International Journal of Medical Research Professionals
P-ISSN: 2454-6356; E-ISSN: 2454-6364
DOI: 10.21276/ijmrp

Original Research Article.

Assessment of Efficacy of Single Posterior Debridement with Single-Stage Anterior Debridement in the Treatment of Spinal Tuberculosis: A Comparative Study

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ABSTRACT

Background: Spinal tuberculosis (TB) is a commonly encountered extrapulmonary type of the TB. Due to the small volume of the spinal canal and the poor blood supply of the spinal cord, lower extremity weakness or other neurological deficits are liable to occur in patients with severe bone destruction or instability of the spine. Hence; the present study was undertaken for assessing of efficacy of single posterior debridement with single-stage anterior debridement in the treatment of spinal tuberculosis.

Materials & Methods: A total of 40 patients with presence of active spinal TB (without active TB) were enrolled. All the patients were broadly divided into two study groups with 20 patients in each group as follows: Group 1: Patients in which were treated with single posterior debridement, and Group 2: Patients which were treated with single-stage anterior debridement. The American Spinal Injury Association (ASIA) scale was used to evaluate preoperative and postoperative spinal cord injury. For assessing the severity of postoperative pain, Visual analog scale (VAS) scores were used. All the results were recorded in Microsoft excel sheet and were analysed by SPSS software.

Results: Mean age of the patients of group 1 and group 2 was found to be 40.8 and 41.9 years respectively. Mean duration of procedure among patients of group 1 and group 2 was found to be 172.5 minutes and 227.6 minutes respectively. Mean blood loss among the patients of group 1 and group 2 was found to be 823.1 ml and 1183.2 ml respectively. While comparing the mean VAS among the patients of the two study groups, non-significant results were obtained. Non-significant results were obtained while comparing the outcome of the patients according to ASIA scale.

Conclusion: Single posterior debridement could attain comparable therapeutic results as that accomplished with single-stage anterior debridement.

Key words: Spinal, Tuberculosis, Debridement.

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Article History:

Received: 03-11-2019, **Revised:** 29-11-2019, **Accepted:** 14-12-2019

Access this article online	
Website: www.ijmrp.com	Quick Response code
DOI: 10.21276/ijmrp.2020.6.1.053	

INTRODUCTION

Spinal tuberculosis (TB) is a commonly encountered extrapulmonary type of the TB. In developed nations, most cases of spinal tuberculosis are seen primarily in immigrants from endemic countries. Because the epidemic of human immunodeficiency virus (HIV) infection caused resurgence in all forms of tuberculosis, increased awareness about spinal tuberculosis is necessary. Despite its common occurrence and the high frequency of long-term morbidity, there are no straightforward guidelines for the diagnosis and treatment of spinal tuberculosis. Early diagnosis and prompt treatment is necessary to prevent permanent neurological disability and to minimize spinal deformity.[1,2]

Anatomically the intervertebral disc is an avascular structure and the paradiscal arteries split on either side of the disc and reach the subchondral region of the upper and lower endplates of each disc. This arterial supply of the vertebra favors subchondral bone involvement on either side of the disc, “paradiscal,” which is the most common type observed. The other patterns of involvement are “central,” resulting in vertebral body loss; “posterior,” when posterior appendicular structures are involved; and “non-osseous

abscess" formation.[2-4] Due to the small volume of the spinal canal and the poor blood supply of the spinal cord, lower extremity weakness or other neurological deficits are liable to occur in patients with severe bone destruction or instability of the spine.[5] Hence; the present study was undertaken for assessing of efficacy of single posterior debridement with single-stage anterior debridement in the treatment of spinal tuberculosis.

