Case Report

Recurrent shoulder stabilization with open bankart repair and long head biceps transfer[☆]

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ABSTRACT

There are several treatment options for recurrent shoulder instability. The Latarjet addresses bone loss via coracoid transfer, and creates a “sling effect” on the humeral head with the conjoint tendon. It does however carry a high potential risk of complications including graft resorption, hardware failure, and neurologic injury. It is hypothesized that the long head of the biceps can function similarly, without the donor site morbidity of a coracoid transfer. We present a case of recurrent instability and musculocutaneous nerve palsy following primary arthroscopic stabilization three years prior, and treatment via long head of the biceps stabilization.

1. Introduction

There are multiple options for addressing recurrent anterior shoulder instability after failure of arthroscopic Bankart repair. One popular technique is the Latarjet technique. Recent study of the Latarjet procedure has helped understanding of the various mechanisms of stabilization of this procedure.¹ The Latarjet procedure involves transfer of the tip of the coracoid and conjoint tendon, and has been demonstrated to be an effective treatment for recurrent instability. While the Latarjet procedure has been well studied in the literature, it does carry a high potential risk of complications including graft resorption, hardware failure, and neurologic injury.^{2,3} The authors have obtained the patient's informed written consent for print and electronic publication of the case report.

2. Case report

2.1. History and physical exam

We present the case of a 21-year-old female with chronic right recurrent anterior shoulder instability. She has a history of multiple shoulder dislocations, with the first, beginning at age 15. At age 18 she underwent arthroscopic Bankart repair. She had no subsequent instability events for 3 years, until she had a seizure, which resulted in recurrent dislocation, as well as musculocutaneous nerve palsy. Upon presentation to our office, she endorsed persistent shoulder pain and instability since the seizure. Examination of the right shoulder was

significant for decreased sensation in the antebrachial cutaneous nerve distribution and decreased biceps and brachialis strength. She had full strength in her rotator cuff muscles. She had a positive apprehension test that was relieved with relocation testing. She had a 3+ anterior load shift on the right side in a low abducted position combined with a grade 2+ on the left side. MRI arthrogram and CT scan revealed approximately 15% anterior inferior glenohumeral bone loss. There was no Hill Sachs lesion present. Electromyography confirmed musculocutaneous nerve palsy. After a discussion of the risks and benefits of several different stabilization procedures, it was decided that the best treatment would be open stabilization via Bankart repair and capsular shift. We discussed Latarjet as well as Bristow but had concerns about the musculoskeletal nerve injury. We then opted for transfer of the long head of the biceps to the anterior glenoid neck as an adjunctive procedure.

2.2. Procedure

Following induction of anesthesia and positioning in the beach chair position, examination of the right shoulder was performed. The patient has a grade IIIB load shift that stayed dislocated in the anterior direction requiring reduction. Diagnostic arthroscopy was confirmed approximately 10–15% anterior glenoid bone loss. There was a small, non-engaging Hill-Sachs lesion, and her rotator cuff was intact.

The deltopectoral approach was used to expose the anterior glenoid. The deltopectoral fascia was identified and split. The lateral aspect of the conjoint tendon was identified and released for enhanced

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Fig. 1. Cadaveric specimen demonstrating the restraint provided by the long head of the biceps on anterior translation of the humeral head. A. Neutral rotation. B. External rotation. C. Abduction.

visualization of the subscapularis. The subscapularis was split transversely at the 50% mark. The capsule was identified and a T shaped capsulotomy was made. The anterior inferior glenoid labrum was identified and prepared so that an open Bankart procedure could be performed. Following Bankart repair, capsular shift was performed by imbricating the superior capsular leaflet over the inferior capsule.

Additional stabilization was performed using the tendon of the long head of the biceps. The tendon was pulled from the bicipital groove and mobilized to the level of the pectoralis tendon. The tendon was tagged with a FiberWire stitch and transected near its insertion. The biceps tendon was passed through the split in the subscapularis, similar to how the conjoint tendon is passed in Latarjet or Bristow procedure (Fig. 1). A suture anchor was placed 1 cm medial to the glenoid rim in the 3 o'clock position, and the biceps tendon was tied down over an anchor (Fig. 2). The subscapularis tendon was closed and satisfactory stability was confirmed with the load shift test. Our patient was last seen at 16 month follow up, with return of full range of motion, no pain, and no further instability events.

