Case report

MRI of neurosyphilis presenting as brain tumor: A case report

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Abstract

Syphilis has a broad spectrum of clinical manifestations, among which cerebral gumma is a kind of neurosyphilis. However, it is rare and can be cured by penicillin. We report a case of syphilitic gumma of which the patient was first suspected of brain tumor, but confirmed by surgery to be cerebral gumma due to neurosyphilis. Magnetic resonance imaging, which is thought to be one of the potential and specific diagnostic methods for neurosyphilis, is discussed.

Keywords: Neurosyphilis; Syphilitic gumma; Magnetic resonance (MR); 1H-MRS

1. Introduction

Syphilis is a complex systemic illness with protean clinical manifestations caused by a spirochete called Treponema pallidum. Neurosyphilis is one of the commonest causes. It can cause both symptomatic and asymptomatic clinical symptoms, which include meningitis and encephalitis. The central nervous system (CNS) involved in syphilis patients is classified into four syndromes: syphilitic meningitis, meningoencephalitis, parenchymatous and gummatous neurosyphilis. For the past few years, it presents a tendency of increasing incidence. Nevertheless the epidemiology of modern neurosyphilis is not well defined because of the paucity of population-based data [1]. The majority of neurosyphilis cases have been reported in HIV-infected patients. Here we report an unusual case of cerebral syphilitic gumma mimicking a brain tumor in a non-HIV patient.

2. Case report

In March 2015, a 62-year-old male was seen in an emergency room with a 12-day history of speech disturbance. He had a medical history of hypertension, controlled well with medication.

Vital signs at admission were stable. Both pupils showed normal light reflex. The result of the examination of deep tendon reflexes was normal, and there were no other neurological deficits, particularly headache or nuchal rigidity. His muscle strength was normal, and there were no muscle atrophy.

The results of the following investigations were normal: complete blood count, serum electrolytes, liver function test, and CSF test. Especially the anti-HIV antibody was negative. However, a brain MRI scans showed a mass. It was located at the frontal lobe of the left cerebrum. There was serious edema around the mass. A T1-weighted image showed hypointense and isointense, meanwhile T2-weighted image showed isointensity. Moreover, a diffusion-weighted image (DWI) showed high and medium signal intensity in the central portion of the lesion. In MRS, the choline peak was high, and the NAA peak. NAA/Cho was 0.268, and NAA/Cr was 0.775(Fig. 1) The clinical diagnosis was glioma and the patient was admitted to the hospital for surgery. In hospital,
Fig. 1. T1-weighted image(A), T2-weighted image(B), FLAIR(C), DWI(D), Contrast-enhanced image(E), MRS(F,G,H).
Fig. 2. T1-weighted image (A), T2-weighted image (B), FLAIR (C), DWI (D), Contrast-enhanced image (E), MRS (F,G,H).
more laboratory examinations were performed. And the
diagnosis of active neurosyphilis was given based on positive
results of the Venereal Disease Research Laboratory test/
Treponema pallidum hemagglutination reactions in blood and
cerebrospinal fluid samples. His TRUST was 1:8, with a
positive fluorescent treponemal antibody-absorption (FTA-
ABS) (IgG), the range was 39.95 S/CO.

He was treated by Penicillin instead of surgery with G
3.2 × 10,000,000 U/daily for 2 weeks. After 3 months, the
clinical signs and neuropsychological findings showed slight
improvement in general cognitive functioning. Improvement
was also noted on the brain MRI, and the lesion were reduced.
NAA/Cho was 0.717, and NAA/Cr was 1.08 (Fig. 2).

3. Discussion

Neurosyphilis is a slow progressive infection of the central
nervous system (CNS). It can occur at any stage of syphilis.
The radiologic findings of neurosyphilis include syphilitic
meningitis, meningovascular syphilis, parenchymatous and
gummatous neurosyphilis.

Syphilitic gumma develops from the dura and pia mater
over the cerebral convexity. Single or multiple masses attached
do both pia mater and dura mater can invade brain parenchyma [2].
The symptoms of gumma are similar to those tumors which arise
from brain parenchyma, and both of them are often accompa-
nied by a seizure. The radiological findings of gumma are
very inconsistent [3]. T1-weighted images show a hypo-
intensity or isointensity mass. T2-weighted images reveal a
homogeneous and hyperintensity mass, however, it shows a
mixed signal intensity in our case. There are some reports
revealed that the adjacent area of the mass shows hyper-
intensity on T1-weighted images and a hypointensity on T2-
weighted images [3,4]. Unfortunately in the present case, we
didn't find the symptom like this. Due to that gumma occurs
commonly in association with the meninges, the location of
lesion and the findings of contrast-enhanced imaging are
useful to make a diagnosis of gumma [5]. In the present case, both brain tumor and brain abscess were highly suspected,
because of the heightened contrast enhancement in the pe-
ripheral portion. A report by Vieira Santos et al. [6] presented
a case showing a hyperintense signal on DWI and the high
apparent diffusion coefficient (ADC) values. In our case, DWI
highly prompted brain abscess rather than tumor. Some reports
described an improvement of the signal hyperintensity weeks
or months after the treatment by Penicillin [6,7].

The MR spectroscopic image (MRS) showed comparatively
higher peaks formed by choline compounds, indicating the
possibility of a tumor rather than brain abscess. The
choline peaks in MRS represent the complexes of phos-
phorylcholine and glycerophosphorylcholine that are found in
the membrane, and these complexes play a role in cell
membrane synthesis or destruction; choline peaks are thus
regarded as markers of cancer. A recent report showed the
increasing absolute concentrations of Cho, Cr and mI, the
decreasing NAA/Cr and NAA/Cho, and the increasing mI/Cr
and mI/Cho in left hippocampus. It also showed the
decreasing NAA and NAA/Cr and the increasing mI/Cho in
right hippocampus [8]. There is an increased awareness of
mesial temporal T2 signal abnormalities in NS [9–12], but
the etiology is still uncertain. MRS holds promise to identify
NS in non-HIV patients with reactive syphilitic serology and
neurological symptoms [8].

4. Conclusion

The present case emphasizes that neurosyphilis may be
specific in neuroimaging aspects of brain tumor. The brain
MRI of syphilitic gumma has multiple performances, which
may one of the potential and specific diagnostic methods for
neurosyphilis.

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