

Outcome Analysis of Posterolateral Decompression and Spinal Stabilization for Tuberculous Spine

Abstract

Aim: This is a prospective study to analyze the clinical, radiological, and functional outcomes of posterolateral decompression and spinal stabilization with pedicle screws and rods done for the thoracolumbar tuberculous spine. **Materials and Methods:** This study was conducted at Gandhi Medical College and Hospital from September 2016 to September 2017 on 30 patients who underwent posterolateral decompression and spinal stabilization using pedicle screw and rod fixation for active spinal tuberculosis. Pain, erythrocyte sedimentation rate (ESR), kyphotic angle correction, and Frankel's grading were taken to study the clinical, radiological, and functional outcome at the end of 1 year. Other parameters taken into consideration were the duration of stay and level of involvement; antituberculous therapy was given to all the patients for 16–18 months until the signs of radiological healing were evident. **Results:** This study comprised of 30 patients with a mean age of presentation of 39.835 ± 14.75 and M: F ratio of 1:1. The mean duration of stay is 10.67 ± 4.06 , and the most common level of involvement is D6–D11. Kyphotic angle was corrected by a mean of 19.08 ± 5.44 at the end of 1 year ($P < 0.001$). Visual analog score improved from a median of 8 preoperatively to 2 at follow-up ($P < 0.001$). ESR improved from a mean of 37.08 ± 12.64 mm/h preoperatively to 19.83 ± 13.68 mm/h at follow-up ($P = 0.01$). There was an improvement in Frankel's grading in most of the patients at the end of 12 months. Radiological healing was evident in the form of the reappearance of trabeculae formation and bony fusion at the end of 12 months. **Conclusion:** Posterolateral approach is a good method for decompression and spinal stabilization because of significant kyphotic correction, improvement in pain, good neurological recovery, less duration of stay, and less morbidity.

Keywords: Outcomes, posterolateral decompression, spinal fixation, tuberculous spine

Introduction

Spinal involvement occurs in less than 1% of patients with tuberculosis (TB).^[1,2] Spinal TB is one of the most dangerous forms of skeletal TB and accounts for 50% of all the skeletal TB. The thoracolumbar junction is the most common site for involvement in spinal TB although any part of the spine can be affected.^[3] Although standard chemotherapy is highly successful in skeletal TB standard chemotherapy, surgery is indicated in early neurological findings such as progressive neural deficits.^[4] The approach for surgical treatment has been controversial. The goals of surgery in Pott's spine are adequate debridement, maintenance, and reinforcement of stability, correction, and prevention of deformity. Here, we have employed posterolateral approach for decompression and

pedicle screws and rods for fixation and stabilization posteriorly.

The aim of the study is to analyze the clinical, radiological, and functional outcome of posterolateral decompression approach used for all the patients in this study.

Materials and Methods

A total of 30 patients treated at Gandhi Medical College and Hospital, during September 2016 – September 2017 for thoracolumbar tuberculous spine by posterolateral decompression and spinal stabilization are included in this study. All the patients were operated by one surgeon.

Inclusion criteria

Patients with active TB with instability, intractable pain, neurological deficit, and deformity patients who have not responded to medical treatment.

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Figure 1: Magnetic resonance imaging T1 and T2 images of lumbosacral spine showing D12 wedge compression fracture, T1 hypointense, and T2 hyperintense homogeneously enhancing lesion on contrast in the vertebral body of D12

Exclusion criteria

Patients suffering from coagulation disorders and patients who refused to be part of the study.

All the patients underwent preoperative plain radiographs, computed tomography, and magnetic resonance imaging of the spine [Figure 1]. Antituberculous therapy was administered to all the patients before surgery and continued till 16–18 months after surgery for all the patients. All the patients were operated by posterolateral approach for decompression and spinal fixation posteriorly using pedicle screw and rods [Figure 2]. Pedicle screws were placed under fluoroscopic guidance in the vertebral bodies 1 level above and below the lesion. Patients were immobilized in a rigid Taylor's brace for 3 months postoperatively. Immediate postoperative plain radiographs (anteroposterior and lateral views) were done for all the patients to assess the extent of decompression, placement of the graft, kyphotic angle correction, and instrumentation [Figure 3]. All the patients were evaluated at 1, 3, 6, and 12 months after surgery [Figure 4]; at each follow-up, the visual analog score, erythrocyte sedimentation rate (ESR), kyphotic angle, and Frankel's grading were assessed.

