Morganella morganii Peritonitis Associated with Continuous Ambulatory Peritoneal Dialysis (CAPD) after Colonoscopy

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Abstract

A 79-year-old man on continuous ambulatory peritoneal dialysis (CAPD) developed abdominal pain and cloudy peritoneal fluid two days after colonoscopy that revealed multiple diverticula. The white blood cell count was 9,000 cells/μL, C-reactive protein level was 6.86 mg/dL, and the white blood cell count of the peritoneal fluid was 7,800 cells/μL, suggesting acute peritonitis. Empiric therapy consisting of cefazolin and ceftazidime slowly improved the patient’s symptoms. The initial microbiological examination of the peritoneal fluid demonstrated Morganella morganii. He was changed from CAPD to hemodialysis. It is important to consider M. morganii peritonitis in patients with colonic diverticula.

Key words: acute peritonitis, continuous ambulatory peritoneal dialysis, Morganella morganii, colonoscopy, colonic diverticulum

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Introduction

Morganella morganii is a Gram-negative rod commonly found as normal flora in the intestinal tracts of humans, mammals, and reptiles or as environmental bacteria. Initially, M. morganii had been classified in the Proteus genus, and had been called Proteus morganii. In 1978, it was reclassified into the Morganella genus (1). A cluster of M. morganii infections occurred at a general tertiary hospital in 2006 (2), consisting of 61% wound infections and 39% urinary tract infections. M. morganii has been reported as the cause of urinary tract infections (3), arthritis (4), pericarditis (5), pyomyositis (6), sepsis (7), chorioamnionitis (8), ecchyma gangrenosum-like eruptions (9), meningitis (10), renal abscesses (11), and gas gangrene (12) in neonates or elderly immunocompromised patients or those with other serious underlying diseases.

M. morganii infections generally respond well to appropriate antimicrobial chemotherapy. However, its natural resistance to many β-lactam antimicrobial agents may lead to delays in proper treatment (13). We herein report a case of peritonitis due to M. morganii related to CAPD after colonoscopy with a review of the pertinent literature.

Case Report

A 79-year-old Japanese man was admitted to the Division of Nephrology and Rheumatology at Aichi Medical University Hospital for a fever, abdominal pain, and cloudy peritoneal fluid. Thirty years prior to admission, he was diagnosed with hypertension. One year before admission, CAPD was initiated for end-stage kidney disease. His regular peritoneal dialysis routine consisted of four exchanges of 1.5 L bags of 1.5% glucose solution. His daily urine output ranged from 400 to 1,200 mL. Two days before admission, he underwent colonoscopy for an evaluation of diarrhea. Multiple diverticula were observed in the colon, and a diagnosis of diverticulosis was made (Figure). No pathologic organisms were detected. On the day of colonoscopy, he stopped peritoneal dialysis to empty and rest the peritoneal cavity. Several hours after the resumption of peritoneal dialysis, he developed abdominal pain with cloudy peritoneal fluid.

On admission, he was afebrile at 36.5°C and complained
of abdominal pain. His pulse was 53 beats/min and regular, and blood pressure was 178/62 mmHg. His body weight was 58.0 kg with 1.5 L of peritoneal fluid. A physical examination revealed a normal mental status, a clean surgical scar in the neck, and diffuse abdominal tenderness with rebound tenderness. There was no erythema or other signs of infection at the catheter exit site. Laboratory studies included a white blood cell (WBC) count of 9,000 cells/μL, hemoglobin 9.4 g/dL, hematocrit 27.9%, platelet count 16.5×10⁴ cells/μL, albumin 2.5 g/dL, blood urea nitrogen 61.9 mg/dL, and creatinine 6.60 mg/dL. The Na concentration was 137 mEq/L, K 2.4 mEq/L, Cl 101 mEq/L, AST 29 U/L, and ALT 24 U/L. The lactate dehydrogenase concentration was 302 IU/L, CK 337 IU/L, and CRP 6.86 mg/dL. The WBC count of the peritoneal fluid was 7,800 cells/μL (71.5% neutrophils, 8.5% lymphocytes, and 20% macrophages). A blood culture examination revealed no bacteraemia.