MATERIALS & METHODS

The present study was conducted for assessing the efficacy of single posterior debridement with single-stage anterior debridement in the treatment of spinal tuberculosis. A total of 40 patients with presence of active spinal TB (without active TB) were enrolled. Ethical approval was obtained from institutional ethical committee and written consent was obtained from all the patients after explaining in detail the entire research protocol. Only those cases of spinal TB were enrolled in which confirmed clinico-radiographic and pathologic diagnosis was established. In the initial phase, conventional anti-TB treatment was started two weeks before operation. All the patients were broadly divided into two study groups with 20 patients in each group as follows:

Group 1: Patients in which were treated with single posterior debridement, and

Group 2: Patients which were treated with single-stage anterior debridement

Among patients of group 1, pedicle screw was inserted followed by temporarily insertion of internal fixation rod. Removal of necrotic intervertebral disc and pathological vertebral body was done followed by washing of the area with large amount of saline. Among patients of group 2, extra pleural or extra peritoneal anterolateral approach was used. The incision was sutured after confirmation of internal fixation. Among patients of both the study groups, removal of the drainage tube was done after one to two days of operative procedure. Prophylactic antibiotics were used for 3 days postoperatively. The American Spinal Injury Association (ASIA) scale was used to evaluate preoperative and postoperative spinal cord injury. For assessing the severity of postoperative pain, Visual analog scale (VAS) scores were used. All the results were recorded in Microsoft excel sheet and were analysed by SPSS software. Chi- square test and student t test were used for evaluation of level of significance.

Table 1: Demographic data

Parameter		Group 1	Group 2
Age group (years)	Less than 30	4	5
	30 to 45	11	10
	More than 45	5	5
Gender	Males	15	13
	Females	5	7

Table 2: Comparison of mean operative time (minutes)

Parameter	Group 1	Group 2
Mean operative time (minutes)	172.5	227.6
SD	23.8	35.7
p- value	0.00 (Significant)	

Graph 1: Comparison of blood loss

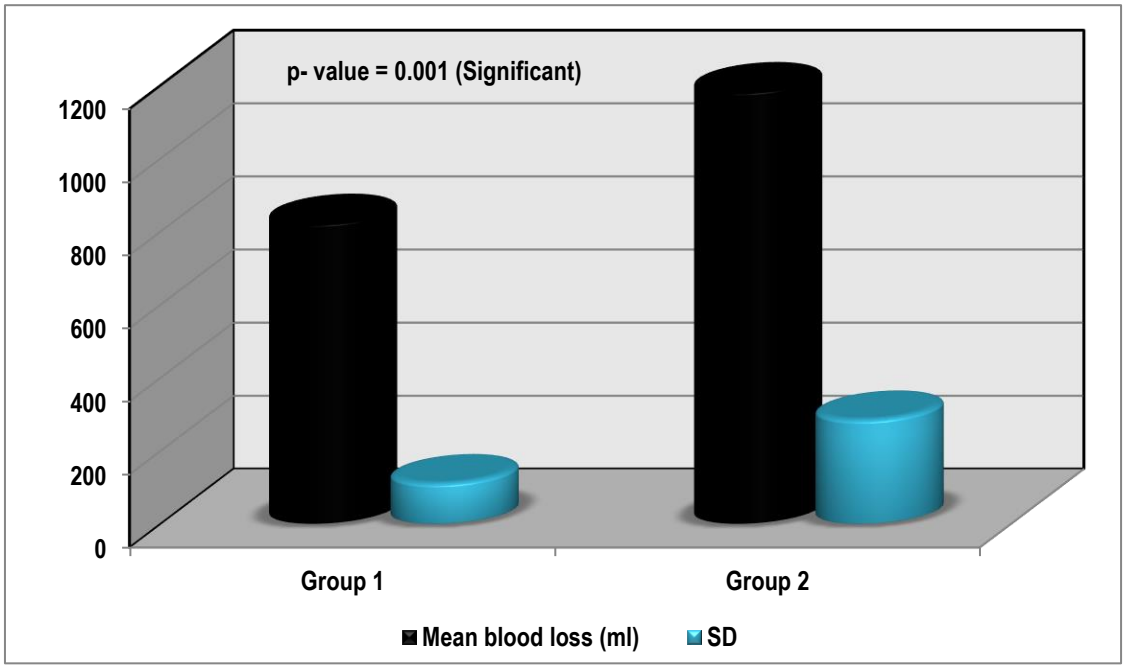

Table 3: Comparison of postoperative parameters

Parameter	Group 1	Group 2	p- value
Time to abscess disappearance postoperatively (months)	8.3	8.2	0.71
Time to bone fusion postoperatively (months)	8.7	8.6	0.46
Mean duration of hospital stay (days)	22.6	25.1	0.01 (Significant)

