

## PROBLEM



>> A patient presents to the ED with heel pain and difficulty bearing weight. A lateral radiograph of the ankle is obtained (Figure 1).

**What is your diagnosis?**

Turn page for answer >>

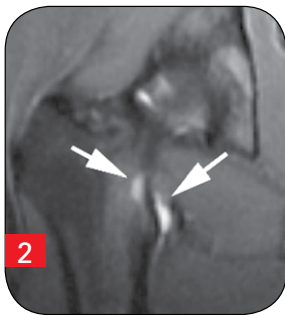
## ANSWER



The patient has a stress fracture of the calcaneus, as demonstrated by the band of sclerosis (white arrow, Figure 1a) extending perpendicular to the normal trabecular bone and paralleling the posterior cortex of the bone.

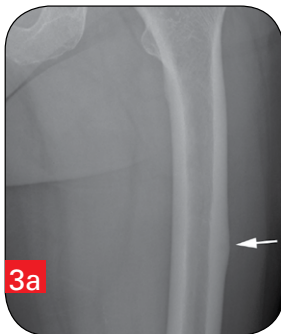
The lower extremities are the most common sites for all stress fractures. Stress fractures can be classified into two categories. *Fatigue fractures* result from abnormal stress applied to normal bone. These are most commonly seen in athletes and military recruits. *Insufficiency fractures* result when normal stress is applied to abnormal bone. These fractures are most commonly seen in patients with advanced osteoporosis.

While the tibial shaft and posterior calcaneus are the most common sites for such fractures in the lower extremities, these injuries may occur at the femoral neck, femoral shaft, patella, fibula (“runner’s fracture”), talus, navicular, and metatarsals and in the sesamoids of the first toe.



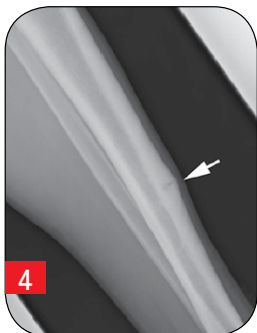
Stress fractures may be difficult to visualize on radiographs, with a reported sensitivity of 15% to 35% on initial radiographic evaluation. This is in part due to the fact that it takes 2 to 3 weeks for a developing stress fracture to become radiographically visible. The sensitivity increases to 30% to 70% on follow-up examinations.<sup>1</sup> Therefore, if a stress fracture is suspected based on clinical findings, radiographs are not sufficient to exclude this possibility.

Additional imaging modalities that are more sensitive for stress injuries include MRI and nuclear medicine bone scanning. Figure 2, an edema-sensitive coronal MR image of the hips, demonstrates increased signal surrounding the medial cortex of the right hip (white arrows), confirming the presence of a stress fracture in this patient with hip pain and a normal radiographic examination. A follow-up radiograph (Figure 2a) demonstrates faint sclerosis (white arrow). If MRI is not available or is contraindicated, a bone scan can be performed.



A stress fracture in the femur, for example, will demonstrate increased radiotracer uptake (Figure 3, white arrow). On a concurrent radiograph (Figure 3a), this fracture appears as subtle cortical thickening (white arrow).

Advanced stress fractures may appear on radiographs as cortical lucency (white arrow, Figure 4), as seen in a case of an advanced stress fracture of the tibia.



### REFERENCE

1. Berger FH, de Jonge MC, Maas M. Stress fractures in the lower extremity: the importance of increasing awareness amongst radiologists. *Eur J Radiol.* 2007;62(1):16-26.

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