



SPINAL TUBERCULOSIS REVISTED : STUDY OF CLINICAL PRESENTATION, DIAGNOSIS, AND MANAGEMENT OF SPINAL TUBERCULOSIS IN A TERTIARY CARE CENTRE IN SOUTH INDIA

Thamilpavai. N*

Associate Professor Of Neurology. Madras Institute Of Neurology. Madras Medical College. *Corresponding Author

K. Prabha

Senior Resident, Govt Medical College, Omandurar Estate, Chennai.

Ganesan Sreepakash

Post Graduate Student At Kilpauk Medical College & Govt Royapettah Hospital.

ABSTRACT

Introduction: Tuberculosis is a disease that affects mostly young individuals in their productive formative years. The risk is 20–37 times greater in HIV co- infected individuals than among those without HIV. Spinal tuberculosis is uncommon in the western world as compared to Asian countries. But it is e-emerging in Western Countries due to the HIV pandemic.

Aim of The Study: This study analysis the clinical presentation, neuroradiology manifestations, and treatment aspects of spinal tuberculosis.

Design: Observational study.

Materials And Methods: Patients admitted in government Royapettah hospital during the year July 2018- February 2020 in the general medical ward with the diagnosis of paraplegia / paraparesis and subsequently diagnosed with spinal tuberculosis were recruited for the study. 35 of them were diagnosed to have spinal tuberculosis after Inclusion and exclusion criteria. Detailed history was taken, examination was done and appropriate imaging (MRI Spine, CT Chest) was taken.

Results: 1 (2.9 %) patient had intramedullary lesion in the form of longitudinally extensive transverse myelitis. 34 (97.1 %) patients had extra medullary lesion. 26 (74.3 %) patients underwent medical management. All of them were started on CAT I ATT DOTS regimen along with steroids. 9 (25.7 %) of them underwent both surgical and medical management.

Conclusion: The prime aim of treatment of spinal tuberculosis is prevention of deformity so that patients can have a better quality of life. Paramount to this is a high index of suspicion, early detection and initiation of treatment. A holistic treatment approach in all cases of spinal tuberculosis is needed to prevent this dreaded complication.

KEYWORDS : Paraplegia, Spinal tuberculosis, ATT.

INTRODUCTION:

Tuberculosis is still a leading cause of mortality and morbidity in spite of marked advances in the diagnosis and treatment in developing countries. Improvement in the socio-economic status led to a major decline in prevalence even before the introduction of anti-tuberculosis drugs. However, it still continues to be a major public health problem in terms of economic burden, disability, job absenteeism in developing countries. Malnutrition, poor sanitation, overcrowding, lower socioeconomic status are the factors contributing to the spread of the disease. Spinal Tuberculosis (Pott's disease, tuberculosis spondylitis) constitutes a significant health burden in developing countries despite of effective screening strategies, novel diagnostic techniques, health care programs, causing significant morbidity and mortality. This is in part due to the non-specific nature of the early complaints and that plain radiograph changes take 3-6 months after the onset of the disease. Paraplegia or quadriplegia due to this non-traumatic myelopathy is a disabling neurological complication of spinal tuberculosis. It is said to occur in about 1-2% of patients with tuberculosis either alone or with concurrent pulmonary or cerebral involvement.

Spinal TB (Pott's disease) is common as well as the most disabling form of extra pulmonary TB and accounts for 50% of all cases of skeletal TB. Any part of the spine can be affected, though the thoracolumbar spine seems to be the most common site of the spinal column involvement. Spondylodiscitis is the classical form and an atypical form which is spondylitis without disc involvement are the types of potts spine. There is an increase in the incidence of multidrug resistant TB, as more cases of HIV are being diagnosed and treated, with increased frequency of infection in immunodeficient individuals, in recent years. Advances in spinal reconstruction techniques, instrumentation, intra operative monitoring, laboratory diagnostic modalities have all challenged the management of Pott's disease.

MATERIALS AND METHODS:

35 patients admitted in government Royapettah hospital during the year 2018- 2019 in the general medical ward with features suggestive of spinal TB with neurologic deficit (back pain sensory or motor deficit). Demographic profile obtained. Detailed history which included the duration of symptoms either acute, sub-acute, chronic, the presence or absence of back pain, whether any prior h/o of intake of ATT for pulmonary or extra pulmonary form, prior treatment details, h/o trauma, h/o constitutional symptoms, were analyzed.

Inclusion Criteria:

All cases of presumptive Spinal TB (localized back pain for 6 weeks or more) as defined by INDEX TB 2016 Guidelines with associated neurologic deficit.

