

# Use of Decompression and Transpedicle Fixation in the Patients of Thoracic Spine Tuberculosis

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## ABSTRACT

**Objective:** Posterio-lateral decompression and transpedicle fixation for TB of the thoracic spine are the focus of the present study.

**Study Design:** Cross-sectional/observational study

**Place and Duration:** The study was conducted at the department of Neurosurgery, Mardan Medical Complex for duration of four years from July 2017 to June 2021.

**Methods:** Total 18 patients of both genders with ages 18-65 years were included. Case demographics, such as age, gender and BMI, were gathered after obtaining written permission from all participants. Included patients were undergone posterio-lateral decompression and trans-pedicle fixation for thoracic spine tuberculosis. Post-operative outcomes among all patients were recorded in terms of reduction of pain score by VAS, improvement in neurological deficit and frequency of complications. All the data was analyzed by using the SPSS 20.0 version.

**Results:** Among 18 cases, there were 12 (66.7%) males and 6 (33.3%) females with mean age 35.8± 8.51 years and had mean BMI 24.6±5.51 kg/m<sup>2</sup>. Post-operative improvement in the reduction of pain score was noted among 15 (83.3%) cases. According to ASIA score improvement in neurological deficit was recorded among 14 (77.8%) patients. Frequency of complications was 1 (5.5%).

**Conclusion:** According to this research, it is safe to do posterior-lateral decompression and trans-pedicle fixation for TB of the thoracic spine. It is effective in relieving pain and improving neurological function. Complications are rare after this treatment. Because of this, it is a viable alternative to conventional surgical methods for the treatment of TB of the thoracic spine.

**Keywords:** Thoracic Spine, VAS Scale, Spine Tuberculosis, Trans-pedicle Fixation, Posterolateral Decompression.

## INTRODUCTION

TB is a disease that may be deadly, especially in those with spinal tuberculosis (STB). Approximately half of all instances of musculoskeletal TB are caused by it. There has been an increase in the prevalence of spinal TB in underdeveloped nations. It is common for TB to cause kyphotic deformities of the vertebrae and discs [1, 2]. In many cases, surgery is necessary to treat spinal decompression and deformity. According to previous research, surgical therapy is an essential technique for treating spinal tuberculosis.

Anterior method for spinal tuberculosis was initially reported in 1934 by Ito and his colleagues. It is typical to observe persistent kyphosis after anterior debridement therapy [6], which might impair the spine's biomechanical stability. There is still a paucity of data and recommendations on the best ways to treat and manage spinal TB, making treatment decisions even more complex [7]. Conservative treatment options for spinal TB include immobilisation with body casts or plaster beds, as well as a balanced diet and lifestyle modifications. For individuals with spinal tuberculosis, anti-TB medicines have been suggested as a possible treatment option. Patients who are at risk of instability, advancement of neurological deficiency, and those who are resistant to medical therapy may not be suited for anti-TB medication therapies. More than that, the extended anti-TB treatment cycle of 9-18 months and longer [8] has a social and economic impact on the community and on the patient's quality of life. If surgery isn't an option, there are other alternatives available, such as an anterior-posterior or an anterior-posterior-posterior or an anterior-posterior-posterior combination of fusions. There is, however, a paucity of data on the safety of surgical intervention for spinal TB, as well as the neurological results and complication rates.

Even though anterior debridement and fusion is the gold standard for treating spine TB, it comes with a lengthy list of drawbacks. These include a longer recovery period, an increased risk of pulmonary problems, and anatomical challenges in the upper thoracic spine.[11] Because of this, the posterior method is an alternative.[12] There are many alternatives for treating TB of

the thoracic spine in the posterior approach, but the one using posterio-lateral decompression and transpedicular fixation takes less time and has less problems. [13]

In order to effectively manage patients with thoracic spine TB, this research will help us examine the surgical outcomes of patients who undergo posterio-lateral decompression and pedicle fixation.

## MATERIAL AND METHODS

This cross-sectional/observational study was conducted at the department of Neurosurgery, Mardan Medical Complex for duration of four years from July 2017 to June 2021 and comprised of 18 patients of thoracic spine tuberculosis. Case demographics, such as age, gender and BMI, were gathered after obtaining written permission from all participants. Patients with recurring TB, those under the age of 18, and those deemed ineligible for surgery were all excluded from the research.

