Journal of Population Therapeutics & Clinical Pharmacology

RESEARCH ARTICLE
DOI: 10.53555/hkv21s45

COMPARISON OF THE EFFICACY OF ULTRASOUND GUIDED ERECTOR SPINAE PLANE BLOCK, PECTORAL NERVE BLOCK AND THORACIC EPIDURAL FOR POSTOPERATIVE ANALGESIA AFTER MASTECTOMY SURGERY RANDOMIZED COMPARATIVE PROSPECTIVE CLINICAL STUDY

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Abstract

Background: Breast cancer operation is one of the most prevalent surgical procedures for females, with approximately 50% of cases having persistent pain (Postmastectomy Pain Syndrome) postoperatively, with twenty-four percent of these cases reporting their pain as moderate to severe. Evidence-based recommendations for the use of multimodal analgesia to treat postoperative pain were approved by the American Society of Anesthesiologists

Objective: Compare analgesic effectiveness of US guided PECSII with ESP block & TE for post operative analgesia.

Patients & Methods: This randomized comparative prospective clinical trial was conducted at Al-Zahraa University Hospital, Cairo, and Sharq Elmadina Hospital, Alexandria. 105 females between the ages of 40 and 60, with ASA II or III and a BMI less than 30, were enrolled. females were divided into three groups at random (35 female/each): ES, PECSII(PE) or TE.

Results: Time to perform block was longest in TE Group, VAS was lower in PECSII and ES Groups compared to TE Group at various postoperative intervals. Analgesic consumption was also reduced in the PECSII and ES groups. Intraoperative hemodynamics were lowest in TE Group in the first 6 hours then increased. Patient satisfaction scores were highest with the PECSII Group, followed closely by ES Group. Stress markers were highest in group TE.

Conclusion: The US guided single-shot PECSII offers superior analgesic efficacy, patient satisfaction, and safety compared to TE Analgesia and ES block for postoperative pain management following simple mastectomy. PECSII showed shorter block performance time, lower pain scores, delayed first morphine request time, and reduced total 24-hour analgesic consumption compared to TE and ES.

Keywords: Erector Spinae Plane Block (ES), Pectoral Nerve Block (PECSII), Thoracic Epidural

Analgesia (TE), Mastectomy.

INTRODUCTION

Breast surgery is linked to a higher prevalence of pain. Its presence can delay patients' mobilization, decrease respiratory function, and lead to serious medical issues including deep vein thrombosis, psychological problems, and respiratory tract infections (1). Additionally, this may make chronic pain syndrome more likely to occur (2).

For these reasons, optimal pain control has become a primary concern in the care of surgical patients and surgery has been identified as a high-priority area for pain research.

Two issues make the study of pain following surgery in mastectomy cases essential: breast cancer operation ranks among the most prevalent procedures for women, with approximately half of patients experiencing persistent discomfort known as postmastectomy pain syndrome (PMPS) afterward. Nearly a quarter of these individuals describe their pain levels as moderate to severe (3).

Second, breast cancer is more prevalent in elderly women with 43% aging 65 or above at time of diagnosis (4).

The American Society of Anesthesiologists has endorsed evidence-based guidelines supporting for multimodal analgesia in the management of pain following surgery. (5).

Choosing the appropriate method is individualized, tailored according to the type of procedure, the patient's comorbidities & patient's preference.

Regional techniques such as TE, thoracic paravertebral block (TPVB), pectoral nerve block (PECS I, II), and erector spinae plane block, have been advised as the primary means of pain relief following thoracic surgeries (6).

Patients and Methods:

The research gained approval by the local ethics council & Institutional Research Board of Faculty of Medicine for Girls, Al-Azhar University number (2018122001).

A randomized comparative prospective clinical trial was conducted on 105 female patients enrolled for elective simple mastectomy who were divided into three Groups at random (35 female/each): ES, PE or thoracic epidural (TE). females aged 40- 60 years with ASA II or III, and a BMI less than 30, were enrolled in the research.

The study excluded females have abnormalities of the vertebral column, bleeding diathesis, anti-coagulants medications, infection at the puncture site, research medication allergies & Pre-existing pain syndromes.

All female patients provided written informed consent following a thorough description of the benefits and potential drawbacks of each technique. At the preoperative visit, all females who completed the research had a clinical evaluation and were trained for how to measure their own discomfort by utilizing a ten centimeters visual analogue scale.

Technique:

On arrival at the operating theatre, females have been linked to the standard monitors; NIBP, ECG, and SpO2. Balanced general anesthesia has been induced after IV cannula (20G) was inserted with propofol two milligrams per kilogram, fentanyl two micrograms per kilogram, and atracurium (half milligrams per kilogram), and with the insertion of the endotracheal tube of suitable size and connection to a mechanical ventilator on controlled mode. The respiratory rate & tidal volume were adjusted to keep the ETCO2 within 10% variation from baseline values. Intravenous fluid therapy, transfusions, and other procedures followed the usual standards.

Maintenance of anesthesia was performed using Drager Fabius Plus Anesthetic Machine (Drager Medical System Inc.), with isoflurane 1- 2% and 0.1 mg/kg atracurium as top up doses for muscle relaxation. Paracetamol 1gm and ketorolac 30mg was given before skin incision to maintain hemodynamic variables within 20% of baseline values.

