



Arthroscopic Reduction and Internal Fixation of a Displaced Fracture of the Acromion: Case Report and Arthroscopic Technique

Jason E. Hsu, MD¹
Chang Soo Lee, MD²

¹Department of Orthopaedic Surgery,
University of Pennsylvania

²Department of Orthopaedic Surgery,
Inje University, Ilsan Palk Hospital,
Goyang, Korea

Fractures of the acromion are relatively rare and often occur as a result of a direct blow to the shoulder. In some cases, this mechanism may lead to significant injury to the soft tissue envelope of the shoulder, and in those fractures amenable to reduction and fixation, the healing potential of an open incision may be compromised. In this case report, we describe an arthroscopic approach to treat an isolated acromion fracture that facilitates anatomic reduction and avoids lateral sloping of the acromion. Anatomic reduction of the fracture restores the normal subacromial space and may avoid long term complications related to impingement of the rotator cuff.

Introduction

Fractures of the acromion are relatively rare and often result from a direct blow to the acromion or from a force transmitted by the humeral head. Kuhn et al. proposed a classification scheme, in which type I fractures are minimally displaced, type II fractures are displaced laterally, superiorly, or anteriorly, and type III fractures reduce the subacromial space¹. In that study, all patients with type III fractures that were treated non-operatively developed impingement symptoms with significant limited shoulder range of motion with pain. Therefore, the authors proposed that all type III fractures undergo early surgical intervention. Proper anatomic reduction is necessary to prevent impingement of the acromion with the humeral head and interference of normal rotator cuff function.

The acromial process serves as the attachment for multiple tendinous and ligamentous stabilizing structures of the shoulder and is one component of the superior shoulder suspensory complex. Therefore, anatomic reduction of such a fracture is not only important to prevent impingement when the subacromial space is reduced, but reduction and stabilization may also be necessary to avoid long-term functional consequences of resultant instability².

We present a case report of a displaced fracture of the acromion treated with an arthroscopic technique that resulted in anatomic reduction and stable fixation. After restoration of the subacromial space and stabilization, this patient had an excellent outcome with full pre-operative range of motion and no pain.

Case Report

An 18-year-old male lost control of his motorcycle into a car and was thrown from the vehicle. He sustained a direct blow to his left

shoulder onto the road. On inspection, he had an area of ecchymosis and a large abrasion over the upper portion of his shoulder anteriorly, laterally, and posteriorly. Shoulder range of motion was limited due to pain. The extremity was neurovascularly intact distally. Plain radiographs and CT scan were obtained and revealed a displaced fracture of the posterolateral angle of the acromion (Figure 1). Aside from superficial abrasions along the face and arm, the patient sustained no other injuries.

Due to the extensive soft tissue damage about the shoulder and the concern for surgical

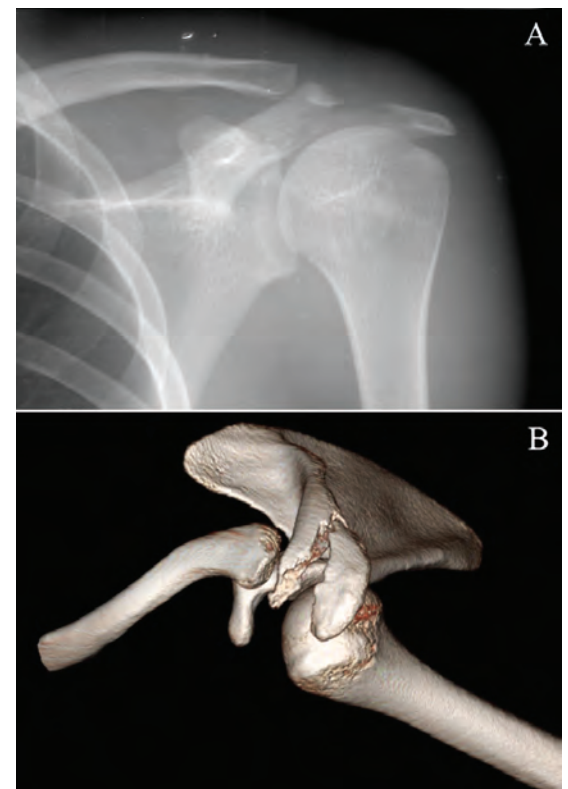


Figure 1. Pre-operative imaging of the left shoulder including a A) plain radiograph and B) 3D CT reconstruction demonstrating a displaced fracture of the posterolateral angle of the acromion.

