Arthroscopic Triple Labral Repair in an Adolescent

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Abstract: Traumatic glenohumeral dislocations often result in significant injury to the anterior-inferior labrum, most commonly leading to recurrent anterior instability. While in skeletally immature patients, shoulder trauma more commonly results in fracture versus a true dislocation, shoulder instability does occur and can be difficult to manage in the setting of open physes. In any event, the goal of treatment is to reduce the risk of recurrence and allow full participation in activities, including sports. Arthroscopic stabilization has been shown to be an effective treatment option for young patients, with good return to sport rates; however, the vast majority of literature on shoulder instability in the youth patient population focuses on anterior instability. Concomitant lesions of the anterior, posterior, and superior labrum have been rarely described in youth athletes and present a formidable clinical challenge, particularly in skeletally immature patients. In this Technical Note, we describe the authors' preferred technique for arthroscopic repair of a traumatic triple labral tear, including anterior, posterior, and type IV SLAP components, in adolescent patients.

Acute shoulder dislocations occur at a rate of approximately 35 per 100,000 person-years in male patients.[1] Traumatic dislocations often result in significant injury to the anterior-inferior labrum, most commonly leading to recurrent anterior instability.[2,3] When evaluating the adolescent patient with shoulder instability, it is critical to understand the mechanism of action, chronicity of injury (first time event vs recurrent instability), and prior treatment history, as this information will allow for appropriate clinical decision-making. Although skeletally immature patients inherently have greater elasticity of the capsular structures that may respond well to nonoperative measures, including physical therapy,[3] multiple studies have reported unacceptably high rates of recurrence in adolescents treated without surgery.[4,5] Favorable outcomes have been reported following arthroscopic stabilization in skeletally immature patients.[6]

The vast majority of clinical studies on shoulder instability in the youth patient population have evaluated patients with anterior labral tears or multidirectional labral laxity without an isolated labral tear. Concomitant lesions of the anterior, posterior, and superior labrum have been rarely described in youth athletes and present a formidable clinical challenge, particularly in skeletally immature patients.[7] In this Technical Note, we describe the authors' preferred technique for arthroscopic repair of a traumatic triple labral tear, including anterior, posterior, and type IV SLAP components, in adolescent patients.

Technique

Patient Positioning and Anesthesia

Following the induction of regional and general anesthesia, the patient was placed in the lateral decubitus position with all bony prominences well padded. An examination under anesthesia was performed, which revealed a 3+ translation on anterior superior, anterior middle, anterior inferior, and posterior load and shift testing. The patient's right shoulder was prepped and draped in the usual sterile fashion. A time-out was called to confirm the correct patient, procedure, operative site and side, and administration of antibiotics.

Diagnostic Arthroscopy

The arthroscope was inserted into a standard posterior portal 2 cm inferior and 1 cm medial to the

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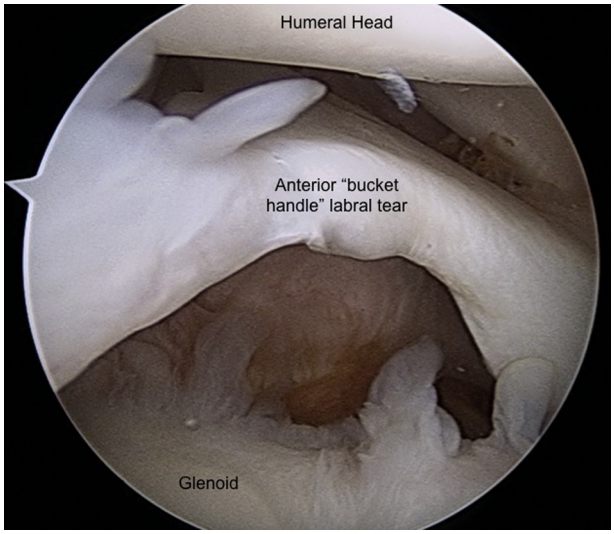

Fig 1. Arthroscopic photograph of the right shoulder demonstrating the bucket-handle-like appearance of the near-circumferential labral tear (viewing from the posterior).

