

Blind-Tie Remplissage: Technique and Sequence

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Abstract: Patients with recurrent anterior shoulder instability and an associated Hill-Sachs lesion are commonly encountered by orthopaedic surgeons. Effective management of the Hill-Sachs lesion can be performed using an arthroscopic remplissage technique to fill the bony defect with the infraspinatus and posterior capsule. Various surgical techniques, anchor configurations, and tying mechanisms can be used to accomplish the remplissage procedure. The goal of this Technical Note is to describe our technique and sequence for accomplishing an arthroscopic “blind-tie” remplissage procedure. In this remplissage technique, the suture anchor sutures placed into the Hill-Sachs defect are tied in a blind fashion over the infraspinatus fascia without direct visualization from within the subacromial space.

Anterior shoulder dislocations are a common pathology,^{1,2} especially among collision athletes.^{3,4} Recurrent instability has been linked to bone loss of both the anterior glenoid and Hill-Sachs lesions on the humeral side.⁵⁻⁷ Multiple studies have demonstrated the efficacy of the addition of remplissage to a Bankart repair to address recurrent instability and achieve postoperative stability and excellent function with fewer complications than a Latarjet procedure.⁷⁻¹¹

Various procedures, both open and arthroscopic, have been described to address recurrent instability in the setting of both glenoid and humeral head bone loss.¹²⁻¹⁵ Recent meta-analyses comparing open Latarjet and arthroscopic Bankart repair with concurrent remplissage have shown equivalent outcomes in patients undergoing arthroscopic Bankart plus remplissage.¹⁶⁻¹⁸

The remplissage technique described in this Technical Note provides a step-by-step approach to performing the procedure and includes a blind-tie method for

securing remplissage sutures in which these sutures are secured using standard techniques but are tied over the infraspinatus fascia without visualization within the subacromial space. The senior author (L.D.F.) has used this remplissage suture-tying technique in several hundred cases over a 15-year period, and the authors believe that the method is safe, efficient, and effective.

Surgical Technique

The described technique is used by the authors routinely when remplissage is indicated and performed. The authors prefer a lateral decubitus position for arthroscopic shoulder instability procedures. Following the induction of general anesthesia, the patient is secured in the lateral decubitus position with a bean bag but only after carefully performing an examination under anesthesia of both shoulders in the supine position.

The shoulder is placed in 10 to 20 pounds of balanced suspension after being prepped and draped in the usual sterile fashion. In the specific demonstrated case (Video 1), a standard diagnostic arthroscopic examination is initially performed using a 30° arthroscope as viewed from the posterior portal. In this shoulder, a non-engaging Hill-Sachs lesion is shown (Fig 1). An accessory anterior-superior portal and anterior-inferior portal are both created, and diagnostic assessment is completed by also using these 2 anterior portals. After completion of the comprehensive diagnostic evaluation, an arthroscopic shaver (Dyonics Powermax; Smith & Nephew) is introduced to debride and stimulate the exposed surfaces of the Hill-Sachs lesion (Fig 2). While visualizing the Hill-Sachs lesion through the anterior-

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Received April 15, 2024; accepted June 7, 2024.

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2212-6287/24615

<https://doi.org/10.1016/j.eats.2024.103168>

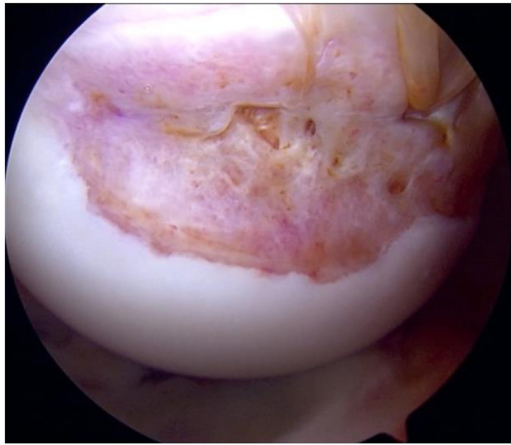


Fig 1. Nonengaging Hill-Sachs lesion of the right humeral head as viewed from the posterior viewing portal in the lateral decubitus position.

superior portal, a drill bit and tap are advanced through this standard posterior portal and the Hill-Sachs anchor placed (Figs. 3, 4). The compressed bone of the Hill-Sachs lesion is often very dense, so depending on the type of suture anchor used, tapping is recommended by the authors. After placement of the double-loaded anchor shown in the video, the threaded cannula is retracted by turning it counterclockwise until it is felt to rest immediately superficial to the infraspinatus fascia. A disposable 60° retrograde retriever (IDEAL suture grasper; Depuy Mitek) is then passed through the posterior cannula and advanced into the joint space passing through the infraspinatus and posterior capsule in a relatively lateral position (Fig 5). The authors typically retrieve these sutures, with the most lateral and inferior suture retrieved first, followed by the medial-inferior, lateral-superior, and then the

