

# Staphylococcus simulans Osteomyelitis of the Foot: A case report

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*Staphylococcus simulans, a coagulase-negative pathogen is not commonly seen in the foot. The pathogen has been isolated in chronic osteomyelitis and infected internal fixation. This case describes a 65 year-old, diabetic male with recalcitrant osteomyelitis following partial metatarsal head resection. Staphylococcus simulans was the primary pathogen isolated. This may be the first reported case of Staphylococcus simulans osteomyelitis of the foot.*

**Key words :** Osteomyelitis, Diabetic foot infection, Staphylococcus infection.

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**S**taphylococcus simulans is a common, coagulase-negative (CoNS) pathogen linked to animals, including cattle.<sup>1</sup> The pathogen is common in normal flora and is primarily acquired through contact with domestic animals. In animals, the pathogen has been isolated and implicated in a condition called "bumble foot".<sup>2,4</sup> Bumble foot, or ulcerative pododermatitis, has been described in both rats and birds.<sup>2,3,5</sup> In humans, the pathogen has been isolated in intravascular and indwelling catheters and conditions including urinary tract infections, septicemia, conjunctivitis, and endocarditis.<sup>1,6,7,8</sup> In the past 15 years, the organism has been isolated in cases of osteomyelitis, prosthetic joint infections, and infected internal fixation devices.<sup>1,7,8</sup> The author has found no reported cases of Staphylococcus simulans osteomyelitis of the foot. This report describes a patient who presented with a draining wound after having a previous partial metatarsal resection for acute osteomyelitis.

## Case Report

A 65 year-old diabetic male presented to our office with a draining dorsal abscess of the right foot. In May 2006, he underwent a partial metatarsal resection of the 3<sup>rd</sup> right metatarsal by another podiatrist. Unfortunately, the area became infected. He states the surgery was performed through the 'top of the foot' and the ulcer was left to close on the bottom. He reports the dorsal incision, which was primarily closed, opened just days after surgery and began to drain. The plantar ulcer did not close. The patient reports he had a dog. It appeared that hair from the dog constantly adhered to his wound because of walking bare foot on the carpet. His treatment included antibiotic therapy and local wound care. He was on an oral Ciprofloxacin. He continued on local wound care and oral antibiotics until he presented to our office in January, 2007. He has had a draining sinus for the past eight months. Radiographic evaluation revealed reactive bone changes to the base of the 3<sup>rd</sup> proximal phalanx consistent with recalcitrant osteomyelitis. (Fig. 1)

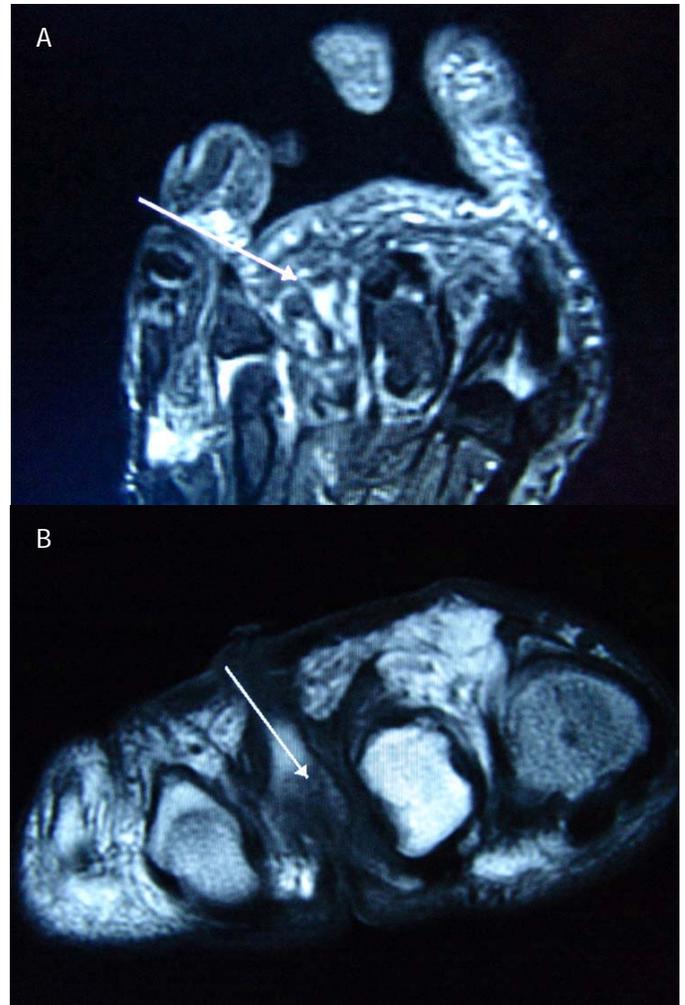
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**Figure 1** Radiographs of the foot revealed a previous metatarsal resection. Reactive, osteolytic changes were seen of the 3<sup>rd</sup> proximal phalanx base consistent with chronic osteomyelitis.

