



CODEN [USA]: IAJ PBB

ISSN: 2349-7750

INDO AMERICAN JOURNAL OF
PHARMACEUTICAL SCIENCES

<http://doi.org/10.5281/zenodo.3567278>

Available online at: <http://www.iajps.com>

Research Article

SAFETY AND EFFECTIVENESS OF TITANIUM MESH CAGE (TMC) INSERTION THROUGH POSTERIOR APPROACH IN SINGLE LEVEL UPPER THORACIC SPINAL TUBERCULOSIS FROM T3 TO T6

¹Malik Liaqat Ali Jalal, ²Muhammad Shaukat Farooq, ³Atta ur Rehman Khan, ⁴Wajahat Hussain, ⁵Zunaira Javed, ⁶Muhammad Imran

¹(MBBS, MCPS Surgery, FCPS Neurosurgery), Email: liaqatjalal786@gmail.com, Assistant Professor (Neurosurgery), DG Khan Medical College, Dera Ghazi Khan

²(FCPS Neurosurgery), Email: drshaukat80@gmail.com, Senior Registrar (Neurosurgery), DG Khan Medical College, Dera Ghazi Khan

³(FCPS Neurosurgery), Email: attakhan94@gmail.com, Senior Registrar (Neurosurgery), DG Khan Medical College, Dera Ghazi Khan

⁴(MBBS, MPH, FCPS Community Medicine), Email: wajahat.shah98@yahoo.com, Assistant Professor, Quaid e Azam Medical College, Bahawalpur

⁵(MBBS), Women Medical Officer, Bahawal Victoria Hospital, Bahawalpur

⁶(B.Sc Hons. Emergency and Intensive Care, MSPH), Email: imranmerani247@gmail.com, Emergency Medical Technologist, DHQ Hospital, Layyah

Article Received: October 2019 **Accepted:** November 2019 **Published:** December 2019

Abstract:

Introduction: The standard anterior approach for cage fixation in upper thoracic spine is more aggressive and less familiar. Moreover in upper thoracic spine T3 to T5 this approach for cage fixation is quite complicated because of limited space for cage placement due to presence of heart and major vessels. However cage insertion through posterior approach is simple with lesser complications, decreased duration of surgery and shorter hospital stay. Furthermore the neurosurgeons are more familiar with posterior approaches in spine. The aim of study was to determine the safety and effectiveness of posterior cage insertion in upper thoracic spine

Methods: This study was conducted at neurosurgery department, Ghazi Medical College, Dera Ghazi Khan. Eight cases of thoracic spinal tuberculosis from T3 to T5 level were enrolled in this study in which only single level was involved. These patients underwent decompression and cage insertion through posterior approach. All eight patients had neurologic deficits in the form of weakness of lower limbs, sphincteric disturbances and back pain. All patients were followed 3 monthly for one year. The efficacy of procedure was assessed by the neurological status of lower limbs, decrease in backache and reduction in erythrocyte sedimentation rate (ESR). Antituberculous treatment was given to all patients for one year.

Results: Average duration of surgery was two and half hours. All patients improved neurologically as assessed by Frankel grading and spasticity in lower limbs. No dislodgement of cage was noted during followup period. There was no wound infection and ESR reduction was evident in all cases

Conclusion: The use of posterior approach for cage insertion in single level upper thoracic spinal tuberculosis is safe, effective and can be used as an alternative to anterior and / or anterolateral approach especially in t3 to t6.

Key Words: Thoracic, spine, tuberculosis, cage insertion

Corresponding author:**Malik Liaqat Ali Jalal,***(MBBS, MCPS Surgery, FCPS Neurosurgery),**Email: liaqatjalal786@gmail.com, Assistant Professor (Neurosurgery),**DG Khan Medical College, Dera Ghazi Khan*

Please cite this article in press Malik Liaqat Ali Jalal et al., The Positive Assets to Review the Improvement and Its Neuronal Focus Were Largely Maintained by Rodents., Indo Am. J. P. Sci, 2019; 06(12).

INTRODUCTION:

Tuberculosis has become increasingly widespread in our country (1,2). Bone and Joint tuberculosis (BJTB) constitutes about 10% of total extra-pulmonary TB cases(3), and spinal tuberculosis is known as the most commonly infected site among skeletal tuberculosis (about 44%) (4). The intervertebral disc and the end plates of the adjacent superior and inferior vertebral bodies are often involved in spinal tuberculosis, and their severe destruction can result in kyphotic deformity and even paraplegia (5). Various studies have shown that the majority (82- 95%) of spinal tuberculosis patients obtain good clinical outcome after receiving current chemotherapy.

