

Osteochondral Autograft and Hemiarthroplasty for Bilateral Locked Posterior Dislocation of the Shoulder

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Abstract

Posterior shoulder dislocations are rare and account for less than 4% of all shoulder dislocations, with only 6.6% of these proving to be bilateral. More importantly, the majority of posterior shoulder dislocations continue to represent a diagnostic trap for the unwary physician who first sees patients with this condition.

This report describes the treatment of a locked bilateral posterior dislocation of the shoulder with an associated impression fracture of both articular surfaces of the humeral heads due to an epileptic seizure. The osteochondral autograft obtained from the left humeral head was sutured to the dominant (right) side and the hemiarthroplasty was performed on the contralateral non-dominant shoulder.

Posterior bilateral dislocation of the shoulder is still a diagnostic challenge. In the chronic setting, bilateral hemiarthroplasty should be postponed as long as possible since posterior bilateral dislocation is usually experienced by middle-aged active males.

Posterior shoulder dislocations are rare and account for less than 4% of all shoulder dislocations,¹⁻⁵ with only 6.6% of these proving to be bilateral.⁴ More importantly, the majority of posterior shoulder dislocations continue to represent a diagnostic trap for the unwary physician who first sees patients with this condition.⁵ Treatment therefore varies from closed reduction under anesthesia to open surgery,² depending on the length of time between injury and diagnosis.

Once conservative treatment is deemed inappropriate, and the duration of the dislocation, the extent of the

defect in the humeral head, the condition of the glenoid fossa, and the patient's general health is taken into consideration, a number of procedures are available. Treatment options range from tendon transfers to hemiarthroplasty and total arthroplasty to grafts.² This report describes the treatment of a locked bilateral posterior dislocation of the shoulder with an associated impression fracture of both articular surfaces of the humeral heads due to an epileptic seizure. The osteochondral autograft obtained from the left humeral head was sutured to the dominant (right) side and the hemiarthroplasty was performed on the contralateral non-dominant shoulder.

The authors have obtained the patient's written informed consent for the print and electronic publication of the report.

CASE REPORT

A previously healthy 45-year-old, right-handed man was assessed. He had been suffering from bilateral shoulder pain upon waking-up each morning for the previous 3 months. During this period, the patient was examined at 2 different medical centers where he was misdiagnosed. In the clinical examination, both shoulders appeared flattened and the arms were locked in an internal position when viewed from the front. There was also reduced anterior elevation at 60°. Standard radiographs showed bilateral posterior shoulder dislocations (Figures 1A and 1B). A computed tomography (CT) scan was obtained in order to analyze the size of the humeral defect, which was considered to involve 50% of the articular surface in both shoulders (Figures 2A and 2B).

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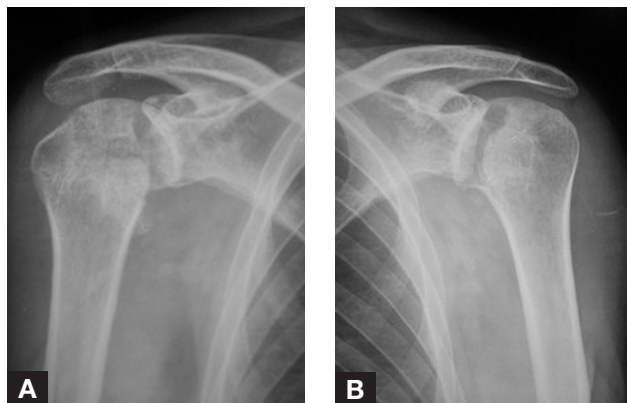


Figure 1. Anteroposterior x-ray of the left (A) and the right (B) shoulders showing bilateral posterior dislocation.

