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# A Case Report of *Pasteurella multocida* Peritoneal Dialysis-Related Peritonitis: Your Pet Cat May Be a Source of Disease!

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## ABSTRACT

**Background:** *Pasteurella multocida* is a gram-negative coccobacillus commonly found in the oropharyngeal flora of various animals, including domestic pets such as cats and dogs. Transmission of *Pasteurella* to humans usually occurs through close contact and can cause soft tissue infections, pneumonia, peritonitis, and meningitis.

**Case Report:** We present a case of peritonitis in a 52-year-old male patient who had been undergoing home peritoneal dialysis for four years due to chronic renal failure. Peritoneal fluid culture identified the causative agent as *P. multocida* using matrix-assisted laser desorption/ionization time-of-flight mass spectrometry (MALDI-TOF MS). Upon analyzing the patient's medical history, it was determined that the patient had a pet cat. It was hypothesized that close contact with the cat and contamination of dialysis equipment were the likely sources of transmission.

**Conclusion:** Educating patients at risk about the dangers of pet contact is crucial for preventing *P. multocida*-related peritonitis.

**Keywords:** *Pasteurella multocida*, peritoneal dialysis, pet, peritonitis.

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## INTRODUCTION

*Pasteurella* species are gram-negative, catalase-positive, oxidase-positive, indole-positive, facultative anaerobic coccobacilli.[1] They were first described in diseased birds in 1878.[2] Today, it is known that *Pasteurella* species colonize 70–90% of cats and 20–50% of dogs.[3] These bacteria can cause various infections in humans following close contact with these animals and are commonly associated with skin or soft tissue infections, particularly after animal bites.[3–5] *Pasteurella* species can also cause severe infections such as pneumonia, sepsis, endocarditis, peritonitis, and meningitis, especially in immunocompromised individuals with conditions such as malignancy, cirrhosis, or kidney failure.[6] Among the species, *P. multocida* is the most frequently isolated in human infections.[1,5] The first reported case of peritonitis caused by *Pasteurella* species linked to pet contact was described in 1987 by Paul and Rostand.[7] Currently, individuals undergoing chronic treatments, such as home-based peritoneal dialysis, and those who own pets are considered at risk for infections associated with *Pasteurella* species.[8] This study aims to highlight the factors contributing to the development

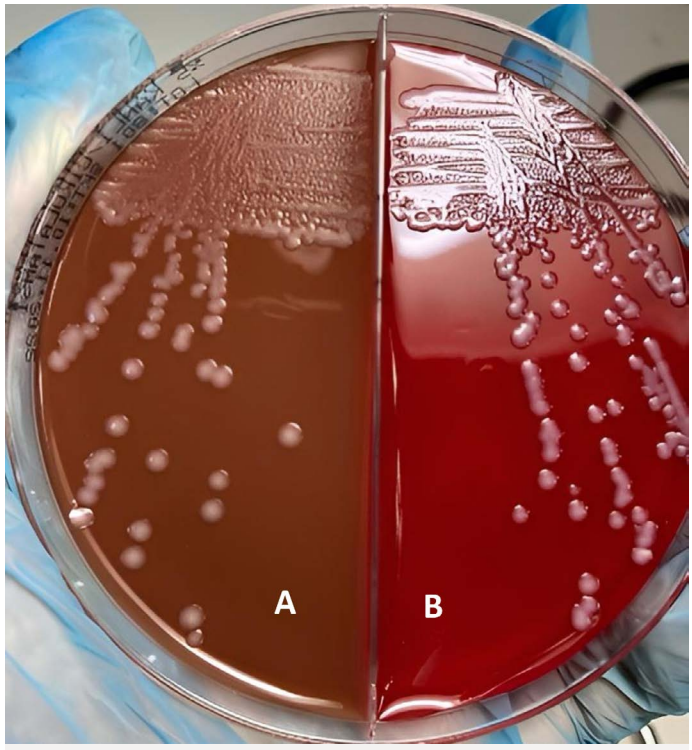


**Figure 1.** Growth of *Pasteurella multocida* on 5% sheep blood agar (KKA) and chocolate agar plates after 24 hours of incubation. **(A)** Chocolate agar, **(B)** 5% sheep blood agar.

