Original Article

A comparison of the analgesic efficacy and complications of combined general anaesthesia with paravertebral block versus general anaesthesia alone in breast surgery

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Abstract

Background: General anaesthesia is currently the standard technique used for surgical treatment of breast cancer. However, it has its limitations in the form of poor postoperative pain control and subsequent post-operative nausea and vomiting and other complications. Regional anaesthesia using paravertebral block has been suggested as an ideal adjunct to general anaesthesia for better analgesic effects and less complications. This study was undertaken to compare analgesic efficacy and complications of combined general anaesthesia with paravertebral block versus general anaesthesia alone in breast surgery. **Material and Methods:** A total of 60 patients for elective breast surgery were grouped as Group A (General anaesthesia with paravertebral block) and Group B (General anaesthesia alone) and compared for analgesic efficacy and complications. **Results:** Group A patient maintained stable hemodynamics as compared to group B. Duration of postoperative analgesia in group A was 17.63 ± 2.34 versus 5.47 ± 1.63 in group B. None of the patients required postoperative analgesic and no complications observed in Group A. **Conclusion:** Para vertebral block when used with general anaesthesia induces excellent anaesthesia and results in greater haemodynamic stability intraoperatively as well as greater postoperative pain relief and lower incidence of PONV and other complications.
Keywords: General anaesthesia, paravertebral block, postoperative analgesia, breast surgery.

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INTRODUCTION

General anaesthesia is routinely used technique for surgical treatment of breast cancer. It is associated with considerable post-operative pain, nausea and vomiting (PONV)[1]. In addition, the side-effects and complications of general anaesthesia preclude ambulatory surgery for most patients undergoing breast surgery. Various local and regional anaesthetic techniques have been evaluated to reduce post-operative side effects and cost. Of these techniques, thoracic paravertebral block (PVB) appears promising due to reduction in post-operative pain, decreased opioid consumption with reduction in PONV, drowsiness, risk of respiratory depression and cost saving[2,3]. It has additional advantages including decrease in the incidence of chronic post-surgical pain and improvement in subcutaneous oxygenation in the wound site thus possibly reducing infection risk and improving wound healing[4]. These techniques have been used as an alternative or as an adjuvant to general anaesthesia. Simple infiltration methods provide adequate anaesthesia for minor procedures but patient discomfort, frequent supplementation and distortion of anatomy may preclude their use for major procedures. Thoracic epidural block is the preferred choice for regional anaesthesia with GA for the breast surgeries but difficulty in technique and chances of hypotension like complications are more[5]. So,

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regional anaesthesia using thoracic paravertebral block has emerged as a suitable alternative to epidural as it offers good surgical anaesthesia along with prolonged post-operative analgesia. Therefore, we undertook a prospective trial to study the analgesic efficacy and complications of combined general anaesthesia with paravertebral block versus general anaesthesia alone in breast surgery.

MATERIAL AND METHODS

This prospective study included 60 patients belonging to ASA I, II and III physical status scheduled for elective breast surgeries which included modified radical mastectomy, simple mastectomy with axillary dissection, simple mastectomy without axillary dissection, lumpectomy. Patients with local infection, anatomic deformities of the spine, coagulation disorders, allergy to local anaesthetics, patient refusal, severe respiratory or cardiac disorders, pre-existing neurological deficits, liver or renal insufficiency, pregnancy or breast feeding and breast reconstruction surgery were excluded. Approval from the Hospital Research Ethics Committee and written informed consent were obtained. During the pre-anaesthetic assessment, patients were instructed on the use of the Visual Analogue Scale (VAS 0-10: 0 being no pain, 10 being worst pain imaginable educated about reporting pain on the 11-point verbal rating scale (VRS)[6]. Patients were randomly grouped between two equal groups as Group A with patients receivingcombined paravertebral blockwith general anaesthesia (GA+PVB) and Group B with patients receiving general anaesthesia alone (GA group). On arrival to the operating room, monitoring lines were established for non-invasive blood pressure measurements, continuous electrocardiography and pulse oximetry. On the day of surgery, after the arrival of the patient, paravertebral block wasperformed with patients of Group A in a sitting position. Tuohy's epidural needle was inserted perpendicular to the skin to contact transverse process at 2-4 cm depth. Syringe prefilled with air was connected to the Tuohy's epidural needle. Then the needle was manipulated to walk off the superior or inferior aspect of the transverse process, until loss of resistance to air could be elicited. Insertion was limited to less than 2 cm past the transverse process. Syringe was detached from the needle and epidural catheter was threaded in and epidural needle was withdrawn over the catheter carefully. Catheter port was attached and catheter was fixed to skin using adhesive tapes. After careful aspiration, test dose of 3cc 2% lignocaine was given and then 0.4ml/kg of 0.5% bupivacaine was injected. Patient was then made to lie down supine. Onset of sensory anaesthesia occurred 10 - 15 minutes after the injection. After confirming sensory anaesthesia following PVB, GA was induced. Patient was induced with propofol 2 mg/kg IV. succinylcholine 1.5 mg/kg IV was given to facilitate tracheal intubation. After intubation patient was maintained with isoflurane 0.2-1.5% with 60 % nitrous oxide in oxygen. Neuromuscular blockade was achieved using vecuronium 0.08 mg/kg IV. All patients in group B were provided with intraoperative analgesia with tramadol. Heart rate, non-invasive blood pressure, arterial oxygen saturation and three lead ECG were monitored.The residual neuromuscular blockade was antagonised with IV neostigmine 50 µg/kg and glycopyrolate 8 µg/kg. After surgery, patients were observed in the postoperative room for two hours and then shifted to their respective wards.In both the groups, rescue analgesia was given with tramadol (2mg/kg) to patients with VAS scores of four or more.

