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Case Report

Pets or Pest: Peritoneal Dialysis-related Peritonitis due to *Pasteurella multocida*

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Pasteurella multocida is a Gram-negative bacteria found in the oropharynx of many domestic animals. *P. multocida* can cause a variety of human infections, but it remains a rare cause of peritoneal dialysis-related peritonitis. We describe a severe case of peritoneal dialysis-related peritonitis due to *P. multocida* infection caused by close contact with a cat.

KEYWORDS: *Pasteurella multocida*, peritoneal dialysis, peritonitis

Introduction

Pasteurella multocida is a pathogen found as a part of the normal oropharyngeal flora of household pets and has been implicated in a range of human diseases. *P. multocida* is a rare cause of peritoneal-dialysis peritonitis, with only 18 cases reported in the literature to date. Most cases have occurred as a result of a cat either biting, or licking, the peritoneal dialysis tubing. We describe a severe case of *P. multocida* peritonitis in a patient with end-stage renal disease undergoing continuous cycler peritoneal dialysis believed to be caused by a close contact with a cat.

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Case Report

A 38-year-old Native American man with end stage renal disease due to anti-neutrophil cytoplasmic antibody associated vasculitis on continuous cycler peritoneal dialysis for 5 years, presented to the emergency department with a 1-day history of severe, diffuse abdominal pain, subjective fever, chills, and a cloudy peritoneal dialysis effluent. The patient had a significant past medical history of hypertension and anti-neutrophil cytoplasmic antibody associated vasculitis, with a history of multiple pulmonary vasculitic relapses requiring maintenance immunosuppression with prednisone and oral cyclophosphamide.

Physical examination revealed an alert, oriented, and obese man with a blood pressure of 110/70 mmHg, a pulse of 89 beats/min, and a temperature of 37.1°C. A head exam revealed a Cushingoid facies and the cardiopulmonary exam was unremarkable. Abdominal examination revealed a soft abdomen, with moderate to severe tenderness to palpation throughout, moderate guarding with no rebound and normoactive bowel sounds. There was no erythema or discharge at the peritoneal dialysis catheter

exit site. The tubing of the peritoneal dialysis catheter was intact with no macroscopic evidence of damage.

Laboratory tests revealed a white blood cell (WBC) count of $5.7 \times 10^3/\mu L$, hemoglobin of 8.7 g/dL, hematocrit of 25.5%, and a platelet count of $109 \times 10^3/\mu L$. His serum chemistries were as follows: sodium = 141 mmol/L, potassium = 3.3 mmol/L, chloride = 98 mmol/L, total carbon dioxide = 23 mmol/L, glucose = 99 mg/dL, blood urea nitrogen = 51 mg/dL and creatinine = 13.2 mg/dL. Initial peritoneal fluid analysis revealed a WBC count of 4,936 cells/μL with 96% neutrophils, and a red blood cell count of 149 cells/μL. Gram stain of peritoneal fluid was negative for any organisms. Computed tomography of the abdomen with intravenous contrast revealed no evidence of intra-abdominal pathology.

Based on the history, physical examination and the findings in the peritoneal dialysis fluid, a diagnosis of peritoneal dialysis-related peritonitis was made. Empiric treatment was initiated with vancomycin (2 g intraperitoneally) in a 6-hour dwell every 5 days, and ceftazidime (1 g intraperitoneally) in a 6-hour dwell every day. The patient was stable and was transferred to the medical floor. A few hours after arrival to the medical floor, his systolic blood pressure decreased to 80 mmHg with no response after 1 L of normal saline bolus intravenously. The patient was then transferred to the intensive care unit where vasopressors, stress-dose steroids, and intravenous piperacillin/tazobactam (2.25 g intravenously every 8 hours) and vancomycin (750 mg intravenously every 48 hours) were initiated. His symptoms markedly improved within 72 hours of initiation of therapy. Vancomycin was stopped and treatment with piperacillin/tazobactam continued when preliminary culture report indicated the growth of a Gram-negative rod. Final culture results indicated the organism was *P. multocida*, which was found to be sensitive to ampicillin, ampicillin/sulbactam, cefazolin, gentamicin, imipenem, levofloxacin, and trimethoprim/sulfamethoxazole. The patient was then switched to ampicillin (2 g intravenously every 12 hours) for 7 days. He then completed a 2-week course of oral levofloxacin (750 mg orally every 48 hours) upon discharge. Upon further questioning, the patient reported that he had a cat at home and that the cat had been playing with the tubing leading to the cycler machine the morning before admission. Later that day, during his peritoneal dialysis exchange, he noticed a minimal fluid leakage on the floor. The patient then stopped his drain, immediately disconnected from his y-set, and did two rapid manual exchanges. He did not report the incident to his physician or dialysis unit nurse coordinator. Due to the severity of his infection, the peritoneal dialysis catheter was removed and the patient switched to hemodialysis. He has been on hemodialysis ever since and continues to do well.