Included patients were aged between 18 to 65 years. As soon as the patient has recovered from their anaesthetic, they are placed in the prone position. Using anatomical landmarks and a C-arm, the amount of involvement is determined. A bilateral subperiosteal dissection is performed using a midline incision. On the opposite side of the foraminotomy, a pedicle screw is inserted into the regular vertebrae above and below. At the level of the affected articular joint, a costotransversectomy of around 4–5cm is performed. It's either retracted or sacrificed when the thoracic nerve root gets in the way. Intervertebral disc and vertebra are debrided and decompressions are ensured in the procedure. You may put bone grafts or a mesh cage in the trough. Afterwards, the ipsilateral pedicle screws and rods are anchored in place. Hemostasis has been established. This is how the wound gets stitched back together.

### ASIA score presented by:

- A** No motor/No sensory function
- B** No motor but sensory function present
- C** Motor present but power < 3
- D** Motor present power > 3
- E** Normal sensory and motor function

As a result of surgery, a patient's pain and neurological improvement were evaluated. Pre-surgical and post-surgical pain levels were measured using a VAS (visual analogue scale) and an ASIA score, respectively. Input of the data was accomplished via the use of pre-made Performa forms. SPSS version 20 was used to examine the data of patients. The p-value of 0.05 or less was judged statistically significant.

**RESULTS**

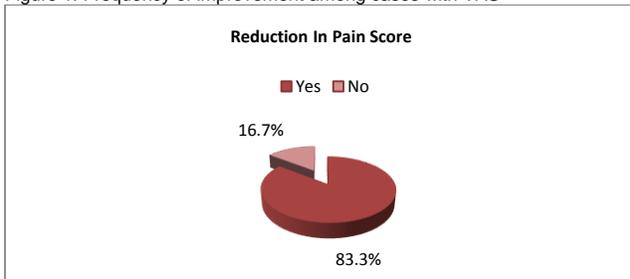
Among 18 cases, there were 12 (66.7%) males and 6 (33.3%) females with mean age 35.8± 8.51 years and had mean BMI 24.6±5.51 kg/m<sup>2</sup>. table 1)

Table 1: Age and gender distribution

Variables	Frequency	Percentage
Mean age (years)	35.8± 8.51	
Mean BMI (kg/m <sup>2</sup> )	24.6±5.51	
Gender		
Male	12	66.7
Female	6	33.3

Post-operative improvement in the reduction of pain score was noted among 15 (83.3%) cases.(fig 1)

Figure 1: Frequency of improvement among cases with VAS



According to ASIA score improvement in neurological deficit was recorded among 14 (77.8%) patients.(figure 2)

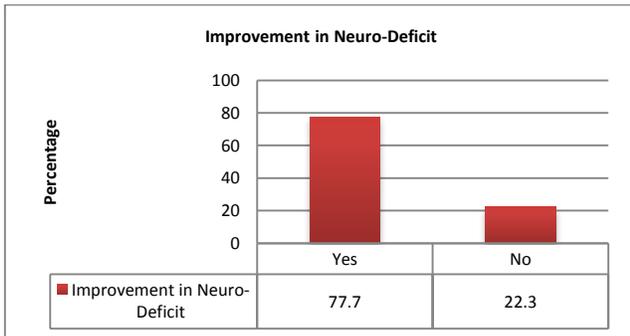


Figure 2: Improvement in neurological deficit

We found that at 2-months post-operatively, all of the patients showed some neurologic improvement. There has been a statistically significant improvement in neurology by using ASIA (p-value = 0.02).(table 2)

Table 2: Post and pre-operative comparison of neurological improvement among cases

Variables	Pre-operative	Post-Operative
ASIA score		
A	3 (16.7%)	0
B	8 (44.4%)	0
C	4 (22.2%)	2 (11.1%)
D	2(11.1%)	2 (11.1%)
E	1 (5.5%)	14 (77.7%)
Total	18(100)	18 (100)

Among 18 cases, frequency of complications was 1(5.5%) and had wound infection and no any case found of dural tear. (Table 3)

