ISSN 2515-8260 Volume 10, Issue 2, Winter 2023

ORIGINAL RESEARCH

Evaluation of the Single Path Versus Double Path PECS I and II Blocks as an Efficient Analgesic Choice in Female Breast Surgeries

[1]Dr. Rajeev Kumar, [2]Dr. Praveen Kumar Singh

[1]Senior Resident, Department of Anesthesiology and Critical Care Medicine, AIIMS, New Delhi, India
[2]Senior Resident, Department of Anesthesiology and Critical care Medicine, SKMCH, Muzaffarpur, Bihar, India

Corresponding author
Dr. Rajeev Kumar
Senior Resident, Department of Anesthesiology and Critical Care Medicine, AIIMS, New Delhi, India
Email: drrajeev03@gmail.com

Received: 22 November, 2022 Accepted: 25 December, 2022

ABSTRACT

Background: Excruciating pain is a common consequence following breast surgery and can be efficiently managed with double path PECS I and II blocks. Pectoral plane blocks (PECs) are being utilised more frequently in analgesia for patients undergoing breast surgery.

Methods: Sixty patients undergoing breast surgery were randomly assigned into two groups: Single path and double path. Performance time of technique, the onset and length of the sensory block, visual analogue pain ratings (VAS), postoperative analgesic requirements and success rate were the outcomes.

Results: A single-path block performed more quickly. With the exception of 10 hours postoperatively, where the double-path group had lower pain scores, other time points saw equal pain scores. The sensory block lasted longer and started sooner in the double path block.

Conclusions: The use of double-path pectoral blocks was a beneficial approach, as it was associated with a faster onset, and a longer duration of analgesia.

Keywords: Pecs, breast, female, single path, double path

INTRODUCTION

Over 40% of women report severe pain after breast surgery [1], and opioids are widely prescribed for postoperative pain relief despite their potential for adverse effects.[2] Opioids can modify the immune system's efficiency, leading to a different immunological state as the tumour develops. [3]

When compared to general anaesthesia, regional anaesthesia is superior in relieving both acute and chronic pain. [4] Blanco developed the less risky Pectoral nerve block. [5] This novel technique is used to obstruct the pectoral, intercostobrachial, upper six intercostal, and long thoracic nerves. Various authors have reported the benefit of isolated or combined PECS I and II blocks for breast cancer surgery, including a recent meta-analysis by Hussain et al.[6] Medications are injected into the space between the third rib and the pectoralis minor and major muscles to block the pectoral nerve (PECS) I. The PECS II block involves injecting a

local anaesthetic in between the pectoralis minor and the serratus anterior muscles.These blocks may be more appropriately compared to other regional anesthetic techniques. Indeed, they are minimally invasive with a rapid-spread use.[7,8]
This prospective study sought to evaluate the Single Path Versus Double Path PECS I and II Blocks as an Efficient Analgesic Choice in Female Breast Surgeries.

MATERIALS AND METHODS

This study was conducted at the Department of Anaesthesiology, AIIMS New Delhi, with approval from the ethics committee for a three-year period. This prospective randomised parallel group experiment comprised 60 female patients between the ages of 35 and 50 who were having breast cancer procedures at a hospital and had an ASA physical status I or II. All patients gave their informed consent.
Psychological conditions, morbid obesity, bilateral surgery, re-do breast surgery, radiotherapy, patients who were male, an allergy to local anaesthetics, renal insufficiency, ASA III-IV, and patients with coagulopathy were excluded.
Using a computer-generated random number generator, the patients were split into two groups: a single path group (n = 30) that received PECS I and II blocks through a single injection and a double path group (n = 30) that received PECS I and II blocks through two separate injections.
Pre-anesthetic research was conducted. All patients received an IV dose of 1-2 mg of midazolam prior to induction. The patients were lying on their backs with their shoulders abducted and their elbows flexed. The 22G 80mm bevelled tip needle was seen using an in-plane method.
Single path PECS I and II block: The pectoralis major and minor muscles as well as the thoraco-acromial artery were visible when the probe was positioned below the outer third of the clavicle in a single path PECS I and II block. The pectoralis major and minor muscles were then made visible after being moved infero-laterally over the fourth rib. The pectoralis minor and serratus anterior muscles were found at the level of the fourth rib and thoraco acromial artery as the ultrasound (US) probe was then advanced towards the anterior axillary line. 1% lidocaine was injected into the skin. After a negative aspiration, the needle was put in plane, and 15mL of 0.25% bupivacaine was administered into the possible gap between the pectoralis minor and serratus muscles. A further 15 ml of 0.25% bupivacaine was then injected into the fascial plane between the pectoralis muscles.
Double path PECS I and II block: The pectoralis major and minor muscles, as well as the thoraco-acromial artery, were visible when the ultrasound probe was positioned below the outer third of the clavicle. This is known as a double path PECS I and II block. The pectoralis major and minor muscles could be seen when the probe was moved inferolaterally to the fourth rib. 15mL of 0.25% bupivacaine was injected into the possible gap between the pectoralis muscles after the skin had been infiltrated with 1% lidocaine. The ultrasound probe was positioned so that the pectoralis minor and serratus anterior muscles were at the level of the fourth rib and the thoraco-acromial artery for the second puncture. A comparable amount of 0.25% bupivacaine was injected into the possible gap between the serratus and pectoralis minor muscles after the needle was entered in plane (PECS II).
One skilled operator completed all of the blocks. The sensory level of the block was determined by a pin prick test.
Visual analogue scores (VAS) were measured immediately after recovery (0 hour), then 2, 4, 10, and 24 hours later. 0 = “no pain” and 10 = “worst imagined pain” on a visual analogue scale (VAS).
An investigator who was blind to the study's design and group allocation assessed each postoperative outcome measure. The Independent T-test and the Mann Whitney U test were