Following surgery but prior to extubation, the studied techniques were done with complete aseptic

conditions, High frequency sixteen megahertz- linear ultrasound-transducer (Sono Scape E1 Expert, Shanghai, China) utilized as real-time pre-insertion scanning.

Group ES,

A linear transducer has been placed longitudinally on the ipsilateral side, three centimeters lateral to the T4 spinous process, while the female has been placed laterally. Three muscles have been found superior to the hyperechoic transverse process: rhomboids major middle), trapezius (uppermost), and erector spinae (lowermost). A 22-gauge spinal needle (Pencan, B. Braun) has been inserted in a caudal-cephalad direction utilizing an in-plane technique until the tip has been positioned beneath the erector spinae muscle, as indicated by observable hydro dissection beneath the muscle plane. Subsequently, twenty milliliters of 0.25 percent bupivacaine have been administered in five-milliliter increments following negative aspiration.

Group PE,

A linear transducer has been placed in the infraclavicular region on the surgical side while the female patient was lying down, with the ipsilateral upper limb in an abducted position. A 22-gauge spinal needle has been placed using an in-plane approach from medial to lateral, and ten milliliters of 0.25 percent bupivacaine has been administered into the fascial plane between the pectoralis muscles to block the medial and lateral pectoral nerves (PECS I). The needle was subsequently reinserted into the fascial plane among the pectoralis minor and serratus anterior muscles, and twenty milliliters of 0.25 percent bupivacaine has been injected in five-milliliter increments after negative aspiration to block intercostals II, III, IV, V, VI, and the long thoracic nerve (PECS II).

Group TE,

While the female was in a lateral posture, a linear transducer has been positioned horizontally at the T5 spinous process, corresponding to the T4 transverse process. Three muscles have been found superior to the hyperechoic transverse process: rhomboids major (middle), rapezius (uppermost), and erector spinae (lowermost). The location of insertion, the distance from the skin to the epidural space, as well as the direction have been determined and marked prior to the insertion of an 18-gauge Touhy needle (prefix epidural catheter set, B. Braun). Subsequently, twenty milliliters of 0.25 percent Bupivacaine (half percent Bupivacaine HCl injection, Sunny Pharmaceutical Company, Egypt) was administered in five-milliliter increments following negative aspiration. At the end of the procedure, the duration of the block has been evaluated in minutes across the three groups, followed by the administration of neostigmine (0.05 milligrams per kilogram) and atropine (milligrams per kilogram 0.01 intravenously) to reverse the neuromuscular block. The endotracheal tube has been extubated upon meeting the extubation requirements, following which the case has been moved to the recovery room.

The sensory block of the fifth intercostal space along the midaxillary line has been evaluated for up to thirty minutes. post-nerve block. Patients were excluded from the trial if sensory blockades didn't manifest. Complications following the puncture of the blockage, such as hematomas at the puncture sites and pneumothorax, have been ruled out. Pain following surgery evaluations on the Visual Analogue Scale have been conducted at the following intervals: immediately post-surgery (baseline), one hour, six hours, twelve hours, and twenty-four hours. Pain was categorized as mild (VAS 0-4), moderate (VAS 5-7), and severe (VAS 8-10). Intravenous paracetamol, one gram, was administered every six hours for mild pain. Rescue analgesia was provided when the VAS was ≥ 4 or upon the case's request, using IV morphine sulphate at a dosage of 0.03 milligrams per kilogram, and the total morphine dosage for the initial twenty-four hours postoperatively was recorded. MAP and HR have been evaluated post-operatively at zero hours (immediately following the procedure), one hour, six hours, twelve hours, and twenty-four hours. Patient satisfaction has been assessed using a satisfaction score ranging from zero (unsatisfied) to ten (most satisfied), categorized as follows: 0-3 (not satisfied), 4-6 (partly satisfied), and 7-10 (very satisfied). Blood samples have been collected for the

analysis of stress markers at baseline, immediately prior to intervention, and at one, six, twelve and twenty-four hours post-operatively.

Sample size:

It was calculated utilizing PASS program version 13 & depending on an earlier research done by Nagaraja et al. (2018) who stated in his study that visual analogue scale (VAS) in group A (TEA) (2.08 ± 0.64) was found higher than of group B (ESP) (1.44 ± 0.87) with a mean difference of (0.64); adjusting the power of the test to 90%, confidence interval to 95%, type I error 5%, ratio between group to 1 and number of pairwise comparison to 3; sample size needed for the research was found to be 102 patients with 3 patients for dropout to be 105 patients divided into three groups equally (35 females / group).

Statistical analysis:

Data were encoded, organized, and statistically examined using IBM SPSS Statistics software version 28.0, IBM Corp., Chicago, USA, 2021. Quantitative data were assessed for normality using the Kolmogorov-Smirnov test, subsequently presented as Mean±SD along with minimum and maximum values and compared using the ANOVA test. Qualitative data quantified as numbers and percentages, thereafter, analyzed using the Chi-square test. The log-rank test was utilized to compare the rate of morphine consumption. The Bonferroni test is applied for post hoc comparisons. The significance level of p-value ≤0.050 has been deemed significant; otherwise, it has been considered non-significant.

