

Proximal Biceps Tendon Tear in an Adolescent Tennis Player

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Abstract

The diagnosis of a torn biceps tendon in athletes who use overhead throwing or swinging motions can be difficult to make because there is no one physical examination finding that will confirm the diagnosis, and because magnetic resonance imaging, although sometimes helpful, does not image the length of the biceps tendon adequately. We report a case of an isolated partial biceps tendon tear in an adolescent female athlete who was diagnosed during arthroscopy after the tendon was pulled into the joint. The tendon was cut and a tenodesis was performed. Two years after the surgical procedure, the patient was without pain and returned to playing tennis at her previous level.

did not improve with nonsurgical treatment. Her preoperative evaluation did not isolate any one cause for her pain, but at the time of arthroscopy, a partial tear of the long head of the portion of the biceps tendon within the bicipital groove was discovered. The patient had complete relief of her pain with a biceps tenodesis and was able to return to her sport without limitations.

The patient provided written informed consent for print and electronic publication of this case report.

Case Report

A previously healthy 15½-year-old Caucasian female high school tennis team player injured her shoulder while hitting an overhead tennis shot. Before that injury, she had had no problems with her shoulder or elbow and no other musculoskeletal injuries. During an overhead return shot, she felt a sharp pain deep in the front of her shoulder that subsequently subsided after some overhead stretching. The causative shot occurred during the end of practice and was neither out of the ordinary for her nor did it cause her to try to strain to an awkward position. She had a residual dull ache but continued playing without seeking medical attention. The pain was worse when serving and hitting overhead shots, but it did not interfere with her groundstrokes, her ball velocity, her tennis performance, or her activities of daily living. Six months after the injury, she consulted her primary care doctor, who referred her to an orthopedic surgeon.

The surgeon examined her shoulder and noted that she had diffuse tenderness over the lateral acromion, but there was no tenderness localized to the bicipital groove. During his examination, he noted no subluxation or instability of the biceps tendon, nor did he mention pain with resisted elbow flexion or supination, but she had full range of motion (ROM) with mild pain through mid arc flexion. Abduction and supraspinatus testing caused considerable pain but no weakness. He also noted no clinical instability, but found that apprehension testing caused marked pain; conventional radiographs (normal) and a magnetic resonance imaging (MRI) scan without gadolinium of her shoulder were obtained. After reviewing the images, the surgeon thought the pain was a shoulder sprain/strain, rotator cuff tendinitis, or subacromial bursitis, and prescribed muscle relaxants, nonsteroidal anti-inflammatory medications, and

Shoulder pain in athletes who use the arm in overhead sports can have a myriad of causes.¹ The causes and abnormalities that have been cited as sources of shoulder pain in this population include anterior instability, impingement (eg, partial rotator and full-thickness rotator cuff tears, biceps and superior labrum lesions, internal impingement, and coracoid impingement), loss of glenohumeral internal rotation, and neurovascular lesions.

To our knowledge, tears of the long head of the biceps tendon unassociated with superior labrum anterior and posterior lesions in athletes involved in overhead sports have not been reported as a cause of shoulder pain, especially in very young athletes. Such tears have typically been regarded as degenerative lesions that increase in frequency with age and can result in spontaneous rupture in some individuals.² Those individuals may or may not have anterior shoulder pain before the rupture. In individuals with pain before the rupture, the pain is often relieved after the tendon completely tears.

The English scientific literature was reviewed and no report of an isolated tear in the biceps tendon in an athletic individual younger than 18 years was found. Presented here is the case of an adolescent tennis player with anterior shoulder pain that

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Figure 1. Initial view from the arthroscope. The joint space appears normal. The biceps tendon attaches to the labrum with no visible pathology (B, biceps tendon; G, glenoid; H, humeral head; and L, labrum).

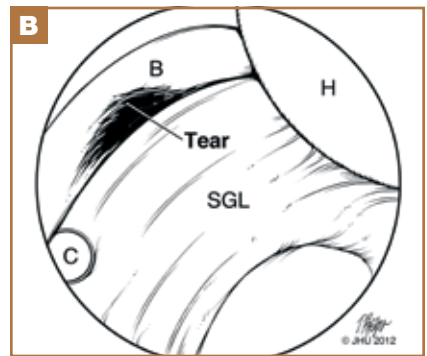


Figure 2. Arthroscopic photograph (2A) of a right shoulder viewed posteriorly (large arrow, biceps tear; small arrow, biceps pulley; B, biceps tendon; C, cannula; H, humeral head; S, subscapularis; and SGL, the superior glenohumeral ligament). Artist rendition (2B) of Figure 2A. (B, biceps tendon; C, cannula; H, humeral head; and SGL, the superior glenohumeral ligament). © 2012 Johns Hopkins University [JHU]. Used with permission.

physical therapy. After 5 months, her strength improved but pain with tennis continued. She declined a magnetic resonance arthrogram and had no diagnostic or therapeutic shoulder injections. She finished her senior year on the varsity team and was able to compete despite the pain. However, she anticipated needing her shoulder to be pain free to participate at a higher level in college.