both used to analyse both parametric and non-parametric data. The Chi-square test was used to compare the categorical data.

RESULTS

Sixty patients were enrolled with 30 in one group. Both groups of patients had similar demographics and surgical data (Table 1).

Table 1: Demographic data

Variable	Single Path	Double Path	P value
Age	41.30±4.48	44.70±5.51	0.500
BMI	25.87±1.80	26.63±2.23	0.280
ASA I	18 (60%)	16 (53.3%)	0.509
ASA II	12 (40%)	14 (46.7%)	
Duration of surgery	113.87±1.13	114.50±8.03	0.899
Success Rate	28 (93.33%)	27 (90%)	0.159

In both groups, the success rate was similar. Pain scores of both study groups after extubation, 2,4 and 24 hours postoperatively were comparable. However, the VAS of the double-path group was significantly lower 10 hours postoperatively. (P less than 0.001) (Table 2)

Table 2: Visual analogue scores

VAS	Single Path	Double Path	P value
0 hour	1 (1-2)	1 (1-2)	1.200
2 h postoperative	2 (1-2)	1 (1-2)	0.879
4 h postoperative	2 (2-3)	2 (1-3)	0.087
10 h postoperative	5 (4-5)	2 (2-3)	<0.001
24 h postoperative	2 (2-3)	2 (2-3)	0.278

Shorter onset time of the block was recorded in double-path group in comparison with single-path group [12.74 ± 1.59, 18.27 ± 2.37 respectively]. A longer duration of the block was recorded in double-path group [20.07 ± 1.43] (Table 3).

Table 3: The onset time and duration of the block.

Variable	Single Path	Double Path	P value
Onset time (min) (Mean ± SD)	18.27 ± 2.37	12.74± 1.59	< 0.001
Duration of Block (Mean ± SD)	12.50 ± 0.41	20.07 ± 1.43	< 0.001

Despite not exceeding the safe dose of local anesthetic and intermittent aspiration, one patient from each group developed convulsions during recovery from anesthesia without any arrhythmia or deterioration of the vital signs which was treated with intravenous intralipid 20% 1.5 ml/kg over 1 minute then the patients dramatically recovered and were sent to high dependency unit for monitoring (Table 4).

Table 4: The incidence of postoperative adverse events

Variable	Single Path	Double Path	P value
Paresthesia	1 (1%)	0 (0%)	0.312
LA toxicity	1 (3.3%)	1 (3.3%)	1.000
Hematoma formation	2	1	0.555
Vascular puncture	1	0	0.312

DISCUSSION

According to the investigation's findings, single-path PECS I-II blocks performed noticeably more slowly. With the exception of 10 hours postoperatively, when the pain score was lower in the double-path group, all time points were comparable in terms of pain. The onset time was quicker in double path block. In the double path group, the blockade lasted longer and provided a higher level of enjoyment.

Wang and colleagues [9] studied patients undergoing shoulder surgery who received single-injection or triple-injection interscalene blocks, and they found that the single injection group had a shorter performance time and the triple injection group had a shorter time of onset and a longer duration of blockade. Cowie et al. [10] performed a double-injection operation in each cadaver, injecting 10 mL of contrast dye at T3-4 and T7-8 on the opposing side and 20 mL at T6-7 on one side under ultrasound guidance. They stated that due to significantly greater segmental intercostal dispersion, a double-injection strategy was able to reach more thoracic dermatomes than a single-injection method.

After performing a unilateral mastectomy on female patients, Uppal et al [11] compared the effectiveness of single injection versus multiple injection paravertebral block (PVB) and found that the single injection block required much less time to complete than the multiple injection technique. Kaya et al [12] investigated the analgesic effectiveness of PVB using single or multiple injection techniques in patients undergoing video-assisted thoracoscopy. They discovered that the performance time was 17.9 ±3.0 minutes in the multiple-injection group and 6.8 ±1.9 minutes in the single-injection group. This finding was consistent with ours, which demonstrated that the performance time in double path block was longer than that of single path block. In patients undergoing hand and elbow surgeries, Roy et al [13] compared single-injection and double-injection supraclavicular blocks; they found that the single-injection group's performance time (179± 104 seconds) was smaller than the double-injection group's performance time (275± 137 secs).

