

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 biceps 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.¹⁻¹⁸ They 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.^{7,10,12,15} 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.

From the Department of Orthopaedic Surgery, Madigan Army Medical Center, Joint Base Lewis-McChord, Washington (B.H.Z., B.P.M., E.K.T., J.W.G.); and The Shoulder, Elbow, Wrist, and Hand Center, Mercy Medical Center, Baltimore, Maryland (G.G.), U.S.A.

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Address correspondence to Joseph W. Galvin, Department of Orthopaedics, Madigan Army Medical Center, 9040A Jackson Ave, Joint Base Lewis-McChord, WA 98431. E-mail: Joseph.w.galvin@gmail.com

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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.

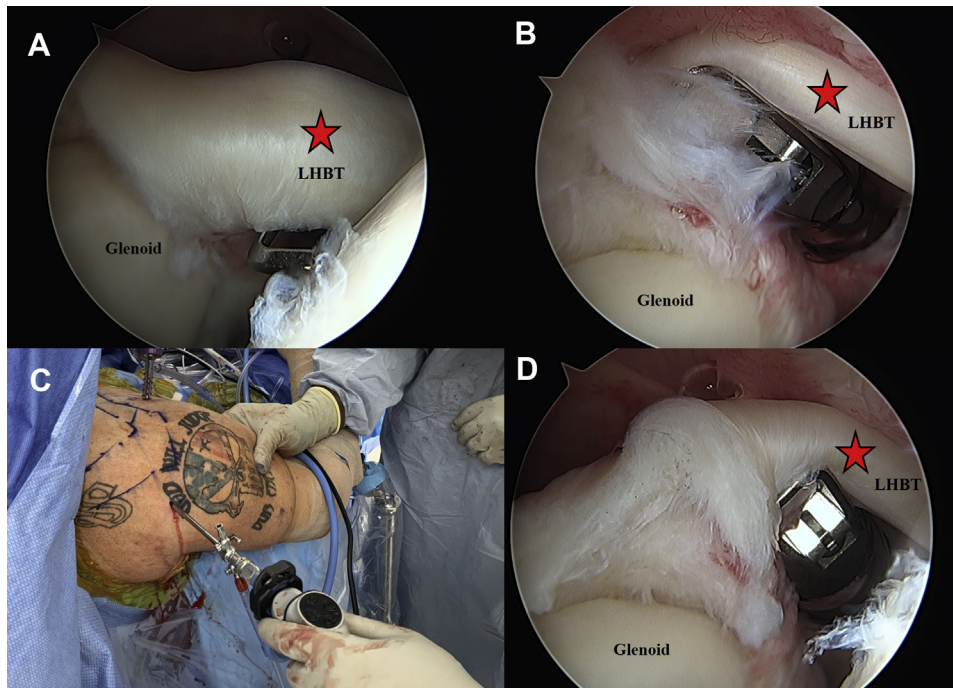


Fig 1. (A) Arthroscopic photo of right long head of biceps tendon (star) as viewed from the posterior arthroscopic viewing portal with the patient in the beach chair position with the biter in position for tenotomy. (B) Arthroscopic photo of right long head of biceps tendon (star) as viewed from the posterior arthroscopic viewing portal with the patient in the beach chair position displacing with the biter without the biceps squeeze maneuver being used. (C) Clinical photo of biceps squeeze maneuver being performed on the right biceps of a young athletic male patient in the beach chair position. (D) Arthroscopic photo of taut right long head of biceps tendon (star) as viewed from the posterior arthroscopic viewing portal with the patient in the beach chair position with the biceps squeeze maneuver decreasing displacement of the biceps tendon.

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.

