

## CLINICAL PRESENTATION AND RADIOLOGY QUIZ QUESTION

A 20 year old man presents with wrist pain and deformity following a snowmobile accident. The patient was driving a snowmobile at 30 to 35 MPH and hit a patch of dirt, which caused him to fly forward off of the snowmobile and land on his outstretched right hand. He felt immediate pain in the wrist. He had no other significant injuries. His vital signs are stable. On physical examination, he has swelling and deformity of his right wrist, particularly over the radial aspect. He has tenderness over the scaphoid. His pulses and sensation are intact.

Which of the following imaging studies is the initial examination of choice for evaluation of post-traumatic wrist pain?

- (a) magnetic resonance (MR) imaging of the wrist
- (b) plain film examination of the wrist
- (c) nuclear medicine whole body bone scan
- (d) ultrasound (US) examination of the wrist

<b>RADIOLOGY QUIZ QUESTION, ANSWER, AND EXPLANATION</b>
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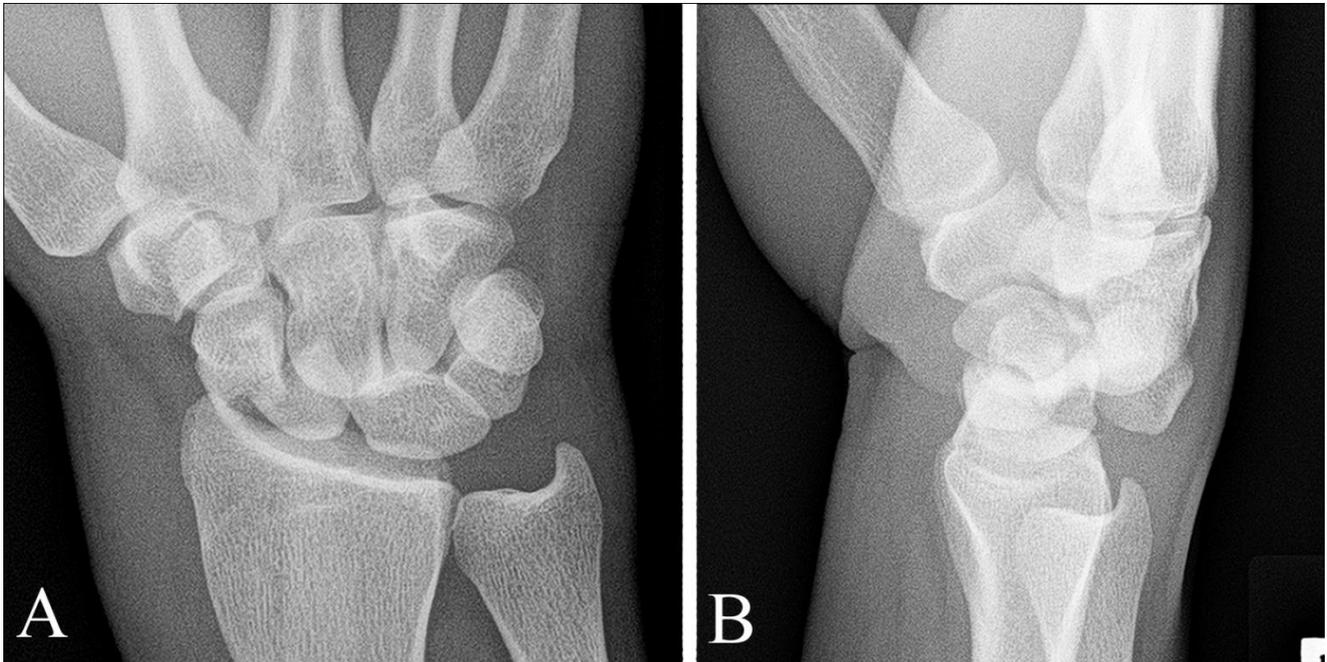
- (a) magnetic resonance (MR) imaging of the wrist
- (b) plain film examination of the wrist
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The initial imaging study in almost all patients with acute wrist pain following trauma is a plain film examination of the elbow, and (b) is correct.

