Technical Note

An Arthroscopic Technique for Release of the Middle Glenohumeral Ligament and the Effect on External Rotation of the Shoulder

C. Cody Tipton, M.D., Brian B. Gilmer, M.D., F.A.A.O.S., F.A.A.N.A., Sean Marvil, M.D., Sarah Lang, M.Ed., A.T.C., O.T.C., Kaan Unal, and Dan Guttmann, M.D.

Abstract: The middle glenohumeral ligament (MGHL) is well recognized as a primary stabilizer of the shoulder. Its role in shoulder pathologies such as adhesive capsulitis, subscapularis tendon tear, and glenohumeral arthritis is less understood. Biomechanically, the MGHL plays an important role in range of motion, specifically involving normal and pathologic external rotation in less than 45° of abduction. In this Technical Note, we present a technique for arthroscopic release of the MGHL in the setting of a stable shoulder with preoperative loss of external rotation and a patient at risk for postoperative restriction of external rotation.

As arthroscopic shoulder surgery has evolved, so has our understanding of both the clinical and arthroscopic anatomy of the shoulder. The middle glenohumeral ligament (MGHL) is well recognized as a primary stabilizer of the glenohumeral joint. While the MGHL in the unstable shoulder has been well studied, its role in other shoulder pathologies such as adhesive capsulitis, subscapularis tendon tear, and glenohumeral osteoarthritis is less understood.[1-3]

Anatomic studies have found when testing the anterior stability of the glenohumeral joint, the MGHL functions primarily when the arm is abducted up to 45°.[2] Cadaveric sectioning of the MGHL has demonstrated the important role in normal and pathologic external rotation.[4]

Savoie et al.[5] demonstrated isolated injury to the MGHL may lead to symptomatic instability. This cohort, however, did not include previous diagnosis of adhesive capsulitis, subscapularis tendon tear, and glenohumeral arthritis. In our experience, preoperative and postoperative stiffness may be alleviated by isolated arthroscopic release of the MGHL. In this Technical Note, we present an arthroscopic release of the MGHL in the setting of a stable shoulder with preoperative external rotation loss in patients at risk for postoperative restriction of external rotation.

Surgical Technique (With Video Illustration)

Patient Position

The procedure can be performed with the patient under general anesthesia with or without the additional of an interscalene block. The beach-chair position is our preference because it allows easy conversion to subpectoral biceps tenodesis and the ability to perform additional procedures such as rotator cuff repair and comprehensive arthroscopic management (CAM) for the treatment of glenohumeral osteoarthritis.

With the patient supine, before positioning, an examination under anesthesia of the affected shoulder is performed simultaneously while an assistant performs the examination with the contralateral shoulder. The MGHL is then tested in external rotation by making sure the shoulder abducted less than 45° until

From the Taos Orthopedic Institute, Taos, New Mexico (C.C.T., S.M., K.U., D.G.); and Mammoth Orthopedic Institute, Mammoth Hospital, Mammoth Lakes, California (B.B.G., S.L.), U.S.A.

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Address correspondence to Brian Gilmer, M.D., Mammoth Orthopedic Institute, 85 Sierra Park Rd., Mammoth Lakes, CA 93546. E-mail: bbgilmer@gmail.com

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maximum external rotation is reached. This external rotation should be noted for intraoperative comparison after MGHL release is performed.

Diagnostic Arthroscopy and Portal Placement

After standard preparation and draping of the surgical fields, the bony landmarks are identified with a marking pen, including the spine of the scapula, acromion, clavicle, and coracoid process. The authors then proceed with establishing the following portals, adding additional portals based on diagnostic examination and need for additional procedures:

- Posterior portal, used as the initial primary viewing portal or as a working portal.
- Anterior portal, established cephalad and lateral in the rotator interval, used for debridement, biceps release dissection, and excision of the MGHL.
- Anterior superolateral portal, in the setting of full-thickness supraspinatus tear. This may be established before anterior portal used for primary debridement, biceps release, dissection, and excision of the MGHL anchor placement. This same portal can be used for anchor placement and suture management in the setting of rotator cuff repair.

For the purpose of MGHL excision, no cannulas are required. Cannula placement may be performed based on additional procedures to be performed.

