

ORIGINAL ARTICLE

Evaluation of Surgical Decompression by Laminectomy and Fusion by Strut Graft with Stabilization by Pedicle Screw and Rod in Lumbar Spinal Tuberculosis

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Abstract:

Potts disease is a common cause of neurological complications and kyphotic deformity in our country. When deformity progressed that may leads to painful costo-pelvic impingement, respiratory distress, risk of paralysis of muscle of lower limb and consequent reduction in quality, longevity of life. The treatment strategy is to avoid neurological complication and achieve a near normal spine. In TB, spinal column may become unstable. Pathological fracture/dislocation of a diseased vertebral body may occur due to mechanical insult. Surgical decompression cause further instability. The insertion of a metallic implant is to provide stability. Pedicle screw fixation in kyphotic correction in old potts disease is a most suitable device. This prospective interventional study was done on BSMMU for the period of 60 months with minimum follow up period of 2 years. 20 cases (13 males and 7 females) of lumbar spinal tuberculosis with neurological deficit were operated with a transpedicular decompression and screw fixation along with anti-tubercular drug treatment. All of these patients had varying degrees of neurological deficit and single level involvement with vertebral body destruction and mild kyphosis of 5–15 degrees. Long segment pedicle screw fixation, posterior decompression, and correction of kyphosis were performed in single stage. The mean age of patients was 50.9 and kyphosis improved from 10.4±2.9 degrees to 4.0±1.2 degrees. Neurological recovery occurred in 18 patients (90%). Bony fusion was achieved in 67.5% cases. At 2-years follow-up mean VAS score improved from 5.5 to 0.75. So posterior decompression and transpedicular stabilization with continued chemotherapy is a good treatment option for the management of the lumbar TB in patients with vertebral body destruction.

Introduction:

Spinal tuberculosis is the most common form of extrapulmonary TB¹. As like other TB anti-tubercular chemotherapy is the mainstay of treatment for spinal tuberculosis (TB). About 15%–50% of spinal TB patients develop the most dreaded complication, that is, paraplegia². Patients who are treated conservatively, though

collapse may progress still bony fusion was noticed causing residual kyphosis upto 60 degrees³. Therefore, surgery is indicated for the patient who developed neurological complication. It is also indicated in acute onset, severe grade paraplegia, pain due to instability, or in elderly patients⁴.

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Surgery improves neurological status by removal of compressive elements, that is pus, granulation tissue, sequestrum, and disk material. It also increases the vascularity, improves the delivery of drug into disease site, and thus helps in healing and bony fusion^{5,6}. Though there is controversy about ideal surgical treatment. Decompression surgeries only with prolonged immobilization increased kyphosis^{7,8,9}. As pott's being an anterior disease of vertebra, anterior decompression and fixation has been considered as the gold standard. But it has problems of anesthetic complications, higher morbidities, peroperative vascular injury, graft failure, and poor fixations in osteopenic bone¹⁰. Sometimes even additional incision or surgery is required for posterior fixation¹¹. Hence, recently the posterior approach surgery has gained popularity, based on the principle of adequate but not extensive debridement and stable fixation, with much lower complication rates⁴. This prospective study was taken to evaluate the efficacy of posterior decompression and fixation in lumbar TB with definite surgical indication in skeletally mature patients.

Materials and method:

The study included 20 patients (13 males and 7 females) with mean age of 50.9 years (range, 32–71 years) from July 2011 to June 2016 were included in this study. It is a prospective interventional study with purposive type of sampling according to inclusion and exclusion criteria. Patient with medical co-morbidity, advance stage of spine TB was excluded from the study. Patients were taken from BSMMU OPD and Popular hospital. All patients with lumbar spinal TB involving two adjacent vertebrae with neurological deficits and destruction of the vertebral bodies. Exclusion criteria were cases more than 1 level paravertebral involvement, multifocal lesion. All

the cases were confirmed by CT guided FNAC. All cases were operated by the senior author in orthopaedic surgery BSMMU and Popular hospital of Dhaka city. Hemtological workup CBC, LFT done before starting 4-drug oral antitubercular chemotherapy regimen (isoniazid 5–10mg/kg/d, rifampicin 10–20mg/kg/d, ethambutol 15–25 mg/kg/d, and pyrazinamide 25–35 mg/kg/d) for three months followed by isoniazid and rifampicin for 15 to 18 months. Patients included in the operative study were those having Frankel grade A/B paraplegia, Frankel C/D paraplegias not responding to chemotherapy within four weeks, and/or those with severe pain with VAS score more than five.