Discussion

P. multocida is a small Gram-negative coccobacillus that is a component of the normal upper respiratory tract flora of fowl and mammals, especially felines.[1,2] A wide range of infections have been reported, including soft tissue infections and, less commonly, septic arthritis, osteomyelitis, sepsis, and meningitis, particularly in immunocompromised hosts.[1,3]

P. multocida is a rare cause of peritoneal dialysis-related peritonitis. A review of the literature revealed only 18 previously reported cases (Table).[4–17] Almost all reported cases of peritonitis complications associated with *P. multocida* were due to close contact with cats. This may reflect the higher prevalence of colonization with *P. multocida* in cats versus dogs (70–90% *vs.* 50–66%, respectively) and the sharper teeth of cats.[2,10]

The mechanism of transmission is thought to be due to a cat bite, or scratch, of the peritoneal dialysis tubing, or bags, though exposure without biting or scratching and even the absence of any exposure has been described.[2,5,6,10,12–14] Patients who have household cats have a high prevalence of oropharyngeal colonization with *P. multocida*. This is demonstrated by the finding that one third of animal breeders whose livestock had suffered from Pasteurellosis were found to be oropharyngeal carriers of this organism.[10] Therefore, potential contamination resulting from break in technique could also be possible.[10] Despite the preponderance of continuous ambulatory peritoneal dialysis, most of the reported cases of *P. multocida* peritonitis are in patients on CCPD. One possible explanation for this is that the length of tubes necessary for the cycler makes them attractive toys for cats, or that they stay in prolonged contact with the environment, as opposed to continuous ambulatory peritoneal dialysis.[2]

The onset of symptoms in patients with *P. multocida* peritoneal dialysis-related peritonitis is typically less than

Table. Reported cases of peritoneal dialysis-related peritonitis due to *P. multocida*

Case	Age (yr)/ sex	Etiology of end stage renal disease	Other comorbidities	PD type	Animal exposure	PD tubing break/leak	Treatment[a]	Reference
1	55/F	Hypertension	–	CCPD	Cat	Yes	Vancomycin IP, Gentamicin IP	4
2	25/M	Alport's syndrome	HIV	CCPD	Cat	No	Gentamicin IP, Cephadrine IP	5
3	55/M	Polyarteritis nodosa	–	CAPD	Cat	No	Vancomycin IP, Gentamicin IP, Ciprofloxacin PO	6
4	54/M	Hypertension	–	CCPD	Cat	Yes	Vancomycin IV, Gentamicin IV, Cefazolin IP	7
5	75/M	Hypertension	–	CAPD	Cat	Yes	Vancomycin IP, Cefamandole IP	8
6	42/F	Hypertension	–	CCPD	Cat	Yes	Vancomycin IP, Gentamicin IP, Penicillin PO	9
7	12/F	Focal segmental glomerulosclerosis	–	CCPD	Cat	Yes	Cephapirin IP, Gentamicin IP	1
8	73/M	Chronic glomerulonephritis	–	CAPD	Cat	No	Vancomycin IP, Ceftazidime IP	10
9	55/M	Polyarteritis nodosa	–	CCPD	Cat	Yes	Vancomycin IP, Gentamicin IP, Ampicillin/ Sulbactam PO	11
10	47/F	Type 1 DM	–	CCPD	Cat	No	Piperacillin IV, Ciprofloxacin PO	12
11	22/F	Medullary cystic kidney disease	–	CCPD	Cat	Yes	Vancomycin IP, Amikacin IP, Ciprofloxacin PO	3
12	24/F	Chronic pyelonephritis	–	CCPD	Cat	No	Ciprofloxacin PO	13
13	52/M	IgA Nephropathy	Hypertension, gout	CCPD	Cat	No	Amykacin IP, Cefazolin IP	2
14	48/M	–	–	CCPD	Cat	No	Cefazolin IP, Gentamicin IP, Ampicillin IV	14
15	73/F	Autosomal dominant polycystic kidney disease	–	CAPD	Cat	Yes	Vancomycin IP, Gentamicin IP, Ciprofloxacin PO	15
16	21/F	Congenital small kidneys	–	CCPD	Cat	Yes	Gentamicin IP, Ceftazidime IP	16
17	58/M	Cyclosporine nephrotoxicity	Orthotopic heart transplant	CCPD	Cat	Yes	Gentamicin IP, Vancomycin IP	16
18	48/F	Hypertension, type 2 DM	–	CAPD	Dog	No	Cefazolin IP, Gentamicin IP	17

[a]All patients were fully recovered after treatment. PD = Peritoneal dialysis; F = female; M = male; CCPD = continuous cycler peritoneal dialysis; CAPD = continuous ambulatory peritoneal dialysis; IP = intraperitoneally; PO = orally; IV = intravenously; DM = diabetes mellitus.

