Arthroscopic remplissage: is it still an option? A report of 51 cases

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Introduction
The posterolateral humeral head defects can be large and engaging on the anterior glenoid and usually contribute to anterior shoulder instability in 40–90% of cases. The purpose of this study is to evaluate the results of the largest series of patients who underwent arthroscopic remplissage with Bankart repair for recurrent anterior shoulder instability due to associated Bankart lesion with large and engaging (>25% involvement) humeral Hill–Sachs defects (HSDs).
Patients and methods
In all, 51 patients underwent arthroscopic Bankart repair with remplissage technique for the treatment of recurrent anterior glenohumeral instability with large and medial HSDs. Preoperative imaging in all patients identified Bankart lesion with an associated HSD that involved greater than 25% of the humeral head. Rowe score was used to clinically assess the patients.
Results
Forty-six patients were male. The mean age of the patients was 28.7 years. The mean follow-up period was 31 months (range: 20–39 months). At the final follow-up, three patients reported recurrence of instability (two dislocations and one sublaxation). The mean Rowe score improved to 95.4 points (function, 45.5 of 50; stability, 26.4 of 30; motion, 8 of 10; pain, 8 of 10).
Conclusion
Bankart repair with remplissage technique offered satisfactory results and is still considered to be an effective, safe, and reliable procedure for the treatment of glenohumeral instability in cases with large and medial HSDs.

Keywords:
Bankart–Hill–Sachs, instability, remplissage

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Introduction

The posterolateral humeral head defects (Hill–Sachs lesions) were first described in 1890 by Broca and Hartman and further classified by Hill and Sachs [1]. These defects are one of the most common findings in patients with recurrent anterior glenohumeral dislocations [2,3]. It has been reported that the humeral head defects contribute to anterior shoulder instability in 40–70% of patients with a first-time dislocation, and up to 90% of recurrent cases [4,5].

Traditionally, the Hill–Sachs defect (HSD) is a posterolateral compression fracture in the humeral head that occurs as the glenoid edge hits the humeral head during an anterior dislocation [5–7]. The size of the HSD continues to increase with subsequent dislocation or subluxation, and this in turn increases the risk of recurrence. The recognition of the critical role of the HSD in recurrent instability pinpoints the need to solve the posterior bone deficiency of the humeral head together with the anterior capsulolabral repair [8]. Different solutions were suggested such as Latarjet procedure [9], osteoarticular allograft transplantation [10], rotational humeral osteotomy [11], and transhumeral impaction grafting [12]. Usually, these procedures are performed with an open technique and can be associated with many complications such as hardware problem, axillary nerve injury, subscapularis insuffiency, and glenohumeral arthritis [8–12].

An arthroscopic filling of HSD by infraspinatus tendon, known as 'remplissage', was described in 2008 by Purchase *et al.* [13]. Since then, this technique has gained popularity with the hope to be an arthroscopic way to handle HSD.

The purpose of the study was to evaluate the results of the largest series of patients who underwent arthroscopic remplissage with Bankart repair for recurrent traumatic anterior glenohumeral instability caused by combined anterior capsulolabral lesion and posterior large humeral head defect (>25% involvement).

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Patients and methods

The study was conducted in the Department of Orthopedic Surgery, El-Hadara Orthopaedic and Traumatology University Hospital, Alexandria University, Egypt, from 2012 to 2014. Fifty-one shoulders in 51 patients, 46 men and five women, with recurrent traumatic anterior shoulder instability with large and medial HSDs were included in the study. The study was approved by the local ethics committee of Alexandria University and a written informed consent was taken from every participant included in the study.

Patients with associated biceps tendon pathology (e.g. superior labrum anterior posterior), small or lateral HSDs, and/or rotator cuff tear were excluded from the study.

The mean age of the patients was 28.7 years (range: 18–43 years). Right shoulder was affected in 45 (88%) patients. Thirty-eight (75%) patients were right-handed.

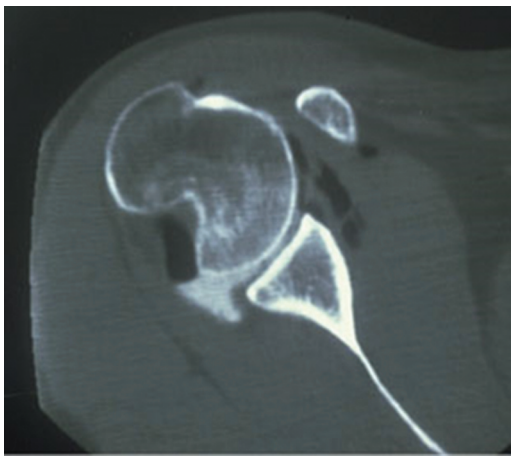
All patients underwent thorough clinical examination followed by radiological evaluation with plain radiography and MRI. All patients in this study had a positive apprehension sign. Radiologically, anterior labral tear and a significant HSD (>25% of humeral head) were found in all cases (Fig. 1). No significant glenoid bone defects were encountered. The Rowe shoulder score was used in this study to monitor the shoulder state before and after at least 12 months from the operative intervention.

