CASE REPORT

Listeria monocytogenes meningitis preceded by acute cholangitisSarah Kyuragi Luthe,¹ Ryota Sato,² Tetsuro Maeda,³ Kuniko Takahashi¹¹Urasoe General Hospital, Urasoe, Japan²Department of Emergency and Critical Care, Urasoe General Hospital, Urasoe, Japan³Kobe City Medical Center General Hospital, Kobe, Japan

Correspondence to

Dr Ryota Sato, st051035@gmail.com

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SUMMARY

Listeria monocytogenes is a well-known cause of meningitis in immunocompromised patients. This organism has a growing significance for community-acquired meningitis, which should have ampicillin added to the usual regimen. We describe a case of *L. monocytogenes* meningitis preceded by cholangitis. This case suggests gastrointestinal symptoms preceding meningitis may be a clue of listeriosis. It is important for physicians to consider *L. monocytogenes* as a cause of bacterial meningitis in patients with altered mental status preceded by gastrointestinal symptoms, especially in the immunocompromised population.

BACKGROUND

Listeria monocytogenes is a known cause of meningitis and self-limiting gastroenteritis among neonates, pregnant women, elderly, immunosuppressed or diabetic patients, and patients with malignancies. However, this organism has a growing significance for community-acquired meningitis. To cover this pathogen, ampicillin should be added to the usual antibiotic regimen. Therefore, it is important for physicians to consider *L. monocytogenes*. We here report a case of *L. monocytogenes* meningitis preceded by gastrointestinal symptoms.

CASE PRESENTATION

A woman aged 87 years presented to the emergency department with altered mental status (AMS) and a 1-week history of fever, appetite loss and progressively exacerbating right upper quadrant pain. She had a medical history of type 2 diabetes mellitus, hypertension and chronic kidney disease. On arrival, she was in acute distress with a body temperature of 36.5°C, heart rate 130 bpm, blood pressure 65/36 mm Hg, respiratory rate 32/min and oxygen saturation 92% on room air. Her Glasgow Coma Scale was E3V4M5. Physical examination revealed tenderness in the right upper quadrant. Other physical exams were unremarkable. Laboratory studies revealed a white cell count of 14 600/μL with 88% neutrophils. Liver panels were elevated to aspartate aminotransferase level of 789 U/L, alanine aminotransferase level of 327 U/L, alkaline phosphatase level of 679 U/L, lactate dehydrogenase level of 1253 U/L and γ-glutamyl transpeptidase level of 81 U/L, respectively. C reactive protein was elevated to 22.8 mg/dL. Abdominal ultrasound scan as well as contrast-enhanced CT revealed dilation of the common bile duct (10 mm).

The patient was admitted to the intensive care unit intubated with aggressive fluid resuscitation and vasopressors. She was empirically treated with intravenous meropenem (1 g/8 hours). Elevated hepatobiliary enzymes and haemodynamic instability brought suspicion for septic shock due to acute cholangitis. On the second day of admission, she underwent endoscopic retrograde cholangiopancreatography and endoscopic nasobiliary drainage. After the procedure, her liver panels improved. Nevertheless, her AMS progressively exacerbated.

INVESTIGATIONS

On the third day of admission, blood cultures returned positive for Gram-positive bacilli while the biliary drainage culture remained negative. Since acute cholangitis is typically caused by Gram-negative rods, sepsis due to bacteria such as *L. monocytogenes*, *Corynebacterium* species and *Clostridium* species were suspected. As her AMS was worsening, suspicion for a central nervous system infection arose. Further history obtained by her family revealed that she was a farmer mainly involved in sugarcane cultivation without history of contacts with wild animals or livestock. Recent consumption of raw milk or meat was denied as well. Lumbar puncture was performed and cerebrospinal fluid (CSF) analysis revealed pleocytosis. Gram stain of the CSF revealed Gram-positive bacilli as well.

