

CASE REPORT

Achromobacter Denitrificans: A Rare Cause of Pancreatic Pseudocyst Necessitating Total Mesopancreas Excision for Pancreatic Head Cancer

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ABSTRACT

Invasive infections by *Achromobacter denitrificans* in people who are immunocompromised may be fatal. Most infections develop during stay in hospitals with primary uncomplicated bacteremia, pneumonia and catheter-associated infections being particularly frequent presentations. The prevalence rate of *A. xylosoxidans* has increased in recent years. We present a unique case of *Achromobacter denitrificans* causing an infection progressing to a pancreatic pseudocyst in an immunocompetent adult man.

INTRODUCTION

Members of genus *Achromobacter* are widely distributed in aquatic sources in nature. Previously, this genus was known as *Alcaligenes*. *Achromobacter* species are non-fermenting, Gram negative rods which can inhabit human intestine and have very low intrinsic pathogenic potential. Seven species have been described in the past; including *A. xylosoxidans*, *A. denitrificans*, *A. insolitus*, *A. marplatensis*, *A. piechaudii*, *A. ruhlandii* and *A. spanius*. Recently, *A. xylosoxidans* is subdivided into two sub-species, *A. xylosoxidans* sub spp *denitrificans* and *A. xylosoxidans* sub spp *xylosoxidans* [1].

This organism is commonly found to inhabit aquatic sources in not only the environment but also in the human gut. Nevertheless, it may cause both, nosocomial and community-acquired infections. Invasive infections by *Achromobacter denitrificans* in people who are immunocompromised may be fatal. Most infections develop during stay in hospitals with primary uncomplicated bacteremia, catheter-associated infections, and pneumonia being extremely common presentations [2]. The prevalence rate of *A. xylosoxidans* has increased in recent years. This may however, be because of mounting attention and better and updated microbiological detection techniques. Ridderberg W *et al.* reported the proportion of cystic fibrosis patients with at least one airway sample positive for *A. xylosoxidans* to have increased from 6% in 2005 to 10% in 2009 [3].

We present a unique case of *Achromobacter denitrificans* causing an infection leading to a pancreatic pseudocyst in an adult immunocompetent man.

CASE REPORT

A Thirty-two-years-old male, known smoker for the past 5 years was admitted to the hospital on November 26, 2016 with complaints of epigastric pain radiating to the back and vomiting for 3 days. 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. A contrast enhanced computed tomography scan of the abdomen of the patient displayed acute edematous pancreatitis with diffuse peri-pancreatic, pararenal and mesenteric ascites. There was no sign of cholelithiasis.

Laboratory investigations showed a total leucocyte count of $18.4 \times 10^9/l$, red blood cell count of $3.0 \times 10^{12}/l$ and hemoglobin of 7.8 gram/dl. Differential leukocyte count revealed neutrophils 88%. His C-reactive protein (CRP) was 32 IU/l and ESR 40 mm at first hour. Fasting plasma glucose was 7.5 mmol/l; urea 6.6 mmol/l and creatinine $68 \mu\text{mol}/l$. His lipid profile was normal.

The patient was conservatively managed and empirically started on meropenem. Unfortunately, his condition did not get better and consequent ultrasonography findings were indicative of a pancreatic pseudocyst that was further confirmed by an abdominal computed tomography (CT). Purulent fluid along with pancreatic tissue was obtained by endoscopic retrograde cholangiopancreatography (ERCP), and forwarded to microbiology laboratory for culture and sensitivity.

Pancreatic tissue was cultured under aerobic conditions on sheep blood agar (Oxoid UK) and MacConkey agar (Oxoid UK) and anaerobically on Wilkins-Chalgren Agar (Oxoid UK). Culture yielded growth of two types of colonies, both were oxidase-positive, non-fermenting, Gram-negative bacilli. Subsequently, one of these was identified as *Achromobacter denitrificans* and *Pseudomonas aeruginosa* by VITEK® 2 system. As *Achromobacter*

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denitrificans is isolated rarely from clinical specimens, its identity was further confirmed by API 20 NE (bioMérieux, La Balme les Grottes, France). Antibiotic susceptibility testing was also performed by VITEK® 2 system for minimum inhibitory concentration (MIC) determination. *Achromobacter denitrificans* was sensitive to ticarcillin ≤ 8 $\mu\text{g/mL}$, piperacillin ≤ 4 $\mu\text{g/mL}$, piperacillin/tazobactam ≤ 4 $\mu\text{g/mL}$, ceftazidime 4 $\mu\text{g/mL}$, meropenem ≤ 0.25 $\mu\text{g/mL}$, trimethoprim-sulfamethoxazole ≤ 20 $\mu\text{g/mL}$ and colistin 2 $\mu\text{g/mL}$. It was intermediate to imipenem 8 $\mu\text{g/mL}$ and resistant to cefipime ≥ 64 $\mu\text{g/mL}$, aztreonam ≥ 64 $\mu\text{g/mL}$, amikacin ≥ 64 $\mu\text{g/mL}$, gentamicin ≥ 16 $\mu\text{g/mL}$, ciprofloxacin ≥ 4 $\mu\text{g/mL}$.

