CT And MR Findings In A Case Of Listeria Monocytogenes Encephalitis Complicated By Hydrocephalus

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Citation

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Abstract

Listeria monocytogenes is a gram-positive bacillus, that uncommonly affects hosts who are immunodepressed. Listeriosis of central nervous system is unusual and temporal lobe involvement is even more rare; it consists of meningitis, meningoencephalitis, rhomboencephalitis, cerebritis and brain abscesses. Our case describes Listeria encephalitis with hydrocephalus and brain abscess in a 46-year-old woman, affected by crioglobulinemia and hepatitis C. The final diagnosis was based on clinical findings, blood culture, cerebrospinal fluid results and, obviously, on cranial computerized tomography (CT) and magnetic resonance imaging (MRI) findings. CT seems useful both for disease detection and follow-up of potential complications, like hydrocephalus. MRI should be considered not only for detection of small necrotic lesions, but also to distinguish these lesions and then avoiding delay of appropriate treatment. In this regard, diffusion-weighted images seem to play a pivotal role to reveal and to characterize the lesions.

INTRODUCTION

Listeria monocytogenes is a gram-positive bacillus uncommonly affecting hosts who are immune-depressed. Listeriosis of the central nervous system is unusual and temporal lobe involvement is even more rare; it consists of meningitis, meningoencephalitis, rhomboencephalitis, cerebritis and brain abscesses. Our case describes Listeria encephalitis with hydrocephalus and brain abscess in a 46-year-old woman, affected by cryoglobulinemia and hepatitis C. The final diagnosis was based on clinical findings, blood culture, cerebrospinal fluid results and, obviously, on cranial computerized tomography (CT) and magnetic resonance imaging (MRI) findings. CT seems useful both for disease detection and follow-up of potential complications, like hydrocephalus. MRI should be considered not only for detection of small necrotic lesions, but also to distinguish these lesions and then avoiding delay of appropriate treatment. In this regard, diffusion-weighted images seem to play a pivotal role to reveal and to characterize the lesions.

CASE REPORT

A 46-year-old woman came to the local emergency department with fever and drowsiness. Her medical anamnesis reported a long history of cryoglobulinemia and hepatitis C. Moreover, two months earlier she had been hospitalized for acute haemolytic anaemia; in that occasion a chronic type B lymphoproliferative monoclonal disease was diagnosed after sternal puncture.

At the time of admission clinical examination showed aphasia and mild right arm paresis. Computerized tomography (CT) of the head (Lightspeed Ultra, GE Medical System, Milwaukee, USA) revealed an area of low attenuation in left temporal lobe, not involving cortical gyri and without mass effect (Fig.1). She was admitted in the department of internal medicine, suspecting an ischemic stroke. The day after the admission she developed haemolytic anaemia, for which she underwent transfusions. Blood culture was performed and generic antibiotic treatment was started.

A follow-up CT obtained 24 hours after showed moderate increase in size of temporal lesion. Two days later clinical condition worsened; patient was lethargic and responded only to painful stimulation. CT with contrast administration revealed a supratentorial hydrocephalus and periventricular low attenuation, while the temporal lesion became wider with an inner ring of weak enhancement, poorly delineating an inhomogeneous oval area (fig.2). The patient was transferred to the intensive care department. At this time result of blood culture was available and positive for Listeria

monocytogenes. Cerebrospinal fluid culture was negative for Listeria, viral and fungal microorganisms; other findings included monocytosis (63% monocytes in leucocyte count), protein level of 462 mg/dl and normal glucose level. Serum human immunodeficiency virus test was negative. Specific antibiotic therapy was begun with piperacillin, gentamicin, sultamicillin, associated to acyclovir, methylprednisolone and omeprazol.

