A 39 year-old man presents to the ED complaining of severe left shoulder pain following a fight. He admits to having "a few beers" and cannot recall exactly how the injury occurred.

He exhibits limited range of motion of the shoulder. His arm is carefully held against the chest wall with the shoulder internally rotated. A neurovascular exam is completely intact.

Two x-ray views of the shoulder are ordered. The x-ray tech does his best to take internal and external rotation views; however, the patient's pain limits his ability to co-operate:

![Shoulder X-rays](image1.png)

How do you interpret these radiographs and what are your clinical concerns?

*Case images submitted by Mark Donnelly, MD and Tracey Demino, MD from the Department of Emergency Medicine, University of Rochester/Strong Memorial Hospital.*
**Posterior Shoulder Dislocation**

The treating physician did not immediately appreciate the subtle x-ray findings suggesting a posterior shoulder dislocation, but was concerned about the patient's level of discomfort and maintained a high suspicion for significant pathology. Therefore, a CT scan of the shoulder was obtained:

![CT scan image](image)

On the CT scan, the humeral head is clearly seen to be rotated posteriorly in relation to the glenoid. In addition, a reverse Hill-Sachs deformity is evident (*).

Routine AP shoulder films usually are sufficient to detect a variety of anterior dislocations. Unfortunately, this radiograph is rarely sufficient to diagnose a posterior dislocation. It should be emphasized that this type of dislocation may look deceptively normal on the AP radiograph because a “routine” AP film of the shoulder does not afford a true AP view of the glenohumeral joint. As a result, the “standard” trauma shoulder series in many institutions that consists of AP views in internal and external rotation is inadequate. Nevertheless, there are specific radiographic signs seen on the AP view that may suggest this injury:

*Light bulb sign*: The humeral head takes on an abnormally rounded, more symmetrical shape, like a light bulb, due to rotation of the humerus.

![X-ray images](image)

A side-by-side comparison of this patient's initial x-ray (left) and his post-reduction film (right) reveals an obvious light bulb
**Hollowed out** humeral head: With a posterior dislocation, the arm is locked in internal rotation. The x-ray beam, therefore, passes through both the greater and lesser tuberosities, creating the image of a hollow humeral head.

**Empty glenoid sign**: In posterior dislocations, the head rests behind the glenoid; as a result, the glenoid fossa appears to be partially vacant and the distance between the articular surface of the humeral head and the anterior lip of the glenoid may be increased.

A reverse Hill-Sachs lesion may be seen. This is a defect from compression of the anteromedial portion of the humeral head produced by the posterior cortical rim of the glenoid (the more commonly encountered Hill-Sachs lesion is seen on the posterolateral humeral head in anterior dislocations).

These signs suggest posterior dislocation and a further view should be obtained to confirm the diagnosis. This may be either an axillary or transcapular-Y view.
Figure 4.30. Pure posterior dislocation of the right humerus (b). The frontal projection of the normal left shoulder (c) of the patient has been reversed for ease of comparison. In the dislocated frontal projection (a), the distance between the anterior glenoid rim and humeral head (double-headed arrow) exceeds 6 mm (Gleason's rim sign), and the humeral head is in severe internal rotation as evidenced by its rifle-barrel appearance (arrowheads). Comparison of these observations with the normal shoulder (c). In the through-thethorax chest lateral radiograph (b), although the relationship of the humeral head (open arrows) to the glenoid fossa cannot be evaluated, the humerus is clearly posterior to the acromion (large closed arrows) and the scaphohumeral angle (small closed arrows) is acute. These observations confirm posterior dislocation of the humerus.
Posterior dislocation results from axial loading of the adducted, internally rotated arm. Because the internal rotator muscles are approximately twice as powerful as the external rotator muscles, a sudden powerful contraction is required to cause the humeral head to dislocate, such as from a seizure or electrocution. The finding of a posterior shoulder dislocation, then, should always raise the possibility that the patient experienced a seizure. In fact, the patient described in this case sustained his injury during a seizure, as relayed by witnesses who arrived in the ED.

Reducing a posterior shoulder dislocation can be more difficult than an anterior dislocation, and not infrequently general anesthesia is required. Nevertheless, an attempt should be made in the ED. The technique is as follows:

- Apply gentle, prolonged axial traction on the humerus.
- Apply gentle anterior pressure while coaxing the humeral head over the glenoid rim.
- Slow external rotation may be needed.

References:

