

A COMPARATIVE STUDY OF PECTORAL BLOCK (PECS) AND PARAVERTEBRAL BLOCK (PV) FOR INTRAOPERATIVE AND POSTOPERATIVE ANALGESIA IN OPIOID-FREE GENERAL ANESTHESIA TECHNIQUE

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Abstract

Background: Using ultrasound guidance to perform peripheral nerve blocks increases the success rate, reduces block performance times, improves block quality, reduces the local anaesthetic doses needed and reduces the chances of complications. The study compares the Pectoral block (PECS) and Paravertebral block (PV), providing Intraoperative & postoperative analgesia in an opioid-free General anaesthesia technique. **Materials and Methods:** Using ultrasound guidance to perform peripheral nerve blocks increases the success rate, reduces block performance times, improves block quality, reduces the local anaesthetic doses needed and reduces the chances of complications. The study compares the Pectoral block (PECS) and Paravertebral block (PV), providing Intraoperative & postoperative analgesia in an opioid-free General anaesthesia technique. **Results:** The mean heart rate, systolic and diastolic blood pressure recorded at different time intervals in both groups was the same, and there was no statistical significance between the two groups in SBP. The mean arterial pressure, oxygen saturation, and VAS score between the two groups were comparable, and no significance was observed. 95% of patients did not experience nausea or vomiting, while 5% experience complications. There was no significant difference between the groups in complications, surgeons' satisfaction scores, and patients' satisfaction scores. There was no difference in intra or postoperative hemodynamic parameters & block-related complications such as pneumothorax or vessel puncture. **Conclusion:** We conclude that either PEC or PV block with dexmedetomidine may be used safely as an opioid-free anaesthetic technique for patients undergoing MRM with axillary dissection in the perioperative period.

INTRODUCTION

Pain is defined as an "unpleasant sensory or emotional experience associated with actual or potential tissue damage" by IASP (International Association for Study of Pain).^[1] Pain prevention is an important part of anaesthesiology, and surgeries like modified radical mastectomy are associated with severe postoperative pain and distress.^[2] The multifactorial origin of pain following breast surgeries includes pain from the surgical incision and dynamic pain during coughing/straining or mobilising.^[3] But significant postoperative pain mostly occurs from the incision site. Therefore, a multimodal approach to postoperative analgesia is required to block pain transmission. Modified

radical mastectomy (MRM) is a common surgical procedure, accounting for 31% of all breast cancer surgery cases performed. Post-mastectomy pain managed by opioids alone often leads to side effects such as nausea and vomiting. Inadequate control of pain may later develop into chronic pain syndrome (paraesthesias, phantom breast pain and intercostobrachial neuralgia) in 25%–40% of the patients.^[4,5]

Following thoracic surgery, various regional anaesthetic blocks are used, including Thoracic Epidural Block (TEB), thoracic Paravertebral Block (PVB), intercostal block, and intra- or extrapleural block.^[6] Each of these blocks has its specific advantages and disadvantages. PVB involves a local anaesthetic injection into the paravertebral space to

block nerves after they exit the spinal cord. PVB is a unilateral technique; respiratory and sympathetic functions are preserved on the contralateral side. This feature may be associated with fewer pulmonary complications and less hypotension and urinary retention. The major potential complications related to PVB are total spinal block, pneumothorax and neuronal injury.^[7]

Blanco R, in 2011, illustrated the procedure of the Pectoral Nerve (PECS) block and its effectiveness in reducing pain locally over the serratus anterior area during breast reconstruction surgeries.^[8] With limited studies showing positive results of PECS, this study was initiated to provide further evidence of the efficacy and safety of this recently introduced technique towards pain management in mastectomy surgeries compared to Paravertebral block. Using ultrasound guidance to perform peripheral nerve blocks increases the success rate, reduces block performance times, improves block quality, reduces the local anaesthetic doses needed and reduces the chances of complications. The study compares the Pectoral block (PECS) and Paravertebral block (PV), providing Intraoperative & postoperative analgesia in an opioid-free General anaesthesia technique.

MATERIALS AND METHODS

This double-blinded randomised controlled prospective study was conducted at the department of Anaesthesiology, Government medical College hospital Ramanathapuram, for one year.

Inclusion Criteria

ASA physical status 1, 2 & 3, age 30 to 60, elective surgery, and patients giving valid informed consent were included.

Exclusion Criteria

Lack of patient consent, emergency surgeries, coagulopathy, infection at the puncture site, and allergy to recent local anaesthetics were excluded.