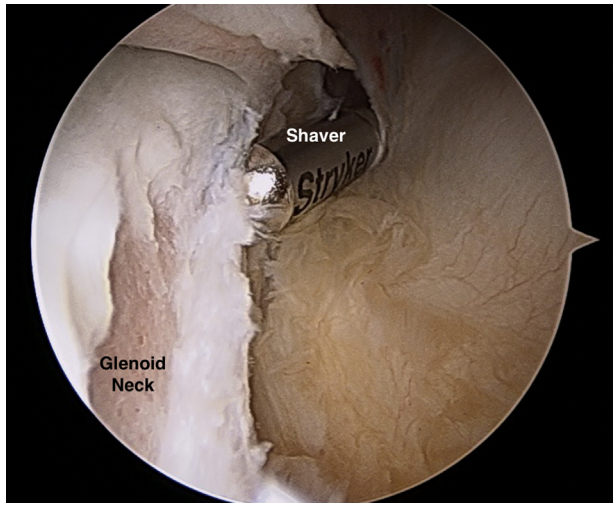

Fig 3. Arthroscopic photograph of the right shoulder demonstrating anterior labral preparation with an arthroscopic burr.

posterolateral corner of the acromion, and a standard midglenoid anterior portal was established using an outside-in technique through the rotator interval just lateral to the coracoid process. Diagnostic arthroscopy revealed the labrum torn off the glenoid superiorly and subluxated down in a bucket-handle fashion, with the majority of labral tissue still present and with a viable appearance (Fig 1, Video 1). In addition, a type IV SLAP lesion was present, extending along and into the long head of the biceps tendon. The detachment of the labrum extended near-circumferentially around the glenoid, with the exception of a preserved glenoid-labrum attachment between 6 and 7 o'clock. There was no evidence of a humeral avulsion glenohumeral ligament (HAGL) lesion or reverse-HAGL lesion. The rotator cuff was completely intact.

Surgical Technique

At this point, the decision was made to proceed with the all-arthroscopic repair of this triple labral lesion. First, the neck of the glenoid was abraded to a light bleeding surface anteriorly, superiorly, and posteriorly, using a labral elevator, shaver, and rasp (Figs 2 and 3). Prior to anchor placement, the displaced bucket-handle-like labrum was reduced from the inferior portion of the joint back to the superior portions of the glenoid. The labrum was provisionally held in place

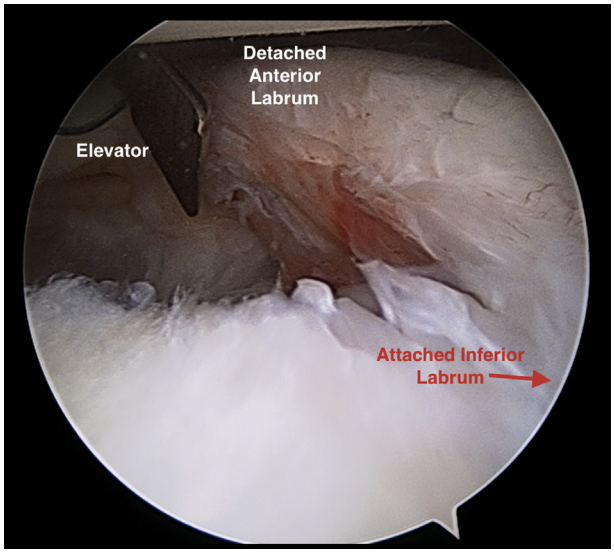

Fig 2. Arthroscopic photograph of the right shoulder demonstrating anterior labral preparation with an arthroscopic elevator.

