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Achromobacter piechaudii bloodstream infection in an immunocompetent host

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Summary

Background: *Achromobacter piechaudii* is a rare cause of clinical disease in humans. Previously, clinical disease has only been documented in immunocompromised patients. We present a case of *Achromobacter piechaudii* bacteremia in a patient with previous malignancy but no known immunosuppression.

Case Report: A 67-year-old man with distant history of colon and prostate cancer presented with low grade fevers and malaise. Blood cultures initially identified *Alcaligenes xylosoxidans* ss. *denitrificans*. Based on susceptibility testing, antibiotics were narrowed to levofloxacin. After further evaluation, the isolate was identified as *Achromobacter piechaudii*, an organism rarely previously seen only in immunocompromised patients. The source was felt to be dental infection after transesophageal echocardiogram and CT abdomen/pelvis were unrevealing. He improved with oral levofloxacin and dental extraction

Conclusions: This is the first case report of primary *Achromobacter piechaudii* bloodstream infection in an immunocompetent host and adds to the growing list of clinical syndromes caused by this organism.

key words: ***Achromobacter piechaudii*** • **RNA sequencing** • **bloodstream infection** • **immunocompromised**

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Background

Achromobacter piechaudii is a recently described gram-negative bacterium that is usually found in soil and water and is a rare cause of human disease. To date, there are only two published reports of *A. piechaudii* infection in humans. One case involved a diabetic patient with *A. piechaudii* infection resulting in chronic ear discharge [1]. The second case was *A. piechaudii* bloodstream infection in an immunosuppressed patient with underlying hematologic malignancy [2]. We report the first case of primary *A. piechaudii* bloodstream infection in an immunocompetent host.

Case Report

A 67-year-old man presented with a three-week history of malaise, low-grade fevers, and tooth pain. He was evaluated by a local dentist who prescribed amoxicillin out of concern for oral infection in the setting of multiple nonrestorable teeth. However, despite antibiotic therapy, he continued to have ongoing malaise and fever and presented to a local facility where blood cultures were obtained. Amoxicillin was discontinued and oral clindamycin was initiated. One out of two blood cultures was reported positive on day three of incubation. Biochemical testing revealed an oxidase-positive Gram-negative rod, later identified as *Alcaligenes xylosoxidans* ss. *denitrificans*. He was subsequently transferred to our institution for specialized tertiary care.

The patient's past medical history was significant for severe aortic regurgitation for which he underwent aortic valve replacement with a bileaflet mechanical valve three years earlier. He also had a history of rectal adenocarcinoma ten years earlier that was treated with hemicolectomy and proctectomy with J-pouch creation and he ultimately had ostomy take down. He was undergoing regular surveillance and had no evidence of recurrence. He had history of prostate adenocarcinoma fourteen years earlier for which he underwent radical prostatectomy and had no evidence of recurrence.

On admission, the patient was afebrile with a pulse of 58 beats per minute and a blood pressure of 167/106 mmHg. On physical examination, he had multiple dental carries and nonrestorable teeth. Cardiac examination revealed mechanical valve sounds of S2 with no murmurs. Pulmonary and abdominal examinations were normal. He had no rash or skin lesions.

Laboratory evaluation (normal values in parentheses) included hemoglobin 13.5 g/dL (12.5–17.5 g/dL), leukocytes 4.5×10^9/L ($3.5–10.5\times10^9$/L) with neutrophils 2.44×10^9/L ($1.7–7\times10^9$/L), lactate 1.2 mmol/L (0.6–2.3 mmol/L), alanine aminotransferase (ALT) 26 U/L (7–55 U/L), and total bilirubin 0.4 mg/dL (0–0.3 mg/dL).

The original blood cultures grew an organism identified as *Alcaligenes xylosoxidans* ss. *denitrificans* in the outside laboratory [3]. Antibiotic coverage was changed to meropenem and then to oral levofloxacin based on *in vitro* susceptibility testing. An extensive evaluation looking for the underlying source of infection was initiated. A panoramic dental x-ray was obtained and revealed no abscess, but multiple non-restorable teeth. A computed tomography (CT) scan of the abdomen and pelvis was performed and was without diagnostic abnormalities. Because the patient had a prosthetic aortic valve, a transesophageal echocardiogram was performed which revealed no evidence of endocarditis. Given his history of rectal cancer, a colonoscopy was completed and was without abnormality. Due to the concern that bloodstream infection originated from an oral source, the patient underwent extraction of twelve teeth. With the dental extractions and ongoing antibiotic therapy, the patient's malaise and fever resolved.

Blood cultures following transfer remained negative. The original blood isolate was sent to our institution for identification. The organism was a motile Gram-negative bacillus that grew on MacConkey and cetrimide agars, was urease negative, oxidase positive, motile, nitrate reductase positive, nitrite reductase negative, lysine and arginine decarboxylase negative, and did not acidify glucose, maltose, xylose, sucrose, lactose or mannitol or hydrolyze esculin. Based on biochemical analysis, the organism was identified as *A. piechaudii*. Partial sequencing of the 16S ribosomal RNA gene performed as previously described [4] revealed a sequence which was 99.9% identical to *A. piechaudii*, although other members of this genus also have closely-related sequences.

The patient was discharged home to complete a total of two weeks of oral levofloxacin therapy. His post-hospital course was complicated by *Clostridium difficile* colitis. He ultimately returned to his baseline status with no definitive identification of a source of infection.

