

ORIGINAL ARTICLE

Assessment of the Opinions of Anesthesiology and Reanimation Research Assistants Regarding Clinical Anatomy Education: A University Example

Klinik Anatomi Eğitimi Verilen Anesteziyoloji ve Reanimasyon Anabilim Dalı Araştırma Görevlilerinin Eğitim Hakkındaki Görüşlerinin Değerlendirilmesi: Bir Üniversite Örneği

¹Emine Aslanlar , ¹İnci Kara , ¹Nadire Ünver Doğan , ¹Zeliha Fazlıoğulları , ²Mustafa Büyükcavlak 

¹Selcuk University Faculty of Medicine, Department of Anesthesiology and Reanimation, Konya, TURKEY.
²Konya City Hospital, Department of Anesthesiology and Reanimation, Konya, TURKEY.

Correspondence

Emine Aslanlar, Selcuk University Medicine Faculty, Department of Anesthesiology and Reanimation, Konya, TURKEY.

E-Mail: draslanlar@gmail.com

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ABSTRACT

Introduction: Anatomy is considered one of the cornerstones of medical education. In-depth understanding of anatomy is essential, especially for safe clinical practice in surgical disciplines. This study aimed to evaluate the feedback of research assistants in the department of anesthesiology and reanimation, who received clinical anatomy education.

Methods: Clinical anatomy education was provided for research assistants at different levels in the department of anesthesiology and reanimation, with two hours per week, and the education was completed within one month. The 5-point Likert scale questionnaire consisting of 18 questions was administered to research assistants to gather their opinions about education. Participants were asked to rate the questions on a scale from 1 to 5. Additionally, data such as age, gender, duration of clinical experience, experience with neuroaxial or peripheral nerve blocks, and participation in regional anesthesia courses were recorded.

Results: A total of 40 participants, including 15 (37.5%) males and 25 (62.5%) females, with an average age of 29.67 ± 3.94 years, were included in the study. Nearly all participants in our study reported that integrated clinical anatomy education is necessary. The majority mentioned that anatomy education would contribute to airway management and regional anesthesia applications. The participation rate in regional anesthesia courses before education was 17.5%. There was no significant difference in average questionnaire scores between those who participated in regional anesthesia courses and those who did not (p=0.06).

Conclusion: In the process of anesthesiology and reanimation specialization training, we believe that incorporating clinical anatomy education would enhance the quality of specialization education, thereby improving safety and effectiveness in clinical applications.

Keywords: Clinical anatomy, Regional anesthesia, Specialist training

Öz

Giriş: Anatomi, tıp müfredatının temel taşlarından biridir. Anatominin derinlemesine anlaşılması, özellikle cerrahi disiplinde güvenli klinik uygulama için esastır. Bu çalışmada klinik anatomi eğitimi verilen anesteziyoloji ve reanimasyon anabilim dalı araştırma görevlilerinin eğitim hakkındaki geri bildirimlerinin değerlendirilmesi amaçlanmıştır.

Gereç ve yöntemler: Anesteziyoloji ve reanimasyon anabilim dalındaki farklı kıdemdeki tüm araştırma görevlilerine haftada 2 saat klinik anatomi eğitimi verilerek eğitim 1 ay içinde tamamlanmıştır. Araştırma görevlilerine eğitim hakkındaki görüşlerini bildiren 18 sorudan oluşan 5'li Likert tipi anket uygulanmıştır. Katılımcıların anketteki sorulara 1'den 5'e kadar puan vermeleri istenmiştir. Aynı zamanda yaş, cinsiyet, uyruk, klinikteki deneyim süresi, nöroaksiyel veya periferik sinir bloğu deneyimi ve reyonel anestezi kursuna katılım gibi veriler kaydedilmiştir.

