

RESEARCH ARTICLE

Early Clinical Results of Arthroscopic Remplissage in Patients with Anterior Shoulder Instability with Engaging Hill-Sachs Lesion in Iran

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Abstract

Background: To assess the outcome of the remplissage arthroscopic surgical method in patients with anterior shoulder dislocation associated with Hill-Sachs lesion.

Methods: Ten patients with anterior shoulder dislocations and Hill-Sachs lesions were entered into this study and were operated on by the remplissage arthroscopic surgical method. They were followed up 22 months after surgery in order to evaluate the outcome of the treatment, including recurrence of dislocation and motion limitation.

Results: During the internal follow up period, no case of recurrence was found. Motion limitation during the follow up period was not significant (internal rotation limitation= $5^{\circ}\pm 1^{\circ}$, and external rotation limitation= $4^{\circ}\pm 1^{\circ}$)

Conclusions: Our findings suggest that the remplissage arthroscopic surgical method is an acceptable, safe and reliable treatment for anterior shoulder dislocation with engaging Hill-Sachs lesion.

Key words: Anterior shoulder dislocation, Arthroscopy, Hill-Sachs, Remplissage

Introduction

Anterior shoulder instability is the most common complication of shoulder dislocations, especially in young patients (1-8). It may lead to bone defects in the humeral head (Hill-Sachs lesion) and in the glenoid rim (1-2, 7). The Hill-Sachs lesion is a bone defect in the posterolateral side of the humeral head occurred during shoulder dislocation and associated with recurrent dislocation; furthermore, Hill-Sachs lesion is detectable in up to 76% of recurrent shoulder dislocations (2, 4, 7). Engaging Hill-Sachs is a kind of lesion in which the long diameter of the lesion is parallel to the anterior rim of the glenoid, so, it leads to engagement. In this situation, the orientation of the Hill-Sachs lesion is such that it engages the anterior glenoid with the shoulder in abduction and external rotation (9-10).

Recurrent dislocations with Hill-Sachs lesions are usually treated with surgical procedures (1-2, 4, 6, 11). Open surgery with the purpose of internal rotation restriction, avoiding bony engagement and consequently

shoulder dislocation (1-2, 6, 11-12). Humeral head derotational osteotomy, filling the defects with autograft or allograft, and shoulder arthroplasty are other known ways to treat recurrent dislocation with bony defects (1-2, 6, 9, 11-13).

The remplissage method was first described by Wolf in 2004 and primary results were reported by Purchase *et al* in 2008 (9). Recently, arthroscopic remplissage of the shoulder is known as an effective method to stabilize a shoulder with Hill-Sachs lesion (9-10, 12, 14). However, the failure rate for different kinds of arthroscopic methods was reported to be between 5 to 20% (6, 9-10, 12).

In the current study, we tried to show our clinical experience in stabilizing shoulders associated with Hill-Sachs lesion in the Iranian population.

Materials and Methods

Between 2007 and 2011, in a prospective experimental pilot study, all patients with anterior instability of the

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Table 1. Demographic data of patients underwent arthroscopic remplissage

Case	Age	Gender	Primary reason for operation	Mechanism of injury
1	29	Male	Primary recurrent dislocation	Sport injury
2	32	Male	Primary recurrent dislocation	Car accident
3	28	Male	Bankart failure	Sport injury
4	25	Female	Primary recurrent dislocation	Falling
5	24	Male	Bankart failure	Car accident
6	22	Male	Bankart failure	Car accident
7	27	Male	Bankart failure	Falling
8	36	Male	Primary recurrent dislocation	Car accident
9	32	Male	Primary recurrent dislocation	Sport injury
10	30	Male	Bankart failure	Sport injury

shoulder, who were referred to Milad, Taleghani and Pars Hospitals in Tehran, underwent arthroscopic remplissage. The ethical committee of Shahid Beheshti University approved the study and all of the patients signed an informed consent form.

Population

All of the patients were adults and had at list two approved shoulder anterior dislocations. Patients had one of the criteria of moderate to severe Hill-Sachs lesion (depth of 3 mm or more) with a glenoid lesion of less than 25% or a mild Hill-Sachs lesion (depth of less than 3 mm with a glenoid lesion of 25 to 40%). Our exclusion criteria were synchronic rotator cuff tearing, multi-directional instability, or any previous surgery on the affected shoulder with the exception of stabilizing procedures. However, patients with previous arthroscopic Bankart operation failure and involvement in a professional sport were not excluded.

