Emergency Imaging

Christy Pomeranz, MD, and Keith D. Hentel, MD

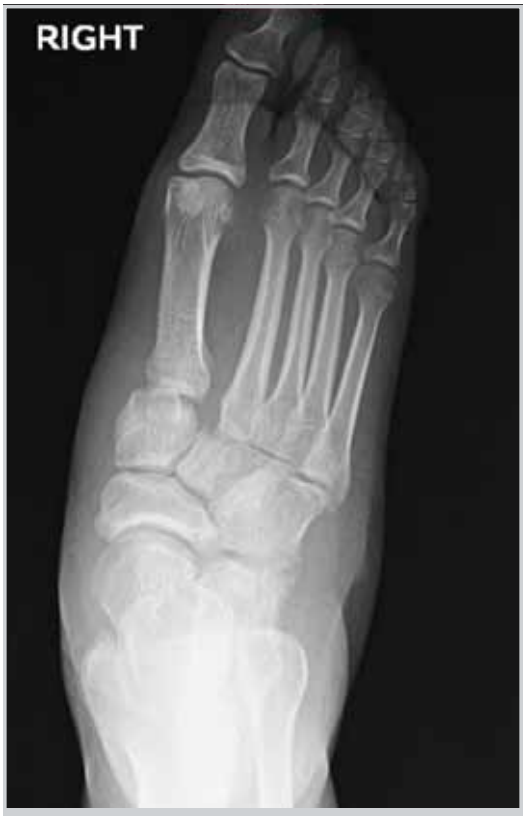

Figure 1

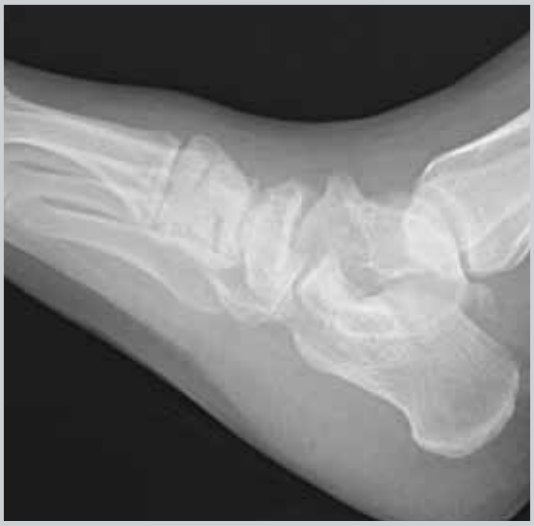

Figure 2

A 25-year-old man presents to the emergency department with right foot pain, swelling, and inability to bear weight after stepping on a rock the prior day. AP (Figure 1) and lateral (Figure 2) radiographs are obtained.

What is the diagnosis?

