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# Ultrasound-Guided Erector Spinae Plane Block Compared to Modified Pectoral Plane Block for Postoperative Analgesia in Modified Radical Mastectomy

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## ABSTRACT

**Background:** One of the most frequently performed breast surgeries is the modified radical mastectomy (MRM). Following breast surgery, patients report significant acute pain. Regional anesthesia utilization shows potential in relieving discomfort following breast surgeries.

**Objective:** To evaluate safety and effectiveness of ultrasound-guided erector spinae plane block (ESPB) and pectoral plane block (PECS) on the quality of analgesia postoperatively for postoperative pain relief in patients undergoing MRM.

**Patients and Methods:** This randomized, clinical trial included 90 women aged from 18 to 65 years undergoing MRM. Patients were randomly allocated into two equal groups: Group I received an ultrasound-guided ESPB, while Group II received an ultrasound-guided PECS block. All patients were subjected to clinical assessment, and laboratory investigation. Patients were administered one tablet of alprazolam 0.5 mg two hours prior to the scheduled surgery on the day of the operation.

**Results:** Visual analogue scale (VAS) at rest and at movement were significantly lower at 6, 12 and 24 h in group II compared to group I ($P<0.05$). Time of 1$^{st}$ rescue analgesic requirement was significantly delayed in group II compared to group I ($P=0.003$). In comparison to group I, the overall dose of morphine and the number of patients who required rescue analgesia were significantly lower in group II ($P=0.017$, 0.039 respectively).

**Conclusions:** In patients underwent MRM, PECS block showed superior pain relief, less postoperative analgesic requirement with delayed request and lower morphine consumption. However adverse events were less common in both modalities, PONV incidence was less in PECS than ESPB.

**Keywords:** Ultrasound-Guided; Erector Spinae Plane Block; Modified Pectoral Plane Block; Postoperative Analgesia; Modified Radical Mastectomy.

## INTRODUCTION

The most frequently executed breast surgery is modified radical mastectomy (MRM) [1]. About 60% of patients who have breast surgery report severe acute discomfort after the procedure. The majority of this pain is caused by the axillary portion of the procedure [2].

About 40% of patients with breast cancer report experiencing acute postoperative pain, suggesting that postoperative pain management is inadequate [3]. Additionally, by raising risk of postmastectomy pain syndrome, acute postoperative pain may lower quality of life [4].

Effective management of acute pain preserves immunological response while reducing need for opioids and general anesthetics and suppressing surgical stress response [5].

The use of regional anesthesia to treat post-breast surgery discomfort shows promise. Pectoral nerve I and II blocks, paravertebral blocks, interscalene brachial plexus blocks, and thoracic epidurals have all been employed in various trials with positive outcomes [6,7]. Every one of these methods, meanwhile, has a unique set of issues. Since ultrasound was introduced into operating room, novel and safer ultrasound-guided interfascial plane blocks—which are better than invasive procedures like thoracic paravertebral block—are replacing traditional treatments [8].

For post-mastectomy analgesia, pectoral nerve (PECS) block is thought to be an effective block [9].

Additionally, a modified pectoral plane block is employed for postoperative analgesia. This block inhibits intercostals, long thoracic, pectoral, and intercostal brachial nerves. It was demonstrated to have a strong analgesic effect with mastectomy surgeries [10].

Novel analgesic method known as ultrasound (US)-guided erector spinae plane block (ESPB) was put forth by **Forero *et al.*** [11].

According to a scientific experiment and other case studies, ESPB can lessen discomfort following MRM for breast cancer [12-14]. Few studies have been conducted to date on effectiveness of ESP blocks in MRM surgeries, and none have examined relative effectiveness of PEC and ESP blocks A recent study by **Altiparmak *et al.*** [15] demonstrated that in first 24 hours following elective unilateral radical mastectomy surgery, US-guided modified PECS block was more effective than ESP block at lowering postoperative tramadol consumption and pain scores. They did note, though, that it is currently unknown what ideal LA agent dosage and concentration are for ESP block.

This study 's objective was assessing safety and effectiveness of PECS block and ultrasound-guided ESPB on analgesia quality following surgery for patients who underwent MRM.



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## PATIENTS AND METHODS

Ninety women between the ages of 18 and 65 who had physical status I, II, or III in accordance with ASA were having MRM in this parallel, double-blind, randomized clinical research. The study was carried out during the period from March 2022 to March 2023. This manuscript adheres to the CONSORT guidelines.

