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REFRESHER COURSE: THE ROLE OF INTRAVENOUS LIDOCAINE IN MODERN ANESTHESIA

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The role of intravenous lidocaine in modern anesthesia: Lidocaine (diethylamino-2,6 aceto-xylylidide), an amide local anesthetic, was discovered in 1943 by Nils Löfgren and his assistant Bent Lundqvist.¹ It has analgesic, anti-hyperalgesic and anti-inflammatory properties². For over 50 years, lidocaine has been used intravenously for several indications including the improvement of acoustic function, regional anesthesia, the treatment of arrhythmias, and the treatment of neuropathic and central pain.³ De Clive-Lowe et al. in 1958 and Bartlett et al. in 1962 were the first to describe the intravenous use of lidocaine in the management of postoperative pain.^{4,5}

Pharmacokinetics and toxicity of lidocaine: The therapeutic plasma concentration of lidocaine ranges between 2 to 5 µg/ml, with side effects occurring at levels above 6 to 10 µg/mL. Lidocaine is metabolized primarily by the liver, only 10% is excreted unchanged in urine. It is degraded to two active metabolites, monoethylglycinexylidide (MEGX) and glycinexylidide. The elimination half-life of lidocaine after an intravenous bolus injection is 1.5 to 2 hours. The pharmacokinetics of lidocaine appear to change with prolonged infusions, which is attributed to the inhibitory effect of MEGX on the clearance of lidocaine. Lidocaine and MEGX competitively bind to hepatic enzymes. Additionally, congestive heart failure is also a cause of decreased clearance of lidocaine because of a smaller volume of distribution of the central compartment and a diminished cardiac index. Hsu et al. investigated the pharmacokinetics of a 48 hours infusion of lidocaine in patients undergoing cardiac surgery with cardiopulmonary bypass. The authors concluded that weight-dosing is recommended to reduce the risk of toxicity and that the infusion rate should be reduced by 20% after 24 hours of infusion to minimize the risk of toxicity.⁶ In most of the studies with intravenous lidocaine, a bolus dose between 1 and 2 mg/kg is administered followed by a continuous infusion of 1.5 mg/kg/h, which corresponds with a plasma concentration of 2 µg/mL.³

Mechanisms of action of intravenous lidocaine: Although the exact mechanisms of action of intravenous lidocaine are still not fully understood, several potential mechanisms have been described. The best known action of lidocaine (and of its active metabolite, i.e. monoethylglycinexylidide, MEGX) is the blockade of the peripheral and central voltage-gated Na⁺-channels at the intracellular side of the cell membrane, hereby inhibiting the propagation of action potentials.⁷ The prolonged effect of lidocaine is thought to reflect its inhibition of the spontaneous pulse generation arising from injured nerve fibers and from the dorsal root ganglion neurons proximal to the injured nerve.⁸ Recently, Wolff et al. have shown that local anesthetics act also on different types of voltage-gated potassium channels.⁹ In fact, at low concentrations, lidocaine suppresses tonic firing neurons by interacting with voltage-gated potassium channels. Contrariwise, the effects on the adapting firing neurons can be explained by interaction with the voltage-gated sodium channels. The different sensitivity to a blockade of voltage-gated sodium and potassium channels in different types of neurons can offer a differentiated approach in pain therapy.

It is known that the plasma levels reached with systemic administration of lidocaine are too low to directly block the sodium channels.^{7,10,11} Therefore, there must be other mechanisms to explain the effect of intravenous administered lidocaine. It is thought that the antinociceptive effect of lidocaine is partially mediated through an interaction with receptor mechanisms. First, intravenously administered lidocaine increases the intraspinal release of acetylcholine (ACh), resulting in an increased pain threshold by stimulating inhibitory pathways.³ This effect of lidocaine on ACh release is mediated through an activation of muscarinic (probably muscarinic receptors of the

subtype M3) and nicotinic receptors.^{3,12} Second, already in 1993, Biella et al. have suggested a glycine-like action of lidocaine in the central nervous system.¹³ Glycine is, besides γ-aminobutyric acid, the major inhibitory neurotransmitter in the central nervous system where it binds to and activates glycine receptors to cause hyperpolarization.¹⁴ In addition, glycine is also an excitatory neurotransmitter by its action as co-agonist of glutamate at the N-methyl-D-aspartate (NMDA) receptor. The glycinergic neurons contribute to the inhibition of nociceptive signaling and have important roles in segregating nociceptive and non-noxious information pathways.¹⁴ The synaptic glycine concentration is regulated by two glycine transporters (GlyT).¹⁵ The GlyT1 removes glycine from the synaptic cleft and the GlyT2 mediates the glycine reuptake into the nerve terminals. It is not lidocaine itself, but its major metabolites mono-ethylglycinexylidide (MEGX) and glycinexylidide, that cause the inhibition of the GlyT1-mediated uptake of glycine. This inhibition of the GlyT might provide a novel molecular mechanism for the antinociceptive effect of systemic lidocaine.

A third possible mechanism to explain the analgesic effect of lidocaine is the inhibition of glutamatergic neurotransmission. Glutamate is the most important excitatory neurotransmitter in the central nervous system and binds to several receptors, one of which the NMDA receptor. It is known that the activation of the NMDA receptor can lead to postoperative hyperalgesia and central sensitization. Both Hahnenkamp et al. and Gronwald et al. showed that local anesthetics inhibit the NMDA receptor in a concentration-dependent manner.^{16,17}

Finally, lidocaine exerts anti-inflammatory effects by inhibition of nuclear factor κB activation and decreased up-regulation of pro-inflammatory cytokines.¹⁸ Lidocaine attenuates the production of inflammatory cytokines such as IL-1, IL-6, IL-8 and stimulates the production of IL-1-receptor antagonist.¹¹ The inflammatory response is an important determinant of outcome after surgery, as an excessive stimulation of the inflammatory cascade can lead to a systemic inflammatory response syndrome, organ dysfunction and pain.¹⁹

The analgesic effect of lidocaine in abdominal surgery: During the last decade, the use of systemic lidocaine as a co-analgesic has gained renewed interest for the treatment of acute postoperative pain. Four meta-analyses (Sun et al. 2012, Marret et al. 2008, Mc Carthy et al. 2010 and Vigneault et al. 2011) showed that the use of intravenous lidocaine perioperatively in abdominal surgery decreased postoperative pain intensity, reduced opioid consumption, accelerated the recovery of gastro-intestinal function and shortened hospital stay.^{2,20,21,22} In a randomized, placebo controlled, double-blind study, Kaba et al. showed for laparoscopic colectomy that patients receiving systemic lidocaine perioperatively required 50% less opiate medication during the first 24 hours postoperative.²³ Likewise, Tikuišis et al. investigated systemic lidocaine in laparoscopic colon surgery²⁴ and found significantly lower pain scores both in rest and during movement. Kuo et al. compared the use of thoracic epidural analgesia and intravenous lidocaine in patients undergoing colonic surgery and reported that intravenous lidocaine can be an alternative for an epidural catheter to improve postoperative pain relief. In abdominal surgery other than colonic surgery similar results have been reported with regard to postoperative pain relief and opioid consumption.²⁵ Kang and Kim reported for patients undergoing inguinal herniorrhaphy significantly lower pain scores and opioid consumption the first 12 hours postoperatively in the intravenous lidocaine group.²⁶ Yon et al. investigated the effect of intravenous lidocaine on postoperative pain in patients undergoing subtotal gastrectomy. Their results demonstrated that the VAS scores were significantly lower in the lidocaine group the first postoperative 24 hours and the fentanyl consumption was lower for the first 12 hours.²⁷ Also after laparoscopic bariatric surgery systemic lidocaine reduced pain scores and opioid consumption and therefore improved quality of recovery.²⁸ Koppert et al. examined the effect of perioperative intravenous lidocaine on postoperative pain and morphine consumption after major abdominal surgery. He included several types of abdominal surgical procedures in his trial and found that intravenous lidocaine reduced postoperative pain and morphine consumption.²⁹

Although the majority of trials on intravenous lidocaine in abdominal surgery confirms the analgesic effect of lidocaine, several other studies failed to

reproduce these findings. Herroeder et al. investigated the effects of intravenous lidocaine in colorectal surgery. While intravenous lidocaine improved gastrointestinal motility and shortened length of hospital stay, it failed to reduce VAS scores and opioid consumption.³⁰ Bryson investigated the effect of intravenous lidocaine in patients undergoing abdominal hysterectomy and observed no differences between the lidocaine group and the control group concerning VAS scores, opioid consumption and length of hospital stay.³¹ Wuethrich et al. could not demonstrate any benefit of intravenous lidocaine in laparoscopic renal surgery.³²

The analgesic effects of lidocaine in non-abdominal surgery: The analgesic effect of perioperatively intravenous lidocaine has also been studied in non abdominal surgery, with however mixed results. Insler et al. did not observe any significant advantages in the perioperative use of intravenous lidocaine with respect to postoperative analgesia and recovery of patients undergoing coronary artery bypass surgery.³³ In total hip arthroplasty, Martin et al. found intravenous lidocaine not to improve analgesia and functional recovery.³⁴ In breast surgery, Choi et al. did not find beneficial effects of intraoperative lidocaine on opioid sparing, pain intensity, return of bowel function and length of hospital stay.³⁵ In contrast, Grigoras et al. performed a randomized, double-blind controlled trial in 63 patients undergoing breast surgery and found perioperatively administered intravenous lidocaine to reduce the VAS scores the first 4 hours postoperatively, but particularly to ameliorate persistent pain after breast surgery.³⁶ Kim et al. investigated the effect of perioperative intravenous lidocaine for lumbar discectomy, while Farag et al. studied the use of lidocaine for complex spine surgery. In both studies intravenous lidocaine reduced postoperative pain and opioid consumption.^{37,38}

Of note, systemic lidocaine does not interfere with neurophysiological monitoring and allows to reduce the total dose of propofol in total intravenous anesthesia when used as an adjunct.³⁹

The effect of lidocaine on functional recovery: Intravenous lidocaine improves bowel motility, decreases the length of postsurgical ileus and thereby shortens hospital stay.^{21,23} Decreased bowel motility after surgery or postsurgical ileus is a common finding after major abdominal surgery and is characterized by hypoactive bowel sounds, abdominal distention, pain, nausea and vomiting. The motility of the bowel is affected by the activation of neural reflexes involved in pain.⁴⁰ The pathophysiology is complex, and neurogenic, metabolic and inflammatory responses are involved. Also endogenous opioids released during the stress response or exogenously administered opioids can cause ileus. The complications of ileus may contribute to a prolonged and uncomfortable hospital stay. In a study published in 2000, Ness et al. investigated the effect of intravenous lidocaine in the rat on visceral pain as a result of colorectal distension. The investigators concluded that intravenous lidocaine produces significant dose-dependent inhibition of neural and reflex responses to colorectal distension.⁴¹ Harvey et al. investigated the effect of intravenous lidocaine on postsurgical ileus and length of hospital stay in 22 patients undergoing elective bowel surgery. The authors noted significantly earlier return of bowel motility in the lidocaine group when compared to the control group (88.3±6.08h versus 116.2±10.1h).⁴⁰ Similar results were found by Groudine et al. in patients undergoing radical retropubic prostatectomy. In the lidocaine group, the patients experienced earlier bowel movements than the control group (61.8±13.2 versus 73.9±16.3). There was also a significant reduction in length of hospital stay (4±0.7 days in the lidocaine group versus 5.1±2.9 days in the control group).⁴² The above mentioned studies of Kaba et al. and Tikuišis et al. confirm the results from the two previous studies with respect to recovery of bowel function and shorter hospital stay. In the Kaba trial the first flatus occurred 12h earlier in the lidocaine group and the hospital stay was shortened by approximately 1 day.^{23,24} Tikuišis found for lidocaine an 18% reduction in the time to the first bowel movement and a reduction of hospital stay by 1.2 days.

Some studies however did not show a benefit of systemic lidocaine on bowel function. Wongyingsinn et al. investigated the effects on bowel function of a perioperative lidocaine infusion in comparison with thoracic epidural analgesia in patients undergoing laparoscopic colorectal surgery. Recovery of the bowel function was the primary endpoint in the study. The authors found no significant differences between the two techniques.⁴³ Swenson et al. compared a lidocaine infusion with epidural analgesia concerning the effects on bowel function in open colon resection. These authors came to the same conclusion as Wongyingsinn et al., with no differences observed between groups in terms of bowel function and duration of hospital stay. Intravenous lidocaine may be an alternative to epidural therapy in patients in whom epidural anesthesia is contraindicated or not desired.⁴⁴ No benefit of intravenous lidocaine was found in relation to bowel function and hospital stay after breast surgery by Choi

et al. and after non-bowel abdominal surgery by Wuethrich et al.^{32,35} The authors investigated the effect of intravenous lidocaine on pain, bowel function and length of hospital stay, but no beneficial effects were found.^{32,35} In the two last studies no direct bowel surgery was involved, which might be an explanation for the lack of beneficial effect on bowel function and length of hospital stay.

The effect of lidocaine on the inflammatory response: Surgery causes tissue and peripheral nerve injury, which leads to a local inflammatory reaction mediated primarily by cytokines synthesized at the site of injury. The local release of cytokines (interleukin-1 (IL-1), IL-8, tumor necrosis factor (TNF)) coordinates the inflammatory response at the site of injury and induces neutrophil chemotaxis.¹¹ Proinflammatory cytokines (interleukin (IL)-1β and IL-6) induce peripheral and central nervous system sensitization which leads to hyperalgesia.¹⁹ Lidocaine has anti-inflammatory properties reflected by a decreased release of proinflammatory cytokines both in vitro and in vivo.¹¹ Moreover, lidocaine stimulates the secretion of the anti-inflammatory cytokine IL-1 receptor antagonist (IL-1ra) by epithelial cells.¹⁸ The study by Kuo et al. demonstrated that the increase in proinflammatory and anti-inflammatory cytokines in the perioperative period was the least in the patients with a thoracic epidural and intermediate in the patients who received intravenous lidocaine which is translated in better pain relief and better bowel function.²⁵ Yardeni et al. examined in 2009 the effect of perioperative intravenous lidocaine on postoperative pain and immune function in patients undergoing a transabdominal hysterectomy. The authors demonstrated that the group who received perioperative lidocaine had better pain relief postoperatively which was associated with attenuated production of both pro- and anti-inflammatory cytokines (IL-6, IL-1ra).¹⁹ Herroeder et al. found similar results in his study: systemic lidocaine significantly attenuated the plasma levels of IL-6, IL-8 and IL-1ra.³⁰

The effect of lidocaine on cancer recurrence: The perioperative period of tumor surgery is a vulnerable time in which tumor progression and metastasis are often accelerated. Inflammatory responses are implicated in different stages of tumor development, including promotion, malignant conversion, invasion and metastasis.⁴⁵ The immune system plays an important protective role against cancer growth.⁴⁶ It is therefore important to activate and maintain the anti-metastatic host defenses in which cell-mediated immunity and natural killer cell function play a role. Newer developments in the field of chemotherapy, radiotherapy, and surgical techniques have improved the prognosis of the cancer patient. Recently it has been shown that the anesthetic technique and drug choice can play a role in cancer growth and recurrence.⁴⁷ Regional anesthesia is associated in some retrospective studies with a reduced risk of metastasis and increased long-term survival. So far, the potential beneficial effect of regional anesthesia on cancer recurrence has been contributed mainly to the inhibition of the stress response to surgery, and to the reduction in the requirements of volatile anesthetics and opioids. Since local anesthetics have anti-inflammatory properties and cancer is linked to inflammation, these agents might reduce the risk of metastasis. The amide local anesthetics (ropivacaine and lidocaine) blocks the tumor necrosis factor-α-induced proto-oncogene tyrosine-protein kinase (Src) activation and cell adhesion molecules (ICAM-1). It is known that both processes can favor the extravasation of tumor cancer cells and metastases.⁴⁸ The activity of these 2 systems is significantly inhibited in vitro by the application of amide type local anesthetics.⁴⁸ Lirk et al. demonstrated in his trial that lidocaine demethylates deoxyribonucleic acid in breast cancer cells lines in vitro which may have clinical relevance for local anesthetics on metastatic disease.⁴⁹ Lidocaine also suppresses the epidermal growth factor (EGF)-induced proliferation of malignant cells, thereby inhibiting tumor cell proliferation.^{47,50} Voltage-gated sodium channels (VGSCs) are expressed de novo in vitro and in vivo in a variety of carcinomas. The VGSCs are a well known target of local anesthetics. The blockage of the VGSC suppresses the motility and invasiveness of cancer cells.⁵¹

There is still a lot of controversy about the role of anesthesia in cancer. The British Journal of Anaesthesia workshop on cancer and anaesthesia formulated in their consensus statement five recommendations: 1) there is insufficient evidence that anesthetic or analgesic technique affect cancer outcome, 2) the available data on the role of opioids in cancer are conflicting, 3) morphine does not stimulate tumor initiation, morphine analgesia does not cause cancer and its role in the risk of cancer recurrence or metastasis remains unclear, 4) collaboration should be sought with other specialists in an attempt to study the link between anesthetic technique(s) and cancer outcome, 5) the expert group calls for randomized clinical trials to evaluate the effect of adjunct medications used during anesthesia for primary cancer surgery on cancer recurrence or metastasis.⁵²

The effect of lidocaine on cognitive dysfunction: Wang et al. investigated the effects of lidocaine on early postoperative cognitive dysfunction after coronary artery bypass surgery. The authors concluded that the proportion of

patients showing postoperative dysfunction was significantly lower in the lidocaine group compared with the placebo group (18.6% versus 40.0%; $p=0.028$).⁵³

Conclusion: In recent years, there is increasing evidence on the use of intravenous lidocaine for perioperative pain relief.

The studies suggest that intravenous lidocaine might be used as a co-analgesic in a multimodal approach for postoperative pain therapy, particularly in abdominal surgery. Lidocaine seems to have positive effects on the recovery of bowel motility. The mechanisms of action of lidocaine are still not fully understood. The effect of lidocaine on the voltage-gated sodium channels is by itself inadequate to explain the analgesic effect of intravenous lidocaine. Given the positive effect of intravenous lidocaine in many studies, lidocaine should remain the subject for further research.

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PRO-CON DEBATE: CONTINUOUS REGIONAL ANESTHESIA FOR ORTHOPEDIC SURGERY IS SUPERIOR TO SINGLE SHOT TECHNIQUES – PRO

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Regional anesthesia and combined techniques have some advantages over general anesthesia, consisting of a leaner perioperative process management (of which post-anesthesia care unit by-pass is only one aspect), the prevention of very common complications (eg, postoperative nausea and vomiting, sedation, urinary retention, pruritus, constipation) and optimal postoperative pain control, with rarer side effects than an opioids-based systemic analgesia. An effective, opioid-free analgesia is indeed one of the crucial points in the enhanced recovery after surgery philosophy, whose guidelines strongly recommend multimodal analgesia, integrating regional anesthesia techniques whenever possible.

Advantages of regional anesthesia based analgesia however seem to be limited to block duration. In fact, when single shot techniques are used, postoperative pain can outlast the effect of local anesthetics, with consequent need for an opioids-based complementary analgesia. This carries the risk of related side-effects, with a potential negative impact on the outcomes of the rehabilitation process (about one out of four patients receiving opioids manifest clinically significant side effects).

Several methods are available to effectively prolong the effect of regional analgesia in the postoperative period. Adjuvants can be added to local anesthetic in single shot techniques, however this will also prolong motor block, which can impair early rehabilitation in fast-track settings and delay discharge after ambulatory surgery. Perineural catheters instead can provide optimal analgesia and much more flexibility, local anesthetics concentration and infusion protocols being adjustable to meet specific postoperative processes requirements and patients' exigencies.

Even if many case reports have been written about severe perineural catheters linked complications, an increase in risk with continuous versus single shot peripheral nerve blocks has never been demonstrated. Of course there are specific perineural catheters linked complications, however the most frequent and severe complications in regional anesthesia remain procedural, occurring during needle placement or anesthetic bolus injection. Provided the know-how and the resources to effectively manage continuous regional analgesia in the ward are available, if a peripheral nerve block has been planned as anesthetic technique, a continuous technique can be considered to treat postoperative pain without a demonstrated significant increase in risks for the patient.

Postoperative continuous regional analgesia has also been effectively and safely used in the outpatient setting. Thanks to the availability of effective, affordable, sophisticated and user-friendly disposable infusion devices, continuous regional analgesia can now be performed with comparable quality and safety standards in-hospital and at home.

In literature only a few double blind, randomized, placebo-controlled prospective trials are available on safety and effectiveness of home-based continuous peripheral nerve blocks. All of them strongly support the use of outpatient continuous peripheral nerve blocks for postoperative pain management in the ambulatory setting. In particular, continuous regional analgesia is associated to better pain scores, less opioids requirement, less side effects and higher patients' satisfaction. Moreover outpatient continuous peripheral nerve blocks after painful ambulatory surgical procedures can potentially determine significant hospital savings, fastening discharge and preventing unexpected patients readmissions due to untreated postoperative pain at home.

Of course a safe and effective postoperative continuous regional analgesia based practice (particularly if outpatient peripheral nerve blocks are performed on a regular basis) requires specific skills, significant resources and – even more important – a well defined and structured perioperative care process protocol, to be shared and endorsed by many actors. The organization of such a protocol seems to be the single most important key factor to success. In particular attention should be paid to an appropriate candidates selection. Some specific considerations must be taken into account in case an outpatient continuous regional analgesia is planned: optimal patients' compliance, patients' autonomy, presence of architectural barriers, distance from the hospital, possibility to reach the hospital if needed and availability of informal cares at home. Patients must be adequately informed well in advance, since they should play an active role in the treatment, for example getting in touch with the hospital pain-team to early notify eventual side-effects or complications. A telephonic follow-up is thus recommendable, in order not only to monitor patients, but also to optimize their analgesia with simple instructions (for example to change infusion rate or temporary stop it). Finally a 24/24 hours active number should be available for all patients, who should be given the possibility to contact the acute pain-team whenever they need to.

In case an outpatient continuous regional analgesia unit would be too difficult, expensive or work-intensive to put in place for a given anesthesia department, a simpler and effective alternative option in many cases would be a single shot anesthetic block supplemented by one or more distal antalgic blocks. In order to avoid prolonged motor block, a shorter acting local anesthetic based on surgery duration can be used for the anesthetic block, while distal peripheral nerve blocks can be performed with longer acting local anesthetics plus eventual adjuvants, such as clonidine or dexamethasone, in order to provide long term analgesia while preserving motility.

In the last years dexamethasone has been investigated as an effective local anesthetic adjuvant to significantly prolong peripheral block duration. The resulting very long, intense block could be a problem when motility is also affected, since a prolonged motor block can cause intense discomfort to patients, impair early rehabilitation and – when performed on lower limbs – also mobilization, eventually delaying discharge and increasing the risk of prolonged immobilization related complications. Moreover a residual lower limb motor block can contribute to falls and injuries when patients are initially mobilized after surgery. The use of adjuvants seems thus to be an alternative to the more flexible and adjustable continuous peripheral nerve blocks only when performed distally (for example single nerve blocks at the level of the elbow, wrist block, abductor canal block, saphenous block, ankle block, troncular blocks, paravertebral block, abdominal wall block and local infiltration anesthesia).

A comparison of continuous peripheral nerve blocks versus distal analgesic blocks supplementation for the treatment of a relatively short duration moderate to severe postoperative pain has not been properly investigated yet. However whenever a significant postoperative pain is expected to last for several days – such as in major orthopedic surgical procedures – postoperative continuous regional analgesia remain a gold standard.

ESRAS-0532

REFRESHER COURSE: HOW TO MANAGE CANCER PAIN

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Having cancer doesn't mean having pain but in more than 50%-70% of cases patients with cancer experience a severe, often uncontrollable pain during the course of their disease (ACS2002). This pain usually rises during

disease progression: in advanced stages of cancer pathology the pain affect the 80% of patients and also 90% in patients with osseous metastases.

Also if the cancer pain incidence is well known, only less than half of patients receive an adequate pain treatment.

Many studies clarify how the cancer pain can have different physiopathology mechanisms behind its occurrence, despite it the most used approach to cancer pain is driven by 1990 WHO ladder scale.

As above-mentioned the pathologic process that cause cancer pain is complex and involves different mechanisms that are responsible for the genesis of cancer pain, the correct knowledge of these mechanisms can move our practice from symptom control toward mechanism specific pharmacology management.

Simplifying we can identify two types of pain:

Nociceptive pain where stimuli are transmitted by specialized pain receptors (nociceptors) through peripheral nerves until the spinal cord; in cancer pain it is frequently associated with invasion of tumor in bone, joint, connective tissue and innervated organs.

Nociceptive pain can be well-localized well-described (often like a knife-like, a sharp or a dull pain) like in somatic nociceptive pain; in other cases the description is less clear, without a good localization of the pain that is much more like a generic pressure like, cramp sensation arising from organ damage or tumor infiltration, compression or torsion of organs, sometimes can be referred to superficial zone also distant from affected organs.

The other type of pain is neuropathic pain that is much more complex and a challenge to attend; it results from mechanical or metabolic alteration of nervous system; can be divided in peripheral or central. Neuropathic pain is associated with alteration of nerve system with a series of neurological signs of altered nerve perceptions (allodynia, painful anesthesia, paresthesia, thermal hyperalgesia) with typical description of sting, numbness, pins, electrical sensations and can be a result of nerve invasion by tumors, central metastasis but often it may arise from efforts to treat the tumor (surgery, radiotherapy, chemotherapy).

Also if WHO ladder scale has limits a systematic dissertation about the drugs used in control cancer pain can be useful:

Acetaminophen (paracetamol): It is recommended as a first and second step for mild to moderate pain. There are much to clarify about paracetamol mechanism of action but in a recent paper Graham exhibited some interesting findings about target of acetaminophen:

- inhibits the production of PGs from arachidonic acid when the peroxide tone of isolated cells is low; there are two enzymes precursors of the intermediate PGs, PGG2 and PGH2
- Serotonergic 5-HT₃ antagonism in Human
- Opioid receptors anti-nociceptive effect of paracetamol inhibited by mu and k opioid receptor antagonists in rats;
- Cannabinoid: CRB1 effect
- glutamate, substance P, NMDA
- NO

For all these targets Paracetamol can be a real useful drug for treatment of cancer pain where the peripheral and central mechanism of pain work together.

Acetaminophen is not generally used alone for cancer pain, but rather in combination with opioids and other adjuvants.

Its use is limited by a maximum daily dose of 4000 mg due to potential hepatic toxicity caused by one of its metabolites, N-acetyl-p-benzoquinoneimine (NAPQI), that depletes the liver's natural antioxidant glutathione and directly damages cells in the liver, leading to liver failure

NSAIDs: NSAIDs have analgesics, antipyretics, and anti-inflammatory effects through nonspecific inhibition of cyclooxygenase (COX).

COX mediates prostaglandin synthesis from arachidonic acid.

General NSAIDs have nonspecific inhibition of both isoenzymes of cyclooxygenase

(COX-1 and COX-2), so with chronic use, they can cause serious gastric and intestinal ulcerations and bleeding, which is a result of the inhibition of COX-1 isoenzyme.

Recent works shown that a use of pump inhibitors can reduce gastric complication but at same time for dismicrobism can worse the intestinal effect.

In cancer pain, these effects make NSAIDs the choice not better because cancer patients often are experiencing nausea and vomiting associated with receiving chemotherapy or have a history of GI bleeding in the past or with surgical or cancer localization on gastrointestinal area.

NSAIDs have a maximum daily dose that limit their utility also in form of pain that can take advantage by the use of anti-inflammatory drugs.

For these reasons the recommendation is to use the NSAIDs at the lowest effective dose (that often is different by the commercial dosage), for the shorter

time possible and if doesn't show effects after few days it is important to reevaluate the therapeutic strategy.

COX-2 inhibitors are born for reduce the GI and renal side effects, this drugs inhibit only COX-2 isoenzyme (the inducible form, typically over expressed in inflammation). Some recent studies show also an antitumoral effect in some solid tumors due to the inhibition of cytokine production (Rouff Lema 2003).

For that reason COX-2 demonstrate a good efficacy in patients with bone metastasis where prostaglandins play a role in pain genesis.

Weak Opioids: There is a big confusion about the definition of weak opioids; traditionally weak opioids are the drugs that show a low affinity with opioid receptors or that show a partial agonism with the receptors.

For this reason codeine can't be defined a weak opioid also if it is often put in this group, because codeine is a pro-drug that is metabolized after a hepatic metabolism into morphine.

Actually the most important weak opioids are tramadol and buprenorphine **Tramadol:** combines two effects, one is a central effect with low affinity for μ -opioid receptors, the second is an effect over the descending inhibitory pain pathways by inhibition of reuptake of serotonin and norepinephrine.

The two effects work in synergic way and can be a good choice in patients who fail non opioid therapy and want to delay taking opioids.

For add another synergic effect actually there are commercialized form of tramadol associated with acetaminophen.

Buprenorphine: is a partial agonist of μ -opioid receptors and antagonist for kappa and delta receptors; It is 25–30 times more potent than morphine and it's available in different forms (in particular is widely used the transdermal form).

Transdermal buprenorphine shows a little lower incidence of constipation and a lower incidence of respiratory problems compared to other transdermal opioids, but at same time buprenorphine seems to have the most powerful effects of immunodepression and hormonodepression between all opioids.

Strong Opioids: **Morphine:** remains the most used opioid for severe cancer pain. The reasons of this broad use depends by low cost, availability and wide ways to administration (oral, iv., rectal, subcutaneous, intrathecal, etc.).

Morphine is metabolized in the liver producing one inactive metabolite (M3G) and an active one (M6G) with a longer half-life that can be under accumulation in particular if the kidney excretion is reduced by some renal pathologies.

Morphine, however, has a very important role in titration of opioids, in the oral form can be real useful for switch to other formulations or ways of administration.

Codeine: as told before codeine is a prodrug which must be O-demethylated by liver (around 10%) into morphine. Codeine is converted by an enzyme that is expressed in different genetic form (CYP2D6) there are different evidence over around 10% of population who is unable to produce morphine by codeine and another 5%-6% is a ultra rapid metabolizer that can produce suddenly peak of morphine.

This genetic variability explain the real different reaction to codeine by patients and confirm by a genetic point of view the validity of opioids rotation.

Hydromorphone: is a semisynthetic agonist of μ opioid receptor 6 time more potent than morphine; compared to morphine, hydromorphone has higher lipid solubility and ability to cross the blood-brain barrier and, therefore, more rapid and complete central nervous system penetration.

Oxycodone: is an agonist of μ and kappa opioids receptors, It's often used in association with paracetamol and its commercialized in both forms: fast release and slow release. Controlled release oxycodone provides a good relief for 12h with a faster onset than morphine. Recently the association with naloxone has shown a good effect over constipation, with a sensible reduction of Bowel Function Index and nausea.

Tapentadol: is a centrally acting opioid analgesic of the benzenoid class with a dual mode of action as an agonist of the μ -opioid receptor and as a norepinephrine reuptake inhibitor.

Unlike tramadol the absence of serotonergic effect prevents some side effects and some drug interactions. Moreover the only descending inhibitory pain pathways that is inhibiting is the noradrenergic one and it's an important part of its effect because the serotonergic one in some case can have a pronociceptive function.

Adjuvants Drugs: As mentioned before adjuvants are so named because in the WHO ladder are used together with analgesic drugs. Sometimes "adjuvants" can be the principal treatment in particular in neuropathic pain.

In cancer pain treatment there are also other drugs that can be considered adjuvants in addition to usual antidepressants and anticonvulsants;

- **corticosteroids:** reduce neural edema inhibiting prostaglandins synthesis. It's often used for the cancer complication that can cause pain like: cerebral edema with headache and/or high intracranial pressure, infiltration of blood

vessels, metastatic bone, capsular distension pain, lymphedema and so on. Dexametazone is widely used for its extended half-life and for the easy oral way.

Topical anesthetics: cream and patch are used for painful lesions of mucosa or skin.

Biphosphonates: inhibiting osteoclast activities can be useful for reduce bone pain in patient with advanced state of cancer. Different studies show a clear effect in bone pain for multiple myeloma.

Antidepressants: the analgesic effect induced by antidepressant is independent by the effects on mood, often with lower dose. The most used are TCA (tricyclic antidepressant) that can have a double effect over the neuropathic pain and helping sleep and reduce anxiety.

The group of SSRI never reveal a good efficacy over neuropathic pain in cancer and non-cancer origins.

Anticonvulsants: in this group there are different families of drugs, in general all are effective over the shooting, burning pain typical of nerve invasion. Gabapentin before and pregabalin after are the most used anticonvulsant for neuropathic pain, it's not clear which is the best against cancer pain, in some studies gabapentin shows a little prevalence of efficacy but pregabalin shows a better profile of tolerability.

Knowing all the drugs for pain treatment doesn't mean that cancer pain is easy to treat: a standard treatment for severe cancer pain needs a multimodal therapy where the different aspects of pain in terms of etiology and temporal incidence are fully covered.

Usually the first step is to cover the along day pain using long term release drugs mixing analgesic effect, anti-inflammatory effect and if present anti neuropathic pain drugs.

After this approach that must be in the first days carefully analyzed and fixed, the patients report short but very intense pain; this is the breakthrough cancer pain (BTcP) that has different definition, the last published definition of btcp is by Davies on European journal of Pain in 2009 and it's express like a transient exacerbation of pain that occurs either spontaneously, or in relation to a specific predictable or unpredictable trigger, despite relatively stable and adequately controlled background pain

BTcP must be differentiated by "end drug effect" (where always at a particular hour the patient refers pain), after this differential diagnosis the use of Rapid Onset form of Opioids (ROO) is mandatory.

Also in a recent work by Antonio Gatti it's clear how the BTcP is undertreated and when treated the drugs chosen were often non opioids and non-fast release formulation.

There are different forms of ROO that use different drugs and different way of administration:

Until the early 2000s, the only way to administer opioids for fast relief of pain was morphine (more often in oral route, but also subcutaneous), which has a long half life but required about 30–40 minutes to show its effect, often too long for BTcP.

In the last 15 years many products have been introduced, most of them based on fentanyl, which shows a perfect pharmacokinetic for BTcP (fast onset, powerful, short duration of effect).

In the following table are exposed the different onset time, peak of effect and duration of effect.

	Onset time	Peak of effect	Duration of effect
Oxycodone IR	15–30 min	1 h	4–6 h
Tapentadol IR	30 min	1,25 h	4 h
FNT Buccal Tablet	15 min	40–60 min	1 h
FNT Sublingual	15 min	30–60 min	2–4 h
FNT Oral Transmucosal	15 min	22–24 min	2–4 h
FNT Intranasal	5–8 min	12–15 min	1 h
FNT Intravenous	1–2 min	3–5 min	0,5–1h

Because there is no "best" formulation for every BTcP, it is important to choose the right ROO for the right patient, choosing in base of onset time, duration and clinical status: a patient with mucositis, after, will have more advantage by the use of a transanal product; a patient who has pain everytime he goes shopping may benefit from a drug with a longer duration effect and slower onset time if taken 20–30 minutes before going out.

Another important space in treatment is about the surgical procedure for pain that is a really 4th step of WHO ladder

Also treatments directed at the source of cancer pain are important and may enhance patient's longevity:

- **Vertebroplasty:** with insertion of methylmethacrylate into a painful vertebral body; the acrylate stabilized the bone activity and can reduce the pain in less than 3 days; Near all the vertebrae are treatable if not have destruction of posterior body wall also if not collapsed.

- **Radiofrequency tumor ablation:** may produce significant pain reduction in some tumors as pancreatic, bone and renal but in particular in liver metastases.

- **Radiotherapy:** there are clear data supporting use of RT in bone, cerebral and epidural metastasis.

After all drugs are used another step can be evaluated – not a 4th step but often considered an integrated approach to treatment of cancer pain, reducing or sometimes changing the drug's response.

Neuroaxial Techniques: Neuroaxial techniques work placing medications closer to the entrance of afferent fibers, interneurons and ascending pathway; in this way the total amount of drugs (and adverse effect correlated to dosage) is brutally reduced. Drugs used are usually opioids and local anesthetics, with sometimes addition of adjuvant like clonidine or ziconotide.

The way to administer drug in this way is through epidural infusion or intrathecal infusion; in particular intrathecal continuous infusion is often used in cancer pain for the efficacy and relative simply management.

Patients with a life expectation of at least 3 months can be eligible to IT test with opioids with the intention to put a implantable drug delivery system. For the patient with a shorter expectation an external pump infusion can be anyway effective and safely with a low incidence of collateral effect.

Neurolysis: Neurolysis is a maneuver for disrupt a nerve or a group of nerves with mechanical force (chemical, heat, freeze)

The typical neurolytic blocks are reported in the table below:

Lesion	Pain site
Thoracic ganglia	Arms Lung, Esophagus, bronchi, pleura, pericardium
Gasserian	Face, mouth
Celiac	Pancreas, abdominal vessel, colon, liver, ureters
Lumbar	Kidney, testes, lower extremity vessel
Hypogastric	Uterus, bladder, ovaries, prostate, sigma
Ganglion impar	Rectum, anus, vagina, vulva

The exact techniques description for the block of all these areas are not the purpose of this work but in general we can say that are relatively easy techniques with high level of efficacy that must be reserved for pathologies clearly without any other way of care.

The exact techniques description for the block of all these areas are not the purpose of this work but in general we can say that are relatively easy techniques with high level of efficacy that must be reserved for pathologies clearly without any other way of care.

In conclusion, cancer pain treatment is a complex issue for pain physician for a variety of reasons:

- wide variability of presentation, with different signs and a complex physiopathology;
- different types of cancer and stages of illness may require different therapeutic approaches;
- patient complexity, including psychological aspects of the cancer;
- a patient's family may modify the patient's status.

In summary, optimum treatment of one of the most important cancer symptoms requires a multidisciplinary multimodal therapy initiated promptly and driven by the WHO ladder.

ESRAS-0505

PRO-CON DEBATE: THE ANTI-INFLAMMATORY EFFECTS OF LOCAL ANESTHETICS ARE OF NO MAJOR CLINICAL RELEVANCE – PRO

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Local anesthetics (LA) are prodigious drugs that did a lot of services to the patients. They are currently used either locally in the setting of locoregional anesthesia/analgesia (LRA), or by systemic administration, especially during abdominal surgery, where a clear benefit has been demonstrated on postoperative pain relief as well as on recovery course. Their mechanisms of action are

numerous, complex and remains still partially unknown more than a century after their discovery.

The most characterized action of LA is to block the conduction of nociceptive inputs in nerves by a specific action on neuron cell ion channels. Additionally, probably the most non-anesthetic striking effect of LA is their inhibition on inflammatory response elicited by surgery (1,2). Considering the major role played by inflammation on postoperative morbidity (3) and pain process (generation and maintenance) (4), this is certainly worth to address and could explain the large number of reports dedicated to this area of research for a long time.

In fact, LAs are able to display anti-inflammatory properties mainly by two ways. First of all by direct mechanisms, involving the reduction of the interleukine release from leucocytes, the dose-dependent reduction in the Reactif-Oxygen Species (ROS) formation, the depression of the inducible NO synthase activity and the decrease in macrophages recruitment (1,2). There is no doubt about these properties. For instance, it has been shown that bupivacaine directly inhibits COX-2 expression and cytokine production in isolated endotoxin-activated macrophages (5). The second anti-inflammatory pathway is related to indirect effect mediated through neural blockade. Indeed, surgical injury promotes the release of inflammatory mediators that triggers the nervous system activation, which by itself may promote the inflammatory reaction. This creates a positive retro-controlled loop; the so-called "axonal reflex", involved in the initiation, maintenance and the chronicization of pain. There is a large body of evidences that peripheral neural blockade is likely to reduce local inflammation (6–8). It has been shown that this anti-inflammatory effect, bring about by neural blockade, is of similar magnitude than the effect induced by a parenteral administration of ketoprofen (9). Then, what about the LA specific anti-inflammatory effect? In these models, direct anti-inflammatory effect of LA can be ruled out because systemic administration of bupivacaine, or tetrodotoxin did not display the same effects than locoregional administration (10–12). Furthermore, it has been shown that this indirect anti-inflammatory effect, triggered by LA, was not associated with a decrease in systemic concentration of inflammatory mediators (8). Similarly, the recognition of the reduction of the inflammatory flare induced by a skin incision after preoperative lidocaine infiltration may be ascribed to a blockade of terminal nerves ramification (13), albeit it can be argued that local anti-inflammatory mechanisms might have played at least a minor role.

Beneficial effects of lidocaine perioperative intravenous infusion has been well characterized (14,15). After abdominal surgery, intravenous lidocaine administration decreases postoperative pain, opiate consumption, improves abdominal comfort and hastens the resumption of gastric function. These properties are of major clinical importance within the concept of postoperative rehabilitation (16). However, the role played by LA anti-inflammatory properties remains poorly established and questionable. Indeed, intravenous lidocaine has analgesic properties related to various sites of action and mechanisms (blockade of Na⁺ channels in central and peripheral nerve, increase in cerebrospinal acetylcholine concentration, blockade of presynaptic muscarinic receptors, release of endogenous opioids, and also inhibition of glycine and NMDA receptors at the spinal level). Systemic anti-inflammatory effects cannot be totally excluded, but if exists, is certainly of minor importance. Only one study carried out by Herroeder et al. has shown a moderate reduction in the IL-6 production after intravenous lidocaine administration during colorectal surgery, this effect being limited to the first 2hrs after surgery (17). Efficacy of intravenous lidocaine to reduce digestive ileus is rather related to a specific action on neuronal inputs coming from digestive tract, as well as an effect on digestive muscular cells, than to anti-inflammatory effects (18). This statement is further reinforced by the lack of efficacy of intravenous lidocaine after orthopedic surgery (19).

In conclusion, specific anti-inflammatory effect of LA certainly exists but is to date mostly proved on in vitro models. Its clinical relevance has to be more studied in in vivo models. Although specific anti-inflammatory action, at least for a minor part, cannot be totally excluded, the major part of the clinically relevant anti-inflammatory effect of LA is mostly ascribed to the blockade of nociceptive inputs transmission and the abolition of axonal reflex.

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ESRAS-0497

PRO-CON DEBATE: THE ANTI-INFLAMMATORY EFFECTS OF LOCAL ANESTHETICS ARE OF NO MAJOR CLINICAL RELEVANCE – CON

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The use of local anesthetics has long been focused on the treatment of pain and cardiac arrhythmias. During the last decades several studies have demonstrated that local anesthetics are able to interfere with other receptors(1). This has led to the administration of local anesthetics in different settings including postoperative ileus, neuroprotection, decompression sickness, cerebral air embolism, cancer recurrence and various types of inflammation. On the other hand some concerns including chondrotoxicity have been the focus of different investigations. The aim of this lecture is to provide an overview of recent progress in terms of new indications and limitations of local anesthetic application.

Antimicrobial properties: Local anesthetics have long been known to inhibit the growth of different species in vitro(2). Infiltration of surgical wound with 2ml lidocaine 2% prior to inoculation was associated with an average decrease in bacterial count of >70%(3). Epidural abscess is an uncommon yet serious complication of epidural catheterisation. Coghlan et al(4) investigated the antibacterial activity of various local anesthetics and additives used in epidural infusions, against a range of micro-organisms associated with epidural abscess.

Different concentrations of bupivacaine, ropivacaine and levobupivacaine with or without fentanyl, adrenaline or clonidine were tested. Bupivacaine was shown to have the most efficient activity against micro-organisms. It showed antibacterial activity against staphylococcus aureus, enterococcus faecalis and escherichia coli with minimum inhibitory concentrations between 0.125% and 0.25%. However, bupivacaine did not inhibit the growth of pseudomonas aeruginosa. Levobupivacaine and ropivacaine had no activity against any of the micro organisms tested. The presence of fentanyl, adrenaline and clonidine had no additional effect on the antimicrobial activity of any of the local anesthetic tested. While the clinical implications of this in vitro study are not known, consideration should be given to use higher concentration of LA (bupivacaine 0.25% has a greater antimicrobial activity than 0.125%) in epidural infusion in order to take advantage of this property.

Neuroprotection: Several studies have previously shown that lidocaine at antiarrhythmic doses(5) or lower doses(6) demonstrates neuroprotective effects. These potential properties are of great importance since the severity of neurologic sequelae and the relatively limited therapeutic interventions make this an important area of research. Postoperative neurocognitive decline is detected in more than 50% of patients after cardiac surgery and is still present 6 months later in 30%. Mathew et al(7) investigated in a prospective, randomized double-blinded, placebo controlled study whether a continuous infusion of lidocaine (bolus 1mg/kg followed by 1mg/min for the next 48h) would reduce postoperative cognitive dysfunction after cardiac surgery using cardiopulmonary bypass. This work demonstrated that lidocaine did not reduce the incidence of cognitive dysfunction, but in non-diabetic patients a secondary analysis did show a protective effect, which was still present 1 year after surgery. This study suggests that certain patients, but not all, may benefit from this treatment.

Recovery of bowel function: Postsurgical ileus is a common occurrence after abdominal surgery, and is one of the major reasons to delay patient's discharge. Previous studies have shown that continuous infusion of lidocaine has positive effects in this setting(8,9). Among the possible hypothesis to explain the salutary effects of i.v. lidocaine, a reduction of the inflammatory reaction secondary to peritoneal distension and / or reduction of post-traumatic - post-surgical stress have been suggested(10,11).

Cancer recurrence: Surgery still remains a cornerstone in the management of cancer patients. However, surgery inevitably induces a profound neuroendocrine, metabolic, and cytokine response. General anesthesia, pain, sympathetic blockade, all are involved in the modulation of the immune system. The natural killer cells (NK) are an important part of non-specific cellular-mediated and antitumoral immunity. Forget and De Kock(12) performed a systematic review to recapitulate data over NK activity during the perioperative period and the influence of anesthesia, analgesia and modulation of sympathetic system. It came out from this review that local anesthetics, contrary to opioids, stimulate the activity of NK cells during the perioperative period. However, it is important to keep in mind that the long term consequences of each technique on patient's outcome warrant further investigations. Yardeni et al(13) assessed pain intensity and immune reactivity in two groups of female patients scheduled for trans-abdominal surgery assigned either to i.v. lidocaine started 20min before surgery or a placebo. All patients had patient-controlled epidural analgesia. In the lidocaine group postoperative pain at rest and during coughing was less in the first 8 postoperative hours. The in vivo production of IL-1ra and IL-6 was significantly reduced, whereas the lymphocyte proliferation response to phytohemagglutinin-M was better maintained in the control group. This study indicates that i.v. lidocaine reduces surgery-induced immune alterations. The long-term clinical implications of these findings are unknown and warrant future investigations.

Conclusions: It is fascinating that more than decades after the introduction of local anesthetics for perioperative analgesia, we may still discover new properties and anticipate new applications of this class of drugs. Various types of inflammation including neuroprotection, acute lung injury, bowel function recovery and maybe cancer recurrence may be positively influenced by the application of local anesthetics. These issues are without any doubt the challenges of the coming years.

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ESRAS-0520

PRO-CON DEBATE: INTRANEURAL INJECTION SHOULD BE AVOIDED COMPLETELY – CON

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Macfarlane et al. started their review article "Needle to nerve proximity" (*Reg Anesth Pain Med* 2011; 36:290–302) with the sentence: "It has long been believed that intraneural, particularly intra-fascicular, injection is a significant cause of nerve injury."

In fact, peripheral nerve blocks carry the risk of permanent nerve injury, even if the risk is very low. It is also common sense that putting a needle into a nerve and injecting drugs into the nerve can easily be accused for causing the nerve injury.

But the scientific evidence for this is very weak and eventually there are no clinical human data to definitely support this.

Interestingly, the first studies about intraneural injection and nerve injury were written before ultrasound was used for peripheral nerve blocks. Nowadays the needle to nerve proximity is visible and measurable with ultrasound and there are clear ultrasonic signs of an intraneural injection. But in those days only nerve stimulation was available for nerve localization, which has a very weak performance for indicating intra- versus extraneural needle position. Therefore if nerve injury occurred after a peripheral nerve block it was easy to think that an intraneural injection must have been present and that this was the cause for the peripheral nerve injury.

Having a closer look at these first investigations about intraneural injection and nerve injury reveals that these investigations do not resemble clinical practice. Animal models were used, the nerves were prepared and sometimes even isolated and different kind of needles, sometimes even long-beveled sharp needles have been used. Everyone is very reluctant to transfer animal research to human use, e.g. no drugs are registered and available to human use after only animal research without phase 2 or phase 3 studies on humans. But these investigations were easily accepted as being valid during daily clinical practice of peripheral nerve blocks in humans.

What data would prove evidence that “Intraneural injection should be avoided completely”?

Option 1: A prospective study in humans with intentional intraneural injection in one group and intentional extraneural injection in the other group and comparing nerve injury as primary outcome parameter. Such a study does not exist. The study of Bigeleisen (*Anesthesiology* 2006; 105:779–783) is perhaps the only clinical study at all with intentional intraneural injection in humans. In this study no neurologic deficit was observed using sensory and motor testing 6 months after the nerve injection. This justified at least the title of this study: “Nerve puncture and apparent intraneural injection during ultrasound-guided axillary block does not invariably result in neurologic injury.”

Option 2: A retrospective study in humans with one group in which unintentional intraneural injection appeared (based on ultrasonic criteria for intraneural injection) and one group in which unintentional intraneural injection did not appear and comparing nerve injury as primary outcome parameter. Whereas studies which were set up in this way might have been underpowered, these studies did not show a difference between both groups with no evident neurologic deficit in none of the patients of both groups. See for example Sala Blanch et al. (*BJA* 2009; 102:855–61) with 28 patients meeting intraneural injection criteria, Sala Blanch et al. (*Anesthesiology* 2011; 115:589–95) with 16 injections meeting the criteria for an intraneural injection and Liu et al. (*Anaesthesia* 2011; 66:168–174) where intraneural injection occurred in 42 patients.

Option 3: A bundle of case reports or case series describing neurologic deficit after (unintentional) intraneural injection. The level of evidence of option 3 is already very low and is open for misinterpretation of a coincidence as a cause, see e.g. the literature about the relationship between M. Duchenne and Malignant Hyperthermia. Such case reports about neurologic deficit after (unintentional) intraneural injection rarely exist. Cohen et al. published a case report: “Functional deficits after intraneural injection during interscalene block” (*Reg Anesth Pain Med* 2010; 35:397–99). Cohen et al. wrote: “Intraneural injection was recognized based on a retrospective review of the recorded ultrasound imaging. The symptoms persisted for more than 2 weeks and completely resolved by 6 weeks. Our report suggests that intraneural injection during ultrasound-guided interscalene block carries a risk of neurologic complications.” For the interested reader a detailed reading of this case report is recommended with special attention to some of the details as: no paresthesia reported, low pressure injection, and a close look to the video of the injection given as supplemental material.

Option 4: Expert opinion ...

All guidelines recommend against intraneural injection. “Do not harm” is the major principle in clinical care for patients. Absence of evidence is not evidence of absence. But as stated above: eventually there are no clinical human data to definitely support the statement that: “Intraneural injection should be avoided completely”.

ESRAS-0539

REFRESHER COURSE: PHANTOM PAIN: TREATMENT ALGORITHMS

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Pain manifested in the area of an amputated limb¹ or after the removal of certain organs (breast, eye)^{2,3} is known as phantom pain.

Chronic phantom limb pain affects more than 80% of patients with partial or total loss of a limb and leads to serious psychological and physical issues. Risks factors include female gender, upper extremity amputations, pre-existing pain, as well as stress, anxiety and depression.⁴

It is mostly intermittent⁵ and its quality may be shooting, stabbing, throbbing and burning.⁶

Phantom limb pain is a neuropathic type of pain and although its mechanism is not totally delineated we have evidence that it includes a peripheral and a central component that lead to neuroplastic changes and reorganization in the area of the somatosensory and motor cortex.^{7,8,9}

There is some evidence that these neuroplastic changes may be reversed when the phantom pain is relieved¹⁰

The treatment of phantom limb pain remains a challenge and it is mostly based on the results of the studies that were performed for the treatment of neuropathic pain.

The level of evidence that we have for its treatment is weak, as the conducted studies were small with multiple methodological flaws, and hence inadequate for the development of guidelines.

The current approach used for the treatment of phantom limb pain includes multiple treatment modalities such as pharmacological, supportive non-invasive, and invasive treatment strategies.

Additionally there is an effort to treat phantom limb pain by using mechanistic type of approaches. This process is challenging since the treatment of PLP is currently mostly based on a trial and error approach.

A) Pharmacological treatment: 1) Acetaminophen and Nonsteroidal Anti-Inflammatory Drugs (NSAIDs)

Used most frequently show a variety of results and act peripherally and centrally¹¹

2) Antidepressants

They intervene as sodium channel blockers mainly on the peripheral afferent mechanism of phantom limb pain

This mechanism involves the presence of a neuroma at the distal end of the nerve in the remaining extremity. There is increased up-regulation of the sodium channels in the neuromas which lead to increased excitability and generation of spontaneous afferent impulses that are perceived as pain by the brain.

Amitriptyline (one of the tricyclic Antidepressants) was shown to have some effect when peripheral afferent mechanisms are the target^{13,14}

Although the tricyclic antidepressants have a beneficial effect their use is limited due to their undesirable anticholinergic properties.

Regarding the other classes of antidepressants such as the Serotonin-Norepinephrine Reuptake inhibitors (SNRIs) and Selective Serotonin Reuptake Inhibitors (SSRIs) although they have less side effects and there is evidence for their effective use in the treatment of neuropathic pain,¹⁵ there is no studies showing their benefit in the treatment of phantom limb pain.¹⁶

3) Sodium Channel Blockers

The most representative drugs of this category are the Local Anesthetics.

Their role on the treatment of phantom pain was evaluated when they were administered orally, intravenously, or epidurally via infusions that were started preemptively, 1–2 days prior to surgery.

More specifically, lidocaine when used intravenously (IV), or in its oral form mexiletine has shown effectiveness in the treatment of neuropathic pain.¹⁷

The later was also useful in the treatment of phantom limb pain.¹⁸

The role also of preemptive analgesia¹⁹ was evaluated for the prevention and treatment of phantom limb pain based on the hypothesis that a decrease of the afferent impulses in the periphery would attenuate central hyper-excitability and cortical reorganization related to phantom limb pain. Studies were conducted evaluating the effect of epidural anesthesia/analgesia with bupivacaine and morphine. The epidural infusion was started 1–2 days prior to surgery. Some of these studies demonstrated no effect of the epidural infusion on PLP²⁰ and others have shown a positive effect of the epidural infusions with bupivacaine when started preoperatively.²¹

The evidence we have on the effect of perineural catheters with continuous infusions of local anesthetics is limited due to a few small powered studies.

It has been shown that a prolonged perineural infusion of high concentrations of ropivacaine 0.5% has a positive effect on the treatment of PLP²². A recent study on perineural catheters conducted with a small number of Veterans demonstrated also encouraging results²³

4) Anticonvulsants

Medications such as gabapentin may target the central component of the mechanism for the development of phantom pain. The results concerning its effectiveness are mixed with some studies being in favor for its use²⁴ and some not^{25, 26}. While a whole list of anticonvulsant medications such as gabapentin, pregabalin, carbamazepine, oxcarbazepine, lamotrigine, topiramate and valproic acid have demonstrated some efficacy in treating neuropathic pain, further studies are required to assess their role in the treatment of PLP.

5) NMDA Receptor Antagonists

Ketamine, an NMDA receptor antagonist that affects the central sensitization process, has been proven to be beneficial in the treatment of PLP.

Intravenous infusions of Ketamine alone or in combination with Calcitonin have resulted in lowering significantly PLP²⁷. Memantine—an oral NMDA receptor antagonist—in a very small study was not successful in reducing PLP²⁸

6) Opioids

Opioids have been shown to be beneficial in the treatment of neuropathic pain and PLP²⁹.

Apart from their usual mode of action opioids may decrease PLP by affecting cortical reorganization. Opioids that were proven to be beneficial include morphine, oxycodone, methadone. Another small study showed that tramadol might be beneficial in the treatment of PLP³⁰.

7) Other: Benzodiazepines capsaicin and Tizanidine have occasionally been used

Combinations of all the above categories of medications are used for the treatment of PLP in order to achieve an optimal result by a synergistic effect and decrease their dose and their potential side effects.

B) Non-Pharmacological treatment:

a) Non-Invasive Approaches

These include Visual Feedback (mirror therapy), Motor Imagery and Transcranial Magnetic Stimulation (TMS)

PLP may result from the dissociation between a visual feedback and the proprioception of the amputated limb.

Mirror therapy is based on the observation that looking on an intact limb and its movement on the mirror can result in the sensations of movement in the phantom limb and alleviate the pain. Mirror neurons are involved and this type of treatment results in cortical reorganization.

Mirror therapy was shown to be beneficial in the treatment of PLP³¹

Motor Imagery is also a useful treatment as its purpose is to improve the motor representation of the amputated limb.

The effect of TMS treatment in PLP is not supported currently by strong evidence.

The above is true also for various relaxation techniques, hypnosis and cognitive behavioral therapy.

b) Invasive Approaches

Surgical destructive procedures that is limited to patients with severe refractory pain for palliative situations.³²

Various sympathetic blocks combined with physical therapy are occasionally effective in decreasing PLP³³.

Finally Neuromodulation is another option for the treatment of PLP and includes procedures such as Deep Brain Stimulation (DBS) which provided conflicting results, Motor Cortex Stimulation (MCS) that may benefit approximately 50% of patients with PLP³⁴ and Spinal Cord Stimulation (SCS) which provided significant pain relief in patients with PLP³⁵. Neuromodulation treatment is reserved for patients where noninvasive treatment was shown not to be effective.

C) Conclusions: Currently simple measures such as intense physical therapy and regular use of the prosthetic device are strongly recommended in patients with phantom pain since they are beneficial. Conservative treatment with medications and noninvasive approaches as described above consists the first line of treatment. If the above treatment fails invasive treatment that includes epidural/peripheral catheter infusions with local anesthetics, or a spinal cord stimulator implant, are appropriate. Ketamine and lidocaine intravenous infusions are also recommended if invasive procedures are contraindicated for the patient.

Although significant progress has been made in elucidating and understanding the mechanisms involved in PLP and in the evaluation of several treatment modalities we are still unable to treat PLP effectively.

Clinical trials evaluating pharmacological agents specifically for PLP are required.

Future advances in research such as in genetics, and technology with emphasis in the development of new imaging techniques and neuromodulation may provide us with the evidence we need to develop specific treatment algorithms for the management of PLP.

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ESRAS-0538

REFRESHER COURSE: RADIOFREQUENCY ABLATION FOR THE TREATMENT OF SPINE PAIN: UNDERSTANDING THE BASIC PRINCIPLES AND CLINICAL APPLICATIONS

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Radiofrequency ablation (RFA) is an interventional technique frequently employed for the treatment of specific pain conditions that originate from the axial spine. These common conditions include lumbar and cervical facet syndrome and sacroiliac (SI) joint dysfunction.

To use RFA effectively, practitioners must understand the electrophysiological principles and technical aspects to successfully treat the targeted structure and limit the risk of complications. In addition, practitioners should have an in-depth understanding of relevant anatomy and appropriate patient selection to improve procedural outcomes.

General Principles

The ability to ablate specific tissues while limiting destruction to nontargeted tissues is dependent on factors that influence energy delivery and local physiological tissue characteristics. The bioheat equation describes coagulation necrosis.¹

Bioheat equation

$\text{Coagulation necrosis} = (\text{heat generated} \times \text{local tissue interactions}) - \text{heat lost}$

In a simplified thermal RFA system, three primary factors determine heat generation and the size of the lesion: distance from the active tip, radiofrequency current density, and duration of application of the radiofrequency current.²

Monopolar and Bipolar Thermal RFA

Thermal RFA involves the use of high-frequency alternating current and results in irreversible cellular damage from focal high temperature tissue heating.³ Temperature-controlled RFA systems are primarily employed in interventional pain medicine. For monopolar RFA, the high-frequency alternating current flows from the uninsulated active tip into the tissue. The alternating current produces frictional heating in the tissue surrounding the electrode.²

For conventional RFA, the time of lesioning, tip size, and set temperature all influence the final lesion size. With monopolar RFA, lesions are in the shape of a prolate spheroid with coagulation occurring primarily in the radial direction perpendicular to the long axis of the electrode. Minimal lesioning occurs distal to the tip. Therefore, for monopolar RFA, the cannula should be placed with its shaft parallel to the target nerve.^{4,5}

In bipolar RFA, a passive electrode replaces the grounding pad with the goal of focusing the electrical current between the electrodes. A 3-dimensional Cartesian coordinate system describes a bipolar lesion. Bipolar RFA is employed when a larger lesion is required and has been used for SI RFA of the lateral branches.^{6–11} When performing bipolar RFA, it is important to understand specific configuration parameters that will influence lesion development including: 1) active tip size and length, 2) fluid preinjection composition, technique and volume, 3) interelectrode distance, 4) lesion time, 5) tip configuration, and 6) tip temperature.^{7,9} One parameter that is of crucial importance is the set interelectrode distance (IED). The goal should be to choose an IED that will allow for the ablation of the desired area and minimize destruction to nontargeted structures. In addition, the IED should be set to limit hourglass lesioning. The maximum allowed IED will depend on multiple configuration parameters including the size of the active tip, lesioning time, and composition of the preinjected fluid.^{6,7,9}

Cooled RFA

Recently, cooled RFA has been used for the treatment of SI joint dysfunction.^{10–12} Compared with traditional thermal RFA, cooled RFA results in significant lesion development distal to the tip of the RFA cannula. Lesioning distal to the tip is advantageous in certain anatomical areas, such as the SI joint, where perpendicular placement of the cannula is often required. In cooled RFA, an electrode is utilized that allows for continuous internal cooling of the tip with a perfusate.¹³

Methods to Modulate the Local Tissue Environment to Increase

Lesion Size

In the quest to enlarge the coagulation zone, methods to modulate the local tissue environment surrounding the RFA cannula to allow for greater energy deposition have been investigated.^{9,13–15} The nerves innervating the facet joints have a diameter of less than 2 mm and anatomical variability is common.^{16–18}

Therefore, the development of controlled and defined larger lesions may assist with lesioning structures that are small and have variable courses, with the goal of limiting technical failures. The chemical composition of the preinjected fluid has been shown to alter lesion size and development in both monopolar and bipolar RFA setups. Increasing the sodium chloride concentration of the preinjected fluid has been shown to significantly increase power output and lesion size.^{15,19} Studies to date have been in ex vivo models and further research is warranted.

Lumbar Medial Branch RFA for Facet Joint Mediated Pain

The therapeutic efficacy of lumbar medial branch RFA has been evaluated in observational and randomized controlled trials (RCTs). Of the six RCTs, three had technical flaws in both patient selection and surgical technique, which hinders interpretation of the results.^{20–22} The other three studies had definitively positive results for RFA.^{23–25} The study by Nath et al.²⁵ demonstrated that the active treatment groups had statistically significant improvement in back/leg pain and back/hip movement at six months. Improvement was also seen in quality-of-life scores and in reduced use of analgesics. No significant complications were reported. Two observational studies also demonstrated that RFA is effective.^{26,27} Dreyfuss et al.,²⁷ in a study of 15 patients with a diagnosis of lumbar facet syndrome made with diagnostic controlled medial branch blocks, demonstrated 90% pain relief in 60% of treated individuals at 12 months. At least 60% pain reduction was seen in 87% of the patients at 12 months. Gofeld et al.,²⁶ in a large clinical audit of 209 patients (179 of whom completed the study; 35 were lost to follow-up), reported that 68.4% had good (>50% pain relief) to excellent (>80% pain relief) results lasting from 6 to 24 months.

Cervical Medial Branch RFA for Facet Joint Mediated Pain

A systematic review evaluating a randomized controlled trial and four observational studies provides strong evidence that cervical medial branch RFA is a successful treatment for chronic neck pain.²⁸ Lord et al.,²⁹ in a randomized double-blind trial, compared RFA to sham denervation in patients with cervical facet pain confirmed with double-blind, placebo-controlled local anesthetic blocks. RFA denervation was found to be superior to the sham procedure, and the median time that elapsed before pain returned to at least 50% of the preoperative level in the RFA group was 263 days.

SI Joint RFA

Several RFA techniques that target the posterior innervation of the joint have been developed to treat SI joint pain. One of the associated challenges with SI joint RFA includes an incomplete understanding of the innervation of the joint. Furthermore, the innervation of the SI joint consists of small nerves with diameters ranging from 0.292 to 0.997 mm that are difficult to locate with sensory stimulation and have variable anatomic courses in relation to bony anatomy.³⁰ RFA techniques utilized include bipolar intraarticular RFA, bipolarlateral branch RFA, cooled RFA of the lateral branches, and sensory stimulation guided SI joint RFA.^{7,8,10,11,31,32} Recently the employment of cooled RFA has shown promise in the treatment of SI pain. In a randomized placebo-controlled study examining lateral branch radiofrequency denervation with cooled RFA, Cohen et al.¹⁰ reported that 57% of patients obtained 50% or greater pain relief at 6 months. Cooled RFA creates wide diameter lesions that may increase the ability to target areas of nociceptive input. The study by Cohen also demonstrated functional improvements. In individuals with successful pain relief, the median duration of relief was 7.9 ± 4.7 months. Patel et al.¹¹ studied the efficacy of lateral branch cooled RFA in a randomized placebo-controlled study. Significant improvements in pain, disability, physical function, and quality of life at 3-month follow-up were demonstrated with cooled RFA compared with placebo.

Complications: Although radiofrequency treatment can be associated with both minor and major complications, there are limited data documenting the occurrence of these events.^{33,34} Following RFA, a temporary exacerbation of pain secondary to an inflammatory response will often occur and can last several days to two weeks. Some patients may also experience transient dysesthesias of the skin over the operative area, arising from partial denervation of the lateral branch of the posterior primary ramus. These transient dysesthesias occur more frequently with cervical medial branch RFA.

Another concern with RFA is the morphological changes that may occur in the spine after lesioning the medial branches. In the lumbar spine, in addition to providing sensory innervation to the lumbar facet joint, the medial branch also provides innervation to the multifidus muscle. The multifidus muscle plays an important role in segmental spine stabilization and postural stability. Following RFA, electromyography has demonstrated denervation of the multifidus muscle.³⁵

Other complications that may occur following cervical medial branch and third occipital nerve RFA include ataxia and spatial disorientation.³⁶ These

complications are more common with cervical medial branch RFA of the upper cervical levels, especially the third occipital nerve, and are usually mild and self-limiting.

One of the most feared complications is damage to surrounding nontargeted spinal nerves. Methods to prevent this complication include precise anatomical placement of the RFA cannula through fluoroscopic guidance, physiological testing, and a detailed understanding of lesion dimensions. The RFA active tips should be positioned safely away from the neuroforamen to avoid thermal lesioning of the spinal nerves. This is especially relevant when methods are used to enhance lesion size, including cooled RFA and fluid preinjection. In addition, the risk of toxicity to nontargeted tissues, including central and peripheral nervous system structures, should be considered prior to injecting specific fluids (i.e., high saline concentrations).¹⁵

Conclusions: RFA is an effective therapeutic treatment for spinal pain originating from cervical and lumbar facet joints and SI joints. Additional work is needed to improve patient selection, extend the duration of relief, and limit technical failures. Furthermore, optimal lesioning algorithms need to be developed which incorporate multiple factors into decision-making.

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ESRAS-0528

PRO-CON DEBATE: PERIPHERAL NERVE BLOCKS ARE NOT CONTRAINDICATED IN PATIENTS ON ANTICOAGULANTS—PRO

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Introduction: Commonly, peripheral nerve blocks (PNB) can be safely performed in patients on anticoagulants prior to surgery, because of temporary interruption or bridging of anticoagulants.

But would you offer a continuous popliteal block for treatment of ischemic foot pain in a patient on novel oral anticoagulants (NOAC) for atrial fibrillation?¹ What do we know about the bleeding risks of PNB?

Evidence shows that an abnormal coagulation in patients on anticoagulants represents the most important risk factor of spinal and epidural bleeding after neuraxial blockade. This has led to meticulous guidelines by various societies on the management of patients on pharmacological anticoagulation undergoing regional anaesthesia. The incremental amount of clinically relevant anticoagulants, like the NOAC, has increased the complexity of the respective guidelines^{2,3} without covering a common statement regarding PNB.

Yet, while neuraxial hematomas occur in a fixed, non-compressible space, PNB are predominantly performed in rather superficial, easily compressible and expandable tissue. Even if a perineural hematoma develops within the perineural sheath, as has been tested in animals,⁴ sequelae are minor compared to spinal hematoma. However, there is still substantial uncertainty on how to manage patients with impaired coagulation with respect to PNB.

We searched for evidence of bleeding risks of PNB, analyzed different national and international guidelines, assessed the value of ultrasound guidance in this respect and draw a firm conclusion.

What is the risk of bleeding for peripheral nerve blocks in patients on anticoagulants?: Up to date, there is limited data on bleeding complications related to PNB. In one prospective study on 670 patients receiving warfarin as thromboprophylaxis after hip surgery, lumbar plexus catheters were removed with an international normalized ratio (INR) of up to 3.9 without any major bleeding complications.⁵ In another investigation on 6935 blocks in 3588 patients undergoing joint arthroplasty, perineural catheters were removed without major bleeding in patients receiving thromboprophylaxis after knee and hip surgery, using both, warfarin and low molecular weight heparin. In these cases, thromboprophylaxis was not interrupted.⁶

In the absence of sufficiently powered prospective studies, the evaluation of published case reports on bleeding complications after PNB represents the best available evidence. These cases have been reviewed before.^{2,7,8} Of the 26 published cases in which bleeding complications occurred, anticoagulants were used in 13 cases, while in the other cases, patients did not use any anticoagulant. Five patients developed hematoma after lumbar plexus block, one patient died as a consequence of hemorrhagic shock after lumbar sympathetic ganglion block, and one patient required emergency tracheostomy after stellate ganglion blockade. Peripheral neurologic disorders induced by a hematoma, completely resolved within 6–12 months.

What are the recommendations of the current guidelines?: Despite sparse evidence, several national and international guidelines comment on the management of anticoagulated patients receiving PNB. The *American Society of Regional Anesthesia* recommendations state that for deep plexus blocks, the recommendations regarding neuraxial techniques should be applied.² In contrast, the guideline on regional anesthesia and antithrombotic agents by the *European Society of Anaesthesiology* mentions that existing guidelines for neuraxial blockade do not routinely include explicit recommendations on management of PNB in anticoagulated patients.³ Likewise, the *Association of Anaesthetists of Great Britain & Ireland* published a guideline on regional anesthesia and patients with disturbed coagulation in which bleeding risk is described as a continuum. Accordingly, it is graded from normal (local infiltration) and hence sequentially increasing risk (superficial blocks – fascial blocks – perivascular blocks – deep blocks) up to the regional anesthesia techniques with the highest risk for bleeding (neuraxial, paravertebral).⁹ This guideline advises (after balancing the risk of PNB against general anesthesia) to perform PNB in patients with abnormal coagulation with ultrasound guidance by an experienced anesthesiologist. The guidelines of the *German Society of Anesthesiology and Intensive Care* state that except lumbar plexus blocks, therapy with platelet aggregation inhibitors or thromboprophylaxis are not absolutely contraindicated for PNB but block performance by an experienced anesthesiologist is preferred. Further, it is advised that only those blocks should be performed for which, in case of vascular puncture, local compression is feasible.¹⁰ The Guidelines of the *Dutch Society of Anesthesiologists* recommend the use of ultrasound to identify vascular structures. Furthermore, it divides PNB into three categories following the severity of possible bleeding complications (limited - intermediate - severe). According to this classification, depending on type and dose of the anticoagulants in blocks with intermediate or severe risk, it is advised to continue anticoagulation (limited risk) or to discontinue anticoagulant medication.⁷ In contrast, the *Orthopedic Anesthesia, Pain, and Rehabilitation*

Society states that there is currently no evidence of increased risk of major bleeding during performance of PNB in patients receiving thromboprophylaxis.⁸

Hence, due to insufficient evidence these guidelines vary on the management of anticoagulants and PNB

Does ultrasound guidance decrease the risk of bleeding after PNB?:

The current widespread use of ultrasound (US) helps to visualize nerves and plexus as well as surrounding structures. Although it is not proven that the use of US reduces bleeding risk in PNB, it has been shown that it does reduce the risk of local anesthetic toxicity and occurrence of vascular puncture.^{11,12} Thus, even in the absence of definite evidence, it may be suggested, that the use of US may serve to decrease the incidence of PNB-related complications.

Conclusion: To date, some uncertainty exists about the management of anticoagulant medication in patients receiving PNB. However, comprehensive evidence demonstrates that anticoagulation does not increase the risk and consequences of bleeding, considering that 50% of the reported cases occurred by chance and 50% on anticoagulation. Secondly, sequelae of bleeding complications are less severe in PNB compared to neuraxial blocks. We suggest that "best practice" measures should be taken in case of increased risk, like use of US, performance of the PNB by an experienced anesthesiologist and whenever possible to perform the PNB with the lowest risk profile (e.g. combined sciatic / femoral nerve block instead of lumbar plexus block). However, we support that in most cases, PNB can be safely performed in patients on anticoagulants.

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ESRAS-0507

PRO-CON DEBATE: PERIPHERAL NERVE BLOCKS ARE NOT CONTRAINDICATED IN PATIENTS ON ANTICOAGULANTS – CON

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All the anesthesiologists are concerned about the question if the risks of regional anaesthetic techniques are increased when performed on patients with abnormalities of coagulation and, if so, whether they are so increased that the techniques should be modified or avoided. This problem is growing in the last decade because the wide use of anticoagulant therapy in chronic disease in addition to aggressive thromboprophylaxis particularly in orthopaedic surgery. On the other hand serious complication in regional anaesthesia are very rare in patient with normal coagulation. As was reported in ASRA 2010 guidelines [1] there are few investigations that examine the frequency and severity of haemorrhagic complications after plexus or peripheral nerve blockade in anticoagulated patients. Very few complications were described in patients submitted to peripheral nerve blocks single shot or in continuous. Until now only one extensive study was performed in anticoagulated patients submitted to continuous peripheral nerve block. Chelly and colleagues described their experience in 670 patients receiving lumbar plexus CPNB for total hip surgery along with warfarin thromboembolic prophylaxis[2] In this population only one bleeding at insertion site was detected in a patient with INR higher than 3. This was managed with direct pressure on the site and resolved without any haematoma formation or neurological compromise. The patient received vitamin K on the following day when the INR was 4.0, after which was continued on warfarin upon being discharged from the hospital. Although in other report more serious complications were described.

In 1989 Nielsen noted a severe thoracic wall haematoma requiring blood transfusions after bilateral intercostal block for post-cholecistectomy acute pain in a 80 yrs old[3]. Several retroperitoneal haematoma after lumbar plexus block were published in the last two decades[4]-[5][6]. Not all the patients recovered without neurologic sequelae, and all of them needed blood transfusions and delayed discharge from the hospital. An intraneural femoral haematoma was described in a patients with a preexisting coagulation disorder (Factor XI deficiency (formerly known as hemophilia C) manifests as prolonged aPTT in preoperative laboratory assessment) with quadriceps paresis lasting for more than 4 months and persisted cutaneous anesthesia of the medial side of the calf and the medial malleolus[7]. In this case, the combination of thromboprophylaxis with a daily dose of LMWH and a coexisting mild deficiency in factor XI activity led the patient to an anticoagulated status confirmed by a more prolonged aPTT in the postoperative period. The first clinical implication of the present case may be that the possibility of intraneural hematoma formation in anticoagulated patients must not be overlooked. It is advisable to avoid direct contact between needle and nerve.

In the absence of data regarding the relative risk of bleeding complications at the time of the removal of deep perineural catheter in patients receiving thromboprophylaxis, several authors have recommended the same guidelines for the removal of lumbar plexus catheters than those proposed for epidurals.

In a more recent consensus paper presented at a plenary session of Orthopedic Anesthesia, Pain, and Rehabilitation Society Chelly et al. stated :

1. Performing superficial and deep peripheral nerve blocks may lead to vascular injury and major bleeding, including retroperitoneal hematoma (level of evidence 1C). Major bleeding, including retroperitoneal hematoma, has been reported following the performance of both superficial (stellate ganglion, axillary and infraclavicular, interscalene and ilioinguinal/iliohypogastric blocks and and deep and plexus blocks (paravertebral, lumbar sympathetic and pudendal) (level of evidence 1C)

2. Major bleeding appears to increase when anticoagulants rather than thromboprophylaxis are indicated for thrombolytic therapy, when multiple blocks are being performed over time or multiple attempts are required (traumatic conditions) versus a single block, or when a continuous nerve block technique is indicated.

3. Evidence supporting the safety of the combination of peripheral nerve blocks and thromboprophylaxis exists but only in limited number of patients. In 670 patients receiving warfarin published by Chelly and coworkers. These data were recently confirmed by Mariano et al [8] with a series of 316 patients and INR of up to 4.0

In this scenario the Conference statement can only provide little direction for peripheral regional anaesthesia or CPNB, citing no evidence upon which to base recommendations. The Conference left the issue suggesting that neuraxial guidelines could be applied to peripheral nerve block patients as a conservative approach while admitting this 'may be more restrictive than necessary'.

In the absence of a 'cookbook' for anaesthesia practice, the anaesthesia community depends on academic research like this to provide the clinical evidence and experience that, combined with good clinical judgement, allows for calculated risk management in anaesthesia practice. These safety measures will ultimately benefit our patients and provide a more secure environment in which to practice the art and science of regional anaesthesia.

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ESRAS-0524

REFRESHER COURSE: MANAGEMENT OF LAST: PAST, PRESENT AND FUTURE !

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LAST: Past, present and future: Severe local anesthetic systemic toxicity (LAST) is, fortunately, a rare event. However, its incidence during regional anesthesia, especially peripheral nerve block, is not negligible and when it occurs LAST can be devastating to both patient and physician. It is the anesthesiologists' responsibility to minimize the risk of this damaging iatrogenic event. We hold the syringe and needle in our hand and it's difficult to view anyone other than ourselves responsible for the outcome. This was as true a century ago when LAST was first recognized as a potentially fatal complication of using local anesthetics as it is today when our knowledge of its mechanism and treatment make optimal management of LAST part of our clear responsibility to improving patient safety.

Management of LAST comprises elements of prevention, detection and treatment. Of these, prevention attains primacy: we must be sufficiently mindful of LAST to take precautions necessary to minimizing its likelihood. The three simplest and least controversial components of this are: adequate monitoring, incremental injection and frequent aspiration. While some anesthesiologists will argue that a pulse oximeter probe is sufficient, the standard of care for placing a nerve block should not be less than that for inducing general anesthesia and requires at a minimum non-invasive blood pressure monitoring, continuous ECG as well as pulse oximetry. Each of these elements can contribute to earlier detection of an intravascular detection and thereby allow cessation of injection to prevent LAST or earlier intervention if it occurs. Continuing to speak to the patient during placement of the block is another simple monitor to help detect early LAST. While this requires avoiding over sedating the patient, use of a modest benzodiazepine dose, while not required, can reduce the seizure threshold to local anesthetics and is another simple way to reduce risk of LAST.

Recent evidence indicates that use of ultrasound guidance can also reduce the risk of LAST. This was shown in several studies and most convincingly by Michael Barrington's group. Another unexpected finding of the same study was that the risk of LAST is greater in patients of small stature. This makes sense since a recent study showed that in rats a few minutes after intravenous injection, bupivacaine (a canon for lipophilic, cardio-toxic local anesthetics) is found in skeletal muscle; thus, if the skeletal muscle can be considered the primary reservoir for local injected anesthetics then patients with a small muscle mass should obtain higher blood levels for any given dose of local anesthetic than otherwise comparable patients of normal stature or muscle bulk. For patients with this or other medical co-morbidities that are known to lower the threshold for LAST it makes sense either to lower the total dose of drug

administered or to avoid regional anesthesia entirely. These include pre-existing cardiac disease (especially ischemia, recurrent arrhythmia or low ejection fraction), extremes of age, mitochondrial disease, and carnitine deficiency.

Finally, we must consider that regional anesthesia is performed in a context and requires that safety be engineered into the system. This requires that patients are properly evaluated before nerve block to determine their suitability for regional anesthesia, that the correct drug and dose be used, that the practitioner be adequately supervised or trained in regional anesthesia (and use of ultrasound guidance) and that the choice of block is matched to the patient and procedure. There are examples for each of these where violating the underlying principle (s) has resulted in catastrophic LAST.

Detection of classic LAST can be relatively simple if the practitioner is paying close attention to the patient and monitors. LAST can elicit both CNS and cardiovascular signs and symptoms. Though the CNS effects are classically described as the stereotypical prodrome (e.g., tinnitus, metallic taste, etc) progressing to grand mal seizure, patients can also become agitated or obtunded and even present with no CNS signs at all. Cardiovascular changes in early LAST typically include hypertension with tachycardia that devolves to hypotension and bradycardia with conduction block as the toxidrome progresses. Malignant arrhythmias associated with LAST include the gamut from Torsade de Points to ventricular tachycardia, ventricular fibrillation and asystole. LAST is also classically viewed as occurring immediately after the block is placed. However, a large and (since ultrasound guidance is in common use) increasing number of events is delayed by many minutes, presumably representing delayed absorption from the injection depot. In extreme cases, LAST can occur an hour or longer after the LA injection. In short, LAST covers a wide range of possible clinical presentations and since as many as half occur outside the parameters of standard textbook descriptions, it is important to at least consider this diagnosis if a patient experiences any unusual, unexplained deterioration in clinical status after a regional anesthetic, even if the event occurs long after the block is placed.

Treatment of LAST has evolved substantially over the past decade with the acceptance of intravenous lipid emulsion (ILE) as an effective adjunct in resuscitating these patients. Prior to 2006, the treatment for mild and moderate LAST was symptomatic and supportive, including seizure suppression and airway management. These are necessary since both hypoxia and acidosis (worsened by seizure) are known to exacerbate local anesthetic toxicity. Treating severe LAST associated with cardiovascular collapse included standard ACLS backed up by cardiopulmonary bypass. Fatal events involving LAST were well known among experts in the field but were rarely if ever reported in the literature. The best known series was reported by Dr. Albright in 1975 where he several fatal events involving the most lipophilic local anesthetics (bupivacaine, etidocaine). His report of the connection between lipid solubility and cardiac toxicity seems prophetic in retrospect. Toxicity was later ascribed to prolonged interaction with cardiac voltage-gated sodium channels but local anesthetics are now known to have potent, deleterious effects at a range of other molecular targets that in the aggregate contribute to the difficulty of treating severe cardiac local anesthetic-induced toxicity. In my view, one of the key sites of action is mitochondrial oxidative metabolism where local anesthetic toxicity results in depletion of cardiac myocyte of ATP.

Two well recognized components of treatment of LAST, airway management and seizure suppression have remained unchanged over the years. Two other aspects have been modified. The first involves modified use of pressors vasopressin and epinephrine. While basic life support (including high quality chest compressions) is necessary for recovery from cardiovascular collapse associated with LAST, vasopressin should not be used at all and epinephrine if used at all, should be given in small doses (e.g., ~ 1mcg/kg or less). Vasopressin is normally used in vasodilated shock to improve blood pressure or in ischemic arrest to improve coronary perfusion by increasing diastolic pressure. However, LAST is entirely different from ischemic-based arrest and intense systemic vasoconstriction is not desirable given that the heart is poisoned and essentially unable to generate cardiac output. In this setting, reducing the underlying toxicity is more rational than increasing afterload. Epinephrine might be helpful to increase cardiac output and blood pressure when used at lower doses; however, there is evidence in an animal model that high doses of epinephrine impair the efficacy of ILE and, more importantly, there are no good evidence that standard dose (1mg) epinephrine improves survival to hospital discharge for any type of cardiac arrest.

The second change is the recognition that ILE can be life-saving for patients in LAST. While there is some controversy regarding the levels of evidence justifying its use, there is no doubt that it can attenuate or reverse the adverse effects of local anesthetic on cardiovascular function both in laboratory models of LAST and in patients suffering cardiac arrest after regional anesthesia. These

controversies will be discussed in a Pro-Con Debate at this meeting and more information is available in the corresponding chapters of the syllabus. The 'bottom line' for the Pro side of the debate is that evidence informing the risk-benefit of ILE strongly supports its use for LAST.

One important advance over the past several years is our improved understanding of the mechanism(s) responsible for the benefit of ILE. Several studies in both rat and volunteers show reproducible pharmacokinetic effects that speak to accelerated redistribution of local anesthetic to tissue/organ reservoirs such as liver and skeletal muscle. ILE also exerts an inotropic effect that directly reverses the cardiac depression of LAST and contributes to the pharmacokinetic benefit. ILE is also known to attenuate post-recovery ischemia reperfusion injury which could account for the favorable outcomes in patients given ILE for LAST-induced cardiac arrest. Mechanisms underlying both the inotropy and reduced I-R injury are currently under investigation and apparently involve activation of biochemical signaling pathways altered by LA and ischemia.

The remaining question is, "When to use lipid"? That is, should we use it early at the first sign of toxicity or save it to use only for cardiac arrest and when everything else has failed? Given the very favorable therapeutic index of ILE and the inability to predict which patients will go on to have cardiovascular instability, it is rational to use ILE as soon as the diagnosis of LAST is made. The author is aware of many cases of severe LAST where a patient initially had only seizures that responded to conservative therapy and after a stable interval of several minutes the patient then developed cardiovascular collapse. In such cases, early treatment with lipid might prevent progression of cardiac toxicity.

Anesthesiologists are increasingly aware of LAST and have adopted measures to minimize its risks through improved practice, choice of local anesthetic and dose, recognizing patients at risk, selecting the right block, and use of ultrasound guidance. Moreover, the science in resuscitation of LAST has improved success of managing this potential complication of nerve block. The real challenge for our specialty now is to educate our non-anesthesia colleagues. Many surgeons, emergency room doctors and other clinicians use local anesthetics with apparent impunity, unaware of the risks involved or how to recognize them. It is incumbent on us, as educators to convey an understanding of these risks to our colleagues and educate them on the proper management of LAST through prevention, diagnosis and treatment.

ESRAS-0517

PRO-CON DEBATE: NOVEL STRATEGIES TO MONITOR INTRANEURAL NEEDLE PLACEMENT ARE AN ABSOLUTE MUST – PRO

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Nerve injuries related to peripheral nerve blocks can be caused by toxicity of the injected solution or by mechanical nerve damage. In the worst cases, nerve damage can lead to persistent motor or sensory impairment and debilitating neuropathic pain(1,2). Thus, it is highly important to avoid such iatrogenic injuries. Penetration of a nerve alone does not necessarily lead to lasting damage unless local anesthetic is injected within the nerve fascicle.(3) Hence, if intraneural needle placement is identified in time, the needle could be withdrawn and nerve injury can be avoided. Ultrasound guidance(4), electrical nerve stimulation (5–7), and injection pressure measurements(8,9) are used to reduce the risk of intraneural needle placement and injection.

Ultrasound: Theoretically ultrasound-guidance should prevent needle displacement within peripheral nerves. However, when the distance between skin and target nerves is large or when solid build patients are anesthetized, there might be poor image quality and interpretation of the needle position can be challenging. Intraneural needle placement might be even more likely when out-of-plane needling techniques are used.

Nerve stimulation: A correlation between low current thresholds and intraneural needle placement has been shown in several studies.(5–7) In an animal model a motor response obtained with stimulation currents below 0.2 mA was associated with peri- and intraneural occurrence of lymphocytes and granulocytes.(5) Local anesthetics injections are therefore not recommended when a motor response is obtained with low current settings. However, higher stimulation currents above 0.5 mA cannot rule out intraneural needle placement. (6)

Pressure monitoring: Animal studies indicate an increased incidence of intrafascicular needle placement when injection pressure is high (>20 psi).

(8,9) It is still unsure if the measurements from surgically exposed nerves in dogs are applicable in humans. (8) Clinical studies should be performed to confirm these findings.

A combination of ultrasound, nerve stimulation, and possibly pressure monitoring is recommended to reduce the risk of intraneural needle placement and injection when peripheral nerve blocks are performed. (10) The reliability of these methods to reduce the incidence of nerve injuries has not been demonstrated, yet. (11)

Electrical impedance: Bioimpedance in a needle-electrode circuit has been measured in an animal model and in a clinical study to detect placement of the block needle within a nerve. (12,13) The impedance was measured as an absolute value obtained with a square pulse from an electrical nerve stimulator. Advancing the needle through tissue types with different electrical conductivity can give a rise or fall in the measured impedance. Until now, sufficient discrimination of nerve from other tissue types has not been obtained using such absolute impedance measurements.

A novel algorithm for impedance measurements to detect nerve tissue, and discriminate it from surrounding tissue types, was developed by analyzing a complex impedance data set in a recent animal study at the University Hospital in Oslo. (14) The specific curve shapes obtained by plotting the impedance variables (modulus and phase angle) as a function of the measurement frequencies were used as a "fingerprint" to identify and discriminate nerve tissue from other tissue types. When investigating sciatic nerves in pigs, a sensitivity of 80% and a specificity of 96% for the discrimination for intraneural tissue was obtained. The method can be implemented in a routine clinical device to avoid intraneural injections and thereby reduce the incidence of nerve damage during nerve block procedures. Clinical studies must confirm that the results obtained from sciatic nerves in pigs are applicable in humans.

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ESRAS-0526

REFRESHER COURSE: PERIPHERAL NERVE BLOCKS IN PEDIATRICS

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This refresher course will review some references on peripheral nerve blocks in children and includes some personal recommendations to safely perform regional anesthesia in children. This abstract contains a short summary of the lecture and the main references.

Pediatric regional anesthesia combined with general anesthesia is a standard in pediatric anesthesia to reduce intraoperative opioids and to provide postoperative pain relief. Large European and North American epidemiology studies (Eccofey et al, Polander et al) have shown the safety of performing regional techniques under general anesthesia in children. Both studies have proven no mortality and lack of major complications (such as local anesthetic systemic toxicity (LAST), postoperative nerve symptoms, hypotension or infection). Moreover, there is tendency to additional safety and decreased failure rates of peripheral versus neuroaxial blocks.

Nerve stimulation may still be used in regional anesthesia but its purpose is no more to localize nerve structures but a physiology interpretation of nerve behavior. Ultrasound guided peripheral nerve blocks have been used for the past two decades in pediatric regional anesthesia. Ultrasound guidance seems to decrease the rate of block failure and this greater reliability of ultrasound guided peripheral nerve blocks has widely increased their use. Literature now shows an increased use of all upper and lower limb peripheral nerve blocks, including previously "prohibited approaches in kids" such as the supraclavicular block. Today nobody doubts that ultrasound guided regional anesthesia is now a standard of care in pediatric limb surgery. The use of trunk blocks has also increased extensively with the aid of ultrasound guidance. Ultrasound guided rectus sheath blocks and ilioinguinal / iliohypogastric nerve blocks have become a reliable and efficient technique and offer clear advantages versus landmark techniques (efficacy, reliability and decreased dose of local anesthetic). Paravertebral nerve blocks in children were previously used only in a few centers but with the use of ultrasound this approach is now much more widely used. More studies are necessary, but PVNB might behave somehow different in children than in adults. Some studies in cadavers (Yanovski et al & Albokrinov et al) show that a single paravertebral injection of 0.3 - 0.5ml/Kg local anesthetic at a low thoracic level covers 6–8 spaces in children. These two papers confirm how important anatomical knowledge is for regional anesthesia. Transverse abdominal block (TAP Block) has also gained its place in pediatric anesthesia with the use of ultrasound guidance. Many approaches of the TAP Block have been described in adults (lateral, posterior, subcostal, quadratus lumborum, transversalis fascia), but my in my personal opinion to get a more prolonged duration and reliable extension, blocks in children should be done at least at the transversalis fascia, at the termination of the transversus abdominis muscle.

Personal recommendations

Regional anesthesia should be performed under general anesthesia in all those children who cooperate as children. If a cooperative child wishes to stay awake, the block may be performed awake or under light conscious sedation. Conventional monitoring is always required. Children are more easily kept anesthetized under spontaneous ventilation than adults are. Whenever possible, keeping the child under spontaneous ventilation, at least while performing the block is recommended. With the aid of a laryngeal mask this is easily achieved in most children and the capnogram provides information about the absence of acute complications while doing the block. Should neural damage or LAST occur acutely, the first sign seen would be a change in the child's respiratory pattern, i.e. a change in capnogram. This would not prevent the complication from happening but would enable earlier diagnosis and treatment. As no method of test dosing is infallible, incremental and slow injection of local anesthetics is a critical safety measure in children. Once the block has been established the child may be kept under spontaneous ventilation with pressure support or intubated and controlled ventilation if the surgical procedure requires so.

Children loose temperature in the operating room much faster than adults and should always be kept covered. The covering blanket should be transparent to allow visual monitoring of any movement or abnormal breathing pattern. Moreover, the child should be covered not only while inducing general

anesthesia but also while doing the block. If ultrasound guidance is used, previous warming of the ultrasound gel is recommended.

Appropriate pediatric regional equipment should always be used. Needles should be centimeter or half centimeter marked, of appropriate tip, gauge and length and injection extension tubes are recommended. All local anesthetics amide type may be used in children. The most commonly used local anesthetics are ropivacaine, levobupivacaine, and bupivacaine. Nevertheless, L-enantiomers are recommended due to their lower cardiac toxicity compared to bupivacaine. After extravascular injection, plasma concentration of ropivacaine peaks later than that of bupivacaine, sometimes up to more than 2h after injection. This delay in peak plasma concentration of ropivacaine usually reduces maximum plasma concentration, providing some security in terms of toxicity. Even if plasma concentration of free and total ropivacaine is higher in the youngest groups of children, plasma concentrations of ropivacaine and its main metabolite (2, 6-pipecoloxylidide) are not influenced by the duration of infusion of local anesthetic. The clearance of ropivacaine increases with age but remains unchanged throughout the infusion in each age category. Therefore, ropivacaine seems more appropriate, more predictable and safer during continuous infusion for 48–72 h compared with bupivacaine.

Regional blocks are indicated in all children without a formal contraindication. True contraindications include coagulopathy, sepsis or infection at the needle insertion site, true local anesthetic allergy, and refusal by child or parents. For peripheral nerve blocks, a relative contraindication may be the risk of compartment syndrome. In my personal opinion analgesic regional blocks may be performed in these risk cases only if the surgical team agrees and provided that a dense motor block is not achieved. In these cases, if the surgery has been done with a block, it is imperative to wait for a partial recovery of the motor block (if any) before starting a continuous infusion of local anesthetic in the postoperative period. Any breakthrough or out of proportion pain should be carefully assessed before increasing local anesthetic infusion or adding systemic analgesia. Intramuscular pressure measurement kits should be available in the facility if regional blocks are to be performed in higher risk patients. Early measurement of compartment pressure is recommended in any case of compartment syndrome suspicion.

Placement of peripheral nerve catheters is now common in pediatric regional anesthesia. In my opinion indications include mainly major surgery or pain/rehabilitation therapy. Complications consequence of the technique should be avoided by a very careful procedure performed by skilled pediatric anesthesiologists. Continuous peripheral nerve blocks should be performed under strict aseptic conditions. Fixation of catheters should be done with a specific transparent fixation device to allow observation of the catheter or possible signs of infection. Fixed rate infusions can be used in single nerve blocks but scheduled boluses must be added at least for plexus blocks. Avoidance of complications derived from infusions and catheter's care need extensive team training. Personnel of the anesthesia pain team should daily inspect the catheter and control the infusions. Fixation should only be changed if strictly necessary and with aseptic conditions. Catheters should be removed and the tip cultured if the child develops fever $>38^{\circ}\text{C}$. Most catheters for acute postoperative pain relief can be removed after 48–72 hours but if the catheter is to be kept in place for more than 48h tunneling is recommended. Because drug errors are higher in centers where less number of catheters are managed in the wards, it is imperative that thorough staff education programs and medical support to the ward personnel is implemented before catheters are managed in the ward. Intravenous lipid emulsion resuscitation guidelines and training as well as intramuscular pressure measurement devices should be available in all places where continuous local anesthetics are used.

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ESRAS-0498

PRO-CON DEBATE: NEURAXIAL BLOCKS SHOULD BE PERFORMED USING ULTRASOUND – CON

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The development and introduction of a new technology raised for the leader of the department two main issues. First, as a manager he should weigh the balance between costs (investment) and benefits (increase success rate, decrease incidence of complication, ergonomic improvement...). Second, as a teacher he should watch that new technology will not by-pass crucial steps considered necessary for the accomplishment of training in regional anesthesia. In this regard the application of neurostimulation compels the residents to develop with perspicacity one of his sense, touching. To touch or not to touch - a crucial dilemma for the young anesthesiologists. The act of using accurately the potential of the tip of our finger is mandatory to recognise not only the external landmarks but also to recognise the different anatomical structures, their depth and their space organisation. I consider these knowledges indispensable for the comprehension and correct performance of regional anesthesia. Then, technology will help us to confirm what we already have configured in our brain. Neurostimulation has a valuable unique feature. It allows a direct relation between anatomy and physiology, the stimulation of a nerve and the visible response of a muscle, an inestimable teaching means. The stimulating needle allows also to understand the architecture of the nerve by eliciting different muscle twitches just by changing the position of the needle around it. Mastering these steps is a matter of education. Too much reliance on technology impoverishes our own basic skills and know-how. Not doing it means not knowing how to do it anymore. Finally, the basis of regional anesthesia is anatomy, regional anesthesia is dynamic anatomy, indeed. But we learn anatomy in the anatomy lab, not with the use of neurostimulation or ultrasound. "New" does not mean better.

ESRAS-0504

REFRESHER COURSE: INFILTRATIVE TECHNIQUES- THE WAY FORWARD IN POSTOPERATIVE PAIN MANAGEMENT?

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Postoperative pain continues to be a major medical challenge. In spite of many recent advances in our understanding of pain mechanisms, recent surveys from USA and Europe show that postoperative pain is common and remains undertreated(1,2). Opioid monotherapy remains the foundation of postoperative pain management in spite of strong evidence of its drawbacks, indeed the use of opioids has increased(3). A recent review based on 300,000 patients across 380 US hospitals showed that about 95% patients were treated with opioids(4).

Multimodal analgesia using more than one class of analgesic drug or technique to target different mechanisms of pain relief, has been advocated to improve analgesia and reduce opioid-related side effects. However, a recent review showed that the 24-hour morphine-sparing by non-opioids is rather modest, ranging from 6.3 mg for paracetamol, 10.2 mg for NSAIDs and 13.0 mg for gabapentin(5). This has to be balanced against the risk of anastomotic leakage with NSAIDs and of sedation, dizziness and visual disturbances with gabapentinoids, especially pregabalin(6,7). A recent review by one of the originators of the concept concluded that the evidence for multimodal analgesia is modest and that many patients may be at an increased risk of side effects(8). It is time that we shift our focus to evaluate the role of simple local anaesthetic-based infiltrative techniques (mostly delivered by surgeons) as a primary component of multimodal analgesia.

Regional anaesthesia techniques are the most effective methods to treat postoperative pain. Current evidence shows that the role of epidural technique is decreasing, it can no longer be considered the gold standard for most major surgical procedures(9,10). Perineural techniques are very effective but remain underused. US-guided blocks have reduced failure rates and

encouraged more anaesthesiologists to use such techniques but that is from a low base. For example a 2014 US report from over 400 acute care hospitals with 191,570 patients undergoing TKA showed that only 12.1% of patients received peripheral blocks for analgesia(11). Although epidural and perineural techniques are very effective they require anaesthesiologist expertise, have documented failure rates and catheter management can be labour intensive because of monitoring requirements. Infiltrative techniques are much simpler and less invasive alternatives as stand-alone or as a part of multimodal regimens.

Wound infiltration techniques.

The simplicity and safety of local anaesthetic infiltration technique is well-recognized. Local anaesthetics act directly on the tissues and block pain transmission from afferent nociceptive barrage. Local anaesthetics also inhibit the inflammatory response to injury and may reduce the risk of hyperalgesia. There is evidence that the risk of persistent postoperative pain is reduced when wound infiltration techniques are used in surgeries for hernia repair, iliac crest bone grafting and vasectomy(12). The technique is inexpensive and has a good safety profile. Depending on the severity of postoperative pain it can be used alone or as part of multimodal analgesia. In the opinion of this author, there is no reason for not using wound infiltration with a long-acting local anaesthetic as a routine method for most surgical procedures. Since 1991, every surgical patient at our institution receives a combination of paracetamol and wound infiltration with bupivacaine(at the end of surgery by surgeon) as part of our standard protocol. Other regional techniques, NSAIDs, opioids, or i.v morphine PCA are added as necessary (13). Nearly 25 years of this multimodal regimen, in tens of thousands of patients, and results of repeated audits testify to the remarkable safety of this regimen. Wound infiltration is recommended as part of multimodal regimens by several national and international anaesthesia organizations (14,15,16).

Wound catheter infusion(WCI) techniques.

These techniques should preferably be called surgical-site catheter infusions (SSCI) because the catheters are not always strictly in the surgical wound. In the literature, catheters have been placed in several sites such as subcutaneous, subfascial, preperitoneal, intraperitoneal, subacromial, intraosseous, intraarticular, "TAP space"(for TAP block). A systematic review of 44 RCTs showed that WCI techniques provided effective analgesia at rest and movement, reduced opioid consumption, improved patient satisfaction and sometimes reduced hospital stay. There were no major adverse effects, wound infection rates (0.7%) were similar to controls. The impressive finding was that the technique was effective across a variety of major surgical procedures such as abdominal, cardiothoracic, orthopaedic (17). A more recent metaanalysis of 14 RCTs focused on ropivacaine, there was consistent evidence of effective pain relief and opioid-sparing across a wide range of procedures (TKA, THA, major abdominal, cardiac), again, no major adverse effects were noted. In spite of 8–20 mg/h ropivacaine infusion for 48h, plasma concentration was below toxic levels(18). Another metaanalysis of infiltrative techniques (WCI, TAP, intraperitoneal) versus placebo or routine analgesia for colorectal surgery concluded that infiltrative techniques were associated with lower pain scores, opioid-sparing, reduced hospital stay and no increase in complications(19).

Local Infiltration Analgesia (LIA) technique for TKA and THA

In spite of its name, the original LIA technique is not just infiltration of local anaesthetic, it is a multi-component optimization package described elsewhere(20), an important component is the placement of intraarticular catheter for analgesic top-up. LIA technique has achieved widespread acceptance by orthopaedic surgeons especially in Scandinavia, UK and Australia. The 2014 report of Swedish Knee Arthroplasty Register showed that 97.3% patients received LIA for TKA(21).

LIA technique has shown favourable results when compared with other regional techniques such as epidural analgesia (22,23,24) and intrathecal morphine (25,26,27) for TKA and THA and with femoral block for TKA (28,29). LIA was superior to epidural in terms of analgesia, opioid use, joint function, mobilization and hospital stay for TKA(22,23) and THA(24). Literature review supports the use of LIA for TKA(30), however the reviews for using LIA for THA are conflicting. One review favours LIA for THA (31) while another does not(30). There is no evidence that LIA is inferior to multimodal analgesia that has been proposed as an alternative for THA(32).

In conclusion, LIA is a major recent development in lower extremity joint replacement surgery. In some institutions and in countries like Sweden, it has been a game changer. Although controlled trials are necessary to address the many unanswered questions such as the role of intraarticular catheter and most appropriate drug combinations, the technique is here to stay. The results of ongoing studies with ultralong acting local anaesthetics are eagerly awaited.

Intraperitoneal local anaesthetics

A metaanalysis of 30 RCTs showed that intraperitoneal local anaesthetics for laparoscopic cholecystectomy reduced postoperative pain and opioid use. There were no adverse effects in spite of potentially toxic serum levels in two patients(33). Similar results have been reported in previous reviews.

With increasing literature it is becoming clearer that the position of catheter tip is important. This was demonstrated in studies in patients undergoing colorectal surgery(34,35,36). Preperitoneal catheter placement is not only effective, it is superior to epidural technique as regards analgesia and hospital stay(35,36). For C.Section the most appropriate catheter position is subfascial rather than subcutaneous, this subfascial position has been shown to be as effective as epidural(37) or even superior to epidural(38). It is recommended by PROSPECT(15).

Transversus Abdominis Plane (TAP) blocks

This block can be clinically useful in bowel surgery, appendectomy, hernia repair, umbilical surgery, and gynaecological surgery(39). There is a large body of efficacy and safety data which has allowed several metaanalyses (40,41) and a Cochrane review (42). A recent metaanalysis recommended the technique for laparoscopic surgical procedures(43) and another metaanalysis recommended it for C.Section(44). The evidence-based PROSPECT recommendations also include TAP blocks as an effective method for this surgery(15).

To summarize, the ease of use and safety of local anaesthetics is well recognized. Collectively, they serve as one of the most important classes of drugs in perioperative pain management. The main advantage of local anaesthetics is that they act directly on the tissue they are applied to and do not have the side effects of opioids. Simple surgeon-administered techniques such as wound infiltration, pre-or-intraperitoneal administration, TAP blocks, LIA as a single administration or with catheters placed under direct vision and in collaboration with anaesthesiologists and Acute Pain Services (APS) can play a significant role in improvement of postoperative care. There is increasing evidence from several metaanalyses and systematic reviews that these techniques can be good alternatives to epidural and perineural catheters. WCI can be used for a variety of surgical procedures such as abdominal, cardiothoracic, vascular and major orthopaedic, LIA technique for hip and knee replacement, intraperitoneal and TAP blocks for many abdominal surgical procedures. Since most of these techniques are relatively new, there is a need for further studies to address the many unanswered questions.

(This abstract has been adapted from an invited review "Current issues in postoperative pain management" that has been submitted by the author to Eur J Anaesth).

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ESRAS-0523

PRO-CON DEBATE: INTRALIPID IS THE CORNERSTONE OF LAST MANAGEMENT– CON

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Definition, cornerstone: 1: a stone forming a part of a corner or angle in a wall; *specifically* : such a stone laid at a formal ceremony; 2: a basic element: foundation

The word cornerstone is an apt description for the role infusion of lipid emulsion (ILE) in resuscitation of patients with local anesthetic systemic toxicity (LAST). The cornerstone by definition isn't the first thing you see entering a building. However, it is a basic element and foundation for the edifice just as ILE is a basic element and foundation for treatment of LAST. Nevertheless, the primary focus of managing LAST must be prevention since our overarching goal is to reduce the incidence of LAST to an absolute minimum. Unfortunately, eliminating LAST entirely (e.g., zero risk) is impossible given the reality that we treat patients with extreme sensitivity to local anesthetics who are otherwise entirely asymptomatic. Here, LAST can occur despite otherwise perfect technique (see refresher course on LAST).

When LAST occurs, ILE is a cornerstone of treatment. Once again, 'cornerstone' is the appropriate description since ILE is a basic element of therapy but not the first. Our primary concerns in treatment comprise three elements: airway management, seizure suppression and, if needed, effective chest compressions. After accounting for these, ILE is appropriate for the next steps in therapy. This assertion is based on evidence for a highly favorable risk-benefit relationship. Strong evidence from multiple sources support the efficacy of ILE in treating LAST; moreover, standard lipid emulsion has a long (>50 year) history of safe use as TPN and few significant reports of complications following its use in resuscitation. In short, there's much to be gained and little downside in giving ILE to a patient with LAST. A brief discussion of efficacy and safety follows.

Clinical and laboratory sources provide two elements in support for the use of ILE: 1) evidence for its efficacy in treating LAST and 2) knowledge of mechanisms that plausibly account for this beneficial effect. Laboratory models of bupivacaine toxicity have clearly shown attenuation or reversal of LAST by ILE in multiple species, (e.g., rodent and canine) and at multiple biologic systems levels: intact animal, isolated organ, cultured cells. The notable exception is pig in which a well-described, adverse systemic response to ILE induces pulmonary hypertension that confounds lipid infusion experiments. This renders porcine models, long considered an ideal animal for

studying ischemia due to the similarity to human coronary anatomy, questionable for the study of ILE.

Published, peer-reviewed case reports of efficacy in treating ILE include dramatic reversals of full cardiac arrest that appeared resistant to standard ACLS measures. In such cases, each patient provides their own control in a 'repeated measures' experiment where a temporal relationship of recovery to ILE provides strong support for causality. Similar case reports for non-LAST related intoxications suggest that ILE is effective against a wide range of lipophilic drug overdoses that lead to cardiotoxicity. Case reports in both LAST and non-LAST poisoning suggest a generalizable benefit in treating lipophilic drug overdose. This level of evidence falls short of that from randomized control trials, but such events are too rare to allow for such studies and ethical considerations prevent high-dose challenges of local anesthetic or other drugs in volunteers. Nevertheless, a recent report of results from an ILE clinical registry indicate positive hemodynamic response and overall survival following ILE for both LAST and non-LAST related toxic cardiomyopathies and a very low incidence of possible adverse effects. Finally, antidotal efficacy for ILE was shown in a recent prospective RCT in cats presenting to veterinary emergency rooms poisoned with permethrin a common insect repellent. In the aggregate, these reports support the clinical efficacy of ILE for treating a range of 'toxidromes' and the evidence is strongest for treatment of LAST.

Recent studies reveal potent pharmacokinetic effects of ILE in both animal models and volunteers. While there remains controversy regarding the interpretation of these results, especially in terms of identifying or defining what has been called a 'lipid sink' effect, they all show congruent effects on bupivacaine's half-life. Whether in rat or human, the net effect of ILE appears to be acceleration of bupivacaine redistribution. Thus, ILE should no longer be considered a static sink or sponge for bupivacaine, but a shuttle that carries bupivacaine away from target organs (brain and heart) to 'receiver' or reservoir organs (liver and skeletal muscle). ILE also exerts a potent inotropy that contributes to the shuttling effect but only occurs after myocardial bupivacaine concentration has dropped below a threshold that corresponds to ion channel blocking. Thus, the benefit of ILE occurs in two steps: shuttling of bupivacaine away from target organs to 'safe zones' and subsequent acceleration of this phenomenon as bupivacaine myocardial content drops and the heart beats more strongly, thereby increasing cardiac output and coronary flow. This synergism of two distinct effects contributes to the rapidity of LAST reversal reported for ILE in both clinic and laboratory settings.

The question of safety is important to consider in any therapy as a necessary counter to the evidence in support of efficacy. We must be convinced that ILE is sufficiently safe that the risk of an adverse effect never outweighs its potential benefit. The most common adverse effect following ILE is interference with laboratory studies. Insofar as lipemia is the goal of treatment it is expected that for a high fraction of patients we will find it difficult after ILE to draw meaningful information from their clinical laboratory studies. Fortunately, the half-life of triglycerides in chylomicron-sized particles is about 15 minutes so that blood will usually clear in less than an hour. Another approach is for the lab to spin the sample at low speed to separate the lipid from clear plasma. In any event, the lipemia itself should not be dangerous if the total volume infused is below the standard limits of ~12mL/kg. Other potential albeit rare complications that have been ascribed to ILE include pancreatitis and lung injury. However, there are sufficient confounders in these reports that the associations are not clearly causally related to ILE. For instance, many patients receiving ILE are also given large doses of pressors that are also known to cause pulmonary edema; and reports of pancreatitis following ILE generally lack radiographic confirmation and have not required specific therapy or intervention. In short, the evidence for adverse effects associated with ILE does not warrant withholding this potentially life-saving therapy.

In conclusion, the combined laboratory and clinical evidence in support of efficacy for ILE in treating LAST convincingly outweighs its potential risks or theoretical limitations and strongly support its use in treatment of LAST.

ESRAS-0518

Pro-Con Debate: Intralipid is the cornerstone of LAST management– CON

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Local anaesthetics have been used for more than 100 years, and Local Anaesthetic Systemic Toxicity (LAST) is a well-known complication. Its first description was in 1928 from cocaine administration in a case series of 40 patients [1]. Contemporary literature reports that LAST occurs in 7.5 to 20 out of 10,000 peripheral nerve blocks and 4 out of 10,000 epidural anaesthetics [2]. Mechanisms of LAST are unintentional intravascular injection or absorption from surrounding tissues, resulting in neurotoxicity and cardiotoxicity. Patients may develop devastating complications such as seizure or cardiac arrest. This latter is tremendously recalcitrant to conventional resuscitative techniques, occasionally necessitating management as complex as extracorporeal membrane oxygenation until full clearance of local anaesthetics is achieved.

Based on animal data, Guy Weinberg and colleagues reported in 1998 that lipid infusion reduced cardiotoxicity related to bupivacaine [3]. This initial promising publication was followed by several case reports where patients suffered from LAST and underwent successful resuscitation with Intralipid [4–6]. While a proper randomized controlled double-blinded trial would never be conducted for obvious reasons, there are still unanswered questions that need to be addressed. These include the exact mechanism of action, the optimal dosage, and the possible antagonism of lipophilic drugs used in resuscitation. In the context of a patient suffering from cardiac arrest, possible side-effects such as pulmonary hypertension, hyperlipidemia, hypercoagulability and interference with extracorporeal membrane oxygenation circuits appear, relatively speaking, benign [7].

Keeping in mind the Latin maxim “primum non nocere”, the physician should apply the standard of good clinical practice to prevent complications. Whereas certain local anaesthetics advertised by industry may not be characterized by a pretended reduced cardiotoxicity, respect of toxic doses to avoid LAST is of paramount importance. There remain areas of uncertainty regarding these doses, especially in case of injection of local anaesthetics mixtures.

There is no doubt that Intralipid should nowadays be part of LAST treatment. However, the cornerstone is without any doubt *prevention*. Then, in case of LAST suspicion, application of Advanced Cardiac Life Support (ACLS) guidelines is of utmost importance: the physician should secure the airway, provide oxygenation and ventilation, administer anticonvulsants, and initiate the first steps of cardiac arrest management, if required, along with early consideration for Intralipid. If the patient does not respond to the ACLS protocol, Intralipid should then be administered quickly as a reasonable and appropriate therapeutic modality.

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ESRAS-0521

REFRESHER COURSE: INCIDENCE AND EPIDEMIOLOGY OF NEUROLOGIC COMPLICATIONS FOLLOWING REGIONAL ANESTHESIA

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Regional anesthesia (RA) is associated with multiple benefits compared to general anesthesia. However rare, neurologic injury after RA can be

distressing to patients and their families. Because neurologic injuries related to anesthesia and pain medicine practice are extremely rare, standard tools of evidence-based medicine such as randomized controlled trials, meta-analysis, and prospective human studies rarely exist, and are unlikely to be available in the future.

1- Central Nerve Blocks: Serious complications after central nerve blocks (CNB) are rare.

1-a- Epidural abscess: The occurrence of an epidural abscess is a rare but potentially serious complication of epidural catheterisation. Its incidence varies enormously and is difficult to apply to a general surgical population. Reasons for this variability include the targeted population studied. Indeed, prolonged epidural catheterisation (more than 48 hours) increases the risk for epidural abscess. The incidence of epidural abscess is certainly most favorable for obstetric applications and least favorable for chronic pain applications, with the rates for postoperative acute pain patients being intermediate. Ruppen showed in a large survey on labor epidural analgesia involving a total of 1.37 million women that the risk of epidural infection was 1/145,000.

1-b- Epidural hematoma: A recent closed-claim study in Finland showed that neuraxial hematoma after spinal block occurred in 1/775,000 of cases, and after epidural block in 1/26,400 of cases. Moen et al had a much higher incidence of hematoma (total incidence after epidural 1/10,300 and 1/480,000 after spinal anesthesia). The occurrence of neuraxial hematoma is lower after spinal anesthesia and in obstetrics compared to orthopedic surgery. The introduction of low-molecular-weight heparin since 1992 has been identified as a risk factor in increasing the incidence of postoperative epidural hematoma. The timing of anticoagulant administration is important in decreasing this risk. In addition, advanced age, female gender and bony spinal pathology are also reported as being risk factors.

1-c- Spinal Nerve injury: Moen et al calculated the frequency of severe neurological complications after epidural anesthesia to be 2.8/10,000 when the obstetrical population is omitted, as opposed to 0.4/10,000 for obstetrical epidural anesthesia. Excluding obstetrics, Auroy et al similarly found the incidence of major neurological complications related to CNB to be 3.4/10,000 compared to 0.6/10,000 for the obstetric population. Ruppen et al showed that, in Obstetrics, the risk of persistent neurologic injury was 1/240,000 while the risk of a transient neurologic injury (less than 1 year duration) was estimated to 1/6,700 parturients.

With the current increase in the use of central nerve blocks to provide labor analgesia, many postpartum neurologic injuries, regardless of their true cause, are being attributed to the anesthetic. Although most neurologic complications are associated with pregnancy and delivery, some may be related to the anesthetic, and it often is difficult to determine the exact cause of a postpartum neuropathy.

2- Peripheral Nerve Blocks:

2-a- Single shot nerve blocks

In the early postoperative period, mild paresthesias may be present in up to 15% of patients that undergo peripheral nerve block. Most of these symptoms resolve within days to weeks, with more than 99% completely resolving by 1 year. Serious neurologic injury reported in a large prospective study occurred in 2.4 per 10,000 peripheral nerve blocks.

In the two large prospective studies performed by Auroy et al, 8 cases of neurological injury were identified among 21,278 PNB (3.8/10,000) in 1997 and 12 cases among 43,946 PNBs (2.7/10,000) in 1998–1999. In the latter study, neurological symptoms were still present 6 months after the PNB in 7 of the 12 cases of reported peripheral neuropathy.

Barrington et al performed a prospective audit of more than 7,000 pnerve blocks (PNB) performed at 9 Australian hospitals. Ultrasound imaging was used as the primary mode of neural localization in more than 63% of the procedures. Overall, they identified a neurologic injury rate of 0.5%. However, only 10% of these injuries were attributed to peripheral nerve blockade suggesting that the vast majority of perioperative nerve injuries have a non-anesthesia related etiology. The nerve injury rate attributed to peripheral nerve blockade was found to be 0.04%, a rate similar to other large-scale investigations.

2-b- Continuous peripheral nerve blocks (CPNB)

In contrast to single-shot nerve blocks, catheter-induced complications need to be considered in addition to needle-induced complications when studying complications and adverse effects associated with CPNBs. Many investigators speculate that the risk of peripheral nerve injury may be higher in patients undergoing continuous perineural catheter placement versus single-injection techniques. The frequency of minor neurologic deficits (dysesthesias, persistent numbness) occurring within the first few days after perineural catheter placement is variable, ranging from 0% to 8%. However, severe neural lesions or long-term (3 to 6 month) neurologic deficits occur at rates comparable to single-injection techniques.

The incidence of transient adverse neurologic symptoms associated with CPNB is 0–1.4% for interscalene, 0.4–0.5% for femoral and 0–1% for sciatic catheters. The overwhelming majority of neurologic symptoms resolve spontaneously within 3 months of surgery.

There are reported cases of long-term nerve injury in patients with perineural infusion. Indeed, the results of many surveys on this topic suggest that the risk of neurologic injury lasting longer than 9 months associated with CPNB is 0.07%.

Suggested Readings: - Ruppen W, Derry S, Mc Quay H et al. Incidence of epidural hematoma, infection, and neurologic injury in obstetric patients with epidural analgesia/anesthesia. *Anesthesiology* 2006; 105: 241–3.

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ESRAS-0571

Symposia: Functional anatomy for the anesthetist performing regional anesthesia

STANDARDISATION OF NOMENCLATURE AND DEFINING STRUCTURES IN PERIPHERAL NERVE BLOCKS

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After to describe the structure and ultrastructure of human peripheral nerve (1–3), we are checking the nomenclature used and the confuse words of controversies defining the same structures.

Axons are the essential transmitting units of peripheral nerves, and are surrounded by endoneurium. Multiple axons are grouped into fascicles, which are surrounded by perineurium. Fascicles in turn, can be grouped in fascicular bundles, which are covered by epineurium. All fascicular groups also are surrounded by epineurium. Outer the nerve visualized after dissection, there are concentric layer of like-epineurium that we rename paraneurium layers. Branches of the nerve have been found inside fat compartment limited by paraneurium layer. These compartments are mentioned as paraneurium compartment. Endoneurium, epineurium and paraneurium is mainly formed by collagen fibres at difference of perineurium formed by layers of cells.

Structure and ultrastructure of the human peripheral nerve Multiple axons surrounded by endoneurium are grouped into fascicles, which are surrounded by perineurium. Unmyelinated and myelinated axons are present within the same nerve fascicles of mixed nerves and their respective locations may vary along the nerve. Inside nerve fascicles there is an intraneural plexus, in which the axons take different positions in different fascicles along its path. Successive cuts, which have been taken every few millimetres along a nerve show that the topographic map of the fascicles varies. Variations in topography of fascicles along a nerve are explained by the interchanging of axons between different

fascicles. This transfer of axons begins in the proximal region of the spinal ganglion, close to the epidural space, and continues along the intervertebral canal. At the distal end of the ganglion, the fascicular structure seen in peripheral nerves starts to appear. The number of fascicles increases along the course of the nerves. In mixed nerves, single fascicles, groups of fascicles and ‘small’ fascicles may be found. The latter form a characteristic structure known as ‘fascicular interconnections’.

Endoneurium: Endoneurium enclosing myelinated and unmyelinated axons consists mainly of collagen fibres. The space limit by endoneurium is the endoneurial compartment. Collagen in the endoneurium is similar to collagen found in the perineurium, and paraneurium. Conversely, scanning electron microscopy enabled accurate observations of the structural array of these collagen fibres, which shape genuine tunnels for each axon. In the samples examined, all tunnels contained a single myelinated axon, whereas unmyelinated axons and capillaries lacked from these collagen formations. The endoneurium helps to maintain a protective environment, and plays an important role in axonal repair when cut or damaged. It functions as an isolating device preventing disruptions in the conduction of nerve impulses among adjacent axons. The endoneurium may help to keep damaged ends of axons in correct alignment, and facilitate repair of injured axons. This is unlikely to happen when the axon is completely ruptured, but is more likely when the lesion is incomplete.

Perineurium: Perineurium covering each fascicle forms a continuum around each fascicle, and is composed of concentric cellular layers and collagen fibres interposed (perineurial space) among these layers. In sciatic nerves, perineurium is composed of 8–18 alternating concentric layers of cells and connective tissue. Overall, the number of perineurial cell layers bears a linear relationship to the diameter of the fascicles, being higher in fascicles of larger diameter and lower in the fascicles of smaller diameter. We observed numerous intracytoplasmic pinocytotic vesicles in perineurial cells, mainly in the outer layers. Each layer of the perineurium is formed by single cells joined together. Perineurial cells have a thick basement membrane, which surrounds the perineurial cell layers on both sides, tight junctions and desmosomas, which connect adjacent cells within each layer of perineurium. The collagen fibres that fill the perineurial space can be aligned in different directions, but predominantly in a longitudinal fashion along the axis of the fascicle. Immunohistochemical studies with EMA (epithelial membrane antigen) have been used to differentiate the nature of the tissues surrounding the fascicles. EMA immunoreaction is positive with perineurial cell surfaces and negative with collagen fibres. It has been found that single fascicles are surrounded only by perineurium, whereas groups of two or more fascicles are covered by both collagen fibres and some isolated fibroblasts, a structure similar to the epineurium. Masson’s Trichrome dye technique, allow us identified collagen fibres on endoneurium, epineurium and paraneurium. The perineurium allows certain mobility to axons inside fascicles and serves to maintain an intrafascicular pressure while acting as an effective physical barrier against mechanical and chemical injury. The perineurium transmits pressure to the endoneurium, which then generates intracellular pressure within the axon. Perineurial cells and its specialized junctions confer selective diffusion barrier properties to the perineurium, while protecting axons and Schwann cells from toxins, antigens, infectious agents and sudden ionic fluxes.

Epineurium: The epineurium is composed mainly of collagen fibres and a few blood vessels. The epineurium consists of thicker, condensed layers of connective tissue, surrounding nerves externally and tethering them to neighbouring structures, typically muscles and connective tissue. The epineurial layer is freely permeable and does not form a barrier. Thus unlike puncture of the perineurium, damage to the epineurium seems to have no harmful effects. The epineurium a term that can lead to confusion (see “synonyms”). Some authors rename epineurium as only the outer layer of collagen fibres of the nerve, while others, rename as epineurium all tissue outside from the fascicles.

Interfascicular tissue: A structure known as “interfascicular tissue”, appears wrapping around fascicles and its thickness increases around groups of nerve fascicles. Interfascicular tissue is mainly composed of adipocytes, blood vessels of various sizes such as arteries, veins, arterioles, venules and fenestrated capillaries; as well as lymphatic vessels and small nerve endings supplying the vessels. Interfascicular tissue has elastic properties. The amount present in each nerve fascicle varies, although its proportionally higher in larger nerves.

Intrafascicular tissue: The “intrafascicular tissue,” is a structure tightly enveloped by perineurium and composed by nerve axons, Schwann cells, endoneurium and non fenestrated capillaries.

Paraneurial layers: Fatty compartments enclosed by layers of collagen fibres surround the nerves. The compartments may be concentric or non-concentric to the nerve, and their collagen films are known as “paraneurial sheaths.” These layers may emit projections that extend toward the adventitia of larger vessels

and the collagen sheaths of neighboring muscle groups. Capillaries are often found in these paraneurial layers. The paraneurium is another term that can lead to confusion (see “synonyms”). Histologically, the paraneurial layers are identical to the epineurium, and fat present in the paraneurial compartments has identical composition to interfascicular fat inside nerves. In complex nerve structures, branches appear to be divided by their respective epineurial layers even before physical division occurs. Therefore, the concept of anticipated division into collateral and terminal nerve branches inside single nerve structures may be applied to nerves at other locations. The amount and shape of fat tissue within the paraneurial compartment varied along the nerve structure, progressively losing its concentric contour and becoming unevenly distributed. As epineurial and paraneurial structures are identified histologically as identical structures, it seems reasonable to question the true origin of the paraneurial lamina. Hypothetically, tissues inside a sectioned nerve may be identified as epineurium and interfascicular tissue, respectively, whereas tissues remaining in the cadaver may be identified as paraneurial layer and paraneurial compartments. Both epineurium and paraneurium have similar functions, including insulation and protection of nerves from erosion or injury. Paraneurial compartments facilitate longitudinal displacement of nerves controlling body movement. This movement is necessary to neutralize lateral compression by changing their shape. Tissues exposed to external irritation are subject to interfascicular fibrosis.

Confuse terms and synonyms A number of anatomical terms continue to cause confusion owed to ambiguities as the same word may refer to different structures. Such is the case of “epineurium,” as it often constitutes a source of discussion in clinical practice. In some circumstances it may refer to the outer and most peripheral portion of connective tissue surrounding nerves or it may otherwise, refer to both “epifascicular and interfascicular portions” of connective tissue outside fascicles. The epineurium also may be known as epineurium, and “interfascicular tissue” as “interfascicular epineurium”. Different synonyms may be used and while may be recognize its significance disappear the confusion.

Synonyms: Endoneurium: Endoneurial compartment, endoneurial environment, endoneurium, Henle sheath

Perineurium: Perineurial layers

Interfascicular tissue: epineurium (as part of epineurium), interfascicular epineurium, sub-epineurium, subepineurial place.

Epineurium: Epi-epineurium, epifascicular epineurium, nerve sheath, common epineurial sheath

Paraneurium: paraneurial sheaths, conjunctiva nervorum, adventitia, mesoneurium.

Adopting a comprehensive terminology for classifying connective tissue layers of peripheral nerves may contribute to a better understanding of the ultra-structure of the larger and more complex peripheral nerves (3).

Conflict of interest: The authors declare no conflict of interest.

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ESRAS-0530

REFRESHER COURSE: LOCAL ANESTHETIC PHARMACOLOGY IN CHILDREN

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Amide local anesthetics used for regional anesthesia in pediatric patients are potent sodium channel blockers, and, thereby, blockade of impulse conduction

in axons. Local anesthetics have other actions that may contribute to both local and systemic toxicities and to beneficial systemic actions on inflammatory responses and cancer. Amide local anesthetics are potent sodium channel blockers with marked stereospecificity, which consistently influences their action, especially their toxic action on the heart.

1. General Considerations: The primary local anesthetic agents used in pediatric regional techniques are lidocaine, bupivacaine, levobupivacaine, ropivacaine, and mepivacaine. The pharmacology of local anesthetics in children is similar to that in adults. In neonates and infants, however, the greater total body water volume results in a larger volume of distribution and therefore longer elimination half-life (1). Lidocaine 0.5% to 2% has a short time to onset and medium duration of action. Bupivacaine 0.1% to 0.5% has a longer onset time and duration of action than lidocaine but has a greater potential for severe cardiotoxicity than other agents. Mepivacaine is approximately equally potent to lidocaine. Mepivacaine can provide a rapid onset of block, with a shorter duration of motor block that may allow for rapid recovery in the postoperative period. Ropivacaine 0.2% to .05% and levobupivacaine 0.25 to 0.5% may replace the racemic mixture of bupivacaine because of its decreased potential for central nervous system toxicity and cardiotoxicity. Ropivacaine differs from bupivacaine in various aspects: it is a pure S-enantiomer and its lipid solubility is markedly lower; these characteristics can significantly improve the safety profile of ropivacaine. Levobupivacaine, the S-enantiomer of racemic bupivacaine, is less cardiotoxic while showing similar local-anesthetic properties and the potency of racemic bupivacaine. Indeed, several cases of central nervous system toxicity have been reported after inadvertent intravascular administration of ropivacaine or levobupivacaine in adults, but only some cases of cardiovascular toxicity have been reported. The outcome of these inadvertent intravascular administrations was favorable, even in a neonate (2).

2. Pharmacokinetics factors: When injected into the body, the pure isomers do not undergo interconversion, meaning, they do not transform into the usual racemic compounds.

LA's bind to blood components (erythrocytes and serum proteins such as α 1 - acid glycoprotein (AGA) and albumin (3). These different buffer systems have different levels of importance; the AGA is by far the most important because it is specific. The blood cell played little role in setting the LA (the concentration ratio between blood and plasma ranged from 65–80 %, which corresponds to about 15–30% of LA molecules in the blood determined by cells) (4). This buffer system may become important when the LA blood concentration is very high beyond the toxic concentrations and anemia (red blood cells bind less than 15 % of molecules of LA when the hematocrit goes down under 30 %). Binding of LA amide to serum proteins is important. Like all weak bases, amides are mainly related to the AGA and serum albumin (3). The AGA is 50–80 times less abundant in plasma than is albumin, particularly in infants. The determination of serum albumin LA is characterized by a low affinity but a high capacity, while the affinity of binding to the AGA is high but the capacity is low.

The AGA is the main serum protein involved in the binding of LA. Because AAG is a major acute phase protein, its concentration rapidly increases when inflammatory processes develop, particularly during the first six hours of the post-operative period (5). In addition, the affinity of LA increases with the inflammatory processes; acidosis decreases this affinity. Neonates and infants have a lower AAG concentration in serum as compared with adults (6); therefore, their free fraction of local anesthetics is increased accordingly. This has important clinical implications since, at least at a steady state; the toxic effects of local anesthetics are directly related to the free (unbound) drug concentration. Nonetheless with a continuous infusion no accumulation of unbound drug concentrations occurred (7). In summary, there are no differences in protein binding between R and S enantiomers of bupivacaine, at least when the concentrations even toxic are observed in clinical practice (8).

After passing through the bloodstream, the LA amides are excreted by the liver. This phase involves the cytochrome P450. The clearance of bupivacaine, like the clearance of ropivacaine and levobupivacaine, ranges from 3 to 6 ml/kg/min. The value of clearance is low; therefore the main metabolism of these agents is hepatic metabolism. Local anesthetics are metabolized by cytochrome P450 (CYP). The main CYP isoforms involved are CYP3A4 for lidocaine and bupivacaine (9) and CYP1A2 for ropivacaine (10). CYP3A4 is not mature at birth but is partly replaced by CYP3A7 (11). The intrinsic clearance of bupivacaine is only one third of that in adults at 1 month of age, and two-thirds at 6 months. CYP1A2 is not fully mature before the age of 3 years. Indeed, the clearance of ropivacaine does not reach its maximum before the age of 8 years (12). However, at birth this clearance is not as low as expected (13) even with levobupivacaine (14), and ropivacaine and levobupivacaine may be

used even in younger patients. Finally, the S and R enantiomers of AL kinetics are very similar and the slight differences that have been described do not have any clinical consequences.

3. Pharmacodynamic factors: The R and S enantiomers have different pharmacodynamic effects on the myocardium, and the nerve. The nervous sign is result of a notice of numerous events, which are added on in time and in space. By simplifying a lot, we can say that nerves work in most cases in modulation of frequency and not in modulation of amplitude. The most part of nerves has a basic activity on which comes to be added sign (painful for instance). The effects of local anesthetics can be improved when the signal they are trying to block increases in frequency. Thus, the basic block (tonic block) superadded a block whose intensity will increase with the frequency of discharge of nerve or the heart rate, the phasic block. Purkinje's fibers of the myocardium are more sensitive. If cardiac frequency is rather slow (between 40 and 200 beats/min), the frequency of nerve impulses is bigger. Therefore, the nerves, when stimulated, are immediately locked up, while the intensity of heart block increases with tachycardia. The S enantiomers are unique in that they cause phasic blocks smaller than the enantiomers R (and therefore than the racemic mixtures). On nerve, difference is weak because sodium channels put involved at this level are little sensitive to the phasic block and because frequency is straightaway maximum. On heart the difference is more important (15). When the frequency increases, the S enantiomers are increasing the power they generate much more slowly than the racemic mixtures (the difference between ropivacaine and levobupivacaine remains the same, equal to the difference in power level of the nerve) (15). However, though there is no intrinsic difference between newborn and adult animals, phasic block (the one that increases with frequency) plays a very important role (16) and we can well imagine that an infant, whose heart beats at 150 beats/min, is significantly more sensitive than an adult's, whose heart beats at 75 beats/min.

The S enantiomers levobupivacaine and ropivacaine cause moderate vasoconstriction, whatever the concentration range studied.

4. LAs toxicity:

4.1. Systemic toxicity

Reports in humans suggest that lipid emulsion Intralipid® may be an effective therapy for cardiac toxicity from high systemic concentrations of ropivacaine and bupivacaine, even in patients for whom conventional resuscitation is ineffective (17). The solubility of long-acting local anesthetics in lipid emulsions and the high capacity of binding of these emulsions most probably explain their clinical efficacy in case of toxicity. The long-chain triglyceride emulsion Intralipid® appears to be about 2.5 times more efficacious than the 50/50 medium-chain/long-chain Medialipide® emulsion (18). No data exist in pediatrics except for one case in which a 20% lipid infusion was used to successfully treat a ventricular arrhythmia, after a ropivacaine and lidocaine injection in a psoas compartment block in a healthy 13-yr-old child, was administered (19). Indeed, a bolus of 1.5 mL/kg and then an infusion of 0.5 to 1 mL/kg/min of Intralipid® in combination with usual resuscitation should be useful to treat LAs cardiac toxicity in children.

Preferably, lipid rescue is administered via a central venous catheter, but in its absence, peripheral veins can also be used. A 20% lipid emulsion bolus over one minute is recommended with an initial dose of 1.5 mL/kg, immediately followed by small boluses of 1 µg/kg epinephrine in order to limit the increase in heart rate which is deleterious as discussed above (15). Chest compressions should not be interrupted. The intralipid® bolus can be repeated with a maximum of 4 mL/kg/min. The lipid infusion is to be maintained at a rate of 0.5 mL/kg/min until hemodynamic recovery.

Lipid infusions act as an antidote to local anesthetic intoxication, and should be readily at hand like O-negative blood and dantrolene. It has a low cost and a shelf life of up to one year. The guidelines for the management of severe local anesthetic toxicity provide essential information, which should be available in all hospitals, particularly in units where local anesthetics are administered.

4.2. Local tissue toxicity

Skeletal muscle toxicity is a rare and uncommon side effect of local anesthetic drugs, although experimental data show that intramuscular injections of these agents regularly result in calcified myonecrosis (20). All local anesthetic agents that have been examined are myotoxic, in which the extent of muscle damage is dose dependent and worsens with serial or continuous administration. Pathophysiologically, increased intracellular Ca²⁺ levels appear to be the most important element in myocyte injury (21). Lipophilicity also determines the extent of Ca²⁺ release by local anesthetics, as effects of racemic bupivacaine and levobupivacaine were significantly more pronounced than those of ropivacaine isomers (22). Consequently, a rank order of myotoxic potency (ropivacaine < bupivacaine < levobupivacaine) is suggested. The clinical

impact of local anesthetic-induced myotoxicity is still controversially discussed. Only few case reports of myotoxic complications in patients after local anesthetic administrations have been published in adults. In particular, the occurrence of clinically relevant myopathy and myonecrosis has been described after continuous peripheral blocks; some experimental data have shown more toxicity in young animals (23), therefore particular attention must be with prolonged continuous infusion in infants.

Most recently, several studies revealed that local anesthetics might irreversibly damage chondrocytes in articular cartilage, which may contribute to cartilage degeneration (24). Bupivacaine especially showed profound chondrotoxic effects in experimental models, and, although these results cannot be directly extrapolated to the clinical setting, caution should be exercised in the intra-articular use of this agent. Ropivacaine seems to be less chondrotoxic than bupivacaine (25), whereas the chondrotoxic potency of levobupivacaine has yet to be assessed.

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ESRAS-0525

PRO-CON DEBATE: PERINEURAL DEXAMETHASONE SHOULD ALWAYS BE USED IN A PERIPHERAL NERVE BLOCK—PRO

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The main postoperative challenge after painful surgery is to provide effective pain relief beyond 24 hours. dexamethasone is a glucocorticosteroid used for prevention of postoperative nausea and vomiting. A decrease in postoperative opioid demand is also observed after dexamethasone administration[1].

1- Minimum effective dose of dexamethasone used perineurally.

Number of studies have clearly shown that when a low dose of dexamethasone is added to a long acting local anaesthetic in peripheral nerve block, analgesia duration achieved 26–32 hours[1]. In this publication, on 88 individuals undergoing shoulder arthroscopy, patients received interscalene brachial plexus block using 20 ml of bupivacaine 5 mg ml⁻¹ with 1: 200,000 epinephrine and clonidine 75 microg. Patients were randomly assigned to receive either dexamethasone 8 mg or 0.9% NaCl as an adjuvant to the mixture. Dexamethasone prolonged median sensory (1457 vs. 833 min) and motor (1374 vs. 827 min) blockade compared with the control and reduces opioid use.

To identify the effects of adding two different doses of dexamethasone on the duration and quality of interscalene block with 0.5% bupivacaine (40 mL) in patients undergoing shoulder surgery, Tandoc[2] assigned randomly to one of three groups: control patients, who received no additive; low dose, who received additional dexamethasone 4 mg; and high dose, who received dexamethasone 8 mg in addition to 0.5% bupivacaine. There was no difference in the duration of analgesia and motor block between low-dose and high-dose dexamethasone.

Recently, Liu[3] compared the analgesic effect of 3 doses of dexamethasone in combination with low concentration local anaesthetics to determine the lowest effective dose of dexamethasone for use as an adjuvant in supraclavicular brachial plexus nerve block. Low-dose dexamethasone (1–2 mg) prolongs analgesia duration and motor blockade to the similar extent as 4-mg dexamethasone when added to 0.25% bupivacaine for supraclavicular brachial plexus nerve block.

2-Volume and concentration of local anaesthetic used perineurally.

Many publications showed the reduction of the volume of local anaesthetic solution. The minimum effective volume of local anaesthetic for shoulder analgesia for a US-guided interscalene block in 95% of the patients was 3.6 ml[4]. Finally, successful ultrasound-guided axillary brachial plexus block may be performed with 1 ml of 2% lidocaine-epinephrine per nerve [5].

In the lower limb, the minimal local anaesthetic volume for sciatic nerve block has been found to be 0.10 ml mm⁻² cross-sectional nerve area[6].

Concentration of local anaesthetics can also be reduced. Perineural injection of 15 ml of lidocaine 0.93% under ultrasound guidance could provide successful femoral nerve block in 90% of patients [7].

Taha [8] showed that perineural injection of 15 ml ropivacaine 0.167% under ultrasound guidance can provide successful femoral nerve block in 90% of patients. Successful combined sciatic and femoral nerve block with bupivacaine 0.25% on diabetic patients can also be performed [9].

In the upper limb, Kii[10] showed that 16 ml of 0.1285 % ropivacaine is suitable for achieving differential block known as sensory block with

mobilization, for adequate analgesia in ultrasound-guided axillary nerve block for hand and forearm surgery.

3- Neurotoxicity of local anaesthetic solution and adjuvants used in peripheral nerve blocks

Recent studies investigating potential local anaesthetic adjuvant neurotoxicity. Although there is no clinical evidence for neurotoxicity, a laboratory study in rats has raised the possibility of dexamethasone neurotoxicity at clinical doses [11]. Williams[11] compared the neurotoxicity of adjuvants and local anaesthetic on sensory neurons isolated from adult rats. In these experiments, he confirmed that a concentration of ropivacaine administered clinically (2.5 mg/mL) is neurotoxic to isolated sensory neurons. High concentrations of clinically packaged adjuvants, Clonidine, Buprenorphine and dexamethasone were significantly less neurotoxic than ropivacaine.

Ropivacaine – Clonidine solution (frequently used in clinical practice) was significantly more neurotoxic than ropivacaine or ropivacaine-dexamethasone solution. But, increasing the concentration of dexamethasone from 66 to 133 Kg/mL in the combination of estimated clinical concentrations of ropivacaine + dexamethasone resulted in a further increase in neurotoxicity.

To limit these risks of neurotoxicity, a minimum effective concentration of local anaesthetic solution and dexamethasone should be chosen when performing a nerve block.

Ma[12] evaluated the effects of dexamethasone on bupivacaine induced toxicity in mouse neuroblastoma N2a cells. He showed that bupivacaine or lidocaine administration locally could result in neuron injury. This local anaesthetic induced neurotoxicity is concentration dependent. In this study, Ma suggested that pretreatment of neuroblastoma cells with low dose of dexamethasone exerts a protective effect on bupivacaine induced neuronal cell injury, but high concentration of dexamethasone will increase this neurotoxicity.

In a recent study from Xinhong Feng[13], the results provide strong evidence that dexamethasone enhances sciatic nerve regeneration and function recovery in a rat model of sciatic nerve injury through immunosuppressive and potential neurotrophic effects.

Future research with adjuvants should address if adjuvants can enable reducing ropivacaine concentrations needed to achieve equianalgesia and/or provide equal or superior duration.

The absence of clinical neurotoxicity after perineural dexamethasone treatment in the different studies is underpowered, given the small sample size compared to 2,7/10 000 nerve injuries found in the french study on regional anesthesia complications made by Auroy after peripheral nerve blocks using nerve stimulator.

Interestingly, recent studies showed that whether dexamethasone is injected perineurally or intravenously, the prolongation of postoperative analgesia is comparable[14]. At the opposite, Wouters[15] et coll. found, in popliteal sciatic nerve block, a 27% longer duration of analgesia when dexamethasone was injected perineurally compared to intravenous injection.

Kawanishi[16] showed that perineural but not intravenous administration low-dose of 4 mg of dexamethasone significantly prolongs the duration of effective postoperative analgesia resulting from a single-shot ISB with ropivacaine 0.75%.

Williams [17] reported on potential clinical research priorities with respect to multimodal perineural anesthesia and analgesia. He routinely used this technique for over 1,300 patients. He addressed the four-drug combination of bupivacaine, clonidine, buprenorphine, and dexamethasone used for postoperative perineural analgesia. The goals of multimodal perineural

Analgesia include the potential to extend nerve block analgesic duration while potentially reducing the needed concentration of local anaesthetics to provide meaningful analgesia, while simultaneously reducing the potential need for a perineural continuous infusion catheter. Dexamethasone is a common denominator in both multimodal pursuits of antiemesis and perineural analgesia and is also frequently explored as a meaningful coanalgesic for systemic use.

At this stage, further studies are needed to confirm such an hypothesis and to assess the potential neurotoxicity of dexamethasone.

Conclusion: Adjuvants have been used for a long time in peripheral blocks, in order to optimize peripheral block characteristics.

The safety of the use of adjuvants is still an important issue needing more research. Dexamethasone is one of the most popular and currently, is subject of many recent studies. The goals of dexamethasone perineural analgesia include the potential to extend nerve block analgesic duration while potentially reducing the needed concentration of local anaesthetics

to provide meaningful analgesia, while simultaneously reducing the potential need for a perineural continuous infusion catheter.

Some issues regarding the potential risk of neurotoxicity when dexamethasone is used perineurally are still debated, and human clinical data are still lacking [18].

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Indication:

- Endarterectomy of Arteria carotis
- Hemithyroidectomy
- Lateral cyst of the neck
- Collar or auricular lymph node extirpation
- Collar or auricular abscess
- Clavicular fracture

Contraindication:

- Allergy against local anesthetics
- Infection of the puncturing site
- Hardly compensated respiratory function
- Contralateral lesion of N. laryngeus recurrens
- Contralateral paresis of the diaphragm
- Anxiety disorder
- Refusal of surgeon or patient

Key structures:

- M. longus colli
- M. longus capitis
- M. scalenus medius
- M. levator scapulae
- M. sternocleidomastoideus
- Fascia cervicalis superficialis
- Fascia cervicalis profunda
- Bifurcation of A. carotis
- carotis interna
- Cervical Nerves Pathway⁴

Target structure: Cervical Nerves Pathway⁴

Mandibular angle

By the surgeon: Adventitia of A. carotis

Avoid: A. carotis

A. and V. vertebralis

Anterior tubercle of the transverse process

Posterior tubercle of the transverse process

Structures underneath the Fascia cervicalis profunda

- M. longus colli
- M. longus capitis
- M. scalenus medius
- Puncturing without visualization of the needle

Risks of cervical plexus block without ultrasound: Cervical plexus blocks with nerve stimulation guidance can no longer be recommended, because they may lead to harmful deep cervical blocks underneath the Fascia cervicalis profunda. Superficial cervical nerves in contrary are not reliably aimed.¹

This is easily explained, because a motor-response may be achieved by:

- Stimulation of Ramus posterior (motoric nerve root) of the cervical spinal nerves. After leaving the transverse processes, the motoric nerve roots C2–C4 do not run together with the sensible nerve roots of the Ramus anterior and remain underneath the Fascia cervicalis profunda.
- Direct stimulation of the prevertebral muscles underneath the Fascia cervicalis profunda. This is not the location of the sensible nerve roots C2–C4.

Deep cervical blocks are correlated with much more complications:²

- Bleeding (Harming A. and V. vertebralis)
- Blockade of the sympathetic trunk (lying upon the M. longus colli)
- Diffusion to N. glossopharyngeus, N. hypoglossus, N. vagus respectively to N. laryngeus recurrens with typical adverse effects (Coordination of pharyngeal musculature, coordination of the tongue, coordination of the swallowing act, coordination of speaking).

Procedure with ultrasound (Figure 1 and 2): Perform a trace back manoeuvre with the probe, visualizing the bony structures of the transverse processes (specifically different from C7–C4) and spinal nerves at the lateral neck from C7 to C4.

• Centre Tuberculum anterius and Tuberculum posterius on the screen.

Follow the spinal nerves C7 to C4.

ESRAS-0547

REFRESHER COURSE: CERVICAL PLEXUS BLOCKS MADE EASY

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When spinal nerve C4 reaches the transverse process of the 4th. vertebra, the exact axial probe position for intervention at the neck is reached.

Recognize the bright hyperechoic space underneath M. sternocleidomastoideus at this level with a thickness of about 0,5 cm. We call it the "Cervical Nerves Pathway".

Medially, this space is bordered by the vascular sheath, anteriorly by the Fascia cervicalis superficialis, dorsally by the Fascia cervicalis profunda.

The lateral edge of this space is defined by the lateral border of the M. sternocleidomastoideus, a region that was formerly called the Erb's point.

Target of the needle (Figure 3 to 6): Centre the Cervical Nerves pathway at the height of spinal nerve C4.

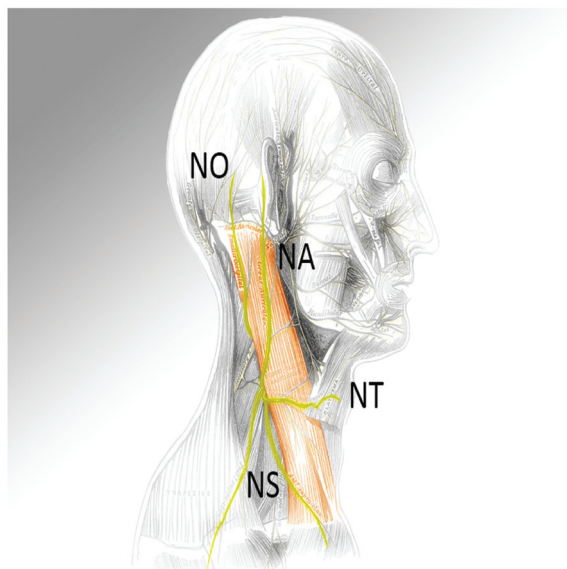


FIGURE 1.

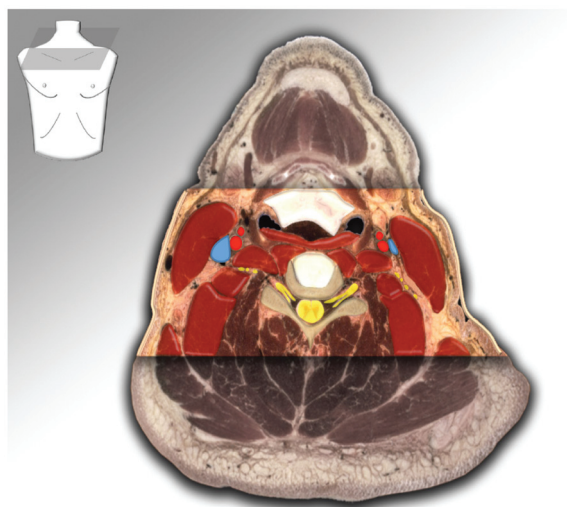


FIGURE 2.

This clearly bordered compartment contains the spinal nerves C2 to C4.

Because the bifurcation of the carotid artery is to be found at the C4 level in 75% of the human population, this landmark may also be assumed targeting the Cervical Nerves pathway.

LA - Bolus:

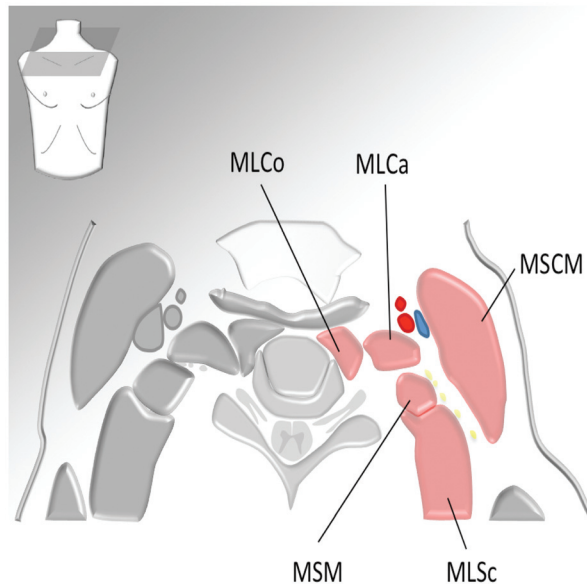


FIGURE 3.

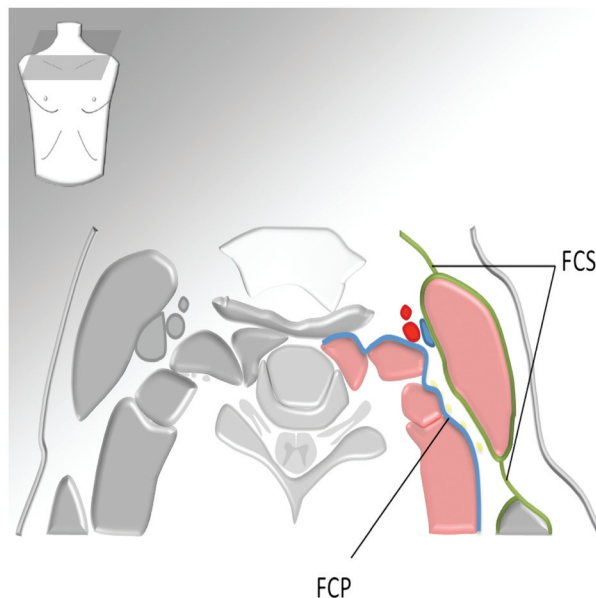


FIGURE 4.

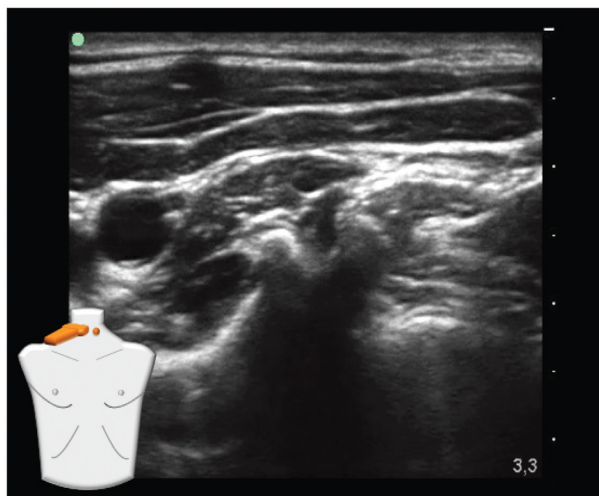


FIGURE 5.



FIGURE 7.

