Section: Anaesthesia

Original Research Article

COMPARISON OF CONVENTIONAL GENERAL ANAESTHESIA VERSUS ERECTOR SPINAE PLANE BLOCK WITH GENERAL ANAESTHESIA IN POSTOPERATIVE PAIN MANAGEMENT FOR PATIENTS UNDERGOING MODIFIED RADICAL MASTECTOMY

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ABSTRACT

Background: Effective postoperative pain management is essential for enhanced recovery following modified radical mastectomy (MRM). Regional anaesthetic techniques such as the erector spinae plane block (ESPB) have shown promise in reducing postoperative pain and enabling faster recovery. **Objective:** This study compares general anaesthesia (GA) alone versus ultrasound-guided ESPB combined with GA for postoperative analgesia in MRM patients. **Materials and Methods:** Forty ASA I and II female patients undergoing MRM were randomly allocated to receive GA alone (Group GA, n=20) or ultrasound-guided ESPB with GA (Group ESPB, n=20). Postoperative pain was assessed using a visual analogue scale (VAS) at 1, 6, 12, and 24 hours. Objectives Included time to first rescue analgesia, total paracetamol consumption, patient satisfaction, and adverse effects. **Result:** Group ESPB had significantly lower VAS scores at all time points ($p<0.001$), longer time to first rescue analgesia (8.3 ± 1.6 h vs. 3.2 ± 0.9 h; $p<0.001$), fewer paracetamol doses (1.3 ± 0.5 vs. 3.0 ± 0.7; $p<0.001$), and higher satisfaction scores. Incidence of nausea and vomiting was significantly lower in Group ESPB. **Conclusion:** ESPB provides superior postoperative analgesia and improved patient satisfaction with fewer side effects and is a valuable adjunct in anaesthetic management for MRM.

INTRODUCTION

Modified radical mastectomy (MRM) is a standard surgical treatment for breast cancer but is frequently associated with significant postoperative pain, leading to delayed recovery, reduced patient satisfaction, and higher risk of chronic pain syndromes.[1,2] General anaesthesia (GA), though commonly used, often requires high doses of opioids, resulting in complications like postoperative nausea, vomiting, sedation, and respiratory depression.[3]

The erector spinae plane block (ESPB), introduced by Forero et al. in 2016,[4] is an interfascial plane block targeting the dorsal and ventral rami of the thoracic spinal nerves. Administered under ultrasound guidance, ESPB provides effective multi-dermatomal analgesia and has shown promising results in thoracic and breast surgeries.[5,7*]

This randomized controlled study aims to compare the efficacy of GA alone with ESPB combined with GA for postoperative pain management in patients undergoing MRM.

MATERIALS AND METHODS

Study Design and Patients

After institutional ethics committee approval and informed consent, 40 female patients (ASA physical status I–II, aged 18–60 years) undergoing elective MRM were enrolled in this prospective randomized controlled trial. Study was performed from June 2024 to June 2025.

Group Allocation

Patients were randomly assigned using a computer-generated table:

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- Group GA (n=20): Received general anaesthesia alone.
- Group ESPB (n=20): Received ultrasound-guided ESPB followed by GA.

Anaesthetic Technique

In Group General Anaesthesia

Patients received intravenous (IV)midazolam 0.05 mg/kg as premedication. Induction was done with IV propofol 2 mg/kg and fentanyl 2 µg/kg. Neuromuscular blockade was achieved with IV succinylcholine(1-1.5mg/kg) to facilitate endotracheal intubation. Anaesthesia was maintained with sevoflurane (1–2%) in a 50% air-oxygen mixture and inj.vecuronium (0.01mg/kg). Neuromuscular reversal was achieved with neostigmine 0.05 mg/kg and glycopyrrolate 0.01 mg/kg.

In Group Erector Spinae Plane Block

In Group ESPB, patients received the block pre-induction in the sitting position. A high-frequency linear ultrasound probe was placed 3 cm lateral to the T4 spinous process. A 22G echogenic needle was inserted in-plane until the transverse process was contacted, and 20 ml of 0.25% bupivacaine was deposited in the fascial plane beneath the erector spinae muscle. Following administration of ESPB, GA was then administered.

Postoperative Evaluation

Pain was assessed using VAS at 1, 6, 12, and 24 hours. Rescue analgesia (IV paracetamol 15 mg/kg) was administered if VAS >4. Parameters assessed:

- Time to first rescue analgesia
- Total number of paracetamol doses in 24 hours
- Hemodynamic stability
- 5-point Likert scale satisfaction score
- Adverse effects (nausea, vomiting, respiratory depression)

Statistical Analysis

Data were analyzed using SPSS version 25.0. Mean values were compared using unpaired t-tests; categorical variables with Chi-square or Fisher's exact test. A p-value <0.05 was considered significant.

RESULTS

Patient Demographics

Table 1: Demographic Data

Parameter	Group GA (Mean ± SD)	Group ESPB (Mean ± SD)
Age (years)	47.3 ± 6.2	46.8 ± 6.5
Weight (kg)	62.5 ± 5.8	63.2 ± 6.0
Height (cm)	158.4 ± 4.9	157.9 ± 5.1
ASA I/II (n)	12/8	13/7

No statistically significant differences in demographic parameters were noted between groups.

