The Research of Medical Science Review
ISSN: 3007-1208 & 3007-1216 Volume 3, Issue 6, 2025

ULTRASOUND-GUIDED ERECTOR SPINAE PLANE BLOCK VERSUS PARAVERTEBRAL BLOCK FOR POST-OPERATIVE ANALGESIA IN POSTEROLATERAL THORACOTOMY

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DOI: https://doi.org/10.5281/zenodo.15650319

Keywords
Thoracotomy, Paravertebral Block, Erector Spinae Plane Block, Postoperative Pain, Morphine Consumption

Article History
Received on 05 May 2025
Accepted on 05 June 2025
Published on 12 June 2025

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Abstract

Background *Posterolateral thoracotomy is a usual method for surgery in the chest and it usually leads to significant post-op pain. Good pain relief is crucial for a smooth recovery and regional blocks are now a main practice in this area.*

Objectives: *to evaluate and compare how much morphine was used by patients after ultrasound-guided erector spinae plane (ESP) block and paravertebral block (PVB), when both blocks were used for posterolateral thoracotomy.*

Study Design: *A Retrospective Observational Study.*

Place and Duration of Study. *The Department of Cardiothoracic Anesthesia Department in RMI Peshawar, from May 8, 2024, to November 8, 2024*

Results : *60 patients undergoing posterolateral thoracotomy were equally divided into two groups: those with ESP block (Group A) and those with PVB (Group B). For the first two days after surgery, patients were given morphine as prescribed and this use was noted.Group B (PVB) had a daily morphine intake that was significantly less than Group A (ESP): 16.48±9.37 mg versus 33.17±20.34 mg (p=0.000). The trend was the same for people of all ages, genders, BMIs, medical conditions and economic levels.*

Conclusion: *The paravertebral block provides superior postoperative analgesia compared to the erector spinae plane block in patients undergoing posterolateral thoracotomy, significantly reducing opioid requirements.*

INTRODUCTION

esophagus and pleura are done through a posterior and lateral thoracotomy. This surgery gives trainees good practice in thoracic interventions, yet it regularly leads to serious pain after surgery, because the ribs have to be spread and several muscles are cut [1,2]. Post-thoracotomy pain causes fast-oncoming and long-term issues, so providing good pain relief after the procedure benefits recovery, breathing, steps taken afterward and keeps the patient's hospital stay short [4]. Many experts regard thoracic epidural and paravertebral blocks (PVB) as the best methods for pain management right after thoracotomy surgery [5]. A paravertebral block is performed by injecting local anesthetic next to the thoracic vertebrae to achieve a

unilateral block of the nerves and blood vessels. Many studies have shown that it gives similar pain relief as epidurals but with less risk of side effects [6]. This technique, though, comes with certain risks such as pneumothorax, vascular puncture, hypotension and it requires considerable skill. To overcome these limitations, a novel ultrasound-guided block called the erector spinae plane (ESP) block has been proposed. Forero et al. originally described ESP block in 2016 as the procedure where local anesthetic is injected in the fascia deep to the erector spinae muscle at the level of the transverse process [8]. The medication disperses both cranially (anteriorly) and caudally (backward), obstructing both the front and back branches of the spinal nerves and shielding various thoracic dermatomes [9]. ESP block injection sites tend to be closer to the skin, so there are lower chances of complications like injury to the pleura or blood vessels [10].Because of the limited data available for regional blocks and wanting to enhance thoracotomy pain treatment, this study will compare how well ESP block and paravertebral block control pain postoperatively in patients who undergo posterolateral thoracotomy. Anesthesiologists can use the results to select the best and safest regional block for each patient, limit the use of opioids and prevent the issues linked to them.

Materials and Methods

The retrospective observational study was held at the Cardiothoracic Anesthesia Department in RMI Peshawar, from May 8, 2024, to November 8, 2024. After approval was obtained (RMI/RMI-REC/APPROVAL/198), 60 patients having posterolateral thoracotomy were included in the study using non-probability consecutive sampling. Thirty patients were put in Group A and received an ESP block with 20 mL of 0.25% bupivacaine under ultrasound guidance at T5, while Group of 30 patients underwent a PVB in the same manner. Information on age, gender, body mass index, other diseases, socioeconomic background and living location was listed. The amount of morphine given for pain relief in the first 48 hours after surgery was documented on a proforma. It was ensured that only experienced anesthesiologists carried out all the blocks to ensure that each was given correctly.