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

ANSWER

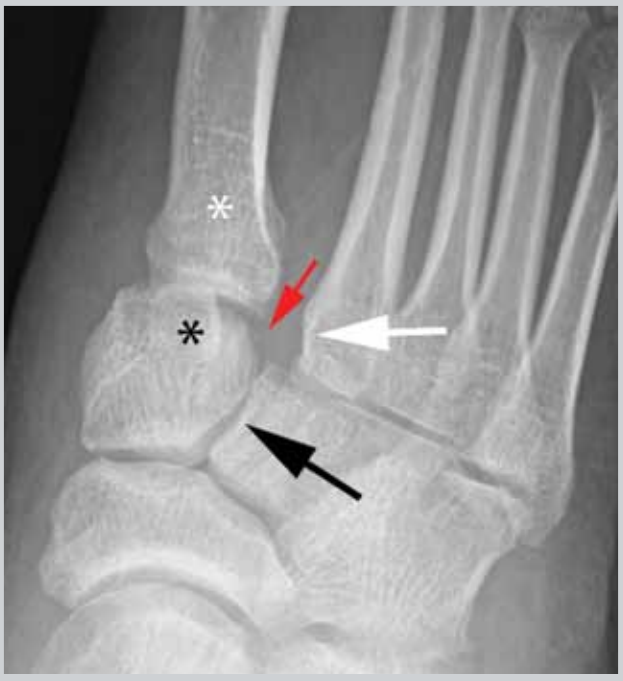

Figure 3

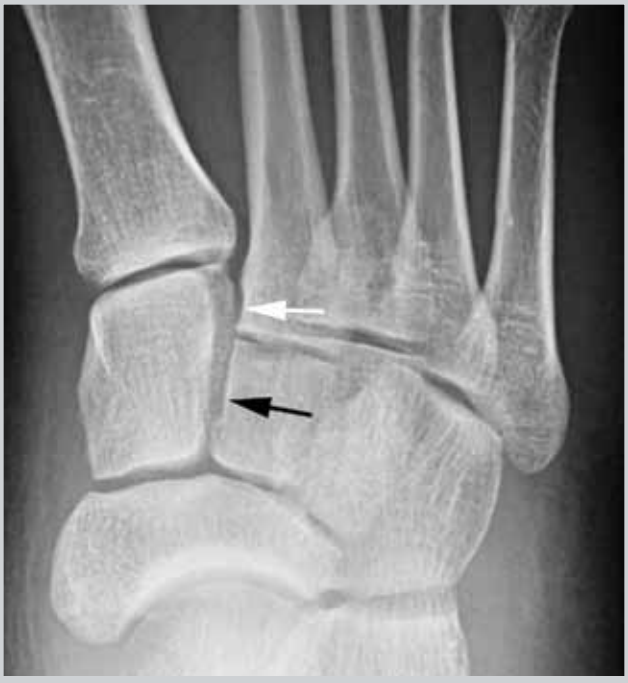

Figure 4

The AP radiograph of the right foot (Figure 3) reveals malalignment of the base of the second metatarsal (white arrow) and the middle cuneiform (black arrow). Lateral subluxation of the first metatarsal (white asterisk, Figure 3) relative to the medial cuneiform (black asterisk, Figure 3) is also seen. On close examination, there is a tiny cortical fracture fragment adjacent to the lateral border of the medial cuneiform (red arrow, Figure 3). These findings indicate the presence of a Lisfranc joint fracture-dislocation.

The Lisfranc joint is the articulation of the three cuneiforms and the cuboid with the first through fifth metatarsals. This joint, also referred to as the tarsometatarsal joint, separates the midfoot from the forefoot. The joint is named for Jacques Lisfranc de St. Martin, who as a surgeon in Napoleon's army described amputations without osteotomies at the tarsometatarsal joint for soldiers suffering from gangrene.

Injuries to the Lisfranc joint are uncommon, representing 0.2% of all orthopedic injuries.[1] These injuries may be classified based on the mechanism of injury as high-velocity or low-velocity. High-velocity injuries typically occur due to falls from height or in motor vehicle accidents (with the foot planted on the brake or floor at impact), and are typically easy to diagnose. Low-velocity injuries occur from what often seem like trivial traumatic events, such as tripping while stepping off a curb. The clinical presentation of low-velocity injuries may be similar to that of sprains, and these injuries may be missed on initial work-up in up to 50% of cases, making both low- and high-velocity Lisfranc injuries among the most commonly missed emergency department diagnoses. While outcomes for patients with these injuries are good if treatment is undertaken early (within 4–6 weeks), failure to treat results in progressive midfoot instability, foot deformity, and a rapidly progressing osteoarthritis.[2]

Radiographs are typically the initial diagnostic imaging test for evaluation of foot injury. On an AP view of the foot, the cortices of the second metatarsal (white arrow, Figure 4) and the middle cuneiform (black arrow) should exactly align. An oblique view of the foot may be

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used to evaluate for alignments of the medial cortex of the third metatarsal with the lateral cuneiform, and the fourth metatarsal with the cuboid; obtaining this view may increase the sensitivity of radiography. Abnormal alignment and the presence of cortical avulsion fragments, referred to as the *fleck sign*, are diagnostic of instability and indicate the need for surgical stabilization.[3]

CT with multiplanar reformats is more sensitive than radiography for detection of Lisfranc injuries. CT is also useful in documenting the full extent of these complex injuries, allowing optimized presurgical planning. MRI is also useful in cases of Lisfranc injury because it is able to directly visualize the ligaments and injuries to them.

The Lisfranc joint should be carefully evaluated on all foot radiographs, as failure to detect these injuries may result in significant morbidity. In cases that are equivocal or have normal radiographs with a high suspicion of injury to the Lisfranc joint, additional imaging should be performed with CT or MRI. For the patient presented, prompt diagnosis of the Lisfranc injury leading to surgical intervention resulted in a return to normal function. **EM**

References

1. Sands AK, Grose A. Lisfranc Injuries. *Injury.* 2004;35 Suppl 2:SB71–76.
2. Mayich DJ, Mayich MS, Daniels TR. Effective detection and management of low-velocity Lisfranc injuries in the emergency setting: Principles for a subtle and commonly missed entity. *Can Fam Physician.* 2012;58(11):1199-1204.
3. Kalia V, Fishman EK, Carrino JA, Fayad LM. Epidemiology, imaging, and treatment of Lisfranc fracture-dislocations revisited. *Skeletal Radiol.* 2012;41(2):129-136.