

## Shoulder Disorders: Review Questions

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### QUESTIONS

Choose the single best answer for each question.

1. A 25-year-old woman with a history of seizures presents to the emergency department with severe right shoulder pain and severely limited shoulder range of motion (ROM) after a seizure she experienced earlier in the day. Prior to the seizure, shoulder function was normal. On examination, both active and passive ROM are limited due to pain. External rotation is limited to  $-20$  degrees. An anteroposterior (AP) radiograph is performed (Figure 1). What is the next most appropriate step in this patient's management?

- (A) Axillary radiograph
- (B) Erythrocyte sedimentation rate
- (C) Magnetic resonance imaging (MRI) of the shoulder
- (D) Manipulation under anesthesia
- (E) Sling immobilization for 2 weeks

2. A 64-year-old woman presents with insidious onset of shoulder pain over 3 weeks, which has been associated with decreased tolerance for overhead activities. She denies any prior trauma and has not been previously diagnosed with shoulder pathology. On examination, she has full active ROM but reports pain between 80 and 120 degrees of abduction. She has full strength in testing of the subscapularis, supraspinatus, and infraspinatus, and she has pain with impingement maneuvers. What is the best initial step in the management of this patient?

- (A) Computed tomography arthrogram of the shoulder
- (B) MRI of the shoulder
- (C) Oral anti-inflammatory medications and physical therapy
- (D) Rotator cuff repair
- (E) Subacromial decompression

3. A 71-year-old woman presents with progressive loss of shoulder ROM. She describes a fall onto her shoulder several years ago but was told that she had no fractures. She has forward elevation to



Figure 1. Anteroposterior radiograph of the right shoulder of the patient described in question 1.

90 degrees, abduction to 80 degrees, internal rotation to L5, and external rotation to neutral. Radiographs demonstrate superior migration of the humerus, subchondral sclerosis of the superior humerus and inferior acromion, and loss of glenohumeral joint space. What is this patient's diagnosis?

- (A) Glenohumeral dislocation
- (B) Primary arthritis
- (C) Proximal fracture of the humerus
- (D) Rotator cuff tear arthropathy
- (E) Septic arthritis

4. A 32-year-old man presents with shoulder pain after a high-speed mountain biking accident. Physical examination reveals severely limited active and passive ROM. Neurovascular examination reveals paresthesias in the volar surface of his hand, thumb, index finger, and long finger. Radial pulses and symmetric perfusion are intact, and motor examination is normal. Plain radiographs reveal a fracture-dislocation of the humeral head with inferomedial displacement of the humeral head. Closed reduction is attempted, but postreduction plain radiographs reveal

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**Figure 2.** Anteroposterior radiograph of the right shoulder of the patient described in question 5.

that the position of the humeral head is unchanged. The patient reports progressive blunting of light touch sensation. What is the most likely cause of the evolving neurologic examination?

- (A) Acute carpal tunnel syndrome
- (B) Brachial artery injury
- (C) Cervical herniated disk
- (D) Traction injury to the brachial plexus
- (E) Traumatic intracranial bleed

5. A 43-year-old man presents with right shoulder pain after a fall onto an outstretched arm. He complains of pain in all planes with active and passive ROM, but he has normal neurovascular and rotator cuff examinations. An AP radiograph is performed (Figure 2). What is the appropriate next step in the management of this patient?

- (A) Acromioclavicular injection
- (B) Immediate open reduction and internal fixation
- (C) MRI of the shoulder
- (D) Sling with early passive motion
- (E) Subacromial decompression

6. A 53-year-old man reports persistent shoulder pain and difficulty with overhead activities after a mountain biking accident 8 weeks ago. He initially presented to an emergency department, where radiographs revealed an anterior glenohumeral dislocation. He underwent uneventful closed reduction, and his pain has improved but has reached a plateau. He complains of pain at night and persistent weakness with abduction. On examination, he has forward elevation to 120 degrees and abduction to 100 degrees, but he demonstrates full passive ROM. He has a positive drop-arm sign, significant weakness in supraspinatus testing, and resisted

external rotation. Radiographs reveal normal alignment with no evidence of fracture. What is the most likely cause of this patient's persistent deficits?

- (A) Axillary nerve palsy
- (B) Cervical herniated disk
- (C) Compressive brachial plexopathy
- (D) Humeral impaction fracture
- (E) Rotator cuff tear

#### ANSWERS AND EXPLANATIONS

1. (A) **Axillary radiograph.** Posterior glenohumeral dislocation typically occurs as a result of motor vehicle trauma, seizures, electroconvulsive therapy, electrocution, or alcohol-related trauma. In the setting of forced muscle contraction, the strong humeral internal rotators (subscapularis and pectoralis major) overpower the weaker humeral external rotators (teres minor and teres major), creating excessive internal rotation and causing translation of the humeral head posteriorly on the glenoid. These injuries are frequently missed and can often present as locked dislocations associated with fractures. The hallmark of a locked posterior dislocation is lack of external rotation.<sup>1</sup> Additional physical examination findings include coracoid prominence, acromial prominence, limited elevation, and excessive internal rotation. The axillary radiograph contributes to the diagnosis of all shoulder pathology and is essential to diagnose this condition. Treatment consists of closed reduction, but locked fracture dislocations may require open reduction and internal fixation.<sup>1</sup> Manipulation under anesthesia should not be attempted without first ruling out fracture and dislocation. MRI would help in the diagnosis, but it is more costly and delays diagnosis when compared with axillary radiography. There is no evidence of septic arthritis in this patient's history or radiograph, and sling immobilization should not be initiated until after the evaluation for dislocation has been completed.

