

Myroides odoratimimus bacteremia in a diabetic patient

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Myroides species are a rare source of human infection. Though not part of the human microbiota, *Myroides* species are commonly found in the environment. *Myroides* infections are typically attributed to contact with contaminated water; the most common presentation is in immunocompromised patients. We present a patient with a diabetic foot ulcer who subsequently developed *Myroides odoratimimus* bacteremia and bone abscess.

M*roides odoratum* and *odoratimimus* are gram-negative, nonmotile, obligate aerobic bacilli with yellow pigmentation and a distinct fruity odor (1). *Myroides* species infect primarily immunocompromised patients, often with diabetes mellitus, cirrhosis, chronic obstructive pulmonary disease, or prolonged corticosteroid therapy (2–6); they are infrequent sources of bloodstream infections (1, 7). This case describes *Myroides odoratimimus* bloodstream infection in a patient with a chronic diabetic foot ulcer who was exposed to freshwater sources.

CLINICAL PRESENTATION

A 75-year-old white man presented to the emergency department with a 2-day history of fever, chills, and concern of an infected wound on his arm. The patient had taken a recent trip to Colorado, where he went whitewater rafting and spent time in a mineral spa. During the trip he slipped on a rock and fell on his arm, causing an abrasion. Five days later, after returning home, he developed a fever (up to 102°F), fatigue, and malaise, treated with acetaminophen. He became concerned that his arm could be the source of his infection. His temperature was 98.8°F; blood pressure, 118/57 mm Hg (sitting); heart rate, 62 beats/minute; and respiratory rate, 18 breaths/minute. Physical exam revealed a 3 cm abrasion on the right forearm with mild erythema, minimal warmth, and no swelling or exudate and a nontender ulcerated lesion on the right second toe with no exudate. His white blood cell count was 12.5 K/ μ l. He received a 1 L 0.9% saline bolus, and blood cultures were collected. Lactate results were initially 3.0 mmol/L and decreased to 2.0 mmol/L when redrawn following the fluid bolus. He was discharged with directions to follow up with his primary care physician.

Two days after discharge from the emergency department, the blood cultures demonstrated gram-negative rods. The initial

identification of the culture revealed *Myroides* species. The patient was contacted and instructed to return to the hospital. He was started on intravenous meropenem 500 mg every 6 hours and vancomycin 1500 mg every 12 hours. The patient improved on the antibiotic regimen. He was also found to have a chronic, nonhealing ulcer on his left second toe. The toe was excised prior to discharge and cultures showed polymicrobial growth of *Myroides* species along with multiple morphotypes of coagulase-negative *Staphylococcus* species. He was discharged 2 days following his toe amputation.

Initial identification of *Myroides* species was performed using Matrix-assisted laser desorption ionization time-of-flight (MALDI-TOF) on a VITEK MS system (bioMérieux, Nürtingen, Germany). Briefly, isolated bacterial colonies from blood agar plates were smeared on the VITEK MS-DS target slide. The smear was overlaid with 1 μ L matrix solution and allowed to air dry completely. Composite mass spectra of over 100 spectral profiles were generated within the range of 2 to 20 kilodaltons and probed using the Research-Use Only version of the VITEK MS Plus database (SARAMIS™ Knowledge Base v4.12) that includes *M. odoratimimus* and *M. odoratus*. Species-level-only identification was obtained at a 92.8% to 99.9% confidence level at four different attempts. Definitive identification of *M. odoratimimus* was accomplished via 16S rRNA sequencing using subcultured isolates from the same plate at the reference testing facility (ARUP Laboratories, Salt Lake City, UT).

DISCUSSION

The two most common *Myroides* species seen in humans are *odoratus* and *odoratimimus* (8). The most common clinical presentations are bacteremia, cellulitis, and isolated outbreaks of urinary tract infections following exposure to a contaminated water source or in the setting of trauma (8, 9). Infections are rare but can occasionally be life-threatening (8). The less common *Myroides* species *pelagicus*, *profundi*, and *marinus* have been

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isolated from various seawater sources but have not to date been documented as a source of infections in humans (10–12).

The traditional epidemiology of *Myroides* involves infection of an immunocompromised host. While our patient appeared clinically well, patients with diabetes are well documented to be relatively immunocompromised compared with nondiabetic patients. The most common types of patients infected with *Myroides* species (*M. odoratus* and *odoratimimus*) are immunocompromised or have end-stage renal disease, cirrhosis, chronic obstructive pulmonary disease, neoplasms, or heart diseases (4–7, 9, 13–16). While *M. odoratus* infections in diabetics have been documented, to our knowledge, ours is the first documented case of *M. odoratimimus* in a diabetic patient (14, 16). Of the five documented reports of *M. odoratimimus* infections, two involved nosocomial outbreaks of urinary tract infections in the setting of urinary stones or cancer (9, 17). Another report documented bacteremia and cellulitis in a patient with alcoholic cirrhosis (13). The next report involved an otherwise healthy elderly man who experienced severe trauma from a farming accident that caused septic shock, pneumonia, and soft tissue infection (8). The last report was of a child who suffered a pig bite and subsequently developed cellulitis (1). In our case, the primary portal of entry and source of infection was felt to be the second left toe, after exposure of that open wound to a presumably contaminated water source, either the natural thermal mineral spa or the river. Subsequently, there was hematogenous spread of *M. odoratimimus* from the infected nonhealing chronic ulcer.

Although antibiotics appeared to clinically resolve the *Myroides* bloodstream infection, the patient's left second toe was still amputated due to a chronic nonhealing ulcer that was felt to pose a risk for future infections. Cultures of the left toe revealed *Staphylococcus epidermidis* in the bone as well as coagulase-negative *Staphylococcus* and *Myroides* spp. from an abscess in the toe. While the patient was initially concerned that the arm abrasion was the cause of infection, that was unlikely given the *Myroides* abscess found in the left second toe.

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