Emphysematous osteomyelitis of the forefoot

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ABSTRACT

Emphysematous osteomyelitis is a very rare, potentially fatal infection that requires immediate diagnosis and prompt treatment. Emphysematous osteomyelitis is usually considered whenever intraosseous gas is detected on imaging. Most organisms implicated in emphysematous osteomyelitis are members of the Enterobacteriaceae family or anaerobes; sometimes the infection is polymicrobial. We report a case of emphysematous osteomyelitis of the forefoot in a 33-year-old man with type 1 diabetes mellitus.

KEYWORDS Diabetes; emphysematous osteomyelitis; midfoot; necrotizing fasciitis

In 1981, Ram et al described intraosseous gas as a sign of emphysematous osteomyelitis on computed tomography (CT).¹ Intraosseous gas within the femur on plain films was also described by Patton et al in 1983.² The presence of intraosseous gas in the absence of recent surgery or compound fracture is highly indicative of emphysematous osteomyelitis.^{3,4} Conditions resulting in immunodeficiency such as diabetes predispose patients to emphysematous osteomyelitis.⁵ We report a young man with type 1 diabetes who presented with emphysematous osteomyelitis of the midfoot and necrotizing fasciitis of the distal lower limb.

CASE REPORT

A 33-year-old man with type 1 diabetes mellitus and left transmetatarsal amputation presented with a 3-day history of fevers, chills, left foot pain, and drainage from the amputation stump. He was febrile, was tachycardic, and had malodorous discharge from his left foot. His laboratory values were significant for a sodium level of 131 mmol/L and glucose level of 315 mg/dL. An x-ray of the left foot demonstrated evidence of prior transmetatarsal amputation, marked soft tissue swelling, and foci of air in the subcutaneous and deep soft tissues, with a large pocket of air along the lateral aspect of the foot, raising the possibility of necrotizing fasciitis (*Figure 1*). Subsequently, a CT scan of the left lower extremity without contrast demonstrated a moderate amount of subcutaneous and deep air, evidence of bone destruction, and air within the cancellous portion of the second metatarsal (*Figure 2*). CT scan also demonstrated a 2.0 × 1.6 cm fluid collection with an air fluid level along the lateral aspect of the foot. The patient was admitted to the surgical intensive care unit, started on empiric intravenous cefepime and Flagyl, and had a left above-ankle guillotine

amputation performed. Tissue and blood cultures grew *Staphylococcus aureus* and *Proteus penneri*, and his antibiotics were narrowed down to oxacillin. The patient's general condition improved drastically and he was taken to the operating room to undergo completion below-knee amputation before his discharge from the hospital.

DISCUSSION

Emphysematous osteomyelitis is a very rare and potentially life-threatening condition. Less than 30 cases have been described in the English literature.⁶ Most cases are associated with immunosuppression as a result of diabetes or malignancies.⁵ Our patient suffered from poorly controlled type 1 diabetes with a blood sugar of 387 mg/dL upon presentation. According to Luey et al, the mean age at presentation is 51 years with no sex predilection.⁵ The infection can be monomicrobial or polymicrobial, with the most commonly isolated organism being either a member of the Enterobacteriaceae family or anaerobes.⁵ In our case, tissue and blood cultures indicated growth of *S. aureus* and *P. penneri*.

On imaging, the presence of locules of gas within bone and adjacent soft tissues is pathognomonic for emphysematous osteomyelitis. Such findings could be detected on plain radiographs; however, CT scan is an excellent modality in detecting intraosseous gas. In our case, x-ray showed foci of air in the subcutaneous and deep soft tissues of the left leg and foot (*Figure 1*). The CT scan clinched the diagnosis by demonstrating subcutaneous and deep air, evidence of bone destruction, and air within the cancellous portion of the second metatarsal (*Figure 2*).

Mortality from emphysematous osteomyelitis can be as high as 32%.⁵ Emphysematous osteomyelitis should be managed aggressively. Surgical debridement is the cornerstone of

Figure 1. (a) Frontal, (b) oblique, and (c) lateral views of the left leg demonstrating evidence of prior transmetatarsal amputation. Marked soft tissue swelling is evident on the lateral film, and foci of air are evident in the subcutaneous and deep soft tissues (white arrow), with a large pocket of air along the lateral aspect of the foot (curved white arrow). A chronic fracture deformity of the left fifth metatarsal is also shown (black arrow).

Figure 2. (a) Axial and (b) coronal noncontrast CT scan of the leg demonstrating a moderate amount of deep air (curved black arrow) and evidence of bone destruction (curved white arrow) with air in the cancellous portion of the second metatarsal (black arrow). There is 2.0 × 1.6 cm fluid collection with air fluid level along the lateral aspect of the foot (white arrow).

treatment.³ Intravenous antibiotic therapy has been shown to control the spread of infection. As soon as the diagnosis was made, our patient was taken urgently to the operating room for above-ankle guillotine amputation. The patient recovered uneventfully and was discharged in stable condition.

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