Discussion

A. piechaudii is an aerobic, motile, Gram-negative rod that reduces nitrate and is oxidase-positive [5]. *A. piechaudii* was originally named *Alcaligenes piechaudii*. However, in 1998, it was reclassified into the *Achromobacter* genus based on DNA and RNA analysis [6]. *A. piechaudii* is a rare cause of clinical disease in humans. It was first reported as a pathogen in the setting of chronic ear discharge in a patient with diabetes mellitus [1]. The patient required hospitalization for aggressive glycemic control that lead to resolution of infection [1]. *A. piechaudii* bloodstream infection has also been reported in a patient with a longstanding central venous catheter [2]. This particular patient was immunocompromised with underlying large cell lymphoma and a recent bone marrow biopsy had demonstrated transformation into acute myeloid leukemia.

The *Achromobacter* genus includes *A. piechaudii*, *A. xylosoxidans*, *A. denitrificans*, and *A. ruhlandii*. The rarity of *A. piechaudii* playing a pathogenic role has caused difficulty in identifying this organism in published case reports. In our case, the organism was originally identified as *Alcaligenes xylosoxidans* ss. *denitrificans*, now called *A. denitrificans* [3]. *A. denitrificans* has been reported as a cause of bloodstream infection in a case series of patients with underlying malignancy. However, in this case series, *A. xylosoxidans* was much more common compared to *A. denitrificans* and there were no isolates of *A. piechaudii* [7]. While still uncommon, *A. xylosoxidans* has been reported more commonly in association with clinical disease. Published reports include *A. xylosoxidans* associated with prosthetic valve endocarditis [8], aortic root abscess [8], urinary tract infections [9], and tracheal secretions in patients with cystic fibrosis [10]. The largest case series

included cases of primary bloodstream infection as well as catheter-associated infections with high mortality ranging from 15% to 17% [11, 12]. The vast majority of these cases of bacteremia were due to nosocomial infections.

Accurate identification of *Achromobacter* spp. is clinically important, because they can be confused with *Burkholderia cepacia* complex, which requires a significantly different antibiotic treatment and, in some cases, infection control regimens [10].

The source of bloodstream infection in our patient remained unclear. Based on the patient's past medical history of rectal cancer and prosthetic aortic valve, these locations were investigated and were negative. Given that the patient had no recurrence of bacteremia after removal of his decayed teeth, bacteremia in our patient was most likely due to a dental source.

CONCLUSIONS

A. piechaudii, previously thought to only cause clinical disease in immunocompromised patients can occur in an immunocompetent patient. This can be treated successfully with levofloxacin.

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Conflicts of interest

None.

REFERENCES:

1. Peel MM, Hibberd AJ, King BM, Williamson HG: *Alcaligenes piechaudii* from chronic ear discharge. J Clin Microbiol, 1988; 26: 1580–81
2. Kay SE, Clark RA, White KL, Peel MM: Recurrent *Achromobacter piechaudii* bacteremia in a patient with hematological malignancy. J Clin Microbiol, 2001; 39: 808–10
3. Coenye T, Vancanneyt M, Cnockaert MC et al: *Kerstersia gyiorum* gen. nov., sp. nov., a novel *Alcaligenes faecalis*-like organism isolated from human clinical samples, and reclassification of *Alcaligenes denitrificans* Ruger and Tan 1983 as *Achromobacter denitrificans* comb. nov. Int J Syst Evol Microbiol, 2003; 53 Pt 6: 1825–31
4. Baracaldo R, Foltzer M, Patel R, Bourbeau P: Empyema caused by *Mycoplasma salivarium*. J Clin Microbiol, 2012; 50: 1805–6
5. Murray PR, Baron EJ: Manual of Clinical Microbiology. Washington, D.C.: American Society of Microbiology Press, 2003
6. Yabuuchi E, Kawamura Y, Kosako Y, Ezaki T: Emendation of genus *Achromobacter* and *Achromobacter xylosoxidans* (Yabuuchi and Yano) and proposal of *Achromobacter ruhlandii* (Packer and Vishniac) comb. nov., *Achromobacter piechaudii* (Kiredjian et al.) comb. nov., and *Achromobacter xylosoxidans* subsp. denitrificans (Ruger and Tan) comb. nov. Microbiol Immunol, 1998; 42: 429–38
7. Aisenberg G, Rolston KV, Safdar A: Bacteremia caused by *Achromobacter* and *Alcaligenes* species in 46 patients with cancer (1989–2003). Cancer, 2004; 101: 2134–40
8. van Hal S, Stark D, Marriott D, Harkness J: *Achromobacter xylosoxidans* subsp. xylosoxidans prosthetic aortic valve infective endocarditis and aortic root abscesses. J Med Microbiol, 2008; 57 Pt 4: 525–27
9. Tena D, Gonzalez-Praetorius A, Perez-Balsalobre M et al: Urinary tract infection due to *Achromobacter xylosoxidans*: report of 9 cases. Scan J Infect Dis, 2008; 40: 84–87
10. Liu L, Coenye T, Burns JL et al: Ribosomal DNA-directed PCR for identification of *Achromobacter* (*Alcaligenes*) *xylosoxidans* recovered from sputum samples from cystic fibrosis patients. J Clin Microbiol, 2002; 40: 1210–13
11. Gomez-Cerezo J, Suarez I, Rios JJ et al: *Achromobacter xylosoxidans* bacteremia: a 10-year analysis of 54 cases. Eur J Clin Microbiol Infect Dis, 2003; 22: 360–63
12. Tsay R-W, Lin L-C, Chiou C-S et al: *Alcaligenes xylosoxidans* bacteremia: clinical features and microbiological characteristics of isolates. J Microbiol Immunol Infect, 2005; 38: 194–99