Shoulder arthroscopy, anatomy and variants — part 2

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Abstract
In part 1 of this article we have described the history of shoulder arthroscopy and its current indications. We introduced concepts useful in the execution and interpretation of shoulder arthroscopy and introduced some technical tips to help those starting out, or developing their expertise, in this surgical skill. In part 2 we will focus on the range of findings that arthroscopy can yield, which can at first be daunting and confusing. The spectrum of normal findings is quite wide and substantial experience is needed simply to recognise what is within this spectrum and what should be considered pathological. Furthermore some pathological findings can be subtle or obscure, and easily missed if the arthroscopy is not complete and correlated carefully with the examination under anaesthesia.

Keywords arthroscopy; patient positioning; portals; shoulder anatomy

Gleno-humeral joint arthroscopy

Once intra-articular access has been gained with the arthroscope, as described in part 1 of this article, it is important to conduct a systematic and thorough examination of the shoulder. This usually, but not always, starts with the gleno-humeral joint. Fundamental to any surgical procedure is a good knowledge of anatomy and its variants to ensure that all abnormalities are recognised, and just as importantly, that variants are not misdiagnosed as being pathological.

Shoulder capsule

The use of arthroscopy has led to a better appreciation of the structure and function of the capsule and its definable anatomic components. The capsule can be considered as a watertight structure that exhibits restraint but also permits the great mobility we see in the shoulder joint. The volume of the joint, as dictated by the capsule, varies significantly and the extremes include the small restrictive volume found in adhesive capsulitis, to the capacious capsule in those patients with connective tissue disorders or multidirectional laxity.

From an anatomical perspective, the rotator cuff tendons fuse with the capsule near their insertions. Supraspinatus and infraspinatus merge with the capsule about 15 mm proximal to their insertions on the humerus and cannot be separated from the capsule by blunt dissection.

The capsule importantly contains several localised areas where there are definable thickenings representing the gleno-humeral ligaments. It is also necessary to remember that the capsule is lined by synovium and is therefore subject to inflammatory disorders, malignancy and tumour-like conditions.

Superior gleno-humeral ligament (SGHL)

This structure is found to be present in 40–94% of shoulders[1,2] and, when present, tends have the most consistent anatomy of the three anterior ligaments. It arises from the 12 o'clock position at the supra glenoid tubercle but can also take origin from the biceps anchor and labrum. It travels parallel to the biceps tendon to insert on the medial edge of the bicipital groove and the fovea capitus (just superior to the lesser tuberosity). Laterally, at its insertion, the SGHL joins the coracohumeral ligament,[3] contributes to the biceps pulley and forms part of the rotator interval.

The lateral insertion of the SGHL means that this structure plays a crucial role in the stabilisation of the biceps tendon against anterior shearing stress as part of the pulley system.

Arthroscopically it is best seen from the A portal and can be made more visible by bringing the shoulder into adduction (Figure 1).

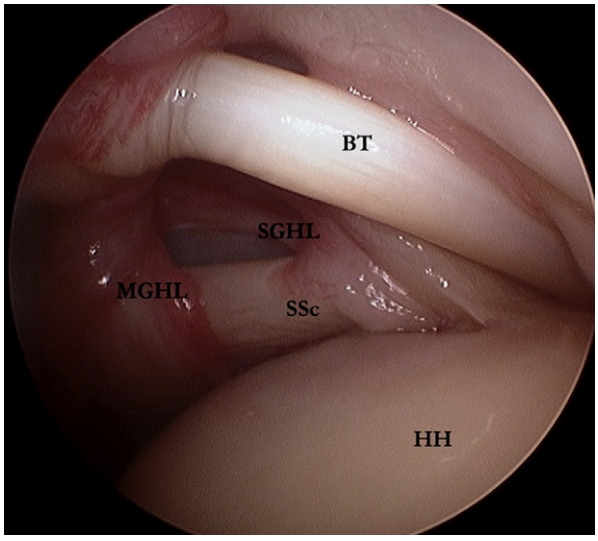

Figure 1 HH — humeral head, SSc Subscapularis, SGHL Superior gleno-humeral ligament, MGHL Middle glenohumeral ligament, BT Biceps tendon.

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Middle gleno-humeral ligament (MGHL)

This ligament is present in 84–92% of shoulders[1,2,4] and arises variably from the upper part of the glenoid, the labrum, or with the SGHL. It then runs diagonally downward and across the subscapularis tendon at 45° to insert into the inferior part of the lesser tuberosity. Its superior border is usually easily identifiable as it courses away from the SGHL. The interval between the two ligaments forms the entrance to the subscapular bursa through the foramen of Weitbrecht.

The appearance of the MGHL is also subject to common variations

- a cord like MGHL (17–22%[1,2])
- Buford complex[19] which comprises
  - cord like MGHL
  - arising from the superior labrum
  - with an absent anterior superior labrum between the MGHL origin and the mid-glenoid notch
- an absent or thin MGHL

The importance of the morphology of the MGHL may well affect the stress that certain anatomical variations put on the biceps anchor, potentially predisposing to SLAP tears.

Arthroscopically, the MGHL can be seen through the A or D portals (Figure 2). Special care should be taken to ensure it is carefully assessed at its humeral insertion to avoid missing a humeral avulsion of the gleno-humeral ligaments (HAGL) lesion at this level.