Surgical intervention is required if the patients suffer from neurologic deficit, big abscess formation, persistent or recurrent infection, severe pain, local kyphosis, and segmental instability (1,2,5-7). Surgical intervention has become an important way of treating serious spinal tuberculosis, and the anterior-posterior approach is known as the gold standard for surgery, but limited by severe trauma, great blood loss, and high risk (2). Many studies have revealed that posterior approach is able to achieve good clinical outcome when treating spinal tuberculosis (1, 2,6,8,9). Vertebral height demands reconstruction after surgical debridement, but it is still elusive to select appropriate bone-grafting materials to restore vertebral height (1,10-13).

The standard anterior approach for cage fixation in upper thoracic spine is more aggressive and less familiar. Moreover in upper thoracic spine T3 to T5 this approach for cage fixation is quite complicated because of limited space for cage placement due to presence of heart and major vessels. However cage insertion through posterior approach is simple with lesser complications, decreased duration of surgery and shorter hospital stay. Furthermore the neurosurgeons are more familiar with posterior approaches in spine. The aim of study was to

determine the safety and effectiveness of posterior cage insertion in upper thoracic spine.

OBJECTIVE:

To determine the safety and effectiveness of titanium mesh cage (TMC) insertion through posterior approach in single level upper thoracic spinal tuberculosis from t3 to t6.

MATERIALS AND METHODS:**Study design:** Descriptive prospective**Setting:** Department of neurosurgery Ghazi Khan Medical College & Hospital Dera Ghazi Khan

Duration: One year April 2018 to March 2019 All patients with spastic paraparesis were admitted through out patient department (OPD). History physical examination, Magnetic Resonance Imaging (MRI) thoracic spine was obtained along with Erythrocyte sedimentation rate (ESR). Patients having spinal tuberculosis with spinal cord compression involving single level from T3 to T6 were included in this study. Spasticity was graded by Ashworth's grading system. Neurology of lower limbs was assessed by Frankel grading system. Chest X-ray was done to rule out pulmonary tuberculosis. Erythrocyte Sedimentation Rate (ESR) was obtained on each visit during follow-up period of one year .Informed consent was obtained from all patients and study was approved by ethical committee.

Sampling technique: Non-probability consecutive**Inclusion criteria :**

T3 –T6 thoracic spinal tuberculosis with paraparesis

- Severe end plate destruction with local kyphosis
- Patients with extradural cord compression from T3 to T6
- Age 15 to 70 years
- Intractable pain

Exclusion criteria:

Patients with Frankel grade A for more than one week. Patients less than 15 years & more than 70 years of age. Patients infected with HIV.

Data analysis :

Date was assessed by spss statistical version . P-value <0.5 was taken as significant.

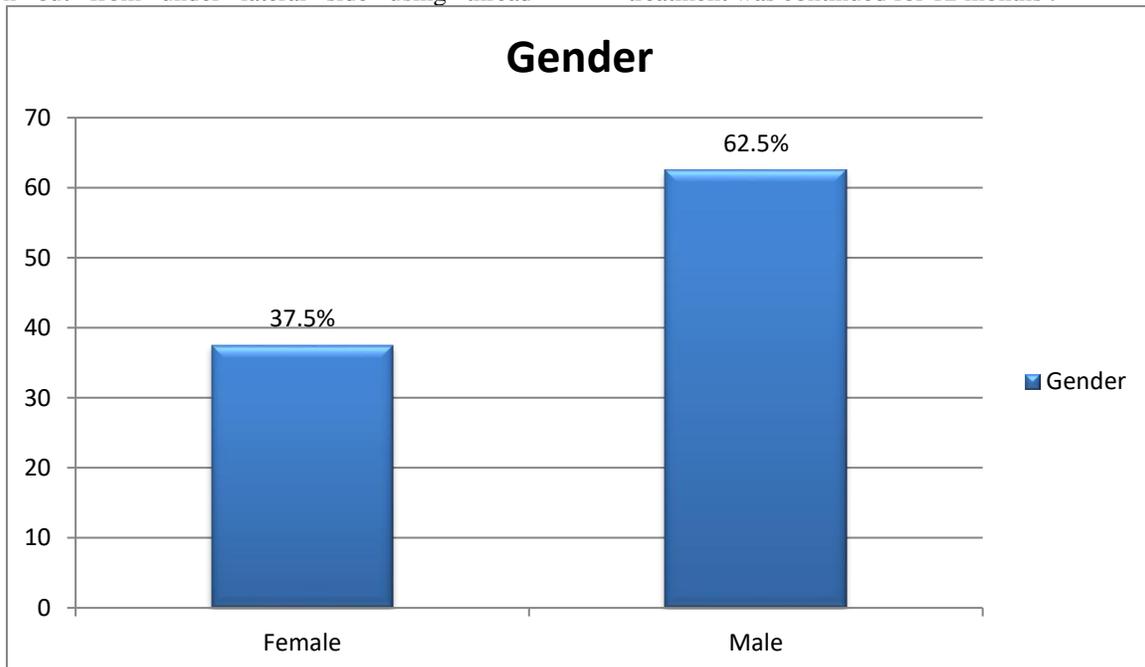
Operative technique:

