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RESEARCH ARTICLE

Efficacy of Combined Pecto-Intercostal and Recto-Intercostal Fascial Plane Blocks for Cardiac Surgery: A Prospective, Randomized, Controlled Trial

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ABSTRACT

Objectives: The aim of this study was to evaluate the effects of combined bilateral pecto-intercostal fascial plane block (PIFB) and recto-intercostal fascial plane block (RIFPB) on the quality of postoperative analgesia and recovery in cardiac surgery patients undergoing median sternotomy.

Methods: This prospective, randomized controlled study was conducted in 40 patients who underwent cardiac surgery via median sternotomy. Patients were randomized into two groups: the block group (PIFB+RIFPB, n=20) and the control group (no regional block, n=20). The primary outcome measure was postoperative pain scores (NRS) during the first 24 hours. Secondary outcomes were the Quality of Recovery-15 (QoR-15) score at 24 hours postoperatively, opioid consumption, and opioid-related side effects. Blocks were performed bilaterally using PIFB (20 mL of 0.25% bupivacaine on each side) and RIFPB (10 mL of 0.25% bupivacaine on each side) under ultrasound guidance.

Results: Pain scores (NRS) were significantly lower in the block group during the first 24 postoperative hours, both at rest and during movement. Consequently, QoR-15 scores at 24 hours were significantly higher in the block group than in the control group. Tramadol consumption was significantly lower in the block group. Additionally, opioid-related side effects, such as nausea and vomiting, were significantly less common in the block group. No complications related to the blocks were observed.

Conclusion: The combination of bilateral PIFB and RIFPB after median sternotomy significantly improved postoperative analgesia, reduced opioid use, and increased the quality of recovery by minimizing side effects. These results, evaluated for the first time in a prospective randomized controlled trial, indicate that the combination of PIFB and RIFPB can be included in multimodal analgesia protocols in cardiac surgery.

Keywords: Cardiac surgery, epigastric drain, median sternotomy, pecto-intercostal fascial plane block, postoperative analgesia, recto-intercostal fascial plane block

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Introduction

Median sternotomy is a common incision in open-heart surgeries such as coronary artery bypass grafting. However, it causes significant postoperative pain due to sternal separation, rib retraction, internal mammary artery harvesting, mediastinal tube placement, and visceral manipulation.[1] Poor pain control can lead to pulmonary complications, delayed mobilization, prolonged ICU/hospital stay, and chronic post-sternotomy pain.[2] It has been reported that persistent pain develops in 29% of patients at 3 months, 15% at 1 year, and 18% at 2 years after cardiac surgery, highlighting the importance of early and effective analgesia.[1]

While opioids are central to post–cardiac surgery analgesia, their exclusive use can cause side effects such as respiratory depression, nausea, constipation, pruritus, sedation, and dependence. Therefore, multimodal analgesia is preferred

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to minimize opioid requirements.[2] However, regional techniques are challenging in cardiac surgery due to high-dose heparinization. Although thoracic epidural analgesia is effective in thoracic procedures, it carries an unacceptable bleeding risk in cardiac patients.[2] Thoracic paravertebral blocks have similar limitations, and bilateral erector spinae (ESP) blocks are difficult in anesthetized, supine patients.

Recently, parasternal intercostal plane blocks have gained attention for sternotomy pain.[3] The pecto-intercostal fascial plane block (PIFB) targets the anterior branches of the T2–T6 intercostal nerves by injecting local anesthetic between the pectoralis major and intercostal muscles under ultrasound guidance. Studies have shown that bilateral PIFB reduces opioid use and pain scores in the first 24 hours postoperatively.[4]

However, PIFB alone does not adequately cover pain originating from subxiphoid drains or the lower sternum, as it is limited to T2–T6 dermatomes.[5] Therefore, pain in the epigastric and lower sternal region may persist and require additional analgesia.[3] A novel technique addressing this issue is the recto-intercostal fascial plane block (RIFPB), described by Tulgar et al.[6] in 2023. RIFPB involves ultrasound-guided injection of local anesthetic between the rectus abdominis muscle and the 6^{th}–7^{th} costal cartilages, targeting the T6–T9 intercostal nerves that innervate the epigastrium and upper abdominal skin.[6]

Combining PIFB and RIFPB can provide comprehensive analgesia for both the sternum and subxiphoid drain areas.[7] A case series of 15 patients using bilateral PIFB+RIFPB demonstrated effective pain relief in the sternum and subxiphoid region.[7] However, prospective evidence evaluating this combined approach remains limited.

