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Infectious Spondylodiscitis, Epidural Phlegmon, and Psoas Abscess Complicating Diabetic Foot Infection: A Case Report

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ABSTRACT

Few published case reports have cited vertebral osteomyelitis as a sequela of a diabetic foot infection. The purpose of the present report is to increase awareness of a potentially severe complication of diabetic foot ulceration: vertebral osteomyelitis and associated pathologic features. We present the case of a 63-year-old male with right calcaneal osteomyelitis who developed acute onset lower back pain with concomitant fever and chills. Magnetic resonance imaging revealed L4-L5 vertebral osteomyelitis, a T9-L1 epidural abscess, and a right psoas muscle abscess secondary to hematogenous seeding from the calcaneus. The patient underwent right partial calcanectomy, spinal and right psoas abscess incision and drainage, and direct lumbar interbody fusion of L4-L5 with a right iliac crest allograft. All bone, blood, and abscess cultures were positive for methicillin-resistant *Staphylococcus aureus*. After the surgery, the patient's pain resolved in his back and hip and he regained full right lower extremity function. The 1-year follow-up examination revealed that the patient had vertebral arthritis but was able to perform his activities of daily living with a walker and cane. It is important to recognize the potential complications of diabetic foot ulcerations and be aware of the identifying symptoms and treatment options for this condition to prevent significant morbidity and mortality.

Vertebral osteomyelitis, or infectious spondylodiscitis, can present by hematogenous spread from a distant source, contiguous spread from an adjacent source, or direct inoculation during spinal procedures. *Staphylococcus aureus* is the most common cause of adult hematogenous vertebral osteomyelitis and methicillin-resistant *S. aureus* (MRSA) has been found in more than 67% of cases (1). Priest and Peacock (1) performed a retrospective review of 40 patients with *S. aureus* vertebral osteomyelitis and reported a 55% causal incidence after an invasive vertebral procedure. A 2008 study by Grammatico et al (2) estimated the overall incidence of vertebral osteomyelitis at less than 1%, approximately 2.4/100,000 persons. The incidence of a psoas abscess and spinal epidural abscesses has also been rare, estimated at 12 cases annually and 0.2 to 1.2/10,000 persons annually, respectively (3,4). The development of all 3 conditions is thus even rarer still. Epidural and psoas abscesses can originate from vertebral osteomyelitis, but each of these infections can also result in the development of the other (5). However, the incidence of vertebral osteomyelitis has been increasing, especially in patients with diabetes, because of the use of indwelling catheters and injectable recreational drugs (6,7).

Few studies have cited the foot as the hematogenous source of vertebral osteomyelitis, none of which specifically named the calcaneus. In 1977, Ceilley (8) published a case report of a 71-year-old diabetic female with pedal osteomyelitis whose vertebral, pedal wound, and blood cultures revealed the same organism: *Corynebacterium haemolyticum* (now *Arcanobacterium haemolyticum*). In 2013, Cechurová et al (9) reviewed 3 cases of hematogenous spread of methicillin-sensitive *S. aureus* from recurrent neuropathic diabetic foot ulcers. They concluded that a sudden onset of back pain was a common fundamental symptom in their diagnosis.

Our case report illustrates the development of hematogenous osteomyelitis that spread from a calcaneal origin. The purpose of the present case report is to inform podiatrists of this potentially severe pedal osteomyelitis complication. It is important to be aware of the identifying symptoms and treatment options for this condition to prevent significant morbidity and mortality.

Case Report

In February 2013, a 63-year-old male was transferred to the Cleveland Clinic from an outside hospital for treatment. A magnetic resonance imaging (MRI) scan from the outside hospital revealed an epidural abscess at the T9-L1 level, a ventral fluid collection at L4-L5,

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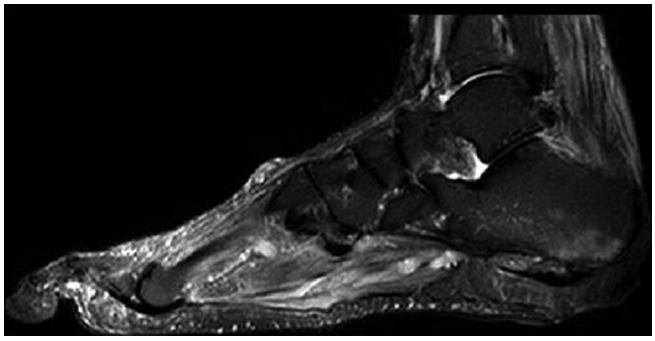

Fig. 1. T2-weighted sagittal right foot magnetic resonance imaging scan before the right partial calcanectomy. The increased signal intensity in the calcaneus is suggestive of calcaneal osteomyelitis.