After getting written informed consent, 60 patients undergoing MRM surgery were selected. Patients were randomly allocated into Group PE (Pectoral) 30 patients and Group PV (Paravertebral) 30 patients.

Standard monitors were attached upon arrival in OR, and pre-induction vitals were noted. Both groups were pre-medicated and induced similarly, and in both groups, the steps of free GA were

standardised. Under ultrasound guidance, the PECS block was administered at the level of the fourth rib in the mid-axillary line. 20 ml and 10 ml of the solution (0.3 ml/kg 0.5% bupivacaine, 0.3 ml of 2% lignocaine with adrenaline and 1 mcg/kg dexmedetomidine) was administered, and drug spread in the correct plane was documented.

The incision was made 10-15 mins after testing for no response to skin pinch stimulus with forceps. In PV group after GA, patients positioning to lateral, under ultrasound guidance, a PV block was administered at the level of the fourth vertebra. The needle tip was visualised, and 30ml of a drug (0.3 ml/kg 0.5% bupivacaine, 0.3 ml/kg 2% lignocaine with adrenaline and 1 mcg/kg dexmedetomidine) was injected with the depression of parietal pleura being the endpoint.

In either group, if one or more of three pre-defined signs (20% rise in baseline heart rate or BP, purposeful movement of limbs or facial grimacing) was noted on the incision, add-on analgesia was administered (Inj. Paracetamol 1g, local infiltration 5-10 ml of 1% lignocaine).

Block inadequacy was defined as the recurrence of any of the three pre-defined signs after the rescue, and opioids were administered if previous methods failed. In the postoperative period, the VAS score was documented, and the patient was administered 1g paracetamol (max dose of 4g in 24 hrs) if VAS >4. If VAS >6/beyond the full dose, 75mg diclofenac IV was administered, and no oral analgesics were prescribed in the first 24 hours after surgery. Intraoperative hemodynamics, rescue analgesia requirement, postoperative nausea and vomiting, patient satisfaction score, and surgeon satisfaction score were observed.

Statistical Analysis

Statistical analysis was analysed by using SPSS 21. The normality of data was checked by Kolmogorov-Smirnov test and expressed as Mean (Standard Deviation) or Median (Inter quartile Range). Continuous variables were compared by using Student's unpaired t-test and categorical variables by χ^2 test if variables were normally distributed, else the alternate tests for non-parametric variables were used. The pain scores were considered a continuous variable. Confidence intervals were calculated for statistically significant differences.

RESULTS

Among 60 patients, 60% were aged 45-60, 40% were aged 30-45, 63.3% had a BMI of > 25, and 36.6% had a BMI of < 25.

Table 1: Demographic data of the study

		Frequency (%)
Age group	30-45 years	24 (40%)
	45-60 years	36 (60%)
BMI	> 25 (Kg/m ²)	38 (63.3%)
	< 25 (Kg/m ²)	22 (36.6%)

The mean heart rate, systolic and diastolic blood pressure recorded at different time intervals in both groups was the same, and there was no statistical significance between the two groups in SBP. The mean arterial pressure and oxygen saturation between the two groups were comparable, and no significance was observed.

The VAS score between the two groups was almost similar, and no significance was observed [Figure 1].

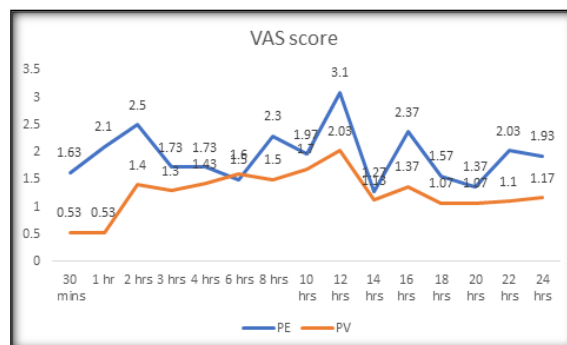


Figure 1: VAS score between groups

Table 2: Comparison of PE and PV Treatment Groups

		PE	PV	P-value
Requirement of Rescue Analgesia	Yes	4 (13.3%)	1 (3.3%)	0.161
	No	26 (86.7%)	29 (96.7%)	
Complication	Nausea	1 (3.3%)	0	0.601
	Vomiting	1 (3.3%)	1 (3.3%)	
	No	28 (93.3%)	29 (96.7%)	
Surgeons' Satisfaction score	4	6 (20%)	3 (10%)	0.549
	4.5	3 (10%)	3 (10%)	
	5	21 (70%)	24 (80%)	
Patient's satisfaction score	3	1 (3.3%)	0	0.187
	4	1 (3.3%)	4 (13.3%)	
	4.5	2 (6.7%)	0	
	5	26 (86.7%)	26 (86.7%)	

91.7% of patients did not require rescue analgesia, while 8.3% did. There was no significant difference in the requirement for rescue analgesia between the groups. 95% of patients did not experience nausea or vomiting, while 5% experience complications.

