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CASE REPORTS

Debridement of axillary necrotizing fasciitis under anesthetic blocks of the serratus plane and supraclavicular brachial plexus: a case report

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Abstract The regional techniques for axillary analgesia are well established. However, few studies have investigated surgical anesthesia. In this report, extensive debridement of axillary necrotizing fasciitis, including the posteromedial region of the right arm, performed under exclusive regional anesthesia in a patient with probable difficult airway is described. The procedure was accomplished under a Serratus Plane Block (SPB) and supraclavicular brachial plexus block, guided by ultrasound, and with venous sedation. We observed satisfactory anesthesia 15 minutes after the intervention, efficient intraoperative pain control and within the following 24 hours. Surgical axilla anesthesia is feasible with the described blocks.

Introduction

Interfacial thoracic blocks, including Erector Spinae Plane (ESP), pectoral (PECS I and II), and Serratus Plane Blocks (SPB), are established analgesic techniques for thoracic, breast and axilla surgeries and are less invasive alternatives to Thoracic Epidural (TEB) and Thoracic Paravertebral Blocks (TPVB).[1–3] However, in the literature, there is no consensus on the performance of these blocks for anesthetic purposes, especially for axillary surgeries. The axilla is a region of intricate anatomy and innervation, which makes it challenging to induce surgical anesthesia in this compartment.[1]

In the present report, the combination of the SPB and supraclavicular brachial plexus block (BPB), guided by ultrasound, was proposed to address extensive axillary necrotizing fasciitis, which included the posteromedial region of the right arm, in a probable difficult airway scenario.

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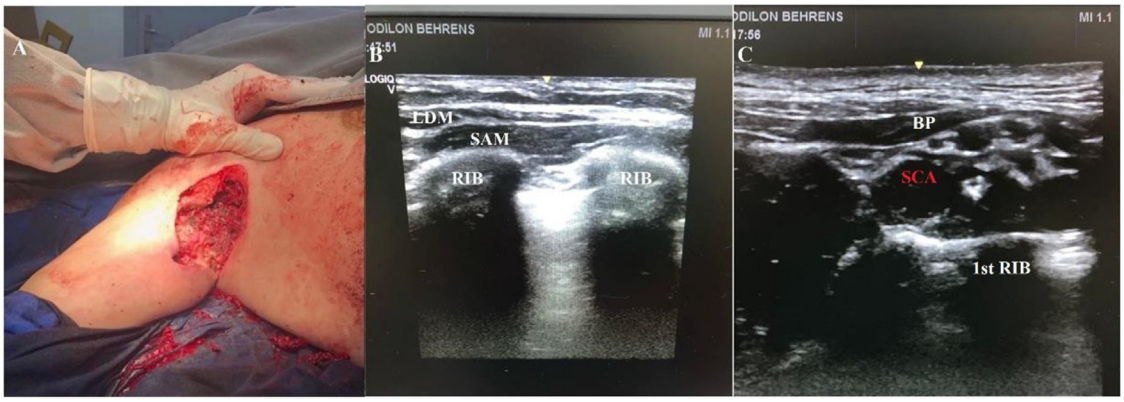

Figure 1 A, Sonoanatomy of the serratus plane block (LDM, Latissimus Dorsi Muscle; SAM, Serratus Anterior Muscle). B, Image after surgical debridement. C, Sonoanatomy of supraclavicular brachial plexus block (BP, Brachial Plexus; SCA, Subclavian Artery).