Procedure

After thorough intra-articular diagnostic arthroscopy is performed with the 30° arthroscope, the anterior structures are evaluated. A dynamic examination is then performed by internally rotation and posterior translation of the humerus noting the integrity of the MGHL and subscapularis tendon and any associated pathology. This includes tearing of the subscapularis, thickening or scarring of the MGHL, inflammation or injection of the tendon or ligament, labral pathology, and subluxation of the bicep tendon. An accessory working portal is then selected and created under direct visualization after optimization with a spinal needle. If the patient has a full-thickness supraspinatus tear, we recommend using the anterolateral portal, which can be used for both intra-articular access and subacromial access for additional procedures (Fig 1A). This portal allows less anterior soft-tissue fluid extravasation and may facilitate bicep tenodesis or subscapularis tendon repair as necessary. If there is no concomitant rotator cuff pathology, an anterior portal is established cephalad and lateral in the rotator interval (Fig 1B).

A blunt switching stick is then inserted into the anterior portal. This is used to dynamically examine the bicep tendon, MGHL humeral insertion, and integrity of the subscapularis tendon. After dilation of the anterior portal, this instrument is then replaced with arthroscopic scissors. With the scissors closed, the anterior and posterior aspect of the MGHL is dissected, separating the MGHL from the subscapularis tendon (Fig 2). This should be done under direct visualization, with care not to dissect anterior to the subscapularis tendon or too inferior due to risk of neurologic injury.

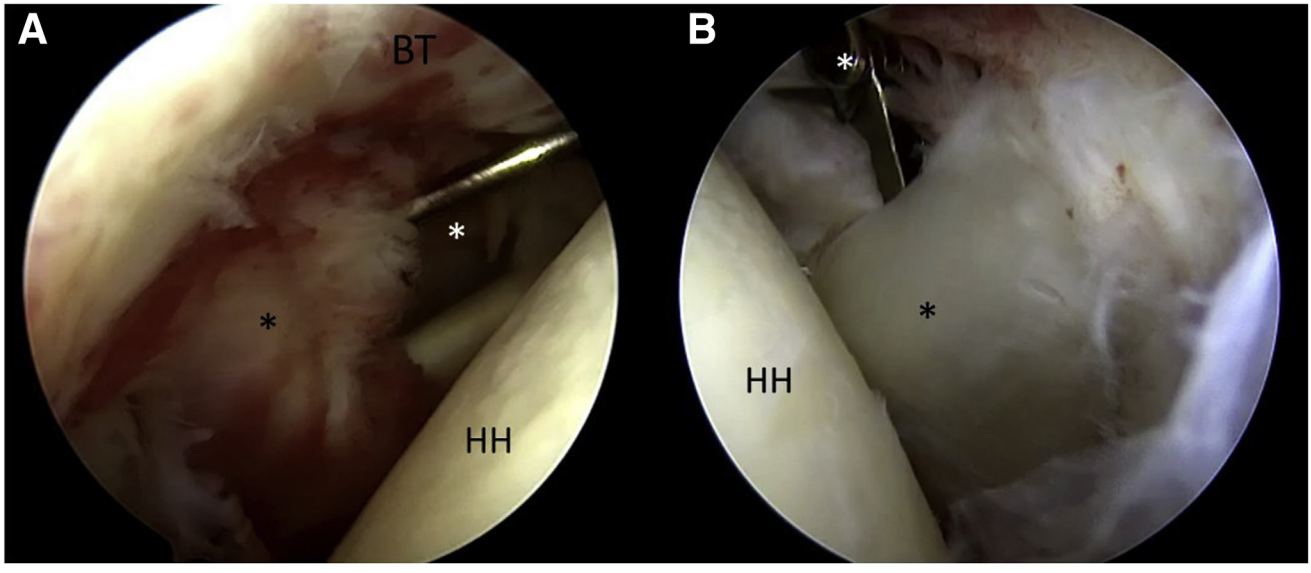

Fig 1. (A) Arthroscopic view of the right shoulder. The HH is demonstrated lateral to the MGHL, identified with an asterisk. The area for direct anterior portal is identified with a white asterisk. Just above, an arthroscopic probe is inserted through an anterolateral portal, avoiding the need to make a direct anterior portal to access the MGHL. (B) Arthroscopic view of the left shoulder. The HH is demonstrated lateral to the MGHL identified with an asterisk. The direct anterior portal is being used by an arthroscopic instrument, identified with a white asterisk (HH, humeral head; MGHL, middle glenohumeral ligament.)

