Research Article

Cost-effectiveness of fascial plane blocks in laparoscopic cholecystectomy: A retrospective study

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ABSTRACT

Background: Fascial plane blocks have increasingly been used in recent years as a component of multimodal analgesia. The aim of this study was to evaluate the impact of fascial plane blocks, applied for postoperative analgesia, on hospital costs in laparoscopic cholecystectomy (LC) procedures.

Materials and Methods: This retrospective, single-center study included 1414 patients who underwent elective LC under general anesthesia between 2020 and 2025. Patients were divided into two groups: those who received fascial plane blocks (Group M, n=346) and those who received the standard analgesia protocol (Group S, n=1068). Total hospital invoice costs at discharge, length of hospital stay, demographic characteristics, ASA scores, and comorbidities were compared between the groups.

Results: No significant differences were observed between the groups regarding age, sex, or comorbidity rates. Hospital length of stay was similar. In the overall analysis covering 2020–2025, hospital costs were significantly lower in the fascial plane block group (p<0.001). Subgroup analyses by year revealed a significant cost difference in favor of the fascial plane block group only in 2024.

Conclusions: In addition to providing effective analgesia, fascial plane blocks reduced hospital costs in LC procedures, contributing as a cost-effective component of multimodal analgesia.

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1. Introduction

Laparoscopic cholecystectomy (LC) is one of the most frequently performed operations among all surgical procedures and accounts for a significant proportion of healthcare expenditures. Currently, accelerating postoperative recovery, shortening hospital length of stay, and thereby reducing hospital costs are among the primary goals of the Enhanced Recovery After Surgery (ERAS) protocols [1].

In recent years, opioid-free analgesia and multimodal analgesia approaches have gained increasing importance in anesthesia and analgesia practice, aiming to prevent opioid-related side effects. In this context, fascial plane blocks are being increasingly used for postoperative analgesia and are considered a significant advancement in daily practice [2]. In laparoscopic cholecystectomies, both somatic pain due to trocar insertion sites and visceral pain associated with gallbladder manipulation and pneumoperitoneum may occur [3,4]. While postoperative pain of moderate to severe intensity was traditionally managed with paracetamol, nonsteroidal anti-inflammatory drugs, and opioids, the current trend increasingly favors the use of fascial plane blocks, particularly as alternatives to opioids.

In abdominal surgeries, various techniques such as the transversus abdominis plane block (TAP), erector spinae plane block (ESP), quadratus lumborum block

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(QLB), modified thoracoabdominal plane block (m-TAPA), and external oblique intercostal block may be employed [5–7]. The literature reports that these blocks provide effective analgesia, reduce the need for rescue analgesics, lower postoperative pain scores, and decrease opioid-related side effects such as postoperative nausea and vomiting [5–9]. A reduction in opioid consumption contributes to lowering the incidence of atelectasis secondary to pain, thromboembolic complications due to delayed mobilization, and nausea and vomiting, thereby shortening hospital length of stay and consequently reducing hospital costs.

The aim of this study is to compare the effects of fascial plane blocks applied for postoperative analgesia on hospital costs in laparoscopic cholecystectomy operations. In this context, it was planned to compare the invoice amounts generated at discharge between patients who received fascial plane blocks and those who did not.

2. Materials and Methods

2.1. Study design and ethical approval

This study was conducted as a retrospective, single-center investigation at Gaziosmanpaşa Training and Research Hospital. Ethical approval was obtained from the Non-Interventional Research Ethics Committee of Health Sciences University, Gaziosmanpaşa Training and Research Hospital on October 25, 2023 (Decision No: 2023/138).

Subsequently, an additional application was submitted to the same ethics committee to include patients operated on until June 1, 2025, and approval was granted. In this study, patients who underwent elective laparoscopic cholecystectomy (LC) under general anesthesia in the general surgery operating room of Gaziosmanpaşa Training and Research Hospital were retrospectively reviewed. During this period, a total of 2572 LC procedures were performed under general anesthesia at our institution. After excluding patients with missing data or not meeting the inclusion criteria, 346 patients in the block group (from 725 patients with block application) and 1068 patients in the non-block group (from 1847 patients without block application) were analyzed (Fig. 1).

