

Conservative Management of Pott's Spine and Its Outcome: An Institute-Based Observational Study

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Abstract

Objective: To analyze the functional outcome of cases with Pott's disease treated solely by antitubercular drugs.

Methods: This observational study was conducted at the Department of Orthopedics of a tertiary care medical college. Sixty patients with Pott's disease were included in this study based on predefined inclusion and exclusion criteria. All patients received antitubercular drugs for nine months. The Modified McCormick Scale (MSS) was used to assess the outcome of patients.

Results: Out of 60 patients, 37 (61.67%) were females, and 23 (38.33%) were males, with an M: F ratio of 1:0.62. Most patients had some or the other risk factors and belonged to low socioeconomic status. The most common presenting complaint was low back pain, and the thoracolumbar spine was most commonly involved. There was a significant improvement in the patient's functional status as assessed by the MSS score.

Conclusion: If diagnosed early, patients with Pott's disease can be treated solely by antitubercular treatment with excellent outcomes.

Keywords: Functional outcome, mccormick scale, pott's disease, tuberculous spondylitis

Introduction

Pott's disease is one of the forms of infection of the spine that is caused by *Mycobacterium tuberculosis*. This disease has been associated with significant morbidities and serious functional impairments, and comes second as the most common forms of tuberculosis after pulmonary tuberculosis.¹ In most cases, the initial symptoms are non-specific, requiring a high index of suspicion for an early diagnosis and prompt medical management. A delay in diagnosis and antitubercular treatment linked to catastrophic complications, such as paraparesis, scoliotic deformity, as well as paraplegia. This tubercular infection usually reaches the spine through a hematogenous route, and the common vertebral lesions include paradiscal, central, and anterior subligamentous lesions.² Symptoms in initial stages of Pott's disease are non-specific and, often times, they are attributed to less serious

causes such as spondylosis. The common symptoms of Pott's disease include low grade fever, backache, unexplained weight loss, and local tenderness. A past history of pulmonary tuberculosis may be present in many cases. If untreated, neurological manifestations may occur, such as impaired sensations, radicular pain, paraparesis or paraplegia. Unlike in other spinal pathologies, the neurological complications due to Pott's disease are usually symmetrical and gradually progressive. In addition, the clinical presentation may differ depending upon the site of involvement, with thoracic spine as the most common site, followed by lumbar and cervical spine. If cervical spine is affected, complications such as stridor, dysphagia and, in serious cases, paraplegia or even quadriplegia may be observed.³ Once suspected, the diagnosis of Pott's disease is usually confirmed through imaging techniques such as X-Ray, computed tomography (CT), and magnetic resonance

imaging (MRI). Though X-Ray of the spine is widely available, it has, however, a very low sensitivity for the diagnosis of Pott's disease, particularly in early stages, because in early stages of disease the vertebral space is usually preserved. In some cases, X-Ray may show reduced vertebral height with the irregularity of endplate. In untreated cases, the Pott's disease may present as gibbus deformity and vertebra plana. MRI is the imaging method of choice to assess the extent of involvement because it has a distinct advantage of showing the presence of epidural component of the involvement and cord compression. MRI may also show presence the paraspinal collection which may require a surgical intervention to be done.⁴ The Pott's disease in majority of the cases managed by antitubercular drugs. Though the duration of treatment is a topic of debate majority of the researchers are of the opinion that the treatment should be continued for a total of 9 months. Total duration of treatment is divided into intensive phase (4 drugs given for 2 months) followed by continuation phase (2 drugs for 7 months). Surgical interventions are not needed if an early diagnosis is promptly followed by antitubercular treatment. In some cases, surgical procedures such as laminectomy, abscess drainage, costo-transversectomy, or anterolateral decompression may be required. Novel techniques, such as minimally invasive spine surgery and implantable devices, have also shown promising outcomes in selected cases.⁵ This institution-based observational study was undertaken to analyze the functional outcome of cases with Pott's disease treated only by antitubercular drugs.