MR imaging of the wrist (a) may be helpful for evaluation of the elbow and may allow diagnosis of a variety of traumatic and non-traumatic wrist abnormalities (including radiographically occult fractures, avascular necrosis of the lunate, and bone and soft tissue tumors). However, MR of the wrist is typically performed only *after* plain film examination of the wrist, and (a) is incorrect. A nuclear medicine bone scan (c) may be helpful in excluding areas of increased radiotracer indicating increased bone turnover such as might be seen in radiographically occult post-traumatic fracture, stress fracture, or complex regional pain syndrome. However, as in the case with the MR study, nuclear medicine is typically performed only *after* plain film examination of the wrist, and (b) is incorrect. US examination of the wrist (d) is not widely used in the setting of acute trauma, and (d) is incorrect.

## IMAGING STUDY AND QUESTIONS

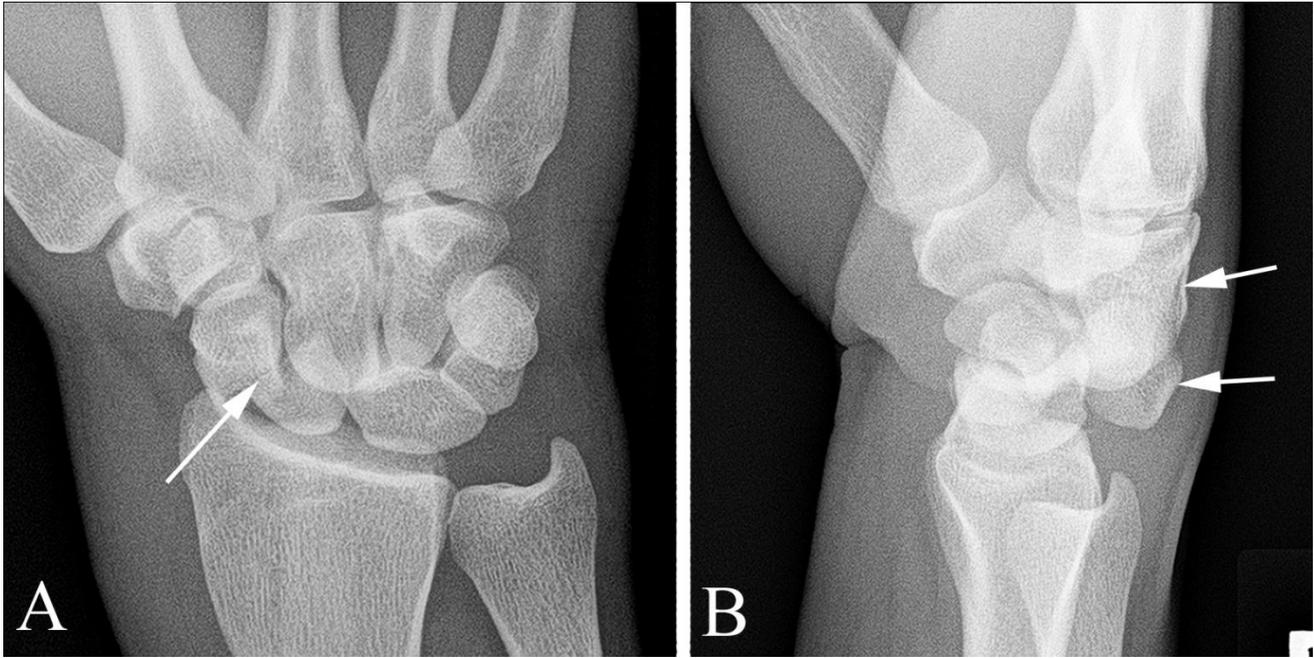
An imaging study was performed:



Imaging questions:

- 1) What type of study is shown?
- 2) Are there any abnormalities?
- 3) What is the most likely diagnosis?
- 4) What is the next step in management?