Exclusion criteria were patients with history of allergy to local anesthetic, with bleeding disorder or receiving anticoagulants, with body mass index (BMI)>35kg/$m^2$, with spine or chest wall deformity, injection site infection, or opioid abuse and pregnancy.

### Randomization and blindness:

Using computer-generated random numbers, patients were randomized to one of two groups (each consisting of 45 patients): group I (ESPB group) received ultrasound-guided ESP block, while group II (PECS group) received ultrasound-guided PECS block. The method was concealed from patients and outcome researcher.

CBC, partial thromboplastin time, prothrombin time and concentration, kidney (creatinine clearance), and liver function tests (alanine aminotransferase test, bilirubin, aspartate aminotransferase test) were executed on all patients, along with a complete history taking (age, BMI), and a clinical evaluation to rule out any of contraindications listed above.

Alprazolam 0.5 mg tablets were given to patients two hours prior to scheduled operation time on day of procedure as a premedication.

### Ultrasound-guided erector spinae plane block, group 1 (US-ESPB):

The patient was placed in a sitting posture. Marking location where the spine was palpated from C7 to T5 allowed for identification of spinous process. Following skin asepsis, we positioned the ultrasound machine's high frequency (5–13 MHz) linear probe (Sonosite, Bothwell, USA) 3 cm laterally to T5 spinous process in a sterile sheath. Erector spinae, rhomboids major, and trapezius muscles were identified from outside. The tip of a 21 G echogenic needle was placed into fascial plane on deep (anterior) portion of erector spinae muscle utilizing an in-plane superior to inferior approach. Visible fluid spread beneath erector spinae muscle off bony shadow of transverse process verified needle tip's position. Through needle, 20 milliliters of 0.25 percent bupivacaine were administered.

After the block, patients were monitored for half an hour. Every five minutes, a blinded observer using pin-prick feeling evaluated sensory level of block in each dermatomal distribution from T1 to T8. In comparison to opposing side, total number of dermatomes that experienced less pain upon pin pricking was recorded. Block failure was deemed to have occurred if, within 30 minutes, pin-prick feeling did not lessen in any portion.

### Pectoral nerve block, group 2 (PECS):

PECS block was carried out by one person. Ipsilateral upper limbs of patients were abducted 90 degrees below lateral third of clavicle whereas they were in a supine position. Following identification of axillary vessels, two pectoralis muscles (major and minor) were found in one plane when US-probe was rotated inferolaterally till it reached serratus anterior. Ten milliliters of same research solution were injected through needle positioned in interfascial plane between pectoralis muscles. Subsequently, 20 mL of solution was administered above serratus anterior muscle, located over third and fourth ribs, after rotating probe toward axilla. All blocks were executed prior to induction of general anesthesia.

### General anesthesia induction:

Bi-spectral index monitoring (BIS, Philips Healthcare, Andover, MA), electrocardiograms, non-invasive arterial blood pressure, pulse oximeters, and capnography were among monitoring methods used in operating room. Intravenous infusion of isotonic saline was initiated at a rate of 15 mL/kg/h. Following 100% oxygen preoxygenation, 2 μg/kg fentanyl and 2-3 mg/kg propofol were used to induce anesthesia; 0.6 mg/kg rocuronium helped with endotracheal tube intubation. For postoperative nausea and vomiting, ondansetron 4 mg and dexamethasone 8 mg were administered intravenously to every patient. Sevoflurane in a 50% oxygen/air combination was utilized to maintain anesthesia, with ventilation parameters to maintain end-tidal $CO_2$ of roughly 35–45 mmHg and a minimum alveolar concentration that maintained a BIS value between 40 and 60.

When a patient's heart rate (HR) or blood pressure rose by more than 20% from baseline, 0.5 μg/kg of intravenous fentanyl was administered; total dose was noted. Prior to induction and every five minutes until procedure was completed, hemodynamic parameters were collected. Following completion of skin closure, sevoflurane was discontinued, and intravenous sugammadex 2 mg/kg was used to achieve neuromuscular reversal.

Patients were taken to PACU following a successful extubation. Following their transfer to PACU, patients were monitored, and for one-hour, hemodynamic data were recorded every fifteen minutes. Utilizing VAS with a range of 0 (no pain) to 10 (worst agony imaginable), all patients were assessed for hemodynamics and pain severity in PACU, 2-, 4-, 6-, 12-, 24-, and 48-hours post-surgery [16]. When VAS was ≥4, rescue analgesia was provided as intravenous boluses of 3 mg morphine. In first 24 hours, number of rescue analgesics required was recorded, and time of need for first rescue analgesia was calculated as total amount of time block delivered analgesia.

