

CASE REPORT

Arthroscopic Reverse Remplissage in a Bilateral Seizure-related Posterior Shoulder Dislocation: Technique Description and 3-Year Follow-up Case Report

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Received: 17 June 2020

Accepted: 24 November 2020

Abstract

The treatment options for posterior instability associated with epilepsy includes grafts, osteotomies, arthrodesis and arthroplasty. The technique of reverse arthroscopic remplissage was described in 2006 as a method of filling the anterior humeral bone defect, associated with tenodesis of the subscapularis tendon. This case report presents the results of the reverse remplissage technique in relation to a patient who suffered a bilateral posterior glenohumeral dislocation with a reverse Hill-Sachs lesion.

Level of evidence: IV

Keywords: Arthroscopic reverse remplissage, Hill-sachs lesion, Posterior shoulder dislocation

Introduction

The incidence of posterior shoulder dislocation is estimated to be 1.1/100,000 per year, most commonly due to trauma (67%) or epilepsy (33%) (1,2). Amongst patients with seizure-induced dislocations, approximately 50% are posterior. In this cases, significant defects of the anterosuperomedial portion of the humeral head known as the reverse Hill-Sachs lesion can occur in 39% of cases (3).

The treatment options for posterior shoulder instability associated with reverse Hill-Sachs include bone grafts (autologous or allograft), glenoid neck/humerus osteotomies, arthrodesis, arthroplasty, and tenodesis (4,5). The remplissage technique was originally described by Wolf et al in 2004 and involves the fixation of the infraspinatus tendon to the posterior humeral head defect for treatment of anterior dislocations (6). In 2006, Krackhardt described what they called the reverse arthroscopic remplissage, with tenodesis of the subscapularis tendon into the anterior humeral bone defect (7). Similarly, in 2013, Duey and

Burkhart described the use of the middle glenohumeral ligament (MGHL) to fill the reverse Hill-Sachs lesion(8). However, none of the studies aforementioned report clinical results, therefore the outcomes following reverse remplissage are still lacking.

The aim of the present study was to describe: (a) the reverse remplissage technique, (b) report the results of this procedure in a patient with bilateral posterior glenohumeral instability associated with reverse Hill-Sachs lesion, and (c) the treatment rationale for seizure-induced posterior shoulder instability. This case report was approved by the IRB and all ethics principles were respected.

Case presentation

A 31-year-old, right-hand dominant businessman presented to the Emergency Department after a first episode of seizure, which resulted in bilateral posterior shoulder dislocation [Figures 1; 2]. After initial radiographic studies, closed reduction under conscious

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THE ONLINE VERSION OF THIS ARTICLE
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sedation was performed on both sides, achieving concentric reduction. However, advance imaging modalities demonstrated a significant humeral bone loss, particularly in the right shoulder. During inpatient admission for a comprehensive seizure workup, the patient's right shoulder remained unstable even when placed in external rotation immobilization. The presence of frank shoulder instability and negative neurological workup with no identifiable cause for seizure prompted our decision to perform a stabilization procedure after the first episode of shoulder dislocation in the acute setting.

Surgical technique

We first operated on the right shoulder, five days after the injury [Figure 3]. We use the traditional beach chair position without arm holder so that the arm can move freely during the procedure. A standard posterior arthroscopic portal is made, followed by diagnostic inspection. The outside-in technique is used to establish the anterior portal just lateral to the coracoid process. For posterior labrum reattachment, the posterior portal is the working portal, to allow a precise angle for glenoid drilling, while the arthroscope is placed anteriorly. We identified a posterior labrum injury from nine to six o'clock. After debridement of the damaged tissue and preparation of the glenoid surface, the labrum was repaired with two absorbable 3mm anchors (Biogrifon, JN). For the reverse remplissage we use the posterior portal as a viewing portal, which allows adequate assessment of the reverse Hill-Sachs and the anterior

