

CLINICAL PRESENTATION AND RADIOLOGY QUIZ QUESTION

A 20 year old man presents with hand pain and deformity following a striking a wall in anger. He felt immediate pain in the hand following the incident, with increasing pain since. He had no other significant injuries. His vital signs are stable. On physical examination, he has swelling and deformity of his right hand, particularly over the proximal metacarpals of the long, ring, and small fingers. He had abrasions over the metacarpal heads but no distal metacarpal or phalangeal tenderness. He had no thumb pain or tenderness. His pulses and sensation are intact.

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

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

RADIOLOGY QUIZ QUESTION, ANSWER, AND EXPLANATION

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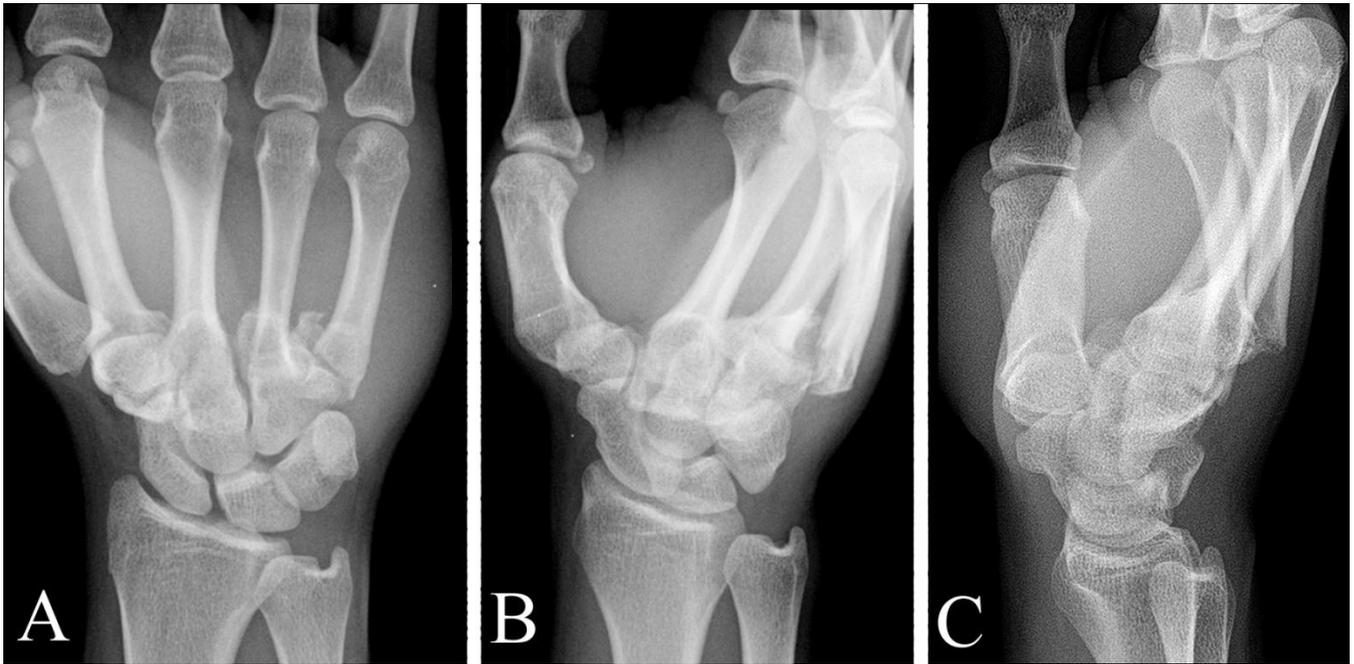
- (a) magnetic resonance (MR) imaging of the hand
- (b) plain film examination of the hand
- (c) nuclear medicine whole body bone scan
- (d) ultrasound (US) examination of the hand

The initial imaging study in almost all patients with acute hand pain following trauma is a plain film examination of the hand, and (b) is correct.

MR imaging of the hand (a) may be helpful for evaluation of the hand and may allow diagnosis of a variety of traumatic and non-traumatic hand abnormalities (including radiographically occult fractures, tendon and ligament injuries, and bone and soft tissue tumors). However, MR of the hand is typically performed only *after* plain film examination of the hand, 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 MR imaging, nuclear medicine is typically performed only *after* plain film examination of the hand, and (b) is incorrect. US examination of the hand (d) may be helpful for identifying retained foreign bodies, but is not widely used in the setting of acute trauma with suspected fractures or fracture/dislocations, and (d) is incorrect.