Additionally, patients were asked about their overall happiness with treatment and their level of comfort following surgery. This was done using a

patient satisfaction score, which was calculated 24 hours after procedure using a 5-point Likert scale (1 being extremely unhappy and 5 being extremely satisfied) [17]. Postoperative nausea and vomiting (PONV), vascular damage, pneumothorax, hypotension, bradycardia, arrhythmia, and desaturation ($SpO_2$ <95%) were among adverse events that were treated and documented.

**Outcomes:**

Primary outcome focused on measuring total amount of morphine consumed postoperatively for rescue analgesia, and secondary outcomes comprised pain at rest, the frequency of analgesic requests, intraoperative fentanyl usage, adverse events, and patient satisfaction.

**Sample size calculation:**

G. power 3.1.9.2 was utilized for calculating sample size (Universitat Kiel, Germany). A prior study determined sample size based on overall morphine consumption in first 24 hours following surgery, which was significantly higher in group 1 (ESP block group) than in group 2 (PECS block) (16.7±7.21 vs., 10.7±3.12, P=0.001) [18]. Based on following factors: 80% study power and a 0.05 α error. To combat dropout, four more cases were introduced. As a result, 90 patients were assigned.

**Ethical considerations:**

**The study was done after being accepted by Research Ethics Committee, Benha University. All patients provided written informed consents prior to their enrolment. The consent form explicitly outlined their agreement to participate in study and for publication of data, ensuring protection of their confidentiality and privacy. This work has been carried out in accordance with The Code of Ethics of the World Medical Association (Declaration of Helsinki) for studies involving humans.**

***Statistical analysis***

Statistical analysis was executed utilizing SPSS version 28 (IBM©, Armonk, NY, USA). Normality of data distribution was estimated through histograms and Shapiro-Wilks testing. For quantitative parametric data, analysis was done utilizing unpaired student t-test, with results expressed as mean ± standard deviation (SD). Quantitative non-parametric data were analyzed utilizing Mann Whitney test, with results expressed as median and interquartile range (IQR). Qualitative variables were analyzed employing either Chi-square test or Fisher's exact test where appropriate, with results reported as frequency and percentage (%). A two-tailed P value < 0.05 was deemed statistically significant.

**RESULTS**

A total of 127 patients were estimated for eligibility in the study; 23 did not fit requirements, and 14 opted out of participation. Two groups of 45 patients each, were randomly selected from remaining 90 patients. Every patient assigned was monitored and subjected to statistical analysis **(Figure 1)**.

