Technical Note

The Saber Technique for Biceps Tenotomy

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Abstract: Long head of the biceps (LHB) pathology is a prevalent cause of shoulder pain. Arthroscopic tenotomy and tenodesis are performed for treatment at increasing frequency. When LHB pathology is the only glenohumeral intra-articular pathology that needs to be addressed, and an LHB tenotomy or subpectoral LHB tenodesis is planned, it is unnecessary and potentially harmful to establish an anterior rotator interval portal. The objective of this Technical Note is to describe a minimally invasive technique for LHB tenotomy at the supraglenoid tubercle without the need for establishing an accessory portal.

Long head of the biceps (LHB) pathology is a prevalent[1,2] cause of shoulder pain. Arthroscopic tenotomy and tenodesis are performed for treatment at an increasing frequency. When LHB pathology is the only glenohumeral intra-articular pathology that needs to be addressed, and an LHB tenotomy or subpectoral LHB tenodesis is planned, it is unnecessary and potentially harmful to establish an anterior rotator interval portal. The objective of this Technical Note is to describe a minimally invasive technique for LHB tenotomy at the supraglenoid tubercle without the need for establishing an accessory portal.

Typically, when performing shoulder arthroscopy, whether in the beach chair or lateral decubitus position, a posterior portal is initially established for insertion of the arthroscope. This is generally followed by an anterior working portal to aid in diagnostic arthroscopy or for insertion of instrumentation. This typically requires an approximately 1-cm incision with insertion of a small cannula placed through the skin and subcutaneous tissues, within the rotator interval (RI).[3] This results in a capsular defect that is typically left open upon completion of the intra-articular portion of the arthroscopic procedure.

This anterior RI portal, although small, is not without potential risks. Although its exact location varies, it typically originates somewhere along the line from the anterolateral edge of the acromion to the palpable tip of the coracoid. Regardless of the exact position, the cephalic vein lies in closest proximity, often within 20 mm, and is commonly injured with the establishment of this portal.[4,5] Other neurologic structures, including the musculocutaneous and axillary nerves, as well as the lateral cord of the brachial plexus, are slightly farther away. These structures lie between 30 and 50 mm, making them at lower risk for injury.[5]

Another potential risk includes the defect left in the RI. The RI and its contribution to glenohumeral rotation, stability, and shoulder kinematics are yet to be completely understood.[6,7] Therefore, minimally invasive techniques, when possible, may help maintain native anatomy and function. In instances when the arthroscope is inserted into the joint through the posterior viewing portal and no additional pathology exists other than the LHB tendon, it is possible to perform a diagnostic arthroscopy with LHB tenotomy without establishment of an anterior portal by using a standard 18-gauge spinal needle (Becton Dickinson, Franklin Lakes, NJ) and performing the saber technique.

Surgical Technique (With Video Illustration)

A narrated video with demonstration of the surgical technique described in the following may be reviewed (Video 1).

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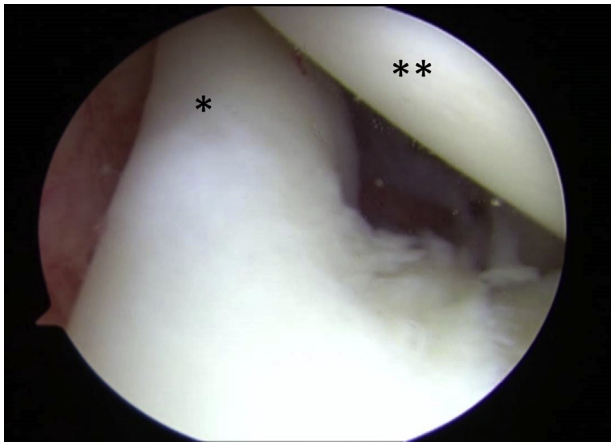

Fig 1. Arthroscopic view through the posterior portal in a right shoulder in the lateral decubitus position. Long head of the biceps tendon is represented by an asterisk (*). The humeral head is identified with a double asterisk (**).

Patient Positioning and Anesthesia

Before the patient is transferred to the operating room, an indwelling interscalene catheter in addition to a single-shot pectoral plane block is placed for pain control by the regional anesthesia team. The patient is then brought to the operating room. Then, after induction of general anesthesia in the supine position, the patient in this case is positioned in the lateral decubitus position with the help of a large bean bag positioner. Care is taken to protect the brachial plexus with an axillary roll and the peroneal nerves using padding. A total of 15 lbs of balanced traction is then applied to the operative arm in approximately 30° of abduction and 15° of forward flexion.