After written informed consent; fitness for General anaesthesia (G/A) was obtained. After G/A, patient was laid down in prone position with boosters under chest and iliac crests making abdomen free from compression. Appropriate padding of pressure point was done with neck held in neutral position. Incision was marked with the help of image intensifier or pre-operative marker x-ray. Two levels above and below the involved level were included in the incision and same was done in case of gibbus if present. Paraspinal muscles were separated Subperiosteally. Dissection was extended far laterally upto the full exposure of rib heads on both sides. Laminectomy of involved level was done. Rib heads at involved level were excised . On the side greater epidural collection costo-vertebral junction were excised till the visibility of pedicels and nerve roots on both sides. Nerve root of the side with more collection was transected attaching a thread of silk 2/0 with its sleeve. Intervertebral discs above and below the involved level were excised. Caseous material along with sequestered bone fragments were taken out from under lateral side using thread

attached with sacrificed nerve root as a sling for gentle retraction of cord dura. Debridement and decompression at involved level was done from lateral and anterior side of dura exposing the vertebral bodies and end plates above and below. Titanium mesh cage of appropriate size was placed and snugly fitted in the preformed space after filling it with bone chips. Cage position was adjusted and confirmed using per-operative image intensifier. Drain placed and wound closed in layers. Patients were assessed immediately post-operatively especially the status of lower limbs. Patients were followed fortnightly for first three months and then monthly for next 9 months.

RESULTS:

There were 8 patients included in this study. Mean age was 38.5 years. 3(37.5%) were females and 5 (62.5%) were males. Two (25%) patients were paraplegic. All (100%) patients had gibbus on back. All (100%) patients had ESR more than 50 and three (37.5%) patients were having pulmonary tuberculosis along with spinal TB. 6 patients (75%) attained full neurological recovery of Frankel grade E. NO patient was received with cage dislodgement during follow-up. No patient developed wound infection. No mortality occurred in our study. Anti tuberculous treatment was continued for 12 months .



Average duration of surgery was two and half hours. All patients improved neurologically as assessed by Frankel grading and spasticity in lower limbs. No dislodgement of cage was noted during followup period. There was no wound infection and ESR reduction was evident in all cases.