TREATMENT

Meningitis caused by *L. monocytogenes* was suspected and meropenem (1 g/8 hours) was changed to ampicillin (2 g/6 hours). After switching the antibiotics, her AMS gradually resolved. However, on the 15th day of admission, her systolic blood pressure dropped to 70 mm Hg and she developed septic shock once again. Fluid resuscitation and vasopressor were initiated. For further investigation, contrast-enhanced CT scan was performed and revealed the presence of free air. She immediately underwent emergent surgery. Intraoperatively, rectal perforation and diffuse oedema was appreciated. Hartmann's procedure was performed while histopathological evaluation did not reveal any evidence of malignancy or detection of *L. monocytogenes*. Postoperatively, she received ampicillin/sulbactam for 2 weeks.

OUTCOME AND FOLLOW-UP

On discharge, her AMS had resolved completely. She was transferred to a rehabilitation hospital.

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DISCUSSION

Listeria monocytogenes is an aerobic Gram-positive bacillus, widely distributed in soil, water, dust, decaying vegetable matter and dairy products. It typically causes meningitis among neonates, pregnant women, the elderly and patients with immunosuppression, diabetes or malignancies¹ after ingestion of contaminated products. Especially, patients with history of immunosuppressive therapy within 1 month or chronic liver disease have an increased risk of meningitis by *L. monocytogenes* compared with *Streptococcus pneumoniae*, which is the most common cause of bacterial meningitis.² In 1998, the incidence of meningitis by *L. monocytogenes* among all community-acquired meningitis was estimated at 5–10% in North America and Europe.³ Newer statistical data have not been reported since. However, as life expectancy and survival duration among immunosuppressed patients have improved, the percentage is likely to be increasing. Additionally, considering the importance of early diagnosis and treatment requiring ampicillin, *L. monocytogenes* has a growing importance as a cause of community-acquired meningitis.

Recently, several cases of gastrointestinal listeriosis have been reported.⁴ Since it is typically a self-limiting condition, the significance of gastrointestinal listeriosis has been underestimated. However, one-third of patients with invasive listeriosis are reported to have preceding gastrointestinal symptoms, such as nausea or diarrhoea. *Listeria monocytogenes* is capable of passing the intestinal barrier, which may cause bacterial translocation leading to systemic infections. Some investigators speculate that a viral infection may contribute to the conversion of asymptomatic carriage of *L. monocytogenes* into invasive listeriosis as well. Although the absolute mechanism has yet to be elucidated, the presence of gastrointestinal symptoms could be a clue to suspect listeriosis.

In the present case of listeria meningitis, the patient is immunocompromised as she is elderly and diabetic, with right upper quadrant pain and appetite loss. There are a few reports demonstrating cholecystitis and cholangitis due to *L. monocytogenes*.⁵ Retrospectively, her bile tract infection was potentially caused by *L. monocytogenes* despite the negative biliary drainage culture, since the culture was obtained ~16 hours after meropenem was initially administered. Therefore, this case may demonstrate the multifarious gastrointestinal symptoms preceding *L. monocytogenes* meningitis. Regarding the rectal perforation, *L. monocytogenes* has been reported to cause exacerbation of colitis to fulminating and colonic perforation.⁶ However, the aetiology of rectal perforation appreciated in this case remains unclear since the histopathological evaluation was unremarkable.

Although meningitis caused by *L. monocytogenes* is relatively rare, *L. monocytogenes* should be considered as a cause of meningitis, especially when a patient with AMS presents with gastrointestinal symptoms. Further, early treatment with dexamethasone is reported to improve the outcome in adults with acute bacterial meningitis.⁷ However, Koopmans *et al*⁸ have reported that adjunctive dexamethasone should be

discontinued since there were no proven benefits in *L. monocytogenes* meningitis.

Additionally, meropenem is considered to be effective to most pathogens of bacterial meningitis, including *L. monocytogenes*. However, antibiotic treatment with benzylpenicillin or aminopenicillin is reported to lower the 30-day mortality compared with meropenem.⁹ Therefore, recognising the possibility of *L. monocytogenes* infection is extremely important for adequate treatment.

In conclusion, *L. monocytogenes* meningitis should be considered as a cause of AMS in immunocompromised patients, especially if it is preceded by gastrointestinal symptoms.

Learning points

- ▶ *Listeria monocytogenes* meningitis should be considered as a cause of altered mental status in immunocompromised patients.
- ▶ *Listeria monocytogenes* meningitis may be preceded by gastrointestinal symptoms.
- ▶ *Listeria monocytogenes* can cause cholecystitis or cholangitis.

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Patient consent Obtained.

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