



Superior capsular reconstruction for recurrent anterior shoulder dislocation with irreparable rotator cuff tear: a case report

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Traumatic or recurrent dislocation of the shoulder due to disruption of the anterior band of inferior glenohumeral ligament (AIGHL) complex occurs in young and active populations.¹ However, the concomitance of rotator cuff tears associated with the traumatic dislocation increases with advancing age.²⁴ These different injury patterns are thought to represent secondary changes in tissue properties that occur with aging.⁹

Treatment of glenohumeral instability in young patients has been focused on Bankart lesion and osseous lesions of the glenoid and humeral head. A large humeral osseous defect, a Hill-Sachs lesion, poses a risk of postoperative redislocation after Bankart repair.^{2,3} On the other hand, among older patients, rotator cuff tears are the main focus because functional outcomes including pain and weakness of the shoulder muscles become problematic after shoulder dislocation.^{25,28} However, recurrent anterior after a shoulder dislocation with an irreparable rotator cuff tear is a difficult condition to treat in middle-aged patients.

Superior capsular reconstruction (SCR) has been widely performed to treat irreparable rotator cuff tear.^{4,14} However, few reports have described recurrent anterior shoulder instability with an irreparable rotator cuff tear. This report describes Bankart repair and SCR for the treatment of recurrent anterior shoulder dislocation in a case with a large Hill-Sachs lesion and an irreparable rotator cuff tear. SCR would provide not only functional improvement

by reconstructing the superior capsule but also shoulder stability by filling the Hill-Sachs lesion with graft material.

Case report

A 54-year-old man complained of restricted shoulder function due to instability and pain in the right shoulder. The first dislocation had occurred at 52 years of age after he fell on his hand. He then experienced recurrent dislocations of the right shoulder, with over 20 events in 2 years. Physical findings showed a clearly restricted active range motion with 100° of flexion, 90° of abduction, 30° of external rotation, and internal rotation to the level of L4. The patient could not elevate his shoulder over 100° because of concerns and anxiety regarding shoulder dislocation. Positive results were obtained for anterior apprehension test and sulcus sign. University of California, Los Angeles, score was 10 (maximum, 34), and Japanese Orthopaedic Association score was 35 (maximum, 100).

Radiographs showed slight degenerative changes in the glenohumeral joint and a Hill-Sachs lesion without dislocation of the humeral head (Fig. 1). Computed tomography showed that the glenoid osseous defect comprised 20% of the whole glenoid (Fig. 2, A). The Hill-Sachs lesion was larger than the glenoid track and was considered an off-track lesion as described by Yamamoto et al (Fig. 2, B).³⁰ Magnetic resonance imaging (MRI) showed an antero-inferior labral tear at the 2- to 5-o'clock position of the glenoid and a massive rotator cuff tear including tears in the supraspinatus and infraspinatus tendons (Fig. 3, A–C). According to the Goutallier classification, fatty infiltration of the supraspinatus and infraspinatus were stage 1 and 3 in an oblique sagittal view (Fig. 3, D).

Institutional review board approval was not required for this case report.

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Figure 1 Preoperative anteroposterior radiograph.

Based on these findings, we diagnosed recurrent anterior shoulder dislocation with an irreparable rotator cuff tear.

The treatment options were discussed considering the age of the patient, condition of the rotator cuff tear, glenoid bone defect, and Hill-Sachs lesion. The supraspinatus and infraspinatus tendon tears were considered irreparable based on severe fatty infiltration. Reverse shoulder arthroplasty (RSA) was one of the treatment options, but this patient was middle-aged, and the glenohumeral joint did not show severe osteoarthritic changes. We therefore believed that soft-tissue reconstruction such as SCR was desirable for irreparable massive rotator cuff tear. In addition, bony reconstruction was not considered necessary for glenoid bone defect, but the Hill-Sachs lesion was off-track and thus required additional treatment. A remplissage procedure involves filling the Hill-Sachs lesion with infraspinatus tendon to prevent engagement of the Hill-Sachs lesion. In this patient, the infraspinatus tendon was missing and so unavailable for remplissage, but SCR enables filling of the Hill-Sachs lesion with graft material in addition to reconstruction of the superior capsule. We therefore finally decided to perform arthroscopic Bankart repair combined with SCR.

