


# Arthroscopic Remplissage Using a Double-Pulley Technique

Cody Ashy,<sup>\*†</sup> MD , Paul Pottanat,<sup>†</sup> MD, Harris Slone,<sup>†</sup> MD, and W. Michael Pullen,<sup>†</sup> MD  
*Investigation performed at the Medical University of South Carolina, Charleston, South Carolina, USA*

**Background:** Anterior shoulder instability is associated with Hill-Sachs lesions (HSLs) in 40% to 90% of cases. When addressing anterior shoulder instability, unaddressed engaging or “off-track” HSL have a recurrence rate of 75%. Remplissage is a known technique to address recurrent instability in the setting of an engaging HSL. In this video, we demonstrate that a double-anchor-pulley technique may be used to address recurrent instability in the setting of engaging HSL.

**Indications:** Patients with recurrent anterior shoulder instability with off-track HSL in patients with glenoid bone loss <20% are candidates for arthroscopic Remplissage.

**Technique Description:** Patients are placed in the lateral decubitus position. Examination under anesthesia is performed to assess for degree of instability and engagement of HSL. Posterior, anterosuperior, and anteroinferior portals are established. Routine diagnostic arthroscopy is performed with identification of the HSL. While viewing from an anterosuperior portal and working through the posterior portal, the HSL bed is prepared with curettage and a bur. A 5.5-mm accessory Cannula is used through an accessory posterior portal. Two knotless all-suture self-tensioning anchors are placed in the anterior and inferior aspect of the defect, passed through the cannula, and tagged for later identification. Bankart stabilization is performed. The knotless anchors are linked to each other to perform a knotless repair with a broad area of compression.

**Results:** Results are excellent with only a 5.6% failure rate, significant patient improvement, low complication rate, and 95.5% return to play.

**Discussion:** We demonstrate the technical aspects of an all-arthroscopic Remplissage technique using all-suture knotless anchors to provide a simple and reproducible method of performing a Remplissage.

**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.

**Keywords:** anterior shoulder instability; Hill-Sachs lesion; Remplissage; arthroscopic

## VIDEO TRANSCRIPT

This video describes and illustrates a technique for an arthroscopic Remplissage with a double-pulley technique

<sup>\*</sup>Address correspondence to Cody Ashy, MD, Department of Orthopaedics, Medical University of South Carolina, Clinical Sciences Building, 96 Jonathan Lucas Street, MSC Code: 708, Charleston, SC 29425, USA (email: ashy@musc.edu).

<sup>†</sup>Department of Orthopaedics, Medical University of South Carolina, Charleston, South Carolina, USA.

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performed for anterior shoulder stabilization with an engaging Hill-Sachs lesion (HSL).

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This presentation will review a clinical case and discuss indications for arthroscopic Remplissage in anterior shoulder stabilization. In this video, we will demonstrate an arthroscopic Remplissage technique using knotless, self-tensioning anchors to produce a simple and reproducible Remplissage. In addition, we will outline the benefits of an arthroscopic double-pulley Remplissage technique, offer technical tips for successful completion of the procedure, and outline our routine postoperative protocol.

Our case is that of a 33-year-old male presenting with left shoulder pain and recurrent instability after greater than 10 dislocations. These dislocations now occur without significant trauma. Owing to his last dislocation requiring conscious sedation for reduction, he presented for surgical evaluation. On examination, he demonstrated a grade 2 anterior load shift.

Routine preoperative imaging includes 3 views of the left shoulder: Grashey, Scapular Y, and axillary lateral



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views. For cases with concern for significant bony involvement, computed tomography (CT) scans are obtained to evaluate for HSLs and glenoid bone loss. The literature would indicate that HSLs have an occurrence rate of 40% to 90% in anterior shoulder dislocations.<sup>10</sup> On-track and off-track describe whether or not the humeral bone defect engages the glenoid rim, with off-track lesions being associated with levering the humerus out of socket contributing to instability.<sup>8</sup> Off-track lesions are associated with a recurrence rate of up to 75% for dislocation after Bankart repair, thus many suggest addressing these cases with augmentation on the glenoid or humeral side.<sup>8,12</sup> For glenoid bone loss <20% with an associated HSL, Remplissage may be considered. In cases with considerable glenoid bone loss of >20% to 25%, glenoid bony augmentation should be considered via procedures such as a Latarjet or distal tibial allograft.<sup>5,8-10</sup> This patient had an off-track HSL with <25% glenoid bone loss, making him a candidate for Remplissage.

The surgery can be performed in either the beach chair or lateral decubitus position, with our preference being the lateral decubitus position. We typically use 10 to 15 pounds of traction depending on the size of the arm and titrate the lateral distraction force based on intraoperative visualization needs. Alternatively, a well-padded bump can be used in the axilla to facilitate visualization of the glenohumeral joint.

Pictured here is a demonstration of our portal placement for this procedure. In the front, you can see our scope in the anterosuperior portal which we placed to be our viewing portal during Remplissage. Next, you can see our routine posterior portal that was used to establish this anterosuperior portal. A 7-mm cannula is placed in this portal. Finally, we make an accessory lateral portal. You can see a switching stick in this portal demonstrated here. We subsequently place an accessory 5.5-mm posterior cannula in this accessory lateral portal. This cannula is delivered into the subacromial space overlying the area of the proposed Remplissage but is not intracapsular.