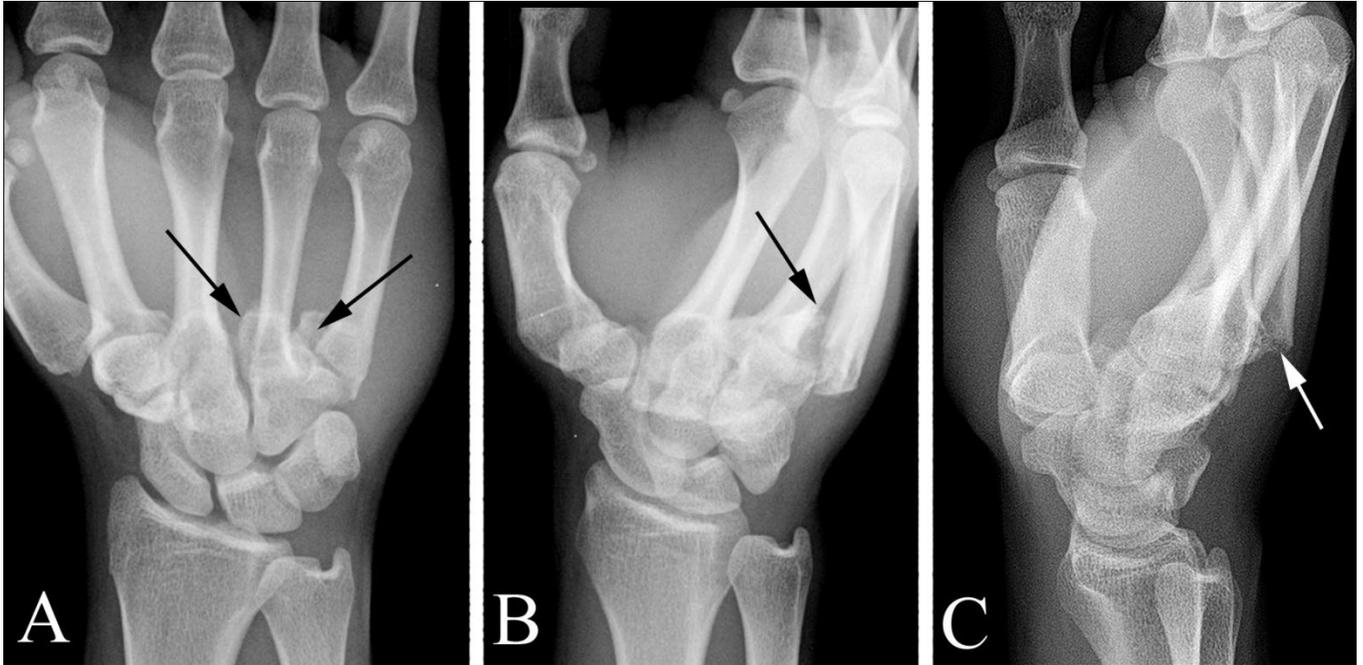
IMAGING STUDY AND QUESTIONS

An imaging study was performed:



Imaging questions:

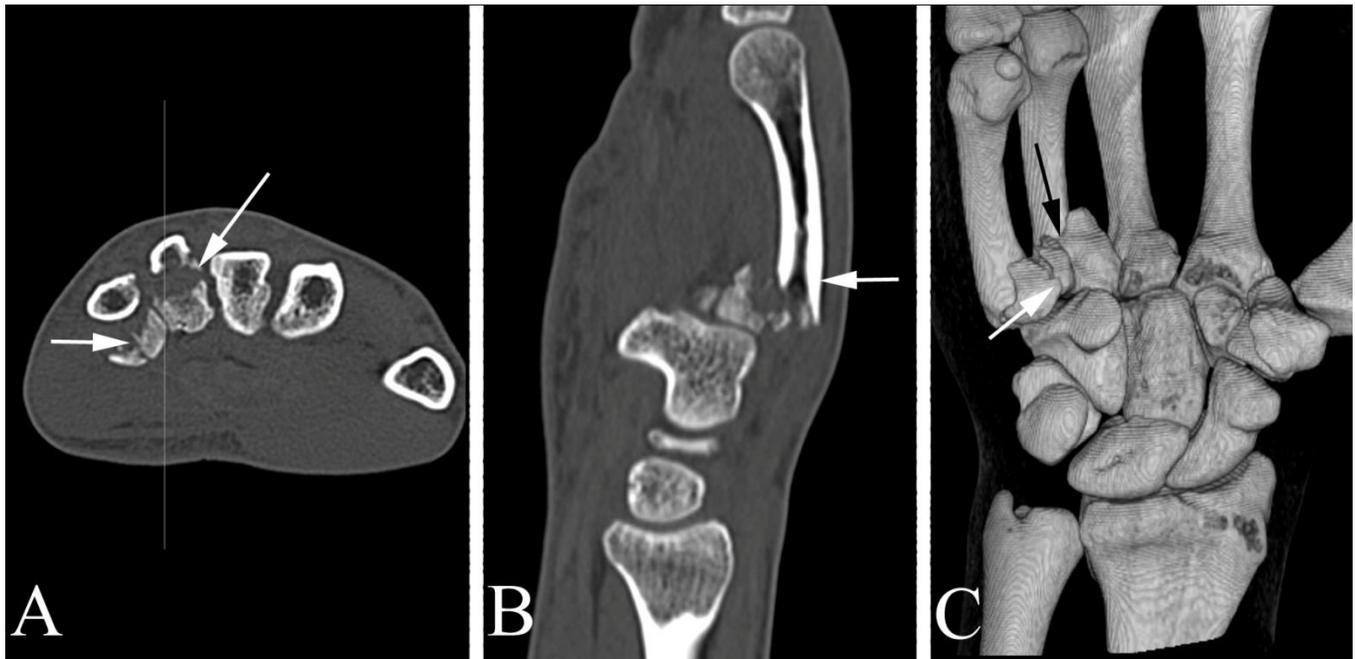
- 1) What type of study is shown?
- 2) Are there any abnormalities?
- 3) What is the most likely diagnosis?
- 4) What is the next step in management?