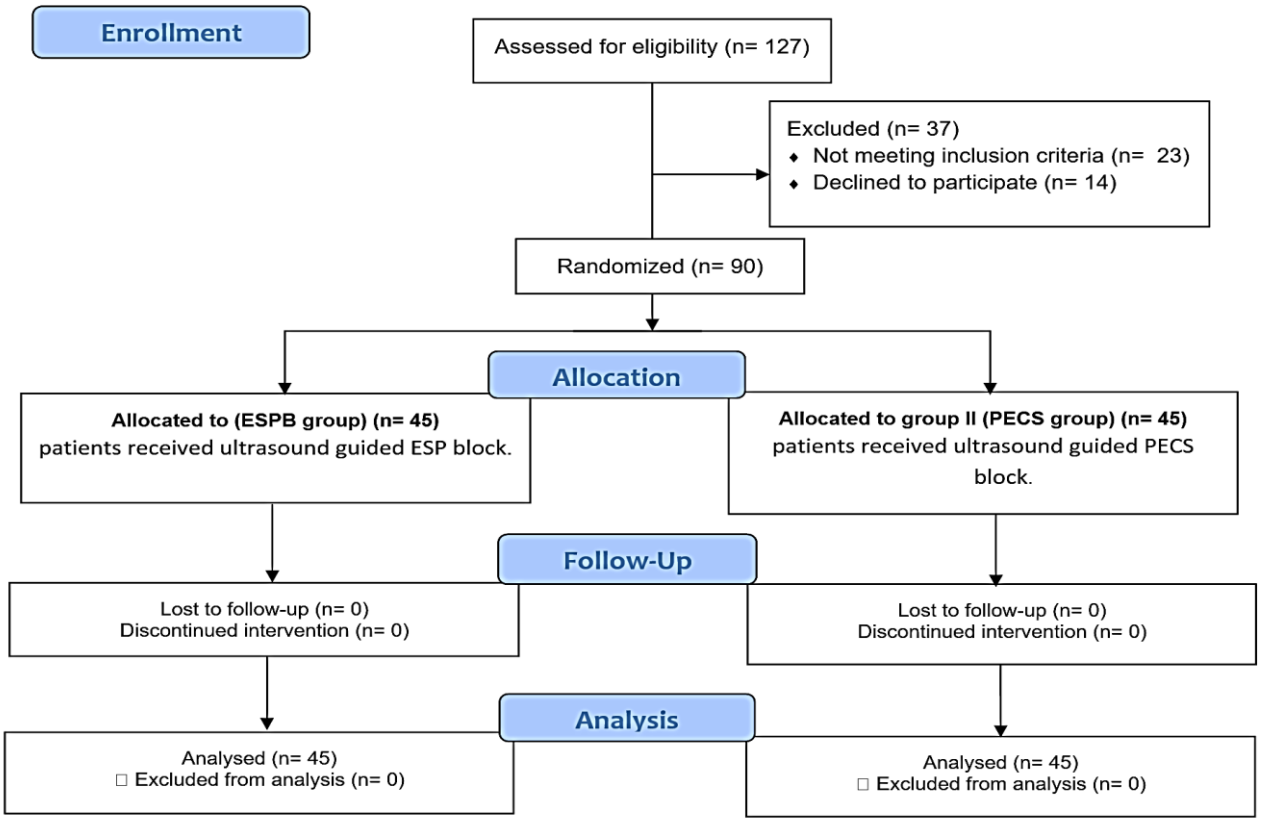


**Figure 1: CONSORT flowchart of enrolled patients**

There was an insignificant difference between both groups regarding baseline characteristics (age, weight, height, BMI, and ASA), comorbidities (HTN, DM), operative duration, and site of surgery **(Table 1)**.

**Table 1: Baseline characteristics of the studied groups**

| | | Group I (ESPB group) (n=45) | Group II (PECS group) (n=45) | P value |
|---|---|---|---|---|
| **Age (years)** | | 46.78±10.95 | 44.49±13.28 | 0.375 |
| **Weight (Kg)** | | 77.96±11.9 | 78.56±12.57 | 0.817 |
| **Height (m)** | | 1.67±0.04 | 1.65±0.04 | 0.129 |
| **BMI (Kg/m$^2$)** | | 28.07±4.58 | 28.8±5.11 | 0.481 |
| **ASA** | **ASA I** | 20 (44.44%) | 17 (37.78%) | 0.561 |
| | **ASA II** | 17 (37.78%) | 15 (33.33%) | |
| | **ASA III** | 8 (17.78%) | 12 (26.67%) | |
| **Comorbidities** | **HTN** | 16 (35.56%) | 13 (28.89%) | 0.499 |
| | **DM** | 10 (22.22%) | 13 (28.89%) | 0.468 |
| **Operative duration (min)** | | 87.31±13.09 | 88.04±11.62 | 0.779 |
| **Site of surgery** | **Right** | 21 (46.67%) | 17 (37.78%) | 0.393 |
| | **Left** | 24 (53.33%) | 28 (62.22%) | |

Data expressed as mean ± SD or number (%), BMI: body mass index, ASA: American society of anesthesiologists.

Whereas VAS at rest and at movement at PACU, 2, 4, and 48 hours did not significantly differ between the two groups, VAS at rest and at movement at 6, 12, and 24 hours were significantly reduced in group II (PECS group) than in group I (ESPB group) **(Table 2 and figures 2 and 3)**.

**Table 2: Postoperative pain assessment by visual analogue scale at rest and movement of the studied groups**

| | | Group I (ESPB group) (n=45) | Group II (PECS group) (n=45) | P value |
|---|---|---|---|---|
| **VAS at rest** | **PACU** | 2 (1-3) | 2 (1-3) | 0.331 |
| | **2 h** | 2 (1-3) | 2 (1-3) | 0.777 |
| | **4 h** | 2 (2-3) | 2 (1-3) | 0.699 |
| | **6 h** | 3 (3-5) | 3 (3-3) | **0.015*** |
| | **12 h** | 3 (3-5) | 3 (2-3) | **0.005*** |
| | **24 h** | 3 (2-4) | 3 (2-3) | **0.040*** |
| | **48 h** | 2 (1-3) | 2 (1-3) | 0.792 |
| **VAS at movement** | **PACU** | 2 (2-4) | 2 (2-3) | 0.822 |
| | **2 h** | 3 (2-4) | 3 (2-3) | 0.536 |
| | **4 h** | 3 (2-4) | 3 (2-3) | 0.649 |
| | **6 h** | 4 (3-5) | 4 (2-5) | **0.027*** |
| | **12 h** | 4 (3-6) | 3 (2-4) | **0.006*** |
| | **24 h** | 4 (3-5) | 3 (3-4) | **0.037*** |
| | **48 h** | 3 (2-4) | 3 (2-3) | 0.363 |

Data expressed as median (IQR), VAS: visual analogue scale, PACU: post-anesthesia care unit, *: statistically significant as P value <0.05.

