

# Allograft Reconstruction for Reverse Hill-Sachs Lesion in Chronic Locked Posterior Shoulder Dislocation: A Case Report

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## Abstract

Posterior dislocations of the humeral head are rare and often missed on initial presentation. Half of these injuries are associated with an impression fracture of the anteromedial aspect of the humeral head (reverse Hill-Sachs lesion). Several operative strategies have been described to treat this injury, but evidence based management strategies are lacking. We describe a case in which a young and active patient presented with a stiff and painful shoulder following a clavicle fracture 9 months earlier. MRI revealed a locked posterior shoulder dislocation and large reverse Hill-Sachs defect. Anatomic reconstruction of the humeral head was performed using a femoral head allograft to fill the defect. A year later the patient has a good shoulder function without pain or impairments in his daily activities. Posterior shoulder dislocation continues to be a “diagnostic trap”. This case reinforces the importance of radiographic axial and transscapular (Y) shoulder views to prevent missing the diagnosis. We state that, even in cases with delayed diagnosis and large humeral head defects, one should attempt to preserve the stability and function of the shoulder joint by restoring the normal anatomy of the humeral head. Femoral head allografting proves to be a suitable option. This case is unique in the combination of injuries, the long diagnostic delay and the encouraging functional results after femoral head allografting.

**Keywords:** Locked posterior shoulder dislocation; Reverse Hill-Sachs lesion; Anatomic reconstruction; Allograft reconstruction; Femoral allograft

## Introduction

Posterior dislocations of the humeral head are rare, comprising only 2 - 4% of shoulder dislocations [1, 2]. They mostly occur secondary to violent muscle contractions associated with seizures, electric shock or (sports) trauma [3-5]. Half of these dislocations are associated with an impression fracture of the anteromedial aspect of the humeral head or “reverse Hill-Sachs lesion” [6, 7]. Unfortunately, the injury is over-seen in 60% at first presentation [8].

There are no evidence-based management strategies concerning the humeral head impaction, but different surgical options are a non-anatomic reconstruction such as a transfer of the subscapularis tendon [9] or the minor tubercle [10] into the defect and subcapital rotational osteotomy of the proximal humeral head [11]. Other options are cancellous auto- or allografting [8] and arthroplasty [6, 12].

Recently, fresh osteochondral allografts have been proven safe and efficacious to restore the articular surface in weightbearing joints. This preserves the normal anatomy and has therefore been advocated as a joint-preserving alternative to total or hemiarthroplasty [13-15].

The purpose of this paper is to report the results of reduction and reconstruction of the humeral head with a bone allograft after a 9-month diagnostic delay in a young and active patient with a locked posterior shoulder dislocation and subsequent impression fracture involving 40% of the articular surface, and an ipsilateral midshaft clavicular fracture.

## Case Report

A 30 year-old, healthy, active male was referred to our clinic with left shoulder complaints. Nine months earlier, he had fallen from his racing bicycle, directly onto his shoulder, for which he had visited the emergency department. Due to an

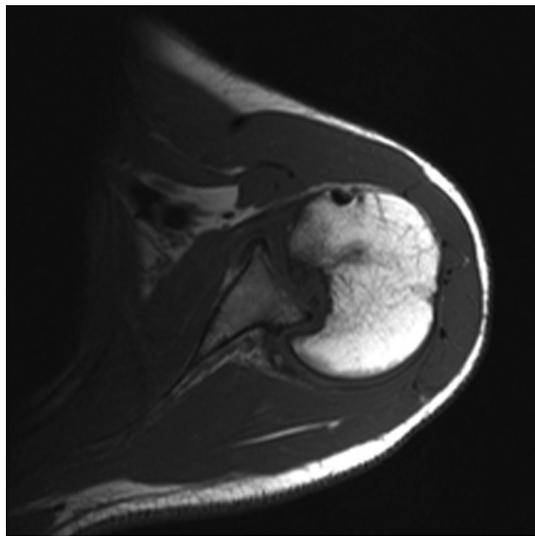
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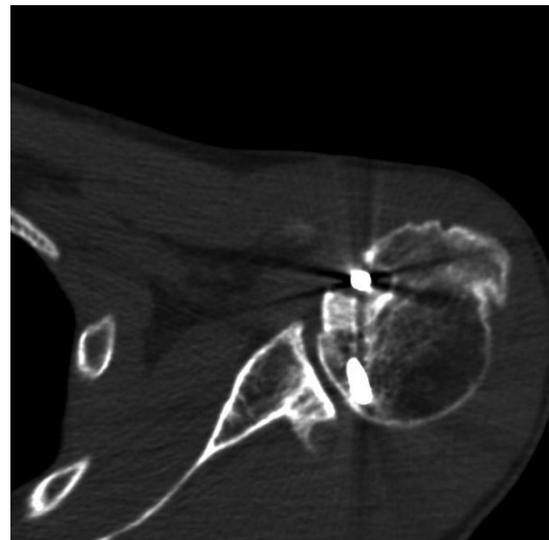
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**Figure 1.** Anteroposterior radiograph showing a partially consolidated clavicle fracture and a deviant position of the humeral head, suspect for posterior dislocation.



