

# Management options of Long Biceps Tendon Lesions Accompanying Rotator Cuff Injuries

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## Abstract

Surgery to repair a torn rotator cuff most often involves re-attaching the tendon to the head of the humerus (upper arm bone). A partial tear, however, may need only a trimming or smoothing procedure called a debridement. A complete tear is repaired by stitching the tendon back to its original site on the humerus. There are a few options for repairing rotator cuff tears. Advancements in surgical techniques for rotator cuff repair include less invasive procedures. While each of the methods available has its own advantages and disadvantages, all have the same goal: getting the tendon to heal. The type of repair performed depends on several factors, including your surgeon's experience and familiarity with a particular procedure, the size of your tear, your anatomy, and the quality of the tendon tissue and bone. Many surgical repairs can be done on an outpatient basis and do not require you to stay overnight in the hospital. Your orthopaedic surgeon will discuss with you the best procedure to meet your individual health needs. You may have other shoulder problems in addition to a rotator cuff tear, such as biceps tendon tears, osteoarthritis, bone spurs, or other soft tissue tears. During the operation, your surgeon may be able to take care of these problems, as well. The three techniques most commonly used for rotator cuff repair include traditional open repair, arthroscopic repair, and mini-open repair. In the end, patients rate all three repair methods the same for pain relief, strength improvement, and overall satisfaction

**Keywords:** Long Biceps Tendon Lesions, Rotator Cuff Injuries

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## Introduction

Treatment options depend on the patient's age, comorbidities, activity level, and degree of disability. (1)

Treatment of the biceps tendon pathologies is often dependent on treatment of associated rotator cuff pathology and failure to address LHBT disorder in the setting of rotator cuff repair can result in persistent shoulder pain and poor patient satisfaction. (2)

#### **Conservative Treatment:**

Conservative management with modalities such as nonsteroidal anti-inflammatory drugs, corticosteroid injections, gentle physical therapy with strengthening of the intact rotator cuff and deltoid component, and rest should be attempted first (1)

Range of motion exercises concentrating on rotation should be an important part of the therapy protocol. A combination corticosteroid and local anesthetic injection may be of value for diagnosis, injected into the subacromial space if rotator cuff pathology is suspected, intra-articularly if joint pathology may be a cause of symptoms or into the biceps tendon sheath if pathology is felt to be isolated. (3)

1-2 ml can be injected anteriorly along the intertubercular sulcus at the point of greatest tenderness, taking care not to inject the material into the actual tendon. Ultrasound can improve the accuracy of injections, but intra-sulcal adhesions or synovitis can interfere with injection efficacy. (3)

Post-injection testing and symptom relief guide the diagnosis. Although minimal, you should be warned about the risk of biceps tendon rupture. After injection, activity restriction is recommended for the next 1-2 weeks before physical therapy.(3)

#### **Operative Treatment:**

Surgical treatment may be warranted if symptoms persist despite adequate conservative therapy. (1)

Surgical treatment is usually withheld for at least 3 to 6 months of conservative management attempts. Surgical alternatives for treating biceps brachii muscle conditions include debridement, resection of the diseased tendon, tenotomy, or tenodesis. (4)

#### **Debridement**

Arthroscopic debridement is an effective treatment option for grade I to II biceps longus tendon fraying. For example, debridement can be used in young athletes with less than 50% fraying of the tendon fibers and minimal rotator cuff involvement. (4)

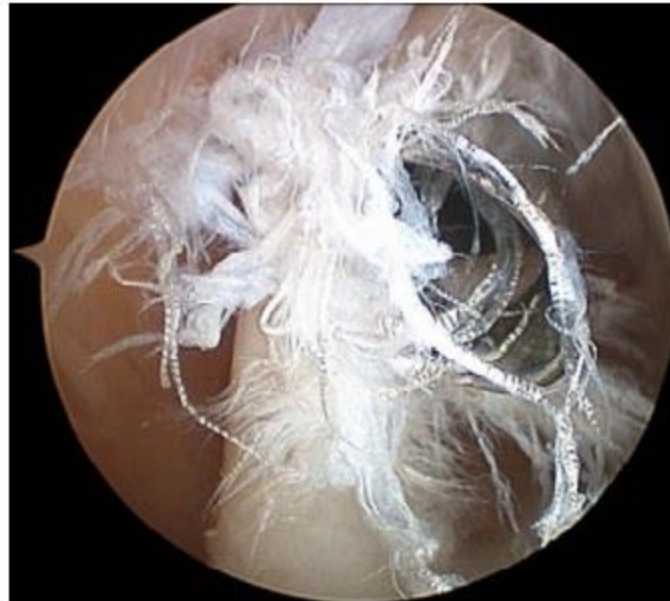


Figure (33) Arthroscopic view of >50% fraying of the long head of the biceps tendon within the glenohumeral joint. (4)