S1, with extension into the paraspinous muscle, a right psoas muscle abscess, and vertebral osteomyelitis of L4-L5. The patient's medical history included type 2 diabetes mellitus, atrial fibrillation, hypertension, peripheral vascular disease, hyperlipidemia, chronic renal disease, renal calculi, sciatica, and a recent cessation of tobacco smoking, with a 30 pack-year history. The patient was not being treated for any spinal condition other than noninvasive therapy for sciatica. The patient's most recent hemoglobin A1c value was 9.0%.

Fig. 2. Non-weightbearing medial oblique right foot and ankle radiograph after right partial calcanectomy.

Five months before his presentation, the patient had developed a right heel, plantar ulceration secondary to a blister. Wound care treatment under the guidance of a local podiatrist included wet-to-dry dressings with saline and ambulation in an athletic shoe. The frequency of visits and whether debridement was performed remained unknown. The ulceration progressed in size within 1.5 months to measure approximately 4.0 cm × 3.0 cm × 2.0 cm. The patient subsequently developed right lower extremity cellulitis and edema, and the calcaneus became visible within the ulceration. The patient was admitted to an outside hospital with a diagnosis of calcaneal osteomyelitis, and wound cultures revealed the presence of MRSA in the calcaneus. The patient was treated with 1.5 g of intravenous (IV) vancomycin every 12 hours for 4 days and was discharged with 1.0 g of intravenous cefepime for 4 weeks followed by a 10-day course of oral ciprofloxacin 500 mg every 12 hours.

The patient was without antibiotics for 1 week subsequent to the aforementioned treatment, when he was admitted to an outside hospital because of a sudden onset of severe back pain, fever, and chills. A delay resulted in obtaining spinal MRI scans because the patient could not tolerate lying in a supine position secondary to his back pain. Both blood and a calcaneal wound swab culture at that admission revealed MRSA. The findings from transesophageal echocardiography and transthoracic echocardiography were negative for vegetations. The patient's hospital course was complicated by *Clostridium difficile*, for which the patient was treated with oral 7.5 mg/kg metronidazole every 6 hours. The patient then underwent a partial calcanectomy and was given 6 mg/kg of IV daptomycin every 24 hours after the calcaneus revealed MRSA in the intraoperative bone specimen (Figs. 1 to 3). On the ninth day of admission, the patient was placed under general anesthesia to obtain spinal MRI scans. After the images had been read, the patient was transferred to the Cleveland Clinic for additional treatment (Figs. 4 and 5). On arrival, the patient was given 1.5 g of IV vancomycin every 12 hours and 3.375 g of IV piperacillin and tazobactam (Zosyn®, Wyeth Pharmaceuticals, Inc., a Division of Pfizer, Inc., Philadelphia, PA) every 6 hours.

The physical examination revealed spinal tenderness around the mid-thoracic level to the lower lumbar spine and superior anterior right thigh. The patient was unable to perform hip flexion on the right secondary to pain. Laboratory testing revealed a white blood cell count of 13.86 k/μL and an elevated blood glucose level of 380 mg/dL.

The patient underwent spinal and right psoas abscess incision and drainage, followed by direct lumbar interbody fusion of lumbar vertebrae 4 and 5 with a right iliac crest allograft. The bone and abscess cultures were positive for MRSA. Postoperatively, the patient's pain resolved in his back and hip, and he regained full right lower extremity function. Repeat vertebral MRI scans revealed complete resolution of the psoas abscess and stable epidural phlegmon dorsal

Fig. 3. Non-weightbearing lateral right foot radiograph after right partial calcanectomy.