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# Post Operative Pain Management of Patients under-Going Modified Radical Mastectomy Using Thoracicpara Vertebral Block: Comparison of Ropivacainevs Ropivacaine with Dexmedetomidine

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**Abstract:** ***Background: Effective pain control after surgery is an important part of taking care of someone who had undergone surgery. Paravertebral block is an effective regional anesthetic technique that can provide significant analgesia for breast surgeries. Aim of the study is to compare the effectiveness of thoracic paravertebral block (TPVB) using Ropivacaine (0.5%) or Ropivacaine (0.5%) with Dexmedetomidine (1µg /kg) in patients undergoing modified radical mastectomy. Methods: Fifty American Society of Anaesthesiologists physical statusI/II patients posted for breast cancer surgery were randomly assigned into two groups of 25 each. Group R received thoracic PVB with 20 mL of Ropivacaine 0.5%. Group RD received thoracic PVB with 20 mL of Ropivacaine 0.5% + 1 µg/kg Dexmedetomidine. Time of first analgesics request, total analgesic consumption, VAS score, hemodynamic, sedation score and side effects in the first 24 hours were recorded. Results: VAS score was less in group R when compared to group RD. MOSAS score was similar in both the groups. Duration of analgesia and time of 1st analgesic requirement is more in group RD when compared to group R. Conclusion: The addition of dexmedetomidine 1 µg/kg to Ropivacaine 0.5% in PVB in patients undergoing breast cancer surgery improves the quality and the duration of analgesia postoperatively.***

**Keywords:** Thoracic para vertebral block, ropivacaine, dexmedetomidine, breast surgeries, VAS score, MOSAS score, analgesia, anesthesia, duration of analgesia, better, post operative pain control

## 1. Introduction

Nearly 40% of post operative breast surgerypatients experience significant acute post operative pain, with a pain score of 5 reflecting the inadequacy of conventional pain management. Paravertebral nerve block has the potential to offer long-lasting pain relief and few postoperative side effects when used for breast surgery[1]. Thoracic Paravertebral Block (PVB) is used for pain relief in mastectomy. Paravertebral block can provide profound, long lasting sensory de-afferentation. Additionally, Paravertebral block can provide superior post operative analgesia, reduced nausea and vomiting, shorter recovery time requires fewer analgesics, earlier mobilisation and earlier readiness for discharge[2]. Thoracic paravertebral block (TPVB) provides superior analgesia for breast cancer surgery when used in conjunction with general anesthesia (GA) and reduces the severity of chronic pain after mastectomy [4]. Although TPVB and GA are often combined [3], for some patients GA is either contraindicated or undesirable due to factors including frailty, comorbidities, anxiety and patient choice. TPVB alone has previously been compared with GA alone[3]. Para vertebral block provide a better postoperative pain control with little adverse effects compared with other treatment strategies[3]. Ropivacaine is a long acting amide local anaesthetic agent and has a great degree of motor sensory differentiation[4]. Dexmedetomidine is a highly selective alpha 2 adrenoceptor agonist and administration via epidural route providesananalgesic effect in post-operative pain without severe sedation[5]. Administration via intrathecal or epidural route provides analgesic effect in postoperative pain without severe sedation. This is due to the sparing of supraspinal central nervous system (CNS) sites from excessive drug exposure, resulting in analgesia without sedation[6].

**Primary aim:**

1) This study is designed to compare the effectiveness of thoracic paravertebral block (TPVB) using Ropivacaine or Ropivacaine with Dexmedetomidine in patients undergoing modified radical mastectomy.
2) Post-operative VAS scores.
3) Time of 1st analgesia.
4) Duration of analgesia

## 2. Methodology

The study was conducted at a GSL General hospital from Nov 2020 to Nov 2021. Sixty patients were studied after Institutional Ethical Committee approval and after giving written informed consent.

| Inclusion criteria | Exclusion criteria |
|---|---|
| Adult patients aged between 18-70 yrs | Bleeding disorders |
| ASA I and ASA II physical status | Allergy to amide type local anaesthetics |
| Diagnosed cases of breast cancer | Infection at thoracic paravertebral injection site |

The patient was examined prior to surgery and pre-op assessment was done. Routine pre-op investigations were ordered. On the day of surgery, in the operating room a 18G IV cannula secured and iv fluids started. Standard ASA monitors (ECG, NIBP, Spo2, and temperature) were attached. Thoracic PVB performed in sitting position.

The Paravertebral block was performed according to the technique EASON AND WYATT. Patients were placed in the lateral position with the side to be blocked to be above and the upper most Spinous processes of T2-T5 vertebrae were identified. Under strict aseptic precautions, skin was punctured approximately 2.5-3cm lateral from the midline and level with the cephalad end of the T5 spinous process under local anaesthesia.