Bulgular: Çalışmaya dahil olan 40 katılımcının 15'i (%37,5) erkek, 25'i (%62,5) kadın ve yaş ortalamaları 29,67±3,94 yılıdır. Çalışmamızda katılımcıların tamamına yakını klinikle entegre anatomi eğitiminin gerekli olduğunu bildirmişlerdir. Büyük çoğunluğu anatomi eğitiminin hava yolu yönetiminde ve reyonel anestezi uygulamalarında kendilerine katkı sağlayacağını belirtmiştir. Katılımcılar arasında eğitim öncesinde reyonel anestezi kursuna katılım oranı %17,5'tir. Reyonel anestezi kursuna katılanlar ve katılmayanlar arasında anket puan ortalaması açısından fark bulunmamıştır.

Sonuç: Anesteziyoloji ve reanimasyon uzmanlık eğitimi sürecinde, klinik anatomi eğitimlerine yer verilmesiyle uzmanlık eğitimi kalitesinin buna bağlı olarak klinik uygulamadaki güvenlik ve etkinliğin artacağı kanaatindeyiz.

Anahtar Kelimeler: klinik anatomi, reyonel anestezi, uzmanlık eğitimi

Introduction

Modern medical education takes place in three stages: pre-graduation, post-graduation (residency and fellowship training), and continuous medical education (in-service training). At each of these stages, integration of basic sciences with clinical sciences is essential to enhance the effectiveness of medical education (1, 2). Currently, during the pre-graduation phase, an integrated education

approach, which combines basic and clinical sciences to provide effective training with specific goals, is widely implemented worldwide. However, unfortunately, the contribution of basic sciences to the training of clinical sciences is ignored at the post-graduation stage. Anatomy is considered one of the cornerstones of medical education. Especially in surgical disciplines, a profound understanding of anatomy is critically

important for safe and effective clinical practice. Therefore, anatomy education within medical curricula is a fundamental requirement for the success of healthcare professionals. Anesthesiology is a surgical specialty where interventional procedures are predominantly practiced, and with the advancement in regional anesthesia, the proportion of interventional applications has further increased. The success of regional anesthesia, which is based on the principle of targeting the correct anatomical region for accurate local anesthetic injection, depends on the practitioner's three-dimensional comprehension of the region and well-developed hand-eye coordination. Reliable delivery of local anesthetics to target nerves requires a complete understanding of the relevant anatomical structures (3). The place of regional anesthesia practices in contemporary anesthesia has been steadily increasing, particularly with the widespread use of ultrasound. Today, regional anesthesia is widely used in various fields such as surgical anesthesia, postoperative acute pain management and chronic pain treatment (4).

The aim of this study is to evaluate the opinions of research assistant doctors in the Department of Anesthesiology and Reanimation regarding clinical anatomy education, particularly to assess the impact and necessity of clinical anatomy courses during their residency training.

Materials and Methods

Ethical approval for this survey study (Ethical Committee No. 2022/51) was provided by Selçuk University Local Ethics Committee. Our study encompasses research assistant doctors at different levels who are undergoing specialization education in the field of anesthesiology and reanimation. These participants were offered clinical anatomy education related to airway management, central nervous system, and upper-lower extremity peripheral nerves during their residency training. The training was given two hours per week over a period of one month. Participants were asked to complete 5 Likert-type questionnaire consisting of 18 questions regarding their opinions on clinical anatomy education. Demographic data, including age, gender, duration of clinical experience, experience with neuroaxial or peripheral nerve block and participation in regional anesthesia courses were also recorded.

IBM SPSS Statistics 22 software was used for the statistical analysis. Descriptive statistics were presented for categorical variables in terms of frequency and percentage, while continuous variables were presented as mean and standard deviation. Pearson and Fisher's Exact Chi-Square tests were used for the comparison of categorical variables. The significance level was set at 0.05.

Results

Of the 40 research assistant doctors who participated in the study, 15 (37.5%) were male, 25 (62.5%) were female, and the mean age was 29.67 ± 3.94 years. Of

the research assistants, 16 had less than 12 months of experience, 8 had 13-24 months, 5 had 25-36 months, 5 had 37-48 months, and 6 had more than 48 months of experience. Other demographic data are provided in Table 1.

