



Spontaneous bacterial peritonitis by *Listeria monocytogenes*. A rare case and literature review

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Abstract

Spontaneous bacterial peritonitis (SBP) is a bacterial infection of ascites and a common complication in patients with cirrhosis, associated with a high morbidity and mortality rate. Gram-negative Enterobacteriaceae bacteria are usually the major pathogens involved in SBP, with *Klebsiella pneumoniae* accounting for 50% of these. Individuals with chronic liver and/or kidney disease associated with long-standing ascites are predisposed to SBP. Nosocomial SBP presents most commonly a poorer outcome. Although *Listeria monocytogenes* peritonitis is a relatively rare focal manifestation of *Listeria* infection, its incidence is increasing. It is associated with a mortality rate approaching 30% in cases of systemic involvement, despite first-line therapy. To our knowledge, this is the first case of *L.monocytogenes*-associated SBP described in Italy. Clinicians should be aware of the uncommon agents of SBP, such as *Listeria*, because, if diagnosed early, early antibiotic administration is crucial in minimizing adverse outcomes.

Key word: *Listeria monocytogenes*, spontaneous bacterial peritonitis, gram-positive bacteria.

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Introduction

Spontaneous bacterial peritonitis (SBP) is a common and often serious complication of long-standing ascites and one of the most frequent bacterial complications of liver cirrhosis, bacteremia, and urinary-respiratory tract infections. It characteristically involves gram-negative rods (coliforms) as the causative agents due to their translocation from the bowel into the peritoneal cavity and situations complicated by ascites formation. The risk of developing SBP is significantly increased in patients with preexisting chronic liver and or kidney disease.

L. monocytogenes is a gram-positive rod that has been increasingly recognized as a pathogen in immunocompromised. It has been recognized as the etiologic agent in cases of meningitis, endocarditis, bacteremia with or without sepsis, and, more rarely, SBP.

Listeria is an uncommon cause of peritonitis, associated with an estimated mortality rate of 30%. However, the incidence of *Listeria* SBP is increasing, especially in Spain. In a review published in 2015, 109 cases of *Listeria* PBS were reported(1).

The clinical features of PBS associated with a *Listeria* infection are non-specific, while in these cases, the ascitic fluid generally has a higher protein concentration and a prevalence of lymphocytic cells. Diagnostic paracentesis should immediately be performed, Gram stain may be helpful, and bacteremia has been commonly observed (2). Ampicillin remains the first-line antibiotic of choice, although it should be combined with an aminoglycoside. We herewith discuss an uncommon case of SBP caused by *L.monocytogenes*, a rare and unusual pathogen in this setting in Italy.

Case Report

A 72-year-old male suffering from a decompensated HCV-related liver cirrhosis complicated by hepatocarcinoma entered our ward due to fever and diffuse abdominal pain. The diagnosis of post-chronic hepatitis C hepatocellular carcinoma was formulated only one month before admission. A series of outpatient diagnostic investigations were performed to diagnose the cause of progressive weight loss and gradual impairment of well-being. The liver tumor appeared to be insensitive to both surgical and chemotherapy treatment. The patient's previous medical history was free of relevant comorbidities; in particular, the patient had never

undergone tests for HCV and had undergone a single abdominal ultrasound over twenty years earlier for a transient abdominal pain syndrome, with no evidence of liver alterations. The patient presents a weight loss of about 15 kg in the last six months, associated with asthenia, easy muscle exhaustion, inappetence, diffuse abdominal pain, abdominal distention, and diarrhea; about a week before being admitted to the hospital, he developed jaundice. Abdominal ultrasound and tomography documented abundant ascites, multiple masses of variable attenuation with central necrosis, infiltrative lesions invading the portal vein, multiple abdominal adenopathies, and splenomegaly. Blood tests at the admission showed: hemoglobin 8.5 g/dL (range 13-17), leucocytes 23,500/ μ L (range 4,500-11,400) with 92.4% PMN, platelets 110,000/ μ L (range 150,000-450,000), total bilirubin 8.65 mg/dL (range 0.2-1), international normalized ratio-1.9 (range 0.8-1.2), creatinine serum level-1.3 mg/dL (range 0.7-1.3), albumin-2.1 g/dL (range 3.5-5), and alpha-fetoprotein (AFP) levels were elevated.