Surgical procedure

The procedure consisted of an arthroscopic capsulotenodesis of the posterior capsule and infraspinatus tendon to fill the Hill-Sachs lesion (9). The surgeries were done under hypotensive general anesthesia (systolic blood pressure of 80-100 mm of Hg) in a beach-chair position. Arthroscopic repair was done through the three standard portals of the posterior, anterior and anterosuperolateral. Two additional accessory ports could be established if necessary to facilitate placing transtendon anchor sutures. At first, we created the posterior portal at the lateral aspect of the convexity of the humeral head that is centered over the lesion (Figure 1A). Then, we passed and placed the glenoid anchor sutures and then after the humeral suture anchors were placed, we tied the anterior sutures. The subacromial space was shaved through the posterior and posterolateral portals. After preparing

and refreshing the bed of the Hill-Sachs lesion, a spinal needle was passed through the posterior portal without engaging the infraspinatus or capsule, and an anchor was placed in the inferior rim of the Hill-Sachs lesion (Figure 1B). A penetrating grasper was passed through the tendon and posterior capsule, 1 cm inferior to the initial posterior portal entry to pull one suture limb. A second anchor was placed at the superior rim of the Hill-Sachs lesion, and then one suture limb was similarly passed. The previously placed Bankart repair sutures were then tied, and finally, at the posterior side, the inferior suture was tied first with the remaining knots extra-articular, pulling the infraspinatus and capsule into the lesion (Figure 1C).

The patients were discharged the day after surgery. All of the patients were followed up in intervals of 2 weeks, and then three, 6 and 12 months. Shoulder range of motions and complications were recorded in each session.

Statistical analysis

We used the SPSS software version 17 (SPSS Inc., Chicago, IL, USA) to analysis our data. Quantitative variables were showed with means and standard deviation and qualitative variables with percentage. A *P*-value of less than 0.05 was deemed to be significant.

Results

Among the 10 patients enrolled in our study, there were 9 men and one woman. The average age of the patients was 29 ± 4 years old (range: 22 to 36 years). Five patients had a history of primary recurrent dislocations and five had a failure of previous Bankart lesions. The most common reason for recurrent dislocation was sports injuries (40%) and car accidents (40%). The demographic data is shown in Table 1.

The average external and internal rotation restriction after the 12-month follow-up were 4 ± 1 and 5 ± 1 degrees

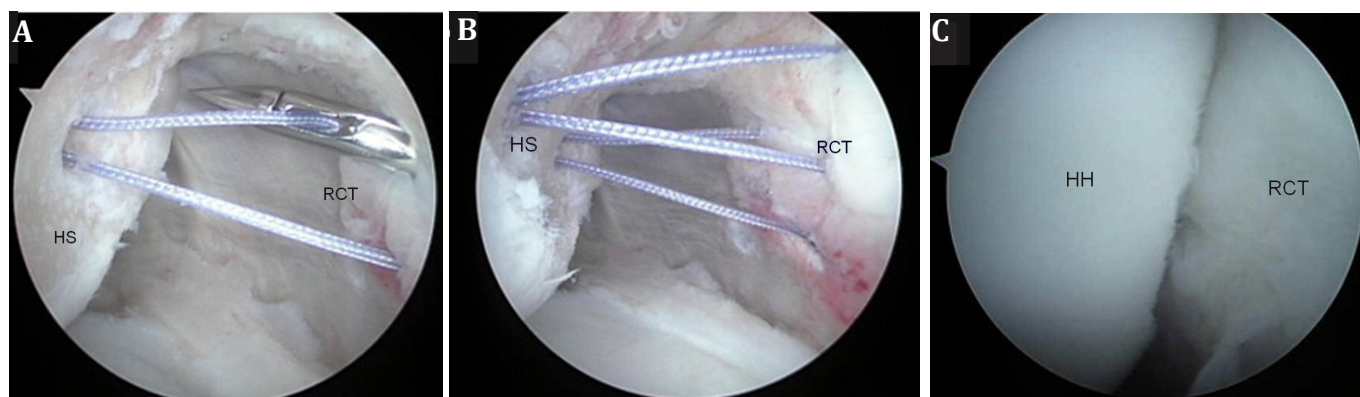


Figure 1. Stages of Remplissages (intra articular view) from left to right.

respectively. We could not find statistical difference between the primary reason for dislocation (primary recurrent dislocation or Bankart failure) and our inclusion criteria (the patients had moderate to severe Hill-Sachs lesions (depth of 3 mm or more with a glenoid lesion of less than 25%), with the patients with mild Hill-Sachs lesions (depth of less than 3 mm with a glenoid lesion of 25 to 40%). Table 2 shows more details.

In the 22 months, none of the patients experienced shoulder dislocation, no complications were reported and all of the patients returned to their previous work.

Discussion

The remplissage technique, which was initially described by Wolff, is an arthroscopic method to fill the Hill-Sachs lesion using infraspinatus tenodesis and posterior capsulodesis. This technique was designed to prevent recurrent instability by making the Hill-Sachs lesion extra-articular, consequently, eliminating Hill-Sachs engagement with the anterior glenoid rim (9, 12, 15).

Although the follow up period was limited to 22 months, in our study all the shoulders were stabilized without any failure. The internal and external rotations were limited to less than 5° after one year of follow up and no complications were reported.