Inclusion Criteria

Only those aged 18 to 70 and of either gender, performing a posterolateral thoracotomy, with ASA Grade I–II, who signed informed consent were included in the study.

Exclusion Criteria

Those with extremely serious problems related to breathing, heart, liver, kidney, blood clotting, spine or a high body mass index were not included in the study to prevent additional risks.

Data Collection

A form was used to gather data about gender, age, other diseases and the amount of morphine the patient used within 2 days after surgery. Monitoring the effectiveness of each block and overall sensory exposure was done. Patients were kept under observation at all times and pain control was handled according to an standardized plan using VAS scores and doctor's opinion.

Statistical Analysis

All statistical analysis was carried out using SPSS version 24.0. Differences in mean morphine use and demographics were determined with independent t-tests. The associations between categorical variables were checked using Chi-square tests. Statistical significance was found at any p-value less than 0.05. Patients were split into groups by age, gender, BMI, other illnesses and socioeconomic class.

Results

Sixty patients were assigned to two groups in the study and each group had the same number. The mean age for those in Group A (ESP) was 53.73±5.93 years, while their BMI was 27.47±1.69 kg/m². Group B (PVB) had an average age of 52.63±5.04 years and BMI of 26.01±2.28 kg/m². Most members of both groups were male (83.3% in Group A and 90% in Group B). Frequencies of diabetes and hypertension in the two groups were very similar and Group B received less morphine on average (16.48 mg). Studies on different age groups, genders, BMI and people with other medical conditions showed that PVB helps people use less opioid medication. The results also show that in the 18–50 age group, PVB significantly reduced morphine intake compared to ESP

(11.14±7.96 mg vs. 29.14±16.58 mg). Patients in rural and lower income landscapes also used less opioid pain medicine thanks to PVB. The results prove that pain relief after the surgery is much better with PVB than with an ESP block after a posterolateral thoracotomy.

Figure 01: Overall Morphine Consumption Comparison

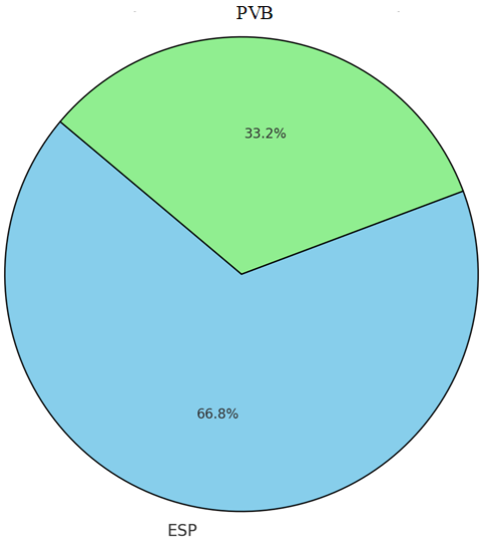

FIGURE 02: Morphine Consumption By Age Group

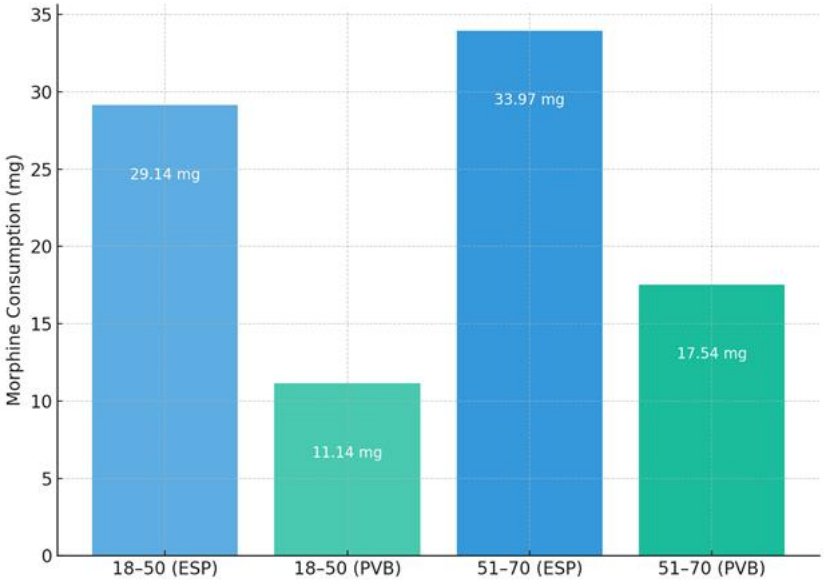

Table 1: Demographic and Clinical Characteristics

Variable	Group A (ESP)	Group B (PVB)
Age (years)	53.73 ± 5.93	52.63 ± 5.04
BMI (kg/m²)	27.47 ± 1.69	26.01 ± 2.28
Gender (Male)	83.3%	90%

