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Original article

TO COMPARE THE EFFICACY OF ULTRASOUND-GUIDED PECS II BLOCK WITH THORACIC PARAVERTEBRAL BLOCK (TPVB) FOR DURATION OF POSTOPERATIVE ANALGESIA AFTER MODIFIED RADICAL MASTECTOMY

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ABSTRAST

Modified radical mastectomy, usually performed for the treatment of breast cancer, is associated with considerable acute post-operative pain and restricted shoulder mobility.[1] Although the thoracic paravertebral block (TPVB) is the most widely used technique to provide postoperative analgesia after breast surgeries,[2-6] patients having radical mastectomy under TPVB frequently complain of pain in the axilla and upper limb, because TPVB does not block medial and lateral pectoral nerves as effectively as long thoracic and thoracodorsal nerves, leading to inadequate analgesia.The PECS is a more effective technique, provides better pain relief for longer time in contrast with the TPVB, and reduces postoperative opioid consumption with less hemodynamic changes. Accordingly, the PECS is more effective and safe when combined with general anesthesia for postoperative analgesia after modified radical mastectomy with axillary dissection.

KEYWORDS

Thoracic Paravertical block, Pectoralis nerve block ,Thoracic and lumber paravertibular block

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INTRODUCTION

Modified radical mastectomy, usually performed for the treatment of breast cancer, is associated with considerable acute post-operative pain and restricted shoulder mobility.[1] Although the thoracic paravertebral block (TPVB) is the most widely used technique to provide postoperative analgesia after breast surgeries,[2-6] patients having radical mastectomy under TPVB frequently complain of pain in the axilla and upper limb, because TPVB does not block medial and lateral pectoral nerves as effectively as long thoracic and thoracodorsal nerves, leading to inadequate analgesia. The TPVB also involves the risk of pneumothorax, spinal cord trauma, sympathetic block, and hypotension.[7]

The present study was planned to compare the efficacy of ultrasound-guided PecS II block with thoracic paravertebral block (TPVB) for duration of postoperative analgesia after modified radical mastectomy.. The PecS I block is a superficial block that has been used effectively for surgical procedures such as placement of breast expanders and subpectoralprosthesis, shoulder surgery with deltopectoral groove involvement, and insertion of a pacemaker or intercostal drain.[8] The PecS II block favours mastectomy and axillary clearance, because long thoracic and thoracodorsal nerves are also blocked in addition to the lateral branches of the intercostal nerves that exit at the level of the mid-axillary line to innervate the mammary gland and the skin from T2 to T6.[9]

AIM

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The present study was planned to compare the efficacy of ultrasound-guided PecS II block with thoracic paravertebral block (TPVB) for duration of postoperative analgesia after modified radical mastectomy.

OBJECTIVES:

1. Study the postoperative analgesia using VAS score.
2. 24 hours analgesic consumption.
3. First request of analgesia.
4. Complication if any.

INCLUSION CRITERIA

- ASA I and II
- No other systemic diseases
- No difficult airway
- Age more than 18 years less than 60 years of either sex

EXCLUSION CRITERIA

- Patients of age below 18 years and above 60 years
- ASA III and above
- Patients having predicted difficult airway (mouth opening < 2 cm, modified Mallampatti scale class 3 and 4, BMI >35 kg/m2)
- Patients with pre-existing infection at the block site, coagulopathy, allergy to local anesthetics, decreased pulmonary reserve, major cardiac disorders.

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- Patients having head injury and psychiatric illness.

MATERIAL AND METHODS

With the approval of Hospital Research Ethical Committee and informed consent this study is conducted in Department of Anaesthesia and Critical Care of Sarojini Naidu Medical College, Agra during 2019-2022.

All patients was kept fasting overnight and premedicated with alprazolam 0.25 mg and ranitidine 150 mg orally the night before and 2 h before surgery.

The group allocation numbers was concealed in sealed opaque envelopes that were opened after enrolment of the patients. Group-A which were include 35 patients, receive Pecs II block with general anaesthsia, whereas Group-B which were include 35 patients, receive TPVB block with general anaesthesia. Both the groups received ropivacaine 0.5%, 25 ml. The blocks were performed under all aseptic precautions in the operating room 30 min before surgery with a 23 G Spinal needle using the same ultrasound machine (Sonosite my lab 40) and linear array probe (38 mm, 7-12 MHz frequency) by an anaesthetist not involved in the preoperative or postoperative assessment of the patient, anaesthesia management, and data collection.