At the time of surgery, arthroscopic remplissage together with Bankart repair were done.

The technique started with the introduction of the scope through the standard posterior portal. Visualization of the anterior labral tear, as well as the posterior HSD, was then performed (Figs 2 and 3). The posterior defect was dealt with through the following steps: localization of the defect through a spinal needle inserted from a posterolateral portal, preparation of the defect using a motorized shaver and burr (Fig. 4), bone anchor insertion into the medial edge of the defect (5 mm) double-loaded with no. 2 Orthocord or Fiberwire suture threads (Fig. 5), and finally retrieval of the suture threads of the anchor through the infraspinatus and posterior capsule using an arthroscopic penetrating grasper (Fig. 6). The sutures were left without tying and the scope was directed anteriorly.

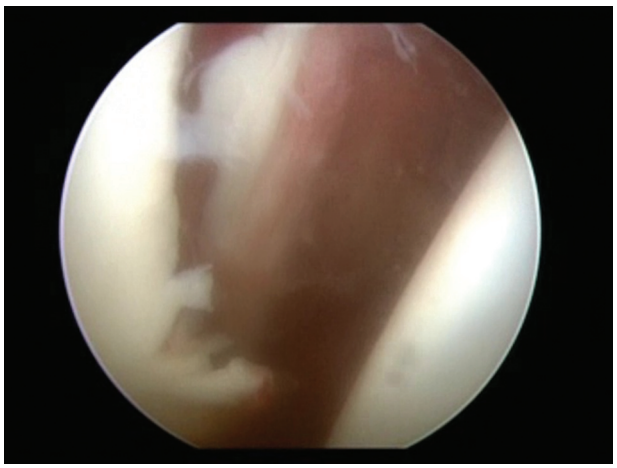
Bankart repair was then performed using three biodegradable bone anchors (Mitek Lupine) inserted anteriorly through a 7-mm arthroscopic cannula applied through the rotator interval.

Figure 1



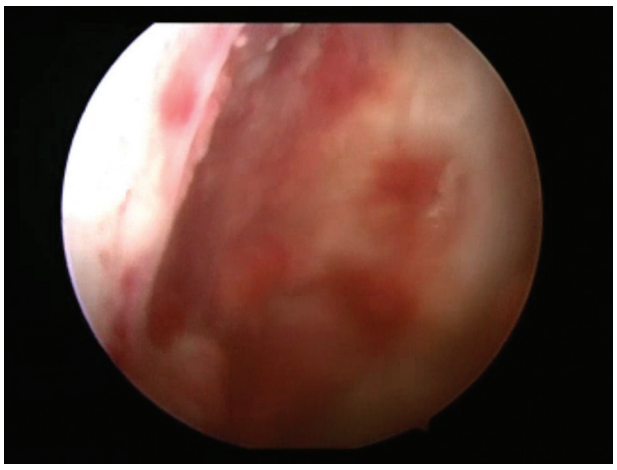
Hill–Sachs defect.

Figure 2



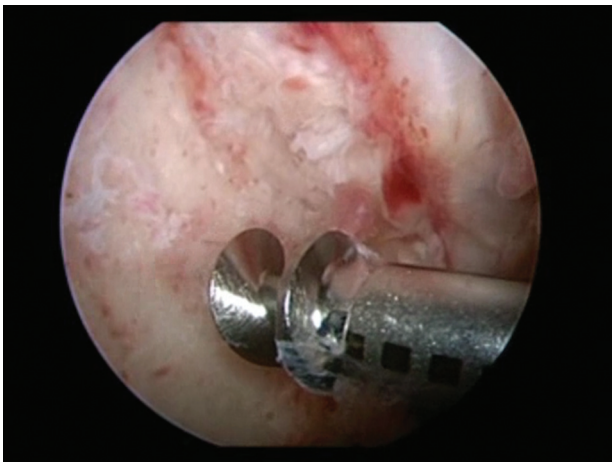
Anterior labral tear.

