

Campylobacter fetus Peritonitis in a Patient with Continuous Ambulatory Peritoneal Dialysis: A First Case Report in Korea

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Campylobacter fetus may cause infections such as septicemia, peritonitis, meningitis, endocarditis, septic arthritis, and cellulitis, increasing the risk of spontaneous abortion but decreasing the likelihood of gastroenteritis. We identified *C. fetus* from continuous ambulatory peritoneal dialysis (CAPD) fluid using 16S rRNA gene sequencing. It is significant that this is

the first case report in Korea of CAPD peritonitis caused by *C. fetus*, which is known to be rare. (Ann Clin Microbiol 2018;21:20-22)

Key Words: *Campylobacter fetus*, Continuous ambulatory peritoneal dialysis, Peritonitis, 16S rRNA

INTRODUCTION

Campylobacter spp. can cause either gastrointestinal or extra-intestinal infections [1]. Although acute diarrheal illnesses are most common in *Campylobacter jejuni*, another *Campylobacter* spp., especially *C. fetus* may cause infections in virtually all parts of the body including septicemia, peritonitis, meningitis, endocarditis, septic arthritis, cellulitis and abortion more likely and gastroenteritis less likely [1-3]. *C. fetus* has been reported especially in patients with AIDS or other immunocompromised patients [1,3]. The cases of continuous ambulatory peritoneal dialysis (CAPD) infection caused by *C. fetus* have rarely been reported in global [3-7], especially the first case in Korea.

CASE REPORT

The patient was 73 year old with diabetes mellitus and chronic kidney disease (CKD) for 16 years and underwent CAPD for 2 years. He was admitted to the nephrology department with a 4-day history of abdominal pain, nausea and vomiting. CAPD peritonitis was suspected by the analysis of following tests at

the time of admission. Laboratory tests showed a leukocyte count of 14,200/ μ L (segmented neutrophil 74.2%, lymphocytes 11.5%, monocytes 10.4%), and C-reactive protein (CRP) level of 9.1 mg/dL. And CAPD fluid contained 840/ μ L WBC with 85% polymorphonuclear cells. Cefazoline and ceftazidime treatment were started for empirical intraperitoneal antibiotics.

On the day of admission, Gram stain of the CAPD fluid was negative. But, CAPD fluid culture using blood bottles, *C. fetus* was identified. CAPD fluid cultures were inoculated using BacT/ALERT 3D (bioMérieux, Marcy-l'Étoile, France). On the third day of culture, bacterial growth was detected and Gram-negative curved rods were observed. The bacteria were cultivated in a Campy Blood-Free Selective Media agar medium (Asan, Seoul, Korea). The bacteria grew at 35°C at the duration of 2 days, but not grew in a micro-aerobic environment at 42°C. The results of the additional identification test on the colony are as follows: oxidase test was positive, hippurate hydrolysis test was negative, and cephalothin was susceptible. For further identification of bacterial species, polymerase chain reaction (PCR) for 16S rRNA gene sequencing was carried out. The universal primers 27F (5'-AGAGTTTGATCCTGGCTCAG-3') and 1492R (5'-GGTTACCTTGTTACGACTT-3') were used to amplify

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parts of the 16S rRNA gene. The strain was the most closely matched to that of *C. fetus* subsp. *fetus* ATCC27374 (GenBank accession number NR043597.1) with 99.9% identity (1314/1315 bp). Antimicrobial susceptibility testing was performed by E-test and interpreted according to the Clinical and Laboratory Standards Institute (CLSI) guidelines [9]. The medium used was Mueller-Hinton agar with 5% sheep blood. The plates were incubated in a micro-aerobic environment for 24 hours at 35°C. The antimicrobial materials used were ciprofloxacin and erythromycin. *C. fetus* was both susceptible to ciprofloxacin (minimum inhibitory concentration=0.25 µg/mL) and erythromycin (0.38 µg/mL). Additional treatment using ciprofloxacin was started. After 2 weeks of intraperitoneal antibiotic treatment, the patient's symptoms was improved and discharged.

