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Original Article

Clinical and radiological spectrum of intracranial tuberculosis: A hospital based study in Northeast India

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ABSTRACT

Central nervous system tuberculosis (TB) is the most severe extra pulmonary TB having a high mortality and morbidity.

Objective: To study the various clinical, biochemical, and radiological spectrum of intracranial TB.

Materials and method: Ninety-three patients were enrolled in this prospective study after ethical clearance and consent from August 2013 to May 2015. The entire clinical course with complications and predictors of mortality were assessed.

Results: 36 females (38.7%) and 57 males (61.3%) were included whose mean age of presentation was 32.3 ± 17.05 years. Alcohol was the most common risk factor seen in 19.4%. Headache (90.3%) was the most common symptom. Co-infection with human immunodeficiency virus, cryptococcal, and toxoplasmosis were seen in 11, 3, and 2 patients, respectively. Cerebrospinal fluid analysis showed acid-fast bacilli in 1 patient; polymerase chain reaction for TB and BACTEC was positive in one and three patients, respectively. Neuroimaging showed basal exudates (21.7%), tuberculoma (28.6%), brain edema (27%), hydrocephalus (32.9%), infarct (21%), and abscess (2.9%). Complications were noted such as brain edema (24.7%), vasculitis (26.9%), hydrocephalus (17.2%), hyponatremia (11.8%), drug-induced hepatitis (4.3%), and drug rash in 5 patients (5.4%). A total of 25 patients (26.9%) died and 38 patients (40.9%) developed neurological sequelae like hemiparesis, paraparesis, visual loss, and hearing loss. Logistic regression showed that a Glasgow scale of <10, British Medical Research Council stage 3, and vasculitis were associated with poor outcome.

Conclusion: Lack of sensitive diagnostic method and criteria makes central nervous system TB a challenge where early diagnosis and prompt management is required.

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1. Introduction

Tuberculosis (TB) is a major public and global health issue. India is one of the world's highest TB bearing country according to World Health Organization (WHO).[1,2] It is estimated that 1% of all TB-infected patient will develop intra cranial TB in due course of time. Among the various manifestation of intracranial TB, tubercular meningitis is the most common bearing a high morbidity and mortality rate (20–60% with treatment; 100% without treatment).[3] The most important factor predicting this severity is the stage at which the patient presents and adequacy of treatment received. Definite diagnosis is made by detection of tubercle bacilli in cerebrospinal fluid, which is highly specific but lacks sensitivity,[4] because of this a multidisciplinary approach combining clinical, cerebrospinal fluid (CSF) profile and neuroimaging help us in making a diagnosis at the earliest. Uncertainty and doubts still dominates all aspect of intracranial TB. Its unpredictable natural history and various clinical manifestations pose a challenge in its diagnosis and management.

2. Materials and method

A prospective analysis of 93 patients of intracranial TB from August 2013 to September 2015 was done (informed consent and ethical clearance was obtained). The criteria are given below:

Inclusion criteria (one or more of the following):

- Patients with fever (>14 days) or any other history suggestive of TB, presence of new focal neurological deficit, or altered sensorium with past history of TB.
- Patient presenting as chronic headache with infection as a cause.
- Patient with seizure (generalized or focal) due to tuberculoma or abscess.

Exclusion criteria:

- Other causes of fever with altered sensorium or focal neurological deficit were excluded.

Detailed history, clinical examination, blood investigation, radiograph, and ultrasonography (USG) of whole abdomen was done in all the patients. Human immunodeficiency virus (HIV) and other viral markers were tested. CSF analysis like cell count, protein, sugar, adenosine level (ADA), acid-fast bacilli (AFB), gram and fungal stains, cryptococcal antigen, culture, and polymerase chain reaction (PCR) study to confirm TB and to exclude other infection was done. CSF culture was done by automated BACTEC MGIT 960 system, designed for the rapid and optimal detection of mycobacterium. The instrument photo detector measures the level of fluorescence, which corresponds to the amount of oxygen consumed by the organism. Associated test of AFB-Xpert panel was used for detection of rifampicin resistance. PCR study, which is a nucleic amplification technique, was done using MYCOREAL Real time PCR method. Neuroimaging [computed tomography (CT) head or magnetic resonance imaging (MRI) or both] was obtained in all patients.

The patients were graded into clinical stages according to British Medical Research Council (MRC)[5]:

Stage 1: includes early nonspecific symptoms and signs, without any neurological symptom.
Stage 2: Symptoms and signs of meningitis may be present, in addition to minor focal neurological deficits, isolated cranial nerve (CN) palsies, and no clouding of consciousness.
Stage 3: Patients in stupor or coma, with severe neurological deficits, seizures, posturing, and abnormal movement may be present.

Patients were treated with conventional anti-tubercular treatment (ATT) regimen, steroid, and anti-epileptics; follow up and outcome was noted. Outcome was divided into three groups: death, neurological sequelae, and complete recovery. An attempt was made to analyze various factors that would prognosticate these patients.

2.1. *Statistical methods*

Descriptive and inferential statistical analysis has been carried out. Results on continuous measurements are presented on mean ± SD (Min-Max), standard error of mean (SEM), and results on categorical measurements are presented in number (%). Significance is assessed at 5% level of significance. Chi-square/Fisher's exact test has been used to find the significance of study parameters on categorical scale between two or more groups.

3. Results

This present study comprised of 57 males (61.3%) and 36 females (38.7%), having a male-to-female ratio of 1.6:1. The most common age group was 21–30 years; a mean age of 32.3 ± 17.05 years with a range of 2–72 years was noted. Fourteen patients (15%) were less than 14 years.

The most common risk factor was alcohol intake, seen in 18 (19.4%) patients, smoking (12.9%), diabetes mellitus (10.1%), nephritic syndrome (1.4%), systemic lupus erythematosus (SLE) (1.4%), and drug abuse and high-risk behaviors (2.2%). History of contact of TB was found in seven patients (7.5%) and a past history of TB (pulmonary or extra-pulmonary) in 23 patients (24.7%).

A total of 93 patients who were diagnosed with intracranial TB had varied presentation. The most common presentation is tubercular meningitis seen in 50 (53%) patients. Others were mixed presentation (27%), tuberculoma (15%), tubercular abscess (2.1%), and tubercular encephalopathy in one patient.

Clinical manifestations were described in Table 1. The common clinical feature noted was headache (90.3%), fever (84.9%), and meningeal sign (81.7%). The triad of meningitis (fever, headache, and signs of meningeal irritation) was found in 78.6%. Focal neurological deficit (hemiparesis, paraparesis and ataxia) and CN involvement was seen in 40 (43%) and 58 (62.4%) patients, respectively. Among the CNs, the most commonly involved is the 2nd CN (35.5%), followed by 6th (16.1%), 7th (11.8%), 3rd (7.5%), 8th (3.2%), 9th and 10th (2.2%),

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