Exclusion Criteria:

H/O trauma other than trivial.
H/O disc disease
H/O spinal metastasis
H/O chronic steroid abuse.
H/O Cytotoxic drug intake

Diagnosis was made based on clinical features which included the presence of paraplegia or paraparesis with or without back pain, band like sensation, paraesthesia, fever, weight loss, and typical imaging features. The classical constitutional symptoms of fever, loss of appetite, and weight are often absent, and are certainly not mandatory for the diagnosis.

Detailed neurological examination included the MRC grading of muscle power (0- 5) to assess the motor weakness, definite sensory level, bladder, bowel involvement and the presence or absence of gibbus. Tuberculosis of the spine was defined as an infection of the spine caused by Mycobacterium tuberculosis and included the cervical, lumbar, thoracic, and sacral vertebrae and all intervertebral discs. MRI was taken to aid the diagnosis. MRI sequences in all patients consisted of a sagittal T1 weighted spin echo (W SE), fat suppressed T2W FSE and short T1 inversion recovery (STIR) sequences and axial T1W SE and T2W FSE sequence. Site of lesion was further assessed with axial pre and post contrast T1W SE images and whole spine screening was done in all patients to assess noncontiguous vertebral or and spinal tuberculosis. HRCT chest also was done to rule out pulmonary tuberculosis. Computed tomography (CT) provides better bony detail, while MRI evaluates soft tissue involvement, disc pathology and abscess formation. MRI was also used to assess disc involvement and soft tissue infiltration without abscess, collapse and neurologic deficit, lesions only limited to vertebra with only end plate involvement without soft tissue or disc involvement. It was used as a measure to assess the outcome of the patient and the modality of treatment medical or surgical. MRI brain was also done to rule out any cerebral involvement. Routine blood investigations included complete blood count including ESR, liver

function tests, renal function tests and chest X ray. HIV/VDRL done to rule immune compromised state.

All patients with spinal tuberculosis were treated by Category I DOTS RNTCP regimen used for seriously ill extra pulmonary disease. This consisted of four drugs (INH, Rifampicin, Ethambutol, and Pyrazinamide) administered under direct observation by a trained personnel, daily for two months during intensive phase, followed by two drugs (INH and Rifampicin), daily for ten months or till the resolution of symptoms in the continuation phase. Patients were asked to come for follow up to our department every month for two months and then once in two months till the treatment was completed. During each follow up visit, physical and neurological examination findings were recorded; complete blood counts with ESR and Liver function tests were monitored. Ophthalmology consultation was done at the beginning of treatment and on first follow up to rule out optic neuropathy due to Ethambutol. If there was no expected improvement clinically, radiologically, after 12-16 weeks of treatment or if there was worsening of neurological deficit during this period, then patients were suspected to be clinically resistant to first-line anti-tuberculous drugs or worsening of the existing lesion or the development of IRIS. Along with ATT an initial six-week tapering course of steroid was part of the treatment regime. However, none of our patients in this study were found to have drug resistance. Surgery was considered in patients if there was severe neurological deficit, prominent deformity, significant spinal instability, and selected cases of epidural abscess. CT guided aspiration was done in certain cases followed with AFB culture and sensitivity. The radiological evidence of healing was proven by repeat MRI and clinical examination.

RESULTS:

Demographic And Clinical Features:

Out of 35 patients admitted 17 were men, 18 women. Their age group ranged from 20 – 80 years. Patients in age group between 20 – 40 years were more affected than in older age group. 21 out of 35 patients were in 20 - 40 age group compared to 4 patients in the 60 -80 age group. 7 out of 17 were smokers and 6 were alcoholics. Constitutional symptoms of fever were present in 14, and 11 presented with respiratory symptoms.

Clinical Findings:

14 out of 35 were diabetes with poor glycemic control. 2 had immunocompromised status with HIV seropositivity. 1 patient had chronic renal failure and was on maintenance hemodialysis. 8 (22.9%) had prior ATT intake for pulmonary tuberculosis (TABLE 1). 10 (28.6 %) had history of contact with tuberculosis patients from their family members. Concomitant TB present in 19 (54.3 %) of 35 patients. 12 (34.3 %) had pulmonary tuberculosis in addition to spinal tuberculosis. 2 (5.7 %) had disseminated TB in the form pulmonary military tuberculosis. 6 (17.1 %) had cerebral tuberculoma in addition to spinal tuberculosis.

