

CASO CLÍNICO

Continuous Erector Spinae Plane Block for Rescue Analgesia in Thoracic Trauma: A Case Report

Bloqueio Contínuo do Plano do Eretor da Espinha como Opção Analgésica no Trauma Torácico: Caso Clínico

Cândida Infante^{1*} , Ana Vieira¹ , Francisco Matias¹ , Joana Gonçalves¹ 

Afilição

¹Serviço de Anestesiologia, Centro Hospitalar e Universitário de Coimbra, Coimbra, Portugal.

Keywords

Analgesia; Nerve Block; Pain; Ultrasonography, Interventional

Palavras-chave

Analgesia; Bloqueio Nervoso; Dor; Ultrassonografia de Intervenção

ABSTRACT

The ultrasound-guided erector spinae plane (ESP) block is a novel regional anesthesia technique described for providing thoracic analgesia. It is simple to perform and relatively noninvasive compared to neuroaxis techniques, allowing to provide effective analgesia for acute rib fractures, which is essential to avoid pulmonary complications.

This newly technique have demonstrated pain relief in patients with rib fractures and it is an effective analgesia when part of multimodal analgesia plan.

In this report, we described the use of unilateral ESP catheter as a rescue analgesic technique placed in a patient with rib fractures secondary to a car accident.

RESUMO

O bloqueio do plano do músculo eretor da espinha, é uma técnica de abordagem locoregional, guiada por ultrassonografia, utilizada para a analgesia torácica, com grandes benefícios clínicos e hemodinâmicos. É um bloqueio de simples execução e menos invasivo em comparação com as técnicas de abordagem do neuroeixo, e tem demonstrado um papel importante no controlo da dor no contexto de trauma torácico associado a fratura de costelas.

No presente caso clínico, descrevemos o uso de cateter unilateral no plano do músculo eretor da espinha como técnica analgésica de resgate num doente com fratura de costelas após acidente de viação.

INTRODUCTION

Erector spinae plane block (ESPB) is a fascial plane block and was initially described by Forero *et al*, in September 2016, as an analgesic alternative for postoperative pain control and for the treatment of chronic pain in the thoracic region, of multiple etiologies: surgical, traumatic and/or pathological.¹ As a locoregional analgesic technique it has gained considerable prominence and its effectiveness is obtained through the compartmentalized distribution of the local anesthetic (LA) until it reaches the target nerves; the absorption and diffusion of the LA through the tissue planes also seems to play a role in the extent and quality of the block. In chest trauma, pain control is central to the patient's comfort and survival. The interruption of ventilatory mechanics caused by pain, often results in an increase in respiratory complications and, consequently, an increase in the length of hospitalization and morbidity, being responsible for about one third of the mortality in these patients.²

In this case report, we describe the ESP block with catheter placement as an analgesic technique used in a patient with multiple unilateral rib fractures.

CASE REPORT

A 40-year-old male, victim of a car accident in a 30 m ravine, with rollover and projection. The airway was permeable but had extensive closed chest trauma with subcutaneous emphysema and fracture of the left costal arches, without ventilatory instability. Without an active hemorrhage focus with hemodynamic stability and a Glasgow coma scale of fifteen, he was immobilized and transported to the hospital. The transport was uneventful and oxygen therapy was administered by a face mask with O₂ at 5 L/min, ondansetron 4 mg ev and analgesia with paracetamol

Autor Correspondente/Corresponding Author*:

Cândida Cardoso Infante

Morada: Rua do Barqueiro, Torres do Mondego. Coimbra, Portugal.

E-mail: candidacinfante@gmail.com

1gr ev and morphine 6 mg ev. The man was admitted to the emergency room of a trauma referral hospital. He had severe pain complaint while being continuously monitored, with maintained hemodynamic stability and oximetry values greater than 98%, with supplemental oxygen therapy. A thoracic computed tomography was performed, revealing "extensive pneumothorax with slight left pleural effusion, left pulmonary contusion, fractures of the 3rd to 7th left costal arches in the axillary region with adjacent subcutaneous emphysema and fracture of the sternal manubrium". No other associated injuries.

