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Group JK Corynebacterium Peritonitis in a Patient Undergoing Continuous Ambulatory Peritoneal Dialysis

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We describe a case of peritonitis with isolation of a group JK corynebacterium from the peritoneal effluent in a patient undergoing continuous ambulatory peritoneal dialysis and treated with corticosteroids. Therapy with intraperitoneal vancomycin resulted in a rapid eradication of the organism. However, only 1 month after discontinuation of the 26-day therapy, a second episode of peritonitis with JK corynebacterium occurred. After vancomycin was restarted, the organism disappeared again from the peritoneal fluid, but the patient died a few days later from heart failure apparently unrelated to the infection. Some authors have mentioned the isolation of diphtheroids (without further identification) from peritoneal effluent of continuous ambulatory peritoneal dialysis patients, but to our knowledge, this is the first report of peritonitis associated with JK corynebacterium, an opportunistic organism that must be differentiated from other corynebacteria.

Peritonitis is still the main complication of continuous ambulatory peritoneal dialysis (CAPD). A great variety of organisms have been isolated from peritoneal effluent: *Staphylococcus epidermidis* (30 to 40% of cases), *Staphylococcus aureus* (7 to 20%), *Streptococcus* spp. (about 10%), diphtheroids (0 to 6%), gram-negative bacteria (25 to 30%), anaerobic organisms (about 5%), and fungi (0 to 6%, usually *Candida* spp.). With the improvement of laboratory techniques, the incidence of culture-negative episodes has dropped to a level of 4 to 20% (6, 10, 14, 17, 19, 22). It is believed that the majority of these negative cultures are due to technical failures and that sterile peritonitis is exceptional. Nevertheless, some authors have suggested the possible occurrence of rupture of a sterile abscess (1), presence of endotoxins (18), or chemical peritonitis (4).

The recovery of uncommon organisms in CAPD peritonitis has been documented (2, 3, 5, 9, 20, 24). We describe here the first case with isolation of a group JK corynebacterium from the peritoneal effluent. An important characteristic of this organism is its resistance to most antibiotics currently used.

Case report. Our patient, a 77-year-old woman, was treated by CAPD beginning in February 1981 for an end-stage renal failure caused by chronic pyelonephritis. She also suffered from severe atherosclerosis, hypertension, and ischemic cardiomyopathy. From December 1981, she received 30 mg of hydrocortisone per day for idiopathic hypercalcemia resistant to parathyroidectomy (11). During her first year on CAPD, she presented two episodes of peritonitis. One was caused by *S. aureus*. The second was associated with a mixed flora (*Escherichia coli, Morganella morganii, Bacteroides fragilis*, and *Candida albicans*). Treatment by intraperitoneal cefamandole and gentamicin and oral ketoconazole resulted in a rapid disappearance of bacteria; *C. albicans* persisted. The intraperitoneal catheter was removed without trying any further treatment. Oral ketoconazole was continued, and the patient recovered quickly. After uneventful hemodialysis from February to April 1982, CAPD was restarted. Rapidly thereafter, a new episode of peritonitis was diagnosed. Cultures remained negative. An initial intraperitoneal trimethoprim-sulfamethoxazole treatment was followed by a course of intraperitoneal cefamandole, with prophylactic oral nystatin, resulting in a clinical and biological cure.

On 1 July 1982, the patient was admitted again with peritonitis. She complained of abdominal pain, she was afebrile, and a rebound phenomenon was present; the peritoneal effluent was cloudy and contained 1,900 leukocytes per μl, but Gram stain and culture were negative. After a report of *Streptococcus faecalis* isolation from a peritoneal catheter connection (probably a contaminant since effluent cultures were negative), ampicillin (200 mg/liter of dialysate) was

started. Oral ketoconazole (200 mg per day) was given prophylactically. Despite a progressive decrease of leukocytes in the peritoneal effluent to a level of 47 per μl on 15 July, she still complained of abdominal pain, and peritoneal irritation signs persisted. Tobramycin (15 mg/liter of dialysate) was then started. In the following days, abdominal pain and peritoneal irritation disappeared. Nevertheless, the leukocyte count of the effluent rose gradually to 560 per μl on 23 July. From 15 to 23 July, multiple colonies of a diphtheroid, identified as a group JK corynebacterium, grew from six of seven peritoneal fluid samples. Gram stains remained always negative.

Since the clinical condition seemed to improve, treatment was not changed at first. Later, the condition of the patient worsened, with progressive reappearance of peritoneal irritation without fever. On 23 July, vancomycin (15 mg/liter of dialysate) was started with continuation of ketoconazole. After 24 h, the peritoneal fluid still yielded a few colonies of JK corynebacterium, but after 48 h, it was sterile. The leukocyte count declined gradually to 30 per μl 5 days later.

The patient improved very quickly and was discharged. Vancomycin was continued for 26 days. One month after stopping this therapy, the patient was readmitted. She complained of abdominal pain, peritoneal effluent was cloudy and contained 870 leukocytes per μl, and Gram stain was negative. Multiple JK corynebacterium colonies grew from this sample. Vancomycin was immediately restarted. Signs and symptoms once more disappeared quickly. Two days later, the peritoneal effluent was clear (30 leukocytes per μl) and sterile. Nevertheless, 5 days after admission the patient died from heart failure apparently not related to the peritonitis.