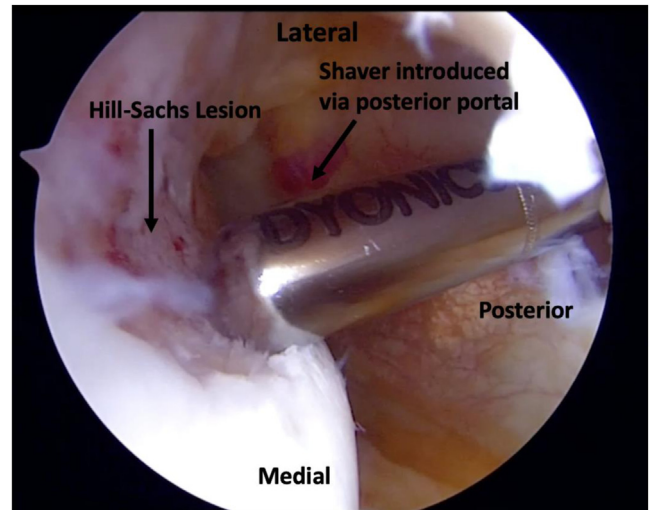


Fig 2. As viewed from the anterior-superior viewing portal in the lateral decubitus position, an arthroscopic shaver is introduced through the standard posterior portal to debride and stimulate the exposed surface of the nonengaging Hill-Sachs lesion of the right humeral head.

medial-superior suture limb (Fig 6), although the sequence of suture retrieval is not felt to be important by the authors.

After all of the remplissage sutures have been retrieved posteriorly, these suture limbs are set aside and attention turned to accomplishing the Bankart repair. It is important to recognize that much more space is available to carry out remplissage anchor placement and suture retrieval if it is accomplished before completing Bankart repair because a well-performed Bankart repair will result in significant oblique posterior humeral head translation due to

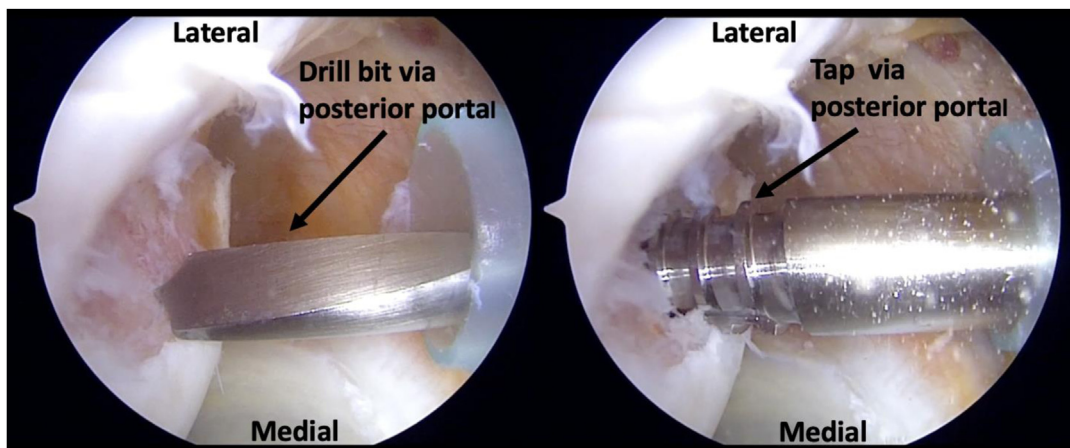


Fig 3. Right shoulder in the lateral decubitus position as viewed from an anterior-superior portal. A drill bit and tap are advanced through this standard posterior portal. The compressed bone of the Hill-Sachs lesion is often very dense, so depending on the type of suture anchor used, tapping is recommended by the authors.

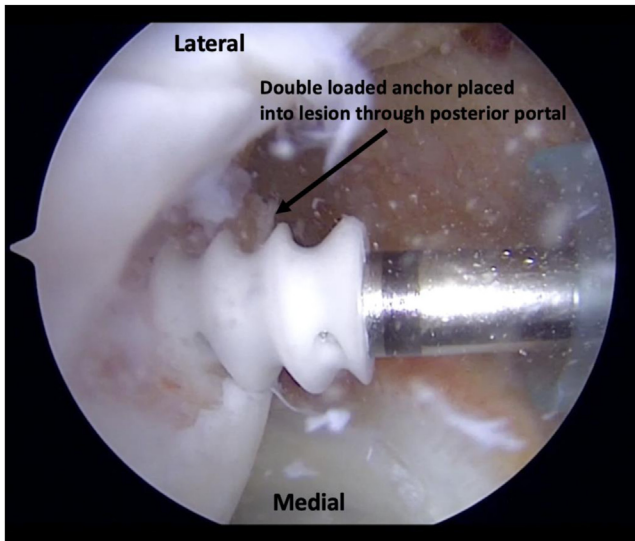


Fig 4. Right shoulder in the lateral decubitus position as viewed from an anterior-superior portal. A “rotator cuff--style” anchor is placed into the Hill-Sachs lesion of the humeral head through the standard posterior portal.

