

## Multidrug-Resistant Tubercular Ventriculitis

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### Abstract

Central nervous system tuberculosis accounts for 1% of all tuberculosis cases, and often gets complicated leading to excessive morbidity and mortality. We present a case of a 36-year-old female who presented with tubercular ventriculitis; a rare complication of tuberculous meningitis. Despite prompt clinical diagnosis and appropriate timely management, patient succumbed to the disease. The underlying cause of death could be infection due to multidrug-resistant *Mycobacterium tuberculosis*. This case reinforces the importance of not only early diagnosis of tuberculous meningitis; but also effective anti-tuberculosis therapy following drug susceptibility testing for a favourable outcome. [Indian J Chest Dis Allied Sci 2020;62:145-147]

**Key words:** Ventriculitis, Tuberculous meningitis, Multidrug-resistant tuberculosis

### Introduction

Ventriculitis (ependymitis) is inflammation of the ventricular system of the brain. It is a rare but lethal condition requiring prompt diagnosis and treatment to avoid fatal outcome.<sup>1</sup> Symptoms include headache, dizziness to loss of consciousness and death.<sup>1</sup> It is especially seen after insertion of extraventricular drains or intraventricular stents following neuro-surgical interventions. *Staphylococcus* species has been commonly implicated as the causative pathogen in 90% of cases of infective ventriculitis.<sup>1</sup> Ventriculitis as a complication of central nervous system tuberculosis (CNS-TB) has also been described in tuberculous meningitis, which is endemic in many regions of the world.<sup>1-5</sup> We report a case of multidrug-resistant tuberculous meningitis who succumbed due to tubercular ventriculitis as a fatal complication of CNS-TB.

### Case Report

A 36-year-old female presented with history of fever and headache for one week with altered sensorium and incoherent speech for two days. The patient was cachexic and febrile (temperature 39 °C) and had one episode of tonic clonic seizures. The patient had labored breathing with mild tachycardia (92/min) and blood pressure of 130/80 mmHg. She had signs of meningeal irritation and Kerning's sign was positive. Bilateral papilloedema and sixth nerve palsy were present. Motor examination revealed decreased deep tendon reflexes in all the four limbs. She was moving all the limbs equally; however, exact power could not be

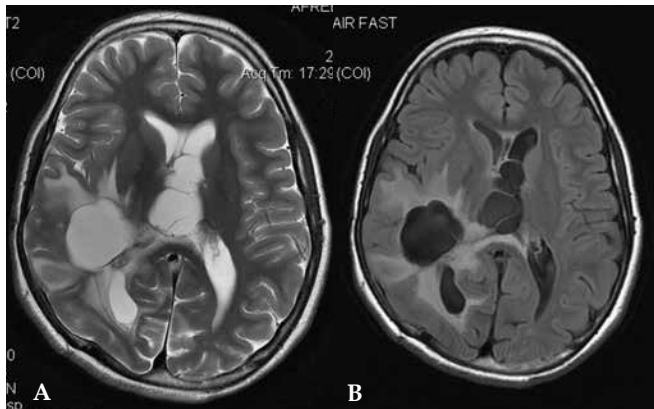
assessed due to altered sensorium. She had past history of pulmonary tuberculosis for which she was probably treated but did not have any records.

Routine laboratory investigations revealed haemoglobin of 7.2mg% with raised erythrocyte sedimentation rate (ESR) (109 mm/hr), leucocytosis ( $17 \times 10^3$  cells/mm<sup>3</sup>) with normal platelet count. On lumbar puncture, intracranial pressure was raised (20mmHg), cerebrospinal fluid (CSF) was clear with pleocytosis (120 WBC/mm<sup>3</sup> with 100% lymphocytes), low glucose (17mg/dL) and increased protein level (575mg/dL). Gram staining and Ziehl-Neelsen staining did not reveal any microorganism or acid-fast bacilli. Cerebrospinal fluid was subjected to pyogenic, fungal and *Mycobacterium tuberculosis* cultures.

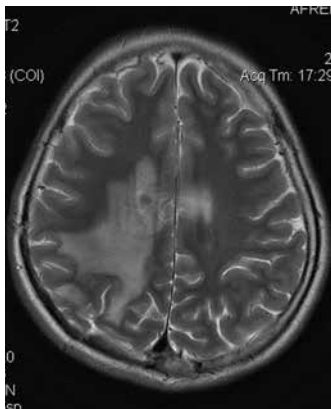
Chest radiograph revealed fibrocalcific opacities in bilateral upper lobes of the lung suggestive of old healed tuberculosis lesions. Magnetic resonance imaging (MRI) of brain with contrast revealed multiple thin intraventricular septations in an enlarged body of the left lateral ventricle with sequestered temporal and mildly dilated occipital horns of the right lateral ventricle and periventricular ooze (Figure 1). Small rounded T2 hypointense lesions suggestive of caseating tuberculomas were seen along ependymal lining (Figure 2). Post-contrast study revealed multiple conglomerate ring enhancing tuberculomas along the ependymal lining of frontal horn of the right lateral ventricle with ependymal enhancement in the left lateral ventricle and trapped right temporal horn (Figure 3).

