

# Case Report

## Proximal coracobrachialis tendon rupture, subscapularis tendon rupture, and medial dislocation of the long head of the biceps tendon in an adult after traumatic anterior shoulder dislocation

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### ABSTRACT

Rupture of the coracobrachialis is a rare entity, in isolation or in combination with other muscular or tendinous structures. When described, it is often a result of direct trauma to the anatomic area resulting in rupture of the muscle belly. The authors present a case of a 57-year-old female who suffered a proximal coracobrachialis tendon rupture from its origin at the coracoid process, with concomitant subscapularis tear and medial dislocation of the long head of biceps tendon after first time traumatic anterior shoulder dislocation. Two weeks after injury, magnetic resonance imaging suggested the diagnosis, which was confirmed during combined arthroscopic and open technique. Soft-tissue tenodesis of coracobrachialis to the intact short head of the biceps, tenodesis of the long head of biceps to the intertubercular groove, and double-row anatomic repair of the subscapularis were performed. The patient did well postoperatively, and ultimately at 6 months follow-up, she was without pain, and obtained 160° of active forward elevation, 45° of external rotation, internal rotation to T8, 5/5 subscapularis and biceps strength. Scoring scales had improved from the following preoperative to final follow-up: American Shoulder and Elbow Surgeons, 53.33-98.33; constant, 10-100; visual analogue scale-pain, 4-0. DASH score was 5.

**Key words:** Biceps, coracobrachialis, dislocation, rupture, subscapularis

### INTRODUCTION

The subscapularis tendon is frequently at risk for a tear with anterior shoulder dislocation in a large percentage of middle-aged and older patients. Several reports additionally describe medial dislocation of the long head of biceps both with and without concomitant rotator cuff pathology.<sup>[1]</sup> In contrast, coracobrachialis injury has rarely been described during traumatic shoulder dislocation. When its rupture has been reported, the location of the injury was within the muscle belly or distal insertion at the humerus, rather than the tendinous

origin at the coracoid.<sup>[2]</sup> To the authors' knowledge, there are no reports describing a combination of proximal coracobrachialis and subscapularis tendon ruptures with medial dislocation of the long head of the biceps tendon during traumatic anterior shoulder dislocation. The authors report a 57-year-old female who sustained this injury after low-energy fall.

### CASE REPORT

A 57-year-old right-hand-dominant female suffered a 1<sup>st</sup>-time, traumatic anterior left shoulder dislocation after falling from

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standing height onto an outstretched left hand. Upon arrival to the hospital, the left shoulder had spontaneously reduced and radiographs demonstrated no fractures or persistent dislocation. She presented to the orthopedic clinic 6 days postinjury for further evaluation and treatment. Her chief complaint at the time of presentation was moderate pain (4/10 severity) that interrupted sleep and was unresponsive to oral nonsteroidal anti-inflammatories. She additionally complained of significant functional loss at the left shoulder causing difficulty in activities of daily living.

Physical examination revealed a diffuse ecchymosis over the anterior left shoulder and arm [Figure 1]. Neurovascular status was intact. Actively, the patient had only 130° of forward elevation in the scapular plane (FE), 70° of external rotation (ER) with the arm at the side, and internal rotation (IR) to L4. Yergason's test, lift-off test, belly press, and bear-hug signs were positive. There was appreciable coracoid tenderness with palpation, and significant anterior joint line and bicipital groove tenderness. Radiographic imaging demonstrated a reduced glenohumeral joint on anteroposterior (AP), scapular-Y, and axillary views of the left shoulder. On the axillary and AP views, a small Hill–Sachs lesion and questionable lesser tuberosity avulsion fracture were noted.

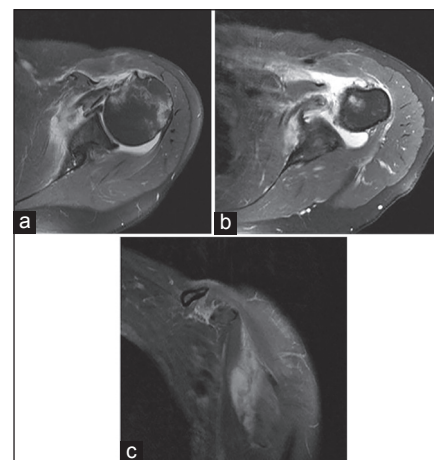
The working diagnosis after initial history and examination was that the patient's left shoulder pain was due to either rotator cuff injury or an occult fracture as suggested by initial radiographs. Subsequent left shoulder magnetic resonance imaging (MRI) demonstrated a full-thickness coracobrachialis tendon rupture from the coracoid with medial and distal retraction, a full-thickness subscapularis tear with medial retraction in the background of severe subscapularis tendinopathy, and medial dislocation of the intraarticular tendinous portion of the long head of biceps [Figure 2]. A small Hill–Sachs lesion was again appreciated. Given this constellation of injuries, surgical treatment was recommended.



