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Dexmedetomidine as an Adjuvant to Levobupivacaine in Paravertebral Block for Postoperative Analgesia after Breast Cancer Surgery

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Abstract: ***Introduction*: Currently regional technique-thoracic paravertebral block for postoperative analgesia after breast surgery is gaining popularity. Aim of the study is to find out the safety and the analgesic efficacy of 1 µg/kg dexmedetomidine when added to levobupivacaine 0.25% in paravertebral blocks (PVB) in patients undergoing breast cancer surgery. *Methods*: Sixty American Society of Anaesthesiologists physical statusI/II patients posted for breast cancer surgery were randomly assigned into two groups of 30 each. Group L received thoracic PVB with 20 mL of levobupivacaine 0.25%. Group LD received thoracic PVB with 20 mL of levobupivacaine 0.25% + 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*: The time of the first rescue analgesic requirement was significantly prolonged in the group LD (8.15 ± 2.21 hours) in comparison to group L (6.34 ± 2.83 hours). The mean total consumption of intravenous tramadol as rescue analgesia in the post-anaesthesia care unit in the first 24 hours postoperatively was significantly decreased in group Levobupivacaine + Dexmeditomidine compared to group Levobupivacaine. *Conclusion*: The addition of dexmedetomidine 1 µg/kg to levobupivacaine 0.25% in PVB in patients undergoing breast cancer surgery improves the quality and the duration of analgesia postoperatively.***

Keywords: Dexmedetomidine, Levobupivacaine, Paravertebral Block, Postoperative Analgesia, Breast Cancer

1. Introduction

Breast cancer is the most common cancer in women that requires surgery. General anaesthesia is mostly used for modified radical mastectomy. Limitations are in the form of poor postoperative pain control.IV narcotic used commonly during the early postoperative period, which increases the incidence of nausea, vomiting and sedation[1].Multi-modal approach to postoperative pain control with Regional anaesthesia using paravertebral block has been suggested as an ideal adjunct to GA for MRM-better reduction in post op pain, improved quality of operative recovery.Most importantly, by reducing postoperative pain, nausea and vomiting, paravertebral block markedly improves the quality of operative recovery for patients[2].The addition of adjunctive analgesics, such as fentanyl and clonidine, to local anesthetics has been shown to enhance the quality and duration of sensory neural blockade, and decrease the dose of local anesthetic and supplemental analgesia[3].Dexmedetomidine is a highly selective α2-agonist produces a dose dependent sedation, anxiolysis, and analgesia without respiratory depression[4]. 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[5].The aim of this study was to investigate the safety and the analgesic efficacy by adding 1 µg/kg dexmedetomidine to levobupivacaine 0.25% in thoracic PVB in patients undergoing breast cancer surgery.

Primary aim

1) To assess efficacy of dexmedetomidine as adjuvant to Levobupivacaine for postoperative pain management by paravertebral block.
2) Postoperative VAS score
3) Time to 1st rescue analgesia
4) Total rescue analgesia consumption

2. Methods

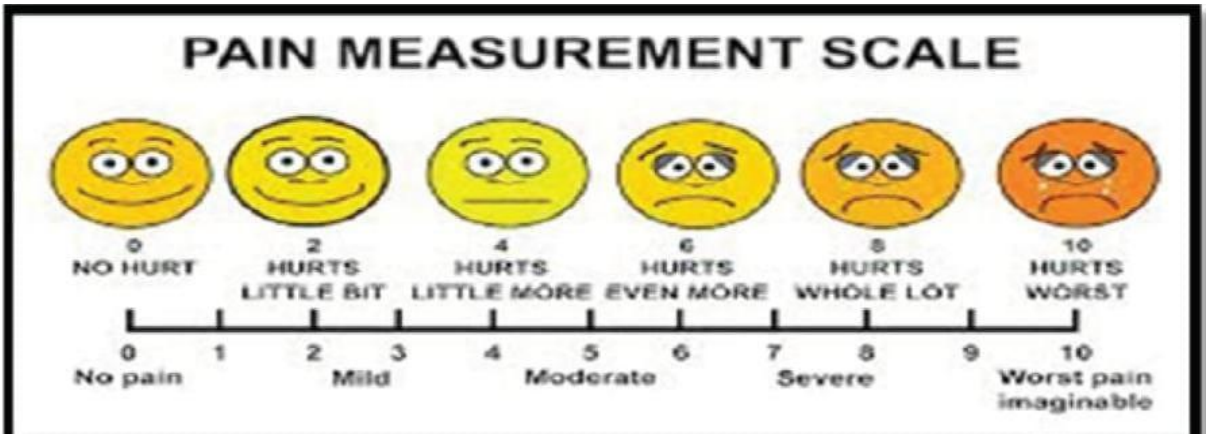
The study was conducted at a GSL General hospital from Sept 2020 to Sept 2021. Sixty patients were studied after Institutional Ethical Committee approval and after giving written informed consent.

