ORIGINAL ARTICLE

# COMPARISON OF POSTOPERATIVE PAIN WITH AND WITHOUT PECTORAL BLOCK IN PATIENTS UNDERGOING MODIFIED RADICAL MASTECTOMY

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**Background:** Modified Radical Mastectomy is associated with significant acute postoperative pain. If this pain is not managed properly most patients will develop chronic post-mastectomy pain, which reduces quality of life. Pectoralis (PECS) block is effective in reducing pain and the consumption of analgesia in the post-operative period. The objective was to compare mean post-operative pain with or without pectoral (PECS) block in females undergoing modified radical mastectomy under general anaesthesia. **Methods:** A randomized controlled trial was done in the Department of General Surgery at Pakistan Institute of Medical Sciences, Islamabad. Patients who fulfilled the inclusion criteria and underwent modified radical mastectomy were included in the study. A total of 60 patients, were randomly divided into two equal groups, the PEC group and without PEC group. After surgery, patients were shifted to the postoperative care unit and were assessed for postoperative pain after 6 and 12 hours. Data was collected and descriptive analysis was done using SPSS version 22. **Results:** The mean age and BMI of the patients was 51.52±10.29 years and 24.1±3.94 kg/m$^2$, respectively. Among patients from the PEC group, the mean post-op pain after the 6 hours was 2.13±0.571 while in the without PEC group, the mean post-op pain was 2.67±1.093 (*p*-value=0.021). Similarly, in patients from the PEC group, the mean post-op pain after the 12 hours was 1.20±0.407 while in the without PEC group, the mean post-op pain was 1.63±0.615 (*p*-value=0.002). **Conclusion:** Post-operative pain with PEC block showed significantly better control as compared to the patients without PEC block group in females undergoing modified radical mastectomy under general anaesthesia.

**Keywords:** Post-operative Pain; Pectoral Block; Modified Radical Mastectomy

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## INTRODUCTION

Breast cancer is the most common cancer in women globally with more than a million new cases diagnosed every year.[1] Acute postoperative pain is an imperative risk factor in the development of chronic post-mastectomy pain; 40% of women have severe acute postoperative pain following breast cancer surgery, while 50% develop chronic post-mastectomy pain with compromised quality of life.[2]

Adjuvant treatment, age, gender, psycho-social status and genetic variables are among the factors that may increase the likelihood that postoperative pain may advance to a chronic condition; however, it is unknown how much of an influence each of these factors ~~will~~ have.[3]

After a breast cancer operation, regional anaesthetic techniques including thoracic para vertebral and epidural blocks can effectively relieve postoperative discomfort. However, as the thoracic epidural block and the thoracic paravertebral block are deep nerve blocks, surgeons do not perform these techniques.[4]

Pectoral Nerve Blocks (PECS I and II), are a newly introduced method that provides an improved reduction in postoperative pain as they provide targeted pain relief to the chest area and offer greater pain control compared to systemic analgesics alone. By effectively managing pain in the immediate postoperative period, patients may experience improved mobility, earlier ambulation, and better overall recovery. The pectoral nerve (PECS) block, which was first described by Blanco et al., is an inter-fascial plane block, done under ultrasound guidance with the help of an anaesthetist trained in ultrasound, infiltrated after the removal of the breast intraoperatively. The local anaesthesia with recommended volume of 0.2 mL/kg of 0.25% bupivacaine or 0.5% ropivacaine is used and deposited into the plane between the pectoralis major and minor muscles (PECS I block) and above the serratus anterior muscle at the third rib (PECS II block) targeting the inter-cost brachial; intercostal III, IV, V, and VI; and long thoracic nerves.[3–5]

PECS block (I, II) was conducted after the induction of general anaesthesia in patients undergoing MRM. Yuki I *et al* showed that the average pain relief at 6 hours post-operatively with PECS Block was 2.2±1 and

Control Group was 3.6±1 ($p$-value<0.05) and after 12 hours was 2.3±1 with PEC block and 3.5±1 in the control group ($p$<0.05).[5] There is increasing importance of pectoral blocks in breast surgeries, as it provide superior analgesic effects.[6] In another study, mean postoperative pain, i.e., 1±1.25 with PECS and 2±1 without PECS in females undergoing modified radical mastectomy under general anaesthesia ($p$=0.03) and almost remained the same in after 12 hours.[7]

The rationale of this study is to compare mean post-operative pain with or without Pectoral block in females undergoing modified radical mastectomy under general anaesthesia. Through literature, it has been noticed that addition of Pectoral block can significantly reduce post-MRM pain, but in routine it is not practiced. This may be due to lack of local evidence. So, we conducted this study to get evidence considering effectiveness of PECS block in addition to general anaesthesia. This study may prove that PECS block is effective in reducing post-MRM pain, so in future, we will implement the addition of PECS in patients who undergo MRM. The objective is to compare mean post-operative pain with or without PECS block in females undergoing modified radical mastectomy under general anaesthesia.

