

Bilateral shoulder pain developing after a hypoglycemic seizure

Posterior shoulder dislocations are hard to diagnose because of their rarity. Your ability to order appropriate radiographs and then to interpret them correctly is key.



FIGURE 1. Right (a) and left (b) shoulders in internal rotation (prereduction)

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CASE

A 63-year-old male presented to the emergency department (ED) with bilateral shoulder pain. He reported that 4 days earlier, he experienced a hypoglycemic seizure and that the shoulder pain had been constant since then. His wife witnessed the seizure and denied that he had experienced any associated trauma. Immediately after the seizure, the patient refused transport by emergency medical services but acknowledged experiencing the shoulder pain. He presented to his primary care physician the following morning, when routine laboratory tests were ordered, a physical examination was conducted, and referral to a neurologist was made. At the neurology clinic, the patient reiterated his continued shoulder pain, for which bilateral shoulder radiographs were obtained. The radiographs showed that the patient had sustained bilateral fractures of the proximal humerus. The patient was notified and referred to the ED for further evaluation.

History and examination The patient's history was significant for diabetes, mild hypertension, hypercholesterolemia, and benign prostatic hypertrophy. He had no history of seizure disorders. He denied any tobacco use and acknowledged drinking one glass of wine a few nights a week. He stated that he has three to four meals a day and exercised regularly.

The patient was a well-nourished, well-developed white male with mild shoulder discomfort. He appeared to be in good physical condition for his age. His vital signs were stable. Focused examination of the shoulder revealed no open wounds, with mild ecchymosis of the anterior aspect of the shoulder and anterior arm bilaterally. There were no obvious deformities of the shoulder region or the proximal arm, but there was soft tissue swelling and tenderness of the superior and lateral aspect of the deltoid muscle and the anterior aspect of the glenohumeral joint. Active range of motion was limited in forward flexion, abduction, and especially external rotation. Passive range of motion in forward flexion was limited to 60 degrees, abduction to 20 degrees

and external rotation to neutral (0 degrees). The elbow, wrist, hands, and fingers were normal. Radial and ulnar pulses were intact bilaterally. Motor and sensory function of the axillary, musculocutaneous, radial, median, ulnar, and the posterior and anterior interosseous nerves were grossly intact bilaterally. Strength was decreased as a result of pain around the shoulders but was equal bilaterally.

Imaging Bilateral anteroposterior (AP) views of the shoulders in internal rotation (Figure 1) and external rotation (Figure 2) revealed no obvious abnormality of the clavicles, acromioclavicular joints, or glenohumeral joints. The left shoulder showed a fracture of the lesser tuberosity, and the right shoulder demonstrated a fracture of the medial aspect of the proximal humerus near the insertion of the pectoralis major. Axillary views (Figure 3) indicated bilateral posterior shoulder dislocations, as well as large lesser tuberosity fragments and reverse Hill-Sachs lesions (compression fracture of the anterior humeral head). The left shoulder axillary view also demonstrated a small fracture of the posterior glenoid rim.

Closed reductions of the dislocations were achieved in the ED using the Brooke Army reduction sequence,¹ and postreduction radiographs and CT scan confirmed articular congruity. The patient was placed in bilateral shoulder slings with abduction pillows and admitted for pain control. The medicine service was consulted for further evaluation and management of the patient's diabetes while operative management was planned and discussed with the patient.

DISCUSSION

Posterior dislocations of the shoulder comprise less than 4% of all shoulder dislocations.^{1,3} Although this condition is well-described in the literature, most reported cases of posterior dislocations are missed on the patient's initial visit; the rare presentation and the subtle physical and radiographic findings make diagnosis difficult unless the patient history raises the index of suspicion.^{1,4} Even orthopedic surgeons fail to identify posterior shoulder dislocations, although the surgeon's level of experience is directly correlated with the rate of missed diagnosis.⁵ Lack of appreciation of subtle findings on examination, inability to assess the patient because of pain, and inadequate radiographic views of the shoulder may contribute to the problem.