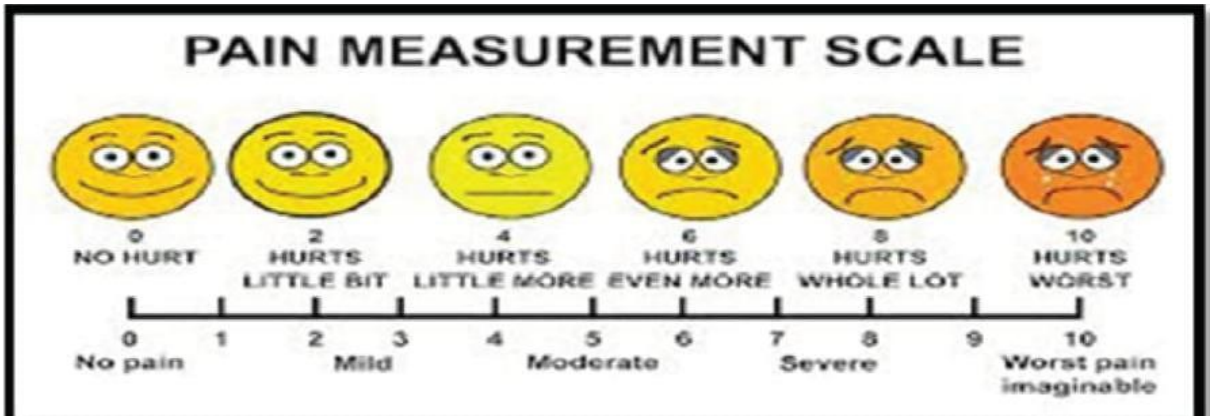
The Tuohy's needle was advanced 90 degrees to the skin in all plains to strike the transverse process at the depth of 3-3.5 cm. The needle was further walked off the surface of the transverse process and advanced 1-2cm further. Loss of resistance indicates the passage of the needle into the paravertebral space. Catheter is introduced. After negative aspiration, one-third of the calculated dose is given at this level, the catheter was withdrawn 1.5 cm and another one-third dose was given. Again the catheter was withdrawn 1.5cm and the remaining drug was given at this level and the catheter was removed.

Group R: Patients received 20ml of 0.5%Inj Ropivacaine through paravertebral space.

Group RD: Patients received 20ml of 0.5% Inj Ropivacaine with injection dexmedetomidine (1microgram/kg) The time for performance of block ranged 10 to 15 minutes. The success of the block was checked by decrease pin prick sensation at dermatomal level T1-T6).

The patients were placed in supine position and GA was induced by fentanyl 1.5 µg/kg, and Propofol 2-3 mg/kg. Endotracheal intubation was facilitated by Vecuronium 0.1mg/kg. Anesthesia was maintained with 02+ N20+ isoflurane 1 – 1.5 MAC and Vecuroniumboluses. At the end of the surgery patients were extubated after giving reversal agent and were transferred to the post-anesthesia care unit.

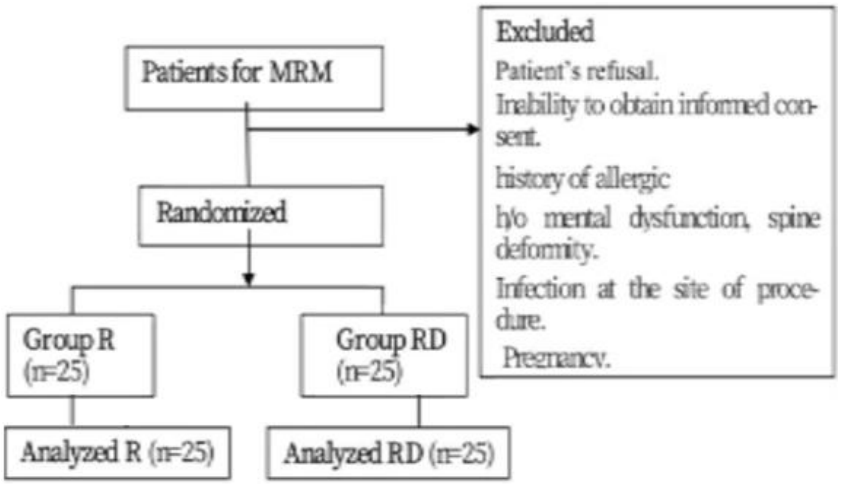
They were monitored for vital signs (heart rate, noninvasive blood pressure, respiratory rate, and spo2). VAS was assessed immediately postoperatively and at hours 2, 4, 6, 12, and 24 of the postoperative period.




The time of the first request for analgesia and the duration of analgesia.

Any postoperative complications of the block such as accidental pneumothorax and vascular puncture were recorded and treat

In both the groups we analysed the level of sedation using Modified Observers Assessment of Alertness / Sedation Scale and Pain using visual analogue scale at 0, 2, 4, 6, 12, 24 Hrs after the surgery.



**Statistical Analysis**

The power of the study was based on a calculated sample size of 25 patients which would have 80% power of detecting a difference at a 0.05 level of significance, using a confidence interval of 95%. Analysis was performed using SPSS version 17 (Chicago-USA). Data was presented as mean ± SD, numbers, and percentages.

## 3. Results

There were no significant differences among the 2 groups in demographic data as regard to age, weight, height, BMI, and duration of surgery (P > 0.05). There was a significant reduction in pulse rate starting at 30 minutes in both groups, but more evidenced in group RD. Intraoperative Systolic blood pressure showed a significant reduction at 30 minutes in both groups then returned to baseline level at 120 minutes in both groups.