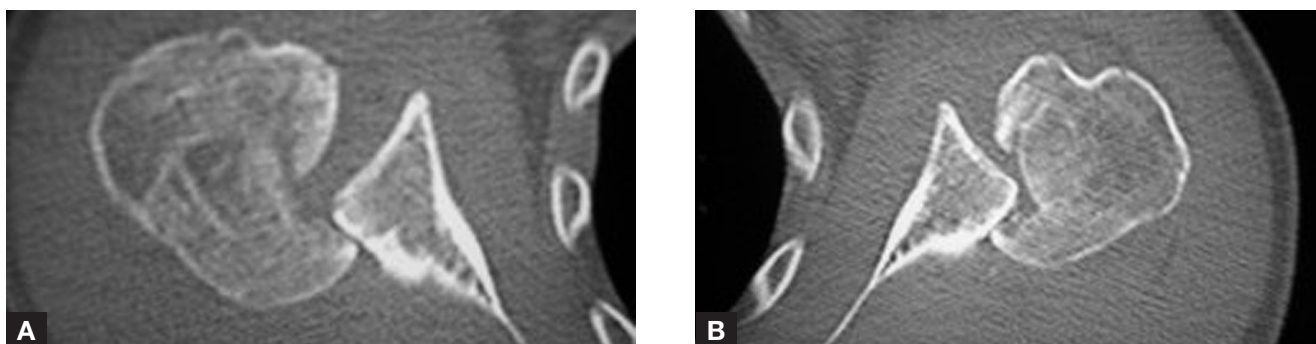


Figure 2. CT scan showing articular impaction fracture of more than 50% of the articular surface in the left (A) and right (B) shoulders.

Because of the amount of articular surface affected, and the delay in treatment, a hemiarthroplasty was performed on the left shoulder and the excised left humeral head was used to reconstruct the right humeral head. The neurological examination, which included a CT scan and an electroencephalogram, revealed no abnormalities and the patient was considered to have suffered an epileptic seizure, as he did not recall receiving an electric shock or having experienced extreme trauma.

The patient was placed in the beach-chair position and the left shoulder was first manipulated using a standard deltopectoral approach. Extreme care was taken to detach the subscapular muscle and reduction was by no means easy. An examination of the humeral head revealed a large articular defect with the greater and lesser tuberosities intact. The remaining humeral head was osteotomized following the anatomical neck of the humeral head, preserving both tuberosities as if a primary hemiarthroplasty for glenohumeral osteoarthritis was performed. The bone obtained was preserved in a saline solution. The hemiarthroplasty was implanted in its anatomical position and showed good stability when tested in the operating room. No issues relating to the posterior capsule were addressed and the subscapular was reattached to the humeral neck with the aid of previously passed non-absorbable sutures. The right shoulder was then treated in the same manner using the deltopectoral approach and the subscapular muscle was also detached. The preserved articular segment obtained from the left shoulder was then shaped and contoured to fit into the articular defect of the right shoulder that had previously been refreshed to favor graft integration. Although good stability seemed to have been achieved after press-fitting the autograft into the defect, fixation was improved by passing transosseous bone sutures through pre-drilled holes in the greater and lesser tuberosities surrounding the graft to brace it (Figure 3).

Gentle passive exercise was started immediately after surgery. At 2-year follow-up, the patient was pain-free in both shoulders. Mobility was the same in both shoulders and the patient was able to achieve 160° flexion, 45° external rotation, and level L3 of internal rotation. The latest x-ray and magnetic resonance imaging obtained at the 2-year follow-up revealed good bone integration of the graft (Figures 4 and 5), although the radiograph demonstrated sclerosis of

the articular segment suggesting that it is avascular and may well collapse with time. A hemiarthroplasty x-ray examination showed no remarkable findings (Figure 6).

DISCUSSION

Even though it is a well-established fact that posterior shoulder dislocation is commonly misdiagnosed, it still constitutes a frequent cause of diagnostic error. Bilateral posterior shoulder dislocation typically occurs in middle-aged males and has been named the triple E syndrome, as it is usually produced by an epileptic seizure, an electric shock, or extreme trauma.⁶⁻⁸

The therapeutic approach to posterior shoulder dislocations depends on the period of time between diagnosis and treatment, the extension of the articular humeral defect, and the bilaterality of the process. McLaughlin⁵ advocated for subscapularis transposition to achieve stability and fill in the articular defect. Hawkins and colleagues² meanwhile, proposed transferring the osteotomized lesser tuberosity together with the subscapularis into the defect. The choice between both techniques depends on the size of the articular defect and the surgeon's perception of shoulder stability in the operating room once the dislocation has been reduced. If the articular defect exceeds 50% of the total surface, a hemiarthroplasty is recommended. Alternatively, Gerber and Lambert⁹ treated 4 consecutive patients with chronic locked posterior shoulder dislocation with an associated defect of the humeral head of at least 40% of the articular surface in another manner. The patients were treated with an allogeneic segment of a femoral head. They showed good clinical results and there was good graft incorporation in 3 patients and the development of avascular

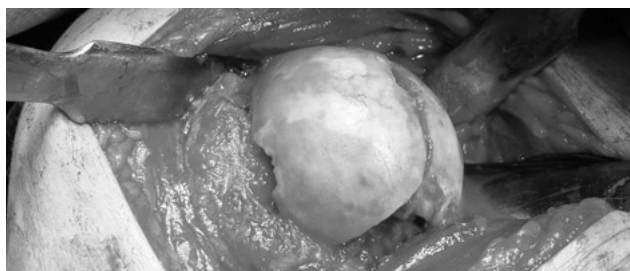


Figure 3. Autograft obtained from the left shoulder and fitted into the right shoulder.



