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Case Report

Peritonitis due to *Moraxella osloensis*: A case report and literature review

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ABSTRACT

A-26-year-old man was admitted to our hospital with diffuse abdominal pain, nausea, and vomiting. He had a history of malignant nephrosclerosis, for which he had been receiving peritoneal dialysis (PD) for the past 14 months. His PD effluent was cloudy and turbid (white blood cell count, 10,528/μL; neutrophils 95.2%). A Gram-negative coccobacillus was isolated from peritoneal fluid culture. However, the organism could not be identified by matrix-assisted laser desorption/ionization-time of flight mass spectrometry (MALDI-TOF MS) (Vitek MS, bioMérieux), but was identified as *Moraxella osloensis* by the 16S rRNA gene sequencing. He was successfully treated with intraperitoneal cefazolin therapy for 3 weeks without removing the intra-abdominal catheter. A literature review revealed three previous case reports all of which were diagnosed by MALDI Biotyper (Bruker Daltonics), suggesting that the identification of *M. osloensis* may vary depending on the type of MALDI-TOF MS system. In conclusion, we experienced a case of *M. osloensis* infection in a PD patient, which was successfully treated by antibiotic treatment, without removing the PD catheter.

1. Introduction

Peritonitis is a common complication in patients undergoing peritoneal dialysis (PD). The causative organisms are Gram-positive bacteria, Gram-negative bacteria, and multiple microorganisms in over 50%, 15–20%, and approximately 4% of cases, respectively [1]. *Moraxella osloensis* is an aerobic Gram-negative bacterium; it is saprophytic on the skin and mucosa in humans. This organism has been found in hospital environments and rarely causes infections in humans. This organism is also considered a member of the normal flora of the human respiratory tract [2] and has been reported to be a rare pathogen in immunocompromised individuals.

Here, we report a case of peritonitis due to *M. osloensis* in a patient undergoing peritoneal dialysis; we also present a review of the literature.

2. Case report

A 26-year-old male PD patient was admitted to our hospital with diffuse abdominal pain, nausea, vomiting, and cloudy PD effluent for 2 days. He had been undergoing PD due to malignant nephrosclerosis for 14 months. Physical examination showed a body temperature of 37.9 °C, blood pressure of 130/68 mmHg, heart rate of 64 beats per minute, and oxygen saturation of 99% without supplemental oxygen. He also had diffuse abdominal rebound tenderness, but no findings of infection were observed at the catheter exit site or tunnel. Blood examination revealed that the white blood cell count was 10,500/μL with 84.7% neutrophils, creatinine level was 3.34 mg/dL, and blood urea nitrogen (BUN) was 28 mg/dL; the C-reactive protein level was 3.38 mg/dL. His PD effluent was cloudy and turbid, with a white blood cell count of 10,528/μL with 95.2% neutrophils. The patient was provisionally diagnosed with PD-related peritonitis and administered empirical antibiotic treatment with intraperitoneal ceftazidime 1 g and cefazolin 1 g daily for covering both Gram-positive and Gram-negative organisms. The blood cultures were negative, but the

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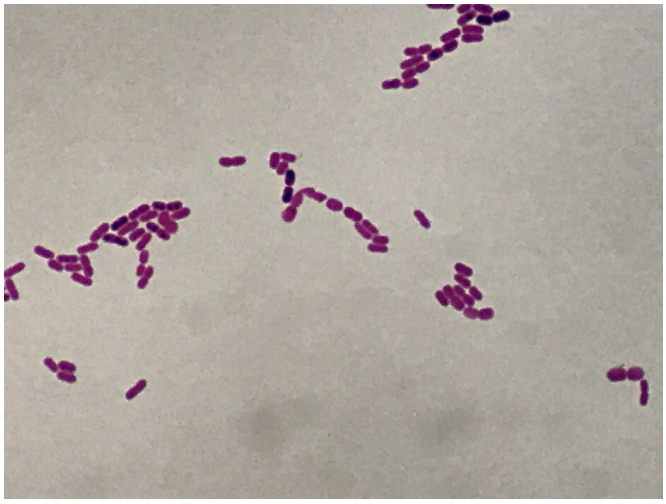

Fig. 1. Gram stain of the colonies showing Gram-negative polymorphic bacilli (x 1000).

Table 1
Drug susceptibility profile of *Moraxella osloensis*.

Antimicrobial agent	MIC (μg/mL)
ampicillin	≤0.12
cefaclor	≤0.5
cefotiam	0.25
ceftriaxone	≤0.06
cefepime	≤0.06
imipenem	≤0.06
clarithromycin	2
clindamycin	≥1
levofloxacin	≤1
minocycline	≤0.12

culture from the continuous ambulatory peritoneal dialysis (CAPD) fluid was positive after 55 hours at 37 °C showing tiny transparent whitish colonies on 5% sheep blood agar (Kyokuto Pharmaceutical, Tokyo, Japan). Gram staining of the colonies showed polymorphic Gram-negative coccobacilli (Fig. 1). The isolate was evaluated using matrix-assisted laser desorption/ionization-time of flight mass spectrometry (MALDI-TOF MS) using the Vitek MS ver. 4.0 (bioMérieux, Tokyo, Japan), which demonstrated 50% *Enhydrobacter aerosaccus* and 50% *M. osloensis*. After administration of intraperitoneal ceftazidime and cefazolin, the turbidity in the peritoneal fluid gradually cleared and his fever and abdominal symptoms were diminished in 2 days. Drug susceptibility testing was subsequently performed by the broth microdilution method using Dry Plates Eiken (Eiken, Tokyo, Japan) (Table 1). Therapy was continued for 3 weeks with only intraperitoneal cefazolin in accordance with the drug susceptibility test results, and he was subsequently discharged.

