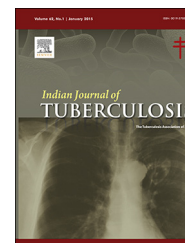


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Original Article

A cross sectional study in patients with confirmed spinal tuberculosis in central Taiwan: Analysis of preliminary clinical presentation and neuroradiological findings

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ABSTRACT

Spinal tuberculosis (STB) can cause significant functional impairment. The purpose of the present study was to analyze the factors at preliminary presentation and the neuroradiological findings in STB patients. We performed a retrospective cross-sectional analysis of cases with a definitive diagnosis of STB. Four patients with confirmed mycobacterial infection and histopathological findings confirming TB were identified. We noted two key clinical indicators. We also identified seven key neuroradiological findings associated with STB lesions. A high degree of clinical suspicion along with nine neuroradiological findings described in this study are important for STB diagnosis and for starting treatment with antituberculosis agents.

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1. Background

Tuberculosis (TB) is an ancient disease, but is still a major public health problem globally.¹ The incidence of TB appears to

be increasing throughout the world.² Although pulmonary tuberculosis (PTB) is the most common form, extrapulmonary tuberculosis (ETB) also causes significant morbidity and mortality. In Taiwan, the estimated TB burden was 44/million/year in 2009.³ Spinal tuberculosis (STB) comprises

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Abbreviations: AFS, acid fast stain; ATA, antituberculosis agents; CCH, Changhua Christian Hospital; CCHS, Changhua Christian Hospital System; CT, computed tomography; ETB, extrapulmonary tuberculosis; FNAC, fine needle aspiration cytology; HERZ, isoniazid, ethambutol, rifampin, and pyrazinamide; MRI, magnetic resonance imaging; PTB, pulmonary tuberculosis; STB, spinal tuberculosis; TB, tuberculosis.

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1–4.3% of all TB cases and 10–15% of all ETB cases.⁴ Because STB has been suggested as an important cause of vertebral osteomyelitis and it is a common site of ETB, we conducted a literature review on STB (summarized in [Additional File](#)). However, physicians are not only familiar with the common clinical features of STB, but have an in-depth understanding of the disease; an early diagnosis and effective treatment can minimize the occurrence of sequelae and improve clinical outcomes. Since the clinical symptom of STB is variable, and some of fragile patients developed handicapped, such as spinal cord compression, to study the accurate and effective diagnosis and treatment of STB are very necessary. Literature is sparse concerning the early preliminary clinical presentation and neuroradiological findings of STB; therefore, the purpose of the present study was to analyze these factors.

2. Materials and methods

2.1. Hospital setting and data collection

The population of rural area of central Taiwan is mostly served by the Changhua Christian Hospital System (CCHS), which totally has 4000-bed to serve patients. Changhua Christian Hospital (CCH) is one of nine branch hospitals among the CCHS, and it is an 1800-bed tertiary referral medical center situated in central Taiwan. This study was carried out at CCHS and was approved by the institutional review board of CCH. From January 2010 to December 2013, hospitalized patients over 18 years of age who were diagnosed with STB were included in this study. The study design was retrospective in

Table 1 – Preliminary clinical presentation and preliminary neuroradiological findings.

Patient	1	2	3	4
Age (year)/sex	78/F	66/M	82/F	57/M
Previous exposure to TB	NEG/NEG	NEG/NEG	NEG/NEG	POS/NR
Hypertension/diabetes mellitus/acupuncture	POS/NEG/NEG	POS/NEG/NEG	NEG/NEG/NEG	NEG/NEG/NEG
Previous spinal disorders	ST, L4/L5; CF, L5	ST, s/p TSF	CF L2/3, s/p VTB	NEG
Previous prednisolone usage	NEG	NEG	NEG	POS
Patient delay (days)/doctor delay of ATA (days)/total delay (days)	60/5/65	30/5/35	32/5/37	60/3/63
Local painful sensation on admission	2 Mo	1 Mo	NEG	2 Mo
Fever on admission	NEG	NEG	NEG	4 days
Wound discharge on admission	NEG	POS	NR	NR
Neurological deficits on admission	NEG	NEG	right lower LW	right FP
American Spinal Injury Association impairment score on admission	A	B	B	A
Evidence of pulmonary TB on chest plain film radiography on admission	NEG	NEG	NEG	NEG
White cell count (cell/mm ³) on admission	4800	6200	5800	6800
ESR (mm/h) on admission	NR	45	NR	68
GOT/GPT (U/L) on admission	40/35	41/44	35/25	36/46
Ccr (mL/min) on admission	50	60	50	65
Uric acid (mg/dL) on admission	5.5	5.6	6	5.6
CRP (mg/dL) on admission	24.9	NR	NR	5.5
TB smear of sputum	NEG	NEG	NEG	NEG
TB smear of tissue/MtbcDT of tissue/TB culture of tissue	POS/POS/MTBC	POS/POS/MTBC	POS/POS/MTBC	POS/POS/MTBC
Interferon	NR	NR	NR	POS
Histopathological results	GI	GI, CN	GI, CN	GI, CN
Preliminary neuroradiological findings				
Originate from vertebral endplate	OBS	OBS	OBS	OBS
Involves the anterior vertebral body corner	OBS	OBS	OBS	OBS
Subligamentous spread	OBS	OBS	OBS	OBS
Multiple vertebral bodies involved and preserved disk	OBS	OBS	OBS	OBS
Extensive paraspinal abscess formation	OBS	OBS	OBS	OBS
Calcification of abscess		OBS		
Vertebral destruction, vertebral body collapse (Gibbus deformity)	OBS	OBS	OBS	OBS
Chest plain film radiography findings	Non-specific	Non-specific	Non-specific	*1

Abbreviations: ATA: anti-tuberculosis agent; Ccr: creatinine clearance rate; CF: compression fracture; CN: caseous necrosis; CRP: C-reactive protein; ESR: erythrocyte sedimentation rate; F: female; FP: flank pain; GI: granulation inflammation; GOT: glutamate oxaloacetate transaminase; GPT: glutamate pyruvate transaminase; M: male; Mo: month; MTBC: *M. tuberculosis* complex direct test; MtbcDT: *M. tuberculosis* complex direct test; NEG: negative; NR: not recorded; OBS: the finding was observed; POS: positive; s/p: status of post; ST: spinal stenosis; TB: tuberculosis; TSF: transpedicular screws fixation; VTB: vertebroplasty.

Notes: *1 linear fibrosis with a dense nodule in the right upper lobe due to previous pulmonary tuberculosis.

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