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ORIGINAL ARTICLE

Assessment of the quality of recovery in patients receiving erector spinae plane block compared to local infiltration in patients undergoing major oncological breast surgery.

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ABSTRACT… Objective: To compare the Quality of Recovery (QoR-15) scores and postoperative opioid consumption in patients undergoing major oncological breast surgery receiving the Erector Spinae Plane (ESP) block versus local infiltration (LI). **Study Design:** Prospective Randomized Controlled Trial. **Setting:** Department of Anaesthesia and Pain Management, Shaukat Khanum Memorial Cancer Hospital and Research Centre, Lahore, Pakistan. **Period:** March 1, 2025 to September 30, 2025. **Methods:** Seventy female patients aged 18–65 years, ASA physical status I or II, undergoing unilateral major oncological breast surgery were randomized into two equal groups (n=35 each). Group A received an ultrasound-guided ESP block at T2–T6 using bupivacaine 0.375% (30 ml), and Group B received local infiltration at the incision site with bupivacaine 0.375% (30 ml) with standard general anaesthesia. The primary outcome was the QoR-15 global score assessed at 48 hours postoperatively. Secondary outcome included postoperative opioid consumption. Data were analysed using the Mann–Whitney U test, with $p < 0.05$ considered statistically significant. **Results:** Both groups were comparable in baseline demographic and clinical characteristics. At 48 hours, the ESP group demonstrated significantly higher QoR-15 global scores compared to the LI group (median [IQR]: 145.9 [144.3–149.0] vs. 115.8 [112.9–118.0] ($p < 0.0001$). Significant improvements in the ESP group were observed across all 15 individual QoR-15 items. 24-hour postoperative morphine consumption was significantly lower in the ESP group compared to the LI group (1.71 ± 0.79 mg vs. 3.26 ± 0.70 mg; $p < 0.0001$). **Conclusion:** The ESP block significantly improves quality of recovery at 48 hours and reduces postoperative opioid consumption compared to local infiltration in patients undergoing major oncological breast surgery.

Key words: Breast Neoplasms Mastectomy Nerve Block Anesthesia, Local Pain, Postoperative.

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INTRODUCTION

Improvement of the perioperative health status of a surgical patient is a global health concern.[1] It has been recommended that a patient's perspective on postoperative recovery should be a useful endpoint for routine care. Patient-reported outcome measurements (PROMs) can be used to measure the patient's perspective of their own postoperative quality of recovery.[2] The QoR-15 is a validated and practical patient-reported outcome measuring tool after surgical procedures, and the score depicts excellent reliability and effectiveness.[3]

Breast cancer is the most common malignancy amongst women. In such circumstances, surgical management is a key component of treatment and cure.[4] However, the surgical procedure is often associated with postoperative pain. Approximately 60% of women after breast cancer surgery complain of severe acute pain.[5] In addition, in most cases, acute pain may develop into chronic pain postoperatively if not managed properly.[6,7] As it is estimated that chronic pain may persist in up to 50% of patients after major breast oncological procedures[8], it is therefore inevitable to use effective techniques that can alleviate postoperative pain in these patients.

The skin and glands of the breasts are innervated by the T2–T6 spinal nerves. In addition to these, the long thoracic nerve, medial pectoral nerve, thoracodorsal nerve, and lateral pectoral nerve also carry sensation to the axillary region and the breasts.[9]

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Thus, to commence postoperative analgesia for breast oncological surgery, it is compulsory to block spinal nerve dermatomes from vertebral levels T3 to T6.

Numerous regional modalities have been widely employed to alleviate postoperative pain following major breast oncological surgery, including paravertebral, epidural, and intercostal blocks. However, a prime approach has not been determined, and every block has a few shortcomings. The drawbacks associated with epidural block include needless contralateral block, abscess, epidural hematoma, dural puncture, and post-dural puncture headache.[10] Another block with excellent analgesic effect is the paravertebral block; however, it is difficult to execute and is associated with the complication of pneumothorax. Of all the blocks, one that is easy to perform is the intercostal block, but it must be given at more than one level.

The Erector Spinae Plane (ESP) block was initially known for thoracic neuropathic pain management.[11] As a result, this block was employed for lung-related oncological surgery for the management of pain, and the result was outstanding.[12] The aim of this study was to assess the quality of recovery in patients receiving ESP compared to local infiltration in patients undergoing major oncological breast surgery. There are very few studies on QoR of patients comparing block and local infiltration for breast surgery. However, one previous study on QoR comparing pectoral nerve block (PECS II) and local infiltration showed baseline QoR-15 global scores reported as median [quartiles] were 135 [129, 143] in the PECS group and 139 [127, 143] in the infiltration group. The 24-hour QoR-15 global score reported as median [quartiles] was 131 [116, 140] in the PECS group and 123 [117, 143] in the infiltration group (P = .60), with a median difference (95% confidence interval) of –2 (–9 to 5).[13] Similarly, a previous study was also conducted comparing the ESP group and local infiltration as control, with results of 7.9 ± 2.5 versus 5.0 ± 2.1. Since limited data is available with scarcity on the local level, further outcomes can serve as a source for evidence-based practice. The objective of our study was to compare Quality of Recovery (QoR) of patients undergoing major oncological breast surgery by using the Erector Spinae Plane block with local infiltration.