Five and a half years post-injury, she presented to our clinic with unchanged symptoms. She had no atrophy, and her sensory, motor, and reflex examinations were normal bilaterally. Her right arm had full, equal elevation but at 90° more external rotation (15°) and less internal rotation (20°) than her left arm; a positive Hawkins-Kennedy impingement sign,³ Speed's test,⁴ Neer impingement sign,⁵ and dynamic shear test⁶; a negative Yergason's test⁷ and active compression test⁸; tenderness over her lesser tuberosity, bicipital groove, and anterior portion of her greater tuberosity; and negative anterior⁹ and posterior¹⁰ apprehension signs. She had bilateral and equal Grade 2 sulcus signs,¹¹ but did not have a sense of instability with the test nor did she have any pain. She had pain but no weakness with a lift-off test.¹² Because she had a negative active-compression test, a negative Yergason's test, and no pain with a resisted lift-off test, we were not convinced that her symptoms were secondary to an isolated biceps tendon problem. Her MRI scans were inconclusive for a superior labrum tear, with no signs of biceps tendon abnormality. We concluded she had signs of rotator cuff irritation without a rotator cuff tear, and because her examination was equivocal for labrum or biceps abnormality, she was allowed to continue participating in tennis as pain permitted. She elected to delay diagnostic arthroscopic surgery until 3 months after the tennis season.

Examination under anesthesia showed full ROM in each shoulder and asymmetry of rotation with the arm abducted 90°, but the indicated glenohumeral internal rotation of 15°. She had Grade 2 sulcus signs of equal magnitude bilaterally and in internal and external rotation.¹¹

The arthroscopic examination revealed no pathologic

changes. She had a positive drive-through sign¹³ and, on ROM examination, contact of the rotator cuff with the posterior and superior glenoid,¹⁴ but no peeling off of the labrum was noted. The biceps tendon was normal intra-articularly (Figure 1), but pulling the extra-articular portion of the tendon into the joint with a neuroprobe⁴ showed a portion of the tendon approximately 1 cm outside the joint to be torn approximately 50% of its width, with extensive fraying and splitting (Figure 2).

Tear repair was not a viable option, so we performed a biceps tenodesis using standard procedure except that the tendon was placed, not subpectorally, but on the humeral shaft just inferior to the transverse ligament; the tenodesis was reinforced with absorbable sutures (Figure 3).

On postoperative day 1, the patient was allowed unlimited active and passive motion of fingers, wrist, elbow, and shoulder. For 6 weeks, she was allowed to lift 0.5 kg with her right arm and could increase her strength progressively under a physical therapist's supervision. She was allowed to hit groundstrokes at 4 months and serve at 6 months after surgery. At the 8-month and final 26-month follow-up, she was playing tennis with no restrictions, pain, or functional limitations.

Discussion

Our case illustrates 3 important points: (1) making the diagnosis of anterior shoulder pain is difficult because the physical examination is inexact^{4,15} and radiographic studies may not elucidate partial tears¹⁶; (2) pulling the extra-articular portion of the biceps tendon into the joint during arthroscopic surgery helps avoid missing a lesion; and (3) biceps tenodesis can provide pain relief and return of function in athletic individuals older than 18-years-old.

In terms of diagnosis, the pain of biceps abnormality is typically in the anterior shoulder and radiates into the proximal arm, but such pain in athletes using throwing or swinging motions can be caused by many shoulder abnormalities. No single historical finding or clinical examination can confirm an isolated biceps tendon abnormality.¹⁵ Our patient had no

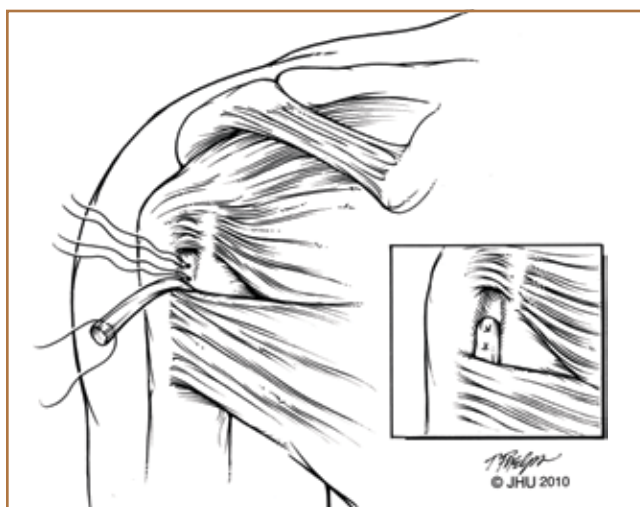


Figure 3. The tenodesis was reinforced with absorbable sutures between the transverse ligament superiorly and the superior tendon of the pectoralis major tendon inferiorly.

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physical or arthroscopic evidence of occult anterior instability, superior labrum anterior and posterior lesions, or rotator cuff disease, which have been associated with biceps tendon lesions. Imaging studies, except for magnetic resonance arthrograms, are not consistent in showing partial tears and, to our knowledge, MRI for this diagnosis in the bicipital groove has not been studied.

For our patient, the history, physical examination, and radiographic findings did not indicate one particular abnormal process. Diagnostic arthroscopy identified the lesion because the extra-articular portion of the tendon was pulled into the joint. We conclude that this maneuver is particularly appropriate in evaluating the athlete with anterior shoulder pain without other abnormalities. In the presence of a rotator cuff tear, the surgeon should use it to complete the examination of the biceps tendon.

The function of the long head of the biceps is still disputed. Some authors believe it to be active in the stability of the glenohumeral joint,¹⁷ whereas other electromyogram studies have shown that the biceps has no activity in the shoulder when the elbow and forearm motions are controlled.¹⁸ To our knowledge, this case report is the first to confirm an isolated¹⁹ partial tear of the biceps tendon in a tennis player younger than 18 years and the first to be treated with a tenodesis. We found that an open, extra-articular biceps tenodesis provided an excellent result with pain-free full return to sport for our patient.

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This paper will be judged for the Resident Writer's Award.