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# *Pseudomonas* sp. Group Ve-2 Bacterial Peritonitis in a Patient on Continuous Ambulatory Peritoneal Dialysis

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***Pseudomonas* sp. group Ve-2 peritonitis occurred in a patient on continuous ambulatory peritoneal dialysis who had recently completed intraperitoneal cephalosporin therapy for culture-negative peritonitis. This is the second reported case of peritonitis in this population of patients due to this unusual organism, which is usually resistant to most cephalosporin antibiotics.**

We report a second case of peritonitis in a patient on continuous ambulatory peritoneal dialysis (CAPD) caused by a gram-negative organism which has rarely been documented as a cause of clinical infection and is notably resistant to most cephalosporins.

A 47-year-old male with a 10-year history of end-stage renal disease due to Goodpasture's syndrome presented with a 1-day history of abdominal pain and cloudy dialysis fluid. The patient had been on CAPD for 4.5 years. He had experienced several episodes of culture-negative peritonitis in the past which always responded to empiric therapy with cephalosporin antibiotics. In addition, he previously had one *Staphylococcus aureus* catheter tunnel infection and one episode of peritonitis caused by *Staphylococcus epidermidis*, which were both treated successfully with cephalosporin antibiotics. The patient had completed a 2-week course of intraperitoneal cephapirin treatment 14 days before the current episode. During the prior episode, clinical symptoms and peritoneal fluid findings were compatible with bacterial peritonitis, including rare gram-positive cocci seen on a Gram stain; however, cultures were negative.

Positive findings of a physical exam during the current episode included diffuse abdominal tenderness and rebound. Laboratory data revealed a hemoglobin of 11 g/dl and a total leukocyte count of 14,900/mm$^3$, consisting of 71% segmented neutrophils, 3% bands, 18% lymphocytes, and 8% monocytes. Centrifuged dialysis fluid appeared cloudy and showed 1,990 leukocytes per mm$^3$ (94% polymorphonuclear leukocytes) and 40 erthrocytes per mm$^3$. Gram-negative rods were seen both intra- and extracellularly on a Gram stain, and the patient was empirically started on cephapirin and gentamicin. Culture results at 24 h revealed growth of gram-negative rods into the third quadrant of a streaked MacConkey agar plate. Colonies appeared wrinkled and waxy and were yellow pigmented. The organism was found to be susceptible to ampicillin and aminoglycosides but resistant to cephalosporins, and the regimen for the patient was changed to intraperitoneal ampicillin. The organism was later identified as a member of CDC group Ve-2. The symptoms and peritoneal fluid abnormalities of the patient resolved, and he was discharged to complete a 2-week course of intraperitoneal ampicillin as an outpatient. Follow-up cultures became negative, and the patient remained stable on CAPD.

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The Veterans Administration Medical Center in Salt Lake City, Utah, is a 555-bed teaching hospital affiliated with the University of Utah School of Medicine. The renal service has been operating a CAPD program since 1981 and maintained 12 patients during 1985, the year in which the infection occurred in our patient. The incidence of peritonitis in our CAPD program during 1985 was 1.4 episodes per patient year, which equals the incidence published in 1985 by the National Institutes of Health National CAPD Registry (7).

Peritoneal fluid samples in our laboratory are processed by removing 50 ml of fluid from a well-mixed dialysate bag. Samples (5 ml) are inoculated into BACTEC 6B and 7D blood culture broths (Johnston Laboratories, Inc., Towson, Md.). The remaining 40 ml of fluid is centrifuged, and the pellet is used for a Gram stain and to inoculate Columbia sheep blood, MacConkey, CNA (colistin nalidixic acid), and chocolate agars (BBL Microbiology Systems, Cockeysville, Md.). The organism isolated from our patient grew well on MacConkey agar, was catalase positive, and produced acid oxidatively from glucose, xylose, mannitol, and maltose (BBL). The TSI (BBL) showed no change; other negative reactions included oxidase (Eastman Kodak Co., Rochester, N.Y.), nitrate reductase, indole (Difco Laboratories, De-

