

Subscapularis Avulsion in the Adolescent Athlete: Can Rotator Cuff Repair Techniques be used for Physeal-Sparing Surgical Repair?

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Background

- Although shoulder injuries are among the most frequent sports-related injuries, subscapularis tendon and lesser tuberosity injuries in adolescents are particularly uncommon.
- History and physical exam are crucial to an accurate and timely diagnosis, and advanced imaging and/or arthrogram are often useful diagnostic adjuvants
- Prompt surgical management of acute traumatic subscapularis tendon tears and/or lesser tuberosity avulsions is associated with improved surgical outcomes
- To the best of our knowledge, there is no universally accepted surgical technique for fixation of an avulse lesser tuberosity fracture in children.

Materials & Methods

- A 13-year-old right-hand dominant skeletally immature male athlete suffered an acute-on-chronic lesser tuberosity avulsion fracture two months after returning to sports following non-operative management of a previous lesser tuberosity avulsion fracture.
- Given his prominent activity-related pain, we proceeded with an open-approach repair using suture and anchor rotator cuff repair arthroscopic instrumentation (Arthrex© SpeedBridge).
- Four anchors were placed on the medial and lateral insertion points of the subscapularis, and a knotless double row footprint was utilized to repair the tendon and avulsed tuberosity directly to the proximal humerus.
- The patient was then placed into a shoulder immobilizer prior to beginning physical therapy at six weeks post-operatively.

Imaging



Avulsion fracture of the lesser tuberosity of the left proximal humerus, with fragment located anteromedial to the humeral head, at the level of the coracoid process.

MR Arthrogram

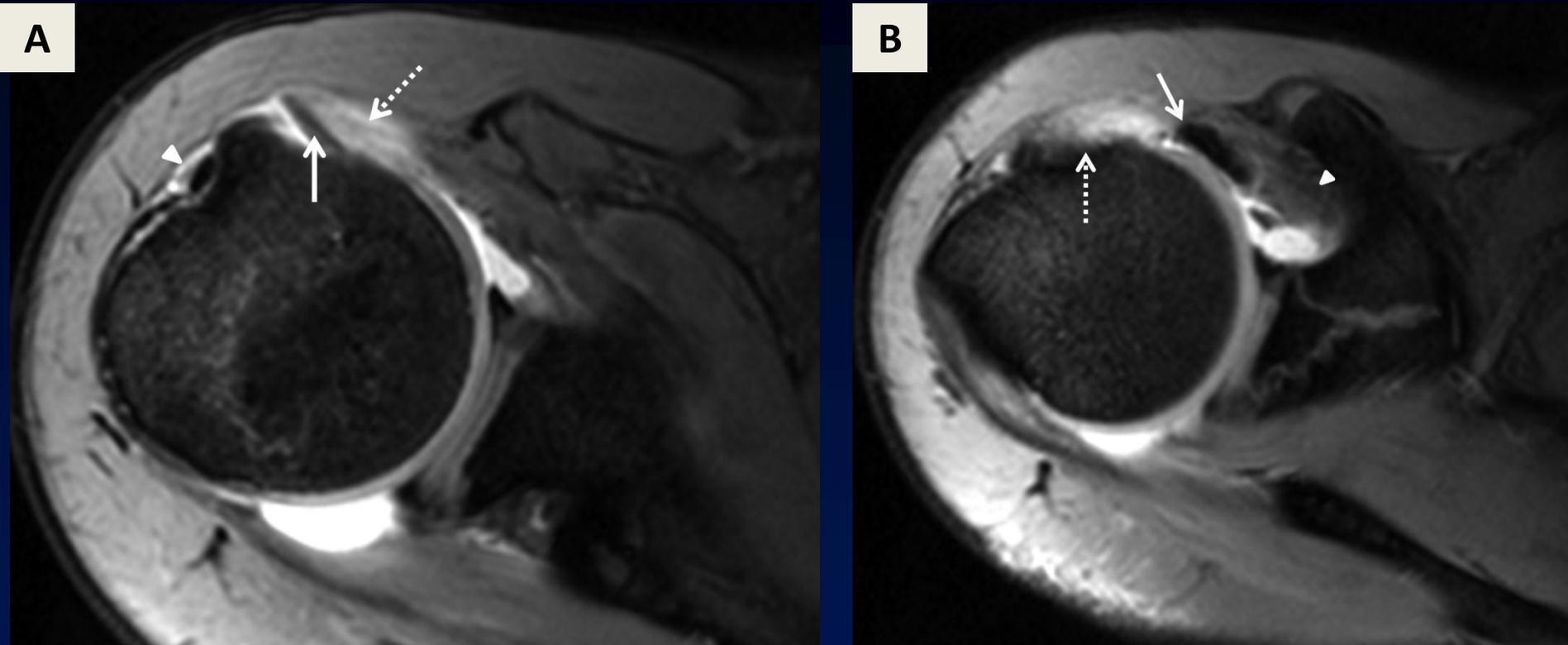


Figure 1: (A) Axial gradient echo MR arthrogram image at the level of the superior aspect of the lesser tuberosity demonstrates a chronic osseous avulsion fragment (solid arrow) which is displaced approximately 2cm from the lesser tuberosity (dashed arrow) with retraction of the subscapularis tendon (arrowhead). Axial gradient echo MR image one slice inferior (B) shows a slightly displaced acute avulsion injury of the inferior aspect of the lesser tuberosity (solid arrow) with abnormal, increased signal intensity within the inferior subscapularis tendon fibers (dashed arrow). The biceps tendon is located (arrowhead). (C) Standard axillary radiograph confirmed bony avulsion in a skeletally immature patient.

