

Clinical Outcomes Of One-Stage Anterior Debridement, Interbody Fusion With Allograft, And Anterior Fixation For Lumbar Segment Tuberculosis

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INTRODUCTION:

Tuberculosis (TB) remains the most common cause of death from infectious disease world-wide¹. Percival Pott described tuberculosis of the vertebral column in 1877 as a kyphotic deformity of the spine associated with paraplegia,². In 1960 Hodgson et.al.⁵ reported anterior decompression and strut graft for reconstruction of anterior column. Graft slippage, resorption, subsidence leading to increased kyphosis is commonly anticipated in anterior debridement without instrumentation^{11,12}. Purpose of this study was to evaluate clinical outcomes of one-stage anterior debridement, interbody fusion with allograft, and anterior fixation for the treatment of lumbar segment tuberculosis at Yangon Orthopaedic Hospital.

METHODS:

From January 2014 to December 2015, 16 patients diagnosed with lumbar segment tuberculosis received antituberculosis medications for three weeks before anterior debridement, autologous iliac bone grafting, and anterior fixation. Surgery was performed when the toxic symptoms of tuberculosis were controlled, local kyphotic angle, percentage of anterior vertebra height, back pain by visual analogue scale (VAS), ESR, and neurological status were assessed before and after surgery up-to 6months. Finally functional status was assessed by modified MACNAB criteria.

RESULTS:

All surgical procedures were performed successfully without intra or postoperative complication. Mean blood loss (ml) is (158.1 ± 50.4), no need to transfuse at all cases. The mean local kyphotic angle was significantly decreased from the mean preoperative angle (14.6 ± 3.9) to (1.8 ±

2.5) at final follow-up (P <0.001). The mean VAS scores and ESR were significantly decreased from preoperative levels (7.6 ± 0.8, 68.2 ± 14.8mm/h, respectively) to (0.4 ± 0.5 and 20.5 ± 6.1mm/h, respectively) at final follow-up (all P <0.001). The mean percentage of anterior vertebra height was significantly increased from the mean preoperative height (40.1 ± 8.3) to (81.1 ± 4.9) at final follow up(P <0.001). Eight patients who had non-functional neurological performance (Frankel B and C)before surgery had normal neurological performance after months, only two patients still had sensory impairment (Frankel D). Eight patient were excellent, five patients were good and three patients were fair at functional status, it was assessed by modified MACNAB.

Table 1. Comparison of clinical parameters before and 6 months after surgery

Variables	Pre-op (Mean ± SD)	Post-op (Mean ± SD)	P value ^a
Local kyphotic angle (°)	14.6 ± 3.9	1.8 ± 2.5	<0.001
Height (% of vertebra)	40.1 ± 8.3	81.1 ± 4.9	<0.001
Visual Analogue Scale	7.6 ± 0.8	0.4 ± 0.5	<0.001
ESR	68.2 ± 14.8	20.5 ± 6.1	<0.001

a. Wilcoxon Signed Ranks test

Table 2. Comparison of neurological status before and 6 months after surgery

Frankel neurological grading	Pre-op n (%)	Post-op n (%)	P value
Grade A	0	0	< 0.001 ^a
Grade B	2	0	
Grade C	6	0	
Grade D	6	2	
Grade E	2	14	

DISCUSSION:

Although chemotherapy can be effective, it is important to preserve normal curvature during treatment of spinal tuberculosis and minimise the chance of kyphosis. In addition restoration of anterior vertebra height can improve lumbar lordosis and indirect decompression of lumbar nerve roots. We suggest that surgery for spinal tuberculosis should generally be via an anterior approach because the disease invariably destroys the anterior bone and soft tissue structures of the spine. Bone grafting plays a crucial role in preventing progression of the kyphosis in the unstable segment by providing structural anterior support. However, the graft may be subjected to extreme mechanical stresses, which may cause the graft to fail. The forces transmitted across the graft and the weakening of the graft during the creeping substitution period may cause slippage or resorption of the graft. Therefore, anterior instrumentation is suggested for correcting the kyphotic deformity, stabilising the vertebral column, and preventing graft related complications^{11,20}. Our study has a number of limitations, small number of patients and relatively short length of follow-up. A further limitation of technique described is not applicable for cases with kyphotic more than 30 degrees and destructive posterior structures and is only applicable in cases in which the screw can be stably fixed to the vertebra body, should be cautioned in osteoporosis cases.

CONCLUSION:

Our findings suggest that anterior radical debridement, interbody fusion, and rod fixation can be one staged effective treatment option for lumbar segment tuberculosis.