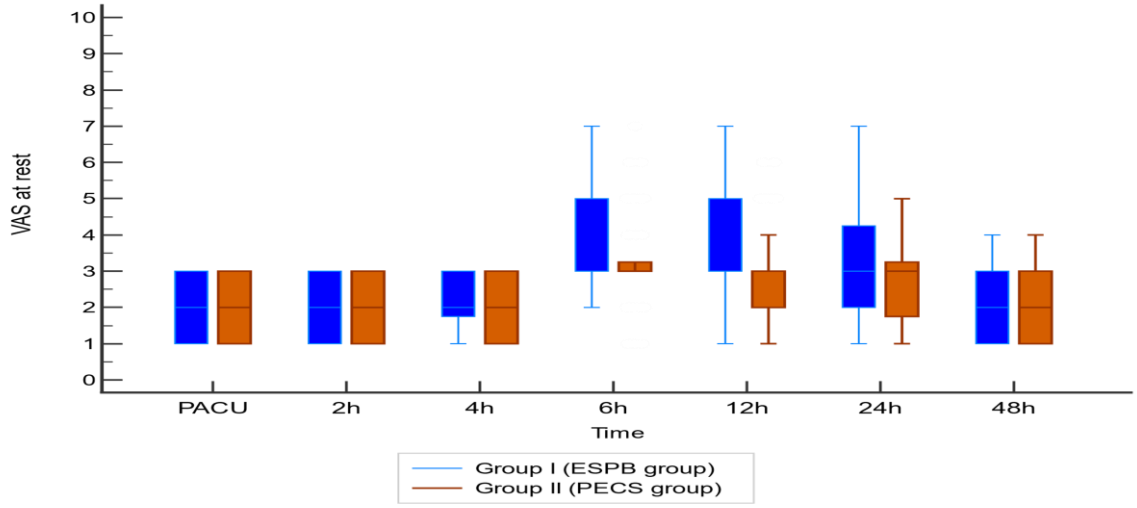


**Figure 2: VAS at rest of the studied groups**

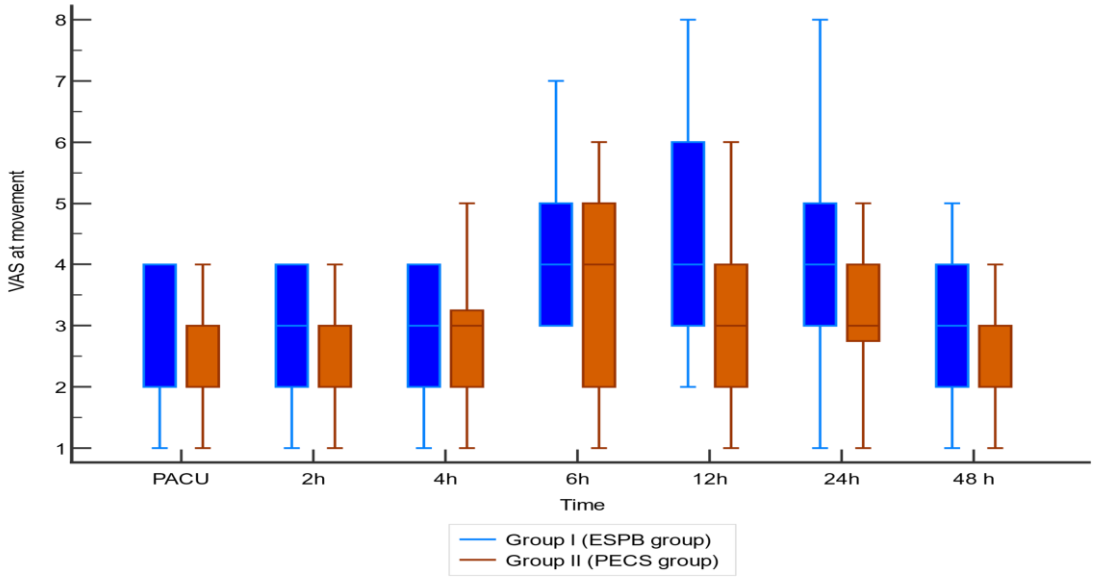


**Figure 3: VAS at movement of the studied groups.**

Postoperative HR and MAP at all time measurements (PACU, 2, 4, 6, 12, 24 and 48 h) were insignificantly different across both groups **(Table 3 and figures 4 and 5)**.