The TPVB was administered at the T3 level with the patient in the sitting position. The skin was infiltrated with lidocaine 2% down to the T2 transverse process (2.5 cm lateral to the T3 spin-ous process). The ultrasound probe was placed 5 cm from the midline in the craniocaudal direction and moved medially to identify the transverse process and parietal pleura. The superior costotransverse ligament was identified as a collection of homo-geneous linear echogenic bands alternating with echo-poor areas running from one transverse process

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to the next. Ropivacaine 0.5%, 25 ml was deposited in the space between the pleura and the costotransverse ligament.

The PecS II block was performed on the side of surgery. The patient was placed in the supine position with the arm abducted. The ultrasound probe was placed at the midclavicular level inferolaterally to locate the axillary artery and vein, and then moved laterally until pectoralis minor and serratus anterior muscles was identified at level of the third rib. After skin infiltration with lidocaine 2%, the needle was advanced in the plane of probe from medial to lateral in an oblique manner until the tip entered the plane between pectoralis major and minor and ropivacaine 0.5%, 25 ml was injected.

The patients was monitored for 24 h after surgery in the postoperative room. A patient-controlled analgesia pump, programmed to deliver morphine 2 mg boluses with a lockout interval of 10 min, was attached to the patient for rescue analgesia. No background infusion will be allowed. The primary outcome measures of the study was the duration of postoperative analgesia. The secondary outcome measures were postoperative analgesia using VAS score. IF VAS >4,inj. Diclofenac 75 mg is given. Postoperative pain was assessed using a visual analog scale (VAS, 0-10; 0=no pain and 10=worst imaginable pain). The vital signs and pain score was recorded at 0, 0.5, 1,2,4, 6, 8, 12, and 24 h after surgery by an investigator blinded to the group allocation. Any adverse effects, such as hypotension, respiratory depression, shivering, and urinary retention, was recorded. Post-operative nausea and vomiting (PONV) was assessed using a four-point numerical scale (0=no PONV, 1=mild nausea, 2=severe nausea or vomiting once, and 3=vomiting more than once). The rescue antiemetic ondansetron 0.1 mg kg^{-1} was given i.v. if the score will be 2 or more.

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STATISTICAL ANALAYSIS

Based on previous studies we presume that pre-operative block was reduce 24 hrpost operative analgesic by 35 % (type I error 0.05 & power of 0.8) on this basis we was include 70 patients.

Patients were randomly allocated into two groups The group allocation numbers was concealed in sealed opaque envelopes that were opened after enrolment of the patients. Group 1 which was include 35 patients, receive pecs II block with general anaesthesia, whereas Group 2 which also was include 35 patients, receive TPVB with general anaesthesia.

Pre block VAS score is noted and then subsequently at 6, 12, 24 and 48 hrs . Postop standard analgesic including injection diclofenac 75 mg iv is given when the patient first complain of pain. Total analgesic requirement of diclofenac is noted. Complication if any with the technique is also noted.

After counting the required information the data was classified tabulated and analyzed by using the various statistical methods. SSPS version 23 was used for analysing the data.

SAMPLE SIZE

Based on previous studies we presume that pre-operative block will reduce 24hr post operative analgesic by 35 % (type I error 0.05 & power of 0.8) on this basis we were include 70 patients.

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Patients was randomly allocated into two groups using computer generated random numbers. Group 1 which were include 35 patients, receive pecs II block with general anaesthesia, whereas Group 2 which also include 35 patients, receive TPVB with general anaesthesia.

Pre block VAS score is noted and then subsequently at 6, 12, 24 and 48 hrs . Postop standard analgesic including injection diclofenac 75 mg iv is given when the patient first complains of pain. Total analgesic requirement of diclofenac is noted. Complication if any with the technique is also noted.

