

Bumble Foot: A Rare Presentation of a *Fusobacterium varium* Infection of the Heel Pad in a Healthy Female



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ABSTRACT

Fusobacterium infection is common in herd animals and caged birds; the infection is typically referred to as “bumble foot” or “foot rot.” These are opportunistic anaerobic bacteria that cause abscesses in the feet of animals that have developed inflammation in the foot pad secondary to the terrain. In humans, *F. varium* is known to cause abscesses associated with the oropharynx and gastrointestinal tract, also known as Lemierre's disease. The present study reports the case of a rare presentation of a *F. varium* soft tissue infection of the heel pad in a healthy young female with no associated oropharynx or gastrointestinal abscesses. Therefore, her presentation and disease course were similar to that described in herd animals. The patient was treated with 3 weeks of intravenous antibiotics, incision and drainage, and a gracilis free flap to the weightbearing surface of the right heel.

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Pododermatitis, bumble foot, and foot rot are terms used to describe an inflammatory process that develops in range mammals such as cattle, sheep, and pronghorns and in caged birds. Pododermatitis occurs secondary to chronic inflammation of the foot pad and presents as red, swollen skin that eventually progresses to blister and/or abscess formation, fissuring, and necrosis of the underlying soft tissue (1,2). This inflammatory condition is often associated with a secondary bacterial infection caused by opportunistic gram-negative anaerobes, predominately *Fusobacterium* and *Bacteroides* species. Experimental trials have shown that inoculation with *Fusobacterium* alone is not enough to cause foot rot; rather, the interdigital spaces must be actively inflamed from other causes for the bacteria to create the festering necrotic abscess that represents foot rot (3). The localized infection can be detrimental to herds, because it can lead to bacteremia and/or abscesses of the gastrointestinal tract. Research has concluded that a major contributing factor is the surface the animals stand on. In cattle, it is damp ground with sticks and stones, and for

pigs and birds, it is a concrete surface (1). Soft textured substrates seem to distribute forces in patterns that vary, thereby reducing the likelihood of developing inflammation of the weightbearing surface with progression to pododermatitis (4,5). The conclusions from the terrain research have indicated that the living conditions experienced by the herd potentiate the development of pododermatitis; thus, it is an opportunistic bacterium and not highly virulent.

In humans, *F. nucleatum*, and less frequently *F. necrophorum*, are the most common species of the *Fusobacterium* family involved in infection. Of these microorganisms, *F. necrophorum* is most prevalent in healthy, young (<40 years old) populations (6). Most documented cases of *Fusobacterium* infection have involved bacteremia associated with an initial abscess localized to the oropharynx, known as Lemierre's disease, with little to no association with a superficial soft tissue infection. In a review of 2 Canadian hospitals, *Fusobacterium* bacteremia infection was observed in 40 adult patients during a 10-year observation period (7). In that report, the only primary soft tissue infection occurred in a known intravenous drug user, and all 3 infections associated with *F. varium* displayed an abscess of either the oropharynx or the colon.

In the present report, we describe the case of a young healthy female with bumble foot caused by *Fusobacterium*. To the best of our knowledge, this is the first published report to describe

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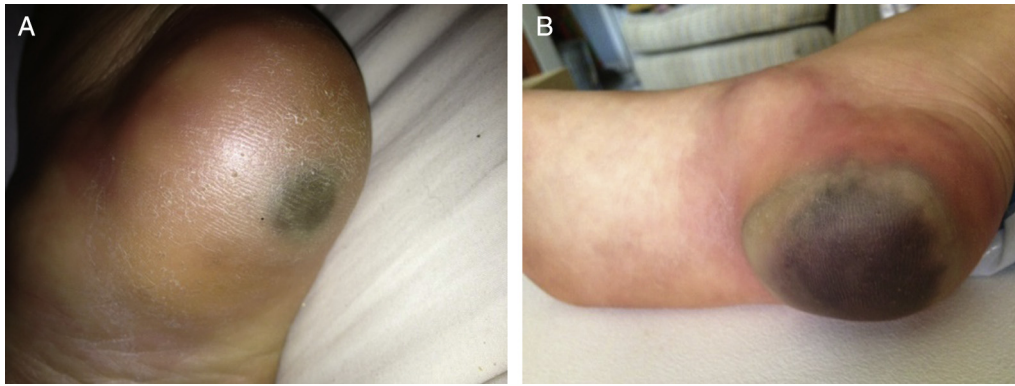


Fig. 1. (A) View of our patient's heel when evaluated by occupational therapy department and diagnosed as plantar fasciitis. (B) View of patient's heel on admission to the hospital 3 days later.

bumble foot (foot rot, pododermatitis) in an otherwise healthy human.

Case Report

A 29-year-old female employed as a restaurant manager presented to urgent care with a complaint of severe right heel pain that had been present for 5 days. On the initial examination, she was diagnosed with acute plantar fasciitis and was referred to occupational medicine. Over the next few days, her pain continued to become increasingly worse, and she developed a progressive blister, with concomitant discoloration of the plantar surface of her right heel. The patient documented her course out of the hospital with serial photographs that revealed heel pad edema with mild erythema and the progressive development of central necrosis of the plantar heel pad (Fig. 1).

Three days after she had presented to urgent care, she was referred to internal medicine and admitted to our hospital. On admission, she had a fever with an oral temperature of 100°F, with all her other vital signs normal. Her white blood cell count was elevated at $13.8 \times 10^3/\mu\text{L}$, the erythrocyte sedimentation rate was elevated at 43 mm/hr, and all remaining laboratory results were within the normal range. After the initial clinical examination, including an infectious diseases consultation (R.B.), no clear-cut route of inoculation was apparent. Her medical history was benign, and her social history was only significant for current cigarette smoking and an occupation that required shifts

of >8 hours standing on her feet. The pertinent negative findings from her workup included no history of intravenous drug use, no oropharyngeal infection, no sign of a puncture wound localized to her right foot, and no recent trauma to her right heel.

At her admission, moreover, standard foot radiographs had revealed an increase in the soft tissue density and volume, no gas in the subcutaneous tissues, and no evidence of bony destruction or proliferation of the calcaneus (Fig. 2). Contrast-enhanced magnetic resonance imaging scans revealed soft tissue edema localized to the plantar heel pad, without cortical erosion or marrow edema involving the calcaneus; no distinct sign of abscess formation was seen (Fig. 3).

On hospital day 1, empiric, intravenous (IV) antibiotic treatment, consisting of 1 g each of cefazolin and meropenem administered every 8 hours, was started. The patient also underwent incision and drainage of her right heel, with procurement of deep culture specimens for microbiologic assessment (Fig. 4). Gram stain of the deep right heel specimen revealed the presence of gram-negative, fusiform organisms. By hospital day 2, the intraoperative bacterial culture and sensitivity results had identified *F. varium* as the infectious organism. Thus, the antibiotic treatment regimen was refined to 1 g of IV meropenem administered every 8 hours. On hospital day 3, she returned to the operating room for a second debridement of her right heel and coverage of the wound with an ipsilateral gracilis free flap transfer combined with a split-thickness skin graft procured from her right thigh. Her hospital course remained uneventful. She was discharged



Fig. 2. (A) Non-weightbearing radiograph, lateral view, showing no gas in the soft tissues and no cortical bone erosion at the calcaneus. (B) Non-weightbearing radiograph, medial oblique view, showing no gas in the soft tissues and no cortical bone erosion at the calcaneus.

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