portal for instrumentation. The anterior humeral head defect is debrided in preparation for the tenodesis of the subscapularis tendon. We find useful to place the arm in internal rotation and abduction for anchor insertion. A 4.75mm punch is passed through the rotator interval and aimed towards the reverse Hill-Sachs lesion. Two holes are made, one superiorly and the other inferiorly, in the center of the bone defect, followed by use of a tap, to prepare for anchor insertion. Two double-loaded 5mm bioabsorbable anchors (Healix, DePuy Synthes) are then placed in the locations described previously, and the suture limbs are retrieved through the subscapularis tendon in a retrograde manner, exiting the anterior portal. Sutures are tied using a sliding knot (Nick knot), starting from the inferior suture, to allow visualization of the defect being filled by the subscapularis tendon.

Outcomes

After the procedure, the patient was placed in a sling with neutral rotation. Post-operative follow-up occurred weekly for the first three weeks to assess for pain and wound healing. Physical therapy started one week after surgery, initially to control pain and edema. After the sling was removed at four weeks post operatively, physical therapy under direct supervision of an experienced professional, addressed range of motion (ROM) and progressed accordingly.

Four months after the right shoulder surgery, the same procedure was done in the left shoulder [Figure 4]. Labrum lesion was observed at the posteroinferior quadrant (3-6 o'clock position) and repair with the same anchors and

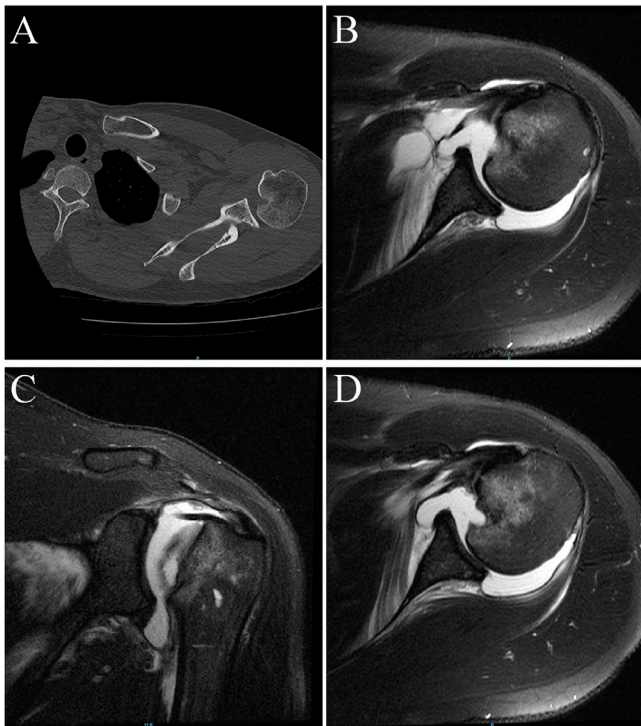


Figure 1. Reverse Hill-Sachs lesion – left shoulder.

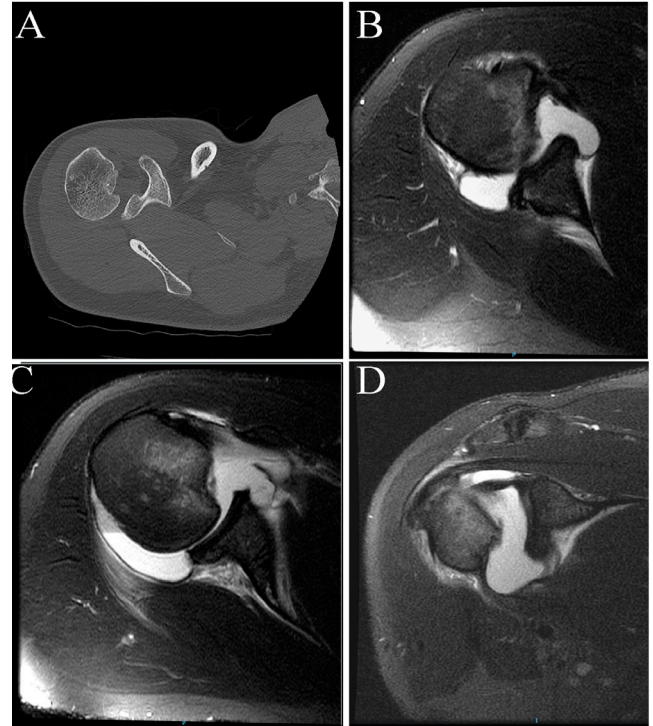


Figure 2. Reverse Hill-Sachs lesion – right shoulder.