The next day a cranial MRI was obtained with a 1.5T machine (Achieva, Philips Medical System, Best, The Netherlands), performed with T1, T2, PD, FLAIR, diffusion weighted imaging (DWI) with two different b values (0 and 1000 s/mm2), apparent diffusion coefficient map (ADC) and contrast administration. MRI findings easily confirmed triventricular hydrocephalus, periventricular oedema, thickening of choroid plexi, especially on the right, and the large temporal lesion, surrounded by oedema; moreover, two other small ipsilateral lesions were detected, both periventricular, adjacent to the body and to the splenium of corpus callosum, respectively. DWI and ADC map clearly demonstrated these two small nodular lesions with diffusion restriction as high signal foci in DWI and low signal in ADC (Figures 3a and 3b). The same results came from the larger temporal lesion in DWI surrounded by high signal in ADC (Figures 4a and 4b). On T1 images, only the large temporal lesion was clearly detected as an inhomogeneous hypointense area but the smaller periventricular lesions were not. On T2-weighted, PD and FLAIR images all the lesions appeared hyperintense (Figures 5 and 6).

After contrast administration, only the temporal lesion showed a deep, tiny ring of enhancement (Figures 7a and 7b).

A follow-up MRI examination was performed after five days of specific antibiotic therapy but no significant modifications of previous findings appeared. The patient continued to show clinical deterioration and died seven days later.

DISCUSSION

Listeria monocytogenes is a gram-positive, nonsporulating bacillus, that is a facultative intracellular parasite (4). It represents a rare cause of meningo-encephalitis, with a mortality rate of 19-50% (2). Most human infections by Listeria monocytogenes are acquired by consumption of contaminated food, but this bacillus attacks host who are immunocompromised or debilitated by factors such as pregnancy, the extremes of age, solid and lymphatic malignancies, autoimmune and liver diseases, as well as chronic illnesses like diabetes mellitus and heart diseases (4,7,8). Listeria has a predilection for invading central nervous system in humans: meningitis and meningoencephalitis are common manifestation of infection (1, 2, 5, 6, 8, 9). Rhomboencephalitis is found predominantly in not immunocompromised patients while brain abscesses occur in individuals compromised by underlying medical conditions or immunosuppressive therapy (4). The latter is the case in our report. Clinical symptoms of listeria infection are not specific. Most common signs are headache, altered sensorium, lethargia, cranial nerve palsies and coma (4,8,9). Diagnosis is based upon blood culture and CSF examination: the latter typically reveals increasing of leukocyte count, particularly monocytes, increased proteins and normal glycorrachia, but often culture is negative for listeria (4, 9). Nevertheless, early diagnosis is extremely important for treatment (1) and neuroimaging in addition to microbiological and CSF data is mandatory to demonstrate brain involvement, even if differential diagnosis is broad including viral encephalitis, vasculitic disease, lymphoma, brain tumours, neurosarcoidosis and tuberculosis (1). Most of the previous reports of listerial infections of the central nervous system have described involvement of brain stem and cerebellum (rhomboencephalitis). We report a case of brain involvement by listeria with detection of brain lesions followed up in its evolution, mainly by CT, with the finding of an acute hydrocephalus. At the first CT a poorly defined area of low attenuation in left temporal lobe was found without involvement of cortical gyri. At follow-up CT (after 24 hours) the lesion appeared lightly increased in size and more inhomogeneous. These findings were non-specific as reported by other authors (6). A new CT performed two days later revealed a hydrocephalus accompanied by periventricular oedema while contrast material depicted a ring of enhancement inside the lesion in the left temporal lobe. MR findings easily confirmed both temporal lesion and supratentorial hydrocephalus with oedema all around the ventricular cavities. It also revealed two more little lesions well demonstrated by diffusion imaging. At that time the result of blood culture was available (fig.8). All parenchymal lesions appeared markedly hyperintense on DWI and hypointense on ADC map suggesting restricted diffusion by necrotic processes like abscesses. The temporal focus was surrounded by high signal intensity both on DWI than on ADC images, findings suggesting interstitial-vasogenic oedema. These results correspond to DWI and ADC reports of other authors (3, 5). There is also another element to consider: thickening of the ependyma and of the choroid

plexus of the right occipital ventricular cavity produced by inflammatory changes related to infection like hydrocephalus.

In conclusion, CT may be considered useful in Listeriosis of the central nervous system both for disease detection and follow-up of potential complications like hydrocephalus. Nevertheless, MRI should be preferred and in all cases performed, not only for detection of small necrotic lesions, but also to characterize these lesions and then avoiding delay of appropriate treatment. In this regard, diffusion-weighted images seem to be very useful to reveal and to distinguish the lesions.

