Original Article

Comparison of the efficacy of ultrasound guided pectoralis-II block and intercostal approach to paravertebral block (proximal intercostal block) among patients undergoing conservative breast surgery: A randomised control study

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Abstract

Background and Aims: Regional anesthesia techniques have attributed a multimodal dimension to pain management after breast surgery. The intercostal approach to paravertebral block has been gaining interest, becoming an alternative to conventional paravertebral block, devoid of complexities in its approach, being recognized as the proximal intercostal block. Parallel to the widespread acceptance of fascial plane blocks in breast surgery, pectoralis II block has emerged as being non-inferior to paravertebral block. The aim of this study was to evaluate the efficacy of two independent fascial plane blocks, proximal intercostal block and pectoralis II block, in breast conservation surgery.

Material and Methods: This prospective, randomized control, pilot study included 40 patients, randomly allocated among two groups: proximal intercostal block and pectoralis II block.

Results: The pectoralis II block group had significantly lower pain scores at rest in the immediate postoperative period but became comparable with the proximal intercostal block group in the late postoperative period. Pain scores on movement though were lower at 0 h postoperatively and became comparable with the proximal intercostal block group subsequently. Although the pectoralis II group had earlier recovery in the post-anesthesia care unit, the overall time to discharge from the hospital was comparable and not influential. Both groups had high patient satisfaction scores and similar perioperative opioid consumption. Sedation, time to first rescue analgesia, and postoperative nausea vomiting scores were comparable.

Conclusion: Fascial plane blocks in the form of pectoralis II and proximal intercostal block facilitate pain alleviation, early return to shoulder arm exercise, and enhanced recovery, which should render them to be incorporated into multimodal interdisciplinary pain management in breast conservation surgery.

Keywords: Breast conservation surgery, enhanced recovery after breast surgery, intercostal approach to paravertebral block, pectoralis II block, proximal intercostal block

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Introduction

Breast surgery has been associated with moderate to severe acute postoperative pain.[1] Poorly controlled acute postoperative pain may lead to increased postoperative opioid requirement, new persistent postoperative opioid use, poor patient satisfaction, prolonged recovery, and predisposition to the development of chronic post-mastectomy pain syndrome in up to 29% of patients postoperatively.[2-6]

Breast conservation surgery along with targeted breast radiation therapy has become the established standard of care in low-grade breast malignancy, replacing mastectomy in the early stages of breast cancer as the overall survival benefits were found to be similar in several studies with superior cosmetic benefits.[7,8] Moreover, breast conservation surgery carries a risk of local tumor recurrence.[9] Hence, patient selection becomes the paramount criteria with identification of younger age group, early stage I and II tumors with no fixity to surrounding structures, small monocentric tumors with clear localization of margin, favorable physical profile, and good patient compliance for radiation treatment.[8]

Regional anesthesia techniques have provided a multimodal dimension to pain management after breast surgery.[10,11] The initial days of central neuraxial blockade were superseded by the relatively less invasive thoracic paravertebral blocks. Conventional paravertebral block became the technique of choice for breast analgesia despite having its drawbacks in the causation of inadvertent pneumothorax, central neuraxial spread, and systemic toxicity.[6] Although ultrasound guidance has rendered it an advanced block technique, the relative window of narrow safety remains a challenge, needing precision and an advanced skill set.[6,11,12] Precise needle-tip visualization with angulations maneuvered in a limited wedge-shaped space demands expertise and constant vigilance, especially during multilevel block performance.[12-16]

The quest for a safer fascial plane block as a regional anesthesia technique for breast surgery has invoked research interest among pain physicians to find equianalgesic alternatives for the conventional thoracic paravertebral block.[6] A lateral approach to the paravertebral space by a landmark-based intercostal technique described by Burns in 2008 was later modified to an ultrasound-guided intercostal approach, that was devoid of the complexities of the paravertebral technique, as proposed by Shibata and Ben-Ari in 2009.[17-19] The lateral intercostal approach to paravertebral block later became popularized as "paravertebral by proxy" and became an established regional anesthesia technique for breast analgesia, referred recently in the literature as the proximal intercostal block.[11,20-23]

