Management of Traumatic Coracoid Fracture and Anterior Shoulder Instability With a Modified Arthroscopic Latarjet Technique

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Background

Coracoid fractures are uncommon and comprise 2-11% of all scapular injuries (1). Typically, they occur from high-energy direct trauma such as motor vehicle collisions or falls from height (2). Ogawa et al. reviewed 87 patients with fractures of the coracoid process and classified them based on the relationship between the fracture site and the coracoidoplasty ligament. Fractures located proximal to the coracoclavicular ligaments are classified as type I, while fractures distal to the CC ligament is classified as type II (3). Treatment of these fractures are based on fracture type and displacement. Isolated type II fractures with minimal displacement can be treated conservatively while displaced type II and the majority of type I fractures should be treated surgically (4). The most common method of surgical fixation of coracoid fractures is with screw fixation, however, Kennedy et al reported good outcomes in their technical note using sutures anchors (5).

Isolated injury to the coracoid is rare and definitive treatment should take concomitant shoulder injuries into account. Ogawa and Knapik showed that coracoclavicular dislocations, clavicular and glenoid fractures, coracoid fractures, scapular spine fractures, rotator cuff tears, and anterior shoulder dislocations are all commonly associated with coracoid injury (1, 3). The current literature of Cottias et al described an open Latarjet procedure for treatment of persistent instability in a patient that suffered a greater tuberosity fracture, coracoid fracture and anterior glenoid bone loss (6). Schreier et al reported a successful outcome in a patient with chronic anterior shoulder instability and avulsion fracture of the coracoid treated with an open Latarjet procedure (7).

The purpose of this Technical Note is to describe our technique used to treat a displaced Ogawa Type II coracoid fracture process with concomitant shoulder dislocation and a fragmented bony Bankart lesion using an arthroscopic Latarjet technique.

Case Description

• CC: Right Shoulder Pain and Instability
• HPI: 16 y/o Male sustained an injury falling on an extended arm while playing ice hockey. The shoulder was found to be dislocated in the anterosuperior direction and subsequently reduced by an athletic trainer on the sideline. He was then sent to the emergency department for further evaluation. He was placed in a sling and made non-weightbearing and sent for orthopedic follow up.
• PMH: Negligible, PSH: Negligible
• Physical Exam: Tenderness over coracoid to palpation, 2+ Load and Shift test, and a positive apprehension/relocation sign
• No previous history of subluxation or dislocation events

The Instability Severity Injury Score by De Boeuf et al. (8) predicted continued instability with soft-tissue only procedure in this patient.

The patient underwent an arthroscopic Latarjet procedure to address the multiple sites of pathology of the shoulder by utilizing the fractured coracoid to address the glenoid bone loss

Pre-Operative Imaging

Figure 1
Axillary View showing displacement of coracoid fracture, bony Bankart lesion and loss of normal contour

Figure 2
Axial MRI showing edema surrounding coracoid base fracture

Figure 3
3-D Reconstruction from CT demonstrating anterior bone loss as well as fracture of coracoid base

Operative Technique

Anatomic landmarks are drawn and portal site D/E/HM and J are marked in accordance with Lafosse’s arthroscopic Latarjet technique (9) (Figure 5). A slightly medialized posterior portal is utilized and a standard diagnostic arthroscopy is conducted to assess the 15 portals through which the fracture is to be addressed. If a fracture is visualized on an outside-in technique. After confirmation that the bony Bankart lesion is not viable, the fracture site and underlying abutments are drilled and debrided and using a spinal needle is used to determine the H portal location over the coracoid (Figure 7). Through this portal the proprietary coracoid drill guide can be placed (Depuy Synthes, Raynham, MA). In this case, counterpressure was used on the coracoid to prevent displacement of the fracture. The alpha hole on the drill guide must be approximately 2 cm proximal to the tip of the graft can then be removed and the coracoid step drill bit is used over the guide wires into the alpha and beta positions.