Results.

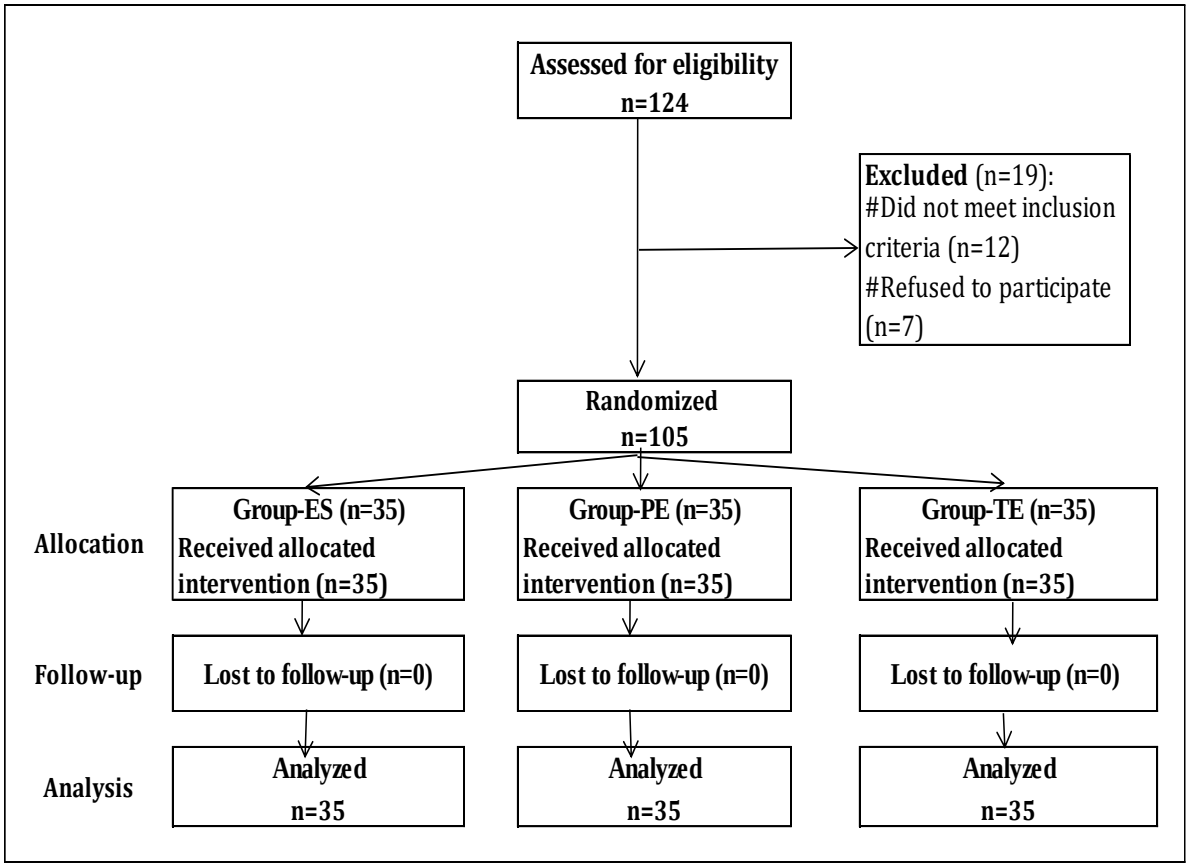

Figure (1): CONSORT flowchart of studied cases

Table (1): Demographic data between the studied groups.

Variables	Measures	Group-ES (Total=35)	Group-PE (Total=35)	Group-TE (Total=35)	p-value
Age (years)	Mean±SD	49.4±3.9	50.3±4.4	49.1±4.2	^0.435
	Range	42.0–57.0	40.0–60.0	41.0–57.0	
BMI (kg/m^2)	Mean±SD	29.6±2.4	28.9±2.9	28.4±3.3	^0.175
	Range	25.7–35.0	23.5–35.7	22.2–35.5	
ASA class (n, %)	II	16 (45.7%)	20 (57.1%)	18 (51.4%)	#0.633
	III	19 (54.3%)	15 (42.9%)	17 (48.6%)	

^ANOVA test. #Chi square test

There were statistical insignificant differences among three groups in response to demographic data.

Table (2): Time to perform the block (min) between the studied groups.

Measures	Group-ES (Total=35)	Group-PE (Total=35)	Group-TE (Total=35)	p-value
Mean±SD	13.9±0.6a	13.7±0.6a	16.3±1.9b	^<0.001*
Range	13.0–15.0	13.0–15.0	13.0–21.0	

^ANOVA test. *Significant. Homogenous groups had the same symbol "a,b" based on post hoc Bonferroni test.

Time to perform the block was significantly longer in TE Group, while insignificant differences was observed among the ES & PE-Groups.