We designed a prospective, randomized study to assess the impact of adding RIFPB to PIFB on postoperative pain and recovery in cardiac surgery patients undergoing median sternotomy. We hypothesized that bilateral ultrasound-guided PIFB+RIFPB would enhance postoperative analgesia and recovery compared with no block. The primary outcome was postoperative pain scores assessed using the Numerical Rating Scale (NRS) during the first 24 hours. Secondary outcomes included the Quality of Recovery-15 (QoR-15) score at 24 hours and early opioid consumption.

Methods

Study Design and Patients

This single-center, prospective, parallel-group randomized clinical trial was conducted at Istanbul Medipol University Hospital between February 2024 and March 2025. Approval was obtained from the Istanbul Medipol University Clinical Research Ethics Committee (Decision No: 134, Date: 01.02.2024), and the study was registered in the ClinicalTrials.gov database (NCT06285773). Written informed consent was obtained from all patients before the study. The study protocol was conducted in accordance with the Declaration of Helsinki and Good Clinical Practice guidelines.

Forty adult patients scheduled for elective open-heart surgery via median sternotomy were included. Inclusion criteria were:

- Age 18–75 years,
- ASA physical status II–III,
- Ability to provide informed consent.

Exclusion Criteria Included

- Skin infection or lesions at the block site,
- Allergy to local anesthetics or opioids,
- Chronic opioid use or tolerance,
- Advanced hepatic or renal disease,
- BMI>35kg/m^2,
- Chest wall deformities preventing ultrasound-guided block,
- Inability to participate in postoperative evaluations due to cognitive or communication impairment.

Before surgery, patients were randomly assigned (n=20 per group) to either the block group (PIFB+RIFPB) or the control group (no block) using a computer-generated table by an independent anesthesiologist not involved in the study. Group assignments were placed in numbered, opaque envelopes. After sternal closure, the attending anesthesiologist opened the envelope to determine group allocation and performed or omitted the block accordingly.

All patients were under general anesthesia and unaware of group assignment. The surgical team was also blinded. ICU nurses and research staff conducting postoperative pain assessments were not informed of group status, thereby maintaining blinding. Although the anesthesiologist who applied the block knew the allocation, they did not participate in data collection or analysis.

All patients received standard general anesthesia. After monitoring (ECG, arterial pressure, SpO_2, $EtCO_2$), induction was achieved with IV midazolam (0.05mg/kg), fentanyl (2–5µg/kg), and propofol (1–2mg/kg), followed by rocuronium (0.6–0.8mg/kg) for intubation. Central venous catheterization via the right internal jugular vein and radial arterial monitoring (21G) were performed post-intubation. Anesthesia was maintained with sevoflurane (0.8–1.2 MAC) in 50% O_2–air. Fentanyl was repeated if the heart rate rose>20% above baseline.

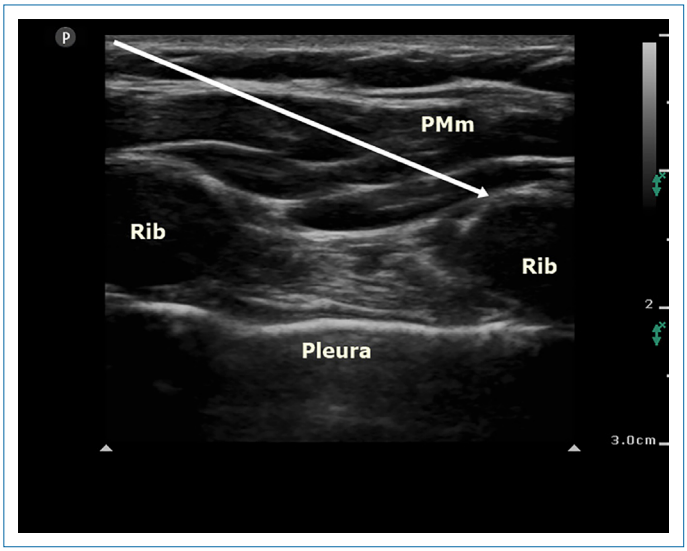

Figure 1. Sonoanatomy of PIFPB. PMm (Pectoralis major muscle). Ribs and pleura are seen.