Case report

Voluntary and informed consent was provided by the patient for the inclusion of his data in this report. The patient was a 55-year-old male with a height of 1.75 m and weight of 82 kg; he had diabetes mellitus type II and took 500 mg of metformin/day. The patient was referred to the operating room for emergency surgical debridement with diffuse necrotizing fasciitis and multiple abscesses in the right axilla, which had been ongoing for 10 days due to a probable complication of suppurative hidradenitis (Fig. 1A). The patient had reported fasting for 8 hours. The physical examination revealed that he was conscious, eupneic, and hemodynamically stable. The airway examination revealed that the patient had a Mallampati score of IV, mouth opening of less than 4 cm, upper lip bite test class of II and thyromental distance of less than 6 cm. The axillary inspection showed extensive necrotizing fasciitis affecting the entire anatomical pyramid, extending to the edges of the pectoral muscles and the posteromedial face of the right arm. The laboratory tests showed leukocytosis of 15,000 cell.mm^{-3} with deviation, PCR 259 mg.dL^{-1}, hyperglycemia of 280 mg.dL^{-1} (corrected to 170 mg.dL^{-1} with 10 IU of regular insulin) and arterial gasometry showing adequate peripheral perfusion. After standard monitoring, antibiotic therapy with 400 mg of ciprofloxacin and 600 mg of intravenous (IV) clindamycin was instituted. Sedation was started with 1 mcg.kg^{-1} dexmedetomidine in a 10-minute bolus and 1 mg/kg ketamine and was maintained with 0.7 mcg.kg^{-1}.h^{-1} dexmedetomidine. Spontaneous ventilation was maintained with O_2 support by a nasal catheter at 2 L.min^{-1}. The blocks were guided by ultrasound (GE LOGIQ V2®; General Eletric Company, Wauwatosa, WI) with a linear transducer (6–13 MHz). When performing the SPB, with the patient in supine position and arm abducted, the probe was slid distally and laterally (in sagittal orientation) from the middle portion of the clavicle until 4th and 5th ribs appeared. The probe was reoriented to the coronal plane and tilted backward, identifying the Latissimus Dorsi Muscle (LDM); then, the Serratus Anterior Muscle (SAM) was visualized deep in relation to the LDM and superficial to the ribs. A 50-mm needle (Locoplex® 50 mm, Vygon, Ecouen, France) was inserted from the posterior to anterior direction in the interfacial plane of these muscles, and 20 mL of ropivacaine 0.5% was injected (Fig. 1B). In the BPB, the transducer was positioned in the transverse plane, proximal to the clavicle. The transducer was inclined caudally to visualize the thoracic structures (subclavian artery, 1strib, pleura, and brachial plexus); the plexus was noted as a collection of hyperechoic oval structures posterior and superficial to the artery. The needle was introduced in the same plane, and 15 mL of ropivacaine 0.5% was injected (Fig. 1C). A loss of sensitivity was observed in the lateral thorax wall of T2–T6 in the entire axilla and lateral region of the pectorals as well as in the entire right upper limb during the pinprick test performed 15 minutes after the blocks. A fibrobronchoscope, videolaryngoscope and laryngeal mask n. 5 were prepared in case airway rescue was needed. The procedure lasted 1 hour and 30 minutes, with satisfactory sensorial block and RASS-2 sedation scale scores. Adjuvant therapy with 2 g of dipyrone, 30 mg of ketorolac and 4 mg of ondansetron was administered. There were no pain complaints (score of 0 on the visual analogue scale) within 2 hours in the PACU. Within the following 24 hours, there were also no episodes of pain; 2 g of dipyrone was administered on a fixed schedule every 6 hours, and there was no need for opioids.

Discussion

It is well known that acute and chronic pain can develop after breast and axilla surgery, and regional anesthesia help prevent this. Both TPVB and TEB are traditional techniques for regional chest anesthesia, but they are elaborate and are associated with latent catastrophic complications.[1,2] With the evolution of ultrasound-guided blocks, new analgesic techniques have emerged for this purpose. Thoracic interfacial blocks such as the ESP, PECS I and II and SPB have appeared as safer and easier alternatives to perform.[1,3] However, while analgesia in these regions is satisfactory, procedures performed exclusively with peripheral nerve anesthesia are not widely performed. The axilla is a region of complex anatomy and innervation, and it is not simple to induce surgical anesthesia in this compartment (Table 1).[1]

Anesthetic blocks were chosen to avoid general anesthesia because of the difficult airway condition. However, it is known that the choice for regional anesthesia is not always the guarantee of safety. In cases of block failure

Table 1 Axillary anatomy.

