



COMPARISON BETWEEN ANTERIOR VS ANTEROLATERAL DECOMPRESSION WITHOUT INSTRUMENTATION IN TUBERCULOSIS SPONDYLITIS

Orthopaedics

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ABSTRACT

Tuberculosis infections of the spine are usually the result of seeding from an extraspinal source (eg, pulmonary infection) and commonly manifest as paradiscal, anterior or central lesions. **Aims and objective:** To compare Anterior vs Anterolateral decompression without instrumentation in tuberculosis spondylitis. **Materials and method:** This Retro cum prospective study with simple randomization was conducted in the Department of Orthopaedics, Institute of Medical Sciences and Sir Sunderlal Hospital in Banaras Hindu University, Varanasi, India. The duration of the study was from June 2011 to June 2013. **Results:** There is no significant difference in progress of local kyphosis between group 1 and group 2 from postoperative period to latest follow up at 2 years (p value: 0.5). Concern to neurological recovery there is no significant difference between group 1 and 2. **Conclusion:** In anterior decompression without instrumentation the correction of local kyphosis was better.

KEYWORDS

Anterior decompression, Anterolateral decompression, tuberculosis spondylitis

INTRODUCTION:

Tuberculosis is a chronic, insidious and recurrent bacterial infection caused by *M. tuberculosis*, *Mycobacterium bovis* or *Mycobacterium africanum*. Worldwide tuberculosis is the commonest infectious disease and about 95% of cases occur in developing countries. Tuberculous spondylitis, although less common, is the most dangerous form of skeletal tuberculosis [1].

Tuberculosis infections of the spine are usually the result of seeding from an extraspinal source (eg, pulmonary infection) and commonly manifest as paradiscal, anterior or central lesions [2]. In adults, there are four primary patterns of involvement: 1) paradiscal, 2) anterior granuloma, 3) central lesions and 4) appendiceal type lesions [3-5].

Surgery should be through the anterior approach because the disease almost always destroys the anterior bone and soft-tissue structures of the spine [6]. Through anterolateral approach simultaneous posterior instrumentation can be done with modified T shape incision [7]. The problems with anterior approach are lack of adequate space to insert the anterior implants and the possible problem of prominent hardware putting pressure on the great vessels particularly in the thoracic spine. Further retrieval of dislodged anterior hardware is more risky and fixation in cancellous vertebral bodies gives less pullout strength compared to fixation in the dense pedicles [8,9]. Anterolateral approach is not free of problems, one may find difficulty in graft placement, graft dislodgement and other similar complications. However it is basically simple and safe; by not opening the pleural cavity, plural complications are very few.

MATERIALS AND METHOD:

The present study was conducted in the Department of Orthopaedics, Institute of Medical Sciences and Sir Sunderlal Hospital in Banaras Hindu University, Varanasi, India. The duration of the study was from June 2011 to June 2013.

Study design:

It is a type of Retro cum Prospective study with simple randomization.

Patient population:

The patients who were admitted in orthopaedics ward after June 2011 with tuberculosis spine either not improving with appropriate antitubercular treatment and bed rest or their condition was deteriorating were studied prospectively. The patients who were operated before June 2011 and whose records could be traced were studied retrospectively and follow up was done till the study completed. Patient population comprised of 27 patients operated with anterior debridement, spinal cord decompression with bone grafting without instrumentation, having a minimum follow up of 2 years and

24 patients operated with anterolateral decompression with or without bone grafting.

Inclusion criteria

- Patients of tubercular spondylitis between 20 and 65 years of age classified according to Tuli's classification.
- Patients of dorsal and dorso-lumbar tubercular spondylitis with paraplegia were also included.

Exclusion criteria

- Patients younger than 20 years and older than 65 years were excluded from the study.
- Patients of tuberculosis of cervical, lumbosacral spine, with inadequate pre and postoperative follow up or which were not treated in our hospital were excluded from the study.

Procedures and methods used:

We traced the records of patients admitted and operated in the past and called to assess them clinically and radiologically. Those patients who were operated after June 2011 were assessed prospectively by clinical and radiological examinations preoperatively and post operatively till the completion of study.