PIFPB: Recto-intercostal fascial plane block.

All surgeries were performed via median sternotomy by the same cardiac team. Cardiopulmonary bypass was initiated when needed. Approximately 20 minutes before skin closure, both groups received IV paracetamol 1g and tramadol 100mg. The block group also received bilateral PIFB+RIFPB according to randomization; the control group received no block. After block administration, all patients were transferred to the ICU while intubated.

Ultrasound-Guided Block Application

Patients in the block group underwent bilateral PIFB and RIFPB after surgery, before dressing, and prior to transfer to the intensive care unit. Blocks were performed by an anesthesiologist experienced in regional anesthesia under sterile conditions, with patients under full general anesthesia and in the supine position. A high-frequency (6–13MHz) linear transducer was used.

Pecto-Intercostal Fascial Plane Block (PIFB)

The transducer was placed approximately 2–3cm lateral to the sternal edge at the level of the 3rd or 4th intercostal space. The pectoralis major muscle, ribs, costal cartilage, and the intercostal muscle layer beneath it were visualized (Fig. 1).[4] A 22G, 80mm block needle was advanced from cranial to caudal using the in-plane method, passing through the pectoralis major muscle fascia and directed to the fascial plane between the pectoralis major and the external intercostal muscle. After the correct location of the block was confirmed with 5mL of isotonic solution, 20mL of 0.25% bupivacaine was injected bilaterally (40mL in total).[4]

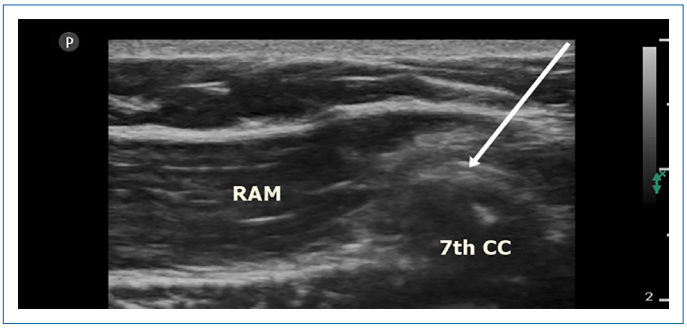

Figure 2. Sonoanatomy of RIFPB.

RAM: Rectus abdominis muscle; CC: Costal cartilage; PIFPB: Recto-intercostal fascial plane block.

Recto-Intercostal Fascial Plane Block (RIFPB)

After PIFB, the ultrasound probe was moved beneath the xiphoid to the epigastric region. The probe was positioned inferolateral to the xiphoid process (~2–3cm away) to visualize the area where the rectus abdominis muscle attaches to the 6th and 7th costal cartilages (Fig. 2).[6] The 80mm block needle was advanced caudally to cranially using an in-plane approach and placed in the potential space between the rectus abdominis muscle and the costal cartilage. After hydrodissection with 5mL of isotonic solution to confirm the correct plane, 10mL (0.25% bupivacaine) was injected bilaterally (total 20mL).[6]

As a result, a total of 60mL of 0.25% bupivacaine was administered to patients who received both PIFB (2×20mL) and RIFPB (2×10mL).

Postoperative Analgesia Protocol and Outcome Measures

Patients were extubated on average at the 3rd postoperative hour in the cardiovascular intensive care unit. In the postoperative period, a standard analgesia protocol was applied in both groups: intravenous paracetamol 1g was given every 8 hours in the intensive care unit. Additional tramadol (100mg IV) was administered if the patient's NRS pain score was≥4 at rest. The total amount of opioid consumed by each patient and the need for additional analgesics were recorded.

