Case Report

Listeria monocytogenes Bacteremia in an Immunocompetent Host

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The authors report a patient with a very rare manifestation of *Listeria monocytogenes* bacteremia infection presented with exudative tonsillitis in an immunocompetent host. The patient presented with acute febrile illness with upper respiratory tract symptoms. He did not have any underlying diseases, but had a history of eating microwaved ready-to-eat frozen meals. Physical examination revealed enlarged tonsils with exudates. Blood culture indicated that the patient was suffered from *Listeria monocytogenes*. Magnetic resonance imaging (MRI) of brain, cerebrospinal fluid (CSF) analysis and culture were normal. There were no physical or laboratory findings to suggest that he was immunocompromised. He was intravenously treated with ampicillin for 21 days and was followed-up uneventfully for three years. To our knowledge, this is the very rare case of *Listeria monocytogenes* bacteremia without central nervous system involvement presented with exudative tonsillitis in an immunocompetent host.

Keywords: *Listeria monocytogenes*, Bacteremia, Immunocompetent, Exudative tonsillitis

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Listeria monocytogenes is a facultatively anaerobic, non-sporing, short gram-positive rod[1]. It is rarely reported and considered a food-borne disease[2,3]. Most infections occurring in immunocompromised hosts are often severe[3,4]. This infection has also been reported in patients with cancer, acquired immune deficiency syndrome (AIDS), organ transplant recipients, or corticosteroid therapy, as well as in neonates, older adults, pregnant women, and rarely, in immunocompetent hosts[5-9]. Infections caused by *L. monocytogenes* have many clinical syndromes including sepsis, central nervous system (CNS) infections, endocarditis, gastroenteritis, and other focal infections in various organs[3,10]. CNS infection is one of the common clinical syndromes, and bacteremia without an evident focus of which is the most common manifestation of listeriosis after the neonatal period. Clinical manifestations typically include fever and myalgia, and a prodromal illness with nausea and diarrhea may occur[10]. The authors describe herein a rare case of invasive infection caused by *L. monocytogenes* bacteremia in a healthy patient without CNS involvement presented with exudative tonsillitis.

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Case Report

A 21-year-old Thai single male university student from Bangkok presented with high fever and chills for four hours. He also had a constant headache, nausea and vomiting, sore throat, rhinorrhea, and loss of appetite. The fever persisted after taking 1,000 mg of paracetamol before he came to the hospital. He was previously healthy and denied drinking alcohol. For the past several weeks, he had stayed in the university campus in the city, preparing for the upcoming exam. His diet consisted mainly of frozen ready-to-eat meals from the local grocery store. The food would be warmed in the microwave oven before eating.

Physical examination showed a body temperature of 38.9°C, heart rate 100/min, blood pressure 103/54 mmHg, and respiratory rate 18/min. He looked very ill, and his pharynx and tonsils were mildly injected with one tiny spot of exudates on the tonsils. Cardiovascular, respiratory, gastrointestinal, and neurological examinations were normal. The stiff neck was negative. Complete blood count data revealed the hemoglobin of 15.2 g/dl, WBC of 19,090 cells/mm^3 (PMN 93.8%, Lym 2.8%, Mo 3.4%), and platelet count of 271,000/mm^3. Renal function was normal and urine examination was negative for white blood cells. Screening for influenza A, B by nasal swab was negative.

The patient was diagnosed with sepsis, and 2 grams of ceftriaxone was given after specimens of blood cultures were observed. The patient requested to continue his treatment at a private hospital near his home. One day later, he was diagnosed with exudative tonsillitis (Figure 1A).

