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Original Research Article

# Ultrasound Guided Clavipectoral Fascia Plane Block with Superficial Cervical Plexus Block for Clavicle Surgeries - A Case Series

**Smitha Y[1], Mamatha H K[2], Naveen kumar C P[3]**

**[1]Assistant Professor, Department of Anaesthesiology and Critical care, S. S. institute of medical sciences and research centre, Davangere, Karnataka**
**[2]Associate Professor, Department of Anaesthesiology and Critical care, S. S. institute of medical sciences and research centre, Davangere, Karnataka**
**[3]Professor, Department of Anaesthesiology and Critical care, S. S. institute of medical sciences and research centre, Davangere, Karnataka**

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**Corresponding author: Dr. Smitha Y**
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**Abstract**

The clavipectoral fascia plane block (CPB) is a novel regional anaesthesia technique that has been utilized for clavicular fracture surgeries. It involves injection of local anaesthetic in between the clavipectoral fascia and the periosteum of clavicle and it provides pain relief by blocking the terminal branches of the nerves as they pass through this plane. The cutaneous innervation of the skin above the clavicle is supplied by the supraclavicular nerve of the superficial cervical plexus (SCP). We present this case series of successful management of clavicular surgeries under ultrasound guided clavipectoral fascia plane block with superficial cervical plexus block.

**Keywords:** Clavipectoral fascia, Superficial cervical plexus, Clavicle fracture, Supraclavicular nerve, Rib fracture.



## Introduction

Clavicle fracture commonly occurs as a direct fall on shoulder during sports activity or an injury during road traffic accidents. Most clavicle fractures (81%) are located at the mid shaft[1].

Historically clavicle fracture surgeries have been performed with patients under general anaesthesia. Sensorineuronal innervations of clavicle is complex and debated, and represents a challenge for the anaesthesia provider when it comes to choose regional anaesthesia for clavicle fracture[2]. A combination of Interscalene brachial plexus block and superficial cervical plexus block have been successfully used in the past for clavicle surgeries. However, these procedures can be time consuming and associated with many adverse events such as phrenic nerve injury, horners syndrome and pneumothorax[3].

The sensorineural innervation of the clavicle is a complex issue. The osseous part is mainly innervated by long thoracic, subclavian, supraclavicular, and suprascapular nerve which are responsible

for pain transmission of clavicular fracture and surgery. The skin over the clavicle is innervated from superficial cervical plexus[4].

The clavipectoral fascia plane block (CPB) is a novel regional anaesthesia technique that has been utilized for clavicle fracture surgeries. Valdés-Vilches originally described the CPB as an injection of 10-15 cc of local anaesthetic under ultrasound guidance in between the clavipectoral fascia and the periosteum on the medial and lateral aspects of fractured site[5]. It is hypothesized that the CPB provides pain relief by blocking many of the above nerves as their terminal branches pass through the plane between the clavipectoral fascia and the clavicle[6].

Since the skin over clavicle is supplied by supraclavicular nerve which is a branch of superficial cervical plexus that doesn't penetrate clavipectoreal fascia we supplemented CPB with superficial cervical plexus block[7].

We in this case series report successful use of clavipectoral fascia block with superficial cervical plexus block for open reduction and internal fixation of clavicle fracture surgery.

**Anesthetic Procedure**

Pre anaesthetic evaluation was done. Informed consent was obtained. Investigations were assessed. Once the patients were shifted inside the operating room, monitors like non-invasive blood pressure, pulseoximetry and electrocardiogram were connected, and baseline vital parameters were recorded. Patients were sedated using intravenous midazolam and fentanyl with supplemental oxygen at 3l/minute via nasal prongs.

The block was performed preoperatively under ultrasound guidance using high frequency linear probe. The patient was placed supine with the head turned to opposite side. Under aseptic precautions the linear probe was placed, on the anterior aspect of clavicle and the fracture site located. Then the injection points were marked 2-3 cm medial and 2-3cm lateral to the fracture site. After visualizing the clavicle and clavipectoral fascia, an in-plane technique was used and needle inserted in a caudal to cranial direction, 30 ml of local anesthetic (mixture of 15 ml of 0.5% Bupivacaine and 15 ml of Xylocaine with adrenaline) was injected on the medial and lateral aspects of the fracture site (15 ml on either side) after negative aspiration for blood. Drug was deposited between the periosteum of clavicle and the clavipectoral fascia.[fig:2]**.**

Superficial cervical plexus was identified under ultrasound guidance, between the middle and anterior scalene muscles, in the space posterior to the sternocleidomastoid muscle 5 ml of Inj.bupivacaine 0.5% was injected after negative aspiration of blood.