In the survey, when asked if "clinical integrated anatomy education is required", 50% of the research assistants answered "agree" and 45% answered "strongly agree". Regarding the statement "I think the education will contribute to airway management", 62.5% of participants answered "agree" and 12.5% answered "strongly agree". For the statement "I think it will contribute to regional anesthesia applications", 60% answered "agree" and 20% answered "strongly agree". For the statement "I think it will contribute more to regional anesthesia applications than general anesthesia applications", 62.5% answered "agree" and 12.5% answered "strongly agree".

For the statement "Working on a cadaver made a significant contribution to the education", 7.5% of participants answered "strongly disagree" 35% with "disagree" and 17.5% were "undecided". Regarding the statement "I think it will contribute to regional anaesthesia applications rather than general anaesthesia applications" 12.5% answered "strongly disagree" 32.5% with "disagree" and 22.5% were "undecided". The percentage distribution of participants' responses to other questions in the survey is shown in Table 2. The participation rate in regional anesthesia courses was 17.5%. There was no significant difference in the average questionnaire scores between those who participated in regional anesthesia courses and those who did not ($p=0.06$) (Table 3).

Table 1. Demographic datas

	Mean±SD	n (%)
Age (year)	29,6 ±73,94	
Gender	Female	25 (62,5)
	Male	15 (37,5)
Clinical Experience (month)	26,8±19,73	
	<12	16 (40)
	13-24	8 (20)
	25-36	5 (12,5)
	37-48	5 (12,5)
Neuraxial block experience	>48	6 (15)
	Yes	34 (85)
USG guided peripheral nerve block experience	No	6 (15)
	Yes	31 (77,5)
Regional anaesthesia course	No	9 (22,5)
	Yes	7 (17,5)
	No	33 (82,5)

USG: Ultrasonography

Table 2. Percentage distribution of participants' answers

	1	2	3	4	5	Me-an±SD
Helped me to remember my knowledge in my undergraduate medical school education	2,5	7,5	2,5	70	17,5	3,93±0,85
The duration of education was sufficient	5	12,5	30	47,5	5	3,35±0,95
The education was original	7,5	12,5	27,5	50	2,5	3,28±0,99
The education programme was carried out in accordance with its purpose	2,5	10	17,5	62,5	7,5	3,63±0,87
The physical conditions of the education environment were adequate	0	15	7,5	65	12,5	3,75±0,87
The education positively affected my clinical approach to the patient	5	10	32,5	47,5	5	3,38±0,92
The anatomical expression given in the education was sufficient	5	7,5	20	65	2,5	3,53±0,88
The material used in the education was adequate	0	10	32,5	45	12,5	3,6±0,84
Education demonstrated the importance of anatomy in the clinic	2,5	5	7,5	70	15	3,9±0,81
Education increased my love for anatomy	15	27,5	20	32,5	5	2,85±1,19
Education contributed to my training as a physician	2,5	7,5	22,5	65	2,5	3,58±0,78
I was satisfied with the education	2,5	7,5	12,5	70	7,5	3,72±0,82
Clinically integrated anatomy education is required	2,5	0	2,5	50	45	4,35±0,77
I think the education will contribute to airway management	2,5	7,5	15	62,5	12,5	3,75±0,87
I think the education will contribute to my regional anaesthesia practice	2,5	10	7,5	60	20	3,85±0,95
I think it will contribute to regional anaesthesia applications rather than general anaesthesia applications	2,5	7,5	15	62,5	12,5	3,75±0,87
Working on cadavers made a significant contribution to education	7,5	35	17,5	37,5	2,5	2,93±1,07
Ultrasonographic examination on cadaver contributed to education	12,5	32,5	22,5	32,5	0	2,75±1,05

1-Strongly disagree, 2-Disagree, 3-Undecided, 4-Agree, 5-Strongly agree

Table 3. Comparison of the mean questionnaire scores of those who had experience in neuraxial block, USG-guided peripheral nerve block and those who attended the regional anaesthesia course

	No	Yes	P
	Mean-SD	Mean-SD	
Neuroaxial block experience	3,69 ± 0,33	3,52 ± 0,61	0,55
USG guided peripheral nerve block experience	3,56 ± 0,45	3,54 ± 0,61	0,78
Participation in regional anaesthesia course	3,47 ± 0,6	3,86 ± 0,27	0,06

Discussion

In our study, the majority of research assistants have indicated that clinical integrated anatomy education is necessary, and they have stated that this education will especially contribute to regional anaesthesia applications.