Shokri et al [14] examined single and double-point injection approaches of ultrasound-guided PECS block in patients having breast operations, finding that the double injection group had a higher success rate, a faster onset, and a longer block duration.

Because of fluid-filled voids after PECS block performance, Bakshi and his colleagues had issues with surgical dissection and electrocautery use. However, this issue was never brought up during any of our surgical procedures, most likely as a result of the extra time we gave the patient before the procedure started, which improved local anaesthetic absorption.[15]

In a clinical trial, Versyck et al [16] investigated the effectiveness of pectoral nerve block for patients undergoing mastectomy with sentinel node or axillary node dissection. In the first 24 hours following surgery, they discovered that PECS block had lower pain scores and postoperative opioid need than the saline group.

There were some limitations to the study as it was a single centre study and the sample size was small therefore the results could not be generalized to whole population.

CONCLUSION

Due to its advantages over single-path PECS I and II blocks, double-path PECS I and II blocks appeared to be the preferred method. It has a faster onset time, a comparable success rate, greater levels of satisfaction, and a longer sensory block period.

REFERENCES

1. Taylor RS, Ullrich K, Regan S, Broussard C, et al. The impact of early postoperative pain on health-related quality of life. Pain Pract. 2013; 13: 515-23

2. Benyamin R, Trescot AM, Datta S, Buenaventura R, Adlaka R, Sehgal N, et al. Opioid complications and side effects. Pain Physician. 2008; 11 (2 suppl): S105- 120. PMID: 18443635.
3. Afsharimani B, Cabot P, Parat MO. Morphine and tumor growth and metastasis. Cancer Metastasis Rev. 2011; 30: 225-38.
4. Apfel CC, Heidrich FM, Jukar-Rao S, et al. Evidence-based analysis of risk factors for postoperative nausea and vomiting. Br J Anaesth. 2012; 109(5):742–53.
5. Blanco R, Fajardo M, Maldonado TP. Ultrasound descrip- tion of Pecs II (modified Pecs I): a novel approach to breast surgery. Rev Esp Anestesiol Reanim 2012; 59: 470-5
6. Hussain N, Brull R, McCartney CJ, Wong P, Kumar N, Essandoh M, Sawyer T, Sullivan T, Abdallah FW. Pectoralis-II myofascial block and analgesia in breast cancer surgery: a systematic review and meta-analysis. Anesthesiology. 2019 Sep;131(3):630-48.
7. Bashandy GM, Abbas DN. Pectoral nerves I and II blocks in multimodal analgesia for breast cancer surgery: a randomized clinical trial. Reg Anesth Pain Med. 2015; 40: 68-74.
8. Erdurmus M, Aydin B, Usta B, et al. Patient comfort and surgeon satisfaction during cataract surgery using topical anesthesia with or without dexmedetomidine sedation. European journal of ophthalmology 2008; 18(3):361–367.
9. Wang CI, GE YL, Long FY, et al. Comparison of single- and triple-injection methods for ultrasound-guided interscalene brachial plexus blockade. Exp Ther Med. 2018;15(3):3006-3011.
10. Cowie B, McGlade D, Ivanusic J, Barrington MJ. Ultrasound-guided thoracic paravertebral blockade: a cadaveric study. Anesth Analg. 2010; 110:1735–9.
11. Uppal V, Sondekoppam RV, Sodhi P, et al. Single-Injection Versus Multiple-Injection Technique of Ultrasound-Guided Paravertebral Blocks. A Randomized Controlled Study Comparing Dermatomal Spread. Reg Anesth Pain Med 2017; 42(5):575-581.
12. Kaya FN, Turker G, Mogol EB, Bayraktar S. Thoracic paravertebral block for video-assisted thoracoscopic surgery: single injection versus multiple injections. J Cardiothorac Vasc Anesth. 2012;26(1):90-94.
13. Roy M, Nadeau MJ, Côté D, et al. Comparison of a single- or double-injection technique for ultrasound-guided supraclavicular block: a prospective, randomized, blinded controlled study. Reg Anesth Pain Med. 2012;37(1):55-59.
14. Shokri H, Abd El Aziz H. Pectoral Nerve I and II Blocks, Single Versus Double Path, as an Effective Pain Management Strategy in Female Breast Cancer Surgery. Sri Lankan Journal of Anaesthesiology. 2022 Jun 11;30(1).
15. Bakshi SG, Karan N, Parmar V. Pectoralis block for breast surgery: A surgical concern? Indian J Anaesth. 2017; 61:851–2.
16. Versyck B, van Geffen GJ, Van Houwe P. Prospective double blind randomized placebocontrolled clinical trial of the pectoral nerves (Pecs) block type II. J Clin Anesth. 2017; 40:46-50