Intraoperative Imaging

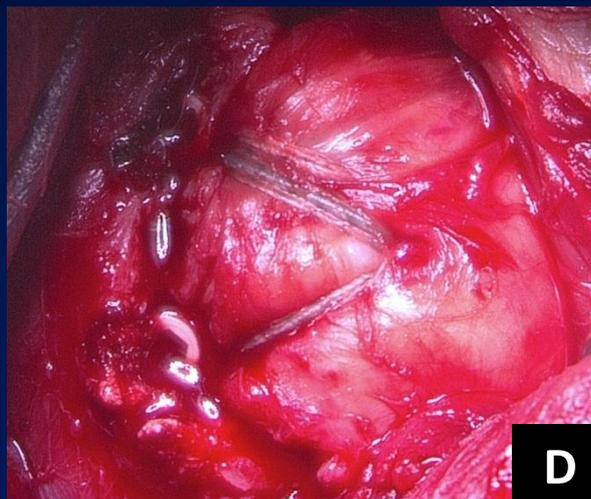
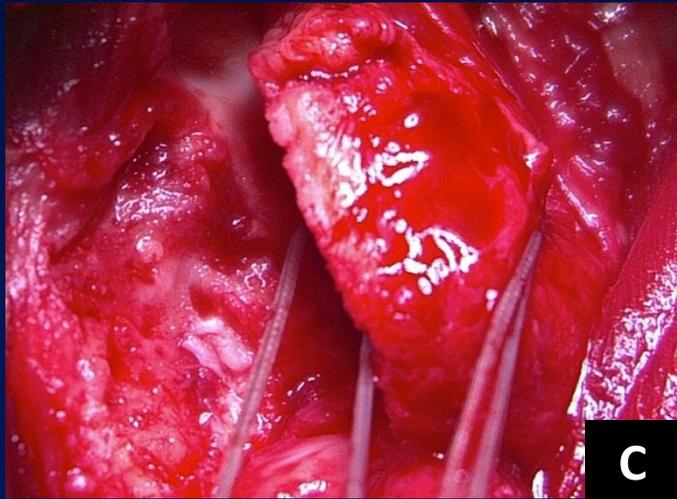
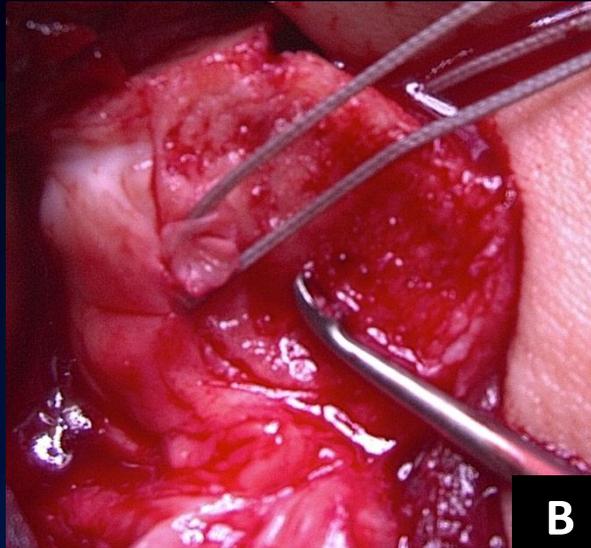
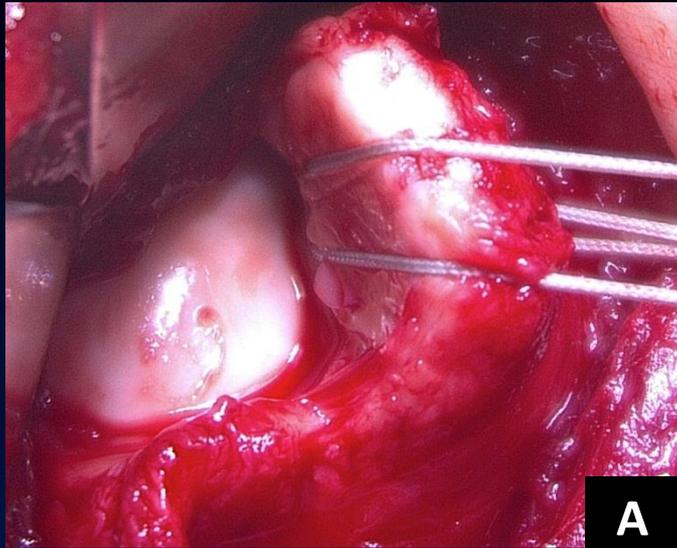


Figure 2: **A.** Image from open deltopectoral approach demonstrating the avulsed fragment with attached subscapularis tendon everted with high-strength non-absorbable sutures. **B.** Preparation of the donor site via curette to stimulate an appropriately healing bone response. **C.** Advancement of the fractures site to the donor site. **D.** Final product demonstrating the use of Arthrex© SpeedBridge sutures anchors placed medial and lateral to the subscapularis insertion points in order to create a knotless double row footprint.