The primary outcome measure was postoperative pain scores. Pain was evaluated using a Numerical Rating Scale (NRS) ranging from 0 to 10 (0=no pain, 10=unbearable pain). Patient pain scores were recorded at rest and during movement/cough in the intensive care unit at the 4th, 6th, 8th, 12th, 16th, and 24th postoperative hours by blinded ICU nurses.

Secondary outcomes included the Quality of Recovery-15 (QoR-15) score, total opioid consumption, and opioid-related side effects. The QoR-15 is a validated questionnaire consisting of 15 questions measuring the quality of postoperative recovery in five dimensions (patient comfort, mood, support, independence, and pain). Each question is scored from 0 to 10, with 0 representing the worst and 150

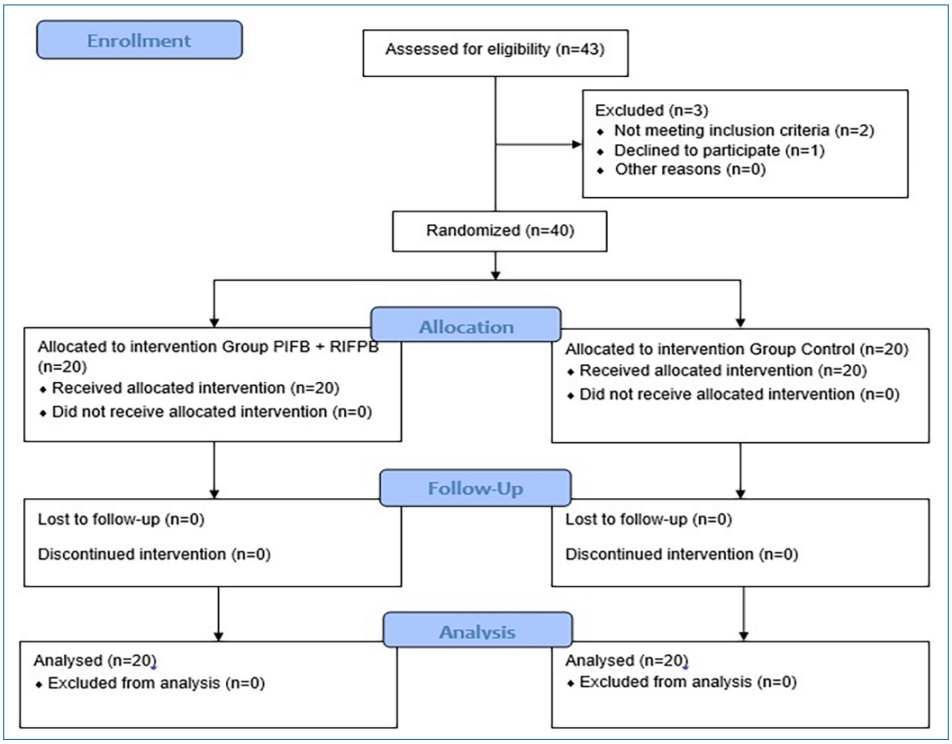

Figure 3. CONSORT flow diagram of the study.

representing the best recovery. The validity and reliability of the questionnaire in Turkish have been previously demonstrated.[8] The questionnaire was administered to patients on the first postoperative day (after 24 hours) by a researcher who was blinded to group allocation, and the total QoR-15 score of each patient was recorded.[9] Additionally, the total amount of tramadol consumed and the incidence of opioid-related side effects (such as nausea, vomiting, and pruritus) during the first 24 hours were recorded.

Sample Size and Statistical Analysis

The primary aim of the study was to compare the Numeric Rating Scale (NRS) scores between the groups postoperatively. To determine the required sample size, a preliminary study was performed with 5 patients per group. The mean NRS scores were approximately 1±1 in the Pecto+Recto group (n=5) and 4±2 in the control group (n=5). For the NRS scores, a total sample size of 34 was calculated using G*Power (version 3.1.9.2, Düsseldorf, Germany) with an alpha probability of 0.05, a power of 0.95, and an effect size of 1.15. Considering possible dropouts, we included 20 patients in each group.

