ORIGINAL PROF-621

TUBERCULOUS MENINGITIS (TBM); AN EXPERIENCE OF 100 PAEDIATRIC PATIENTS

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ABSTRACT

OBJECTIVES: To study clinical and diagnostic laboratory features of tuberculous meningitis (TBM) in children. **STUDY DESIGN:** Prospective cohort study. **PATIENTS & METHODS:** Children diagnosed as TBM in Paediatric ward Allied Hospital, Punjab Medical College Faisalabad were included in the study. Complete history and clinical examination was recorded. Complete blood count, ESR, Chest X Ray, Mantoux test were done. CSF was subjected to biochemical and microscopic examination. CT scan (computerized axial tomogram) of brain, plain and contrast was done in all patients. **RESULTS:** One hundred children were included in the study. 67% were below five years of age. 78% belonged to lower socioeconomic status. 82% were malnourished. 26% were vaccinated while 74% were unvaccinated. History of contact with a tuberculous patient was found in 48% of patients. 69% were in stage III TBM, 31% in stage II. 74% had focal neurological deficit with hemiplegia being the commonest one. 73% had convulsions. Most patients presented quite late, 29% were comatose for more than two weeks before coming to the hospital . 28% were in decerebrate or decorticate posture. Atypical clinical findings were also noticed. 43% had high grade fever from the onset of illness, 14% had an abrupt onset with symptoms developing in less than one week. 39% had encephalitic TBM. 31% had extra pyramidal signs. Mantoux test was >10 mm in 17% cases, suggestive chest X-Ray in 80% and typical CSF findings in 46%. 37% had normal CSF glucose, 8% had predominant polymorphs in CSF. Abnormal CT scan was found in 85% cases with hydrocephalus as commonest CT abnormality observed. **CONCLUSIONS:** A high index of suspicion is needed to diagnosis TBM in children. A combination of epidemiological , clinical and laboratory data should be used to make an early diagnosis.

INTRODUCTION

Tuberculosis is a major health hazard in developing countries. With the advent of HIV (Human immuno-deficiency virus), the disease has become a significant health problem all over the world, hence declared a global emergency by WHO in 1993[1].

Tuberculous meningitis (TBM) is the major cause of morbidity and mortality amongst various complications of primary tuberculosis[2]. In early part of twentieth century, the mortality was high with a low rate of recovery. With improvement in treatment the survival rate has improved with an increase in serious sequelae , as the diagnosis is often delayed[3].

Given the urgency to reach at an early diagnosis, the low yield of 'gold standard' microbial methods[4] and non availability or high cost of sophisticated tests, there is an immense need to develop a set of clinical criteria based on clinical findings and simple investigations.

The objectives of the present study were to study clinical and laboratory features of children presenting with TBM and to look for atypical presentations. Local data so collected might be helpful in designing a set of criteria useful in early diagnosis.

PATIENTS & METHODS

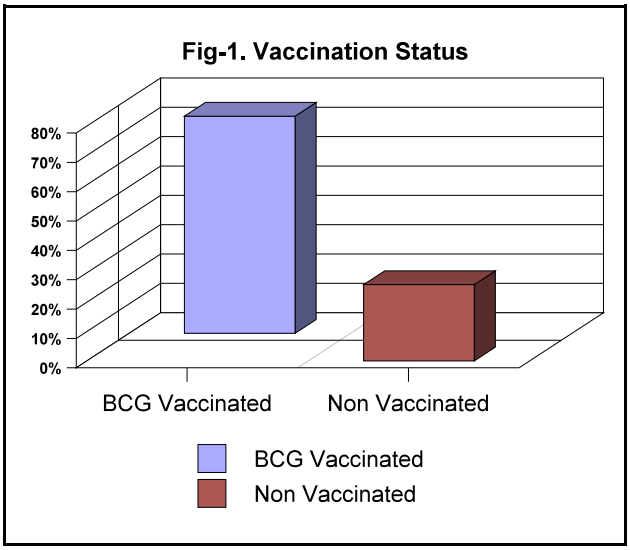
A prospective study was conducted at children ward Allied Hospital (PMC) Faisalabad, a tertiary care referral center, from January 1999 to July 2001. All newly diagnosed cases of TBM were included in the study. Cases diagnosed elsewhere and referred for complications were excluded.

Suspected cases that expired or left against medical advice before completion of investigations were also excluded. Complete history including history of contact with a tuberculous patient was recorded, and thorough examination was done.

Modified Gomez Classification was used to assess the nutritional status. Staging of the disease was done according to clinical staging suggested by British Medical Research Council[5]. Patient was considered vaccinated only if a BCG scar was detected. Every patient was subjected to blood routine examination, chest x-ray, Mantoux test , CSF complete examination and CT scan. The information gathered was entered on a performa and analyzed.

