Original Article

Regional anesthesia practice in Greece: A census report

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Abstract

Background and Aims: Regional anesthesia (RA) techniques (central neuraxial and peripheral nerve blocks [CNBs and PNBs]) are well-established anesthesia/analgesia modalities. However, information on their nationwide use is sparse. The aim of the survey was to assess the utility of RA techniques in Greece, during 2011.

Materials and Methods: A nationwide, cross-sectional descriptive survey was conducted (March to June, 2012), using a structured questionnaire that was sent to 128 Greek Anesthesia Departments.

Results: Sixty-six completed questionnaires (response rate 51.56%) were analyzed. The data corresponded to 187,703 operations and represented all hospital categories and geographical regions of Greece. On the whole, RA was used in 45.5% of performed surgical procedures (85,386/187,703). Spinal anesthesia was the technique of choice (51.9% of all RA techniques), mostly preferred in orthopedics (44.8%). Epidural anesthesia/analgesia (application rate of 23.2%), was mostly used in obstetrics and gynecology (50.4%). Combined spinal-epidural and PNBs were less commonly instituted (11.24% and 13.64% of all RA techniques, respectively). Most PNBs (78.5%) were performed with a neurostimulator, while elicitation of paresthesia was used in 16% of the cases. Conversely, ultrasound guidance was quite limited (5%). The vast majority of consultant anesthesiologists (94.49%) were familiar with CNBs, whereas only 46.4% were familiar with PNBs. The main reported limitations to RA application were lack of equipment (58.23%) and inadequate education/training (49.29%).

Conclusion: Regional modalities were routinely used by Greek anesthesiologists during 2011. Neuraxial blocks, especially spinal anesthesia, were preferred over PNBs. The underutilization of certain RA techniques was attributed to lack of equipment and inadequate training.

Key words: Central neuraxial blocks, epidural technique, peripheral nerve blocks, regional anesthesia, spinal technique

Introduction

Regional anesthesia/analgesia (RA) techniques represent a well-established part of perioperative care, providing site — specific, high quality pain relief, while reducing the systemic opioid consumption.[1,2] Furthermore, neuraxial or peripheral nerve catheters offer prolonged postoperative analgesia, facilitate early mobilization and rehabilitation and increase patient satisfaction.[1,2] Ongoing research has shown that RA may have positive effects on specific outcome parameters, such as inflammation, bowel function, coagulation and cancer recurrence.[2] All these well-established or potential advantages have led to a continuously growing interest in RA, especially peripheral nerve blocks (PNBs).[1-4] In addition, Anesthesia Societies and Education Committees worldwide encourage the use of RA techniques and their teaching and training during residency.[3-6]

Despite literature abundance on potential benefits associated with RA, there are sparse evidence-based data to evaluate the frequency of RA application perioperatively at national or international level.[7-12] To the best of our knowledge, recent nationwide or multicentre surveys based on objective data retrieved from hospital records are lacking. Nevertheless, such studies may provide material for comparisons among different countries and time periods, reveal problems and drawbacks,

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and consequently promote continuous improvement of clinical practices. They may also represent a useful tool for assessment of the teaching process, knowledge expansion, hospital resources and technical developments associated with RA.

The current survey is the first nationwide attempt to document the current trends in RA practice in Greece. The collected data and results may serve as a benchmark for future intra- and inter-country comparisons and evaluation of the efficacy of currently running educational and training programs.

The aim of the survey was to explore the practice of RA in Greece during 2011 - regarding the frequency, preference and familiarity with the various RA techniques - and to explore the factors that may influence its routine application. We considered that the data of this survey could reveal the existing weak points and drawbacks, and thus lead to approaches for improving the structure, process and outcomes of the RA clinical practice in Greece.

Materials and Methods

This nationwide cross-sectional descriptive study was approved and endorsed by the Scientific Committee of the Greek Section of the European Society of Regional Anaesthesia and Pain Therapy (ESRA Hellas), which acted as Ethics Committee. A four-part questionnaire on the practice of RA in Greece during the year 2011 was developed for the survey (Appendix 1). Potential respondents were the directors of all Greek Anesthesia Departments. In order to assure the questionnaire validity and readability, five Senior Anesthesiologists, experienced with RA, were consulted to review and assess its content, design and structure.

