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CASE REPORT

Peritoneal dialysis-associated peritonitis of zoonotic origin, when minor gets major

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ABSTRACT

A 62-year-old patient with peritoneal dialysis (PD)-associated peritonitis is described. Identical strains of *Pasteurella multocida* and *Streptococcus minor* were cultured from the dialysate, and from the saliva of her recently adopted stray cat. *Pasteurella* is not often encountered as pathogen in PD-associated peritonitis, *Streptococcus minor* has never been cultured in human infection before. We emphasise the importance of hygiene in peritoneal dialysis and the need for testing pets when zoonotic pathogens are cultured.

KEYWORDS

Continuous ambulant peritoneal dialysis, pasteurella, PD peritonitis, *Streptococcus minor*, zoonotic infection

What was known on this topic?
PD peritonitis is a potentially dangerous complication of peritoneal dialysis and hygiene is of crucial importance. Skin bacteria such as staphylococci are most frequently encountered in PD-peritonitis cultures.

What does this case add?
PD peritonitis with *Pasteurella multocida* is rare, as is confirmation of the bacterial strain deriving from a pet. *Streptococcus minor* has never before been cultured in human bodily fluid/material. Amplified fragment length polymorphism is a highly reliable technique in the confirmation of bacterial strains. To identify the cause of disease, the domestic situation should carefully be analysed.

CASE REPORT

A 62-year-old female patient treated with continuous ambulatory peritoneal dialysis (PD) for 37 months presented with mild abdominal discomfort and cloudy effluent. Her medical history consisted of hypertensive nephropathy and two exit-site infections (with *Candida* and *Difteroides* species cultured, respectively) as well as an episode of PD-associated peritonitis with *Streptococcus mitis* cultured in peritoneal effluent. At that time, the patient was reinstructed on maintaining good hygiene. The patient had been using mupirocine cream around the exit site daily ever since.

Physical examination on admission showed a slightly tender abdomen on palpation; there were no signs of tunnel or exit-site infection or damage to the catheter. Vital signs including temperature were normal.

According to the local protocol (based on the national guidelines (SWAB) and the relatively few cases of Gram-negative peritonitis encountered in our population), cefalexin 500 mg three times daily, orally, and cefalotin 250 mg four times daily, intraperitoneally in each bag, were started immediately. The patient refused to be admitted and recovered initially at home, but two days later she deteriorated and was admitted to the hospital where laboratory findings revealed a leukocyte count of 11.2 x 10^9/l (4-10 x 10^9/l) of which 8.15 x 10^9/l granulocytes (1.5-7.5 x 10^9/l) and C-reactive protein of 317 mg/l (< 10 mg/l). Analysis of the effluent showed a white blood cell count of 5.37 x 10^9/l (< 0.10 x 10^9/l), of which 4.67 x 10^9/l granulocytes. Effluent cultures showed

the presence of *Pasteurella multocida* and a *Streptococcus* species. After sequence analysis of the 16S rRNA gene the definitive determination was *Streptococcus minor*.[1] Both bacteria were pan-sensitive to regularly used antibiotics.

Since the patient was allergic to penicillin (she had developed a mild rash in the past) she started on ciproxin upon admission to ensure coverage of Gram-negative bacteria. Soon she developed tendon pain so she was switched to cotrimoxazole intravenously 960 mg twice daily for 14 days, according to the antibiogram of cultured microorganisms. Intraperitoneal cefalotin was continued (for 14 days in total). The abdominal tenderness and cloudy peritoneal effluent soon cleared. After 25 days the white blood cell count in the effluent was < 0.1 x 10^9/l.

Because a zoonotic origin was suspected, saliva of the patient's two cats and dog was cultured. No pathogens were cultured in the dog, but one of her cats carried *P. multocida* and the stray cat she had recently adopted carried both pathogens. The bacteria found in the stray cat were identical to the ones cultured from our patient, as confirmed by amplified fragment length polymorphism (AFLP) (*figure 1*).[2]

DISCUSSION

The most common and potentially fatal complication of PD is peritonitis, with 0.24-1.66 episodes/patient-year. In most cases of PD-peritonitis bacteria originating from the skin track through and along the catheter. Infections with Gram-positive cocci such as *Staphylococcus epidermidis* and *S. aureus* are most frequently observed.[3] Transvisceral migration of intestinal bacteria due to intra-abdominal pathology is another pathophysiological mechanism.[4]

