New Risk Factor for Neurological Involvement in Patient with Spinal Tuberculosis

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Background : Spinal tuberculosis is one of the causes leading to damage to the spine, nerve roots, or spinal cord[1]. Few studies have identified the risk factors of developing neurological deterioration in spinal tuberculosis patients[11]. In order to take care of the patients promptly before developing paralysis, the risk factors of neurological deterioration in these patients should be identified.

Methods: The demographics and clinical characteristics of the patients diagnosed with spinal tuberculosis at Srinagarind Hospital between 1993 and 2013 were collected. These include; age, sex, local pain and tenderness, radicular pain, body temperature, bladder involvement, Cobb angle, neurological deficit, vertebral collapse, endplate collapse, signal cord change, posterior element involvement, paraspinal or epidural abscess, disk space involvement, level of involvement, ESR, and CRP. Univariate analyses were used to identify individual risk factors. Multivariate analyses were used to adjust the effect of combined risk factors.

Result: A total of 125 patients with spinal tuberculosis were categorized into groups of 70 men aged around 55.7 (55.7± 2.0 years) and 55 women aged around (52.3± 2.4 years). According to univariate analysis, the risk factors for developing neurological deterioration were signal cord changes, Cobb (>30 degrees), radicular pain, and epidural abscess. Multivariate analyses found that the only one risk factor for developing neurological deterioration was signal cord change.

Conclusion: The risk factor for developing neurological deterioration in spinal tuberculosis patients was signal cord change.

Keyword: Spinal tuberculosis, Neurological deficit, predictive factor

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Introduction

Incidence of spinal tuberculosis (TB) is 1% of all tuberculous infection.[1] Data from World Health Organization estimates that more than 8 million new cases of TB occur each year. Spinal TB is the most common and most serious form of musculoskeletal TB. Incidence of TB spine is one half of the cases of extra pulmonary TB.[2-4] Spinal TB was the cause of pain, spinal cord compression, neurological deficit which varied from numbness to significant motor deficit.[2] Due to motor deficit, patient have poor function in activity of daily living. Now a day we have magnetic resonance image (MRI) which provides the information for the spinal pathoanatomy and the diagnosis.[5-9] However, the literature still have a little knowledge about the risk factors to predict neurological involvement in spinal TB patient.[11] Therefore, the purpose of the current study was to find out the risk factors of neurological deficit in spinal TB patient.

Patients and Methods

During 1993 to 2013,125 spinal tuberculosis patients were reviewed for their medical records. The diagnosis of spinal tuberculosis was based on pathological specimens or MRI finding which was reported by radiologist and clinical feature of the patient including good response to treatment by anti-tuberculosis drug . The sample size was calculated by Fisher's (1998) formula

$$n = \frac{Z_{\frac{a^2}{2}}(pq)}{se^2}$$

p is the incidence of neurological deficit in TB spine which is 30% (Jain AM., 2013) in underdeveloped countries, then q was 0.7, se was standard error of estimate (10%). The significance level was set at 0.05, therefore, Z was1.96. total sample size was 80. The patients were divided in to two groups; the 49 cases were patients who had neurological involvement and the 76 controls were patients who had no neurological deficit.

The possible risk factors that may lead to the development of neurological deficit including age, sex, local pain and tenderness, radicular pain, body temperature, bladder symptom, Cobb angle, neurological deficit, vertebral collapse, MRI findings (signal cord change, posterior element involvement, paraspinal or epidural abscess, disk space involvement, level of involvement), ESR, and CRP.

We compared data between the groups to find out the odd ratio both the crude ratio and adjusted odds ratio using the logistic regression method. The statistically significant risk factors and the literature accepted risk factors were analyzed together using the multivariate analysis.

