

PROBLEM



>> An 89-year-old woman presents to your emergency department after a fall. She is complaining of left hip pain and is unable to bear weight. You obtain the radiographs above.

Question 1

What is your diagnosis?

- a) subcapital femoral neck fracture
- b) intertrochanteric femur fracture
- c) pelvic ring fracture
- d) sacral fracture

Question 2

What imaging modality should you use for confirmation?

- a) computed tomography (CT) scan
- b) oblique radiographs
- c) magnetic resonance imaging (MRI)
- d) bone scan

Question 3

A CT scan of the left hip is performed. This test is highly sensitive for which of the following injuries?

- a) sacral fractures
- b) pelvic ring fractures
- c) acetabular fractures
- d) muscle injury

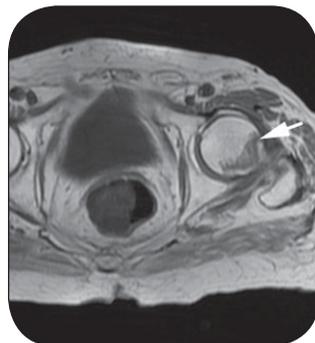
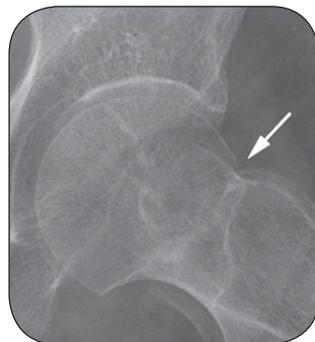
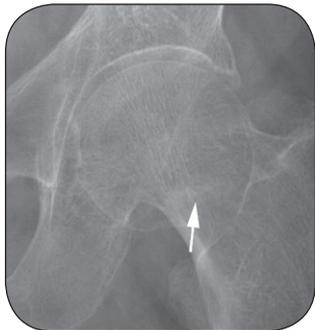
Question 4

Which of the following is not a contraindication to MRI?

- a) cardiac pacing device
- b) stainless steel total hip replacement
- c) ocular metallic foreign body
- d) stainless steel aneurysm clip

Turn page for answers >>>

ANSWER



Question 1. The radiographs taken on presentation demonstrate a band of sclerosis along the medial femoral neck, raising the possibility of impacted bone (first image). There is also mild irregularity of the lateral cortex on the frog-leg lateral film (second image). It is important to note, however, that these same findings are also present with degenerative bone formation.

For a suspected hip fracture, plain radiographs remain the initial imaging study of choice due to their high sensitivity (greater than 90% in elderly osteopenic patients), wide availability, low cost, and ability to determine the type of fracture (intertrochanteric versus femoral neck) helping dictating proper treatment. If, after normal or equivocal radiographs are reviewed, persistent clinical suspicion for hip fracture still remains, then further imaging is indicated. When reviewing hip radiographs, remember to evaluate the sacrum and the pelvic ring, as these injuries can mimic hip fractures. One should always be able to trace the obturator ring as a smooth oval (third image). If there is an interruption in this oval, the possibility of a pelvic rami fracture should be investigated.

Questions 2 and 3. Oblique radiographs have no particular ability to visualize fractures that standard views do not, and CT, although useful in diagnosing many other fractures, has a low sensitivity for radiographically occult hip fractures (30% to 50%). Although state-of-the-art multidetector CT may improve on these numbers, MRI is still the test of choice, with sensitivity reported as high as 100%. Fractures appear as low-intensity lines in the normally bright marrow on T1-weighted images (fourth image). With unilateral hip pain, always use the opposite side for comparison. While CT scans are highly sensitive for pelvic ring, acetabular, and sacral fractures, MRI allows for detection of soft tissue injuries such as muscle tears, bursitis, and joint effusion as well as osseous injuries that may mimic hip fracture. Bone scans are highly sensitive (96%) for radiographically occult fractures but require roughly 72 hours to have passed since the injury for the body to mount a healing response and ensure this high sensitivity. Imaging any earlier may result in missed fractures. Multiple studies have found that using MRI instead of a bone scan decreases both treatment cost and patient morbidity by eliminating the associated waiting period.

Question 4. Contraindications to MRI include cardiac pacing devices, ferromagnetic aneurysm clips, and metallic foreign bodies in sensitive areas (such as the eye). Tattoos in these same areas are a relative contraindication. Although stainless steel orthopedic hardware is ferromagnetic, it should not pose a risk to the patient. When in doubt about about the safety of MRI for a specific patient, a radiologist should be consulted.

SUGGESTED READING

Cannon J, et al.: Imaging choices in occult hip fracture. *J Emerg Med* 35: 2008.

Perron AD, et al.: Orthopedic pitfalls in the ED: radiographically occult hip fracture. *Am J Emerg Med* 20(3):234, 2002.

Dr. Hentel, editor of "Emergency Imaging," is an assistant professor of radiology at the Weill Cornell Medical College and chief of emergency/musculoskeletal imaging and vice chairman for clinical operations in the department of radiology at New York-Presbyterian Hospital in New York City. He is also a member of the EMERGENCY MEDICINE editorial board.