Table 4: Comparison of mean VAS

Mean VAS	Group 1	Group 2	p- value
Preoperative	6.6	6.4	0.11
6 weeks postoperatively	3.7	3.4	0.38
6 months postoperatively	1.5	1.4	0.27

Table 5: Comparison of ASIA scale

ASIA scale	Group 1	Group 2
Number of patients with preoperative neural deficit	18	19
Number of patients with postoperative recovery	16	17
Percentage of patients with postoperative recovery	88.89	89.47

RESULTS

In the present study, a total of 40 patients were analysed and were broadly divided into two study groups. Mean age of the patients of group 1 and group 2 was found to be 40.8 and 41.9 years respectively. There were 15 males and 5 females in group 1 while they were 13 males and 7 females in group 2. Mean duration of procedure among patients of group 1 and group 2 was found to be 172.5 minutes and 227.6 minutes respectively. Significant results were obtained while comparing the mean duration of procedure among patients of the two study groups. Mean blood loss among the patients of group 1 and group 2 was found to be 823.1 ml and 1183.2 ml respectively. Significant results were obtained by while comparing the mean blood loss among patients of the two study groups. In the present study, mean time to abscess disappearance postoperatively among patients of group 1 and group 2 were found to be 8.3 months and 8.2 months respectively (p- value > 0.05; Non-significant). Mean time to bone fusion postoperatively among the patients of group 1 and group 2 were found to be 8.7 months and 8.6 months respectively (p- value > 0.05; Non-significant). Mean duration of hospital stay among patients of group 1 and group 2 were found to be 22.6 days and 25.1 days respectively (p- value < 0.05; Significant). In the present study, mean VAS among the patients of group 1 at preoperative time, postoperative 6 weeks' time and postoperative 6 months' time was found to be 6.6, 3.7 and 1.5 respectively. Mean VAS among the patients of group 2 at preoperative time, postoperative 6 weeks' time and postoperative 6 months' time was found to be 6.4, 3.4 and 1.4 respectively. While comparing the mean VAS among the patients of the two study groups, non-significant results were obtained. Among the patients of Group 1, 88.89 percent of the patients showed postoperative recovery while among the patients of the group 2, 89.47 percent of the patients showed postoperative recovery. Non-significant results were obtained while comparing the outcome of the patients according to ASIA scale.