**Figure 1:** This is a preoperative picture demonstrating the diffuse pattern of ecchymosis that persisted over the affected anterior shoulder and biceps at 2 weeks postinjury

Two weeks postinjury, the patient was taken to the operating room, placed in a beach chair position, and examined under anesthesia. A 2+ anterior load and shift, 1+ sulcus, and 1+ posterior load and shift were demonstrated. Initially, diagnostic arthroscopy was performed for confirmation of the preoperative MRI findings. It was noted that the long head of the biceps tendon was dislocated medially out of the groove in the rotator interval due to the subscapularis tear [Figure 3a and b]. The antero-inferior labrum demonstrated injury [Figure 3c]. An arthroscopic biceps tenotomy, partial synovectomy, and limited glenohumeral joint debridement were performed. The arthroscope was removed.

A standard deltopectoral incision and approach was performed. The coracobrachialis was identified, torn and retracted distally. Deeper dissection revealed the subscapularis had torn and retracted entirely off the lesser tuberosity approximately 3-cm medially, along with anterior capsule and a small lesser tuberosity bone fragment (3 mm × 3 mm × 15 mm) [Figure 4a]. This sleeve avulsion, consisting primarily of the subscapularis tendon and lesser tuberosity, was repaired primarily with a double-row transosseous-equivalent technique. Two 4.5-mm double-loaded polyetheretherketone (PEEK) Twinfix suture anchors (Smith and Nephew, Andover, MA, USA) were placed along the medial aspect of the tuberosity footprint; two 4.75-mm PEEK SwivelLock (Arthrex, Naples, FL, USA) anchors were placed along the lateral aspect of the lesser tuberosity, spaced approximately 2-cm apart, using a standard suture-bridge technique [Figure 4b]. Four medial row horizontal mattress anchor points were established, and one suture from each knot was anchored into the superior and inferior lateral row anchors, respectively, in an interlocking, criss-crossing fashion. The long head biceps tendon was quite attenuated with partial scarring within the intertubercular groove. Therefore, soft-tissue tenodesis was performed with several horizontal



**Figure 2:** (a) (Axial magnetic resonance imaging [MRI]) demonstrates subscapularis tear, long head biceps tendon dislocation, coracobrachialis tear, and subchondral humeral head edema. (b) Demonstrates intra- and extra-articular hematoma due to torn, retracted subscapularis and coracobrachialis. (c) (Coronal MRI) demonstrates full-thickness coracobrachialis tear with medial distraction

mattress sutures using #2 Ethibond (Ethicon, Cincinnati, OH, USA) to the pectoralis major tendon and periosteum at the lower aspect of the bicipital groove.

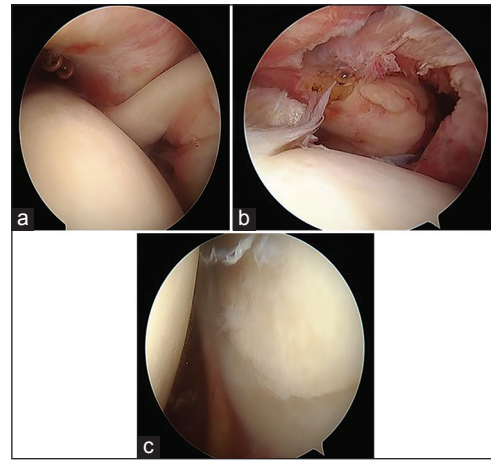
The short head of the biceps tendon was intact at the origin on the coracoid. However, the torn coracobrachialis tendon was identified distal, superficial and medial to the intact short head. Hemorrhage extended through the tendon, its musculotendinous junction, and proximal muscle belly. It was mobilized, and a soft-tissue tenodesis was performed to the lateral border of the short head of the biceps tendon. Several mattress sutures (#2 Ethibond) and a running baseball whip-stitch were placed to establish and reinforce the repair [Figure 5]. The repair was stable to flexion and extension of the arm and elbow.

The patient did well-postoperatively, with improvements in pain with physical therapy. At 1-month follow-up, examination revealed active-assisted range of motion to 85° of FE with minimal discomfort. She had 30° of painless ER. A sling with abduction brace was utilized for 5 weeks and sling alone for an additional 2 weeks. Two months following surgery, the patient had 110° of active and 150° of passive FE, and 35° of ER. Three months after surgery, the patient was free of pain in the operative shoulder, and felt “75% of normal” subjectively. At 4 months follow-up, she had obtained 150° of active FE, 45° of ER, IR to T10, and 5/5 subscapularis strength in the left shoulder, and was discharged from physical therapy pain-free with transition to a home exercise program. At 5 months postoperative, she had 155° of active FE, 55° of ER and IR to T10. At final 6 months follow-up, she was still without pain, and had obtained 160° of active FE, 45° of ER, IR to T8, 5/5 subscapularis, and 5/5 biceps strength. Scoring scales had improved from the following preoperative to final 6 months follow-up: American Shoulder and Elbow Surgeons, 53.33-98.33; constant (Subjective Assessment of Shoulder), 10-to 100; visual analog scale pain, 4-0. DASH score was 5.