Diagnostic Arthroscopy

Following a surgical safety timeout, a standard posterior portal is established (Fig 1). A complete diagnostic arthroscopy is performed including assessment of the LHB tendon and its anchor, a 360° labral assessment, glenoid and humeral head articular surfaces, inferior pouch, subscapularis, and the rotator cuff tendinous attachment. Assessment of the inferior pouch and superior rotator cuff tendon–bone interface is facilitated by gentle manipulation of the arm. If the diagnostic arthroscopy reveals no additional pathology besides the LHB tendon, and a biceps tenotomy or subpectoral biceps tenodesis is planned, the LHB tendon is tenotomized at its origin at the supraglenoid tubercle without the establishment of an additional working portal.

Biceps Tenotomy

A standard 18-gauge spinal needle is inserted through the skin superolateral to the coracoid in a line projecting to the anterolateral acromion. The needle is then advanced through the RI within its triangular boundaries of the LHB tendon, the anterior glenoid labrum, and the subscapularis. The exact location of entry through the RI is less imperative than the appropriate angle to allow assessment of the reach of the needle tip. The tip of the needle should be able to comfortably reach the biceps anchor free of obstruction (Fig 2). Next, the needle bevel is angled toward the humeral head and the tip is placed anteromedial to the origin of

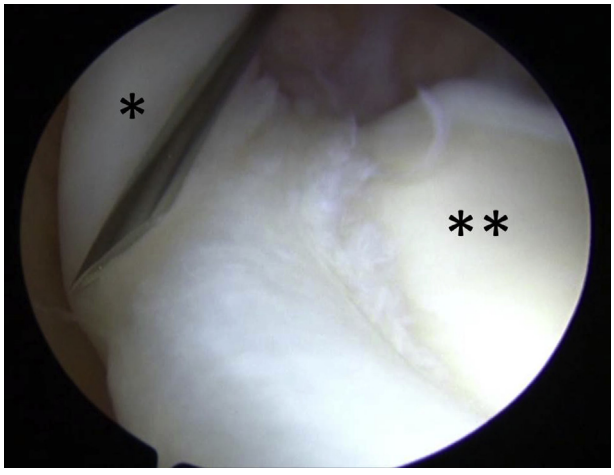

Fig 2. Arthroscopic view through the posterior portal in a right shoulder in the lateral decubitus position. The 18-gauge spinal needle is inserted through the rotator interval and the needle bevel is placed at the base of the biceps anchor at the site of the intended tenotomy. Long head of the biceps tendon is represented by an asterisk (*). The glenoid is identified with a double asterisk (**).

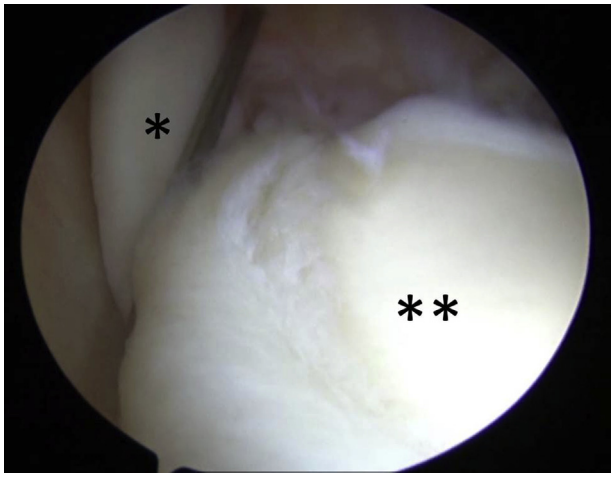

Fig 3. Arthroscopic view through the posterior portal in a right shoulder in the lateral decubitus position. The 18-gauge spinal needle bevel is angled toward the humeral head and the tip is placed anteromedial to the origin of the LHB tendon at the planned tenotomy site with care not to disrupt the circumferential labral fibers. Long head of the biceps tendon is represented by an asterisk (*). The glenoid is identified with a double asterisk (**).

Table 1. Pearls and Pitfalls

Pearls	Pitfalls
Place the bevel of the 18-gauge spinal needle toward the humeral head and begin tenotomizing the LHB tendon superiomedially to avoid iatrogenic chondral damage.	Avoid tenotomizing the biceps tendon too close its labral origin, as this can lead to disruption of the circumferential labral fibers.
Use a gentle sawing motion after applying slight pressure to direct the LHB tendon into the glenohumeral joint.	Transilluminate the anterior soft tissues and try to avoid placing the spinal needle through the cephalic vein, if visible.
	An inappropriately cut LHB tendon or failed tenotomy could require the establishment of an anterior portal for completion tenotomy.

