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Reduced Humeral Component Retroversion as a Preventive Strategy to Avoid Recurrent Posterior Instability in Seizure Induced Posterior Dislocations with Severe Bone Loss

Sebastián Cobián Pérez, Arlene I. Pérez Zierenberg, Felix M. Rivera Troia and Carlos J. Pérez López*

Department of Surgery, Section of Orthopedic Surgery, Ponce Health Sciences University, School of Medicine, Ponce, Puerto Rico

***Corresponding author:** Carlos J. Pérez López, Department of Surgery, Section of Orthopedic Surgery, Ponce Health Sciences University, School of Medicine, Ponce, Puerto Rico. E-mail: cjperez80@yahoo.com

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Abstract

We present the case of a 52-year-old male with an atraumatic, locked posterior dislocation of the left shoulder with approximately 50% humeral head bone loss, requiring hemiarthroplasty. Given the strong suspicion of an underlying seizure disorder, the humeral component was implanted with reduced retroversion of 10° to enhance posterior stability. Six weeks later, the patient experienced an undiagnosed nocturnal seizure, resulting in a locked posterior dislocation of the contralateral shoulder that likewise required hemiarthroplasty. Despite the convulsive event, the initial prosthesis remained stable without evidence of redislocation. Neurologic evaluation ultimately confirmed a seizure disorder. This case highlights sequential bilateral posterior shoulder dislocations as the initial manifestation of an undiagnosed seizure disorder and suggests that individualized humeral component version may be an important surgical consideration for patients at risk of recurrent seizure-associated posterior instability.

Keywords: Bilateral posterior shoulder dislocation; Humeral retroversion; Hemiarthroplasty; Shoulder arthroplasty; Reverse Hill-Sachs lesion; Light-bulb sign

Introduction

The glenohumeral joint is the most frequently dislocated joint in the body [1], with anterior dislocations comprising the majority of cases [2]. Posterior dislocations, in contrast, account for less than 3% of all glenohumeral dislocations [3], and bilateral dislocations represent an even rarer entity, mainly resulting from epileptic seizures [4].

Glenohumeral joint stability is provided by a coordinated interaction of osseous-capsuloligamentous and muscular contributions [5]. During seizures, tonic, forceful contractions generate forces capable of luxating and fracturing certain joints [6]. In the shoulder, this mechanism of injury is thought to result from an imbalance between the internal rotators of the shoulder (i.e. the subscapularis muscle), which contract with greater force than the external rotators (i.e. infraspinatus and teres minor). The effect is superior and posterior displacement of the humeral head from the glenoid cavity [7]. In some cases, posterior glenohumeral dislocations can result in a locked position, where the dislocation of the humeral head posteriorly is not followed by return to the glenoid cavity, causing its incarceration [8]. Notably, locked posterior dislocations of the shoulder are known to be misdiagnosed in 50-79% of cases due to lack of recognizable patterns on radiologic imaging, especially on anteroposterior imaging [9-11].

A common finding of chronic posterior dislocations is a reverse Hill-Sachs lesion, the extent of which guides treatment selection [12]. When humeral head bone loss reaches 45%-50%, shoulder arthroplasty is generally favored [12]. Studies suggest that both total shoulder and hemiarthroscopy have comparable efficacy in restoring function in locked posterior shoulder dislocations, especially when the rotator cuff is intact [13]. On the other hand, both surgical technique and humeral version significantly influence shoulder arthroplasty outcomes, with humeral version playing a particularly important role in implant stability, muscle forces, and range of motion [14]. While individual anatomy must be taken into consideration [15], current evidence supports a humeral version of 0° to 20° as optimal for most shoulder arthroplasties, with positioning of the humeral component between 20° to 40° of retroversion, which significantly increases impingement-free range of motion, external rotation and reduces the risk of subluxation [14].

In this case report, we present sequential bilateral posterior shoulder dislocations as the initial presentation of an undiagnosed seizure disorder and discuss the potential protective role of humeral component orientation during hemiarthroplasty in preventing redislocation.

Case Presentation

This is a case of a 52-year-old male with no significant past medical history who presented to the orthopedic clinic with a six-week history of severe left shoulder pain and complete loss of functional range of motion (ROM). The patient denied any trauma but recalled waking up one morning with the shoulder feeling "stuck," followed by progressively worsening pain. He had initially sought care at a local emergency department (ED), where a single anteroposterior (AP) radiograph was obtained and he was discharged with a sling and analgesics without a definitive diagnosis. After a month of persistent symptoms, he returned to the ED, where a Computed Tomography (CT) of the left shoulder revealed an incarcerated posterior glenohumeral dislocation with an engaging reverse Hill-Sachs lesion (Figure 1), prompting referral to our orthopedic clinic for further evaluation.

On physical examination, no gross deformity was noted; however, physical examination revealed markedly diminished global range of motion. Rotator cuff strength and provocative maneuvers could not be reliably assessed due to patient apprehension. Neurovascular examination of the left upper extremity was unremarkable. Quantification of humeral head bone loss demonstrated approximately 50% involvement.

