JOURNAL OF CLINICAL MICROBIOLOGY, Dec. 1984, p. 1225–1226
0095-1137/84/121225-02$02.00/0

Vol. 20, No. 6

Pseudomonas paucimobilis Peritonitis in Patients Treated by Peritoneal Dialysis

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Received 18 June 1984/Accepted 10 August 1984

***Pseudomonas paucimobilis* has rarely been reported as an opportunistic human pathogen. We report the isolation of this organism in two patients who developed peritonitis during the course of intermittent or continuous ambulatory peritoneal dialysis. The origin of the infection was related to contamination of the dialysate in the first patient but could not be determined in the second case.**

Pseudomonas paucimobilis has been isolated from clinical specimens and from sources in the hospital environment (3). However, its pathogenic role remains uncertain in most cases. Sources of isolation etiologically linked to clinical disease include leg ulcer (5), blood (6, 7), and spinal fluid (2). To our knowledge, this is the first report of isolation of this microorganism from peritoneal fluid of patients developing peritonitis during the course of peritoneal dialysis.

MATERIALS AND METHODS

Case reports. (i) Case 1. A 74-year-old woman treated by intermittent peritoneal dialysis was admitted to the hospital on 7 January 1979 because of diffuse abdominal pain, vomiting, and cloudy peritoneal effluent. A Tenckhoff catheter had been inserted 6 months before, and intermittent peritoneal dialysis had been begun for the treatment of end-stage renal failure secondary to analgesic nephropathy. Upon patient admission, the temperature was 36.6°C, the heart rate was 76 beats per min, and the blood pressure was 180/100. The abdomen was diffusely tender with voluntary guarding, but intestinal peristalsis was present. The peritoneal fluid contained 850 leukocytes per mm^3 and a protein level of 470 mg/dl. A gram-stained smear of the dialysate revealed the presence of gram-negative bacilli which were subsequently isolated and identified as *P. paucimobilis*. Culture of the water produced by the reverse osmosis peritoneal dialysis machine yielded the same organism. The patient was put on another reverse osmosis peritoneal dialysis machine; trimethoprim-sulfamethoxazole (16 mg/liter and 80 mg/liter, respectively) was added to the dialysate, and the volume of exchange was decreased from 2 liters to 1 liter. Clinical improvement followed rapidly, and within 48 h, the peritoneal effluent had cleared, whereas it took another 4 days for the culture to become negative. After 2 weeks, intraperitoneal antibiotherapy was stopped, and intermittent peritoneal dialysis was resumed as usual.

(ii) Case 2. A 33-year-old woman on continuous ambulatory peritoneal dialysis was admitted to the hospital on 21 June 1983 because of abdominal pain and cloudy peritoneal effluent. She had begun continuous ambulatory peritoneal dialysis 13 months before for end-stage renal failure caused by chronic pyelonephritis and had never experienced peritonitis since the initiation of continuous ambulatory peritoneal dialysis. Abdominal examination showed diffuse tenderness with rebound. Temperature, pulse rate, and blood pressure were normal, as was the skin exit site of the peritoneal catheter. The peritoneal effluent contained 9,100 leukocytes per mm^3. The protein level was 700 mg/dl. A gram-stained smear of the dialysate was negative. Therapy was begun with cefazolin intraperitoneally (50 mg/liter of dialysate) and resulted in the rapid disappearence of the clinical signs of peritoneal irritation. After 2 days, the cultures obtained on admission grew a *Staphylococcus epidermidis* strain. Cefazolin was replaced by cephalexin (3 g orally per day), and the patient was allowed to return home for personal reasons. However, she was readmitted on 28 June 1983 because of increasing abdominal discomfort. Therapy was restarted with intraperitoneal cefazolin and tobramycin while we were waiting for culture results. These yielded nonfermentative gram-negative bacilli which were definitely identified as *P. paucimobilis*. According to the antimicrobial susceptibility results, treatment was changed to ampicillin (50 mg/liter of dialysate). She left the hospital after 5 days with amoxycillin (3 g orally per day) as the sole treatment. At that time, the peritoneal effluent was clear, and the leukocyte count (20 per mm^3) and protein level (100 mg/dl) were normal.