Clinicians, especially surgeons, need to have a

profound knowledge of anatomy to perform clinical procedures safely and competently. However, there is concern that they may be insufficient in anatomy when entering residency programs due to limited exposure to anatomy during their clinical training and internship periods following anatomy-intensive education in the early years of medical education. A medical student tends to lose approximately 14.7% ± 11.7% of their anatomical knowledge within the first year after an anatomy course. Three years into their specialization education, their knowledge further decreases, dropping to roughly 50%, and unless actively reinforced, this decline continues gradually throughout their careers (5, 6). Hence, postgraduate anatomy education should be given due importance because it plays a vital role in enhancing surgical residents' surgical and technical knowledge. Simulation-based training, which includes practical courses and cadaver dissections, allows for the detailed practice of surgical procedures before live patient operations, therefore, it leads to an increase in residents' confidence levels and surgical skills (7, 8).

A significant portion of anesthesia procedures consists of regional anesthesia techniques. Safety and efficacy are mandatory requirements for a regional anesthesia technique, and these can only be met by clinicians who are well-versed in all the anatomical details related to the technique. Topographic anatomy is complex, and training aimed at summarizing anatomical concepts is necessary for high-quality regional anesthesia (9). Research assistant doctors who participated in our study provided high rate positive feedback to the survey questions regarding the importance and benefit of anatomy education in clinical practice: "The education demonstrated the importance of anatomy in the clinic", "the education contributed to my training as a physician", "I was satisfied with the education", "Clinical integrated anatomy education is required" (Table 2). This reflects the fact that anesthesiologists find anatomy education necessary and acknowledge their need for it during their medical training, as has been shown in many studies. In an anesthesia clinic where regional anesthesia rotations were undertaken by 1-year and 3-year residents, a 6-month cadaver review training was provided. After the training, the residents reported feeling more confident in identifying anatomical structures on ultrasound. They found the training to be highly effective in helping them visualize the anatomy they would encounter with ultrasound and stated that this training should be included in the anesthesia specialization curriculum (10). In another anesthesia clinic that organized a procedural anatomy course to better teach the fundamental anatomical and technical details related to regional anesthesia, 83% of the residents stated that the anatomy course positively contributed to their regional anesthesia application skills (11). Similarly, in a survey conducted by Akkoç et al. with internal and surgical physicians, the majority of participants, especially surgical physicians, emphasized the need for anatomy education specific to each department during their specialty training (12). Kandemir et al.

conducted a survey study on resident physicians undergoing specialization training in six different fields (Radiology, Plastic Surgery, General Surgery, Thoracic Surgery, Orthopedics, and Anesthesia) with the topic of "The benefits of integrating anatomy education into the specialization field." In this survey, 96.72% of the participants stated that they needed anatomy education in their speciality and 88.7% remarked that anatomy education should be integrated into speciality education. Most of the resident physicians (62.9%) suggested that this education should be provided in the first year of residency, while 37.1% suggested the second year (13).

