When Love Hurts, It Leaves No Options! An Unusual Case of *Pasteurella* Peritoneal Dialysis Peritonitis Causing Severe Intra-abdominal Adhesions Preventing a Future Peritoneal Dialysis Option

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A 67-year-old white man with a history of end-stage renal disease receiving peritoneal dialysis (PD) presented with acute onset of vomiting, chills, and abdominal pain. He was diagnosed with PD-associated peritonitis secondary to Pasteurella. *After failure of 3 weeks of antibiotic treatment, catheter loss occurred. On follow-up, the patient was found to have extensive intra-abdominal adhesions precluding placement of a new PD catheter.*

Key words
Peritonitis, *Pasteurella,* cats, catheter loss, intra-abdominal adhesions

Case description

We report a case involving a 67-year-old white man with end-stage renal disease secondary to diabetic nephropathy and hypertensive nephrosclerosis. He had been receiving peritoneal dialysis (PD) for 3 years, using a cycler at night, with a last-bag fill of icodextrin during the day. He presented to the emergency room in March 2017 after experiencing vomiting, chills, and diffuse abdominal pain that had begun the same morning.

Initially blaming the hamburger he had consumed at lunch, he noted cloudy effluent when draining his last bag, prompting him to seek care. He had, to the best of his knowledge, been adherent to the sterile technique he had been taught. Other than elevated blood pressure, his vital signs were stable when he was evaluated. His abdomen was diffusely tender, and he was guarding, but he had no rebound tenderness. His bowel sounds were normoactive.

Laboratory results revealed an elevated white cell count of 18.5×10^9/L, with a left shift. His effluent was cloudy, with 98% neutrophils and a white cell count of 14,943/μL. Empiric treatment for PD peritonitis was initiated, with a loading dose of intraperitoneal vancomycin 1 g and ceftazidime 500 mg. The following day, PD effluent culture results showed *Pasteurella multocida*.

On direct questioning, the patient reported the acquisition of a pet cat 3 months earlier. He had, on occasion, seen the cat licking the tubing leading from his cycler. His antibiotics were switched to intraperitoneal ampicillin, with a plan to treat for 3 weeks. Clinically appearing to improve, the patient was discharged after 3 days.

Two weeks later, the patient was readmitted with persistence of abdominal pain and cloudy PD fluid. He felt that his condition was unchanged from the initial presentation. Repeat fluid cultures were now negative, and his effluent white cell count had dropped to 900/μL.

The patient was switched to intravenous ampicillin. He complained of constipation, and conservative measures did little to relieve the symptoms. A week later, the PD catheter was removed, and hemodialysis

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was initiated, with a dramatic improvement in his symptoms. He was discharged on oral ciprofloxacin for 3 weeks. Subsequent abdominal computed tomography showed multiple pockets of loculated fluid in the patient's abdomen.

An attempt was made 4 months later to laparoscopically place a new PD catheter. The operative report cited "widespread adhesions which would preclude placement of a PD catheter."

On review of available case reports of *P. multocida,* the present case is the first that we have come across that resulted in catheter loss resulting from the complication of adhesions.

Discussion

Peritonitis remains a devastating complication of PD. Overall, PD peritonitis rates have dropped worldwide, and fewer than 5% of peritonitis episodes result in death. Nevertheless, peritonitis is the direct or a major contributing cause of death in approximately 16% of PD patients (1). In its 2017–2018 survey, the American Pet Products Association reported that 68% of U.S. households (almost 85 million families) own a pet, a rise from 56% of U.S. households in 1988. The United States has the largest population of pet dogs and cats globally, and in 2016, baby boomers accounted for 32% of pet ownership (2,3).

In 2010, Broughton *et al.* (4) uncovered 123 cases of PD peritonitis reported in the literature that were caused by 12 different zoonotic agents, with an animal being involved in 24% of cases. They found that the overall mortality rate was 13.5% and that, in 27% of the cases, the Tenckhoff catheter had to be removed. Interestingly, of the 30 reported cases in which contact with animal was documented, 24 cases were reported to involve *Pasteurella* species, with 21 of those cases being related to cats (4).

P. multocida is a gram-negative coccobacillus found in the oropharynx of domestic animals (5). It was first identified in 1878 in fowl, and it was isolated 2 years later by Louis Pasteur (hence its name). The first time *P. multocida* was cultured in PD effluent was in 1987 (6). Rates of *P. multocida* carriage in oral or nasal secretions of a variety of apparently healthy animals are quite high, ranging from 70% to 90% in cats (7) and 50% to 66% in dogs (8,9). Using pulsed-field gel electrophoresis, Satomura *et al.* (10) found that oropharyngeal colonization with identical strains of *Pasteurella* species can occur in both a patient and the patient's cat.

P. multocida is a rare cause of PD peritonitis. It is, however, associated with several soft-tissue infections and can present as edema, cellulitis, or bloody or suppurative (purulent) exudate at wound sites (11). Complications include septic arthritis, osteomyelitis, endocarditis, and meningitis—the latter site potentially having a dramatic and devastating presentation (5,11,12). Most reported cases of *P. multocida* peritonitis (up to three quarters) have been reported in patients undergoing continuous cycling PD. The higher incidence in patients using that modality compared with continuous ambulatory PD is hypothesized to be attributable to greater contact with the environment and a greater length of tubing that could be punctured by a playful cat (5,13,14). Based on a series of 37 cases of *P. multocida* PD-related peritonitis published in 2015 (15), PD catheter removal was required in only 11% of patients (4 of 37). Only 1 patient experienced a recurrence after 4 months (16). No discernible association between a particular therapeutic regimen and a poor outcome has been observed, and no mortality has so far been reported (15). The lack of mortality is reassuring, especially given that *P. multocida* bacteremia typically carries a 30% historic mortality rate (12,17).

Treatment

Penicillin remains the first-line treatment for *P. multocida* infection. Cephalosporins and oral fluoroquinolones are also considered to be effective. Aminoglycosides should be avoided because of their unreliable activity against *Pasteurella.* In one documented case of *P. multocida* recurrence, resistance to gentamycin was demonstrated *in vitro* (16).

No specific duration of antibiotic therapy has been defined, but 3 weeks of antibiotics have certainly proved effective in the management of *P. multocida* peritonitis (5). Some centers have reported successful treatment with 2 weeks of therapy (15).

Summary

Peritoneal dialysis patients, like many others with chronic diseases, can receive emotional support from their pets. However, they must be made aware of the risks that their pets pose to their health.

Retraining regimes should specifically ask about the acquisition of pets. Strict adherence to hygienic technique and prevention of access by pets to the PD set-up might help to reduce the risk of PD peritonitis associated with zoonotic agents.

Disclosures

We understand that *Advances in Peritoneal Dialysis* requires disclosure of any conflicts of interest, and we declare that we have no conflicts to disclose.

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