Corresponding Author:

Jason Hsu, MD
Department of Orthopaedic Surgery
University of Pennsylvania
3400 Spruce St, 2 Silverstein
Philadelphia, PA 19104
Jason.hsu@uphs.upenn.edu

wound healing complications, the decision was made by the operative surgeon (CSL) to perform an arthroscopic irrigation and debridement as well as an arthroscopic reduction and internal fixation of the fracture.

Surgical Technique

After general anesthesia, the patient was positioned in a lateral decubitus position. A standard posterior portal was created, and routine arthroscopic examination of the shoulder was performed. No injury to the rotator cuff, labrum, cartilage, or ligaments was appreciated. The scope was then redirected via the same posterior portal incision into the subacromial space and then a standard anterior portal was created under direct visualization. A large hematoma was evacuated, the fracture site was debrided, and extensive irrigation was performed (Figure 2A).

A K-wire was then inserted in the anterior portion of the displaced fracture to joystick the fragment into an anatomic position and to provide temporary fixation (Figure 2B). A separate incision was made 1 cm lateral to the acromion slightly posterior to the K-wire. A hemostat was inserted to grasp the displaced portion of the acromion and hold the reduction. Anatomic reduction was confirmed with fluoroscopy. The

temporary K-wire was removed, and then re-inserted through the acromion into the clavicle. The hemostat was then removed, and a terminally-threaded 5.0 mm cannulated screw was inserted through the same incision to compress the fracture site. Final reduction was confirmed with fluoroscopy, and the portal sites were closed. Post-operative radiographs and CT confirmed an anatomic reduction with restoration of the subacromial space (Figure 3).

Post-operatively, the patient was immobilized in an abduction brace for six weeks. Passive range of motion was started at four weeks, and active range of motion resumed at eight weeks. The K-wire and cannulated screw were removed percutaneously three months after the initial procedure. At follow-up six months after the initial operation, the patient had no pain, full range of motion, and no limitations. Radiographs revealed anatomical reduction and osseous integration at the fracture site (Figure 4).

Discussion

In this report, we describe an arthroscopic technique that facilitates anatomic reduction and fixation of an isolated acromion fracture. The patient sustained a direct injury to the

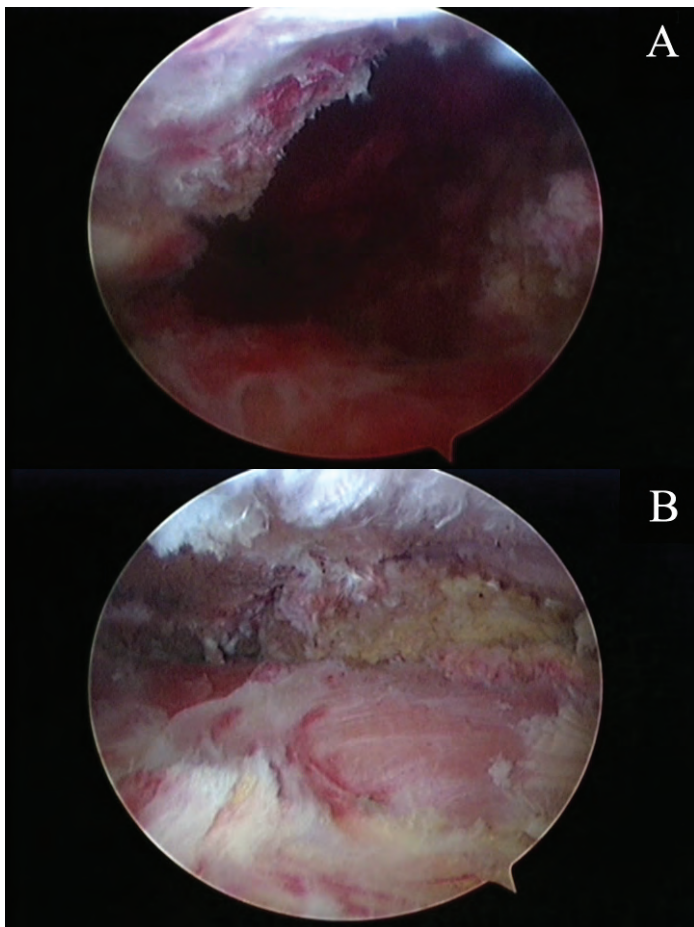


Figure 2. Arthroscopic images taken from the posterior portal demonstrating (A) the acromion fracture and (B) reduction of the fracture with a hemostat.