## MATERIAL AND METHODS

A randomized controlled trial was conducted in Department of General Surgery from July 2019 to June 2020 at Pakistan Institute of Medical Sciences, Islamabad. Patients fulfilled the inclusion criteria were included in the study after taking informed consent. Females of age 30–70 years undergoing MRM for primary unilateral breast cancer disease were included in the study. Patients who underwent reconstructive surgery, bilateral surgery, received another nerve block (like thoracic para vertebral block or epidural anaesthesia). Over-conscious patients or have anxiety (on clinical examination) or having neurological disorder, psychiatric problem (on medical record) was excluded.

After taking ethical approval for the study from hospital ethical committee, sixty patients were included in the study. Demographic information like name, age, BMI, duration of diagnosis of breast cancer and anatomical side was noted. Patients were randomly divided in two equal groups by using lottery method. One group was given PEC block with general anaesthesia while the other group was given only general anaesthesia. All surgeries were performed by a single surgical team with the assistance of a researcher and anaesthetist. The local anaesthetic, 0.2 ml/kg of 0.25% bupivacaine or 0.5% ropivacaine (20-40ml) is deposited between two separate interfacial places, the pectoralis major and pectoralis minor and pectoralis minor and serratus anterior. The needle is advanced using ultrasound guidance. The depth is usually 1 to 3 cm for the interfacial plane between the pectoralis major and pectoralis minor, and 3 to 6 cm for the interfacial plane between the pectoralis minor and serratus anterior. After surgery, patients were shifted in the postoperative care unit and were followed-up there. After 6 and 12 hours, patients were assessed for postoperative pain by using a visual analogue scale. Patients with pain scores>4 were managed as per hospital protocol. A specially designed proforma was filled for each patient post-operatively at 6 and 12hrs. All data was collected, recorded and analyzed, using SPSS 22. Quantitative variables like age, BMI, duration of breast cancer and postoperative pain was presented as mean and standard deviation. Qualitative variables like the anatomical side were presented as frequency and percentage. Both groups were compared for mean postoperative pain by using independent sample t-test. $p$-value≤0.05 was taken as significant.

## RESULTS

There were sixty patients enrolled in the study. Their demographics are presented in Table I. Comparison of post operative pain scores between the two groups is shown in Table 2 and statistically significant difference was found between the study groups in mean post-operative pain after 6$^{th}$ and 12$^{th}$ hours in patients of MRM.

**Table-1: Demographics of patients between two groups**

| | With PEC | Without PEC |
|---|---|---|
| Mean age (years) | 52.27±10.03 | 50.77±10.55 |
| Mean BMI (kg/m$^2$) | 24.10±3.86 | 25.48±4.03 |
| Mean Duration of cancer (months) | 14.47±7.21 | 13.30±5.42 |

**Table-2: Comparison of post-op pain between two groups (n=60)**

| Mean post-op pain | With PEC (n=30) | Without PEC (n=30) | $p$-value |
|---|---|---|---|
| After 6 hours | 2.13 | 2.67 | 0.021 |
| After 12 hours | 1.20 | 1.63 | 0.002 |

## DISCUSSION

The most frequent cancer in women is breast cancer, and its incidence continues to rise. Because breast cancer surgery is seen as minimally intrusive, acute postoperative pain is frequently ignored. However, most patients will experience chronic post-mastectomy pain, which lowers quality of life, if acute pain management is ignored.[8]

Blanco *et al*., described that the intercostobrachial, lateral cutaneous branch, medial cutaneous nerve of the arm and forearm, long thoracic

and thoracodorsal nerves, can all be anesthetized by pectoral nerves (PECS) block. This analgesic effect is felt at the lateral mammary area.[9,10]