Anterior decompression:

With the patient in left lateral position, access was gained to the involved vertebrae by means of thoracotomy. Single lung ventilation was carried out after thoracotomy with the left lung deflated to improve exposure and to avoid inadvertent injury to the lungs. The abscess was drained if present and neural decompression was done with complete/partial corpectomy of the destroyed vertebra leaving only a shell of bone of the opposite cortex. Before inserting the strut graft slots are made in the proximal and the distal healthy vertebral body. The kyphus is corrected manually by applying anterior pressure at its apex [7]. When the pressure on the back of the spine is released, the graft is locked in position. Remaining gap is filled with rib that was resected during exposure and supplemented by auto iliac bone graft. Sitting with brace support was allowed at 12 weeks onwards in non-instrumented patients. Brace was used for support in the initial 6 months and full weight bearing when radiological signs of fusion were evident was followed in both groups. Follow up was done at 1, 3, 6, 9, 12, 18 months following surgery and at every 6 months thereafter. Radiological and lab investigation, including the erythrocyte sedimentation rate were done at each follow-up visit. Frankel grade was evaluated clinically. Immediate post operative local kyphosis was calculated from plain radiographs, taken at post operative day 5th. Late loss of kyphosis correction was measured by the plain radiograph taken 2 years post operatively. From the time of initial diagnosis and continuing post operatively, antitubercular drugs were given as per the

department protocol.

Anterolateral decompression:

With the patient in left lateral position access to involved vertebra was done through semilunar paravertebral incision. Abscess was drained if present and decompression of cord was done with complete / partial corpectomy of involved vertebra. Adequate decompression accessed intraoperatively. Remaining gap was filled with resected ribs. Postoperatively sitting with brace support was allowed after 3 months. Brace was used for support in initial 12 months and full weight bearing was started when radiological signs of fusion were evident. Follow up was done at 1, 3, 6, 9, 12, 18 months postoperatively and at every 6 months thereafter. Radiological and lab investigations including erythrocyte sedimentation rate were done at each follow up visit. Frankel grade was evaluated clinically, immediate post operatively and local kyphosis was measured at 1st month postoperatively. Late progression was measured by plain radiograph taken 2 years post operatively. From the time of initial diagnosis and continuing post operatively, anti tubercular drugs were given as per the national government's protocol.

The patients were classified according to Tuli's classification. All patients of tuberculosis spine were randomly assigned to the 2 groups. Anterior group had in common anterior debridement and decompression of spinal cord and autofibular strut/autoiliac/autorib and combination grafting. One group was not having the instrumentation, other group was Anterolateral group debridement without auto rib bone grafting was done.

The statistical methods used were independent simple T test for improvement in local kyphosis, loss of correction and progression of kyphosis at 2 years.

RESULTS:

This study was conducted in the Department of Orthopaedics, Institute of Medical Sciences and Sir Sunderlal Hospital in Banaras Hindu University, Varanasi, India. The duration of the study was from June 2011 to June 2013 which also included records of cases operated before 2011. The present study was performed to observe the change in kyphosis by different surgical interventions (Anterior vs Anterolateral decompression).

Group 1 :Anterior decompression without instrumentation

Group 2 :Anterolateral decompression without instrumentation

A total of 38 patients were included in the study. The average follow up was 30 months [18 months to 42 months]. The patients had an average age of 42.6 years with the age ranging from 22 years to 64 years. The groups (group-1 and 2) were matched in reference to age (42.3 vs 42.8) in years, average number of vertebrae involved (2.3 vs. 2.2), severity of deformity (29.20 vs.29.40) and type of auto grafts used. The most common region of spinal vertebrae involved was thoracic (D7-D8) in both the groups. Statistical test of significance used was the student T test.

Table no 1 shows average number of vertebrae involved 2.3. Preoperatively 9 patients were in Frankel grade A, 3 in B and 2 in D. Postoperatively at 2 years follow up 5 patients from grade A improved to grade E, 3 improved from grade B to E and 2 improved from D to E. 3 patients changed from Frankel grade A to D. 1 patient did not improve and remained unchanged in grade A.

Table 2 shows preoperative average kyphosis of 29.2°. Immediate post operative kyphosis of 19.5° (mean) was observed. Correction achieved at immediate post op was 9.7° (mean). Loss of correction at 2 years follow up was 9.1° (mean). Average correction achieved at 2 year follow up is 0.6° (mean) with 2% correction in local kyphosis.