Result

A total of 125 patients with spinal TB were categorized into groups of 68 men aged around 55.7 (± 2.0 years) and 57 women aged around 52.3 (± 2.4 years). The patient demographic data were shown in table 1. According to univariate odd ratio, the risk factors for neurological deficit were signal cord change, Cobb angle (> 30 degrees), radicular pain and epidural abscess ($p<0.2$) (Table 2) and the medical literature's accepted risk factors which were age and severe collapse. When all the risks are combined into the multivariate analysis (Table 3), it is found that the statistical significant risk factor for neurological deficit is signal cord change neither , Cobb angle (> 30 degrees), radicular pain, epidural abscess not statistic significant risk factor

Discussion

The clinical features of TB spine are varied. They can be either systemic or local diseases but are often nonspecific. The clinical features in our TB spine patient were fairly similar to that described in previous studies, with backache(58%), fever (22%), and weight loss(19%) being the most common presenting symptoms. [12] The frequency of neurologic involvement has been found to vary across studies, from 23% to 76% of patients. [4,10,14,17]

Radiographic changes associated with TB spine including destruction of the vertebral endplates, disc space narrowing, and bone destruction. These findings may not be visible on plain radio graphs for up to 8 weeks.[2,15,18,20] MRI provides better information of spinal canal and spinal cord lesion. In the past literature, excellent studies outlined the typical MRI features of TB spine.[2,19] The typical MRI of TB spine would involve the vertebral body and the intervertebral discs are severely

Table 1 Patient demographic data

Patient characteristic	Case group	Control group
Age	Mean 50.61	Mean 54.68
Men	24	44
women	25	32
Local Tenderness	47	76
Radicular pain	19	28
Fever	40	30
Complaint of Bladder	47	0
Cobb change >30	32	15
ESR>40	30	17
Endplate involvement	30	42
Signal Cord change	31	16
Posterior element involvement	46	74
Severe collapse	24	23
Epidural Abscess	19	28
Disc space involvement	43	70

Proceeding

Table 2 Risk factor was analyzed univariate odd ratio

risk	Odd ratio	P-value	95% CI
Age	1.253	1.253	.607-2.585
Sex	1.484	.287	.718-3.068
Local Tenderness	1.617	.736	.099-26.474
Radicular pain	1.786	.134	.837-3.809
Fever	1.556	.402	.554-4.370
Complaint of Bladder involvement	1520446910.919	.998	0.00
Cobb change >30	. 328	.016	.133-.809
ESR>40	.618	.267	.264-1.446
Endplate involvement	.960	.957	.219-4.213
Signal Cord change	3.805	.001	1.75- 8.24
Posterior element involvement	1.253	.855	.111-14.208
Epidural Abscess	2.180	.048	1.006-4.724
Disc space involvement	1.674	.436	.458-6.119
Severe collapse	.657	.259	.316-1.363

Table 3 risk factor was analyzed adjusted odd ratio

risk	Adjusted odd	P-value	95%CI
Age	.823	.644	.360-1.881
Severe collapse	.480	.089	.206-1.119
Epidural Abscess	1.040	.935	.405-2.671
Signal Cord change	3.993	.004	1.537-10.373
Cobb change >30	.458	.119	.171-1.222
Radicular pain	1.753	.195	.749-4.101

damaged, with evidence of osteomyelitis, and the epidural space is affected by the extension of the paravertebral abscess or epidural abscess.

From literature review found one study that found level of involvement, present of abscess not classified, epidural or paravertebral, and age are the risks but not include MRI finding of the patient to identify risk factor[11]. In our study was include MRI finding for identifing risk factors this is the different from another study.

From univariate odd ratio, we found neurological deficit are signal change of the spinal cord , cobb (> 30 degrees), radicular pain, epidural abscess were risk factors and literature found age and severe collapse.

In the adjusted odd ratio found only signal cord change was the risk factor. This is the risk factor that identify from MRI the important investigation in present that use to evaluated suspected spinal tuberculosis patients.

Limitation of the study In this study was retrospective cause we has recall bias and gold standard to diagnosis is culture can identify Mycobacterium tuberculosis but in this study we include the patient who have clinically and associate investigation to diagnosis. After review of literature brucellosis can lead to spondylitis as well and mimic to spinal tuberculosis[19]

Clinical application of this study is spinal tuberculosis patient who present with no neurological deficit and signal change of the spinal cord have the risk to develop neurological deficit 4 times greater than patient who has not had signal change of the spinal cord. Radicular pain is the one risk factor that we found so the patient who have radicular pain 1.5 times to develop neurological deficit than whom has not risk. In patient who have risk above we should closed follow up or early intervention

conclusion

Our study show the risk factor for neurological involvement of spinal tuberculosis patient is signal change of the spinal cord in MRI finding. In addition of age, and severe collapse in previous study.

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