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General review

Risk assessment of the outcome for cerebral infarction in tuberculous meningitis

L'évaluation des risques à l'issue de l'infarctus cérébral dans la méningite tuberculeuse

C.-H. Chen [a,*,f], Y.-J. Chang [b], H.-N. Sy [c], W.L. Chen [d], H.-C. Yen [e]

[a] *Division of infectious disease, department of internal medicine, Changhua-Christian hospital, 135, Nanhsiau street, Changhua, Taiwan, Republic of China*
[b] *Laboratory of epidemiology and biostatistics, Changhua-Christian hospital, 135, Nanhsiau street, Changhua, Taiwan, Republic of China*
[c] *Department of neurology, Changhua-Christian hospital, 135, Nanhsiau street, Changhua, Taiwan, Republic of China*
[d] *Department of medical imaging, Changhua-Christian hospital, 135, Nanhsiau street, Changhua, Taiwan, Republic of China*
[e] *Department of neurosurgery, Changhua-Christian hospital, 135, Nanhsiau street, Changhua, Taiwan, Republic of China*
[f] *Department of Nursing, College of Medicine & Nursing, Hung Kuang University, Taichung, Republic of China*

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ABSTRACT

Introduction. – Cerebral infarction in tuberculous meningitis is a major risk factor for permanent disability. This study assessed the clinical presentation of tuberculous meningitis and risks factors for cerebral infarction.

Observation. – Thirty-eight adult patients with tuberculous meningitis were studied between 2002 and 2006. Clinical, radiological, and laboratory data of patients with cerebral infarction were compared with those of patients without cerebral infarction. Patients with cerebral infarction were significantly older (65.1 vs 52.1 years), had higher risk assessment scores (3.7 vs 2.2), and more often had basal meningeal enhancement on imaging (92.3% vs 60.0%), mild to moderate sequelae (69.2% vs 4%), an overall poor brain outcome (69.2% vs 8%), aspirin prescription (84% vs 8%), and neurosurgical intervention for hydrocephalus (54.0% vs 16.0%). Cerebral infarction patients were also more likely to have experienced doctor-related delays in antituberculosis (61.5% vs 36%) and corticosteroid (61.5% vs 32%) therapy.

Discussion and conclusion. – The Framingham risk score would be an option for tuberculous meningitis patients to access cerebral infarction risk. Contrast-enhanced brain imaging is helpful for exploring basal meningeal enhancement, in order to obtain an early diagnosis. Antituberculosis, corticosteroid, and aspirin therapies should be started immediately when tuberculous meningitis is suspected.

* *Corresponding author.*
E-mail address: chenchanghuachad@gmail.com (C.-H. Chen).
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RÉSUMÉ

Introduction. – L'infarctus cérébral dans la méningite tuberculeuse est un facteur de risque majeur d'incapacité permanente. Cette étude a évalué la présentation clinique de la méningite tuberculeuse et les facteurs de risque d'infarctus cérébral.

Observations. – Les cas de trente-huit patients adultes atteints de méningite tuberculeuse ont été étudiés entre 2002 et 2006. Les données de laboratoire et celles cliniques et radiologiques des patients avec un infarctus cérébral ont été comparées à celles des patients sans infarctus cérébral. Les patients avec un infarctus cérébral étaient significativement plus âgés (65,1 contre 52,1 années), avaient des scores plus élevés dans l'évaluation des risques (3,7 vs 2,2), avaient le plus souvent vu une amélioration méningée fondamentale sur l'imagerie (92,3 % vs 60,0 %), des séquelles de légères à modérées (69,2 % contre 4 %), un résultat global médiocre du cerveau (69,2 % contre 8 %), une prescription d'aspirine (84 % contre 8 %) et une intervention neurochirurgicale pour hydrocéphalie (54,0 % contre 16,0 %). Les patients ayant subi un infarctus cérébral étaient également plus susceptibles de profiter en retard d'une thérapie antituberculeuse (61,5 % contre 36 %) et corticostéroïde (61,5 % contre 32 %) décidée par des médecins expérimentés.

Discussion et conclusion. – Le score de risque de Framingham serait une option pour les patients atteints de méningite tuberculeuse pour accéder au risque d'infarctus cérébral. Le renforcement du contraste en imagerie cérébrale est utile pour explorer l'amélioration méningée fondamentale et ce, afin d'obtenir un diagnostic précoce. Des thérapies antituberculeuses, à base de corticoïdes ou d'aspirine, doivent être lancées dès qu'une méningite tuberculeuse est suspectée.

1. Introduction

Tuberculous meningitis (TBM) is the most frequent cause of subacute or chronic meningitis [1,2] and is estimated to constitute 1.5–5% of cases of tuberculosis (TB) in Taiwan [3].

TBM remains a catastrophic illness with significant neurological sequelae. The neurological complications of TBM are diverse, and include hydrocephalus, vasculitis, cranial neuropathies, epilepsy, dementia, and cerebral infarction (CI) [4–7]. Computed tomography (CT) scanning studies show infarctions in 17% to 63% of patients with TBM [8,9]. CI is also a major risk factor for permanent disability [10–12], and the prevention of this complication is an important issue in TBM patients. Infarct is a poor prognostic predictor in children with TBM [13]. Although many studies have evaluated CI in TBM [10,12,14–17], most have been radiological studies, and only a few have focused on the correlations between CI and clinical factors in TBM patients [6,11,17]. No comprehensive study has conducted a risk assessment for CI in patients with TBM [10,12,17]. Furthermore, the underlying mechanisms of CI in TBM are not yet fully understood, and the most effective means of prevention remains unknown.

Therefore, we compared the clinical characteristics of TBM patients with and without CI, and determined the risk factors for CI in TBM patients.

2. Patients and methods

2.1. Inclusion criteria

The study was approved by the institutional review board of Changhua Christian Hospital. This study was carried out at the Changhua Christian Hospital (CCH). CCH, an 1800-bed medical centre situated in central Taiwan, provides both primary care and referred care in Taiwan. From January 2002 through to December 2009, hospitalized patients aged over 18 years and diagnosed with TBM were recruited. Inclusion criteria were based on clinical, radiological, and mycobacterial data [17]. The diagnosis of TBM was established on the basis of the presence of symptoms and/or signs suggestive of meningitis and, for a definitive diagnosis, a positive culture for *Mycobacterium tuberculosis*, and a positive smear for acid-fast bacilli (AFB) from cerebrospinal fluid (CSF). The criteria for presumptive diagnosis were:

- positive *M. tuberculosis* culture, positive smear for AFB, or positive polymerase chain reaction from another body fluid;
- tissue-proven TB involvement of other organs;
- negative CSF culture for virus, bacteria, and fungi, plus clinical response to empirical antituberculosis therapy.

Brain CT and/or magnetic resonance imaging (MRI) studies were performed on admission, according to the discretion of the physician, and follow-up brain images were obtained within 3 months of admission for all patients. Patients also underwent repeated brain imaging when neurological deterioration occurred during hospitalization. Exclusion criteria included concomitant positive findings for other CNS infections or malignancy, previous receipt of antituberculosis therapy, and failure to undergo brain imaging studies.

2.2. Evaluation and investigation

The diagnosis of symptomatic CI secondary to TBM was based on new-onset acute neurological deficits demonstrated to be due to new infarction by brain imaging analysis. The