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Research Article

Thoracic paravertebral block versus pectoral nerve block for analgesia after breast surgery



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KEYWORDS

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Abstract *Background:* Pectoral nerve block (Pecs) is a novel interfascial plane block which can provide analgesia after breast surgery while paravertebral block (PVB) is widely used for this purpose. We evaluated the difference between the two techniques in regard to morphine consumption and analgesic efficacy after modified radical mastectomy (MRM).

Methods: Sixty patients undergoing elective MRM were randomly allocated into either PVB with 15–20 ml of levobupivacaine 0.25% at the level of fourth thoracic vertebra or Pecs block with 10 ml of levobupivacaine 0.25% injected inbetween pectoralis major and pectoralis minor muscle and another 20 ml levobupivacaine 0.25% inbetween pectoralis minor and serratus anterior muscle. Primary outcome measure was morphine consumption in the first 24 h while secondary outcome measures included pain scores, intraoperative fentanyl consumption as well as postoperative nausea and vomiting (PONV).

Results: Postoperative morphine consumed at 24 h was significantly lower in Pecs group [21 (20–25) mg] than in PVB group [28 (22–31) mg], ($p = 0.002$). Time for first request of morphine was longer in Pecs group [175 (155–220) min] than in PVB group [137.5 (115–165) min], ($p < 0.001$). Numerical rating score (NRS) at rest was lower in Pecs group compared with PVB group at 1 h, 6 h and 12 h ($p < 0.001$) but at 18 h and 24 h it was lower in PVB group compared with Pecs group ($p = 0.008$ and < 0.001 respectively). During movement, NRS was significantly lower at 1st hour in Pecs group ($p < 0.001$) while at 18 h and 24 h it was significantly lower in PVB group ($p < 0.001$). PONV was comparable between both groups.

Conclusion: Pecs block reduced postoperative morphine consumption in the first 24 and pain scores in the first 12 h in comparison with PVB after mastectomy.

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1. Introduction

Appropriateness of postoperative analgesic technique after breast surgery is always questionable; especially many breast surgeries are performed on the basis of day case setting. Although thoracic epidural analgesia is the gold standard technique after breast surgery [1], paravertebral block (PVB) has become a potential alternative approach [2–6]. However, both techniques may be associated with serious complications such as pneumothorax, total spinal anesthesia and inadvertent intravascular injection.

On the other hand, attributed to the recent application of ultrasound (US) in anesthetic practice, several interfascial plane blocks have been described recently. Pectoral nerve block (Pecs) is a novel interfascial plane block [7] which can provide analgesia after breast surgery. A recent study compared PVB versus combination of PVB with Pecs block in reconstructive breast surgery [8]. We hypothesized that the analgesic efficacy of Pecs block performed under US would provide a better analgesia with fewer complications in comparison with PVB. Therefore, the aim of this study is to compare postoperative morphine consumption as well as analgesic efficacy of both techniques in the first 24 h after MRM.

2. Methods

After the approval of our scientific and research ethic committee (Ain-Shams University hospital), written informed consent was taken from 60 ASA physical status I–II patients (ages 36–63) scheduled for elective MRM between September 2012 and May 2013. Patients were excluded if they had a history of sensitivity to local anesthetic, bleeding disorders or receiving anticoagulant, body mass index (BMI) ≥ 35 kg/m², spine or chest wall deformity or pregnancy. During preoperative visit; demographic data were recorded and numerical rating score (NRS; 0–10, 0 = no pain, 10 = worst pain) was explained to patients. Before surgery patients were randomly allocated according to the computer generated sequence into two equal groups. Group I (PVB = 30 patients) received a single ipsilateral PVB while the group II (Pecs = 30 patients) received US guided Pecs block preoperatively. PVB was performed with one of the investigators with the patient in sitting position at the level of 4th thoracic vertebra under complete aseptic precaution with low resistant technique with saline using an 18-G tuohy needle (Perifix, B Braun, Melsungen AG, Germany) according to Eason and Waytt' technique [9], seeking contact with the transverse process of the 4th thoracic vertebra then sliding the needle caudally for 1–1.5 cm into the paravertebral space and 15–20 ml of levobupivacaine 0.25% was injected. Pecs block was performed by another investigator while the patient in supine position with placing the ipsilateral upper limb in abduction position with a 50 mm needle (Stimuplex D, B Braun, Melsungen AG, Germany) using a linear US probe of high frequency (6–13 MHz, Sonosite, Bothell, WA, USA) after sheathing. The US probe was first placed at infraclavicular region after skin sterilization and moved laterally to locate the axillary artery and vein directly above 1st rib where pectoralis major and pectoralis minor muscles are identified at this US window. After infiltration of the skin at puncture site with 3 ml of xylocaine 2%, the needle was inserted in plane with US probe to the fascial plane between pectoralis muscles