Surgical procedure: The patient was positioned prone with 1 bolster beneath chest and other below pelvis so that the abdomen could hang free. This position may help in reducing some amount of kyphosis due to gravitational pull. With midline incision and stripping of the paravertebral muscles, the pedicle screws were inserted in the unaffected vertebrae (above and below the diseased site). The affected segments were avoided as there was a previous report of loosening of the screw with subsequent subcutaneous abscess formation. After placement of pedicle screws, decompression was performed at the extradural compression in the MRI picture. The pedicle of the vertebra in which the body is more eroded and destroyed, was usually selected for removal. With the help of power burrs, the inferior facet of the adjacent superior vertebra was excised first and then the upper facet and pedicle were removed until body of the vertebra. For better visibility, small part of the adjoining lamina was also cut; although majority of laminar parts were preserved. The exiting nerve root would be visible now. With

retraction of the nerve root, the compressive elements, that is, granulation tissues, sequestrated bone, and disk were removed, preferably with angled curettes and disk forceps protecting the spinal cord. The tissue was sent for histopathologic examination. Paravertebral abscesses were also drained and sent for culture and sensitivity tests. In the patient with involvement of L1–L2, adequate space was available for decompression through intervertebral foramen after partial removal of the facets from 1 side without removal of pedicle. Lastly the connecting rods were fixed with pedicle screws on both sides after proper contouring.

Postoperative management: Sutures were removed after 14th postoperative day. Patients were mobilized 6 days after surgery with brace and advised to continue it for 6 months and discharged the patient 10 days after surgery. ATT was continued for 15 to 18 months. Patients were followed up at 3 weeks then 3, 6, 12, 18 and 24 months. Neurological status was evaluated using the Frankel grading, pain was assessed using VAS, the angle of kyphosis was calculated from x-rays by Konstam and Blesovsky technique.

Results:

The details of the results of the 20 cases are shown in the table below. The mean age of the patients was 50.9 years. The mean vertebral body destruction was 0.51 VBL. The mean follow-up period was 30.8 months. There was significant relief of pain in all patients with improvement of VAS using paired t-test for

preoperative and final follow-up for 3 different levels and p-value is equal to 0.0031 which is strongly significant. Relief of pain assess by (VAS) Visual analogue score.¹² Neurological status was evaluated by Frankel grading.¹³ ESR of all the patients which was between 37 and 86 mm & preoperatively reached to normal level 12 months after surgery. Eighteen (90%) out of 20 patients showed signs of neurological recovery. Eleven patients (55 %) recovered neurologically to Frankel grade E out of whom preoperatively two patients were in grade D, six in grade C, and three in grade B. Nine patients who showed neurological recovery to Frankel grade D, preoperatively four of them were in grade A and five in grade B. At the last follow-up, 11 patients (55%) had radiologic fusion. Preoperative mean kyphotic angle 10.4 ± 2.9 with post operative 4.0 ± 1.2 . Kyphotic angle correction was significant as p-value equals to 0.0206 using paired t-test which is significant. Bed sore was the most common complication, which occurred in three patients. Four patients (20 %) had urinary tract infection.

Frankel Classification¹³

Grade A: Complete paralysis.