Because physical examination findings may be subtle, the clinician must be alert to the possibility of posterior shoulder dislocation in anyone who has suffered a seizure or electrical shock. These injury mechanisms have been found to be frequently associated with posterior shoulder dislocations.^{4,6,7}

Physical and radiographic assessment Several physical examination and radiographic findings should lead the clinician to suspect a posterior shoulder dislocation. Adequate assessment involves inspection of the shoulder for subtle deformities, such as a prominent anterior coracoid or posterior protrusion of the humeral head below the acromion. The patient typically presents with the affected arm held against the abdomen (adduction and internal rotation). With the head of the humerus pinched behind the glenoid, the patient

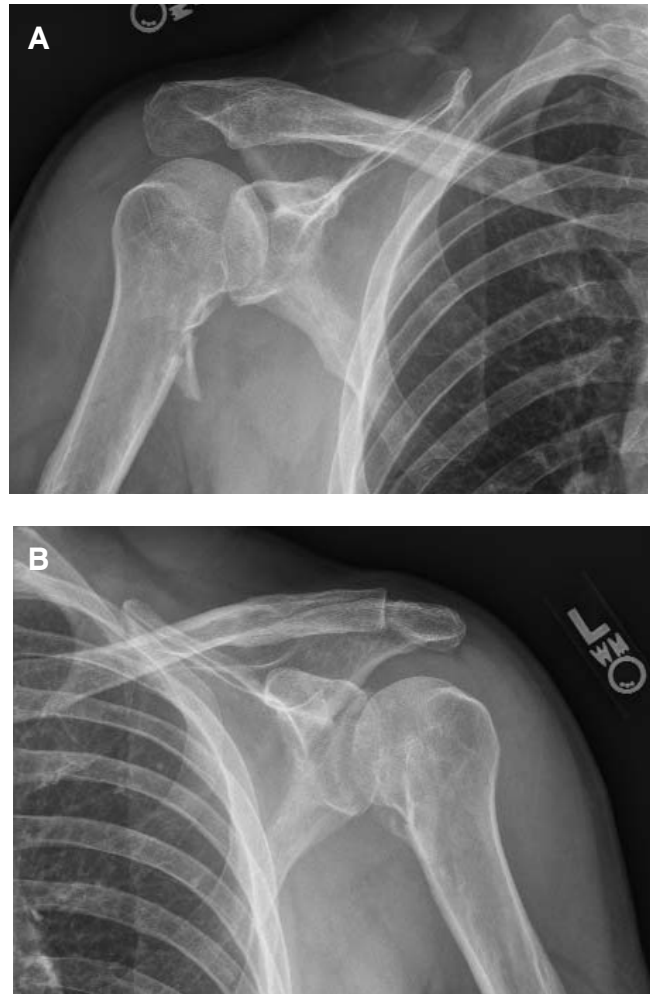


FIGURE 2. Right (a) and left (b) shoulders in external rotation (prereduction)

usually cannot externally rotate the shoulder. Palpation of the posterior aspect of the shoulder may reveal the prominent humeral head, but soft tissue swelling usually hinders an accurate assessment. Diagnosing the posterior dislocation may be aided by palpating for the posterior position of the dislocated humeral head while having the patient forward flex the affected shoulder.³

The neurovascular status of the affected limb must be carefully assessed. Both motor and sensory function should be compared with the contralateral side, paying special attention to the axillary and musculocutaneous nerves. Typical testing for range of motion may be not only difficult but also contraindicated in the presence of certain fractures of the proximal humerus. The patient's range of active and passive motion is usually assessed to the point of pain and then stopped. The patient's inability to tolerate movement of the shoulder can prevent the radiology technician from obtaining appropriate radiographs.

