CASE REPORTS

Vibrio fluvialis Peritonitis in a Patient Receiving Continuous Ambulatory Peritoneal Dialysis

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We describe a case of peritonitis due to *Vibrio fluvialis* in a patient receiving continuous ambulatory peritoneal dialysis; we believe the case to be associated with the consumption of poorly prepared seafood. This was shown to be an important but rare cause of recurrent infection in our patient.

CASE REPORT

A 55-year-old Cook Island woman living in New Zealand since 1972 presented with acute peritonitis related to continuous peritoneal dialysis (CAPD). She had received CAPD for end-stage renal failure secondary to diabetic nephropathy for 3 years prior to her admission. Her treatment had been previously complicated by episodes of CAPD-associated peritonitis caused by *Streptococcus mitis*, coagulase-negative staphylococci, and *Klebsiella pneumoniae*. Each episode was treated with standard intraperitoneal and oral antibiotics.

The key clinical features on this occasion were a fever of 38.2°C, cloudy peritoneal dialysis fluid (PDF), generalized abdominal pain, and peritonism (no guarding of the abdominal wall or rebound tenderness on clinical examination). Mild diarrhea and vomiting were also present; however, a stool culture was not performed. There was no inflammation of the Tenckhoff catheter exit site.

Analysis of PDF revealed a leukocyte count of $1,155 \times 10^6$/liter, with 56% polymorphonuclear cells; gram-negative bacilli were seen in the centrifuged deposit. Empirical treatment with intravenous ceftriaxone was commenced. The following day, an oxidase-positive, gram-negative bacillus was cultured. Aerobic growth occurred on supplemented chocolate agar, with beta-hemolytic colonies seen on Columbia agar containing 5% sheep blood. Anaerobic growth occurred on fastidious anaerobic agar (Fort Richard, Auckland, N.Z.). The organism grew in the presence of 6.5% salt, differentiating it from *Aeromonas* spp. Smooth yellow colonies were seen on thiosulfate citrate bile salt sucrose agar, excluding *V. mimicus*, *V. hollisae*, *V. parahaemolyticus*, V. damselae, and *V. vulnificus* from the diagnosis. When a Vitek I system (BioMerieux, Auckland, N.Z.) was used, the isolate was identified with 98% probability as *Vibrio fluvialis*, with a bionumber of 7420360274. Its identity was also confirmed by API 20E (BioMerieux). It was differentiated from *V. furnissii* by fermentation of D-glucose

without the production of gas, clearing of tyrosine on an agar plate, and reduction of nitrate. It was ONPG (o-nitrophenyl-β-D-galactopyranoside) positive and lipase negative (4). Finally, identification was confirmed by the analysis of the 16S rDNA sequence by use of a BigDye Terminator cycle sequencing ready reaction kit on an ABI Prism 3100 apparatus (Applied Biosystems, Foster City, Calif.). Sequencing of 715 nucleotides demonstrated 95.8% homology with *V. fluvialis* (ATCC33809T). Susceptibility testing revealed it to be susceptible to ciprofloxacin, ceftriaxone, and imipenem but resistant to amoxicillin, amoxicillin-clavulanic acid, and gentamicin.

Ciprofloxacin (250 mg) was prescribed twice daily orally for 5 days. However, 2 weeks later the patient again presented with an episode of CAPD-related peritonitis. Gram staining of PDF this time revealed gram-positive cocci, which were shown on culture to be *Enterococcus casseliflavus* cocci. Treatment for this episode initially was intraperitoneal gentamicin (40 mg) postdialysis and also oral amoxicillin (250 mg) twice daily, for 2 weeks. During this time, the patient remained at home, maintaining regular contact with the renal team. Because of the frequent episodes of peritonitis due to organisms usually associated with bowel floras, the possibility of underlying bowel pathology was considered. Unfortunately, due to the short time period between infective episodes, investigations to look for this were never commenced. The patient was using the "Fresenius Stay Safe" model of cycling peritoneal dialysis (Fresenius Medical Care, Milsons Point, New South Wales, Australia), a system employed with "at-risk" patients who are thought to have poor dialysis technique. It was thought that poor hygiene and technique were major contributory factors in the development of peritonitis in our patient.

Two weeks later the patient developed another episode of CAPD peritonitis due to *V. fluvialis*. This episode was treated initially with intraperitoneal gentamicin (40 mg) postdialysis, and the patient was discharged home on a 3-week course of ciprofloxacin treatment.