Sample size = $= \frac{2SD^2\left(Z_{\alpha/2}+Z_{\beta}\right)^2}{d^2}$

SD - Standard deviation = Rx>m previous studies or pilot study

$Z_{\alpha/2} = Z_{0.05/2} = Z_{0.025} = 1.96$ (from Z table) at type 1 error of 5%

$Z_{\beta} = Z_{0.20} = 0.842$ from Z table) at 80% power

d = effect size = difference between mean values

So now formula was

Sample size = $= \frac{2SD^2\left(1.96+0.84\right)^2}{d^2}$

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OBSERVATION AND RESULTS

TABLE 1. AGE DISTRIBUTION AMONG THE GROUP-A (PEC BLOCK) AND GROUP-B (TPV BLOCK)

Age in years	Group-A (PEC block)		Group-B (TPVB block)	
	No	%	No	%
40-45	9	25.72	6	17.14
45-50	7	20.00	9	25.72
50-55	14	40.00	14	40.00
55-60	5	5.71	5	8.57
Total	35	100.0	35	100.0
Mean±	49.43±5.57		50.23±5.43	
t	0.608			
P	>0.05			

These two group were matched according to their age for randomization and found that there was no statistical different between mean age in between them A (49.43±5.57) and B (50.23±5.43).

TABLE 2.COMPARISON OFMEAN VAS SCORE AT DIFFRENT TIME BETWEEN GROUP-A (PEC BLOCK) AND GROUP-B (TPVB BLOCK).

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Age in years	Group-A (PEC block)		Group-B (TPVB block)		t	p
Time	Mean	S.D.	Mean	S.D.		
0 hr.	0.89	1.54	1.20	1.82	2.769	<0.05
0.5	0.63	0.59	1.09	1.05	2.260	<0.05
1 hr	1.17	0.77	2.06	1.90	2.568	<0.05
2 hr	1.80	1.21	2.06	1.74	2.726	<0.05
4 hr	2.29	1.47	2.60	1.69	2.819	<0.05
6 hr	2.57	1.32	3.00	1.71	2.178	<0.05
8 hr	2.71	1.65	3.20	2.12	2.079	<0.05
12 hr	3.14	1.90	3.46	1.95	2.695	<0.05
24 hr	3.46	1.15	3.43	1.87	2.081	<0.05

Above table reveals the comparison of mean VAS score at different time between group-A (PEC block) and group-B (TPVB block) mean score at different times i.e. 0 hr to 24 hrs were found to be more in group-B as compared to group-A.

Mean score at various time beween the group A and B found significant at 5% level of significance.

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TABLE-3: TO COMAPRE THE MEAN SCORE OF TOTAL DOSE OF DICLOFENAC (mg) IN GROUP-A (PEC BLOCK) AND GROUP-B (TPVB BLOCK)

Diclofenac (in 24 hrs)	Group-A (PEC block)		Group-B (TPVB block)		t	p
	Mean	S.D.	Mean	S.D.		
Total dose (mg)	79.29	66.94	130.71	76.78	2.986	<0.05

Above table reveals the comparison of mean score of total dose diclofenac (mg) in group-A (PEC block) and group-B (TPVB block) the mean score of total dose was found significantly more in group-B as compared to group-A ($t=2.986$; $p <0.05$).

TABLE-4: MEAN SCORE OF TIME TO FIRST REQUEST OF ANALGESIA IN GROUP-A (PEC BLOCK) AND GROUP-B (TPVB BLOCK)

	Group-A (PEC block)		Group-B (TPVB block)		t	p
	Mean	S.D.	Mean	S.D.		
First request of analgesia (in hrs)	5.17	6.16	4.51	3.87	2.025	<0.05

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Above table reveals the comparison of mean score of time to first request of analgesia in group-A (PEC block) and group-B (TPVB block) the mean score of time to first request of analgesia was found significantly more in group-A as compared to group-B ($t=2.025$; $p <0.05$).

DISCUSSION

In this randomized and double blind study, we had compared the effectiveness of USG guided pectoral nerve block-II versus thoracic paravertebral block for postoperative analgesia after modified Radical Mastectomy.

This randomized and double blind study was performed on a total 70 female patients which were divided in to 2 groups with 35 patients in group A for PEC-II block and 35 patients in group-B for TPVB. Measuring postoperative pain which was assessed using visual analog scale (VAS, 0-10; 0 = no pain and 10 = worst Imaginable pain). Pain score were monitored at 0,0.5, 1,2,4,6,8,12 and 24 h after surgery.

