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CASE REPORTS

Continuous peripheral nerve block for upper limb ischemic pain: a case report

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Abstract Peripheral Arterial Obstructive Disease (PAOD) may course with severe ischemic pain. In low-income health systems, patients may wait for vascular surgery. Continuous peripheral nerve block may be an effective alternative, with fewer side effects, in this scenario. A female patient with acute arterial obstruction of upper limb evolving with severe ischemic pain. She was submitted to a continuous infraclavicular brachial plexus block, which led to a satisfying pain control until the amputation surgery. The early postoperative period evolved with good pain management. This approach may be effective and safe as an analgesia option for ischemic pain.

Introduction

Nowadays, population aging and atherosclerosis associated comorbidities (smoking, diabetes mellitus, hypertension, and metabolic syndrome) lead to a significant prevalence of vascular diseases in the world.[1] Acute and chronic pain are important symptoms due to Peripheral Arterial Obstructive Disease (PAOD) and lead to important impact on quality of life. The lower limbs are more frequently affected.[1] Treatment should be directed to the reversion of primary cause and regain perfusion, if possible. When this is not possible, amputation of affected limb is a manner to avoid more serious complications. However, many patients require pain management before the ultimate treatment. This may be a challenging issue due to frequent old age and comorbidities. In this scenario, interventional pain management procedures may be useful.[2]

We present a case of an inpatient who presented an acute arterial obstruction in the left upper limb, leading to a challenging pain management, who underwent a continuous

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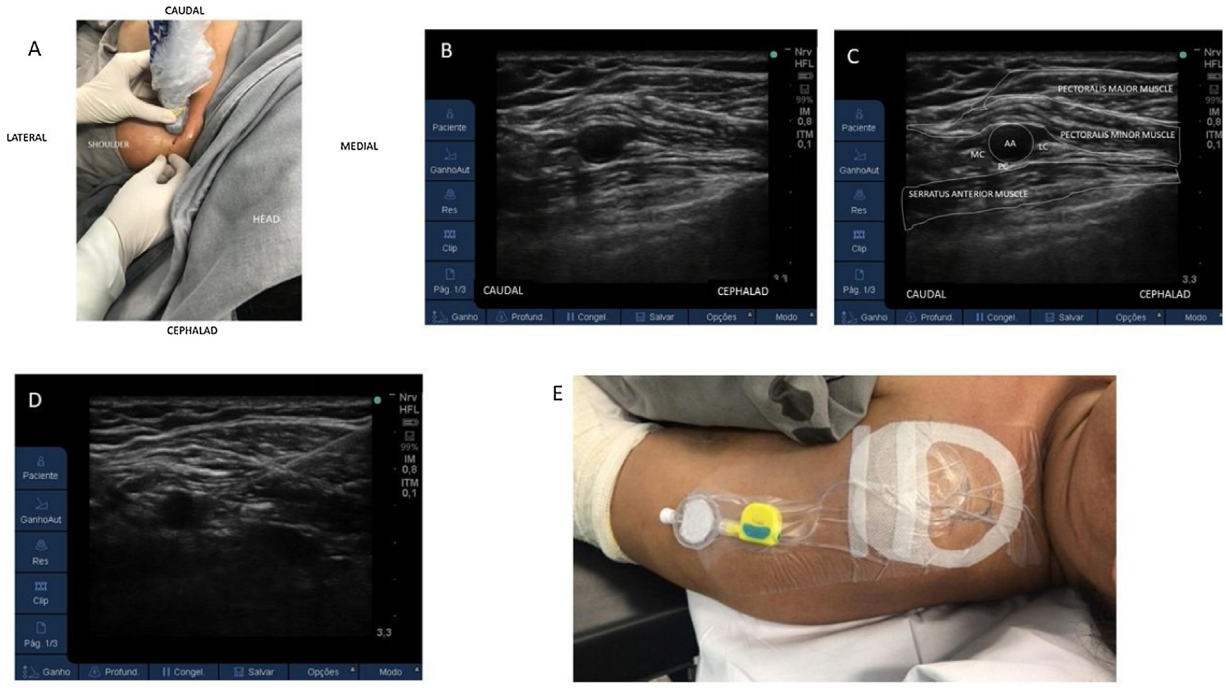

Figure 1 A, Positioning (patient and USG probe); B, Ultrasound image; C, Ultrasonographic anatomy. Axillary Artery (AA), Lateral Cord (LC), Posterior Cord (PC), and Medial Cord (MC). D, Needle in-plane toward the lateral and posterior cord. E, Insertion, and fixation of peripheral nerve catheter in the infraclavicular brachial plexus.

infraclavicular brachial plexus block, resulting in satisfactory analgesia until the definitive surgery.

Case report

Written informed consent to publication was obtained from the patient. Female, 42 years old, 70 kg, 160 cm, no diseases, on an acute arterial obstruction of the left upper limb, with no successful attempts for revascularization (embolectomy, endovascular thrombolysis, and a limb's fasciotomy).

The patient kept severe pain at the left hand and forearm, accordingly to Numeric Verbal Scale (NVS – in which 0 indicates absence of pain and 10 indicates unbearable pain) varying from 8 to 10. She was taking methadone 20 mg peroral (PO) per day; gabapentin 900 mg PO per day; nortriptyline PO 25 mg per day; intravenous (IV) morphine PRN (mean of 10 mg per day); enoxaparin 40 mg twice a day, subcutaneously.