Table 1: Clinical Profile

	Frequency (n=35)	Percentage
Diabetes mellitus	14	40
CKD	1	2.8
HIV seropositivity	2	5.7
TB Contact	10	28.6
Prior ATT Use	8	22.9
Concomitant PTB	12	34.3
Concomitant Disseminated TB	2	5.7
Concomitant cerebral Tuberculoma	6	17.1

Neurological Complications:

14 (40.0%) patients presented with chronic onset of symptoms which ranged from low back ache to slowly developing para paresis and subsequently to paraplegia or quadriplegia over a period of 1 – 7 months into their symptomatology (TABLE 2). The character of pain was dull aching, or typical radicular distribution, or band like sensation with a severe catch during coughing or sneezing in either the thoracic region or lumbar region.

Only 10 were pain free compared to 25 who had pain. 27 (71.4%) out of 35 presented with weakness, and 8 (22.9%) had no weakness presenting only with radicular pain in thoracic or lumbar regions (TABLE 3). 23 (65.7%) had paraplegia and 4 (11.4%) presented with quadriparesis. Patients who presented with weakness the MRC

grading of power ranged between 0 -1 (TABLE 4). All of them had a definite sensory level which was complete with loss of all modalities like touch, pain and temperature, vibration and position sense. Incomplete in some with ipsilateral loss of position and vibration sense and contra lateral loss of pain temperature. Retention of bladder was the most disabling manifestation.

Table 2: Symptom Duration

Presentation	Frequency	Percent
Acute	8	22.9
Subacute	13	37.1
Chronic	14	40.0
Total	35	100.0

Table 3 - Back Pain

Frequency	Percent	Valid Percent	Cumulative
25	71.4	71.4	71.4
10	28.6	28.6	100.0
35	100.0	100.0	

Table 4: Pattern Of Weakness

	Frequency	Percent
No Weakness	8	22.9
Lower limb	23	65.7
Upper Limb and lower limb	4	11.4

IMAGING FEATURES:

MRI Characteristics Of The Lesion :

1 (2.9%) patient had intramedullary lesion in the form of longitudinally extensive transverse myelitis (TABLE 5)(Fig 1). 34 (97.1%) patients had extra medullary lesion (TABLE 6) (Fig 2,3,4). None had lesion restricted to the lumbar spine alone. 4 (11.4%) patients with cervical spine involvement (Fig 2), 18 (51.4%) thoracic spine tuberculosis, 11 (31.4%) patients had thoraco-lumbar junction involvement.

Table 5: Intramedullary TB

	Frequency	Percent	Valid Percent	Cumulative Percent
Absent	34	97.1	97.1	97.1
Present	1	2.9	2.9	100.0
Total	35	100.0	100.0	

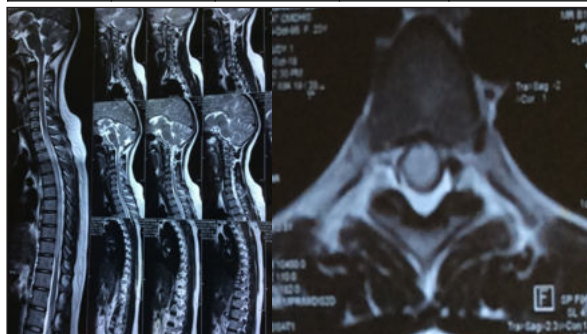


Fig 1 Intramedullary Longitudinally Extensive Lesion From T1 – T10 Vertebrae Both Sagittal And Axial Sections

Table 6: Extramedullary TB

	Frequency	Percent	Valid Percent	Cumulative Percent
Absent	1	2.9	2.9	2.9
Cervical	4	11.4	11.4	14.3
Thoracic	18	51.4	51.4	65.7
Thoracolumbar	11	31.4	31.4	97.1



Fig 2a Cervical Involvement MRI Sagittal Sections: Vertebral body

destruction with end plate involvement cervicothoracic,2b lumbosacral regions with gibbus formation

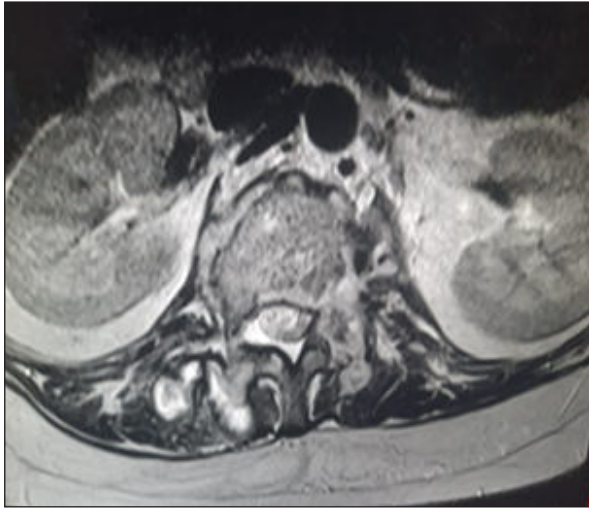


Fig 3 Thoracolumbar Involvement MRI Axial Sections : Vertebral Body Destruction With End plate Involvement .

