

# Erector spinae plane block for perioperative analgesia in cardiac surgery. Case report

*Bloqueio do plano eretor espinhal para analgesia perioperatória em cirurgia cardíaca. Relato de caso*

Ricardo Kenithi Nakamura<sup>1</sup>, Felipe Chiodini Machado<sup>1,2</sup>, Leonardo Sérgio Rocha Novais<sup>1</sup>

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## ABSTRACT

**BACKGROUND AND OBJECTIVES:** The anesthetic management has evolved with the use of alternative techniques that promote greater safety, quick recovery and comfort in the perioperative period. The erector spinae plane block emerges as a promising alternative that can be employed as a simple analgesic technique for thoracic analgesia, acute post-surgical, post-traumatic and chronic neuropathic thoracic pain.

**CASE REPORT:** Female patient, 72-year-old, undergoing aortic valve replacement surgery under general anesthesia associated with an erector spinae plane block as a technique for perioperative pain management.

**CONCLUSION:** We demonstrate with this case report that the erector spinae plane block can be a suitable option as a regional analgesia technique for cardiac surgery, used perioperatively as a regional block for multimodal analgesia. Further research and studies are needed to address its efficacy and safety for multiple cardiac and aortic surgery techniques.

**Keywords:** Erector spinae plane block, Fast-track, Enhanced recovery after surgery.

## RESUMO

**JUSTIFICATIVA E OBJETIVOS:** O manuseio anestésico evoluiu com o uso de técnicas alternativas que promovem maior segurança, rápida recuperação e conforto no período perioperatório. O bloqueio do plano eretor espinhal surge como uma alternativa promissora que pode ser empregada como uma técnica analgésica simples para analgesia torácica, dor torácica aguda pós-cirúrgica, pós-traumática e crônica neuropática.

**RELATO DO CASO:** Paciente do sexo feminino, 72 anos, submetida à cirurgia de troca valvar aórtica sob anestesia geral asso-

ciada ao bloqueio do plano eretor espinhal, como técnica para o manuseio da dor no período perioperatório.

**CONCLUSÃO:** O presente relato demonstrou que o bloqueio do plano eretor espinhal pode ser uma opção adequada como uma técnica de analgesia regional para cirurgia cardíaca, usada no perioperatório como um bloqueio regional para analgesia multimodal. Mais pesquisas e estudos são necessários para abordar sua eficácia e segurança para múltiplas técnicas de cirurgia cardíaca e aórtica.

**Descritores:** Bloqueio do plano eretor espinhal, *Fast-track*, Recuperação aprimorada após a cirurgia.

## INTRODUCTION

The anesthetic management has evolved with the use of alternative techniques that promote greater safety, quick recovery and comfort in the perioperative period. Fast-track or enhanced recovery after surgery (ERAS) is a concept of perioperative management that aims at shortening hospital stay in order to reduce patient morbidity and healthcare costs. It combines minimally invasive surgical techniques, preoperative patient optimization, and evidence-based clinical measures that minimize complications and speeds up recovery<sup>1</sup>. The goals of *fast-track* surgery are reducing postoperative complications and speeding recovery times. For *fast-track* strategy, regional blocks are often performed for postoperative pain management and to facilitate extubation after major surgeries.

The interfascial plane block, or erector spinae plane (ESP) block, produces an extensive multi-dermatome sensory block. Local anesthetic (LA) instilled in the myofascial plane deep to the erector spinae muscle and superficial to the tip of the transverse process is likely to provide sensory block at the posterior, lateral and anterior thoracic wall<sup>2</sup>. The analgesic effect seems to be due to the diffusion of LA into the paravertebral space, acting at both the dorsal and ventral rami of the thoracic spinal nerves, and at the rami communicantes that supply the sympathetic chain<sup>3</sup>. The ESP plane extends along the length of the thoracolumbar spine, thus providing extensive craniocaudal spread. There is evidence that a single injection in a cadaver model at T5 could spread between C7 cranially and L3 caudally<sup>2</sup>.

The ESP block can be associated with general anesthesia in major surgery facilitating early extubation in the operating room and is associated with shorter length of stay and morbidity after open thoracic surgery and major vascular surgery<sup>4,5</sup>. However, there is no evidence or report of ESP block used for postoperative analgesia in cardiac surgery.

We present a case of ESP block being used for postoperative pain management in aortic valve replacement surgery.

1. Hospital Beneficência Portuguesa de São Paulo, São Paulo, SP, Brasil.

2. Universidade de São Paulo, Faculdade de Medicina, São Paulo, SP, Brasil.

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### Correspondence to:

Rua Maestro Cardim, 769 – Liberdade  
01323-001 São Paulo, SP, Brasil.  
E-mail: ricardonakamura04@gmail.com

## CASE REPORT

A 72-year-old woman, weight 64kg and height 150cm (body mass index 28.4 kg/m<sup>2</sup>), with a history of systemic arterial hypertension, prediabetes, chronic obstructive pulmonary disease (COPD), hypothyroidism and heavy smoking for over 50 years was scheduled for aortic valve replacement surgery. She was medicated with losartan, metoprolol, trimetazidine, atorvastatin, propranolol, metformin, bupropion, and levothyroxine. A transthoracic echocardiogram was performed showing a 67% ejection fraction, a calcified aortic valve with significant stenosis (pressure gradient of 63mmHg and mean of 42mmHg), discrete Doppler reflux, severe calcification of the mitral valve with mild stenosis and ascending aorta with discrete dilatation (diameter 42mm).