RESULTS

Both the groups were similar with respect to demographic characteristics of age, weight, ASA grading (Table 1). No significant difference seen with respect to baseline pulse rate,systolic and diastolic BP, mean arterial pressure and type of surgeries. It was observed that in group A around 63% of the patient maintained stable haemodynamics at 0.2-0.4% isoflurane as compared to group B, where in order maintain a stable haemodynamics 1.2-1.5% isoflurane was required in around 60% of the patients. VAS scores were recorded in the postoperative period at an interval of 3 hours for a period of 24 hours. Patients reporting a VAS score of four or more were provided rescue analgesia with Injection tramadol (2.0 mg/kg body weight). VAS scores of Group A was found to be significantly lower than group B at all time intervals and it is statistically significant ($p < 0.0001$) (Table 1).

Table 1: Post-operative VAS

VAS	Group A (Mean ± SD)	Group B (Mean ± SD)	P value
3 hour	0.23 ± 0.63	3.80 ± 1.73	<0.0001
6 hour	0.60 ± 0.89	3.03 ± 1.67	<0.0001
9 hour	0.57 ± 0.90	4.00 ± 1.44	<0.0001
12 hour	0.53 ± 0.90	2.97 ± 2.01	<0.0001
15 hour	0.33 ± 0.76	2.13 ± 2.15	<0.0001
18 hour	0	1.70 ± 1.74	<0.0001
21 hour	0	1.40 ± 1.57	<0.0001
24 hour	0.07 ± 0.37	0.97 ± 1.16	<0.0001

In present study duration of postoperative analgesia in group A was 17.63 ± 2.34 versus 5.47 ± 1.63 in group B ($p < 0.001$). None of the patients required postoperative analgesic in the form of tramadol in group A whereas 28 patients in group B required post-operative analgesia.PONV was reported in 3 patients in the group receiving paravertebral block and general anaesthesia as compared to 13 patients in the group receiving general anaesthesia alone. Patients were monitored in the

intraoperative and postoperative period for 24 hours and observed for complications such as failure of paravertebral block, pneumothorax, hypotension, dural puncture related complications, transient Horner's syndrome, ipsilateral arm sensory changes, pulmonary haemorrhage, hematomaand local anaesthetic toxicity. However, no postoperative complications were noted due to the paravertebral block.

DISCUSSION

This study was undertaken to assess the efficacy of paravertebral block use in conjunction with general anaesthesia for intraoperative haemodynamic parameters as well as postoperative pain relief in comparison to general anaesthesia alone. Postoperative control of nausea and vomiting along with complications of the procedure were also assessed. As both the groups were comparable in all demographic data and baseline parameters except the technique of anaesthesia and analgesia it can be presumed that any difference in the two groups with regards to the efficacy and postoperative complications was basically a result of the anaesthetic technique adopted for each group. It was observed that in group A around 63% of the patient maintained stable hemodynamics at 0.2-0.4% isoflurane as compared to group B (1.2-1.5% isoflurane). Due to increased haemodynamic stability observed in group A chances of blood loss were reduced and clear operative field was obtained. Patel *et al*[7] also observed better hemodynamic stability with paravertebral block. Group A experienced significantly better post-operative analgesia as compared with Group B (VAS score at all time interval was lower in group A than B). Rescue analgesic with tramadol was required only in Group B. Earlier investigators have also observed a similar efficacy of PVB for breast carcinoma surgery[3,5,8]. PONV was also reported in more patients (13 Vs 3) receiving general anaesthesia alone.Kairaluoma *et al*[3] and Coveney *et al*[9] also observed that patients receiving PVB had comparatively lesser incidence of PONV. No complications were observed in patients receiving paravertebral block. Earlier studies also reported very few or nil complications[8,10,11]. To conclude, para vertebral block when used with general anaesthesia induces excellent anaesthesia and results in greater haemodynamic stability intraoperatively as well as greater postoperative pain relief and lower incidence of PONV and other complications.

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