Successful resolution of recurrent peritoneal dialysis-related peritonitis by listeria monocytogenes: a case presentation

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Abstract

Peritoneal dialysis-associated peritonitis caused by Listeria monocytogenes (LM) is a rare occurrence among peritoneal dialysis patients. It can be induced by an contaminated diet and lacks characteristic clinical manifestations. We present a case of recurrent peritonitis caused by LM. The patient an aged male, had a history of four years of peritoneal dialysis with diabetic kidney disease, high blood pressure, heart failure, chronic hepatitis B, and syphilis. The patient ingested food contaminated with monocyte listeria and had repeated symptoms of peritoneal cloudy, diarrhoea, abdominal pain, chills and fever. The efficacy of Cefazolin sodium combined with Ceftazidime is poor. Finally, its successful treatment included a combination of Vancomycin, Amikacin, and Piperacillin Tazobactam.

Keywords: Listeria monocytogenes; Peritoneal dialysis; Peritonitis; Recrudescence.

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Introduction

Listeria monocytogenes (LM) is a facultative anaerobic, spore-free, Gram-positive corynebacterium. It is a rare human pathogen that can cause meningitis, sepsis, or multiple organ failure in immunocompromised individuals. Recurrent peritoneal dialysis-related peritonitis caused by this bacterium is relatively rare. To enhance the understanding of this bacterium, a case of peritoneal dialysis-related peritonitis caused by repeated LM infection seen in this hospital is reported herein, along with a review of the relevant literature.

Case report

A 53-year-old Chinese male presented to the outpatient room of nephrology department, Shaoxing People's Hospital, Zhejiang, China, on October 4, 2021, with complaints of four years of peritoneal dialysis, abdominal pain, and diarrhoea for one day. He had a history of diabetic nephropathy, hypertension, heart failure, chronic hepatitis B, and syphilis. After consuming bamboo shoots from the refrigerator, the patient experienced abdominal pain, diarrhoea, chills, turbid peritoneal dialysis (PD) fluid, and a fever of 37.8 °C, without redness, swelling, or purulent secretion at the catheter outlet. The patient had tenderness throughout the abdomen, no rebound pain, and mild lower limb oedema.

The patient had a PD fluid nucleated cell count of $2{,}000\times10^6$/L ($<500\times10^6$/L), neutrophils (classification) of 0.95 (0.5-0.7), a leukocyte count of 10.92×10^9/L ($4\text{-}10\times10^9$/L), haemoglobin of 11.1 g/dL (11.5-15g/dL), whole-blood high-sensitivity C-reactive protein of 162.65 mg/L (0-6 mg/L), and serum albumin of 2.2 g/dL (4-5.5 g/dL). The significant increase in the number of nucleocytes and the large increase in neutrophils indicate that the patient was very likely to have acute bacterial peritonitis. According to the ISPD guidelines 2022[1], empirical antimicrobial therapy should be initiated as soon as possible after the collection of microbial specimens. Cefazolin sodium combined with Ceftazidime was administered into the PD fluid, along with 1.0g intravenous Cefoperazone Sulbactam twice daily. Oral Nystatin was used to prevent fungal infection. On the third day after admission, the patient still had abdominal pain and cloudy PD fluid. Considering the poor treatment effect, it was changed to 1.0g Vancomycin twice a week, combined with 0.2 g Amikacin in the PD fluid every night. The patient's abdominal pain disappeared after two days, and the nucleated cell count returned to the normal range. Gram staining after a 24-hour culture of PD fluid indicated the presence of Gram-positive bacteria (Figure 1). The PD fluid culture was processed using an automatic rapid microbial mass spectrometry detection system, revealing an infection with Listeria monocytogenes (there was no hint of drug sensitivity—LM has high nutritional requirements, so routine antibiotic sensitivity tests are not conducted for LM by

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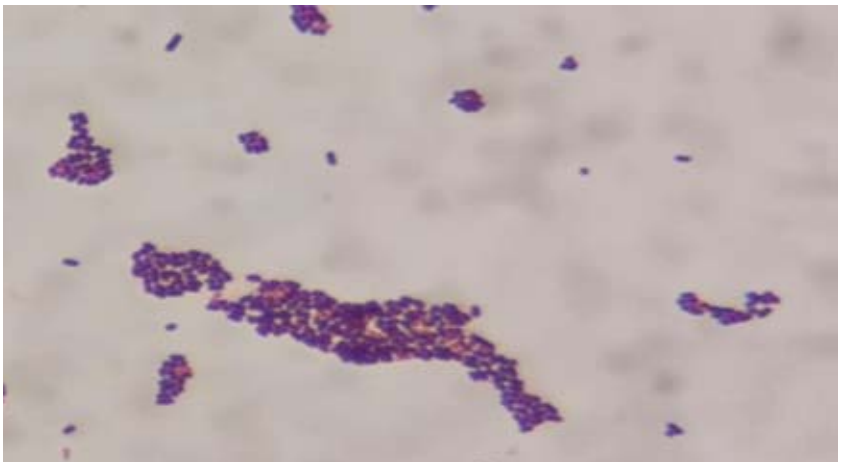

Figure-1: Gram positive Listeria monocytogenes in clusters.

default). After reviewing the literature, oral Penicillin was added. The routine examination of PD fluid was twice normal. He was discharged after three weeks of treatment.