Figure 4. X-Ray image of the 2-year follow-up of the grafted shoulder showing good articular contour although subchondral sclerosis.

necrosis and graft collapse in 1 patient.⁹ Martínez and colleagues¹⁰ reported on a series of 6 patients with posterior dislocation and impression fracture of the humeral head involving at least 40% of the articular surface on which the defect of the head was filled with an allogenic segment of humeral head contoured to restore the spherical shape. In 2 of these 6 patients, the allograft flattened and collapsed with time.¹⁰

The situation is slightly different in the case of bilateral locked posterior dislocation because both shoulders risk losing function and there is a wider choice of treatment combinations. The time elapsed before treatment, the articular defect of the humeral head, and the patient's dominant side must be taken into consideration when determining treatment options. Although bilateral hemiarthroplasty has been reported as a treatment for bilateral posterior fracture dislocation, the authors believe that bilateral hemiarthroplasty should always be avoided if at all possible.¹¹ One alternative treatment might be to implant a hemiarthroplasty on one side and use the autograft obtained from a humeral head osteotomy to reconstruct the articular defect of the humeral head on the other side. Two previously published reports address bilateral locked posterior dislocation with a hemiarthroplasty on one side and autografting the articular defect on the other side in a 1-stage procedure.^{4,12} The difference between the case outlined in this paper and the others is the extremity chosen for hemiarthroplasty. While Connor and colleagues¹² chose the nondominant side to implant the hemiarthroplasty, arguing that the functional result is less predictable, Ivkovic and colleagues⁴ selected the dominant side. However, the latter later clarifies that hemiarthroplasty should be performed on the nondominant side in the discussion. Despite the good final clinical outcome on differing sides, the authors agree that hemiarthroplasty should be reserved for the nondominant side because of possible complications that might arise in the active working middle-aged male population. The authors also believe that hemiarthroplasty can be safely implanted while avoiding a change of version or releasing the posterior capsule without risk of dislocation recurrence. Furthermore, the final range of motion obtained is an improvement on that reported with hemiarthroplasties placed with proper retroversion.

Another discussion topic is the fixation of the autograft. While Connor and colleagues,¹² and Ivkovic and colleagues⁴ used different screws to fix the graft to the remaining humeral head, the authors prefer to press-fit the graft and improve fixation with bone sutures to avoid the use of screws due to the potential risk of necrosis in the articular fragment that

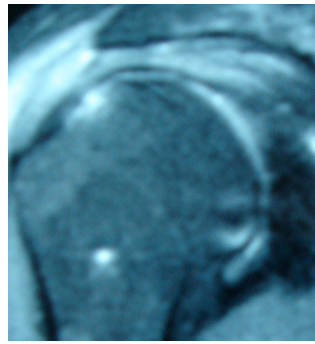


Figure 5. Two-year follow-up MRI of the left shoulder showing good graft incorporation.



Figure 6. Two-year follow-up x-ray of the right shoulder with the hemiarthroplasty in place.

may lead to articular screw intrusion. Even though the exact rate of graft necrosis remains unknown due to the limited number of studies published, Gerber and Lambert,⁹ and Martínez and colleagues¹⁰ have reported on the development of avascular necrosis of the inserted allograft.

CONCLUSION

Posterior bilateral dislocation of the shoulder is still a diagnostic challenge. In the chronic setting, bilateral hemiarthroplasty should be postponed as long as possible since posterior bilateral dislocation is usually experienced by middle-aged active males. One alternative might be to use the remaining contralateral humeral head as an autograft to reconstruct the dominant side and reserve hemiarthroplasty for the non-dominant side. Autograft reconstruction of the dominant shoulder potentially produces less co-morbidity and better functional results than hemiarthroplasty. Since necrosis of the autograft may develop over time, screw fixation of the graft should be avoided.

AUTHORS' DISCLOSURE STATEMENT

The authors report no actual or potential conflict of interest in relation to this article.

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