A simultaneous parallel quest for finding an alternative to paravertebral block for breast analgesia led to the emergence of the more popular, simpler, and safe myofascial pectoral nerve block, namely pectoralis II block. Originally described by Blanco in 2011, pectoral block graduated from being a simple interpectoral Pecs I to deeper pectoral-serratus plane Pecs II (modified Pecs I) and finally embracing both in the same block to be more recently referred to as pectoralis II block.[6,24,25] Pectoralis II block has emerged from being merely clinically superior to placebo control, to being comparable with single-level paravertebral block in earlier studies, to becoming not clinically worse compared with multilevel paravertebral block, and finally attaining recognition as being non-inferior to paravertebral block in a recent meta-analysis.[6] Pectoralis II block has emerged to be a useful multimodal pain management adjunct in breast analgesia.[26-33]

Our study is the first to compare the efficacy of two alternative regional techniques to conventionally established paravertebral block in conservative breast surgery as a direct comparative reference is not available in the literature among the two blocks. The primary outcome was to compare the postoperative pain between the two techniques at different times at rest (NRS R) and on movement (NRS M). The Secondary outcomes was to compare the perioperative opioid consumption, sedation and postoperative nausea vomiting (PONV), time to recovery and hospital discharge, and patient satisfaction score (PSS).

Material and Methods

This study is a prospective, randomized, parallel-group, double-blind, interventional trial initiated as a pilot study. Randomization of participants was done by computer-generated random number table utilizing sequentially numbered sealed opaque envelopes for concealment. The study was approved by Medical Research Cell Institutional Ethical Committee and registered prospectively in Clinical Trials Registry-India (CTRI/2019/01/017298). As there were no direct references from previously published studies for sample size calculation and determining the power of study among the two comparators, a pilot study was initiated to enroll 46 patients provisionally subject to probable dropouts.

A total of 40 female patients in the age group of 12–65 years, ASA I–III physical status with breast tumor in early T1 and T2 stages with no skin or muscle fixity, having a distinct localization of margins, with favorable physical profile and willingness to be compliant for undergoing

postoperative radiation treatment were included in the study. Patients excluded were those with locally advanced tumor, multicentric, diffuse microcalcification, prior breast irradiation, pregnancy, refusal to consent, anticoagulant therapy, allergy to local anesthetic, morbid obesity with BMI ≥35, severe cardiopulmonary compromise, collagen vascular disease, inflammatory carcinoma, and mutations of breast cancer (BRCA 1 and 2) genes.

After exclusion, 40 patients were randomly allocated among the two groups. The sample size taken was a feasible number of 20 in each group. The patient and the assessor were blinded toward group allocation, pain modality treatment provided, and study outcome. The study was initiated on a pilot basis, and an interim analysis was planned during the course of the study to seek the post-hoc power.

Group 1: Ultrasound-guided intercostal approach to paravertebral block [PICB] (n = 20).

Group 2: Ultrasound-guided pectoralis II block [PECS] (n = 20).

All patients underwent pre-anesthetic evaluation. Preoperative informed consent for pain intervention and conduct of anesthesia and surgery was obtained. Patient education regarding the pain assessment tool with an 11-point (0–10) numerical rating scale component for pain score and patient satisfaction score (0–10) was introduced in the preoperative holding area.

Patients were subjected to baseline monitoring with electrocardiography, noninvasive blood pressure monitoring, pulse oximetry, temperature, and end-tidal agent with carbon dioxide monitoring. Patients received standardized anesthesia protocol in the operating theatre, with an intravenous access secured in the contralateral arm followed by intravenous glycopyrrolate 0.2 mg premedication, fentanyl (2 μg/kg), titrated propofol induction (2 mg/kg), atracurium (0.5 mg/kg), and placement of appropriate size supraglottic airway device (I-gel ® Intersurgical, Berkshire, UK). Anesthesia maintenance was carried out with oxygen, air, and sevoflurane, targeting a minimum alveolar concentration of 1.2 and atracurium 0.1 mg/kg intermittent boluses titrated to neuromuscular monitoring. Dexamethasone 0.1 mg/kg was initiated in all patients. In the event of baseline heart rate and/or mean arterial pressure exceeding by 20% from baseline, the attending anesthesiologist was provided the discretion to administer 1 μg/kg fentanyl with documentation. All patients were given intravenous ondansetron 0.1 mg/kg and paracetamol 15 mg/kg (repeated postoperatively every 6 h) toward the end of surgery and neuromuscular blockade reversal with neostigmine 0.05 mg/kg and glycopyrrolate 0.01 mg/kg. The supraglottic airway was removed and the patient shifted to the post anesthesia care unit (PACU).