However, four months later, the patient was readmitted with abdominal pain and cloudy dialysate from 3 days before admission. CAPD peritonitis was recurrently diagnosed at the time of admission from the analysis of following tests. Laboratory tests showed leukocyte count of 11,600/µL (segmented neutrophil 64.0%, lymphocytes 17.4%, monocytes 9.6%) and CRP level of 9.0 mg/dL. CAPD fluid contained 40/µL WBC with 80% polymorphonuclear cells. The patient underwent intraperitoneal antibiotics treatment with cefamezin and ceftazidime in the CAPD transfer set. However, at that time, Gram stain and culture of the CAPD fluid were negative. After 10 days of intraperitoneal antibiotic treatment, patient symptoms and test results improved, outpatient follow-up and peritoneal dialysis has been maintained after discharge.

DISCUSSION

There have been so many different species causing CAPD infection. Most series have found coagulase-negative staphylococci to be the most frequently encountered agents (40% to 60%), followed by *S. aureus* and *Streptococcus* spp. (10% to 20% each), *Enterobacteriaceae* (5% to 20%), nonfermentative gram-negative rods (3% to 15%), and gram-positive rods (2% to 4%). Values for mixed bacteria, fungi, mycobacteria, and anaerobes are generally <5% [4].

Campylobacter spp. can be detected by Gram stain examination from a colony on a primary isolation plate. They have characteristic microscopic morphology: small, curved or seagull-winged gram-negative rods [1]. If the colony is suspicious-looking at *Campylobacter* spp., it must be cultured to selective agars and incubated at 35°C in a micro-aerobic

atmosphere. To identify species of *Campylobacter* spp., the incubation of three inoculated plates at 42°C, 35°C and 25°C should be required because they have different optimum temperatures [10]. *C. coli* and *C. jejuni* could grow at 42°C, but *C. fetus* could not. In this case, *C. fetus* isolate showed poorly growth at 42°C but well growth at 35°C. Also, susceptibility to nalidixic acid and cephalothin is an important differential characteristic among species. Molecular assays using PCR-based amplification of the 16S rRNA gene and direct sequencing of the PCR product have successfully identified the majority of *Campylobacter* species. *C. fetus* is generally susceptible to many antibiotics: erythromycin is the regimen of choice, with ciprofloxacin as an alternative drug [1,11]. The rate of resistance to erythromycin was about under 10% in Korea. However, the resistance rates to ciprofloxacin were different from 20% to 100% in Korea [10,12,13]. In this case, *C. fetus* was susceptible to ciprofloxacin.

In this case, the portal of entry of *C. fetus* is unclear, but might be due to infectious colitis. The patient was diagnosed with infectious colitis in the colonoscopy. Also, abdominal CT showed edematous wall thickening of sigmoid colon and peritoneal dialysate in perihepatic space and pelvic cavity. These findings suggest that intestinal bacteria may have spread into the peritoneal cavity. Inappropriate use of peritoneal catheter or exit-site infection can also increase the risk of CAPD peritonitis [5,14].

Nearly all patients without compromised or systemic infection recover from *C. fetus* gastroenteritis, especially without antibiotic therapy. However, immunocompromised persons or those with bacteremia or other extra-intestinal infection may require a prolonged course of antimicrobial treatment. Endovascular infections and immunocompromised patients with systemic infections due to *C. fetus* should be treated for at least four weeks. Persistent or relapsing infection with *C. fetus* can occur even years after the initial diagnosis [2,11]. In this case, although *C. fetus* was not recovered from CAPD fluid on 2nd peritonitis event, the recurrent infection due to *C. fetus* might be suspicious. It is significant that this is the first case report of CAPD peritonitis caused by *C. fetus* in Korea.

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=국문초록=

지속복막투석법 치료 환자에서 발생한 *Campylobacter fetus* 복막염 1예

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*Campylobacter fetus*는 패혈증, 복막염, 뇌수막염, 심내막염, 화농성 관절염, 봉와직염, 유산을 일으킬 수 있고, 위장염도 드물게 일으킨다. 본 저자들은 지속복막투석법(CAPD) 치료를 받는 환자의 투석액에서 *C. fetus*를 16S rRNA 유전자 염기 서열 분석법으로 동정한 증례를 보고하고자 한다. 본 증례는 *C. fetus*에 의한 드물게 보고되는 CAPD 복막염으로 국내 첫 증례보고이다. [Ann Clin Microbiol 2018;21:20-22]

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