IMAGING STUDY QUESTIONS AND ANSWER**Imaging questions:**

- 1) What type of study is shown? Plain film examination of the hand (the distal phalanges have been cropped).
- 2) Are there any abnormalities? Yes. There are fractures of the proximal phalanges (arrows) and there is a disorganized appearance of the joints at the carpal-metacarpal level.
- 3) What is the most likely diagnosis? Fracture/dislocation through the proximal metacarpals.
- 4) What is the next step in management? Referral to an orthopedic or hand surgeon.

PATIENT DISPOSITION, DIAGNOSIS, AND FOLLOW-UP

The emergency room physician consulted an orthopedic surgeon and while the orthopedic surgeon was en route to the emergency room to see the patient, the patient underwent computed tomography (CT) of the hand (see below figure). This examination allowed better evaluation of the extent of injury by displaying the fractures and carpal-metacarpal junction, and demonstrated that the fourth metacarpal was fractured with fracture fragment displacement, but that the fourth carpal-metacarpal joint was not subluxed or dislocated; nor did the fourth metacarpal fracture extend to the articular margin. The fifth metacarpal fracture, on the other hand, did extend into the articular margin. The patient subsequently underwent closed reduction with percutaneous pin placement and underwent an uneventful recovery with subsequent pin removal five weeks later.



22 year old man with fracture-dislocation through the proximal fourth and fifth metacarpals following striking a wall in anger. A. Axial CT at the level of the proximal metacarpals shows fractures through both the fourth and fifth metacarpals (arrows). B. Sagittal CT through the fourth metacarpal (at the location of the reference line in figure A) shows posterior displacement of the proximal shaft of the fourth metacarpal, distal to the location of the fracture (arrow). C. Surface rendering CT image demonstrates the proximal fifth metacarpal fracture which extends to the articular margin (white arrow) and the fractured proximal fourth metacarpal fracture (black arrow). The static images here do not do justice to the amount of information available with the CT study, and the surface rendered images in particular reveal much more information when reviewed at a workstation. The surface rendered images may be rotated, tumbled, and further manipulated to provide a much better appreciation of the configuration of the fracture and joint.

SUMMARY

Presenting symptoms: The patient presented with acute hand 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 hand pain and deformity is a plain film examination of the hand. Views obtained typically include an anteroposterior (AP), lateral, and oblique. Plain films may be negative, positive and providing complete information necessary for treatment, or positive but not providing complete information necessary for treatment. If plain films are positive but do not provide complete information necessary for treatment of the injury, as in this case, CT may be performed, although ordering of these studies is generally done after consultation with a surgeon.

Establishing the diagnosis: When plain films demonstrate definite fracture lucency and joint disruption, they are diagnostic, although in this case the CT certainly added significant information which was helpful for treatment.

Take-home message: The initial study of choice for virtually all patients with acute post-traumatic hand 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, RQW092 Acute Post-traumatic Elbow Pain 09-29-12, and RQW094 Acute Post-traumatic Wrist Pain 10-13-12. 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 hand pain. UpToDate, accessed 5/7/12.

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.