

A PROSPECTIVE STUDY COMPARING THE CLINICAL OUTCOMES IN CONSERVATIVE AND SURGICAL MANAGEMENT OF SPINAL TUBERCULOSIS

Neurosurgery

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ABSTRACT

Background: Spinal tuberculosis (TB) remains an important cause of spinal deformity, pain and neurological morbidity in high-burden settings. The optimal balance between conservative and surgical treatment remains clinically important. **Methods:** A prospective observational comparative study was conducted in the Department of Neurosurgery, Kurnool Medical College/Government General Hospital, Kurnool, over 24 months from March 2024 to March 2026. Fifty patients aged 10–80 years with spinal tuberculosis were included and divided into conservative (n=25) and surgical (n=25) management groups. Clinical findings, Visual Analogue Scale (VAS), neurological status and Oswestry Disability Index (ODI) were assessed at baseline and follow-up at 1 week, 1 month and 3 months. Statistical analysis was performed using IBM SPSS 21.0, with $P < 0.05$ considered significant. **Results:** The most common age group was 31–40 years in both groups. Thoracic disease was the commonest level (40% in each group). Back pain was present in 88% of conservatively treated and 100% of surgically treated patients. Motor weakness, sensory loss, bladder and bowel involvement were more frequent in the surgical group. Mean baseline VAS was 7.24 ± 0.46 in the conservative group and 8.62 ± 0.48 in the surgical group ($P < 0.001$); surgical treatment was associated with significantly lower VAS scores at 1 week, 1 month and 3 months ($P < 0.001$ at each interval). Neurological improvement occurred in 76% and 84% of patients in the conservative and surgical groups, respectively ($P = 0.479$). At 3 months, minimal ODI disability (0–20%) was observed in 80% of the conservative group and 68% of the surgical group. Overall, 78% had no complications. **Conclusion:** Surgical management provided faster and greater pain relief and was particularly useful in patients with neurological deficits and spinal deformity. Conservative treatment also produced satisfactory neurological and functional recovery in appropriately selected patients with less aggressive disease. Treatment should therefore be individualised according to neurological status, instability, deformity and response to antitubercular therapy.

KEYWORDS

Spinal Tuberculosis; Pott's Spine; Conservative Management; Surgical Management; Visual Analogue Scale; Oswestry Disability Index; Neurological Outcome.

INTRODUCTION

Spinal tuberculosis is a major form of osteoarticular tuberculosis and remains an important cause of chronic back pain, spinal deformity and neurological impairment in endemic regions. The disease is usually acquired through haematogenous dissemination and commonly affects the thoracic and thoracolumbar spine. Progressive vertebral destruction may result in collapse, kyphosis, abscess formation, instability and spinal cord or nerve-root compression.

The clinical spectrum ranges from pain without neurological deficit to severe paraplegia with sphincter dysfunction. Although multidrug antitubercular therapy is the foundation of treatment, the role and timing of surgery remain debated. Conservative treatment may be adequate in selected patients without significant neurological compromise or instability, whereas decompression, debridement and stabilisation may be required in progressive neurological deficit, significant deformity, instability, abscess-related compression or failure of medical treatment.

The present study was undertaken to compare clinical, neurological and functional outcomes between patients managed conservatively and those managed surgically for spinal tuberculosis in a tertiary-care neurosurgical centre.

AIM AND OBJECTIVES

To compare the clinical outcomes of conservative and surgical management of spinal tuberculosis and to assess functional and neurological outcomes following treatment.

MATERIALS AND METHODS

Study design and setting: Prospective observational comparative study conducted in the Department of Neurosurgery, Kurnool Medical College/Government General Hospital, Kurnool.

Study population: Fifty patients with spinal tuberculosis admitted/attending the neurosurgical service during March 2024–March 2026. Patients aged 10–80 years with clinically and radiologically diagnosed spinal tuberculosis were included. Patients with age outside this range, spinal injury, extraspinal tuberculosis or unwillingness to participate were excluded.

Treatment groups: Twenty-five patients underwent conservative management and 25 underwent surgical management. The thesis describes the groups as conservatively and surgically treated Pott's spine cohorts. All patients were followed clinically, with pain assessed by VAS, functional disability by ODI and neurological status documented at baseline, 1 week, 1 month and 3 months.