METHODS

This prospective randomized controlled trial was conducted over six months from 01-03-25 to 30-09-25 at the Department of Anesthesia and Pain Management, Shaukat Khanum Memorial Cancer Hospital and Research Centre, Lahore after taking ethical approval (ERB No. IRB-23-12-A1). A Total of 70 patients were included in the trial 35 in each arm. Non-probability consecutive sampling was used. Inclusion criteria were female patients aged 18–65 years, ASA physical status I or II, with unilateral breast cancer undergoing major oncological breast surgery. Exclusion criteria included local infection based on history and examination, coagulation dysfunction based on PT and INR levels, BMI > 35 kg/m^2, diagnosed cases of anxiety or depression, bilateral mastectomy, chronic pain, opioid use history and drug charts, redo mastectomy, and patient refusal. Patients were divided into two groups using online randomization software: Group A received ESP block and Group B received local infiltration. After explaining the procedure in detail, written informed consent was obtained from all patients. On the day of surgery, patients allocated to Group A received ESP block at T2–T6 nerves using bupivacaine 0.375% with a total volume of 30 ml not exceeding the allowable safety dosage of 2 mg/kg, while Group B received local infiltration at the incision site with bupivacaine 0.375% in a volume of 30 ml, also not exceeding the allowable safety dosage of 2 mg/kg. General anesthesia was induced with IV propofol 2 mg/kg and atracurium 0.5 mg/kg IV, maintained with inhaled sevoflurane targeting MAC of 1 in oxygen-enriched air (FiO_2 = 0.5), and supplemented with atracurium 0.1 mg/kg every 30 minutes. Rescue analgesia with IV morphine 0.1 mg/kg was given if mean arterial pressure or heart rate rose above 20% of baseline levels. Intraoperatively, patients were given paracetamol 15 mg/kg and diclofenac sodium 75 mg. At the end of surgery, residual neuromuscular blockade was reversed with neostigmine (0.05 mg/kg), and patients were extubated after complete recovery of airway reflexes. Postoperatively, tramadol and metoclopramide were prescribed by the surgical team, and rescue analgesia with morphine 2 mg IV

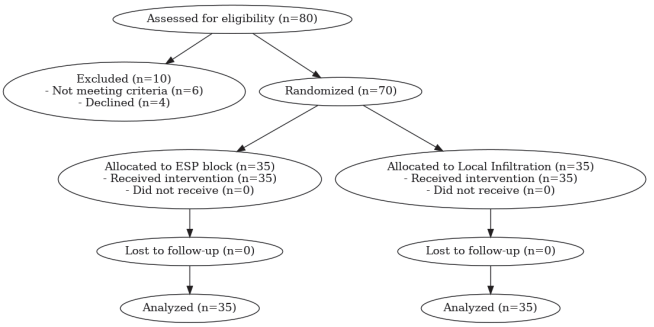
bolus was administered if the pain score was ≥ 4. On postoperative day 2, patients were contacted telephonically, and the QoR-15 questionnaire was completed. All data were kept confidential and remained with the researcher. Data were entered in SPSS version 23 demographic data and baseline characteristics were compared between groups. Qualitative data were presented as frequency and percentage, while quantitative data were presented as mean ± standard deviation (SD). Data were stratified for age and BMI. The independent t-test was applied to determine statistical significance of differences in quality of recovery between the two groups, with a p-value < 0.05 considered statistically significant.

