Intracapsular Origin of the Long Head of the Biceps Tendon With Glenoid Avulsion of the Glenohumeral Ligaments

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An 18-year-old woman presented with a history of recurrent glenohumeral dislocations involving her right dominant shoulder. Physical examination suggested physiologic hyperlaxity and anterior instability. Magnetic resonance arthrography demonstrated an anomalous intracapsular origin of the long head of the biceps tendon (LHBT), with normal-appearing LHBT in the intertubercular groove. Diagnostic arthroscopy confirmed the absence of the LHBT attachment on the superior labrum. Instead, the LHBT originated from the capsule of the shoulder joint. Diagnostic arthroscopy also revealed glenoid avulsion of the glenohumeral ligaments (GAGL) lesion as a tear in the anterior-inferior capsule near its insertion on the glenoid and labrum. An arthroscopic anterior capsulolabral repair was performed with rotator interval closure by imbrication of superior and middle glenohumeral ligaments. A retrospective review of the magnetic resonance arthrogram identified irregularity and interposition of contrast between the capsule and the anterior-inferior labrum that was reproduced in the abduction–external rotation view corresponding with the GAGL lesion seen at arthroscopy. At 12 months postoperatively, the patient demonstrated full range of motion and no signs of instability. This case report helps to raise awareness about 2 rare shoulder lesions: the anomalous origin of LHBT and the GAGL lesion. Diagnosing such lesions on preoperative magnetic resonance imaging may aid in operative planning and avoid unexpected intraoperative findings.

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Congenital anomalies of the long head of the biceps tendon (LHBT) are rare. These anatomic variations of the LHBT include its absence, duplication, varied origin, or extra-articular course or the presence of a mesotenon. A literature review revealed 5 reported cases of intracapsular origin of the LHBT. These cases had varied clinical presentations, including shoulder instability, shoulder pain, and shoulder stiffness. This article reports a case of an anomalous intracapsular origin of the LHBT associated with anterior glenohumeral instability and its management.

The origin of the LHBT is the supraglenoid tubercle and superior glenoid labrum. Between the origin and its musculotendinous junction, the LHBT traverses the glenohumeral joint (intra-articular segment) and the intertubercular sulcus (bicipital groove). Magnetic resonance imaging (MRI) is an excellent tool for evaluating the biceps tendon anatomy, including its origin and course. In our case, the congenital anomaly of the LHBT was diagnosed preoperatively on MRI and verified during arthroscopic surgery.

Also noted intraoperatively was glenoid avulsion of the glenohumeral ligaments (GAGL). Although humeral avulsion of the glenohumeral ligaments has been identified as a cause of anterior shoulder instability, the GAGL lesion has been reported only once. This abnormality was not initially identified on preoperative MRI assessment in our patient but could be identified on retrospective review.

This article describes the MRI and arthroscopic findings and the management of 2 rare entities in the same patient: an anomalous insertion of the LHBT and a GAGL lesion. Awareness of such congenital anomalies and their characteristic MRI appearance is important so that an accurate preoperative diagnosis can be made and an appropriate management plan can be established.

**Figure 1:** Sagittal T2 fast spin-echo (FSE) fat-suppressed image following arthrography shows an empty biceps pulley (gray arrow) with thickened structures of the biceps pulley at the rotator interval (red arrow) (A). An axial 3-D fast imaging employing steady-state acquisition sequence following arthrography reveals a normal sized intertubercular groove and LHBT (white arrow) (B). Coronal T1 FSE fat-suppressed image following arthrography shows the LHBT (white arrow) fibers blending in with the capsule as it passes through the rotator interval (yellow arrow). Note also the anterior slip of LHBT extending toward the anterosuperior labrum, which correlates well with arthroscopy (C).

**CASE REPORT**

An 18-year-old woman fell down the stairs and dislocated her right dominant shoulder. She spontaneously reduced. She subsequently dislocated again during routine activities. Her surgical history was significant for a prior medial patellofemoral ligament reconstruction for patellar instability. Physical examination suggested physiologic hyperlaxity. Examination of her shoulder revealed full range of motion (ROM), anterior instability with a positive apprehension sign, positive relocation and release sign, and +2 sulcus sign. She had adequate strength in internal and external rotation.

Magnetic resonance imaging was performed after a contrast injection using a posterior approach. This demonstrated an absent intra-articular LHBT in the glenohumeral joint and thickened structures in the rotator interval at the level of the biceps pulley (Figure 1A). The LHBT was present in a well-formed intertubercular groove and was normal in size and configuration (Figure 1B). However, the tendon fibers blended with the undersurface of the capsule as it passed through the rotator interval (Figure 1C). The middle glenohumeral ligament (MGHL) was cord-like.