**Table 3: Postoperative hemodynamics of the studied groups**

| | | Group I (ESPB group) (n=45) | Group II (PECS group) (n=45) | P value |
|---|---|---|---|---|
| **HR (beats/min)** | **PACU** | 79.1 ± 5.27 | 79.5 ± 5.75 | 0.703 |
| | **2 h** | 79.9 ± 6.3 | 81.0 ± 6.06 | 0.387 |
| | **4 h** | 79.9 ± 5.37 | 79 ± 6.3 | 0.484 |
| | **6 h** | 84.9 ± 10.34 | 87.5 ± 9.81 | 0.232 |
| | **12 h** | 84.4 ± 8.77 | 86.2 ± 9.35 | 0.367 |
| | **24 h** | 84.8 ± 10.31 | 84.1 ± 8.71 | 0.716 |
| | **48 h** | 77.98 ± 11.66 | 79.4 ± 11.89 | 0.566 |
| **MAP (mmHg)** | **PACU** | 85.3 ± 8.83 | 86.2 ± 9.12 | 0.623 |
| | **2 h** | 83.9 ± 9.33 | 84.1 ± 8.37 | 0.906 |
| | **4 h** | 86.4 ± 9.21 | 85.8 ± 9.72 | 0.790 |
| | **6 h** | 86 ± 11.25 | 87 ± 9.35 | 0.633 |
| | **12 h** | 86.7 ± 10.27 | 87.8 ± 8.55 | 0.571 |
| | **24 h** | 87.2 ± 11.62 | 84.8 ± 8.93 | 0.293 |
| | **48 h** | 85.6 ± 7.92 | 84.7 ± 9.5 | 0.623 |

Data expressed as mean ± SD, HR: heart rate, MAP: mean arterial pressure, PACU: post-anesthesia care unit.