In our study in patients from PEC group the mean post-op pain after 6th hours of the patients was 2.13±0.571 while in patients from without PEC group the mean post-op pain after 6th hour of the patients was 2.67±1.093 (*p*-value=0.021). Similarly, patients from PEC group the mean post-op pain after 12th hours of the patients was 1.20±0.407 while in patients from without PEC group the mean post-op pain after 12th hour of the patients was 1.63±0.615 (*p*-value=0.002). The VAS scores and the additional 1 g of acetaminophen administered within 24 hours of the operation were considerably lower in the PECS group than in the control group at all postoperative time periods, according to the literature. The advantages of combining general anaesthetic and regional anaesthetic over just general anaesthesia alone include improved postoperative recovery, decreased postoperative mortality and morbidity, decreased incidence of surgical site infection, and decreased incidence of cancer recurrence.[11–14]

PECS block (I, II) was administered after the induction of general anaesthesia in patients undergoing MRM. Yuki I *et al* concluded in their retrospective study that PECS block provides effective and statistically significant ($p<0.05$) postoperative analgesia within the first 24 hours after breast cancer surgery.[5] This finding is similar to our results where PEC block showed better postoperative analgesia after MRM; however, our results were in first 12 hours rather 24 hours. In another study, postoperative pain scores during the 48 h after surgery were significantly lower in the total intravenous analgesia (TIVA) + PEC group than in the TIVA group (TIVA: 2 [1–5]; TIVA + PEC: 1 [0–5]; $p=0.03$). This comparison was made in patients undergoing BCS, while our patients underwent MRM.[7]

According to some studies, the heart rate and blood pressure are significantly elevated within the first 24 hours following surgery, and visual analogue scale (VAS) pain scores taken at rest and while moving around during this time demonstrate apparent agony.[15–17] Notably, it has been discovered that pectoral nerve blocking is simple to perform with ultrasound guidance[18–20] and that the sole consequence is hematoma[21].

Zhao *et al* concluded that as compared to the ~~GA~~ general anaesthesia group, the PECS block group significantly decreased the dosage of opioids used during and after surgery, the incidence of PONV, the requirement for postoperative rescue analgesia, and pain levels between 0 and 6 hours after surgery.[22] We also found that PEC block group received less dosage of opioids postoperatively.

Results of Wei Deng *et al* study showed that reduction of pain post-MRM through PECS II Block (Ropivacaine) was dependent on ropivacaine concentration, and 0.2% ropivacaine did not provide efficacious analgesia for MRM.[23] Forty millilitres of ropivacaine was used to cover all pectoral nerve blocks. Studies have shown 40 ml to be safe for nerve blockade.[24]

As contrary exist in our findings and few of previously published studies, so it is suggested that in future further studies should be done with larger sample size and data should be taken from different centers to control the biased approach.

## CONCLUSION

Post-operative pain with PEC showed significantly better control as compared to the patients without PEC group in females undergoing modified radical mastectomy under general anaesthesia.

**Conflict of interest:** None

**Disclaimer**: This article is based on the dissertation of postgraduate student, for FCPS in Surgery.

## AUTHORS' CONTRIBUTION

ZN: study conception & design, data collection & interpretation, draft preparation. SHW: study conception & design, data analysis, critically revision the draft & final approval. SAS: data collection and interpretation. SH: data collection and draft writing
SAS: data analysis, manuscript revision

## REFERENCES


1. Mejdahl MK, Andersen KG, Gärtner R, Kroman N, Kehlet H. Persistent pain and sensory disturbances after treatment for breast cancer: Six year nationwide follow-up study. BMJ 2013;346:f1865.
2. Zhao Y, Jin W, Pan P, Feng S, Fu D, Yao J. Ultrasound-guided transversus thoracic muscle plane-pectoral nerve block for postoperative analgesia after modified radical mastectomy: a comparison with the thoracic para vertebral nerve block. Perioper Med (Lond) 2022;11(1):39.
3. Beyaz SG, Ergönenç JŞ, Ergönenç T, Sönmez ÖU, Erkorkmaz Ü, Altintoprak F. Post mastectomy pain: a cross-sectional study of prevalence, pain characteristics, and effects on quality of life. Chin Med J (Engl) 2016;129(1):66–71.
4. Blanco R, Fajardo M, Maldonado TP. Ultrasound description of Pecs II (modified Pecs I): a novel approach to breast surgery. Rev Esp Anestesiol Reanim 2012;59(9):470–5.
5. Yuki I, Ueshima H, Otake H, Kitamura A. PECS Block Provides Effective Postoperative Pain Management for Breast Cancer Surgery—A Retrospective Study. Int J Clin Med 2017;8(3):198–203.
6. Bakeer AH, Kamel KM, Abdelgalil AS, Ghoneim AA, Abouel Soud AH, Hassan ME. Modified Pectoral Nerve Block versus Serratus Block for Analgesia Following Modified Radical Mastectomy: A Randomized Controlled Trial. J Pain Res 2020;13:1769–75.
7. Morioka H, Kamiya Y, Yoshida T, Baba H. Pectoral nerve block combined with general anesthesia for breast cancer surgery: a retrospective comparison. JA Clin Rep 2015;1(1):15.