Table 2: Pain Scores (VAS)

Time Post-op	GA Group (Mean ± SD)	ESPB Group (Mean ± SD)	p value
1 hour	4.6 ± 1.1	2.1 ± 0.9	<0.001
6 hours	4.2 ± 1.0	2.3 ± 0.8	<0.001
12 hours	3.7 ± 0.9	1.9 ± 0.6	<0.001
24 hours	3.1 ± 0.8	1.5 ± 0.5	<0.001

Table 3: Other Outcomes

Outcome	ESPB:	GA	P value
Time to first rescue analgesia:	8.3 ± 1.6 h	vs: 3.2 ± 0.9 h	(p<0.001)
Paracetamol doses in 24 h:	1.3 ± 0.5	3.0 ± 0.7	(p<0.001)
Patient satisfaction (Likert scale):	4.6 ± 0.5	3.2 ± 0.7	(p<0.01)
Nausea/Vomiting incidence:	40%,	10%	(p=0.03)
Incidence of respiratory depression	0	0	

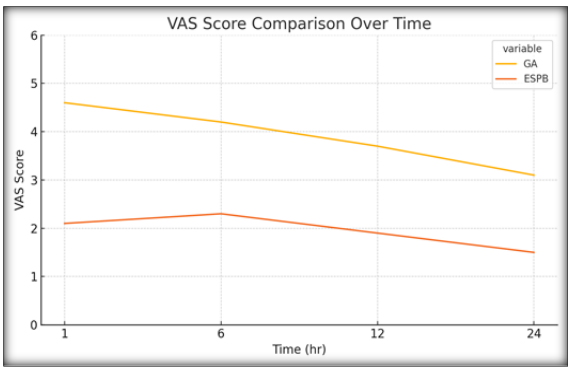

Figure 1: VAS Comparison over Time between 2 Groups

VAS scores at 1, 6, 12, and 24 hours postoperatively were significantly lower in the ESPB group at all time points.

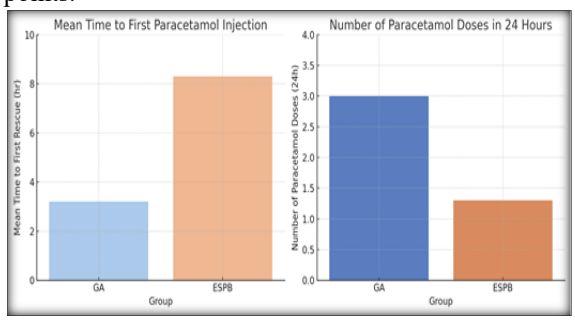

Figure 2: Rescue Analgesia Comparison

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Group ESPB showed a significantly longer mean time to first rescue analgesia and required fewer paracetamol injections over 24 hours compared to Group GA.

DISCUSSION

Our results demonstrate that ESPB significantly improves postoperative pain relief in MRM patients, evidenced by lower VAS scores, delayed requirement of rescue analgesia, reduced analgesic consumption and reduced incidence of side effects were observed in the ESPB group. Similar outcomes were reported in other studies.[7,13]

The VAS scores at all postoperative time intervals (1, 6, 12, and 24 hours) were significantly lower in the ESPB group. This suggests that ESPB offers consistent and prolonged analgesia throughout the immediate postoperative period. These findings are consistent with prior studies that report effective dermatomal spread and blockade of both dorsal and ventral rami using ESPB, thereby reducing nociceptive input from the surgical site.[4,5,6]

The time to first rescue analgesia was significantly prolonged in the ESPB group, indicating better pain control duration. Furthermore, the total number of paracetamol doses administered in 24 hours was significantly lower in the ESPB group, reinforcing its opioid- and analgesic-sparing properties. This contributes not only to better pain management but also to a reduction in drug-related side effects and healthcare resource utilization. These results are supported by earlier studies that observed decreased opioid consumption following ESPB in breast and thoracic surgeries.[7,8] Ueshima and Otake also reported successful use of ESPB in breast surgery, noting its simplicity and safety, which supports its inclusion in multimodal analgesia protocols.[9]

Hemodynamic parameters remained stable and comparable between both groups. Unlike thoracic epidurals or paravertebral blocks, ESPB has a lower risk of hypotension, making it safer for patients with cardiovascular comorbidities.[10]

Patient satisfaction scores were significantly higher in the ESPB group, likely due to better pain control, decreased need for rescue medications, and lower incidence of side effects. Improved satisfaction has been previously documented with regional blocks in breast surgery due to better pain management and earlier mobilization.[11] This reflects the growing trend of patient-centered perioperative care, where multimodal analgesia and regional techniques are increasingly valued.

Importantly, the incidence of postoperative nausea and vomiting (PONV) was significantly lower in the ESPB group. This can be attributed to reduced systemic analgesic requirements, especially opioids and NSAIDs, which are common contributors to PONV.[12] ESPB's role in reducing opioid-related side effects is increasingly being recognized in enhanced recovery protocols.

No cases of respiratory depression were noted in either group, aligning with the known safety profile of both ESPB and non-opioid rescue medications like paracetamol.

These findings are consistent with the observations by Krishna et al,[13] who reported better analgesia and fewer side effects with ESPB compared to paravertebral block. Additionally, Gürkan et al,[7] found ESPB effective in reducing opioid consumption and enhancing recovery in breast surgery.

Notably, no respiratory depression was reported in either group, which is consistent with the known safety profile of ESPB and non-opioid analgesic strategies.[14]

Limitations

This study was limited by a relatively small sample size (n = 40), which may reduce the statistical power to detect differences in less frequent side effects. Also, the single-center nature and lack of double-blinding may introduce potential observer bias. Future multicentric studies with larger patient cohorts and inclusion of long-term follow-up (e.g., chronic post-mastectomy pain) would be valuable to further validate these results.

CONCLUSION

Ultrasound-guided ESPB significantly improves postoperative pain control, prolongs analgesia duration, reduces the need for rescue medications, enhances patient satisfaction, and lowers the incidence of PONV compared to general anesthesia alone in modified radical mastectomy. These findings support the inclusion of ESPB as a standard component of multimodal analgesia in breast cancer surgeries.

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