Patients were either turned to lateral position for proximal intercostal block with the affected side nondependent, or placed in the supine position for pectoralis II block with arms abducted to 90°. The performance of either block was done by utilizing a 6–13-MHz linear transducer (Sonosite(R) M Turbo(TM), Bothell, USA) by using a 22-G 10-mm insulated needle (Stimuplex(R) B-Braun medical, Melsungen, Germany) with an in-plane needle visualization technique. The ultrasound probe was covered intact with a sterile transparent film (3 M™ Tegaderm™ HP) with sterile conducting ultrasound gel for coupling. Patients received 30 mL of local anesthetic 0.25% bupivacaine with adjuvant 1 μg/kg dexmedetomidine in both groups, after induction of general anesthesia to prevent procedure-related pain and anxiety, followed by surgical procedure.

Technique for ultrasound-guided proximal intercostal block

After sterile aseptic precautions for the skin and sterile cover for ultrasound probe, the probe was held in the paramedian sagittal plane lateral to the midline spinous process of D2 vertebra identifying the transverse process. The proximal intercostal space was identified by the tip of transverse process medially, costal angle laterally, external intercostal muscle with internal intercostal membrane superiorly and the innermost intercostal membrane, and endothoracic fascia with parietal pleura inferiorly. The internal intercostal membrane visualized was continuous with superior costotransverse ligament medially. The block target was between inner and the innermost intercostal membrane, which was often obscured, rendering the downward displacement of bright hyperechoic pleura as a definitive endpoint. Maintaining an oblique longitudinal parasagittal view, the probe was tilted to attain both transverse process and ribs in the same ultrasound window and then lateralized to obtain two consecutive ribs. The needle approach was caudal to the probe directed in-plane cephalad. Confirmation was by hydrodissection with dynamic needle advancement, followed by negative aspiration and injection of 10 mL local anesthetic to create downward displacement of pleura. The same technique was repeated at D4 and D6 levels. Total volume of local anesthetic utilized was 30 mL, which spread to paravertebral space medially with 1–3 intercostal level spread. At the completion of procedure, a swift B mode and M mode lung scan was performed to rule out pneumothorax. Ultrasound and chest X-ray was repeated in both the groups in the PACU to rule out pneumothorax.

Technique for ultrasound-guided pectoralis II block

After sterile precautions for skin and ultrasound probe, the probe was positioned transversely below the lateral third of the clavicle and angled inferolaterally. The second rib was localized below the axillary vessels, and the probe was slided further inferolaterally to identify the third rib along with the pectoralis and serratus muscle attachment. The needle was advanced in-plane from medial to lateral direction until the interfascial plane between the pectoralis major and minor with thoracoacromial artery visualized at which 10 mL of local anesthetic was deposited. The needle was further advanced with saline hydrodissection until the intermuscular plane of pectoralis minor and serratus anterior at the level of the third rib was identified, at which 20 mL of local anesthetic was deposited after negative aspiration. Two separate injections totaling 30 mL of local anesthetic were carried out to attain distinct planes of separation.

Pain scores were noted in the immediate postoperative period by PACU resident who was unaware of the block modality. Pain assessment was done at 0 h postoperatively, by numerical rating scale (0–10) elicited both at rest as well as on shoulder-arm movement [0 = no pain, <3 = no more than mild pain, >3 = pain needing pharmacological intervention, 10 = worst imaginable pain]. The patient was assessed again for nausea, sedation, and pain scores at rest as well on movement (moving in bed, coughing, straining, exercise, and ambulation) at the end of 2 h (early postoperative pain). On attaining post-anesthesia discharge criteria, patients were shifted to the ward where pain scores were followed up by an independent observer at 6, 12, and 24 h (late postoperative pain).

Patient satisfaction score (PSS) was obtained using a confidential feedback form attached with hospital record prior to discharge from the hospital on a 0–10 score with scoring autonomy provided to the patient (and not observer elicited) to prevent bias, representing the efficiency of pain services obtained from the patient's perspective. The PSS was a summation of variables with respect to satisfaction towards overall pain management received, patient education regarding practical aspects of pain relief, communication received regarding analgesic options, prompt activation of acute pain service, speed of activation of rescue analgesia, duration of pain-free interval, quality of sleep achieved, ability to perform physiotherapy exercise, extent of mobilization possible, and overall perioperative experience.