Figure 1: Axial CT image of the left shoulder demonstrating a locked posterior glenohumeral dislocation with engaging reverse Hill-Sachs lesion with severe humeral head bone loss.

Given the atraumatic presentation and imaging findings, an underlying seizure disorder was suspected. Neurology referral was requested alongside urgent surgical planning.

The extent of humeral head bone loss excluded the McLaughlin procedure, and arthroplasty was pursued as the treatment. Given the strong clinical suspicion for an underlying seizure disorder and the associated risk of future convulsive episodes, particular attention was paid to implant orientation as a means of preventing redislocation.

Surgery was performed in the beach chair position, and access was a standard delto-pectoral approach with a subscapularis peel. The patient's anatomical humeral retroversion was measured intraoperatively at approximately 30°; however, given the patient's seizure risk, a decision was made to perform a forearm referenced 20° retroversion cut to provide stability against posterior shifting. A short stem design humeral component was press-fit implanted in the targeted 20° of retroversion after trials were performed confirming shoulder stability especially in a posterior vector.

Reduction was successful and with adequate intraoperative range of motion. The subscapularis was reattached using high-strength sutures through both the stem and bone tunnels. The deltopectoral interval was closed in standard fashion with careful preservation of the cephalic vein. The arm was placed in a sling postoperatively and rehabilitation protocol was initiated, including gentle pendulums and early passive ROM avoiding excessive internal and external rotation. Given the suspected underlying seizure disorder, neurology evaluation was once again strongly reinforced prior to discharge.

Assessments in the first post-operative visit demonstrated adequate recovery. However, at the six week follow-up, the patient complained of severe right shoulder pain and poor global ROM, again without any reported trauma. Notably, he exhibited evident tongue lacerations, which he reported noticing upon waking, a finding strongly suggestive of a nocturnal seizure. Anteroposterior radiographs of the right shoulder demonstrated the classic "lightbulb sign," accompanied by a large Hill-Sachs lesion (Figure 2), consistent with a posterior glenohumeral dislocation.

Figure 2: Anteroposterior (AP) radiograph of the right shoulder demonstrating the classic "light bulb" sign of posterior glenohumeral dislocation with an associated reverse Hill-Sachs lesion.

Further imaging evaluation of the right shoulder revealed approximately 40% humeral head bone loss. Concurrently, Xray examination of the left shoulder confirmed a well-positioned prosthesis at 20° of retroversion with no evidence of migration or instability (Figure 3).

Figure 3: Anteroposterior Xray imaging of the left shoulder revealing intact prosthesis with no posterior migration following second episode of seizures.

The patient's failure to follow up with neurology, likely attributable to denial of his condition, ultimately resulted in a second posterior dislocation following another convulsive episode. Upon this presentation, the importance of neurological evaluation was discussed, and the patient subsequently completed a neurology consultation, where a diagnosis of epilepsy was established and levetiracetam (Keppra) 500mg was initiated.

Surgical planning for the right shoulder proceeded accordingly. Given the right shoulder's anatomic retroversion of 30° and the lessons drawn from the left side, a hemiarthroplasty was performed targeting 20° of retroversion, which represents a 10° reduction in retroversion from the patient's anatomic version. The procedure was completed successfully, the same rehabilitation protocol was established, and subsequent post-operative visits demonstrated adequate recovery.

Discussion

Posterior shoulder dislocations account for only 3% of all the dislocations of the glenohumeral joint [3], and sequential bilateral dislocations represent an even rarer entity, occurring most commonly in the setting of epileptic seizures [7]. Accordingly, seizure activity should be considered in patients presenting with posterior shoulder dislocations, particularly in the absence of a clear traumatic mechanism [16]. The clinical manifestations of posterior shoulder dislocation are broad and may include restricted ROM, poor rotator cuff strength with limited external rotation and abduction, and persistent pain [5,9].

Posterior shoulder dislocations have a high incidence of misdiagnosis for a contusion or a rotator cuff injury [17], as occurred with our patient, who was initially discharged with only a sling and analgesia following a single AP radiograph. Supplementary views are essential in cases of clinical suspicion; a scapular "Y" view or axillary projection can reliably confirm the diagnosis when standard AP imaging is inconclusive [18]. In our patient, a "Y" view (Figure 4) in conjunction with axial CT imaging (Figure 1) rapidly established the diagnosis of posterior glenohumeral dislocation.

