Technical Note

Shoulder Stabilization Technique Using the Medial Glenohumeral Ligament in Patients With the Buford Complex

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Abstract: The Buford complex is an anatomic variation defined as the association of a cordlike middle glenohumeral ligament (MGHL) and an absent anterosuperior labrum. It can be challenging to properly identify on preoperative imaging and remains mostly an arthroscopic finding. It may, however, lead to problematic situations when encountered during an arthroscopic soft-tissue stabilization procedure, as the treatment of choice in such cases is a bone block. Moreover, reattaching the MGHL to the anterior border of the glenoid rim has traditionally not been recommended because it theoretically leads to severe restriction in external rotation. This technical note describes arthroscopic stabilization for anterior traumatic glenohumeral instability associated with the Buford complex. The cordlike MGHL is used to reconstruct a neo-labrum, associated with an anteroinferior glenohumeral ligament plication. Glenohumeral stabilization using the cordlike MGHL of the Buford complex may be an efficient alternative to a bone block procedure.

During the past several decades, shoulder arthroscopy has considerably advanced, allowing the recognition of normal anatomy, variations, and pathology of the anterior glenohumeral ligamentous complex. The sublabral recess, sublabral foramen, and Buford complex are nowadays commonly accepted as normal variations of the anatomy.

The Buford complex, first described by Williams et al.[1] in 1994, is defined as the absence of the anterosuperior labrum with the presence of a cordlike middle glenohumeral ligament (MGHL). Radiologic diagnostic criteria based on magnetic resonance arthrogram have been described by Tirman et al.,[2] with non-visualization of the anterosuperior labrum and a normal appearance of the contiguous anteroinferior and superior labra, as well as visualization of a discrete cordlike ligamentous structure extending from the humerus inferiorly and coursing laterally and obliquely to its site of insertion at the base of the long head of the biceps.

The Buford complex is present in 1.2% to 6.5% of the population and can be bilateral.[3-5] According to the study of Williams et al.,[1] the reinsertion of the MGHL to the anterior glenoid rim is associated with a severe restriction of glenohumeral mobility and is thus strongly discouraged. This variation, although not a rarity, remains a radiologic challenge to diagnose. In their radiologic study, Tirman et al.[2] only found a 40% rate of correct diagnoses of the Buford complex. This difficulty was also found in a study by Tuite et al.,[6] in which it was commonly mistaken for a SLAP or Bankart lesion.

In the presence of glenohumeral instability associated with a Bankart lesion and no or minimal bone loss, the recommended surgical procedure is an arthroscopic Bankart procedure.[7-10] The recurrence rate of this procedure varies between 5% and 20%[9-11] but remains low if properly indicated.[11-14]

In this technical note, we describe a treatment for anteroinferior glenohumeral shoulder instability associated with the Buford complex that consists of performing stabilization using the cordlike MGHL to reconstruct a neo-labrum, in association with an anteroinferior glenohumeral ligament plication.

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Surgical Technique

Patient Selection

Eligible patients usually present with post-traumatic anteroinferior glenohumeral instability and failed nonoperative management. Magnetic resonance imaging findings are a cordlike MGHL in association with the absence of the anteroinferior labrum (Fig 1).

Technique: Patient Positioning, Arthroscopic Portal Creation, and Initial Joint Exploration

The patient is administered general anesthesia with an interscalene block and is placed in the beach-chair position with the arm in slight traction using a Trimano arm holder (Arthrex, Naples, FL) or similar device (Fig 2). A 3.5-mm 30° oblique arthroscope is inserted through the standard posterior viewing portal. The joint workup is completed; the Buford complex and the tear in the anteroinferior labrum are confirmed (Fig 3). An anterolateral portal is created using a spinal needle to confirm correct positioning, and a 5-mm cannula is placed through the rotator interval. The repair is then carried out according to the steps in the following paragraphs.

The anteroinferior labrum is mobilized using a rasp, and the anterior glenoid rim is decorticated using an arthroscopic rasp or a shaver. A traction suture can be placed through the labrum at this stage to lift it away from the bone.