A month following that admission, she was again hospitalized, this time for CAPD peritonitis due to *E. casseliflavus*. By this time the patient had had four episodes of peritonitis; therefore, the Tenckhoff catheter was removed and the patient commenced hemodialysis. There were no more episodes of

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peritonitis. *V. fluvialis* was not isolated again from clinical samples from leg ulcers secondary to peripheral vascular disease and diabetes. Unfortunately, the patient's condition deteriorated due to complications of her diabetes, namely, extensive peripheral vascular disease (resulting in a below-knee amputation of the left leg and above-knee amputation of the right leg), persistent lower limb and sacral ulcers, and significant hypotension. She ultimately died from sepsis secondary to a buttock ulcer and cardiac arrhythmia. *V. fluvialis* was not identified in clinical specimens at the time.

To our knowledge, this is the first described case of CAPD infection caused by *V. fluvialis*. It occurred in a patient who did not appear to have good technique when handling her bag changes. We suspected that ingestion of seafood or exposure to seawater may have been the source of infection in this case: *Vibrio* spp. are often found in freshwater and seawater and have been found in raw seafood (4). The patient enjoyed eating seafood and mainly bought her fresh seafood from the local supermarket. However, she admitted to also eating freeze-dried seafood imported from the Cook Islands, located in the tropics over 3 h by air from New Zealand. It is not clear how the seafood was stored and what actual freeze-drying process was used, although it seems that it was commercially prepared. Our patient denied ever going into the sea or other direct exposure to estuarine water or seawater.

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CAPD-related peritonitis is usually due to gram-positive bacteria, mainly those that are part of normal skin floras (*Staphylococcus epidermidis*, *Staphylococcus aureus*, streptococci). *Enterococcus faecalis*, *Escherichia coli*, *Klebsiella* spp., *Pseudomonas aeruginosa*, and *Enterobacter* spp. have also frequently been reported (5). The portal of entry in these cases is presumed to have been the Tenchkoff catheter site. There have been reported cases of CAPD-related peritonitis due to other gram-negative bacteria, namely *Plesiomonas shigelloides* (15), *Aeromonas hydrophila* (3), *Aeromonas caviae* (1), *Salmonella* spp. (6, 12), and *Campylobacter* spp. (16). There has been one reported case of CAPD-related peritonitis due *to Vibrio alginolyticus* (13). In most of these cases, the portal of entry was presumed to be via the Tenchkoff catheter exit site and the peritonitis was also associated with poor hygiene and dialysis technique. Diarrhea is not always a key feature; however, it has been seen in some cases of patients on CAPD with *Campylobacter* bacteremia and peritonitis (16). Non-CAPD-related peritonitis with bacteremia due to non-01 *V. cholerae* and also *V. vulnificus* has been reported, being found more commonly in patients with underlying hepatic cirrhosis (10, 14). Our patient did not have exhibit clinical or biochemical evidence of liver disease.

There have been many reports of human infection caused by *Vibrio* spp., especially in association with gastroenteritis and diarrheal illnesses (2, 8, 11). Most of these infections can be traced back to a history of ingestion of seafood (7, 8, 9, 10, 11). Mortality can be high, particularly in those patients with concurrent sepsis, underlying cirrhotic liver disease, and/or immunocompromise (10, 11, 14). While non-01 *V. cholerae*, *V. vulnificus*, and *V. parahaemolyticus* are the most common *Vibrio* species implicated in cases of gastroenteritis and wound infections (2, 8, 11), *Vibrio fluvialis* gastroenteritis in cases of a patient with AIDS (7) and of a patient found to have renal impairment (9) has been reported.

The fact that this patient suffered from relapses of CAPD peritonitis caused by *V. fluvialis* and *E. casseliflavus* resulted in the removal of the Tenckhoff catheter and starting the patient on hospital-based hemodialysis. The surgeon did not find any visible intraperitoneal disease or abscess at the time of removal of the Tenckhoff catheter.

We believe this report is interesting and important, because it describes the first case of CAPD peritonitis caused by *V. fluvialis*. It is possible that the infection was caused by ingestion of improperly prepared and stored seafood imported from the tropics. This report adds to the known dangers of immunocompromised individuals eating uncooked or poorly prepared seafood.

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