The abundant ascites allowed a diagnostic paracentesis. Laboratory examination of abdominal fluid confirmed an inflammatory picture (8,420 white blood cells/mL, proteins 22 g/L, and a serum-ascites albumin gradient 1.1 g/dL), while light microscopy disclosed Gram-positive rods. A diagnosis of SBP was made, and empirical treatment with ceftriaxone 2 g every 24 h and ciprofloxacin 400 mg every 12 h were promptly prescribed.

While our patient rapidly went to death after three days, *L.monocytogenes* grew from both blood-ascites cultures carried out upon admission. This bacterial strain proved phenotypically resistant to clindamycin-fusidic acid but remained sensitive to all other tested agents.

Discussion

Spontaneous bacterial peritonitis (SBP) is a common and potentially fatal complication of liver cirrhosis, due to the development of bacterial infection in the peritoneum, with no apparent intraabdominal source of infection. The translocation of intestinal Enterobacteriaceae species, such as *Escherichia coli* and *Klebsiella pneumoniae*, commonly causes SBP. *L.monocytogenes* is a rare cause of SBP, with 0.2 cases/per 100,000 annually in Europe and the US.

L.monocytogenes is a gram-positive aerobic, motile hemolytic bacterial agent potentially responsible for several clinical syndromes. Influenza-like forms have been described during pregnancy with pyelonephritis and septic abortion. Septic granulomatosis has been reported in infants. *L.monocytogenes* also plays a role in sepsis of unknown origin in both children and adults, encephalitis-meningoencephalitis, and a large spectrum of pictures of focal infection, favored by direct contact or bacteremic spread: skin-soft tissue localizations, eye-lymph node-enteric-biliary tract infections, and endocardial-bone-spinal localizations. *L.monocytogenes* is infrequently responsible for liver involvement: single-multiple abscesses have been reported, as well as acute hepatitis mimicking a viral form or acute hepatitis after orthotopic liver transplantation. Recent

literature evidence underlines that *L.monocytogenes* plays an emerging role in SBP secondary to ascitic liver cirrhosis(1-2). Predisposing conditions include malignancies, chronic renal disease, and diabetes mellitus.

A systematic literature review in 2011 reported 128 published cases of *Listeria* SBP (3);

since then, around 35 additional cases of *Listeria* SBP have been described and published (3). Concomitant bacteremia and the high resistance level towards third-generation cephalosporin (frequently employed as empiric therapy of SBP), are of great concern.

Enriched cultures favor *L.monocytogenes* growth, so the laboratory should be alerted in the event of SBP. Despite the resort to combined beta-lactam-aminoglycoside treatment, the mortality rate of SBP varies from 17 to 32% according to the different literature series (1-2). Several cases were reported from Spain (4), suggesting a geographical predisposition that might be due to a higher incidence of human listeriosis in this country because *Listeria* contamination occurs more frequently. In a recent retrospective study in two university hospitals in Madrid, among 194 cases with culture-proven listeriosis analyzed between 1977 and 2021, SBP occurred in 8.2% of cases (4).

Some authors suggested that SBP *Listeria* should be suspected when diphtheria-like organisms are documented on ascitic/blood cultures, and patients present iron overload or hemochromatosis features, report exposure to farm animals, or show poor response to empiric antibiotic therapy (5). In conclusion, Although *Listeria monocytogenes* peritonitis is a relatively rare focal manifestation of *Listeria* infection, its incidence is increasing and is associated with a mortality rate of approaching 30% in cases of systemic involvement, despite first-line therapy.

Listeria SBP can be successfully treated with ampicillin alone or in combination with gentamicin. A recent literature review showed that patients with *Listeria* SBP who underwent large-volume paracentesis survived (6).

Author contribution Statement

The authors confirm their contribution to the paper as follows: All authors contributed to the clinical evaluation of the cases and the manuscript's drafting. All authors approved the drafting of the manuscript. All authors agreed to be responsible for all aspects of the work to ensure the accuracy and integrity of the published manuscript.

Ethics statement

The authors declare that the published work reflects an investigation and analysis carried out truthfully and completely. A signed informed consent for publication was obtained, and the manuscript is in accordance with the institution's ethics committee.

Conflict of interest

The authors declare no conflict of interest.

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Availability of data

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