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SERRATUS ANTERIOR PLANE BLOCK (SAPB) IMPROVES PAIN CONTROL IN RIB FRACTURES

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Background

- **Trauma** is a major cause of morbidity and mortality worldwide. **Rib fractures** are identified in at least 10% of all injured patients.
- Rib fractures can lead to **significant respiratory complications**, with pneumonia and respiratory failure occurring in up to 31% of patients with rib fractures. **Early initiation of aggressive pain control and pulmonary hygiene with incentive spirometry** are standard of care to prevent complications from developing.
- In the Emergency Department, patients with rib fractures typically receive **systemic analgesia that is largely narcotic-based**. This pain control strategy puts patients at risk for the **side effects** of narcotics such as constipation, delirium, and opioid addiction.
- **Regional ultrasound-guided anesthesia** is well within the purview of emergency physicians and offers a safe and effective alternative to systemic pain medications. A regional block known as the **Serratus Anterior Plane Block (SAPB)** was described in the anesthesia literature in 2013 as a strategy for improving pain related to rib fractures.
- The **literature evaluating the effectiveness of the SAPB is limited** to case reports with a small number of patients (n = 1-6). No published studies have assessed incentive spirometry performance in patients who have received the SAPB, described the systemic analgesia required by patients who have received the SAPB, or formally evaluated the safety of the SAPB.

Objective

We sought to characterize the range of chest wall pain experiences for adult emergency department patients with acute traumatic rib fractures following receipt of the Serratus Anterior Plane Block (SAPB).

Secondary aims included describing incentive spirometry performance, morphine milligram equivalents received, and block complications in patients who received the SAPB.

Methods

Study Design:

- **Prospective Cohort Study**

Setting:

- **Maine Medical Center (MMC) Emergency Department** – Approximately 74,000 patient visits annually at 637-bed academic, tertiary care, Level-I trauma center

Subjects:

- **Adult patients** (≥ 18 years of age) with acute traumatic injuries including (but not limited to) ≥ 2 **unilateral fractures of anterior or lateral ribs 2-9**, being admitted to the Trauma Surgery service.
 - Recruited on a convenience basis by screening of Trauma Team activation pages.
- **Exclusion Criteria:**
 - **Inability to provide informed consent or verbally score chest wall pain** (i.e. patients who are intubated, have traumatic brain injury, clinical intoxication, or cognitive impairment).
 - **Distracting injury** (i.e. long bone fracture, visceral injury, large laceration, large burn, chest tube in place).
 - **Allergy to bupivacaine or weight < 50 kg** (to allow standard dosing of bupivacaine).

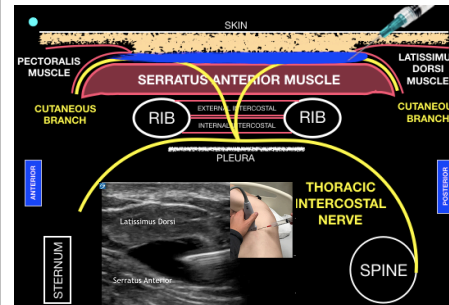
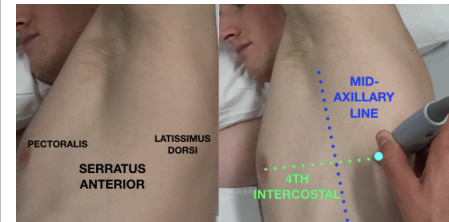
Intervention:

- **Serratus Anterior Plane Block (SAPB)**
 - Performed under ultrasound guidance using 20mL of 0.5% bupivacaine with 10mL of normal saline
 - Enrolling providers were Emergency Medicine residents and attendings with dedicated training in performing the SAPB.

Data Collection:

- **Chest wall pain** on an 11-point scale **at rest** and **with incentive spirometry use**, and **vital capacity** on incentive spirometry, before the SAPB was performed and again 15 and 60 minutes after the block was performed.

Performing the SAPB



Methods (cont'd)

Data Collection (cont'd):

- **Morphine Milligram Equivalents (MME)** received by the patient during the 8 hours after the block is performed.
- Block-related **complications** during the 24 hours after the block is performed (infection/hematoma at block site, pneumothorax, local anesthetic systemic toxicity).

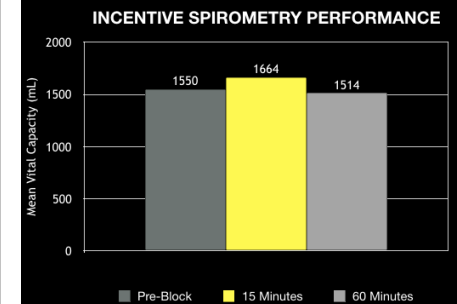
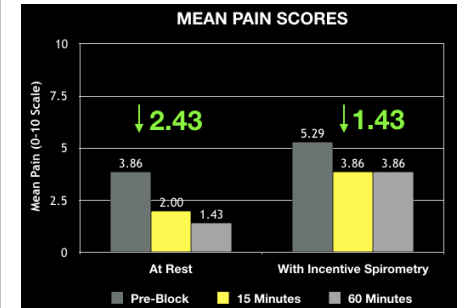
Results

Our study is currently enrolling, with a goal of 65 patients.

The following preliminary analysis is from the first 7 patients enrolled:

- **Mean Age:** 72 years
- 4 Female, 3 Male

Tables



PATIENT AGE/SEX	MME 8 HRS	COMPLICATIONS 24 HRS
92 F	0 mg	0
52 M	15 mg	0
65 M	20 mg	0
78 F	8.7mg	0
77 F	8 mg	0
51 M	0 mg	0
95 F	0 mg	0

Conclusion

The Serratus Anterior Plane Block is a safe ultrasound-guided nerve block that can improve pain control in patients with rib fractures.

Conflict of Interest Disclosure: None
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