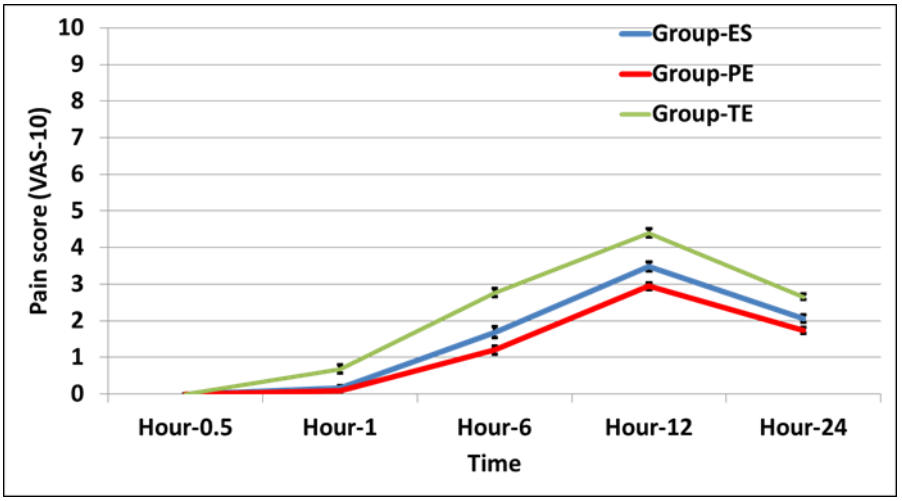

Figure 2: Pain score (VAS-10) between the studied groups.

There were insignificant differences among the three groups as regards pain score at hour-0.5. However, at hour-1 the TE group had significantly the highest pain score. Similarly, pain scores at 6, 12, and 24 hours were consistently higher in the TE group, followed by the ES group, with the PE group showing the lowest scores.

Table 3: First time requesting morphine (hours) between the studied groups

Measures	Group-ES (Total=35)	Group-PE (Total=35)	Group-TE (Total=35)	p-value
Mean±SD	13.9±2.2a	14.8±1.7a	7.1±0.6b	^<0.001*
Range	11.0–17.0	12.0–18.0	6.0–8.0	

^ANOVA test. *Significant. Homogenous groups had the same symbol "a,b" based on post hoc

Bonferroni test.

First time requesting morphine was significantly shortest in Group-TE. However, insignificant differences were observed among the ES and PE groups.

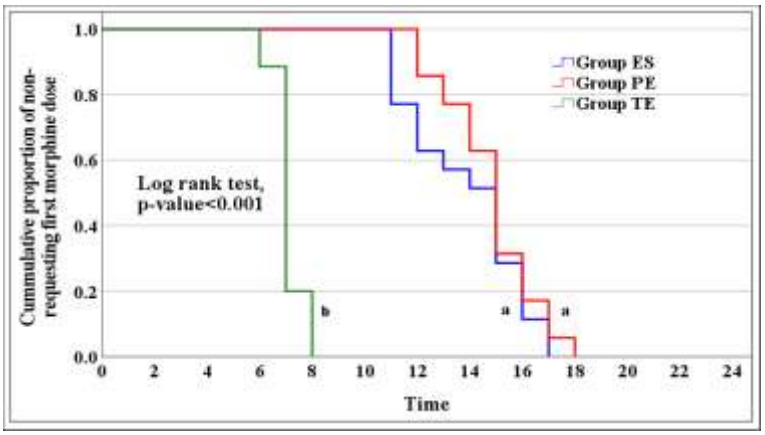

Figure 3: Kaplan-Meier curve for rate of requesting first morphine dose
The rate of requesting the first morphine dose was significantly fastest in Group-TE while it was insignificant among ES & PE-Groups.

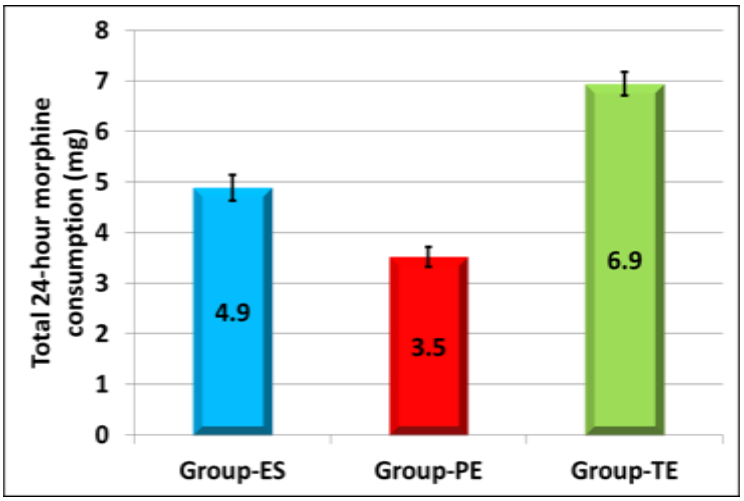

Figure 4: Total 24-hour morphine consumption among the studied groups
Total morphine consumption was highest in TE group, followed by ES and PE groups, these differences were statistically significant across the groups studied.