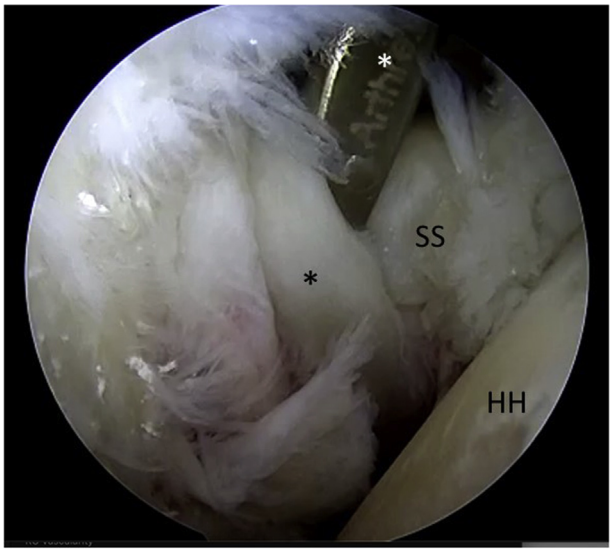

Fig 2. Arthroscopic view of the right shoulder with severe degenerative joint disease. The HH is demonstrated lateral to the MGHL identified with an asterisk. The direct anterior portal (white asterisk) is used the bluntly dissect between the MGHL and SS to release any adhesion between the glenohumeral ligament and subscapularis. (HH, humeral head; MGHL, middle glenohumeral ligament; SS, subscapularis tendon.)

Once the MGHL has been delineated from the subscapularis tendon, the scissors are then opened and used to release the MGHL, cutting the ligament from cephalad to caudal without causing injury to the subscapularis tendon itself or inferior neurovascular structures. Once the release is complete, the free edges of the ligament are then debrided with a 4.0-mm shaver (Fig 3). Upon completion of the MGHL release, the shoulder again is taken from full internal to full external rotation, ensuring free excursion of the subscapular tendon.

A clinical assessment of external rotation is the performed. Again, making sure the shoulder abducted less than 45° until maximum external rotation is reached. This external rotation should be compared with the previous exam under anesthesia (Fig 4).

Postoperative Care

Routine sterile dressings are placed. Postoperatively, the patient is placed into a shoulder immobilizer. It is imperative to begin range of motion and formal physical therapy as soon as possible. If a subscapularis repair is performed in the setting of the MGHL release, the postoperative rehabilitation protocol is driven by the quality of patient's tissue and repair but generally includes limited external rotation to zero for 2 weeks followed by progression active and active assist external rotation over the next 6 weeks. Video 1 demonstrates the full procedure (Table 1).

Discussion

The anatomy and function of the glenohumeral ligaments have been extensively studied arthroscopically via magnetic resonance imaging (MRI) and with cadaveric models.[1-9] Arthroscopic studies have described the morphology of the MGHL to be flat or leaf-like, cord-like, vestigial, in several strands, absent, or as a Buford complex. The most common of these are the flat or leaf-like MGHL, being present in 63% to 72% of cases.[6,7] While there are many anatomic variations of the MGHL, there is no clear correlation between the morphology of the MGHL and coexisting pathologic process. The Buford morphology, while readily depicted

