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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 en-
docarditis 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 poly-
angiitis (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 Achromo-
bacter xylosoxidans and cleared in one day (Table 1). An infec-
tious 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 fem-
oral condyle. Knee aspirate revealed a white blood cell count of 
163,000/mm³ 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/mm³ and 127,500/mm³ white blood 
cells, with no crystals. ESR and CRP increased to 115 mm/ 
hours and 22.6 mg/L. After bilateral irrigation and debride-
ment, cultures again demonstrated A. xylosoxidans, and mero-
penem 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 doxy-
cycline, she had recurrent knee pain. Bilateral knee aspirations 
revealed white blood cells of 62,000/mm³ in the right and 
57,000/mm³ in the left knee. Cultures again grew A. xyloxi-
dans 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 suc-
cessfully resuscitated. Once stabilized, she underwent open irri-
gation 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 lev-
foxcin, she had a repeat septic right knee admission with cul-
tures growing A. xylosoxidans. She was treated with meropenem 
for 8 more weeks and in May 2014, after 2 weeks on levoflox-
cin, 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 sup-
pression she had a final presentation to an emergency depart-
ment in florid sepsis, and was unable to be resuscitated and 
died, blood cultures were not taken at that time.
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 transeosophageal 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 reservoir. 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 hyper-immunoglobulin 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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Table 1. *Achromobacter xylosoxidans* Culture Susceptibilities Reported Over Time for This Patient

| Date            | Type of Culture | Amikacin MIC (R/S) | Gentamicin MIC (R/S) | Imipenem MIC (R/S) | Meropenem MIC (R/S) | 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                  |
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