An unusual cerebral mass lesion

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A 54-year-old Caucasian woman living in Bahrain presented with a four-week history of headache associated with heaviness in the left arm and leg. Her past history included recurrent migranous headaches with associated visual aura. Fifteen years prior to admission she had developed a temporary left facial palsy and unsteadiness diagnosed as Bell's palsy. The patient did not smoke and there was no history of drug abuse or blood transfusion. Clinical examination revealed brisk reflexes in the left arm and leg with slight reduction in power. A chest radiograph was normal. A computed tomography (CT) brain scan was performed. The pre-contrast scans revealed a low density area in the deep white matter of the right hemisphere. The post-contrast scan is shown in figure 1.

Figure 1 Axial CT brain scan following intravenous contrast. An enhancing mass lesion is seen in the deep white matter of the right hemisphere with surrounding low density oedema

Questions

- 1 What does the scan show?
- 2 What is the differential diagnosis?
- 3 How would you proceed?

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Answers

QUESTION 1

The CT scan demonstrates a ring enhancing mass lesion in the deep white matter of the right hemisphere with surrounding low density oedema. The complete CT scan obviously needs to be studied to assess whether this is an isolated lesion. This was indeed the case.

QUESTION 2

The differential diagnosis is that of an intrinsic cerebral space occupying lesion (see box).

QUESTION 3

The most common lesions to present with headaches and focal signs with these CT appearances are either a primary or secondary tumour or an abscess. Biopsy would therefore be needed for diagnosis. The past history here is, however, of great importance as 15 years previously this patient had experienced a facial palsy and ataxia. This may simply have been coincidental, but it is possible that this and the current presentation are part of the same disease process 'disseminated in both time and space'. A diagnosis other than tumour or abscess such as demyelination should therefore be considered and magnetic resonance imaging (MRI) requested.

Unfortunately this lesion was initially considered to be a brain tumour and the patient was submitted to stereotactic biopsy which was nondiagnostic. In the period following biopsy the patient developed focal motor seizures. In view of this and because of her past history an MRI brain scan was eventually performed. This demonstrated the lesion seen on CT but in addition revealed multiple abnormal areas of high signal in the deep white matter of both hemispheres (figure 2). Further lesions were seen in the brainstem (figure 3) and cerebellum (figure 4). These findings suggest a diagnosis of demyelination secondary to multiple sclerosis. Examination of the cerebrospinal fluid (CSF) revealed oligoclonal gamma globulin bands, also supporting this diagnosis.

Discussion

A diagnosis of multiple sclerosis is usually made on the basis of clinical signs and symptoms which are typically separate with respect to time and space. Multiple sclerosis may, however, present in many different ways including that of a space-occupying lesion. Correlative auditory, visual and somatosensory evoked responses, along with examination of the CSF for the presence of oligoclonal bands, aids in the diagnosis. The use of CT has had a great impact on the diagnosis of multiple sclerosis particularly in excluding surgically treatable lesions. However, as in this case, large multiple sclerosis plaques may enhance on CT and be associated with marked mass effect mimicking brain tumours.^{1,2} That this may be the only abnormality compounds the problem. In the past the clinical options in such a case were either to biopsy the lesion or to follow it with serial CT scans.³ Over time the lesions of

Causes of a solitary ring-enhancing cerebral hemisphere mass lesion

- primary brain tumour
- solitary metastatic tumour
- brain abscess
- atypical infective lesion (eg, cysticercosis, toxoplasmosis)
- granuloma
- demyelinating disease (eg, multiple sclerosis)

Figure 2 Axial T2W MRI brain scan showing multiple areas of high signal in the deep white matter of both hemispheres in addition to the larger lesion seen at CT. This appears to lie more posteriorly on this image due to a different scan angle. The biopsy track can be seen in the right parietal region and an associated small post-operative subdural collection in the right frontal region

Figure 3 Axial T2W MRI through the posterior fossa demonstrating a linear area of increased signal in the right cerebellar peduncle

Figure 4 Axial T2W MRI through the lower posterior fossa demonstrating a high signal lesion in the right cerebellar hemisphere

multiple sclerosis show reduction in size, mass effect and degree of enhancement as the acute inflammatory reaction subsides. Ultimately the lesions become of low density and do not

enhance. However the suspicion of a potentially life-threatening mass lesion may constrain expectant management.

MRI is both more sensitive⁴ and more specific⁵ than CT in the diagnosis of multiple sclerosis and therefore has the potential to solve this diagnostic problem, obviating the need for further more invasive tests. To our knowledge, there are no reported cases in the literature of an isolated multiple sclerosis plaque seen at CT showing similar changes on MRI. The usual appearance is that of multiple additional areas of demyelination not seen at CT thus helping to confirm the diagnosis of multiple sclerosis as in this case.

In conclusion we would like to emphasise the importance of considering multiple sclerosis in the differential diagnosis of a cerebral white matter mass lesion. If there is any doubt about the diagnosis of a mass lesion at CT or atypical features in the clinical history then MRI should be performed to exclude multiple sclerosis prior to neurosurgical intervention.

Final diagnosis

Multiple sclerosis presenting as a solitary mass lesion.

Keywords: multiple sclerosis, computed tomography, magnetic resonance imaging

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