To identify the isolate from the patient's peritoneal fluid, we performed 16S ribosomal RNA (16S rRNA) gene sequencing using a universal primer pair: 27F (5′-AGAGTTTGATCC TGGCTCAG-3′) and 1492R (5′-GGTTACCTTGTTACGACTT-3′). The isolate was 99.35% identical (1366/1375 bp) to *E. aerosaccus* LMG21877T (accession: AJ550856) and 99.06% identical (1364/1377 bp) to *M. osloensis* CCUG350T (accession: CP014234) in the EzBioCloud 16S database (http://www.ezbiocloud.net/eztaxon). After conducting a dendrogram analysis by the neighbor joining method, the highest homogeneous strain was *E. aerosaccus* LMG21877T. However, Kawamura et al. concluded that LMG21877T was not a strain of *E. aerosaccus* by phylogenetic and chemotaxonomic tests [3]; the sequence result of our isolate was considerably different from those of other strains of *E. aerosaccus* PAGU 1623T or 1624T. Furthermore, our isolate was easily cultured on 5% sheep blood agar, which is not usually conducive to *Enhydrobacter* cultures. We therefore concluded that the isolate was *M. osloensis*.

3. Discussion

PD-related peritonitis is a major infection in patients undergoing PD. The International Society for Peritoneal Dialysis guidelines recommend that empirical antibiotic regimens covering both Gram-positive and Gram-negative organisms should be initiated as soon as possible [4]. They recommend that Gram-positive organisms and Gram-negative organisms be covered by intraperitoneal vancomycin or a first-generation cephalosporin and by a third-generation cephalosporin or aminoglycoside, respectively. They also recommend removal of PD catheters if clinical improvement is not noted by 5 days with appropriate antibiotics.

M. osloensis is an aerobic Gram-negative bacterium that is saprophytic on the skin and mucosa of humans. This organism is also considered a member of the normal flora of the human respiratory tract [2] and has been reported to be a rare pathogen in immunocompromised individuals. Infections attributed to this organism include endocarditis, osteomyelitis, septic arthritis, vaginitis, bacteremia, and meningitis [5]. Gagnard et al. reported an increase in infections due to *M. osloensis* in their hospital and speculated that this increase was owing to the widespread use of new identification techniques such as MALDI-TOF MS [6]. Following their report, three cases were diagnosed by MALDI-TOF, all by the Bruker Biotyper [7–9]. However, in our case, the organism could not be identified by Vitek TOF-MS. Thus, the results of mass spectrometry are dependent on the quantity and accuracy of the database.

There have been only three previous case reports of peritonitis due to *M. osloensis* [7,10,11] (Table 2). All of the cases were identified as *M. osloensis* by MALDI Biotyper (Bruker Daltonics), suggesting that the identification of *M. osloensis* may vary according to the types and database of MALDI-TOF MS system. The appropriate treatment for infection with *M. osloensis* has not been clearly defined. Most isolates reported in the literature were susceptible to penicillin, cephalosporins, and aminoglycosides. However, penicillin-resistant strains of *M. osloensis* have also been described [5]. In a case series by Han

Table 2
Moraxella osloensis peritonitis in patients on peritoneal dialysis.

References	Age/Sex	Comorbidity	Other bacteria cultured	Catheter removal	Antibiotic therapy	Outcome
[7]	83/M	Unknown	None	no	Cefazolin, ceftazidime plus linezolid, and then ceftazidime and amoxicillin	cured
[10]	47/M	Membranous nephropathy	*Rhizobium radiobacter*	yes	Intraperitoneal cefazolin, ceftazidime, ciprofloxacin, and then meropenem	cured
[11]	68/M	End-stage renal disease, diabetes, anemia	None	no	Intraperitoneal ceftazidime	cured
Present case	26/M	Malignant nephrosclerosis	None	no	Intraperitoneal ceftazidime and cefazoline, and then only cefazoline	cured

et al., all patients with blood or catheter infections from *M. osloensis* were treated with antibiotic therapy without catheter removal [12]. In our case, the infection caused by *M. osloensis* was also successfully controlled without the removal of the PD catheter.

In conclusion, we report a rare case of peritonitis caused by *M. osloensis*. The identification of *M. osloensis* may vary depending on the types and the database of MALDI-TOF MS system. As demonstrated by literature review and our case, PD catheter infections due to *M. osloensis* may be treated by antibiotics alone without removing the PD catheter.

Authorship statement

All authors have made substantial contributions to the conception and design of the study, or acquisition of data, or analysis and interpretation of data; drafting the article or revising it critically for important intellectual content; and have given final approval for submission of the final version. All authors meet the ICMJE authorship criteria.

Declaration of interest

None.

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