

CLINICAL PRESENTATION AND RADIOLOGY QUIZ QUESTION

A 62 year old woman tripped and fell on her deck, landing on her right elbow. She had immediate elbow pain. Her vital signs are unremarkable. She cannot move the elbow without pain. She has no shoulder or wrist pain and no numbness or weakness in the right upper extremity. She has had no similar incident in the past.

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

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

RADIOLOGY QUIZ QUESTION, ANSWER, AND EXPLANATION

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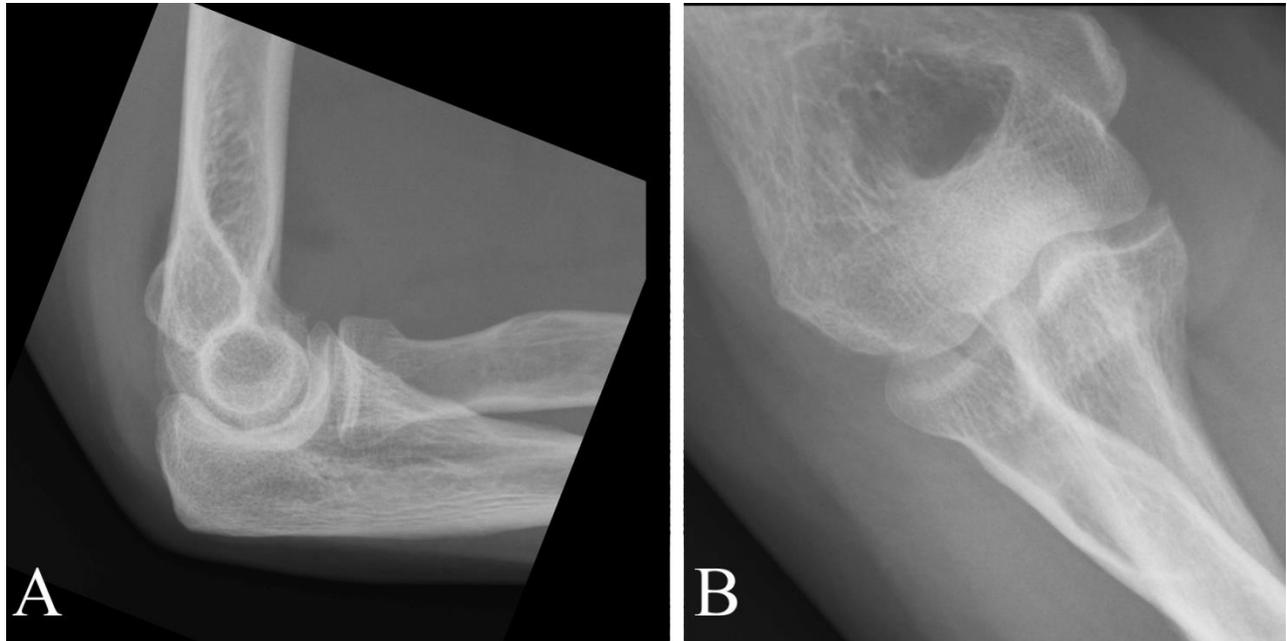
- (a) magnetic resonance (MR) imaging of the elbow
- (b) plain film examinations of the elbow
- (c) nuclear medicine whole body bone scan
- (d) ultrasound (US) examination of the elbow

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

MR imaging of the elbow (a) may be helpful for evaluation of the elbow and may allow diagnosis of a variety of traumatic and non-traumatic elbow abnormalities (including radiographically occult fractures, avascular necrosis of the humeral capitellum, bone and soft tissue tumors, distal biceps tendon rupture, and tears of the collateral ligaments). However, MR of the elbow is typically performed only *after* plain film examination of the elbow, 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 metastatic deposit or stress fracture. However, as in the case with the MR study, nuclear medicine is typically performed only *after* plain film examination of the elbow, and (b) is incorrect. US examination of the elbow (d) is not useful in the setting of acute or chronic elbow pain, and (d) is incorrect.