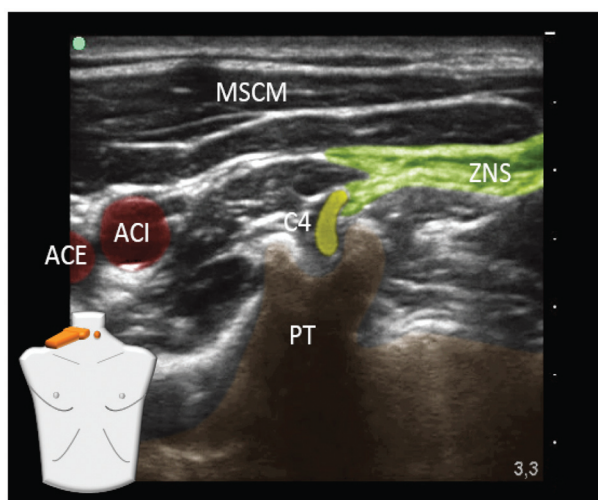


FIGURE 6.

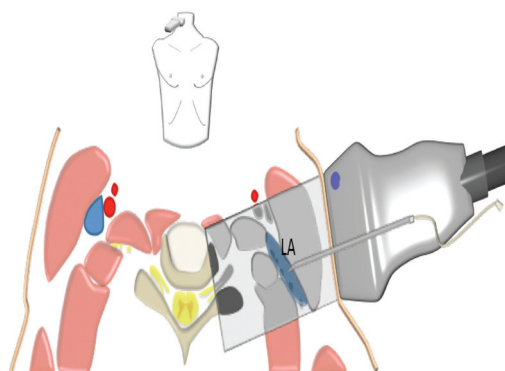


FIGURE 8.

Out-of-Plane (Figure 7 to 10):

- Perform an “out-of-Plane procedure towards the „Cervical Nerves Pathway”, inject 20–30 ml of local anesthetic to fulfill the whole hyperechoic space from medially to laterally.
- This procedure may be performed with mobile or immobile needle.
- Use a 26G subcutaneous needle with sharp cut. Passing the M. sternocleidomastoideus with this type of needle is not painful.
- Be sure to visualize the needle tip with the double shaped hyperechoic reflex and not the shaft of the needle, be sure to visualize the injection as increasing hypoechoic volume in the CNP.
- Move the needle forth and back between Fascia cervicalis superficialis and Fascia cervicalis profunda. During this manoeuvre, several horizontal hyperechoic septal membranes are dissected (diffusional barriers) in which the cervical nerves C2 to C4 are embedded.



FIGURE 9.

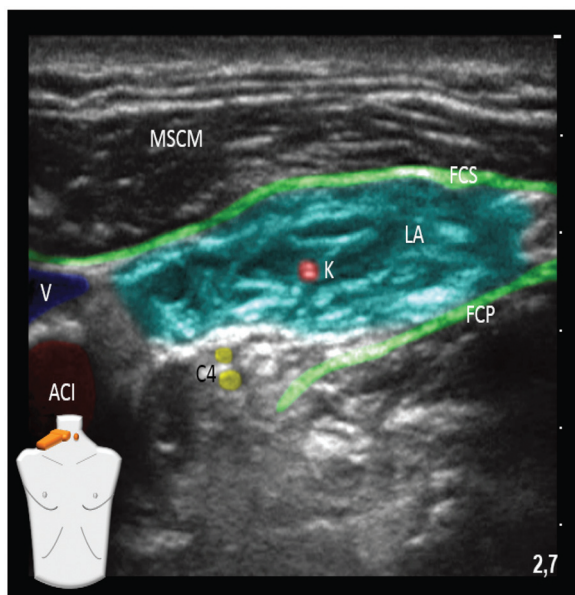


FIGURE 10.

In-Plane (Figure 11 to 13):

- Insert a 50mm plexus needle from lateral to medial from the lateral edge of the M. sternocleidomastoideus towards the CNP.
- Be sure, that the needle is always and fully visualized during the procedure.
- Move the needle from lateral to medial in the CNP.
- Move the needle between Fascia cervicalis superficialis und Fascia cervicalis profunda.
- Fill up the whole CNP

Rami mentales: As the surgical retractor may be painful at the lateral edge of the mandibula (innervated by N. facialis), 3–5 ml of local anesthetic should be infiltrated at the periost of the mandibula.

Possible Errors/Complications: The adventitia of the carotid artery, respectively the glomus caroticum, are sensibly innervated by brain nerves and the sympathetic trunk (N. vagus, N. glossopharyngeus, Ganglion cervicale superius)

The sheath of the carotid must not be covered with local anesthetics. The surgeon under direct vision can easily do the sub-adventitial injection during preparation (1–3 ml).

For most patients, it is much more comfortable that the LA of the adventitia is blocked later by the surgeon, because N. vagus with N. laryngeus recurrens are blocked. This leads to hoarseness.

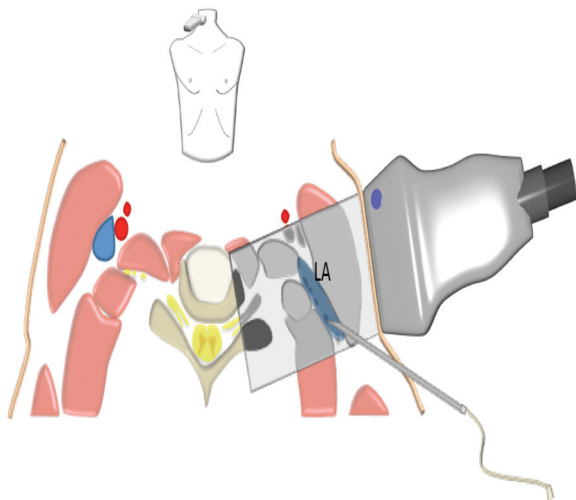


FIGURE 11.

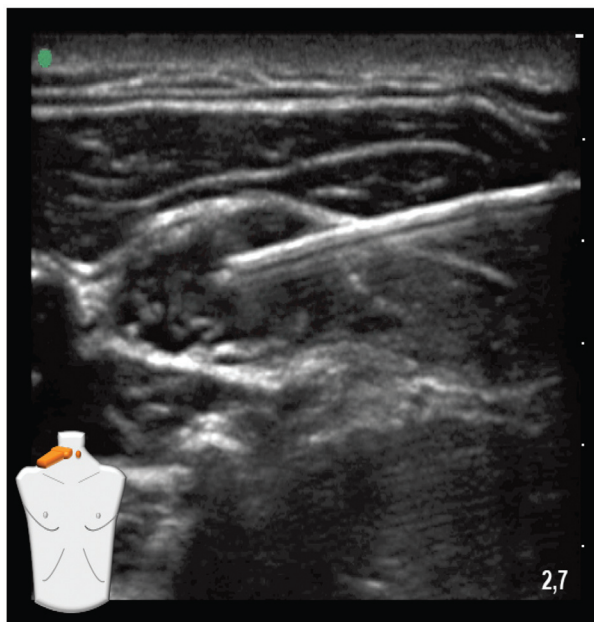


FIGURE 12.

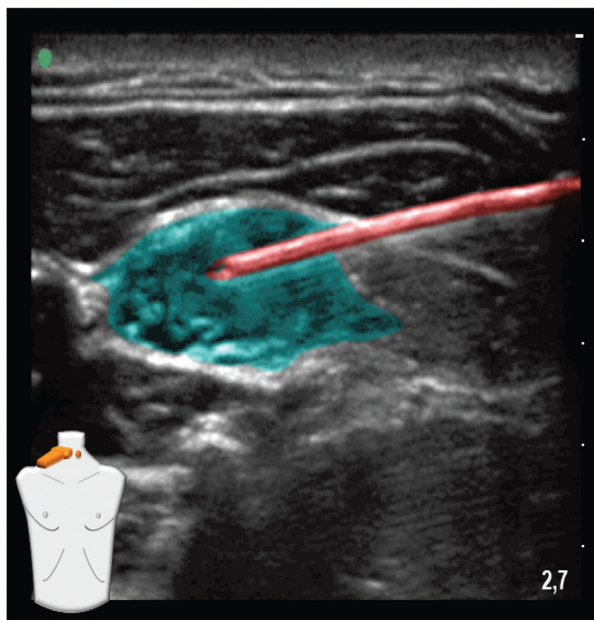


FIGURE 13.

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- Web:** These basic images and puncturing clips are available at <http://www.usra.ca/cpauthor.php>

ESRAS-0551

REFRESHER COURSE: MANAGING A PATIENT WITH ABNORMAL PLACENTATION

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Introduction: Abnormal placental attachment can result in severe postpartum hemorrhage (PPH) with significant morbidity and mortality (1). The previous incidence of abnormal placentation was approximately 3 per 1000 deliveries but it has been rising partly related to the increased rate of cesarean section (CS) throughout the world (2). Since abnormally invasive placentation as one of the major causes of massive obstetric hemorrhage leading to peripartum hysterectomy, current concepts and approaches about its obstetric and anesthetic management for parturients undergoing CS will be reviewed.

Definition: Placenta previa: occurs when the placenta implants in advance of the fetal presenting part. The incidence of placenta previa is 3.6 per 1000 deliveries. The classification is made according to the relationship between the placenta and cervical os. The placenta can either completely cover the cervical os (**total placenta previa**), or partly but not all (**partial placenta previa**), or lie close to cervical os (**marginal placenta previa**). It usually becomes relevant during the 3rd trimester when developing fetus is accommodated by thinning and stretching of the lower uterine wall. This expansion causes some degree of placental separation and subsequent bleeding which can worsen effacement of cervix if the placenta is close or over the cervical os (3).

Several conditions associated with placenta previa are multiparity, advanced maternal age, previous cesarean delivery or other uterine surgery and previous placenta previa (3). Although the association between prior cesarean section, placenta previa and placenta accreta is well recognized, underlying mechanism for previous scar is poorly understood, but it may be due to less upward shift of placenta as pregnancy advanced.

Association of placenta previa with placenta accreta is common. The sole incidence of **placenta accreta** stands 1:2500 deliveries but the relative risk of **placenta accreta** in the presence of **placenta previa** is 1:2065 deliveries. **Placenta accreta** is defined as the abnormal attachment of the placenta to the uterus with invasion of the placenta villi through the decidua. Depending on the depth of invasion, abnormal placentation can be divided into three categories as **placenta accreta**, **increta** or **percreta**. Villi are embedded directly into the myometrium in **placenta accreta**, whereas villi invade through the full depth of the myometrium and villi penetrate through the uterine serosa in **placenta increta** and **percreta** respectively. The abnormal placenta not separating easily from the uterine wall during cesarean delivery can result in fatal hemorrhage. Therefore, this challenging obstetric emergency needs careful anesthetic management for delivery (4).

Appropriate obstetric management relies upon suitable antenatal assessment and monitoring. Sometimes the position of the placenta may physically prevent normal vaginal delivery and require CS. If antenatal hemorrhage and hypotension cannot be prevented, blood may shunt away from the fetus to maintain maternal blood pressure that can cause fetal hypoxia. According to the clinical practice guidelines of *The Society of Obstetricians and Gynaecologists of Canada* (SOGC), regional anesthesia may be employed for CS in the presence of placenta previa which has a class II-2B. In case of an imaging evidence of pathological adherence of the placenta, delivery should be planned in women at high risk for placenta accreta (5).

Several multicenter or single centered retrospective or prospective studies have been conducted to document the placenta accreta, increta or percreta (6-10). According to a recent Nationwide Inpatient data from USA about potential cesarean complications, there was an increased morbidity associated with cesarean delivery because of the co-existence of placenta accreta (6). A single institution from Japan reported 8 cases with placenta previa - accreta over 7-years. Half of the cases underwent stepwise treatment, while intra-aortic balloon occlusion (IABO) was performed in one of them. The other half underwent cesarean hysterectomy under neuraxial anesthesia. However, anesthesia was converted to general anesthesia due to massive bleeding in two of these patients (7). In contrast to these retrospective audits, cases with antenatally suspected placenta accreta were collected prospectively in a single-site tertiary delivery center over nine years. Ninety-two suspected accreta cases were identified from 46623 deliveries (0.2%), where the diagnosis was confirmed at surgery in 52/92 cases (56%). Blood transfusion requirements were greater in patients with placenta accreta versus patients without placenta accreta (8). The largest retrospective case series, a total of 23 with placenta accreta out of 56892 all deliveries between 2000 and 2008 were documented in Canada. Uterine preservation cesarean delivery was scheduled for all 23

parturients under neuraxial anesthesia. In six patients epidural +general anesthesia was performed, but neuraxial anesthesia was converted to general anesthesia in five out of the rest of 17 patients. All patients had an epidural catheter preoperatively and bilateral femoral artery sheaths were inserted in 22 patients preoperatively. In 9 of the patients, placenta was left in situ as planned, in 5 patients placenta was separated easily and delivered, in 2 patients placental fragments were left in situ and 7 required hysterectomy. After surgery patients were transferred to the radiology suite for uterine artery embolization (UAE) (9). In a case report of a multiparous parturient with complete placenta previa and a potential accreta, cesarean delivery under combined spinal epidural anesthesia was planned. However, continuous spinal anesthesia (CSA) was employed instead because of the inadvertent dural puncture occurred during epidural insertion. After delivery of the baby, surgical team confirmed placenta previa - increta with adherence to the myometrium and performed hysterectomy with the adherent placenta in situ. After extensive bleeding requiring 3800 mL Ringer's solution, 1500 mL hespan, 16 units of red blood cells and fresh frozen plasma, 4 units apheresis platelets and 1 unit cryoprecipitate, CSA was converted to general anesthesia (10).

A case with placenta percreta underwent emergency CS under general anesthesia due to vaginal bleeding. Total abdominal hysterectomy and partial cystectomy were performed because of the persistent massive hemorrhage. Bleeding could be controlled following bilateral internal iliac artery embolization using a cell salvage device for stabilization of hemodynamics. The patient was discharged on the 32nd postoperative day without major complications (11). Although national guidelines advise preoperative placement of internal iliac artery occlusion balloon catheters to reduce haemorrhage, to avoid caesarean hysterectomy and to preserve fertility, it may cause puncture-site complications, arterial thrombosis and/or ischaemic nerve injury (12).

Anesthetic management: Regional anesthesia might be an appropriate choice for some patients with abnormal placentation. However, the decision to administer regional anesthesia should be individualized, and made only after careful review of history, physical examination and appropriate laboratory/imaging studies. Extensive invasion of urinary bladder or other pelvic structures and/or significant potential for major intraoperative bleeding still favor general anesthesia (3,4).

Sometimes conversion from regional anesthesia to general anesthesia because of massive bleeding and inadequate operating conditions and/or patient discomfort may be required. Regardless of the anesthetic technique used, two large bore intravenous catheter is placed routinely but insertion of arterial line and possibly central line should be individualized. Preoperative preparation includes 2-4 units of red blood cells, blood products and vasoactive drugs (phenylephrine, ephedrine, dopamine and epinephrine) readily available. When major bleeding is anticipated, use of the cell saver and acute normovolemic hemodilution in addition to the use of the bilateral hypogastric artery balloon catheters preoperatively for embolization in the interventional radiology department usually under monitored anesthesia care should be considered according to the resources of the facility (13).

We described two cases with placenta previa underwent CS and hysterectomy.

Case 1: A 33-year-old gravida (G) 5 and para (P) 2 with in vitro fertilisation history followed by two prior uneventful cesarean sections under epidural and spinal anesthesia, respectively was admitted at 38 weeks' gestation. Ultrasound scan revealed a single fetus in an transverse presentation and a partial placenta previa. She underwent CS and tubal ligation under spinal anesthesia and transferred to the ward uneventfully. After three hours, patient was readmitted to the operating room because of painless vaginal bleeding associated with hypotension (60/30 mmHg) and tachycardia (132 beat/min). For management of massive bleeding two large-bore intravenous lines, arterial and central line were placed. Two liters (L) of Ringer's solution, 500 mL 6% HES, 3 units of red blood cells and 1 unit of FFP were infused. Then, hysterectomy was made under general anesthesia because of refractory atony of the uterus. She was uneventfully discharged on the 3rd postoperative day (14).

Case 2: A 34 yr-old parturient at 36 weeks, G4, P2, with vaginal bleeding was admitted to our institution. Doppler ultrasound and MRI revealed a single fetus and a placenta previa totalis. Emergency repeat CS, with a high likelihood of cesarean hysterectomy was performed. Median surgical incision was used to deliver the baby in the breech position for avoiding placental harm. After umbilical cord clamping, placenta was left in situ and parenteral uterotonics (oxytocin and methylergonovin) and tranexaminic acid were administered to maintain uterine tone and control bleeding. Then, hysterectomy was performed. Pathologic

cross sections showed placenta increta. She was discharged on the 3rd postoperative day without any complications (15).

Conclusion: Abnormal adherence of placenta has important clinical implications that can result in severe maternal and neonatal morbidity and mortality. Therefore, accurate diagnosis and appropriate management of obstetric hemorrhage is mandatory. Supportive perianesthetic care of the patient to provide stable hemodynamics with appropriate strategies under rational monitoring is of utmost importance. Using IABO and UAE could be an effective aid for management of placenta accreta. If clinicians anticipate for possible bleeding related problems in patients with abnormal placentation who may possibly need cesarean hysterectomy and plan to prepare adequately in advance, best outcomes can be achieved by multidisciplinary approach.

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ESRAS-0514

REFRESHER COURSE: CENTRAL BLOCKS IN PEDIATRIC ANESTHESIA

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Pediatric regional anesthesia has now a big role in the perioperative pain control. The evidence of safety/efficacy well described in different studies has brought to a worldwide diffusion of central and peripheral blocks; all the blocks

performed in adults can be performed also in children and some of them are possible only in children due to their anatomical characteristics

When regional anesthesia became a daily practice for many years central blocks were almost the sole blocks performed and only more recently peripheral blocks have obtained an important role in children

Caudal was the most commonly performed block and still remains the preferred central block.

Looking along the years, at the big surveys performed by pediatric societies or single centers experience we can see that from the prevalence of central blocks we have now an increasing number of peripheral blocks arriving at a superior number of peripheral blocks vs central blocks (1-5)

- The reason probably is due to the use of Ultrasound assistance that gives the opportunity of directly visualization of needle and local anesthetic increasing safety to the blocks.

Here are briefly described the central blocks (caudal, lumbar and thoracic blocks) and the drugs used in children

Caudal Block: The dural sac can extend to S3-S4 at birth, going up to S2 only towards 2 years of age and maintained in the adult. Through the sacral hiatus, crossing the sacrococcygeal ligament, we enter the sacral canal and today the use of ultrasound gives more anatomical details important for the performance of the block. Recent papers showed that the speed of injections does not affect the level of anesthesia, that increasing the volume does not give a significant increase in the level; moreover when the local anesthetic is injected rostral movement of CSF is caused by the compression of the distal part of the dural sac.(6-15)

This is later followed by re-expansion of the distal part of the dural sac when CSF is moving caudally due to reversal of the relative spinal-to-intracranial pressure gradient, thereby forcing the epidurally located LA to move to a more cranial level

In newborns the compression due to the local anesthetic increases the pressure on CSF at intracranial level can result in a temporary reduction in cerebral blood flow

A good choice of needle could be a short bevelled, atraumatic needle with stylet

My personal technique is "the **no turn technique**": the needle is inserted with an angle of about 60 degrees with respect to the sacral plane and after crossing the sacrococcygeal ligament, the needle is already within the peridural space and drugs can be administered without moving forward with no risk of vessel lesions or of dura, or intraosseous injections.(16)

Lumbar Block: Usually it is performed at L5-S1 or L4-L5 level, midline approach, (in the child the spinal cord ends at L3 level and that the intercristal line crosses L5) with a Tuohy needle almost perpendicularly at this level in the midline with the bevel facing cephalad, crossing the superficial planes and the yellow ligament

The Loss of Resistance Technique (LOR) can be performed with air or with saline solution or CO2

Air may be useful in newborns or infants to detect if dura mater was accidentally punctured (saline solution may mask CSF reflux that at this age has not the usual adult pressure); moreover, saline can dilute the small amount of drug used; the key is to work with only 1-ml of air used just to detect the change of resistance and not injected in the space.

When catheter positioning is required, Tuohy needle should be inserted in the correct site, close to the block target area, with the indwelling catheter 2-3 cm in the epidural space to avoid risk of kinking or malpositioning

Thoracic Block: The anatomy of the thoracic approach increases the difficulty in the block performance: the spinous processes are more oblique than at lumbar level, the epidural space is reduced and the dura mater is much closer to the yellow ligament, the spinal canal is narrower than at lumbar level; it is important to balance the risk/benefit ratio and only well-trained, experienced anaesthetists must approach this block

The landmarks are the prominent spine of the 7th cervical vertebra and the line joining the angles of the shoulder blades crossing the 7th thoracic vertebra; the Tuohy needle must be inserted with a more oblique inclination

Indications: T2-T4 level for the thoracic surgery, T6-T8 level for upper abdominal surgery and T10-T12 for lower abdominal surgery.

Recommendations: our 10 golden rules for a safe/effective paediatric regional anaesthesia

1. Asepsis
2. Use LOR technique (air or saline)
3. Aspiration test (before and during drug injection)
4. Follow accurate drug dose guidelines
5. Slow injection

6. Monitoring
7. Know complication
8. Know how to treat them
9. Know different techniques
10. Use paediatric tools

Very recently ESRA and ASRA presented "The European Society of Regional Anesthesia (ESRA) and the American Society of Regional Anesthesia (ASRA) Joint Committee Practice Advisory on Controversial Topics in Pediatric Regional Anesthesia" (17).

Three topics are involving the performance of central blocks

-General anesthesia when the block is performed: the conclusion of the text is that the performance of the blocks under General anesthesia/deep sedation "should be viewed as the standard of care"

-The use of test dose: the conclusion is that its use "should remain discretionary" and anyway the injection of local anesthetic should be performed slowly, in small amounts with intermittent aspiration looking at ECG tracing.

-air vs saline for epidural space detection: it is not possible to demonstrate the superiority of one technique vs the other and then either technique can be used appropriately both in infants and in children.

Drugs:

Bupivacaine: It was the most commonly used, well known for the clinical, pharmacodynamic and pharmacokinetic aspect in children; the several case reports on its toxicity brought to the replacement (in many countries) with the two new levodugs

Ropivacaine an Levobupivacaine: these two local anaesthetics are enantiomers less toxic (for central nervous system and cardiovascular system) than bupivacaine with a less intense and shorter motor block and similar analgesia. Both Ropivacaine and levobupivacaine in several studies have shown to be safe and effective in children (19–21)

Adjuvants: To prolong the analgesia given by the local anaesthetics many adjuvants were described such as Adrenaline, Opioids, Clonidine and Ketamine but only clonidine has recently demonstrated to be more effective in children with less side effects (no respiratory depression, no nausea and vomiting) very suitable for paediatric regional anesthesia. (22–24)

A new adjuvant, dexmedetomidine, could be, for the future, a valid alternative to clonidine but so far few studies in children are available (25,26)

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ESRAS-0546

REFRESHER COURSE: TREATMENT OF FACET-RELATED PAIN: EVIDENCE BASED STANDARDS FOR GOOD CLINICAL OUTCOME

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The problem of low back pain: In 1996 Waddell described low back pain as the healthcare enigma of the twentieth century.¹ Despite turning into another century low back pain still remains a major health care problem and has a considerable socio-economic burden. The point prevalence of low back pain is documented to be 11.9% and the one-month prevalence is 23.2%.² Considering the projected aging of the population the number of patients suffering low back pain is likely to increase over the next decades.

The first step in the management of patients with low back pain consists of a diagnostic triage to exclude back pain that arises from other structures such as retroperitoneal structures, the hips etc.³ The so-called red flags draw the attention to potentially underlying serious diseases. Prior to designing any treatment plan the clinician will try to exclude inflammatory/metabolic causes (diabetes, ankylosing spondylitis, Paget's disease, arachnoiditis, sarcoidosis) cancer and vertebral fractures, which can be identified in approximately 5-10% of the patients.⁴⁻⁶ Acute low back pain usually responds well to conservative analgesic treatment, but part of them prove to have refractory pain that becomes a chronic problem. The frequently cited Spitzer publication states that only 10% of the patients would continue to suffer chronic pain. More recent studies showed that 62% of the patients have recurrent episodes of low back pain at 12 months, 16% is still unable to work 6 months after the first diagnosis and 33% has repeated episodes of incapacity to work during the first year.⁷ A recently published systematic review regarding the clinical course of a specific low back

pain in primary care found that 65% of the patients still have pain at 1 year after onset.⁸

In 90-95% of the patients the underlying pathology cannot be identified and low back pain is considered aspecific. This aspecific low back pain is further subdivided as being of mechanical origin, radicular pain, pain originating from the joints, the ligaments or muscles or pain of undefined origin. Potential causes of low back pain of mechanical origin are: the zygapophyseal (facet) joints, the sacro-iliac joint and the intervertebral disc.⁹⁻¹² Interventional pain management techniques can be considered when the conservative treatment fails to provide satisfactory pain relief or causes unbearable side effects. The target specificity of the interventional pain management techniques requires identification of the causative structure and the involved level. Because there is no gold standard for establishing the diagnosis of low back pain, a diagnostic procedure consisting of: history taking, clinical examination and adapted additional examinations proper for the different types of low back pain is required.

In this 21st century it is logic to base the treatment choice on the available evidence of the efficacy, but also the type, importance and frequency of occurring of side effects and complications should be taken in consideration and careful weighing of the potential benefits against the potential side effects and complications should help define the ultimate treatment choice.

Lumbar facet joint pain: The prevalence of lumbar facet joint pain has been reported to vary between 5% to 90%, depending on the diagnostic tests used. However, when selected patient populations were studied, the prevalence ranged between 5% and 15%.^{13,14} Osteoarthritis and degenerative disease are often indicated as cause of facetogenic pain, which also explains the increasing prevalence with age.^{15,16} The findings of the provocation studies in volunteers allowed identifying a typical distribution pattern of the pain.¹⁷⁻²⁰

Physical examination: No physical examination is pathognomonic for the diagnosis lumbar facet pain.

The well-known Revel criteria for lumbar facet joint pain were defined based on the correlation between the physical examination and the symptoms with the response to placebo-controlled nerve blocks.^{21,22} According to Cohen et al 23 paravertebral tenderness is the only predictive factor for facet joint pain. In a prospective study aiming at identifying clinical predictors for facet joint pain the following criteria were withheld: age > 50 years; the extension rotation test, that is typically considered positive when pain is provoked by extension combined with rotation towards the painful side presumably causing joint compression, "best walking", "best sitting", onset pain is paraspinal, and MSPQ>13.²⁴

The role of medical imaging: The primary role of radiological examination is to exclude malignancy, compression fracture, or spinal infection.^{25,26} Degenerative facet joints can best be visualized with computed tomography examination.²⁷ Magnetic resonance imaging is believed to be somewhat less sensitive, although the classification of degenerative facet joints is based on MRI.²⁸

Abnormal radiological findings correlate in half of the studies with a positive response to diagnostic blocks, while in the other half no correlation could be found.

The diagnostic blocks of the articulations that showed hypercaptivity with computed tomography-single-photon emission computed tomography fusion (CT-SPECT) resulted in (temporary) pain relief in 36 of the 37 patients.²⁹ These findings suggest a potential role for CT-SPECT in the diagnosis of lumbar facet joint pain.

Diagnostic – prognostic blocks: A survey of an expert panel resulted in the establishment of 12 indicators for facet joint pain. Pain relieved by fluoroscopically guided double-anesthetic blocks of the medial branch of the dorsal ramus supplying the facet joint was accepted as a positive indicator by 85 % of the experts.³⁰

Diagnostic –prognostic blocks are recommended in guidelines prior to performing a radiofrequency (RF) facet joint denervation, in order to confirm the involvement of the facet joint.³¹

There are currently seven randomized controlled trials (RCT's) on RF facet denervation.³²⁻³⁸ In all these studies the diagnosis was confirmed by means of a diagnostic block, but the technique, the medication used, the targeted structure and the interpretation of the outcome of those blocks varied widely. In one study, approximately 10% of the patients were ultimately selected for the RF treatment³⁸, while this was the case for 92% of the patients in another study.³⁴ In this latter study the RF treatment was not better than sham intervention. The patients were selected with an intra-articular block with local anesthetic and corticosteroid. The block was judged positive if the patient reported "significant" pain relief during 24h within the week after the injection. The high inclusion rate may be suggestive for a high number of false positive blocks. In the studies where patients were selected with diagnostic medial branch blocks, the percentage of

patients included in the study is much lower (10-31%) but the outcome of the RF treatment is positive compared to sham intervention.^{33,38} Furthermore, in a recently published prospective triple cross-over study it was concluded that a single intra-articular facet joint block with local anesthetics is not useful to detect the facet joint responsible for the pain.³⁹ When local anesthetic is injected at the level of the medial branch of the dorsal ramus false positive and false negative outcome may be noted. To increase the accuracy of the diagnostic blocks, controlled blocks have been proposed. This means that the injection is performed twice with two different local anesthetics, each with a different duration of action. To conclude that the injected level is the causative level, the patient should experience pain relief for the duration of action of both local anesthetics.³⁸

As for the selection of a treatment it is recommended to evaluate the balance between the potential benefit and the patient burden. With controlled diagnostic blocks the rate of false positive blocks will be reduced, but at the same time the number of false negatives will increase. Increasing the number of blocks increases the burden to the patient. Controlled blocks require different sessions and this means at least two appointments in the clinic. Patients who have a false negative block will not receive radiofrequency treatment although this treatment was demonstrated to provide pain relief. The patient will continue either conservative treatment or move on to surgery. This reasoning is outlined in references [45] and [46].

A randomized controlled trial estimated the cost per successful radiofrequency treatment when patients were selected based on clinical examination alone, with 1 diagnostic block or with 2 comparative blocks. Radiofrequency treatment of patients selected with clinical examination has the lowest cost per successful treatment, whereas the highest costs per successful radiofrequency treatment is generated when performing this procedure after one single diagnostic block.⁴⁰ The highest success rate is observed in the group who received 2 diagnostic blocks.

However, 64% of the patients treated after two diagnostic blocks and 39% of the patients treated after one block had a successful outcome. This means that for a 25% increase in successful outcome after radiofrequency treatment, 100% more diagnostic interventions are needed.^{40,41}

In a recent publication, it was observed that no optimal threshold for designating a diagnostic block as positive, above 50% pain relief, could be calculated. Employing more stringent selection criteria for lumbar facet RF is likely to result in withholding a beneficial procedure from a substantial number of patients, without improving success.³¹

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ESRAS-0542

PRO-CON DEBATE: KYPHOPLASTY IS THE TREATMENT OPTION OF CHOICE FOR PAIN RELATED WITH OSTEOPOROTIC VERTEBRAL FRACTURES

CON

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The spine is a complex structure, and vertebrae, similarly to long and flat bones, have a complex autonomic and sensory innervation, and bone cells have receptors for several neuropeptides (NPY, CGRP, VIP, SP) present in the nerves in bones^{1,2}. Nerves supplying the vertebrae, intervertebral discs, ligaments, and facet joints originate from the meningeal and posterior rami of the spinal nerves. In the cervical region, the vertebral nerve contributes also to the innervations of the vertebral column². The meningeal ramus (sinuvertebral nerve) arises from the spinal nerve just distally to the spinal ganglion, and after travelling medially, it is joined by sympathetic fibers. The nerve then passes through the intervertebral foramen into the vertebral canal where it divides into ascending and descending branches. The branches of this nerve supply the vertebral body, vertebral arch, intervertebral disc, and posterior longitudinal ligament. NPY-immunoreactive nerve fibers were abundant in the bone marrow of the vertebra and near the vertebral growth plate, being classified into three main groups: 1) those which penetrate the walls of the arterioles and form delicate plexiform networks between the adventitia and the media; 2) those which surround the capillaries; and 3) those which terminate between the cells of the parenchyma³.

Vertebral compression fracture is defined as the reduction of vertebral body (VB) height by 15% or greater and can be classified by the degree and type of deformity, which includes wedge, biconcavity, and compression fractures. The most commonly compressed VB levels are lower thoracic vertebrae, L1 and L4. VB is the most common complication of osteoporosis, and are very heterogeneous in nature. Most important for the understanding and treatment of these injuries is the evaluation of spinal stability or instability, respectively. The classification is based on the "two column theory" described by Holdsworth^{4,5} and Kelly and Whitesides⁶, is increasingly being accepted as the gold standard for documentation and treatment of injuries of the vertebral spine. This classification considers the spine to comprise two functionally separate supportive columns. The anterior column consists of the vertebral body and the intervertebral discs and is loaded in compression. The posterior column consists of the pedicles, the lamina, the facet joints, and the posterior ligamentous complex, and is loaded in tension. The facet joints of the thoracic region are oriented in the coronal (frontal) plane, limiting flexion and extension while providing substantial resistance to anteroposterior translation. In the lumbosacral region, the facet joints are oriented in a more sagittal alignment, which increases the degree of potential flexion and extension at the expense of limiting lateral bending and rotation.

Pathophysiologically, bony instability triggers local pain during body movement. In greater than 50% of osteoporotic patients with more than one VB, activities of daily living cannot be performed without assistance. Vertebral

fractures may result in pain at, above, or below the fracture site due to loss of height caused by vertebral collapse, and related spinal instability. Osteoarthritis and trauma, renders intraarticular changes that occur within the facet joint. The most common source of symptomatology may be secondary to injury/inflammation of the facet capsule itself which is richly innervated by the dorsal ramus of the lumbar spinal nerve. A deep branch of the dorsal ramus loops under the transverse process and supplies the joint capsule of its superior articular facet. Another more lateral branch of the same dorsal ramus is directed caudally and sends a branch to the joint capsule of the inferior articular facet. A single lumbar spinal nerve, therefore, supplies two facet joints, and each facet joint has bisegmental innervation. The primary symptom of pain emanating from this site is that of back pain.

Patients likely to benefit from kyphoplasty have a history of pain that correlates well with the level of a recent compression fracture. Criteria that have been used for determining the efficacy of kyphoplasty include reduction of pain, increase of patient function, and the restoration of vertebral height or spinal column alignment. Some systematic reviews^{7,8} and evidence-based guidelines⁹ concluded that there is level 3 or moderate evidence in management of patients with symptomatic osteoporotic vertebral compression fractures refractory to conventional medical therapy. Nevertheless four randomized controlled trials showed no benefit from vertebroplasty (VP) versus sham,^{10,11} or nonsurgical management.^{12,13} Burton et al¹⁴ reported that certain patients, even after reasonable pain relief from the fracture site, require interventional procedures to treat either residual pain or a new type of pain that manifests after the augmentation procedure. Those patients require interventional procedures including epidural injections, nerve blocks, facet joint injections, sacroiliac joint injections, and myofascial trigger point injections.

Osteoporotic vertebral fracture can induce profound disruption to normal spine mechanics. The pain generated, goes beyond the instability of the fracture, and the impact in the bone marrow of the vertebral body, and its corresponding edema, which can have both short-term and long-term consequences. The primary purpose of kyphoplasty is to mechanically augment the fractured vertebral body in order to stabilize the fracture and hence alleviate pain. Nevertheless osteoporotic fracture not only damages the fractured vertebral body, but also causes profound changes to the mechanics of the whole spine. It is therefore necessary to analyze the pathogenesis of spinal pain after a fracture based on the biomechanical changes established in the anterior column, but also posterior. An individual assessment is absolutely necessary, and therapeutic decision based on criteria of the new biomechanics instituted.

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ESRAS-0516

PRO-CON DEBATE: A PERINEURAL CATHETER SHOULD ALWAYS BE PLACED AFTER MAJOR SHOULDER SURGERY FOR POSTOPERATIVE PAIN RELIEF

PRO

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Introduction: Major shoulder surgery is associated with severe postoperative pain, especially within the first 48 h (1). Successful analgesia is important for early and effective rehabilitation. Single-injection brachial plexus block provides an average 12 to 24 h analgesia. After block resolution patients rely on opioids to control pain. Opioids are associated with undesirable side effects, such as sedation, nausea and vomiting. Therefore local anesthetic administration via perineural catheters has been used and recommended to decrease postoperative pain and opioid requirements (1, 2).

Continuous peripheral nerve block (CPNB) versus systemic opioid analgesia: Numerous clinical trials have been published examining the efficacy of CPNB after shoulder surgery compared with systemic (parenteral and oral) opioids (1,3,4,5). Borgeat showed better quality of analgesia and patient satisfaction in the CPNB group (1). In the meta-analysis of randomized clinical trials (RCTs) with relatively small number of patients included, most RCTs conclude that CPNB decreases postoperative pain and opioid related side effects compared with opioids. Improvements in analgesia were noted through postoperative day 3 (3).

Single-injection block versus CPNB: As single-injection brachial plexus block provides an average 12 to 24 h analgesia, more successful pain relief with CPNB is expected for longer time periods: significant reduction in visual analogue scale (VAS) scores and opioid consumption was shown (6,7).

Continuous brachial plexus block (CBPB): continuous infusion versus bolus: Shin compared continuous basal infusion of 4 ml/h of 0.2% ropivacaine and bolus doses 4 ml per 60 min of 0.2% ropivacaine. Both provided equivalent pain control and were more efficient than intravenous patient-controlled (IV PCA) after arthroscopic rotator cuff repair (4). Motor weakness was comparable in all 3 groups. In the contrary, the results of the study performed by Singelyn 15 years earlier showed that basal infusion of 5 ml/h combined with PCA boluses 2.5 ml/30 min provides better analgesia than only continuous infusion 10 ml/h or boluses 5 ml/30 min only (8).

Which local anesthetic: ropivacaine or bupivacaine?: Borgeat and co-workers compared 0.15% bupivacaine and 0.2% ropivacaine: both provided comparable analgesia, but there was better preserved motor function in the ropivacaine group (9). Casati, however, showed similar motor function and pain relief in 0.125% levobupivacaine and 0.2% ropivacaine groups, but there was less volume of local anesthetic needed for successful block in the 0.125% levobupivacaine group (10).

CBPB in hospital and at home: CPNB may be provided in the hospital setting, but the use of lightweight, portable pumps permits ambulatory infusion as well. The study of Rawal showed that the technique of self-administration of local anesthetic to manage postoperative pain is feasible also outside the hospital. The overall satisfaction with the technique was high (11). Although many issues are similar between hospital-based and outpatient CPNB, Ilfeld discussed distinct challenges for ambulatory perineural infusions. He emphasized the importance of selecting the appropriate patients who are ready to accept the extra responsibility that comes with the catheter and pump system. Block failure may occur following discharge, so identifying inaccurately placed perineural catheters during insertion is even more critical (12).

Conclusions: CBPB provides successful postoperative analgesia for several postoperative days, including decreased baseline, dynamic and breakthrough pain, supplemental analgesic requirements, opioid side effects and sleep disturbances. CBPB improves patient satisfaction and ambulation and accelerates resumption of passive joint range-of-motion. Nearly all benefits occur during the local anesthetic infusion itself, but several RCTs suggest that there are prolonged benefits after catheter removal as well (13).

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ESRAS-0502

REFRESHER COURSE: REGIONAL ANESTHESIA TO AVOID POSTOPERATIVE COGNITIVE DYSFUNCTION: WHAT IS THE EVIDENCE?

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Postoperative cognitive dysfunction

Postoperative cognitive dysfunction (POCD) is a syndrome of prolonged impairment of cognitive function associated with surgery with limitation in intellectual ability, memory and executive functions. This state usually last for weeks, sometimes months.

Postoperative cognitive dysfunction (POCD) has been reported to happen in 7% and 25% one week and up to 9.9% - 12.7% 3 months after surgery. (1-3) After hip fracture the incidence of POCD is considerably higher (18-50%). (4) Multiple factors like inflammatory response, drug use, the level of postoperative pain etc. have been described as possible contributing factors. (5) If the use of regional anesthesia has positive impact in the incidence of POCD is controversially discussed in literature. (2, 4) Also the effects of analgesia techniques are inconclusive. (6, 7)

Subjective symptoms or behavioural changes after surgery might arouse suspicion but the formal diagnosis of POCD requires a preoperative neuropsychological test (baseline) and a definition of how much of impairment is called a

cognitive dysfunction. (8) Pre- and postoperative testing is necessary to diagnose POCD because self-reporting of cognitive symptoms differs quite remarkably from objective tests (9) The "Statement of Consensus on Assessment of Neurobehavioral Outcomes After Cardiac Surgery" provided a good overview of commonly used testing instruments (10). However, to date, no formal diagnostic criteria have been established for POCD. Moreover, it is as yet unclear how big a decline ought to be deemed clinically significant. One possible method could be the percentage change method which looks as follows:

postoperative score – preoperative score / preoperative score

As POCD has been shown to improve with time, the incidence needs to be described at a defined interval after surgery, e.g. 1 day, 10 days, 3 months, 6 months and 1 year after surgery. (11) Moreover, recognition is of pivotal importance, as POCD has been associated with increased mortality, risk of prematurely leaving the work market and dependence of the social system. (3, 12)

Several hypothesis regarding the etiology of POCD have been postulated including perioperative ischemia and hypoxemia (13, 14), surgical stress-associated systemic or localised inflammatory reactions, alterations in hormonal homeostasis, as well as direct anesthetic agent toxicity. (15, 16) It is still to be determined to what extent postoperative decline in cognitive function is attributable specifically to either surgical or anesthetic management compared to patient-related risk factors such as co-morbid cerebrovascular and systemic vascular disease or even undiagnosed mild cognitive dysfunction, which might be of greater etiological importance. (17)

Additionally, the impact of the different anesthesia techniques (regional versus general anesthesia) on POCD remain controversial. (4, 18, 19)

A recent review and meta-analysis by Mason et al. concluded that general anesthesia might increase the risk of developing POCD compared to other anesthesia regimens. However, this was not seen for postoperative delirium. (20) However, this review suffers from different methodological weaknesses as it includes studies of doubtful quality. (21)

Moyce et al. performed a review and meta-analysis to detect interventions to decrease postoperative delirium in non-cardiac surgery. The found out that perioperative geriatric consultations with multidisciplinary interventions and lighter anesthesia were potentially effective in decreasing the incidence of postoperative delirium. (22) Surprisingly, general anesthesia was considered to be potentially more favorable to avoid delirium compared to regional anesthesia.

In shoulder surgery the research concerning the impact on cerebral oxygenation and neurocognitive outcome has increased due to the challenging beach chair position and different case reports describing devastating neurologic outcome. Several randomized controlled trials have demonstrated that detection and treatment of cerebral oxygen desaturation leads to better clinical outcomes. (23-25). However, without extensive neurocognitive monitoring, subtle changes induced by cerebral hypoxia may go unnoticed until functional organ damage becomes evident. Six of the included studies measured (regional cerebral saturation) rScO₂ and performed neurologic / neurocognitive outcome measurement. However, the quality of this assessment was variable. Lee et al. assessed the cognitive function using the MMSE prior to surgery and the day after surgery. No difference between the groups was found. (26) Moerman et al. used a "gross neurological (motor and sensory evaluation) and gross cognitive evaluation (orientation in time and space, recall of name, date of birth and address)" pre and 1 day postoperatively without showing a difference after general anesthesia. (27) Jeong et al. performed the evening after surgery "a gross motor and sensory neurologic evaluation and gross cognitive evaluation (orientation in time and space, recall of name, date of birth, and address)" and found no difference between the sevoflurane and the propofol groups. (28) Salazar et al. were the first to use a validated tool for neurocognitive function evaluation: Repeatable Battery for the Assessment of Neuropsychological Status (RBANS) was used to assess the neurocognitive outcome preoperatively, at discharge and at POD3 without any impairment in neurocognitive outcome. (29) Aguirre et al. performed the evening prior to surgery and the day after surgery a neurologic (Glasgow Coma Scale, pupil size, lateralization signs, MMSE) assessment and two validated POCD assessment tools: Trailmaking Test A and B (TMTA / TMTB). They could demonstrate a difference between the general and the regional anesthesia group with no worsening of the neurological outcome in either group but with an impairment of the early cognitive function in the general anesthesia group. Moreover, patients with CDEs in the general anesthesia group showed a worse early cognitive function compared to those without CDEs. (30) Cho et al. performed only the evening after surgery a "gross motor and sensory neurological evaluation and gross cognitive evaluation (orientation in time and space, recall of name, date of birth and address)" after general total intravenous anesthesia and found no difference between the group treated with arginine vasopressin to prevent hypotension and the placebo group. (31)

Postoperative delirium

Delirium is a condition with a wide range of possible etiologies and is defined as a confusional state emerging clinically by acute and fluctuating changes in consciousness and attention.

Postoperative delirium is seen in 36.8% of surgical patients (32) with a higher incidence in the over 70 years population (33) and in the orthopedic population (28%-52-6%). (34) There is a strong association between delirium and serious postoperative complications (35) leading to prolonged hospital stay, persistent functional and cognitive decline, increased morbidity and mortality (36, 37) with subsequent institutionalisation (8, 38) and finally leading to increased costs ranging from 38 – 152 billion USD / year. (39) Additionally, patients suffering delirium have a higher numbers of surgical complications such as urinary and respiratory tract infections, fractures and vascular events. (40) Moreover, delirium increases the incidence of postoperative depression. (41)

In hospitalized patients up to 40% of cases of delirium are thought to be preventable (42, 43) but prevention strategies are unproven or even untested.

Delirium is thought to result from neuroinflammation, neurotransmitter imbalance, pain, infection, sleep disorders and metabolic abnormalities. (44, 45)

A recent meta-analysis showed great inconsistencies in incidence, definition, duration and severity of postoperative delirium. (46) Russo et al. (47) studied the effects of controlled hypotension by epidural anesthesia on delirium in patients for hip replacement surgery. Their intraoperative mean arterial blood pressure (MAP) was maintained in the range of 45 – 55 mmHg or 55 – 70 mmHg. They found no difference in the incidences of postoperative delirium (8.5% vs 4.2%, MAP 45 – 55mmHg vs. MAP 55 – 70 mmHg, $p = 0.167$). However, there were many inaccuracies in this study, which was underpowered, had no standardized anesthesia/analgesia regimen and did not analyze the effects of sedation and blood loss on the primary outcome.

According to literature there is no difference in the incidence of postoperative delirium between neuraxial and general anesthesia. (48-51) However, also these studies show relevant limitations and do not focus on major hip surgery, which is known to be a risk for co-occurrence of cognitive dysfunction in elderly patients. (52)

Depth of sedation has recently been shown to correlate with an increased incidence and duration of postoperative delirium. (53) However, these were induced low levels of sedation and not normal clinical standard sedation for regional anesthesia. (54)

Nishikawa et al. (55) showed on abdominal surgery patients that the severity of delirium based on the Delirium Rating Scale was higher in the propofol group (intravenous anesthesia) compared to the sevoflurane (inhalative anesthesia) group. However, the incidence was of postoperative delirium was not different between the groups. Additionally, also this study was underpowered.

Three randomized controlled trials in orthopedic and abdominal surgery compared postoperative epidural analgesia to intravenous analgesia and could not find a difference between the groups. However, also these studies were underpowered. (46) Mouzopoulos et al. investigated the effects of additional fascia iliaca compartment block on postoperative delirium in hip surgery patients. (56) The regional anesthesia group found a decreased incidence, a reduced severity and a shorter duration of delirium. However, the study showed insufficient allocation concealment, blinding and there was no intention-to-treat analysis.

To assess the effects of the anesthesia management on neurobehavioral outcome additional high-quality studies are warranted focusing on current clinical practice (controlled hypotension, extreme positions like prone or beach chair positions).

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ESRAS-0513

PRO-CON DEBATE: REMIFENTANIL IS THE OPIOID OF CHOICE FOR GENERAL ANESTHESIA DURING C-SECTION AND SHOULD BE ADMINISTERED AT INDUCTION PRO

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Anesthesia for Cesarean section (CS) is usually provided by regional anesthesia. Although general anesthesia (GA) is used infrequently to provide anesthesia for CS, it remains an essential tool for the anesthesiologist in certain situations, more specifically in emergency situations, when regional anesthesia is contraindicated. Textbooks and conventional teaching, induce GA for CS without the administration of opioids prior to delivery of the baby because of fear for neonatal respiratory depression (1). In the present manuscript, the case will be made to use remifentanyl at induction in all parturients undergoing GA for CS. **Problems associated with conventional GA for CS:** General anesthesia is associated with significant potential risks and problems. Mortality risk is higher for GA as compared to regional anesthesia (2,3). This is mainly due to problems of failed intubation, aspiration, anaphylaxis and hypertension (4). Difficult intubation is related to changes in the airway related to pregnancy and labour (5), as well as the rapid sequence intubation scenario in a patient with lower oxygen reserve due to reduced functional residual capacity.

Hypertension, especially in preeclamptic women, does occur at intubation, incision and delivery of the neonate. In part, this is due to "light" anesthesia which results from the avoidance of pre-delivery opioids and the administration of only minimal doses of thiopentone or propofol. The conventional practice to

avoid predelivery opioids originates from fears to depress the neonate at birth. Hypertension is an important reason of maternal morbidity and mortality due to intracerebral hemorrhage (3).

As was demonstrated with the most recent National Audit Project (NAP5) in the UK, cesarean section is the procedure most frequently associated with awareness. The absence of opioids during induction of anesthesia is contributory to the high incidence of this significant complication (6).

Placental pharmacokinetics of remifentanyl: Several studies have demonstrated that remifentanyl is the opioid with the highest transplacental passage. In a landmark study, Kan et al. evaluated the placental transfer of remifentanyl and its neonatal and maternal effects when administered as an intravenous infusion (7). The observed remifentanyl umbilical vein/maternal artery (UV/MA) ratio of 0.88 ± 0.78 suggests a significant degree of placental transfer. Rapid esterase metabolism and fetal redistribution is suggested by a remifentanyl umbilical artery/umbilical vein (UA/UV) ratio of 0.29 ± 0.07 . Ngan Kee and co-workers confirmed the UV/MA ratio to be 0.77 following a bolus of remifentanyl at induction of CS (8).

Effects of remifentanyl at induction of GA for Cesarean section: The addition of remifentanyl as a bolus or an infusion has been demonstrated to improve maternal hemodynamics and reduce the maternal stress response in various case reports as well as clinical studies. Van de Velde et al. performed a prospective unblinded evaluation of remifentanyl in parturients requiring non-emergent Cesarean delivery under general anesthesia due to contraindications for regional anesthesia (9). Ten patients were included in this prospective case series involving 13 neonates. A bolus of remifentanyl $0.5 \mu\text{g/kg}$ was given intravenously, followed by a continuous infusion at $0.2 \mu\text{g/kg/min}$. Anesthesia was induced with propofol using target controlled infusion (TCI) set at $5 \mu\text{g/ml}$. TCI was reduced to $2.5 \mu\text{g/ml}$ following tracheal intubation. Succinylcholine was given in a dose of 1.5 mg/kg to produce muscle relaxation and facilitate tracheal intubation. Maternal heart rate and blood pressure remained stable throughout laryngoscopy, intubation, surgical incision and surgery. Ngan Kee et al. reported excellent maternal hemodynamic stability after a bolus of 1 mcg/kg of remifentanyl at induction (8). Heesen et al. performed a meta-analysis on the effects of remifentanyl at induction of GA (10). The authors selected five articles including 186 patients. Highest and lowest systolic blood pressure were significantly lower in the remifentanyl group (WMD: -29.98 , -50.90 to -9.07 mmHg , 95% CI; $p = 0.005$; and WMD: -12.46 , -18.21 to -6.71 mmHg , 95% CI; $p < 0.0001$), the lowest heart rate was significantly lower after remifentanyl treatment (WMD: -8.22 , -11.67 to -4.78 , 95% CI; $p < 0.00001$). This is also reflected in the release of stress hormones. Draisci et al. and Yoo et al. demonstrated lower stress hormone plasma levels when remifentanyl was given at induction of anesthesia (11,12).

The most important reason for many anesthesiologists not to use remifentanyl prior to delivery of the fetus, is the concern that significant respiratory and neurologic depression of the neonate may occur. Twenty-three cases of remifentanyl use at induction of anesthesia in high risk medically challenging cases were published (13-32). Brief respiratory depression was reported in 10 infants requiring short mask ventilation (1-6 minutes). Two infants were intubated (one of which was extremely premature with a birth weight of 635g) and in three babies naloxone was given. Low 1-minute Apgar scores (<7) occurred in 12/23 cases, but only 1 neonate had a low Apgar score at 5 minutes after delivery. Van de Velde et al. reported similar neonatal effects in their case series of 13 babies (in 10 CS). Six babies had low 1-minute Apgar scores and 6 required brief (1-5 minutes) mask ventilation (9). Heesen et al. performed a meta-analysis and reported a relative risk of 1.83 that babies born after remifentanyl at CS would require mask ventilation for a brief period neonatally (10). However since respiratory depression is extremely short-lived, the presence of a skilled person performing support to the neonate (midwife, anesthesiologist or pediatrician) would be more than enough to avoid significant problems.

Conclusion: Remifentanyl is an attractive short acting opioid which can be used at induction for anesthesia for Cesarean section. It can be useful to provide maternal haemodynamic stability without prolonged neonatal depression and at the same time induce deeper levels of anesthesia and a reduced maternal stress response. However, pediatric support is mandatory to manage brief episodes of respiratory depression.

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PRO-CON DEBATE: REMIFENTANIL IS THE OPIOID OF CHOICE FOR GENERAL ANESTHESIA DURING C-SECTION AND SHOULD BE ADMINISTERED AT INDUCTION

CON

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In 2011 UK anaesthetists were surveyed regarding their choice of drugs for caesarean section under general anaesthesia.¹ Only 15% said that they would use opioids during induction of anaesthesia, similar to a previous survey in Australasia.² Such reluctance to use opioids in these circumstances is undoubtedly consequent on concerns regarding the respiratory depression in the neonate.^{3,4} However, a similar survey regarding pre-eclamptic patients (a subgroup where the use of opioids is widely accepted) found that the vast majority chose alfentanil to obtund the pressor response at induction of general anaesthesia, with only a small minority selecting remifentanyl.⁵ Why was it that so few anaesthetists chose remifentanyl in this situation?

Remifentanyl⁶ has a rapid onset and short latency to peak effect. It is rapidly inactivated by esterases in both blood and tissues, resulting in a very short duration of action. The context-sensitive half-life is only 3 to 4 minutes and this is independent of the duration of infusion. When given at induction of anaesthesia, remifentanyl has been found to obtund the pressor response to intubation in women with pregnancy induced hypertension.³ It is also known to be rapidly metabolised by the neonate.⁷ Thus remifentanyl would seem to have many of the ideal characteristics for use in obstetric anaesthesia. It works quickly, is extremely titratable, is a truly short acting drug and would be anticipated to have minimal effects on the neonate. With all of these characteristics in its favour, why is it that up to this point, obstetric anaesthetists have been reluctant to embrace it?

One possible explanation is the relative complexity of the administration of remifentanyl compared to other short acting opioids such as alfentanil or fentanyl. The commonest indication for general anaesthesia for a caesarean section is foetal distress where the technique is chosen ahead of regional anaesthesia in order to expedite delivery of the baby. In this context setting up and administering a remifentanyl infusion requires a number of carefully performed steps when there is significant time pressure. Firstly all of the necessary equipment must be assembled (50ml syringe, needle, catheter, remifentanyl vial, syringe driver etc) following which care must be taken in drawing up the drug and selecting the appropriate programme for infusion. In contrast, if the anaesthetist were to ask for alfentanil, this simply requires that the drug (already in solution) be drawn up and given. Clearly the latter approach is far simpler, quicker and less prone to error. Whilst there have been no studies comparing the time that these two different approaches take, a trial of drug preparation for rapid epidural top-up revealed significant differences in the length of time it took dependent on the complexity of solution prepared.⁸

Errors in drug preparation are common⁹ and a review of drug errors in anaesthetic practice found that opioids were one of the commonest groups to be involved.¹¹ Such lapses are undoubtedly related to the necessity to multitask in “pressure to proceed” environments,¹¹ and to fatigue.¹² Both of these factors are all too familiar to obstetric anaesthetists around the world. In our unit a critical incident occurred where there was an error in administering a remifentanyl infusion during regional anaesthesia resulting in an overdose causing the patient to lose consciousness and require general anaesthesia. The anaesthetist was a highly experienced trainee working out of hours in a pressured environment. Had they chosen to give another short acting opioid, it is highly unlikely that such an error would have occurred.

An evidence based review of drug errors in intensive care and anaesthesia concluded that drugs should be drawn up and labelled by the anaesthetist who will administer them.¹³ Thus the preparation of drugs should not be delegated to a member of the theatre team and the anaesthetist (already with much to do in a short time) must perform the task.

The risk of drug error may be reduced by prior preparation¹³ however solutions of remifentanyl should be stored for no longer than 24 hours.¹⁴ This would occasion preparation of solutions of remifentanyl each day, which would incur considerable expense.

If (as the title suggests) remifentanyl is the agent of choice, what is the evidence of its superiority to other opioids. Remifentanyl has a rapid onset and may produce profound opioid analgesia intraoperatively followed by rapid and predictable reversal at the end of surgery.¹⁵ Although it crosses the placenta readily and is rapidly cleared by the neonate,⁷ some studies have found that there is neonatal compromise³ and a review of the literature and meta-analysis found that an appropriately powered study was required to assess incidence of side effects in the new born.¹⁶ Thus at the present time the risk to the neonate has not been quantified and as such it is too early to recommend remifentanyl as the opioid of choice for all caesarean sections under general anaesthesia.

Both fentanyl and alfentanil are short acting opioids which have been found to attenuate the response to intubation in women who suffered from pregnancy induced hypertension.³ They have longer half lives than remifentanyl and may also cause transient respiratory depression in the neonate. Consequently similar precautions are required regardless of whether fentanyl, alfentanil or remifentanyl are used at induction of general anaesthesia for caesarean section.

Whilst remifentanyl is known to give excellent intraoperative analgesia, withdrawal at the end of the procedure is known to cause hyperalgesia.¹⁷ This may result in women having increased pain and analgesic requirements in the immediate recovery period.

In conclusion, remifentanyl has many characteristics which make it potentially an excellent choice for use during general anaesthesia for obstetric surgery. However, there are other drugs which can obtund the pressor response and provide intraoperative analgesia. These drugs are also simpler to use, do not wear off abruptly at the end of the procedure and it is not known whether their effect of neonatal respiration differs in clinically important ways to remifentanyl. Remifentanyl should not be recommended for use in all cases where general anaesthesia is required for caesarean section.

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REGIONAL ANALGESIA AND PROGRESS OF LABOR

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1. Introduction: Epidural analgesia (EA) is the most efficacious technique for pain relief during labor [1]. However, this powerful analgesic technique has been reported to alter the dynamics/progress of labor (i.e., to prolong 1st et 2nd stages of labor) and to increase instrumental and Cesarean deliveries.

For an accurate understanding of this issue, it is important to remind the reader that an “epidural” is only describing a route of drug administration (just like the intravenous route is a route of drug administration too). Therefore, the influence of an “epidural” on the progress of labor and the mode of delivery is depending first and foremost on which drugs and which concentrations are used. Local anesthetics (LA) remain essential to provide adequate pain relief at least in advanced labor and these products can indeed produce motor block that may impair the course of labor. Lidocaine provides clearly much more motor block than bupivacaine, ropivacaine or levobupivacaine for an equivalent sensory/analgesic effect. Thus, lidocaine must be avoided during labor, except when a rapid and dense anesthesia is required (i.e., for instrumental or Cesarean delivery or for manual removal of the placenta). Improvements of EA for labor have been centered on reduction of motor block with the use of diluted solutions of bupivacaine, ropivacaine or levobupivacaine (close to 0.10%, i.e., 1 mg/mL) combined with a potent lipophilic opioid (fentanyl or sufentanil).

2. Influence of regional analgesia (RA) on Cesarean section rate: There is strong and consistent evidence that modern EA does not increase Cesarean section rate. Both randomized controlled trials [2, 3] and impact trials (i.e., “after” vs. “before” periods) [4] have provided consistent results. In some cases/locations (namely China), the introduction of a 24-h epidural service has even decreased the Cesarean section rate, when compared to the “before” period, likely by reducing the mother request of scheduled Cesarean section for fear of labor pain due to lack of EA availability [5]. It is important to understand that a non-causal but statistically significant link is usually observed between epidural request and the risk of Cesarean section during labor. In other words, EA request is a risk marker for Cesarean section. Several reasons may explain it. The obstetrical team more often requests EA in dystocic labor. In addition, intensity of pain itself with related analgesic requirements is a marker of dystocia and therefore of increased cesarean section rate, even when intravenous opioids are used in absence of epidural service availability [6]. Thus, multivariate analyses are inappropriate statistical methods to assess this issue because labor pain related to dystocia, as risk factor for cesarean section, is hidden and replaced by efficacious labor pain relief provided by epidural analgesia. In addition, labor induction or augmentation in dystocic settings may lead to a significant increase (x 2) in Cesarean section rate. Advanced maternal age (>35 yr.) is another example of independent and pronounced risk factor (x 6). These unfavorable settings are also more often associated with EA request [7].

3. Influence of RA on first stage of labor (cervical dilation): The prolongation of the first stage of labor (= cervical dilation) during EA is sometimes

reported, even in randomized controlled trials (RCT). Nonetheless, this increased length remains modest, when observed (+ 30 min over a 7-h laboring period on average in the metaanalysis of Sharma et al. [2]). In addition, when LA concentrations were lowered, the prolongation of the first stage of labor was no longer retrieved in a subsequent metaanalysis of RCT [3]. This again underlines that an “epidural” is only describing a route of drug administration for which beneficial and adverse effects are highly dependent of the type and the concentration of drugs used. Two RCT have shown that EA started in early labor (< 3 cm versus > 5 cm of cervical dilation) did not increase the duration of first stage of labor while using a bupivacaine concentration ≤ 0.25% (without combination with a lipophilic opioid) in both oxytocin augmented labor [8] or spontaneous labor [9]. Two other large RCT published in 2005 and 2006 have even retrieved a duration of labor shorten by 40 and 90 min on average when a modern « light » RA was induced in early labor rather than in more advanced labor; this positive result was observed with a CSE analgesia [10] but also with a « light » EA alone using ropivacaine 0.1% + fentanyl 2 mcg/ml [11]. Finally, a huge Chinese RCT (N ≈ 6400 x 2) reported no differences in duration of first stage of labor when EA was started at 1.6 versus 5.1 cm mean cervical dilation (with a 15-ml initial bolus of ropivacaine 0.125% + sufentanil 0.3 mcg/ml then followed by a PCEA using the same analgesic combination) [12]. Consequently, as soon as labor is started (with cervical modification and regular uterine contractions), the relevant criterion to consider to initiating EA must be pain intensity and/or maternal request, and no more any threshold of advanced cervical dilation.

4. Influence of RA on second stage of labor: Adverse effects of EA on the progress of labor are mainly susceptible to occur during the second stage of labor (i.e., from full cervical dilation to delivery). During the 80', high concentrations of LA were used (bupivacaine 0.5% or lidocaine 2%); motor block produced was often pronounced and could really alter the descent and rotation of the fetal presentation due to the relaxation of the pelvic floor and psoas muscles. In addition, motor block could impede maternal expulsive efforts at the end of labor. Recently, a metaanalysis including 11 RCT confirmed the benefit of using a diluted solution of LA to reduce instrumental delivery rate, without decrease in pain relief [13].

Chestnut et al. first demonstrated that EA no longer prolonged second stage of labor when a very diluted LA concentration was used in combination to a potent lipophilic opioid (fentanyl in this study). Similarly, instrumental delivery rate was no longer increased with this modern “light” EA technique [14]. In routine clinical practice, some parturients may have higher LA requirements (in concentration and/or volume); this may explain why a modest second stage prolongation (of 15 min on average) is still retrieved in recent metaanalyses, sometimes even associated with a mild increase in instrumental delivery rate [3]. Nonetheless, the two RCT published in 2005 and 2006 have shown that duration of second stage of labor and instrumental delivery rate were not increased when EA was initiated in very early first stage of labor (2 cm mean cervical dilation) versus in more advanced labor [10, 11]; the huge 2009 Chinese RCT confirmed these results while including 12,793 parturients [12]!

Last year, authors have studied the descent of fetal head with three-dimensional ultrasound sonographic indices (angle of progression and head-symphysis distance) during second stage of labor in parturients with or without mobile EA. All sonographic indices of fetal head progression were similar at each time interval between the 2 groups. This study further suggests that modern light EA (as mobile EA) is not likely to affect the dynamics of the second stage of labor. Despite some methodological limitations, this study provides meaningful information, because it is based on objective sonographic criteria [15].

5. Mobile/ambulatory EA: The first study on mobile EA was published in 1993 [16]. Despite the use of a very diluted (0.04%) bupivacaine concentration combined with fentanyl, 17% of the parturients had motor block, which was weak but that precluded upright standing position and ambulation. One parturient fell down (without damage), 2 h after a previous uneventful ambulation period. This led the authors to add a partial knee bend-testing prior to allowing ambulation. This test disclosed that 12% of parturients were unable to complete it adequately (those parturients were thus not allowed to ambulate although they were able to stand alone on their feet). An orthostatic hypotension precluding the upright standing position was also observed in 9% of cases. Besides, the too much-diluted LA solution did not provide effective enough analgesia in half of cases. This often led to a premature interruption of ambulation to allow the administration of a more concentrated LA top-up.

A better ambulation success rate (93%) was then reported paradoxically with a less diluted LA (bupivacaine 0.125%), still combined with a lipophilic opioid (sufentanil 10 mcg), but without giving a previous lidocaine test-dose [17]. However, despite common belief, mobile/ambulatory EA does not appear

to improve dynamics and progress of labor on objective end-points assessed in RCT such as duration of labor and instrumental delivery rates [18]. This is at odds with impact trials where the implementation of a 24-h epidural service seems consistently to improve the dynamics and progress of labor. A large RCT has helped understanding this apparent discrepancy: a reduced instrumental delivery rate and a shorter first stage of labor were linked to the use of a "light" RA, but not to ambulation *per se* [19]. It is the elimination of motor block needed to allow ambulation that appears to be the main trigger improving the dynamics and progress of labor. Conversely, ambulation itself plays little role, if any [20]. Ambulation benefits are mostly those of improved maternal autonomy, reduction of urinary catheterization and maybe sometimes less oxytocin augmentation and LA requirements [18, 20].

6. Combined spinal-epidural (CSE) analgesia: In addition to a diluted local anesthetic + lipophilic opioid combination mandatory for successful ambulatory epidurals, some teams use the combined spinal-epidural (CSE) analgesia technique [18, 19]. With this needle-through-needle technique, a lipophilic opioid (fentanyl or sufentanil) $\pm$ a small dose of bupivacaine (≤ 2.5 mg) or ropivacaine (≤ 4 mg) is injected into the cerebro-spinal fluid through a thin pencil-point spinal needle (25-27 gauge) prior to the classical insertion of the catheter through the Tuohy needle into the epidural space. This initial spinal analgesia provides a fast (≤ 5 min), very powerful and reliable pain relief, even in the perineal area; furthermore, it provides very little motor block and walking about is often possible during this period [10, 18, 19]. The length of the spinal analgesia is unfortunately limited (90 min on average) and therefore, the spinal analgesia usually needs to be relayed via the epidural catheter. The choice of this combined technique compared to epidural analgesia alone remains a very controversial subject: some teams use it systematically while others never use it. For a parturient with moderate pain in early stage of labor, there is no objective benefit compared to epidural analgesia alone, regarding motor block reduction and/or progress of labor [21]. Conversely, this powerful analgesia technique remains very useful for parturients with a fast or advanced cervical dilation, or with very severe pain. CSE may be also difficult to manage in obstetrical and/or anesthetic high-risk circumstances because the epidural catheter functionality (in case of emergency cesarean section) cannot be ascertained until the spinal analgesia wears off [22].

7. PCEA, PIEB, alone or combined: "PCEA" (Patient Controlled Epidural Analgesia) is based on a programmable pump which allows the parturient to self-administer boluses by epidural route with a push-button according to her own needs [23]. The bolus dose and the lockout interval (minimal safety time separating two boluses allowed by the pump) are determined by the anesthesiologist. PCEA reduces on average by one-third the analgesic dose received and/or decreases the number of interventions for inadequate analgesia, compared to a classical continuous epidural infusion (CEI). However, advantage of PCEA alone in reducing motor block is quite modest and does not result in a detectable improvement in the progress of labor. Currently, a new mode of automated boluses administered at regular time periods (Programmed Intermittent Epidural Bolus - PIEB) has gained great interest. In a recent meta-analysis including 694 parturients, the PIEB mode, with or without PCEA, has been compared to the CEI technique, with or without PCEA as well [24]. It appears that global LA consumption is reduced and that maternal satisfaction score is improved with the use of PIEB mode ($\pm$ PCEA). The rate of instrumental delivery and the rate of unscheduled clinician interventions for inadequate analgesia also tend to decrease, although these two benefits need to be confirmed with larger series. The bolus effect obtained with discontinuous injections would promote a better diffusion of LA into the epidural space throughout the catheters [25]. In addition, it has been shown that under 80 mL/h of infusion rate, multi-hole catheters behave like single-hole catheters. This phenomenon also tends to limit the LA spread with CEI [26]. In a randomized double blind study by Capogna *et al.* [27] using low concentrations of LA, motor block was less often present at least once during labor using the PIEB + PCEA mode, compared to CEI + PCEA mode (3% vs. 37%, respectively); there was also a significant benefit regarding instrumental delivery rate (7% vs. 20%, respectively) [27]. This obstetrical benefit would need to be confirmed, as it was not significant in previous studies [24]. In a recent review, the authors suggest different explanations regarding this reduced motor block and especially proposed a reduced LA diffusion/concentration in the center of the nerves using PIEB + PCEA mode [25]. Many pumps commercially available still do not provide the PIEB mode, especially in combination with the PCEA mode. Software adaptation should occur rapidly and some brands in EU already offer this PIEB + PCEA mode.

8. Ropivacaine, levobupivacaine, and analgesic adjuvants by epidural route: The use of ropivacaine or levobupivacaine has contributed to the

development of effective epidural analgesia without motor block. Some studies suggest a beneficial effect of ropivacaine (*versus* bupivacaine) in decreasing motor block, favoring ambulation and perhaps spontaneous micturition. Nevertheless, with diluted concentrations around 0.10%, ropivacaine has not proven superiority over bupivacaine, regarding progress of labor and instrumental delivery rate [28]. Looking at similar obstetrical criteria, another study confirms that levobupivacaine, ropivacaine and bupivacaine lead to similar results [29]. Besides, quality of analgesia and reduction of motor block with ropivacaine and levobupivacaine are equivalent, when a lipophilic opioid is added as recommended [30].

Other adjuvants like clonidine or neostigmine have been suggested to improve analgesia, to limit LA doses in order to reduce even more the motor block and its potentially harmful consequences on progress of labor [31]. Clonidine, by acting on spinal cord α -2 receptors, seems particularly interesting to maintain or restore epidural analgesic efficacy at the end of labor (75 mcg epidural bolus). It may help avoiding the use of more concentrated LA. Nonetheless, the benefit regarding motor block is not obvious and different studies also report sometimes maternal or neonatal dose-dependent side effects (decrease in blood pressure and/or moderate maternal sedation, reduction in fetal heart rate variability or neonatal NACS scores). Conversely, clonidine addition seems to reduce pruritus induced by sufentanil [32]. Finally, a recent study has confirmed its usefulness to improve analgesia but suggested that clonidine systematic addition (1.36 mcg/mL) to a levobupivacaine + sufentanil solution might (paradoxically) increase the rate of instrumental delivery [33]. Therefore, routine use of this « triple combination » (i.e., with local anesthetic and lipophilic opioid) is still debated [34]. We think this should likely lead to select a lower concentration of clonidine (≈ 0.75 mcg/mL), whenever this « triple combination » is adopted. Indeed, if there is no doubt about the beneficial effect on analgesia of adding clonidine to the association of "diluted local anesthetic + lipophilic opioid", its positive, neutral or negative impact on progress of labor is still not obvious, even at these low concentrations. Besides, when used in combination with neostigmine during the first stage of labor, clonidine has not shown any beneficial effect regarding duration of labor and/or mode of delivery. Nonetheless, a significant reduction in LA hourly consumption is common, as demonstrated in the recent meta-analysis of Zhang *et al.* [35].

9. Conclusion: RA has evolved over this past four decades towards a marked decrease in LA concentrations, particularly with the systematic addition of a potent lipophilic opioid (fentanyl or sufentanil). Today, this permits to often eliminate motor block while preserving adequate analgesia. Ropivacaine or levobupivacaine $\pm$ clonidine and PIEB + PCEA devices $\pm$ CSE further improve this sophisticated therapeutic armamentarium. Negative influence of epidurals is now very weak or absent; it is sometimes even replaced by a beneficial influence that slightly speeds up cervical dilation when the epidural is initiated in very early labor. Therefore, the criterion to initiate RA during labor today must be pain intensity and/or maternal request and no longer any threshold of advanced cervical dilation [36, 37, 38].

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ESRAS-0537

REFRESHER COURSE: SINGLE NERVE RESCUE BLOCKS

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Compared to other techniques, ultrasound has increased the success rate of most peripheral nerve blocks, the incidence of block failure is still clinically relevant^{1,2}.

However, the risk of a block failure should always be considered possible. The ulnar nerve can be missed after a supra- or infraclavicular block. The radial nerve can sometimes be hard to visualize in the axillary fossa.

A more distal approach of the brachial plexus has the advantage of better visibility of the terminal nerves and offers an easy and elegant solution when a brachial plexus block is incomplete.

Infiltration around the terminal branches of the brachial plexus that innervate the upper limb, namely the median, ulnar, radial and musculocutaneous nerves, are regarded as the most common single nerve rescue blocks. These nerves run from the brachial plexus to the axilla, from where they course more distally while innervating their different anatomical structures.

The ulnar nerve lies adjacent to the axillary artery in the axilla and courses to the cubital tunnel. From there it runs in the anterior compartment of the forearm to join the ulnar artery.

The median nerve lies adjacent to the brachial artery and passes the elbow joint. In the forearm it deviates from the artery and enters the carpal tunnel.

The medial and ulnar nerve can be blocked at any location from the axilla to their terminal smaller nerves, depending on the site of surgery. They are frequently blocked in the mid forearm because of good visibility³.

The musculocutaneous nerve penetrates the coracobrachial muscle and runs to the lateral side of the arm. Below the elbow it continues as the lateral antebrachial cutaneous nerve. The musculocutaneous nerve can be blocked in the upper arm between the coracobrachial and the biceps muscle⁴, or it can be blocked more distally, as the terminal cutaneous branch at the cephalic vein just below the antecubital fossa, although its course is variable.

The radial nerve runs with the axillary artery and then travels posteriorly. It winds around in the groove on the humerus and emerges at the lateral aspect of the humerus. It branches as a deep branch and a superficial branch in the forearm. It can easily be blocked above the elbow at the lateral side of the humerus in a fascial plane between the brachial and brachioradial muscle. More distal branches of these nerves can be blocked separately as well⁵.

The medial part of the forearm is supplied by the medial antebrachial cutaneous nerve. When this area needs to be anesthetized, the medial antebrachial cutaneous nerve can be blocked above the elbow near the basilic vein⁶.

The beauty of ultrasound is that all terminal nerves can be blocked wherever they can be seen. However a good understanding of anatomy, the sensory innervation of the dermatomes, myotomes and osteotomes necessary to utilize these blocks. It is also important to remember that anatomic variations exist and sensory nerve communications between dermatomes are possible.

Rescue blocks also have a disadvantage, since paraesthesia's or pain could be absent in a partly anaesthetized nerve⁷.

Single nerve blocks are regarded as rescue blocks. However for some procedures, a combination of single nerve block can provide surgical anaesthesia as well. This allows sparing of motor function because of a more distal approach of the nerves. Unfortunately, this is often limited by the use of a tourniquet.

With the increasing resolution of ultrasound it is possible to identify and block smaller and smaller nerves. A select part of the fore arm or hand can be blocked. The ulnar, medial and medial cutaneous antebrachial nerve could for example be combined to have a block on the medial side of the forearm.

Single nerve rescue blocks are easy to perform and provide a good solution for incomplete nerve blocks.

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ESRAS-0536

REFRESHER COURSE: LOCAL ANAESTHETIC IN PERIPHERAL NERVE BLOCKS: DOSE, VOLUME, AND CONCENTRATION

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Ultrasound guidance facilitates needle positioning and injectate placement, increasing nerve block success rates, reducing onset time, and permitting local anaesthetic dose reduction. Some studies have estimated the minimum effective anaesthetic volume of local anaesthetic required to accomplish successful blockade.

1-Volume of local anaesthetic solution used perineurally.

During the past decades, large volumes of local anaesthetics have been used for peripheral regional anaesthetic techniques to compensate for morphometric methods of nerve identification. Pure landmark-based, surface nerve mapping or nerve stimulation techniques may serve as examples of indirect methods of identification of peripheral nerves. As a consequence, upper limb blocks have been described with volumes up to 60 ml and lower limb blocks with volumes up to 40 ml of local anaesthetics. Direct ultrasonographic visualization of nerve structures enables the performance of blocks with reduced volumes of local anaesthetics. In the upper limb, a successful infraclavicular block in adults with 14 mL of lidocaine is feasible with the use of ultrasound [1]. As well, the minimum effective volume of local anaesthetic for shoulder analgesia for a US-guided interscalene block in 95% of the patients was 3.6 ml [2]. Finally, successful ultrasound-guided axillary brachial plexus block may be performed with 1 ml of 2% lidocaine-epinephrine per nerve [3]. In the lower limb, the minimal local anaesthetic volume for sciatic nerve block has been found to be 0.10 ml mm(-2) cross-sectional nerve area [4]. At the opposite, Imasogie [5] proposed hundred twenty patients undergoing upper limb surgery to receive an axillary brachial plexus block involving 2 injections, with 30 mL local anesthetic injected posterior to the axillary artery, plus 10 mL local anesthetic to the musculocutaneous nerve, guided by ultrasound. Gonzales [6] confirmed that an ultrasound-guided 2-injection axillary block may be as effective as, and more time efficient than, a 4-injection technique. For double-injection ultrasound-guided AXB, the MEV90 of lidocaine 1.5% with epinephrine 5 µg/mL is 5.5 and 23.5 mL for the musculocutaneous nerve and perivascular injection, respectively. But, to inject a large volume solution with a single injection technique may involve some modifications in the nerve sheath. Ay [7] showed in axillary block on cadavers that septae from the deep surface of the axillary sheath form compartments for each nerve. The septae function as barriers under physiologic

conditions. Boluses of 10, 20, and 40 cc of methylene-blue were injected into one of the compartments of the axillary sheath. By increasing the injected volume of solutions, bubble-like defects are produced in the septae in the compartments into which leakage was demonstrated.

2- Concentration of local anaesthetic solution used perineurally.

There is a significant variability in the nerve/connective tissue ratio, not only among the nerves, but also at different locations along the same nerve. Such anatomic variability may help explain why a higher concentration of local anaesthetic is required to block the sciatic nerve in the popliteal fossa than at the subgluteal fold. Number of studies have clearly shown the possibility to decrease the concentration of local anaesthetic solution used in peripheral nerve blocks. Perineural injection of 15 ml of lidocaine 0.93% under ultrasound guidance could provide successful femoral nerve block in 90% of patients [8]. Taha [9] showed that perineural injection of 15 ml ropivacaine 0.167% under ultrasound guidance can provide successful femoral nerve block in 90% of patients. Successful combined sciatic and femoral nerve block with bupivacaine 0.25% on diabetic patients can also be performed [10]. In the upper limb, Kii [11] showed that 16 ml of 0.1285 % ropivacaine is suitable for achieving differential block, known as sensory block with mobilization, for adequate analgesia in ultrasound-guided axillary nerve block for hand and forearm surgery.

3- Interest of low volume and concentration of local anaesthetic.

3-1 To limit the risk of systemic toxicity.

Torup [12] showed TAP blocks with bilateral injections of 20 ml ropivacaine 0.5% gave rise to potentially toxic peak blood concentrations of total ropivacaine in one-third of the patients. Then, Weiss reported 2 cases of systemic local anaesthetic toxicity after Transversus abdominis plane (TAP) block with bilateral injections of 20 ml ropivacaine 0.5% used for postcesarean section analgesia leading to seizures. To limit this risk, a low concentration of local anaesthetic solution should be chosen when a "20 mL bilaterally" regimen is necessary to achieve the required spread for a successful block.

3-2 To decrease the potential risk of neurotoxicity.

Recent studies investigate potential local anesthetic neurotoxicity. Willams [13] compared the neurotoxicity of adjuvants and local anesthetic on sensory neurons isolated from adult rats. In these experiments, he confirmed that a concentration of ropivacaine administered clinically (2.5 mg/mL) is neurotoxic to isolated sensory neurons. High concentrations of clinically packaged adjuvants, Clonidine, Buprenorphine and dexamethasone were significantly less neurotoxic than ropivacaine. Ma [14] evaluated the bupivacaine induced toxicity in mouse neuroblastoma N2a cells. He showed that bupivacaine or lidocaine administration locally could result in neuron injury. This local anesthetic induced neurotoxicity is concentration dependent. To limit these risks of neurotoxicity, a minimum effective concentration and volume of local anaesthetic solution should be chosen when performing a nerve block.

3-3 The ultrasound appearance of nerves and target injections are better understood. [15].

Large peripheral nerves are surrounded by a gliding layer, the adventitia or paraneurium. Ultrasonically, a circumneural spread corresponds to adventitial extraneural injection. For popliteal sciatic nerve blocks, positioning the needle in the common nerve sheath between the tibial and peroneal components and obtaining a circumneural spread surrounding both divisions predict rapid surgical anaesthesia. At the opposite, for single injection interscalene block, an injection into the fascial sheath but far from the plexus proved to be as effective as an injection adjacent to the nerve structures. The specific distributions of local anaesthetic spread that predict success are significantly different from one anatomical site to another. When applied directly to ion channels, the concentration of local anaesthetics necessary to cause conduction block is small compared to those used clinically.

4- Volume and concentration of local anaesthetic solution and block duration.

Thus, ultrasound guidance contributed to the reduction in total dose of local anaesthetic but it is unclear whether this decrease can affect block duration. Is block duration influenced by both local anaesthetic solution volume and concentration? Fredrickson [16] found a clear association between local anesthetic volume, concentration (and dose), and the duration of interscalene block, findings that have particular relevance for the current trend in ultrasound-guided regional anesthesia of administering low local anesthetic volumes. In sciatic nerve, an injection of small dose (2.5 to 5ml bupivacaine 0.5%) is associated with delayed onset and decreased block duration [17]. Volumes greater than 10 mL did not extend block duration. When the dose of local anaesthetic is optimal to achieve a successful block (10ml of 0.5% bupivacaine), a large injection volume (30ml bupivacaine 0.5%) does not extend the duration of the sensory or motor block [17].

5- Adjuvants to extend nerve block analgesic duration

The main postoperative challenge after painful orthopedic surgery is to provide effective pain relief beyond 24 hours. Recently, a number of studies have clearly shown that when a low-dose of dexamethasone is added to a long-acting local anaesthetic in peripheral nerve block, analgesia duration achieved 26-32 hours [18, 19]. Kawanishi [20] demonstrates that perineural but not intravenous administration low-dose of 4 mg of dexamethasone significantly prolongs the duration of effective postoperative analgesia resulting from a single-shot ISB with ropivacaine 0.75%. Recently, Liu [19] showed that low-dose dexamethasone (1-2 mg) prolongs analgesia duration and motor blockade to the similar extent as 4-mg dexamethasone when added to 0.25% bupivacaine for supraclavicular brachial plexus nerve block. Interestingly, recent studies showed that whether 10 mg dexamethasone are injected perineurally or intravenously, the prolongation of postoperative analgesia is comparable [21]. Adjuvants to local anaesthetic solution in perineural analgesia include the potential to extend nerve block analgesic duration while potentially reducing the needed concentration of local anaesthetics to provide meaningful analgesia, while simultaneously reducing the potential need for a perineural continuous infusion catheter. Finally, some issues regarding the potential risk of neurotoxicity when dexamethasone is used perineurally are still debated, and human clinical data are still lacking [22]. To limit the risks of systemic and neurotoxicity, a minimum effective volume and concentration of local anaesthetic solution and adjuvants should be chosen when performing a nerve block.

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ESRAS-0543

REFRESHER COURSE: PDPH: AN UPDATE

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Introduction: Caused by CSF leak after dura mater puncture, either intentional or accidental, PDPH incidence is reducing because of use of thinner and less traumatic needles in spinal procedures.

Nowadays accidental dural puncture (ADP) during epidural anaesthesia is frequently responsible for PDPH, often in the pregnant population, where recent incidences around 50 % are reported.

Although peripartum headache is not uncommon (39%), most of these tension-type headaches with only 4,7% diagnosed as PDPH, one should be aware of peripartum vulnerability to serious neurological complications. (Bateman et al. 2012; Goldszmidt et al. 2005)

Subdural haematoma and cerebral vein thrombosis are both complications of pregnancy and dural puncture, and can confuse the diagnosis of headache presenting after ADP.

Even while a postural component of a headache relates to ADP, changed presentation or sudden worsening of symptoms and intensity are signs to reconsider the aetiology before performing invasive therapeutic measures like an epidural blood patch (EBP). (Flood and Li 2012)

On the other hand, ADP can result in an atypical headache without a postural component or no headache at all, especially with a past history of migraine, a more cephalad epidural needle insertion or recognition of ADP by CSF aspiration through the epidural catheter. (Loures et al. 2014)

PDPH: The 3rd edition of the International Classification of Headache Disorders (ICHD-3), describes PDPH as a headache occurring within 5 days of a lumbar puncture, not better accounted for by another ICHD-3 diagnosis, caused by CSF leakage through a dural puncture; often accompanied by neck stiffness and/or subjective hearing symptoms, it disappears either spontaneously within 2 weeks or after sealing the leak with autologous epidural lumbar patch. (Torelli et al. 2013)

The most striking clinical feature, the almost immediate (within 20 seconds) appearance/intensification of pain after changing from horizontal to vertical position has been left out in the ICHD-3, because it is not considered a diagnostic reliable criterion, although in the obstetric population only 5.6% of PDPH presents without a postural component. (Loures et al. 2014; Vilming and Kloster 1997)

The accompanying symptoms included in ICHD-3 are not the most frequent: in a non-obstetric population after spinal anaesthesia, neck stiffness only occurred in only 4%, rarer compared to nausea and vomiting (39% and 20%), dizziness (19%), photophobia (15%), tinnitus (12%) and diplopia (8%), which symptoms implicate involvement of cranial nerves. (Amorim, Gomes de Barros, and Valença 2012)

Quality and location can vary considerably: so does intensity which is related to the size of the needle used and the dural lesion it causes. (Morley-Forster et al. 2006; Russell 2012; Sprigge and Harper 2008)

Eventually dissolving spontaneous in most cases, sometimes persisting complaints have been cured after years with EBP. (Raffin et al. 2006; Shear and Ahmed 2008)

Older, overweight and smoking males for once seem to have advantage, since risk factors for PDPH are female gender, age between 20–50, pregnancy, previous PDPH, non-smoking, low BMI and recent headache. (Baysinger 2013; Dodge et al. 2013; Kuntz et al. 1992; Lybecker and Andersen 1995; Miu, Paech, and Nathan 2014)

The headache is caused by excessive loss of CSF (minimal 10%) into the epidural space, similar to the one CSF shunt patients experience during a temporary over-drainage through the shunt.

The resulting low intrathecal pressure results in downward displacement of the brain in the vertical position, with accompanying tension on vessels and other intracranial structures which contain stretch pain sensors.

The other explanation relates to the Monro-Kellie doctrine: any decrease of volume of one intracranial compartment will result in an increase of another constituent intracranial.

CSF loss results in compensatory increase of blood flow/volume with vasodilatation, both venous and arterial; this has been demonstrated with MRI, although no direct relation seems to exist between the amount of CSF leaking and the occurrence of headache. (Iqbal, Davis, and Orrison)

Thirdly, a relation has been made between PDPH and lower substance P concentrations in CSF. (Clark et al. 1996)

Needle choice: Although technically more challenging, the use of a 29 G pencil-point needle seldom, if ever, results in PDPH. (Geurts et al. 1990; Smith et al. 1994)

A-traumatic spinal needles like the Whitacre and Sprotte needles, although causing less PDPH, produce actually more trauma with tearing and severe disruption of the collagen fibres: this may result in a more profound inflammatory reaction with oedema. This acts as a plug limiting the leakage of CSF and thereby reducing the incidence of PDPH. The dura consists of different sub-laminas containing randomly orientated elastic and collagen fibres, centrally bordered by a compact laminar arachnoid mater, which forms the real limitation for CSF to flow out of the dural sac. (M.A. Reina 2000; Miguel Angel Reina et al. 2002)

Tuohy needles, once accidentally puncturing the dura, create bigger, clear-cut and crescent-moon shaped lesions, irrespective of bevel direction, with a 50–60% incidence of PDPH. (Peralta et al. 2015; VAN Zundert, Reina, and Lee 2013)

A-traumatic epidural Sprotte needles cause more disruptive dural damage resulting in lower incidences of PDPH, which can be lowered as well by choosing the smaller 18 G Tuohy needle. (Morley-Forster et al. 2006; Russell 2012; Sadashivaiah and McLure 2009)

Reinserting the stylet before removing the needle reduces incidence of PDPH after spinal diagnostic puncture with a 21 G Sprotte needle but not in a 25 G Quincke needle for spinal anaesthesia. (Sinikoglu et al.; Strupp, Brandt, and Müller 1998)

ADP: Two recent meta-analyses found no different incidences for ADP when using either saline or air for loss of resistance, with different position of the mother while inserting the epidural, or different sorts of epidural needles/catheters, bevel direction or operator experience. Only an increasing depth of the epidural space was shown to increase the risk of ADP. (Heesen, Klöhr, Rossaint, Van De Velde, et al. 2013; Hollister et al. 2012)

New methods to identify the epidural space position and depth, like ultrasound, acoustic puncture assist devices (APAD), mechanical devices to detect the LOR to air, epidural waveform analysis and electrical stimulation through the epidural catheter, can reduce the number of attempts of less experienced anaesthesiologists, particularly in obstetric patients. (Lechner et al. 2011; Tran et al. 2015; Vallejo et al. 2010)

CSE, although reducing ADP rate in trainees, does not appear to influence either the risk of ADP or PDPH. (Bradbury et al. 2013; Norris et al. 1994; Van de Velde et al. 2008)

Prophylactic measures: Bed-rest gives acute, temporary relief of symptoms once headache occurs, but does not prevent development of PDPH, nor do supplementary fluids. (Arevalo-Rodriguez et al. 2013; Sudlow and Warlow 2002)

Caffeine (oral or intravenous) has proven to be ineffective: its potential lowering of seizure thresholds might actually provoke atrial fibrillation or seizures in patients at risk. (Basurto Ona et al. 2013; Halker et al. 2007; Van de Velde et al. 2008)

Intrathecal nor epidural saline occasionally seemed to reduce PDPH occurrence, without statistical significance. (Apfel et al. 2010; Charsley and Abram)

Epidural morphine, injected epidural after earlier ADP, reduced the incidence of PDPH from 48 to 12 % in one RCT. (Al-Metwalli 2008)

Maybe this study also provides an explanation for the lower PDPH incidence found in one Canadian study after ADP in Caesarean Section (CS) (with

neuraxial opioid anaesthesia) compared to regular delivery with second stage pushing. (Angle et al. 1999; Russell 2012; Sachs and Smiley 2014)

These days, active pushing during second stage is not discouraged after ADP, although recently Peralta et al. demonstrated anew a relation between PDPH and active pushing in obese and non-obese women. (Baraz and Collis 2005; Peralta et al. 2015)

Other medications used in preventing or reducing intensity of PDPH have only been studied in small sample sized, often singular, studies, under different circumstances and with conflicting results, maybe cosyntropin being an exception. (Basurto Ona et al. 2013; Hakim 2010)

Heterogeneity of results provides frail and conflicting evidence for the efficacy of prophylactic epidural blood patch; the only RC double-blind study in obstetrics concluding that eight patients were needed to treat with a PEBP in order to avoid one therapeutic EBP, resulting only in a reduction of PDPH duration. (Apfel et al. 2010; Boonmak and Boonmak 2010; Scavone et al. 2004; Stein et al. 2014)

Maybe it makes sense to only consider PEBP when additional risk factors for the development of PDPH exist; it should be applied after complete resolution of neuraxial blockade has taken place. (Agerson and Scavone 2012)

During ADP the catheter can be inserted spinally instead of attempting another epidural to provide intrathecal analgesia with adjusted dosages, which bypasses the 9% risk of a second ADP with renewed epidural attempts. (Russell 2012)

Apart from described risks like dosage errors, high block, infections, nerve damage or transient increase in intrathecal pressure, there is an on-going discussion on the PDPH preventive effects of intrathecal catheterization. (Sachs and Smiley 2014; Tsai et al. 2011)

The catheter supposedly blocks CSF leakage through the dural tear, can replace CSF loss, and is by some considered to cause an inflammatory reaction which could reduce the dural tear faster once the catheter is removed, the faster after prolonged stay, although the material is considered to be inert. (Ayad et al.)

Some recent publications demonstrate reductions in PDPH incidence, without a statistical significant simultaneous reduction of the need for EBP once PDPH occurs. A recent meta-analysis resulted showed the reverse: no reduction in PDPH, but a reduction in the need for EBP, probably a reflection of a smaller amount of CSF leakage resulting in a less severe headache. (Heesen, Klöhr, Rossaint, Walters, et al. 2013; Kaddoum et al. 2014; Verstraete et al. 2014)

Therapeutic measures: The results of conservative treatment of PDPH have been disappointing.

Symptomatic analgesia, aggressive hydration and bed rest do reduce symptoms, and may be appropriate for light headache complaints and comfort the patient, although they fail to treat the underlying cause. An estimated 40 % of patients improve within 5 days anyway. (Sprigge and Harper 2008)

Recently, studies with cosyntropin, GABA agonists, theophylline and aminophylline have shown effectiveness in reducing incidence and intensity of PDPH, but larger, well conducted studies are required to assess their value in treatment of PDPH. (Hakim 2010; Huseyinoglu et al. 2011; Mahoori et al. 2013, 2014; Vahabi, Nadri, and Izadi 2014)

Prophylactic use of dexamethasone might actually be a significant risk factor for developing PDPH, as recently demonstrated in CS after spinal anaesthesia. (Najafi et al. 2014; Yang et al. 2014; Yousefshahi et al. 2012)

Using the indwelling epidural or spinal catheter to provide neuraxial opioid analgesia might, apart from preventing PDPH, reduce its severity. (Al-Metwalli 2008)

Possible elevated risk of opioid related side-effects in the presence of a dural perforation, especially late respiratory depression, discourages clinicians to use neuraxial opioids in PDPH after vaginal delivery. (Gaiser 2013)

A few small studies and case reports describe the temporary symptomatic relief of PDPH after repeated bilateral blocking of either the greater occipital nerves or the sphenopalatine ganglion, the last by a trans-nasal approach with L.A. soaked cotton-tips.

Although not stopping dural CSF leak, they are thought to interrupt autonomic pathways around the upper cervical nerves and cervical sympathetic plexus. (Akyol et al.; Cohen 2014; Grant et al. 2014; Kent and Mehafeey 2015; Niraj, Kelkar, and Girotra 2014)

Epidural saline, dextran and colloids, instead of blood for an epidural patch, have shown a temporary improvement of PDPH, which can be extended by either continuous (epidural/intrathecal) infusions or repeated caudal injections; but they are not able to accelerate the dural healing process like blood does. (Abdulla, Abdulla, and Eckhardt 2011; Chiron et al. 2003)

Using fibrinous glue instead of blood to seal dural lesions has been effective both after spinal surgery and intrathecal drug delivery system removal, although little data exist on side effects. (Crul et al. 1999; Freeman et al. 2014; Gerritse, van Dongen, and Crul 1997; Spears 2014)

EBP: Autologous epidural blood patch (EBP) is considered to be, apart from unwanted neurosurgical intervention, the only effective treatment to stop the CSF leak from the arachnoid space.

The injected blood tamponades CSF leak and temporarily increases CSF pressure, which almost immediately alleviates symptoms by reducing traction on intracranial structures and/or possible reversal of cerebral vasodilatation, although there seems to be no relation between the final epidural pressure generated during blood-patching and its success.(Pratt, Kaczka, and Hess 2014)

The secondary, long-term effect of the EBP is sealing of the dural lesion by a blood clot, which is formed as a result of interaction between injected blood, (damaged)

dura/arachnoid and CSF. MRI imaging demonstrates a gradual fragmentation, within 18 hours, of this clot into smaller dura adjacent clots.(Beards et al. 1993)

Initial dilution of blood with CSF (up to 30 %) speeds up clot formation, but may result at the same time in a slight loss of clot strength, as Armstrong et al. showed recently using thrombo-elastographic coagulation parameters. Further dilution of blood is expected to eventually reduce coagulant activity, but has not been explored yet.(Armstrong et al. 2015)

These findings emphasize the importance of proper, not too early timing of the EBP in order to evade maximal CSF leak, and the need of locating the EBP as close to the dural lesion as possible, in order to maximize blood-CSF contact. Ultrasound and MRI could possibly assist to visualize both location and effect. (Grau et al. 2002; Vakharia et al. 1997)

EBP efficacy is variable, not only because of different techniques, locations, volume and timings are used, but also because of patient related factors and the amount of damage to the dura which is greater when ADP is the cause of PDPH.

Recent studies find a 61%, and less than 40% complete resolution of ADP-caused PDPH after the first EBP.(M. Kokki et al. 2013; Merja Kokki, Sjövall, and Kokki 2012; Paech et al. 2011)

Both timing of the EBP and the blood volume appear to be important factors in determining success/failure, but more research is needed to identify additional risk factors, especially in the obstetric population.

If EBP does have no effect at all, the aetiology of PDPH should be reconsidered as mentioned before; clot degradation can cause of recurrence of symptoms and need for an additional EBP.

Contraindications for EBP are the same as for epidural anaesthesia: these make conservative therapy, although less effective, sometimes the only option.

Light symptoms often resolve spontaneously, with conservative measures and time.

But in severe cases, or if PDPH presents with symptoms suggesting cranial nerve involvement/palsy, EBP should not be delayed in order to improve outcome.(Diaz and Weed 2005)

Inadvertent injection of blood intrathecal, might lead to arachnoiditis and permanent neurological damage.(Verduzco, Atlas, and Riley 2012)

Seldom complications of EBP are reported apart from transient mild backache and temperature rise; temporary facial nerve palsy, infection and radiculopathy related to large volume EBP have been described. A causative relation between subdural haematoma, ADP and EBP is less clear.(Malhotra 2014; Rucklidge 2014)

Persisting headache after PDPH is considered mostly to be unrelated to continuous chronic CSF leakage, instead possibly resulting from central sensitization after PDPH.

In a case control study Webb et al. found a 28% incidence of chronic headache, 18 months after ADP compared to 5% in matched controls: bigger study populations are needed to answer questions of a possible protective effect of EBP on chronic headache or the development of chronic headache without initial PDPH symptoms.(Webb et al. 2012)

Future epidural anaesthesia and analgesia seem not to be hindered by previous ADP and EBP, although 2 cases of inadequate epidural anaesthesia during a new delivery have been described.(Agerson and Scavone 2012; Collier 2011; Hebl et al. 1999)

Assuming human epidural scar healing and dural thickness recovery resembles that of Angora goats :-), 3 months are considered a safe interval for renewed, necessary neuraxial interventions.(Shaparin et al.)

Cancer dissemination is a multi-step process and the many cellular and molecular mechanisms involved are potential targets for therapeutic interventions. Metastatic disease after surgery remains a crucial issue. Traditional systemic therapy (i.e., chemotherapy and radiation therapy) is delayed for weeks after major surgery to allow wound healing and to avoid the risk of immunosuppression and postoperative infections.¹ This delay is associated with a worse outcome.² This may be because cellular and molecular events that are critical to the metastatic process, and are activated by the manipulation and removal of the tumor during surgery, are not treated for weeks by systemic therapies.³ Therefore an intervention that does not have the toxicity of chemotherapy, and that might attenuate the activation of the cellular and molecular events that are critical to the metastatic process during the perioperative period, presents a window of opportunity for cancer treatment that should not be missed.

The metastatic process is enhanced by many factors that include the suppression of Cellular Mediated Immunity (CMI) and the increase in proangiogenic factors.

CMI includes natural killer (NK) cell, natural killer T (NK-T) cell, dendritic cell, and macrophage cell functions. CMI affects the immune response to the circulating tumor cells (CTCs) and to the process of micrometastasis.⁴ NK cells play a significant role in the intravascular elimination of CTCs.⁵ Along with the surgical stress response, anesthetic agents also affect CMI. Inhalational anesthetics and opioids significantly

reduce natural killer cell activity (NKA) in rats and increase lung tumor metastasis.⁶ It has also been shown that inhalational anesthetics upregulate the expression of hypoxia inducible factor-1 α (HIF-1 α) thereby enhancing cancer cell survival under hypoxic conditions.⁷ Amongst opioids, morphine has been shown to have immunosuppressant properties and to increase survival of CTCs.⁸

Along with immunosuppressive properties, morphine has demonstrated proangiogenic properties. Angiogenesis (the formation of new blood vessels) plays an important role in the growth and metastatic potential of various cancers. It is mediated by degradation of the basement membrane, migration of endothelial cells towards an angiogenic stimulus, and proliferation of these cells. This results in the development of abnormal tumor vessels that are highly permeable to macromolecules and circulating inflammatory cells. One such molecule that is involved in these mechanisms is vascular endothelial growth factor (VEGF).⁹ Morphine was shown to stimulate angiogenesis in a human breast tumor xenograft model in mice and promote tumor progression.¹⁰ There are preliminary in vitro data demonstrating that the proangiogenic effect of morphine is attenuated by lidocaine.^{11,12}

The metastatic process is also facilitated by the activation of certain molecules including Src kinase, various adhesion molecules such as Intracellular Adhesion Molecule-1 (ICAM-1) and inflammatory cytokines. Src family kinases appear to play an important role in tumor proliferation, disruption of cell/cell contacts, migration, invasiveness and resistance to apoptosis, they are attractive targets for anticancer therapeutics.¹³

ICAM-1 has been implicated in tumor invasion in vitro,¹⁴ and in metastasis in vivo. Increased expression of ICAM-1 is associated with a more aggressive tumor phenotype¹⁵ and it can be used as a biomarker for tumor prognosis and a target for therapeutic interventions.

In recent years, a plethora of retrospective studies have suggested that the perioperative use of regional anesthesia and local anesthetic agents (LAs) can reduce cancer-related mortality following surgical treatment of prostate,^{16,17} breast,¹⁸ colorectal,^{19, 20} and ovarian²¹ cancers, as well as malignant melanoma.^{22,23}

The current clinical evidence continues to be based on retrospective studies with inconclusive results due to their limitations and some of them do not even demonstrate an advantage for regional anesthesia.^{24,25}

Thus far, the beneficial effect of regional anesthesia and LAs on long-term outcome after cancer surgery has been attributed to the inhibition of the neuroendocrine stress response to surgery,^{1,4} and to the reduction in requirements of volatile anesthetics and opioids. Because volatile anesthetics have been implicated in suppressing CMI and morphine has been implicated in increasing proangiogenic factors, it is postulated that Regional Anesthesia/ Local Anesthetics may have a beneficial effect on long-term outcome after cancer surgery because they reduce volatile anesthetic and opioid requirements.²⁶

The actual mechanism by which regional anesthesia and local anesthetics might prove to be beneficial in cancer patients at the molecular level is currently under investigation.

There are a significant number of ongoing prospective randomized controlled trials (RCTs) evaluating the effect of Regional Anesthesia on cancer recurrence.

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REFRESHER COURSE: CANCER RECURRENCE AND REGIONAL ANESTHESIA: AN UPDATE OF THE EVIDENCE!

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It will take some time before we know the outcomes and time is of the essence for cancer patients. This is why research targeting a mechanism by which regional anesthesia and local anesthetics play a beneficial role is very important.

It has been demonstrated that amide LAs have anti-inflammatory properties in addition to their anesthetic and analgesic effects. They exert their anti-inflammatory effects by intervening in several stages of the inflammatory pathway²⁷ and systemic lidocaine attenuates the stimulation of the inflammatory response induced by surgery. For example, lidocaine infusion attenuates plasma levels of IL-6, IL-8, IL-1ra, and complement C3a, as well as the expression of CD11b and P selectin.²⁸ The anti-inflammatory effects of lidocaine infusions are responsible for the faster recovery of bowel function after surgery.^{28,29,30,31} In vitro studies have also demonstrated anti-inflammatory effects of LAs in models of acute vascular injury.^{32,33}

There is increasing evidence that mechanisms similar to inflammatory processes play an important role in the development, growth, and metastasis of solid tumors.³⁴ The presence of inflammatory cells and inflammatory mediators in tumors, tissue remodeling, and angiogenesis is similar to the ones seen in chronic inflammatory responses that precede and constitute the hallmark of cancer-related inflammation. As amide-linked LAs are known to have anti-inflammatory properties and as there is increasing evidence that inflammation and cancer share a connected pathway,³⁴ the possibility that LAs might attenuate the metastatic process of cancer cells, in a manner similar to that by which they attenuate inflammation was investigated.

A number of recent in vitro studies (listed below) evaluating the effect of amide local anesthetics on cancer signaling pathways and cancer cell functions have provided us with very useful results.

An in vitro study demonstrated that the amide local anesthetics (lidocaine and ropivacaine) at clinically relevant concentrations dose-dependently inhibited TNF α -induced Src activation, ICAM-1 phosphorylation, and migration of human lung adenocarcinoma cells.³⁵ As it was mentioned above these are molecules that play a role in the metastatic process. It was also shown in lung microvascular endothelial cells that lidocaine and ropivacaine inhibit TNF α -induced inflammatory signaling by attenuating the recruitment of p85 subunit of PI3-kinase to TNF-receptor-1, thereby blocking subsequent Akt, eNOS, and Src activation and attenuating neutrophil adhesion and endothelial hyperpermeability.³⁶ This finding is significant because the PI3K/AKT pathway is also responsible for triggering a cascade of responses that enhance tumor progression, and molecules that block this pathway may increase cancer survival.³⁷

Another study demonstrated that both lidocaine and ropivacaine significantly reduced TNF- α -induced Akt, focal adhesion kinase activation (FAK) and Src-dependent caveolin-1 phosphorylation in NCI-H838 lung adenocarcinoma cells. Matrix Metalloproteinase 9 (MMP-9) secretion triggered by TNF- α was also significantly inhibited and TNF- α increase in invasion was completely blocked by the above local anesthetics.³⁸

Additional beneficial effects were shown in studies by both ropivacaine and lidocaine. Ropivacaine inhibited the growth of human colon adenocarcinoma cells in a dose-dependent manner³⁹ and Lidocaine suppressed both serum-induced and epidermal growth factor-induced proliferation at clinical concentrations on human tongue cancer cells.⁴⁰ An important study demonstrated the antiproliferative effects of the amide local anesthetics on mesenchymal stem cells and the potential implications for tumour spreading and wound healing. The authors concluded that their results suggest that mechanisms affecting this antiproliferative action may involve the inhibition of I κ -B, NF- κ B- ICAM-1 signaling pathway, as well as the inhibition of mitochondrial respiration with adenosine triphosphate depletion.⁴¹ Silencing of tumor suppressor genes associated with methylation is recognized as being a molecular hallmark of human cancer. Lidocaine and Ropivacaine demonstrated a dose dependant demethylating effect on the DNA of breast cancer cell lines in vitro. The combination of lidocaine with a chemotherapeutic demethylating agent increased this effect.⁴²

In conclusion, Cellular and molecular events that are critical to the metastatic process may be significantly influenced perioperatively. Currently, the retrospective studies demonstrating the perioperative effect of regional anesthesia and LAs on cancer recurrence in patients undergoing cancer surgery provide us with weak evidence for intervention. Prospective RCTs are needed to establish the standard of care for the perioperative management of cancer patients. There is however encouraging in vitro data indicating the possible beneficial role of Regional Anesthesia/ Local Anesthetics in this patient population.

In vitro evidence though is not equivalent to in vivo evidence.

It is evident that research to answer the question in regards to the role of the anesthetic management on cancer recurrence is a priority for our field.

An international workshop on the topic was held in Dublin Ireland in 2013 and concluded that the evidence was insufficient to support any current change regarding anesthetic care for cancer surgery patients.

A recent publication⁴³ from the participants (expert group) calls for prospective RCTs and also for further evaluation of the effects of regional anesthesia and analgesia, intravenous lidocaine and non-steroidal anti-inflammatory drugs on cancer recurrence and metastasis.

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ESRAS-0487

REFRESHER COURSE: OUTCOME DATA IN PERIPHERAL REGIONAL ANESTHESIA

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Introduction: Peripheral regional anaesthesia plays an important role in the field of perioperative care. A large number of surgical procedures can be managed via peripheral regional anaesthesia techniques with or without general anaesthesia. Peripheral regional anaesthesia became safe and effective due to modern methods of nerve identification and subsequently the worldwide popularity of peripheral regional anaesthesia has increased significantly. Nevertheless, the scientific evidence regarding the impact of the various peripheral regional anaesthesia techniques on perioperative outcome is lacking. A large number of scientific papers are published in the field of peripheral regional anaesthesia, but the heterogeneity of data does not allow conclusions regarding perioperative outcome and peripheral regional anaesthesia. This summary is based on a recent narrative review article from the British Journal of Anaesthesia (BJA Advance Access published February 17th 2015).¹

Data selection: One-thousand-ninety-eight potential relevant studies (upper limb, lower limb, trunk), published between October 4th 2003 and October 3rd 2013 were extracted from PubMed according to the recommendations for narrative reviews by McAlister.² After exclusion of 1709 studies, which did not meet the relevant criteria, 189 studies (published between October 4th 2003 and October 3rd 2013, human studies, all languages, age $\geq$ 18 years, Jadad-score $\geq$ 3) were included for further analysis.

The following section provides an overview regarding specific outcome data for peripheral regional anaesthetic techniques.

Upper extremity blocks:

Interscalene approach (17 Randomized Controlled Trials, n=910; 11 non-Randomized Controlled Trials, n=25378)

Interscalene brachial plexus blockade is an effective peripheral regional anaesthetic technique. A large number of patients are highly satisfied and would choose the same procedure again. Interscalene brachial plexus blockade is also associated with an improved functional outcome. The incidence of neurological complications is described between 0 and 4.4%, but not all of these are anaesthesia related. Other side effects (systemic toxicity, dyspnoea, hoarseness, etc.) could be associated with needle guidance techniques and volumes of local anaesthetics. Ten articles were identified where interscalene brachial plexus blockade was compared with subacromial infusion of local anaesthetics showing similar effects on immediate postoperative pain. Nevertheless, subacromial infusion of local anaesthetics is associated with chondrolysis and no longer recommended by the American Association of Orthopaedic Surgeons.

Interscalene brachial plexus blockade shows economic advantages when compared with general anaesthesia for shoulder arthroscopy.

Supraclavicular approach (1 Randomized Controlled Trial, n=12; 6 non-Randomized Controlled Trials, n=1703)

Most articles describe ultrasound as an essential technique for a safe and effective performance of supraclavicular brachial plexus blockade. Side effects and complications of the supraclavicular approach are mainly caused by large volumes of local anaesthetics. Due to the limited data regarding this approach, no recommendations can be provided.

Infralavicular approach (1 Randomized Controlled Trial, n=52; 5 non-Randomized Controlled Trials, n=2436)

Infralavicular brachial plexus blockade is associated with less pain on arrival at the post-anaesthesia care unit in patients undergoing hand- and wrist surgery when compared with general anaesthesia. Phrenic nerve blockade and Horner's syndrome are again associated with large volumes of local anaesthetics. Vascular puncture is a risk, especially when neurostimulation is used.

Axillary approach (2 Randomized Controlled Trials, n=130; 9 non-Randomized Controlled Trials, n=8521)

A large number of studies regarding axillary brachial plexus blockade are published. Nevertheless, outcome data are rare. Short-term perioperative pain is reduced, but no long-term effects are detected so far. Permanent nerve damage is described in the literature.

Lower extremity blocks:

Femoral nerve block (42 Randomized Controlled Trials, n=2845; 5 non-Randomized Controlled Trials, n=1677)

Femoral nerve blockade is well investigated in clinical studies. This lower extremity nerve block is superior compared with epidural anaesthesia or wound / intraarticular infiltration for knee surgery (knee arthroplasty, anterior cruciate ligament reconstruction). Data regarding functional recovery following total knee arthroplasty are controversial. Pain after hip surgery is better managed by fascia iliaca compartment blockade. Femoral nerve blockade is a safe regional anaesthetic technique.

Saphenous nerve block (8 Randomized Controlled Trials, n=347; 1 non-Randomized Controlled Trial, n=20)

Saphenous nerve blockade provides similar effective pain therapy after knee surgery (total knee arthroplasty, knee arthroscopy) without motor block as compared with femoral nerve block.

Sciatic nerve block (23 Randomized Controlled Trials, n=1257; 4 non-Randomized Controlled Trials, n=2212)

Sciatic nerve block is often performed with femoral nerve blockade for knee surgery. The quality of pain therapy is similar as compared with periarticular infiltration or epidural anaesthesia, and better as compared with spinal anaesthesia. Most of the studies describe sufficient pain therapy, less opioid requirement and improved patients satisfaction after surgery as compared with alternative pain management.

Psoas compartment block (5 Randomized Controlled Trials, n=250; 1 non-Randomized Controlled Trial, n=93)

Psoas compartment blockade is mainly used for pain therapy during hip surgery. It provides sufficient pain therapy, which is equal to epidural blockade. Epidural spread is frequently detected after a psoas compartment block.

Trunk blocks: Cervical plexus block (12 Randomized Controlled Trials, n=9104632; 0 non-Randomized Controlled Trials)

Cervical plexus blockade is used for thyroid surgery, carotid endarterectomy and in combination with other head blocks for craniotomy. This regional anaesthetic technique provides high patients satisfaction for thyroid and carotid surgery, but no differences in stroke and death incidences are detected for carotid surgery as compared with general anaesthesia.

Intercostal blockade (9 Randomized Controlled Trials, n=582; 1 non-Randomized Controlled Trial, n=102)

Intercostal blockade is described in the literature for large number of indications: rib fractures, thoracotomy, retroperitoneal and abdominal surgery. Intercostal blockade is effective when compared with placebo, but epidural anaesthesia seems to be superior when dynamic pain scored are investigated. Respiratory function is improved after rib fractures.

Ilioinguinal-iliohypogastric nerve block (6 Randomized Controlled Trials, n=396; 2 non-Randomized Controlled Trials, n=158)

Ilioinguinal-iliohypogastric nerve block is effective for patients undergoing hernia repair, renal transplantation and some gynaecological procedures. This block is cost effective due to a described earlier hospital discharge as compared with pure general anaesthesia.

Transversus abdominis plane block (16 Randomized Controlled Trials, n=875; 0 non-Randomized Controlled Trials)

Transversus abdominis plane block is described for a large number of surgical indications and compared with placebo, wound infiltration, epidural anaesthesia or systemic opioid based pain therapy. It is equally effective for large abdominal surgery as compared with epidural anaesthesia and superior as compared with pure systemic pain therapy.

Rectus sheath block (1 Randomized Controlled Trial, n=91; 1 non-Randomized Controlled Trial, n=98)

Bilateral rectus sheath blockade provides better pain therapy for laparoscopic surgery as compared with intraperitoneal and inter-incisional local anaesthetic infiltration. It may shorten the length of hospital stay.

Summary: The available literature regarding peripheral regional anaesthesia and outcome parameters is heterogenic. Improved patients comfort and/or satisfaction have been demonstrated for most of peripheral regional anaesthetic techniques. Long term effects are not apparent, but further scientific efforts are required to investigate the impact of peripheral regional anaesthetic techniques on functional recovery.

Literature:

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PRO-CON DEBATE: THE FASCIA ILIACA BLOCK IS THE BLOCK OF CHOICE FOR PATIENTS UNDERGOING HIP SURGERY

CON

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Hip surgery is frequently performed and with the increasingly aging population numbers will rise in the future.¹ Postoperative pain is often intense and immediate postoperative opioid consumption can be high. Unfortunately, opioid related side effects may negatively impact postoperative outcome parameters such as early mobilization. Regional anaesthesia techniques can play an important role in the reduction of perioperative opioid consumption and pain scores leading to higher patient satisfaction and a better outcome.²

Anatomical research demonstrated that the anterior and anterolateral section of the hip joint is innervated by branches of the femoral nerve (FN). The anteromedial section of the hip capsule is innervated by branches of the anterior, posterior or common trunk of the obturator nerve (ON). The sacral plexus innervates the posterior part of the hip through the superior gluteal nerve, the nerve to the quadratus femoris muscle and occasionally directly by the sciatic nerve.³ When the surgical incision extends towards the lateral side of the thigh blockade of the lateral cutaneous femoral nerve is indicated.

Because of the involvement of multiple nerves, it seems logical that single nerve blocks (eg. femoral nerve block) will lead to insufficient analgesia after hip surgery. Indeed, there is a plethora of literature describing different blocks (eg. femoral nerve block, combined femoral and obturator nerve block, 3-in-1 in one block, fascia iliaca compartment block, lumbar plexus block, psoas compartment block) and different block techniques (ultrasound guided, nerve stimulator guided, blind, single shot or catheter technique). We would like to focus on the usefulness of the fascia iliaca compartment block (FICB).

The femoral, obturator and lateral cutaneous nerve are all part of the lumbar plexus, implying that blocking the lumbar plexus is an elegant way to provide postoperative analgesia. Posterior lumbar plexus blocks can lead to important adverse effects such as spinal anaesthesia, epidural diffusion, neurologic damage and an increased risk of vascular puncture and retroperitoneal haemorrhage.⁴ An alternative for the posterior approach of the lumbar plexus could be the FICB.

The FICB was first described in children in 1989 by Dalens et al.⁵ He described a landmark technique where the needle was perpendicularly advanced at the level of the inguinal ligament at the junction of the lateral and medial two thirds of the line between the pubic tubercle and the anterior superior iliac spine. Using a loss of resistance technique, penetration of the fascia lata and fascia iliaca was determined after which an adequate amount of local anaesthetics was injected. During injection firm pressure was applied caudal to the needle to increase cranial spread. The FN, LCN and ON were blocked in 100%, 91% and 88% of the cases respectively. The control group received a nerve stimulator assisted 3-in-1 block. In the control group there was a complete block of the FN, LCN and ON in 100%, 15% and 13% of the cases.⁵ Capdevilla et al. however, were unable to reproduce these results in an adult population. Both the FICB and the 3-in-1 block blocked the ON in only 34-38% of the patients, leading to an incomplete block in the distribution of the lumbar plexus.⁶

Although there are doubts on the anatomical rationale of the FICB, numerous studies have shown its positive impact on the outcome especially in hip fracture patients.⁷⁻⁹

With the introduction of ultrasound the fascia iliaca can be visualised thus allowing a higher accuracy of the delivery of local anaesthetics. The FICB can be performed using a "transverse" approach at the level of the femoral nerve. Dolan et al. demonstrated that the USG technique increased the proportion of complete sensory block in all three nerve territories, from 47 to 82% compared to the classic "loss of resistance" technique.¹⁰

Recently, a prospective double blind, randomized controlled study examined the effect of an ultrasound guided "transverse" fascia iliaca compartment block

(FICB) on postoperative pain scores and morphine consumption. Shariat et al. could not observe any analgesic effect of the FICB compared to a sham block group during the first 24 hours postoperatively. This could be explained by the fact that, in contrast to previous studies, the block success was limited. Indeed only, in 2 out of 16 patients all three target nerves were blocked.¹¹ The inefficacy of an USG "transverse" FICB for hip surgery could be explained by an insufficient volume of local anaesthetics or an inappropriate technique.

Hebbard et al. described the longitudinal supra-inguinal FICB. For this approach, a long axis view of the fascia iliaca at the level of the anterior superior iliac spine is obtained. At this level the fascia iliaca overlying the iliac muscle can be visualized. Caudal to the inguinal ligament, a needle is introduced in a cephalad direction using an in-plane technique and local anesthetics are injected between the iliac fascia and iliac muscle cranial to the inguinal ligament.

Hebbard and co-workers demonstrated in a cadaver study that a longitudinal supra-inguinal approach the injection of 20 ml of dye stained the femoral and lateral cutaneous nerve in all cases. This study unfortunately did not investigate involvement of the obturator nerve.¹² Although Hebbard named his approach supra-inguinal, he approached the fascia iliaca compartment from a position caudal to the inguinal ligament. However, using ultrasound guidance, he positioned the tip of the needle superior to the ligament. Theoretically, this technique blocks the nerves more cranial than with a transverse FICB which might lead to higher clinical success. Data on the efficacy of this technique are scarce. Miller described successful blockade with this approach in a case series of only 3 pediatric patient.¹³ In a letter to the editor Vaughan and colleagues described their success with the longitudinal FICB for total hip arthroplasty.¹⁴ As this report was merely descriptive no conclusions can be drawn regarding the efficacy of the longitudinal FICB. We recently concluded a randomized controlled trial with the longitudinal FICB using 40mL ropivacaine 0.5% for total hip arthroplasty. Our preliminary results suggest a positive effect on morphine consumption and pain scores (unpublished data).

To conclude, the FICB is an interesting approach of the lumbar plexus but more research is needed to establish the role of the FICB in hip surgery. Both the approach, volume of local anaesthetics but also indications for specific types of hip surgery (eg total hip arthroplasty, hip arthroscopy, hip fracture) need further evaluation.

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REFRESHER COURSE: REGIONAL ANESTHESIA IN THE ACUTE TRAUMA SETTING: DEFINING IT'S ROLE

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Globally, trauma is the leading cause of death for individuals aged between 5 and 44 years.¹ In the European Union, trauma represents the fourth leading cause of death.² The pain associated with trauma often arises from multiple locations and varies considerably in severity. Early institution of multimodal analgesic agents helps prevent pain related complications including, delayed rehabilitation following orthopaedic injury, delayed discharge and chronic pain syndromes. In addition poorly controlled pain contributes to morbidity through activation of the stress response and the coagulation cascade. Enhanced sympathetic nervous system activity and hypercoagulability may be detrimental in trauma patients.

In the recent years, regional analgesia has been increasingly used as part of a multimodal approach to analgesia for trauma patients. Regional analgesia (RA) has a qualitative and an opioid sparing effect. Central and peripheral nerve blocks can prevent or abolish the neural transmission of nociceptive signals. However it has other advantages including the ability to assess mental status, avoidance of airway instrumentation, decreased blood loss and incidence of venous thrombosis, increased vascular flow and facilitation of physical therapy and early mobilization.

What is the role of Regional Anaesthesia for fracture neck of femur?:

Hip fracture is a common condition. In 1990 there were approximately 1.7 million surgical repairs of hip fractures worldwide. This is projected to increase to 6.2 million by 2050.⁴ Patients with neck of femur fractures frequently present with significant coexisting co-morbidities. 30-day mortality remains persistently above 8 % despite recent improvements in patient care.⁵

The burden to the global healthcare system both in terms of the volume and care of this elderly group of patients with increasing complex co morbidities is considerable. Any intervention that affects the outcome of this cohort of patients may have profound benefits for health care systems around the world. It is therefore relevant to ask whether RA is associated with a better outcome in patients undergoing fracture hip repair.

Evidence: The controversy as to whether RA has advantages over general anaesthesia (GA) in reducing mortality and morbidity for fracture neck of femur is not new. As far back as 1933, Nygaard demonstrated fewer complications with spinal anaesthesia as compared to open drop ether anaesthesia.⁶

The first reported meta-analysis comparing GA versus RA for hip fracture was by Sorensen in 1992.⁷ This meta – analysis compared regional and general anaesthesia in 13 randomised controlled trials of patients undergoing surgical repair of fractured neck of femur (n=2000). Outcome measures included mortality at one month, the incidence of venous thrombosis and blood loss. Sorensen demonstrated no difference in mortality between the two groups at one month. Patients who received GA were 4 times more likely to develop deep vein thrombosis (DVT).

Urwin et al subsequently performed a similar meta-analysis.⁸ 15 randomised controlled trials including some 2,162 patient were reviewed. Outcome measures include mortality at one month, incidence of DVT, blood loss, incidence of hypotension, myocardial infarction, congestive cardiac failure, urinary retention, vomiting, pneumonia, post-operative hypoxaemia, confusion and renal failure. In contrast to Sorensen et al, they found reduced one month mortality in the RA group (49/766 versus 76/812 RR 0.68 95% confidence interval 0.49-0.97). Patients receiving RA showed a reduction in the incidence of DVT in the (30% versus 47%) and consequently fatal pulmonary embolism.

In contrast, a retrospective analysis by O Hara et al reviewed outcome in all patients undergoing surgical repair for fractured hip at 20 US hospitals over the time period 1983–1993 (n= 9,425).⁹ The authors concluded that there was no association between the choice of anaesthetic technique and morbidity or mortality. The authors suggest that coexisting disease and ASA status may be more important in determining outcome.

In his landmark systematic review, Rodgers et al reviewed all papers where patients were randomised to receive central axial blockade, with or without GA.¹⁰ Outcomes measured include mortality, venous thrombosis, pneumonia, respiratory depression, myocardial infarction, renal failure and pulmonary embolism. Although the study population was not exclusive to orthopaedic surgery, overall mortality was reduced by a third in the group who received a central axial block (odds ratio 0.68 (95% CI, 0.49-0.96). This reduction in mortality was independent of the type of surgery or whether RA was continuous (epidural) or single shot (spinal). Rogers et al demonstrated a reduction in DVT, postoperative pneumonia, renal failure, myocardial infarction, bleeding complications and respiratory depression in patients receiving central axial blockade.

In contrast in 2004, a Cochrane review of anaesthesia for hip fracture was failed to demonstrate a difference in mortality between GA and RA groups.¹¹

More recently, Neuman et al compared effectiveness of RA v GA for hip fracture patients in the state of New York between 2007 and 2008. In their review of more than 18,000 patients, they demonstrated that the use of RA reduced major pulmonary complications and death by 24–29%.¹² Subsequently the same group looked at anaesthetic technique, 30 day mortality and length of stay in 56,000 patients undergoing hip fracture surgery in New York state between 2004–2011. Whilst in this study there was no difference in 30 day mortality between RA and GA, the use of RA was associated with a modest reduction in length of stay.¹³ An observational audit by White et al in the UK including some 65,000 patients from the National Hip fracture Database, compared mode of anaesthesia for hip fracture surgery. There was no difference in 30 day mortality between general and spinal anaesthesia.¹⁴ In 2014 Patomo et al retrospectively reviewed 73,000 patients in the USA, undergoing hip fracture repair between 2007 and 2011. Primary outcome was in hospital mortality. Their results showed no difference in hospital mortality between the general and spinal anaesthesia groups.¹⁵

Conclusion: Whilst earlier results suggested a reduction in mortality associated with the use of regional anaesthesia, it is clear that more recent outcome data have shown no mortality benefit associated with central axial blockade. It is unlikely that a single RCT will ever comprehensively answer this question.¹⁶ As suggested by White et al either there is no difference between GA and RA for hip fracture or the current tools used are not sensitive enough to determine a difference.¹³ Perhaps future research should focus on what constitutes best regional anaesthetic care in this cohort of patients rather than crude outcomes such as mortality. Despite the lack of clear benefit, the UK National Hip Fracture Database Sprint audit of practice 2014, continues to recommend spinal/epidural anaesthesia as a standard of care for fracture neck of femur repair.¹⁷

The role RA in the prehospital and emergency room acute trauma: Several common injuries are well suited to peripheral nerve blockade (PNB), including hip and/or femoral fracture, shoulder dislocation, distal extremity injuries, and rib fractures. Preoperative pain management of elderly patients with femoral neck fractures is often unsatisfactory. Opioid administration is restricted in this population because of concerns of delirium or respiratory depression, and many hip fracture patients are left in considerable discomfort while awaiting surgical repair.¹⁸ Abou-Setta et al performed a systematic review of 83 studies of pain management interventions for hip fracture. They concluded that in this population, the use of nerve blockade is effective in reducing pain after hip fracture and is associated with a lowered risk of delirium versus standard treatment.¹⁹ Rashid et al in their multiple treatment comparison including 1,422 participants in twenty-one RCTs concluded that a combination of obturator nerve block and lateral cutaneous nerve of thigh block had the highest probability of being the most effective against acute postoperative pain.²⁰ Regarding peripheral nerve blocks delivered in the emergency department (ED), ultrasound guided femoral nerve block is feasible and efficient in reducing the pain scores.²¹

Fascia Iliaca compartment block

Schiffrer et al demonstrated an early reduction in pain, anxiety and tachycardia in patients with painful femoral trauma following the prehospital administered; nerve stimulator guided femoral nerve block versus intravenous metamizol.²² Fascia iliaca compartment block (FICB) had the highest probability of being the most effective against delirium, a common complication in this cohort of patients. It provides a fast and consistent blockade of the femoral nerve and lateral femoral cutaneous nerve. The landmark technique does not require the use of a nerve stimulator and therefore avoids muscle contraction across a fracture site. Lopez et al demonstrated that pain scores were significantly reduced ten minutes after the performance of FICB for isolated femur fractures by pre-hospital personnel in the field.²³ Foss et al in a randomised placebo controlled trial of patients presenting to ER with hip fracture, demonstrated superior analgesia at rest and at movement in the FICB block group with an increase in opiate consumption and sedation in the placebo block group.²⁴ Monzón et al in

a series of 154 patients presenting to ER with fractured hips compared FICB v systemic non steroidal anti-inflammatory. The results demonstrated the FICB had a rapid onset and was effective in controlling post hip fracture pain.²⁵

In 2013 the Association of Anaesthetists of Great Britain and Ireland and RA – UK published a position statement recognising the role and superiority of FICB over opiates in the management of proximal femoral fractures in the ER. Furthermore, they recommended that non-physician practitioners could provide this block in the emergency room setting.²⁶

Based on the current evidence, in 2014 the National Institute for Health and Care Excellence (NICE) in the UK produced an updated hip fracture guideline suggesting preoperative nerve blocks if paracetamol and opioids provide insufficient analgesia for fracture site pain relief.²⁷

RA using an interscalene brachial plexus block is commonly employed in patients with shoulder dislocation in ED. The potential benefits include reduced length of stay in the ED, reduced need for one-on-one care, reduced need for deep sedation and associated complications (respiratory depression, haemodynamic instability).²⁸

Regional anaesthesia and military pain management – the role of RA in the battlefield: During the last decade pain relief in military medicine has become more central to the overall approach to the trauma patient.²⁹ Good quality analgesia in addition to humanitarian and physiological aspects has been shown to protect casualties against post-traumatic stress disorder.³⁰ Recent data suggests that superficial wounds or wounds to the extremities tend to be survivable unlike wounds of the head or thorax and RA is well suited to manage these types of injuries.³¹ RA offers surgical anaesthesia, excellent postoperative analgesia, rapid recovery and the ability to protect the airway thus allowing the wounded soldier to participate in the evacuation. Despite its increasing use, there have been concerns. These techniques are sometimes performed in challenging conditions, which could make an infective complication from neuraxial blockade more common. The potential masking of compartment syndrome with peripheral nerve blocks has also limited their broader use. Fortunately better understanding of the pathophysiology of these conditions and the recent development of portable ultrasound devices has facilitated the use of RA in the battlefield. In particular the use of continuous peripheral nerve blocks (CPNB) appears to be very useful in the management of the combat casualty as it allows the re-use of the indwelling catheter for repeated surgical manipulations and provides prolonged postoperative analgesia.³² Buckenmaier et al in their interview survey demonstrated that combat casualties receiving CPNBs during their hospitalization reported significantly better pain relief and also had significantly less “pain right now” than patients without catheters.³³ Although current evidence concerning the battlefield use of CPNB is limited, there are on going UK trials, results of which are expected to clarify questions regarding complication rate and efficacy.³⁴

The role of Peripheral Nerve Blockade in Compartment Syndrome?: Acute Compartment syndrome (ACS) is a rare complication, which if not diagnosed early may lead to irreversible tissue loss. Although the leading cause of ACS is trauma, it has been associated with burns, ischemia reperfusion injury, crush injuries and surgical positioning (e.g. lithotomy position).

Pathophysiology

Trauma, bleeding or local tissue damage in an osseofascial compartment will lead to an increase in tissue pressure. Consequent increases in extravascular venous pressure will decrease capillary blood flow and result in a reduction in tissue oxygenation and ultimately result in tissue ischemia. Ischemia releases a cascade of vasoactive molecules and oxygen free radicals that will increase tissue oedema.

Diagnosis

ACS remains a clinical diagnosis. Disproportionate pain in relation to the injury or pain not responsive to analgesics remains a cardinal feature of ACS. Clinical examination demonstrates a swollen, tender compartment. Passive stretching typically exacerbates pain. Paraesthesia and pulselessness remain late signs of ACS. The diagnostic test of reference is the insertion of a needle manometer into the compartment. Normal compartment pressure is 10–12 mmHg. A compartment pressure of 30–45 mmHg is associated with compartment syndrome.

Peripheral Nerve Blockade and Acute Compartment Syndrome

Whether peripheral nerve blockade (PNB) contributes to a delay in the diagnosis and treatment of ACS has long been the source of controversy. As the current available evidence is largely based on case reports and retrospective case series, evidence based recommendations are limited and of necessity weak.

Evidence

A 2007 a systematic review demonstrated no evidence that femoral nerve block caused a delay in the diagnosis of lower limb compartment syndrome.³⁵

In 2009 Mar et al performed a systematic review of ACS and RA from 1986–2009. 20 case reports and 8 case series were included in the review. The majority of cases were associated with the use of an epidural ($n = 23$), only 3 were associated with PNB and three with patient controlled analgesia (PCA). There was no case report associating PNB and upper limb compartment syndrome. They concluded that there was no convincing evidence that RA or PCA opioids delayed the diagnosis of ACS.³⁶

Cometa et al described a case of breakthrough pain in a 15 year old boy following femur and tibial osteotomy. Severe pain occurred in the setting of functioning femoral and sciatic nerve catheters, prompting the diagnosis of ACS and resulted in urgent fasciotomy.³⁷

Walker et al subsequently reported a case where breakthrough pain in the setting of an adequate continuous popliteal catheter suggested the diagnosis of compartment syndrome. A review of the literature at this time showed a total of 4 case reports associating PNB with ACS. Two cases had a fasciotomy with no permanent disability. Of the remaining two cases, both patients experienced breakthrough pain despite a working continuous nerve block. They concluded that the current evidence was insufficient to make any definitive statement on the relationship between ACS and PNB.³⁸ Aguirre and colleagues reported a case of ACS in a patient with an infraclavicular catheter. Again the patient complained of breakthrough pain despite a functioning perineural infusion, which prompted the diagnosis of ACS and subsequent fasciotomy. They reviewed the 5 reported cases of ACS associated with PNB and again concluded that in some cases breakthrough pain was ignored thereby delaying the diagnosis.³⁹ More recently, two further cases were reported where adequate sensory and motor nerve blockade did not prevent patients experiencing ischemic pain.⁴⁰

Their finding were supported by Kucera et al who reported two further cases where breakthrough pain occurred in patients with functioning PNB infusions *Pain Medicine* 2014; 15: 316–319

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Conclusion: The traditional belief was that RA could delay the diagnosis and treatment of ACS. In fact, many of the cases report a consistent finding of breakthrough pain despite a working continuous perineural infusion. The current evidence suggests that a functioning regional block will not block ischemic pain and that the presence of breakthrough pain in this patient population remains a cardinal diagnostic sign for ACS. Currently there is inadequate evidence to support the theory that PNB delays the diagnosis or treatment of ACS.

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ESRAS-0495

REFRESHER COURSE: REGIONAL ANESTHESIA FOR OPHTHALMIC SURGERY

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Ophthalmic procedures are mostly performed under local/regional anaesthesia but debate exists regarding the ideal technique. Ophthalmic regional technique which produces akinesia is broadly divided into two types. The needle based blocks such as intracone (retrobulbar) and extracone (peribulbar) are performed by injection of local anaesthetic agent in or around the muscle cone through a needle¹. The cannula based blocks (sub-Tenon's) is performed by injecting local anaesthetic agent under the Tenon's capsule using a blunt cannula¹.

Terminology of blocks: The terminology used for needle based block is controversial². A name based on anatomical placement of needle is accepted. Intraconal block involves the injection of local anaesthetic agent into the orbital cavity (muscle cone) behind the globe formed by four recti muscles and the superior and inferior oblique muscles. The extraconal block, the needle tip remains outside the muscle cone. These terms are interchangeably used in the published literature. Thind and Rubin³ in their editorial highlighted that a wide range of local anaesthetic injection techniques are in use, some of which may be described as retrobulbar by one clinician and peribulbar by another. We know now that multiple communications exist between the two compartments and it is difficult to differentiate whether the needle is intraconal or extraconal after placement as block produced depends on deposition and proximity of local anaesthetic agents to the nerves⁴. A combination of intraconal and extraconal block is described as the combined retro-peribulbar block⁵.

Sub-Tenon's block or single quadrant injection is commonly performed through inferonasal (inferomedial) quadrant⁶ but other quadrants such as inferotemporal⁷, superotemporal (pinpoint anaesthesia)⁸ and medial episcleral block⁹ have been used. Sub-Tenon's block is also termed as ultrashort sub-Tenon's¹⁰, anterior (parabulbar)¹¹, mid sub-Tenon¹², or posterior sub-Tenon's⁶. These names are given depend on where Tenon's capsule is entered or the type of cannula used. However it is not known how frequently these quadrants are used for access. In addition, at present, there is no comparative data to support the ease of access to any particular quadrant.

Choice and preference of ophthalmic regional anaesthesia: There are numerous studies illustrating the diversity of preference for anaesthetic technique^{13, 14, 15, 16}. The choice of technique usually depends on a balance between the patient's wishes, the operative needs of the surgeon, the skills of the anaesthetist/ophthalmologists and the type of surgery.

Assessment and preparation of patients: Preoperative assessment is usually limited to medical history, drug history and physical examination. The Joint Royal Colleges Working Party Report¹⁷ recommended that routine investigations are unnecessary and tests are only performed to improve the general health of the patient if required.

Patients are not starved unless sedation is planned. Diabetic patients are advised to continue their routine medications and blood sugar is checked¹⁷.

There is no guidelines on the level of blood sugar above which the surgery is postponed.

Those receiving anticoagulants and antiplatelets (antithrombotics) are screened for clotting profile and they are advised to continue their medications unless told otherwise¹⁸. Needle blocks are generally avoided in patients receiving antithrombotics. Sub-Tenon's block or topical is the preferred choice¹⁷.

Needle block is avoided in patients with myopic who has an axial length >26 mm. Sub-Tenon's block or a medial peribulbar block is the appropriate choice¹⁹.

Needle based blocks: In old classical retrobulbar block, the patients is asked to looked upward and inward and a 38 mm long needle is inserted through the skin after the formation of a wheal between the medial 2/3rd and lateral 1/3rd of inferior orbital margin²⁰. The needle is directed towards the apex and 2-3cc of local anaesthetic is injected. A facial nerve block is also performed to block the orbicularis oculi muscle. These blocks have known sight and life threatening complications^{21, 22}.

During a modern retrobulbar block, the eye is kept in neutral gaze position and a shorter needle <31 mm is inserted as far as possible in the extreme inferonasal quadrant through skin or conjunctiva²³. The needle is directed slightly upwards and inwards but keeping the needle tangential to the globe all the time. 4–5 cc of local anaesthetic agent is injected. A separate facial nerve block is not normally required.

While performing a peribulbar block, the eye is kept in neutral gaze position and a needle <31 mm is inserted as far as possible in the extreme inferotemporal quadrant through the conjunctiva. The needle is not directed upwards and inwards and the needle remains tangential to the globe along the orbital floor. 5–6 cc of local anaesthetic agent is injected outside the muscle cone²³.

If akinesia is less than desirable, a supplementary injection in the form of medial peribulbar block is performed. The needle is inserted between the caruncle and the medial canthus to a depth of 1–1.5 cm. 3–5 cc of local anaesthetic injected²³. A single medial injection technique is advocated in patients with myopic eyes (axial length >26mm)¹⁹.

Complications of needle blocks range from mild to serious^{21, 22}. The complications may be limited to the orbit or systemic. Orbital complications include chemosis, conjunctival haemorrhage, vessel damage leading to orbital (retrobulbar) haemorrhage, globe perforation, globe penetration, optic nerve damage and extraocular muscle damage. Systemic complications include brainstem anaesthesia²⁴ leading to cardio-respiratory arrest and local anaesthetic systemic toxicity.

Cannula based block (sub-Tenon' block): The local anaesthetic agent is injected under the Tenon's capsule with the help of a blunt cannula^{25, 26}.

Anatomy of Tenon's capsule permits sub-Tenon's space to be accessed from all 4 quadrants but inferonasal quadrant is the most commonly accessed because cannula in this quadrant allows good fluid distribution superiorly while avoiding the area of access for surgery and damage to the vortex veins.

After obtaining surface anaesthesia and instillation of antiseptic agent such as 5% povidine, access to the sub-Tenon's space is made by dissecting conjunctiva and Tenon's capsule with the help of blunt scissors and forceps. A blunt sub-Tenon's cannula is inserted and the local anaesthetic agent is injected under Tenon's capsule. A variety of sub-Tenon's cannulae are available and they are made of metal or plastic^{6, 10, 11, 12, 27}. These vary in lengths and gauges and they all work irrespective of their lengths albeit volume requirements vary. The choice of cannula depends on the availability, cost and preference of clinicians.

Sub-Tenon's block is very effective and a versatile technique²⁶. It has been used for cataract surgery, vitreoretinal surgery, panretinal photocoagulation, trabeculectomy, strabismus surgery, optic nerve sheath fenestration and the delivery of drugs.

General considerations: All local anaesthetic agents are suitable for ophthalmic blocks and numerous studies have shown little difference in the quality of anaesthesia, analgesia and akinesia. 2% lidocaine with or without epinephrine and/or hyaluronidase remains the choice²⁸. The volume of local anaesthetic agent for sub-Tenon's block varies from 1.5–11 cc, but 3–5cc is common²⁶.

Subconjunctival haemorrhage and chemosis are common^{25, 26}. Residual muscle movement or incomplete akinesia rarely causes intraoperative difficulties. Sight and life threatening complications are similar to needle based blocks but the incidence is indeed very low²⁹.

Summary: Ophthalmic regional anaesthesia provides excellent anaesthesia for ophthalmic surgery with a high success rate. Satisfactory anaesthesia and akinesia can be obtained with both needle based and cannula based blocks however needle blocks are invasive techniques and sight and life threatening complications are known to occur. Sub-Tenon's block is a safer alternative and serious sight and life threatening complications are much less frequent. All injection

techniques regardless of needle or cannula are associated with complications and at present there is no absolutely safe technique.

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ESRAS-0522

PRO-CON DEBATE: PERIPHERAL NERVE BLOCKS IN CHILDREN: ULTRASOUND IS PREFERRED

PRO

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A significant problem in regional anesthesia was that techniques did not always achieve a success rate close to 100%. Indeed, the key to successful regional anesthesia has always depended on the accuracy of needle and local anesthetic placement in relation to the nerve or structures to be blocked. Ultrasound guided peripheral nerve blocks have been used for the past two decades in pediatric regional anesthesia. Ultrasound guidance not only allows real time visualization of the target (nerve, fascial plane or anatomical space), but more importantly it allows monitoring of the spread of local anesthetic. This increases block reliability and becomes a great advantage in children because it allows decrease the dose of local anesthetic moving away from the toxic dose.

Effectiveness. Ultrasound guidance seems to decrease the rate of block failure but large studies comparing rates in children have not been published nor are probable to take place. However, it is probably this greater reliability of ultrasound guided peripheral nerve blocks a reason why all types of regional blocks in children have widely increased since the use of ultrasound, not only limb blocks but trunk blocks and catheters placement too.

Efficiency. Some studies in adults have controlled the speed of performing a block as a surrogate of efficiency: ultrasound guided regional anesthesia is shorter than nerve stimulation but it's not clear if ultrasound guided regional anesthesia is shorter than nerve stimulation plus ultrasound. Anyway, a few minutes difference would not be in my opinion relevant in the whole context of a surgery.

Safety. Because serious complications following pediatric regional anesthesia luckily are very rare, it is unlikely that even large-scale studies will prove ultrasound guidance to be superior to other approaches with regards to the rate of complications. However, ultrasound guidance has proven to decrease the risk of local anesthetic systemic toxicity (LAST) by visualizing the spread and allowing reduce the dose of local anesthetic. The risk of postoperative nerve symptoms (PONS) with ultrasound versus nerve stimulation has not been specifically studied in children yet. Intra-neural injection and its possible consequences are unknown in children. Moreover, the response of neural tissue in development to a noxious stimulus is also unknown. Anyway, following the tendency of adult studies, it is improbable that ultrasound as we know it today may accurately and significantly reduce intrafascicular damage more than nerve stimulation.

Conclusion. At the time of writing this abstract and in this author's personal opinion, there is no doubt that ultrasound guidance is the method of choice for peripheral nerve blocks in children. Even though neural damage can't be ruled out, ultrasound allows localize the structures to be blocked, control the spread of local anesthetic and decrease its dose. Nerve stimulation may still be used in regional anesthesia but not any more with the purpose of localizing nerve structures. In selected cases nerve stimulation might give us complementary information or physiology interpretation of nerve behavior.

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whether local anaesthetic-based techniques are beneficial for the intra- and post-operative pain relief and whether they should be part of multimodal anaesthesia and analgesia. We know that they are and we know from many systematic reviews and the Prospect group work [8-10] which techniques are evidence-based. Most regional anaesthetists believe that RA can beneficially affect general recovery, improve functional recovery, and decrease morbidity and mortality. However, the evidence is sometimes conflicting and the challenging questions for clinicians and researchers are:

- Can we prove that RA positively affects morbidity and mortality in comparison to GA?

- What is the best evidence-proven RA technique in the frame of enhanced recovery (ER)?

- Is RA more cost-effective vs GA?

- What is the ideal RA technique and will we ever get it?

Impact on morbidity and mortality: have we got an answer?: Although past systematic reviews showed some benefits of RA over opioid based GA for THR and TKR, including immediate recovery [5-7], up until recently there was no convincing data showing superiority of RA in relation to reduction in morbidity and mortality. The main tasks of the national joint registries are to analyse data on activities, continuous improvement projects and clinical research. Hence we know that, for instance, in England and Wales [3,4,11] over 180,000 arthroplasties were performed in 2013 (an increase vs. 2012), and that the demand for THR and TKR in the USA is forecast to increase dramatically by 2030 [12]. While many relatively small group randomised prospective studies give conflicting messages, utilization of large databases gives an opportunity for studying big samples of relatively homogenous data. For regional anaesthetists it should be particularly pleasing that recent studies of big national samples showed the positive impact of central neuraxial techniques on major outcomes for primary arthroplasties: for instance, analysis of 382,236 records in the USA showed that when neuraxial anaesthesia was used, 30-day mortality, the incidence of prolonged length of stay and increased cost, and in-hospital complications were significantly lower compared to GA [2]. Other studies of large THRs and TKRs databases showed that spinal anaesthesia is associated with lower occurrence of adverse events and lower mortality [1, 13, 14]. Interestingly, spinal anaesthesia was identified as one of the four “simple clinical management strategies” which can reduce mortality after THR [1].

Suitable and evidence-based regional anaesthesia techniques: Taken into consideration neuroanatomy of the hip and knee joints and surrounding bone and soft tissues, numerous RA techniques can be used: central neuraxial anaesthesia (epidurals, spinals or combined spinal-epidurals), as solo or in combination with GA or sedation; procedure-specific peripheral nerve blocks (single-shot or continuous); local anaesthetic infiltration techniques (as a supplement to systemic analgesia with GA or “single-shot” blocks).

Choice of the RA technique is governed by various factors: patient's, surgeon's, anaesthetist's. For the latter the knowledge of evidence, technical competency, habits and training, personal experience of complications, institutional protocols - all of the above affect the decision-making. It is clinicians' duty to educate the patients and offer “the best” procedure-specific RA techniques.

The PROSPECT Group – which includes anaesthetists and surgeons - reviews evidence of positive benefits in the preoperative, intraoperative and postoperative patient's care [15-17] and publishes evidence-based recommendations. Of note is the advice on the PROSPECT website: “clinicians must make judgements based upon the clinical circumstances and local regulations”.

PROSPECT recommends for THR posterior lumbar plexus or femoral nerve block (with GA) as first choice or single shot spinal with intrathecal morphine (not first choice). Epidural +/- opioid (no clonidine) is recommended for high risk patients.

PROSPECT recommends for TKR femoral nerve block with GA or spinal anaesthesia (with LA), or spinal with LA+morphine (not as a first choice).

However, PROSPECT review predates the more recent introduction of enhanced recovery (ER) programmes. For instance, adductor canal block has moved into the centre of attention as a motor-sparing and effective analgesic technique for TKR [18,19]. Also, there have been recent large databases studies of perioperative comparative effectiveness of neuraxial blocks [1,2]. Therefore, recommendations may change in future.

Regional analgesia for postoperative management: Adequate postoperative pain control is a prerequisite for successful rehabilitation because it allows early mobilisation and permits a more rapid initiation of physiotherapy.

PROSPECT provides clinicians with supporting arguments for and against the use of various perioperative interventions including RA, based on published

ESRAS-0544

REFRESHER COURSE: REGIONAL ANAESTHESIA AND POSTOPERATIVE PAIN MANAGEMENT FOR TOTAL HIP AND KNEE REPLACEMENT

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Introduction: Since the very first lower limb arthroplasty – a primitive hinge knee joint made of ivory – was reported by Themistocles Gluck in 1860, the implants, surgical equipment and techniques for hip (THR) and knee (TKR) replacements came a long, long way. So did the anaesthesia.

Today primary hip and knee arthroplasties constitute the bulk of elective lower limb orthopaedic surgery, have low mortality [1,2], good outcomes and high patients' satisfaction [3,4]. Advances in anaesthesia made it possible to operate on very frail elderly patients and patients who are not so elderly but have significant comorbidities. These advances also made it possible to successfully perform not only simple primary arthroplasties for common “wear and tear” osteoarthritis but also complex primary surgery (e.g. for avascular necrosis and long bone deformities), bilateral and revision operations (e.g. for implant failure, infection or peri-prosthetic fractures), thus making hip and knee arthroplasty one of the surgical success stories of our times. And it is regional anaesthesia and analgesia with its proven reduction in stress response, opioid requirements and side-effects, blood loss, and DVT and PE incidence [5-7] that is well recognized by anaesthetists and surgeons alike as a major positive factor in the successful development of major lower limb arthroplasty surgery.

Challenges for RA: The main goals of THR and TKR are to alleviate the pain and improve mobility. The main questions for regional anaesthetists today are not

evidence and expert opinion. The final recommendations, published in the form of procedure-specific algorithms [16,17], are based on short-term pain outcomes (e.g. pain scores and supplementary analgesic use) and do not take into account rehabilitation related to long-term pain.

Generally, based on postoperative pain outcomes, the continuation of some form of regional analgesia following general anaesthesia is recommended over the use of general anaesthesia alone, as part of multimodal therapy.

The PROSPECT does not recommend the following RA interventions for THR: epidural clonidine, magnesium sulphate, extended-release morphine; spinal clonidine, short-acting spinal opioids, continuous spinal anaesthesia; wound catheter techniques using local anaesthetic; wound infiltration at the drain site.

The PROSPECT does not recommend the following RA interventions for TKR: addition of obturator or sciatic nerve blocks to the femoral nerve block because of limited procedure-specific evidence; lumbar plexus block as femoral nerve block is equally effective and is associated with fewer complications; alpha-2-adrenoceptor agonists (clonidine, epinephrine) as adjunct to peripheral nerve blocks due to a lack of efficacy in procedure-specific studies; epidural with LA and/or opioid due to an increased risk of adverse events and no improvement in analgesia compared with femoral nerve block; ketamine as adjunct to epidural, due to side-effects and inconclusive analgesic efficacy; tramadol as adjunct to epidural because of insufficient analgesia; intra-articular techniques because of inconsistent evidence.

The recommendations for postoperative analgesia have been straightforward until recently: central neuraxial blocks, femoral nerve block for TKR, lumbar plexus block for THR offer the best quality of analgesia (although concerns exist about lumbar plexus blocks complications). At the same time, with the development of ER programmes for THR and TKR, new modalities such as motor sparing adductor canal block for TKR [18,19] and local infiltration analgesia for both TKR and THR [20,21] are being closely examined.

Local anaesthetic infiltration [20,21] is performed towards the end of surgery to supplement systemic analgesia or single-shot RA blocks; its effectiveness can depend on the operator technique. Local infiltration analgesia (LIA), otherwise known as high volume local infiltration analgesia (HVLIA), provides postoperative analgesia but it is not clear whether it is equivalent to contemporary peripheral nerve blocks in terms of analgesia and functional outcome in the context of a comprehensive enhanced recovery program.

In conclusion, the search for the ideal regional anaesthesia and pain relief technique continues. This ideal should:

- provide fast onset and dense surgical anaesthesia without side effects
- be simple to perform
- be free of major complications
- have positive impact on morbidity and mortality
- allow to avoid GA if this is in the patient's interest
- continue into the postoperative period without untoward events
- not hinder and, preferably, enhance postoperative rehabilitation and decrease length of stay
- be cost-effective

Regional anaesthesia and postoperative pain relief are vital aspects of multimodal perioperative care. The standards of care evolve over time and the new techniques appear and get tested by time. It may not be realistic to achieve all the goals with one "single shot" technique but it is possible that one day we will have the ideal "recipe".