Inferior gleno-humeral ligament (IGHL)

Cadaveric studies have revealed that this structure is found in 75–93% of shoulders.[4,6] The IGHL has an anterior band (IGHLa) which takes origin from the glenoid between the 2 and 5 o'clock positions and a posterior band (IGHLp) which takes origin from the 7–9 o'clock position. These converge to form a sling which inserts onto the humerus in the 4–8 o'clock position. This anatomical arrangement dictates that the IGHL acts as the main static stabiliser of the GHJ in abduction. The intervening capsular tissue between the two bands represents the axillary pouch.

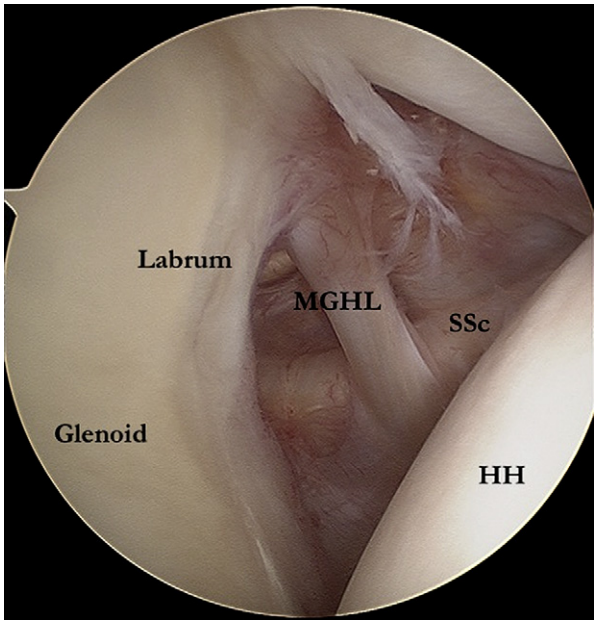

Figure 2 Cord like MGHL. SSc subscapularis, HH humeral head.

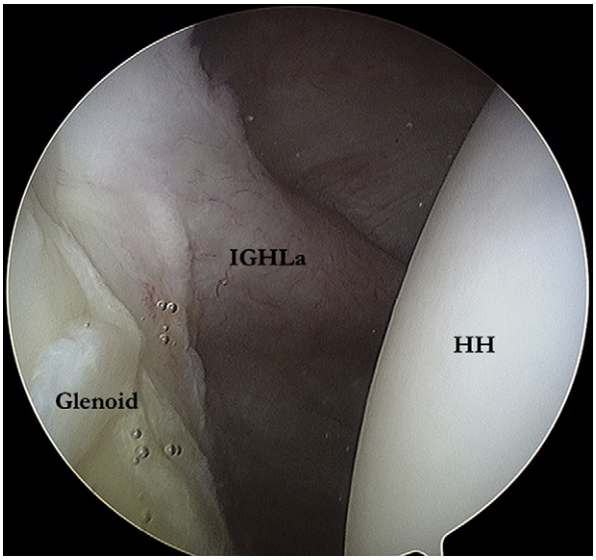

Figure 3 IGHLa. The prominent anterior edge of the IGHLa can be seen easily in some shoulders.

Arthroscopically the anterior band of the IGHL is best seen through the A portal and occasionally a thickened anterior edge can be discerned[7] (Figure 3). Improved visualisation of this band may require abduction and external rotation of the arm to bring it under tension and into view. Further dynamic testing of these ligaments involves performing translational movements of the humeral head and observing the structures and their tension (Figure 4).

Disruption of the IGHL should be carefully looked for due to its important role in shoulder stability. The glenoid or humeral attachment may be disrupted on either band predisposing to instability (Figure 5).

The ability to pass the arthroscope between the humeral head and the glenoid at the level of the IGHLa is known as the drive through sign. This was originally considered to be a sign of shoulder instability but more recent work suggests that it is associated with shoulder laxity and is not specific for instability.[8]

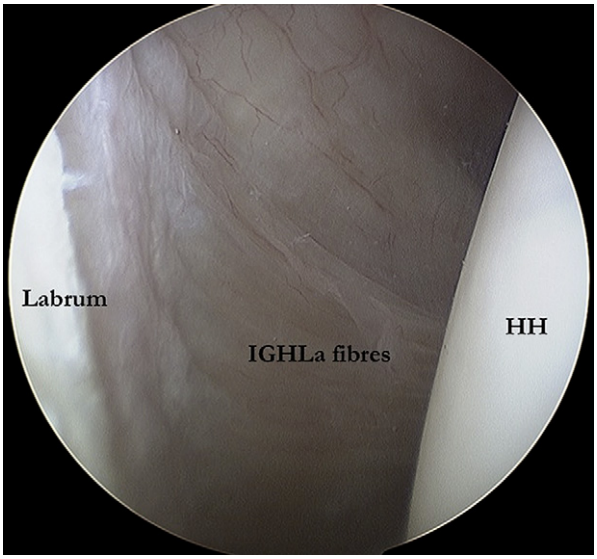

Figure 4 IGHLa. These fibres can be seen forming a sling around the humeral head as they descend into the axillary pouch.