Biceps Squeeze Tenotomy: Technique to Improve Efficiency of Arthroscopic Biceps Tenotomy

B. Holt Zalneraitis, M.D., Brian P. Milam, M.D., Eric K. Turner, M.D., Gregory Gasbarro, M.D., and Joseph W. Galvin, D.O.

Abstract: Biceps tenotomy is a common procedure performed in arthroscopic shoulder surgery. Numerous studies have demonstrated the effectiveness of both biceps tenotomy and tenodesis to relieve pain and restore function for the diagnoses of bicipital tenosynovitis, SLAP tears, rotator interval pulley lesions, and failed SLAP repairs. It is also frequently performed as a concomitant procedure with arthroscopic rotator cuff repair. We report a technique to improve the efficiency of arthroscopic bicep tenotomy using a biceps squeeze maneuver. This is a simple method of manually squeezing the biceps muscle belly while performing the arthroscopic biceps tenotomy. This shortens and tensions the intra-articular portion of the tendon to facilitate a more safe and efficient procedure.

Biceps tenotomy or tenodesis are both effective surgical techniques to manage lesions of the long head of the biceps tendon, SLAP tears, rotator interval sling lesions, and failed SLAP repairs. The are commonly performed in conjunction with other surgeries addressing shoulder pathology, including arthroscopic rotator cuff repair. Both arthroscopic suprapectoral and open subpectoral biceps tenodesis are effective techniques, and several studies have demonstrated equally favorable outcomes with minimal complications. The purpose of this Technical Note is to illustrate a simple technique that improves the safety and efficiency of arthroscopic biceps tenotomy.

Informed verbal consent was obtained from the patients in the figures and videos included in this manuscript.

Surgical Technique

Step 1: Setup and Patient Positioning

The procedure can be performed with the patient in the beach chair or lateral decubitus position. Our preference is to perform arthroscopic biceps tenotomy and tenodesis with the patient in the beach chair position. After general anesthesia and regional block, the patient is positioned in the beach chair position and all bony prominences are well padded with the head secured in a head rest. An examination under anesthesia is performed before placing the operative arm in an articulating arm holder (Spider Limb Positioner; Smith & Nephew, Andover, MA). The patient undergoes sterile preparation and draping and a formal timeout is performed.

Step 2: Portal Placement and Diagnostic Arthroscopy

A diagnostic shoulder arthroscopy is performed in the standard fashion. The standard posterior viewing portal is placed approximately 2 cm inferior and 1 cm medial to the posterolateral corner of the acromion. The anterior working portal is then established in the rotator interval with the aid of a spinal needle to determine the optimal trajectory. For biceps tenotomy, it is ideal to place this portal slightly more inferior and lateral in the rotator interval to optimize instrument trajectory. The portal is dilated and a 5-mm cannula is placed. Figure 1A depicts the typical arthroscopic view of the right glenohumeral joint and the superior labral biceps complex, as viewed from the posterior portal with the patient in the beach-chair position.
Step 3: Biceps Tenotomy With Biceps Squeeze Maneuver (With Video Illustration)

Following diagnostic shoulder arthroscopy, the biceps tenotomy is performed. Through the anterior working portal, an arthroscopic biter or radiofrequency wand is used to detach the long head of the biceps from the junction of the biceps tendon and superior labrum (Video 1). Before tenotomy, the surgeon or assistant squeezes the muscle belly of the biceps with their hand (Fig 1C, Video 1). This shortens the biceps musculotendinous unit, thereby increasing the tension of the intraarticular portion of the tendon. It creates a taut biceps tendon, which resists displacement from the arthroscopic biter or radiofrequency device (Fig 1D, Video 1). Without the increased tension, the biceps tendon will commonly displace superiorly and posteriorly (Fig 1B), increasing time spent using the biter or radiofrequency wand and adding additional unnecessary time to the surgery. This displacement also decreases visualization of the tenotomy site, increasing risk to surrounding structures such as the superior labrum, supraspinatus, and humeral head articular cartilage (Table 1).

Table 1. Pearls/Pitfalls of the Biceps Squeeze Tenotomy Technique

| Pearls                          | Pitfalls                                                                 |
|--------------------------------|--------------------------------------------------------------------------|
| Have assistant manually squeeze the biceps muscle belly before initiation of arthroscopic tenotomy. | Maintaining the biceps squeeze maneuver during final completion of the tenotomy may cause the biceps tendon to retract into the sheath distally, below the inferior border of the pectoralis major. This could lead to difficulty with identification of the tendon when performing an open subpectoral biceps tenodesis (although the authors have not encountered this problem). |

Table 2. Advantages/Disadvantages of the Biceps Squeeze Tenotomy Technique

| Advantages                                      | Disadvantages                                      |
|------------------------------------------------|---------------------------------------------------|
| Simple                                         | Requires an assistant                              |
| Decreases tenotomy procedure time              | May be less effective in patients with lower biceps muscle mass |
| Does not require additional equipment or devices|                                                   |
| Increases safety of tenotomy due to decreasing displacement of tendon |                                                   |
**Discussion**

Arthroscopic tenotomy or tenodesis of the long head of the biceps tendon is a very common procedure performed to address pathology of the biceps tendon, its pulley system, or superior labrum.\(^1\)-\(^4\),\(^6\)-\(^19\) Although considered a relatively safe and straightforward procedure, biceps tenotomy can quickly increase surgical time when multiple attempts are made with an arthroscopic biter or with sustained contact of a radiofrequency wand. Increasing tension of the biceps tendon with the biceps squeeze maneuver is a simple way to decrease procedure time by preventing displacement of the tendon superiorly and posteriorly with pressure from the instrument anteriorly. Minimizing displacement of the biceps tendon intra-articularly also allows for better visualization of the tenotomy site, decreasing risk to surrounding structures. We have observed that in young athletic male patients with large biceps muscles this technique is very effective. In addition, the maneuver does not appear to add any additional risk to the procedure.

The biceps squeeze tenotomy maneuver is a simple, remarkably effective, and worthwhile addition to a surgeon’s arthroscopic tenotomy technique, as it improves the efficiency and safety of the procedure without adding additional cost (Table 2).

The views expressed are those of the author(s) and do not reflect the official policy of the Department of the Army, the Department of Defense, or the U.S. Government. The investigators have adhered to the policies for protection of human subjects as prescribed in 45 CFR 46.

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