Thoracic Epidural Anaesthesia (TEA) as a Sole Technique for Thoracic or Cardiac Surgery

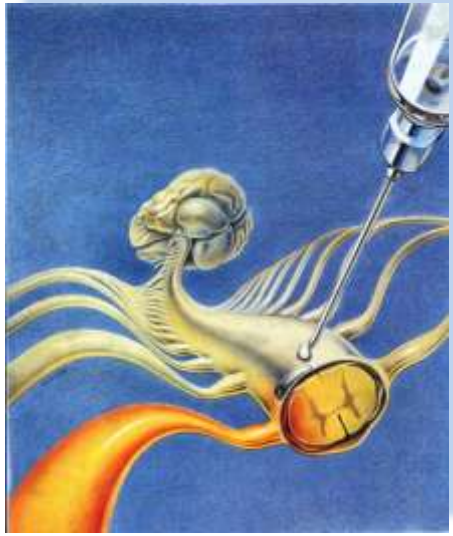
CON

THE EUROPEAN SOCIETY OF REGIONAL ANAESTHESIA & PAIN THERAPY

XXIX ANNUAL ESRA CONGRESS

PORTO | PORTUGAL

SEPTEMBER 8-11, 2010



Cardiac – Thoracic Surgery

Evolution

- minimally invasive techniques
- small incisions
- off – pump

Anaesthetic Approach

- Fast Tracking
- Benefits of High TEA

Hemmerling TM et al. Br J Anaesth, 2008; 1: 3 – 5
Vassiliades T Jr. Sem Thor Cardiovasc Surg, 2009; 21: 237 – 244
Adams DH et al. J Am Coll Cardiol, 2009; 53: 2389 – 2403
Cerfolio RJ. Thorac Surg Clin, 2008; 18: 301 – 304

Pande RU. Heart Surg Forum, 2003; 6: 244 – 248
Myles PS et al. Anesthesiology, 2003; 99: 982 – 987
Cohn LH et al. Am Heart Hosp J, 2006; 4: 174 – 178

Techniques in Regional Anesthesia and Pain Management (2008) 12, 87-98

Techniques in
Regional Anesthesia
& Pain Management

Technique of awake cardiac surgery

Murali Chakravarthy, MD, DA, DNB

From the Wockhardt Heart Institute, Bangalore, Karnataka, India.

High thoracic epidural anaesthesia for cardiac surgery

Colin F. Royse[a,b]

Current Opinion in Anaesthesiology 2009, 22:84–87

European Journal of Cardio-thoracic Surgery 32 (2007) 13–19

EUROPEAN JOURNAL OF CARDIO-THORACIC SURGERY

www.elsevier.com/locate/ejcts

Review

Epidural anesthesia in awake thoracic surgery

Tommaso Claudio Mineo *

Thoracic Surgery Division, Tor Vergata School of Thoracic Surgery, Policlinico Tor Vergata, Rome, Italy

ELSEVIER SAUNDERS

Thorac Surg Clin 18 (2008) 311–320

THORACIC SURGERY CLINICS

Awake Operative Videothoracoscopic Pulmonary Resections

Eugenio Pompeo, MD*, Tommaso C. Mineo, MD

Department of Thoracic Surgery, Policlinico Tor Vergata University, V.le Oxford, 81, 00133 Rome, Italy

Awake Video-Assisted Thoracoscopic Biopsy in Complex Anterior Mediastinal Masses

Eugenio Pompeo, MD*, Federico Tacconi, MD, Tommaso C. Mineo, MD

Thorac Surg Clin 20 (2010) 225–233

High TEA
single anaesthetic technique

Awake Spontaneously Breathing Patients

- CABG
- Heart Valve Surgery
- Combined Procedures
- Thoracic Surgery

↓

Impressive Results

Aybek T et al. Ann Thorac Surg, 2003; 75: 1165 – 1170
Chaney MA. Anesth Analg, 2006; 102: 45 – 64
Mineo TC. Eur J Cardiothorac Surg, 2007; 32: 13 – 19
Chakravarthy M. Techniques in RA and Pain Management, 2008; 12: 87 – 98
Royse CF. Curr Opin Anaesthesiol, 2009; 22: 84 – 87
Chaney MA. Annals of Cardiac Anaesthesia, 2009; 12: 1 – 3

Yet …

- The ongoing discussion
  on the merits of High TEA
  as a sole anaesthetic technique
  in heart and thoracic surgery continues

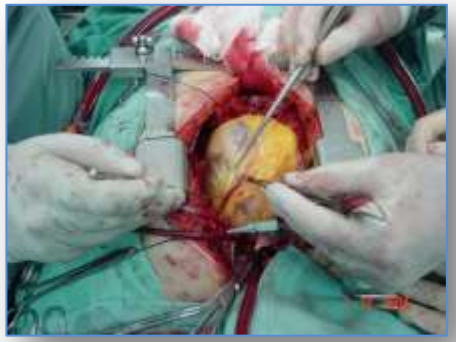
Cheng DCH, Fleisher LA. Cardiac Anaesthesia: Today and Tomorrow. Anesthesiology Clinics, 2008; Vol 26, No 3
Slinger P, Fleisher LA. Thoracic Anaesthesia. Anesthesiology Clinics, 2008; Vol 26, No 2

WHY ???