The results were analyzed using Bonferroni's multiple comparison test, Wilcoxon signed-rank test, and Chi-square

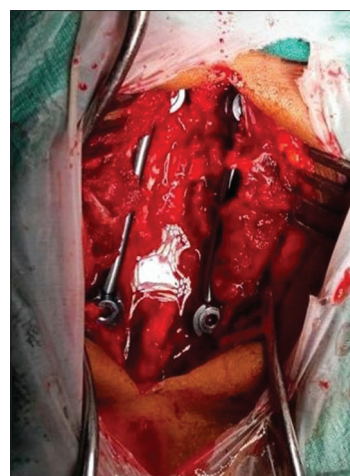


Figure 2: Intraoperative picture showing pedicle screw and rods

Table 1: Distribution of parameters

| Parameter | Number |
|---------------------------|--------|
| Age (years) | |
| 15-30 | 11 |
| 31-40 | 7 |
| 41-50 | 6 |
| 51-60 | 3 |
| 61-75 | 3 |
| Extent of instrumentation | |
| Two motion segment | 9 |
| Three motion segment | 19 |
| Four motion segment | 2 |
| Level of involvement | |
| D1-D5 | 5 |
| D6-D11 | 20 |
| D12-L3 | 5 |
| Sex | |
| Male | 15 |
| Female | 15 |

| | Parameters | | |
|---------------------|---------------------|----------------------|------------------|
| | Preoperative (mean) | Postoperative (mean) | Follow-up (mean) |
| Kyphotic angle | 25.58±7.83 | 14.25±5.07 | 6.5±2.39 |
| Visual analog score | 8 | 2 | 2 |
| ESR (mm/h) | 37.08±12.64 | - | 19.83±13.68 |
| | Frankel's grading | | |
| | C | D | E |
| Preoperative | 16 | 14 | - |
| Follow-up | - | 14 | 16 |

ESR – Erythrocyte sedimentation rate

test. The accepted level of statistical significance was $P < 0.05$.

Results

The mean age of presentation of patients in this study was 39.835 ± 14.75 ranging from 16 to 65 years [Figure 5]. There were 15 males and 15 females [Figure 6] in this study with a ratio of 1:1 [Table 1]. The most common level of

involvement for the tuberculous spine is D6–D11 [Figure 7]. The mean duration of stay for the patients is 10.67 ± 4.06 .

The mean value of kyphotic angle preoperatively was 25.58 ± 7.83 and the mean value at follow-up was 6.5 ± 2.39 . The mean correction of kyphotic angle was 19.08 ± 5.44 which was statistically significant ($P < 0.001$). The median visual analog score preoperatively was 8 which improved to 2 at follow-up which was statistically significant ($P = 0.001$). The mean ESR was 37.08 ± 12.64 mm/h preoperatively which improved to 19.83 ± 13.68 mm/h at follow-up, which was statistically significant ($P = 0.01$).

Frankel's grading was Grade C (16) and Grade D (14) preoperatively which improved to Grade D (14) and Grade E (16) postoperatively; this was not statistically significant. Few complications we noted at various stages of follow-up were superficial wound infections.^[2]

Discussion

TB of the spine has got a good prognosis if treated adequately and in a timely manner. Tuberculous chemotherapy remains the mainstay of treatment, with surgery reserved for those with neurological deficits. The aim of surgery is to treat the neurological deficits, correct the kyphotic deformities, and achieve and maintain stability. Various surgical procedures used in the treatment of tuberculous spine are as follows:

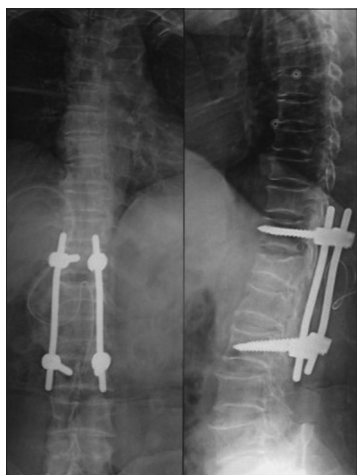


Figure 3: Postoperative picture showing bilateral D11–L2 pedicle screws and D11 and D12 laminectomy

1. Anterior radical debridement and strut grafting with instrumentation
2. Posterolateral decompression and strut grafting with posterior instrumentation
3. Single-stage transpedicular decompression and posterior instrumentation
4. Anterior radical debridement and strut grafting with posterior instrumentation.

Decompression followed by fusion and instrumentation has resulted in better results than without instrumentation; instrumentation helps in early mobilization, prevents graft displacement, and prevents progression of the deformity.

Posterolateral decompression and posterior instrumentation are quite effective in preventing graft-related complications and progression of kyphosis. The main advantage of posterior instrumentation is that it can provide good fixation through posterior elements and also helps in correcting preexisting kyphosis effectively.^[5-7] A posterolateral approach utilizing extrapleural approach is an effective option as the respiratory function is not compromised.^[7]

The posterolateral approach used in our study helped us to achieve a good kyphotic correction for the deformity and maintain that correction in the thoracolumbar spine at the end of 12 months (mean correction: 19.08 ± 5.44); this was found to be statistically significant ($P < 0.001$).

