CASE REPORT

Simultaneous supratentorial and brainstem abscesses due to *Listeria monocytogenes*

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Abstract  Multiple supratentorial abscesses caused by *Listeria monocytogenes* are rare. We report the simultaneous occurrence of multiple supratentorial and brainstem abscesses due to *Listeria*, in a patient under corticotherapy for an exacerbation of ulcerative colitis. MR imaging features before and after successful conservative treatments are depicted. In immunocompromised patients with supratentorial listerial abscesses, the coexistence of brainstem abscedation is exceptional. Despite high mortality associated with listerial abscesses, this case illustrates the possibility of a good clinical outcome, if the appropriate antibiotic regimen is instituted and the immunosuppressant agent is discontinued.

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Résumé Les abcès multiples supratentoriels à *Listeria monocytogenes* sont rares. Nous rapportons l’observation de la survenue simultanée d’abcès multiples supratentoriels et du tronc cérébral chez un patient sous corticothérapie pour colite. Les aspects en imagerie par résonance magnétique (IRM), avant et après un traitement sont décrits. Chez les patients présentant un déficit immunitaire, une atteinte listérienne supratentorielle coexistant avec des abcès du tronc cérébral est exceptionnelle. Cette observation illustre la possibilité d’une évolution clinique favorable, si le traitement antibiotique est institué et le traitement immunosupresseur arrêté.

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Introduction

*Listeria monocytogenes* is an intracellular Gram-positive rod that is known to cause systemic and central nervous system (CNS) infection, afflicting mainly the immunossuppressed and perinatal–neonatal populations [12].

CNS involvement by *L. monocytogenes* includes meningitis and other less common manifestations, such as meningoencephalitis, rhomboencephalitis, cerebritis and abscesses [2,9,14]. Brain abscesses account for approximately 10% of CNS listerial infections and are seen in 1% of all listerial infections [10].

In 2003, Cone et al. [6] reviewed published cases of brain abscesses due to *L. monocytogenes*. Thirty of the 40 observed were solitary ones and only four presented with more than three abscesses.

We present a case of multiple *Listeria* brain abscesses, describe its imaging findings and discuss the potential physiopathologic mechanism of this infection.

Case report

A 46-year-old woman presented to our emergency department with a five-day history of general malaise, fever, headaches and progressive lethargy. She took prednisolone (40 mg per day) for an exacerbation of her ulcerative colitis 6 weeks before and had recently been diagnosed to have diabetes mellitus.

On examination, the patient was feverish (40.4°C), comatose, with conjugate eye deviation to the right. She also exhibited left hemiparesis and evident neck stiffness.

Laboratory analysis showed a mild leukocytosis (13.1 × 10⁹/l) and elevated C-reactive protein (75 mg/l). A lumbar puncture revealed an opening pressure of 490 mm of water, a leukocyte count of 50 cells/mm³ (consisting of 67% neutrophils), a glucose level of 42 mg/dl (serum level of 168 mg/dl) and a protein level of 1.14 g/l.

MR imaging displayed multiple rounded lesions, with variable sizes, involving the right thalamus, basal ganglia and frontal white matter. The midbrain structures were bilaterally involved. The lesions were characterized by prolonged T2 (Fig. 1A), restricted water diffusion (Fig. 2) and ring-like or nodular enhancement after contrast administration (Fig. 1B–D).

Cultures of blood and CSF samples yielded *L. monocytogenes*. An ultrasound study of the abdomen failed to reveal hepatic lesions. The patient was treated with intravenous ampicillin (8 g per day) for eight weeks and gentamicin (300 mg per day) for 4 weeks. She recovered her consciousness within five weeks and was discharged with slight bilateral restriction of ocular abduction and...
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pressed patients[2].

suggesting that suppressed immunity is a risk factor for listerial supratentorial brain abscess are immuno-

white matter is another elective location.

occurring in up to 21%[8,10]. The frontoparietal subcortical

grey matter , such as the thalamus and the basal ganglia,

strengthens the presumed blood dissemination through the

capillary endothelium, via middle cerebral artery. There-

Cerebritis and subsequent abscess formation result from

contact with the extracellular space[7].

In the CNS, meningitis may follow as the organism

attaches to the epithelial cells on the choroid plexuses.

Cerebritis and subsequent abscess formation result from

penetration in the brain parenchyma, through the cerebral

capillary endothelium, via middle cerebral artery. There-

fore, bacteraemia is a laboratory finding in about 86% of

*Listeria* abscesses. Bacteraemia is an unusual laboratory

finding in brain abscesses caused by other bacteria, occur-

ring in 11% of cases [8]. As in our case, listerial brain abscess

have been associated with meningitis in up to 38% of the

patients [8].

On the other hand, listerial rhombencephalitis may be

explained by axonal transport of food borne *Listeria* to the

brainstem, after entering cranial nerve endings [1]. The

proposition of two different mechanisms for two different

lesions (supratentorial abscesses and rhombencephalitis)

strengthens the presumed blood dissemination through the

perforating arteries of the basal ganglia and brainstem in

our patient.

The limited number of reported cases of multiple brain

abscesses caused by *L. monocytogenes* provided few reports

of MR imaging correlations. Involvement of the subcortical

grey matter, such as the thalamus and the basal ganglia,

are more common than in abscesses due to other agents,

occurring in up to 21% [8,10]. The frontoparietal subcortical

white matter is another elective location.

Seventy-five percent of patients presenting more than one

listerial supratentorial brain abscess are immuno-

suppressed versus 58% of those with solitary abscesses,

suggesting that suppressed immunity is a risk factor for lis-

terial brain abscesses and even more so with multiple ones

[6]. Differently, rhombencephalitis often occurs in otherwise

healthy adults, with only 8% of cases found in immunosup-

pressed patients [2].

Since listerial abscesses are rare entities, alternative
diagnosis of more common conditions occurring in the

immunocompromised patient must be considered. Toxoplas-
mosis also presents with multiple lesions, involving the

basal ganglia. However, normal ADC values are usually

seen [5]. Pyogenic abscesses are infrequently multiple and
typically show restricted diffusion [4]. Additionally, a rim

of hyperintensity on T1-weighted images and low signal

on long-TR sequences due to the presence of free radicals

is characteristically found. In our case, basal ganglia

abscesses showed restricted diffusion, without a rim of free

radiicals.

The combination of ampicillin (for a minimum of 4

weeks) and gentamicin (for 2–4 weeks) is the regimen

of choice for the treatment of listerial brain abscess

[11,13]. Trimethoprim—sulphamethoxazole may be a reason-
able alternative for the treatment of patients with allergy

to penicillin.

Mortality is high and not significantly different in patients

with more than one abscess (44%) from those with a single

abscess (40%) [6]. However, it is significantly higher than in

non-listerial supratentorial brain abscess.

Finally, we excluded the concomitant presence of hep-

atic abscesses, which seems to predict a dismal outcome. In

Braun’s review of liver abscesses due to *L. monocytogenes*

[3], all the patients with multiple liver abscesses expired,

while those with solitary ones survived.

Despite high mortality associated with listerial abscesses,

this case illustrates the possibility of a good clinical out-
come, if the appropriate antibiotic regimen is instituted and

the immunosuppressant agent is discontinued.

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