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Case report

Osteomyelitis caused by *Achromobacter xylosoxidans*

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ABSTRACT

Achromobacter xylosoxidans is an aerobic, nonfermenting gram-negative rod and described as a waterborne bacterium since it habits aquatic environments ubiquitously. It has frequently been isolated from aquatic surroundings in the hospital and from various human body sites. Although occasionally considered a non-pathogen, *A. xylosoxidans* has been associated with outbreaks of nosocomial infection due to contaminated fluids. Moreover, a wide variety of infectious etiologies due to *A. xylosoxidans* has been reported primarily in immunocompromised individuals. Heightened awareness of this bacterium and associated clinical importance is warranted for clinicians since its broad disease spectrum in humans and frequent multi-drug resistance may result in an increased mortality rate. In this report, we describe a case of osteomyelitis caused by *A. xylosoxidans* in a patient with a history of diabetes mellitus.

Introduction

Achromobacter xylosoxidans is an aerobic, motile, nonfermenting gram-negative rod. It was first isolated from patients with chronic otitis media in 1971 [1]. *A. xylosoxidans* inhabits aquatic environments ubiquitously and it has been implicated in outbreaks related to contaminated fluids in the hospital. It has also been recovered from various human body fluids, including respiratory tract secretions and peritoneal fluid. Although a broad range of infectious etiologies due to *A. xylosoxidans* have been described in the literature primarily in immunocompromised hosts, it has rarely been reported as a cause of osteomyelitis. We herein report a case of osteomyelitis caused by *A. xylosoxidans.*

Case report

A 39-year-old male with a longstanding history of diabetes mellitus was in his usual status until 7 days prior to presentation when he developed severe pain in his left great toe. The pain was described as throbbing, progressive in nature, and associated with subjective fevers and malaise. He had noticed ulceration with an open wound on the left great toe 3 months before. Serosanguinous discharge and foul-smelling were also observed. He was noncompliant with his insulin therapy. On physical examination, the patient appeared ill. The temperature was 102.1 °F, blood pressure 91/58 mm Hg, pulse 134 beats per minute, respirations 19 breaths per minute and oxygen saturation 98% on room air. His heart sounds revealed tachycardia without murmurs and his lungs were clear to auscultation. There was deep ulceration with an open wound on his great toe with surrounding erythema and edema. Serosanguinous discharge was observed and marked tenderness was elicited on the surrounding erythema. Laboratory studies revealed a white blood cell count of 19,100 cells/mm^3 with 68% polymorphonuclear leukocytes, hemoglobin of 12.3 g/dL, and platelets of 281,000 per cubic millimeter. The level of sodium was 126 mmol/L, potassium 4.3 mmol/L, bicarbonate 22 mEq/L, urea nitrogen 20 mg/dL, creatinine 1.2 mg/dL, and lactic acid 5.1 mg/dL. A magnetic resonance imaging (MRI) study disclosed extensive bony destruction of his left great toe with surrounding soft tissue edema, findings compatible with osteomyelitis. Subsequently, the patient underwent amputation of the infected left great toe. The pathological examination of the infected bone revealed multiple fragments of dead bone with infiltrating plasma cells consistent with chronic osteomyelitis. Cultures of the bone yielded *A. xylosoxidans*. The initial empiric antimicrobial therapy with vancomycin was changed to piperacillin/tazobactam based on the antimicrobial susceptibility results. There were no signs of recurrence on a follow-up MRI study 6 weeks later.

Discussion

A. xylosoxidans was first isolated from ear discharge of patients with chronic otitis media [1]. The organism has been further

