

Bilateral Erector Spinae Plane Block for Redo Tricuspid Valve Replacement with Thoracotomy

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Torakotomi ile Redo Triküspit Replasmanında Bilateral Erektör Spina Düzlem Bloğu

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ABSTRACT

Erector Spinae Plane (ESP) block in cardiothoracic surgery may be a good alternative to perioperative opioid use or thoracic epidural analgesia in the postoperative analgesia. We presented our effective ESP block experience in redo tricuspid valve replacement surgery. A patient was scheduled for a redo tricuspid valve replacement (TVR) via thoracotomy. The patient underwent aortic valve replacement in 1994, mitral commissurotomy in 2005 and TVR in 2008. Single injection block was performed at the level of the T5 for ESP with a total of 40 ml 0.5% 1: 1 bupivacaine/ saline mixture administered bilaterally in equal amounts of 20 ml. On the 1. and 2. postoperative day, VAS was 1-2 and no additional analgesic was required. Single injection block was quite effective in relieving postoperative pain, the patient was hemodynamically stable and minimum perioperative opioid requirement was promising. ESP block is very advantageous in order to avoid problems caused by high opioid doses. An important point is that more tissue resection is required in redo surgeries, causing more pain, however, adequate analgesia was achieved with single injection ESP in our case.

Keywords: erector spinae plane block, cardiac surgery, thoracotomy, cardiac anesthesia, postoperative pain, redo surgery

Öz

Kardiyotorasik cerrahide Erector Spinae Plane (ESP) bloğu, postoperatif analjezide perioperatif opioid kullanımına veya torasik epidural analjeziye iyi bir alternatif olabilir. Bu yazıda redo triküspit kapak replasmanı ameliyatında etkili ESP blok deneyimimizi sunduk. Hastaya torakotomi ile redo triküspit kapak replasmanı (TVR) ameliyatı planlandı. Hastaya 1994 yılında aort kapak replasmanı, 2005 yılında mitral kommissurotomi ve 2008 yılında TVR uygulanmıştı. ESP için T5 seviyesinde % 0.5 bupivakain: salin 1: 1 karışımı, her bir tarafa 20 ml olacak şekilde bilateral tek enjeksiyon bloğu uygulandı. Postoperatif 1. ve 2. gün VAS 1-2 idi ve ek analjezik gerekmedi. Tek enjeksiyonlu blok postoperatif ağrıyı hafifletmede oldukça etkiliydi, hasta hemodinamik olarak stabildi ve minimum perioperatif opioid gereksinimi ümit vericiydi. ESP bloğu, yüksek opioid dozlarının neden olduğu sorunları önlemek için çok avantajlıdır. Önemli bir nokta, redo ameliyatlarda daha fazla doku rezeksiyonu gerekir ve bu daha fazla ağrıya neden olur, ancak olgumuzda tek enjeksiyonlu ESP ile yeterli analjezi sağlanmıştır.

Anahtar kelimeler: erektor spina düzlem bloğu, kalp cerrahisi, torakotomi, kalp anestezi, postoperatif ağrı, redo

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INTRODUCTION

Erector spinae plane block (ESP) is one of the newest techniques described which delivers local anesthesia deeper in the fascial plane than the erector spinae muscle at the distal end of the transverse process of the vertebra. The Regional Anesthesia Guidelines evaluate peripheral blocks as for its safety, taking into account site vascularity, compressibility and the consequences of bleeding. ESP is not yet officially classified, but, in general, it is a superficial block belonging to a safe category, and its use is advocated by others ^[1,2]. ESP block in cardiothoracic surgery may be a good alternative to excess opioid use perioperatively or other invasive techniques such as thoracic epidural analgesia in the treatment of postoperative analgesia. It should be emphasized that repetitive surgeries require more extensive tissue resection, resulting in more pain. In this paper, our aim is to present effective single shot injection ESP experience for a patient who underwent redo tricuspid valve replacement with thoracotomy. Written informed consent was obtained from the patient for the publication of this case report.

CASE PRESENTATION

A 64-year-old, 70 kg, ASA 3 female patient underwent surgery for redo tricuspid valve replacement (TVR) using thoracotomy approach. The patient had undergone aortic valve replacement in 1994, mitral commissurotomy with thoracotomy in 2005 and TVR in 2008. The patient had no other co-morbidities or liver, kidney and other organ dysfunctions. Atrial fibrillation was detected on the preoperative ECG and costodiaphragmatic sinuses were closed in both lungs as observed on the chest radiograph. After the routine cardiac anesthesia monitoring general anesthesia was induced with propofol, ketamine and rocuronium and the patient was intubated with 37 F left double-lumen endotracheal tube. The endobronchial position was confirmed by auscultation. Anesthesia was maintained with oxygen-air, sevoflurane with minimum alveolar concentration of

