



ORIGINAL RESEARCH PAPER

Orthopaedics

A PROSPECTIVE STUDY OF SPINAL TUBERCULOSIS TREATED BY POSTERIOR SPINAL SURGERY

KEY WORDS: Spinal tuberculosis, Posterior Spinal Surgery

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ABSTRACT

Introduction: Tuberculosis in the spine is still extremely common in our country and the fact that it is basically a “medical” disease cannot be over-emphasized. Over last forty years a lot has changed in the diagnosis, medical treatment and surgical procedures to treat tuberculosis of spine. However, chemotherapy alone or long periods of bed rest or external supports combined with chemotherapy may not be effective in the prevention of paraplegia and kyphosis.

Patients and methods: Adult patients with clinical and radiological evidence of active tuberculosis involving vertebral body from the first thoracic to the first sacral level were included in the study. Clinical examination and documentation of neurological status with bowel and bladder function. Kyphotic angle was measured using Cobb method and documented. The affected vertebral body is approached posteriorly, decompressed, infected bone and disc material evacuated. Pedicle screws fixed to the spine. vi All patients were seen at 1, 3, 6, and 12 months after surgery. The kyphotic angle was measured and documented. Neurological assessment was done using Frankel's grading. The functional disability and ability was assessed using Denis work scale.

Results: Of the 22 patients in our series 17 patients were in the age group of 21 to 60 with mean age of 45.5 years. Majority of the cases were men. We had 10 patients (45.5%) with tuberculosis in the thoracic spine of which 6 were in single level, 3 were in two levels and one was in three levels. There were 8 (36.4%) patients with tuberculosis at thoraco-lumbar level (T11 to L2). We had 9 patients with pre-operative kyphosis angle less than 30 degrees, 12 patients kyphosis angle between 30 and 60 degrees whereas there was one patient with kyphosis angle more than 60 degrees. The mean kyphotic angle pre-operatively was 45.3 degrees which was corrected to 29.7 degrees. At the final follow up, there was mean loss of 2 degrees. We had 6 patients each with Frankel grade A and B, 4 each in grade C and D and 2 in grade E pre-operatively. At the final follow up vii one patient with grade A remained unchanged where as 14 patients were in grade E and 5 in grade D; there were 2 patients in grade C. In our series pre-operatively 20 patients were in grade 5 where as at the end of one year there was one patient who did not show recovery where as 14 patients were in grade 2 and 7 were in grade 3.

Conclusion : Posterior approach utilizing only extra pleural approach, is an effective option to debride the infected vertebra, decompress the spinal cord and stabilize the spine. It allows decompression of spinal cord under direct vision. The transpedicular instrumentation provided rapid relief of instability and early reconstruction of spinal instability plays an important role in treating active spinal TB. In our series, debridement and instrumentation arrested infection and promoted lesion healing as demonstrated radiologically.

INTRODUCTION

Tuberculosis of the spine is one of the most common spine pathology in India. Over last 4 decades a lot has changed in the diagnosis, medical treatment and surgical procedures to treat this disorder. Further developments in diagnosis using molecular genetic techniques, more effective antibiotics and more aggressive surgical protocols have become essential with emergence of multidrug resistant TB. Surgical procedures such as single stage anterior and posterior stabilization, extrapleural dorsal spine stabilization and endoscopic thoracoscopic surgeries have reduced the mortality and morbidity. With biological control of the disease by the employment of modern antitubercular drugs, the present day physician can give a better quality of life to the patient.

We have now broken the myth that “antitubercular drugs do not penetrate the skeletal tuberculous lesion in sufficient concentrations,” and ankylosis of the joint is the only method to achieve no recurrence of disease. If diagnosed and managed effectively by “functional treatment,” early disease can resolve completely. In moderately advanced disease, many joints will heal with retention of functional arc of motion for many years; in advanced disease, surgical treatment can offer a mobile joint with healed status¹. Tuberculosis in the spine is still extremely common in our country and the fact that it is basically a “medical” disease cannot be over-emphasized. Paraplegia and kyphotic deformity development are two major disease-related problems.

The aims of treatment are to eradicate the disease and also to prevent the development of paraplegia and kyphotic deformity and if exists, to manage the pathological fracture and to allow early ambulation and to return the patient back to work. However, chemotherapy alone or long periods of bed rest or external supports combined with chemotherapy may not be effective in the prevention of paraplegia and kyphosis.^{4,5}

Therefore, for active tuberculosis with kyphosis, the two foremost objectives should be debridement and correction of deformity. Previous studies addressed these problems by anterior approaches²⁰, one- or two-stage combined anteriorposterior approach¹⁴⁻¹⁵, or posterior approach alone³⁰. A mild kyphosis can be successfully corrected by the anterior approach alone²⁶⁻²⁸, but for kyphosis of more than 30° the anterior approach by itself provides only limited correction, and hence the antero- posterior approach is warranted. The ideal strategy in the antero-posterior approach would be to achieve debridement and kyphosis correction in one stage. Nevertheless, a standardized surgical procedure has not been established. Points of controversy include whether the potential morbidity associated with both approaches being carried out in one procedure outweighs its benefit, whether the posterior approach should follow anterior debridement or vice versa, and the ideal instrumentation for posterior fixation^{20,29}.

PATIENTS AND METHODS:

This study consists of the patients with tuberculosis of dorsal,

dorso-lumbar and lumbar spine who underwent surgical decompression and fusion with posterior instrumentation. The patients who were available for regular follow up for a minimum period of 12 months were included in the study.