**Figure 3.** Postoperative radiograph of the right shoulder showing the reduced humeral head with restoration of the sphericity.

obvious left clavicle deformity, only clavicle radiographs were made, showing a midshaft clavicle fracture that was treated conservatively with a sling. During follow-up in our hospital, radiographs showed the consolidated clavicle fracture. Despite this consolidation and intensive physiotherapy, the patient continued to suffer a poor shoulder function. He

was referred to our department with the diagnosis frozen shoulder.

On physical examination, the left clavicle was shortened. There was no obvious distortion of the shoulder contour. His range of motion was restricted with 0° external rotation, 70° abduction and 90° forward elevation. There was no neurological deficit on examination. Plain radiographs showed a partially consolidated clavicle fracture and a deviant position of the humeral head in the shoulder joint, suspect for a posterior luxation (Fig. 1). Subsequent magnetic resonance imaging (MRI) scanning revealed a locked posterior shoulder dislocation and a large reverse Hill-Sachs defect, measuring approximately 40% of the articular surface of the humeral head (Fig. 2).



**Figure 2.** Preoperative MRI scan of the right shoulder showing a locked posterior shoulder dislocation and a large reverse Hill-Sachs defect.

### Operative technique

The patient was placed in beach chair position under general anaesthesia and an interscalene-block. The deltopectoral approach was used. There were no lesions of the rotator cuff,



**Figure 4.** CT scan 6 months postoperative confirming incorporation of the allograft and regular contour of the humeral head.

but due to damage of the long head of the biceps tendon, a tenodesis was performed. After performing a subscapularis tendon tenotomy and subsequent arthrotomy, the posterior capsule was released to reduce the humeral head. The glenoid and the remaining humeral cartilage were remarkably well, but there was no vital cartilage in the large reverse Hill-Sachs defect.

A cryopreserved femoral head allograft was carefully measured to fill the defect and to restore the original sphericity of the femoral head, using two cancellous screws. Hereafter, the shoulder showed a broad external and internal rotation with no apparent instability, after which the incision was closed.

Postoperative radiographs showed the reduced humeral head with restoration of the sphericity (Fig. 3). The shoulder was immobilized in a shoulder brace in 30 degrees of abduction and neutral rotation for 4 weeks, followed by a sling for several weeks. During this period, the splint was removed for passive external rotation exercises only. After six weeks, muscle resistance exercises were started.

### Functional outcome evaluation

At follow-up 6 months postoperatively, functional outcome was assessed using the Constant and Murley score [16]. The absolute Constant Score was 77 points, whereas the “relative Constant Score”, a percentage based on average values using reference parameters out of a healthy age and gender related control group, [17] was 97 points. This decrease in functional outcome was entirely based on a mild reduction in strength and range of motion; subjectively, the patient was free of pain and had no restrictions in his daily activities. He had resumed his work full time at follow-up. He had also started riding his bicycle without complaints. CT scanning confirmed incorporation of the allograft into the former defect zone and a regular contour of the humeral head with only a small intra-articular step-off (Fig. 4).

At most recent follow-up, 12 months postoperatively, the absolute Constant Score had improved from 77 to 89 points, with only a slight impairment in range of motion remaining, and normal strength. Overall, the patient stated to be very satisfied with the result.

### Discussion

Due to the rarity of incidence of posterior-fracture dislocations, their occasional occurrence creates a “diagnostic trap” for the unwary surgeon [9]; due to incomplete clinical and radiological evaluation at the emergency department, the injury is overseen in 60% at first presentation.

