



## Case Report

## Listeria Meningitis in a Patient with Regular Vital Diet and Proton Pump Inhibitor

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### Abstract

*Listeria (L.) monocytogenes* infection of the central nervous system is often seen in patients with underlying diseases or immunocompromised status. We report a 60-year-old immunocompetent woman who presented with progressively intermittent headache for 3 weeks. Brain magnetic resonance imaging revealed leptomenigeal enhancement on T1-weighted imaging. Cerebrospinal fluid culture showed *L. monocytogenes*. Dairy products containing yeast (which she has made daily at home for years) and undercooked vegetables (which she harvested and ate daily) may have been the sources of the *L. monocytogenes* infection. Therefore, we note that a diet of natural raw food may cause outbreaks or sporadic cases of listeriosis. The patient recovered completely after 6 weeks of treatment with ampicillin. (*Tzu Chi Med J* 2009;21(2):178–180)

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## 1. Introduction

Since *Listeria (L.) monocytogenes* is the only pathogen of the genus in animals and humans, the term “*Listeria*” in reports of humans in the literature and in this report refers to *L. monocytogenes*. It is a non-spore-forming, Gram-positive, catalase-positive, aerobic or facultative anaerobic rod. Most clinical cases of *L. monocytogenes* infections are due to food-borne contamination (1), although it is often difficult to identify when its ingestion has occurred. Patients who are elderly, pregnant, or immunocompromised are at increased risk of listeriosis. The most common presentation of listeriosis in immunocompromised

hosts is a febrile syndrome. Central nervous system (CNS) infections may present as progressive headaches, cognition changes, and/or focal neurologic signs as a result of raised intracranial pressure, and may occur without fever. It is difficult to definitively establish the etiology initially. Many tissues, organs and the CNS may become clinically infected with *L. monocytogenes* (2).

We report a case of listeria meningitis in a 60-year-old woman who had eaten homemade dairy products and undercooked vegetables for many years to improve health. We note that the increased consumption of natural raw foods in Taiwan may increase the risk of outbreaks or frequency of listeriosis.

## 2. Case report

This 60-year-old right-handed previously healthy woman was admitted to the hospital because of recurrent fever (for 3 weeks) and severe headaches, along with nuchal rigidity.

She recalled a very severe headache and fever 3 weeks prior to this admission, which was relieved 3 days after the headache began by drinking a large amount of water without any medications. However, the headache returned the following week but was intermittent for the next 3 weeks. She took a proton-pump inhibitor (PPI), lansoprazole (15 mg daily), intermittently for gastric discomfort and mild gastritis that was diagnosed using panendoscopy for 7 months. She had a history of hepatitis B but had recovered. Otherwise, she had been in good health without any systemic or chronic diseases. She has been eating homemade dairy products containing yeast and undercooked vegetables harvested by herself for years.

On admission, she had mild leukocytosis (WBC:  $14.2 \times 10^3/\mu\text{L}$ ; predominantly PMNs, 89.4%). Renal function (blood urea nitrogen, creatinine), liver function (aspartate aminotransferase and alanine aminotransferase) and other biochemical test results were within the reference ranges. Both serum and cerebrospinal fluid (CSF) were negative for HIV antibodies and cryptococcus antigens, and the CSF was negative for *Mycobacterium tuberculosis* (MTB)-PCR. Other CSF microbiology test results, including bacterial culture, tuberculosis culture, and virus detection, were all negative. Chest X-ray, abdominal sonography, and serum tumor markers were all unremarkable. CSF data

showed neutrophil-predominant pleocytosis (WBC:  $3888/\mu\text{L}$ ; neutrophils: 93%), protein 206.8 mg/dL, and glucose 39 mg/dL. CSF culture on sulfide-indole-motility medium identified *L. monocytogenes* using the characteristic tumbling motility in a saline suspension at room temperature, and on blood agar by clear areas around each colony with characteristic small zones of  $\beta$ -hemolysis. *L. monocytogenes* meningitis was diagnosed.