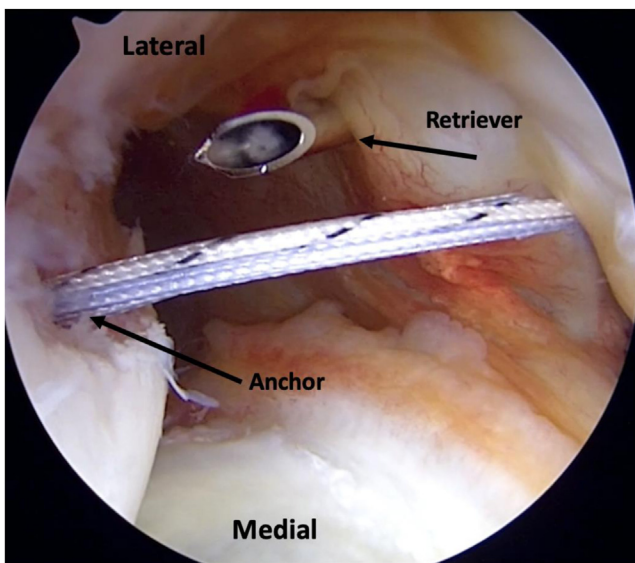


Fig 5. Right shoulder in the lateral decubitus position. A double-loaded anchor is placed in the Hill-Sachs lesion, and the disposable retrograde retriever is passed across the capsule and infraspinatus fascia in a position relatively lateral to the anchor.

mobilizing, retensioning, and securing the anterior labral-ligamentous complex in an anatomic position, thus restoring the humeral head centering on the glenoid. This humeral head recentering significantly reduces the space available to perform the remplissage procedure (Fig 7).

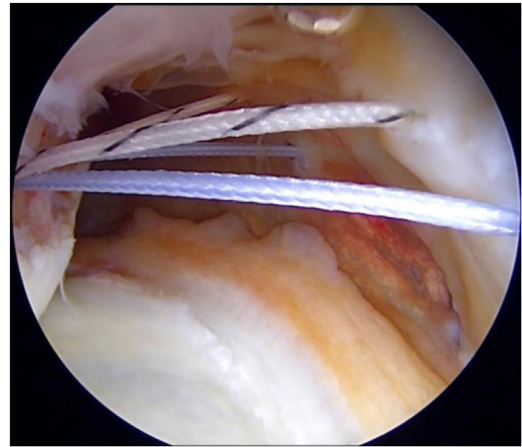


Fig 6. Right shoulder in the lateral decubitus position as viewed from an anterior-superior portal. Four suture limbs of the double-loaded suture anchor are seen passing through the infraspinatus fascia and capsule.

After completion of the Bankart repair, attention is turned again to tying the remplissage sutures. An 8.25-mm cannula (Smith & Nephew) is advanced again into the posterior portal location. A firm stop can be reliably felt when this cannula contacts the infraspinatus fascia (Fig 8). Once this fascia location is confirmed by palpation using the cannula, remplissage sutures that had been previously retrieved through the posterior capsule and infraspinatus are then sequentially retrieved through the cannula while the cannula is externalized (Fig 9). This cannula, after being loaded with 2 matching suture anchor suture limbs, is then returned to its location adjacent to the infraspinatus fascia and held securely in place by an assistant while a standard arthroscopic sliding knot reinforced with alternating half-hitches is tied (Fig 10). This remplissage suture-tying technique is repeated as necessary until all matching remplissage knots have been tied and cut. If the surgeon wishes, they can observe filling of the Hill-Sachs defect that occurs at the time of knot tying by visualizing the Hill-Sachs lesion through the anterior-superior portal. Tying of the remplissage sutures is always the authors' final step in the stabilization procedure when using this blind-tie remplissage technique.

