



# Ultrasound-guided analgesic injection for acromioclavicular joint separation in the emergency department

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## ABSTRACT

We present the first documented case of an emergency clinician treating the pain of an acute Acromioclavicular (AC) joint separation through ultrasound (US) guided injection of an anesthetic agent. A 41 year old male presented with an acute traumatic grade III AC joint separation after falling off a scooter, and his pain was not significantly improved with oral medication. The AC joint was located by US, and bupivacaine was injected into the joint effusion under US guidance, yielding near complete resolution of pain. In orthopedics and physiatry literature, US guided AC joint injections have been shown to be far more efficacious than landmark guided AC joint injections, yet this is the first known case documenting injection in the Emergency Department (ED). The superficial location of the AC joint, its ease of identification by US, and the rapid onset of analgesia by intra-articular injection makes the US-guided anesthetic injection of the AC joint an ideal tool to incorporate into a multimodal approach to pain management in AC joint separations.

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## 1. Introduction

Acromioclavicular (AC) joint injuries are common, accounting for 40% of shoulder injuries, and are frequently associated with sport-related activities and vehicle accidents [1]. The AC joint is a diarthrodial joint formed by the distal clavicle and the acromion process of the scapula (Fig. 1a). The primary functions of the AC joint are to support the upper extremities and to transmit force from the appendicular skeleton to the axial skeleton. The acromioclavicular and coracoclavicular (CC) ligaments reinforce the AC joint and are the structures commonly injured in AC joint injuries.

The primary Emergency Department (ED) management of an acute AC separation is pain management, and in severe cases, orthopedic referral. Oral pain control is the cornerstone of treatment, and is often a challenge in the era of opioid sparing therapy. Ultrasound (US)-guided AC joint injections have been demonstrated to be efficacious in the outpatient setting [2], but have never been described as a part of multimodal analgesia in the acute setting. An US-guided approach to injection has been shown to more successfully access the AC joint as compared to a landmark-based injection technique (93.6% versus 68.2%), and is

also associated with better pain relief [3]. This technique can be easily performed at the bedside and offer another option in the multimodal strategy for pain control for this common acute ED injury [4]. We present the first report of an ED based ultrasound-guided injection of the AC joint for analgesia of acute AC joint separation.

## 2. Case

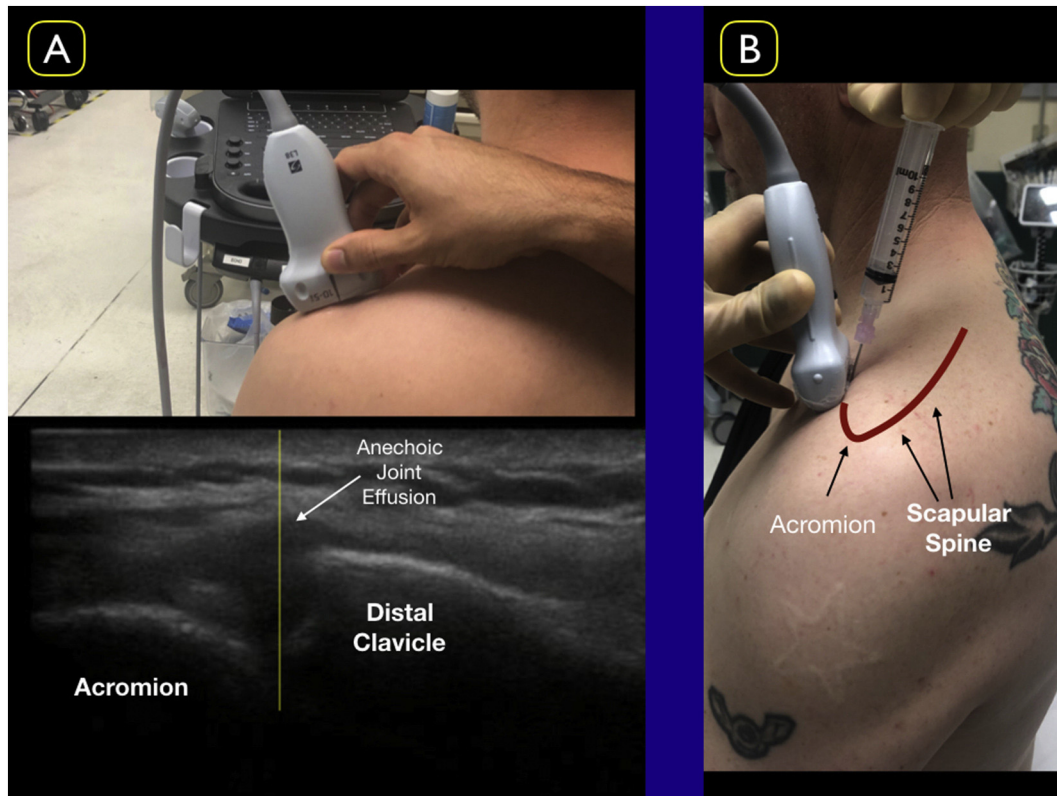
A 41-year-old male with no relevant past medical history presented to the ED with a chief complaint of left shoulder pain after falling off of his motorized scooter. His physical exam showed prominence of the medial aspect of his left AC joint that was extremely tender to palpation, with his overlying skin intact. Plain films of the left shoulder showed a Rockwood Grade III AC joint dislocation (Fig. 2). The patient had minimal pain relief with oral pain medications (600 mg ibuprofen and 1000 mg acetaminophen), and an ultrasound-guided intra-articular injection was performed for additional pain relief.

