

Abstract

Background: Athlete is a 24 year-old (180.3 cm and 99 kg) male minor league baseball pitcher. Athlete's previous medical history includes a right knee ACL, medial and lateral meniscus tear that was surgically repaired and right shoulder pain that was treated conservatively. The athlete's chief complaint was right anterior and lateral shoulder pain over the biceps tendon similar to the pain he experienced previously. Athlete stated that his pain is a 10/10 while he is warming up and in the late cocking to acceleration phases of throwing. The athlete reported decreased symptoms after warming up however, it has been taking him longer to warm up. Athlete later disclosed that his initial pain never went away as he reported it did after completing rehabilitation for his shoulder pain. The athlete disclosed that his pain remained a 7/10 over the course of the season following his initial assessment. Athlete reports having no symptoms with non-baseball activity with no neurological symptoms noted. The athlete's shoulder ROM was normal other than shoulder flexion which was greater than 180 on both arms. Bilateral MMT equal but right shoulder symptoms increased with shoulder internal and external rotation. All special tests on the left shoulder were negative, however on the right shoulder there was a (+ for pain) O'briens Test, (+ for pain) Hawkins Kennedy Test, (+ for pain) Neers Test, and (+ for superior/posterior click that was pain free) Clunk Test. The athlete was then referred to an orthopedic surgeon for an MRI. The evaluation from the orthopedic surgeon revealed all negative tests and the athlete was cleared to begin rehabilitation exercises and return to throwing. As the athlete began to throw again, he began experiencing similar symptoms and was shut down from throwing any further but continued rehabilitative exercises. A secondary opinion with another orthopedic surgeon revealed lesions of the long head of the biceps tendon. A biceps tendon transfer to the conjoint tendon was recommended to increase pain free function. **Differential Diagnosis:** Biceps Tendonitis, SLAP labral tear, Lesions of Long Head of Biceps Tendon. **Treatment:** The athlete received a biceps tendon transfer to the conjoint tendon as recommended. The procedure used an arthroscopic approach via the sub-deltoid space which allows for better access to the anterior shoulder. Athlete is currently going through the post-operation rehabilitation process. **Uniqueness:** Shoulder pain is a common complaint found in both minor league and major league baseball players. Evidence has indicated that pathology of the biceps tendon is often a factor to consider when a baseball athlete is experiencing shoulder pain. However, treatment of biceps tendon pathology still remains controversial. Conservative treatment and management of a biceps tendon pathology includes activity modification, rehabilitation exercises, local steroid injections and oral anti-inflammatory medications. If conservative management and treatment fails to relieve shoulder symptoms, surgical intervention options should be considered. Surgical interventions include a biceps tenotomy, biceps tenodesis and a biceps tendon transfer to the conjoint tendon. This case is unique because the athlete chose to proceed with the more recent surgical intervention of a biceps tendon transfer to the conjoint tendon as conservative treatment failed to relieve his symptoms. **Conclusion:** This case highlighted the unique surgical procedure of an all-arthroscopic biceps tendon transfer to the conjoint tendon in a minor league baseball pitcher. This case provides as an instance of failure of conservative treatment for a biceps tendon pathology and elaborates on the possible

Introduction

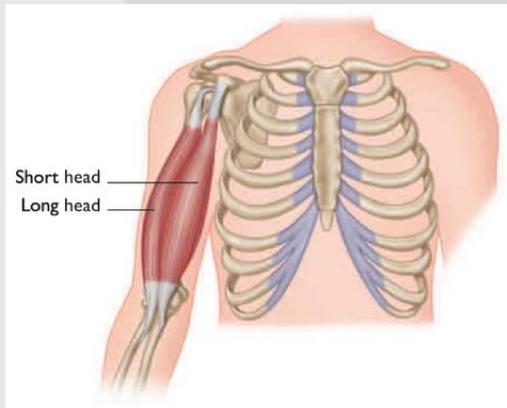
A biceps tendon pathology is a very common injury in baseball pitchers due to the repetitive and forceful motion of pitching. Treatment for a biceps tendon pathology is still controversial. Treatment for a biceps tendon pathology can include conservative and surgical treatment. In a chronic biceps tendon pathology, surgical intervention may be warranted. Two surgical interventions for a biceps tendon pathology include, a biceps tendon transfer to the conjoint tendon and a biceps tenodesis. The biceps tendon transfer to the conjoint tendon is a relatively newer technique that has shown to have increased biomechanical advantages when compared to the biceps tenodesis. The biceps tenodesis is an older technique that has shown positive results however, has been shown to have negative outcomes in some cases. Evidence has indicated that the biceps tendon transfer to the conjoint tendon has biomechanical advantages that may benefit a baseball pitcher. Further research needs to investigate the reliability and longevity of the surgical technique in active overhead athletes, such as a baseball pitcher. The following information will explain the mechanism of injury, clinical assessments, radiographic findings, diagnosis, treatments and return to play to provide additional information to this athlete's unique injury and surgical intervention.