- Because …

  results regarding the **outcomes**
  and possible **benefits**
  are still **conflicting**





Mora Mangano C. J Cardiothorac Vasc Surg, 2003; 125: 1204 – 1207
Djaiani G et al. Semin Cardiothorac Vasc Anesth, 2005; 9: 87 – 104
Groeben H. J Anesth, 2006; 20: 290 – 299
Mineo TC. Eur J Cardiothorac Surg, 2007; 32: 13 – 19
Chakravarthy M. Techniques in Regional Anesthesia and Pain Medicine, 2008; 12: 87 – 98
Sullivan EA. J Cardiothorac Vasc Anesth, 2009; 23: 761 – 765
Pompeo E et al. Thorac Surg Clin, 2010; 20: 225 – 233

Editorials

Risky business

Christina T. Mora Mangano, MD

The ubiquitous media coverage of health care issues provides the patient, as consumer, with a plethora of information (and disinformation) for consideration. For example, casual investigation by a nonphysician will identify a variety of fundamentally different treatment options for ischemic heart disease. Strategies centered on pharmacologic therapy, angioplasty, coronary stents, or drug-eluting stents all have advocates and detractors. And although the prevalence of surgical coronary revascularization declined approximately 15% from 2000 to 2002, the proliferation of "new and improved" operative techniques—warm heart, minimally invasive, beating heart surgery—continues unfettered by rigorous scientific study. In contrast to new drugs, surgical innovation is adopted without peer or patient advocate review. Market forces persuade hospital administrators and push clinicians to adopt the latest surgical fashion to appease ever more "informed" patients. Marketing is increasingly more important than outcomes research.

J Thorac Cardiovasc Surg 2003;125:1204-7

… There is no place for this **trick**
in the cardiothoracic anaesthesiologist armamentarium …

… Innovation for the **sake of change or marketing**
will increase our patients' risks…

Cardiac – Thoracic Surgery
Conscious Neuraxial Anaesthesia

- Anaesthetic Concerns
- Surgical Concerns
- Patient Concerns

Mora Mangano C. J Thorac Cardiovasc Surg, 2003; 125: 1204 – 1207

Awake Cardiothoracic Surgery
Thoracic Epidural Anaesthesia (High TEA)
Disadvantages

- From **GA – ETI Avoidance**
- From **High TEA Application**

Chakravarthy M. Techniques in Regional Anesthesia and Pain Medicine, 2008; 12: 87 – 98

Awake Cardiothoracic Surgery – High TEA
Anaesthetic Concerns

Unprotected – Compromised Airway

- blocked cranial nerves
- upper airway reflexes not intact
- cough reflex derangement
- difficult airway – impossible control

Chakravarthy M. Technique of awake cardiac surgery.
Techniques of Regional Anaesthesia and Pain Medicine, 2008; Vol 12: 87 – 98
Mineo TC. Epidural Anaesthesia in awake thoracic surgery
Eur J Cardio Thorac Surg, 2007; 32: 13 – 19
Pompeo E, Mineo TC. Awake Operative Videothoracoscopic Pulmonary Resections
Thorac Surg Clin, 2008; 18: 311 – 320
Li PTY, Ho AMH. Conscious neuraxial anaesthesia is a viable alternative to GA in cardiac surgery. CON SCA Newsletter, October 2005; Vol 4, No 5

Awake Cardiothoracic Surgery – High TEA
Anaesthetic Concerns

Securing the Airway: Difficult

- nasal cannula
- face mask
- nasopharyngeal airway

Airway Mechanical Obstruction

Chakravarthy M. Techniques of Regional Anaesthesia and Pain Medicine, 2008; Vol 12: 87 – 98
Hemmerling TM et al. Can J Anaesth, 2005; 52: 1088 – 1092

Awake Cardiothoracic Surgery – High TEA
Anaesthetic Concerns

Airway: Limited Access

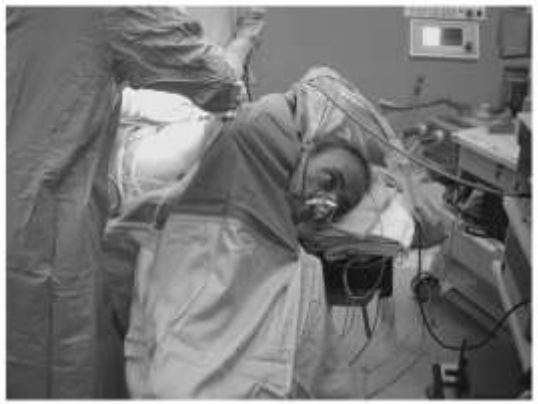
Karagoz HY et al. Ann Thorac Surg, 2000; 70: 91 – 96
Aybek T et al. Ann Thorac Surg, 2003; 75: 1165 – 1170
Chakravarthy M et al. J Cardiothorac Vasc Anesth, 2005; 19: 44 – 48
Chakravarthy M. Techniques of Regional Anaesthesia and Pain Medicine, 2008; 12: 87 – 98

Awake Cardiothoracic Surgery – High TEA
Anaesthetic Concerns

Airway: Limited Access

Thoracic Surgery – Lateral Position – need for DLT

Risk of Delay !!!



