

CASE REPORT

Cutaneous branches of the intercostal nerves modified block for analgesia in vertebral body fracture. Case report

Bloqueo modificado de las ramas cutáneas laterales (BRILMA) para analgesia de fractura vertebral

AUTHORS:

Adolfo Matilla, Pablo Díaz, Susana Pretus y **Esperanza Ortigosa**

Chronic Pain Unit. Department of Anesthesia and Reanimation. Hospital Universitario de Getafe. Madrid, España

CORRESPONDENCE:

Adolfo Matilla amatillaal@gmail.com **RECEIVED: 25 / March / 2022**

ACCEPTED: 16 / May / 2022

DOI: 10.20986/mpj.2022.1026/2022

Key words: Chronic pain, nerve block, ultrasonography, interventional.

Palabras clave: Dolor crónico, bloqueo nervioso, ultrasonografía, intervencionismo.

ABSTRACT:

Pain deriving from vertebral fractures may become chronic, and occasionally refractory to oral treatment or invasive processes, such as vertebral augmentation. We describe the case of a patient with chronic pain due to vertebral compression, who was successfully treated with cutaneous branches of the intercostal nerves in the mild axillary line "modified" block. We conclude that this technique could be helpful, especially in those cases of dorsal vertebral injuries, with radiating pain to the chest wall.

RESUMEN:

El dolor por fractura o aplastamiento vertebral es muy incapacitante, puede cronificar y, en ocasiones, ser refractario a procedimientos de aumento o refuerzo vertebral. Presentamos el caso de un paciente con dolor torácico crónico secundario a fractura vertebral, que fue tratado con bloqueo modificado de las ramas intercostales laterales a nivel medio axilar (BRILMA). Consideramos que esta técnica puede ser beneficiosa en fracturas vertebrales a nivel dorsal, asociados a dolor irradiado a pared torácica.

Introduction

Interfascial plane blocks of the chest wall are not considered particularly challenging techniques. They are generally safe and their use has been extended from postoperative or post-traumatic analgesia, to the treatment of chronic pain when not responding to other techniques or is refractory to conventional analgesia.

The lateral cutaneous branches of the intercostal nerves block (BRILMA block, in Spanish) was first described by Fajardo et al. in 2012 (1). It consists on the infiltration of local anesthetic in the interfascial plane located between the anterior serratus muscle and the external intercostal muscles. The patient is placed in a supine position with the arm abducted at 90°. The probe is placed in the sagittal plane at the level of the mid-axillary line, on the lateral wall of the thorax. A neurostimulation needle is introduced in plane with the probe, in a cephalad direction until it reaches the fascia located between the muscles mentioned above. At this level, the terminal intercostal branches are anesthetized, providing effective analgesia in many procedures related to breast and chest surgery.

Although initially employed as an analgesic technique in non-reconstructive breast surgery as part of major ambulatory pathways, its use has been extended to postoperative pain control in video-assisted thoracoscopic surgery or lymphadenectomy, and also to chest trauma cases with multiple rib fractures. Furthermore, wall chest blocks have been employed successfully in chronic pain units to treat localized and peripheric neuropathic pain in for example, patients with mastectomy or thoracotomy scar pain (2).

There is a variant of this interfascial block, known as modified BRILMA block, which consists on delivering the local anesthetic on this same plane, at the level of the 8th rib (more caudally compared to the original block) (3). This way, thoracoabdominal nerves coming from anterior divisions of the inferior intercostal nerves (T7 to T11) also get anesthetized. These branches innervate the intercostal muscles and the anterior rectus muscle, and end up as anterior cutaneous branches carrying sensitivity of the anterior abdominal territory and peritoneum. With this modified block, the use of the BRILMA technique has been extended to abdominal wall surgery and laparoscopy.

We present the case of a patient with chronic chest pain secondary to vertebral fracture, who was successfully treated with lateral cutaneous branches of the intercostal nerves "modified" block (modified BRILMA block).

Clinical case report

A 39 year-old male patient with no relevant medical history, referred to the chronic pain unit due to chest pain secondary to T12 vertebral fracture caused 12 months ago by accidental trauma and treated with vertebroplasty (Figure 1).

Ever since, he has been unable to work due to severe back pain, which he describes as radiating pain to the left chest wall, up to the epigastrium. The patient describes this pain as continuous and he rates it as 8/10 in the Visual Analogue Scale (VAS). Several neuropathic symptoms are detected: electric shock, tingling and hypoesthesia. However, the score obtained on DN4 Assessment Tool was less than 4 points. The electromyogram reveals no significant alterations. At the time he is referred to our chronic pain unit, he is being treated with Duloxetine 30 mg/ day and Tramadol 100 mg/day. He describes adequate back pain control, but no response from the radiating pain to the left chest wall. He refuses the possibility of taking major opioids or anticonvulsants for fear of possible adverse effects. Furthermore, no treatable trigger points or other signs suggestive of myofascial syndrome are recognized on physical examination. After assessing the topographic distribution of his pain, and given the high security and minimal invasiveness of the technique, we suggest performance of a T11 level BRILMA block.