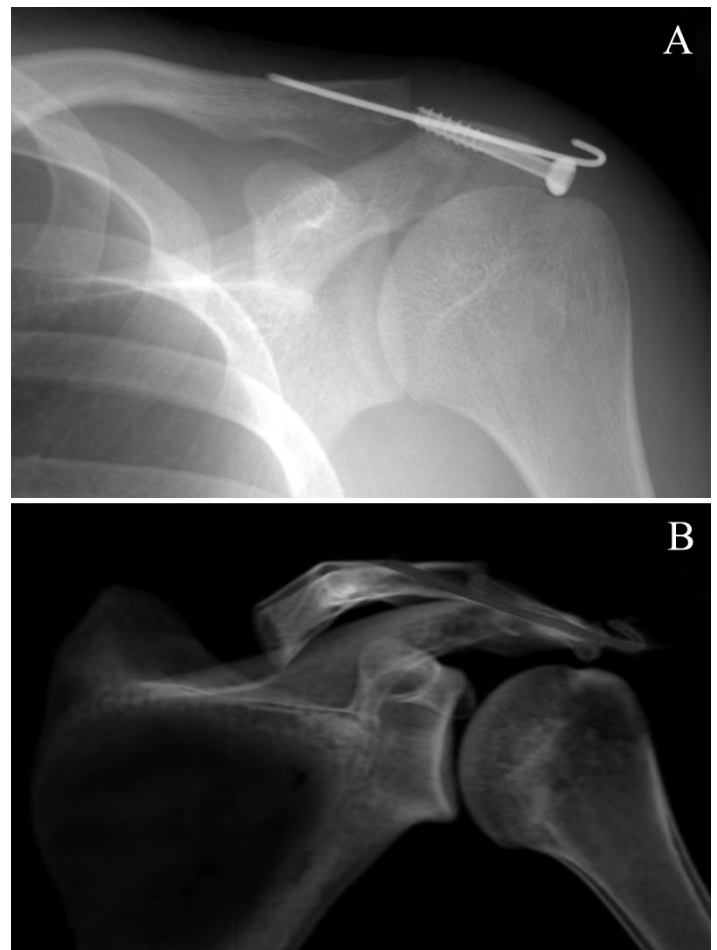


Figure 3. Post-operative imaging including (A) plain radiograph and (B) 3D CT reconstruction after arthroscopic reduction and internal fixation of acromion fracture.