Mineo TC. Eur J Cardio Thorac Surg, 2007; 32: 13 – 19

Al Abdullatief M et al. Eur J Cardiothorac Surg, 2007; 32: 346 – 350

Pompeo E, Mineo TC. Thorac Surg Clin, 2008; 18: 311 – 320

Pompeo E et al. Thorac Surg Clin, 2010; 20: 225 – 233

Awake Cardiothoracic Surgery – High TEA
Anaesthetic Concerns

Paralysis of the Diaphragm – Thoracic Musculature

Respiratory Compromise – Distress

- potential complication
- if TEA reaches C5 or ↑: phrenic nerve palsy
- Horner's Syndrome / C6: 5.7 – 52% pts
- intercostal blockade
- diaphragm paralysis: detrimental
- CPAP assisted manual ventilation – face mask: 0.66 – 20% pts
- ETI – GA – mechanical ventilation: 0.66 – 33% pts

Anderson MB et al. Heart Surg Forum, 2002; 5: 105 – 108
Karagoz HY et al. J Cardiothorac Surg, 2003; 6: 1401 – 1404
Meininger D et al. World J Surg, 2003; 27: 534 – 538
Kessler P et al. Anesth Analg, 2002; 95: 791 – 797
Hemmerling TM et al. Can J Anaesth, 2005; 52: 1088 – 1092
Groeben H. J Anesth, 2006; 20: 290 – 299

Kessler P et al. J Cardiothorac Vasc Anesth, 2005; 19: 32 – 39
Chakravarthy M et al. Indian Heart J, 2005; 57: 49 – 53
Chakravarthy M et al. Ann Thorac Surg, 2005; 11: 93 – 97
Aybek T et al. Ann Thorac Surg, 2003; 75: 1165 – 1170
Pompeo E, Mineo TC. Thorac Surg Clin, 2008; 18: 311 – 320
Chakravarthy M. Techn Reg Anesth Pain Med, 2008; 12: 87 – 98

Awake Cardiothoracic Surgery – High TEA
Anaesthetic Concerns

Pneumothorax (PNX)

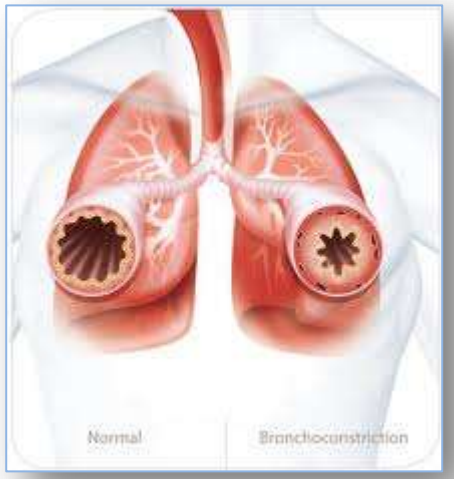
- cardiac surgery: intact pleura
- thoracic surgery: collapse of non dependent lung
  compression of dependent lung – functional compromise
- in almost every case report, 5 – 50% in case series, clinical trials
- open / closed / tension PNX
- sternotomy / ITA harvesting / sternum closure
- can be repaired / coughing – discomfort
- ↓ O_2 – permissive hypercapnia – CPAP – GA: 25%

Aybek T et al. Heart Surg Forum, 2002
Kessler P et al. Anesth Analg, 2002
Aybek T et al. Ann Thorac Surg, 2003
Aybek T et al. J Thorac Cardiovasc Surg, 2003
Karagoz HY et al. J Thorac Cardiovasc Surg, 2003
Pompeo E et al. Ann Thorac Surg, 2004

Chakravarthy M et al. J Cardiothorac Vasc Anesth, 2003
Kirali K et al. Ann Thorac Surg, 2004
Kirali K et al. Eur J Cardiothorac Surg, 2005
Chakravarthy M et al. Ann Thorac Cardiovasc Surg, 2005
Kessler P et al. J Cardiothorac Vasc Anesth, 2005
Pompeo E et al. J Thorac Cardiovasc Surg, 2007

Awake Cardiothoracic Surgery – High TEA
Anaesthetic Concerns

Bronchospasm - ↑ Bronchial Tone
Airway Hyperreactivity



- uncommon clinical observation
- sympathetic block of TEA
- theoretically bronchial constriction
- increased Paw

Krintzinger M et al. Br J Anaesth, 1999
Groeben H et al. J Clin Monit Comput, 2000
Groeben H. J Anesth, 2006
Bensenor FE et al. Sao Paulo Med J, 2007
Pompeo E, Mineo TC. Thorac Surg Clin, 2008
Chakravarthy M et al. Techn Reg Anesth Pain Med, 2008

Awake Cardiothoracic Surgery – High TEA
Anaesthetic Concerns

- Impaired Ventilation due to TEA

Less harmful than ETI and Mechanical Ventilation?

Awake Cardiothoracic Surgery – High TEA
Anaesthetic Concerns

Haemodynamics

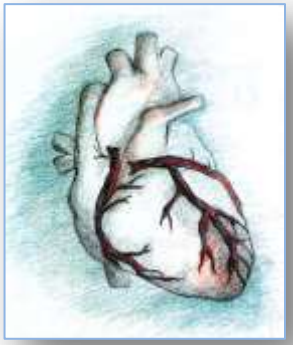
- ↑ doses LA / ↓ sympathetic tone / ↓ HR
- risk of ↓ BP (>20%)
- ↑ doses of vasopressors / inotropes
- detrimental effects on coronaries / grafts
- delayed discharge to ward
- volume replacement 50 – 90%: detrimental in CHF
- impact on incidence of MI: mask or initiate MI

Kirno K et al. Anesth Analg, 1994
Vanek T et al. Eur J Cardiothorac Surg, 2001
Chaney M. Can J Anaesth, 2005
Waurick R et al. Best Pract Res Clin Anesthesiol, 2005
Kessler P et al. Anesth Analg, 2002
Chaney M. Anesth Analg, 2006

Stenseth R et al. Acta Anaesthesiol Scand, 1994
Moore CM et al. Br J Anaesth, 1995
O' Connor CJ et al. Anesth Analg, 2001
Fillinger M et al. J Cardiothorac Vasc Anaesth, 2002
Williams JP. Can J Anaesth, 2002
Casalino S et al. Tex Heart Inst J, 2006