2.2. Patient selection

The study included patients aged between 18 and 65 years who underwent elective LC under general anesthesia. Patients admitted and operated on for acute cholecystitis, those who required reoperation due to postoperative complications, and those with a hospital stay of 6 days or longer were excluded from the study.

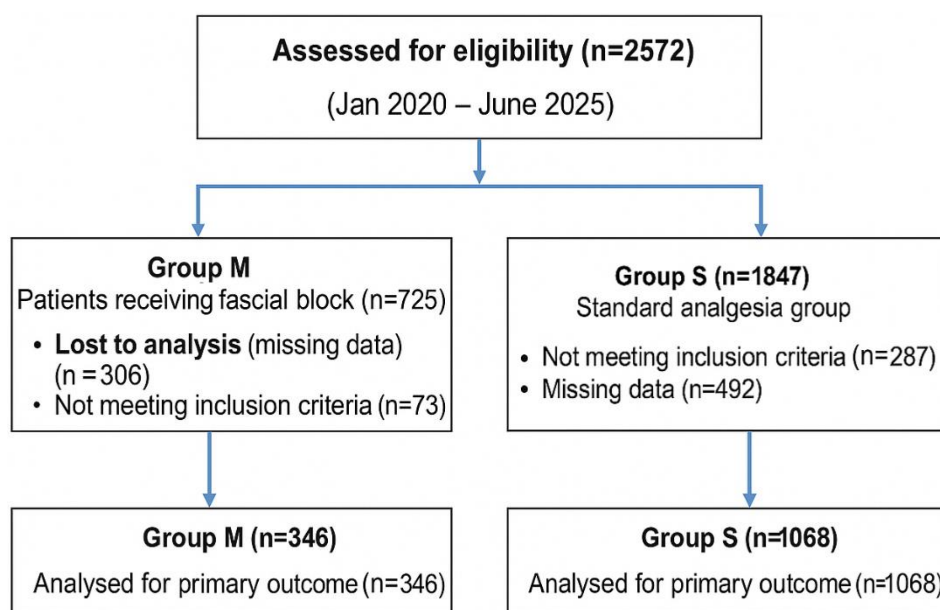

Fig. 1. Study flowchart.

2.3. Anesthesia and postoperative analgesia protocol

In our clinic, all patients receive standard monitoring (electrocardiography, noninvasive blood pressure measurement, pulse oximetry) and a standard general anesthesia technique. For induction of general anesthesia, propofol 2 mg/kg, lidocaine 1 mg/kg, midazolam 0.05 mg/kg, and rocuronium 0.6 mg/kg are routinely administered. General anesthesia is maintained with remifentanil and sevoflurane, while postoperative analgesia consists of paracetamol 1 g, tramadol 1 mg/kg, and ondansetron. In the general surgery clinic, paracetamol, dexketoprofen, and diclofenac are preferred as first-line postoperative analgesics, whereas tramadol is generally administered as a second-line treatment if needed. For patients experiencing nausea and vomiting, additional ondansetron or dexamethasone may be administered in the ward. Unless complications occur, all laparoscopic cholecystectomy patients are routinely discharged home after 24 hours.

2.4. Intervention and group definitions

In our clinic, fascial plane blocks may be performed in suitable patients and under appropriate conditions for postoperative multimodal analgesia in LC operations. Prior to all block procedures, patients are informed both verbally and in writing, and written consent is obtained. Blocks are usually performed preoperatively and bilaterally. The most commonly performed blocks are the modified thoracoabdominal plane block (m-TAPA), quadratus lumborum block (QLB), or erector spinae plane block (ESP).

For block applications, a standard local anesthetic solution consisting of 20 mL of 0.25% bupivacaine per side is administered under ultrasound guidance. In accordance with the national reimbursement system (SUT), block procedures are coded as a single intervention.

