CASE REPORT

Multiple ring-enhancing lesions: diagnostic dilemma between neurocysticercosis and tuberculoma

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SUMMARY

Multiple ring-enhancing lesions in the brain often raise many questions about the true diagnosis. The aetiologies are many neoplastic, infectious, vascular, inflammatory and demyelinating conditions and also depend on the geographical location of the patient. The two important causes of multiple ring-enhancing lesions in the cranium are multiple neurocysticercosis and multiple tuberculomas in developing countries like India. This case report illustrates how multiple ring-enhancing lesions cause a diagnostic dilemma between neurocysticercosis and tuberculoma. A young girl with a typical presentation of neurocysticercosis finally turned out to be a case of tuberculoma. A high index of suspicion is required in appropriate clinical settings to have best clinical outcome.

BACKGROUND

Multiple ring-enhancing lesions in the brain have been a topic of debate for differentiating between tuberculoma and neurocysticercosis for long. Differentiating between the two on the basis of clinical and radiological criteria has been proposed by various authors, but these are not absolute. Spontaneous resolution of the ring-enhancing lesions is considered as a major criterion for diagnosis of neurocysticercosis. We report a rare case of multiple ring-enhancing lesions in the brain, which was initially diagnosed as a case of neurocysticercosis but reconsidered as a case of tuberculoma later on, in spite of spontaneous resolution of these lesions.

CASE PRESENTATION

An 18-year-old girl presented with a 1-month history of headache and multiple episodes of partial seizure with secondary generalisation. The patient's history of contact with tuberculosis (TB) was negative. On examination, she was conscious and well oriented to time, place and person. Her systemic and neurological examination was normal including funduscopy. Signs of meningeal irritation were negative.

On investigations, her chest X-ray and routine blood investigations were within normal limits. The serum cysticercus IgG-antibody (by enzyme immunoassay) was negative. MRI of the brain with contrast revealed multiple ring-enhancing lesions in the cerebral and cerebellar hemispheres with no hyperintensity on magnetisation transfer (MT) imaging (figure 1A). MR spectroscopy (MRS) at the site of lesion showed an increased choline peak, an increased choline to creatinine ratio and a

Figure 1 (A) MRI of the brain T1-weighted image postcontrast showing multiple ring-enhancing lesions in the cerebral and cerebellar hemispheres. (B) MR spectroscopy at the site of the lesion showing an increased choline peak, an increased choline to creatinine ratio and a normal *N*-acetylaspartate peak.

normal *N*-acetylaspartate (NAA) peak, findings suggestive of neurocysticercosis (figure 1B). Cerebrospinal fluid (CSF) examination was performed and was found to be normal (cells 5/mm³, protein 74.2 mg/dL, CSF sugar/random blood sugar 74.2/108 mg/dL, and acid-fast bacilli (AFB) stain negative).

A probable diagnosis of neurocysticercosis was made, and antiepileptic medications and short duration of corticosteroids and regular follow-up were advised to the patient.

INVESTIGATIONS

On follow-up, the patient's symptoms did not subside and she consulted many physicians, including a psychiatrist. She was readmitted 5 months later with a history of fever, headache, vomiting, generalised tonic-clonic seizures, drooping of the left eyelid and weakness on the right side of the body.

On examination, the patient was drowsy. On cranial nerve examination, there was bilateral papilloedema, left third and right seventh cranial nerve palsy. There was spasticity and diminution in power on the right side. Deep tendon reflexes were within normal limits and right plantar reflex was extensor. Signs of meningeal irritation were present.

This time MRI of the brain showed resolution of old parenchymal lesions, calcified nodules, communicating hydrocephalus and leptomeningeal enhancement (figure 2). Guarded CSF examination showed cells 50/mm³ with lymphocyte predominance, protein 543 mg/dL and CSF sugar/random blood sugar 43.7/101 mg/dL. CSF examination for AFB stain, Indian ink preparation, cryptococcal antigen latex agglutination system (CALAS), TB-PCR and culture for tubercle bacilli were negative.

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Figure 2 MRI of the brain showing resolution of old parenchymal lesions without any specific treatment and leptomeningeal enhancement.

TREATMENT

The patient was subsequently put on antitubercular therapy (ATT) for 2 months of isoniazid, rifampicin, pyrazinamide, ethambutol and 10 months of isoniazid and rifampicin with antiepileptic medications, corticosteroids and decongestives.

OUTCOME AND FOLLOW-UP

She started to get relief from symptoms within 2 months of ATT and gained full recovery in 6 months. All clinical parameters became normal including fundoscopy and power. Antiepileptic drugs were also gradually withdrawn. MRI of the brain had also become normal except for the hydrocephalus (figure 3A,B). Now the patient is asymptomatic since the past 8 months.