Purpose

The purpose of this case report was to introduce a 24 year-old minor league baseball pitcher who suffered from lesions of the long head of the biceps brachii tendon. In this specific case, conservative treatment failed to resolve symptoms and, therefore, resulted in a surgical intervention transferring the long head of the biceps brachii to the conjoint tendon, a relatively newer technique. An overview of this unique injury and surgical intervention is presented to obtain additional information and a better understanding regarding lesions of the biceps brachii tendon and potential surgical interventions, if necessary.

Anatomy

Understanding the anatomy in relation to the biceps brachii tendon and the glenohumeral joint is essential in understanding the injury, radiographic findings and surgical intervention. The glenohumeral joint is responsible for connecting the upper extremity through the trunk. The glenohumeral joint is comprised of the humeral head and the glenoid fossa of the scapula. The joint capsule, ligaments and muscles all contribute to the function and stabilization of the glenohumeral joint. The biceps brachii muscle is a two headed muscle that runs from the coracoid process (short head) and supraglenoid tubercle of the scapula (long head) to the radial tuberosity. The conjoint tendon is a continuation from the short head of the biceps brachii off the coracoid process. This joint is considered to be the most mobile and least stable joint in the body, and is the most commonly dislocated diarthroidal joint.



Case Report

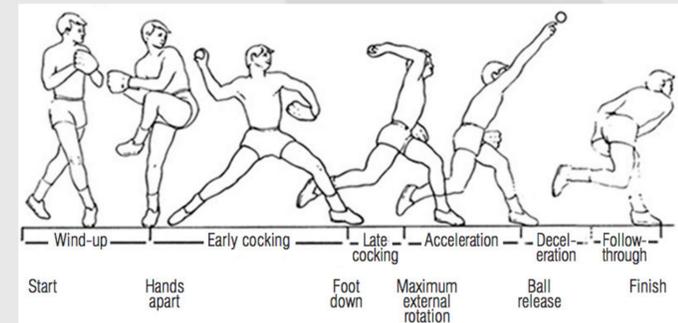
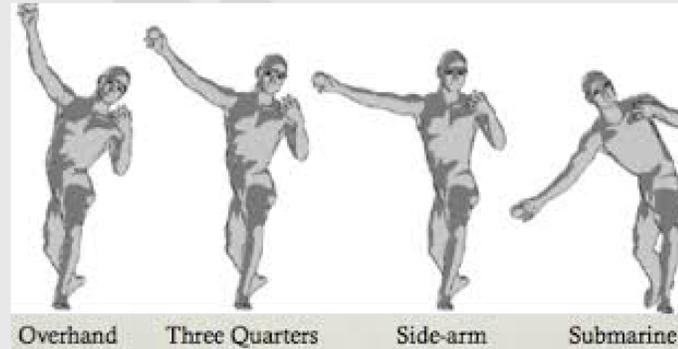
Patient: Patient is a 24 year-old minor league baseball pitcher (180.3 cm and 99 kg) that suffered from lesions of the long head of the biceps brachii muscle from continuous pitching. The following information will explain the mechanism of injury, clinical assessments, radiographic findings, diagnosis, treatments and return to play to provide additional information to this athlete's unique injury and surgical intervention.