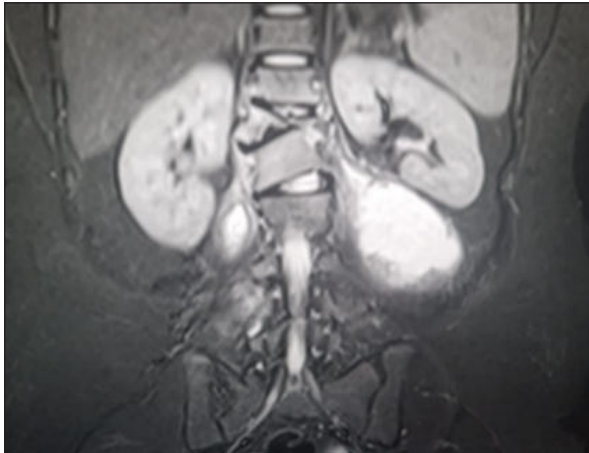


Fig 4 PSOAS Abscess

TREATMENT: 26 (74.3 %) patients underwent medical management. All of them started on CAT I ATT DOTS regimen along with steroids. 9 (25.7 %) of them underwent both surgical and medical management (TABLE 7). All of them recovered after a period of time with no disability. Only one of them had permanent disability (TABLE 8).

Table 7

Treatment Modality	Frequency	Percent
Medical	26	74.3
Medical+Surgical	9	25.7

Table 8

Outcome	Frequency	Percent
NO DEFORMITY	34	97.1
DEFORMITY	1	2.9

DISCUSSION:

There is a re emergent of spinal tuberculosis because of an increase in the incidence of immune compromised states and drug resistance. Abscess, inflammatory tissue, or sequestrum and instability causes direct compression causing neural compromise in the form of radiculopathy, or more commonly to myelopathy or paraplegia due to spinal cord or cauda equina compression. Late neurological deficits can also occur due to mechanical stretch of cord over an internal gibbus. Late-onset paraplegia may occur years later after an initial TB infection, which is due to severe kyphosis from non-union with chronic spinal cord compression or spinal cord atrophy, spinal stenosis above the healed kyphosis. Compensation for the kyphotic deformity in the thoracolumbar causes the unaffected thoracic and lumbar spine to go into compensatory hyper lordosis leading to early facet joints degeneration, spinal stenosis.

The goals of treatment in spinal TB are to treat the disease and to prevent and/or correct spinal deformity and neurological deficits. Medical management alone forms the cornerstone of treatment in uncomplicated spinal TB. The benefits of surgery is in achieving adequate decompression , debridement, maintenance, and reinforcement of stability.

MEDICAL MANAGEMENT: DURATION OF DOTS

The efficacy of DOTS regimen in pulmonary and non-skeletal forms of extra pulmonary tuberculosis is well established. Anti-tuberculous drug therapy is very effective in a compliant patient. The failure of treatment and emergence of drug resistance is due to poor drug compliance which can only be overcome by establishing a good rapport between the patient and the DOTS provider. Evidence from studies shows that the introduction of DOTS has increased completion of therapy to 80–90%, with relapse rates of less than 5%. Rajeshwari R et al in their study have concluded that a combination of surgery and short course chemotherapy of 9-month duration is effective in treatment of Pott's paraplegia (1). The optimum duration of treatment is unresolved between 6 , 9, 12 to 18 months or more based on evidence of clinical radiological healing.

At present, World Health Organization (WHO) recommends therapy for a duration of 9 months in bone and spinal tuberculosis (2). As per the American Thoracic Society (ATS) guidelines, spinal TB in adults should be treated for 6–9 months (4).

The National Institute for Health and Care Excellence (NICE) guidelines recommends a daily six-month regimen, with the first 2 months consisting of four drugs regimen (INH, rifampicin, pyrazinamide, ethambutol/streptomycin). INH and rifampicin are to be continued for the remaining duration, based on drug sensitivity and response to treatment (3).

The Index-TB guidelines for the treatment of extra-pulmonary TB in India states that bone and joint TB should be treated with extended courses of ATT with a 2-month intensive phase consisting of four drugs (isoniazid, rifampicin, pyrazinamide, and ethambutol), followed by a continuation phase lasting 10–16 months, depending on the site of disease and the patient's clinical course(5). The recommended regimen as per this guideline is initial 2 months of INH, rifampicin, pyrazinamide, and ethambutol, followed by 10 months of INH, rifampicin, and ethambutol.