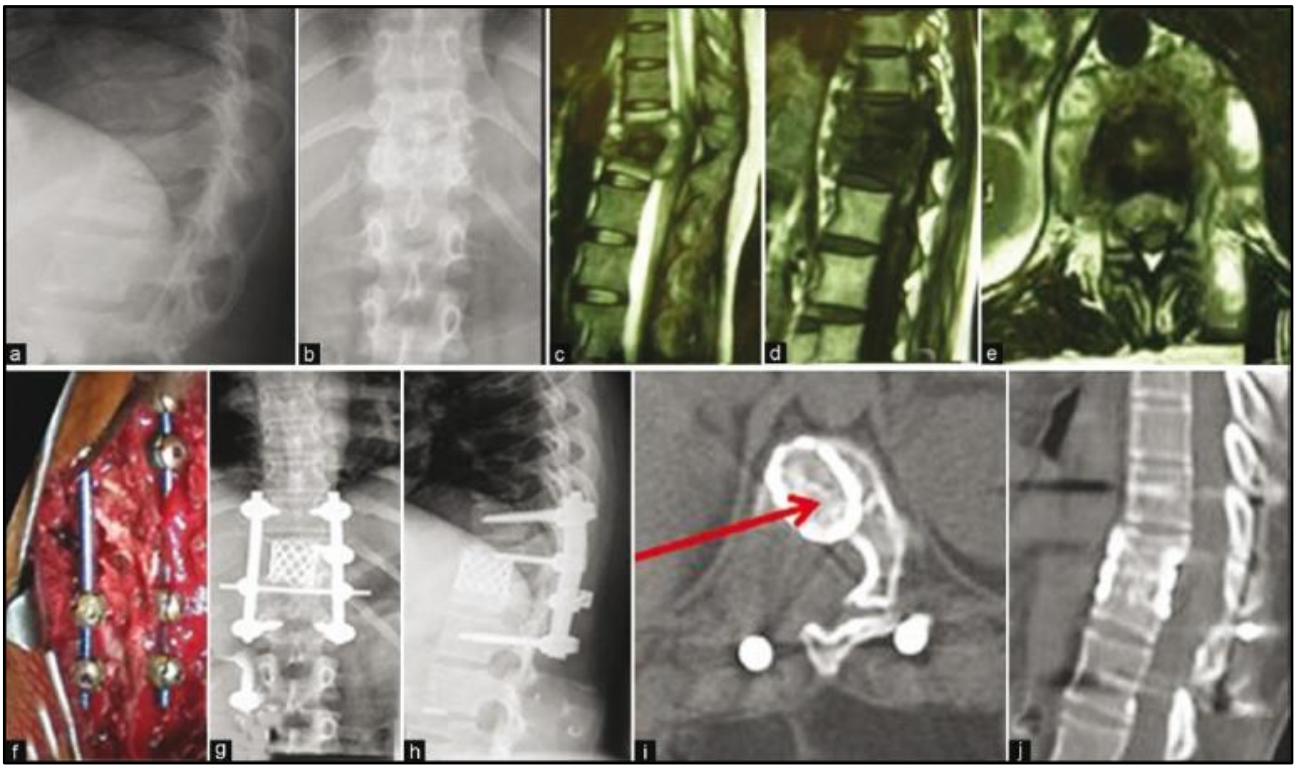

Figure 1: 1. Preoperative AP And Lateral X Ray A and B --43 Yr Male with Tb Spine D11/D12 and MRI Shows Active Tb+Abscess + Cord Compression 2. Treated By Posterior Approach 3. Decompression + Pedicular Screw Fixation + Cage 4. Post Op Xray - Decompression + Kyphosis Correction 5. At 11 Month, Bony Fusion on CT Scan

