

Characteristic Array of Imaging Markers in Central Nervous System Tuberculosis

A 50-year-old female presented to us with a low-grade fever along with night sweats for a month. This was associated with holocranial headache and photophobia for the last 10 days and gradually worsening sensorium for the last 7 days. On admission, the patient was stuporous. Neurological examination was marked by neck stiffness, very sluggishly reacting bilateral dilated pupil, panhyporeflexia, and bilateral extensor plantar response.

Routine blood examination showed microcytic hypochromic anemia and markedly elevated erythrocyte sedimentation rate. Magnetic resonance imaging (MRI) brain revealed pachymeningeal enhancement and enhancement along the lining of the lateral ventricle and optic chiasm enhancement. There was associated asymmetrical ventricular dilatation, multiple ring-enhancing lesions, and small foci of diffusion-weighted image restrictions in the bilateral cerebral hemisphere. MRI spine showed diffuse meningeal and exiting root enhancement, longitudinally extensive transverse myelitis, and multiple ring-enhancing lesions in the cord and cord swelling [Figure 1]. Cerebrospinal fluid (CSF) examination indicated lymphocytic pleocytosis (cell count – 220), protein level was 300mg/dL (normal: 10–50mg/dL), glucose was 18mg/dL (serum glucose: 124mg/dL), and a positive cartridge-based nucleic acid amplification test results. Mantoux test was positive; serology for HIV was negative. A diagnosis of central nervous system (CNS) tuberculosis (TB) was made.

The patient was immediately started on anti-tubercular drug, steroids, and antiepileptics. However, she succumbed after 4 days of hospitalization.

TB is a curable and preventable disease that affected around 10 million cases globally in 2019, with Southeast Asia accounting for 44% of it. CNS involvement can be seen in 5%–10% of TB patients. Neuroimaging plays a crucial role in the early and accurate diagnosis of CNS-TB and its disabling complications. CNS-TB can have both meningeal and parenchymal involvement. Meningitis is the most common manifestation (90%), usually most pronounced in basal cisterns, and commonly complicated by communicating hydrocephalus. Ischemic infarcts (20%–40%) have a predilection to involve small-/medium-sized vessels, related to vascular compression and occlusion, commonly in the bilateral gangliothalamic region. Ventriculitis may be seen as a thickened and enhanced ependymal lining often leading to aqueductal obstruction due to inflammatory exudates. The most common parenchymal lesion is a tuberculoma. It is usually thick-walled, close to meninges, commonly located in the frontal and parietal region, and may conglomerate.

Caseating tuberculoma with a liquid center and tuberculous abscess share similar imaging features. Both have central hyperintensities and a surrounding hypointense rim on T2WI with rim enhancement postcontrast. However, tuberculous abscess can be differentiated by its solitary occurrence, thin wall, larger size, and multiloculation.^[1-4]

Spinal cord involvement in TB may manifest in several forms such as TB radiculomyelitis, spinal tuberculoma, myelitis, syringomyelia, vertebral TB, and rarely spinal TB abscess. The MR imaging features of spinal TB meningitis include CSF loculation and obliteration of spinal subarachnoid space with loss of outline of the spinal cord in the cervicothoracic spine and matting of nerve roots in the lumbar region. Postcontrast study usually reveals nodular, thick, and linear intradural enhancement.^[1-3,5]

Imaging characteristics of CNS-TB can mimic other lesions such as brain tumors and it may not always be typical.^[2,3] However, awareness of various imaging manifestations of CNS-TB on the part of the treating physician can lead to early diagnosis and institution of timely therapy, thereby minimizing morbidity and mortality.

LEARNING POINTS

1. TB can have multiple neuroaxial involvements with varied but characteristic radiological manifestations
2. Neoplastic and inflammatory etiologies can be a close radiological mimic of CNS TB; however, in an appropriate clinical setting, a low index of suspicion for TB can aid in early diagnosis and minimizing mortality
3. Although the pathophysiology of disseminated TB and tuberculoma is different, they may coexist which underpins the variation in immune response in the part of the host.

Declaration of patient consent

The authors certify that they have obtained all appropriate patient consent forms. In the form, the patient has given her consent for her images and other clinical information to be reported in the journal. The patient understands that her name and initials will not be published and due efforts will be made to conceal her identity, but anonymity cannot be guaranteed.