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ESRAS-0534

PRO-CON DEBATE: LOW DOSE CSE IS THE TECHNIQUE OF CHOICE FOR ANESTHESIA FOR ELECTIVE C-SECTION

PRO

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Spinal induced hypotension is a common problem during Caesarean delivery. It can cause serious maternal and foetal morbidity. Various strategies to prevent hypotension are only partially successful. The present review will focus on the usefulness and efficacy of low dose spinal anaesthesia to prevent maternal hypotension while maintaining good anaesthetic conditions.

Cesarean sections are increasingly performed throughout the Western world (1). Spinal anaesthesia is the anaesthetic technique of choice for both elective and unplanned operative delivery (1). Hypotension is the most important side effect with a reported incidence between 20 and 100 % (2-4). Hypotension can cause maternal discomfort (nausea and vomiting) (2) and impair uteroplacental perfusion (5,6). Depending on the severity and duration of the hypotensive episode, fetal academia can develop (7).

Various strategies have been described to prevent hypotension: left uterine displacement, prophylactic IV fluid loading with crystalloids or colloids, maternal leg wrapping and prophylactic vasopressors such as ephedrine or phenylephrine infusions. Despite these strategies, hypotension remains a common problem (2,3,8-15). A recent meta-analysis showed that while interventions such as colloids, ephedrine, phenylephrine or lower leg compression can reduce the incidence of hypotension, none have been shown to eliminate the need to treat maternal hypotension during spinal anaesthesia for Cesarean section (16). Furthermore, prophylactic management has been associated with side effects: iatrogenic pulmonary oedema, hypertension and foetal acidosis (15,17). Phenylephrine can cause maternal bradycardia or arrhythmias. Lai et al. recently described a case of ventricular bigeminy seconds after starting a phenylephrine infusion, which reverted spontaneously to sinus rhythm when the phenylephrine infusion was stopped (18). Myocardial ischemia as a result of coronary artery dissection has also been described (19).

There is some evidence available in the literature indicating that reducing the spinal dose of bupivacaine can produce effective anaesthesia with less haemodynamic side-effects. The present review will put this evidence into perspective.

Haemodynamic effects of low dose spinal anaesthesia: In a recent meta-analysis, Arzola et al. reported that lowering the spinal dose of bupivacaine to less than 9 mg results in significantly less hypotension (20). Vercauteren and co-workers published three trials in which they evaluated the incidence of hypotension following CSE anaesthesia with 6.6 mg of hyperbaric bupivacaine and 3.3 microgram sufentanil (21–23). Hypotension occurred in the combined studies in only 8 out of 102 patients (8%). The same group recently compared low dose CSE anaesthesia with plain levobupivacaine, bupivacaine and ropivacaine, all three combined with sufentanil and confirmed that low dose CSE anaesthesia is able to preserve maternal haemodynamics in most women (24).

More recently, Choi et al. compared single shot spinal anaesthesia, using 9 mg of hyperbaric bupivacaine with 20 microgram of fentanyl, with CSE anaesthesia using 6 mg hyperbaric bupivacaine with 20 microgram fentanyl intrathecally (25). Significantly more patients in the high dose spinal group experienced hypotension and this resulted in a significantly higher proportion of patients in nausea and vomiting.

At our institution, we also performed a randomised comparison of patients treated with CSE using either 6.5 or 9.5 mg of hyperbaric bupivacaine combined in both groups with 2.5 microgram of sufentanil (26). Patients in the 9.5 mg group experienced more pronounced and longer hypotensive periods as compared to the 6.5 mg group. The mean lowest recorded systolic pressure was higher in the 6.5 mg group (102 ± 16 vs 88 ± 16 in the 9.5 mg group; $p < 0.05$). More patients in the 9.5 mg group experienced hypotension compared to the 6.5 mg group (68% vs 16%, $p < 0.05$). In the 9.5 mg group 15 patients required pharmacological treatment for hypotension, compared to 5 in the 6.5 mg group.

Chen et al performed a dose-response study of spinal hyperbaric ropivacaine in 60 parturients scheduled for elective Caesarean section (27). The patients were randomized to four groups and received intrathecally, using a CSE technique, 10.5, 12, 13.5 or 15 mg of hyperbaric ropivacaine following a fluid load with 1000 mL of Ringer's lactate solution. The rate of hypotension was significantly correlated to the dose of ropivacaine.

Teoh et al evaluated the effect of ultra-low dose spinal anaesthesia as part of a combined spinal-epidural technique for elective Caesarean deliveries (28). The first group received intrathecal hyperbaric bupivacaine 3.75 mg in combination with 25 mcg fentanyl, 0.1 mg morphine and an epidural test dose of 3 mL lidocaine 1.5%. The second group received 9 mg of hyperbaric bupivacaine with the same adjuvants and test dose. There was significantly less hypotension in the low-dose group with less ephedrine use and faster motor recovery. The same authors reported four cases of Caesarean section in severe preeclampsia using low dose CSE anaesthesia with stable maternal haemodynamics (29).

Kaya et al studied the combined effect of low-dose spinal bupivacaine with or without colloid preload or wrapping of legs to normal dose spinal bupivacaine on reduction of maternal hypotension during Caesarean section (30). They randomised 120 patients into 4 groups. The first group received 10 mg of bupivacaine intrathecally with 500 mL of Ringer's lactate. The second group received a low dose spinal with 4 mg of bupivacaine plus 25 mcg of fentanyl with 500 mL of Ringer's lactate solution. The third group received the same low dose spinal with 500 mL hydroxyethylstarch and the fourth group received low dose spinal with colloid preloading and wrapping of the lower extremities. Hypotension was reduced from group one to four from 100 to 70, 47 and 23% respectively. Low-dose spinal therefore reduced hypotension and this was further reduced by colloid preloading and leg wrapping.

Recently, Ghazi and Raja published a letter on their experience with low dose CSE and concluded that the incidence of maternal hypotension and the need for vasopressors was reduced in women undergoing operative delivery (31).

McNaught and Stocks concluded that epidural saline can extend a spinal block and that low dose spinal anaesthesia is effective in reducing maternal haemodynamic instability (32).

It seems clear from these trials that hypotension occurs less frequent, is less severe and requires less pharmacological treatment when lower spinal doses are administered intrathecally as compared to higher, more generally accepted doses.

Quality of anaesthesia: Many anaesthetists would worry that lowering the spinal dose would reduce the quality of anaesthesia and increase the incidence of pain during Caesarean section (33). However, Vercauteren et al. and Choi et al. using between 6 and 7 mg of bupivacaine combined with opioids, reported excellent anaesthetic conditions (21,22,23,25). However, these authors used a CSE technique and could give epidural top-ups if required or they could anticipate pain if surgery was prolonged. In their review of the literature, McNaught

and Stocks did conclude that the technique of using low intrathecal doses has an increased risk of intra-operative pain, shorter duration of effective anaesthesia with a slower onset (32). Also Arzola et al. in their meta-analysis concluded that the risk of intraoperative need for anesthetic supplementation was increased (20). However, these authors considered using the epidural catheter as part of the CSE as anesthetic supplementation and failure of the anesthetic, whilst this is an integral part of the planned anesthetic strategy.

In our trial, epidural supplementation was required in approximately 20% of patients treated with 6.5 mg bupivacaine versus only 8% in patients treated with 9.5 mg bupivacaine (26). If additional epidural anaesthesia was required this only occurred if surgery was prolonged after 60 minutes from the start of the spinal injection. Since we are using low spinal doses (5.5 – 6.5 mg bupivacaine with sufentanil) routinely as part of a CSE technique, we now know that if the uterus is not closed approximately 45 minutes after start of the CSE, epidural supplementation will be required and an epidural top-up (5 – 8 mL of ropivacaine 0.75% with sufentanil) is given prophylactically. We only very rarely have to supplement the initial spinal dose with epidural local anaesthetic within one hour of the spinal injection. We also very rarely observe complete motor block. Indeed many authors report on faster motor recovery (25, 32).

Conclusion: It is clear from prospective trials that lowering the spinal dose improves maternal haemodynamic stability. Doses of intrathecal bupivacaine between 5 and 7 mg are sufficient to provide effective anaesthesia. However complete motor block is seldom achieved and adequate anaesthesia is limited in time. As a result an epidural back-up catheter is a must. In my clinical practice, experience learns us that a dose between 5.5 and 6.5 mg combined with opioids provides reliable anaesthesia from start of the spinal injection for 60 – 70 minutes. If the uterus is not closed after 45 minutes an epidural top-up is given to prevent breakthrough pain.

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and cesarean section during labor. It is believed to improve maternal mobility and maternal satisfaction, but also carries the risks of potential side effects of each technique. When compared with spinal anesthesia; there is an increased risk of failure of the spinal component. When compared with epidural anesthesia; there is the potential for postdural puncture headache and conventional epidural test doses may become impractical. Failure of the test dose during CSE may cause serious complications. Epidural catheters are subject to failure during CSE for many reasons and when they fail, additional analgesia or general anesthesia may be required during surgery. Potential concerns related to epidural catheters exist and even rare major complications may occur. The migration of epidural catheters into the subarachnoid space through dural hole made by the spinal needle is another possibility. Drugs intended for epidural use may be administered into the subarachnoid space and they might interfere with the intrathecal spread of the drugs and the quality of anesthesia during surgery. Even though the incidence of hypotension may be less with low dose CSE, but the risk of inadequate anesthesia during cesarean section may increase. There is little evidence that shows the analgesia provided by epidural technique after cesarean section is better than the intrathecal opioids and also there is no guarantee that a previously well functioning epidural catheter will work properly. An excellent, most widely used and preferred technique for cesarean section is the single shot spinal anesthesia with a local anesthetic and opioid combination that provides a short term dense surgical anesthesia with rapid and predictable onset. There appears to be little basis for offering CSE over single shot spinals taken into account with all those pitfalls of epidural catheters when it is possible to obtain efficient postoperative pain relief with a simpler method of single shot spinals that would include local anesthetic agents combined with intrathecal opioids.

ESRAS-0515

REFRESHER COURSE: BLOCKS AROUND THE CLAVICLE

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A variety of blocks can be performed around the clavicle. The most important ones include interscalene, cervical plexus –deep and superficial-, supraclavicular and infraclavicular blocks. For the purpose of this ESRA meeting I will include only supraclavicular and infraclavicular blocks as the other blocks I mentioned above and some selective nerve blocks could be discussed during other lectures.

Supraclavicular Block (SCB) is an upper extremity block performed just above the clavicle and it is well known for rapid onset and effective motor block of the upper extremity. Although the block has a long history, the potential complication of pneumothorax has withheld many clinicians from performing the block in their daily clinical practice (1). Introduction of ultrasound (US) into regional anesthesia practice has changed the fate of the block as US allowed the visualization of subclavian artery, brachial plexus, pleura and the needle. An increased interest in SCB has resulted in widespread clinical use of the supraclavicular block today.

Anatomy: The block is performed at the level of distal trunks and the divisions where the brachial plexus is confined to its smallest surface area. The tree trunks carry the entire sensory, motor, and the sympathetic innervation of the whole arm with the exception of the uppermost part of the medial side of the arm (T2). The supraclavicular block results in anesthesia of dermatomes C5-T1, making it suitable for the anesthesia or analgesia of the upper extremity distal to the shoulder. The subclavian artery is in front of the lower trunk and its divisions. During SCB, the pleura can be punctured either at the pleural dome or through the first intercostal space.

History: Supraclavicular block was first described by Klumpkamff in 1911 (1). Since the first description of the technique, modifications and different approaches have been described (2). Papper and Brand reported 84% success rate and 6.1% pneumothorax incidence (3). Different approaches have been described to decrease the risk of pneumothorax (4). Since then the most important advancement has been the introduction of US to SCB (5). Kapral (6) has published pioneering study on US-guided SCB. Chan's group has published many important studies regarding US guided SCB and found answers of clinically important questions (7-8).

Ultrasound Guidance: The linear transducer is placed transversely on the neck, just superior to the clavicle at the midpoint. Goal is to distribute LA around the brachial plexus, lateral and superficial to the artery. The brachial plexus can be seen as bundle of hypoechoic round structures (like a bunch of grapes) just lateral and superficial to the artery. The brachial plexus is very

ESRAS-0550

PRO-CON DEBATE: LOW DOSE CSE IS THE TECHNIQUE OF CHOICE FOR ANESTHESIA FOR ELECTIVE C-SECTION

CON

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CSE is an excellent technique for labor analgesia especially for a prolonged labor. It may be the best choice in case of a need of instrumental vaginal delivery

superficial in a few cm distances in most of the patients. Tran De HQ (9) has found that ED90 for SCB was 32 ml. We recommend only 5 cm needle and 25–30 ml of local anesthetic. In-plane approach is often preferred to have a better control of needle path. “*Corner pocket approach*” has been described by Chan’s group with the hope that all nerves could be reached and bathed in LA (7). Murata H. (10) has reported the anatomic variations about the transverse cervical and dorsal scapular arteries.

Possible complications: Visual guidance by the use of US has already decreased the risk of pneumothorax. Phrenic nerve palsy may occur up to 50% of supraclavicular blocks (11). Just like interscalene block it would be expected that decreasing the LA dose should reduce the incidence of hemidiaphragmatic paresis. Yet it is important to know that SCB should not be performed bilaterally.

Infraclavicular block (ICB) is an upper extremity block that provides complete anesthesia below the shoulder. Refinement in techniques and US guidance has increased the interest in ICB and it is probably one of the most commonly performed upper extremity blocks today.

Anatomy: This block is performed below the clavicle, at the cord level of brachial plexus. The axillary (subclavian) artery is surrounded by three cords. The axillary vein lies adjacent to the artery and positioned caudally. These three cords -lateral, posterior and medial- are named according to their relative position to the artery. The anatomy of the plexus varies widely among individuals. The MRI study of Sauter (12) revealed that the cords were found within 2 cm from the center of the artery approximately within 2/3 of a circle. With reference to a clock face the cords are distributed between III and XI o’clock. Considering all volunteers, an average point with shortest distances to all cords was found at VIII o’clock, close to the artery, in the cranioposterior quadrant.

History: ICB was first described by Bazy (13) in 1914. Although the technique had a long history, Raj (14) modified the technique and reported a high success rate using a nerve stimulator in 1973. Since then, many approaches, which differ in the site of needle entry and/or needle direction, have been described.

Following MRI studies Klaastad (15) has suggested that ICB can be accomplished by the ‘lateral sagittal route’ [*lateral sagittal infraclavicular block (LSIB)*] with ease and low risk of complications, such as pneumothorax or vascular puncture. LSIB is the infraclavicular approach used in our clinic. In this technique, it is easy to palpate the bony landmarks -clavicle and coracoid process- even in obese patients. Using LSIB the single injection technique is well accepted by patients and had fewer adverse effects than an axillary block by the multiple-injection technique (16). ICB resulted in more complete anesthesia compared to axillary block. Musculocutaneous nerve is also blocked and patients do not experience tourniquet pain. Large-scale studies have reported similarly success rates that range between 89.5% and 91% (17–19). This dependably high success rate seems to be a major advantage of the LSIB technique.

Ultrasound Guidance: LSIB is a technique very suitable for US guidance. Brachial plexus cords are visualized as hyperechoic structures surrounding the artery. Comparative studies have revealed that US guidance further increased the block success rate up to 95% (20–21). Currently in our clinic, where more than thousands of US guided LSIB has been performed during the recent years, our success rate is over 95% (unpublished data). US guidance also reduced vascular puncture incidence from 20% to almost nil (17, 20, 21). In addition to high success rates, improved patient safety and comfort, US guidance has provided certain advantages that allow the technique to be used in many instances where it would not be clinically feasible with NS alone (22–24).

Ultrasound Guided LSIB Technique

The point of needle insertion is at the intersection between the clavicle and the coracoid process. A *linear probe* is placed just below the clavicle inferior to the site of needle entry. Needle is directed using *in-plane* technique. In very obese patients, convex or microconvex probes should be considered.

A 22G, 80mm block needle is used during block performance. The needle is directed in-plane with the US probe, and aimed towards the cranioposterior part of the axillary artery. The visualized *Local Anesthetic (LA) distribution* should be considered sufficient when it reaches all identified cords or surrounds the artery in *U shape covering 3–11 o’clock* of the clock face. The MEVs in 95% of the patients was 31 ml (95% CI, 18–45) (25). In adult patients, we typically administer 30 ml of local anesthetic (LA) mixture (20 ml of levobupivacaine 0.5% and 10 ml of lidocaine 2%). If bilateral block is planned we administer only 20 ml of LA for each site.

Catheter technique: Infraclavicular area is the best site of brachial plexus for catheter placement. Pectoral muscles keep the catheter in place, and therefore catheter dislodgment is not a major problem. Catheters are most useful for repeated surgery, daily debridement and painful complex surgeries like elbow surgery.

Possible complications: Vascular puncture with or without inadvertent LA toxicity is the most frequent complication described, although US guidance has dramatically reduced the incidence of this occurrence. Because ICB block is a relatively deep block- a noncompressible area- coagulopathy can be considered as a relative contraindication. Pneumothorax is probably the most feared complication; attention should be paid to stay strictly lateral and sagittal to avoid meeting the pleura.

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ESRAS-0545

PRO-CON DEBATE: LONG-TERM OPIOID USE IN LOW BACK PAIN PATIENT SHOULD BE DISCOURAGED

PRO

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Introduction: In 2002 a congress entitled “Opioids the Janus Drugs, and the Relief of Pain.” intended to give a historical review of the use of opioids. The lectures were bundled in a book where the editor asked the question: “What other drug . . . is so interwoven with the . . . best and worst in humanity?”

Morphine and its derivatives initially reserved for the treatment of pain in cancer patients were gradually more liberally used for the treatment of chronic pain. Patients rapidly learned how to motivate their physician for a prescription of higher doses. Many physicians with little training in pain management and no training in addiction were prescribing large doses of opioids. The majority of these may have a worsening condition that is no longer responding to the initial treatment, but often the underlying reason for the non-response is not the pain but the increasing disability to work, sometimes because of the side effects of opioid consumption, and the social and economic problems induced by this disability. In the last two decennia the sales of prescription opioids in the US increased with 300% but the number of deaths from overdose on pain pills increased in parallel.[1]

The size and origin of the problem: J. Gregg in her article: “A startling injustice: Pain, Opioids and addiction” [1] states “Through good intentions and bad medicine, the medical community helped create a deadly epidemic. Now, in an act of startling injustice, we are abandoning its victims.”

Addiction is still highly stigmatized. Physicians, during the short consultation time will focus on the physiologic disease and its symptoms with pain being the most prominent and readily reported by the patient. The drug seeking behavior may be missed.

Additionally to the risk of addiction and overdose, opioid-induced hyperalgesia is only recently recognized. Opioid-induced hyperalgesia is a phenomenon whereby exposure to opioids sensitizes a patient to a pain stimulus, causing a paradoxical increase in pain. [2]

A retrospective cohort study found that patients on long-term opioid treatment (>30 days) had large increases in health-care utilization during the first 6-months after start of treatment, afterwards those utilization rates decreased but never returned to baseline levels. Costs followed the same movement.[3]

An Australian prospective cohort study showed the demographic characteristics of patients who received prescription opioids for chronic pain had complex demographic and clinical profiles. Age-related differences in the experience of pain, coping, mental health, and substance use justify the need for an individual treatment approach.[4]

The clinical decision to install chronic opioid therapy should be a balance of opioid selection, dose initiation and titration strategies; integration of risk assessment and mitigation strategies; and consideration of alternative, nonopioid therapies. [5]

A systematic review on the efficacy of long-term opioid therapy for chronic pain found insufficient evidence to determine the effectiveness but evidence supports a dose-dependent risk for serious harms[6].

The origin of the problem may be searched in the aggressive promotion of the right for treatment for each pain patient. But the marketing from the pharmaceutical companies has also contributed to the increased opioid use for non-cancer patients.

A careful approach: We fully agree that each patient has the right for treatment and pain relief. It is the right of the producers to advertise and promote their products, but physicians should be coached into a more appropriate use of opioids.

We suggest exploring all other treatment options that for the pharmaceutical treatment include the search for a more mechanism-based approach. For specific conditions a well-selected minimum invasive interventional pain treatment should be considered prior to installing an opioid therapy.

When opioids are needed, the general practitioner should not proceed beyond the dose of 60 mg morphine equivalent before asking specialist advice.

When correctly used for the correct patient, opioids are definitely a very valuable tool in our therapeutic armamentarium.

The appropriate use consists of the balance between potential benefits and potential risks. Patients and health care providers require appropriate information to make the right therapeutic choices.

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ESRAS-0506

REFRESHER COURSE: ULTRASOUND GUIDED CHRONIC PAIN MANAGEMENT: EVIDENCE AND PRACTICE

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Ultrasound has become a popular tool utilized in the performance of chronic pain interventions. Traditionally, procedures in pain medicine were performed using anatomic landmarks, fluoroscopy or CT scan. While these modalities continue to be utilized, there has been a tremendous growth in the use of ultrasound by pain practitioners.

Interventional techniques for acute and chronic pain management have traditionally performed upon a combination of anatomical landmarks, electro-neurostimulation or imaging. All these techniques are useful but, ENS has no help in avoiding puncture of vessels, pleura or other structure. Fluoroscopy is effective for visualization of bony structures but not soft tissues. It thus has limitations when performing procedures for peripheral procedures. While CT scan is better than fluoroscopy for visualization of bony structures and soft tissue, it can be cost prohibitive and is associated with significant radiation exposure to the patient and practitioner

Most pain management guidelines have moved towards recommending image guidance such as ultrasound, fluoroscopy or CT scan for interventional procedures. This is largely due to the increased accuracy, reliability (precision) and safety associated with structure visualization.

Ultrasound can identify other structures as muscles, ligaments, vessels, joint and bony surfaces. An ultrasound machine is affordable, portable and does not diffuse radiation, its use has not been associated with any risk both for patients and practitioners.

The image that we can see is real time and can be performed continuously along the procedure. Ultrasound can be implemented in office-based practice for diagnostic and therapeutic injections.

Mergin experience from various specialties seems to be a way for forward. Musculoskeletal US experts (radiologists, rheumatologists) may help to develop

skills in joint injections. Trigger point injections (including Botulinum Toxin A) are not longer to be blind but specific group of muscle can be targeted and potential complications (pneumothorax, intraperitoneal, intravascular injections) avoided.

Anesthetists with experience with peripheral nerve blocks under ultrasound guidance naturally progress to blocks in field of chronic pain.

Chronic pain procedures may include nerve blocks, many spinal approaches, including epidurals, selective nerve block, facet joints, medial branch blocks and sympathetic blocks. More recently ultrasound guidance has been used as aid placement of peripheral neuromodulation electrodes.

What limitations. High frequency probe providing high resolution pictures but will not penetrate deep tissue. Low frequency probe penetrates deeper but quality of pictures is degraded. Structures like bones are not easily penetrated by ultrasound wave producing scattering or artifacts.

Spine procedures: The primary advantage of ultrasonography (besides no radiation exposure) is direct visualization of soft tissue structures, it is particularly beneficial in cervical spine injections, where the multitude of blood vessels and other vital soft tissue structures make this area particularly vulnerable to injury if only fluoroscopy-guided injections are used. Ultrasound is an excellent tool in “visualizing” and, hence, “avoiding” vascular injury during cervical spine procedures, whereas contrast fluoroscopy can only “detect” when the tip of the needle is intravascular. One should be mindful that fluoroscopy may not detect that the needle has already traversed a vessel on its way to the target, whereas ultrasound can avoid this.

Ultrasound guided lumbar intra-articular and medial branch block was compared to the most commonly used fluoroscopically guided approach. Very good result were obtained with US technique but limitations also exist when compared to fluoroscopically based technique. These limitations are: obese patients, challenge in detecting intravascular injection at such a depth, the possible need for a larger-gauge needle to improve visibility[1].

Thus despite the increasing number of paper published no recommendations can be given at this time if US is superior to fluoroscopy.

On the contrary third occipital nerve block under fluoroscopy has a false positive rate of 38% and accurate needle placement up to 82% has been achieved with US guidance[2].

Also US guided stellate ganglion block helps in decreasing complications. With the anatomical landmarks technique several side effects or complications can occur. Puncture of the oesophagus leading to mediastinitis or carotid artery or other thyroid vessels puncture are serious complications. US guidance increases the incidence of successful sympathetic block and lowers the incidence of hoarseness associated with local anesthetic injections above the prevertebral fascia.[3]

US guidance is very helpful in border nerve syndromes (genitofemoral, ilioinguinal and iliohypogastric nerves) where anatomical landmarks are confusing. Anatomical variability of the course of these nerves and distribution of the sensory innervated skin area are very high. US helps in needle visualization and makes anatomy more predictable.[4] In trunk pain US helps to visualize ribs, pleura, muscle layers. US makes the block easier and safer.

In other situation as pudendal neuralgia diagnosis is primarily a clinical one, confirmed by a diagnostic block. The interligamentous plane is the key to local anesthetic placement. US helps in real time visualization of needle placement and confirmation of an injectate spread within the interligamentous plane. Almost 100% block success has been achieved by this technique and by identifying pudendal artery and depositing local anesthetic solution medial to the artery[5]

US was considered a standard tool also for musculoskeletal pain. All joint injection can better performed under US guidance.[6]

Ultrasound-guided peripheral nerve stimulation avoids the invasiveness of electrode placement via an open procedure while providing excellent pain relief. There are limitations of the percutaneous approach when navigating close to large blood vessels, a situation more appropriately managed with open peripheral nerve stimulator placement. Ultrasound-guided placement may be considered for patients receiving peripheral nerve stimulators placed within the deep tissues, and not easily placed in a blind fashion.[7]

Conclusions: US systems are more available and cheap these days. Transportable devices give high resolution and quality pictures. This device is available in almost every hospital. Potential advantages of ultrasound are: no hazard of radiation exposure, it could be done in every position, visualization of nerves and surrounding structures: vessels, muscles, bone and visceral pleura, lung, peritoneum, bowel, diagnostic recognizing anatomical variability and pathology real time image of needle, needle nerve contact and inject it spread, reduce complication: nerve injury, vessels puncture, pneumothorax etc., higher success rate, quicker onset, reduces performance time, reduce volume of local anesthetic.

A problem with the application of ultrasound in chronic pain interventions is that randomised controlled trials may not be ethical while comparing to fluoroscopy or CT. Worldwide use of ultrasound guidance into clinical practice has to come as its use a tool, from clinical outcome studies. Its further development will depend on training and education.

ASRA and ESRA published recommendation on this issue in 2009[8]

Further investigations will include quantitative analysis of bidimensional ultrasound images, coupled with volume data from 3D ultrasound technology.

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ESRAS-0501

PROBLEM BASED LEARNING DISCUSSION: MY PATIENT IS OBESE: IS REGIONAL ANESTHESIA USEFUL AND FEASIBLE THORACIC PARAVERTEBRAL BLOCK: WHEN, WHY AND HOW?

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WHEN:

Introduction: Postoperative pain control is one of the major concerns in the postoperative period of patients undergoing thoracic surgery. Thoracotomy, the surgical incision of the pleural cavity or chest wall induces severe postoperative pain and marked impairment of respiratory function. Chest wall pain is caused by retraction, resection, rib fracture, costovertebral joint disruption and intercostal nerve damage. Thoracic epidural analgesia (TEA) was considered by many to be the gold standard of pain relief after major thoracoabdominal surgery. Paravertebral block is an alternative technique that may offer comparable analgesic effectiveness and a better side-effect profile (1). Thoracic paravertebral block (TPB) is the technique of injecting local anesthetic adjacent to the thoracic vertebra close to where the spinal nerves emerge from the intervertebral foramina. It results in ipsilateral somatic and sympathetic nerve blockade in multiple contiguous thoracic dermatomes above and below the site of injection (2).

TPB was first performed in 1906 by Hugo Sellhaim of Leipzig and is thus amongst the oldest of local anesthetic techniques (3). Its popularity reached a peak in the 1920's and 1930's following which, during 1950's and 1960's publications about this technique almost completely disappeared. Eason and Wyatt stimulated renewed interest when they described the insertion of a catheter into the thoracic paravertebral space (4). Sabanathan, Richardson and Lönnqvist are three researchers who recently have contributed to improving our understanding of this almost the forgotten technique (5,6).

Anatomy: The thoracic paravertebral space (TPVS) is a wedge-shaped area between the heads and necks of the ribs. The posterior boundary is the superior

costotransverse ligament and laterally, the posterior intercostal membrane. Anteriorly is the parietal pleura and medially is the postero-lateral aspect of the vertebra, the intervertebral disc and the intervertebral foramen (7). The spinal nerves emerge from the dura, cross the epidural space encased within a dural cuff and enter the TPVS via the intervertebral foramina usually still within the dural cuff. Within the TPVS the segmental nerve divides into the dorsal and ventral branches (rami). The ventral ramus gives rise to the rami communicantes, which connect the intercostal nerve to the sympathetic chain. The dorsal ramus provides innervation to the skin and muscle of the paravertebral region; the ventral ramus continues laterally as the intercostal nerve (Figure 1). The spinal nerves in the TPVS are lying freely among the fat and devoid of fascial sheath, which makes them susceptible to local anaesthetics. The endothoracic fascia divides the TPVS into two potential fascial compartments, the anterior extrapleural paravertebral compartment and the posterior subendothoracic paravertebral compartment (8). The spinal nerves and vessels are located in the posterior compartment while the sympathetic trunk is located in the anterior paravertebral compartment.

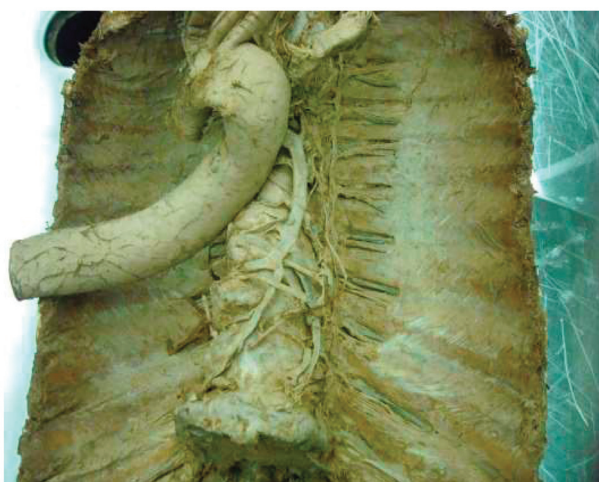


FIGURE 1. Anatomy of the thoracic paravertebral space.

WHY:

Indications: Thoracic paravertebral blocks are particularly advocated for unilateral surgical procedures for example: thoracotomy, breast surgery and lung surgery. Continuous TPB either unilaterally or bilaterally has been useful in minimally invasive cardiac surgery to provide excellent analgesia while allowing early ambulation (9). It was presented that TPB can resolve ST segment depression during general anaesthesia and thus is useful in treatment of angina pectoris (10). There is some evidence that TPB because of the effect on the sympathetic chain may provide visceral analgesia also and thus may be useful for cholecystectomy and nephrectomy (11). Continuous right thoracic paravertebral block has been successfully used for right-lobe hepatectomy (12). TPB provides excellent analgesia for rib fractures (13). Paravertebral block is being utilised for chronic postoperative neuralgia and other chronic pain syndromes. It can also be used for the treatment of hyperhidrosis. Thoracic paravertebral block is an alternative technique for cosmetic breast surgery that may offer superior pain relief and decreased nausea to general anaesthesia alone (14).

Retrospective study suggests that paravertebral anaesthesia and analgesia for breast cancer surgery reduces the risk of recurrence or metastasis during the initial years of follow up (15).

Preemptive paravertebral block can reduce prevalence of chronic pain one year after breast cancer surgery (16).

In patients undergoing lung surgery thoracic paravertebral analgesia compared to thoracic epidural analgesia did not show any differences in development of post-thoracotomy pain syndrome (17).

Contraindications: Infection at the site of needle insertion, empyema, tumor occupying the TPVS are some of the few contraindications. A coagulopathy, bleeding disorder or therapeutic anticoagulation are considered as relative contraindications for TPB. Some of the absolute contraindications for TEA are not

such a problem with TPB. Because of the low potential for neurological damage, the presence of a coagulation disorder or the use of anticoagulants are relative rather than absolute contraindications. Paravertebral blocks can be safely performed in anaesthetized patients. Care is needed in the case of severe chest deformity or scoliosis to avoid injection into epidural or subarachnoid space.

Side effects and complications: Paravertebral blocks generally have a low incidence of side effects. In retrospectively reviewing this subject, the overall incidence of side effects or complications was less than 5% (18). Accidental epidural or subarachnoid injection is a rare event which indicates a faulty technique. Lönnqvist et al. evaluated complications after paravertebral blocks and observed the following frequency of complications: hypotension 4.6%, vascular puncture 3.8%, pleural puncture 1.1% and pneumothorax 0.5% (19). In a patient who has already undergone thoracotomy a pulmonary haemorrhage developed after performance of percutaneous paravertebral block (20).

A case report of systemic local anaesthetic toxicity from continuous paravertebral block administration after thoracotomy and lobectomy leading to seizure, aspiration and ultimately death has been reported (21).

HOW:

Techniques: The standard technique of space location is by loss of resistance to air or saline. The patient can be positioned set up or lying in the lateral position. The proximal edge of the appropriate thoracic spinous process is palpated and a local anaesthetic skin wheal raised 2-3 cm lateral. Because of the angulation of the spinous processes of the thoracic spine, the transverse process contacted will belong to the vertebra below that of the spinous process. An 18 G Tuohy or 22 G spinal needle is inserted at 90 degrees to the skin until it touches the transverse process at a depth of 2.5-5 cm. The needle is then walked off the cranial or caudal edge according to preference, using loss of resistance to identify the TPVS as the needle penetrates the superior costotransverse ligament. This usually occurs 0.5-1 cm deep to the transverse process. The needle must be kept parallel with the midline to avoid puncturing the pleura laterally or the epidural space medially (22,23). The TPVS can be identified by loss of resistance to air or saline, using a peripheral nerve stimulator to induce pulse synchronous muscle movement or pressure inversion (24). The technique is repeated at each dermatomal level, using 3-5 ml of local anaesthetic per segment. If a single-shot technique is used, choose the dermatomal level at the mid point of the surgical field and inject 15 ml once the TPVS is identified. If a catheter is to be placed Tuohy needle 18 G is used, then catheter is inserted that 1-3 cm of distal end of the catheter lies within TPVS. Sabanathan described a method of surgical catheter placement under the direct vision for use in thoracotomy (25). Insertion of paravertebral block catheter under direct vision by the surgeon, can reduce incidence of block failure (26). Fluoroscopy and contrast chest radiography are often used as supplementary methods to confirm the position of the catheter (Figure 2).

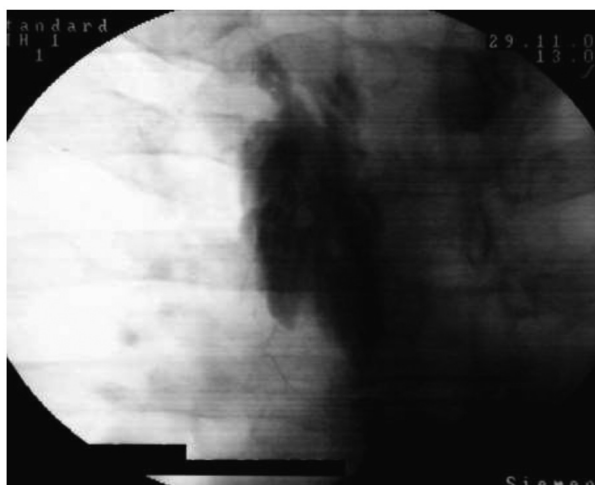


FIGURE 2. Radiographic appearance after injection of 10 mL of contrast medium through a paravertebral catheter.

Contrast injected into the TPVS produces either a longitudinal or cloud-like spread localized to the paravertebral region as depicted on frontal chest radiograph.

The ultrasound needle guidance positioning system, real time TPB were performed accurately and without clinical complications such as pleural puncture using in-plane and out-of-plane approaches (27) (Figure 3).



FIGURE 3. Ultrasound guided local anaesthetic injection through the thoracic paravertebral catheter.

Mechanism of analgesia: The mechanism of action of paravertebral analgesia is by direct penetration of local anaesthetic into the spinal nerve, its dorsal ramus, the rami communicantes and the sympathetic chain anteriorly. TPB can produce a very dense afferent blockade of sensory information. TPB differs in one specific way from neuroaxial blocks. Although neuroaxial blocks cause almost complete blockade of the mainly efferent sympathetic transmission from the spinal cord, such blocks are not able to block transmission within the sympathetic chain. TPB, on the other hand, will cause not only dense somatic afferent blockade, but will also, due to the anatomy of the paravertebral space, completely block transmission within the sympathetic chain (28). A thoracic paravertebral injection can spread to the contiguous spaces above and below, the epidural space medially and the intercostal space laterally (29,30). A contradictory studies about the spread of local anaesthetics in TPVS were published. After single paravertebral injection of local anaesthetic a large ipsilateral somatosensory and sympathetic block occurred (31,32). In the novel studies it has been recommended that single-bolus technique may be better supplanted by a reversion to the multiple-level injection technique (33,34). There is controversy about epidural spread and its contribution to the extension of TPB. Epidural spread has been shown to occur after 70% of percutaneous paravertebral injections (35). It was demonstrated that a thoracic paravertebral injection can result in contralateral paravertebral spread anterior to the vertebral bodies through the anterior paravertebral compartment (36). In summary thoracic paravertebral injection can spread to the contiguous spaces above and below, the epidural space medially and the intercostal space laterally, and anteriorly to the contralateral paravertebral space. The use of clonidine and fentanyl as adjunctive analgesics for TPB improved postoperative pain relief (37,38).

Comparative studies: The studies which compared TPB with TEA found no difference in analgesia.

In the study of Casati and co-workers was shown that continuous thoracic paravertebral analgesia is as effective as epidural blockade in controlling a post-thoracotomy pain, but is associated with less haemodynamic effects (39).

In patients having open lung surgery continuous paravertebral block resulted in similar analgesia but greater haemodynamic stability than epidural analgesia, paravertebral block also required smaller volume of colloids and vasopressors to maintain target oxygen delivery index (40).

In patients undergoing minimally invasive direct coronary artery bypass surgery TEA and TPB were compared. The quality of analgesia was comparable within the groups. TPB is technically easier than TEA and may be safer than TEA because no complication were seen in the TPB group (9).

In a prospective, randomized comparison of continuous thoracic epidural and paravertebral bupivacaine infusion was shown that, TEA is as effective as TPB for pain management in patients with unilateral fractured ribs (41).

Karmakar showed that continuous thoracic paravertebral infusion of bupivacaine is a simple and effective method of providing pain relief in patients with unilateral multiple fractured ribs (42).

In the study which compared interpleural and paravertebral analgesia in thoracic surgery was found that bupivacaine administered paravertebrally produced greater preservation of lung function and less confused patients than bupivacaine administered interpleurally (43).

Single-injection thoracic paravertebral block performed preoperatively reduced pain score after thoracoscopic surgery in a clinically significant fashion (44).

The study of a continuous paravertebral infusion of bupivacaine for the management of post-thoracotomy pain in 20 infants showed no major complications relating to the technique and analgesia was satisfied (45).

Two recent systematic reviews have confirmed the efficacy of paravertebral blockade for post-thoracotomy analgesia (1,46). Davies et al. compared TPB with TEA and confirmed that the quality of analgesia was equivalent but there were fewer side effects and complications with TPB (1). The Prospect group looked at all randomized trials where regional technique was used (epidural, paravertebral, intrathecal, intercostals and interpleural). Again, on the balance of equivalent or superior analgesia and less adverse events, TPB is recommended for post-thoracotomy analgesia (47).

Thoracic paravertebral block in paediatric cardiac surgery is associated with significantly less failure rate and side effects compare to thoracic epidural block (48).

Replacing general anaesthesia with thoracic paravertebral block can attenuate cytokines response in patients undergoing cancer breast surgery (49).

Thoracic paravertebral block and sedation alone is an effective and reliable form of anaesthesia for breast surgery for patients in which general anaesthesia is undesirable or poses an unacceptable risk (50).

Following mastectomy, adding a multiple-day, ambulatory, continuous ropivacaine infusion to a single-injection ropivacaine paravertebral nerve block results in improved analgesia and less functional deficit during the infusion. However, no benefits were identified following infusion discontinuation (51).

Multimodal thoracic paravertebral analgesia with levobupivacaine resulted in less opioid consumption, less rescue analgesia and better pain scores than analgesia with bupivacaine (52).

Conclusion: Over the past decade enthusiasm for a TPB in patients undergoing thoracic surgery has increased. Systematic reviews found no difference in analgesia with TPB techniques when compared with TEA regimens. Important side effects such as hypotension, urinary retention, nausea and vomiting, were less frequent with TPB than with TEA. Compared to the other available regional techniques such as intercostals and interpleurals TPB offers better quality, longer duration of analgesia and less side effects (53). Thoracic paravertebral blocks deserve greater consideration and investigation.

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REFRESHER COURSE: SPINAL ANESTHESIA AND THE STRESS/IMMUNE RESPONSE

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Stress response is a significant risk factor for an unsatisfactory outcome in surgical patients. This is part of the systemic reaction to injury which encompasses a wide range of endocrinological, immunological and hematological effects (1). The reduction and modulation of stress response during the operation can significantly reduce the incidence of post-operative complications and morbidity (2). Regional anesthesia with local anesthetic agents inhibits the stress response to surgery and can also influence postoperative outcome by beneficial effects on organ function (1).

Different anesthesia methods do not have the same effect on clinical outcome regarding their efficacy in suppressing this stress. A combination of the

analgesic methods could be more effective while having fewer adverse effects of the anesthetics. The results of the current study suggested that spinal anesthesia plus intravenous patient-controlled analgesia have the most favorable cardiac effects regarding postoperative levels of pro-BNP (3).

Spinal anesthesia administered for laparoscopic cholecystectomy alone maintained comparable hemodynamics compared to general anesthesia (GA) and did not produce any ventilatory depression. It also produced less neuroendocrine stress response as seen by reduction in the level of serum cortisol in ASA physical status I patients scheduled for laparoscopic cholecystectomy (4). Spinal anesthesia in addition to GA compared to epidural anesthesia (EA) in addition to GA may reduce postoperative morbidity in laparoscopic cholecystectomy. Intraoperative cortisol, noradrenaline and total catecholamine levels were significantly lower in the SA group compared with the EA group. When pre- and intraoperative values were compared, the SA group showed a decrease in adrenaline, noradrenaline and total catecholamine levels, and the EA group showed an increase in ACTH and noradrenaline levels (5).

Another study demonstrated effectiveness of spinal anesthesia in suppressing stress response in elective surgical patients. Serum cortisol and glucose levels were significantly higher in the general anesthesia group compared to the spinal anesthesia group ($p < 0.01$). There was a statistically significant, positive correlation between serum cortisol levels and glycemia at all times observed ($p < 0.01$) (2). Gottschalk et al. also demonstrated in a well designed prospective, randomized controlled study that spinal anesthesia attenuates the hyperglycemic response to surgical stimuli in diabetics and nondiabetic patients (6).

It is well established that normal response to stress is immunosuppressive, which seems at the first glance protective, but can be harmful in the perioperative setting if prolonged and severe (7, 8, 9). Inflammation in the surgical setting is primarily a product of the innate immune system masked by activation of blood monocytes, neutrophils and tissue macrophages, complement activation, release of proinflammatory cytokines and chemokines and upregulation of endothelial adhesion molecules. Decreased function of the adaptive immunity in the early days following surgery is often due to a decrease in total lymphocyte counts, altered T-cell subsets, diminished lymphocyte proliferation and a shift to the T-helper type 2 (Th2) cytokine profile (10, 11). The immunomodulatory effects of surgery, anesthesia and other therapy are difficult to define in a surgical patient. Danger immune patterns and pattern recognition receptors have been targets of the recent investigations. It is interesting observation that aseptic trauma primes the innate immune system for the posttraumatic release of LBP and sCD14. In a recent reported study the authors reported the physiological reactions to LBP and sCD14 after total hip replacement surgery during spinal/epidural anesthesia. IL-6 levels peaked 24 h after the operation, whereas IL-1 β and IL-10 levels remained unchanged. Systemic levels of LBP were increased 24 h after surgery, whereas sCD14 remained steady. However, the dilution-corrected sCD14 values increased significantly, and the levels of both LBP and sCD14 peaked at day 3 after surgery (12).

Indeed it seems that spinal anesthesia results in less immunosuppression compared to general anesthesia, i.e. maintains the number of Th1 cells, thus stimulating the cell immunology. Cytokines are significant mediators of the immune response to surgery (13). Žura et al. showed on a case series an increase of pro-inflammatory cytokine IL-6 on first postoperative day after spinal anesthesia for transurethral resection of the prostate (14). Another study of the same authors on more significant number of patients confirmed surgery-related postoperative release of the pro-inflammatory cytokine IL-6 was increased in patients after spinal and general anesthesia. In addition, increased levels of the typical Th1 cytokine IL-2 were found in patients anesthetized by general anesthesia compared to spinal anesthesia. Serum concentrations of other pro-inflammatory cytokines, anti-inflammatory cytokines and cytokines which are secreted by Th1 helper lymphocytes showed no statistical difference before and after surgery under general and spinal anesthesia (15).

Recent study, that evaluated the effect of epidural analgesia on postoperative pain, endocrine-metabolic and inflammatory stress response and cellular immune responses during major corrective spine surgery, demonstrated significantly less plasma levels of glucose, cortisol, CRP, IL-1 β , IL-6, IL-10 at various stages in group with epidural anesthesia (EA) compared to general anesthesia (GA). The ratio of CD4/CD8 ($p = 0.001$) and B cells ($p = 0.01$) have increased by postoperative day 3 in group EA compared to GA. NK-cells (CD16/56+) have decreased significantly by day 3 after surgery ($p = 0.001$) compared to the group 2. T-lymphocytes, (CD3) have decreased in all patients, but they were significantly lower in patients receiving opioids, compared with EA. The authors concluded that EA reduces the surgical stress response, prevents postoperative lymphocyte apoptosis and thus, increases stress and infectious resistance (16).

Hemostasis changes can be considered as a component of the surgical stress-response too. Liuboshevskii et al. claimed that the role of intraoperative regional anesthesia was much more significant, than postoperative analgesia. Both spinal and epidural anesthesia show comparable correction of surgical stress-response markers. Also both types of regional anesthesia reduced hypercoagulation expression and prevented fibrinolysis activation. This resulted in a reduction in the hemotransfusion frequency (17).

Administration of local anesthetics was designed to provide intraoperative anesthesia and analgesia. However, in recent years it has become evident and clear that regionally administrated local anesthetics have benefits far beyond anesthesia and pain relief; indeed the technique has significant impact on outcome of major surgical procedures by modulating stress/immune response (13, 18).

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REFRESHER COURSE: OPHTHALMIC REGIONAL ANAESTHESIA IN PATIENTS ON ANTITHROMBOTICS

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Introduction: Eye surgery patients are often elderly and may have significant co-morbidity. Many receive antithrombotic agents such as aspirin, anticoagulant, antiplatelet, direct oral anticoagulant (DOA) and others. Regional anaesthesia is commonly used. Drugs with longer half-life (warfarin, clopidogrel) need a specific time before their effects are over and their effects can be reversed with antidotes. Whereas drugs such as newer DOA have a shorter half-life but no known antidote. Antithrombotics withdrawal predisposes to risk of thromboembolic events. There may not be enough time to stop these agent specifically when surgery is urgent or emergency. Their continuation on the other hand predisposes to the risk of bleeding during regional anaesthesia and surgery.

There are several published guidelines on antithrombotics and regional anaesthesia but these guidelines are generic^{1,2}. There are no specific guidelines for patients undergoing ophthalmic surgery and for regional or eye blocks. There are lack firm recommendations as published literature is limited to reviews^{3,4}. This refresher lecture concentrate on why patients receive antithrombotic agents, consequences of their withdrawal, consequences of their continuation on regional anaesthesia and surgery and finally recommendations will be made for clinical practice based on current published literature.

Why patients receive antithrombotic agents?: The patients usually receive one or combined antithrombotic agents if they suffer from medical conditions such as angina, STEMI, Non-STEMI, acute coronary syndrome, post bypass surgery, AF, ventricular arrhythmia, valvular disease, hypertension, secondary prevention of heart disease, bleeding disorders, stroke prevention & TIA.

Consequences of antithrombotics withdrawal: Aspirin withdrawal: A large meta-analysis in more than 50,279 patients who received aspirin for secondary prevention confirmed that stopping aspirin increases the risk of major cardiovascular events three times⁵. The risk was much higher in patient who coronary stents and there increases risk of myocardial infarction or death 2-3 fold. However a recent trial POISE 2 has shown that continuation of aspirin does not significantly affect the composite death or non-fatal myocardial infarction but increased the bleeding⁶.

Warfarin withdrawal: A survey of cataract surgeons⁷ revealed that if warfarin was discontinued, 6 patients had acute strokes and 2 died, 1 had deep vein thrombosis and 1 had pulmonary embolism. They also recommended that sudden withdrawal of warfarin may lead to hypercoagulable state.

Antiplatelet withdrawal: Several studies have shown that stopping antiplatelet increases the risk of thrombotic events in coronary stent patients. If non-cardiac surgery is performed within 6 weeks of BMS (Bare Metal Stent), 5-30% suffer Major Adverse Cardiac Event (MACE) such as death, MI, or stent thrombosis requiring urgent revascularisation if antiplatelet is withdrawn^{8,9}. In another study, 192 patients underwent non-cardiac surgery with coronary stent within less than 1 month after BMS or 3-6 months after DES¹⁰. Thirty percent of early surgery group who stopped DAP suffered a MACE, 4 of whom died. No patient who continued antiplatelet therapy had an event¹⁰. The risk may be reduced undergoing non-cardiac surgery within 6 weeks of Bare Metal Stent if surgery is deferred for at least 3 months. Stent thrombosis is known to have fatality up to 50%^{8,9} if there are additional risk factors. The additional factors¹¹ are broadly divided into clinical or anatomical factors. Clinical factors include previous stent thrombosis, age >80 years, Acute Coronary Syndrome, indications for stent, diabetes, renal impairment and low ejection fraction. Anatomical risk factors include left main stent, bifurcation stent, ostial stent, small stent <3mm, long stent >18mm and multiple stents.

Consequences of continuation of antithrombotics on regional anaesthesia: Risks of RA when on antithrombotics: Retrobulbar haemorrhage is a known complication of needle based block¹² although much rarer with sub-Tenon's block¹³. In a case series of 19283 patients there was no significant increase in retrobulbar haemorrhage during needle blocks when patients were taking aspirin & warfarin but there was an increased incidence of conjunctival haemorrhage¹⁴. In another case series of cases in patients on aspirin, warfarin

and clopidogrel, there was no significant increase in retrobulbar haemorrhage¹⁵. According a large series consisting of 55567 patients¹⁶, the incidence of haemorrhagic events doubled during sharp needle and sub-Tenon's block if patients were receiving warfarin and clopidogrel. Retrobulbar haemorrhage or orbital haemorrhage is very rare following sub-Tenon's block¹³ but incidence of subconjunctival haemorrhage is increased^{17,18}.

Risks of bleeding during eye surgery when on antithrombotics: Risks during cataract surgery: Phacoemulsification surgery is routinely performed through a small phacoemulsification probe in which significant complications related to bleeding, even in patients on antithrombotics are extremely rare³. There is no published literature on intraoperative bleeding during large excision extra capsular cataract extraction. However, there is an increased risk of hyphaema and suprachoroidal haemorrhage especially in diabetics, myopic, atherosclerosis, vascular diseases and hypertensive patients.

Risks during glaucoma surgery: Trabeculectomy (filtration) is the most common surgery. Perioperative bleeding complications such as hyphaema, intrableb bleeding and suprachoroidal haemorrhage may occur during surgery but they are more frequent in patients taking antithrombotics which may result in surgical failure or loss of sight¹⁹. If aspirin is continued, there may be an increased risk of hyphaema²⁰. However, patients on warfarin have been found to be at increased risk of bleeding and treatment failure²⁰. Trabeculectomy tube surgery has also been associated with a risk of hyphaema and suprachoroidal haemorrhage²¹.

Risks during VR surgery: The results of published studies relating to bleeding in patients on antithrombotics undergoing pars plana vitrectomy (PPV) are conflicting. Chauvaud et al²² & Fu et al²³ concluded that some patients suffered from sub-retinal haemorrhage however, this was a known complication of scleral buckling & vitreous drainage procedure. They suggested that continuation of anticoagulation does not increase risk of haemorrhage. In another study by Dayani et al²⁴ & Grant (Narindaran)²⁵ in a series of 1737 patients, 54 received warfarin and there was no anaesthetic or surgical haemorrhagic complications. Another study by Chandra et al²⁶, 120 cases were on warfarin and there was no increase in perioperative haemorrhagic complications. In another study of 289 diabetic patients 27 who were on anticoagulants or antiplatelet agents, there was no increased risk of vitreous haemorrhage. However, in one study of 139 high risk diabetic patients who were on antithrombotic therapy, there were more persistent vitreous cavity haemorrhage (27.6%) and required reoperation (13.8%) compared to those not on such therapy (6.9% and 0% respectively) but luckily there was no effect on final visual outcome²⁸. In another study of 289 patients (25 gauge vitrectomy, 110 control, 61 warfarin & 118 clopidogrel) there were transient vitreous haemorrhage (control 3.6%, warfarin 1.6%, clopidogrel 3.7%).

Risks during oculoplastic surgery: There may not be evidence to strongly support or refute that there is a significant risk of haemorrhage during lacrimal surgery, orbital surgery, postseptal eyelid surgery and skin grafts in patients receiving antithrombotics but most authors recommend an approach tailored to each patient. In 1130 oculoplastic procedures there was no difference whether patients were on anticoagulants & antiplatelet agents or whether these were stopped^{29,30}.

Risks during strabismus surgery: No serious bleeding other than rare retrobulbar haemorrhage has been reported³¹.

Risks during corneal graft surgery: Suprachoroidal haemorrhage³² is a rare complication of penetrating keratoplasty and endothelial keratoplasty³³ but there are no studies indicating any increased risk in patients taking antithrombotics.

Risk assessment: The decision to stop, continue antithrombotic or use bridging therapy is based on risk assessment. Risk assessment comprises of identification of risk factors, risk calculation, risk prediction & stratification.

Identification of risk factors: Factors predisposing patients to haemorrhagic risks include increasing age, uncontrolled hypertension, anaemia, cardiac stent, coexisting haematological, vascular, renal or hepatic disease, concurrent medication with steroids or antiplatelet agents, type of proposed procedure, its complexity and anticipated difficulty and herbal drugs³⁴.

Risk calculation & prediction: The risk of a thromboembolic complication in patients with non-valvular atrial fibrillation is often estimated by means of the CHA2DS2-VASc score³⁵. Scores of 1 or 2 are allocated based on the presence or absence of the following characteristics: congestive cardiac failure, hypertension, age ≥ 75 , diabetes, prior stroke or transient ischaemic attack (TIA) or thromboembolism, vascular disease, age 65–74 and female sex. The greater the cumulative score, the greater the risk of thromboembolic events.

Stopping antithrombotics in patients with AF, prosthetic heart valve, coronary stent carries a higher risk of thrombotic events, Antithrombotic agents should be continued³⁶.

Risk stratification: The patients are stratified into high risk, moderate risk and low risk group for thromboembolic complications (**Figure 1**).

FIGURE 1. Suggested risk stratification for perioperative thromboembolism³⁴.

Risk category	Atrial fibrillation	Venous thromboembolism (VTE)	Mechanical heart valve
High (>10%/year arterial thromboembolism risk, or >10%/month venous thromboembolism risk)	CHA ₂ DS ₂ -VASc score 5–6 CHA ₂ DS ₂ -VASc score 6–9 Recent (<3 months) stroke or TIA Rheumatic valvular heart disease	Recent (<3 months) VTE Severe thrombophilia Multiple thrombophilias Protein C, protein S or antithrombin deficiency Antiphospholipid antibodies	Any mechanical mitral valve Caged ball or tilting disc valve mitral/aortic position Recent (<6 months) stroke or TIA
Intermediate (4–10%/year arterial thromboembolism risk, or 4–10%/month venous thromboembolism risk)	CHA ₂ DS ₂ score 3 or 4 CHA ₂ DS ₂ -VASc score 3–5	VTE within past 3–12 months Recurrent VTE Non-severe thrombophilia Active cancer	Bi-leaflet aortic valve replacement with major risk factors for stroke
Low (<4%/year arterial thromboembolism risk, or <2%/month venous thromboembolism risk)	CHA ₂ DS ₂ score 0–2 CHA ₂ DS ₂ -VASc score 0–2 (and no previous stroke or TIA)	VTE more than 12 months ago	Bi-leaflet aortic valve replacement without major risk factors for stroke

TIA, transient ischemic attack.

Practice recommendations: Cataract surgery: There is no increase in haemorrhagic complication. Stopping antithrombotics in patients with AF, prosthetic heart valve, coronary stent carries a higher risk of thrombotic events. Antithrombotic agents should be continued during cataract surgery^{3, 4}.

Non-cataract surgery: There is less robust evidence to make firm recommendations during glaucoma, VR and oculoplastic procedures^{3, 4}. Current evidence suggest that patients should continue warfarin and INR should be within the therapeutic range or that is determined by condition for which the patient is being anticoagulated. Sub-Tenon's block or general anaesthesia is chosen and all attempts are made to avoid needle based blocks. Risk of significant bleeding is relatively low when INR remains within therapeutic range. If INR > 3 the incidence of major bleeding is twice compared to when value lies within 2–3. Reducing warfarin is safer than stopping. Sudden withdrawal may lead to hypercoagulable state¹¹. If possible, continue antiplatelet therapy in patients with coronary stents undergoing ophthalmic surgery. It is important to defer elective non-cardiac surgery for 6 weeks after BMS. Surgery should be deferred for elective surgery for 12 months after DES. Direct Oral Anticoagulants are gradually replacing warfarin for most current indications. However, there are no validated antagonists hence their clinical effects cannot be monitored by simple standardized laboratory tests. At present there is insufficient data to make a definite recommendation for continuing or withdrawing DOA. Primary treating physician should be consulted to consider bridging therapy if surgery is urgent or emergency^{37, 38, 39}.

Summary: Multidisciplinary discussion with an agreeable approach, risks and benefits analysis of surgery, continuation or withdrawal of antithrombotic agents and/or bridging therapy should be the ideal approach. There are limited quality studies. Haemorrhagic complications in patient receiving anti-thrombotics are rare in patients who receive RA and ophthalmic surgery such as cataract, VR, glaucoma, oculoplastic surgery. It is recommended that anti-thrombotic agents should be continued in patients undergoing regional anaesthesia for almost all ophthalmic surgery unless there is a good reason to stop. If surgery is elective and requires temporary stoppage of warfarin, it should be stopped 5 days before surgery to keep INR within normal range. Warfarin should be started 12–24 hours postoperatively. In patient whom thromboembolic risk is high, bridging therapy with LMWH or UFH is necessary. If sight threatening bleed occurs, reversal with intravenous vitamin K and Prothrombin Complex Concentrate or FFP can be considered. Rivaroxaban should be stopped 24 hours before and should be restarted as soon as possible. Apixaban should be stopped 48 hours before and restart after surgery. If effects need to be reversed, intravenous tranexamine acid may be considered.

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ESRAS-0535

REFRESHER COURSE: OPIOIDS FOR NON-CANCER PAIN: THE GOOD, THE BAD, THE UGLY

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Current Practice of Opioid Prescribing for Chronic Noncancer Pain:

Despite the publication and widespread dissemination of new clinical practice guidelines that include the use of opioid therapy in chronic noncancer pain^{1,2,3}, several surveys of physician attitudes and behaviors show numerous barriers to optimal use of opioids in this setting, potentially causing unnecessary suffering among patients. A survey completed by 248 primary care physicians found that the majority were comfortable prescribing opioids to patients with terminal cancer, but less comfortable prescribing opioids for chronic pain conditions. The reasons listed included concerns about prescription drug abuse (84%), addiction (80%), adverse effects (68%) and tolerance (61%).⁴ In another survey, 38% of 132 physician responders expressed concern about causing addiction by prescribing opioids.⁵ There is also evidence for a reluctance to prescribe long-acting opioid formulations even when medically appropriate. Of 267 family physicians responding to a survey, while 80% of respondents believed that long-acting opioids would be effective in controlling pain and would improve overall quality of life in patients with chronic noncancer pain, only two thirds of them indicated that they would be willing to prescribe long-acting opioids and about half of them believed that this would lead to patient addiction.⁶

Even though the evidence for long-term opioid therapy in chronic noncancer pain conditions remains limited, new guidelines provide detailed recommendations for clinical practice. Clinicians who treat patients with chronic pain need to understand these recommendations and apply them in everyday practice.

Recent Evidence of Opioid Efficacy in Chronic Noncancer Pain: In addition to the systematically reviewed and stratified evidence in the recent AAPM-APS and AGS guidelines, subsequent studies have added important data on the use of opioids for the treatment of several painful chronic conditions. For example, there is increasing evidence that in carefully selected osteoarthritis patients appropriately dosed and monitored opioids have potentially fewer life-threatening complications than some of the more commonly employed pharmacotherapeutic approaches.⁷ Furthermore, a review of 10 placebo-controlled studies in chronic OA pain showed improvements in both pain intensity and in sleep disturbances with the use of long-acting opioids, including improved sleep quality, reduced awakenings from pain, and increased duration of sleep.⁸

Opioids are commonly prescribed for chronic back pain and have proven efficacy for short-term pain relief.⁹ Long-term efficacy is unclear, primarily due to a lack of long-term studies.¹⁰ It is also unclear to what extent the use of opioids contributes to an improvement in functionality. Low back pain is very heterogeneous in etiology and presentation and proper patient selection for opioid prescribing is of critical importance. A systematic review published in 2008 evaluated 10 randomized trials of long-acting opioids in chronic back pain concluding that the various opioids studied were of similar efficacy.¹¹

The current neuropathic pain guidelines recommend opioids as second line treatment that can be used as a first-line approach in select clinical circumstances, such as the alleviation of severe pain, acute neuropathic pain, or during titration of another first-line medication.¹² Since the publication of these guidelines additional evidence supporting the efficacy of opioids in neuropathic pain has emerged.³ For example, a head-to-head comparison of oxycodone and gabapentin in PHN showed that oxycodone, but not gabapentin, significantly reduced worst pain compared to placebo.¹³ In an earlier study the combination of morphine and gabapentin at lower doses achieved better analgesia than either drug as a single agent.¹⁴ Research seems to be focusing on comparing existing agents in neuropathic pain as well as on systematically evaluating combination therapies with the goal of identifying synergistic or additive efficacy in pain control with attendant reductions in side effects. This research is reaffirming the important role that opioids have in the management of chronic neuropathic pain conditions.

High variability in response to different opioids has long been recognized and observed. One strategy to improve the response to therapy or to reduce adverse effects is opioid rotation or switching from one opioid to another. The first step in this strategy is the selection of a new drug at a starting dose that minimizes potential risks while maintaining analgesic efficacy. This starting dose is based on an estimate of the relative potency between the existing opioid and the new one. An expert panel was recently convened to re-evaluate the equianalgesic dose tables and the clinical protocols for opioid rotation as the science underlying relative potency evolves. The panel proposed a guideline intended to promote safety during opioid rotation by establishing best practice recommendations.^{15,16}

The 2009 Guidelines from the American Geriatrics Society have reaffirmed the importance of opioids in this large and vulnerable patient population.² While advocating an individualized and careful approach to opioid therapy, these guidelines remind clinicians to balance opioid analgesia against the harms of unrelieved pain as well as the potential adverse effects of opioid therapy. While these guidelines were reprinted in one pain publication (*Pain Medicine*) since their initial publication in the *Journal of the American Geriatrics Society*, they remain insufficiently known among other clinicians who provide care for older adults.

Consequences of long-term opioid use: the need for increased awareness and strategies for management: Opioids affect the endocrine, immune, respiratory and other systems. Most of the data on these effects come from animal studies, but there is a growing body of evidence on some of these effects in humans. Additionally, some of these effects are better understood than others and their clinical ramifications are not always clear. As long-term opioid prescribing for chronic noncancer pain conditions increases, clinicians will need to be aware of these effects and of strategies to diagnose and manage them.

Even though the negative effects of long-term opioid use on the endocrine system have been known for some time, neither these effects nor strategies to manage them are much discussed in pain management literature and there seems to be limited awareness of these effects among clinicians.

Long-term opioid therapy often induces hypogonadism via central suppression of hypothalamic secretion of gonadotropin-releasing hormone. There is some evidence that opioid-induced hypogonadism is much more prevalent in men than in women. Three studies have been published on the effect of long-term oral opioid therapy in men with chronic pain and have found that hormone levels were much lower in opioid users compared with controls. Specifically, total testosterone levels were subnormal in 74% of the opioid group with the attendant decrease in libido and sexual function. At least one study showed a dose-response effect. Significant improvements in hypogonadal symptoms, sexual function and mood were observed in these patients when they were treated with testosterone replacement therapy.¹⁷ Since the signs and symptoms of hypogonadism (including decreased libido, tiredness, depressed mood, loss of muscle mass and strength, erectile dysfunction) are also widespread in patients with chronic pain, clinicians may not entertain the possibility of hypogonadism as the cause. Best practice should include prospective assessment of these symptoms as well as laboratory endocrine monitoring.

There are no accepted standards for the management of presumptive opioid-induced hypogonadism. In patients with symptoms or laboratory abnormalities, the first option would be to switch treatments. While there is no information regarding whether opioid hypogonadism improves with opioid rotation, since other opioid side-effects occur idiosyncratically between patients, hypogonadism may also occur with different degree with different opioids in any individual patient. In patients who have failed multiple opioids testosterone supplementation for men and estrogen supplementation for women may be more appropriate.¹⁷ These patients need to be appropriately monitored, particularly because of the risk of cardiovascular disease with the former and cancer with the later.

High prevalence of osteoporosis has been reported in patients on methadone maintenance.¹⁸ Additionally, at least one study suggests that osteoporotic fractures can be caused by opioid-induced hypogonadism even when no other symptoms of hypogonadism are present.¹⁹ Monitoring of bone density should be considered in all patients at risk. When appropriate, one of the many treatments to maintain or increase bone density can be considered.

Chronic opioid use may have an effect on respiration and may be associated with sleep-disordered breathing or central apnea in about 30% of patients.²⁰ Patients who are obese, have COPD, or obstructive sleep apnea may be at higher risk of developing nocturnal sleeping disorders. At the same time, chronic pain itself causes sleep disturbances. As in all other areas of long-term opioid therapy, the individualization of treatment and careful monitoring are needed for achieving the balance between pain relief and side effects.

Opioid-induced hyperalgesia remains controversial. While there seems to be reasonable evidence in animals that opioid exposure will decrease the pain threshold, such evidence in humans is unclear. A recent systematic review of the literature has evaluated the evidence of opioid-induced hyperalgesia and concluded that its existence can be neither supported nor refuted, except in normal volunteers receiving opioid infusions.²¹ However, many publications discuss opioid-induced hyperalgesia as a noncontroversial fact. Clearly, more studies are needed. In the meantime, what is truly known and not known about this phenomenon needs to be discussed with clinicians.

Opioid misuse in chronic pain patients: Misuse of prescription opioids has increased along with the increased utilization of opioids for the relief of pain.²² Possibly the most critical issue in clinical practice is the identification of "at-risk" patients. To that end, several risk tools have been developed, such as SOAPP, ORT, and PADT, among others. Clinicians need to be aware of the benefits and limitations of these tools, as well as of predictors of aberrant behavior, such as history of illicit drug and alcohol abuse. Strategies such as urine drug screening, pill counts, and prescription drug monitoring programs have their place and may need to be individualized. Clinicians need to assess and reassess for risk, document, and monitor.

Misuse and diversion of opioids has grown with the overall greater opioid utilization making the identification of patients at risk more important than ever. This program will include a discussion of various risk assessment tools, as well as of other strategies clinician can use in everyday practice to minimize these risks.

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ESRAS-0540

REFRESHER COURSE: HOW DO WE DECIDE BETWEEN THE TRANSFORAMINAL, CAUDAL OR INTERLAMINAR APPROACH FOR EPIDURAL STEROID INJECTIONS

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Epidural injection of corticosteroids is one of the most commonly used interventions in managing lumbar radicular pain. An epidural steroid injection is a minimally invasive procedure that delivers steroids via a needle directly into the epidural space to help reduce inflammation. Since inflammatory and mechanical reaction between the intervertebral disc, posterior longitudinal ligament, and nerve roots have been suggested as playing an important role in provoking back pain, it is very important that the epidural steroid is administered in the appropriate concentration to the ventral epidural space, in the area of the source of pain, to accomplish therapeutic goals. Research showed that: dorsal contrast of flow in epidural space occurred in 100% of injections in interlaminar approach, ventral spread of the contrast in epidural space was seen only in 36% of injections in IL approach, a unilateral filling pattern in 84% of the patients; whereas, it was bilateral in 16%. A retrospective study by Schaufele et al, assessing pain improvement between IL and TF steroid injection over 18 months, reported TF ESI's superiority in short-term pain improvement and long-term surgical interventions. Recently evaluated clinical significance of PIL with MIL approach and reported that PIL was superior to the MIL approach. The PIL approach provided more patients with effective pain relief (68.4% vs 16.7% at 6 months), better VESp (89.7% versus 31.7% in MIL), better functional improvement, and less number of injections. The results of this assessment interlaminar and caudal approach showed significant improvement in patients suffering with chronic lumbar spinal stenosis with caudal and interlaminar epidural approaches with local anesthetic only, or with steroids in a long-term follow-up of up to 2 years, in contemporary interventional pain management setting, with the interlaminar approach providing significantly better results than caudal approach.

Key Words: Transforaminal approach epidural steroid injection, Interlaminar approach epidural steroid injection, Caudal approach epidural steroid injection

Research showed that: dorsal contrast of flow in epidural space occurred in 100% of injections in interlaminar approach, ventral spread of the contrast in epidural space was seen only in 36% of injections in interlaminar approach, a unilateral filling pattern in 84% of the patients; whereas, it was bilateral in 16%.⁵ The transforaminal approach to epidural injections results in deposition of the steroids in the ventral epidural space (VESp) in close proximity to the site of pathology and may require lesser volume and steroid dose. Using the TF technique, injectate was frequently localized in the unilateral periradicular space and did not cross the midline; therefore, it did not cover the contralateral space.⁵ Among various approaches for ESI, TF was considered as target specific and more effective as compared to IL in the past.^{6,7,8,9} This may be due to blind administration of IL or needle placement in the dorsal space under fluoroscopic guidance leading to limited VESp of steroid (28% – 47% only).^{5,10} Studies have suggested the superiority of TF ESIs for both short and long-term outcomes.^{7,9,11,12}

A retrospective study by Schaufele et al, assessing pain improvement and surgical rates between IL and TF injection over 18 months, reported TF ESI's superiority in short-term pain improvement and long-term surgical interventions.⁷ Ackerman and Ahmad, comparing efficacy of 3 fluoroscopically guided approaches (TF, IL, and caudal ESI) in patients with IDH, demonstrated TF ESI's superiority to IL ESI for lumbar radicular pain relief. They attributed this to higher VESp while using the TF approach.¹² An advantage of TF ESI is that it can be performed in patients with failed back surgery syndrome at the levels of surgeries. However, recent studies and systematic reviews show an equivalence of IL and TF injections. Rados et al, while comparing TF and IL approaches in patients with chronic unilateral radiculopathy, demonstrated significant functional and pain improvement with both approaches. Gharibo et al while

comparing IL and TF techniques in patients with subacute unilateral radiculopathy, reported comparable significant improvements in pain, function, and depression. The IL was entered through the epidural space with a paramedian approach and ipsilateral spread was confirmed. The authors concluded that IL could be the initial technique because of better safety and less patient discomfort. Manchikanti et al, while evaluating the effectiveness of a single injection of lumbar interlaminar local anesthetics (LA) with or without steroids for managing chronic pain or radiculitis, reported significant pain relief in 74% patients treated with LA and 86% with LA and steroids. The epidural space was entered at the L5/S1 level or at a level below the pathology to direct contrast flow toward herniated disc side. Furman et al evaluated the effect of ESI using a paramedian IL approach for lumbar radicular pain and showed pain improvement for at least 3 months.^{13–18,19}

Lately, good VESp is reported when the needle was placed in the lateral most part of the epidural space. Candido et al demonstrated 100% VESp with the paramedian interlaminar (PIL) approach and 75% spread with the TF approach. Choi and Barbella reported VESp in all patients using the LIVE approach of injection. However, these studies investigated contrast spread as the primary outcome. The clinical significance was either not elucidated or was limited by the observational uncontrolled nature.^{20,21} Recently evaluated clinical significance of PIL with medial interlaminar (MIL) approach and reported that PIL was superior to the MIL approach. The PIL approach provided more patients with effective pain relief (68.4% vs 16.7% at 6 months), better VESp (89.7% versus 31.7% in MIL), better functional improvement, and less number of injections.²² ESI is comparable with TF and PIL approaches under fluoroscopic guidance for achieving effective pain relief and functional improvement over 12 months for managing chronic lumbar back pain (CLBP) with unilateral radicular pain with the requirement of a comparable number of injections. ESI was without any complications with both approaches. The equivalent clinical outcomes with both approaches are most probably due to similar VESp. The PIL approach can either be a suitable alternative to the TF approach or the first choice for its probable better safety profile and technical ease.²³

In studies, IL techniques might have outperformed previous studies due to a lateral paramedian/parasagittal interlaminar approach (leftward or right, toward the side of complaint) compared to a traditional midline approach. However, final position of the needle in the epidural space during an IL approach was not clearly mentioned, though there were attempts to have the contrast spread on affected side which could influence drug spread.^{24–27}

Latest studies met the Cochrane Review criteria for randomized trials and the Agency for Healthcare Research and Quality criteria for observational studies. Five studies assessed were prospective and 3 were retrospective, altogether encompassing 506 patients. A difference in pain reduction of $\geq 20\%$ and functional score improvement of $\geq 10\%$ were considered clinically significant. At 2 weeks, TFESI was superior to ILESI in pain relief by 15%. However, at 1 or 6 months, no difference was found. Furthermore, combining pain improvements from all 5 prospective studies revealed $< 20\%$ difference between TFESI and ILESI (54.1% vs. 42.7%). Results comparing functional improvements between groups showed slight superiority for ILESI (56.4%) vs. TFESI (49.4%) at 2 weeks and very slight differences for combined data (TFESI 40.1% and ILESI 44.8%). Current practice trends have demonstrated a shift away from interlaminar epidural steroid injections, toward the increasingly more widespread practice of the transforaminal approach. Most complications from epidural injections are minor, but some can be serious, including the potential for neurological damage. This begs the question as to whether the increased risk of potential catastrophic morbidity is effectively offset by the minimal differences in efficacy between the 2 respective approaches (IL or TF).²⁸

To determine the efficacy of fluoroscopic guided transforaminal steroid versus interlaminar epidural steroid versus caudal steroid. The change in pain scores was statistically different at 1- and 6-month interval such that a higher change was observed by transforaminal route as compared to the other two. There was no difference in change of scores between interlaminar and caudal routes. For Oswestry Disability Index (OSD), a greater change was seen in transforaminal at all times as compared to the other two. There was no difference in change of scores between interlaminar and caudal routes at any time of assessment. In current study, transforaminal steroid injection group has better symptomatic improvement for both short and long term as compared to interlaminar and caudal steroid injection group.²⁹ The evidence in managing lumbar spinal stenosis is Level II for long-term improvement for caudal and lumbar interlaminar epidural injections. For transforaminal epidural injections, the evidence is Level III for short-term improvement only. The interlaminar approach appears to be superior to the caudal approach and the caudal approach appears to be superior to the transforaminal one. The available evidence

suggests that epidural injections with local anesthetic alone or with local anesthetic with steroids offer short- and long-term relief of low back and lower extremity pain for patients with lumbar central spinal stenosis. However, the evidence is Level II for the long-term efficacy of caudal and interlaminar epidural injections, whereas it is Level III for short-term improvement only with transforaminal epidural injections.³⁰

The results of this assessment interlaminar and caudal approach showed significant improvement in patients suffering with chronic lumbar spinal stenosis with caudal and interlaminar epidural approaches with local anesthetic only, or with steroids in a long-term follow-up of up to 2 years, in contemporary interventional pain management setting, with the interlaminar approach providing significantly better results than caudal approach.³¹ Of the current literature available, most of the professional associations recommend epidural application of steroids for lumbar radicular pain, and they prefer TF approach in comparison to IL. The TF approach is considered more efficacious than the interlaminar approach probably because of ventral epidural spread. However, catastrophic complications reported with the TF approach have raised concerns regarding its use. These concerns regarding the safety of the TF approach lead to the search for a technically better route with lesser complications with drug delivery into the ventral epidural space. The parasagittal interlaminar (PIL) route is reported to have good ventral epidural spread. Parasagittal interlaminar approach is a good alternative to TF approach, but it is necessary to perform additional research to confirm its superiority in comparison to TF.

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ESRAS-0247 Best Free Papers

NEUROTOXICITY OF LIPOSOME BUPIVACAINE VS. BUPIVACAINE HCL AFTER INTRANEURAL (EXSTRAFASCICULAR) INJECTION IN A PORCINE SCIATIC NERVE MODEL

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Aims: Intraneural injections continue to occur inadvertently despite the use of ultrasound guidance. Since the majority of them are extrafascicular, the possibility of nerve injury is quite low. Local anaesthetics, on the other hand, may contribute to nerve injury with the longer and intimate fascicular exposure as in prolonged release formulations. The aim of this study is to evaluate the neurotoxicity of liposome bupivacaine as compared to bupivacaine HCl after intraneural (extrafascicular) injection using histomorphometric analysis, and secondly, to assess a possible neurological dysfunction with the extent of sensory and motor blockade.

Method: After Review Board for Animal Research approval, 15 pigs were studied in this double-blind prospective trial. They were randomized into three groups (n=5) according to intraneural (extrafascicular) injections of respective 4 ml of 1.3% liposome bupivacaine, 0.5% bupivacaine HCl and saline. After the experiment the animals were subjected to serial neurologic examinations using the Thalhammer's scale. At a 2-week end point their nerves were harvested to perform a histomorphometric analysis.

Results: No changes in axonal density and myelin structure indicative of nerve injury were observed in any of the studied groups. A quantitative analysis revealed a similar distribution of histomorphometric parameters between the groups (Table 1). Neither of the injections resulted in persistent neurological deficit throughout the study period. Significantly longer sensory (P=0.001) and motor blocks (P<0.0001) were observed after liposome bupivacaine injections.

Conclusion: Under the conditions of our study, neither liposome bupivacaine nor bupivacaine HCl resulted in neurotoxicity after intraneural (extrafascicular) injections.

ESRAS-0189 Best Free Papers

DIABETIC NEUROPATHY INCREASES STIMULATION THRESHOLD DURING POPLITEAL SCIATIC NERVE BLOCK

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Aims: This study examined motor activity thresholds for peripheral nerve stimulation in sciatic nerve blocks in patients with and without diabetic neuropathy.

Method: The study was approved by the ethics committee of the Medical University of Graz, Austria. Patients >18 years, ASA status I-IV were eligible. Preoperative evaluation included a detailed neurological exam and electroneurography. During ultrasound (US) guided popliteal sciatic nerve block, we measured the current required to produce distal motor activity for the tibial nerve (TN) and common peroneal nerve (CPN) in diabetic and non-diabetic patients. Proximity to the nerve was evaluated *post-hoc* using US imaging.

Results: Average stimulation currents did not differ between diabetic patients (n=55) and non-diabetic patients (n=52). Subjects with diminished pressure perception showed increased threshold for the CPN (median 1.30mA vs. 0.57mA in subjects with normal perception, p=0.042), as did subjects with decreased pain sensation (1.60mA vs. 0.50mA in subjects with normal pain sensation, p=0.038). Slowed ulnar nerve conduction velocity predicted elevated mean stimulation current (r=-0.35, p=0.002). Finally, 15 diabetic patients required more than 0.5mA to evoke a motor response despite intraneural needle placement (n=4) or required current ≥2mA despite needle-nerve contact, versus 3 such patients (1 intraneural, 2 with ≥2mA) among non-diabetic patients (p=0.003).

Conclusion: These findings suggest that stimulation thresholds of 0.3-0.5mA may not reliably determine close needle-nerve contact during popliteal sciatic nerve block, particularly in patients with neuronal dysfunction due to diabetes mellitus.

TABLE 1. Histomorphometric Analysis

Type of injection	Percentage of fascicle area per nerve	Fiber density in fascicles (fibers/mm ²)	Fiber area in fascicles (μm ²)	Percentage of large fibers per nerve	Large fibers diameter (μm)	Axon diameter (μm)	Myelin width (μm)
Intraneural liposome bupivacaine	47,49±10,58	15074,49±7017,88	34,09±16,20	50,77±17,10	8,96±2,07	3,72±1,97	2,62±50
Intraneural bupivacaine HCl	49,85±10,65	14167,15±4220,36	30,42±16,51	44,06±12,77	8,41±1,18	2,84±0,64	2,78±0,26
Intraneural saline	56,26±7,61	12254,05±3008,43	29,14±9,33	67,74±15,73	8,95±0,86	3,51±0,56	2,72±0,58
Negative control (non-injected)	54,20±3,71	15211,87±7266,80	30,19±13,36	61,38±21,89	8,75±1,36	3,49±0,96	2,63±0,38
*P-value	0,161	0,893	0,142	0,092	0,975	0,785	0,970

There was no statistically significant difference among groups. *P-value is calculated by using ANOVA. The data are presented as mean ±SD.

ESRAS-0051

Best Free Papers

EPIDURAL ANALGESIA IS SAFE AT TOLAC FOR THE MOTHER AND NEONATE

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Aims: Epidural analgesia has been assigned a risk factor for failed TOLAC and uterine rupture. This study aim is to assess the maternal and neonatal safety of the use of epidural at TOLAC.

Method: A cohort study of women who engaged in TOLAC after one low segment CS with a singleton fetus in vertex presentation, 2006–2013, based on a validated computerized database at a single center. Women with epidural at TOLAC (exposed) were compared to women without epidural (non-exposed). Primary outcome: CS in labor vs vaginal delivery (VD) and uterine rupture (UR). Secondary outcome: instrumental delivery and maternal and neonatal adverse outcome.

Results: During the study 105,471 births were registered, 9464 (9%) eligible for TOLAC; 7149 (75.5%) of the eligible engaged in TOLAC, among which 4081 (57.1%) were exposed (epidural).

The rate of CS in labor was lower in exposed women vs non-exposed 356 (8.7%) vs 361 (11.8%), $p < 0.0001$. while the rate of UR was similar among groups 25 (0.6%) vs 16 (0.5%) $p = 0.61$, respectively. An increased rate of instrumental delivery was observed in the exposed 479 (11.7%) vs non-exposed 85 (2.8%), $p < 0.0001$.

A multivariate model adjusted for: maternal age, education, ethnicity, complications, ART, gestational age at birth, labor induction, oxytocin during labor, past VD and Bishop ≥ 6 , showed a significant higher rate of VBAC at TOLAC: OR 3.34 (2.44–4.59) for exposed, $p < 0.0001$.

Conclusion: Epidural analgesia at TOLAC is safe for mother and neonate while emerging as a significant contributor to successful VBAC. Its use lessens the anxiety at TOLAC and reduces the repeat CS rate.

ESRAS-0340

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RECOMMENDED DOSES OF LEBOBUPIVACAINE FOR TAP BLOCKS: DEVELOPMENT OF A PHARMACOKINETIC MODEL AND ESTIMATION OF THE RISK OF SYMPTOMS OF LOCAL ANESTHETIC SYSTEMIC TOXICITY

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Aims: Local anesthetic systemic toxicity (LAST) cases have occurred after TAP blocks using levobupivacaine. No population pharmacokinetic (PK) models describing levobupivacaine absorption during TAP blocks are currently available. Our aim is to characterize levobupivacaine absorption pharmacokinetics with and without epinephrine using a population modeling approach, estimating the risk of LAST of different dose schemes, based on simulation analysis.

Method: This secondary analysis of levobupivacaine PK used data from a study previously published¹. Eleven volunteers underwent ultrasound-guided TAP block in two independent occasions; one receiving 20 ml of plain 0.25% levobupivacaine, and a second one adding epinephrine (5mcg/ml) to the anesthetic solution. Serial venous plasma concentrations were measured for 90 minutes.

Plasma concentrations of levobupivacaine were used to estimate population parameter PK, using non-linear mixed effects models. The analysis of covariates included patients' weight and the use of epinephrine.

Estimated pharmacokinetic parameters of levobupivacaine with and without epinephrine and their variability were used to test different dose schemes in a simulated population of 1000 patients.

Results: Levobupivacaine data fits a one-compartment first order input and elimination model. Using the simulation analysis, the associate risk of LAST symptoms for two commonly recommended dose schemes of 3 mg/kg

TABLE 1. Risk of Local anesthetic toxicity symptoms according to the simulation analysis in 1000 healthy subjects

Dose (mg/kg)	With epinephrine	Without epinephrine
1.5	0%	0.1%
2.0	0%	1.1%
2.5	0%	5.5%
3.0	0.1%	13.3%
3.5	0.5%	27.2%

levobupivacaine with epinephrine and 2.5 mg/kg levobupivacaine without epinephrine is shown in Table 1.

Conclusion: Using 3.0mg/kg of levobupivacaine with epinephrine has an associated risk of reaching toxic concentrations of 0.1%. In contrast, using 2.5mg/kg of plain levobupivacaine would significantly increase this risk to 5.5% of the patients receiving that dose.

Reference:

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ESRAS-0346

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UNCOMMON CAUSES OF SCIATICA: THREE-CASE REPORT

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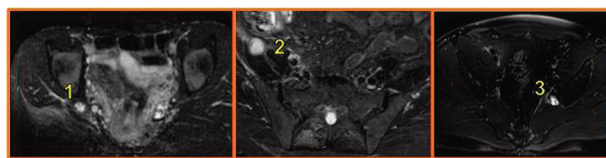
Aims: Sciatica is caused by compression of the lumbar and sacral nerve roots or of the sciatic nerve. The most common cause is a herniated or protruded intervertebral disc, although it might be caused by a list of more unusual etiologies, as we show.

Method: We present three clinical cases of uncommon causes of sciatica.

Results: 1. 38 yo female who consults because of invalidating right leg pain and radiculopathy. She undergoes several epidural infiltrations and right piriformis muscle infiltration, with little improvement. After several months the patient realizes that her pain increases during her menstrual cycle. Endometriosis is suspected, so a MRI is performed, which shows involvement of the obturator foramen. She's referred to the gynecologist, and hormonal therapy is initiated with complete recovery.

2. 77 yo female with neurofibromatosis and polyarthralgias. She consults because of severe pain in her right gluteus, irradiated to her right thigh. A pelvic MRI is performed which shows a solid image near her right sciatic nerve, that in the context of her multiple skin lesions, it's considered to be a neurofibroma.

3. 46 yo male who presents with left gluteal pain irradiated to below the popliteal fossa and paresthesias lasting several months. No improvement with medical treatment. An MRI is done, which shows an intraneural polylobulated cyst in the left sciatic root of S1. The patient is referred to neurosurgery, but the pain resolves spontaneously.



1: Endometrioma cyst.
2: Neurofibroma.
3: Radicular cyst.

Conclusion: When treating a patient with sciatica, it is important to consider the multiple etiologies that can cause it, especially if the patient doesn't progress as expected.

ESRAS-0025

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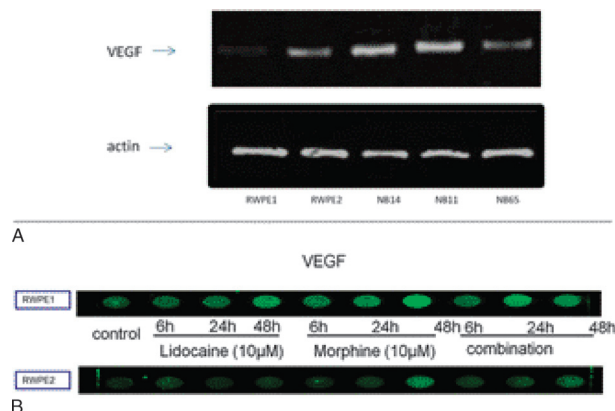
MORPHINE-INDUCED VEGF SECRETION BY PROSTATE CANCER CELLS: IS IT INHIBITED BY LIDOCAINE?

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Aims: The aim of this study was to examine whether lidocaine demonstrates an antiangiogenic effect in a variety of prostate cancer cell lines mimicking various stages of prostate cancer progression from pre-metastatic stage (RWPE1, RPWE2) to metastatic stage (WPE1-NB2665), by opposing morphine-induced VEGF secretion.

Method: Human tumorigenic prostate epithelial cell lines derived from RWPE1 cells were used. VEGF secretion was measured using a dot-blot system. The effect of morphine and lidocaine at a concentration of 10 μ M each, as well as their combined effect on VEGF secretion from the above cells lines was measured. For studies of angiogenic potential a Boyden chamber transwell system was used of the well and human microvascular endothelial cells plated on the insert.

Results: We found that VEGF secretion is maximal in the case of RWPE2, a cell line that represents a pre-metastatic stage. Metastatic WPE1-NB2665 secreted the lowest levels of VEGF among the tumorigenic cell lines. In contrast to RWPE2 where morphine markedly enhanced VEGF secretion, WPE1-NB2665 showed no response to morphine in regards to VEGF secretion (Figure 1a). Lidocaine suppressed morphine induced VEGF secretion in RWPE2 cells (Figure 1b). RWPE2 showed the highest angiogenic potential as indicated by the induction of endothelial cell migration.



Conclusion: In vitro results suggest that lidocaine may be suppressing the morphine angiogenic potential by decreasing morphine-induced production of VEGF. Our findings indicate that the pro-angiogenic effects of morphine are stage dependent, being highest on cells representing prostate carcinoma *in situ*, characterized by high basal VEGF secretion.

ESRAS-0100

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EFFECT OF LOCAL ANESTHETIC CONCENTRATION, DOSE AND VOLUME ON THE DURATION OF SINGLE-INJECTION ULTRASOUND-GUIDED AXILLARY BRACHIAL PLEXUS BLOCK WITH MEPIVACAINE: A RANDOMIZED OBSERVER-BLINDED TRIAL

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Aims: In what way volume, concentration and dose affect block duration is controversial. The purpose of this investigation is to study the effect of dose, volume and concentration of mepivacaine on the duration of sensory and motor blockade in ultrasound-guided axillary brachial plexus blockade. This study was approved by the Independent Review Board Nijmegen.

Method: 45 patients were randomized to 3 groups of 15 patients each: Group A: 20 mL mepivacaine 1.5%, Group B: 30 mL mepivacaine 1% and Group C: 30 mL mepivacaine 1.5%. Duration of sensory and motor block was compared.

Results: Mean sensory and motor block duration in Group B was reduced by 44 minutes (95% CI: -79 to -8 and -80 to -7) when compared to Group C. No difference was found between Groups A and C. Group A compared to Group B showed a clear trend towards an increased mean sensory and motor block duration of 30 (95% CI: -5 to 65) and 34 (95% CI: -3 to 70) minutes in favor of the higher concentration of mepivacaine.

Conclusion: When using equal volumes of mepivacaine for axillary brachial plexus block, a higher dose/concentration is associated with a longer duration of sensory and motor blockade. When using equal doses of mepivacaine in different concentrations/volumes, the higher concentration is associated with a trend towards a longer duration of action. A higher volume/dose with equal concentration is not associated with a longer duration of action. This study suggests that concentration is an important factor in block duration.

ESRAS-0026

Best Free Papers

COMPARATIVE STUDY MEASURING OPTIC NERVE SHEATH DIAMETER BY TRANSORBITAL ULTRASOUND IN HEALTHY WOMEN, PREGNANT WOMEN AND PREGNANT WITH PREECLAMPSIA / ECLAMPSIA

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Aims: To compare the diameter of the optic nerve sheath transorbital measured by ultrasound between healthy women, pregnant women and pregnant women with preeclampsia/eclampsia.

Method: Cross-sectional, multicenter study. 3 groups were included: Group1: healthy women. Group2: women with pregnancy. Group 3: women with preeclampsia / eclampsia. We obtained urine protein, serum creatinine and platelets, blood pressure, related symptoms. Diameter 3 mm behind the eyeball and an axis perpendicular to the optic nerve was measured. Three measurements of each eye were made, averaging them to give a mean to minimize the variability of the measurement.

Results: 60 patients, 20 in each group. The diameter of the optic nerve sheath was higher with statistical significance ($p < 0.05$) for both eyes in patients with preeclampsia/eclampsia. In group 3, 20% in the right eye and 25% in the left eye had a diameter of optic nerve sheath above 5.0 mm

Conclusion: Pregnant patients with the diagnosis of preeclampsia/eclampsia had diameters larger than the optic nerve sheath compared with women with normoevolutive pregnancies and healthy women. In this sense, measurement transorbital DVNO by ultrasound appears as a new promissory tool, affordable, accessible and non-invasive evaluation and timely care of patients with preeclampsia/eclampsia to rule elevated intracranial pressure.

ESRAS-0035

Best Free Papers

EFFECT OF INJECTION PRESSURE ON SPREAD OF INJECTATE IN THE INTERSCALENE SPACE IN HEALTHY VOLUNTEERS

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Aims: High opening injection pressure (OIP) can detect needle-nerve contact and influence the spread of local anesthetic. [i] Injection pressure >20 PSI is associated with significant spread of injectate into the epidural space after lumbar plexus block. [ii] The effect of injection pressure on disposition of the injectate in the interscalene space has not been studied yet.

Method: After L4 IRB approval, nine volunteers received injections of 10 mL contrast dye (Omnipaque 240R; GE) in the interscalene space. Perineural needle position was confirmed by ultrasound, absence of neurostimulation <0,5 mA (0,1 msec) and OIP <15 PSI (Braun BSmart) for the test injection of the initial 1 mL. The remaining 9mL were injected under low (<15 PSI) or high pressure (>20 PSI), at 10–20 mL/min. Spread of the injectate was evaluated by CT-scan.

Results: Adequate spread (C5 to C7) of contrast occurred after all injections. Regardless of injection pressure, contrast was detected underneath the cervical fascia over the surface of the anterior and middle scalene muscle. Substantial spread of the injectate in the cervical epidural space was noted in one volunteer after high-pressure injection.

Conclusion: Disposition of contrast in the interscalene space did not seem to be affected by injection pressure. However, injection >20PSI resulted in significant epidural spread in one volunteer. (Figure 1) Similar spread of local anesthetics with interscalene block could lead to inadvertent cervical epidural block.

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- [i] Gadsden et al. *Anesthesiology* May 2014 120 (5); 1246-53.
- [ii] Gadsden et al. *Anesthesiology* Oct 2008 109(4); 683-8.

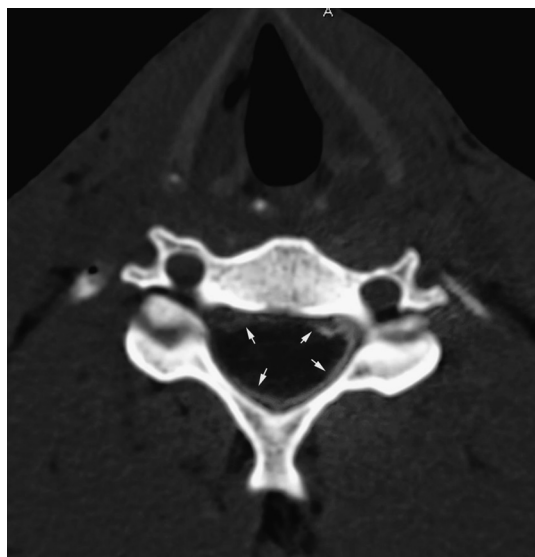


FIGURE 1. Epidural spread in one volunteer.

Abstracts and Highlight Papers of the 34th Annual European Society of Regional Anaesthesia & Pain Therapy (ESRA) Congress 2015: Free Communication Papers

ESRAS-0393

Free Communications 1

ULTRASOUND GUIDED SUPERIOR HYPOGASTRIC PLEXUS BLOCK. CADAVERIC STUDY AND CASE REPORT

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Aims: Superior hypogastric plexus block and neurolysis is used to manage sympathetically mediated pain arising from the pelvic viscera caused mainly by malignancy, chronic inflammation within the pelvis and more recently for pain after uterine fibroid embolization. Pharmacotherapy is often insufficient and increasing doses of opioids causes poorly tolerated side effects. Superior hypogastric plexus lies on the anterior surface the L4, L5 and S1 vertebral body. The first neurolysis was performed and described by Plancarte et al. in 1990.

Method: Traditionally the procedure is performed with the fluoroscopic guidance from the posterior approach. Needle entry is usually lateral to the spinous process of L5, 5–7 cm from the midline. The common technical problem is to bypass the transvers process of L5 and avoid puncture of the iliac artery and vein which lie in proximity. After analyzing of the anatomical models and scans of the lumbar region authors concluded that it is possible to visualize antero-lateral part of the L5 vertebral body with ultrasound and perform superior hypogastric plexus block under direct vision. This allows avoiding bony obstacles and minimizing the risk of iliac artery and vein puncture.

Results: Authors performed cadaver study with ultrasound guided needle placement on the anterolateral surface of the L5 vertebral body and injection of the contrast. Correct placement was confirmed with fluoroscopy and in postprocedural dissection. Consequently similar procedure was performed in patient with advanced bladder cancer with a good outcome and no complications

Conclusion: Ultrasonography guidance superior hypogastric plexus block may be supplementary or alternative to fluoroscopy.

ESRAS-0432

Free Communications 1

COMPARISON OF 2-CHLOROPROCAINE, BUPIVACAINE AND LIDOCAINE FOR SPINAL ANESTHESIA IN KNEE ARTHROSCOPY IN AN OUTPATIENT SETTING: A DOUBLE BLIND RANDOMISED TRIAL

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Aims: The short duration of knee arthroscopy and high turnover in day-care requires a fast onset and quick recovery from spinal anesthesia. We compared 2-chloroprocaine, bupivacaine and lidocaine and hypothesized that 2-chloroprocaine is an optimal local anesthetic with the shortest ambulation time and no neurotoxicity.

Method: Following ethical committee approval and written informed consent, we included 99 patients in a prospective, double blind and randomized trial from October 2011 until May 2014. Primary endpoint was time from spinal injection to ambulation. Secondary endpoints were the ratio successful over failed blocks, per- and postoperative analgesia, voiding and discharge times, incidence of transient neurologic symptoms (TNS) and hemodynamics.

Results: Ambulation time was shorter with 2-chloroprocaine vs. lidocaine ($p=0.006$) and bupivacaine ($p<0.0001$, Figure 1). After three hours, 93.8%, 84.4% and 2.9% had a complete recovery of the motor and sensory block for 2-chloroprocaine, lidocaine and bupivacaine, respectively. Conversion to general anesthesia occurred in 12.5%, 6.3% and 2.9% of cases for lidocaine, 2-chloroprocaine and bupivacaine, respectively ($p=0.29$). Voiding time was longer for bupivacaine compared to lidocaine and 2-chloroprocaine ($p<0.0001$).

Discharge time was longer for bupivacaine compared to 2-chloroprocaine ($p=0.001$) and lidocaine ($p=0.02$). The need for **postoperative analgesia** was less for bupivacaine compared to lidocaine ($p=0.006$) and 2-chloroprocaine ($p=0.003$). There was no difference in satisfaction, perioperative anesthesia and hemodynamics and no TNS (Figure 1).

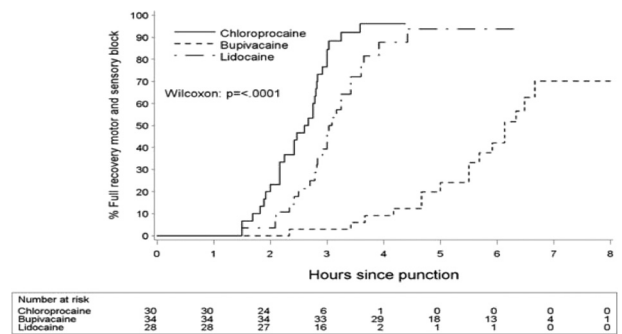


FIGURE 1. Primary endpoint: ambulation time

Conclusion: 2-Chloroprocaine was the most suitable drug for spinal anesthesia with the shortest ambulation, voiding and discharge time without neurotoxicity. Hemodynamics remained unaltered and patient satisfaction was high. Nonetheless, clinical attention for sufficient postoperative analgesia was mandatory.

ESRAS-0150

Free Communications 1

SERRATUS PLANE BLOCK AND LONG-ACTING EFFECTIVE ANALGESIA IN BREAST SURGERY, CASE REPORT

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Aims: The problem of postoperative pain in breast surgery remains to this day not entirely solved^{1,2}. The introduction of new interfascial blocks in breast surgery provides the opportunity to have a good long-lasting pain control, with no occurrence of PONV nor postoperative complications.

Method: A 61-year-old patient, ASA-2, undergoing lumpectomy and axillary dissection. In the operative room, Serratus plane block was performed by injecting Mepivacaine 2% 15ml + Ropivacaine 0.75% 15ml between latissimus dorsi and serratus anterior at level of 5th rib. Intraoperative sedation with spontaneous breathing was maintained with continuous infusion of Propofol 4mg/kg/h, nasal cannula (O2 flow 3lt/min) and capnography monitoring. The following day, the surgeon proceeded to drain a large hematoma formed in the surgical cavity, with revision of hemostasis and compressive bandage in outpatient setting, without the need of general anesthesia nor local anesthetics, avoiding taking the patient to the operating room.

Results: In addition to an adequate anesthetic plane, intraoperative hemodynamic stability and postoperative analgesia, the excellent analgesic residual effect due to the block allowed the drainage of hematoma 24 hours after the intervention, in outpatient setting.

Conclusion: Breast surgery with extension to the axilla causes a moderate/severe pain not only in the first postoperative day, but often also in the first 48-72 hours. Serratus plane block has provided an excellent anesthetic plane and a long-lasting effective analgesia, so that the surgeon has been able to evacuate a hematoma the day following the operation in outpatient setting, with reduced recovery time.

ESRAS-0151

Free Communications 1

CAN BILATERAL PECS II BLOCK PROVIDE A GOOD QUALITY OF ANESTHESIA AND A VERY LONG LASTING ANALGESIA AFTER BILATERAL MASTECTOMY? A CASE REPORT

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Aims: The pectoral nerves (Pecs) block II is a new technique to block the pectoral, intercostobrachial, third to sixth intercostals, and the long thoracic nerves. This technique can provide good analgesia during and after breast surgery. A bilateral Pecs block was performed in L'Aquila Academic Hospital for bilateral mastectomy.

Method: After IRB approval and written patient consent statement, in L'Aquila Academic Hospital an ultrasound-guided bilateral Pecs block II was performed, in a 46 year old woman for bilateral mastectomy. Overall 20 ml of levobupivacaine 0.5% for each breast, were injected. 5 mcg of sufentanil and 3-5 mg/kg/h of propofol were injected to provide a light sleep with easy arousability, in order to ensure sedation during surgical procedure. Supplemental oxygen (2 L/min) was administered by nasal dispenser with ETCO₂ control. Heart rate, main blood pressure, arterial oxygen saturation and ETCO₂ greater or less than 30% of baseline were treated.

Results: At the end of the surgery, propofol infusion was stopped and patient was taken to phase 1 post-anaesthesia care unit (PACU) and then to phase 2 PACU 4,2 mg/kg/h of propofol were injected. No supplemental painkillers were requested by the patient neither in PACU phase 1 and 2 neither in the first 24 hours. The day after surgery, the patient was discharge from the hospital and no side effects were recorded.

Conclusion: This experience showed that Pecs block II can provide a good quality of anesthesia and a very long lasting analgesia with sparing of painkillers for a positive benefits/costs ratio.

ESRAS-0185

Free Communications 1

QUADRATUS LUMBORUM TYPE II BLOCK FOR ANALGESIA IN LAPAROSCOPIC CHOLECISTECTOMY

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Aims: The Quadratus Lumborum (QL) block provides effective analgesia of the abdominal wall on dermatomes T6 to L1, as well as visceral analgesia due to cephalic diffusion of the local anesthetic to the ipsilateral paravertebral space. Given the growing interest in this block, we tested its efficacy as an opioid-sparing strategy in a laparoscopic cholecystectomy.

Method: We report the case of a 54 year-old ASA II male undergoing elective laparoscopic cholecystectomy in our hospital, who accepted a right-sided ultrasound-guided QL type II block as part of his analgesic strategy. We performed the block with 20ml 0.5% Ropivacaine immediately prior to anesthetic induction. The procedure took 60 minutes to complete under balanced general anesthesia. Intra-operative analgesia consisted of intravenous Paracetamol 1g, Ceterolac 30mg, and no opioids.

Results: Shortly after recovery and during the 6 hours following the block, the patient reported no pain at rest or movement, motor block, need for additional analgesia, or side effects. Overall, he was very satisfied with his pain management

strategy. After this period, the patient required his first analgesia bolus due to mild abdominal pain.

Conclusion: The QL block differs from the Transverse Abdominis Plane block since it covers a larger dermatomal area and has the potential to control visceral pain. Although the exact indications for the QL block remain unclear, it provided excellent pain control and no side effects; therefore, it might constitute an attractive opioid-sparing strategy for surgeries prone to cause post-operative nausea and vomiting such as laparoscopic cholecystectomies.

ESRAS-0241

Free Communications 1

QUADRATUS LUMBORUM TYPE II BLOCK AS AN ANALGESIC APPROACH FOR TOTAL GASTRECTOMY

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Aims: The Quadratus Lumborum (QL) is a recent peripheral nerve block which constitutes an attractive alternative to Transverse Abdominis Plane blocks or thoracic epidurals: while the first technique doesn't provide visceral analgesia, the latter carries non-negligible risks and is not always feasible or accepted by patients. We endeavoured to test the analgesic efficacy of the QL type II block in a patient undergoing total gastrectomy.

Method: We report the case of an 83 year-old ASA III male undergoing elective total gastrectomy who refused a thoracic epidural for intra and post-operative pain management, due to fear of neuroaxis-related complications. We performed an ultrasound-guided QL type II block with bilateral injection of 15 ml 0.25% Levobupivacaine immediately prior to anesthetic induction. Intraoperative analgesia consisted Fentanyl 0.15mg for induction and Paracetamol 1g given 30 minutes before the end of the procedure, which took 3 hours to complete under balanced general anesthesia.

Results: During his stay at the post-anesthesia care unit the patient reported mild pain during movement in the upper abdomen. He reported no pain at rest, motor block, need for additional analgesia, or any side-effects. 6 hours after the block was performed, the patient required its first rescue analgesia bolus.

Conclusion: The bilateral QL type II block provided excellent abdominal wall and visceral analgesia for 6 hours, with no side effects. The placement of interfascial catheters might make this a viable alternative to thoracic epidurals, particularly in patients who refuse neuroaxial approaches or in whom they are not easily feasible.

ESRAS-0101

Free Communications 2

PULSED RADIOFREQUENCY TREATMENT (PRF) FOR CHRONIC PAIN- AN AUDIT OF OUTCOMES AT NORFOLK AND NORWICH UNIVERSITY HOSPITAL, UK

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Aims: PRF is a non-destructive neuromodulation technique that modifies gene expression and is therefore, an attractive treatment avoiding the risks of deafferentation associated with thermal radiofrequency lesioning of somatic sensory neurones.

This audit evaluates the outcomes from PRF neuromodulation carried out in our hospital.

Pulsed RF: 2Hz, 20mS pulse width at 45-60V, 42deg C, for 240s, using a Radionics RFG-3C plus generator was offered to patients who obtained short-term benefit from LA + steroid procedures.

Method: With local audit committee approval, a retrospective review of case notes was undertaken of patients who underwent PRF neuromodulation between 01.01.2011 and 31.12.2012. Data was analysed for procedures, outcome, discharge and complications.

Results: A total of 137 treatments were analysed.

PRF neuromodulation produced a longer lasting pain relief in 65% cases, however, in 35% cases, there was minimal or no benefit. Following treatment, 42 (31%) of patients were discharged of whom 30 (66%) reported positive outcome (Table 1).

TABLE 1.

Procedure	Number	Positive outcome (%)
Nerve root/DRG	78	57
Lumbar sympathetic chain	14	57
Stellate ganglion	4	75
Suprascapular Nerve	17	64
Other Peripheral nerves	14	52
Coccyx	7	72
Cervical medial branch	2	100
Trigger Point / scar	18	61

2 patients reported temporary leg numbness and one had severe flare-up following lower lumbar nerve root blocks.

Conclusion: PRF neuromodulation is a safe procedure providing longer duration of pain relief than LA+steroid. More than 50% of treatments resulted in a positive outcome and 30% patients were discharged following review 3 months post-procedure. Our results are encouraging but should be confirmed in a prospective RCT.

ESRAS-0229

Free Communications 2

OCCIPITAL NERVE STIMULATION FOR INTRACTABLE COMPLEX HEADACHES: A CASE REPORT WITH A TWO YEARS FOLLOW UP

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Aims: Although occipital nerve stimulation (ONS) is becoming a mainstream treatment for intractable occipital neuralgia and migraine headaches, its effectiveness in attenuating complex headaches has not been studied. Here we present a patient who has been suffering from intractable mixed headaches and gained a long-term pain relief following ONS.

Method: A 39 year old woman with a 4-year of severe headaches, was diagnosed with combined migraine, bilateral occipital neuralgia (right > left) and tension-type headaches (TTH). Both preventive and abortive medical treatments, as well as repeated occipital nerve blocks (steroids plus local anesthetics) resulted in only partial and temporary relief. An ONS trial procedure was performed with a single octrode lead implantation (right occipital area). The one week trial period resulted in 50% decrease in the intensity and frequency of all three headaches. Therefore two permanent octrode leads and an internal pulse generator (Eon-mini IPG, SJM) were implanted.

Results: ONS led to dramatic and persistent improvement: migraine attack frequency and intensity decreased by more than 80%. Mean TTH intensity dropped from 9-10 to 0-2 (0-10 VAS). Attacks of occipital neuralgia on both sides were completely abolished. Additionally, limitations in daily activities and analgesic consumption have been reduced and the patient resumed regular employment. No complications were reported during the entire 2 years follow up.

Conclusion: This case report suggests that ONS may provide long-term, adequate and safe pain relief even in patients with intractable complex headaches. Studies aimed to verify this observation are recommended.

ESRAS-0206

Free Communications 2

PRESCRIPTION PATTERNS FOR POSTHERPETIC NEURALGIA PATIENTS WITH OR WITHOUT DIABETES

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Aims: To assess whether diabetes affects the pattern of prescription for the management of post-herpetic neuralgia (PHN), a retrospective claims analysis was conducted.

Method: This was a retrospective analysis of administrative claims data of a tertiary care center in Taiwan from Jan 2010 to Dec 2013. Cases were defined

with ICD-9-CM code as zoster (from 053.0 to 053.9) with or without a combination of diabetes (ICD-9-CM code 250) present in outpatient service claim. PHN was defined as visiting a physician again with a coding of zoster more than 90 days after the first onset in addition to receiving treatment for neuralgia. Prescription of specific neuropathic pain medications included topical analgesics, tricyclic antidepressants (TCAs), anticonvulsants and tramadol in patients with a previous diagnosis of zoster were analyzed.

Results: Outpatients (n=2997) with a diagnosis of PHN were recruited. The medications of first and second lines therapy were prescribed for less than 57% of the study subjects. The gabapentin were more often prescribed than pregabalin, TCAs or tramadol for these PHN subjects (71.1% vs. 49.9%, 36.3% and 15.6%, respectively). About one fifth (20.3%) of these PHN patients were diabetes. There was no significant difference in the prescriptions of gabapentin, pregabalin or tramadol for PHN subjects between diabetes and non-diabetes. The TCAs were more likely to be prescribed for PHN subjects with diabetes than non-diabetes (55.1% vs. 48.3%, $p=0.023$).

Conclusion: The management of PHN is suboptimal. Except TCAs, the analgesics were not prescribed significantly more often for PHN subjects with diabetes than for non-diabetes.

ESRAS-0418

Free Communications 2

PERIPHERAL NEUROPATHIC FACIAL/TRIGEMINAL PAIN AND RANTES IN JAWBONE CAVITATION

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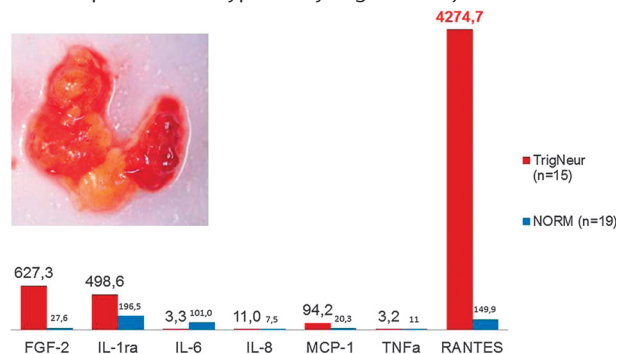
Aims: Neurons contain opioid-receptors which transmit anti-pain-reactions as well in peripheral as in central nervous system. Opioid containing remedies sensitize in an agonistic contrary effect the opioid-receptors and block the conduction of pain. Pro-inflammatory chemokines like RANTES CCL5 de-sensitize, μ -opioid-receptors in periphery sensory neurons and it is suggested that RANTES interacts with opioid receptors and modifies a nociceptive reaction.

This study tries to elucidate the possible causative role of chronic subclinical inflammation in jawbone in patients with atypical facial pain (AFP) and trigeminal neuralgia (TRN) by local overexpression of chemokine RANTES

Methods: In 15 patients with AFP/TRN we examined fatty degenerated samples of jawbone (FDOJ) for 7 cytokines by multiplex analysis.

Results: Each of these medullary jawbone samples showed RANTES as the only extremely overexpressed cytokine. FDOJ cohort with AFP/TRN showed a mean 35 fold overexpressed RANTES compared to healthy jawbone.

Comparison of 7 cytokines in FDOJ samples (n=15) of facial pain patients to normal jawbone (n=19) in Multiplex-Analysis (pg/mL); picture shows typical fatty degenerated jawbone.



Abbreviations: FGF-2, fibroblast growth factor 2; IL-1ra, interleukin 1 receptor antagonist; IL, interleukin; MCP-1, monocyte chemoattractant protein 1; TNFa, tumor necrosis factor alpha; RANTES, regulated upon activation, normal T-cell and secreted CCL5; TrigNeur, patients with facial pain; NORM, normal healthy jawbone

Conclusion: Hitherto no other research are known to the author which correlate RANTES overexpression in silent inflamed jawbone as a possible cause for AFP/TRN. Thus we hypothesize surgical clearing of FDOJ might diminish RANTES signaling pathways in neurons and contribute to resolving chronic neurological pain in AFP/TRN patients.

ESRAS-0042**Free Communications 2****POSTOPERATIVE EPIDURAL FIBROSIS – NEUROMODULATION**

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Aims: The study is based on the comparison of the range fibrosis and the effect of stimulation (spinal cord stimulation-SCS). The goal is to find a suitable selection factor for the indication of neuromodulation.

Method: We studied a cohort of the dorsal column stimulation to 50 patients with history of failed back surgery syndrome coupled with epidural fibrosis. Percutaneous implantation technique was used in 48 patients. Study group is composed by 20 women and 28 men aged 26–67 years (mean age 49). Two patients had no effect during the examination period. Prospective observational questionnaire based study was used. The results were processed relative to the clinical finding, subjective intensity of complaints rated on a visual-analogue scale (VAS) and graphic finding.

Results: Assessment of the EF and Δ VAS correlation after neuromodulation: as cross-tabulation suggests, there was a statistically significant correlation between the degree of fibrosis and Δ VAS after implantation at the 5% level of significance. As for linear association, a significant correlation was found at the 5% level of significance.

Conclusion: There is clear evidence of a correlation between the MR degree of epidural scar formation and the effect of dorsal column stimulation. The stimulation in patients without postoperative epidural fibrosis is less effective. This is important factor for the indication of patients for spinal cord stimulation. Previous spinal fixation is also the statistically significant factor for a bad result of the neuromodulation. Other factors such as instability, Modic changes or spinal stenosis are less statistically significant. UK PRVOUK P-34

ESRAS-0089**Free Communications 2****THE PAIN AND ITS MANAGEMENT IN THE VERY ELDERLY**

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Aims: Pain in the very elderly who are beyond the age of 80 varies in characteristics, duration, aetiology, management options and preferences of treatment. Here, we report a descriptive analysis of pain and pain management in the very elderly patients.

Method: Files of the patients over 80 referred to the pain clinic between January 2012 and December 2014 were assessed. Age, gender, mental and physical status, initial reference diagnosis, characteristics and cause of pain, initial treatment modality, and verbal analogue scores for pain (VAS) at the first visit and after treatment were recorded.

Results: After assessment of files, 142 patients were included to analysis. Mean age of the patients was 83.1 ± 3.03 (min-max; 80–96). Types of pain were somatic (21.8%), neuropathic (9.2%), mixt (69.0%). Cause of pain was cancer-related in 21.8% of the patients whereas the rest was non-cancer pain mostly due to spinal stenosis (56.8%). VASs were 7.6 ± 0.9 and 3.6 ± 1.6 at initial visit and after the treatment, respectively. Initial treatment included invasive procedures (64.9%); epidural, caudal steroid injections, peripheral nerve blocks, trigger point and intra-articular injections), medical therapy (27%), or both (8.1%). Gender had no effect on type of the pain and the first treatment but on aetiology whereas 36% of patients were male with predominantly cancer pain (64.7%). Initial treatment modalities differed according to aetiology whereas cancer patients received mostly medical therapy (83.9%) and non-cancer pain patients had invasive procedures (64.9%).

Conclusion: We suggest that pain clinician should be aware of the specific characteristics of pain and related treatment modalities in the very elderly over 80.

ESRAS-0358**Free Communications 3****GENICULAR NERVE BLOCK FOLLOWED BY RADIOFREQUENCY ABLATION - A UNIQUE TREATMENT FOR CHRONIC KNEE PAIN FOR A POLIO AFFECTED PATIENT**

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Aims: A 66 year old female patient with known history of polio since childhood, presented with long standing pain in the hips & knees. She was under the care of the orthopaedic surgeons for this intractable pain who did not recommend Total Knee Replacement as she suffered from the sequelae of polio including marked muscle wasting around the knee joints. They instead gave her intra-articular steroid injections which gave her short term pain relief. Other than this she also had multiple treatments for this pain from different pain management teams in different hospitals. Various conservative treatments including electroacupuncture were tried none of which helped in pain relief.

Method: Genicular nerve, which is the sensory nerve supply to the knee joint was blocked under fluoroscopic guidance with 0.5% Chirocaine and 80mg Depomedrone as an attempt to relieve pain. This procedure was done under aseptic precautions and written consent including an explanation that this particular procedure has not been tried in polio affected patients in the past.

Results: The patient reported 50% pain relief lasting four months. A radio-frequency ablation of Genicular nerves was subsequently performed, post-procedure patient reported 50% reduction in knee pain and marked functional improvement, which lasted for over twelve months.

Conclusion: There is no such case reported in literature where Genicular Nerve Block has been used in polio affected patients or patients with muscular dystrophies. This procedure may be beneficial in more patients falling into such categories as this helps in significant pain reduction and functional improvement in cases with intractable painful joints.

ESRAS-0356**Free Communications 3****THERMAL RADIOFREQUENCY ABLATION OF MEDIAL BRANCHES TO LUMBAR FACET JOINTS FOR CHRONIC LOW BACK PAIN- OUTCOME FROM PROCEDURES AT NORFOLK AND NORWICH UNIVERSITY HOSPITAL, UK**

Dhillon P.¹, Hudspeth M.², Kare R.² ¹*Ipswich Hospital, Anaesthetic and Pain Management, Ipswich, United Kingdom,* ²*Norfolk and Norwich University Hospital, Anaesthetics and Pain Management, Norwich, United Kingdom.*

Aims: Monopolar Radiofrequency lesioning of the medial branches of the posterior primary rami of L2 to L4 and the posterior primary ramus of L5 reduces or abolishes nociceptive afferent input from lumbar facet joints and can be an effective treatment for mechanical lumbar pain.

We included patients who underwent radiofrequency ablation (60s, 80 deg C, using Radionics RFG-3C) if medial branch blocks or intra-articular facet joint injections produced in excess of 75% symptoms relief of short duration. All patients undergoing RF lesioning had pain of greater than 1 year duration and ODI (Oswestry Disability Index) score $> 40\%$ despite analgesia and physical therapy.

Method: With local audit committee approval, a retrospective electronic notes review of all patients undergoing facet joint RF lesioning over two years (2010–2012) was undertaken for outcomes, discharge rates and complications.

Results: We identified a total of 175 patients with outcome data available for analysis. The response to the procedure was evaluated at 4 months using patient global perception of change. In total about 30 (16.3%) had excellent response and 85 patients (46.1%) had good response to the procedure. 60 (37.6%) patients had minimal benefit. About 1/3 of patients were discharged while 3 patients had documented prolonged flare up of their pain problem and one patient experienced thigh paraesthesia.

Conclusion: RF denervation was well tolerated and produced a meaningful improvement in symptoms in $> 60\%$ patients enabling discharge from our pain service.

These findings are encouraging and are consistent with literature. We are reinforcing our practice to continue offering this treatment to our patients.

ESRAS-0380**Free Communications 3****A COMPARISON OF LIDOCAINE AND KETAMINE IN ACUTE AND CHRONIC PAIN AFTER OPEN NEPHRECTOMY: A PROSPECTIVE, DOUBLE-BLIND, RANDOMIZED, PLACEBO CONTROLLED STUDY**

Jendoubi A., Ben Naceur I., Marzouguy Y., Kouka J., Ghedira S., Houissa M. *Charles Nicolle Hospital, Department of Anesthesiology and Critical Care, Tunis, Tunisia.*

Aims: The aim of this study was to compare the preventive effects of perioperative intravenous Lidocaine and Ketamine on early pain, quality of postoperative recovery and chronic pain after elective open nephrectomy.

Method: Sixty patients undergoing open nephrectomy were randomly allocated to receive intravenous Lidocaine (Group L: Bolus of 1.5 mg/kg at induction of anesthesia followed by infusion of 1 mg/kg/h intraoperatively and for 24 h postoperatively) or Ketamine (group K: Bolus of 0.15 mg/kg followed by infusion of 0.1 mg/kg/h intraoperatively and for 24 postoperatively) or an equal volume of saline (Control Group C). The anesthetic technique was standardized, and the postoperative assessments included pain scores, opioid consumption and 6-minute walk distance (6-MWD) on the fourth postoperative morning. At 3 months, patients were questioned for chronic postoperative pain using the Neuropathic Pain 4 scale (NPS).

Results: Postoperative visual analog scale scores were significantly lower with the L and K groups compared with placebo group ($p < 0.001$). Total morphine use was decreased by 42% and 33% in the L and K groups, respectively, compared with the C group ($P < 0.001$). The 6-MWD for L group was 82.3 ± 28 m, which was significantly longer than the distance walked by C group (27 ± 16.2 m; $p < 0.001$). NPS was significantly lower in L group compared with the K and C groups ($p < 0.001$).

Conclusion: L and K are similar in improving early pain control and in decreasing opioid consumption; however, L also improved rehabilitation as measured by a 6-MWD and prevented chronic pain after open nephrectomy.

ESRAS-0291

Free Communications 3

IDENTIFICATION OF NEUROPATHIC PAIN COMPONENT AND NEW STRATEGIES OF PAIN TREATMENT IN PATIENTS WITH MUSCULOSKELETAL DISEASES

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Aims: Neuropathic pain accompanying various musculoskeletal diseases has recently been the highlight of numerous studies. The aim of this study is to determine neuropathic pain component in patients suffering from the musculoskeletal diseases.

Method: We've examined 73 patients aged 45–85 years (average age 68.1 ± 1.2 years). Patients were divided into 3 groups: A – osteoporosis ($n=30$), B – low back pain ($n=23$), C – knee osteoarthritis ($n=22$). To assess the NP component, painDETECT, LANSS, and DN4 questionnaires were used. For statistical analysis of results, the ANOVA, correlation, and regression analyses were applied.

Results: Regression analysis shows correlation between the questionnaires: LANSS and painDETECT ($r=0.76$, $p=0.000001$), DN4 and painDETECT ($r=0.8$, $p=0.000001$). 66,7% of patients with osteoporosis, by painDETECT, were unlikely to have the NP component, 18,5% might possibly have one, 14,8% – probably had one. Among them, by the LANSS and DN4 scales, respectively 23,3% and 36,7% probably had NP. 63,2% of patients with low back pain examined by painDETECT were unlikely to have NP, 26,3% might possibly have one, 10,5% – probably had one. Among them, by LANSS and DN4 scale, 29,4% and 43,5% probably had NP. 68,1% of patients with osteoarthritis of knee joints examined by painDETECT were unlikely to have the NP, 22,8% might possibly have one, 9,1% – probably had one. Among them, by LANSS and DN4 scale: 31,8% and 40,9% probably had NP.

Conclusion: In patients with musculoskeletal diseases, pain syndrome may have the NP features. Identification of these would promote the development of a special NP-targeted treatment strategy.

ESRAS-0327

Free Communications 3

INTRA-ARTICULAR INJECTIONS VERSUS RADIOFREQUENCY GENICULAR NEUROTOMY IN PAINFUL KNEE

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Aims: Chronic knee osteoarthritis pain treatment is known to be a difficult and long process. The objective of this study is to compare the efficacy of intra-articular corticosteroid injection and radiofrequency (RF) applied to the genicular nerve in patients with knee pain.

Method: Seventy three patients with osteoarthritis knee pain were included in the study. Patients were randomly allocated into group 1 (intraarticular injection) and group 2 (RF to the genicular nerve). Outcome measures included a pain scale (visual analog scale; VAS), Western Ontario and McMaster Universities (WOMAC) Index of Osteoarthritis, and paracetamol consumption in weeks 1,4, and 12.

Results: In both groups, significant improvement was observed in all weeks in VAS, and WOMAC subscores ($P < 0.05$). When the groups were compared, a significant difference was found between the groups in favor of group 1 in terms of VAS in weeks 4, and 12; WOMAC physical function and total scores in week 4; and WOMAC stiffness in week 12 ($P < 0.05$).

Conclusion: Intra-articular injection and RF applied to the genicular nerve are effective in the treatment of osteoarthritis knee. When 2 treatments are compared, it may be concluded that RF to the genicular nerve was more effective especially in the first weeks regarding pain than the intra-articular steroid injection. Further studies are needed to confirm these results in the prospective treatment guidelines.

ESRAS-0388

Free Communications 3

SYNERGISTIC EFFECT OF PULSED RADIOFREQUENCY LESIONING OF DORSAL ROOT GANGLION ON TRANSFORAMINAL EPIDURAL STERIOD INJECTION IN CHRONIC LUMBAR RADICULAR PAIN MANAGEMENT

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Aims: Transforaminal epidural steroid injection (TFESI) has been used in managing chronic radicular pain with varied efficacy. The objective of this study was to investigate the efficacy of additional Pulsed-radiofrequency lesioning (PRFL) to TFESI comparing with TFESI alone in chronic lumbar radicular pain management.

Method: Adults with chronic radicular pain, at least six-month period, were included and randomly allocated into two groups; Treatment; T-group and control; C-group. After confirming needle position by sensory and motor stimulation, T-group received PRFL at 42°C for 120 seconds in combination with TFESI, whereas, C group had only TFESI. All participants were followed in 1, 2, 3 and 4 months. The primary outcome was a comparison of the efficacy, defined by reducing 20 points of VAS (visual analog scale). Additionally, the secondary outcome was a comparison of quality of life (QOL) between two groups as assessed by SF-36 questionnaire $P < 0.05$ was statistically significant.

Results: There was no difference in demographic data, spine pathology, pre-procedural pain score, level of procedure and QOL between groups. T group had lower VAS than C-group in 1, 2, 3 and 4-month follow-up. Also, number of patients, who had 20-point VAS reduction, was higher in T group in every follow-up. However, statistically difference was showed only in 3-month period [13 vs. 4; $p=0.004$]. There was no difference in QOL between groups.

Conclusion: PRFL of lumbosacral DRG combined with TFESI showed an advantage over TFESI alone in reducing the pain intensity with no effect on QOL.

ESRAS-0389

Free Communications 4

BUPIVACAINE-HYDROXYPROPYL-β-CYCLODEXTRIN INCLUSION COMPLEX IN ASSOCIATION WITH SUFENTANIL: EVALUATION OF THE ANALGESIC EFFECT AFTER INTRATHECAL ADMINISTRATION IN RATS

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Aims: Bupivacaine (BVC) is a local anesthetic largely used in surgical procedures worldwide. It has been used in association with lipophilic opioids in surgical procedures, reducing the required amount of anesthetic without loss of the analgesic level achieved. Previously, we have reported that the complexation of BVC with hydroxypropyl-β-cyclodextrin (HP-β-CD) improved the time of anesthesia (*Rev. Bras. Anesthesiol.* 55(3):316,2005). In this work, the analgesic efficacy of the BVC:HP-β-CD (1:1 molar ratio)

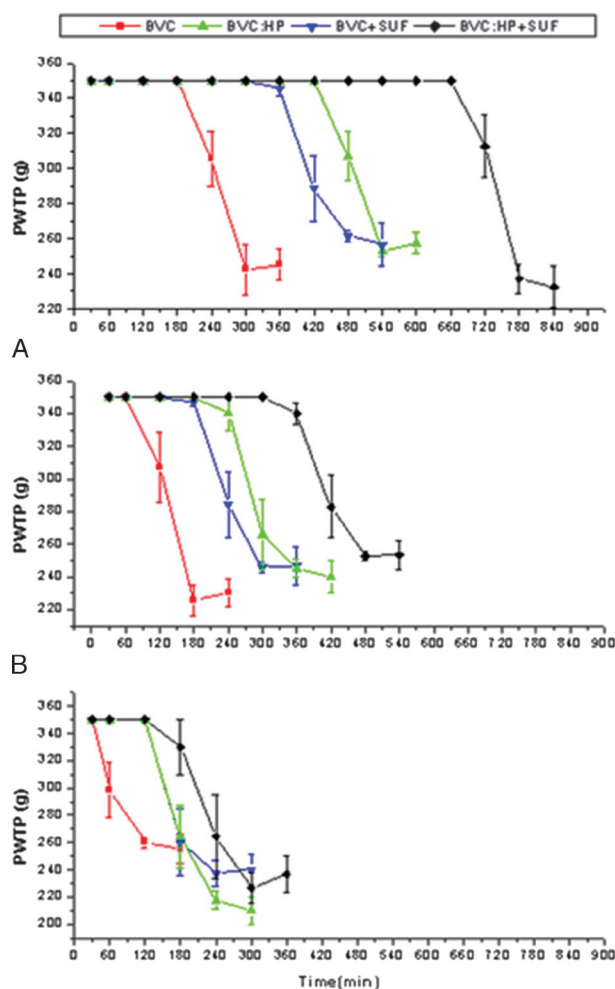


FIGURE 1. Effect versus Time Curves in PWTP test for groups treated with: BVC, BVC+SUF, BVC:HP e BVC:HP+SUF ([BVC]= 0.5% (A), 0.25%(B), 0.125%(C) + [SUF]=1µg/kg). Data expressed as mean $\pm$ SD (n=7/group).

inclusion complex in association with the opioid sufentanil (SUF) was evaluated after intrathecal administration in rats.

Method: Male Wistar albino rats (250–300g, n=7/group) were treated by intrathecal injection with BVC; BVC:HP- β -CD; BVC or BVC:HP- β -CD plus SUF ([BVC]=0.125%; 0.25%; 0.5% and [SUF]=1µg/kg). Paw Withdrawal Threshold to Pressure (PWTP) Test was used to evaluate the sensory blockade evoked by the formulations, established in order to avoid stress-induced analgesia (Protocol #1957-1 CEEA, UNICAMP).

Results: BVC:HP- β -CD in association with SUF prolonged the analgesic effect in 3.2, 3.7 and 4.2 fold when compared to the free BVC and in 1.8, 1.9 and 1.3 fold, in comparison to the BVC+SUF in the respective BVC concentrations: 0.5%; 0.25% and 0.125% ($p<0.001$ – ANOVA/Tukey-Kramer test) (Figure 1).

Conclusion: These results indicate a potential clinical application for the association of BVC:HP- β -CD and sufentanil which can be used to reduce the administration frequency as well as the necessary BVC doses to induce the same effect.

ESRAS-0085

Free Communications 4

REGIONAL ANAESTHESIA CRITICAL INCIDENTS - A FIVE-YEAR REVIEW IN SINGAPORE GENERAL HOSPITAL

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Aims: We aim to review critical incident reports relating to regional anaesthesia over a 5-year period in a tertiary teaching hospital in Singapore.

Method: Upon IRB approval, critical incident reports from our institution dating from Jan 2009 to Dec 2013 were retrieved and analysed. Incidents pertaining to regional anaesthesia were selected and categorised into central neuraxial, peripheral nerve blocks and others. Central neuraxial incidents were further categorised into epidural or spinal related incidents.

Results: 16 central neuraxial (epidural=9; spinal=7), 8 peripheral nerve blocks and 1 relating to local infiltration were identified (total=25). 4 incidents of local anaesthetic toxicity were reported, of which 2 died despite receiving intralipid infusion. 6 central neuraxial incidents involving post block neurological deficits (spinal=1; epidural=5) were none of these patients had evidence of haematoma on MRI scan. 2 epidural catheters were accidental cut during dressing and 1 medication error involving accidental administration of ondansetron instead of fentanyl into the epidural space. 4 operations were postponed by surgeon due to poor skin conditions after regional anaesthesia were performed. 2 failed spinal were reported consecutively questioning a possibility of local anaesthetic defect. 2 peripheral nerve blocks were performed prior to patient signing the consent form.

Conclusion: Increasing popularity of regional anaesthesia in a teaching hospital mandates a vigorous critical incident reporting system to improve practices and reduce human errors. A dedicated incident reporting system for regional anaesthesia will be beneficial for future audits.

ESRAS-0454

Free Communications 4

THE COMPARISON OF CLINICAL OUTCOMES OF PATIENTS TREATED WITH PERCUTANEOUS HYDRODISCECTOMY ON SINGLE/TWO AND MULTIPLE LEVELS

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Aims: A new minimally invasive procedure, percutaneous hydrodiscectomy (PHD), mechanically cuts and removes disc material using a high-velocity, non-thermal saline fluid jet. The purpose of this study is to compare the clinical outcomes of PHD on single/two or three levels in treating patients with radiculopathy secondary to lumbar acute herniated nucleus pulposus (HNP).

Method: A retrospective review at Trakya University Hospital was conducted on 18 patients with HNP confirmed by MRI, who underwent PHD at one/two levels (Group I) or three levels (Group II). Some parameters were compared between the two groups for 4 weeks: Gender, age, Pain(VAS), walking distance, complain duration, MRI findings, complication.

Results: A total of 33 lumbar levels were treated by PHD; 7 single-level, 7 two-level (Group I: Total 21 levels) and 4 three-level (Group II: Total 12 levels). We found significant differences in some parameters between two groups: Age (36.5/64), walking distance after procedure (800/450m), VAS after 4 weeks (3/5), number of procedure levels (2/4.50) ($p<0.05$).

Conclusion: PHD single / two levels is a more reliable treatment option with minimal risk of complications than three or more levels for patients with HNP.

ESRAS-0132

Free Communications 4

RELATIONSHIP BETWEEN INTRAOPERATIVE REGIONAL CEREBRAL OXYGEN SATURATION TRENDS AND COGNITIVE DECLINE AFTER TOTAL KNEE REPLACEMENT: A POST-HOC ANALYSIS

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Background: Bilateral regional brain oxygen saturation (rSO₂) trends, reflecting intraoperative brain oxygen imbalance, could warn of brain dysfunction. Various types of cognitive impairment, such as memory decline, alterations in executive function or subjective complaints, have been described three months after surgery. Our aim was to explore the potential utility of rSO₂ values as a

warning sign for the development of different types of decline in postoperative psychological functions.

Methods: Observational post-hoc analysis of data for the patient sample (n=125) of a previously conducted clinical trial in patients, over 65 years, undergoing total knee replacement under spinal anesthesia. Bilateral rSO₂ intraoperative values were recorded. An absolute rSO₂ value of <50% or a reduction of >20% or >25% below baseline were chosen as cutoffs. Tests were used to assess visual-motor coordination and executive function (VM-EF) and memory; scales were used to assess psychological symptoms.

Results: We observed no differences in baseline rSO₂ values; rSO₂ decreased during surgery (P<0.0001). Seventy-five patients (60%) had no sign of cognitive decline or psychological symptoms. Twenty-one patients (16.8%) had memory decline, 3 (2.4%) had VM-EF decline, and 33 (26.4%) had psychological symptoms. Left and right rSO₂ values were asymmetric in patients who had memory decline (Ratio Right/Left for patients with no changes, P=0.0012). Difference right-left in rSO₂ was (-2.87% [4.73%], lower on the right, P=0.0034).

Conclusions: Detection of a trend to asymmetry in rSO₂ values can warn of possible postoperative onset of memory decline. Psychological symptoms and memory decline were common three months in our aged population.

ESRAS-0463

Free Communications 4

INTRA-ARTICULAR US HIP INJECTION OF PLATELET-RICH PLASMA VS VISCOSUPPLEMENTATION: EVALUATION OF LONG TERM PAIN RELIEF AND FUNCTIONAL IMPROVEMENT IN MIDDLE AGED PATIENTS

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Aims: Osteoarthritis (OA) is a common disease that will affect almost half the population at some point of their lives through pain and decreased functional capacity. New nonoperative options are being proposed to treat earlier stages of joint degeneration providing symptomatic relief and delaying surgical intervention. Intra-articular injections of autologous platelet-rich plasma (PRP) and hyaluronic acid (HA) represent efficacious medical treatments for OA, although no comparative study on long-term efficacy in hip OA exists.

Method: After IRB approval, we studied 20 patients (12 women, 8 men, aged 49–63) affected by chronic unilateral symptomatic hip cartilage degenerative lesions due to early and severe OA. Patients were enrolled and randomly assigned to 1 of 2 groups: patients received every third week respectively ultrasound-guided injections of intraarticular autologous PRP (group A :11 patients) and high-molecular weight HA (group B: 9 patients). Pain, disability and walking pattern were evaluated at baseline and after 3, 6 and 12 months using the Harris Hip Score (HHS), visual analog scale (VAS) and the Western Ontario and McMaster Universities osteoarthritis index. (WOMAC)

Results: In both groups analgesia significantly improved (VAS < 4), as well as stiffness and disability. Patients after 3 months walked with higher cadence and stride length compared to baseline. PRP resulted better than HA injections in reducing pain symptoms and recovering articular function.

Conclusion: More satisfactory results were achieved in younger and more active patients with a low/moderate degree of cartilage degeneration, whereas a worse outcome was obtained in more degenerated joints and in older patients.

ESRAS-0266

Free Communications 5

COMPARISON OF KETOROLAC AND LOW-DOSE KETAMINE IN PREVENTING TOURNIQUET-INDUCED INCREASE IN ARTERIAL PRESSURE

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Aims: Application of tourniquet during surgical procedures causes pain and increase in blood pressure despite adequate anaesthesia and analgesia. Low dose ketamine has been shown to be effective in relieving tourniquet pain and the related hypertension. Ketorolac has been shown to be effective for tourniquet induced pain. In this study we compared ketorolac with ketamine in patients undergoing elective lower limb surgery with a tourniquet in order to discover

if ketorolac was equally effective or better than ketamine in preventing tourniquet-induced hypertension.

Method: Approval was granted by the institutional Ethics Review Committee and informed consent was obtained from all participants. It was a randomized double-blinded controlled trial with 38 patients each in the ketamine and ketorolac groups undergoing elective lower limb surgery. Induction and maintenance of anaesthesia was standardized in all patients, with minimum alveolar concentration of isoflurane maintained at 1.2. One group received 0.25 mg/kg ketamine and the other group received 30 mg ketorolac 10 minutes before tourniquet inflation. Blood pressure was recorded before induction of anaesthesia (baseline) and at zero, 10, 20, 30, 40, 50, and 60 minutes after tourniquet inflation.

Results: The demographic and anaesthetic characteristics were similar in the two groups. At 0 and 10 minutes tourniquet induced rise in blood pressure was not observed in both groups. From 20 minutes onwards, both systolic and diastolic blood pressures were significantly higher in ketorolac group compared to ketamine group.

Conclusion: We conclude that ketamine is superior to ketorolac in preventing tourniquet induced increases in blood pressure.

ESRAS-0146

Free Communications 5

IMMEDIATE POSTPARTUM MAJOR MORBIDITY : WHAT ABOUT LAST 5 YEARS?

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Aims: Retrospective study of the immediate postpartum admissions to the coronary and intensive care unit (C&ICU) during five years in a tertiary hospital.

To determine the C&ICU admission incidence, setting and possible association with type of delivery and type of anesthesia.

Method: Files of women who had been admitted on the immediate postpartum period to C&ICU between January 1st 2010 and 31st December 2014 were analyzed. Descriptive statistics were used for sample characterization and odds ratio were calculated for type of delivery and type of anesthesia for cesarean section (CS).

Results: Sixty obstetric patients (median [standard deviation] age, 33.5 [6] years; median gestational age, 37 [5] weeks) were analyzed, which represented 0.6% of all deliveries and 1.1% of total admission on C&ICU. 40% were primigravida and 50% primipara. 93% completed adequate prenatal follow-up, 3% had twin pregnancy. Preexisting medical conditions were present in 80% of these patients (hypertensive disorders accounted for 47%).

Delivery occurred by CS in 92% (representing 1.7% of the total CS performed, 18% were routine procedures) [OR 35.07, 95% CI 14.03 to 87.69, P < 0.0001]. 60% of the CS occurred under general anesthesia (representing 13 % of the total of general anesthesia for CS), 40 % under regional anesthesia (representing 0.7% of the total of regional anesthesia for CS) [OR 19.97, 95% CI 11.45 to 34.84, P < 0.0001].

Conclusion: Follow-up during 5-years gives highlighted an association between CS/CS under general anesthesia and C&ICU admission.

ESRAS-0324

Free Communications 5

SPREAD OF DYE IN SERRATUS ANTERIOR PLANE - A CADAVERIC STUDY

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Aims: The Serratus Anterior Plane block (SAP) is a newly described regional anaesthesia technique. Authors performed this cadaveric study to assess spread of dye in facial plane and to explore further regional nerve involvement.

Method: Methylene blue dye was injected using real-time ultrasound guidance between the SA and Rib/External Intercostal muscles in posterior axillary line, on both sides of thorax in 15 embalmed cadavers. There were three groups

classified according to the volume of injectate; 15 mls, 20 mls and 30 mls. The cadavers were dissected 30 minutes after dye injection to see the spread of dye and assess nerve involvement.

Results: Dye spread was seen as Superficial: up to subcutaneous tissue; Deep: Intercostal nerves; Cephalad: up to 1st Rib; and Caudal: up to 9th Rib. Posteriorly: dye was seen up to 8 cm lateral to midline and Anteriorly: up to Mid-clavicular line. Lateral thoracic nerves were involved in all, and trace of dye was observed on intercostal nerves. The dye was seen on nerve to Serratus anterior and Latissimus dorsi muscle. Involvement of Lateral pectoral nerve, medial pectoral nerve, brachial plexus and epidural spread was not seen in our study. Detailed results will be discussed during presentation.

Conclusion: Dye injected in SAP was seen beyond the boundaries of Serratus anterior muscle. Lateral thoracic nerve, intercostal nerve, nerve to Serratus anterior and nerve to Latissimus dorsi were found stained with the dye. The spread of the dye was not seen on the Brachial plexus, Lateral and medial pectoral nerve, or in the Epidural space.

ESRAS-0168

Free Communications 5

CONVENTIONAL VERSUS AMBULATORY EPIDURAL: EFFECTS DURING LABOR ON PREGNANT WOMEN

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Aims: Epidural analgesia is effective for management of pain during labor but is associated with a greater oxytocin requirement, longer duration of labor and a higher risk of instrumental delivery and caesarean sections¹. The aim of this study was to determine whether the use of low-dosage local anesthetic would decrease the incidence of instrumental deliveries and caesarean sections for dyskinesia compared to a conventional dosage.

Method: After EC approval and written informed consent, 85 laboring nulliparous women aged 18 to 40 years old, with a singleton in vertex presentation were included in this prospective randomized double-blind study.

When an epidural analgesia was requested, patients were randomized to receive either levobupivacaine 0.1% and sufentanil 0.2 µg/mL (control group) or levobupivacaine 0.07% and sufentanil 0.3 µg/mL (ambulatory group). After a test dose, the patient received a bolus of 15 mL of the dedicated solution followed by 10 mL/h continuous infusion. Ambulation was allowed after anesthesiologists' evaluation. Maternal satisfaction was determined using a visual analog scale. Data between groups were compared using Student-t test or chi-square. Results are expressed as mean±SD or percentage. A p<0.05 was considered significant.

Results: Results are summarized in Figure 1.

	Ambulatory group (N=42)	Control group (N=43)	P-value
Instrumentation and Caesarean sections (%)	22	31	0,353
Ambulation (%)	69	35	0,005
Labor duration (min)	369 ± 167	320 ± 128	0,133
Maternal Satisfaction	7,5 ± 2,5	7,7 ± 2,1	0,828

FIGURE 1.

Conclusion: The use of a low-dosage local anesthetic was associated with a non-significant decrease in the incidence of instrumental delivery and caesarean section. Although ability to ambulate was significantly higher, this does not translate in a better maternal satisfaction rate. Labor duration remained unchanged.

References

1. Cochrane Database Systematic Review 2011; 82

ESRAS-0187

Free Communications 5

IS THE QOR-15 A VALID INDEX FOR PREDICTING PROLONGED LENGTH OF STAY AFTER TOTAL KNEE ARTHROPLASTY: RESULTS FROM AN ENHANCED RECOVERY AFTER SURGERY PROGRAMME

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Aims: Enhanced Recovery After Surgery (ERAS) protocols are designed to maximise patient satisfaction and improve metrics, such as length of stay (LOS) and the incidence of severe pain.

We have utilized the Quality of Recovery (QoR)-15 score after total knee arthroplasty (TKA) to determine if routine administration is useful in identifying patients who stay beyond the median LOS.

Method: Hospital research office approval was obtained. Patients were offered the opportunity to complete the QoR-15 on POD-1 and POD-2. Receiver operating characteristic (ROC) curves were mapped for QOR scores and prolonged LOS (beyond the median). Area under the curve (AUC) and threshold values were determined through maximisation of sensitivity and specificity. Factors associated with higher QoR scores were identified with univariate regression. Factors associated with prolonged LOS were identified using Fishers Exact Test for categorical variables, and univariate logistic regression for continuous variables. These were then entered into a multivariate model.

Results: Between June and December 2014, 245 TKAs were performed; QoR results were available from 208 patients (84.9%). Median LOS was 4.5 days (IQR 2 days).

Maximal AUC (0.725) was obtained using the POD-2 QoR score without the pain component. Sensitivity (0.646) and specificity (0.699) were maximised with a score of 78/100. Factors associated with elevated QoR scores are shown in Figure 1. Factors associated with prolonged LOS are shown in Figure 2.

QoR-15 Score	ROC-AUC			
Day One	0.610			
Day Two	0.719			
Day One + Day Two	0.678			
Day One (No Pain Scores)	0.611			
Day Two (No Pain Scores)	0.725			
Day One + Day Two (No Pain Scores)	0.684			

Day Two (No Pain Scores)	Sensitivity	Specificity	Positive Predictive Value	Negative Predictive Value
Threshold Score = 78	0.646	0.699	0.654	0.691

	p-value
ASA Score >2	0.094
Local Infiltrative Analgesia (LIA)	0.014
Time to Assisted Weight Bearing	0.017

FIGURE 1. Receiver operating characteristic curve analysis.

	Odds Ratio	p-value
Age	0.93 (0.89 – 0.97)	0.001
Number of Anesthetic Doses	0.83 (0.72 – 0.94)	0.005
Time to Assisted Weight Bearing	0.94 (0.90 – 0.98)	0.007
Local Infiltrative Analgesia (LIA)	4.40 (1.79 – 10.84)	0.001
Non-Steroidal Anti-Inflammatory Drugs	2.85 (1.35 – 6.01)	0.006
Transaxemic Acid	1.97 (0.90 – 4.31)	0.09

FIGURE 2. Results of the multivariate regression model.

Conclusion: The QoR-15 offers fair performance in identifying patients with prolonged LOS. The use of LIA appears to facilitate higher QoR scores and more rapid discharge from hospital.

ESRAS-0323

Free Communications 5

STANDARDISED VERSUS FREE TEXT DOCUMENTATION OF RA PROCEDURES: PROSPECTIVE AUDIT OF DOCUMENTATION IN 200 CONSECUTIVE PATIENTS

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Aims: The advancement and expansion of regional anaesthesia over recent decades has not been mirrored by an improvement in its documentation. Good

documentation forms part of a medico-legal record, assists future regional block procedures, and helps defend the anaesthetist should a complication occur. We prospectively assessed 100 central neuraxial (CNBs) and 100 peripheral nerve blocks (PNBs) at our orthopaedic centre for the quality of block documentation against our standard. Purpose-designed stickers to assist documentation by containing standardised data prompts were made widely available for CNBs and PNBs.

Method: Purpose-designed stickers, incorporating our standardised documentation for CNBs and PNBs, were stored in all theatres and to be used at the individual anaesthetist's discretion. Examining patient notes at the end of each day, the documentation of 100 consecutive CNBs and 100 consecutive PNBs were assessed against our standard as incorporated on our stickers. Comparison to the results from our previous assessment was made.

Results: Free-text documentation led to lower rates of compliance with the standard, e.g. "side of block" was documented in 47%, "length of needle" - 53%, "awake" or "asleep" block" - 29%. Utilizing the sticker led to superior rates of compliance, 94%, 94% and 94% for the above examples, respectively. Overall, free-text documentation led to compliance rates between 30–50%, while using the sticker resulted in rates >90%.

Conclusion: Documentation was improved uniformly with the utilization of a standardised sticker prompting data entry. This mirrors previous findings and suggests that mandatory usage of the sticker would significantly improve the documentation of regional blocks.

ESRAS-0492

Free Communications 6

ULTRASOUND ASSISTED THORACIC EPIDURAL FOR CONGENITAL DIAPHRAGMATIC HERNIA REPAIR IN A 30 HOUR INFANT

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Aims: Management of Congenital Diaphragmatic Hernia (CDH) is a challenge and best anesthetic method remains controversial. We report a 30-hour-old neonate, 1800gr (>50percentile) scheduled for subcostal CDH repair.

Method: Patient was born at 35th week twin gestation. She has left sided Bochdaleck CDH diagnosed at antenatal period. She intubated immediately after birth and stable with high-frequency oscillatory ventilation. Pulmonary hypertension and dextroposition of the heart are the main features. Midazolam sedation was given.

Anesthetic plan is combined anesthesia with a thoracic epidural catheter. After routine monitoring general anesthesia induced with sevoflurane %3. With-in right lateral position ultrasonographic examination done, anatomic structures and epidural depth is defined. Epidural space is determined at 0.8 cm depth with loss of air method through 20G toughy needle. Epidural catheter was placed at 6th thoracic level. %0,1 bupivacaine 1ml is given for epidural anesthesia. Sevoflurane is reduced to %1,5 during surgery and no muscle-relaxation is needed. Surgery took 120 minutes and intercostal fleb operation has done.

Results: During postoperative period %0,1 bupivacaine 0,4ml.h-1 infusion started. For 3 days no sedation needed. Right lung expanded and ventilation parameters getting better. Epidural catheter taken out at 3th postoperative day. Patient extubated at 4th postoperative day and continued with nasal CPAP.

Conclusion: Regional anesthesia reduces stress response and sedation requirements in neonates. Ultrasonography is a valuable tool for neuroaxial techniques especially for neonates. With the aid of ultrasonography failure rates and complications are also reduced.

ESRAS-0387

Free Communications 6

COMPARATIVE EVALUATION OF DEXMEDETOMIDINE AND FENTANYL FOR EPIDURAL ANALGESIA IN PEDIATRIC ORTHOPEDIC SURGERY

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Aims: Opioids as epidural adjunct to local anesthetics are commonly used. This randomized double-blind study was conducted to evaluate the epidural

analgesic efficacy and safety of dexmedetomidine compared with fentanyl when combined with ropivacaine in pediatric orthopedic surgery.

Method: Fourteen children (10 boys and 4 girls) of American Society of Anesthesiologists grade I-II, aged 6 to 12 years, scheduled for femoral derotation osteotomy and/or Dega procedure with cerebral palsy received either dexmedetomidine 1 µg/kg or fentanyl 1 µg/kg along with 0.2% ropivacaine 0.2 ml/kg through epidural catheter 30 min before the end of the surgery. Children were observed for postoperative pain, nausea-vomiting, agitation, sedation, and adverse effects. Additionally, total amount and bolus use of administered epidural patient-controlled analgesia (0.2% ropivacaine) were recorded during the first 48 hours after surgery, subdivided into the following 4 periods: 0 to 6 hours, 6 to 12 hours, 12 to 24 hours and 24 to 48 hours.

Results: There were no significant differences between the two groups in demographic characteristics and haemodynamic changes. The frequency of bolus administration of patient-controlled analgesia until 12 hours after surgery was significantly less in the dexmedetomidine group compared with the fentanyl group ($p < 0.05$). None of the patients showed delayed anesthetic emergence.

Conclusion: Epidural administration of dexmedetomidine as an adjunct to ropivacaine provides prolonged postoperative analgesia compared with fentanyl.