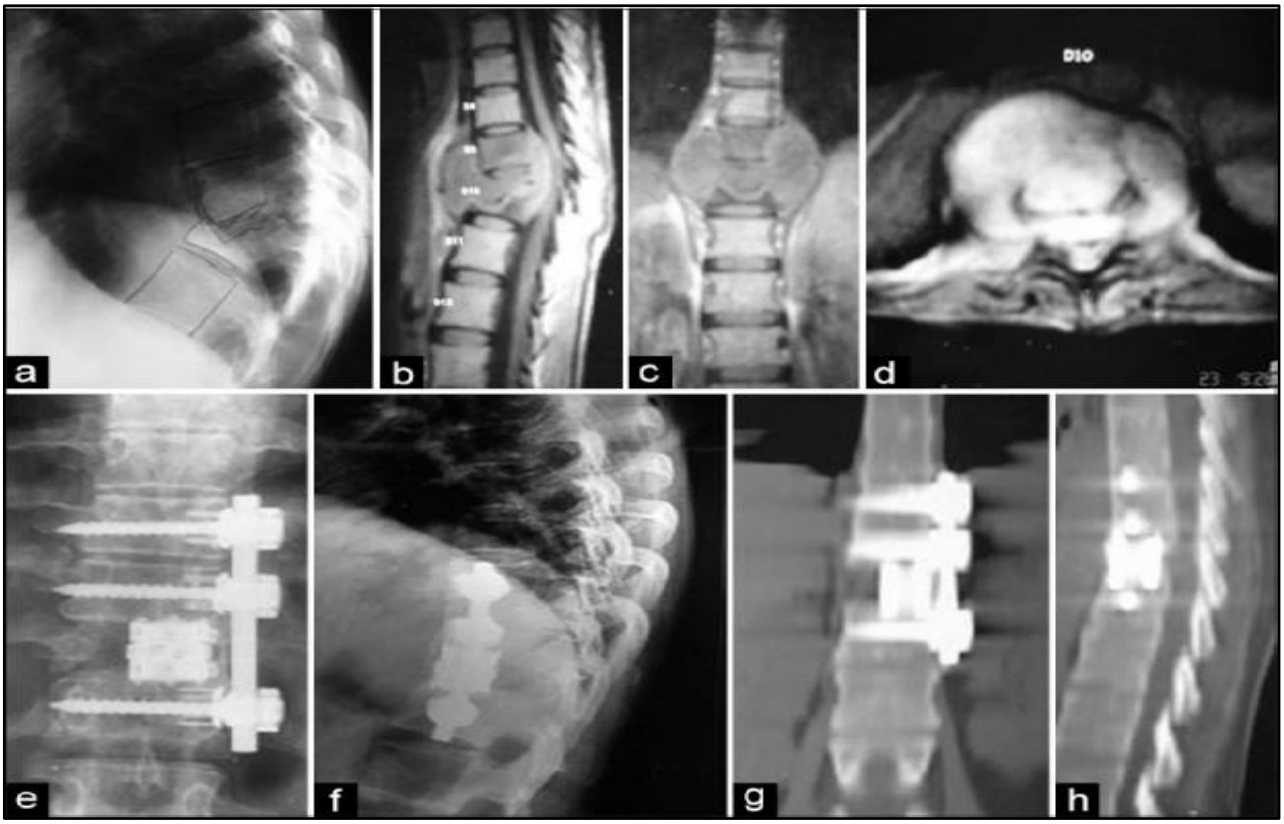

Figure 2: A. Preoperative Lateral Xray A] of 35 Yrs Male with TB Spine D9/D10 Level with Kyphosis Sagittal [B] Coronal [C] Axial [D] 2. MRI Images Show Vertebral Destruction and Abscess Formation + Cord Compression 3. Treated Via Anterior Approach 4. Post Op X Ray E and F Shows Decompression + Reconstruction with Pedicular Screw and Expandable Cage 5. Post Op CT Shows Bony Union at 14 Months [G]

DISCUSSION

The existence of tuberculosis (TB) in ancient times is evident from the fact that it was observed in mummies from Egypt and Peru (9000 BC) and has also been described as "Yakshama" in the oldest Indian medical treatises of Charaka Samhita and Sushruta Samhita, dating back to 1000 and 600 BC, respectively. Skeletal TB (STB) contributes to around 10% of EPTB, and spinal TB has been the most common site of STB, amounting to around half of skeletal EPTB. Thoracolumbar junction remains to be the most affected region of the spinal column followed by lumbar spine and the cervical spine.[6] The management of spinal tuberculosis consists of supportive care, chemotherapy and surgery. Surgical measures include: cold abscess drainage; focal debridement of the tuberculous lesion and/or anterior fusion; decompression surgery including costotransversectomy and anterior radical surgery; a two-stage procedure of posterior instrumentation and anterior radical surgery; a combined procedure of anterior radical surgery and anterior instrumentation; and corrective spinal osteotomy for healed rigid kyphosis. However, surgery alone cannot cure the active disease, and effective antituberculous chemotherapy is necessary. Although the final fusion of the affected vertebral segment is an important part of the treatment, it does not necessarily accompany the spontaneous healing process.[7] Hence; the present study was undertaken for assessing of efficacy of single posterior debridement with single-stage anterior debridement in the treatment of spinal tuberculosis.

