Middle Glenohumeral Ligament Abrasion Causing Upper Subscapularis Tear

Paul C. Brady, M.D., Heather Grubbs, Alexandre Lädermann, M.D., and Christopher R. Adams, M.D.

Abstract: The middle glenohumeral ligament (MGHL) typically contributes partially to the anterior stability of the shoulder. In a very limited number of cases, the MGHL can cause abrasion on the upper edge of the subscapularis causing persistent pain symptoms for patients. The condition is exacerbated by internal rotation of the arm. In this Technical Note, we describe this entity and call it the SAM lesion (Subscapularis Abrasion from the MGHL). We present a technique of addressing this lesion.

With the evolution of arthroscopic shoulder surgery, our understanding of normal and pathologic shoulder conditions continues to advance. The subscapularis has increasingly been recognized as a potential source of shoulder pathology and pain. Studies have shown subscapularis pathology in up to 37% of rotator cuff tears.1,2 Several members of the BRASS research group have noticed an arthroscopic finding in a limited number of patients related to upper subscapularis tearing and/or fraying. Specifically it is an entity in which the middle glenohumeral ligament (MGHL) abrades against the upper edge of the subscapularis medial to its insertion at the lesser tuberosity. Anatomic studies have shown the close relation of the MGHL to the upper subscapularis near its insertion into the lesser tuberosity of the humerus.3,4 In the lesion we describe in this Technical Note, the MGHL compresses into the upper edge of the subscapularis causing pain and intra-articular pathology. We have used the acronym of the SAM lesion for Subscapularis Abrasion from the MGHL.

The MGHL has been found to contribute to anterior stability when the arm is in 0° to 45° of abduction, and the strain on the ligament is decreased as the arm continues to 90° of abduction.5 However, although sectioning has been shown to allow for increased excursion of the humeral head, this has not been shown to contribute to clinical anterior instability.6 In this Technical Note, we describe both the entity of subscapularis abrasion from the MGHL (SAM lesion) and our technique of addressing this pathologic lesion.

Surgical Technique

Preoperative Assessment

Preoperatively these patients have presented somewhat of a diagnostic conundrum for us. They frequently have vague and nondescript anterior shoulder pain. Imaging studies including magnetic resonance imaging and radiographs are typically nondiagnostic. Symptoms are primarily reproduced with resisted internal rotation of the shoulder with pain with subscapularis testing including the bear hug, belly press, lift off, and Napoleon examinations. However, these patients often have normal strength with these same tests. The biceps examination is typically equivocal and often biceps pathology is suspected...
in these patients because of their symptoms of primarily anterior shoulder pain with activities.

**Operative Setup**

After general anesthesia and administration of preoperative antibiotics, patients are positioned in the lateral decubitus position and the shoulder prepped and draped in the usual sterile fashion.

**Portal Placement**

A posterior portal is used and diagnostic arthroscopy performed. After the intra-articular diagnostic portion of the procedure is completed, a low anterior portal and an anterosuperolateral portal are created. These 2 anterior portals will be used as the working portals as the visualization is entirely from the posterior portal.

**Diagnostic Arthroscopy**

During this portion of the procedure, the anterior structures of the shoulder are visualized and dynamically examined with internal rotation and flexion of the humerus (Video 1, Table 1). On initial inspection of the upper border of the subscapularis, an abrasion lesion or a tendon indentation and/or partial tearing is noted approximately 1 to 2 cm medial to the articular insertion of the upper subscapularis on the lesser tuberosity bone bed. The lesion is in close approximation to the lateral edge of the MGHL (Fig 1A). Typically with internal rotation of the humerus, the MGHL is seen “cutting” into the upper boarder of the subscapularis (Fig 1B). Frequently, the MGHL will have a relatively sharpened edge that can clearly be seen as the pathologic lesion creating the upper subscapularis pathology.

**Surgical Technique**

After completion of the intra-articular diagnostic arthroscopy, an anterosuperolateral and/or anterior portal are created. Through this anterior portal, the edge (and usually the entirety) of the MGHL is divided with arthroscopic scissors, shaver (Arthrex, Naples, FL), electrocautery (Arthrex), or combination of the above (Fig 2). This is divided in a lateral to medial direction just at the superior margin of the subscapularis, thus cutting the MGHL in its midsubstance (Table 2).

**Assessment After Addressing the Lesion**

The anterior aspect of the shoulder is then re-examined and rotation of the humerus performed to confirm that the previous lesion is now adequately addressed (Fig 3). There should now be no abrasion
of the MGHL against the upper boarder of the subscapularis.

Addressing Remainder of Shoulder

Particular care is also taken to thoroughly examine the remainder of the intra-articular structures in the anterior aspect of the shoulder. The long head of the biceps tendon is palpated with a probe, and a portion pulled into the joint for further examination. The subcoracoid space is examined to assure that there is no subcoracoid impingement, and if this is encountered, a coracoplasty is performed. If the patient had any preoperative symptoms of acromioclavicular joint involvement, then this joint is addressed with an arthroscopic distal clavicle excision.