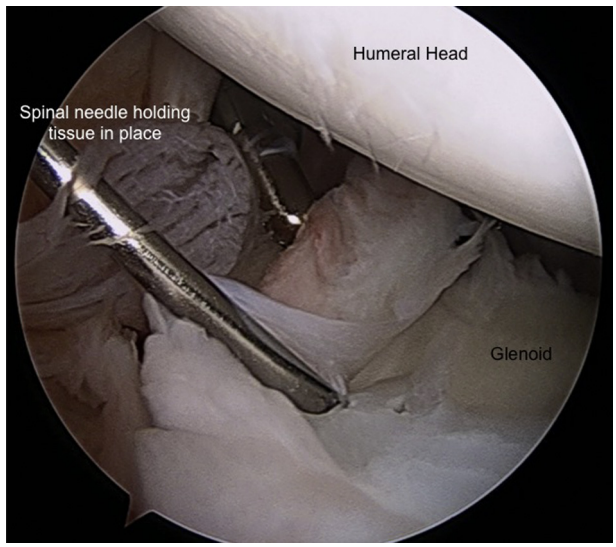

Fig 4. Arthroscopic photograph of the right shoulder demonstrating provisional labral stabilization to the glenoid rim with an 18-*g* spinal needle.

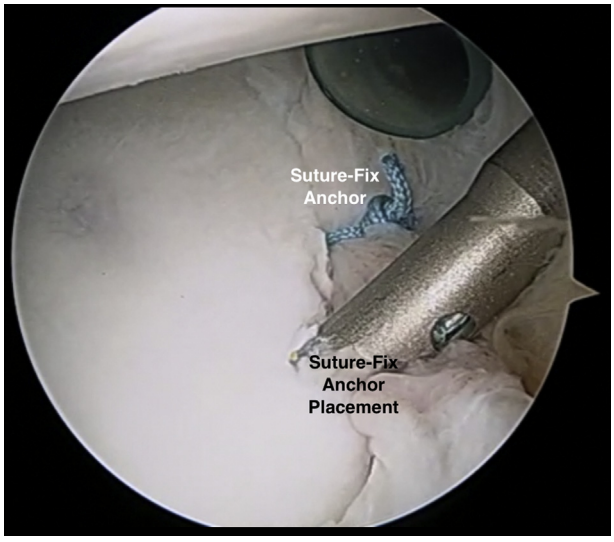

Fig 5. Arthroscopic photograph of the right shoulder demonstrating the final appearance of the repaired anterior and posterior labrum following near-circumferential suture-anchor fixation.

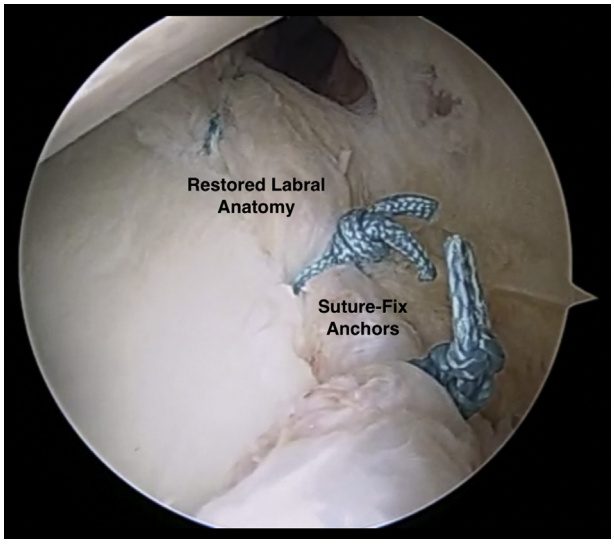

Fig 7. Arthroscopic photograph of the right shoulder from the subacromial space demonstrating right shoulder in situ biceps tenodesis prior to biceps tenotomy.