An ultrasound-guided puncture is performed on the mid-axillary line at the T11 level (Vygon Echoplex[®] 23 G x 35 mm, Sonosite X-Porte[®]) with the patient lying on a right lateral decubitus position. A linear probe with a 6-8 mHz transducer is employed.

The deep interfascial plane of the anterior serratus muscle is identified and the puncture is then performed with a caudal-cranial orientation. The tip of the needle is placed in the virtual space between the anterior serratus plane and the intercostal



Figure 1. T2 flair MRI spinal. Hyperdense material related to the vertebroplasty, with moderate spreading to the intervertebral disc between T11 and T12 vertebrae. Neural foramina appear widely patent and there is no central spinal canal compromise.

external muscle. After waterjet dissection, 18 mL of ropivacaine 0.2 % and 12 mg of betamethasone are delivered (Figure 2).

The patient describes immediate relief of his pain after the puncture, with a reduction in the VAS to 1/10. In subsequent follow-ups, he refers clinical stability, and oral analgesia is removed after three months. Nevertheless, four months later he reports progressive reappearance of his initial symptoms. For this reason, the patient is subjecte to repetition of the technique. The result remains positive, avoiding further prescription of analgesia.

Discussion

Thoracolumbar joint injuries are the most common fractures of the spine, and appear in two incidence age peaks. In younger patients, predominantly in men between 20 and 40 years old, due to high-energy trauma (motor vehicle accidents or falling injury). In elderly - mainly in women- they are associated with isolated fractures secondary to osteoporotic disease. As was seen in our patient, the majority of fractures of the lumbar and the last thoracic vertebral bodies are more painful than those of the middle thoracic spine (region with less mobility). Usually, the maximum pain intensity is located in midline of the back, at the level of the fractured vertebrae, but it often radiates forwards, without necessarily implying the existence of radicular involvement. Acute pain from a recent fracture is easily explained by tissue injury, hemorrhage, release of inflammatory mediators, deformity, and periosteal traction. Additionally, the pain may be a consequence of ligamentous complex traction, flattening of the vertebral discs (whose margins are highly innervated) or disruption of the capsules of the zygapophysial joints (4).

Moreover, our patient showed recurrent pain after percutaneous vertebroplasty. This is a not uncommon complication; it appears in 1.8 % to 15.6 % of vertebroplasties and could be caused by several conditions: secondary rib fracture, cement leakage with compression on the spinal cord or radicular nerves, new symptomatic compression fracture, spondylitis... Although all these aetiologies were ruled out in the imaging and complementary tests, given the characteristics and distri-



Figure 2. A: basic ultrasound plane for the performance of modified BRILMA block. Serratus muscle (1), rib ridge (2), intercostal muscles (3) and pleura (4) have been marked in the image above. The external intercostal muscle runs over the ribs, covered by the fascial plane of the serratus anterior muscle. B: the dashed red line marks the path of the needle. The area of distribution of the local anesthetic has been colored in blue. The tip of the needle is placed in the virtual space between the anterior serratus plane and the intercostal external muscle. With a craniocaudal orientation, the local anesthetic is infiltrated once the correct position has been checked by waterjet dissection.

bution of pain along the lateral chest wall; we cannot rule out a "silent rib fracture", involved in chronification and poorly pain management (5).

In recent years, several interfascial techniques have been described for the treatment of chest wall pain. The serratus plane in which the local anesthetic should be injected has been a cause of controversy. Some authors prefer to infiltrate the most superficial interfascial plane of the anterior serratus muscle. This block, described by Blanco et al., consists on blocking the lateral cutaneous branches of the intercostal nerves as they run superficial to the anterior serratus muscle, below the lattisimus dorsi muscle (6). However, the degree of analgesia achieved with this block is limited to the anterior and lateral chest wall. This is why this approach was considered insufficient in the clinical case presented, as pain in this patient radiated from the posterior region of the chest wall. It is believed that there is a posterior spreading of the local anesthetic with the modified BRILMA block, along the intercostal nerve pathway located under the serratus muscle (7). This complements the analgesia of the hemithorax, reaching its posterior region.

The original BRILMA, performed at T6-T7 level on the mid-axillary line, allows adequate analgesic control for the thoracic lateral wall and breast. Modified BRILMA block had a similar effect on this patient at a lower level (where our target was located), since this approach is performed at T11 or T12.

Some other procedures with proven efficacy to treat thoracic pain have been described: for example, the erector spinae plane block or transversus abdominis plane block. These are techniques with a relatively short learning curve, with a low rate of complications and well tolerated by most patients.

