

# Recurrent Septic Arthritis Due to *Achromobacter xylosoxidans* in a Patient With Granulomatosis With Polyangiitis

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**We report a case of recurrent *Achromobacter xylosoxidans* infections including bacteremia, sepsis, septic joints and endocarditis in a 72 year old female with granulomatosis with polyangiitis. *Achromobacter xylosoxidans* is a gram negative bacteria increasingly identified in immunocompromised patients. Surgical and medical therapy may need to be combined.**

**Keywords.** *Achromobacter*; virulence; gram negative; native joint; septic arthritis.

## CASE REPORT

A 72 year-old female with a history of granulomatosis with polyangiitis (on 10 mg prednisone daily and azathioprine), chronic kidney disease and diabetes was admitted with worsening right leg cellulitis after a fall in September 2012. She developed sepsis and required intubation and vasopressors. She was found to have cholecystitis and had a laparoscopic cholecystectomy and

appendectomy. One of 2 sets of blood cultures grew *Achromobacter xylosoxidans* and cleared in one day (Table 1). An infectious disease consult was obtained and she completed 2 weeks of imipenem. Azathioprine was discontinued and patient remained on 10 mg of prednisone for granulomatosis with polyangiitis.

In February 2013, she developed new right knee pain. Knee radiographs indicated erosive changes at the right medial femoral condyle. Knee aspirate revealed a white blood cell count of 163 000/mm<sup>3</sup> with elevated inflammatory markers (ESR of 137 mm/hours and CRP of 14.3 mg/L). She underwent arthroscopic irrigation and debridement with synovectomy and synovial fluid analysis identified *Achromobacter xylosoxidans*. Pathology of the medial femoral condyle indicated osteomyelitis. She received a 10-week course of imipenem. Her inflammatory markers, ESR and CRP, decreased to 43 mm/hours and 1.7 mg/L, after completion. The patient's baseline inflammatory markers were chronically elevated and thought to be related to her underlying granulomatosis with polyangiitis. In August 2013, she developed bilateral knee pain. Bilateral arthrocentesis demonstrated 157 500/mm<sup>3</sup> and 127 500/mm<sup>3</sup> white blood cells, with no crystals. ESR and CRP increased to 115 mm/hours and 22.6 mg/L. After bilateral irrigation and debridement, cultures again demonstrated *A. xylosoxidans*, and meropenem was initiated. A trans-esophageal echocardiogram revealed mitral and aortic valve vegetations. She was discharged on meropenem and was transitioned to doxycycline after 8 weeks. Susceptibility testing indicated doxycycline was an oral treatment option for this isolate.

In November 2013, a month after starting suppressive doxycycline, she had recurrent knee pain. Bilateral knee aspirations revealed white blood cells of 62 000/mm<sup>3</sup> in the right and 57 000/mm<sup>3</sup> in the left knee. Cultures again grew *A. xylosoxidans* and CRP was 104.9 mg/L and ESR 56 mm/hours. In the ER, she went into PEA arrest of unclear etiology and was successfully resuscitated. Once stabilized, she underwent open irrigation and debridement of both knees and meropenem was restarted with a plan for 10 weeks followed by oral suppression with levofloxacin. In March 2014, 2 months after starting levofloxacin, she had a repeat septic right knee admission with cultures growing *A. xylosoxidans*. She was treated with meropenem for 8 more weeks and in May 2014, after 2 weeks on levofloxacin, she was re-admitted with right knee septic joint and had an arthrotomy. Tissue grew *A. xylosoxidans*. She was treated with meropenem for 8 more weeks and while on levofloxacin suppression she had a final presentation to an emergency department in florid sepsis, and was unable to be resuscitated and died, blood cultures were not taken at that time.