Awake Cardiothoracic Surgery – High TEA
Anaesthetic Concerns

Haemodynamics



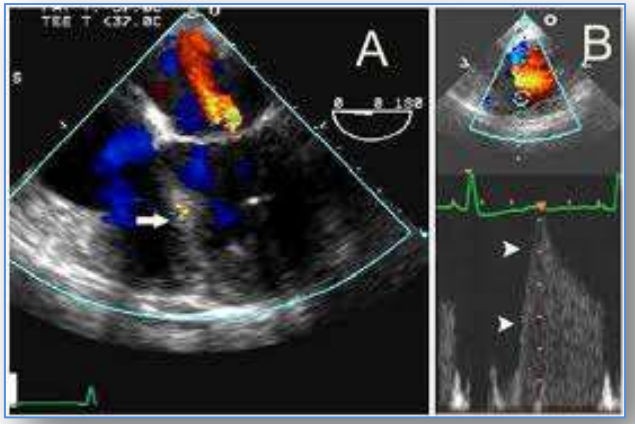
- ↓ EF, b – blockers
- position of the heart
- grafting / viewing lateral coronary arteries
- hypotension / inadequate CPP / restlessness / ↑ irritability
- GA – further potential haemodynamic instability

Kessler P et al. Anaesthesist, 2002
Maslow A. SCA Newsletter, 2003
O' Connor CJ et al. Anesth Analg, 2001
Gravlee GP. J Cardiothorac Vasc Anesth, 2003
Mora Mangano C. J Cardiothorac Vasc Surg, 2003
Chakravarthy M et al. J Cardiothorac Vasc Anaesth, 2003
Chakravarthy M. Techniques in Regional Anaesthesia and Pain Medicine, 2008

Awake Cardiothoracic Surgery – High TEA
Anaesthetic Concerns

Inability for TEE

- valve replacement / repair
- intraoperative assessment of wall motion abnormality
- epicardial echocardiography



Chakravarthy M. Techniques of Regional Anaesthesia and Pain Medicine, 2008; Vol 12: 87 – 98

Awake Cardiothoracic Surgery – High TEA
Surgical Concerns

Significant Limitations

- surgical options
- progress of operation

WHY ???

Maslow A
Awake Heart Surgery: Useful Technique or “Trick”?
SCA Newsletter, December 2003

Awake Cardiothoracic Surgery – High TEA
Surgical Concerns

- patient voluntary / unanticipated movement
- spontaneous respiration / breathing pattern
- operation on ventilating lung
- non satisfactory lung collapse
  - inconvenient / interfere with surgery
  - technical difficulties / ↓ visualization
  - compromised operating conditions
  - delay / ↑ CPB time
  - compromised anastomosis quality
  - aortic cannula dislodgement / exsanguination

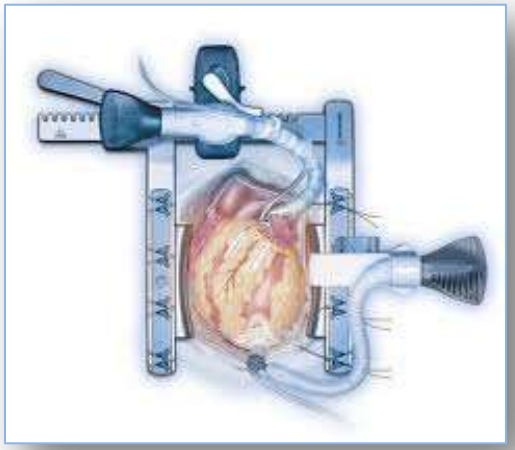
Mora Mangano C. *J Thorac Cardiovasc Surg, 2003*
Maslow A. *SCA Newsletter, December 2003*
Pompeo E, Mineo TC. *Ann Thorac Surg, 2007*
Pompeo E, Mineo TC. *Thorac Surg Clin, 2008*
Pompeo E et al. *Thorac Surg Clin, 2010*

Awake Cardiothoracic Surgery – High TEA
Surgical Concerns

- **CABG**
  - difficult groin access
  - saphenous venous graft harvesting
  - lumbar neuraxial block
  - 3 – in – 1 peripheral nerve block
- ↑ risks of neuraxial – block complications
- cardiovascular instability
- LA toxicity

Gatti G et al. *Ital Heart J, 2003*
Lucchetti V et al. *Eur J Cardiothorac Surg, 2004*
Hemmerling TM et al. *Can J Anaesth, 2005*
Noiseaux N et al. *Br J Anaesth, 2008*
Christina T Mora Mangano. *J Thorac Cardiovasc Surg, 2003*

Awake Cardiothoracic Surgery – High TEA
Surgical Concerns



- **CABG**
  - difficulty in manipulation
  - stabilizing heart
  - one / two vessel bypass
  - use of internal mammary artery / arteries
  - radial artery used in some cases
  - Cx: difficult to bypass (lateral wall – Trendelenbourg)
  - risk of graft spasm during recovery from TEA

Chakravarthy M. Techniques of Regional Anaesthesia and Pain Medicine, 2008; Vol 12: 87 – 98

Awake Cardiothoracic Surgery – High TEA
Surgical Concerns

- blood loss – haemorrhage
- cardiovascular instability
- arrhythmias
- extensive fibrous pleural adhesions
- conversion: off pump to CPB

may require conversion to GA

efficient focus on the problem(s)

Patient: better off awake???