Unlike the anterior serratus plane block, the erector spinae plane block (ESP) provides analgesia to the anterior and posterior chest wall (8). In this case, the local anesthetic is administered on the myofascial plane located between the transverse apophysis and the erector spinae muscles, favoring diffusion of the medication through the paravertebral foramina (also through adjacent levels) anesthetizing the anterior spinal nerves prior to the origin of the intercostal nerves. In fact, we commonly perform this block as an analgesic complement in vertebral fractures with predominant back pain, with less radiation to the ventral region of the chest.

Some authors have described the reflex contraction of the psoas and quadratus lumborum muscle as a secondary mechanism derived from vertebral compression, mostly in fractures of the lower thoracic or lumbar levels. Transversus abdominis plane block (TAP) has been employed successfully in such cases, as some terminal branches of the lumbar plexus (coming from posterior T12 and L1 nerves) get anesthetized with this technique (9).

On the other hand, the paravertebral block remains the gold standard among all the thoracic analgesia techniques. Nevertheless, its utility in chronic pain is limited. It is a highly invasive technique, with the complications and contraindications typical of neuraxial procedures. Thermal radiofrequency of the posterior spinal nerve branch has also been employed in chronic pain units as treatment for this kind of pathology. The denervation of this structure allows to mitigate pain deriving from the ligamentum flavum and the intervertebral disk (10).

Conclusion

The interest of this clinical case publication lies in the fact that it is the first successful employment of the modified BRILMA block to treat this kind of pathology. With all the aforementioned arguments, we believe that thus technique deserves to be considered and should be further studied, to treat acute or chronic pain derived from vertebral fractures or compressions.

Conflict of interest

The authors declare no conflicts of interest.

REFERENCES

- 1. Fajardo Pérez M, García Miguel FJ, Alfaro de la Torre P, López Álvarez S, Diéguez García P. Bloqueo de las ramas cutáneas laterales y anteriores de los nervios intercostales para analgesia de mama. Rev Cir May Amb. 2012;17(3):95-104.
- Zocca JA, Chen GH, Puttanniah VG, Hung JC, Gulati A. Ultrasound-guided serratus plane block for treatment of postmastectomy pain syndromes in breast cancer patients: a case series. Pain Pract. 2017;17(1):141-6. DOI: 10.1111/ papr.12482.
- Martín MF, Álvarez SL, Herrera GM, Burgos JP. Bloqueo fascial ecoguiado de las ramas cutáneas de los nervios intercostales: una buena alternativa analgésica para la cirugía abierta de vesícula biliar. Rev Esp Anestesiol Reanim. 2015;62(10):580-4. DOI: 10.1016/j.redar.2015.02.011.
- Xin J, Liu X, Jing X, Su C, Mao Y, Chen F, et al. Multifactor Analysis of Costal Pain in Osteoporotic Fracture of Thoracic Vertebra. Pain Physician. 2021;24(6): E795-E80. DOI: 10.36076/ ppj.2021.24.E795.

- Lin CC, Shen WC, Lo YC, Liu YJ, Yu TC, Chen IH, et al. Recurrent pain after percutaneous vertebroplasty. Am J Roentgenol. 2010;194(5):1323-9. DOI: 10.2214/AJR.09.3287.
- Blanco R, Parras T, McDonnell JG. Serratus plane block: a novel ultrasound-guided thoracic Wall nerve block. Anaesthesia. 2013;68(11):1107-13. DOI: 10.1111/anae.12344.
- 7. Mayes J, Davison E, Panahi P, Patten D, Eljelani F, Womack J, et al. An anatomical evaluation of the serratus anterior plane block. Anaesthesia. 2016;71(9):1064-9. DOI: 10.1111/ anae.13549.
- Restrepo-Garces CE, Bambague JPR. Combined short axis erector spinae block and retrolaminar block for pain relief in acute vertebral fracture. Korean J Pain. 2019;32(3):228-30. DOI: 10.3344/kjp.2019.32.3.228.
- Støving K, Rothe C, Rosenstock CV, Aasvang EK, Lundstrøm LH, Lange KH. Cutaneous Sensory Block Area, Muscle-Relaxing Effect, and Block Duration of the Transversus Abdominis Plane Block: A Randomized, Blinded, and Placebo-Controlled Study in Healthy Volunteers. Reg Anesth Pain Med. 2015;40(4):355-62. DOI: 10.1097/AAP.00000000000252.
- Esses SI, McGuire R, Jenkins J, Finkelstein J, Woodard E, Watters III WC, et al. The treatment of symptomatic osteoporotic spinal compression fractures. J Am Acad Orthop Surg. 2011;19(3):176-82. DOI: 10.5435/00124635-201103000-00007.