Statistical analysis was performed using the IBM SPSS v20.0 (SPSS Inc., Chicago, Illinois, USA) software package. The normality distribution of variables was assessed using the Shapiro–Wilk normality test and histogram analysis. Descriptive data were expressed as median (Q1–Q3) and mean±standard deviation. Continuous and ordinal variables were compared between the two groups using the Mann–Whitney U test or the independent samples t-test, depending on the normality of distribution. Categorical variables were analyzed using the Fisher exact test. A $p<0.05$ value was considered statistically significant.

Results

A total of 40 patients were randomized and included in the analysis (block group n=20, control group n=20) (Fig. 3). No statistically significant difference was found

Table 1. Demographic data and comparison of operative procedures between groups

	Group PIFB+ RIFPB block (n=20)	Group control (n=20)	p
Age (years)	60 (51–64)	54 (44–68)	0.565[a]
Gender (m/f)	11/9	13/7	0.374[b]
Height (cm)	168 (161–171)	170 (166–172)	0.478[a]
Weight (kg)	72 (68–84)	75 (68–80)	0.883[a]
ASA (II/III)	13/7	11/9	0.364[b]
Duration of surgery (min)	190 (180–212.5)	192.5 (167.5–232.5)	0.925[a]
Duration of anesthesia (min)	225 (212.5–242.5)	225 (202.5–255)	0.925[a]

[a]: Mann Whitney U test; [b]: Fisher Exact test. Values are expressed median (Q1-Q3), mean±SD or number. PIFB: Pecto-intercostal fascial plane block; RIFPB: Recto-intercostal fascial plane block; ASA: American society of anesthesiologist; m: Male, f: Female; cm: Centimeter; kg: Kilogram; min: Minutes.

Table 2. Comparisons of static and dynamic NRS scores assessment between groups

	Group PIFB+ RIFPB block (n=20)	Group control (n=20)	p[a]
NRS static (hour)			
4th	0 (0–2)	3 (1–4)	**0.002**
6th	1 (0–1)	3 (2–5)	**<0.001**
8th	1 (0–2)	2 (2–4)	**0.001**
12th	1 (0–1)	3 (1–5)	**0.001**
16th	1 (0–2)	2 (1–3)	**0.017**
24th	1 (1–2)	2 (2–3)	**0.004**
NRS dynamic (hour)			
4th	1 (1–2)	3 (3–6)	**0.001**
6th	2 (1–2)	4 (3–6)	**<0.001**
8th	1 (1–2)	4 (3–5)	**<0.001**
12th	2 (1–3)	4 (3–6)	**0.001**
16th	2 (1–3)	3 (3–49	**0.001**
24th	2 (1–2)	3 (3–4)	**<0.001**

Values are expressed median. [a]: Mann Whitney-U test. (Q1-Q3) PIFB: Pecto-intercostal fascial plane block; RIFPB: Recto-intercostal fascial plane block; NRS: Numeric rating scale.

Table 3. The comparison of postoperative (tramadol) opioid consumptions and Quality of Recovery 15 Score between groups

	Group PIFB+ RIFPB Block (n=20)	Group control (n=20)	p
Tramadol use (N/Y)	17/3	4/16	<0.001[a]
Tramadol dose (mg)	0 (0–0)	100 (50–100)	<0.001[a]
QoR-15	114.5 (105–119)	105 (97.5–115)	0.015[b]

[a]: Mann Whitney-U test; [b]: Fisher Exact test. Values are expressed median (Q1-Q3), mean±SD or number. mg: Milligram; N: No; Y: Yes; PIFB: Pecto-intercostal fascial plane block; RIFPB: Recto-intercostal fascial plane block; QoR-15: Quality of Recovery-15.

Table 4. The comparison of incidence of side effects between groups

	Group PIFB+ RIFPB block (n=20)	Group control (n=20)	p[a]
Nausea	1	8	**0.010**
Vomiting	–	6	**0.010**
Pruritus	1	2	0.500

[a]: Fisher Exact test. Values are expressed as a number. PIFB: Pecto-intercostal fascial plane block; RIFPB: Recto-intercostal fascial plane block.

between the two groups in terms of demographic and perioperative variables such as age, gender distribution, body mass index, ASA physical status class, and surgery/anesthesia times (Table 1).