The total dose of tramadol used in 24 h (TR24) as rescue analgesia provided by a trained nurse was recorded (along with antiemetic metoclopramide) if pain score exceeded beyond 3, with a ceiling dose of 300 mg mandated over 24 h. Postoperative pain scores were measured and compared at 0, 2, 6, 12, and 24 h at rest (NRS R) and on movement (NRS M). Perioperative opioid consumption, sedation and postoperative nausea vomiting (PONV), time to recovery and hospital discharge, and patient satisfaction score (PSS) were also compared.

Statistical analysis

All quantitative and continuous variables such as age and weight were expressed as mean ± standard deviation. Continuous variables were analyzed using student independent 2 sample unpaired *t* test followed by a test for homogeneity of variance. The qualitative or categorical variables were described as frequencies and proportions which were compared using the Chi-square test. The statistical test applied was Mann–Whitney U test for intergroup comparison. Unpaired *t* test was used to know the statistical significance between quantitative variables. A value of $P < 0.05$ was considered statistically significant. Statistical analysis was performed using SPSS version 20 (SPSS INC. Chicago, Illinois, USA) and Microsoft Excel 2011 (Microsoft Corporation, Redmond, Washington, USA).

Results

The pilot study was conducted involving 46 patients enrolled after obtaining informed consent. Two patients were excluded in view of previous wide excision biopsy and axillary lymph node sampling. One patient was on prescribed oral morphine in the recent past, which was revealed by the patient after the initial pre-anesthetic workup. One patient withdrew consent and declined to participate in the study a day prior to surgery. Forty-two patients enrolled were randomized into two groups of 21 patients each. Intraoperatively, one patient had tumor progression with chest wall infiltration needing rib excision and mesh graft in PECS (group 2), and one patient had a multicentric tumor on intraoperative ultrasound needing conversion to modified radical mastectomy in PICB (group 1); both patients were excluded from the analysis. Data analysis was performed on 20 patients in each of the groups [Figure 1].

Patients were comparable among the groups with respect to age, height, ASA physical status, and duration of surgery. Patient distribution in group 1 (PICB) had obese patients, which skewed the normal distribution of weight and body mass index (BMI) among the groups [Table 1]. The mean heart rate and mean arterial pressure were comparable among the groups [Figure 2]. None of the patients suffered from any serious complications arising or related to the performance

of the block (local anesthesia systemic toxicity, intravascular needle entry, and pneumothorax).

NRS scores were evaluated at rest (NRS R) and on movement (NRS M) at 0, 2, 6, 12, and 24 h postoperatively [Table 2 and Figure 3]. In the immediate postoperative period (0 h), there was a significant reduction in postoperative pain in group 2 (PECS) both at rest ($P = 0.03$) and on movement ($P = 0.025$). Furthermore, this effect was seen extending till 2 h postoperatively at rest but not upon movement. Although seen in the initial postoperative period, this reduction in postoperative pain was not witnessed in the late postoperative period [2–24 h]. The pain scores were comparable among the groups in the late postoperative period both at rest and on movement.

At 2 h postoperatively, group 2 (PECS) had lower pain scores when compared with group 1 (PICB) at rest ($P = 0.03$). However, pain scores were comparable upon assessment after movement ($P = 0.11$). At 6, 12, and 24 h postoperatively, NRS scores at rest (NRS R) and on movement (NRS M) were comparable among both groups [Table 2]. Time to first rescue analgesia requirement postoperatively ($P = 0.46$) were comparable among the groups [Table 3]. The worst NRS score at rest (NRS R) was significantly lower in the PECS group when compared with the PICB group ($P = 0.03$), whereas the worst NRS score on movement (NRS M) was comparable among the groups ($P = 0.12$) [Table 4 and Figure 4]. There was no statistical difference in PSS among the groups based on feedback scores provided by patients at the time of discharge ($P = 0.25$). Both PECS and PICB groups were comparable, suggesting that both block groups were effective in rendering patient satisfaction

