Case Report

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Achromobacter xylosoxidans: a rare pathogen for community-acquired acute pancreatitis

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Introduction: *Achromobacter xylosoxidans* is a water-borne organism that causes healthcare-associated infections and has been isolated from blood, cerebrospinal fluid, stool, urine, sputum, peritoneal fluid, skin, ear discharge, wounds, abscesses, bone, joints, endocardium and central venous catheters, mostly in immunocompromised patients.

Case presentation: We describe here the rare case of a young immunocompetent alcoholic male admitted with symptoms of acute pancreatitis who failed to improve with conventional management. Blood culture later showed the growth of *A. xylosoxidans*. The patient improved when he was treated with antibiotics as per the sensitivity report.

Conclusion: Although *Achromobacter* is rarely isolated from clinical samples, it should never be assumed to be a contaminant as this infection has propensity for progression to fatal bacteraemia, even in apparently healthy individuals.

Keywords: *Achromobacter xylosoxidans*; acute pancreatitis; bacteraemia.

Introduction

Achromobacter, an aerobic, non-fermentative, Gram-negative rod is rarely isolated from clinical material. It can be confused with *Pseudomonas* spp. in clinical specimens, so that its role as a significant pathogen is underestimated. This organism was first described and named by Yabuuchi in 1971. (Yabuuchi & Oyama, 1971). Seven species are currently described within the genus *Achromobacter*, namely *A. xylosoxidans*, *A. denitrificans*, *A. insolitus*, *A. marplatensis*, *A. piechaudii*, *A. ruhlandii* and *A. spanius*. However, species identification is difficult using conventional methods, and clinical isolates are generally referred to as *A. xylosoxidans*. The most common clinical spectrum of *A. xylosoxidans* infection includes bacteraemia, pneumonia, biliary tract infection, urinary tract infection, wound infection and peritonitis (Aisenberg *et al.*, 2004; Gomez-Cerezo *et al.*, 2003; Legrand & Anaissie, 1992). Ocular infections (Park *et al.*, 2012), community-acquired infections of skin and soft tissues (Tena *et al.*, 2014), osteomyelitis (Walsh *et al.*, 1993) and ventriculitis (Shigeta *et al.*, 1978) are a few of the rarer clinical presentations. Here, we present an unusual case of infectious acute pancreatitis caused by *A. xylosoxidans*.

Case report

A 32-year-old male was admitted to our hospital with the chief complaints of epigastric pain radiating to the back

and vomiting for 3 days. He was a hypertensive and a known alcoholic for 2 years. There was no history of trauma, surgery, recent drug intake or similar episodes in the past. On examination, the patient was afebrile, anicteric and had a tense, distended abdomen with evidence of ascites. He had a higher total leukocyte count ($25.6 \times 10^9 \text{ mm}^{-3}$) with relative neutrophilia (95 %), and raised serum amylase (275.2 U dl^{-1}), creatinine (1.6 mg dl^{-1}) and random blood sugar (160 mg dl^{-1}) levels. His serum calcium was low (6.0 g dl^{-1}) and his lipid profile was normal. A contrast enhanced computed tomography scan of the abdomen of the patient showed acute oedematous pancreatitis with diffuse peripancreatic, pararenal and mesenteric ascites. There was no evidence of cholelithiasis. With the relevant clinical features and investigations, a diagnosis of acute pancreatitis was made and the patient was treated empirically with ciprofloxacin along with other medications following the guidelines for pancreatitis management after sending a blood sample for aerobic bacterial culture. In spite of the initial treatment, there was a progressively rising total leukocyte count along with neutrophilia, suggesting a probable infectious aetiology. On day 4 of admission, automated blood culture by BacT/ALERT (bioMérieux) was flagged positive. On subsequent subculture on blood agar plates, the colonies were pinhead-sized, translucent and non-haemolytic, and on MacConkey agar plates they were non-lactose fermenting (Fig. 1). They were catalase and oxidase positive, Gram-negative bacilli. The biochemical characteristics of this isolate were similar to that of

Fig. 1. Non-lactose-fermenting colonies on a MacConkey agar plate.