In our study showed that PECS performed in patients before MRM resulted in significantly longer duration of postoperative analgesia and less postoperative diclofenac consumption in the first 24 h with lower intensity of pain in comparison with TPVB.

The PECS anesthetize the pectoral, Intercostobrachial, the Intercostals III and VI, and the long thoracic nerves which supply the breast and axilla (Purcell and Wu 2014[24]). Blocking those nerves provides complete analgesia after breast surgery (Ueshima and Otake 2017[23]).

In our study we have found that patient receiving the PECS with general anesthesia, Reported lower VAS scores (Table No. 2, p value< 0.05) and decrease postoperative

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diclofenac dose (Table No. 3, p value < 0.05) which is also supported by Hamed IG[22] et al. 2020 and Bashandy and Abbas 2015[25].

In our study we have found that the VAS score were significantly lower (Table No. 2, p value < 0.05) in patients receiving the PECS Postoperatively compared with the patients receiving TPVB which is supported by Wahba and Kamal 2013[26] and Sopena- Zubiria et al. 2012.[27]

In our study we have found that PECS block revealed adequate postoperative analgesia for 5 h (Table No. 4, p value < 0.05) after modified radical mastectomy which is supported by Hamed IG[22] et al. 2020 and Blanco et al. 2012[8].

In our study we have found that decrease postoperative diclofenac dose (Table-3, p value <0.05) and adequate postoperative analgesia (Table-4, p <0.05) in PECS block compared with patients receiving TPVB block with supported by Kartik S. &Chandel A (2017).

A study by Kulhari et al.[9] reported prolonged duration of first rescue analgesia after breast surgeries in patients receiving PecS II block compared to TPVB (294.5 ± 52.76 versus 197.5 ± 31.35 min, respectively; P < 0.0001). Wahba and Kamal[10] also performed similar study and concluded that duration of analgesia was significantly longer in the PecS group [175 (155–220) min] than in the PVB group [137.5 (115–165) min], (P < 0.001), while study by El-Sheikh et al. [11] compared between PecS II group and TPVB group, and found no significant difference in time to first rescue analgesic, postoperative 24 h morphine consumption, and first rescue analgesia.

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In our study total dose of diclophenac consumption in 24 h in group A was less compared to group B. The results of the study by Kulhari et al. found that 24 h morphine consumption was also less in the PecS II block group compared to TPVB group (3.90 ± 0.79 mg versus 5.30 ± 0.98 mg; P < 0.0001). In Wahba and Kamal study morphine consumption at 24 h was significantly lower in PecS group (20–25) mg in comparison with TPVB group (22–31) mg, (P = 0.002). Similarly, Bashandy and Abbas compared quality of analgesia after MRM surgery using general anesthesia and PecS II blocks versus general anesthesia alone. They reported that postoperative morphine consumption in the PECS group (2.9 ± 1.714 mg) was lower in the first 12 h after surgery than in the control group (6.9 ± 1.861 mg) (P < 0.001).

On other hand many studies was described better pain relief when TPVB was used as a adjuvant to general anesthesia with significant reduction in opioids dose used, patient receiving TPVB frequently describe pain in the axilla and upper limb at the same side of surgery, as the TPVB does not anesthetize the medial and lateral pectoral nerves as effectively as the long thoracic and thoracodorsal nerves, leading to inadequate analgesia of the axillary region (Blackshaw et. al. 2018)[28], while the PCES gives better analgesia as it blocks the medial and lateral pectoral nerves together with long thoracic and thoracodorsal nerves. (Bashandy and abbas 2015)[25]

In our study revealed that patients in PECS group had a significantly prolonged duration of postoperative analgesia (Table No. 2, p value < 0.05) as the request for first dose of analgesics was significantly delayed (Table No.4, p value < 0.05) with significant reduction in total diclofenac consumption (Table No.3, p value 0.05) in the PECS group in contrast with the TPVB group during the First postoperative 24 h.

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In another study, Wahba and Kamal 2013[26] used different volume of local anaesthetic used in each group, however, they reported move postoperative morphine consumption with longer time for first requested analgesia in patient receiving pectoral nerve block, compared with thoracic paravertebral block. Sidiropoulou et al. 2008[29] used continuous ropivacaine infusion and reported less pain intensity at 16 h and 24 h in PECS group in comparison with TPVB.