IMAGING STUDY AND QUESTIONS

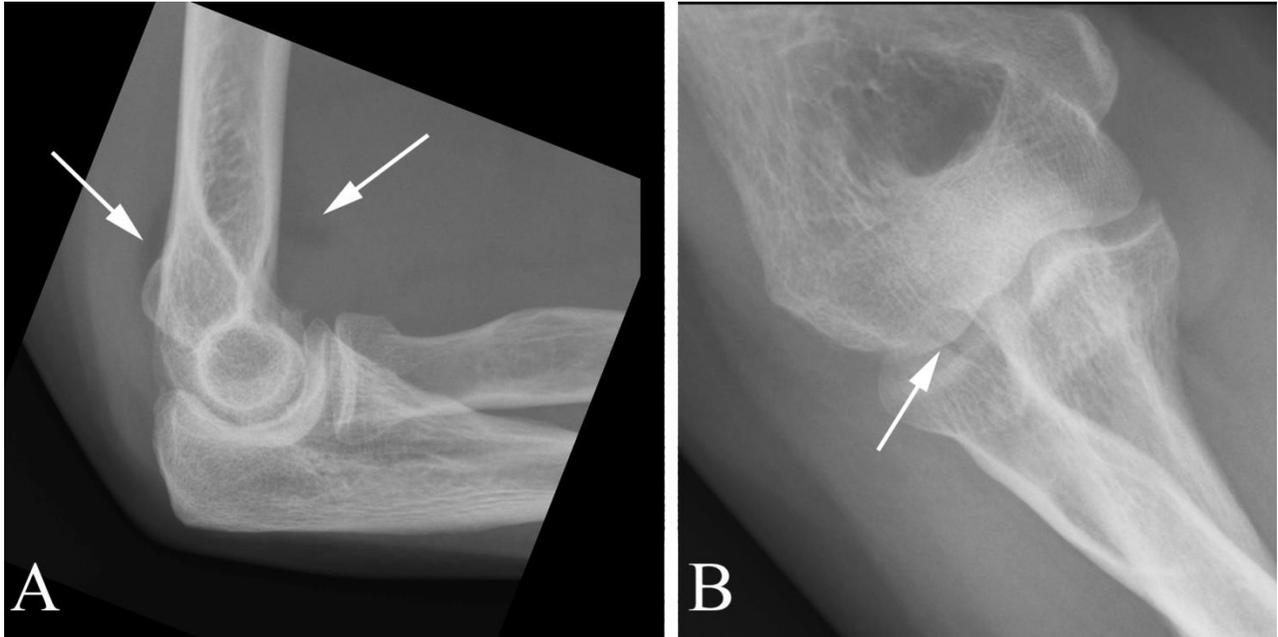
An imaging study was performed:



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? A lateral (A) and anteroposterior (AP) (B) plain film examination of the right elbow.
- 2) Are there any abnormalities? Yes. There is displacement of both the anterior and posterior fat pads of the elbow joint (arrows in A), and there is a lucency through the radial head (arrow in B).
- 3) What is the most likely diagnosis? Acute post-traumatic intra-articular fracture of the radial head with an accompanying joint effusion.
- 4) What is the next step in management? The first order of business is to determine whether there is any reason to believe that there may be a loose body. If the patient has a full range of motion on pronation/supination then it is quite unlikely that there is a loose body. Intra-articular injection of anesthetic may be required to complete this portion of the exam. Provided there is no block to motion and no comminution or step-off of the fracture on plain films, splinting with progressive range of motion exercise is appropriate. If there is lack of full pronation/supination, or if there is significant step-off or comminution on the plain film examination, orthopedic surgery consultation is indicated. The orthopedic surgeon may order a CT scan to further define fracture anatomy.

PATIENT DISPOSITION, DIAGNOSIS, AND FOLLOW-UP
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The patient was given pain medication and the elbow was immobilized. She was referred to an orthopedic surgeon and treated non-operatively with appropriate flexibility exercises. Her recovery was uneventful and she returned to full activity following fracture healing.

SUMMARY

Presenting symptoms: The patient presented with acute elbow pain following trauma. Immediate considerations include fracture of the radius, dislocation of the elbow, and soft tissue injury.

Imaging work-up: The initial imaging study of choice for post-traumatic elbow pain is a plain film examination of the elbow. Views obtained typically include an anteroposterior (AP), lateral, and one or more oblique views. The most frequent fracture of the bones of the elbow joint is a radial head or neck fracture, and since these are intra-articular, the resultant hemorrhage from the fracture (and extravasation of marrow elements) will distend the elbow joint. This distension will displace the anterior and posterior fat pads from their usual position in coronoid (anterior) and olecranon (posterior) fossae, and the fat pads will look like low density (gray or black) “sails” extending from the distal humerus (see figure, Page 4). This is known as the positive fat pad sign (or “sail” sign) and, in the setting of acute trauma, indicates a joint effusion, frequently from a fracture. Of course, there are other causes of elbow joint effusion, including arthritis.

Establishing the diagnosis: When plain films demonstrate a definite fracture lucency, they are diagnostic. In a patient with a history of trauma and pain on palpation of the radial head along with a positive fat pad sign, treatment typically proceeds under the assumption that the patient has a nondisplaced radial head fracture. If definitive diagnosis of a fracture is required, further imaging with computed tomography or magnetic resonance imaging can be performed.

Take-home message: The initial study of choice for virtually all patients with acute post-traumatic elbow pain is a plain film evaluation. A positive fat pad sign indicates an effusion and in the setting of acute trauma and when accompanied by radial head pain is virtually diagnostic of a fracture; in this situation, if a fracture is not visualized on routine plain films, patients are generally treated as if they have a nondisplaced fracture.

Note the similarity of this case to that presented in RQW090 Acute Post-traumatic Shoulder Pain 09-15-12. 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, Anderson RJ. Evaluation of elbow pain in adults. UpToDate, accessed 11/6/09.

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.

Slabaugh M. Radial head and neck fractures in adults. UpToDate, accessed 4/11/12.