According to 2011 data of official websites,[13-15] there were 230 Anesthesia Departments, distributed in the seven major Greek health districts [Table 1 and Figure 1]. Using the available contact details, communication with all the department directors was attempted. Contact was achieved with 128 departments and the survey questionnaire was emailed to their directors in March 2012. An accompanying letter invited them to participate, after explaining the aim of the survey and clarifying that participation was voluntary and that the questionnaire could be completed anonymously. A second, reminder E-mail was sent 6 weeks later, in case of no response. After a further 6 weeks, the remaining non respondents were contacted for a third time by fax, E-mail and/or telephone, with the survey being terminated on June 30, 2012.

Specific instructions were given to the participants for a sound inclusion of accurate data, derived from their hospital records or electronic databases. In order to minimize the bias for few open questions, the directors of the departments were asked to answer themselves or supervise the completion of the questionnaire. For the same purpose, four question formats were used: Yes or No boxes, selection of best possible answer out of 2-5 alternatives, fill-in the blank and check-off options. No monetary compensation was provided for any kind of participation in this survey. All the acquired data were kept safely and anonymity was preserved.

Statistical analysis

Returned questionnaires were evaluated for their consistency (complete data, missing values) and were analyzed by the use of the Statistical Package for the Social Sciences (IBM-SPSS, 20 Armonk, NY: IBM Corp.). The results are presented mainly in a descriptive form, including total numbers, frequencies, or percentages, where applicable. Comparisons, wherever appropriate, were made with the Chi-square statistical test, given that $P < 0.05$ was considered as significant. We retrospectively calculated the required sample size for the comparison of a proportion, given that the proportion of RA utilization in the Hospitals was 45.5%. With the margin of error to be 0.05 and 95% confidence level it was found that 381 operations would be the minimum required sample size for valid conclusions.

Results

Of the 230 registered Anesthesia Departments, 128 were contacted by E-mails, as we did not manage to reach the Directors of the rest. According to the Greek Ministry of Health,[13] most of the noncontacted Departments were located in rural County Hospitals without scheduled anesthetic procedures or with few minor operations. Thus, even though the rate of contacts was 55.6% of all the registered Anesthesia Departments, the 128 contacted hospitals reflected 79.9% (421,493 out of 527,263) of the operations that were performed throughout Greece during 2011, according to the official data of the Ministry of Health,[13] the Health Network[14] and the Pan-Hellenic Society of Private Hospitals.[15] The type and geographical distribution of the contacted Anesthesia Departments are shown in Table 1.

A total of 66 completed questionnaires were returned (response rate 51.56%). The data acquired from the answered questionnaires corresponded to 187,703 operations and according to the statistical calculation, they created an adequate sample size for analysis.

In the participating hospitals, RA was used in 45.5% (85,386/187,703) of the surgical procedures (95% confidence interval [CI] 0.4519-0.458). Central neuraxial blocks (CNBs, 95% CI: 0.8574-0.8699) were far more popular than PNBs (PNBs, 95% CI: 0.1339-0.1389), ($P = 0.021$) as shown in Figure 2. Among all regional

Appendix 1: Regional Anesthesia Practice in Greece during 2011-

Survey Questionnaire
(*optional)

CONTACT DETAILS/HOSPITAL TYPE

Anesthesiologist's name*: ……

Address/City……

Telephone ……E-mail……

Name of Hospital*: ……..

Type of Hospital:
a. University/NHS
b. NHS
c. Military
e. Private

Specialized (and what kind)

PART I — GENERAL INFORMATION REGARDING REGIONAL ANESTHESIA (RA) TECHNIQUES

No. of operations performed in your hospital under any anesthesia type in 2011……

No. of operations performed under RA in 2011…….. No. of central neuraxial blocks (CNBs) performed in 2011……..

No. of peripheral nerve blocks (PNBs) performed in 2011…….

