

Complications and Outcome of Children Presenting with Tuberculosis Meningitis

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ABSTRACT

Aim: To determine the frequency of complications and outcome in children with tubercular meningitis.

Study design: Descriptive case series.

Place and duration of study: Department of Paediatric Medicine, The Children's Hospital and Institute of Child Health Lahore from 1st July 2021 to 31st December 2021.

Methodology: One hundred and forty children of both genders aged between 1-12 years diagnosed of tuberculous meningitis which were treated as per department protocols and were evaluated for various complications of TBM; seizures, tuberculoma, tuberculous brain abscess and hydrocephalus. Outcome of these children was evaluated after 3 months in terms of death and survival with and without sequelae; cognitive impairment, motor deficit, aphasia and seizures.

Results: The mean age of the children was 4.9±2.6 years with 88(62.9%) boys and 52 (37.1%) girls. Among the various complications of TBM, tuberculoma was the most frequent and was observed in 73(52.1%) children followed by hydrocephalus 53(37.9%), seizures 20(14.3%) and tubercular brain abscess 11(7.9%). 16(11.4%) children died while 124(88.6%) children survived of TBM. Out of 124 children who survived, 72(58.1%) children had sequelae.

Practical implication: Understanding the complication and related outcomes can assist in pre-empting the related issues in cases of tuberculosis meningitis and therefore assist in better treatment by promptly preventing severe complications identified through this research.

Conclusion: Tuberculoma and hydrocephalus were observed as the most frequent complications in children presenting with tuberculous meningitis and majority of these children survived with long term disability.

Keywords: Extrapulmonary tuberculosis, Tuberculous meningitis, Complications, Outcome

INTRODUCTION

Tuberculosis is a leading cause of death in developing countries due to its easy transmission. It is still a major health threat to many regions of the world that can spread easily through air.^{1,2} Recent WHO data demonstrated high toll of TB patients.³ It is estimated that 20 million children are exposed to tuberculosis (TB) each year, making TB a global pediatric health emergency, Children bear a substantial burden of the global tuberculosis (TB) burden, with more than one million⁴ and estimated that 136000 children died from tuberculosis in 2014¹.

TB mainly affects lungs but it also targets other organs as well. Most common sites which are affected by TB are meninges, pleura, lymph nodes and joints. Tuberculosis meningitis causes significant death and illness in different ethnic groups⁵.

Tuberculosis also badly impacts the central nervous system and sometime it results in spread of TB bacterium from CSF to meninges.⁶ Highest incidence is observed in children and impaired brain growth is also higher among children as compared to adults^{7,8}. Frequency of tuberculosis meningitis is higher than any other form. This includes brain abscesses, intracranial tuberculomas, and spinal tubercular arachnoiditis.⁵ Its symptoms slowly developed over the course of time from worsening headache to vomiting and fever. Accurate and timely diagnosis of TBM greatly relied on signs and symptoms besides with other CSF parameters⁸.

Rohlwink et al⁹ conducted a study on Forty-four children. Most common symptoms of TB include meningism, loss of appetite, consciousness and fever. Specific neurological signs include cranial nerve palsies, aphasia and limb paresis.

Fatema et al¹⁰ conducted a study on 79 children with tubercular meningitis in June 2018. Very low number of individual had 20 days of illness where more than 60% of the population diagnosed at stage 2 of TB. Most common symptom at the time of

diagnosis was fever, meningeal irritation and seizures. Neuroimaging showed that tuberculoma was most prominent followed by hydrocephalus. Normal neuroimaging is associated with good outcome whereas all the patients who died had abnormal neuroimaging.

Today, tuberculous meningitis still poses a diagnostic problem and this leads to high risk of mortality and comorbidities. Definitive and exact diagnosis can only be made possible by the estimation and determination of mycobacterium in CSF by staining method, however, this sometime leads to misinterpretation of result as well. Other major obstacle in diagnosis is low bacillary loads in children which gets even more difficult to obtain from samples. To combat this problem of diagnosis, neuroimaging appeared to be a better option to solve the problem. No such study is conducted in our region and data is lacking so we intend to review clinical spectrum and neuroimaging of children with tuberculous meningitis so the mortality and morbidity can be lower down related to it.

MATERIALS AND METHODS

This descriptive case series was conducted in the Department of Paediatric Medicine, The Children's Hospital & The Institute of Child Health, Lahore from 1st July 2021 to 31st December 2021 after getting permission from IRB and 140 cases were enrolled. All of the admitted children between 1 month and 12 years of age who met the case definition of tuberculous meningitis were included. Children who presented with other causes of febrile encephalopathy such as pyogenic and meningococcal meningitis, cerebral malaria, electrolyte imbalance, intracranial space occupying lesion (IC SOL), enteric fever and children diagnosed cerebral palsy, stroke, or epilepsy were excluded. Children within age of 1 month to 12 years were included in this study. Children were having diagnosis of TBM by CSF findings, previous history and examination and they were investigated according to pre-designed protocol. Physical examination of each patient was carefully recorded. Clinical investigations such as gram stain, CSF examination, acid-fast bacilli stain, chest radiograph and MRI or

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CT scan was also planned within a week of admission to hospital and at 3 months of illness to find out specific changes related to tuberculous meningitis. For radiological diagnosis, help was taken from the Radiology Department of our institute. Complication and outcome at 3 months were labelled. Data was analyzed using SPSS-21.0.