Schematic of Repair

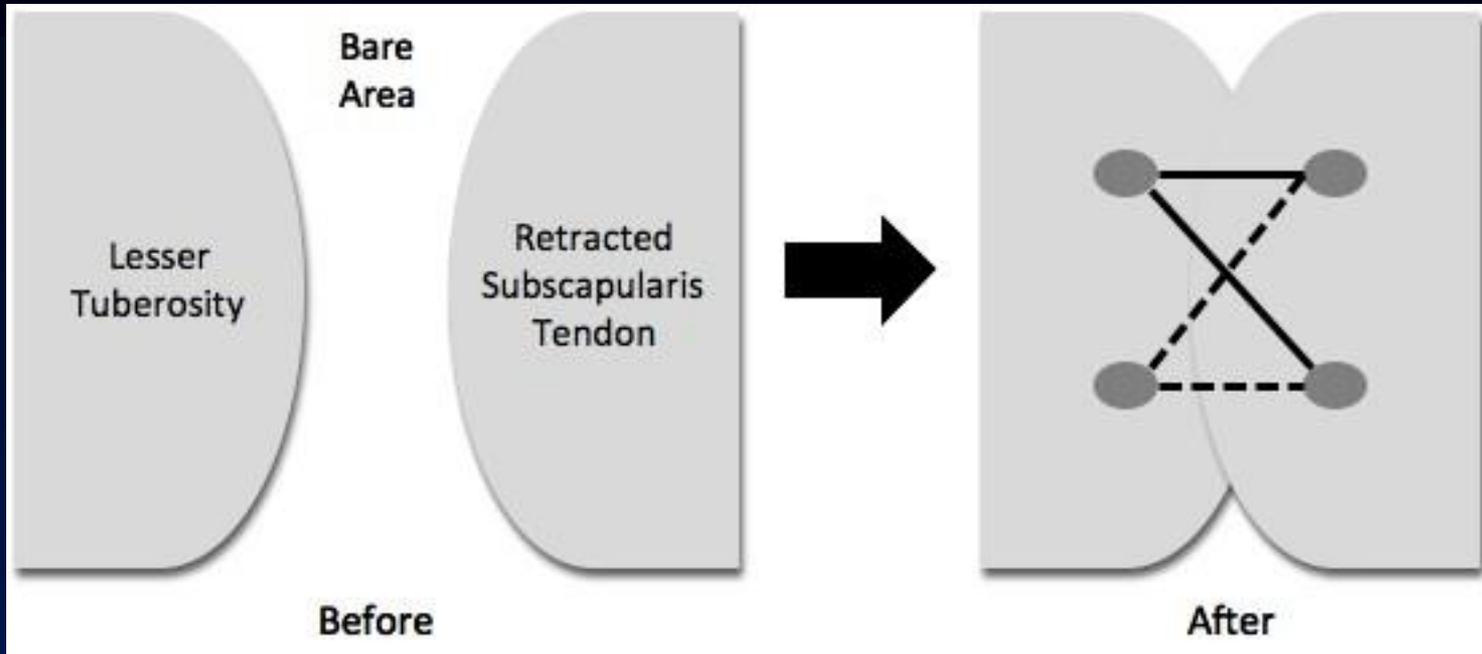


Figure 3: Line drawing demonstrating the surgical technique utilized to re-attach the avulsed subscapular tendon to the lesser tuberosity of the proximal humerus. Arthrex© SpeedBridge sutures were passed behind this exposed bone fragment. Four biocomposite SwiveLock C 5.5 millimeter anchors with a closed eyelet were then placed on the medial and lateral insertion points of the subscapularis, beginning medially, in order to construct a knotless double row footprint. Finally, the sutures were brought directly over the fragment, and then crisscrossed, in order to achieve a secure repair.

Conclusion

- At nine months post-operatively the patient had returned completely to full-time sporting activity without symptoms or limitations. Physical examination was notable for full, painless range-of-motion and complete strength.
- Given the optimal outcome in this patient, the rotator cuff suture and anchor technique appears to be a time-efficient and user-friendly physal-sparing method for achieving an anatomic, secure repair of an avulsed lesser tuberosity.
- When considering subscapularis injuries, an accurate diagnosis and prompt referral to surgery, when indicated, is associated with superior outcomes. For those patients who require surgical repair, the technique described appears to provide a safe and efficacious method of fixation for this unique fracture pattern.