Microbiological studies. The organism was isolated from seven different samples of peritoneal effluent during the first episode and once during the second episode. Gram stain of effluent samples was never positive. Peritoneal fluid was inoculated on sheep blood agar supplemented with X and V factors and New York City medium incubated under 5% CO_2, on Mac Conckey agar, mannitol salt agar, Sabouraud agar and thioglycolate broth incubated aerobically, and on blood agar and cooked meat broth incubated anaerobically. The only medium that yielded visible growth of JK corynebacterium was the supplemented blood agar (on subcultures, the growth was identical on ordinary blood agar): after 48 h, multiple discrete pinpoint whitish colonies appeared. A hurried observer could easily miss these and report the cultures as negative. In fact, this probably occurred with one of our specimens, reported as negative during a weekend, whereas specimens taken days before and after were positive. The Gram stain showed small gram-positive coccoid rods with a tendency to agglomerate in clusters. This organism was catalase positive and not motile. It did not reduce nitrate. Urease was negative, and *o*-nitrophenyl-β-D-galactopyranoside was not hydrolyzed. Heavy growth occurred on bile esculin agar without hydrolysis of esculin. Acidification of glucose and maltose occurred after 3 days in peptone water supplemented with sterile horse serum. Xylose, mannitol, lactose, and sucrose were not acidified.

In vitro susceptibility tests to antimicrobial drugs were strictly similar for isolates from the first and second episodes: disk susceptibility tests on Mueller-Hinton agar supplemented with 5% sheep blood demonstrated resistance to penicillin, ampicillin, oxacillin, carbenicillin, cefazolin, cefamandole, cefuroxime, cefotaxime, clindamycin, erythromycin, chloramphenicol, gentamicin, and amikacin and susceptibility to tetracyclines and vancomycin. Results for the combination trimethoprim-sulfamethoxazole were not interpretable. Minimal inhibitory concentrations (MIC) were determined in Mueller-Hinton broth supplemented with 25% sterile horse serum and 1% Tween 80 to support sufficient growth of the organisms; for trimethoprim-sulfamethoxazole testing, 5% lysed horse blood was added as well.

Results were as follows, with all concentrations given in milligrams per liter: ampicillin, MIC > 200, minimal bactericidal concentration (MBC) > 200; doxycycline, MIC = 3.125, MBC > 200; vancomycin, MIC = 0.195, MBC = 0.39; trimethoprim-sulfamethoxazole, MIC > 10 and > 200 (respectively), MBC > 10 and > 200 (respectively); ketoconazole, MIC = 200, MBC > 400.

Conclusions. Although corynebacteria are generally contaminants, group JK corynebacterium has been associated with severe infections: sepsis and soft tissue infections, particularly in immunosuppressed patients (12, 15, 16, 23, 26, 29), and endocarditis, frequently on prosthetic heart valves (8, 21, 28). This organism can be distinguished from other corynebacteria by its slow growth and distinctive biochemical reactions (7, 25). The majority of group JK corynebacteria are characterized by multiple resistance to antibiotics. Prevalence studies (13, 27) of JK corynebacteria on the skin demonstrated their low frequency in a normal population but showed their common occurrence in patients treated with broad-spectrum antibiotics. Thus, our patient might have carried the organism on her skin and consequently contaminated her peritoneal fluid during manipulations, resulting in the development of peritonitis. The presence

of foreign material (silicone dialysis catheter) in her abdomen and her altered immune response (corticosteroid treatment and the renal failure state itself) are additional factors predisposing her for the development of opportunistic infections. The organism was isolated for the first time when the patient had been under antibiotic treatment for 15 days for an episode of culture-negative peritonitis (we do not consider the isolation of *S. faecalis* from the catheter connection as significant). Nevertheless, a JK corynebacterium might have been present but missed in the peritoneal effluent sample at the admission of the patient on 1 July, in which case the patient had a primary peritonitis with a JK corynebacterium susceptible to tobramycin, since this antibiotic resulted in an initial amelioration. Later, a resistant mutant could have been selected. It is more likely, however, that the organism was selected on the skin of the patient during antibiotic treatment and resulted in a suprainfection.

The infection in September associated with JK corynebacterium might have been a relapse as well as a second infection. It was unexpected since the vancomycin treatment given for 26 consecutive days must be considered appropriate. Indeed, vancomycin is the antibiotic of choice for JK corynebacterium infections (25), and the MIC of vancomycin for our isolates was very low.

A recent study of vancomycin pharmacokinetics in CAPD patients (13) showed that vancomycin must be administrated intraperitoneally for peritonitis treatment; vancomycin given intravenously resulted in unpredictable peritoneal levels. In our patient, definitive cure could perhaps only have been achieved by concomitant removal of the peritoneal catheter.

This report outlines the need for distinguishing JK corynebacterium from other diphtheroids. This opportunistic pathogen is resistant to the commonly used antibiotics in CAPD peritonitis, cephalosporins and aminoglycosides.

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