Rehabilitation

If additional pathology encountered and addressed at the time of arthroscopy is limited or nonexistent, then we allow these patients to begin immediate shoulder mobilization. Once range of motion is functional, then strengthening and resumption of normal shoulder activity is begun.

Discussion

We have described MGHL abrasion causing upper subscapularis pathology. We have termed this pathology as the SAM lesion.

A similar shoulder pathologic entity of a frayed upper subscapularis with impingement (or FUSSI) lesion has

Table 2. Technique Pearls and Pitfalls

| Pearls | Pitfalls |
|--------|----------|
| • Recognize normal MGHL anatomy | • Failure to thoroughly evaluate the entire subscapularis tendon |
| • Perform a dynamic examination during diagnostic arthroscopy (internal and external humeral rotation) | • Simple debridement of an upper subscapularis abrasion without determining and addressing the offending lesion |
| • Divide compressing MGHL through its midsubstance | • Incomplete transection of the MGHL |
| • Assure that the entire offending lesion is released by repeating dynamic examination during arthroscopy | • Failing to re-evaluate the anterior structures after MGHL division |
| • Must address any additional shoulder pathology | |

MGHL, middle glenohumeral ligament.
been described by the SCOI group in an online educational video7; however, the pathology we describe differs in several ways. First, the FUSSI lesion is described as a capsular reflection causing abrasion, whereas we describe the MGHL as being the offending structure. Second, the lesion caused by the capsular reflection is typically quite medial and often not visible from the posterior portal with a standard arthroscope, whereas the condition we describe is always visible from the posterior portal because the pathology lies at the level of (or lateral to) the MGHL. Third, the abrasion of the subscapularis caused by the capsular reflection is noted to be worse with external rotation. However, with the SAM lesion, the MGHL compresses the upper subscapularis with internal rotation. Lastly, the FUSSI lesion is reported to always occur with subacromial impingement. This is seldom a clinical or surgical finding with our patients.

In the cases we have seen, the MGHL has typically appeared relatively normal. However, in one case (presented in Video 1), the MGHL was somewhat cord-like. Often, the lateral edge of the MGHL appears somewhat sharper than is typical and thus may contribute to the subscapularis abrasion. We have not seen significant detriment to the excision and removal of the MGHL in these patients.

Although our results have been excellent with this procedure, sectioning of the MGHL could have potential negative repercussions (Table 3). These could include destabilization of the glenohumeral joint. Although we believe that the risk is minimal, it could be more apparent in patients with some degree of pre-existing instability. Another limitation of this technique is that it should not exclude a thorough examination of all potential contributing factors of anterior shoulder pain. Surgeons should be very vigilant to thoroughly examine each structure in the shoulder for its integrity and potential contribution to a patient’s shoulder pain. Despite these potential limitations in this procedure, we believe that knowledge of and examination for this potential pathology is an important aspect in the arthroscopic assessment and management of patients with anterior shoulder pain.

We believe that surgeons should evaluate for the SAM lesion when they perform shoulder arthroscopy on patients with anterior shoulder pain. When abrasion of the upper subscapularis is identified arthroscopically, the MGHL may be a contributor to the pathology.

Table 3. Technique Advantages and Disadvantages

| Advantages | Disadvantages |
|------------|---------------|
| The evaluation and diagnosis are simple and straightforward | Potential destabilization in patients with laxity |
| Addresses a potential cause of anterior shoulder pain | If substantial damage has occurred to the subscapularis, |
| Eliminates future potential damage to the upper edge of the subscapularis | additional repair may be necessary |

**References**

1. Garavaglia G, Ufenast H, Taverna E. The frequency of subscapularis tears in arthroscopic rotator cuff repairs: A retrospective study comparing magnetic resonance imaging and arthroscopic findings. Int J Shoulder Surg 2011;5:90-94.
2. Adams CR, Brady PC, Koo SS, Narbona P, Arrigoni P, Burkhart SS. A systematic approach for diagnosing subscapularis tendon tears with preoperative magnetic resonance imaging scans. Arthroscopy 2012;28:1592-1600.
3. Itoigawa Y, Itoi E. Anatomy of the capsulolabral complex and rotator interval related to glenohumeral instability. Knee Surg Sports Traumatol Arthrosc 2016;24:343-349.
4. Denard PJ, Lädermann A, Burkhart SS. Arthroscopic management of subscapularis tears. Sports Med Arthrosc 2011;19:333-341.
5. O’Connell PW, Nuber GW, Mileski RA, Lautenschlager E. The contribution of the glenohumeral ligaments to anterior stability of the shoulder joint. Am J Sports Med 1990;18:579-584.
6. Schwartz E, Warren RF, O’Brien SJ, Rfonke J. Posterior shoulder instability. Orthop Clin North Am 1987;18:409-419.
7. FUSSI Lesions. By SCOI eChat Featuring Stephen Snyder https://www.vumedi.com/video/fussi-lesions/. Accessed November 6, 2017.