PART II — CENTRAL NEURAXIAL BLOCKS

Subarachnoid anesthesia (Spinal)

No. of Spinals Performed in 2011 in Your Department…… From Those How Many Were Performed For the Following Types of Operations:

A.	General Surgery	YES	□	NO	□	Number…..
B.	Orthopedic Surgery	YES	□	NO	□	Number…..
C.	Obstetrics — Gynecology	YES	□	NO	□	Number……
D.	Vascular Surgery:	YES	□	NO	□	Number…..
E.	Urological Surgery:	YES	□	NO	□	Number…..
F.	Other Type of Surgery:	YES	□	NO	□	Specify ……..…….. Number…..

Epidural anesthesia

No. of epidurals performed in 2011 in Your Department…….

From those how many were performed for the following types of operations:

G.	General surgery	YES	□	NO	□	Number…..
H.	Orthopedic surgery	YES	□	NO	□	Number…..
I.	Obstetrics — Gynecology	YES	□	NO	□	Number……
J.	Vascular surgery:	YES	□	NO	□	Number…..
K.	Urological surgery:	YES	□	NO	□	Number…..
L.	Other type of surgery:	YES	□	NO	□	Specify ……..…….. Number…..

Number of combined spinal epidurals performed in your department in 2011:…….

PART III — PERIPHERAL NERVE BLOCKS

Number of PNBs performed in 2011 in your department .....

Number of PNBs performed for anesthesia/analgesia of:

a. Upper Limb …….
b. Lower Limb …….
c. Trunk ……..
d. Head ……..
e. Other ……..

PNBs were performed for:

Anesthesia	YES	□	NO	□	Number ….
Postoperative Analgesia	YES	□	NO	□	Number….
Both	YES	□	NO	□	Number…..

Peripheral Nerve Catheter Insertion:…….

Time catheter was left in place: …….

For PNBs Performance the Following Equipment/Technique was used:

a.	Neurostimulator	YES	□	NO	□	Number.
b.	Ultrasounds	YES	□	NO	□	Number
c.	Combination of NS and Ultrasounds	YES	□	NO	□	Number
d.	Paresthesia	YES	□	NO	□	Number
e.	None of the Above	YES	□	NO	□	Number ……Specify ……..

PART IV — ANESTHESIOLOGIST EXPERIENCE IN RA

Number of Consultant Anesthesiologists in Your Department in 2011:…….

How many of them are familiar/perform RA Techniques

a. CNBs …….
b. PNBs …….
c. Both ……..

Reasons for not applying RA (Tick or Circle)

- Lack of equipment
- Lack of knowledge or Education
- Lack of time
- Surgeons preferences
- Other/specify…….....

modalities, subarachnoid anesthesia was the most commonly applied technique (95% CI: 0.5142-0.5238), ($P = 0.042$) as shown in Figure 3. Regarding the types of surgery, subarachnoid anesthesia was instituted mostly in orthopedic surgery, while epidural technique was more often performed in gynecological/obstetric surgical procedures [Figure 4]. Notably, in the central institutions of the capital most cesarean deliveries were performed under epidural or combined spinal-epidural (CSE, 50.3%), whereas in county hospitals, single-shot spinal was the regional technique of choice (64.9-90.1%). The PNBs were mainly used in patients undergoing upper (41.3%) or lower extremity (50.7%) orthopedic surgery.

Peripheral nerve catheters were used only in 284 cases (2.4% of PNBs) and remained in place for 48-72 h. Most PNBs (70.2%) were performed in hospitals of the capital, while only 29.8% were reported by peripheral hospitals ($P = 0.019$). The vast majority of PNBs (78.5%) were performed by the use of a neurostimulator, whereas ultrasound application alone or combined with neurostimulation was quite limited (1.5% and 3.5%,

respectively). In a relatively high percentage of PNBs (16%), the elicitation of paresthesia was the main method to confirm the correct placement of the needle.

