

## Management of spinal tuberculosis — a metropolitan city based survey among orthopaedic and neurosurgeons

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### Abstract

**Objective:** To explore the core understanding of spinal tuberculosis and its current management plans by orthopaedics and neurosurgeons.

**Methods:** The questionnaire-based study was conducted from July 2011 to November 2012 in Karachi and comprised consultant orthopaedics and neurosurgeons belonging to 4 private and 3 government tertiary care teaching hospitals and having a minimum five years of post-fellowship experience. A pre-designed questionnaire was used to explore the current practice in spinal tuberculosis regarding its clinical presentation, diagnosis and treatment. SPSS 15 was used for statistical analysis.

**Results:** There were 48 subjects in the study; 24(50%) orthopaedic surgeons and 24(50%) neurosurgeons. According to 44(91.70%) respondents, common age for spinal tuberculosis was second and third decades of life, and 37(77.08%) reported refractory back pain with or without neurological deficits as the commonest clinical finding. Typical magnetic resonance imaging findings was the uniform observation of all the 48(100%) respondents. Diagnosis was made by histopathological findings by 39(81.25%) respondents. Anti-tuberculosis therapy was started empirically on the basis of clinical, laboratory and radiological findings by 33(68.75%) respondents. Those in favour of giving anti-tuberculosis therapy for 18 months were 32(66.7%) respondents, and 33(68.75%) thought surgery does not expedite recovery.

**Conclusion:** Extremely variable tools of diagnosis and diversified approaches for the treatment are alarming signs for the possible development of resistant strains and complications of spinal tuberculosis.

**Keywords:** Tuberculosis, Spine, Anti-tuberculosis therapy. (JPMA 65: 1256; 2015)

### Introduction

Spinal tuberculosis, commonly known as Pott's disease, is an extrapulmonary infection commonly originating from lungs. Most of the time, the concomitant lung infection is not evident. Spinal involvement occurs in less than 1% patients with tuberculosis (TB).<sup>1</sup> TB has become a worldwide health problem. One of the most important reasons is immigration of undiagnosed cases from endemic countries to non-endemic countries.<sup>2,3</sup>

Extrapulmonary TB accounts for about 15-20% of all cases<sup>4</sup> and spinal TB accounts for 50% of all skeletal TB cases.<sup>5</sup> Due to its vague clinical presentation, the diagnosis is usually delayed and the patients are treated for mechanical backache for variable time duration. Besides difficulty in diagnosis, the treatment regimens, duration, drug combinations, drug efficacy assessment, treatment end-points criteria are largely debatable subjects and the probable causes of the recent resurgence of chemoresistant mycobacterium TB. As a

result, multidrug resistant tuberculosis (MDRTB) has become one of the most important challenges in the control of TB worldwide.<sup>6</sup>

Since spinal TB is mainly handled by neurosurgeons and orthopaedic surgeons. The current study was planned to explore this diversity in the understanding and management of the disease in practice.

### Subjects and Methods

The questionnaire-based study was conducted from July 2011 to November 2012 in Karachi and comprised consultant orthopaedics and neurosurgeons belonging to 4 private and 3 government tertiary care teaching hospitals and having a minimum five years of post-fellowship experience. After explaining the objective of the study and obtaining verbal informed consent, the participants were requested to fill-up the questionnaire in the same session to ensure sharing their core, personnel experience with all due assurance of anonymity. The questionnaire was specifically designed to explore the current practice in spinal TB regarding its clinical presentation, diagnosis and treatment.

SPSS 15 was used to analyse the data. Descriptive analysis was done and the results were given in

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frequencies and percentages.

## Results

There were 48 subjects in the study; 24(50%) orthopaedic surgeons and 24(50%) neurosurgeons. According to 44(91.70%) respondents, spinal TB was found most commonly in second and third decades of life, and almost none in children, while 4(8.3%) found it equally common in all age groups. Besides, 40(83.4%) respondents found spinal TB in poor class, while 8(16.7%) found it equally in all classes.