Surprisingly, 10 days after discharge from the hospital, the patient developed symptoms similar to the first episode after consuming cold food again. Due to his previous LM infection and hospitalisation and because LM recurrence or any other bacterial infection could not be ruled out, Vancomycin combined with Amikacin was administered to him once again. Multiple antibiotic susceptibility tests were also performed. The cultivation of ascites still showed LM growth. The results of drug susceptibility test showed that the Listeria strain was Piperacillin Tazobactam sensitive. According to the drug sensitivity tests, he was treated with 2.5g Piperacillin Tazobactam twice a day (added to daytime PD fluid), 0.2g Amikacin (added to night-time PD fluid), combined with 6.4 million U Penicillin intravenously every 12 hours for four weeks and other supportive treatments. Additionally, the patient was instructed to thoroughly clean up the food in the refrigerator that might have been infected with LM. The peritonitis did not recur till six months of follow-up.

Discussion

Listeriosis is one of the most significant foodborne diseases, caused by LM. Contaminated food such as frozen meat can cause human listeriosis.[2] Among several bacterial food-borne disease outbreaks in history, LM has the highest mortality. In specific high-risk groups, LM can cause invasive infection, sepsis, meningitis, amnionitis, and peritonitis, resulting in a mortality rate of 30-46%.[2,3] Peritoneal dialysis-associated peritonitis caused by LM is rare among patients undergoing peritoneal dialysis. The clinical manifestations of LM in peritoneal dialysis-related peritonitis are not specific, and there is no increase in monocytes in the PD fluid. To date, only 20 cases have been reported worldwide, of which seven cases failed to be treated with Vancomycin and three cases ended in death.[4, 5]

The recurrence of peritonitis caused by LM is infrequent. It has been reported that LM is naturally resistant to Cephalosporins, and inappropriate use of antibiotics may lead to a poor prognosis.[6,7] Vancomycin is effective against Gram-positive bacteria, but its ability to penetrate eukaryotic cell membranes is limited, so it usually has a limited effect on Listeria. Aminoglycosides such as Amikacin have been reported to improve bacterial clearance. Although Vancomycin combined with Amikacin seems effective, such a short-term recurrence of peritonitis indicates that this regimen is not recommended. The only clinical resolution case ultimately combined it with the use of Amoxicillin.[3] Ampicillin is considered a first-line therapeutic drug. When other drugs are ineffective, Ampicillin can be used as salvage treatment. When other drugs are effective, Penicillin may still be used to obtain better therapeutic effects.[4] In patients allergic to Penicillin, it is preferred to use compound Culfamethoxazole.[8] Typically, the treatment course of LM is at least three to four weeks.[9] Additionally, the patient may have had an increased susceptibility to LM. Patients with recurrent LM infection, patients with previous chronic diseases such as hypertension, diabetes, diabetes nephropathy, and individuals with low immunity are more prone to infection. Similarly, patients on long-term peritoneal dialysis have increased risk of infection. In patients with abdominal dialysis, catheter flushing treatment can temporarily clean the catheter biofilm, but, on the other hand, it may also increase the chance of catheter infection. However, the current patient had poor self-management ability and a long history of consuming contaminated diet. After health education on diet, peritonitis did not recur for a long time. LM can survive for a long time in refrigerated raw or semi-raw food and can only be killed by high-temperature cooking. Therefore, when the patient was discharged from hospital, he was instructed in health education, and was persuaded to completely discard the food in the refrigerator, and to thoroughly disinfect the refrigerator. He was told that the refrigerator should be cleaned and disinfected regularly, and the cooked meat products stored in the refrigerator should be fully heated before eating.

Conclusion

LM-mediated peritonitis has no specific clinical manifestations. Clinicians should increase their awareness of the risk of LM infections. Peritoneal dialysis patients who are immunocompromised and have a history of consuming raw and cold diet, accompanied by diarrhoea, should be vigilant regarding the possibility of infection with this bacterium. Inappropriate antibiotic treatment and repeated contact with LM-contaminated food may lead to the recurrence of peritonitis. We emphasize that the role of Penicillin should be emphasized in the treatment of peritonitis caused by LM, and avoidance of exposure to raw and cold foods is necessary for the prevention and treatment of peritonitis caused by LM.

Consent: Consent for publication of the case report was obtained from the patient.

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Conflict of Interest: None.

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SW: Writing and final approval.
XW: Writing, revision and final approval.
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