- Group M: Patients who, according to the SUT codes, underwent fascial plane block in addition to LC for multimodal analgesia were assigned to this group.
- Group S: Patients who underwent LC alone and received only the standard analgesia protocol without fascial plane block were assigned to this group.

2.5. Data collection and endpoints

Data were obtained by screening the hospital archives using SUT codes for laparoscopic cholecystectomy and fascial plane block procedures. Demographic characteristics, ASA scores, length of hospital stay, diagnoses of chronic diseases such as diabetes and hypertension, and total hospital invoice costs at discharge were recorded.

2.6. Outcome measures

The primary outcome of this study was the comparison of total hospital costs between 2020 and 2025 in patients who underwent elective LC under general anesthesia, comparing those who received a fascial plane block with those who received standard analgesia. The secondary outcomes were subgroup comparisons by year between the two groups and comparison of hospital length of stay.

2.7. Statistical analysis

Descriptive statistics included median (Q1–Q3), frequency, and percentage values. The distribution of variables was tested using the Kolmogorov–Smirnov test. The Mann–Whitney U test was used to analyze independent quantitative variables with non-normal distribution. The chi-square test was applied for independent qualitative variables. All analyses were performed using SPSS version 28.0.

3. Results

In this study, 346 patients in Group M and 1068 patients in Group S were analyzed. The groups were comparable in terms of age and sex distribution. There was a significant difference in ASA scores between the groups. The proportion of ASA I patients was significantly higher in Group M. The prevalence of chronic comorbidities such as hypertension (HT) and diabetes mellitus (DM) was similar between the groups. The length of hospital stay was comparable between the two groups (Table 1).

When the distribution of patients across years was compared, a significant difference was observed between the groups ($p < 0.001$) (Table 2).

When all patients operated between 2020 and 2025 were compared, there was a significant difference in hospital costs between the group that received fascial plane blocks and the group that did not (Table 3). Hospital costs were significantly lower in patients who received fascial plane blocks ($p < 0.001$).

In subgroup analyses by year, no significant difference in hospital costs was observed between the two groups in 2020. Since no fascial plane blocks were performed in 2021, data for that year were unavailable. In 2022, 2023, and 2025, no significant differences in costs were found between the groups. However, in 2024, hospital costs differed significantly between the two groups ($p < 0.001$) (Table 3) (Fig. 2).

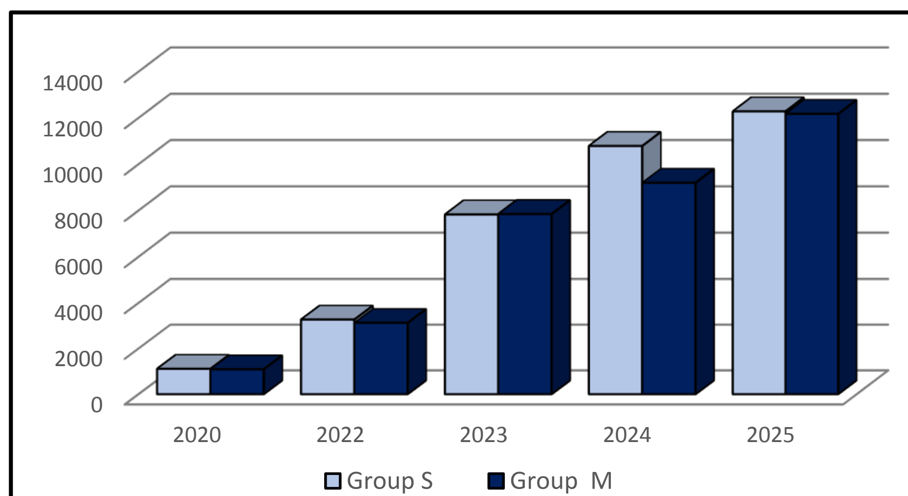

Fig. 2. Year-by-year comparison of per-patient hospital costs between groups (TRY).

Table 1. Comparison of demographic data between groups.

