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ORIGINAL RESEARCH

A comparative analysis of thoracic epidural block and paravertebral block in patients undergoing breast surgery

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ABSTRACT
Background: Breast surgery is typically carried out under general anesthesia and is linked to significant post-operative nausea, vomiting, and pain (PONV), as well as immunological, psychological, and physical distress.The present study compared thoracic epidural block and paravertebral block in patients of breast surgery. **Materials & Methods:** 56 females undergoing unilateral breast surgerywere divided into 2 groups of 28 each. Group I patients received thoracic epidural single shot at T4 level using 2ml/segment of 0.5% ropivacaine and group II patients received thoracic single shot paravertebral block at T2 level using 0.3 ml/kg of 0.5% ropivacaine. Parameters such as mean blood pressure, respiratory rate, Ramsey sedation score, performance time, induction time, duration of surgery, total propofol required, total fentanyl required etc. was recorded. **Results:** Total propofol required (mg) was 124.6 and 142.5, total fentanyl required (µg) was 121.2 and 124.8, total fluid (RL) required (l) was 1.91 and 1.51, time to rescue analgesic (min) was 304.4 and 302.2, patient satisfaction score was 88.5 and 86.2, duration of surgery (min) was 71.2 and 70.0, performance time (min) was 7.24 and 6.22, systolic blood pressure (mm Hg) was 112.6 and 124.4, respiratory rate (breadth/min) was 22.1 and 18.3, Ramsey sedation score was 1.71 and 1.69, induction time (min) was 15.7 and 16.4 in group I and II respectively ($P< 0.05$). Side effects were nausea/ vomiting in 6 in group I and 2 in group II. Hypotension requiring vasopressors was seen in 4 in group I and 1 in group II. The difference was significant ($P< 0.05$). **Conclusion:** Both epidural and paravertebral blocks offer the best analgesic and surgical conditions, as well as high patient satisfaction.
Key words: Breast surgery, Epidural anaesthesia, paravertebral anaesthesia

INTRODUCTION

Breast surgery is typically carried out under general anesthesia and is linked to significant post-operative nausea, vomiting, and pain (PONV), as well as immunological, psychological, and physical distress.[1]Thoracic paravertebral block (PVB) and thoracic epidural appear promising due to reduction in post-operative pain, decreased opioid consumption with reduction in PONV, drowsiness, risk of respiratory depression, and cost savings.[2] Hence, there is a search for optimal regional techniques for breast surgeries that would minimize narcotic requirements of the various local and regional anesthetic techniques evaluated in the past to reduce post-operative pain after breast surgery.[3]When administering local anesthetics into the paravertebral space, whether percutaneously (blindly or ultrasound guided) or under direct vision intraoperatively, clinicians should be aware that a paravertebral block (PVB) frequently becomes an epidural block, unilateral or bilateral, and may in certain cases also result in total spinal anesthesia. This is because the paravertebral space and the epidural space communicate freely through the intervertebral foramina.[4]

Nowadays, PVB is promoted as the best technique for managing pain following thoracic surgery. In epidural blocking, the durameter is encircled anteriorly, laterally, and posteriorly by the spinal epidural space, which stretches from the foramen magnum to the sacral hiatus.[5] Depending on the body habitus, the

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depth changes. While motor blockage offers muscle relaxation along with variable degrees of sympathetic blockade, sensory blockade prevents the perception of pain.[6]The present study compared thoracic epidural block and paravertebral block in patients of breast surgery.

MATERIALS & METHODS

This study was conducted on 56 females undergoing unilateral breast surgery. All gave their written consent to participate in the study.

Data such as name, age etc. was recorded. All were divided into 2 groups of 28 each. Group I patients received thoracic epidural single shot at T4 level using 2ml/segment of 0.5% ropivacaine and group II patients received thoracic single shot paravertebral block at T2 level using 0.3 ml/kg of 0.5% ropivacaine. Parameters such as mean blood pressure, respiratory rate, Ramsey sedation score, performance time, induction time, duration of surgery, total propofol required, total fentanyl required etc. was recorded. Results were subjected to statistical analysis. P value less than 0.05 was considered significant.

RESULTS

Table I Comparison of parameters

Parameters	Group I	Group II	P value
Total propofol required (mg)	124.6	142.5	0.72
Total fentanyl required (µg)	121.2	124.8	0.12
Total fluid (RL) required (l)	1.91	1.51	0.05
Time to rescue analgesic (min)	304.4	302.2	0.18
Patient satisfaction score	88.5	86.2	0.91
Duration of surgery (min)	71.2	70.0	0.16
Performance time (min)	7.24	6.22	0.08
Systolic blood pressure (mm Hg)	112.6	124.4	0.35
Respiratory rate (breadth/min)	22.1	18.3	0.14
Ramsey sedation score	1.71	1.69	0.81
Induction time (min)	15.7	16.4	0.74