At surgery, the patient was placed in the beach-chair position. An examination under anesthesia showed signs of physiologic hyperlaxity and anterior-inferior instability with +2 sulcus sign. Diagnostic arthroscopy from the posterior portal revealed absent LHBT attachment on the superior labrum (Figure 2A). The superior labrum was intact and stable, with no evidence of a tear or a stump. The LHBT emerged from the foramen (Figure 2B) and then fanned out and blended with the superior capsule in the rotator interval (Figure 2C). A slip of LHBT was seen traversing toward the anterosuperior labrum. The MGHL was cord-like, with an intact anterior and anteroinferior labrum.

When viewed from the anterolateral portal with the MGHL retracted by a probe from the anterior portal (Figure 3A), a tear was identified in the anterior capsule from 3-o’clock to 5:30-o’clock near its insertion on the glenoid and labrum (GAGL lesion) (Figure 3B). When the anteroinferior labrum was examined, fraying on its back surface at the site of capsular attachment was observed.

An arthroscopic anterior capsulolabral repair was performed using 2.9-mm Push-Lock knotless suture anchors (Arthrex, Naples, Florida) with capsular rotator interval closure by imbrication of superior and middle glenohumeral ligaments (Figure 3C).

Postoperatively, the patient underwent 4 months of physical therapy. At 12 months postoperatively, she demonstrated full ROM and showed no signs of instability. A retrospective MRI review identified irregularity and interposition of fluid
and contrast between the capsule and the anteroinferior labrum with the patient’s arm abducted and externally rotated corresponding with the GAGL lesion seen at arthroscopy (Figure 3A).

**DISCUSSION**

Recently, Dierickx et al\(^1\) suggested a classification of 12 variations of the intra-articular portion of LHBT to describe its complete range: the simple vinculum, mesotenon between the tendon and the capsule, adherence to the capsule, the double-tendon origin, the split tendon, and the absent tendon. However, in their report of 57 patients with congenital anomalies of the LHBT, only 1 patient had an intra-capsular origin of LHBT. A 62-year-old woman presented with a full-thickness rotator cuff tear and the LHBT was attached to the undersurface of the supraspinatus tendon—only 1 patient had an intra-articular segment of the LHBT. This contrasts with our patient, who had a traumatic anterior labrum tear, where the intra-articular segment was partially absent, but the tendon was normally present in a well-formed bicipital groove.

The role of LHBT in shoulder function is debated in the literature. Lippmann considered LHBT as a vestigial structure with no substantial role.\(^1\) The long head of the biceps tendon has been described as a humeral head depressor\(^14\) and as an anterior stabilizer of the glenohumeral joint.\(^16\) Based on our case, it is difficult to postulate whether the anomalous origin of LHBT had any role in the anterior instability of the shoulder, although previous authors have tried to establish such a relationship.

Wolf\(^1\) and Siparsky\(^2\) recently reported 3 cases of traumatic shoulder dislocation with a GAGL lesion. Magnetic resonance imaging was performed in 1 patient and failed to identify the lesion. During arthroscopy, the labrum was frayed but intact in 2 cases. The authors recommended...
visualization using a 30° arthroscope from the anterosuperior portal and a capsulolabral repair using suture anchors in the anteroinferior portal, similar to a Bankart repair. A retrospective review of the MRI in our patient while in the abducted and externally rotated position identified the GAGL lesion.

The importance of this case report is threefold. First, it helps to raise awareness about the anomalous origin of LHBT and the GAGL lesion. Such lesions, although rare, should be diagnosed on preoperative MRI to aid in preoperative planning. A complete arthroscopic examination of the joint should be performed to identify any lesions that may have been missed on MRI. In our case, the GAGL lesion was not seen until the MGHL was retracted and the anterior labrum was probed.

Second, the reported MRI findings in such cases would help prevent misdiagnosis, such as a superior labral tear or LHBT tear. Irregularity, fraying, and degenerative changes in the tendon are signs suggesting a rupture or tear of LHBT. The proximal stump of a completely torn LHBT may remain attached to the superior aspect of the glenoid. These findings should help differentiate a torn LHBT from a congenital anomaly of LHBT.

Third, the identification of such lesions further assists in understanding the developmental anatomy of the LHBT and functional contribution of the LHBT and glenohumeral ligaments to the shoulder joint, although more studies are needed before a relationship can be definitively established.

**REFERENCES**