LHB, long head of the biceps.

the LHB tendon at the planned tenotomy site with care not to disrupt the circumferential labral fibers (Fig 3, Table 1). The bevel is used with a sawing back and forth motion until the LHB tendon is cleanly severed. This use of the bevel of the spinal needle as a cutting edge without the need for an anterior portal is origin for the "saber" technique name. The correct location of the tenotomy is imperative to avoid leaving a stump of the biceps tendon on the superior labrum. This should be at the junction of the biceps and superior labrum and angled appropriately. A complete tenotomy is confirmed with retraction of the tendon distally in the joint (Fig 4).

Concomitant Procedures

Next, the arthroscope is placed into the subacromial space and any bursal, acromial, or acromioclavicular pathology is addressed. If a subpectoral biceps tenodesis is planned, a 3-cm axillary incision is made just inferior to the pectoralis major tendon. Sharp and blunt dissection is carried down to the plane between the pectoralis major tendon and the short head of the biceps. Digital palpation between this interval to the origin of the pectoralis major tendon exposes the LHB tendon directly medial to the pectoralis major tendon insertion. With the aid of a curved hemostat, the LHB tendon can then safely be delivered through the wound, whipstitched with a nonabsorbable suture, and fixed to the humeral shaft by means of the surgeon's preference.

Discussion

The prevalence of LHB tendon tenodesis continues to increase, especially in the United States.[8] In the absence of other glenohumeral intra-articular pathology, such as labral tears, synovitis, or rotator cuff pathology, it may be advantageous to tenotomize the LHB tendon without creation of an accessory portal. First, although establishment of an anterior portal is considered safe, injury to the cephalic vein is possible, and although some consider this complication inconsequential,[5] it has the potential to negatively affect the ipsilateral arm's circulation. Second, given the lack of knowledge on the importance of the RI contents,[6] including the coracohumeral ligament, superior glenohumeral ligament, and RI capsule in terms of shoulder stability and kinematics, potential effects of perforating these structures and leaving them unrepaired is unknown and should be avoided, if possible. Third, the authors believe greater intra-articular work and greater shoulder fluid extravasation leads to significantly more pain for the patient, which may result in postoperative physical therapy delay. Fourth, the cost of using an accessory cannula and the time required to close an anterior portal site, although minimal, adds to the length and overall cost of the case and can potentially be avoided.

To overcome these pitfalls of creating an anterior portal in cases of isolated LHB pathology, we present an easy, cost-effective, cosmetically-pleasing, safe, less painful, and efficient alternative to the typical method for performing a LHB tenotomy: the saber method. The bevel of an 18-gauge spinal needle through the RI is used to tenotomize the LHB tendon at the supraglenoid tubercle. This method requires no additional portal, no cannula, and no closure. This technique is not without

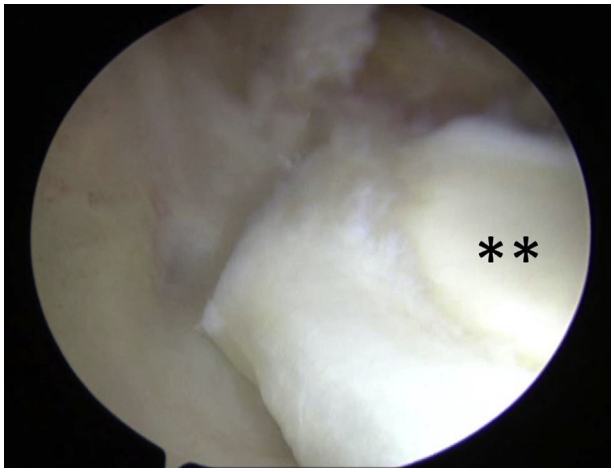

Fig 4. Arthroscopic view through the posterior portal in a right shoulder in the lateral decubitus position. The view of the residual biceps stump after successful, complete tenotomy of the long head of the biceps tendon is confirmed with slight retraction of the tendon distally in the joint. The glenoid is identified with a double asterisk (**).

limitations, however, as a perforation to the cephalic vein is still possible, but will likely result in patency of the vessel as compared with a larger-diameter instrument perforation, which is more likely to completely compromise the cephalic vein. A second limitation and risk is the potential for an inappropriately placed tenotomy, which could disrupt the circumferential labral fibers if placed to medially or, alternatively, could require establishment of an anterior portal if incomplete or if the insertion is placed too laterally. Its efficiency and availability make it desirable not only in the first world, where costs and time are becoming more of a factor, but also in resource-poor settings, where supplies are limited. Shoulder arthroscopists should keep this useful technique in their armamentarium.

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