Routine diagnostic arthroscopy is performed. Here, we are seen viewing from the anterosuperior portal and cleaning our HSL using a ringed curette. We use a combination of curette, rasp, and arthroscopic shaver to clean our HSL and create a well-decorticated bed.

On the top-right portion of the screen, you can see our set up for placing our knotless Fibertak anchors (Arthrex, Inc.) through the cannula in our posterior portal. We first identify an area at the most inferior and superior aspect of the Hill-Sachs defect to optimize our area of fixation. Next, we carefully drill making sure to remain co-linear with the anchor cannula. Next, we place the anchor in the drilled area applying gentle pressure to initially set the anchor. Gentle mallet taps seat the anchor, the grommet is subsequently removed, and the sutures are gently tensioned to deploy the anchor as demonstrated here and ensure that it is well fixed. This process is repeated for a second anchor.

Next, we then used an arthroscopic piercer to pierce through the relatively more lateral portion of the infraspinatus exiting into the joint to retrieve our sutures. We do this through our accessory portal with the 5.5-mm cannula in place. You can see our intra-articular view while we perform

this while also seeing how we do this outside the shoulder. Once the sutures are successfully removed from the shoulder through the cannula, we then clamp them with a hemostat so we can then easily identify each pair of anchor sutures later for performing our double-pulley technique.

This process is then repeated for our second set of sutures as demonstrated here. Doing this through a cannula decreases our likelihood of tissue bridge formation, and clamping of our sutures helps us to identify them when doing our double-pulley execution, decreasing the likelihood of tangling our sutures.

The anterior Bankart lesion is then identified, elevated, debrided, and subsequently repaired in the standard fashion. This is done prior to performing our Remplissage fixation to improve our visualization and avoid disrupting our Remplissage.

Here you can see our demonstration of performing our double-pulley technique from outside the shoulder. We first identify the sutures from each anchor. On the left, we have the sutures from anchor 1, and on the right, we have the sutures from anchor 2. We then take the blue repair stitch from anchor 1, and pass it through the looped portion of anchor 2. Here, you can see us pinching down with our left hand; on the right side, we have the other end of the shuttle suture of anchor 2. We then gently tug and pull this repair stitch through the shoulder.

So here is our live execution of that. We take the repair stitch from anchor 1, pass it through the looped portion of anchor 2, and grab the nonlooped portion of the shuttle suture anchor 2 to pull the repair suture through the shoulder. You can see us tugging here to perform that.

Once this is removed, we then pull on our repair stitch from anchor 1 to seat down our repair.

Here is our view from inside the joint while this is being performed. You can see us demonstrating here how we perform several gentle tugs to facilitate suture passing. Then once both repair stitches are passed all the way through the cannula, we then alternate tensioning between the 2 to evenly tension our repair across the Hill-Sachs defect.

After this, you can see our final Bankart repair and the final appearance of our Remplissage.

Postoperatively, the patient is placed in a sling. Initial rehabilitation keeps the patient in a sling for 6 weeks with range of motion limited and advanced as shown here. At week 6, the sling can be discontinued with progressive increasing in range of motion. Isometric and band periscapular strengthening can begin at this time. By week 8, full range of motion should be obtained with initiation of lightweight strengthening, and sport-specific rehabilitation may begin starting at 4 months.

This technique illustrates and builds off previously described techniques of arthroscopic and arthroscopic double-pulley repair. It employs the same benefits of other arthroscopic repairs in that it is minimally invasive.<sup>9,11,13</sup> Like previous double-pulley techniques, this technique uses knotless fixation, has a wide foot print of fixation, and decreases operative time.<sup>10,13</sup> Knotless sutures, particularly Fibertak sutures (Arthrex, Inc.) further decreases the amount of bone loss, decreases operative time further via ease of fixation, and are superior to knotted constructs.<sup>4,6</sup>

Overall, outcomes of combined arthroscopic Remplissage and Bankart repair are very positive. Instability recurs at a 5.6% rate.<sup>2</sup> Various patient-reported outcome measures have demonstrated significant postoperative improvement.<sup>1-3</sup> Athletes return to play 95.5% of the time with a nonsignificant decrease range of motion, and there is an overall lower complication rate compared to Latarjet stabilization.<sup>1-3,7</sup>

Potential complications of Remplissage include Bankart repair disruption, suture anchor pull-out, mispositioned suture anchors, skin bridge formation, and tangling or confusion of sutures during final fixation. Performing your Remplissage cortical bed preparation, placing your suture anchors through a cannula within the subacromial space, and tagging them helps prevent soft tissue bridge formation, decreases the likelihood of suture tangling or confusion, and allows for ease of final tensioning.<sup>9,11,13</sup> Proper tensioning of the suture anchors should be done prior to shuttling of sutures to ensure there is good purchase. If there is not good purchase, given the minimal bone removed with these anchors, you have the option to either upsize your anchor, place the anchor in a new spot, or switch to a larger, hard bodied anchor alternative. The knotless technique also obviates the need to have knots overlying the infraspinatus within the subacromial space.

In summation, this arthroscopic Remplissage technique builds off previous double-pulley techniques resulting in adequate anterior shoulder stabilization via a minimally invasive approach with decreased operative time, secure fixation, and an anatomic construct.<sup>9,11,13</sup>

Thank you for your attention.

## ORCID iD

Cody Ashy  <https://orcid.org/0000-0001-8238-9264>

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