A first double-loaded 2.8-mm Lupine BR anchor (DePuy Synthes Mitek Sports Medicine, Oberdorf, Switzerland) is placed at the 5-o'clock position. By use of a No. 0 PDS suture passer (Ethicon, Somerville, NJ), the sutures are shuttled inferolaterally through the anterior band of the inferior glenohumeral ligament to perform plication and labral repair with simple or mattress knots (Fig 4). Next, a second anchor is placed at the 4-o'clock position. One suture is used to reinforce the labral repair, and the second is placed through the distal end of the MGHL to start the neo-labral reconstruction. At this stage, tension can be released by carefully releasing the MGHL from the deep subscapularis. It is important to make sure that the arm is placed in neutral or slight external rotation.

Fig 2. Operative room setup. The patient is placed in the beach-chair position (45°-60° of inclination) with the right arm in neutral rotation assisted by a mechanical arm holder (i) (Trimano [Arthrex, Naples, Florida]).

A third anchor is placed at the 3-o'clock position. By use of a Cleverhook (DePuy Synthes Mitek Sports Medicine), a lasso loop is performed with the first suture around the cordlike MGHL (Fig 5), making sure that the "post" limb is also passed anteriorly to the MGHL so that the knots will be extra-articular. The second suture is passed through the substance of the MGHL to form a simple stitch. The lasso loop is tied first to approximate the MGHL and thus reconstruct a "neo-labrum," secured by the simple stitch, again using the anterior limb so that the knots are extra-articular.

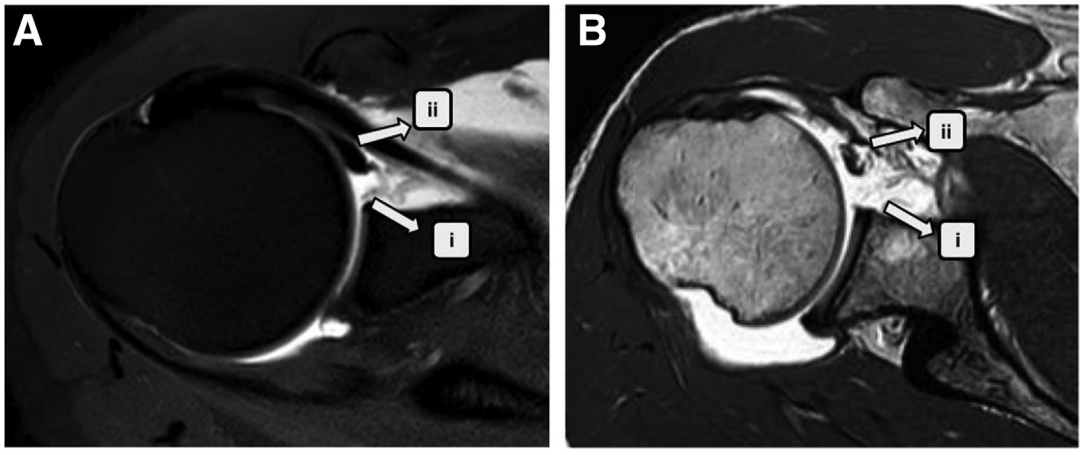

Fig 1. Axial short tau inversion recovery (STIR) (A) and T1 (B) views of magnetic resonance arthrogram of a right shoulder showing absence of anterior labrum (i) and cordlike middle glenohumeral ligament (ii) in 2 different patients.

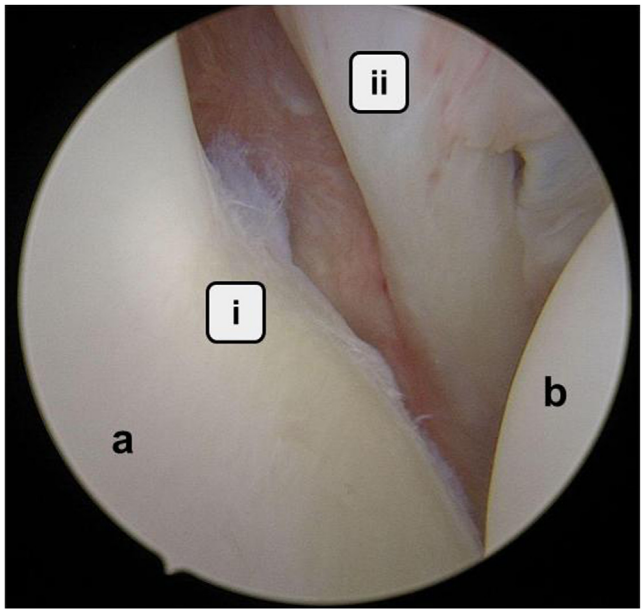

Fig 3. Arthroscopic view of a right shoulder in the beach chair position through posterior portal showing Buford complex: absence of anterior labrum (i) and cordlike middle glenohumeral ligament (ii). (a, glenoid surface; b, humeral head.)

