



# Rare Case of Thalamic Abscess Due to *Listeria Monocytogenes*

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Submitted: 10 March 2022, accepted: 5 April 2022, published: 13 April 2022

**Abstract:** *Listeria monocytogenes* (*L. monocytogenes*) infection is a rare cause of meningoencephalitis. Brain abscess represents only 1–10% of *Listeria* central nervous system (CNS) manifestations. The typical finding on magnetic resonance image (MRI) of the brain is ring enhancement after contrast administration. We report a 71-year-old female patient with anal squamous cell carcinoma who developed a fever and deterioration of mental status caused from a brain abscess. *L. monocytogenes* is a rare pathogen of thalamic brain abscess.

**Keywords:** *Listeria monocytogenes*; thalamic brain abscess; rare location of *Listeria monocytogenes* brain abscess; immunocompromised host

**How to cite:** Patel, P.M.; Rehman, A.; Rivera, C.I.; Tuda, C. Rare Case of Thalamic Abscess Due to *Listeria Monocytogenes*. *Priv. Pract. Infect. Dis.*, 2022, 2(1): 3; doi:[10.55636/ppid2010003](https://doi.org/10.55636/ppid2010003).

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## Introduction

*Listeria monocytogenes* (*L. monocytogenes*) is a Gram-positive, facultatively anaerobic, non-spore-forming bacillus. In most cases, it is a contaminant in food and water [1,2], and ingestion is the most common route of transmission. It is an uncommon cause of invasive foodborne infection in humans, with an estimated 1600 cases per year in the United States [3,4]. However, the link between neurological presentation and the ingestion of food or water contaminated by *Listeria* may be difficult to identify, as the onset of symptoms can be as late as 1 month after pathogen exposure [4]. Immunodeficiency, extreme age (neonates and people older than 50 years of age), and pregnancy are correlated with a higher risk of invasive infection. Meningoencephalitis is the most common central nervous system (CNS) manifestation of listeriosis. However, brain abscess contributes only 1–10% of all CNS listeriosis [5,6]. The disease carries significant morbidity and mortality rates. There is no specific radiologic characteristic that can be observed in a radiograph, but the most common manifestation is ring-enhancing lesions, as seen with other types of brain abscesses. Early diagnosis followed by prompt and appropriate antibiotic therapy improves clinical prognosis.

## Case Presentation

Here, we report the case of a 71-year-old female with a recently diagnosed anal squamous cell carcinoma in August 2020. She completed chemotherapy and radiation therapy in October 2020. She also had a history of liver transplant 17 years prior due to primary biliary cirrhosis. Initially, the patient presented to an emergency room with a fever of 103 F, nausea, and myalgia. Blood cultures were drawn. Computed tomography of the abdomen and pelvis showed a  $1.8 \times 1.5$  cm soft tissue prominence in the perirectal space, which was thought to represent either phlegmonous change or the previously diagnosed anal carcinoma. She was discharged on oral Augmentin for possible intraabdominal infection. Three days later, the patient again presented to an emergency room, this time with a worsening mental status over two days. The physical exam revealed cachexia, stupor, brief opening of the eyes to physical stimuli, and strength in all four extremities. There was no neck stiffness in this patient. Blood culture from the ER visit three days prior was positive for Gram-positive rods and grew *L. monocytogenes* [Figure 1]. Routine laboratory findings, including complete blood count, and renal and hepatic functions, were all within normal limits. She underwent lumbar puncture, which showed markedly elevated protein at 1000, normal glucose, and increased nucleated cells, with lymphocytic pleocytosis, which is typical in CNS listeriosis. MRI of the brain revealed a single small 5–6 mm round ring-enhancing lesion in the right thalamus and surrounding edema (Figure 2). The patient received three weeks of synergistic therapy with ampicillin and gentamicin. She completed a total of six weeks of ampicillin and two weeks of gentamicin synergy with neurological improvement.