Grade B: Sensory function only below the injury level

Grade C: Incomplete motor function below injury level

Grade D: Fair to good motor function below injury level

Grade E: Normal function

Table-I: Pre and post operative grading and VAS of the patients

S.No	Age (years) /sex	Level of Involvement	Pre-op Frankel's grading	Post-op Frankel's grading	Final Frankel's grading	Pre-op VAS	Post-op VAS	Final VAS
1	53/f	L1-L2	B	D	D	7	3	1
2	67/m	L2-L3	C	D	E	6	2	1
3	71/m	L3-L4	B	C	D	7	3	1
4	53/m	L4-L5	A	D	D	6	2	0
5	41/f	L3-L4	B	D	D	8	5	5
6	47/m	L2-L3	D	E	E	7	0	0
7	46/f	L3-L4	B	D	D	6	3	0
8	57/m	L4-L5	C	D	E	7	2	0
9	43/f	L2-L3	B	D	E	3	1	0
10	52/m	L3-L4	B	D	E	6	3	1
11	32/m	L4-L5	A	C	D	3	1	0
12	31/m	L1-L2	B	D	D	5	2	0
13	66/f	L4-L5	A	C	D	5	1	2
14	57/m	L3-L4	C	D	E	6	2	1
15	48/m	L2-L3	C	D	E	4	0	0
16	59/m	L1-L2	D	E	E	5	2	1
17	39/f	L4-L5	B	D	E	4	1	0
18	51/m	L4-L5	A	C	D	5	1	1
19	48/f	L1-L2	C	D	E	4	1	1
20	57/m	L3-L4	C	D	E	6	0	0

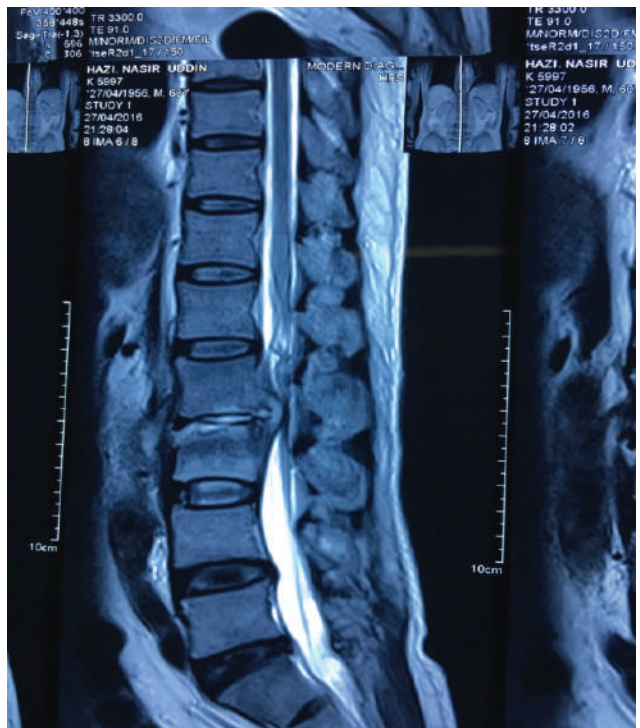
Table-II: Pre and post operative change of Kyphotic angle of the patients

Pre-op kyphotic angle	Post- op kyphotic angle	Degree of correction	Kyphotic angle at final FU	Fusion
10	7	3	7	Y
9	3	6	3	N
7	2	5	2	Y
15	5	10	5	N
14	4	10	5	N
14	4	10	4	Y
9	2	7	2	Y
10	4	6	4	N
15	4	11	3	Y
7	3	4	3	N
11	5	6	5	Y
11	4	7	4	Y
5	3	2	3	N
8	6	2	5	Y
14	6	8	5	N
8	2	6	2	Y
12	5	6	5	Y
11	4	7	4	N
8	6	2	5	Y
10	4	6	4	N

