



## Consecutive posterior shoulder fracture dislocation after a cerebral saccular aneurysm episode: a rare case

Ahmet Sağır, MD<sup>a,\*</sup>, Harun Köse, MD<sup>b</sup>, Kadir Ertem, MD<sup>c</sup>

<sup>a</sup>Kadirli State Hospital Orthopedics and Traumatology, Osmaniye, Turkey

<sup>b</sup>Inonu University Faculty of Medicine, Orthopedics and Traumatology, Malatya, Turkey

<sup>c</sup>Inonu University Faculty of Medicine Orthopedics and Traumatology, Malatya, Turkey

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The posterior shoulder dislocation is an uncommon condition compared with anterior shoulder dislocation. It accounts for 2%–4% of all shoulder dislocations with an incidence of 6 in a million.<sup>2</sup> It can be overlooked at first presentation in 79% of cases due to lack of readily recognizable physical and radiological signs.<sup>6</sup> Unilateral dislocations generally occur due to trauma. Bilateral posterior shoulder dislocations are rarer and primarily result from epileptic seizures. Epileptic seizures, electric injury, and severe trauma are 3 main reasons for bilateral dislocations.<sup>3</sup> Epileptic seizures may result from trauma, brain tumors, or metabolic problems.<sup>6,10</sup>

In this case report, we present bilateral posterior fracture-dislocation of shoulders developed due to seizures during sleep in a patient who experienced cerebral aneurysm-induced seizures by a 3-month interval.

#### Case report

A 66-year-old male presented to our outpatient clinic with limitation of movements and tenderness at his right shoulder. The patient reported that he had no previous complaint about his shoulders and that he was unable to move his shoulder yesterday morning. He presented to another facility with these complaints where no pathologic finding could be detected in laboratory evaluations. Thereafter, the patient presented to a second health-care facility, but no pathologic condition was considered. The

patient had no history of comorbid disease, medication, or trauma. In physical examination, there was tenderness with limited movements in the right shoulder. Neuromuscular examination and peripheral circulation were normal in the right upper extremity. Based on shoulder radiographies (Fig. 1, A) and computerized tomography (CT) scan (Fig. 1, B) findings, the patient was diagnosed with fracture of lesser tuberosity and posterior fracture-dislocation of right shoulder with a reverse Hill-Sachs lesion.

The patient was scheduled for surgery. After preoperative preparations were completed, the patient was transferred to an operating theater. The surgical site was exposed with a deltopectoral approach. The biceps tendon was prepared for suprapectoral tenodesis. The shoulder was reduced by longitudinal traction with external rotation of the extremity. Lesser tuberosity and tendon of subscapularis muscle were attached to an anatomical position using 2 anchors and 2 cannulated screws. Biceps tenodesis was accomplished using 1 suture anchor. The surgery was completed when sufficient stability was achieved, and velpeau bandage was applied (Fig. 2).

Postoperative rehabilitation was recommended to the patient at the physical therapy and rehabilitation outpatient clinic. The patient was informed that this is a rare condition which may develop due to seizures, and a control visit to the neurosurgery department was recommended. Thus, the patient presented to a neurosurgery outpatient clinic, and a saccular aneurysm (6 mm in size) was detected at bifurcation of the left-middle cerebral artery. Endovascular coiling was performed by interventional radiology department, and he was transferred to a neurosurgery intensive care unit (ICU) after the procedure. During the ICU admission, a thoracic CT scan involving shoulders was performed

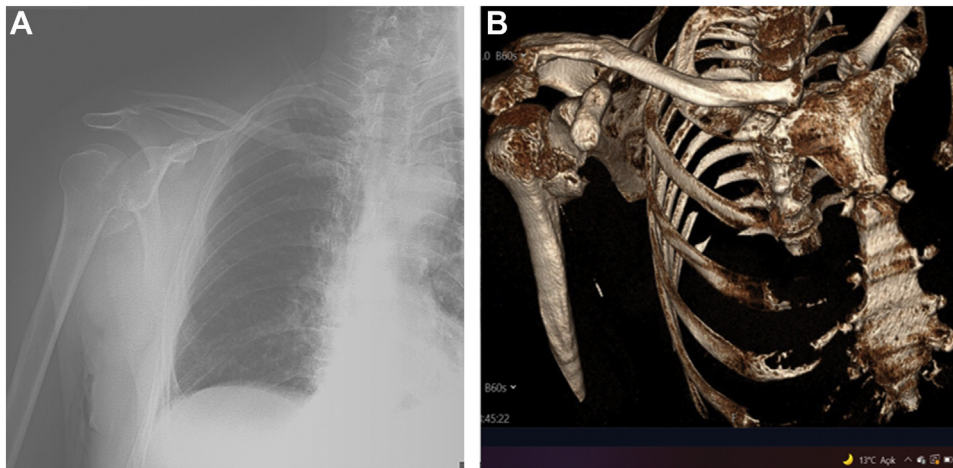
Institutional review board approval was not required for this case report.

