A CASE REPORT OF LISTERIA MONOCYTOGENES MENINGOENCEPHALITIS IN GENERAL HOSPITAL "DR RADIVOJ SIMONOVIĆ" SOMBOR

PRIKAZ SLUČAJA MENINGOENCEFALITISA IZAZVANOG LISTERIJOM MONOCITOGENES U OPŠTOJ BOLNICI "DR RADIVOJ SIMONOVIĆ" SOMBOR

Snežana DELIĆ1, Snežana BRKIĆ2, Aleksandar DELIĆ3 and Ivana B. ĆIRKOVIĆ4

Summary
Introduction. Listeria monocytogenes is one of the most common causes of bacterial central nervous system infections in adults. It often affects immunocompromised and elderly patients. Even with appropriate antimicrobial treatment, mortality due to Listeria monocytogenes meningocencephalitis is among the highest of all causes of bacterial central nervous system infections. Case report. We presented a previously healthy, 79-year-old farmer with typical clinical features of meningocencephalitis. The initial treatment with vancomycin and meropenem did not produce any clinical effect. On day six, Listeria monocytogenes was isolated from the cerebrospinal fluid and blood culture and identified by using conventional and automated microbiology methods. Antimicrobial susceptibility testing was performed by E test method. After bacterial isolation and identification, the administration of ampicillin and gentamicin was followed by the complete recovery of our patient. Conclusion. This case is presented to emphasize the negative outcome of empirical treatment when Listeria monocytogenes is not taken into consideration. Furthermore, the administration of ampicillin and gentamicin combination for treatment should be considered as the best therapeutic option in Listeria monocytogenes meningocencephalitis.

Key words: Meningoencephalitis; Listeria monocytogenes; Meningitis, Listeria; Central Nervous System Bacterial Infections; Aged; Male; Diagnosis; Anti-Bacterial Agents

Introduction

Listeria monocytogenes is a Gram-positive, rod-shaped and facultative anaerobic bacterium. It is motile via flagella at room temperature and usually not at 37°C, but can move within eukaryotic cells by polymerization of actin filaments. Listeria monocytogenes is a facultative intracellular bacterium that can grow and reproduce inside the host’s cells and is one of the most virulent food-borne pathogens [1]. Listeriosis is the leading cause of death among food-borne bacterial pathogens, with mortality rates surpassing even Salmonella spp. and Clostridium botulinum [2].

Listeria monocytogenes is the common cause of the central nervous system (CNS) infections and bacteremia in immunocompromised and elderly patients, as well as severe infections in pregnant women and their newborns. It can also cause gastroenteritis in healthy people who have ingested a large inoculum of the organism [3]. Few reports of Listeria monocytogenes infections are available from Serbia [4, 5] and hereby, a...
Case Report

A 79-year-old male farmer, previously healthy with a 3-day history of severe headache, nausea, vomiting and fever was admitted to the Department. On examination, he was febrile (38.9°C), adynamic, dehydrated, with arterial blood pressure of 25/13 kPa, heart rate 100/minute, ventilation 25/minute. There were neck stiffness and positive Kernig’s and Brudzinski’s signs. Other results of physical check-up were normal. Leukocyte count was 16.100/mm3 (89% neutrophils) and 84.5% lymphocytes), proteins of 0.35 g/L and glucose of 3.4 mmol/L (glycemia 5.4 mmol/L). The values of aspartate aminotransferase (80 U/L), alanine aminotransferase (53 U/L), lactate dehydrogenase (866 U/L), urea (56 mg/dL), creatine (1.1 mg/dL) were within normal ranges. The patient was still febrile. Meningeal syndrome started to disappear. A week after the treatment with ampicillin and gentamicin had begun, the patient was afebrile and the symptoms of meningeal syndrome started to disappear. A week after the isolation on day 6, the therapy with ampicillin (2 g IV, q4 h) and gentamicin (120 mg IV) was administered. The day after, the patient was still febrile. Meningeal syndrome started to disappear. A week after the treatment with ampicillin and gentamicin had begun, the control CT scan was normal. After 21 days of treatment with ampicillin and gentamicin, the patient fully recuperated and was discharged from hospital.

Discussion

Bacterial meningoencephalitis is one of the most severe conditions in medicine, with the mortality rate going up to 30% [6]. A prerequisite for the favorable outcome of this disease is early administration of adequate antimicrobial therapy, which usually indicates an empirical treatment. Recommended primary treatments for community-associated bacterial meningoencephalitis in adults include third generation cephalosporins and vancomycin, with the addition of ampicillin or amoxicillin in the circumstances implying possible Listeria monocytogenes cause of the infection, e.g. older age or diseases with insufficient cellular immunity [7, 8]. Listeria monocytogenes is one of the most common causes of acute bacterial CNS infections, after Streptococcus pneumoniae and Neisseria meningitides, and the frequency rate is 4-12% in a number of countries in the northern hemisphere [9–11].