Inclusion criteria

1. Adult patients with clinical and radiological evidence of active tuberculosis involving vertebral body from the first thoracic to the first sacral level.
2. The patients available for full follow up observation.

Exclusion criteria

1. Patients younger than 18 years.
2. Involvement or having disorders of central nervous system
3. History of major surgery for any other disease of the spine

IMPLANT CHOICE: Implant choice are individualised according to the case. The anterior plate or rods and screws can be used in short-segment disease. As healthy vertebral bodies are necessary above and below the diseased segment to acquire purchase, this system can be used in mild to moderate kyphosis only. In panvertebral disease, anterior instrumentation alone does not provide mechanical stability. Hence, stabilisation by posterior instrumentation is indicated. Regional osteopenia is the essential feature of the TB lesion. Hence, the screw should span the healthy vertebral body, with good bone stock to provide mechanical stability.

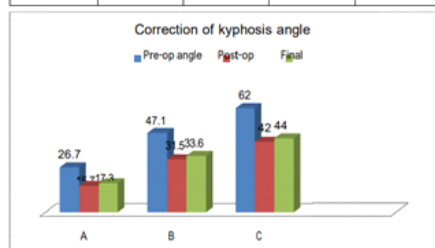
The posterior pedicle screw can be applied, ensuring insertion into relatively healthy vertebrae. Otherwise, it may cut through when corrective forces are applied to correct kyphosis in active disease, when correcting kyphosis in healed disease, pedicle screws in two vertebrae on either side is adequate. Hartshill instrumentation can be applied, gaining purchase against a healthy posterior complex spanning between one healthy segment above and below the diseased segment.

OBSERVATIONS AND RESULTS

Twenty six patients with tuberculous of thoraco-lumbar spine who underwent decompression and spinal instrumentation were included in this study. Of the twenty six patients, four patients were lost for final follow up. Consequently the study design was restricted to available twenty two patients.

Kyphosis angle: We used Kaplan's method and grouped our patients into three groups depending on the pre-operative kyphosis angle. We had 12 patients with pre-operative kyphosis angle between 30 and 60 degrees whereas there was one patient with kyphosis angle more than 60 degrees. Pre-operative, immediate post-operative and final kyphosis angle were as given in the chart.

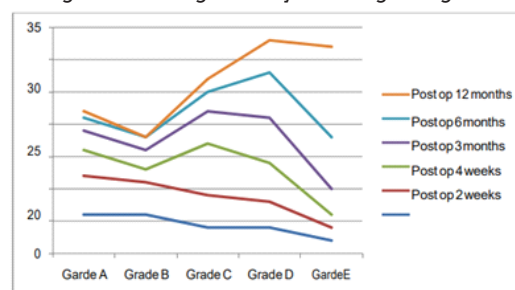
Kyphosis Angle				
Patient groups	Number of patients	Pre-operative	Post-operative	Final follow up
A: <30	9	26.7	15.7	17.3
B: 30 to 60	12	47.1	31.5	33.6
C: > 60	1	62	42	44
Total/Mean angle	22	45.3	29.7	31.7



Neurological function: Pre-operative and post-operative assessment was done using frankel grading. Except 2 patients all other 20 patients had neurological involvement of some grade, which improved after surgery. We had 6 patients each with frankel grade A and B, 4 each in grade C and D and 2 in grade E pre-operatively. At the final follow-up, 1 patient with grade A remained unchanged whereas 14 patients were in grade E and 5 in grade D.

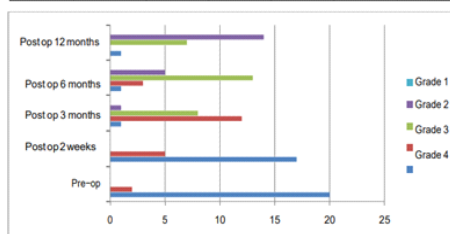
Frankel Grading	Pre-operative	Post-op 2 weeks	Post-op 4 weeks	Post-op 3 months	Post-op 6 months	Post-op 12 months
A	6	6	4	3	2	1
B	6	5	2	3	2	0
C	4	5	8	5	3	2
D	4	4	6	7	7	5
E	2	2	2	4	8	14
Total	22	22	22	22	22	22

Neurological function graded by Frankel grading



Work ability status: Working ability of the patients were assessed using Denis work scale. This scale has 5 grades, W1 being the normal and W5 is completely disabled. The work ability of our patients is given in the following table.

Grade	Pre-operative	Post-op 2 weeks	Post-op 4 weeks	Post-op 3 months	Post-op 6 months	Post-op 12 months
5	20	17	6	1	1	1
4	2	5	15	12	3	0
3	Nil	Nil	1	8	13	7
2	Nil	Nil	Nil	1	5	14
1	Nil	Nil	Nil	Nil	Nil	Nil
Total	22	22	22	22	22	22



Work ability assessment by Denis work scale

CONCLUSION

Posterior approach utilizing only extra pleural approach, is an effective option to debride the infected vertebra, decompress the spinal cord and stabilize the spine. It allows decompression of spinal cord under direct vision. The transpedicular instrumentation provided rapid relief of instability and early reconstruction of spinal instability plays an important role in treating active spinal TB. Apart from increasing the stability of the spinal column, instrumentation also help encourage neurological recovery, as rigid stabilisation of the spine has been shown experimentally to promote neurological recovery.

Our results confirm that neurological deficits clinically improved at least one grade according to the Frankel grading system after surgery. The immobilisation effect achieved

through posterior instrumentation during the operation might also be useful in suppressing infection. In our series, debridement and instrumentation arrested infection and promoted lesion healing as demonstrated radiologically.

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