Pseudomonas aeruginosa was sensitive to imipenem ≤ 0.5 $\mu\text{g/mL}$, meropenem ≤ 0.25 $\mu\text{g/mL}$, polymixin B 0.125 $\mu\text{g/mL}$, piperacillin/tazobactam $\leq 2/0.5$ $\mu\text{g/mL}$ and resistant to gentamicin, amikacin, ciprofloxacin, levofloxacin, aztreonam, cefipime and ceftazidime.

Intravenously injection 1 g meropenem was started every 8 h. The patient showed signs of improvement after 7 days.

DISCUSSION

Achromobacter denitrificans is a gram negative bacterium recently classified as *Achromobacter*. *Achromobacter denitrificans* and *xylosoxidans* are motile, obligate aerobes that are ubiquitous in nature [4]. These usually don't ferment glucose but are oxidase and catalase positive. Members of this genus are highly motile with long, peritrichous flagella that propel the organism in a highly efficient swimming motion [5].

The clinically most important species from the genus *Achromobacter xylosoxidans*, has been frequently isolated from a range of human samples. The bacterium has been drawn in several nosocomial infections associated with the infusion of contaminated solutions (haemodialysis, intravenous solutions) humidifiers and incubators. In the infected immunocompromised individuals, this microbe has seldom been isolated from the blood, urine, sweat, peritoneum, respiratory secretions and pleural liquid [5, 6]. The risk factors established for *Achromobacter* infection are: immunodeficiency state, malignancy, HIV infection, cystic fibrosis and prolong hospitalization. Community acquired infections may be seen in cystic fibrosis patients [7, 8]. Most infections from *Achromobacter* present asymptotically. Symptomatic infections include clinical cases ranging from natural-valve or prosthetic valve endocarditis to pneumonia, meningitis, peritonitis, osteomyelitis, conjunctivitis, prosthesis infections and intra-abdominal abscess [9, 10, 11, 12]. Bacteremia, which is frequently linked to the presence of indwelling urinary catheters, is mainly the commonest infection caused by this bacteria and may be polymicrobial [6]. Gomez-Cerezo *et al.* reported 28% of cases in concordance with coagulase-negative staphylococci. Polymicrobial infections have also been frequently observed in patients infected by *Achromobacter xylosoxidans* [12]. The three most common

concurrent infecting organisms, reported by Duggan JM *et al.* are **Pseudomonas** species, **Acinetobacter** species and **Staphylococcus** species respectively [9]. For *Achromobacter xylosoxidans* the spectrum of mortality rate for infections ranges from 3% for primary bacteremia or catheter-related infections, to more than 80% in severe neonatal infections [5]. Clinical presentations are varied, they may include endocarditis which is a life-threatening infections. Our case archives a novel presentation in an immunocompetant adult of an infected pancreatic pseudocyst by *A. denitrificans*. Common organisms of concern in pancreatic infections are *Klebsiella spp*, *Escherichia coli*, *Proteus spp*, *Staphylococcus aureus*, *Enterococcus spp* and *Pseudomonas spp*. *Acinetobacter spp* associated with infected pancreatic pseudocyst case has also been reported by Rodríguez CN *et al.* however; our case is an unusual presentation by *A. denitrificans* [13, 14].

The gut flora of patient's could be the focal of infection in this case. Infections caused by *Achromobacter* have been reported in a number of abdominal infections like hepatobiliary, in the form of liver abscesses, peritonitis associated with dialysis and severe life threatening intra-abdominal infections [10]. However, to the preeminent of our knowledge, this is the first case report of an infected pancreatic pseudocyst. This organism is rarely isolated in the microbiology laboratory. Identification may be delayed also. The bacterium may often be overlooked as a contaminant. Nevertheless, for this organism the treatment regimen has not been standardized yet. However, preceding studies have shown it to be susceptible to penicillins with anti-pseudomonal activity and carbapenems. As reported previously, these bacteria express resistance to various classes of antimicrobials. Although in the present case it was susceptible to aminoglycosides and third-generation cephalosporins. Aisenberg *et al.* reported a case series of patients suffering from cancer, in which 33% infections were hospital acquired. In 25% cases infected intravenous catheters were the cause while urinary tract infection, pneumonia, sinusitis and mucocutaneous infection were the other sources of bacteremia [2]. Hypercholesterolemia cholelithiasis and alcoholism are the common etiologies of acute pancreatitis [15]. Our patient did not have any of the risk factors.

CONCLUSION

The clinical spectrum of infections by the infrequent but still significant opportunistic pathogen *Achromobacter* further enhanced our knowledge. The isolation from pancreatic pseudocysts which is a deep-seated infection should alarm microbiologists towards proper identification of the bacteria and direct antimicrobial therapy to prevent complications, as non-fermenting, Gram-negative bacteria are repeatedly disregarded as environmental contaminants. Likewise, wound infections by *Achromobacter* in immunocompromised individuals from contaminated wound dressings in patient care areas, emphasize the need for firm infection control practices.

Conflict of Interest

The authors have declared that no competing interests exist.

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