Pseudomonas spp. such as positive reactions for oxidase and catalase and growth on Simmons' citrate medium, but it oxidatively utilized xylose and glucose but not other carbohydrates, and showed a negative reaction in an arginine dihydrolase test. Further identification and sensitivity testing was done using a VITEK-2 system using GN and N90 cards, respectively. The organism was identified as *A. xylosoxidans* and was resistant to third- and fourth-generation cephalosporins, (ceftriaxone MIC $\geq 64 \mu\text{g ml}^{-1}$, cefepime MIC $\geq 64 \mu\text{g ml}^{-1}$, ceftazidime MIC $\geq 32 \mu\text{g ml}^{-1}$) aminoglycosides, (amikacin MIC $\geq 64 \mu\text{g ml}^{-1}$, gentamicin MIC $\geq 32 \mu\text{g ml}^{-1}$), ciprofloxacin (MIC $\geq 16 \mu\text{g ml}^{-1}$), and tetracycline (MIC $\geq 16 \mu\text{g ml}^{-1}$). It was moderately sensitive to imipenem (MIC $8 \mu\text{g ml}^{-1}$), levofloxacin (MIC $4 \mu\text{g ml}^{-1}$) and tigecyclin (MIC $4 \mu\text{g ml}^{-1}$) but showed sensitivity to piperacillin-tazobactam (MIC $\leq 8 \mu\text{g ml}^{-1}$), meropenem (MIC $\leq 2 \mu\text{g ml}^{-1}$) and co-trimoxazole (MIC $\leq 20 \mu\text{g ml}^{-1}$). As identified by the antibiogram, the patient was treated with amikacin and piperacillin-tazobactam. Haematological and biochemical parameters along with the clinical picture improved drastically subsequent to the appropriate antimicrobial therapy. Repeat blood culture after 1 week of treatment did not show any growth, implying a clinical and bacteriological cure.

Discussion

A. xylosoxidans is an aerobic, motile, Gram-negative rod. The organism can exist in any contaminated place, such as soil and water, but rarely causes infection in humans. This may be due to the fact that it is not a part of the normal human flora, thus ruling out chances of endogenous infection (Duggan *et al.*, 1996), as well as being due to the low virulence potential of *A. xylosoxidans*. Colony morphology is also not specific enough for differentiation from other Gram-negative non-fermenting organisms.

While primary, uncomplicated bacteraemia is the most common manifestation of *A. xylosoxidans* infection, this organism has been associated with a few other clinical conditions. However, it rarely causes pancreatic infection such as pancreatic abscess (Appelbaum & Campbell, 1980) and acute necrotizing pancreatitis complicated with pancreatic pseudocyst (Eshwara *et al.*, 2011).

Cholelithiasis, alcoholism and hypertriglyceridaemia are the common aetiologies of acute pancreatitis. In contrast, it has been stated that alcoholics have a very low incidence of pancreatitis (Robles-Diaz & Gorelick, 1997). Ingestion of $100\text{--}200 \text{ g ethanol day}^{-1}$ (Talamini *et al.*, 1995) for more than 15 years is known to be associated with this disease, but our patient had a history of alcoholism for only 2 years with consumption of less than 100 ml day^{-1} . Thus, it is unlikely that alcohol was the sole aetiological cause of the disease; instead, it may have been a precipitating factor in our case. A total leucocyte count in the range of $15\,000\text{--}20\,000 \mu\text{l}^{-1}$ is common in acute pancreatitis, but a progressive increase in leucocyte count with neutrophilia in the absence of haemoconcentration suggests an infectious aetiology. Pancreatic infection has been reported in 40–70 % of patients with pancreatic necrosis and is the most life-threatening complication of the disease, leading to sepsis (Schmid *et al.*, 1999). Thus, in the present case, *A. xylosoxidans* must have accentuated the injury to the pancreas, already triggered by alcohol, to cause acute pancreatitis followed by bacteraemia.

Achromobacter spp. are associated with opportunistic infections. Generalized infections caused by this organism are often severe. Poor prognosis and high mortality rates are expected in neonates and elderly individuals, patients with malignancies, neutropenia, sepsis syndrome and multi-organ failure, those on mechanical ventilation and patients with meningitis, endocarditis and pneumonia (Al-Jasser & Al-Anazi, 2007). However, our patient responded well to treatment, with a striking improvement in the clinical and biochemical profile. The improvement may have been facilitated by the normal immune status of the patient.

A. xylosoxidans generally causes nosocomial infection associated with a breach in infection control practices. The organism inhabits aquatic environments, and the source of infection is usually found to be contaminated fluids used in hospitals (Duggan *et al.*, 1996). The source of infections has been evaluated to be disinfectant solutions, particularly quaternary ammonium compounds, dialysis fluids, saline solutions and deionized water contaminated with this organism (Holmes *et al.*, 1977; Moffet & Williams, 1967). However, as there was no history of prior hospitalization, our patient must have had a community-acquired *Achromobacter* infection.

The treatment regimen for this organism has not been standardized, but prior studies have shown it to be sensitive to anti-pseudomonal penicillins and carbapenems (Aisenberg *et al.*, 2004; Gomez-Cerezo *et al.*, 2003) but

resistant to aminoglycosides and variably resistant to quinolones and trimethoprim-sulfamethoxazole (Aisenberg *et al.*, 2004; Gomez-Cerezo *et al.*, 2003; Teng *et al.*, 2009). The combination of gentamicin and piperacillin has been shown to be effective in treatment of serious infections by *A. xylosoxidans* (Duggan *et al.*, 1996). Our patient recovered well following treatment with amikacin and piperacillin-tazobactam. The present case thus highlights the significance of this organism in the context of rare cases such as pancreatitis. Proper identification of this infrequently isolated organism along with a thorough patient history, particularly in a clinical microbiology laboratory, can prove helpful in solving such diagnostic dilemmas.

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