Case Report

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Serratia marcescens Peritonitis in a Diabetic Patient Receiving Continuous Ambulatory Peritoneal Dialysis

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We report a case of *Serratia marcescens* peritonitis in a 45-year-old man with insulin-dependent diabetes mellitus undergoing continuous ambulatory peritoneal dialysis (CAPD). The patient presented with abdominal pain and cloudy dialysate. Empiric antibiotic therapy was initiated intraperitoneally with cefazolin and ceftazidime for 5 days. Cultures of the dialysate revealed *S. marcescens*, and the treatment was subsequently changed to gentamicin and ceftazidime. Oral ciprofloxacin was also added. The patient's abdominal pain and the dialysate white blood cell (WBC) count, however, did not improve. The indwelling CAPD catheter was therefore removed. This is an unusual case report in the Korean literature of *S. marcescens* peritonitis in a patient receiving CAPD.

Key Words: *Serratia marcescens*, Continuous ambulatory peritoneal dialysis, Peritonitis

Introduction

Serratia marcescens is a one of gram-negative rod-shaped Enterobacteriacease that is involved in nosocomial infections, particularly catheter-associated bacteremia, urinary tract infections, and wound infections [1]. It can cause endocarditis and osteomyelitis, pneumonia, and meningitis. *S. marcescens* is also a rare cause of peritonitis.

Peritonitis is one of the most significant complications in patients undergoing continuous ambulatory peritoneal dialysis (CAPD). Peritonitis is the leading cause of hospitalization in peritoneal dialysis patients, and the infection is also associated with catheter loss, transfer to hemodialysis, and considerable morbidity in these patients [2]. The initial treatment of peritonitis is empirical, making the effective treatment of cases that are caused by a rare organism a challenge. We report an unusual case of CAPD-related peritonitis caused by *S. marcescens*.

Case Report

A 45-year-old male on CAPD with end-stage renal disease (ESRD) secondary to diabetes mellitus presented with abdominal pain and a dialysate WBC count of 9,070/mm^3 (97% neutrophils). The patient had a history of hypertension and insulin-dependent diabetes mellitus for over 20 years, and had

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been maintained on CAPD since 2001. He had experienced two episodes of CAPD-associated peritonitis caused by coagulase-negative staphylococci 10 years earlier. He had not taken immunosuppressive drugs or steroids. The patient's blood sugar had been well controlled, and his hemoglobin A1c was 6.7%.

A 50 mL sample of peritoneal fluid was centrifuged at 3,000 g for 15 minutes, followed by resuspension of the sediment in 5 ml of sterile saline and inoculation on solid culture medium. Immediately after sampling, the patient was treated empirically with intraperitoneal cefazolin (15 mg/kg/day) and ceftazidime (1 g/day). His body weight was 52.0 kg, his creatinine level was 10.0 mg/dL, and his urine output was < 100 mL/day. After 5 days of aerobic incubation on blood agar, the pathogenic organism was identified as *S. marcescens*. In vitro susceptibility, tested by the disk diffusion method, demonstrated that the organism was resistant to cefoxitin, imipenem, and ampicillin/sulbactam, but susceptible to gentamicin, ciprofloxacin, levofloxacin, and ceftazidime. At the same time, blood cultures that were performed were positive for an organism identified as *S. marcescens* via bacterial recombinant DNA sequencing. At this point, the patient's clinical symptoms and cloudy dialysate had not shown significant improvement. His peritoneal WBC count was 8,750/mm^3 (98% neutrophils), and he continued to complain persistent abdominal distension and pain. On the basis of culture and antibiotic susceptibility results, cefazolin was discontinued and intraperitoneal gentamicin (40 mg/day) was started. Oral ciprofloxacin was also begun at a dose of 500 mg daily, which has been known to be effective in *S. marcescens* peritonitis [3]. Despite appropriate antibiotic therapy, however, the patient still complained of abdominal pain, and the peritoneal dialysate remained cloudy and continued to demonstrate a high WBC count, consisting mainly of neutrophils. The CAPD catheter was removed 10 days after the initiation of intraperitoneal antibiotic treatment. After removal of the catheter, the patient's abdominal pain was relieved and his C-reactive protein level decreased from 13.80 mg/dL to 8.07 mg/dL. His total hospital stay was 20 days, and oral ciprofloxacin was continuously prescribed for 10 days following removal of the CAPD catheter.

Discussion

Peritoneal dialysis has been widely accepted as a form of renal replacement therapy for patients with end-stage renal disease (ESRD). Despite increased experience with and advances in the technique, peritonitis remains a major cause of morbidity in peritoneal dialysis patients. The overall rates of peritonitis in these patients have decreased because of advances in connectology and *Staphylococcus* decolonization protocols [4]. These improvements have primarily made an impact on the incidence of gram-positive peritonitis, however, to such an extent that the prevalence of gram-negative organisms has consequently increased [5]. Infections with gram-negative organisms are often more severe than other forms of peritoneal dialysis-associated peritonitis, and are associated with worse clinical outcomes, including catheter loss, technical failure, and death [6]. Among gram-negative infections, *S. marcescens* peritonitis is associated with the poorest outcomes and is most commonly refractory to antibiotics [7].