RESULTS

The mean age was 4.9 ± 2.6 years. Majority 119(85%) of children were aged ≤ 5 years while 21(15%) children were aged above 5 years. There were 88(62.9%) boys and 52(37.1%) girls. The mean duration of disease was 5.1 ± 2.1 months. Majority 61(43.6%) of the children belonged to lower socioeconomic class (Table 1).

Among the various complications of TBM, tuberculoma was the most frequent and was observed in 73(52.1%) children followed by hydrocephalus 53(37.9%), seizures 20(14.3%) and tubercular brain abscess 11(7.9%) [Table 2].

Table 1: Baseline characteristics of children with tuberculous meningitis (n=140)

Characteristics	No.	%
Age (years)	4.9±2.6	
≤5	119	85.0
>5	21	15.0
Gender		
Boys	88	62.9
Girls	52	37.1
Duration of disease (months)	5.1±2.1	
≤5	76	54.3
>5	64	45.7
Socioeconomic status		
Lower Class	61	43.6
Middle Class	50	35.7
Upper Class	29	20.7

Table 2: Frequency of various complications among children with tuberculous meningitis (n=140)

Complications of TBM	No.	%
Seizures	20	14.3
Tuberculoma	73	52.1
Tubercular Brain Abscess	11	7.9
Hydrocephalus	53	37.9

DISCUSSION

Tuberculosis is still a major problem for developing region of the world, causing 1.7million death worldwide.^{1,2} TBM is considered to be the most severe form of TB affecting mainly children of growing age.⁵ TBM is a disease of young children with 40% of patients being under 2 years of age and about 70% under 5 years at the time of presentation⁶. The onset is mostly insidious (days to weeks), and the early symptoms are non-specific, such as cough, low-grade fever, vomiting, irritability and general listlessness. Over days to weeks the full-blown clinical picture of meningitis develops, and loss of consciousness, signs of raised intracranial pressure (ICP) and motor and cranial nerve palsies become apparent⁷. Definitive diagnosis of TBM is still a major challenge for clinical practitioners because of its similarity with other forms of meningitis. TB cause various lesions in brain and cause wide range of infections^{7,8,11,2}.

Common pattern of complications among those patients could help in the anticipated management and thus improved outcome of such cases. Also accurate prediction of outcome in TBM is of critical importance when assessing the efficacy of different interventions.¹¹ However, despite lot of research evidence in adults, still limited data is available to determine the frequency and outcomes of conflicting results¹⁹⁻¹².

We observed that there were 88(62.9%) boys and 52(37.1%) girls. Male frequency was also higher among children with tuberculous meningitis has already been reported by Anjum et al.¹³ In two similar studies involving Indian children with tuberculous meningitis, Mohan et al¹⁴ and Karande et al¹⁵ observed similar

male was dominant over female participants. Miftode et al¹⁶ and Rohlwink et al⁹ also reported the similar findings.

In the present study, among the various complications of TBM, tuberculoma was the most frequent among TBM patients followed by hydrocephalus, seizures and tubercular brain abscess. 11.4% children died while 58.1% children survived with sequelae. No significant difference was observed in various subgroups of study patients.

Aalia et al¹⁷ conducted a similar study at Ayub Teaching Hospital, Abbottabad. They evaluated 40 children with TBM and reported similar frequency of seizures (12.5%), tuberculoma (50%) and hydrocephalus (35%). 12.5% children died in their series while 52.5% children survived with sequelae. In a similar study conducted over 65 Indian children with TBM, Mohan et al¹⁴ reported similar frequency of seizures (15%) and hydrocephalus (36.4%). Fatema et al¹⁰ in a similar study involving 79 Bangladeshi children with tuberculous meningitis, reported similar frequency of seizures (13%), tuberculoma (50%) and hydrocephalus (54%). 10.0% children died in their series while 75.0% children survived with sequelae. Similar results have been documented by Miftode et al¹⁶ in South Africa where the researcher evaluated 127 adult and 77 pediatric cases diagnosed with TBM. They reported comparable frequency of 14.0% for seizures, 36.0% for hydrocephalus and 8.0% for mortality among these cases.

CONCLUSION

Tuberculoma and hydrocephalus were observed as the most frequent complications in children presenting with tuberculous meningitis and majority of these children survived with long term disability which advocate appropriate diagnostic evaluation of such children for these complications.

Conflict of interest: Nil

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