TABLE 1. Antimicrobial susceptibility test results

| Antimicrobial agent | Disk diffusion interpretation[a] | MIC (μg/ml) |
|---|---|---|
| Amikacin | S | <2 |
| Ampicillin | S | 8 |
| Cefamandole | R | >32 |
| Cefazolin | R | >32 |
| Cefoperazone | S | <4 |
| Cefotaxime | S | 4 |
| Cefoxitin | R | 16 |
| Chloramphenicol | R | >16 |
| Erythromycin | R | 5 |
| Gentamicin | S | <0.5 |
| Imipenem | S | <4 |
| Mezlocillin | S | <16 |
| Moxalactam | S | <4 |
| Netilmicin | S | <0.5 |
| Piperacillin | S | <8 |
| Tetracycline | S | <1 |
| Tobramycin | S | <0.5 |
| Trimethoprim-sulfamethoxazole | S | <1/19 |

[a] S, Susceptible; R, resistant.

troit, Mich.), lysine decarboxylase, and esculin hydrolysis (BBL). Antimicrobial testing was initially performed using the Kirby-Bauer disk diffusion technique (1). The MIC of each antimicrobial agent for the organism was determined by a microtiter modification (15) of the method chosen by the international collaborative study (2), with an API Uniscept MIC tray (Analytab Products, Plainview, N.Y.) (Table 1).

Bacteria belonging to group Ve are yellow pigmented, nonfermentative bacilli infrequently encountered in the clinical microbiology laboratory (4, 5, 8). The group is divided into two biotypes, Ve-1 and Ve-2, on the basis of biochemical, morphologic, and DNA content differences (4–6, 16). Although previously classified as *Chromobacterium typhiflavum* (8–10) and commonly described as CDC group Ve, these organisms are believed to have the basic characteristics of the genus *Pseudomonas* and are now classified as *Pseudomonas* sp. group Ve-1 and *Pseudomonas* sp. group Ve-2 (4). Recently, *Pseudomonas oryzihabitans* has been proposed for group Ve-2, based on its isolation from normal rice paddies (6). Documented reports of clinical infection associated with group Ve-2 have included one case of bacteremia in a traumatized postneurosurgical patient (10), one case of bacteremia in a patient with a malignancy (11), and one other case of peritonitis in a patient also on CAPD (13).

Organisms of this group are easily identified by the conventional techniques listed above and possess a characteristic pattern of antimicrobial susceptibilities. In general, both Ve-1 and Ve-2 biotypes are susceptible to the aminoglycosides, and group Ve-2 is usually susceptible to ampicillin and the semisynthetic penicillins. Both biotypes show variable susceptibilities to chloramphenicol, erythromycin, tetracycline, and trimethoprim-sulfamethoxazole (3, 5, 8, 10, 11, 13, 14). It is important to recognize that group Ve bacteria as a whole are almost always resistant to the cephalosporins, except the newest broad-spectrum compounds, to which they are variably sensitive (3, 11, 13, 14).

Initial empiric antibiotic therapy for patients on CAPD with suspected peritonitis is usually with a cephalosporin, intraperitoneally or systemically administered, since the majority of causative organisms are gram positive or susceptible to these agents (12). It is interesting that both our case and the only other recorded case of peritonitis caused by this water-associated organism occurred in a population of patients that maintains chronic peritoneal fluid accumulations, and both patients had also received cephalosporins during prior episodes of peritonitis (13).

In summary, we report another case of peritonitis due to *Pseudomonas* sp. group Ve-2, which again occurred in a patient on CAPD. This organism has also been reported to have caused bacteremia in two other debilitated patients. It is generally resistant to most cephalosporin antibiotics, and alternative regimens based on susceptibilities and cost could include ampicillin, aminoglycosides, or possibly trimethoprim-sulfamethoxazole.

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