Arthroscopic Remplissage for Anterior Shoulder Instability

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Background: There are several approaches such as the Bankart repair, Latarjet, and Remplissage to treat recurrent glenohumeral instability.

Indications: We chose to augment an arthroscopic Bankart repair with a Remplissage in this 26-year-old patient given the presence of a Hill-Sachs lesion, history of recurrent shoulder dislocations, and young age of the patient.

Technique Description: We established four portals using previously well-documented techniques. The Hill-Sachs lesion was evaluated using the anterosuperior portal. Two anchors were placed, one on both the superior and inferior aspects of the Hill-Sachs lesion. The sutures were shuttled through the knotless anchor mechanism and tensioned after confirming the cannula was through the deltoid. Then, we completed the Remplissage by repairing the infraspinatus tendon and capsule into the posterior humeral head.

Results: The Remplissage procedure is very successful at reducing recurrent instability in young, active patients. Previous studies have reported very low rates, even 0% recurrent instability, after surgery with 80% to 90% of patients returning to sports. Studies have also documented excellent patient-reported outcomes at short- to mid-term follow-up. Complication rates are historically lower when the Remplissage is done with an arthroscopic Bankart repair than the Bankart repair alone.

Discussion/Conclusion: The Remplissage procedure is a safe, effective option at reducing future instances of shoulder dislocations in conjunction with Bankart repairs. Patients can expect to return to their active lifestyles, with many patients achieving the same level of activity as before the initial shoulder dislocation.

Patient Consent Disclosure Statement: The author(s) attests that consent has been obtained from any patient(s) appearing in this publication. If the individual may be identifiable, the author(s) has included a statement of release or other written form of approval from the patient(s) with this submission for publication.

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VIDEO TRANSCRIPT

Today, we will discuss the technique for arthroscopic Remplissage when treating anterior shoulder instability. The authors are Akshar Patel, Daniel Wagner, Parth Vaghani, David Gibbs, Noah Mallory, Vikas Munjal, Connor Hoge, Gregory Cvetanovich, and Ryan Rauck.

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In this presentation/video, we will go over a specific patient presentation from our institution, surgical treatment, indications for surgery, preoperative planning, the surgical procedure with an associated video, postoperative management, potential complications, and reported outcomes.

There are several approaches to treat shoulder instability, such as arthroscopy, open bone restoration, open Bankart repair, and open capsular shift.[7] Our focus in this video is to address shoulder instability in the setting of subcritical bone loss or isolated humeral bone loss. Due to time constraints, we are unable to discuss all the potential

management strategies for shoulder instability but recognize that treatment should be tailored to each individual patient's goals and expectations.

Bankart repair is the reattachment of the anterior inferior labrum and capsule to the bony glenoid through anchors or trans-osseous fixation.

The Latarjet procedure is a bony reconstruction of the anterior glenoid through transfer of the corociod.

It is increasingly popular with arthroscopic Bankart repairs to add a Remplissage, a procedure where the posterior shoulder capsule and infrapspinatus tendon are inset into the Hill-Sachs defect, converting the intra-articular location of the defect to an extra-articular one.

While the Latarjet has low rates of recurrent instability, it is associated with a higher complication rate than arthroscopic stabilization.[4,6]

In patients with anterior shoulder instability, minimal glenoid bone loss, and significant Hill-Sachs lesions, augmenting arthroscopic Bankart repair with Remplissage can reduce the risk of recurrent instability and residual apprehension.[9]

The main indications for surgical treatment of anterior shoulder instability include:

- Off-track Hill-Sachs defects, meaning that the defect will "engage" on the glenoid if the width of the Hill-Sachs interval is greater than the glenoid track.
- On-track Hill-Sachs defects in a high-risk patient (such as a younger, contact athlete), or lower-demand patient with some glenoid bone loss, typically less than 13.5%.

Relative contraindications include a minimal Hill-Sachs defect, prior rotator cuff tear, and overhead athletes without a significant Hill-Sachs defect.

Thus, Remplissage may be a good alternative to reduce the risk of complications seen with open bone block procedures and reduce the recurrent instability seen in isolated arthroscopic Bankart repair in the appropriate patients. Multiple studies have demonstrated that the arthroscopic Remplissage procedure can prevent recurrent instability in over 90% of patients because it reduces the Hill-Sachs interval by filling the defect and therefore can convert an off-track lesion into an on-track one to reduce the risk of recurrent instability.[1,8,10]

Our case presentation involves a 26-year-old previously healthy male who presented after sustaining an anterior shoulder dislocation while playing football. He reported a prior shoulder dislocation episode 2 years ago that self-reduced. On examination, the patient was apprehensive but neurovascularly intact. The shoulder was reduced in the emergency department, and the arm has been immobilized since the initial injury. He was seen in clinic and opted for surgical management with the goal of eventual return to contact sports.

Radiographs revealed evidence of anterior shoulder dislocation with interval reduction. There was evidence of a Hill-Sachs lesion on the humeral head.

The magnetic resonance imaging (MRI) revealed an anterior labral tear with displacement and periosteal stripping. There was also a medialized Hill-Sachs lesion with edema within the infraspinatus lesion. The Hill-Sachs interval measured 24.1 mm, and the glenoid width measured 29 mm. There was no bone loss, and the glenoid track was then calculated to be 24 mm; therefore, the measurements were consistent with an "off-track" lesion. While this patient did have a medialized humeral lesion, the technique is the same for performing the arthroscopic Remplissage regardless of medialization.