Clinical findings reported by 37(77.08%) clinicians were refractory back pain with or without neurological deficits, and 11(22.91%) described weight loss with fever beside

**Table-1:** Diagnostic criteria (% responders).

	Major	Minor
1. Clinical (22.91%)	Refractory back pain (77.08%)	Weight loss with fever
2. Laboratory	Raised ESR (62.5%)	Positive culture yields (12.5%) Tuberculous bacilli in the smear (4.16%)
3. Radiological	Typical MRI findings (100%)	
4. Biopsy	Histopathology (81.25%)	

MRI: Magnetic resonance imaging.

**Table-2:** Basis of initiation of Anti-Tuberculosis Therapy (ATT).

Group A (68.75%)	Group B (31.25%)
Clinical raised ESR radiological findings	Clinical raised ESR, radiological findings, biopsy and/ or culture

ESR: Erythrocyte sedimentation rate.

**Table-3:** Anti-tuberculosis dosage regimens.

ATT Regimens	Respondents (%)
Rifampicin, INH, Ethambutal, Pyrazinamide = 3 months	66.7% (n: 32)
Rifampicin, INH, Ethambutal = further 3 months	
Rifampicin, INH = 12 months	
Rifampicin, INH, Ethambutal, Pyrazinamide = 3 months	10.4% (n: 5)
Rifampicin, INH, Ethambutal = further 3 months	
Rifampicin, INH = 06 months	
Rifampicin, INH, Ethambutal, Pyrazinamide = for 2 months	8.4% (n:4)
Rifampicin, INH = for 07 months	
Rifampicin, INH, Ethambutal, Pyrazinamide = for 2 months	8.4% (n:4)
Rifampicin, INH = for 4 months	
Rifampicin, INH, Ethambutal, Pyrazinamide = 06 months	4.16% (n:2)
Rifampicin, INH, Ethambutal, Pyrazinamide = 18 months	2.08% (n:1)

INH: Isonicotinylhydrazine.

back pain and variable neurological deficits for 1 to 6 months.

Erythrocyte sedimentation rate (ESR) was consistently found raised by 30(62.5%) clinicians, while 11(22.9%) did not find it uniformly raised in their practice. Final diagnosis of spinal TB was made on the basis of histopathology findings by 39(81.25%) respondents, positive culture yields by 6(12.5%) and finding TB bacilli in the smear by 2(4.16%) respondents (Table-1).

Anti-tuberculosis therapy (ATT) was started empirically on the basis of clinical, laboratory (raised ESR) and radiological findings by 33(68.75%) respondents, while 14(31.25%) required proven biopsy and/or culture report in addition to clinical, laboratory and radiological findings (Table-2).

In case of spinal instability and/or neurological deficits, 37(77.08%) surgeons were in favour of surgical intervention, while 9(18.75%) chose to give empirical ATT for 4-6 weeks and then surgical intervention in unresponsive patients. Two (4%) respondents would never consider surgery irrespective of the level of spinal instability or neurological deficits.

In case of massive psoas abscess without any spinal instability or neurological deficits, 28(58.4%) subjects were in favour of ultrasound-guided aspiration and starting ATT; 12(25%) suggested open surgery, and 7(14.58%) were in favour of starting ATT without any aspiration. According to 40(83.4%) respondents, empirical ATT has never failed, 5(10.41%) found some other pathologies later on when the lesion was biopsied, while 3(6.25%) had no idea.

Streptomycin and ciprofloxacin were used as second-line drugs by 38(79.16%) clinicians in case of non-responders or as replacement therapy in case of adverse effects with first-line drugs, while 10(20.83%) would refer them to physician/internal medicine.

Recurrence/resistance of spinal TB was quoted less than 3% by 37(77.08) participants, while 11(22.91%) quoted more than 3% cases of recurrent/resistant spinal TB.

ATT was prescribed on once-a-day dose before breakfast by 42(87.5%), three-times-a-day by 4(8.4%) and 2(4.16%) participants would give rifampicin before breakfast and the remaining drugs after breakfast.

ATT had been prescribed in split drug form by 35(72.91%), while in combination form (all 4 drugs in a single tablet) by 10(20.83%), and 3(6.25%) preferred to refer the case to a physician.