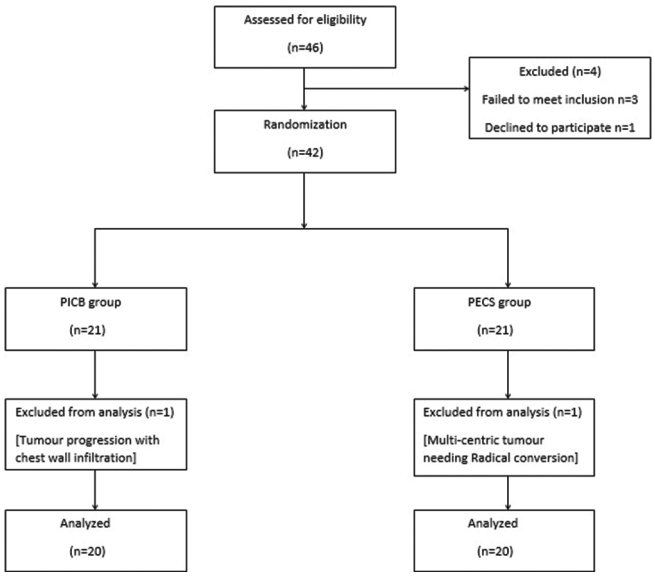

Figure 1: Consort flow diagram showing study participants

Table 1: Comparison of mean age, height, and weight between groups

Variable	Group	*n*	Mean	S.D	*P*
Age	Group 1	20	49.50	11.93	0.06
	Group 2	20	56.75	11.86	
Height	Group 1	20	152.0	7.02	0.60
	Group 2	20	150.75	7.93	
Weight	Group 1	20	69.20	12.06	0.02
	Group 2	20	61.10	9.29	
Body mass index	Group 1	20	29.98	5.10	0.02
	Group 2	20	26.84	3.34	
Duration of surgery	Group 1	20	2.07	0.61	0.56
	Group 2	20	2.17	0.48	

Group 1=PICB; Group 2=PECS; Intergroup comparison by unpaired student t-test

Table 2: Comparison of NRS at rest and movement among the groups

Duration	Group	NRS at rest		NRS on movement	
		Median (IQR)	*P*	Median (IQR)	*P*
0 h	1	2 (1–2)	0.03	3 (2–3)	0.025
	2	1 (1–1)		2 (1.75–2)	
2 h	1	1 (0–1.5)	0.03	2 (1–2.25)	0.11
	2	0 (0–0)		1.5 (1–2)	
6 h	1	0 (0–1)	0.44	1 (1–2)	0.47
	2	0 (0–1)		1.5 (1–2)	
12 h	1	0 (0–1)	0.64	1 (0–2)	0.94
	2	0 (0–0.25)		1 (1–1)	
24 h	1	0 (0–0)	0.42	1 (0–1)	0.23
	2	0 (0–0)		1 (1–1)	

Group 1=PICB; Group 2=PECS; Significance=P<0.05; Inter-group comparison by Mann–Whitney U test

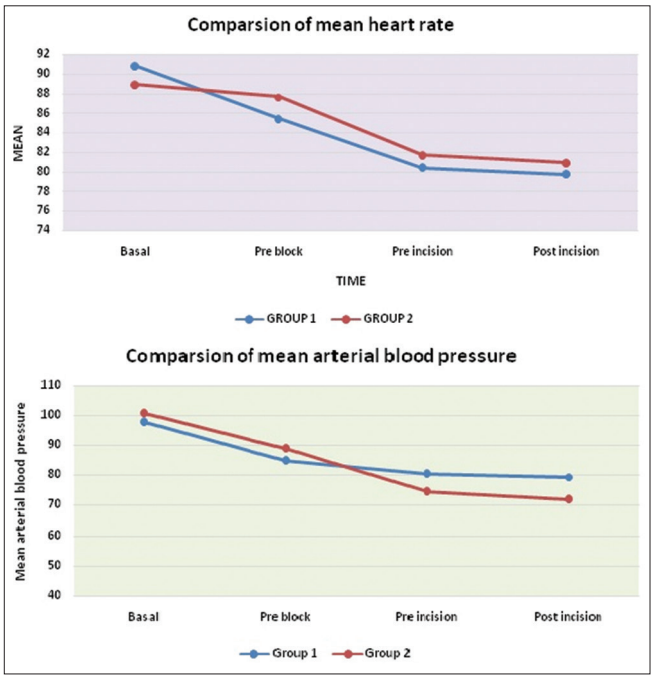

Figure 2: Comparison of heart rate and mean arterial blood pressure between groups. [Group 1 = PICB; Group 2 = PECS]

[Table 4 and Figure 5]. There was no statistical difference in PSS among the groups based on feedback scores provided by patients at the time of discharge ($P = 0.25$). Both PECS and PICB groups were comparable, suggesting that both block groups were effective in rendering patient satisfaction [Table 4 and Figure 5].

