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Bilateral paravertebral blockade for bilateral modified mastectomy – a case report

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Background. Thoracic paravertebral blockade has been widely used for unilateral, surgical procedures on the thorax for many years. It is also the mainstay of postoperative pain management, providing long-lasting analgesia. The procedure is relatively simple and the complication rates are low. Due to its efficacy bilateral paravertebral blockade has been increasingly advocated for major surgical procedures involving both sides of the thorax. This procedure is broadly used in our hospital. However, surgical patients scheduled for modified mastectomy after neoadjuvant therapy with history of medical problems have been proven to benefit the most.

Case report. A 73-yr-old woman scheduled for bilateral radical mastectomy received continuous, bilateral paravertebral blockade before the induction of general anaesthesia. Both paravertebral spaces were identified using the Eason-Wyatt technique with 18 G Tuohy needles. A test dose of 5 ml of 0.5% bupivacaine with adrenaline was followed later by a full dose of 0.5% bupivacaine up to a total dose of 2 mg/kg. Before the cessation of general anaesthesia we administered 10 ml of 0.25% bupivacaine to each catheter and commenced continuous infusions of local anaesthetic for a 48-hour post-operative period. Additional analgesia was obtained with a non-steroidal anti-inflammatory agent – ketoprofen. During the bupivacaine infusion the quality of analgesia and patient's comfort was assessed every six hours using the Visual Analogue Scale, which confirmed a very good level of analgesia. The entire recovery course was uneventful. On the sixth day after surgery the patient was discharged from the hospital.

Conclusion. Paravertebral blockade is becoming a procedure of choice for radical mastectomy providing an extremely good quality of analgesia, patient's comfort, and low frequency of complications.

Key words: paravertebral blockade, bilateral modified mastectomy, postoperative analgesia, bupivacaine

Case report

A 73-yr-old woman presented with bilateral breast cancer. Her medical history included neoadjuvant chemotherapy, mild coronary insufficiency, arterial hypertension and osteoarthritis. In the immediate preoperative period two paravertebral catheters were placed at the Th3 level. Both paravertebral spaces were identified using the Eason-Wyatt technique with 18 G Tuohy needles. After determining loss of resistance and performing the aspiration test to confirm correct needle placement, a catheter was introduced to a maximal depth of 4 cm. A test dose of 5 ml of 0.5% bupivacaine with adrenaline 1:200 000 was injected after each catheter placement without any reaction. It was followed later by the full dose of 0.5% bupivacaine to a total of 2 mg/kg. General anaesthesia, after two-minute preoxygenation, was induced with 20 mg of etomidate and 200 μg of fentanyl. Muscle relaxation facilitating endotracheal intubation was achieved with 16 mg of cisatracurium. Anaesthesia was maintained with 1.0 MAC (minimal alveolar concentration) of sevoflurane in an air/oxygen 1:1 mixture. Total of 4 mg of cisatracurium was administered in the course of anaesthesia. The patient remained normothermic and haemodynamically stable. Before the cessation of surgery the patient received 10 ml of 0.25% bupivacaine to each catheter and continuous infusions were commenced with 0.1% bupivacaine over a 48-hour post-operative period. She received a total of 1000 ml of Ringer's solution and 1000 ml of Hartmann's solution and was breathing spontaneously at the end of surgery. Neuromuscular blockade was reversed with 2.5 mg of neostygmine and 1.0 mg of atropine i.v. After maintaining a 5-s head lift the airway was suctioned and the patient was extubated and transported to the recovery unit under oxygen.

The early postoperative period was uneventful and the patient was discharged to the ward after an hour of observation.

During the first 48 hours of the postoperative period the patient received an infusion of 0.1% bupivacaine

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ranging from 5 mg (initial infusion level) to 12 mg per hour through each catheter. The level of analgesia was assessed every six hours using the Visual Analogue Scale (VAS) and the infusion rate was adjusted accordingly. The infusion protocol was based on VAS:

- 0-3 points – maintain present infusion rate
- 4-5 points – increase present infusion rate by 2 ml/hr on the affected side
- 6-10 points and/or patient's request – 8 ml of 0.25% bupivacaine bolus.