Research quality and ethics statement

The authors followed applicable EQUATOR Network guidelines, notably the CARE guideline, during the conduct of this report.

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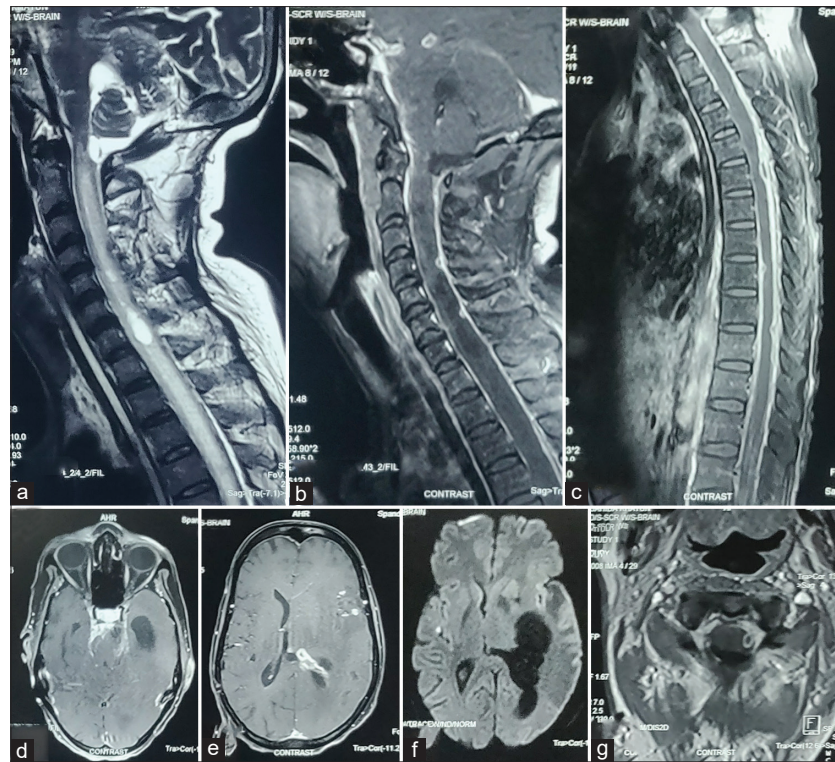


Figure 1: MRI spine (T2 weighted), sagittal section shows intra-medullary hyperintensities along the entire length of cervical and visualized dorsal spine suggestive of LETM along with cord swelling (a); T1-weighted postcontrast sequence, sagittal section shows multiple intramedullary ring enhancing lesions suggestive of tuberculoma along with meningeal thickening and enhancement (b); enhancement along the exiting nerve root (c); MRI Brain T1 postcontrast axial section showing diffuse enhancement of optic chiasm suggestive of opticochiasmatic arachnoiditis (d); thick-walled ring enhancement in left frontal and thalamic region suggestive of tuberculoma and enhancement along the ependymal lining of lateral ventricle suggestive of ventriculitis and enhancement of the meninges over the right frontal lobe suggestive of meningitis (e); DWI sequence shows small true restriction in the right parietal lobe suggestive of acute infarct due to tubercular arteritis with asymmetric dilatation of left temporal horn of lateral ventricle suggestive of hydrocephalus (f); T1-weighted postcontrast sequence, axial section in the upper cervical region shows intramedullary ring enhancing lesions suggestive of tuberculoma (g); MRI: Magnetic resonance imaging, DWI: Diffusion-weighted images, LETM: Longitudinally extensive transverse myelitis

Conflicts of interest

There are no conflicts of interest.

Shambaditya Das, Biman Kanti Ray, Alak Pandit, Keshaw Kumar¹, Souvik Dubey

Department of Neurology, Institute of Post Graduate Medical Education and Research, Bangur Institute of Neurosciences, Kolkata, West Bengal, ¹Department of Radiology, Medanta Hospital, Patna, Bihar, India

Address for correspondence: Dr. Souvik Dubey,

Department of Neurology, Institute of Post Graduate Medical Education and Research, Bangur Institute of Neurosciences, 52/1A Shambu Nath Pandit Street, Kolkata- 700 025, West Bengal, India.
E-mail: drsouvik79@gmail.com

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