Maslow A. *SCA Newsletter, December 2003*
Pompeo E, Mineo TC. *Thorac Surg Clin, 2008*
Al Abdullatief M et al. *Eur J Cardiothorac Surg, 2007*
Pompeo E et al. *Thorac Surg Clin, 2010*

Awake Cardiothoracic Surgery
High TEA Neurological Complications

Awake Cardiothoracic Surgery – High TEA Complications

Risk of Epidural Haematoma – EH (mathematical model)

Conventional Cardiac Surgery (In the past)

- non – cardiac surgery pts 1:143.000 – 95% CI (<1:150.000)
- >> >> 1:50.000 up to 1:250.000
- risk after full / half dose heparinization probably higher
- calculated risk zero occurrence / 4.582 cases up to 1999

Minimum – Maximum Risk

- 1:1.500 (1:1.528) up to 1:150.000 (95% CI)
- 1:1.000 up to 1:250.000 (99% CI)

Vandermeulen EP et al. Anesth Analg, 1994; 79: 1165 – 1177
Chaney MA. Anesth Analg, 1997; 84: 1211 – 1221
Ho AMH et al. Chest, 2000; 117: 551 – 555
Castellano JM, Durbin CG. Chest, 2000; 117: 305 – 307
Horlocker TT et al. Reg Anesth Pain Med, 2003; 28: 172 – 197
Ho AMH et al. Anesth Analg, 2006; 103: 1327 – 1328

If Nothing Goes Wrong, Is Everything All Right? Interpreting Zero Numerators

James A. Hanley, Abby Lippman – Hand

JAMA, 1983; 249 (13): 1743 – 1745

- some case reports of EH
- after 2000
- with or without epidural instrumentation

Horlocker TT et al. Reg Anesth Pain Med, 2000; 25: 83 – 98
Rosen DA et al. Anesth Analg, 2004; 98: 966 – 969
UK Medical Protection Society. Case Book, 2004
Imanaka K et al. Intensive Care Med, 2000; 26: 826
Yoshinaga A et al. Masui, 2004; 53: 551 – 554
Sharma S et al. J Cardiothorac Vasc Anesth, 2004; 18: 759 – 762
Li PTY, Ho AMH. SCA Newsletter, 2005; Vol 4, No 5
Ho AMO, Li PTY, Karmakar MJ. Anesth Analg, 2006; 103: 1327
Epidural Emergency. South East Asia Case Book, Medical Protection Society, 2004: 19 – 20
Nakaya M et al. Nippon Kyobu Geka Gakkai Zasshi, 1992; 40: 1764 – 1766

Risk of Epidural Haematoma – EH

- danger overestimated
- comparable to risk of non – obstetric population
- comparable to risk of receiving wrong blood
- comparable to risk of fatal road accident
- 10 times ↓ than risk of dying by human error in ICU
- 100 times ↓ than risk of death after CEA under GA

- 12.000 published cases of High TEA in cardiac surgery
- true risk 1: 12.000
- estimated / calculated risk 1: 2.100 to 1: 68.000 (95% CI)

Moen V et al. Anesthesiology, 2004; 101: 950 – 959
Bracco D, Hemmerling T. Heart Surg Forum, 2007; 10: E334 – E 337
Scott NB et al. Anesthesiology, 2006; 105: 853
Ruppen W et al. BMC Anesthesiology, 2006; 6: 10
Jack ES, Scott NB. Acta Anaesthesiol Scand, 2007; 51: 722 – 725
Scott NB. Anaesthesia, 2008; 63: 1139 – 1140

Royse CF et al. Anesth Intensive Care, 2007; 35: 374 – 377
Bracco D et al. Heart Surg Forum, 2007; 10: E499 – E458
Chaney MA. Annals of Cardiac Anaesthesia, 2009; 12:1
Royse CF. Curr Opin Anaesthesiol, 2009; 22: 84 – 87

Awake Cardiothoracic Surgery – High TEA Complications

- Epidurals: Excessive harm?
  - 477 pts need to be treated to save a life
  - 5000 pts need to be treated to harm
- **Incidents underreported???**
- **Paraplegia:** still catastrophic complication
  - spinal decompression is daunting
  - unstable pts
  - risk of coronary insufficiency – respiratory compromise
  - multiple tubes attached

Li PTY, Ho AMH. SCA Newsletter, October, 2005
Wijeysundera DN et al. Lancet, 2008; 372: 562 – 569
Royse CF. Curr Opin Anaesthesiol, 2009; 22: 84 – 87

Awake Cardiothoracic Surgery – High TEA
Complications

Minimizing Risk of Epidural Haematoma – EH

Guidelines Adherence for Application

- catheter withdrawal: reasonable haemostatic conditions
- laboratory evidence / ↑ costs
- bloody tap (3 – 4%): inconvenient
  upset surgeon / delay of surgery
- insert catheter night before: impractical
  same day admission impossible

Li PTY, Ho AMH. SCA Newsletter, October, 2005
Wijeysundera DN et al. Lancet, 2008; 372: 562 – 569
Royse CF. Curr Opin Anaesthesiol, 2009; 22: 84 – 87

Awake Cardiothoracic Surgery – High TEA
Technique Failure

- Titration of Epidural Block
  - satisfactory level
  - tedious
  - no guarantee of success
- Failure of Technique
  - not uncommon

Djaiani G et al. Semin Cardiothorac Vasc Anesth, 2005
Kamming D, Davies W. Eur J Anaesthesiol, 2005
Li PTY, Ho AMH. SCA Newsletter, October, 2005
Chakravarthy M. Techniques in Regional Anaesthesia and Pain Medicine, 2008

Awake Cardiothoracic Surgery – High TEA Technique Failure

FAILURE RATE

- Failure Rate: 1:2 to 1:3
- 33% - 50% in two large studies
- not specified where catheters were placed
- Do we really want our patients awake in such situations?