Due to difficult pain control and after discussion in a multidisciplinary team and patient's consent, continuous ESP block was performed as unconventional analgesia. Pre-positioning fentanyl 0.1 mg was administered. The blockade was performed in the right lateral position and under *Standard* A.S.A. monitoring. The T5 spinous process was identified and under sterile conditions, the high frequency linear ultrasound probe (GE 9L-RS Probe, 3.33-10.0 MHz imaging frequency) was placed 3 cm laterally to the T5 spinous process, with longitudinal orientation. The trapezius, rhomboid and erector muscles of the spine and the T5 transverse process were identified. After infiltration with 2% lidocaine and with an *in-plane* technique, an 80 mm Tuohy needle for blocking (Perifix® Soft Tip, 18 G / 80 mm, B. Braun, Germany) was advanced in the cephalo-caudal direction until its tip went deep into the erector spinae muscle. The location of the needle was confirmed by hydrodissection with saline solution and 30 mL of 0.375% ropivacaine was subsequently injected. Finally, a 4 cm multiperforated epidural catheter was inserted and fixed beyond the tip of the needle. The analgesic efficacy was verified 20 minutes after the blockade (with a pain score of 9/10 vs 2/10 on the numeric rating scale (NRS) and a 28 French chest tube was

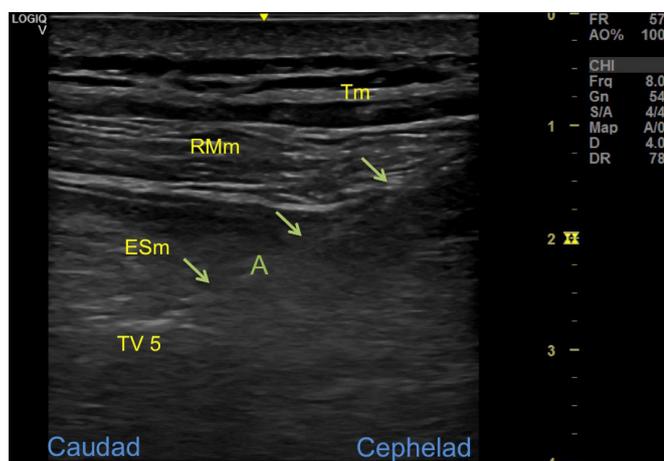


Figure 1. The trapezius (Tm), rhomboid major (RMm) and erector muscles of the spine (ESm) and the T5 transverse process (TV5) were identified.

A: *In-plane* technique, an 80 mm Tuohy needle (arrows) for blocking was advanced in the cephalo-caudal direction until its tip went deep into the erector spinae muscle.

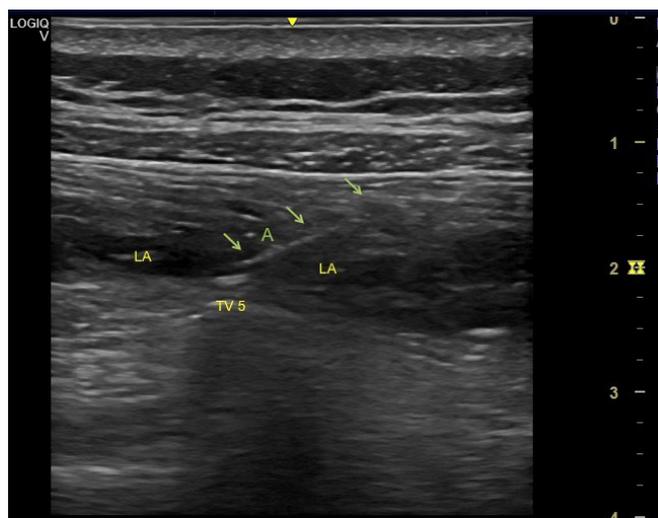


Figure 2. After injection of 10 mL of local anesthetic (LA) to open the muscle plane.

