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Management Techniques for Posterior Shoulder Dislocations: A Discussion and Case

Introduction

Posterior shoulder dislocations are an uncommon injury and comprise less than 5% of all shoulder dislocations. Even more rare, are posterior shoulder fracture-dislocations, comprising less than 1% of shoulder fracture-dislocations.¹ Posterior shoulder dislocations usually occur as a result of trauma, seizure, severe muscle contractions following an electric shock.^{1,2} Prompt evaluation and treatment of this condition is paramount in order to prevent avascular necrosis of the humeral head.³ Over 70 years ago, McLaughlin noted the difficulty that can be present in diagnosing a posterior shoulder dislocation—“posterior dislocation of the humerus is a diagnostic trap. Clinical and roentgenographic evidence of this lesion is always present, but usually escapes notice unless deduced.”⁴ These injuries can be missed or have delayed diagnosis due to non-specificity of pain, or the urgent treatment of an associated condition taking medical priority and distracting from a focused assessment of the entire patient. Furthermore, when assessed with x-ray, AP radiographs of the shoulder often appear normal.¹

Careful examination is necessary to prevent missed or delayed diagnosis. On inspection, increased prominence of the coracoid, flattening of the anterior shoulder and increased prominence over the posterior shoulder may only be noticeable in direct comparison to the contralateral side.⁴ The examiner should look for fixed internal rotation and adduction of the shoulder with limited external rotation and abduction and/or pain with attempted range of motion.^{1,4} Radiographically, multiple views of the shoulder must be obtained. While the Emergency Department (ED) will often obtain an AP and Scapular Y view of the shoulder, these films are often unsatisfactory for diagnosis⁴, which can be confirmed with Axillary or Velpeau views.¹ Posterior shoulder dislocations can lead to impression defects of the anteromedial humeral head—reverse Hill-Sachs lesions—caused by the humeral head impacting on the glenoid. The size of the impression defect has been defined into categories of less than 20%, 20-40%, and

greater than 45-50% of the humeral head articular surface.⁵ Posterior dislocations have also been considered acute within 6 weeks and chronic if present for more than 6 months.⁵

Treatment options

Closed reduction

Closed reduction is a treatment option indicated for posterior shoulder dislocations with small impression defects. These are typically dislocations diagnosed within the first 6 weeks after injury as delay of diagnosis beyond 6 weeks typically leads to greater progression of the impression defect.⁶ Closed reduction may be accomplished by disimpacting and clearing the reverse Hill-Sachs lesion from the posterior glenoid. Traction, adduction, internal rotation, and posterior force on the humerus will disengage the humeral head from the glenoid. Following disimpaction, external rotation of the humerus will relocate the shoulder. Care must be taken to ensure that the humeral head has been completely disengaged from the glenoid as premature humeral external rotation has risk of fracturing the humerus.⁶ After reduction, instability is assessed by determining the amount of internal rotation at which the shoulder re-dislocates.⁶

Operative treatment

If the shoulder is not stable through a functional range of motion, a stabilization procedure is indicated. For dislocations with impression defects less than 40-50% of the humeral head articular surface, the McLaughlin or modified McLaughlin procedures have been widely used to achieve stability following reduction.⁶ When greater than 40-50% of the humeral articular surface is involved in the reverse Hill-Sachs lesion, arthroplasty is the most commonly used treatment.^{6,7}

Case presentation

The patient was, at the time of injury, a 23 year-old right hand dominant male with bilateral posterior shoulder fracture

dislocations after a fall from height from a truck rig (Figure 1). At the time of initial injury, he presented to a local ED who deferred reduction and referred him to an orthopedist in the community. The patient followed up outpatient with the community provider 12 days after initial injury. At that time, the outside provider informed the patient he was unable to care for his condition and referred him to a tertiary shoulder and elbow specialist at our institution. The initial visit at our institution occurred 3 weeks after the index injury. Physical exam revealed no obvious deformity or ecchymosis. There was tenderness to the bilateral shoulders on palpation and throughout passive range of motion. Active range of motion was limited to 10 degrees in each plane. The patient was otherwise neurovascularly intact distally to the bilateral upper extremities. X-rays and CT scan of the bilateral shoulders revealed posterior shoulder dislocation with comminuted reverse Hill-Sachs fractures with humeral heads perched on the posterior glenoid (Figure 1, 2, and 3). The decision was made to pursue operative management for his bilateral posterior shoulder fracture dislocations.

On the left, the patient was treated via a Modified McLaughlin through the rotator interval. On the right, there was a greater degree of bone loss compared to the contralateral extremity, requiring fixation with hemiarthroplasty using complete peeling of the subscapularis (Figure 4).