The surgical plan for this patient was an arthroscopic Bankart repair with Remplissage. The patient would be in the beach chair position, and 3 portals would be established for the Remplissage: anterosuperior, posterior, and posterolateral.

The overall sequence is as follows: diagnostic scope, establishing anterior and anterosuperior portals, establishing the posterolateral portal while viewing from the anterosuperior portal, then placing the anchors for Remplissage without tightening the sutures, followed by the anterior labral repair and capsulorraphy (Bankart), and finally shuttling the repair sutures for Remplissage and tensioning to complete the repair.

The patient is in the beach chair position with all bony prominences appropriately padded. After prepping and draping in usual sterile fashion, the operative arm is connected to the TriMano to assist with arm positioning and manipulation throughout the case. As can be seen in the slide, 3 different portals will be used primarily.

The standard posterior portal is established using an 11-blade scalpel. A blunt trocar is introduced into joint followed by the arthroscope. An anterior portal is then established just above the upper border of the subscapularis with an outside-in technique. An 8-mm cannula is then placed anteriorly. A second anterior portal is then placed anterosuperiorly high in the rotator interval to be used for viewing down the face of the glenoid for the Bankart repair and viewing over the humeral head for the Remplissage. Next, the joint is systematically examined using a probe.

The intraoperative findings were consistent with the MRI of an anterior labral tear and a moderate-to-large Hill-Sachs defect.

Viewing from the anterosuperior portal, we are able to fully evaluate the Hill-Sachs lesion. Using the arthroscopic shaver and a rasp, the Hill-Sachs lesion is gently decorticated to promote a healing response.

A posterolateral portal is then made to facilitate proper trajectory for anchor placement using a spinal needle for localization. A 7-mm cannula is introduced down through the deltoid and to the infraspinatus, but not through it. Using a large sweeping motion with the cannula, the subdeltoid space is cleared. A drill guide is then placed through the cannula, and the inferior aspect of the infraspinatus and capsule is pierced to place the drill guide on the Hill-Sachs lesion. A 2.6-mm knotless anchor is then placed in the inferomedial aspect of the Hill-Sachs lesion. This process is repeated with a second pass through the infraspinatus and capsule in the superomedial aspect of the Hill-Sachs lesion, and a second 2.6-mm knotless anchor is placed. These sutures are maintained until after

anterior labral repair, which will be shown at the end of the video.

The knotless anchor conversion is done after the anterior labral repair. The repair suture from the inferior anchor is shuttled through the shuttling suture of the superior anchor. This was repeated with the repair suture from the superior anchor and shuttling suture from the inferior anchor. After shuttling the sutures through the knotless anchor mechanism, the sutures were tensioned as can be seen here in a double-pulley fashion. It is important to ensure the cannula is through the deltoid and up against the infraspinatus tendon and muscle.

To avoid tangling when performing a double-pulley technique using knotless suture anchors through a single cannula, we recommend the following: After placing the first anchor, use a hemostat to clamp all the sutures from the inferior anchor together. After placing the second anchor, place another hemostat to clamp all the sutures from the superior anchor together. Then use a third hemostat to clamp all the sutures as they come out of the cannula to keep the cannula beyond the deltoid and pressed against the infraspinatus.

Here you can see we repaired the infraspinatus and capsule into the posterior humeral head and completed our arthroscopic Remplissage.

The anterior labral repair was completed with three 1.8-mm knotless anchors.

A potential pitfall is the loss of anchor fixation while tensioning the Remplissage.[2] To avoid this, after initially placing the anchors, pull tension to ensure the anchors are well seated and have good fixation. In the rare setting where the anchor may lose fixation at final tensioning, one can replace the 2.6-mm anchor with a larger anchor, such as a 4.75-mm anchor with a knotless mechanism to use the same suture configuration.

A pearl of this technique, by being diligent with suture management and using this technique, surgeons do not need to enter the subacromial space with the arthroscope to find the sutures and tie them. A pitfall, if the surgeon is not diligent with suture management, is that tangles can happen, which is why we recommend the suture management techniques described previously.

The patient was immobilized in a sling for 4 weeks postoperatively, and physical therapy (PT) begins 2 weeks after surgery. The patient then progresses from passive range of motion, active assisted, and active range of motion with a goal of full range of motion by 3 months. Strengthening begins around 10 weeks postoperatively with no resisted external rotation until 12 weeks. The main differences in rehabilitation protocols from arthroscopic Bankart alone are that we avoid internal rotation or cross-body stretching and resisted external rotation for 3 months postoperatively.

Patients can get back to noncontact sports at 4 months and return to contact sports at 6 months.

Patients generally perform well after undergoing the Remplissage procedure for shoulder instability. At 5 years postoperatively, Garcia et al[3] found that 95.5% of patients were able to return to sports at an average of 7 months following surgery while 81% were able to return to their previous intensity and level of sport. In addition, they reported the mean American Shoulder and Elbow Surgeons (ASES) score was 89.3.[3]

Similarly, other studies have reported greater pain reduction when the arthroscopic Bankart is performed alongside the Remplissage compared with Latarjet alone. Previous studies have documented that patients can often lose about 5° of external rotation after Remplissage.[5]

In summary, given the high rate of return to sports and low recurrent instability, the arthroscopic Remplissage is an effective augment to use with arthroscopic Bankart repairs for patients with recurrent anterior instability, significant Hill-Sachs lesions, and minimal glenoid bone loss.

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