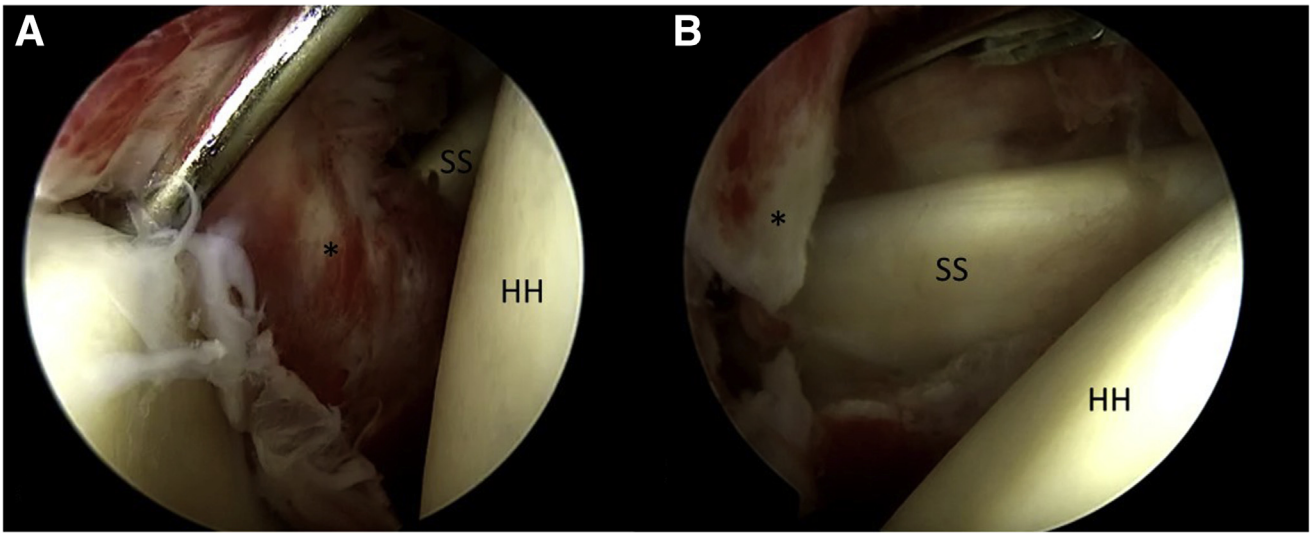

Fig 3. (A) Arthroscopic view of the right shoulder. The HH is demonstrated lateral to the MGHL identified with an asterisk. The arthroscopic scissors are inserted through an anterolateral portal, avoiding the need to make a direct anterior portal to access the MGHL. (B) The same right shoulder is demonstrated after completion of the MGHL release. The SS is now well visualized. (HH, humeral head; MGHL, middle glenohumeral ligament; SS, subscapularis tendon.)

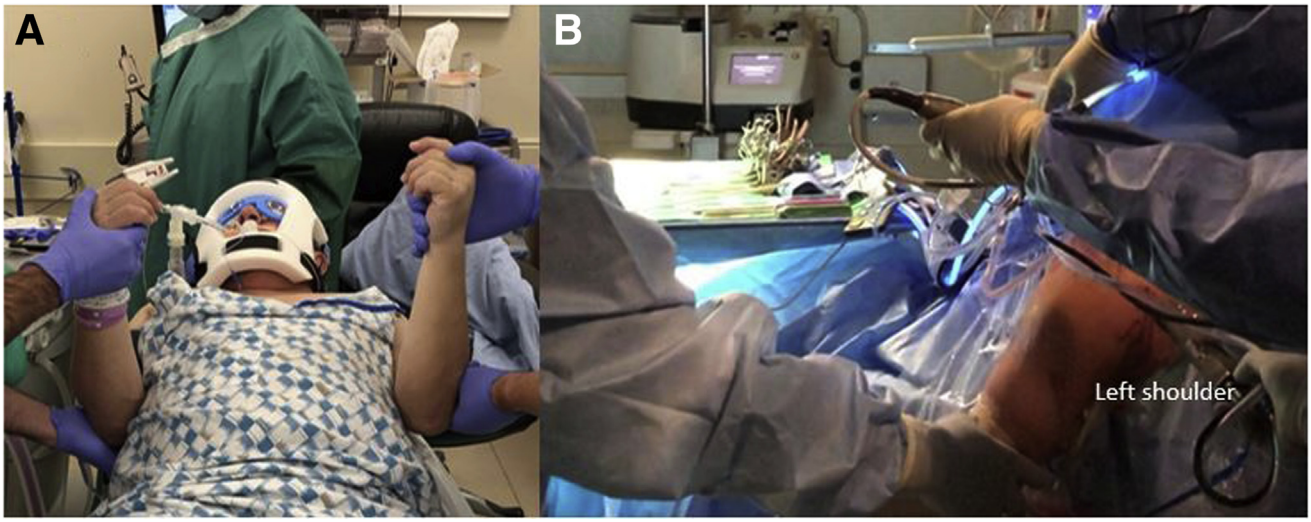

Fig 4. (A) Patient undergoing preoperative range of motion assessment, comparing external rotation of operative (left) versus the nonoperative shoulder (right) while the humerus is held in an adducted position. (B) Same patient has the external rotation of the left shoulder re-evaluated intraoperatively after complete release of the MGHL. (MGHL, middle glenohumeral ligament.)

in the literature, remains exceedingly rare, being found in 1% to 1.5% of cases.[7,8] It is important to discuss the Buford complex in the setting of considering MGHL release, as this may exacerbate anterior instability and may lead to additional shoulder pathology.