Table 3 shows preoperative average number of kyphosis 29.4°. Immediate postoperative kyphosis 29.4°(mean). Correction achieved at immediate post op was 0°. Progression of kyphosis at 2 years follow up was 11° (mean). Average deterioration at 2 year follow up is 11°(mean) with 37.4% increase in local kyphosis.

The local kyphosis correction at immediate postoperative period in group 1 was 9.7° [mean] and the late loss of correction at last follow up of 2 years has been 9.1°. In group 2, local kyphosis progression was 11° [mean]. There is no significant difference in progress of local kyphosis between group 1 and group 2 from postoperative period to latest follow

up at 2 years (p value: 0.5). In group 1 this correction was 2 %, while in group 2 there is 37.4% increase in kyphotic angle as compare to preoperative angle. Concern to neurological recovery there is no significant difference between group 1 and 2. There were no episodes of wound infection, development of new discharging sinuses and recurrence of the disease at the same or any other level in the spine in either of the 2 groups.

DISCUSSION:

Spinal tuberculosis is the most common type of osteoarticular tuberculosis [10]. Many types of surgical approach have been described for debridement of caries spine but it is rather difficult to strictly compare the results of various series treated by operative treatment as clinical matter varies from center to center [11]. Despite the good results of medical treatment kyphosis remains an unresolved problem especially when more than two disc spaces are involved. The various surgical procedures have been described for debridement and stabilization of tuberculosis of dorsal and lumbar spine.

Transthoracic transpleural (anterior decompression)

Extraleural anterolateral decompression

In this study fibula was used for osteoconductive and structural support, whereas the rib, iliac crest were used for osteoinductivity [12]. The bone graft following uninstrumented anterior decompression in spinal tuberculosis provides sufficient stability and structural support in only 41% of patients with a short defect. The need for an external splint was suggested when the bone graft $\approx$ 5 cm (two-disc heights) to prevent graft-related complications [1]. However, the use of autologous bone is not without problems. Though we didn't encounter many problems due harvesting to autologous graft but hematomas, wound infections, neuropraxia and pain are known complications when harvesting autologous bone [13]. In an effort to eliminate donor site morbidity, spinal surgeons have begun using fibular allograft, but to date, gold standard for cortical strut graft is still autologous fibula [13].

In Jain et al series 2004, 64 patients were operated with anterolateral decompression without any instrumentation. 90% patients improved neurologically but 10% patients showed no improvement. In the same series in 85% patients there was no significant change in kyphotic deformity. According to Tuli (2010) average increase in kyphotic angle was 100 (00 to 300) in patients followed for more than 2 years after anterolateral decompression surgery [14].

Thus from our study in operative treatment of tubercular spondylitis, it is safe to say that anterior debridement, decompression of cord and autofibular strut grafting is an effective procedure and when performed in equipped centers, very few complications are noted and yields excellent results. Non instrumented group in which the fibular strut graft which is not as rigid as metals and sometimes on account of graft subsidence during follow up shows greater degree of loss of local kyphosis correction. There were no cases of graft dislodgement in immediate postoperative radiographs. [radiograph taken at postoperative day 5]. Without the use of anterior instrumentation, only anterior debridement, decompression of cord and autofibular strut grafting is also associated with comparable neurological recovery at 2 years follow up. However, the patients have to confine to bed for a longer period of time and local kyphosis would be more if anterior instrumentation were not used.

Further, progression of kyphosis at 2 years follow up is significantly more in the non instrumented group and though, local kyphosis is more in non instrumented group, both the groups have comparable neurological results at 2 years follow up. In terms of neurological recovery in anterolateral group recovery was similar to anterior group at 2 years follow up but postoperative discomfort was more in anterior group without significant increase in morbidity. Our late loss of kyphosis correction 9.1° in non instrumented group while in anterolateral group progression of kyphosis was 11°. No case of apparent pseudoarthrosis or implant failures was observed. All patients demonstrated clinical healing of the tuberculosis infection and the surgical site wound. In the noninstrumented group and anterolateral group the favourable neurological results can be ascribed to prolonged period of immobilization until radiological signs of union were evident and to the prolonged use of spinal orthosis in this group. Morbidities due to prolonged immobilization, decreased correction of kyphosis in immediate post operative period and further progression of kyphosis in due course of time are well known disadvantages of not using spinal

instrumentation after debridement.