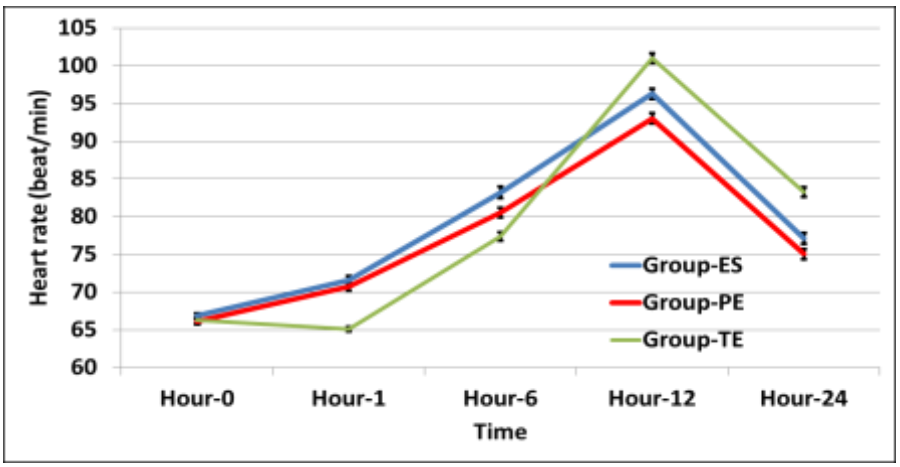

Figure 5: HR among the studied Groups

Insignificant differences among three groups regarding HR at hour-0 (immediately before intervention). HR at hour-1 was significantly lowest in Group-TE while it was insignificant among ES & PE-Groups.

HR at hour-6 was lowest in Group-TE, followed by Group-PE and highest in Group-ES, the differences were significantly different across the groups studied. HR at hour-12 was highest with Group-TE, followed by Group-ES & lowest with Group-PE, the differences were significantly different across the groups studied. At 24 - hours HR was significantly high with Group-TE while insignificant among ES & PE-Groups.

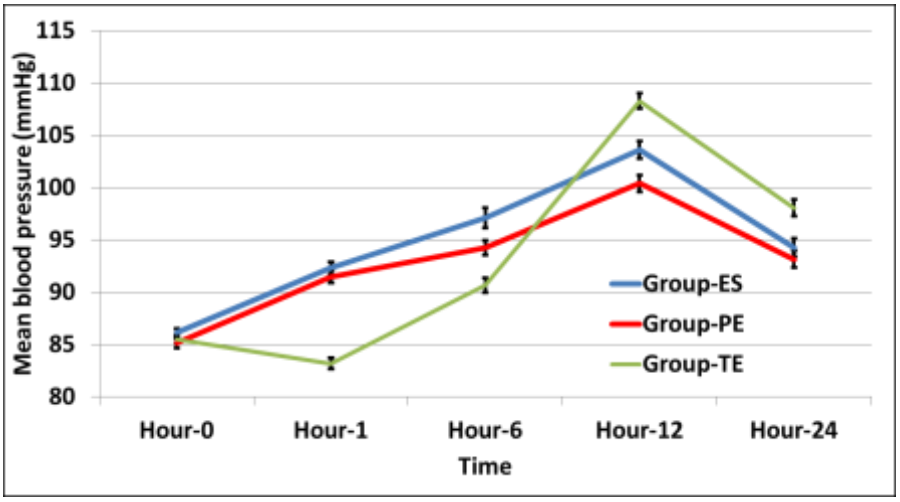

Figure 6: MAP among the studied groups

Insignificant differences among three studied Groups regarding MAP at hour-0 (immediately before intervention). MAP at hour-1 was significantly lowest in Group-TE while insignificant among ES & PE-Groups.

MAP at hour-6 was lowest with Group-TE, followed by Group-PE and highest with Group-ES, the differences were significantly different across the studied groups. MAP at hour-12 was highest in Group-TE, followed by Group-ES & lowest in Group-PE, the differences were significantly different across the studied groups. MAP at hour-24 was significantly high in Group-TE while insignificant among ES and PE Groups.

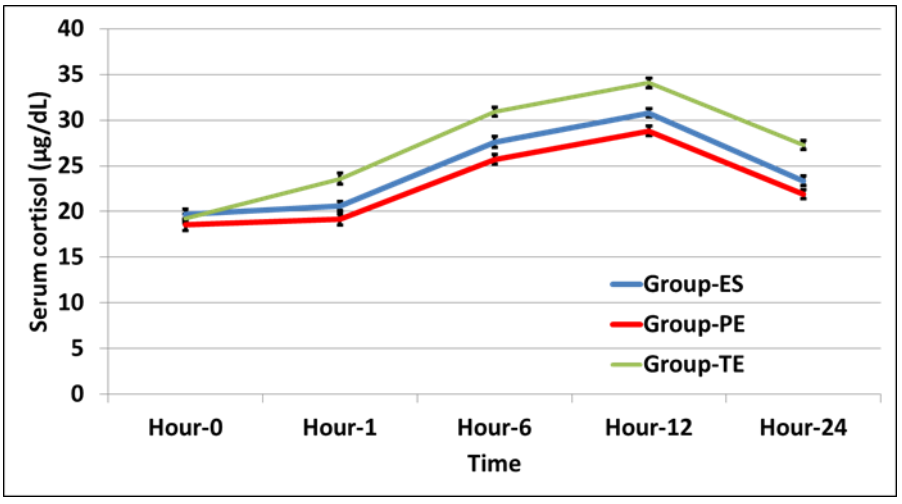

Figure 7: Serum cortisol between the studied groups

Insignificant differences among the studied Groups regarding serum cortisol at hour-0 (immediately before intervention). Serum cortisol at hour-1 was significantly highest in Group-TE with no

significant difference between Group-ES and Group-PE. Serum cortisol at hours-6 and 12 were highest with Group-TE, followed by Group-ES and lowest in Group-PE, the differences were significantly different across the groups studied. Serum cortisol at hour-24 was significantly high in Group-TE while there was an insignificant difference among ES & PE Groups.

