Technical Note

Hill-Sachs “Remplissage”: An Arthroscopic Solution for the Engaging Hill-Sachs Lesion

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Abstract: We present an arthroscopic technique used to treat traumatic shoulder instability in patients with glenoid bone loss and a large Hill-Sachs lesion. The procedure consists of an arthroscopic capsulotenodesis of the posterior capsule and infraspinatus tendon to fill the Hill-Sachs lesion. With the patient in the lateral decubitus position, a posterior portal is established at the lateral aspect of the convexity of the humeral head that is centered over the lesion. After anterior-inferior and anterior-superior portals have been established, the camera is placed in the anterior-superior portal. The Hill-Sachs lesion is freshened with a bur through the posterior portal. A cannula is inserted in the posterior portal through the deltoid but not through the infraspinatus or capsule, and an anchor is placed in the inferior aspect of the humeral lesion. A penetrating grasper is passed through the tendon and posterior capsule, 1 cm inferior to the initial portal entry site to pull 1 suture limb. A second anchor is placed superiorly, and 1 suture limb is similarly passed. The inferior suture is tied first with the knots remaining extra-articular, pulling the infraspinatus and capsule into the lesion. After completion, the Bankart lesion can then be repaired. Key Words: Traumatic shoulder instability—Glenoid bone loss—Hill-Sachs lesion—Posterior capsulodesis and infraspinatus tenodesis.

Broca and Hartmann recognized the problem of engagement of the Hill-Sachs lesion on a deficient glenoid in 1890, but Burkhart and De Beer highlighted the role of bony defects in the failure of arthroscopic stabilization procedures. Recognition of the role that glenohumeral bone deficiency plays in the failure of arthroscopic shoulder stabilization procedures continues today.2

The question of how best to treat unstable shoulders with significant glenoid and humeral bone defects remains. Some authors have advocated limiting glenohumeral motion through some type of open capsular shift that would prevent engagement of the Hill-Sachs lesion by limiting external rotation and abduction. Other open procedures have been described such as an open transfer of the infraspinatus tendon and capsule into the Hill-Sachs lesion.3 More recently, several authors have described more novel approaches to treat the engaging Hill-Sachs lesion.4-8 We present a procedure that consists of an arthroscopic posterior capsulodesis and infraspinatus tenodesis to fill (remplissage, which means “to fill” in French) the Hill-Sachs lesion in addition to an arthroscopic Bankart repair.
The Hill-Sachs remplissage technique is similar to an arthroscopic repair of a partial-thickness, articular-surface rotator cuff tear. It consists of fixation of the infraspinatus tendon and posterior capsule to the abraded surface of the Hill-Sachs lesion.

The patient is placed in the lateral decubitus position and leaned back approximately 30° with the shoulder in 30° of abduction and 15° of forward flexion. The arm is suspended with 15 lb of distal traction.

The glenohumeral joint is entered through a posterior portal that is placed at the lateral aspect of the convexity of the humeral head so that it is centered directly over the Hill-Sachs lesion (Fig 1). This remplissage portal will allow initial visualization and evaluation of the joint as well as working access to the Hill-Sachs lesion. After an anterior-inferior portal is made in the rotator interval, which will be the primary working portal for the anterior labral repair, an anterior-superior portal is established at the anterior margin of the acromion. This portal should enter immediately behind the biceps tendon. The arthroscope is switched from the posterior portal to the anterior-superior portal, and a cannula is placed into the posterior portal.

While viewing from the anterior-superior portal, the surgeon carefully withdraws the cannula in the posterior portal from the posterior capsule and infraspinatus tendon but not through the deltoid. Therefore the mouth of the cannula is in the subdeltoid space. The anchor cannula with obturator is passed through the infraspinatus tendon and posterior capsule via the pre-existing portal, and the first anchor is placed in the inferior aspect of the Hill-Sachs lesion. A penetrating grasper is passed through the tendon and posterior capsule, 1 cm inferior to the initial portal entry site, to grasp and pull 1 suture limb (Fig 2A). A second anchor is placed in the superior aspect of the Hill-Sachs lesion, and a grasper penetrator is used in the same fashion to pass 1 suture limb 1 cm superior to the initial portal entry site (Fig 2B). The inferior suture is tied first with the knots remaining extra-articular in the subdeltoid space. The superior suture is tied to complete the remplissage. The knots can be visualized by opening the posterior wall of the subacromial bursa. These mattress sutures draw the infraspinatus and posterior capsule to the abraded bony surfaces, thus filling the Hill-Sachs lesion (Fig 3A). The Bankart repair can then be completed (Fig 3B).