Figure 1

Nonenhanced cranial CT (fig.1) shows a poorly defined area of low attenuation in left temporal lobe, without mass effect. Contrast-enhanced cranial CT (fig.2) two days later reveals deep, ill-defined enhancement of the temporal lesion and also ventricular dilatation with surrounding low attenuation.

Figure 2

Nonenhanced cranial CT (fig.1) shows a poorly defined area of low attenuation in left temporal lobe, without mass effect. Contrast-enhanced cranial CT (fig.2) two days later reveals deep, ill-defined enhancement of the temporal lesion and also ventricular dilatation with surrounding low attenuation.

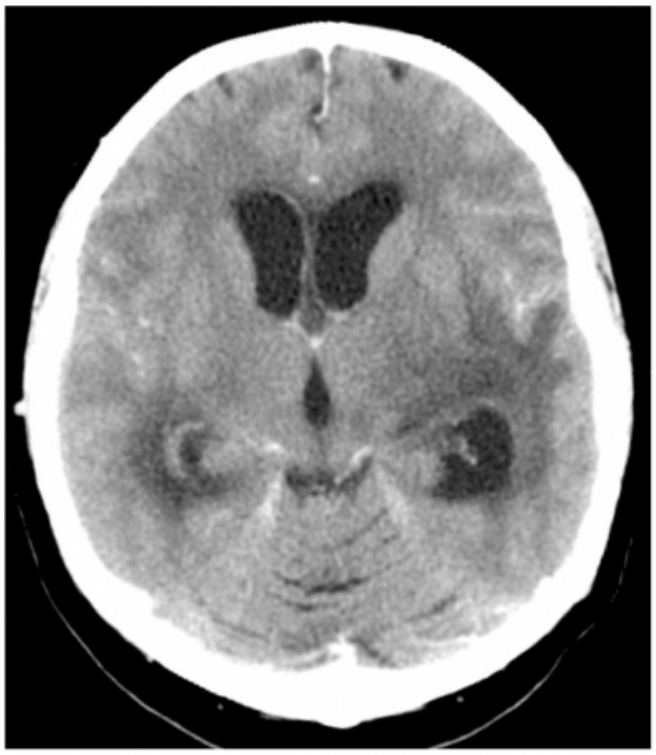


Figure 3a

DWI image shows two periventricular small nodular lesions with diffusion restriction, as high signal foci (arrows).

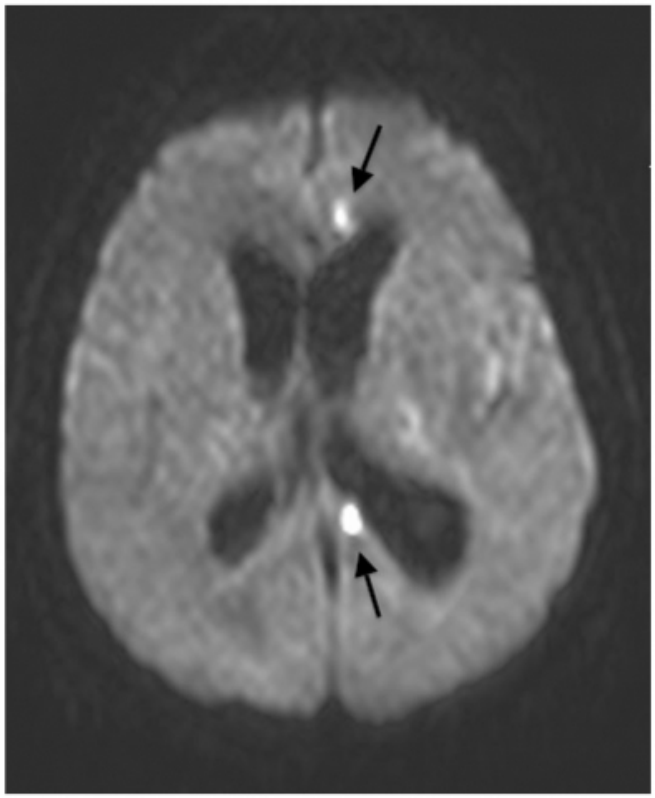


Figure 3b

On ADC map the lesions appear as low signal areas (arrows).

