



Original article

Efficacy of paravertebral block analgesia for post-thoracotomy pain control

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Abstract

Background: Paravertebral block (PVB) is an effective analgesic technique for post-thoracotomy pain, whereas there is no clear proof on how it can be more effective. We aimed to assess if the pleural integrity has a significant effect on thoracic PVB analgesia. **Methods:** Data of patients who underwent thoracotomy and paravertebral catheterization in Menoufia University Hospitals, between November 2010 and December 2014 were retrospectively collected. Patients were classified into two groups; group A, where the parietal pleura was disrupted, and group B, where there was no pleural tear. Pain scores and pulmonary functions were compared between both groups. Also the frequency of PVB analgesia and the need for supplementary drugs taken as well as the use of rescue pain medications were assessed in both groups.

Results: 132 patients were analyzed; group A (n = 68) patients with pleural disruption and group B (n = 64) patients with intact pleural. There was no statistical significant difference regarding age, sex, body mass index, American Society of Anesthesiologists score (ASA), diagnosis, and operative details. Pain scores were significantly lower in group B, where no pleural tear. Pulmonary functions significantly improved among intact pleura group. Significant increases in the frequency of PVB analgesia, supplementary drugs taken in postoperative period and in the use of rescue drugs were observed in patients with pleural disruption. Complications were higher in pleural disruption group.

Conclusion: Preservation of integrity of the parietal pleura is essential for the quality thoracic PVB.

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Keywords: Thoracic general subjects; Paravertebral block; Pleural disruption; Post-thoracotomy pain

1. Introduction

Post-thoracotomy pain remains a challenging clinical problem that may be associated with increased morbidity and mortality. Previous studies have found that ineffective pain control may lead to serious pulmonary complications because of insufficient clearance of secretions, mucous plugging, and atelectasis [1].

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The paravertebral space is a wedge-shaped space that lies to the side of the vertebral column and contains the spinal (intercostal) nerve, the dorsal ramus, the rami communicantes and the sympathetic chain. Application of local anesthetic within the paravertebral space produces unilateral somatic and sympathetic block, which is better for unilateral surgical procedures of the chest and abdomen [2].

Thoracic PVB was originally described by Sabanathan et al. [3], and they subsequently updated this technique by inserting an indwelling extrapleural catheter for infusion of local anesthetic drugs (LA) in the postoperative period. Several studies assessed the analgesic effectiveness of thoracic PVB [4–6]. The use of Seldinger technique for catheter insertion under vision with a trocar passed one space below the thoracotomy wound posteriorly is easy and safe method. To avoid pleural tear, once the catheter tip becomes visible in the extra-pleural space through the thoracotomy wound, the catheter is passed through the trocar and positioned to lie vertically covering two to three intercostal spaces [7,8].

We applied this study to evaluate the effect of keeping the pleural membrane intact on the success of thoracic PVB catheter analgesia.

2. Patients and methods

2.1. Study design

After approval of the study protocol by the Menoufia Ethics Committee, we retrospectively selected patients from a surgical database records in the Cardiothoracic Surgery Department, Menoufia University Hospital, Egypt. All patients had thoracotomy and paravertebral block catheter for different surgical procedures including pulmonary lobectomy for primary lung cancer, lung abscess, or bronchiectasis, and repair of bronchopleural fistula, resection of posterior mediastinal mass, from November 2010 to December 2014.

Exclusion criteria included; patients who were under 18 or over 75 years of age, those with a history of severe cardiac disease, hepatic or renal failure, those with American Society of Anesthesiology class (ASA) IV or higher, those who underwent resection of the pleura or chest wall, those with bleeding tendencies or were receiving anticoagulant therapy, those with a known allergy to local anesthetic agents, those having a neurological disorder, and those receiving opioid therapy for chronic pain treatment.

The surgical approach in all patients was a muscle sparing posterolateral thoracotomy through the 5th intercostal space, usually extending from the midscapular to the anterior axillary line with an incision length of 10–12 cm. At the end of the procedure all patients were extubated.

Patients were classified into two groups, group A (n = 68) where there was pleural disruption, and group B (n = 64) with intact pleural membrane.

Postoperative pain and pulmonary functions were the primary outcomes, where the frequency of paravertebral block analgesia (PVB), supplementary drugs (paracetamol) and the postoperative complications were the secondary outcomes.

Visual analogue scale (VAS) was used for assessment of postoperative pain degree at one, six, 12, 24, 48, and 72 h. The scale was used from zero (no pain) to 10 (intolerable pain) usually by the cardiothoracic surgery resident or a well-trained nurse. A score >3 indicated pain requiring an analgesic administration in the form of Bupivacaine in the paravertebral catheter as 20 ml Bupivacaine 0.5% in 5 ml increments (Marcaïn Plain; AstraZeneca, Egypt[®]) until the VAS for pain score at rest was three or less.

To ensure a good cough effort and excellent physiotherapy, every patient was strongly encouraged to take analgesia without hesitation, if needed, as a supplementary drug in the form of an intravenous infusion of 1 g of paracetamol (Paracetamol, Egyptian European Pharmaceutical Industry, Egypt[®]) every 8 h in the first 2 days then oral paracetamol during the following 5 days. Every postoperative patient was not allowed to take supplementary drug not <8 h apart, which indicated that the maximum frequency of supplementary drugs use allowed was three times a day. In the case of analgesic failure with paracetamol, meperidine (Pethedin 50 mg), a synthetic opioid, (0.5–1 mg/kg/dose, as bolus subcutaneous or intravenous injection) was given. It was given maximally every 12 h and was used as a rescue medication.

Pulmonary function tests were performed by using a spirometry (Cosmed[®]). We used forced expiratory volume in first second (FEV1) percentage of the predicted both preoperative and three days postoperative and usually done by a well-trained pulmonologist.

2.2. Technique of intraoperative PVB catheter insertion

Before closure of the thoracotomy, an indwelling extrapleural catheter (Tuohy 18 G; Braun, Melsungen, Germany[®]) was inserted intraoperatively by the surgeon. The classic surgical method for insertion of extra-pleural catheters is creation of a tunnel lateral to the parietal pleura and placing the catheter as deep as possible in this tunnel. But this method was found to be associated with a significant leak of the local anesthetic into the pleural space resulting in a less effective postoperative pain control. So instead of creating a tunnel into the parietal pleura, we usually use a Seldinger technique of catheter insertion under vision and intraoperatively

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