Magnetic resonance imaging (MRI) was performed using high field 1.5 Tesla without contrast. Multiplanar, multisequence images were obtained through the previous partial amputation of the distal right third metatarsal bone and proximal phalanx. On T1 coronal and axial views abnormal bone marrow signal intensity was seen involving the proximal phalanx of the third toe and third metatarsal at the distal shaft. On the respective STIR coronal images and T2WI, there was diffuse high signal intensity. MRI confirmed osteomyelitis to the base of the 3<sup>rd</sup> proximal phalanx as well as the 3<sup>rd</sup> end of the remaining metatarsal stump. (Fig. 2A and 2B)



**Figure 2A and 2B** MRI axial (a), coronal (b) images revealed abnormal image intensity to the base of the 3<sup>rd</sup> proximal phalanx and 3<sup>rd</sup> metatarsal bone.

The patient was admitted to the hospital and scheduled for incision and drainage of the wound with deep tissue and bone cultures with partial resection of the metatarsal stump and base of the proximal 3<sup>rd</sup> digital phalanx. At surgery, the patient had significant scarring with chronic osteomyelitis of the 3<sup>rd</sup> metatarsophalangeal joint (MPJ) space. Deep tissue cultures were performed around the base of the 3<sup>rd</sup> proximal phalanx. Bone was then resected from the base of the 3<sup>rd</sup> phalanx and 3<sup>rd</sup> metatarsal stump. Bone was then sent for culture and sensitivity. The wound was left open and packed with plain gauze and saline.

## Surgical Culture Report

Surgical culture results revealed *Staphylococcus simulans* as the primary organism. Bone cultures were also consistent with the same organism. Culture sensitivities reported resistance to Ampicillin, Ciprofloxacin, Clindamycin, Erythromycin, Oxacillin, Penicillin, Primaxin, Cefazolin and Ceftriaxone. The organism was susceptible to Gentamycin, Tetracycline, Vancomycin and Bactrim.

## Discussion

Osteomyelitis associated with *Staphylococcus simulans* is rarely reported. This appears to be the first documented case of *Staphylococcus simulans* osteomyelitis from a chronic plantar foot ulcer. In 1985, Males, et al., documented a case of fibular, malleolar osteomyelitis after removal of a syndesmotic screw that led to *Staphylococcus simulans* septic ankle arthritis and septicemia.<sup>8</sup> Before 1985, many species of staphylococcus, including *S. simulans*, were not identified as a separate strain of staphylococcus and were often labeled *Staphylococcus epidermidis*. This may explain the lack of reported cases from this pathogen. *Staphylococcus simulans* is also known to produce a strong slime layer. The production of a strong slime layer and its adherence to smooth surfaces, is linked to the organisms ability to colonize, especially in prosthetic devices, shunts and catheters.<sup>8,9,10</sup> In cases of chronic osteomyelitis, this slime layer is also observed in grossly colonized abscesses. In this case, we also observed a mucoid, slime layer adherent to the packing material. We lavaged and repacked the wound daily. It has also been shown that the encapsulated forms of *Staphylococcus simulans* (i.e. slime layer), as compared to unencapsulated forms of the pathogen, have an antiphagocytic effect on human PMN's. Little phagocytosis was observed during a 2 hour incubation of PMN's, even when the ratio of PMN's to bacteria was increased from 1:1 to 10:1.<sup>11</sup> This would explain the virulence of this organism and its ability to colonize wounds and prosthetic devices.

## Conclusion

The patient responded well to intravenous (IV) Vancomycin during his hospital course. He remained in the hospital setting for 16 days on IV antibiotic therapy until the dorsal incision closed. This patient returned to a diabetic shoe without further complication. To date, no signs of recurrent osteomyelitis have been reported.

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