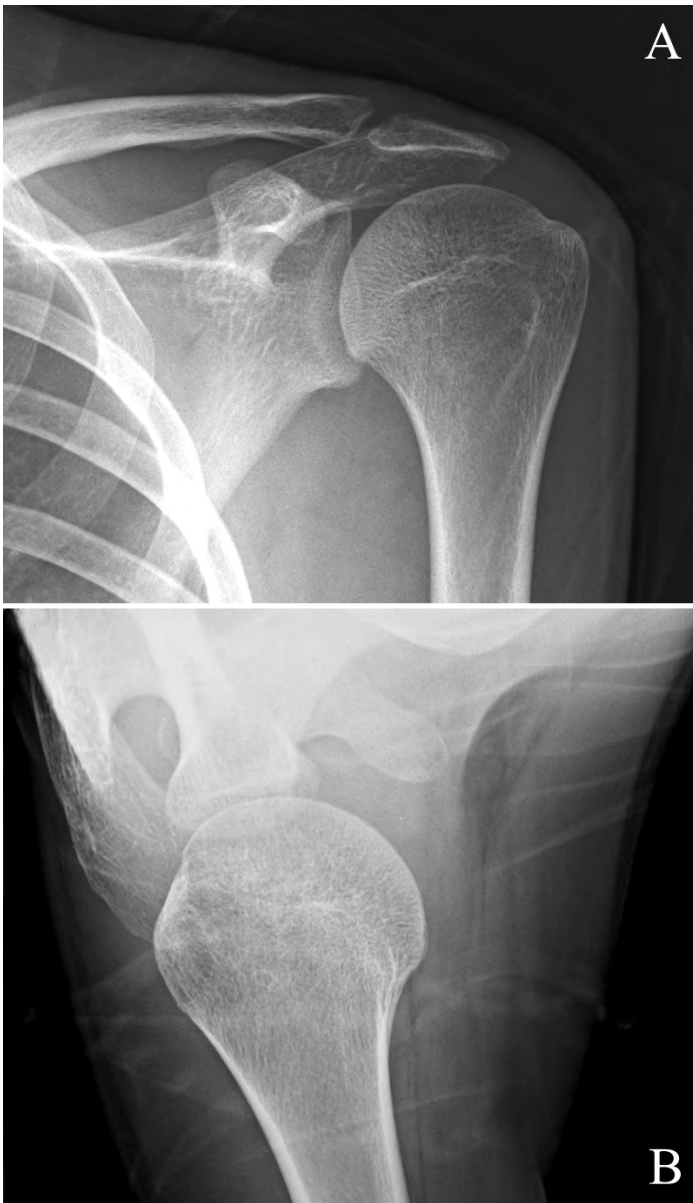


Figure 4. Plain radiographs six months after hardware removal demonstrating bony union.

shoulder, and a large abrasion was present over a large portion of the shoulder. Although a mini-open procedure could have been performed, wound healing likely would be compromised with the amount of soft tissue damage directly over the fracture

site. Imaging revealed a large fracture gap, likely due to the pull of the deltoid. After arthroscopic debridement, we used a K-wire to initially joystick the fragment, then a hemostat to anatomically reduce the fracture. The latest follow-up films reveal bony union without lateral sloping of the acromion or reduction of the subacromial space.

Isolated acromion fractures are very rare, with only a few cases of acromion fractures reported in the literature^{1, 3-5}. This report is only the second description of an arthroscopic method of treating an isolated acromion fracture. Russo et al. first described a case report of an isolated acromion fracture treated arthroscopically³. In that report, reduction was obtained with percutaneous pinning. A 2.5 mm cannulated screw was then introduced to maintain the reduction. Post-operatively, the patient was placed in an abduction brace. The percutaneous pins were removed at 3 weeks, and the cannulated screw at 2 months. The patient achieved bony union, and although post-operative x-rays revealed lateral sloping of the acromion, no pain or limitation of range of motion was reported in that patient.

The advantage to the arthroscopic technique described in this report is that anatomic reduction was held by a hemostat (rather than a percutaneous pin) before a 5.0 mm cannulated screw was inserted. Firm fixation with the hemostat was essential to prevent displacement of the fracture due to the strong pull of the deltoid musculature. This ensures that the reduced lateral acromial piece does not displace or rotate inferiorly, which could lead to the lateral piece healing in a laterally sloped position and result in rotator cuff impingement. This will potentially reduce the likelihood that the patient will complain of impingement symptoms later in life.

References

1. Kuhn JE, Blasler RB, Carpenter JE. Fractures of the acromion process: a proposed classification system. *J Orthop Trauma*. 1994; 8(1): 6-13.
2. Goss TP. Double disruptions of the superior shoulder suspensory complex. *J Orthop Trauma*. 1993; 7(2): 99-106.
3. Russo R, Vernaglia Lombardi L, Giudice G, Ciccarelli M. Arthroscopic treatment of isolated fracture of the posterolateral angle of the acromion. *Arthroscopy*. 2007; 23(7): 798 e1-3.
4. Ogawa K, Naniwa T. Fractures of the acromion and the lateral scapular spine. *J Shoulder Elbow Surg*. 1997; 6(6): 544-8.
5. Weber D, Sadri H, Hoffmeyer P. Isolated fracture of the posterior angle of the acromion: a case report. *J Shoulder Elbow Surg*. 2000; 9(6): 534-5.