Table 1: The characteristics of the contacted anesthesiology departments

Hospital characteristics	Number of hospitals with active anesthesiology departments (*n*)	Number of contacted anesthesiology departments (*n*) (%)
Hospital category		
University hospitals, (public)	1	1 (100)
Central NHS hospitals, (public)	18	15 (83.3)
Central mixed university and NHS hospitals, (public)	26	24 (92.3)
County-peripheral hospitals, (public)	64	23 (35.9)
Military hospitals, (public)	12	6 (50)
Special public hospitals*	8	5 (62.5)
Private hospitals	101	54 (53.5)
Hospital distribution in the seven major health districts†		
1st health district	66	37 (56.1)
2nd health district	34	19 (55.9)
3rd and 4th health district	51	29 (56.9)
5th health district	30	16 (53.3)
6th health district	35	17 (48.6)
7th health district	14	10 (71.4)
Sum of all institutions	230	128 (55.6)

**Special public hospitals = Hospitals for specialized surgery, e.g., pediatric, cardiothoracic, plastic, outpatient — day case, obstetrics — gynecology and eye surgery, †The Greek health districts=1st: Capital (Athens) and rest of Attiki, 2nd: Piraeus and Aegean Islands — Dodecanese, 3rd: Macedonia, 4th: Eastern Macedonia — Thrace, 5th: Peloponnese, Epirus, Ionian Islands and Western Greece, 6th: Central Greece — Thessaly, 7th: Crete. Data are presented as numbers and percentage, NHS = National Health System*

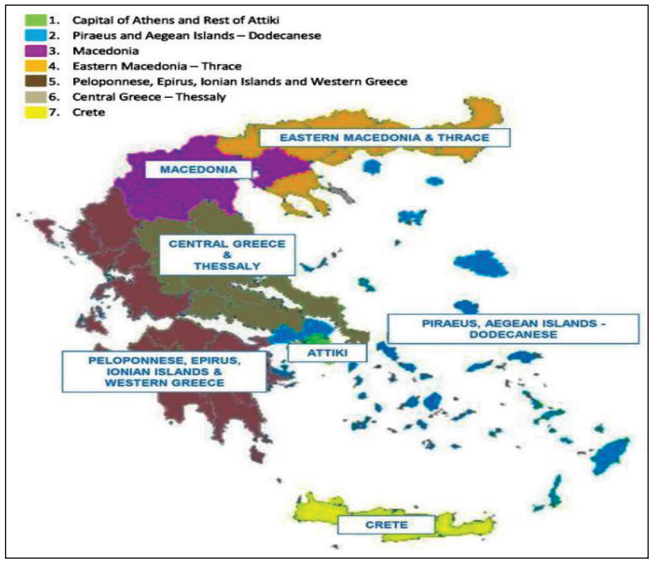

Figure 1: A map of Greece showing the seven major health districts of the country

The reported number of consultant anesthesiologists serving in the responded departments was 345. According to the survey, the vast majority (94.49%) were very well accustomed with CNBs, whereas only 46.38% were familiar with PNBs. The main reported limitations to RA application were the lack of necessary equipment (58.23%) and inadequate training in the specific technique (49.29%).

Discussion

The survey revealed a regular use of RA techniques in Greece during 2011. The CNBs - especially single-shot spinal — were very popular, while the use of PNBs was quite limited, mainly due to lack of equipment and inadequate training. Unfortunately, our results cannot be directly compared to those of other national surveys, since recent relevant studies with a similar design to ours are lacking. Few previously performed surveys in European countries, also based on data from hospital records, showed quite low rates of RA use: In France[11] during 1996 and in German speaking countries (Germany, Austria and Switzerland)[10] during 2002 the average percentage of RA was only 23%.[9,10] Among the latter countries, Switzerland reported the highest proportion of RA, thus 48% in adult patients.[10] Obviously, the aforementioned percentages reflect the use of RA in the previous two decades and the rates have possibly changed significantly over the last years. More recent data show that there is a rising trend toward RA; in Chile and Nigeria, >90% of the respondent anesthesiologists reported the routine use of RA techniques.[16,17] It should be noted though that the results of these surveys are not based on hospital data, but on answers given by individual anesthesiologists (n = 140-209 respondents).[16,17]