#### Tenotomy versus Tenodesis

There is continued interest and controversy in the treatment of biceps tendon pathology with tenotomy versus tenodesis. (4)

A simple biceps tenotomy may provide faster recovery and less surgery but may result in residual pain, muscle spasm, fatigue, or cosmetic deformities.(5,6)

Distal tendon migration following tenotomy is relatively common, despite hypertrophy and flattening of the diseased tendon, which biomechanically requires greater force to displace distally through the bicipital groove. (5,6)

Evidence suggests that elbow strength is compromised, but many authors also report good results with tenotomy(4)

Tenodesis requires more involved surgery and a longer, more difficult postoperative rehabilitation but may help to avoid cosmetic deformity or residual pain or spasms.[80]

Biceps tenodesis has several advantages, including maintenance of the length– tension relationship, prevention of muscle atrophy, maintenance of elbow flexion and supination strength, and avoiding spasm, pain, and cosmetic deformity of Popeye's lesions.(7)

Tenodesis has been shown to have good results in reducing shoulder pain and improving shoulder function.(8)

- **Tenotomy**

The procedure is performed arthroscopically in the beach chair position under general anesthetic with interscalene block. Tenotomy involves division of the LHBT at its proximal insertion at the supraglenoid tubercle and resection of a small amount of the intra-articular portion; this procedure allows the tendon to retract away from the joint into the bicipital groove. (9)

Arthroscopic scissors or the electrocautery are used to tenotomize the LHBT at the supraglenoid tubercle. A shaver or electrocautery can be used to smooth any irregularities at the tendon's origin. (10)



**Figure (34)** A simple biceps tenotomy should be performed at the glenoid level, using, either a knife, or a punch, or electrocautery, (9)

There are also other reported techniques of tenotomy that have been shown to reduce the risk of distal migration of the tendon, and hence reducing the Popeye deformity but these involve violation of the labral complex. (10)

Funnel-shaped tenotomy was performed by division of the LHBT at its proximal origin of the posterosuperior labrum at the supraglenoid tubercle and resection as close as possible to the origin of the biceps tendon at the posterior border of the glenoid This is intended to prevent the retraction of the tenotomized long head of the biceps away from the joint into bicipital groove and thereby prevent the development of a Popeye deformity (11).

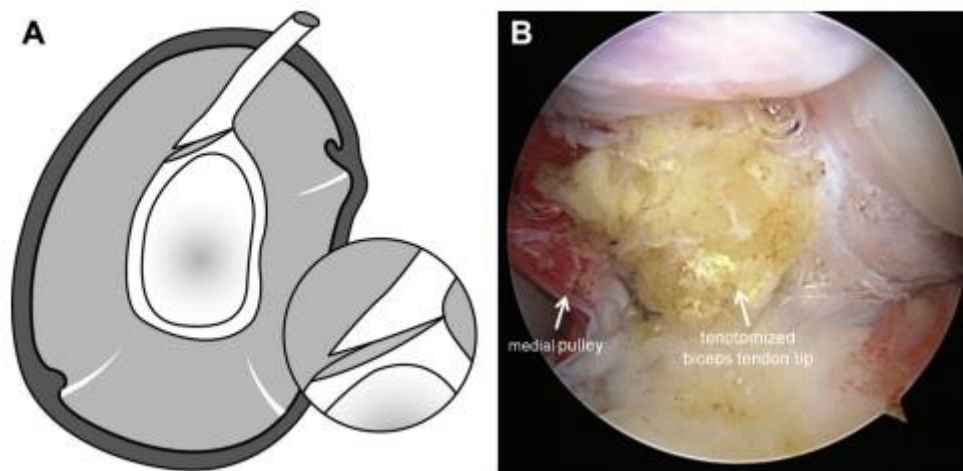


Figure (35) (A) Funnel-shaped tenotomy is performed by resection of the long head of the biceps tendon at its proximal origin as close as possible to the posterosuperior labrum at the supraglenoid tubercle. (B) After funnel tenotomy, it would be entrapped by the bicipital groove and transverse ligament in the junction between the joint and bicipital groove through a broader area of the tenotomized end. (11).

A so-called “Y-tenotomy” technique is popularized by Laurent Lafosse. For this technique the LHBT insertion site is detached from the 11 to 1 o’clock glenoid position. The cut labrum and LHBT tendon form the shape of a “Y”, which gives this technique its name. The bulky labral end-piece of the “Y-shape” lodges underneath the transverse ligament in the bicipital groove, thereby performing an auto-tenodesis (12).