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**Table 1. *Achromobacter xylosoxidans* Culture Susceptibilities Reported Over Time for This Patient**

Date	Type of Culture	Amikacin	Gentamicin	Imipenem	Meropenem	Levofloxacin
		MIC (R/S)				
September 2012	Blood	≥64 R	≥16 R	2 S	≤1 S	≥8 R
August 2013	Synovial fluid	≥64 R	≥16 R	2 S	N/A	≥8 R
November 2013	Synovial fluid	≥64 R	≥16 R	≤1 S	≤1 S	≤1 S
March 2014	Knee Tissue	≥64 R	≥16 R	≤1 S	≤1 S	≤1 S
May 2014	Knee Tissue	>32 R	≥16 R	≤1 S	≤1 S	<1 S

## DISCUSSION

First described in 1971, *Achromobacter xylosoxidans*, is a gram negative rod that has been associated with nosocomial infections in immunocompromised patients [1]. It has not been established as a normal component of human GI flora, but is often found in water sources and the method of transmission is thought to be related to well water in community acquired infections and intravenous fluids, ventilators or dialysis fluid in nosocomial infections [2]. *A. xylosoxidans* has previously been described as causing bacteremia, meningitis, otitis media, urinary tract infections, pneumonia and rarely as causing prosthetic knee infection [2, 3]. A unique challenge posed by *A. xylosoxidans* is treatment, since it is inherently resistant to most aminoglycosides, first and second generation cephalosporins and variably resistant to fluoroquinolones [4]. Gram negative infections, such as *A. xylosoxidans*, can persistently cause opportunistic infections in patients with underlying immunosuppressed conditions such as malignancy or organ transplants or patients with rheumatologic disease [4–6].

The patient described in this case had native joints and native heart valves. After the initial transesophageal echocardiogram in August 2013 revealed small echodensities on the mitral and aortic valve, 3 follow-up transthoracic echocardiograms were negative for vegetations in November 2013, March 2014 and June 2014. Though surgical intervention was considered, in the absence of worsening echocardiogram findings, neurologic manifestations, persistent bacteremia, and heart failure, she did not have cardiac surgery. A tagged white blood cell scan was done in June 2014 for further workup of source and this was unrevealing. It was suspected that repeated infections and surgical washouts altered her anatomy, predisposing her to recurrent infections and incomplete eradication of the bacterial reservoirs. This complexity was further compounded by her underlying rheumatologic disease and chronic corticosteroid use, making her treatment an insurmountable challenge despite extensive periods of combined medical and surgical treatment. The susceptibility profile for *Achromobacter xylosoxidans* is outlined in Table 1. The initial cultures were resistant to levofloxacin and the MIC for imipenem also changed over time. While laboratory testing methods can impact results, heterogenous sub-populations may have also played a role in the difficulty

of eradicating this organism. *Achromobacter xylosoxidans* has been noted to have plasmid mediated beta-lactamases conferring resistance to cephalosporins [7].

A previously reported case describes a patient with hyperimmunoglobulin M syndrome having fourteen episodes of *A. xylosoxidans* bacteremia [8]. In an attempt to isolate the bacterial reservoir, the patient had gastrointestinal biopsies, stool cultures and a lymph node biopsy. Lymph tissue grew *A. xylosoxidans* despite 2 years since the last infection, and was proposed as a possible reservoir for *Achromobacter spp.* We suspect the repeated infections and surgical washouts in the setting of rheumatologic disease may have created an anatomical bacterial reservoir in our patient. We combined a medical and surgical approach in her care with repeated washouts and with suppressive therapy following her extended intravenous courses. Patients with rheumatologic disease may represent another population at increased risk of developing *Achromobacter xylosoxidans* infection. Recurrent *Achromobacter xylosoxidans* infection poses a difficult diagnostic challenge for infectious disease physicians in formulating a tolerable suppressive course, even in the setting of no hardware.

## Note

**Potential conflicts of interest.** All authors: No reported conflicts.

All authors have submitted the ICMJE Form for Disclosure of Potential Conflicts of Interest. Conflicts that the editors consider relevant to the content of the manuscript have been disclosed.

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