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To study the MRI findings and CSF analysis in patient diagnosed with tuberculoma.

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Abstract

Background: To study the MRI findings and CSF analysis in patient diagnosed with tuberculoma

Methods: It was a cross-sectional observational study was conducted on tuberculoma patients.

Results: MRI had a sensitivity of 87%, specificity of 92%, PPV and NPV of 83% and 94% respectively with a diagnostic accuracy of 90%.

Conclusion- MRI has a huge potential superiority in the diagnosis of CNS infections.

Keywords: CSF, MRI, Tuberculoma.

Introduction

Tuberculosis (TB), an infectious disease caused by the Mycobacterium tuberculosis, remains a major public health concern and ranks among the top ten causes of death worldwide. [1] Approximately 10 million people are infected with tuberculosis each year, especially those immunocompromised patients, such as HIV-infected individuals or people with risk factors like under-nutrition, diabetes, smoking and alcohol consumption. Tuberculosis typically affects the lungs (pulmonary TB) but can also spread to other sites (extrapulmonary TB) through lymphatic or hematogenous dissemination. Involvement of the central nerve system (CNS) occurs in 2e5% of patients with tuberculous infections and in up to 15% of cases of AID Serelated tuberculosis [3,4] CNS tuberculosis accounts for a high mortality and disability rate, representing the most severe form of tuberculosis.[5]It mainly manifests as tuberculous meningitis, tuberculomas or tuberculous abscesses. Tuberculous meningitis is the most common form, followed by tuberculomas. Furthermore, tuberculomas represent 10%e30% of intracranial masses in tuberculosis endemic areas,[6] which may be indistinguishable from neoplasms. Early diagnosis and timely treatment are significantly critical to improve prognosis of these patients.

Material and methods

Study design: It was a cross-sectional observational study.

Inclusion criteria: All cases referred to department of radio diagnosis with suspected neuro-infections.

Exclusion criteria:

1. All patients in whom MRI is contraindicated
2. Clinical conditions precluding the conductance of MRI.
3. Hypersensitivity to contrast media
4. Pregnant patients (use of contrast is contra indicated).

Results

Table 1: Diagnostic performance of MRI as compared to CSF examination/clinical follow up

MRI	**CSF**	
	Positive	**Negative**
Positive	20	4
Negative	3	47
Total	23	51

MRI had a sensitivity of 87%, specificity of 92%, PPV and NPV of 83% and 94% respectively with a diagnostic accuracy of 90%. Three false negative cases were diagnosed as neurocysticercosis on MRI. One case of astrocytoma was falsely picked as tuberculoma on MRI. This patient had peripherally enhancing lesion on T1 contrast, hypointense lesion on T2, infratentorial lesion with perilesional edema.

Discussion

We observed that on T1 with contrast, 78% had ring enhancing lesion and rest had conglomerated lesions. On T2 imaging, 48% of the patients had central hypointensity with peripheral hyperintensity and hypointensity each, while one case had isointensity. Supratentorial location was observed in 87%, while rest of the lesions were infratentorial. This is in accordance with the statement of previous literatures.[7] Multiple lesions were observed in 70% and rest were single. Perilesional oedema was observed in 96%.

MR Imaging findings of tuberculomas are varied depending on its three stages of maturation: noncaseating, caseating with a solid centre and caseating with a liquefied centre. Noncaseating tuberculomas generally exhibit hypointense signal on T1-weighted images and are hyperintense on T2-weighted and FLAIR images. They generally demonstrate homogeneous nodular enhancement on contrast- enhanced T1-weighted images. Caseating lesions with a solid centre appear relatively iso- to hypointense on both T1-weighted and T2-weighted images with an isointense to hyperintense rim on T2-weighted images, and with ring-like gadolinium enhancement. The rim may be inseparable on T2-weighted images with the presence of peripheral oedema. Caseating lesions with liquefied centres are hypointense on T1- weighted images and hyperintense with a hypointense rim on T2-weighted images, and show ring-like enhancement as well.

Ma et al reported that 60% patients had both supra- and infra-tentorial tuberculomas (brain stem and cerebellum), while four (40%) had lesions located supratentorial (cerebral hemispheres, basal ganglia and thalamus). Tuberculoma was solitary in one (10%) patient, and multiple lesions were seen in nine (90%).[8] 122 tuberculomas were detected totally in all patients on contrast-enhanced T1-weighted images, of which 92 (75.4%) were dispersed in the cerebral hemispheres, 25 (20.5%) in the cerebellum, and five (4.1%) in the brain stem, with predominant distribution in the corticomedullary junction. The lesions were between 0.2 cm and 4.5 cm in size. One hundred ten of the tuberculomas were smaller than 1 cm, six lesions ranged

from 1 to 3 cm, and the rest exceeded 3 cm in diameter. On T1-weighted images, 115 tuberculomas were mildly hypo- intense and almost indistinguishable from the normal cerebral gray matter, while 7 demonstrated central mixed isointensity and slight hyperintensity with hyperintense rim. On T2- weighted and FLAIR images, 35 lesions showed mildly hyperintense signals, 80 lesions demonstrated hypointense core with hyperintense rim, and central mixed isointensity and hypointensity with hyperintense rim was seen in seven lesions. On contrast-enhanced T1-weighted images, 35 lesions exhibited homogeneously nodular enhancement, and the rest manifested ring-like enhancement, either single ring or multiple conglomerate rings. Thirty-one tuberculomas exhibited peripheral edema and blurred the margin of lesions on T2- weighted and FLAIR images. There was accompanying meningitis in four patients, hydrocephalus in five, and unilateral or bilateral basal ganglia infarction in six. Meningitis manifested as meningeal enhancement, usually most pronounced in the basal cisterns on contrast-enhanced T1- weighted images.

Although cerebral tuberculoma is usually solitary and neurocysticercosis often presents as multiple lesions, the differential diagnosis of cerebral tuberculoma with multiple nodular lesions from neurocysticercosis is difficult, owing to similarities in clinical symptoms and CT/MRI imaging findings. Recently, Yuzawa et al described a case cerebral tuberculoma mimicking neurocysticercosis. [9] Magnetic resonance imaging (MRI) showed several lesions. Some were isointense on T1-weighted imaging and hyperintense on T2-weighted imaging. Others were hypointense on T1- weighted imaging and showed a hypointense area with a hyperintense fringe on T2- weighted imaging. Gadolinium-enhanced MRI showed ring-enhancing lesions. There were no findings suggesting bleeding on T2* imaging. The key to the diagnosis in the present case were the CSF ADA levels and peripheral blood T-SPOT assay.

In addition, 73.9% of our patients showed low glucose and 78.3% had high protein level in CSF examination. These results may be due to the presence of meningeal involvement. The presence of myco- bacterium tuberculosis may have stimulated a T-cell-mediated delayed allergic response accompanied by antibody release, resulting in elevated protein levels.[10] Low CSF glucose is attributed to consumption of glucose by mycobacterium tuberculosis. These results may be associated with mycobacterium infection but not specific for the diagnosis. As with other forms of TB, the gold standard of diagnosis is isolation of the organism through culture or detection of its presence by acid-fast staining.[11]

Conclusion

MRI has a huge potential superiority in the diagnosis of CNS infections..

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