with spinal needles placed percutaneously to hold the reduction (Fig 4). Next, suture-fix anchors (Smith and Nephew, Andover, MA) were placed along the glenoid sequentially, beginning anterior-inferiorly and moving from inferior to superior along the anterior aspect of the glenoid (Fig 5). Additional suture anchors were then placed posteriorly along the glenoid, again moving from inferior to superior. For each suture anchor, a spectrum was used for suture passing around the labral tissue, and a standard arthroscopic knot tying technique was used to reduce the labrum back to the glenoid. At this point, the near-circumferential labral lesion was adequately reduced and repaired with the exception of the most superior aspect of the labrum near the biceps anchor insertion, with the lesion now functionally a type II SLAP tear with an associated split in the long head of the biceps tendon. Due to the patient's young age and degree of instability, the decision to fix the superior labrum was made, and 2 additional suture anchors were placed superiorly along the glenoid to repair the SLAP component of the labral tear (Fig 6). At this point, the labrum was completely reduced back to the glenoid and was noted to be essentially anatomic. The stability of the glenohumeral joint was gently assessed, and excellent stability was achieved in the anterior, posterior, and inferior directions.

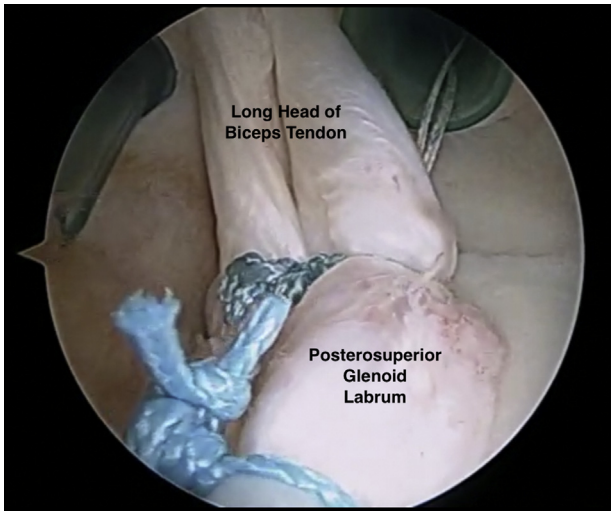

Fig 6. Arthroscopic photograph of the right shoulder demonstrating the split biceps tendon in the setting of the SLAP tear repair.

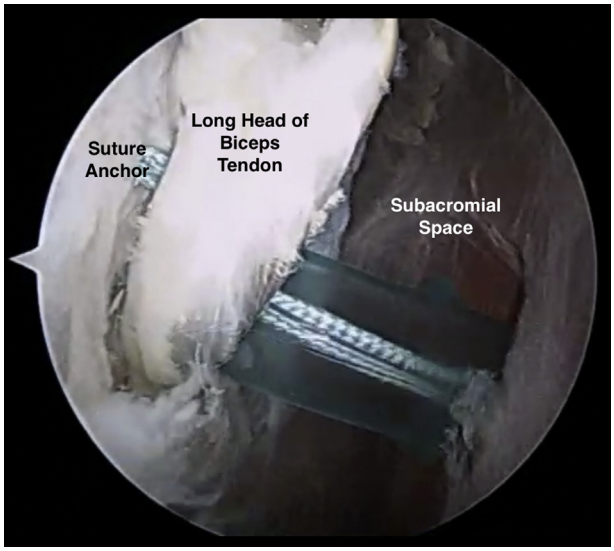

Fig 8. Arthroscopic photograph of the right shoulder demonstrating the biceps tenotomy following in situ arthroscopic biceps tenodesis.

Table 1. Pearls and Pitfalls of the Surgical Technique

Pearls	Pitfalls
• Use spinal needles to temporarily reduce the labrum in order to facilitate capsular shift. • Begin the repair inferiorly and work superiorly. • Be prepared to work anteriorly and posteriorly in a back- and = forth fashion to ensure equal capsular tension.	• It can be difficult to manage this type of global labral tear with malreduction of the labrum. • Suture passage around the bony Bankart portion anteriorly. • Multiple steps are required with portal switching from anterior to posterior in order to check the labrum-capsular tension with repair.