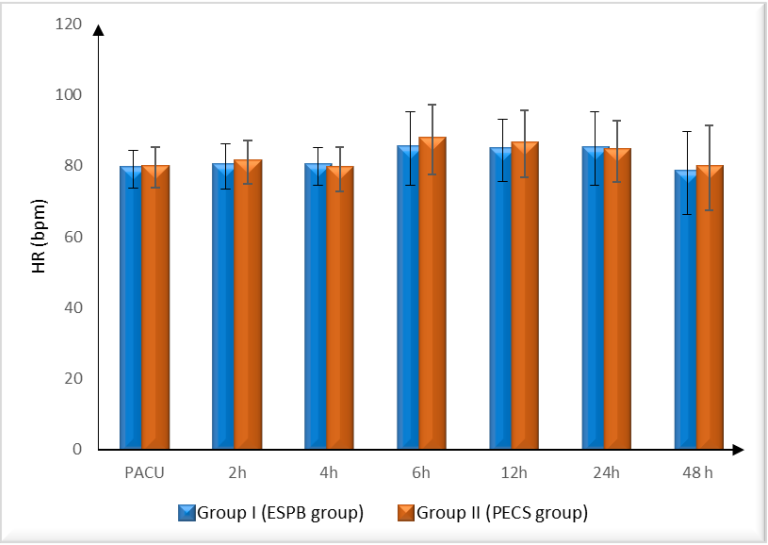


**Figure 4: Postoperative heart rate of the studied groups.**

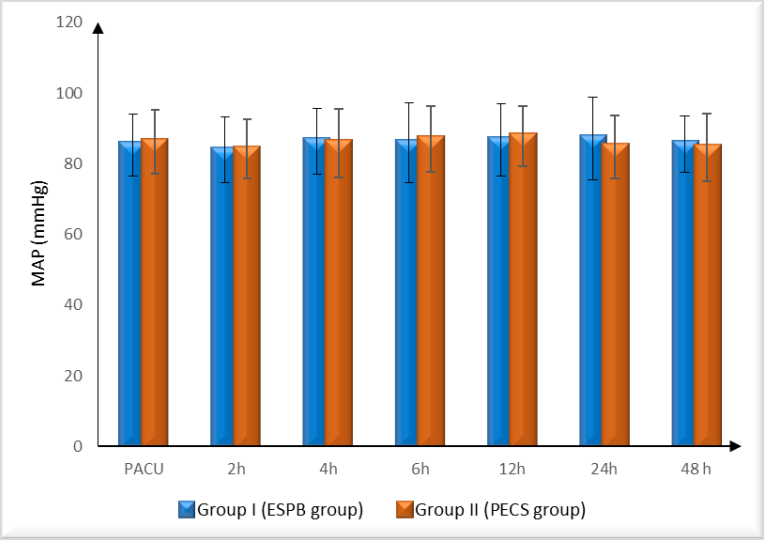


**Figure 5: Postoperative mean arterial pressure of the studied groups**

**Table 4** shows that intraoperative fentanyl consumption was insignificantly different between both groups. Time of 1st rescue analgesic requirement was significantly delayed in group II (PECS group) compared to group I (ESPB group). No. of patients required rescue analgesia and total dose of morphine were significantly reduced in group II (PECS group) than group I (ESPB group).

**Table 4: Intraoperative fentanyl consumption and postoperative rescue analgesic requirement of the studied groups**

| | Group I (ESPB group) (n=45) | Group II (PECS group) (n=45) | P value |
|---|---|---|---|
| **Intraoperative fentanyl consumption** | 94.44±34.08 | 104.44±35.07 | 0.174 |
| **Time of the 1st rescue analgesic requirement** | 10.42±6.03 | 16.0±12.43 | **0.003*** |
| **No. of patients required rescue analgesia** | 38 (84.44%) | 28 (62.22%) | **0.017*** |
| **Total dose of morphine (mg)** | 4.69±2.04 | 3.77±1.68 | **0.039*** |

Data expressed as mean ± SD or number (%), *: statistically significant as P value <0.05.

Regarding adverse events, only PONV occurred in 9 (20%) patients in group I (ESPB group) and 3 (6.67%) patients in group II (PECS group). Other adverse events as never injury, hematoma formation, local anesthetic toxicity, intravascular injection, pneumothorax, hypotension and bradycardia were not observed in any of the studied groups.

However, PONV was lower in group II (PECS group) than group I (ESPB group), but with no significant difference between both groups **(Table 5)**.

**Table 5: Adverse events of the studied groups**

| | Group I (ESPB group) (n=45) | Group II (PECS group) (n=45) | P value |
|---|---|---|---|
| **Never injury** | 0 (0%) | 0 (0%) | 1 |
| **Hematoma formation** | 0 (0%) | 0 (0%) | 1 |
| **Local anesthetic toxicity** | 0 (0%) | 0 (0%) | 1 |
| **Intravascular injection** | 0 (0%) | 0 (0%) | 1 |
| **Pneumothorax** | 0 (0%) | 0 (0%) | 1 |
| **PONV** | 9 (20%) | 3 (6.67%) | 0.063 |
| **Hypotension** | 0 (0%) | 0 (0%) | 1 |
| **Bradycardia** | 0 (0%) | 0 (0%) | 1 |

Data presented as number (%), PONV: postoperative nausea and vomiting.

**Table 6** shows that there was an insignificant difference between both groups regarding satisfaction.

**Table 6: Satisfaction of the studied groups**

| | Group I (ESPB group) (n=45) | Group II (PECS group) (n=45) | P value |
|---|---|---|---|
| **Very dissatisfied** | 4 (8.89%) | 2 (4.44%) | 0.465 |
| **Dissatisfied** | 6 (13.33%) | 6 (13.33%) | |
| **Neutral** | 16 (35.56%) | 10 (22.22%) | |
| **Satisfied** | 13 (28.89%) | 17 (37.78%) | |
| **Very satisfied** | 6 (13.33%) | 10 (22.22%) | |

Data presented as number (%).

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## DISCUSSION

MRM is linked to increased rates of PONV and both acute and chronic pain [19], which was primary aim for executing this study. The study sought to compare analgesic quality of ESPB and PECS II block in managing postoperative discomfort after MRM. ESP block is a safe substitute for paravertebral block (PVB), as transverse process acts as a protective barrier, reducing risk of pleural injury during needle insertion [20]. Depending on level of injection site, US-ESP can produce analgesia for either thoracic or abdominal segmental innervation [21].

After being injected beyond transverse process of T4 level, LA distributes craniocaudally over several levels. LA travels via costotransverse foramina to thoracic paravertebral region. Therefore, spinal neurons' dorsal and ventral rami and their communicants can be blocked by ESP [22]. LA extends nearly beneath injection site when thoracic PVB is performed while seated. Because of its superior cranial and caudal distribution, ESP block may therefore be a viable substitute for PVB. However, a prior study comparing modified PECS block with thoracic PVB in radical mastectomy patients found that modified PECS block led to lower opioid consumption and enhanced postoperative pain relief compared to PVB [23].