Figure 3



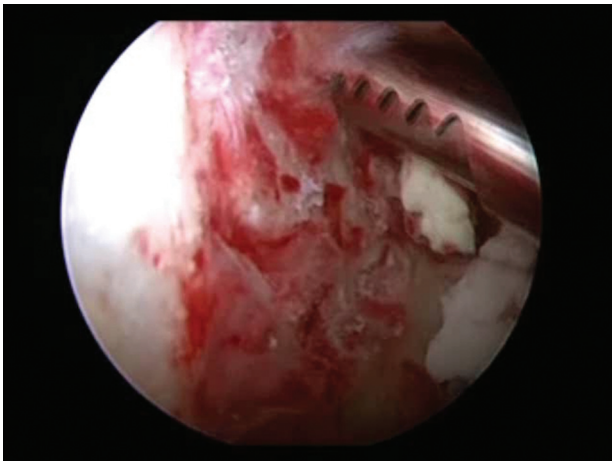
Posterior Hill–Sachs defect.

Figure 4



Preparation of the defect.

Figure 5

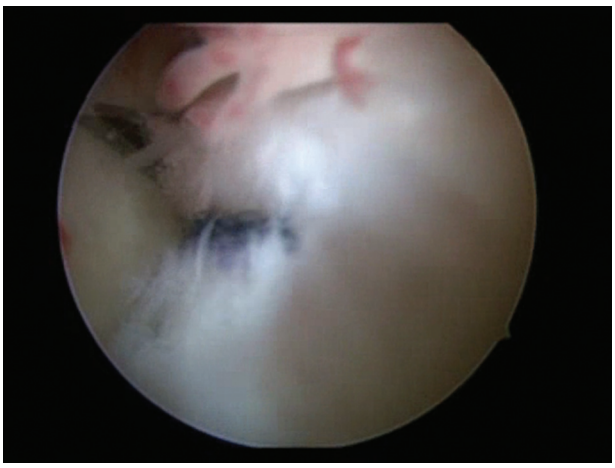


Anchor insertion in Hill–Sachs defect.

Figure 6

Suture retrieval.

Figure 7



Closure of Hill–Sachs defect through infraspinatus and capsule.

Following secure repair of the anterior labrum, the posterior sutures were tied bringing the infraspinatus and the capsule down to fill and close the HSD (Fig. 7). The sutures were tied with the patient's shoulder in neutral rotation and with the humeral head pushed posteriorly.

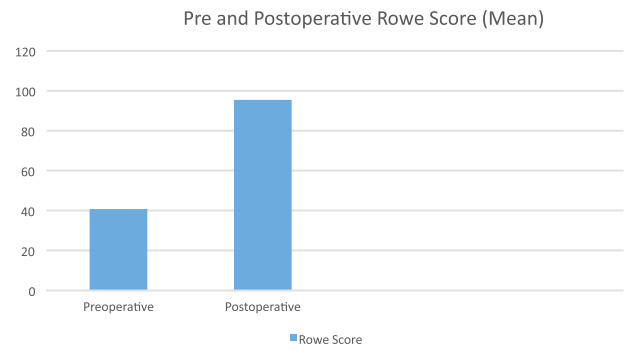
Postoperatively, a sling was applied for all patients for 5 weeks, with gentle daily activities allowed. Six weeks postoperatively, active assisted and active exercises were started. At 3 months, shoulder strengthening exercise was permitted. Patients were allowed to regain to preinjury level of activity at 6 months postoperatively.

Results

The follow-up period ranged from 20 to 39 months, with a mean of 31 months. The Rowe score improved significantly from a mean of 40.8 points preoperatively (ranging from 30 to 53 points) to a mean of 95.4 points postoperatively (ranging from 80 to 100 points) ($P<0.001$). A total of 49 (96%) of 51 shoulders were considered by the patients to be better as a result of the operation (Fig. 8). The mean score of function improved from 18.3 points (range: 12–25 points) preoperatively to 45.5 points (range: 41–50 points) postoperatively.

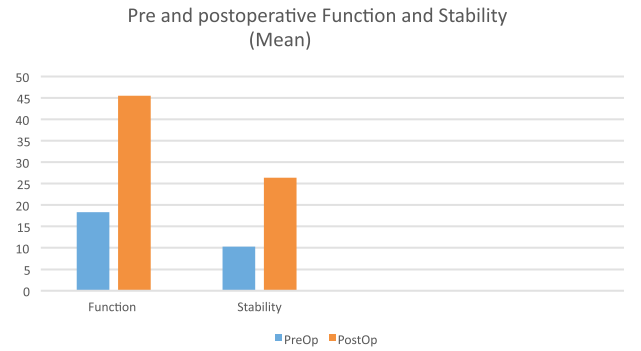
The stability component of the score improved significantly from a mean of 10.3 points (range: 6–13 points) preoperatively to 26.4 points (range: 24–30 points) postoperatively (Fig. 9). The pain improved from a mean of 5 points (range: 3–6 points) preoperatively to 8 points (range: 7–10 points) postoperatively. Similarly, the motion improved from a mean of 4 points (range: 2–6 points) preoperatively to 8 points (range: 7–10 points) postoperatively (Fig. 10).