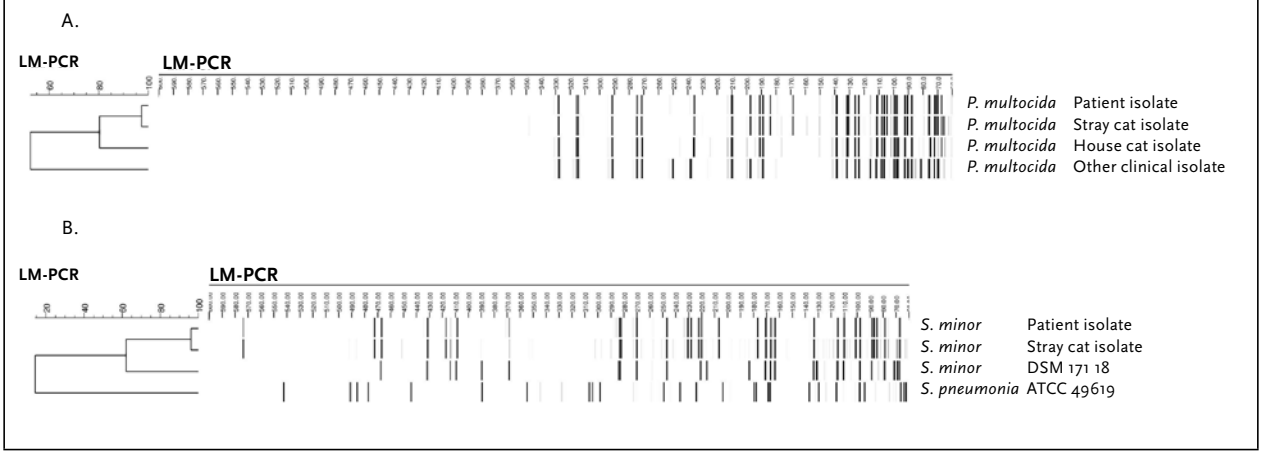
Streptococcus minor is a small, Gram-positive bacterium present in the throat and intestinal tract of cats and dogs, but has never before been shown in human disease.

This microorganism is typically susceptible to penicillin, as are all streptococci.[5] *Pasteurella multocida* is an aerobic, Gram-negative, coccoid rod named after Louis Pasteur, who first described the organism in 1880.[6] It is found in the oral cavity of many mammals, including cats (70-90%) and dogs (66%).[7] In humans, it generally causes cellulitis at the infection site. In more severe cases pneumonia, meningitis and osteomyelitis can develop.

Pasteurella is an uncommon cause of peritonitis in patients on peritoneal dialysis. We found only 23 cases to date in literature. In all but one case, close contact with pet cats was present and in most of the cases cats were in contact with the equipment or even damaged the bags or tubing by scratches or bites. Only one author confirms the strain of *P. multocida* found in the pet cat and peritoneal effluent to be identical. This was done by pulse field gel electrophoresis (PFGE).[8] In our case, we confirmed the strains to be identical by AFLP. AFLP is a DNA fingerprinting technique that has shown to be valuable in studying the molecular relationship of bacterial strains.[2] This technique is easy to use, relatively cheap and more reliable than PFGE.[9]

Usually beta-lactams can resolve infections with *Pasteurella*.[10] In this case, the explanation for the initial ambulant recovery could be the effective treatment of

Figure 1. *AFLP analysis of strains A) P. multocida strains isolated from the patient, the stray cat, the house cat and an independent clinical isolate. Strains clustering with a similarity of above 90% were identified as identical isolates. B) S. minor strains isolated from the patient and the stray cat plus control S. minor and S. pneumoniae strains. Strains clustering with a similarity of above 90% were identified as identical isolates. Strains clustering with a similarity below 35% were of different species.*



Streptococcus minor with first-generation cephalosporins, but since *Pasteurella* can be relatively insensitive it could have been left untreated causing the deterioration.[11] Since no damage to the catheter or fluid leakage was noted, the way of transmission was not definitively clarified, but hygiene measures may have been flawed in this patient.

CONCLUSION

We describe a patient with PD peritonitis with zoonotic bacteria that originated from an adopted stray cat, as confirmed by AFLP. This is the first observation of *Streptococcus minor* in human infection. This case again illustrates the importance of hygiene in peritoneal dialysis. When uncommon micro-organisms are cultured in PD peritonitis, their origin should be investigated thoroughly. When typical zoonotic pathogens are encountered, the pets should be considered as the source.

DISCLOSURES

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