An additional anchor can be placed at the 2-o'clock position using a similar construct to reinforce the superior part of the neo-labrum.

The glenohumeral range of motion must be cautiously assessed under arthroscopic guidance to test the repair and make sure it does not impede external rotation up to at least 30°. An extra release of the MGHL on the deep subscapularis can be carried out if necessary.

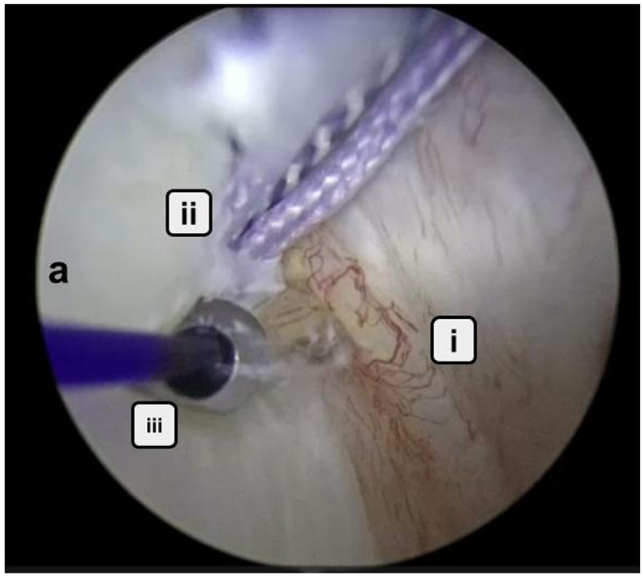

Fig 4. Arthroscopic view of a right shoulder in the beach chair position through posterior portal showing first, most inferior anchor: anterior band of inferior glenohumeral ligament (i), double-loaded 2.8-mm Lupine BR anchors at 5-o'clock position (ii), and suture passer mounted with No. 0 PDS (iii). (a, glenoid surface.)

Postoperative Management

Patients should undergo rehabilitation using a usual Bankart repair protocol, with immobilization in a neutral sling and progressive passive range of motion for 4 weeks, followed by active range of motion and strengthening. Return to non-contact sports activities is allowed after 3 months, and return to contact sports, after 4 months (Video 1). Pearls and pitfalls of the described technique are presented in Table 1 (Figs 5-7).

Discussion

We report a technique of arthroscopic stabilization for anterior traumatic glenohumeral instability associated with the Buford complex, using the cordlike MGHL to reconstruct a neo-labrum, associated with an anteroinferior glenohumeral ligament plication. The Buford complex, first described by Williams et al.,[1] is defined as a cordlike MGHL originating at the base of the biceps tendon, associated with the absence of the anterosuperior labrum. In their original study, Williams et al. presented the case of a young woman with severe motion restriction after reattachment of the Buford complex. After synovectomy and 2 series of mobilizations under general anesthesia, the patient recovered an acceptable range of motion. After a new arthroscopic workup, the authors noted that the MGHL was returned to its initial position and thus concluded that the MGHL should not be reattached in the presence of the Buford complex to avoid any restriction in range of motion.

This description led to consideration of the Buford complex as a normal variant of the anatomy. Nevertheless, some recent studies seem to have shown some association between the Buford complex and intra-articular shoulder pathologies. According to Ilahi et al.,[15] SLAP lesions were associated in 56% of cases with either a sublabral foramen or the Buford complex compared with 12% in the normal population. Bents and Skeete[16] similarly showed a statistically significant correlation between SLAP lesions and the Buford complex in their study. Their explanation was the increase in shear forces applied to the superior bicipital-labral complex in the absence of the anterosuperior labrum. According to this association, Crockett et al.[17] described a technique to repair symptomatic type II SLAP lesions in patients with the Buford complex. Their technique used the MGHL to augment the anterosuperior labrum, leaving the anteroinferior face of the glenoid free of soft tissues to prevent, as they explained, the lack of external rotation.[17,18] Our technique, on the contrary, aims to redefine what used to