The consumption of intraoperative fentanyl ($P = 0.32$), postoperative tramadol requirement as rescue analgesic in 24 h (TR 24) ($P = 0.24$), and time to first rescue analgesia requirement postoperatively ($P = 0.46$) were comparable among the groups [Table 3 and Figure 5]. Sedation ($P = 0.15$ and 1.0 at 0 and 2 h, respectively) and postoperative nausea vomiting scores ($P = 0.6$ and 1.0 at 0 and 2 h, respectively) were comparable among the groups in the immediate postoperative period and did not interfere with post-anesthesia discharge [Table 5].

Time to recovery in PACU was significantly earlier in the PECS group when compared to the PICB group ($P = 0.001$), but this did not affect the time to final discharge from the hospital, which was comparable among the groups ($P = 1.0$) [Table 5].

Table 3: Comparison of opioid consumption perioperatively among the groups

Perioperative opioid consumption	Group	*n*	Mean	SD	Significance (*P*)
Total fentanyl used	1	20	2.50	11.18	0.32
	2	20	0.00	0.00	
First rescue analgesia post-operative	1	20	0.55	0.60	0.46
	2	20	0.40	0.68	
Tramadol consumption 24 (TR 24)	1	20	42.5	49.4	0.24
	2	20	25	44.42	

Group 1=PICB; Group 2=PECS; Inter-group comparison by unpaired student t-test; Significance=P<0.05

Table 4: Comparison of patient satisfaction score and worst NRS score at rest and movement amongst the groups

Variable	Group	Median (IQR)	*P*
Patient satisfaction score (PSS)	1	9 (8–10)	0.25
	2	8.5 (8–9)	
Worst NRS score at Rest	1	2 (1–2.5)	0.034
	2	1 (1–1.5)	
Worst NRS score on Movement	1	3 (2–3)	0.12
	2	2 (2–2.5)	

Group 1=PICB; Group 2=PECS; Significance=P<0.05; Inter-group comparison by Mann–Whitney U test

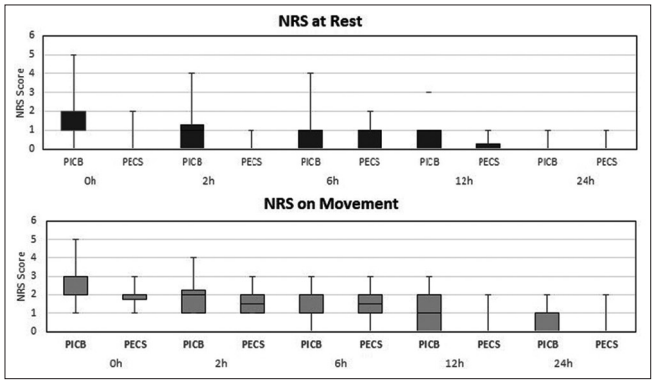

Figure 3: Comparison of NRS scores (y-axis) at rest and movement among the groups PICB and PECS alternately (x-axis) at various time intervals 0, 2, 6, 12, and 24 h (Median + IQR)

Discussion

Ultrasound-guided intercostal approach to paravertebral block is an emerging concept, an alternative approach to paravertebral space minimizing its adversities of central neuraxial spread and pneumothorax. The continuity between the intercostal and paravertebral space has been established by several studies; which could be regrouped as anatomic, radiographic, cadaveric, and clinical studies.[17,20,34-37] The combination of ultrasound in cadaveric studies demonstrated the continuity of intercostal and paravertebral spaces contributing to real-time visualization of spread.[20,38]

Paraskeuopoulos demonstrated that in 92.8% of cases, injectate in intercostal space could spread to paravertebral space with the needle inserted between the internal intercostal membrane and parietal pleura and concluded that ultrasound-guided injection into the intercostal space could offer an alternative approach to the thoracic paravertebral space.[20] Ultrasound-guided paravertebral block using an intercostal approach was further demonstrated by case studies.[18,19,21,39,40]

