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# A Case Report on Acute Meningoencephalitis Caused by Listeria Monocytogenes

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**ABSTRACT**

Listeria monocytogenes (L. monocytogenes) is a gram-positive, facultative, intracellular bacterium that causes meningitis, meningoencephalitis, and infrequently hydrocephalus and cerebral bleeding. These infections are more prone to occur in elderly, pregnant women, new-borns and immunocompromised patients than healthy adults. It is transmitted either vertical transmission from mother to child or through ingestion of contaminated food. Patients may present with symptoms like fever, headache and signs of meningitis. The patient may have an altered mental status with a drop in GCS. It is diagnosed through CSF analysis, blood cultures, placental fluid cultures and now through molecular testing and contributed by MRI imaging. Since listeria meningoencephalitis has a high mortality rate of up to 30%, if it is not identified and treated quickly, it can cause coma, irreversible brain damage, and even death.

**Keywords**: Listeria Monocytogenes (L. Monocytogenes), Cerebrospinal fluid (CSF), Glasgow Coma Scale (GCS), Total Leukocyte Count (TLC)

## INTRODUCTION

Listeria monocytogenes is a gram-positive facultative intracellular bacterium that is commonly found in environment such as soil, rivers, livestock, and wild animals. It's ability to produce biofilms enhances L. monocytogenes to survive in harsh environments. It is transmitted to humans through ingestion of contaminated foods such as cold deli meats and unpasteurized dairy products. [(1)] Typically, it affects immunocompromised individuals, the elderly, infants, and pregnant women. It can cause sepsis, endocarditis, and central nervous system infections in immunocompromised patients. Pregnancy-related infections can result in amnionitis, abortion and premature birth, whereas infections in new-borns can cause pneumonia, conjunctivitis, and late-onset meningitis [(2).] Even though there are 13 different serotypes of L. monocytogenes, only three serotypes (1/2a, 1/2b, 4a) causes disease in humans. Though listeriosis is rare in humans (0.1–10 incidents/million), it can contribute to a 30% mortality rate in cases of meningitis [(3).]

In healthy individuals listeria infections might be asymptomatic or just mild stomach upset that resolves on its own, however in immunocompromised patients it may result in potentially fatal blood or brain infections [(4).] Listeria causes two main types of illness: the most common is a slow developing type of meningitis, which manifests as fever, headache and stiff neck. Rhombencephalitis, the second form of CNS listeriosis in adults, is characterized by early onset of fever, headache, nausea, and vomiting, with fewer indications of meningeal irritation. Later on, individuals may develop cerebellar dysfunction,

including ataxia, accompanied by other cranial neurological conditions [5].

The diagnosis of CNS listeriosis infections are challenging due to previous exposure to antibiotic therapy and low bacterial count in the cerebrospinal fluid (CSF) [6]. Avoiding the use of contaminated food and proper hand washing techniques can prevent the transmission of L.monocytogenes.L.monocytogenes are usually treated with intravenous (IV) ampicillin or penicillin G. In patients with penicillin allergy, trimethoprim-sulfamethoxazole is used as an alternative, but not in first or last trimester. Ampicillin penetrates the CNS well during inflammation, depicting high bactericidal activity against Listeria and hence considered as the first line of choice. Other antibiotics such as Rifampin, vancomycin, levofloxacin, and cotrimoxazole are also used against Listeria. Rifampin has bacteriostatic activity.Vancomycin is ineffective in severely immunocompromised patients. Levofloxacin is recommended for empiric therapy, but linezolid has limited action. Cotrimoxazole and amoxicillin have been found to be effective and meropenem has potential activity, but clinical evidence is unclear. In susceptible individuals like infants less than one month old: Ampicillin plus gentamicin can be used and survival is reduced in those treated with adjunctive Dexamethasone.In adults with depressed cellular immunity or older than 50 years old: Vancomycin plus ceftriaxone plus ampicillin is recommended. [7]

## CASE

A 42-year-old lady presented to the Emergency Department with complaints of fever, headache, body pain and tiredness for the past three days. Subsequently, she developed multiple episodes of seizure and postictal confusion lasting for more than 30 minutes. She also experienced involuntary micturition and one episode of vomiting. There was no history of chest pain, breathing difficulty,
loose stools, photophobia, abdominal pain or burning micturition. She had no significant medical history, with no prior neurological illness and was not on any regular medications. On examination she was febrile with mild tachycardia. Neurological assessment showed a low Glasgow Coma Scale (GCS) of E2V2M5 along with focal neurological deficits and positive Kernig's sign and neck stiffness was absent. Due to low GCS she was intubated for airway protection and stabilization.

Her initial blood investigations revealed leucocytosis with a total white blood cell count of 15,015 cells/cumm along with an elevated C-reactive protein (CRP), both suggesting an inflammatory or infectious process. In view of multiple episodes of seizure and post ictal confusion, a non-contrast computed tomography (CT) scan of the brain was done and showed no significant abnormality. Her MRI brain with FLAIR contrast sequences was done and showed extensive leptomeningeal enhancement in bilateral cerebral and cerebellar hemispheres which is a suggestive of meningitis. EEG showed a moderate degree of generalized non-specific disturbance of electrical function supporting ongoing encephalopathy. MR venogram suggested mildly hypoplastic right transverse sinus without evidence of venous thrombosis. Relevant laboratory and immunological tests are shown in Table 1 and Table 2 respectively.

From the clinical picture of fever, convulsions, impaired mental status, and imaging studies suggestive of meningitis, a diagnosis of CNS infection was made.