According to our results, CNBs were much more favored over PNBs; this preference was in accordance with the

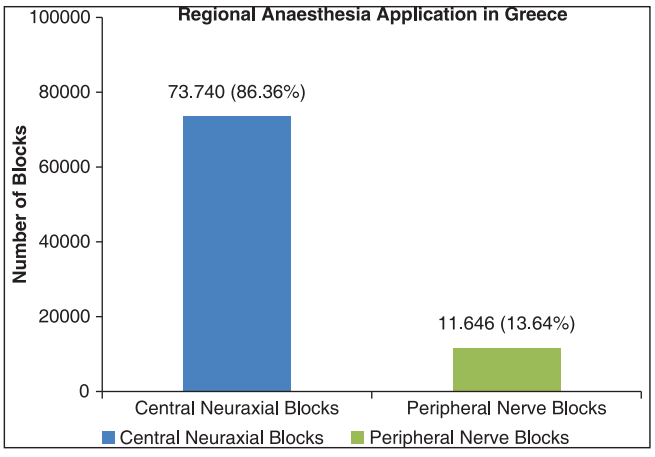

Figure 2: The application rates of central neuraxial and peripheral nerve blocks in Greek Hospitals

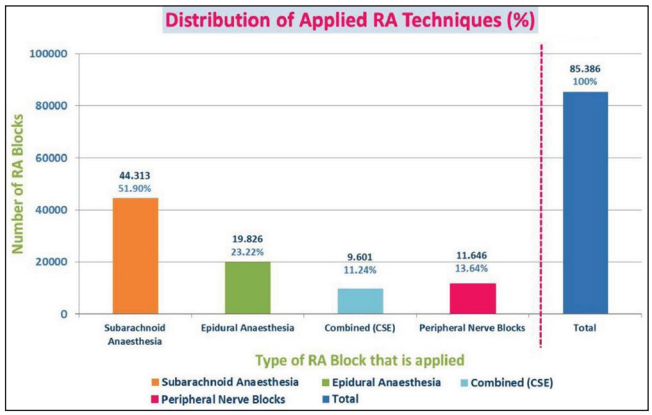

Figure 3: The application rates of al regional techniques in Greek Hospitals: Subarachnoid anesthesia, epidural anesthesia, combined-spinal anesthesia/analgesia and peripheral nerve blocks

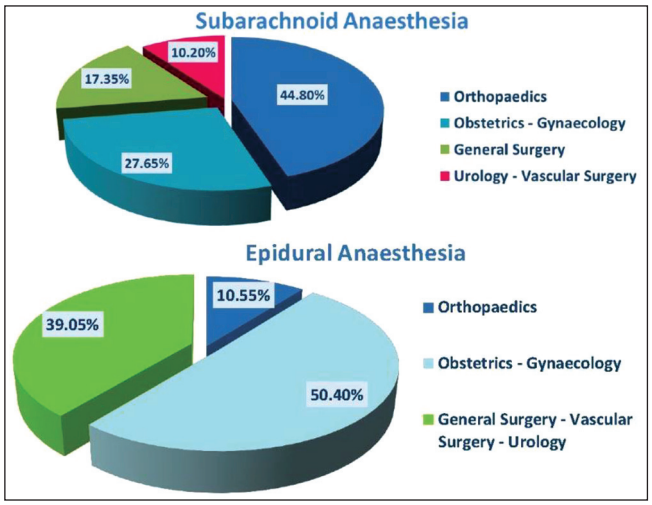

Figure 4: The application rates of subarachnoid and epidural anesthesia in various types of surgical procedures

reported familiarity with the former techniques by Greek anesthesiologists. Previous data show that throughout Europe the overall application rate of CNBs was 17% in 1992,[7] whereas, in individual countries, it fluctuated from 25.32% in Sweden[8] up to 56% in France during the mid to late 90 s.[11]