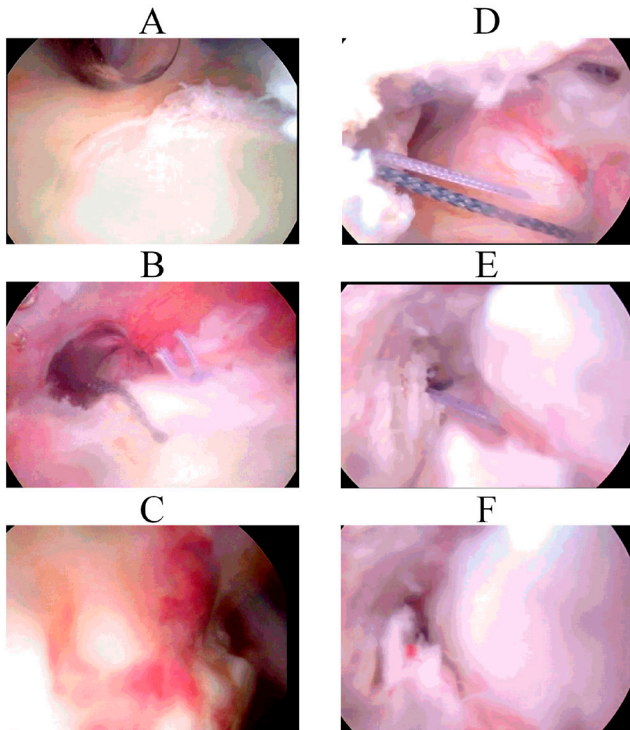


Figure 3. Arthroscopic images during the right shoulder surgery. A) no anterior labral lesion; B) repair of the posterior labral lesion using two anchors; C) reverse Hill-Sachs lesion; D) one anchor in the head defect (5.5); E) second anchor for the head defect; F) final appearance.

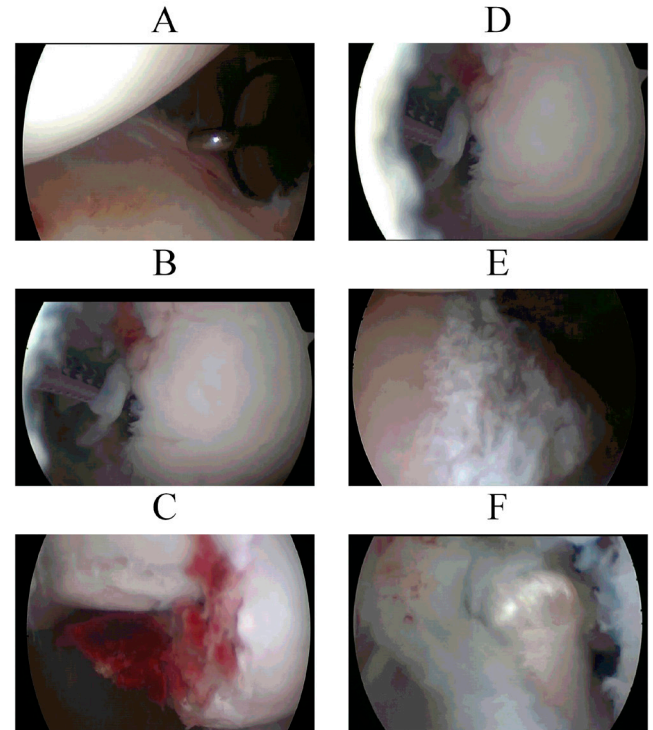


Figure 4. Arthroscopic images during the left shoulder surgery A) no anterior labral lesion; B) posterior labral lesion; C) reverse Hill-Sachs; d-E) two anchors in the humeral head; F) final appearance.

the post-operative rehabilitation followed the same principles for the right shoulder.