Complications avoided easily with proper ultrasound training and searching for the right pattern or spread of the local anesthetic.

Hence, we conclude that the PECS is more effective technique, provides better pain relief for longer time in contrast with the TPVB, and reduces postoperative diclofenac consumption with less hemodynamic changes accordingly, the PECS is more effective and safe when combined with general anesthesia for postoperative analgesia after modified radical mastectomy with axillary dissection.

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CONCLUSION

The PECS is a more effective technique, provides better pain relief for longer time in contrast with the TPVB, and reduces postoperative opioid consumption with less hemodynamic changes. Accordingly, the PECS is more effective and safe when combined with general anesthesia for postoperative analgesia after modified radical mastectomy with axillary dissection.

The Pecs blocks produce excellent analgesia when combined with general anesthesia for breast surgery with axillary dissection. They are simple, easy-to-learn techniques, having easily identifiable landmarks based on good anatomical and ultrasound knowledge, making them an excellent alternative to the conventional thoracic paravertebral and neuraxial blocks for radical breast surgeries. Prospective randomized studies comparing Pecs blocks with paravertebral and neuraxial blocks are recommended.

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REFERENCES:

1. Fecho K, Miller N, Merritt S, Klauber-Demore N, Hultman C, Blau W. Acute and persistent postoperative pain after breast surgery. *Pain Med*, 2009; 10: 708-15.
2. Ono K, Danura T, Koyama Y, Hidaka H. Combined use of para-vertebral block and general anesthesia for breast cancer sur-gery. *Masui*, 2005; 54: 1273-6
3. Kairaluoma PM, Bachmann MS, Korpinen AK, Rosenberg PH, Pere PJ. Single injection paravertebral block before general anesthesia enhances analgesia after breast cancer surgery with and without associated lymph node biopsy. *AnesthAnalg*, 2004; 99: 1837^3
4. Arunakul P, Ruksa A. General anaesthesia with thoracic paravertebral block for modified radical mastectomy. *J Med Assoc Thai*, 2010; 93:8149-53.
5. Boughey JC, Goravanchi F, Parris RN, et al. Prospective randomized trial of paravertebral block for patients undergoing breast cancer surgery. *Am J Surg*., 2009; 198: 720-5.
6. Moller JF, Nikolajsen L, Rodt SA, Ronning H, Carlsson PS. Thoracic paravertebral block for breast cancer surgery: a randomized double-blind study. *AnesthAnalg*., 2007; 105: 1848-51

ISSN: 0975-3583, 0976-2833 VOL15, ISSUE 08, 2024

7. Schnabel A, Reichl SU, Kranke P, Pogatzki-Zahn EM, Zahn PK. Efficacy and safety of paravertebral blocks in breast surgery: a meta-analysis of randomized controlled trials. *Br J Anaesth*., 2010; 105: 842-52

8. Blanco R. The 'pecs block': a novel technique for providing analgesia after breast surgery. *Anesthesia*, 2011; 66: 847-8

9. Blanco R, Fajardo M, Maldonado TP. Ultrasound description of PecS II (modified PecS I) a novel approach to breast surgery. *Rev EspAnestesiolReonim*, 2012; 59: 470-5

10. VishramSingh, Text book of Anatomy, Upper Limb and Thorax, Second edition, 2014.

11. Dabbagh A. &Elyasi H. The role of paravertebral block in decreasing postoperative pain in elective breast surgeries. *Med SciMonit.* 2007; 13: CR464–7

12. Sopena-Zubiria LA, Fernandez-Mere LA, Valdes Arias C, Munoz Gonzalez F, Sanchez Asheras J, Ibanez Ernandez C. [Thoracic paravertebral block compared to thoracic paravertebral block plus pectoral nerve block in reconstructive breast surgery]. *Rev EspAnestesiolReanim*. 2012; 59(1): 12–17

13. Sherif Samir Wahba et al (2014) Thoracic paravertebral block versus pectoral nerve block for analgesia after breast surgery. *Egyptian Journal of Anaesthesia*, 2014; Volume 30, Issue 2, 129-135

14. DiabFuadHetta [1], Khalid Mohammed Rezk [2]Pectoralis-serratus interfascial plane block vs thoracic paravertebral block for unilateral radical mastectomy with axillary evacuation. *J. ClinAnesth*. 2016; 34:91-7.