and 10 ml of levobupivacaine 0.25% was injected. Then, the US probe was moved toward axilla till serratus anterior muscle was identified above 2nd, 3rd and 4th ribs then the needle was reinserted into the fascial plane between pectoralis minor muscle and serratus anterior muscle and 20 ml of bupivacaine 0.25% was injected in increments of 5 ml after aspiration (Fig. 1). The sensory level was tested with pin prick and ice pack before induction of general anesthesia.

All patients received midazolam 1–2 mg before the induction of anesthesia and monitored with three leads electrocardiography, pulse oximetry, noninvasive blood pressure and capnography. General anesthesia was induced with fentanyl 1 μ g/kg, propofol 1.5–2 mg/kg and tracheal tube was facilitated with atracurium 0.5 mg/kg. Anesthesia was maintained with isoflurane 1.5% and O₂/air mixture with a fraction of 40% inspired O₂. Fentanyl 25 μ g in bolus doses was given intravenously if the mean blood pressure (MBP) or heart rate exceeded 20% of the preoperative value. Hypotension was defined as a decrease of more than 20% of the base line MBP and was treated with increments of 6 mg bolus doses of ephedrine iv and 250 ml of lactated ringer solution.

After recovery from anesthesia, patients were shifted to post-anesthetic care unit (PACU) for the first 2 h. Postoperative analgesia was provided with morphine. The PCA pump (Graseby 3300, Graseby Medical Ltd., Watford, UK), was programmed to deliver 1 mg morphine bolus per press with a lockout interval of 15 min and morphine consumption in the first 24 h was recorded. Pain intensity was measured using NRS (1–10) at rest and during abduction of the ipsilateral upper limb at 1, 6, 12, 18, and 24 h.

Nausea lasting more than 10 min or vomiting was treated with ondansetron 4 mg. Patient' satisfaction for postoperative analgesia was recorded according to a satisfaction score (poor = 0, fair = 1, good = 2, excellent = 3). All data were recorded with residents of anesthesia not sharing in the study. Complications related to local anesthetic drug and PVB technique like pneumothorax or epidural spread of local anesthetic as evidenced by test for sensory deficit on contralateral side were also recorded. Chest X-ray was requested for any patient in PVB group if had any difficulty of breath, desaturated or had diminished air entry at any time after the block. Primary outcome was morphine consumption in the first 24 h. Secondary outcome measures were pain intensity at rest and during movement, intraoperative fentanyl consumption, postoperative nausea and vomiting (PONV) and patient' satisfaction.

3. Statistical analysis

The required sample size was calculated using the IBM® SPSS® SamplePower® version 3.0.1 (IBM® Corp., Armonk, NY, USA). The primary outcome measure was the difference between the two study groups as regards the postoperative morphine consumption. A previous study [10] reported that the mean (SD) 24-h morphine consumption associated with PVB was 42.6 (11) mg. Thus, it was estimated that a sample size of 30 patients in each study group would achieve a power of 88% to detect a reduction of 20% in the mean morphine consumption associated by pectoral nerve block using a two-sided *t* test at a significance level of 0.05.

Statistical analysis was done on a personal computer using IBM® SPSS® Statistics (IBM® Corp., Armonk, NY) version

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