Ultrasound-Guided Clavipectoral Fascial Plane Block for Clavicle Surgery: A Case Report

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The clavicle is a frequently fractured bone. Regional anesthesia for clavicle surgeries is always challenging due to its complex innervation arising from the two plexuses (cervical and brachial). The clavipectoral fascial plane block (CPB) is a novel, procedure-specific, phrenic-sparing, and motor-sparing RA technique that can provide anesthesia or analgesia for clavicle surgeries. The clavipectoral fascial plane block was introduced by Dr. Luis Valdes in a symposium at the 2017 European Society of Regional Anesthesia and Pain Therapy Congress.

We performed an ultrasound-guided Clavipectoral plane block (CPB) with intravenous sedation provided in a 48-year-old male patient with a right mid-shaft clavicle fracture with COPD. This in-plane technique was used to deposit 30 ml of a local anesthesia mixture between the clavipectoral fascia and periosteum on both the medial and lateral sides of the fracture line.

INTRODUCTION

Clavicular fractures are frequently encountered in orthopedic practice, and about 80% of these fractures are located in the mid-shaft region. Due to the complexity and variability of the nerve supply of the clavicle, there is an ongoing debate regarding the optimum regional anesthetic technique that could be applied to decrease pain in such cases.1-2

Multiple approaches are available to manage clavicular fractures, including general anesthesia or regional techniques such as interscalene brachial plexus combined with superficial cervical plexus blockade.3 The clavipectoral plane block (CPB) can avoid the possible adverse events associated with an interscalene block, such as ipsilateral phrenic nerve palsy, vocal cord paralysis, vertebral artery injection, total spinal anesthesia, and pneumothorax.4

This case report discusses the use of a clavipectoral block as the sole nerve block that provides surgical anesthesia and analgesia in a mid-shaft clavicle fracture. Evaluation of postoperative pain control using the Numerical Rating Scale (NRS) and opioid consumption showed the effectiveness of this plane block.

CASE REPORT

A 48-year-old, 165 cm; 60 kg; American Society of Anesthesiologists physical status II patient with COPD had a closed, displaced fracture in the middle third shaft of the right clavicle after trauma. Investigation showed hemoglobin of 12.5 g% with a total leukocyte count of 7,400/ml, platelets-273000 cells/cumm, fasting blood sugar 123mg/dl. Results of serum electrolytes, and renal and liver functions were within normal limits. Chest
radiography showed emphysematous changes in both lungs. The electrocardiogram revealed normal sinus rhythm.

On examination, his pulse was regular with 98 beats per minute, blood pressure 130/80 mmHg, and respiratory rate 22 per minute. On auscultation, there was bilateral air entry. His airway was Mallampati grade II. A high-risk informed and written consent was obtained. Two units of blood were made available for the surgery. On arrival in the operating room, intravenous access was established with an 18 G cannula. The patient was placed in the supine position. Standard monitoring was performed (ECG, electrocardiography, pulse oximetry, and noninvasive blood pressure).

A peripheral nerve block was administered preoperatively under sedation with midazolam (2 mg) and fentanyl (50 µg) intravenously. Monitoring was set to 5-minute intervals with supplemental oxygen at 3 L/min via nasal cannula. In the supine position, the head was turned to the contralateral side (left). The block was administered with appropriate asepsis. The affected clavicle was surrounded by sterile drapes. A high-frequency linear probe dressed with a sterile sonography cover was used to scan the length of the clavicle. The probe was initially placed 2 to 3 cm proximal to the fracture line to mark the first injection and a similar marking was performed 2 to 3 cm distal to the fracture line to mark the second injection. The periosteum of the clavicle as well as the surrounding fascia were visualized for both the medial and lateral injection sites. An in-plane technique was used to view the ultrasound-visible stimulation needle advancing in a caudad to cephalad direction until it rested on the clavipectoral fascia. Aspiration was performed before the injection of local anesthesia. An injection pressure monitor attached to the syringe objectively measured the injection pressure during the administration of the peripheral nerve blocks. The total amount of local anesthetic mixture used was 30 ml (0.375% ropivacaine and 1% lidocaine), divided into 15 ml medial and 15 ml lateral. The first injection was deposited on the medial side. The same steps were followed to block the lateral fracture line. Sensory and motor assessment of the arm and shoulder was performed 15 min after the nerve block. The right supraventricular and intracavicular areas were mapped for coverage of the block, which were both insensate to needle pricks. Additionally, the right upper extremity retained a full range of motion leading to unremarkable surgery for almost two hours. The patient was monitored for pain control at the post-anesthesia care unit for two hours, with an NRS score of 0/10. Twelve hours after the nerve block, the patient sat comfortably on the bed while wearing an arm sling, retaining an NRS of 7/10. The right clavicle area was insensate. The patient was able to perform a range of motion over the right elbow and wrist. It was immediately relieved by a dose of intravenous tramadol (50 mg), decreasing the pain score to NRS 0/10. The postoperative course of the patient was uneventful and was discharged after his condition improved.

DISCUSSION

The clavicle and anterior superior shoulder area derive their nerve supply from both the cervical and brachial plexus. Thus, any single block is usually insufficient to provide effective surgical or peri-operative analgesia. Regional anesthesia for sole clavicle surgeries has not been commonly practiced due to multiple innervations of the clavicle. The combination of ultrasound-guided interscalene and SCP block has been successfully used for open reduction and internal fixation of clavicle fracture.5 Also, ultrasound-guided SCP and superior trunk interscalene blocks have been used as sole anesthetic techniques for acromioclavicular joint fixation surgery.6

It has been shown that a large volume of local anesthetic for interscalene brachial plexus block often results in cervical plexus blockade.7 Both interscalene and cervical plexus block have the potential to cause phrenic nerve paralysis, which can lead to detrimental effects in some patient populations, such as those with obstructive sleep apnea, obesity, or significant underlying lung disease. Besides diaphragmatic hemiaparesis, interscalene block can also cause upper extremity motor block and complications like Horner’s syndrome and adverse events of epidural or vertebral artery injection.8

The clavipectoral fascial plane block (CPB) can provide anesthesia or analgesia for CF, eliminating the disadvantages of plexus blocks. This nerve block technique may provide benefits to patients with difficult airways and in trauma patients with rib fractures and pneumothorax, where general anesthesia may increase the risk of expansion of the pneumothorax.4 Ince et al. successfully anesthetized a patient using CPB with skin infiltration and suggested the safe and effective use of CPB to provide anesthesia for clavicle surgeries as an alternative to ISB.9 Kukreja et al. further highlighted the motor-sparing and phrenic-sparing effects as added benefits of this more distal block.4 Similar observations were appreciated by Ueshima et al. for lateral end clavicle fracture.10

In our patient, we used an ultrasound-guided clavipectoral fascia block with analgesic efficacy for clavicle surgery. We confirmed the required dermatomal coverage using pinpricks before shifting our patient inside the operating room, where the operating surgeon reconfirmed it using blunt forceps.
before the incision. Our patient remained comfortable throughout the surgery, the clavipectoral fascia block creates a field block around the clavicle without causing the sensorimotor alterations of the whole upper extremity.

CONCLUSIONS

This case report supports the use of an ultrasound-guided clavipectoral fascia block for anesthesia and analgesia in mid-shaft clavicle surgeries. In addition to its safety and ease of use, an ultrasound-guided clavipectoral fascia block is a good alternative, especially if general anesthesia is not warranted. It also provides another effective alternate regional anesthesia technique while avoiding undesirable side effects of more proximal techniques such as motor blockade and phrenic nerve paralysis.

REFERENCES