Mc Leod GA et al. Anaesthesia, 2001; 56: 75 – 81
Rigg JR et al. Lancet, 2002; 359: 1276 – 1278
Kamming D, Davies W. Eur J Anaesthesiol, 2005
Li PTY, Ho AMH. SCA Newsletter, October, 2005
Chakravarthy M. Techniques in Regional Anaesthesia and Pain Medicine, 2008

Awake Cardiothoracic Surgery – High TEA Technique Failure – Failure Rate

- Prospective study / 571 pts, on pump CABG failure rate: 2.45%

Sanchez R et al. J Cardiothorac Vasc Anesth, 1998; 12: 170 – 173

- Prospective observational study / 714 pts, on pump Global failure rate: 2.5%

Pastor MC et al. J Cardiothorac Vasc Anesth, 2003; 17: 154 – 159

- Prospective Audit Analysis / 2113 cardiac surgery pts inability to locate ES / insert catheter: 0.9%

Chakravarthy M et al. J Cardiothorac Vasc Anesth, 2005; 19: 44 – 48

- Prospective Audit Analysis / 677 CABG pts failure rate: 6.9%

Salvi L et al. J Cardiothorac Vasc Anesth, 2003; 17: 154 – 159

Salvi L et al. Eur J Anaesthesiol, 2005; 22: 723 – 732

Awake Cardiothoracic Surgery – High TEA
Inadequate TEA Block

- supplementation with LA
  - jugular notch
  - xiphoid process level
  - surgical incision edges
- 8 – 42% awake cardiothoracic patients
- incomplete bilateral blocks
- analgesia over thorax:
  guaranteed stress free sternotomy / thoracotomy ?
- necessity of conversion to GA

Mora Mangano CT. J Thorac Cardiovasc Surg, 2003
Li PTY, Ho AMH. SCA Newsletter, October, 2005
Chakravarthy M. Techniques in Regional Anaesthesia and Pain Medicine, 2008
Mineo TC. Eur J Cardiothorac Surg, 2007
Bayhan C et al. Anaesthesist, 2008

Awake Cardiothoracic Surgery – High TEA
Anaesthetic Concerns

What is the harm in providing GA?

<u>well conducted GA</u>

- safe
- stable operative environment
- control of ventilation
- control of haemodynamics
- Gold – Standard in cardiothoracic surgery

Mora Mangano C. *J Thorac Cardiovasc Surg, 2003; 125: 1204 – 1207*
Li Peggy TY, Ho Antony MH. *SCA Newsletter, October 2005; Vol 4, No 5: 10 – 12*
Kessler P et al. *J Cardiothorac Vasc Anesth, 2005; 19: 32 – 39*

Awake Cardiothoracic Surgery – High TEA
Anaesthesia Concerns

Spinal Cord Blockade:
attenuates profound immune stress response associated with major cardiothoracic surgery

- Stenseth R et al. Acta Anaesthesiol Scand, 1994; 38: 834 – 839
- Kirno K et al. Anesth Analg, 1994; 79: 1075 – 1081
- Moore CM et al. Br J Anaesth, 1995; 75: 387 – 393
- Loick HM et al. Anesth Analg, 1999; 88: 701 – 709
- Novac Jancovic V et al. Eur J Anaesthesiol, 2000; 17: 50 – 56
- Ganapathy S et al. Heart Surg Forum, 2001; 4: 323 – 327
- Waurick R, Van Aken H. Best Pract Res Clin Anaesthesiol, 2005; 19: 201 – 213
- Kozian A et al. Curr Opin Anaesthesiol, 2005; 18: 29 – 34
- Chaney MA. Anesth Analg, 2006; 102: 45 – 64
- Palomero Rodriquez MA et al. Minerva Anestesiol, 2008; 74: 619 – 626
- Vanni G et al. Ann Thorac Surg, 2010; 90: 973 – 978
- Tacconi F et al. Interact Cardiovasc Thorac Surg, 2010; 10: 666 – 671

Awake Cardiothoracic Surgery – High TEA
Anaesthesia Concerns

- **High TEA**
  - can modify stress response of surgery and SIRS
  - does not obtund it
  - stress response should be avoided for ↓ morbidity
  - adding a GA would help
  - immunomodulation / antiinflammatory action of GA
    - iv anaesthetics – propofol
    - inhalational anaesthetics
    - ketamine
    - steroids
    - clonidine / dexmedetomidine

Desborough JP. *Br J Anaesth, 2000*
Kehlet H, Dahl JB. *The Lancet, 2003*
Kehlet H. *World J Surg, 2000*

Homburger JA et al. *Curr Opin Anaesthesiol, 2006*
Kurosawa S, Kato M. *J Anaesth, 2008*
Griffis CA et al. *AANA J, 2008*

Awake Cardiothoracic Surgery – High TEA
Anaesthesia Concerns

LOSS of

- preconditioning properties of anaesthetics
- potential anti – inflammatory effects of protective ventilation during CPB

Piriou V et al. *Br J Anaesth, 2002; 89: 486 – 491*
De Hert SG et al. *Anesth Analg, 2005; 100: 1584 – 1593*
Hu ZY, Liu J. *Anaesth Intensive Care, 2009; 37: 532 – 538*
De Hert SG et al. *Eur J Anaesthesiol, 2009; 26: 985 – 989*