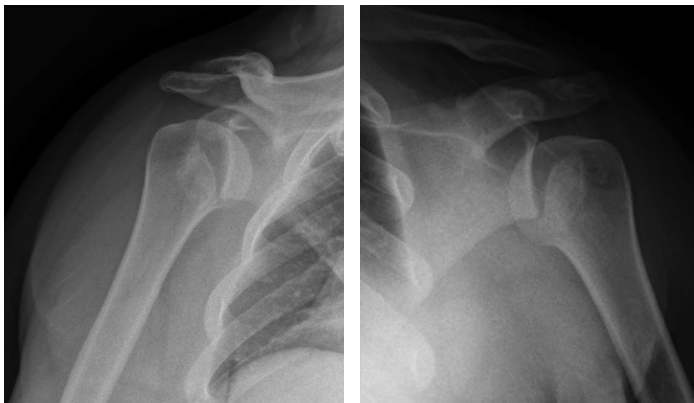


Figure 1. Shoulder x-rays of the right (left) and left (right) sides illustrating posterior shoulder dislocations.

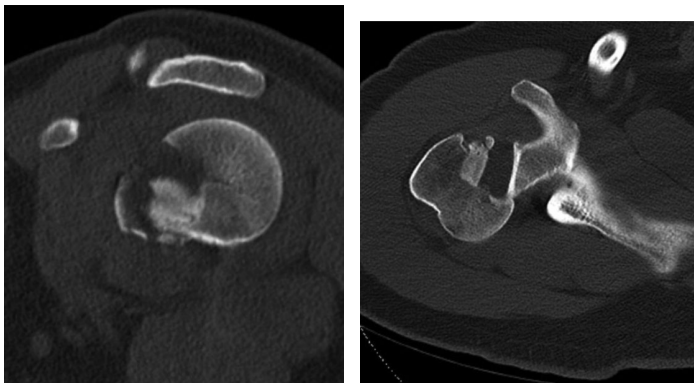


Figure 2. CT scan of the right shoulder illustrating a posterior shoulder dislocation with large comminuted reverse Hill-Sachs fracture with humeral head perched on the posterior glenoid.

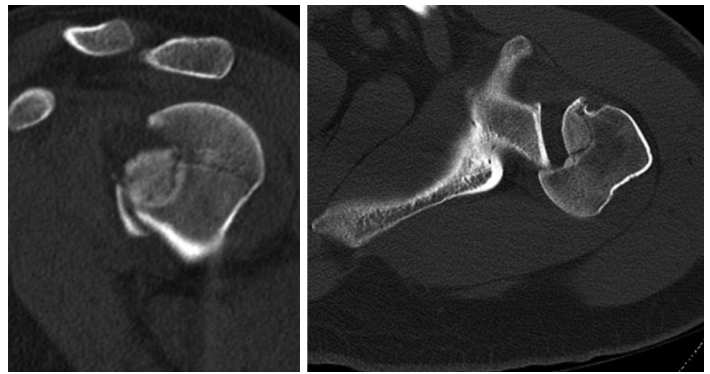


Figure 3. CT scan of the left shoulder illustrating posterior shoulder dislocation with comminuted reverse Hill-Sachs fracture with humeral head perched along the posterior glenoid.

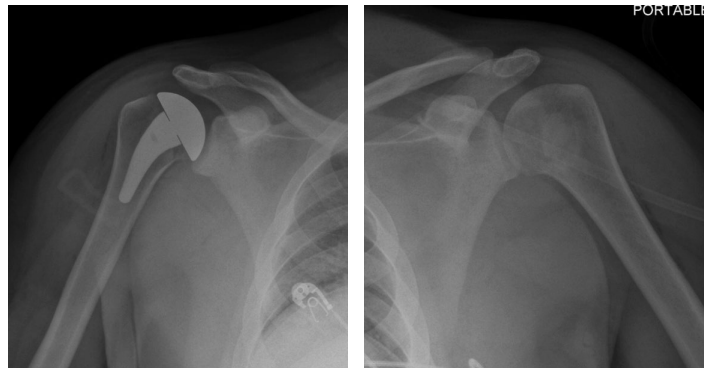


Figure 4. Postoperative shoulder x-rays of the right (left) and left (right) sides after right shoulder hemiarthroplasty and left shoulder Modified McLaughlin procedures.

Procedure

The patient was positioned in the modified beach chair position. The left shoulder and extremity were draped, and the procedure completed in its' entirety prior to prepping and draping of the right shoulder, and completion of reduction and fixation on the right side.