In terms of adverse effects of ATT (Table-3), 26(54.16%) clinicians reported raised serum glutamic pyruvic transaminase (SGPT) as the commonest adverse effect. Raised uric acid was found by 17(35.41%) respondents and blindness by 5(10.41%).

In case of raised SGPT, rifampicin was the first drug to be withdrawn by 26(54.16%); isonicotinylhydrazine (INH) by 9(18.75%), pyrazinamide (PZA) by 8(16.66%), and ethambutal by 3(6.25%), while 2(4.16%) had no idea.

Surgery does not expedite recovery was the observation of 33(68.75%) clinicians, while according to 15(31.25%) it shortened the duration of therapy as well as expedited the recovery.

Drug efficacy was uniformly assessed by clinical improvement, decrease in ESR, and cessation of intervertebral disc and bone destruction on periodic imaging, initially at 3 to 6 months' interval and later on at the time of withdrawal of treatment.

## Discussion

In our survey the main age group affected with spinal TB was second and third decades of life compared to developed countries where it is common in the elderly population.<sup>7</sup>

Clinical presentation of spinal TB is different from pulmonary TB. In spinal TB the classical general symptoms like fever, loss of appetite, weight loss, and night sweats are usually lacking, an observation common to other studies as well.<sup>8</sup> Persistent severe thoracolumbar backache in an otherwise healthy patient, usually resistant to multiple analgesics, raised the suspicion of spinal TB in our surgeons.

Raised ESR and intervertebral disc and/or endplate destruction with surrounding soft tissue oedema on MRI were the strong suspicion of spinal TB in this survey as well in an extensive update.<sup>8</sup>

World over, ultrasound or computed tomography (CT) scan- guided biopsy are the preferred methods of diagnosis in case of absent neurological involvement and spinal instability. This practice was scarcely found in our responders. Acid-fast bacilli (AFB) smear and culture yield was quite low in this survey, hence reliance was made more on histopathological findings compared to studies where the acid-fast staining and culture are important tools of diagnosis.<sup>9</sup> Mantoux test was not performed routinely due to routine bacilli Calmette-Guerin (BCG) vaccination in our country. Polymerase-chain reaction (PCR) technique utilising the tissue specimen is one of the most advanced diagnostic techniques and was also used

very rarely by our responders. PCR can provide both rapid results and an improved diagnostic accuracy of the involved mycobacteria.<sup>9</sup> The automated Mycobacterial Growth Indicator Tube (MGIT) is the state-of-the-art technology for not only rapid mycobacterial isolation, but for proper drug susceptibility as well.<sup>10,11</sup> But this technology is not accessible to many developing countries yet. Our responders did not mention this technology.

Majority of the surgeons in this survey would diagnose spinal TB on the basis of history, laboratory and radiological findings and would start empirical ATT without any histopathological or microbiological confirmation. This approach has already been criticised the world over due to emergence of uncomfortable situations during the course of treatment if there was worsening while on ATT with no histopathological or microbiological proofs.<sup>8</sup> Though there is a clear benefit of timely chemotherapy, which reduces the need for surgical intervention<sup>12-14</sup> it does not over-rule the benefit of isolation of TB bacilli either through smear or culture.

In countries like ours, where Pott's spine is still at its high swing, physicians should raise the index of suspicion manifold to achieve the early definitive diagnosis. Accurate diagnosis is possible when the bacterium is isolated through smear or culture techniques, which is most of the time difficult to obtain. The present practice may result in cultivation of resistant strains because of the over-diagnosis and excessive usage of TB chemotherapy. Similarly, the same practice where finding the tuberculous bacilli is the mainstay of final diagnosis may result in under-diagnosis of the disease and, hence, can complicate spinal TB in the form of spinal deformities or neurological deficits.

The most controversial issue found in this study was the highly variable way of chemotherapy administration in the form of drug combination and duration.

Most of the surgeons prescribed anti-TB drugs in split forms that is rifampicin, isoniazid, ethambutal and pyrazinamide in separate tablet form, and were highly reluctant to use the combined formulation (a single tablet containing all 4 drugs in certain ratios). Whether anti-TB drugs should be prescribed in split form or in a combination form needs further evaluation for their efficacy.