Investigations and assessment: Clinical examination and laboratory investigations were performed. Radiological evaluation included CT whole spine and MRI whole spine with plain and contrast sequences. The case proforma recorded neurological examination, sensory findings, bowel and bladder function, treatment details and follow-up outcomes.

Statistical analysis: Descriptive statistics were expressed as mean and standard deviation for quantitative variables and frequency and percentage for categorical variables. IBM SPSS version 21.0 was used. $P < 0.05$ was considered statistically significant.

RESULTS

Fifty patients were studied, with 25 in each treatment group. The age distribution was comparable between groups ($P = 0.531$). The 31–40-year group was the largest in both cohorts: 36% in the conservative group and 44% in the surgical group. Gender distribution was also not significantly different ($P = 0.354$); males constituted 64% and 76% of the conservative and surgical groups, respectively.

Table 1. Baseline demographic and neurological presentation.

Variable	Conservative n (%)	Surgical n (%)
Male	16 (64.0)	19 (76.0)
Female	9 (36.0)	6 (24.0)
Back pain	22 (88.0)	25 (100.0)
Motor weakness	1 (4.0)	21 (84.0)
Sensory loss	1 (4.0)	18 (72.0)
Bladder involvement	0 (0.0)	8 (32.0)
Bowel involvement	0 (0.0)	6 (24.0)

Back pain was the commonest neurological symptom. Motor weakness, sensory loss, bladder involvement and bowel involvement were markedly more frequent in the surgical cohort, indicating greater

neurological disease burden among patients selected for surgery. Fever was the commonest associated systemic symptom, occurring in 76% and 80% of conservative and surgical patients, respectively.

Local deformity was more common in the surgical cohort. Gibbus was present in 20% of conservative and 68% of surgical patients; kyphosis in 12% and 48%; and scoliosis in 4% and 40%, respectively.

Thoracic disease was the most frequent lesion level in both groups (40% each), followed by thoracolumbar disease. The distribution of spinal levels did not differ significantly between treatment groups ($P=0.899$).

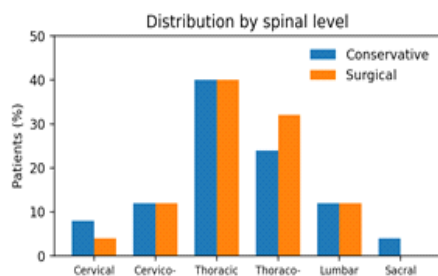


Figure 1. Distribution of spinal lesions by level.

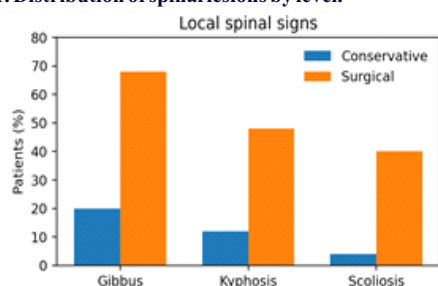


Figure 2. Local spinal signs in the two treatment groups.

PAIN OUTCOME

Mean baseline VAS was significantly higher in the surgical group (8.62 ± 0.48) than in the conservative group (7.24 ± 0.46 ; $P < 0.001$). Despite the higher baseline pain burden, the surgical group demonstrated significantly lower pain scores at every subsequent assessment: 4.37 ± 0.24 versus 5.10 ± 0.32 at 1 week, 1.97 ± 0.54 versus 3.47 ± 0.67 at 1 month, and 1.04 ± 0.27 versus 1.33 ± 0.12 at 3 months; $P < 0.001$ at each interval.

Table 2. Visual Analogue Scale scores during follow-up.

Follow-up	Conservative mean $\pm$ SD	Surgical mean $\pm$ SD	P value
Baseline	7.24 $\pm$ 0.46	8.62 $\pm$ 0.48	<0.001
1 week	5.10 $\pm$ 0.32	4.37 $\pm$ 0.24	<0.001
1 month	3.47 $\pm$ 0.67	1.97 $\pm$ 0.54	<0.001
3 months	1.33 $\pm$ 0.12	1.04 $\pm$ 0.27	<0.001

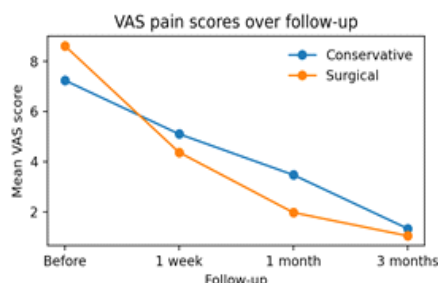


Figure 3. VAS pain score trajectory.

