

Some Aspects of Tuberculous Meningitis

Taslim S. Soetomenggolo

(Department of Child Health, Medical School, University of Indonesia, Jakarta)

ABSTRACT Tuberculous meningitis remains a serious pediatric problem in Indonesia; the morbidity, mortality, and sequelae are still high. During January 1994 and December 1998 had been hospitalized 85 patients of tuberculous meningitis. The diagnosis was based on the clinical signs & symptoms, the abnormalities of cerebrospinal fluid, the tuberculin skin test, and the imaging of chest & brain. The sex distribution was male patients more than female patients. The age distribution was between 5 months and 11 years, and most of the patients were at the age of less than 5 years old (77.6%). Most of the patients (65.9%) suffered from undernutrition. On admission only 7 patients (8.2%) were in the stage I, and most of the patients (91.8%) were in the stage II and III. The most frequent clinical signs & symptoms of the patients were fever, unconsciousness, paresis of extremities, nuchal rigidity, convulsions, and cranial nerve palsies. The cerebrospinal fluid showed pleocytosis, and most of the cells were lymphocytic type. Only 36.5% of the patients showed positive tuberculin skin test, and 16.5% of the 85 patients had received BCG vaccination. The chest X-ray examination showed miliary tuberculosis in 24.7% of the patients, and other abnormalities in 36.5%. Head CT-scan examination showed ventriculomegaly in 75.9%, tuberculomas in 6.9%, brain infarcts in 3.4%, meningoencephalitis in 3.4%, and brain atrophy in 5.2% of the patients. The mortality of this study was 14.1%. [Paediatr Indones 1999; 39:308-314]

Introduction

Tuberculous meningitis remains a serious pediatric problem in Indonesia with the morbidity, mortality, and the sequelae are still high.¹ Tuberculous meningitis is usually considered a chronic meningitis, although an acute onset occurs in about half of affected children.² Due to the clinical manifestations, tuberculous meningitis is divided into three stages.^{3,4} In the first stage, gastrointestinal symptoms predominate with nausea and vomiting; another symptoms are fever, irritable or apathetic, but the neurological signs are negative.

During the second stage of illness, the child enters into progressive stupor, Kernig and Brudzinski signs become positive, the deep-tendon reflexes are hyperactive, ankle and patellar clonus can be present, and the cranial nerves signs occur. During the third stage, the patient is comatose, although periods of intermittent wake fullness can occur. The pupils are fixed and recurrent clonic spasm of the extremities, irregular respiration, and rising fever are present. Hydrocephalus develops in about two thirds of patients whose illness lasts longer than 3 weeks. The diagnosis is based on the clinical manifestations, laboratory examinations, and imaging of the lungs and the brain. The aim of this study is to evaluate some aspects of clinical manifestations, laboratory abnormalities, imaging of lungs and brain of patients with tuberculous meningitis.

Methods

The evaluation was a retrospective study. The subjects consisted of all the patients with the diagnosis of tuberculous meningitis who were hospitalized in the Department of Child Health, General hospital Dr. Ciptomangunkusumo, Jakarta during January 1994 and December 1998. The diagnosis of the patients was based on the clinical manifestations supported by the laboratory and imaging examinations. The severity of the disease was divided into three stages as stated by Linolin criteria. The laboratory examinations were performed on the cerebrospinal fluid and tuberculin skin test. The imaging examinations were performed by chest x-ray and CT-scan of the brain.

Results

During January 1994 and December 1998 eighty-five patients were hospitalized with the diagnosis of tuberculous meningitis. Of the 85 patients 51 (60%) were male, and 34 (40%) were female. The age distribution was between 5 months and 11 years old. Most of the patients were at the age of before 5 years old. From Table 1 we can see patients with the age of less than one year are 31 (36.4%), age 1-4 years are 35 (41.2%), age 5-9 years are 14 (16.5%), and patients with the age of more than 10 years are 5 patients (5.9%).