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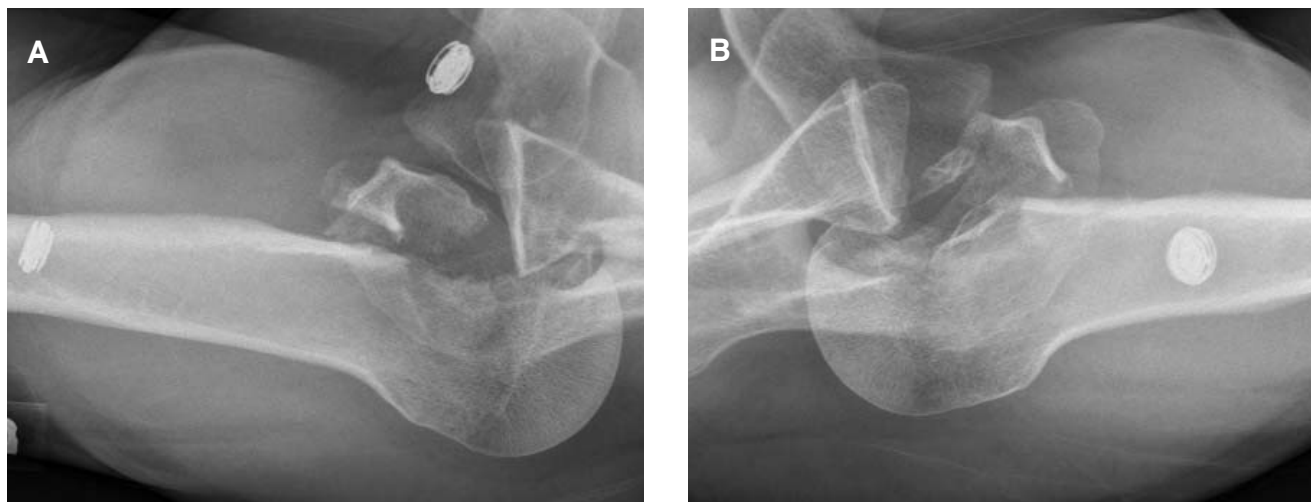


FIGURE 3. Right (a) and left (b) axillary views. Note that although Figures 1 and 2 reveal the fractures of the proximal humerus, the posterior dislocations of the shoulder are difficult to appreciate without the addition of axillary views.

Proper radiographic assessment of the posteriorly dislocated shoulder is critical in making a prompt diagnosis. Standard internal and external rotation AP radiographs are normally obtained when patients present with shoulder pain. In assessing these radiographs, certain subtle findings may point to a dislocation. A posteriorly dislocated humeral head may project slightly smaller than on the uninjured side. The humeral head may appear to be rotated internally on an AP radiograph or may project more medial in relation to the glenoid than is seen in the contralateral shoulder. This radiographic finding is termed the *rim sign*.⁸ The *trough line*, another radiographic finding, can also indicate a posterior dislocation. The trough line represents the projection of the lesser tuberosity, which forms a fine white line through the medial aspect of the humeral head, just lateral to the anterior rim of the glenoid.⁹ These findings can be very difficult to appreciate, and a good understanding of normal radiographic anatomy is essential to understand the position of landmarks in each view of the shoulder (Figure 4).

Two orthogonal views of the shoulder, such as a true AP view and an axillary view, are essential in evaluating the traumatized shoulder. If an axillary view cannot be obtained, several alternate views allow assessment of the glenohumeral joint

relationship. The most well-known is the Velpeau view, which provides a view similar to the axillary view and only requires the patient to lean back over the downward-projecting x-ray beam.¹⁰ The angle-up view, the shoulder outlet view, and the scapular lateral view can also be used to assess the glenohumeral joint. If adequate radiographs are obtained, CT is usually not necessary to confirm the diagnosis of posterior shoulder fracture-dislocation. CT is critical, however, in planning operative management for these injuries and can reveal subtle findings that are not readily observed on plain films.⁷

Reduction of the posterior dislocation An orthopedic surgeon should be consulted before any reduction attempt if a periarticular fracture is present or neurovascular compromise is suspected. Certain fracture-dislocation patterns, such as fractures involving the surgical neck of the humerus, usually require surgical reduction.¹¹ Fracture-dislocations involving the greater or lesser tuberosity or the humeral shaft may be reduced by closed methods with adequate analgesia or sedation. Intra-articular local anesthetics can be very effective in providing pain relief during a reduction attempt.

Reduction of a posterior shoulder dislocation can be accomplished by traction-counter-traction using a three-step

TEACHING POINTS

- Posterior dislocation of the shoulder accounts for less than 4% of all shoulder dislocations, making it a high-risk condition for delayed diagnosis. Maintain a high index of suspicion for these injuries, especially in patients who have had a seizure or sustained a high-voltage electrical shock injury.
- Physical examination findings are often nonspecific and may be masked by pain or swelling, making it difficult to assess the patient adequately.
- A keen understanding of the radiographic anatomy of the shoulder is required to accurately evaluate standard radiographic views of the shoulder.
- The Velpeau view, angle-up view, and scapular lateral view allow for appropriate analysis of the glenohumeral joint when standard axillary lateral radiographs are not possible. These alternate views can be obtained with minimal patient discomfort.
- Before attempting closed reduction, refer fracture-dislocations of the shoulder involving the anatomic or surgical neck of the humerus to an orthopedic surgeon.

