

Arthroscopic McLaughlin Procedure for Treatment of Posterior Instability of the Shoulder With an Engaging Reverse Hill-Sachs Lesion



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Abstract: Posterior shoulder dislocation is associated with an engaging reverse Hill-Sachs lesion (i.e., involving >25% of the articular surface of the humeral head) in 28% of cases, leading to posterior instability. Isolated capsulolabral fixation usually performed to treat posterior instability is not effective at stabilizing the shoulder when there is such a bony lesion. The original McLaughlin procedure, first described in 1952, consists of detaching the subscapularis tendon from the lesser tuberosity and transferring it to the bony defect by an open approach. Several open and arthroscopic modifications of this technique have been described since this description. This article describes a truly arthroscopic McLaughlin procedure. Arthroscopy allows complete visualization of the glenohumeral joint and allows associated posterior and anterior soft-tissue lesions to be addressed at the same time. Moreover, the morbidity of open procedures is avoided. Although this procedure is known to be effective at stabilizing the shoulder, further long-term studies are required to assess the functional outcomes.

Posterior shoulder dislocation is a rare condition, representing 2% to 5% of all shoulder dislocations, but many cases go undetected.^{1,2} When associated with bony defects, it can lead to posterior instability (i.e., recurrent dislocation or subluxation). On the humeral side, a reverse Hill-Sachs lesion (RHSL) is known to be engaging when it is over 20% to 25% of the articular surface in size.^{1,3,4} Surgical treatment is then indicated to stabilize the shoulder.

Soft-tissue procedures give good results in patients with capsulolabral lesions⁴ but do not effectively treat

instability with large impression fractures.⁴ In such cases, filling the bony defect is essential to restore shoulder stability.

Several techniques have been described to address RHSLs that involve 20% to 45% of the articular surface of the humeral head.¹ Anatomic procedures (i.e., humeral head reconstruction with allografts or autografts⁵ or transhumeral head plasty²) aim to restore the original anatomy of the humeral head. The goal of nonanatomic techniques is to treat instability by filling the bony defect.

In 1952, McLaughlin⁶ described this procedure for the first time: The subscapularis tendon was detached and transferred into the defect. Hawkins et al.⁷ modified this technique by transferring the osteotomized lesser tuberosity rather than the subscapularis tendon alone. Krackhardt et al.⁸ later proposed arthroscopic remplissage with fixation of the subscapularis tendon into the RHSL without detaching it from the lesser tuberosity. Since then, several authors have described variations of this technique.⁹ Duey and Burkhart¹⁰ transferred the middle glenohumeral ligament into the defect, making it an extra-articular defect. We describe an arthroscopic approach for the McLaughlin procedure with tenotomy and transfer of the subscapularis tendon into the bony defect.

Surgical Technique

Indications

Patients with posterior shoulder instability associated with an engaging RHSL are candidates for this

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Table 1. Advantages and Disadvantages of Arthroscopic McLaughlin Technique

Advantages	
Effective stabilization of shoulder in case of bony defect >20%-25%	
Visualization of entire joint with scope: allows treatment of associated capsulolabral lesions	
Less morbidity than open approach	
Simple: standard installation, portals, and suture methods	
Disadvantages	
Detachment of subscapularis tendon: risk of retear	
Theoretically reduced internal rotation short-term (further studies needed)	

procedure (Video 1). Advantages and disadvantages are summarized in Table 1, and pearls and pitfalls are summarized in Table 2.

Preoperative Preparation and Positioning

Under general anesthesia and an interscalene nerve block, the patient is placed in the beach-chair position with the affected shoulder retained in 30° to 40° of forward flexion using 3 to 4 kg of longitudinal traction.

Portals and Cannula Placement

A 30° arthroscope is used during the whole procedure. A standard posterior viewing portal is used to perform a thorough diagnostic arthroscopy. Three more portals are established using a spinal needle: (1) an anterior portal through the rotator interval, (2) a lateral portal, and (3) an anterolateral portal. If a posterior Bankart procedure is also performed, a fifth posterolateral portal through the infraspinatus is created.