24 hours.[10] Patients usually present with low grade temperature, severe abdominal pain, and a cloudy effluent. Nausea and vomiting are sometimes reported. Peripheral WBC counts can vary from normal to severe leukocytosis with bandemia. Peritoneal dialysate WBC counts are usually very elevated. Gram staining of the peritoneal dialysate is usually negative. Almost all patients recover from symptoms within 48–96 hours of the initiation of antibiotic therapy.

Penicillin is the antibiotic of choice for *P. multocida* infection although aminoglycosides, fluoroquinolones, and cephalosporins are also effective. Vancomycin is usually not effective.[1,2,10] The appropriate duration of antibiotic therapy has not been defined, but it appears from the current literature that 3 weeks of antibiotics should be sufficient.

In conclusion, *P. multocida* peritonitis in patients undergoing peritoneal dialysis is a rare occurrence that has been almost exclusively associated with the biting or licking of the dialysis tubing, or peritoneal dialysis bags, by domestic cats. It is clear from our case presentation that the supposedly healing touch of a dog's, or cat's, tongue could be fatal for a patient undergoing peritoneal dialysis. We recommend that peritoneal dialysis patients who have pets at home should be alerted to the danger of acquiring infections from them. Personal hygiene when handling pets should be emphasized. Also, pets should be kept away from designated bag changing areas, especially during exchanges.[18]

References

1. Loghman-Adham M. *Pasteurella multocida* peritonitis in patients undergoing peritoneal dialysis. *Pediatr Nephrol* 1997;11:353–4.
2. Mat O, Moenens F, Beauwens R, Rossi C, Muniz-Martinez MC, Mestrez F, et al. Indolent *Pasteurella multocida* peritonitis in a CCPD patient. 25 years of "cat-bite peritonitis": a review. *Perit Dial Int* 2005;25:88–90.
3. Van Langenhove G, Daelemans R, Zachee P, Lins RL. *Pasteurella multocida* as a rare cause of peritonitis in peritoneal dialysis. *Nephron* 2000;85:283–4.
4. Paul RV, Rostand SG. Cat-bite peritonitis: *Pasteurella multocida* peritonitis following feline contamination of peritoneal dialysis tubing. *Am J Kidney Dis* 1987;10:318–9.
5. Elsey RM, Carson RW, DuBose TD, Jr. *Pasteurella multocida* peritonitis in an HIV-positive patient on continuous cycling peritoneal dialysis. *Am J Nephrol* 1991;11:61–3.
6. Frankel AH, Cassidy MJ. *Pasteurella multocida* peritonitis in CAPD: beware of the cats. *Perit Dial Int* 1991;11:184–5.
7. London RD, Bottone EJ. *Pasteurella multocida*: zoonotic cause of peritonitis in a patient undergoing peritoneal dialysis. *Am J Med* 1991;91:202–4.
8. Kitching AR, Macdonald A, Hatfield PJ. *Pasteurella multocida* infection in continuous ambulatory peritoneal dialysis. *N Z Med J* 1996;109:59.
9. Uribarri J, Bottone EJ, London RD. *Pasteurella multocida* peritonitis: are peritoneal dialysis patients on cyclers at increased risk? *Perit Dial Int* 1996;16:648–9.
10. MacKay K, Brown L, Hudson F. *Pasteurella multocida* peritonitis in peritoneal dialysis patients: beware of the cat. *Perit Dial Int* 1997;17:608–10.
11. Joh J, Padmanabhan R, Bastani B. *Pasteurella multocida* peritonitis following cat bite of peritoneal dialysis tubing. With a brief review of the literature. *Am J Nephrol* 1998;18:258–9.
12. Musio F, Tiu A. *Pasteurella multocida* peritonitis in peritoneal dialysis. *Clin Nephrol* 1998;49:258–61.
13. Kanaan N, Gavage P, Janssens M, Avesani V, Gigi J, Goffin E. *Pasteurella multocida* in peritoneal dialysis: a rare cause of peritonitis associated with exposure to domestic cats. *Acta Clin Belg* 2002;57:254–6.
14. Sillery J, Hargreaves J, Marin P, Lerma E, Kuznia C, Abbe C. *Pasteurella multocida* peritonitis: another risk of animal-assisted therapy. *Infect Control Hosp Epidemiol* 2004;25:5–6.
15. Cooke FJ, Kodjo A, Clutterbuck EJ, Bamford KB. A case of *Pasteurella multocida* peritoneal dialysis-associated peritonitis and review of the literature. Int *J Infect Dis* 2004;8:171–4.
16. Malik A, Al Aly Z, Mailey KS, Bastani B. *Pasteurella multocida* peritoneal dialysis-associated peritonitis: a report of two cases and review of the literature. *J Nephrol* 2005;18:791–3.
17. Antony SJ, Oglesby KA. Peritonitis associated with *Pasteurella multocida* in peritoneal dialysis patients—case report and review of the literature. *Clin Nephrol* 2007;68:52–6.
18. Makin AJ, Cartwright KA, Banks RA. Keeping the cat out of the bag: a hazard in continuous ambulatory peritoneal dialysis. *BMJ* 1991;303:1610–1.