Shoulder arthroscopy was performed in the beach chair position under general anesthesia. A 30° arthroscope was used for visualization. The standard diagnostic arthroscopy was used to evaluate intra-articular structures and the rotator cuff tendon. The anteroinferior labral tear was observed from the 2- to 5-o'clock position of the glenoid (**Fig. 4, A**). Furthermore, a Hill-Sachs lesion existed at the posterolateral portion of the humeral head (**Fig. 4, B**), engaging during abduction and external rotation. The detached inferior glenohumeral ligament was repaired using 4 suture anchors (FiberTak suture anchor; Arthrex Inc., Naples, FL, USA) (**Fig. 5, A**). Tear sizes in the supraspinatus and infraspinatus tendons were 35 mm in anteroposterior diameter and 50 mm in mediolateral diameter. Fascia lata (size 140 × 40 mm) was harvested from the lateral aspect of the contralateral thigh, distal to the greater trochanter. A graft (length, 50 mm; width, 35 mm; thickness, 8 mm) was fashioned by folding the fascia lata twice (**Fig. 5, B**). Two suture anchors (Corkscrew FT 4.5 mm; Arthrex Inc., Naples, FL, USA) were inserted into the superior glenoid. Two suture anchors (Biocomposite Corkscrew FT, Double Loaded 4.75 mm; Arthrex Inc., Naples, FL, USA) were inserted into the medial side of the greater tuberosity. Of these, the posterior anchor was inserted into the Hill-Sachs lesion to fill the lesion with graft material. After threads were passed through the graft, the graft was inserted into the subacromial space. The medial side of the graft was fixed using mattress sutures, then the lateral side of the graft was fixed using a bridging suture technique in which 2 anchors (SwiveLock C, Closed Eyelet 4.75 mm; Arthrex Inc., Naples, FL, USA) were inserted into the lateral aspect of the greater tuberosity. Finally, 2 side-to-side sutures with No. 2 FiberWire were added between the graft and teres minor tendon. An abduction pillow was used for 8 weeks postoperatively. Passive exercises started 4 weeks after the operation. Active forward elevation of the shoulder with the patient in a sitting position was allowed from 8 weeks postoperatively. Heavy work and sports were allowed from 6 months postoperatively.

At the latest follow-up, at 24 months postoperatively, no recurrence of dislocation and shoulder pain had occurred. Active range of motion had improved to 165° of flexion, 165° of abduction, 45° of external rotation, and internal rotation to Th10. University of California, Los Angeles score had improved to 33, and Japanese Orthopaedic Association score to 95. Radiographs showed no progression of degenerative change in glenohumeral joint. MRI showed healing of the grafts on the glenoid and greater tuberosity (**Fig. 6, A-C**).