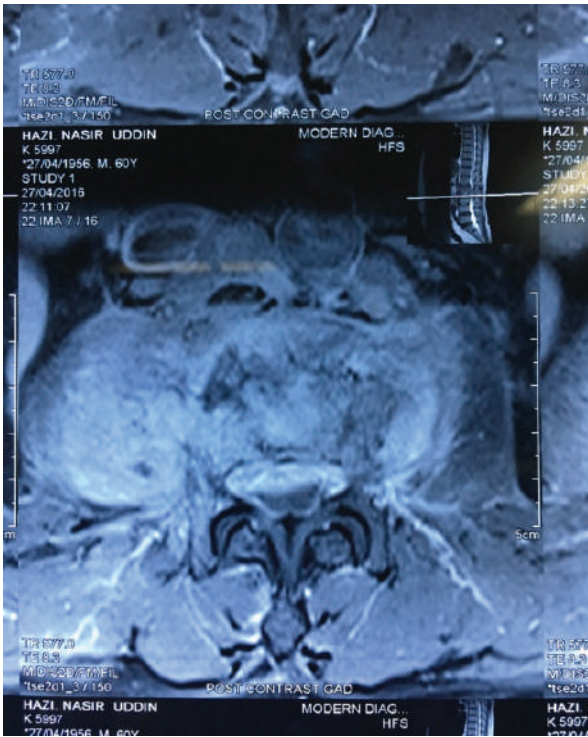
F, fusion; fix, fixation levels; FU, follow-up; L, lumbar; N, no fusion Y, fusion seen.



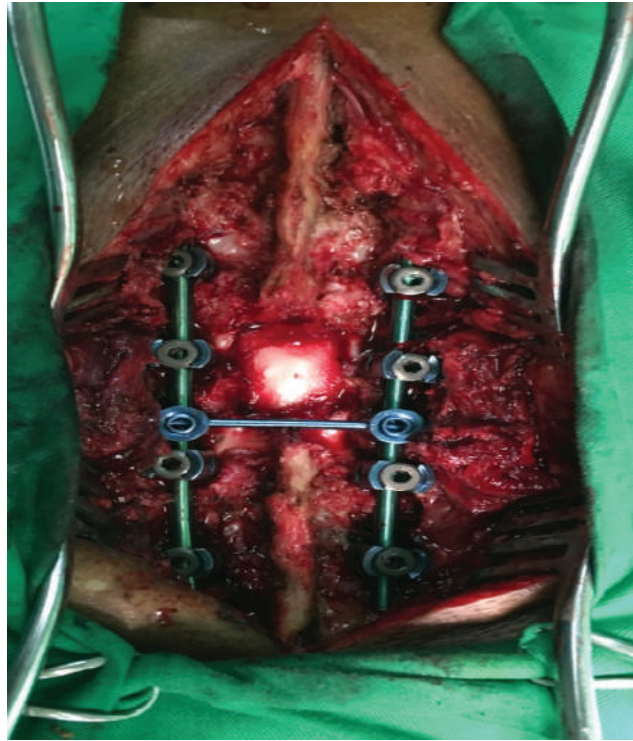
Preoperative X-ray AP and lateral view shows involvement of L3 vertebral body



Preoperative MRI saggital section T1 and T2 weighted image.



Preoperative axial MRI shows epidural pus.



Peroperative view of decompression, Fusion and stabilization.



Discussion:

Posterior approach with instrumentation were established as safe technique in treatment of pott's disease⁴. Lee and colleagues have compared the result of transpedicular decompression to anterior decompression with fixations. All their patients had complete neurological recovery and significant VAS improvement, but most of their neurological deficits (Frankel D or E) were less severe. In the present study, severe neurological involvement (Frankel grade A and B) was seen in 12 patients, of which all recovered to grade D or E. In the present study, the kyphosis correction was comparable with other posterior surgery series (5.16–9.6 degrees).⁴ In the present series, fusion was observed in only 55.5% cases despite adequate period of follow-up, but the patients without fusion had neither any pain nor any radiologic evidences of implant loosening at their latest follow-up. Previous study showed fusion up to 100%.⁴ Though, rate of fusion is less, still transpedicular approach is useful technique for decompression and fixation of pott's patient with a very low complication rate.

There are some limitations of our study. This study was carried out with limited sample size. There are also variations in the level and neurological involvement. The exact time of onset of the disease was not known.

Conclusion:

It can be concluded that transpedicular decompression and long segment stabilization with pedicle screw and rod is a good surgical option with less surgical risks for the treatment of lumbar TB in patients with bone destruction less than 50%.

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