We confirmed the required dermatomal coverage using pinprick method and also had it confirmed by the operating surgeon prior to the incision.

**Case Studies**

1) A 50 year old male,ASA II, with right Lateral 1/3 rd clavicle fracture following road traffic accident was posted for open reduction internal fixation with plating and screws .He had right sided 3$^{rd}$ and 4$^{th}$ rib facture. He was a known case of hypertension. CPB with superficial cervical plexus block was performed as described above. Patient was pain free intraoperatively there was no need of analgesic supplementation. No complications were noted intraoperatively and post operatively.The patient was very much satisfied with the anaesthetic technique.

2) A 43-year-old male with road traffic accident sustained fracture of middle third of left clavicle. He had head injury with sub arachanoid haemorrhage with GCS of 14/15, treated conservatively. He was a

known diabetic on oral hypoglycaemic drugs. CPB with superficial cervical plexus block was performed as described above. Patient was pain free intraoperatively. There was no need of additional analgesic supplementation. No complications were noted perioperatively.

3) A 27-year-old female with no known comorbidities had closed, complete displaced fracture in the middle third of the left clavicle following trauma. Patient was posted for open reduction and internal fixation with plates and screws. CPB with superficial cervical plexus block was performed. Patient neither needed any supplemental analgesics nor had any complications perioperatively.

4) A 50-year-old male, obese weighing 90 Kgs was posted for clavicle plate removal. He had history of OSA.He had short neck with mallampatti grade 3 with anticipated difficult intubation. he was also apprehensive about general anaesthesia He was counselled for clavipectoral fascia block with superficial cervical plexus block. Preoperatively procedure was performed as described above he was very comfortable intraoperatively and post operatively he was very thankful and satisfied with the block.

**Discussion:**

Use of regional anaesthesia for clavicle surgeries has been limited due to complex innervations of the clavicular region. The supraclavicular nerve of the superficial cervical plexus innervates the skin above the clavicle. All the sensory nerves supplying the clavicle penetrates the clavipectoral fascia.

Although the high-volume interscalene block often blocks the cervical plexus, it can cause hemidiaphragmatic paresis due to associated blockade of the phrenic nerve that can cause detrimental effects in some patients with obstructive sleep apnea, obesity, or significant underlying lung disease. Other complications like Horner's syndrome, local anaesthetic systemic toxicity, total spinal anesthesia, and adverse events like epidural or vertebral artery injections are also associated with this block[3].

The clavipectoral fascia is a thick fascia located on the clavicular portion of the pectoralis major muscle that extends superior, medial and superolateral from the clavicle, the costochondral joints, and the coracoid process respectively[fig:1].

The success of the clavipectoral fascial plane block and its analgesic coverage depends on the integrity of the fascia , the potentiality of the interfascial plane and adequate local anaesthetic distribution around the clavicle to block all nerves that pierce the clavipectoral fascia before supplying the clavicle, hence ultrasound-guided CPB involves two injections at either side of the clavicle fracture site and the deposition of LA in the plane between the clavipectoral fascia and the periosteum of the clavicle. Its analgesic coverage depends on. It acts by blocking all the nerves running in the plane between the clavipectoral fascia and the periosteum of the clavicle.

The advantages of CPB include the ease of administration, an advanced safety profile in patients with respiratory diseases. CPB can be safe and effective in trauma patients with rib fractures and pneumothorax in whom general anaesthesia can be detrimental.

Since the skin over clavicle is supplied by supraclavicular nerve which is a branch of superficial cervical plexus that doesn't penetrate clavipectoreal fascia we supplemented CPB with superficial cervical plexus block[7].