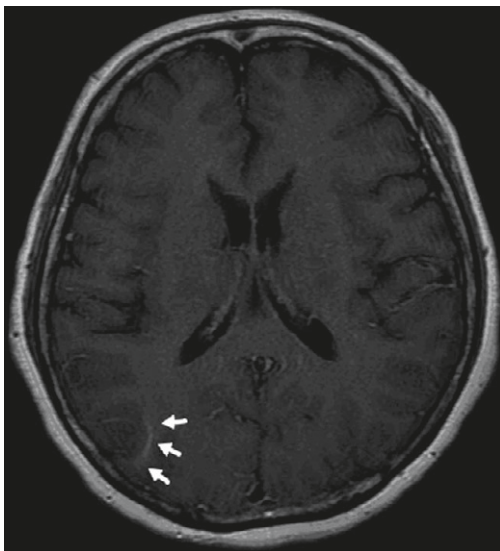
In agreement with the patient's clinical features, magnetic resonance imaging demonstrated leptomeningeal enhancement on postcontrast T1-weighted imaging (Fig. 1). Initially, she was treated with 2 g parenteral ampicillin q4h and 2 g ceftriaxone q12h but was then shifted to ampicillin alone for 6 weeks after the diagnosis of *L. monocytogenes* meningitis was made. Her headache and nuchal rigidity subsided gradually and she was headache-free after antibiotic treatment for 5 days.

## 3. Discussion

A retrospective study at the Massachusetts General Hospital during a 36-year period found that *L. monocytogenes* accounted for 11% of episodes of community-acquired acute bacterial meningitis in adults, but only 3% of nosocomial cases (3). Prevention of *L. monocytogenes* contamination in food processing plants is becoming increasingly important. Between 1980 and 2000, there were 15 food-borne outbreaks of listeriosis according to the Center for Disease Control and Prevention in the United States. These included two outbreaks of listeriosis in the year 2000: one among Hispanic persons in Winston-Salem, North Carolina, which was caused by noncommercial, fresh, Mexican-style cheese made from contaminated raw milk traced to one local dairy, and another linked to contaminated delicatessen turkey. Such outbreaks may not be recognized at the local level if there are only a few cases in any one jurisdiction and there is no routine integrated analysis of case-specific data.

Few reports of outbreaks of *L. monocytogenes* are available in Taiwan. *L. monocytogenes* infections have been linked to consumption of contaminated milk, soft cheese, undercooked meat, unwashed raw vegetables, and cabbage (1). The source of listeria infection may also include refrigerated foods since refrigeration permits the slow multiplication of *Listeria* to an infectious dose. The typical route of entry of *Listeria* is gastrointestinal. Once in the gut lumen, PPIs can interfere with local secretory immunity and enable *Listeria* to invade the intestinal epithelium directly without disrupting the integrity of the intestinal wall.

With the increase in the number of people in Taiwan eating organic foods and using PPIs for gastric acid



**Fig. 1** — Contrast-enhanced axial T1-weighted (516/29/1 [TR/TE/excitation]) magnetic resonance imaging shows enhancement over the leptomeningeal and right parietal gyri (arrows).

(a natural barrier to *L. monocytogenes* infection), it is reasonable to expect an increase in the prevalence of *Listeria* CNS infection. Prevention and control are difficult because *Listeria* organisms are ubiquitous and most infections are sporadic, and can even occur throughout life in individuals without predisposing factors (4). Therefore, control of *Listeria* contamination may present a critical challenge to food safety professionals in the near future.

Host factors such as immune status, age, and underlying medical conditions affect the risk of developing listeria meningitis. The present case suggests that a diet of raw vegetables and homemade dairy products is a risk factor for listeria meningitis in immunocompetent individuals. This risk may be exacerbated by PPI use, which impairs the natural defense mechanism of the stomach environment by facilitating

listeria organism penetration and proliferation within stomach epithelial cells. Epidemiologic studies are needed to test this hypothesis.

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