KEY WORDS:

Spinal tuberculosis, Lumbar Interbody Fusion, Visual Analogue Scale, MACNAB criteria

REFERENCE:

- Pertuiset E, Beaudreuil J, Liote F, Horowitzky A, Kemiche F, Richette P, Clerc-Wyél D, Cerf-Payrastre I, Dorfmann H, Glowinski J, Crouzet J, Bardin T, Meyer O, Dryll A, Ziza JM, Kahn MF, Kuntz D (1999) Spinal tuberculosis in adults. A study of 103 cases in a developed country, 1980–1994. *Medicine (Baltimore)* 78:309–320
- Yao DC, Sartoris DJ (1995) Musculoskeletal tuberculosis. *Radiol Clin North Am* 33:679–689
- Jain AK, Dhammi IK (2007) Tuberculosis of the spine: a review. *Clin Orthop Relat Res* 460:39–49
- Jain AK (2010) Tuberculosis of the spine: a fresh look at an old disease. *J Bone Joint Surg Br* 92:905–913
- Bezer M, Kucukdurmaz F, Aydin N, Kocaoglu B, Guven O (2005) Tuberculous spondylitis of the lumbosacral region: longterm follow-up of patients treated by chemotherapy, transpedicular drainage, posterior instrumentation, and fusion. *J Spinal Disord Tech* 18:425–429
- Jain AK, Aggarwal A, Mehrotra G (1999) Correlation of canal encroachment with neurological deficit in tuberculosis of the spine. *Int Orthop* 23:85–86
- Pun WK, Chow SP, Luk KD, Cheng CL, Hsu LC, Leong JC (1990) Tuberculosis of the lumbosacral junction. Long-term follow-up of 26 cases. *J Bone Joint Surg Br* 72:675–678
- Bhojraj S, Nene A (2002) Lumbar and lumbosacral tuberculous spondylodiscitis

in adults. Redefining the indications for surgery.

J Bone Joint Surg Br 84:530–534

9. Rajasekaran S (2001) The natural history of post-tubercular kyphosis in children. Radiological signs which predict late increase in deformity. *J Bone Joint Surg Br* 83:954–962

10. Farfan HF (1978) The biomechanical advantage of lordosis and hip extension for upright activity. Man as compared with other anthropoids. *Spine (Phila Pa 1976)* 3:336–342

11. Yilmaz C, Selek HY, Gurkan I, Erdemli B, Korkusuz Z (1999) Anterior instrumentation for the treatment of spinal tuberculosis. *J Bone Joint Surg Am* 81:1261–1267

12. Christodoulou AG, Givissis P, Karataglis D, Symeonidis PD, Pournaras J (2006) Treatment of tuberculous spondylitis with anterior stabilization and titanium cage. *Clin Orthop Relat Res* 444:60–65

13. Jin D, Qu D, Chen J, Zhang H (2004) One-stage anterior interbody autografting and instrumentation in primary surgical management of thoracolumbar spinal tuberculosis. *Eur Spine J* 13:114–121

14. Lee SH, Sung JK, Park YM (2006) Single-stage transpedicular decompression and posterior instrumentation in treatment of thoracic and thoracolumbar spinal tuberculosis: a retrospective case series. *J Spinal Disord Tech* 19:595–602

15. Guzey FK, Emel E, Bas NS, Hacisalihoglu S, Seyithanoglu MH, Karacor SE, Ozkan N, Alatas I, Sel B (2005) Thoracic and lumbar tuberculous spondylitis treated by posterior debridement, graft placement, and instrumentation: a retrospective analysis in 19

cases. *J Neurosurg Spine* 3:450–458

16. Chen WJ, Wu CC, Jung CH, Chen LH, Niu CC, Lai PL (2002) Combined anterior and posterior surgeries in the treatment of spinal tuberculous spondylitis. *Clin Orthop Relat Res* 398:50–59

17. Talu U, Gogus A, Ozturk C, Hamzaoglu A, Domanic U (2006) The role of posterior instrumentation and fusion after anterior radical debridement and fusion in the surgical treatment of spinal tuberculosis: experience of 127 cases. *J Spinal Disord Tech*

19. Rajasekaran S, Soundarapandian S (1989) Progression of kyphosis in tuberculosis of the spine treated by anterior arthrodesis. *J Bone Joint Surg Am* 71:1314–1323

20. Korkusuz F, Islam C, Korkusuz Z (1997) Prevention of postoperative late kyphosis in Pott's disease by anterior decompression and intervertebral grafting. *World J Surg* 21:524–528

21. Tulu U, Gogus A, Ozturk C, Hamzaoglu A, Domanic U. The role of posterior instrumentation and fusion after anterior radical debridement and fusion in the surgical treatment of spinal tuberculosis: experience of 127 cases. *J Spinal Disord Tech* 2006;19(8):554-59.

22. Rajasekaran S, Soundarapandian S. Progression of kyphosis in tuberculosis of the spine treated by anterior arthrodesis. *J Bone Joint Surg* 1989;71-A:1314-23.

23. Benli IT, Acaroglu E, Akalin S, Kis M, Duman E, Un A. Anterior radical debridement and anterior instrumentation in tuberculosis spondylitis. *Eur Spine J* 2003;12(2):224-34.

24. Oga M, Arizono T, Takasita M, Sugioka Y. Evaluation of the risk of instrumentation as a foreign body in spinal tuberculosis. Clinical and biologic study. *Spine* 1993;18(13):1890-94.

25. Zhao J, Lian XF, Hou TS, Ma H, Chen ZM. Anterior debridement and bone grafting of spinal tuberculosis with one stage instrumentation anteriorly or posteriorly. *Int Orthop* 2007;31:859-63.