The final follow-up occurred 34 months after the initial surgery and at that time the patient stated he had no pain or limitations for activities of daily living. In addition, he was able to swim at the same level as prior to surgery 10 months after the index procedure and six months after the second procedure and did not experience any episode of dislocation or subjective instability. Physical exam demonstrated full painless passive and active ROM in both shoulders [Figure 5]. Lift-off and bear-hug tests did not elicit pain and revealed normal muscle strength. ROWE score was 100 for both shoulders, which represents good-excellent results. Constant score was 26.8 and 27.8 for the left and right shoulder, respectively. This score was obtained following the procedures described by the European Society for Shoulder and Elbow and muscle strength was assessed with Lafayette Manual Muscle Testing. An MRI of both shoulders at six months after the last surgery confirmed good filling of the anterior humeral head bone defect with the subscapularis tendon (> 75%), as described by Boileau et al(9) [Figures 6; 7].

Discussion

Remplissage means “filling” in French, and it is a surgical

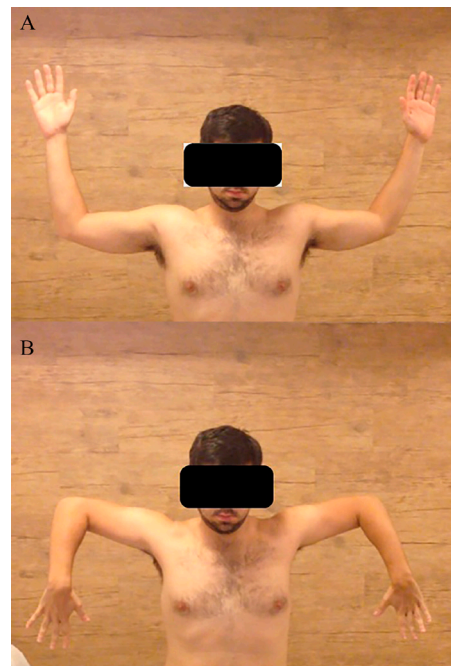


Figure 5. Complete symmetrical (A) external rotation during abduction and (B) internal rotation and abduction.

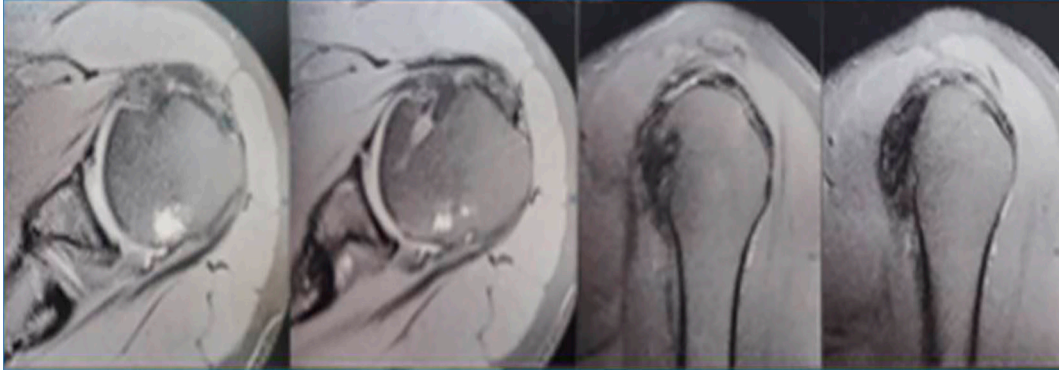


Figure 6. Magnetic resonance after left shoulder surgery.