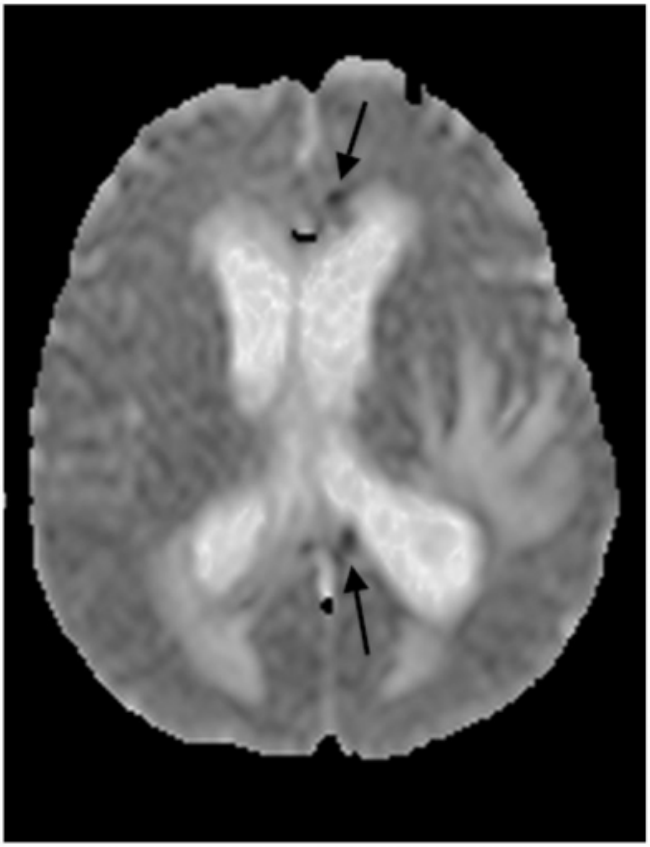


Figure 4a

On DWI images temporal lesion is easily detected as high signal area

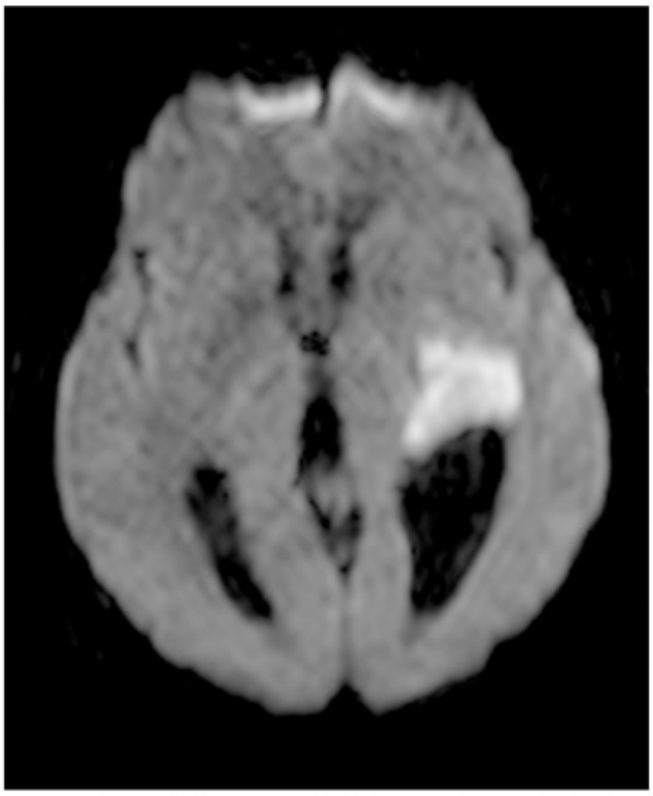


Figure 4b

On ADC map the extention of the lesion is well depicted (asterisk) while high signal around the lesion represents surrounding vasogenic-interstitial oedema.