ESRAS-0120

Free Communications 6

THORACIC PARAVERTEBRAL BLOCK FOR PERIOPERATIVE ANALGESIA IN PEDIATRIC ONCOLOGY

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Aims: Epidural analgesia (EA) is considered to be a method of choice for pediatric thoracic surgeries. However, EA may have complications such as spinal block, neurological complications, epidural hematoma, infection. To reduce the risk of complications many authors consider less invasive methods of regional anesthesia as paravertebral block (PVB).

Method: In prospective randomized study intraoperative and early postoperative periods in patients ($n=90$) undergoing surgeries for malignant tumors of the lung and chest wall were assessed. Patients were divided into 2 groups: PVB group comprised children ($n=50$) who had prolonged thoracic PVB; EA group comprised children ($n=40$). In PVB group, depth of paravertebral space on level (Th_3-Th_4) was assessed using ultrasound assisted technique in lateral position under general anesthesia. After ultrasound-assisted puncture ropivacaine 0.5% dose (0.3 ml/kg) bolus was administered and catheter was secured. Continuous infusion of ropivacaine 0.2% (0.2 mg/kg/hour) was started after 6–8 hours. In EA group, catheterization of epidural space on level (Th_4-Th_6) was performed, catheter was advanced 3–5 cm cranially. After the test-dose, continuous infusion of ropivacaine 0.2% (0.2 mg/kg/hour) with fentanyl 0.005% (2 mcg/ml) was started. Postoperative analgesia was infusion of ropivacaine 0.2% (0.15–0.2 ml/kg/hour).

Results: Analgesic effects of PVB and EA were equal, while PVB grants a greater hemodynamic stability. Performing PVB under ultrasound guidance has a wide safety profile and efficacy of the block is up to 98.1%.

Conclusion: Thoracic PVB combined with general anesthesia seems to improve the efficiency and safety of anesthesia for thoracic surgeries in pediatric oncology but further investigations are required.

ESRAS-0471

Free Communications 6

POST-DURAL PUNCTURE HEADACHE MANAGEMENT: EVIDENCE-BASED IMPROVEMENT

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Aims: We audited our management of post-dural puncture headache (PDPH) in the light of the national findings of the MBRACCE report.

Method: A retrospective audit of all post-dural puncture headaches (PDPH) and accidental dural punctures (ADP) during a 12 month period between April 2014–March 2015.

Results: 717 epidurals and 904 spinals were performed with 16 PDPHs identified; 14 after lumbar epidurals and 2 after spinal anaesthesia. Of the 14 epidural-related PDPHs, 6 were immediately recognised as ADPs. An unintentional intrathecal catheter caused a total spinal necessitating general anaesthesia after epidural top-up for Caesarean. Mean onset of headache from procedure was 41 hours (Range 0–144 hours). 77% of headaches were frontal, 38% were occipital, 84% were postural, 30% had neck pain. Other symptoms included dizziness, ear-aches and muffled hearing.

44% of patients were re-admitted with PDPH. Length of stay post re-admission ranged from 1–4 days. 63% of patients were managed with an epidural blood patch (EBP). 2/10 required a second EBP. Conservative management varied considerably with anaesthetist and included paracetamol, NSAIDs, opioids, sumatriptan and advice to stay hydrated and consume caffeinated beverages. Unfortunately none of our patients received out-patient follow-up.

Conclusion: Our current management of PDPH requires revision. We have re-written our guidelines and created a pathway including the PDPH diagnostic criteria from the International Headache Society to aid recognition and prevent re-admission. We have reviewed the current evidence and have updated our management plans. All patients will receive a GP letter and a follow-up appointment in obstetric anaesthesia clinic.

ESRAS-0202

Free Communications 6

COMPARISON OF INTRATHECAL PLAIN AND HYPERBARIC BUPIVACAINE WITH MORPHINE FOR POSTOPERATIVE ANALGESIA FOLLOWING CESAREAN SECTION

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Aims: In this observational study, we primarily aimed to compare the effects of intrathecal plain and hyperbaric bupivacaine with morphine on the postoperative analgesic consumption.

Method: After approval of Ethics Committee and written consent, 40 parturients undergoing elective cesarean section were enrolled to study. They received intrathecal either plain (PB) or hyperbaric (HB) bupivacaine 12.5 mg (2.5 ml) with morphine 150 µg (0.75 ml) for spinal anesthesia. Postoperative rescue analgesia was provided with tramadol patient controlled analgesia (PCA). 24 h tramadol consumption, block characteristics, time to first analgesic requirement postoperatively, hemodynamic data, intraoperative need for analgesia, side effects (nausea, vomiting, shivering and pruritus), and patients' satisfaction were compared.

Results: 24 hour tramadol consumption was significantly lower in PB compared to HB (72.8±22.2mg vs 127±43.2; $p<0.001$). There was no significant difference in the onset, cephalad spread, regression of sensory and motor block. Time to first analgesic requirement was significantly longer in PB compared to HB (456.6±209 min vs 265 ±138.2; $p=0.002$). Intraoperative hypotension was more frequent with HB than PB (65% vs 20%; $p=0.01$). Intraoperative need for analgesia, perioperative side effects and patients' satisfaction were similar.

Conclusion: Plain bupivacaine with morphine significantly reduced 24 hours analgesic consumption with prolonged time to first analgesic requirement. This advantageous property may advocate the use of plain bupivacaine combined with morphine for spinal anesthesia in cesarean section.

ESRAS-0303

Free Communications 6

INTRATHECAL CATHETER VERSUS REDO EPIDURAL FOLLOWING ACCIDENTAL DURAL PUNCTURE IN OBSTETRIC PATIENTS: NO SIGNIFICANT DIFFERENCE IN RATE OF SPINAL HEADACHE OR EPIDURAL BLOOD PATCH

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Aims: The impact of threading an intrathecal catheter (instead of redoing the epidural) on the incidence of spinal headache following an accidental dural puncture is controversial.

Method: We collected data on 107 accidental dural punctures over three years. The initial accidental dural puncture was performed by a midlevel provider; the attending anesthesiologist on service used their fixed preference regarding intrathecal catheters versus redo epidurals to guide therapy. We judged a clinically significant effect size to be a 20% difference in the incidence of spinal headache and/or epidural blood patch (e.g., 50% incidence versus 70% incidence).

Results: The incidence of spinal headache was not significantly different among the two groups: 79.6% for the intrathecal catheter group, and 69.8% for the redo epidural group (RR = 1.14, 95% CI 0.9–1.4, $P=0.27$). Similarly, the fraction of patients receiving epidural blood patches was not significantly different: 32.6% for the intrathecal catheter group and 45.9% for the redo catheter group (RR = 0.7, 95% CI 0.4–1.2, $P=0.25$).

Conclusion: The choice of intrathecal catheter versus redo epidural does not result in a clinically important difference in the incidence of spinal headache or epidural blood patch. Nonetheless, there are specific advantages of placing an intrathecal catheter instead of redoing the epidural: lack of delay of analgesia, the high reliability of intrathecal catheters for analgesia/anaesthesia, and the avoidance of further risk of accidental dural puncture.

ESRAS-0029

Free Communication 7

ULTRASOUND GUIDED PENILE BLOCK FOR ADULT PENILE SURGERY

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Aims: Penile surgery in adults is a quite painful procedure. The purpose of this study was to evaluate analgesic effect of ultrasound (US) guided penile nerve block (PNB) in adult patients undergoing penile surgery.

Method: After Kocaeli city clinical research ethical committee permission and informed written patients' consent; 40 ASA I–II patients, aged 20–60, were included in this double-blinded study. In a randomized and prospective manner patients were allocated to either PNB or control group. Surgery was performed under spinal anesthesia using bupivacaine 10 mg plus 25 µg of fentanyl. US guided PNB was performed using 20 ml 0.25% bupivacaine. Postoperative analgesia was provided with patient-controlled analgesia method with morphine intravenous. Primary outcome measure was postoperative opioid consumption and analyzed using Mann Whitney U test. Secondary outcome measures were comparison of opioid side effects like nausea and vomiting and analyzed using Fisher exact test.

Results: VAS scores for pain at postoperative 1st, 6th, 12th, and 24th hours were lower in PNB compared to control groups (Median VAS values were 0, 1.5, 0, 0 and 2, 4, 3, 1, respectively). Postoperative morphine consumptions were lower in PNB group compared to control group at postoperative 1st, 6th, 12th, and 24th hours (Median doses of morphine consumption were 0, 1, 5, 5 and 1.5, 9, 17.5, 28.5 mg respectively) ($P<0.05$). In control group 6 patients had nausea and vomiting. One patient in PNB group had nausea and vomiting.

Conclusion: Our study has shown that US guided PNB has a significant analgesic effect in adult patients undergoing penile surgery.

ESRAS-0170

Free Communication 7

DISPLACEMENT OF POPLITEAL SCIATIC NERVE CATHETERS AFTER MAJOR FOOT AND ANKLE SURGERY: A PROSPECTIVE MRI RCT OF SHORT VERSUS LONG AXIS CATHETER PLACEMENT

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Aims: Major foot and ankle surgery produces severe postoperative pain. Continuous popliteal sciatic catheters (CPSC) have a high frequency of secondary catheter displacement (SCD). We aimed to estimate the frequency of SCD after

48 hours with MRI in patients randomized to CPSC inserted along the short (SAX) or the long axis (LAX) of the sciatic nerve.

Method: Forty patients scheduled for major foot and ankle surgery were randomly assigned to LAX or SAX CPSC placement in the popliteal fossa. Ropivacaine 0.2% 20 ml was injected via the catheter followed by 8 ml/hour infusion with 10 ml escape boluses as required. Primary catheter displacement was tested by pinprick sensation in the tibial and peroneal territories of the operated foot 20 minutes after injection.

Forty-eight hours after catheter insertion, MRI was performed after injection of saline with added contrast (Dotarem) via the catheter, which was removed prior to MRI. The primary outcome was SCD estimated as frequency of subperineural spread of contrast.

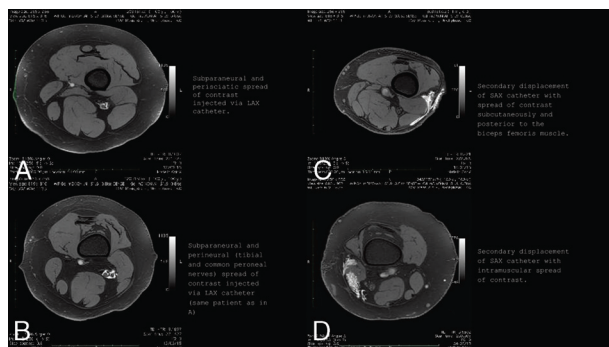


FIGURE 1.

Results: No patients had primary catheter displacement. The frequency of SCD with SAX catheter insertion was 60% (95%CI: 36–84) vs. 90% (95%CI: 76–100) with LAX. The risk (relative risk, RR) of SCD was 3 times larger (95%CI: 0.8–10, $p < 0.05$) with SAX vs. LAX catheter insertion (Figure 1).

Conclusion: Popliteal sciatic nerve catheters for major foot and ankle surgery have a significantly lower frequency of secondary catheter displacement when inserted along the long versus the short axis of the sciatic nerve.

ESRAS-0557

Free Communication 7

THE EFFECT OF COMBINED SAPHENOUS AND OBTURATOR VS SAPHENOUS NERVE BLOCKADE VS LOCAL INFILTRATION ANALGESIA AFTER TOTAL KNEE ARTHROPLASTY

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Background and objectives: Total knee arthroplasty (TKA) is associated with severe pain, and effective analgesia is essential for the quality of postoperative care and ambulation. The analgesic effect of combined obturator and saphenous nerve blockade has not previously been tested after TKA. We hypothesized that combined obturator and saphenous nerve blockade would reduce opioid consumption and pain more than a single saphenous nerve blockade or local infiltration analgesia (LIA).

Methods: Seventy-eight patients were randomized to either combined obturator and saphenous nerve blockade, single saphenous nerve blockade or LIA after primary unilateral TKA. The primary outcome was morphine consumption during the first 24 postoperative hours. Secondary outcomes were morphine consumption during the first 48 postoperative hours, pain at rest and passive knee-flexion, nausea and vomiting, cumulated ambulation score and Timed Up and Go test.

Results: Seventy-five patients were included in the analysis. The total intravenous morphine consumption during the first 24 postoperative hours was 2 mg (IQR 0–15) in the combined saphenous and obturator nerve block group, 20 mg (IQR 10–26) in the saphenous nerve block group ($P = 0.0007$) and 17 mg (IQR 10–36) in the LIA group ($P = 0.002$). The combined saphenous and obturator nerve group had reduced pain, nausea, and vomiting compared to the other groups. The ambulation tests showed no difference between the groups.

Conclusions: Combined saphenous and obturator nerve blockade significantly reduced opioid consumption and pain after TKA compared to a single saphenous nerve block or LIA without impaired ambulation.

ESRAS-0478

Free Communication 7

LIPOSOMAL BUPIVACAINE EXTENDS THE DURATION OF ANALGESIA COMPARED TO PLAIN BUPIVACAINE FOLLOWING ARTHROSCOPIC SHOULDER SURGERY UNDER INTERSCALENE BRACHIAL PLEXUS BLOCK

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Aims: Liposome bupivacaine (EXPAREL®; Pacira Pharmaceuticals, Inc., Parsippany, NJ) in femoral nerve block in volunteers results in prolonged blockade. In this randomized, blind, active comparator-controlled clinical trial we assessed efficacy of EXPAREL in interscalene block (ISB) after shoulder surgery.

Method: Under an IND application (No. 69,198), and Ethics Committee approval, 40 subjects having outpatient arthroscopic rotator cuff repair were studied (NCT01977352). Patients were randomized to receive single-injection ISB with either 20 ml 0.25% bupivacaine or 6.5 ml EXPAREL® (88mg) diluted to 20 ml. Injections were done under ultrasound guidance; injection was abandoned if motor response was present at < 0.5 mA, and/or injection could not commence with opening injection pressure < 15 psi. All patients received general anesthesia for surgery, and followed for 1 month after ISB.

Results: Patients in EXPAREL® ($n = 20$) and bupivacaine ($n = 20$) groups did not differ in gender, age, or ASA physical status. Onset of sensory block was within 25 min for both groups; block onset was faster with bupivacaine than EXPAREL. More patients in EXPAREL® group reported VAS scores ≤ 3 ('none to mild pain') on POD 1 and on POD 2 than in bupivacaine group. Opioid consumption was slightly lower and sleep duration higher in the EXPAREL® group. No patients developed complications after 1 month follow up.

Conclusion: EXPAREL in ISB results in better analgesia and patient comfort than bupivacaine after shoulder surgery. Future studies are indicated to determine optimal dose-response of EXPAREL in PNBs.

ESRAS-0022

Free Communication 7

PHRENIC NERVE FUNCTION AFTER CONTINUOUS SUPRACLAVICULAR OR INTERSCALENE NERVE BLOCKADE FOR ARTHROSCOPIC SHOULDER SURGERY: AN INTERIM ANALYSIS OF THE ONGOING PHRENICUS TRIAL

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Aims: The PHRENICUS trial is the first randomized, controlled trial investigating phrenic nerve palsy in continuous supraclavicular versus interscalene blockade for arthroscopic shoulder surgery. Small, published case series or voluntary studies suggest better respiratory stability for supraclavicular blockade.

Method: After ethic's approval and written informed consent, we started the trial comparing both RA catheter techniques. Before catheter insertion, in the PACU and on postoperative day 1 (POD1), patients phrenic function was investigated using ultrasound examination of diaphragm, spirometry for lung function and clinical assessment of dyspnea, pain scores etc. Initial application of 10ml of ropivacaine 0.2% was followed by continuous flow of 4ml of ropivacaine 0.2% (as well as a patient controlled bolus option of 4ml/h).

Results: Until now, 60 patients were included in this trial (32 with interscalene, 28 with supraclavicular catheter). Ultrasound examination of diaphragm showed paradoxical movement of the ipsilateral diaphragm in 12 of 32 patients in the PACU and 4 of 32 patients with interscalene blockade on POD 1. This is significantly different comparing with supraclavicular blockade (3/28 in PACU, 0/28 on POD1). Rates of dyspnea, oxygen saturation as well as pain scores at rest and stress were not different for each given time point.

Conclusion: The PHRENICUS trial interim analysis showed superior diaphragmatic function and comparable pain scores in patients with continuous supraclavicular versus interscalene blockade for arthroscopic shoulder surgery.

ESRAS-0062

Free Communication 8

AN INTERNATIONAL SURVEY OF ULTRASOUND GUIDED REGIONAL ANAESTHESIA NEEDLE ENDPOINTS

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Aims: Our aim is to survey current international practice of ultrasound guided regional anaesthesia; specifically, accepted needle endpoints for common blocks, using a bespoke interactive website.

Method: We surveyed local regional anaesthesia specialists and identified 10 common nerve blocks: Interscalene, Supraclavicular, Infraclavicular, Axillary, Median mid-forearm, Rectus Sheath, TAP, Femoral, Adductor Canal and Popliteal. An interactive website was developed in a combination of java script and php script, and compatibility was ensured across all portable electronic devices and internet-browsers. The interactive website survey was disseminated to all ASRA, ESRA and RA-UK members over the study period of 4 months (June–September 2014).

Results: 831 international anaesthetists completed the survey. Participant country of residence, seniority and postgraduate qualifications were collected. 473 (57%) respondents were from Europe, 190 (23%) from North America, 77 (9%) from Asia, 45 (5%) from South America, 40 (5%) from Australasia and 5 from Africa. Coordinate density maps have been produced for all blocks. See Figure 1 for the Interscalene nerve block results.

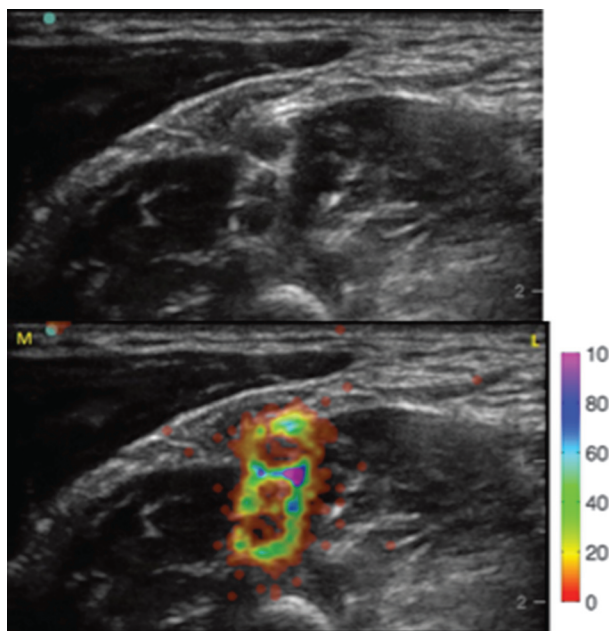


FIGURE 1. Interscalene block, heatmap of ALL needle endpoints

This shows two discrete peak target endpoints where <100 anaesthetists have used as their endpoint target. For each nerve block, data has been collected on in-plane vs out-of-plane approaches and concomitant use of nerve stimulation.

Conclusion: This survey demonstrates remarkable variation in needle tip endpoints, and raises the question of what constitutes best practice. Further work would seek to link needle tip endpoints to patient and nerve block outcomes.

ESRAS-0114

Free Communication 8

EFFECTS OF ADDUCTOR CANAL BLOCK ON POSTOPERATIVE OUTCOME IN TOTAL KNEE ARTHROPLASTY: A SYSTEMATIC REVIEW

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Aims: Total knee arthroplasty (TKA) is associated with significant postoperative pain that impairs recovery and delays discharge from the hospital. Adductor canal block (ACB) is a primarily sensory block involving the saphenous nerve and branches of the obturator nerve. ACB is thought to reduce postoperative pain while preserving quadriceps strength. This could theoretically improve various parameters of postoperative outcome. The objective of this study was to perform a systematic review of the effects of ACB in TKA.

Method: We sought randomized controlled trials (RCTs) in EMBASE, MEDLINE (PubMed), Scopus and Trip using the following keywords: ACB or saphenous nerve block and total knee replacement or TKA. The only restriction was language (English). The methodological quality was assessed with the Jadad scale.

Results: Six RCTs were identified revealing a Jadad score of 3–5. All RCT demonstrated sufficient postoperative analgesia for ACB with two RCTs demonstrating a significant reduction in morphine consumption when compared to placebo, and three RCTs observing equivalent morphine consumption when compared to a femoral nerve block (FNB) or added to local infiltration anesthesia. Three RCTs demonstrated early or late sparing of quadriceps strength when compared to FNB or placebo. In two trials, ambulation ability was increased. A reduced length of stay (LOS) was found in only one study.

Conclusion: Recent studies show a trend towards adequate analgesia with early sparing of quadriceps strength and enhanced ambulation ability. This might reduce LOS as demonstrated by one RCT. Further RCTs specifically addressing hard outcome parameters are warranted.

ESRAS-0107

Free Communication 8

PHARMACODYNAMICS AND PHARMACOKINETICS OF 0.5% ROPIVACAINE 30ML AND 0.75% ROPIVACAINE 20ML AFTER ULTRASOUND-GUIDED INTERSCALENE BRACHIAL PLEXUS BLOCK: A DOUBLE-BLINDED RANDOMIZED STUDY

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Aims: We compare the pharmacodynamics and pharmacokinetics of same dose but different concentration of ropivacaine (0.5% 30 ml or 0.75% 20 ml) used for ultrasound-guided interscalene brachial plexus block.

Method: After ethics committee approval and informed consent, 44 healthy patients scheduled for elective upper limb surgery were randomly assigned to receive 0.5% ropivacaine 30ml (Group 1, n=22) or 0.75% ropivacaine 20 ml (group 2, n=22). Block duration and complications were recorded. In 12 patients of each group, venous blood samples were collected for determination of ropivacaine plasma concentration at 0, 2, 5, 10, 15, 20, 30, 45, 60, 90, and 120min after placement of the block.

Results: The quality of anesthesia was adequate and no systemic toxicity was observed in all patients. The onset time of three terminal nerves and motor blockade were similar in the two groups ($P>0.05$). The block duration of Group 1 (567.9 ± 196.5 min) tended to be longer than that of Group 2 (451.7 ± 139.5 min) ($P=0.0574$). The peak plasma concentration of ropivacaine was significantly higher in Group 2 (1.986 ± 0.588 $\mu\text{g/ml}$) than that in Group 1 (1.460 ± 0.511 $\mu\text{g/ml}$) ($P<0.05$). The area under the plasma concentration time curve was also higher in Group 2 (154.654 ± 43.352 $\mu\text{g/ml/h}$) than that in Group 1 (122.167 ± 25.433 $\mu\text{g/ml/h}$) ($P<0.05$). There were no differences in T_{max} between the two groups ($P>0.05$).

Conclusion: Ultrasound-guided interscalene brachial plexus block with 0.5% ropivacaine 30ml and 0.75% ropivacaine 20ml result in similar pharmacodynamic effect, whereas 0.5% ropivacaine 30ml will produce lower peak plasma concentration which seems to reduce the risk of severe toxic side effects.

ESRAS-0076

Free Communication 8

ANALGESIC EFFECTS OF ULTRASOUND-GUIDED SERRATUS-INTERCOSTAL PLANE BLOCK COMBINED WITH ULTRASOUND-GUIDED INTERMEDIATE CERVICAL PLEXUS BLOCK IN TRANSAXILLARY SINGLE-INCISION ROBOTIC THYROIDECTOMY

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Aims: Transaxillary single-incision robotic thyroidectomy requires large tissue disruption to reach the target area from the axilla to the central neck. This seems to produce significant pain in the axillary and neck areas in the early postoperative period. We hypothesized that early postoperative pain can be reduced by ultrasound-guided serratus-intercostal plane block (SIPB) targeting the lateral cutaneous branches of the 2nd and 3rd thoracic intercostal nerves supplying the axillary area combined with the intermediate cervical plexus block (ICPB) targeting the cervical plexus supplying the supraclavicular area and the sternocleidomastoid muscle.

Method: Sixteen adult patients scheduled for elective robotic thyroidectomy under general anesthesia were randomly allocated to receive the ultrasound-guided SIPB and ICPB (Block group; n = 9) or not to receive the nerve blocks (Control group; n = 7) before emergence. Postoperative axillary and neck pain in two groups were compared using a visual analogue scale (VAS) score and the number of administrations of rescue analgesics for the first 24 hours postoperatively.

Results: VAS scores of postoperative axillary pain were significantly lower in the Block group than in the Control group at 1, 3, 6, and 9 hours after surgery. VAS scores of postoperative neck pain were significantly lower in the Block group than in the Control group at 1 and 3 hours after surgery. Rescue analgesics were administered more frequently in the Control group than in the Block group (Table 1).

Table. Visual analogue scale (VAS) scores of patients and mean number of rescue analgesics administered for 24 hours following surgery

Variable	Postoperative hour	Control group (n = 7)	Block group (n = 9)	P
Postoperative axillary pain	0-1 hr	8.00 (1.15)	4.67 (1.39)	0.003*
	1-3 hr	7.36 (1.03)	1.67 (1.20)	0.001*
	3-6 hr	4.79 (2.16)	1.17 (0.79)	0.001*
	6-9 hr	3.50 (2.50)	0.67 (0.50)	0.008*
	9-24 hr	1.79 (1.35)	0.89 (0.78)	0.138
Postoperative neck pain	0-1 hr	6.43 (2.51)	2.28 (1.75)	0.006*
	1-3 hr	4.00 (1.73)	1.06 (1.29)	0.004*
	3-6 hr	2.00 (2.00)	0.89 (1.17)	0.187
	6-9 hr	1.43 (2.30)	0.56 (0.73)	0.724
	9-24 hr	0.79 (1.41)	0.44 (0.53)	0.902
No. rescue analgesics	0-1 hr	0.86 (0.38)	0.33 (0.50)	0.042*
	1-24 hr	2.29 (0.95)	0.67 (0.87)	0.007*

Values are mean (SD) or numbers

Rescue analgesics were given for VAS scores ≥ 4 .

Rescue analgesics were the single injection of fentanyl 0.5 μ g/kg i.v. in PACU (0-1 hr) or ketorolac trimethaphane 30 mg i.v. in the general ward (1-24 hr). PACU; post-anesthetic care unit

* $P < 0.05$

Conclusion: Ultrasound-guided SIPB combined with ICPB is an effective postoperative analgesic method for the transaxillary single-incision robotic thyroidectomy, especially in the early postoperative period.

ESRAS-0108

Free Communication 8

INGUINAL HERNIA REPAIR IN LOCAL ANESTHESIA AND DAY CARE SURGERY

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Aims: There are several proven benefits of performing inguinal hernia repair (IHR) under local anesthesia (LA). Despite this, only 20% of all IHR in men in Sweden are performed with this setting. A concern about inadequate pain relief is a probable cause. The purpose of this study was to evaluate the perioperative course after IHR in LA and daycare surgery.

Method: 309 men (21–75 years) were included. Surgeons were instructed in a 30-minute group session how to administer LA. Patients were given 10 mg oxycodone, 1 g paracetamol and 25 mg meklozin as premedication. A mixture of Lidocain® (5 mg/ml) and Marcain® (2.5 mg/ml) in proportion 1:1 was used for local anesthesia. Initially, 20 ml of the mixture was infiltrated subcutaneously along the incision line, and every second cm a deeper infiltration against the external fascia was given. Another minimum volume of 20 ml was infiltrated subfascially before the external fascia was cut open.

Results: Two patients were converted to oro-tracheal intubation (one due to vomiting, one due to insufficient pain relief). Operation time was 48 min (40–58) (median (IQR)). Patients were discharged in 170 min (130–225). Patients were off any use of analgesics by day 7 and returned to their normal daily activities and normal workload in 8 days (0–14).

Conclusion: IHR in LA is easy to perform with good results in postoperative recovery. IHR can advantageously be performed in LA and a day care setting. From a health economic perspective, IHR in LA is probably favorable but further studies are needed.

ESRAS-0134

Free Communication 8

ANATOMICAL AND ULTRASOUND DESCRIPTION OF THE POSTERIOR FEMORAL CUTANEOUS NERVE

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Introduction: Posterior Femoral Cutaneous Nerve (PFCN) is a sensitive nerve. It innervates the skin of the perineum and posterior thigh to the popliteal fossa. MRI and CT guided blocks have been described for pelvic pain management, and there is only one reference of ultrasound-guided block. The aim is to perform PFCN detailed anatomical description to identify referrals for ultrasound-guided block.

Method: Dissections of 4 lower extremities are made. Ultrasound scan is performed following the formally identified anatomical references. The nerve is identified and marked with ink.

Results: PFCN progressive superficialisation flowing between the Gluteus Maximus and the long head of Biceps Femoralis muscles is observed. The nerve is closely related to the deep fascia of the Gluteus Maximus muscle. In the caudal margin of the muscle, the nerve lies subcutaneous, superficial to the long head of the Biceps Femoralis muscle.

In the ultrasound image (Figure 1), we locate the PFCN moving from the vicinity of Sciatic Nerve towards the fascia between the Biceps Femoralis muscle and the Gluteus Maximus to be located above the Biceps Femoralis.

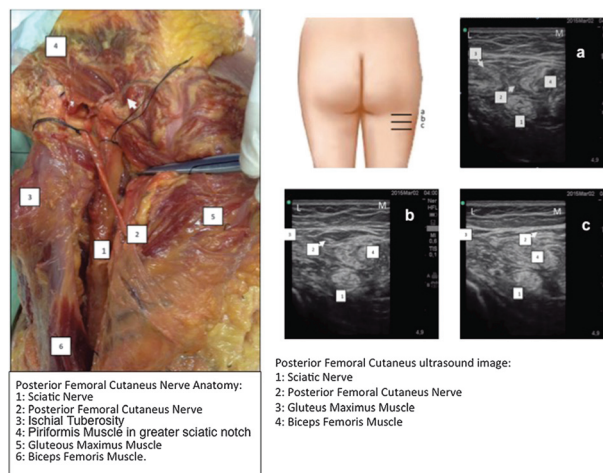


FIGURE 1.

Conclusion: The PFCN is an independent nerve, branch of the sacral plexus, suitable for ultrasound guided block. The PFCN block might be useful for posterior thigh surgery.

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ESRAS-0159

Free Communication 9

THE ANALGESIC EFFICACY OF SCIATIC NERVE BLOCK IN ADDITION TO FEMORAL NERVE BLOCK IN PATIENTS UNDERGOING TOTAL KNEE ARTHROPLASTY: A SYSTEMATIC REVIEW AND META-ANALYSIS

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Aims: Based on subjective assessment and not on formal statistical evaluation, a previous systematic review on the analgesic contribution of sciatic nerve block (SNB) in patients undergoing total knee arthroplasty (TKA) with femoral nerve block (FNB) remained inconclusive.¹ We therefore undertook a meta-analysis to assess the postoperative analgesic efficacy of SNB in addition to FNB after TKA.

Method: This meta-analysis was performed according to the PRISMA statement guidelines. The primary outcome was cumulative iv morphine consumption at 12h postoperatively, analysed according to the type of block: FNB+SNB (single-shot injection or continuous SNB) vs FNB only. Secondary outcomes were iv morphine consumption at 24h and 48h postoperatively, pain scores at rest and on movement at 12, 24 and 24h postoperatively and rate of PONV at 24h postoperatively. All analyses were performed with the “Review Manager” software (RevMan_version_5.3).

Results: Eleven controlled trials were identified including a total of 514 patients. When added to FNB, SNB significantly reduced cumulative iv morphine consumption at 12h postoperatively, with a mean difference of 7 mg (95% CI: –10; –4; $p < 0.0001$) (Figure 1). All other secondary outcomes were significantly reduced as well (Table 1).

Conclusion: SNB confers additional postoperative analgesia to FNB in patients undergoing TKA.

Reference

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ESRAS-0368

Free Communication 9

THE EFFECT OF CERVICAL SYMPATHETIC BLOCK ON OPTIC NERVE SHEATH DIAMETER: EVALUATION USING ULTRASONOGRAPHY

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Aims: Cervical sympathetic block (CSB) is performed to treat patients with a variety of conditions, such as vascular insufficiency and pain syndromes of the face, neck, and upper extremities. Increase of cerebral blood flow (CBF) after CSB may elevate intracranial pressure (ICP). In the present study, we aimed to determine the effect of CSB on optic nerve sheath diameter (ONSD) by comparing ONSDs measured by ultrasonography, a noninvasive screening tool, before and after CSB in patients without intracranial pathologies or neurological disorders.

Method: Ultrasound-guided CSB was performed with a lateral approach at the C6 level in 35 patients. ONSD was measured before CSB and after checking for Horner's syndrome 15 minutes after CSB.

Results: The mean ONSD was significantly higher after CSB than before (5.15 ± 0.38 mm vs. 4.75 ± 0.32 mm, $P < 0.001$). A comparison of ONSDs

between the blocked and non-blocked sides revealed that these values did not differ significantly between sides at baseline and after CSB.

Conclusion: CSB caused an increased ONSD in patients without intracranial pathologies or neurological disorders. Further larger and controlled studies of the effect of CSB on ICP in humans are needed to confirm our findings.

ESRAS-0198

Free Communication 9

EXTRAFASCIAL INJECTION FOR INTERSCALENE BRACHIAL BLOCK REDUCES RESPIRATORY COMPLICATIONS COMPARED TO A SUBFASCIAL INJECTION: A RANDOMIZED, CONTROLLED, DOUBLE-BLIND TRIAL

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Aims: Hemidiaphragmatic paresis after ultrasound-guided interscalene brachial plexus block (IS block) is reported to occur in up to 100% of patients. We tested the hypothesis that an injection lateral to the brachial plexus sheath reduces the rate of hemidiaphragmatic paresis compared to a classical approach while providing similar analgesia.

Method: After ethics committee approval, 40 ASA I–III patients scheduled for elective shoulder surgery under general anaesthesia were randomized into two groups. An ultrasound-guided IS block was performed prior to surgery: 20 milliliters of bupivacaine 0.5% with epinephrine 1:200,000 were injected either between C5 and C6 within the interscalene groove (group subfascial, SF) or 4 mm lateral to the brachial plexus sheath (group extrafascial, EF). The primary outcome was rate of complete hemidiaphragmatic paresis (diaphragmatic movement reduction >75%), measured by M-mode ultrasonography, before and 30 min after the procedure. Secondary outcomes were forced expiratory volume, forced expiratory volume in 1 second, and peak expiratory flow. Other outcomes included intraoperative fentanyl consumption, time to first analgesic request, and oxycodone consumption at 24 h postoperatively.

Results: The rate of hemidiaphragmatic paresis was 95% in group SF and 25% in group EF ($p < 0.0001$). Other respiratory outcomes were significantly preserved in group EF (table 1). Acute pain-related outcomes were similar between groups (Table 2).

Conclusion: IS block with an extrafascial injection reduces respiratory complications and provides similar analgesia compared to a subfascial injection.

ESRAS-0204

Free Communication 9

COMPARISON OF TWO DIFFERENT ANATOMIC APPROACHES TO ULTRASOUND-GUIDED SAPHENOUS NERVE BLOCK

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Aims: The present study aimed to compare the applicability and outcomes of ultrasound (US)-guided saphenous nerve block through the subsartorial approach and the medial infracondylar approach.

Method: The study included 68 patients at the age of 18–65 years, with ASA physical status of I–III, who were scheduled for minor surgery of the lower extremity at the level of below knee by the orthopedics clinic. The patients who were randomly divided into two groups as Group S (subsartorial approach), and Group M (medial infracondylar approach) for US-guided saphenous nerve blockade. For all patients who had a block procedure, the pinprick test was performed using a blunt needle on the saphenous nerve dermatome; time to block performance (TBP), onset time of block (OTB) and duration of sensory blockade (DSB) were recorded in the patient follow-up form.

Results: DSB values were found 413.5 ± 64.23 min. for Group S (subsartorial approach) and 367.05 ± 51.03 min. for Group M (medial infracondylar approach). Significant statistical difference was found between groups ($p = 0.004$). There was no significant difference between groups for comparing TBP and OTB.

Conclusion: The saphenous nerve blockade performed under the guidance of US with two different anatomical approaches has a 100% success rate equally for both approaches. Although DSB was found statistically longer in the sub-sartorial approach, suggests that the medial infracondylar approach is a good alternative for applicability and these are comparable techniques.

ESRAS-0203

Free Communication 9

CONTINUOUS FEMORAL NERVE BLOCK DOES NOT WORSEN FUNCTIONAL OUTCOMES AFTER ANTERIOR CRUCIATE LIGAMENT RECONSTRUCTION: A RANDOMIZED, CONTROLLED, DOUBLE-BLIND TRIAL

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Aims: We have previously demonstrated that continuous femoral nerve block (CFNB) after anterior cruciate ligament reconstruction (ACLR) may result in femoral nerve injury, in turn worsening functional outcomes. This randomized controlled double-blind trial compared electrophysiological and functional outcomes after ACLR where analgesia was provided with CFNB or intravenous patient-controlled analgesia (IVPCA) of morphine.

Method: After ethics committee approval, 54 ASA I-II patients scheduled for ACLR under general anaesthesia were prospectively randomized to receive either an ultrasound-guided CFNB placed prior to surgery, followed by an infusion of ropivacaine for 2 days with oxycodone pro re nata or IVPCA of morphine. The primary outcome was compound muscle action potential (CMAP) area from the quadriceps muscle measured at 6 weeks postoperatively. Secondary outcomes were range of active flexion, quadriceps muscle power, and distance walked. Other outcomes included total equivalent intravenous morphine consumption, pain scores at rest and on movement, and rate of postoperative nausea and vomiting at 24 and 48 h postoperatively.

Results: CMAP area at 6 weeks was equivalent in both groups (group CFNB:47[41; 54]mV*ms;group PCA:51[42;60]mV*ms;p=0.50). While no statistically significant differences were detected between groups in functional (table 1) or pain outcomes, morphine consumption at 24hrs was reduced by CFNB (table 2).

Conclusion: Despite prior contrary findings, CFNB in this study did not result in femoral nerve injury or worsen functional outcomes after ACLR. Analgesia was not improved beyond 24 postoperative hours although this secondary outcome should be interpreted with caution.

ESRAS-0070

Free Communication 10

DIFFERENCE BETWEEN TRANSVERSALIS FASCIA PLANE BLOCK AND TRANSVERSUS ABDOMINIS PLANE BLOCKS IN RESPECT OF ANALGESIC EFFECT AND SERUM CONCENTRATION OF ROPIVACAINE

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Aims: Transversalis fascia plane block (TFPB) may potentially provide better analgesia than transversus abdominis plane block (TAPB) by producing blockade of both the anterior and the lateral branches of spinal nerves. Thus, we hypothesized that TFPB provides better analgesia than TAPB in patients having laparoscopic gynecological surgery. Because of the difference of blood supply to surrounding tissue, we secondly hypothesized that serum concentration of ropivacaine after TFPB is lower than that after TAPB.

Method: Thirty patients scheduled for laparoscopic gynecological surgery under general anesthesia supplemented with TFPB or TAPB participated in this study. After induction of general anesthesia with propofol, fentanyl, and rocuronium, either TAPB or TFPB was administered bilaterally using 60ml of 0.25% ropivacaine under ultrasound guidance. General anesthesia was maintained with sevoflurane, rocuronium and remifentanyl. Heart rate and systolic

blood pressure were measured and recorded through the entire course of anesthesia. Concentrations of ropivacaine were measured 15mins, 30mins, 45mins, 60mins, 90mins, 120mins and 180mins after the administration of blocks. We also recorded Numeric rating scale (NRS) 0hr, 2hrs, 4hrs, 6hrs, 12hrs, 18hrs and 24hrs after emergence from general anesthesia.

Results: There was no statistically significant difference in hemodynamic changes during surgery between the two groups. Serum concentration of ropivacaine after block was significantly lower in patients with TFPB than those with TAPB (Table 1). Patients with TFPB had significant lower NRS than those with TAPB (Table 2).

TABLES 1 AND 2.

	15min	30min	45min	60min	90min	120min	180min
TAPB	1.14±0.36	1.13±0.27	1.27±0.15	1.19±0.15	1.06±0.15	0.84±0.17	0.63±0.17
TFPB	1.00±0.52	1.04±0.51	1.02±0.34*	0.92±0.36*	0.80±0.31*	0.65±0.26	0.53±0.19
Values are mean±SDmcg/mL. * p<0.05 vs TAPB.							

	0h	2h	4h	6h	12h	18h	24h
TAPB	2.6±1.9	1.8±1.3	1.8±1.4	1.6±1.1	1.9±1.8	1.9±1.9	1.5±1.0
TFPB	1.6±1.2*	1.6±1.3	1.4±1.1	1.3±1.0	1.2±1.1	1.2±1.1	0.7±0.5
Values are mean±SD. * p<0.05 vs TAPB							

Conclusion: Serum concentration of ropivacaine after TFPB was lower than that after TAPB despite the fact that TFPB has better analgesic effect than TAPB.

ESRAS-0098

Free Communication 10

LOWER PAIN SCORES AND OPIATE CONSUMPTION FOR FEMORAL NERVE CATHETER VERSUS LOCAL INFILTRATION ANALGESIA IN FAST TRACK KNEE ARTHROPLASTY: A RANDOMIZED CLINICAL TRIAL

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Aims: Background and aims: For optimal recovery after total knee replacement surgery, the analgesic technique should allow early ambulation with good pain relief and minimal side effects. This study aims to compare femoral nerve block with local infiltration analgesia.

Method: Methods: After receiving local ethics committee approval, 80 patients scheduled for fast track total knee replacement surgery under spinal anesthesia were randomized to receive local infiltration analgesia (LIA) or femoral nerve block (FNB). LIA received a solution of 400 mg ropivacaine and 1 mg epinephrine by infiltration of the posterior capsule of the knee as well as the anterior tissues at the end of surgery. FNB received 200 mg ropivacaine with 0.5 mg epinephrine by infiltration of the posterior capsule of the knee and 40 mg ropivacaine through a femoral nerve catheter, every four hours during the first 24 hours after surgery. All patients received oxycodone orally upon request. Groups were compared by repeated measures ANOVA.

Results: Results: FNB had lower pain scores (p=0.019, Figure 1) and lower oxycodone use (mean 11.4 mg vs 17.5 mg for FNB and LIA, respectively,

$p=0.045$). There was no difference in hospital length of stay, patient mobilization, and patient satisfaction with the anesthetic technique between groups.

Conclusion: Conclusion: Combined with LIA of the posterior capsule, femoral nerve block provides better postoperative analgesia and lower opiate consumption as compared with LIA of the posterior capsule and anterior tissues, without impeding the fast track recovery schedule.

ESRAS-0117

Free Communication 10

ADDUCTOR CANAL BLOCK VERSUS FEMORAL NERVE BLOCK FOR ANALGESIA AFTER ARTHROSCOPIC ANTERIOR CRUCIATE LIGAMENT RECONSTRUCTION: A PROSPECTIVE, RANDOMIZED, CONTROLLED TRIAL

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Aims: Femoral nerve block (FNB) provides effective analgesia for knee procedures but has been associated with quadriceps weakness. A promising alternative is adductor canal block (ACB) that delivers a primarily sensory blockade; however, the differential effects of these two techniques on functional outcomes and analgesia after arthroscopic anterior cruciate ligament reconstruction (AACL R) are not well established.

Method: After ethics committee approval and informed consent, 40 patients scheduled for AACL R were randomized to receive either continuous ACB or FNB (infusion of 0.2% ropivacaine, 5 mL/h for 48 hours) as a component of a multimodal analgesic. Quadriceps strength and pain score at rest or during knee flexion was assessed at 6 h, 24 h and 48 h after surgery. Degrees of knee flexion and morphine consumption were also recorded at 24 h and 48 h after surgery (ClinicalTrials.gov No. NCT02355093).

Results: Quadriceps strength was significantly higher in the ACB group than that in the FNB group at 6h (1.95 ± 0.22 vs 1.15 ± 0.49 , $P=0.009$), 24h (2.50 ± 0.51 vs 1.20 ± 0.41 , $P=0.002$), and 48h (3.15 ± 0.37 vs 2.35 ± 0.49 , $P=0.004$) after surgery. Pain scores at rest and during knee flexion, degrees of knee flexion, and morphine consumption were similar between the two groups ($P > 0.05$).

Conclusion: ACB may be superior to FNB in preserving quadriceps muscle strength after AACL R without a significant reduction in analgesia.

ESRAS-0184

Free Communication 10

EFFECT OF ADDUCTOR CANAL BLOCK ON POSTOPERATIVE PAIN MANAGEMENT AFTER TOTAL KNEE ARTHROPLASTY

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Aims: The aim was to evaluate analgesia effectiveness with CACB compared to CFNB after total knee arthroplasty (TKA).

Method: After institutional Research Ethics Board approval, 62 patients, aged >18 years, ASA1-3, undergoing unilateral TKA under spinal anesthesia were enrolled into this trial. Patients were randomly allocated to receive, US-CACB (GS, $n=31$) with a local infiltration of the knee with ropivacaine 0.2% or US-CFNB (GF, $n=31$). Blocks were induced with bupivacaine 0.25%. In the GF a continuous bupivacaine 0.125% were maintained 48h postoperatively whereas in the GS boluses were performed every 12h. Postoperative analgesia included PCA morphine, paracetamol and diclofenac. We have assessed NRS pain score, morphine consumption, ability to ambulate, walked distance. NRS pain scores were analyzed to search for non-responders. The NNT was calculated to have a 25% reduction of pain at rest and movement. $P < 0.05$ was considered as clinically significant.

Results: Demographics data were similar between the 2 groups. Cumulative morphine consumption over the 2 first postoperative days was 15.3 ± 19 mg vs 17.7 ± 17 mg; $P=0.78$ in the GF and GS, respectively. At rest, median NRS pain score were higher in the GS during the three first postoperative hours without statistical difference, in GS and GF, respectively. Fourteen patients were able to ambulate the first postoperative day in GS versus 2 ($P < 0.0001$). Individual

analyses of patients have shown that 7% (GF) and 17% (GS) are non-responders after 48h of treatment; $P=0.37$. NNT was 10 patients.

Conclusion: CACB provides similar analgesic profile to CFNB, but allows earlier ambulation. CACB is associated with high incidence of non-responders.

ESRAS-0227

Free Communication 10

ORAL PROLONGED-RELEASE OXYCODONE OFFERS EQUIVALENT ANALGESIA TO INTRAVENOUS MORPHINE PATIENT-CONTROLLED ANALGESIA AFTER TOTAL KNEE REPLACEMENT. PRELIMINARY DATA FROM A PROSPECTIVE, RANDOMIZED STUDY

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Aims: The purpose of this study is to determine if oral controlled-release oxycodone could provide equivalent analgesia, and a similar side-effect, to i.v. morphine patient-controlled analgesia (PCA) after total knee replacement (TKR) managed by continuous-femoral and single-shot sciatic nerve block.

Method: All patients received the same anesthetic management as follow: sciatic nerve block with 0.3% ropivacaine 15ml, femoral nerve block with 0.5% ropivacaine 20 ml using a continuous catheter set Contiplex® C (B. Braun, Melsungen, Germany), spinal anesthesia and continuous femoral nerve infusion (ropivacaine 0.2% 4ml/h). After surgery (T0), patients were randomly allocated to receive one of two treatment: OXYCODONE group received 10 +10 +5mg controlled release oxycodone hydrochloride/5mg naloxone hydrochloride (Targin™) oral administration 12 hourly (T9, T21, and T33). MORPHINE group; morphine 2mg i.v. bolus PCA (no basal infusion).

Results: 62 out of 120 planned patients fulfilled the inclusion criteria. There were no significant differences in the primary outcome measures of rest and dynamic pain score at each post-operative time observations, and at the data pooled into 24 h periods (Figure 1). The secondary outcome measures showed no significant differences in the total equivalent morphine consumption (OXY 12.6 ± 1.1 mg vs 11.7 ± 3.7 mg - $p 0.20$) or postoperative nausea and vomiting (PONV) (OXY 0.6 ± 0.8 vs 0.8 ± 1.0 - $p 0.40$).

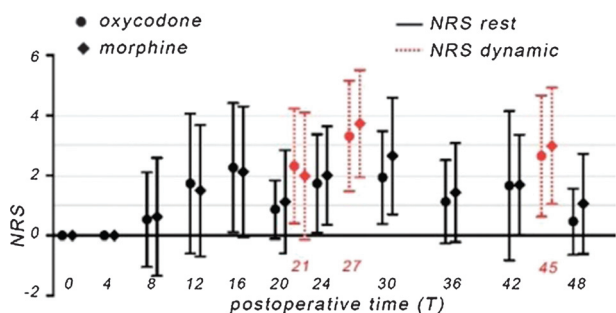


FIGURE 1.

TABLE 1.

	OXYCODONE (nr 30)	MORPHINE (nr 32)	P	95% C.I.
NRS rest 0-24	1.01 ± 1.71	1.05 ± 1.82	0.83	-0.36 +0.29
NRS REST 25-48	1.30 ± 1.78	1.71 ± 1.81	0.07	-0.85 +0.03
NRS dynamic	2.77 ± 1.95	2.91 ± 2.06	0.63	-0.71 +0.43

Conclusion: These preliminary results suggest that after TKR performed under spinal anesthesia and managed by continuous-femoral and single-shot sciatic nerve block, oral controlled-release oxycodone/naloxone provide equivalent analgesia to i.v. morphine PCA, with a similar degree of PONV.

ESRAS-0399

Free Communication 10

TOTAL SERUM ROPIVACAINE LEVELS AFTER FASCIA ILIACA COMPARTMENT BLOCK WITH 40ML ROPIVACAINE 0.5%

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Aims: The supra-inguinal longitudinal Fascia Iliaca Compartment Block (FICB) as described by Hebbard is a useful block for hip surgery. As it is a field block, large volumes of local anaesthetics are required to achieve success. Using large volumes of local anaesthetics increases the risk of systemic toxicity. We performed a study to determine total serum ropivacaine levels after FICB.

Method: After Institutional Review Board approval, written informed consent was obtained in 10 patients planned for total hip arthroplasty. An ultrasound-guided FICB was performed using 40 mL ropivacaine 0.5%. Arterial blood samples were taken at different time points and total serum ropivacaine levels were determined using a Liquid Chromatography-Mass Spectrometry method. All patients were monitored for neurological and cardiac symptoms of local anesthetic systemic toxicity. Values are presented as means (range).

Results: Figure 1 presents the pattern of total arterial serum levels over time for all patients and the mean values. The mean (range) peak arterial serum level (Cmax) was 1.41 (0.8–1.6) mg/L. Time to reach Cmax was 55 (15–90) minutes after performance of the FICB. In all patients, the Cmax was lower than the maximum tolerated concentrations (3.4–5.3 mg/L) described in previous studies. None of the patients experienced neurological or cardiac symptoms of local anesthetic systemic toxicity.

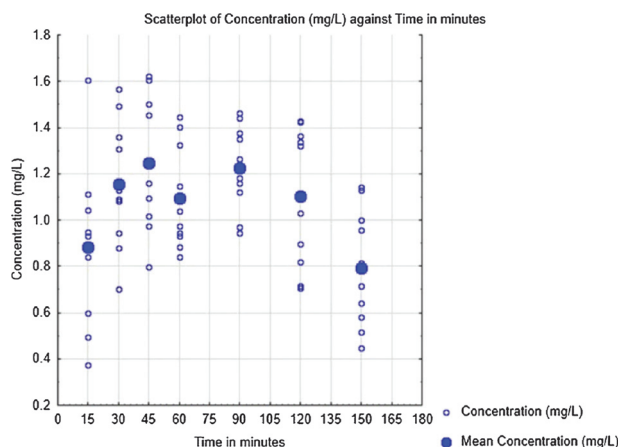


FIGURE 1.

Conclusion: Total serum ropivacaine levels remains under the toxic thresholds after a FICB with 40 mL ropivacaine 0.5%. Further research is necessary to determine free plasma ropivacaine levels.

ESRAS-0442

Free Communication 11

EVALUATION OF THE EFFECTS OF EPIDURAL BUPIVACAINE ON THE COAGULATION SYSTEM BY USING THROMBOELASTOMETRY IN WOMEN WITH GYNECOLOGIC MALIGNANCIES

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Aims: In this study, epidural local anesthetic drugs are scheduled to examine their effects on the coagulation cascade.

Method: A total of 40 patients with gynecologic tumors were eligible, which was approved by the Ethics Committee, and informed consent was given. Epidural catheter was introduced into the epidural space of all patients. The patients were randomized into two groups; Control group and Study group. Before the induction of anesthesia, saline 5 cc, in Control group and 25 mg bupivacaine was given via epidural catheter in Study group. An epidural morphine infusion was started at the rate of 0.2 mg/hour in Control group and an epidural infusion was started at the rate of 0.2 mg/hour morphine + 0.75 mg/hour bupivacaine in Study group in the recovery room. Before induction of anesthesia and postoperative 24 hours, complete blood count; PTT- PT; platelet aggregation tests with ADP, epinephrine, collagen and arachidonic acid and thromboelastometry analysis were performed on blood samples.

Results: INTEM CT, which was measured in the postoperative period, was significantly shorter in study group (Table 1). There was no significant difference in the aggregation test results between the study and control groups.

Conclusion: Bupivacaine causes platelet dysfunction induced by various agonists while neither this primary hemostatic abnormality nor other coagulation abnormalities can be detected by ROTEM.

ESRAS-0268

Free Communication 11

RELIABILITY AND VALIDITY OF A BEHAVIORAL PAIN SCALE TO MEASURE PAIN IN CRITICALLY ILL SEDATED AND INTUBATED PATIENTS IN A CARDIAC SURGERY INTENSIVE CARE UNIT

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Aims: Few validated tools exist to measure pain in critically ill sedated and intubated patients in the intensive care unit (ICU). Evidence demonstrates that behavioral pain assessment can provide important information about pain in patients unable to communicate verbally. This study was designed to validate the Imelda Pain Scale for Intubated and Sedated patients (IMPIS), a 10-point behavioral pain scale based on the Pain Assessment In Advanced Dementia Scale (PAINAD) and the Pain Observation Scale for Young Children (POCIS).

Method: Data were prospectively collected in a cardiac surgery ICU of a university-affiliated hospital after implementation of IMPIS. The validity and reliability of IMPIS was assessed against the patient's self-reported visual analogue scale (VAS). IMPIS-scores range from 0 (no pain) to 10 (maximum pain) and were plotted against VAS-scores. The Richmond Agitation and Sedation Scale (RASS) was used to determine depth of sedation. Correlations were determined.

Results: 504 paired assessments were recorded in 113 ICU-patients after cardiac surgery over a period of 6 months. Regression analysis demonstrated a strong correlation between IMPIS-scores and VAS-scores ($R^2 = 0.69$, $p < 0.05$). All measurements ($n=246$) at RASS 0 (patients are intubated but calm and alert) showed a strong correlation between IMPIS and VAS ($R^2 = 0.86$, $p < 0.001$). Internal consistency (Cronbach α 0.79) was high.

Conclusion: We conclude that IMPIS is a valid tool to assess pain in critically ill intubated and sedated patients. Future validation of IMPIS before and after painful procedures will contribute to the implementation of IMPIS in an ICU pain management protocol.

ESRAS-0397

Free Communication 11

A RANDOMIZED, CONTROLLED TRIAL COMPARING ANALGESIC EFFECTS OF ULTRASOUND-GUIDED SUPRA-INGUINAL FASCIA ILIACA BLOCK WITH FEMORAL NERVE BLOCK FOR SURGICAL FIXATION OF HIP FRACTURES

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Aims: This study aims to evaluate the analgesic effects of ultrasound-guided supra-inguinal fascia iliaca block (FIB) and femoral nerve block (FNB), for surgical fixation of hip fractures.

Method: Institutional ethics board and written, informed consent from patients were obtained. 30 patients undergoing surgical fixation of hip fractures were recruited and randomized into 2 groups. Patients received a single shot, ultrasound-guided supra-inguinal FIB or FNB with 0.5% Ropivacaine 30mls pre-operatively. Spinal anesthesia was performed for all patients.

Pain scores at rest and on movement were assessed pre-operatively, on positioning for spinal, in recovery and at 24 hours post-operatively. Time to first analgesic (oxynorm), oxynorm consumption in the first 24 hours, opioid related side effects and block related complications were assessed at 24 hours.

Results: All blocks were successful and blocked the sensory distribution of femoral nerve. The FIB produced a blockade of distribution of lateral femoral cutaneous nerve in 73% of cases compared to 27% by FNB ($p=0.03$). The distribution of obturator nerve was blocked in 80% of FIB and 67% of FNB ($p=0.68$).

The post-block pain scores (at rest and on movement), on positioning for spinal and at 24 hours were similar for both groups, as was 24hr opioid consumption. There were no block-related or opioid-related complications.

Conclusion: The ultrasound guided supra-inguinal FIB was more consistent in blocking the lateral femoral cutaneous nerve than a FNB with the same volume and concentration of local anesthetic. However, this difference did not translate to any difference in terms of pain scores, opioid consumption and side effects.

ESRAS-0458

Free Communication 11

PREOPERATIVE PERIPHERAL NERVE BLOCKADE IN THE PERIOPERATIVE PAIN MANAGEMENT AND EARLY MOBILIZATION FOR ARTHROSCOPIC ANTERIOR CRUCIATE LIGAMENT RECONSTRUCTION

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Aims: The aim of this study is to investigate the success rate of preoperative ultrasound-guided peripheral nerve blockade with low dose of local anesthetic.

Method: 150 patients scheduled for the anterior cruciate ligament reconstruction were randomly chosen. They were uniformly anesthetized, but the analgesia was different: intravenous and two models of regional.

Ethical committee approval was obtained. Patients were randomized in three groups: group A ($n=50$) received preoperative blockade (ultrasound-guided) of adductor canal and sciatic nerve with the same dose of local anesthetic mixture combined with unilateral spinal anesthesia. Group B received only unilateral spinal anesthesia, followed by intravenous postoperative analgesia. Group C received preoperative blockade of femoral and sciatic nerve (same dose of local anesthetic mixture as group A). We measured intraoperative and postoperative pain control using visual analogue scale (VAS), motor blockade of the quadriceps muscle, as well as postoperative nausea, iv fluid intake, early mobilization and patient satisfaction.

Results: Intraoperative VAS was similar in all groups. Postoperative VAS was significantly lower in A and group C compared to group B. Early mobilization was found to be worse in group B as well as nausea and patient satisfaction scores. Greater iv fluid intake was found in group B, while group A and C could take fluid orally. Motor strength of the quadriceps muscle was better in group A and B.

Conclusion: The use of peripheral nerve blocks in orthopedic surgery should be a mainstay of perioperative pain control. We found this technique and dosage optimal for this and similar procedures.

ESRAS-0332

Free Communication 11

EVALUATION OF A HANDHELD ULTRASOUND IMAGING SYSTEM FOR ULTRASOUND-ASSISTED EPIDURAL AND SPINAL PLACEMENT

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Aims: This study's aim was to evaluate the performance of a real-time 3D image navigation algorithm that automatically detects the spine midline and epidural depth from images acquired by a handheld ultrasound imaging device. Computer-assisted image interpretation may improve the accuracy of epidural and spinal placement.

Method: The accuracy of the image navigation algorithm was evaluated in a clinical study of 25 patients. Results of the automated algorithm were compared to ground-truth results supplied by three independent physician observers. Patient BMI ranged between 23 and 48.

Results: The figure is a screen-shot from the handheld ultrasound device that depicts the spine midline (dashed white line) and the epidural depth (3.7 cm). Also shown is an outline of a vertebral body cross-section and a 3D rendering that tracks the spine's location to assist with image interpretation.

Across all 25 patients, the estimated epidural depth exhibited root mean squared error (RMSE) of 1.9 mm, while the estimated position of the spine midline was accurate to within 1.6 mm (RMSE). Ultrasound cine captures acquired from multiple patients will also be presented.

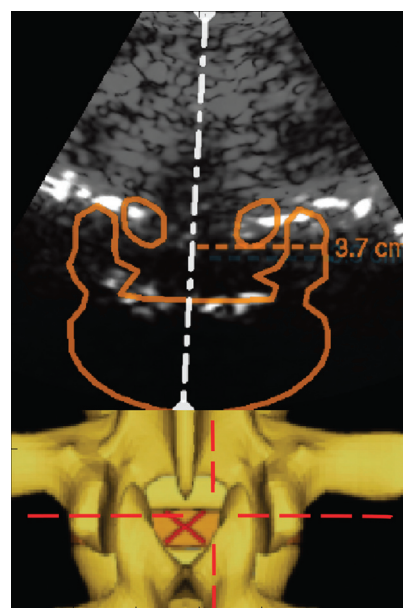


FIGURE 1.

Conclusion: The handheld ultrasound device enabled intuitive imaging of bone anatomy. The automated 3D image navigation algorithm resulted in less than 2 mm error when reporting the depth of the inter-laminar space and identifying the location of the spine midline. Collectively, these results suggest that this new imaging technology may assist with spinal and epidural needle placement in patients across a wide range of BMI.

ESRAS-0292

Free Communication 11

LONGITUDINAL FASCIA ILIACA COMPARTMENT BLOCK FOR TOTAL HIP ARTHROPLASTY

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Aims: Total hip arthroplasty (THA) is painful surgery. Posterior lumbar plexus blocks and more distal nerve blocks (eg. femoral nerve block or fascia iliaca compartment blocks) have been described for postoperative analgesia. This is

a two center, double blind, randomized controlled trial where we compared the opioid consumption of patients with and without a longitudinal supra-inguinal fascia iliaca compartment block (FICB).

Method: After Institutional Review Board approval and written informed consent, patients were included in a double-blinded, placebo-controlled study and were randomly allocated to one of the two research groups. One group received a FICB (Group FICB) with 40mL ropivacaine 0.5%, compared to a control group (Group C) without FICB. All patients received paracetamol, NSAIDs and a patient controlled intravenous analgesia system (PCIA) with morphine for postoperative pain relief. Baseline demographics and results were analyzed using Mann-Whitney U test.

As primary endpoint was postoperative morphine consumption at 24 and 48 hours.

Results: We included 78 patients (Group FICB = 38, Group C = 40). There were 49 women and 29 men. Mean age was 60 and 65 years for Group FICB and Group C, respectively ($p = 0.03$). BMI was comparable for both groups. The mean morphine consumption at 24 and 48 hours was 8.8 and 10.9 mg for Group FICB compared to 16.9 and 20.8 mg for Group C (at 24h $p < 0.001$, at 48h $p < 0.001$).

Conclusion: A longitudinal supra-inguinal fascia iliaca compartment block (FICB) for postoperative pain relief after a anterior total hip replacement significantly decreases morphine consumption at 24 and 48 hours.

Abstracts and Highlight Papers of the 34th Annual European Society of Regional Anaesthesia & Pain Therapy (ESRA) Congress 2015: E-poster Viewing Papers

ESRAS-0193

Central Nerve Blocks

THE CSE ON RELAPSE SPINAL SURGERY

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Aims: Patient is 77 years old.

The patient had previously been her lumbar 4-5 discectomy pain was in the patient's leg. lumbar stenosis diagnosed. ef was %65. Patient was used to antihypertensive drug.

Method: Illuminated anesthetized consent. cardiology and pulmonology consultation was held. ASA 3 was given risk. Introduction signs were stable. given was 1mg demizolam.

Combine Spinal anesthesia was administered in ranges from 11. given was intrathecal 12.5mg heavy marcain and 25mcg fentanyl.

Operation began and after was added 3 hours of additional doses of lidocaine test dose.

Epidural catheter was given 2cc 2% lidocaine and 1/2 bulb sodium bicarbonate.

Results: Operation lasted 4 hours and 45 minutes. bilateral L4-5 facet screw and total laminectomy was performed bilaterally foraminectomy. administering drugs through epidural catheter for postoperative analgesia was provided with 6 hours. 8cc serum physiologic, 100 mcg morphine and 1cc 0.5% Marcaine.

Conclusion: Vital signs were stable. The patient was discharged after removing the catheter 2 days postoperative. There were no complications.

ESRAS-0443

Central Nerve Blocks

HYPERBARIC 2% PRILOCAINE SPINAL ANESTHESIA IN ORTHOPAEDIC DAY SURGERY: A SOLUTION TO THE VOIDING PROBLEM?

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Aims: In day surgery context voiding is a primary discharge criteria after surgical procedures.

Method: We had analyzed patients submitted to orthopaedic lower limbs surgery through spinal anaesthesia with Prilocaine 2% (2 mL) 40 mg. The fasting period was the same (eight hours) for every patient and during surgery we had administered a crystalloids bolus of 500 mL followed by 15 mL /kg.

We registered the time to first voiding, the bladder volume with ultrasound after more than 4 postoperative hours.

Catheterization was performed if bladder content was more than 500 mL after US exam or if there were clinical symptoms.

Results: We have monitored 110 consecutive patients. No catheterization was necessary.

Table 1 shows the results.

TABLE 1.

Mean BMI (Kg/m ²)	25,1 ± 3,98
Mean time (minutes) to voiding (110 pts)	249 ± 69
Mean bladder volume (mL) after 4 postoperative hours (49 pts)	248 ± 70

Conclusion: We have showed that the same dose of 2% Prilocaine in subaracnoidal space for outpatient orthopaedic lower limbs surgery allowed an optimal anesthesiological plane without any discharge problems. Actually

it's impossible to detect, between bladder filling and spinal anesthesia, the risk factors which prolong voiding time. Taking into account that one patient took up to six hours to spontaneously urinating, probably it could be important to analyze in every patients the bladder volume with US just before urinating.

ESRAS-0284

Central Nerve Blocks

SPINAL ANAESTHESIA FOR PROXIMAL FEMORAL FRACTURE FIXATION AT MEDWAY HOSPITAL - WHY LOCAL PRACTICE MIGHT DEVIATE FROM NATIONAL STANDARDS

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Aims: In the United Kingdom, nationally audited standards exist for spinal anaesthesia in patients undergoing proximal femoral fracture fixation (PFFF)¹. These include the use of hyperbaric bupivacaine and the avoidance of hypotension. We aimed to compare local practice at our hospital with these standards.

Method: With local governance approval, data was prospectively collected on 30 patients, randomly selected, undergoing spinal anaesthesia for PFFF between November 2014 and January 2015. Anaesthetists were asked to complete a structured proforma, with physiological data collected from our hospital's electronic anaesthetic record system (SaferSleep®).

Results: 19 patients (63%) received isobaric levobupivacaine, compared to hyperbaric bupivacaine (11, 37%). When intraoperative blood pressures were analysed from the available SaferSleep® records (19 of 30), we observed a clear difference between the two groups (see Figure 1). The two groups were similar in terms of age, ASA, dose of local anaesthetic, dose of intrathecal opioid, use of sedation, type of surgery, and the level of experience of the anaesthetist. Patients in the isobaric group also received average lower doses of vasopressor agents.

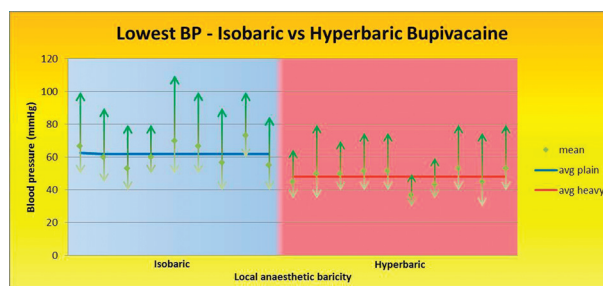


FIGURE 1.

Conclusion: Practice at our hospital deviates from national standards in our anaesthetists' choice of intrathecal local anaesthetic. This choice is likely to be multifactorial but may include observed effects on blood pressure.

Although not designed as a comparative study, our audit data demonstrated a striking difference in the degree of hypotension between the two groups which appears to merit further research.

References

1. Anaesthesia Sprint Audit of Practice (ASAP), National Hip Fracture Database, 2014

ESRAS-0490

Central Nerve Blocks

A PROSPECTIVE RANDOMIZED COMPARISON BETWEEN UNILATERAL VERSUS BILATERAL SPINAL ANAESTHESIA WITH PRILOCAINE FOR DAY CASE PROCEDURES

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Background: Unilateral spinal anaesthesia by local anaesthetic dose reduction can lower side effects due to faster block regression. This prospective randomized study was designed to compare block characteristics, micturition quality and discharge time between unilateral and bilateral spinal anaesthesia with different doses of prilocaine 2%.

Methods: After approval by the ethics committee, 26 patients scheduled for ambulatory knee surgery were randomized to receive either unilateral spinal anaesthesia (30 mg hyperbaric prilocaine 2% with 20 minutes lateral decubitus) or bilateral spinal anaesthesia (50 mg plain prilocaine 2 %). Block characteristics, bladder volumes and discharge times were registered. Voiding was evaluated by a scoring system and uroflow. Maximum bladder capacity was based on a voiding diary.

Results: Because of unacceptable incidence of failed blocks (6/13) in the unilateral group the trial was stopped. L2 regression (101±21min) and time to regain Bromage 1 (94±23min) were faster in the unilateral compared to the bilateral group (resp. 130±36 and 128±35 min). The sensory block reached higher in the bilateral group. Unilateral anaesthesia was complete in 18 %. Urinary retention occurred in both groups (20%) and postoperative uroflows were abnormal in 79 %. Discharge time was 253 minutes in both groups.

Conclusion: The conclusion of this premature stopped trial is that a unilateral block with 30 mg hyperbaric prilocaine provides unpredictable sensory analgesia and increases the risk of block failure. Moreover a higher incidence of urinary retention than expected occurred and the abnormal uroflows confirm the clinical importance of measuring bladder volumes before and after voiding.

ESRAS-0244

Central Nerve Blocks

PREDICTING DISTANCE SKIN TO MID-THORACIC EPIDURAL SPACE (DSMTES) USING A EMPIRICAL FORMULA DERIVED FROM BODY WEIGHT: CORRELATION BETWEEN ESTIMATED AND REAL EPIDURAL DEPTH SPACE

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Aims: Lately, the use of imaging techniques (ultrasound, CT scan, MRI) to estimate the depth of the epidural space has gained many fans and popularity, with good correlation coefficients between estimated and the actual distance (0.56 to 0.81).

However the regular use of these techniques is time / money consuming, requires a long learning curve by Anesthesiologists and aren't always available preoperatively.

In our previous study presented as e-poster in ESRA 2014, we found a statistically significant relationship between weight and DSMTES, which allowed us to reach this empirical equation:

$$\text{DSMTES} = 4.3 + 0.044 \times \text{weight}$$

Our aim is to demonstrate that by using this equation we can easily estimate the DSMTES with good correlation with the real distance.

Method: We selected randomly 20 patients who were not part of the initial study, and had an epidural catheter between T7-T8 and T4-T5; by consulting Anesthesia records, we made correlation between the real and estimated distance.

Pearson correlation coefficient was used to evaluate the association between real and estimated depth values. Bland-Altman analysis was used to assess the limits of agreement between the measurements.

Results: The mean body weight was of 65.4kg (standard deviation 14.49 kg).

A significant association was found between real and estimated depth values, with a good correlation coefficient ($r=0.75$, $p<0.001$).

The Bland-Altman analysis showed the bias of -0.3 and limits of agreement of -2.24 cm and 1.57 cm.

Conclusion: We suggest that DSMTES can be estimated with this empirical formula, with the same degree of confidence from the use of imaging techniques, but without its difficulties and costs.

ESRAS-0274

Central Nerve Blocks

PERIOPERATIVE COMPLICATIONS FOLLOWING PREOPERATIVE CESSATION OF ANTITHROMBOTIC AGENTS IN PATIENTS UNDERGOING PRIMARY TOTAL KNEE ARTHROPLASTY

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Background: Elderly patients undergoing primary total knee arthroplasty (TKA) usually have underlying diseases, and some of them take antithrombotic agents related to co-morbidities. When these patients are planned to undergo TKA, preoperative cessation of antithrombotic agents is considered based on the risks and benefits. Currently, the effect of preoperative cessation of antithrombotic agents on perioperative complications for TKA is unclear. The purpose of this study was to evaluate the impact of discontinuing antithrombotic agents for primary TKA on perioperative complications.

Methods: Patients who underwent primary TKA between 2008 and 2012 were identified, and classified: group A, in which antithrombotic agents were ceased preoperatively, and group B, in which patients did not receive antithrombotic therapy. Patient characteristics, history of antithrombotic therapy, intraoperative blood loss, perioperative blood transfusion, postoperative 30-day complications, and postoperative hospital stay were recorded.

Results: Out of 885 patients undergoing primary TKA, 218 (24.6%) patients was included in group A, and 667 (75.4%) patients in group B. Group A received transfusion more frequently than group B ($P<0.001$). However, there was no difference between the two groups in terms of intraoperative blood loss, postoperative 30-day complications, and postoperative hospital stay.

Conclusion: Patients who discontinued antithrombotic drugs before primary TKA do not have a higher incidence of postoperative 30-day complications, including cardiovascular, cerebrovascular, or thromboembolic events. Moreover, the estimated intraoperative blood loss was not different compared to that in patients not receiving antithrombotic agents preoperatively. However, larger prospective studies of this issue are required.

ESRAS-0246

Central Nerve Blocks

THORACIC EPIDURAL ANAESTHESIA FOR HERNIOTOMY AND COLON RESECTION IN AN ELDERLY HIGH RISK PATIENT- A CASE REPORT

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Aims: One of the most frequent emergency abdominal interventions is an incarcerated inguinal hernia. This is usually performed under general or spinal anaesthesia. Epidural anaesthesia is not the usual technique for this emergency case.

Method: This is a case report of a 82 year old man who was initially diagnosed with an incarcerated inguinal hernia with symptoms of nausea, vomiting, and symptoms of an acute bowel obstruction. In this setting, surgery is urgent and it can be concluded with a bowel resection.

Patient's history of intercurrent diseases was chronic obstructive pulmonary disease and cardiac failure. In order to reduce the adverse effects of general anaesthesia we decided to perform thoracic epidural anaesthesia at TH7-TH8 level.

Epidural anaesthesia was performed in two divided doses with bupivacaine 50 mg + fentanyl 100 mcg. A decrease of blood pressure was avoided with etilefrin hydrochloride.

The procedure was performed with mandatory monitoring: HR, EKG, NIBP, SpO₂.

Before starting the incision 1 mg of midazolam was administered intravenously and the patient was sedated.

Results: The patient onset of sensory loss occurred approximately 20 minutes after the injections. Surgeons performed herniotomy and right colon resection. During the operation, the patient were sedated, did not experience pain, and was hemodynamically and respiratory stable spontaneously breathing with nasal catheter. An excellent analgesic effect was achieved and the intervention was without complications. Furthermore thoracic epidural allowed adequate postoperative analgesia without ventilatory or hemodynamic events.

Conclusion: Epidural anaesthesia performed for high-risk patient for herniotomy with colon resection is effective and safe.

ESRAS-0046

Central Nerve Blocks

INTRACEREBRAL SUBDURAL HAEMATOMA AFTER NEURAXIAL ANAESTHESIA PROCEDURES: LITERATURE REVIEW WITH ANALYSIS OF 97 REPORTED CASES

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Aims: This review highlights the importance of considering an intracranial subdural haematoma as differential diagnosis of headache as a rare but serious complication of neuraxial anaesthesia. With early diagnosis and treatment, severe neurological sequelae can be avoided.

Method: The present article reviews 97 cases of intracranial subdural haematoma following neuraxial anaesthesia for epidemiological factors, clinical signs and symptoms, treatment, outcome and the effect of performing a blood patch. A comparison between the general population and the obstetric subpopulation was performed.

Results: Review of the literature identified 42 cases following epidural anaesthesia and 55 cases following spinal anaesthesia. In the epidural group 76% were parturients, in the spinal group 33%. Results and outcome in the obstetric subpopulation were comparable with those in the general population.

Conclusion: Subdural haematoma is a severe complication after dural puncture and especially obstetric patients might be at high risk. Diagnosis is difficult, but should always be remembered when post dural puncture headache does not resolve or becomes atypical with or without the association of focal neurological deficits. Neuroimaging is fundamental for the diagnosis. Management is either conservative or surgical. Up till now, there is no consensus as to the benefit of an epidural blood patch in the presence of an intracranial subdural haematoma. Epidural blood patch should be performed with caution when there is suspicion or evidence of the existence of an intracranial subdural haematoma.

ESRAS-0450

Central Nerve Blocks

HYPOBARIC ROPIVACAINE (0.1%) VERSUS ISOBARIC ROPIVACAINE (0.1%) IN SPINAL ANAESTHESIA FOR ANORECTAL SURGERIES

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Aims: The aim of this study was to compare the onset, the level, and the duration of sensory and motor blockade occurring after the administration of low-dose hypobaric ropivacaine (0.1%) with isobaric ropivacaine (0.1%) in spinal anaesthesia for anorectal surgeries.

Method: Study design was prospective, randomized, double-blind, comparative, case-control study. A total of 80 ASA grade I-II patients were enrolled for the study.

Results: The isobaric ropivacaine group had a significantly higher heart rate as compared to the hypobaric ropivacaine. Mean arterial pressure (MAP) was

significantly higher in isobaric ropivacaine group. No patient in both of the groups had complete motor blockade (Bromage score³). Two hours after, there was complete decay of sensory and motor blockade (Bromage score=1) in all the patients. The majority of cases, achieved a T8 level of sensory blockade.

Conclusion: Hypobaric ropivacaine provides acceptable surgical environment for anorectal surgeries. Hypobaric ropivacaine is a better than isobaric ropivacaine in terms of hemodynamic stability.

ESRAS-0122

Central Nerve Blocks

THE DOUBLE-BLIND STUDY OF ISOLATED AND COMBINED USE OF TRANEXAMIC ACID AND EPIDURAL ANESTHESIA IN SCOLIOSIS SURGERY

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Aims: To assess the effectiveness of tranexamic acid (TA) and in combination with epidural anesthesia (EA) on perioperative blood loss and hemostasis/fibrinolysis in scoliosis surgery. A prospective, randomized, double-blind study of four techniques for perioperative analgesia during scoliosis surgery.

Method: The study included 115 patients, aged from 15 to 18 years. All patients were divided into 4 groups. Thoracic epidural anesthesia with 0.75% ropivacaine and fentanyl and general anesthesia with sevoflurane were used in group 1 and group 2 and only general anesthesia with sevoflurane and fentanyl was used in group 3 and group 4. Tranexamic acid was administered in group 1 and group 3 before skin incision – a bolus of 15 mg / kg followed by IV infusion of 2 mg/kg/hour up to the end of surgery.

Results: The main effect of reducing intraoperative blood loss by 65% (524 ml, p=0.001) was obtained in group 1 as compared with group 3. In patients without epidural anaesthesia using of TA has decreased blood loss to 29.7% (p=0.01) comparing with group 4. The use of EA without TA has reduced intraoperative blood loss to 50% (730 ml, p=0.005). The use of EA contributed to limit the changes in biochemical data of hemostasis/fibrinolysis system during surgery; while hypercoagulated changes dominated in group 4. There were no complications in all groups.

Conclusion: The main blood saving effect of EA conclude in redistribution of blood flow. The suppression of fibrinolysis is an added without impacting significantly on the amount of perioperative blood loss and transfusion requirements.

ESRAS-0376

Central Nerve Blocks

SPINAL ANAESTHESIA FOR AMBULATORY ARTHROSCOPIC KNEE SURGERY: INFLUENCE OF LOCAL ANESTHETIC, OPIOID AND MIDAZOLAM DOSES ON THE RECOVERY TIMES AND PATIENT OUTCOME

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Aims: Regional anaesthesia has proved economic and clinical benefits when compared to general anaesthesia, but may increase the length of stay in the ambulatory setting. We aimed to assess how total dose of local anaesthetics, opioids and anxiolytics affected patient outcome and recovery times of arthroscopic knee surgery (AKS) performed in our ambulatory surgery unit.

Method: We conducted an observational retrospective study: records of all patients submitted to ambulatory AKS under RA (January 2013 to March 2015) were analysed for demographic data, drugs administered, recovery times (RT) and 24h post-operative (PO) pain and ambulation scores. Proportions were

compared with chi-squared test; association between prescription patterns and RT was estimated by multivariate linear regression, adjusting for age, ASA, and gender.

Results: 158 patients were analysed: mean age 51.6 years, 52.5% male and 94.9% ASA status 1 or 2. All spinals except one were performed in lateral position with hyperbaric bupivacaine (B): patients of group L (29.1%) received 6-8mg and group N (70.9%) 9-10mg. Variable doses of midazolam (M) were administered.

Among men, RT phase 1 significantly increased in group N ($p=0.022$), adding a mean of 15 minutes. There were no statistical differences between M use and RT, but higher doses of M were associated with more PO pain and limitations ($p=0.044$). Total time to discharge was similar in all groups.

Conclusion: Lower doses of B reduced RT phase 1 but not total time to discharge; however, the lower dose was not a true low-dose (5mg). Curiously, higher doses of M seemed to increase PO pain.

ESRAS-0067

Central Nerve Blocks

REFRACTORY HYPOTENSION AFTER SIMULTANEOUS ADMINISTRATION OF EPIDURAL LEVOBUPIVACAINE AND INTRAVENOUS AMOXICILLIN MIMICKING ANAPHYLACTIC REACTION IN VASCULAR PATIENT SUCCESSFULLY TREATED WITH 20% LIPID EMULSION

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Aims: A systemic toxicity of local anesthetics may be difficult to distinguish from anaphylactic reactions.

Method: We are presenting a case of severe hypotension after the epidural application of levobupivacaine and intravenous amoxicillin.

Results: A 64-year old female patient undergoing iliac artery revascularization was given midazolam 2 mg premedication. She had preoperative blood pressure (BP) 140/80 mmHg, and heart rate 89 beats/min. Epidural analgesia was achieved by 10 mg of levobupivacaine 0.375% in 5 ml increments. Simultaneously, she was given amoxicillin with clavulanic acid intravenously. Few minutes later, when she was draped in the prone position, she reported shortness of breath and sleepiness, with rush and severe decrease in BP (47/35 mmHg) and heart rate, which was unresponsive to sympathomimetic therapy.

The patient was given oxygen via face mask, 0.5 mg of atropine, repeated boluses of diluted epinephrine followed by continuous infusion of norepinephrine, with no effects on BP. Infusion of 200 mL of 20% lipid emulsion restored circulatory stability immediately. Norepinephrine dose was reduced, and abolished soon. Surgical procedure was continued. Intraoperative BP and heart rate was normal, and SpO₂ was 95-100% without oxygen supplementation. Blood samples for determination of total IgE and amoxicillin specific IgE were drawn, and the results were normal. We believe that this reaction was manifestation of levobupivacaine systemic toxicity.¹

Conclusion: Lipid emulsion had beneficial effect in the treatment of refractory hypotension after epidural levobupivacaine and should be considered in the early treatment of systemic toxicity of local anesthetics.

Reference: ¹Brull SJ. *Anesth Analg* 2008;106:1337-9.

ESRAS-0155

Central Nerve Blocks

TO EVALUATE THE INCIDENCE OF PRURITIS IN PATIENTS RECEIVING SPINAL DIAMORPHINE IN ARTHROPLASTIES

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Aims: Aim of this audit was to assess the occurrence of pruritis in patients who received spinal diamorphine in total hip arthroplasty.

Method: Data was recorded from case notes of patients who had total hip arthroplasty over one year. We recorded the type of anaesthesia used, dose of

spinal diamorphine, use of antiemetics, occurrence and grade of pruritis and treatment used.

Results: Forty one percent patients experienced pruritis. Thirty eight percent patients received treatment and injection Chlorpheniramine was used in all cases. Eight percent patients experienced second episode of pruritis. Among patients who had one antiemetic, 50 % patients experienced mild pruritis. The patients who received combination antiemetics, all experienced mild pruritis.

Conclusion: There is generally a greater risk of pruritis with increasing dose of intrathecal diamorphine with 300 mcg having the smallest risk. The use of Ondansetron has a beneficial effect in reducing the severity of pruritis.

ESRAS-0293

Central Nerve Blocks

SURVEY OF THORACIC EPIDURAL ANALGESIA

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Aims: Aim of our survey regarding thoracic epidural analgesia is to ascertain the overall failure rate and the reasons for epidural failure and determine any major complications associated with thoracic epidural analgesia.

Method: Prospective survey of all thoracic epidurals inserted during a period of five months between August to December 2014. Patients were followed up in recovery and in ITU/ward on post operative day 1 and 2. Data collection involved patient demographics, level and technique used for epidural insertion, grade of anaesthetist and any associated complications.

We also collected data on intra operative epidural use, effectiveness of epidural in the immediate post operative period and post operative day 1 and 2. We also documented any interventions carried out to manage sub optimal epidurals and associated complications.

Results: 42 thoracic epidurals were inserted during the study period. Among these 36 epidural were inserted by consultant anaesthetists and 6 were inserted by trainees. Most of the epidurals were inserted at low thoracic level T10-L1. Majority of the epidurals were done while the patient was asleep 30/42. Majority 29/42 used saline for loss of resistance while insertion. In most cases 24/42 5cm of catheter was left in desired space.

37/42 epidurals were used during intra-operative period. 9/42 epidurals were documented as difficult to insert. 16/42 epidurals failed due to catheter dislodgement/leak, ineffective/low/unilateral/no block.

Overall failure rate in day 1 was 29% and on day 2 was 38%.

Conclusion: Our epidural failure rate is higher 38% than the failure rate quoted in literature 32%. No major complications were observed. Epidural bolus was indicated in few cases but was not given resulting in epidural failure.

ESRAS-0319

Central Nerve Blocks

AN AUDIT OF NEUROLOGICAL COMPLICATIONS FOLLOWING CENTRAL NEURAXIAL BLOCKADE IN OBSTETRIC ANAESTHESIA

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Aims: The aim of this audit was to compare the complication rates of our institution with the National Audit Project UK (NAP 3) standards.

Method: Retrospective data was collected from our follow-up anaesthetic record sheets over a 2 year period from July 2012 till September 2014. We investigated temporary neuropathy lasting longer than 24 hours and permanent neuropathy following labour analgesia, elective and emergency obstetric procedures.

Results: A total of 3683 CNB were performed. Some patients had more than 1 regional procedure. 21 patients had neurological symptoms. The symptoms and signs varied from numbness to motor weakness. Out of 21 patients, 19 patients had neuropathy that resolved completely within weeks. All their investigations were normal. 1 patient had neuropraxia with bladder symptoms that resolved

completely in 2 months. 20 patients experienced temporary neuropathy. 1 patient had permanent foot drop requiring ongoing neurological care.

On close review of case notes, investigations and specialist reviews among the 20 cases of temporary neuropathy 7 cases of temporary neuropathy likely related to anaesthetic factors, 12 cases were related to obstetric causes and 1 case of atypical presentation with facial weakness. 1 case of permanent neuropathy related to obstetric cause.

Conclusion: Incidence of temporary neuropathy related to anaesthesia in our audit is 0.19% which is comparable to the rate of 0.1% for temporary neuropathy following CNB in obstetric anaesthesia quoted by Obstetric Association of Anaesthetists UK.

ESRAS-0215

Central Nerve Blocks

PNEUMOCEPHALUS FOLLOWING SEQUENTIAL ANESTHESIA: A CASE REPORT

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Aims: Regional anesthesia techniques, including neuraxial anesthesia, are common anesthetic modalities used in orthopedics surgery, particularly in patients with multiple comorbidities. Despite their advantages, there can be complications. The objective of this article is to report a case a pneumocephalus following sequential anesthesia with the "loss of resistance to air" technique to the identification of the epidural space.

Method: Case Report: A 78-year-old woman, ASA III was proposed for a partial hip replacement. We used a sequential anesthesia, which proved difficult, requiring multiple attempts for the identification of the epidural space, initially with loss of resistance technique with saline (LORS) followed by air (LORA), but it was finally achieved with spinal injection of levobupivacaine and morphine and an epidural catheter placement.

Results: Immediately after the apparently uneventful procedure, the patient was unconscious, with a Glasgow score of approximately 5, without response to call or any voluntary movements, showing only a mild response to painful stimuli, maintaining spontaneous respiration and hemodynamically stable. This situation reversed in about 30 minutes, without any changes in neurologic examination. Cranial CT scan showed multiple intracranial air collections, with infra and supratentorial distribution, mostly in the frontal area without herniation or mass effect. The patient recovered with no other symptoms related to pneumocephalus.

Conclusion: Pneumocephalus is a rare but potentially severe complication of the loss of resistance to air (LORA) technique, and so its use must be weighted.

ESRAS-0153

Central Nerve Blocks

A NEW APPROACH FOR POSTOPERATIVE PAIN CONTROL AFTER SURGICAL DECOMPRESSION AS TREATMENT FOR THORACIC OUTLET SYNDROME: THE PECS BLOCK

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Aims: The pectoral nerve blocks (PECS blocks) have been extensively described. We report on the use of PECS blocks for postoperative pain control after surgical decompression as treatment for thoracic outlet syndrome. We hypothesize that the preoperative placement of a PECS I and II can result in good postoperative pain control and possible reduction in length of hospital stay.

Method: In patients undergoing partial rib resection, the PECS blocks were placed under ultrasound guidance. We injected 10 mL of levobupivacaine 0.25% in-between pectoralis major and pectoralis minor muscle and another 20 mL in-between pectoralis minor and serratus anterior muscle. These patients were compared with historical controls without PECS blocks. We performed a retrospective evaluation of the VAS (visual analogue score) scores for postoperative pain (PACU, 12 hours and 24 hours) using the VAS scores reported in the patient files. Furthermore, the need for rescue analgesia and the length of hospital stay were compared. The rescue medication scheme was similar within

both groups, and is based on piritramide IM injections, 0,2 – 0,3 mg/kg up to 4 times a day.

Results: Although the results are based on a small sample size, the results already points toward a decrease in length of stay (2 vs. 3 days, p: 0,003). Based on this study, there is a definite better VAS pain score on day 0, but it is not statistically significant. (VAS 20 vs. 27, p: 0,173)

Conclusion: Larger trials are required to further assess the usefulness of these blocks for this indication, but initial results are promising.

ESRAS-0285

Central Nerve Blocks

COMPARISON OF THE SLEEP PATTERN BY DEXMEDETOMIDINE AND PROPOFOL USED FOR SEDATION: WATCH-PAT200 ANALYSIS

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Aims: Sedatives may lead to respiratory depression in common. The aim of this study was to compare the effects of dexmedetomidine and propofol in respiratory depression and sleep patterns.

Method: Sixty patients were randomized to be treated with dexmedetomidine (n=30, Group D) or propofol (n=30, Group P) as sedatives undergoing orthopedic surgery and receiving SA. Apnea events and sleep patterns were monitored using a portable respiratory monitor, the Watch-PAT200. And additional airway manipulation and adverse effects were recorded.

Results: The respiratory disturbance index (RDI) defined as the total number of sleep-disordered breathing events divided by the recording time were both significantly lower in Group D than in Group P. In addition, the ratio of the REM stage was less in the D group.

Conclusion: Dexmedetomidine is safe and effective when used for sedation by providing similar to a normal sleep pattern, thereby reducing complications.

ESRAS-0220

Central Nerve Blocks

SKIN TO SUBARACHNOID SPACE DEPTH PROFILE IN THE TURKISH POPULATION: A PROSPECTIVE STUDY

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Aims: Our aim was to evaluate the factors affecting skin to subarachnoid space depth (SSD) and to determine the equation of SSD in Turkish population.

Method: We included all consecutive patients who underwent regional anesthesia prior to surgery in our hospital. Age, sex and BMI was measured for all patients. The relationship between SSD and patient characteristics was examined in both sexes.

Results: Two hundred and fifty two patients undergo regional anesthesia. Patients were 115 male (61,5%) and 97 female (38,5%). Mean age was 53,52 ±18,545 (18-92). No significant correlation found between age and SSD (p:0,09). Mean SSD of male population was 5,65±0,922, mean SSD of female population was 5,64 ±0,813 and mean SSD of all population was 5,64±0,880. No statistically significance found between the sex and SSD (p: 0,91). Although we found a very strong positive correlation (r:0,75, p<0,001) with BMI and SSD in male and strong positive correlation (r:0,66 p>0,001) in female (Figure). We found the equation of SSD in relation to BMI based on linear regression analysis as SSD=BMIx0,14+1,884 (R²:0,56) for men, SSD=BMIx0,098+2,799 (R²:0,43) for women and SSD=BMIx0,117+2,403 (R²:0,49) for all population (Figure). Also we examined the correlation of our equation with Stocker, Abe and Chong's modified formula and we found very strong positive correlation (all p<0,001) with them (respectively r:0,84/0,95/0,95) (Figure 1).

Conclusion: We found a significant strong positive correlation between BMI and SSD. The estimation of SSD is a very helpful guide to prevent any complication for regional anesthesia. Further analysis must be done with a larger population to estimate more accurate equations.

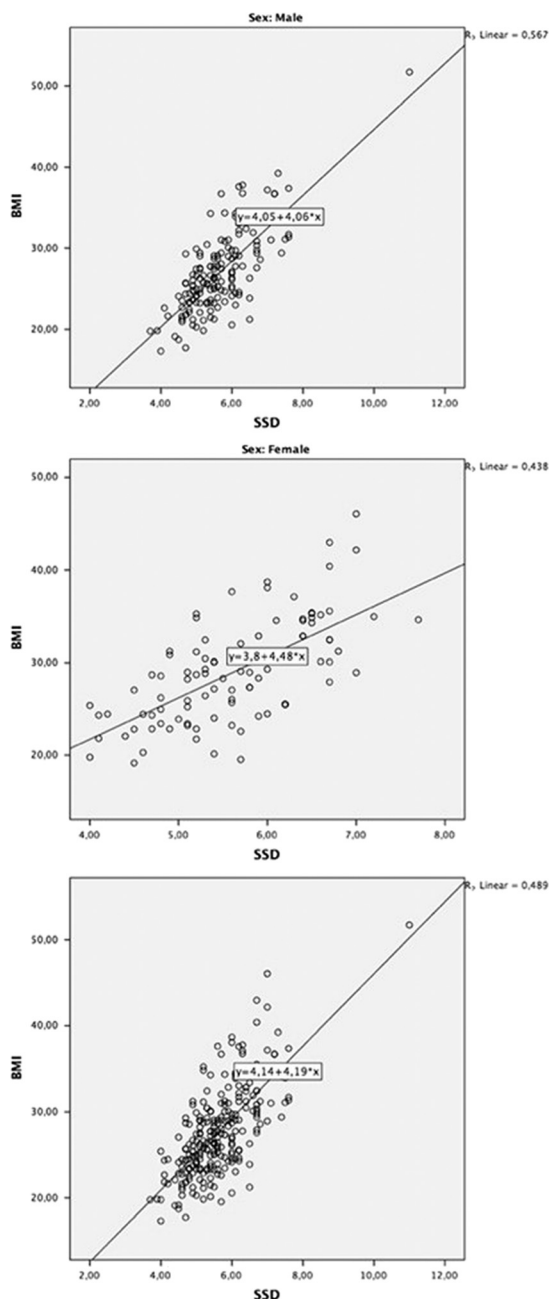


FIGURE 1.

ESRAS-0322

Central Nerve Blocks

THE INCIDENCE OF INTRAVASCULAR INJECTION IN CAUDAL BLOCK: DOES WIRE-REINFORCED CATHETER CAN REDUCE IT? - PRELIMINARY STUDY

Lee JY,¹ Park HJ,² Kim ES.³ ¹Samsung Medical Center, Anesthesiology and Pain Medicine, Seoul, Korea, ²Seoul St. Mary's Hospital-College of Medicine- The Catholic University of Korea, Seoul, Korea, ³Seoul St. Mary's Hospital-College of Medicine- The Catholic University of Korea, Anesthesiology and Pain Medicine, Seoul, Korea. **Aims:** During caudal block, intravascular injection may occur more frequently than generally recognized. Aspiration to confirm the absence of blood in the

needle hub may be insufficient for finding intravascular injection possibility. As an alternative technique for caudal block, we used wire-reinforced catheter to minimize accidental needle movement, finally for reducing intravascular injection. So, we compared caudal block with or without wire-reinforced catheter to make sure the difference of intravascular injection incidence.

Method: A total of 21 caudal blocks were performed with or without catheter. All patients were divided into the 2 groups according to the randomized program. True intravascular injection, simultaneous intravascular and epidural injection and true epidural injection of the groups were measured and statistically analyzed. The primary outcome was defined as the difference of intravascular injection incidence. The secondary outcome was defined as correlation with pain relief.

Results: There were significant differences between the groups in the incidence of true intravascular injection, simultaneous intravascular and epidural injection and true epidural injection, the number of attempts and quality of analgesia. The caudal block with catheter showed significant fewer incidence of intravascular injection and higher analgesic efficacy.

Conclusion: This investigation suggests that wire-reinforced catheter can be used for caudal block with fewer incidence of intravascular injection with higher analgesic efficacy. Further larger studies are required to confirm that wire-reinforced catheter for caudal block can be seen as a safe and accurate device in patients with subnormal coagulopathy.

ESRAS-0452

Central Nerve Blocks

PERFORMING CENTRAL NERVE BLOCKS BEFORE OR AFTER INDUCTION OF GENERAL ANAESTHESIA: A FOLLOW-UP SURVEY OF BELIEFS AND PRACTICE IN OXFORD REGION ANAESTHETISTS

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Aims: Given the rarity of neurological damage as a consequence of performing central neuraxial blocks (CNBs), the evidence that performing CNBs in awake patients minimizes risks, is scant. However, in the Oxford Region, CNBs are routinely taught to be performed prior to general anaesthesia (GA) induction whenever possible. Following our previous surveys published in 2001 and 2008, we re-examined the beliefs and practice in Oxford Region anaesthetists, in order to assess changes in the timing of CNBs when combined with general anaesthesia for limb surgery in adults.

Method: Experienced anaesthetists working in the Oxford Region were invited to complete an on-line questionnaire. We collected data from all respondents on beliefs regarding safety of performing common CNBs awake or asleep in adults; and specific data from regular CNB practitioners regarding performing neuraxial techniques awake or asleep. Data were compared to previous surveys published in 2001 and 2008.

Results: Of the 153 respondents, 81 (53%) regularly performed CNBs. 75% of anaesthetists believed that neuraxial techniques were safer when performed awake, compared to 82% in 2008, and 78% in 2001. 90% of regular block practitioners revealed that they actually performed CNBs awake, compared to 83% in 2008 and 43% in 2001.

Conclusion: In the group of 153 experienced anaesthetists the majority believed that CNBs for limb surgery in adults were safer to be performed awake although the percentage is lower compared to our previous surveys. To the contrary, compared to the 2008 and especially the 2001 surveys, there was an increased trend to perform CNBs prior to GA.

ESRAS-0448

Central Nerve Blocks

THE EFFECT OF INTRATHECAL DEXAMETHASONE AND LEVOBUPIVACAINE ON EARLY POSTOPERATIVE COGNITIVE DYSFUNCTION AFTER FEMUR FRACTURE SURGERY

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Aims: Cognitive side-effects often complicate postoperative care especially in elderly and fragile patients. The aim of this research is to establish the influence of

intrathecal dexamethasone administration in spinal anesthesia with levobupivacaine on postoperative consciousness and pain for patients with femur fracture.

Method: A total of 60 patients ASA2 and ASA3status, scheduled for surgical procedures will be sorted into two groups and undergo surgery. One group will have spinal anesthesia with levobupivacaine, SA group, and the other study group will have spinal anesthesia with addition of dexamethasone, DSA group. Cortisol and glucose are analysed in five measurements. Postoperative cognitive dysfunction is defined by using Confusion Assessment Method (CAM) criteria. Visual analogue scale (VAS) is used to define pain severity.

Results: We collected data for 28 patients so far. Data presented as median (min-max) measured variables. Preoperative cortisol levels were 713,25nmol/L, pain intensity(VASscore) 8,3. Postoperative cortisol plasma levels in 17 patients in DSA group were significantly lower 384(184-511) nmol/L in comparison to 11 patients in SA group with postoperative cortisol plasma levels 551(397-753) nmol/L. The duration of analgesia in DSA group was 428(350-510) minutes and in SA group 212(183-254) minutes. According to CAM criteria, postoperative cognitive disturbances were seen in 8 (72%) patients in SA group, and 3 (17%) patients in DSA group.

Conclusion: The addition of dexamethasone to the local anesthetic has proven so far that it significantly prolongs the duration of sensory block and, thus, decreases opioid requirements and postoperative cognitive disturbances.

ESRAS-0382

Central Nerve Blocks

THE IMPACT OF REGIONAL ANESTHESIA ON HEART RATE VARIABILITY AND QT-INTERVAL CHANGES IN DIABETIC PATIENTS

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Aims: Cardiovascular autonomic diabetic neuropathy is a major complication of diabetes mellitus and is reported to be associated with increased perioperative hemodynamic instability. This study aimed to evaluate cardiovascular autonomic neuropathy with holter monitoring and the effect of regional anesthesia on heart rate variability (HRV) and QT interval.

Method: After ethics committee approval, 34 diabetic ASA II-III patients scheduled for elective either orthopedic or urologic surgery with spinal (Group S) or epidural anesthesia (Group E) were enrolled for the study. Preoperative evaluation included traditional cardiovascular autonomic function tests and HRV with holter monitoring. Holter monitoring was restarted on the day of the operation just before regional anesthesia and continued until the end of the anesthetic effect. Simultaneous heart rate, blood pressure, peripheral oxygen saturation were recorded.

Results: Heart rate and BP remained within 20% of control in all cases. The average level of anesthesia was T8. Heart rate variability data included frequency and time domains. Compared with baseline, in group E TP, LF, HF, mean RR, RMSDD, SDANN, ASDNN increased, and LF/HF ratio was decreased. In group S patients had a transient increase in TP, LF, HF, mean RR, RMSDD, ASDNN, and a corresponding increase in the ratio, and SDANN. Power spectral heart rate and QT-interval analysis during levobupivacaine spinal or epidural anesthesia is compatible with decreased sympathetic activity during stable hemodynamic intervals.

Conclusion: Holter analysis of HRV is a sensitive method for detecting diabetic individuals at risk of hemodynamic instability during anesthesia. Regional anesthesia is a safe anesthetic method in diabetic patients.

ESRAS-0366

Central Nerve Blocks

COMPARISON BETWEEN TWO SPINAL ANAESTHETIC REGIMES FOR PRIMARY KNEE ARTHROPLASTY: AN OBSERVATIONAL STUDY

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Aims: To ascertain if the use of subarachnoid isobaric 0.5% L-bupivacaine (Chirocaine®) could have potential benefits (less haemodynamic instability and less initial post-operative motor weakness) when compared with the use of subarachnoid 0.5% hyperbaric bupivacaine for primary knee arthroplasty.

Method: Twenty six patients were divided into two equal groups and observed after receiving spinal anaesthesia with one of the two regimes (2 mls isobaric 0.5% L-bupivacaine (Chirocaine®) or 2 mls 0.5% hyperbaric bupivacaine. Both are standard anaesthetic techniques and therefore Ethics approval was not sought. Hypotension was defined as a systolic blood pressure of less than 100 mm Hg or a decrease in systolic blood pressure of more than 30% from the baseline. This was addressed with fluid boluses and/or boluses of vasoactive drugs. Bromage score was used to assess the degree of motor block after the spinal and in Recovery.

Results: None of the patients had discomfort during surgery or the post-operative period. The mean decrease in systolic BP was 33% in Chirocaine® group ([range] [23%,43%]) and 41% in the hyperbaric bupivacaine group ([range][27%,51%]). Two patients in each group required augmentation of their blood pressure. 30% of patients in the Chirocaine® group had Bromage scores of 2 (vs 23% in the hyperbaric bupivacaine group) and 61% had Bromage scores of 4 (vs 41% in the hyperbaric bupivacaine group) in Recovery. This was not statistically significant.

Conclusion: The use of isobaric 0.5% L-bupivacaine (Chirocaine®) in this setting does not appear to provide less haemodynamic instability or less initial post-operative motor weakness when compared with the use of 0.5% hyperbaric bupivacaine.

ESRAS-0305

Central Nerve Blocks

THE EFFECTS OF GABAPENTIN ON SEVERITY OF POST SPINAL ANESTHESIA HEADACHE

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Aims: Post dural puncture headache (PDPH) is one of the most common adverse effects of spinal anesthesia. Gabapentin is a popular anticonvulsant drug that has been used as an oral nonopioid analgesic. We wanted to assess the effect of Gabapentin on incidence of PDPH.

Method: In this placebo-controlled double-blind study, 120 patients were randomized in two equal groups (Placebo or gabapentin).

An informed consent from patients and ethics committee approval form were received. The patients in the gabapentin group received gabapentin 300 mg orally one hour before the surgery and then every 12 hours for the first 24 hours after the surgery while the placebo group received placebos in the same way. Severity of headache and postoperative pain assessed by verbal rating score for pain (VRSP), morphine consumption, nausea, vomiting, somnolence, pruritus, dizziness in the first 48 hours, hypertension, hypotension, bradycardia and tachycardia in the first 24 hours after the surgery were recorded.

Results: In first 48 hour after surgery the mean of severity of headache in the gabapentin group was 0.20 ± 0.05 , and in the placebo group it was 0.93 ± 0.01 . The mean of postoperative pain in the gabapentin group was 2.25 ± 0.793 , and in the placebo group it was 3.77 ± 0.813 . In the first 24 hours post operative the mean of morphine consumptions were 0.20 ± 0.030 and 0.32 ± 0.030 mg in gabapentin and placebo groups. No significant differences were found between the two groups regarding incidence rate of the adverse effects.

Conclusion: Administration of gabapentin as prophylactic drug decreased the incidence and severity of post spinal anesthesia headache.

ESRAS-0109

Central Nerve Blocks

A MOTORIZED STEREO-MICROSCOPIC EVALUATION OF CUT-BEVEL (QUINCKE) VERSUS ATRAUMATIC (ATRAUCAN) SPINAL NEEDLES

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Aims: Gross deformation of the spinal needle tip may occur during spinal needle insertion due to bone impact in the spinal anaesthesia procedures. The primary objective of this study was to examine deformation differences between two kinds of spinal needle tip.

Method: A total of 41 females, aged 18-45 years, undergoing caesarean section delivery were administered spinal anaesthesia of 0.5%-weighted (2ml) bupivacaine, using a 27G, 3.5 inch cut-bevel (Quincke) spinal needle (B.Braun) in 21 cases and a 26G, 3.5 inch atraumatic (Atraucan) spinal needle (B.Braun) in 20 cases. In all patients prior to the anaesthesia administration in the sitting

position, 250-500 ml SF was administered. Following the intervention, the spinal needles were retained for evaluation by motorised stereomicroscopy.

Results: In a motorised stereo-microscopic evaluation, lost tip was detected in 50% of impacted needles and in none of the non-impacted needles in the cut bevel group. Lost tip was detected in 25% of the impacted needles and in 16.6% of the non-impacted needles in the atraumatic group.

Conclusion: There seems to be no difference between the two kinds of spinal needles. Further studies can be suggested for innovative spinal needle design.

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ESRAS-0130

Peripheral Nerve Blocks

SETTING UP REGIONAL ANAESTHESIA SERVICE FOR AWAKE ARTHROSCOPIC SHOULDER SURGERY IN A DGH – CHALLENGES, OUR EXPERIENCE AND FUTURE

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Aims: The practice of regional anaesthesia (RA) is gaining popularity with use of ultrasound and realization of the advantages of regional anaesthesia over general anaesthesia (GA). The aim of this study was to evaluate the feasibility and patient experience undergoing awake arthroscopic shoulder surgery in our hospital.

Method: We investigated 100 patients for awake arthroscopic shoulder surgery under Interscalene block. The parameters recorded were age, gender, ASA status, pain, supplementation of RA, duration of block, complications, preference of RA vs GA and patient comments.

Results: The results of the study were encouraging. Overall patient experience was excellent and good in 96% and satisfactory in 4% cases. All cases were done awake with Propofol TCI sedation, rescue analgesia with Alfentanil was used in 45% and 2% patients required repeat Interscalene block. The incidence of complications was low with post Alfentanil desaturation in 1%, Horner's syndrome in 2% and bradycardia in 1% patients. The average duration of block was 15 hours. 99% of patients said that they would prefer RA again in future.

Conclusion: The encouraging result of the study and low incidence of complications with RA makes it an attractive option for avoiding GA. Patients undergoing RA benefit by early ambulation, better postoperative pain and early discharge to home. Increased bed availability facilitates surgery for more patients, reduces surgical waiting timings and operational costs for the Hospitals. The good feedback from the patients made the effort of setting up the service worthwhile and encouraged us to constantly monitor and improve the service for the future.

ESRAS-0230

Peripheral Nerve Blocks

HAND SURGERY UNDER BRACHIAL PLEXUS BLOCK AS A SOLE ANAESTHETIC TECHNIQUE: DO WE NEED TO STARVE PATIENTS BEFORE OPERATION?

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Aims: Brachial plexus block (BPB) is commonly performed as the sole anaesthetic technique for hand surgery. There is clear evidence that patients are usually starved for much longer than expected and this might have serious consequences on susceptible patients. We aimed to explore anaesthetists' views on fasting before hand surgery performed under BPB.

Method: After departmental approval, we conducted a national survey in two big teaching hospitals in London and Stoke-on-Trent. We asked 120 anaesthetists the question: "Do you believe patients should be fasted for hand surgery under BPB if we are not using sedation?"

Results: Out of 120 anaesthetists, 65 were consultants and 55 were trainees. The most commonly performed BPB was axillary (39%). Ultrasound was used in 92% of BPBs. 37.5 % of anaesthetists disagreed with fasting patients before BPB (45% consultants and 55% trainees). 37% of anaesthetists with over 5yrs experience in regional anaesthesia believed that patients should not be fasted. 47% of anaesthetists who perform over 100 BPBs and 44% of anaesthetists who do regular lists under BPB disagreed with fasting. Out of 75 who agreed with fasting, 53% had experience of converting BPB to GA as opposed to 38% of those who disagreed.

Conclusion: Our survey showed that although the majority of UK anaesthetists are in favour of fasting before BPB for hand surgery, a significant proportion

disagreed. It also showed that having more experience in BPB and doing them regularly did not change the majority vote. It would be interesting to explore anaesthetists' ideas and surgeons' views worldwide.

ESRAS-0197

Peripheral Nerve Blocks

OPTIMAL NUMBER OF INJECTIONS FOR ULTRASOUND-GUIDED BRACHIAL PLEXUS BLOCK: A SYSTEMATIC REVIEW AND META-ANALYSIS

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Aims: In a busy operating theatre, rapid procedure time and high success rates are critical to efficient care. This meta-analysis aimed to evaluate the optimal number of injections for ultrasound-guided brachial plexus block to ensure both efficient procedure time and high success rate.

Method: This meta-analysis was performed according to the PRISMA statement guidelines. The primary outcome was block success rate, analysed according to the technique of injection (single versus multiple injections). Secondary outcomes included procedure time, onset time of action, rate of paraesthesia during the procedure and persistent neurological deficit (>24 h).

Results: Nine controlled trials, including 859 patients were identified. The overall success rate of brachial plexus block was 92%. A single injection technique is equivalent to a multiple injection technique ($p = 0.77$), in all subgroups except the supraclavicular group ($p = 0.03$) (figure 1). However, when a random effects model was applied to the supraclavicular subgroup, where I^2 value was 56%, no statistically significant difference was observed ($p = 0.21$). Procedure time was shorter in the single-injection group (mean difference: -2 min; 95% CI: -3, -1; $p < 0.00001$) with equivalent onset time of action (mean difference: 2 min; 95% CI: -1, 5; $p = 0.14$). The lower number of needle passes (mean difference: -2; 95% CI: -4, -1; $p < 0.0001$) was associated with fewer episodes of paraesthesia (risk ratio: 0.6; 95% CI: 0.4, 1.0; $p = 0.004$), but without difference in persistent neurological deficit (risk ratio: 0.7; 95% CI: 0.2, 2.3; $p = 0.39$).

Conclusion: During ultrasound-guided brachial plexus block, a single-injection technique provides an equivalent success rate to a multiple-injection technique, but with reduced procedure times and fewer paraesthesias.

ESRAS-0345

Peripheral Nerve Blocks

RETROSPECTIVE ANALYSIS OF ADVERSE EVENTS ASSOCIATED WITH CONTINUOUS PERIPHERAL NERVE BLOCKS AT HOME DURING 2013-2014

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Aims: We aimed to identify adverse events and associated risk factors during the use of ambulatory continuous peripheral nerve blocks (CPNB).

Method: We performed a retrospective analysis of our Pain Management Unit database during a 1-year period. Patients with ambulatory CPNB using elastomeric pumps were included.

Demographic data and adverse events were registered. Once adverse events were identified, we sought possible associations with specific risk factors such as age, gender, body-mass index (BMI), and type of block using bivariate analysis.

Results: We identified 236 patients using ambulatory CPNB with elastomeric pumps during this period. Patients were primarily ASA II (53.8%), women (58%), with a mean age of 46.2 ± 17.6 and BMI 26 ± 3.7 .

Most of the blocks (72.3%) were used for lower extremity surgeries. Most common blocks were sciatic popliteal (54.2%), interscalene (19.5%) and femoral (16.5%) nerve blocks. The mean PACU static and dynamic pain scores were 1/10 and 1.3/10, respectively.

There were 46 adverse events (19.46%) (Table 1). The most common one was accidental catheter dislocation (Table 1). It was significantly associated with upper extremity blocks (OR: 3.39, CI95[1.3 to 8.8], $p < 0.05$) and more specifically with interscalene block (OR: 3.42, CI95[1.2 to 9.08] $p < 0.02$).

Table 1. Adverse Events

Events	N(%)
Catheter dislocation	19(8,05%)
Nauseas	10(4,23%)
Change catheter	5(2,11%)
Delayed discharge	3(1,27%)
Neurological Damage	2(0,84%)
Claude Bernard Horner	1(0,42%)
LAST	1(0,42%)
Falls	1(0,42%)
Emergency consultation	1(0,42%)
Itching	1(0,42%)
Urinary retention	1(0,42%)
Infection	1 (0,42%)
Total	46((19,4%)

Conclusion: In this retrospective analysis, minor complications appear to be quite common, although the occurrence of serious complications is not possible to determine by these results.

Efforts should focus on implementing measures to optimize management of CPNB associated with increased risk of catheter dislocation.

ESRAS-0339

Peripheral Nerve Blocks

DOMICILIARY INTERSCALENE CATHETER FOR DAY CASE AWAKE SHOULDER SURGERY

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Aims: Since August 2012 we have performed awake open shoulder surgery under interscalene and supraclavicular nerve blocks with excellent patient satisfaction (1). However we identified high pain scores on Day 1 post-surgery after the interscalene block has worn off (median VAS of 6). Outpatient interscalene catheters provide excellent analgesia with few complications (2, 3, 4). We have introduced this service and present the data for 16 consecutive patients.

Method: All interscalene catheters were placed under ultrasound guidance preoperatively. Intraoperatively patients were sedated using Remifentanyl TCI. Catheter infusion of 0.25% Levobupivacaine at 4 ml/hr using elastomeric pump was started at the end of surgery. Patients were discharged on the day of surgery with Paracetamol and Ibuprofen as regular analgesia and Codeine, oral Morphine as rescue analgesia. All patients had home visits for three days by senior orthopaedic nurse to assess the pain using visual analogue scale (VAS) (0-10), oral morphine consumption, side effects, complications and patient satisfaction. The catheter was removed on day three.

Results: We audited a total of 16 patients. The median VAS pain score at rest and on movement on day one was 1.5 and 3, on day two was 2 and 2.5 and on day three it was 0.5 and 2 respectively. 18.75% (3 out of 16) required oral morphine. 2 patients complained of nausea and there were no catheter related complications.

Conclusion: The use of domiciliary interscalene catheter for open shoulder surgery improved postoperative pain relief with very low pain scores and improved patient satisfaction with no complications.

ESRAS-0431

Peripheral Nerve Blocks

US GUIDED PROXIMAL BLOCKS AS AN ALTERNATIVE TO SPINAL ANESTHESIA FOR ELDERLY ANTICOAGULATED PATIENTS WITH HIP FRACTURE FOR INTRAMEDULLARY OSTEOSYNTHESIS

Bakalov S. Bressuire, France.

Aims: Most of the elderly (>80 years) patients have cardiovascular comorbidities or cardiac surgery procedures. That determines the use of oral anticoagulants in their personal treatment. In case of hip fracture the use of neuroaxial techniques is precluded. However general anesthesia is not either desirable given the risk of pulmonary distress, fragile hemodynamics and postoperative cognitive impairment. We used combination of two US guided blocks to provide anesthesia and good postoperative analgesia.

Method: The first block is fascia iliaca block, performed cranially to the inguinal ligament with 15 - 20 ml Ropivacaine 0.75% and 2 mg Dexamethasone.

This give us the necessary analgesia to turn the patients and to perform the second block:

Proximal sciatic nerve block (Paralel Parasacral Shift -Bendtsen TF)We used Mepivacaine 2% 15 ml

Results: 20 patients over 80 years of age, not obese (BMI 16 - 25 kg/m²) were included.

In 13 (65%) - adequate surgical anesthesia.

In one patient (5%) - not successful anesthesia, conversion to general anesthesia.

In 6 patients (30%) - low dose propofol or ketamine to complete the regional anesthesia.

All patients except the patient with failed anesthesia had excellent postoperative analgesia for 24 hours.

Conclusion: In elderly more extensive spread or LA along the fascial planes is observed. The success of the combination of two proximal block can be due to the more extensive spread either of the fascia iliaca or parasacral block to the obturator nerve. Despite the limited study the anesthesia seems effective and we believe that can be alternative to spinal anesthesia for anticoagulated patients.

ESRAS-0166

Peripheral Nerve Blocks

PERIBULBAR BLOCKS-THE EXPERIENCE OF A SPECIALIZED OPHTHALMIC SURGERY CENTER

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Aims: Instituto Oftalmológico Dr. Gama Pinto (IOGP), in Lisbon, Portugal, is a specialized ambulatory ophtalmic surgery center. The anesthesiology team currently comprises 3 dedicated Anaesthesiology consultants who perform peribulbar blocks on a routine basis, and regularly receive Anaesthesiology trainees from other institutions. In December 2014 a new register comorbidities specifically to patients undergoing peribulbar blocks was implemented, allowing easier access to relevant data.

Method: After clearance from the local Ethics Committee, we performed a retrospective, descriptive analysis of the clinical records obtained from patients undergoing peribulbar blocks at IOGP from December 1st 2014 to April 23rd 2015.

Results: 151 blocks were included in the study, 60,93% male and 39,07% female, with an average age of 72,88 years (±10,42). Most patients were classified as either ASA 2 (68,21%) or ASA 3 (28,48%), with the most frequent comorbidities belonging to the cardiovascular and endocrine systems (88,08% of patients).

There were 6 complications: 2 vascular punctures, 2 palpebral ecchymosis, 1 paraesthesia during performance of the block and 1 conversion to general anaesthesia. None of them prevented the surgery or had lasting consequences.

In 4 additional patients there was intraoperative supplementation of the block with local anaesthetic. During the study period 11 patients were re-operated at least once with a second peribulbar block.

Conclusion: Peribulbar blocks are an effective, safe alternative to many procedures in ophthalmic surgery, especially considering the typical patients in this setting. Surgeons are keen on this technique, which also has a good acceptance from patients.

ESRAS-0480

Peripheral Nerve Blocks

THORACIC PARAVERTEBRAL BLOCK FOR BREAST SURGERY

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Aims: To evaluate the efficacy of multiple injection thoracic paravertebral block (TPVB) on patients submitted to breast surgery.

Method: After obtaining Institutional Ethics committee approval, 6 consenting female, ASA III – IV, scheduled for breast surgery, were included in this study. Incremental doses of iv midazolam and fentanyl were given in all patients prior to the block placement. TPVB was performed at T2 to T6 levels, using 5 ml of local anesthetic in each level. Intraoperatively, patients received an iv infusion of remifentanyl. The perioperative hemodynamic changes, the necessary time spent in the recovery room, and the adequacy of analgesia in the recovery room, 6, 12, 18, 24 and 36 hours later, were recorded. Postoperatively rescue doses of opioids and NSAID's were recorded. Time to the first analgesic requirement was noted.

Results: No major complication was recorded in all six patients perioperatively. All patients stated to have been completely satisfied with the quality of anesthesia and analgesia. Rescue analgesia was required in the recovery area in one patient.

Conclusion: TPVB appears to be an effective and reliable form of anesthesia for breast surgery. TPVB allows early mobilization and home discharge and provides excellent unilateral anesthesia and postoperative analgesia in high risk patients.

ESRAS-0348

Peripheral Nerve Blocks

PROJECTED COMPLEX SENSATIONS AFTER SCALENUS BLOCK – CASE REPORT

Bilic A. *Slovenj Gradec, Slovenia.*

Aims: Report shows Scalenus block complication.

Method: 50 year old female patient was treated unsuccessfully with NSAID and opiates for shoulder pain. We decided to perform Scalenus block.

Patient was supine, her head rotated left. Right hand was flexed in elbow.

US guided Anterior Scalenus block was successfully performed with 10 mls of 0,75% Ropivacaine.

Results: Five hours later, patient felt the pain originating from the palm and the elbow of her phantom »third arm«. Her original arm was 15 cm below the source of pain. She also had visual appearance of her phantom extremity.

Two hours later the pain along with her previous sensations was gone.

Conclusion: In our case it was helpful that there was already one case report on this subject (Casutt, Borgeat et.al Anaesthesia & Analgesia 2002).

We learned that the position of the arm during the block was important factor for development of projected complex sensation, because proprioceptive memory involves a dynamic neuroplastic imprinting process described by Isaacson et al. If the imprinting process is strong enough, could it produce changes in visual cortex, so that the patient can have visual sensations of the phantom limb?

This complication is thought to be linked to sodium channels, shown to be more susceptible to local anaesthetic when activated by flexed limb, and therefore proprioceptive imprint is stronger. However, the exact mechanism of this complication is unclear.

Perhaps, the block would be effective, without complications, with lower concentration or volume of local anaesthetic. That maybe the take home bonus of this case report.

ESRAS-0154

Peripheral Nerve Blocks

ULTRASOUND GUIDED BRACHIAL PLEXUS BLOCK USING THE AXILLARY APPROACH IN A PATIENT WITH CHARCOT-MARIE-TOOTH DISEASE

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Aims: The use of regional anaesthesia techniques in the presence of degenerative neurological diseases such as Charcot-Marie-Tooth (CMT) disease is a

relative contraindication. The use of peripheral nerve blocks in patients with CMT is scarcely reported; however when performed has proven to be effective for post-operative pain control.

CMT disease is a hereditary motor and sensory peripheral demyelinating neuropathy characterised by abnormalities of nerve conduction. Regional anaesthesia can be associated with nerve damage and so historically general anaesthesia was the preferred anaesthetic technique in this patient group.

The use of direct ultrasonographic visualisation of nerves whilst performing peripheral nerve blockade allows identification of pathologic alterations in anatomy. Certain forms of CMT disease are associated with enlargement of peripheral nerves. Nerves with unusually large diameters can be identified prior to regional nerve blockade using ultrasound. This case illustrates how regional blockade can be used safely in these patients as the sole anaesthetic technique.

Method: We present the case of a 40 year old male with CMT disease who successfully underwent upper limb tendon transfer surgery under regional anaesthesia alone after an ultrasound guided axillary brachial plexus block was performed.

Results: No complications were experienced; there was not an abnormally long duration of action using standard local anaesthetic solutions and volumes nor any temporary or permanent sensorimotor deficits.

Conclusion: The ultrasound images were recorded and the authors would like to present a comparison with normal anatomy to illustrate the potential risk of performing regional nerve blockade on this patient group without direct ultrasonographic visualisation of the nerves.

ESRAS-0353

Peripheral Nerve Blocks

ULTRASOUND-GUIDED LONGITUDINAL SUPRA-INGUINAL FASCIA ILIACA COMPARTMENT BLOCK SUCCESSFULLY BLOCKS FEMORAL, OBTURATOR, AND LATERAL CUTANEOUS NERVE

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Aims: The fascia iliaca compartment block (FICB) has been proposed as a useful block for hip procedures. It aims to block the femoral, obturator and lateral cutaneous nerve. The ultrasound guided approach at the level of the femoral nerve as described by Dolan et al. does not reliably block the three different nerves. Hebbard described a longitudinal supra-inguinal approach. To our knowledge no studies reported on the efficacy of this approach. We performed a study to assess the efficacy of the longitudinal supra-inguinal approach to block the three nerves of the fascia iliaca compartment.

Method: A dual centre observational trial was performed in patients undergoing total hip arthroplasty. After induction of anaesthesia, we performed an ultrasound guided FICB according to the approach described by Hebbard. This ultrasound-guided supra-inguinal technique allows an easy identification of the fascia iliaca compartment. After correct positioning of the needle 40 mL of ropivacaine 0.5% was injected. One hour postoperatively, we evaluated the sensory block and motor block in the different nerve territories as described by Neal.

Results: After ethical committee approval and obtaining written informed consent, 43 patients were included. Table 1 presents the result for sensory and motor blockade for the different nerves. In 32 of 43 patients (75%) of the patients all three nerves were blocked.

	Femoral nerve	Obturator nerve	Lateral cutaneous nerve
Sensory block	41/43 (95.3%)	32/43 (74.4%)	41/43 (95.3%)
Motor block	37/43 (83%)	36/43 (86%)	NA

Table 1: Proportion of nerves blocked 1 hour postoperatively.

Conclusion: The longitudinal suprainguinal FICB successfully blocks the femoral and obturator nerve, as well as the lateral cutaneous nerve. The longitudinal supra-inguinal FICB seems to be a successful and reliable approach.

ESRAS-0276

Peripheral Nerve Blocks

INTRAVENOUS DEXAMETHASONE 5MG IS NOT EQUIVALENT TO PERINEURAL DEXAMETHASONE 5MG IN PROLONGATION OF ANALGESIC DURATION AFTER SINGLE-SHOT INTERSCALENE BRACHIAL BLOCKS: PROSPECTIVE, RANDOMIZED, DOUBLE-BLIND TRIAL

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Aims: The objective of this study was to compare the effect of i.v. dexamethasone with that of perineural dexamethasone on prolonging analgesic duration of an ISB in patients receiving a single-shot interscalene brachial blocks.

Method: We performed a prospective, randomized, double blind, placebo-controlled study. Patients undergoing elective arthroscopic shoulder surgery with ultrasound-guided ISB were enrolled and randomized into two groups. A total volume of 12 ml study drug was made with final concentration being 0.5% ropivacaine. In i.v. group, patients received single-shot ISB by using ropivacaine 5 mg ml⁻¹ with normal saline (control) with dexamethasone 5 mg i.v. injection. In perineural group, patients received single-shot ISB by using ropivacaine 5 mg ml⁻¹ with dexamethasone 5 mg, with normal saline 1 mL i.v. injection. The primary outcome was the analgesia duration (median, standard error; 95% confidence interval) compared with i.v. dexamethasone (P = 0.028). (18 hours, 1.76; 16-24) vs. (13.5 hours, 1.13; 12-16). There were no significant differences in patient satisfaction scores, side effects and neurologic symptoms.

Results: Data were analyzed for ninety four patients. Perineural dexamethasone significantly prolonged the analgesia duration (median, standard error; 95% confidence interval) compared with i.v. dexamethasone (P = 0.028). (18 hours, 1.76; 16-24) vs. (13.5 hours, 1.13; 12-16). There were no significant differences in patient satisfaction scores, side effects and neurologic symptoms between the two groups.

Conclusion: Perineural dexamethasone 5 mg is more effective compared with i.v. dexamethasone 5 mg on the analgesic duration of a single-shot ISB for arthroscopic shoulder surgery. We should consider that systemic dexamethasone could not provide equivalent prolongation of analgesia duration to perineural dexamethasone.

ESRAS-0331

Peripheral Nerve Blocks

CHECK BEFORE BLOCK: ULTRASOUND EVALUATION OF THE CONTRALATERAL DIAPHRAGMATIC EXCURSION PRIOR TO INTERSCALENE BLOCK

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Aims: The brachial plexus block performed to interscalene level is associated with a high incidence of ipsilateral phrenic nerve block and secondary with diaphragmatic paralysis, being asymptomatic in most patients.

Having prior information about the mobility of the contralateral diaphragm allows us to diagnose patients who may present respiratory compromise in the postoperative stage by a bilateral diaphragmatic paralysis.

Our goal is to present an ultrasound method to evaluate the diaphragmatic mobility. **Method:** To visualize the diaphragm we use a curvilinear transducer, placed in the subcostal region on spleen or liver window.

B mode is initially used to locate the diaphragm like a hyperechoic line and the M mode to measure the amplitude of its excursion.

We perform the measurement of at least two respiratory cycles in forced inspiration and expiration.

Results: The range of the diaphragmatic motion has been reported between 1.9 to 9 cm, discarding a severe dysfunction in measurements superior to 2.5 cm.

The diaphragmatic paralysis is diagnosed by the absence of the diaphragm excursion both quiet and deep breathing.

Conclusion: The diaphragm dysfunction is one of the pathologies frequently under-diagnosed in the preoperative stage. Its diagnosis would contraindicate the performing of a contralateral brachial plexus block. The ultrasound evaluation could be included as a routine for the patients submitted to the above mentioned procedure to avoid the bilateral paralysis. Furthermore, comparing the preoperative and postoperative values allows us to calculate in a quantitative way the degree of paralysis produced after the blockade.

ESRAS-0249

Peripheral Nerve Blocks

THE ULTRASOUND-GUIDED RETROLAMINAR BLOCK: VOLUME DEPENDENT INJECTATE DISTRIBUTION

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Aims: The ultrasound-guided retrolaminar block is a new, simpler and safer alternative to the traditional, technically more challenging, paravertebral block. Its feasibility and efficacy have already been demonstrated in patients with multiple rib fractures where higher volumes of local anaesthetic were needed, compared to the traditional approach. The aim of this study is to test the hypothesis that the spread of local anaesthetic from the retrolaminar injection point to the paravertebral space is volume-dependent.

Method: Ten fresh porcine cadavers were randomized into 2 groups (n = 5 each) to receive ultrasound-guided retrolaminar injections at Th4-Th5 level with either 10 ml (low volume group) or 30 ml (high volume group) of 2% lidocaine and methylene blue mixture. After the procedure, the cadavers were dissected and frozen. Cross-section cuts (approximately 0.5 cm thick) were performed to evaluate the injectate spread.

Results: The retrolaminar plane was easily identified in all porcine cadavers and ultrasound images were comparable with those in humans. In the high volume group, injectate spread from the retrolaminar to the paravertebral space was observed in all specimens (5 out of 5; 100%), while in the low volume group, no apparent spread to the paravertebral space was found (0 out of 5; 0%).

Conclusion: We demonstrate that in porcine cadavers injectate distribution to the paravertebral space is strongly volume-dependent, suggesting that high volumes might be required for effective regional anaesthesia. Deposited in the relatively non-compliant retrolaminar space, the high injection volumes might generate pressures allowing a pathway for the injectate to cross to the paravertebral space.

ESRAS-0171

Peripheral Nerve Blocks

AUDIT OF MANAGEMENT OF PROXIMAL FEMORAL FRACTURES

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Aims: Fascia iliaca blocks (FIB) play an important role as first line pain control for patients presenting to Emergency department (ED) with proximal femoral fractures. In this study, we looked at the practice of FIB performance by ED physicians and also compared our peri-operative practice of this subset of population in accordance to national guidelines and data^{1,2}

Method: We performed a retrospective audit and reviewed 53 random case notes between the period Jun'14-Mar'15

Results: 26.4% of the patients had fascia iliaca blocks performed on admission to ED. The other results are shown in Table 1.

Parameter	Our study	UK national data 2014
Median age (years)	80	83
ASA3/4 class (%)	64	66.8
Operated within 24 hours of hospital admission (%)	77.8	71.7
Spinal anaesthesia (%)	62	44
Peri-operative nerve blocks (%)	43.4	56
Mean length of stay in acute hospitals (days)	20.2	19.8
30-day mortality (%)	2	8.2

Conclusion: Our data shows good results in most areas of peri-operative practice. In addition to medical reasons, the other reasons for less number of FIB performance in ED were found to be due inter hospital transfer of patients within our trust, lack of awareness of the beneficial effects of FIB. After a multidisciplinary discussion, the study findings were disseminated to anaesthetists, emergency department physicians, orthopaedicians and trauma specialist nurses. Regular training sessions for fascia iliaca blocks and continuous audit of this group of patients are planned for improving the management of elderly patients with hip fracture.

References:

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ESRAS-0372

Peripheral Nerve Blocks

PARAVERTEBRAL ANALGESIA TECHNIQUE AND EFFICACY IN LUNG RESECTION SURGERY

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Aims: Perioperative outcome in major surgery can be influenced by the method and quality of analgesia. A paravertebral block (PVB) can provide effective postoperative pain relief in thoracic surgery, reducing the incidence of respiratory complications. Surgical placement of the paravertebral catheter and block, after lung cancer resection is completed, has been the conventional technique in our institution, but there have been recent variations in practice to meet the needs of enhanced recovery. The aims of this study were to identify the current analgesia methods in lung resection surgery and to examine their efficacy.

Method: The study was registered with the Clinical Governance and Audit Committee. Perioperative data was collected by questionnaire for elective lung resection surgery patients. Primary outcome measures included analgesic technique and efficacy. **Results:** Data from 35 patients was collected: 25 (71%) for open thoracotomy and 10 (29%) for thorascopic (VATS) surgery. 17 (49%) received a single pre-incisional ultrasound-guided PVB and subsequent surgically placed paravertebral catheter and block; 16 (46%) received a surgically placed paravertebral catheter and block towards the end of the operation; 2 (5%) received intercostal blocks only. No complications were recorded.

Table 1. Analgesic technique used and measures of efficacy. Data are mean (SD) or median (IQR [range])

Analgesic technique	Surgically placed PVB catheter and bolus placed towards the end of the operation	Pre-incisional PVB PLUS surgically placed PVB catheter	p-value
Participants (n)	16 (14 Open, 2 VATS)	17 (11 Open, 6 VATS)	-
Pain Score at 24hrs (0-3)	1 (IQR 1 [0-1])	0.50 (IQR 1 [0-1])	0.40
Morphine consumption in recovery (mg)	10.00 (+/-3.54 SD)	5.83 (+/-1.44 SD)	0.34
Morphine consumption at 24hr (mg)	35.64 (+/-21.80 SD)	26.50 (+/-22.80 SD)	0.12
Length of Stay (Days)	7.58 (+/- 3.32 SD)	5.80 (+/-2.94 SD)	0.10

Conclusion: There is a range of analgesic techniques for open thoracotomy and thoracoscopy procedures. Although not statistically significant our data may show reduced opioid requirements and length of stay in patients receiving a pre-incisional PVB. Preoperative PVBs have been shown to have a pre-emptive effect in reducing postoperative pain, analgesic requirements and length of stay. Well-designed larger studies are required to evaluate this pre-emptive technique on clinical outcomes.

ESRAS-0034

Peripheral Nerve Blocks

A SYSTEMATIC REVIEW ON THE EFFECTIVENESS OF ULTRASOUND VERSUS NERVE STIMULATOR GUIDANCE, ON EFFICACY OF BRACHIAL PLEXUS BLOCK (MSC DISSERTATION SUBMITTED FOR TEESSIDE UNIVERSITY)

Eid H. Manchester, United Kingdom.

Aims: Review aimed to assess whether the use of ultrasound, as compared to nerve stimulation, increases the efficacy of single shot brachial plexus blocks.

Method: Databases searched (April 2013): MEDLINE, EMBASE, Cochrane Central Register of Controlled Trials, CINAHL, Web of Science, SciVerse Scopus and ProQuest for randomized controlled trials comparing single injection ultrasound-guided brachial plexus block with nerve stimulation techniques.

Results: Twelve trials (1242 patients) were included, seven judged as of high quality and five of moderate quality; however, all had at least a moderate risk of bias because the operator was not blinded. Eleven trials assessed the success rate, defined as production of successful surgical anaesthesia, and four reported higher success rate with US use. Five trials showed similar success rate for axillary block; three assessed infraclavicular block and two found significant difference; one assessed supraclavicular block and reported higher success rate and lower incidence of diaphragmatic pareses. Six out of nine studies reported a significant reduction of performance time with US guidance. Three found lower number of needle passes with US guidance. Three studies out of five reported shorter onset time for US aided block. No major complications reported and the two techniques showed similar patients' satisfaction.

Conclusion: In experienced hands, US guidance is as successful as nerve stimulation guidance for axillary and interscalene blocks, and increases the success rate for infraclavicular and supraclavicular blocks. US decreases number of needle passes and appears to improve procedure time and onset time particularly for multi-injection axillary block.

ESRAS-0359

Peripheral Nerve Blocks

DEVELOPING A NATIONAL MULTI-DISCIPLINARY FASCIA ILIACA BLOCK NETWORK TO IMPROVE CARE FOR PATIENTS WITH FRACTURED NECK OF FEMUR

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Aims: Older patients with hip fracture are at risk of significant morbidity and mortality and there is considerable variation in patient outcomes and management. For patients with fractured neck of femur (NOF), national guidelines in the UK recommend us to consider nerve blocks for preoperative pain relief and to limit opioid dosage. Our hospital provides an anaesthetic-led fascia iliaca block (FIB) service for patients with fractured NOF. We formed a network with other hospitals to help them initiate their own services and to seek ideas to improve our own.

Method: We organized an FIB Network Meeting as a platform for sharing ideas. The day-long meeting was advertised nationally on a multi-disciplinary basis. The programme included a mix of practical workshops, seminars and a discussion forum. An online survey was sent to delegates after the meeting and resources were shared via an interactive online folder.

Results: Delegates came from all over England with a wide range of backgrounds (anaesthetists, ortho-geriatricians, pain nurses, emergency doctors, orthopaedic nurses and physiotherapists). Feedback was good for all of the sessions.

Conclusion: This networking and sharing of ideas and resources has provoked enthusiasm and confidence to set up services to provide FIB for fractured NOF and gave ideas on how to improve existing services. Delegates believe this will help to provide and improve high quality care for this vulnerable group of patients.

ESRAS-0363

Peripheral Nerve Blocks

DEVELOPING A LOCAL TEACHING PROGRAMME ON SONO-ANATOMY FOR ANAESTHETIC TRAINEES

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Aims: Experience in ultrasound-guided regional anaesthesia can be varied for anaesthetic trainees. We set out to develop a teaching programme on ultrasound scanning and sono-anatomy for regional anaesthesia.

Method: A three-month rolling programme was designed to deliver once-weekly lunchtime sessions covering basic ultrasound, probe handling and the most commonly encountered ultrasound-guided regional blocks. The programme is then repeated every three months and alterations made depending on participant feedback. Sessions are delivered by a Consultant experienced in regional anaesthesia and facilitated by a Regional Anaesthesia Fellow. All members of the Anaesthetic Department are encouraged to attend. The teaching sessions were reinforced by creating a resource library, which is available to all.

Results: The teaching programme was well attended. Trainees found it very useful and had increased confidence in using ultrasound to identify landmarks. Due to time constraints and numbers, some participants wanted more hands-on time with the ultrasound. In subsequent sessions more scanning time for each participant was included and senior trainees were encouraged to demonstrate for their junior peers.

Conclusion: Trainees' confidence was improved and they were more enthusiastic to engage in ultrasound-guided regional anaesthesia after attending the teaching sessions.

ESRAS-0479

Peripheral Nerve Blocks

PROCEDURE CHARACTERISATION OF ULTRASOUND-GUIDED FEMORAL NERVE BLOCK - A METRICS-BASED APPROACH

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Aims: Procedural skills comprise complex cognitive elements and observable behaviours. Detailed task analysis can be used to develop effective training and assessment tools. To date, the description of cognitive and physical processes which underpin learning and performance of ultrasound-guided femoral nerve block (USGFNB) is lacking. The objectives of this study are: (1) to describe the specific tasks and errors associated with USGFNB; (2) to define objective performance metrics for USGFNB.

Method: With ethics committee approval and having obtained written informed consent, a panel of three experts in ultrasound-guided regional anaesthesia participated in semi-structured interviews and facilitated group discussions to: (1) objectively describe USGFNB; and (2) to identify and define observable objective proficiency performance metrics.

The USGFNB procedural start and completion points were defined as from patient entering the block room to completion of block assessment.

Video recordings of expert and novice block performance were obtained from both first person (head mounted camera) and third person (mobile videography) perspectives. Synchronous ultrasound imaging was recorded live and superimposed onto the final video edit. These video files were reviewed by the expert panel to 'stress test' the procedural description, errors and performance metrics.

Results: A comprehensive description of tasks and subtasks, procedural errors and performance metrics was compiled. Stress testing yielded operational definitions of the errors and performance metrics, and the ideal videography perspectives.

Conclusion: This process has yielded a description of procedural tasks, errors and performance metrics relevant to USGFNB. Further validation is ongoing.

ESRAS-0253

Peripheral Nerve Blocks

PLEURAL BLOCK (PB): EFFECT ON THE RESOLUTION OF AN INFECTED WALL DEHISCENCE AFTER ABDOMINAL SURGERY

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Aims: PB targets the intercostal nerves (ICN) (1) and the sympathetic trunk (2). Both blocks were important in this subcutaneous wound healing after abdominal dehiscence surgery.

Method: Patient male, 27 years-old, malnourished, was attacked with knife on the abdomen in a public street. Referred to the Hospital, underwent exploratory laparotomy with xyphopubic incision. Several intestinal perforations were repaired. After passing through the post-anesthetic unite, he was sent

to the general ward. At the third day occurred subcutaneous dehiscence of the surgical wound, probably due his anemia, malnutrition and subcutaneous infection. The exposed wound was pale, edematous, with secretions showing the suture reinforcement stitches. At that time, parenteral nutrition begun. It was either suggested for bilateral pleural and sympathetic blocks respectively, to provide somatic analgesia, vascular perfusion improvement (offering oxygen, food and antibiotic to harm tissues) (3), and also to clean the wound with saline. After informed consent at the operation room under standard non invasive monitoring the blocks have been made with 20 ml 0.25% bupivacaine 6/6 hs through the catheters during 4 days, changing to 0.125% bupivacaine for the next 2 days.

Results: A retrograde absorption of local anesthetic from the pleural space to the spinal emergence of the ICN and to the sympathetic trunk (paravertebral space) (Figure 4) was responsible for the good wound healing.

Conclusion: Somatic nerves and sympathetic blocks can contribute to a good recovery of a subcutaneous open infection.

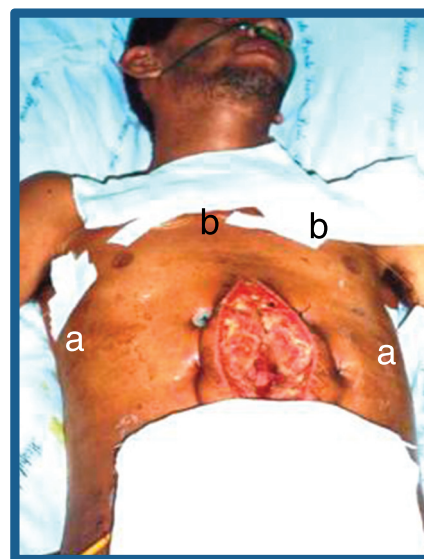


FIGURE 1. Starting the POA. The xyphopubic incision wound was swollen, pale, cool and infected a = catheter; b = catheter filters.

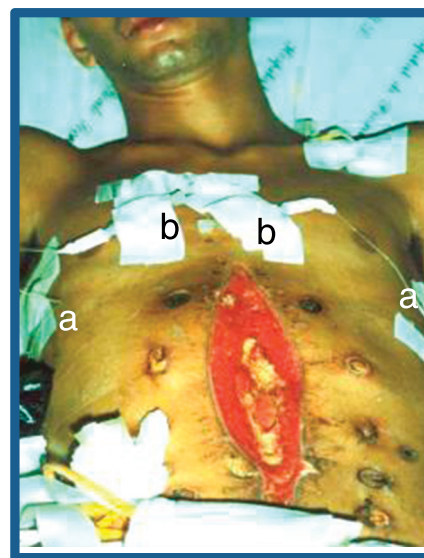


FIGURE 2. Four days of POA. The wound shows good healing process. At that moment, 20 ml, 0.125% bp was given for more two days.



FIGURE 3. Two days later both catheters were removed and sent for culture. *Saphylococcus epidermitis* was found in one of them. The patient was very satisfied with the POA and with the good aspect of the surgical wound.

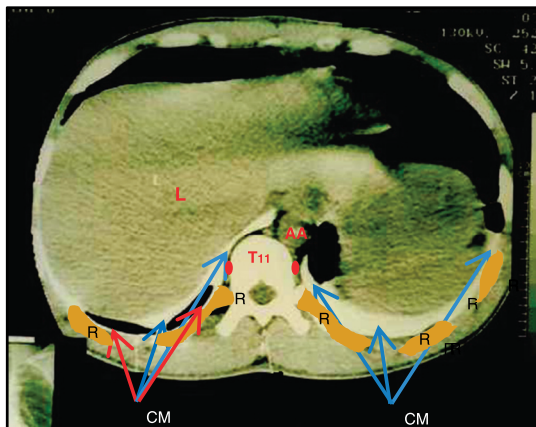


FIGURE 4B. Air are seen on the right side, probable due to the block technique – Loss Of Resistance with air. On both sides the CM are seen in the pleural spaces (thin blue arrows). The subserous layer internal to the endothoracic fascia (?) (thin red arrow); R = ribs are colored in brown; L = Liver; AA = abdominal aorta.

ESRAS-0287

Peripheral Nerve Blocks

COULD STIMULATING CATHETERS FOR CONTINUOUS LUMBAR PLEXUS BLOCK IMPROVE POST-OPERATIVE OUTCOME IN PATIENTS UNDERGOING TOTAL HIP ARTHROPLASTY?

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Aims: Stimulating catheters have been thought to be placed closer to the targeted nerve structures, but their effectiveness is still controversial. We hypothesized that stimulating catheters, reducing local anesthetic requirement, have less effects on quadriceps weakness after continuous lumbar plexus block (CLPB) for total hip arthroplasty (THA).

Method: After IRB approval, 24 patients were enrolled and randomized to receive a CLPB through a stimulating catheter (STIM=11 pt) or a non-stimulating one (NONSTIM=13 pt). All patients received spinal anesthesia for surgical intervention and a 15 ml mepivacaine 1% via the catheter after spinal regression. CLPB electronic pump was set to deliver a 0.2% ropivacaine solution (basal rate 3 ml/h, lock out 3 ml/10 min) for 72h. Quadriceps strength was measured before surgery, after 24, 48, 72h. VAS score and LA consumption were also evaluated. Primary endpoint was the difference between basal and 72h value of quadriceps strength. A P<0.05 was considered significant.

Results: Two patients in NONSTIM group showed bilateral block after mepivacaine bolus and excluded. Table shows the difference in quadriceps values. No difference was found regarding LA consumption, VAS score, opioids administration and adverse effects (Table 1).

TABLE 1.

	NONSTIM			STIM			P VALUE
	P50	P25	P75	P50	P25	P75	
BASAL (Newton)	27	[20	50]	32	[18	80]	0.70
24H	-19	[-35	-10]	-21	[-37	-14]	0.59
48H	-20	[-32	-10]	-28	[-50	-4]	0.80
72H	-20	[-32	-4]	-17	[-74	-4]	0.56

Conclusion: These preliminary data did not support the hypothesis that stimulating catheters have less effects on quadriceps strength after THA compared to nonstimulating catheters.

ESRAS-0468

Peripheral Nerve Blocks

THE BENEFITS OF SAPHEOUS NERVE BLOCK FOR KNEE ARHROPLASTY

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Aims: Femoral nerve block has been gold standards for knee arthroplasty surgery however anaesthetists have been looking for another option of pain relieve to depart from this technique as it interferes with early mobilisation.

Ultrasound guided saphenous nerve block (SNB) became gradually more popular in the last few years. The opportunity to block this purely sensory nerve has important benefits. The lack of muscle weakness in the age of the enhanced recovery allows early mobilisation and makes it a very useful anaesthetic technique to improve postoperative analgesia and patient satisfaction.

Method: In our hospital we wanted to incorporate SNB into the enhanced recovery protocol after total and unicompartmental knee replacement surgeries. We executed a number of cases when SNB was performed additionally to our standard protocol and compared the data with the same amount of consecutive cases done with our standard technique.

The cases were performed by the same surgeon to avoid the bias created by the different surgical techniques. SNB was performed under ultrasound guidance from sub-sartorial approach using 10ml of 0.75% Ropivacaine. The block has been verified by assessing skin numbness in the area of saphenous nerve.

We compared length of stay, opioid consumption, pain scores and the incidence of PONV.

Results: SNB provided superior analgesia and have an opioid sparing effect when used as part of our multimodal approach.

Conclusion: SNB is a useful adjunct to our protocol in the management of knee arthroplasty.

ESRAS-0265

Peripheral Nerve Blocks

E-LEARNING EDUCATION FOR ULTRASOUND-GUIDED PERIPHERAL BLOCKS. A PROSPECTIVE STUDY EVALUATING INDIVIDUAL INCREMENT IN LEARNING CURVES DURING A ONE-MONTH TRIAL PERIOD

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Aims: Continuous education with ultrasound-guided (USG) blocks is an important concept. The importance of structured education is well documented.¹⁻³ We aimed to evaluate a USG-Block-School concept based on a structured approach using a specific E-learning program provided by www.USabcd.org.

Method: Four consultant anesthetists and four residents were enrolled in a one-month trial period. A specific E-learning program was designed including 17 different block techniques relevant for the surgical specialties present: detailed anatomy descriptions, relevant nerves, muscles, vessels, pitfalls, tips and tricks. A comprehensive description of block techniques and ultrasound images was also provided. The participants' knowledge were evaluated four times, each time using a random selection of 40 out of 80 specific multiple-choice questions; i.e. when entering the program, reporting ready to the practical examination, having passed the practical examination following the one-month trial period, and finally following a three-month practical trial period with extensive experience registration. Chi-square test was used to evaluate individual statistical changes.

Results: Primary outcome: Individual correct score rates when entering the program compared to correct score rates having passed the practical examination. Secondary outcomes: Learning curves comparing residents to consultants, and numbers of block placements and success rates for block administration in the three-month practical trial period.

Conclusion: E-learning is a growing concept in medical education.⁴⁻⁵ A specific E-learning program can be designed to fit specific needs for departments of anesthesia. Individual learning curve statistics and practical examinations can be effective tools to document successful education.

ESRAS-0162

Peripheral Nerve Blocks

A SMART NEEDLE FOR OBJECTIVE NERVE LOCALISATION DURING ULTRASOUND GUIDED PERIPHERAL NERVE BLOCK

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Aims: Ultrasound guidance has become the gold standard nerve localisation technique in modern peripheral nerve block (PNB). Limitations in ultrasonography fail to define the relationship between nerve and needle tip prior to injection. The ASRA neurologic complications practice advisory states: "No nerve localization or monitoring technique has been shown to be clearly superior in terms of reducing the frequency of clinical injury"¹. All tissue types have characteristic bioimpedance profiles. Placing a sensor on the needle, tip thereby creating a 'smart' needle, may enhance identification of needle tip location and potentially improve PNB safety and efficacy.

Method: The 'smart' needle is fabricated by integrating a novel bioimpedance sensor to a commercially available needle. This technology allows real-time identification of tissue type encountered at the needle tip. Importantly, the information generated will inform about needle-nerve proximity. By objectively

defining needle tip location in real-time the operator of the 'smart' needle can identify optimum location for local anaesthetic delivery. The integration of our bioimpedance sensor to a currently used needle does not alter the ultrasound guided PNB procedure.

Results: Results on characterization of the 'smart' needle by in vitro testing in saline solutions and meat will be presented.

Conclusion: Bioimpedance can be used to identify tissue type at the needle tip. The addition of 'smart' needle technology to USGPNB may provide objective information of real-time needle-nerve proximity, and enhance procedural safety and efficacy.

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ESRAS-0218

Peripheral Nerve Blocks

INJECTION PRESSURE IS HIGHER IN INTRANEURAL THAN IN PERINEURAL INJECTIONS DURING SIMULATED NERVE BLOCKS OF THE LOWER LIMB IN FRESH HUMAN CADAVERS

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Introduction: Intraneural placement of a needle may result in nerve inflammation and neurologic injury.¹ Monitoring and avoiding opening injection pressure >15 psi can detect and prevent needle-nerve contact and intrafascicular injection in interscalene brachial plexus blocks.^{ii,iii} We tested the hypothesis that a higher injection pressure is also required to inject intraneurally than perineurally in human peripheral nerves of the lower limb.

Materials and methods: In a closed tissue model resembling clinical practice, needles were placed bilaterally in 10 fresh cadavers in 2 needle tip positions using ultrasound: either 2 mm away from the nerve (*perineural*) or within the nerve (*intraneural*). Five common nerve blocks were simulated: femoral, saphenous, subgluteal sciatic, tibial and common perineal nerve. Saline was infused at 10 ml/min using an automatic infusion pump and injection pressure (psi) was assessed with a digital pressure manometer, which was coupled to a computer for continuous pressure recording (Fluke IDA4). Opening injection pressure was defined as the highest (peak) value in the 60-sec interval. The Statistical Package for the Social Sciences, version 20.0 (IBM SPSS, Chicago, IL, 2011) was used for statistical analysis.

Results: Peak injection pressure in the 5 nerve blocks was approximately 5 psi and 23 psi during perineural and intraneural needle positions, respectively. (Table 1).

TABLE 1. Peak injection pressure. Data are means $\pm$ standard deviations.

NERVE	Peak Injection Pressure (psi)		
	Perineural	Intraneural	p-value
Femoral	3.8 $\pm$ 0.8	22.4 $\pm$ 4.7	<.001
Saphenous	5.3 $\pm$ 1.7	21.7 $\pm$ 2.6	<.001
Subgluteal	4.5 $\pm$ 2.2	24.6 $\pm$ 4.9	<.001
Tibial	6.1 $\pm$ 1.9	21.5 $\pm$ 4.9	<.001
Peroneal	5.6 $\pm$ 1.7	25.8 $\pm$ 4.3	<.001

Conclusion: Monitoring injection pressure during peripheral nerve blocks of the lower limb detects intraneural injection.