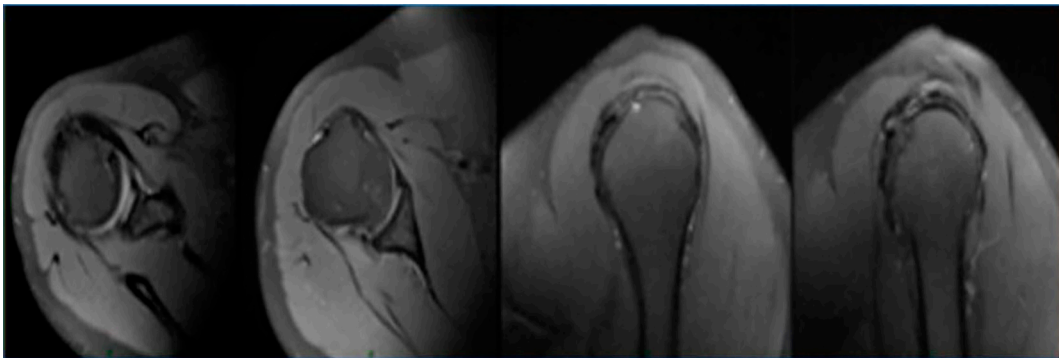


Figure 7. Magnetic resonance after right shoulder surgery.

technique described by Wolf et al for the treatment of anterior glenohumeral instability (10). Despite the risk of decreased ROM after a remplissage, the procedure is considered a viable alternative for the treatment of anterior shoulder instability with an engaging Hill-Sachs lesion (9, 11–13).

In posterior shoulder dislocation, the anterior aspect of the humeral head collides with the posterior glenoid rim resulting in a humeral bone defect known as reverse Hill-Sachs or McLaughlin lesion in more than 80% of posterior shoulder dislocations. Specifically, in the epileptic population, bone defects play an important role, since they are more commonly seen than in the non-seizure related shoulder instability cases (1, 14). In the presence of bone defects, treatment options include bone grafts (autologous or allograft), glenoid neck/humerus osteotomies, arthroplasty, and tenodesis (1, 4, 5).

The reverse remplissage is a technique based on the same principles as the original remplissage, in which a tendon fills the bone defect preventing it to engage in the glenoid rim, and decreasing recurrence of shoulder dislocation. Two previous studies describe the reverse remplissage, one using the subscapularis tendon to fill the defect while the other used the MGHL (7, 8). However, neither reported the postoperative outcomes. Of particular interest, is the fact that the patient had bilateral posterior seizure-related shoulder dislocation and was operated on the acute setting. Additionally,

the time elapsed from the index surgery to the second procedure is important to consider in bilateral cases. Finally, the treatment rationale for seizure-related shoulder dislocation is peculiar.

In the epileptic population shoulder dislocation is associated with higher rates of recurrence after surgery (69%) than non-epileptic patients (10%) (14, 15). This is usually the result of non-compliance with antiepileptic medication, refractory seizures, and the fact that it most commonly affects young individuals (14). Bone loss for itself increase the risk for recurrent shoulder instability after surgical stabilization; in a patient with seizures the scenario can be even more challenging.

A multidisciplinary team should be involved in patient care since the time of first dislocation. Preoperative neurological workup is important to determine the cause of seizure and plan an appropriate treatment if an underlying cause is identified. In the case we present here, after the first episode of seizure the patient was admitted to the hospital for further evaluation. A comprehensive neurological workup confirmed a non-epileptic seizure. The neurologist decided to initiate phenytoin and after five days under antiepileptic drug the patient was deemed ready for surgery. We performed the procedure in the acute setting due to extreme instability of the glenohumeral joint.

Limitations of our study are inherited to case reports, such as the description of only one patient. Additionally,

the technique herein presented is not new, but rather a variation of a previously well-known procedure. Finally, it is worth mentioning that ROM was not measured with goniometer, relying solely on the surgeon's visual assessment. Strengths of this study include the peculiarity of a relatively rare condition - bilateral posterior shoulder dislocation after a seizure. The follow-up period, use of well-established postoperative scores, and MRI confirming the bone defect filling are also valuable contributions to the literature.