3. Discussion

We describe an augmentation technique for recurrent shoulder instability in a patient with subcritical bone loss in whom Latarjet is contraindicated due to her musculocutaneous nerve palsy. With

minimal bone loss, other bone augmentation procedures such as distal tibia or iliac crest grafting would be less optimal than a procedure providing the sling effect of the conjoint transfer. Transferring the tendon of the long head of the biceps allows for a similar bumper and dynamic sling effect to act as a restraint to anterior instability. Arthroscopic Bankart repair can fail for various reasons. Boileau et al examined the risk factors for failure of arthroscopic repair in 91 patients.⁴ They reported a failure rate of 15.3% at mean 3 year follow up, with glenoid, or humeral bone loss, patient hyperlaxity, or fixation of 3 or less suture anchors as risk factors for recurrence.⁴ Shibata et al performed a similar study more recently, examining risk for recurrent instability in 102 shoulders who underwent arthroscopic Bankart repair. The authors found a 8.8% re-dislocation rate with large humeral bone loss (Hill Sachs lesion) and fixation with less than 4 anchors as the greatest predictors of failure.⁵ While our patient did not have a Hill Sachs lesion, she did have 15% anterior glenoid bone loss, as well as hyperlaxity in her other joints. Additionally, she has a history of seizure disorder. These factors may have predisposed her to developing recurrent instability after her initial repair. While our technique description is open, the transfer of the long head biceps tendon is easily convertible to an arthroscopic procedure and could be utilized as an adjunct to arthroscopic stabilization with a potentially lower risk profile than arthroscopic Latarjet.

There are multiple options for addressing recurrent anterior

Fig. 2. Intraoperative photograph demonstrating the location of fixation of the long head biceps on the medial glenoid neck (white arrow). Note the split in the subscapularis tendon (yellow arrows). (For interpretation of the references to colour in this figure legend, the reader is referred to the web version of this article.)

shoulder instability after arthroscopic Bankart repair, based on the underlying pathology for instability. Sisto et al evaluated 30 patients in whom revision of arthroscopic repair was addressed via traditional open repair.⁶ It is important to note that none of these patients had glenoid bone loss or Hill Sachs lesion > 20%. Failure was presumed to be due to hyperlaxity or inadequate anchor fixation. Twenty-six (86.7%) patients reported excellent or good results at mean 46 month follow up, with no recurrent instability. Of note, 10 (33%) of patients underwent rotator interval closure during their revision open procedure.⁶ While this may be a good option for patients without bone loss, our patient had 15% glenoid bone loss, which likely contributed to the recurrence of her instability. While 20–25% is typically considered significant with respect to glenoid bone loss, Shin et al defined subcritical bone loss in a cadaveric model to be 15%.⁷ The authors concluded that once glenoid bone loss exceeds 15%, soft tissue stabilization alone is insufficient to restore normal glenohumeral translation and range of motion.⁷ Dickens et al examined the effect of subcritical bone loss on NCAA football players with recurrent anterior instability.⁸ In a study of 50 patients, all 3 patients with > 13.5% glenoid bone loss experienced recurrent dislocation following return to play, while no patient with < 13.5% bone loss had recurrence.⁸

In the setting of glenoid bone loss, many authors recommend bony augmentation via Latarjet procedure.^{9,10} Burkhart et al performed Latarjet procedure in 102 patients with an inverted pear shaped glenoid and reported that only 5 patients (4.9%) of patients had recurrent dislocation or subluxation.⁹ The authors reported an unacceptably high rate (67%) of failure following arthroscopic Bankart repair in patients with similar inverted glenoid morphology.⁹ Bessiere et al examined the differences in recurrence in patients undergoing open Latarjet or arthroscopic Bankart repair for posttraumatic anterior shoulder instability.² A retrospective comparison of 93 patients who underwent arthroscopic Bankart repair compared with 93 who underwent open Latarjet found that 9 (10%) of Latarjet patients and 20 (22%) of

arthroscopic Bankart patients experienced recurrent instability, with reoperation rates of 7% and 6% respectively.² Patient age younger than 20, as well hyperlaxity in the contralateral shoulder were associated with failure in both groups.²

While Latarjet has been proven to be a safe and effective treatment of recurrent shoulder instability for patients with bone loss, it was a suboptimal option in the case of our patient. The Latarjet procedure relies on several factors in stabilization of the shoulder. First the coracoid transfer reconstructs the bone loss on the anterior glenoid. Next, the coracobrachialis serves as a dynamic buttress of the anterior-inferior capsule. The split in the subscapularis muscle also acts as a dynamic constraint via the intersection of the conjoint tendon, which acts to provide tension during abduction and external rotation. Lastly, repair of the anterior capsule acts as a final restraint to recurrent instability.¹ To our knowledge, there is no pre-existing literature for how to address recurrent instability in patients with musculocutaneous nerve palsy. The described technique was performed in order to approximate the biomechanical effects of Latarjet without bony augmentation. Transferring the long head of the biceps through a split in the subscapularis allows it to function similarly to the conjoint tendon following coracoid transfer. The biceps tendon acts as a dynamic restraint to anterior translation of the humeral head.

4. Conclusion

Transfer of the long head of the biceps tendon is a viable option in the management of patients with recurrent instability and subcritical glenoid bone loss and may be considered as an alternative to Latarjet procedure in this patient population. Further clinical and biomechanical studies are warranted to compare this procedure to more commonly utilized techniques.

Conflict of interest

None.

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