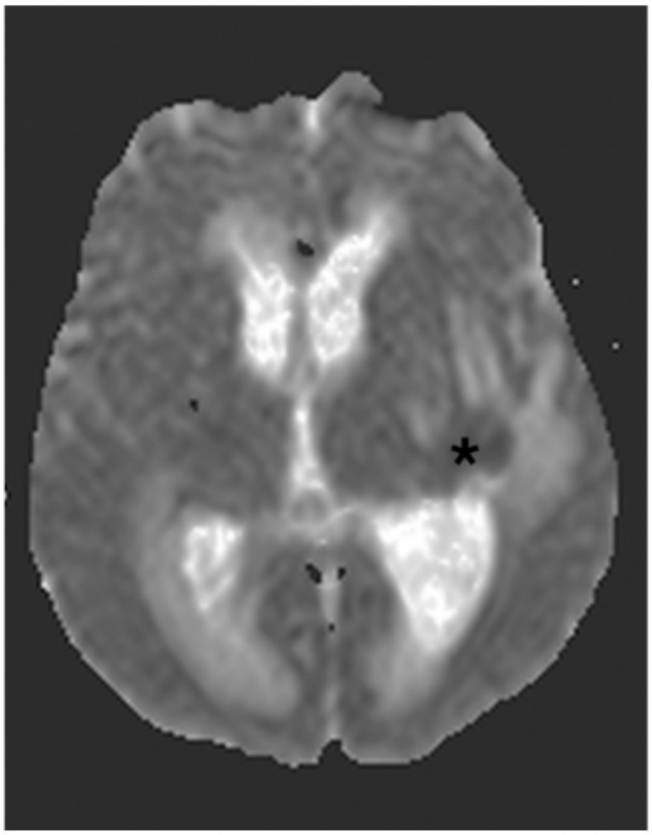


Figure 5

FLAIR image (TR 11000.0, TE 140.0) on coronal plane shows hydrocephalus and periventricular oedema at the level of the temporal lesion.

Figure 6

On T2 weighted image (TR 3600.0, TE 120.0) the two periventricular lesions are easily depicted as high signal foci (arrows).

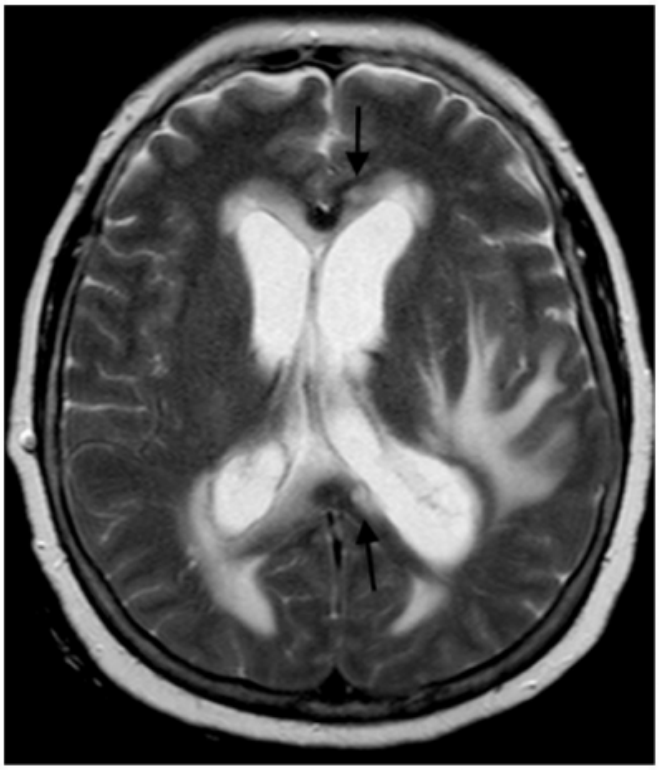


Figure 7a

T1 weighted image (TR 596.0, TE 15.0) with contrast agent reveals a tiny ring enhancement deep in temporal lesion