Figure 8



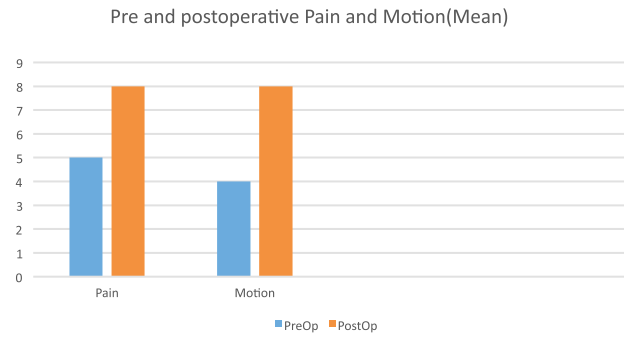
Preoperative and postoperative Rowe score (mean).

Figure 9



Preoperative and postoperative function and stability (mean).

Figure 10



Preoperative and postoperative pain and motion (mean).

In this study, three (4%) patients had recurrent instability (two dislocations and one subluxation). All were traumatic in nature and spontaneously reduced. None of those patients asked for any further surgical intervention.

No surgical-site infection was encountered in the study, and there were no complications associated with suture anchors. None of the patients included in this study reported complaints of decreased shoulder range of motion, and all showed excellent degrees of shoulder external rotation.

Discussion

HSDs were considered to be the main cause of recurrent instability following glenohumeral dislocation [4]. Lynch *et al.* [14] recorded recurrent instability in more than 90% of cases because of large engaging Hill–Sachs lesions. In a study published by Patel *et al.* [15], the authors attributed failures of previous instability interventions to unrecognized Hill–Sachs lesions. In fact, most of the failure cases were associated with a Bankart repair. Up to 80% correlation between anterior capsulolabral lesions and posterior humeral head defects were found in a study by Widjaja *et al.* [16].

For the hope of solving the problem caused by these defects, many procedures were suggested to fully address bone defiencies together with the arthroscopic Bankart repair during surgery. Unfortunately, most of these procedures were performed with an open technique and were associated with many complications [8–12]. Lafosse and Boyle [17] described an arthroscopic Latarjet technique with excellent results. However, this can be a technically demanding procedure with a high learning curve, and it showed difficulty in achieving the satisfactory results reported by the authors.

The remplissage procedure described by Purchase *et al.* [13], converts an intra-articular HSD into an extra-articular lesion without the need for any open procedure or additional graft material. Since then, the technique has gained popularity as being a minimally invasive approach, which is easy and quick to be applied, with promising outcome. As the interest in the remplissage procedure is increasing, many reports with variable clinical outcome have been published [8,18–21].

The clinical success rate in patients included in this study was 96%, with acceptable overall patient satisfaction, less pain, and good shoulder function.

Franceschi and colleagues compared the results of Bankart repair alone and combined with remplissage in 25 patients in each group. They reported zero recurrence of instability in the remplissage group compared with 20% recurrence in Bankart repair alone [22].

Park *et al.* [23], in a small number of patients, reported 9% recurrence (one out of 11patients). Zhu *et al.* [24] evaluated the outcome of remplissage with Bankart repair; three (6%) out of 49 patients in their study suffered from recurrent instability.

The present study evaluated the results of arthroscopic remplissage with Bankart repair in 51 patients, eventually

the largest series in the literature. Only three (4%) cases had recurrent instability (two dislocations and one sublaxation). None of them asked for any further surgical intervention. No limitation of external rotation caused by infraspinatus tenodesis was encountered by any of the patients.

Unlike what was described by Park *et al.* [19], no posterior cannulas were used in the study. This has the advantages of avoiding not only large incisions needed to introduce the cannulas but also the defects in infraspinatus with the passage of cannulas, which may weaken the tendon.

Conclusion

Bankart repair with remplissage technique offered satisfactory results and is still considered to be an effective, safe, and reliable procedure for the treatment of glenohumeral instability in cases with large and medial HSDs.

Financial support and sponsorship

Nil.

Conflicts of interest

There are no conflicts of interest.

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