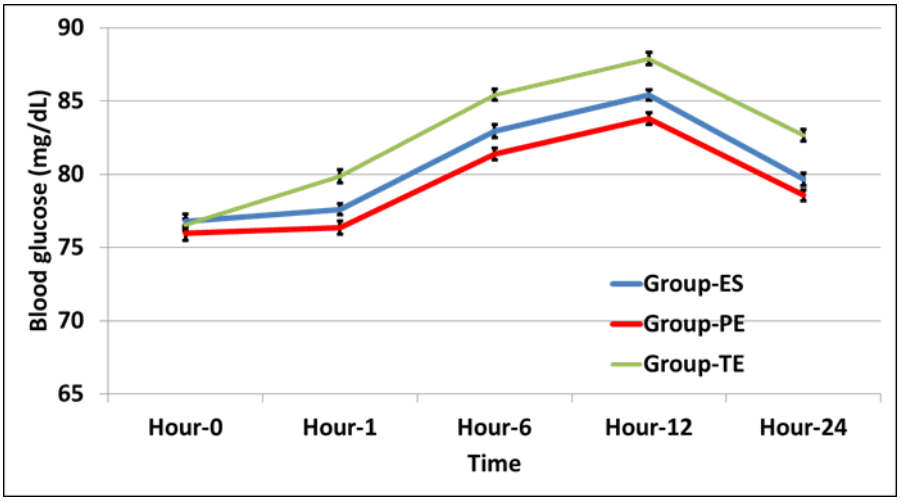

Figure 8: Blood glucose between the studied groups

Insignificant differences among the studied Groups in response to blood glucose at hour-0 (immediately before intervention). Blood glucose at hour-1 was significantly highest in Group-TE while there was an insignificant difference among ES & PE Groups. Blood glucose at hours-6 and 12 were highest in Group-TE, followed by Group-ES and lowest in Group-PE, the differences were significantly different across the studied groups. Blood glucose at hour-24 was significantly high in Group-TE while there was an insignificant difference among ES & PE Groups.

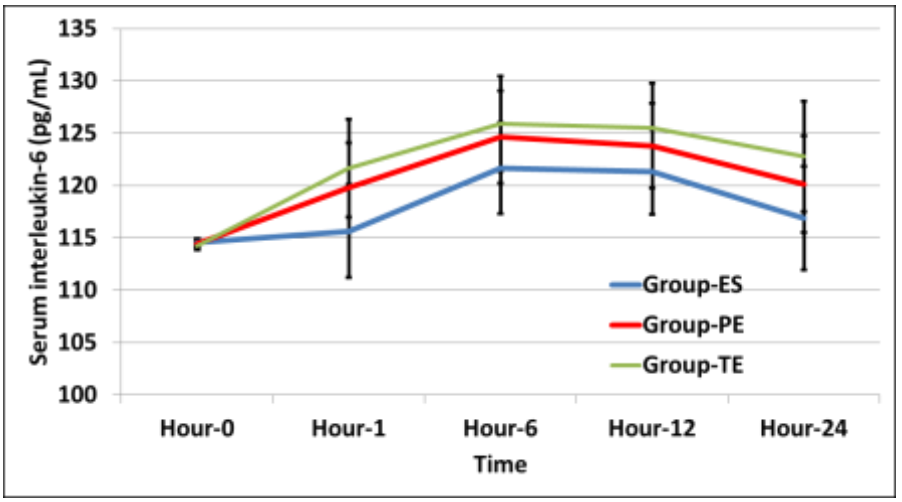

Figure 9: Serum interleukin-6 between the studied groups

insignificant differences among studied Groups as regards serum interleukin-6 at hour-0 (immediately before intervention). Serum interleukin-6 at hour-1 was significantly highest in Group-TE while there was an insignificant difference among ES & PE Groups. Serum interleukin-6 at hours-6 and 12 were highest in Group-TE, followed by Group-ES and lowest in Group-PE, the differences were significantly different across the studied groups. Serum interleukin-6 at hour-24 was significantly highest in Group-TE while there was an insignificant difference among ES & PE Groups.

