

# Pediatric Surgeons' Approaches to Postoperative Analgesia in Türkiye

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## ABSTRACT

**Objective:** This research aimed to evaluate the knowledge and experience of pediatric surgeons in Türkiye regarding multimodal analgesia approaches, and the use of regional anesthesia techniques in pediatric abdominal surgery. The research also aimed to investigate what can be done for better pain management in pediatric abdominal surgeries in Türkiye.

**Materials and Methods:** The study sample included 825 active pediatric surgery specialists and 204 resident physicians in Türkiye. A questionnaire consisting of 27 questions was distributed to Turkish pediatric surgeons via email and WhatsApp. Based on the answers given to the questionnaire, we aimed to investigate the most commonly used postoperative analgesia methods in pediatric abdominal surgeries, whether multimodal analgesia methods are preferred for pain control, and the reasons affecting these preferences.

**Results:** Feedback was received from 122 physicians. Among the participants, 54.09% had worked as pediatric surgeons for 15 years or more, while 8.19% were resident physicians. Anesthesiologists, with whom 55.4% of the participants worked, preferred only intravenous (IV) drugs as the postoperative analgesia method. It was found that 70.8% of the participants did not experience ultrasound-guided anterior abdominal wall blocks in pediatric cases at their institutions. Additionally, a significant proportion of the participants (82%) reported a lack of training on multimodal analgesia.

**Conclusion:** The data show a lack of awareness regarding the importance of using multimodal analgesia approach in pediatric cases, revealing the importance of the benefits of collaborative work and training programs.

**Keywords:** Anesthesiologists, multimodal treatment, pain management, pediatrics, questionnaires, surgeons

**How to cite this article:** Erten E, Bahadır GB. Pediatric Surgeons' Approaches to Postoperative Analgesia in Türkiye. CM 2024;16(1):45-50

## INTRODUCTION

Effective and long-lasting analgesia is crucial for ensuring the satisfaction of both children and their parents following pediatric surgeries. Although efforts to improve the pain management of children in the perioperative period have been increasing for many years, the number of children suffering from pain during this period is still quite high. In the latest European Society for Paediatric Anaesthesiology (ESPA) guideline (for 6 surgical procedures such as inguinal hernia repair, pyloromyotomy, and appendectomy), in addition to intravenous (IV) or rectal drugs to reduce postoperative pain, local wound infiltration/local port-side infiltration by the surgeon with a long-acting local anesthetic at

the basic level, landmark-based ilioinguinal/iliohypogastric block with a long-acting local anesthetic combined with an appropriate adjunct (clonidine) at the intermediate level, and at the advanced level, it is also recommended to use the application of ultrasound-guided peripheral blocks (e.g., ilioinguinal/iliohypogastric, transversus abdominis plane (TAP) block, paravertebral block) with a long-acting local anesthetic, combined with an appropriate adjunct.<sup>[1]</sup>

The use of a multimodal analgesia approach, which consists of regional anesthesia techniques, is recommended to provide sufficient pain relief in pediatric patients.<sup>[2]</sup> Multimodal analgesia refers to the administration of two or more drugs that use different mechanisms to provide analgesia. The pri-



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**Received date:** 11.10.2023

**Revised date:** 19.12.2023

**Accepted date:** 23.12.2023

**Online date:** 15.01.2024



mary goal of multimodal analgesia is to reduce the use of opioids and their associated side effects while managing pain effectively.<sup>[3]</sup> Abdominal wall blocks, frequently employed as part of regional anesthesia techniques, are highly effective methods for providing sufficient analgesia in pediatric abdominal surgeries.<sup>[4]</sup> Examples of commonly used abdominal wall blocks include the TAP block, the ilioinguinal/iliohypogastric nerve block, and the rectus sheath block.<sup>[5]</sup>

Pediatric surgeons play a significant role in making decisions regarding analgesia for their patients, given their increasing interactions with patients and their families in the preoperative and postoperative periods. Therefore, pediatric surgeons need to have knowledge about perioperative analgesia methods. This study aims to evaluate current practices in pain management for pediatric abdominal surgeries in Türkiye. The aims are to explain the knowledge and approaches of pediatric surgeons in this area, identify potential barriers to ideal practices, and seek solutions to improve pain management after abdominal surgery in children.

## MATERIALS and METHODS

### Study Design

Our questionnaire was prepared to be completed in 10 minutes and included 27 multiple-choice questions. In the first part of the questionnaire, questions were related to the institutions and working periods of the participants. In the second part, questions were related to the post-op analgesia approaches of the anesthesiologists they worked with in abdominal surgeries, and their experiences with pain in the postoperative follow-up of pediatric surgeons. In the third part, questions were related to their experiences and opinions about USG-guided abdominal wall blocks, which have recently become widespread. Finally, questions were asked about how to improve the multimodal analgesia approach in pediatric abdominal surgeries. Before publication, the questionnaire was tested by five health professionals with significant experience in pain management in children.

