PERITONITIS CAUSED BY CHRYSEOBACTERIUM MENINGOSEPTICUM IN A PATIENT UNDERGOING CONTINUOUS AMBULATORY PERITONEAL DIALYSIS

Vin-Cent Wu,1 Tun-Jun Tsai,2 Robert Wang,2 and Po-Ren Hsueh2, 3

Abstract: Chryseobacterium meningosepticum is rarely encountered as a pathogen causing peritonitis in adults. A 54-year-old woman who underwent continuous ambulatory peritoneal dialysis for 8 years developed peritonitis due to C. meningosepticum. Although she received intravenous antibiotics with good in vitro activity against the organism, the fever and signs of peritonitis persisted. The Tenckhoff catheter was finally removed on the 25th day of hospitalization and the fever subsided. Four isolates of C. meningosepticum recovered from 4 ascites samples drawn on the third, 13th, 18th, and 23rd hospitalization days had identical antibiograms and random amplified DNA polymorphism patterns generated by an arbitrarily primed polymerase chain reaction. Early removal of Tenckhoff catheter and appropriate antimicrobial therapy are crucial to the successful treatment of peritonitis due to C. meningosepticum.

Key words: Catheter, indwelling; Flavobacterium; Peritoneal dialysis, continuous ambulatory; Peritonitis; Random amplified polymorphic DNA technique


Peritonitis is the main source of morbidity and treatment failure in chronic peritoneal dialysis patients. The majority of peritonitis results from infection with aerobic Gram-positive organisms.1 Chryseobacterium meningosepticum (formerly Flavobacterium meningosepticum) is a non-fermentative Gram-negative bacillus historically associated with meningitis in premature neonates.2 This organism is ubiquitous in the hospital environment, probably due to its ability to grow in non-nutrient fluid, and is resistant to a wide range of antibiotics including aminoglycosides and β-lactams.3 In this report, we describe a patient with long-term continuous ambulatory peritoneal dialysis (CAPD) who developed peritonitis due to C. meningosepticum. The 2 other cases of peritoneal dialysis-associated C. meningosepticum peritonitis found in the MEDLINE database are also reviewed.4,5

Case Report

A 54-year-old woman with end-stage renal disease diagnosed in 1993 started peritoneal dialysis via a Tenckhoff catheter in 1994. She also had tertiary hyperparathyroidism and underwent a subtotal parathyroidectomy in May 1997.

On March 21, 2001, she presented at the emergency department with a 2-day duration of diffuse abdominal pain with cloudy dialysate fluid. She was drowsy and had fever (39.1°C) upon arrival. Marked hypotension (92/56 mm Hg) was also noted. Abdominal examination revealed hypoactive bowel sound and diffuse tenderness to palpation. There was no evidence of erythema, discharge, or swelling around the exit site of the Tenckhoff catheter. The peritoneal effluent appeared markedly cloudy, and an obtained sample revealed a leukocyte count of 2200/mm³ with 97% polymorphonuclear neutrophils and 3% lymphocytes. Hemogram showed white blood cell (WBC) count of 10.42 x 10³/µL (normal, 4 to 11 x 10³/µL) with 94.2% neutrophils, hemoglobin of 9.7 g/dL (normal, 11.3 to 15.3 g/dL), and platelet count of 317 x 10³/µL (normal, 120 to 320 x 10³/µL). The blood urea nitrogen was 33.7 mg/dL (normal, 8 to 20 mg/dL) and creatinine 9.42 mg/dL (normal, 0.6 to 1.2 mg/dL).

A clinical diagnosis of peritonitis was made and empirical antibiotic therapy with cefazolin and
Chryseobacterium meningosepticum was administered. There was an initial clinical improvement in the abdominal pain and consciousness. One culture of the ascites sample collected on the third hospitalization day yielded *C. meningosepticum* (isolate A), which was susceptible to gentamicin, ciprofloxacin, piperacillin-tazobactam, and levofloxacin as determined by the disk diffusion method. Two sets of blood cultures and dialysis solutions were negative for the organism. Antibiotics were then shifted to piperacillin-tazobactam on the fourth day of hospitalization and the effluent fluid became clear with marked decrease in WBC count (100/mm³). Although the patient remained afebrile, 3 ascites samples drawn on the 13th, 18th, and 23rd hospitalization days still grew *C. meningosepticum* (isolates B, C, and D, respectively).