On hospital day 5, after cefazolin (1.0 g/day) and ceftazidime (1.0 g/day) were started empirically, the WBC count of the peritoneal fluid became 51 cells/μL, and the CRP level was 2.0 mg/dL. The initial peritoneal fluid bacterial culture grew out *Morganella morganii* resistant to cefotiam (CTM), sulfamicillin (SBTPC), and fosfomycin (FOM), and sensitive to third-generation cephalosporins such as cefcapene pivoxil (CFPN-PI), ceftazidime (CAZ), and cefpodoxime proxetil (CPDX-PR). We continued CAZ for 16 days and discontinued cefazolin. The patient’s clinical condition and laboratory data improved gradually. He was changed from CAPD to hemodialysis due to the risk of bacterial biofilm formation and recurrence of peritonitis due to multiple diverticulosis.

**Discussion**

*Morganella morganii* is a Gram-negative rod that is part of the normal flora of the intestinal tract in humans and other animals. Characteristics of this organism include indole production, ornithine decarboxylase, urease, phenylalanine deaminase, and growth in KCN (1). In addition, *Morganella* species are capable of producing β-lactamases (13). Initially, *M. morganii* was mainly identified as a cause of urinary tract infections (3), and it has subsequently been isolated in patients with pneumonia, wound infections, skin and soft tissue infections (2), nonclostridial gas gangrene (12), meningitis (10), and sepsis (7). Falagas et al. reported 24 patients infected with *M. morganii* over a four-year period in a general tertiary hospital in Greece with 650 beds (2). They noted that skin and soft tissue infections were the most common type of infections due to *M. morganii*. Only one patient had peritonitis secondary to appendicitis, and 58% of the patients in that series had polymicrobial infections. Falagas et al. reported 24 patients infected with *M. morganii* over a four-year period in a general tertiary hospital in Greece with 650 beds (2). They noted that skin and soft tissue infections were the most common type of infections due to *M. morganii*. On hospital day 5, after cefazolin (1.0 g/day) and ceftazidime (1.0 g/day) were started empirically, the WBC count of the peritoneal fluid became 51 cells/μL, and the CRP level was 2.0 mg/dL. The initial peritoneal fluid bacterial culture grew out *Morganella morganii* resistant to cefotiam (CTM), sulfamicillin (SBTPC), and fosfomycin (FOM), and sensitive to third-generation cephalosporins such as cefcapene pivoxil (CFPN-PI), ceftazidime (CAZ), and cefpodoxime proxetil (CPDX-PR). We continued CAZ for 16 days and discontinued cefazolin. The patient’s clinical condition and laboratory data improved gradually. He was changed from CAPD to hemodialysis due to the risk of bacterial biofilm formation and recurrence of peritonitis due to multiple diverticulosis.

Regarding peritonitis due to *M. morganii*, Isobe et al. first reported a patient with spontaneous bacterial emphysema and peritonitis in 1994 (15). The second case was part of a case series by Falagas et al. (2). The first case of CAPD-related peritonitis caused by *M. morganii* appeared in Turkey in 2010 (16). The second case occurred in Taiwan (17) and the third case was in Austria (18). The present case is the fourth such case so far reported in the literature (Table).

We changed the patient from CAPD to hemodialysis due to the risk of bacterial biofilm formation by *M. morganii* and multiple diverticulosis. *M. morganii* produces urease, which generates ammonia from urea, and is associated with crystalline bacterial biofilm formation on urinary catheters (19). It is able to survive in acidic conditions, and the urease it produces is activated in low pH environments. In addition, the present patient had multiple diverticula, which
The authors state that they have no Conflict of Interest (COI).

**References**