The superior costotransverse ligament (SCTL) blends laterally with the internal intercostal membrane (IIM), resulting in lateral paravertebral space in continuum with proximal intercostal

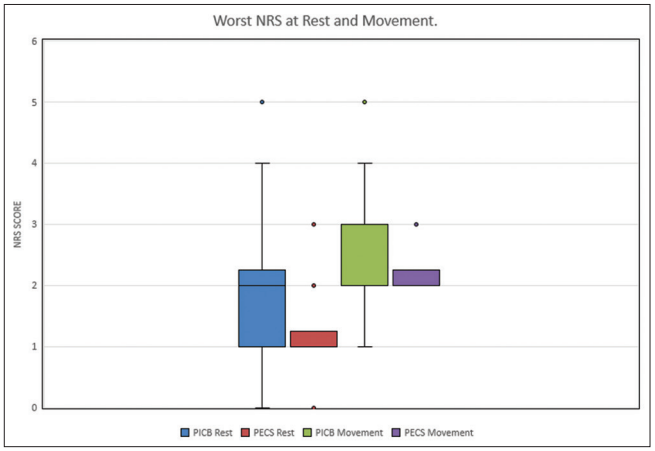

Figure 4: Comparison of worst NRS scores at rest and on movement among the groups (Median + IQR); PICB = Proximal intercostal block; PECS = Pectoralis block

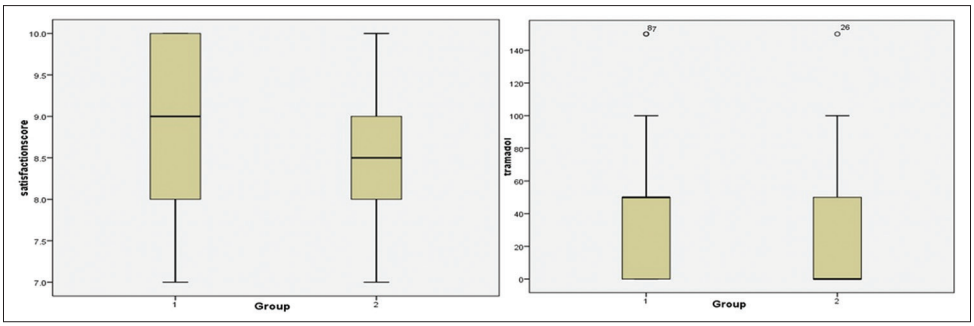

Figure 5: Comparison of Patient Satisfaction Score (PSS) [Left inset] and Tramadol consumption (TR 24) [Right inset]. Group 1 = PICB; Group 2 = PECS

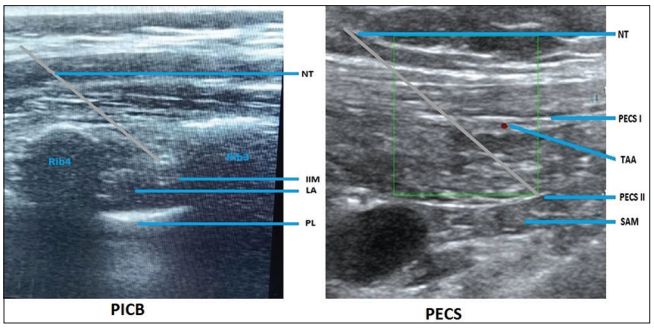

Figure 6: Ultrasound image Left: Proximal Intercostal Block (PICB); NT = Needle trajectory; IIM = Internal intercostal membrane; LA = Local anesthetic spread; PL = Pleural dip. Ultrasound image Right: Pectoralis II block (PECS); NT = Needle trajectory; PECS I = Plane between pectoralis major and minor; TAA = Thoracoacromial artery; PECS II = Plane between pectoralis minor and Serratus anterior muscle (SAM). [PECS = LA in PECS I + II]

space. The term "proximal intercostal block," in which block is carried out in proximal intercostal space (between the tip of the transverse process medially and the costal angle laterally) with the needle inserted in-plane between the internal intercostal membrane and parietal pleura after visual confirmation of depression of parietal pleura upon injection, was put forth as an alternative approach to paravertebral space[11,23] [Figure 6].