Postoperative care and immobilization are individualized and based on the patient’s history and pathology, but in general, we require the use of an immobilizer for 6 weeks. Patients are allowed to remove the immobilizer for “controlled” activities of daily living such as eating, showering, and computer use within 1 or 2 days. They can remove it for these activities as long as the arm is not abducted and does not externally rotate beyond neutral. Active and resistive range of motion is started at 6 weeks. No “at-risk” work activities or contact sports are allowed for 6 months.

Several authors have recognized the contribution of glenoid deficiency to the recurrence of anterior instability.1,2 Typically, less attention has been focused on the significance of the Hill-Sachs lesion. However, it was recognized, in 1948, that a dislocation might recur after repair of the capsule and labrum in the presence...
of a sizable Hill-Sachs lesion. It was suggested that abduction and external rotation of the arm would bring the Hill-Sachs lesion to engage with the anterior rim of the glenoid, thereby levering the humeral head out anteriorly.

Burkhart and De Beer have recently refocused attention on the role of the engaging Hill-Sachs lesion in recurrent instability. In their series of 194 patients with recurrent shoulder instability treated with suture anchors, there were 21 failures (10.8%). However, those patients who did not have significant bony defects had a failure rate of 4%. It was noted that 14 of 21 recurrences (67%) had significant bone defects in the form of anterior-inferior glenoid loss and/or large Hill-Sachs lesions.

Several open techniques have been developed to address large Hill-Sachs lesions, including an open transfer of the infraspinatus tendon and capsule into the defect. Connolly reported satisfactory results in all but 1 of 15 patients treated with this transfer of the infraspinatus tendon for large defects of the humeral head. He postulated that this procedure afforded max-
imum stability by only affecting gliding of the humeral head rather than rotation, thus minimizing the limitation of external rotation in the overhead position. This is essentially the reverse of the McLaughlin procedure.

Interestingly, an arthroscopic technique has recently been described by Krackhardt et al.\(^5\) to fix the subscapularis into the anterior humeral head impression fracture. This technique uses suture anchors in a manner similar to the technique described for the remplissage. Short-term results of 12 patients treated with the arthroscopic McLaughlin procedure are pending.

There have been more recent attempts to develop techniques to solve the problem of the engaging Hill-Sachs lesion. Re et al.\(^6\) have described a “transhumeral head plasty” by use of a deltopectoral approach in which the depressed, compacted bone of the Hills-Sachs lesion is tamped up from below. Another technique, using a limited posterior approach, was described to fill the humeral head defect with osteoarticular allograft.\(^7\)

As instruments and techniques are refined, the role of arthroscopy has expanded. Chapovsky and Kelly\(^4\) described an all-arthroscopic technique to fill the lesion, also using osteoarticular allograft. In addition, Lafosse et al.\(^8\) recently described a technique for an arthroscopic Latarjet procedure for anterior shoulder instability. They admit that their technique is complex and requires experience but report that the early results of 44 cases are promising.

Remplissage is an arthroscopic technique that directly addresses the problem of the engaging Hill-Sachs lesion. The filling of the abraded Hill-Sachs lesion effectively obliterates it and converts the lesion into an extra-articular one. Therefore it prevents engagement. In an unpublished review, only 2 of 24 patients (7%) treated with remplissage have had recurrent instability. In both, this occurred after significant trauma. Furthermore, there were no significant complications. In particular, the concern that the remplissage would limit rotation did not materialize. There was no significant loss of motion in any plane after the procedure. Remplissage is an effective arthroscopic approach in a difficult subgroup of instability patients with a significant potential for failure after a standard arthroscopic Bankart repair.

REFERENCES