2. (C) **Oral anti-inflammatory medications and physical therapy.** Subacromial impingement syndrome is part of the spectrum of rotator cuff disease. Other causes of pain in the subacromial space include subacromial bursitis, supraspinatus tendinopathy, and partial- or full-thickness rotator cuff tears. Patients often report pain through a 60- to 120-degree arc of elevation. Evocative maneuvers such as Neer's (full elevation with scapula stabilized) or Hawkins' (forward elevation to 90 degrees and internal rotation) tests are usually positive.<sup>2</sup> Because this patient's injury occurred in the short term, initial

management includes activity modification, physical therapy for scapular stabilization, ROM, and rotator cuff strengthening. The addition of oral nonsteroidal anti-inflammatory drugs (NSAIDs) or selective cyclooxygenase-2 inhibitors is also beneficial.<sup>2</sup> Subacromial steroid injection is controversial in this setting, as the possibility of rotator cuff tear has not been ruled out. Surgical intervention is reserved for patients in whom nonsurgical management fails.

3. **(D) Rotator cuff tear arthropathy.** Rotator cuff tear arthropathy is characterized by chronic rotator cuff insufficiency, superior migration of the humeral head, and arthritic changes to the glenohumeral joint.<sup>3</sup> In more advanced disease, erosions of the humeral head and acetabularization of the acromion may occur. Physical examination is remarkable for motion consistent with severe rotator cuff insufficiency, limited and crepitant ROM, and marked atrophy of shoulder musculature; in more advanced disease, a large subdeltoid effusion may be present. The long biceps tendon also may be dislocated or ruptured. First-line therapy is nonsurgical and consists of NSAIDs and physical therapy.<sup>3</sup> Surgical interventions in older patients include large hemiarthroplasty or total shoulder arthroplasty with a reverse ball-and-socket prosthesis. There is no evidence of septic arthritis in this patient, and superior migration of the humeral head is not associated with primary osteoarthritis. The physical examination and radiographic findings are not consistent with fracture or dislocation.
4. **(D) Traction injury to the brachial plexus.** The patient's evolving neurologic examination suggests a traction injury to the brachial plexus caused by the dislocated humeral head. In this position, the brachial plexus and brachial artery are at risk for injury. If closed reduction initially fails or is not attempted in a timely manner, surgical consultation is required. In the operating room, closed reduction may be attempted again under general anesthesia. If this fails, open reduction and internal fixation of the fracture are required. The other choices are not consistent with the patient's neurovascular examination.
5. **(D) Sling with early passive motion.** The radiograph (Figure 2) reveals a minimally displaced fracture of the glenoid neck. These injuries are usually the result of high-energy trauma to the pectoral girdle.

As a result, the patient should be evaluated for thoracic trauma, including pneumothorax, pulmonary contusion, and rib fracture. When associated with clavicle or other ligamentous injuries, the injury pattern may constitute a "floating shoulder."<sup>4</sup> In this case, the glenoid is not significantly displaced or angulated. Nonsurgical treatment (ie, immobilization and then supervised, graduated physical therapy) of this injury is preferred. Early physical therapy emphasizes ROM followed by increased time dedicated to strengthening. Radiographs should be obtained at 4 to 6 weeks after the injury to evaluate for fracture union and maintenance of position.<sup>4</sup> Surgical intervention is reserved for significantly displaced or angulated glenoid neck fractures as well as for some fractures with intra-articular extension. This patient's history and physical examination findings do not suggest injury to the acromioclavicular joint, and MRI is not necessary to make the diagnosis.

6. **(E) Rotator cuff tear.** In patients older than 40 years of age, shoulder dislocation is highly associated with rotator cuff rupture.<sup>5</sup> Patients typically present with inability to abduct after uncomplicated closed reduction of glenohumeral dislocation. Patients also complain of general shoulder weakness and pain at rest, especially at night. In this case, the patient most likely has a massive rotator cuff tear with weakness with abduction and external rotation. In a study by Neviaser et al,<sup>5</sup> the incidence of axillary nerve injury in an older population was 7.8%, while the incidence of rotator cuff rupture was 100%. Impaction fracture, brachial plexopathy, and traumatic disk herniation are much less likely in this patient given his history and physical examination findings.

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