However, a routine follow-up culture taken 1 week later remained positive for *P. paucimobilis*. As is our policy in cases of persistant peritonitis, the Tenckhoff peritoneal catheter was removed, and the patient was placed on hemodialysis via a subclavian catheter. Hemodialysis sessions, followed by an 80-mg tobramycin IV injection, were performed until a new peritoneal catheter was inserted without any further problems.

Bacteriological results. *P. paucimobilis* was isolated from three different samples of peritoneal effluent in case 1 and from nine distinct specimens in case 2. Biochemical characteristics were investigated by the methods of Holmes et al. (3), Gilardi (1), and Hugh (4). Cultures of the peritoneal dialysate on horse blood agar and chocolate agar grew deep-yellow, nonhemolytic, convex colonies with smooth edges after 48 h of incubation at 35°C. The organism was oxidase and catalase positive but was not motile at either 35°C or 22°C. It did not grow on MacConkey agar; esculin and *O*-nitrophenyl-β-D-galactopyranoside; glucose, lactose, and maltose were oxidized.

In vitro susceptibilities to antimicrobial drugs were strictly similar in both cases. Disk susceptibility on Mueller-Hinton agar demonstrated susceptibility to erythromcyin, tetracycline, chloramphenicol, trimethoprim-sulfamethoxazole, ampicillin, carbenicillin, gentamicin, and tobramycin and

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resistance to cefazolin, cefamandol, and colistin. These results were in accordance with those previously reported by Slotnick et al. (6) and Southern and Kutscher (7).

DISCUSSION

The yellow-pigmented strains of nonfermentative, gram-negative bacteria characterized by Holmes and colleagues (3) as *P. paucimobilis* are ubiquitous bacteria that have been recovered from water, but also from hospital environments, including tap water, distilled water, nebulizers, respirators, dialysis fluid, and other equipment (1, 3, 8). In fact, organisms subsequently shown to belong to the same taxon were first isolated from a diversity of human clinical material by Tatum et al. (8), who provisionally referred them to group II k-1. Previous reports have emphasized the potential of *P. paucimobilis* for causing nosocomial infections in debilitated hosts but failed to establish a direct link between the source of infection and the patient. To our knowledge, this is the first report of infection in which the nosocomial character of this pathogen is definitely assessed. The strains isolated in these two cases can be considered as clinically significant: in both cases, the organism was repeatedly isolated from peritoneal effluent and the patients were considerably improved after 2 or 3 days of appropriate local antimicrobial therapy.

However, in the second patient, definitive cure could only be achieved after 14 days by removal of the peritoneal catheter. The source of peritonitis was evident in case 1, since cultures of separate samples of the dialysate yielded the same bacterium.

In case 2, the source of infection remained obscure. A swab of the skin area around the insertion of the peritoneal catheter failed to reveal *P. paucimobilis* at culture. Unfortunately, extensive bacteriological monitoring of the immediate surroundings of the patient was not attempted, so that we can only make speculative assumptions about an exogenous source for the infection. Interestingly, this patient first developed an episode of peritonitis due to *S. epidermidis*, for which she was treated with cefazolin (given intraperitoneally), so it could also be possible that the organism was selected on the skin of the patient after the antibiotic treatment and resulted in an endogenous superinfection through septic manipulation when the dialysate bag was connected to the peritoneal catheter.

These two case reports demonstrate that *P. paucimobilis* can act as an opportunistic pathogen in patients with end-stage renal failure treated by peritoneal dialysis.

Repeated isolation of *P. paucimobilis* from peritoneal effluent or other body fluids should trigger an epidemiological survey to determine the source of infection.

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