## IMAGING STUDY QUESTIONS AND ANSWER



### Imaging questions:

- 1) What type of study is shown? An anteroposterior (AP) (A) and lateral (B) plain film examination of the right wrist.
- 2) Are there any abnormalities? Yes. There is a transverse fracture through the waist of the scaphoid (arrow in A), and there is posterior dislocation of the carpal bones including the capitate (arrows in B). Note that the lunate and proximal pole of the scaphoid are *not* dislocated with the other carpal bones.
- 3) What is the most likely diagnosis? Fracture/dislocation of the carpus, specifically, trans-scaphoid, perilunate dislocation of the wrist.
- 4) What is the next step in management? Referral to an orthopedic or hand surgeon.

## PATIENT DISPOSITION, DIAGNOSIS, AND FOLLOW-UP

Although the patient's pulses and sensation were intact upon initial evaluation, by the time he had completed evaluation and undergone radiography, he was beginning to develop numbness in his index and long fingers. He was immediately referred to a hand surgeon, who took the patient to the operating room. Surgical findings included disruption of the lunotriquetral ligament and a transscaphoid fracture with an intact scapholunate ligament, focal cartilage loss over the head of the capitate, cartilage loss over the margin of the triquetrum, avulsion of the dorsal wrist capsule from the dorsal radius with stripping of the periosteum and capsular attachments to the dorsal ridge of the scaphoid, and a hematoma in the carpal canal with compression of the median nerve. The patient underwent an open carpal tunnel release, open reduction and internal fixation of his scaphoid fracture, and open treatment of his transscaphoid perilunate fracture-dislocation. Over the ensuing several months, the scaphoid fracture healed and the patient's radial-sided hand sensation gradually returned to normal.

Post-traumatic injuries to the wrist include fractures of the distal radius and ulna, isolated fractures of the scaphoid, fractures of the scaphoid with accompanying ligamentous tears and/or posterior dislocation around the lunate, and ligamentous tears with initial posterior displacement of carpal bones except the lunate followed by return of the carpal bones to normal position with associated anterior displacement of the lunate. Both isolated dislocation and fracture/dislocation need to be identified promptly and rapidly referred to an orthopedic or hand surgeon to prevent potentially devastating neurovascular complications.

## SUMMARY

**Presenting symptoms:** The patient presented with acute wrist pain and deformity following trauma. The main considerations are fracture, dislocation, or a combination of both.

**Imaging work-up:** The initial imaging study of choice for post-traumatic wrist pain and deformity is a plain film examination of the wrist. Views obtained typically include an anteroposterior (AP), lateral, oblique, and “navicular” view obtained with the carpus in ulnar deviation. Plain films may be negative, positive and providing complete information necessary for treatment, or positive but not providing complete information necessary for treatment. In the setting of a negative plain film with a high suspicion of fracture, options include splinting the patient and repeating the examination in two weeks (as is frequently done with suspected nondisplaced navicular fractures) or immediate MR or CT examination. If plain films are positive but do not provide complete information necessary for treatment of the injury, MR or CT may be performed, although ordering of these studies is generally done by the treating surgeon.

**Establishing the diagnosis:** When plain films demonstrate definite fracture lucency, they are diagnostic. In this case, in addition to directly demonstrating the fracture, the abnormal alignment of the bones allowed diagnosis of associated ligamentous injuries. These findings were confirmed at surgery.

**Take-home message:** The initial study of choice for virtually all patients with acute post-traumatic wrist pain is a plain film evaluation.

Note the similarity of this case to that presented in RQW090 Acute Post-traumatic Shoulder Pain 09-15-12 and RQW092 Acute Post-traumatic Elbow Pain 09-29-12. In most cases, acute post-traumatic joint pain is first evaluated with a plain film, although the patterns of injury are specific to the joint.

### FURTHER READING

Anderson BC. Evaluation of the adult patient with wrist pain. UpToDate, accessed 5/1/12.

Burroughs KE. Scaphoid fractures. UpToDate, accessed 5/2/12.

Renfrew DL. Single joint pain. Chapter 14 in *Symptom Based Radiology*, Symptom Based Radiology Publishing, Sturgeon Bay, WI, 2010, available for no charge at [www.symptombasedradiology.com](http://www.symptombasedradiology.com).