Huffmyer J. *Sem Cardiothorac Vasc Anesth, 2009; 13: 5 – 18*
Shim YH et al. *Best Pract Res Clin Anaesthesiol, 2008; 22: 151 – 165*
Ng CS et al. *Ann Thorac Surg, 2008; 85: 154 – 162*
Zupanich E et al. *J Thorac Cardiovasc Surg, 2005; 130: 378 – 383*

Awake Cardiothoracic Surgery – High TEA
Anaesthesia Concerns

Ultra Fast Track / Fast Track Cardiothoracic Surgery

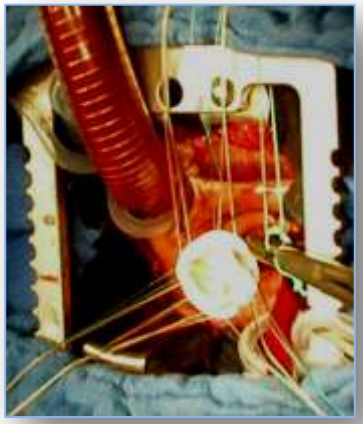
- Can be done
- with GA alone
- with GA – High TEA combination
- immediate extubation in OR
- combined procedures
- in pts with co morbidities
- in pts with morbid obesity
- in octagenerians

Djaiani GN et al. *J Cardiothorac Vasc Anesth, 2001; 15: 152 – 157*
Straka Z et al. *Ann Thorac Surg, 2002; 74: 1544 – 1547*
Hemmerling TM et al. *Can J Anaesth, 2004; 51: 163 – 168*
Hemmerling TM et al. *J Cardiothorac Vasc Anesth, 2005; 19: 176 – 181*
Campos JH. *Curr Opin Anaesthesiol, 2009; 22: 1 – 3*

First MIC – AVR in Crete:

Minimally Invasive AVR – GA

April 12th 2009: 87 year – old man, 23 mm Medtronic Mosaic II ultra



Post Operative Day 2 !!!

Minimally Invasive AVR – MIC AVR – GA

July 26th 2010
59 years old woman, BMI 52.4
21 mm Medtronic Mosaic II ultra
Discharged: 6th postop day

Post Operative Day 3 !!!

Awake Cardiothoracic Surgery – High TEA
Patient Concerns

What does the patient want?

Awake Cardiothoracic Surgery – High TEA
Patient Concerns

- patient remaining **conscious** during any type of cardiothoracic surgery especially under CPB

↓

difficult, if not impossible

Christina T Mora Mangano
"Risky Business" (Editorial)
J Thorac Cardiovasc Surg, 2003; 125: 1204 – 1207

Awake Cardiothoracic Surgery – High TEA
Patient Concerns

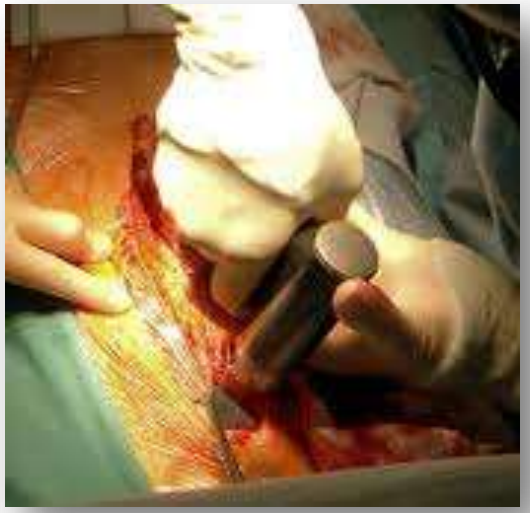
Stress – Stress Response

associated with consciousness

Christina T Mora Mangano
"Risky Business" (Editorial)
J Thorac Cardiovasc Surg, 2003; 125: 1204 – 1207

Awake Cardiothoracic Surgery – High TEA
Patient Concerns

- Absolute Silence
- Inability to Communicate
- Saw Opening Chest ➔ Anxiety



Christina T Mora Mangano
"Risky Business" (Editorial)
J Thorac Cardiovasc Surg, 2003; 125: 1204 – 1207

Awake Cardiothoracic Surgery – High TEA
Patient Concerns

- high risk operation: **anxiety** is common
- mandate for **spontaneous respiration**
- some patients: intraoperative **sedation**
- careful **titration**
- **respiratory depression** – muscle paralysis from TEA
- chest open / patients staying still: very **stressful**

Li Peggy TY, Ho Antony MH
"Conscious Neuraxial Anaesthesia is a viable alternative to GA in Cardiac Surgery " (CON)
SCA Newsletter, October 2005; Vol 4, No 5: 10 – 12

Awake Cardiothoracic Surgery – High TEA
Patient Concerns

Conversion from **TEA** to **GA**

- patients' anxiety…
- perhaps relief in some patients !!!
- non – reassuring sign to others

Li Peggy TY, Ho Antony MH
"Conscious Neuraxial Anaesthesia is a viable alternative to GA in Cardiac Surgery " (CON)
SCA Newsletter, October 2005; Vol 4, No 5: 10 – 12

Awake Cardiothoracic Surgery – High TEA
Patient Concerns

Perioperative Anxiety:

- undesirable in patients with CAD – fragile patients
- **Anxiety – Personality Characteristics**

  major contributors to postoperative **outcomes**

Szekely A et al. *Psychosomatic Medicine, 2007; 69: 625 – 631*
Anxiety predicts mortality and morbidity after CABG and valve surgery: A 4 – year follow up study
Pignai – Demaria V et al. *Ann Thorac Surg, 2005; Vol 75, No 1: 314 – 321*
Depression and Anxiety: Outcomes of Coronary Artery Bypass Surgery
Tully PJ et al. J Psychosom Res, 2008; Vol 64, No 3: 285 – 290
Anxiety and Depression as Risk Factors for Mortality after Cardiac Surgery
Tully PJ et al. *Heart Lung, 2010 (Epub Ahead of Print)*
Anxiety, Depression and Stress as Risk Factors for Atrial Fibrillation after Cardiac Surgery