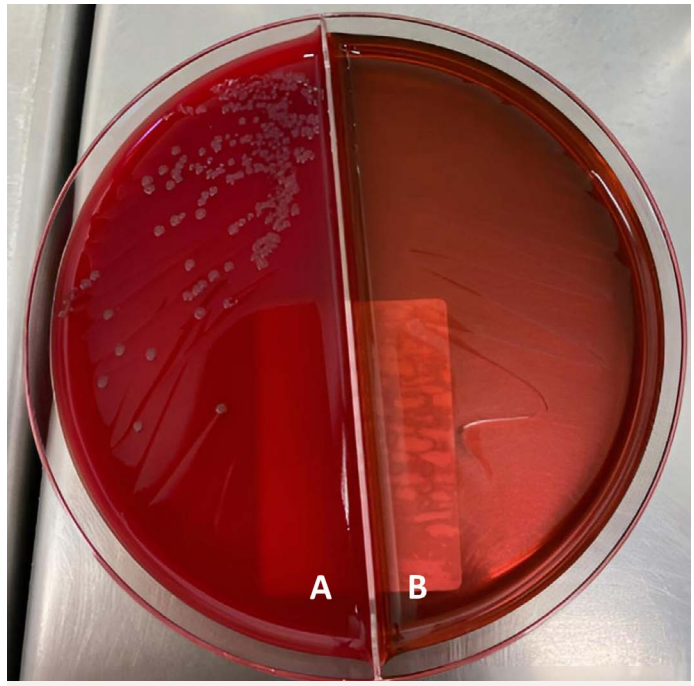


**Figure 2.** Growth of *Pasteurella multocida* on 5% sheep blood agar (KKA) and eosin methylene blue (EMB) agar plates after 24 hours of incubation. **(A)** 5% sheep blood agar, **(B)** Eosin methylene blue agar.

of *P. multocida* peritonitis in a patient undergoing peritoneal dialysis who lives with a pet. Additionally, it seeks to emphasize similar cases reported in the literature.

## CASE REPORT

A 52-year-old male patient undergoing home peritoneal dialysis for four years due to chronic kidney failure presented to the emergency department on July 23, 2022, with complaints of abdominal pain and fever (up to 38.5 °C) lasting one day. Upon physical examination at admission, the patient's general condition was moderate; he was conscious, oriented, and cooperative. Systemic examination revealed no abnormal findings except for abdominal tenderness. Turbidity was noted in the patient's dialysate fluid. The patient's laboratory findings were as follows: Hemoglobin (Hb): 9.7 g/dL, white blood cell count (WBC): 11.3x$10^3$ cell/$mm^3$, neutrophil ratio: 76%, lymphocyte ratio: 14.5%, neutrophil count: 8,600 cells/$mm^3$, C-reactive protein (CRP): 78 mg/L, creatinine: 8.48 mg/dL. The patient was admitted to the nephrology service with a diagnosis of peritonitis. Gram-stained microscopic examination of the peritoneal fluid sample obtained on the first day of hospitalization revealed polymorphonuclear leukocyte cells, but no bacteria were observed. The sample was inoculated onto 5% sheep blood agar, eosin methylene blue agar, and chocolate agar at 37 °C in 5% $CO_2$. After 24 hours of incubation, growth of a catalase-positive, oxidase-positive, and indole-positive gram-negative coccobacillus was observed on sheep blood and chocolate agar plates (Fig. 1, 2). The isolate was identified as *P. multocida* using matrix-assisted laser desorption/ionization time-of-flight mass spectrometry. Antibiotic susceptibility testing was performed using the disk diffusion method, according to the criteria of the European Committee for Antimicrobial Susceptibility Testing. The isolate was found to be susceptible to penicillin, ampicillin, amoxicillin, clavulanate, cefotaxime, ciprofloxacin, levofloxacin, tetracycline, and trimethoprim/sulfamethoxazole. Empirical treatment with ceftriaxone 1 gram intravenously and cefazolin 250 mg intraperitoneally, four times daily, was initiated on the first day of hospitalization. On the second day of treatment, Gram-stained examination of the peritoneal fluid sample revealed no neutrophil cells or bacteria, and no growth was observed in the cultures. The empirical treatment was continued without changes for two weeks. During the course of treatment, improvement was observed in the examination of peritoneal fluid samples, as well as in laboratory results for blood and biochemistry (Table 1). The patient was discharged in good health after completing 14 days of treatment.