## 3. Technique

With the patient in a seated position, the AC joint was identified by gentle palpation. The ultrasound system was placed anterior to the patient, with the operator behind the patient to allow a clear view of the ultrasound screen. A high-frequency (10–5 MHz) linear

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**Fig. 1.** a) Positioning of linear ultrasound probe with middle line centered over the AC joint. Ultrasound image from case showing acromioclavicular anatomy. Yellow line demarcates place for entry on skin, as well as the target for anesthetic placement is the anechoic joint effusion. b) Out-of-place approach for ultrasound visualized needle entry into the AC joint. (For interpretation of the references to colour in this figure legend, the reader is referred to the web version of this article.)



**Fig. 2.** X-ray of patient's left shoulder showing Plain a Rockwood Grade III AC joint dislocation.

transducer was placed over the AC joint so that the distal clavicle, AC joint space, and acromion process were all visualized (Fig. 1a). Unlike more common joint injections that are performed in-plane (with clear direct needle visualization), this procedure was planned in an out-of-plane technique secondary to the minimal depth of the AC joint. The AC joint was centered on the ultrasound screen, and a center line was used to clearly delineate the planned location for needle entry (Fig. 1a). A small skin wheal of anesthetic of 1–2 cc of 1% lidocaine was placed for patient comfort. A 5 cc syringe was filled with 3 cc of 0.5% bupivacaine and attached to a 1.5-in. (3.8 cm) 21 g needle. A steep (approximately 80–90°) out-of-plane technique was used to easily enter the AC joint and inject the anesthetic (Fig. 1b). No aspiration of joint space fluid was attempted prior to injection of anesthetic. The patient tolerated the procedure well with minimal discomfort.

Thirty minutes after injecting the joint, the patient was re-evaluated, and he noted a significantly decreased level of pain from 8/10 severity to 3/10. He was also able to fully abduct his left shoulder with minimal discomfort. The patient was neurovascularly intact after the injection. The affected shoulder was supported in a sling, and the patient was given outpatient follow-up with orthopedic surgery. The patient was contacted 1 week later for phone follow-up, and noted that pain on arriving home was 1/10 in severity, and that the joint injection pain relief lasted for approximately 8 h.

#### 4. Discussion

AC joint separation is a common painful acute condition seen in the emergency department. Despite its prevalence and significant pain, there are few options for analgesic management. NSAIDs are the primary prescribed analgesic agent, along with physical support via a shoulder sling for low grade separations. Patients who continue to have severe pain after oral or even intravenous analgesia often have few alternatives. Opioid medications could be considered for severe pain, but given the risks associated with these medications, alternative modes of analgesia should be pursued.

Regional anesthesia, including the superficial cervical plexus block and the interscalene brachial plexus block have been shown to be effective for clavicle fracture, but are not ideal for distal clavicle injuries [5]. These blocks require significant clinical training, real-time cardiac monitoring, and hours of post-procedure observation, none of which are needed for the care of a low-grade AC joint injury that can be safely and quickly discharged home.

Intra-articular joint injections have been detailed in the orthopedics, family medicine, and Physical Medicine and Rehabilitation literature. Classically, intra-articular AC joint injections have been performed using landmarks. Despite its superficial location, the AC joint is often missed during landmark based injections. The accuracy of injections has been shown to be poor due to the AC joint's small width, patients' variations in anatomy, and presence of osteophytes [6]. Multiple studies have shown that the addition of ultrasound-guidance improves the success rate of AC joint injections [3,4,7]. Individuals with little US training can infiltrate the AC joint with high accuracy [4].

To our knowledge, this simple and effective technique has not been reported in emergency medicine literature. The superficial location of the AC joint, its ease of identification by ultrasound, and the rapid onset of analgesia by intra-articular injection makes the US-guided anesthetic injection of the AC joint an ideal tool to easily integrate into the armamentarium of the clinician treating this painful condition.

#### 5. Conclusion

A multimodal pain strategy is essential to the management of acute pain in the emergency department, with clinicians searching for novel methods for managing acute pain [8]. Point-of-care ultrasound has become integrated in the training of emergency medicine [9], with a growing amount of data supporting an active pain management strategy to reduce opioid over-reliance. An US-guided AC joint injection can be an ideal solution for patients with persistent pain when standard oral pain medications are insufficient. With most emergency clinicians becoming facile at ultrasound guidance for procedures, we believe this technique can easily become a standard part of the multimodal approach to pain from AC separation. Although US-guided intra-articular AC joint injection is used among orthopedists and pain management specialists for chronic pain, there is a paucity of data in the emergency medicine literature on its use in the acute setting. This case presents a situation where an US-guided AC joint injection safely and effectively managed pain associated with acute AC joint separation.

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