8. Gärtner R, Jensen MB, Nielsen J, Ewertz M, Kroman N, Kehlet H. Prevalence of and factors associated with persistent pain following breast cancer surgery. JAMA 2009;302(18):1985–92.
9. Blanco R, Fajardo M, Maldonado TP. Ultrasound description of Pecs II (modified Pecs I): a novel approach to breast surgery. Rev Esp Anestesiol Reanim 2012;59(9):470–5.
10. Blanco R. The 'pecs block': a novel technique for providing analgesia after breast surgery. Anaesthesia 2011;66(9):847–8.
11. Fearon K, Ljungqvist O, Von Meyenfeldt M, Revhaug A, Dejong C, Lassen K, *et al*. Enhanced recovery after surgery: a consensus review of clinical care for patients undergoing colonic resection. Clin Nutr 2005;24(3):466–77.
12. Rodgers A, Walker N, Schug S, McKee A, Kehlet H, Van Zundert A, *et al*. Reduction of postoperative mortality and morbidity with epidural or spinal anaesthesia: results from overview of randomized trials. BMJ 2000;321(7275):1493.
13. Chang CC, Lin HC, Lin HW, Lin HC. Anesthetic Management and Surgical Site Infections in Total Hip or Knee Replacement A Population-based Study. Anesthesiology 2010;113(2):279–84.
14. Biki B, Mascha E, Moriarty DC, Fitzpatrick JM, Sessler DI, Buggy DJ. Anesthetic Technique for Radical Prostatectomy Surgery Affects Cancer Recurrence A Retrospective Analysis. Anesthesiology 2008;109(2):180–7.
15. Goswami S, Kundra P, Bhattacharyya J. Pectoral nerve block I versus modified pectoral nerve block II for postoperative pain relief in patients undergoing modified radical mastectomy: a randomized clinical trial. Br J Anaesth 2017;119(4):830–5.
16. Singh PM, Borle A, Kaur M, Trikha A, Sinha A. Opioid-sparing effects of the thoracic interfascial plane blocks: A meta-analysis of randomized controlled trials. Saudi J Anaesth 2018;12(1):103–11.
17. Kumar S, Goel D, Sharma SK, Ahmad S, Dwivedi P, Deo N, *et al*. A randomized controlled study of the post-operative analgesic efficacy of ultrasound-guided pectoral nerve block in the first 24 h after modified radical mastectomy. Indian J Anaesth 2018;62(6):436–2.
18. Jin H, Zhang T, Sun X, Wang Z, Wang F. Efficacy of ultrasound-guided pectoral nerve block versus thoracic paravertebral block for postoperative analgesia after radical mastectomy. J Clin Anesthesiol 2018;34(2):126–9.
19. Kulhari S, Bharti N, Bala I, Arora S, Singh G. Efficacy of pectoral nerve block versus thoracic paravertebral block for postoperative analgesia after radical mastectomy: a randomized controlled trial. Br J Anaesth 2016;117(3):382–6.
20. Nai AS, Sahoo RK, Ganapathy M, Mudunuri R. Ultrasound guided blocks for surgeries/procedures involving chest wall (Pecs 1, 2 and serratus plane block). Anaesth Pain Intensive Care 2019;27:348–51.
21. Bashandy GMN, 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(1):68–74.
22. Zhao J, Han F, Yang Y, Li H, Li Z. Pectoral nerve block in anesthesia for modified radical mastectomy: a meta-analysis based on randomized controlled trials. Medicine (Baltimore) 2019;98(18):e15423.
23. Deng W, Fu D, He L. Evaluation of Pectoral Nerve Block in Modified Radical Mastectomy: Comparison of Three Concentrations of Ropivacaine. Clin Interv Aging 2020;15:937–44.
24. Fang G, Wan L, Mei W, Yu H, Luo A. The minimum effective concentration (MEC 90) of ropivacaine for ultrasound-guided supraclavicular brachial plexus block. Anaesthesia 2016;71(6):700–5.



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