Walls	Boundaries	Inervation
Medial	External surface of 4 first ribs Serratus anterior muscle	Intercostal nerves Long thoracic Nerve C5–C7
Posterior	Subscapularis muscle Teres major muscle Latissimus dorsi muscle tendon	Lower and upper subscapular nerves C5–C6 Subscapular nerves Thoracodorsal nerve C8–T1
Anterior	Pectoralis major muscle Pectoralis minor muscle Pectoral and clavipectoral fascias	Lateral pectoral nerve C5–C7 and medial pectoral nerve C8–T1
Base	Axillary fascia, adipose layer, and skin	Intercostobrachial nerve T2– T3 Medial brachial cutaneous nerve C8–T1 Lateral cutaneous branches of intercostal nerves T3–T9
Apex	Cervicoaxillary canal	
Lateral	Space between the humerus and the insertions of the muscles of the anterior and posterior walls	

Source: Moore KL, Dalley AF, Agur AM. Clinically Oriented Anatomy Seventh Edition. Lippincott Williams & Wilkins; 2014. p. 851-870.

or complications, the difficult airway would need to be addressed suddenly, adding risks to the situation. Clinicians may choose to perform blocks in this scenario, but it is mandatory to prepare a plan for the airway.[4]

PVTB induces axillary analgesia by accessing ventral thoracic roots, blocking the intercostobrachial and intercostal nerves. However, for anesthetic purposes, theoretically, there is a gap in the coverage of innervation since the medial brachial cutaneous nerve and the medial and lateral pectoral, long thoracic and thoracodorsal nerves originate from the brachial plexus.[1] By blocking similar innervations, the ESP also promotes good axillary analgesia. Nevertheless, the same limitations remain as with the PVTB. De Cassai et al. (2019) proposed the use of the SPB with brachial plexus selective nerve blocks to prevent these issues. The authors accessed the long thoracic, thoracodorsal, medial, and lateral pectoral nerves individually, inducing anesthesia in the region.[3]

Radiological and cadaveric dissection studies after SPBs have evidenced that solutions spread to the axilla and lateral thoracic wall, stimulating the reproduction of this block in a surgical context.[1,2] With the SPB, the accessed nerves are responsible for most of the sensitive innervation of the axilla (intercostobrachial and lateral cutaneous branches of intercostal), further the long thoracic and thoracodorsal nerves, responsible for axillary myotomes. All these nerves are located between the fascias of the SAM and LDM.[2] Sanllorente-Sebastian et al. (2020) reported 2 cases of axillary arteriovenous fistulas being successfully treated under the supraclavicular BPB and SPB (between the SAM and external intercostal muscle at the 2nd rib level). In one case, it was necessary to additionally administer mepivacaine in the incision.[5] The ability to perform the technique in the supine position in patients with severe pain was the reason why the SPB was chosen over the ESP. The SPB was chosen over the PECS II (pectorals, long thoracic, intercostobrachial, and lateral cutaneous branches of intercostal nerves are reached) because there was an infection that extended towards the anterosuperior chest. The reason that the BPB was performed was that the debridement extended to the posterior arm region (radial nerve territory) and there was a probable need to address the remaining axillary innervation (medial and lateral pectoral nerves and medial brachial cutaneous nerve).[1]

The SPB is a well-explored analgesic technique used in axillary surgeries. However, there is still a lack of strong evidence supporting the use of the SPB for anesthetic purposes in this context. In the present case, we successfully performed extensive axillary debridement with the SPB and supraclavicular BPB. Clinical trials are necessary to validate the presented conclusions as well as to determine the viability of the SPB as a unique technique in these circumstances and the required doses for this technique.

Authors' contributions

Leonardo Saraiva Guimarães de Oliveira: conception and design of the study, data acquisition and interpretation, writing of the article and critical review, final approval.

Renata de Andrade Chaves: conception and design of the study, data acquisition and interpretation, critical review of the article, final approval.

Conflicts of interest

The authors declare no conflicts of interest.

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Glossary

BPB: brachial plexus block
ESP: erector spinae plane block
LDM: latissimus dorsi muscle
PECS: pectoralis blocks
RASS: Richmond Agitation Sedation Scale
SAM: Serratus anterior muscle
SPB: serratus plane block
TEB: thoracic epidural block
TPVB: thoracic paravertebral block