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ESRAS-0390

Peripheral Nerve Blocks

THE ANALGESIC EFFICACY OF PARAVERTEBRAL BLOCKS WITH LIPOSOMAL BUPIVACAINE FOR BREAST SURGERY: A RETROSPECTIVE COHORT STUDY

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Aims: Postoperative pain control remains a common problem for patients undergoing breast cancer surgery. The aim of our study was to evaluate the acute pain control of paravertebral injections with off-label use of liposomal bupivacaine (Exparel®) compared to surgeon infiltration with bupivacaine in patients undergoing unilateral or bilateral breast cancer surgery.

Method: This was a retrospective chart review of 70 patients who had breast cancer surgery. All patients were age and case matched. 35 patients received an ultrasound-guided paravertebral injection with liposomal bupivacaine at T2, 4, and 6. The paravertebral was placed preoperatively and was either unilateral or bilateral depending on the surgery. 35 patients received surgeon infiltration with bupivacaine. The charts were analyzed for opioid use, maximal pain scores, length of stay, nausea and vomiting, and any intervention related complications.

Results: This was an institutional review board (IRB) approved study of ASA class I-III patients. There was no difference in baseline patient and surgery characteristics. Those patients who had liposomal bupivacaine paravertebrals had decreased total opioids, decreased maximal pain scores at 0-24 and 24-48, and decreased nausea and vomiting compared to those who had local infiltration. There was no difference in length of stay nor intervention related complications. However, when separately analyzed those who had a mastectomy and paravertebral with liposomal bupivacaine had decreased length of stay.

Conclusion: Those patients who had preoperative ultrasound guided paravertebrals with liposomal bupivacaine had better acute postoperative pain control compared to those who had local infiltration for breast cancer surgery.

ESRAS-0409

Peripheral Nerve Blocks

ULTRASOUND-GUIDED C5 AND C6 NERVE BLOCK AND SUPERFICIAL CERVICAL PLEXUS BLOCK FOR CLAVICULAR SURGERY IN PATIENT WITH SILENT MYOCARDIAL INFARCTION: CASE REPORT

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Aims: Clavicle surgery has been performed under general anesthesia. The superficial cervical plexus (C3,C4) supplies the fascia and skin above the clavicle and shoulder to the region of the acromion. The distal clavicle and anterior and superior shoulder area are innervated from cervical plexus and brachial plexus (C5,C6). In patient with silent myocardial infarction regional anesthesia may become an alternative for general anesthesia.

Method: We report a case of successful regional anesthesia during clavicular open reduction and internal fixation (ORIF) using an ultrasound-guided C5 and C6 nerve block and superficial CPB. A 53-year-old man with silent myocardial infarction undergoing left clavicular ORIF was given preoperatively a superficial CPB according to the classic approach using 10ml of ropivacaine 0.5% and ultrasound-guided C5 and C6 interscalene block using 15ml of ropivacaine 0.5%.

Results: The patient did not complain any pain and there were no cardiovascular complications during surgery.

Conclusion: This case demonstrates that a combined cervical plexus and brachial plexus block can provide complete anesthesia during clavicle ORIF.

ESRAS-0441

Peripheral Nerve Blocks

SURGICAL ANALGESIC EFFECT OF ULTRASOUND-GUIDED SUPERIOR AND INFERIOR OF C5 NERVE ROOT BLOCK USING POSTERIOR APPROACH FOR ARTHROSCOPIC SHOULDER SURGERY: CASE SERIES

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Aims: Interscalene brachial plexus block has been performed between C5 and C6 nerve root for arthroscopic shoulder surgery. However, surgical analgesia of the upper and posterior shoulder is usually required of block of C3-4 nerve root. We report the case series of the superior and inferior of C5 nerve root block at the posterior shoulder.

Method: Forty-eight patients undergoing arthroscopic shoulder surgery received ultrasound-guided interscalene brachial plexus block via posterior approach as a sole anesthesia. Using the in plane approach, a 18gauge Tuohy needle was advanced until the tip was located between C5 and C6 nerve roots. 15 ml of 0.5 % ropivacaine with 1:200,000 epinephrine was injected to superior and inferior of C5 nerve root, respectively. A catheter was threaded 2-3cm and secured. Anesthetic effect, side effect such as nausea, vomiting, dyspnea, paresis, permanent nerve injury were measured at intraoperative period, second day postoperatively, and 12 months after surgery.

Results: 46 patients (95.8%) presented successful surgical analgesia for arthroscopic shoulder surgery. 2 patients (4.17%) complained of severe pain at the posterior of the shoulder and were converted to general anesthesia. 3 patients (6.25%) complained of mild dyspnea, however, the symptom was subsided within 30 mins. No patients revealed the neurologic complications.

Conclusion: Ultrasound-guided superior and inferior C5 nerve root block using posterior approach provided an good surgical analgesic effect at the upper and posterior shoulder, deltoid area, and shoulder joint for arthroscopic shoulder surgery.

ESRAS-0278

Peripheral Nerve Blocks

STEPPING INTO THE SUPRAZYGOMATIC MAXILLARY NERVE BLOCK APPROACH FOR CLEFT PALATE REPAIR ANALGESIA

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Aims: Cleft palate (CP) is a common congenital malformation that requires early surgery in infancy. CP repair is a painful procedure associated with the risk of postoperative nausea and vomiting and airway obstruction, which may be increased by opioids. An alternative approach for cleft palate analgesia is bilateral suprazygomatic maxillary nerve block (SMB). We describe eight clinical cases of children scheduled for CP repair who underwent SMB.

Method: Eight children aged between 4 months to 1 year old, ASA physical status I or II, scheduled for routine CP repair. After general anesthesia induction bilateral SMB was performed with 0.15 ml/kg of 0.2% ropivacaine on each side. Intraoperatively a single dose of fentanyl (3 µg/kg) was administered. Postoperative analgesia with paracetamol and metamizol was prescribed. Administration of rescue analgesics and adverse effects were recorded during a 72h period following surgery.

Results: No technical failure or complications related to SMB were recorded. No patient required rescue analgesics for the first 24 h postoperatively.

Conclusion: Bilateral SMB is an easy regional anesthesia technique with a low complication rate. It seems to be an effective alternative for pain relief, reducing peri-operative opioid consumption and thus their related adverse effects.

ESRAS-0475**Peripheral Nerve Blocks****EVALUATING GENELYN EMBALMED CADAVERS FOR ULTRASOUND GUIDED REGIONAL ANAESTHESIA TRAINING**

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Aims: Ultrasound guided regional anaesthesia (USGRA) is a complex skill requiring not only understanding of anatomy but also of ultrasonography and needling technique. Traditionally, training in USGRA involves trainee apprenticeship within real clinical settings. Various simulators have been used for the trainee to practice this skill outwith these settings each presenting their own merits and problems.

Our project evaluated the use of Genelyn embalmed cadavers for USGRA training. Ease of positioning, ultrasonography, needle visualisation and accuracy of the injected indocyanine green (ICG) dye were assessed.

Method: We asked three regional anaesthetists to perform nerve blocks on one cadaver using 0.1 to 0.2ml of ICG (as determined to be optimum in a preliminary study). Each operator then completed a questionnaire comparing similarity of USGRA on a Genelyn cadaver with live patients using 1-5 Likert scale (dis-similar – very similar). Location and distribution of dye along the nerve as well as surrounding tissues were assessed by dissection and compared to the ultrasound image acquired during injection.

Results: Accuracy of dye location in relation to target nerves injected was high in each case, and dye spread was minimal.

Genelyn cadavers accurately simulated positioning, sonoanatomy and needle visibility (ratings ranged from 4-5). Operators rated 1-4 on appreciation of needle piercing fascial layers and 1-5 on dye injection. All operators agreed on the utility of Genelyn cadavers for USGRA training.

Conclusion: This experiment supports the use of Genelyn cadavers as a valuable and high fidelity simulator for training in USGRA.

ESRAS-0408**Peripheral Nerve Blocks****USING AIRSCOUTER WD-200S CAN POTENTIALLY SUCCESS DURING INTERSCALENE BRACHIAL PLEXUS BLOCK**

Ito H. *Chiba Medical Center; Chiba, Japan.*

Aims: When using ultrasound-assisted brachial plexus blocks, we often need access to ultrasound images of target nerves and the needle, but getting this images from ultrasound device means taking eyes off probe or needle. We report a case of interscalene brachial plexus block (IBPB) using a head mounted display the new model "AiRScouter WD-200S (Brother Industries, Ltd.)" (ASW) to perform IBPB without taking eyes off probe or needle.

Method: A trained anesthetist used a 4-13 MHz linear transducer and a standard diagnostic high resolution GE LOGIQ-e ultrasound machine (GE Healthcare) to perform IBPB. The system takes data from ultrasound images and transmits the encoded image via the control box to the wearer's head mounted display with high-definition clarity using HDMI cable connection. On the head mounted display screen, the arbitrary segmentation in ultrasound images can be enlarged by tapping a few buttons on the control box.

Results: ASW showed nerves between the scalene muscles, block needle movement at the time of advancement, and local anesthetic spread during injection using both in-plane technique (alignment with the long axis of the probe). IBPB was successful after 1 attempt of nerve localization and needle placement with visual confirmation and confirm the display screen of the real-time ultrasound image at the same time without taking eyes off probe or needle.

Conclusion: To simultaneously confirm hand operation part of needle, the positioning of the probe and the real-time ultrasound images using ASW can potentially improve success during IBPB.

ESRAS-0164**Peripheral Nerve Blocks****ANALGESIC EFFICACY OF ULTRASOUND-GUIDED CONTINUOUS PERIPHERAL NERVE BLOCK (CPNB) CATHETERS FOR TOTAL SHOULDER AND ELBOW REPLACEMENTS**

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Aims: Effective pain control after painful orthopaedic procedures may facilitate earlier patient discharge, improve acute rehabilitation, and increase patient satisfaction. With the widespread availability and fairly reasonable cost of disposable infusion pumps, continuous catheter techniques provide a more appealing method of prolonging postoperative analgesia. In addition, CPNB have been found to provide more potent analgesia than wound catheters with fewer undesirable effects.

In this retrospective audit, we describe our experience with CPNB in regard to analgesia, length of stay, infection and complications.

Method: The records for all patients with total shoulder or total elbow replacements and CPNB were reviewed over a period of one year from July 1st 2013. Data was collected from hospital electronic medical record system.

Results: We reviewed a total of 27 patients with supraclavicular or interscalene catheters; records were unavailable for 3 patients. The primary outcome of this analysis i.e. average verbal pain scores at 0, 12 and 24 hours were quite satisfactory except where it was discontinued due to technical problems. Average LOS was 3 days; delay was due to nonclinical reasons. Complications were technical difficulties related to catheter displacement in 6 and PONV in 7 patients, however, none catheter related infections noted.

Conclusion: The results of our study demonstrate that there was decreased use of intravenous/oral opioids, length of hospital stay, improved rehabilitation and patient satisfaction. The use of CPNB did not lead to an increased incidence of complications as compare to single injection. Vigilance in dealing with patients with nerve block catheters is crucial to prevent complications.

ESRAS-0318**Peripheral Nerve Blocks****POST-OPERATIVE NERVE DYSFUNCTION - AN AUDIT**

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Aims: Nerve injuries are an uncommon but important complication of surgical procedures. Patients suffer with prolonged physical and mental impairments; clinicians may have to resolve complaints and claims. This service evaluation sought to appraise the incidence, risk factors, management strategies and consequences of post-operative nerve dysfunction (POND) for our local population.

Method: We identified 210 surgical referrals investigating POND between December 2007 and Oct 2012 with nerve conduction studies. We reviewed the referral letters and medical records for demographics, procedural information, symptoms, clinical and neurophysiological findings and outcomes.

Results: Total 39 patients had positive findings from nerve conduction studies for suspected post-operative neurological dysfunction during the time frame studied.

There were more males than females. Most patients had identifiable risk factors (74 %); most prevalent risk factor was hypertension. Majority of patients (69%) were identified or investigated for motor deficits and 49% patients had full recovery, 25% had permanent sensory loss. Follow-up information was not available for seven patients (0.03%).

Conclusion: POND in patients undergoing orthopaedic surgical procedures occurs rarely, and is usually accompanied by identifiable aetiological factors. Outcome is usually good; poor outcome / function is associated with more risk factors and more severe injury, alongside strongly positive nerve conduction study findings.

In our institution, POND after non-orthopaedic surgery is not investigated with nerve conduction studies or neurophysiology, or is under-identified.

ESRAS-0081

Peripheral Nerve Blocks

ULTRASOUND GUIDED INTRANEURAL INJECTION INTO SCIATIC NERVE FOR RELIEVING INVOLUNTARY LEG MOVEMENT: A CASE REPORT

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Aims: We investigated the effect of ultrasound guided intraneural injection into sciatic nerve for relieving involuntary leg movement in patient with spinal cord injury.

Method: Thirty-one year old male with history of C6 complete tetraplegia since a motor vehicle accident at 11 years ago, presented with chronic involuntary movement on both legs. The patient positioned in the prone. Using ultrasound, the diameters and area of the sciatic nerve were measured before and after the injection. Using a nerve stimulator, the sciatic nerve was stimulated at low-current intensities during muscle contraction. The intraneural injection was done using ultrasound and 100 mm stimulating needle and 6ml of a 50% ethyl alcohol on each nerve. During the intraneural injection, the pressure remained constant throughout injection. The neurolysis was done 2 times. Clinical outcomes were measured by modified ashworth scale and Modified Bathel index.

Results: The sciatic nerve appeared swollen after the injection. The patient had immediate relief of spasticity and did not complain about any side effect from the intraneural injection into sciatic nerve. The mean modified ashworth scale of the hip/knee flexion/extension 4/4, and it improved to 1/1. Modified Bathel index increased 20 to 33. Followed up after 3 month later, the intraneural injection effect is lasted.

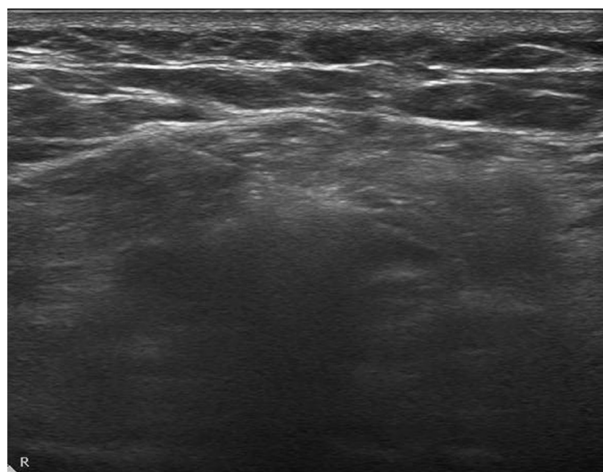


FIGURE 1.

Conclusion: The ultrasound guided intraneural injection into sciatic nerve is an effective and safe procedure for relieving localized spasticity in patient with spinal cord injury.

ESRAS-0245

Peripheral Nerve Blocks

THE USE OF TOPICAL LOCAL ANAESTHETIC TO REDUCE PAIN AND IMPROVE PATIENT SATISFACTION DURING PERIPHERAL NERVE BLOCK

Kingsley C., Cheen Ng S. Kaur K. London, United Kingdom.

Aims: Twenty percent of anaesthetists regard regional anaesthesia as painful or unpleasant for patients.¹ Peripheral nerve blocks reduce postoperative pain, opioid consumption and increase patient satisfaction.² However, there is little data regarding patient satisfaction and pain during block performance.

Method: A project outline was created to determine if topical local anaesthetic (Ametop), with or without lidocaine skin infiltration, prior to peripheral nerve block (PNB) would reduce procedural pain and improve satisfaction. Five patients per week for surgery with PNB were recruited for 3 weeks. Group 1 patients received PNB's with lidocaine skin infiltration, Group 2 patients received Ametop only and Group 3 patients received Ametop and lidocaine skin infiltration. All blocks were performed under ultrasound guidance. After the block patients reported pain and satisfaction scores using a visual analog scale (VAS).

Results: Fifteen blocks were performed, with 5 patients in each group. A variety of blocks were performed, with interscalene brachial plexus block the commonest in all groups. Pain was experienced by 86% of patients: 100% in groups 1 and 2 and only 60% in group 3. Average pain scores (VAS) were lower in group 3 at 1.4, with average scores of 2.2 and 3.4 respectively for groups 1 and 2. All patients would have the block performed again. However, mean satisfaction scores were higher in both groups 1 (9.8) and 3 (9.6), compared to group 2 (8.4).

Conclusion: The application of topical anaesthetic cream, in addition to local lidocaine infiltration, prior to performance of PNB's reduces procedural pain and improves patient satisfaction.

ESRAS-0103

Peripheral Nerve Blocks

A PROSPECTIVE AUDIT OF INTERSCALENE BRACHIAL PLEXUS BLOCKS PERFORMED FOR SHOULDER SURGERIES

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Aims: We aim to study the efficacy of interscalene blocks for shoulder surgeries in our institution and the rate of immediate and early complications of the blocks.

Method: Institutional review board waived the requirement for approval for this prospective audit. Data was collected from all patients receiving peripheral nerve blockade in a single institution over 5 years, from November 2008 to October 2013. These patients were followed-up twice, on Day 1 and between Day 7 to 10. A standard set of questions were administered to these patients to elicit possible complications.

Results: 618 interscalene blocks were performed for shoulder surgeries over the 5 year period. Majority of blocks (94%) were performed under real-time ultrasound guidance, 27% were performed in combination with use of nerve stimulator.

94% of blocks were successful and 60% of patients underwent shoulder surgery with interscalene brachial plexus block supplemented with light sedation.

1 patient (0.16%) had respiratory depression due to pneumothorax following an interscalene block. 10 patients (1.6%) had residual numbness during the 24 hour follow up. Only 1 patient (0.16%) had a demyelinating lesion. There was 1 incident (0.16%) of vascular puncture/ hematoma formation at the site of injection. No patients had local anaesthetic toxicity syndrome.

Conclusion: The success rates of interscalene brachial plexus blocks in our institution is high and most shoulder surgeries can be performed under regional anaesthesia and sedation.

Complications associated with the performance of interscalene brachial plexus blocks are rare. The incidence of late neurological complications was 0.16%, comparable to other prospective audits.

ESRAS-0347

Peripheral Nerve Blocks

ANALGESIA FOR FRACTURED NECK OF FEMUR PATIENTS - A NEW NERVE BLOCK SERVICE

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Aims: AAGBI guidance¹ states that preoperative nerve blocks may benefit fractured neck of femur patients by controlling pain and minimising opioid consumption. We set out to evaluate a preoperative single shot nerve block service 18 months after institution.

Method: Data was collected using the same proforma that had assessed the service 6 months after implementation. This included: time to administration of block, type of block performed, opioid consumption and effectiveness of the block as assessed by pain scores, pm opioid consumption and the ability to tolerate movement.

Results: 25 out of 118 eligible patients received a block (21.9%). This compared to 47.7% of patients receiving a nerve block in the first audit. 81% were Fascia iliaca compartment blocks (FICB) with the remaining being femoral.

Delays in performing the block (A&E to block) varied from 2 hours to 17 hours 30 minutes. Once an anaesthetist was contacted the average time waited for a block was 1hr 20 minutes.

77.3% of patients had an opioid administered pre block.

92% of blocks were effective. 8% were deemed equivocal. No block failed to provide analgesia.

Conclusion: These blocks appear effective in managing pain for up to 8 hours. However the uptake of the service is poor and has fallen significantly since the program was established. There are significant delays in accessing the service. We hope that a new trust "fracture neck of femur pathway" which highlights the service will improve uptake but are looking at additional ways to decrease these delays.

Reference

1. Management of Proximal Femoral Fractures 2011. AAGBI.

ESRAS-0385

Peripheral Nerve Blocks

PROLONGED NERVE BLOCK DURATION AND TYPE 1 DIABETES NEUROPATHY: CASE REPORT

Madeira I., Calixto L. *Centro Hospitalar Porto, Anesthesiology, Porto, Portugal.*

Aims: Patients with peripheral vascular disease frequently present for amputation surgery or control of severe pain from their ischemic extremities.

It is widely known that Popliteal Sciatic Nerve Block is effective for procedures involving foot and ankle. It has also been observed that conventional nerve stimulation may be of limited value in patients with abnormal nerves, raising interest in the use of ultrasound. Nerve injury is an infrequent but potentially devastating complication.

The exact etiology of the injury remains unclear, but pre-existing neuropathies as diabetes may play a role as confounding factors. Recent studies in diabetic animals suggest that nerves have increased sensitivity local anesthetics, as evidenced by prolonged block.

Method: This report describes a prolonged popliteal sciatic nerve block performed for a surgery of toes amputation in a patient with type 1 diabetes neuropathy.

Results: 46 years old female with high blood pressure, type 1 diabetes diagnosed at 21 years old (neuropathy, retinopathy, peripheral arterial disease, chronic renal failure), renopancreatic transplant in 2014. Schedule for surgical amputation of 3/4th toes. RNI 1.7. A single shot popliteal sciatic block was performed with 15 mL of 0.5% ropivacaine, using ultrasound. Patient maintained the sensitive and motor block for more than 24 hours. A neurologic evaluation was performed at 36 hours and the patient maintained impossibility of foot dorsiflexion, suspecting peroneal nerve injury. At 48 hours showed complete recovery and was discharged.

Conclusion: Every anesthesiologist should be aware for possibility of prolonged duration of nerve blocks in patients with neuropathy.

ESRAS-0296

Peripheral Nerve Blocks

CHRONIC TOXICITY STUDY RESULTS AFTER LIDOKAIN REPEATED INJECTION IN THE REGION OF HEAD AND NECK AND INTRAPERITONEALLY. EXPERIMENTAL CASE

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Aims: The aim of our trials - to create a method for experimentally testing the local anesthetics toxicity conditions of which are similar to the real clinical situation.

Method: We injected local anesthetic 2% lidocaine to experimental animals in submandibular area (extraoral way of mandibular nerve block). The trials were performed on two series of white laboratory mice in accordance with the requirements governing the work with experimental animals. The 1 series animals LA was injected intraperitoneally, the 2 series - in submandibular area. We performed the Pathological examination of animals' parenchymal organs.

Results: In the 1 series the mortality rate was 0%, in the 2 - 37.5%. At pathomorphological examination of animals 1 Series in the liver were determined a few foci of hepatocytes necrosis with inflammatory, some scanty inflammatory infiltration of the portal tracts; at 2 series in the liver were observed nuclear polymorphism, foci of hepatocytes necrosis with perifocal inflammation, infiltration in the portal tracts, intraduct cholestasis, eosinophilic intranuclear inclusions. Significantly more often in a case of injection of LA in submandibular area is determined more foci of hepatocytes necrosis, periportal necrosis, periportal inflammation, cholestasis.

Conclusion: We consider the method for testing toxicity of drugs used in dentistry proposed by us, to be the most accurate to detect toxic reactions and target organs.

ESRAS-0144

Peripheral Nerve Blocks

A PROSPECTIVE AUDIT OF NEUROLOGICAL COMPLICATIONS FOLLOWING POPLITEAL SCIATIC NERVE BLOCKS

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Aims: Popliteal sciatic nerve blocks are commonly performed for vascular and orthopedic surgeries. Risk factors for neurological complications post peripheral nerve blocks include Diabetes Mellitus (DM), pre-existing neurological complications and use of tourniquet. We aim to study the overall incidence of neurological complications associated with popliteal blocks and incidence in patients with those risk factors.

Method: Data was collected for all patients receiving popliteal blocks in a single institution from September 2007 to March 2015. These patients were followed-up twice, on Post-operative day (POD) 1 and between POD 7 to 10. A standard set of questions were administered to these patients to elicit possible complications. Institutional review board approval was waived for this audit.

Results: 2333 popliteal nerve blocks were performed. 78% of patients had diabetes mellitus, 20% of patients had pre-existing neurological disease while 19% of patients had both. Intra-operative tourniquet was used in 31% of operations.

The overall incidence of prolonged motor block was 2.8% and parasthesia was 3.8% on POD 1. The incidence of residual numbness/ parasthesia on POD 7-10 was 0.5%. No patients had permanent neurological deficits.

There were no significant differences between incidence of prolonged motor block in patients with DM or pre-existing neurological complications or both compared to none. However, there was an increase in incidence of prolonged motor block when intra-operative tourniquet was used.

Conclusion: The incidence of prolonged motor block was higher in patients where intra-operative tourniquets were used but there was no increase in incidence in patients who had DM or pre-existing neurological deficits or both.

ESRAS-0238

Peripheral Nerve Blocks

EFFECT OF INJECTION PRESSURE ON THE DISCOMFORT OF PATIENTS DURING INJECTION IN THE INTERSCALENE BLOCK IN HEALTHY VOLUNTEERS

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Aims: Administration of interscalene brachial plexus block (ISB) is often associated with some degree of patient discomfort during local anesthetic (LA) injection. We postulated that high injection pressure or force during ISB results in greater patient discomfort during injection.

Method: After IRB approval from the University of Brussels, 9 consenting healthy volunteers (BMI<35) received an injection of 10ml NaCl 0.9% into the right and left interscalene spaces. Injections were administered under ultrasound guidance through 22G needle (0.5mA, 0.1msec) placed between the superior and middle trunks of the brachial plexus. Utmost precautions were taken to avoid needle nerve contact and risk of nerve inflammation.

After assuring absence of motor response at <0.5mA and ability to initiate the injection with low opening injection pressure(<15PSI), radiocontrast was injected in random order into the right (<15PSI) and left (>20PSI) interscalene spaces. Discomfort upon injection (NRS 0-10) was recorded. Injections were halted at the volunteer's request when they report pain NRS>5.

Results: High pressure injection resulted in significant discomfort to all volunteers. No volunteers requested that injection be halted due to discomfort with injection pressure <15PSI; however, all volunteers requested that injection be halted due to discomfort on injection with injection pressure >20PSI.

Conclusion: Forceful injection and consequent high-pressure injection in the vicinity of the neural elements of the brachial plexus induce uncomfortable, paresthesia-like symptoms and should be avoided during administration of ISB.

ESRAS-0065

Peripheral Nerve Blocks

THE IMPACT MADE BY LOCAL ANAESTHETIC CONCENTRATION FOR PERIPHERAL NERVE BLOCK UPON TIME TO POSTOPERATIVE STANDING FOLLOWING PRIMARY TOTAL KNEE ARTHROPLASTY UNDER SPINAL ANAESTHESIA

Minich M., Sanghavi S. *Leicester General Hospital, Department of Anaesthesia, Leicester, United Kingdom.*

Aims: Total knee arthroplasty is a painful operative procedure. Peripheral nerve blocks confer excellent postoperative analgesia, but the associated motor blockade may be an obstacle to early mobilisation. It is believed that reducing the local anaesthetic concentration can limit the duration of the motor block. We assessed whether the concentration used had any clinical impact on mobilisation at our institution.

Method: The case notes for all primary knee arthroplasties performed under spinal anaesthesia with femoral or femoral and sciatic nerve blocks at our institution between October and December 2013 were reviewed.

Results: Intrathecal injections consisted of Levobupivacaine alone or in combination with Fentanyl.

Local Anaesthetic Used for the Peripheral Nerve Block(s)	Number of Patients	Mean Total Morphine Dose in 48 hours (mg)	Mean Time to First Stand (minutes)
Operations performed under Spinal Anaesthesia with a Femoral Nerve Block Only			
0.25% Levobupivacaine (Femoral)	24	64	1452
0.375% Levobupivacaine (Femoral)	33	65	1674
0.5% Levobupivacaine (Femoral)	9	46	1448
0.75% Levobupivacaine (Femoral)	4	36	1423
Operations performed under Spinal Anaesthesia with Femoral and Sciatic Nerve Blocks			
0.25% Levobupivacaine (Femoral) 0.125% Levobupivacaine (Sciatic)	5	26	1276
0.25% Levobupivacaine (Femoral) 0.25% Levobupivacaine (Sciatic)	20	54	1399
0.375% Levobupivacaine (Femoral) 0.25% Levobupivacaine (Sciatic)	22	37	1540
0.375% Levobupivacaine (Femoral) 0.375% Levobupivacaine (Sciatic)	9	41	1944

FIGURE 1.

Seventy primary knee arthroplasties were performed under spinal anaesthesia and femoral nerve block.

Fifty-six operations were performed under spinal anaesthesia with both femoral and sciatic nerve blocks.

A total of 15 to 20mL of local anaesthetic were used for each peripheral nerve block (Figure 1).

Conclusion: The evidence presented suggests that increased concentration of local anaesthetic for femoral nerve block is opiate sparing. Increasing the Levobupivacaine concentration from 0.25% to 0.375% appears to delay time to first stand, but this isn't reflected by higher concentrations.

Increasing the local anaesthetic concentration for sciatic nerve blocks has a larger delay on time to first stand with less of an opiate sparing effect. Therefore it may be more detrimental to use higher concentrations of local anaesthetic in sciatic nerve blocks, since the motor block appears to be significantly prolonged without any additional analgesic benefit.

ESRAS-0058

Peripheral Nerve Blocks

THE EFFECTS OF DEXMEDETOMIDINE ADDED TO LEVOBUPIVACAINE FOR RECTUS SHEATH BLOCK

Nakajima K. *Gunma University, Maebashi-shi, Japan.*

Aims: Recently, to prolong the duration of anesthesia and analgesia, adding some drugs to local anesthetic has become common. We evaluated the effect of adding dexmedetomidine (DEX) to levobupivacaine (LEV) for rectus sheath block.

Method: Thirteen adult patients undergoing elective lower abdominal laparoscopic surgery were recruited and received bilateral ultrasound-guided RSB before the operation (150 mg of LEV). They were divided into two groups, group DEX is administered 100 µg of DEX, and group S is 1ml of saline. Numerical rating score was recorded at recovery room, 4,8,16,24,36,48 hours after the operation.

Results: Mean NRS and standard deviation (group DEX, group S) were at recovery room (0.22±0.67, 0.0), 4hours (0.11±0.33, 2.60±1.82) 8 hours (0.33±0.50, 2.60±1.14), 16 hours (2.33±1.80, 2.80±1.10), 24 hours (3.00±2.06, 3.80±1.30). There was a significant difference from at 4 to 8 hours (Student-Newman-Keuls Method). No complications were observed in any patients.

Conclusion: Dexmedetomidine added to levobupivacaine for RSB has an analgesic effect about 8 hours after operation without any complication.

ESRAS-0177

Peripheral Nerve Blocks

ULTRASOUND GUIDED POSTERIOR CAPSULAR INFILTRATION OF LOCAL ANAESTHETIC AS PART OF AN ENHANCED RECOVERY PROGRAMME FOR TOTAL KNEE ARTHROPLASTY

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Aims: The aim of our audit was to ensure that we are providing good analgesia, early mobilisation and a short length of hospital stay(LOHS) by including ultrasound guided posterior capsular infiltration(PCI) as part of our total knee arthroplasty(TKA) enhanced recovery programme(ERP).

Method: The audit was approved by the hospital audit committee. The Sunderland ERP for TKA includes spinal anaesthesia (0.5%levobupivacaine) in conjunction with ultrasound guided femoral nerve block and PCI (0.25% levobupivacaine 20 mls each site). We prospectively collected data using a standard proforma for patients undergoing TKA during the period 08/14 – 01/15. Outcome measures were: maximum and minimum pain scores (day 0-2), LOHS, opioid consumption and time to independent mobilisation time. Patients were asked to rate pain assessment at discharge on a scale of 1 (excellent) to 4 (very unsatisfactory). Data were compared with a previous audit where popliteal sciatic blocks, rather than PCI were performed.

Results: Table 1 demonstrates the mean pain scores, morphine dose and LOHS.

Mean pain score(MPS)

	Femoral block + Popliteal sciatic block	Femoral block + Posterior capsular infiltration(PCI)
Number of Patients	30	42
Day 0 MPS: Lowest/Highest	0.4/3.4	0.0/5.7
Day 1 MPS: Lowest/Highest	0.4/3.5	0.4/5.8
Day 2 MPS: Lowest/Highest	0.1/2.9	0.5/5.0
Mean Morphine Dose(mg)	25.1(PCA)	6.7 Oromorph(PRN) + Morphine Sulphate BD
Mean LOHS (days) [median]	4.06 [4]	3.59 [2]

Mean time for independently mobilisation was day one. Mean and median pain assessment scores at discharge were 1.4 and 1 respectively.

Conclusion: The above data suggest that, in conjunction with a femoral nerve block, PCI provides good post-operative analgesia, allows early mobilisation and facilitates an early discharge from hospital (median day 2). There was a clinically significant reduction in LOHS compared to previous patients who had received popliteal sciatic block (median discharge day 4).

ESRAS-0297

Peripheral Nerve Blocks

ADDUCTOR CANAL BLOCKS FOR ANTERIOR CRUCIATE LIGAMENT RECONSTRUCTIVE (ACLR) SURGERY DO NOT IMPROVE PATIENT EXPERIENCE

Ng S., Chazapis M., Wilson M., Rajani C., Kaur N., Kamming D. *University College London Hospital, Anaesthesia, London, United Kingdom.*

Aims: Various analgesic modalities are used for ACLR including adductor canal blockade (ACB). A recent retrospective study on ACLR patients in our institution showed a 50% reduction in opioid requirement in patients receiving ACB. Thus in this evaluation, we aim to assess ACB and how it impacts on patient reported outcome measurements.

Method: Ethics approval was waived as this was a service evaluation.

All patients undergoing primary ACLR completed the Quality of Recovery-15 questionnaire (QoR-15), pre-operatively, at 24 hours, 48 hours and at day 7 post-operatively. The allocation of ACB was influenced by familiarity of attending anaesthetist to ACB, contraindications to regional anaesthesia or patient refusal. The change in QoR-15 score between both groups of patients were evaluated.

Results: Nineteen patients were recruited, of which 10 were given ACB (Table 1).

ACB does not appear to improve postoperative QoR-15 scores significantly compared to controls (Table 1). Pain outcomes derived from the questionnaire also showed no significant improvement. There was a trend towards poorer moderate and severe pain evaluation but this was not found to be statistically significant.

Table 1: QoR-15 scores in both groups

	QoR-15 score	24 hrs, mean (range)	48hrs, mean (range)	Day 7, mean (range)
	Pre-operation, mean (range)			
No ACB	135.6 (120-147)	122.8 (91-140)	125.2 (104-139)	129.7 (108-145)
ACB	141.8 (126-150)	121.4 (99-149)	126.7 (90-150)	134.6 (112-150)
p-value	0.1071	0.8453	0.833	0.393

Conclusion: Recent outcome studies incorporate a patients' experience of their recovery. The QoR-15 questionnaire is a patient reported outcome measure which does not appear to be improved post operatively by the addition of an ACB. It may reduce the immediate postoperative pain in recovery and improve patient experience on awakening from surgery (as seen with our previous retrospective study) but this effect does not continue after discharge home from surgery.

ESRAS-0381

Peripheral Nerve Blocks

AXILLARY NERVE BLOCKADE - DEVELOPING PREOPERATIVE INFORMATION TO IMPROVE PATIENT EXPERIENCE

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Aims: Good preoperative information is essential - it provides a basis to the patient journey, ensuring adequate preparation, stimulating questions, alleviating anxiety and improving overall patient experience. However, delivering this information effectively can be challenging, particularly where there are potential barriers such as literacy, language, lack of understanding and poor retention of verbal information.

Our aim was to identify the levels of satisfaction with preoperative information on the procedure, and then to develop a patient-focused approach to delivering this information.

Method: Over a two month period, 50 patients scheduled for axillary nerve blockade in preparation for forearm/hand surgery completed a written survey pre and post procedure. The results of this survey were then used to develop modes of delivering preoperative information.

Results: Over two thirds of patients stated they would have benefited from further information prior to their procedure. 62% of these patients stated a preference for an audiovisual format.

As a result, a short educational film was developed by the authors in association with our Centre's 'Patient Information Group', detailing the patient pathway for axillary nerve blockade in its entirety.

A portable tablet device enabled access to the video for all patients, and was introduced as an adjunct to the preoperative assessment process.

Conclusion: Axillary nerve blockade is a frequently performed technique to provide regional anaesthesia at our tertiary centre. Provision of multimedia information for axillary nerve blockade can be easily developed, delivered and utilised. Patients are keen to engage with such methods thereby improving overall patient experience and care.

ESRAS-0411

Peripheral Nerve Blocks

LOGISTICAL REGRESSION ANALYSIS OF FASCIA ILIACA BLOCK EFFECT ON PERIOPERATIVE ABBREVIATED MENTAL TEST SCORES IN HIP FRACTURE PATIENTS

Odor P., Sage F. *East Surrey Hospital, Anaesthetic Department, Redhill, United Kingdom.*

Aims: The aim was to compensate for multiple covariates in hip fracture patient data to determine if early fascia iliaca block (FIB) is beneficial to Abbreviated Mental Test Scores (AMTS).

Method: Local R&D committee granted approval. Data collected prospectively over 2 years in a Trust database of hip fracture patients was analysed retrospectively. Patients aged ≥ 60 years and receiving surgery for hip fracture were included. 56.6% of the included cohort received FIBs, at a median time of 6 hours from admission. AMTS (recorded on admission and ≤ 3 days post-op) was categorised as Poor (≤ 6), Moderate (7-8) and Normal (9-10). Demographics, pre-admission status, medical comorbidity scores, anaesthetic/surgery modality and timings, and orthogeriatric assessments were included in the logistical regression model.

Results: 959 patients were included (complete AMTS for 93% patients). A best model to describe categorical and continuous variables was constructed. The adjusted proportional odds ratio by which having a FIB increases the odds ratio of a better change versus the combined worse and no change of those who did not receive FIB, irrespective of baseline AMTS and assuming all other covariates are held constant = 1.72 (95%CI 1.22-2.42; $p = 0.002$). A worse change in AMTS was associated with: increasing age in patients with Moderate admission AMTS (but not in Normal or Poor groups), admission from nursing home, and waiting time to surgery (but not in Normal group).

Conclusion: Early FIB, performed prior to surgery, is associated with improved perioperative AMTS for hip fracture patients. This may relate to effective, opioid-sparing analgesia provision.

ESRAS-0485

Peripheral Nerve Blocks

IMPORTANCE OF REGIONAL ANAESTHESIA IN RARE DISEASES

Oliveira D. Oliveira do Bairro, Portugal.

Aims: This work shows that regional anaesthesia can be adequate for rare syndromes that often present challenges in their anaesthetic approach.

Method: Case1: A man, 62 years old. Madelung Syndrome. Predictable difficult airway. Humeral fracture reduction under ultrasound guided supraclavicular brachial plexus block.

Case2: A woman, 53 years old, Rendu-Osler-Weber disease, recent nasal surgery. Trochanteric fracture fixation under neurostimulation guided lumbar and sacral plexus block.

Case3: A woman, 33 years old 37w pregnant, Arrhythmogenic Right Ventricular Dysplasia, proposed for elective cesarean section under lumbar epidural anaesthesia (L4-L5).

All cases were performed under spontaneous ventilation and ASA standard monitoring.

Results: Case1: Abnormal blood loss without signs of hemodynamic instability. Revealed an abnormal blood vessel crossing the interscalene plexus.

Case2: Remained 9 hours in surveillance, hemodynamically stable, discharged 2 days after.

Case3: Period of 20 seconds self-limiting supraventricular tachycardia without hemodynamic instability.

Conclusion: Careful anaesthetic-surgical planning was crucial to the success of those procedures.

ESRAS-0181

Peripheral Nerve Blocks

TRAINING OF REGIONAL ANAESTHESIA SUPPORTED BY PATIENT-SPECIFIC VIRTUAL PHYSIOLOGICAL HUMAN (VPH)-BASED MODELS

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Aims: Training tools for learning and improving regional anaesthesia's (RA) skills are currently limited. Therefore, the Regional Anaesthesia Simulator and Assistant (RASimAs) project has the goal of increasing the application, the effectiveness of RA by combining a simulator ultrasound-guided and electrical nerve-stimulated through an integration of image processing, physiological models and subject-specific data, and virtual reality (VR).

Method: This on-going project is performed by experts from academia, industry, and clinics. For realistic and individualized modelling of RA, two commercial 3D anatomical models are extended with respect to structures (e.g., the fascia), and mechanical tissue properties. Patient-specific virtual physiological humans (VPH) models are composed registering the general mesh-based models with patient voxel-data recordings. The results include anatomical and mechanical properties of the tissues compatible with real-time simulation.

Results: Extending a previous prototype [1], the RA simulator component recreates RA procedures in a virtual environment, which allows the trainee to practice on various anatomies avoiding on-patient training. The medical simulator is applicable to all body regions of relevance and supports RA training using electrical nerve stimulation, ultrasound (US) guidance, or a combination of both. Also, an advanced haptic framework allows a complete immersion in a virtual environment combining stereoscopic rendering and US probe interaction.

Conclusion: Instead of relying on generic models and by fitting automatically relevant patient data into VPH template models, the RASimAs project will enhance the state of the art.

Reference

1. Grottko O, Ntoubas A, Ullrich S, et al. Virtual reality-based simulator for training in regional anaesthesia. *Br J Anaesth*. 2009;103(4):594-600

ESRAS-0080

Peripheral Nerve Blocks

THE IMPACT OF ANAESTHETIC MANAGEMENT ON POSTOPERATIVE OUTCOMES IN UNICOMPARTMENTAL KNEE ARTHROPLASTY

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Aims: The Oxford enhanced recovery pathway (OERP) for joint arthroplasties has been introduced into our institution. We aimed to evaluate postoperative outcomes for patients managed according to OERP and benchmark these against a pre-existing practice.

Method: We conducted a retrospective study of medical notes of patients undergoing unicompartmental knee arthroplasty (UKA) from May 2012-April 2014 under 2 teams. Group 1(G1) were managed according to OERP with plain spinal anaesthesia. Group 2(G2) underwent general anaesthesia (GA) and single shot femoral nerve block (FNB) either with 20mls 0.375% bupivacaine (Bu) or 1% prilocaine (Pr). Inclusion/exclusion criteria were applied. Outcomes were length of hospital stay (LOS), 4hr/24hr pain scores (PS) and 48hr opioid consumption (OC). Multivariate logistic regression analysis or analysis of covariance (ANCOVA) models were performed.

Results: 89 patients were included, 37 in G1 and 52 in G2 (23 Bu, 29 Pr). Group was not a significant factor for LOS (P=0.23). However, on analysis of FNB type, mean LOS was significantly shorter for G1 than G2Bu (P=0.04), but there was no significant difference between G1 and G2Pr (P=0.81). Group was not a significant factor for 4hr PS (P=0.38). 24hr PS were significantly higher in G1 than G2 (P<0.001) and also when compared to each subgroup (G2Bu P=0.002, G2Pr P<0.001). Mean OC in G1 was significantly higher than G2 (146.9mg v 58.1mg P<0.001) and again when compared to each subgroup (G2Bu P<0.001, G2Pr P<0.001).

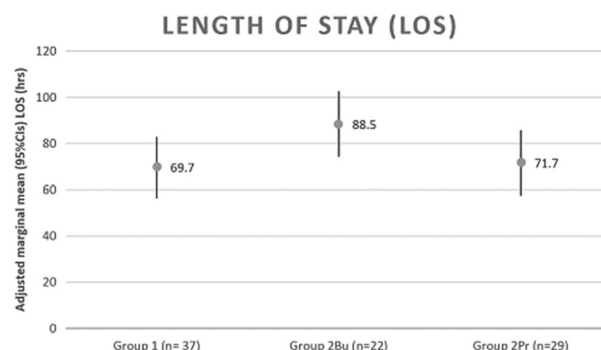


FIGURE 1. One patient from Group 2Bu was excluded from LOS data only as developed a pulmonary embolus on Day 4.

Conclusion: The combination of GA and a prilocaine FNB may be a superior technique to spinal anaesthesia for enhanced recovery pathways for UKA.

ESRAS-0082

Peripheral Nerve Blocks

COMPARISON OF BUPIVACAINE VERSUS PRILOCAINE FOR FEMORAL NERVE BLOCK ON POSTOPERATIVE OUTCOMES FOR UNICOMPARTMENTAL KNEE ARTHROPLASTY

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Aims: The use of femoral nerve block (FNB) for knee arthroplasty raises concerns over delayed functional recovery. Shorter duration local anaesthetics may

therefore be desirable. We aimed to compare bupivacaine versus prilocaine for FNB on postoperative outcomes for patients undergoing unicompartmental knee arthroplasty (UKA).

Method: We conducted a retrospective study of medical records of patients undergoing UKA by a specific team from May2012-April2014. All patients underwent general anaesthesia and single shot FNB with either 20mls 0.375% bupivacaine (Group 1) or 1% prilocaine (Group 2). Inclusion/exclusion criteria were applied. Outcomes were length of hospital stay (LOS), 4hr/24hr pain scores (PS) and 48hr opioid consumption (OC). Multivariate logistic regression analysis or analysis of covariance (ANCOVA) models were performed.

Results: 52 patients were included, 23 in Group 1 and 29 in Group 2. After age, gender, ASA and Group were fitted in the multivariate ANCOVA model, mean LOS in Group 1 was longer than Group 2 but the difference was not significant ($P=0.09$). Group was also not a significant factor for 4hr PS ($P=0.95$), 24hr PS ($P=0.36$) or mean OC (57.3mg Group 1 vs 67.4mg Group 2, $P=0.41$)

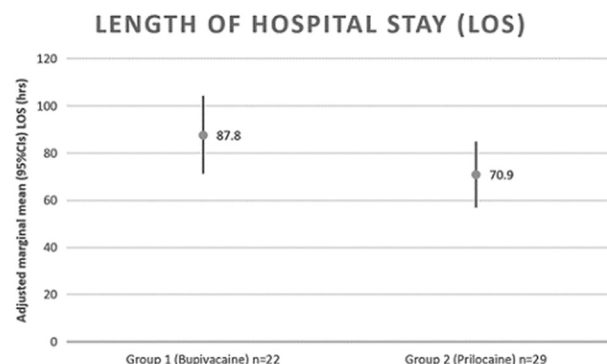


FIGURE 1. One patient from Group 1 was excluded from LOS data only as developed a pulmonary embolus on Day 4.

Conclusion: Although the difference in LOS between the groups did not quite reach statistical significance ($P=0.09$) the results do imply clinical significance; the use of prilocaine FNB may shorten LOS by up to 17 hours when compared to bupivacaine and is not associated with an inferior analgesic profile. For UKA, prilocaine FNB may therefore be desirable for minimising hospital stay yet still providing adequate postoperative analgesia.

ESRAS-0428

Peripheral Nerve Blocks

CASE SERIES: SERRATUS PLANE BLOCK FOR RIB FRACTURE ANALGESIA

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Aims: Multiple rib fractures can be a cause of significant respiratory morbidity in the trauma patient. Treatment involves early, effective pain relief with analgesic drugs or regional anaesthesia techniques. Regional techniques are generally more effective, but are invasive and traditionally have involved intercostal nerve block, interpleural block, neuraxial blocks, or paravertebral blocks. Recently the serratus plane block has been described as an alternative to paravertebral blocks, less invasive means of providing analgesia for patients with rib fractures.

Method: 11 patients with multiple rib fractures, already receiving opioid analgesia, were identified as needing additional analgesia. These patients received a serratus plane block (injection between serratus anterior and latissimus dorsi muscles) on the ward. Following verbal consent, establishing intravenous access and monitoring, an ultrasound guided block with 30ml of 0.125% levobupivacaine was performed and a peripheral catheter was placed. Pain scores on deep breathing were compared prior to the block and 1 hour after the block.

Results: Every patient (11/11) had a reduction in their pain scores following serratus plane block (Figure 1). Mean pain score prior to block was 7.86 and post-block 4.55. All patients felt that it had made a difference to their pain management. There were no reported complications from the block.

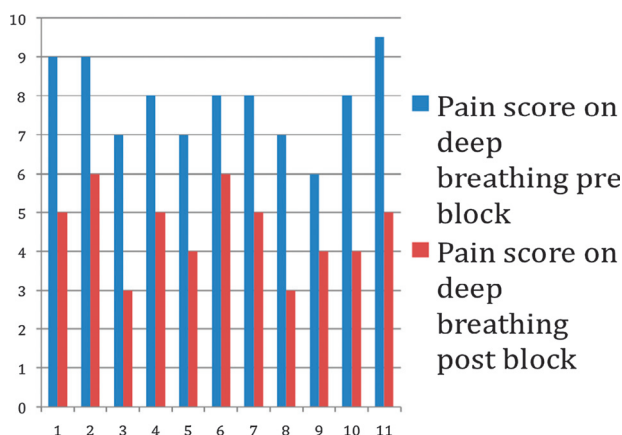


FIGURE 1.

Conclusion: Serratus plane block appear to be a safe, reliable means of improving pain relief following multiple rib fractures in trauma patients. This study was limited by a relatively small sample size. Randomised controlled trial is required to prove its efficacy using a larger number of patients.

ESRAS-0289

Peripheral Nerve Blocks

PERIPHERAL NERVE BLOCKADE BEFORE OR AFTER INDUCTION OF GENERAL ANAESTHESIA IN THE ERA OF ULTRASOUND: A FOLLOW-UP SURVEY OF BELIEFS AND PRACTICE IN OXFORD REGION

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Aims: Performing peripheral nerve blocks (PNBs) awake or asleep when combined with general anaesthesia remains a contentious issue. Following our previous survey published in 2008, we re-examined the beliefs and practice in Oxford Region anaesthetists, in order to assess changes and a possible impact of ultrasound guidance.

Method: Experienced anaesthetists working in Oxford Region were invited to complete an on-line questionnaire. We collected data from all respondents on their beliefs regarding safety of performing common PNBs awake or asleep in adults; and specific data from regular PNB practitioners regarding performing common blocks awake or asleep, and the impact of ultrasound on their practice.

Results: Of the 153 respondents, 81 (53%) regularly performed PNBs. There was a trending perception that upper limb (UL) PNBs were safer when performed awake (~55%) but less so for lower limb (LL) PNBs (~25%), both showing an increased percentage versus 2008. The practice of regular PNB practitioners mirrored these findings with 59% ULPNBs and 19% of LLPNBs being performed awake, again showing an increased percentage for both versus 2008.

Conclusion: In the group of 153 experienced anaesthetists there was a dichotomy in belief and practice: more anaesthetists believe it is safer and perform ULPNBs awake, but are more equivocal regarding LLPNBs. While 45% believed that US makes asleep blocks safer, its impact on the practice was inconclusive.

ESRAS-0242

Peripheral Nerve Blocks

ULTRASOUND-GUIDED ASSESSMENT OF DIAPHRAGM PARALYSIS AFTER BRACHIAL PLEXUS BLOCKADE

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Aims: Conventional high-volume of local anesthesia used in brachial plexus causes ipsilateral hemidiaphragm paralysis. The known adverse effects are

based on that conventional blockade. Ultrasound guidance more precise needle placement permit lowers volumes resulting in a reduction of phrenic nerve affection without concerning the efficacy, onset and quality of the block. But also, it can be an easy, quick, cheap and available technique to diagnose an inadvertent paralysis, compared to the traditional X-ray.

Method: With institutional human ethics board approval, we enrolled 8 patients undergoing upper extremity surgery to which, under the anaesthesiologist decision, an ultrasound-guided brachial plexus blockade was performed. A pre and post hemidiaphragm evaluation (mobility and velocity) was carried out using B and M ultrasound modes locating the diaphragm in the middle-clavicle and anterior axillary lines in the subcostal region. Inadvert complications were also collected. We classified 3 block levels comparing the pre and post measures obtained (mild <25%, middle 25-75%, complete >75%).

Results: All patients had a good anaesthetic and analgesic blockade. 2 patients (25%) were classified as a mild, 4 (50%) medium and 2 (25%) complete hemidiaphragmatic paralysis. The average of blockades's level was 45%. No added complications were observed.

Conclusion: We considered an easy learning technique with basic ultrasound knowledge that allows a quick and objective hemidiaphragm blockade valoration with no need of additional proves. Ultrasound is a reliable tool that allows a real time viewing of the respiratory cycle and measurements of the diaphragm dome technique to identify diaphragmatic hemiparesis and classify them.

ESRAS-0252

Peripheral Nerve Blocks

EXTRANEURAL VERSUS INTRANEURAL INJECTION PRESSURES DURING ULTRASOUND GUIDED SUPRACLAVICULAR BRACHIAL PLEXUS BLOCK

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Aims: Triple monitoring (ultrasonography, nerve stimulation and injection pressure monitoring) has been advocated to help reduce the risk of nerve injury. No recommendation exists for injection pressures specific to supraclavicular blocks. We carried out a study comparing injection pressures during standardised intraneural and extraneural injections of the supraclavicular plexus in human cadavers. To aid interpretation of our results, needle positioning was investigated further using cadaveric dissection.

Method: Under ultrasonographic guidance an echogenic needle was placed intraneurally, deliberately targeting nerve structures, within the supraclavicular brachial plexus. Using an automated pump and pressure monitor 1ml of saline was injected and peak pressure measured. The needle was then placed extraneurally outside the plexus sheath and the process repeated. Six cadavers were injected bilaterally. In another cadaver indocyanine green dye was injected in the same positions and spread was examined macroscopically on dissection.

Results: Intraneural injection pressures were significantly higher than extraneural. Pressures lower than 15psi were recorded in 11 of 12 injections in the extraneural group and greater than 15psi in 8 of 12 in the intraneural group. Dissection revealed dye spread within the plexus sheath but outside the nerve body in the intended intraneural injection.

Conclusion: An "intratheath extraneural" needle position may explain the low pressure readings in the intraneural group. This would be supported by our dissection findings and the widespread clinical practice of injecting through the sheath. We suggest that ultrasound alone is inadequate for this technique and recommend triple monitoring with threshold injection pressures of less than 15psi.

ESRAS-0461

Peripheral Nerve Blocks

ADDUCTOR CANAL BLOCK IN MORBIDLY OBESE OUTPATIENT KNEE ARTHROSCOPY - QUICKER PACU DISCHARGE

Ramezankhani R. Los Angeles, USA.

Aims: Quicker PACU discharge in morbidly obese outpatient knee arthroscopy - A case study

Method: Comparing outpatient knee arthroscopy in two morbidly obese patients - general anesthesia vs. adductor canal block and monitored anesthesia care. Performing an U/S guided adductor canal block in two morbidly obese patients with BMI greater than 35 for outpatient routine knee arthroscopy with Ropivacaine 0.5% 20 cc at the adductor canal plus monitored anesthesia care with propofol infusion reduced PACU turnover time by 10-15 minutes compared to general anesthesia with standard IV opiates and NSAIDs.

Results: Adductor canal block with monitored anesthesia care reduced PACU turnover times in two morbidly obese patients with BMI greater than 35 by 10-15 minutes compared to a standard general anesthetic and reduced postop adverse events including nausea and surgical site pain.

Conclusion: U/S guided adductor canal block with monitored anesthesia care is an option for intraoperative and postoperative management of morbidly obese outpatient knee arthroscopy and can lessen PACU (post anesthesia care unit) time.

ESRAS-0325

Peripheral Nerve Blocks

THE USE OF PARAVERTEBRAL AND FASCIAL PLANE BLOCKS IN BREAST SURGERY AT FRIMLEY PARK HOSPITAL, UNITED KINGDOM

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Aims: Breast surgery is associated with significant postoperative pain. This can delay discharge from the post anaesthetic care unit (PACU) as well as delayed mobilisation and discharge from hospital. The aim of this poster is to highlight our experience with the use of fascial plane blocks in breast surgery and their effect on post-operative opioid consumption.

Method: A retrospective analysis of patients undergoing breast surgery. Patients undergoing unilateral mastectomy received paravertebral blocks either alone or in combination with PECS I or a Serratus Anterior Plane block (SAP). For bilateral surgery, combinations of paravertebral and PECS I+II or SAP were used depending on the invasiveness of surgery on either sides. Minor procedures received either PECS I+II or a SAP block (Figure 1). We use a modification of the PECS I+II or SAP to do an interpleural injection through a single entry point in intermediately invasive procedures. Our standard anaesthetic regime is TIVA with Propofol and remifentanyl with preoperative paracetamol and NSAID's. No other opioids are used intraoperatively and the opioid consumption in PACU is recorded.

Results: 21 patients were included in this case series. Age range 30-79 years (median age 53). All were ASA 1 or 2. The average amount of LA used was 1.9mg/kg and volume 58 mls of 0.25% Bupivacaine. Average morphine consumption in the PACU was 2.3mg with 67% of the cases not requiring any extra analgesia.

Conclusion: The use of fascial plane and paravertebral blocks reduces opioid consumption in the post-operative period in patients undergoing surgical procedures of the breast.

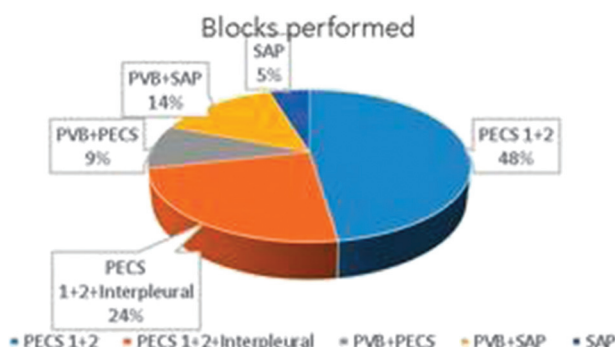


FIGURE 1.

ESRAS-0163

Peripheral Nerve Blocks

AUDIT OF ULTRASOUND GUIDED INFRACLAVICULAR BRACHIAL PLEXUS BLOCK WITH 1% PRILOCAINE COMBINED WITH PERIPHERAL NERVE BLOCKADE OF THE UPPER EXTREMITY FOR HAND TRAUMA: INITIAL RESULTS

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Aims: St Andrew's Centre (hand trauma centre) does 1200 hand cases annually under regional blocks. As anaesthetists' skills develop, novel blocks are regularly introduced. We examined one anaesthetist's infraclavicular brachial plexus block (IBPB) practice geared towards safe, effective day case surgery.

Method: With audit committee approval, a prospective audit of the anaesthetist's practice was done.

Appropriate hand trauma patients received ultrasound guided IBPB, using prilocaïne. Additionally, peripheral nerve (median, ulnar or radial) blocks were done for postoperative analgesia, using bupivacaine. Data collected included demographics, duration of block procedure, onset and duration of action, complications and patient satisfaction.

Results: For six months from October 2014, 47 IBPBs were analyzed.

All patients (age 18-91 (mean 49)years; weight 45-129 (78.5)kg; ASA I-III) received IBPB with 30ml 1% Prilocaïne and at least one peripheral nerve block with 6-21 (13)ml 0.5% Bupivacaine. IBPB performance duration was 2-10 (3) min for infraclavicular and 1-7 (3)min for peripheral nerves. Motor and sensory blockade both onset at (mean) two minutes. All patients were surgically ready in 6-20 (12) minutes.

The prilocaïne infraclavicular block lasted 124 min (range 108 – 140 min). All patients were discharged home pain free. No complications were recorded. All patients were satisfied with the block process.

Conclusion: Our results suggest that using prilocaïne for IBPB, combined with bupivacaine for peripheral nerve blocks, is quick, uncomplicated, and easy to perform. The result is satisfied patients who can be pain free, safely discharged home soon after surgery.

We encourage others to try this technique and report their results.

ESRAS-0221

Peripheral Nerve Blocks

ULTRASOUND-GUIDED INFRACLAVICULAR BRACHIAL PLEXUS BLOCK ENHANCES POSTOPERATIVE BLOOD FLOW IN ARTERIOVENOUS FISTULAS

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Aims: Brachial plexus block offers several advantages when creating vascular access for hemodialysis. However, no controlled studies have directly evaluated arteriovenous fistula (AVF) blood flow in patients anesthetized by this method. We aimed to compare the effects of ultrasound-guided, infraclavicular brachial plexus block and local infiltration anesthesia on blood flow in the radial artery and arteriovenous fistula during the early and late-postoperative periods.

Method: Sixty patients were randomly assigned to either an experimental group, which received infraclavicular brachial plexus block (IB), or a control group that received local infiltration anesthesia (C). Before and after anesthesia (block or infiltration), blood flow in the distal radial artery was measured. AVF flow during the early and late postoperative period was evaluated using Duplex ultrasound. The rates of primary fistula failure were also compared.

Results: After anesthesia, preoperative radial arterial flow was greater in Group IB than Group C (56 ± 8.6 mL/min vs. 40.7 ± 6.11 mL/min, $p < 0.0001$). Blood flow in the fistula, measured 3 hours, 7 days, and 8 weeks post-operatively, was also greater in Group IB (respectively, 69.6 ± 7.9 vs. 44.8 ± 13.8 mL/min [$p < 0.001$], 210.6 ± 30.9 vs. 129 ± 36.1 mL/min [$p < 0.001$], and 680.6 ± 96.7 vs. 405.3 ± 76.2 [$p < 0.001$]).

Conclusion: When used for AVF access surgery, infraclavicular brachial plexus block provides higher blood flow in the radial artery and AVF than is achieved with infiltration anesthesia.

ESRAS-0186

Peripheral Nerve Blocks

A SINGLE CENTER TRAINEE EXPERIENCE IN AXILLARY BRACHIAL PLEXUS BLOCK PERFORMANCES: COMPARISON OF NERVE STIMULATOR- AND ULTRASOUND-GUIDED TECHNIQUES

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Aims: In this prospective-randomized study, we compared the nerve stimulator (NS)- and ultrasound (US)-guided axillary brachial plexus block techniques, which were all performed by trainees under the supervision of 2 experienced anesthetists.

Method: Sixty patients were enrolled after obtaining Institutional Ethics Committee approval and written informed patient consent. In NS-group (n:30), musculocutaneous, radial, ulnar and median nerves were blocked with prilocaïne 2% and lidocaine 2% ($V = \text{height(cm)}/5$) after eliciting motor responses between 0.3-0.5mA. In US-group (n:30), all nerves were visualized (no motor response < 0.3 mA with NS), then same local anesthetics (LAs) with similar volumes ($V = \text{height (cm)}/5$) were deposited. Block performance times, number of skin punctures, procedure-related pain, sensory and motor block onset times and complications during block performances were all recorded. Block success was defined as complete sensory loss to surgical attempts at 30 min without any analgesic use.

Results: The block performance times, total volumes of LAs, and sensory and motor block onset times were similar in both groups ($p > 0.05$). The number of skin punctures and VAS scores were significantly higher in NS-group (Table 1). The number of successful blocks was higher in the US-group (93.2% vs 76.6%) and 2 patients in US- and 7 patients in NS-groups received additional remifentanyl (0.05mcg/kg/h) and midazolam (0.03mg/kg) infusions (Table 1). The number of complications during block performance was significantly higher in NS-group, 8 vascular punctures, 2 hematomas, 9 paresthesias ($p = 0.0001$).

Conclusion: US-guided axillary brachial plexus blocks, even in inexperienced trainees' clinical practices, improve the block success rates and patient comfort with a lower incidence of complication.

Table 1: Follow-up parameters in NS- and US-guided axillary brachial plexus block groups

	NS-group (n=30)	US-group (n=30)	P
Block performance time (min)	10.7±5.4	9±3.6	0.15
Local anesthetic volume (mL)	33±3	33.5±2.3	0.47
The number of skin punctures	2.3±1 (1-4)	1.5±0.7 (1-3)	0.001
Visual Analog Scale (VAS) (0=no pain; 10=worst pain)	3.8±2.4	2.6±2.1	0.045
Number of successful blocks	23 (76.6%)	28 (93.2%)	>0.05
Number of partially successful blocks	7 (23.3%)	2 (6.6%)	
Number of unsuccessful blocks	0	0	

ESRAS-0263

Peripheral Nerve Blocks

BILATERAL THORACIC PARAVERTEBRAL BLOCKS IN A PEDIATRIC PATIENT FOR AN EXCEPTIONAL INDICATION

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Aims: Ultrasound-guided paravertebral blocks (PVBs) and catheter placement techniques have been reported for various surgical procedures previously in pediatric patients. In this case report, we discuss our experience of bilateral ultrasound-guided use of thoracic PVBs (TPVBs) for postoperative analgesia of left latissimus dorsi muscle transfer surgery.

Method: A 10-year-old male underwent a left latissimus dorsi muscle transfer surgery under general anesthesia (GA) because of right biceps brachii muscle motor weakness and atrophy that had occurred after polio vaccines (Figure 1). After an uneventful surgery, ultrasound-guided TPVBs were performed bilaterally

for postoperative pain management. Firstly, injections of 10mL of 0.125% bupivacaine at paravertebral spaces of T3-4 and T6-7 achieved expected dermatomal distribution (T2-T8) on the left side. Secondly, injection of 10mL of 0.25% bupivacaine at paravertebral space of T1-2 provided analgesia (C6-T2) on the right side. A 20-gauge catheter was also placed at this level for the vasodilation of free flap vascular anastomosis, and an infusion of 0.2% bupivacaine was initiated.

On postoperative day 2, the patient underwent another surgery for debridement under GA and the catheter was removed at the end of the surgery after injecting 10mL of 0.25% bupivacaine.

Postoperatively, oral paracetamol was used twice daily as supplemental analgesic as planned. The patient was stable without any opioid use, able to ambulate, and expressed satisfaction with his pain control until hospital-discharge.

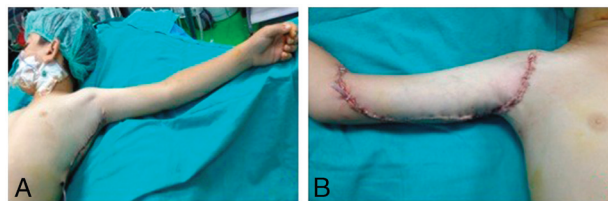


FIGURE 1.

Results: This case is important to demonstrate an exceptional indication for the use of TPVBs techniques.

Conclusion: We believe that single injection and continuous TPVBs are useful analgesic methods.

ESRAS-0271

Peripheral Nerve Blocks

RETROSPECTIVE ASSESSMENT OF OUR BRACHIAL PLEXUS BLOCK OUTCOMES IN 465 CASES: THE ROLE OF ULTRASOUND-GUIDANCE ON BLOCK SUCCESS, ADVERSE EFFECTS AND COMPLICATIONS

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Aims: Brachial plexus blocks are commonly performed for upper extremity procedures with well-known advantages of anesthesia and analgesia. We reviewed the brachial plexus block outcomes in our hospital to understand the effect of ultrasound (US)-guidance on block success, adverse effects and complications.

Method: Retrospective review of prospectively collected data of 465 brachial plexus block patients were assessed, taking into account the block levels, catheter use, block techniques (nerve stimulator (NS)-guidance or NS with US-guidance), block success, and related-adverse effects and complications.

Results: In 465 patients (interscalene (95), supraclavicular (66), infraclavicular (76), axillary (228) brachial plexus blocks), while 327 received only single injection blocks for anesthesia, the rest 138 also received catheters for postoperative pain relief. Only 143 of 465 blocks were performed under NS with ultrasound (US)-guidance. The blocks were successful in 461 patients (99.1%) and surgical procedures were completed with the support of planned sedation. Although NS-guidance combined with ultrasound did not have an additional effect on block success rates (100% vs 98.6%), it significantly lowered adverse effects and complications (29.8% vs 18%) ($p < 0.009$). Vascular puncture (7.5%), pain during LA injection (6.7%), temporary motor block (4%), phrenic nerve block (1.5%), Horner syndrome (1.5%), and technical problems with catheters (8.7%) were the common minor complications and the vast majority of these were after axillary (57/122, 46.7%) and interscalene (42/122, 34.4%) blocks. There were no major complications.

Conclusion: Consequently, ultrasound-guidance facilitates to visualize the target structure to improve the block success, and also the potentially dangerous structures to reduce the risk of associated complications.

ESRAS-0474

Peripheral Nerve Blocks

SERRATUS PLANE BLOCK IN BREAST SURGERY

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Aims: Surgery procedures for the treatment of Breast malignancies, accounting for more than 30% of malignancies in women, can still lead to significant pain and discomfort. Recently, a new regional anaesthesia technique has been described by Blanco et al. This block is designed to block primarily the thoracic intercostal nerves and to provide complete analgesia of the lateral part of the thorax. Aim of this preliminary study is to evaluate the pain control effectiveness of this new regional anaesthesia technique.

Method: 10 patients with breast cancer undergoing mastectomy and breast expander positioning have been enrolled (median age 55 yrs). After patients signed an informed consent, ultrasound serratus plane block was performed, using naropine 0.375%, 3 mg/kg. Surgery was then performed with standard general anaesthesia. Pain and nausea and vomiting (PONV) were assessed by ward nurses using both VAS scale (at 0/6/12 and 24 h) and a specially-designed forms.

Results: After surgery, at 0/6/12 and 24h all patients rated their pain severity as below 5 (range 0-5). All patients reported adequate pain control and optimal post-operative recovery. No PONV was reported.

Conclusion: Serratus plain block seems to be an adequate analgesic technique in breast surgery. The number of patients is still limited, but a randomized study comparing regional anaesthesia vs usual pain control protocol by paracetamol and morphine is ongoing.

ESRAS-0027

Peripheral Nerve Blocks

ULTRASOUND ASSISTED TRANSVERSUS ABDOMINIS PLANE BLOCK GIVEN THROUGH SURGICAL FIELD

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Aims: To enhance safety and to improve efficacy of TAP block for open inguinal herniorrhaphy

Method: An adult male patient was posted for open inguinal hernia repair. He was consented for a combination of Transversus abdominal plane (TAP) block and general anaesthetic for the surgery. Prior to skin closure, through the surgical field, an 18 G Tuohy needle was introduced under vision in the transversus abdominis plane. A linear ultrasound probe was applied over the anterior abdominal wall. The needle was advanced in an anteromedial direction under ultrasound guidance by intermittent aspiration injection technique. A total of 10 mL of 0.2% Ropivacaine (plain) was used in 2 mL aliquots to visualize the progress of the advancing needle while creating a plane for its passage. A further 20 mL of the same local anaesthetic was administered and its spread visualized real time to confirm accurate distribution of the local anaesthetic bolus.

Results: Assessment of pain severity in post anaesthesia care unit revealed a visual analog score of 1/10. Patient was discharged from the recovery without needing any other analgesics after 60 minutes.

Conclusion: Introduction of needle through the surgical incision removes the ambiguity regarding reaching the transversus abdominis plane accurately. Ultrasound guidance helps in advancing the needle to the precise spot to administer the local anaesthetic bolus. It also helps visualize the appropriate spread of the anaesthetic bolus.

Thus the facility of open surgical field and availability of ultrasound can be coupled to perform an established technique with greater safety and efficacy.

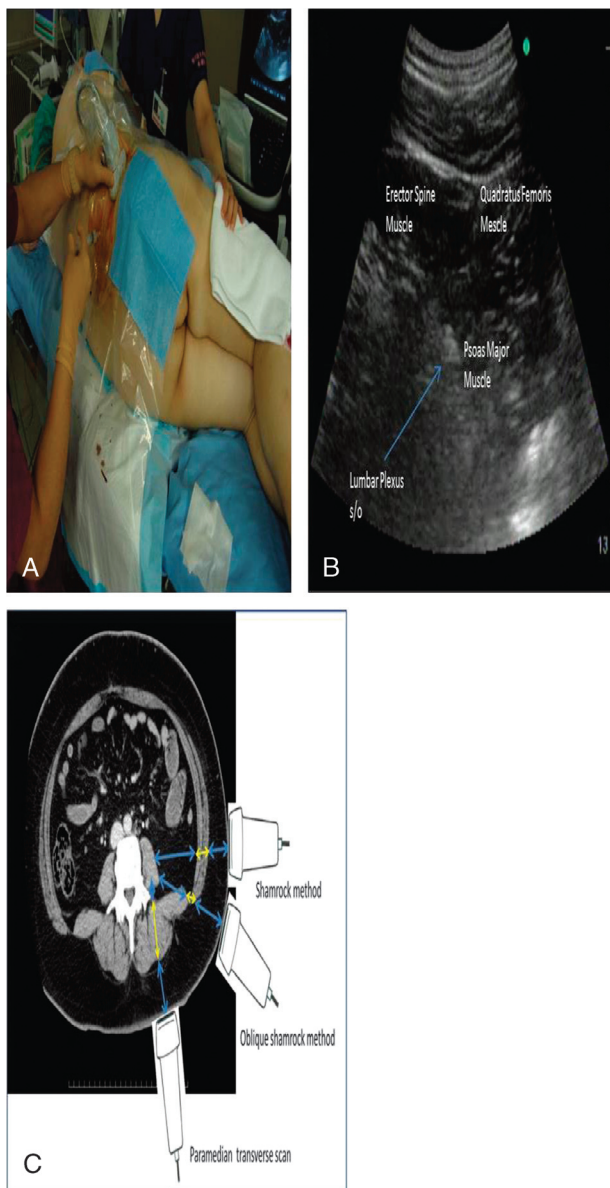
ESRAS-0064

Peripheral Nerve Blocks

D LUMBAR PLEXUS BLOCK USING THE OBLIQUE SHAMROCK METHOD IN AN OBESE PATIENT UNDERGOING TOTAL HIPARTHROPLASTY: A CASE REPORT

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Aims: Several ultrasound-guided (USG) lumbar plexus block (LPB) techniques have been described, but all are difficult to perform in obese patients because the target is deeper. We describe here a new approach that allows for easy identification of the lumbar plexus and subsequent injection in obese patients.



Method: Case Report

An LPB was planned for intraoperative analgesia in a 29-year-old obese patient (body mass index 36) with developmental dysplasia of the hip. The conventional USG techniques (paramedian transverse scan, shamrock method) initially used did not provide an appropriate image to detect the psoas major muscle and lumbar plexus. The transducer was then moved from the midline to the dorsal margin of the iliac crest transversely, and both structures were clearly identifiable in this position (oblique shamrock method: Figure 1A-B). The transducer was kept in this position and USG-LPB was well done.

Results: In obese patients, a large amount of fat surrounding the muscles leads to high signal attenuation on ultrasound. In this patient, the range of total ultrasound attenuation from the transducer to the target in the paramedian transverse scan, shamrock method, and oblique shamrock method are calculated to be 1.41-2.11, 1.27-2.22, and 0.82-1.42 dB at 1 MHz from computed tomographic image (Figure 1C). These results strongly suggest that oblique shamrock method can improve the ultrasound image for LPB in obese patients.

Conclusion: Oblique shamrock method could provide a best image with clear identification of the psoas major muscle and lumbar plexus for USG-LPB in obese patients.

ESRAS-0188

Peripheral Nerve Blocks

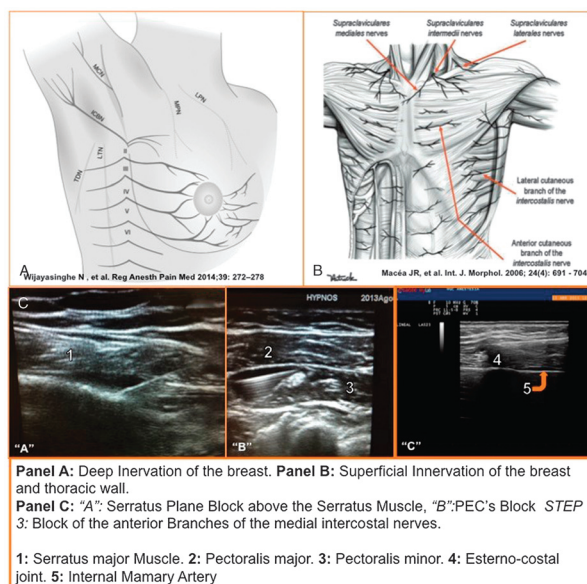
COMPLETE BREAST BLOCK. A NEW APPROACH FOR BREAST SURGERY

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Aims: The innervation of the breast is complex, with multiple nerve roots¹. The deepest part receives input from the pectoral nerves (PN) lateral and medial^{2,3}. The lateral and medial branches of the lateral intercostal nerves (II to VI) innervate supra-aponeurotic tissues¹; the fourth intercostal nerve gives the largest percentage of innervations to the nipple⁴. The upper inner quadrant receives cutaneous branches of the supraclavicular plexus. Blanco^{5,6} et al, described the PN block and the serratus plane block for the lateral branches of the intercostal nerves (II to VI), however the medial aspect of the breast is not covered. We propose the use of these blocks created by Blanco but adding the block of the middle branches of the intercostal nerves, by doing a parasternal subcutaneous infiltration.

Method: We conducted this approach in 379 breast cosmetic surgeries, having very good anesthesia and postoperative analgesia, without consumption of post-operative morphine.

Results:



Conclusion: This block is easy to learn, not time consuming, offers excellent postoperative results for esthetic surgery. We strongly advise prospective studies to validate this block.

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ESRAS-0213

Peripheral Nerve Blocks

IN PLANE LATERAL APPROACH OF THE PECTORAL NERVES. A Pecs II MODIFICATION

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Aims: The pectoral nerves (PN) block was described by Blanco^{1,2}. This author describes an in-plane approach from medial to lateral. However the 45° angle of the needle presents an issue, making it difficult to see, especially in obese patients and in those with big breast, having little flexibility with this technique. We propose another in plane approach.

Method: We have done this modification on 487 breast cosmetic surgeries, with good level of anesthesia and post-operative analgesia. It's done by an in-plane approach of the PN from lateral to medial, with the arm open at 90°, we put our linear probe on the patient's chest wall, and insert the needle from the armpit, under the pectoral major muscle. We have not had any complications such as hematoma due injury thoracoacromial vessels, as suspected in the lateral approach. In all surgeries the surgeons dissect the interpectoral space separating his side face without sectioning, with no evidence of hematoma in the area.

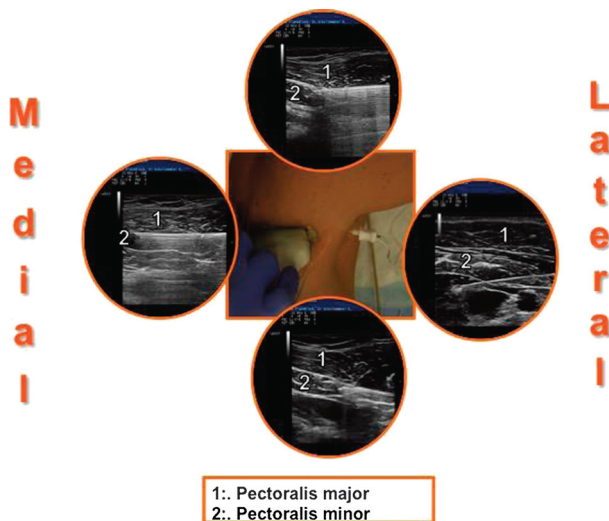
Results:

FIGURE 1.

Conclusion: This lateral approach PN block, has proven to be an easy and safe technique, providing adequate anesthesia and analgesia for breast cosmetic surgery, without any important complications derived from this modification.

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ESRAS-0183

Peripheral Nerve Blocks

TOWARDS REALISTIC PATIENT-SPECIFIC HUMAN MODELS FOR VIRTUAL REALITY REGIONAL ANAESTHESIA SIMULATION

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Aims: Performing regional anaesthesia (RA) requires advanced practical skills difficult to acquire in current training practise. Virtual-reality environments provide realistic training platforms, as aimed by the European project 'Regional Anaesthesia Simulator and Assistant' (RASimAs, www.rasimas.eu). This calls for accurate virtual models of human. Within the framework of patient-specific modelling, we aim at providing a realistic generic model for the femoral region.

Method: The model used for the project contains skin, fat, muscles, nerves and blood systems, all of interest for RA. Three-dimensional (3D) observations and millimetre axial slices showed however wrong positioning of the nerve. Its position in relation to the *iliopsoas* muscle has been manually corrected slice by slice and the 3D resultant calculated. Missing structures, but ensuring an important haptic feedback in RA simulations, the *fascia iliaca* has been generated by expanding the femoral nerve structure in 3D, and the *fascia iliaca* by applying morphological dilatation and closing filters on the anatomical structures located inside subcutaneous fat.

Results: Using image processing and computer graphics techniques, the *fascia iliaca* and *lata* have been added to the model as additional surface layers and the 3D femoral nerve corrected. An expert qualitative evaluation has been performed, considering the new model as realistic for RA simulation.

Conclusion: Despite high needs in virtual-reality medicine, existing commercial human models lack of accuracy for realistic simulations. This study proves the need for expert evaluation and enhancement before use in medical environment. The next steps include registration of this realistic model on patient-specific data.

ESRAS-0169

Peripheral Nerve Blocks

ATTITUDE OF ANAESTHETISTS TO OFFERING THE CHOICE OF PERIPHERAL NERVE BLOCK ANALGESIA AND ANAESTHESIA DURING DAY TIME WORKING HOURS

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Aims: Peripheral nerve blocks (PNB) are increasingly used as an essential component of multimodal analgesia for enhanced recovery after surgery. Patient awareness on choice of anaesthesia and analgesia has improved with better access to pre-assessment clinics and decision aids. Patient choice is extremely important and there is increased expectation to offer the option of PNB analgesia/ anaesthesia. The Royal College recommends that when alternative anaesthetic techniques with a similar risk are available, the patient's preference should be taken fully into account.

We conducted a survey to find out the attitude of ALL anaesthetists to offering patients the option of analgesia/anaesthesia with a peripheral nerve block.

Method: Survey Monkey was used to produce a 10 question survey, which was sent out to all anaesthetists registered with the Royal College of Anaesthetists. It asks their opinion and current practice of offering and performing PNBs, their most favoured service delivery option for offering a wider choice, and their view of perioperatively managing a patient who has had a PNB by another doctor.

Results: The collection of results will be completed in May 2015.

Conclusion: The feedback from the survey will provide an opportunity to understand the attitude of anaesthetists and their preferred model of service delivery to offering the choice of a wide variety of peripheral block techniques to all patients. Such information is vital to design and shape the development of future service delivery models that will allow the patients to benefit from a range of different choices for anaesthesia and pain relief.

ESRAS-0360

Peripheral Nerve Blocks

SURVEY OF REGIONAL ANAESTHESIA TRAINING AMONGST TRAINEES AND STAFF AND SPECIALTY GRADE ANAESTHETISTS AT A LARGE DISTRICT GENERAL HOSPITAL IN THE UK

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Aims: Use of regional anaesthesia (RA) is increasingly widespread in UK hospitals, with benefits of excellent analgesia, patient satisfaction, enhanced recovery and potentially reduced cancer recurrence. However, training for RA varies widely. As a pilot initiative, we describe trainee experiences of RA from a large representative UK hospital.

Method: Lister Hospital, Stevenage, is a large district general hospital (DGH) that receives trainees from three UK schools of anaesthesia. In 2015, we surveyed trainees and staff/specialty (SAS) grades about their confidence in performing regional nerve blocks, logbook numbers, and satisfaction with clinical and formal training.

Results: 17/33 responded. Among core trainees, half had little hands-on experience, although one reported performing >200 blocks in 6 months. Specialty trainees felt competent to perform only a minority of blocks independently. Confidence was higher among SAS grades but most could not perform all blocks deemed useful in their practice. Overall only 3 rated clinical teaching as excellent/good, and 12 rated formal teaching as poor. Most were not confident that this post would help them acquire their required competencies. Common reasons cited: lack of formal teaching and clinical exposure, pressure from surgeons. All but one felt that competency in regional anaesthesia is essential.

Conclusion: Trainees reported the need for improved clinical and formal training in RA. In this DGH where opportunities for RA are plentiful, this could be addressed by identification of suitable lists, allocation to a consultant with an interest in RA, and distribution among trainees. Further work is needed nationally to identify deficiencies in formal and clinical training.

ESRAS-0211

Peripheral Nerve Blocks

SHAMROCK VS. LUMBAR ULTRASOUND TRIDENT &NDASH; A RANDOMISED CONTROLLED TRIAL OF ULTRASOUND GUIDED LUMBAR PLEXUS BLOCKS IN HEALTHY VOLUNTEERS

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Aims: The Lumbar Ultrasound Trident (LUT)-technique is currently the most well-known ultrasound guided lumbar plexus block (LPB),¹ but it may be correlated with high-incidence of epidural spread of local anaesthetics.² The Shamrock-method allows for easier visualization of anatomical structures, block needles, and injectate, implying shorter block procedure time and less risk of epidural spread.³ In a randomised controlled trial, we aimed to compare the block procedure time and the distribution and the effects of lidocaine 2% with adrenaline 1:200,000 after LPB using the Shamrock-method vs. the LUT-technique (Figure 1).

Method: We included 20 healthy male volunteers older than 18 years. All volunteers received a LPB using the Shamrock-method and the LUT-technique in randomised order one week apart. Block procedure time, anatomical distribution of the injectate with added contrast visualized on MRI, motor and sensory effects, and lidocaine pharmacokinetics were recorded. The ethics committee approved the study.

Results: The trial is completed. Data analysis is ongoing. Final results will be presented.

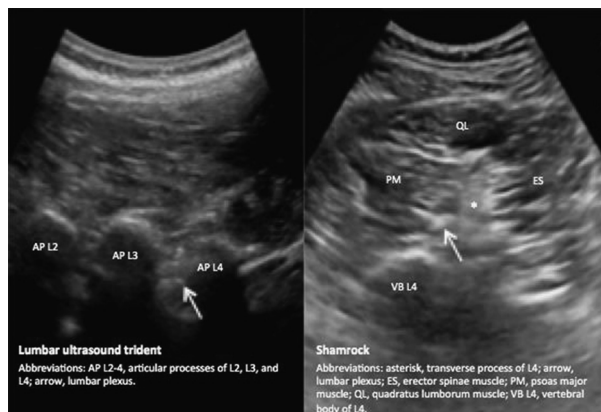


FIGURE 1.

Conclusion: This study aims to validate and compare the efficacy of two ultrasound guided LPB-techniques.

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ESRAS-0328

Peripheral Nerve Blocks

PERIPHERAL NERVE BLOCK DOCUMENTATION

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Aims: Documentation of peripheral nerve blocks is not yet afforded the attention that is given to general anaesthesia or neuraxial blockade. Notwithstanding, the invasive procedure is associated with risks, side effects and medico-legal implications to poor documentation. The RCoA, AAGBI and NYSORA provide recommendations for documentation. However, the current anaesthetic chart for the Worcestershire NHS Trust offers little guidance to anaesthetists.

The aim of the audit is to assess the extent to which block documentation locally is meeting standards set by national and international bodies. Furthermore, to highlight the importance of documentation of peripheral nerve blocks, and move it in line with other modes of anaesthesia.

Method: Data was collected retrospectively from 188 anaesthetic charts across the trust over a three month period using a data collection tool. The audit project was approved locally by the clinical audit department.

Results: Naming of the operator was infrequent at 54%. Aseptic technique was reported on 80% of charts and patient conscious state on 60%. 99% of charts recorded local anaesthetic drug, concentration and volume. Approach and mode of monitoring were documented on 79% and 87% of charts, respectively.

Conclusion: The audit found a lack of consistency in block documentation trust-wide. This may be attributed to there being limited guidance offered by the anaesthetic chart. In response to the audit's findings a peripheral nerve block sticker was designed to incorporate those elements recommended by national and international bodies. A re-audit will take place following implementation of the sticker to assess any improvement in peripheral nerve block documentation.

ESRAS-0444

Peripheral Nerve Blocks

ULTRASOUND-GUIDED CONTINUOUS SUPRACLAVICULAR BRACHIAL PLEXUS BLOCK FOR PREEMPTIVE ANALGESIA PREVENTING PHANTOM-LIMB PAIN FOLLOWING ARM AMPUTATION IN A CHILD WITH OSTEOSARCOMA

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Aims: Phantom-limb pain typically begin within days of amputation. It occurs in adult as well as paediatric patient. Studies shown 92 % paediatric patient suffered from phantom limb pain within 10 years of amputation. Supraclavicular Brachial Plexus Block has provided excellent postoperative analgesia in Arm Amputation patient, but its role as preemptive analgesia has not been described. The aim of this report was to describe a case using preoperative continuous Supraclavicular Brachial Plexus Block for preemptive analgesia of phantom-limb pain in a child with Osteosarcoma submitted to Arm Amputation

Method: A 10 year-old female patient weighing 30 kg suffering from Osteosarcoma of Upper Extremity, with physical status ASA 3 with comorbid of sepsis and slight anemia, scheduled for above-elbow amputation. Routine perioperative monitoring were set. Ultrasound imaging then used to identify the brachial plexus, guide the block needle, and confirm correct placement of the catheter. An hour before incision, 15 cc bolus of 1.5% Lignocaine was injected, and the anaesthetic spread was identified. General endotracheal anaesthesia was conducted with propofol and fentanyl, without neuromuscular blocker. The surgery held for 3 hours. Postoperatively, 15 cc bolus of 0.2% Ropivacaine was injected, continued by pump run at 1 cc/hr. Pain scores were assessed 6 hourly for 4 days. Oral Paracetamol was given as multimodal analgesia.

Results: Postoperatively patient did not expressed any pain on amputated limb with range of Wong Baker Pain Scale 1 to 2 until patient discharged home at the 4th day.

Conclusion: Preoperative continuous Supraclavicular Brachial Plexus Block provided preemptive analgesia of Phantom-Limb pain.

ESRAS-0312

Peripheral Nerve Blocks

EVOLUTION OF ULTRASOUND-GUIDED REGIONAL ANAESTHESIA FOR BREAST CANCER SURGERY IN TAN TOCK SENG HOSPITAL, SINGAPORE

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Aims: To chart the evolution of regional anaesthesia (RA) techniques used for breast cancer surgery in a tertiary hospital in Singapore. We conclude by presenting a case of breast cancer surgery under opioid free RA.

Method: We describe our journey of discovering thoracic paravertebral block (TPVB) for breast cancer surgery. We first used it as an opioid sparing technique for intra- & post-operative analgesia. TPVB was with/without catheter insertion under general anaesthesia with ultrasound guidance, using the parasagittal out-of-plane approach. We then tried out various ultrasound guided approaches, and settled on the transverse in-plane lateral to medial needle approach as described by Shibata and Renes. We find this easiest to teach/learn, and the approach whereby view of the needle is best tracked. We currently have a workflow whereby patients are informed of the block at the breast clinic and pre-anaesthesia evaluation clinic, before being offered it at the OT induction room. We have performed >200 TPVBs with very good safety record.

Results: Patient consented for case study. She is an elderly lady presenting for simple mastectomy with sentinel lymph node biopsy KIV axillary clearance for cancer. She has cervical spondylosis with upper limb radiculopathy and numbness, as well as suspected sleep apnea with a BMI of 33. Anaesthesia was with 2 level TPVB, superficial cervical plexus block, and modified infraclavicular block.

Conclusion: Breast surgery under RA is challenging. However, with a proper understanding of the relevant anatomy, an effective and safe approach can be established and implemented.

ESRAS-0364

Peripheral Nerve Blocks

PATIENT SATISFACTION WITH REGIONAL ANAESTHESIA FOR DAY CASE SHOULDER SURGERY IN PACU AND AT 3 MONTHS

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Aims: Our aim was to determine satisfaction with peri-operative pain relief and anaesthetic technique, whether patients would like to receive written information about RA and if they would recommend the anaesthetic technique, in the PACU and at 3 months.

Method: Prospective survey of 70 patients (ASA1- 3) undergoing arthroscopic shoulder surgery under Interscalene and Superficial cervical plexus blocks alone or with GA / conscious sedation in PACU. We also surveyed a cohort of 30/70 patients at 3 months when they attended the surgical-outpatient clinic.

Results: Survey results are summarized in Figure 1.

51 patients requested GA or conscious sedation while 19 patient had surgery only under regional anaesthesia. All patients were discharged on the day with no readmission.

68/70 and 30/30 patients were satisfied with peri-operative pain relief in recovery and at 3 months.

69/70 and 30/30 were satisfied with anaesthetic technique.

64/70 would recommend the anaesthetic technique, while 6/70 were unsure in the recovery. 30/30 felt they would recommend the anaesthetic technique at 3 months.

34/70(48%) felt they would prefer to have written information about RA, while the number increased to 22/30 (73.3%) at 3months.

6/70 (9%) patients said they did not understand the verbal information about RA given on the day of surgery.

Patient satisfaction with Regional Anaesthesia for shoulder surgery.	Recovery	3 month Surgical Outpatient appointment
Pain relief after surgery?		
Good / Excellent	63	27
Satisfactory	5	3
Unsure / Unsatisfactory	2	0
How satisfied were you with the anaesthetic?		
Extremely Satisfied	53	20
Very Satisfied	16	10
Satisfied	1	0
Not Satisfied	0	0
Very Unsatisfied	0	0
Will you recommend this technique:		
Yes	64	30
No	0	0
Unsure	6	0
Would you like to have written information about regional anaesthesia:		
Yes	34	22
No	36	8
Did you understand the information given?		
Yes	64	29
No	6	1

FIGURE 1.

Conclusion: Excellent patient satisfaction with RA whether awake, sedation or under GA.

Good post-op analgesia and patient comfort with this technique.

A need to develop local information leaflet regarding RA/ Nerve blocks for shoulder surgery, which the patients should receive at the time of pre-operative assessment. This will help them to take informed decision.

Giving patient choice about the anaesthetic technique improves patient satisfaction.

ESRAS-0302

Peripheral Nerve Blocks

UPPER EXTREMITY REGIONAL ANESTHESIA: AN ANALYSIS OF PATIENT SAFETY OF TWO DIFFERENT TECHNIQUES

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Aims: The aim of this prospective observational study was to estimate the incidence of complications related to upper limb regional anesthesia comparative between recently introduced in our clinic ultrasound-guided versus neurostimulation technique.

Method: During two years period we enrolled patients who required upper limb surgery, over 18 years old. After monitoring and sedation, the patients received, depending on anesthesiologist preference, ultrasound-guided (US) or neurostimulation (NS) interscalene, axillary or combination of two blocks according to site surgery. We recorded data on block success rate, local anesthetic (LA) volume, immediate and late complications, patient's satisfaction. The results were statistically analyzed, with significance assumed at $p < 0.05$.

Results: We enrolled 63 patients in NS group and 62 in US group, with similar demographic, surgical characteristics and block success rate. We used significant less LA in US group vs. NS group (20.89 ± 3.9 ml vs. 43 ± 5.1 ml). We recorded less paresthesia during block performance and vascular puncture due to US guidance ($p < 0.05$). In the NS group we recorded 2 LA systemic toxicity (minor-moderate neurologic symptoms) with complete recovery and none in US group. Late complications (transient paresthesia and local hematoma) are more frequent in NS group, but resolved in one week.

Conclusion: This results suggest that both techniques of brachial plexus block are adequate for upper limb surgery, but US guidance provides significant benefits for patients in terms of safety, decreasing the risk of nerve injury or potential systemic toxicity due to lower risk of vascular puncture and using less volume of LA.

ESRAS-0214

Peripheral Nerve Blocks

THREADING THE EYE OF THE (TUOHY) NEEDLE: A NOVEL TECHNIQUE FOR THE TRAINING OF PRECISION ULTRASOUND-GUIDED REGIONAL ANAESTHESIA SKILLS

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Aims: The use of phantoms in ultrasound guided regional anaesthesia (UGRA) training is well established. Despite the wide range of phantom designs, few offer feedback of exact block needle tip position and those that do are complicated in their design. The authors report a novel technique aiming to provide a simple, reproducible model for the training of precision ultrasound probe handling and needling skills.

Method: The model consists of a standard 18G Tuohy needle inserted "bevel-up" into a meat-based ultrasound phantom. The objective is to gain a full ultrasound view of the Tuohy needle shaft and tip and insert a block needle in-plane such that the block needle tip lies inside the tip of the Tuohy. Confirmation of correct tip placement can be made by injecting fluid down the block needle which then passes out of the Tuohy needle hub.

Results: The model has been used with success in UGRA teaching courses in Perth, Australia and Leeds, UK. When used to teach junior anaesthetic trainees, the model allowed precision skills development in ultrasound probe handling and needling, resulting in improved confidence in UGRA amongst candidates.

Conclusion: The Tuohy needle phantom offers a cheap and easily reproducible model for training precision UGRA skills. To our knowledge, no other technique allows feedback of successful needle placement with such a simple

design. The technique may also provide a safe and objective means of examining competence in UGRA skills in the non-clinical setting. This would have a number of potential applications in UGRA education and research.

ESRAS-0091

Peripheral Nerve Blocks

UNWELCOME EPIDURAL SPREAD FOLLOWING COMBINATION OF LUMBAR PLEXUS AND SCIATIC NERVE BLOCKS FOR FEMOROPLOPLITEAL BYPASS SURGERY IN AN ELDERLY, HIGH-RISK PATIENT

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Aims: Combination of lumbar plexus and sciatic nerve blocks (LP-SNB) may be a better choice than general anesthesia or central neuroaxial block in high risk patients. The main advantage of LP-SNB is a unilateral blockade avoiding the adverse effects of neuro-axial approaches. However, this advantage becomes unpredictable due to possible occurrence of bilateral epidural spread with an incidence of 27%. In this case, we report an epidural spread and bilateral blockade following LP-SNB in an elderly, high-risk patient presenting for femoropopliteal bypass surgery.

Method: A 73-year-old man admitted with ischemia due to superficial femoral artery occlusion was scheduled for femoropopliteal bypass of the right leg. His medical history revealed severe chronic obstructive lung disease, severe heart failure with mitral valve dysfunction, hypertension, and nephropathy.

Results: We administered 30 ml of 0.25% bupivacaine for LP followed by 20 ml of 0.25% bupivacaine for SNB by peripheral nerve stimulator. We checked the blockade with pin-prick test in every five minutes. Bilateral blockade started at 15th minutes. Motor blockade of both legs along with sensory block at T10 was established at 20th minute. The patient was secured in semi-Fowler's position to prevent a higher level of block and promote ventilation without haemodynamic alterations while allowing the surgery to start. Surgery continued for 150 minutes and perioperative period was uneventful without hemodynamic or respiratory complications.

Conclusion: One should consider a possible and unintentional neuroaxial spread after high volume peripheral blockades which may have been cogitated as a safer option in high risk patients.

ESRAS-0096

Peripheral Nerve Blocks

COMBINATION OF FEMORAL AND SCIATIC NERVE BLOCKS FOR SURGICAL DEBRIDEMENT OF DIABETIC FOOT ULCER IN A HIGH-RISK PATIENT

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Aims: Surgical debridement of diabetic foot ulcer is often performed under general anesthesia or central neuroaxial blocks. Peripheral regional blocks alone or in combinations may be a better choice than these techniques especially in high risk patients. In this case, we report the combination of femoral and sciatic nerve blocks for anaesthesia and postoperative analgesia in a high-risk patient who presented for large surgical debridement of diabetic foot ulcer.

Method: A 61-years-old man was admitted with infected foot ulceration due to diabetes mellitus. His medical history included severe coroner artery disease, non-compensated heart failure with severe pulmonary hypertension, bilateral pulmonary infiltrates, hypertension, diabetes mellitus, chronic renal failure requiring heparinized hemodialysis 3-times a week. He was on anticoagulants and antiplatelets and he was scheduled for surgical debridement of diabetic foot ulcer of the left foot.

Results: We decided to perform a combination of sciatic and femoral nerve block considering an appropriate timing for anticoagulant and antiplatelet therapy. We administered 30ml of 0.25% bupivacaine for sciatic nerve block followed by 20ml 0.25% femoral nerve block by peripheral nerve stimulator. The patient received 2-4L/min oxygen via nasal cannula. Perioperative period was adequately pain-free and uneventful.

Conclusion: We suggest that combination of sciatic and femoral nerve block with 0.25% bupivacain provides sufficient and reliable anesthesia and adequate analgesia in high-risk patients on anticoagulant and antiplatelet therapy with concomitant severe diseases undergoing large surgical debridement of diabetic foot ulcer.

ESRAS-0178

Peripheral Nerve Blocks

COMPLETING THE STOP BEFORE YOU BLOCK PRIOR TO PERFORMING PERIPHERAL NERVE BLOCKS IN A TERTIARY HOSPITAL

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Aims: We aimed to audit the adherence of our department in completing the Stop Before You Block checks (Figure 1) prior to performing a peripheral nerve block.

Method: Data were prospectively collected using a pro forma. This was completed by Operating Department Practitioners during all elective orthopaedic and trauma lists. Data collected included: Proposed surgery, type of regional block, grade of anaesthetist performing block, if the following were carried out: Visualising the surgical arrow indicating site of surgery, asking the patient to confirm the side of surgery (conscious patient) and checking the consent form for operative side (unconscious patient) and any adverse events that occurred. Audit compliance was monitored by comparing numbers collected against theatres' computer records.

Results: The audit was terminated early as there were 2 incidences of wrong-sided blocks around the time of data collection (one just before data collection commenced and one during). Over 26 days, 45 peripheral nerve blocks were performed, majority being femoral nerve blocks (22). 41 patients were involved (34 conscious, 7 unconscious). 29 were elective cases and 12 were trauma. A wrong-sided block was performed on one patient when the Stop Before You Block was omitted and the Stop Before You Block was not performed on another patient with vascular dementia.

Recommended Stop Before You Block checks	Compliance
Visualising the surgical arrow	98% (40, N=41)
Asking the conscious patient to confirm the side of surgery	91% (31, N=34)
Checking the consent form for operative side (unconscious patient)	43% (3, N=7)

FIGURE 1. Recommended checks

Conclusion: Although a small sample size, it still showed that omitting appropriate checks can result in wrong-sided blocks. Continual education, training and team communication are vital in promoting patient safety. We also recommend the use and innovation of visual reminders to prevent inadvertent wrong-sided peripheral nerve blocks.

ESRAS-0453

Peripheral Nerve Blocks

ANATOMICAL INVESTIGATION OF THE STRUCTURES SURROUNDING THE FOURTH LUMBAR VERTEBRA USING COMPUTED TOMOGRAPHY

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Aims: In the case of ultrasound-guided lumbar plexus and quadratus lumborum blocks, the muscle tissue surrounding the nerve is often used as a marker of the nerves. We examined anatomical distances of the structures surrounding the fourth lumbar vertebrae and its relationships with these surrounding structures on computed tomography (CT) images.

Method: Subjects comprised 102 patients who underwent surgery along with preoperative CT imaging. We measured distances between the skin and the epidural space, anterior surface of the transverse process, anterior surface of the

vertebral body, quadratus lumborum, and sectional areas of the musculus erector spinae, quadratus lumborum, and psoas major muscles.

Results: Results are shown as mean and ranges (maximum and minimum values) according to sex (male/female). The distance between skin and epidural space was (45, 61-31 / 43, 67-23) mm, anterior surface of the transverse process was (56, 75-39 / 52, 76-23) mm, anterior surface of the vertebral body was (101, 120-86 / 95, 118-78) mm, quadratus lumborum was (45, 73-20 / 43, 78-7) mm. The sectional area of the musculus erector spinae was (2016, 2830-745 / 1544, 2816-360) mm², quadratus lumborum was (546, 1144-143 / 334, 884-121) mm², psoas major muscles was (1038, 1800-528 / 578, 1022-276) mm². Multiple regression analysis revealed that in males, age and weight were factors influencing sectional area for all muscles. However, for females, age only affected sectional area of the quadratus lumborum.

Conclusion: When performing ultrasound-guided deep nerve blocks, it is beneficial to confirm the positional relationship of the nerve with the target muscle in advance using CT.

ESRAS-0407

Peripheral Nerve Blocks

COMPARISON OF COMBINED ILIOINGUINAL / ILIOFEMORAL NERVE BLOCK ASSOCIATED WITH LOCAL ANAESTHESIA INFILTRATION AND SPINAL ANAESTHESIA FOR INGUINAL HERNIA REPAIR IN THE ELDERLY PATIENTS

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Aims: Inguinal hernia (IH) is one of the most common surgical procedures, but there is no common consensus regarding the best choice of anesthesia. The Ilioinguinal and iliofemorale nerve block (IIB) and local infiltration anaesthesia (LA) have better cost-benefit than general anesthesia and spinal anesthesia (SA), but fear of intra-operative pain may hinder its widespread use. The aim of our study was to compare IIB and LA versus SA for IH repair in the elderly patients regarding to intraoperative pain, duration of time in operating room, postoperative pain, complications and patients satisfaction.

Method: 36 patients (aged 62–84 yr), scheduled for unilateral IH repair were included in this prospective study. They were divided into two groups: an ilioinguinal-iliofemorale nerve block and surgical wound infiltration (Group IIB n=18) and spinal anesthesia (Group SA n=18). Intraoperative pain, duration of time in operating room, need of analgesics and complications in the intra-postoperative period and patients satisfaction were assessed.

Results: Moderate intraoperative pain was the same in both groups. Patients in group IIB had significantly better hemodynamic stability, shorter time spent in operating room ($p \leq 0.001$), lower analgesic requirements ($p < 0.002$), lower complications ($p < 0.001$) and higher satisfaction in the postoperative period than in group SA ($p = 0.013$).

Conclusion: We found that IHB associated with local anaesthesia infiltration is better alternative than SA in patients undergoing IH repair and may be preferred to other methods, specially in elderly patients.

ESRAS-0309

Obstetric

COMBINED SPINAL-EPIDURAL ANAESTHESIA FOR ELECTIVE CAESAREAN SECTION IN A PATIENT WITH TURNER SYNDROME

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Aims: Turner syndrome (TS) is the most common chromosomal abnormality in women with a prevalence of 1 in 2500 live births. Features pertinent to the anaesthetist include a potentially difficult airway, spinal deformities and cardiac anomalies. Although most patients are infertile assisted fertility techniques are being increasingly used. Unfortunately cardiovascular strain during pregnancy carries a risk of aortic dissection with a quoted mortality of 2%¹.

Method: A TS patient at our centre recently underwent caesarean section for breech presentation. A cardiologist was closely involved and echocardiograms

undertaken. A combined spinal epidural technique was used. The spinal mixture contained 2.2ml of heavy bupivacaine, 20 micrograms of fentanyl and 100 micrograms of morphine.

Results: The epidural component was not required as a block height of T5 to touch was achieved bilaterally with a right sided block of T2 to cold and left sided T4 block to cold. The patient was haemodynamically stable and made an excellent recovery from surgery.

Conclusion: Obstetric anaesthesia for patients with TS is discussed infrequently in the literature. However there is significant risk of cardiovascular complications. We feel such patients should receive pre-pregnancy risk counselling and be managed in tertiary centres by interested obstetricians cardiologists and anaesthetists. Adequate imaging (echo +/- cardiac MRI) should be undertaken for risk stratification and antenatal monitoring. With the increase in fertility - assisted pregnancies we advocate national audit and guidelines to aid in the management of such patients, as occurs in France.²

Note: Written consent was obtained from the patient to present her case.

ESRAS-0486 Obstetric

USE OF PROTHROMBIN COMPLEX CONCENTRATE FOR RAPID REVERSAL OF WARFARIN TO PERFORM AN EPIDURAL BLOOD PATCH IN A PATIENT WITH INTRACRANIAL HYPOTENSION AND SUBDURAL HEMATOMA

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Introduction: Prothrombin complex concentrate (PCC) has recently being used successfully to reverse the effect of warfarin in spontaneous intracranial hemorrhage and in anticoagulated trauma patients. We are reporting a case where PCC was used emergently to reverse warfarin-induced anticoagulation for placement of an epidural blood patch in a patient with impending herniation of the brain.

Case Discussion: A patient developed postdural puncture headache (PDPH) like symptoms a day after placement of a labor epidural. over the next two weeks, she developed paraesthesia on upper extremities with a left facial droop. CT showed cortical vein thrombosis and warfarin was started. After ten days, the patient developed severe headache; MRI showed bilateral subdural hematoma with extension of cerebellar tonsils below foramen magnum; these findings were consistent with intracranial hypotension. An urgent epidural blood patch was planned, and patient received several units of FFP to counteract the effect of warfarin; however, INR still remained elevated. Patient was then given PCC IV, and within a couple of hours, the INR came down to 1.07. An epidural blood patch was then performed with 20 ml of autologous blood via L4-L5 intervertebral space. Headache improved immediately, and the subdural hematoma gradually improved. Patient was discharged home in a few days.

Results: N/A

Conclusion: We believe this is the first reported case where PCC, vitamin K dependent factor concentrate, has been successfully used to reverse the effect of warfarin for placement of an epidural blood patch, a procedure that was necessary to avoid potentially fatal intracranial hypotension and cerebellar herniation.

ESRAS-0273 Obstetric

SPINAL INTRODUCER NEEDLES CAUSING A HEADACHE?

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Background: Central neuraxial blockade may be associated with complications such as post-dural puncture headache (PDPH). The RCOA Audit compendium suggests spinal anaesthesia should be followed by severe PDPH in <1% of cases. We completed a 4 year audit cycle into PDPH on our labour ward.

Method: Data from all obstetric spinal anaesthetics undertaken in 2010+2011 were collected and analysed. R&D approval was not required, as this project was deemed service evaluation. An increased incidence of PDPH with spinal needles with longer introducer needles (40mm) compared with shorter introducers (30mm) was noted (Table 1). The 40mm introducer needles were withdrawn over 2012 and are now only available on request. Data were then collected for 2012-13. A chi-squared test compared changes in PDPH rates between the two periods of study (Table 2).

Results: Data were evaluated from 2937 parturients receiving spinal anaesthesia from 2010-2013.

Data are presented as count(%). Denominator = total number of women having spinal anaesthesia.

TABLE 1.

	30mm Introducer	40mm introducer	P value
Total Spinals	2151	694	
PDPH	25(1.2%)	16(2.3%)	0.028

TABLE 2.

	2010-2011	2012-2013	P value
Total Spinals	1484	1453	
PDPH	25(1.7%)	16(1.1%)	0.18

Conclusion: On analysing all data from 2010-2013 we found a statistically significant difference in the rate of PDPH between the two types of needle. Removing this needle was associated with a reduction in the incidence of PDPH; this did not reach statistical significance. We suggest:

- Accidental dural puncture by the introducer needle of spinal needles may increase risk of PDPH.
- We should consider using shorter introducer needles first, with longer introducer needles used at the clinician's discretion.

ESRAS-0180 Obstetric

HYPOTHERMIA FOLLOWING INTRATHECAL MORPHINE INJECTION DURING CESAREAN SECTION

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Aims: Hypothermia is defined as a core temperature below 35°C. The most commonly used definitions found in the literature are as follows: Mild hypothermia – Core temperature 32-35°C, Moderate hypothermia – 28-32°C, Severe hypothermia – below 28°C. While mild to moderate perioperative hypothermia is a fairly common phenomenon, it has plenty of possible causes, and distinguishing between them is of utmost importance when treating a hypothermic patient. We present here a unique case (with informed consent of our patient) of hypothermia following cesarean section, and discuss the relevant differential diagnosis; in hope this discussion may help physicians when diagnosing similar cases.

Method: Case report: A 32 year old female, first IVF pregnancy with twins, underwent cesarean section under spinal administration of bupivacaine and morphine. About four hours after operation's end, body temperature was measured at 35.4°C per rectum, which later reached a nadir of 32.8°C, restoring to normal range only after four hours. During the incident, the patient was hemodynamically stable, with vital signs at the normal range.

Results: This case presents differential diagnoses, the most relevant of which are infection, hypovolemia, endocrinopathy, environmental conditions, iatrogenic causes and the administration of anesthetics. We discuss supporting and contradicting evidence for each relevant diagnosis, reaching a concluding diagnosis of intrathecal-morphine induced hypothermia.

Conclusion: Intrathecal doses of morphine are associated with pruritus, urinary retention, nausea, and respiratory depression. Our case joins other reports

to add hypothermia as an important side-effect of intrathecal morphine. This case highlights the importance of temperature follow-up after spinal injection of morphine.

ESRAS-0484 Obstetric

COARCTATION OF THE AORTA AND CAESAREAN DELIVERY: A REVIEW OF THE LITERATURE

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Aims: Aortic coarctation (AC) is a congenital heart defect in which a section of the aorta is narrowed in the area where the ductus arteriosus inserts. It may occur as an isolated defect or in association with other lesions and accounts for 5-8% of all congenital heart defects. As the treatment of AC has developed, it is currently the most common congenital heart defect encountered in pregnant women. The aim of the present study is to investigate what is the percentage of neuraxial anesthesia performed in women presenting for caesarean delivery as well as the outcome.

Method: A PubMed literature search was conducted using the terms coarctation, pregnancy, anaesthesia, caesarean section.

Results: Ten cases of women with AC who underwent caesarean section were found in the literature. Details are missing in one patient. Among the other cases 9 in 10 had elective caesarean delivery. Regarding the severity of their disease, in 5 out of 10 AC was uncorrected and all women were symptomatic (hypertensive). Regarding anaesthesia, 6/10 had regional anaesthesia, among which 2/10 combined spinal-epidural, 2/10 epidural and 2/10 spinal. One out of 2 who had epidural anaesthesia developed hypotension and was converted to general anaesthesia (GA). Three patients had planned GA. The most common complication of regional anaesthesia was hypotension. The main reason for GA was the risk of hemodynamic instability. No adverse outcome for the baby was reported.

Conclusion: Regional anaesthesia was well-tolerated in parturients with AC except from episodes of hypotension treated with vasopressors or conversion to GA in one case.

ESRAS-0083 Obstetric

THE EFFECTS OF ADDITION FENTANYL OR MORPHINE TO BUPIVACAINE IN SPINAL ANESTHESIA FOR ELECTIVE CESAREAN

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Aims: We intended to compare effects of morphine or phentanyl which are added to intrathecally administered bupivacaine for spinal anesthesia.

Method: After ethics committee approved medical and anesthesia records of patients were evaluated who underwent cesarean with spinal anesthesia. 90 ASA I-II patients going to elective cesarian operation were included. There was not local anesthetic sensitivity or spinal anesthesia contraindication in any patient. Group M (n:30) was 10 mg bupivacaine and 1 mg morphine, group B (n:30) was 12 mg bupivacaine and group F was 10 mg bupivacaine and 20 µg fentanyl. Hemodynamic, motor and sensorial block developing and regression times, first analgesic need time, newborn APGAR score and umbilical cord blood gas sample results were recorded.

Results: There was no statistically significant difference in demographic, hemodynamic findings and side effects in any group. Maximum sensorial block time was 6,6 minute in group B. Operation starting time was 8,76 minute in group F and it was statistically significant. In group F two segment regression time was high 101,3 minute and statistically different from other groups. Motor block regression time was lower than other groups in group B. First analgesic administration time was 1336 minute in group M. APGAR 1st and 5th minute scores were lower in group M but they were not statistically significant. Optimal anesthesia and analgesia were provided in all groups. But longer anesthesia and analgesia time was seen in morphine added bupivacaine group (Figure 1).

Conclusion: According to these results additional morphine to bupivacaine for cesarian operation is more effective than other strategies.

Table 1: Demographic data

	Group M (n = 30)	Group B (n = 30)	Group F (n = 30)	p
Age	29.60 ± 5.3	29.70 ± 5.4	30.00 ± 1.0	0.959
Height (cm)	164.37 ± 5.9	164.57 ± 19.3	162.80 ± 5.1	0.824
Weight (kg)	75.0 ± 11.7	77.03 ± 9.2	74.17 ± 8.6	0.52
Duration of surgery (min)	45.00 ± 9.7	41.50 ± 10.4	44.33 ± 9.7	0,357

p <0.05: significant

Table 2: Block characteristics

	Group M	Group B	Group F	P
T6 SBT	3.56 ± 1.6 *	6.20 ± 8.4	6.66 ± 1.8	0,043
Max.SBT	7.63 ± 3.1	6.60 ± 2.0	7.80 ± 1.9	0.124
OST	6.50 ± 2.1	7.43 ± 4.4	8.76 ± 2.2 ♦	0,024
MBOT1	2.30 ± 1.1	2.23 ± 0.9	2.90 ± 1.1 ♦	0,039
2 SRT	82.06 ± 19.9 *	107.83 ± 26.0	101.33 ± 29.7	0,001
T10 RT	111.10 ± 25.5 *	131.16 ± 23.7	134.33 ± 31.6	0,001
MBET2	233.73 ± 47.5	184.00 ± 26.7 ♦	244.00 ± 59.7	0,011
FAT	1336 ± 270.0 *	178.06 ± 32.9	235.33 ± 68.1	0,001

* Group M compared with group B and group F, p <0.05: significant

♦ Group B comparison with group M and group F

♦ Group F compared with Group B and Group M

T6SBT: T6 sensory block time, MSBT: The maximum sensory block time, OST: Operation start time, MBOT1: Motor block onset time, 2SRT: Two segment regression time, T10 RT: T10 Regression time, MBET2: Motor block end time, FAT: First analgesic time

Table 3: Umbilical cord blood gas analysis

	Group M	Group B	Group F	P
PH	7.297 ± 0.01	7.295 ± 0.02	7.255 ± 0.10	0,022
PCO ₂	42.30 ± 2.8	41.75 ± 1.1	47.06 ± 8.0	0,001
PO ₂	26.23 ± 1.9	26.51 ± 1.9	28.55 ± 8.0	0,142
HCO ₃	19.29 ± 1.1	19.40 ± 0.8	19.59 ± 2.3	0.758
BA	3.83 ± 1.6	6.53 ± 1.0	3.73 ± 2.54	0,001

p <0.05: significant

Table 4 Newborn Apgar score

	Group M	Group B	Group F	P
1 min	7.33 ± 0.4	7.57 ± 0.6	7.67 ± 0.7	0.131
5 min	9.23 ± 0.4	9.37 ± 0.4	9.27 ± 0.6	0.621

p <0.05: significant

FIGURE 1.

ESRAS-0335 Obstetric

SUCCESSFUL COMBINED SPINAL - EPIDURAL ANESTHESIA IN A MORBID OBESE PARTURIENT WITH THROMBOPHILIA AND THOMSEN'S DISEASE

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Aims: Thomsen's disease is the dominant type of myotonia congenita. Patients are at high risk for developing severe myotonic spasms and malignant hyperthermia during general anesthesia. A 'non-triggering' anesthetic plan includes the avoidance of certain anesthetic drugs, cold, shivering and pain. We describe a 38 years old, morbid obese (BMI: 50.9) parturient with Thomsen's disease

scheduled at 35 weeks' gestation for cesarean section under combined spinal and epidural anesthesia.

Method: The medical history of the parturient included hypothyroidism and thrombophilia. Physical examination and laboratory findings the day before delivery were unremarkable. We decided to proceed to regional anesthesia with a contingency plan in the risk of conversion to general anesthesia. Standard monitoring included invasive blood pressure, and brain oxygen saturation measurements. A Pencil Point spinal needle was inserted through a Tuohy epidural needle in the L3-L4 space. We administered 15 mg Ropivacaine and 10 µg Fentanyl. The epidural catheter was used for post-operative analgesia.

Results: The patient did not experience myotonic crisis and underwent the delivery uncomplicated. Intra- and postoperative analgesia was satisfactory. At 30 minutes a female neonate, with Apgar score of 10 at first and fifth minutes, was born.

Conclusion: Successful anesthetic management with combined spinal-epidural anesthesia of a high-risk cesarean delivery in a pregnant woman with Thomsen's disease.

ESRAS-0217

Obstetric

HORNER SYNDROME AND TRIGEMINAL PALSYP AFTER LUMBAR EPIDURAL ANALGESIA

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Aims: Epidural catheterization is a long standing technique for labour analgesia. It's complications can be inoffensive to life-threatening. Among them, subdural migration of the epidural catheter is a rare and poorly understood phenomenon.

Method: We report the case of a 32 year-old ASA I parturient presenting for labour analgesia. An epidural catheter was inserted at the L3-4 interspace using a midline approach with a 18-gauge Tuohy needle, using loss of resistance technique with saline. The catheter was inserted 4 cm into the epidural space without mishappenings. A total of 10 mL solution of Levobupivacaine 0.25% (8 mL) and Sufentanyl 0.01 mg (2 mL) was administered, preceded by a test dose of 3 mL.

Results: Ten hours later, at the fourth administration of a 10 mL solution of Levobupivacaine 0.25%, the patient presented with persisting left-sided ventral pain; Horner syndrome, trigeminal palsy, paresthesia over the right of the body and mild weakness on the upper right limb. No hemodynamic or respiratory repercussions have been registered. Subdural migration of the catheter was assumed. It was removed and intravenous analgesia was started.

Conclusion: Complete remission issued at 6 hours of symptom presentation. The patient was discharged home, asymptomatic, two days later.

ESRAS-0209

Obstetric

WE DESCRIBE THE SUDDEN ONSET OF MOTOR BLOCK FOLLOWING SPINAL ANAESTHESIA FOR CAESAREAN SECTION AT TERM IN A PRIMIP WITH ADVANCED MULTIPLE SCLEROSIS

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Aims: Case report

Method: Examination prior to anaesthesia revealed brisk reflexes and bilateral leg weakness with altered sensation. She underwent a spinal with 2.6mL of 0.5% heavy bupivacaine (13mg), 20 mcg fentanyl and 100 mcg morphine.

Results: The patient immediately commented that her legs were 'completely dead.' At 45 seconds she had a dense motor block and block to cold and touch to T6. This remained unchanged until the initiation of head down positioning with blockade ascending to T4 at 8 minutes. Recovery to pre-anaesthetic baseline proceeded normally.

Conclusion: We found no published reports concerning speed of onset of sub-arachnoid block in parturients with MS. Time to motor block after spinal is reported as six minutes with hyperbaric bupivacaine, in health. Opiates appear not to affect speed of onset. MS results in chronic active inflammation and demyelination. In health, sodium channels are concentrated at the nodes of Ranvier with a lower density throughout internodal areas. Animal demyelinated axons demonstrate increased numbers of sodium channels throughout previously internodal axon. We hypothesise that the rapid onset of motor block after spinal in our patient may be explained by the loss of myelin sheath. We postulate that the slow ascent of block height may be explained by increased binding of bupivacaine to a greater absolute numbers of sodium channels in demyelinated nerves. Despite a possibly altered pattern of onset, block adequacy, duration and resolution appear to be unchanged. Consensus opinion and published evidence indicate that regional anaesthesia in patients with MS is safe.

ESRAS-0462

Obstetric

USE OF NEFOPAM FOR THE RELIEF OF SHIVERING IN OBSTETRICS

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Aims: Shivering in obstetrics - a frequent condition in a peripartum period. We investigated the use of nefopam for relief of fever and shivering during and after childbirth.

Method: Application for relief nefopam shivering was studied in 50 obstetric patients: first - for the relief of shivering after anesthesia for caesarean section, and then - for the relief of shivering during and after natural childbirth, now - for the relief of shivering, muscle tremors any origin during and after natural or operative delivery. Nefopam administered as an intravenous infusion lasting 20-30 minutes in the supine position. Recommended dose per administration was 20 mg. If necessary, the introduction repeated every 4 hours, not to exceed the maximum daily dose of 120 mg.

Results: Nefopam managed to remove not only the postoperative shivering. It has successfully eliminated the muscle tremor in spinal anesthesia for caesarean section. In addition, it is well suppressed all other options chills and muscle tremors in childbirth, including - related probable amniotic embolism. Symptoms of overdose and side effects in our practice is not occurred.

Conclusion: Nefopam in a single dose of 20 mg - a great tool for the relief of shivering and muscle tremors of any origin in obstetric anesthesiology.

ESRAS-0175

Obstetric

LEVOBUPIVACAINE IN EPIDURAL ANALGESIA IN LABOR: EPIDURAL ANESTHESIA IN EMERGENCY CESAREANS

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Aims: Epidural analgesic with levobupivacaine has been used routinely in our hospital, having had a great acceptance by anaesthetists.

Method: We have analysed 18 pregnant women in a week that required emergency cesareans due to cephalopelvic disproportion, risk of fetal distress or failed induction. Epidural Anesthesia is placed with an initial bolus of levobupivacaine 0.25% 10 mL in divisions every 5 minutes, and placed at 15 minutes later PCA controlled by a continuous infusion of levobupivacaine 0.125 % and fentanyl 1 mcg/mL to about 14-18 mL/h according to the height of the patient. A bolus anesthetic consisting with 10 mL of 0.75 % levobupivacaine+ 10 mL 2% Lidocaine were given to all patients that underwent cesarean sections, and they were injected with about 14 mL of the solution. We have studied hemodynamic effects, side effects and have evaluated the level of anaesthetic.

Results: Results are shown in Table 1.

Hemodynamic Effects were resolved without incident with 0.01mg/kg of atropine in 500mL of Ringer's Lactate solution.

TABLE 1.

Total	General anesthesia	Bradycardia <50 and/ or Hypotension SBP < 90	Sde. Claude-Bernard- Horner	No incidents
18	1	2	1	14

Conclusion: The combination of levobupivacaine/Lidocaine shows great effectiveness in the transition of epidural analgesia to epidural anesthesia in those pregnant women undergoing cesareans after receiving an infusion of levobupivacaine. Adverse hemodynamic effects are mild and resolve themselves without incident. In no case was the motor block higher than level T4. Regarding the case involving the Claude Bernard Horner syndrome, it resolved spontaneously. We recommend the results of this study be more widely implemented.

ESRAS-0176 Obstetric

BREASTFEEDING AND EPIDURAL ANESTHESIA: A DESCRIPTIVE STUDY

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Aims: In Spain the percentage of mothers that breastfeed is above 80% according to paediatric journals.

The latest social trends that look for a more humanised birth have tried to make a connection between receiving an epidural anaesthetic with greater abandonment of breastfeeding, due to a decrease in the release of stress hormones and increased hydration.

It's the objective in this study.

Method: We have analysed 187 epidural anesthetics in a quarter year and its correlation with breastfeeding.

We have made a descriptive study and have not differentiated between primigravida or multiple births.

In all cases, patients were hydrated with 1500 mL of Lactated Ringer's solution and then 500 mL hourly.

We have analysed the different local anesthetics: Ropivacaine 0.2% with Fentanyl 1 mcgr/ml and Bupivacaine 0.125% with fentanyl 1 mcgr/ml and types of deliveries (ectopic, instrumental birth and cesarean) and their average hospital stay.

Deliveries using general anesthesia, sedation or blood transfusions were excluded.

Results: There were no significant statistical differences between the different types of deliveries and breastfeeding.

The average hospital stay does not favor nor prejudice the onset of lactation.

There is also no correlation between the chosen anesthetic and lactation.

Conclusion: The total percentage of breastfeeders was 84.6%, which implies minimal change compared with statistical data of paediatric groups that are experts in lactation.

The effect of local anesthetics via epidural with fentanyl and are not notable as it's commonly thought in society.

Primigravida and multiple pregnancies have not played an important role in the study results.

ESRAS-0243 Obstetric

ANESTHETIC MANAGEMENT OF PROGRAMME CESAREAN IN A CHARCOT - MARIE -TOOTH PATIENT

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Aims: Charcot-Marie-Tooth (CMT) is a peripheral sensory - motor hereditary neuropathy with high prevalence: 2.8 / 10,000 in Spain.

It is characterized by demyelination and loss axonal of peripheral nerves, causing weakness and distal muscle atrophy, with major deformities, abnormal sensitivity and deep tendon reflexes absent.

Method: Patient was primiparous 29 years, programme cesarean section, 66 kg weight and 150 cm height, with CMT, nephrotic syndrome and multiple amputated fingers of both hands in lower right member.

We performed a subarachnoid anesthesia in L3-L4 level with pencil-point needle 25G, 9 mg of 0.5 % hyperbaric bupivacaine and 10 microgrames fentanyl.

A sensory level T4 is reached and surgery was without complications.

Results: After 66 minutes of surgery, the patient was moved to recovery room where she remained 4 hours. The motor block was disappeared in 180 minutes. She was discharged on the fourth postoperative day without progression of disease.

Conclusion: CMT increased risk of emergency interventions, dystocia and postpartum hemorrhage in pregnancy patient.

The use of regional techniques is an alternative raises the risk of aggravating the existing neuromuscular disorder by the direct effect of local anesthetic.

Although the CMT only affects the peripheral nerves, we do not consider the possible exacerbation after spinal anesthesia.

The risk in addition to general anesthesia (hyperkalemia and malignant hyperthermia) in an CMT pregnant is very important, so that subarachnoid anesthesia was considered as a good choice despite the relative contraindication for regional anesthesia in this type of neurological disease.

ESRAS-0483 Obstetric

OBSERVATIONAL STUDY OF NONINVASIVE CARDIAC OUTPUT MONITORING USING PULSE WAVE TRANSIT TIME IN CONSCIOUS PATIENTS UNDER REGIONAL ANAESTHESIA

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Aims: Estimated continuous cardiac output [esCCO by Nihon Kohden] provides noninvasive cardiac output estimation using new technique pulse wave transit time (PWTT) obtained from plethysmographic wave and ECG. So far, no research has been conducted using PWTT to monitor cardiac output in awake patients for obstetric or orthopaedic operations. We conducted study using PWTT to monitor cardiac output in women undergoing elective caesarean under spinal anaesthesia.

Method: We included 45 women undergoing elective caesarean at Hull Royal Infirmary, UK. Ethics committee, local R&D approval was obtained. Patients were consented as per EU directive guidelines. Women with BMI ≥ 40, hypertension, PIH, diabetes, placenta accreta, ≤37 weeks and who required translator were excluded. Standard Philips and Nihon-Kohden monitor cuffs were attached to different arms. If BP decreased by 25% from baseline, intermittent boluses of Phenylephrine (80µg) was administered. Both monitors measured NIBP every minute before and every 2.5 minutes after delivery. Heart rate and SpO2 were measured continuously. esCCO monitor also measured CO and SV.

Results: Phenylephrine was not needed in 14 women. Calibration took 6.82 ±5.75 minutes for CO and SV estimation. Paired differences in CO, SV before and after interference did not show statistical difference. 26 patients had 1 interference and 12 had ≥2 interferences. There was no statistical difference in MAP readings between both monitors.

Conclusion: This monitor may help for noninvasive CO and SV monitoring in awake ASA 1-2 patients. Further comparative studies are required for its use in high risk surgical patients because of disturbances due to artefacts or patients' movements.

ESRAS-0473

Obstetric

ANAESTHESIA SCHEDULING FOR EMERGENCY CAESAREAN SECTIONS-AN OBSERVATIONAL PROSPECTIVE AUDIT STUDY

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Aims: The aim of this audit was to analyse scheduling of emergency LSCS based on RCOG guidelines and Communication between Anaesthetists, Obstetricians and Midwives.

Method: It was an observational prospective audit study of 60 patients over eight weeks. The data studied included, Parity, LUCA's categorization, staff contacting anaesthesia NCHD, Decision to Delivery interval (DDI), duration of surgery, indication for LSCS, Mode of anaesthesia (Spinal, Epidural and GA), Reasons for delayed surgery and complications.

Results: 38 (63.33%) were Primipara and 22 (36.66%) were Multipara. 26 (43.33%) occurred during day time and 34 (56.66%) out of hours.

Midwives accounted for majority ie 42(70%), 14 (23.3%) Obstetric registrars, 3(5%) by Consultant. Lucas classification was applied only in 15(25%) patients against 45(75%) patients having no categorisation. The most common indication for Emergency LSCS was Failure to advance (17), followed by 7 each of non Re-assuring CTG, Fetal distress, Breech in labor, Previous LSCS. Others are pyrexia, low cord Ph, PET, PPH etc.

The most common anaesthesia was Spinal 29(48.33%), Epidural 21(35%) and GA 10(16.66%).

The Median duration of surgery was 37.5 mins.

The Median DDI was 35mins.

The Median time of GA to Baby delivery was 2.5 mins

Conclusion: Midwives accounted for majority to contact anaesthetist for Emergency LSCS. LUCA's classification was poorly followed. Institutional compliance of DDI was 35min against the RCOG guidelines (30) for urgent LSCS. For category 1 LSCS, DDI(12.5 min) was fully compliant against 30 mins standard.

Recommendations from study:

- To adhere to Lucas categorisation
- Effective, close communication between Obstetric and Anaesthetists
- Conduct LSCS drills
- Re audit with above changes.

ESRAS-0210

Obstetric

IMPACT OF SEDATION DOSE OF MIDASOLAM ON OXYGEN SATURATION DURING CAESAREAN SECTION UNDER SPINAL ANAESTHESIA

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Aims: Midazolam is known for its dose-dependent respiratory depression which occurs due to depressed ventilatory response to CO₂. In clinical practice, midazolam is commonly used as a sedation agent during regional anaesthesia. Intravenous sedation dose of midazolam is 0.01-0.1 mg/kg. The aim of this study is to show the impact of intravenous application of midazolam on oxygen saturation among the patients which underwent caesarean section under spinal anaesthesia.

Method: Patients which underwent caesarean section under spinal anaesthesia were included in the study. Half of the patients received intravenous midazolam 0.05 mg/kg after clamping and cutting of the umbilical cord. As a part of standard monitoring, oxygen saturation was measured via the pulse oxymeter during the whole operating procedure and changes in saturation were recorded. Supplemental 100% oxygen therapy by face mask was given to patients who presented with decrease in oxygen saturation.

Results: Average preoperative oxygen saturation value in midazolam group was 99% and 99.45% in non-midazolam group. In midazolam group, 80% of patients presented with decrease in oxygen saturation after intravenous application of midazolam, with average lowest oxygen saturation value of 95%. Average time for oxygen saturation value to fall was 2.25 minutes (2 minutes and

15 seconds). In non-midazolam group, none of the patients presented with decrease in oxygen saturation during the whole operating procedure.

Conclusion: In most patients, midazolam decreases oxygen saturation due to decreased ventilatory CO₂ response but is still considered safe as a sedation drug during regional anaesthesia procedures.

ESRAS-0200

Obstetric

MAINTENANCE OF THE PARTURIENT IN THE LEFT LATERAL POSITION AFTER SPINAL ANESTHESIA WITH PLAIN LEVOBUPIVACAINE FOR CESAREAN SECTION REDUCES HYPOTENSION: A RANDOMIZED STUDY

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Aims: Hypotension during spinal anaesthesia is a main concern in cesarean delivery. We hypothesized that keeping parturients in a prolonged left lateral position before turning them to a supine position with left lateral tilt would reduce the incidence of hypotension without jeopardizing the quality of anaesthesia.

Method: Randomized comparative unblinded prospective study. This randomized comparative prospective study was conducted at Gaziantep University Hospital between June and December 2011. Sixty parturients undergoing cesarean section were included. Patients were randomized to two groups: turning to the supine position with left lateral tilt immediately or 15 min after subarachnoid injection of 2.5 mL 0.5% plain levobupivacaine in the left lateral position. Loss of pinprick sensation to T6 was accepted as adequate for cesarean section, and surgery proceeded. Characteristics of anaesthesia; incidences of hypotension, bradycardia, and other adverse events; and ephedrine use were assessed.

Results: Compared with the supine group, parturients kept in a lateral position for 15 min showed marked reductions in the incidence of hypotension (33.3% vs. 83.3%, $P < 0.001$) and adverse events related to hypotension, such as nausea and vomiting (16.7% vs. 57.3%, $P < 0.001$). In addition, ephedrine consumption per hypotension case was significantly reduced in the lateral group (5.4 ± 4.7 vs. 8.9 ± 5.8 mg; $P < 0.001$).

Conclusion: Keeping parturients in the lateral position for 15 min before turning them to the supine position for cesarean section can provide reliable spinal anaesthesia with a lower incidence and severity of hypotension and nausea/vomiting.

ESRAS-0423

Obstetric

A SURVEY OF THE FASTING POLICY FOR WITH EPIDURAL IN LABOUR

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Aims: A survey on the fasting policies for women with epidural in labour was carried out in our region following an audit of current practice in a District General Hospital.

Method: A quick monkey survey comprising of 8 questions was sent out via email to Obstetric Anaesthetists in the region.

Results: Our results show wide and varied practice within our region for women in labour with epidural. 50 percent had a fasting policy. Only 35% considered the above category women as high risk. Only two responders had their policy reviewed within the last 3 years. 55% didn't have any anaesthetic input into the policy. 25% allowed women to eat and drink as normal. 58% allowed clear fluids, 50% squash and isotonic fluids, 17% light diet and 8.3% for fasting till delivery. On the question on antacid prophylaxis 100% had Ranitidine and 8.3% Sodium Citrate and none with Metoclopramide or Proton Pump Inhibitors.

Conclusion: Our survey shows wide and varied practice in our region. It might be useful to have a consensus guideline to optimise the risk versus benefit of fasting and antacid prophylaxis for women with epidural and in labour. Although we didn't include the stage of labour in our questionnaire, it will be worth considering. Anaesthetists should play a proactive role in developing these guidelines.

ESRAS-0099

Obstetric

ASYMPTOMATIC HELLP SYNDROME:
AN ANAESTHETIC CHALLENGE

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Aims: HELLP syndrome is characterised by haemolysis, elevated liver enzymes and low platelet count and occurs in 10–20% of cases with severe preeclampsia. However the insidious and variable nature of disease presentation and progression challenges the clinician and complicates consensus on management.

Method: A 17-year-old primigravid patient with no significant past medical history and uneventful antenatal period was admitted to the labour ward for induction of labour. She requested an epidural which when being sited, the anaesthetist noticed blood in the catheter which resolved after catheter withdrawal to the desired level.

Results: Subsequent blood reports revealed platelets of only $52 \times 10^9/L$ and deranged liver functions and she was diagnosed as asymptomatic HELLP syndrome. This patient was then considered as high risk for developing epidural haematoma. Her epidural top up boluses were administered by anaesthetist after full neurological examination. She had a normal vaginal delivery and epidural was left in situ till next day when the platelets improved to $89 \times 10^9/L$. No neurological deficit was noticed.

Conclusion: There has been only one reported case of an epidural haematoma occurring in a pregnant woman in the presence of thrombocytopenia ($71 \times 10^9/L$). In a survey of American Anaesthesiologists' only 16% would site an epidural if the platelet count was between 50 and $79 \times 10^9/L$. The Obstetric Anaesthetists Association states that neuraxial blockade can be justified provided the platelet count is $50 \times 10^9/L$ or above." No clear guidance however exists for managing inadvertent epidural catheter inserted in patient with low platelets.

ESRAS-0093

Obstetric

COMBINED SPINAL-EPIDURAL BLOCK FOR CESAREAN
SECTION OF A PARTURIENT PATIENT WITH FAMILIAR
HYPERTROPHIC CARDIOMYOPATHY

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Aims: Familiar hypertrophic cardiomyopathy (FHC) is a rare hereditary cardiac disorder characterized by hypertrophy of the ventricular septum and variable degrees of subvalvular aortic stenosis resulting in left ventricular outlet obstruction which may severely complicate anaesthetic management of a parturient undergoing cesarean section (C/S). Although general anaesthesia is the recommended anaesthetic technique in these patients, unexpected conditions may necessitate the use of regional techniques. Here, we present the efficient and uneventful anaesthetic management with combined spinal-epidural anaesthesia in a patient with FHC.

Method: A patient, 30 y, 68 kg, 166cm with a late diagnosis of FHC was presented for emergency C/S due to preterm premature rupture of membranes at 37th week of pregnancy without appropriate fasting status of 2 hours. Her examination included a pulse rate of 72/min, blood pressure of 148/83mmHg, left ventricular hypertrophy with ejection fraction >60% and moderate diastolic dysfunction.

Results: After monitorization and arterial and basilic vein catheterisation combined spinal-epidural block was performed in sitting position, with the subarachnoid administration of 10 mcg fentanyl added 8 mg heavy bupivacaine followed by introduction of epidural catheter. Perioperative period was haemodynamically uneventful and postoperative analgesia was secured by epidural patient-controlled analgesia to maintain haemodynamic stability with adequate pain relief.

Conclusion: Carefully performed combined spinal-epidural anaesthesia may be an efficient anaesthetic technique providing hemodynamic stability and avoiding deleterious cardiac complications in a parturient with FHC during C/S where general anaesthesia isn't an option of choice.

ESRAS-0308

Postoperative Pain Management

THE ROLE OF USG ILEOINGUINAL AND ILEOHYPOGASTRIC
NERVE BLOCKS IN OUTPATIENT VARICOCELE SURGERY;
PRELIMINARY DATA OF OBSERVATIONAL
MONOCENTRIC STUDY

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Aims: The aims of our study is to identify which is the best technique for an outpatient who undergoes varicocele surgery.

Method: We had analyzed patients submitted to varicocele surgery with general anesthesia (GA group) or regional anesthesia technique (RA).

Every patient, in both groups, had received same postoperative analgesic therapy at home.

We had registered the time to achieve discharge criteria and postoperative pain rate (NRS- NRSi).

Results: Currently we have enrolled 40 patients (20 pts GA - 20 pts RA).

Table 1 shows the postoperative pain rate and **Table 2** the mean discharge time from day surgery unit.

TABLE 1.

TAB 1	GA group	RA group	Mann-Whitney test (independent samples)
NRS (1 h postoperative)	0,95 ± 1,57	0,30 ± 0,92	P = 0,08
NRSi (1 h postoperative)	1,55 ± 1,98	0,85 ± 1,59	P = 0,17
NRS (at discharge)	0,6 ± 0,94	0,35 ± 0,81	P = 0,31
NRSi (at discharge)	1,1 ± 1,33	0,85 ± 1,26	P = 0,45

TABLE 2.

	GA group	RA group	t-test (independent samples)
discharge time (minutes)	249,25 ± 52,67	198,5 ± 66,03	P = 0,01 (assuming equal variance)

Conclusion: The regional anaesthesia approach appears to be more efficient in the immediate postoperative period, nevertheless there is, actually, no statistical differences; in addition the patients could be discharged in less time guaranteeing a good analgesia. The role of regional anaesthesia to prevent immediate postoperative pain-sensitization could reveal the importance of nerve blocks use to inhibit long-term postoperative pain development (chronic pain).

ESRAS-0272

Postoperative Pain Management

A COMPARATIVE STUDY OF EFFICACY AND SAFETY OF
LORNOXICAM VERSUS ETORICOXIB AFTER TOTAL
KNEE ARTHROPLASTY

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Aims: To assess efficacy and safety of lornoxicam compared with that of etoricoxib after total knee replacement.

Method: After obtaining ethical committee approval and informed consent, 110 patients undergoing knee replacement under spinal anesthesia were randomized to receive postoperative either lornoxicam (8mg PO -peros/12 hours) or etoricoxib (120 mg PO/24 hours) both administered in the postoperative care, at the end of the surgery.

The groups received postoperative analgesia when NRS (numeral rating scale) over 3 with IV Perfalgan in fixed dose 1g every 8 hours and morphine

(loading dose 0.1mg/kg and titration until NRS under 3, followed by subcutaneous administration of ½ of the total loading dose on demand for the following 48 hours).

The effectiveness was evaluated by the time from the initiation of spinal anesthesia until the first analgesic dose at NRS > 3, the total amount of morphine in the first 24 and 48 hours postoperative, the side effects and necessary amount of adjuvant medication.

Results: The groups were similar in terms of demographic data, ASA(American Society of Anesthesiology) class and operation duration. There are no significant differences between groups regarding the duration of analgesia and morphine consumption at 24 and 48 hours postoperatively. The tolerability of etoricoxib appeared to be significantly superior to lornoxicam, with less number of patients experiencing adverse drug reactions.

Conclusion: Postoperative use of 8 mg PO lornoxicam twice a day is safe, effective and comparable to etoricoxib 120 mg in pain relief after total knee arthroplasty.

ESRAS-0371
Postoperative Pain Management

DOES SPINAL ANALGESIA IN MAJOR LAPAROSCOPIC SURGERY HELP IN ENHANCED RECOVERY?

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Aims: Postoperative analgesia with intrathecal diamorphine and Bupivacaine in major laparoscopic urology and colorectal surgery.

Patient satisfaction at discharge after major laparoscopic surgery.

Aim for due recommendations after major laparoscopic surgery.

Method: Prospective data collection

Elective major urology and colorectal surgery patients

All the patients had intrathecal Diamorphine and Bupivacaine as postoperative analgesic regime.

Patients on long term analgesics and history of drug abuse excluded.

Pain score and analgesic requirements noted in recovery, day 0 and day 1

Review percentage of patients with pain score more than 5.

Patient satisfaction score at discharge noted.

Reviewed patients with satisfaction score > 5 at discharge.

Results: Results are summarized in Tables 1 and 2.

TABLE 1. % of patients with pain score > 5

	Colorectal surgery	Radical Prostatectomy	Radical Nephrectomy
Recovery	19%	10%	42%
Day 0	20%	5%	60%
Day 1	19%	15%	33%

TABLE 2. Satisfaction score > 5 at discharge

Colorectal surgery	Radical prostatectomy	Radical Nephrectomy
67%	75%	33%

Conclusion: Intrathecal diamorphine + Bupivacaine is an effective analgesic technique in first 48 hours after major laparoscopic colorectal and prostate surgery but this technique is a poor choice for laparoscopic Nephrectomies.

Individual causative variations in colorectal like inflammatory bowel disease or malignancy may play a part.

Other pain control techniques like TAP block need consideration for colorectal surgery & Options like thoracic epidural or paravertebral blocks need consideration for radical nephrectomies.

Pain scores and patient satisfaction scores reflect this, though they do not have strong correlation.

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ESRAS-0451
Postoperative Pain Management

CONTINUOUS WOUND INFUSION WITH LOCAL ANESTHETIC AND STEROID FOR POSTOPERATIVE ANALGESIA IN MAJOR ABDOMINAL SURGERY: PRELIMINARY RESULTS FROM A PHASE III RCT

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Aims: Continuous wound infusion (CWI) of local anesthetics (LA) reduces postoperative morphine consumption[1]. Inflammation is a major feature of pain[2], but the effect of CWI with steroids+ LA has never been addressed[3]. We investigate efficacy and safety of CWI with LA+methylprednisolone on acute and persistent pain (PPSP) in patients undergoing major abdominal surgery.

Method: Following a 24 hours CWI of ropivacaine 0.2%+methylprednisolone 1mg/kg (+iv morphine PCA), patients were randomized to receive CWI either with ropivacaine 0.2%+methylprednisolone 1mg/kg (*Group A*) or placebo (*Group B*) for the next 24 hours (+iv morphine PCA). Then, *patient-controlled* CWI (PC_CWI) with only ropivacaine 0.2% or placebo (according to randomization) were planned up to the 7th day (+ rescue analgesia with tramadol/acetaminophen). We registered: morphine/analgesics' consumption, NRS at rest/movement, side effects, surgical complications, PPSP at 3 months after surgery.

Results: We present preliminary results of a PHASE III, double-blind RCT (NCT02002663). We enrolled 40 patients, with 5 dropouts. Patients' characteristics and analgesics' consumption are shown in *Figure 1*. No differences were observed in postoperative pain. No patients reported PPSP at 3 months. One patient in *Group A* reported subcutaneous wound infection. No other side effects were registered.

Demographics		
	Group A (n=18)	Group B (n=17)
M/F	16/6	11/7
Age	66.3 ± 13	65.8 ± 14.4
Weight (Kg)	72.7 ± 9.6	68.4 ± 9.2
Height (cm)	171 ± 6.7	164.2 ± 10
Analgesics' consumption		
	Group A (n=18)	Group B (n=17)
Morphine PCA 48h	17.3 ± 14.3	26.1 ± 19.2
Morphine equivalents 7 days	20.1 ± 21.1	30 ± 17.5
Δ 24-48h morphine PCA	3.8 ± 4	7.11 ± 6.6
Δ 24h-7days morphine equivalents	6.2 ± 12	11 ± 12.3
PC CWI bolus 3rd day (ml)	28.6 ± 30.4	48.6 ± 24.2
PC CWI bolus 4th day (ml)	32 ± 31	68.6 ± 49.4
PC CWI bolus 5th day (ml)	34 ± 31.1	71.4 ± 52.3
Subjects requiring additional analgesics (n%)	2 (11%)	6 (35%)
Catheters' removal - causes		
	Group A (n=18)	Group B (n=17)
Maintained up to 7 days	1	3
Dislodgment/occlusion	8	7
No PCA CWI bolus >36 hs	9	7

FIGURE 1. Patients' characteristics, analgesic consumption, and cause of catheter removal.

Conclusion: CWI with LA+methylprednisolone was more effective than placebo for postoperative analgesia (less morphine, less PC_CWI boluses, less analgesics' requests), with no side effects specifically associated with LA/ methylprednisolone. Hopefully, with bigger sample size, we want to verify whether CWI for more than 48 hours protect against PPSP, by preventing the wound to restart sensitization.

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ESRAS-0310

Postoperative Pain Management

IMPROVING PAIN MANAGEMENT FROM THE RETROPERITONEAL SPACE WITH THE ULTRASOUNDGUIDED (USG) TRANSMUSCULAR QUADRATUS LUMBORUM (TQL) BLOCK ON PERCUTANEOUS NEPHROLITHOTOMY (PNL) - A RANDOMIZED CONTROLLED TRIAL

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Aims: PNL is unilateral surgery in the retroperitoneal space involving patients with pelvic stones. Our one-year retrospective study revealed that 71% of PNL-patients needed substantial amounts of opioids for postoperative pain management (PPM) in recovery despite a multimodal analgesic regime; i.e. 24.1 ± 14.8 mg morphine (mean $\pm$ SD). In a prospective pilot study including ten PNL-patients and retrograde intrarenal surgery patients with severe postoperative pain, we found that a USG TQL block substantially reduced pain and opioid consumption. This study aims to evaluate the effect on PPM of a unilateral USG TQL block compared to placebo.

Method: A single center, randomized, controlled and double-blinded trial with concealed allocation achieved ethics committee approval. Sixty patients undergoing PNL under standardized general anesthesia with a multimodal analgesic regime will be randomized to receive either a unilateral USG TQL block (Figure 1) with 30 mL ropivacaine 0.75% or isotonic saline prior to surgery. Primary outcome: accumulated opioid consumption during the first six postoperative hours. Secondary outcomes: NRS (0–10) pain scores at rest assessed as area under the curve (0–6 hours post-operatively), time in recovery, time to ambulation and cytokine measurements as biochemical markers for surgical stress response. We will be able to detect a 50% reduction in recorded opioid consumption with $\alpha=5\%$, $\beta=20\%$ and a dropout rate of 15%.

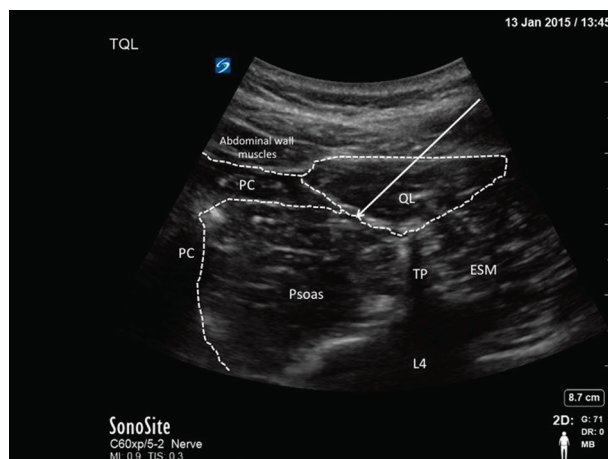


FIGURE 1.

Results: Preliminary results and study design from our ongoing randomized study will be presented.

Conclusion: The present study is powered to demonstrate whether a unilateral USG TQL block can reduce opioid consumption with clinical significance in PNL-patients.

ESRAS-0467

Postoperative Pain Management

POSTOPERATIVE PAIN MANAGEMENT FOLLOWING TOTAL KNEE ARTHROPLASTY, CONTINUOUS PERIARTICULAR LOCAL ANESTHETIC INFUSION VS. LIPOSOMAL BUPIVACAINE INJECTION, REVIEW OF THE LITERATURE

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Aims: Local anesthetics often used as foundation for multimodal pain management following total knee arthroplasty (TKA). Inadequate control of pain may

lead to poor functional recovery, need for opioid medications and longer hospital stays. This review compares three methods of regional anesthesia post TKA; continuous periarticular infusion of bupivacaine (CWI), and periarticular injections of two liposomal bupivacaine (LB) doses (266mg and 532mg) and bupivacaine HCl 150mg. Analgesic efficacy can be determined by amount of concomitant opioid consumption over 72 hours postoperative. Head to head studies are not available however two studies allow for comparison of these methods.

Method: Bramlett reviewed two doses of LB, 266mg and 532 mg. Plain bupivacaine 150mg (B150) was also tested and included as reference. Goyal used continuous infusion of 0.5% bupivacaine 5ml/hr. Analgesia efficacy estimated by opioid consumption 0–48 hours and 48–72 hours. Adverse events also reviewed.

Results: Side effects reported by the subjects were generally mild and appeared related to the opioid consumption in each group and were lowest in CWI group. Opioid consumption significantly lower in the CWI group compared to all three single injection groups ($p<0.001$). Reporting of opioid related adverse events were significantly reduced in those patients receiving the CWI compared to both LB groups.

Conclusion: In this review the use of a continuous infusion of local anesthetic was found to be superior to the use of liposomal bupivacaine in both efficacy and safety. No differences found between the three single injection groups. Further head to head comparisons are warranted.

ESRAS-0404

Postoperative Pain Management

COMPARATIVE STUDY BETWEEN LOCAL ANAESTHETIC INFILTRATION OF THE SURGICAL WOUND SUPPLEMENTED TO MULTIMODAL ANALGESIA AND CAUDAL EPIDURAL ANALGESIA FOR POSTOPERATIVE PAIN IN PAEDIATRIC PATIENTS

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Aims: Caudal analgesia cannot be safely applied in some cases like coagulation disorders, brain metastases, allergy to local anesthetics, and infection at the site of injection. We consequently conducted this study to compare the effectiveness of the local anesthetic infiltration of the surgical incision supplementing the intravenous multimodal analgesia versus caudal analgesia for perioperative analgesia in abdominal surgeries.