	Group M (n=346)	Group S (n=1068)	p
	n (%)	n (%)	
Gender			
Female	253 (73.1)	818 (76.6)	0.2
Male	93 (26.9)	250 (23.4)	
Presence of diabetes mellitus	62 (17.9)	227 (21.3)	0.2
Presence of hypertension	61 (17.6)	237 (22.2)	0.1
ASA			
I	72 (20.8)	152 (14.2)	0.004
II	266 (76.9)	880 (82.4)	
III	8 (2.3)	35 (3.3)	
IV	0 (0.0)	1 (0.1)	
	Med (Q1-Q3)	Med (Q1-Q3)	p
Age (year)	45.5 (36-53)	45.5 (36-54)	0.6
Hospital length of stay (days)	3 (2-4)	3 (2-4)	0.4

Values are expressed as median (Q1–Q3) and as number and percentage (n, %) for categorical variables, where Q1 and Q3 represent the first and third quartiles, respectively. Group M: fascial plane block; Group S: standard analgesia (no block). The distribution of variables was assessed using the Kolmogorov–Smirnov test. Since the data did not follow a normal distribution, comparisons between groups were performed using the Mann–Whitney U test. A p-value <0.05 was considered statistically significant.

Table 2. Distribution of patient numbers by year.

Year	Group M (n =346)	Group S (n = 1068)	p
	n (%)	n (%)	
2020	42 (12.1)	120 (11.2)	0<0.001
2022	103 (29.8)	210 (19.2)	
2023	80 (23.1)	150 (14.0)	
2024	94 (27.2)	397 (37.2)	
2025	27 (7.8)	191 (17.9)	

Values are presented as number and percentage (n, %) for categorical variables.
Group M: fascial plane block; Group S: standard analgesia (no block). Statistical tests: Chi-square test. $p < 0.05$

Table 3. Comparison of hospital costs (TRY) between groups.

Year	Group M (n =346)	Group S (n = 1068)	p
	Med (Q_1-Q_3)	Med (Q_1-Q_3)	
2020	1060.5 (1060.5-1060.5)	1060.5 (1060.5-1060.5)	0.199
2022	3486.2 (2497.7-3486.2)	3486.2 (2965.8-3486.2)	0.052
2023	8091.4 (8091.4-8093.8)	8091.4 (8091.4-8094.5)	0.899
2024	8094.5 (8094.5-12137.2)	12137.2 (8094.5-12137.2)	<0.001
2025	12137.2 (12137.2-12367.2)	12137.2 (12137.2-12137.2)	0.791
2020-2025 (aggregate, all years)	8091.4 (3486.2-8094.5)	8094.5 (3486.2-12137.2)	<0.001

Data are expressed as median (Q1–Q3), where Q1 = 25th percentile and Q3 = 75th percentile.
Group M: fascial plane block; Group S: standard analgesia (no block). Values are reported in Turkish Lira (TRY).
Statistical tests: Mann-Whitney U test. $p < 0.05$

4. Discussion

In this study, when hospital costs of patients who underwent elective LC between 2020 and 2025 were evaluated, the overall analysis across all years demonstrated significantly lower costs in patients who received fascial plane blocks. Considering the variable inflation conditions in Türkiye, subgroup analyses by year revealed no significant difference between the groups in 2020, 2022, 2023, and 2025, whereas in 2024, costs were found to be lower in the group that received fascial plane blocks.

Fascial plane blocks provide effective analgesia during both the intraoperative and postoperative periods, reducing the need for analgesics and consequently the use of rescue analgesics. This contributes to lowering the incidence of postoperative nausea and vomiting and complication rates, thereby indirectly reducing hospital costs.

In the present study, examination of ASA distributions revealed that the number of ASA I patients was higher in the group that received fascial plane blocks, no ASA IV patients were present in this group, whereas one ASA IV patient was identified in the standard analgesia group. This difference may be attributable to the preference in our clinic for selecting ASA I–II patients in randomized controlled trials. The distribution of diabetes mellitus and hypertension, the proportion of ASA II–III patients, and the mean age were comparable between the groups. Only the proportion of ASA I patients was higher in the multimodal analgesia group, which may have introduced a minor imbalance. Nevertheless, considering the similarity in age, comorbidities, and higher ASA classifications, the generalizability of the results appears to be largely preserved.