Awake Cardiothoracic Surgery – High TEA
Patient Concerns

Patients' Satisfaction

- **overall satisfaction**
- after successful operation
- very good to excellent
- under **TEA** with or without **Sedation**

Anderson MB et al. Heart Surg Forum, **2002**; 5: 105 – 108
Kessler P et al. Anaesthesist, **2002**; 51: 533 – 538
Kessler P et al. Anesth Analg, **2002**; 95: 791 – 797
Aybek T et al. Ann Thorac Surg, **2003**; 75: 1165 – 1170
Aybek T et al. J Thorac Cardiovasc Surg, **2003**; 125: 1204 – 1207
Meininger D et al. World J Surg, **2003**; 27: 534 – 538
Noiseaux N et al. Br J Anaesth, **2008**; 100: 184 – 189

Awake Cardiothoracic Surgery – High TEA
Patient Concerns

- ??? in part
  due to **relief** of surviving the experience
- comparison:
  similar group of patients under GA
- claim of superior satisfaction:
  premature

Li Peggy TY, Ho Antony MH
"Conscious Neuraxial Anaesthesia is a viable alternative to GA in Cardiac Surgery " (CON)
SCA Newsletter, October 2005; Vol 4, No 5: 10 – 12

Comparison of Three Anesthetic Techniques for Off-Pump Coronary Artery Bypass Grafting: General Anesthesia, Combined General and High Thoracic Epidural Anesthesia, or High Thoracic Epidural Anesthesia Alone

Paul Kessler, MD,* Tayfun Aybek, MD,† Gerd Neidhart, MD,* Selami Dogan, MD,† Volker Lischke, MD,* Dorothee H. Bremerich, MD,* and Christian Byhahn, MD*

Conclusion: **Based on the authors' data, all anesthetic techniques were equally safe from the clinician's standpoint. However, GA + TEA appeared to be most comprehensive, allowing for revascularization of any coronary artery, providing good hemodynamic stability and reliable postoperative pain relief. Nonetheless, the actual and potential risks of TEA during cardiac surgery should not be underestimated.**

Journal of Cardiothoracic and Vascular Anesthesia, Vol 19, No 1 (February), 2005: pp 32-39


Good quality long term RCTs are still required

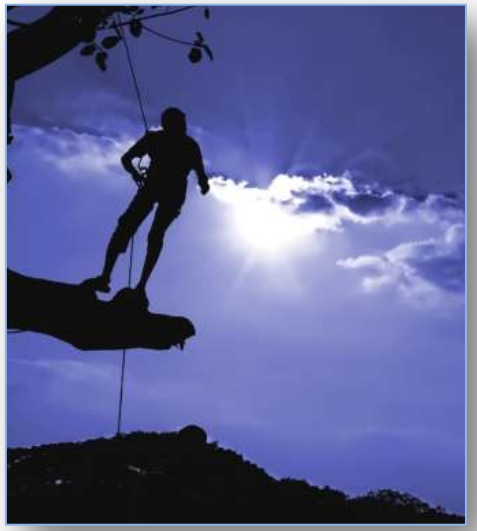
Conscious Neuraxial Anaesthesia
Cardiac – Thoracic Surgery

- Several Questions: NOT answered yet

- awake cardiothoracic surgery: NOT for ALL
- contraindications
- many potential problems
- some extremely serious
- potential gain: minimal
- for the most part: unproven

Byhahn C, Meininger D, Kessler P.
CABG in conscious patients: A procedure with a perspective? Anaesthesist, 2008

Conscious Neuraxial Anaesthesia
Cardiac – Thoracic Surgery



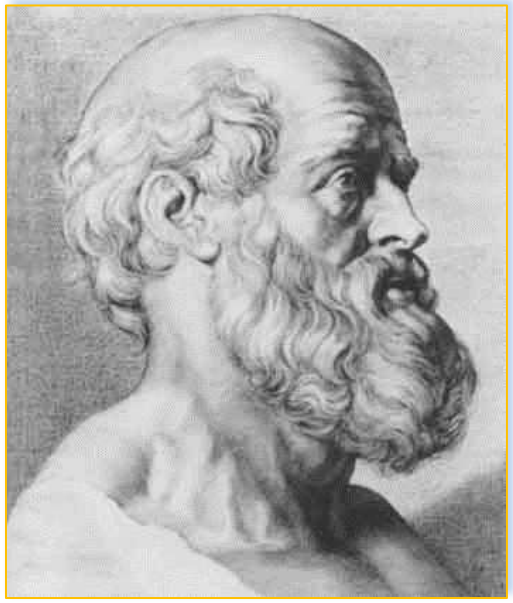
- despite theoretical advantages
- a leap into the unknown
- too risky to justify
- one case of serious complication:

  negation of the so – called potential benefits

plan should be developed preoperatively

Byhahn C, Meininger D, Kessler P. Anaesthesist, 2008
Kapoor PM et al. Ann Card Anaesth, 2009
Wildgaard K et al. (Critical Review) Eur J Cardiothorac Surg, 2009

"… As to diseases,
make a habit of two things –
to help, or at least to do no harm … "



Hippocrates (460 – 370 BC)

Epidemics, Bk 1, Sect XI