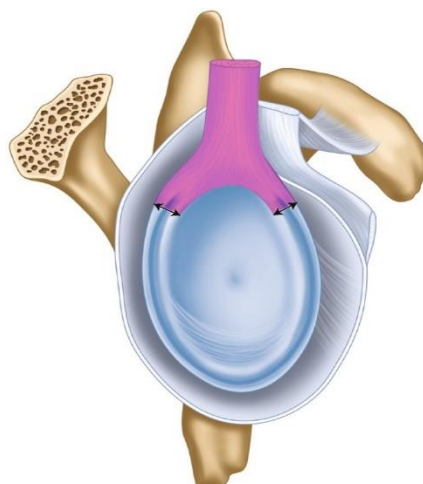


Figure (36) (A) Y-Tenotomy: The LHBT is detached from the 11 to 1 o’clock glenoid insertion site. The cut bulky end-piece of the “Y-shape” lodges underneath the transverse ligament in the bicipital groove, thereby performing an auto-tenodesis. (13)

A novel Anchor-Tenotomy technique for arthroscopic LHBT tenotomy was defined. It avoids the classic Popeye muscle deformity and without violating the labrum. (10)

Two incisions are performed in the LHBT. The first incision is an oblique incomplete incision that entails 50% of the tendon. The 2nd incision is a entire transverse incision that releases the LHBT on the tendon-labrum junction. The first incision (incomplete oblique incision) lets in the remnant of the LHBT to open up and shape an anchor form that anchors the LHBT on the articular entrance of the bicipital groove. (10)

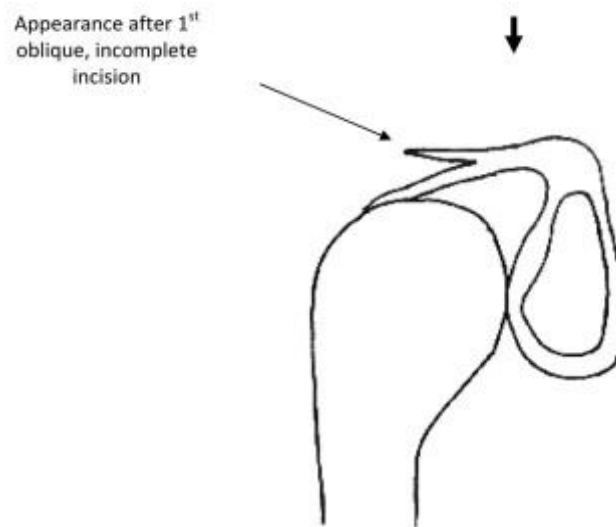


Figure (37) Oblique incomplete incision (first incision). (10)

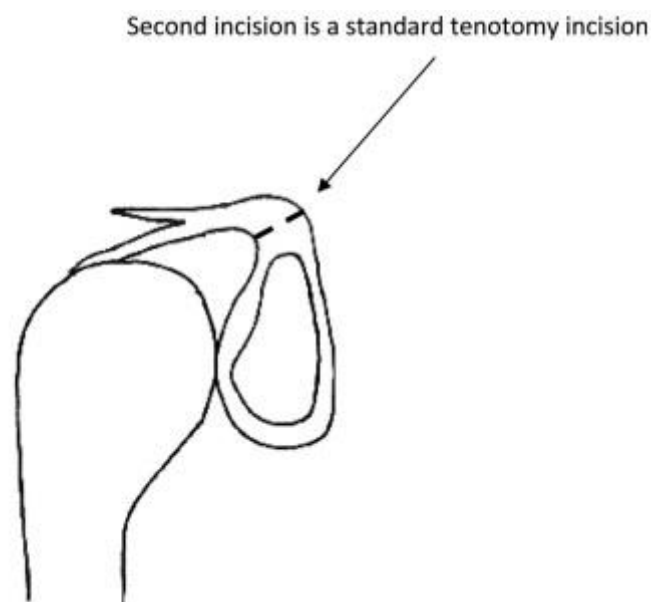


Figure (38) (A) Standard tenotomy incision (second incision). (10)