The diabetic patient discussed here experienced severe peritonitis, which was resistant to adequate antibiotic treatment. The causative microorganism was identified as *S. marcescens*, which has been rarely reported as a cause of invasive peritonitis in diabetic patients undergoing CAPD. The morbidity and mortality rates for *S. marcescens* infection are generally high, because most patients have serious underlying medical problems and the causative strains usually exhibit multiple drug resistance [8]. *S. marcescens* was usually resistant to ampicillin, tetracycline, cefazolin, cephalothin, and cefuroxime [9]. Some cases of *S. marcescens* peritonitis have been managed using fluoroquinolones [3]. Fluoroquinolones offer a promising alternative to standard parenteral treatment in CAPD patients, while their high oral bioavailability makes them attractive and convenient [10]. Nonetheless, peritonitis due to *S. marcescens* had high non-resolution rate. In a retrospective clinical study, four episodes of Serratia peritonitis were identified among 104 episodes of recurrent CAPD peritonitis. One of them was effectively treated by catheter removal [11]. The poor outcome probably reflects the virulence of the organism.

S. marcescens causes nosocomial infection, and several factors have been associated with the acquisition of this pathogen. Prior administration of antimicrobials, immunosuppression, diabetes, renal failure, steroid use, and malignancy seem to be predisposing factors [12]. Peritoneal dialysis patients with diabetes are known to be at particularly high risk for peritonitis. Importantly, when subgroups of causative organisms were analyzed, incidence and rates of gram-negative peritonitis were remarkably increased among peritoneal dialysis patients with diabetes [13]. Recurrent peritonitis caused by *S. marcescens* in one diabetic patient receiving CAPD had a fatal course [14]. In each instance of nosocomial infection, an inciting event or risk factor could be identified. The patient in the present case displayed the following risk factors: diabetes, renal failure, and peritoneal catheter insertion.

In summary, we report an unusual case of *S. marcescens* peritonitis. Considering the increased morbidity and poor resolution rate of *S. marcescens* infection, clinicians should carefully watch for signs of *S. marcescens* peritonitis in peritoneal dialysis patients, particularly in high-risk patients.

References

1. Hejazi A, Falkiner FR. Serratia marcescens. J Med Microbiol 1997;46:903-12.
2. Saklayen MG. CAPD peritonitis. Incidence, pathogens, diagnosis, and management. Med Clin North Am 1990;74:997-1010.
3. Leblanc M. Oral ciprofloxacin to treat bacterial peritonitis associated with peritoneal dialysis. Clin Nephrol 1997;47:350.
4. Vas S. Changing picture of peritonitis in peritoneal dialysis. Am J Kidney Dis 2000;36:1057-8.
5. Jarvis EM, Hawley CM, McDonald SP, Brown FG, Rosman JB, Wiggins KJ, Bannister KM, Johnson DW. Predictors, treatment, and outcomes of non-Pseudomonas Gram-negative peritonitis. Kidney Int 2010;78:408-14.
6. Szeto CC, Leung CB, Chow KM, Kwan BC, Law MC, Wang AY, Lui SF, Li PK. Change in bacterial etiology of peritoneal dialysis-related peritonitis over 10 years: experience from a centre in South-East Asia. Clin Microbial Infect 2005;11:837-9.
7. Krishnan M, Th odis E, Ikonomopoulos D, Vidgen E, Chu M, Bargman JM, Vas SI, Oreopoulos DG. Predictors of outcome following bacterial peritonitis in peritoneal dialysis. Perit Dial Int 2002;22:573-81.
8. Wilhelmi I, Bernaldo de Quirós JC, Romero-Vivas J, Duarte J, Rojo E, Bouza E. Epidemic outbreak of Serratia marcescens infection in a cardiac surgery unit. J Clin Microbiol 1987;25:1298-300.
9. Haddy RI, Mann BL, Nadkarni DD, Cruz RF, Elshoff DJ, Buendia FC, Domers TA, Oberheu AM. Nosocomial infection in the community hospital: severe infection due to Serratia species. J Fam Pract 1996;42:273-7.
10. Nikolaidis P. Newer quinolones in the treatment of continuous ambulatory peritoneal dialysis (CAPD) related infections. Perit Dial Int 1990;10:127-33.
11. Lee SH, Noh HJ, Shin SK, Lee IH, Kang SW, Choi KH, Ha SK, Han DS, Lee HY. Clinical characteristics of relapsing peritonitis in CAPD patients. Korean J Nephrol 1997;16:738-46.
12. Bouza E, García de la Torre M, Erice A, Cercenado E, Loza E, Rodríguez-Créixems M. Serratia bacteremia. Diagn Microbiol Infect Dis 1987;7:237-47.
13. Chow KM, Szeto CC, Leung CB, Kwan BC, Law MC, Li PK. A risk analysis of continuous ambulatory peritoneal dialysisrelated peritonitis. Perit Dial Int 2005;25:374-9.
14. Connacher AA, Old DC, Phillips G, Stewart WK, Grimont F, Grimont PA. Recurrent peritonitis caused by Serratia marcescens in a diabetic patient receiving continuous ambulatory peritoneal dialysis. J Hosp Infect 1988;11:155-60.