Table 2 shows the nutritional states of the 85 patients. Normal nutritional states are in 22 patients (25.9%), undernutritions are in 56 patients (65.9%), and malnutrition are in 7 patients (8.2%). The clinical signs & symptoms of the 85 patients can be seen in Table 4. The most frequent are fever, unconsciousness, paresis of extremities, nuchal rigidity, convulsions, and cranial nerve palsies.

Table 1. Age distribution of 85 patients

Age (yr)	No of patients	%
<1	31	36.4
1-4	35	41.2
5-9	14	16.5
≥10	5	5.9
Total	85	100.0

Table 2. The nutritional states of 85 patients

	No of patients	%
Normal	22	25.9
Undernutrition	56	65.9
Malnutrition	7	8.2
Total	85	100.0

On admission most of the patients were in the stage II and III. From Table 3 can be seen 7 patients (8.2%) are in stage I, forty-nine patients (57.6%) are in stage II, and 29 patients (34.1%) are in stage III.

Table 3. The stages of 85 patients on admission

Stages	No of patients	%
Stage I	7	8.2
Stage II	49	57.7
Stage III	29	34.1
Total	85	100.0

Table 4. The clinical signs & symptoms of 85 patients

Signs & symptoms	No of patients	%
Fever	75	88.2
Unconsciousness	70	82.4
Paresis of extremities	66	77.6
Nuchal rigidity	63	74.1
Convulsions	61	71.8
Cranial nerves palsies	48	56.5
Brudzinski (+)	43	50.6
Vomiting	37	43.5
Bulging fontanel	17	20.0
Headache	15	17.6

The cerebrospinal fluid findings were characteristic. All the patients showed pleocytosis with the cell counts were more than 10 per mm³, and lymphocytic cell were more than 50% (Table 5).

Table 5. The cerebrospinal fluid findings of 85 patients

Cell counts	No of patients	%
> 100 cells/mm ³	45	52.9
d" 100 cells/mm ³	40	47.1
Lymphocytes > 50%	72	84.7
Lymphocytes d" 50%	13	15.3

Tuberculin skin tests were performed to all the 85 patients, and the results were positive in 31 patients (36.5%). Of the 85 patients, fourteen patients (16.5%) had received BCG vaccination. Chest x-ray examination was performed to all the 85 patients, and the results can be seen in Table 6. Normal chest x-ray is in 33 patients (38.8%), miliary tuberculosis is in 21 patients (24.7%), and other abnormalities are in 31 patients (36.5%).

Table 6. The results of chest x-ray examination of 85 patients

Chest x-ray	No of patients	%
Normal	33	38.8
Miliary tuberculosis	21	24.7
Other abnormalities	31	36.5
Total	85	100.0

Head CT-scan examination was performed in 58 patients, and the results showed ventriculomegaly in 44 patients (75.9%), tuberculomas in 4 patients (6.9%), brain atrophy in 3 patients (5.2%), infarcts in 2 patients (3.4%), meningoencephalitis in 2 patients (3.4%), and normal in 3 patients (5.2%) (Table 7).

Table 7. Head CT-scan examination of 58 patients

Head CT-scan	No of patients	%
Ventriculomegaly	44	75.9
Tuberculomas	4	6.9
Brain atrophy	3	5.2
Infarcts	2	3.4
Meningoencephalitis	2	3.4
Normal	3	5.2
Total	58	100.0

The mortality of the 85 patients was 12 patients (14.1%).

Discussion

Despite recent advances in chemotherapy, tuberculous meningitis remains a serious pediatric problem in our hospital. During January 1994 and December 1998 we hospitalized 291 severe tuberculous patients, and 85 (29.2%) of them suffered from tuberculous meningitis.⁵ So the morbidity of tuberculous meningitis in our hospital was still high.

The youngest patient of this study is 5 months old, and most of the patients are at the age of less than 5 years (Table 1), these conditions are not quite different with other studies.^{2,4} Snyder stated that tuberculous meningitis is rare before 3 months of age, but the incidence is high in the first 5 years of life.²

From Table 2 can be seen that the most of the patients suffered from undernutrition and malnutrition (74.1%). This figure is too high if be compared with the condition of population. The last survey in Indonesia the total children with undernutrition and malnutrition were 41.8%.⁶ So from this data can be made a conclusion that tuberculous meningitis disease often occur in patients with under and malnutrition.