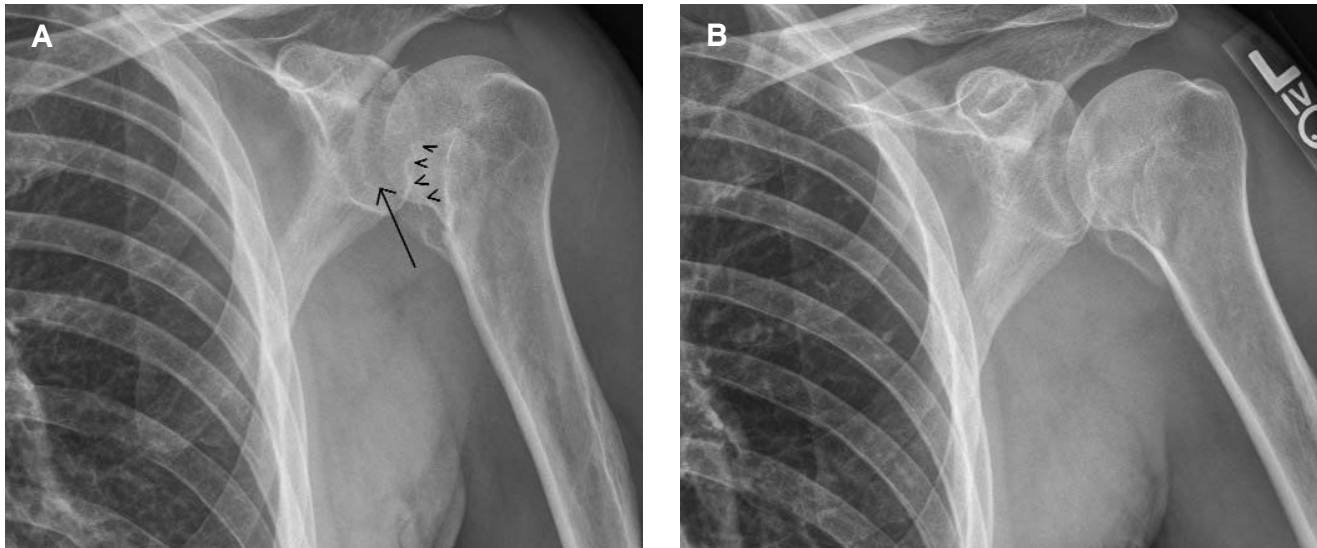


FIGURE 4. The trough line (a, small arrows) represents the position of the lesser tuberosity with internal rotation, and the rim sign (large arrow) represents the widening of the joint space. Note the slightly smaller-than-normal appearance of the humeral head and increased distance from the acromion as compared to what is seen in the postreduction radiograph (b).

sequence. Posterior traction allows disengagement of the humeral head from the posterior glenoid rim; lateral traction places the humeral head in position; and external rotation brings the articular surface of the humeral head onto the glenoid face. Application of an anteriorly directed force over the humeral head may be necessary to reduce the dislocation once full lateral traction and maximum external rotation is accomplished. Note that the reduction of the subacute posteriorly dislocated shoulder is neither as apparent nor as dra-

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matic as in an anterior dislocation and may necessitate close attention while performing the reduction.

Once reduced, the shoulder is immobilized in abduction with slight external rotation using a gunslinger brace or abduction pillow and sling. Adequate postreduction radiographs should be obtained, and a thorough neurologic and vascular examination should be conducted.

CONCLUSION

Diagnosing the rare posterior shoulder dislocation requires a high index of suspicion, an appreciation of subtle physical findings, and appropriate radiographic assessment, which requires two orthogonal views of the glenohumeral joint. This requirement is critical in evaluation of the shoulder and

is often overlooked because of an inability to properly position the patient. Special radiographic views are available to evaluate the shoulder and will aid in the timely assessment of a posterior dislocation and prevent the morbidity associated with a missed or delayed diagnosis. **JAAPA**

The views expressed in this article are those of the authors and do not reflect the official policy or position of the Department of the Army, Department of Defense, or the United States government.

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