Method: After approval of the institutional Ethics Committee of the Children Cancer Hospital- Egypt, and written informed parental consent, forty patients scheduled for nephrectomy were randomly allocated into either C- group to receive caudal block (1 ml/kg, 0.25% bupivacaine); or M- group to receive multimodal analgesics of paracetamol (10 mg/kg), ketamine (0.5 mg/kg), ketorolac (1mg/kg) and local anesthetic infiltration of the surgical incision 8 ml of a mixture of (lidocaine 0.5% and bupivacaine 0.25%). Morphine (0.15 mg/kg) was administered IV to all patients 15 minutes before the surgical incision.

The primary endpoint was Duration of analgesia from discontinuation of anesthesia till 1st intravenous morphine dose.

Results: The median time to the first narcotic requirement was significantly longer in M group 6 (5, 8) h than that in C group. The median morphine consumption in the first 24 hours postoperatively was significantly higher in C group than that in M group.

Conclusion: The local anesthetic infiltration supplemented to intravenous multimodal analgesia is effective and have the potential to improve analgesia and reduces narcotic requirement within the first 24 h postoperatively with higher opioid sparing effect more than the preoperative single dose caudal analgesia in paediatrics abdominal surgeries.

ESRAS-0212

Postoperative Pain Management

DEXMEDETOMIDINE WITH SEVOFLURANE OR PROPOFOL ANESTHESIA EFFECTIVELY COMPLEMENT EPIDURAL ANALGESIA IN COLORECTAL SURGERY

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Aims: Dexmedetomidine (DEX) has never been used in major abdominal surgery together with epidural analgesia. We studied the influence of DEX on perioperative opioid consumption, pain management and incidence of postoperative delirium.

Method: 88 patients were scheduled for elective colorectal surgery. All patients received patient controlled epidural analgesia with levobupivacaine continuing for 3 days after surgery. Anesthesia was maintained either with sevoflurane or propofol infusion. In addition, DEX group received dexmedetomidine infusion starting 30 min before incision and stopping 30 min before end of surgery. Piritramide boluses were added according to visual analogue scale. Visual analogue scale (VAS) value and piritramide consumption were measured two days after surgery. Results were analyzed with ordinal regression with significance of P value < 0.05 .

Results: Demographic parameters were comparable among dexmedetomidine (DEX) groups (46 patients, 26 with propofol (P), 20 with sevoflurane (S) and control (CON) groups (42 patients, 20 with propofol (P), 22 with sevoflurane (S)). In the group with DEX, pain scores in first 48 hours were significantly lower (Figure 1). Average VAS in first 24 hours, DEX 0.680; CON 1.309 ($p=0.001$). VAS in CON group were lower with propofol anesthesia, with less opioids (average consumption in recovery, P group 1.75mg, S group 4.05mg $p=0.014$). DEX groups had lowest opioid use (P 0.81mg S 0.75mg, comparing to CON $p=0.00$). There was only 1 case of postoperative delirium.

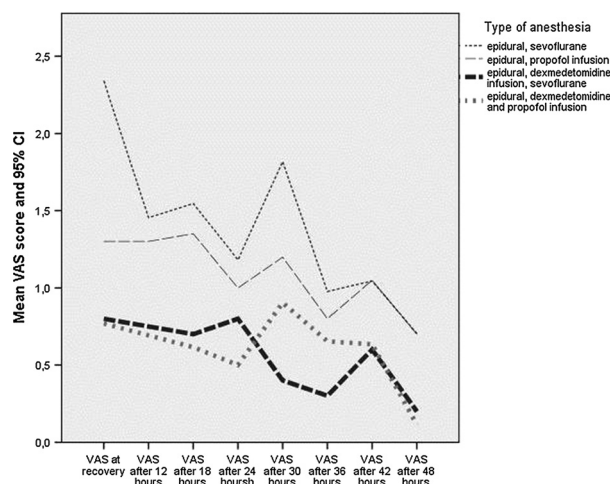


FIGURE 1. Pain levels (VAS) in the 48 hours after colorectal surgery

Conclusion: Use of dexmedetomidine in colorectal surgery significantly decreased VAS score and minimized postoperative opioid analgesic requirements. Results suggests protective effects of dexmedetomidine in sevoflurane anesthesia.

ESRAS-0059

Postoperative Pain Management

A RANDOMIZED CONTROLLED TRIAL OF ULTRASOUND/LAPAROSCOPIC CAMERA GUIDED TRANSVERSUS ABDOMINIS PLANE BLOCK FOR RENAL TRANSPLANT DONORS

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Aims: The most common treatment modality for postoperative pain relief following laparoscopic surgery is multimodal, using nonsteroidal antiinflammatory drugs (NSAID), opioids, and infiltration of local anesthetics. Because NSAIDs are nephrotoxic, local infiltration does not relieve deep tissue pain, and opioids have a side effect profile including pruritus, nausea, vomiting, oversedation, apnea, and decreased gastrointestinal motility, the use of a regional analgesic technique can lead to an improved quality of recovery. The aim of this prospective, randomized, placebo-controlled study was to evaluate the effect of TAP block

on postoperative verbal analog scale (VAS) scores and total morphine requirements in the first 24 hours after laparoscopic live donor nephrectomy.

Method: After obtaining approval from the hospital ethical committee and written informed consent from the patients, 49 ASA I-II patients undergoing laparoscopic donor nephrectomy aged 18 years or over were included in this prospective, randomized, controlled study. In this clinical trial patients were divided into 2 groups: TAP block group (group T) and placebo group (group P). The demographic variables, pain scores, morphine consumption, level of sedation, presence of postoperative nausea, vomiting, pruritus, and average length of postoperative stay were reviewed.

Results: The pain scores were significantly lower after TAP block with bupivacaine at most but not all time points. Patients receiving the TAP block with bupivacaine required less morphine up to 24 hours after surgery compared with the saline group.

Conclusion: USG-guided TAP block as part of a balanced analgesia regimen is of benefit in reducing postoperative pain and morphine consumption after laparoscopic donor nephrectomy.

ESRAS-0216

Postoperative Pain Management

FEASIBILITY OF PERFORMING SHOULDER REPLACEMENT SURGERY AS DAY CASE: A RETROSPECTIVE AUDIT

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Aims: To assess how feasible it would be to perform shoulder replacement surgery as day-case rather than as an inpatient procedure, as is usual.

Method: Following local audit department approval, we audited shoulder replacement patients for the preceding 12 months, examining anaesthetic technique, post-operative pain scores, analgesia requirements and other significant post-operative symptoms which would prevent day-case discharge or cause readmission.

Results: 20 patients were included in our audit (12 female, 8 male). Mean age was 68 years with median ASA grade 2 and mean BMI 30.4.

All patients had an interscalene block with levobupivacaine performed either awake, sedated or under general anaesthesia (GA) with nerve stimulator and/or ultrasound. The range of levobupivacaine was 0.25-0.5% and volume 10-40ml. Post-op regular analgesia was paracetamol +/- NSAID +/- oxycodone/tramadol/codeine.

In the first 24 hours, 15 patients required additional opioid analgesia. The median amount used in 24 hours was 3.33 mg IV morphine equivalent, and maximum 25mg IV morphine equivalent. In the first 24 hours the highest pain score was 0 (none) for eight patients, 1 (mild) for seven patients and 2 (moderate) for five patients.

Sixteen patients were discharged on the first post-op day, two patients on the second post-op day and two required longer stay for non-clinical reasons.

Conclusion: For the majority of our patients, there were no significant symptoms that would have prevented discharge or resulted in re-admission. Day case surgery is feasible provided patients are sent home with adequate 'as needed' medication which could include anti-emetics, and written instructions for post-op care.

ESRAS-0040

Postoperative Pain Management

EFFICACY OF ONDANSETRON IN INTRAVENOUS PCA WHIT FENTANYL IN PREVENTION OF NAUSEA AND VOMITING AFTER TOTAL HIP OR KNEE REPLACEMENT PROCEDURES

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Aims: Postoperative nausea and vomiting (PONV) is a frequent and clinically significant complication of surgery and anesthesia. The main objective of this study was to evaluate, in a double-blind and randomized manner, the efficacy of ondansetron hydrochloride administered in intravenous patient control analgesia whit fentanyl for the prophylaxis of PONV in patients undergoing total hip replacement or total knee replacement procedures.

Method: 84 Patients undergoing elective, primary total hip or total knee replacement procedures selected. After surgery Patients divided into 2 treatment groups: in group case (n = 42) 0.16mg/ml received ondansetron hydrochloride in PCA/IV pump with 5 µg/ml fentanyl in 72 ml 0.9% isotonic sodium chloride and in group control (n=42) received PCA/IV pump with 5microg/ml fentanyl in 80 ml 0.9% isotonic sodium chloride. Patients assessed for the presence and severity of nausea or vomiting and emetic episode.

Results: The age ranges in the ondansetron group 46.7 to 70.3 and the placebo group was 43.9 to 68.1 years. In group control patients incidence and severity of Nausea & incidence of vomiting and the severity of vomiting greater compared with group case.

Conclusion: This randomized, double-blind study demonstrates that ondansetron provides superior control of PONV in patients undergoing total hip replacement or total knee replacement procedures.

ESRAS-0394

Postoperative Pain Management

THE EFFECT OF GABAPENTIN ON REDUCING PAIN AFTER LAPAROSCOPIC GASTRIC BYPASS SURGERY IN PATIENTS WITH MORBID OBESITY: A RANDOMIZED CLINICAL TRIAL

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Aims: Pain after laparoscopic gastric bypass surgery (LGBP) is a major problem. Gabapentin is an anticonvulsant drug that can be effective in postoperative pain control.

Objectives: This study examined the effect of preoperative administration of gabapentin on reducing pain after LGBP in patients with morbid obesity.

Method: This randomized clinical trial was performed in Hazrat Rasoul Akram Medical Center in Tehran. A total of 60 patients undergoing LGBP were randomly allocated into two groups; one group received 100 mg of oral gabapentin and the other group received placebo. Pain was evaluated at recovery time, and at the first, second, fourth and sixth hour of surgery by visual analog scale. The number and dose of opioid use after surgery and incidence of postoperative complications, such as nausea and vomiting, agitation, and headache, were also recorded.

Results: The mean pain score in the group receiving gabapentin was significantly lower than the placebo group ($P < 0.001$). Indications and dose of opioid consumption between the two groups were not statistically significant. Incidence of nausea/vomiting ($P = 0.028$) as well as agitation ($P = 0.037$) was significantly lower in the gabapentin group.

Conclusion: Administration of gabapentin before surgery can reduce pain after LGBP. Furthermore, it is not accompanied by significant short-term adverse effects.

ESRAS-0481

Postoperative Pain Management

A QUALITY IMPROVEMENT PROJECT TO INCREASE PERIPHERAL NERVE BLOCKADE AND DECREASE OPIOID USAGE IN FEMORAL NECK FRACTURE PATIENTS IN A UK HOSPITAL

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Aims: Femoral neck fracture patients represent a frail elderly population in which opioid analgesia is associated with increased post-operative confusion. 2011 AAGBI guidelines state that peripheral nerve block should always be considered as an adjunct to spinal or general anaesthesia.

Local audit identified that 26.3% of patients (n=38) received perioperative peripheral nerve blocks in February to March 2014. A quality improvement project was developed, aiming to increase the number of perioperative blocks performed.

Method: Over one year, several educational initiatives were used to raise awareness among anaesthetists of the requirement for consideration of perioperative peripheral nerve block in femoral neck fracture patients. The number of patients receiving preoperative blocks, including fascia iliaca, femoral nerve block and lumbar plexus block was recorded, as well as the number of doses

of opioid drugs in the 24 hour postoperative period. The incidence of complications including delay of mobilisation directly caused by block was recorded.

Registered as hospital quality improvement project with ethics approval.

Results: Incidence of perioperative peripheral nerve blockade increased over a one year period, such that in the period February to March 2015 62% of patients (n=37) received blocks, compared to 26.3% in the same period of previous year. A significant reduction (T-test $p=0.04$) in opioid analgesia usage was observed amongst nerve blocked patients (mean 0.89 doses, n=145) compared to non-blocked (mean 1.20 doses, n=132). No complications were noted.

Conclusion: The increased usage of peripheral nerve blockade is associated with a statistically significant decrease in opioid usage in fractured neck of femur patients.

ESRAS-0459

Postoperative Pain Management

ULTRASOUND-GUIDED QUADRATUS LUMBORUM BLOCK AS A POSTOPERATIVE ANALGESIA TECHNIQUE FOR EMERGENCY LAPAROSCOPIC CHOLECYSTECTOMY WITH DRAINAGE TUBE

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Aims: Quadratus lumborum (QL) block is a relatively recent approach for abdominal wall postoperative analgesia. It was first described by Blanco in 2007. It has been postulated that local anesthetics spread ranges from T7-L1. We evaluated its efficacy for an emergency laparoscopic cholecystectomy with a drainage tube.

Method: A 59-year-old woman, ASA 2, presents with complicated acute cholecystitis and underwent an emergency laparoscopic cholecystectomy with intraoperative cholangiography. Rapid sequence induction with propofol, fentanyl and suxamethonium was performed followed by neuromuscular paralysis with rocuronium. Maintenance of anesthesia was with 50:50 O₂ and air with sevoflurane. After one hour another dose of fentanyl was administered. Intraoperative analgesia was complemented with paracetamol and ketorolac which were maintained for postoperative analgesia. The procedure lasted 2.5 h and was uneventful. A subcostal drainage tube was left. At the end of the procedure the patient was positioned in left lateral decubitus and the QL block was performed under echographic guidance with 20 mL of 0.375% ropivacaine (100 mm, 22 Gauge needle). Pain scores using the numerical rating scale were recorded hourly in postanesthesia care unit. Administration of rescue analgesics and adverse effects were recorded during a 72h period following surgery.

Results: In PACU pain scores were 0/10. Sensory block was T7/8-L1. Postoperatively effective analgesia was accomplished and the patient did not require rescue analgesics. No complications related to QL were recorded.

Conclusion: From this case report QL block seems to be an effective alternative for postoperative analgesia, reducing opioid administration.

ESRAS-0333

Postoperative Pain Management

ELASTOMERIC LOCAL ANAESTHETIC WOUND INFUSION DEVICE - AN AUDIT TO ASSESS EFFICACY AND COMPLICATIONS

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Aims: Use of surgically inserted wound catheters has increased within our setting. Anecdotal evidence from Acute Pain Nurses suggested improvement in pain scores and opioid consumption with their use. The aim of this audit is to assess their efficacy and complications and to form a tool for future surveillance for their use.

Method: This audit has obtained approval from our local Clinical Effectiveness department. Our team of Acute Pain Nurses regularly follow up patients with these devices undergoing general surgical, urological and gynaecological

surgery. Data recorded include patient demographics, intrathecal opioid use, duration and total dose of PCA morphine, average pain scores and complications.

There were 120 patients within the data set over a period from July 2014 until February 2015. 73 patients were included in the analysis. Patients who had thoracic incision, paravertebral block and those with incomplete data were excluded.

Results: Of the 73 patients analysed, the majority received two 10ml/hr pumps delivering 0.125% levobupivacaine.

Average pain score on the first post-operative day was 1.12. Mean duration of PCA use was 29.9 hours. Mean total dose of PCA opioid was 58.6mg of morphine equivalent.

Leakage was reported in 14 (19%) cases and in 2 (3%) cases the infusion device did not deploy. There were no cases of serious complications reported.

Conclusion: This initial audit supports the reports that these wound catheters are effective adjuncts to post-operative analgesia with low complication rate. Data collection is ongoing as part of quality improvement project and the latest data set will be presented.

ESRAS-0019

Postoperative Pain Management

FOREQUARTER AMPUTATION: PAIN MANAGEMENT USING MULTIPLE NERVE CATHETERS

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Aims: A 55 yr old man presented with a large chondrosarcoma of his right humerus with planned surgical forequarter amputation. Regional anaesthesia has an important role in providing not only acute post-operative pain relief and reducing opiate requirements but as an emerging therapy to prevent phantom limb pain (PLP) (Borghi 2011) and cancer recurrence. We present the anaesthetic and pain management of this challenging patient.

Method: After premedication with 150mg pregabalin US guided single shot interscalene, superficial cervical plexus and paravertebral block at the level of T4 were performed using a total of 30ml 0.25% Levobupivacaine. Paracetamol, Parecoxib, dexamethasone and hourly boluses of 30mg Ketamine were given. At the end an interscalene and paravertebral catheter were inserted and respective infusions of 5ml/hr 0.2% Ropivacaine with patient boluses and 10 ml 0.25% Levobupivacaine boluses every 12 hours for 2 days. A 14 hr ketamine infusion at 8mg/hr in addition to regular paracetamol, etoricoxib, pregabalin and twice daily 20mg oxycodone for 48hrs.

Results: Worst pain scores over the first 4 days was 3/10 and no immediate release oxycodone was required until the 5th day when the interscalene catheter became displaced and had to be resited and continued till day 13. The patient was discharged home on oral paracetamol and at 2yr followup has reported no PLP.

Conclusion: A multi-modal analgaesic strategy including the use of an extended regional anaesthesia technique can provide good quality acute post-operative pain relief and may prevent the occurrence of PLP.

ESRAS-0466

Postoperative Pain Management

THE EFFECT OF INTRAPERITONEAL ANALGESIC TRIPLE THERAPY ON POSTOPERATIVE PAIN AND FUNCTIONAL OUTCOME AFTER GYNAECOLOGIC LAPAROSCOPY

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Aims: Pain after laparoscopic dermoids-cystectomy-ovariectomy is severe in young women and interferes with functional recovery. We compared the intraperitoneal analgesia vs. intravenous analgesic regimes on postoperative recovery.

Method: 45 patients, ASA I/II, were randomised in two study treatment groups: IP- intraperitoneal instillation of levobupivacaine 20mg, dexamethasone 8mg, tramadol 100mg through the trocar at the end of the laparoscopy vs. continuous intravenous infusion of tramadol 200mg/ ketoprofen 400mg in the 1st/ 2nd postoperative day. Rescue medication for both was tramadol 50mg i.v.

Patients were assessed at 0,4,8,12,24 and 48h after the operation for VAS at rest, and at movement.

The primary outcome was cough-evoked pain. Secondary outcomes included pain at rest, during sitting, opioid consumption, supraclavicular pain, side effects.

Results: VAS scores were significantly lower in the intraperitoneal analgesia group than in the intravenous analgesia group ($p < 0.01$) during all the observations (both at rest and at movement) on the first postoperation day. Tramadol consumption was also reduced by 33% in the intraperitoneal group. Pain scores and tramadol consumption were similar in the groups on the second post-operative day. Sedation was common in intravenous group, but the incidence of postoperative nausea and vomiting was significantly lower in the intraperitoneal group.

Conclusion: Intraperitoneal instillation of triple analgesic therapy, as a part of a multimodal approach, at the end of the laparoscopic surgery resulted in significant reduction in postoperative VAS scores at rest and movement as well as tramadol consumption compared with intravenous analgesia during the first postoperative day. Lower incidence of nausea and vomiting was an additional advantage.

ESRAS-0264

Postoperative Pain Management

EFFECT OF SYSTEMIC LIDOCAINE ON QUALITY OF RECOVERY AFTER ROBOT-ASSISTED THYROIDECTOMY

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Aims: The effect of systemic administration of lidocaine on postoperative recovery has not been clearly investigated. The aim of this study was to determine whether systemic lidocaine could enhance recovery after robot-assisted thyroidectomy. In addition, the effect of systemic lidocaine on chronic post-surgical pain was also evaluated.

Method: [IRB approval number: 4-2013-0342]

Ninety patients aged 20 or more undergoing robot-assisted thyroidectomy were randomly allocated to either group C or group L. After induction of anesthesia, the group L received a bolus of 2 mg/kg of lidocaine intravenously followed by continuous infusion at a rate of 3 mg/kg/h during surgery. Group C received the same bolus volume and infusion as Group L with 0.9% saline. Quality of recovery, pain scores during 2 days postoperatively, and chronic post-surgical pain (CPSP) at 3 months after surgery were assessed. Quality of recovery was assessed by using the Quality of Recovery 40 questionnaire (QoR-40).

Results: Demographic data and profiles related to anesthesia and surgery were comparable between the two groups. QoR40 at 24 h and pain scores for 2 days after surgery were also not different between the two groups (Table 1). However, the incidence of CPSP was significantly lower in the group L than in the group C [6 out of 41 patients (14.6%) vs. 16 out of 43 patients (37.2%), $p < 0.001$].

	Group C	Group L	P value
QoR 40 at 24 h after surgery			
Emotional status	36.9±7.6	36.7±7.3	0.902
Physical comfort	50.3±7.1	47.2±9.7	0.102
Psychological support	31.2±4.8	31.5±3.9	0.752
Physical independence	20.2±4.1	19.8±4.1	0.651
Pain	27.4±5.1	27.1±5.2	0.744
Total	165.5±23.6	164.4±31.4	0.854
Pain score			
at 24 h after surgery	51.5±23.7	50.0±22.4	0.772
at 48 h after surgery	24.2±14.0	24.1±14.3	0.990

Group C, control; Group L, systemic administration of lidocaine; QoR 40, quality of recovery 40 questionnaire

FIGURE 1. QoR 40 and pain scores.

Conclusion: Systemic administration of lidocaine may not enhance the quality of recovery after surgery in patients undergoing robot-assisted thyroidectomy. However, it may be associated with lower incidence of chronic post-surgical pain.

ESRAS-0299

Postoperative Pain Management

COMPARATIVE EFFECTIVENESS OF DIFFERENT ANALGESIC TECHNIQUES FOR TOTAL KNEE REPLACEMENT POSTOPERATIVE PAIN CONTROL

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Aims: There are different ways to address postoperative pain after total knee replacement (TKR). We analyzed postoperative outcomes for patients undergoing unilateral TKR in the last two years by comparing different analgesic techniques employed to treat postoperative pain in our hospital.

Method: Observational, retrospective. No ethics approval needed as per institution's policy.

We analyzed 173 cases (2013 and 2014 unilateral TKRs in our Hospital) by reviewing every patient's electronic medical record. We recorded pain scores since arrival to the ward until 48 hours after surgery, demand and uptake of rescue analgesia, and occurrence of side effects.

Results: 63% of cases carried lumbar epidural PCA, 31% femoral PCA, 8% intravenous PCA (morphine) and 1% tramadol and NSAIDs.

On arrival to the ward: Pain Numeric Scale (NS) less than 3: 83,9% of patients on epidural PCA (EPCA), 78% of patients on continuous femoral catheter (RPCA: regional PCA) 100% of patients on IVPCA (intravenous PCA). 48 hs after surgery (at rest): NS less than 3: 95,3% in the EPCA group; 100% in the RPCA group and 100% in the IVPCA.

47,2 % in the EPCA group asked for additional analgesia (iv morphine), vs 23,8% in the RPCA group.

Adverse effects were found in 26,5% of patients in the EPCA group; 10,2% in the RPCA; 50% in the IVPCA group.

Conclusion: We found acceptable control of postoperative pain with no significant differences among techniques.

Demand of rescue analgesia and occurrence of adverse effects were higher in EPCA group than in RPCA.

ESRAS-0160

Postoperative Pain Management

A RETROSPECTIVE COMPARISON OF SINGLE SHOT TAP BLOCK WITH PCA OPIOID SUPPLEMENTATION VERSUS TAP CATHETER INFUSION FOR POST-OPERATIVE ANALGESIA IN PATIENTS UNDERGOING ABDOMINAL SURGERY

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Aims: Abdominal surgeries can cause significant postoperative pain. Multimodal postoperative analgesia, including the use of Transversus Abdominis Plane (TAP) blocks, has been shown to improve outcomes. We compare the analgesic efficacy of TAP catheter infusions with single shot TAP blocks with systemic opioids.

Method: We conducted an ethics board-approved retrospective observational study on all patients undergoing abdominal surgeries who received a single-shot or continuous TAP block over a year. Data was collected from patients' case notes, pain management forms, and Operating Theatre System database (OT System 2.0). Pertinent data included baseline characteristics of patients, postoperative pain scores, opioid usage, side-effects and complications were collected and analyzed.

Results: Out of 112 patients, 69 were single-shot techniques and 43 had continuous infusions via TAP block catheters. The pain scores at rest on POD 1 – 3 and dynamic pain score on POD 1 were similar for both groups. However, the dynamic pain scores were higher for the single-shot group compared to the continuous group on POD 2 ($p=0.02$) and POD 3 ($p=0.005$). More patients had opioid-related side effects in the single-shot group and 10.7% required repeat block as rescue analgesia. The incidence of catheter-related complications such as leaking, migration and disconnections were low (2.3 – 4.7%).

Conclusion: Our study showed compared to the single-shot TAP block, the continuous TAP catheter was more effective in dynamic pain control on POD 2 and 3 when patients are expected to start mobilizing. The low incidences of catheter-related complications also suggest its safety profile.

ESRAS-0072

Postoperative Pain Management

USE OF A CONTINUOUS WOUND INFILTRATION CATHETER REDUCES POST OPERATIVE MORPHINE REQUIREMENTS IN LIVE DONOR RENAL RECIPIENTS

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Aims: Effective post operative analgesia for renal recipients remains a challenge. Unrelieved pain may promote respiratory complications yet morphine metabolites can accumulate in this patient group resulting in serious adverse effects. The use of continuous wound infiltration (CWI) of local anaesthetic (LA) has had benefit in other surgeries. Its use has not been described in renal transplant recipients.

Method: We examined 16 live donor recipients. Surgery was performed by a single surgeon. Two groups: 48 hour CWI to transversus abdominis plane (TAP) ($n=7$; ON-Q TAP group); morphine only ($n=9$; control group). Both groups received paracetamol and/or oxycodone for breakthrough. In the ON-Q group, an infiltration catheter was placed during surgery in the TAP. A bolus of LA was given on wound closure and a continuous infusion of 10 ml/hr of 0.125% levo-bupivacaine for 48 hours.

Results: TAP ON-Q group used less morphine over 48 hours: 4.29 vs 18.8; and required less breakthrough analgesia at 24 and 48 hours [5.6 vs 15.1; 3.3 vs 5.7]. They had a median length of stay of 7 days (5 – 12 days) compared to the control group of 8.5 (6–15 days).

Conclusion: Novel multimodal analgesic techniques are required for renal transplant recipients. Evidence for TAP blocks has been conflicting, where benefit is shown the analgesic effect is short lived. The ability to provide CWI may overcome this limitation and negate the risks of TAP injections. Furthermore the variability in TAP block technique could be eliminated using a CWI system and thus facilitate enhanced recovery protocols.

ESRAS-0447

Postoperative Pain Management

A RETROSPECTIVE STUDY OF POSTOPERATIVE PAIN MANAGEMENT IN MYASTHENIC PATIENTS UNDERGOING THYMECTOMY

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Aims: Myasthenia Gravis (MG) is an autoimmune disease that attacks postsynaptic nicotinic acetylcholine receptors at the neuromuscular junction. The aim of the retrospective study was to analyse the postoperative pain management of MG patients who underwent thymectomy.

Method: After ethics committee approval, postoperative pain management of 33 patients of ASA I-III class was recorded.

Results: Patient-controlled thoracic epidural analgesia (PCTEA) (continuous infusion of 0.125% bupivacaine at 3–5 ml/h, bolus dose of 3–5 ml and lockout time of 30 min) was performed via an epidural catheter inserted in the T3–4 intervertebral space at 30 of 33 patients. Postoperative analgesia at the other 3 patients was provided with nonsteroidal anti-inflammatory drugs and low doses of opioids. Visual analogue scale (VAS) pain scores in the PACU were noted less than 2 in all patients. Postoperatively, additional analgesic was required in only one patient who was applied PCTEA (VAS pain scores >3) in the clinic. Re-intubation or ventilation support was not needed in any patients.

Conclusion: According to our results, PCTEA with low concentration of bupivacaine provided effective and safe analgesia after thymectomy. Thus, we believe that it may be a preferred technique for postoperative uncomplicated pain management in this group of patients.

ESRAS-0047

Postoperative Pain Management

EFFECT OF CONTINUOUS TRANSVERSUS ABDOMINIS PLANE (TAP) CATHETER LOCAL ANAESTHETIC (LA) INFUSION TECHNIQUE ON POST-OPERATIVE OPIOID CONSUMPTION IN RENAL TRANSPLANT PATIENTS

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Aims: TAP catheters for LA infusion in renal transplant patients have been used in Nottingham University Hospital (NUH) NHS Trust City campus since 2013. The main perceived advantage is their opioid-sparing effect, thereby minimising the adverse effects of opioid use in this group of patients.

The aim of our audit was to compare the post-operative opioid consumption between renal transplant patients with and without TAP catheter LA infusion.

Method: We performed a retrospective audit looking at the patient-controlled analgesia (PCA) observation charts in all adult patients (aged >18) who underwent renal transplant surgery between January 2014 and July 2014 in NUH NHS Trust City Campus. The amount of opioid consumption and the duration of PCA use between these two groups as a marker of post-operative analgesia were observed. Additionally, any documented adverse effects of opioid use including sedation, nausea and vomiting, and anti-emetic use were analysed.

Results: Twenty eight subjects were identified (85.7% in the TAP catheter group, and 14.3% in the non-TAP catheter group). There were no pre-operative issues with chronic pain. One patient from the non-TAP group was sedated and ventilated in intensive care post-operatively. All other patients received post-operative PCA.

The mean total opioid consumption was noted to be significantly higher in the non-TAP catheter group, with a longer duration of PCA use, compared to the TAP catheter group.

Conclusion: It is therefore concluded that TAP catheter LA infusion in renal transplant patients show benefit in reducing opioid consumption and duration of PCA use in the immediate post-operative phase.

ESRAS-0414

Postoperative Pain Management

THE EFFECT OF COMBINATION OF INTRAPERITONEAL AND INTRAVENOUS ROUTES FOR PAIN RELIEF IN LAPAROSCOPIC CHOLECYSTECTOMY

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Aims: The purpose of this study was to evaluate the analgesic effect of the intraperitoneal administration of bupivacaine compared to combination of intraperitoneal bupivacaine with intravenous tramadol and intravenous tramadol in patients undergoing laparoscopic cholecystectomy (LC). Incidence of postoperative nausea and vomiting (PONV) was also recorded.

Method: For this study 120 patients undergoing LC were randomized in three equal groups - Group A patients received 40ml of 0.25% bupivacaine intraperitoneally, group B received 40ml of 0.25% bupivacaine with 50 mg tramadol with a continuous infusion rate of 5 mg/h, and group C Tramadol with an intravenous loading dose of 100mg and a subsequently continuous infusion of 12.5 mg/h for 24 hours was given. Intraperitoneal bupivacaine was administered 20 ml of 0.25% bupivacaine under direct vision into the hepato-diaphragmatic space, near and above the hepato-duodenal ligament and above the gallbladder and at the end of operation another 20 ml of bupivacaine was injected. All patients were of similar age, sex and ASA risk (American Society of Anaesthesiologists).

Pain intensity was assessed using VAS and postoperative nausea and vomiting (PONV) was rated on a 3-point scale.

Results: Parietal and visceral pain scores were lowest in the intraperitoneal Bupivacaine in combination with intravenous tramadol Group B had significantly lower shoulder pain scores. This difference is pronounced throughout the entire postoperative period ($p < 0.001$).

Also the incidence of postoperative vomiting was significantly lower in group B.

Conclusion: Pain management following elective LC is best achieved with combination intraperitoneal bupivacaine and intravenous tramadol, achieving the least incidence of postoperative vomiting.

ESRAS-0074

Postoperative Pain Management

CASE REPORT: SAFE AND EFFECTIVE PERIOPERATIVE MANAGEMENT OF WIDE RESECTION OF PROXIMAL HUMERAL TUMOR WITH DUAL CONTINUOUS PERIPHERAL NERVE BLOCKADES USING LEVOBUPIVACAINE

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Aims: Wide resection for chondrosarcoma at proximal humerus and reconstruction with free vascularized fibular bone graft was planned for a 22 year-old otherwise healthy patient. The anesthetic plan was general anesthesia combined with continuous brachial plexus and sciatic nerve blockades.

Method: The patient was intubated after the administration of propofol and rocuronium. Anesthesia was maintained with desflurane and dexmedetomidine. The infusion catheters for interscalene blockade and sciatic nerve blockade were then placed with ultrasound guidance. Levobupivacaine (0.375% 10mL each) was injected through the catheters, and 0.25% levobupivacaine at 4 mL/h for each catheters was infused throughout the surgery. Additional levobupivacaine (0.375% 5mL each) was injected at the end of the surgery. Sugammadex was administered for reversal of rocuronium after the confirmation of recovery from muscle relaxation. The patient was extubated after discontinuing desflurane and dexmedetomidine. The setting for each continuous infusion was 0.25 % levobupivacaine at 4 mL/h plus 3mL/push with a 30-min lockout. Arterial levobupivacaine concentrations were measured intraoperatively and the safety of this procedure was confirmed.

Results: Fentanyl was administered to 300 µg during the 8-hour surgery and 11-h anesthesia. Postoperative analgesia was satisfactory, although the patient required rescue until postoperative day 2. The other additional rescue analgesia comprised intravenous flurbiprofen only twice on postoperative day 1. The sciatic catheter was removed on day 3, and the inter scalene on day 6. No complications related to regional blockade were encountered.

Conclusion: This case suggested that dual continuous peripheral nerve blockades can be safe and effective for highly invasive limb surgery.

ESRAS-0053

Postoperative Pain Management

EFFECTS OF INTRAOPERATIVE EPIDURAL ADMINISTRATION OF ROPIVACAINE ON POSTOPERATIVE ANALGESIA FOR SCOLIOSIS SURGERY

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Aims: Scoliosis surgery is very painful. We investigated the effects of intraoperative epidural administration of ropivacaine on anesthesia and postoperative pain of scoliosis surgery.

Method: Twenty patients aged 20 to 40 years for scoliosis surgery of 6 to 10 vertebrae were allocated to epidural or control group. Anesthesia was induced with midazolam, propofol, fentanyl and vecuronium, and maintained with propofol and remifentanyl. To decrease blood pressure, nicardipine was infused. Blood pressure was kept at about 70% of the control, heart rate was kept at about $\pm 10\%$ of the control, and Bispectral index was kept between 40 and 60. At the end of surgery, diclofenac suppository 50 mg was inserted and subdermal fentanyl 25 µg/h was started. In the epidural group only, an epidural administration of 0.375% ropivacaine 1.5 mL/vertebra was done by surgeon when epidural

space was visible during surgery. For postoperative rescue analgesia, intramuscular pentazocine 15 mg was administered when visual analog scale (VAS) became 5 of 10. Consumption of propofol, remifentanyl, nicardipine, and pentazocine, blood pressure, heart rate, and VAS were compared between the two groups.

Results: Consumption of remifentanyl, nicardipine, and pentazocine were significantly smaller in the epidural group, but not of propofol. Blood pressure at the end of anesthesia and heart rate at 2, 6, 12, and 24 hours after surgery, VAS at 1, 2, 6, and 12 hours after surgery were significantly larger in the control group.

Conclusion: Epidural administration of 0.375% ropivacaine 1.5 mL/vertebra was effective on anesthesia and postoperative pain of scoliosis surgery.

ESRAS-0232

Postoperative Pain Management

PARAVERTEBRAL THORACIC BLOCK IN OPEN THORACOTOMY. RESULTS AND ANALYSIS

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Aims: Postoperative pain associated with thoracic surgery is severe.

It conditions reducing respiratory reserves, complicates respiratory physiology, favours atelectasis and pulmonary infection.

We have evaluate the effectiveness of continuous paravertebral block

Method: We have performed a prospective study of thoracotomy for 3 months.

The variables studied were the score of the visual analog scale (VAS).

VAS data were collected 12-24 hours after surgery, the 2nd, 3rd and 4th postoperative day. We have analysed these variables in rest and respiratory activity.

All patients received the same anesthetic procedure.

At the beginning of surgery, we placed a thoracic paravertebral catheter and we administrated levobupivacaine 0.25% bolus and then 7-10ml / h continuous infusion.

TABLE 1.

	12-24h	2 day	3 day	4 day
Passive VAS	0.65 (±0.82)	0.92 (±1.08)	0.75 (±0.96)	0.64 (±0.85)
Active VAS	2.38 (±1.29)	2.95 (±1.6)	2.7 (±1.6)	2.47 (±1.5)

Results: 43 patients were operated in this period. The mean values in active VAS were significantly higher than passive VAS (Table 1).

Two patients only needed rescue analgesic needed on the second day.

Conclusion: The paravertebral block is a simple technique and achieves the blocking of the intercostal nerves, his branch and his sympathetic chain (4-7 metameres).

We observed lower incidence of secondary effects such as nausea, vomiting, urinary retention, postoperative ileus and less postoperative morbidity.

The study shows good control of postoperative pain, allowing extubation of all patients in the operating room and they began a early respiratory physiotherapy.

There is minor relative or absolute contraindication for the use of paravertebral block.

ESRAS-0095

Postoperative Pain Management

BEST PRACTICES IN MAJOR GYNECOLOGICAL SURGERY

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Aims: To describe best practices in major gynecologic surgery in terms in fast track concepts

Method: We reviewed the terms major gynecologic surgery & ERAS/fast track in Marz 2015 using PubMed/MEDLINE, EMBASE, and The Cochrane Library. All study types were included. References were hand reviewed to ensure completeness. The Enhanced Recovery After Surgery (ERAS) Society was contacted to identify any unpublished protocols.

Results: Several investigations were identified that examined the role of ERP (Enhanced Recovery Pathways) in gynecologic surgery. Common interventions included allowing oral intake of fluids up to 2 hours before induction of anesthesia, solids up to 6 hours before anesthesia, carbohydrate supplementation, intra- and postoperative euvoolemia, aggressive nausea/vomiting prophylaxis, and oral nutrition and ambulation the day of surgery. In addition, bowel preparations, the NPO aftermidnight rule, nasogastric tubes, and intravenous opioids were discontinued. While no randomized data are available in gynecologic oncology, significant improvements in patient satisfaction, length of stay (up to 4 days), and cost (up to \$7600 in savings per patient) were observed in ERP cohorts compared to historical controls. Morbidity, mortality, and readmission rates were no different between groups.

Conclusion: Enhanced recovery is a safe perioperative management strategy for patients undergoing surgery for gynecologic surgery, reduces length of stay and cost, and is considered standard of care at a growing number of institutions. Our specialty would benefit from formalized ERP such as ERAS which audits compliance to protocol care elements to optimize patient outcomes and value.

ESRAS-0021

Postoperative Pain Management

PEC BLOCK, A NEW TOOL: COMBINE IDEAL OUTCOMES FOR SURGEON, ANESTHESIOLOGIST AND PATIENT

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Aims: Postoperative pain is a primary complaint and a reason for a prolonged convalescence, with the dynamic pain like new marker in patient satisfaction the Pectoral nerve block (Pec1), is recognized as a technique to control it, likewise as opioid sparse, avoiding adverse effects, decreasing length of hospital stay and perioperative costs.

Method: We report 10 patients for breast augmentation surgery. All received multimodal anesthesia, including Pec1 after anesthetic induction. Pec1 was performed "in-plane" from medial to lateral approach, under ultrasound guidance. 10 - 15 mL of 0.25 % bupivacaine was deposited. Perioperative analgesia with ketorolac 60mg IV intraoperative, and celecoxib 200mg PO every 12h/5 days postoperatively.

Results: The visualization of the spread of local anesthetic was possible in all patients. In the PACU visual analogue scale (VAS) pain core was less than 2. Any patient required rescue analgesics. All reported high levels of satisfaction; their postoperative VAS score dynamic pain was 2-3/10 during 48hs follow up.

Conclusion: Pec1 is an effective strategy for analgesic management for breast augmentation surgery, with proper handling of dynamic/static pain and opioid consumption. Multimodal proposal based in Pec1 under ultrasound-guided technique, plus oral celecoxib 200mg every 12hs/5days, provides excellent postoperative analgesia, better control of dynamic pain, improving quickly return to daily activities.

Pec1 achieves the combined ideal outcomes in our patient centred care:

for **Patient**, I can do my daily activities.

for **Surgeon**: My patients are recovering faster, I could suppress lyrica use.

for **Anaesthesiologists**: My patients are more satisfied; they get excellent analgesia through opioid sparing/avoiding multimodal analgesia.

ESRAS-0228

Postoperative Pain Management

PATIENTS' EXPERIENCE WITH EPIDURAL ANALGESIA: A QUESTIONNAIRE SURVEY. RANGANATHAN

Chavan D.^{1,2} ¹Tata Memorial Hospital, Mumbai, India, ²Tata Memorial Hospital, Anaesthesia- Critical Care and Pain, Mumbai, India.

Aims: Patients undergoing surgery should be informed about various modalities of post-operative analgesia. This study evaluated:

Patients' awareness about their epidural analgesia

Patients' experience during epidural catheter insertion

Patients' satisfaction with epidural analgesia

Method: We included consenting adult patients receiving epidural analgesia who could understand English, Hindi or Marathi. Epidural catheter insertion

was carried out as per standard hospital practice. Patients were informed about the risks, benefits and alternatives. Post-operative pain was managed by the Acute Pain Services. Post-operatively, patients were administered a questionnaire in their native language (English, Hindi or Marathi) at 2 time-points: 1. 24 hours post-operatively 2. Post-operative day 5 or discharge A convenience sample of 300 patients was chosen for the study.

Results: Only 32 (11%) patients knew the function of the epidural catheter. Educated patients had significantly more awareness about their epidural as compared to less educated patients. On prompting, 291 patients (97%) recalled being informed about epidural catheterisation. 18 (6%) patients recalled being informed about procedural risks. 7 patients (2.3%) recalled being offered alternative analgesic methods. Only 23 patients (7.7%) had moderate to severe discomfort during epidural catheter insertion (Figure 1); this was significantly more in females than in males. Figure 2 shows quality of post-operative pain relief.

Conclusion: Patients have poor spontaneous recall about information they receive regarding their epidural analgesia, especially risks/alternatives

Patients experience minimal discomfort during the procedure

Patients' satisfaction with epidural analgesia is high

ESRAS-0406

Postoperative Pain Management

IS POSSIBLE AVOIDING REBOUND PAIN? CASE SERIES OF CONTINUOUS AMBULATORY FEMORAL OR INTERSCALENE ANALGESIA, IN DEVELOPING COUNTRY: SALUD SURA, MEDELLIN, COLOMBIA

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Aims: Continuous analgesia has been shown to improve postoperative functional recuperation after shoulder and knee surgeries.¹ Single shot regional anesthesia not to have short, medium or long term benefits.²⁻⁵ Rebound pain is main reason for postoperative emergency visits and unplanned admission.

Method: After IBR, 52 patients older than 18 years with physical status classification of I to II according of ASA, scheduled for elective arthroscopic shoulder or knee surgery are reported. A standardized anesthesia with preoperative ultrasound-guided interscalene or femoral block, "in plane" approached, followed by the placement of a catheter, an elastomeric pump was used during 50 hours. Postoperative analgesia regimen included oral NSAIDs and acetaminophen for 5 to 7 days

Results: The mean operative time was 189 minutes. In the post anesthesia recovery unit the verbal analogue scale was under 3/10, only 4 patients required additional analgesic at home. No patient had nausea and vomiting. All patients reported high levels of satisfaction with their postoperative regimen of analgesia. Any complications about catheter management by patient or relatives

Conclusion: A routine continuous blocks for shoulder or knee surgeries is an effective strategy for reducing rebound postoperative pain and opioid consumption. Majority of trials suggested early pain control with single shot, lasting 8 hours for static and 6 hours for dynamic pain.² We are really concerned about rebound and chronic pain, by functional consequences, our strategy for prevention is a continuous regional analgesia US guided, the priority is a centered patient care, with emphasis in continuous analgesia, with standardized protocols, with higher patient satisfaction.

ESRAS-0118

Postoperative Pain Management

ANALGESIA PROTOCOL GUIDED BY ACUTE PAIN UNIT VERSUS NURSE GUIDED IN COLORECTAL SURGERY: AN AUDIT STUDY

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Aims: The main cause of postoperative pain is the lack of guidelines implementation. The primary objective was to determine the value of the individualization pain protocol, focusing on early mobilization and adjustments of pain therapy, compared with standard pain guideline

Method: Patients scheduled for colorectal surgery, in an open sequence were distributed in two groups: Intervention, daily the Acute Pain Unit encouraged early mobilization; Control, standard protocol guided by ward nurses. Analgesia protocol in both groups consists in: wound local anesthetic infiltration, NSAID and paracetamol in a fixed dose and patient control morphine administration. A composite variable was built on basis of: Fluid tolerance, solid tolerance, sitting on bed, and ambulation. Both groups were following-up for three days post surgery.

Results: Sixty-three patients scheduled for colorectal surgery were included (28 in the Intervention and 35 in Control). There were no differences related to the characteristic of patients, laparoscopic procedure, and duration of surgery, analgesic pain visual score, and consumption of morphine (12 [2.5-30] mg vs 14.5 [7.2-33.5] Control).

The composite variable was significantly better in the Intervention group on day two and three. Differences in the length of hospital stay was not significant (8 [6-15] days vs 10 [6-19] Control, $p = 0.24$). Nauseas were present in 32% vs 37% in the Control group; wound infection (17% vs 20% Control) and medical complications (17% vs 11.4% Control).

Conclusion: Individualized analgesia facilitates early feeding and mobilization, but not a reduction of hospital stay, which was mainly dependent on post surgery complications.

ESRAS-0417

Postoperative Pain Management

THE ANALGESIC EFFECT OF THE ULTRASOUND-GUIDED TRANSVERSE ABDOMINIS PLANE BLOCK WITH DIFFERENT VOLUME OF LOCAL ANALGESICS AFTER LAPAROSCOPIC CHOLECYSTECTOMY

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Aims: The aim of a TAP block is to deposit local anaesthetic in the plane between the internal oblique and transversus abdominis muscles targeting the spinal nerves in this plane. Several methods are performed to control postoperative pain for laparoscopic cholecystectomy. This study was designed to evaluate the effect of the ultrasound-guided transverse abdominis plane block (US-TAP-block) to compare efficacy according to the different volume of local analgesics in patients undergoing laparoscopic cholecystectomy.

Method: Sixty patients undergoing laparoscopic cholecystectomy were randomized into two groups. The patients in Group A 20 ml (100 mg bupivacaine + 10 ml serum physiologique 0.9%) and Group B 30 ml (100 mg bupivacaine + 20 ml serum physiologique 0.9%) received the US-TAP block. After general anesthesia, unilateral right-sided TAP block was performed prior to skin incision under ultrasound guidance with a linear high frequency 6-18 MHz ultrasound probe (esaote, MyLab™Five). Intraoperative use of remifentanyl and postoperative rescue analgesics were recorded. The postoperative VAS was evaluated at 20 min, and 12, and 24 hr. The patient's satisfaction scores, postoperative complications were checked.

Results: The intraoperative use of remifentanyl, postoperative VAS (20 min, 12 hr, 24 hr) and using of postoperative analgesics were lower in Group B. No complications were observed. There was no difference between the groups with respect to demographic characteristics of the patients and duration of anesthesia time and patient's satisfaction scores.

Conclusion: The US-TAP-block with 30 ml (100 mg bupivacaine + 20 ml SF) significantly reduced perioperative remifentanyl consumption, postoperative pain and postoperative rescue analgesics in patients undergoing laparoscopic cholecystectomy.

ESRAS-0421

Postoperative Pain Management

POST OPERATIVE PAIN IN DAY CASE SURGERY - AN AUDIT

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Aims: To study the adequacy of pain management in day case surgery in a DGH setting.

Method: 3 part audit proforma starting from induction of anaesthesia through recovery and discharge to home with the medications along with a telephone survey and written questionnaire about patient experience of their pain management sent in by the patient.

Results: Vast majority of our patients were happy with the adequacy of pain management. 16 percent of the patients had a pain score more than 4 (moderate or severe pain) in the recovery. 28 percent of the patients received analgesia and antiemetics in recovery. 48 percent of our patients had pain in the Day Care Unit. 19 percent of the patients received pain relief after 30 minutes of requesting one. 70 percent of the patients received. There was not a single patient who was discharged with moderate or severe pain. 80 percent were satisfied with the explanation they received.

Conclusion: Ensuring optimal pain management in the recovery is a key to ensuring long term outcome to the patient. Chronic Pain can develop if pain is not treated adequately at the time of surgery. Despite the understanding, a large gap exists between the evidence available and current practice. Ineffective pain relief is the main cause of delayed discharges. Failure of pain management in recovery can result in increased patient suffering and increased calls for help to busy on-call Anaesthetists. Optimising pain management by education of staff, reviewing intraoperative pain management, procedure specific guidelines and a follow up audit is recommended.

ESRAS-0424

Postoperative Pain Management

POSTOPERATIVE PAIN MANAGEMENT AMONG NATIVE AND NON-NATIVE ISRAELI CITIZENS DATA FROM THE EUROPEAN PAIN-OUT REGISTRY

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Aims: It has been widely reported that patients from minority groups receive inferior pain management. However, this has largely been demonstrated in the USA or Great Britain and in emergency room or delivery room settings. In this study, we aimed to determine whether this assumption is true in the postoperative setting, as effective postoperative pain management is an essential component of high quality medical care.

Method: 248 post-surgical Israeli patients were included in the study (124 natives and 124 non-natives citizens). Data was gathered from the European Union's "PAIN-OUT" registry, an ongoing post-operative pain management questionnaire-based survey. Quality of care measures were analyzed separately as well as grouped into three clusters termed composite pain score, composite side effects score and composite emotional score.

Results: Opioid consumption did not differ between the two groups. Composite pain, side effects and emotional scores were significantly higher among natives compared to non-natives. While the amount of time spent in complete pain relief was comparable between the groups, natives rated their pain as severe significantly more often than non-natives.

Conclusion: In this study, immigration status was not a predictor of inferior postoperative pain control. Moreover, non-natives seemed to benefit more from analgesic care. We suggest this stems from differing patient expectations and attitudes toward pain management between the groups, with higher expectations for analgesia on the part of native patients accounting for these observations. The study was reviewed and approved by the Tel Aviv Medical Center Institutional Review Board.

ESRAS-0298

Postoperative Pain Management

EFFECTS OF DIFFERENT ANESTHESIA TECHNIQUES ON CHRONIC PAIN AFTER LOWER LIMB AMPUTATION (PRELIMINARY RESULTS)

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Aims: Lower limb amputation (LLA) is usually associated with peripheral arterial disease. Post-amputation chronic pain (PACP) is a common phenomenon and has a considerable effect on quality of life (1). The aim of this study is to

determine the incidence of chronic pain in our institution and to compare different anesthetic techniques.

Method: After approval of local Ethics Committee, from January 2013 to December 2015 all LLA patients were enrolled for the study. As an observational study each anesthetist was free to choose the technique (general anesthesia [GA], neuroaxial [NAB] or peripheral nerve blocks [PNB]). Demographic, operative data and anesthesia regimen were noted as well postoperative pain scores (visual analogue scale; VAS). Each patient had a telephone visit at 3th and 6th months postoperatively.

Statistical evaluation was made via Mann-Whitney U test for intergroups comparison, and chi-square test for categorical data.

Results: Forty-five patients were assigned for the study, with 17 under GA, 15 with NAB and finally 13 with PNB. Demographic and operative data were similar. We lost to follow up 4 subjects due to death.

PACP incidence at third month was 16 (39%). Maximum VAS at 48 hours was significantly higher in PACP patients compared to patients free of PACP (5.58 ± 2.7 vs 3.17 ± 1.9 ; $p < 0.01$). NAB was associated with 64% (9) chronic pain which was significantly higher than two study groups (GA 31% [5] PNB 18% [2]; $p < 0.05$).

Conclusion: NAB resulted remarkably more often chronic pain. This can be explained by preoperative factors (preoperative VAS, coexisting pain syndrome, etc) which was not investigated in this study.

ESRAS-0477

Postoperative Pain Management

TWO METHODS OF CONTINUOUS FEMORAL NERVE BLOCK WITH ELASTOMERIC PUMPS BY TOTAL KNEE ARTHROPLASTY

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Aims: • Continuous femoral nerve block (CFNB) stays the gold standard of postoperative regional anesthesia. The best regimes of postoperative perineural infusion were not determinate.

• The aim of an investigation was to exam that CFNB with basal rate 5 ml/h plus bolus 5 ml better relieves of postoperative pain, than only CFNB with basal rate 5 ml/h.

Method: • We followed-up 42 patients ASA I-II after TKA. Ethical committee approval was obtained. Patients were previously randomized and divided into two groups: Group1: CFNB with ropivacaine 0.2% 5 ml/h, Group2 with ropivacaine 0.2% 5 ml/h plus bolus 5 ml. Infusion was carry out with elastomeric pumps. The time of infusion –60 hours, and lasts 60 hours after surgery.

• The analysis was undertaken postoperative pain (NRS-scale), consumption of opioids, satisfaction of patients, side –effects. The assessment of mobilization and rehabilitation was evaluated by distance of movement, angle of knee flexion.

• We registered this parameters in the 1,2,3,4 days after surgery.

• Statistical analysis was performed.

Results: • NRS, consumption of opioids was lower, distance of movement was longer in Group 2. Angle of knee flexion bigger in Group 2 in 1, 2, 3 days. The frequency of nausea was bigger in the 1 day in the Group1. The satisfaction of patients was the same in the both group.

Conclusion: • We conclude that CFNB with basal rate plus bolus is more effective regime of perineural infusion rather than only CFNB with basal rate. Less pain, less consumption of opioids, faster rehabilitation were significant in the 1 and 2 da.

ESRAS-0028

Postoperative Pain Management

POST LAPAROSCOPIC PAIN CONTROL WITH TRANS-PORT LOCAL ANESTHETICS

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Aims: Although patients experience very little pain after laparoscopic surgery, but the actual procedure however, is not painless. While conventional pain killers in laparoscopic surgery including NSAID and narcotics have specific side effects, their application is inevitable. This study evaluates the role of local

trans-port anesthesia using local anesthetic drugs to reduce post operative pain and narcotic administration.

Method: At the end of laparoscopic surgeries, prior to port withdrawal, a local anesthetic mixture is [a short acting (Lidocaine 2%) plus a long acting (Bupivacaine 0.5%)] instilled through the port lumen between the abdominal wall layers. This study was conducted in 2 groups of patients. Group 1 was the control group, which were given conventional pain killer such as narcotics and NSAID. Group 2 were evaluated with the method to be mentioned in this paper. Efficacy of both types of medications was compared. This is a prospective clinical trial.

Results: 85% of group 1, received injection of 5 to 20 ml of Morphine for pain control while the other group were controlled with trans-rectal NSAIDs. In group 2, the pain of 65% of the patients were controlled only with local anesthetic drugs, while of the remaining 35% of the patients, 30% required NSAIDs and the other 5% required narcotics administration for pain control.

Conclusion: The application of local anesthetic drugs for pain control after laparoscopic surgery is a modality with low a complication rate and is extremely effective. In addition, the application of such drugs can reduce the side effects of narcotics.

ESRAS-0251

Postoperative Pain Management

A COST SAVING PROJECT: CHANGING FROM INTRAVENOUS INTRAOPERATIVE PARACETAMOL AND NSAIDS TO ORAL PREOPERATIVE ANALGESIA IN A DISTRICT GENERAL DAY SURGERY UNIT (DSU)

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Aims: Current day surgery guidelines state "prophylactic oral analgesics with long-acting non-steroidal anti-inflammatory drugs (NSAIDs) should be given to all patients if not contraindicated"¹.

Our DSU currently administers intraoperative IV analgesia. We aimed to: audit our current practice and plan for potentially changing to oral preoperative analgesia.

Ethics committee approval was waived by a local clinical governance committee.

Method: 1. Audited the analgesic management of 50 DSU cholecystectomies (8/2014-11/2014).

2. Calculated the savings from switching to oral analgesia.

Results: Only 2 (4%) received preoperative oral paracetamol 1g.

All other analgesics were given intraoperatively: 48 (96%) received IV paracetamol 1g, 47(94%) received IV NSAIDs (11 diclofenac 75mg, 36 parecoxib 40mg). 3 (6%) were not given NSAIDs.

71% of intraoperative analgesics were administered within 15 minutes of anaesthetic induction, 10% were given within 15 minutes of the end of anaesthesia.

Our DSU currently administers ~2800 units of IV paracetamol 1g and 2100 units of IV NSAIDs (comprised of diclofenac 75mg and parecoxib 40mg) per year (3/2014-2/2015). Changing to oral analgesia would reduce our current expenditure by 93%.

Conclusion: Preoperative oral analgesics are recommended by current DSU guidelines.

Cost savings are significant with an estimated 93% reduction in cost at our institute.

We are introducing preprinted oral paracetamol and ibuprofen (both immediate and sustained release) prescriptions on our DSU drug chart. These will be signed at the clinical discretion of the anaesthetist during preoperative assessment. Analgesia will then be administered >30mins before anaesthesia.

1. Verma R, Alladi R, Jackson I, et al. Day case and short stay surgery: 2. *Anaesthesia* 2011; 66: 417-434

ESRAS-0434

Postoperative Pain Management

A SURVEY OF USE OF REGIONAL ANAESTHESIA FOR MASTECTOMY IN THE NORTH EAST OF ENGLAND

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Aims: Regional anaesthesia when used for mastectomy has been shown to improve analgesia¹, reduce chronic pain² and may reduce cancer recurrence³, with little adverse effects when compared to other analgesic strategies¹. At our institution we regularly perform both interpleural and paravertebral block for mastectomy but novel techniques also exist.

Our aim is to establish the range of current practice across the North East of England and identify reasons for underutilisation of regional anaesthesia.

Method: A link to a 'surveymonkey' survey was sent to all hospital trusts who perform breast surgery in the North of England and all trainee anaesthetists in the Northern School of Anaesthesia. We surveyed whether the anaesthetist performed a regular breast list, their anaesthetic technique of choice, the reason for not performing a regional technique, and whether ultrasound is used.

Results: 50 consultant anaesthetists and 14 trainees responded. 13 of 50 (26%) consultants and 4 of 14 (28%) of trainees use a regional technique. Paravertebral (10 responders), interpleural (6), PECS (5) and serratus plane block (3) were all used. The most common reason for not performing regional anaesthesia was insufficient training, 50% of consultants and 75% of trainees.

Conclusion: Our survey highlights an underutilisation of regional anaesthesia for mastectomy in the North East of England. Training in chest wall regional anaesthesia would be the most obvious way of increasing use of the techniques.

ESRAS-0334

Postoperative Pain Management

VISUAL ANALOG SCALE AND EFFICACY SAFETY SCORE VALIDITY IN MONITORING EFFICACY OF THE POSTOPERATIVE PAIN PREDICTION

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Aims: The objective of this prospective study was to assess the applicability and validity of the visual analog scale (VAS) score and the efficacy safety score (ESS) for identification of inadequate postoperative pain management.

Method: All operated patients > 18 years of age who were expected to be treated in hospital for more than 8 hours after surgery were included. The ESS as a measure of both efficacy and side effects of pain treatment and is based on information about mental/general condition, PONV and pain status. We used Hosmer-Lemeshow tests and area under receiver operating characteristic (ROC) curves to describe and analyze the data.

Results: 154 surgical patients were included in the study. Discrimination and calibration were adequate for both VAS and ESS, with discrimination of ESS slightly better than that of VAS (ROC 0.921 vs 0.890). We found that a VAS score greater than 3 and a ESS score greater than 10 evaluated during the first hour after the operation predicted a severe postoperative pain in the next 7 hours with 93.7% [79.2-99.1] and 84.2% [60.4-96.4] sensitivity and 77.1% [59.9-89.5] and 97.9% [88.9-99.7] specificity, respectively.

Conclusion: Both VAS and ESS are valid scores for use in clinical practice. The ESS predicts severe postoperative pain in the next 7 hours more accurately than the VAS score.

ESRAS-0391

Postoperative Pain Management

ULTRASOUND-GUIDED INTERCOSTAL NERVE BLOCK AFTER COSTAL CARTILAGE HARVEST EFFICIENTLY REDUCES PAIN IN PEDIATRICS

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Aims: Costal cartilage harvest is a critical procedure in total auricular reconstruction. Perioperative analgesia has traditionally been provided by simple intravenous infusion. Our aim was to find out if ultrasound-guided intercostal nerve block is appropriate for pain treatment in pediatrics after Costal cartilage harvest surgical procedures.

Method: The study was approved by Zhongda Hospital Ethics Committee. We prospectively randomized 30 ASA I pediatric patients undergoing Costal cartilage harvest surgical procedures into 2 groups: the intercostal nerve block (B group, $n = 15$) received an ultrasound-guided intercostal nerve block with 2 mL 0.25% ropivacaine each intercostal after surgical procedure and the control group (C group, $n = 15$) received 2 mg/kg Tramadol i.v immediately after surgical procedure. Post operatively, all patients received PCA Tramadol. The efficiency of postoperative analgesia was assessed with VAS, FLACC at 4 h (T1), 8 h (T2), 12 h (T3), 24 h (T4), 48 h (T5) of postoperative period, time to 1st rescue analgesia demand and side effects also recorded in this period.

Results: Compared with C group, the VAS scores in the B group were significantly lower at T1 and T2 ($P < 0.05$ both), FLACC scores in the B group were significantly lower at T1 ($P < 0.05$) but higher at T3 ($P < 0.05$). The time to 1st rescue analgesia demand in B group were delayed than those in C group. None intercostal nerve block associated side effects were observed in B group.

Conclusion: Ultrasound-guided intercostal nerve block after Costal cartilage harvest with 2 mL 0.25% ropivacaine each intercostal provided efficient analgesia in pediatrics.

ESRAS-0496

Chronic Pain Management

ACUPUNCTURE AND KETAMINE IN TREATING CHRONIC

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Aims: Chronic backache is a common clinical symptom in Iraq. Most painkilling medications, such as non-steroidal anti-inflammatory drugs, have undesirable side effects, particularly affecting the stomach. Ketamine is an anesthetic drug that can be used intramuscularly, intravenously, or orally. It has an analgesic effect with no side effects on the stomach if taken orally. This report provides an overview of available clinical data on the use of acupuncture and oral ketamine in the treatment and management of chronic back pain.

Introduction: The primary aim of this research was to determine if the use of oral ketamine is effective, safe, and acceptable for patients presenting with low back pain. The reason for its use in conjunction with acupuncture treatments was to try to reduce the number of acupuncture treatments needed for relief of this condition.

Background: Ketamine, a derivative of phencyclidine, was introduced into clinical practice in 1965 and started being used in Iraq around 1978. This drug is a water soluble compound which may be administered by intravenous (IV) or intramuscular (IM) injection or ingested orally.

Results: 1) In the Study group, 29 out of 50 patients (58%) became pain-free. These patients were given ketamine along with acupuncture.

2) Thirteen out of 50 patients (26%) experienced a decrease in pain by one half. These patients were given ketamine with acupuncture for the first course of treatment. For the second course, they had acupuncture treatments only, without ketamine.

3) The remaining 8 out of 50 patients (16%) had no response during the first course. Among these eight participants, six requested ketamine in a smaller dosage than was used in the other courses (in combination with acupuncture), and two required surgery.

4) For the Standard group of 30 patients treated with acupuncture only, 30% were pain free after the first course of acupuncture, 50% had pain reduced by one half, and only 20% showed no response during the first course.

Conclusion: Acupuncture alone may not be enough when treating chronic backache. Longer treatment time may be needed. When acupuncture is combined with ketamine, the treatment time is reduced with good results. Acupuncture has an analgesic and sedative effect which can possibly override the side effects of ketamine (an increase in blood pressure, pulse rate, and possible hallucinations which can occur if ketamine is given orally in large doses and common if ketamine is used IV or IM alone).

ESRAS-0416

Chronic Pain Management

LUMBAR FACET MEDIAL BRANCH RADIOFREQUENCY DENERVATION (RFD) IN SPECIALIST PAIN MANAGEMENT CENTRE: A REVIEW OF CURRENT PRACTICE

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Aims: RFD of the lumbar medial branch is a common procedure for the treatment of facetogenic low back pain. At Ashford and St Peter's hospital (ASPH), we routinely provided this procedure for more than 300 patients per year. We aimed to assess our current practice at ASPH and to evaluate patient satisfaction with RFD service.

Method: After departmental approval, we collected data on 70 patients undergoing RFD. We assessed grade of operator, selection criteria, type of RFD needle and generator, Local anaesthetic (LA) and steroid volume and amount and duration of temperature generated. Patient satisfaction with RFD was also conducted.

Results: Consultants specialised in pain performed/supervised 100% of the RFD. The most common selection method used was one successful medial branch block with 0.5 mL of LA (chirocaine 0.5%) plus depomedrone 10 mg -15 mg. 20G Neurotherm cannula with a 10 mm straight tip was the most commonly used RFD needle. Most of the consultants used 80 degrees C generated by Neurotherm machine for 90-180 seconds. Motor stimulation was performed in 100% of the RFD to confirm the needle proximity to the nerve root. Patient satisfaction with RFD service was very high (82%) and 71.5% of patients rated the value of RFD as quite or extremely helpful for their care overall.

Conclusion: We concluded that the majority of RFD techniques were performed as described by the international spinal intervention society. Our study also showed that ASPH offers high quality RFD services, ample opportunities for pain trainees to advance their competency in RFD and a high patients satisfaction rate.

ESRAS-0465

Chronic Pain Management

PAIN MANAGEMENT IN A CHILD WITH INFANTILE NEURONAL CEROID LIPOFUSCINOSIS (NCL)

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Aims: NCL is a rapidly progressing lysosomal storage disorder. Profound neuronal degeneration, cortical thinning and overall brain atrophy are prominent features. The symptoms usually develop around 18 months of age and may include visual defects and blindness, motor and cognitive deficits, seizures and ultimately early death. Lifespan is short (death typically occurs by respiratory failure).

Method: The authors intend to describe the chronic pain management of a paediatric patient with NCL.

Results: A 12 years old girl, 26Kg, diagnosed with NCL 9 years ago was referred to Chronic Pain Unit (CPU) due to severe pain, particularly during provision of hygiene care. The usual medication was tramadol, baclofen, sodium valproate, levetiracetam and clonazepam. In CPU, morphine 150 µg/Kg sc was administered without respiratory depression. An analgesic plan was established and introduced in hospital environment: acetaminophen 15 mg/kg t.i.d. and titration with rapid release oral morphine 8 mg q.4 h via gastrostomy. Respiratory depression occurred and the dose of morphine was lowered and then followed by rotation to transdermal fentanyl 6.25 µg/h every 3 days. According to the child's caregiver the pain is now better controlled. The child is frequently re-evaluated to adjust the dose of opioid agents.

Conclusion: Treating chronic pain in paediatric patients may be challenging and is important to ensure a good quality of life for the child and its family. Morphine is the gold standard for pain relief in the paediatric population. However, transdermal formulations may be used and are more suitable in some patients, particularly when oral slow release formulations are not available via gastrostomy.

ESRAS-0446

Chronic Pain Management

FACIAL NERVE PARESIS AND LOW BACK PAIN: A CASE REPORT

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Aims: Low back pain (LBP) may be associated with, muscle tension, or stiffness localized below the costal margin and above the inferior gluteal folds. It may occur with or without sciatica.

Method: Case report.

Results: 73-year-old woman with a medical history of LBP since 2000, discectomy in 2007, stabilisation of the spinal column in 2010, positioning of a medullary pacing, followed by its removing in 2011. In March 2013, she experienced a facial nerve paresis (FNP) with negative neurologist evaluation and MRI, MR-A and EMG made for a hypo-dysesthesia on the left side of the body. She was given pregabalin and duloxetine warranting pain control without resolution of FNP. In December 2013 she was followed up by our Acute and Chronic Pain Service for hyperalgesia of bilateral sacroiliac. She underwent infiltration with triamcinolone 80 mg and 100 mg lignocaine. Trigger points localised at the left middle trapezius, square of the loins and small left gluteus were infiltrated with lignocaine too. She was given NSAID therapy together with 4 mg of tizanidine for 15 days. A patient's reevaluation occurred after 15 days. Facial paresis was resolved, albeit hyperalgesia of sacroiliac was still on. She underwent a new infiltration with same drugs. The trigger points at right middle trapezius and dentatus were infiltrated with 100 mg lignocaine at D4-D5 level. Lumbar scar was infiltrated too with lignocaine to gain resolution of pain.

Conclusion: A proper clinical evaluation and management of LBP can reduce human and economic and harmful clinical consequences.

ESRAS-0105

Chronic Pain Management

NOVEL ULTRASOUND GUIDED GENICULAR NERVES BLOCKADE AND RADIOFREQUENCY DENERVATION IN COMPARISON TO FLUOROSCOPY GUIDED TECHNIQUE

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Aims: Genicular nerves block (SL, SM, and IM) seems to be a promising technique providing partial knee denervation and good pain relief for patients who are not indicated for knee replacement.

The traditional method is based on fluoroscopy guidance and bony landmarks. We described the use of ultrasound to guide needle placement to the same end point of intervention but with greater appreciation of neighbouring structures such as periosteum and accompanying vessels. These articular branches around the knee joint are known as genicular nerves and are exclusively sensory nerves branching from tibial, common peroneal, saphenous and obturator nerve.

Method: Using longitudinal US, scan junction of the shaft and the epicondyle of the femur with genicular artery and nerve were identified. 90 degrees rotation allows the probe to lie along the nerve and artery. Needle inserted "in plane" parallel to the nerve and artery and close to periosteum.

Results: In our series we observed very good correlation of US guided technique with fluoroscopy. Responders to local/ anaesthetic steroid block have been qualified for radiofrequency treatment.

Conclusion: We have performed a series of genicular nerves blocks and radiofrequency ablations with satisfactory results similar to previous published data. We have introduced ultrasound guided technique with reliable end point of intervention and appreciation of surrounding anatomical structures. Ultrasound can reliably be used to visualise the genicular nerves in order to perform diagnostic blocks and radiofrequency treatments. The advantages are no exposure to radiation, added accuracy in delivering the treatment hence increased success rate.

ESRAS-0286

Chronic Pain Management

EPIDUROSCOPY AS A DIAGNOSTIC TOOL FOR THE LOWER BACK PAIN

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Aims: Epiduroscopy has been performed for the treatment of lower back pain such as adhesiolysis, irrigation of the epidural space, and direct drug

administration to the pathologic site in the epidural space. However, we need to change our perspective of the epiduroscopy as a diagnostic tool for seeking the cause of lower back pain.

Method: Although we use a MRI as a definite diagnostic tool for detecting the cause of lower back pain, it cannot provide the origin of lower back pain. MRI is only an image, not the real situation. If we can see the epidural space by epiduroscopy, we can get the more accurate information by a direct vision of the epidural space.

Results: I would like to introduce one interesting case that we found the disc protrusion and epidural adhesion by epiduroscopy inspite of not detecting the disc protrusion by MRI.

Conclusion: Epiduroscopy can be a useful tool for the diagnosis of lower back pain as well as the treatment of lower back pain.

ESRAS-0361

Chronic Pain Management

PROLONGED RELIEF OF HEAD AND FACE NEURALGIA AFTER REGIONAL NERVE BLOCKS

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Aims: The main sensory innervation of the face derives from the cranial nerve V and the upper cervical nerves. Atypical neuralgia is characterized by unilateral, prominent, constant and severe aching, boring or burning pain within the affected distribution of the cranial nerve.

Method: 11 patients with facial neuropathic pain were forwarded to pain clinic because of complications and side effects of high doses of anticonvulsant therapy, antidepressants therapy and still suffering of severe burning pain. All patients, after they signed informed consents, were treated with three or four series of minimal invasive techniques of reaching the trigeminal/ maxillary/ cranial nerves through the face without the skin incision. The goal of peripheral local levobupivacaine and corticosteroids injections was to block the area of the injured nerves to keep it from sending pain signals to the brain.

Results: All patients experienced an initial total relief of ongoing pain for 8–12 hours. Evoked pain which occurred in all patients, was blocked simultaneously with the spontaneous pain. In all of the patients we achieved a long term decrease of anticonvulsant daily therapeutic doses. In one young female patient with trigeminal (V2) neuralgia the nerve blocks reduced the incidence of pain appearance but she expressed the side effects of corticosteroids injections, so after applying the blocks twice she gave up.

Conclusion: Prolonged relief of neuralgia after regional blocks may be the result of a central action of local anesthetics and corticosteroids at the spinal level after an intra-axonal incorporation and centripetal axoplasmic transport, and allow us to avoid the drug abuse.

ESRAS-0469

Chronic Pain Management

PROLONGED PAIN RELIEF FROM HEAD AND FACE NEURALGIA AFTER REGIONAL NERVE BLOCKS

Kalagac Fabris L., Biberić M., Koseto A. General Hospital Pula, Pain Clinic, Pula, Croatia.

Aims: The main sensory innervation of the face derives from the cranial nerve V and the upper cervical nerves. Atypical neuralgia is characterized by unilateral, prominent, constant and severe aching, boring or burning pain within the affected distribution of the trigeminal/ cranial nerve.

Method: 11 patients with facial neuropathic pain were forwarded to pain clinic because of complications and side effects of high doses of anticonvulsant, antidepressants therapy and still suffering of severe burning pain. All patients, after they signed informed consents, were treated with three or four series of minimal invasive techniques of reaching the trigeminal/ cranial nerves through the face without the skin incision. The goal of peripheral local levobupivacaine and corticosteroids injections was to block the area of the injured nerves to keep it from sending pain signals to the brain.

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Conclusion: Prolonged relief of neuralgia after regional blocks may be the result of a central action of local anesthetics and corticosteroids at the spinal level after an intra-axonal incorporation and centripetal axoplasmatic transport, and allow us to avoid the drug abuse.

ESRAS-0045

Chronic Pain Management

EFFECT OF EPIDURAL STEROID INJECTION ON BONE MINERAL DENSITY IN POSTMENOPAUSAL WOMEN ACCORDING TO ANTIOSTEOPOROTIC MEDICATION USE

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Aims: No studies to date have compared bone mineral density (BMD) changes after epidural steroid injection (ESI) between postmenopausal patients taking antiosteoporotic medication and those not taking antiosteoporotic medication. The aim of the present study was to analyze the relationship between ESI and BMD changes in postmenopausal patients according to antiosteoporotic medication use.

Method: We retrospectively analyzed postmenopausal women who underwent ESI using dexamethasone. All women had received a diagnosis of lumbar spinal stenosis and their BMD measurements had been taken before and after treatment. BMD was measured by dual-energy X-ray absorptiometry at the lumbar spine, femoral neck, femoral trochanter, and total femur and was recorded as absolute g/cm² and T-scores. A total of 61 patients were included in the final analysis. Patients were grouped as follows: group 1 comprised 35 ESI patients who took antiosteoporotic medication; group 2 comprised 26 ESI patients who did not take antiosteoporotic medication.

Results: In group 1, there were no significant differences between baseline BMD absolute values (g/cm²) and changes in BMD absolute values (g/cm²) in the lumbar spine, femoral neck, femoral trochanter, and total femur. In group 2, significant changes in the post-treatment BMD absolute values (g/cm²) from baseline were observed in the femoral neck, femoral trochanter, and total femur, but not in the lumbar spine.

Conclusion: Our data provide new evidence indicating that ESI causes BMD changes in postmenopausal women who do not take antiosteoporotic medication. Thus, we recommend that prophylactic antiosteoporotic treatment be considered for postmenopausal women who require ESI treatment.

ESRAS-0350

Chronic Pain Management

RESEARCH PROPOSAL: ATTITUDES OF ITALIAN PATIENTS WITH CHRONIC NON-CANCER PAIN TOWARDS OPIOID ANALGESICS

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Aims: The prevalence of chronic pain in Italy is among the highest in Europe (21.7%). Conversely, the per capita consumption of opioids is at the lowest levels, especially due to the attitudes of patients towards these drugs. The cultural setting may also affect the understanding, expression and treatment of pain. The goal is firstly to identify the attitudes of Italian patients with chronic non-

cancer pain towards the use of opioids, and secondly the factors influencing patients' choice in accepting opioids.

Method: The study will be conducted at our institution's Pain Clinic via a questionnaire. For six months, all opioid-naïve patients aged between 18 and 75 years with a diagnosis of chronic non-cancer pain will be asked to participate in the study. A registered nurse will present the study, obtain informed consent, and help patients to self-complete the questionnaire. After a simple definition of opioids the questionnaire includes: a) indication of the level of agreement with statements about the use of opioids for pain currently experienced by the patient and the attitude towards drugs in general, b) the degree of concern regarding various real or presumed side effects, c) demographic data, d) location, intensity, and duration of pain.

Results: The results of this study will contribute to understanding the attitudes of patients to opioids.

Conclusion: This study should help to improve the management of patients with chronic pain.

ESRAS-0341

Chronic Pain Management

A REVIEW ON TREATMENT OF MALE DEEP DYSPAREUNIA

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Aims: Dyspareunia is defined as pain perceived within the pelvis, associated with intercourse. This condition is clinically subdivided to superficial and deep. Distribution and severity of the pain and its associated symptoms vary significantly among individuals. This study aims to evaluate the medication used to treat male deep dyspareunia.

Method: The authors reached a consensus opinion on the treatment of male dyspareunia after reviewing and discussing information from the Medline and ScienceDirect databases.

Results:

Pharmacological Treatment
Pregabalin
Antibiotics
A-adrenoreceptor antagonists
Anti-inflammatory drugs
Tricyclic antidepressants
Anticholinergic agents
5a - reductase inhibitors
Opioids
Allopurinol
Pentosan polysulphate
Muscle relaxants
Botulinum toxin

TABLE 1. Pharmacological treatment

In most cases, the etiology of male dyspareunia remains unclear. Given this knowledge gap in pathophysiology of deep dyspareunia, physicians usually prefer a symptom-based treatment approach for their patients. Treatment options include mainly oral medication, such as antibiotics, anti-inflammatory drugs and 5a-reductase inhibitors (Table 1). Other treatments include minimally

invasive procedures (microwave chemotherapy, transurethral needle ablation, neuromodulation devices), physical treatment, psychological therapy and phytotherapy.

Conclusion: Treatment management options in male dyspareunia are limited by a lack of randomized controlled trials. Therefore further research is recommended for the effective cease of dyspareunia on men.

ESRAS-0250

Chronic Pain Management

THE ROL OF ULTRASOUND IN PUDENDAL RADIOFREQUENCY

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Aims: The pudendal neuralgia involves sharp pain along the area of the pudendal nerve. It can occur postoperatively or without a provoking factor. A recent retrospective study concluded that pudendal neuralgia is “poorly recognized and poorly treated”

The treatment includes medication, pudendal nerve blocks, neuromodulation and in the last step surgery (decompressive surgery).

The pudendal nerve block has been used in the treatment of the pudendal neuralgia. Usually this block is realized like “blinded block”, only by anatomic references. We want to describe the importance of use of the sonography in the pudendal radiofrequency.

Conclusions: The ultrasonography do the radiofrequency of pudendal nerve more save and more efficient. Using ultrasonography in the locating of pudendal nerve, the outcomes can improve and the complications decrease.

Method: We present a 10 cases, male and female, with pudendal neuralgia or pain in perineal region, where we used a pulsed radiofrequency ecoguided for the treatment of the pain in pudendal nerve area.

Results: After 3 months follow-up, the quality of live has improve and the EVA decreased.

Conclusion: The ultrasonography do the radiofrequency of pudendal nerve more save and more efficient. Using ultrasonography in the locating of pudendal nerve, the outcomes can improve and the complications decrease.

ESRAS-0435

Chronic Pain Management

RETROSPECTIVE AUDIT ON DEEP BRAIN STIMULATION FOR CHRONIC PAIN: IRISH EXPERIENCE

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Aims: To assess feasibility, safety and effectiveness of Deep Brain Stimulation for treatment of intractable pain.

Method: Electrical intracerebral stimulation (also known as Deep Brain Stimulation (DBS) involve insertion of a device in brain. It's a neuromodulatory technique that is being used for various conditions including chronic pain. Other indications include Parkinson's disease, dystonia, essential tremor and OCD.

We performed retrograde analyses of patients who have DBS inserted for chronic pain during the period of 2010 to 2014. These patients were referred to Oxford University Hospital Oxford UK. Total 12 patients have DBS inserted during this period. Electrodes were inserted in somatosensory thalamus and periventricular gray region. We assessed the patients for pain relief, overall improvement of quality of life, changes in medications and associated complications.

Results: Most of the patients didn't have adequate pain relief. Few had serious complications. No improvement in quality of life, neither decrease in medications were noted. Our audit shows it may be helpful for carefully selected patients.

Conclusion: In overall results of DBS in our series of patients can be regarded as unsatisfactory. However there some who benefited from this method. Probably more careful selection is a key to success.

ESRAS-0106

Chronic Pain Management

MEDICINALLY STEP SCHEME IN COMBINATION WITH ACUPUNCTURE AND LOCAL ANALGESIA, PHYSIOTHERAPY, PHYTOTHERAPY TO CURE OR RELIEF OF REFRACTORY ULCERATIVE COLITIS AND IRRITABLE BOWEL SYNDROME

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Aims: The chronic bowel disease ulcerative colitis is an incidence at 3.0 to 3.9 per 100,000 people, or about 128,000 to 328,000 patients.

Method: In the acute episode is above-mentioned Step scheme with phytotherapy Mesalazin, E. coli Nissle and in severe cases, cortisone, in combination with lumbaler-, thoracic sympathetic chain blockade of spinal nerves bloc Th5 - L3/L4, vagus nerve blockade, PDA Th6/7, L1/2, lower fan-shaped infiltration of the left abdominal wall with 50 ml of 1% procaine without X-ray and CT fluoroscopy radiation exposures and acupuncture are performed to Trang with sensational success. After 1 to 7 treatments, most patients do not have diarrhea, and blood in the stool more so that cortisone may be discontinued, and if necessary Mesalazin.

Results: A patient has more than 20 years because of cortisone intolerance in part to 25 bowel movements day. After 3 treatments she received at regular treatments in 1 to 4-week interval 10 years without medication no thrust, then it has 2 drawers at intervals of 4 weeks, which could be eliminated with my combination treatment.

Conclusion: With a large number of patients with ulcerative colitis, with over 80% very good therapeutic success, we can conclude that the levels is referred to above is the treatment of choice in patients with ulcerative colitis, because it is more economical and can bring healing in an almost incurable disease. Each patient costs the Community 2500–7000 euros per year, for a total of 1 to 2 billion a year.

ESRAS-0262

Chronic Pain Management

INTERVENTIONAL PAIN MANAGEMENT FOR THE TREATMENT OF SPINAL PAIN: AN AUDIT AT PAIN CLINIC IN TERTIARY CARE HOSPITAL

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Aims: Interventional pain management (IPM) is the discipline of medicine devoted to the diagnosis and treatment of pain-related disorders. The aim of this audit was to evaluate the efficacy of interventional pain management (IPM) procedures for treatment of spinal pain.

Method: After getting exemption from ethical approval for this study by Ethical Committee of the Aga Khan University Hospital, Karachi, Pakistan (3113-Ane-ERC-14) all adult patients who underwent diagnostic interventional pain management (IPM) procedure between 1st January 2013 to 31st December 2013 were enrolled in this audit. Patients who underwent therapeutic IPM procedure for spinal pain after positive diagnostic IMP procedure were included in this audit. All patients were followed for next one year. Effective therapeutic IPM procedure was defined as 60–70% decrease in numerical rating pain score from base line after 2 to 3 IPM procedures for up to Six months.

Results: Total sixty four adult patients with spinal pain were reviewed in which 23 were male while forty one were female. Eight patients had axial pain while 56 had radicular pain. Out of 64, four patients had spine surgery before procedure. Two patients underwent spine surgery because of ineffective pain control. Statistically significant difference was observed in pain score of patients between pre-IPM and post-IPM procedure ($p=0.0005$). In 90% of patients, interventional pain management (IPM) procedures were effective for treatment of spinal pain.

Conclusion: In this study, interventional pain management (IPM) procedures proved effective for treatment of spinal pain in 90% of patients.

ESRAS-0116

Chronic Pain Management

EFFICACY OF MULTIPLE EPIDURAL INJECTIONS OF STEROIDS FOR LOW BACK PAIN

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Aims: To examine the efficacy of multi epidural injection in treatment of low back pain.

Method: We evaluated retrospectively 62 patients with low back pain, 40 mg methylprednisolone mixed with 1 ml normal saline plus 1 ml of plain bupivacaine and 1 ml lidocaine. This total amount was administered in epidural space at the point of severe pain in prone position. The epidural injection was done 3 times for every patient, with an interval of 10 days in each injection. Each patient was interviewed and asked about the pain according to visual analogue scale on every visit. And after the third injection was given the patient was asked for a follow up after 8 weeks.

Results: After 10 days from first injection 35 patients showed improvement of pain, 25 patients reported no change and 2 patients had no follow up. 10 days After the second injection 55 patients (80.7 %) showed improvement, an addition of 20 patients from the first result, 4 patients showed no change and one patient had no follow up plus the two patients who received the first injection but had not shown up for the second and last. After 8 weeks from last injection 57 (91.93 %) patients completely improved of low back pain, one patient had pain and a total of 4 patient had no follow up (1-from last visit).

Conclusion: Multiple epidural injections are effective and safe in the treatment of low back pain, as what was shown in the results of our study.

ESRAS-0125

Chronic Pain Management

ULTRASOUND-GUIDED AXILLAR BLOCK IN AN ADOLESCENT FOR THE TREATMENT OF ALGODYSTROPHY

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Aims: Algodystrophy occurs in children significantly less frequently than adults. Symptoms, course, responsiveness to treatment and prognosis are also different. In this case, we described an adolescent with algodystrophy and her progress after hand surgery.

Method: A 12 year old girl experienced throbbing and shooting pain in her left hand. She complained of oedema at the wrist and discoloration for 1.5 years. MRI results demonstrated regional effusion and the patient underwent hand surgery. Three days after the surgery her pain and oedema worsened. She became completely unable to move the fingers and did not allow the affected hand to be touched. The symptoms accompanied with hyperesthesia and the hand became paler and colder. The patient received paracetamol and NSAIDs but pain did not resolve.

Results: Ultrasound-guided somatic block of the brachial plexus at the axilla was performed with 15 mL 0.25% bupivacaine. Immediately the hand became warmer and painless with a normal skin colour and all symptoms resolved a week after the treatment.

Conclusion: Algodystrophy in adolescents may pose a significant challenge even to a physician and comprehensive therapy with somatic blocks would be appropriate.

ESRAS-0128

Chronic Pain Management

A NEW ASPECT TO AN OLD CHRONIC SITUATION: TREATMENT FOR POST-AMPUTATION PAIN

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Aims: Post-amputation pain is highly prevalent after limb amputation but remains an extremely challenging pain condition to treat. Inflammation initiates peripheral mechanisms and contributes to limb pain and phantom sensation. We present a patient with presumed phantom limb pain subsequently discovered to be caused by contracted, painful hypertrophic scar tissue.

Method: A 37 year old man developed post-amputation pain due to traffic accident a year ago. Mirror therapy and medical therapy with pregabalin for

phantom pain failed. The complaints like burning, tingling, shooting, stabbing and stretching were increased following placement of prosthesis on his left leg. Physical examination revealed pain during palpation of hypertrophic scar tissue and its extension through dermatomes.

Results: Medical therapy with tramadol 2x10 drops/daily and infiltration block through the contracted scar tissue with 100 mg diclofenac and lidocaine in 10 mL solution decreased the initial NRS score of 10 to 4 following 2 repeats with one week interval. The tension and contraction of the scar tissue resolved and the patient substantially healed from limb pain and phantom pain.

Conclusion: The cause of the supposed phantom pain might be related to poorly fitting prosthesis and wound retraction that both create mechanical compression on nerve tissue. The infiltration block with diclofenac and lidocaine may resolve the tension of the contracted scar tissue by tearing the adhesions. Phantom limb pain should be carefully differentiated for proper treatment.

ESRAS-0282

Pediatric

LATERAL FEMORAL CUTANEOUS NERVE BLOCK AFTER ULTRASOUND-GUIDED ILIOINGUINAL BLOCK: A CASE REPORT

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Aims: Abdominal wall nerve blocks are frequently used for postoperative analgesia following pediatric inguinal surgery. Despite its safety, there is a 7-10% incidence of transient femoral nerve palsy. Direct sonographic visualization improves the blockage quality and reduces the risk of complications. The purpose of this report is to describe a case of lateral cutaneous nerve of the thigh after an ultrasound-guided ilioinguinal block.

Method: Description of a clinical case.

Results: 14 year old male patient, weighing 60 kg, ASA I, with no significant past medical and surgical history, was scheduled for bilateral orchidopexy as a day case surgery. After obtaining informed consent, anesthesia was induced using 0,15mg of fentanyl and 300mg of propofol and the airway was secured using a laryngeal mask airway (size 4). Anesthesia was maintained with sevoflurane. A bilateral ultrasound guided ilioinguinal nerve block was performed, using 0.5% ropivacaine (10 mL for each side). Additional analgesia was given during the surgery – acetaminophen 1g and cetorolac 30mg. The surgery was concluded without any complication. Postoperatively the patient referred complete pain relief at the operative site and paresthesia over the lateral part of the thigh. The patient made a complete recovery 8 hours after surgery without any treatment, thus not postponing Hospital discharge.

Conclusion: Although ultrasound-guided blocks allow better identification of structures and lower local anesthetic doses, it does not prevent fascial dispersion of the local anesthetic, and the resulting blockage of other nervous structures.

ESRAS-0344

Pediatric

ANALGESIC EFFICACY OF NERVE STIMULATED PUDENDAL BLOCK VERSUS CAUDAL BLOCK FOR HYPOSPADIAS SURGERY IN CHILDREN

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Aims: The aim of this prospective randomized study is to assess the analgesic efficacy and duration of Pudendal block(PB) compared with Caudal block(CB) for pediatric patients undergoing hypospadias surgery concerning intraoperative analgesic and also postoperative total analgesic consumption within 24 hours.

Method: In this prospective study, patients were randomized into 2 groups, either receiving CB or nerve stimulator-guided PB. In the PB group, patients were injected with 0.5 mL/kg 0.25% bupivacaine. In the CB group, patients were injected with 1 mL/kg 2mg/kg bupivacaine. Intraoperative analgesic

requirement and postoperative analgesic consumption that was assessed. The “face pain scale” used to assess postoperative pain.

Results: There were no significant differences of age, weight, time to perform to block and surgery duration. PB group showed significantly lower postoperative pain scores than the caudal block group ($p < 0.0001$). The percentage of patients who received analgesics during the first 24 hours in the CB compared with the PB group ($p < 0.0001$). Parent satisfaction was significantly higher in PB compared with the CB ($p < 0.0001$).

Conclusion: PB is safe and effective analgesic method during the intraoperatively and postoperatively in pediatric patients undergoing hypospadias surgery.

ESRAS-0354

Pediatric

A COMPARISON OF EFFECTIVENESS OF PUDENDAL NERVE BLOCK VS PENILE NERVE BLOCK FOR CIRCUMCISION IN CHILDREN

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Aims: The aim of this prospective randomized study is to assess the analgesic efficacy and duration of Pudendal block (PB) compared with Penile block for pediatric patients undergoing circumcision surgery concerning intraoperative analgesic and also postoperative total analgesic consumption within 24 hours.

Method: In this prospective study, patients were randomized into 2 groups, either receiving penile block or nerve stimulator-guided PB. In the PB group, patients were injected with 0.5 mL/kg 0.25% bupivacaine. In the penile block group, patients were injected with 0.5 mL/kg 0.25% bupivacaine. Intraoperative analgesic requirement and postoperative analgesic consumption that was assessed. The “face pain scale” used to assess postoperative pain.

Results: PB group showed significantly lower postoperative pain scores than the penile block group. The percentage of patients who received analgesic during 24 hours were significantly higher in the penile block compared with the pudendal block.

Conclusion: Patients who received PB had reduced analgesic consumption and pain within the first 24 hours postoperatively compared with penile block.

ESRAS-0290

Pediatric

DEXMEDETOMIDINE AS ADJUNCT TO ILIOINGUINAL/ILIOHYPOGASTRIC NERVE BLOCKS FOR PEDIATRIC INGUINAL HERNIA REPAIR: AN EXPLORATORY RANDOMIZED CONTROLLED TRIAL

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Aims: Adult meta-analysis has identified dexmedetomidine as a potentially useful adjunct to prolong the duration of peripheral nerve blocks. However, no data exist in the setting of pediatric peripheral nerve blocks.

Method: The study was approved by the Regional Ethical Review Board of Stockholm (EPN N° 2013/527-31/1). Using a prospective, randomized, double-blind design, children (1½-8 yrs, ASA 1-2) scheduled for outpatient inguinal hernia repair were randomized to receive either an ultrasound guided ilioinguinal/iliohypogastric nerve block (IINB) with plain ropivacaine 0.197 % (Group LA; n = 21) or ropivacaine 0.197 % with adjunct dexmedetomidine 0.3 mcg kg⁻¹ (Group LAD; n = 22). The primary endpoint was time to first postoperative administration of supplemental analgesia (FPASA) triggered by a pain score ≥ 4 (CHIPPS or NRS scale). Intention-to-treat (ITT) analysis was decided as the primary statistical analysis of the data.

Results: The median time to FPASA was prolonged by 88 % following the use of adjunct dexmedetomidine (4.0 hours and 7.6 hours in group LA and LAD, respectively) ($p = 0.0717$). Group LA displayed a higher number of patients

with a CHIPPS score ≥ 4 in the PACU (7 vs. 0; $p = 0.0029$) and a higher incidence of PAED (4 vs. 0; $p = 0.0485$) when compared to Group LAD.

Conclusion: The use of dexmedetomidine as an adjunct to an IINB resulted in reduced incidences of CHIPPS pain scores ≥ 4 and PAED scores of ≥ 11 during early recovery, and with a prolongation of the period to first supplemental analgesia demand following pediatric inguinal hernia repair.

ESRAS-0255

Pediatric

INJECTION OF ROPIVACAIN INTO TWO FASCIA LAYERS TO BLOCK THE ILIOINGUINAL/ILIOHYPOGASTRIC NERVES IS EFFECTIVE FOR POSTOPERATIVE PAIN MANAGEMENT OF PEDIATRIC HERNIOPLASTY

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Aims: The ilioinguinal/iliohypogastric (II/IH) nerves block is conventionally performed by injecting local anesthetics between the internal oblique muscle and transversus abdominis muscle (IOM/TAM). The effectiveness is not always sufficient, because of the wide variation in abdominal nerve networks and the role possibly played by the fascia between the internal and external oblique muscle (EOM/IOM). Therefore we planned a prospective study to evaluate both fascial planes (EOM/IOM and IOM/TOM) as injection sites of ropivacaine for postoperative analgesia.

Method: After the ethics committee approval of our institute and written approval of guardians, we recruited 50 patients aged 0-8 years who received unilateral inguinal hernioplasty as outpatients. After induction of general anesthesia, ultrasound-guided II/IH nerves block was performed with 0.2% ropivacaine, 0.2 mL/kg into the IOM/TAM and then 0.1 mL/kg into the EOM/IOM. In the recovery room, an assigned nurse used the FLACC score to evaluate postoperative pain on arrival and at 30 and 60 min. Analgesics were given when the score was over 7.

Results: Thirty-eight patients participated in this study. Twenty-six of 38 patients [68%] did not require analgesics in the recovery room. Median FLACC scores were 1 on arrival, 5 at 30 min, and 0 at 60 min. No perioperative complications were observed.

Conclusion: II/IH nerves block by injection into two fascia layers, EOM/IOM and IOM/TOM, is an effective method for pediatric hernioplasty; however, further study is needed to compare the two-fascia injection method with the single-fascia injection method.

ESRAS-0436

Pediatric

THE USE OF DEXMEDETOMIDINE AS AN ADJUNCT ANAESTHETIC IN CHILD WITH RARE MITOCHONDRIAL MYOPATHY FOR SPINAL FUSION SURGERY DUE TO SEVERE SCOLIOSIS

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Introduction: 15 years boy with Mitochondrial myopathy complex chain disease was scheduled for Posterior spinal fusion for severe kyphoscoliosis correction.

Background: Optic atrophy Progressive scoliosis, wheel chair bound.

Medications: Co-enzyme Q 10 Thiamine.

Preoperatively: Strict instructions were recommended by the Metabolic team for Vapor free anaesthesia, avoid prolonged fasting, high dose Propofol, repeated ABGs for lactate, glucose.

Also he was commenced on L carnitine, Coenzyme Q q10, Intralipid to avoid crisis due to stress and surgery.

Intraoperatively, patient was induced with Remifentanyl, Midazolam and maintained on Remifentanyl, Dexmedetomidine infusions with Midazolam boluses. Also, he received Intrathecal 90mcg Morphine. Anaesthesia depth was monitored using BISS, EEG and the SSEP, MEP. The BISS was maintained between 40 and 60. No muscle relaxants or N2O were used which would interfere with neuromonitoring.

Repeated ABG samples remained acidotic with subtle variation from the baseline.

Patient had uneventful surgery and transferred to ICU for Morphine infusion and extubated following day without adverse outcome.

We report a case where anaesthesia was maintained with Dexmedetomidine/Remifentanyl infusions with adequate depth of anaesthesia. Prolonged Propofol infusions would have been hazardous in mitochondrial myopathy patients.

Results: Results are shown in Table 1.

TABLE 1.

ABG	Pre-op	Intra-op	
PH	7.33	7.31	
Pco2	4.5	4.9	
Po2	13.2	16.4	
BE	-4.5	-4.9	
Hco3	20.5	20.3	
Hb	12.2	10.3	
Glucose	5.8	6.3	6.8
Lactate	3.1	3.3	3.5

Conclusion: Dexmedetomidine is a useful adjunct to general anaesthesia by virtue of its alpha 2 agonist properties, with sedating and analgesic effects. Hence Dexmedetomidine can be a safe alternative adjunct anaesthetic agent in cases where Propofol use can be hazardous or contraindicated as in our case.

ESRAS-0301 Pediatric

PEDIATRIC REGIONAL ANESTHESIA FOR EXTREMITY SURGERIES IN A NIGERIAN HOSPITAL

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Background and aims: Regional blocks can be used as alternative or adjunct to general anesthesia for surgeries of the extremities in children. We describe the use of spinal blocks and peripheral regional anesthesia among a cohort of children < 15 years in our center.

Methods: Anesthetic records of one hundred and eighty children between the ages of 1 and 14 years who had regional block for extremity procedures were retrospectively reviewed from 2008 – 2014. Consent was obtained from parents/guardian of each child for procedure.

Result: Out of 180 children, 136 had orthopedic surgeries and 44 had plastic reconstructive procedures. The demographic and block data are shown in Table 1. There were 128 (71.1%) spinal, 26 (14.4%) Brachial plexus blocks for upper limb surgeries and 26 (14.4%) lower extremity blocks. In 14 (7.8%) cases, regional blocks were used as adjuncts to general anesthesia but in the rest, ketamine-midazolam or ketamine-diazepam sedation was employed.

TABLE 1. Patient characteristics, surgical and anesthetic data, N = 180

Characteristics	
Sex MF	90/90
Age (years) mean / median Range 1-14	8.1/ 9.0
Body weight (kg) Range: 10-74	24.9/ 24.0
ASA physical status I / II / III	137/ 39 / 3
Duration of surgery (min) mean / median Range: 15-310	87.5/ 80.0
Duration of block (min) mean / median Range: 10-840	159.4/ 125.0

Conclusion: This study showed that pediatric regional anesthesia was successfully used for extremity surgeries in children.

ESRAS-0280 Case Reports

PSOAS COMPARTMENT AND SCIATIC NERVE BLOCKS IN TWO GERIATRIC PATIENTS WITH DIFFERENT COMORBIDITIES

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Aims: The pathophysiologic changes in all organ systems due to advanced age has been a risk factor for anesthesia management in geriatric patients. The effects of peripheral nerve blocks on organ systems are less than general anesthesia. In this case report, we aimed to discuss psoas compartment and sciatic nerve blocks in two patients with comorbidities who had femur fracture.

Method: Case 1: A 90-years-old, 57 kg, 155 cm, ASA-III female patient with chronic atrial fibrillation, congestive cardiac failure (Ejection Fraction:45%), Alzheimer, chronic obstructive lung disease, thoracic kifosis.

Case 2: A 66-years-old, 80 kg, 154 cm, ASA-III female patient with chronic atrial fibrillation, goitre, restrictive lung disease and thoracic kifosis 45°.

The laboratory values were normal. After patients' informed consent and intravenous sedation, Psoas compartment block was performed via the nerve stimulator with a stimulation needle. Lomber plexus was localized at 4 cm lateral of L4 vertebra's spinous process at 8 cm depth with seeing the quadriceps muscle stimulation and was given %0.05 bupivacaine 90 mg-%2 prilocaine 120 mg. N. Ischiadicus was localized with the classical approach technique and % 2 lidocaine 300 mg-15 ml saline was injected. Dexmedetomidine infusion was given for sedation perioperatively. The first analgesic was applied at 10th hour after surgery.

Conclusion: The geriatric patients who need surgery increases depending on the aging world population. Perioperative careful anesthesia management reduce risk factors, morbidities and mortality. Peripheral nerve blocks are preferred in geriatric patients, to protect the state of consciousness, creating minimal changes in hemodynamic and respiratory parameters and postoperative sufficient pain control.

ESRAS-0357 Case Reports

THE IMPORTANCE WITHIN A SMALL DETAIL

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Aims: The infiltration of the surgical wound with a local anesthetic is a widely used technique in order to improve the post-operative analgesia. Ropivacaine and levobupivacaine are the most commonly used local anesthetics for this purpose. Anaphylactic reactions to the local anesthetics of the amide group are considered rare.

Method: We report a case of a 56 year-old woman with a history of asthma and pruritus when applying a topical lidocaine cream, ASA II, submitted to a lateral internal sphincterotomy.

Results: After a surgery without any complications under general anesthesia with laryngeal mask, local instillation of the surgical wound was performed with 150mg of ropivacaine 0.75%. In about one minute the patient began to develop an exuberant maculopapular rash, initially only on the face but quickly spreading to the whole body, without hemodynamic changes associated. Following the hospital protocol, 200mg of intravenous hydrocortisone was quickly administered, followed by 0.5 mg of epinephrine intramuscularly. In the next three minutes the rash worsened, and 0.1mg of intravenous epinephrine was administered, with a progressive improvement of the clinical condition.

Conclusion: With this case we intend to recall the importance of a quick response to a probable local anesthetic anaphylaxis, particularly when we do not have an airway ensured, as well as the attention one must give to some details in the patient medical history which are often ignored in the pre-anesthetic consultation. The patient was subsequently sent to an Immunology consultation to study a possible allergic reaction to local anesthetics of the amide group.

ESRAS-0306 Case Reports

CONTINUOUS SPINAL ANAESTHESIA FOR OPEN INGUINAL HERNIA REPAIR IN HIGH CARDIAC RISK PATIENT

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Aims: Continuous Spinal Anaesthesia (CSA) is the technique of producing and maintaining spinal anaesthesia by administering small doses of local anaesthetic into the subarachnoid space, via an indwelling catheter.

Method: Case Report: Male, 52 years-old, BMI:23kg/m2, ASA IV admitted for elective inguinal hernia repair. Previous history of myocardial infarction, dilated cardiomyopathy, atrial fibrillation, ejection fraction of 19%, mitral and

tricuspid regurgitation, severe pulmonary hypertension, class III-IV NYHA heart failure, with an implantable cardiac defibrillator and waiting for heart transplant.

Results: After ASA standard and invasive arterial pressure monitoring, the authors performed CSA using a Spinocath® catheter set (Braun®: epidural needle 18G, Quincke spinal needle 27G and spinal catheter 22G) at the first attempt. An initial dose of 5mg of levobupivacaine and 0.002 mg of sufentanil was injected. One hour later, an additional bolus of 3mg of levobupivacaine was administered to maintain the blockade. All potential arrhythmic factors were avoided and judicious fluidotherapy was planned. Multimodal analgesia and anti-emetic prophylaxis was provided. Anesthesia and surgery duration was 90 and 60 minutes, respectively. The catheter was removed in the operation room after the intervention. The patient was admitted in the post-anaesthetic care unit for 24 hours and discharged 4 days later, without complications during the hospital stay.

Conclusion: The authors believe that in high risk cardiac patients, CSA is a safe and advantageous technique, that allows incremental doses and thereby producing a titrated, pronounced and stable sensory-motor blockade with haemodynamic stability maintenance and fewer side effects.

ESRAS-0173

Case Reports

ANAESTHETIC MANAGEMENT OF A PARTURIENT WITH ARTHROGRYPOSIS MULTIPLEX CONGENITA AND POSTINTUBATION SUBGLOTTIC GRANULOMA: A CASE REPORT OF A MULTIDISCIPLINARY PATIENT APPROACH

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Aims: Arthrogryposis Multiplex Congenita (AMC) is a multifactorial syndrome caused by a variety of neurogenic and myopathic disorders often progressing to a state of significant disability. Several case reports with adverse obstetrical outcomes have already been reported. We are presenting the case of a polymorbid parturient with AMC where a multidisciplinary approach resulted in a successful obstetrical management.

Method: 27 years old primigravida with AMC and epilepsy, schizophrenia, several orthopaedic procedures in childhood, after tympanoplasty and previous subglottic granuloma removal was admitted to a tertiary centre in the 39th week of pregnancy for a planned vaginal delivery after previous (32nd week of pregnancy) referral to anaesthesiologist because of a severe inspiratory stridor. In week 18, she experienced epileptic status requiring intubation and resulting in a postintubation subglottic granuloma covering 70% of tracheal diameter. In week 34, granuloma was surgically removed under GA using ETT No.5. For delivery, induced by IUGR, epidural analgesia was successfully initiated and maintained with PCEA. After 10 hours, emergency CS due to dystocia was performed under GA using ETT no. 7 with the neonatal APGAR of 9/9.

Results: This is an example of a polymorbid parturient with AMC where labour analgesia was well managed with an epidural catheter and endotracheal intubation for CS uneventfully preformed after preoperative subglottic granuloma removal.

Conclusion: An early referral of polymorbid parturient to an anaesthesiologist and a multidisciplinary approach together are necessary to ensure a safer delivery and a better care of the mother and the baby.

ESRAS-0398

Case Reports

AN UNUSUAL ROUTE TAKEN BY A CENTRAL VENOUS CATHETER RESULTING IN INADVERTENT SUBCLAVIAN ARTERY CANNULATION: A CASE REPORT

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Aims: Ultrasound-guided cannulation of a central venous catheter into the internal jugular vein (IJV) was performed for a patient. The catheter was inserted into the subclavian artery despite prior ultrasound confirmation of the guidewire position.

This case demonstrates that the confirmation of the guidewire in the proximal segment of the vein is insufficient to exclude arterial cannulation.

Method: We report a case of a 80-year-old Chinese male who developed respiratory failure and shock secondary to pneumonia. In the intensive care unit

(ICU), he was hypotensive requiring vasopressors, and remained hypoxemic after intubation.

Ultrasound was used during the insertion of the central venous catheter (CVC). Following confirmation of the guidewire position in the right IJV in the in-plane and out-of-plane views, the CVC was inserted via the Seldinger technique. However, upon transducing the CVC pressures, an arterial waveform was seen and blood gas analysis of the blood sample from the CVC was consistent with arterial blood.

A bedside ultrasound and a computed tomographic (CT) angiogram of the neck showed that the catheter had been inadvertently inserted into the subclavian artery after traversing the IJV for a short distance.

Results: Above

Conclusion: Subclavian artery injury following attempted IJV cannulation has been reported but rarely did it occur in the setting of prior ultrasound confirmation of the guidewire inside the IJV prior to dilatation and railroading of the catheter.

Routine use of ultrasound is recommended for insertion of central lines. This case demonstrates that the confirmation of the guidewire in the proximal segment of the vein is insufficient to exclude arterial cannulation.

ESRAS-0283

Case Reports

ANTEROLATERAL APPROACH FOR PERCUTANEOUS VERTEBROPLASTY IN THE TREATMENT OF PAINFUL OSTEOLYTIC METASTATIC LESION OF THE LATERAL MASS OF THE ATLAS

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Aims: To evaluate the anterolateral approach for percutaneous vertebroplasty in the treatment of painful mass of the atlas.

Method: A 56-year-old man visited our pain clinic due to intractable pain in the right suboccipital area with a limited range of neck motion. On physical examination, there was tenderness in the right suboccipital area and severe limitation of right lateral rotation in the neck. A destructive lesion was found in the right lateral mass of the atlas from the computed tomography and bone scans.

The patient was placed in the supine position with a pillow placed under his shoulders to create neck extension. After sterile draping, local anesthetic with 1% lidocaine was given at the point of the anticipated needle entry. A 13-gauge vertebral needle was introduced after determining the location of the carotid artery under the ultrasound guidance. While advancing the needle, we took a great care not to pierce the vertebral artery and the spinal nerves by observing the depth of penetration using lateral fluoroscopy. After confirming the needle position in the targeted lateral mass, contrast medium was injected to observe any possible leakage of bone cement into the vessel or epidural space.

Results: Immediately after percutaneous vertebroplasty (PVP) at the lateral mass of the C1, right suboccipital headache was disappeared and the limitation of the neck motion was decreased.

Conclusion: The anterolateral approach for PVP under the guidance of both ultrasound and fluoroscopy was safe. It showed immediate pain relief and increased range of the neck motion.

ESRAS-0472

Case Reports

IS NEURAXIAL BLOCK SAFE FOR CESAREAN DELIVERY? A CASE REPORT OF A PATIENT WITH UNCORRECTED TYPE 1 ARNOLD-CHIARI MALFORMATION

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Aims: Type 1 Arnold-Chiari malformation (ACM-1) is a neurologic condition resulting from a downward displacement of the cerebellar tonsils through a narrowed foramen magnum. It is not consensual what optimal anaesthetic management for cesarean delivery is, some advocating that a spinal block may trigger brain herniation.

Method: We report the case of a 34-years- old, ASA II (ACM-1 and mild controlled asthma), primigesta presenting for elective cesarean delivery. Since the

age of 18 years, she has a history of ACM-1, presented as episodes of syncope during heavy exercise when combined with stressful periods of sleep deprivation. At the time neurosurgical correction was proposed but the patient refused it; at present she is asymptomatic, reporting only rare headaches.

Results: A cesarean delivery is planned both following her neurosurgeon's advice and due to pelvic fetal presentation. A spinal block was performed at L3-L4 median approach with 10mg hyperbaric bupivacaine and 0.001mg sufentanyl through a G25 Quincke needle. The expected block was obtained and mild hypotension developed that was reverted with IV fluids and ephedrine. A healthy full term female newborn was delivered and surgery was uneventful. Mother and baby were discharged home 3 days later. Her sole complaint was neck stiffness that she attributed to insufficient sleep at the ward, which was solved after sleeping the first night at home. After one year she remains asymptomatic.

Conclusion: As reported in this case, neuraxial block seems to be a safe option in patients with uncorrected ACM-1 presenting for cesarean delivery.

ESRAS-0195

Case Reports

AMNIOTIC FLUID EMBOLISM AND PERIMORTEM CAESAREAN SECTION - AN ANAESTHESIOLOGICAL CHALLENGE: CASE REPORT

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Aims: Amniotic fluid embolism (AFE) is a rare and potentially catastrophic condition unique to pregnancy. We report a case of AFE in a parturient with polyhydramnios who underwent perimortem caesarean section and was successfully managed by a multidisciplinary team.

Method: A 33-year old secundigravida underwent induction of labour and vaginal delivery due to persistent polyhydramnios and episodes of foetal bradycardia. Foetal heart rate was persistently decreasing following amniotomy and parturient went into seizures. When anaesthesiologists arrived the parturient was unresponsive, with dilated unreactive pupils and a palpable carotid pulse. Caesarean section was performed within 6 minutes after the emergency call. Meanwhile, pulseless electrical activity was found and after two hours of resuscitation sinus rhythm was restored with norepinephrine and levosimendan infusions. Cardiac ultrasound showed enlarged right ventricle with minimal cardiac contractility. Patient received massive transfusion and underwent delayed hysterectomy. Both mother and the baby survived.

Results: AFE is characterised by cardiovascular collapse, respiratory distress and/or disseminated intravascular coagulation during pregnancy and peripartum period. It remains one of the leading causes of direct maternal mortality. Diagnosis is clinical. Management is immediate, supportive and multidisciplinary. There have been limited case reports of other management approaches. Recent reports show a lower mortality rate (11%).

Conclusion: Many women with AFE do survive on account of excellent resuscitation and ongoing care. New insights into pathophysiology have been established and new treatment options are open. Further investigation is needed to establish whether more rapid correction of coagulopathy and early use of levosimendan are associated with improved outcomes.

ESRAS-0449

Case Reports

AUDIO-VISUAL DISTRACTION AS A CRUCIAL ADJUNCT TO EPIDURAL ANAESTHESIA AND SEDATION IN A HIGH-RISK ANXIOUS PATIENT UNDERGOING PROLONGED ORTHOPAEDIC SURGERY

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Aims: In our experience, using epidural anaesthesia and sedation (EA+Sed) for lower limb free tissue transfer (LLFTT) allows avoidance of respiratory and other complications of prolonged general anaesthesia (GA). We present a case where music as a simple modality of audio-visual distraction (AVD) became crucial in managing a high-risk anxious patient.

Method: A 54 year old man presented for LLFTT. He had BMI of 30, sleep apnoea habitus, history of heavy smoking, excessive alcohol intake and symptomatic degenerative cervical disc disease. Although very anxious, he agreed to EA+Sed.

Results: Establishing effective EA was straightforward but sedation proved difficult. Deeper sedation (propofol TCI with added ketamine) was required but, unfortunately, led to respiratory acidosis: pH 7.185, pCO₂ 10.2 kPa, pO₂ 15.6 kPa and normal BE. Alternative anxiolysis was needed.

On lightening sedation, the patient objected to the choice of music in theatre. He requested Elvis Presley, whose album was, fortunately, available on our recently acquired AVD tablet. Listening to his favourite music at preferred volume through the noise-reducing headphones allowed a 9.5hr operation under minimal (0.2µg/ml) propofol TCI sedation.

Subsequent ABG showed rapid reversal of the acidosis, with pO₂ 22.5/22.8kPa, pH 7.38/7.37, pCO₂ 5.7/6.0kPa and BE 0.4/1.3 before and after flap revascularization, respectively. There were no postoperative complications. The patient found his anaesthetic a "better experience" than his previous nineteen GAs.

Conclusion: To our knowledge, this is the first description of AVD use for prolonged LLFTT surgery, demonstrating its crucial positive role in allowing a high-risk anxious patient to benefit from EA+Sed for his operation.

ESRAS-0410

Case Reports

TRAPPED EPIDURAL CATHETER FOLLOWING COMBINED SPINAL EPIDURAL (CSE) - A RARE ANAESTHETIC DILEMMA

Gorecha M., Sainsbury K., Tilak D. *George Eliot Hospital, Anaesthetics, Nuneaton, United Kingdom.*

Aims: A Combine Spinal Epidural (CSE) has the advantage over a spinal by extending the duration of anaesthesia for surgery. This case is a rare complication where the epidural catheter was extremely difficult to remove.

Method: A 75-year old female was scheduled for an elective left total hip replacement under CSE. At the end of surgery the epidural catheter could not be flushed or removed. By sitting the patient forward with lumbar flexion the catheter was removed and a noticeable pinch at 5.5cm was seen but intact (Figure 1). This could have been due to likely compression from the posterior element of the spine.

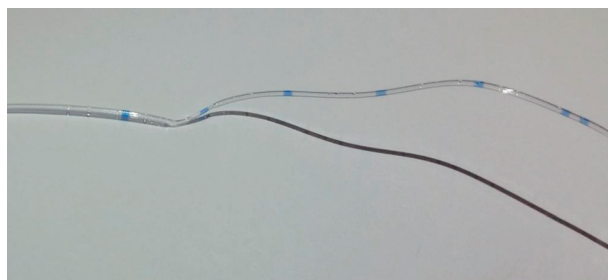


FIGURE 1.

Results: The patient made a good recovery from the operation and had no complications from the epidural and was successfully discharged home after three days.

Conclusion: A trapped epidural catheter is an extremely rare complication and can be due to likely trapping in the vertebral spaces, posterior elements or the lamina. Catheter knotting is also another cause of trapped epidural catheter with an incidence of 0.0015%. The management of a trapped catheter is extremely important as undue force will risk tearing the catheter which will end up remaining inside patient and usually not possible to remove. There are a few successful manoeuvres which can be used to facilitate catheter removal including; lumbar flexion, spine rotation, returning patient to the original insertion position and injecting the catheter with saline.

ESRAS-0068

Case Reports

COMPLEX REGIONAL PAIN SYNDROME-SAME CONDITION, DIFFERENT APPROACH

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Aims: Complex regional pain syndrome (CRPS) is characterized with dysfunction of sympathetic nervous system and development of sensory, motoric,

vascular and trophic symptoms. We present you three patients with CRPS of the upper extremity that were successfully treated with different therapeutic approaches.

Method: Case "1" - Fifty one year old male patient presented four months after the trauma and operative procedure of his right arm with developed CRPS. There was no benefit of physical therapy, NSAID and antidepressive therapy. Ganglion Stellatum blockade was performed four times.

Case "2" - Sixty-five year old female patient presented with CRPS of her right hand six weeks after the trauma and operative procedure. There was no benefit of pharmacotherapy and intensive physical therapy so ganglion Stellatum blockade was performed four times. Each blockade gained only short cessation of pain so interscalene catheter was inserted for daily application of local anesthetic.

Case "3" - Fifty-seven year old female patient developed CRPS of the middle finger on the right hand after no previous trauma. The symptoms lasted for six months with no benefit from NSAID, pregabalin and physical therapy. Digital block was performed with installation of corticosteroids in the proximal interphalangeal joint.

Results: After performed procedures all of the patients had cessation of symptoms with improved clinical finding and mobility, normalization of extremity color and reduction of edema.

Conclusion: Early therapy is important in the treatment of CRPS to prevent chronic phase with irreversible changes in the skin and bones and with the pain that becomes unyielding and may involve the entire limb.

ESRAS-0139

Case Reports

TWO CASE REPORTS OF ANAESTHESIA FOR ELECTIVE CAESAREAN SECTION IN A PARTURIENT WITH PORPHYRIA

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Aims: Porphyrrias are rare metabolic disorders with low clinical penetrance. Symptoms are non-specific and could be easily mistaken for a different diagnosis. Crisis is usually provoked by drugs, endocrine factors, calorie restriction, infections and other yet unknown causes. Some anaesthetics have been implicated to trigger severe acute attacks. Inappropriate anaesthesia can therefore have a fatal outcome in an undiagnosed patient.

In obstetrics, the main factors triggering an acute porphyric crisis are hormonal changes, hyperemesis gravidarum, fasting, infections, surgery and anaesthesia.

Method: We are presenting two cases of parturients with different porphyria types: acute intermittent porphyria (AIP) and erythropoietic protoporphyria (EPP).

Both delivered by elective Caesarean section. The anaesthetic technique of choice was a combined spinal-epidural.

Results: After delivering healthy babies, the parturient with AIP was transferred to the ICU for continuous postoperative observation and the parturient with EPP, with no signs of acute crisis, could be observed in the HDU of the maternity ward. Generally, they were both feeling well, had no pain, symptoms or signs of an acute porphyric crisis.

Conclusion: Porphyria poses a special anaesthetic challenge, including preoperative assessment, correct diagnosis and type of the disease, intraoperative management, selection of the most suitable technique with appropriate anaesthetics and postoperative care, analgesia, monitoring, recognition and management of acute porphyric crisis.

Regional anaesthesia is preferred, as firstly local anaesthetics do not provoke acute crisis and secondly, an epidural catheter provides sufficient postoperative pain management with minimal use of intravenous analgesics.

ESRAS-0023

Case Reports

GLOMUS TUMOR CAUSING ANTERIOR THIGH PAIN: A CASE REPORT

Lee JU., Park SY., So SY., Ko YK. *Chungnam National University Hospital, Department of Anesthesiology and Pain Medicine, Daejeon, Korea.*

Aims: Glomus tumors are rare benign neuromyoarterial tumors, most commonly in the subungual location of the digit. They are clinically defined by a

triad of symptoms: paroxysmal pain, pinpoint tenderness and hypersensitivity to cold. However, atypical locations and symptoms can delay diagnosis and treatment. We present a case of glomus tumor with neuropathic pain in the anterior thigh.

Method: A 65-year-old man visited pain clinic with localized pain in the left anterior thigh for 10 years. The patient complained of constant dull discomfort with paroxysmal lancinating pain and visual analogue score (VAS) was 80 of 100. There was no palpable mass or any skin color change but severe tenderness, dynamic allodynia and hyperalgesia were observed. Epidural, somatic and sympathetic blocks were performed under the impression of peripheral neuralgia or radiculopathy. These therapeutic procedures were not effective. And a well-circumferenced hypoechoic cyst was found following ultrasonographic examination. Local anesthetic injection directly into cystic lesion relieved of the pain for several hours.

Results: The patient was transferred to the department of surgery for excisional biopsy and results led to the diagnosis of glomus tumor. Pain was nearly (90%) disappeared until 6 months after surgery.

Conclusion: Glomus tumors of the extradigit are rare and a diagnostic challenge to the pain clinician. Because many cases are misdiagnosed in patients with neuropathic pain, further differential diagnosis must be carried out.

ESRAS-0056

Case Reports

A CASE OF A RENAL KAPOSI FORM HEMANGIOENDOTHELIOMA IN A 5 MONTH OLD INFANT

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Aims: Kaposiform hemangioendothelioma (KHE) is a rare, often life-threatening type of paediatric vascular tumor frequently associated with Kasabach-Merritt syndrome (KMS). It is characterised by the presence of tumor, profound thrombocytopenia, and hypofibrinogenemia. The common sites for KHE include lateral neck, trunk and limbs. In this case, an Indonesian-Chinese infant developed KHE of the kidney, with concurrent coagulopathy classic of KMS. The case is unique in that retroperitoneal KHE are extremely rare. Also, the recommended treatment for KHE typically includes pharmacotherapy such as vincristine, corticosteroids to correct the coagulopathy before undergoing surgery. In this patient, no established pharmacotherapy was instituted. The team proceeded with an open radical nephrectomy on a baseline platelet count of 22,000.

Method: A 5-month old infant was referred for a left retroperitoneal mass. CT abdomen pelvis revealed a 3.9 x 6.4 x 5 cm mass in the left kidney. There was concomitant bicytopenia, hypofibrinogenemia and raised D-dimer. Extensive haematological work up was inconclusive, which led to the suspicion of KMS. A multidisciplinary team decided to proceed with an open radical nephrectomy in spite of the coagulopathy. The patient received hypertransfusion of platelets preoperatively, and continuous platelet and cryoprecipitate infusion intraoperatively, guided by ROTEM results.

Results: The patient was transferred to CICU for 2 days after a 9-hour long surgery. No further blood products were required post-operatively and the platelet counts normalised on POD2.

Conclusion: This case is interesting because in an extremely rare retroperitoneal form of KHE with profound coagulopathy, a haemostatically safe surgical environment was made possible with ROTEM-guided targeted transfusion therapy.

ESRAS-0373

Case Reports

TAPENTADOL PR FOR THE MANAGEMENT OF PELVIC PAIN ASSOCIATED WITH ENDOMETRIOSIS: A CASE REPORT

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Aims: Endometriosis is defined as presence of endometrial-like tissue outside the uterus, most commonly at the cul-de-sac, ovaries, and the pelvic peritoneum; this associated with menstrual cycle results in inflammation, scarring, fibrosis, and adhesion formation. Infertility and cyclical recurrent pain are major challenges. Currently NSAIDs are the sole analgesics recommended by guidelines. Pelvic pain due to endometriosis has a mixed inflammatory and neuropathic

pathogenesis, in which interaction of peripheral and central sensitization mechanisms are involved, therefore a double acting molecule should be useful. We report a clinical case in which we used tapentadol PR to relief pelvic pain associated with endometriosis.

Method: A 32-year-old woman, with a diagnosed endometriosis was referred to Pain Management Service due to progressive and worsening pelvic pain. Pain was reported to be 7/10 NRS on average, was treated with meloxicam 15 mg od plus tramadol 600 mg/day, and was described as continuous with menses-related exacerbations, median Pain Disability Index (PDI) was 5 (range 4–8). We started with tapentadol PR 50mg bid and rose doses up to 200mg bid associated with paracetamol if needed (max 3 g/day).

Results: Patient was treated for 9 months, and reported a good pain control (NRS = 2/10) and quality of life (median PDI 1.5; range 0–2) without significant side effects.

Conclusion: We suggest clinical efficacy of tapentadol PR for the treatment of pelvic pain with endometriosis. To our knowledge this is the first case reported.

ESRAS-0048

Case Reports

AWAKE CAUDAL ANAESTHESIA FOR IMPROVED PATIENT SAFETY

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Aims: Caudal anaesthesia is frequently performed in our hospital owing to the extensive safety record and relative ease of the technique. It is useful as an adjunct during general anaesthesia and provides good postoperative analgesia. We present a case of local anaesthetic toxicity in an awake infant who received a caudal block. Immediate resuscitation was performed following the instant recognition of local anaesthetic toxicity and a good outcome was achieved.

Whilst local anaesthetic toxicity is rare in caudal anaesthesia, this raises the concern that perhaps awake caudal anaesthesia should be performed for better patient safety.

Method: A 2 months old full-term infant, weighing 4800g was scheduled for elective bilateral inguinal hernia repair. Awake caudal anaesthesia was performed using PSIS as a landmark. A 22G cannula was easily inserted through the sacrococcygeal membrane. A dose of 6 mls of 0.17% Bupivacaine was given in 2 mls boluses with negative aspiration confirmed between injections.

The infant quickly developed tonic clonic seizure activity and became unresponsive. Local anaesthetic toxicity was suspected and intralipid therapy commenced. The infant regained consciousness promptly, with spontaneous eye opening.

Surgery proceeded under general anaesthesia and the infant was transferred to the intensive care unit postoperatively. Recovery was uneventful and patient was discharged home on post-operative day two.

Conclusion: Local anaesthetic toxicity is a known side effect of caudal anaesthesia. Inadvertent intravascular injection may occur despite negative aspiration for blood, and this case suggests performing this technique in the awake infant so as to improve patient safety.

ESRAS-0338

Case Reports

SPINAL ANAESTHESIA IN A PATIENT WITH AMYOTROPHIC LATERAL SCLEROSIS FOR HIP FRACTURE SURGICAL REPAIR

Archontaki V, Gkiliatis E., Koutsaki M., Leftherioti A., Mazarakis G., Makris A. Asklepion Hospital of Voula, Anaesthesia, Athens, Greece.

Aims: Amyotrophic lateral sclerosis (ALS) is a progressive neurodegenerative disease affecting upper and lower motor neurons in the brain and spinal cord, leading to muscle weakness and atrophy, slurred speech, impairment of coughing, swallowing and airway protection and eventually respiratory insufficiency. Having obtained written consent, we report the anaesthetic management of a hip fracture patient with ALS.

Method: A 74-year-old female with ALS and moderate physical activity, receiving riluzole medication, presented for intertrochanteric fracture fixation.

Clinical examination revealed dysarthria, difficulty in swallowing, raised respiratory rate, lower extremity weakness and limited chest wall expansion.

Intraoperative monitoring included ECG, HR, non-invasive BP measurement, and pulse oxymetry. Due to severe scoliosis of the lumbar-thoracic spine, we performed spinal anaesthesia (3 ml ropivacaine 0.5%, 25G needle) in L4-L5 level.

Results: Within ten minutes, sensory block level reached T10 with proper sensory-motor blockade. In general the patient remained haemodynamically stable and operation was uneventful. Four hours later, sensory and motor block had fully reversed to pre-anaesthetic levels. Patient was discharged 5 days later.

Conclusion: Due to the limited amount of literature pertaining to the anaesthetic management of ALS, constructing a safe anaesthetic plan may be challenging. Regional anaesthesia helps to avoid agents of general anaesthesia like muscle relaxants that could result in prolonged muscle weakness and difficulty in weaning. Epidural anaesthesia is generally preferred over spinal, in order to avoid potential neurotoxic effects of local anaesthetics on demyelinated nerve tissue, but spine deformities may render the technique difficult. In our case spinal anaesthesia was a successful anaesthetic option.

ESRAS-0172

Case Reports

ULTRASOUND-GUIDED SCIATIC NERVE CATHETER PLACEMENT IN A PATIENT WITH CHARCOT-MARIE-TOOTH DISEASE FOR ANKLE ARTHROPLASTY

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Aims: Charcot-Marie-Tooth is the commonest inherited peripheral neuropathy but the evidence for use of perineural infusions is limited. Use of a nerve stimulator is questionable in the context of pre-existing motor neuropathy. We describe the safe use of ultrasound to enable placement of a distal sciatic perineural catheter for postoperative pain control following ankle arthroplasty.

Method: A 47-year-old male patient with Charcot-Marie-Tooth with associated motor and sensory neuropathy of the feet presented for elective ankle arthroplasty. A distal sciatic perineural catheter was sited to aid in peri- and post-operative pain control under ultrasound guidance and a bolus followed by an infusion of 0.2% Ropivacaine was used over a period of 46 hours before removal of the catheter.

Results: There was prolonged analgesia lasting 20 hours after completion of the infusion but no motor weakness. Motor and sensory neurological status returned to baseline.

Conclusion: Use of peripheral nerve blocks, and particularly nerve block catheters, has been demonstrated to be an effective adjunct to general anaesthesia for peri- and post-operative pain in Charcot-Marie-Tooth patients. The use of ultrasound allows direct visual confirmation of catheter placement and local anaesthesia spread in a cohort of patients in whom nerve stimulation may not be the best indicator of nerve location. Our case demonstrates an effective use of a perineural sciatic catheter with no short or long term complications aside from a longer duration of analgesia after cessation of the infusion.

ESRAS-0313

Case Reports

EFFICACY OF SUBCOSTAL TAP BLOCK AND ADJUVANTS. CASE REPORT

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Aims: We evaluated the effect of adding dexamethasone to levobupivacaine on the quality and duration of Subcostal Transversus Abdominis Plane (TAP) block in patient allergic to NSAIDs and opioids undergoing laparoscopic cholecystectomy (LC).

Method: Male patient, 55 years old, ASA II, undergoing LC under general anaesthesia. In history: known allergy to NSAIDs and opioids, previous burn of right hemithorax and lateral cervical region. Before surgical procedure was performed a bilateral subcostal TAP block under ultrasound guidance. On

confirming placement of the needle in the correct target space, 20 ml of 0.375% levobupivacaine + 1 ml dexamethasone “4 mg” was injected, between the internal oblique and transversus abdominis muscles. Careful aspiration was performed before injection to exclude vascular puncture. The TAP block was then performed on the opposite side, using the same technique and the same injectate. In the postoperative period was administered IV Acetaminophen 1000 mg every 8 hours.

Results: Postoperative pain was evaluated by visual analog scale (VAS) for pain scoring at 1, 2, 4, 12, 24 and 48 h postoperatively. The mean VAS score was 3 on the second postoperative day. Side effects correlated with performed technique have not been reported.

Conclusion: The case report demonstrates how the addition of dexamethasone to levobupivacaine in subcostal TAP block prolonged the duration and the quality of the block. This technique could be a viable alternative to intravenous analgesics when these are contraindicated.

ESRAS-0311

Case Reports

RADICULITIS/ARACNOIDITIS AFTER EPIDURAL TECHNIQUE - CASE REPORT

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Aims: We are reporting a case of radiculitis in a patient in whom an epidural catheter was placed for post-operative analgesia for cephalic duodenopancreatectomy.
Method: Female patient, 71 years old, ASA III, without neurological disorders, presented for surgery.

Anesthesia began with a fentanyl injection (0.05 mg) for mild analgesia and reduced discomfort. With the patient in lateral decubitus fetal position, surface landmarks were used to identify the T12-L1 intervertebral space. Local anaesthetic infiltration with 30 mg of Lidocaine 1% was performed. After three attempts, a median approach was used and an epidural catheter was introduced and left 4 cm from the skin. The patient didn't show any complain.

Surgery was performed under general anesthesia with OT tube. Surgery proceeded uneventful.

Results: Four days after surgery, patient complained of inability to dorsiflect both feet. During the physical examination motor strength was 4/5 on dorsiflexion on the right foot and 2/5 on the left foot. Osteotendinous reflexes were present bilaterally and symmetrically and were graded 2. Neurological evaluation and spinal CT were compatible with radiculitis/aracnoiditis. The patient started physiotherapy on the 10th day and showed improvements. After discharge, the patient was followed by Physical Medicine and Rehabilitation.

Conclusion: Epidural catheters are a valuable tool for post-operative analgesia. Although rare, neurologic complications associated with lumbar epidural catheter placement may occur. This emphasizes the need of always considering the risk/benefit ratio of this procedure.

This case report highlights the importance of regularly reviewing the patient in the post-operative period following epidural catheter placement.

ESRAS-0143

Case Reports

ULTRASOUND-GUIDED TRIPLE PERIPHERAL NERVE BLOCK ON FEMORAL, LATERAL FEMORAL CUTANEOUS AND OBTURATOR NERVES FOR DISTAL FEMORAL SURGERY IN A VERY OLD AND ILL PATIENT

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Aims: Surgical procedures for femur fractures in older patients, are associated with a high perioperative complication and mortality rate¹; patients often die because of intraoperative surgical or anesthesiological complications. The aim of this experience is to show as peripheral nerve block can be a viable and safe

alternative to general anesthesia and to central nervous blocks, in a very old and ill patient.

Method: After IRB approval and written patient consent statement, in L'Aquila Academic Hospital an ultrasound-guided and ENS-assisted triple peripheral nerve block (TPNB) on femoral (FN), lateral femoral cutaneous (LFCN) and obturator nerves (ON) was performed in 96 years old patient with chronic cardiac insufficiency (ejection fraction: 20%), chronic renal failure and chronic obstructive pulmonary disease with mandatory supplemental oxygen therapy, affected by distal femoral fracture. Patients was unable for setting or lateral position because of pain. 24 ml of Levobupivacaine 0.5% were injected. Supplemental oxygen (8 L/min) was administered by Venturi mask. 5 mcg of Sufentanyl and 2 mg of midazolam were injected.

Results: No supplemental opiates were injected during surgery and no haemodynamic changes were recorded. Patient was discharged from operating theatre and he went back into the ward with a good control of rest and incidence pain.

Conclusion: This experience demonstrates that TPNB is a safety procedure that can ensure a good anesthesia and analgesia to prevent dangerous and fatal haemodynamic complication in a very old and ill patient, for femoral surgery.

ESRAS-0148

Case Reports

ULTRASOUND-GUIDED PECS II BLOCK IN A HIGH-ANESTHETIC RISK PATIENT CASE REPORT

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Aims: Recent literature highlight show PECS block may represent a valid alternative to general anesthesia and locoregional conventional techniques in oncological breast surgery, especially for patients at high anesthetic risk.^{1,2}

Method: An 83-year-old patient, ASA-3, undergoing undelayable surgical intervention of radical mastectomy for an invasive breast cancer. In history, chronic atrial fibrillation, oral anticoagulant therapy (INR 1.6), moderate aortic and mitral steno-insufficiency, myocardial infarction during the previous three months. In the operating room, subject to routine monitoring an administration of Midazolam 1mg, ultrasound-guided PECS II were performed by injecting 25 ml of Levobupivacaine 0.5% between pectoralis minor and serratus anterior. Intraoperative sedation was performed using continuous Propofol infusion (2mg/kg/h), maintaining spontaneous breathing, nasal cannula (O2flow: 2lt/min) and capnography monitoring.

Results: PECS II in association with sedation, have provided an adequate intraoperative hemodynamic stability and an excellent postoperative analgesia, avoiding the administration of opioids and NSAIDs, with no occurrence of complications.

Conclusion: Although the epidural and paravertebral thoracic block represent the gold standard in breast surgery for postoperative analgesia, these procedures are not easy to perform, and no risk-free. PECS II block has proved to be a safe and effective alternative to conventional techniques, providing an adequate intraoperative hemodynamic stability and an excellent postoperative analgesia, avoiding the administration of additional systemic analgesics and the occurrence of complications in a patient at high anesthetic risk.

ESRAS-0149

Case Reports

ULTRASOUND-GUIDED SERRATUS PLANE BLOCK IN A PATIENT AFFECTED BY PSYCHOSIS AND CEREBELLAR-ATAXIA SYNDROME. CASE REPORT

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Aims: The recent introduction of serratus plane block in breast surgery represents an alternative to general anesthesia and locoregional conventional techniques^{1,2}, especially in patients with brain disease.

Method: A 53 year-old patient, ASA 3, undergoing lumpectomy and axillary dissection. In history, hypertension, cerebellar ataxia and psychosis, with quadriplegia and inability to stand upright. In the operative room, subject to routine monitoring, administration of Midazolam 2mg and refracted boluses of Sufentanyl 5mcg, serratus plane block were performed by injecting Levobupivacaine 0.5% 25 ml superficially to serratus anterior at level of 5th rib. Intraoperative sedation was performed using continuous Propofol infusion (2mg/kg/h), maintaining spontaneous breathing, nasal cannula (O2 flow 2lt/min) and capnography monitoring.

Results: Serratus plane block in association with sedation, has provided an adequate intraoperative anaesthesia of the thoracic wall, immediate recovery of vital functions and an excellent and long-lasting postoperative analgesia, with no occurrence of complications.

Conclusion: Serratus plane block represents an evolution of the PECS II block described by Blanco, which allows to block the thoracic intercostal nerves, in order to obtain a complete anesthesia / analgesia in surgical operations at the level of the armpit and the lateral side of chest. In this report, serratus plane block has proved to be a safe and effective alternative to conventional techniques, providing an adequate intraoperative hemodynamic stability and an excellent and long-lasting postoperative analgesia, avoiding the administration of additional systemic analgesics and the occurrence of complications in a patient affected by psychosis and cerebellar-ataxia syndrome.

ESRAS-0152

Case Reports

SAFETY OF PECS BLOCK II IN PATIENTS WITH HIGH ANESTHETIC RISK: A CASE REPORT

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Aims: Scientific literature demonstrates that dual-antiplatelet therapy reduced the risk of recurrent stroke¹, but surgical and anesthetic risks is very high. The aim of this experience is that serratus plane block can reduce the peri-operative risk when patient have to undergo to the surgery before 2 months by the IMA.

Method: After IRB approval and written patient consent statement, in L'Aquila Academic Hospital an ultrasound-guided unilateral serratus plane block was performed, in a 65 year old woman for quadrantectomy with a recent (<30 days) ischemic heart attack with percutaneous coronary intervention (ASA III). She was under dual-antiplatelet therapy (clopidogrel and aspirin); 30 ml of 0.5% Levobupivacaine were injected above the serratus muscle. A light sleep with easy arousability was ensured with 3.5 mg/kg/h of propofol intravenously. Supplemental oxygen (2 L/min) was administered by nasal dispenser with ETCO2 control. Heart rate, main blood pressure, arterial oxygen saturation and ETCO2 greater or less than 30% of baseline were treated.

Results: A good anesthesia and analgesia were obtained and no supplemental opiates were injected during surgery. No side effects were recorded and patient after PACU phases 1 and 2 was discharged and she came back in the ward without rest and incidence pain. The day after surgery, the patient was discharge from the hospital and no side effects were recorded.

Conclusion: This experience shows that serratus plane block is a good anesthetic procedure to ensure the possibility of surgery even when patient need it, because of his pathology but have a serious and dangerous comorbidities.

ESRAS-0396

Case Reports

THORACOSCOPIC VISUALISATION OF A MISDIRECTED PARAVERTEBRAL CATHETER

Phoon P.¹, Thong SY.¹, Koh PT.², Loh K.¹ ¹Singapore General Hospital, Anaesthesiology, Singapore, Singapore; ²National Cancer Centre, Surgical Oncology, Singapore, Singapore.

Aims: Despite accurate block needle placement into the thoracic paravertebral space, catheter direction still remains an issue.

Method: A 20G thoracic paravertebral catheter (Espocan®) was inserted in a 42-yr-old female with suspected lung metastasis undergoing a thoracoscopic wedge resection of the left upper lobe at the level of T6 through an 18G Tuohy needle in the prone position. A parasagittal, ultrasound-guided, in-plane insertion technique was employed with a linear array probe. The Tuohy needle was directed cephalad and the catheter easily advanced and secured 5 cm past the needle tip. 10mls ropivacaine 0.5% given through the catheter pre-operatively established a left-sided T4-T8 sensory block.

Results: During thoracoscopy, the catheter could be seen tracking in the T6-T7 intercostal space before curling to lie in the T5-T6 space (consent taken for publication, Figure 1). Despite its lateral placement, a post-operative infusion of ropivacaine 0.1% at 7 mlhr-1 maintained a left-sided T4-T10 sensory block, providing 2 days of excellent analgesia.

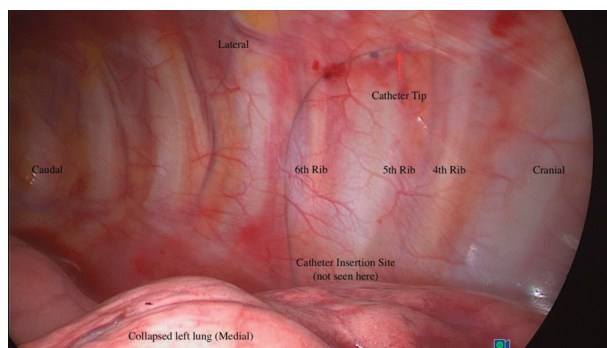


FIGURE 1.

Conclusion: Our catheter has gone beyond the lateral border of the thoracic paravertebral space to lie between the intercostalis intimus and parietal pleura before curving underneath a rib in the extrathoracic space. We suggest that the thoracic paravertebral space may be a 'potential' space rather than a discrete anatomical compartment. This image illustrates the discrepancy between the insertion site and final catheter position and may explain the variable spread of local anaesthetic seen in some catheter-based techniques.

ESRAS-0261

Case Reports

THE USE OF THORACIC EPIDURAL ANALGESIA AND INTERSCALENE BRACHIAL PLEXUS BLOCK FOR PERIOPERATIVE MANAGEMENT OF THORACOTOMY IN PATIENT WITH MULTIPLE SCLEROSIS

Reichenshtein Y., Fadeev A. Shaare Zedek Medical Center, Anesthesiology- Perioperative Medicine and Pain Treatment, Jerusalem, Israel.

Aims: The use of the regional anesthesia in patients with multiple sclerosis is still controversial.

The only one case report regarding the use of thoracic epidural analgesia in patient with multiple sclerosis was found in literature.

Method: 71 year old female patient scheduled to undergo an open Left Lung Upper Lobectomy due to adenocarcinoma. Multiple sclerosis has been diagnosed in this patient 10 years ago with clinical manifestations of visual disturbances and misbalanced gait. No relapses in the course of the disease were mentioned during last three years.

Before the induction of general anesthesia epidural catheter was inserted at the T4-T5 level. Bupivacaine 0.25% by incremental boluses of 6 ml with Fentanyl- 50 mcg were injected three times during the intraoperative course. At the end of the procedure the interscalene brachial plexus block with Bupivacaine 0.25% - 12 ml was performed to prevent the postthoracotomy shoulder pain. Patient controlled epidural analgesia with Bupivacaine 0.1% and Fentanyl - 2 mcg/ml has been used during 67 postoperative hours.

Results: The recovery from anesthesia was pain free. The VAS at rest and on movement were 3 and 5 respectively on the first postoperative day. The patient

discharged home on the fifth postoperative day with no changes in her preoperative neurological status.

Conclusion: We present the case of uncomplicated use of the thoracic epidural anesthesia and brachial plexus block in patient with multiple sclerosis. We believe, that successful intra- and postoperative analgesia in these patients significantly decreases the perioperative stress- the important factor in the prevention of the disease exacerbations.

ESRAS-0369

Case Reports

ANAESTHESIA FOR PARTURIENT WITH SICK SINUS SYNDROME

Ramachandran R.¹, Balaji P.² ¹Hull and East Yorkshire Hospitals NHS Trust, Hull, United Kingdom, ²Hull and East Yorkshire Hospitals NHS Trust, Department of anaesthesia, Hull, United Kingdom.

Aims: We present an unusual case of sick sinus syndrome in a pregnant woman. Sick sinus syndrome in a pregnant woman has not been published in the literature.

Method: 31 year old second gravida presented with history of sick sinus syndrome for which she had a pacemaker inserted 5 years ago. Her pacemaker insertion has been programmed as DDDR during this pregnancy.

Her first baby was born by elective LSCS under spinal anaesthesia in March 2013. During the second pregnancy, she developed both tachycardia and bradycardia. Her symptoms of palpitations, breathlessness and syncope were mainly caused by episodes of tachycardia as the pacemaker has been set to control bradycardia. She has been managed by a multidisciplinary team including cardiologist during pregnancy. She has been advised to commence Bisoprolol from 12 weeks of gestation. But she has stopped Bisoprolol after 3 weeks as her symptoms could not be controlled with the drug. Her pacemaker interrogation suggested no episodes of atrial or ventricular arrhythmia and her palpitations were considered to be due to ectopics rather than sustained arrhythmia.

Results: She has been posted for elective caesarean section at 37 weeks of gestation. Her second caesarean section was managed under spinal anaesthesia with heavy Bupivacaine and diamorphine. We administered phenylephrine infusion to prevent hypotension during surgery. We specifically planned to avoid ephedrine to prevent the side effect of tachycardia.

Conclusion: Multidisciplinary team helped us for safe management of a woman with sick sinus syndrome for elective caesarean section operation.

ESRAS-0038

Case Reports

SPINAL CORD STIMULATION CANCELLED BY UNEXPECTED RADIOLOGICAL FINDINGS

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Aims: Implantation of a spinal cord stimulator (SCS) is a well – established treatment of chronic neuropathic pain. SCS are usually placed in the thoracic region to treat low back and lower extremities radicular pain. The aim of this study is to demonstrate the great importance of obtaining thoracic spine radiological studies prior to perform any SCS trial or permanent implantation.

Method: The patient is a 54 – year old female with three years history of bilateral lower limbs radicular pain, numbness, and paresthesias after previous laminectomies of lower lumbar spine at another hospital, not relieving by standard methods and rehabilitation programme.

Results: The patient was referred for consideration of SCS therapy and was found to be an appropriate candidate. Due to a recent fall and moderate spine injury, she underwent thoracic spine MRI that revealed incidental finding of a large cystic non – enhancing intradural mass at T12, isointense to CSF. The patient underwent T12 laminectomy for surgical excision of the mass and postoperatively she experienced an impressive improvement of her previous symptoms, no longer requiring consideration of SCS trial. Histopathology was compatible with an arachnoid cyst.

Conclusion: This case report outlines the importance of obtaining routine thoracic spine MRI imaging prior to perform any epidural SCS thoracic procedure. If our patient had undergone trial without imaging study, thoracic arachnoid cyst would have been missed or she might have had an unexplained neurological deterioration. This case study carries the significant message of necessary MRI screening of all patients prior to any SCS trial.

ESRAS-0182

Case Reports

CONTINUOUS "PECS" BLOCK AS AN ANALGESIC ALTERNATIVE IN UNILATERAL SIMPLE MASTECTOMY

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Aims: The PECs II block was described by R. Blanco as a possible approach for intra and post-operative analgesia in breast surgery. The author reports the use of an interfascial catheter with continuous infusion of local anesthetic; however, no clinical data is provided. We endeavoured to test the efficacy of this technique in our hospital.

Method: We report the case of an otherwise-healthy 50 year-old female undergoing unilateral simple mastectomy due to breast malignancy. Prior to anesthetic induction, an ultrasound-guided type II PECs block with 30ml of 0.5% Levobupivacaine was performed. Under balanced anesthesia, the procedure took 2 hours to complete. No further intra-operative analgesia was required. After surgery, we placed a catheter within the fascial plane between Pectoralis Major and Minor, to which we attached a Drug-Infusing Balloon with Ropivacaine 0.5% at a rate of 5.2ml/h during 48 hours. For post-operative pain management, we prescribed 1g of Paracetamol every 8 hours, for 2 days.

Results: During the next 48 hours, the patient only reported mild pain during movement. She reported no pain at rest, need for rescue analgesia, and no side effects. She was overall very pleased with her pain-management strategy.

Conclusion: The use of an interfascial catheter with continuous infusion provided good analgesia for 48 hours without the need for opioid, rescue therapy, or unwanted side effects. This is of particular importance in patients with oncologic disease or who are prone to post-operative nausea and vomiting. A continuous PECs block might therefore be an attractive option in patients undergoing unilateral simple mastectomy.

ESRAS-0270

Case Reports

CONTINUED SCIATIC BLOCKADE FOR PHANTOM LIMB PAIN: A CASE REPORT

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Aims: Phantom Limb Pain (PLP) is an excruciating type of pain that gives a sensation of the continued presence of an amputated limb. Physicians have used many methods and drugs to treat PLP. We present a case of continued sciatic nerve block performed for PLP that developed after a traumatic amputation.

Method: A 36-year-old male patient suffered from PLP after a traumatic right leg amputation under general anesthesia. Second day after his amputation, he developed a stump infection, severe stump pain and phantom pain. Another operation was planned for stump revision. In the operating room, we inserted an ultrasound-guided sciatic perineural catheter and sciatic block (20 mL 0.25% levobupivacaine) then femoral nerve block (20 mL 0.25% levobupivacaine). We administered postoperative analgesia using a patient-controlled analgesia (PCA) infusion with 0.1% levobupivacaine at a bolus dose of 5 mL, lockout time 30 min and limit of 4 hours and 20 mL.

Results: The patient used PCA as long as he felt pain and his pain was gone by the fourth day. He used an antibiotic for 15 days. No phantom pain or any other sensation in the amputated leg ever reappeared within six months.

Conclusion: We think that PCA with a perineural sciatic catheter effectively treated both PLP and stump pain after traumatic leg amputation during the early postoperative period.

ESRAS-0445

Case Reports

A CASE OF SEVERE THROMBOCYTOPENIA DURING PREGNANCY, DIAGNOSTIC DILEMMA AND MULTIDISCIPLINARY APPROACH

Salota V., Sharafudeen S., Skelton V. *King's College Hospital- London- UK, Anaesthetics, London, United Kingdom.*

Aims: Thrombocytopenia (platelet count of $<100 \times 10^9/L$) is the second most common haematological abnormality during pregnancy. Diagnosis carries importance as this determines outcome based on whether or not a platelet transfusion can be safely carried out. Management requires a multi-disciplinary approach.

Method: A 30 year old healthy primiparous full term woman had an assisted ventouse delivery. She had an epidural for pain relief. Estimated blood loss was about 1.2 L. Haemodynamic parameters remained stable on HDU. Her antenatal bloods were all normal. Immediately after delivery, inspite of adequate fluid resuscitation, she developed acute kidney injury, haemolysis and thrombocytopenia. She was diagnosed with microangiopathic haemolytic anaemia, probably atypical HELLP syndrome. Multiple red cells transfusion with a single pool of PLT had little effect. Therapeutic plasma exchanges were subsequently initiated on day 5 post-partum with excellent response. She was discharged on day 12.

Results: Results are shown in Figure 1.

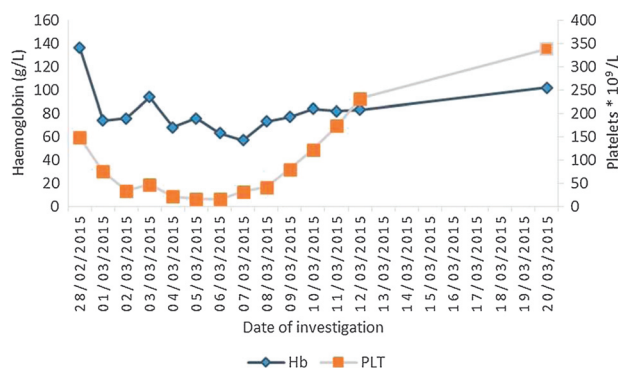


FIGURE 1. Blood results trend (Delivery on 01/03/15)

Conclusion: The majority of women with HELLP syndrome have hypertension and proteinuria which may be absent in 10–20% of cases - referred to as atypical HELLP. These patients may present with gastrointestinal, respiratory, or hematologic symptoms risking initial misdiagnosis. Management includes: 1. Obstetric management: Treatment is delivery, however, if patient is <34 weeks gestation corticosteroids can be administered to accelerate fetal lung maturity. Magnesium sulphate (to prevent seizures) and antihypertensives may be required. 2. Hematologic management: Corticosteroids may improve the PLT count. There is no contraindication to PLT transfusion or other blood products. If patient continues to worsen 48–72 hours postpartum, therapeutic plasma exchange should be considered.

ESRAS-0036

Case Reports

MEDIASTINITIS AFTER LMA SUPREME- A CASE REPORT

Satapathy A., Baliga J., Kadugodage A. *Alexandra Hospital- Jurong Health Services, Anaesthesia, Singapore, Singapore.*

Aims: To increase awareness of the dangers of second generation LMAs during seemingly uncomplicated intra-operative course.

Method: A 76 year old, ASA III, community ambulant, male patient, with a background of hypertension, Zenker's Diverticulum and right sided inferior

lobectomy, presented for an open reduction and fixation of right elbow fracture. After workup, discussion and consent, a right infraclavicular block was performed, with a sub-coracoid approach and ultrasound guidance. General anaesthesia was then induced and size 3 LMA Supreme inserted uneventfully. A gastric tube was then inserted through the LMA, as per the manufacturer recommendations.

Patient was then positioned in left-lateral position with appropriate support and anaesthesia maintained with controlled ventilation. No additional analgesics were needed during the procedure.

LMA was removed in Post-Anaesthesia-Care-Unit, patient monitored and discharged to ward as per department protocols. Patient complained of mild throat pain but no additional analgesics were needed during the recovery period.

Results: Patient developed severe writhing and vomiting on the night of the operation, with worsening sore throat and presented with a mediastinitis on post-operative day 3. He returned to theatre for an upper GI endoscopy and thoracoscopic drainage. A tear was noticed in the pyriform fossa during this time.