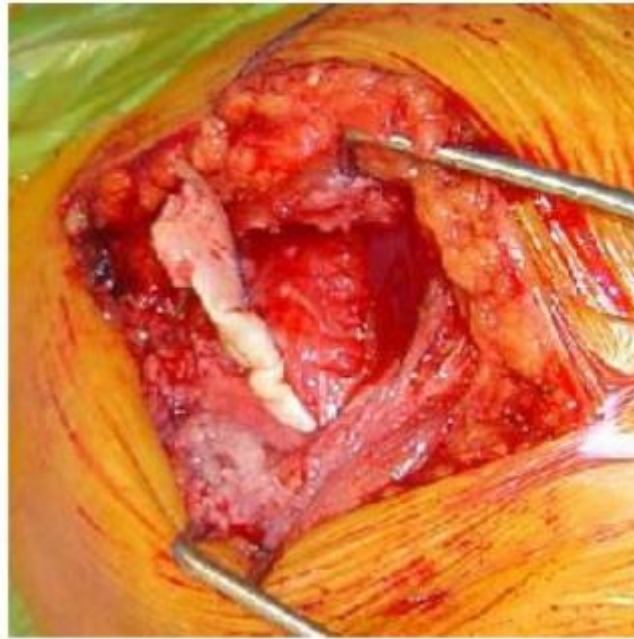


Figure (39) The remnant of the LHBT forms an anchor shape that anchors the LHBT at the articular entrance of the bicipital groove. Because this remnant is lodged at the bicipital groove, the risks of distal migration of the tendon and, thus, Popeye deformity are reduced. (Although the technique is arthroscopic, for clarity, the image was obtained during an open procedure.) (10)

- **Tenodesis**

Many techniques for biceps tendon tenodesis have been described in the literature. (4)

When performing tenodesis, the surgeon must decide the method of fixation (ie, interference screws, suture anchors, sutureless anchors), position relative to the pectoralis major tendon (suprapectoral vs subpectoral), intraosseous or extraosseous fixation, and arthroscopic or open technique. (3)

An arthroscopic technique of soft tissue tenodesis to the subscapularis or rotator cuff is described if these structures are intact. (4)

Arthroscopic tenodesis to bone has also been shown to be successful. The technique marks the biceps tendon with a suture, but release is more distal, near the supraspinatus. The proximal portion of the tendon is exteriorized and sutured to be placed back into a predrilled bone tunnel within the bicipital groove for both the tendon and bio-tenodesis screw. (4)

As a new alternative to traditional tenodesis techniques, the subdeltoid arthroscopic transfer of the long head of the biceps to the conjoint tendon was described. This technique, performed either arthroscopically assisted or arthroscopic, demonstrated no loss of strength and a 95% resolution of pre-operative biceps symptoms in a continually followed series. (4)

Several other techniques have been described, including the arthroscopic percutaneous intra-articular transtendon technique, keyhole technique, bone tunnel technique, and arthroscopic interference screw technique. The number of described techniques continues to evolve. The technique chosen by the surgeon is largely based on experience and comfort. (3)

#### **Postoperative Care:**

The postoperative protocol following treatment of biceps tendon pathology is dependent on an isolated or concomitant surgical procedure. Rest, ice, and anti-inflammatory drugs can be used in all protocols as needed to relieve symptoms. (4)

When an isolated simple tenotomy is performed, the patient can have free range of motion and activity limited by symptoms. (4)

If a biceps tenodesis is performed alone, the patient should wear a sling for 4 weeks after surgery with exception for moderate activities of daily living and range of motion to prevent stiffness. Aggressive elbow flexion and forearm supination should be strictly avoided to avoid repair overload. (4)

Strengthening may begin at approximately 6 - 8 weeks after surgery. Return to sport should appropriately begin at 3 to 6 months postoperatively. If a concomitant procedure is performed, such as rotator cuff repair or supraspinatus repair, that postoperative protocol takes precedence. (4)

Full range of motion should be included if tenotomized, whereas elbow flexion and forearm supination should be avoided if tenodesis is performed. (4)

#### **Complications**

Complications associated specially to biceps tenotomy encompass "Popeye deformity", chronic groove ache and fatigue pain. Weakness and fatigue pain are encountered much less often in patients over the age of 60 years. (14)

The general risks of shoulder arthroscopy must also be discussed with the patient. Stiffness after arthroscopic tenotomy is the most frequently encountered problem thus post-operative advice must stress the importance of early mobilisation. (15)

Other complications include infection, transient nerve injuries, complex regional pain syndrome and stroke secondary to cerebral hypoperfusion for patients in the beach-chair position. (16)

Biceps tenodesis is comparatively a longer and technically more challenging technique often requiring hardware to achieve fixation of the tendon to the bone. Some of the main disadvantages pertaining to all tenodesis procedures have been discussed which include infection, loss of fixation and recurrence of 'Popeye' deformity, persistent bicipital groove pain and injury to the brachial plexus (rare). (17)





**Figure (40) Posttenotomy Popeye deformity in the right arm.**

Complications can be related to the type of fixation technique with some reports of implant failures and infrequently proximal humerus fractures. (18)

Fractures are thought to be secondary to stress risers in patients that underwent an open procedure where larger cortical drill holes (Keyhole fixation) were made. (19)

Subsequently biomechanical studies comparing subpectoral tenodesis groups to suprapectoral tenodesis or control groups have shown maximum torque and rotation to failure were reduced in the subpectoral group. This potentially can predispose them to a higher risk of humeral fracture. (20)

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