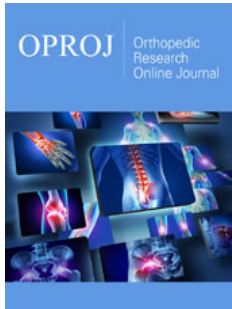



# Clavipectoral Plane Block Combined with Superficial Cervical Plexus for Awake Surgery of Clavicular Midshaft Fracture

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## Abstract

**Background:** Clavicular fractures have always been managed through general anesthesia, however, thanks to the Clavipectoral Plane Block (CPB) introduced in 2017 by Valdes, it is possible to use a regional anesthesia technique which is widely gaining interest because of its safety. But is it effective?

**Case:** A 35-year-old man with history of drug addiction underwent surgery for a complex midshaft clavicular fracture. We performed clavipectoral plane block and superficial cervical plexus block combined with dexmedetomidine intravenous sedation. An in-plane technique was used to deposit 30mL of a local anesthetic mixture (15mL per side) between the clavipectoral fascia and periosteum on both the medial and lateral sides of the fracture line.

**Conclusions:** Excellent anesthesia and analgesia for up to 20 h post-block were provided by CPB during the clavicle surgery.

**Keywords:** Analgesia; Anesthesia; Clavicle; Local anesthesia; Nerve block

## Introduction

Clavicular fractures, which account for 35% of injuries to the shoulder girdle, occur most commonly in men because of falls sustained during sport activities such as cycling and equestrian sports. According to a study conducted over a period of 6 years, it has emerged that traffic accidents were the most common mechanism of injury. Most of clavicle fractures occurred in men and the mid-clavicle was the most common location. Undisplaced clavicular fractures are usually managed conservatively, whereas surgical fixation is reserved for young patients with displaced fractures for a better functional outcome. Emergency physicians, orthopedic surgeons and anesthesiologists are frequently required to provide analgesia for patients with fractured clavicles [1]. Covering the pain due to clavicular fractures has been, until now, a great challenge because of the complex and uncertain innervation of the clavicle. For this reason, physicians preferred general anesthesia as the preferred anesthesiological choice [2]. The growing in understanding of the clavicular innervation lets regional anesthesia play a greater role in the local anesthesia of this region. In fact, we know that the cutaneous innervation of the skin above the clavicle is supplied by the supraclavicular nerve of the Superficial Cervical Plexus (SCP) [3], however, the sensory innervation of the clavicle remains controversial even if we know that the terminal branches of many of the sensory nerves like suprascapular, subclavian, lateral pectoral, and long thoracic nerves,

branches of brachial plexus, pass through the plane between the clavipectoral fascia and the clavicle itself [4]. Several case reports and case series support the use of brachial plexus block with the interscalene approach, which provides anesthesia for the clavicular region, and it has considered until now the best option for this kind of surgery. Unfortunately, this block is associated with well-known complications such as ipsilateral phrenic nerve palsy, vocal cord paralysis, vertebral artery injection, total spinal anesthesia, and pneumothorax [5]. The Clavipectoral Fascial Plane Block (CPB) is a novel regional anesthesia technique that was firstly described by Valdés in 2017 [6]. They reported injection of about 10-15mL of the local anesthetic agent under ultrasonographic guidance into the space between the clavipectoral fascia and the periosteum of the clavicle itself, on both medial and lateral aspects of the fracture area [7]. The undiscussed advantage of performing CPB is the absence of the well-known complications mentioned before of the brachial plexus block. Our case report discusses the use of a clavipectoral block and superficial cervical plexus as sole anesthesia and aims at demonstrating the 'clavipectoral space' as the target to anesthetize the clavicle in order to undergo patients to surgery. Evaluation of post-operative pain control using the Numerical Rating Scale (NRS) and analgesic consumption (FANS, acetaminophen and opioids) showed the effectiveness of this plane block. This technique perfectly accords with ERAS protocols.

### Case Report

The patient signed an informed consent, which stated that the clinical images taken would be used for medical teaching and in a journal publication. A 40-year-old male patient with a history of drug addiction but without comorbidities or allergies underwent surgery after a multi-fragmentary midshaft clavicular fracture due to a motorbike accident. The patient received open reduction and internal fixation of the left clavicle with plates and screws. Before the peripheral nerve block, the patient, whose weight was 75 kg, received an adequate sedation with midazolam (0,02mg/kg) and we started an infusion of dexmedetomidine about 15 minutes before the performance of the block, in accordance with the dexmedetomidine peak effect [8]. This strategy allowed us to have the patient well sedated but extremely collaborative. He was monitored by measuring blood pressure every 5 minutes and he was given supplementary O<sub>2</sub> at 3L/min via nasal cannula. In a supine position his head was turned to the opposite side of the fracture. With an aseptic technique and material, a CPB and SCP were performed using a high-frequency linear probe (Sonosite MicroMaxx<sup>®</sup>) placed on the anterior surface of the clavicle. We used an in-plane technique to visualize the 50mm-needle advancing through the target from caudal to cephalic. We performed 2 injections 2-3cm proximal and distal to the fracture. Aspiration was performed before the injection of the anesthetic and hydrodissection was used to identify the clavipectoral fascia.

The total amount of local anesthetic mixture was 30mL (1:1 of mepivacaine 2% and ropivacaine 7,5%), divided into 15mL medial and 15mL lateral. Local anesthesia spread over the clavicular line. The motor and sensory assessment was checked in

3 different moments: before the block, after 5 and 15 minutes of the performance of the nerve block. The patient claimed an NRS of 8-9 before the block, which increases with the extension of the arm. Already after 5 minutes the patient claimed not to have pain anymore. We have also performed a SCP with a unique 10mL-syringe filled with ropivacaine 7,5% (5mL) and mepivacaine 2% (5mL). No complications occurred and tattoos were excluded from the puncture sites. Given the history of drug addiction, we preferred to choose an intraoperative sedation with dexmedetomidine (4mcg/mL) at an infusion rate of 1mcg/kg/h, trying to avoid opioids. The surgery was performed with a beach chair position. We obtained an adequate sedation ranged between 3 and 4 in Ramsey sedation scale [9] which was maintained during the 1,5 hour-surgery. Pain scores were monitored in the post anesthesia care unit (PACU) and after 6-12-24 hours after surgery where the NRS was respectively 0-0-4-0. After 12 hours he was administered 1gr of acetaminophen and 30mg of ketorolac. No addiction pain was revealed in the next hours and no opioids were needed.

### Discussion

We observed that the combination of CPB and SCP is an effective regional technique to provide anesthesia of the clavicle, which has a complex innervation. These blocks allow physicians to avoid the notorious risks of general anesthesia, which was the preferred choice before the introduction of the regional anesthesia. CPB also avoids the undesirable side effects of more proximal techniques (interscalene nerve block) such as hemiparalysis of the diaphragm, Horner syndrome, and pneumothorax [10]. Having considered the criticality of our patient we preferred to choose the most appropriate technique that could allow the patient to recover in the shortest possible time and give an adequate comfort. For this reason, we have avoided opioids and proximal techniques with great results. Larger prospective studies are required to further clarify the distribution of sensory blockade and the efficacy and safety of the CPB.

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