References

- Crenshaw AH, Kilgore WE. Surgical treatment of bicipital tenosynovitis. *J Bone Joint Surg Am* 1966;48:1496-1502.
- Dines D, Warren RF, Inglis AE. Surgical treatment of lesions of the long head of the biceps. *Clin Orthop Relat Res* 1982;165-171.
- Becker DA, Cofield RH. Tenodesis of the long head of the biceps brachii for chronic bicipital tendinitis. Long-term results. *J Bone Joint Surg Am* 1989;71:376-381.
- Curtis AS, Snyder SJ. Evaluation and treatment of biceps tendon pathology. *Orthop Clin North Am* 1993;24:33-43.
- Walch G, Nove-Josserand L, Boileau P, Levigne C. Subluxations and dislocations of the tendon of the long head of the biceps. *J Shoulder Elbow Surg* 1998;7:100-108.
- Boileau P, Ahrens PM, Hatzidakis AM. Entrapment of the long head of the biceps tendon: The hourglass biceps—a cause of pain and locking of the shoulder. *J Shoulder Elbow Surg* 2004;13:249-257.
- Boileau P, Parratte S, Chuinard C, Roussanne Y, Shia D, Bicknell R. Arthroscopic treatment of isolated type II SLAP lesions: Biceps tenodesis as an alternative to reinsertion. *Am J Sports Med* 2009;37:929-936.
- Brockmeier SF, Voos JE, Williams RJ 3rd, et al. Outcomes after arthroscopic repair of type-II SLAP lesions. *J Bone Joint Surg Am* 2009;91:1595-1603.
- Provencher MT, McCormick F, Dewing C, McIntire S, Solomon D. A prospective analysis of 179 type 2 superior labrum anterior and posterior repairs: Outcomes and factors associated with success and failure. *Am J Sports Med* 2013;41:880-886.
- Ek ET, Shi LL, Tompson JD, Freehill MT, Warner JJ. Surgical treatment of isolated type II superior labrum anterior-posterior (SLAP) lesions: Repair versus biceps tenodesis. *J Shoulder Elbow Surg* 2014;23:1059-1065.
- McCormick F, Nwachukwu BU, Solomon D, et al. The efficacy of biceps tenodesis in the treatment of failed superior labral anterior posterior repairs. *Am J Sports Med* 2014;42:820-825.
- Gombera MM, Kahlenberg CA, Nair R, Saltzman MD, Terry MA. All-arthroscopic suprapectoral versus open subpectoral tenodesis of the long head of the biceps brachii. *Am J Sports Med* 2015;43:1077-1083.
- Gurnani N, van Deurzen DF, Janmaat VT, van den Bekerom MP. Tenotomy or tenodesis for pathology of the long head of the biceps brachii: A systematic review and meta-analysis. *Knee Surg Sports Traumatol Arthrosc* 2016;24:3765-3771.
- Rosy W, Sanchez G, Sanchez A, Provencher MT. Superior labral anterior-posterior (SLAP) tears in the military. *Sports Health* 2016;8:503-506.
- Green JM, Getelman MH, Snyder SJ, Burns JP. All-arthroscopic suprapectoral versus open subpectoral tenodesis of the long head of the biceps brachii without the use of interference screws. *Arthroscopy* 2017;33:19-25.
- Castricini R, Familiari F, De Gori M, et al. Tenodesis is not superior to tenotomy in the treatment of the long head of biceps tendon lesions. *Knee Surg Sports Traumatol Arthrosc* 2018;26:169-175.
- Abdul-Rassoul H, Defazio M, Curry EJ, Galvin JW, Li X. Return to sport after the surgical treatment of superior labrum anterior to posterior tears: A systematic review. *Orthop J Sports Med* 2019;7:2325967119841892.
- MacDonald P, Verhulst F, McRae S, et al. Biceps tenodesis versus tenotomy in the treatment of lesions of the long head of the biceps tendon in patients undergoing arthroscopic shoulder surgery: A prospective double-blinded randomized controlled trial. *Am J Sports Med* 2020;363546520912212.
- Frantz T, Shacklett A, Martin A, et al. Biceps tenodesis for superior labrum anterior-posterior tear in the overhead athlete: A systematic review [published online June 24, 2020]. *Am J Sports med.* <https://doi.org/10.1177/0363546520921177>