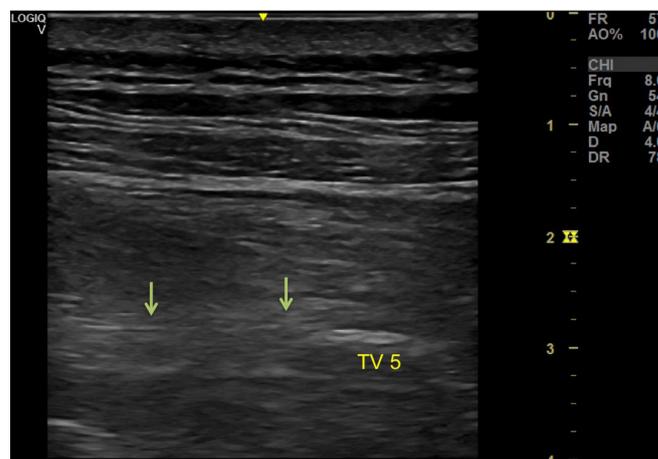


Figure 3. Multiperforated epidural catheter (arrows) was inserted beyond the tip of the needle.

placed in the left hemithorax without pain complaints and without complications. Patient-controlled analgesia (PCA) was started with intermittent mandatory boluses of 7 mL/hour of 0.15% ropivacaine through the catheter, paracetamol 1 g 8/8 hours and ketorolac 30 mg 12/12 hours. For rescue analgesia, PCA was programmed with a 6 mL bolus, with a 20-minute lock-out; and a maximum of 3 boluses/hour.

The patient was admitted to the Acute Pain Unit of the Anesthesiology Service for a surveillance and follow-up plan. He was admitted to the Intermediate Surgical Care Unit for clinical and hemodynamic monitoring, where he remained for 3 days, and was then transferred to the ward.

The presence of the catheter in the fascial plane allowed for a prolonged and continuous pain control (NRS: 0/10 at rest and 3/10 in movement) providing maximum comfort for the patient in carrying out the hygiene and the rehabilitation program with 15 daily sessions of respiratory kinesiotherapy, passive and active polyarticular mobilization, muscle strengthening of the limbs in functional activities and progressive lifting. On the 6th day of hospitalization, due to

the improvement of pain complaints and to minimize the risk of infection, the catheter was removed and the pain control remained stable only with peripheral analgesia: paracetamol 1 g 8/8 hours ev and tramadol 100 mg 8/8 hours ev, alternately. The patient was discharged on the 11th day of hospitalization, with prescription for rescue analgesia: paracetamol 1gr and magnesium metamizole 575 mg, both *per os*.

DISCUSSION

Chest trauma is associated with a significant increase in patient morbidity and mortality. Pain related to rib fracture is a frequent complaint, causing changes in ventilatory mechanics and leading to a set of respiratory complications, especially in patients with pre-existing respiratory pathology. In the effective control of chest pain, the intravenous administration of analgesic drugs, namely opioids, and the use of locoregional techniques such as thoracic epidural block and thoracic paravertebral block are currently possible and effective analgesic options. However, in patients with associated respiratory disease or in patients with sensitivity to opioids, the adverse effects that accompany their administration, such as respiratory depression, drowsiness, nausea, vomiting and constipation, sometimes become a barrier to prescription, limiting pain control. In addition, patients with contraindications to neuroaxis and paravertebral block techniques, such as anticoagulated or coagulopathic patients, have a narrow window of analgesic options in the context of chest trauma.

More recently, ESP block has emerged as an alternative locoregional analgesic technique, equally effective in treating pain in chest trauma.³ There is evidence that in this fascial block there is also partial diffusion of LA to the paravertebral and epidural space, which contributes to the analgesic effects obtained.² Studies of ESP block in cadavers have shown that the LA injected into the tissue plane, deep to erector spinae muscle and superficial to the transverse processes, propagates not only in the craniocaudal direction but also in anterior direction, to block spinal nerves and allow extensive analgesia with a single-shot or with catheter placement in the plane. Further investigation in fresh cadavers showed that volumes of 20 mL injected at the level of T5, promote analgesia of the vertebral segment T2 to T8.^{3,5}