He was managed conservatively in ITU, ventilated for a week and PEG fed until the tear healed and was then discharged to the ward.

Conclusion: In keeping with literature, LMA Supreme presents several advantages as a second generation device but is not devoid of severe complications, although rare, including pyriform fossa damage leading to mediastinitis.

ESRAS-0429

Case Reports

RECURRENT ATYPICAL PRESENTATIONS OF POST DURAL PUNCTURE HEADACHE FOLLOWING SPINAL ANAESTHESIA

So K., Stolydy D., Balakrishnan R. *Queen Elizabeth Hospital, Anaesthetic Department, King's Lynn, United Kingdom.*

Aims: Spinal anaesthesia is commonly performed for surgical procedures involving the lower body, providing effective analgesia for patients during the perioperative period. However, post-dural puncture headache (PDPH) is a potential complication which can be debilitating.

Method: In this case report, we describe a 50-year old patient with known myasthenia gravis in remission, who presented with two separate incidents of atypical PDPH following elective knee arthroscopy under spinal anaesthesia over a period of one year interval.

Results: PDPH with neurological symptoms as well as lack of postural symptoms are uncommon but not unheard of. A recent study found 5.6% of 142 obstetric patients with PDPH presented with an atypical non-postural headache. Our patient's headaches were not indicative of typical PDPH in timing of onset and presenting features, this led to a missed diagnosis and prolonged duration of headache without intervention for five months. Most PDPH resolve within 7 days (72%), although it is not unknown for the duration of PDPH to last up to 6 months (15%).

On the second presentation, our patient was treated with an epidural blood patch, enabling rapid resolution of symptoms and discharge from hospital.

Conclusion: Our case highlights the importance of being aware of the rare atypical presentations of PDPH, the need to have a high index of suspicion for PDPH in patients presenting with atypical headaches as prompt treatment and intervention can provide rapid resolution to patient's symptoms.

ESRAS-0383

Case Reports

MANAGEMENT OF COSTOCHONDRITIS IN PREGNANCY WITH INTERCOSTAL NERVE BLOCK: A PRELIMINARY CASE SERIES

Sodha S., Concagh R., Samuel T., Gowrie-Mohan S. *Lister Hospital, Anaesthetics, Stevenage, United Kingdom.*

Aims: Costochondritis (CC) in pregnancy, although uncommon, can be distressing and debilitating. Onset is from 4 months gestation and it can last until delivery.

Method: We report 5 cases of parturients with CC treated with intercostal nerve block (ICNB) with bupivacaine 0.5% and adrenaline 1-in-400000, leading to resolution of symptoms. Consent obtained.

Results: Case 1, a 34-year-old primigravida, of body mass index (BMI) 22.2, developed CC at 22 weeks gestation at the right 4th, 5th, 6th costochondral junctions (CCJs). Regular anti-inflammatories and opioids were required, and she

was unable to lie on the affected side. ICNB was performed at the right 4th, 5th and 6th spaces, and repeated after 24 hours. She experienced full recovery over 5 days. Case 2 was a 38-year-old multigravida, BMI 23.6, with a background of CC during her first pregnancy. She developed CC at the right 5th and 6th CCJs at 18 weeks, of similar severity to case 1. Right 5th and 6th ICNB was performed, resulting in complete recovery over 3 days. Cases 3-5 were similarly in their thirties with BMI <25. All developed costochondritis between 26-30 weeks, with resolution of symptoms after ICNB at 2 levels, with case 2's repeated after 36 hours.

Conclusion: Intercostal nerve block is an effective technique for relief of pain associated with costochondritis in pregnancy, a debilitating condition that appears to be associated with low BMI. Although further work is needed, ICNB should be considered as a first-line treatment in this setting to avoid prolonged management with anti-inflammatories and opioids, undesirable in pregnancy.

ESRAS-0044

Case Reports

BRAINSTEM ANAESTHESIA PRESENTING AS A FIFTH AND SEVENTH CRANIAL NERVE PALSY FOLLOWING A PERIBULBAR NERVE BLOCK FOR CATARACT AND GLAUCOMA SURGERY

Strowbridge S., Milroy S. *Kings College Hospital, Department of Anaesthesia, London, United Kingdom.*

Aims: Ophthalmic blocks are safe and effective options for eye surgery. The safety profile of 'blunt needle' subtenon blocks is preferable. However, for complex ophthalmic surgery such as trabeculectomy and gas injection, the peribulbar block (PB) provides dense and reliable akinesia and analgesia. These techniques should only be performed after discussion with the surgical team and patient assessment. Brainstem anaesthesia is a serious but recognised complication of these techniques. We present a case of fifth and seventh cranial nerve blockade after performing a PB for ophthalmic surgery.

Method: An ASA 2, 61-year-old female presented for cataract phacoemulsification, lens implantation and goniosynechialysis. Preoperative assessment was unremarkable. Optometry revealed normal axial length but elevated intraocular pressure, treated with intravenous acetazolamide. A PB was performed with local anaesthetic (2% lignocaine & 0.5% bupivacaine) and 150i.u hyaluronidase. 7mls was injected via a transdermal approach infero-laterally. The patient developed immediate, transient agitation lasting for approximately 10 seconds. She remained haemodynamically stable. No ptosis or akinesia was noted, and a further 3ml medial canthus top up was administered.

Results: Post-procedure, the patient developed features consistent with an ipsilateral motor facial nerve and sensory trigeminal nerve distribution palsy. Haemodynamic and respiratory parameters remained stable. Surgery was expedited and completed uneventfully. 3 hours postoperatively, the neurological deficits had resolved fully. Further review on day 1 postoperatively was unremarkable.

Conclusion: Although rare, brainstem anaesthesia is a recognised complication of PB. These techniques should be performed by an experienced practitioner, with intravenous access, monitoring and the facility to provide ventilatory and haemodynamic support.

ESRAS-0054

Case Reports

NERVUS LARYNGEUS RECURRENS PARALYSIS AFTER INTERSCALENE BRACHIAL PLEXUS BLOCK

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Aims: Interscalene brachial plexus block is one of the most commonly used techniques for regional anaesthesia of the arthroscopic shoulder surgery. Ultrasound guidance might increase success rates and reduce complications. Rarely, ultrasound guidance complications may be occurred during blocks. We report a case of laryngeus recurrens nerve injury after interscalene brachial plexus block, discuss the possible cause and prevention.

Method: A 50-year-old female, ASA I status patient, who was diagnosed with rotator cuff injury, was taken operating room for arthroscopic shoulder surgery. Right-sided ultrasound guidance brachial plexus block through interscalene approach was chosen. After supine positioning with head rotation to the other side, block was performed with ultrasound and nerve stimulation. The brachial

plexus was identified using a nerve stimulator connected to the proximal end of the metal inner needle of a plastic cannula (Stimuplex-A, 20-G, 50 mm). The initial current output of the nerve stimulator was 0.7 mA. A linear high frequency 6-18 MHz ultrasound probe (esaote, MyLab™Five) was used. Upon contraction of the triceps muscle, the C5-6 nerve root or superior trunk was found, and 20 ml of 100 mg bupivacaine (5%) and 10 ml of 200 mg lidocaine (2%) was injected.

Results: After 30 minutes hoarseness was occurred and 8 hours later completely recovered. The surgery was completed without any complications.

Conclusion: Low-volume regional blocks are only possible if nerve structures are directly visualized and multi-injection technique is used. We thought our local anaesthetic volume was excessive and lower local anaesthetic volumes for blocks were performed in ultrasound-guided blocks reduce complications.

ESRAS-0248

Case Reports

PRESENTING 2 CASE REPORTS WITH POST-OPERATIVE EVENTS MIMICKING SERIOUS REGIONAL ANAESTHESIA COMPLICATIONS, AFTER THORACIC PARAVERTEBRAL BLOCK & CONTINUOUS SPINAL ANAESTHESIA RESPECTIVELY

Tey J., Kan R. *Tan Tock Seng Hospital, Anaesthesiology- Intensive Care and Pain Medicine, Singapore, Singapore.*

Aims: Post-operative events may present with findings mimicking severe regional anaesthesia complications. We present 2 case reports, after a single-shot thoracic paravertebral block for mastectomy with reconstructive surgery, and after a continuous spinal anaesthesia for hip surgery. We aim to raise awareness of such potential events and to remind our readers to be mindful of post-regional anaesthesia complications and their management.

Method: Consent obtained from patients on condition of anonymity.

Results: 1st patient underwent a left mastectomy with immediate pedicle flap reconstruction under general anaesthesia. Under anaesthesia, she received a left paravertebral block at T3, and bilateral posterior TAP block. Surgery lasted 5 hours and intraoperative course was unremarkable. Patient woke up well in the recovery with no issues. Unfortunately on post-operative day 1, she developed bilateral lower limb weakness and numbness around noon. MRI showed lesions at T3-7 suspicious of haematoma with cord ischaemia. An emergency laminectomy did not find a haematoma but an arterio-venous malformation. Her recovery unfortunately was not good.

2nd patient underwent a left hip bipolar hemiarthroplasty under continuous spinal anaesthesia. Her clopidogrel was stopped 5 days prior. A fascia iliaca catheter was inserted post-operatively for pain-relief. In the general ward, she developed severe back pain and unilateral lower limb weakness and numbness suspicious of a spinal haematoma. Urgent MRI lumbar spine revealed no spinal haematoma but severe degenerative changes. She was treated conservatively with analgesics and recovered completely.

Conclusion: Although complications after regional anaesthesia are rare, it is extremely important to be mindful of their potential existence and appropriate management.

ESRAS-0135

Case Reports

WHEN THE POSTDURAL PUNCTURE HEADACHE IS SOMETHING MORE

Vilaça MJ., Coelho F., Reis E. *Azevedo P. Hospital Prof Dr Fernando Fonseca, Anestesiologia, Amadora, Portugal.*

Aims: Although postdural puncture headache (PDPH) remains a common problem in our practice, we must not forget that other causes of headache should be carefully considered in the assessment of any patient after a central neuraxial block.

Method: We describe four cases initially diagnosed as PDPH.

Results: A 20-year-old woman, diagnosed with PDPH after spinal anaesthesia (SA) for cesarean section, showed no improvement with conservative treatment. After a MRI two subdural hematomas and cortical vein thrombosis were diagnosed.

A 22-year-old woman was diagnosed with PDPH after SA for cesarean section. Conservative treatment was prescribed and after an initial improvement, a

new resurgence of complaints with less relief with the supine position occurred. A MRI showed two subdural hematomas and left lateral sinus venous thrombosis.

A 57-year-old woman developed postural headache within 24 hours after SA for an urological intervention. Because of persistence of symptoms with conservative treatment, a Blood Patch was considered, but not conducted since the patient was suddenly found in mutism. After complete study, transitory ischemic accident was assumed.

A 67-year-old woman was diagnosed with PDPH after a SA for a protological surgery. Due to new neurological symptoms and fever, a lumbar puncture was done and meningococcalitis diagnosed.

Conclusion: The diagnosis of postdural puncture headache is frequently clear from the clinical history; however it is important to rule out other possible causes for headache, both to prevent the unnecessary use of invasive treatments to treat benign and self-limiting conditions, but, more importantly, to ensure that potentially life-threatening intracranial pathology is not overlooked.

ESRAS-0427

Case Reports

ZOSTER NEURITIS CONFOUNDING CHRONIC PAIN MANAGEMENT OF LUMBAR RADICULOPATHY: A CASE REPORT

Zheng Z., Tan KH. *Singapore General Hospital, Department of Anaesthesiology, Singapore, Singapore.*

Aims: Herpes zoster neuritis often presents with pain and neuropathic features, usually up to ten days preceding onset of rash. We report a case of zoster with delayed onset of rash, in a patient with known lumbar radiculopathy, presenting as a diagnostic challenge.

Method: A case report.

Results: A 63 year old Japanese woman with known history of lumbar spondylosis and facet arthropathy, treated previously with facet joint and transforaminal epidural steroid injections, developed acute exacerbation of back pain. Aggravated by mechanical strain, presenting symptoms included neuropathic pain and paraesthesia similar to past episodes, involving the L4 and L5 dermatomes.

Failing initial oral pharmacotherapy with paracetamol, codeine and amitriptyline, she was scheduled for repeat procedural intervention twelve days after the initial consult in view of worsening symptoms. She developed pathognomonic rash of zoster over L4/5 dermatomes on the day of procedure and intervention was cancelled. Resolution of symptoms two weeks later followed use of gabapentinoids and tricyclic antidepressants on top of standard treatment with acyclovir.

Conclusion: In the absence or delayed onset of rash, zoster neuritis may be difficult to diagnose in patients with established spondylotic radiculopathy. Although truncal and thoracic zoster reactivations are the most common, it remains a differential to consider in patients presenting with lumbar radiculopathy. A high index of suspicion is required for patients at risk of zoster reactivation.

ESRAS-0351

Case Reports

A USER NEEDS ASSESSMENT OF SIMULATED LEARNING ENVIRONMENT IN REGIONAL ANAESTHESIA

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Aims: Proficiency based curricula are replacing traditional apprenticeship models in postgraduate medical education. Simulated learning environments are important in developing and assessing technical and non-technical skills. The Department of Health (UK) recommend 'As part of a managed learning process ... healthcare professionals should learn skills in a simulation environment ... before undertaking them in supervised clinical practice'. The RASimAs project, funded by the European Union, aims to develop a high fidelity simulator to train and assess regional anaesthesia skills.

Method: Clinical collaborators based at University College Cork, Ireland; Katholieke Universiteit Leuven, Belgium; and Uniklinik RWTH Aachen,

Germany were surveyed to identify perceived user needs from multiple perspectives. Feedback from the collaborators was collated into user stories, which describe the needs of individual user groups. Systematic need assessment for ultrasound- and electrical nerve stimulation-guidance was performed. The output of this process has been used to inform ongoing simulator system design.

Results: A regional anaesthesia simulated learning environment has diverse user needs dependent on user group. The user needs of trainees centre on the provision of a structured curriculum, realistic learning environment, timely performance feedback and the ability to measure and track performance over time. The needs of trainers and professional bodies (standards regulators) relate to the validity of the system, the learning efficacy of the simulator and the ability to track performance metrics of individuals and trainee cohorts.

Conclusion: Technical skills training and assessment in regional anaesthesia is a high stakes process which requires valid tools to improve both clinical practice standards and patient safety.

ESRAS-0379

Miscellaneous

NEW CHALLENGES, OLD PROBLEMS

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Aims: Patients with ankylosing spondylitis present unique challenges for the anesthesiologist regarding the handling of the airway, ventilation and positioning. Precautions to take in addressing these patients begin in the preoperative period, requiring a careful assessment by the anesthesiologist, orthopedic surgeon, pulmonologist, and sometimes neurologist. Proper planning in need of invasive monitoring, use of BIS® and evoked potentials, and implementing the correct surgical procedure provides a result that can radically change the lives of these patients.

Method: We report the case of a 39-year-old woman, ASA III, proposed to subtraction pedicle osteotomy, instrumentation and arthrodesis, for surgical correction of a dorsolumbar ankylosis with kyphotic curvature of 130°. This markedly conditioned their daily activities, being impossible to maintain in a supine position without a support height of about 30 cm.

Results: This fact conditioned the positioning of the patient for anesthesia and intubation as well as for the placement in the prone position, being necessary to resort to the use of various supports and the articulation of the operative table. Care in terms of hemodynamic stability and ventilation were a constant concern. For postoperative analgesia an intravenous PCA with fentanyl was placed, due to the fear of an unexpected distribution of the local anesthetic administered via epidural, and the risk of possible postoperative neurological injury associated with this type of surgery.

Conclusion: At a center with experience in scoliosis surgery, we intend to describe the difficulties encountered in a patient with a marked kyphosis, remembering the specifics to be considered in such patients and surgery.

ESRAS-0392

Miscellaneous

COMPARISON OF THREE TRANSDUCER ORIENTATION APPROACHES FOR ULTRASOUND GUIDED INTERNAL JUGULAR VENOUS CANNULATION: A RANDOMIZED CONTROLLED TRIAL

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Aims: The purpose of our study was to assess and compare the safety and efficacy of three transducer orientation approaches that have been proposed for ultrasound-guided internal jugular venous cannulation (IJVC): short-axis (SAX), long-axis (LAX) and oblique-axis (OAX) (Figure 1).

Method: We conducted a single-center, parallel-group randomized trial. It was approved by the Ethical Committee for Clinical Investigations of Navarra's Health Department. Adult patients undergoing ultrasound-guided IJVC were randomly assigned to one of three intervention groups: SAX, LAX and OAX. The main outcome measure was cannulation at first needle pass. Secondary outcome measures were number of needle passes, cannulation time and mechanical complications rate.

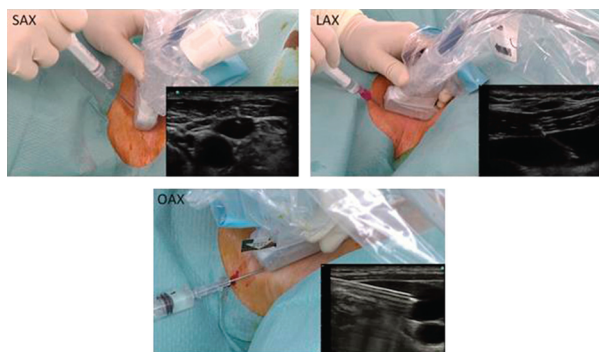


FIGURE 1.

Results: 220 patients were included. Failure at first needle pass was higher in LAX group than in OAX (OR 3.7) and SAX (OR 2.37). Patients in LAX group required more needle passes than OAX (OR 3.85) and SAX (OR 2.27). Cannulation time was also higher in LAX than in OAX and SAX ($p=0.05$). A higher mechanical complications rate was observed in SAX (15.1%) than in OAX (6.9%) and LAX (4%), with marginal significance ($p=0.069$). The most frequent complication was posterior venous wall puncture (PVWP), with 9 cases (8 of them in SAX). All other complications were minor. No arterial punctures occurred.

Conclusion: LAX is a technically more demanding approach, which implies more cannulation attempts and time compared with SAX and OAX. Incidence of PVWP is greater with SAX. OAX is more effective in avoiding PVWP compared with SAX. According to our results, we recommend using OAX to perform and teach IJVC.

ESRAS-0111

Miscellaneous

THE IMPLEMENTATION OF REGIONAL ANAESTHESIA BLOCK ROOMS IN BELGIUM: A NATIONAL SURVEY

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Aims: The aim of this survey was to assess the opinion of Belgian anaesthetists about the implementation of block rooms to perform peripheral nerve blocks and/or neuraxial techniques.

Method: A multiple-choice questionnaire was sent to each of the 90 heads of Belgian anaesthetic departments. Information about hospital characteristics, local custom, opinions about block rooms and satisfaction levels regarding the practice of regional anaesthesia (RA) were collected. Statistical analysis was performed using Fisher's exact test.

Results: We received 48 completed questionnaires: the response rate was 53%. RA is performed in the PACU in 42% of the hospitals, in a block room in 29%, in the operating room (OR) in 17% or in the hall adjacent to the OR in 12%. In 92% of the settings, the time needed to reach the OR from the place where the block is performed is <1 minute. Epidural blocks are performed out of the OR in 23% of the departments and spinal blocks in 19%. The main expected benefits of a block room are reported in Figure 1.

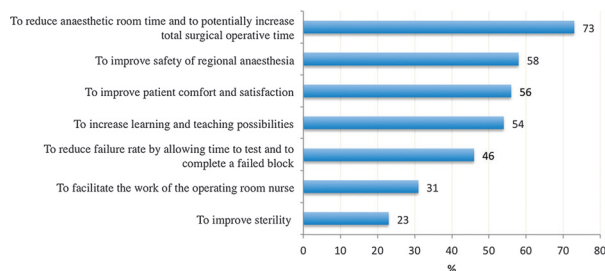


FIGURE 1. Expected benefits of a regional anaesthesia block room.

The availability of a block room does not affect the anaesthetist's level of satisfaction ($p=0.721$). 62% of departments with no block room would increase their RA practice if such a facility was available. The main obstacles that must

be overcome are the lack of space (44%), the unavailability of nurses (42%) and insufficient funding (27%).

Conclusion: Most anaesthetics departments think that block rooms could improve RA practice. However, such rooms require adequate resources in order to be successful.

ESRAS-0208

Miscellaneous

AN AUDIT ON THE OPERATIVE FACTORS THAT AFFECT DELAY IN DISCHARGE FROM THE POST-ANAESTHETIC CARE UNIT (PACU)

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Aims: The Singapore General hospital has over 8700 surgeries performed per year (as of 2012). Delays in discharge from the PACU post surgery affects patient and family satisfaction, nursing to patient ratio and has implications on cost/revenue and quality & safety. Multiple operative factors affect delay in discharge from the PACU which this study aims to identify.

Method: Data from 590 postoperative patients aged 21 years and above in the PACU was collected in February to March 2012 at the Singapore General Hospital (SGH). Patient demographic data, surgical data, intra-operative anaesthetic data and recovery data were collected. The outcome measure was a delay in discharge which was defined as more than 30 minutes stay in the PACU.

Binomial logistic regression was used for the univariate and multivariate analysis for preoperative and intraoperative variables that may be associated with delay in discharge. Statistical analyses were conducted with SPSS version 17 (Chicago: SPSS Inc).

Results: In the multivariate analysis, factors associated with delay in discharge included higher BMI - BMI 18.6-25 (OR=4.1, CI=1.3-12.3), BMI 25.1-30 (OR=6.3, CI=1.8-22.6), BMI >30 (OR=5.2, CI=1.1-23.8), non-analgesia drug allergy (OR=3.4 CI=1.61-7.11), higher max pain score (OR=1.5, CI=1.28-1.65) and the use of Nurse Controlled Analgesia (NCA) (OR=4.2, CI=1.29-13.5).

Conclusion: This study identifies operative factors for the delay in discharge from the PACU in a major operating hospital in Singapore. Knowledge of these factors can lead to quality improvement measures for patient management and work flow in the PACU.

ESRAS-0235

Miscellaneous

SURVEY ON ANTIBIOTIC PROPHYLAXIS FOR UPPER LIMB SURGERIES ACROSS UK HOSPITALS

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Aims: Prophylactic administration of antibiotics is important in perioperative period to reduce the incidence of surgical site infection. There is minimum evidence to suggest any benefit of 3 doses over 1 dose of antibiotic given in the peri-operative period.

Aim of this survey was to standardise the practice of antibiotic prophylaxis in Upper limb surgeries in UHL (University Hospitals of Leicester) in comparison to the practise of other established Upper limb units in UK with the intention to reduce the antibiotic dose to single shot in majority of upper limb surgeries except arthroplasties.

Method: Clinical Audit and Quality Improvement Team at UHL NHS Trust approved this survey. Survey proforma was made of 9 questions. All the questions were downloaded on survey monkey website and the link was sent to Anaesthetics and Orthopaedics clinicians in UK over 4 week period.

Results: 58 responses from UK hospitals (18 UHL, 40 Non UHL). Co-amoxiclav is the most preferable antibiotic (UHL) followed by Cefuroxime (except for MCP/PIP). Majority of responders reported not using any antibiotic for arthroscopic and soft tissue surgeries. Around 34% respondent felt discharges were delayed because of additional dose of antibiotic, although many patients were discharged on oral antibiotics.

Conclusion: Antibiotic usage following day case surgeries varied between hospitals in UK. Within hospitals the preference varied between microbiologists, surgeons, anaesthetists. Significant number of delayed discharges was because of need to stay in for extra antibiotic doses.

Recommendation: Patients needing prophylaxis should receive a single dose of antibiotic given at induction or before the nerve block.

ESRAS-0375

Miscellaneous

PRE-OPERATIVE ANESTHETIC EVALUATION: THE IMPACT IN OUTPATIENT SETTING

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Aims: Pre operative anesthetic evaluation is essential. In one day surgery it allows for exclusion of patients without criteria for surgical intervention in outpatient setting, decreasing the incidence of perioperative complications.

We aimed at evaluating the impact of pre operative anesthetic consultation at an Outpatient Unit, analyzing the grounds for refusal, the patient guidance, length of hospital stay in a conventional inpatient system and complications during the perioperative procedure related to reasons for refusal.

Method: We conducted a retrospective study based on medical anesthetic records between January 1st and December 31st 2014. We analyzed age, sex, motives for refusal, whether patients were treated in inpatient setting as well as complications following these interventions and number of days in the hospital.

Results: During 2014, 3850 patients were observed. Of those 172 were refused for one day surgery setting. 37.2% (n=64) were female and 62.8% (n=108) were male. The majority (68.6%) were between 12-65 years. Clinical criteria (comorbidities - 84.8% and a predictable difficult airway-13.3%) were the main reasons for refusal (91.8%) followed by economic and social criteria (6.98%). 119 (69.2%) were operated of inpatient setting. Most (92.4%) had no complications. 5.88% were discharged in the same day of surgery and 54.6% were discharged the day after.

Conclusion: According to admission criteria, we can ascertain that anesthetic pre-operative consultation allows for reduction of postponement/cancellation of surgical procedures, decreases peri-operative complications as well as unforeseen admissions. However, most of refused patients had admissions that were compatible with ambulatory surgery.

ESRAS-0378

Miscellaneous

ANAESTHETIC AND SURGICAL EVOLUTION OF AN AMBULATORY SURGERY UNIT: COMPARISON BETWEEN PAST AND PRESENT TIMES

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Aims: Ambulatory surgery allows a patient recovery in his environment, which also leads to saving human and financial resources for the hospital.

The aim of this study is to analyze the activity of the Ambulatory Surgery Unit (ASU) during 2009 and 2014 and compare these years.

Method: Retrospective and comparative study. Revision and comparison of the number of operated patients, population characteristics, surgical specialties working on and anaesthesia activity in ASU during 2009 and 2014.

Results: In our Hospital Centre, in 2009, the ASU was responsible for 30.9% of all ambulatory surgery versus 40.5% in 2014 representing, on both years, more than half of the hospital surgical activity.

Of the interventional patients in 2009, mean age was 45.6 years (0-102 years) and in 2014 49.2% (3-95 years) and the patient's ASA status worst over the years.

Was verified an increase of 3.6% in the number of surgeries with a duration of 1-2 hours or longer, an increase in percentage of surgeries under monitored anaesthesia care, general and regional anaesthesia and a drop in surgical activity under local anaesthesia.

Conclusion: Ambulatory surgery has a great importance in hospital surgical activity. In our centre we verified an increase in the activity of all specialties operating in ASU during the years.

The complexity of patient's pathologies, anesthetic and surgical procedures in ASU are being greater over the years and make us aware of the importance of a good patient management in perioperative period.

ESRAS-0470

Miscellaneous

SIMPLE CATHETER CONNECTION SYSTEM SUGGESTION FOR PATIENT SAFETY

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Aims: There can be numerous mistakes with Patient Controlled Analgesia (PCA) after regional techniques (spinal, epidural, peripheral nerve block). Most important is to administer medicines accidentally by the intravenous route. We share our methods to prevent these errors and a simple catheter connection system suggestion to reduce further.

Method: In our institution during every PCA application after regional techniques the method we are using are explained as below:

Education to all staff about PCA and put emphasis on the importance of making correct connections,

Appropriate labeling to the proximal and distal endings of the catheter and PCA,

Big labels on the PCA devices showing delivery route (spinal, epidural, plexus, intravenous),

Double check during preparation and before administering PCA.

Prevention of intravenous line misconnection errors is only possible with developing catheter and needles that have non-luer connections. National Patient Safety Agency (NPSA) in UK issued necessity of this issue at 2011; unfortunately there is no such product in use widely. We developed a system to overcome this problem. Two extension lines different colour (M-M and F-F) used and sealed with special bandages; it will be incompatible with intravenous lines because PCA line will be F.

Results: Fortunately these mistakes are uncommon. Considerable amount of regional techniques and serious consequences is major concern.

Conclusion: We believe until commercial non-luer devices developed our suggested system will improve patient safety.

ESRAS-0267

Miscellaneous

A PROSPECTIVE AUDIT OF THE USE OF KETAMINE FOR ANAESTHESIA IN A DIVERSE DEVELOPING-WORLD POPULATION UNDERGOING PLASTIC SURGERY

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Aims: The use of ketamine in the developing world is common practice due to its availability, ease of storage, diversity of use and safety profile. We conducted a prospective audit of the use of ketamine for routine anaesthesia to establish the analgesic and recovery profile in rural Uganda.

Method: Data was prospectively collected over a 2-week period of plastic surgical cases regarding time to wake, time in recovery and the incidence of delirium, PONV and pain in patients receiving ketamine anaesthesia.

Results: The average dose of ketamine used in children undergoing halothane maintenance of anaesthesia was 2.4 mg kg⁻¹ (range 0.45 – 6.6 mg kg⁻¹). In adults, the average dose of ketamine administered was 91 mg (range 30 – 200 mg). (Figure 1).

Parameter	Value
Age	Mean 15.55 (range 0.08 – 58) years
Paediatric patients (<16 years)	N= 37 (56%)
Adult patients (16 and over)	N= 29 (65%)
Gender	26 Female, 40 Male
Weight (paediatric population)	Mean 14.5 (range 4 – 40) kg
Operation:	Number(%):
Cleft lip/lip-palate	10(15)
Skin grafting (+/- contracture release)	19(29)
Keloid injection	12(18)
Excision of keloid	8(12)
Excision of mass (other)	14(21)
Other	3(5)

FIGURE 1.

In children, higher doses of greater than 2.5 mg kg⁻¹ resulted in predictably longer recovery times (range 8 – 112 minutes). In the adult population, patients receiving up to 125 mg of ketamine had an unpredictable wake-up time (0 – 48 minutes) and recovery time (0–108 minutes).

The incidence of delirium in recovery was 16% (6/38) in children and 27.6% (8/26) in adults. On the ward, the incidence of delirium was 0% in children and 7% (1/26) in adults. PONV occurred in no patients while only 2 children (3%) and no adults complained of postoperative pain.

Conclusion: Ketamine was useful, safe and generally well tolerated in a low-resource environment for providing premedication, anaesthesia and intraoperative analgesia. In addition PONV and pain were both extremely uncommon.

ESRAS-0349

Miscellaneous

A SURVEY OF UK REGIONAL ANAESTHETISTS: EXPERIENCE AND OPINIONS OF ACUTE COMPARTMENT SYNDROME

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Aims: Acute compartment syndrome (ACS) is a serious complication of trauma, which both orthopaedic surgeons and anaesthetists must be aware of and alert for. We sought to explore:

- How frequently regional anaesthetists are encountering ACS;
- The monitoring and management of these cases;
- The use of regional anaesthesia in trauma patients.

Method: An online survey was distributed nationally to the members of Regional Anaesthesia United Kingdom. The survey focused on ACS after trauma surgery.

Results:

- The survey had a good response rate and coverage of the acute hospitals in the UK. Most respondents were consultant grade.
- The majority of respondents had not seen a case of ACS in the previous year.
- Most cases were in the lower limb and secondary to fracture.
- Compartment pressure monitoring was not routinely used in most hospitals.
- Some delays in diagnosis of ACS were thought to be due to the inappropriate location of patients and inexperience of nursing staff.
- Withholding analgesia was not thought to be a useful precaution for those at risk of ACS.
- The vast majority of respondents were unaware of any guidelines for managing these patients.
- Respondents thought that regional anaesthesia should not be contraindicated in patients having trauma surgery.

Conclusion:

- Many anaesthetists would welcome clear evidence-based guidelines on the monitoring and management of patients who are at risk of ACS, which are agreed by the multidisciplinary team.
- UK regional anaesthetists believe that regional anaesthesia and analgesia should not be contraindicated in trauma patients and those at risk of ACS should be appropriately monitored.

ESRAS-0131

Miscellaneous

ULTRASOUND TAP BLOCK AS ALTERNATIVE TO TRADITIONAL EPIDURAL ANESTHESIA: A SURVEY

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Aims: Through our survey we tried to obtain an analysis of the current status of the use of ultrasound by anesthesiologists with special reference to ultrasound TAP block as alternative to epidural anesthesia.

Method: 300 email-questionnaire containing 10 questions with multiple answers were sent to European anesthesiologists. 74% returned correctly filled. The questionnaire referred the number of years of seniority, number of ultrasound TAP block/year, number of epidural anesthetic blocks/year, type of patients treated (adult / pediatric), number of traditional regional anesthesia techniques versus ultrasound-guided techniques performed/year, degree of satisfaction about the use of ultrasound techniques, number of ultrasound postoperative checks performed after the block.

Results: Ultrasound TAP block was used at least once as alternative to epidural block, in adults and pediatric patients (37%). In 25% of cases, ultrasound was used only as a pre-scanning for the visualization of spine structures to identify the interspinous space and then proceed with the traditional technique. The majority of anesthesiologists prefer to perform more than one attempt to locate the epidural space (65%) and in case of great difficulty general anesthesia represents the first alternative choice (83%). The degree of satisfaction about regional ultrasound guided techniques versus the traditional blocks was 91%. Only 2% confirmed to perform an ultrasound postoperative check after the execution of the block.

Conclusion: The survey demonstrated that the use of ultrasound TAP block is gaining consensus and among anesthesiologists but its use as alternative to traditional epidural anesthesia is still limited. The pre-scanning is also limited.

ESRAS-0133

Miscellaneous

EPIDURAL ANESTHESIA AND SEVERE RESPIRATORY FAILURE. WHAT DO ANESTHESIOLOGISTS THINK ABOUT? AN INTERNATIONAL SURVEY

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Aims: The objective of this study was to determine the motivation about the choice of epidural anesthesia in patients suffering for severe respiratory failure.

Method: A questionnaire was sent to 300 anesthesiologists in USA and Europe. The concordance and discordance of each item were compared by z tests (consensus if p < 0.05). The questionnaire contained 10 items measured in a 5-point Likert scale (5 = strongly agree; 1 = strongly disagree) about efficacy, safety, easiness of technique, use of ultrasound for neuraxial blocks, knowledge of regional anesthesia versus general anesthesia complications in critically ill patients, outcome of epidural anesthesia during severe respiratory failure.

Results: Among the positive factors regarding the use of epidural anesthesia for severe respiratory failure was the quality and safety of the block (75%), the development of new local anesthetics with low toxicity and effective at lower dosages (86%) and the possibility of using the catheter for continuous administration of analgesics in the postoperative period to avoid the administration of systemic opioids with consequent risk of respiratory depression (93%). Those who participated in our study demonstrated that the availability of ultrasound equipments could contribute to higher accuracy of the block and the reduction of the dosages (57%).

Conclusion: We concluded that the attitude of pediatric anesthesiologists and residents regarding the use of epidural anesthesia in patients suffering for severe respiratory failure ultrasound is predominantly positive. Quality, precision and safety of the block, especially through the use of ultrasound was identified as a factor that stimulates the choice of the technique.

ESRAS-0400

Miscellaneous

AUDIO-VISUAL DISTRACTION IMPROVES ANAESTHESIA EXPERIENCE IN PATIENTS UNDERGOING ORTHOPAEDIC AND PLASTIC LIMB SURGERY UNDER REGIONAL ANAESTHESIA: A PROSPECTIVE AUDIT OF 30 CONSECUTIVE PATIENTS

Galitzine S., Pepper W., Wallis A., Bayliss J., Ashfield M., Athanassoglou V., Matthews J. *Oxford University Hospitals NHS Trust, Nuffield Orthopaedic Centre, Oxford, United Kingdom.*

Aims: Perioperative patient anxiety can negatively affect patients' experience with regional anaesthesia (RA). Having recently introduced audio-visual distraction (AVD) service in our hospital, we present interim results of a prospective audit of patients' experiences with AVD while undergoing surgery under RA.

Method: Our AVD equipment consists of a Wi-Fi-connected "tablet" and noise-reducing headphones. Patients are also allowed to use their own equipment with our headphones. With institutional approval, all patients using AVD for orthopaedic and/or plastic limb surgery under RA are invited to prospectively complete a standardised postoperative questionnaire.

Results: Our care series to date consists of 30 consecutive patients who underwent orthopaedic and/or plastic limb surgery under RA - peripheral or central neuraxial blocks - with AVD. Procedures lasted from under an hour up to 9.5hrs and included minor and major plastic operations, joint replacements and major reconstructive orthopaedic and orthoplastic operations.

Intraoperatively, 14 patients used AVD alone and 16 - in combination with intravenous sedation titrated to patients' requirements. 100% reported feeling "very comfortable" or "comfortable". 93% (28 patients) rated their experience as "better" than previous GA. 100% were "very satisfied" (29 patients) or "satisfied" (1 patient). 100% stated they would recommend this technique to other patients. 95% of patients with perioperative anxiety (confirmed in the questionnaire) stated that AVD decreased it.

Conclusion: The new service evaluation demonstrates an overwhelmingly positive impact of AVD on patients' experience while undergoing orthopaedic and/or plastic limb surgery under RA. This service should be encouraged and supported for suitable patients.

ESRAS-0260 Miscellaneous

COMPLIANCE WITH A RIB FRACTURE ALGORITHM

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Aims: As an acute pain service we saw 218 patients in 2014 with rib fractures and managed them according to our rib fracture algorithm. The introduction of this algorithm reduced length of stay (LOS). In January 2015 we introduced a revised algorithm which included a rib fracture score, rib fixation and more regional anaesthesia options. To assess compliance we looked at the last 20 patients.

Method: A retrospective review of the acute pain database (Mela), patients' notes and TARN data was conducted.

As this is a service improvement there was no requirement for ethical approval. Good adherence was compliance with referral according to rib fracture score and analgesia according to the suggested step on the algorithm (Figure 1).

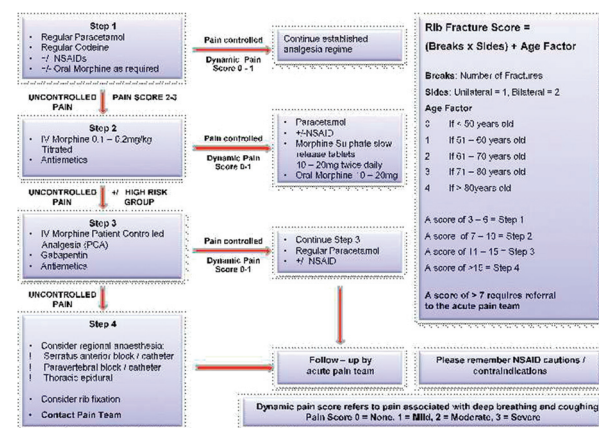


FIGURE 1. Multiple rib fracture pain management algorithm.

We looked at the following variables:

- Time to referral
- Rib fracture score
- Length of stay
- NISS (New Injury severity score)

Results from 20 patients are summarized in Table 1.

TABLE 1.

	Good adherence	Poor adherence
Number of patients	11	9
Time to referral	14.68 hours (1–44)	23.22 (6–48)
Rib fracture score	8.5 (1–20)	16.78 (8–35)
Length of stay	9.8 days (3–22)	13.33 (5–38)
NISS	21.8 (9–34)	33 (6–35)

Conclusion: Good adherence to the rib fracture algorithm resulted in earlier referral and reduction in length of stay. Data indicates that patients with higher rib fracture scores are not referred in a timely fashion. Reasons for this include these patients more associated injuries (higher NISS) and the rib fractures were not the treatment priority. Education and multi disciplinary meetings are highlighting this issue so that patients are managed appropriately to improve analgesia and reduce LOS.

ESRAS-0165 Miscellaneous

REHABILITATION ASPECTS OF CHRONIC UROLOGICAL PAIN

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Aims: Chronic urological pain in patients with percutaneous nephrostomy tube and suprapubic catheter drainage is very pressing problem especially in older people. Aim of this study to show effectiveness of occupation therapy and magnetotherapy for chronic pain relief.

Method: In period 2012–2014 43 patients: 21 with percutaneous nephrostomy tube, 22 with suprapubic catheter drainage were examined. Age 65–75. Every patient was counseling by occupational therapist and formation of every day activity and rest regime were assessed, magnetotherapy projecting on fistula 3 times per week were performed. Treatment continue 3 month for every patient. All patients used nonsteroidal anti-inflammatory drugs (NSAIDs). Starting and after treatment quality of life tested by SF-36 questionnaire. To sum pain intensity verbal pain intensity scale (VAS) was used.

Results: VAS results in first group before treatment: mild 3(23,38%), moderate 7(33,33%), severe 11(52,38%) and 2(9,08%), 9(40,90%), 11(50,00%) in second group respectively. SF-36 results of first group good 3(14,29%), fair 6(28,58%), poor 12(57,14%), in second group 1(4,54%), 4(18,18%), 17(77,27%).

After treatment VAS results in first group were mild 6(28,56%), moderate 9(42,85%) severe 6(28,58%). In second group 6(27,27%), 9(40,90%), 7(31,38%) respectively. SF-36 in first group: good 7(33,33%), fair 8(38,08%), poor 6(28,58%). Second group 5(22,72%), 10(45,45%), 7(31,81%) respectively. In first group stopped use NSAIDs 16(76,19 %) in second group 14(63,64 %) of patients.

Conclusion:

1. Occupation therapy and magnetotherapy helps for relieving chronic urological pain.
2. Quality of life show rather better results in both groups of patients.
3. Occupational therapy and fisiotherapy must be used much more wider in chronic pain patients as alternative for medicament therapy.

ESRAS-0352 Miscellaneous

POSSIBLE IMPACT OF THE TYPE OF ANESTHESIA ON CANCER RECURRENCE: AN UPDATE

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Aims: There is a growing body of evidence suggesting that anesthetic technique may influence cancer recurrence. Natural killer (NK) cells represent the main defense against cancer cells. Cytotoxic T-cells also play an important role.

Method: A PubMed® literature search was conducted combining the terms: "anesthesia", "general", "regional", "cancer recurrence".

Results: Even though much of the literature is based on animal studies, it seems that midazolam, ketamine, thiopental, inhalational agents and morphine reduce cellular immunity. Tramadol, fentanyl and remifentanyl have beneficial effects

on NK activity. Propofol inhibits tumor metastasis in laboratory studies. Therefore, propofol anesthesia with minimum morphine is ideal.

In patients undergoing lower limb osteosarcoma resection receiving combined general/epidural anesthesia the CD4+/CD8+ levels are higher compared to general or epidural anesthesia alone, leading to the conclusion that combined general/epidural anesthesia contributes to the restoration of immune function. Local anesthetics exhibit a cytotoxic effect in vitro. Epidural and paravertebral analgesia may have the potential to reduce cancer recurrence in patients undergoing prostatectomy and breast surgery respectively, compared to morphine analgesia. Peripheral nerve blocks reduce the stress response to surgery, thus enhancing immunity. Whether this can be translated into long-term survival benefit remains to be elucidated. Still, regional anesthesia reduces opioid and volatile requirements.

Conclusion: Factors that reduce perioperative stress response and enhance immunity, such as adequate pain control, multimodal analgesia and regional anesthesia should be implemented in clinical practice. However, basic science data suggesting that regional anesthetic techniques could lead to more favorable prognosis need to be further investigated and supported by more clinical studies.

ESRAS-0295

Miscellaneous

ENDOSCOPIC DEBRIDEMENT AND DRAINAGE FOR THE TREATMENT OF PYOGENIC SPINAL INFECTION

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Aims: The incidence of pyogenic spinal infection (PSI) seems to be increasing in the last years as a result of the higher life expectancy of older patients with chronic debilitating diseases, the rise in the prevalence of immunosuppressed patients, and the increase in spinal surgery and techniques. Percutaneous endoscopic debridement and drainage (PEDD) has become an effective alternative to extensive open surgery. Clinical results of PEDD were evaluated in the patients with PSI who were not unresponsive to conservative therapy.

Method: Retrospective patient chart analysis of performing PEDD in PSI during 13 years was done for the evaluation of the outcomes.

Results: Eighteen patients (11 men and 7 women, aged between 48 and 84) with PSI were performed PEDD. Structural localization of PSI involved 11 cases of spondylodiscitis, 5 cases of psoas abscess with spondylodiscitis, and 2 cases of epidural and psoas abscess with spondylodiscitis. The most common preoperative presenting symptoms were unremitting backache (61.0%), febrile sensation (27.8%), and generalized ache (11.1%), in order. The most common preoperative presenting sign was paravertebral muscle tenderness (83.3%), limitation of spine motion (16.7%), and foot drop (11.1%), in order. Etiologic bacteria were *Staphylococcus aureus* (77.8%), *E. coli* (16.7%), and *Proteus* spp. (11.1%), in order. Postoperative C-reactive protein followed by erythrocyte sedimentation rate was lowered 1 day after operation.

Conclusion: PEDD brought immediate pain relief and good clinical results to patients with PSI.

ESRAS-0043

Miscellaneous

COMPLIANCE OF PREOPERATIVE CXR IN ANAESTHESIA CLINIC

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Aims: Chest x-rays (CXR) are performed as part of preoperative assessment of patients. We performed a retrospective audit of current practices in preoperative CXR ordering in elective patients seen in the Anaesthesia clinic, with the aim of highlighting the indications for CXR ordering in this hospital, compliance rates, and explore the reasons for non-compliance. Absence of a preoperative CXR may result in cancellation or postponement of cases with an impact on operating theatre productivity.

Method: 371 patients were audited over 2 weeks (1-14 March 2013). All patients undergoing general or regional anaesthesia (GA/RA), and monitored anaesthesia care (MAC) electively, and were reviewed in the anaesthesia clinic were included.

Results: 18% of patients had an indication for a preoperative CXR. There was a 56% compliance rate to the department policy of CXR ordering. The top

indications for CXR were 1) low MET (used as a surrogate measure for breathlessness on climbing > 2 flights of stairs): 46%, 2) smoking: 27%, and 3) BMI >35: 7%. Amongst the 44% of patients in whom CXR was indicated but not performed, 43% were cases under GA, minor eye RA (43%), non-eye RA (10%) and MAC (3%). The indications for non-compliance were low MET (47%), smoking history (33%), and obesity (7%).

Conclusion: It is worthwhile to review our department's policy with regards to the need for CXR ordering in patients undergoing minor RA cases and to audit the conversion rate of RA to GA. This would minimize the number of unnecessary CXR ordering in this group of patients.

ESRAS-0102

Miscellaneous

A SURVEY OF EDUCATION AND TRAINING PROGRAMMES IN ULTRASOUND-GUIDED REGIONAL ANAESTHESIA

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Aims: The practice of Ultrasound-Guided Regional Anaesthesia (UGRA) has increased in recent years. There are no national guidelines for education of UGRA for anaesthesia trainees in Singapore.

We aim to study current teaching methods of regional anaesthesia, their perceived effectiveness and our trainees' comfort level with regards to the performance of specific blocks.

Method: This anonymous survey was sent to anaesthesia trainees in all training institutions in Singapore and data was collected over 1 month.

Results: 139 trainees from 6 institutions completed the survey. 91% did not have a formal training program for UGRA in their institution. Only a third had attended lectures on physics and sonoanatomy and half had attended live model workshops. For practice of needling techniques, 17% had used gelatin models, 25% used partial task model and 8% attended cadaveric workshops.

The most effective training methods as perceived by trainees were live model workshops, formal training blocks and cadaveric workshops. 61% of trainees felt they had inadequate opportunities and resources to support their training.

Majority of trainees felt confident in performing brachial plexus and femoral nerve blocks after 20 blocks while the learning curve for popliteal and sciatic blocks appear steeper where trainees only felt confident after performing more than 30 blocks.

Conclusion: Trainees perceive they will benefit from more formalised training programs, in particular, workshops and designated training blocks. The learning curve for sciatic nerve block appears to be steeper than brachial plexus and femoral nerve blocks.

ESRAS-0115

Miscellaneous

DEVELOPMENT OF AN ULTRASOUND PHANTOM TRAINING TOOL FOR VASCULAR ACCESS WITH THREE-DIMENSIONAL PRINTING

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Aims: Interpreting ultrasound images and maintaining visibility of medical devices whilst using ultrasound requires hands-on training, with an emphasis on repetition of skills. Low-cost ultrasound phantoms represent an area of unmet need in facilitating training opportunities to improve dexterity and skills in ultrasound-guided procedures.

Method: We developed a number of low-cost ultrasound phantoms using 3D printing to represent vascular anatomy of central veins, with the aim of facilitating training in ultrasound guided venous access. Agar jelly was embedded within the phantom, replenished with minimal cost and effort when required. This training tool was evaluated on ten anaesthetic trainees using a likert-scale questionnaire. Questions focussed on its training-fidelity, and comparison with other manikins used for ultrasound-guided clinical skills.

Results: The phantoms were produced at a cost of £3 each. All trainees agreed or strongly agreed that both the needle tip and shaft were easily visible using the vascular phantom. 4/10 (40%) of trainees had not had access to manikins with

provision for ultrasound-guided techniques before. 8/10 (80%) agreed or strongly agreed that there was a positive end-point to confirm needle placement within the vessel. The majority were neutral as to the tactile feedback qualities mimicking real-life, and all agreed that traditional commercially available simulation models represented a more life-like experience. 10/10 (100%) agreed or strongly agreed that the presence of other structures such as nerves and fascial planes were important features when training on a manikin.

Conclusion: 3D printing represents a low-cost, low-fidelity resource for training in ultrasound guided vascular access.

ESRAS-0370

Miscellaneous

SATISFACTION WITH SEDATION DURING HIP AND KNEE ARTHROPLASTY

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Aims: Spinal anaesthesia is commonly utilised for hip and knee arthroplasty, often in conjunction with sedation. The 5th National Audit Project of RCOA and AAGBI into accidental awareness under anaesthesia found concerning reports of "awareness" under sedation. The conclusion drawn was such episodes represent a failure of communication between anaesthetist and patient. We surveyed patients who received intra-operative sedation during hip and knee arthroplasty to assess their expectations and satisfaction with sedation provided.

Method: We identified all patients who underwent elective hip or knee arthroplasty over a three week period. Patients completed a questionnaire post-operatively.

Results: Thirty-one patients underwent surgery. 26 patients completed the survey. 2 patients underwent general anaesthesia and were excluded. All patients having surgery under spinal anaesthesia were given intra-operative sedation which included propofol TCI (n=17), midazolam (n=4) or both propofol and midazolam (n=3).

13/24 patients reported that they expected they would not hear, feel or remember anything during their operation with sedation, whilst 11/24 did expect to at least recall something after their surgery. Most patients (19/24) cited their anaesthetist as the person responsible for setting their expectations of sedation.

The overwhelming majority of patients were "very satisfied" with the pre-operative information they received (22/24) and level of sedation (23/24), with the remainder of patients being "satisfied". All patients found their experience was either better than expected (20/24) or as expected (4/24). All patients were very satisfied with their overall experience.

Conclusion: The pre-operative education and intra-operative sedation delivered in our hospital provides an effective service that often exceeds patient expectations.

ESRAS-0415

Miscellaneous

SURGICAL TREATMENT OF CHRONIC SUBDURAL HEMATOMA UNDER COMBINATION OF SEDATION AND LOCAL ANESTHESIA

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Aims: CSDH is predominantly a disease of the elderly. Many of whom present with associated serious comorbidities that usually poses a problem for general anesthesia in this particular patient group. The aim of this study was to evaluate the clinical results of surgical treatment of CSDH under combination of sedation with local anesthesia.

Method: This study included 137 patients with CSDH who had been surgically treated in Clinic of Neurosurgery, University Clinical Center of Kosova during the period 2008-2012. The majority of patients (92 or 67.1%) were operated under sedation (Flormidal; Fentanyl) with local anesthesia (0.5% Bupivacaine) Gr. SLA while the remaining (45 or 32.8%) under general anesthesia Gr.GA. We compared the clinical success of the procedure in two groups regarding overall hospital length of stay (LOS), as well as tracking patient complications during hospital stay - nausea/vomiting, pain, hemodynamic stability. Hematology/lab stability.

Results: Patients with CSDH had very wide age distribution from 1 to 89 years with an average age of 62.85 years with 44 patients aged 70-79.

Overall hospital length of stay of 137 patients ranged from 2 to 46 with mean of 8.6days. Mean hospital stay for Gr. SLA was up to 5days

Whereas for Gr. GA lasted up to 10days. From total number of operated patients, four of them (2,9%) died in early post-operative period but not anaesthesia-related.

Conclusion: In conclusion, our experience suggests that combination of SLA for surgical treatment of CSDH provides adequate sedation and analgesia, satisfaction degree of patient comfort as well as patient safety.

ESRAS-0320

Miscellaneous

STANDARDISED VERSUS FREE-TEXT DOCUMENTATION OF CONSENT FOR RA: PROSPECTIVE AUDIT OF DOCUMENTATION IN 200 CONSECUTIVE PATIENTS

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Aims: Consenting for regional anaesthesia remains a highly variable practice between anaesthetists. Consent documentation forms part of a medicolegal record, shows that an attempt was made to explain the risks and benefits to the patient, and may help defend the anaesthetist should complications arise. Recently, RA-UK has published guidelines clarifying the consent process. We prospectively assessed 100 neuraxial and 100 peripheral nerve blocks (PNBs) comparing the quality of consent documentation against our standard, based upon RA-UK guidelines. Standardised purpose-made stickers to assist documentation were made freely available.

Method: Purpose-made stickers, incorporating our standardised consent documentation for neuraxial and PNBs, were stored next to anaesthetic charts and were to be used at individual anaesthetist's discretion. Examining patient notes at the end of each day, the documentation of 100 consecutive neuraxial and 100 consecutive PNBs were assessed against our standard. Comparison to the results from a previous assessment in 2011 was made.

Results: Usage of the neuraxial and PNB consent stickers was poor, 6% and 4% respectively. Where a sticker had been utilized, documentation was very good with compliance rates of 75-100% to the standard. Free-text documentation demonstrated a low compliance to the standard, e.g. "block failure" 41%, "nerve injury" 55% and "prolonged block" 5%. Overall, free-text documentation resulted in compliance rates ranging from 5-55%.

Conclusion: Documentation was poor but improved with the utilization of the appropriate sticker, prompting data entry. This mirrors previous findings from 2011 and suggests that mandatory usage of the sticker would significantly improve the documentation of regional blocks.

ESRAS-0420

Miscellaneous

HYPERECHOGENIC JELLY FOR TEACHING NEURAL BLOCKS

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Aims: General: Using pieces of fresh human cadaver for teaching ultrasound guided blocks.

Specific: Synthesis of echogenic material for intravascular injection. Compare between nerve and vessels images.

Method:

1. Synthesis of gelatinous substance with the possibility of staining and solidifiable at room temperature.
2. After dissection of several pieces of human cadaver (2 of wrist and hand, 2 leg, ankle and foot, 2 shoulders, 3 abdomen and 3 thorax);

Parts ultrasound was performed and a questionnaire was passed to 10 medical students to locate structures (tibial artery, sciatic nerve, brachial plexus, radial artery, median nerve, clavicle, heel, brachial plexus and Mayor and minor obliquus muscle). In a second time the solution was injected into the main arterial vessels and returned to perform ultrasound and pass the questionnaire. Applying the t-student test for related variables as SPSS, we found significant difference (p < 0.01) in the distinction of nerve and vascular structures after injection.

Results: Significant differences ($p < 0.01$) in the distinction of nerve and vascular structures were found after injection of this substance.

Conclusion: The use of this jelly improves visualization of vascular and nerve structures in ultrasound-guided blocks, which facilitates teaching in ultrasound-guided regional anesthesia.

ESRAS-0456

Miscellaneous

PAIN MANAGEMENT IN PATIENTS WITH GUILLAIN-BARRE SYNDROME

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Aims: Guillain-Barre syndrome (GBS) is a serious disease of peripheral nervous system, more than 90% GBS patients has pain syndrome despite analgetic therapy. The aim of our study – decrease pain syndrome in GBS patients.

Method: This case-control study included 45 consecutive critically ill patients (median age 59.3), admitted to the Intensive Care Unit with different forms of GBS. Patients was divided into Intervention (n=30) and Control (n=15) group and received standard analgetic therapy (pregabalin 600 mg per day) vs. standard therapy plus stimulation of step zone of foot (Korvit, Russia). All patients was bedbound or able to walk 5 meters with help of a person, 30% - requiring artificial ventilation. We assessed Neuropathy Impairment Score (NIS), Total Symptom Score (TSS), visual analogue mortality (VAS) before and after the end of stimulation.

Results: Groups had similar severity GBS on admission: NIS Me=110.9 [LQ=85; UQ=148] vs. Me=111.5 [LQ=72; UQ=128] $p > 0.5$, TSS Me=5.82 [LQ=4.32; UQ=6.99] vs. Me=4.66 [LQ=2.66; UQ=6.32] $p > 0.5$, VAS Me=7 [LQ=4; UQ=8] vs. Me=6 [LQ=5; UQ=6] $p > 0.5$ in Intervention and Control group, respectively. There was similar Δ NIS Me=16.2 [LQ=4.5; UQ=32] vs. Me=13 [LQ=2.5; UQ=36] $p > 0.05$, but was significant difference Δ TSS Me=2.165 [LQ=1.0; UQ=2.66] vs. Me=0 [LQ=0; UQ=1.0] $p = 0.00005$, Δ VAS Me=3 [LQ=2; UQ=5] vs. Me=6 [LQ=5; UQ=6] $p = 0.0004$ in Intervention and Control group, respectively after 2 weeks of stimulation.

Conclusion: Stimulation of step zone of foot for GBS patients associated with significant reduction of pain syndrome.

ESRAS-0440

Miscellaneous

POSTOPERATIVE TYMPANIC MEMBRANE TEMPERATURE MEASUREMENT: FACTORS INFLUENCING ITS VALIDITY

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Aims: Tympanic membrane temperature (TMT) is a reliable indicator of core and brain temperature. In practice, temperature measurement in one ear is considered adequate for the clinical decision making process in the post-operative phase. However, if one ear TMT is found to be abnormal, other side is checked and the higher reading is used. We tested the scientific validity of this practice.

Method: Following approval from the hospital audit committee, we measured both ear temperatures within a few seconds of each other amongst a randomly selected group of patients in the postoperative recovery unit. We used a calibrated infrared TMT measurement device. Measurements were alternated between the left and right ears in consecutive patients to avoid bias.

Results: We recruited 300 patients, aged median 47.2 years. The surgical site was head and neck in 21.7% patients. 82.7% patients were supine during the operation. The mean duration of surgery was 128.8 minutes (SD 72.1). Ear canals were clear in 98% patients. Temperature difference between the two ears did not correlate with body weight ($p = 0.2$), age ($p = 0.09$), duration of surgery ($p = 0.3$) or position during surgery ($p = 0.69$). A cumulative distribution of the temperature difference between the two ears showed > 90% patients had a temperature difference of less than 0.5°C. 20% patients were hypothermic (<36°C) on arrival to recovery (Figure 1).

Conclusion: The temperature difference between the two ears post-surgery is less than 0.5°C amongst 90% of subjects. Thus, there is no need to measure both ear temperatures in routine practice. The current practice is valid.

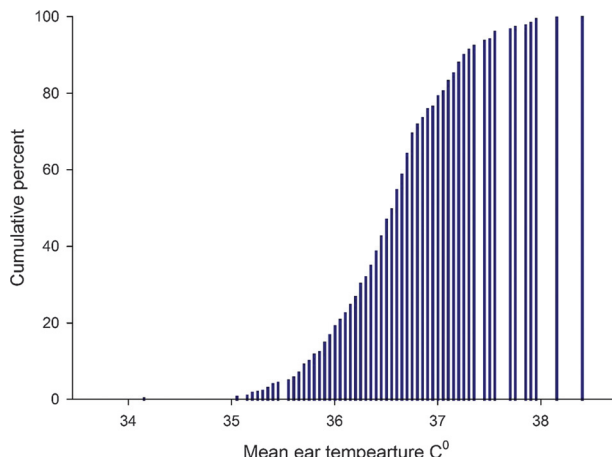


FIGURE 1. Cumulative frequency distribution

ESRAS-0422

Miscellaneous

AN AUDIT ON THE KNOWLEDGE OF LOCAL ANAESTHETICS AMONGST SURGEONS IN A DGH

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Aims: A snap shot study of the Surgeons knowledge about the pharmacology including chemical properties, safe dosage, recognition and initial management of toxicity of Local Anaesthetics in a DGH setting consisting of head and neck as well as Trauma and Orthopaedic Surgeons of all grades was performed.

Method: A questionnaire consisting of 6 questions each with 5 stems and a definite yes or no answer was distributed amongst surgical colleagues on a Clinical Governance Day. 18 Questionnaires were returned consisting of 9 responses each from Trauma and Orthopaedics and Head and Neck. 1 FY1, 5 SHOs, 3 Middle Grades, 3 Consultants and 9 Unknown grades. The responses were analysed using Microsoft excel and manually.

Results: On the questions on general knowledge and mechanism of action of local anaesthetics more than 50 percent had the correct responses. Nearly similar amount were also correct on the questions about safe dose, local anaesthetic toxicity, management of local anaesthetic toxicity including intralipid.

Conclusion: Actions required to promote safe performance of local anaesthesia:

- Laminated poster to be placed in every room where surgeons work with LA.
- Lectures on Clinical Governance to enhance knowledge and team working.
- Re-audit.

ESRAS-0104

Miscellaneous

DAY ONE IN THE HISTORY OF SPINAL OPIOID ANALGESIA - FOR THE FIRST TIME, SUBARACHNOID MORPHINE IS GIVEN TO HUMANS

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Aims: Here we present living history in the words of three men who revolutionized the management of severe pain. A summer's morning in 1978, anesthesiologists Lee Nauss and Joe Wang and neuroscientist Tony Yaksh set out for a day's practice at the Mayo Clinic. Nothing unusual betrayed that afternoon's revolutionary event: for the first time an opioid, morphine, was given subdurally to a human, a patient with intractable cancer pain.

Method: Lee Nauss (Mayo Clinic Emeritus) was interviewed at the Mayo Clinic, and Tony Yaksh (University of California San Diego) and Joe Wang (Mayo Clinic Emeritus) were interviewed by phone.

Results: Dr. Yaksh recalls, "We had shown opioids act at the rat periaqueductal grey and assumed pain was modulated centrally. To rule out spinal action, we infused opioids spinally and the first experiment said everything – opioids in fact act spinally". Drs. Yang and Nauss now proposed a clinical study. Dr. Nauss

recalls “Tony postulated that morphine action at spinal endorphin receptors would relieve pain in patients.” “Joe Wang’s insight drove the study.” “Terminally ill patients, in pain, participated enthusiastically.” Morphine dosage, Dr. Nauss explains “we faced the problem of extrapolating from rats.” And the resulting pain relief – amazing. Dramatic. “We speculated concerning continuous morphine infusions, but at that time, indwelling catheters and pumps did not exist”.

Conclusion: Both scientific and historical foundations support clinical practice. Here we hope to preserve a moment of history, in the words of the participants.

ESRAS-0086

Miscellaneous

PREVALENCE OF PERIOPERATIVE COMPLICATIONS IN PATIENTS AT RISK FOR OBSTRUCTIVE SLEEP APNEA SYNDROME SCHEDULED FOR ELECTIVE SURGERY ACCORDING TO STOP-BANG QUESTIONNAIRE

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Aims: Obstructive Sleep Apnea Syndrome (OSAS) is one of the best known respiratory diseases that occur during sleep, it is related to neurological, cardiovascular and pulmonary diseases. This study focused on knowing the prevalence and risk of trans and postanesthetic complications according to the result of the STOP-BANG questionnaire in patients undergoing an elective surgery.

Method: Patients were selected with different inclusion, exclusion and elimination criteria, the STOP-BANG questionnaire was applied to these patients in order to determine the risk of suffering from OSAS, classifying it as mild, moderate and severe risk; subsequently trans and postanesthetic complications were recorded.

Results: We obtained a sample of 316 patients who were scheduled for elective surgery from June to August 2014. The highest percentage were patients with mild risk for OSA (72.5%), followed by moderate risk (21.5%) and finally patients with severe risk (6%). 61 patients presented complications, most of the complications (64%) were observed in patients with severe OSAS risk (according to the STOP-BANG questionnaire).

Conclusion: The STOP-BANG questionnaire is an easy, affordable tool we can use to foresee the risk of potential complications in patients scheduled for elective surgery.

The prevalence in our population of patients at risk for obstructive sleep apnea syndrome in elective surgeries is greater than reported in world literature. Complications occurred in patients with moderate and severe risk are very similar to those reported worldwide. We consider the need for future studies comparing these results with a definitive test like Polysomnography to implement diagnostic and therapeutic safe maneuvers in patients diagnosed with obstructive sleep apnea syndrome.

ESRAS-0087

Miscellaneous

IMPACT OF ANESTHETIC COMPLICATIONS IN SURGICAL PROCEDURES OUTSIDE THE OPERATING ROOM

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Aims: Anesthesia outside the operating room is a procedure that has been increasing over the years, due to technological advances in the management and diagnosis of different diseases. This type of practice is a real challenge, the anesthesiologist has to deal with the circumstances of the place and at the same time try to reduce or avoid the complications that could be present due to patient’s comorbidities and the use of anesthetic drugs. The purpose of our study was to find the incidence of complications occurring in anesthetic procedures outside the operating room, and the most frequent complications related to these procedures.

Method: We conducted a prospective, cross-sectional, observational study from March to December 2014. We included all patients undergoing anesthetic procedures outside the operating room. During the procedure these patients were monitored with electrocardiography, oxygen saturation and non-invasive blood pressure, and any complications were registered.

Results: We obtained 1 study group of 251 patients. A total of 138 patients presented some kind of complications during the procedure. The most frequent

complication was bradycardia in 45 of the cases (32.6%), respiratory depression was next with 32 cases (23.1%), followed by arrhythmias, nausea and vomit in 23 (16.6%), 17 (12.3%) and 11 (7.97%) cases respectively, only 1 case of allergies (0.72%) was registered.

Conclusion: With this study we could determine the incidence of complications in anesthetic procedures outside the operating room as well as the most frequent complications presented. This study stays as a precedent for further studies where risk factors that influence the presentation of these complications can be determined.

ESRAS-0258

Miscellaneous

RISK FACTORS FOR COMPLICATIONS ON CARDIAC SURGERY

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Aims: Identify independent risk factors for perioperative complications in patients undergoing cardiac surgery.

Method: Cohort study conducted from May 2014 through August 2014. Patients who underwent cardiac surgery were included. No patient was excluded. Statistical method: 22 preoperative, 42 perioperative and 3 postoperative variables. Univariate analysis with Student t test for continuous variables and chi square or Fisher test for categorical variables. The statistical significant ones were subjected to multiple regression analysis to obtain a prognostic index. Significant when $p < 0.05$. SPSS version 17.

Results: 60 patients; 35 men 26 women, One patient died during the study. 58 patients entered cardiopulmonary bypass. The most frequent comorbidity was hypertension 60.7%. Patients who had complications finding as major risk factors: Cardiopulmonary bypass $P = 0.046$, dyslipidemia $P = 0.006$, ischemic cardiopathy $P = 0.000$. Ischemic Cardiopathy patients had a higher number of complications in 25.9%. The surgery who had higher incidence of complications was coronary revascularization 44.4%. The type of surgery was statistically significant for complications with a $P = 0.000$. Patients with NYHA I were the most frequent in 33.3% with a $P = 0.000$ and cardiac index $P = 0.006$ and age 0.021. After logistic regression variables statistically significant were age $P = 0.32$ (IC 1.007-1.169), cardiac index 0.026 (IC 0.425-0.946), time in cardiopulmonary bypass $P = 0.031$ (IC 1.002-1.046).

Conclusion: Age, time in pump, DM2, IC, dyslipidemia, NYHA I were significant. Type of surgery, cardiac index, and the time in cardiopulmonary bypass also. In our study we found similarities with previously reported studies however, the measurement of cardiac index by TEE was significant as a risk factor.

ESRAS-0300

Miscellaneous

EFFICACY OF UPPER AIRWAY ULTRASOUND AS A PREDICTOR OF DIFFICULT INTUBATION IN THE PRE-ANESTHETIC ASSESSMENT

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Aims: Ultrasonography is a noninvasive diagnostic method used for evaluation of the upper airway. Its use in the evaluation of the airway has been directed toward its assessment as a predictor of difficult intubation. Our objective was to determine its efficacy to predict a difficult airway.

Method: An observational, descriptive, longitudinal, prospective study was conducted. We included patients who attended the pre-anesthetic consultation scheduled for any elective surgery requiring general anesthesia from November 2013 to May 2014. An ultrasonographic evaluation of the upper airway was performed, recording measures of the tracheal diameter, tracheal length and the presence of alterations such as tracheal deviation or obstruction of any kind. A tracheal length less than 10cm and a tracheal diameter less than 2cm were considered as predictors of difficult intubation.

Results: 216 patients were included. 18 patients with tracheal deviation were identified, 17 of these patients showed no difficulty at the time of intubation and only 1 presented difficulty at the time of the tracheal tube introduction (5.88%). We compared patients having difficult airway operational definition with patients in which we found a tracheal length less than 10cm and tracheal diameter less than 2cm and no statistical significance was found. A ROC curve was conducted showing a sensitivity and specificity of 50%.

Conclusion: Based on the results of the ROC curve there is no statistical significance in predicting a difficult airway with ultrasound measures, however this may vary obtaining measurements of the length of the epiglottis. We believe that other studies on the matter are needed.

ESRAS-0237

Miscellaneous

ANAESTHETIST'S KNOWLEDGE, IN A TERTIARY REFERRAL HOSPITAL, OF THE TREATMENT OF LOCAL ANAESTHETIC SEVERE TOXICITY (LAST) AND THE USE OF LIPID EMULSION

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Aims: The treatment of seizures or cardiac arrest caused by local anaesthetic systemic toxicity (LAST) differs to the normal treatment of these conditions.¹

We wanted to discover if the anaesthetists in our department were confident to treat LAST.

Method: We surveyed 60 anaesthetists in our department regarding their knowledge of the treatment of LAST.

Results: Local anaesthetic was used regularly by 65% of anaesthetists and 22% had seen or been involved with a patient with LAST. When asked the initial bolus dose of lipid emulsion 33% did not know and 36% did not know where it is stored in theatres. In our trust printed guidelines are no longer kept in theatres but 35% of our anaesthetist would look for these laminated sheets.

Conclusion: A significant number of our anaesthetists did not know the doses of lipid rescue therapy for LAST or where to find guidance for treatment. It has been shown that clinical aids used in the treatment of LAST can improve medical treatment and non-technical skills.²

We have updated and publicised guidance accessed on the hospital's intranet to include an easy to use clinical aid for use in the emergency treatment of LAST.

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Abstracts and Highlight Papers of the 34th Annual European Society of Regional Anaesthesia & Pain Therapy (ESRA) Congress 2015: E-poster Discussion Papers

ESRAS-0088

E-Poster Discussion 01: Case Reports

EFFECT OF STELLATE GANGLION BLOCK ON INTRACTABLE LYMPHEDEMA AFTER BREAST CANCER SURGERY: A PRELIMINARY STUDY

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Aims: Lymphedema of the upper limb after breast cancer surgery is a disease that carries a life-long risk and is difficult to cure once it occurs despite the various treatments which have been developed.

Method: Two patients were referred from general surgery department for intractable lymphedema. They were treated with stellate ganglion blocks, and the circumferences of the mid-point of their each upper and lower arms were measured on every visit to the pain clinic.

Results: A marked decrease of the circumference in each patient was observed after two consecutive stellate ganglion blocks. A series of blocks were established to maintain a prolonged effect. Both patients were satisfied with less swelling and pain relief.

Conclusion: This case demonstrates the benefits of an stellate ganglion block for intractable upper limb lymphedema.

ESRAS-0294

E-Poster Discussion 01: Case Reports

A GOOD ALTERNATIVE FOR POSTOPERATIVE ANALGESIA IN NEONATES VIA TRANSVERSUS ABDOMINIS PLANE BLOCK: OUR EXPERIENCES

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Aims: The postoperative analgesia for abdominal surgery in neonates is important for both the surgical outcome and early ambulation. The newborn analgesia has some challenges, because of the physiological and pharmacological differences of this developmental stage. The intravenous analgesia may have respiratory and metabolic problems with immature organ systems. However, due to the small size of the structure, differences in the resistance of skin, and fascia, complicates this procedure. The regional block with ultrasound (USG) guidance may overcome the practice difficulties, even in the infant group. The Transversus Abdominal Plane (TAP) block is generally performed in adult abdominal surgeries, but recently it has been performed in pediatric patients with usage of USG guide. The effectiveness of the TAP block in the pediatric group

has been well characterized in diverse peer-reviewed publications. However, there are only few reports for TAP block in the neonates and low birth weight groups. We want to present our experiences in eight cases of neonates with applied TAP block, after abdominal surgeries.

Method: The TAP block was scheduled after the surgical procedure. The needle was pushed forward in-plane, at a 10-20 degree angle, to USG probe after internal visualization of the oblique and transversus abdominis muscle layers. The target area between two muscles was confirmed in all cases by injecting 0,1 ml 0.9% NaCl and then 2 mg/kg 0.25% bupivacaine.

Results: Results are shown in Figure 1.

Conclusion: TAP block is a safe alternative in neonates for pain relief, reducing the additional analgesics requirements.

ESRAS-0031

E-Poster Discussion 01: Case Reports

FEATURES OF ANAESTHESIA FOR ABDOMINAL DELIVERY IN PREGNANT WOMEN WITH A TRANSPLANTED KIDNEY

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Aims: More than 1000 operations of kidney transplantation (KT) have been done in Russia in 2014. Among people with KT are women of childbearing age. In our Center we observed and treated 15 pregnant women with KT. 5 pregnant women were performed operation of cesarean section on the gestational age 31-37 weeks. Anesthesia of such women should satisfy requirements: minimal effect on graft, hemodynamic stability, prevention of infectious complications, maintain graft function, rational infusion therapy. Define the most optimal method of perioperative management of women with KT and the kind of anesthesia, with minimal effects on the graft.

Method: There were studied 15 cases of pregnancy with KT. 8 women were investigated, treatment was chosen, then they were discharged in order to prolong the pregnancy. 2 women received abortions for medical reasons. In 5 cases, delivery was carried out by operation of cesarean section. In all cases low dose CSEA was used. Assessment of graft function was assessed before, during and after the operation. Also hemodynamics, electrolyte balance, the adequacy of analgesia were assessed. Postoperative analgesia was multimodal, with using of epidural component.

Results: There were stable hemodynamics (absent as arterial hypo- and hypertension), satisfactory performance of gas exchange and the adequacy of diuresis. The children had Apgar scores 8-9. In the early postoperative period were no clinically significant changes from the mother side. Graft function was satisfactory.

Conclusion: Low dose CSEA is the anesthesia of choice for such patients.

ESRAS-0037

E-Poster Discussion 01: Case Reports

EPIDURAL SPINAL CORD STIMULATION COMPLICATED BY POSTERIOR CORD SYNDROME

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Aims: Spinal cord stimulation (SCS) for neuropathic pain is, nowadays, a well-established method of treatment in interventional pain medicine. Posterior spinal cord syndrome (PSCS) is a rare pathology of the posterior spinal columns resulting in loss of deep touch, proprioception, vibration and light touch sense. The purpose of this study is to demonstrate the unusual complication of a PSCS after SCS implantation in a patient with failed back syndrome.

CASES	1	2	3	4	5	6	7	8
DIAGNOSIS	DUODENAL ATRESIA	BILIARY ATRESIA	DUODENAL ATRESIA	PYLORIC STENOSIS	BILIARY ATRESIA	BILIARY ATRESIA	DUODENAL OBSTRUCTION (ANGULAR PANCREAS)	HYDRONEPHROSIS
AGE (Day)	4	27	5	23	48	70	7	36
WEIGHT (kg)	1600	4000	1950	2700	2800	3500	2200	3600
PROCEDURE	Duodenojejunostomy	Kasai's	Duodenojejunostomy	Pyloromyotomy	Kasai's	Kasai's	Duodenojejunostomy	Pyloroplasty
INCISION	Right subcostal	Extended right subcostal	Right subcostal	Right transverse above umbilicus	Extended right subcostal	Extended right subcostal	Right transverse near to umbilicus	Right laparotomy
TAP block approach	Right subcostal	Bilateral subcostal approach	Right subcostal	Right subcostal approach	Bilateral subcostal approach	Bilateral subcostal approach	Right subcostal approach	Right midaxillary approach
Time catheter of	Postoperative 2 nd hour	Postoperative 12 th hour	In operating room	In operating room	Postoperative 2 nd hour	In operating room	In operating room	In operating room
Postoperative analgesia in 24 hours	no	Paracetamol; 2 times	no	no	Paracetamol; 2 times	Paracetamol; 1 times	no	no
CRIS range	0	0-4	0	0	0-4	0-4	0	0

FIGURE 1.

Method: The patient is a 66-year-old male with a history of failed back syndrome after previous laminectomies and screws fixation for degenerative lumbar stenosis. After successful trial stimulation, he was brought to the operating room for permanent implantation of a paddle lead under general anesthesia.

Results: One hour after recovery, the patient reported decreased sensation of lower limbs. Physical examination revealed decreased light touch sensation in bilateral lower extremities, mainly on right side, and decreased pinprick and vibration sense. Radiological imaging revealed improperly placed lead with electrode placed to right of midline. Patient underwent a reposition of paddle lead confirmed by fluoroscopy. In the next days, he reported adequate pain relief from the stimulation and an improvement of sensory deficits, but he had residual ataxic gait. He was discharged and referred for further rehabilitation care.

Conclusion: Complications related to SCS are usually caused by lead migration, and electrode dislocation or breakage. Other complications include infection, CSF leakage, and hematoma. This case illustrates a PSCS as a rare complication of SCS that was most likely due to the lateral implantation of the lead.

ESRAS-0141

E-Poster Discussion 01: Case Reports

IS IT POSSIBLE TO PERFORM MASTECTOMY AND RECONSTRUCTION WITH BREAST EXPANDER IN A PATIENT WHO REFUSED GENERAL ANESTHESIA? A CASE REPORT

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Aims: Postsurgical recovery after mastectomy and reconstruction with breast expander, is marked by pain related to the stretching of the pectoralis major muscle fibers and muscle spasm caused by the device. Pain and muscle spasms are treated with muscle relaxant therapy and opiates.¹ This experience demonstrates that Pecs II block can provide not only a good anesthesia for mastectomy but also a long-lasting analgesia for pain related to breast expander.

Method: After IRB approval and written patient consent statement, in L'Aquila Academic Hospital an ultrasound-guided unilateral Pecs I block and Serratus Plane Block were performed in a 73 years old patients, for mastectomy and reconstruction with breast expander. She refused general anesthesia. 30 ml of 0.5% Levobupivacaine were injected and a light sleep was ensured by 3 mg/kg/h of intravenously propofol. Supplemental oxygen (2 L/min) was administered by nasal dispenser with ETCO₂ control. Heart rate, main blood pressure, arterial oxygen saturation and ETCO₂ greater or less than 30% of baseline were treated.

Results: A good anesthetic plane was ensured and no side effects were recorded. Patient was discharged from operating theatre without rest and incidence pain and she did not request painkillers during the first day of her hospitalization in breast surgery unit.

Conclusion: Pecs I Block and Serratus Plane Block are a viable alternative to general anesthesia; they can provide a good anesthetic plan during surgery, with a long lasting analgesia in order to reduce opiates consumption and its related side effects with a positive benefits/costs ratio.

ESRAS-0288

E-Poster Discussion 02: Central Nerve Blocks

DAY-CASE ARTHROSCOPY: INTRATHECAL HYPERBARIC 2% PRILOCAINE OR PERIPHERAL NERVE BLOCK? A PROSPECTIVE RANDOMISED COMPARISON

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Aims: Intrathecal prilocaine has been proved to allow a faster recovery after knee arthroscopy, but its effectiveness regarding the onset and performance times compared to peripheral nerve block is still not evaluated. In this prospective, randomized study we compared prilocaine spinal anesthesia with ultrasound femoral-sciatic nerve block for outpatients knee arthroscopy.

Method: After IRB approval and written informed consent, 100 patients were allocated to receive either intrathecal 40 mg 2% hyperbaric prilocaine (spinal=50 pt) or a combined ultrasound femoral-sciatic nerve block (biblock=50 pt) injecting 25 ml of 2% mepivacaine. Primary endpoint was the time to readiness for surgery (block performance + onset times). The intraoperative analgesics requirement as well as the incidence of hemodynamic complications were also evaluated. A $p < 0.05$ was considered significant.

Results: No difference in demographic variables were reported between groups. Intraoperative fentanyl was required by 8 patients in biblock group, and by 2 patients in spinal group ($p=0.046$), while hemodynamic complications were seen only in spinal group (6 hypotensions, 1 bradycardia) ($p=0.012$).

Conclusion: Both spinal and peripheral nerve block took similar times for surgery readiness. Spinal anesthesia showed a better intraoperative analgesic profile, but a higher hemodynamic complications rate for outpatients knee arthroscopy.

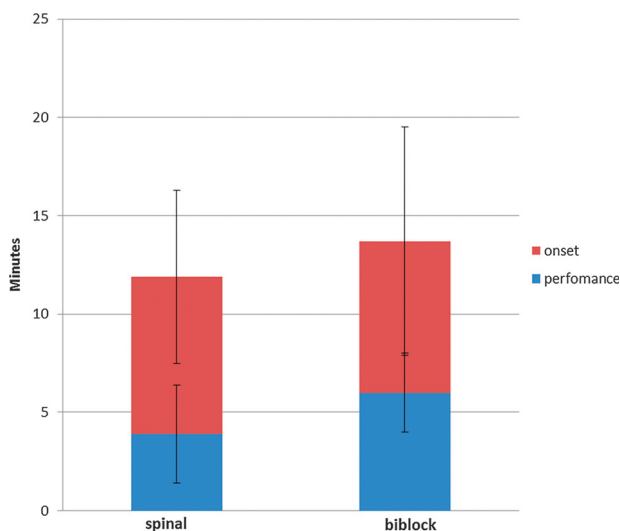


FIGURE 1. onset and performance time

ESRAS-0174

E-Poster Discussion 02: Central Nerve Blocks

CATHETER INSERTION DURING EPIDURAL TECHNIQUE: REDUCING COMPLICATIONS

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Aims: Placement of epidural catheters for labor analgesia is a common procedure routinely performed. However, this procedure can often cause paresthesia (typically characterized as a transient and intense burning pain radiating to the leg) and accidental cannulation of an epidural vein. We tested the hypothesis that predistension of the epidural space pushing the dura with saline before epidural catheterization results in easier catheter insertion and decrease the incidence of these complications without altering the quality of analgesia (Figure 1).

Method: One-hundred-forty-three laboring women were assigned to receive an epidural with loss of resistance technique. Saline was injected through the Tuohy needle prior to catheter insertion: 0.5 mL (nondistension group) or 5 mL (distension group). This two alternatives have proven to be safe and reliable. In both groups, catheter was advanced up to 12 cm in length during the procedure, removing the catheter to maintain 3 cm inside the epidural space. All events developed during the performance were carefully documented.

Results: There were no accidental intravascular catheter placements in the distension group compared to the 8.33% in nondistension group, and 85.42% of patients in this group presented paresthesias versus 11.58% in the distension group. Other complications did not appear during this study. The quality of analgesia (visual analog scores and anesthetic consumption) was similar between groups.

Conclusion: Expansion of epidural space with 5 mL saline before epidural catheterization is a simple and effective maneuver to reduce the blood vessel trauma and nerve root irritation arising from the placement of a catheter into the epidural space.

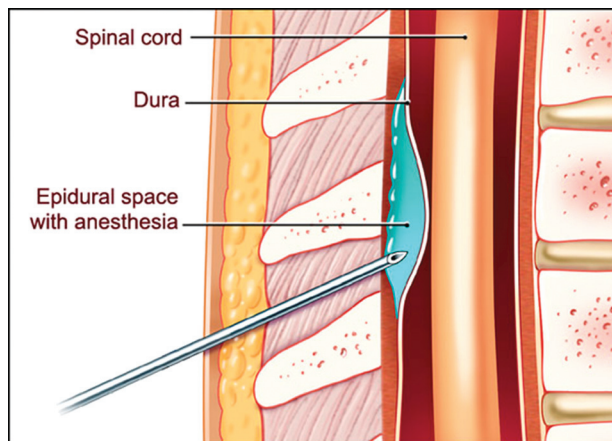


FIGURE 1.

ESRAS-0024

E-Poster Discussion 02: Central Nerve Blocks

CAN VENA CAVA ULTRASOUND GUIDED VOLUME REPLETION PREVENT HYPOTENSION AFTER SPINAL ANESTHESIA? A RANDOMIZED, CASE-CONTROL, PROSPECTIVE TRIAL

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Aims: Significant hypotension is frequent after spinal anaesthesia. Empiric fluid administration is common to prevent this complication. Inferior vena cava ultrasound (IVCUS) is effective in assessing fluid responsiveness in critical care patients. Aim of this study is to evaluate its efficacy in guiding volume optimization to prevent hypotension after spinal anaesthesia.

Method: After local ethical committee approval, ASA 1-3 patients undergoing elective lower abdominal wall non-obstetric surgery or lower limbs minor orthopedic surgery with spinal anesthesia were randomized to undergo either a preventive IVCUS guided volume optimization or no preoperative volume repletion. A variation with breathing of IVC diameter higher than 36% was considered sign of fluid-responsiveness and treated with subsequent boluses of 500 ml of crystalloids until normalization. A decrease in significant hypotension rate in the treated of 50% was considered as clinically significant. A power analysis was performed, indicating 80 patients per arm.

Results: A total of 185 patients were recruited. 160 patients were included and randomized. A difference of 15% in the hypotension rate between the two arms was found (control group 42.5% vs IVCUS group 27.5%), being statistically significant ($p=0.044$, CI=95%). The number of patients requiring vasoactive drugs after spinal anaesthesia was significantly lower in the IVCUS group ($p=0.015$). The total amount of fluid given throughout the operation did not differ significantly in the two groups.

Conclusion: IVCUS is an effective method to assess fluid responsiveness in patients undergoing elective surgery. It could be employed to guide a tailored preoperative volume status optimization, to prevent significant hypotension after spinal anaesthesia.

ESRAS-0196

E-Poster Discussion 02: Central Nerve Blocks

APPROPRIATE SPINAL VERTEBRAL LEVEL FOR LUMBAR SYMPATHETIC GANGLION BLOCK

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Aims: There are numerous variations in both the location and number of the lumbar sympathetic ganglia. The aim of this study was to determine the appropriate level of lumbar vertebra where the lumbar sympathetic ganglia principally aggregate.

Method: 60 patients, 30 female(F) and 30 male(M), underwent lumbar sympathetic ganglion block (LSGB) either on the left (26) or the right side (34). The

site of needle entry was randomly selected between L3 and L5 vertebrae. Less than 1ml of mixture of 2% lidocaine and radio opaque dye(Dye) was injected. The procedure was considered responsive when the skin temperature of either the sole or dorsum of the foot increased more than 1°C within 5 minutes. The space between the upper border of the sacrum (point 0) to the upper border of the L3 (point 12) was divided into 12 segments to allow numerical description of the spread of Dye.

Results: The median spread of Dye was 6.7 (middle 1/3 of L4 body level). The value was significantly different between F and M [7.5 (upper 1/3 of L4) and 5.9 (lower 1/3 of L4)] ($p=0.002$). However, there was no significant difference between Lt.- and Rt.- sided LSGB pts [6.3 (middle 1/3 of L4) and 7.1 (upper 1/3 of L4)] ($p=0.203$). The spread of Dye did not correlate with height or BMI.

Conclusion: The results demonstrate that the lumbar sympathetic ganglia aggregate at the L4 level. In male, the lumbar sympathetic ganglion aggregated at a lower level(lower 1/3 of L4) compared to that in female(upper 1/3 of L4).

ESRAS-0234

E-Poster Discussion 02: Central Nerve Blocks

POSTOPERATIVE PAIN AND NAUSEA AND VOMITING AMONG PRE- AND POSTMENOPAUSAL WOMEN UNDERGOING CYSTOCELE AND RECTOCELE REPAIR SURGERY UNDER SPINAL ANESTHESIA

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Aims: Postoperative nausea and vomiting (PONV) and postoperative pain are among the most common side effects of surgeries. Many factors such as changes in the level of sexual hormones are reported to affect these complications. This study aims to evaluate the probable effects of menopause on PONV and postoperative pain.

Method: In this prospective study that approved by ethics committee of Lorestan university of medical sciences, a total number of 144 female patients undergoing cystocele or rectocele repair surgery with standardized spinal anesthesia were included. An informed consent was obtained from patients prior entrance to study. Patients were divided into two groups of pre- and postmenopausal women with equal sample sizes ($n=72$). The occurrence of PONV, the severity of pain as assessed by Visual Analog Scale (VAS) pain score, and the quantity of needed morphine and metoclopramide were recorded at 2, 4, 6, 12, 18 and 24 th hours after the surgery.

Results: The mean VAS pain score and the mean amount of required morphine was higher among premenopausal women ($P=0.006$). Moreover, these patients needed a higher amount of morphine for their pain management during the first 24 hours after the surgery comparing to postmenopausal women ($P<0.0001$). No difference was observed between the two groups regarding the incidence of PONV ($P=0.086$ and 1 for nausea and vomiting respectively) and the mean amount of metoclopramide requirements ($P=0.38$).

Conclusion: Premenopausal women are more likely to suffer from postoperative pain after surgery.

ESRAS-0075

E-Poster Discussion 03: Chronic Pain Management

HORNER SYNDROME AFTER CERVICAL MEDIAN BRANCH RADIOFREQUENCY NEUROTOMY

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Aims: Chronic neck pain, a common cause of disability, seems to be the result of several interacting mechanisms. One common type of trauma associated with chronic neck pain is whiplash-associated disorder (WAD) (1)

Although relief may not be permanent, there is strong evidence that radiofrequency denervation is effective in reducing pain in patients with chronic whiplash injury. Moreover, it appears that the procedure can be repeated with a similar probability of success (2)

Here we present a case of Horner syndrome as an unusual complications of Cervical median branch radiofrequency neurotomy.

Method: A 49 years old woman has suffered a whiplash injury in July 2007 after a road traffic accident caused her severe persistent neck pain, she underwent a left C5,C6 and C7 median branch radiofrequency neurotomy in theatres under fluoroscopy guide.

15 minutes after the procedure the patient developed headache, left sided flushed face, dropping of left eye lid with blurred vision, smaller left pupil and tingling in her left arm.

The patient's clinical signs confirmed left Horner syndrome. The patient's symptoms completely subsided on the second morning.

Results: In telephone follow up 8 weeks after the injection, the patient did not report any further side effects.

Conclusion: This report documents the unusual occurrence of Horner syndrome following Cervical median branch radiofrequency neurotomy. Although Horner syndrome is well recognized following stellate ganglion block, we found no other reports of Horner syndrome following cervical facet joints radiofrequency neurotomy. Physicians involved with radiofrequency denervation should be aware of this potential complication.

ESRAS-0123

E-Poster Discussion 03: Chronic Pain Management

EVALUATING THE IMPACT OF INJECTION THERAPY AND NON-INJECTION RELATED TREATMENT ON PAIN REDUCTION, QUALITY OF LIFE AND PATIENT SATISFACTION IN CHRONIC BACK PAIN MANAGEMENT

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Aims: The aim of the study was to assess the effect different treatment methods had on pain reduction, quality of life (QOL) and overall satisfaction in patients with chronic back pain.

Method: This was a prospective audit study. Eighty-six patients who attended chronic pain clinic from January 2012 to March 2014 were included. The degree of pain reduction (expressed as a percentage) was grouped into no reduction, minimal reduction (1-30%), moderate (31-50%) and substantial (>50%). Patients were asked if the treatment improved their QOL and if their overall satisfaction was excellent, good, fair or poor. Ethical approval wasn't required as advised by local policy.

Results: Substantial to moderate pain reduction was reported by 54% of the patients. Injection therapy (IT) was associated with substantial pain reduction 91% of the time. Non injection related treatment (NIRT) was commonly associated with no pain reduction (42%). Drug therapy (DT) was the largest contributor to this group.

Majority of patients who reported an improved QOL had received IT (74%) and a smaller percentage received NIRT (26%). NIRT was the most common treatment associated with no improvement in patients QOL.

IT was associated with excellent patient satisfaction 83% of the time compared to 17% for NIRT. Patients who reported a poor satisfaction, DT was the most common (61%).

Conclusion: Results suggest IT is associated with better pain reduction, improved QOL and patient satisfaction when compared to NIRT. Injections should be used in conjunction with other treatments to produce the best patient outcomes.

ESRAS-0079

E-Poster Discussion 03: Chronic Pain Management

GENICULAR NERVE: RF LESION APPLICATION FOR GONARTHROSIS PAIN

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Aims: Osteoarthritis(OA) is the most widespread chronic joint disease worldwide. Conservative treatments models may not be effective and some of them have serious adverse effects that prompted the researchers to research different treatment methods. In this study, we investigated short and mild term effectiveness of genicular nerves radiofrequency(RF) applied in patients with chronic knee pain due to OA.

Method: This study was approved by our Institutional Review Board and informed consent was obtained from all patients. Radiofrequency was performed

on 49 patients with diagnosis of knee OA (Table 1). VAS and WOMAC Index of Osteoarthritis were measured at baseline and 1st, 4th, and 12th weeks post-procedure. Under fluoroscopic guidance, the cannula was advanced percutaneously towards area connecting the shaft to the epicondyle. Sensory stimulation at 50Hz was performed to identify the nerve position. The nerve was tested for the absence of fasciculation in the corresponding area of the lower extremity on stimulation of 2V at 2Hz. The RF electrode was inserted through the cannula, and the electrode tip temperature was raised to 80C for 60seconds. One RF lesion was made for each genicular nerve.

Results: We observed an improvement in pain. VAS scores were at the first:4,73±3,23; fourth:3,89±2,9; twelfth weeks, 3,93±2,95 after the procedure and WOMAC score were 44,93±13,18; 42,81±13,15; 43,04±13,36 respectively (Table 2).

TABLE 1. Demographic characteristics of study patients

Age (years) means ±SD	64±10,6
Gender	Female n (%) 41(83,7) Male n (%) 8(16,3)
ASA n (%)	ASA I 12 (24,5) ASA II 26 (53,1) ASA III 11 (22,4)
Comorbidities n (%)	Morbidite 36 (73,5) No morbidite 13 (26,5)
Medication n (%)	Medication 43 (87,8) No medication 6 (12,2)
KL grade n (%)	2:17 (34,7) 3:22 (44,9) 4:10 (20,4)
Mean ±SD: 2,85±0,73	
Treatment forms applied before n (%)	Non medications: 6 (12,2) Analgesic drugs (NSAIDs and / or opioid): 22(44,9) Intraarticular injection: 8 (16,3) External NSAIDs application: 13 (26,5)
KL grade: Kellgren–Lawrence grade	

TABLE 2. VAS and WOMAC values

	Basal value Means ±SD	1. week Means ±SD	4. week Means ±SD	12. week Means ±SD
VAS	8,9 ± 0,08	4,73 ± 3,23	3,89 ± 2,9	3,93 ± 2,95
P value		<0,01	<0,01	<0,01
WOMAC pain	15,8 ± 1,64	10,55 ± 3,71	9,63 ± 3,60	9,71 ± 3,66
P value		<0,01	<0,01	<0,01
WOMAC stiffness	6,48 ± 0,64	4,36 ± 1,46	4,22 ± 1,48	4,26 ± 1,51
P value		<0,01	<0,01	<0,01
WOMAC physical functioning	42,46 ± 5,09	30,73 ± 8,32	29,20 ± 8,02	29,30 ± 8,13
P value		<0,01	<0,01	<0,01
WOMAC total	64,26 ± 7,29	44,93 ± 13,18	42,81 ± 13,15	43,04 ± 13,36
P value		<0,01	<0,01	<0,01

Basal value versus: VAS Visual analogue scale WOMAC: WESTERN Ontario and McMaster University P value < 0,001

Conclusion: RF neurotomy of genicular nerves leads to significant pain reduction and functional improvement in a subset of elderly chronic knee OA pain, and thus may be an effective treatment in such cases.

ESRAS-0050

E-Poster Discussion 03: Chronic Pain Management

THE UTILITY OF LEAN SIX SIGMA KAIZEN TO IMPROVE PAIN MANAGEMENT DAY CASE SERVICE QUALITY AND EFFICIENCY

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Aims: The Lean Six Sigma Kaizen, is a tool developed by the automobile industry, for the reduction of unwarranted resource wastage. Though used in

optimization of other healthcare delivery system, its potential in improving Day-Care workflow is unexplored. We have studied the utility of this tool, for quality improvement of a Day Case Pain Management Service.

Method: The healthcare providers were asked about the day to day functioning of the outpatients-pre, intra and post procedure periods, to identify problem areas in resource utilization. We constructed a Value Stream Map of the Day Case process over ten days, which was, an adaptation of the described usage methodology of this tool. Following data collection, qualitative and statistical analysis was done.

Results: The bottlenecks in the management cycle of Day Case procedures, such as, Facet Joint Injection, Radiofrequency Ablation, Morphine Pump refill, to name a few, with regards to Pain Management therapy, were identified and addressed. Optimal functioning of this service, were hindered by issues like, communication between the secretaries, nurses, doctors and allied healthcare service providers. Other factors like, drug availability, scheduling time and availability of equipment also required improvement. These results were utilized in implementing changes with positive feedback from caregivers, which then, triggered, a process in the formulation of an operation theatre checklist design.

Conclusion: This study helps recognize the utility of the Lean Six Sigma Kaizen to improve existing workflow and identify inadequacies, at the Day Case Services. Its application, complements to streamline care and communication, thereby, enhancing the overall quality and efficiency of Pain Management in Day Case Services.

ESRAS-0126

E-Poster Discussion 03: Chronic Pain Management

POSTPARTUM SACRAL STRESS FRACTURE AND ITS TREATMENT WITH REGIONAL TECHNIQUES

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Aims: Postpartum sacral stress fracture is relatively rare and its diagnosis is often delayed. The absence of acute trauma or strenuous activities at the onset of pain often distracts physicians from a diagnosis of fracture. We describe such a case who presented with postpartum sacral stress fracture.

Method: A 35 year-old woman described pain over her left buttock with radiation down the back of her left leg. She had caesarean section 1 month prior and had been suffering from a mild back pain from third trimester of pregnancy. On physical examination, muscle functions were normal, straight-leg-raise test was negative. She had hypoesthesia in the left L5 and S1 dermatomes. Tenderness of the left sacroiliac joint and antalgic gait pattern were also noted. Initial visual analogue scale was 8 under NSAID and muscle relaxant therapy. MRI was performed and identified a non-displaced vertically localized fracture on the left sacral ala surrounded by osseous oedema, suggesting the diagnosis of sacral stress fracture.

Results: Caudal epidural steroid injection under fluoroscopic-guidance with 16 mg dexamethasone and 0.25% bupivacaine and trigger point injection with 50 mg lidocaine and 100 mg diclofenac through the sacroiliac joint area were performed. The pain score decreased to 1 and antalgic gait pattern had disappeared almost completely a week after the treatment.

Conclusion: For postpartum patients with low-back, buttock and radicular pain, stress fracture should be suspected in the differential diagnosis and regional techniques would be advocated for pain relief in the presence of failure of medical therapy.

ESRAS-0057

E-Poster Discussion 04: Miscellaneous

INTRODUCTION OF PATIENT INFORMATION LEAFLET FOR CAROTID ENDARTERECTOMY AFTER PATIENT SATISFACTION SURVEY

Ahmad H., Rungta A. *Pennine Acute Hospitals NHS Trust, Anaesthetics, Manchester, United Kingdom.*

Aims: The Royal College of Anaesthetists (UK) has indicated that reliably sourced patient feedback is essential to support revalidation. We conducted a patient satisfaction survey for patients undergoing carotid endarterectomy (CEA) under local anaesthesia with the aim to carry out service improvement.

Method: The questionnaire was sent by post to the patients who had CEA at WWL (Wrightington, Wigan and Leigh) NHS Trust, UK between February 2013 to December 2013. We received 100% response rate. The results of the survey showed that overall satisfaction was good. Majority of the patients were happy with the explanation of risks and benefits of the local anaesthetic technique and more than 80% of the patients were happy to have local anaesthetic in the future. But it was noticed that majority of the patients were not informed about the possibility of CEA under general anaesthesia to obtain informed consent.

Results: We designed the patient information leaflet including the risks & benefits of the procedure, anaesthetic options including both general & local anaesthesia and the details of the hospital stay and care. This leaflet was designed in conjunction with the PALS (patient advice liaison service) team. After initial approval from lay man readers, we presented the leaflet in the local surgical directorate meeting where it was finally approved for distribution to the patients.

Conclusion: This patient information leaflet will help in improving patient experience undergoing CEA at WWL NHS Trust, UK. It will also lead to obtaining informed consent from the patients undergoing CEA in relation to different anaesthetic options.

ESRAS-0194

E-Poster Discussion 04: Miscellaneous

DOES PREOPERATIVE NERVE BLOCK DELAY SURGERY WITH A BLOCK ROOM?

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Aims: To determine whether administering nerve blocks in a block room delays entry into the operating theatre.

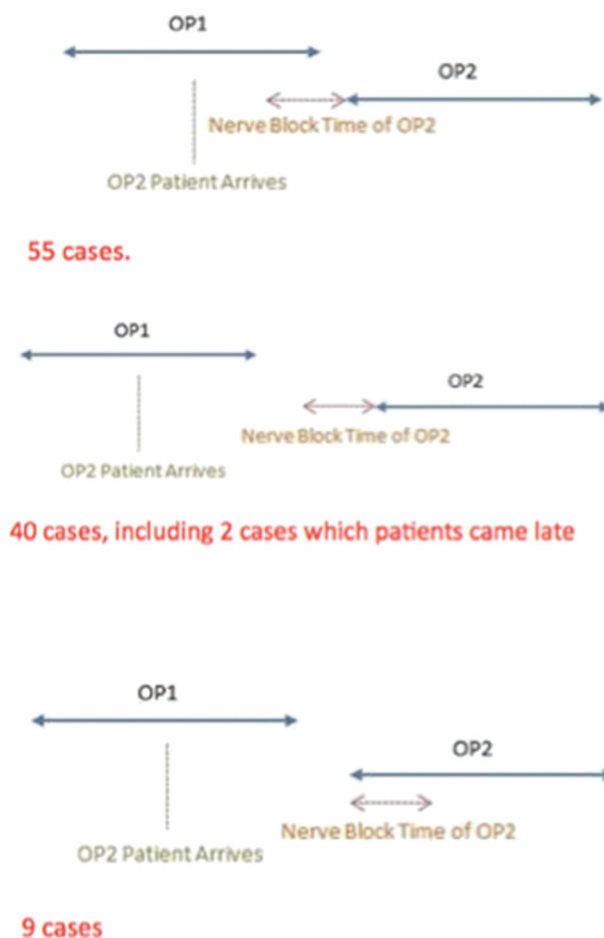


FIGURE 1.

Method: A retrospective analysis of events logged into the OTSys by nursing and medical personnel during a 9 month period.

OTSys is a proprietary operating room software for operating room management which documents patient arrival, nerve block start, nerve block end and operating theatre entry and exit times.

Data was exported to excel and filtered to derive nerve block (NB) times and arrival to nerve block times.

3 scenarios were envisioned:

Scenario 1: NB done in block area while the previous operation was ongoing (parallel processing)

Scenario 2: NB done in block area during turnover time

Scenario 3: NB done in operating theatre

Results: Of 3536 elective operations recorded over nine months, 583 had a nerve block. Only 104 of 583 cases could be analyzed with complete events. There were three scenarios (Figure 1).

Conclusion: While NB time contributes to turnover time, the interval between patient arrival to NB time is a more significant contributor to turnover time than NB time. A block room processes nerve blocks in parallel with the previous operation, which minimized our turnover times. We recommend a lead time of 140 minutes from patient arrival in order to minimize turnover times and improve theatre efficiency.

Future iterations of OTSys could breakdown the time-motion sequence to capture and streamline events.

ESRAS-0157

E-Poster Discussion 04: Miscellaneous

DOES INTRAOPERATIVE METHADONE PROLONG QT INTERVAL? OR IS GENERAL ANESTHESIA?

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Aims: Methadone is an alternative for intraoperative analgesia. One adverse effect is the prolongation of QT interval, which can lead to malignant arrhythmias and could be a limitation.

We designed a prospective not randomized study to explore modifications of QT interval during intraoperative administration of methadone in urological surgery under general anesthesia, and compare these results with a comparable group without methadone use.

Method: We studied two groups of patients submitted to urological surgery under general anesthesia. Group M received 0.2 mg/kg of methadone for intraoperative analgesia and Group F received 5-7 µg/kg of fentanyl.

We measured preoperative and postoperative QTc interval, and compared them in all patients and between both groups.

All patients received dexametazone and ondansetron (prolongs QTc interval).

Results: 25 patients in the group M and 29 in the group F were studied. Demographic data were similar. Preoperative ECG was not significantly different between the two groups. Patients in both groups were comparable and not statistically different in the postoperative ECG. We found significant differences between preoperative and postoperative ECG in all patients (Table 1).

Conclusion: All patients had an increment in the postoperative QTc interval compared with the preoperative ECG. There were no differences between groups. Intraoperative methadone does not prolong QTc interval.

TABLE 1.

	N	Group M	Group F	
n	54	25	29	p
QTc Preop (mean±SD)	383±31	389±33	378±29	NS
QTc Postop (mean±SD)	417±41 *	415±44 *	422±40 *	NS
Δ QT (mean±SD)	36±52	26±44	44±57	NS

* Wilcoxon p<0.01

ESRAS-0161

E-Poster Discussion 04: Miscellaneous

THE USE OF AN ULTRASOUND MACHINE LOGBOOK AS AN EDUCATIONAL, RESEARCH AND ADMINISTRATIVE TOOL IN REGIONAL ANAESTHESIA PRACTICE

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Aims: Ultrasound for regional anaesthesia has largely superseded a legion of landmark based techniques. Training and development have focused on individual anaesthetists' logbooks. Minimal focus has been placed on logging an actual machine's activity and using this as a tool for monitoring anaesthetists' development and for departments' administrative costs.

Method: A logbook (paper notebook) was pinned to each of the department's three ultrasound machines. Each machine use was logged into this book. Data entry was kept deliberately easy: date, type of block, location. These were analysed to determine usage patterns, if any.

Approval of analysis was obtained from the hospital audit committee.

Results: A six month period beginning October 2014 was reviewed. A total of 861 procedures were recorded (788 nerve blocks, 63 vascular access, 10 other). Of the 788 nerve blocks, 69%, 20% and 11% were upper limb, lower limb and trunical blocks respectively.

The three machines were used in five geographically separate areas: theatre suite (18 theatres), maternity, day surgery, wards and emergency departments.

Cumulatively, the three machines were used up to 20 times in a single day (mean cumulative use - six times daily).

It is envisaged that this data will help create a rota of skilled ultrasound practitioners in the hospital. It gives insight into practice development as anaesthetists acquire skills in more, different blocks. Importantly, it is being used to justify a business case for more ultrasound machines.

Conclusion: The simple addition of an ultrasound machine logbook can help guide training requirements and support development of the department's regional anaesthesia service.

ESRAS-0032

E-Poster Discussion 04: Miscellaneous

USING DIGITAL PATIENT INFORMATION SYSTEM (DPIS) FOR IMPROVING PATIENT UNDERSTANDING OF REGIONAL ANESTHESIA

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Aims: We have innovated and indigenously developed a digital patient information system (DPIS) focused on common regional anesthesia procedures.

The DPIS is an effective interactive digital tool which helps disseminate the key features of common regional anesthesia techniques including

- relevant anatomy
- images and videos related to performance of the procedures
- enlistment of common, uncommon and rare complications and risks
- frequently asked questions (FAQ)
- relevant references

Patients appear to support this enthusiastically.

A formal audit of patient satisfaction score and areas of improvement is being run concurrently to help us improve the quality of information provided.

Method: The DPIS is used during the pre-anesthesia patient visit. Some patients are visited as in patients. Clear explanation of what the regional anesthesia entails appears to greatly enhance patient preference for regional anesthesia either as a sole technique or in combination with a subsequent general anesthetic.

Results: We have implemented this novel concept in India where patients though educated did not have this degree of information both text and pictorial at their bedside.

DPIS is also helpful to emphasize and explain the valuable role of acute pain service.

A brief explanation of the Visual analogue scoring to access the severity of pain and the neurological examination to access the sensory and motor blockade following regional anesthesia is given.

Conclusion: Initial feedback is encouraging.

ESRAS-0342

E-Poster Discussion 05: Obstetric

SPINAL ANESTHESIA: COMPARISON OF TWO DIFFERENT DOSES OF LEVOBUPIVACAINE FOR CAESAREAN DELIVERY

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Aims: To compare two different doses of Levobupivacaine in relation to quality of anesthesia and hemodynamic effects measured by Impedance Cardiography (ICG).

Method: After Ethical Committee approval, sixty two women undergoing elective Caesarean delivery were randomly allocated into two groups to receive levobupivacaine 6 mg (Group L6) or levobupivacaine 8 mg (Group L8), both combined with fentanyl 20 µg into subarachnoid space. After the intrathecal injection, Mean Blood pressure (MAP), Cardiac Index (CI), Heart Rate (HR) and Systemic Vascular Resistance (SVRI) were measured non-invasively by ICG. The onset time of sensory block, duration of anesthesia, maximum cephalic spread to pinprick, cold and touch were measured respectively. Motor block was measured by Bromage testing.

Results: MAP (mmHg) in Group L6 was significantly higher than in Group L8 (MAP 7 $P < 0.006$; MAP 8 $P < 0.008$; MAP 10 $P < 0.02$; MAP 19, $P < 0.01$), as well as SVRI (dyn-sec/cm⁵/m²) was significantly higher in L6 (SVRI 7 $P < 0.05$; SVRI 8 $P < 0.03$). Incidence of hypotension was lower in Group L6 than in Group L8 ($P < 0.01$), and use of ephedrine was more frequent in L8 group than in L6 ($P < 0.01$). Offset time of motor block to Bromage 0 in L8 group was longer than in L6 ($P < 0.001$).

Conclusion: Levobupivacaine 6 mg may be used as an alternative dose to 8 mg for spinal anesthesia for Caesarean deliveries with good maternal satisfaction. The satisfying sensory block and rapid mobilization of patient due to the faster recovery from motor block and reduced hypotension may be particularly advantageous in obstetric patients.

ESRAS-0257

E-Poster Discussion 05: Obstetric

PROPHYLACTIC PENTAZOCINE REDUCED THE INCIDENCE OF PRURITUS AFTER ELECTIVE CAESAREAN SECTION UNDER SPINAL ANESTHESIA WITH MORPHINE: A RANDOMIZED CLINICAL TRIAL

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Aims: The incidence of pruritus after elective caesarean section under spinal anesthesia with morphine is high, ranging from 60% to 100%. This side-effect is difficult to prevent. Pentazocine has been shown to be effective for the treatment of pruritus. However the prophylactic effect on pruritus has not been elucidated. The aim of this randomized double-blind trial was to evaluate if intraoperative intravenous pentazocine would reduce the incidence of morphine-induced pruritus.

Method: With IRB approval and written informed consent, ninety-six ASA physical status 1-2 patients (aged 20 to 40) scheduled for elective caesarean section were included in this study. Anesthesia was performed under spinal anesthesia with 0.5% hyperbaric bupivacaine 10mg, fentanyl 10µg and morphine 100µg. After delivery, the parturients were randomized to receive pentazocine 15mg (1ml) i.v. (Group P) or saline 1ml (Group S). All women received postoperative analgesia with epidural infusion of levobupivacaine 0.15%. The presence of pruritus, numerical rating scale for pain (NRS), and adverse effects were recorded at postoperative 0, 3, 6, 12, and 24 h.

Results: The overall incidence of pruritus within 24 hours postoperatively was significant lower in group P than in group S (group P 54%, group S 78%, $P < 0.05$). The severity of pruritus in group S was significantly greater than in group S at postoperative 3 and 6 h. The incidence of PONV and NRS scores were not significantly different.

Conclusion: A single dose of intravenous pentazocine 15 mg after delivery can reduce the incidence of pruritus in women who have received spinal morphine in caesarean section.

ESRAS-0078

E-Poster Discussion 05: Obstetric

ISRAELI NATIONAL SURVEY OF ANESTHESIA PRACTICE RELATED TO PLACENTA PREVIA AND ACCRETA

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Aims: Anesthesia practices for placenta previa (PP) and accreta (PA) may impact hemorrhage management and other supportive strategies. We conducted a national survey to evaluate how Israeli anesthesiologists manage women with suspected PP or PA.

Method: Following Institutional Board Waiver we surveyed 26 obstetric anesthesia directors at Israeli hospitals with a labor and delivery unit. Based on antenatal placental imaging, participants were asked questions about the anesthetic and transfusion management for women with three types of abnormal placentation: PP, low suspicion for PA, and high suspicion for PA. The primary outcome was neuraxial or general anesthesia for cesarean delivery. Univariate statistics were used for survey responses using counts and percentages.

Results: The survey response rate was 100%. There are differences in use of neuraxial versus general anesthesia. Spinal anesthesia is the leading anesthesia mode for PP, 17 (65.4%) units. By comparison, most anesthesiologists reported that they perform general anesthesia for patients with PA: 18/26 (69.2%) for all low suspicion cases of PA and 25/26 (96.2%) for all high suspicion cases of PA. Although a massive transfusion protocol was available in the majority of hospitals (84.6%), the use of thromboelastography and cell salvage was much lower (53.8% and 19.2% hospitals respectively).

Conclusion: In our survey, Israeli lead anesthesiologists have a greater likelihood of using general anesthesia for women with PA compared to women with PP. We found wide variations in anesthesia practice patterns with regard to anesthesia mode, multidisciplinary management and hemorrhage anticipation strategies.

ESRAS-0136

E-Poster Discussion 05: Obstetric

HYPERFIBRINOLYSIS CAUSED BY AMNIOTIC FLUIDEMBOLISM IN A PARTURIENT WITH EPIDURAL ANALGESIA: A CASE REPORT

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Aims: The aim of the presentation is to show and discuss an unrecognized amniotic fluid embolism misinterpreted as an epidural analgesia complication.

Method: Case presentation.

Results: We are presenting a case of a 34 years old healthy multipara with induced labour in 41 week of pregnancy and epidural analgesia. The clinical signs of amniotic fluid embolism (haemodynamic instability, dyspnoea, restlessness and paresthetic feelings in arms and legs) occurred at the beginning of the labour second stage. They were moderate and considered as epidural analgesia complications so the anaesthesiologist was called. Fetal distress occurred at the same time and the delivery was rushed by pushing. After the delivery it was noticed that the postpartal bleeding from otherwise contracted uterus wasn't stopping so other possible causes were considered. ROTEM® performed at that moment showed severe coagulopathy with fibrinolysis. The therapy was guided according to consecutive ROTEM® tests. The epidural catheter was removed after 2 days.

Conclusion: The clinical signs of the amniotic fluid embolism are well known and extensively described. However, they are not specific and in our case they were attributed to epidural analgesia. We have lost some time solving possible "epidural catheter complication". The clinical signs of amniotic fluid embolism were abundant but since they were not severe enough amniotic fluid embolism was not considered as possible cause until coagulopathy became clinical evident. The removal of epidural catheter at that time could have had disastrous consequences.

ESRAS-0224

E-Poster Discussion 05: Obstetric

LOGISTIC REGRESSION AND ANALYSIS OF EPIDURAL RE-SITES IN 4056 PATIENTS - AN OBSTETRIC ANAESTHESIA DATABASE STUDY

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Aims: Like many obstetric units, our institution maintains a database of anaesthetic procedures performed; these include epidurals and combined spinal-epidurals (CSE). We aimed to find the proportion of parturients needing repeat procedures and identify features allowing prediction of those likely to require such repeats.

Method: We analysed characteristics of 4056 patients who had epidurals/CSE examining factors associated with need for re-site by chi-squared tests. Possible factors were included in a stepwise logistic regression model (significant factors retained). The study was approved by the audit department, ethics approval was not required.

Results: 334/4056 (8.23%) epidurals/CSE were inadequate. Figure 1 lists factors associated with inadequate epidural function in the regression model. Inadequate block after 15 minutes of anaesthetic dose was the strongest predictor of inadequacy. Increasing depth to space and later epidurals were associated with poorer function. Compared to an epidural, CSE was less likely to be re-sited. Non-influential factors were maternal age, BMI, anaesthetist seniority, lateral or supine positioning, loss of resistance technique, vertebral level of insertion, number of attempts or recorded complications.

Univariate analysis of epidural catheter length showed 3cm length associated with 21% re-site rates, compared to 7-8% for lengths 4-6cm.

Conclusion: Our re-site proportion was 8.23%. Depth to space and length of catheter left in the epidural space were important predictors of epidural function. We would recommend at least 4cm of catheter be inserted into the epidural space. Importantly, epidurals placed earlier in labour are less likely to require re-siting. In contrast to some studies, anaesthetist seniority was non-influential.

FACTOR	ODDS RATIO	95% CONFIDENCE INTERVAL
INADEQUATE BLOCK AT 15 MINS (UNCORRECTABLE)	15.13	(7.91, 29.35)
INADEQUATE BLOCK AT 15 MINS (CORRECTABLE)	4.93	(2.10, 10.74)
PROCEDURE (EPIDURAL/CSE)	3.12* * CSE more successful	(1.42, 8.36)
DEPTH TO SPACE	1.21	(1.10, 1.43)
CERVICAL DILATION	0.90	(0.85, 0.95)
LENGTH OF CATHETER IN SPACE	0.76	(0.63, 0.92)

Table 1 Logistic regression summary of factors associated with inadequacy of epidural function

FIGURE 1.

ESRAS-0069

E-Poster Discussion 05: Obstetric

PLETH VARIABILITY INDEX IS A REFLECTION OF PERFUSION INDEX AND NOT FLUID STATUS FOR CAESAREAN SECTION UNDER REGIONAL ANAESTHESIA

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Aims: To establish whether changes in Pleth Variability Index (PVI) and Perfusion Index (PI) could be used to detect hypotension during spinal anaesthesia for caesarean section.

Method: Following ethical approval and written informed consent, nineteen women underwent spinal anaesthesia for caesarean section. The PVI and PI were monitored during anaesthesia and surgery. Changes in PVI and PI were compared to changes in blood pressure.

Results: Whilst there was considerable variation between individual cases, average PI values rose and PVI declined during spinal anaesthesia. Eleven patients experienced hypotension (a fall of 25% in systolic blood pressure) and for these patients the decline in PVI was identical to the trend in PI when plotted as an inverse (Figure 1).

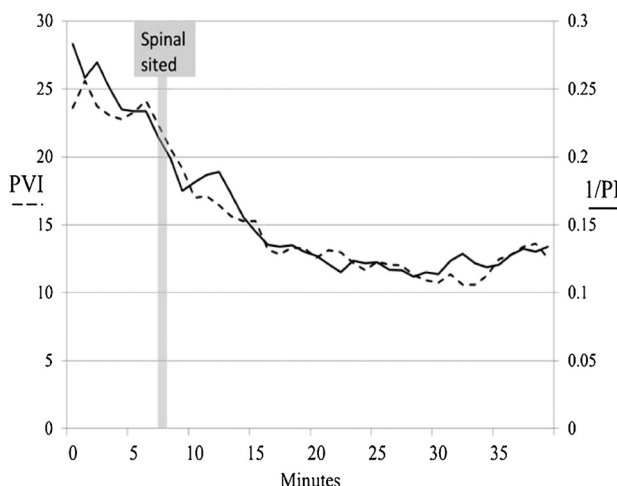


FIGURE 1. PVI plotted against 1/PI during spinal anaesthesia for caesarean section.

Conclusion: In mechanically ventilated patients PVI reflects fluid responsiveness with a high degree of sensitivity and specificity. In the current study PVI fell at a time of relative hypovolaemia induced by spinal anaesthesia, when it would be expected to rise. As PVI closely followed PI plotted as an inverse, this suggests that in spontaneously breathing patients, PVI reflects conditions in the finger rather than the patients fluid status. PVI and PI are not useful parameters to assist with the management of patients undergoing caesarean section under spinal anaesthesia.

ESRAS-0402

E-Poster Discussion 06: Pediatric

ANALGESIC EFFICACY OF CAUDAL BLOCK VERSUS WOUND INFILTRATION WITH LEVOBUPIVACAINE AND STRESS RESPONSE IN CHILDREN FOLLOWING INGUINAL HERNIA REPAIR

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Aims: To compare the analgesic effect between the caudal analgesia and wound infiltration and postoperative cortisol and prolactin levels.

Method: We studied 64 children aged 2-10 years who were undergoing inguinal hernia repair. Anesthesia was carried out using the standard procedure. Patients were assigned to two groups. In group A (n = 32), 0.25 ml/kg levobupivacaine (5 mg/ml) was infiltrated. In group B (n = 32) 1ml/kg levobupivacaine was given via caudal route after induction of general anaesthesia. Mean arterial pressure, heart rate, objective pain score, adverse effects and the number of rescue analgesics were recorded for 24 h. Blood samples were withdrawn following induction of anaesthesia and at 40 min after the end of surgery for measurement of blood cortisol and prolactin levels.

Results: Mean arterial pressure, heart rate were significantly higher in infiltration group (P<0.05). There is no demonstrable difference in rescue

analgesia or objective pain scores when comparing two groups ($P>0.05$). Postoperative plasma cortisol and prolactin levels were significantly higher in two groups than preoperative plasma cortisol and prolactin levels ($P<0.001$). Although there were no difference in these parameters between two groups ($P>0.05$).

Conclusion: We find the analgesic efficacy of wound infiltration comparable to caudal block. This study suggests that local anaesthetic infiltration with levobupivacaine is useful, lower risk and less time-consuming for analgesia in children following inguinal hernia repair.

ESRAS-0219

E-Poster Discussion 06: Pediatric

ULTRASOUND-GUIDED TRANSVERSUS ABDOMINIS PLANE BLOCK IN PEDIATRIC PATIENTS: A RANDOMIZED COMPARATIVE STUDY WITH WOUND INFILTRATION

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Aims: The present study was designed to evaluate the analgesic efficacy of ultrasound-guided transversus abdominis plane block with high volume (0.5mL.kg⁻¹) local anesthetic during the first 24 h after surgery in pediatric patients undergoing inguinal hernia repair.

Method: Fifty-seven children between 2 to 8 years of age undergoing unilateral inguinal herniorrhaphy were randomized to undergo a TAP block (group T, n=29) or to the wound infiltration anesthesia (group C, n=28). A TAP block was performed using the ultrasound-guided technique with 0.5mL.kg⁻¹ 0.25% levobupivacaine volume on the ipsilateral side to the hernia under general anesthesia or wound infiltration with 0.2mL.kg⁻¹ 0.25 % levobupivacaine. First analgesic requirement time, cumulative number of uses of analgesic, pain scores and adverse effects were assessed over the course of 24 hours.

Results: The mean first analgesic requirement time was significantly longer in group T than in group C (17 ± 6.8 h vs. 4.7 ± 1.6 h, respectively) ($p<0.001$). In addition, there was no analgesic requirement in 13 (45 %) patients in group T within 24h. The cumulative number of uses of analgesic was significantly lower in group T than in group C (1.3 ± 1.2 vs 3.6 ± 0.7 , respectively, $p<0.001$). Except for at the H1, H20 and H24 there were significant differences between pain scores between the groups ($p<0.001$).

Conclusion: Ultrasound-guided TAP block with high volume levobupivacaine provides a long postoperative analgesia period and reduced analgesic use without any clinical side effects after unilateral herniorrhaphy in pediatric patients.

ESRAS-0269

E-Poster Discussion 06: Pediatric

COMPARISON OF EFFICIENCY OF CAUDAL, TRANSVERSUS ABDOMINIS PLANE AND ILLIOINGUINAL/ILLIOHYPOGASTRIC NERVE BLOCKS IN PEDIATRIC PATIENTS

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Aims: Different regional anesthesia techniques have been used to achieve postoperative analgesia for children. In this study we aimed to compare the efficiency of caudal, ultrasound guided transversus abdominis plane (TAP) and ilioinguinal/iliohypogastric (IL/IH) block in children aged 1-7 years who underwent unilateral low abdominal surgery.

Method: ASA physical status I-II of 90 patients were divided randomly into three groups. Concentration of 0.25 % levobupivacaine solution which is added 1/200.000 adrenalin performed for each group as follow; 0,5 ml/kg for TAP block (Group T), 0,3ml/kg for IL/IH block (Group I) and 0,7 ml/kg for caudal block (Group K). Postoperative pain scores in the 1st, 4th, 8th, 16th, 24th hours were evaluated using mCHEOPS. Total analgesic consumption, the time of first analgesic administration, vital parameters, adverse effects such as nausea and vomiting in the postoperative period also evaluated.

Results: The total analgesic consumption in Group K and Group T is similar but in Group I this parameter was higher significantly. The mCHEOPS score

is higher significantly in the 1st, 4th, 8th hours in Group I, on the other hand in 16th hour it is similar in Group I and Group K but in Group T it is lower significantly. There were no significant differences in the first analgesic requirement in each group.

Conclusion: Postoperative analgesia was achieved in these three groups, but the pain score and analgesic consumption were significantly higher in Group I compared with the other two groups.

ESRAS-0223

E-Poster Discussion 06: Pediatric

CAUDAL BLOCK VERSUS ABDOMINAL WALL NERVE BLOCKS FOR INGUINAL PROCEDURES IN CHILDREN - A RETROSPECTIVE ANALYSIS AT A REFERENCE CHILDRENS' HOSPITAL

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Aims: Caudal block and abdominal wall nerve blocks are effective anesthetic techniques for pediatric inguinal surgery, which in itself can cause a significant degree of discomfort postoperatively.

The present study has been carried out to assess whether blind caudal block is still preferred to ultrasound-guided abdominal wall nerve blocks in children undergoing inguinal surgery, at a reference childrens' hospital where the ultrasound techniques have been gaining a wider application in the last few years.

Method: Retrospective data collection from a clinical logbook on children that were submitted to inguinal hernia repair, orchidopexy or hydrocele repair, between March 2014 and March 2015.

Results: 161 children were enrolled. 146 male and 15 female, from 2 months to 7 years. 83 caudal blocks, 50 ilioinguinal/iliohypogastric nerve blocks and 28 TAP blocks were performed, with 0.2%, 0.375% ropivacaine or 0.125%, 0.25% levobupivacaine in 0.1-0.5mL/Kg single-shot boluses. 65 orchidopexys, 63 hernia and 33 hydrocele repairs were performed. Caudal block was the technique of choice for orchidopexy (54%) and hernia repair (57%); represented 71.6% of all techniques in children under 2 years and 80.8% for the 26 bilateral procedures. Ultrasound-guided abdominal wall blocks were preferred for unilateral procedures (54%) and for hydrocele repairs (45.5%).

Conclusion: Our study showed that a larger number of ultrasound-guided abdominal wall nerve blocks have been performed to enable pediatric inguinal surgery. However, landmark-based caudal anesthesia, a well-established technique from the anesthesiologists' experience standpoint, still is the single most important regional technique in children, despite our conviction that ultrasound-guided techniques will be the future.

ESRAS-0225

E-Poster Discussion 06: Pediatric

THORACIC EPIDURAL FOR POSTOPERATIVE ANALGESIA IN CHILDREN WITH PECTUS EXCAVATUM FOR THE NUSS PROCEDURE: A RETROSPECTIVE ANALYSIS OF 7 CASES AT A REFERENCE CHILDRENS' HOSPITAL

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Aims: Pectus Excavatum is the most common congenital chest wall deformity. The Nuss procedure is the technique of choice for repair. Although "minimally" invasive, postoperative pain is considerable. Controversy still exists regarding the best method for pain management.

To describe our experience in a multimodal analgesia regimen for the Nuss procedure in children with Pectus excavatum, by analyzing the applicability of thoracic epidural and finding out its efficacy and safety profile.

Method: Retrospective review of postoperative analgesic registries of children submitted to the Nuss procedure, between November 2014 and March 2015.

Results: Seven males, 14 to 17 years old, were enrolled. A thoracic T6-7 epidural was placed in all patients and an epidural infusion with 0.2% ropivacaine 0.2-0.4mg/kg/h plus morphine 30-40mcg/kg/24h was started for the postoperative period. 2 patients received PCEA (rate of 4mL/h, 3mL bolus and 15 minutes lockout). Intermittent IV paracetamol 15mg/kg with ketorolac 0.5 mg/kg IV or metamizol 20mg/kg IV every 8 hours for 2 days were also offered to supplement the epidural analgesia. Patients kept the epidural catheter until postoperative days 4 to 5. Pain scores ranged from 0 to 3/10 on day 0 with no pain after the first 24h and no need for supplemental pain medication. There were no significant side effects.

Conclusion: Thoracic epidural has been advocated as the technique of choice at our Hospital for postoperative analgesia in children undergoing pectus excavatum repair, as part of a multimodal approach, due to its superior pain control with minimal side effects.

ESRAS-0092

E-Poster Discussion 06: Pediatric

DOES LOW DOSE OF CAUDAL NEOSTIGMINE CO-ADMINISTERED WITH BUPIVACAINE PRODUCE LONGER ANALGESIA IN CHILDREN?

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Aims: Caudal analgesia with a local anaesthetic, with or without additives is one of the most popular regional blocks in children. However, limited duration of analgesia is among the limitations of single caudal injection. Addition of neostigmine to local anesthetics significantly prolongs the duration of analgesia following caudal block. Here, we report the use of a low dose neostigmine as an adjunct to local anesthetics in caudal block to prolong the duration of analgesia in six cases undergoing lower urogenital surgery.

Method: Six male patients (1-6 years, ASA physical status I-II) scheduled for hypospadias and circumcision surgery, under general anaesthesia received caudal blockade with a mixture of plain bupivacaine 0.25% 1 ml/kg and neostigmine 1 µg/kg.

Results: There were no hemodynamic or respiratory complications during operation. The patients required no additional analgesics for a mean of 8.6±0.8 hours postoperatively and had no side effects such as nausea, vomiting, excessive bowel movements. Also neurological evaluation of the patients were normal in the postoperative period when the motor blockade wear off.

Conclusion: Previous literature states that bupivacaine alone for caudal anesthesia provides an analgesia duration of approximately 4-5 hours and caudal neostigmine with doses higher than 2 µg/kg is not free of adverse events. We suggest that addition of a lower dose of neostigmine provides a longer duration of pain relief without systemic adverse effects of neostigmine in children undergoing lower urogenital surgery.

ESRAS-0438

E-Poster Discussion 07: Peripheral Nerve Blocks

CLONIDINE PROLONGS ANALGESIC EFFECT OF LEPIBUPIVACAINE SINGLE SHOT INTERSCALENE BRACHIAL PLEXUS BLOCK: A DOUBLE BLIND PLACEBO-CONTROLLED TRIAL

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Aims: An Adequate control of post-operative pain in Shoulder surgery can induce an early mobilization and reduce some complications such as adhesive capsulitis. Several options can be used to induce post-operative pain relief including interscalene nerve block (SSISB).

The objective of the study was to investigate if association of levobupivacaine with clonidine prolongs the analgesic effect of SSISB compared with levobupivacaine alone.

Method: Hundred seventy-six patients undergoing major shoulder surgery were included in this double blind placebo controlled trial and divided in two groups. The patients of intervention group (n=88) received 20 mL of 0.625% levobupivacaine (Chirocaine®, Abbott Scandinavia; Solna, Sweden), mixed with 30 mcg of clonidine (Catapresan, Boehringer Ingelheim Italia S.p.A.).

The remaining 88 patients (Control group) received only levobupivacaine. Post-operative pain, assessed using a VRS scale, was the primary end point of this study. Other outcomes available for evaluation were: amount of remifentanyl used in the anesthesia, needs of analgesics and sleep quality.

Results: Pain score was significantly lower in the clonidine group either after 12 and 24 h (P <0.05). The amount of remifentanyl used and needs of analgesics were also significantly reduced in the study group. Furthermore, the sleep quality was significantly better in the study group.

Conclusion: In this double blind placebo-controlled trial, the addition of clonidine significantly prolongs the analgesic effect of levobupivacaine single shot interscalene brachial plexus block.

ESRAS-0071

E-Poster Discussion 07: Peripheral Nerve Blocks

ULTRASOUND-GUIDED TRANSVERSUS ABDOMINIS PLANE BLOCK IN PATIENTS UNDERGOING OPEN INGUINAL HERNIA REPAIR: 0.125% BUPIVACAINE PROVIDES SIMILAR ANALGESIC EFFECT COMPARED TO 0.25% BUPIVACAINE

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Aims: We aimed to evaluate the effectiveness of 0.125% bupivacaine compared to 0.25% bupivacaine for ultrasound-guided transversus abdominis plane (TAP) block in patients undergoing open inguinal hernia repair.

Method: Following institutional Ethics Committee approval, this randomized, double-blind study was conducted on 40 adult patients undergoing elective primary unilateral open inguinal hernia repair under spinal anesthesia. Patients in Group I received 20 ml of 0.25% bupivacaine while patients in Group II received 20 ml of 0.125% bupivacaine for TAP block at the end of the surgery. Pain intensity was assessed at rest and during coughing using 10 cm VAS score at 5, 15, 30, 45 minutes and 1, 2, 4, 6, 12 and 24 hours after TAP block. Morphine consumption and time to first morphine requirement were recorded.

Results: VAS scores at rest and during coughing were not significantly different between groups at all time points measured. Twenty four hours morphine consumption (7.72±7.33 mg in Group I, and 6.06±5.20 mg in Group II, p=0.437) and time to first morphine requirement (182.35±125.16 min in Group I, and 143.21±87.28 min in Group II, p=0.332) were not different between groups.

Conclusion: 0.125% bupivacaine provides similar analgesic effect compared to 0.25% bupivacaine for ultrasound-guided TAP block in patients undergoing open inguinal hernia repair.

ESRAS-0084

E-Poster Discussion 07: Peripheral Nerve Blocks

ULTRASOUND-GUIDED TRANSVERSUS ABDOMINIS PLANE BLOCK IN PATIENTS UNDERGOING LAPAROSCOPIC CHOLECYSTECTOMY: COMPARISON OF EFFICACY OF BUPIVACAINE AND LEVOBUPIVACAINE

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Aims: We aimed to compare bupivacaine and levobupivacaine in ultrasound-guided transversus abdominis plane (TAP) block in patients undergoing laparoscopic cholecystectomy.

Method: Following institutional ethics committee approval, fifty patients undergoing laparoscopic cholecystectomy were randomly allocated into two groups. Following the anesthesia induction, ultrasound-guided bilateral TAP

block was performed with 30 ml of % 0.25 bupivacaine in group B (n=25) and 30 ml of % 0.25 levobupivacaine in group L (n=25) for each side Figure 1. The level of pain was evaluated using visual analog scale (VAS) at rest and at caughing 1, 5, 15, 30 minutes and 1, 2, 4, 6, 12 and 24 hours after the operation. When VAS >3, the patients received iv tenoxicam 20 mg. If VAS remained >3, they received iv tramadol 1 mg kg⁻¹. In case of inadequate analgesia, a rescue analgesic was given. The analgesic requirement, time to first analgesic requirement, the levels of nausea and vomiting and patient satisfaction were recorded. **Results:** VAS levels showed no difference except first and fifth minutes post-operatively where VAS was higher in group L (p<0.05). Analgesic requirement was similar in both groups. Time to first analgesic requirement was shorter in Group L (4.35±6.92 min versus 34.91±86.26 min, p=0.013). Nausea and vomiting levels and patient satisfaction did not differ between groups.

Conclusion: The difference in pain levels within first five minutes postoperatively and time to first analgesic requirement were probably related to inadequate cooperation of the patient. We believe that bupivacaine and levobupivacaine have similar efficacy at TAP block in patients undergoing laparoscopic cholecystectomy.

ESRAS-0049

E-Poster Discussion 07: Peripheral Nerve Blocks

SONOANATOMY OF ARTERIES AROUND THE FEMORAL NERVE

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Aims: To identify femoral nerve (FN) and arteries around FN is important for safe femoral nerve block (FNB). However, studies on the distribution of arteries around FN are scarce. The aim of this study was to investigate the relationship between FN and arteries: superficial circumflex iliac artery (SCIA), deep femoral artery (DFA), and lateral circumflex femoral artery (LCFA) by ultrasonography.

Method: After obtaining written informed consent, this prospective and observation study was conducted. Fifty-five patients scheduled for elective orthopedic surgery who underwent FNB were included in this study.

The inguinal skin crease (ISC) was zero point, and plus was medial from ISC to the probe and minus was distal from ISC.

Primary outcomes were distance from ISC to SCIA arises from FA, to DFA arises from FA and to LCFA arises from FA or DFA. Color Doppler studies were performed to assess vascular structures and their relationship to the components of FN. The results were shown as mean ± SD.

Results: The distance from ISC to SCIA, DFA and LCFA are summarized in Table 1. The DFA was closest to ISC (-4.3±9.9 mm [right] and -6.4±11.0 mm [left]). The SCIA was most distant from ISC (23.7±12.1 mm [right] and 26.2±16.2 mm [left]) (Table 1).

TABLE 1.

Arteries	Right(mm)	Left(mm)
Superficial circumflex iliac artery	23.7 ± 12.1	26.2 ± 16.2
Deep femoral artery	-4.3 ± 9.9	-6.4 ± 11.0
Lateral circumflex femoral artery	-17.0 ± 5.1	-13.7 ± 9.7

Conclusion: There is great variability among those arteries arise from FA or DFA. It is important to identify arteries when performing ultrasound-guided FNB.

ESRAS-0061

E-Poster Discussion 07: Peripheral Nerve Blocks

EVALUATION OF A NOVEL ULTRASOUND-GUIDED OBTURATOR NERVE BLOCK TECHNIQUE

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Aims: With previously described techniques for ultrasound-guided proximal obturator nerve block (ONB), operators have faced difficulties in achieving real-time needle visualization under in-plane ultrasound guidance. Here we describe and evaluate a novel technique for ultrasound-guided proximal ONB that can overcome this limitation.

Method: This prospective observational study was approved by the research ethics committee of our institute. After obtaining written informed consent, patients who underwent transurethral bladder tumor resection requiring an ONB were enrolled. Following the induction of general anaesthesia, the patient was placed in the lithotomy position. The transducer was placed lateral to the perineum on the medial thigh along the extended line of the inguinal crease and aimed cephalad to visualize the interfascial plane between the pectineus and obturator externus muscles. A needle was inserted 1.5–2 cm cephalad from the ventral end of the transducer and advanced in plane with the transducer in a ventral-to-dorsal direction toward the interfascial plane. Subsequently, 0.75% levobupivacaine (8 mL) was injected into the interfascial plane. The success rate for ONB, time taken to identify the injection site and sensory block in the medial and popliteal aspects of the knee were assessed.

Results: Fifteen patients requiring 20 ONBs were evaluated. The ONB success rate was 100%, the mean (95% confidence interval) time to identify the injection site was 13 (9–17) seconds and sensory block was achieved in seven legs (35.0%).

Conclusion: Our new ultrasound-guided ONB approach can facilitate real-time needle visualization and prove to be an effective and successful technique.

ESRAS-0315

E-Poster Discussion 08: Postoperative Pain Management

EFFECT OF POSTOPERATIVE PAIN MANAGEMENT TECHNIQUES ON NEUROENDOCRINE RESPONSE IN PATIENTS WITH LUMBOTOMY INCISION

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Aims: To evaluate the effects of three different postoperative pain management modalities on cortisol, prolactin, adrenalin and noradrenalin serum levels in patients with lumbotomy incision after open renal surgery.

Method: The prospective, randomized, controlled open-label study included 63 patients randomly allocated the day before surgery to receive continuous intravenous analgesia (CIA) with sufentanil and ketamine (n=22) or continuous epidural analgesia (CEA) with levobupivacaine and sufentanil (n=20) or intravenous analgesia with tramadol, metamizol, and non-steroid antirheumatic drug (control group, n=21). Serum hormone levels were measured before the surgery and 3, 24, and 48 hours after the onset of analgesia. Pain intensity and characteristics were evaluated in all patients using visual analogue scale.

Results: Three hours postoperatively, the reported pain intensity was lower in the CEA group than in the CIA and control groups. Serum cortisol levels significantly increased from preoperative values in the CIA and control groups. In comparison with preoperative values, prolactin levels significantly increased 3 hours postoperatively in all groups; however, 24 and 48 hours postoperatively, prolactin levels were similar in the CEA and CIA groups and significantly lower than in the control group. Adrenaline levels were 10-fold higher in all three groups 3 hours postoperatively, but decreased to values 2-fold higher than preoperatively. Noradrenalin levels were the highest 3 hours postoperatively and similar in all three groups.

Conclusion: All three postoperative pain management modalities resulted in satisfactory pain reduction. However, the endocrine response to trauma and pain cannot be completely blocked by any type of analgesia.

ESRAS-0240

E-Poster Discussion 08: Postoperative Pain Management

PROGRAMMED INTERMITTENT EPIDURAL BOLUS VERSUS CONTINUOUS EPIDURAL INFUSION FOR POSTOPERATIVE ANALGESIA AFTER GASTRECTOMIES: A PRELIMINARY STUDY

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Aims: In other studies with obstetric patients, programmed intermittent epidural anesthetic bolus (PIEB) technique result in reduced total local anesthetic

consumption, fewer SOS boluses, and greater patient satisfaction compared with continuous epidural infusion (CEI).

Our aims were confirm the best cost/benefit profile for PIEB in postoperative analgesia after gastrectomies (less total anesthetic consumption and less SOS rescue bolus), less side effects (PONV, hypotension) and similar analgesic efficacy.

Method: A case-study was performed, including 40 patients randomly allocated into 2 groups of 20 patients, PIEB and CEI (type of anesthesia / analgesia was standardized for the 2 groups).

All patients signed an informed consent for the epidural placement.

The PCA machines CADD® - Solis 2110 were used with collection from its database of the total consumed drug (to/kg/h), total bolus SOS (bo/h) and the ratio of the total bolus SOS/total drug consumed. They were recorded from patient's datalogs the presence / absence of pain at 0, 4, 8, 12, 24 and 48 h, and side effects (PONV, hypotension and itching).

Results: T-tests and Mann-Whitney tests were used when adequate.

There were no statistically differences between the 2 groups concerning sex, age, weight, quality of analgesia, occurrence of side effects / duration of analgesia protocols. PIEB group had a lower total drug consumption (To/kg/h: $p = 0.009$), less SOS bolus (Bo/h: $p = 0.005$) and less SOS bolus volume relative to the total drug volume consumed (Bo/To %: $p = 0.005$).

Conclusion: PIEB seems to have a better cost/benefit profile, saving up to 60% of drug SOS bolus.

ESRAS-0231

E-Poster Discussion 08: Postoperative Pain Management

CADAVERIC FEASIBILITY STUDY ON THE USE OF ULTRASOUND CONTRAST TO ASSESS SPREAD OF INJECTATE IN THE SERRATUS ANTERIOR MUSCLE PLANE

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Aims: Serratus anterior muscle plane (SAP) block has been recently described and maybe a safe alternative to other regional techniques (thoracic paravertebral, central neuraxial blockade). There is an absence in the literature for cadaveric delineation of this plane using this technique.

This study aims to examine the location of well-formed serratus anterior muscle belly, to observe whether agitated water contrast can be used as contrast for effective delineation of SAP using ultrasound, and to observe the extent of cephalo-caudal spread of injectate in SAP.

Method: Seven formaldehyde-embalmed cadavers were used, bilaterally. 20 ml saline was injected into the posterior axillary line at rib 4/5 level, under ultrasound guidance, followed by 10 ml water with air (8 ml saline and 2cc air). The presence of hyperechoic air bubbles in the fluid distended SAP demonstrated the spread of air/water.

Results: In 36% cadavers, SAP was identified at mid-axillary line, 14% posterior axillary line and 50% between posterior and mid-axillary lines. Lower most limit of air/water spread was identified at subcostal margin. Cephalad spread of contrast was noted in 2nd ICS (7%), 3rd ICS (71%) and 4th ICS (22%).

Conclusion: The serratus anterior muscle is well formed near the posterior axillary line and the injectate spread can be determined with the help of agitated water contrast. There is variability in cephalad spread of the injectate when assessed with ultrasound.

ESRAS-0476

E-Poster Discussion 08: Postoperative Pain Management

POSTOPERATIVE CONTINUOUS INCISIONAL INFUSIONS OF LOCAL ANESTHETICS: THEIR ROLE IN THE POTENTIAL PREVENTION OF SURGICAL SITE INFECTIONS

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Aims: Epidemiology of wound infections has evolved in the past decades with advancements in preoperative and postoperative care, yet surgical site infections

(SSI) remain a major cause of postoperative morbidity. Postoperative care includes a multimodal approach to pain management, including continuous infusions of local anesthetics directly into the surgical site via an incisional catheter. Local anesthetics such as bupivacaine and lidocaine have been shown to possess inherent antimicrobial properties, and promote increased tissue oxygenation and perfusion through their vasodilatory effects, their role in the potential prevention of SSI was investigated.

Method: A meta-analysis reporting on the use of the ONQ pump for postoperative pain management was performed to determine the effect of this pain modality on the incidence of SSI. 100 studies were included in the review. The National Nosocomial Infections Surveillance System database served as a source of baseline national SSI incidence. Studies were stratified by surgical procedure for sub analysis. Endpoint measures included documented surgical site infection within 30 days postoperatively.

Results: Continuous infusions of local anesthetics using a portable elastomeric infusion pump yielded significant decrease in SSI rates (RR 0.363; $p < 0.0001$). Compared to a national average of 2.1%, reported infection rate in clinical trials using an elastomeric device was found to be 0.62%.

Conclusion: The use of continuous local anesthetic infusion pumps for pain management appears to reduce the risk of SSI through significantly better pain control reducing the use of opioid analgesics, increasing tissue oxygen, and continuous lavage of surgical site with a solution that has antimicrobial properties.

ESRAS-0052

E-Poster Discussion 08: Postoperative Pain Management

THE PREVENTIVE EFFECT OF MAGNESIUM ON POSTOPERATIVE PAIN IN STAGED BILATERAL TOTAL KNEE ARTHROPLASTY: RANDOMIZED CONTROLLED TRIAL

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Aims: In staged total knee arthroplasty (TKA), hyperalgesia is induced by repeated surgical injury possibly via central sensitization. Magnesium has antinociceptive effects due to its antagonistic effect on NMDA receptor. We evaluated the effect of MgSO₄ on postoperative pain in patients undergoing TKA.

Method: Twenty patients undergoing staged bilateral TKA under spinal anesthesia at 1-week interval were enrolled. Group M received MgSO₄ 50 mg/kg for 15 min and then 15 mg/kg/h by continuous i.v. infusion until the end of surgery. Group S received the same volume of isotonic saline over the same period. Postoperative pain (VAS) at rest, the amount of IV-PCA (fentanyl) and rescue analgesics administered during 48 h after operation, were compared between groups and the first and second periods within each group.

Results: VAS scores were greater in Group S at postoperative 24 h in the first TKA ($P = 0.012$) and at postoperative 24, 48 h in the second TKA ($P < 0.001$ and $P = 0.005$, respectively) than Group M. The cumulative amounts of PCA ($P = 0.020$) and the amounts of rescue analgesics ($P = 0.012$) were greater in the second than in the first TKA in Group S. In Group M, there were no significant differences between the first and second knee in terms of PCA consumption, and rescue analgesic requirements.

Conclusion: MgSO₄ significantly attenuated postoperative pain, and seemed to prevent hyperalgesia in the second TKA. This result suggests that MgSO₄ has preventive effects on postoperative pain enhanced by surgical injury.

ESRAS-0199

E-Poster Discussion 08: Postoperative Pain Management

EFFICACY OF PERIOPERATIVE INTRAVENOUS ADMINISTRATION OF LIDOCAINE ON POSTOPERATIVE PAIN: A SYSTEMATIC REVIEW AND META-ANALYSIS

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Aims: Intravenous (IV) lidocaine has been reported to improve pain outcomes after bowel surgery. A myriad of trials examining other types of surgery have also been published recently. This meta-analysis aimed to evaluate whether

the perioperative administration of IV lidocaine reduces postoperative pain after all types of surgery.

Method: This meta-analysis was performed according to the PRISMA statement guidelines. The primary outcome was cumulative IV morphine consumption at 24h postoperatively, analysed according to the type of surgery (bowel surgery, urologic surgery, gynaecologic surgery, orthopaedic surgery, miscellaneous). Secondary outcomes included IV morphine consumption at 2h and 12h postoperatively, pain scores at rest at 2h, 12h and 24h postoperatively, rate of postoperative nausea and vomiting, hospital length of stay, and lidocaine-related side-effects (drowsiness, sedation, arrhythmias).

Results: Forty controlled trials, including 2,205 patients were identified. Administration of IV lidocaine reduced cumulative IV morphine consumption at 24h postoperatively by 5 mg (95%CI: -8, -2 mg; $p=0.0005$). Subgroup analysis revealed statistically significant reductions in all subgroups except orthopaedic surgery and miscellaneous. All secondary outcomes were similarly improved in the lidocaine group. No differences were observed in the rates of the lidocaine related side-effects.

Conclusion: Intravenous lidocaine improves postoperative pain in bowel, urologic, and gynaecologic surgery, without side-effects. The reduction in hospital length of stay observed should be confirmed by prospective trials as it was a secondary outcome of this investigation.

ESRAS-0066

E-Poster Discussion 09: Case Reports

NEUROPRAXIA FOLLOWING PRIMARY TOTAL KNEE ARTHROPLASTY PERFORMED UNDER SPINAL ANAESTHESIA

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Aims: We describe, with full consent, a 72 year old female who had an elective primary total knee arthroplasty. This patient had a history of chronic lumbar back pain first diagnosed in 1974 and treated with multiple operations. Her most recent back surgery was in 1994.

Method: Elective left total knee arthroplasty was performed under spinal anaesthesia. This was successful on first attempt with no pain during intrathecal injection of Levobupivacaine. Femoral and sciatic nerve blocks were performed. A thigh tourniquet was routinely applied. The surgical procedure was uneventful.

Results: She experienced sensory loss in all dermatomes of the operative leg with reduced tone. This resolved slowly over nine days. Most motor function returned on the day after surgery, but hip adduction and abduction were lost for several days. An MRI demonstrated lumbar spinal stenosis but no acute pathology. Loss of hip adduction (obturator nerve) and abduction (superior and inferior gluteal nerves) suggests a central cause of neuropraxia rather than peripheral. The differential diagnoses include the intrathecal injection and positioning injury. The loss of lumbar lordosis and intra-operative traction may have worsened the spinal stenosis causing neuropraxia.

Conclusion: The safety of spinal anaesthesia in patients with spinal pathology is unclear. One study found an increased incidence of neurological symptoms (1.1%) compared with a standard 0.04% incidence.

This case highlights the increased risk of post-operative neurological symptoms in these patients. The balance of risk and benefit should be carefully evaluated and the increased risk should be discussed when consent is taken.

ESRAS-0140

E-Poster Discussion 09: Case Reports

INTERSCALENIC BRACHIAL PLEXUS BLOCK WITH ULTRASOUND-GUIDED IN THE TREATMENT OF NEUROGENIC THORACIC OUTLET SYNDROME: CASE REPORT

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Aims: Neurogenic Thoracic Outlet Syndrome (NTOS) is characterized by compression and irritation of the brachial plexus nerve roots (C5 to T1).

We describe a case report where an ultrasound-guided brachial plexus block, provided a good pain control with reduction of neuropathic symptoms in a woman with NTOS.

Method: After IRB approval and written patient consent statement, in L'Aquila Accademic Hospital we performed an ultrasound-guided brachial plexus block ENS-assisted, in a 46 year old woman suffering from NTOS with a stabbing pain (VAS 8) and neuropathic symptoms (allodynia and dysesthesia).

Nine controls were conducted after 8 (T1), 12 (T2), 24 (T3), 48 (T4) hours and after 1 (T5), 2 (T6), 4 (T7), 6 (T8), and 8 (T9) weeks from the block; rest pain and incidence pain have been noted. Von Frey hair test and Lindbloom test, were used to assessed neuropathic disturbances. Physiotherapy were prescribed.

Results: After 8 weeks, EAST test and Elvey were negative, and costoclavicular test, Wright test, Adson test and the Halstead maneuver, too.

Conclusion: This experiences demonstrates that the injection of anesthetic drugs with a brachial plexus block, cannot provide a long-term resolution in neurogenic TOS by itself, but if included in a multimodal scheme, it can ensure a good pain control, because it can ensure a resetting of nervous conduction and extend interscalene space, with the possibility of deferring the choice of definitive surgery.

ESRAS-0119

E-Poster Discussion 09: Case Reports

KARTAGENER'S SYNDROME: ANAESTHETIC CONSIDERATIONS FOR CESAREAN SECTION AND INGUINAL HERNIA

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Aims: Kartagener's syndrome is a rare autosomal recessive disorder presenting a triad of sinusitis, bronchiectasis and situs inversus with dextrocardia. The most important anaesthetic implications of Kartagener's syndrome surgery are assesment of pulmonary and cardiac structure and function.

Method: Case-1: We present a case of 32-year-old, 39 weeks pregnant woman with chronic pulmonary and ear infections, and chronic rhinosinusitis with polyps. The chest radiograph and CT scans showed dextrocardia without bronchiectasis. Electroechography showed no cardiac abnormalities with 55–60% of EF. For the operation spinal anaesthesia was choosen. Following the application of routine monitoring, spinal anaesthesia was performed with the patient in the sitting position, using a 25 gauge Quincke needle at the L3-4 interspace using a midline approach and 10mg hyperbaric bupivacaine was administered intrathecally. The cesarean section was performed without any complications and pregnancy resulted in a successful outcome. This was facilitated by a close working relationship between the obstetrician, anaesthesiologist and patient.