The study was carried out electronically between April 15 and 20, 2023. A total of 825 active pediatric surgery specialists and 204 resident physicians across Türkiye were electronically contacted via email and WhatsApp, and invited to complete the questionnaire. Those contacted who did not complete the questionnaire within the specified timeframe, or had incomplete answers, were excluded from the study. Our study received approval from the local ethics committee (Clinical Research Ethics Committee, 2023/95), and was conducted in accordance with the ethical principles outlined in the Declaration of Helsinki.

### Statistical Analysis

All data were uploaded to the SPSS-16 program, and means and percentages were calculated.

Non-parametric chi-square goodness-of-fit tests were used for the statistical analysis of categorical variables. The significance level was set at  $p < 0.05$ . Spearman's rank correlation analysis method, a non-parametric test, was used for the study's correlation analysis. The Statistical Package for Social Sciences (SPSS) version 16.0 for Windows (SPSS Inc., Chicago, IL, USA) was used for data analysis.

## RESULTS

A total of 825 pediatric surgery specialists and 204 resident physicians in Türkiye were contacted via phone, WhatsApp, and email to participate in the survey, and out of these 122 individuals completed the questionnaire in full, and were included in the study.

The distribution of participants, according to the institution where they worked, is as follows: 42.6% in university hospitals, 24.6% in training and research hospitals, 18.9% in private hospitals, and 13.9% in public hospitals (Table 1). When examining the relationship between multimodal analgesia approaches and the institutions the participants worked in, it was found that pediatric surgeons working in universities and training and research hospitals (number; 82) had a significantly higher level of experience than pediatric surgeons working in private and public hospitals (number; 37), regarding ultrasound-guided anterior wall blocks ( $p = 0.025$ ).

The majority of the participants (54.09%) had been working as pediatric surgeons for more than 15 years, while 8.19% worked as resident physicians (Table 2). However, there was no statistically significant relationship between the duration of working as a pediatric surgeon and the experience of regional anesthesia techniques in their cases ( $p = 0.214$ ).

The anesthesiologist with whom 29.5% of the participants worked was only applying anesthesia to the children. However, we found that there was no difference between the choice of multimodal analgesia method between anesthesiologists who applied anesthesia only in pediatric cases (number; 36) and anesthesiologists who applied anesthesia in all patients (number; 86) ( $p = 0.132$ ). According to the answers selected by the participants, 55.4% of the anesthesiologists they worked with used only intravenous (IV) drugs, 19.6% used IV drugs and local anesthetic infiltration (LAI) instead of incisions, and 16.1% used IV drugs and abdominal wall blocks as postoperative analgesia method.

**Table 1. The institutions where the participants work**

Institution	The number of participants	%
Training and research hospital	30	24.6
University Hospital	52	42.6
Public Hospital	17	13.9
Private hospital	23	18.9

**Table 2. Participants' years of experience in pediatric surgery**

Years	The number of participants	%
15 years or more	66	54.09
10–15 years	28	22.9
5–10	18	14.75
Residents	10	8.19

Regarding the most effective anesthesia method at the incision sites, 39.8% of the participants found caudal block effective, while 38.9% preferred LAI (Table 3). The majority of the participants (70.8%) stated that ultrasound-guided abdominal wall blocks were not performed in the hospitals where they worked (Table 4). While 62.8% of the participants were not sure about the success of ultrasound-guided abdominal wall blocks, 34.5% of the participants found them successful. The most commonly performed abdominal wall block in pediatric abdominal surgeries, as identified by 20.4% of the respondents, was the ultrasound-guided TAP block.

When asked about the application times of multimodal analgesia methods, 24.8% of pediatric surgeons indicated that caudal block requires more time, 17.7% indicated ultrasound-guided ilioinguinal block, and 14.2% indicated for ultrasound-guided TAP block. According to survey responses, the long duration of multimodal analgesia affected the analgesia preferences of 75.8% of respondents.

While 72.1% of the participants had no idea about the satisfaction of families after multimodal analgesia methods, 12.4% stated that families were most dissatisfied after caudal block.

When asked about the multimodal analgesia method they did not prefer, 60.2% of the participants were not sure, while 11.5% specifically expressed reluctance towards the caudal block. The reasons for this reluctance were the long duration of the procedure (61%), and concerns about complications (32.2%). However, pediatric surgeons faced with complications were not against the use of multimodal analgesia. ( $p=0.4369$ ).