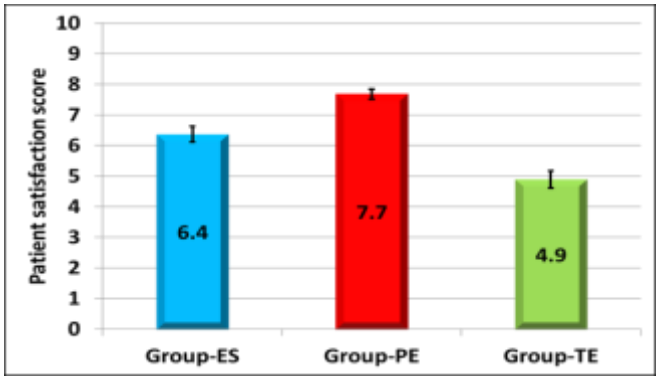

Figure 10: Patient satisfaction score (Likert-10) between the groups studied

Patient satisfaction was lowest in Group-TE, followed by Group-ES and highest in Group-PE. The differences were significantly different across the groups studied.

Table 5: Block complications between the studied groups

Findings	Group-ES (Total=35)	Group-PE (Total=35)	Group-TE (Total=35)	p-value
Present	0 (0.0%)	0 (0.0%)	0 (0.0%)	**NA**
Absent	35 (0.0%)	35 (0.0%)	35 (0.0%)	

NA: Not applicable.
Block complications were not detected in the groups studied.

Discussion:
This prospective, randomized comparative clinical study aimed at comparing the effectiveness of three regional techniques for managing postoperative pain after simple mastectomy: ultrasound-guided, PECSII (PE), Erector Spinae Plane block (ES) and Thoracic Epidural Analgesia (TE).

Regarding Time to perform the block
The time taken to perform the block through the 3 techniques was analyzed. The mean time ± standard deviation (SD) was 13.9 ± 0.6 minutes for group-ES, 13.7 ± 0.6 minutes for group-PE, and 16.3 ± 1.9 minutes for Group-TE.
It was significantly longer in Thoracic Epidural, compared to ESPB and PECS2. However, there is an insignificant difference observed among ESPB & PECS2.
These findings suggest that the thoracic epidural block (TE) technique required a longer duration for block administration compared to ESPB & PECS2 techniques.
This finding goes in line with what was found by Ahmed and Abdelraouf, where time needed to give the block in TE and ES were 14.1 minutes and 7.8 minutes, respectively (7). Similarly, Singh et al. found that the block time was 7.14 ± 1.007 minutes with the TE Group & 4.43 ± 0.69 min with ESPB Group (8).
Longer time required for thoracic epidural analgesia in comparison to erector spinae and pectoral nerve block can be ascribed to the complicated technique for accurately locating the epidural space , extensive screening using ultrasound or palpation techniques .insertion of the epidural catheter ,precise needle placement are frequently required for this procedure to prevent possible problems such as unintentional dural puncture or vascular injury and drug injection through very narrow catheter.

Pain score (VAS-10)
VAS-10 across the studied groups at different time points. Insignificant differences were observed between Groups at hour-0.5, with mean scores of 0.0±0.0 for all groups. However, at hour-1, thoracic

epidural analgesia exhibited significantly higher pain scores (0.7±0.6) compared to ESPB (0.2±0.4) and PECS (0.1±0.3). Additionally, pain scores at hours-6 and 12 were highest in TE, with mean scores of 2.8±0.6 and 4.4±0.7, respectively, followed by ESPB (1.7±0.9 and 3.5±0.7) and PECS (1.2±0.7 and 2.9±0.6). The differences were statistically significant across the studied groups ($p < 0.001$).
Similarly, at hour-24, TE had significantly higher pain scores (2.7±0.5) compared to ESPB (2.1±0.6) and PECS (1.7±0.5).
These findings indicate variations in pain perception among the studied groups over time, with thoracic epidural analgesia resulting in higher pain scores compared to pectoral nerve block and erector spinae plane block techniques.
Sawsan and Horia conducted similar study comparing ultrasound guided PECS II block versus thoracic epidural in modified radical mastectomy for post-operative pain relief & found that patients in group PECS block reported less post-operative pain at 4hr and 12hr than thoracic epidural while insignificant differences were observed at 6, 18 and 24 hr. (9).
Similarly, Abdel-Mo`men et al. have found the same differences. Patients with Pecs block experienced less pain intensity till 8 hours postoperatively (10).
This was further supported by Eldeen study. where VAS scores were significantly lower in PECS than in thoracic spinal blockade after breast conservative surgeries till the 24th hour (11).
On the other hand, findings from Bakeer and Abdallah & Khorasanizadeh et al. studies showed higher pain intensity in ESPB group compared with PECS group at certain time points post-surgery, although differences diminished over time (12,13).

First time requesting morphine

The rate of morphine postoperatively was significantly fastest in the TE group with 7.1 ± 0.6 hours. In ESPB, the time was 13.9 ± 2.2 hours while for PECS 14.8 ± 1.7 hours indicating comparable results with no statistical significance. These findings indicate potentially less effective analgesia with thoracic epidural technique compared to ESPB and PECS2 techniques.
In Abdel-Mo`men et al.' study, time of first request analgesia in TE (4.2 hours) was similarly lower than PECS (7.9 hours). (10) Same results were obtained by Sawsan and Horia. (9)
In comparing ESPB and PECS2, Bakeer and Abdallah reported that ESPB recorded a faster need for analgesia (4.1 hours) compared to PECS2 (6.2 hours) (12).