Results: Case-2: 59-year-old male patient with chronic pulmonary infections, chronic rhinosinusitis was taking the operation room for inguinal hernia. The chest radiograph and CT scans showed dextrocardia. Electroechography was normal. After routine monitoring spinal anaesthesia was chosen. 12.5mg hyperbaric bupivacaine was administered intrathecally. The operation was uneventful.

Conclusion: The anaesthetic implications of Kartagener's syndrome are varied. The main anaesthetic considerations among patients with Kartagener's syndrome are related to the pulmonary function which include preoperative respiratory infections due to bronchiectasis. For us, regional anaesthesia is preferred to general anaesthesia because of the pulmonary problems.

ESRAS-0145

E-Poster Discussion 09: Case Reports

ULTRASOUND WAS USEFUL FOR LOCALIZATION OF A RETAINED CATHETER FRAGMENT: A CASE REPORT

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Aims: Although catheter breakage is a rare medical complication, catheter fragments retained in the body can cause neurological problems and infection. Here, we report a case in which ultrasound was useful for the localization of a retained fragment of a paravertebral block (PVB) catheter.

Method: After induction of general anesthesia for video-assisted thoracoscopic lobotomy in a 75-year-old woman, a PVB was placed under ultrasound guidance using the intercostal approach. An epidural catheter was inserted through a Tuohy needle into the paravertebral space at T5/T6 in the right lateral position. The catheter was fixed at the 9-cm mark with 2-0 silk thread suture. The

operation was completed without problems. On postoperative day 1, the surgeon reported that the PVB broke off 7cm from the tip during removal. We could not detect the fragment by external palpation, and in a case conference we decided to remove the catheter under local anesthesia.

Results: Using ultrasound, we confirmed the position of the catheter as slightly medial to the insertion site and at a depth of approximately 1.5 cm. A 4-cm skin incision was made at this site, but we could not locate the catheter. We then tried to correct the direction of the incision using ultrasound at the surgical field and were able to find and remove the catheter. Experiencing this medical incident prompted us to change the use of suture for catheter fixation to the use of medical glue.

Conclusion: Ultrasound was useful to localizing a retained fragment of a broken PVB catheter.

ESRAS-0129

E-Poster Discussion 09: Case Reports

THE APPLICATION OF A PARAVERTEBRAL BLOCK WITH LOW DOSE LOCAL ANESTHETIC IN TOXIC CARDIOMYOPATHY PATIENT: A CASE REPORT

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Aims: Most breast surgeries are performed under general anesthesia; therefore, patients with present significant cardiac problems are at high risk for the development of hemodynamic disorders. Here we show the ASA IV patient scheduled for breast biopsy and tumorectomy with the present toxic cardiomyopathy. Due to a high risk for general anesthesia, we decided to apply unilateral paravertebral block.

Method: 44-year-old female, ASA IV, was scheduled for the operation of her right breast. The patient had toxic cardiomyopathy (NYHA class III), implanted cardiac resynchronization therapy (CRT) heart device, considerable mitral regurgitation, and interstitial pulmonary fibrosis. The patient was treated for Non Hodgkin's Lymphoma type B with chemotherapy and radiotherapy. The echocardiography showed the systolic dysfunction with EF 30% and scar changes of intraventricular septum and apex. During the preparation for the surgery, an invasive blood pressure measurement was set while the paravertebral space was identified with the neurostimulator using the linear ultrasound probe of 8 Hertz. The anesthetic 0.5% levobupivacaine was applied in levels of Thoracic (Th) 3, Th4, and Th5 (3 milliliters per level). We used 1% lidocaine for local infiltration at the site of the block.

Results: Sensory blockade occurred after 35 minutes and lasted for about 9 hours with normal perioperative period and hemodynamic parameters without accompanying complications.

Conclusion: The application of the ultrasound and neurostimulators in the paravertebral block enabled us to achieve high precision and the administration of small doses of long-acting local anesthetic at multiple levels has resulted in a satisfactory anesthesia and analgesia without hemodynamic complications.

ESRAS-0018

E-Poster Discussion 10: Central Nerve Blocks

PHENYLEPHRINE AS ADJUVANT FOR PROXYMETACAINE OR BUPIVACAINE HAS A SIGNIFICANT SPINAL ACTION IN INTENSIFYING AND PROLONGING ANESTHESIA IN RATS

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Aims: Phenylephrine was added to spinal local anesthetic solutions to extend the duration of action. Here we examined whether phenylephrine potentiates the effect of spinal anesthesia with proxymetacaine and bupivacaine, two potent local anesthetics.

Method: The experimental procedures were approved via the Institutional Animal Care and Use Committee our University and were conducted according to IASP ethical guidelines. After rats receiving spinal anesthesia with proxymetacaine or bupivacaine co-injected with phenylephrine, the neurobehavioral evaluation (motor function and nociception) was tested.

Results: Intrathecal injection of proxymetacaine and bupivacaine at a dose of 3 µmol/kg elicited a spinal blockade (100% blockade) in motor function and nociception. Co-administration of proxymetacaine (3 µmol/kg) or bupivacaine (3 µmol/kg) with phenylephrine (0.1%) produced greater spinal anesthesia than proxymetacaine (3 µmol/kg) alone or bupivacaine (3 µmol/kg) alone, respectively.

Conclusion: Our preclinical data demonstrated that proxymetacaine or bupivacaine elicited spinal anesthesia. When combined with phenylephrine, either proxymetacaine or bupivacaine produced a better effect of spinal anesthesia. The authors declare that they have no conflict of interests.

ESRAS-0121

E-Poster Discussion 10: Central Nerve Blocks

SURGICAL STRESS AND COGNITIVE FUNCTION IN MAJOR SPINAL SURGERY: ARE THEY CONNECTED?

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Aims: Evaluate the influence of epidural anesthesia on endocrine-metabolic, immune responses and cognitive function in patients during the postoperative period after major spinal surgery.

Method: In a randomized, prospective trial 82 patients were divided into two equal groups: Group E (n=48) had continuous epidural analgesia and sevoflurane anesthesia during surgery and continuous epidural analgesia with ropivacaine and fentanyl after surgery (PCEA); Group G (n=34) had general anesthesia with sevoflurane and fentanyl and systemic administration of opioids after surgery. Circulating cytokines, C-reactive protein (CRP), cortisol, glucose and cell-surface receptor expression of immune cells were measured. Visual Analog Scale (VAS) for pain assessment, Montreal Cognitive Assessment (MoCA) and Mini-Mental State Examination (MMSE) were used. Nonparametric statistical methods and linear regression were used.

Results: Postoperative pain was significantly lower in Group E, than in Group G. In patients receiving PCEA postoperative CD4/CD8 ratio and B cells have increased, and NK-cells have reduced by postoperative day 3. All circulating cytokines, CRP and cortisol were significantly less in Group E. Thus, epidural anesthesia is important in modulating immune system response in patients. Epidural anesthesia may reduce postoperative stress responses and thereby influence immune functions. The decrease in the total score at the end of testing after surgery was significantly lower in group E indicating a lower risk of early POD. The total score had strongly correlation with the concentrations of peripheral inflammatory markers.

Conclusion: Epidural anesthesia is an important factor limiting the surgical stress response, as well as the modulation of adaptive immunity and the postoperative cognitive dysfunction.

ESRAS-0317

E-Poster Discussion 10: Central Nerve Blocks

AUDIT OF EPIDURAL USE IN PATIENTS ATTENDING WITH RIB FRACTURES AT THE ROYAL DERBY HOSPITAL

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Aims: Chest trauma leading to rib fractures is a well-known cause of significant morbidity and mortality, often from respiratory complications. Patients over the age of 65 with multiple fractures are at higher risk for such complications and early effective analgesia is known to reduce this risk. Our retrospective audit of the management of patients with rib fractures presenting to our hospital reviewed the use of epidural analgesia and the association with mortality.

Method: We reviewed the notes and imaging of 109 patients who had been admitted to the Royal Derby Hospital within a one-year period with a diagnosis of rib fracture. Rate of epidural use and mortality was calculated using three age

groups (>45; 45-65; >65) and according to the number of ribs fractured (RFx) (>3 RFx; 3-5 RFx; >5 RFx).

Results: The overall rate of epidural analgesia was 20% (22 patients). The rate of epidural use increased with increasing number of rib fractures (>3 RFx 7%; 3-5 RFx 23%; >5 RFx 67%). Epidural use also differed between age groups (>45 18%; 45-65 40%; >65 14%). Mortality increased with age of the patient (>45 0%; 45-65 4%; >65 11%) but not with the number of rib fractures (>3 RFx 9.3%; 3-5 RFx 5.0%; >5 RFx 0%).

Conclusion: Results suggest that whilst the elderly have the highest mortality associated with rib fractures, the use of epidural analgesia is underutilised in this group, especially in those who have 5 or fewer rib fractures. In the groups where rate of epidural use is high, mortality is low.

ESRAS-0112

E-Poster Discussion 10: Central Nerve Blocks

HAEMODYNAMIC STABILITY USING CONTINUOUS SPINAL ANAESTHESIA (CSA)

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Aims: Spinal anaesthesia is the modality of choice for surgical repair of fractured neck of femur (FNOF). However it is associated with significant haemodynamic alterations especially in high risk patients. CSA allows for a decreased dose of local anaesthetic (LA) with a more favourable haemodynamic outcome. The primary aim of this study was to compare haemodynamic parameters between high risk and low risk patients undergoing FNOF repair utilising CSA.

Method: 57 patients undergoing FNOF repair were divided into 2 groups based on ASA status. Their baseline systolic blood pressure (SBP) was calculated as an average from readings 24 hours before surgery. Anaesthesia was conducted using CSA with 0.5% bupivacaine and 20ug fentanyl. Groups were compared with regards to the percentage intra-operative fall in SBP, the incidence of absolute (SBP >90mmHg) and relative (>20% fall in SBP from baseline) hypotension.

Results: Results are shown in Figure 1.

	All	ASA 1 & 2	ASA 3 & 4	p value
No. of patients	57	25 (43.9%)	32 (56.1%)	
Mean age (SD)	82.3 (6.8)	80.4	83.7	0.07
Median Initial LA (ml)	0.4	0.4	0.4	0.182
Median Total LA (ml)	0.8	0.8	0.9	0.058
Mean % SBP fall	17.8%	17%	19%	0.613
No. Relative hypotension	26 (45.6%)	12 (48%)	14 (43.7%)	0.794
No. Absolute hypotension	7 (12.3%)	2 (8%)	5 (15.6%)	0.45

FIGURE 1.

There was no significant difference in the mean % SBP fall, $p=0.613$ (ANCOVA). Relative and absolute hypotension was not significantly different between groups.

Conclusion: CSA offers a viable approach to providing safe anaesthesia in high risk patients without significant haemodynamic compromise.

ESRAS-0030

E-Poster Discussion 10: Central Nerve Blocks

EPIDURAL ANALGESIA FOR INFANTS AFTER MAJOR ABDOMINAL SURGERY

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Aims: There is strong evidence that epidural analgesia provides good postoperative pain relief in adults, but its uses in infants is less established. In this retrospective study, we present our experience with managing infant epidural analgesia for abdominal surgeries.

Method: KK Hospital is a tertiary hospital for women and children in Singapore. Data on patients younger than 1 year old who had received an

epidural for postoperative analgesia after abdominal surgeries were retrieved from our database. Ethics approval was granted for the study.

Results: Fifty-four infants who had received a thoracic or lumbar epidural for perioperative analgesia for abdominal surgeries were included. The mean age of the infants was 6.1 (SD 3.8) months; mean weight 6.8kg (SD 1.8). Most (63%) were ASA 2. Twenty catheters (37.0%) were inserted in the thoracic region and 33 (61.1%) in the lumbar region.

Fifty-two (96.3%) catheters provided adequate intraoperative analgesia. All patients were successfully extubated and did not require observation in the intensive care unit. Thirty-six (66.7%) patients received effective analgesia for the postoperative period. Active management of epidural analgesia, such as epidural top ups and infusion rate adjustment, was necessary to optimise analgesia in 22 (41%) patients. Increased rate of breakthrough pain was associated with lumbar epidurals (vs. thoracic epidural) and plain local anaesthetic infusion (vs. local anaesthetic and fentanyl infusion).

Conclusion: Our data suggests that in experienced hands, specialised settings and active management, the success rate of epidural analgesia in infants undergoing major abdominal surgeries is good, and without major incidents.

ESRAS-0304

E-Poster Discussion 11: Chronic Pain

PERCUTANEOUS RADIOFREQUENCY NEUROTOMY OF GREATER OCCIPITAL NERVE FOR OCCIPITAL NEURALGIA: A RETROSPECTIVE REVIEW OF OUTCOMES IN SEVENTEEN CASES

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Aims: Outcome measures were cessation of prescription analgesia and any adverse events.

Method: Seventeen patients underwent percutaneous Radiofrequency (RF) neurotomy of Greater occipital nerve (GON) for Occipital neuralgia between January 2011 and January 2012. A Neurotherm RF lesion generator (NT2000) was used for the procedure. A 22 gauge 5-cm length RF needle (SMK-S505-22) with 5mm active tip was advanced under fluoroscopic guidance. When the anatomical position of the RF needle was optimised, sensory stimulation was performed. A positive testing in sensory stimulation was $\leq 0.3V$. RF lesioning for 90 seconds at 80°C at two locations was done. Patients were reviewed in the pain clinic at 6 weeks, 6 months and 1 year after the procedure.

Results: At 6 and 12 week review 94.17% and 82.35% of patients experienced complete pain relief and were no longer using prescription analgesia. At twelve months 47.06% of patients were pain free. There were no procedure related complications or unplanned hospital admissions.

Conclusion: Percutaneous RF neurotomy of GON provides significant long-term pain relief without any complications.

ESRAS-0455

E-Poster Discussion 11: Chronic Pain

MANAGEMENT OF CHRONIC PAIN IN MUNCHAUSEN SYNDROME: A CASE REPORT

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Aims: Munchausen syndrome is a psychiatric disorder making patients to fake illness or trauma to attract attention by continuous requests of diagnostic tests, interventions and therapeutic procedures.

Method: Case.

Results: A 41 year old woman came to the Acute and Chronic Pain Service in December 2011 referring a history of left nephrectomy for neoplasia. Sacral metastases were treated by vertebro-plasty and fentanyl patches. Following on an increasing dose of opiates, amitriptyline, duloxetine and pregabalin, an epidural port-cath and eventually an intrathecal infusion pump were inserted. Since the increasing of drug posology given by intrathecal pump, a sacro-iliac therm-ablation was performed. Eventually a cordotomy was performed in another hospital, since patient got only a partial pain benefit. Two months period of wellness followed. A further pain relapsing needed an increase of the dose of morphine

(7.5mg/day), the gradual addition of ziconotide (12.5 mcg/day) and stellate ganglion bilateral infiltration, for algodystrophy. An orthopedic prescribed the tutorial use; a rheumatologist diagnosed a Raynaud's syndrome; a psychiatrist increased the posology of psycholeptics. Reports of instrumental tests produced by the patient later resulted fakes and without any iconography, but an MRI showing only artifacts due to the intrathecal pump. On February 7, 2014 before a new re-charging of the infusion pump, a total body CT scan, revealed the presence of the both kidneys. After a diagnosis of depressive syndrome, she was admitted to psychiatry. Drugs via intrathecal pump were progressively reduced and stopped.

Conclusion: The recognition of Munchausen diseases results in patients' protection from unnecessary medical procedures and healthcare resources savings.

ESRAS-0384

E-Poster Discussion 11: Chronic Pain

GENDER RATIO IN PATIENTS UNDERGOING STEROID INJECTIONS FOR LOW BACK PAIN

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Aims: Epidemiologic data demonstrate greater chronic pain prevalence among women relative to men. This tendency is significant, constant and ubiquitous. Gender differences in chronic pain prevalence begin to emerge in adolescence and increase with age to a peak at around 60 years. It has been suggested that multiple biopsychosocial mechanisms contribute to gender variations in pain experience, including sex hormones, endogenous opioid system, genotype, pain-related behaviours, and social expectations.

The aim of this study was to determine the gender ratio in patients undergoing steroid injections for low back pain.

Method: An anonymous retrospective data collection was performed in patients with low back pain, who were scheduled for steroid injections at our hospital's Pain Management Service from February 2013 to March 2015. We analyzed data from 467 patients who had undergone epidural (EI), facet joint (FI) or sacroiliac joint (SI) injections.

Results: The gender ratio for the three types of infiltrations is reported in Table 1. For each type of infiltration the prevalence of females was greater.

TABLE 1. Gender ratio for steroid injections

	Males	Females
EI	66 (40.2%)	98 (59.8%)
FI	47 (25%)	141 (75%)
SI	27 (23.5%)	88 (76.5%)

Data shown as absolute number (percentage)

Conclusion: Among patients undergoing steroid injections for low back pain there was a higher prevalence of women.

ESRAS-0336

E-Poster Discussion 11: Chronic Pain

CHRONIC PELVIC PAIN MANAGEMENT IN A MULTIDISCIPLINARY PAIN UNIT: 5 YEARS EXPERIENCE

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Aims: The syndrome of chronic pelvic pain is defined by IASP as pain, pressure or chronic discomfort located in the pelvis, perineum or genitals, has a duration of more than three months and is not due to simple explanation causes (infection, malignancy or structural abnormality). Chronic pelvic pain is an

entity that causes great disability in the quality of life. Patients suffering ongoing evaluation by different specialists without reaching a clear diagnosis, the average time until a pain unit is about three years.

Some patients may even surgical intervention in search of the cause of pain.

Method: A retrospective analysis of 200 cases of chronic pelvic pain, including diagnosis like sacroiliitis, proctalgia, interstitial cystitis, vulvodynia, prostatodynia, coccygodynia, pudendal neuralgia and perineal pain, postsurgical, idiopathic or secondary to neuropathy. A psychological examen was performed in all cases. Interventional techniques performed include: infiltration and Walter ganglion radiofrequency, caudal injection, sacroiliac infiltration, pudendal radiofrequency, radiofrequency sacral roots and spinal cord stimulation in all approaches: anterograde, retrograde sacred and field stimulation.

The result is evaluated by quality of life questionnaire and VAS. Follow up patients is performed for 1 year.

Results: The type of result is evaluated according to the techniques performed. The initial techniques are sacral radiofrequency and caudal injection getting mixed results. The last therapeutic option is usually the neuromodulation with spinal cord stimulation.

Conclusion: The average of interventions carried out in a single patient is more than 2, and several interventions are usually necessary to improve the pain and to arrive a satisfactory result.

ESRAS-0233

E-Poster Discussion 11: Chronic Pain

CAN VIDEO-GUIDED EPIDURAL ADHESIOLYSIS REDUCE THE NEED FOR SPINAL CORD STIMULATION IN PATIENTS WITH LUMBOSACRAL RADICULAR PAIN?

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Aims: Patients with lumbosacral radicular pain who fail to respond to conservative or interventional therapy can benefit from spinal cord stimulation (SCS). The aim of this study is to analyse to what extent video-guided epidural adhesiolysis (EA) can reduce SCS requirement.

Method: A retrospective analysis was performed of all patients with lumbosacral radicular pain in our clinic that underwent video-guided EA. A global perceived effect (GPE) was measured 1 week and 6 months after the procedure, SCS requirement was considered if EA gave less than 50% GPE during follow up.

Results: Over a period of 50 months, 39 patients without previous SCS-treatment were included. One week after EA, 12 (30.8%), 8 (20.5%) and 19 (48.7%) patients had a GPE of >50%, 20-50% and 0% respectively. After 6 months, 9 patients were lost to follow-up. Nine (30%), 5 (16.7%) and 16 (53.3%) patients had a GPE of >50%, 20-50% and 0%, respectively after 6 months.

Sixteen patients (40%) required SCS after EA. Three (8%), 4 (10%) and 7 patients (18%) required SCS within 3 months, 3-6 months and 6-12 months respectively. Two patients (5%), required SCS after 12 and 14 months.

Patients who reported no short-term GPE 1 week after EA needed SCS in 42% (8/19) of the cases.

Conclusion: 40% of patients with lumbosacral radicular pain who underwent video-guided EA, required SCS. Especially patients with no GPE 1 week after EA require SCS for pain control. Video-guided EA can possibly reduce the need for SCS implantation in patients with lumbosacral radicular pain.

ESRAS-0314

E-Poster Discussion 12: Miscellaneous

VASOPRESSORS, LENGHT OF STAY AND REGIONAL ANAESTHESIA IN REVISION OF TOTAL HIP REPLACEMENT SURGERY

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Aims: Revision of Total Hip Replacement (RTHR) surgery is usually carried out in elderly patients with significant comorbidities. Intraoperative hypotension associated with neuraxial anaesthesia is more common in the geriatric population, leading to the use of fluids and vasopressors. The objective was to

evaluate the impact of anesthetic technique in the use of vasopressors and hospital length of stay (LOS).

Method: retrospective study, between 2008 and 2014, conducted in Centro Hospitalar Vila Nova de Gaia-Espinho (CHVNG/E), including patients undergoing RTHR. We analyzed gender, age, ASA Physical Status (ASA), anaesthetic technique, use of vasopressors and LOS. Data analyzed using statistic software SPSS, version 21. T-test and Chi-square were applied accordingly and significance level defined as $p > 0.05$.

Results: 124 patients (74 female and 50 male) were included, mean age was 73.5 years. ASA II was most prevalent (54.0%). Regional anaesthesia was the most performed (60.8%), followed by general anesthesia (37.5%) and combined anesthesia (1.7%). Vasopressors were used in 35.5%. Median LOS of 15 days. There was an association between combined sequential spine-epidural anaesthesia and the use of vasopressors ($p = 0.026$) and a shorter LOS ($p = 0.008$).

Conclusion: Regional anaesthesia was the technique of choice for RTHR in CHVNG/E. Age of the patient and his ASA classification did not seem to influence the choice of anaesthetic technique. Combined sequential spine-epidural anesthesia was associated with a greater need for vasopressors and shorter LOS compared with other anesthetic techniques.

ESRAS-0329

E-Poster Discussion 12: Miscellaneous

CLINICAL CORRELATION OF GLUCOSE DETERMINATION THROUGH EPIDURAL CATHETER DURING COMBINED ANAESTHESIA

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Aims: During anaesthetic procedures with combined spinal-epidural anaesthesia, the measure of the glucose in the fluid obtained by spontaneous dropping through the catheter after its insertion is possible and it is a normal event.

Method: After local committee approval, 34 patients (ASA II) were included. All patients were scheduled to orthopedics surgery. A combined spinal-epidural anaesthesia was performed using Spocan® system. Firstly, epidural space was located with saline solution (3 cc). After that, spinal needle was inserted. Then, the output of cerebrospinal fluid (CSF) was checked and a sample was taken. Later, hyperbaric bupivacaine was injected (doses were individualized) and the spinal needle was removed.

Afterwards, the epidural catheter (EC) was introduced and if any fluid was dropping trough was observed. Whether there was fluid, the glucose was determined using always the same calibrated glucometer device.

When the motor block was recovered a local anaesthetic dose was administered through EC to all the patients.

Results: In 22 of 34 patients, spontaneous dropping through EC was observed after its insertion. All samples had glucose levels. Any patients experienced high sensitive-motor block after local anaesthetic dose.

In the 22 patients, the fluid dropping after catheter placement stopped when the conector was inserted and the patient was colocated in supine position.

Conclusion: Finding glucose in the fluid obtained through the EC could be a leak of CSF by the dural puncture hole during or after administration of hyperbaric bupivacaine and the flow of it to epidural space.

This event is very often and it has not clinical significance.

ESRAS-0259

E-Poster Discussion 12: Miscellaneous

A STAGED TREATMENT OF SYMPTOMATIC LUMBAR INTRASPINAL SYNOVIAL CYSTS

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Aims: Lumbar intraspinal synovial cyst (LISC) refers to a cyst that arises from the zygapophyseal joint capsule of the lumbar spine and contains serous or gelatinous fluid. In cases of resistant to conservative treatments, various minimally invasive percutaneous spinal techniques (MIPSTs) may be applied prior to open

surgery. The outcomes of 3-staged MIPSTs in the treatment for the cases of symptomatic LISCs resistant to conservative treatments were evaluated.

Method: Patients with symptomatic LISCs resistant to conservative treatments were treated with 3 staged MIPSTs, including image-guided intra-articular aspiration, cyst distention and rupture, and injection of corticosteroids (ARI), endoscopic cyst enucleation (ECE), and endoscopic facetectomy (EF) by a single pain specialist. A symptom-free period after each intervention was evaluated. Recurrence was defined as the same recurrent symptomatic radicular pain with confirmation of the LISC on magnetic resonance imaging. All patients with a minimum follow up time of 3 year were included.

Results: Of the 40 patients, who underwent ARI, 3 patients were lost follow-up and 19 recurred patients (51.4%) received ECE. Ten re-recurred patients (52.6%) after ECE were performed EF. There was no recurrence after EF. This retrospective and observational study with a limited number of patients does not represent a high level of evidence. However, this information provided the recurrence rate after each intervention.

Conclusion: The half of the patients who received ARI had recurrence; the half of the recurred patients who received ECE had re-recurrence. However, EF showed no recurrence during the 3-year-study period.

ESRAS-0330

E-Poster Discussion 12: Miscellaneous

CHANGE IN ANAESTHETIC AND SURGICAL PRACTICE FOLLOWING IMPLEMENTATION OF THE ENHANCED RECOVERY PROGRAM FOR TOTAL KNEE REPLACEMENT: A DGH EXPERIENCE

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Aims: The Enhanced Recovery Program (ERP) protocol (an evidence-based, multi-modal, patient-centered approach of improving patient experience and clinical outcomes) was implemented for Total Knee Replacement (TKR) in our hospital in 2011. We aimed to analyse the effect of the ERP on anaesthetic and surgical practice and document improvements in length of stay and other outcomes, and compare it to an earlier audit done in 2011.

Method: After audit committee approval, a prospective observational audit of 100 consecutive patients undergoing TKR was performed from October 2014. Data regarding demographics, perioperative information, length of stay and post-operative complications were collected and analysed.

Results: The implementation of the ERP demonstrated that 45% patients, as compared to 28% in 2011, were discharged on Day 3 or earlier. Surgery related 30 days re-admission rates reduced from 7% to 3%. Regional anaesthetic techniques dramatically reduced (56% vs 17%). 75% of patients had general anaesthetic (GA) plus local anaesthetic infiltration, and achieved the best clinical improvement with regards to recovery and compliance with physiotherapy. Almost 90% received postoperative gabapentin as part of their multimodal analgesia. Patient controlled analgesia (PCA) use dropped dramatically (81% vs 3%). 74% of patients were able to mobilize on day 1 despite only 14% reporting satisfactory pain control all the time and this did not affect discharge criteria.

Conclusion: The implementation of ERP has demonstrated improved clinical outcomes and better patient satisfaction although pain control postoperatively has been suboptimal. Regional anaesthetic techniques were markedly underutilized but this did not seem to affect discharge criteria or outcomes.

ESRAS-0205

E-Poster Discussion 12: Miscellaneous

EFFECTS OF ADJUVANTS COMBINED WITH BUPIVACAINE IN THE SCIATIC NERVE BLOCK OF RATS

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Aims: The objective of this experimental study was to examine the effects of epinephrine, dexmedetomidine and clonidine added as adjuvants to bupivacaine

on the block onset and effect times as well as the effects on the Na^+ and Ca^{+2} channel gene expressions in the sciatic nerve cell membrane.

Method: Rats were divided into 5 groups; Group S (Sham): Saline Solution, Group B: Bupivacaine, Group BD: Bupivacaine+Dexmedetomidine, Group BC: Bupivacaine+Clonidine, Group BE: Bupivacaine+Epinephrine. For each group the 0.2 ml local anesthetic was injected in the sciatic nerve bifurcation point of the right leg. Sensory (proprioceptive and nociceptive block) and motor block onset and ending times were recorded.

Results: The shortest effect onset time in the examined sciatic block was determined in the BC group, whereas the longest sensory and motor block times were observed in the BD group. The present data suggest that suppressed *TRPM7* ratio and increased *TRPM2* ratio in groups other than the BE group.

Conclusion: Clonidine is more suitable for fast onset of effect in peripheral nerve blocks whereas dexmedetomidine addition is better for longer duration. Since the *SCN9A* and *TRPM2,4,7* expression ratios of the BE group showed the least amount of change, it seems as the most reliable group in terms of cellular integrity.

ESRAS-0377

E-Poster Discussion 13: Obstetric

LOWER BACK TATTOO: TO PUNCTURE OR NOT TO PUNCTURE?

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Aims: The prevalence of lower back tattoos is increasingly more common amongst obstetric patients. This makes it more challenging for Anesthesiologists to perform the neuroaxial anesthesia procedure. Although tissue coring accompanied by tissue transport to deeper sites has been confirmed, in conjunction with possible neurological hazard implications, no serious complications have been reported in current literature.

Method: One common solution for this problem is for anesthesiologists to find a free pigmented skin spot where they may perform the technique.

Results: We report on a case of a 28-year-old ASA I parturient who presented labour analgesia. Clinical examination revealed nothing of notice but a full lower back tattoo. We were unable to find any free pigmented skin to puncture. After obtaining verbal informed consent, the decision was made to perform a small median superficial skin incision prior to the insertion of the needle so as to prevent coring tattoo pigment when passing through the skin. The procedure was successful and the parturient was relieved of pain without any incidents to report.

Conclusion: In spite of the limited available evidence, we acknowledge that this unconventional technique has, in this situation, yielded results that other non-neuroaxial analgesia techniques would be unable to achieve.

ESRAS-0374

E-Poster Discussion 13: Obstetric

AUTONOMIC DYSREFLEXIA IN A PREGNANT WITH SPINAL CORD INJURY

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Aims: Autonomic dysreflexia (ADR) is a syndrome of imbalanced reflex sympathetic discharge occurring in patients with spinal cord injury (SCI) at or above the level of splanchnic sympathetic outflow (T6). ADR occurs frequently in these patients during labor as visceral stimulation from uterine contractions causes (in the absence of descending central inhibition) extreme sympathetic hyperactivity and severe hypertension secondary to vasoconstriction below the level of spinal cord lesion. Life-threatening hypertension can result, with intracranial hemorrhage occurring in some cases.

Method: Case report: primipara with a SCI who developed ADR during term labor and received epidural anesthesia for C-section.

Results: 27 year old primipara (35 weeks gestation) with a history of SCI at T5, secondary to car crush 10 years before, was admitted with

uterine contractions. Subsequently, she developed shortness of breath, pulse 120 beats/minute and blood pressure lability (147/91 mmHg). Uterine contractions and cervical examinations were noted to be directly correlated with episodes of severe hypertension (190/100 mmHg). The obstetric team decided to perform an urgent C-section. An epidural catheter was placed (L3-L4) and ropivacaine with sufentanyl were administered. No intra and postoperatively events were reported.

Conclusion: Recognition and prevention of ADR is critical in labor management of obstetric patients with SCI. The onset during labour is intermittently timed with uterine contractions. In the majority of pregnant with SCI above T10 the uterine contractions may present only as abdominal discomfort, increase in spasticity and ADR. Adequate anaesthesia is recommended in women with SCI during labour and delivery, despite their apparent lack of sensation.

ESRAS-0437

E-Poster Discussion 13: Obstetric

ARE WE ACHIEVING RECOMMENDED TARGETS WITH LABOUR ANALGESIA: WHAT HAPPENS AFTER 2 HOURS OF EPIDURAL USE

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Aims: We use a bolus only PCEA regime for labour analgesia. Royal college of anaesthetists, UK recommendations include - resiting or alternative form of analgesia if epidural fails to provide pain relief within 45 minutes. Our previously presented audit showed significant motor blockade and less breakthrough pain (BTP) with a background only regime in 2010. We audited the quality of analgesia after 2 hours of initiation of our bolus only protocol and compared the results with the previous outcomes.

Method: King's College Hospital is a teaching hospital with 7000 deliveries. After internal governance approval, we included consecutive 52 patients who had epidural for labour analgesia over a period of 3 weeks. Patients with epidurals for less than 2 hours were excluded. We looked at incidence and frequency of BTP, unilateral motor block and requests for manual top-ups. Patient satisfaction was assessed using a NRS of 0-10.

Results: All patients experienced good pain relief following initial manual bolus. 26.9% patients experienced BTP, 23% requiring 1 or more manual top-ups after 2 hours. 13.4% patients had dense motor block (modified Bromage scale). Only 92% patients experienced satisfactory or above pain relief (Figure 1).

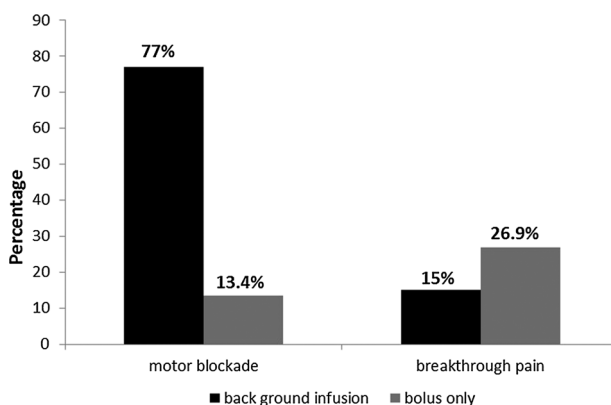


FIGURE 1. Comparison of PCEA.

Conclusion: Bolus only regimes are known for higher incidence of BTP compared to those with background infusions. However, background infusions cause significant motor blockade. Our bolus only PCEA audit showed a significant proportion of patients experienced BTP after initial loading dose. This had an impact on satisfaction scores. However, we still achieve a significantly less motor blockade with the bolus only regime.

ESRAS-0439

E-Poster Discussion 13: Obstetric

PATIENT MONITORING DURING EPIDURAL LABOUR ANALGESIA BY MIDWIVES: ARE WE DOING IT RIGHT?

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Aims: Careful monitoring of vital signs and block level during use of labour epidural analgesia is essential to minimise the potential risks. NICE recommends to measure blood pressure (BP) every 5 minutes for 15 minutes during establishment of regional analgesia or further boluses and hourly assess the level of sensory block. RCoA recommends monitoring respiratory rate; temperature; sedation & pain score; degree of motor & sensory block throughout the period of epidural analgesia.

Method: King's College Hospital is a teaching hospital with 7000 deliveries annually. After internal governance approval, medical records of 30 patients receiving epidural for labour analgesia were retrospectively reviewed over a period of 2 weeks. We checked the documented frequency of monitoring throughout the period of PCEA. We also surveyed 20 midwives to assess their level of awareness of local epidural guideline (Figure 1).

Results: Compliance to heart rate and BP monitoring after loading dose was 100%. However, further hourly heart rate monitoring was documented in only 33.3%, hourly BP was monitored in 16.6% patients. Sensory block was documented in 20% patients after loading dose. Subsequently, during the progress of labour it was documented only in 6.6% patients. None of the patients had documented sedation score, pain score and degree of motor block.

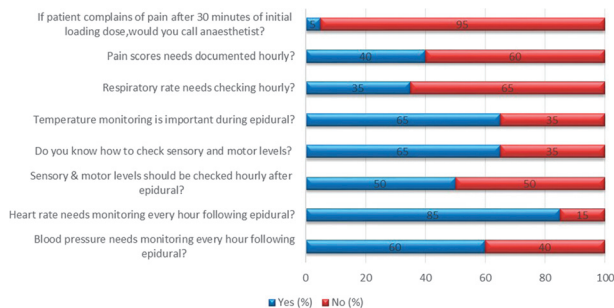


FIGURE 1. Midwives survey.

Conclusion: There is poor awareness of local trust epidural guidelines among the midwives, which was further confirmed by the survey. Poor adherence to epidural guidelines could prevent early detection of potentially serious complications. We aim to re-educate the midwives through monthly teaching sessions and re-audit the progress.

ESRAS-0401

E-Poster Discussion 13: Obstetric

SAFETY OF PHENYLEPHRINE IN ANTIHYPOTENSIVE TREATMENT DURING SPINAL ANAESTHESIA FOR CAESAREAN SECTION

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Aims: The use of phenylephrine in spinal anaesthesia is more favoured than ephedrine in caesarean section. However, bradycardia side effect is its major drawback. The objectives are to study the incidence and risk factors of phenylephrine-induced bradycardia.

Method: The study was conducted on 509 parturients undergoing caesarean section under spinal anaesthesia after IRB approval. Level of anaesthesia, blood pressure, and heart rate (HR) were monitored. Pre-delivery hypotension was treated by 100 mcg of phenylephrine intravenously and pre-therapeutic heart rate (pHR) was recorded. Atropine was administered when the criteria of severe bradycardia were met (HR below 45 or below 60 with hypotension). Data were analysed by multivariable logistic regression.

Results: The incidence of phenylephrine-induced serious bradycardia was 11% (95% CI 8.0-14.0). The increment of pHR reduced the incidence of serious bradycardia significantly (95% CI 0.94-0.98). Comparing to pHR greater than 80 bpm, the pHR of 61-80 and of 60 bpm or lower increased the risk of serious bradycardia to 3.55 times (95%CI 1.81-6.93) and 12.81 times (95% CI 4.40-37.30), respectively. In addition, height, baseline diastolic blood pressure, and the anaesthetic level were also significant associated factors. The benign and temporary abnormal ECG were also observed.

Conclusion: The evidence of phenylephrine-induced severe bradycardia is not uncommon. The authors suggest to use phenylephrine under closed ECG monitoring and prompt treatment, in particular, the parturient with a slower heart rate.

ESRAS-0337

E-Poster Discussion 14: Pediatric

REGIONAL ANESTHESIA IN CHILDREN: WHAT IS CURRENTLY THE ROLE OF NEUROAXIAL BLOCKS? EXPERIENCE GATHERED IN A PEDIATRIC HOSPITAL DURING THE LAST 5 YEARS

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Aims: Recently, the use of regional anesthesia in children increased due to its benefits and security. In the last decade, the pattern of neuroaxial and peripheral blocks changed, becoming the last one more popular.

During the period between 2010 and 2014 there was an increase of 89% regarding regional techniques (990 instead of 524) made at Hospital Dona Estefânia (HDE), although the number of surgeries remained constant.

The aim of this study was to understand the evolution of usage of neuroaxial blocks, considering the recent exponential increase of regional techniques.

Method: 20761 surgeries (pediatric general surgery, plastic surgery, orthopaedics, urology and otorhinolaryngology) were included in a retrospective study of 5 years (2010-2014).

Data was analyzed and compared considering the type of neuroaxial block made by surgical specialty and age group, in each year.

Results: There was a large increased in the overall number of regional techniques. In particular, the number of neuroaxial blocks increased (357 to 476), although that represents a percentage decrease regarding overall number of blocks (68,1% to 48,1%).

For children with two years old or more, the continuous lumbar epidural is the most common block. Regarding newborns and infants, the block more frequently used is the caudal.

Finally, the neuroaxial blocks increased in urology, remaining constant in orthopaedics.

Conclusion: Although neuroaxial blocks still represent nearly 50% of all regional techniques made in HDE, the observed percentage decreased. This could be explained by the introduction of ultrasound-guided blocks, which gradually increases the number of peripheral blocks. This is in agreement with international published papers.

ESRAS-0239

E-Poster Discussion 14: Pediatric

THE USE OF PECS BLOCKS FOR LONG-TERM CENTRAL VENOUS ACCESS PROCEDURES IN PAEDIATRICS

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Aims: Pecs Blocks are gaining popularity in recent times. There is a paucity of evidence for their efficacy in paediatric patients in the current literature. We have successfully used these blocks for analgesia in high risk paediatric patients presenting for insertion or removal of long term central venous access. We hoped to minimise the need for general anaesthesia and systemic opioids in this patient population using this technique.

Method: Our hospital is a tertiary level paediatric centre, specialising in cardiothoracic and oncology services. Therefore, our patient population presenting for long term access procedures are often high risk patients, with multiple, significant co-morbidities. We have performed ultrasound guided Pecs I & II blocks in

addition to a superficial cervical plexus block, to provide analgesia for the insertion and removal of long term central venous access. All patients were consented and had general anaesthesia for the procedure. The volumes used ranged from 0.2-0.4ml/kg of 0.25% Levobupivacaine.

Results: The block success rate was high and most patients did not require additional systemic analgesia in the peri-operative period.

Conclusion: Pecs I & II Blocks with superficial cervical plexus blocks have been successfully used in high risk paediatric patients presenting for long term venous access procedures with minimal complications and good analgesic effects. These blocks are relatively simple to perform and have reduced the requirements for supplemental analgesia in the peri-operative period. We hope to continue to employ this technique for future access procedures in children with additional sedation or general anaesthesia as indicated.

ESRAS-0403

E-Poster Discussion 14: Pediatric

COMPARATIVE STUDY BETWEEN SUGAMMADEX AND NEOSTIGMINE IN NEUROSURGICAL ANESTHESIA IN PEDIATRIC PATIENTS

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Aims: Postoperative recurarization remains a risk following the use of the conventional neuromuscular blocking agents. In addition, none of the commonly used reversal agents, such as neostigmine or edrophonium are capable of reliably reversing profound blockade. The present comparative and randomized study investigated the use of sugammadex for reversing profound neuromuscular blockade in pediatric neurosurgical patients undergone posterior fossa tumour excision.

Method: Following Institutional Review Board approval and written informed consent, forty pediatric patients undergoing elective craniotomy for posterior fossa tumor excision were randomly divided into either of neostigmine or sugammadex group in which muscle relaxant was reversed at the end of anesthesia either with neostigmine 0.04 mg/kg added to atropine 0.02 mg/kg or sugammadex 4 mg/kg alone respectively.

The primary endpoint was the time from the administration of sugammadex or neostigmine to recovery of the TOF ratio to 90% after rocuronium-induced neuromuscular block.

Results: Patients in sugammadex group attained a TOF ratio 90% in statistically shorter time (1.4 ± 1.2 minutes) than those in neostigmine group (25.16 ± 6.49 minutes) for reversal of the rocuronium.

MAP and HR were significantly higher in neostigmine group at 2, 5 and 10 minutes after administration of the reversal agents and returned non significantly different after that. With no recurarization in any patient throughout the study period.

Conclusion: Sugammadex rapidly and effectively reverses rocuronium-induced neuromuscular blockade in pediatric patients undergoing neurosurgery when administered at reappearance of T2 of TOF at dose 4 mg/kg.

ESRAS-0281

E-Poster Discussion 14: Pediatric

ACCIDENTAL LOCAL ANESTHETIC OVERDOSE IN A 9-YEAR OLD PATIENT

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Aims: Peripheral nerve blocks can provide excellent quality analgesia in children. One of the most deleterious complications, albeit rare, is local anesthetic toxicity.

Method: A 9-year old, ASA I, weighing 30 kg, male patient presented for a tibial fracture repair with external fixation. General anesthesia supplemented with an ultrasound-guided popliteal and saphenous block was planned. Anesthesia was induced with fentanyl 2 mcg/kg and propofol 3 mg/kg; rocuronium 0.6 mg/kg was used for neuromuscular blockade and the trachea was intubated with a 5.5 size cuffed tube. Following induction, the nerves were visualized clearly and the local anesthetic spread was confirmed around the tibial and peroneal nerves at the popliteal fossa using 17 ml of 1-bupivacaine 0.2%. For the saphenous nerve 5 ml of the same drug were injected using a landmark

technique. No additional pain relief was needed throughout the procedure. Thirty minutes later the anesthetist realized that 0.5% 1-bupivacaine was accidentally used instead of 0.2%, meaning that a total amount of 110 mg were injected.

Results: The patient remained hemodynamically stable throughout the procedure. Close monitoring was continued for 24 hours. Complete sensory and motor blockade lasted 24 hours and then started to resolve gradually until complete resolution 30 hours after the block placement.

Conclusion: Local anesthetic toxicity in children presents with common symptoms as arrhythmias and convulsions. Wide inter-individual variation in maximum plasma concentration tolerance has been documented. Lipid emulsion 20% is a safe choice at a maximum dose of 3 ml/kg. Close vital sign monitoring is advised in cases of accidental overdose.

ESRAS-0430

E-Poster Discussion 14: Pediatric

THE COMPARISON OF PREMEDICATION EFFECT OF INTRA-NASAL DEXMEDETOMIDINE AND MIDAZOLAM IN SEDATION ANXIETY LEVEL AND EASE OF SEPARATION FROM PARENTS IN CHILDREN FOR ELECTIVE SURGERY

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Aims: The study of premedication effect of intra-nasal dexmedetomidine and Midazolam in sedation anxiety level of children for elective surgery.

Method: This clinical trial study was done on sixty children 2-8 years old ASA class I, II scheduled for elective surgery. By using random fix blocks, children were divided into two equal groups (D and M). Group D children received 1µg/kg intranasal dexmedetomidine and group M received 2 mg/kg intranasal midazolam 30 minutes before surgery. Preoperative sedation effects using the Ramsay sedation score anxiety level changes the ease of children separation from their parents according to Feld score cooperation for inserting the IV line was evaluated.

Results: In terms of gender, age, basal heart rate (HR) blood pressure (BP) and arterial O2 saturation (SaO2), two groups showed no significant difference. Ramsay score before administration of drugs and when entering to operating room were not different between two groups, but it was lower in the time of entrance to operating room ($p=0.009$, $p=0.000$). The anxiety level before administering drug was the same in two groups ($p=0.911$) and decreased at the time of entering OR. ($p=0.000$ in both group D and M) Children in Midazolam group were less anxious when entering the OR ($p=0.034$) were separated from parents more easily and accepted the anesthesia mask better ($p=0.013$) than Dexmedetomidine group.

Conclusion: Administration of intranasal Midazolam and Dexmedetomidine before surgery accompanies with less anxiety and easier separating children from their parents.

ESRAS-0167

E-Poster Discussion 15: Peripheral Nerve Blocks

BRACHIAL PLEXUS BLOCK COMPLETED BY PEC BLOCKS AS AN ANESTHETIC TECHNIQUE FOR THE VASCULAR ACCESS SURGERY OF THE UPPER LIMB WITH AXILLA INVOLVEMENT

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Aims: The performance of the arteriovenous fistulas or grafts in the upper arm (brachial artery to axillary vein) requires anesthetic coverage of the axilla region. The blockade of intercostobrachial and long thoracic nerves that usually missed in the brachial plexus blocks can be obtained with PEC 1 and PEC 2 blocks that were proposed as a good alternative analgesic technique for the breast surgery.

Method: We present the pilot study of 14 patients (ASA III-IV), who underwent vascular access surgical procedures of the upper arm. Before the performance of the regional anesthesia the intravenous sedation with Fentanyl

(0.5-0.7 mcg/kg) and Midazolam (0.017-0.02 mg/kg) was given to all patients. Ultrasound guided supraclavicular brachial plexus block with Bupivacaine 0.25% -17-20 ml, and subsequent PEC 1,2 blocks with another 25 ml of Bupivacaine 0.25% were performed.

Results: The regional anesthesia was successful in all the cases. In two patients Lidocaine 1%- 5ml was infiltrated subcutaneously in the medial surface of the upper arm and axilla due to complain of “burning” at the time of electrocoagulation with diathermy. All the patients were discharged home 3-4 hours after the end of the surgical procedure with accurate instructions concerning the residual motor block. No neurological deficit (motor or sensory) was mentioned 24 hours after the block performance.

Conclusion: Brachial Plexus block completed by PEC 1 and PEC 2 blocks allow to create vascular access in the upper arm under regional anesthesia with minimal sedation, which may be the preferable anesthetic technique in the patients with the end stage renal disease.

ESRAS-0191

E-Poster Discussion 15: Peripheral Nerve Blocks

PROPOSAL OF A NEW ANATOMICAL APPROACH FOR PECTORAL NERVE BLOCK (PEC'S BLOCK)

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Aims: The pectoral nerves (PN) block1,2 is describe in a medial to lateral approach, which makes a steep needle difficult to see, especially in obese patients or in those with big breast. The lateral PN (LPN)3, is consistently near the thoracoacromial artery. The medial PN (MPN) pierces thru the pectoral minor muscle (Pmm) fascia at the level of the third costal arch, describing anatomical variations (intramuscular, transfixing and lateral branches)4. We propose an anatomical approach block for the LPN, MPN, and their branches.

Method: We have done this block in 246 breast esthetic surgeries, having a very good level of anesthesia and post-operative analgesia. We do an in-plane approach of the PN, from lateral to medial, with the arm open at 90°, with the transducer on the chest wall, we localize the third costal arch, and insert the

needle from the armpit under the pectoral major muscle, the needle is progressed in the depth of the Pmm until contact with the rib, we then deposit 5 ml of local anesthetic (LA), we then withdraw the needle into the Pmm until its lateral border to then deposit 2 to 3 ml of LA, and finally progress the needle again into the interpectoral fascial plane to deposit 5 ml of LA beside the thoracoacromial vessels.

Results: See Figure 1.

Conclusion: This anatomical approach of the PN block proves to be a safe and easy approach to the PN, having an adequate anesthesia and post-operative analgesia.

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ESRAS-0192

E-Poster Discussion 15: Peripheral Nerve Blocks

IDENTIFYING A THRESHOLD FOR THE SPEED OF LOCAL ANAESTHETIC INJECTION TO BE USED WITH THE B-SMART DEVICE TO PREVENT “FALSE POSITIVE” RESULTS

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Aims: The B-Smart™ in-line manometer is used for measuring injection pressures during administration of peripheral nerve blocks. In the dynamic or flow phase, injection pressure is influenced by the speed of injection. Our bench-top study aimed to identify a threshold of flow rate below which the B-Smart™ device maintains a reading of less than 15 psi and which may be used as a guide for the speed of injection.

Method: An apparatus was set up consisting of an angiographic injection device, tubing, a B-Smart™ manometer and a peripheral nerve block needle connected in sequence. Using normal saline as the injectate we recorded the B-Smart™ pressure reading during unimpeded flow at a constant injection rate. Injections were performed using three needle sizes (50mm/22gauge, 80mm/22gauge, 100mm/21gauge) from the same manufacturer. For each needle the flow rate started at 0.3 ml/s and was raised in increments of 0.1 ml/s until a pressure greater than 20 psi was recorded. Each test was performed in triplicate.

Results: Higher injection pressures were recorded with faster injection rates. Irrespective of the gauge and length of needle tested, flow rates of 0.3 ml/s consistently produced readings of less than 15 psi.

Conclusion: At an injection rate of 0.3 ml/s (18 ml/min) or less, an increase in pressure reading on the B-Smart™ device can be assumed to be due to needle obstruction or injection into a non-compliant space, in other words, a false positive reading due to injection rate is unlikely at this flow rate irrespective of needle size.

ESRAS-0110

E-Poster Discussion 15: Peripheral Nerve Blocks

A RANDOMIZED, CONTROLLED STUDY STUDYING THE EXTENT TO WHICH PECTORAL NERVE BLOCKS DECREASE ACUTE AND CHRONIC POSTOPERATIVE PAIN AFTER BREAST CANCER SURGERY

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Aims: Breast cancer surgery is associated with moderate-to-severe acute post-operative pain that may lead to chronic pain. Recently, pectoral nerve (Pecs) blocks have been introduced to manage pain after breast cancer surgery, but their beneficial effects have not been confirmed to date. This randomized comparative study was conducted to determine if Pecs blocks decreased pain during 48 h and one month after breast cancer surgery.

Method: With IRB approval and informed consent, we studied 42 consecutive patients (ASA 1-2) undergoing unilateral breast cancer surgery. The patients were randomly divided into two groups: those with and without Pecs blocks. Pecs blocks were conducted by injecting 10 and 20 ml of 0.5% levobupivacaine between the pectoralis major and minor muscles and superficial to the anterior serratus muscle, respectively. General anesthesia was maintained by using

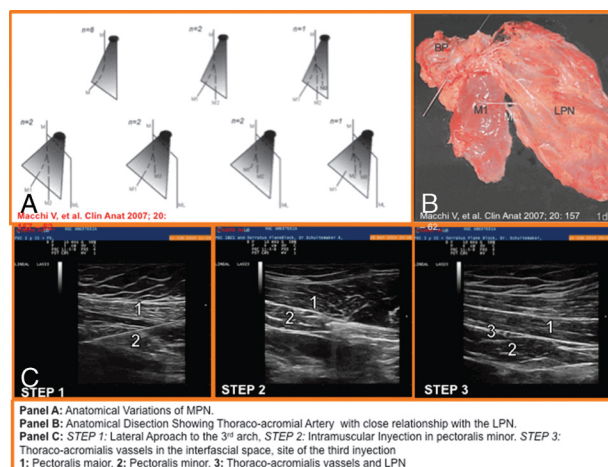


FIGURE 1.

propofol titrated to maintain a BIS of 40-60. When heart rate and/or blood pressure increased more than 20% from its baseline value, fentanyl 1 µg/kg was injected intravenously. Patients postoperatively received intravenous patient-controlled analgesia with fentanyl. Postoperative data included VAS scores, fentanyl requirement, additional analgesics requested, and adverse events for 48 h. An interview was conducted one month after surgery to determine whether or not patients had persistent pain.

Results: Only the VAS score 24 h postoperatively was significantly lower in patients with Pecs blocks ($P=0.0012$). The two groups did not significantly differ in any other measured criteria.

Conclusion: Beneficial effects of Pecs blocks for breast cancer surgery were limited to reduced pain during 24 h after surgery.

ESRAS-0491

E-Poster Discussion 16: Postoperative Pain Management

CAUDAL ANALGESIA IN PEDIATRICS WITH FENTANYL, DEXMETETOMIDINE, DEXAMETHASONE AS ADJUVANT TO LOCAL ANESTHETICS: A COMPARATIVE STUDY

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Background: Caudal analgesia is good, reliable and easy method to provide intra and postoperative analgesia in the infraumbilical surgery in pediatrics. Many additives were used in combination with local anesthetics to prolong the postoperative analgesia (fentanyl, dexmedetomidine and dexamethasone).

Aim of the study: This study aimed to compare the intraoperative hemodynamics, postoperative analgesia, postoperative sedation and postoperative side effects of fentanyl, dexmedetomidine and dexamethasone as adjuvant to bupivacaine in caudal analgesia in pediatrics.

Methods: 120 pediatric patients (3-10) years old scheduled for lower abdominal surgeries under general anesthesia allocated to 4 groups (control) in this group the patients equal mixture of bupivacaine 0.25% and lidocaine 1% diluted in saline (in a dose of 0.5ml/kg) caudally. (fentanyl group), received the same mixture of group I + fentanyl (1µg/ kg) caudally. (Dexmedetomidine group) received the same mixture of group I + dexmedetomidine (1µg/ kg) caudally. (Dexamethasone group) received the same mixture of group I + dexamethasone (0.1mg/ kg) caudally.

Results: The dexmedetomidine group and dexamethasone group were less in pain score, prolong the duration of analgesia and less in number of patients required analgesia compared to control and fentanyl groups. More sedation was present in the fentanyl and dexmedetomidine groups. The fentanyl group showed significant increase in the adverse effects incidence.

Conclusion: Both dexmedetomidine or dexamethasone added to caudal local anesthetics are a good alternatives in prolongation of postoperative analgesia compared to caudal local anesthetic alone or added to caudal fentanyl. Also they showed less side effects compared to caudal fentanyl.

ESRAS-0124

E-Poster Discussion 16: Postoperative Pain Management

PROLONGED FEMORAL NERVE BLOCK VERSUS EPIDURAL ANALGESIA AFTER TOTAL KNEE ARTHROPLASTY

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Aims: For pain management after total knee arthroplasty (TKA), patient-controlled analgesia or epidural analgesia (EA), as well as lumbar plexus block or femoral nerve block (FNB) can be utilized. The presence of an indwelling perineural catheter makes prolonged FNB controllable similar to prolonged EA. The aim was to compare the efficacy of prolonged FNB and EA after TKA.

Method: A randomized, prospective study included 40 patients aged 46 to 84 years, divided into two groups (20 subjects in each group). Postoperative regional analgesia was administered for 3 days using 0.2% Ropivacaine. The efficiency of pain control was assessed based on VAS, stress response of the cardiovascular system (ABP, HR, and MSI), as well as cortisol, insulin, and glucose levels. Tramadol and Ropivacaine consumption levels were monitored as well. Motor block of the lower extremities was measured with the Bromage scale.

Results: No significant differences in terms of MAP, HR, RPP, cortisol, insulin and glucose levels were found between the groups at all stages of the study. Statistically significant decrease in pain at rest at 24 and 48 hours after surgery was noted in PFNB group compared to the EA group, with similar pain intensity at the time of flexion of the operated extremity in both groups. Consumption of Ropivacaine and Tramadol in both groups did not differ significantly. In the EA group, 3 cases of motor block of the contralateral extremity were recorded.

Conclusion: Prolonged FNB provides efficient postoperative pain control, comparable to epidural analgesia, while avoiding inadvertent motor block of the contralateral extremity.

ESRAS-0207

E-Poster Discussion 16: Postoperative Pain Management

THE COMPARISON OF DIFFERENT VOLUMES OF LOCAL ANAESTHETICS IN FASCIA ILIACA COMPARTMENT BLOCK

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Aims: We aimed to find the most effective volume of local anesthetic for Fascia Iliaca Compartment Block (FICB) when applied to patients in order to control post-operative pain in patients undergoing femur and knee surgery.

Method: Forty-five patients with ASA physical scores of I-III were randomly included in this study. General anesthesia induction was done by using fentanyl, propofol, and rocuronium then continued with sevoflurane. After the surgical procedure finished, patients were provided FICB with ultrasound guidance without extubation. Patients were randomly divided into 3 groups. Bupivacaine 0.25 % was administered to Group 1 0.3 ml / kg, to Group 2, 0.4 ml / kg, and to Group 3, 0.5 ml / kg. The patients were sent to their ward after FICB and after reoxygenation and extubation. The patients' vital signs for 24 hours, pain scores, the additional analgesic requirements and possible side effects were recorded.

Results: The pain score is higher significantly in 1st hour Group 1, and in 4th and 6th hour Group 1 and Group 2 ($p<0,05$). Also analgesic consumption were significantly higher in 4th hour Group I and 6th hour Group I and Group II.

Conclusion: Our study showed that FICB, which is performed by ultrasound-guided with a volume of 0.5 ml / kg which contains 0.25% of bupivacaine is safe and the incidence of side effects are very low.

ESRAS-0127

E-Poster Discussion 16: Postoperative Pain Management

IMPROVEMENT IN QUALITY OF PAIN RELIEF FOLLOWING EMERGENCY LAPAROTOMY. DO RECTUS SHEATH CATHETERS HAVE A PLACE?

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Aims: Pain relief following emergency laparotomy plays crucial role in enhanced recovery. Morphine Patient Controlled Analgesia (MPCA) is associated with significant side effects. Rectus sheath catheters (RSC) are alternative where pain relief is required for a midline incision (T6-T11). Catheters can be inserted by either the surgeon or by the anaesthetist.

Method: A retrospective case series was carried out on 40 patients who underwent emergency midline laparotomies in 2014. Required data was collected from patient case notes. Patients were divided into two groups: RSC group and PCA only group.

Results: There were 17 patients in RSC group and 10 patients in PCA only group. Mean pain scores were identical between both groups in recovery, Day 1 and Day 2 post-op. Morphine requirements are demonstrated in Table 1.

Conclusion: USS placed Rectus Sheath Catheters are a reliable and safe adjunct to providing post-operative pain relief following emergency laparotomy. They offer morphine sparing effect of up to 30%. With decrease in morphine

TABLE 1.

	Recovery	Day 1 post-op	Day 2 post-op	Total
RSC	8mg	47mg	32mg	140mg
PCA only	11mg	86mg	58mg	210mg

consumption it is therefore expected there would be a decrease in side effects associated with morphine use while still providing equally effective analgesia. Our practice is an initial bolus of 20 ml of 0.25% levobupivacaine bilaterally following insertion followed by a continuous infusion of ropivacaine 0.2% at the rate 5 ml/h bilaterally via two elastomeric pumps. An intermittent bolus technique is a possible and effective alternative but requires regular top-ups and is labour intensive.

ESRAS-0094**E-Poster Discussion 16: Postoperative Pain Management****THE COMPARISON OF ANALGESIC EFFECTS OF THORACIC PARAVERTEBRAL BLOCKADE WITH BUPIVACAINE AND LEVOBUPIVACAINE DURING PERIOPERATIVE PERIOD OF THORACOTOMY**

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Aims: Adequate pain relief after thoracotomy can facilitate mobility, improve ventilation and secretion clearance followed by a decrease in morbidity and

mortality. The aim of this prospective, randomized, double-blind study was to compare the analgesic efficacy of thoracic paravertebral bupivacaine or levobupivacaine analgesia by measuring perioperative haemodynamics, intraoperative fentanyl consumption, postoperative pain and rescue analgesic requirements in patients undergoing thoracotomy.

Method: After ethics committee approval and patients' consents, 60 patients scheduled for thoracic surgery were randomly enrolled into two groups to receive 20 ml bolus of either 0.5% bupivacaine or 0.5% levobupivacaine before induction of general anaesthesia via paravertebral catheter. A paravertebral continuous infusion (0.15 ml/kg/h) of 0.25% bupivacaine or 0.25% levobupivacaine was started afterwards and patient-controlled analgesia was prepared as 0.15 ml/kg/h infusion, 2 ml bolus, 20 minutes lock-out, no limit for 4 hours, for 48 hours postoperatively. Intraoperative haemodynamics, fentanyl consumption, postoperative visual analogue scale scores for pain (VAS) at rest, move and coughing, usage of PCA, rescue analgesics were recorded.

Results: Both groups were comparable with respect to demographic data, hemodynamics and postoperative side effects. Fentanyl consumption, before extubation heart rate, VAS_{rest} at 4th and 18th hours, VAS_{coughing} at 2th and 4th hours, intensive care admission, VAS_{move} 2th and 4th hours scores were higher in levobupivacaine group than bupivacaine group ($p < 0.05$).

Conclusion: Paravertebral analgesia with bupivacaine provides less intraoperative fentanyl consumption and lower postoperative pain scores than levobupivacaine for thoracotomy.

Abstracts and Highlight Papers of the 34th Annual European Society of Regional Anaesthesia & Pain Therapy (ESRA) Congress 2015: Late Breaking Abstracts

ESRAS-0548

Central Nerve Blocks

CHLOROPROCAINE 1%: EFFICACY AND COST EFFECTIVENESS IN DAY SURGERY

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Aims: In summer 2013, preservative free 1% Chloroprocaine was licensed for spinal use in the UK

The aim of our audit was to establish if spinal 1% Chloroprocaine can be considered as a valid alternative to a quick general anaesthesia within day surgery and if it is cost effective?

Method: 446 patients received spinal anaesthesia with 40 mg of 1% Chloroprocaine, 285 patients received GA over a period of 10 months. Spinal anaesthesia were performed within Emersons Green and Barlborough Care UK NHS treatment centre and in the Derbyshire NHS trust and Nuffield hospital. General anaesthesia were given within the two Care UK hospitals.

Patients included were ASA 1 to ASA 3, BMI < 40, age was not an exclusion criteria Ambulatory patients for orthopaedic, general surgery, gynaecology and urology procedures were included

Results: The surgical time was between 3 and 70 minutes

The average patient discharge time after the end of surgery was 83.5 min for the Chloroprocaine cohort, 95.3 for the GA cohort

No significant side effects were reported. In the GA group 74 patients needed rescue analgesia in Pacu

Conclusion: With Spinal Chloroprocaine 1% discharge times can be significantly reduced, patient throughput potentially increased. Chloroprocaine 1% is safe, reliable providing a predictable duration of sensory and motoric block appropriate for ambulatory patients

Cost Comparison shown that Spinal 1% Chloroprocaine is comparable to general anaesthesia.

References

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Spinal 1% 2-Chloroprocaine versus general anaesthesia for ultra-short outpatient procedures: a retrospective analysis.

ESRAS-0560

Central Nerve Blocks

INTRATHECAL HYPERBARIC PRILOCAINE 2% VERSUS PLAIN ROPIVACAINE 0.4% FOR SAME DAY ARTHROSCOPIC KNEE SURGERY: A PROSPECTIVE, RANDOMIZED, DOUBLE-BLIND, CONTROLLED STUDY

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Aims: Short duration spinal anesthesia is a good alternative for ambulatory day case surgery: Hyperbaric prilocaine 2% has a short onset time and a rapid recovery, and may therefore be well suited in this setting. The aim of the study was to compare the times to reach motor block, resolution, and discharge from the PACU, between hyperbaric prilocaine 2% and plain ropivacaine 0.4%.

Method: In a prospective, randomized and double-blind design, 140 18 - 80 year old ASA I-II patients, scheduled for elective, unilateral, arthroscopic knee surgery lasting less than 45 min, were allocated to either the prilocaine 2% (60mg/3ml) or the plain ropivacaine 0.4% (12mg/3ml) group. Exclusion criteria were contraindications for spinal anesthesia, pregnancy, and known

allergy to the study drugs. Complete recovery of motor block, time to reach discharge criteria, as well as side-effects up to 48 h after discharge, were recorded.

Results: Complete recovery from motor block was faster in the prilocaine 2% group: 195±67 vs 225±81 min. Time to reach discharge criteria was similar in both groups: 334±55 and 346±73 min for prilocaine 2% and ropivacaine 0.4%, respectively. The incidence of side effects was low and similar in both groups. No case of transient neurologic symptoms occurred in either group.

Conclusion: Recovery of motor block was faster after intrathecal application of hyperbaric prilocaine 2% compared to plain ropivacaine 0.4%. However, discharge time was similar. Both drugs showed a similar risk profile.

ESRAS-0585

Central Nerve Blocks

LOCAL ANAESTHETICS USED IN SPINAL ANAESTHESIA FOR PRIMARY HIP AND KNEE ARTHROPLASTY: A NATIONAL SURVEY IN THE UNITED KINGDOM

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Aims: Spinal anaesthesia is the most preferred anaesthetic for total hip and knee arthroplasty in the UK. Bupivacaine is the drug of choice. However the dosage, volume, baricity used varies widely. The reason for such variation is multifactorial. Hence we wanted to know current practise and the rationale behind different drug formulations used.

Method: 10-question survey sent nationally. 249 responses received. 40% consultants, 60% trainees.

Results: 67.8% use heavy bupivacaine (HB). 26.5% plain bupivacaine (PB), rest use other local anaesthetics (LA). 60% of those who use HB say it has quick onset, dense anaesthesia and nearly half say it is traditionally used, easy to adjust levels of block. Half of those using PB say it causes less hypotension and one third say it gives less motor block, prolonged analgesia, hypobaric giving higher levels. The commonest reason for not using HB is significant hypotension and excessive motor block. Reason for not using PB ranges from quality of block being less followed by difficulties in adjusting levels and unfamiliarity with PB.

Conclusion: Drug of choice in spinal for arthroplasty depends mainly on familiarity with a drug, assumed benefits of HB vs. PB and enhanced recovery protocols in hospitals. Anaesthetic drug profiles affect recovery. Anaesthetist should be better informed on the evidence backing their practise. Large-scale studies to predict neuraxial behaviour of different LA formulations in arthroplasty surgery and actual effect in terms of enhanced recovery outcomes should be explored. This would benefit a variety of surgeries done under spinal with an aim to fasten recovery.

ESRAS-0602

Central Nerve Blocks

FIBROMYALGIA UPDATE

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Aims: Recently, pain is the most common reason for patients to consult doctors. The fibromyalgia syndrome (FMS) is known as one of the two major causes of musculoskeletal chronic pain. The study of the brain chemistry of patients with fibromyalgia has given us a hint of the source of the pain, although pain in fibromyalgia involves psychological, genetic and neurobiological factors. There is evidence that FMS can be caused by a hormone and metabolic abnormalities in the biochemical cell composition. High emotional stress, lack of exercise, food, and

diseases as the Pickwick Syndrome, nephropathies, obesity etc increase the development of FMS.

Case: Normally all humans produce acids. Under certain circumstances, the pituitary gland releases ACTH hormone (Adrenocorticotrophic hormone). Through reticular substances in the brain, this hormone enters the blood stream and reaches the suprarenal root, where cortisone and catecholamine will be degraded in the form of free radicals, causing a toxic cycle. In a healthy person with good immunity, these toxins are metabolized, but an overproduction of free radicals will create changes in the sensory electric cortex. These alterations may cause tissue irritation and will decrease the amount of oxygen in the cell. It has been observed that a sedentary life style, eating poor food and emotional anxiety based states will turn the suffering from mild to severe. Fibromyalgia sufferers also have diminished levels of two important brain chemicals, serotonin and norepinephrine. About 40 percent of fibromyalgia patients also experience mood disorders, suggesting a connection.

Treatment: Sleeping pills, modulators to stimulate brain and chemical mediator depressors, analgesic creams, exercise, alkaline diet, positive mental attitude, vasodilators, alkalizing and cleansing colon, depending on the case. In serious cases, the use of the continue block with infusion pump, 2 ml per hour in In Home Pump of 90 ml during 8 days, with 500 mg of Lidocaine, 200 mg Bupivacaine and 16 mg of Dexamethasone.

Conclusion: The endocrine factors, sedentary life, and food rich in saturated fats, promote the formation of a layer within the blood stream that affects the hydrogen ion exchange. Free radicals raise the levels of hydrogen ions in the hemoglobin, occupying the space of the oxygen. This atypical metabolism results in the production of lactate and pyruvate acids (Figure 1), which are responsible for painful symptoms.

$$\text{pH} = 6.1 + \log (\text{Base}/\text{Acid}) = 6.1 + \log 20 = 7.40 \text{ NORMAL}$$

$$\text{pH} = 6.1 + \log (12/1.17) = 6.1 + 1.27 = 7.37 \text{ ACIDEMIA}$$

$$\text{pH} = 6.1 + \log (10/1.08) = 6.1 + 1.24 = 7.34 \text{ ACIDOSIS}$$

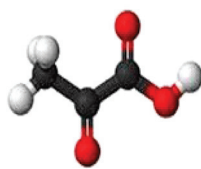
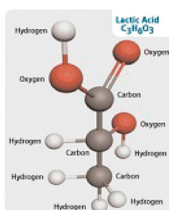
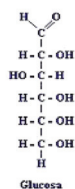


FIGURE 1.

ESRAS-0277

Peripheral Nerve Blocks

DOUBLE TRAFFIC LIGHT SIGN DURING ULTRASOUND GUIDED INTERSCALENE BRACHIAL PLEXUS BLOCK: AN ANATOMICAL VARIATION

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Aims: The ultrasound pattern to identify the C5-C8 nerve roots for interscalene block is well documented. It is popularly described as the 'traffic light sign' due to the appearance of the nerve roots vertically stacked as three circular or oval

hypochoic structures in the interscalene groove. We report a case where the ultrasound pattern resembles normal anatomy, but dynamic scanning reveals an anatomical variation.

Method: An initial ultrasound scan in a patient undergoing interscalene brachial plexus block (ISBPB) showed structures similar to the usual appearance of the brachial plexus roots in the interscalene groove ('traffic light sign'). However, closer examination revealed a second row of structures medial to the anterior scalene muscle ('double traffic light sign') (Figure 1a).

To clarify the anatomy the transducer was placed in the supraclavicular fossa where the morphology appeared entirely normal. Dynamic scanning in a cephalad direction showed that the C5 nerves coursed medial to the anterior scalene muscle, while C6 & C7 appeared to be located in the interscalene groove (Figure 1b).

A successful block was administered in the transition zone between the interscalene and supraclavicular region, where the C5-C7 nerves were in close proximity.

The same anatomical arrangement was found on the contralateral side.

Results: See Figure 1.

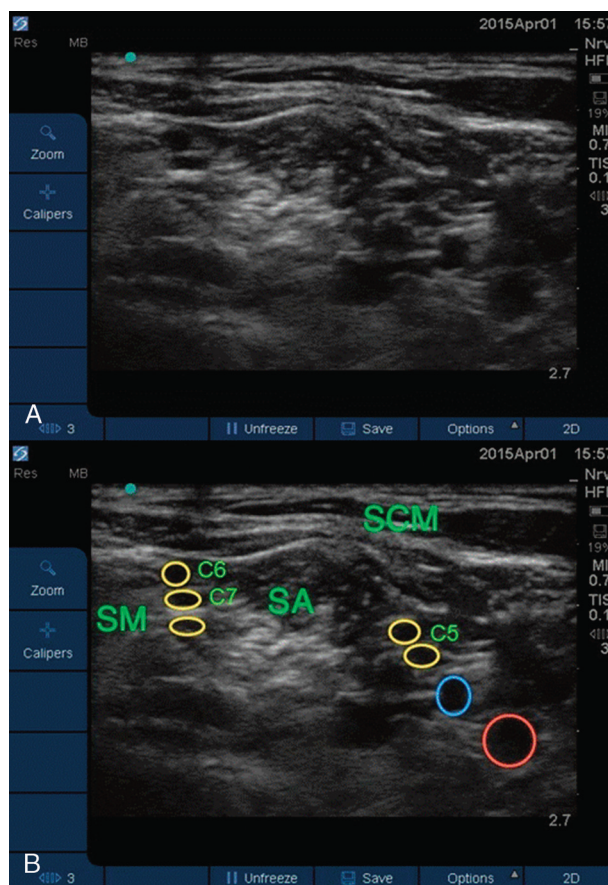


FIGURE 1. Double Traffic Light Sign Figure 1b SCM: Sternocleidomastoid, SA: Scalenus Anterior, SM: Scalenus Medius.

ESRAS-0549

Peripheral Nerve Blocks

INFLUENCE OF DISTRACTION TECHNIQUES ON REGIONAL ANAESTHESIA SATISFACTION SURVEY (RASS) IN SINGAPORE

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Aims: Patient satisfaction is emerging as an important indicator of quality of health care. However, little is known regarding patient's and surgeon's perceptions about regional anaesthesia. Thus this quality improvement project was aimed at studying the effect of distraction techniques like videos/ music/ hand

holding by nurse on patient's satisfaction and willingness to undergo PNB again when needed; using RASS.

Method: After approval from ethical committee, the project was implemented over a 2 month period in 100 patients undergoing hand surgery under PNB. Half of the patients (50) received some form of distractions along with PNB. RASS was carried out by assessing the response of patient to a questionnaire based on their anxiety, pain, satisfaction and their willingness to experience PNB again. Surgeon's satisfaction was also assessed in terms of muscle relaxation and any distraction to them from the music/videos meant for patients.

Results: Patients undergoing PNB along with distraction techniques reported less anxiety and were willing to undergo PNB again. Surgeons (98%) reported high level satisfaction with PNB in terms of surgical relaxation and were not affected by distraction (Table 1).

Parameters assessed	No. of patients (100)	
	PNB (50)	PNB + Distraction (50)
Anxiety	18	2
Pain	0	0
Feeling safe and relaxed	33	50
Willingness for repeat PNB	30	48
Overall satisfaction	40	50

Conclusion: Distraction techniques had a positive effect on the patient satisfaction and their willingness to have a repeat PNB. Distraction measures like music/videos / hand holding, administered to patients while undergoing PNB can thus enhance overall patient satisfaction.

ESRAS-0554

Peripheral Nerve Blocks

LUMBAR PLEXUS BLOCK WITH PERINEURAL CATHETER FOR MANAGEMENT OF HIP SURGERIES

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Aims: Surgeries at the level of hip requires blockade of at least the L1 to L4 dermatomes and osteotomies. Lumbar plexus block (LPB) is an effective loco regional anesthetic technique for analgesia and anesthesia of the entire lower extremity including the hip. Perineural catheter technique allows perioperative top-up injection and postoperative static and dynamic analgesia. In this study, LPB with catheter technique was used as the anesthetic method for management of hip surgeries.

Method: A total of 20 patients aged 61 to 100 years were selected for this study. LPB and perineural catheter was accomplished using a nerve stimulator and landmark technique. After targeted injection hemodynamic variables (heart rate & systolic blood pressure), surgery time, surgeon satisfaction score, additional top-ups required and post-operative pain scores were documented and analyzed. Propofol in trivial doses was infused intraoperatively to provide clinical sedation.

Results: Mean patient's age was 71 ± 20 years with ASA II/III. Surgery time was 115.7 ± 20 minutes, surgeon satisfaction score was good, additional catheter top-ups required was an average of twice over 48 hour period. Postoperative pain Scores range from 0-3. There were no complications and failures. Hemodynamic stability was satisfactorily achieved.

Conclusion: Continuous Lumbar Plexus Block in conjunction with a light sedation could be considered as a reliable prudent satisfying anesthetic option in management of hip surgeries in our patients with three beneficial characteristics of safety, effectiveness, and acceptability. And most important, all our patients underwent surgery without the need for conversion to General Anesthesia.

ESRAS-0562

Peripheral Nerve Blocks

A TANGENTIAL NEEDLE APPROACH TO NERVES IN ULTRASOUND-GUIDED REGIONAL ANESTHESIA DECREASES THE RISK OF AN INTRA-NEURAL INJECTION: A CADAVERIC STUDY

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Aims: The aim was to evaluate the incidence of nerve puncture and intra-neural injection based on the needle approach (tangential vs. direct to the nerve) and with this their role on nerve lesions.

Method: Five fresh cadavers were used for punctures at different nerves and levels of the upper limb. Two in plane ultrasound-guided needle approaches, one directly approaching the nerve and another tangential (aiming below the nerve) were performed for each nerve/level.

Two experts in Ultrasound-Guided Regional Anesthesia (UGRA) performed a total of 176 procedures. After reaching the outer limit of the nerve, the needle was advanced a further few millimetres and 0.2-0.5mL of saline was injected in 159 samples. Both experts classified the needle tip and injectate as being either sub-epineural or not based on the needle-nerve view and spread appearance (swelling of the nerve). Another 17 punctures were performed with ink for histological control. In these nerve samples, the spread of ink and fascicle damage were evaluated.

Results: Subepineural saline injections were observed in 58% of patients (45/77) with a direct approach and in 12% (10/80) with a tangential approach ($p < 0.001$; Kappa:-0.457). Histological studies showed intra-neural injection in 80% of the direct approaches (4/5) versus 17% (2/12) with a tangential approach ($p = 0.028$; Kappa:-0.469). No intra-fascicular injections were observed.

Conclusion: Considering some limitations of this cadaver study, the risk of an unintentional intra-neural injection increases significantly when using a direct needle approach. We therefore recommend a tangential approach of the nerve in UGRA.

ESRAS-0573

Peripheral Nerve Blocks

A CASE SERIES OF PECTORALIS BLOCKS IN THE PAEDIATRIC CATH LAB; A NOVEL TECHNIQUE FOR POST OPERATIVE ANALGESIA

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Aims: The aim of this case series was to determine if the pectoralis (pecs) block might provide effective postoperative analgesia for cardiac procedures involving the anterior chest wall.

Method: We performed pecs blocks on 6 paediatric patients having anterior chest wall cardiac procedures, 3 insertion of pacemakers and 3 recording device insertions. Verbal consent for local anaesthetic use was obtained from parents/ guardians preoperatively. All patients were given a general anesthetic (sevoflurane and fentanyl 1mcg/kg IV) and simple analgesia (paracetamol 15mg/kg PR and diclofenac 1mg/kg PR). Prior to commencement of the procedure a pecs block was performed under ultrasound guidance using described adult landmarks. Levobupivacaine 0.25% (max dose 0.5mL/kg) was injected. Pain scores, sensory blockade and breakthrough analgesia were assessed and recorded post operatively.

Results: The pecs blocks, when combined with simple systemic analgesia gave excellent postoperative analgesia in the 5 of the 6 patients. A dermatomal sensory blockade was demonstrable in 4 of the 6 patients. Time to breakthrough analgesia ranged from immediate upon emergence (1 case) to none being required (2 cases).

Conclusion: We conclude that the pecs block may be a useful local anesthetic technique for paediatric cardiac procedures involving the anterior chest wall. It is quick to learn and perform. To date there is very limited data of this block being used in the paediatric population. Further investigation of this new technique is warranted in this population.

ESRAS-0580

Peripheral Nerve Blocks

SETTING UP A MULTIDISCIPLINARY FASCIA ILIACA BLOCK DELIVERY SERVICE IN A DISTRICT GENERAL HOSPITAL

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Aims: A local Fascia Iliaca Block (FIB) service was introduced to be provided by Emergency Nurse Practitioners (ENPs) or ED doctors to augment analgesia in patients with fractured neck of femur (NOF) (1,2). Service delivery was audited, after which interventions & re-audit were performed.

Method: Retrospective audit occurred for all NOFs diagnosed in ED over two 6 week periods with demographics, admission details, speciality delivering FIB & any contraindications/complications noted.

Results: Results are summarized in Table 1.

	Apr/May 2014	Jan/Mar 2015
Sample size	41	43
FIBs	13	31
Contraindicated	5	6
FIB performed/contraindicated	18 (44%)	37 (86%)
Average time to FIB	4h	2h 43 min
Performed by:	ED:5 Anaes:4 Unknown:2	ED:23 Anaes:6 Unknown:2
No medical notes:2**		

Table 1: *7h48 outlier excluded **Documented in nursing notes

Conclusion: Preliminary audit showed limited uptake & delayed provision, with no ENPs performing FIBs due to lack of supervision or resource pressures. Additionally, the number of FIB trained doctors was limited. Changes agreed by ED, Anaesthetics and Orthogeriatrics in December 2014 included: further training; documentation change; & notifying the on-call anaesthetist. Re-audit showed improved provision and time to administration. However, documentation was often incomplete, including pre- & post-FIB pain scores & observations. As such, it was difficult to fully assess efficacy & implies incomplete monitoring post-FIB.

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ESRAS-0595

Peripheral Nerve Blocks

PERIPHERAL NERVE BLOCKS FOR LOWER LIMB AMPUTATION DUE TO GANGRENOUS FOOT INFECTION

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Aims: Peripheral Nerve Blocks may provide excellent pain relief after amputation, reducing the risk of progression to chronic pain. Also, it avoids neuraxial techniques or general anesthesia in patients with multiple co-morbidities and increased risk of complications.

Method: We had a 79 year-old, ASA 4 male patient scheduled for urgent right transfemoral amputation due to gangrenous foot infection. The patient had a known history of chronic kidney disease with need of hemodialysis, diabetes, class 3 New York Heart Association congestive cardiac failure, arterial hypertension, left ventricle hypertrophy, aortic valve stenosis and a pacemaker. He had also an Health Care Associated Pneumonia. We performed ultrasound-guided subgluteal scyatic nerve block, femoral nerve block, lateral femoral cutaneous nerve block and obturator nerve block with 20mL of 1.25% Mepivacaine and 20mL of 0.5% Ropivacaine. The patient was pre-medicated with 1mg of Midazolam and 0.05mg of Fentanyl. No other medication was administered.

Results: The patient reported no pain during surgery and was hemodynamically stable during procedure. Twelve hours after surgery the patient was still stable and reported no pain. No rescue analgesia was needed and there were no side effects.

Conclusion: Peripheral nerve blocks are an alternative to general anesthesia or neuraxial techniques for lower limb amputation. They can both avoid complications in patients with multiple co-morbidities and provide optimal pain relief minimizing the risks of progression to chronic pain.

ESRAS-0597

Peripheral Nerve Blocks

QUADRATUS LUMBORUM BLOCK FOR ANALGESIA IN LAPAROSCOPIC OVARIAN CYST EXCISION

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Aims: The Quadratus Lumborum (QL) block was initially described by Raphael Blanco. It provides effective analgesia of the abdominal wall on dermatomes T6 to L1 and also seems to provide visceral analgesia due to diffusion of the local anesthetic to the ipsilateral paravertebral space. We performed the transmuscular QL block as an opioid-sparing strategy in laparoscopic ovarian cyst excision.

Method: We performed a transmuscular bilateral ultrasound-guided QL block using the Shamrock approach in a 28 year-old ASA II non-smoking female patient undergoing elective laparoscopic ovarian cyst excision, as part of her analgesic strategy. The block was performed with 20ml 0.2% Ropivacaine per side immediately prior to anesthetic induction. The procedure took 55 minutes to complete under balanced general anesthesia. Intra-operative analgesia consisted of intravenous Paracetamol 1g, Ceftriaxone 30mg, and no opioids. Dexamethasone 4mg was also administered.

Results: During the first 8 hours following the block, the patient reported no pain. There was no need for rescue analgesia nor side effects. No nausea or vomit were reported and the patient was satisfied with the pain management strategy.

Conclusion: Peripheral nerve blocks can significantly reduce opioids consumption and provide excellent pain relief. Gynecological surgeries are associated with bigger risk of postoperative nausea and vomits (PONV). We achieved excellent pain control with an opioid-sparing strategy in a patient with increased risk for PONV.

ESRAS-0599

Peripheral Nerve Blocks

USE OF PERSONAL TABLET DEVICES DURING AWAKE UPPER LIMB SURGERY PERFORMED UNDER REGIONAL ANAESTHESIA: INITIAL EXPERIENCE FROM A UK CENTRE

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Aims: Anxiety is common in patients undergoing awake surgery performed under local/regional anaesthesia, often relating to thoughts of experiencing distressing sights, sounds and sensations. Patients often prefer sedation or general anaesthesia, although this is associated with clinical and financial disadvantages. Personal Tablet Devices (PTD) can offer individualised visual/auditory stimulation, potentially reducing anxiety and the requirement for sedation. Our aim was to evaluate the impact of PTD use on patient experience of awake surgery performed under RA.

Method: Following its recent introduction, adult patients undergoing upper limb surgery under brachial plexus block in our institution are now offered the intra-operative use of a PTD (*iPad, Apple Inc.*) and personal headphones. Following orientation with the device, patients can self-select television, film or audio content. We conducted a post-operative survey of ten consecutive patients to evaluate the initial impact of this practice.

Results: 100% of patients contacted had made use of the PTD. 100% of respondents felt that the PTD had improved their overall experience. The reasons given for this were: distraction (90%), entertainment (20%), helping pass time (20%) and alleviating boredom (10%). The most commonly accessed media content was film (50%), television (40%) and audio (10%). 100% of patients would undergo similar surgery again using the same technique.

Conclusion: Although there is currently little evidence supporting PTD use during awake surgery, our initial experience has been encouraging. PTD use appears to enhance patient experience and may reduce the need for sedation, offering both clinical and financial advantages. Continuing larger scale evaluation of this practice is now planned.

ESRAS-0563

Obstetric

ULTRASOUND-GUIDED TRANSVERSUS ABDOMINIS PLANE BLOCK VERSUS EPIDURAL TECHNIQUE AS REGARD IMPACT OF MULTIMODAL ANALGESIA ON POSTOPERATIVE QUALITY OF RECOVERY AFTER CESAREAN SECTION

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Aims: Post-cesarean section analgesia is complicated because parturient do not feel bedridden, dislike motor impairment, and concern regarding problem with breast feeding; because many analgesics are excreted in breast milk.

Ultrasound-guided transversus abdominis plane block has been used for perioperative analgesia. The purpose of the study was to compare the effectiveness of TAP block versus epidural analgesia as a part of multimodal regimen of pain control.

Method: 300 parturient were randomized to three groups 100 patients each. Group A, received spinal anesthesia followed by bilateral TAP block at the end of the surgery. Group B, patients received combined spinal epidural. Group C, patients received general anesthesia followed by bilateral TAP block at the end of the surgery. The primary outcome was the global quality of recovery-40-questionnaire at 24 hours after surgery. The secondary outcome included time to first analgesia requirement, pain scores, and totally used dose of morphine.

Results: Patients in group A, and C showed better quality of recovery scores in all the Q-R-40 subcomponents that was statistically significant in comparison to group B patients. No patients on group A or C had motor block, while 45% of patients on group B reported mild to moderate motor block. Better patients satisfaction scores were reported in group A, and C patients.

Conclusion: TAP block as a part of multimodal analgesia regimen considered to be, simple, less invasive, and valuable alternative to epidural analgesia. TAP block seems to be a promising opportunity for parturient, as it provide better quality of postoperative recovery, without motor block.

ESRAS-0568

Obstetric

AUDIT OF EPIDURAL RESPONSE TIMES ON THE LABOUR WARD IN A DISTRICT GENERAL HOSPITAL, UK

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Aims: In June 2013, the OAA/AAGBI issued guidance for standards of obstetric anaesthetic practice. The recommendation was that all patients requesting epidurals for labour analgesia should be attended by an anaesthetist within 30 minutes. An audit of the response time of the epidural service on labour ward was conducted in June 2014. Changes in practise were implemented. The audit cycle was completed in May 2015.

Method: Cases were identified using the electronic database. The notes of labour epidurals performed during both the audits were retrospectively reviewed.

Results: In June 2014, 80 parturients requested labour epidurals and 92 parturients requested for the same in May 2015 (Table 1).

TABLE 1.

	June 2014	May 2015
Total cases reviewed	73	68
Mean response time (minutes)	38	32
Patients attended within 30 min (%)	56	77

In June 2014, 56% of the delayed epidurals occurred during the night as compared to 73% in May 2015. The main reason for delay in both the audits was due to the anaesthetist being busy in theatre.

Conclusion: The initial audit showed that the response time in 40% of the patients was above the recommended time. The changes implemented were for the obstetric anaesthetist to seek help from the general theatre team or the consultant on-call. The shared workload reduced delays and provided opportunities for trainees to practice this skill. The re-audit in May 2015 showed that the recommendations had brought down our response time by 6 minutes. We had improved our service significantly as 77% of the parturients were now attended within 30 minutes.

ESRAS-0569

Obstetric

STANDARDISED EPIDURAL TROLLEY ON LABOUR WARD: A SURVEY IN A DISTRICT GENERAL HOSPITAL, UK

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Aims: The Obstetric Anaesthetists' Association (OAA) and The Association of Anaesthetists of Great Britain and Ireland (AAGBI) updated their guidelines for obstetric services in 2013. One of the recommendations states 'It is mandatory that local obstetric anaesthetists are involved in purchasing decisions involving

equipment for neuro-axial analgesia'. The equipment stocked on the epidural trolleys in our obstetric unit was variable. Our aim of this study was to standardize the equipment and drugs available on the epidural trolleys.

Method: Anaesthetists involved with the labour ward, Operating Department Practitioners, Midwives and Maternity Care Assistants were asked to reply to a questionnaire. They were asked to tick all equipment and drugs they would like on a epidural trolley and who should be responsible for stocking up the trolleys.

Results: The questionnaire was answered by 56 respondents. Almost 80% of the respondents felt the following were required:

Tegaderm
Mefix
Lock-it
0.5% chlorhexadine
120mm Tuohy needle
Epidural giving set
Lidocaine
Sterile saline 0.9%
Customised Epidural packs

59% of respondents felt there should be a vasoactive drug on the epidural trolley with ephedrine being the most popular choice.

66% of respondents felt that the person responsible for stocking the epidural trolley was the anaesthetist.

Conclusion: The survey helped us in reaching a consensus regarding the standard equipment and drugs that should be available on the epidural trolley. We now have laminated cards on the epidural trolleys listing the equipment each section should have. This has made the trolleys very convenient for use and also, to ensure the necessary equipment and drugs are available.

ESRAS-0583

Obstetric

SMALL PEOPLE, GREAT CHALLENGE

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Aims: Achondroplasia is one of the most common causes for short stature. There are phenotypical characteristics which present a challenge either for general or neuroaxial regional anesthesia.

We present a case of a 38 year old woman with achondroplasia, height 130 cm, purposed to a cesarean section due to cephalopelvic disproportion.

The patient had several markers of a predictable difficult airway associated with features predicting technical difficulties to achieve the neuroaxis. The ideal dosing and expected spread of local anesthetic to achieve motor blockade for surgery was also questioned, accounting for the narrow spinal canal and areas of spinal stenosis associated with the pathology.

Method: We opted by a combined spinal epidural as our anesthetic technique. L2/L3 space was identified by anatomical landmarks. Both the intratecal and epidural spaces were achieved using a continuous pressure loss of resistance to saline technique. Epidural space was recognized at 5,5 cm from the skin. 7 mg of Bupivacaine 0,5% and 15 mcg of fentanyl were administered into the intratecal space. T4 sensitive blockade was achieved.

5 minutes after intratecal injection it was observed a blood pressure value of 85/46 mmHg. 50 mcg of phenylephrine was sufficient to assure haemodynamic stability during the whole rest of the surgery. A healthy 3125 g baby was delivered.

Results: Post operative analgesia was achieved with 2 mg of epidural morphine for 48 H. 3 days after surgery the parturient was discharged home.

Conclusion: New ways to approach the neuroaxis in these patients are emerging, making it ideal choice for the patients.

ESRAS-0586

Obstetric

SUBGLOTTIC STENOSIS IN PREGNANCY: THE CRITICAL ROLE OF REGIONAL ANESTHESIA FOR A SUCCESSFUL OUTCOME

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Aims: Subglottic stenosis (SGS) in pregnancy is a rare condition predisposing to a potentially life-threatening delivery. Its management implies anesthetic, otorhinolaryngologic and obstetric challenges.

Method: We report the case of a 46-year-old woman with a twin pregnancy and severe SGS.

Results: The patient had no relevant past history and remained asymptomatic until a twin pregnancy, when she started complaining of progressive dyspnea and stridor. Severe subglottic and tracheal stenosis were documented by magnetic resonance and endoscopic laryngoscopy (Figure 1).

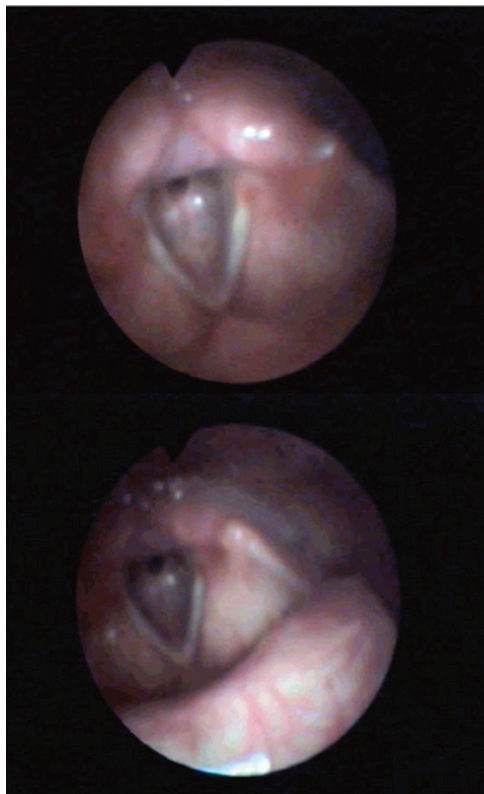


FIGURE 1.

Ventilatory compromise was considered incompatible with vaginal delivery. Elective caesarean was performed at 34th week under combined spinal-epidural anesthesia in presence of an otorhinolaryngologist. Sensory blockade to T4 was achieved. Although an inspiratory stridor was heard throughout the procedure, the patient did not experience respiratory distress. Two healthy babies were delivered. Airway symptoms progressively improved during puerperium. Elective subglottic endoscopic dilatation was planned after discharge.

Conclusion: Airway problems are more common during pregnancy due to anatomical and physiological changes. SGS is a rare cause of respiratory distress in parturients. The preferential management for delivery implies an elective caesarean under neuraxial anesthetic techniques, as performed in the present case. To account for the possibility of regional technique failure or high block, events that would require emergent tracheotomy for endotracheal intubation, an otorhinolaryngology team was ready to intervene.

The management of SGS parturients remains challenging. A multidisciplinary approach involving anesthetist, obstetrician and otorhinolaryngologist is crucial to optimize care. Regional anesthesia avoids intervention in such very difficult airways and is the safest anesthetic approach for both the mother and the baby.

ESRAS-0589

Obstetric

INTRACRANIAL SUBDURAL HEMATOMA AFTER SPINAL ANESTHESIA: CASE REPORT

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Aims: In this case report, we aimed to report the case of a intracranial subdural haematoma after spinal anesthesia

Method: Intracranial subdural hematoma following spinal anesthesia is an infrequent occurrence in the obstetric population. However, it is a potentially life-threatening complication.

Results: A 32-year-old woman with an intracranial subdural hematoma after spinal anesthesia for cesarean section. Postoperative 3rd day our patient started to have a headache without any other symptom. The patient received symptomatic therapy, but the severe headache persisted even in the supine position, with his vital signs and neurological examination being normal. For the differential diagnosis of patient, cranial CT showed a subdural hematoma in the left fronto-parietal region with no mass effect. It was planned primarily conservative treatment due to size of hematoma and absence of midline shift. However the follow up the patient, her pain did not improve. In the control CT size of haematoma was increased. She underwent urgent surgery and haematoma was removed with burr-hole. After the surgery the patient's condition improved and was discharged home with no headache or any other symptom.

Conclusion: The possibility of an intracranial pathology should be considered in persistent headache unrelieved by conservative treatment following regional anesthesia in obstetric patients. Early diagnosis and an appropriate treatment may avoid death or irreversible neurologic damage.

ESRAS-0553

Postoperative Pain Management

PAIN MANAGEMENT POST LAPAROSCOPIC NEPHRECTOMY

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Aims: An effective pain management following laparoscopic nephrectomy is not only essential for early recovery but for preventing postoperative chronic pain which is often poorly managed. Opioids analgesia is widely used in the UK, but it is far from being the ideal pain relief because of its adverse effects. Our aim was to evaluate the various techniques used for pain management post laparoscopic nephrectomy.

Method: Thirty three patients underwent laparoscopic nephrectomy. Intraoperatively, sixteen patients had transversus abdominis plane (TAP) block, four had epidural block, and thirteen had only opioids. The data was retrospectively collected from the medical records and prescription charts.

Results: Male to female ratio was 3:1 (mean age 59.6 years old). Twenty eight patients had nephrectomy for cancer while the other five for benign reasons. All patients received fentanyl 100 mcg intravenously at induction and paracetamol 1 g intravenously by the end of the operation. It is clear from Table 1 that patients received regional blocks required a lot less opioids than those who did not. The length of stay (LOS) in recovery was longer in the TAP block group and it is only because 4 patients had inadequate block and required patient controlled analgesia (PCA) and one patient was bleeding.

TABLE 1. Findings of our project

Pain management modality	No. Patients	No. needed PCA	Recovery LOS (minutes)	Hospital LOS (day)	Morphine equivalent (mg)		Pain score in recovery (0-3)			
					At 24 hour (no.%)	At 48 hour (no.%)	0	1	2	3
TAP Block	16	4	130.3	3.9	44(75%)	54.7(75%)	9	2	4	1
Epidural	4	0	82	4.3	0	0	4	0	0	0
opioids	13	11	103	5.4	60.5(91%)	116.7(91%)	4	3	5	1

Conclusion: The data showed that regional anaesthesia, especially TAP block, can potentially play a key role in reducing postoperative pain and early opioids requirements in laparoscopic nephrectomy, therefore, it warrants further research.

ESRAS-0558**Postoperative Pain Management****THE ROLE BUPIVACAINE OF LOCAL ANESTHETIC WOUND BEFORE THE SURGICAL INCISION ON SELECTED PARAMETERS IN BREAST SURGERY**

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Aims: The study was designed as prospective, randomized, placebo-controlled, double-blinded clinical trial. We have tested a hypothesis that preventive analgesia with bupivacaine applied in the area of surgical incision in patients undergoing mastectomy for breast cancer would reduce the following parameters: the amount of analgesics used during operative and post-operative period, post-operative acute pain and frequency post-mastectomy chronic pain syndrome.

Method: Patients were assigned into two groups: with bupivacaine applied in the subcutaneously area of surgical incision or with placebo. We assessed the intraoperative consumption of fentanyl, the postoperative consumption of morphine delivered using a PCA method and postoperative acute and chronic pain intensity according to VAS score.

Results: 132 women out of 141 consecutive cases qualified for mastectomy were allocated randomly to two groups: group A (bupivacaine) and group B (placebo). The final study group comprised 132 breast cancer cases. Between the groups statistically significant difference was observed with respect to: lower fentanyl consumption during surgery ($p < 0.04$), lower morphine consumption between 4th-12th postoperative hour ($p = 0.03$), significantly lower acute pain intensity assessed according to VAS score at 4th and 12th hour after surgery ($p = 0.004$ and $p = 0.02$ respectively) for the group A patients and chronic pain intensity ($p < 0.05$).

Conclusion: Preventive analgesia application in the form of infiltration of the area of planned surgical incisions with bupivacaine in breast cancer patients undergoing mastectomy decreases limits the amount of fentanyl used during surgery, post-operative acute and chronic pain sensation. Additionally preventive analgesia reduces the demand for opiates in early hours after surgery.

ESRAS-0566**Postoperative Pain Management****AUDIT ON CURRENT PRACTICE OF ANALGESIA DURING PERIOPERATIVE PERIOD FOR LOWER LIMB AMPUTATION AT QUEEN'S MEDICAL CENTRE, NOTTINGHAM**

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Aims: Amputations result in 50-80% of patients suffering with phantom limb pain. Aggressive management peri-operatively will reduce risk of developing persistent pain (1). The Vascular Anaesthetic society Great Britain and Ireland (VASGBI) expects hospitals to implement a formal pain management protocol and access to an acute pain team for amputation surgery (2). We evaluated our current analgesic practice for lower limb amputations in the peri-operative period up to 5 days post operatively, to help improve our practice and guidelines.

Method: After approval from audit committee, we evaluated the data from 45 patients who had lower limb amputations between January 2014 and December 2014, retrospectively. Data collected included: reason for amputation, type of procedure, anaesthetic and perioperative analgesia. Pain scores for five days postoperatively were collected (Table 1).

TABLE 1.

	No pain on day 1	No Pain on day 4
Regional Block	58%(21/36)	64%(23/36)
No Regional Block	0%(0/9)	38%(3/9)

Results: 80% (36/45) patients had regional analgesia (single shot block or nerve sheath catheter) for postoperative pain management. 23 (51%) had above knee

amputation, while 22 (49%) had below knee amputation. 8%-13% were on stronger (opioids, gabapentinoids) analgesics preoperatively.

Conclusion: Nerve sheath analgesia provides good pain relief for this cohort of patients post-operatively; all patients for lower limb amputation should be offered nerve sheath analgesia preferably catheters. This audit enables us to implement a pain management protocol for this group of patients in our hospital in conjunction with the VASGBI.

ESRAS-0567**Postoperative Pain Management****AUDIT ON CURRENT PRACTICE OF ANALGESIA FOR THORACOTOMY IN SPINES SURGICAL PATIENTS AT OUR HOSPITAL**

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Aims: Post thoracotomy patients are at high risk for developing persistent pain at the surgical site (1). Regional techniques have been shown to reduce this risk but are not uniformly accepted in post spinal surgery patients because of concerns regarding masking of neurological deterioration and fear of infection in spinal metalwork. Post-operative analgesia can be a great challenge in these patients and requires a multimodal approach (2). We evaluated current analgesic practices post thoracotomy for spinal surgery in our tertiary referral centre.

Method: We identified and retrospectively reviewed the notes of adult patients who had undergone thoracotomy for spinal surgery over a two year period. We noted demographics, duration of operation, intraoperative and postoperative analgesic choices.

Results: 22 adult spines patients notes were reviewed. 41% of patients had regional techniques peri-operatively as shown - 3 had paravertebral catheters but there were no epidural catheter

TABLE 1.

	Number of cases	Average Age (years)	Average duration of operation (hours)	Average PCA morphine consumption (mgs)	Average Pain score (1-3/3)
No Blocks	13	55	9.2	255	1.85
Non-Paravertebral regional blocks	6	39	4.6	250	1.8
Paravertebral Catheter	3	65	11	170	1

Conclusion: Patients in the paravertebral group had better pain relief despite having complex surgery of longer duration than other patient groups (Table 1). Paravertebral catheters may be more acceptable to spinal surgeons than epidural catheters as they are perceived to be away from the surgical site. One patient in the regional group had intrathecal opioid and had the least opioid requirement. This would suggest an additional analgesic route to explore.

ESRAS-0574**Postoperative Pain Management****POSTOPERATIVE ANALGESIA AND PATIENT SATISFACTION AFTER DAY CASE ARTHROSCOPIC ROTATOR CUFF REPAIR SURGERY**

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Aims: Arthroscopic Rotator Cuff Repair can be associated with moderate to severe pain and in our hospital such patients are traditionally admitted overnight. The aim of this multidisciplinary audit was to determine whether this surgery could be done as a day case by providing good post-operative analgesia with good patient satisfaction rates.

Method: All patients undergoing Arthroscopic Rotator Cuff Repair over a period of one year who were ASA 1-2 and booked for day case surgery were included in the audit. All Patients received a general anaesthetic, with or without a brachial plexus nerve block. Postoperatively, the patients were discharged home on an oral analgesic regimen. Telephone follow up was carried out after 24 hours. The adequacy of pain relief after surgery, length of stay and patient satisfaction were evaluated.

Results: 55 patients were included in the audit; of these, 54 patients received a nerve block before a general anaesthetic. 30(54.5%) patients had pain scores of 0 at discharge, with a mean score of 2/10(range 0-9). 43(78.2%) patients did not require any morphine till discharge. 3 patients stayed overnight, 2 for medical reasons and 1 due to failure of block, with a median time from GA to discharge of 7.05 hours. The mean pain scores on Day 1 were 5(range 0-10). 53 patients (96.3%) gave an overall satisfaction score of $\geq 8/10$.

Conclusion: Post-operative pain following day case rotator cuff surgery can be successfully managed with a multimodal analgesic regimen including brachial plexus nerve blocks and is associated with good patient satisfaction scores.

ESRAS-0578

Postoperative Pain Management

ANTI-INFLAMMATORY EFFECT OF DIFFERENT POSTOPERATIVE PAIN MANAGEMENT MODALITIES IN PATIENTS AFTER LUMBOTOMY INCISION

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Aims: To determine the effect of three postoperative pain management modalities on postoperative inflammatory response by measuring serum levels of interleukin (IL)-6 and C-reactive protein (CRP) in patients after lumbotomy incision.

Method: The prospective, randomized, controlled, open-label trial included 63 patients of whom 22 received continuous intravenous analgesia (CIA) with sufentanil and ketamine, 20 received continuous epidural analgesia (CEA) with levobupivacaine and sufentanil, and 21 received continuous intravenous analgesia with tramadol, metamizol, and a non-steroid antirheumatic drug (control group). IL-6 and CRP serum levels were measured preoperatively and 3, 24, and 48 hours postoperatively, i.e. after the onset of analgesia.

Results: In comparison with the control group and after controlling for age, sex, and body mass index, IL-6 levels were significantly different in the CIA ($p=0.003$) and CEA ($p=0.018$) groups, whereas CRP showed no difference ($p=0.441$ and $p=0.681$ and $p=0.123$, respectively). In all groups, IL-6 levels were significantly higher at all time points postoperatively than preoperatively ($p=0.001$). There was a relative difference in IL-6 increase 24 hours postoperatively between the CIA and control groups ($p=0.049$), but no difference was found between the CEA and control groups ($p>0.05$). In all groups, CRP values were significantly higher 24 and 48 hours postoperatively than preoperatively ($p=0.001$), but showed no difference 3 hours postoperatively. Postoperative CRP values were similar in all groups at all time points ($p>0.05$).

Conclusion: Similar CRP values in all groups are related to the body reaction to surgery. Epidural analgesia and anti-inflammatory drugs may help decrease postoperative inflammatory response.

ESRAS-0582

Postoperative Pain Management

INTRATHECAL MORPHINE ANALGESIA IN MAJOR HEPATOBILIARY AND PANCREATIC SURGERY

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Aims: The purpose of our study was to know the analgesic efficacy of intrathecal morphine (ITM) in the first 24 hours after major hepatobiliary and pancreatic (HPB) surgery, the incidence of side effects and patient satisfaction with pain control.

Method: We retrospectively reviewed medical records of Acute Pain Unit for an 18 month period of patients submitted to major HPB surgery and received ITM. Several variables were recorded including age, gender, ASA physical status score, ITM doses, intensity of the pain using the verbal numerical rating scale

(VNRS), ITM side effects (postoperative nausea and vomiting (PONV), pruritus, urinary retention, ileus, sedation) and patient satisfaction.

Results: A total of 95 patients were included in the study. The median ITM dose was 0.4.

91.6% and 68.4% patients had none or mild pain, at rest and on movement, respectively.

66.3% patients didn't experience any side effects and 21% had nausea and vomiting. The majority of the patients undergo urinary catheterization so urinary retention couldn't be evaluated.

41 patients were investigated about their expectation with pain control and 80 % considered it was better than they expected.

Conclusion: This study showed ITM provide an efficient postoperative pain control for the first 24 hours following major HPB surgery. 91.6% patients at rest and 68.4% on movement have controlled pain.

It's a safe analgesic technique and the most common side effect was PONV. Sedation occurred only in 1 patient.

For 80% of the investigated patients, the pain control was better than they expected.

ESRAS-0591

Postoperative Pain Management

IN WITH THE OLD? - CAUDAL AS AN EFFECTIVE ANALGESIA IN PERINEAL SURGERY

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Aims: Caudal injections of local anaesthesia have previously been a popular form of analgesia in both surgery and childbirth and continue to be popular in paediatric anaesthesia. They have gone out of favour in the adult population due to concern over anaesthetic spread and unpredictability of blockade, as the fat in the epidural space of adults is known to be more fibrous and densely packed. The aim of this audit is to look at a subset of patients having perineal surgery, male to female gender reassignment, who routinely receive caudal analgesia and assess their pain scores.

Method: At a specialist centre in London patients having gender reassignment surgery routinely receive caudal anaesthesia as part of their post op analgesia. Twenty-five to thirty millilitres of 0.375% bupivacaine is injected into the epidural space on induction. Notes of patients who underwent this surgery and received caudal analgesia within a four-month period were reviewed. Pain scores in recovery, presence of nausea and amount of additional opioids required were recorded.

Results: Of the patients reviewed seventy-three percent had no pain in recovery, thirteen percent had mild pain and thirteen percent had moderate pain. Patients received a morphine PCA and only 1 patient reported nausea and they had had some morphine in recovery.

Conclusion: Caudal anaesthesia remains an effective method of providing post-operative analgesia for perineal surgery. Successful caudal anaesthesia reduces the amount of opiates required leading to decreased nausea, and may have reduced sympathetic blockade and therefore less hypotension when compared to lumbar epidurals and spinal anaesthesia.

ESRAS-0552

Chronic Pain Management

USE OF COMPLEMENTARY AND ALTERNATIVE THERAPIES BY NEUROSURGICAL PATIENTS WITH NECK, BACK, AND LOW-BACK PAIN

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Aims: To investigate the use, practice, informational sources, and a willingness to use complementary and alternative therapies (CATs) among a representative sample of patients in İstanbul.

Method: In a cross-sectional descriptive study, a self-administered questionnaire was offered to 125 neurosurgical patients in Istanbul. Patients who had used at least one CATs for her/himself in the previous year were included in the study sample. Descriptive statistics were used. Comparisons among demographics, pain characteristics, and the use of CATs were examined using chi-square test.

Results: Of the 125 patients, 96 (76.8%) completed the survey. Mind-body therapies (67.7%), manipulative and body based therapies (57.7%) were most frequently used. Among mind and body therapies, praying (61.5%) was the most common therapy used. Many patients benefitted from aromatherapy (61.5%), while others expressed an interest in trying hydrotherapy (68.4%). CATs were generally used for strengthening muscles or relieving physical dysfunction (77.1%). Massage therapy (94.8%) was the most common informationally cited source with patients receiving this information from members of their family and their friends (97.9%). Use of CATs was found to be significantly ($p < 0.05$) associated with demographic data and pain characteristics. Furthermore, the use of CATs were widely reported by patients. In particular were those married, with lower education and income levels, living with more family members, and those suffering from pain attacks for 1-5 years.

Conclusion: The usage of CATs were found to be high. Patients should be informed of different usages for CATs and these therapies should be determined during nursing assessment.

ESRAS-0555

Chronic Pain Management

TELEPHONIC COMMUNICATION IN PALLIATIVE CARE FOR BETTER MANAGEMENT OF TERMINAL CANCER PATIENTS IN RURAL INDIA- AN NGO BASED APPROACH

Aditya M. Purba Medinipur, India.

Aims: Due to financial incapability and absence of manpower poor families often fail to carry their advanced cancer patients to the nodal centres. This pilot study will explore whether communication by mobile phone can lessen this burden.

Method: Initially a plan was generated regarding management of an advanced cancer patient in a nodal centre at District Head Quarter. Subsequently every two week a trained social worker attached to nodal centre will follow up and give necessary advice and emotional support to the patients and their families through their registered mobile phone number. Patient's family were also encouraged to communicate with the team by phone in case of fresh complain and urgency in between.

Results: Since initiation in January 2013, 193 cancer patients were contacted by mobile phone every two weeks to enquire about their difficulties. In 76% of the situation trained social workers could give necessary advice by phone regarding management of their physical symptoms. Moreover patient's family were really overwhelmed by the emotional support offered by the team over phone. Only 24% of cancer patients has to attend the nodal centre for expert advice from Palliative Care specialists.

Conclusion: This novel approach helped

- In providing regular physical and emotional support to the patients and their families.
- In significantly reducing the financial and manpower problems of carrying patients to the nodal units.
- In improve the quality of life of patients by continuous guidance.

More and more team members can take help of this new strategy for better communication and uninterrupted care.

ESRAS-0561

Chronic Pain Management

THE PRELIMINARY CLINICAL OUTCOMES OF PATIENTS TREATED WITH PERCUTANEOUS HYDRODISCECTOMY ON EXTRUDED LUMBAR DISC HERNIATION

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Aims: A new minimally invasive procedure, percutaneous hydrodiscectomy (PHD), mechanically cuts and removes disc material using a high-velocity, non-thermal saline fluid jet. The purpose of this study is to show the clinical outcomes of PHD in treating patients with radiculopathy secondary to extruded lumbar disc herniation (ELDH).

Method: A retrospective review at Trakya University Hospital was conducted on 6 patients with LEDH confirmed by MRI, who underwent PHD. Some parameters were followed for 4 weeks: Gender, age, Pain(VAS), walking distance, number of procedure level, complain duration, MRI findings, complication.

Results: A total of 10 lumbar levels were treated by PHD; 3 single-level, 2 two-level and 1 three-level with ELDH. We found significant differences between the values of VAS. VAS before the procedure: 8, VAS in 1st week: 2 and VAS in 4th week: 4 (in respectively, $p = 0.026$ 0.026, 0.026). There was no significant difference between MRI findings before and after PHD on extruded discal hernia ($p = 0.276$).

Conclusion: PHD might be a more reliable treatment option for decreasing pain degree on ELDH in according to the preliminary results of the study.

ESRAS-0572

Chronic Pain Management

SECULAR TRENDS AND ASSOCIATIONS OF ANALGESIC USE IN PEOPLE APPROACHING KNEE REPLACEMENT SURGERY FOR OSTEOARTHRITIS

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Aims: We assessed whether analgesic usage varied across the time period 1999 to 2014 in people approaching total knee replacement surgery for osteoarthritis (OA).

Method: We analysed 1593 consecutive research donors with knee OA undergoing total knee replacement at Sherwood Forest Hospitals NHS Foundation Trust, UK. Prevalence of analgesic use per year and radiography were analysed using Chi-squared tests, Spearman's correlation and logistic regression.

Results: Participants reported using paracetamol (61%), NSAIDs (29%), opioids (47%) and tricyclic antidepressants (5%); although 21% reported no analgesic use.

NSAID and opioid usage decreased over time, and paracetamol in preparations not combined with other analgesic classes increased over time. No significant associations were detected between radiographic OA severity and analgesic use.

Opioid users were more likely to be female and use tricyclics. NSAID and tricyclic users were younger, NSAID users were less-likely, and tricyclic users were more likely to use opioids. Paracetamol users were older, recruited later and less often opioid users.

People reporting no analgesic use were more likely to be male and recruited later.

Conclusion: The high frequency of paracetamol usage reflects its perceived safety profile, compared to opioids and NSAIDs, and ease of access. Analgesic use might be determined more by demographic factors and healthcare policy, rather than structural characteristics of OA pathology. Many people approaching joint replacement used no analgesics, highlighting limitations to the acceptability and effectiveness of current analgesics.

ESRAS-0584

Chronic Pain Management

THE PERMANENT IMPLANTATION OF SPINAL CORD STIMULATOR WITH CYLINDRICAL LEADS UNDER SPINAL ANESTHESIA: A RETROSPECTIVE OBSERVATIONAL STUDY

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Aims: The trial and permanent implantations are commonly performed in a conscious patient under local anesthesia with or without sedation. However, permanent spinal cord stimulator (SCS) implantation can be performed under spinal anesthesia without discomfort if the patient can cooperatively report the location of paresthesia, but there is no report about spinal anesthesia for SCS with cylindrical leads.

Method: Thirty-one patients, with permanent SCS implanted under the spinal anesthesia at a single institution between December 2010 and August 2014, were

retrospectively analyzed. All patients' SCS parameters were compared at the trial (T0), permanent implant (T1), and postoperative stimulation 3 days after surgery (T2), whilst anesthetic level and complications related to the spinal anesthesia were measured at T1.

Results: Spinal anesthesia was shown to be sufficient to perform the implantation of lead and IPG in 31 patients without significant discomfort or neurologic complications. The average time taken for the permanent SCS implantation was 127.2 ± 30.7 min. All patients reported paresthesia coverage under the spinal anesthesia. The electric current variables (mA) needed to reproduce paresthesias at T0, T1, and T2 were 2.03 ± 0.62 , 5.31 ± 1.11 and 1.82 ± 0.49 , respectively. When comparing the electrical current intensity, T1 was significantly higher than both T0 ($P < 0.001$) and T2 ($P < 0.001$).

Conclusion: Spinal anesthesia is a beneficial anesthetic method for permanent SCS implantation with a cylindrical lead, according to the patient's report of paresthesia coverage without causing pain and neurologic complication.

ESRAS-0592

Chronic Pain Management

SPINAL CORD STIMULATOR SURVEY AT NORTH BRISTOL NHS TRUST, UK

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Aims: At North Bristol Trust patients suitable for a spinal cord stimulator (SCS) undergo a 5day trial and are subsequently offered surgical implantation if symptomatic relief of greater than 50% is reported.

A retrospective survey was performed to assess the patient experience of this treatment. The aim was to assess the impact on symptoms and any side effects or complications encountered.

Method: A survey of 12 questions and space for comments was sent to all patients who had received a permanent implant between January 2012 and July 2014.

Results: In total, 64 patients were identified of whom 39 responded.

The most common areas treated were the back and legs. 19 patients out of the 39 reported problems with battery discomfort or issues with charging, of whom 5 needed further surgery to rectify the problem. 7 out of 39 reported problems with the lead.

71% of patients reported a moderate to significant reduction in pain leading to 60% of patients achieving a reduction in analgesia. There was however no increase in the overall number of people working prior to and after the insertion of the SCS, which remained at 38%.

46% of patients reported a moderate to significant improvement in quality of life.

Conclusion: This survey shows that SCS can provide pain relief in a significant proportion of patients.

Problems with the equipment are not uncommon but outcome measures such as pain reduction, improvement in quality of life and overall satisfaction were largely satisfactory.

ESRAS-0594

Chronic Pain Management

PAIN INTENSITY IS NOT A GOOD PREDICTOR OF ANXIETY AND DEPRESSION IN CANCER PATIENTS

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Aims: Anxiety and depression can frequently occur in chronic pain patients and are the matter of clinical concern. An accurate pain evaluation should screen that possibility. Pain intensity evaluation is widely used and has a strong impact on therapeutic patient adherence. However, can patient's pain intensity predict the possibility of anxiety and depression?

Method: Multifactorial study approved by the Ethics Committee. N=120 patients collected during one year. On the first appointment (Chronic Pain Unit) anxiety/depression was evaluated with a validated survey (Hospital Anxiety and Depression Scale-HADS); the pain was assessed with Brief Pain Inventory

(BPI) and Visual Analogue Scale (VAS). Data were analyzed using SPSS 20.0. Pearson (R) correlated coefficients (CI of 99%) and determination coefficients (by linear regression) were calculated.

Results: There's a significant correlation $p < 0.01$ between the pain evaluated by BPI and the anxiety and depression scores obtained by HADS (R: 0.299 and 0.348). The correlation between VAS and HADS is not significant. Approximately 35% of the depression and 23% of the anxiety HADS score is dependent on BPI's pain. The sub-dimensions of BPI related with life quality interference are moderately correlated ($R \approx 0.5$) with HADS ($p < 0.01$). Exists a strong correlation ($R \approx 0.7$) between the pain intensity of BPI and VAS ($p < 0.01$).

Conclusion: Depression and anxiety can be predicted by multidimensional pain evaluation but not by pain intensity only. This study supports the multidisciplinary patient assessment and the holistic patient perspective as improvement of quality pain care.

ESRAS-0596

Chronic Pain Management

CAUDAL BLOCK AND QUADRATUS LUMBORUM BLOCK FOR FAIL BACK SURGERY SYNDROME

Cardoso J.M.¹, Sá M.¹, Pinheiro C.², Machado D.¹, Abrunhosa R.¹ ¹CHTMAD, Anesthesiology, Vila Real, Portugal, ²CHMTAD, Anesthesiology, Vila Real, Portugal.

Aims: Fail Back Surgery Syndrome (FBSS) is characterized by chronic pain following spine surgery. The cause of pain can be multifactorial and is yet to be determined. In a majority of cases, there is a co-existing myofascial pain syndrome, characterized by chronic pain with multiple trigger points and fascial constrictions. As with other chronic pain syndromes, pain can be severely incapacitating and lead to major disability.

Method: We present the case of a 66 year male patient with FBSS. The patient reported severe neuropathic pain on the left lumbar region which irradiated to the left foot. On physical examination he had pain on palpation of transverse lumbar processes and presented exuberant myofascial component with contractures in the left lumbar paravertebral region. He was medicated with buprenorphine patch 52.5ug/h, pregabalin 150mg/day and amitriptyline 25mg/day, without pain improvement. We performed an ultrasound-guided caudal block with 20mL of ropivacaine 0.1% plus 10mg prednisolone and a left ultrasound-guided quadratus lumborum block with 15mL of ropivacaine 0.1%.

Results: The procedure went uneventfully without any side effects. The patient referred major functional and pain improvement for a period of 6 months.

Conclusion: Treatment of FBSS may be challenging with medication alone. The use of ultrasound guided caudal block plus quadratus lumborum was useful in achieving excellent pain relief and improving quality of life and patient satisfaction.

ESRAS-0598

Chronic Pain Management

ULTRASOUND-GUIDED QUADRATUS LUMBORUM BLOCK FOR CHRONIC PAIN TREATMENT

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Aims: Chronic pain syndrome can be severely incapacitating leading to major disability with depression, poor-quality or non-restorative sleep, fatigue and drugs or alcohol abuse which may affect up to 35% Americans with great economic burden. Treatment is difficult and usually multi-disciplinary with pharmacological and non-pharmacological approaches. Quadratus Lumborum (QL) block has been used both for perioperative analgesia and for chronic pain syndrome treatment.

Method: We had a 47 year-old male patient with persistent chronic pain syndrome due to chronic myofascial lumbar pain already medicated with Ethyl Loflazepate 4mg, Acetaminophen+Thiocolchicoside 500mg+2mg, Tizanidine 2mg, Cyclobenzaprine 20mg and Trazodone 150mg. He reported pain with both passive and active mobilization of the lower limbs and with flexion and extension of lumbar spines. He had trigger points at quadratus lumborum muscle. We had performed an ultrasound-guided QL block on the left side with pain improvement. One month later he was scheduled for ultrasound-guided QL block

with intramuscular injection on the right side. The block was performed with 6mL of 0.375% Ropivacaine.

Results: We visualized local anesthetic spreading through QL muscle in its longitudinal extension. There were no side effects or complications during procedure. One week later the patient was re-evaluated and reported significant pain relief.

Conclusion: Chronic pain syndrome can be severely incapacitating and cause major disability. Its treatment is difficult and pain relief not always possible. QL block has proven useful for chronic pain syndrome treatment in patients with myofascial pain and can improve patients' quality of life and satisfaction requiring less medication.

ESRAS-0600

Chronic Pain Management

CHRONIC PAIN AFTER HYSTERECTOMY - SOLVING THE MYSTERY WITH ULTRASOUND GUIDED ILIOINGUINAL BLOCK

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Aims: Chronic pain after abdominal hysterectomy is estimated in 30% of patients. Exclusive neurophatic origin is described only in a minor group. We present a representative case-report highlighting the contribution of ilioinguinal block.

Method: 47 year-old woman with fibromyalgia referred to Pain Clinic. Previously submitted to colonoscopy with polypectomy (six months before) and abdominal hysterectomy with bilateral adnexectomy (five months before).

Main complaint descriptors were deep needling/burning continuous pain on right inguinal area during last five months. Under pregabalin 150 id since then without symptomatic improvement.

On examination the pain was located on the right iliac fossa, elicited with deep palpation, area of 3x5 cm. Basal intensity of pain was five to peak seven on numeric pain rating scale. No evoked allodynia but pinprick hypoalgesia was identified.

On radiologic exams an image on the corresponding location was identified being suspected respectively of intra-abdominal abscess on pelvic ultrasonography, of uraco cyst on abdominal CT and of surgical material on abdominal x-ray. After careful review the doubtful image was determined to be the clip of polypectomy.

Ultrasound guided ilioinguinal block was proposed for diagnosis, therapeutics and prognosis. Until then pharmacologic measures instituted included flupirtine tid and patch of lidocaine (5%) 12h per day ensuing moderate release of pain.

Results: Ultrasound guided ilioinguinal block was performed with ropivacaine and methylprednisolone without interurrences. Intensity of pain after block was zero during 8 hours.

Conclusion: Despite radiologic confounding evidence of the etiology of the pain, a successful diagnosis and treatment was possible with accurate clinical examination and ultrasound guided Ilioinguinal block.

ESRAS-0601

Chronic Pain Management

DEALING WITH A MYASTHENIA GRAVIS' PATIENT IN THE CHRONIC LOW BACK PAIN

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Aims: Chronic Low Back Pain is an epidemic symptom nowadays. Facet joint disease (FJD) is a significant cause many times associated with radicular compression. Conservative and invasive therapies are useful alternatives of surgical approach particularly in high anesthetic surgical risk patients.

Method: Case Report: A 77-year-old woman was evaluated in chronic pain unit for uncontrolled low back pain. She had a history of Myasthenia Gravis with two years' thymoma surgical excision followed by radiotherapy and Stenotic canal surgery with one and half year. Medical record also includes hypertension, hypothyroidism, hepatitis C and dyslipidemia. She is on therapy with pregabalin,

tramadol, antidepressant, prednisolone, beta blocker, calcium channel blocker, angiotensin converting enzyme inhibitor, diuretic, levothyroxine, bronchodilator. Chest X-ray showed a deflection of airway and a limited lung's insufflation. RNM describes L4's spondylolisthesis with nerve outflow compromise and surgical indication that patient refuses. She has a neurogenic claudication and describes a 5 to 8 VAS pain with mixed characteristics.

Results: Myasthenia Gravis is an autoimmune disease characterized by fatigability of skeletal muscles. Anaesthetic management and postoperative period could be challenging particularly in patients with low vital capacity and ventral surgical position. Regional techniques may eliminate the need for muscle relaxants and pain control with no opioid use.

Benefits and risks of non urgent procedures must be highlight. In relevant chronic lumbar pain, invasive therapies, like interarticular injections, radiofrequency denervation for FJD and transforaminal block for radicular symptoms could be good choices.

Conclusion: Regional blocks are an interesting pain management in patients with high surgical risk.

ESRAS-0565

Pediatric

INTERFASCIAL PLANE INJECTION IN CHILDREN - BLOCK OF MEDIAN AND ULNAR NERVES AT FOREARM

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Aims: Regional nerve blockade is common in children as part of a multimodal perioperative analgesic plan. However, certain safety concerns arise as the waste majority of neural blockades in children are performed under general anesthesia or deep sedation potentially masking the signs and symptoms of intraneural injections. Ultrasound-guided nerve blockade is part of the solution but the ideal needle tip position to achieve a safe and efficient blockade of targeted nerves is not yet determined.

Method: We report a case of median and ulnar nerve USG blockade for hand surgery (burn revision of 4 + 5th fingers), at the mid-forearm level, on a 1 year old child. Needle tip was positioned at a distance from the median and ulnar nerves, at the mid-forearm level, with injection between the fascia of the flexor digitorum profundus (FDP) and superficialis (FDS) or carpi ulnaris (FCU) and dynamic spread tracking of 4 ml of ropivacaine 0.2% (0.04 ml/kg) without needle tip repositioning. Patient didn't receive rescue analgesia in the recovery room and no complications, at short or long term, were described (Figure 1).

Results: See Figure 1.

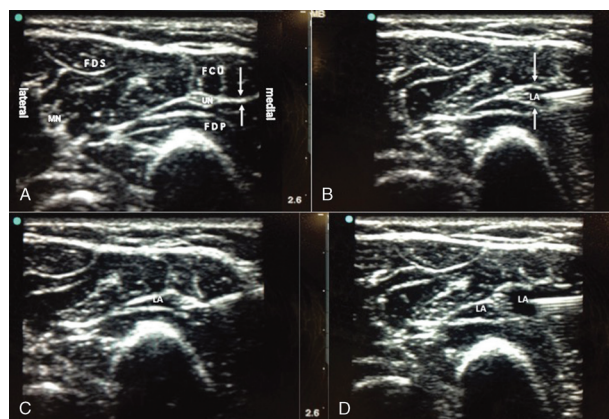


FIGURE 1. Transverse scan at mid-forearm level; UN/MN = ulnar/median nerve. White arrows showing fascia of respective muscles.

Conclusion: Positioning the needle tip in the fascial plane between surrounding muscles, provides an interfascial plane block. This technique enhances safety during regional blockade under general anaesthesia or deep sedation, avoiding any needle to nerve contact, and is easily transferable to a multitude of other blocks. Moreover, the dilated interfascial plane acted as an elastic reservoir of LA.

ESRAS-0575

Pediatric

COMBINED ANESTHESIA DURING SURGERY FOR CONGENITAL CATARACT IN CHILDREN

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Aims: Optimal method of regional anesthesia in frames of combined anesthesia should ensure not only a good analgesic effect, but also have a minimum of complications, and not cause functional-anatomical changes in the structures of the eye, that may worsen the conditions for the surgeon.

Purpose - to assess the effectiveness of combined anesthesia on the base of Sevoran and regional anesthesia.

Method: Prospective study included 24 patients aged 3-13 years. Pre-medication was performed by dornicum 0.1-0.25 mg/kg, inductory anesthesia by sevoran according VIMA method, installing of laryngeal mask, maintaining of anesthesia by sevoran in a dose 2.5-3.0 volumetric percent while maintaining spontaneous breathing, and then the blockade of the pterygopalatine ganglion by lidocaine 2% -2.0 ml + naropin 0,75 % - 2.0 ml. 30 minutes before the operation intravenous Perfalgan was administered at a dose of 15mg / kg. Main indices were registered with Infinity Vista XL Dräger. From moment of awakening, we assessed pain on a scale of verbal assessment.

Results: Course of anesthesia and early postoperative period was characterized by hemodynamic stability without significant fluctuations in blood pressure, heart rate. Pain sensations by scale was $0,12 \pm 0,12$ points. Pathological ocular-gastric and ocular-cardiac reflexes were not noted.

Conclusion: Combined anesthesia by sevoran with regional anesthesia of pterygopalatine ganglion and use of Perfalgan as component of multimodal analgesia allows providing adequate intra- and postoperative anesthetization, as well as creating favorable conditions for the surgeon.

ESRAS-0509

Case Reports

TREATMENT OF A NEW NAVIGABLE PERCUTANEOUS DISC DECOMPRESSION DEVICE (L'DISQ®) IN LOWER BACK PATIENTS: A CASE SERIES

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Aims: The prevalence of intervertebral disc degeneration with discogenic nature is 39% in the patients with chronic low back.

Method: In pathological aspect, the pain may be induced by mechanical and chemical factors. Non-surgical approach has been reported for treatment of chemical factor [2], however, there are no current consistent and definitely effective treatment options for treatment of mechanical factor except surgery. Heating the outer annulus with the intent to shrink annular tissue and coblation technology are one treatment option that has been documented.

Results: L'DISQ® (U&I Co. Ltd., Uijeongbu, Korea) is newly available in Korea that is a navigable percutaneous decompression device for specifically designed to ablate adjacent disc tissue using a wand.

Conclusion: We report our successful experiences of four cases using L'DISQ® and checked pre-MRI, post-MRI for proof the shrink disc size.

ESRAS-0556

Case Reports

INTERSCALEN BLOCK IN A PATIENT WITH OBSTRUCTIVE SLEEP APNEA AND MORBID OBESITY

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Aims: Morbid obesity and obstructive sleep apnea (OSA) are at high risk for difficult airway management, cardiopulmonary dysfunction, increased perioperative morbidity and mortality. The advantages of interscalene block (ISB) for shoulder surgery in these patients are consciousness, stable cardiopulmonary functions, reduced postoperative pain, decrease postoperative nausea-vomiting.

In this report we aimed to discuss our patient (with OSA and morbid obesity) whom we performed ISB for humerus proximal fracture.

Results: A 54 year, 130kg, 158cm, BMI: 52.1, ASA II female patient with OSA, morbid obesity, respiratory distress, diabetes mellitus and hypertension. Additionally, the patient's Mallampati Score was IV. The ISB was decided as an anesthesia method. After patients' informed consent, ISB was performed via the nerve stimulator with a stimulation needle. Brachial plexus was localised at 1,5cm lateral of clavicular head of sternoclavicular muscle in C6 vertebrae level at 3cm depth with seeing the pectoralis, biceps and triceps muscles stimulation and was given 0,5% bupivacaine 100mg-%2 prilocaine 120mg. Motor and sensory blocks was settled in 15th minute. Midazolam infusion and O₂ was given preoperatively. The first analgesic was applied at 8th hour after surgery.

Conclusion: Obesity has become one of the most important health problems globally. It reduces thoracic compliance, functional capacity and expiratory reserve volume. This condition contribute to acute postoperative respiratory dysfunction in obese patients especially after general anesthesia. OSA is associated with higher risk for difficult intubation. ISB is preferred in the patients with OSA and morbid obesity to avoid airway manipulation, create minimal changes in hemodynamic and respiratory parameters and postoperative sufficient pain control.

ESRAS-0559

Case Reports

A TECHNIQUE TO MAINTAIN OR A TECHNIQUE DOOMED TO EXTINCTION?

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Aims: Continuous spinal anesthesia has been successfully used in orthopedic surgeries with a required anesthetic level below T10. It's a technique with alleged advantages - the possibility of reduced interference with the cardiovascular and respiratory systems by allowing the anesthesiologist to titrate small doses of local anesthetic to reach the required level of spinal anesthesia. Despite its benefits, the fear of post-dural puncture headache and infection, and the emergence of other anesthetic options, such as ultrasound-guided peripheral nerve blocks, decreased its use in the past years.

Method: We describe the case of a 90-year-old woman, ASA III, with history of acute myocardial infarction and heart failure NYHA III, non-controlled hypertension and pulmonary tuberculosis with sequelae of bronchiectasis, proposed for a right trochanteric fracture pinning. After intravenous administration of 1mg of midazolam and 0.05mg of fentanyl, the subarachnoid space was searched with a Tuohy needle, and an epidural catheter was left in the subarachnoid space. Incremental doses of hyperbaric 0.5% bupivacaine (total of 7mg) were then administered. Supplementary analgesia was made with 1000mg of intravenous acetaminophen.

Results: Both the sensory level of analgesia and vital signs remained stable throughout the surgery, which lasted for 90 minutes. At the end the subarachnoid catheter was removed and the patient remained without any pain or complications in the post-operative period.

Conclusion: With this case we intend to focus on the advantages of this technique, particularly in the cases of elderly or high-risk patients, but also on its disadvantages, recalling the importance of this often overlooked type of anesthesia.

ESRAS-0564

Case Reports

REGIONAL ANAESTHESIA FOR UPPER LIMB SURGERY IN HEREDITARY ANGIOEDEMA (HAE) TYPE III

Kingsley C., Patel S., Burdett E. *University College London Hospital, Anaesthetics, London, United Kingdom.*

Aims: Hereditary Angioedema Type III (HAE 3) is a very rare inherited genetic condition, only described in 2000.¹ It is characterized by cutaneous, intestinal and laryngeal oedema with normal C1 Inhibitor (C1INH) levels.² There is limited data on perioperative management and optimal anaesthetic technique for HAE 3 patients. This is the first case report of a HAE 3 patient undergoing regional anaesthesia for upper limb surgery.

Method: A 70-year-old female presented for elective arthroscopic sub-acromial decompression (ASAD) with a past medical history that included HAE 3.

Results: An awake ultrasound guided Interscalene Brachial Plexus Block (ISB) was performed. After 1 % lignocaine skin infiltration, a 22-gauge 50mm Sonoplex Stim needle was used, with 20ml 0.5% bupivacaine infiltrated around the brachial plexus. A complete motor block was achieved and loss of sensation to cold in C5, 6 dermatomes. Anaesthesia was subsequently induced with propofol 140mg, atracurium 25mg, with a size 3 flexible LMA for airway management. Anaesthesia was maintained with sevoflurane. Surgery proceeded uneventfully, with no complications post-operatively.

Conclusion: HAE 3 is associated with more extensive facial and tongue swelling, than types I and II, with case reports of asphyxiation.³ Physical trauma and emotional stress are triggers for HAE.⁴ ISB poses a theoretical risk of tissue trauma, however this technique was chosen to reduce pain and the stress response associated with surgery. In addition, a general anaesthetic was performed due to limited airway access in deckchair position. In summary, an ISB is a safe anaesthetic technique for upper limb surgery in HAE 3 patients.

ESRAS-0577

Case Reports

THINKING GLOBALLY, ACTING LOCALLY: OPEN REDUCTION AND INTERNAL FIXATION OF AN ANKLE IN A PATIENT WITH SPINA BIFIDA, SCOLIOSIS AND RESPIRATORY FAILURE

Haren A., Korba E. *Letterkenny General Hospital, Department of Anaesthesia and Perioperative Medicine, Letterkenny Donegal, Ireland.*

Aims: To consider the risks and benefits of various anaesthetic techniques in a patient with spina bifida and kyphoscoliosis with associated restrictive lung disease and Bipap requirement, who presents on the emergency list for ORIF distal tibia/fibula.



FIGURE 1.

Method: MS is a 46 year old female (46kg) with spina bifida and a learning disability. She has severe kyphoscoliosis with restrictive defect (PFTs showed FEV1 of 460mls – 29% predicted, FVC of 530mls – 28% predicted). She consequently has type II respiratory failure necessitating use of nocturnal BiPap (baseline ABG pH 7.35, PO2 7.0, PCO2 8.3, bicarb 33.6). She had a general anaesthetic with LMA 12 years previously, but in the interim respiratory function had further declined. She has recurrent respiratory tract infections, and hypertension (on three agents).

Results: Ultrasound guided popliteal nerve block was performed with injection of 15 mls 0.5% levobupivacaine, followed by saphenous nerve block with 10mls 0.375% levobupivacaine. Anaesthesia was satisfactory and she underwent ORIF

of her displaced comminuted fractures (113mins under tourniquet). Her sister remained with her throughout the procedure to facilitate patient orientation and comfort.

Conclusion: The compromised respiratory function conferred high risk for general anaesthesia. Body habitus could make airway management difficult. The safety of neuraxial techniques in spina bifida depends upon determining (ideally radiographically) the level at which the spinal cord ends to exclude tethered spinal cord. Regardless, spread of local anaesthetic can be unpredictable. Additionally, this patient's scoliosis would make spinal anaesthesia technically challenging. Peripheral nerve blockade was the most satisfactory strategy. She made a full recovery and was discharged home.

ESRAS-0579

Case Reports

COMBINED SPINAL CORD STIMULATION AND PERIPHERAL NERVE STIMULATION FOR THE BRACHIAL PLEXOPATHY: A CASE REPORT

Choi J., Moon H.S. *Yeouido St. Mary's Hospital - The Catholic, Anesthesia and Pain, Seoul, Korea.*

Aims: The brachial plexopathy is mainly resulted from iatrogenic brachial plexus injury, and sometimes cause a severe chronic pain and disability. Despite of the various treatments including medications, physical therapies, nerve block, neuromodulation, and so on, the brachial plexopathy occasionally does not respond to it. In this paper, we report the successful control of relapsed pain due to brachial plexopathy after SCS insertion, by applying combined SCS and PNS. (especially radial nerve).

Method: These days, combined SCS and PNS is considerable appropriate method to treat intractable pain diseases. In this case report, we describe a 54-year old man who was diagnosed with brachial plexopathy 8 years ago. Because of intractable severe pain, he underwent spinal cord stimulation (SCS) 2 years ago. Initially his pain was improved by SCS from numeric rating scale (NRS) 10/10 to NRS 4-5/10, but the pain became worsened gradually; NRS was 8/10 6 months ago. At that time, he was refractory to other treatments, so, we applied peripheral nerve stimulation (PNS) to him, and used it together with SCS. The electrode of PNS was inserted on radial nerve under ultrasound guidance (Figure 1).

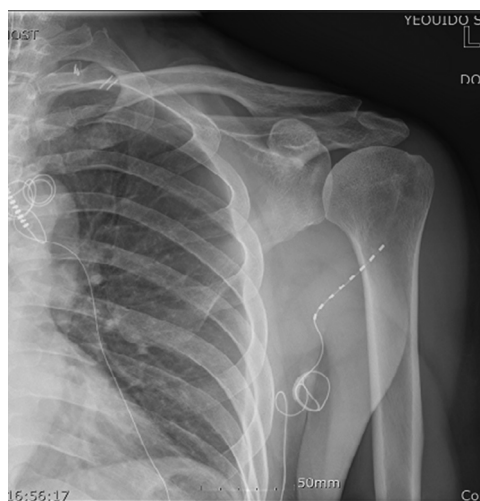


FIGURE 1.

Results: After combined PNS and SCS, his background pain was disappeared, and a breakthrough pain (NRS 3-4/10) was caused intermittently by light touch. Besides, patient's analgesics consumption was decreased, and he satisfied with the combined SCS and PNS.

Conclusion: We concluded that the combined SCS and PNS was a very useful treatment modality, which could stimulate the target nerve directly and indirectly, for the brachial plexopathy.

ESRAS-0581**Case Reports****BREAST SURGERY IN AN AWAKE PATIENT:
A PECS AND PARAVERTEBRAL CASE REPORT**

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Aims: A 55-year-old female presented for exchange of breast implant due to suspected rupture. She wanted to avoid general anaesthesia (GA) having suffered vaso-vagal collapses following previous operations. We performed a paravertebral and pectoral (PECS1) block to avoid GA.

Method: The patient was given 2mg of midazolam and 50mcg fentanyl. The paravertebral was performed at T3-4 using 10mls 0.5% levo-bupivacaine, 10mls 2% lignocaine and 1 in 400,000 adrenaline. The PECS1 block used 20mls of 0.25% levo-bupivacaine. Both blocks were ultrasound guided. Remifentanyl TCI provided conscious sedation. She was given an address to remember to assess memory recall post-operatively.

Results: The patient remained conversant throughout, with a GCS of 15 and a remifentanyl effect-site concentration of 2.5ng/ml. She required no local anaesthesia supplementation by the surgeon. She felt "a bit of pushing" upon insertion of the new implant, but nothing requiring deeper sedation. She did not require rescue opioids in recovery. She had full memory recall of events and the address given to her earlier. She suffered no vaso-vagal symptoms and was discharged that same day on paracetamol and dihydrocodeine.

Telephone follow-up at 5 days re-affirmed her satisfaction with the anaesthesia, her ongoing comfort and good level of function in the ipsilateral upper limb. She had recall of all conversations.

Conclusion: The combination of PECS1 and paravertebral block can provide satisfactory anaesthesia for certain breast surgery performed awake. Performing paravertebral block at more than one level may provide superior dermatome cover, with the addition of the PECS2 block for surgery involving the axilla.

ESRAS-0588**Case Reports****VENOUS OCCLUSION DETECTED DURING CENTRAL
CATHETERIZATION**

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Aims: As it is known, central venous catheterization (CVC) is commonly used for long-term treatment, venous access, parenteral nutrition, central venous pressure (CVP) monitoring and also used for hemodialysis and chemotherapy. Internal jugular vein and subclavian vein are the most commonly preferred veins. Nowadays, ultrasonography (USG) use has been increased. Real-time USG-guided CVC placement increases the success of the process. In addition, the use of USG can assist the detection of pathological conditions which exist in vascular anatomical structures.

Our case was 72 year-old male patient, operated due to gastric carcinoma, received chemotherapy and radiotherapy and had difficult peripheral venous access. Widely disseminated thrombosis in the internal jugular vein was seen with USG and the lumen of IJV was found to be occluded (Figure 1). By the bilateral carotid doppler USG, 3.3 mm mural thrombus was diagnosed in the right common carotid artery and additionally widely disseminated thrombosis causing total occlusion extended inferiorly into the subclavian vein was reported. The USG guidance increases the success of CVC placement, reduces the risk of complications also increases patient comfort and safety.

Conclusion: In conclusion; we think that the use of USG during CVC placement can help for detection of thrombus, prevention of complications and planning of treatment.

ESRAS-0593**Case Reports****EFFECT OF NURSE ADMINISTERED PROPOFOL IN OXYGEN
SATURATION DURING GASTROINTESTINAL ENDOSCOPIC
PROCEDURES**

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Aims: Propofol is known to decrease systemic vascular resistance and can lead to desaturation and decreased systemic perfusion, especially when improperly used. Oklahoma was one of the few places in the world where previously trained nurses would apply propofol during endoscopy under the direction of the endoscopist. We studied how this procedure affects oxygen saturation.

Method: Nearly 50,000 gastroduodenoscopic procedures have been done at a GI lab in Ardmore, OK since 1994. We randomly sampled 1,016 case from the new database ranging from 2010 to 2012. 66 cases were eliminated due to unintelligible or missing saturation data. Information was gathered from the notes of the physicians and nurses.

Results: 950 procedures were studied, 352 gastroduodenoscopies, 469 colonoscopies, 125 both and 4 other endoscopic procedures. 37% were males and 63% were females. Average dose of propofol was 102 mg (STDEV 58), the range was 10-500 mg, interquartile values 60 and 140 mg. Fentanyl was given to 25% of patients, meperidine to 30% and midazolam to 93%. Average procedure duration was 16 minutes. During the procedure oxygen saturation fell below 90%, 80 % and 70% in 95 (10%), 15 (1.5%) and 4 (.4%). All of them recovered by the end of the procedure and none need it to be hospitalized after the procedure. The mean (STDEV) recovery time was 40±14 minutes. Two cases of colon perforation were reported.

Conclusion: Nurse administered propofol was safe in 950 cases. Less than 2% of patients fell below 80% of saturation without immediate problems. This model should be studied further.

ESRAS-0531**Miscellaneous****HISTORY OF SPINAL ANESTHESIA FOR ENT SURGERY**

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Aims: The aim of this study was to describe the historical use of spinal anesthesia (SA) for ENT surgery.

Method: Using institutional archives and Wood Library museum records a search of SA for ENT surgery was conducted.

Results: SA was first used by Corning of New York in 1886 and Morton described ascending anesthesia to the upper part of the thorax, head and face. Payne in 1902 used these observations to conduct operations on the mastoid, middle ear, frontal sinus and even the eye using spinal cocaine administered to patients sitting in a chair!

In 1904, ethocaine was developed to reduce cocaine toxicity. Its use in SA for ENT was presented to the Royal Society of Medicine in 1931 by Mr. A Dickson Wight. For ENT cases ranging from thyroidectomy to mastoid surgery he described the methods for producing better spread by each of the following maneuver's ; volume, dose, barbotage, injection speed, cephalad needle direction, and increasing the specific gravity of the solution by adding starch and then placing the patient head down. He also noted the following complications; hypotension, anxiety, vomiting, inability to speak, shallow respirations and post-dural puncture headache. There were no reported cases of respiratory or cardiovascular collapse.

Conclusion: The interest of SA for ENT surgery started from an observation of the spread of intrathecal cocaine. The demise of SA was due to safer general anesthesia and regional anesthesia nerve blocks. 120 years later, the concept of awake, sedated and pain free anesthesia has reemerged with the use of IV dexmedetomidine.

ESRAS-0576**Miscellaneous****INVOLVEMENT OF CALCIUM OVERLOADING BUT NOT
OPENING OF PERMEABILITY TRANSITION PORE IN THE
MITOCHONDRIAL DEPOLARIZATION IN HUMAN
MONOCYTIC CELLS EXPOSED TO BUPIVACAINE**

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Aims: Local application of bupivacaine provokes inflammatory adhesion of peripheral tissues although this agent rarely causes neurotoxicity. It is suggested therefore that insight into mechanisms of action of bupivacaine to modulate procoagulant activity is important for its safe use. We have previously reported that bupivacaine increased NADPH oxidase activity in monocytes and the resultant superoxide promoted the emergence of apoptotic bodies (ABs) that express tissue factor on their surface (Reg Anesth Pain Med 2014;39:S1 ESRA1-0363). To further clarify underlying mechanism to induce apoptosis, we examined effects of bupivacaine on mitochondrial depolarization that causes the release of cytochrome c and subsequent apoptosis.

Method: Cell suspension of human monocytic cells THP-1 was incubated with tetramethylrhodamine methyl ester (TMRM), that indicates the mitochondrial membrane potential. The suspension was further loaded with bupivacaine with or without dantrolene, cyclosporine A, and acetoxymethyl ester form of BAPTA, which block ryanodine receptors, mitochondrial permeability transition pore, and elevation of intracellular calcium, respectively. The suspension was subjected to flow cytometry.

Results: Bupivacaine concentration- and time-dependently decreased the fluorescence intensity (FI) related to TMRM in THP-1 cells. Exposure of cells to bupivacaine (1 mg/ml) for 15 min almost completely abolished the TMRM-related FI. BAPTA, but not dantrolene and cyclosporine A inhibited the bupivacaine-provoked change in TMRM-related FI. Bupivacaine increased the number of ABs possessing procoagulant activity at 30 min of exposure.

Conclusion: This study indicated that calcium overloading was involved in the mitochondrial depolarization in THP-1 cells exposed to bupivacaine, and that such depolarization preceded the emergence of ABs with procoagulant activity.

ESRAS-0587

Miscellaneous

NICE & COMFORTABLE: FASCIA-ILIACA BLOCKS IN FRACTURED NECK OF FEMURS

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Aims: Approximately 75,000 fractured neck of femurs (NOFs) occur each year. Patients are in severe pain upon arrival to hospital. NICE guidelines recommend analgesia with paracetamol and opioids, with addition of a fascia-iliaca block (FIB) if pain persists [1]. We investigated whether these guidelines were being followed at our hospital.

Method: Orthopaedic trainees were questioned on performing FIBs. We audited 105 patients with fractured NOFs over 5-months. We expected 100% of patients to have received analgesia with paracetamol, systemic opioids, and FIB if clinically indicated. Our interventions included educating staff to perform FIBs, and design of a 'Pain management in fractured NOFs' poster.

Results: Of 40 trainees questioned, 23% felt competent to perform a FIB.

Of 63 patients included in the pre-intervention cohort, 100% received pre-operative paracetamol and morphine. 6% received fascia-iliaca block, despite 73% remaining in pain pre-operatively.

Following our interventions, we re-audited practice in 42 patients and found 67% of patients received fascia-iliaca blocks, with a reduction in pre-operative pain scores and peri-operative opioid requirements.

Conclusion: This audit revealed that our hospital failed to address pre-operative pain in fractured NOFs. Many trainees felt inexperienced to perform blocks. By organising practical workshops, we promoted FIBs and significantly reduced pre-operative pain.

Promoting NICE guidelines and educating trainees to perform a simple, yet effective procedure can provide significant pain relief and reduce opioid-related side effects in fractured NOF patients. This audit has now been extended into a regional project by the Pan-London Audit Network, to promote practice across all London hospitals.

ESRAS-0590

Miscellaneous

BUPIVACAINE AND ROPIVACAINE-INDUCED VASOMOTOR RESPONSE ON ISOLATED RAT CAROTID ARTERIES

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Aims: Bupivacaine (B) and ropivacaine (R) as local anaesthetics (LA) are commonly used for regional anaesthesia. Previous study described, that ropivacaine elicits an endothelium-dependent vasorelaxation. However those direct vasomotor activity on isolated arteries is less known. We hypothesized that LA has an endothelium and cGMP independent vasomotor effect on precontracted-, and non-precontracted isolated rat carotid arteries.

Method: Carotid arteries were isolated from 2 months old rats and their isometric tensions were measured by an isometric DMT myograph. To assess the non-receptor contractile ability of smooth muscle of vessels potassium chloride was administered. LA were tested in dose-dependent manner. The presence of the endothelium was tested by acetylcholine, cGMP was blocked by L-NAME.

Results: The R-induced an endothelium-independent vasorelaxation on precontracted (cc: 10^{-8} : 5.1 ± 0.2 mN, 10^{-7} : 4.8 ± 0.3 mN; 10^{-6} : 4.3 ± 0.5 mN), vasoconstriction on non-precontracted (cc: 10^{-8} : 1.2 ± 0.3 mN, 10^{-7} : 2.2 ± 0.3 mN; 10^{-6} : 2.6 ± 0.3 mN) arteries in dose-dependent manner. The B-induced an endothelium independent vasorelaxation on precontracted (cc: 10^{-8} : 3.9 ± 0.1 mN, 10^{-7} : 3.0 ± 0.4 mN; 10^{-6} : 2.7 ± 0.3 mN), however it has no vasomotor effect on non-precontracted arteries. Pre-treatment with L-NAME does not change significantly the LA-induced vasorelaxation.

Conclusion: Our planned interim results shows that LA has an endothelium-independent vasorelaxation effect on precontracted isolated carotid arteries. R-induced vasoconstriction, however B hasn't vasomotor effect on non-precontracted arteries. The characteristics of the B-induced vasorelaxation is significantly different from R-induced vasomotor response. We observed that the vasomotor responses are due an endothelium and cGMP independent pathways. Based on our findings after infiltration they may differently contribute to extend the effect duration.