Delftia acidovorans: A rare pathogen in immunocompetent and immunocompromised patients

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Delftia acidovorans is an aerobic, nonfermenting Gram-negative bacillus. It is usually a nonpathogenic environmental organism and is rarely clinically significant. Although *D acidovorans* infection most commonly occurs in hospitalized or immunocompromised patients, there are also several reports documenting the infection in immunocompetent patients. The present article describes a B cell lymphoblastic leukemia patient with *D acidovorans* pneumonia who was successfully treated with antibiotic therapy. The present report indicates that unusual pathogens may be clinically significant in both immunocompromised and immunocompetent patients. *D acidovorans* is often resistant to aminoglycosides; therefore, rapid detection of this microorganism is important.

Key Words: Delftia acidovorans; *Febrile neutropenia; Immunocompromised; Pneumonia*

Le *Delftia acidovorans*: un agent pathogène rare chez les patients immunocompétents et immunodéprimés

Le *Delftia acidovorans* est un bacille aérobie à Gram négatif sans pouvoir de fermentation. C'est un organisme généralement non pathogène présent dans l'environnement, qui est rarement significatif sur le plan clinique. Même si l'infection à *D acidovorans* s'observe surtout chez des patients hospitalisés ou immunodéprimés, plusieurs rapports le signalent chez des patients immunocompétents. Le présent article décrit un patient atteint d'une leucémie lymphoïde de type B compliquée par une pneumonie à *D acidovorans* éradiquée par antibiothérapie. D'après le présent rapport, des agents pathogènes inhabituels peuvent être cliniquement significatifs à la fois chez les patients immunodéprimés et chez les patients immunocompétents. Puisque le *D acidovorans* résiste souvent aux aminosides, il est important de le déceler rapidement.

CASE PRESENTATION

A 68-year-old woman with an unremarkable medical history who had been diagnosed with B cell acute lymphocytic leukemia was admitted to the hematology clinic to undergo chemotherapy. Three days before admission, she developed cough, purulent sputum and dyspnea without fever. She had not been admitted to the hospital or have a history of antibiotic use within the previous three months.

On examination, her body temperature was 36°C, with a blood pressure of 105/50 mmHg, a heart rate of 80 beats/min, a respiratory rate of 30 breaths/min and oxygen saturation of 88% on room air. Breath sounds were coarse, with bilateral rales. Her physical examination was otherwise unremarkable. A computed tomography scan of her lungs revealed areas of consolidation suggesting pneumonia. On admission, she was started on intravenous piperacillin-tazobactam, 4.5 g every 6 h, ciprofloxacin, 400 mg every 12 h, as well as vincristine and prednisolone. Blood, urine and sputum cultures were negative.

On day 6, she became neutropenic. Hypoxemia, cough and sputum improved on day 14. Elevated C-reactive protein and procalcitonin levels decreased substantially. Antibiotics were discontinued. Meanwhile, treatment with imatinib was initiated.

On day 17, her initial symptoms recurred and a computed tomography scan revealed progression of previous consolidation areas. Serial serum galactomannan antigen tests were negative. Sputum cultures were obtained and piperacillin-tazobactam and ciprofloxacin were started again. Blood cultures were not repeated because the patient was afebrile.

Direct examination revealed good-quality sputum with dense, Gram-negative bacilli. After a 24 h incubation, nonfermenting Gram-negative bacilli grew in MacConkey agar. These colonies were identified as *Delftia acidovorans*, both by Vitek mass spectrometer (99% probability) (matrix-assisted laser desorption ionization time-of-flight [Biomerieux, USA]) and by the Vitek 2 System (98% probability) (Biomerieux, USA). The organism was susceptible to expanded- and broad-spectrum cephalosporins, carbapenems and piperacillin-tazobactam, but resistant to ampicillin-sulbactam, gentamycin, amikacin, ciprofloxacin and colistin.

On day 19 of admission, the patient was no longer neutropenic. Her symptoms resolved on day 24 and antibiotics were discontinued. The patient was discharged on day 27.

DISCUSSION

D acidovorans, formerly known as *Comamonas acidovorans* or *Pseudomonas acidovorans*, is found in soil, water and the hospital environment. It can be isolated from the respiratory tract, the eyes and blood; however, it is rarely clinically significant (1).

We reported a *D acidovorans*-associated pneumonia in a neutropenic patient. One case involving pneumonia and bacteremia has been reported in the Turkish-language literature (2). Three cases involving pulmonary infections with *D acidovorans* have been reported in the English-language literature (3-5). Bacteremia associated with intravascular catheters (6-11) and endocarditis (12,13) have been reported. Peritonitis (14), ocular infections (15-17) and urinary tract infection (18) have also been reported in the literature.