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Meanwhile, 2 grams of ceftriaxone was continued once a day. After treatment, the vital signs were stable, but fever was still persisted. The results of blood culture specimens indicated that the bacteria were gram-positive bacilli (small) and non-spore forming (Figure 2A). The data of blood agar cultures indicating the characteristics of *L. monocytogenes* such as an incomplete beta-hemolytic pattern (Figure 2B), motility test positive at room temperature with an umbrella like growth (Figure 2C), catalase positive, oxidase negative, fermentation in sugars and producing acid without gas. Then, antibiotic administration was changed to 2 grams of ampicillin by intravenous injection for every 6 hours. Afterwards, the patient requested to transfer back to our hospital due to financial problems. Then, further investigations were accomplished. In the mean time, the patient was treated with 2 grams of ceftriaxone once daily for two days as well as two doses of ampicillin. Throat swab culture showed no growth of bacteria. Magnetic resonance imaging (MRI) and magnetic resonance venography (MRV) of brain found no detectable abnormality of parenchyma, no brain abscess or leptomeningeal enhancement, and no evidence of cerebral venous sinus thrombosis. Lumbar puncture with cerebrospinal fluid (CSF) analysis data demonstrated the opening pressure 20 cmH_2O, closed pressure 16 cmH_2O, WBC 0 cell/HPF, RBC 7 cells/HPF, Protein 33.5 g/dL, and Sugar 53 mg/dL (blood sugar 73 mg/dL). The CSF culture showed no bacterial growth, anti-HIV non-reactive, CD8 (The cytotoxic T lymphocyte) level 1,138 (36.75%) [normal range, 360 to 1,250 (17.1 to 44.6%)]. In addition, Dihydrorhodamine assay for phagocytic activity was normal. Hemocultures confirmed that the patient was suffered from *L. monocytogenes* infection. Then, ampicillin treatment was continued for another 21 days. Later, fever decreased after two days of ampicillin treatment, and the tonsillar exudates and headache resolved (Figure 1B). Afterwards, the patient has been free from symptoms for 36 months.

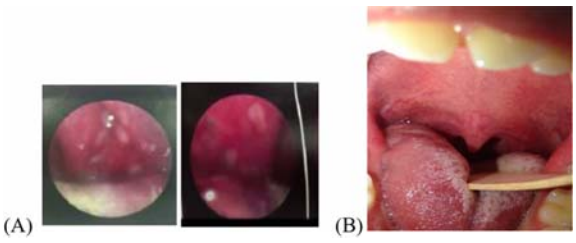

Figure 1. Photograph demonstrating tonsillar exudates on the second day of illness (A) and after intravenously treatment with 6 days (B).

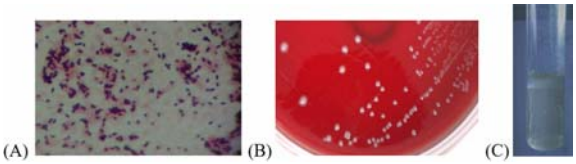

Figure 2. Gram stain from blood culture broth demonstrated gram positive bacilli (small) (A). Blood agar showed incomplete beta-hemolytic colonies (B). Motility test for *Listeria monocytogenes* demonstrate umbrella type growth (C).

Discussion

Listeriosis is a bacterial disease caused by *Listeria* spp. Of the many species in the *Listeria* genus, *L. monocytogenes* is the main pathogen in humans, although disease caused by *L. seeligeri*, *L. ivanovii* and *L. innocua*[1,11,12] have been reported.

L. monocytogenes is a small, facultatively anaerobic, nonsporulating, gram-positive rod, which is motile at room temperature (20 to 25°C). It has a special umbrella-like characteristic[3] with catalase-positive and oxidase-negative (Figure 2C). It expresses an incomplete beta-hemolysin on sheep blood agar as demonstrated by a small zone of hemolysis around and under colonies. The temperature that is appropriate for growing *Listeria* is 30 to 37°C, but it also grows well in lower (refrigerator) temperatures[1,13]. Due to its tolerance to extreme conditions such as cold temperature, acidic pH, and high salt conditions, it can grow in many places such as water, soil, vegetables, meat, food products, including frozen meals[14]. It is considered a human foodborne pathogen because people usually contact the disease by ingesting contaminated food[3]. The incubation period for the invasive disease is approximately 30 days after ingesting contaminated food, with a range of 11 to 70 days, or 3 to 90 days from other reports[1,15].

Although it is not common in the general population, *L. monocytogenes* infection may cause severe and life-threatening illness in babies, older people, pregnant women, people with defective cell-mediated immunity, hematologic malignancy, AIDS, post-transplant patients taking steroids and other immunosuppressive medications[1,2]. However, it rarely occurs in immunocompetent patients, as indicated in this report. An acute with self-limiting gastroenteritis has been reported in people without underlying diseases after ingesting a large inoculum[2,16].

