Case Report

A Report of Peritonitis from *Aeromonas sobria* in a Peritoneal Dialysis (PD) Patient with Necrotizing Fasciitis

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A70-years of age, male patient with underlying type 2 diabetes mellitus, hypertension, dyslipidemia and ischemic heart disease had undergone continuous ambulatory peritoneal dialysis (CAPD) for 3 years without any episodes of peritonitis. He was diagnosed with necrotizing fasciitis and later developed peritonitis after receiving a laceration from an aquatic injury suffered during the flood disaster of 2011. The blood culture, necrotic tissue and the clear dialysate collected upon admission had shown Aeromonas sobria. The route of peritonitis may be from the hematogenous spread of A. sobria resulting in necrotizing fasciitis. A. sobria should be considered as the pathogen of peritonitis in PD patients who have history of wounds from contaminated water. We suggest that the PD patients who present with septicemia and did not meet the criteria for peritonitis, the initial dialysate effluent should be sent for culture. The benefit of this is to allow early recognition and treatment of peritonitis.

Keywords: *Peritonitis, Peritoneal dialysis, Aeromonas, Necrotizing fasciitis*

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Aeromonas species are ubiquitous, waterborne gram-negative bacilli that proliferate in aquatic environments. These are seen in soil, tap water, non-fecal organic material, sewage and fresh or brackish water[1]. The infectious risks are particularly higher in patients with hepatic disease, diabetes mellitus, and patients who are immunocompromised[1,2]. Peritonitis resulting from these organisms in peritoneal dialysis (PD) patients is rare. We are reporting a case of PD-related peritonitis from *A. sobria* which was shown in clear dialysate.

Case Report

A male patient, 70-year of age, with type 2 diabetes mellitus, hypertension, dyslipidemia and ischemic heart disease for 10 years. He developed end stage renal disease (ESRD) from diabetic nephropathy and had performed CAPD for 3 years without experiencing any episodes of peritonitis. He was admitted to the hospital in November, 2011 due to fever, pain and swelling in the left leg lasting one day. Three days prior to this admission, he had a laceration from an aquatic injury acquired during the flooding in the area of his home. He did not have history of diarrhea or liver disease. Physical examination had revealed a fever of 38.5°C with tenderness and swelling in his left leg (Fig. 1). He was diagnosed with necrotizing fasciitis. Intravenous meropenem was started as an empirical treatment with prompt debridement. The initial examination of dialysate revealed a leukocyte count of 2 cells/μL. However, it had turned slightly turbid with an increasing number of leukocytes of 273 cells/μL with 80% of neutrophils at the second day of admission. The blood culture, necrotic tissue from the left leg and dialysate culture obtained upon admission revealed the pathogen *A. sobria*. Although the white blood cell count from the initial dialysate did not meet the criteria

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Fig. 1 The left leg with swelling and discoloration compatible with necrotizing fasciitis.

for peritonitis, we found a positive culture for *A. sobria* which was susceptible to ceftriaxone, ceftazidime, meropenem, gentamicin, ciprofloxacin, and cotrimoxazole. The *A. sobria* found in the blood, necrotic tissue and the initial dialysate were of the same strain. We replaced meropenem with intravenous ciprofloxacin. The dialysate cleared on the fourth day of admission with the negative culture in the subsequent dialysate. Unfortunately, the patient suffered a heart attack and developed a hospital acquired pneumonia from the multidrug-resistant strain of *Acinetobacter baumannii*. He expired from uncontrolled sepsis and heart disease within the next 14 days.

Discussion

The gram negative bacilli, *Aeromonas spp*. are distributed globally, especially in developing countries and thrive predominately in fresh sewage, soil, and water[1]. Among these organisms, *A. hydrophila*, *A. sobria*, and *A. caviae* are the common species. *Aeromonas spp.* adhere to and invades host cells by the production of adhesins, pili and flagella. Aeromonas peritonitis usually occurs in cirrhotic patients with spontaneous bacterial peritonitis[3-5]. The main pathogen normally detected is *A. hydrophila* while a few of cases arise from *A. caviae.* The PD patients may be susceptible to peritonitis from these organisms as the peritoneal dialysate appears to be a good environment for *Aeromonas spp.* to thrive. However, few dialysis-related *Aeromonas* peritonitis cases have been reported. Most of them were from *A. hydrophila* while there were a few reports regarding *A. sobria*[3,5-9].

A. sobria is recognized as a gastrointestinal pathogen. The gastroenteritis, bacteremia and soft-tissue infections, which usually occur in traumatic wounds are the common infections resulting from this organism[2,10,11]. Regarding wound infections in traumatic cases, it usually occurs after contact with surface water or soil. Invasive infections at other sites (bacteremia and peritonitis) occur mainly in immunocompromised hosts. Particularly, this is seen with liver cirrhosis, renal disease, leukemic patients, malignancies or immunosuppressive patients[10,12].

