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(CASE REPORT)

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Listeria monocytogenes meningoencephalitis in an immunocompetent patient: Report of an unusual case and review of the literature

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Abstract

Introduction: Listeria monocytogenes is an intracellular Gram-positive bacterium responsible for serious infections, especially meningoencephalitis, in immunocompromised individuals, pregnant women, and neonates. However, cases in immunocompetent individuals are rare and underdiagnosed.

Case presentation: A previously healthy 34-year-old woman presented with severe headache, fever, and altered mental status. Cerebrospinal fluid (CSF) analysis revealed mononuclear pleocytosis, hypoglycorrhachia, and elevated protein levels. Culture and PCR identified Listeria monocytogenes. She was treated with ampicillin and gentamicin for 21 days, with complete recovery.

Discussion: This case demonstrates Listeria 's ability to cause meningoencephalitis even in patients without predisposing factors. Dietary factors, bacterial virulence, and individual genetic susceptibility may contribute to the clinical presentation. Relevant pathophysiological, diagnostic, and therapeutic aspects are reviewed.

Conclusion: Listeria monocytogenes should be considered in the differential diagnosis of subacute bacterial meningitis in young adults, especially in contexts of high-risk food exposure.

Keywords: Listeria monocytogenes; Meningoencephalitis; Immunocompetent; Listeriosis; Central nervous system

1. Introduction

Listeria monocytogenes is a facultative anaerobic, Gram-positive bacillus with high resistance to adverse conditions of temperature, pH, and salinity. It can survive refrigeration, which explains its persistence in ready-to-eat foods such as soft cheeses, sausages, vegetables, and processed meats [1].

Listeria meningoencephalitis is a severe form of invasive listeriosis, accounting for 2% to 5% of bacterial meningitis cases in adults. Although its incidence is low (0.1–0.3 cases per 100,000 inhabitants/year), the case fatality rate can reach 30% in cases not treated promptly [2]. In Colombia, clinical reports are scarce, but the National Institute of Health (INS) has documented the presence of *Listeria* in food samples since 2022.

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This case describes a central nervous system (CNS) infection by *Listeria monocytogenes* in an immunocompetent patient, highlighting the importance of microbiological diagnosis and targeted treatment, as well as the epidemiological implications for Latin America.

2. Case presentation

This is a 34-year-old woman, resident of Barranquilla, an office worker, with no significant past medical history. She did not regularly take any medications, nor did she have any known immunosuppression. She denied any history of HIV, corticosteroid use, pregnancy, or autoimmune diseases.

She presented to the emergency department with a progressive, holocranial headache of 7 days' duration, described as oppressive in nature, with an intensity of 9/10, associated with fever (38.5 °C), chills, nausea, vomiting, and a sensation of neck stiffness. In the last two days, she noticed daytime sleepiness, difficulty concentrating, and mild disorientation. She did not report any seizures or loss of consciousness.

2.1. Physical examination

BP 108/72 mmHg, HR 94 bpm, RR 22 rpm, T 38.4 °C. Glasgow 12/15 (O3, V4, M5), nuchal rigidity and positive Brudzinski sign. No focal neurological deficits. Other systems without relevant findings.

2.2. Initial laboratory tests

Blood count with leukocytosis with predominance of neutrophilia, elevation of acute phase reactants, negative tests for sexually transmitted diseases, without other alterations (Table 1).

Table 1 Initial laboratory tests

Parameter	Result	Reference
Leukocytes	13 200 /µL	(4,000–10,000)
Neutrophils	80%	(45–75%)
Hemoglobin	12.8 g/dL	(12–16)
Platelets	248,000 /µL	(150,000–400,000)
PCR	45 mg/L	(<5)
Procalcitonin	0.38 ng/mL	(<0.1)
Blood glucose	92 mg/dL	(70–110)
HIV, VDRL, HBsAg, anti-HCV	Negative	—

2.3. Neuroimaging:

Non-contrast brain CT showed no signs of intracranial hypertension or space-occupying lesions (Figure 1).