We elected a single-shot bilateral ESP block as a regional anesthetic technique to provide postoperative analgesia, with early extubation planning to reduce morbidity. The ESP block was performed with the patient in a sitting position, and a high-frequency linear ultrasound transducer (GE Healthcare Venue 40 12L-SC) was placed in a longitudinal orientation 3.0cm lateral to the T5 spinous process. Three muscles were identified superficial to the process transverse shadow as follows: trapezius, rhomboid major, and erector spinae. A 50mm 22G block needle (B Braun stimuplex needle 22x2 50 mm 25/CS) was inserted in a cephalic-to-caudal direction until the tip lay in the interfascial plane between rhomboid major and erector spinae muscles, as evidenced by the visible linear spread of fluid between the muscles upon injection. A total of 30mL of 0.375% ropivacaine was injected in both sides. General anesthesia was induced with propofol (80mg), fentanyl (150µg), rocuronium (50mg) and ketamine (20mg) intravenously. Maintenance was performed with propofol (0.8 to 1.2µg/mL), remifentanyl (1 to 2ng/mL) and lidocaine (1mg/kg/h). Morphine (3mg) was administered 30 minutes before extubation. The surgery occurred without complications. Extracorporeal circulation time was 65 minutes, and tweezing time 51 minutes. The patient was extubated in the operating room and was referred to the intensive care unit (ICU) on spontaneous ventilation with oxygen support through a mask with a reservoir.

Postoperative analgesia was maintained with dipyrone (1g) every 6h, and tramadol (100mg) if necessary. The first tramadol rescue dose was administered 9h after the end of the surgery when the patient reported a numeric pain scale (NPS – from zero to 10) of zero/10 at rest and 5/10 while moving. Twelve hours after the blockade, she reported pain 1 (zero-10) at rest and 3 (zero-10) at movement. It was necessary to administer tramadol (100mg) once daily until the second postoperative day (POD) when the thoracic drains were removed. Discharge from ICU was delayed because the patient presented a high-response atrial fibrillation episode, without hemodynamic repercussion, reversed with chemical cardioversion. The patient remained stable and was discharged to the ward in the POD 3, where she received oral analgesia with acetaminophen and codeine every 8h, for 3 days and had no pain complaints. The patient was discharged from the hospital in POD 6 and remained pain-free with acetaminophen use only.

## DISCUSSION

Regional anesthesia is an important component of multimodal analgesia after thoracotomy reducing stress response, pain scores, and opioid consumption<sup>6</sup>. Despite that, the ideal multimodal analgesia regimen should combine regional analgesia and systemic analgesics. Prior to extubation, a preventive dose of morphine was also administered for multimodal analgesia. For this surgery, it is commonly expected high postoperative pain scores and opioid consumption<sup>7</sup>. However, in our case, postoperative analgesia was maintained with the ESP block and a weak analgesic (dipyrone). The first opioid bolus was demanded only 9h after surgery when the patient had moderate incidental pain. This time greatly surpasses the effect of intraoperative administered analgesics. For these reasons, it is the authors' impression that the ESP block can be used as an opioid sparing technique.

Traditional regional anesthesia techniques such as thoracic epidural analgesia and thoracic paravertebral blockade are unsuitable in aortic valve replacement surgery because of the need for postoperative heparinization to prevent pump thrombosis and the ensuing risk of spinal hematoma. The most recent edition of the American Society of Regional Anesthesia guidelines on patients receiving antithrombotic therapy recommend that in neuraxial and paraneuraxial blocks there should be at least 1h between needle insertion and heparinization and at least 2 to 4h between the discontinuation of heparin infusion and catheter removal<sup>8</sup>. The ESP block, on the other hand, targets a myofascial plane located between the erector spinae muscles and the posterior aspect of the transverse processes. It provides thoracic analgesia by local anesthetic diffusion into the neural foramina and intercostal spaces and over several vertebral levels from a single point of injection<sup>9</sup>. The needle does not enter the paravertebral space and remains distant from the neuroaxis, discrete plexi or nerves, and major blood vessels. The American Society of Regional Anesthesia guidelines<sup>8</sup> suggest that management of blocks of this nature be guided by "site compressibility, vascularity, and consequence of bleeding" while acknowledging that there are insufficient data to definitely confirm safety. Based on these principles, there is some evidence that the theoretical risk of clinically significant complications related to bleeding is low and is outweighed by the benefit observed in the patients described<sup>10</sup>. Recently, other authors have reported the efficacy and safety of ESP block for postoperative pain control in breast surgery<sup>11</sup>, thoracotomy<sup>12</sup>, abdominal surgery<sup>13</sup> and even spine fusions<sup>14</sup> in case reports, but to our knowledge, there are no reports for aortic valve replacement surgery.

## CONCLUSION

We demonstrate with this case report that the ESP block can be a suitable option as a regional analgesia technique for cardiac surgery, used perioperatively as a regional block for multimodal analgesia. Further research and studies are needed to address its efficacy and safety for multiple cardiac and aortic surgery techniques.

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