Successful Nonoperative Management of Coracoid Fracture Associated With Suture-Button Fixation of Acromioclavicular Separation

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ABSTRACT A young active duty solider underwent acromioclavicular reconstruction with hamstring autograft after sustaining a shoulder separation. At 3 months postoperatively, the patient fell and sustained a fracture of the coracoid process. The patient elected for nonoperative management of the coracoid fracture. Despite eventual nonunion of the fracture, the patient had excellent functional outcomes and returned to military duty without limitation. Although some authors advocate operative fixation, especially in a young and active cohort, excellent outcomes can be obtained with nonoperative management.

INTRODUCTION

Operative treatment of high-grade acromioclavicular (AC) joint injuries (Rockwood Type IV–VI) is supported for athletic cohorts.[1] With contemporary innovations in surgical treatment, recent techniques have described arthroscopic and open anatomic coracoclavicular ligament reconstruction with delayed biologic incorporation.[2–4] Various methods of primary and secondary fixation are available for provisional AC joint reduction, including adjustable, suture-button constructs.[5,6] With these newer generation implants, unique perioperative complications have been described, including knot prominence and coracoid fracture.[7] Isolated fractures of the coracoid process are rare, and both surgical[8] and nonoperative treatment[9,10] have been described in the trauma literature. However, the optimal management of early postoperative coracoid fractures after anatomic coracoclavicular reconstruction is unknown, particularly with reliance on coracoid fixation for provisional AC joint reduction. This case report describes the successful nonoperative treatment of a secondary coracoid fracture after anatomic coracoclavicular reconstruction with semitendinosus autograft and suture-button construct.

CASE PRESENTATION

We present the case of a 23-year-old active duty military service member with an injury to his right, dominant shoulder after a fall from his mountain bike. Informed consent was obtained from the patient to report this case. His physical examination revealed significant deformity overlying the AC joint with hypermobility of the distal clavicle, but no abnormal findings on glenohumeral motion, special testing, or rotator cuff evaluation. Injury radiographs revealed a type V AC joint separation, indicating a coracoclavicular distance greater than 100% compared to the opposite side, without associated fracture (Fig. 1). After discussing management options with the patient, he elected for surgery with anatomic coracoclavicular/AC joint reconstruction with semitendinosus autograft as described by Carofino and Mazzocca.[11]

Intraoperatively, reduction was easily obtained with open surgical exposure and downward manual pressure. Conoid and trapezoid ligaments were reconstructed in 5-mm drill tunnels placed at distances 4.5 cm and 2.0 cm from the AC joint, respectively. Maintenance of reduction was held with a suture-button device (AC TightRope, Arthrex, Naples, Florida), with drill holes placed at 3 cm from the AC joint in the clavicle and centrally within the base of the coracoid, which was measured at 14 mm. Stable fixation was preliminarily obtained with the suture-button device, and interference screw fixation was performed after looped coracoid graft passage. Additional graft was imbricated with superior AC joint capsule and careful deltotrapezial fascial closure was obtained. Postoperative films demonstrated anatomic restoration of the anatomic AC congruity (Fig. 2).

After 6 weeks of sling immobilization, the patient began gentle mobilization without difficulties. After full range of motion was obtained, progressive strengthening and return to daily function were encouraged. At 3 months postoperatively, the patient reported a return to light trail mountain biking when he experienced a recurrent injury during a sudden turn on uneven terrain. He reported mild pain and deformity without loss of shoulder range of motion. Radiographs demonstrated a displaced coracoid fracture with suture-button displacement and partial loss of AC reduction (Fig. 3). After discussion of management options including coracoid fixation, the patient chose continued nonoperative treatment because of limited symptoms and the absence of functional limitations.

At 2-year follow-up, the patient continued to have mild, asymptomatic deformity at the AC joint exacerbated by scapular protraction, yet had excellent strength and full range of motion. He demonstrated full return to functional activities without military limitations and capably performed upper body exercises, including push-ups, without difficulty. Computed tomography scan revealed displaced coracoid base

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FIGURE 1. Zanca view of right shoulder Type V AC joint separation, with and without weight.