Long thoracic nerves, thoracic intercostal nerves, intercostobrachial nerves, and lateral and medial pectoral nerves are all impacted by modified PECS block. Regional anesthesia for chest wall and axillary regions results from LA spreading to thoracodorsal nerve distribution in PECS block, according to magnetic resonance imaging studies [24].

Our findings revealed that pain scores (VAS) at rest and during movement were significantly lower in Group II (PECS group) than in Group I (ESPB group) at 6, 12, and 24 hours postoperatively ($P<0.05$). Furthermore, need for first rescue analgesic was significantly delayed in PECS group compared to ESPB group ($P=0.003$). Number of patients required rescue analgesia and total dose of morphine were significantly lower in group II (PECS group) than group I (ESPB group) ($P=0.017$, 0.039 respectively).

**Wahba and Kamal** [25] investigated length of postoperative analgesia and morphine needs in 60 individuals with MRM. Patients who underwent PECS block reported better pain alleviation and less narcotic use compared to those who underwent PVB. These results are consistent with our observations.

This came in line with **Eid *et al.*** [26] who used a double-blind, randomized, prospective approach. ESPB (20 mL of 0.25% bupivacaine solution) was given to group E, while modified PPB (30 mL of 0.25% bupivacaine solution) was given to group P. They discovered that, at 30 minutes, no significant statistical difference in VAS scores was observed between Groups A and B (p-value = 0.168); however, at 2 hours, 4 hours, 6 hours, 8 hours, and 12 hours, group E's VAS score increased statistically significantly more than group P's (p-value = 0.001, <0.001, <0.001, <0.001, and <0.001; respectively). Lastly, after 24 hours, no statistically significant difference was detected between two groups. Furthermore, all group E patients (100.0%) required-morphine increased within 24 hours, compared to group

P patients (5.6%), with a statistically significant difference between two groups at p<0.001.

Consistent with our results, a recent study done by **Gad *et al.*** [18] comparing modified PECS block to ultrasound-guided ESP block showed that PECS block offers higher-quality analgesia than ESP block for patients having MRM operations.

**Bashandy and Abbas** [27] supported our findings, reporting that PECS block was more effective in reducing pain scores within first 24 hours postoperatively.

In contrast of our findings, **Mahajan *et al.*** [28] performed prospective open label study that was executed on 59 patients, planned for MRM. Two groups (P and E) were randomly selected from among patients. Group P (N=30) received 30 ml of 0.25% levobupivacaine along with an ultrasound-guided modified PEC block. Group E (N=29) received 30 ml of 0.25% levobupivacaine along with an ultrasound-guided ESP block. According to their findings, mean VAS score at 24 hours was 4.11 ± 0.629 for group P and 3.69 ± 0.679 for group E. This difference was statistically significant (P=0.024). Given that they utilized same 30 ml volume of local anesthetic for both PECS and ESP blocks, this discrepancy might be result of their usage.

We found that, regarding hemodynamic, postoperative HR and MAP at all time measurements (PACU, 2, 4, 6, 12, 24 and 48 h) were insignificantly different between both groups

This came in line with **Eid *et al.*** [26] who reported that insignificant statistical difference in MAP was observed between Group A and Group B at various measurement time points, however they reported that after 24 hours the level of MAP was found significantly higher in group A than group B with p-value = 0.015.

Pneumothorax following ESPB has been described by both **Ueshima and Otake** [29], who offer a contrasting perspective to our findings. In concordance with, **Hamilton and Manickam** [30] and **Selvi and Tulgar** [31], ultrasound-guided ESPB is a brand-new, well-liked block approach with only two known issues. Pneumothorax and motor paralysis resulted from employing an ESPB technique from a lower thoracic position.

Limitations: It is possible to overcome ESPB discontent caused by needle pricks during block performance by executing block following general anesthetic induction. This could facilitate use of customized PEC blocks under general anesthesia. However, positioning for an ESP block can be difficult once anesthesia is induced, and it calls for a specialized team of operating room staff to handle positioning alone. Another drawback was the lack of clarity regarding relationship between block's overall analgesic intake and systemic effects of LA.

## CONCLUSION

In patients underwent MRM, PECS block showed superior pain relief, less postoperative analgesic requirement with delayed request and lower morphine consumption postoperatively. However adverse events were less common in both modalities, PONV incidence was less in PECS compared to ESPB. The ideal location, dosage, and concentration of the LA agent for ESP block are currently unknown and need to be determined by more research.

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**Conflict of Interest: Nil.**

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