[Orthopaedic Surgery]

Traumatic Subscapularis Tendon Tear in an Adolescent American Football Player

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Isolated traumatic subscapularis tendon tears are uncommon at any age. In adolescent patients, this type of injury is even more infrequent and usually presents as a bony avulsion of the lesser tuberosity. This report reviews a case of an adolescent American football player sustaining a posterior impact to an abducted, extended arm that resulted in an isolated subscapularis tendon tear. Magnetic resonance imaging of the shoulder revealed an isolated subscapularis tear retracted 1.6 cm without bony avulsion from the lesser tuberosity. Surgical repair was performed with 2 biocomposite absorbable anchors in the lesser tuberosity. The patient returned to basketball 12 weeks after surgery. This case illustrates that a high index of suspicion is required for an appropriate diagnosis in young athletes.

Shoulder injuries are common in athletic adolescents; however, rotator cuff tears are infrequently seen. Isolated subscapularis tears without a history of dislocation and without associated avulsions of the lesser tuberosity are rare.⁵

CASE REPORT

A 13-year-old right-hand-dominant boy (5 ft 9 in, 130 lb) presented after football practice complaining of shoulder pain. He recalled making a tackle while sustaining a second posterior impact to his abducted, extended arm. He denied any previous shoulder injuries. On examination, he held his right arm near his body with the elbow flexed. No gross deformities were seen. He was tender to palpation along the proximal anterolateral humerus. He was not able to actively abduct, externally rotate, or internally rotate his arm but had full passive range of motion. Pain prevented adequate testing of shoulder girdle strength or other special tests. He possessed normal strength with grip, wrist flexion and extension, and elbow flexion and extension. A brachial plexus stretch injury was considered unlikely since the weakness was limited to his shoulder. Radiographs revealed a skeletally immature shoulder without fracture of the lesser tuberosity, proximal humerus, or physeal widening. A nondisplaced physeal fracture was initially diagnosed, and he was removed from athletic participation.

The athlete was seen 2 weeks later and did not have any improvement in rotator cuff strength. Repeat radiographs did

not reveal any evidence of proximal humerus physeal fracture. Nonarthrogram magnetic resonance imaging showed an isolated subscapularis tear retracted 1.6 cm without bony avulsion from the lesser tuberosity (Figure 1).

Four weeks postinjury, arthroscopic repair was performed, and the only abnormal finding was the retracted subscapularis tear. There was no evidence of dislocation or labral tear. The long head of the biceps was stable in the intertubercular groove. Bony avulsion was not seen, nor was a Hill-Sachs lesion present. The subscapularis was repaired with 2 biocomposite absorbable anchors placed in the lesser tuberosity, 1 superiorly and 1 inferiorly (Figure 2). Passive external rotation after the repair was 60°.

The patient was immobilized in an abduction sling for 4 weeks. Five weeks after surgery, he was doing well with passive range of motion. He progressed to active range of motion and started strengthening at 8 weeks. At 12 weeks, he had full active range of motion, including 100° of external rotation in 90° of abduction. He had 4+/5 subscapularis strength on bear hug testing. He completed a home exercise program focused on subscapularis strength and overall core strength and stability. He returned to basketball and had no pain during or after games. He successfully participated in tackle football 10 months postinjury without difficulty. Currently, he is 19 months postinjury and has 5/5 subscapularis strength on liftoff and bear hug testing. He has 100° of external rotation and 70° of internal rotation in 90° of abduction. He experiences no pain or deficit in daily living or in his athletic endeavors.

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Figure 1. T2-weighted magnetic resonance imaging of intrasubstance subscapularis tendon tear with open physis present.

Figure 2. (a) Tear of the subscapularis viewed from the subacromial bursa with an instrument pulling the tendon away to expose the lesser tuberosity for preparation of the repair. (b) Two suture anchors to repair the subscapularis tear. (c) Completed repair of subscapularis tear.

DISCUSSION

The subscapularis provides active internal rotation of the humerus and aids in anterior stabilization of the glenohumeral joint.⁵ External rotation and abduction movements or forced hyperextension often result in avulsion fractures of the lesser tuberosity in adolescents due to an open physis. In older athletes, partial- or full-thickness tendon rupture may be seen. The overall incidence of subscapularis tendon tears is difficult to determine; studies show an incidence of 3% to 27%.⁴ When the subscapularis is torn, physical examination shows increased passive external rotation and positive lift-off, bear hug, and belly press testing.⁵

In a report of 16 patients with isolated rupture of the subscapularis muscle, 7 experienced forced external rotation of the adducted arm and 6 suffered powerful hyperextension. The youngest patient was 25 years old, and 13 were between 35 and 64 years of age.²

A 14-year-old wrestler sustained a forced external rotation against resistance resulting in an isolated, medially displaced avulsion fracture of the lesser tuberosity apophysis.³ He underwent open reduction and internal fixation and returned to full activities 4 months after surgery.³ Another 14-year-old wrestler sustained an external rotation and abduction injury to his arm resulting in a bony avulsion of the lesser tuberosity and subscapularis tendon.⁶ His diagnosis was delayed, but he underwent open fixation and 6 months after surgery resumed high school wrestling.⁶

Rotator cuff tears are much less common in adolescent individuals with open physes, but they have occurred in skateboarding, wrestling, and pitching.⁷ The arm positions at the time of injury were abduction, extension, and external rotation. All individuals returned to their sports after surgical treatment.⁷ Traumatic subscapularis tears associated with supraspinatus tears can also occur.¹ An 8-year-old fell off a motorcycle on an outstretched arm and sustained a full-thickness subscapularis tear with a partial-thickness

supraspinatus tear. Similar to many patients in this age group, he was not diagnosed until 2 years after the injury but had a successful surgical repair.¹

A high index of suspicion and thorough physical examination are imperative for appropriate diagnosis in young athletes with traumatic shoulder injury and weak rotator cuff muscles, as they often have normal radiographs. Despite their rarity, subscapularis tears should be considered in young athletes. Fortunately, even in situations with delayed diagnosis, surgical repair should yield good results.

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