On admission most of the patients (91.8%) were in the stage II and III, and only 8.2% of them were in the stage I, so the clinical signs & symptoms and the neurological abnormalities in this study are higher than other study (Table 3 & 4). Idris et al found nuchal rigidity in 77%, apathy in 72%, fever 47%, vomiting in 30%, drowsiness in 23%, headache in 21%, coma in 14%, convulsions, sweating, facial palsy, optic atrophy, and abducens and oculomotor palsies each in 9%, hemiparesis in 5%, and eighth nerve palsy and diabetes insipidus each in 2%.⁷ The results of tuberculin skin tests were positive in 31 patients (36.5%) and anergy in 63.5%. This figure of anergy is too high; other study found anergy in 36%.⁸ This high figure of anergy might be caused by the nutritional states and the severe of the disease. Most of the patients suffered from undernutrition and malnutrition and severe disease (stage II & III).

The cerebrospinal fluid findings were characteristic with the cell counts more than 10 per mm³ (Table 5), and 84.7% of them had more than 50% lymphocytes. Other study found cell counts range between 10 and 350 per mm³ with 87% of the patients have more than 50% lymphocytes.⁴ The chest x-ray examination showed miliary tuberculosis in 24.7%, other abnormalities in 36.5%, and normal chest in 38.8%. Other study found miliary tuberculosis in 23%, normal chest in 43%, and calcifying primary intrathoracic tuberculosis in 10%.⁹ So the figure of this study is not quite different with other study.

From Table 7 can be seen ventriculomegaly in 75.9%, tuberculomas in 6.9%, and infarcts in 3.4%. These figures are lower than other study, they found ventriculomegaly (hydrocephalus) in 87%, and infarcts in 28%.¹⁰ These lower figures might be caused by not all of these patients got head CT-scan examination. Head CT scan was performed only in 58 out of 85 patients. The mortality of this study was 14.1%, this figure is not quite different with other study. Snyder found the mortality was 10% to 20%.²

Acknowledgments

The author cordially thank Dr. Retno Widyaningsih and Dr. Aditya (recidence of Department of Child Health, Medical School University of Indonesia, Jakarta) for their helps in collecting the data.

References

1. Saharso D, Siti Nurul Hidayati. Meningitis tuberkulosa. In: Soetomenggolo TS, Ismael S, eds. Buku ajar neurologi anak. Jakarta: BP IDAI, 1999; 363-72.
2. Snyder RD. Tuberculosis. In: Swaiman KF, ed. Pediatric neurology principles and practice. Toronto: Mosby, 1994; 632-5.
3. Lincoln EM. Tuberculous meningitis in children. I. Tuberculous meningitis. *Am Rev Tuberc Pulm Dis* 1946; 56: 75-94 (Cited by Weil et al, 1995).
4. Weil ML, Levin M. Tuberculous meningitis. In: Menkes JH, ed. Textbook of child neurology. Tokyo: Williams & Wilkins, 1995; 401-5.
5. Rahajoe NN. Masalah tuberkulosis anak saat ini. In: Firmansyah et al, eds. Buku naskah lengkap Konika XI Jakarta. Jakarta: Ikatan Dokter Anak Indonesia, 199; 77-86.
6. Pujiadi S. Prevalensi KKP. In: Pujiadi S, ed. Ilmu gizi klinis pada anak. Jakarta: Balai Penerbit FKUI, 1990; 99-102.
7. Idriss ZH, Sinno AA, Kronfol NM. Tuberculous meningitis in childhood. *Am J Dis Child* 1976; 130: 364-7.
8. Davis LE et al. Tuberculous meningitis in the southwest United States: A community based study. *Neurology* 1993; 43: 1775-8.
9. Zarabi M, Sane S, Girdany BR. The chest roentgenogram in the early diagnosis of tuberculous meningitis in children. *Am J Dis Child* 1971; 121: 389-92.
10. Bharqava S et al. A CT study. *Br J Radiol* 1982; 55: 189-96.