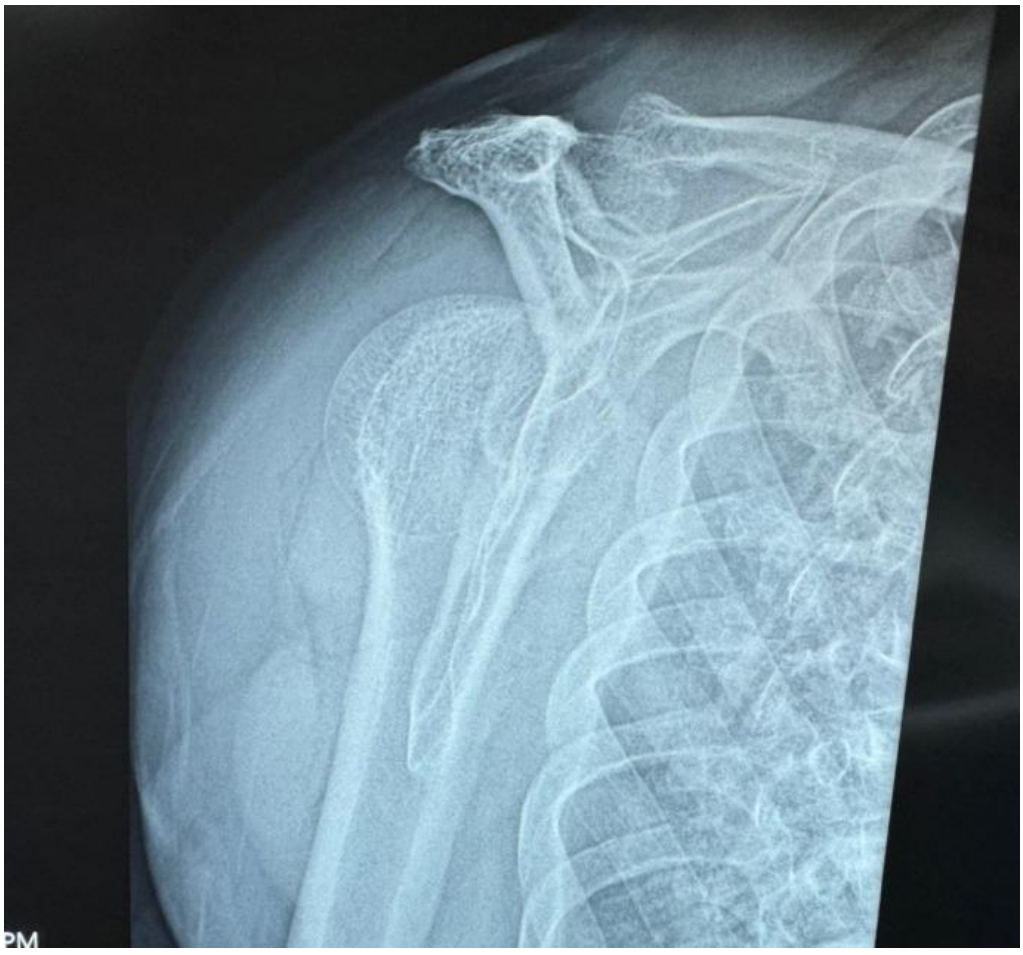

Figure 4: Scapular "Y" view confirming posterior dislocation.

Native humeral version may vary greatly between individuals, with studies suggesting ranges spanning from 6° of anteversion to 56.6° of retroversion [19]. Other studies have suggested that humeral and glenoid versions have an impact in instability and ROM in patients that underwent reverse shoulder arthroplasty, yet limited focus has been placed on the effects of humeral component or glenoid component version in anatomic shoulder arthroplasty [19]. Pearl et al. suggests that reconstruction of the retroversion angle must be individualized [15]. In our patient, the humeral component was implanted in 20° of retroversion, representing a 10° reduction from the patient's native retroversion of approximately 30°, with the goal of improving posterior stability in the event of future seizure activity.

The clinical value of this approach was subsequently demonstrated when the patient experienced another convulsive episode, attributable to non-compliance with the neurology referral, likely due to poor understanding of his diagnosis, which resulted in a posterior dislocation of the contralateral shoulder but left the previously replaced shoulder entirely stable. Despite this convulsive episode, the left shoulder hemiarthroplasty showed no evidence of redislocation, suggesting that reducing humeral component retroversion may have contributed to postoperative stability despite recurrent seizure activity. Moreover, a visit to the neurologist after the second surgery led to thorough evaluation, the diagnosis of a seizure disorder, and the patient was started on anticonvulsants with intentions of preventing further epileptic episodes.

Conclusion

Posterior shoulder dislocation should raise suspicion for an underlying seizure disorder, particularly in the absence of a clear traumatic mechanism, as delayed diagnosis remains common and may result in substantial humeral head bone loss requiring arthroplasty. This case highlights the importance of prompt neurological evaluation and multidisciplinary management to reduce the risk of recurrent seizure-related injury. Furthermore, our experience suggests that individualized humeral component version, incorporating a modest reduction from the patient's native retroversion, may enhance postoperative stability in patients at high risk for recurrent seizures. Although larger studies are needed to establish optimal implant positioning, this case supports consideration of humeral component orientation as an important surgical strategy for minimizing redislocation following hemiarthroplasty.

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