Spinal was the mostly preferred technique by Greek anesthesiologists for CNBs. Similarly, a European Survey of 1995, showed higher rates for spinals over epidurals or CSEs, thus 56%, 40% and 4% respectively.[7] A French survey conducted in 1996 reported that spinals and epidurals were equally applied (by a rate of 28% each), with no data on CSE.[11] In recent times, Chilian anesthesiologists also expressed a similar preference for spinal and lumbar epidural blocks (98 vs. 96%),[16] while in Nigeria, regular use of spinals was reported by 93%, while epidural techniques were preferred only by 15% of the respondent anesthesiologists.[17] Notably, 25.7% of the Nigerians reported that they had never performed an epidural.[17] The popularity of spinal across the world is not surprising, since it is technically easy to perform, provides a rapid and dense block with small doses of local anesthetics, and is minimally traumatic if small gauge, noncutting needles are used. Spinal technique is also taught and performed early during training and has a relative fast learning curve with achievement of competence after 45 attempts.[18] Regarding the current trends in Greece, the results show that even though spinal blocks are preferred, epidural and CSE techniques have also their place in everyday clinical practice, accounting for the 40% of the CNBs, probably due to the advantages the epidural catheters offer for postoperative analgesia. This finding is in accordance with the results of a recent survey on postoperative analgesia, reporting that epidural catheters were used in 44.5% of Greek Anesthesia Departments.[19] Similarly, data from Sweden showed that spinals were chosen for short lasting surgical procedures (up to 1 h), while epidurals and CSEs were preferred when postoperative epidural analgesia was planned.[8]

Regarding the CNBs distribution in various types of surgery, the present survey showed that spinals were most commonly used in orthopedic patients. The aforementioned advantages, along with the high technical success rates (>90%) render the spinal technique a popular option for this specific group of patients (old age, spinal skeletal deformities).[20] Similarly to our results, in Sweden, spinal anesthesia was also preferred in orthopedics (59.7-80.6%), although-unlike Greece - it was popular in urological procedures, too (74.1%).[8] French anesthesiologists used mainly spinals in nonobstetric surgical procedures, but preferred epidurals in obstetrics.[11] In accordance with that, the present Greek survey showed that epidurals were more often instituted in obstetrics/gynecology, at a rate within the range reported by the Swedish Survey for the respective group of procedures (epidural rate: 19.4-66.1%).[8] Interestingly, according to our results, cesarean delivery was more commonly performed under epidurals/CSE in institutions of the Greek capital, whereas single-shot spinal was the method of choice in the county. The use of epidural catheters in central hospitals is probably explained by the adequacy of nursing stuff, the function of Acute Pain Service and the training of residents in more meticulous RA techniques.

According to the present survey, PNBs was the least frequently used regional modality, mostly in orthopedic surgery. Over the last years - especially with the introduction of ultrasound into clinical practice - PNBs have gained popularity mainly in orthopedics and traumatology, but available recent data from different countries are not uniform. A Canadian survey showed that 20% of the anesthesiologists in Academic Hospitals in Ottawa perform blocks rarely or never, while only 8% perform >10 blocks/month.[21] Even lower percentages are reported

in Nigeria, where 47.1% of the respondent anesthesiologists have never attempted PNBs, while only 2.9% use them regularly.[17] Conversely, in Chile, routine application of PNBs was reported by 73.7% of the respondents.[16]

In our survey, almost half the anesthesiologists working in the respondent Departments were familiar with PNBs, even though the application rates were much lower. The main reported limitations to the use of RA techniques were the lack of equipment, while inadequate training was also a significant contributing factor. Similarly, in other surveys,[16,17] inadequate skills/training was a major drawback, while the lack of suitable patients was declared by a small percentage of respondents.[17] PNBs routine application may also be hindered by lack of anatomical knowledge, ignorance of potential benefits, lack of familiarity/acceptability by surgeons, strict time table with rapid turnover of cases, as well as logistic impedance in an ambulatory or fast tracking operative setting.[9,11,17] The role of training is probably reflected to our results, which showed that most PNBs are performed in central hospitals, which are usually teaching ones, opposed to the county institutions. A significant limitation to systematic training in RA techniques is the lack of a formal stepwise program incorporated in the curriculum of the residency. Thus, undertraining during residency possibly accounts — at least in part - for the low application rates of PNBs in Greece. On the other hand, in the United States the PNB experience during residency and subsequent confidence has significantly increased over the last decade, especially for commonly used blocks, such as the femoral, interscalene and popliteal.[6] According to a recent survey in the United States, >90% of the residents achieve the Accreditation Council for Graduate Medical Education mandated goal of 40 PNBs, while 74% perform actually more than 60 PNBs during their residency, usually under ultrasound guidance.[6] Moreover, ultrasound-guided PNBs are taught in all American Board of Anesthesiology-accredited residency programs, where >20 PNBs are performed per week.[5]

