Anterior Versus Posterior Fixation in Thoracic Tubercular Spine

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Abstract: Tubercular spine has been an age old problem for management. Spine fixation in skeletal tuberculosis has evolved in the last decade, which not only helps in early mobilization of the patient but also prevents late problems of chronic pain and progressive kyphosis. Transpedicular fixation and hartschill loop is done mainly through posterior approach while transthoracic, transmanubrial and transaxillary are the methods for anterior approach. In this prospective study of 30 patients which were operated during last 4 years, some via anterior and majority via posterior approach. The results were evaluated and it was concluded that posterior approach had many advantages over anterior approach This includes a three column fixation which is not possible with anterior approach. This helps in early mobilization of the patient. Posterior approach has a lesser morbidity than anterior approach, requires lesser duration of hospital stay and surgical risks of anterior are minimized. For thoracic 1 to thoracic 5 vertebra, posterior approach is not good because of small sized pedicles and also there is more danger of damage to major vessels. In these levels, anterior approach is more suitable. The posterior approach has an edge over anterior approach in many aspects.

Key words: Tuberculosis dorsal spine, posterior fixation, anterior fixation.

1. Introduction

Potts spine has been an age old problem for management. The earlier method of treatment of ATT therapy [1, 2], bed rest and decompression without fixation had its own disadvantages. It involved prolonged bed rest, which has its own antecedent morbidity. Spine fixation in skeletal tuberculosis has evolved in the last decade, which not only helps in early mobilization of the patient but also prevents late problems of chronic pain and progressive kyphosis. Both anterior and posterior approaches are used for dorsal spine fixation depend on level of pathology involvement [3, 4]. This study aims in analyzing the approach depending on the site of lesion, studying the advantage and disadvantage of anterior and posterior approach, the neurological outcome of the patient treated with individual approach and the long term

stability of patient operated by individual approach.

According to definition of spinal instability which is “loss of ability of spine under physiological loads to maintain relationships between vertebrae in such a way that there is neither damage nor subsequent irritation to spinal cord or nerve roots and in addition, there is no development of incapacitating deformity or pain due to structural changes.”

Spinal instability can be acute or chronic. The fixation was done according to Denis’ three column concept [5-7], which has its own advantages as:

- Assesses bony collapse associated with axial load bearing.
- Also details assessment of distraction, flexion and extension components of injury (injury to dorsal elements)
- Middle column comprises of region of neutral axis
- Spine considered to be unstable when any of the two columns are involved

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• Thus, in three column concept a burst fracture is considered to be unstable (Fig. 1).

2. Material and Methods

Thirty patients were included in the study during the period of 4 years. Anterior approach done in conjunction with neurosurgeon. Histological confirmation was done through operative biopsy. Postoperative follow up 3 months interval till 4 years (viz 3, 6, 9, 12, 15, 18...till 48 months). All patients started on standard ATT (anti tubercular therapy) therapy. Multi drug resistance tuberculosis was also evaluated. The mobilization of patient by anterior fixation was done in 3 weeks and by posterior fixation in 7 days [8-9].

Patients were clinically categorized basis on the approach:

Category 1:

- 1: D1-D4 lesions

- 1a—Anterior lesion
- 1b—Anterolateral/Posterior lesion

Category 2:

- 2: D5-D12 lesions
- 2a—Anterior lesion
- 2b—Anterolateral/Posterior lesion

The cases not included in the study were:

- Trauma/tumor
- Cervical/lumbar Involvement
- Follow up less than 3 months
- Decompression without fixation
- Children less than 10 years of age

A, B, C: Pre-op MRI showing destruction of thoracic vertebra and collection of pus anteriorly as well as posteriorly; D: Intraoperative photograph showing removal of diseased vertebra prolene mesh & stabilization by pedicle screws posteriorly; E, F: Anterio posterior and lateral view of skiagram showing stabilization with pedicle screws and rods.

Fig. 1 Two vs Three column concept.

Fig. 2 Posterior stabilization and decompression using prolene mesh technique.

Case-2:

Fig. 3 Anterior stabilization of upper dorsal spine. A+B: Preop MRI showing collection of pus; C: intraoperative stabilization with self expandable titanium cage; D: Postoperative skiagram lateral view showing stabilization.

Case-3:

Fig. 4 Posterior stabilization of upper dorsal spine.

A: Lateral skiagram showing destruction of D-6 vertebra; B: Preoperative MRI showing collection of pus as well as the compression of spinal cord; C: Intraoperative stabilization with pedicle screws and rod without prolene mesh; D: Postoperative AP view of pedicle screws and rods stabilization

3. Results

The cases were classified into two categories. Category 1 included patients with involvement of vertebra from D1-D4. Category 1A included patients

with anterior lesion, 1B included patients with antero lateral/posterior lesions. Category 2 included patients with involvement of vertebra from D5-D12. Category 2A included patients with anterior lesions and 2B included patients with antero lateral/posterior lesions. The patients of category 1 were operated via anterolateral thoracotomy and caging via self expandable cage and patients in Category 2 were operated with Anterolateral thoracotomy + caging, Laminectomy + Pedicle screw + inter transverse fusion and Costo-transversectomy+Pedicle screw+inter

transverse fusion respectively (Table 1).

Patients were divided according to sex distribution (Table 2) and the nature of surgery performed and their neurological status was assessed according to Frankel grading as depicted in (Table 3).

Table 1 Distribution of cases according to level of diseased vertebra and surgery performed.

Surgery	No. of cases	Level
Anterolateral thoracotomy and caging via self expandable cage	8	D1-D4
Anterolateral thoracotomy + caging	4	D5-D12
Laminectomy + Pedicle screw + inter transverse fusion	16	D5-D12
Costo-transversectomy+Pedicle screw+inter transverse fusion	2	D5-D12

Table 2 Distribution of cases according to sex.

Surgery	Male	Female
Anterolateral thoracotomy and caging via self expandable cage	6	2
Anterolateral thoracotomy + caging	3	1
Laminectomy + Pedicle screw + inter transverse fusion	12	4
Costo-transversectomy+Pedicle screw+inter transverse fusion	2	0

Table 3 Neurological status.

Grade	No. of cases
Frankel grade A:	4
Frankel grade B-E	24
MDR	4
WHO Category II cases	6

Table 4 Frankel Grading scale.

Grade	Sensory and motor function
Grade A	Complete neurological injury. No motor or sensory function clinically detected below level of lesion.
Grade B	Preserved sensation only. No motor function clinically detected below level of lesion sensory function remains below level of lesion but may include only partial function (sacral sparing qualifies as preserved sensation).
Grade C	Preserved motor, nonfunctional. Some motor function observed below the level of injury but is of no practical use to the patient
Grade D	Preserved motor, function limbs and walk with or without aid, but does not have normal gait or strength in all motor groups.
Grade E	Normal motor function. formal motor. No clinically detected abnormality in function; abnormal reflexes and subjective sensory

Fig. 5 Anterior vs. posterior fixation -persistent pain.

Fig. 6 Kyphosis.

4. Clinical profile

Mobilization:

The mean time of mobilization by anterior fixation was 13.4 days, while by posterior fixation was around 5.4 days.

Operating time:

The mean time for posterior fixation (Figs. 2 and 4) was 2.5 hr and for anterior fixation (Fig. 3) was 5 hrs.

5. Conclusions

In carefully selected cases, where kyphosis (Fig. 6) is not a major concern, posterior fixation according to frankel grading (Table 4) seems a better alternative to anterior fixation, as it provides 3 column fixation, earlier MOBILIZATION AND lesser morbidity (Figs. 5) to the patient.

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