In order to ensure homogeneity, patients with a hospital stay longer than five days were excluded from the analysis, as prolonged hospitalization was considered likely to indicate the occurrence of complications that could compromise group comparability. At our institution, patients scheduled for elective LC are routinely admitted one day before surgery and are generally discharged within 24 hours postoperatively. Since patients with a hospital stay exceeding five days were presumed to have a higher probability of developing complications, their exclusion was deemed necessary to preserve homogeneity. This decision was also based on the possibility that complication-related diagnostic codes may not have been consistently entered into the hospital records.

In 2021, due to the COVID-19 pandemic, the number of elective surgeries was very low, and since no fascial plane blocks were performed during this period, analyses could not be conducted for that year.

We initially aimed to compare the postoperative analgesic requirements of all patients. However, upon reviewing the data, we noticed that analgesic information was missing in approximately 30 % of the patients, including even routinely administered agents such as paracetamol and NSAIDs. This deficiency was most likely due to changes in the hospital information software system implemented in 2024, which led to incomplete transfer of medication records. To avoid biased results, we therefore decided not to analyze postoperative analgesic consumption and instead focused our comparison on total hospital costs, for which complete and reliable data were available.

Although it could be anticipated that intraoperative remifentanil and sevoflurane consumption might be lower in patients who received fascial plane blocks, we believe that the reductions in the need for postoperative analgesics and antitussive medications were primarily responsible for the observed cost differences. Despite the use of one vial of bupivacaine per patient and the procedure being billed, the lower costs observed in patients who received fascial plane blocks were attributed to the lower cost of the analgesics used.

Our findings were consistent with previous studies demonstrating the cost-effectiveness of fascial plane blocks in LC cases [10]. In a double-blind randomized clinical trial, laparoscopically guided TAP block was shown to reduce postoperative analgesic requirements, decrease the incidence of Postoperative Nausea and Vomiting (PONV), and be approximately 20 times more cost-effective compared to the non-TAP technique [10]. Considering that TAP blocks provide only somatic analgesia, better analgesia would be expected with techniques such as QLB and ESP blocks. Studies have demonstrated that in ESP and QLB blocks, the local anesthetic can spread along the thoracolumbar fascia into the paravertebral space, thereby providing visceral analgesic efficacy [11–15].

In a meta-analysis published by Oraee et al. [16], QLB and ESP blocks were reported to provide similar analgesic effects in laparoscopic surgeries, with both blocks offering superior analgesia compared to TAP blocks. Furthermore, meta-analyses have shown that m-TAPA and ESP blocks provide effective analgesia in LC procedures and reduce postoperative analgesic consumption [17–19].

In this study, subgroup analyses by year demonstrated similar costs between the groups in 2020, 2022, 2023, and 2025. However, in 2024, costs were found to be higher in the standard analgesia group. These results may be attributed not only to the lower requirements for analgesic medications and reduced incidence of complications such as nausea and vomiting secondary to opioid use in the fascial plane block group, but also to the relatively higher number of patients in the standard analgesia group, of whom 37% belonged to the year 2024, which may have influenced the outcomes. In addition, changes in SUT pricing for LC operations were noted in mid-2024. Furthermore, due to the conduct of randomized controlled trials, fascial plane block applications were more concentrated in the early part of 2024, which may have altered the mean hospital costs.

Similar to our findings, studies in the literature have reported the cost-effectiveness of fascial plane blocks in different surgical contexts. For instance, in a study comparing TAP blocks with liposomal bupivacaine to oral opioids in patients undergoing laparoscopic hysterectomy, the liposomal bupivacaine group was found to be more cost-effective [20]. Likewise, in posterior lumbar fusion surgery, the addition of ESP blocks to standard analgesics was shown to reduce postoperative pain, shorten hospital stay, and thereby contribute to cost reduction [21]. These findings suggest that fascial plane blocks may contribute to cost-effectiveness across various surgical fields and are consistent with our results.

