TUBERCULOUS MENINGITIS IN ADULTS: A FOUR-YEAR REVIEW DURING 1997-2000

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Abstract. We reviewed the charts of all HIV-negative patients 15 years of age or older in whom tuberculous meningitis was diagnosed and treated without corticosteroids at Srinagarind Hospital, Khon Kaen, Thailand during the period of 1997- 2000. Forty-five patients were included in this study. The clinical manifestations were subacute to chronic meningitis and they presented in stages 1 and 2, except one case which was in stage 3. All patients were treated with a 6-month course of chemotherapy with good clinical outcomes. The mortality rate was 2.2% and the percent of residual neurological deficits after treatment was 6.7%. The review showed the good clinical outcomes can be had without adjunctive corticosteroid.

INTRODUCTION

Tuberculous meningitis (TBM) is a common infectious disease of the central nervous system. The standard treatment includes a combination of antituberculous drugs and supportive treatment such as repeat lumbar punctures and ventricular shunting. Despite effective chemotherapy, significant morbidity and mortality due to this disease continues to occur. The use of adjunctive corticosteroid therapy for TBM has been controversial. In our hospital, after our previous study in 1996 which demonstrated that prednisolone was not beneficial in patients with altered consciousness, increased intracranial pressure and cranial nerve palsy (Chotmongkol *et al*, 1996), we routinely did not use corticosteroids for the adjunctive treatment of TBM. The purpose of this report was to review the clinical outcomes of TBM cases in adults, treated without corticosteroids, over a four-year period.

MATERIALS AND METHODS

The charts of all HIV-negative patients 15 years of age or older in whom TBM was diagnosed at Srinagarind Hospital from January 1997 through December 2000 were reviewed. The criteria for the diagnosis of TBM was based on (1) a compatible clinical picture and a positive cerebrospinal fluid (CSF) AFB stain, Ziehl-Neelsen stain, or a positive CSF culture for *Mycobacterium tuberculosis*; (2) or a compatible clinical picture and typical CSF findings (lymphocytic meningitis with a low glucose level, elevation protein content, sterile routine bacterial and fungal cultures, and a negative latex agglutination test for bacterial and cryptococcal antigens).

The severity of the disease was classified according to the system of Gordon and Parsons (1972). In stage 1, the patients were conscious and rational with meningism but no focal neurological signs or signs of hydrocephalus. In stage 2, the patients were confused or had focal neurological signs such as squint, hemiparesis, paraparesis or signs of hydrocephalus. In stage 3, the patients' mental state was significant for stupor, delirium, complete hemiplegia or paraplegia. The assessment of muscle power was classified according to the scheme supported by the Medical Research Council. Power was recorded by numbers ranging from the normal of V to complete paralysis represented by 0.

RESULTS

There were 49 patients who were diagnosed as TBM and had compatible criteria. Four of these patients were ineligible because they received cor-

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Table 1
The initial clinical presentations of 45 patients.

Age, years	
Mean	40.3±18.2
Range	16-86
Sex (male), n	25 (55.6%)
Fever (T ≥ 38.0°C), n	41 (91.1%)
Duration of fever, days	
Mean	20.7±20.0
Range	5-90
Headache, n	43 (95.6%)
Duration of headache, days	
Mean	27.3±34.7
Range	4-210
Stiffneck, n	35 (77.8%)
Mental impairment, n	18 (40.0%)
Confusion, n	17
Coma	1
Cranial nerve palsies, n	5 (11.1%)
Unilateral 6th nerve palsy, n	3
Bilateral 6th nerve palsy, n	1
Unilateral 3rd nerve palsy, n	1
Motor weakness	
Paraparesis, n	5 (11.1%)
Other foci of tuberculous infection, n	22 (48.9%)
Lung, n	18
Lymph node, n	2
Knee joint, n	1
Spine, n	1
Staging	
1, n	27 (60.0%)
2, n	17 (37.8%)
3, n	1 (2.2%)

Table 2
Laboratory results of 45 patients.

Abnormal chest x-ray, n	18 (40.0%)
Upper lobe infiltration, n	9
Miliary pattern, n	6
Diffuse reticulo-nodular infiltration, n	2
Pleural effusion, n	1
Abnormal CT scan of the brain, n	13/21 (61.9%)
Hydrocephalus, n	7
Tuberculoma, n	4
Brain edema, n	1
Basal arachnoiditis, n	1
Hyponatremia (serum Na^+ <125 mEq/l), n	7 (15.6%)
CSF analysis	
High opening pressure (≥300 mmH_2O), n	18 (40.0%)
White blood cell count/mm^3	
Mean	330
Range	10-2,100
Protein content (mg/dl)	
Mean	365
Range	60-6,028
Glucose ratio (CSF/blood), %	
Mean	27
Range	7-49
AFB stain, positive, n	1 (2.2%)
Culture for *M. tuberculosis*, positive, n	2 (4.4%)

ticosteroids. The clinical manifestations and laboratory results of 45 patients are summarized in Tables 1 and 2. Of the five patients with paraparesis, the muscle power ranged from grade III-IV. One patient developed hemiplegia after one month of treatment and a CT scan of the brain revealed basal enhancement without an intracranial lesion.

All patients were treated with a 6-month course of chemotherapy. The results of treatment are summarized in Table 3. Of the 18 patients with altered consciousness, 17 patients in stage 2 had complete recovery while one patient in stage 3 died from a brain lesion and hospital acquired-pneumonia. Of the patients with paraparesis, muscle power returned to normal function in three cases and improved in two cases. In the patient with hemiplegia that developed during treatment, the muscle power improved from grade 0 to grade II-III.

DISCUSSION

TBM is a serious health problem in developing countries. The associated morbidity and mortality remain high. Treatment of this disease with a combination of antituberculous drugs has advanced and a 6-month treatment regimen is sufficient for TBM (Chotmongkol, 1991; van Loenhout-Rooyackers *et al*, 2001). The presence of seizures or coma on admission to the hospital are important predictors of mortality, while the

Table 3
Clinical outcomes of 45 patients.

Mortality, n	1 (2.2%)
Ventricular shunting, n	3 (6.7%)
Newly developed neurological complication during treatment, n	1 (2.2%)
Hemiplegia, n	1
Residual neurological deficits after treatment, n	3 (6.7%)
Paraparesis, n	2
Hemiparesis, n	1

presence of focal neurological signs is a predictor for persistent neurological sequelae in survivors (Hosoglu *et al*, 2002). The role of corticosteroids in the treatment of the various complications of TBM is still controversial. A recent review demonstrates that adjunctive steroids might be of benefit in TBM. However, existing studies are small, and allocation concealment and publication bias may account for the positive results found in this review (Prasad *et al*, 2000).

The results of the treatment of TBM patients without corticosteroids in this present study show a good outcome with low morbidity and mortality. We conclude that early diagnosis and treatment with chemotherapy and active management of the complications, such as increased intracranial pressure and hydrocephalus, are of great importance. Corticosteroid may not be necessary as adjunctive therapy for TBM.

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