\*Corresponding author: Ahmet Sağır, MD, Orthopedics And Traumatology Clinic, Kadirli State Hospital, Şehit Orhan Gök mahallesi, 939 Sokak No:7, Osmaniye, Kadirli80750, Turkey.

E-mail address: [ahmetsagir89@hotmail.com](mailto:ahmetsagir89@hotmail.com) (A. Sağır).

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**Figure 1** Preoperative radiograph and tomography of the right shoulder.



**Figure 2** Right shoulder radiograph after surgery.

to the patient for another reason, which revealed a fractured-dislocation in the left shoulder. Thus, the patient consulted with our department. Based on the CT scan, the patient was diagnosed with fracture of the lesser tuberosity and posterior fracture-dislocation of left shoulder with a reverse Hill-Sachs lesion (Fig. 3, A and B).

The patient was scheduled for surgery. Thereafter, the patient was transferred to the operating room. During the surgery, the surgical site was exposed via deltopectoral incision. Open reduction was performed in the left shoulder. The fracture of the lesser tuberosity was fixed using 2 screws, and stability was assessed. It was found that shoulder dislocation occurs at internal rotation. Thus,

proximal osteotomy was performed at the humerus; followed by 45° derotation. Osteosynthesis was achieved using plate and screws. After stability assessment, the surgery was completed. Velpeau sling was applied (Fig. 4).

Postoperative rehabilitation was recommended to the patient at the physical therapy clinic. In addition, the patient was scheduled for control visits. In the final control visit, the patient reported that the surgical outcome was satisfactory in the right shoulder, but it was moderate in the left shoulder. It was found that range of motion was at functional threshold in the right shoulder, but it was below the functional threshold in the left shoulder.

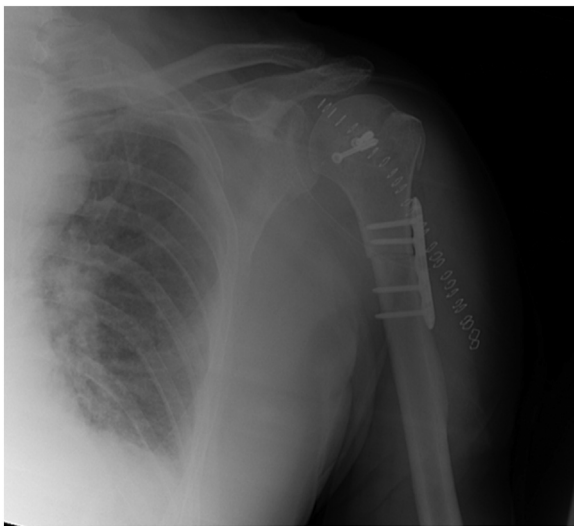
## Discussion

Posterior shoulder dislocation is a condition rarer than anterior shoulder dislocation. It accounts for 2%-4% of all shoulder dislocations.<sup>2</sup> Fractured-dislocation of shoulder, which is a more rare entity, accounts for 0.9% of 1500 cases of fractured-dislocation of shoulder with an incidence of 0.6:100,000 according to Neer and Foster.<sup>5,7</sup> In a systematic review by Rouleau et al (2012), the most commonly associated fracture was that of the articular surface of humeral head (termed as reverse Hill-Sachs lesion) (29%), followed by humeral neck fracture (18.5%), fractures of greater (14.3%) and lesser tuberosity (7.8%), and miscellaneous fractures (humeral diaphysis fractures, scapular fractures, clavicle fractures; 6%).<sup>8</sup> In our patient, there was reverse Hill-Sachs lesion and fracture of lesser tuberosity in both shoulders.