Mechanism of Injury: Shoulder pain is one of the most common complaints of both minor league and major league baseball pitchers. The evidence has indicated that pathology of the biceps tendon is often a factor to consider when a baseball pitcher is experiencing shoulder pain. Over the course of a baseball season, the athlete's chief complaint was right anterior and lateral shoulder pain over the biceps tendon similar to the pain he had experienced previously. This particular athlete demonstrates a sidearm pitching technique. A sidearm baseball pitch brings the baseball along the horizontal axis, at or below shoulder level. Sidearm throwing is characterized by an erect trunk rotating with the pitching extremity parallel to the ground. Due to this motion, the axis of motion is parallel to the vertebral column, with the moment arm running through the shoulder girdle, arm, forearm and hand to the ball. As a sidearm pitcher squares his shoulders to the home plate during the arm cocking phase of throwing, forces are transmitted from the trunk to the lagging extremity through the anterior shoulder joint structures (Fortenbaugh, Fleisig, & Andrews, 2009). Since the rotational force causes the throwing arm to lag behind, the anterior structures of the shoulder, including the biceps brachii, are put on stretch. A biceps tendon pathology is a very common injury in baseball pitchers due to the repetitive and forceful motion of pitching.

Clinical Examination: During season, the athlete reported to the athletic trainer with a chief complaint of right anterior and lateral shoulder pain over the biceps tendon similar to the pain he experienced previously. Upon arrival to the athletic training facility, the athlete was evaluated by the athletic trainer. The athlete's previous medical history includes a right knee ACL, medial and lateral meniscus tear that was surgically repaired and right shoulder pain that was treated conservatively. Athlete stated that his pain is a 10/10 while he is warming up and in the late cocking to acceleration phases of throwing. The athlete reported decreased symptoms after warming up however, it has been taking him longer to warm up. Athlete later disclosed that his initial pain never went away as he reported it did after completing conservative rehabilitation for his prior shoulder pain. The athlete disclosed that his pain remained a 7/10 over the course of the season following his initial assessment. Athlete reports having no symptoms with non-baseball activity with no neurological symptoms noted. The athlete's shoulder range of motion was normal other than shoulder flexion which was greater than 180 degrees bilaterally. Bilateral manual muscle testing was equal but right shoulder symptoms increased with shoulder internal and external rotation. All special tests on the left shoulder were negative, however on the right shoulder there was a (+ for pain) O'briens Test, (+ for pain) Hawkins Kennedy Test, (+ for pain) Neers Test, and (+ for superior/posterior click that was pain free) Clunk Test.

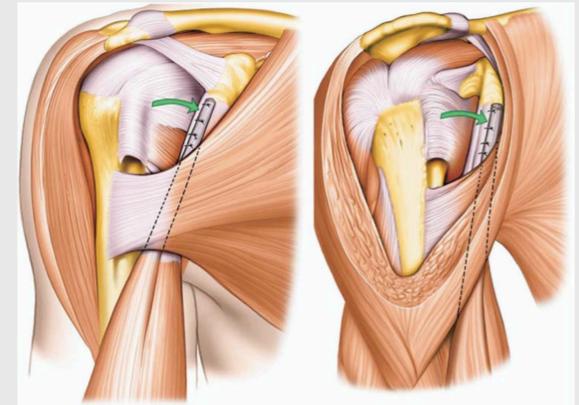
Radiographic Findings: The athlete was then referred to an orthopedic surgeon for an MRI. The evaluation from the orthopedic surgeon revealed all negative tests and the athlete was cleared to begin rehabilitation exercises and return to throwing. A secondary opinion with another orthopedic surgeon revealed lesions of the long head of the biceps tendon.

Clinical Examination: During physical examination, the athlete reported to the athletic trainer with a chief complaint of right anterior and lateral shoulder pain over the biceps tendon. The athlete reported that his pain is a 10/10 while he is warming up and in the late cocking to acceleration phases of throwing. The athlete reported decreased symptoms after warming up however, it has been taking him longer to warm up. Athlete later disclosed that his initial pain never went away as he reported it did after completing conservative rehabilitation for his prior shoulder pain. The athlete disclosed that his pain remained a 7/10 over the course of the season following his initial assessment. The athlete's shoulder range of motion was normal other than shoulder flexion which was greater than 180 degrees bilaterally. Bilateral manual muscle testing was equal but right shoulder symptoms increased with shoulder internal and external rotation. Clinical tests revealed a (+ for pain) O'briens Test, (+ for pain) Hawkins Kennedy Test, (+ for pain) Neers Test, and (+ for superior/posterior click that was pain free) Clunk Test. The athlete was then referred to an orthopedic surgeon for an MRI. The evaluation from the orthopedic surgeon revealed all negative tests and the athlete was cleared to begin rehabilitation exercises and return to throwing. A secondary opinion with another orthopedic surgeon revealed lesions of the long head of the biceps tendon. A biceps tendon transfer to the conjoint tendon was recommended to increase pain free function. The athlete chose surgical intervention, underwent surgery and immediately began recovery and rehabilitation.



