A Rare Case of Peritoneal Dialysis-Associated Peritonitis with *Sphingomonas koreensis*

Sphingomonas species are ubiquitous gram-negative, aerobic bacteria frequently found in aquatic environments such as drinking water and very seldom in hemodialysis fluids or supposedly sterile drug solutions. Human infections with the gram-negative *Sphingomonas* species are rare and peritonitis with these organisms even rarer. Here we report a case of polymicrobial peritonitis due to *Sphingomonas koreensis* and *Escherichia coli* in a patient undergoing peritoneal dialysis (PD).

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KEY WORDS: Peritonitis; peritoneal dialysis; *Sphingomonas koreensis*.

A 51-year-old man with end-stage renal disease was started on continuous ambulatory peritoneal dialysis (CAPD). About 3 months after CAPD start, he was admitted due to abdominal pain and cloudy dialysate he had noticed for 1 day. On clinical examination, his abdomen was diffusely tender, with normal bowel sounds and no sign of catheter exit-site infection. Effluent white blood cells (WBC) were 20,800/μL, confirming PD-associated peritonitis. Culture samples of the peritoneal fluid were taken, and an intraperitoneal empiric therapy with amikacin and cefazolin was started. Growth of *E. coli* was observed in the culture with susceptibility to all antibiotics tested. The patient's effluent WBC count declined rapidly to 360/μL and he was discharged on oral ciprofloxacin 3 days after admission. At a follow-up visit 2 days later, his effluent WBC count rose to 3,400/μL. A computed tomography (CT) scan of the abdomen was performed without revealing any pathologies. Due to a further rise of the effluent WBC count, to

15,300/μL, the PD catheter was removed and the patient was switched to hemodialysis. During surgery, cultures of the PD fluid and the catheter tip were taken, and antibiotic treatment was switched to intravenous piperacillin/tazobactam. After 40 hours of incubation, the cultures revealed gram-negative rods. The isolates were identified as *Sphingomonas koreensis* by matrix-assisted laser desorption ionization-time of flight mass spectrometry (MALDI-TOF MS) and confirmed with 16S rRNA gene sequencing. *Sphingomonas koreensis* showed susceptibility to cotrimoxazol and resistance to all other antibiotics tested. The patient was therefore treated with trimethoprim-sulfamethoxazole orally for 2 weeks, completely resolving the infection.

DISCUSSION

Sphingomonas species belong to the family *Sphingomonadaceae*, within the class *Alphaproteobacteria*. They are frequently found in aquatic environments, such as drinking or distilled water, and very seldom in hemodialysis fluids or supposedly sterile drug solutions (1,2). Despite their wide distribution in nature, human infections caused by *Sphingomonas* are rare. The genus most often implicated as a human pathogen is *Sphingomonas paucimobilis*, known to cause community- and hospital-acquired infections (3). There are a few cases of PD-associated peritonitis caused by *Sphingomonas paucimobilis* reported but none reported for *Sphingomonas koreensis* to date (4). The first evidence of *Sphingomonas koreensis* being a human pathogen was just recently published, in a case where it was the causative agent of meningitis in a patient (5). *Sphingomonas koreensis* is a gram-negative, rod-shaped, aerobic, yellow-pigmented bacterium with single polar flagella and derives its name from the fact that it was first isolated in natural mineral water in Korea in 2001 (6). The low pathogenicity of *Sphingomonas* species can be attributed to the unusual membrane structure. It possesses sphingolipids in the outer membrane of the cell wall and lacks the lipopolysaccharides usually seen in gram-negative bacteria (1). However, *Sphingomonas* species as a human pathogen are associated with high antibiotic resistance (2). In addition, *Sphingomonas* are known to have the capacity to form biofilms with the risk of relapsing/resistant catheter-associated infections (5). In our case, *Sphingomonas koreensis* was identified later, during the course of antibiotic therapy against *E. coli*. It was probably missed initially due to its low microbial count, very slow growth, and the high inoculum of *E. coli*. The underlying cause of the polymicrobial peritonitis in our case remained unclear. Catheter removal together with an antibiotic treatment in accordance with the susceptibility pattern was required to cure the infection. To our knowledge, this is the first reported case of PD-associated peritonitis with *Sphingomonas koreensis*.

DISCLOSURES

The authors have no financial conflicts of interest to declare.

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