Glenoid labral tear and normal variation

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The audience for this lecture is clinical and research radiologists, PhDs who are trying to get a better understanding of the anatomic and clinical aspects of this subject, and MRI technologists who perform shoulder MRI.

The labrum is a fibrous connective tissue that completely rims and deepens the shallow glenoid fossa, increasing the contact area for the humeral head and limiting excessive translation of the joint. The intact labrum also acts as a pressure seal, allowing negative pressure to occur within the shoulder joint during motion, aiding in the dynamic stabilization the joint. In addition, the labrum serves as an anchor for some of the glenohumeral ligaments as well as the long head of the biceps and triceps tendons.

The coracohumeral, superior, middle, and inferior glenohumeral ligaments as well as the capsule contribute to shoulder stability. Two ligaments are located at the top of the joint in the rotator interval. These are the *coracohumeral ligament* (CHL) and *superior glenohumeral ligament* (SGHL). The CHL and SGHL ligaments limit inferior translation and external rotation of the adducted shoulder as well as posterior translation of the flexed, adducted and internally rotated shoulder. The CHL originates on the lateral surface of the base of the coracoid process and inserts on the lesser and greater tuberosities, crossing the bicipital groove. The CHL is an extra-articular bursal sided structure that is not seen during arthroscopy. The SGHL originates from the labrum, biceps tendon or in common with the middle glenohumeral ligament in the region of the superior glenoid tubercle. It inserts into the fovea capitis line just superior to the lesser tuberosity of the humerus. It lies parallel to the lateral aspect of the coracoid process and is present in more than 90% of cases [1]. It restrains external rotation below 60 degrees of abduction, and limits inferior subluxation. Variation of the SGHL includes a common origin with the middle glenohumeral ligament and/or biceps tendon. The SGHL can become thickened in patients with an absent middle glenohumeral ligament.

The *middle glenohumeral ligament* (MGHL) has a variable origin from the glenoid, scapula, anteriorsuperior labrum, biceps tendon, inferior glenohumeral ligament (IGHL) or superior glenohumeral ligament [2]. It merges with the anterior capsule along the subscapularis muscle and tendon, continuing with the subscapularis tendon to the anterior aspect of the proximal humerus just below the attachment of the SGHL on the lesser tuberosity. The MGHL is absent in up to 30% of shoulders. The subscapular recess is more prominent in this situation. The MGHL can show longitudinal splitting or duplication as normal variants.

The *inferior glenohumeral ligament* (IGHL), considered the most important stabilizer of the glenohumeral joint, is a complex that originates at the mid to inferior portion of the anterior glenoid labrum. It drapes for a variable distance from anterior to posterior and

inserts on the anatomic neck of the humerus. This ligament is inseparable from the labrum, forming a labroligamentous complex. It is composed of strong collagenous thickenings at its anterior and posterior margins- the anterior and posterior bands, joined by a fibrous thickening of the capsule called the axillary pouch or recess. Variants of the IGHL include high origin above the equator of the glenoid, origination from the MGHL, or a bandlike attachment between the IGHL and SGHL called the periarticular fiber system [3]. The IGHL functions as a sling to support the humeral head and prevents abnormal translation of the humeral head on the glenoid. The IGHL is a major stabilizer of the joint in 90 degrees of abduction and full external rotation, limiting anterior rotation, and is lax when the shoulder is adducted.

Normal variations of the capsulolabral complex are often seen and can be mistaken for pathologic lesions [4]. These normal variants are seen in the superior and anterior superior aspect of the glenoid.

Tears of the labrum and glenohumeral ligaments are seen in athletes with instability, especially those in sports that require forceful and repetitive abduction and overhead rotation of the humerus. Tears can also be seen following routine or repetitive trauma, microtrauma, as well as and with ageing and degeneration. This lecture will review the various tears of these structures.

The labrum and glenohumeral ligaments are best seen when there is fluid in the joint in the form of an effusion or arthrogram. First time dislocators often have some effusion in the initial few weeks after trauma and an arthrogram is not needed. Otherwise, if the dislocation is more than a few weeks, it is recommended that the patient have a direct MR arthrogram. If that is not available, a high resolution MRI or an indirect (gadolinium intravenously administered) MR arthrogram would be suggested [5-9]. Abduction and external rotation (ABER) imaging can aid in evaluation of the anteroinferior labrum. The ABER sequence obtained during an MR arthrogram improves the accuracy of interpretation of the labral lesion and can bring out associated articular surface supraspinatus and infraspinatus tears [10,11] [12]. A provocative maneuver can also be performed on the shoulder during MR imaging to better evaluate the posterior labrocapsular structures. This is accomplished with flexion, adduction and internal rotation of the shoulder (FADIR position)[13].

References

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