Figure 1 Simple skull tomography

2.4. Cerebrospinal fluid

Clear appearance, 510 cells/µL (80% mononuclear), protein 186 mg/ dL , glucose 44 mg/ dL (CSF/serum ratio 0.48). Gram stain: negative. Multiplex PCR and culture positive for *Listeria monocytogenes* at 48 hours.

Treatment was initiated empirically with ceftriaxone and vancomycin; adjusted to ampicillin 2 g IV every 4 hours plus gentamicin 5 mg/kg/day after the microbiological result. Clinical improvement was observed by day five. Ampicillin was continued for 21 days. Hospital discharge on day 22 without sequelae. At the three-month follow-up, the neurological examination was normal.

3. Discussion

Listeria monocytogenes meningoencephalitis presents a clinical challenge due to its low frequency and atypical presentation. Although it is mainly associated with immunosuppression, pregnancy, or extremes of age, several studies have documented cases in immunocompetent individuals, suggesting additional susceptibility mechanisms [3].

Listeria possesses specific virulence factors, such as internalins A and B, which facilitate its invasion of the intestinal epithelium, as well as listeriolysin O, which allows it to escape the phagosome and multiply in the cell cytoplasm Subsequent hematogenous dissemination allows crossing of the blood-brain barrier and the formation of infectious foci in the meninges, brainstem and cerebellum [4] .

In immunocompetent hosts, it has been proposed that high infectious doses or hypervirulent strains, such as the CC1 and CC4 clonal complex, could be determining factors in the development of neurological disease. Furthermore, polymorphisms in genes of the innate immune system (such as TLR2 and TLR4) could confer individual susceptibility [5].

Globally, the incidence of invasive listeriosis has increased slightly in the last decade due to population aging and changes in dietary habits [6]. In Latin America, documented outbreaks have been associated with contaminated refrigerated foods. In Colombia, the *2024 INS Surveillance Report reported Listeria* isolates in 2.8% of meat products and 1.9% of artisanal fresh cheeses analyzed. Although a national mandatory reporting system has not been established, sporadic cases in young adults demonstrate its potential emergence as a relevant foodborne pathogen [7].

The clinical presentation is often confused with viral, tuberculous, or enterobacterial meningoencephalitis. The mononuclear pleocytosis in the cerebrospinal fluid (CSF), observed in this case, is a key clue, as it differs from the neutrophilic pattern typical of other bacterial meningitis. Gram staining has low sensitivity (<40%), so multiplex PCR

and culture remain the diagnostic gold standard. In cases with subacute presentation or partial response to cephalosporins, active *Listeria infection should be suspected* [8].

Conventional empirical antimicrobial therapy for bacterial meningitis (ceftriaxone + vancomycin) is ineffective against *Listeria* . Therefore, the early addition of ampicillin is essential, especially in high-risk groups or when the diagnosis is uncertain.

The recommended treatment is ampicillin (2 g IV every 4 hours) for at least 21 days, combined with an aminoglycoside for the first 10–14 days due to bactericidal synergy. In cases of penicillin allergy, trimethoprim-sulfamethoxazole is the preferred alternative [9].

Mortality ranges from 15% to 30%, and neurological sequelae (ataxia, paresis, or cognitive impairment) occur in up to 40% of survivors. In these cases, timely diagnosis and early initiation of targeted therapy explain the favorable outcome [10].

This case contributes to the Latin American literature by showing that *Listeria monocytogenes* can affect immunocompetent adults, likely through foodborne exposure and bacterial virulence factors. Microbiological surveillance, case reporting, and strengthening sanitary measures in the food chain are essential to reducing population risk. It also underscores the need to consider *Listeria* within the diagnostic spectrum of subacute meningoencephalitis, even in patients without apparent comorbidities.

4. Conclusion

Listeria monocytogenes meningoencephalitis should be suspected in cases of bacterial meningitis with mononuclear pleocytosis and poor response to cephalosporins, even in young, immunocompetent patients. This case reinforces the importance of thorough microbiological evaluation and early initiation of appropriate antibiotics.

Compliance with ethical standards

Disclosure of conflict of interest

The authors declare that they have no conflict of interest.

Statement of informed consent

Informed consent was obtained from all individual participants included in the study.

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