Many mechanisms including epileptic seizures, electric injury, or severe muscle spasms as seen in electroconvulsive therapy have been implied in the etiology of this traumatic entity.<sup>9</sup> Epileptic seizures, 1 of the etiological factors, may result from trauma, brain tumors, or metabolic problems.<sup>6,10</sup> During a seizure activity, a typical position of shoulders includes adduction, flexion, and internal rotation. Extensive contractions of shoulder girdle muscles force the humeral head against acromion superoposteriorly and glenoid fossa medially. The main muscles contributing to the dislocation are deltoid, latissimus dorsi, and teres major, as well as infraspinatus and teres minor. At the end of seizure, humeral head is located beneath the glenoid edge, and there is often a reverse Hill-Sachs lesion.<sup>2</sup> In addition, posterior shoulder dislocation may develop following major traumas which involves axial loading at



**Figure 3** Preoperative tomography of the left shoulder.



**Figure 4** Left shoulder radiograph after surgery.

adduction, flexion, and internal rotation of upper extremity or motor vehicle accidents.<sup>9</sup> In our patient, presence of posterior Hills-Sachs lesion, fracture of lesser tuberosity, and lack of a trauma history suggested us that seizures might have played a role in the etiology.

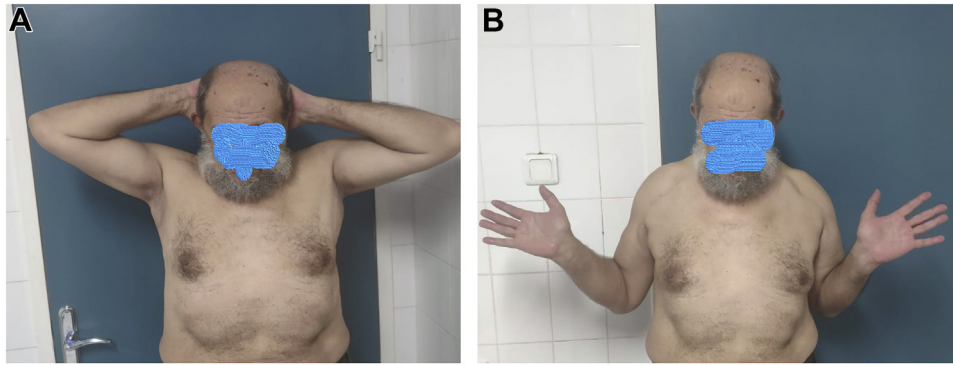
High level of suspicion together with imaging studies (anteroposterior radiographs, scapular "Y" lateral and axillary images, and CT scan) are key for an accurate diagnosis.<sup>4</sup> In our patient, fractured-dislocation of the right shoulder could not be diagnosed in first 2 health-care facilities presented. This may be due to insufficient imaging studies or insufficient assessment of images. In our clinic, we ordered plain radiographs and CT scan at first presentation since the history and physical examination suggested us shoulder dislocation. We believe that CT scan is helpful in diagnosis as well as guiding treatment. In such

injuries, treatment may range from a conservative approach to humeral head reconstruction or arthroplasty; however, there is no consensus guideline.<sup>8</sup> We recommended consultation with a neurosurgery outpatient clinic after the osteosynthesis procedure in the right shoulder in order to reveal etiology since the patient had no history of epileptic seizures or metabolic problems. In positron emission tomography-CT scan, no mass lesion was observed, which may trigger epileptic seizures; however, angiography revealed an aneurysm, which was considered as the etiological factor. In the literature search, we found that epileptic seizures may be due to brain tumors, metabolic disorders, or trauma; we identified a case with seizure due to cavernous sinus thrombosis<sup>2</sup> but no case with seizure resulting from saccular (Berry) aneurysm at the left-middle cerebral artery. Interestingly, during ICU follow-up after the endovascular coiling procedure, a thoracic CT scan revealed a fracture-dislocation with reverse Hills-Sachs lesion in the left shoulder. We think that the patient had seizure following the endovascular coiling procedure, resulting in left shoulder fracture-dislocation.

The patient can move his hands behind his head (post-operative month 20 for right shoulder [Fig. 5, A] and post-operative month 17 for left shoulder [Fig. 5, B]). The patient satisfaction was reported as good for the right shoulder with a Quick-Disability of the Arm, Shoulder, and Hand score of 2.3 while it was reported as moderate for the left shoulder with a score of 54.5. The avascular necrosis rate was reported as 3%-14% and 13%-34% for comminuted fractures of 3 and 4 fragments, respectively, treated conservatively.<sup>1</sup> It was also reported that the avascular necrosis rate is increased in fractured-dislocation. In our case, open reduction plus internal fixation was performed in both shoulders. We found no sign of avascular necrosis in his final evaluation.

## Conclusion

Finally, cerebral aneurysm should be considered in cases of nontraumatic involuntary shoulder dislocation, and research should be done accordingly.



**Figure 5** Postoperative shoulder range of motion image.

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