

## Non-Conventional Analgesic Approach in Thoracic Trauma Patients – Continuous Bilateral Serratus Anterior Plane Block in Preventing and Weaning Mechanical Ventilation

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### Abstract

Injuries caused by blunt thoracic trauma are frequently associated with pulmonary complications and severe pain, prolonging both hospital and intensive care unit stay and significantly increasing healthcare costs.

Ultrasound-guided Serratus Anterior Plane block is a recent technique that provides analgesia for the lateral and anterior thoracic wall by blocking the lateral branches of the intercostal nerves from T2 to T12.

We present the use of this regional approach and other complementary ultrasound guided blocks with excellent results, as part of a multimodal early analgesia plan that contributed to the avoidance of mechanical ventilation and all its associated complications.

**Keywords:** Thoracic trauma; Serratus anterior plane block; Peripheral ultrasound block; Analgesia; Intensive care

### Dear Editor,

Injuries caused by blunt thoracic trauma are frequently associated with pulmonary complications and severe pain, prolonging both hospital and Intensive Care Unit (ICU) stay and significantly increasing healthcare costs [1].

Pain is a proven contributing factor for a significant part of the associated blunt thoracic trauma morbidity [2]. It compromises respiratory dynamics that can progress to respiratory failure, atelectasis, infection and the need of ventilatory support [3].

Optimization of analgesia is crucial to patients enhance recovery, promoting early mobilization and chest physiotherapy that may prevent the need of orotracheal intubation. On the other hand, it may help weaning the ventilator and all the associated complications.

Ultrasound-guided Serratus Anterior Plane Block (SAPB) is a recent technique that provides analgesia for the lateral and anterior thoracic wall by blocking the lateral branches of the intercostal nerves from T2 to T12. It is a safe and simple to perform block with no significant contraindications or side effects [4,5]

We present the use of this regional approach and other complementary regional ultrasound guided blocks in the ICU setting.

A 53-year-old female, victim of run over with 5-meter projection, was admitted with multiple fractures, including 1<sup>st</sup> to 7<sup>th</sup> left ribs, 1<sup>st</sup> to 4<sup>th</sup> right ribs associated with left hemopneumothorax and extensive pulmonary contusion; proximal right humeral, right clavicular and left scapular fractures. Despite the high kinetic trauma, patient had minor brain trauma injury, remaining with a Glasgow Coma Scale >13.

Patient was admitted in ICU due to progressive ventilation deterioration with poor gas exchange (PaO<sub>2</sub>:FiO<sub>2</sub> ratio < 200) which anticipated a short-term need for orotracheal intubation.

Despite optimized conventional analgesia, anaesthesia collaboration was requested due to difficult pain control (scoring 8/10 in Numeric Pain Scale (NPS)).

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**Figure 1:** SAPB Catheter placement on the left side of thoracic wall, with continuous infusion.

Given the scenario, location of the fractures (lateral and anterior wall) and the impossibility of lateralization to perform techniques such as thoracic epidural or Spinal Erector Plane block, informed consent was obtained to perform continuous bilateral SAPB and single shot Clavipectoral Fascial Plane Block (CPB). A continuous interscalenic block was considered for shoulder analgesia but was not performed knowing the associated high risk of phrenic paralysis which could impair, even more, respiratory function and culminate in orotracheal intubation, our main goal to avoid.

Under ultrasound guidance using high frequency linear probe, with an in-plane approach, a 18G Tuohy needle was inserted at mid-axillary 7<sup>th</sup> rib level line (from caudal to cephalic direction) below the serratus anterior muscle and catheter was introduced 8 cm beyond needle tip. With ultrasound visualization an initial 20 mL of 0.2% ropivacaine bolus was given. Both catheters were inserted under serratus anterior muscle and secured over skin with an adhesive plaster (Figure 1).

Pain relief was almost immediate, being the remain pain referred to the right clavícula and shoulder, and left scapula. Afterwards, a CPB was performed using an one puncture technique, laterally to the level of the fracture and 15 mL bolus of levobupivacaine 0.25% was administered under ultrasound visualization.

Fifteen minutes after performing these regional techniques, a 3/10 in NPS score was recorded, being the cause of the remaining pain localized to the proximal humerus and scapula. An elastomeric infusion 5mL/h pump of 0.15% ropivacaine was initiated bilaterally through the SAPB catheters.

Visual and ultrasound pulmonary expansion improvement was notorious and there was a significant enhancement on gas exchange, being PaO<sub>2</sub>:FiO<sub>2</sub> ratio >250 8 h after infusion start.

Patient was able to initiate pulmonary physical rehabilitation with no thoracic pain limitation on day 1 after ICU admission. On day 5, patient was submitted to proximal humeral fixation under general anaesthesia, keeping the infusion through the serratus plane catheters.

Despite the lack of shoulder analgesic blockade, it was possible to extubate the patient after surgery with no complications.

Patient was discharged, from ICU, 6 days after admission and SAPB catheters were removed after 12<sup>th</sup> day of insertion. No complications related to technique, namely, inflammatory signs on catheters insertion site were recorded.

SAPB is an effective method for analgesia in complex thoracic trauma. It is a technique that can easily be accomplished at bedside and does not require patient's mobilization. This can constitute a major competitive advantage specially in ICU polytraumatized patients. Moreover, some of the neuraxial approach contraindication, namely coagulopathy problems, and major complications are overtaken by this novel regional technic.

These analgesic alternative strategies constitute a major benefit to patients and should be performed as soon as possible. An optimized, multimodal early analgesia may prevent mechanical ventilation, shorten ICU duration of stay and all its associated complications, and minimize hospital related costs. In ventilated patients this can also be effective helping weaning from mechanical ventilation.

All critical care professionals should be aware of these analgesic alternatives and work in proximity with acute pain units for the good benefit of patients.

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