Management of Capsulolabral Lesions

Posterior labral pathology can be addressed by viewing from the anterolateral portal. After debridement of the labral tear and abrasion of the glenoid rim, several 1.4-mm single-loaded suture anchors (Jugger-Knot; Biomet, Warsaw, IN) are placed along the posterior glenoid rim. Sutures are passed around the labrum and tied to fix it in the anatomic position and restore normal capsulolabral tension.

Table 2. Pearls and Pitfalls of Arthroscopic McLaughlin Technique

Pearls	
The lateral and anterolateral portals should be more anterior than in the case of a superior cuff tear repair.	
The anterolateral portal should be used as the viewing portal to visualize the bony defect and subscapularis tendon.	
In the case of a capsulolabral lesion, a fifth posterolateral portal through the infraspinatus tendon should be created.	
Pitfalls	
The surgeon should be sure to debride the rotator interval tissue widely to have access to the anterior compartment and to work on the subscapularis tendon.	
The muscular part of the subscapularis should not be detached.	
A biceps tenotomy or tenodesis has to be performed to avoid secondary instability of the long head of the biceps.	

Accessing Anterior Compartment

The arthroscope is then moved through the posterior portal into the subacromial space. From the lateral portal, the deep deltoid fascia is opened vertically, and debridement of the subacromial bursa is performed to create a working space.¹¹ The camera is switched to the anterolateral portal, and the rotator interval is widely opened using an electrocautery device to expose the RHSL and subscapularis tendon.

Transfer of Subscapularis Tendon

The transverse humeral ligament is opened, and the subscapularis tendon is detached progressively from the lesser tuberosity (i.e., leaving the inferior muscular part of the subscapularis attached) and gently abraded (Fig 1). The RHSL is debrided of all soft tissues and abraded to create a bleeding bed of bone.

Through the anterior portal, two 5.5-mm suture anchors (Genesys; ConMed, Utica, NY) are placed into the RHSL, one at the top and one at the bottom (Fig 2). It should be noted that most rotator cuff suture anchors will work for this technique (i.e., surgeon's choice). The sutures of the superior anchor are brought through the upper border of the tendon in a Mason-Allen configuration using a suture passer (ExpresSew III; DePuy Mitek, Raynham, MA). The sutures of the inferior anchor are passed inferiorly through the subscapularis tendon in a Mason-Allen configuration using a Clevhook (DePuy Synthes, Warsaw, IN). The inferior sutures are tied first, followed by the superior ones,

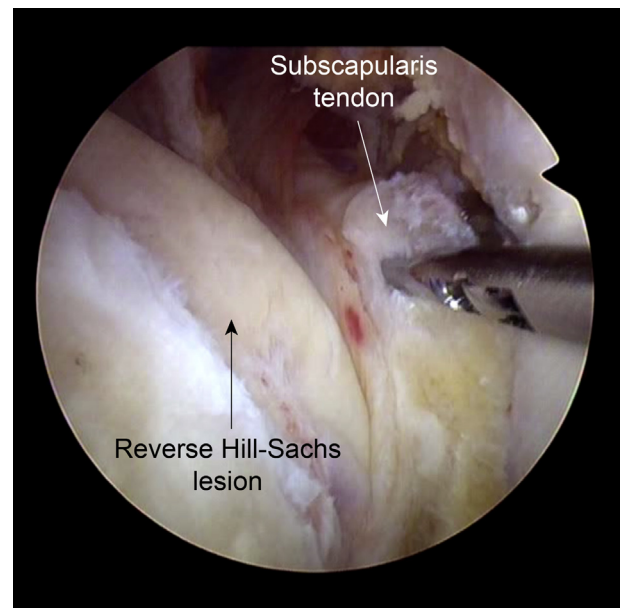
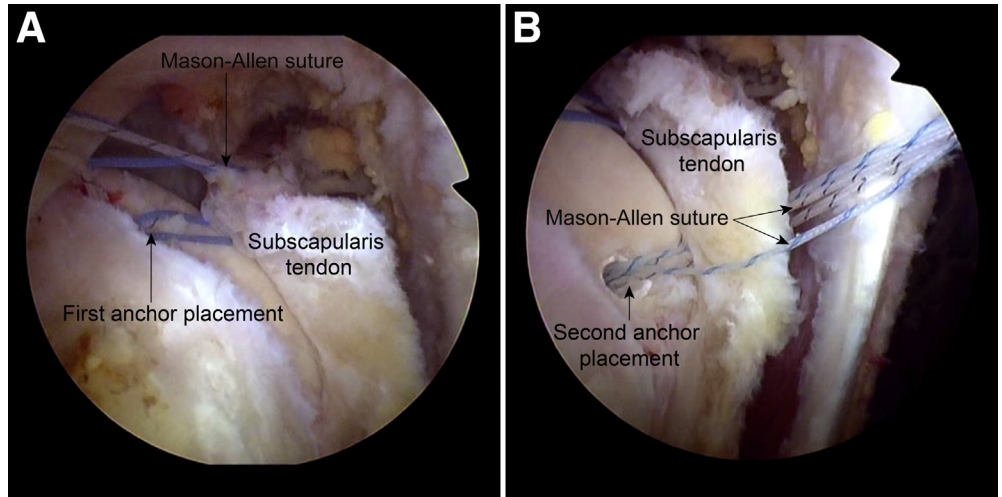