Methods

This was an observational study conducted at the Department of Orthopedics, Bharati Vidyapeeth Medical College and Hospital, Sangli, India. The study period was 2 years, starting from April 2021 to March 2023. During this period, 60 adult patients with Pott's disease treated solely by antitubercular drugs and having modified McCormick Scale (MSS) I, II or III at the time of presentation were included in this study. Patients having MSS IV or V at the time of presentation, as well as those with pre-existing neurological diseases likely to affect the functional outcomes and those with congenital or acquired spinal deformities were excluded from the study. The sample size was calculated on the basis of a pilot study done on patients with Pott's

disease, by assuming 90% power and 95% confidence interval. Based on this calculation, the sample size required was 48 patients. By referring to the central limit theorem, sample size was determined to be adequate if it was more than 50. Thus, 60 patients were included. Demographic details, such as age, gender and socioeconomic status, were noted in all cases. A detailed history with respect to history of Koch's contact or any previous history of pulmonary or extrapulmonary tuberculosis was also collected and noted. Signs and symptoms including the presence of low-grade fever, backache or neurological symptoms, as well as the presence of sphincter involvement was also recorded and a thorough clinical examination was performed with respect to the presence of local tenderness or swelling over the affected part of spine. A thorough general and neurological exams were also performed. Deep tendon reflexes were elicited and the presence of any abnormality was noted. In all patients, routine investigations, such as complete blood count, erythrocyte sedimentation rate (ESR), and chest X-ray to rule out presence of active or previous pulmonary tuberculosis was conducted in all cases. Spine X-ray and magnetic resonance imaging was also performed in all cases. Percutaneous CT guided needle aspiration of abscess was done and the aspirate was sent for Acid fast bacillus (AFB) smear and culture sensitivity tests.

All patients received 2 months of intensive phase therapy using four drugs (isoniazid, 5 mg/kg; rifampicin, 15 mg/kg; ethambutol, 15–25 mg/kg; and pyrazinamide, 15–30 mg/kg) followed by continuation phase using two drugs (isoniazid and rifampicin) for 7 months. Patients were advised to do regular monthly follow up for 3 months and, after that, every 3 months for 15 months, with the last follow up visit scheduled 6 months after the completion of antitubercular treatment. In the follow up visits, routine investigations that included, among others, complete blood count, erythrocyte sedimentation rate (ESR), and detailed neurological examination were performed. The X-Ray of the affected spine was performed every 2 months. In selected cases, MRI was performed during follow up visits when the X-Ray showed an inconclusive result. At the time of final follow up visit, MRI was done in all the cases. Furthermore, during each follow up visit, the functional outcome was assessed using the MMS, which is used for assessment of global functional impairment in terms of neurological functions and walking

Table 1 Age Distribution and Socioeconomic Status

Demographic Profile		No of Cases	Percentage
Gender Distribution	Male	23	38.33%
	Female	37	61.67%
	Total	60	100 %
Age Group	18–30 years	7	11.67%
	31–40 years	21	35.00%
	41–50 years	17	28.33%
	Above 50 years	15	25.00%
	Total	60	100 %
	Mean Age	42.12 +/- 9.80 years	
Socio-Economic Status	Upper Class	1	1.67%
	Upper Middle Class	4	6.67%
	Middle class	15	25.00%
	Lower Middle Class	18	30.00%
	Lower Class	22	36.67%
	Total	60	100 %

ability⁶. The SPSS 21.0 software was used for data analysis and the descriptive statistics were depicted in the form of means and standard deviations for continuous variables, and frequencies, as well as percentages for the categorical variables. A p-value of less than 0.05 was considered as statistically significant.

Results

Sixty patients diagnosed with Pott’s disease and treated by antitubercular drugs for 9 months were included in this study. Out of 60 patients, 37 (61.67%) were females and 23 (38.33%) were males with an M: F ratio of 1:0.62. The analysis of the age group of

Table 2 Predisposing Factors and Presented Complaints

Predisposing Factor and Presented Complaints		No of Patients	Percentage
Predisposing Factors	H/o Pulm Kochs	13	21.67%
	H/O Kochs Contact	7	11.67%
	Hypertension	3	5.00%
	Diabetes	5	8.33%
	Hypertension and DM	2	3.33%
	HIV infection	7	11.67%
	Steroids/Immunosuppressant	3	5.00%
	Back pain	43	71.67%
Presented Complaints	Low grade fever	34	56.67%
	Weight loss	23	38.33%
	Generalized weakness	13	21.67%
	Night sweats	5	8.33%
	Neurological manifestations	3	5.00%

Table 3 MRI Imaging Features and Affected Site in Studied Cases

	Age	No of cases	Percentage
MRI Imaging features	Vertebral body involvement	18	30.00%
	Disc Involvement	14	23.33%
	Endplate changes	12	20.00%
	Paravertebral Abscess	10	16.67%
	Gibbus deformity	6	10.00 %
	Total	60	100 %
Site of MRI changes	Thoracolumbar	32	53.33%
	Lumbar	16	26.67%
	thoracic	7	11.67%
	Lumbosacral	5	8.33%
	Total	60	100 %

the patients showed that the most common affected age group was between 31-40 years (35 %), which was followed by the 41-50 years (28.33 %) age group. The mean age of affected patients was found to be 42.12 +/- 9.80 years (Table 1). The distribution of the patients based on the Modified Kuppaswamy scale showed that the majority of the patients belonged either to lower class (36.67%) or lower middle class (30 %). Fifteen (25%) patients belonged to middle class and only 1(1.67%) patient belonged to upper class (Table 1).