Discussion

Anterior glenohumeral instability is a common pathologic condition encountered by orthopaedic surgeons. Previous studies have demonstrated the effectiveness of the addition of an arthroscopic remplissage to the Bankart procedure when compared with an isolated Bankart repair.⁷⁻¹¹ The literature has also demonstrated similar outcomes, return to play, and

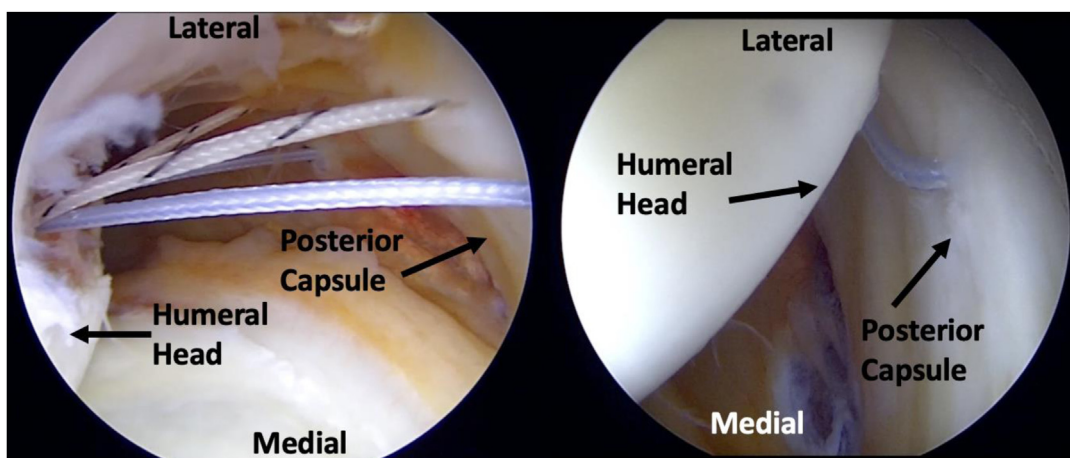


Fig 7. Right shoulder in the lateral decubitus position as viewed from an anterior-superior portal. The arthroscopic image on the left depicts the large amount of space present to retrieve sutures through the infrapinatus fascia and capsule prior to completion of the Bankart repair. The image on the right shows the diminished posterior space due to the oblique posterior translation of the humeral head after completion of the Bankart repair.



Fig 8. Right shoulder in the lateral decubitus position. A cannula is placed in the posterior portal. When this cannula is advanced into the portal access site, a firm stop, due to the infrapinatus fascia, can be reliably felt. This same cannula will then be used to retrieve sutures and facilitate remplissage repair.



Fig 9. Right shoulder in the lateral decubitus position. Two matching suture anchor suture limbs that had been previously retrieved through the posterior capsule and infrapinatus are then retrieved through the cannula with a suture grasper while the cannula is externalized. The process is repeated until each set of matching limbs is retrieved and tied, respectively.

lower complication rates in some studies when the combined Bankart plus remplissage procedure is compared with open Latarjet.^{9,16,19}

This report details the senior author's preferred technique for remplissage. We believe that it offers an efficient and effective remplissage technique option for



Fig 10. Right shoulder in the lateral decubitus position. After being loaded with 2 matching suture anchor suture limbs, the previously externalized cannula is then returned to its location adjacent to the infraspinatus fascia through the posterior portal and held securely in place by an assistant while a standard arthroscopic sliding knot reinforced with alternating half-hitches is tied.

Table 1. Advantages and Disadvantages of a Blind-Tie Technique for Arthroscopic Remplissage

Advantages	Disadvantages
Eliminates entering the subacromial space and the difficulties of navigating and locating sutures within the subacromial bursa	Must be facile with blind arthroscopic knot tying as knot passage and stacking of half-hitches is not visualized with this technique
Reduces the risk of iatrogenic injury to the rotator cuff	Assistant needed to hold posterior cannula during tying of suture limbs

the management of Hill-Sachs lesions. If the surgeon chooses a remplissage technique that requires knot tying to be visualized directly within the subacromial space, visualization and suture retrieval challenges may occur. For example, the possibility of ensnaring or even

Table 2. Technique Pearls and Pitfalls of a Blind-Tie Technique for Arthroscopic Remplissage

Pearls	Pitfalls
Use a tap prior to placing anchor, depending on type of suture anchor used, as the compressed bone of the Hill-Sachs lesion can be dense.	Completing the Bankart repair prior to anchor placement and suture retrieval can limit the space to perform the remplissage procedure.
Place anchors in the defect and retrieve sutures through the infraspinatus fascia and capsule prior to completing Bankart repair.	
Retrieve sutures with the retrograde passer through the infraspinatus and posterior capsule in a relatively lateral position.	

inadvertently cutting 1 or more of the remplissage sutures is a risk during the arthroscopic subacromial bursectomy that is often necessary to adequately visualize the sutures and infraspinatus fascia. This blind-tie technique obviates the time-consuming task of identifying the sutures within the subacromial bursa. Some of the advantages and disadvantages of the blind-tie remplissage technique are listed in [Table 1](#). Pearls and pitfall of the blind-tie remplissage technique are included in [Table 2](#).

Disclosures

All authors (W.B.G., L.D.F.) declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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