Rehabilitation and Results

The athlete chose surgical intervention of a biceps tendon transfer to the conjoint tendon. The biceps tendon transfer to the conjoint tendon is a relatively newer technique that has shown to have increased biomechanical advantages when compared to the biceps tenodesis. In this arthroscopic procedure, the long head of the biceps brachii tendon is released from its anatomical origin and is reattached to the conjoint tendon through the subdeltoid space. The long head of the biceps tendon is fixed to the conjoint tendon using sutures and arthroscopic knot-tying techniques. There are many benefits of the biceps tendon transfer to the conjoint tendon. One benefit of this procedure is that the surgeon is able to directly visualize the tension of the long head of the biceps tendon during reattachment to the conjoint tendon to avoid over-tensioning of the tendon. The biceps tendon transfer to the conjoint tendon more closely reproduces the axis of pull of the biceps muscle and allows the long head and the short head of the biceps brachii muscle to carry the load. In addition, since the reattachment is to soft tissue rather than bone, it recreates the normal "bungee" effect of the superior labrum and biceps tendon (O'Brien, Voos, Drakos, & Taylor, 2007). Furthermore, this surgical technique has a very low rate of post-operative tendon rupture, a high rating of patient self-rating post-operation, and excellent results relating to post-operation pain and strength (Drakos, et al., 2008). Since this is a relatively newer technique, there is no rehabilitation protocol from this procedure for highly active baseball athletes. So the athlete followed the phases of the post-surgical protocol for non-athletes to gain back functional capacity and the rest of the protocol was tailored to include baseball activity. Phase I of rehabilitation post-surgery, was geared towards protecting the area using an arm sling, decreasing pain, inflammation and gradually beginning AAROM. Phase II of rehabilitation post-surgery, focused on increasing ROM, beginning unweighted therapeutic exercise and joint mobilizations. Phase III of rehabilitation post-surgery, focused on increasing therapeutic exercise to manually resisted pain free exercise. Phase IV of rehabilitation post-surgery, worked towards advanced strengthening. Phase V of rehabilitation, focused on sports specific baseball functional movements and continued strengthening. In phase VI of rehabilitation post-operation, return to play initiated with an introduction to an interval throwing programming and progressed to an interval throwing program on the mound. As the player progressed through this phase, he integrated all of his pitching techniques. The athlete will then begin to pitch in games and return to full activity.



Discussion and Summary

The motion of pitching is a coordinated effort of muscle units from the entire body, beginning in the lower body and ending in the upper extremity. The synchronous use of selective muscle groups maximizes the efficiency of the kinetic chain (Seroyer, et al., 2010). Shoulder pain is one of the most common complaints of both minor league and major league baseball pitchers. The evidence has indicated that pathology of the biceps tendon is often a factor to consider when a baseball pitcher is experiencing shoulder pain. Conservative treatment and management of a biceps tendon pathology includes activity modification, rehabilitation exercises, local steroid injections and oral anti-inflammatory medication. If conservative treatment fails to relieve shoulder symptoms, surgical intervention options should be considered. Surgical intervention options could include a biceps tenodesis and a biceps tendon transfer to the conjoint tendon.

This case highlighted the unique surgical procedure of an all-arthroscopic biceps tendon transfer to the conjoint tendon in a minor league baseball pitcher. This case provides as an instance of failure of conservative treatment for a biceps tendon pathology and elaborates on the possible surgical interventions. This case further illustrates the surgical procedure itself and the complexities of rehabilitation following the procedure in a minor league baseball pitcher.

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