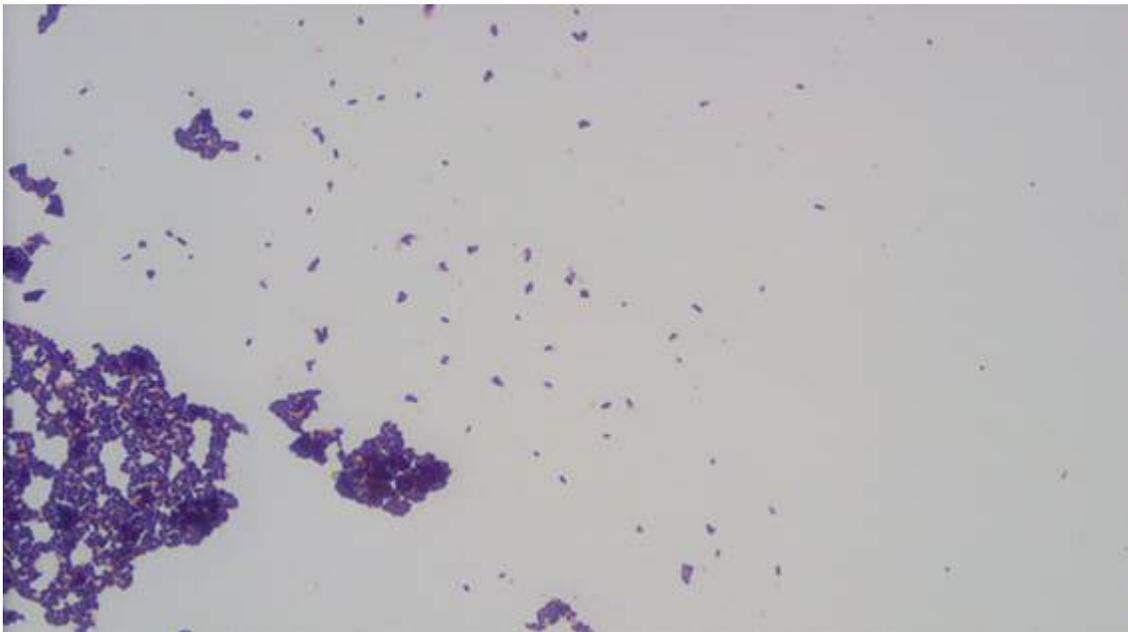
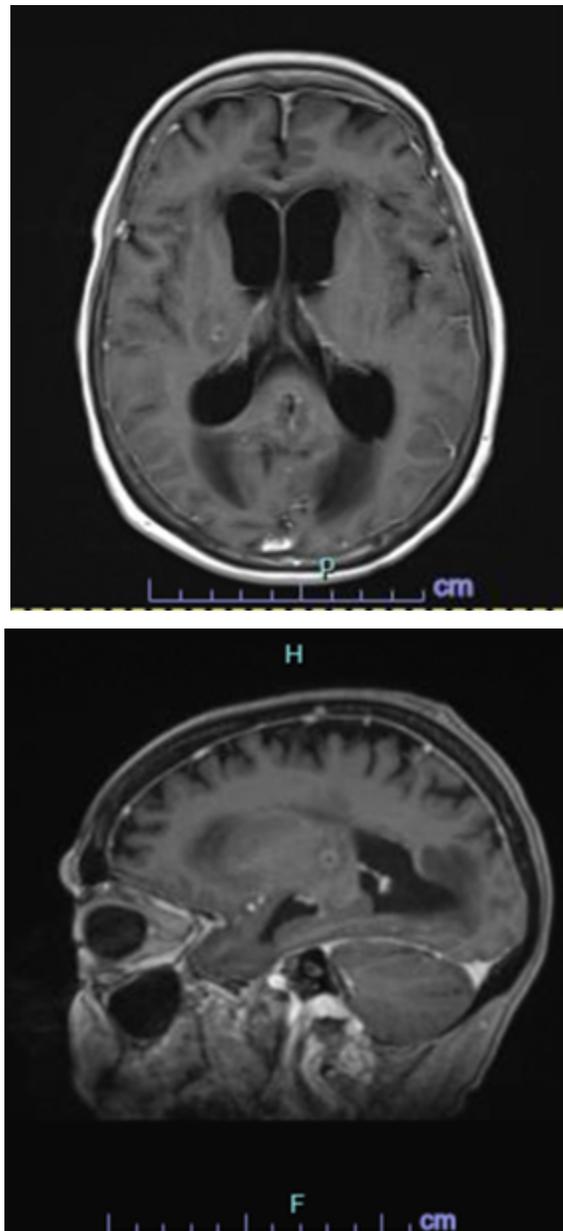


Figure 1: Blood culture gram stain: Gram positive bacilli.



**Figure 2:** MRI brain demonstrated single ring-enhancing lesion in right thalamus.

## Discussion

Listeria brain abscesses are extremely rare and were reported in only 56 cases in the world from 1968 to 2011 [7]. The most common form of listeria CNS infection is meningoen­cephalitis. Brain abscess occurred in only a small percentage of all listeria CNS infections, and the common locations were the thalamus, pons, and medulla [8]. Hematogenous spread is the main route of infection [6]. *L. monocytogenes* is ubiquitously found in soil and water. Humans are infected by this organism via the ingestion of contaminated packaged food, especially seafood, dairy, and vegetables. Pathogenesis invades the small bowel and accumulates in mesenteric lymph nodes and

the bloodstream. When it penetrates the blood–brain barrier, it can cause CNS manifestations of the disease.

A predisposing factor which can cause severe infections in humans is an immunocompromised status [6]. Our patients advanced age and her prior history of cancer represent two well-established risk factors for invasive listeriosis. Our patient presented with indolent symptoms, such as fever and altered sensorium, which perhaps delayed diagnosis. Additionally, her listeria infection might have been partially treated by the oral Augmentin, and hence, the course of the disease was prolonged.

The common etiologies responsible for brain abscesses are Staphylococcus and Streptococcus, with frequent intracranial locations being the frontal–temporal, frontal–parietal, parietal, cerebellar, and occipital lobes. The most common organisms responsible for thalamic abscesses are Streptococcus species and anaerobic organisms [9]. Our patient had a brain abscess in the thalamic region, which is an unusual location.

## Conclusions

We deemed it important to report this case, as we were fascinated by the unusual location of the ring-enhancing lesion. The most common organisms responsible for thalamic abscess are Streptococcus species and anaerobic organisms. A high index of suspicion in patients with risk factors for this infection is key to ensure the timely initiation of appropriate empiric antibiotic therapy in the setting of cerebral ring-enhancing lesions. Thalamic abscesses in particular carry high mortality and morbidity rates. Intravenous ampicillin is the treatment of choice, but trimethoprim/sulfamethoxazole and meropenem represent valid alternatives in penicillin-allergic patients. A synergistic effect has been demonstrated when ampicillin is combined with gentamicin.

**Author Contributions:** P.M.P.: Conceptualization, Resources, Writing; A.R.: Writing; C.I.R.: Review and editing; C.T.: Supervision. All authors have read and agreed to the published version of the manuscript.

**Funding:** This research received no external funding.

**Conflicts of Interest:** The authors declare no conflict of interest.

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