During the first 24 postoperative hours, all NRS pain values measured both at rest (passive) and with movement/coughing (active) were significantly lower in the block group than in the control group (Table 2). The difference in pain was particularly evident in the early hours after surgery; for example, the median NRS value at rest at the 4th hour was 0 (0–2) in the block group, while it was 3 (1–4) in the control group (p=0.002). This difference continued at all time points, and even at the 24th hour, the resting NRS scores of the block group were approximately half of those of the control group (p=0.004). A similar superiority was observed during movement or coughing; active NRS scores were 1 (1–2) in the block group at the 4th hour, while they were 3 (3–6) in the control group (p=0.001), and significantly lower pain values were recorded in the block group at the 6th, 8th, 12th, and 24th hour measurements (p<0.01, Table 2).

The total QoR-15 score at 24 hours after surgery was significantly higher in the block group compared with the control group. The median QoR-15 score was 114.5 (105–119) in the block group and 105 (97.5–115) in the control group (Table 3).

Total tramadol consumption was calculated as 0mg (0–0) in the block group and 100mg (50–100) in the control group, and the difference between the groups was statistically highly significant (p<0.001). Nausea occurred in eight patients in the control group (40%) during the intensive care period, while it was observed in only one patient in the block group (5%) (p=0.010). Similarly, postoperative vomiting was observed in six patients in the control group (30%), whereas it was not observed in the block group (0%) (p=0.010). The incidence of opioid-related pruritus was similar between the groups (Table 4). No patient developed any complications such as pneumothorax, local anesthetic toxicity, hematoma, or infection due to block application.

Discussion

This prospective randomized study demonstrated that the combination of bilateral PIFB and RIFPB significantly enhanced postoperative analgesia in cardiac surgery patients undergoing median sternotomy. As the primary finding, postoperative pain scores (NRS) were significantly lower in the block group both at rest and during movement in the first 24 hours. Consequently, this effective pain management led to a substantial reduction in opioid consumption and opioid-related side effects such as nausea and vomiting, which ultimately resulted in higher Quality of Recovery (QoR-15) scores at 24 hours. Similarly, it has been reported that interfascial plane blocks are a safe and effective part of multimodal analgesia in cardiac surgery.[10] Our findings particularly support the effectiveness of this combined approach in comprehensively controlling acute pain after median sternotomy.

Our results are consistent with the existing literature and expand upon previous evidence. Recent studies have shown that PIFB alone reduces acute pain and opioid use after cardiac surgery.[4,11] For example, Hamed et al.[4] reported a significant decrease in 24-hour opioid consumption and pain scores with PIFB in open-heart surgery. Similarly, Zhang et al.[11] found that continuous PIFB with a catheter provided effective analgesia. In the PROSPECT recommendations by Maeßen et al.,[12] parasternal blocks were included among the recommended techniques for managing sternotomy pain. However, PIFB is mainly effective over the sternum and often fails to address pain from mediastinal drains, especially in the epigastric and lower chest regions.[5] A recent review also highlighted that patients often require additional analgesia at drain sites despite regional techniques.[5] In our study, RIFPB was added to overcome this limitation, and we found that it significantly improved drain site pain control when combined with PIFB. This supports the idea that PIFB+RIFPB is a more comprehensive strategy for managing pain following median sternotomy.

Supporting our results, a case series of 15 patients reported that the PIFB+RIFPB combination effectively controlled both sternotomy incision and subxiphoid drain site pain.[7] Similarly, a case report by Dost et al.[13] stated that effective anesthesia was achieved across T3–T11 dermatomes with this combination, including the subxiphoid region.

Since its first description in 2023, RIFPB has emerged as a novel regional technique with potential advantages over the traditional rectus sheath block (RSB).[6] Previous studies have reported that RSB enhances analgesia for subxiphoid drain pain.[14,15] RSB is typically performed around the umbilicus to block anterior branches (T7–T12), primarily offering analgesia for midline incisions. However, its effect on lateral branches and upper epigastric areas may be limited. In contrast, RIFPB is applied more cranially at the T6–T9 level and targets both anterior and lateral branches, offering broader sensory coverage.[6] This anatomical advantage enables effective blockade of pain transmission from the lower sternum and subxiphoid regions. A systematic review by Dost et al.[16] also showed that single-injection fascial plane blocks reduce 24-hour morphine consumption. In our study, this was particularly evident in areas not covered by PIFB alone.