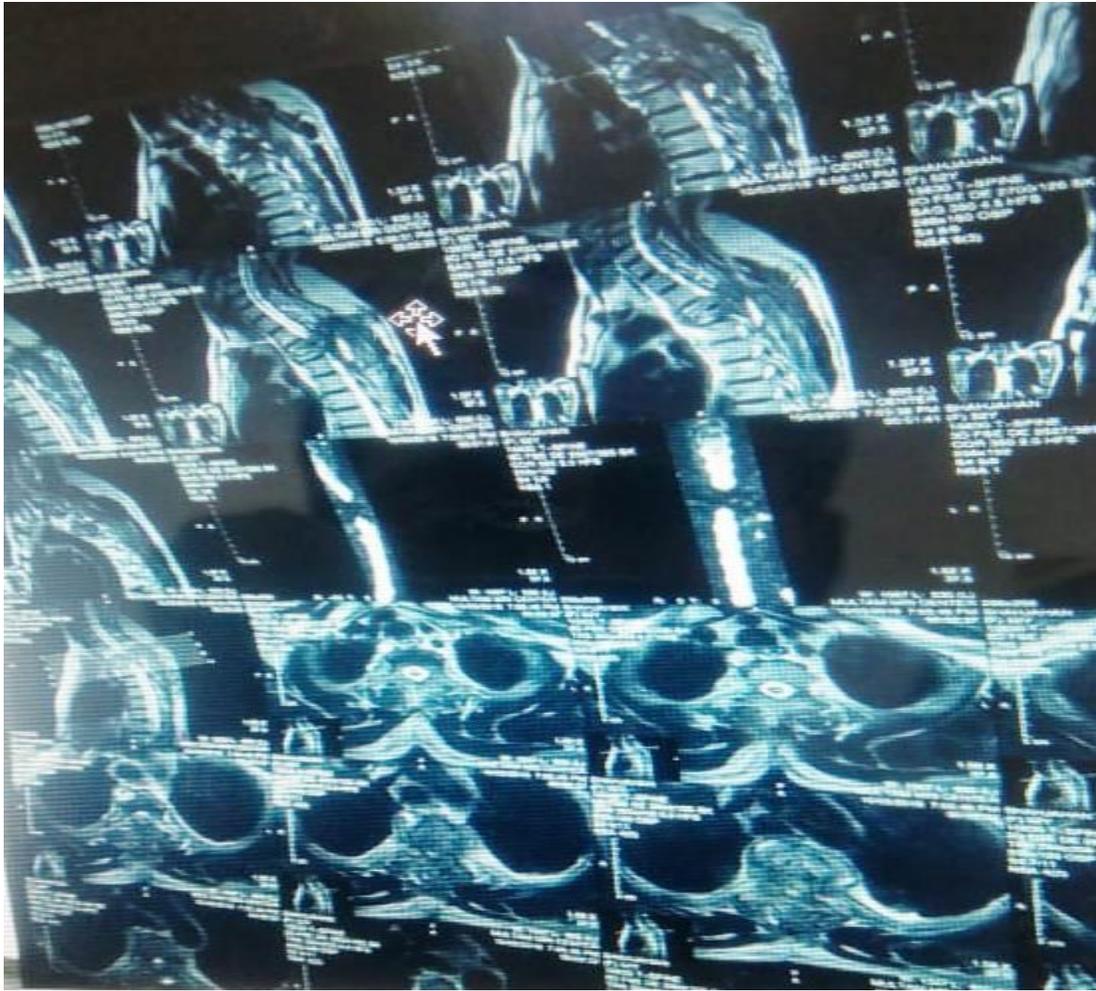


Fig. Pre-Operative MRI Thoracic spine.