Reverse remplissage is a safe and reproducible technique, with good clinical results even in challenging situations such as seizure-related shoulder instability

with bone defect. A multidisciplinary team and tailored management are paramount to achieve good results.

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References

- Bühler M, Gerber C. Shoulder instability related to epileptic seizures. *J Shoulder Elb Surg* 2002; 11(4):339-44.
- Robinson CM, Seah M, Akhtar MA. The epidemiology, risk of recurrence, and functional outcome after an acute traumatic posterior dislocation of the shoulder. *JBJS*. 2011; 93(17):1605-13.
- Longo UG, Rizzello G, Locher J, Salvatore G, Florio P, Maffulli N, et al. Bone loss in patients with posterior gleno-humeral instability: a systematic review. *Knee Surgery, Sport Traumatol Arthrosc* 2016;24(2):612-7.
- Longo UG, Loppini M, Rizzello G, Ciuffreda M, Berton A, Maffulli N, et al. Remplissage, humeral osteochondral grafts, weber osteotomy, and shoulder arthroplasty for the management of humeral bone defects in shoulder instability: systematic review and quantitative synthesis of the literature. *Arthroscopy* 2014;30(12):1650-66.
- Armitage MS, Faber KJ, Drosdowech DS, Litchfield RB, Athwal GS. Humeral head bone defects: Remplissage, allograft, and arthroplasty. *Orthop Clin North Am* 2010;41(3):417-25.
- Wolf EM, Pollack ME. Hill-Sachs "Remplissage": an arthroscopic solution for the engaging Hill-Sachs lesion (SS-32). *Arthrosc J Arthrosc Relat Surg* 2004;20(Supplement1):e14-5.
- Krackhardt T, Schewe B, Albrecht D, Weise K. Arthroscopic fixation of the subscapularis tendon in the reverse Hill-Sachs lesion for traumatic unidirectional posterior dislocation of the shoulder. *Arthrosc - J Arthrosc Relat Surg* 2006;22(2):227.e1-6.
- Duey RE, Burkhart SS. Arthroscopic treatment of a reverse hill-sachs lesion. *Arthrosc Tech* 2013; 2(2):e155-9.
- Boileau P, O'Shea K, Vargas P, Pinedo M, Old J, Zumstein M. Anatomical and functional results after arthroscopic Hill-Sachs remplissage. *J Bone Jt Surg Am* 2012;94(7):618-26.
- Wolf EM, Arianjam A. Hill-Sachs remplissage, an arthroscopic solution for the engaging Hill-Sachs lesion: 2- to 10-year follow-up and incidence of recurrence. *J Shoulder Elb Surg* 2014;23(6):814-20.
- Deutsch A a, Kroll DG. Decreased range of motion following arthroscopic remplissage. *Orthopedics* 2008;31(5):492.
- Koo SS, Burkhart SS, Ochoa E. Arthroscopic double-pulley remplissage technique for engaging Hill-Sachs lesions in anterior shoulder instability repairs. *Arthroscopy* 2009;25(11):1343-8.
- McCabe MP, Weinberg D, Field LD, O'Brien MJ, Hobgood ER, Savoie FH. Primary versus revision arthroscopic reconstruction with remplissage for shoulder instability with moderate bone loss. *Arthrosc - J Arthrosc Relat Surg* 2014;30(4):444-50.
- Thangarajah T, Lambert S. The management of recurrent shoulder instability in patients with epilepsy: A 15-year experience. *J Shoulder Elb Surg* 2015;24(11):1723-7.
- Kim SH, Ha KI, Kim SH. Bankart repair in traumatic anterior shoulder instability: Open versus arthroscopic technique. *Arthroscopy* 2002;18(7):755-63.