A non-steroidal anti-inflammatory agent – ketoprofen 100 mg i.v. was administered at 8-hour intervals as an additional analgesic.

The patient's comfort was also assessed every six hours using the Visual Analogue Scale with mean scores ranging from 2 to 4 points. No significant complaints were recorded during the period of the bupivacaine infusion. After 48 hours both infusions were discontinued and a bolus dose of 10 ml of 0.25% bupivacaine was administered through both catheters before their removal. Ketoprofen boluses were maintained for the next 3 days. Analgesia was supplemented with oral paracetamol 1.0 g every 6 hours. No opioid analgesics were administered during the entire post-operative period.

Discussion

Paravertebral blockade was first performed by Hugo Sellheim from Leipzig in 1905. The aim was to obtain abdominal muscle relaxation and intraoperative analgesia [1]. Arthur Lawen participated significantly in developing this technique by applying procaine to the nerve roots emergence area [2]. Kappis, in 1919, presented a technique resemblant to the one used at present [1]. After its initial popularity the thoracic paravertebral blockade remained neglected until 1979, when Eason and Wyatt described it anew [1, 3]. They also reported the catheter technique which is still in use practically without any modifications [1].

The paravertebral space is a wedge–shaped anatomical compartment adjacent to the vertebral bodies. The space is defined by the parietal pleura, the superior costotransverse ligament, the vertebrae, the vertebral disk, and the intravertebral foramina and heads of ribs. Within this space, the spinal root emerges from the intervertebral foramen and divides into the dorsal and ventral *ramus*. This anatomy probably enhances the contact of the local anaesthetic with the nerve roots, facilitating dense nerve blockade with small volumes of local anaesthetic introduced into the space. Due to multiple neurological structures confined within this compact space, local anaesthetics can produce a unilateral motor, sensory and sympathetic blockade [4].

Due to its benefits in the case of this particular patient we picked the bilateral paravertebral blockade as the analgesia mainstay in the course of the perioperative period. It provided good quality analgesia during the operation. During the emergence from anaesthesia surgical patients can present several problems caused by insufficient analgesia: shallow breathing, hypertension episodes, nausea and vomiting. On the other hand prolonged recovery of spontaneous ventilation, muscle stiffness, nausea and vomiting can be attributed to excessive opioid delivery. This can be avoided or diminished by the employment of regional anaesthesia techniques. Due to cardiovascular disorders we chose the bilateral paravertebral blockade believing it to be superior to the thoracic epidural blockade in this particular case.

During the postoperative period it proved itself as a very efficient way of conducting analgesia. The patient was comfortable and pain free. She did not require any supplementary doses of analgesics.

The thoracic paravertebral blockade is a safe and effective method for major breast surgery. It is associated with a low incidence of complications, such as: local anaesthetic toxicity, pneumothorax, hypotension, intravascular drug administration and Horner's syndrome while it allows to provide a high degree of patient satisfaction [5, 6].

The paravertebral blockade promotes better wound healing due to vasodilatation and higher tissue oxygen tension in the anesthetized area. This is of paramount importance during immediate breast reconstruction after mastectomy where hypoxia and ischemia-induced necrosis are considered the main complications of elevating the latissimus dorsi flap [7].

A bilateral blockade is feasible and provides good hemodynamic stability despite a sympathetic chain block in the upper thoracic level. Excellent analgesia during bilateral breast surgery and the postoperative period and a significant reduction of opioid use are, undoubtedly, the advantages of this technique. This procedure is widely applied in our hospital. However surgical patients scheduled for modified mastectomy after neoadjuvant therapy with a history of medical problems have been proven to benefit the most from this method.

We would like to stress that to the best of our knowledge there exist no publications describing the bilateral paravertebral blockade for bilateral mastectomy.

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