Total 24-hour analgesic consumption

The group of thoracic epidurals had the highest consumption of morphine with a mean of 6.9 mg (SD ±1.4), followed by ESPB with a mean of 4.9 mg (SD ±1.5), and PECS2 with the lowest consumption mean of 3.5 mg (SD ±1.1). The differences in consumption among the 3 groups were found to be statistically significant ($p < 0.001$). This is in favor of PECS scoring a higher rate of analgesia post-operatively.
In line with our study, Abdel-Mo`men et al. have reported that intraoperative consumption of fentanyl with Group PECS was highly significant lower in comparison to Group TE (10). Eldeen study have reported a similar trend with the analgesic requirement of fentanyl dose in postoperative period for 24 h in PECS being 75.7 ug compared to thoracic spinal block (TSB) being 150.8 ug (11). In Bakeer and Abdallah, morphine consumption was significantly higher in ESPB (11.2 mg) vs. PECS (7.8 mg) which also goes in line with our study (12).
Sinha et al. have found similar findings with the PECS group consuming significantly less morphine (4.4 mg) vs. ESPB (6.5) (14). This was further supported by Abdel Fattah et al.' study where postoperative morphine consumption was significantly lower in PECS group compared with ESPB group (15).
Ahmed and Abdelraouf. have reported that the required morphine boluses were significantly lower in ESPB than TE (7).
Altiparmak et al. also recorded that modified PECS block decreased postoperative tramadol consumption & pain scores more effectively than ESP block post radical mastectomy surgery (16).

Hemodynamics

At hour-0 (immediately before intervention), there were insignificant differences among the groups. However, the heart rate at hour-1 was significantly lowest in Group-TE while insignificant differences were observed between Group-ES & Group-PE. At hour-6 it was lowest in Group-TE, followed by Group-PE and highest in Group-ES, the differences were significantly different across the groups studied. But at hour-12 heart rate was highest in Group-TE, followed by Group-ES and lowest in Group-PE, the differences were significantly different across the studied groups. At hour-24 HR was significantly high in Group-TE while insignificant differences were observed between Group-ES & Group-PE.

As regards the MAP, at hour-0 there were no statistically significant differences between study groups. At hour 1 it was significantly lowest in Group-TE with no significant difference between Group-ES and Group-PE. At hour-6 MAP was lowest in Group-TE, followed by Group-PE and highest in Group-ES. But at hour-12 MAP was highest in Group-TE, followed by Group-ES and lowest in Group-PE, the differences were significantly different across the studied groups. At hour-24 it was significantly high in Group-TE while insignificant differences were observed between Group-ES & Group-PE.

Similarly, Sawsan and Horia found a notable and significant reduction in HR & BP in TE group at various points in comparison with PECS group ($p < 0.01$). Conversely, PECS group did not exhibit any significant differences in hemodynamic parameters (p- >0.05) (9).

This distinct hemodynamic response in the TEB group is attributed to bilateral sympathetic blockades, whereas PECS blocks, being peripheral nerve blocks, not induce sympathetic denervation and thus do not affect hemodynamics.

In terms of comparing PECS vs. ESPB, postoperative HR & MAP were insignificantly different among study groups in both studies of Abdel Fattah et al. and Altıparmak et al. which goes in line with our study (15,16).

Stress markers

Regarding serum cortisol, TE consistently demonstrated the highest levels at hours 1, 6, 12, and 24 compared to ESPB and PECS, with significant differences observed between groups. Blood glucose levels followed a similar pattern, with TE consistently showing the highest levels at hours 1, 6, 12, and 24, while ESPB and PECS exhibited lower levels.

Serum interleukin-6 levels exhibited no significant differences between groups at hour 0, but TE consistently showed the highest levels at hours 1, 6, 12, and 24 compared to ESPB and PECS. These findings suggest that TE may have a more pronounced effect on stress response markers compared to ESPB and PECS.

Gad et al. (17) have compared PECS and ESPB after modified radical mastectomy operations yielding comparable results. There was significant reduction in levels of cortisol & prolactin at 1 & 24 hours postoperatively in PECS compared to ESPB. However, hormones revealed significant reduction with each group postoperatively at 1 & 24 h compared to its basal values ($P < 0.05$).

Patient satisfaction score (Likert-10)

females in PECS group stated highest satisfaction (7.7 ± 1.0), while those in the TE group reported the lowest (4.9 ± 1.7).

Abdel Fattah et al. have reported that overall patient satisfaction was insignificantly higher in PECS compared to ESPB (15).

Block complications

In this study, no block associated complications were reported.

Sinha et al & Gad et al. have also reported no adverse effects either in ESPB or PECS(14,17).

Abdel-Mo`men et al.' study, hypotension happened with ten patients in TE (33.3%) and no one in PECS (10). Abdel Fattah et al. reported that intramuscular hematoma happened with 3 (10.0%) in PECS and block-related complications were insignificantly different among PECS & ESPB groups

(15).

Conclusion:

Our study demonstrates that US-guided single-shot PECSII offers superior analgesic efficacy, patient satisfaction, and safety compared to ES and TE for postoperative pain management following simple mastectomy. PECSII showed shorter block performance time,
lower pain scores, delayed time to first morphine request, and reduced total 24-hour analgesic consumption compared to ES and TE.

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