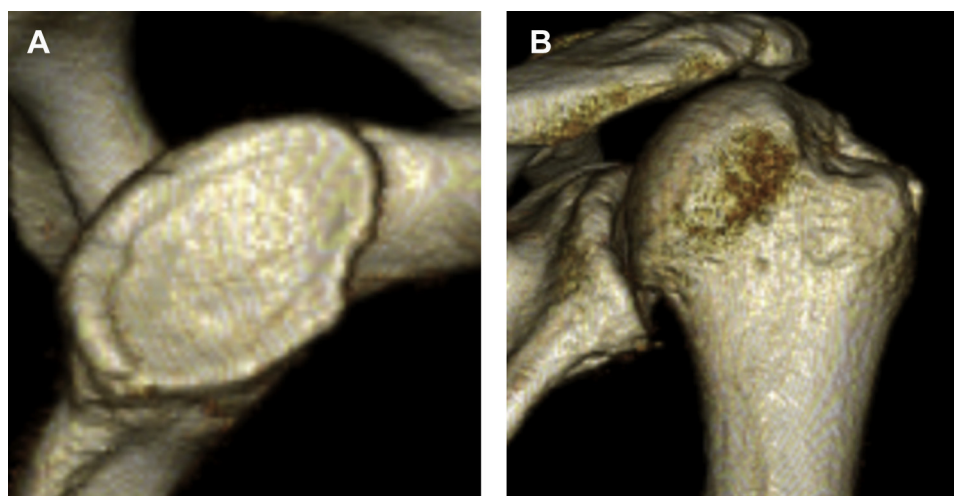


Figure 2 Three-dimensional computed tomography. (A) Glenoid. (B) Humeral head.

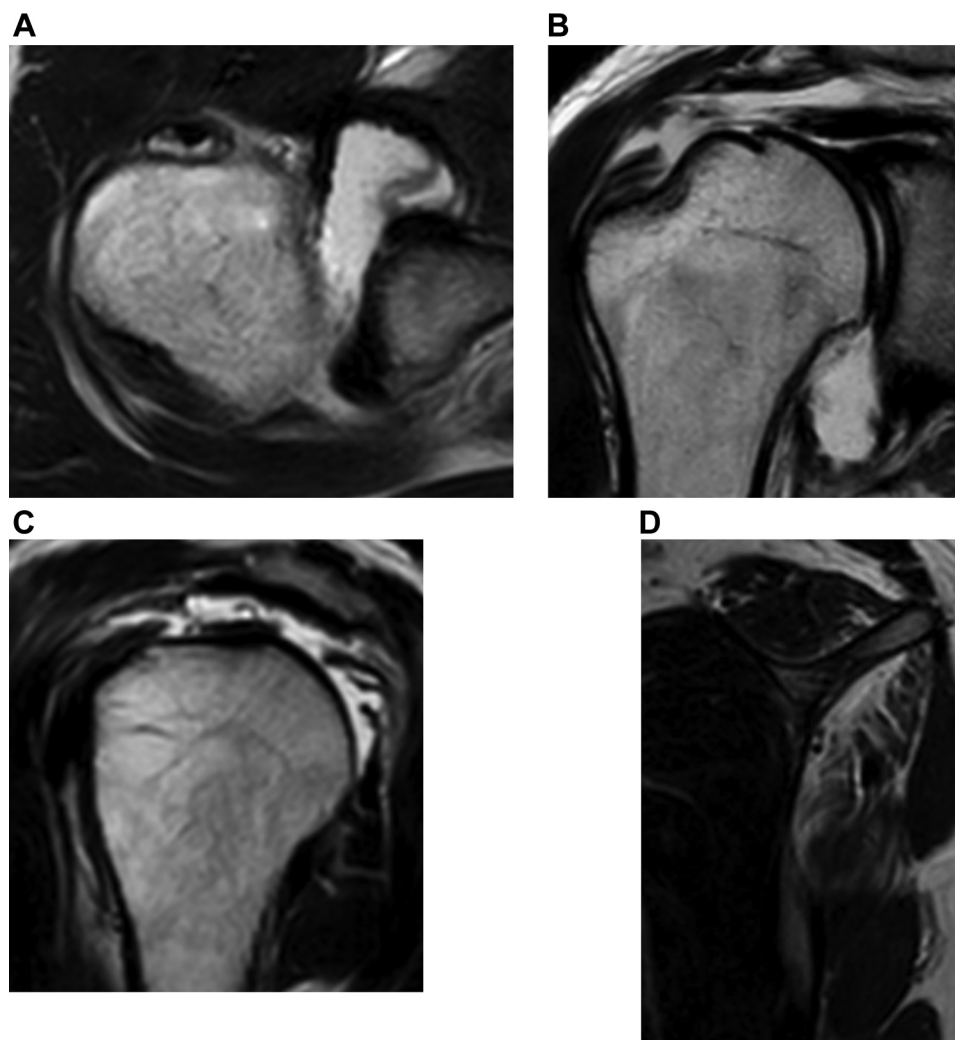


Figure 3 Preoperative magnetic resonance imaging. (A) Axial view. (B) Oblique coronal view. (C) Oblique sagittal view. (D) Oblique sagittal view of the medial muscle of the rotator cuffs.