This study has several limitations. First, it was conducted in a single center, and the imbalance in ASA distribution between groups, with a higher proportion of ASA I patients in the block group, may have influenced the results. Second, postoperative analgesic requirements could not be fully analyzed because of missing data in approximately one-third of the patients, most likely related to deficiencies in data transfer during the

transition between hospital information systems. Third, no sample size or power calculation was performed due to the retrospective design. Although all eligible patients during the study period were included to maximize study power, the absence of a priori power analysis may restrict the interpretation of subgroup analyses. In addition, the cost analysis has some constraints. Although cost data were directly obtained from the hospital billing system, no adjustment for inflation or currency fluctuations was applied. Given the highly variable inflation in Türkiye and the substantial currency fluctuations during the global economic crisis period (2020–2025), standardizing costs to a single year or currency was considered potentially misleading; therefore, subgroup analyses were performed by year, which we believe provides a clearer and more reliable comparison. Finally, although different fascial plane block techniques (m-TAPA, QLB, ESP) are performed in our institution, they are recorded under the same procedure code in the hospital information system in accordance with national reimbursement regulations. As a result, we were unable to analyze patients according to block type, which may limit the reproducibility and generalizability of the findings.

5. Conclusions

Fascial plane blocks reduced hospital costs in laparoscopic cholecystectomy, supporting their role as a cost-effective component of multimodal analgesia.

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Conflict of Interest

The author declared no potential conflicts of interest with respect to the research, authorship, and/or publication of this manuscript.

Data Availability

The datasets created and/or analyzed during the current study are not publicly available, but are available from the corresponding author upon reasonable request.

Ethics Approval and Consent to Participate

This study was approved by the ethics committee of Non-Interventional Research Ethics Committee of Health Sciences University, Gaziosmanpaşa Training and Research Hospital (Approval Number:2023/138; Date: 25.20.2023). Written informed consent was obtained from the participants. All methods were performed in accordance with relevant guidelines and regulations.

Author Contributions

The author confirms sole responsibility for all aspects of the study including: conceptualization, methodology, formal analysis, investigation, data curation, visualization, writing – original draft, and writing – review & editing.