A randomized trial by Wang et al.[14] compared PIFB alone with the combination of PIFB+RSB. They found that the combined block reduced opioid use over 48 hours, although pain scores were similar, likely because both groups received PIFB and opioids as rescue analgesia. Their findings support that adding a second block improves opioid-sparing effects. Our study extends this by showing that RIFPB—due to its anatomical reach—may offer greater benefits than RSB. Although we did not directly compare RSB and RIFPB, we believe the latter may be superior due to its wider dermatomal coverage. Future studies comparing PIFB+RIFPB versus PIFB+RSB may clarify their relative effectiveness.

One of the major benefits of regional blocks is reducing opioid requirements and associated side effects. In our study, tramadol use was significantly lower in the block group, and so were the rates of nausea and vomiting. These effects are important because they can impair early recovery by limiting respiratory function and mobilization. Therefore, in addition to better pain control, PIFB+RIFPB provided improved patient comfort and may have supported early rehabilitation. Furthermore, no complications such as pneumothorax, hematoma, or local anesthetic toxicity were observed. This reinforces the safety of these blocks, consistent with the 2023 review by Yayık et al.,[10] which emphasized the technical simplicity and low complication risk of interfascial plane blocks.

Neuraxial techniques such as epidural or paravertebral blocks are generally avoided in cardiac surgery due to the bleeding risk associated with high-dose heparinization.[2] In contrast, ultrasound-guided superficial fascial plane blocks such as PIFB and RIFPB offer a safer alternative. In our study, we observed no block-related complications, and reports of such complications in the literature are extremely rare.[4–7] Hence, PIFB+RIFPB stands out as a safe and feasible technique for pain control in cardiac surgery patients.

This study has some limitations. First, it was a single-center trial with a relatively small sample size. Second, we did not include a PIFB-only group; therefore, the exact contribution of RIFPB could not be isolated. Third, the study evaluated only the first 24-hour postoperative period in the ICU. Longer follow-up is needed to determine whether these blocks help prevent chronic pain after sternotomy.[1] Better analgesia might facilitate earlier extubation and improve respiratory rehabilitation, but we did not measure respiratory parameters.[17] We also used fixed volumes of local anesthetic without testing volume optimization. In addition, dermatomal spread was not clinically evaluated; objective sensory mapping could help further characterize block efficacy. Finally, we used single-injection techniques. Continuous catheter-based methods may offer longer-lasting analgesia and should be studied further.

Conclusion

In conclusion, the combination of bilateral PIFB and RIFPB applied under ultrasound guidance is a highly effective and safe method for postoperative pain control in cardiac surgery patients undergoing median sternotomy. By providing comprehensive analgesia covering both the

sternal incision and subxiphoid drain sites, this combined block significantly reduces postoperative pain scores (NRS) during the first 24 hours. Consequently, it minimizes opioid requirements and associated side effects, which in turn leads to a higher quality of early recovery (QoR-15). This approach stands out as a reliable and safe alternative to epidural analgesia in the high-risk cardiac surgery population. Therefore, bilateral PIFB combined with RIFPB can be routinely included in multimodal analgesia protocols to enhance pain management, patient comfort, and recovery outcomes in cardiac surgery.

Disclosures

Ethics Committee Approval: The study was approved by the Istanbul Medipol University Clinical Research Ethics Committee (no: 134, date: 01/02/2024) and the study was registered in the ClinicalTrials.gov database (NCT06285773).

Informed Consent: Written informed consent was obtained from all patients before the study.

Conflict of Interest Statement: The authors declare that there is no conflict of interest.