In order to prevent missing this diagnosis, firstly, adequate clinical examination is essential. Particularly asymmetry between the shoulders and an inability to externally rotate

the shoulder should arouse suspicion. Secondly, a transscapular (Y) and axial radiographic projection should always be performed. The radiographic findings on the anteroposterior projection may be so subtle that a posterior dislocation is missed. However, with the addition of axillary and Y views the dislocation will be quite obvious. An axillary projection requires some abduction at the shoulder, which can be very painful after an injury. To overcome this problem, alternatively, a Velpeau axillary view can be obtained [18]. In our hospital, the Velpeau projection has become the routine projection together with the anteroposterior projection in trauma to the shoulder.

Our case was complicated by a concomitant clavicle fracture that had apparently masked the dislocation on initial examination (although passive external rotation should still have been possible) and was assumed to have caused a frozen shoulder. Only 9 months later, the correct diagnosis was made, a delay that rarely has been encountered [6, 13].

The difficulty to treat this injury lies within the fact that in a chronic dislocated humeral head, vascularisation is at risk, which may eventually lead to avascular necrosis. Moreover, the defect can become more extended, provoking instability, osteoporosis and osteoarthritis [1, 8]. Thus, apart from the extent of the humeral head injury and the age of the patient, the choice of treatment also depends on the interval between injury and diagnosis [8, 19].

Although the reverse Hill-Sachs defect is considered to be the main component of recurrent shoulder instability in posterior shoulder dislocation, there are no standardized treatment options [5]. Only a few series, each with a limited number of patients, have been described.

In 1952, McLaughlin was the first to treat the impression fracture, by transferring the subscapularis tendon into the defect [9]. Later, Hughes and Neer modified McLaughlin’s procedure by transferring the lesser tuberosity with its attached subscapularis tendon into small defects [10]. Rotational subcapital humeral osteotomy was introduced by Weber in 1984 [11]. However, all these techniques alter the humeral joint anatomy, leading to a limitation of internal rotation and possibly complicating future prosthetic reconstruction. Anatomic reconstruction with elevation of the depressed cartilage and subchondral buttressing with bone cement [20] or with spongiotic auto- or allograft [8] is possible in fresh defects where the articular cartilage has been impressed but not destroyed [6, 21]. For defects involving more than 40% of the articular surface, the treatment of choice has long remained total or hemiarthroplasty [6, 10, 12].

In younger patients like ours, all effort should be made to preserve the normal sphericity of the humeral head, thereby restoring the stability and function of the shoulder. This makes osteochondral allografting a logical option, provided that the residual bone is in good condition [22]. Thus, in spite of the risk associated with a long diagnostic delay and the large size of the defect, this is what we decided on. Even if

the procedure would fail, prosthetic reconstruction should be simple because the skeletal anatomy is not distorted [1, 5, 8, 13].

To our knowledge, only few published studies have performed femoral allografting in posterior fracture-dislocation. In 1996, Gerber and Lambert [13] introduced this method and reported good results in three cases with a mean Constant Score (CS) of 73 at mean final follow-up of 65 months and one bad result where avascular necrosis of the humeral head developed seven years postoperatively (CS 34). In 2010, Diklic *et al.* [6] retrospectively evaluated the outcome of 13 patients at a mean follow-up of 54 months (41 to 64). Their mean CS was 86.8 (43 to 98) in 12 patients with a 25 to 40% defect. One case developed avascular necrosis with collapse of the allograft in a 60% defect.

Compared to these studies and considering our relatively short follow-up period (with the shoulder function being likely to further improve), the functional outcome is encouraging. However, the follow-up period is too short to determine the final outcome of the treatment with respect to possible graft-failure or the development of osteoarthritis. These results will become evident with the passing of time.

## Conclusion

In this case report the successful treatment of a locked posterior shoulder dislocation with a large reverse Hill-Sachs defect with femoral allografting is described. It illustrates how this injury continues to be a “diagnostic trap” [9]; the correct diagnosis was masked by a clavicle fracture for 9 months. It reinforces the importance of complete radiographic evaluation, including axial and transscapular views for all shoulder trauma to prevent missing this diagnosis. Although evidence-based management strategies are lacking, we state that shoulder anatomy should be preserved where possible, even in cases with delayed diagnosis and large humeral head defects.

This case is unique in the combination of injuries, the long diagnostic delay and the encouraging functional results after femoral allografting.

## Financial Disclosure

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