Table 3: Association of complications among all cases

Variables	Frequency	Percentage
Complications		
Yes	1	5.5
No	17	94.5
Types		
Wound Infection	1	5.5
Dural Tear	0	0

**DISCUSSION**

In several impoverished areas, spinal tuberculosis (TB) is still a problem. The surgical procedure aims to remove TB, alleviate spinal nerve compression, and cure the deformity. It is undeniable that restoring spinal stability is essential to the treatment of spinal TB and the prevention of its reappearance. Anterior debridement and posterior fixation for spinal TB therapy has been widely used since Ito et al. initially established the anterior method for spinal TB. Spinal TB surgery has recently been trending toward fewer incisions, static internal fixation, and just one approach throughout the procedure [14,15]. For spinal TB, a one-stage posterior surgery is now an option. According to Zhang et al. [16], a one-stage posterior approach had better results in minimal surgical invasion and fewer procedure-related problems than a posterior plus anterior approach surgery.

In our study 18 patients were presented. Among 18 cases, there were 12 (66.7%) males and 6 (33.3%) females with mean age 35.8± 8.51 years and had mean BMI 24.6±5.51 kg/m<sup>2</sup>. These results were compare to the previous studies.[17,18] Nine of the 15 spinal TB cases studied were male. In a study of 18 individuals with thoracic-lumbar spine TB, 2/3 (12/18) of their patients were male. [20] More women than men have been shown to be affected by spinal tuberculosis in several investigations. [21] Males had significantly higher rates (54.8 percent) of thoracic spine TB than females, according to our findings. We don't know why most instances of spinal TB occur more often in men than in women.

Patients who underwent thoracic transpedicular decompression and pedicle screw fixation, as described by D'souza et al.[22], showed an average improvement in visual analogue score of 9.52 points to 2.57 points following surgery. On the other hand, the VAS score of 35 patients who had had surgery for spinal TB decreased from an average of 7.48 (0–10) to 0.47 (0–8) in another research study. In all of our patients, post-operative improvement in the reduction of pain score was noted among 15 (83.3%) cases. [23]

According to ASIA score improvement in neurological deficit was recorded among 14 (77.8%) patients. When a person has spinal TB, surgery may be necessary to correct a neurological deficiency. Spinal TB patients that have neurologic involvement make about 10% to 47% of the total population. [24] Neurodeficit in all (48) of the patients with spinal TB investigated by Huipeng et al.[25] improved following surgery. Neurological improvement was seen in all of the individuals studied by Liu et al. After surgery, 93.3 percent of patients experienced neurological improvement, according to Jinet al,[26]. Eighty-four percent (21/25) of the patients studied by Xu Cui and colleagues [27] showed neurological improvement to Frankel grade E or better following surgery, with the other instances showing improvement to Frankel grade D. All the patients remained stable. Debridement, bone graft, and internal fixation in spinal TB patients resulted in an outstanding neurological outcome, comparable to those achieved by anterior decompression, according to a study published earlier this year. In addition, the posterior approach may be preferable than the anterior instrumentation in terms of correcting deformity and preserving that correction.

Among 18 cases, frequency of complications was 1 (5.5%) and had wound infection and no one had dural tear. Patients with

spinal TB who had posterior decompression with interbody fusion and instrumentation were found in 17 of the 33 patients who underwent the procedure. Complications after surgery occurred in 5.9% of patients (1/17). [29]

Many medical professionals feel that patients who are treated through the anterior technique suffer from more blood loss. In addition, the procedure and hospitalisation time are both lengthier with the anterior method. For example, nerve and blood vessel damage might occur when the anterior route is used [30]. This technique's advantages include decreased blood loss and reduced recovery time as well as less pressure on the spinal nerves, corrected kyphosis, improved stability and a more positive outlook on life. Posterior approaches may be a better surgical choice for patients with less severe spinal tuberculosis than anterior approaches, which achieve spontaneous union in the anterior column [31]. Anterior pedicle screw fixation may help patients with severe spinal cord injury recover more quickly neurologically [32].

## CONCLUSION

According to this research, it is safe to do posterior-lateral decompression and trans-pedicle fixation for TB of the thoracic spine. It is effective in relieving pain and improving neurological function. Complications are rare after this treatment. Because of this, it is a viable alternative to conventional surgical methods for the treatment of TB of the thoracic spine.

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