Next the subscapularis split is created. A switching stitch is placed in the posterior portal across the glenoid face and into the subscapularis to define the appropriate position. The subscapularis split is made in the subscapularis to allow the muscle to move as if the muscle were the same place as the future graft site location. The split is made using the radiofrequency ablator due to the appropriate exposure. Care must be taken to avoid injury to the neurovascular nerve while completing the split medially. The medial conjoint tendon can also be visualized medially to the spinal split of the anterior glenoid graft. The anterior glenoid graft is used using the shaver and burr. It is important to make sure there is no soft tissue interposition.

The coracoid osteotomy is performed. The ostotomy is used straight and curved osteotomes to remove the undersurface of the coracoid graft from the glenoid face. The graft is then used to fill the bone loss of the posterior glenoid. The anterior glenoid is then performed. The coracoid is then mobilized through the subscapularis split. The coracoid graft is prepared to allow mobilization of the graft across the subscapularis into the prepared glenoid neck.

The scope is then placed back into the J portal and the coracoid is placed in the desired position on the anterior rim of the glenoid. The 2-cm long, 3.5 mm drill is then placed through the glenoid into the subchondral bone roughly 3-4 mm medial to the glenoid cartilage. Once satisfied with the position, a 2.7 mm drill is used to drill through the camimated coracoid until it penetrates out the posterior shoulder where it is clamped. This process is repeated for the remaining grafts. After completion of the grafts, the coracoid graft is secured with non-absorbable sutures. In this case, the graft is 4.5 mm long. The flap is reapproximated to the beta tunnels and compresses the graft snugly against the glenoid (Figure 8). Fixation is assessed through multiple views along with confirmation of no soft tissue interposition.

Figure 5
Intra-Operative Imaging

Figure 6
Arthroscopic view of the anterior superior glenoid base

Figure 7
Coracoid base fracture with 2 fragments

Figure 8
Arthroscopic view form J portal showing graft placement

Figure 9
Post-operative Bernague view demonstrating intact coracoid graft and proper screw placement

Outcome and Post-Operative Imaging

• The patient is placed in a padded abduction shoulder sling at the end of the procedure
• Immediate post-operative protocol consisted of pendulums and bicipic isometrics for 2 weeks
• After 2 weeks formal physical therapy was initiated with PROM advancing to active assisted ROM and then active ROM
• At the 3 month follow up visit, the patient had full ROM and no instability
• Full ROM was allowed to return to sport at 3 months post-operatively with no restrictions
• The patient has continued to do well at 18 months post op with no incidence of recurrent instability.

Discussion

Although rare, coracoid injury due to high-energy trauma and sports activity has been described in the literature. Knapic et al. published a systematic review of literature from 1970 – 2017, looking at the prevalence of coracoid fractures sustained during sports activity with 16 of those secondary to acute trauma. Sustained remaining were fatigued fractures. Non-operative management was utilized in 16 of the patients with 16/16 reporting complications. Patient had subcoracoid impingement, that was treated with physiotherapy and another had a non-unions that was treated with an electric bone stimulated device. The third complication, a case report published by Chumma et al. where the patient developed anterior shoulder instability and required arthroscopic bony Bankart repair (1,2). Knapic’s review showed that return to sport was not statistically different based on fracture mechanism, management, or the presence or absence of anterior shoulder instability.

The uniqueness of this case involves the associated anterior shoulder instability sustained after anterosuperior dislocation during sport. The reported literature shows that isolated coracoid fractures have good outcomes when treated conservatively. However, a significant proportion of those with concomitant shoulder injury that were treated conservatively required future surgical intervention. The case reports by Cottias and Schneider reported good outcomes when performing an open Latarjet procedure in patients with coracoid fractures and associated anterior shoulder instability (6,7). Aggressive workup and treatment should be considered in those with coracoid injury as concomitant shoulder instability necessitating surgical intervention is likely. This includes the use of advanced imaging to better understand the pathology.

The described technique is our preferred method to successfully treat a type II coracoid fracture, with an unstable, off track anterior shoulder dislocation using an arthroscopic Latarjet procedure.

References