For CAPD patients, normal host defense mechanisms in the peritoneal cavity were impaired, particularly the phagocytic and bacterial killing abilities. Therefore, these patients are predisposed to peritoneal infections. The potential routes of peritonitis are as follows: First; the intraluminal route in which the organisms pass through the peritoneal cavity via the catheter lumen due to contamination during the exchange procedure. Second; the periluminal route in which the organisms migrate from the skin to the peritoneal cavity via the catheter tract. Third; the transmural route where the organisms enter the peritoneal cavity by migrating through the intestinal wall. Fourth; the hematogenous route where the organisms spread from a primary site to the peritoneal cavity via the blood circulation. Last; possibly by the transvaginal route in females[13].

The incubation period of *Aeromonas* infections typically last anywhere from 8 to 48 hours. This information is supported by studies that have been done on wound infections[14]. In our case, we have proposed that the source of *A. sobria* peritonitis may have developed from the hematogenous route. We found that *A. sobria* was identified in the culture of the initial, clear dialysate effluent containing only a few white blood cells. *Aeromonas spp.* can produce outer membrane proteins and siderophores which make it rapidly multiplying in the host tissue. It produces lipopolysaccharide, porins and an S-layer capsule that protect it from host defense mechanisms[2]. Thus, we have proposed that the primary site of infection was found to be the contaminated wound suffered during the flooding that resulted in necrotizing fasciitis and then spread to the blood. We have concluded this as the incubation period was relatively short. It possibly theorizes that this organism seeded the peritoneum following an inflammatory response which progressed to clouding of the dialysate effluent. The pathogenesis of PD-related peritonitis from *A. sobria* in our case was less likely to be a result of the intraluminal, periluminal or transmural route. We have suggested that the PD patient who presents with septicemia and does not meet the criteria for peritonitis, the initial dialysate effluent should be sent for culture even when clear. The benefit of this is to allow early recognition and treatment of the peritonitis.

Conclusion

A. sobria should be considered as the pathogen of peritonitis in PD patients who have history of wounds exposed to contaminated water. Prompt treatment with susceptible antibiotics and the aggressive removal of the source of infection are crucial in the management of these patients. We recommend that more patients with septicemia should have dialysate culture performed even though the initial dialysate effluent is clear. We recommend future studies to confirm our postulations.

Ethical approval

This case has been reported by the ethical standards, approved by the institutional research committee and in compliance with the 1964 Helsinki declaration and its later amendments or comparable ethical standards. For this type of study, formal consent is not required.

What is already known on this topic ?

The patients who are treated with peritoneal dialysis are predisposed to peritonitis from the impairment of normal host defense mechanisms. Peritonitis can occur by one or more of these following routes; intraluminal, periluminal, transmural, hematogenous, and transvaginal routes.

What this study adds?

This study has shown new information which postulates that PD patients with septicemia and clear peritoneal fluid, which do not meet criteria for peritonitis, can develop peritonitis from the hematogenous route. The clear PD fluid should be sent for culture because this allows early recognition, early treatment and to avoid a negative culture from antibiotic contamination which have had to be prescribed to the patient.

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Potential conflicts of interest

None.

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รายงานภาวะติดเชื้อเยื่อบุช่องท้องจากเชื้อ Aeromonas sobria ในผู้ป่วยล้างไตทางช่องท้องที่มีการติดเชื้อ necrotizing fasciitis

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ผู้ป่วยชายอายุ 70 ปี มีโรคประจำตัวคือ เบาหวาน ความดันโลหิตสูง ไขมันในเลือดสูง โรคหัวใจขาดเลือด ได้รับการบำบัดทดแทนไตด้วยวิธีการล้างไตทางช่องท้องนาน 3 ปีและไม่เคยมีภาวะติดเชื้อเยื่อบุช่องท้อง ผู้ป่วยมีภาวะติดเชื้อชนิด necrotizing fasciitis จากการย่ำน้ำถูกของมีคมบาดและเกิดแผลในช่วงน้ำท่วมปี พ.ศ. 2554 การตรวจน้ำยาล้างไตทางช่องท้องของผู้ป่วยแรกรับมีลักษณะใส ตรวจพบเม็ดเลือดขาวน้อยไม่เข้าเกณฑ์ในการวินิจฉัยภาวะติดเชื้อเยื่อบุช่องท้อง ผลเพาะเชื้อจากเลือด เนื้อเยื่อที่มีการติดเชื้อ และน้ำยาล้างไตทางช่องท้องพบเชื้อ Aeromonas sobria ที่มีความไวต่อยาปฏิชีวนะรูปแบบเดียวกัน ภาวะติดเชื้อเยื่อบุช่องท้องในผู้ป่วยรายนี้น่าจะเกิดจากภาวะติดเชื้อ A. sobria ในกระแสโลหิตซึ่งแพร่กระจายมาจากตำแหน่งที่เกิด necrotizing fasciitis ผู้ป่วยที่มีประวัติการมีบาดแผลและสัมผัสน้ำสกปรกอาจมีการติดเชื้อ A. sobria ดังนั้นผู้ป่วยล้างไตทางช่องท้องที่มีอาการติดเชื้อในกระแสโลหิต และตรวจน้ำยาล้างไตทางช่องท้องไม่พบภาวะติดเชื้อเยื่อบุช่องท้อง แนะนำให้ส่งน้ำยาล้างไตทางช่องท้องไปเพาะเชื้อเพื่อให้การวินิจฉัยและรักษาภาวะติดเชื้อเยื่อบุช่องท้องได้รวดเร็วยิ่งขึ้น