Anthony Amoroso and Ajit P. Limaye, Section Editors

An Unusual Etiology for Osteomyelitis in an Immunocompetent Host

Figure 1. Anteroposterior (*left*), oblique (*middle*), and lateral (*right*) views of the right ankle. Images show significant soft tissue swelling (asterisk); lytic destruction of the distal tibia, talar dome, and distal fibula (arrow heads); and periosteal reaction of the distal tibia (curved arrows).

A 58-year-old man sustained an open fracture dislocation of the right ankle when he fell from a stepladder while trimming hedges. He underwent irrigation and debridement followed by open reduction internal fixation (ORIF) for the injury. He received antibiotics during admission but not following discharge. The surgical site healed, radiographs showed stable hardware, and he progressed well when seen in orthopedic follow-up. Six months after ORIF he underwent planned removal of prominent lateral ankle hardware. Operative notes indicated no sign of infection at the time of hardware removal, and the surgical incision healed.

Figure 2. Follow-up coronal (*left*) and sagittal (*right*) computed tomography images. Postoperative placement of antibiotic impregnated beads (arrows) in the ankle joint is noted. There is lytic destruction of the distal tibia, talar dome, and distal fibula (arrowheads) and periosteal reaction of the distal tibia (curved arrows).

Nine months following the original injury, he returned with swelling and an ulcerated area over the medial malleolus. He denied systemic signs of illness but had developed a new discomfort in the ankle. Radiographs of the right ankle showed apparent osteolysis of the medial malleolus and lateral aspect of the tibiotalar joint ([Figure 1](#)).

He underwent additional surgeries for irrigation and debridement as well as removal of remaining hardware ([Figure 2](#)).

Multiple cultures grew an unusual organism. What is your diagnosis?

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Diagnosis: Osteomyelitis of tibia and fibula due to *Fusarium solani*.

A filamentous fungus grew from 8 separate operative specimens of bone and soft tissue. Microscopic morphology showed septate filaments that branched at acute and right angles. Both macroconidia and microconidia were found. The macroconidia were curved, multiseptate, and suggestive of *Fusarium* species (Figure 3). By using combined phenotypic characterization and DNA sequencing, the fungus was identified as *Fusarium solani* (University of Texas at San Antonio Fungus Testing Laboratory). *Fusarium* species are ubiquitous fungi found in soil and organic matter with a widespread distribution. *Fusarium* can be pathogenic to plants and are associated with plant roots as either parasites or saprophytes [1]. In humans, *Fusarium* can cause localized infections in normal hosts and widely disseminated infection in immunocompromised hosts. *Fusarium solani* is the most frequent cause of invasive disease and also the most virulent [2]. Diagnosis is made by isolating the organism from a usually sterile site. Blood cultures may be positive up to 50% of the time.

Figure 3. Lactophenol cotton blue staining of *Fusarium solani*. Hyaline, septate hyphae were present (white arrows), along with the classic multiseptate, curved, or "canoe" shaped, macroconidia (black arrows) representative of *Fusarium* species.

Fusarium are an unusual cause of infection in immunocompetent hosts. When *Fusarium* is the causative organism in a healthy host, it often occurs due to an open wound or penetrating injury [1]. Introduction of the organism may precede overt infection by a year or longer [3, 4]. Examples of indolent presentation in normal hosts include foot abscess 10 months after bamboo chip puncture, osteomyelitis of the leg 8 weeks following motor vehicle accident, and toe callus evolving over a 6-month period to a necrotic ulcer requiring partial amputation [5–7]. Two cases of maxillary sinus infection in normal hosts due to *Fusarium* have been described presenting 1 and 15 years after onset of symptoms [8].

Fusarium can adhere to prosthetic material and form a biofilm. It has been widely reported as a cause of keratitis in contact lens wearers [9, 10]. *Fusarium* infection of bone is unusual. Hiebert and colleagues found 11 cases of osteomyelitis due to *Fusarium* in the English language literature. Only 4 of the cases were in immunocompetent hosts [11].

Optimal antimicrobial management for *Fusarium* is not known as susceptibility is unpredictable [12, 13]. Treatment may include amphotericin, voriconazole, or both. With localized infection, surgical resection of involved tissue is recommended, along with antifungal therapy [12].

We believe our patient had inoculation of *F. solani* at the time of the open fracture followed by persistence in biofilm on the fixation hardware. Infection manifested many months later with surgical wound breakdown and osteomyelitis. He underwent removal of implanted hardware, resection of nonviable bone, and treatment with a multiplanar external fixator for 6 months. Antimicrobial treatment was a prolonged course of voriconazole to which the organism was found to be susceptible. He has recovered fully from his injury and infection.

Note

Potential conflicts of interest. Both authors: No reported conflicts of interest. Both authors have submitted the ICMJE Form for Disclosure of Potential Conflicts of Interest. Conflicts that the editors consider relevant to the content of the manuscript have been disclosed.

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