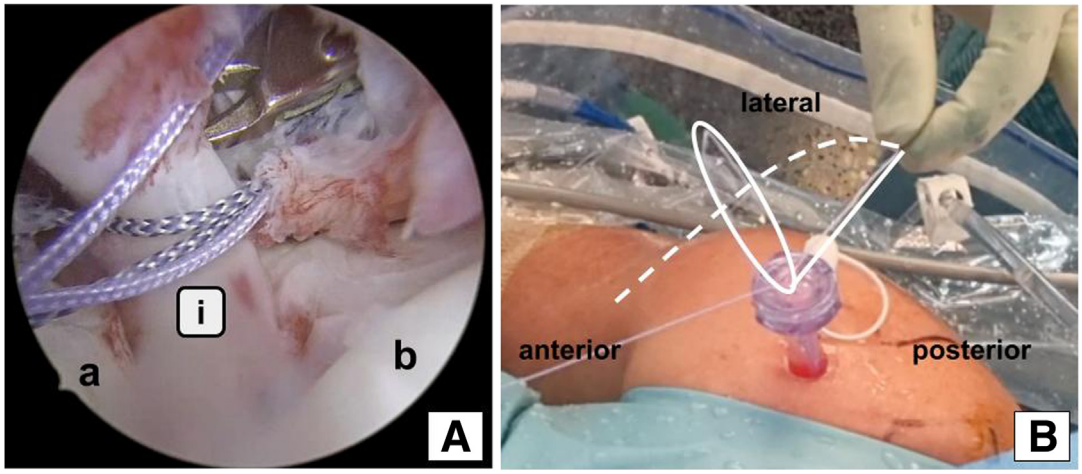

Fig 5. Arthroscopic view of a right shoudler in the beach chair position (A) and external view of a right shoudler in the beach chair position (B) showing creation of lasso loop to reconstruct neo-labrum with cordlike middle glenohumeral ligament. A suture retriever grabs a limb anteriorly to the cordlike middle glenohumeral ligament (i). A loop is pulled out of the cannula. The dashed line represents the other limb of the suture that must be fed through the loop. (a, glenoid surface; b, humeral head.)

be a non-recommended surgical treatment regarding patients with shoulder instability with the Buford complex, using the cordlike MGHL as a complete neo-labrum to cover the whole anterior face of the glenoid, instead of covering it partially. It could be argued that a bone block procedure such as the Latarjet procedure has the advantage of compensating for the deficient labrum with the advocated triple-locking mechanism.[19] However, in the absence of significant bone loss, it may not be addressing the correct problem and lysis of the graft may occur according to Wolff's law.[20]

The current literature on stabilization techniques incorporating the Buford complex is extremely scarce and only consists of some case reports with conflicting results. Williams et al.,[1] as presented earlier, found an important restriction in range of motion. Of note, they did not carry out the initial operation and no detailed technique regarding the procedure was reported. In addition, del Rey et al.[21] presented the case of a