Unfortunately, her fever flared up on the 25th day of hospitalization and the Tenckhoff catheter was removed. Fever subsided gradually. Levofloxacin (500 mg/day orally) was given for another 7 days after 4 weeks of treatment with piperacillin-tazobactam. Culture of an ascites sample on the 39th hospitalization day yielded no organisms. She was then switched to chronic hemodialysis.

**Microbiological investigations**

API and Vitek test systems identified the 4 isolates as *C. meningosepticum*. Minimum inhibitory concentrations (MICs) of the isolates were determined using the agar dilution method described by the National Committee for Clinical Laboratory Standards (NCCLS). These 4 isolates had identical biotypes as well as identical MICs for ciprofloxacin (0.25 µg/mL), piperacillin-tazobactam (4 µg/mL), gentamicin (2 µg/mL), and vancomycin (16 µg/mL), respectively.

Random amplified polymorphic DNA (RAPD) patterns generated by the arbitrarily primed polymerase chain reaction for the 4 isolates using 2 primers, OPB12 (5'-CTTGTAGCA-3') and OPB18 (5'-CCACAGCAGT-3') [Operon Technologies, USA], were performed and interpreted as previously described. The RAPD patterns of these 4 isolates (isolates A, B, C, and D) were identical (Fig.). These patterns were different from those of 2 blood isolates (isolates E and F) of *C. meningosepticum* recovered from the 2 patients seen in 2001.

**Discussion**

*C. meningosepticum* is a non-fermenting, non-motile, Gram-negative aerobic rod widely found in soil and fresh water, but is not considered part of the normal human flora. Studies evaluating the incidence of *Chryseobacterium* in clinical specimens have found it to be low, accounting for 1 to 2% of Gram-negative rods isolated in microbiologic cultures. The bulk of isolates recovered from clinical specimens represent contamination or colonization from nosocomial reservoirs.

An outbreak of the infection was reported in ventilated patients colonized with this organism. *C. meningosepticum* rarely causes infection in the postneonatal immunocompetent host. Anecdotal reports of infections in patients with hematological malignancies, neutropenia, solid tumors, diabetes, organ transplants, steroid use, and malnutrition highlight the importance of altered immunity in predisposing to infection. Patients on dialysis also have an acquired immunodeficiency state. Disruption of host tissue integrity through internal placement of medical devices can predispose to *C. meningosepticum* infection.

The source of infection in this patient was probably the Tenckhoff catheter. Her peritonitis remained refractory despite ’adequate’ bactericidal activity against the organism. The clinical characteristics, treatment and outcome of 2 additional patients with peritoneal dialysis-associated peritonitis caused by *C. meningosepticum* are described in the Table. All 3 of these patients responded satisfactorily to the therapy with antibiotics and catheter removal; however, 1 patient (patient 1) died due to heart failure.

Historically, the poor outcome in patients with *C. meningosepticum* infection has been attributed
to the unusual antimicrobial susceptibility patterns of this bacterium. It is resistant to a wide range of antibiotics including the aminoglycosides and the majority of β-lactams. This situation makes the initial choice of an effective drug for empirical treatment of *C. meningosepticum* problematic. Moreover, discrepancies between the standard agar dilution test and the routinely used disk diffusion method for susceptibility testing of *Chryseobacterium* species to several frequently prescribed antibiotics have been reported. Good correlation and acceptable error rates were observed for piperacillin and ciprofloxacin for *C. meningosepticum*.13 Our observations from this case support these previous findings.

In our patient, the identity of antibiograms and RAPD patterns among isolates recovered during the 4-week interval indicated that the same strain isolates persisted in the peritoneal cavity and caused persistent infection. It was suggested that the indwelling catheter might serve as a foothold and reservoir for this bacterium.5 This observation suggests that *C. meningosepticum*-related peritonitis in CAPD patients may be a clinically refractory process that requires removal of the Tenckhoff catheter. Our findings in this case are in contrast to previous observations that good clinical outcome of catheter-related bacteremia caused by *Chryseobacterium* species can be achieved under adequate antibiotic treatment, even if the catheter remains in place.5–7

In conclusion, *C. meningosepticum* should be included in the list of pathogens causing CAPD-related peritonitis, and is frequently associated with a refractory course. Due to the poor clinical outcome of peritonitis caused by *C. meningosepticum* infection, early removal of Tenckhoff catheter is indicated.

### Literature