The analysis of patients based on the predisposing factors or comorbidities showed

that 13 (21.67%) patients had a history of previous antitubercular treatment. History of recent contact with Koch's patient was found in 7 (11.67%) patients, while 10 (16.67%) patients were having either diabetes mellitus or hypertension or a combination of both. Seven (11.67%) patients were HIV positive whereas 3 (5%) patients were on a long term steroid or immunosuppressant therapy. The analysis of patients on the basis of presented complaints showed that the most common presented complaint was low back pain, which was seen in 43 (71.67%) patients. The other common complaints included low grade fever (56.67%), weight loss (38.33%),

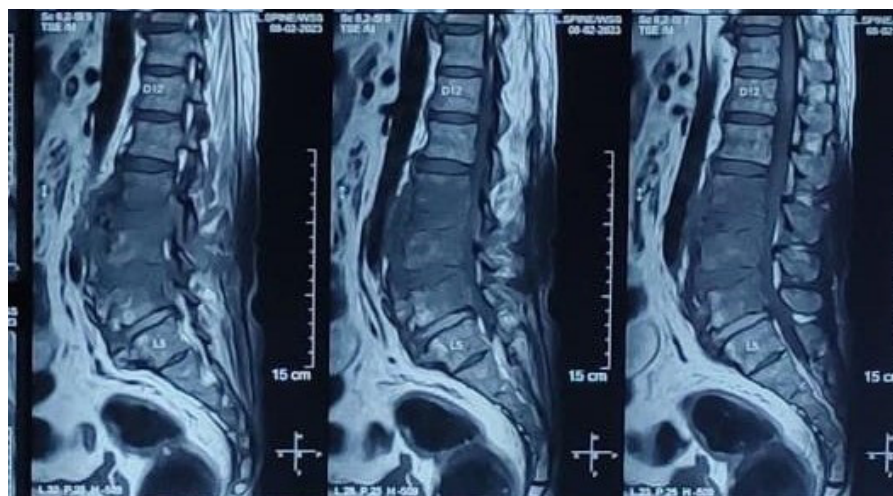


Fig. 1 Pre- and Para-Vertebral Collection Fusiform Observed as Extending From L2 to L4 of the vertebrae. Affected Vertebrae Appears Hypo Intense on T1. Features s/o Tuberculous spondylitis

Table 4 Modified McCormick’s Scale (MMS) in Studied Cases During Follow Up

Modified McCormick’s scale (MMS)	1 st Consultation	3 months	6 months	9 months	12 months	15 months
I	29 (48.33%)	35 (58.33%)	58 (96.67 %)	58 (96.67%)	59 98.33 %	59 98.33 %
II	25 (41.67%)	23 (38.33%)	2 (3.33%)	2 (3.33%)	1 3.33 %	1 3.33 %
III	6 (10%)	2 (3.33%)	0 (0.00%)	0 (0.00%)	0 0%	0 0%
IV	0	0 (0.00%)	0 (0.00%)	0 (0.00%)	0 0%	0 0%
V	0	0 (0.00%)	0 (0.00%)	0 (0.00%)	0 0%	0 0%
Mean MMS	1.61 +/- 0.66	1.46 +/- 0.56	1.03 +/- 0.18	1.03 +/- 0.18	1.01 +/- 0.12	1.01 +/- 0.12

and weakness (21.67%). Night sweats and Neurological manifestations were reported by five (8.33%) and three (5.00%) patients, respectively (Table 2).

On clinical examination, point of maximal tenderness was found in the thoracolumbar region in 32 (53.33%) patients while lumbar, thoracic, and lumbosacral (8.33%) tenderness was observed in 16 (26.67%), 7 (11.67%) and 5 (8.33%) patients, respectively. All patients underwent MRI. The most common abnormality found on MRI was vertebral body involvement, which was seen as low signal on T1-weighted, high signal on T2-weighted images in 18 (30.00%) patients, followed by disc involvement in the form of loss of disc height and altered signal intensity seen in 14 (23.33%) patients. Endplate changes (20%), paravertebral abscess (16.66 %), and gibbus deformity (10%) were the other MRI findings (Table 3).