On the contrary, the use of ultrasound guidance was quite limited in Greece; the vast majority of PNBs were performed by the aid of a neurostimulator, while elicitation of paresthesia is still advocated by a high percentage of physicians. The use of neurostimulation is reported to be similarly high in Chile (64%), but quite lower in Nigeria (31.4%).[16,17] Notably, although the majority of Nigerian anesthesiologists (76.4%) reported to have seen a peripheral nerve stimulator before, most of them do not use them.[17] The use of ultrasound in the aforementioned countries is not reported at all.

The problems revealed by this survey were highlighted in Pan-Hellenic Congresses of RA, so as all parties to be informed about the weaknesses of the current system. Suggestions for improvement were discussed with attendants and members of the ESRA-Hellas and of the Hellenic Society of Anesthesiology. Furthermore, since 2009 ESRA-Hellas has been organizing educational and training programs on RA twice annually, which have been attended by Greek anesthesiologists from all parts of the country. The number of participants continuously increases, indicating the success of these programs and a growing interest toward education on RA. This interest is also reflected by the increasing number of Greek anesthesiologists that apply for the ESRA Diploma Examinations over the last years.

Regarding the future of RA in Greece, we consider that emphasis should be given to the education and training, especially during residency. Incorporation of a step-wise training program in RA into the curriculum of residency should be the goal of ESRA and the Society of Anesthesiology in Greece. In addition, Continuing Medical Education, especially for anesthesiologists working in county hospitals and rural areas, would be an appropriate approach to improving knowledge and skills on RA techniques. Targeted education and case-based learning may apply more successfully to these groups. Furthermore, the use of new teaching methods, such as virtual reality and interactive learning modalities might assist the education and training process in the future. Additionally, electronic databases will allow the registration of RA application to become a standard practice. Based on the example of the pediatric RA network,[12] multicenter collaborative networks could also facilitate the collection of detailed prospective data for research and quality improvement.

Regarding the technical limitations, the directors of departments and hospitals should join forces with the scientific societies and lobby for access to governmental finance for equipments and facilities for RA practice. Not only the improved quality of provided health care, but also the cost/benefit of RA techniques represents a strong argument supporting the wider use of RA in the National Health system.

Finally, the data of this survey should serve as a baseline for future assessment of the RA practice and the work that has been done towards improvement.

Limitations

A possible limitation of the present study is the relatively small number of the respondent Anesthesia Departments. Nevertheless, such participation rates are relative common in national surveys with a design similar to ours.[8,10,19] We also consider that our sample size [anesthesiologists (n = 345) and surgical procedures (n = 187,703)] is adequate, taking into account the country population. Furthermore, the participating departments were distributed to all major

Greek Health Districts, and thus we consider that the results are representative and can be extrapolated nationally.

Conclusions

The present survey was the first attempt to collect data on the current practice of RA in Greece and may offer material for further analysis and a baseline for future comparisons. According to the results, regional modalities were routinely used by Greek anesthesiologists during 2011. Neuraxial blockades, especially spinal anesthesia, were preferred over PNBs, which were usually performed without ultrasound guidance. The main reported limitations to RA application were the lack of equipment and inadequate training. For these problems to be solved, the Greek anesthesiology community should intensify the efforts toward equipment/technology finance and also towards continuous education programs and courses, especially in rural areas. Also, incorporation of RA curriculum in a training program, ideally unified across European countries, would be a significant step towards improvement.

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