NEUROLOGICAL AND FUNCTIONAL OUTCOME

Neurological improvement was observed in 19/25 (76%) conservatively treated patients and 21/25 (84%) surgically treated patients. Although the absolute improvement was higher after surgery, the between-group difference was not statistically significant ($P=0.479$).

Table 3. Neurological outcome at 3 months.

Neurological outcome	Conservative n (%)	Surgical n (%)
Improved	19 (76.0)	21 (84.0)
Not improved	6 (24.0)	4 (16.0)

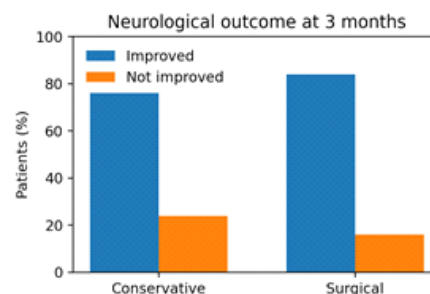


Figure 4. Neurological improvement at 3 months.

ODI demonstrated a marked shift towards minimal disability after treatment. In the conservative group, 20 patients (80%) were in the 0–20% category at follow-up compared with 2 patients (8%) before treatment. In the surgical group, 17 patients (68%) were in the 0–20% category after treatment compared with none at baseline.

Table 4. Oswestry Disability Index distribution before and after treatment.

ODI category	Conservative Before	Conservative After	Surgical Before	Surgical After
0–20%	2 (8%)	20 (80%)	0 (0%)	17 (68%)
21–40%	15 (60%)	4 (16%)	11 (44%)	8 (32%)
41–60%	8 (32%)	1 (4%)	13 (52%)	0 (0%)
61–80%	0	0	1 (4%)	0
81–100%	0	0	0	0

COMPLICATIONS

No complications were recorded in 78% of the study population. Urinary tract infection was the most frequent complication (10%), followed by pressure sores (6%), wound infection (4%) and delayed sinus formation (2%). Overall complication burden was low in the study cohort.

DISCUSSION

The present prospective comparative study suggests that both conservative and surgical treatment can produce satisfactory neurological and functional recovery in appropriately selected patients with spinal tuberculosis. However, surgery produced a significantly faster reduction in pain, with lower VAS scores at 1 week, 1 month and 3 months. This finding is clinically relevant because patients requiring surgery in this cohort had a greater burden of neurological deficit and deformity at presentation.

The predominance of thoracic involvement in the present series is consistent with the thesis literature review. The greater frequency of motor, sensory and sphincter deficits and of gibbus, kyphosis and scoliosis in the surgical group likely reflects treatment selection for more severe disease rather than evidence that surgery itself causes these findings.

Neurological recovery was numerically higher after surgery (84% versus 76%), but this difference was not statistically significant. Thus, the data support an individualised approach rather than routine surgery for all spinal TB patients. Conservative treatment remains an effective option in patients with milder disease, preserved neurological function and acceptable spinal stability, whereas surgery has an important role when neurological deterioration, deformity, instability or significant compressive pathology is present.

The findings are broadly in keeping with studies cited in the thesis. The thesis discussion reports higher neurological recovery after surgery in some comparative cohorts, while other observational studies support conservative treatment in carefully selected patients without neurological deficit. The present study adds prospective comparative data from a tertiary-care centre in a high-burden setting.

LIMITATIONS

The study was single-centre with a small sample size of 50 patients and

follow-up limited to 3 months. These factors restrict generalisability and assessment of long-term recurrence, deformity progression and quality of life. Larger multicentre studies with longer follow-up are warranted.

CONCLUSION

Surgical management of spinal tuberculosis was associated with superior and more rapid pain relief and was particularly useful in patients presenting with neurological deficits and spinal deformity. Conservative management also produced substantial neurological and functional recovery in appropriately selected patients. Treatment should therefore be individualised according to neurological status, degree of deformity and instability, radiological compression and response to antitubercular therapy.

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