The distal insertion of the MGHL also has been described previously. Arthroscopically, this insertion may be difficult to appreciate—reportedly 67% of cases on the subscapularis tendon itself or the capsule covering it and directly on the humerus in 21% of cases.[7] Anatomic studies using MRI show distally, the MGHL is attached to the anterior aspect of the proximal humerus, below the insertion of the superior glenohumeral ligament and occasionally is absent.[9] In our technique, the relevance of the distal insertion is not discussed, as the release occurs at the level of the glenohumeral joint, where it is well visualized and can be done safely, without injuring the subscapularis tendon.

Injury to the glenohumeral ligamentous complex is not uncommon and is readily identified on MRI as disruption from the labral insertion anterior labral periosteal sleeve avulsion with sensitivity, specificity, and accuracy of MRI arthrogram for detection of MGHL tears was 89%, 88%, and 91%.[9] Despite our growing understanding of the MGHL and its importance in cases of instability, there remains no literature demonstrating its utility in the setting of shoulder pathology demonstrating pre- and/or postoperative stiffness.

The MGHL has been shown to be associated with upper border subscapularis tears. Brady et al.[10] have described an example in which the MGHL abrades against the upper edge of the subscapularis medial to its insertion at the lesser tuberosity. This is observed when the arm is put into internal rotation, naming it the subscapularis abrasion from the MGHL (i.e., SAM) lesion.[10] Clinically, these patients have pain with provocative subscapularis testing but intact strength.

This technique describes, in detail, release of the MGHL in the setting of various shoulder pathologies, including subscapularis tendon tear. In the setting of full-thickness retracted subscapularis tears, Nové-Josserand et al.[11] recommend repair of the subscapular tendon before the release of the MGHL. Arthroscopic repair of complete subscapularis tears brings the MGHL into view while it crosses in front of the tendon, which was previously reduced behind the glenoid.[11]

Table 1. Pearls and Pitfalls

Pearls
• An examination under anesthesia should be performed before release of both affected and unaffected extremity
• In the setting of leading-edge rotator cuff tear, use an anterolateral portal
• Dissect between MGHL and subscapularis tendon bluntly, with care not to injure the tendon or neurovascular structures medially and inferiorly
• Release and debride the MGHL to prevent recurrent scarring and tightness
• Re-examine external rotation after release of MGHL
Pitfalls
• Do not release MGHL in setting of previous instability or as part of instability surgery
• Avoid dissection anterior to the subscapularis tendon to avoid nerve injury to the axillary and musculocutaneous nerve
• Caution with release of the MGHL in the setting of sublabral foramen and/or Buford complex to avoid risk of instability
• Avoid cutting with scissors medial to the glenoid to minimize risk to the axillary nerve
• If complete release is required medial to the glenoid, use a push-cut technique

MGHL, middle glenohumeral ligament.

Comprehensive arthroscopic management, now referred to as the CAM procedure, is increasing in popularity as a surgical option in young and active patients with advanced degenerative disease of the shoulder. While initially conservative management is the treatment of choice, the CAM procedure provides a surgical option for the young, active patient who wishes to avoid or delay arthroplasty after not responding to a trial of nonoperative treatment.[12] To optimize outcomes in patients with advanced glenohumeral osteoarthritis with limited motion, we recommend release of the MGHL, allowing an immediate increase in external rotation.

While the literature is not clear whether surgical release of the posterior capsule should be performed in patients with adhesive capsulitis, it is generally agreed that the anterior capsule and MGHL is a cause of restricted motion. This extensive anterior capsular release, allowing mobilization of the subscapularis tendon, has been shown to increase external rotation more than 40°.[13]

Conclusions

In the setting of pathologies resulting in either preoperative external rotation loss or are at risk of postoperative restriction of external rotation, MGHL release is safe, reproducible, and practical. Release of the MGHL allows an increase of external rotation intraoperatively and immediately postoperatively.

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