Fig 1. Arthroscopic view of the right shoulder with the patient in the beach-chair position from the lateral portal with a 30° arthroscope. The reverse Hill-Sachs lesion is visualized after detachment of the subscapularis tendon using an electrocautery device.

Fig 2. Arthroscopic view of the right shoulder with the patient in the beach-chair position from the lateral portal with a 30° arthroscope. Suture anchor placement within the reverse Hill-Sachs lesion is visualized, with one suture anchor at the top and one at the bottom. (A) The sutures of the top anchor are passed through the superior part of the subscapularis tendon in a Mason-Allen configuration. (B) The sutures of the bottom anchor are passed through the inferior part of the tendon in a Mason-Allen configuration.



performed with a sliding Nicky knot and secured by 4 half-hitch locking knots. The subscapularis tendon is thus filling the bony defect (Fig 3).

Management of Long Head of Biceps

The last step of the procedure is management of the instability of the long head of the biceps due to opening of the bicipital groove. Among patients older than 60 years, a tenotomy is made close to the glenoid using an electrocautery device. In these patients, tenodesis is performed using a double lasso-loop technique with a 2.8-mm suture anchor (Y-Knot RC all-suture anchor; ConMed) inserted into the groove (Fig 4).

Postoperative Management

Postoperatively, the shoulder is immobilized in a sling in neutral rotation for 4 weeks. After 4 weeks, passive stretching exercises of the shoulder can be started. The sling should be used for 6 weeks, after which active and passive shoulder motion is allowed. Resisted motion must be avoided for 3 months.

Technique Variations

For surgeons who are used to repairing subscapularis tears from an intra-articular view, the procedure can also be performed from the intra-articular posterior portal. The sutures are then passed through the subscapularis tendon using a BirdBeak (Arthrex, Naples, FL).

Discussion

With 58% of capsulolabral lesions and 28% of engaging RHSLs,¹² posterior shoulder dislocation often leads to posterior instability. Most studies on the treatment of RHSLs are Technical Note,⁸⁻¹⁰ and only a few have evaluated outcomes^{3,13}; none have evaluated the outcomes of arthroscopic remplissage of the defect.

Checchia et al.³ assessed the results of transfer of the subscapularis tendon (i.e., McLaughlin procedure⁶ or Neer's modification⁷) by comparing the range of motion of the affected shoulder with the range of motion of the unaffected shoulder among patients with chronic posterior fracture dislocation. Among cases with a delay in treatment of more than 4 weeks, there was no significant difference in external rotation but there was a significant difference in internal rotation. However, internal rotation of the unaffected shoulder was T8 whereas that of the operated shoulder was T9. It is uncertain whether this difference is clinically relevant.