Surgeon satisfaction score was 4 in 6 patients, 4.5 in 3 patients, and 5 in 21 patients in the PE Group and Group PV; it was three patients with a score of 4 and 4.5 each and 24 with a score of 5. The patient satisfaction score was 3 in 1 patient, 4 in 1 patient and two patients, with a score of 4.5 and 5 in 26 patients.

There was no significant difference between the groups in complications, surgeons' satisfaction scores, and patients' satisfaction scores. There was no difference in intra or postoperative hemodynamic parameters & block-related complications such as pneumothorax or vessel puncture. One patient in each group had PONV grade 2 and received ondansetron [Table 2].

DISCUSSION

There has been a growing interest in opioid-free anaesthesia techniques in recent years. The Pectoral block (PECS) and Paravertebral block (PV) are two regional anaesthesia techniques that have gained popularity for providing intraoperative and postoperative analgesia in opioid-free general anaesthesia.^[9,10] PECS is a regional anaesthesia technique that targets the pectoral nerves. The Paravertebral block is also a regional anaesthesia technique that targets the spinal nerves as they exit the spinal cord. It is the widely used regional anaesthesia technique after thoracic epidural

anaesthesia for postoperative analgesia in thoracic and breast surgery.^[11]

Lately, the application of PECS has vividly increased since the first description of the technique by Blanco in 2011.^[8] There are many reports demonstrating the effectiveness of PECS and PV anaesthesia techniques for breast and thoracic cancer surgery. Some studies report that using PECS block minimises the need for opioid analgesics in the postoperative period compared to PV block. In contrast, some studies report the efficacy of PV block over PECS. Tripathy et al. reported the efficacy of both techniques for prolonged analgesia and preventing the need for opioid analgesics intra and post-operatively. The study concluded with a further detailed comparison between both techniques.^[12]

In another study by Ahmad et al., the PECS block was shown to work more efficiently and safely in relieving pain than PV in intraoperative and postoperative opioid use.^[13] Kulhari et al. reported that the time interval of analgesia was significantly prolonged among patients getting the Pecs II block compared with PV block. Moreover, morphine consumption and postoperative pain scores were lesser in the Pecs II block.^[14] Siddeshwara et al. documented a significant prolongation of analgesic duration in the PECS group than the PV block group.^[15] In contrast, Martsiniv et al. stated no statistically significant difference between the PECS and PV groups in intraoperative fentanyl consumption and pain intensity for the first 24h.¹⁶

Versyck et al. reviewed many articles and reported the efficacy of the Pecs II block technique improves the quality of analgesia significantly and lessens the

consumption of opioids after breast cancer surgery. They recommended using Pecs II block as a first-line option for regional analgesia in breast surgery.^[17] Blackshaw et al. documented similar complication rates and hospital stay duration post thoracic epidural analgesia and paravertebral blockade.^[18] Considering several available reports, it is evident that the literature has very limited information on the positive results of PECS for pain management in mastectomy surgeries compared to Paravertebral block.

Our study compared the Pectoral block (PECS) and Paravertebral block (PV) following Intraoperative & postoperative analgesia in an opioid-free General anaesthesia technique. No significant difference between both groups regarding complications, surgeons' satisfaction scores, and patients' satisfaction scores. Moreover, no difference was observed in intra or postoperative hemodynamic parameters & block-related complications such as pneumothorax or vessel puncture. The current study showed the effectiveness of both PECS and Pv blocks for intraoperative & postoperative analgesia in an opioid-free general anaesthesia technique.

CONCLUSION

We conclude that either PEC or PV block with dexmedetomidine may be used safely as an opioid-free anaesthetic technique for patients undergoing MRM with axillary dissection in the perioperative period. Immediate benefits of avoiding opioids are apparent; long-term benefits include improved quality of life, decreased incidence of chronic pain after surgery and possible increased cancer-free survival.

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