15. Hala M.S. ELdeen. Ultrasound guided pectoral nerve blockade versus thoracic spinal blockade for conservative breast surgery in cancer: A randomized controlled trial. *Egyptian Journal of Anaesthesia*. 2015; 32:29-35.

ISSN: 0975-3583, 0976-2833 VOL15, ISSUE 08, 2024

16. Harue Morioka, YoshinariKamiya et al. Pectoral nerve block combined with general anaesthesia for breast cancer surgery: A retrospective comparison. *JA Clinical Resp. 2015;* 1(15). DOI 10.1186/s40981-015-0018-1

17. Somia M. El-Sheikh. Ultrasound guided modified pectoral nerve block versus thoracic paravertebral block for postoperative analgesia in major breast surgery. *Med. J. Cairo Univ*. 2016; 84: 189-195.

18. A.Pawa, J.Wightetal.Combined thoracic paravertebral and pectoral nerve blocks for breast surgery under sedation: A prospective observational case series. *Anaesthesia* 2018;40:68-74.

19. Satish Kumar, DeepaliGoel et al. A Randomised Controlled study of the post operative analgesic efficacy of ultrasound guided pectoral nerve block in the first 24 hr after modified redical mastectomy. *Indian J Anaesth*.2018 Jun; 62(6):436-442.

20. Mona Gad, KhaledAbdelwahab, Ahmed Abdallah, Mohamed Abdelkhalek, Mahmoud Abdelaziz. Ultrasound-Guided Erector Spinae Plane Block Compared to Modified Pectoral Plane Block for Modified Radical Mastectomy Operations. *Anesth Essays Res* 2019;13:334-9.

21. AshwiniSiddeshwara, GeetaSingariya, Manoj Kamal1,Kamlesh Kumari2,Satyanarayan Seervi, Rakesh Kumar. Comparison of efficacy of ultrasound-guided pectoral nerve block versus thoracic paravertebral block using levobupivacaine and dexamethasone for postoperative analgesia after modified radical mastectomy: A randomized controlled trial. *Saudi Journal of Anesthesia*, October-December 2019; Volume 13 (4): 325-331.

22. Ahmed Ali Fawaz, AmalHamedRabie, Abd El Aziz AbdallahAbd El Aziz and Tarek M. Ashoor. Ultrasound-guided thoracic paravertebral block vs pectoral nerve block for postoperative analgesia after modified radical mastectomy Islam GamalHamed. *Ain-Shams Journal of Anesthesiology*, 2020; 12 (30): 1-7.

ISSN: 0975-3583, 0976-2833 VOL15, ISSUE 08, 2024

23. Ueshima H, Otake H. Ultrasound-guided pectoral nerves (PECS) block: complications observed in 498 consecutive cases. *J ClinAnesth* 2017; 42: 46

24. Purcell N, Wu D (2014) Novel use of the PECS II block for upper limb fistula surgery. *Anaesthesia* 69:1294

25. Bashandy GM, Abbas DN (2015) Pectoral nerves I and II blocks in multimodal analgesia for breast cancer surgery: a randomized clinical trial. *RegAnesth Pain Med* 40(1):68–74

26. Wahba SS, Kamal SM (2013) Thoracic paravertebral block versus pectoral nerve block for analgesia after breast surgery. *Egypt J Anaesth* 30:129–135

27. Sopena-Zubiria LA, Fernández-Meré LA, Valdés Arias C, Muñoz González F, Sánchez Asheras J, Ibáñez EC (2012) Thoracic paravertebral block compared to thoracic paravertebral block plus pectoral nerve block in reconstructive breast surgery. *Rev EspAnestesiolReanim* 59:12–17

28. Blackshaw WJ, Bhawnani A, Pennefather SH, Al-Rawi O, Agarwal S, Shaw M (2018) Propensity score-matched outcomes after thoracic epidural or paravertebral analgesia for thoracotomy. *Anaesthesia*. 73:444–449

29. Sidiropoulou T, Buonomo O, Fabbi E, Silvi MB, Kostopanagiotou G, Sabato AF, Dauri M (2008) A prospective comparison of continuous wound infiltration with ropivacaine versus single-injection paravertebral block after modified radical mastectomy. *AnesthAnalg* 106(3):997–1001.