A study reviewed a large number of case series and concluded that the duration of ATT largely varied from 6 to 18 months.<sup>15</sup> The World Health Organisation (WHO) recommendation for duration of ATT in extrapulmonary

TB has been 6 months (2-months intensive isoniazid (H), rifampin (R), pyrazinamide (Z), and ethambutol (E)[HRZE] + 4-month maintenance phase with HR). However, based on the recommendations by the Centre for Disease Control and Prevention (CDC), American Thoracic Society and Infectious Diseases Society of America, the WHO advocates a 9-month treatment (combination of rifampicin, isoniazid, ethambutol, and pyrazinamide for two months followed by combination of rifampicin and isoniazid for a total period of 7 months) in bone and joint TB.<sup>8</sup> Similarly, extensive studies carried out by British Medical Research Council<sup>16</sup> and an Indian Madras-based study also failed to reach a well-defined duration of chemotherapy.<sup>17</sup>

In our survey majority of the responders were in favour of 18-month duration. As there are no standard criteria for the evaluation of "healed" status or completion of treatment, they preferred to give it for the longest possible duration rather than taking risk of short-course chemotherapy. This probably forms the basis for these variable regimens/durations of chemotherapy.

The 6-month duration is invariably associated with relapse compared with durations 9 months or above.<sup>18</sup>

ATT efficacy was assessed in two phases. In early phase of 6 to 12 weeks, it was assessed by clinical improvement in pain and health status and a decrease in ESR, and later on by imaging to see bone fusion and cessation of bone destruction with resolution of pus. If the patients were slow responders, then a 5th drug, commonly streptomycin, was added for at least 2 months in this survey.

The commonest adverse effects were raised SGPT by rifampicin and INH followed by raised levels of uric acid by pyrazinamide. Blindness by ethambutol was rarely found, especially in unsupervised patients and in those with irregular follow-up.

After 12 to 18 months of anti-TB chemotherapy, the clinico-radiological assessment was performed to withdraw the treatment. The drug endpoints were not clearly defined, but improvement in general health status with almost no residual pain, normal ESR, cessation of bone destruction, disappearance of abscess and evidence of bone fusion were some of the significant signs for the completion of treatment. This approach was exactly in accordance with the other studies.<sup>8,19</sup>

In case of absent neurological deficit or spinal instability, majority of our surgeons did not find any additional benefit of surgery on overall outcome beside early and pain-free mobilisation compared to chemotherapy alone.

Similarly a Cochrane review of randomised controlled trials comparing the chemotherapy plus surgery with chemotherapy alone for spinal TB concluded no statistical difference for any of the outcome measures.<sup>20</sup>

In our survey the indications for surgical interventions were quite clear. Those patients who were neurologically intact without significant deformity or instability were treated with anti-TB chemotherapy and external bracing with or without biopsy. Surgical intervention was carried out for a diagnostic biopsy, drainage of a large psoas abscess, decompression of neural elements or correction of spinal deformity with stabilisation of the spine.

Some studies preferred surgical intervention, believing that the outcome is fast and good, and duration of ATT is shorter compared to non-surgical patients.<sup>21,22</sup> This belief was not observed among our responders.

Empirical ATT, non-compliance due to socioeconomic constraints and illiteracy were the most common causes for the development of resistant tuberculosis in this survey. In our survey, the recurrence rate quoted was around 3% which is also evident in another study.<sup>23</sup> Most of the patients quit ATT because of the rapid relief in pain, which was a common observation in our study.

We recommend that there should be a uniform protocol for the diagnosis and treatment of spinal TB to secure the effectiveness of available first-line chemotherapy as the second-line drugs are not only ineffective but carry significant adverse effects as well; and to avoid unnecessary delay in the diagnosis resulting in spinal instability and neurological deterioration.

## Conclusion

Extremely variable tools of diagnosis and diversified approaches for the treatment are alarming signs for possible development of resistant strains and complications of spinal TB. There is a need for a uniform protocol for the diagnosis and treatment of spinal TB.

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