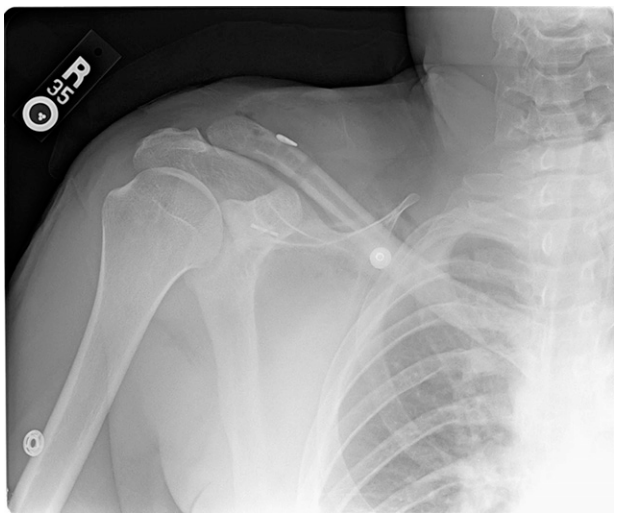

FIGURE 2. AP of shoulder postoperatively. Note appropriate construct congruity.

fracture with presumed fibrous nonunion and coracohumeral distance of 8 mm (Fig. 4).

DISCUSSION

Surgical complications of AC joint reconstruction are not uncommon and include loss of reduction, pain, hardware migration, hardware irritation, infection, and coracoid fracture.[7,12–15] The incidence of coracoid fracture after AC joint reconstruction is between 1.7% and 20%.[14,16] Milewski et al[14] reviewed 27 cases of reconstruction of CC ligaments

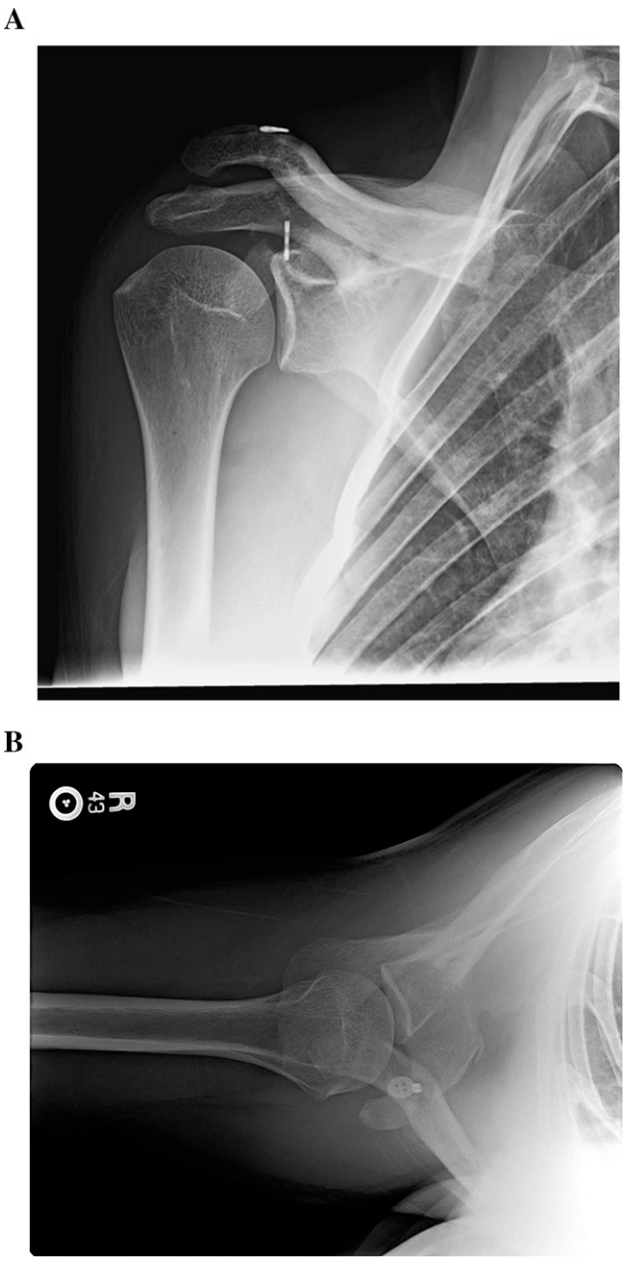

FIGURE 3. (A) AP and (B) axillary radiographs indicating coracoid base fracture with 50% loss of reduction.