There are instances though where instrumentation may not be advisable as in osteoporotic bones where the purchase of the screws may not be adequate and chances of implant failure shall be high. We can hereby safely state that, in cases where instrumentation is not feasible or is unsafe comparable neurological results can be achieved with thorough anterior debridement, spinal cord decompression and strut grafting alone if adequate duration of immobilization, orthotic support and antitubercular drugs are given. In non-instrumented Anterior group there was effective correction of kyphosis in comparison to Anterolateral group without instrumentation.

CONCLUSION:

In anterior decompression without instrumentation the correction of local kyphosis was better as compared to anterolateral decompression without instrumentation when latest kyphotic angle was compared with preoperative kyphosis.

Table 1 : Table showing all cases in the study, their neurology before and after anterior decompression without instrumentation

Patient No	Number of vertebrae Involved	Vertebral Level	Age In Years	Sex	Neurology Before Surgery [Frankel grade]	Neurology at 2 years follow up [Frankel grade]
1	2	D9,D10	45	F	A	E
2	2	D9,D10	23	M	B	E
3	3	D5-D7	64	F	A	E
4	2	D12,L1	35	F	B	E
5	2	D9,D10	62	F	D	E
6	3	L2-L4	34	F	A	E
7	2	D12,L1	55	F	D	E
8	2	D9,D10	23	F	A	E
9	2	D8,D9	33	M	A	A
10	2	D8,D9	55	M	A	E
11	2	D9,D10	46	M	B	E
12	2	D7,D8	52	F	A	D
13	3	D4-D6	22	M	A	D
14	4	D9-D12	44	M	A	D

Table 2 : Table showing angle of local kyphosis pre and post surgery and at 2 years follow up in anterior decompression (without instrumentation)

Sl No	Angle of kyphosis before the operation [in degrees]	Angle of local kyphosis[immediate post op][in degrees]	Angle of local kyphosis[at 2 years post operative][in degrees]	Loss of correction of kyphosis over 2 years[in degrees]
1	28	20	26	6
2	28	23	28	5
3	37	24	36	12
4	32	14	28	14
5	16	8	15	7
6	27	16	28	12
7	26	12	25	13
8	26	22	30	8
9	18	8	16	8
10	45	36	44	8
11	10	8	10	2
12	30	15	28	13
13	70	56	66	10
14	16	12	20	8

Table 3 : Table showing angle of local kyphosis pre and post surgery and at 2 years follow up in anterolateral decompression without instrumentation

Sl No	Angle of kyphosis before the operation [in degrees]	Angle of local kyphosis[immediate post op][in degrees]	Angle of local kyphosis [at 2 years postoperative][in degrees]	Progression of kyphosis
1	18	18	32	14

2	18	18	40	22
3	12	12	16	4
4	22	22	32	10
5	36	36	44	8
6	28	28	36	8
7	40	40	48	8
8	18	18	20	2
9	30	30	38	8
10	38	38	44	6
11	20	20	34	14
12	8	08	17	09
13	40	40	48	08
14	28	28	36	08
15	48	48	58	10
16	45	45	62	17
17	60	60	66	06
18	20	20	38	18
19	48	48	57	7
20	42	42	50	8
21	32	32	36	4
22	18	18	40	22
23	8	08	10	2
24	30	30	40	10

Table 4 : Comparing change in kyphosis in different groups.

Criteria	Group 2 (n=14)	Group 3 (n=24)
Mean local kyphosis pre operative	29.20	29.40
Mean local kyphosis immediate post operative (1st week)	19.50	29.40
Mean correction	9.70	00
Mean kyphosis [2 years post operative]	28.60	40.40
Loss of correction/progression of kyphosis compared to immediate post operative status	9.10	11.00
Mean Correction of kyphosis	0.60	-11.00
%correction of kyphosis compared with preoperative kyphosis	2	-37.4

Table 5: Comparison change in neurological status in different groups

Criteria	Group 2 (n=14)	Group 3 (n=24)
Frankel grade (preoperatively)		
Grade A	9	8
Grade B	3	11
Grade C	0	5
Grade D	2	0
Grade E	0	0
Frankel grade at 2 years follow up		
Grade A	1	2
Grade B	0	0
Grade C	0	2
Grade D	3	2
Grade E	10	18
Graft fracture, resorption, dislodgement	None	Not significant

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