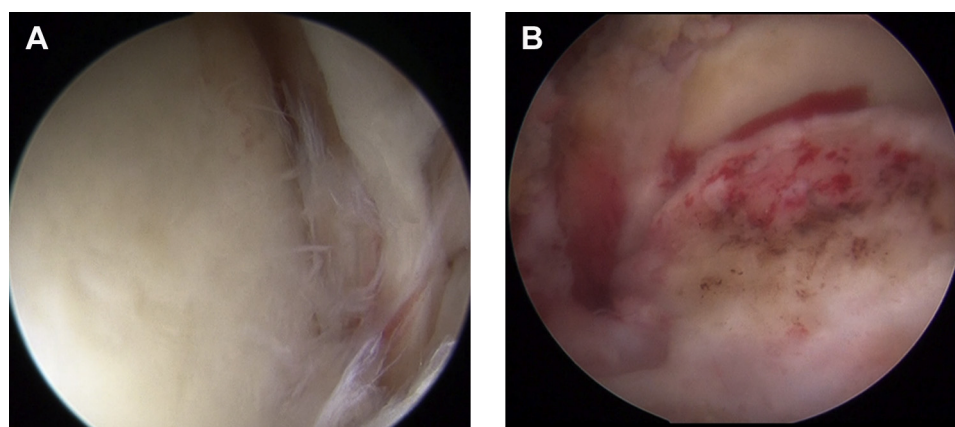


Figure 4 Arthroscopic findings. (A) Bankart lesion viewed from the posterior portal. (B) Hill-Sachs lesion viewed from the lateral portal.

Discussion

The prevalence of rotator cuff tears following traumatic dislocation increases with advancing age.²⁴ Previous reports have shown that older individuals typically display a different spectrum of glenohumeral joint pathologies associated with the first

traumatic dislocation from younger individuals and a greater risk of rotator cuff tear during the first dislocation.^{6,20} Previous reports have shown that the rate of recurrence was higher in younger individuals than in older individuals. Deitch et al showed that the recurrence rate reached 75% in adolescents.⁷ Wheeler et al reported that 92% of younger patients who received nonoperative treatment

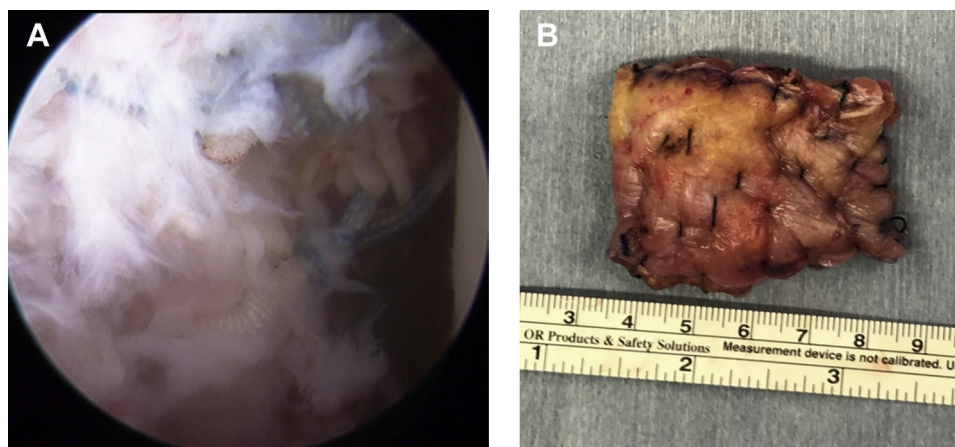


Figure 5 (A) Arthroscopic findings for the repaired Bankart lesion. (B) A graft of fascia lata after folding.