It is a block of simple execution and with a high security profile, not only because it is guided by ultrasound and the sonoanatomy of the muscular planes is easy to identify, but also due to the lack of nearby structures, such as nervous structures and large blood vessels that could be damaged.¹ Although rare, pleural puncture with pneumothorax can occur when performing this block; this risk is minimal compared to epidural and thoracic paravertebral block.⁴ As part of a multimodal analgesic plan, ESP block has been integrated as a safe and effective analgesic technique,

which avoids the risks associated with thoracic epidural and paravertebral block and with a wide range of indications not only for chest pain control but also in the treatment of chronic shoulder pain and arm surgery.²

As it allows to overcome the limitations that were previously described, namely the adverse and poorly tolerated effects of opioids and contraindications for neuraxial and thoracic paravertebral blocks, ESP block is a technique with clear benefits contributing to the patient's comfort and well-being.

Ethical Disclosures

Conflicts of Interest: The authors have no conflicts of interest to declare.

Financing Support: This work has not received any contribution, grant or scholarship.

Confidentiality of Data: The authors declare that they have followed the protocols of their work center on the publication of data from patients.

Patient Consent: Consent for publication was obtained.

Provenance and Peer Review: Not commissioned; externally peer reviewed.

Responsabilidades Éticas

Conflitos de Interesse: Os autores declaram a inexistência de conflitos de interesse na realização do presente trabalho.

Fontes de Financiamento: Não existiram fontes externas de financiamento para a realização deste artigo.

Confidencialidade dos Dados: Os autores declaram ter seguido os protocolos da sua instituição acerca da publicação dos dados de doentes.

Consentimento: Consentimento do doente para publicação obtido.

Proveniência e Revisão por Pares: Não comissionado; revisão externa por pares.

ORCID

Cândida Infante  <https://orcid.org/0000-0002-5257-524X>

Ana Vieira  <https://orcid.org/0000-0001-5498-1404>

Francisco Matias  <https://orcid.org/0000-0002-9519-9053>

Joana Gonçalves  <https://orcid.org/0000-0001-5132-8696>

Received: 22nd of December, 2020 | Submissão: 22 de dezembro, 2020

Accepted: 25th of May, 2021 | Aceitação: 25 de maio, 2021

Published: 30th of September, 2021 | Publicado: 30 de setembro, 2021

© Author(s) (or their employer(s)) and SPA Journal 2021. Re-use permitted under CC BY-NC. No commercial re-use.

© Autor (es) (ou seu (s) empregador (es)) Revista SPA 2021. Reutilização permitida de acordo com CC BY-NC. Nenhuma reutilização comercial.

REFERENCES

- Forero M, Adhikary SD, Lopez H, Tsui C, Chin KJ. The Erector Spinae Plane Block: A Novel Analgesic Technique in Thoracic Neuropathic Pain. *Reg Anesth Pain Med.* 2016;41:621-7. doi: 10.1097/AAP.0000000000000451.
- Bloqueio do Plano do Eretor da Espinha: Uma Revisão de Evidências Atuais Araz Pourkashanian1_+, Madan Narayanan2, Arun Venkataraju, Editado por: Dr. Su Cheen Ng, Anestesiologista Consultor, Hospital University College London, e Dr. Gillian Foxall, Anestesiologista Consultor, Hospital Real do Condado de Surrey, Reino Unido, Publicado em 3 de dezembro de 2019.
- Forero M, Rajarathinam M, Adhikary S, Chin KJ. Continuous Erector Spinae Plane Block for Rescue Analgesia in Thoracotomy After Epidural Failure: A Case Report. *A A Case Rep.* 2017;8:254-6. doi: 10.1213/XAA.0000000000000478.
- Tulgar S, Selvi O, Senturk O, Serifsoy TE, Thomas DT. Ultrasound-guided Erector Spinae Plane Block: Indications, Complications, and Effects on Acute and Chronic Pain Based on a Single-center Experience. *Cureus.* 2019;11:e3815. doi: 10.7759/cureus.3815.
- Schwartzmann A, Peng P, Maciel MA, Forero M. Mechanism of the erector spinae plane block: insights from a magnetic resonance imaging study. *Can J Anaesth.* 2018;65:1165-6. doi: 10.1007/s12630-018-1187-y.