

# Ultrasound-Guided Serratus Anterior Plane Block for Acute Pain Associated with Multiple Rib Fractures in the Trauma Intensive Care Unit: A Case Series

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2018 World Congress on  
Regional Anesthesia & Pain Medicine

April 19-21, 2018 | New York Marriott Marquis, New York City, USA  
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## Introduction

- Pain management of traumatic rib fractures helps to promote optimal pulmonary function and avoid complications such as respiratory failure and pneumonia [1]. Intercostal nerve blocks often involve multiple injections which can be time-consuming [3]. Pneumothorax can occur with both intercostal and paravertebral blockade [3]. Anticoagulation risks, nerve damage, and significant hemodynamic shifts are additional drawbacks associated with paravertebral and neuraxial blockade.
- Serratus anterior plane block (SAPB) is a novel block with reported utility for breast procedures, thoracotomy, and rib fracture analgesia in the emergency department.

## Materials and Methods

- Informed consent was obtained, and IRB approval waived for all subjects. Five male patients with multiple traumatic rib fractures underwent single shot SAPBs. All patients presented with significant static and dynamic pain, with impaired cough and deep breathing refractory to conservative pain management.
- A linear array ultrasound probe (8-13 MHz) was placed across the mid-axillary line at the level of the fifth rib, where latissimus dorsi was identified [Figure 1].
- A block needle (B. Braun Stimuplex) was advanced from supero-anterior to postero-inferior direction into the fascial plane above the serratus anterior muscle (SAM), where 15cc of 0.5% Ropivacaine were administered (21 gauge for all patients except one where 22 gauge was used).

## Results/Case Report

- Our patients had average age of 52 years. Three of them had relative contraindication to neuraxial analgesia due to anticoagulation with Rivaroxaban, Prasugrel, and Enoxaparin.

## Images

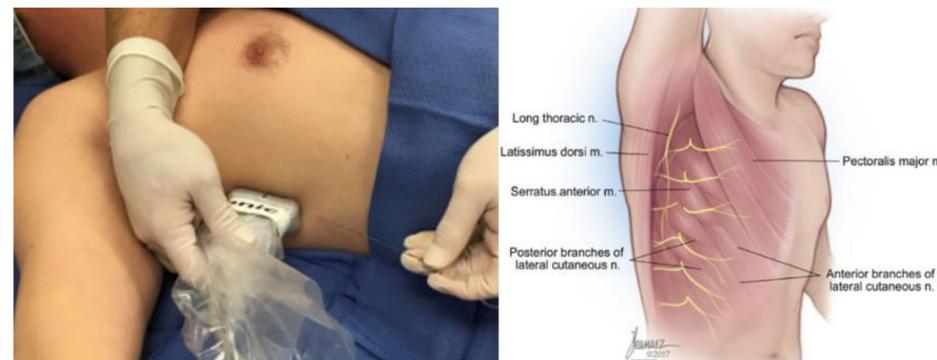
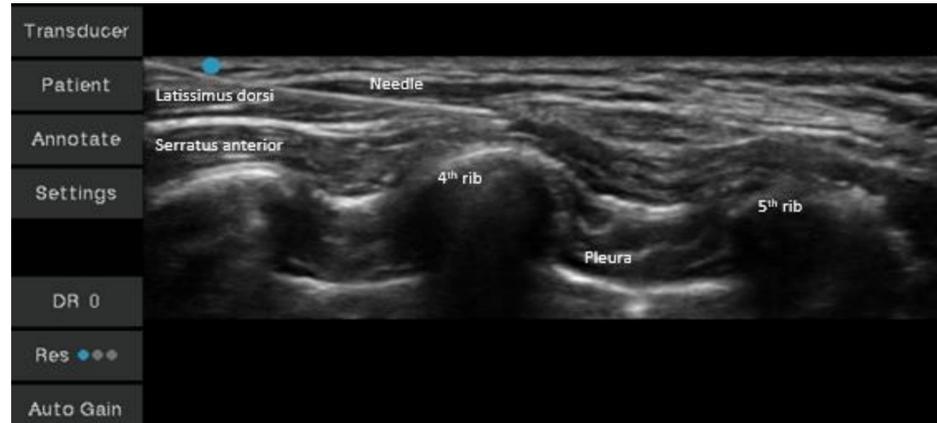


Figure 1. Serratus anterior plane block sonoanatomy (top), with block approach (bottom left) and neuroanatomy (bottom right). Bottom images adapted from Western Reserve Anesthesia Education Block Buddy App.

## Results/Case Report (Continued...)

- One patient failed four epidural placement attempts, and another had a T7 transverse process fracture. Two patients had chronic pain history with opioid tolerance; one was given bilateral SAPBs for bilateral rib fractures with 10mg Dexamethasone additive, and another had combination of SAPB with quadratus lumborum block for more caudal coverage. All patients had > 50% pain relief on numeric rating scale within 1 hour of SAPB, with significant improvement on incentive spirometry and coughing mechanics.

## Discussion

- Managing acute rib fracture pain within the first 2 weeks of injury is critical, as acute pain intensity is predictive of chronic pain and disability [4]. Traditional pain control options for patients with multiple rib fractures are associated with multiple side effects, complications, and anticoagulation limitations.
- SAM is a superficial and easily identifiable target on ultrasound. When close to the mid-axillary line, the lateral cutaneous branch of the intercostal nerves pierces the SAM to innervate the thorax musculature [1]. Injecting anesthetic solution into the fascial plane just superficial to the SAM could provide analgesia to thoracic injuries such as rib fractures comparable to paravertebral or epidural blocks. SAPBs are simple to perform, less invasive, and can serve as an effective alternative to provide analgesia during this critical period.

## References

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