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characterized thereafter. *A. xylosoxidans* is an aerobic, nonfermenting gram-negative rod with distinctive biochemical characteristics. It has oxidase and catalase activity and oxidizes glucose and xylose. It is motile by peritrichous flagella, which aids differentiate it from other nonfermenters [2]. *A. xylosoxidans* has the ability to survive in aqueous environments and as such, it can be a cause of nosocomial outbreaks especially when there is a breakdown of infectious control techniques. In fact, since it was first described in 1971 [1], it has been associated with numerous outbreaks due to contaminated fluids as well as other invasive nosocomial infections, such as catheter-related bacteremia [3,4]. Except in nosocomial outbreaks, immunocompromised individuals are particularly at increased risk for developing severe infection due to *A. xylosoxidans*. In a review of 77 cases of bacteremia due to *A. xylosoxidans* by Duggan et al., 30% had an underlying malignancy (30%) [5]. Although bacteremia is the most frequently reported infection associated with *A. xylosoxidans*, a wide variety of other clinical manifestations have also been reported, including peritonitis [6], pneumonia [7], and prosthetic joint infection [8]. In 1991, osteomyelitis due to *A. xylosoxidans* was descried in a child who developed a plantar puncture wound [9]. Since then, only a small number of case reports of *A. xylosoxidans* osteomyelitis have been described in the literature [10,11]. Our patient developed osteomyelitis potentially in direct contact with *A. xylosoxidans* in the presence of impaired defense system due to his longstanding uncontrolled diabetes mellitus. *A. xylosoxidans* is resistant to multiple antibiotics, including cefoxitin, ceftriaxone, cefotaxime, aztreonam, and aminoglycosides. It is usually susceptible to trimethoprim-sulfamethoxazole, antipseudomonal penicillins, ceftazidime, cefoperazone, and carbapenems [5,12]. Our patient was successfully treated with piperacillin/tazobactam. Beta-lactamase inhibitor combinations are also generally effective antimicrobials against *A. xylosoxidans* [13].

Conclusions

We reported a case of osteomyelitis caused by *A. xylosoxidans* in a patient with diabetes mellitus. *A. xylosoxidans* is ubiquitous in aquatic environments, thus it has caused numerous nosocomial outbreaks due to contaminated fluids. It has also been associated with a wide array of infectious etiologies primarily in immunocompromised individuals. Additionally, multi-drug resistance is not rare for this bacterium. Heightened awareness of its pathogenic potential is paramount, though osteomyelitis caused by *A. xylosoxidans* is not a common clinical entity among the broad disease spectrum of *A. xylosoxidans*.

Written informed consent was obtained from the patient for publication of this case report and accompanying images. A copy of the written consent is available for review by the Editor-in-Chief of this journal on request.

Conflicts of interest statement

None.

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References

[1] Yabuuchi E, Oyama A. *Achromobacter xylosoxidans* n sp. from human ear discharge. Jpn J Microbiol 1971;15(5):477–81.
[2] Holmes B, Snell JJ, Lapage SP. Strains of *Achromobacter xylosoxidans* from clinical material. J Clin Pathol 1977;30(7):595–601.
[3] Schoch PE, Cunha BA. Nosocomial *Achromobacter xylosoxidans* infections. Infect Control Hosp Epidemiol 1988;9(2):84–7.
[4] Mandell WF, Garvey GJ, Neu HC. *Achromobacter xylosoxidans* bacteremia. Rev Infect Dis 1987;9(5):1001–5.
[5] Duggan JM, Goldstein SJ, Chenoweth CE, Kauffman CA, Bradley SF. *Achromobacter xylosoxidans* bacteremia: report of four cases and review of the literature. Clin Infect Dis 1996;23(3):569–76.
[6] Tang S, Cheng CC, Tse KC, Li FK, Choy BY, Chan TM, et al. CAPD-associated peritonitis caused by Alcaligenes xylosoxidans sp xylosoxidans. Am J Nephrol 2001;21(6):502–6.
[7] Dworzack DL, Murray CM, Hodges GR, Barnes WG. Community-acquired bacteremic *Achromobacter xylosoxidans* type IIIa pneumonia in a patient with idiopathic IgM deficiency. Am J Clin Pathol 1978;70(4):712–7.
[8] Taylor P, Fischbein L. Prosthetic knee infection due to *Achromobacter xylosoxidans*. J Rheumatol 1992;19(6):992–3.
[9] Hoddy DM, Barton LL. Puncture wound-induced *Achromobacter xylosoxidans* osteomyelitis of the foot. Am J Dis Child 1991;145(6):599–600.
[10] Barton LL, Hoddy DM. Osteomyelitis due to *Achromobacter xylosoxidans*. Clin Infect Dis 1993;17(2):296–7.
[11] Ozer K, Kankaya Y, Baris R, Bektas CI, Kocer U. Calcaneal osteomyelitis due to *Achromobacter xylosoxidans*: a case report. J Infect Chemother 2012;18(6):915–8.
[12] Legrand C, Anaissie E. Bacteremia due to *Achromobacter xylosoxidans* in patients with cancer. Clin Infect Dis 1992;14(2):479–84.
[13] Mensah K, Philippon A, Richard C, Névot P. Susceptibility of Alcaligenes denitrificans subspecies xylosoxydans to beta-lactam antibiotics. Eur J Clin Microbiol Infect Dis 1990;9(6):405–9.