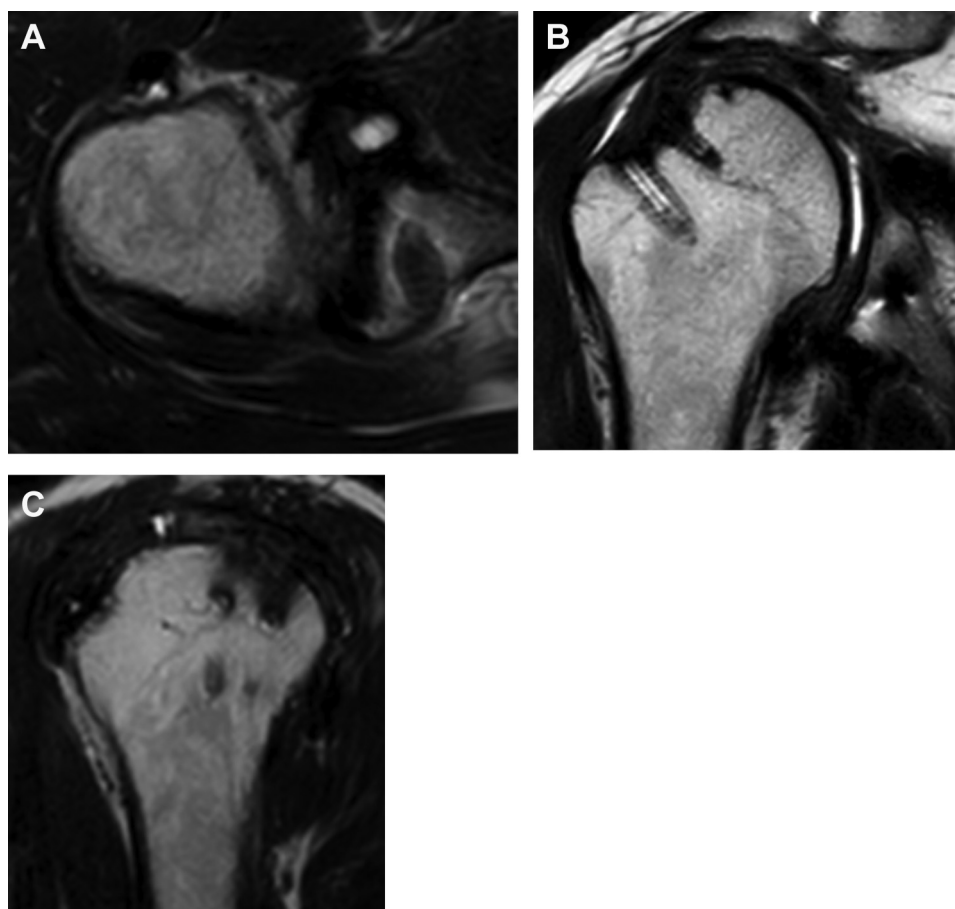


Figure 6 Magnetic resonance imaging at 24 months postoperatively. (A) Axial view. (B) Oblique coronal view. (C) Oblique sagittal view.

experienced further dislocation.²⁹ On the other hand, Pevny et al showed a recurrence rate of only 4% in a group of patients older than 40 years.²⁰

The rotator cuff is central to the posterior stability of the glenohumeral joint, and this structure is likely to fail secondary to pre-existing rotator cuff weakness in elderly patients.⁵ A loss of the restraint provided by the rotator cuff may cause glenohumeral joint instability. Rodosky et al noted that a 50% decrease in rotator cuff muscle activity resulted in a 50% increase in the

occurrence of shoulder dislocations.²² Itoi et al described the importance of the rotator cuff muscles, as a dynamic stabilizer of the shoulder, using a cadaveric model.¹⁰ For these reasons, nonoperative treatments may cause recurrent shoulder dislocations when rotator cuff tears exist.^{9,24} Rotator cuff tears should thus be repaired in older patients who experience recurrent anterior shoulder instability.