At this point, the long head of the biceps tendon was tagged with a no.1 PDS suture, and attention was turned to the subacromial space. A subacromial bursectomy was performed, allowing for visualization of the biceps tendon. The biceps tendon was carefully unroofed and was tenodesed essentially in situ in the suprapectoral location with 2 1.7 suture fix suture anchors (Smith and Nephew); the sutures from the suture anchors were passed both around and through the biceps tendon and tied with via standard arthroscopic knot-tying techniques (Fig 7). The arthroscope was then inserted back into the glenohumeral joint, and the injured, split portion of the long head of the biceps tendon was cut from its attachment onto the superior labrum (Fig 8). This technique allowed for an anatomic fixation of the long head of the biceps tendon without excessive tension, while at the same time allowing for the removal and debridement of the torn/split intra-articular portion of the biceps tendon.

Rehabilitation

The patient is maintained in an abduction sling for the first 4 to 6 weeks following surgery. Gentle pendulum exercises are permitted on the first post-operative day. Gentle passive shoulder range of motion (ROM) is permitted during the first 4 weeks under the care of a physical therapist. At week 4, active-assist ROM is permitted, progressing to active ROM by week 6, with full ROM expected by week 10. Periscapular strengthening is allowed to gently progress beginning at week 6, and return to contact/collision sports is not permitted until 6 months.

Table 2. Advantages and Disadvantages of the Surgical Technique

Advantages	Disadvantages
• All-suture suture anchors provide least intrusion on growth plates and multiple fixation points. • The lateral decubitus position provides excellent exposure to the posterior and inferior quadrants of the shoulder. • Arthroscopic in situ biceps tenodesis ensures anatomic tenodesis and cosmesis.	• Technically challenging with numerous steps. • Difficult visualization and suture management given the extent of the tear pattern. • Biceps technique requires second step of returning to the glenohumeral joint to remove biceps remnant.

Discussion

In this Technical Note, we describe an arthroscopic technique of a combined anterior, posterior, and superior labral repair with concomitant biceps tenodesis for a near complete traumatic labral separation in a skeletally immature adolescent. In skeletally immature patients, shoulder trauma more commonly results in fracture than a dislocation and labral tear due in part to open physes.[3] In the event of a labral tear, the goal of treatment is to reduce the risk of recurrence and allow full participation in activities including sports.[8] Arthroscopic stabilization has been shown to be an effective treatment option for young patients with good return-to-sport rates; however, the vast majority of literature regards anterior labral tears.[6,9]

Very little literature describing triple labral tears is available, with the largest series to date consisting of 7 patients reported by Lo and Burkhart in 2005.[7] In their series, triple labral lesions account for 2.4% of lesions of the glenoid labrum over a 3-year span, with the mean age of patients with this diagnosis being 25 years. All patients had experienced a traumatic onset of symptoms, with only 2 patients having had prior instability surgery. In their series, the authors reported that all patients had a type II SLAP lesion, whereas our patient had a type IV SLAP lesion. Lo and Burkhart treated each patient with suture anchor fixation, with 6 of 7 patients satisfied with their surgical outcome.[7]

Other authors have published smaller case series of arthroscopic management of labral tears 270° or greater.[10] Alpert et al. reported on a cohort of 13 patients with multidirectional instability who were treated using bioabsorbable single-loaded suture anchors (Arthrex, Naples, FL), with 85% either completely or mostly satisfied at mean 56-month follow-up. Twelve of the 13 patients had had discrete trauma prior to onset of symptoms, and 4 patients (31%) experienced more than 2 recurrent instability events.

Pearls and pitfalls of this technique can be found in Table 1, while advantages and disadvantages of the technique can be found in Table 2. Given the severity of his injury, nonoperative measures were highly unlikely to offer any substantial long-term benefit. Ultimately, early surgical intervention with anatomic repair using the technique described can result in a successful outcome.

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