There were some limitations in our study. The number of patients was limited to ten and our follow up period was only 22 months. Furthermore, no control group was defined in our study and we did not use any standard questionnaire to report our outcome.

In the study of Balg *et al*, the risk of redislocation in primary dislocations treated with arthroscopic Bankart repair was reported to be at 14.5 % and Hill-Sachs

lesion was an important risk factor (16). Burkhart *et al* compared the arthroscopic Bankart repair in two groups with and without bone defects. For the group of patients without significant bone loss, the recurrence rate was 4% and for the group with significant bone loss it was 67% (10).

The arthroscopic remplissage method dramatically decreases the failure rate of surgery (9-10). Purchase *et al* treated 20 patients with the current method and had a follow up period of 25 to 57 months (9). They had two redislocations caused by direct trauma (10%), which is significantly less than arthroscopic Bankart repair alone (9-10). In our series, there was no recurrence reported in our limited 22 months follow up.

Some studies have claimed decreased range of motion after arthroscopic remplissage. Deutsch *et al* reported a case in which a patient treated with the arthroscopic remplissage method lost his shoulder external rotation two years later (15). In the Purchase *et al* study there was only shoulder stiffness reported among the 20 patients (9). In our series, no stiffness was detected and average shoulder range of motion restriction was less than 10°.

Finally, we found the arthroscopic remplissage method to be a valuable procedure with reasonable complications. It could stabilize anterior recurrent shoulder dislocations associated with Hill-Sachs lesions.

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Table 2. Limitation in shoulder range of motion in patients underwent arthroscopic remplissage

Follow-up period	Internal rotation	External rotation
months 3	8±3	12±3
months 6	7±2	13±1
months 12	5±1	4±1

References

1. Connolly J. Humeral head defects associated with shoulder dislocations—their diagnostic and surgical significance. *Instr Course Lect.* 1972;21:42-54.
2. DiPaola MJ, Jazrawi LM, Rokito AS, Kwon YW, Patel L, Pahk B, et al. Management of humeral and glenoid bone loss--associated with glenohumeral instability. *Bull NYU Hosp Jt Dis.* 2010;68(4):245-50.
3. Hovelius L, Augustini BG, Fredin H, Johansson O, Norlin R, Thorling J. Primary anterior dislocation of the shoulder in young patients. A ten-year prospective study. *J Bone Joint Surg Am.* 1996;78(11):1677-84.
4. Hovelius L, Eriksson K, Fredin H, Hagberg G, Hussenius A, Lind B, et al. Recurrences after initial dislocation of the shoulder. Results of a prospective study of treatment. *J Bone Joint Surg Am.* 1983;65(3):343-9.
5. Kralinger FS, Golser K, Wischatta R, Wambacher M, Sperner G. Predicting recurrence after primary anterior shoulder dislocation. *Am J Sports Med.* 2002;30(1):116-20.
6. Levine WN, Arroyo JS, Pollock RG, Flatow EL, Bigliani LU. Open revision stabilization surgery for recurrent anterior glenohumeral instability. *Am J Sports Med.* 2000;28(2):156-60.
7. Tauber M, Resch H, Forstner R, Raffl M, Schauer J. Reasons for failure after surgical repair of anterior shoulder instability. *J Shoulder Elbow Surg.* 2004;13(3):279-85.
8. Uhorchak JM, Arciero RA, Huggard D, Taylor DC. Recurrent shoulder instability after open reconstruction in athletes involved in collision and contact sports. *Am J Sports Med.* 2000;28(6):794-9.
9. Purchase RJ, Wolf EM, Hobgood ER, Pollock ME, Smalley CC. Hill-sachs "remplissage": an arthroscopic solution for the engaging hill-sachs lesion. *Arthroscopy.* 2008;24(6):723-6.
10. Burkhart SS, De Beer JF. Traumatic glenohumeral bone defects and their relationship to failure of arthroscopic Bankart repairs: significance of the inverted-pear glenoid and the humeral engaging Hill-Sachs lesion. *Arthroscopy.* 2000;16(7):677-94.
11. Lynch JR, Clinton JM, Dewing CB, Warme WJ, Matsen FA. Treatment of osseous defects associated with anterior shoulder instability. *J Shoulder Elbow Surg.* 2009;18(2):317-28.
12. 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.
13. Re P, Gallo RA, Richmond JC. Transhumeral head plasty for large Hill-Sachs lesions. *Arthroscopy.* 2006;22(7):798 e1-4.
14. Reichl M, Koudela K. Post-traumatic anterior shoulder instability--arthroscopic stabilization method using bone anchors. *Acta Chir Orthop Traumatol Cech.* 2004;71(1):37-44.
15. Deutsch AA, Kroll DG. Decreased range of motion following arthroscopic remplissage. *Orthopedics.* 2008;31(5):492.
16. Balg F, Boileau P. The instability severity index score. A simple pre-operative score to select patients for arthroscopic or open shoulder stabilisation. *J Bone Joint Surg Br.* 2007;89(11):1470-7.