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. Thoracic PVB were then performed as described by Moore

and Katz[6].The superior aspect of the spinous processes of T1-T6 were marked. The skin entry points are 3 cm lateral to the marks. A 23- gauge quincke spinal needle attached through extension tubing to drug syringe. The needle was inserted perpendicular to the skin for a distance of 2 to 4 cm until the transverse process was contacted. The needle was withdrawn and walked cephalad off the transverse process and advanced for a further 1.5 to 2 cm. Patients were allocated into 2 groups of 30 patients each using a computer-generated random number assignment in sealed envelopes. The patients and all staff involved in patient management and data collection were unaware of the group assignment.

In group L, the patients received 20 mL of levobupivacaine 0.25% paravertebrally, divided into 3-4 mL in each level. In group LD, the patients received 20 mL of levobupivacaine 0.25% + 1 µg/kg dexmedetomidine paravertebrally divided into 3-4 mL in each level. 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 vecuronium boluses .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.



Intravenous tramadol 100 mg was given when the VAS was ≥ 5. The time of the first request for analgesia and the total analgesic consumption in the first 24 hours were recorded. Any postoperative complications of the block such as accidental pneumothorax and vascular puncture were recorded and treated.

3. Statistical Analysis

The power of the study was based on a calculated sample size of 30 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.

4. 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 LD. 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 LD, 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 L but only after 12 hours until 24 hours in group LD. VAS measured showed significant reduction in both groups up to 6 hrs but VAS started to increase significantly after 6 hrs in L group compared to LD group. The time of the first rescue analgesic requirement was significantly prolonged in group LD in comparison to group L. The mean total consumption of intravenous tramadol as rescue analgesia in the post-anesthesia care unit in the first 24 hours postoperatively was significantly lower in group LD in comparison to group L.

variable	Group L	Group LD	P Value
Tramadol (mg)	146.67+/-50.74	120+/-40.68	0.0285
Time to first analgesic	6.34+/-2.83	8.15+/-2.21	0.0079

5. 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].In this study, we demonstrated that patients who received PVB with 0.25% levobupivacaine and 1 µg/kg

dexmedetomidine in addition to general anesthesia had intraop stable vitals, superior postoperative analgesia, prolongation of the time of first rescue analgesic requirement, and decreased total intravenous tramadol consumption as compared with PVB with 0.25% levobupivacaine alone. Burlacu et al[9], noted that paravertebral fentanyl and clonidine in combination with diluted levobupivacaine (0.05%) are effective analgesics as demonstrated by a significant decrease in supplemental postoperative morphine consumption. A study by Buhuvaneswari et al[10], demonstrated that the rescue analgesic consumption as well as cumulative pain scores at rest and on movement were significantly lower in 0.25% bupivacaine + epinephrine with fentanyl and 0.5% bupivacaine groups.

6. Conclusion

Addition of dexmedetomidine 1µg/kg to levobupivacaine 0.25% in PVB in patients undergoing breast cancer surgery improves the quality and the duration of analgesia.

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