Not only disruption of the AIGHL complex but also Hill-Sachs lesions can cause recurrent shoulder dislocation because of

engagement with the anterior rim of the glenoid.⁸ The glenoid track concept has been widely described from 3-dimensional computed tomography or MRI studies.^{19,30} Several studies have reported off-track Hill-Sachs lesions as a contributing factor in recurrent instability.^{12,17,23} Shaha et al demonstrated a 75% recurrence rate in patients with an off-track lesion after arthroscopic Bankart repair, whereas patients with on-track lesions only showed an 8% recurrence rate.²³ In our case, the off-track Hill-Sachs lesion in addition to rotator cuff tear and disruption of the AIGHL complex would have resulted in the recurrent shoulder instability. Surgical treatment in this patient thus also needs to address the Hill-Sachs lesion.

Various surgical treatments are available for irreparable rotator cuff tears, such as débridement, subacromial decompression, RSA, and SCR.^{11,15,18} Elderly patients with lower activity demands and pain relief as the main concern are suitable candidates for débridement and subacromial decompression if the response to conservative treatments is inadequate.¹¹ However, this procedure is unable to provide stability to the glenohumeral joint. RSA has expanded indications such as various conditions of the rotator cuff and glenohumeral joint in elderly patients.¹⁸ RSA also provides stability to the glenohumeral joint with recurrent shoulder instability from irreparable rotator cuff tears. However, soft-tissue reconstructions are preferable to treat irreparable rotator cuff tears in the absence of degenerative changes to the glenohumeral joint in middle-aged patients.

SCR is widely performed and has provided good clinical outcomes in patients with irreparable rotator cuff tears.^{4,14} Mihata et al reported that arthroscopic SCR (ASCR) allowed centralization of the humeral head using fascia lata, thereby increasing the stability of the glenohumeral joint and offering good clinical outcomes.¹⁵ The graft between the superior glenoid and greater tuberosity theoretically balances the coronal forces acting on the glenohumeral joint and restores shoulder function. In addition, side-to-side suturing between the graft and residual infraspinatus or teres minor tendons restores superior stability.¹⁶ The biomechanical advantage of SCR is improvement of shoulder force coupling by improving muscle force from the infraspinatus and teres minor muscles if the subscapularis tendon is intact or repaired.¹³ However, an irreparable subscapularis tendon tear leads to inferior clinical outcomes from SCR, as subscapularis tendon tears lead to shoulder imbalance of the functional force couple.^{13,27} In this patient, an intact subscapularis tendon provided stability to the glenohumeral joint due to reconstruction of the force couple after SCR.

Only 1 case report has described ASCR for recurrent anterior shoulder instability. Tajika et al reported a case in which ASCR and Bankart repair improved shoulder function and stability for recurrent anterior instability with an irreparable rotator cuff tear.²⁶ In this case, SCR had the additional effect of remplissage, with the grafted fascia lata filling the Hill-Sachs lesion. Remplissage is a surgical procedure that involves capsule-tenodesis, in which the infraspinatus tendon and posterior capsule fill the Hill-Sachs lesion to prevent engagement with the glenoid.²¹ In this case, remplissage was unable to be performed because of the torn infraspinatus tendon. However, filling of the Hill-Sachs lesion with the graft provides a similar effect to remplissage in preventing engagement with the anterior glenoid rim. We therefore believe that SCR in combination with Bankart repair led to improvement of shoulder function and shoulder stability although restricted external rotation remains a concern after filling a Hill-Sachs lesion with graft material.

Conclusion

SCR using a fascia lata autograft appears useful to stabilize the glenohumeral joint and improve shoulder function in a patient

with recurrent anterior shoulder instability and irreparable rotator cuff tears. SCR can not only help in the reconstruction of the muscle force couple but also provide the effect of remplissage to fill the Hill-Sachs lesion with graft material.

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Patient consent:

Obtained.

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