DISCUSSION

Multiple ring-enhancing lesions in the brain have various differential diagnoses including neoplastic and non-neoplastic diseases. Infectious, vascular and inflammatory are non-neoplastic causes and primary brain tumour and metastasis are important

aetiologies for neoplastic disorders. In a study by Schwartz *et al*,¹ the most common reason for multiple ring-enhancing lesions was neoplastic, but in a developing country like India infectious diseases were encountered more frequently.² Neurocysticercosis and tuberculoma are endemic diseases in India. Both diseases may have similar kinds of clinical manifestations and radiological appearances. So it is necessary to diagnose the case in a timely fashion for definitive management and for a better outcome.

The usual mode of presentation of neurocysticercosis is with focal seizures with or without secondary generalisation in a previously healthy individual.³ Few patients may have associated headache or vomiting⁴ and rarely raised intracranial pressure may be seen particularly with extraparenchymal neurocysticercosis.⁵

Our patient, who was previously healthy, was a young immunocompetent (HIV negative) female who presented with headache and partial seizure with secondary generalisation with no signs of meningeal irritation and normal neurological examination. As the patient was living in an endemic zone for tuberculosis and cysticercosis, infectious etiology was considered first. Neuroimaging was performed and showed multiple ring-enhancing lesions involving the bilateral cerebral and cerebellar hemispheres. The multiple small sized lesions displayed a hyperintense core with a hypointense rim in T2-weighted images and T2 fluid-attenuated inversion recovery images and showed no hyperintense signals in MT sequences so a provisional diagnosis of neurocysticercosis was made. Pyogenic brain abscess was not considered as the patient did not have a fever, the MRI of the brain showed the size of lesions was small without diffusion restriction in a diffusion-weighted image⁶ and MRS did not reveal an amino acid peak. The patient was not typically of basal ganglia lesion therefore toxoplasmosis was not entertained.⁷ Her workup for primary malignancy was also negative so intracranial metastasis was unlikely as well. While keeping the second differential diagnosis of multiple tuberculoma, a serological test for neurocysticercosis, CSF analysis and MRS study was performed. The serological test was negative and MRS showed an increased choline peak, an increased choline to creatinine ratio and a normal NAA peak and was not of much help to us. CSF examination was also normal. Neurosurgical consultation was taken, and conservative management was suggested as it was considered to be an infectious aetiology.

Keeping our provisional diagnosis of neurocysticercosis, we started antiepileptic drugs and advised the patient to follow-up after 1 month. Although the patient did not develop seizures again, she could not get relief from her headache. She was again admitted in our institution with symptoms of chronic meningitis, generalised tonic-clonic seizures, right haemiparesis and left third cranial nerve palsy. Signs of meningeal irritation and raised intracranial tension were present (bilateral papilloedema). CT of the head was performed which showed a non-communicating hydrocephalus. MRI of the brain with contrast study was repeated which revealed leptomeningeal enhancement and a non-communicating hydrocephalus, but most of the ring-enhancing lesions had disappeared or become calcified. Routine CSF examination showed features of chronic meningitis. CSF TB-PCR and culture for mycobacteria was conducted but was negative. CSF analysis with Indian ink preparation, CALAS and Gram stain was performed but was found to be negative. At this stage we reconsidered our diagnosis as a case of tuberculous meningitis with tuberculoma and started treatment with four drug chemotherapy. The patient started to improve within

Figure 3 MRI of the brain after 6 months (A) and after 1 year (B) showing resolution of the lesion.

2 months with total recovery within 6 months. We continued treatment up to 1 year.

Although there was disappearance of the ring-enhancing lesions in MRI of the brain spontaneously, which in retrospect should make definite the diagnosis of neurocysticercosis⁸ (2 major, 1 minor and 1 epidemiological criteria). However, we revised our diagnosis to tubercular meningitis and started chemotherapy in spite of the absence of tubercle bacilli after extensive investigations as hydrocephalus and chronic meningitis are not common in neurocysticercosis. The patient showed remarkable recovery, and after completion of 6 months of treatment she was asymptomatic with normal fundoscopy, cranial nerve examination and power of grade 5.

Learning points

- ▶ Multiple ring-enhancing lesions in the brain on neuroimaging are commonly encountered in clinical practice with varied aetiology.
- ▶ The causes are neoplastic, infections, vascular, inflammatory and demyelinating clinical syndromes.
- ▶ In developing countries, multiple neurocysticercosis and tuberculoma are important causes of multiple ring-enhancing lesions in the brain.
- ▶ The presentation of both these conditions can be similar and sometimes misleading.
- ▶ In spite of the advanced neuroimaging techniques and criteria, the diagnostic difficulties still prevail.

So this report highlights the fact that the disappearance of lesions is common in neurocysticercosis, but it can be seen rarely in tubercular meningitis and a definite diagnosis of neurocysticercosis as proposed by Del Brutto *et al* can be questioned in appropriate clinical settings as seen in our case report. This report also proves that despite CSF TB-PCR and CSF culture being negative, the diagnosis of tubercular meningitis can be considered in endemic areas in appropriate clinical settings.

Contributors RV conceptualised the hypothesis and RG prepared the manuscript.

Competing interests None.

Patient consent Obtained.

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