

Diagnostic Imaging Review

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FIGURE 1. An anteroposterior plain radiograph of the patient's left foot reveals the pathology (arrow).

Foot pain for 5 years, and an abnormal radiograph

CASE

The patient is a 31-year-old female with pain near the great toe of the left foot. The pain had been present for 5 years. The patient had experienced no antecedent trauma. She described the pain as a constant, dull ache and said it had been getting progressively worse, which was why she was seeking treatment. She was being treated for bilateral plantar fasciitis with corticosteroid injections administered by a podiatrist, and that condition was resolving. Screening for rheumatoid arthritis was unremarkable.

On physical examination, the patient complained of exquisite tenderness with flexion and extension of her left great toe. She had tenderness to palpation over the dorsum of the first metatarsophalangeal (MTP) joint. She had 40 degrees of dorsiflexion and 20 degrees of plantar flexion of her first

MTP joint. She was unable to toe walk without inverting her foot to relieve pressure on the first metatarsal head. A radiograph was ordered (see Figure 1). What did the radiograph show?

DISCUSSION

Figure 1, an anteroposterior (AP) plain radiograph of the patient's left foot, revealed subchondral sclerosis and flattening of the first metatarsal head. Osteoarthritis is also seen in the first MTP joint. There was no bone lesion, soft tissue mass, or abnormal fluid collection. The differential diagnosis included stress fracture, osteomyelitis, osteoarthritis, gout, and avascular necrosis of the first metatarsal head (Freiberg's infraction).

The patient had Freiberg's infraction, an uncommon condition that is a challenge for clinicians to recognize and treat. The cause is controversial, but the

most popular theory is that Freiberg's infraction is caused by a traumatic acute or repetitive insult.¹ Symptoms may not manifest until osteoarthritis has already developed, and patients usually present with pain and limited range of motion.¹ As the disease progresses, flattening of the metatarsal head occurs and becomes visible on radiography.¹

Stress fractures in metatarsal bones are caused by chronic repetitive activities. They often occur on the second, third, and fourth metatarsal shafts.¹ Treatment consists of rest and nonweight-bearing activities, with gradual return to full activities after the pain has resolved. Freiberg's infraction, osteoarthritis, and stress fractures may coexist.

Osteomyelitis of the foot is often caused by an infection and is most commonly seen in patients with diabetes.¹ Ulcers may develop under pressure points, such as the first and fifth metatarsal heads. This patient was unlikely to have osteomyelitis because she did not have diabetes.

Osteoarthritis is common in the first MTP joint and is usually caused by repetitive loading injury.¹ Joint-space narrowing, osteophytes, and subchondral cyst formation are typical findings on MRI.¹ This patient had developed osteoarthritis in the MTP joint, which may have been part of the reason why her pain gradually worsened.

Gout commonly affects the first MTP joint. It is caused by deposition of sodium urate crystals in joints, bones, tendons, bursa, and periarticular tissue.¹ Tophaceous gout is the chronic form and may show bone erosions.¹

Avascular necrosis of the first metatarsal head (Freiberg's infraction) is usually seen after surgery to correct hallux valgus^{1,2} and typically affects the second and third metatarsal heads.¹ In 1914, Freiberg first described the condition as an infraction (incomplete fracture without displacement of the fragments) in six patients.³ It is more commonly seen in females.

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A complete history, physical examination, and AP and lateral plain foot radiographs are necessary to identify this entity. MRI is also recommended if the plain radiographs appear normal but the clinician is still suspicious of pathology. Patients usually present with forefoot pain.¹ Range of motion may be limited, and stiffness of the first MTP joint with localized tenderness to palpation may be noted.¹ Radiographs may reveal subchondral fractures in the early phase. Resorption of necrotic bone with epiphyseal fracture occurs with the progression of the disease. Late findings include flattening of the metatarsal head and deformity.¹

Treatment in the early stages is conservative and usually consists of short-term immobilization.^{1,3} Patients with later-stage disease will need metatarsal pad inserts to support the MTP joint. Several surgical procedures have been used to treat Freiberg's infraction, including debridement, osteotomy, and resection; but resection is usually avoided because it can cause arterial injuries, vascular compromise, and osteonecrosis.^{1,4}

A patient with Freiberg's infraction will often present initially in primary care, and recognition can be challenging in this setting because the condition is so unusual. Sensitivity to the radiographic appearance of Freiberg's infraction and to the significance of metatarsal pain can help to provide patients with a timely diagnosis and a better outcome. **JAAPA**

Julie Vajnar, PA-C, RT, department editor

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