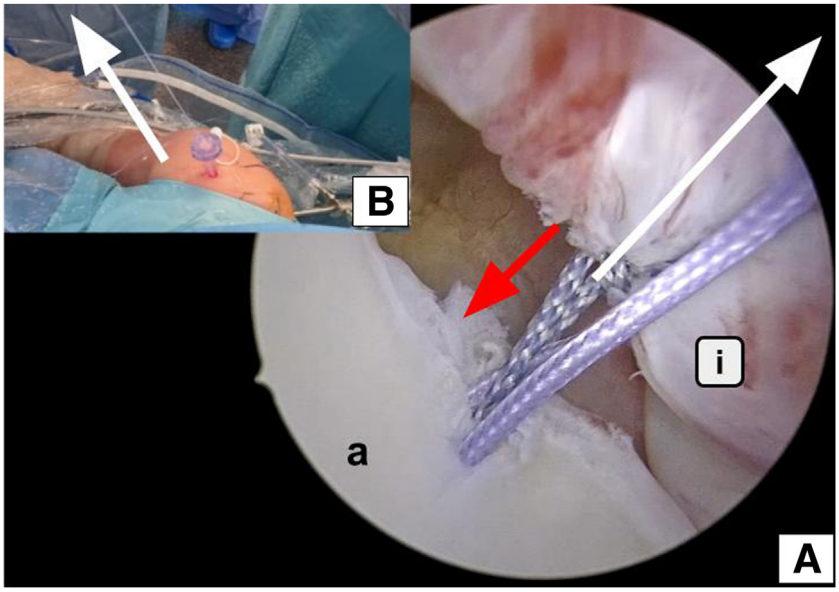

Fig 6. Arthroscopic view of a right shoulder in the beach chair position (A) and external view (B) showing reduction of middle glenohumeral ligament against anterior glenoid using lasso loop, reconstructing neo-labrum. The white arrows represent the direction of the pulled force of the suture post. The red arrow shows the direction of the middle glenohumeral ligament being pulled toward the glenoid (i). (a, glenoid surface.)

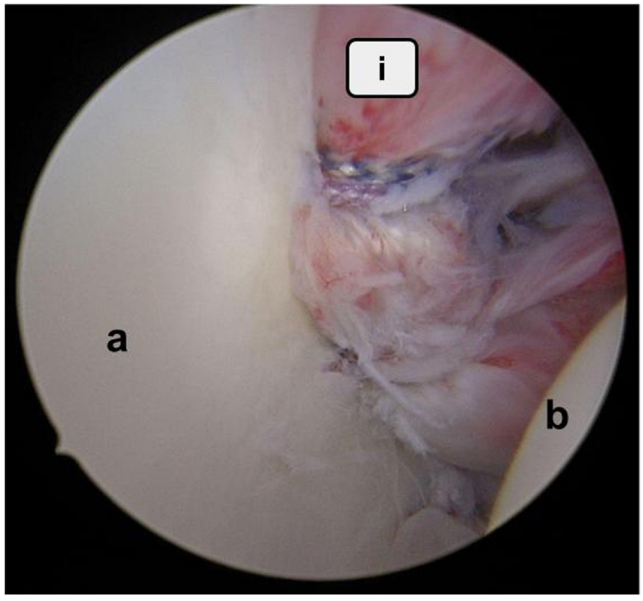

Fig 7. Arthroscopic view of a right shoulder in the beach chair position through posterior portal showing final reconstruction of neo-labrum with cordlike middle glenohumeral ligament (i). (a, glenoid surface; b, humeral head.)

29-year-old male patient with anterior glenohumeral instability in the presence of the Buford complex treated with reinsertion of the MGHL. At 24 months postoperatively, the patient regained full range of motion and returned to full sports activity with no new episodes of instability.[5,21]

There are several advantages to the use of the described technique. First, it helps surgeons to deal with the unexpected finding of the Buford complex, which is missed in nearly half of the cases on preoperative imaging.[2,6,7,15,17] Second, it allows a nearly anatomic reconstruction of a normal glenohumeral joint by re-creating a neo-labrum and thus restoring the relative depth of the glenoid and the concavity-compression effect,[22] as well as re-tensioning the anteroinferior glenohumeral ligament. Last, it does not present a drawback for a subsequent bone block procedure in case of failure[23] (Table 2).

Table 1. Pearls and Pitfalls

Pearls
The use of a cannula facilitates suture management and the creation of a lasso loop, which can be performed extra-articularly, as shown in the Figures 5-7 and Video 1.
Knots should be tied anteriorly to avoid having intra-articular knots.
Pitfalls
The surgeon should make sure that the patient's arm is placed in neutral or slight external rotation to avoid excessive stiffness with the repair.
Being too perpendicular to the glenoid surface should be avoided so as not to damage the cartilage when retrieving the sutures to reconstruct the neo-labrum.

Table 2. Advantages and Disadvantages

Advantages
The technique allows nearly anatomic restoration of the glenohumeral joint by reconstructing a neo-labrum with the cordlike MGHL.
The technique avoids the use of allograft augmentation or the morbidity of bone block donor sites.
The technique does not prevent revision with a bone block procedure in case of failure.
Disadvantages
The technique may be limited by the quality of the patient's soft tissue.
There is a theoretical risk of postoperative stiffness.

MGHL, middle glenohumeral ligament.

Disclosure

The authors report no conflicts of interest in the authorship and publication of this article. Full ICMJE author disclosure forms are available for this article online, as supplementary material.

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