Duration of treatment in tuberculosis of spine has always been debatable in the absence of definite biomarker of healing. According to study by Jain et al (6) only 35.2% patients demonstrate MRI based healed vertebral lesion at the end of 8 months of extended category 1 DOTS regimen, persistent disease activity was present in 65%, only 60% at 12 months of completion of DOTS showed a healed status.

It is unscientific to stop ATT by fixed time schedule and we need to evaluate all spinal tubercular lesions at the end of treatment and subsequently to observe MRI signs of healed status. MRI though defines healed process, better imaging modalities like positron emission tomography (PET) scan can demarcate active and healed lesion.

Steroids In Tuberculosis Of Spine

However, a prolonged course of ATT on a daily regimen is favored by most neurologists under a four-to-six-week steroid cover. It appears to be a safe and effective management of spinal tuberculosis without advanced skeletal destruction or extensive paraspinous spread at presentation.

Surgical Decompression

Aspiration of large paraspinous abscesses should be done, as this will aid in the microbiological confirmation of diagnosis and may yield definite therapeutic benefits in patients thereby decreasing the morbidity. Patients who present with severe neurological deficits can be managed with ATT as well decompressive surgery to prevent bladder involvement as well other neurological sequelae. If the treatment is started before or in the initial stages of destruction the results are rewarding; however, in the later stages of kyphosis with involvement of more vertebrae, the results are unpredictable.

The destroyed tissues can never attain the normal anatomy once they are destroyed; this explains the good outcome in those patients treated

in the early stages of the disease. Studies by Jain et al (6) has observed neurological recovery even where decompression was performed up to 11–12 months after developing paraplegia.

CONCLUSION:

Neurological complications occurs either early or late depending upon the age at presentation, the level of the lesion, vertebral body loss, pretreatment spinal deformity, spine at risk radiological signs. Adults has lesser degree of deformity at presentation and a lesser like hood of progression compared to children in early phases. The thoracic and thoracolumbar lesions have a greater and significant deformity at presentation and have an increased like hood of progression than lumbar or lumbosacral regions. The prime aim of treatment of spinal tuberculosis is prevention of deformity so that patients can have a better quality of life to live in.

A holistic treatment approach in all cases of spinal tuberculosis is needed to prevent this dreaded complication. Only 18 (35.2%) patients in our study demonstrated MRI-based healed vertebral lesion at the end of 9 months of extended Category I DOTS regimen, while 65% of patients had active disease and only 60% of those who completed 12 months DOTs category I had shown healed status by MRI, in spite of clinical improvement. We need to evaluate spinal lesions clinically, and by contrast MRI to document healing of vertebral lesion, after 8 months of ATT and subsequently to decide for the continuation or stoppage of treatments.

Limitations Of The Study:

Larger sample study is needed and long duration of follow up.

Conflicts Of Interest: NIL

REFERENCES:

1. Rajeswari R, Balasubramanian R, Venkatesan P, Sivasubramanian S, Soundarapandian S, Shanmugasundaram TK, Prabhakar R. Short-course chemotherapy in the treatment of Pott's paraplegia: report on five year follow-up. *The International Journal of Tuberculosis and Lung Disease*. 1997 Apr 1;1(2):152-8.
2. WHO Guidelines for treatment of tuberculosis. WHO. Available from: <https://www.who.int/tb/publications/2010/9789241547833/en/>.
3. Recommendations Tuberculosis Guidance NICE. Available from: <https://www.nice.org.uk/guidance/ng33/chapter/recommendations#managing-active-tb-in-all-age-groups>.
4. Dela Cruz CS, Lyons PG, Pasnick S, Weinstock T, Nahid P, Wilson KC, Thomson CC. Treatment of drug-susceptible tuberculosis. *Annals of the American Thoracic Society*. 2016 Nov;13(11):2060-3.
5. Sharma SK, Ryan H, Khaparde S, Sachdeva KS, Singh AD, Mohan A, Sarin R, Paramasivan CN, Kumar P, Nischal N, Khatiwada S. Index-TB guidelines: guidelines on extrapulmonary tuberculosis for India. *The Indian journal of medical research*. 2017 Apr;145(4):448.
6. Jain AK, Srivastava A, Saini NS, Dhammi IK, Sreenivasan R, Kumar S. Efficacy of extended DOTS category I chemotherapy in spinal tuberculosis based on MRI-based healed status. *Indian journal of orthopaedics*. 2012 Nov;46(6):633.