References

1. Feldheiser A, Aziz O, Baldini G, et al. Enhanced Recovery After Surgery (ERAS) for gastrointestinal surgery, part 2: consensus statement for anaesthesia practice. *Acta Anaesthesiol Scand* **2016**;60(3):289-334.
2. Bourgeois C, Oyaert L, Van de Velde M, et al. Pain management after laparoscopic cholecystectomy: A systematic review and procedure-specific postoperative pain management (PROSPECT) recommendations. *Eur J Anaesthesiol.* **2024**;41(11):841-855.
3. Ekstein P, Szold A, Sagie B, Werbin N, Klausner JM, Weinbroum AA. Laparoscopic surgery may be associated with severe pain and high analgesia requirements in the immediate postoperative period. *Ann Surg.* **2006**;243(1):41-6.
4. Mitra S, Khandelwal P, Roberts K, Kumar S, Vadivelu N. Pain relief in laparoscopic cholecystectomy--a review of the current options. *Pain Pract.* **2012**;12(6):485-496.
5. Bilge A, Başaran B, Altıparmak B, Et T, Korkusuz M, Yarımoğlu R. Comparing ultrasound-guided modified thoracoabdominal nerves block through perichondrial approach with oblique subcostal transversus abdominis plane block for patients undergoing laparoscopic cholecystectomy: a randomized, controlled trial. *BMC Anesthesiol.* **2023**;23(1):139.
6. Tulgar S, Selvi O, Thomas DT, Deveci U, Özer Z. Modified thoracoabdominal nerves block through perichondrial approach (M-TAPA) provides effective analgesia in abdominal surgery and is a choice for opioid sparing anesthesia. J Clin Anesth. 2019;55:109–109.
7. Ökmen K, Metin Ökmen B, Topal S. Ultrasound-guided posterior quadratus lumborum block for postoperative pain after laparoscopic cholecystectomy: A randomized controlled double blind study. *J Clin Anesth*. **2018**;49:112-117.
8. Shin HJ, Oh AY, Baik JS, Kim JH, Han SH, Hwang JW. Ultrasound-guided oblique subcostal transversus abdominis plane block for analgesia after laparoscopic cholecystectomy: a randomized, controlled, observer-blinded study. *Minerva Anestesiol* **2014**; 80:185-193.
9. Genc C, Tulgar S, Akgun C, Avci MA, Yesilyurt B, Yildiz B et al. Maximum extension and regression rate of cutaneous sensory block obtained with the external oblique intercostal block or the modified thoracoabdominal nerves block through perichondrial approach in patients undergoing laparoscopic cholecystectomy. *Minerva Anestesiol.* **2024**;90(11):979-988.
10. Nair AS, Seelam S, Naik V, Upputuri O, Sriprakash V. Laparoscopic-guided subcostal transversus abdominis plane block in laparoscopic cholecystectomy: A double-blinded randomized clinical trial. *Anesth Essays Res.* **2022**;16(3):227-32.
11. Elsharkawy H, El-Boghdadly K, Barrington M. Quadratus Lumborum Block: Anatomical Concepts, Mechanisms, and Techniques. *Anesthesiology.* **2019**;130(2):322-335.
12. Willard FH, Vleeming A, Schuenke MD, Danneels L, Schleip R. The thoracolumbar fascia: anatomy, function and clinical considerations. *J Anat* **2012**;221:507-536.
13. Adhikary SD, Bernard S, Lopez H, Chin KJ. Erector Spinae Plane Block Versus Retrolaminar Block: A Magnetic Resonance Imaging and Anatomical Study. *Reg Anesth Pain Med* **2018**; 43: 756-62.
14. Schwartzmann A, Peng P, Maciel MA, Forero M. Mechanism of the erector spinae plane block: insights from a magnetic resonance imaging study. *Can J Anaesth* **2018**; 65:1165-1166.
15. Sørenstua M, Zantalis N, Raeder J, Vamnes JS, Leonardsen AL. Spread of local anesthetics after erector spinae plane block: an MRI study in healthy volunteers. Reg Anesth Pain Med. 2023;48(2):74-79.
16. Oraee S, Rajai Firouzabadi S, Mohammadi I, Alinejadfard M, Golsorkh H, Hatami S. Erector spinae plane block for laparoscopic surgeries: a systematic review and meta-analysis. *BMC Anesthesiol*. **2024**;24(1):389.
17. DE Cassai A, Dost B, Bugada D, et al. Modified thoracoabdominal nerves block through perichondrial approach is effective in reducing postoperative opioids requirements in patients undergoing laparoscopic cholecystectomy: a meta-analysis with trial sequential analysis. *Minerva Anestesiol.* **2025**;91(5):440-449.

18. Yang X, Zhang Y, Chen Y, Xu M, Lei X, Fu Q. Analgesic effect of erector spinae plane block in adults undergoing laparoscopic cholecystectomy: a systematic review and meta-analysis of randomized controlled trials. *BMC Anesthesiol*. **2023**;23(1):7.
19. Zewdu D, Tantu T, Eanga S, Tilahun T. Analgesic efficacy of erector spinae plane block versus transversus abdominis plane block for laparoscopic cholecystectomy: a systematic review and meta-analysis of randomized controlled trial. *Front Med (Lausanne).* **2024**;29;11:1399253.
20. Seagle BL, Miller ES, Strohl AE, Hoekstra A, Shahabi S. Transversus abdominis plane block with liposomal bupivacaine compared to oral opioids alone for acute postoperative pain after laparoscopic hysterectomy for early endometrial cancer: a cost-effectiveness analysis. *Gynecol Oncol Res Pract*. **2017**;4:12.
21. van den Broek RJC, van de Geer R, Schepel NC, Liu WY, Bouwman RA, Versyck B. Evaluation of adding the Erector spinae plane block to standard anesthetic care in patients undergoing posterior lumbar interbody fusion surgery. *Sci Rep*. **2021**;11(1):7631.