0.8–1%, remifentanyl and rocuronium. Bispectral index and TEE probes were placed and monitoring was performed. Afterwards, she was placed in the left lateral decubitus position, the location of the tube was checked and one-lung ventilation was ready to use for surgery. After induction of anesthesia, ESP block was applied just before the start of the operation. A linear ultrasound probe (12 MHz, GE Vivid Q[®] USG device) was placed in a sagittal paramedian orientation at the level of the T5 transverse process for both left and right ESP. The trapezius, rhomboid major and erector spinae muscles were revealed, from superficial to deep above the hyperechoic transverse process view, in each side. For ESP block, 22 gauge, and 50 mm- needle SonoTap; Braun, Stimuplex[®] Ultra, Germany) was inserted through the caudal to cephalic direction into the interfascial plane below the erector spinae muscle. After aspiration, 2 ml of saline solution was injected bilaterally to verify location. The solution prepared with a mixture of 0.5% bupivacaine and saline 1:1 was injected bilaterally as 20 ml into each side. Single shot injection block was performed and catheter was not used for continuous infusion. Following the right thoracotomy, venous cannulas were inserted into the superior and inferior vena cava under the guidance of TEE, blood flow to the right atrium was blocked and cardiopulmonary bypass was initiated, TVR was performed in the beating heart. Intraoperatively, 1.2 mg remifentanyl and 128 ml sevoflurane were used for maintenance of anesthesia. The patient remained hemodynamically stable during and after surgery. No significant hypotension or bradycardia was observed and the patient did not require vasodilators or vasopressors during intraoperative period. The surgery lasted 5 h and blood loss was 550 ml. At the end of the surgery the patient was transferred to the intensive care unit. Before closing the incision, paracetamol 1 gr and tramadol 100 mg was given intravenously. Paracetamol 1 gr and tramadol 50 mg were administered every 12 hours for 2 days. On the first and second postoperative days, VAS was 1-2 and no additional analgesic was required. The patient was dis-

charged postoperatively on the 3. day from ICU and on the 10. day from hospital without any complication.

DISCUSSION

In our case, bilateral single shot injection ESP block was combined with administration of paracetamol and tramadol. Due to the nature of cardiac surgery, it may have been possible to switch from thoracotomy to sternotomy during surgery, so the block was applied bilaterally. Considering the normal liver and kidney function of the patient, and the toxic dose of bupivacaine above 2 mg kg^{-1} , a total of 100 mg of bupivacaine was administered to ensure effective analgesia. At 1 hour after surgery, patient was awake and had VAS scores ≤ 3 when coughing, while at post-operative 6, 24 and 48 hrs, patients had VAS scores 1-2 when coughing.

In a study in cardiac surgery, the application of bilateral ultrasound -guided ESP block using 3 mg kg^{-1} 0.375% ropivacaine injected into the T6 transverse process level, before anesthesia induction was compared with 1 gr of paracetamol given every 6 hours and 50 mg of tramadol every 8 hours in the postoperative period [3]. Median VAS pain score at rest after extubation in the ESP group was significantly lower than the paracetamol + tramadol group, and the analgesia time (8.98hrs & 4.60hrs) in the ESP group was significantly longer. The median VAS pain score in the ESP group was 0/10 until the 6th hour after extubation, 3/10 at the 8th hour, and 4/10 at the 10th and 12th hours after extubation in that study. In our patient, we applied the block at T5 level and also added paracetamol + tramadol iv regimen in addition to the ESP block. Therefore, it was observed that the pain levels in our case were milder.

An important point is that more tissue resection is required in redo surgeries, causing more pain. Since the patient had previous thoracotomy and sternotomy incisions, redo incision and tissue resection would be required. It was conceivable that this could lead to more pain, however, in our case, adequate

analgesia was achieved with bilateral single shot injection ESP

Continuous peripheral nerve block is thought to provide more effective long-term analgesia, providing adequate analgesia that can reduce the incidence and severity of chronic pain after surgery. However, single injection block was quite effective in relieving postoperative pain in our case. Although a single shot ESP block has a more limited duration of action compared to the continuous infusion of local anesthetics, some type of cardiac surgery requires the use of systemic heparinization and cardiopulmonary bypass, and it is controversial to leave a catheter in situ in such patients [4].

Epidural and paravertebral analgesia techniques have been studied previously in cardiac and thoracic surgeries [5]. Although they have proven analgesic benefits, concerns over safety or technical difficulty have prompted the pursuit of alternative techniques [6]. A local anesthetic injection is performed in ESP into the area which is away from the important pleural and neurological structures, so the risk of complications is lower caused by organ injury [7]. Anatomical landmarks are easily visible under USG guidance and the spread of local anesthetics can be visualized under the erector spinae muscle [6]. Sternum is innervated by the T2-T6 intercostal nerves (via the ventral rami) and the skin is innervated by its anterior cutaneous branches. It was shown that epidural and neural foraminal spread of local anesthetic provides the anatomic plausibility for sternal analgesia with the ESP block [8]. Forero et al [9] described extensive spread of 20 ml local anesthetic drug from T2 to T8 when the drug was deposited below the erector spinae muscle at T5 level. Therefore, ESP block is effective in cardiac surgery performed through sternotomy and/or thoracotomy incisions.

Nath et al. [10] performed continuous ESP under ultrasound guidance in two open thoracotomy cases and achieved excellent results. We also had a satisfactory analgesia in our case, moreover, the patient was

hemodynamically stable and hypotension or bradycardia was not observed. Besides, the minimum perioperative opioid requirement was certainly promising. In a study it was shown that ESP block is effective in the treatment of pain in patients undergoing mitral or tricuspid valve repair with mini-thoracotomy. This was an observational study (instead of RCT) due to severe respiratory complications in patients without ESP block group, and difficulties related to postoperative pain control in patients receiving remifentanyl instead of fentanyl during surgery, so eventually shorter extubation times were observed^[11]. ESP block is very advantageous in order to avoid problems caused by high opioid doses frequently used in cardiac surgery, which effect many organ systems in the postoperative period.

CONCLUSION

Bilateral single-injection erector spinae plane block plus postoperative iv paracetamol and tramadol provide enough pain relief and it can be performed as a part of multimodal analgesia treatment for patient undergoing cardiac surgery with thoracotomy. The simplicity of ESP block and the satisfactory initial results will definitely encourage surgeons to perform these surgeries.

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