

PROBLEM

Patient 1



Patient 2



Patient 3



Patient 4

>>> Four patients presented to the emergency department with ankle fracture secondary to a twisting injury. Can you identify the fracture in each of these patients?

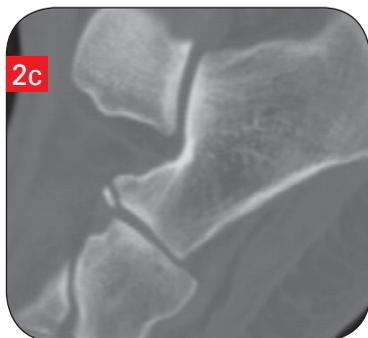
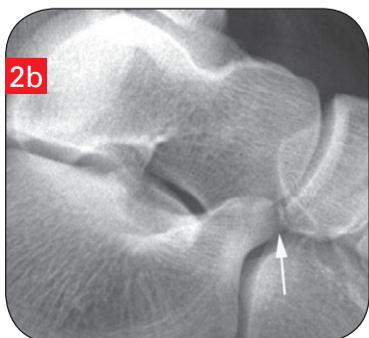
Turn page for answers >>>

ANSWER

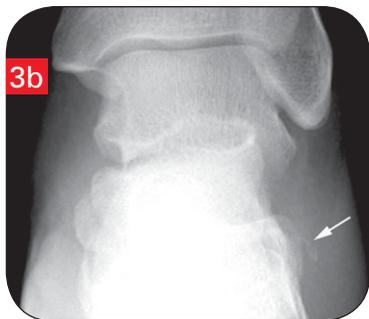


>> These cases represent four commonly missed fractures associated with ankle-twisting injuries.

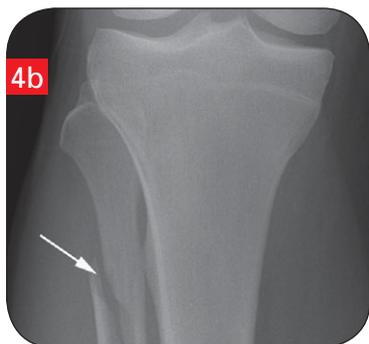
Patient 1 has an osteochondral fracture (or defect) of the medial talar dome. Osteochondral fractures of the talar dome may occur on either the medial or lateral articular surface. When reviewing ankle radiographs, closely examine the articular surface for irregularity and lucency (white arrow) as seen in Figure 1b. Due to its ability to directly visualize the cartilage, MRI is the preferred test to evaluate for and characterize an osteochondral injury. However, when MRI is not available, CT may also be useful.



Patient 2 has a fracture of the anterior process of the calcaneus (white arrow) as seen in Figure 2b. This is another commonly missed injury caused by the avulsion of the bifurcate ligament, which attaches on the anterior process. This injury frequently requires operative management. Be sure to evaluate the anterior process of the calcaneus for fracture lucency or displacement. If radiographs are equivocal, which they may be due to overlapping shadows, CT (Figure 2c) is the preferred examination for further evaluation.



Patient 3 has another avulsion injury that is commonly missed. On the anteroposterior view of the ankle (Figure 3b), fractures secondary to avulsions of the origin of the extensor digitorum brevis tendon from the calcaneus are visualized as linear osseous fragments along the lateral aspect of the calcaneus (white arrow).



Patient 4 does have a fracture, although it is not visible in Figure 4a. The image does demonstrate widening of the medial joint space (mortise), from which one can infer a tear of the medial (deltoid) ligaments. Frequently associated with this injury is a fracture of the proximal fibula (white arrow, Figure 4b), referred to as a *Maisonneuve fracture*. In any patient with evidence of deltoid tear (or displaced fracture of the medial malleolus) without an identified fibular fracture, full-length tibia-fibula views should be obtained.

SUGGESTED READING

Mulligan ME. Ankle and foot trauma. *Semin Musculoskelet Radiol.* 2000;4(2):241-253.

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.