In accordance with the first prospective study of community-associated Listeria monocytogenes meningitis in adults, immunodeficiency or older age were characteristic for all patients [12]. Even with appropriate antimicrobial treatment, mortality due to Listeria monocytogenes meningoencephalitis is among the highest of all causes of bacterial CNS infections [13]. This patient was an old man, with insignificant medical history, and with no obvious reason for immunodeficiency except his old age. Predictably, there CSF were positive, while urine culture was sterile. Gram staining of the CSF and blood culture showed Gram-positive, short, non-sporing bacilli with diphtheroid-like arrangement (Figure 1). For plating, Columbia agar (Torlak, Serbia) with 5% sheep blood and MacConkey agar (Torlak, Serbia) were used. No growth was seen on MacConkey agar, but large numbers of beta-haemolytic grey colonies were found on sheep blood agar. These colonies were identified as Listeria monocytogenes by using conventional microbiology methods and by Vitek2 System (bioMérieux, France) and confirmed by MALDI-TOF MS (Bruker Daltons Inc, USA). The isolate was sensitive to ampicillin (minimum inhibitory concentration (MIC) ≤ 0.125 µg/mL), trimethoprim-sulfamethoxazole (MIC ≤ 0.125 µg/mL), gentamicin (MIC ≤ 0.064 µg/mL) and vancomycin (MIC ≤ 0.73 µg/mL).

After Listeria monocytogenes isolation on day 6, the therapy with ampicillin (2 g IV, q4 h) and gentamicin (120 mg IV) was administered. The day after, the patient was afebrile and the symptoms of meningeal syndrome started to disappear. A week after the treatment with ampicillin and gentamicin had begun, CSF analysis showed 40 WBC per mm3 (15.5% neutrophils and 84.5% lymphocytes), proteins of 0.35 g/L and glucose of 3.4 mmol/L (glycemia 5.4 mmol/L). The control CT scan was normal. After 21 days of treatment with ampicillin and gentamicin, the patient fully recuperated and was discharged from hospital.
were no epidemiologic clues implying *Listeria monocytogenes* infection, which is mostly sporadic and food-borne by various types of food [1].

The treatment of our patient was commenced with meropenem and vancomycin (with proven ineffectivity *in vivo* against listeriosis) [4, 14] which is a common de-escalation therapy used in the hospital. *Listeria monocytogenes* harbors five penicillin-binding proteins (PBPs), and previous investigation has shown that PBP3 is a target for beta-lactam antibiotics in this bacterium [14]. However, cephalosporins have low binding capacity for PBP3 in *Listeria monocytogenes*, even though they are proven inhibitors of other PBPs, and they are not the drug of choice for listeriosis. It has also been shown in earlier studies on imipenem-resistant *Listeria monocytogenes* strains that mutation of gene coding PBP3 is responsible for decreased susceptibility of the strains to the carbapenems [4, 14]. In addition, Stepanovic et al. reported meropenem therapy failure in *Listeria monocytogenes* infection which was explained in the same way as in the previous study, i.e. mutation of PBP3 gene [4]. This is a possible reason for the lack of success in treatment with meropenem in our patient. Ampicillin or amoxicillin is the most active antibacterial agents in treatment of *Listeria monocytogenes* meningitis and meningoencephalitis [15]. Moreover, the results from *in vitro* studies showed that aminoglycosides, chloramphenicol, tetracycline and trimethoprim-sulfamethoxazole are also effective in *Listeria monocytogenes* infections [16]. Regrettably, most antibacterial agents are not bactericidal or have low intracellular concentration capacity [1, 15, 17]. The clinical practice shows that the combination of ampicillin or amoxicillin and gentamicin is still the best option [15] and it is precisely these two antibiotics that are used to treat our patients.

**Conclusion**

*Listeria monocytogenes* is one of the most common causes of bacterial central nervous system infections in immunocompromised or elderly patients. Listeriosis still presents a diagnostic and therapeutic challenge. This case is presented to emphasize the negative outcome of empirical treatment when *Listeria monocytogenes* is not taken into consideration. Furthermore, the administration of the ampicillin and gentamicin combination for treatment should be regarded as the best therapeutic option in *Listeria monocytogenes* meningoencephalitis.

**References**


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