**Table 3. Anesthesia method that pediatric surgeons find most successful**

Method	The number of participants	%
Caudal block	45	39.8
LA	44	38.9
USG-guided anterior abdominal wall block	23	20.4
Anterior abdominal wall blocks	1	0.9
No idea	9	7.37

**Table 4. Participants whose institution uses USG-guided anterior abdominal wall block in pediatric surgeries**

Frequency of USG-guided anterior abdominal wall block	The number of participants	%
60%< of the cases	10	8.8
40–60 % of the cases	1	0.9
40 %> of the cases	22	19.5
None	80	70.8

According to 69% of the participants, more use of ultrasound-guided blocks as part of multimodal analgesia in pediatric cases would be beneficial. Of the 35 participants who responded negatively that ultrasound-guided blocks should be used more frequently in pediatric cases, 14.3% cited concerns about complications, 20% cited the long duration of the procedure, and 11.4% believed that the method was ineffective.

Most of the participants (82%) reported a lack of training in multimodal analgesia, while 84.1% stated that it would be beneficial for anesthesiologists to organize a training course focusing on abdominal wall blocks, especially for pediatric surgeons.

## DISCUSSION

Good and properly designed perioperative pain management is crucial for the success of a surgical procedure. Particularly in postoperative pain management, the goal is to achieve a tolerable level of pain that allows patients to resume their daily activities. While opioids are commonly used for this purpose, they have significant side effects such as respiratory depression, extended hospital stay, and even death.<sup>[6]</sup> Furthermore, research has shown that opioid prescriptions during adolescence increase the likelihood of future opioid and other drug abuse.<sup>[7,8]</sup> Multimodal analgesia techniques like abdominal wall blocks in pediatric surgeries contributes positively to effective pain control and reduces the need for opioids.<sup>[3]</sup>

Studies have reported that sufficient postoperative pain control is not frequently achieved in children, and they have pain ranging from moderate to severe in the postoperative period.<sup>[9,10]</sup> Therefore, the use of multimodal analgesia methods, particularly regional anesthesia techniques, is recommended for pediatric postoperative pain management.<sup>[2]</sup> The recent report by the American Pediatric Regional Anesthesia Network (PRAN) has confirmed the increasing use and safety of regional anesthesia in children.<sup>[10]</sup>

There are limited studies in the literature about postoperative pain management in pediatric cases. We have observed a lack of research on the approaches of pediatric surgeons to postoperative analgesia in Türkiye. Morrison et al.<sup>[11]</sup> conducted a survey study exploring pediatric urologists' preferences for intraoperative anesthesia and postoperative analgesics during urological surgeries. They discovered that most participants preferred local/regional anesthesia for intraoperative anesthesia and opioids for postoperative pain control.<sup>[11]</sup> Similarly, in our study, the postoperative analgesia preference of the participants and the anesthesiologists they worked with was mostly IV anesthetics. Unlike Morrison et al.<sup>[11]</sup> our study focused on analgesia approaches in abdominal surgery and only in the postoperative period.

Our study revealed that anesthesiologists working with pediatric surgeons preferred the use of IV drugs (acetaminophen, non-steroidal anti-inflammatory drugs (NSAID), opioids) as a postoperative analgesia method. Acetaminophen and NSAIDs are often used as first-line treatment for mild to moderate pain in pediatric patients because they have fewer side effects.<sup>[12]</sup> However, the use of regional anesthesia methods has recently increased in pediatric patients because they reduce opioid-dependent side effects and provide early recovery.<sup>[13]</sup> In this survey study, in which we investigated regional anesthesia methods as a part of multimodal analgesia in pediatric cases in Türkiye, we found that regional analgesia is not yet sufficiently applied. This result may be attributed to a lack of training among anesthesiologists concerning regional analgesia methods used in pediatric cases and/or a shortage of equipment, such as ultrasound machines and block needles in anesthesia clinics, as well as the surgeons' reluctance to apply regional analgesia methods. Therefore, we believe that courses and training programs for anesthesiologists should be enhanced to increase the regional techniques in pediatric surgical procedures, along with the importance of ultrasonography.

Considering that most participants in our study have been working as pediatric surgeons for over 15 years in university hospitals, we assume that they must have experience

in regional anesthesia techniques. However, 48.4% of participants with 15 or more years of experience had not experienced an ultrasound-guided TAP block, which is one of the most commonly used regional anesthesia techniques in abdominal surgery.<sup>[14]</sup> In accordance with the survey results, we assume that one reason for this was the lack of preference among anesthesiologists, and another reason was the reluctance of surgeons to demand it. However, the survey suggests that the primary reason pediatric surgeons avoid it is more likely a lack of knowledge and experience.