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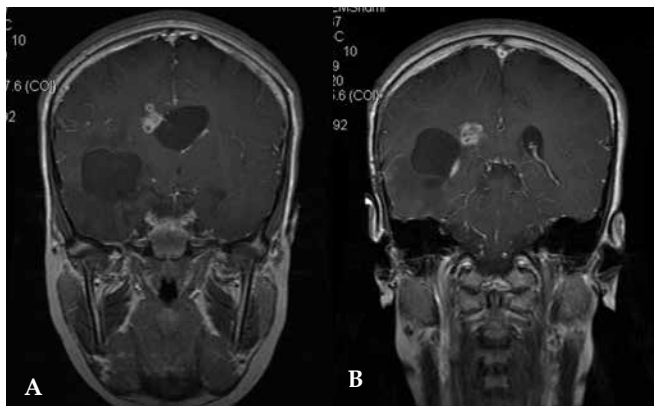
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**Figure 1 (A and B).** Magnetic resonance imaging (axial T2-weighted images) showing multiple thin intraventricular septations in an enlarged and dilated body of the left lateral ventricle. The sequestered temporal and mildly dilated occipital horns of the right lateral ventricle show marked periventricular ooze.



**Figure 2** Magnetic resonance imaging (axial T2-weighted image) showing rounded subcentimeter sized T2 hypointense caseating tuberculomas along ependymal lining.



**Figure 3 (A and B).** Magnetic resonance imaging (coronal post-contrast T1-weighted images) showing multiple conglomerate ring enhancing tuberculomas along the ependymal lining of the frontal horn of the right lateral ventricle with thin rim of ependymal enhancement along the left lateral ventricle with trapped right temporal horn.

In view of the clinical and MRI findings, a diagnosis of tubercular ventriculitis was made and patient was started on anti-tubercular therapy (isoniazid [5mg/kg], rifampicin [10mg/kg], pyrazinamide [25mg/kg] and ethambutol [15mg/kg]) along with parenteral dexamethasone 4mg, 8 hourly and mannitol 100mL, 8 hourly intravenously for raised intracranial pressure. Ventriculo-peritoneal shunt surgery was done on 4th day after the admission. Multiple generalised tonic clonic seizures developed on 5th day of the admission after which her condition deteriorated with progressive loss of response to stimuli and she succumbed on 6th day. Unfortunately, a repeat MRI could not be done post-operatively due to rapidly deteriorating clinical condition of the patient.

After 22 days of incubation, CSF cultures grew *Mycobacterium tuberculosis* in BACTEC-MGIT 960 (Becton Dickinson, Sparks, MD, USA) confirming the diagnosis. Anti-tubercular drug susceptibility testing in BACTEC-MGIT 960 revealed multidrug-resistant (resistant to isoniazid and rifampicin) isolate, though it was sensitive to pyrazinamide, ethambutol and streptomycin.

### Discussion

Central nervous system tuberculosis accounts for 1% of all tuberculosis cases and is the most devastating complication of tuberculosis. Neurological complications in the form of cranial nerve paresis and hydrocephalus are frequently seen; but tuberculous ventriculitis is fatal and relatively rare complication of tubercular meningitis.<sup>7,8</sup>

Neurological signs and symptoms of intracranial tuberculomas include headache, seizures, altered mental status, hemiparesis, cranial nerve deficits and ventriculitis.<sup>1</sup> Clinical presentation of our patient was comparable with reported signs and symptoms in earlier studies of ventriculitis.<sup>3,4</sup> Memory loss and drowsiness has also been reported as the chief presenting complaint in tubercular ventriculitis.<sup>4</sup>

On MRI, tubercular meningitis is classically diagnosed by the presence of leptomenigeal and basal cisternal enhancement, ventriculomegaly due to hydrocephalus; periventricular infarcts and the presence of intra-parenchymal tuberculomas.<sup>9</sup> In the present case, caseating tuberculomas with a hypointense core on T2-weighted image with ring enhancement were seen. Ventriculitis occurs due to rupture and extension of the tubercular granulomas in the ventricles or hematogenous spread of the *Mycobacterium tuberculosis* to the ependymal lining or choroid plexus. Choroid plexus with its papillary fronds having intraventricular protrusions, vascularised mesenchymal core, gap

junctions in capillaries and continuity with ependyma is an important site for hematogeneous spread of the infection. Alternatively, intraventricular spread can occur by rupture from subependymal granuloma. Enhancement of the ependymal lining on post-contrast MRI study suggests ependymitis. Adhesions formed between the inflamed ependyma and choroid plexus results in intraventricular septations, ventricular sequestrations, and there by, transependymal seepage of CSF due to obstructed CSF flow.<sup>10,11</sup>

Irrespective of the underlying cause, most common MRI finding in ventriculitis is the presence of intraventricular debris and pus on diffusion and FLAIR imaging. Abnormal periventricular and subependymal hyperintensity with enhancement of ventricular wall are the hallmark imaging features; while choroid plexitis is seen as enlarged poorly marginated intensely enhancing choroid plexus on contrast administration. Hydrocephalus is a less frequent feature. Intraventricular debris with an irregular level is typically seen in pyogenic meningitis; while tubercular aetiology is suggested by the presence of sequestered ventricles/intraventricular septations and the presence of hyperintense ependymal wall on magnetisation transfer imaging technique in MRI.

The management of tubercular ventriculitis relies on ventriculo-peritoneal shunting and antitubercular therapy with steroids and mannitol. Early diagnosis is the cornerstone of a relatively favourable neurological outcome. In spite of initiation of the timely treatment and surgical intervention; our patient expired probably due to late presentation after the development of extensive complications coupled with mycobacterial infection due to multidrug-resistant strain of *Mycobacterium tuberculosis*.

In conclusion, prompt and early diagnosis and initiation of appropriate anti-tuberculosis therapy based on nucleic acid amplification tests (NAAT) for drug sensitivity is essential for a favourable outcome in patients with CNS-TB.

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