RESULTS

One hundred patients were included in the study. 18% were below one year of age, 49% between one to five years and 33% between six to twelve years. 62% were male and 38% female. 52% belonged to urban while 48% to rural areas. Most of them (78%) were from lower class, 20% were from middle class and 2% from upper class. 18% had normal nutritional status, 33% were having Ist degree, 26% 2nd degree while 23% had 3rd degree malnutrition. BCG vaccination status is shown in Fig 1.



History of contact with a tuberculous patient was seen in 48% of patients. All patients had history of fever that was high grade in 43% and low grade in 57%. Duration of fever is given in table I. 73% had convulsions while 27% did not have convulsions. Focal neurological deficit was observed in 74% cases, which was hemiplegia in 52.7% (n=39), monoplegia in 9.5% (n=7) and 37.8% (n=28) had other types. 69% were in stage III of TBM, 31% were in stage II. None of the patient presented in stage I. Of the comatose patients 49 (71%) had a coma of less than two week and 20 (29%) were comatose for more than two weeks. Out of unconscious patients, 16.4% (n=11) had decorticate posture and 25.3% (n=17) had decerebrate posture. Respiratory symptoms were observed in only 14% and hepatic and splenic enlargement in 18% cases.

Signs of meningeal irritation were present in 61%. Cranial nerve palsies are shown in table II. Involuntary movements were present in 31% and hemiballisms (n=22) were the commonest involuntary movement observed followed by tremors (n=8) and others.

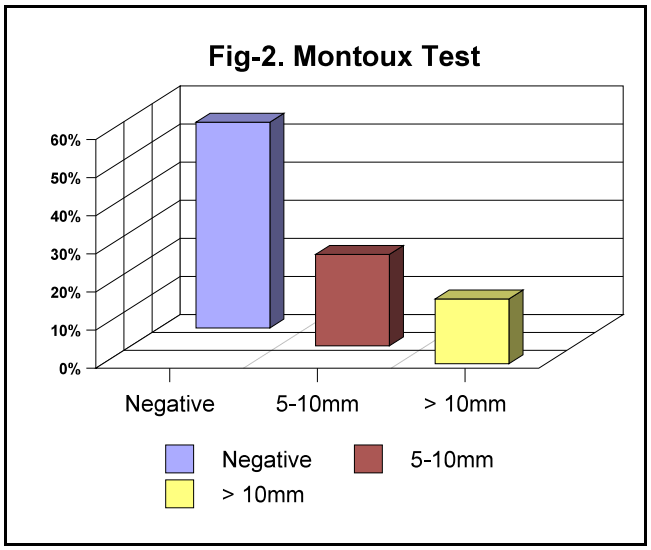
Table -I. Duration of Fever

Duration of fever	%age
<1 week	14
1-2 weeks	32
2-4 weeks	21

>4 weeks	33

Table-II. Cranial nerve palsies (n=100)

Type of palsy	%age
IInd Nerve	12
IIIrd Nerve	22
VIth Nerve	16
VIIth Nerve	39
No Palsy	39
Multiple palsies	28



Fundoscopy revealed papilloedema in 28%. Optic atrophy in 12%, choroid tubercles in 2% and was normal in rest of the 58% patients.

Table-III. Erythrocyte sedimentation rate (mm Hg after Ist hour)

	%age
Normal	26%
10-50	45%
51-100	20%

Table -I. Duration of Fever

Duration of fever	%age
>100	7%

Table-IV. Cerebrospinal fluid examination (CSF) Findings

Finding	%age
PROTEIN (mg/dl)	
Normal (<40)	9
40-200	73
200-400	10
>400	8
GLUCOSE (mg/dl)	
>40 (normal)	37
20-40	56
<20	7
CELL COUNT (no./HPF)	
<5	9
5-20	20
21-100	34
>100	37
LYMPHOCYTES (%age)	
95-100	64
50-94	28
20-49	4
<20	4

ESR (erythrocyte sedimentation rate) is shown in table III. Mantoux test is shown in Fig 2. Chest x-ray findings are given in Fig 3. Cerebrospinal fluid examination revealed findings shown in table IV. CT scan findings in table V. 68% patients were discharged, 13% left against medical advice and 19% expired.

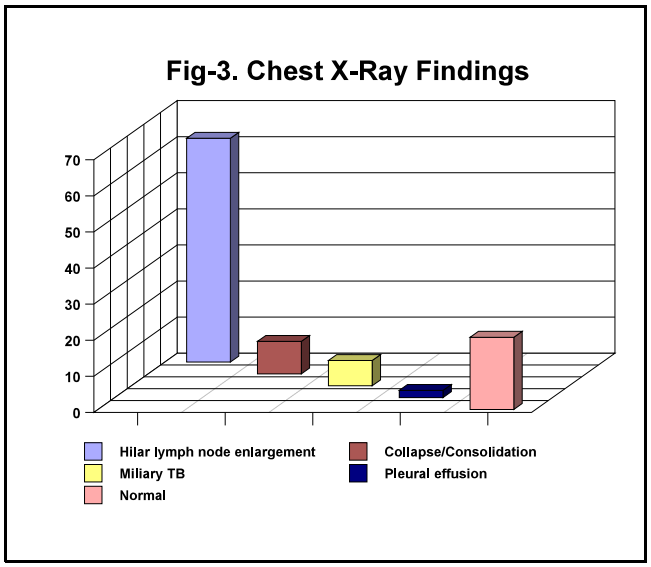


Table-V. CT Scan findings

	%age
Hydrocephalus	52
Basal Enhancement	13
Infarction	6
Tuberculomas	4
Combination	10
Normal	15