The reason for this might be that pedicle screw cross the vertebral body pedicle, the strongest part of the vertebral body, providing three-dimensional correction and stabilization, which is much stronger than anterior instrumentation.

There was a statistically significant improvement in the visual analog score for back pain ($P < 0.001$). This can be attributed to better kyphotic angle correction and maintenance. There was also a statistically significant decrease in the ESR at the end of 12 months ($P = 0.01$); this can be attributed to good decompression.

The duration of stay was also less with a mean of 10.67 ± 4.06 ; this can be attributed to the esthetics of the procedure. There was also a significant improvement in Frankel's grading for neurological deficits.

The various advantages of posterolateral decompression such as good kyphotic correction and better clinical and

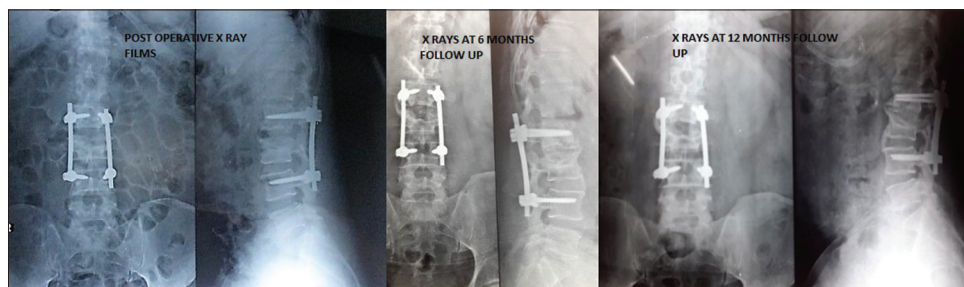


Figure 4: X-ray image of index case showing the postoperative and follow-up changes at 6 and 12 months

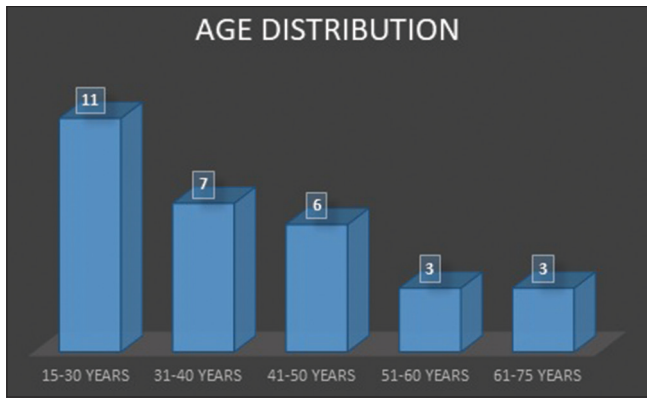


Figure 5: Age distribution

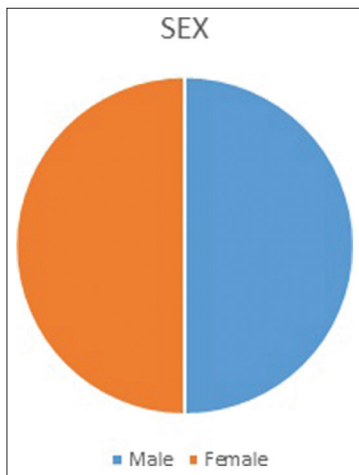


Figure 6: Sex distribution

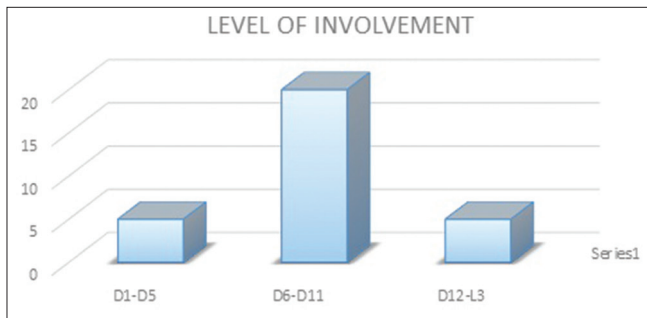


Figure 7: Level of involvement

functional outcomes make it a desirable option of surgery for tuberculous spine.

Conclusion

Our study showed a good neurological recovery, statistically significant correction of kyphotic angle, and statistically significant improvement in pain and ESR for posterolateral decompression and stabilization. Thus, this approach is a safe and effective procedure and should be initial choice for surgical treatment of TB of the spine.

Limitations

1. Small case series
2. Short follow-up
3. Lack of control series which might have been operated without instrumentation.

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Nil.

Conflicts of interest

There are no conflicts of interest.

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