It was decided to perform a continuous brachial plexus, infraclavicular approach, through a catheter. It was performed six hours after the last dose of enoxaparin. In the operation theater, the left shoulder region was cleaned with antiseptic solution and covered with sterile drapes. A high-frequency (6 to 13 Hz) linear Ultrasound (US) probe (M-Turbo® ultrasound system; Sonosite International, Washington, DC, U.S.A.) was placed under the clavicle, at the coracoid process, in a longitudinal plane (Figure 1A). Then axillary vein and artery, pleura, and cords (medial, lateral, and posterior) of brachial plexus (Figure 1 B–C) could be seen. Local anesthesia was then performed at the needle entry point in the skin, with 2 mL of lidocaine 1%.

An in-plane puncture (from cranial to caudal direction) was performed with a Tuohy needle (17G and 80 mm length) (Figure 1D, aiming the posterior cord. After negative aspiration 5 mL of ropivacaine 0.75% and 5 mL of lidocaine 2% without vasoconstrictor were injected. There was a spread in shape of ''U'' around the axillary artery. The patient referred immediate pain relief. Then, an 18G catheter was introduced through Tuohy's needle, 3 cm beyond the needle tip. The needle was then removed, maintaining the catheter in position. Proper spread of injection of 5 mL of ropivacaine 0.375% through the catheter could still be seen with US around the axillary artery. The catheter was covered with a sterile drape (Figure 1E).

A Patient-Controlled Analgesia (PCA) device was installed, with ropivacaine 0.2% solution, programmed as: infusion of 8 $mL.h^{-1}$; bolus of 5 mL; lock-out of 30 minutes.

After 24 hours, methadone dose was reduced in 50% and the patient remained painless. In the following days, pain scores varied between 0 and 4 in NVS. Six days later she was taking no methadone. Average usage of PCA solution was 207 mL per day.

After seven days, a left trans-humeral amputation was performed. Before the surgery, 10 mL of ropivacaine 0.375% was injected through the catheter. Then it was removed by surgeon's request, before the beginning of the procedure, due to sterility concerns. The patient went home, two days after surgery, receiving tramadol 200 $mg.day^{-1}$, gabapentin 900 $mg.day^{-1}$, and nortriptyline 25 $mg.day^{-1}$. She referred no stump or phantom pain at that moment.

Discussion

The treatment of pain due to acute obstructive arterial disease consists basically in the restoration of the tissue perfusion. When revascularization is not feasible, analgesic treatment is imperative to pain management. Such patients, due to the correlated cardiovascular risk, do not tolerate hyperadrenergic and procoagulant states associated with a severe painful condition, and are very sensitive to adverse effects of many analgesic drugs (opioid, anticonvulsant, antidepressants).[1] It is important to highlight that the patient in this case would undergo amputation of the limb, so adequate analgesia prior to the procedure becomes an important condition to maximize a possible prophylactic effect for the occurrence of postoperative phantom limb pain.[3]

Acute ischemic pain represents an intense nociceptive stimulus, often requiring strong opioids for adequate control.[1] Gabapentin and tricyclic antidepressants were also used to modulate central sensitization against intense nociceptive stimuli. Peripheral regional blocks play an interesting role in arterial ischemic disease. It is well known that regional injection of local anesthetics promotes vasodilation, which contributes to improve perfusion of the affected limb, in addition to effective local analgesia, without causing significant hemodynamic instability. This fact is extremely important in these patients, as they present compromised functional capacity related to associated diseases. Another fact that deserves attention is the capacity of the regional blocks to spare opioids and, consequently, their adverse effects. Therefore, a continuous brachial plexus block was performed using an ultrasound-guided infraclavicular approach with effective analgesia. It has been shown to be a safe and easy-to-perform option for localized upper limb pain.[2] Ultrasound-guided needling contributed to safety, reducing the risk of vascular or lung injury. Despite the ongoing anticoagulation, the patient evolved with no related complications (hematoma or bleeding). The infraclavicular approach was chosen because it is a stable site for catheter insertion, once the device is fixed through the pectoral muscles and can remain for long period, with less risk of migration.[2]

Continuous Peripheral Nerve Block (CPNB) is a useful, effective, and already stablished pain management technique for postoperative analgesia in many kinds of surgery, especially in orthopedics. However, most of the studies in this subject are in acute or postoperative pain scenarios. There are few case reports in literature investigating CPNBs for lower limb ischemic pain management.[4,5] The novelty this paper intends to show is that CPNB may be an excellent alternative for managing refractory ischemic pain when a limb is affected.

As a low-income country, with several limitations in public health system, long wait for surgery treatment (revascularization and amputation, for example) is very common. The option for a nerve block is relatively common for postoperative analgesia in case of amputation but is unusual before the procedure. It is here demonstrated that CPNB may be a valuable asset for pain management while waiting for definite surgery treatment in PAOD, especially in institutions with similar limitations.

We do realize there are commercial kits for CPNB and its use would be more suitable for the procedure. However, this material is not available in our institution. We used a Tuohy needle and epidural catheter, which could be an alternative option in places where the specific kit lacks.

Furthermore, the infraclavicular catheter remained in place for 7 days, with no signs of infection or any other complication. The benefits to the patient were very clear: pain control and reduction in opioid use.

This case report demonstrates that this approach may be effective and safe as an analgesia option for pain due to PAOD. However, randomized clinical trials comparing CPNBs with systemic analgesia in ischemic pain syndromes are required.

Conflicts of interest

The authors declare no conflicts of interest.

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