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References

1. Dost B, Karapinar YE, Karakaya D, Demir ZA, Baris S, Koksal E, et al. Chronic postsurgical pain after cardiac surgery: A narrative review. Saudi J Anaesth 2025;19:181–9.
2. Kelava M, Alfirevic A, Bustamante S, Hargrave J, Marciniak D. Regional anesthesia in cardiac surgery: an overview of fascial plane chest wall blocks. Anesth Analg 2020;131:127–35.
3. King M, Stambulic T, Hassan SMA, Norman PA, Derry K, Payne DM, et al. Median sternotomy pain after cardiac surgery: To block, or not? A systematic review and meta-analysis. J Card Surg 2022;37:3729–42.
4. Hamed MA, Abdelhady MA, Hassan AASM, Boules ML. The analgesic effect of ultrasound-guided bilateral pectointercostal fascial plane block on sternal wound pain after open heart surgeries: a randomized controlled study. Clin J Pain 2022;38:279–84.
5. Toscano A, Balzani E, Capuano P, Vaninetti A, Perrucci C, Simonato E, et al. Awake cardiac surgery using the novel pectoralis-intercostal-rectus sheath (PIRS) plane block and subxiphoid approach. J Card Surg 2022;37:2923–6.
6. Tulgar S, Ciftci B, Ahiskalioglu A, Bilal B, Alver S, Sakul BU, et al. Recto-intercostal fascial plane block: Another novel fascial plane block. J Clin Anesth 2023;89:111163.
7. Ciftci B, Omur B, Alver S, Akin AN, Yildiz Y, Tulgar S. The medipol combination: novel rectointercostal fascial plane block and pectointercostal fascial plane block for postoperative analgesia management after cardiac surgery: a report of 15 cases. A A Pract 2024;18:e01794.
8. Selvi O, Azizoğlu M, Temel G, Tulgar S, Chitneni A, Çınar EN, et al. Translation and validation of the turkish version of the quality of postoperative recovery score QoR-15: a multi-centred cohort study. Turk J Anaesthesiol Reanim 2022;50:443–8.
9. Stark PA, Myles PS, Burke JA. Development and psychometric evaluation of a postoperative quality of recovery score: the QoR-15. Anesthesiology 2013;118:1332–40.
10. Yayık AM, Çelik EC, Aydın ME, Oral Ahıskalıoğlu E, Dost B, Altıparmak B, et al. The shining star of the last decade in regional anesthesia part-II: interfascial plane blocks for cardiac, abdominal, and spine surgery. Eurasian J Med 2023;55(Suppl 1):S9–S20.
11. Zhang Y, Min J, Chen S. Continuous pecto-intercostal fascial block provides effective analgesia in patients undergoing open cardiac surgery: a randomized controlled trial. Pain Med 2022;23:440–7.
12. Maeßen T, Korir N, Van de Velde M, Kennes J, Pogatzki-Zahn E, Joshi GP, et al. Pain management after cardiac surgery via median sternotomy: A systematic review with procedure-specific postoperative pain management (PROSPECT) recommendations. Eur J Anaesthesiol 2023;40:758–68.
13. Dost B, Turunc E, Ozdemir E. Subxiphoid pericardial window using a combination of rectointercostal fascial plane block and superficial parasternal intercostal plane block. J Cardiothorac Vasc Anesth 2024;38:1282–3.
14. Wang L, Jiang L, Jiang B, Xin L, He M, Yang W, et al. Effects of pecto-intercostal fascial block combined with rectus sheath block for postoperative pain management after cardiac surgery: a randomized controlled trial. BMC Anesthesiol 2023;23:90.
15. Sepolvere G, Tedesco M, Fusco P, Scimia P, Donatiello V, Cristiano L. Subxiphoid cardiac drainage pain management: could ultrasound rectus sheath block be the answer? Minerva Anestesiol 2020;86:994–6.
16. Dost B, De Cassai A, Balzani E, Tulgar S, Ahiskalioglu A. Effects of ultrasound-guided regional anesthesia in cardiac surgery: a systematic review and network meta-analysis. BMC Anesthesiol 2022;22:409.
17. Singh G, Dhiraaj S, Shamshery C, Agarwal SK, Goyal P, Ambasta S. To study the efficacy of ultrasound guided pecto-intercostal fascial plane block in patients undergoing midline sternotomy in open cardiac surgery: a randomized prospective comparative study. Ann Card Anaesth 2024;27:301–8.