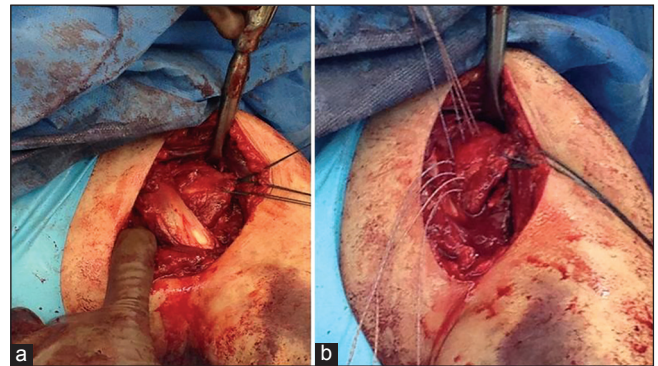
## DISCUSSION

Coracobrachialis rupture is a rare entity, in isolation or combination with other musculotendinous structures. Historically, Gilcreest and Albi<sup>[3]</sup> reported on a single patient with a complete coracobrachialis muscle belly tear secondary to direct impact trauma. Tobin *et al.*<sup>[2]</sup> similarly described a direct impact injury causing coracobrachialis muscle belly rupture along with tearing of the short head of the biceps in a parachutist whose arm got caught against his static line. In comparison, rupture at this muscle's tendinous origin and resultant avulsion from the coracoid process has been much less frequently reported. In recent decades of published cases, this injury type to the coracobrachialis has been reported as a result of indirect traumatic forces, such as a fall onto an outstretched arm as detailed in our patient's history.

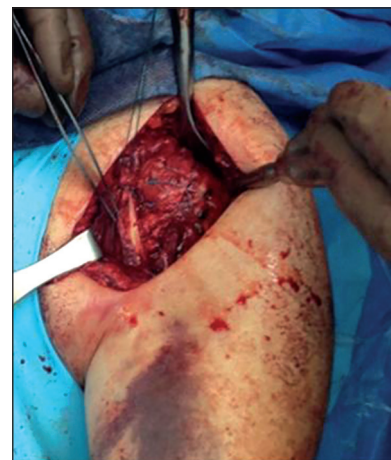
Subscapularis tendon ruptures, by contrast, occur frequently with forced abduction, ER or extension, commonly due



**Figure 3:** (a) (Arthroscopic) demonstrates the long head of biceps tendon medially dislocated out of the rotator interval's intertubercular groove. (b) (Arthroscopic) demonstrates the subscapularis torn off the lesser tuberosity footprint, retracted medially. (c) (Arthroscopic) demonstrates the inferior labrum injury from 7 to 3-o'clock



**Figure 4:** (a) (Intraoperative photograph) demonstrates the open deltopectoral exposure with tag sutures in torn subscapularis tendon, and the torn/retracted coracobrachialis where the surgeon's finger is inserted. (b) (Intraoperative photograph) demonstrates the open the medial row of suture anchors placed in subscapularis



**Figure 5:** This figure demonstrates the open deltopectoral exposure of the left shoulder with the completed repair of the subscapularis with medial and lateral row of suture anchors and coracobrachialis tenodesis to the short head of biceps tendon

to anterior shoulder dislocations.<sup>[4]</sup> Adult males are more commonly affected than females and adolescents.<sup>[5]</sup> The tendon can tear independently but has also been found to be injured with concomitant tears to the supraspinatus and labrum, and with medial dislocation of the biceps tendon.<sup>[5]</sup> Operative repair of both the subscapularis injury and concomitant pathology is critically important, with shorter delays correlating with success.<sup>[4]</sup>

The tendon of the long head of the biceps is often injured in some capacity with rotator cuff ruptures. Its medial dislocation and simultaneous subscapularis tear are not uncommon, as the defect in the subscapularis tear allows for intraarticular entrapment of the biceps tendon. The coracohumeral ligament is a key structure in keeping the biceps tendon aligned within its sulcus and preventing its medial displacement. Thus, its injury probably occurred with our patient's shoulder dislocation. As in this case, MRI is a valuable tool for determining the intra- or extra-articular position of the biceps tendon with dislocation, and the integrity of the surrounding rotator cuff.

The etiology and anatomic locations of this injury combination to the coracobrachialis, subscapularis and biceps tendon are unique and previously undocumented in the literature. Although its incidence is noteworthy, the importance of this report lies more with the promotion of timely diagnosis and appropriate surgical intervention to address the pathology.

The injuries sustained were a result of the patient's traumatic transient anterior shoulder instability event, which generated enough force to rupture the coracobrachialis, tear the subscapularis tendon and therein allow for medial dislocation of the biceps. The patient's affected shoulder range of motion loss on examination, as well as the extensive bruising pattern at the anterior shoulder and biceps regions were indicative of the patient's severity of injury. The authors have proposed a combined arthroscopic and open surgical procedure that allows for adequate identification and surgical treatment of all pathology.

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