The adrenaline-containing LA solution used in our patients helped prolong the analgesic duration, achieve a clean and bloodless surgical field, and reduce total blood loss.

Valdés-Vilches originally described the CPB as an injection of 10-15 cc of local anaesthetic under ultrasound guidance in between the clavipectoral fascia and the periosteum on the medial and lateral aspects of fractured site[5]. Numerous case reports have emerged since its description. Ince et al. successfully anesthetized a patient using CPB with skin infiltration and suggested the safe and effective use of CPB to provide anaesthesia for clavicle surgeries as an alternative to interscalene block[8].

Atalay et al. added evidence to support the use of CPB for medial end clavicle fracture to provide anaesthesia and analgesia as an alternative to the interscalene block[9].

Kukreja et al. further highlighted the motor-sparing and phrenic-sparing effects as added benefits of this more distal block[3].

In our case series, CPB with superficial cervical plexus block provided adequate surgical anaesthesia. None of the patients required additional supplementation of analgesics intraoperatively. All the patients were hemodynamically stable without any complications. All patients were pain free in immediate post operative period. All our patients were very much satisfied with the block.

**Conclusion:**

From this case series we concluded that ultrasound guided CPB with superficial plexus block can be used for clavicular surgeries. This block has the advantage of ease of procedure and good success rate. It is highly recommended especially in patients where general anaesthesia carries higher risk.

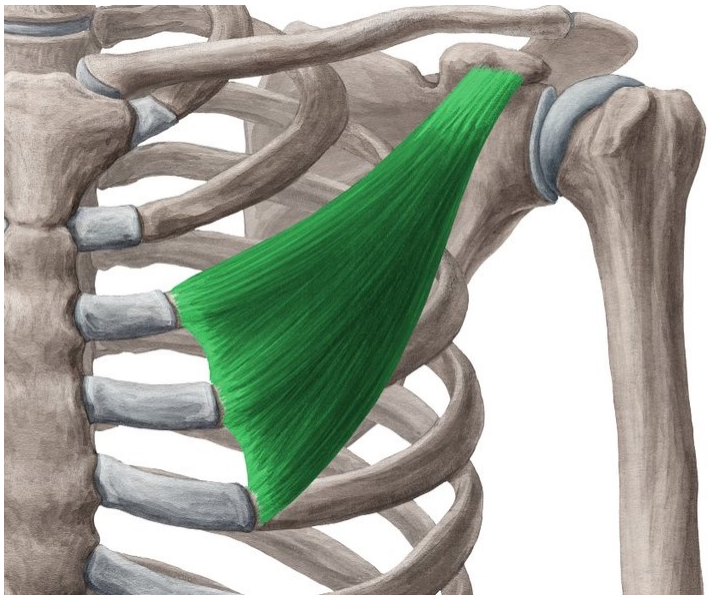

**Figure1: Anatomy of clavipectoral fascia**

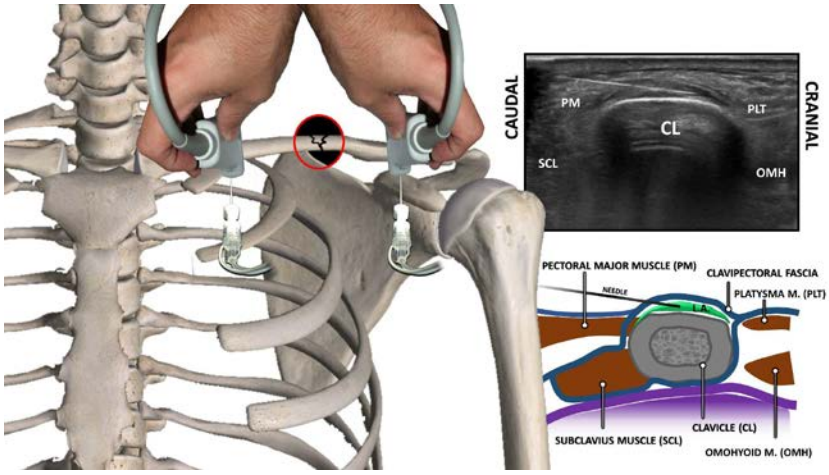


**Figure 2: ultrasound guided CPB block**

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