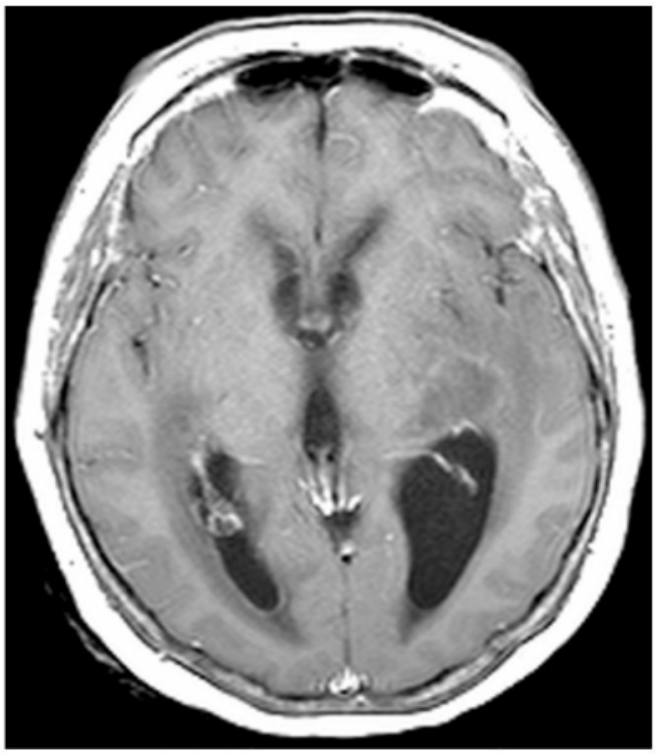


Figure 7b

The two smaller lesions do not enhance. Thickening of ependyma in the right ventricular occipital horn ventricular is clearly seen.

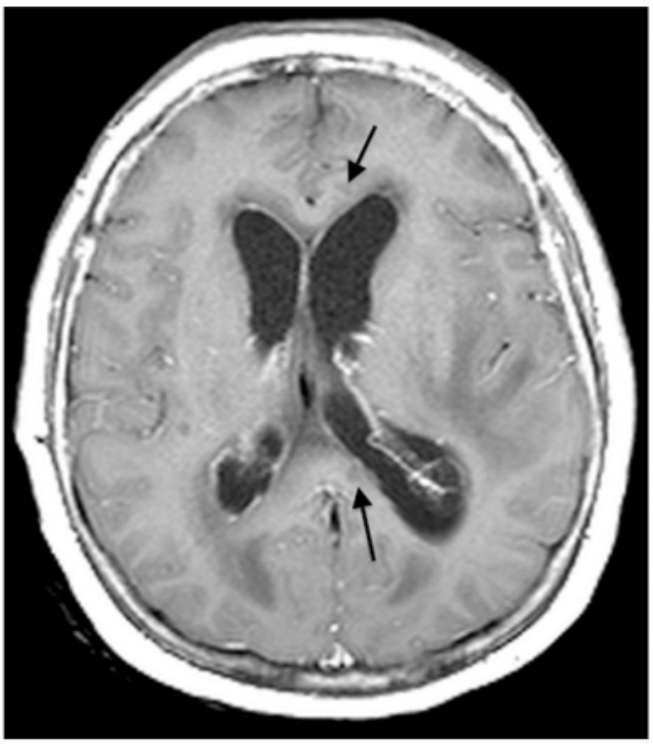
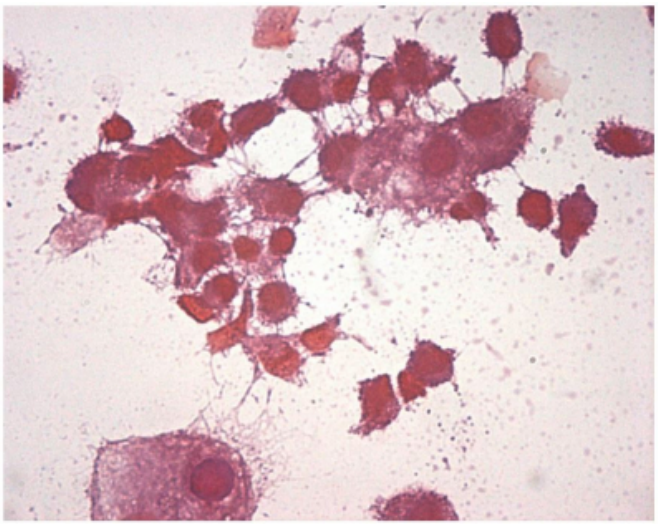


Figure 8

Listeria in blood culture.



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