The cerebrospinal fluid (CSF) culture and analysis was performed and found the presence of Listeria monocytogenes. CSF cryptococcal antigen test was negative, indicating absence of cryptococcal meningitis. Blood and urine cultures were sent and found to be negative. After the confirmation of Listeria infection, her antibiotics were adjusted accordingly to IV Vancomycin for 5 days followed by high-dose intravenous ampicillin for17 days, which is the first line choice for Listeria meningitis. Inj. Lacosamide

was given for seizure control. As her neurological status and GCS improved she was successfully extubated and hence her antibiotics were stopped and intravenous medications for seizure prophylaxis were changed to oral medications and was discharged with oral medicines and other supportive care.

**Table 1: Laboratory Tests**

| PARAMETERS | DAY 1 | DAY 3 | DAY 8 | DAY 12 | DAY 15 | FOLLOW UP |
|---|---|---|---|---|---|---|
| TOTAL COUNT | 15010 | 15300 | 12600 | 9400 | 6300 | 5000 |
| CRP | 13.5 | 40.7 | 137.8 | 29 | 19.3 | 11 |

**Table:2 CSF -EXAMINATION, ROUTINE & MICROSCOPY**

| | |
|---|---|
| CSF Colour | Colourless |
| CSF Appearance | Clear |
| CSF TLC | 25 (0 – 5) cells/µL |
| CSF DLC | N-01, L-24 |
| CSF Microscopy | RBCs :0-1/HPF |
| Protein, Total, CSF | 118.20 mg/dL (15-45) |
| Adenosine Deaminase (ADA), CSF | 2.90 U/L (0-5) |
| Glucose, CSF | 90 mg/dL |
| Cryptococcus Antigen | Negative |
| PAN FUNGAL DETECTION PCR | Negative |

**Table:3 MENINGITIS/ENCEPHALITIS PANEL CSF- BIOFIRE FILMARRAY**

| | |
|---|---|
| Escherichia coli K1 | NOT DETECTED |
| Haemophilus influenzae | NOT DETECTED |
| Listeria monocytogenes | DETECTED |
| Neisseria meningitidis | NOT DETECTED |
| Streptococcus pneumoniae | NOT DETECTED |
| Streptococcus agalactiae | NOT DETECTED |
| Cytomegalovirus | NOT DETECTED |
| Enterovirus | NOT DETECTED |
| Herpes simplex virus 1 | NOT DETECTED |
| Herpes simplex virus 2 | NOT DETECTED |

| | |
|---|---|
| Human herpesvirus 6 | NOT DETECTED |
| Human parechovirus | NOT DETECTED |
| Varicella zoster virus | NOT DETECTED |
| Cryptococcus neoformans | NOT DETECTED |

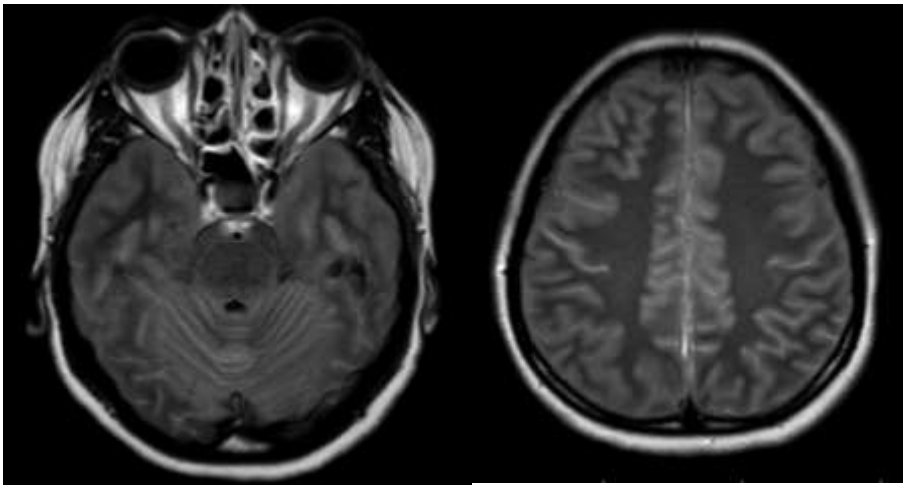

**Fig: 1 Mri Showing Leptomeningial Enhancement**

## DISCUSSION

Listeria monocytogenes is a ubiquitous bacterium which is a food born pathogen that causes mild to moderate infection in humans especially in immune compromised patients. According to the Centre for Disease Control (CDC) 260 people out of 1600 infected patients die every year. Hence early detection and management are crucial to prevent its CNS complications.

This patient met all the criteria like fever, headache, altered mental status and positive Kernig's sign. But neck stiffness was absent. Her inflammatory markers like CRP and TLC were elevated. CSF meningitis panel detected the presence of L. monocytogenes.

Our patient responded well to the treatment with IV Ampicillin 2 g for 17 days. For the seizure episodes she was managed with IV Levipil and Lacosamide for 5 days later changed to oral form. As she was hemodynamically stable her antibiotics and other supportive medicines were optimised. Similar case scenario was also published by Li N in which patient presented with headache and fever later.The patient was diagnosed with encephalitis and positive for L monocytogenes and treated with vancomycin, meropenem, mannitol, methylprednisolone, and enteral nutrition. [9]

## CONCLUSION

Even though Listeria infections are rare it must be considered while making the differential diagnosis for meningoencephalitis. Early detection, diagnosis and treatment with appropriate antibiotics can prevent the complications of infection. Timely interventions and awareness can significantly reduce the risk of serious complications and fatalities.

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