Diabetes Mellitus	20%	20%
Hypertension	20%	16.7%
Rural Residence	53.3%	73.3%

Table 2: Morphine Consumption (Stratified)

Stratification	Group A (ESP)	Group B (PVB)
Age 18-50	29.14 ± 16.58	11.14 ± 7.96
Age 51-70	33.97 ± 21.22	17.54 ± 9.40
Male	33.68 ± 19.12	16.10 ± 9.26
Female	30.60 ± 28.24	19.88 ± 11.70
BMI ≤25	29.41 ± 13.48	18.92 ± 10.16
BMI >25	34.11 ± 21.86	15.26 ± 8.96

Table 3: Morphine Consumption by Socioeconomic Status

Socioeconomic Status	Group A (ESP)	Group B (PVB)
Poor	32.99 ± 14.59	15.34 ± 9.89
Middle-Class	35.39 ± 24.96	19.03 ± 8.00
Rich	13.03 ± 11.19	30.95 ± 25.02

Discussion

manage the postoperative pain that occurs after thoracic surgery. Posterolateral thoracotomy gives good access to the chest, but it is linked with much postoperative pain as a result of muscle damage, the stretching of ribs and contact with intercostal nerves. Should this pain not be adequately managed, it may result in a chronic neurological condition, post-thoracotomy pain syndrome (PTPS), affecting a major number of patients [11,12]. The International Association for the Study of Pain (IASP) has defined PTPS as lasting for at least two months after the operation and is usually felt as burning or stabbing pain near the incision site [13]. Although many patients report it, the condition is often not recognized and studies indicate that 61% of patients are still feeling persistent pain a year after surgery [14].The results showed that PVB reduced the need for morphine after surgery better than ESP block. The results are comparable to what other earlier studies found, supporting the point that strong analgesic methods are essential after thoracotomy [15,16]. Even after minimally invasive or open surgeries of the thorax, chronic pain may result, so pain management right after surgery is very important to prevent problems later on [17].Soldiers during World War II reported intercostal pain for some time after having a thoracotomy and while this observation started to explain PTPS, suitable treatments are still lacking [18]. The outcomes of multimodal therapies vary and some people find that their symptoms become worse because of side effects caused by the treatments [19]. The better results found for PVB compared to ESP are consistent with reports that PVB can often give the same benefits as thoracic epidural analgesia while not causing bilateral sympathetic blockade and the associated complications [20].Benedetti et al. studies revealed that when intercostal nerves were more injured during thoracotomy, the patients experienced more pain and nerve damage, indicating why nerve care and protection help limit PTPS [21]. Also, it is well-known that persistent pain after surgery can be a sign of the cancer coming back, so it is important to accurately assess all types of pain [22].The type of incision affects pain after surgery, though some studies mention that there is not much difference in pain levels between the different cut types [23]. For this reason, using regional anesthesia is a main

priority for improving patient comfort. The data supports the view that when it comes to pain relief, PVB tends to work best for all kinds of patients unlike ESP block.All in all, results from our analysis and others back the adoption of thoracic paravertebral blocks in post-surgery care for thoracotomy patients as they could lead to better health results, less opioid use and fewer chances of getting chronic pain.

Conclusion

Postoperative pain relief after posterolateral thoracotomy was better for patients given paravertebral blocks than for those given erector spinae plane blocks. Consistently, one-lung ventilation reduces the use of opioids and makes it a preferred way to conduct surgery that helps patients heal more quickly and reduces chronic pain after the operation.

Limitations

Because the study was carried out at only one site and had a small sample, the results might not apply to everyone. The authors did not provide results on other long-term outcomes such as prevalence of chronic pain or how satisfied patients were. More studies should assess how these variables affect disease in larger groups of patients.

Future Directions

Studies in the future should aim to analyze how well the pain can be controlled, what outcomes pain sufferers report and the occurrence of chronic pain among those who receive thoracic surgery. Comparing multimodal analgesics and continuous catheter methods in surgery could make pain control more effective and speed up recovery for patients having thoracic surgery.

Disclaimer: Nil

Conflict of Interest:Nil

Funding Disclosure: Nil

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Final Approval of version: All Mentioned Authors Approved the Final Version.

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