Changes in intraoperative diastolic blood pressure were similar to pulse rate where a significant drop occurred at 30 minutes, but more evidenced in group RD, then became stable until 120 minutes in group L and increased but not to baseline in group. There was a significant increase in pulse rate starting 2 hours postoperative until 24 hours postoperatively in group R but only after 12 hours until 24 hours in group RD.

VAS measured showed significant reduction in both groups up to 6 hrs but VAS started to increase significantly after 6 hrs in R group compared to LD group. The time of the first rescue analgesic requirement was significantly prolonged in group RD in comparison to group R. MOSAS score is similar in both groups.

**Results**

Table Showing VAS Scores of Group R and RD

| VAS Score | Group R | Group RD | Total | P value |
|---|---|---|---|---|
| 0min | 1.16±0.37 | 1.08±0.28 | 1.12±0.33 | 0.394 |
| 30min | 1.08±0.28 | 1.04±0.20 | 1.06±0.24 | 0.561 |
| 1hr | 1.20±0.41 | 1.08±0.28 | 1.14±0.35 | 0.230 |
| 2hr | 1.20±0.41 | 1.04±0.20 | 1.12±0.33 | 0.085+ |
| 4hr | 1.52±0.51 | 1.16±0.37 | 1.34±0.48 | 0.006** |
| 6hr | 2.00±0.29 | 1.28±0.46 | 1.64±0.53 | <0.001** |
| 12hr | 2.96±0.93 | 1.56±0.51 | 2.26±1.03 | <0.001** |
| 24hr | 4.16±0.94 | 2.12±0.73 | 3.14±1.32 | <0.001** |

Table showing Mosas score in Group R and RD

| MOSAS | Group R | Group RD | Total | P value |
|---|---|---|---|---|
| 0min | 4.96±0.54 | 5.08±0.40 | 5.02±0.47 | 0.376 |
| 30min | 5.20±0.41 | 5.32±0.48 | 5.26±0.44 | 0.344 |
| 1hr | 5.28±0.46 | 5.16±0.37 | 5.22±0.42 | 0.316 |
| 2hr | 5.40±0.50 | 5.48±0.51 | 5.44±0.50 | 0.578 |
| 4hr | 5.92±0.28 | 5.96±0.20 | 5.94±0.24 | 0.561 |
| 6hr | 5.92±0.28 | 5.88±0.33 | 5.90±0.30 | 0.646 |
| 12hr | 5.96±0.20 | 5.92±0.28 | 5.94±0.24 | 0.561 |
| 24hr | 6.00±0.00 | 5.88±0.33 | 5.94±0.24 | 0.077+ |

**Results**

| | Group R | Group RD | Total | P Value |
|---|---|---|---|---|
| Duration of Analgesia | 762.80 ± 147.47 | 1339.20 ± 64.16 | 1051.00 ± 312.12 | <0.001** |
| Time of first analgesic requirement | 784.80 ± 144.83 | 1102.80 ± 338.30 | 1102.80 ± 338.30 | <0.001** |

p-Value is statistically significant with <0.05
Student Test (Two tailed, Independent)

Table showing mean values of duration of analgesia and time of first analgesic requirement

## 4. Discussion

Post operative pain delay ambulation prolongs hospital stay. Various methods of regional anesthesia for breast surgery are in practice. Thoracic epidurals are associated with cardiorespiratory and physiological changes, which required an increased level of monitoring when used for postoperative analgesia[7] Paravertebral block can achieve superior analgesia and inhibit the surgical stress response at greater extent than epidural anesthesia. PVB is indicated as a primary anaesthetic technique for simple chest wall surgeries, rib resection and for breast augmentation surgeries[8]As per our study design, we conclude that Ropivacaine with Dexmedetomedine used in thoracic paravertebral block along with general anaesthesia provided effective anaesthesia for modified radical mastectomy. It prolonged the duration, provides high quality of analgesia, and the incidence of nausea and vomiting was less. Time for first analgesic was prolonged in patients who received ropivacaine with dexmedetomidine when compared to patients who received Ropivacaine. The VAS scores and the total rescue analgesic requirement were less in ropivacaine with dexmedetomidine when compared to ropivacaine alone.

Hence Dexmedetomidine, used as an additive provides longer duration of analgesiapost-operatively with minimal cardiovascular and respiratory side effects. Kulkarni etal in their study showed Single needle continuous thoracic paravertebral block using ropivacaine 0.5% with Dexmeditomidine 0.5 mcg/kg as a sole anesthetic technique provided satisfactory surgical anaesthesia with minimal hemodynamic changes and adverse effects[9]. Zha J Etal in their study showed a small volume of TPVB with ropivacaine and DEX by single injection produced longer analgesia in patients undergoing video-assisted thoracoscopic lobectomy, reduced postoperative opioids consumption, and the incidence of side effects[10].

## 5. Conclusion

Addition of Dexmedetomidine 1µg/kg to Ropivacaine 0.5% in PVB in patients undergoing breast cancer surgery improves the quality and the duration of analgesia.

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