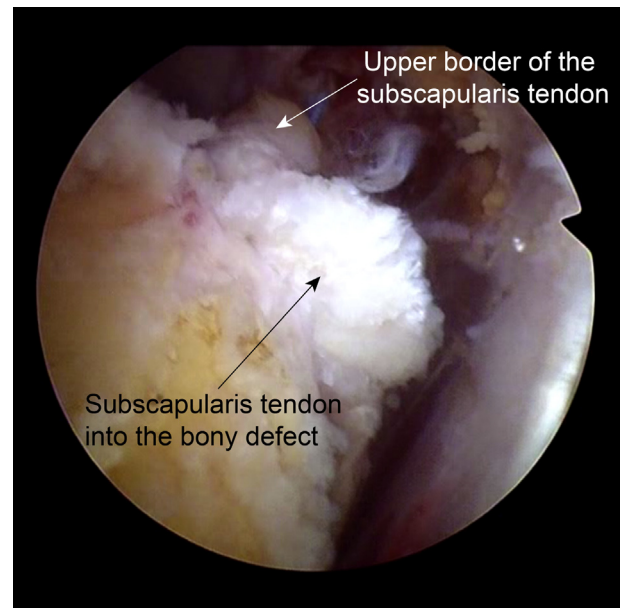


Fig 3. Arthroscopic view of the right shoulder with the patient in the beach-chair position from the lateral portal with a 30° arthroscope. The subscapularis tendon is filling the reverse Hill-Sachs lesion after the sutures are tied.

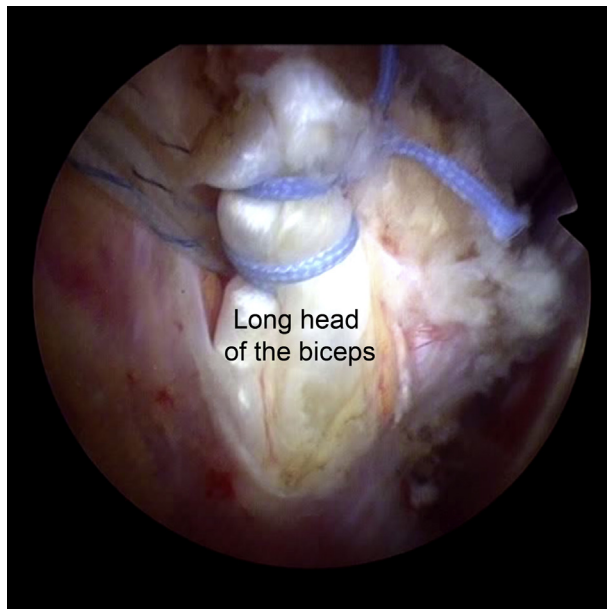


Fig 4. Arthroscopic view of the right shoulder with the patient in the beach-chair position from the lateral portal with a 30° arthroscope. Tenodesis of the long head of the biceps has been performed a double lasso-loop technique to avoid instability due to opening of the bicipital groove.

Several articles have described modified McLaughlin procedures, but all consist of fixing the subscapularis tendon into the bony defect without detaching the tendon from the lesser tuberosity.⁹ This technique could theoretically cause contractures because it can be seen to tighten the biceps tenodesis.

The procedure described in this article is a truly arthroscopic McLaughlin procedure. The disadvantage of this technique is detachment of the subscapularis tendon from the lesser tuberosity, which involves a risk of re-tear that does not exist with the other arthroscopic procedures described later. All of these procedures are responsible for reduced internal rotation by medialization of the insertion of the subscapularis. Bastard et al.¹⁴ evaluated patients who underwent stabilization by Bankart repair with remplissage surgery for anterior shoulder instability associated with a Hill-Sachs lesion. At a mean follow-up of 128 months, there was no longer any stiffness, particularly in external rotation. If we compare this with anterior remplissage, short-term reduced internal rotation is expected to improve gradually.

Nowadays, arthroscopy is routinely used for stabilization of posterior instability. It avoids the morbidity of open procedures and seems to give better outcomes.¹⁵ Moreover, during the arthroscopic procedure, the surgeon can visualize the entire joint and address both anterior and posterior lesions associated with the bony defect.

Our arthroscopic technique is a simple and reproducible procedure. It uses standard installation, portals, and suture methods and does not need any specific materials. However, further studies are required to assess the efficacy of this technique regarding shoulder stabilization and clinical outcomes.

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