Left

There was an initial attempt at closed reduction with paralysis but the humeral head did not disengage from the posterior glenoid. A standard anterior deltopectoral incision was made. Once the humeral head was palpated, it was reduced using posterior pressure with simultaneous internal rotation to disengage the reverse Hill-Sachs from the posterior glenoid. The arm was placed in external rotation to avoid further posterior subluxation. The reverse Hill-Sachs lesion was palpated and then the rotator interval was located and opened to allow palpation of the defect to localize the apex and leading edge. The Modified McLaughlin was performed using 3mm cottony Dacron tape, placed at the top of the apex of the reverse Hill-Sachs lesion. One arm of the tape was brought around the undersurface of the bicipital groove and out the greater tuberosity cortical bone laterally. The same procedure was repeated with the other limb of Dacron tape to create a horizontal mattress stitch in the superior aspect of the reverse Hill-Sachs lesion. Next, a second 3mm cottony

Dacron tape was placed just inferior to the first tape in the Hill-Sachs lesion defect. It was applied in the same fashion with both ends exiting through the lateral cortical bone transosseous and underneath the bicipital groove. After completion, tension was pulled on the free ends of the tapes to allow subscapularis to sink into the reverse Hill-Sachs defect, thereby creating a reverse remplissage effect. Each of the Dacron tapes were then sequentially tied over the bone bridge in horizontal mattress pattern. After completion, excess suture limbs were cut and the shoulder stability was tested and the patient was noted to have excellent range of motion with only minor loss of external rotation. There was no concern for posterior engagement of the glenoid with the arm brought into internal rotation. The left shoulder was closed and dressed, and held in external rotation.

Right

The right shoulder was positioned, prepped, and draped. An initial closed reduction maneuver was attempted with paralysis but failed. A standard anterior deltopectoral incision was made. The rotator interval was opened and followed to the supraglenoid tubercle. The biceps long head was tenodesed to the superior border of the pectoralis major tendon. An open reduction of the humeral head through the rotator interval was attempted but failed due to posterior glenoid engagement. A subscapularis peel was then performed. With the arm adducted, externally rotated, and flexed, a humeral capsular release was undertaken past the six-o'clock position. The humeral head was then disengaged from the posterior glenoid and dislocated anteriorly. Direct inspection revealed a very large reverse Hill-Sachs lesion with depression of the anterior 40% of the humeral head articulation. A hemiarthroplasty was then performed with Tornier Ascend Flex. After completion, the shoulder was reduced and the patient was found to have 140 degrees of passive forward elevation, 45 degrees of external rotation with the arm at the side, and no posterior dislocation with cross-body adduction. The right shoulder was closed and dressed.

The left shoulder was placed in an external rotation gun sling and the right shoulder was placed in a sling.

Modified McLaughlin

For posterior shoulder dislocation with 20-45% involvement of the articular surface of the humeral head in the impression defect, the subscapularis tendon may be transferred to fill the defect in the humeral head and prevent engagement with the posterior glenoid. To preserve the subscapularis attachment to bone and provide more bony support for defect, the lesser tuberosity may be osteotomized and transferred with the attached subscapularis to fill the defect.⁷

McLaughlin originally developed the McLaughlin procedure for correction of reverse Hill-Sachs deformities

after posterior shoulder dislocation by transferring the subscapularis tendon into the defect.⁸ The Modified McLaughlin was introduced by Hawkins et al, where the reverse Hill-Sachs defect was filled by transferring the subscapularis tendon and lesser tuberosity.⁸

Shoulder Hemiarthroplasty

Indication

For posterior shoulder dislocation with greater than 45-50% involvement of the articular surface of the humeral head in the impression defect and a preserved glenoid, a hemiarthroplasty should be performed.⁷

Discussion

Posterior shoulder dislocation accounts for less than 5% of all glenohumeral dislocations,⁶ Approximately 15% of posterior shoulder dislocations are bilateral,⁵ as was the case with the patient presented above. The rarity of the injury, the associated injuries, and often delayed diagnosis contribute to the morbidity of posterior shoulder dislocations.⁵ The approach to treatment of posterior shoulder dislocation and instability should take into account the timeline since injury, and most importantly the size of the reverse Hill-Sachs lesion.

The patient above required operative management of bilateral posterior shoulder dislocations and demonstrates how management may differ based on evaluation of patient pathology. The left shoulder was reduced with an opening in the rotator interval and following evaluation of the impression defect, was able to be managed with a modified McLaughlin procedure. For the right shoulder, reduction first required peeling of the subscapularis in order to disengage the reverse Hill-Sachs from the posterior glenoid. Evaluation of the humeral head following reduction found the defect too large to be successfully treated by filling the defect alone, and a hemiarthroplasty was performed.

Conclusion

Posterior shoulder dislocation may be treated with closed reduction, a McLaughlin procedure, modified McLaughlin procedure, or arthroplasty. Selecting the correct treatment requires consideration of the humeral head defect and intraoperative findings. Having multiple options available in the operating room facilitates making the optimal treatment choice for the patient.

Dedication

The authors would like to dedicate this paper to the memory of the patient referenced in this report who passed away in the year following his injury.

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