The study conducted by Dadure et al.,<sup>[14]</sup> investigating the use of regional anesthesia techniques in children across 33 European countries including Türkiye, found that the most commonly used regional anesthesia method was caudal block. In our study, most of the pediatric surgeons preferred local anesthesia infiltration instead of incision as a multimodal analgesia method in abdominal surgeries, and caudal block was their second preferred method. The reason for this difference may be that we only questioned on the analgesia methods used in abdominal surgeries.

The majority of the participants (68.9%) reported that ultrasound-guided abdominal wall blocks were not performed in pediatric cases in their institutions. However, according to the survey, the most commonly performed anterior abdominal wall block was the ultrasound-guided TAP block. Numerous studies have demonstrated the positive contribution of TAP block to postoperative analgesia in pediatric cases.<sup>[15-17]</sup> Therefore, we believe that it would be beneficial to expand the use of USG-guided abdominal wall blocks in pediatric patients undergoing abdominal surgery.

The majority of the participants (61.5%) were uncertain about the success of ultrasound-guided abdominal wall blocks, and they had no knowledge of the duration of analgesic effects provided by multimodal analgesia methods. We believe that the lack of training or information on multimodal analgesia methods among most participants, along with the anesthesiologists' tendency to primarily use IV drugs for postoperative pain management, may have contributed to this result. Similarly, Miró et al.<sup>[18]</sup> have suggested that limited access to sufficient education and training is one of the main obstacles to proper pain management by healthcare professionals in pediatric cases.

The survey questions we asked revealed that surgeons' concerns about the duration of the operation affected their choice of analgesia method. Most of the participants (49.2%) stated that they would prefer the fastest available method as the postoperative analgesia method, but 17.2% stated that they would choose the fastest available method when the oper-

ation list was crowded. However, insufficient postoperative pain control will lead to increased postoperative complications and prolonged hospitalization which, in turn, will lead to increased costs, loss of labor force, and dissatisfaction of patients and physicians. It is really important to pursue acceptance of that issue by surgeons and hospital administrators.

The participants cited the lengthy process duration as the reason for their reluctance to adopt regional anesthetic methods, rather than the risk of possible complications or infection. However, when the complications they observed were questioned, the majority of the participants did not state a serious problem. Also, the widespread use of ultrasound has significantly reduced the risk of complications associated with regional blocks, leading to increased utilization of regional anesthesia in multimodal analgesia.<sup>[10,19]</sup> However, blocks will be made safer when ultrasound in the pediatric patient group will be carried out under ultrasound guidance with training on its use.<sup>[20]</sup>

### Study Limitations

Our study had several limitations. First, the sample size was small, which could limit the generalizability of the findings. In future studies, it would be beneficial to include a larger number of participants to obtain a more representative sample. Another limitation is that the survey does not pose questions on specific types of surgeries or ages, which could have provided more detailed insights. However, doing so might have resulted in a longer survey, potentially leading to participant attrition. Additionally, our study focused on a broad overview of analgesic approaches in pediatric cases. Conducting more specific studies that investigate analgesic approaches for particular types of surgeries would provide more targeted and in-depth information.

### CONCLUSION

This study highlights the importance of a collaborative approach, involving anesthesiologists and pediatric surgeons, for effective postoperative pain management in pediatric cases. However, survey responses point to a lack of awareness and understanding of the importance of multimodal analgesia approaches in pediatric cases, and highlight the need for training courses to address this gap. Our study suggests that the creation of online training platforms for pediatric surgeons and anesthesiologists in Türkiye will contribute to the dissemination of pediatric analgesia training. In addition, the elimination of equipment deficiencies in anesthesia clinics, and widespread training in regional anesthesia techniques, will facilitate more widespread use of ultrasound-guided abdominal blocks in pediatric cases.

### Disclosures

**Ethics Committee Approval:** The study was approved by the Gülhane Training and Research Hospital Clinical Research Ethics Committee (No: 2023/95, Date: 12/04/2023).

**Informed Consent:** Written informed consent was obtained from all patients.

**Peer-review:** Externally peer reviewed.

**Authorship Contributions:** Concept: E.E., G.B.B.; Design: E.E., G.B.B.; Supervision: E.E., G.B.B.; Funding: E.E., G.B.B.; Materials: E.E., G.B.B.; Data Collection or Processing: E.E., G.B.B.; Analysis or Interpretation: E.E., G.B.B.; Literature Search: E.E., G.B.B.; Writing: E.E., G.B.B.; Critical review: E.E., G.B.B.

**Conflict of Interest:** No conflict of interest was declared by the authors.

**Financial Disclosure:** The authors declared that this study received no financial support.

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