RESULTS

A total of 80 patients were assessed for eligibility, of whom 10 were excluded (6 not meeting criteria and 4 declined participation). Seventy patients were randomized equally into the ESP block group (n=35) and the local infiltration group (n=35), with no patients lost to follow-up Figure-1

FIGURE-1

CONSORT Flow Diagram



The two groups were comparable at baseline. The mean age in the ESP group was 39.7 ± 13.2 years compared with 35.5 ± 12.7 years in the LI group (p=0.18). Mean BMI was 27.1 ± 3.7 kg/m² in the ESP group and 25.8 ± 3.8 kg/m² in the LI group (p=0.16). The distribution of ASA physical status was identical, with all 70 patients having ASA II. The laterality of surgery was balanced, with 18 right-sided and 17 left-sided procedures in the ESP group compared with 16 and 19 respectively in the LI group (p=0.61). The proportion of mastectomy versus modified radical mastectomy was also similar (22 vs 13 in ESP; 20 vs 15 in LI, p=0.64). The mean duration of surgery was 102.3 ± 21.4 minutes in the ESP group and 106.7 ± 22.8 minutes in the LI group (p=0.42). Median baseline opioid requirements were 2 mg [IQR 1–3] in both groups (p=0.52). Table-I

TABLE-I

Baseline demographic and clinical characteristics

Characteristic	ESP (n=35)	LI (n=35)	P-Value
Age (years), mean ± SD	39.7 ± 13.2	35.5 ± 12.7	0.18
BMI (kg/m²), mean ± SD	27.1 ± 3.7	25.8 ± 3.8	0.16
Baseline opioid use (mg), median [IQR]	2 [1–3]	2 [1–3]	0.52
Side of surgery (Right/Left)	18 / 17	16 / 19	0.61
Type of surgery (MRM/ Mastectomy)	22 / 13	20 / 15	0.64
Duration of surgery (min), mean ± SD	102.3±21.4	106.7 ± 22.8	0.42

At 48 hours, participants in the ESP group had significantly higher global Quality of Recovery (QoR-15) scores compared with those in the LI group. The median [IQR] QoR-15 score was 145.9 [144.3–149.0] in the ESP group and 115.8 [112.9–118.0] in the LI group. The Hodges–Lehmann estimated median difference was 30.4 points (95% CI 18.6–40.7), indicating a clinically and statistically significant improvement in recovery with ESP (Mann–Whitney U test, p < 0.0001). Table-II

TABLE-II

QoR-15 Outcomes Comparison at 48 hours

Measure	ESP (Median [IQR])	LI (Median [IQR])	Between-group Comparison
48 h total QoR-15 score	145.9 [144.3–149.0]	115.8 [112.9–118.0]	Hodges–Lehmann diff = 30.4 (95% CI 18.6–40.7); Mann–Whitney U p < 0.0001

At 48 hours, scores for all 15 QoR-15 items were higher in the ESP group compared with the LI group (Table-III). Significant differences were seen across physical comfort, emotional state, functional recovery, and independence domains. The largest improvements were noted in Q7, Q8, and Q9, all favoring the ESP group with p<0.0001. Table-III

TABLE-III

Individual QoR-15 item scores Comparison at 48 hours

Item	ESP Median [IQR]	LI Median [IQR]	P-Value
Q1	9.0 [8.5–10.0]	8.0 [7.5–9.0]	0.00015
Q2	9.0 [9.0–10.0]	8.0 [7.0–9.0]	0.00011
Q3	9.0 [9.0–10.0]	9.0 [8.0–9.0]	0.00412
Q4	9.0 [9.0–10.0]	8.0 [8.0–9.0]	<0.0001
Q5	9.0 [9.0–10.0]	8.0 [7.5–9.0]	0.00002
Q6	9.0 [9.0–10.0]	8.0 [7.0–9.0]	0.0008
Q7	10.0 [9.0–10.0]	8.0 [7.0–9.0]	<0.0001
Q8	10.0 [9.0–10.0]	8.0 [8.0–9.0]	0.00001
Q9	10.0 [9.0–10.0]	8.0 [7.5–9.0]	<0.0001
Q10	9.0 [9.0–10.0]	8.0 [7.0–8.0]	<0.0001
Q11	9.0 [9.0–10.0]	8.0 [7.0–9.0]	<0.0001
Q12	9.0 [9.0–10.0]	8.0 [8.0–9.0]	0.00017
Q13	9.0 [9.0–10.0]	8.0 [8.0–9.5]	0.00251
Q14	9.0 [8.5–10.0]	8.0 [8.0–9.0]	0.00127
Q15	9.0 [9.0–10.0]	8.0 [7.0–9.0]	<0.0001

Postoperative opioid consumption within 24 hours was significantly lower in the ESP group, with mean values of 1.71 ± 0.79 mg versus 3.26 ± 0.70 mg, respectively. Table-IV

TABLE-IV

Postoperative opioid consumption (first 24 h)

Outcome	ESP	LI	Between-group
24 h morphine (mg), mean ± SD	1.71 ± 0.79	3.26 ± 0.70	t-test p=0.0000

DSCUSSION

In this randomized trial, patients who received an erector spinae plane block (ESP) had markedly better recovery at 48 hours after major oncological breast surgery than those who received local infiltration, with a 30-point advantage on the QoR-15 and substantially lower 24-hour opioid consumption. These findings align with the growing body of evidence that emphasizes patient-reported outcomes as core endpoints of perioperative care and enhanced recovery pathways[2], and they reinforce the validity and responsiveness of the QoR-15 instrument in surgical populations.[3] The magnitude of benefit we observed is not only statistically robust but also clinically compelling, comfortably exceeding commonly cited thresholds for a minimal clinically important difference for QoR-15, and it was consistent across all 15 items, indicating broad improvements in comfort, emotional state, function, and independence rather than a narrow effect confined to pain alone.