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TABLE 1
Summary of *Delftia acidovorans* infections according to infection site

Reference	Age, years	Infection	Risk factor(s)	Treatment	Outcome successful
Present case	68	Nosocomial pneumonia	Hematological malignancy	IV piperacillin/tazobactam	Yes
2	79	Nosocomial pneumonia and bacteremia	Chronic obstructive pulmonary disease	IV meropenem	No
3	Unknown	Nosocomial pneumonia	AIDS	IV ceftazidime	Yes
4	4	Empyema	Immunocompetent	IV cefaperazone/sulbactam	No
5	5	Empyema	Immunocompetent	IV imipenem	Yes
6	11	CRBSI	Solid organ malignancy	Catheter removal and IV ceftazidime	Yes
7	Unknown	CRBSI	Hematologic malignancy	Unknown	Yes
8	4	CRBSI	Solid organ malignancy	IV ceftazidime	Yes
9	27	CRBSI	AIDS	Catheter removal, IV imipenem and amikacin	Yes
10	65	CRBSI	Hematologic malignancy	Catheter removal and IV imipenem	Yes
11	10	CRBSI	End-stage renal disease and hemodialysis	Cahteter removal and IV cefepime	Yes
12	42	Infective endocarditis	Intravenous drug use	IV ceftazidime and ciprofloxacin	No
13	30	Infective endocarditis	Intravenous drug use	IV piperacillin/tazobactam	Yes
14	35	Peritonitis	End-stage renal disease and peritoneal dialysis	IV ceftazidime, oral ciprofloxacin and catheter removal	Yes
15	63	Keratitis	Corticosteroid treatment and corneal transplantation	Topical and IV ceftazidime	Yes
15	49	Keratitis	Corticosteroid treatment and corneal transplantation	Topical and IV ceftazidime	No
16	Unknown	Ocular infections	Unknown	Unknown	Unknown
17	40	Keratitis	Hyrdogel contact lenses	IV gentamicin and ciprofloxacin	Yes
18	61	Urinary tract infection	Immunocompetent	Oral norfloxacin	Yes
19	46	Bacteremia	Immunocompetent	IV piperacillin/tazobactam	Yes
22	Unknown	Bacteremia	Pressure-monitoring device	Unknown	Unknown
23	93	Bacteremia	Immunocompetent	IV imipenem/cilastatin	Yes
24	30	Bacteremia	Immunocompetent	IV piperacillin/tazobactam	Yes

CRBSI Catheter-related bacteremia; IV Intravenous

Three cases involving nosocomial pulmonary infections have been reported in the literature. Franzietti et al (3) reported an episode of nosocomial pneumonia as an opportunistic infection in a patient with AIDS. The organism was isolated from bronchoalveolar lavage fluid and the patient responded to ceftazidime treatment. Khan et al (4) reported a case involving a four-year-old immunocompetent child with empyema. *D acidovorans* was isolated from the drainage tube and the endotracheal aspirate sample. The patient did not survive, despite cefaperazone-sulbactam treatment. Chun et al (5) reported a chronic empyema case associated with *D acidovorans* in an immunocompetent adult patient.

Although rare, *D acidovorans* infection can be clinically important in immunocompromised patients with underlying malignancies, such as chronic kidney disease, HIV/AIDS (2) or patients taking immunosuppressive drugs. However, serious infections with *D acidovorans* have also been reported in immunocompetent patients (4,5,18,19,20).

The susceptibility profile of our isolate was similar to strains in previous reports (10-13).

Identification of the microorganism can be performed using a simple orange indole reaction test. With the addition of Kovac's reagent, the organism produces anthranilic acid using tryptophan. This results in a pumpkin-orange colour in the media, which is characteristic for *D acidovorans* (4).

An extensive literature search revealed several other cases of *D acidovorans* infection (Table 1).

Because of the ubiquitous presence of this microorganism, establishing its pathogenicity may be difficult. In the present case, clinical and radiological signs led us to a diagnosis of pneumonia, and the patient improved with antibiotic therapy. At that time, there was a large outbreak with carbapenem-resistant Enterobactericea in the medical and surgical intensive care units. We performed surveillance cultures in the hematology unit, and in the medical and surgical intensive care units. We did not isolate this microorganism from any environmental or patient cultures. Therefore, we accepted the organism as a pathogen in the present case.

A recent study performed in an intensive care unit in Brazil (21) showed clonal dissemination of *D acidovorans* in hospital settings using molecular confirmation. They isolated 24 *D acidovorans* strains in 21 patients from deep tracheal aspirate samples. However, they could not decide on the clinical significance of the pathogen due to lack of clinical data and patient follow-up.

D acidovorans-related infections are rare. It can occur in different age groups, as well as in both immunocompromised and immunocompetent patients (3-14). *D acidovorans* is often resistant to aminoglycosides (20), which are commonly used as empirical treatments in febrile neutropenic patients and in most Gram-negative infections. Therefore, timely identification of this organism to the species level is necessary to determine the most appropriate antibiotic therapy.

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