Many clinical syndromes have been described indicating localized infection due to direct inoculation, such as conjunctivitis and skin infection[1,17]. Additionally, invasive infections including meningitis, brain abscess, endocarditis, and bacteremia are observed. The most common invasive infection is meningitis or bacteremia. According to invasive infections, the non-specific symptoms such as malaise, myalgia, fever, and back pain are dominant in adults with immunosuppressed states. Even though blood cultures are usually positive, the primary site of infection may not be found. Moreover, other clinical syndromes of which localized infection due to hematogenous seedings, such as liver abscess, peritonitis, and septic arthritis are also present[1].

To date, the present case study of exudative

tonsillitis associated with *Listeria* bacteremia in an immunocompetent human is rare and unique. Previously, canine tonsillitis had been stated as short communication. Although the tonsils were reddish and slightly swollen, there were no exudates[18]. Unfortunately, *L. monocytogenes* was unable to be isolated from the tonsils of this patient which may be due to prior antibiotic treatment resulting in disappearance of the exudates at the time of specimen collection. Hence, it is ambiguous to conclude that *Listeria* is the cause of exudative tonsillitis or merely a co-incidence. However, a discovery of *Listeria* bacteremia in an immunocompetent host, itself, is extremely rare.

Normally, routine bacterial culture from sterile sites such as blood or CSF is recommended for isolation and diagnosis of *L. monocytogenes* infection. In case of the gastroenteritis outbreak and negative routine stool cultures, a specific stool culture may be requested. Usually, hemocultures of *L. monocytogenes* takes two to three days. However, it may be misinterpreted as *Diphtheroid*, *Streptococcus*, *Enterococcus* due to their morphological similarity[1]. Therefore, the biochemical tests are necessary for discrimination among the aforementioned organisms. Referring to catalase assay, *Streptococcus* and *Enterococcus* are negative, while *Diphtheroid* and *Listeria* are positive. In addition, *Listeria* is motile while *Coryneform* or *Diphtheroid* are non-motile at room temperature.

Although many antimicrobials inhibit *L. monocytogenes* in vitro but not all are clinically useful for treatment[19]. Among them, ampicillin have been widely used with good efficacy[19,20]. In case of patients with penicillin allergy or refractory to ampicillin, trimethoprim-sulfamethoxazole has been effective for listeriosis treatment[21,22]. Concerning the invasive listeriosis treatment duration, patients with meningitis, bacteremic patients with normal CSF, and endocarditis should be treated for at least 3 weeks, 2 weeks and 4 to 6 weeks, respectively. Meanwhile, patients with well response to treatment show the decrease in fever, improved mental status, and negative repeat blood cultures. These patients do not require repeat studies to determine a treatment endpoint. Furthermore, patients with rhombencephalitis or brain abscess should be treated for at least 6 weeks followed by repeated brain imaging studies[1]. Besides, addition of gentamicin to ampicillin is recommended for treatment of patients with meningitis, endocarditis, and severely impaired T-cell function[23,24]. Herein, our patient was intravenously received ampicillin for 3 weeks with well clinical responses such as defervescence, resolution of headache, and normal mental status. During the follow-up process for three years, this patient shows no recurrent infection.

In conclusion, the authors report a very rare case of invasive infection caused by *L. monocytogenes* bacteremia in a healthy patient without CNS involvement presented with exudative tonsillitis.

What is already known on this topic?

Human *L. monocytogenes* infection is a zoonotic disease that usually manifests as bacteremia or meningitis in patients with defective cell-mediated immunity. In immunocompromised hosts, the illness is life-threatening. In contrast, listeriosis in immunocompetent hosts is rare with variation of the clinical signs and severity. Among patients with normal immune status, there have been a few case reports of *L. monocytogenes* infection presenting as septic arthritis or bacteremia with meningitis.

What this study adds?

This case report adds to the literature of *L. monocytogenes* bloodstream infection in immunocompetent patients. Our case had a unique presentation of exudative tonsillitis. Previously, tonsillitis associated with listeriosis had been reported in dogs, but not in humans. In patients presenting with exudative tonsillitis and sepsis, of which the clinical condition seems out of proportion, complete culture specimens of the blood and throat area should be taken. Moreover, empiric antimicrobials should be clinically correlated and administered accordingly. If hemocultures or throat swab cultures confirm *L. monocytogenes* infection, ampicillin would be the drug of choice.

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Potential conflicts of interest

The authors declare no conflicts of interest.

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