The participants in our study provided high rate positive feedback to the survey questions regarding the adequacy of the content of their education: "The education helped me to remember my knowledge in my undergraduate medical school education", "The anatomical expression given in the education was sufficient" and "The education demonstrated the importance of anatomy in the clinic". However, they provided relatively lower levels of positive feedback to the following survey questions: "The duration of the education was sufficient", "The education was original" and "The material used in the education was adequate". It is thought that this reflects the participants' desire to increase the duration of anatomy education and diversify the educational material and method. The debate on the most effective way to teach anatomy continues today. No single teaching method has been found that meets all the requirements of education (14). However, many clinicians believe in and advocate for the critical role of human cadaver dissections in providing essential knowledge, facilitating long-term learning, enhancing clarity and acquiring advanced surgical skills (7, 15). Particularly in surgical specialties, it is recommended to have periodic rotations in cadaver dissection laboratories during specialization training to gain more precise knowledge about the relevant anatomies (8, 16). The French Society of Anesthesia has suggested the inclusion of cadaver dissection workshops in the initial curriculum for anesthesia residents to provide more effective regional anesthesia education (17). Cadaveric dissection has remained the gold standard for learning anatomical knowledge for hundreds of years. Nevertheless, due to limitations such as the difficulty of cadaver procurement, high maintenance costs, and time-consuming education, as well as advances in technology and alternative methods (prosection, plastination, computer-based learning, medical imaging) have brought the top position of cadaveric dissection in anatomy education into question. It is increasingly supported that the best way to teach modern anatomy is to combine multiple pedagogical sources complementarily (18, 19). In our education, cadaveric dissection was not performed, and ultrasonographic examination was carried out on cadavers. The majority of the participants stated that the use of ultrasonography on cadavers did not contribute to their education. This may be due to the inability to observe arterial blood flow accompanying

peripheral nerves, which is an important landmark in regional anesthesia applications with using ultrasonography.

Among the participants included in our study, no difference was detected between the answers given to the questionnaire by those who had experience in neuraxial block application, participation in regional anaesthesia course, ultrasound-guided peripheral nerve block application and those who did not ($p>0.05$). This indicates that participants require clinical anatomy education independently of their experience and level of clinical training.

This study has some limitations. While most participants stated that clinical integrated anatomy education "contributes to regional anesthesia applications", there was no assessment comparing pre- and post-training anatomy knowledge to objectively demonstrate this. The provided clinical anatomy education was mainly theoretical and did not incorporate newer methodologies in anatomy education such as 3D simulation technologies, virtual augmented reality, or simulation training models. The lessons were delivered for 2 hours per week, completing in one month, and all residents at different levels received the same education. A more extended and level-appropriate planning for the education could have enhanced its effectiveness. Implementing the education as part of an anatomy rotation program might have been more efficient, but it was not possible due to the absence of an official anatomy rotation in the anesthesia specialization curriculum. Conducting cadaver dissections during the clinical anatomy education process could have provided significant contributions to peripheral nerve block applications, but it was not possible due to cost and time constraints.

In conclusion, the vast majority of residents indicated that clinical integrated anatomy education was necessary and this education could enhance the quality of their specialty training. We, therefore, recommend that clinical anatomy training should be included in the anaesthesia residency training curriculum.

Major implications

Anatomy education is important at post-graduation medical education especially for surgical branches.

Clinical integrated anatomy education is necessary for anesthesiology research assistants.

Clinically integrated anatomy training can improve safety in regional anesthesia practice.

Inclusion of clinically integrated anatomy education in the anesthesia specialty curriculum may improve the quality of education.

Statements and Declarations

Competing Interests

The author declares no potential conflicts of interest concerning this article's research, authorship, or publication.

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There is no funder.

Data Availability

The data sets generated during or analyzed during the current study are available from the corresponding author upon reasonable request.

Ethics Declarations

Ethical Approval

This study was approved by Selçuk University Medicine Faculty Local Ethic Committee (Approval no: 2022/51).

Authors' Contributions

Emine ASLANLAR: Collection data, conceptualized and designed the study, analyzed and interpreted data, drafted the initial manuscript, and revised and approved the final manuscript as submitted. İnci KARA: revised the manuscript, and approved the final manuscript as submitted. Nadire ÜNVER DOĞAN: conceptualized and designed the study. Zeliha FAZLIOĞULLARI: conceptualized and designed the study. Mustafa BÜYÜKCAVLAK: drafted the initial manuscript and revised.

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