The functional assessment on the basis of MSS score showed that at the time of the first consultation, 29 (48.33%) patients belonged to the MSS I whereas 25 (41.67%) and 6 (10%) patients belonged to scale II and III, respectively. At the time of the final follow up at 15 months, 59 (98.33%) patients were found to have an MSS score of I with intact neurologically and no sensory or motor abnormalities and one (1.67%) patient had an MSS score of II with mild sensory deficit but functionally independent. There was remarkable improvement in functional status of the patient as assessed by the MSS score and the difference was highly significant statistically ($p < 0.0001$) (Table 4).

Discussion

In this study, patients with Pott’s disease and treated solely by antitubercular management

were studied. Out of 60 patients, 37 (61.67%) were females and 23 (38.33%) were males with an M:F ratio of 1:0.62. Jagiasi *et al.*⁷ in their study of 44 patients diagnosed as Tuberculous spondylitis to delineate the importance of middle path regime and short course chemotherapy in the management of spine tuberculosis⁷ also showed a significant male preponderance, with 10 (22.73%) males and 34 (77.27%) females. Similar female preponderance was also reported by other authors, such as Kothari⁸ and Peer *et al.*⁹

The mean age of patients in this study was found to be 42.12 +/- 9.80 years. Wang *et al.*¹⁵ collected data from 597 patients with Pott’s disease with no major neurological deficits or severe spinal deformities. Their study population consisted of 313 males (52.43 %) and 284 females (47.57 %) with a mean age of 43 years (range 13–89 years), which is similar to the mean age of this present study. Similar mean age of patients with Pott’s spine was also reported by the authors, such as Divya *et al.*¹¹ and Mittal *et al.*¹². The analysis of patients on the basis of predisposing factors or presence of co-morbidities showed that 13 (21.67%) patients had history of having received antitubercular treatment in past. History of recent contact with Kochs patient was found in seven (11.67%) patients. Other predisposing factors in this study were immunosuppression due to HIV and long-term steroid therapy. Previous history of pulmonary tuberculosis and immunocompromised status were the common factors leading to Pott’s disease stated in many the studies. Vaishnav B *et al.* in an observational study of 100 cases of Pott’s spine¹³ also showed that the majority of the patients had a previous history of pulmonary tuberculosis. Similar predisposing factors were also reported by other authors, such as Jurcev-Savicevic *et al.*¹⁴ In this study,

the majority of patient's belonged to the lower and lower middle classes, and poor socioeconomic status was a significant factor associated with patients suffering from Pott's disease. Glassman *et al.*¹⁵ have also reported malnutrition and poverty as one of the significant risk factors for developing Pott's disease.

The most common area involved in this present study was the thoracolumbar area. MRI showed involvement of either thoracic or lumbar or thoracolumbar vertebrae in the majority of the cases (91.67%). Only five (8.33%) patients showed an involvement of the lumbosacral area. The most common abnormality found on MRI was vertebral body involvement, which was seen as low signal on T1-weighted, high signal on T2-weighted images (30.00%), followed by disc involvement (23.33%), endplate changes (20%), paravertebral abscess (16.66 %), and gibbus deformity (10%). Misra *et al.*¹⁶ studied the MRI findings in 36 patients with Pott's disease, and vertebral changes in form of spondylodiscitis in 33 (92%) patients, epidural abscess in 29 (81%) patients, spinal cord changes including edema and granuloma in 17 (47%) patients, paravertebral abscess in 29 (81%) patients, and vertebral body collapse in 12 (33.3%) patients. were reported. Similar MRI findings in cases of Pott's disease was also reported by other authors such as Rivas-

Garcia *et al.*¹⁷ and Kubihal *et al.*¹⁸

In terms of treatment, there was a significant improvement in functional status of the patient as assessed by the MSS score and the difference was highly significant statistically ($p < 0.0001$). No patient had been affected significantly in terms of functional independence, and only one patient experienced mild sensory disturbance at the time of final follow up. This excellent outcome after complete course of antitubercular treatment was also reported by other authors, such as Talebzadeh *et al.*¹⁹ and Bakhsh *et al.*²⁰

Patients with Pott's disease or tubercular spondylitis needs early diagnosis and prompt antitubercular treatment, which is provided in an adequate period of time. Patients who are diagnosed early can be successfully treated by antitubercular drugs without any need for surgical interventions. The majority of the adequately treated patients have excellent functional outcomes without any residual motor or sensory disturbance.

The main limitation of this study was that it is a purely observational study. More randomized controlled trials are needed to further substantiate the findings of this study.

In conclusion, patients with Pott's disease can be treated solely by antitubercular treatment and have excellent outcomes and remain intact neurologically with no sensory or motor abnormalities when diagnosed early.

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