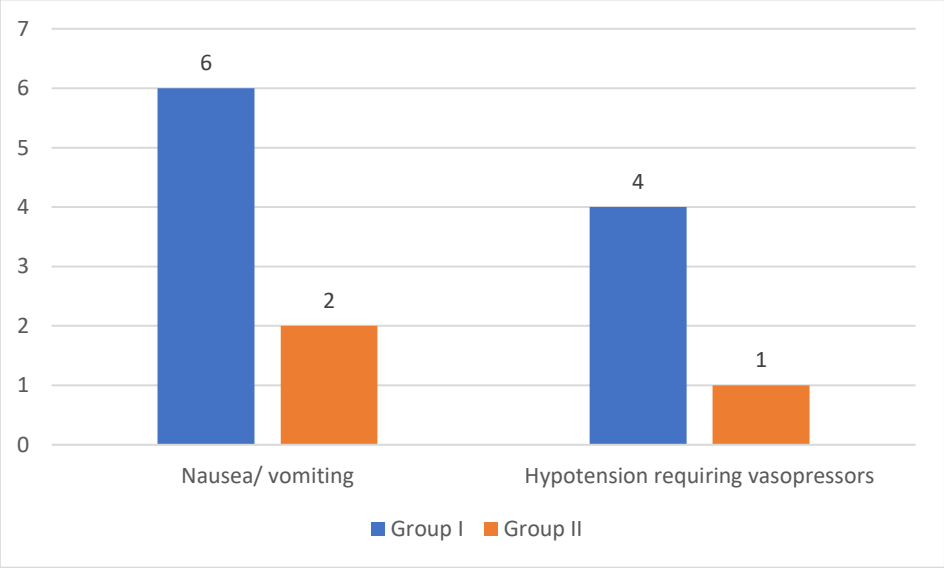
Table I shows that total propofol required (mg) was 124.6 and 142.5, total fentanyl required (µg) was 121.2 and 124.8, total fluid (RL) required (l) was 1.91 and 1.51, time to rescue analgesic (min)was 304.4 and 302.2, patient satisfaction score was 88.5 and 86.2, duration of surgery (min) was 71.2 and 70.0, performance time (min) was 7.24 and 6.22, systolic blood pressure (mm Hg) was 112.6 and 124.4, respiratory rate (breadth/min) was 22.1 and 18.3, Ramsey sedation score was 1.71 and 1.69, induction time (min) was 15.7 and 16.4 in group I and II respectively (P< 0.05).

Table II Assessment of side effects

Side effects	Group I	Group II	P value
Nausea/ vomiting	6	2	0.05
Hypotension requiring vasopressors	4	1	0.03

Table II, graph II shows that side effects were nausea/ vomiting in 6 in group I and 2 in group II. Hypotension requiring vasopressors was seen in 4 in group I and 1 in group II. The difference was significant (P< 0.05).

Graph II Assessment of side effects



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DISCUSSION

Following thoracic surgery, patients may experience significant pain due to thoracic movement, intercostal nerve injury, or thoracic catheter-induced pleura stimulation. As a result, up to 50% of patients may develop persistent pain following thoracotomy.[7] Relevant recommendations propose TEA as the gold standard for analgesia following thoracotomy. With better patient outcomes and less discomfort than thoracotomy, video-assisted thoracoscopic surgery (VATS) has taken over as the primary surgical technique. Postoperative discomfort is still a problem, though.[8] In addition to raising the risk of cardiac ischemia and arrhythmia, pain also raises the incidence of hypoxemia and hypercapnia. As a result, decreasing postoperative pain also lessens the need for bed rest and pulmonary issues. After thoracotomy, TEA is the initial option for analgesia. Because of serious side effects such epidural hematoma and the possibility of severe spinal cord damage, TEA is not recommended in all situations.[9,10]The present study compared thoracic epidural block and paravertebral block in patients of breast surgery.

We found that total propofol required (mg) was 124.6 and 142.5, total fentanyl required (µg) was 121.2 and 124.8, total fluid (RL) required (l) was 1.91 and 1.51, time to rescue analgesic (min) was 304.4 and 302.2, patient satisfaction score was 88.5 and 86.2, duration of surgery (min) was 71.2 and 70.0, performance time (min) was 7.24 and 6.22, systolic blood pressure (mm Hg) was 112.6 and 124.4, respiratory rate (breadth/min) was 22.1 and 18.3, Ramsey sedation score was 1.71 and 1.69, induction time (min) was 15.7 and 16.4 in group I and II respectively ($P< 0.05$). The analgesic effects of TEA versus TPVB following thoracoscopic surgery were analyzed by Kitowski et al.[11] This study comprised 458 patients in total from five RCTs. Following thoracoscopic surgery, at 1–2 hours and 4-6 hours following surgery, the TPVB group's numerical rating scale (NRS) score for resting pain was higher than that of the TEA group (MD = 0.44, 95% CI = 0.24 to 0.64, $P < 0.0001$, I2 = 0%; MD = 0.47, 95% CI = 0.23 to 0.70, $P < 0.0001$, I2 = 0%). The TPVB group used more morphine throughout the postoperative 24-hour period than the TEA group (SMD = 0.67; 95% CI = 0.03 to 1.31; P = 0.04; I2 = 84%). TPVB group participants experienced a significantly reduced incidence of hypotension than TEA group participants (OR = 4.52; 95% CI = 2.03 to 10.10; P = 0.0002; I2 = 0%). There was no discernible variation between the groups when it came to postoperative nausea and vomiting (PONV).

We observed that side effects were nausea/ vomiting in 6 in group I and 2 in group II. Hypotension requiring vasopressors was seen in 4 in group I and 1 in group II.In a double-blind, prospective, randomized research, Soni et al[12] compared thoracic PVB with epidural block in sixty women who were scheduled for unilateral breast surgery. Each of the two groups of thirty patients—Group P for thoracic paravertebral treatment and Group E for thoracic epidural treatment—received 15 milliliters of 0.5% ropivacaine, either in the thoracic paravertebral or thoracic epidural regions. The mean arterial pressure of the epidural patients decreased, resulting in a significant p-value at 10, 20, 30, 40, 50 minutes, 1 hour, and 1 hour post-op. Fluid boluses were administered promptly to treat the fall, and if the patient did not improve, 6 mg of mephentermine was given as a vasopressor. Both groups experienced comparable analgesic profiles from the two regional techniques. Patients in Group E (20%) reported vomiting and nausea, which was higher than in Group P (7%).[13-16]

CONCLUSION

Authors found that both epidural and paravertebral blocks offer the best analgesic and surgical conditions, as well as high patient satisfaction.

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