DISCUSSION

The patients in the present study belonged mostly to poor class (78%) and were predominantly male (62%). There was almost an equal proportion of children belonging to urban and rural areas. TBM is essentially a disease of young children as seen in the present study with 67% of cases below 5 years of age and 18% below one year.

About a quarter of the sufferers, 26% were vaccinated with BCG emphasizing the fact that BCG does not provide 100% protection against TBM. Protection afforded by BCG against TBM varies in various reports. The incidence of TBM was shown to be 52-100% lower in vaccinated children less than 15 years of age than unvaccinated controls[6,7]. The protective efficacy has been reported to be 82% to 84% in Brazil and 77% in India[8,9,10].

A history of contact with a tuberculous patient was found in 48% while a contact was found in 25.3% of cases in another study[11].

In the present study, most of the patients were in stage III (69%) and rest of them (31%) presented in stage II. None of them was in stage I. In a similar study at Turkey[12] , 10% children presented in stage I, 56% in stage II, whereas relatively fewer cases(34%) presented in stage III. 29% of our patients were comatose for more than two weeks before coming to the hospital . 28% were in terminal stage having decerebrate or decorticate posture. 18% had hepatosplenomegaly reflecting dissemination. These facts indicate that patients present quite late in the illness. The parents or the primary physician could be responsible for this delay. One of the major prognostic factors in TBM is the stage of disease at the time of presentation[13]. Once the child has already got significant neuronal damage no anti-tuberculous drug can reduce high morbidity and mortality[14]. Early diagnosis and referral/management is therefore crucial.

Fever was high grade in 43% instead of low grade. Abrupt onset with a history of fever of less than one week was noticed in 14% of patients . Hence diagnosis of TBM should not be ignored in patients with a short history of fever. Signs of meningeal irritation were absent in 39% showing encephalitic TBM. Extra pyramidal symptoms (hemiballisms, tremors etc) were observed in 31% of patients. Atypical onset and manifestations of TBM have been mentioned in literature[15].

Fundoscopic examination of eye revealed choroid tubercles, pathognomonic of TBM, in only 2% of patients. Normal fundus was seen in 58% of patients.

ESR was significantly raised in 74% but normal in 26% of cases. Mantoux (tuberculin) test was not helpful in most of the patients, being negative in 54% and doubtful (5-10 mm) in another 29% of patients. A negative mantoux test therefore does not rule out TBM. The incidence of positive mantoux test declines if the child comes in stage II or III of TBM as pointed by Udani[16]. Mantoux test was positive in 25% of his patients suffering from stage II or III TBM. Positive mantoux test was seen in 30% of patients in another report[17]. The

low tuberculin positivity rate (17%) in the present study could be due to late stage of disease or high percentage (89%) of malnourished children.

Chest x-ray revealed evidence of primary pulmonary lesion in 80% of patients. Mediastinal adenopathy was the commonest (62%) chest x-ray finding. A chest x-ray can be quite helpful in diagnosis of TBM but a negative chest x ray does not exclude it. Chest x-ray did not reveal any finding in 20% of our patients. Moreover mediastinal adenopathy may not always be visible on routine chest x-ray. The sensitivity of x-ray can be improved if it is taken with high KVP using grid[18].

CSF examination, the "gold standard" for diagnosis was typical of TBM in 46% cases. On the other hand it was completely normal (protein, glucose and cell count) in 9% whereas normal glucose alone was found in 37% . A CSF with predominant polymorphs was seen in 8% of the cases. Polymorphic predominance in CSF was observed in 9% cases in another study[19].

CT scan was helpful in 85% of patients with hydrocephalus being the predominant finding. CT scan was found to be abnormal in 55% of patients in another report from Qatar[17]. Higher number of patients showing an abnormality on CT scan in the present study could be due to late presentation of the patients.

CONCLUSIONS

A high index of clinical suspicion is needed to diagnose childhood TBM. Atypical cases should be specifically looked for. Diagnostic criteria may be designed using local data that may be followed by every hospital dealing with children in order to minimize delay in diagnosis. Atypical CSF findings should be kept in mind. In addition to traditional tests, CT scan can be very useful. Therefore suspected cases should be referred early to the centers where the facility is available.

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