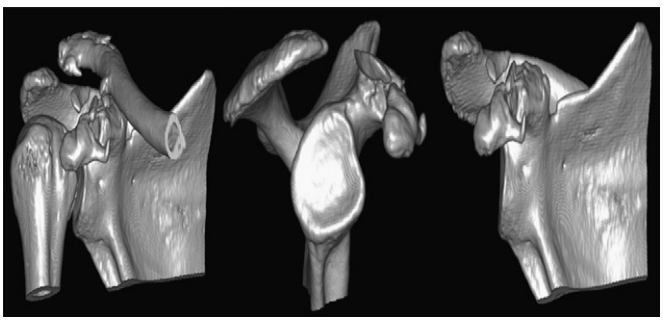

FIGURE 4. Three-dimensional computed tomography reconstructions demonstrating coracoid fibrous nonunion.

for treatment of high-grade AC joint separations, including 10 patients treated with a coracoid tunnel and 17 utilizing a soft tissue graft looped around the coracoid. In this cohort, 20% of patients within the coracoid tunnel group sustained a coracoid fracture, whereas 18% of the graft loop group sustained a clavicle fracture.

Smaller coracoid width, inadequate surgical exposure, and/or premature return to activity may impose higher risk of fracture to the coracoid process. Furthermore, eccentric guidepin or tunnel placement at the base of the coracoid may increase the risk of secondary fracture. Baldwin et al[12] also cautioned against transcoracoid drilling, while preferentially recommending looped graft passage and biologic fixation to avoid fracture. Meanwhile, other authors have advocated for drilling a smaller hole to reduce fracture risk. Gonzalez et al[13] suggested use of a smaller diameter peroneus brevis graft, which would require a smaller bone tunnel, to potentially reduce the risk of fracture. Alternative techniques of coracoclavicular stabilization include mersilene tape, high-tensile, nonabsorbable suture, or soft tissue allograft or autograft tissue,[17] although these may loosen or cut through the undersurface of the coracoid with repetitive micromotion.

Compliance with postoperative rehabilitation is also essential to avoid perioperative complications. Coracoid fracture risk may persist for up to a year after suture-button fixation and index transcortical drilling.[7] Jeon et al[18] reported one patient who sustained a fracture of the base of the coracoid after heavy lifting at work in the early postoperative period. Similarly, Tomlinson et al[2] reported one patient, a baseball pitcher, who sustained a fracture after returning to throwing 7 months postoperatively.

Treatment options for traumatic coracoid fractures have previously been compared. Ogawa et al[8] retrospectively reviewed 67 patients with fractures of the coracoid process who underwent either nonrandomized operative or nonoperative treatment. As high as 87% of patients had excellent results and there was no difference in outcome based on treatment method. The authors concluded that excellent results may be obtained with a sling and early physical therapy, and surgical repair should only be considered for scapulothoracic disassociation or multiple shoulder injuries.

Operative treatment results of a coracoid fracture following AC joint reconstruction has previously been reported. Gerhardt et al[7] reported a case of coracoid fracture after failed AC joint reconstruction despite good patient compliance. The authors preformed a revision AC joint reconstruction with semitendinosus allograft, coracoid fixation with a single arthroscopic-assisted cannulated compression screw, and a LCP Clavicle Hook Plate (Synthes, West Chester, Pennsylvania) to reinforce this construct. The patient was able to return to full activity, including strenuous cycling, without limitations.

Complications of coracoid fracture after AC joint reconstruction include loss of coracoid sling fixation, secondary coracohumeral impingement, or disruption of the coracoid muscular attachments. To limit complications, it is critical to perform a diligent capsular imbrication at the conclusion of the procedure. The etiology of our patient's fracture is not clear. Early return to active, weight bearing activities and eccentric drilling may have precipitated the postoperative coracoid fracture.

This is the first reported case of nonoperative management of a coracoid process fracture following AC joint reconstruction. We believe this postoperative complication may be managed with the principles of an isolated coracoid process fracture. Our patient obtained excellent functional results and was able to return to strenuous activity, including full military duty.

CONCLUSION

We demonstrate successful nonoperative management of suture-button-associated coracoid fracture. Although some authors recommend screw fixation with secondary coracoid fracture, conservative treatment may also represent a reasonable option even in a very active patient without resultant functional deficits.

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