Visualization of the Extra-Articular Portion of the Long Head of the Biceps Tendon During Intra-Articular Shoulder Arthroscopy

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Purpose: To quantify the amount of the extra-articular long head of the biceps tendon (LHBT) seen during intra-articular shoulder arthroscopy by pulling the tendon into the joint with a probe through an anterior portal while viewing through a standard posterior portal. **Methods:** Intra-articular shoulder arthroscopy was performed on 10 forequarter cadaveric specimens. The extra-articular portion of the LHBT was evaluated by pulling the tendon into the joint with an arthroscopic probe inserted through an anterior portal. The tendon was marked at the pulley insertion on the humerus with a vascular clip before and after the tendon was pulled into the joint. An open deltopectoral approach was performed, and the amount of extra-articular tendon visualized was calculated as an absolute amount and in relation to nearby anatomic structures. **Results:** An additional 1.9 cm (range, 1.4 to 2.6 cm) of extra-articular LHBT was viewed by pulling the tendon into the joint with an arthroscopic probe through an anterior portal during shoulder arthroscopy. This represented 30.8% of the extra-articular portion of the tendon, 47.7% of tendon in the bicipital groove, and 76.3% of the tendon that lies under the area from the pulley insertion to the distal edge of the transverse humeral ligament. **Conclusions:** During intra-articular shoulder arthroscopy, the extra-articular portion of the LHBT is incompletely visualized by pulling the tendon into the joint with a probe placed through an anterior portal while viewing through a standard posterior portal. **Clinical Relevance:** An additional extra-articular portion of the LHBT may be viewed by pulling the tendon into the joint with an arthroscopic probe during shoulder arthroscopy.

Pathology of the long head of the biceps tendon (LHBT) has been a long-established source of shoulder pain.[1-4] Several types of pathology have been described including tendinitis, tendinosis, and partial and complete ruptures.[5,6] LHBT disease can exist as an isolated condition or in association with other conditions such as rotator cuff tears, pulley lesions, and external impingement.[7-10] The diagnosis of LHBT disease can be challenging. To date, no physical examination maneuver has been proved to be highly accurate, even in the setting of isolated disease.[11-15] Further confounding the diagnosis is the association of LHBT pathology with other conditions. Symptoms resulting from rotator cuff tears and external impingement can mimic those of LHBT disease.

Historically, when treated surgically, LHBT pathology was treated in an open manner.[1] This allowed complete inspection of the entire LHBT, particularly the extra-articular portion if warranted. As arthroscopic techniques continue to advance and an increasing number of procedures previously performed in an open manner are now performed arthroscopically, surgeons often rely on arthroscopic evaluation of the LHBT. To thoroughly arthroscopically evaluate the LHBT, many surgeons advocate evaluating not only the intra-articular portion of the tendon but also its extra-articular portion. A commonly described technique to evaluate the extra-articular portion is to maximally pull the tendon into the joint with a probe placed in an

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anterior portal while viewing through a posterior portal.[11,16-19]

The purpose of this study was to quantify the amount of extra-articular LHBT seen during intra-articular shoulder arthroscopy by pulling the tendon into the joint with a probe through an anterior portal while viewing through a standard posterior portal. The hypothesis was that the extra-articular portion of the LHBT is incompletely evaluated through shoulder arthroscopy, even when pulling the LHBT into the joint with an arthroscopic probe.

Methods

Ten frozen forequarter amputation specimens were examined by a sports medicine fellowship—trained orthopaedic surgeon (A.F.). Each specimen had an intact extremity without any mid-arm amputation. Each specimen was thawed for a minimum of 18 hours before examination. The specimens were placed in the beach-chair position. A 30° arthroscope with the pump pressure set to 40 mm Hg was placed through a standard posterior viewing portal. An 18-gauge spinal needle was then used to localize the position of the accessory portals. An anterior midglenoid portal was created under direct visualization at the upper edge of the subscapularis tendon. An arthroscopic probe was inserted through this portal. A systemic examination was performed to assess for other pathology, including rotator cuff tears or pulley lesions, that could lead to LHBT instability and therefore alter the normal course of the tendon.

The arm was elevated 45° in the scapular plane with neutral rotation, and the elbow was maximally flexed and supinated. The arm position was maintained constantly throughout the arthroscopic LHBT examination. A second anterior portal was then created in the lateral aspect of the rotator interval. Care was taken not to violate the pulley insertion on the humerus. A vascular clip device (Ligaclip; Ethicon, Somerville, NJ) was inserted through this portal. A vascular clip was placed on the LHBT at the pulley entrance (Fig 1). The arthroscopic probe was then used to maximally pull the LHBT into the joint (Fig 2). A second vascular clip was subsequently placed on the LHBT at the pulley entrance while the tendon was being maximally pulled into the joint (Fig 3).

After the LHBT was marked arthroscopically, an open deltopectoral approach was performed. The bursal side of the rotator cuff and rotator interval was examined for any abnormalities. The rotator interval and the transverse humeral ligament were sharply incised to show the vascular clip markings (Fig 4). The length of

Fig 2. Maximally pulling the LHBT into the joint with a probe through the anterior portal, as viewed from the posterior portal.

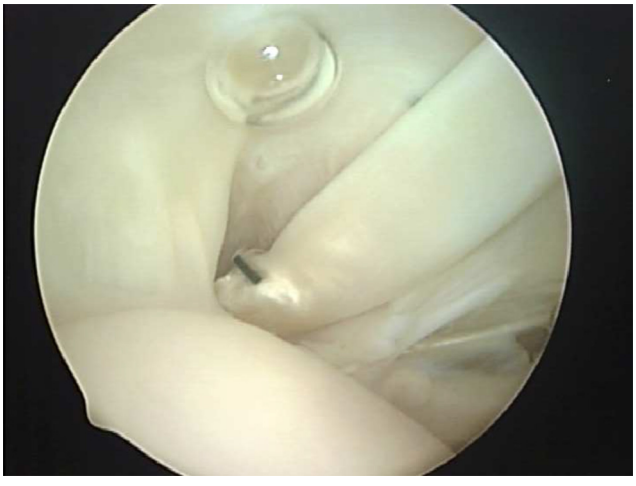

Fig 1. View from posterior portal with instrumentation through anterior portal. Placement of the first vascular clip on the LHBT at the pulley entrance before the LHBT was pulled into the joint.

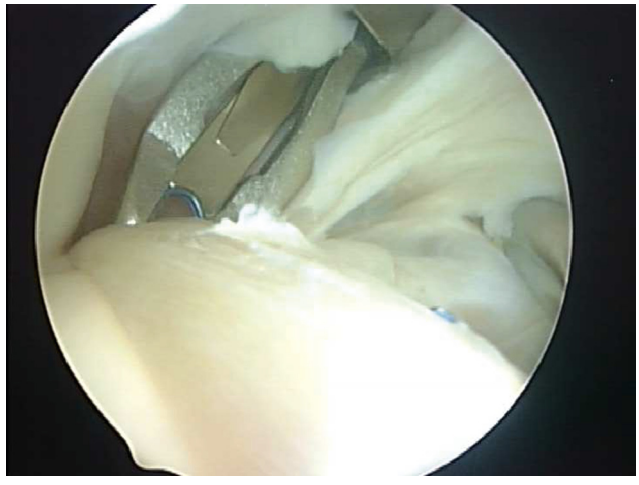

Fig 3. Placement of the second vascular clip at the pulley entrance while the tendon is being maximally pulled into the joint, as viewed from the posterior portal.