Pectoralis II block demonstrated a significant reduction in pain scores at rest (NRS R0) and movement (NRS M0) in the immediate postoperative period, with earlier recovery and discharge from PACU (P = 0.001). This finding has been comparable to the efficacy of pectoralis II block for breast surgery in which reduced pain intensity and postoperative opioid consumption was demonstrated against general anesthesia.[41] However, the pain scores in the PECS group were comparable with the paravertebral group in the late postoperative period, similar to the non-inferiority analgesic effects demonstrated in previous studies.[6,42]

The primary aim of this study was to compare the pain scores between the two fascial plane block approaches for conservative breast surgery at various time points. Both the block approaches were comparable with respect to pain scores in the late postoperative period, although the PECS

Table 5: Comparison of sedation score, PONV, time to recovery in PACU, and discharge from hospital among the groups

Criteria	Group	Mean	SD	*P*
Sedation 0 h	1	0.75	0.63	0.15
	2	1.0	0.45	
Sedation 2 h	1	0.05	0.22	1.0
	2	0.05	0.22	
PONV 0 h	1	0.15	0.36	0.60
	2	0.25	0.78	
PONV 2 h	1	0.05	0.22	1.0
	2	0.05	0.22	
Time to recovery in PACU	1	1.62	0.53	0.001
	2	1.12	0.31	
Time to discharge from hospital	1	24.0	0.00	1.0
	2	24.0	0.00	

Group 1=PICB; Group 2=PECS; Inter-group comparison by unpaired student t-test; Level of significance=P<0.05

group demonstrated significantly lower pain scores in the immediate postoperative period at rest (NRS R0, R2). This can be attributed to the direct effect of PECS on the pectoral nerves and fascial plane in proximity to the surgical incision. Although PICB had a latent onset time, it was found equally efficacious in pain alleviation during the late postoperative period (NRS 6, 12, 24).

Time to recovery in PACU was significantly earlier in the PECS group when compared to the PICB group (P = 0.001), probably owing to better pain alleviation during the early postoperative period. Apart from the standard discharge criteria (modified Aldrete score) employed in PACU, the ability to perform functional exercises in the form of shoulder and arm movement was employed in liaison with the physiotherapy and occupational therapy team as part of the modification to enhanced recovery after surgery (ERAS). The decision to discharge from PACU was considered only after attaining the ability to perform a functional exercise. This was probably the reason for earlier discharge from PACU seen in the PECS group as other parameters for attaining discharge were comparable with the PICB group.

Perioperative opioid consumption was comparable among the groups, with intraoperative fentanyl requirement ($P = 0.32$), postoperative rescue tramadol needed ($P = 0.24$), and time to first rescue analgesic ($P = 0.46$) being comparable. There was no significant difference in PSS among the groups based on patient feedback scores elicited on hospital discharge ($P = 0.25$). Both PECS and PICB groups were comparable, suggesting that both block groups were effective in rendering patient satisfaction.

This study was intended to compare pain and satisfaction among patients subjected to conservative breast surgery among the two fascial plane blocks, establishing safety in its conduct. However, the study was not without limitations. The study was conducted on a pilot basis, and further studies involving a larger population would be required to validate the findings. The results of the study may not be extrapolated upon daycare breast surgery and radical mastectomy with or without the involvement of reconstruction. All assessments could not be made by a single observer, which might have led to interobserver bias in reporting the pain and satisfaction scores. Continuous catheter delivery system and patient-controlled analgesia were not considered in the study feasibility.

Conclusion

Pectoralis II block demonstrated pain alleviation in the early postoperative period and early return to functional shoulder arm exercise leading to discharge from the post-anesthesia care unit. Both pectoralis II and proximal intercostal block were comparable with respect to late postoperative pain scores, satisfaction scores, and time to patient discharge from the hospital. We recommend ultrasound-guided fascial plane blocks to be incorporated in multimodal interdisciplinary pain management and as the standard of care for pain alleviation, improved satisfaction, combined with enhanced recovery in breast conservation surgery.

Declaration of patient consent

The authors certify that they have obtained all appropriate patient consent forms. In the form, the patient(s) has/have given his/her/their consent for his/her/their images and other clinical information to be reported in the journal. The patients understand that their names and initials will not be published and due efforts will be made to conceal their identity, but anonymity cannot be guaranteed.

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Conflicts of interest

There are no conflicts of interest.

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