**Table 1.** Peritoneal fluid examination, complete blood count, and biochemical results for patient follow-up

| | Peritoneal fluid sample examination | | | | Complete blood count | Biochemical laboratory findings |
|---|---|---|---|---|---|---|
| | Microscopic examination (gram stain) | Bacterial culture | Cell count: WBC | WBC | N% | CRP |
| DAY 1 | Numerous PMNL in all areas | *P. multocida* + | $5.9x10^3$ | $12.1x10^3$ | 78% | 122.2 |
| DAY 3 | No PMNL | No Growth | $0.1x10^3$ | Not tested | Not tested | Not tested |
| DAY 6 | Not tested | Not tested | Not tested | Not tested | Not tested | 49.5 |
| DAY 9 | Not tested | Not tested | Not tested | Not tested | Not tested | 32.7 |
| DAY 11 | Not tested | Not tested | Not tested | $8.5x10^3$ | 64% | 17.8 |
| DAY 13 | Not tested | Not tested | Not tested | Not tested | Not tested | 13.7 |

WBC: White blood cell count; N: Neutrophil; PMNL: Polymorphonuclear leukocytes; CRP: C-Reactive protein.

## DISCUSSION

In past years, infections caused by *P. multocida* were primarily observed in individuals engaged in animal husbandry or those frequently in contact with animals as a hobby. However, with the increasing trend of keeping pets at home, the incidence of *P. multocida*-related infections has risen significantly, especially in immunocompromised individuals.[7] Pets are integral members of many households and share close relationships with their owners. However, injuries such as bites or scratches during close contact with pets can serve as a potential source of various infections. In patients undergoing peritoneal dialysis at home, the most common cause of *P. multocida* peritonitis is close contact between cats or dogs and dialysis equipment, including tubes, bags, and other materials.[3,9] The sound emitted by dialysis devices during operation and the vibrations in the dialysate tube can make the equipment an appealing toy for cats.[3] Patients with pets who cannot maintain necessary hygiene while preparing their treatment are at the highest risk for developing *Pasteurella* peritonitis.[7]

Knowing the presence of pets at home from the patient's anamnesis is a valuable guide for physicians to suspect zoonotic infections.[6] However, spontaneous cases of *P. multocida* peritonitis have also been reported in the literature in patients with cirrhosis or ascites.[4] The literature indicates that symptoms of *P. multocida*-associated peritonitis typically begin one day before hospital admission. The most common symptoms include low-grade fever, severe abdominal pain, and turbidity in the dialysate fluid.[8,9] In most cases, an increase in polymorphonuclear leukocyte cells is observed in the dialysate fluid, but microorganisms are generally not detected via Gram staining.[8] Poliquin et al.[8] reported that gram-negative coccobacilli were detected in only 6 out of 33 peritoneal fluid samples from patients. Given the significance of this infection, especially in high-risk groups such as individuals undergoing dialysis, it is crucial to utilize reliable identification techniques in addition to traditional methods like microscopic examination with Gram staining. In our case, no microorganisms were observed in the Gram-stained examination of the peritoneal fluid. *P. multocida* is generally sensitive to penicillin, which is the first-line antibiotic for treatment.[6,10] Tetracyclines, cephalosporins, and quinolones are alternative therapeutic agents.[10] However, penicillin resistance may rarely occur in this microorganism due to β-lactamase production.[6] Therefore, antimicrobial susceptibility testing should be performed to guide both the effectiveness of empirical treatment and the continuation of therapy.[3,10]

In our case, the isolate was sensitive to penicillin, ampicillin, amoxicillin-clavulanate, cefotaxime, ciprofloxacin, levofloxacin, tetracycline, and trimethoprim/sulfamethoxazole. The treatment was continued for two weeks without any modifications to the empirical regimen. Although the precise duration of antibiotic treatment is not universally defined, literature suggests that a treatment period of two to three weeks is sufficient.[9] Symptoms generally resolve rapidly, and clinical improvement is observed within 48–96 hours of initiating antibiotic therapy.[7] Prompt initiation of appropriate antibiotic treatment following the diagnosis of peritonitis is crucial to reducing morbidity and mortality.[8]

## CONCLUSION

Preventing peritonitis caused by *P. multocida* requires educating at-risk patients about the risks of pet contact. Patients should be advised to prevent their pets from coming into contact with dialysis equipment. In cases of recurrent

infections or in individuals who do not adhere to these precautions, removing the pet from the household during peritoneal dialysis treatment should be considered. Physicians should be vigilant about *Pasteurella multocida* as a potential causative agent of infection in patients with pet contact who are also using devices such as peritoneal dialysis. Prompt and appropriate examinations should be performed without delay to ensure timely diagnosis and treatment.

**Informed Consent:** Written informed consent was obtained from patients who participated in this study.

**Author Contributions:** Concept – KA, ZLY; Design – AKA, ZIY; Supervision – İSA, KT; Resource – İSA, KT; Materials – AKA, KT; Data Collection and/or Processing – AKA; Analysis and/or Interpretation – KA, ZLY; Literature Search – İSA, KT; Writing – AKA; Critical Reviews – AKA.

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