Our results are congruent with prior reports that established ESP as an effective analgesic technique in thoracic and abdominal surgery. The original description of ESP for thoracic neuropathic pain highlighted its potential to provide extensive multi-dermatomal coverage via injection deep to the erector spinae muscle[10], and subsequent clinical series reported favorable analgesia across diverse procedures.[11,12] In the specific context of breast surgery, randomized controlled data have similarly shown that ESP improves postoperative analgesia and reduces opioid requirements compared with conventional strategies[14], mirroring the opioid-sparing effect we found. ESP also complements earlier work on alternative chest wall blocks such as paravertebral, PECS, and intercostal techniques where efficacy must be weighed against technical complexity and complication profiles.[9] Mechanically, the ESP injection at mid-thoracic levels plausibly attenuates nociceptive input from T2–T6 dermatomes relevant to breast and axilla, with potential spread toward the paravertebral space to engage both dorsal and ventral rami; this broader segmental coverage offers a physiologic explanation for the global recovery gains we observed.

The clinical importance of improving early recovery after breast cancer surgery is substantial. Acute postoperative pain is common and severe for many patients and is a known risk factor for persistent postsurgical pain[5–7], which affects a high proportion of breast surgery survivors.[8] Interventions that simultaneously reduce pain and opioids while enhancing patient-reported recovery may therefore translate into better medium-term outcomes, fewer opioid-related adverse effects, and improved satisfaction key aims of modern perioperative care.[1,2] Our item-level QoR-15 analysis suggests that ESP's benefits extend beyond analgesia to domains that matter to patients' lived experience of recovery, a priority explicitly endorsed by perioperative consensus statements and consistent

with the performance characteristics of QoR-15 in day-surgery and inpatient settings.[3]

This study is strong because prospective randomization was done with balanced baseline characteristics, no loss to follow-up, standardized general anesthesia and multimodal analgesia, prespecified patient-centred endpoints, and robust statistical evidence nonparametric tests, effect sizes, and adjusted models. It also has limitations that should temper over-generalization. This was a single-centre study; operator technique and local practice patterns may limit external validity. Although the direction and size of effects were consistent, we did not collect longer-term outcomes for example, pain at 3–6 months, so we cannot directly infer an impact on chronic pain trajectories highlighted in prior literature[6–8] We compared ESP with local infiltration rather than with other regional standards such as thoracic paravertebral or PECS blocks; head-to-head comparisons would more precisely position ESP within the regional anesthesia spectrum for breast surgery. Finally, while we assessed safety clinically and observed no block-related complications, our sample is insufficient to detect rare adverse events.

With prior evidence from first principles and early clinical experience with ESP [10–12] to randomized breast surgery data showing opioid-sparing analgesia[14] our findings strengthen the case for incorporating ESP into enhanced recovery pathways for major oncological breast procedures. Future work should include multicentre trials comparing ESP with paravertebral and PECS techniques along with longitudinal follow-up to determine whether early gains in QoR translate into reduced persistent postsurgical pain, lower opioid exposure, and improved quality of life. Hence, for institutions seeking a technically straightforward, ultrasound-guided strategy that augments patient-centred recovery while reducing opioid requirements, ESP appears to be a compelling choice supported by our data and by the broader literature.[2,3,14]

CONCLUSION

This randomized controlled trial demonstrated that the erector spinae plane block significantly improves quality of recovery at 48 hours and reduces postoperative opioid consumption compared with local infiltration in patients undergoing major oncological breast surgery. The benefits were consistent across all QoR-15 domains, highlighting both superior analgesia and broader enhancements in patient-reported recovery. Larger multicenter studies with long-term follow-up are suggested to confirm these findings and explore their implications for persistent postoperative pain and overall quality of life.

CONFLICT OF INTEREST

The authors declare no conflict of interest.

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AUTHORSHIP AND CONTRIBUTION DECLARATION	
1	**Muhammad Asif:** Concept, data collection, write up.
2	**Ahsun Waqar Khan:** Supervision of project.
3	**Huma Saleem:** Data collection.
4	**Syed Raza Mehdi:** Data analysis.
5	**Muhammad Arslan Tariq:** Write up, editing and drafting.