In the present study, a total of 40 patients were analysed and were broadly divided into two study groups. Significant results were obtained while comparing the mean duration of procedure among patients of the two study groups. Mean blood loss among the patients of group 1 and group 2 was found to be 823.1 ml and 1183.2 ml respectively. Significant results were obtained by while comparing the mean blood loss among patients of the two study groups. Zhou Y et al compared the clinical efficacy of single posterior debridement, bone grafting and instrumentation with that of single-stage anterior debridement, bone grafting and posterior instrumentation for treatment of adult patients with thoracic and thoracolumbar spinal tuberculosis (TB). They performed a retrospective analysis of 64 adult patients with thoracic and thoracolumbar spinal TB. The mean (±standard deviation) duration of follow-up was 16.8 ± 1.4 months (range, 10–34). Bony fusion was achieved in all the bone grafts with no loosening or breakage of internal fixation. In both of the groups, the visual analog scale (VAS) pain score, ESR and CRP at 6 weeks after operation and at the most recent follow-up were significantly lower than the preoperative level ($p < 0.05$). No significant between-group difference was observed with respect to preoperative kyphosis angle, and postoperative angle correction and angle correction rate ($P > 0.05$). One patient in group A relapsed 20 months after operation, and was successfully treated with debridement using the combined anterior and posterior approach.[8] In the present study, mean time to abscess disappearance postoperatively among patients of group 1 and group 2 were found to be 8.3 months and 8.2 months respectively (p- value > 0.05; Non-significant). Mean time to bone fusion postoperatively among the patients of group 1 and group 2 were found to be 8.7

months and 8.6 months respectively (p- value > 0.05; Non-significant). Mean duration of hospital stay among patients of group 1 and group 2 were found to be 22.6 days and 25.1 days respectively (p- value < 0.05; Significant). Mohanty SP et al evaluated the clinical and radiological outcomes in patients with tuberculosis of the thoracic and thoracolumbar spine, treated by an operative technique in which anterior debridement with posterior instrumentation and global fusion was performed through a single-stage posterior approach. The mean ± SD preoperative, post-operative, and 2-year follow-up kyphotic angle were 49.5 ± 18.4°, 22.6 ± 7.1° and 24.5 ± 7.6°, respectively, and showed significant kyphosis correction (P < 0.01). Sclerosis was seen as early as 3 months in 82(84.5%) patients whereas interbody fusion started appearing at the end of 6 months in 38.14% of patients and peaked at 1 year. All patients recovered neurologically, with no significant loss of kyphosis correction, at final follow-up. The surgical technique described in this study had favourable clinical and radiological outcomes.[9]

In the present study, mean VAS among the patients of group 1 at preoperative time, postoperative 6 weeks' time and postoperative 6 months' time was found to be 6.6, 3.7 and 1.5 respectively. Mean VAS among the patients of group 2 at preoperative time, postoperative 6 weeks' time and postoperative 6 months' time was found to be 6.4, 3.4 and 1.4 respectively. While comparing the mean VAS among the patients of the two study groups, non-significant results were obtained. Among the patients of Group 1, 88.89 percent of the patients showed postoperative recovery while among the patients of the group 2, 89.47 percent of the patients showed postoperative recovery. Non-significant results were obtained while comparing the outcome of the patients according to ASIA scale. Ma et al. reported that excellent neurological result was observed after single stage posterior debridement, bone graft, and internal fixation in patients with neurological impairment due to spinal TB, which was similar to those obtained via anterior decompression. And the posterior approach may be superior to the anterior instrumentation to correct deformity and maintain that correction.[10] With the development of surgical techniques for spinal TB, single posterior debridement, bone grafting and instrumentation can achieve correction of kyphosis deformity and spinal stabilization. Zhang et al. reported good clinical outcomes in patients with thoracic vertebral TB.[11]

CONCLUSION

From the above results, the authors concluded that single posterior debridement could attain comparable therapeutic results as that accomplished with single-stage anterior debridement. However; further studies are recommended.

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Source of Support: Nil. **Conflict of Interest:** None Declared.

Cite this article as: Makhan Lal, Barun Golwara, Subodh Sharma, Anjit Kumar. Assessment of Efficacy of Single Posterior Debridement with Single-Stage Anterior Debridement in the Treatment of Spinal Tuberculosis: A Comparative Study. Int J Med Res Prof. 2020 Jan; 6(1): 221-25.
DOI:10.21276/ijmrp.2020.6.1.053