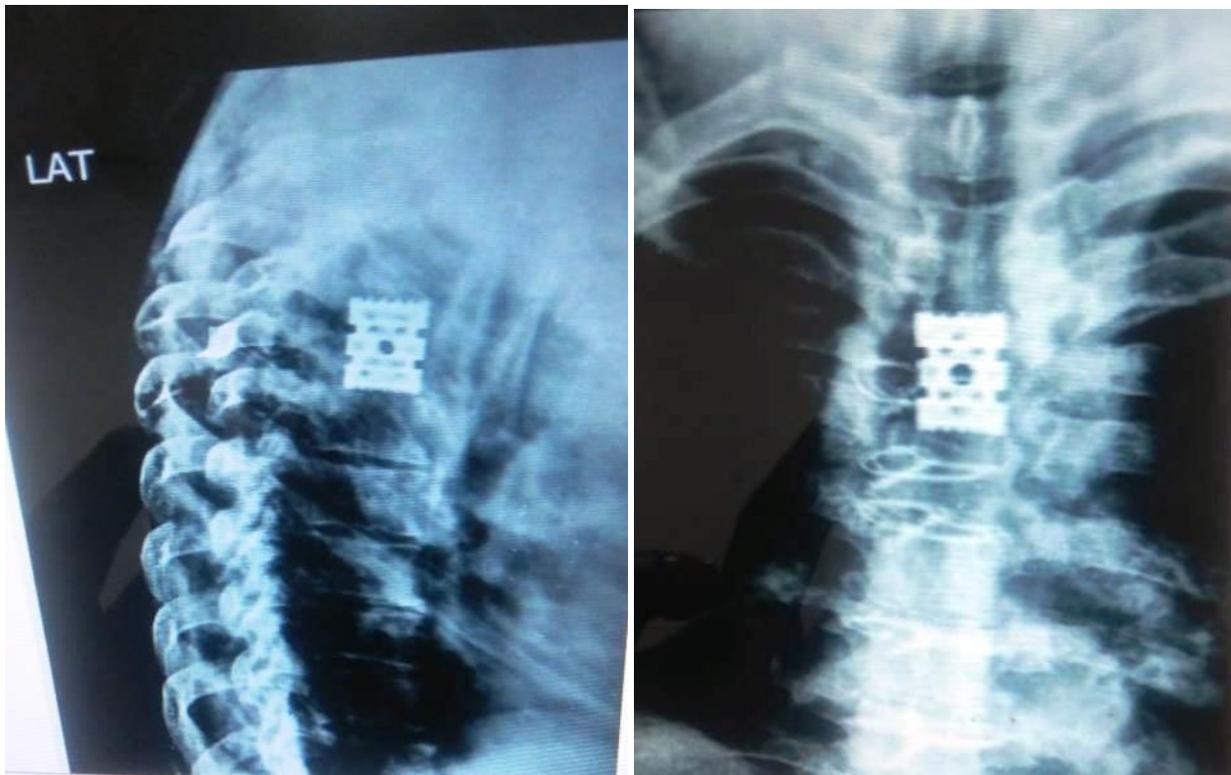


Fig. 2 X-Ray Post-Operative Thoracic Spine Lateral and AP view.

DISCUSSION:

All (100%) patients had gibbus on back. All (100%) patients had ESR more than 50 and three (37.5%) patients were having pulmonary tuberculosis along with spinal TB. Similar studies showed that preoperative managements are very important for perioperative period care. The ESR and CRP are of a high level, which represent that the tuberculosis bacillus are active and TB toxicity symptoms are serious. ESR and CRP can't return to normal within 2 ± 4 weeks after chemotherapy, because of abscesses persisting, but TB toxicity symptoms may be relieved. When ESR decreased below 40 ± 80 mm/h or returned to normal, and CRP was progressively decreased (14,15,16,17), the surgery was recommended. In addition, if the patients encountered neural function aggravation, defecation function disturbance, and paraplegia, the surgical intervention should be performed immediately.

75% attained full neurological recovery of Frankel grade E. NO patient was received with cage dislodgement during follow-up. Similar results found in recently, many studies report that titanium mesh cages showed an important potential in reliable spinal reconstruction, high bone fusion, sufficient sagittal profile maintenance and low implant-related problems (6,10, 18, 19). In this research, the single-segment titanium mesh group and autogenous iliac

bone group achieved solid bone fusion, and neurological function in all patients was obviously improved after surgery apart from 1 case in group B1 who was rated as grade D at the final follow-up. Cobb angle loss and intervertebral height loss in group A1 were less when compared with that in group B1. Our results were consistent with previously published results (2, 5, 18). On the one hand, titanium mesh cages allowed tailored design of shape corresponding to individual bone defects. Titanium mesh cages was filled with resected cancellous bone, which consisted of excised vertebral lamina and articular process, and the donor site complications were avoided. And its insertion to the resection site provided a large interbody \bar{D} bone interface beneficial to improve spinal stability. Posterior instrumentation and titanium mesh cages were used in our patients to enforce operative segments stability, induce deformity correction and maintenance, bone fusion and prevention of bone resorption. Cobb angle loss and intervertebral height loss using autogenous iliac bone graft were revealed to be greater than that using titanium mesh cages, which may be mediated by bone resorption. In the current study, solid bony fusion, good clinical outcomes as well as improvement of neurologic function were achieved in single-segment titanium mesh group and autogenous iliac bone group, and a

small loss of kyphosis and intervertebral height correction was acceptable (7).

CONCLUSION:

The use of posterior approach for cage insertion in single level upper thoracic spinal tuberculosis is safe, effective and can be used as an alternative to anterior and / or anterolateral approach especially in T3 to T6.

REFERENCES:

- Zeng H, Zhang P, Shen X, Luo C, Xu Z, Zhang Y, et al. One-stage posterior-only approach in surgical treatment of single-segment thoracic spinal tuberculosis with neurological deficits in adults: a retrospective study of 34 cases. *BMC Musculoskelet Disord.* 2015; 16(186).
- Zhang HQ, Li JS, Zhao SS, Shao YX, Liu SH, Gao Q, et al. Surgical management for thoracic spinal tuberculosis in the elderly: posterior only versus combined posterior and anterior approaches. *Arch Orthop Trauma Surg.* 2012; 132(12):1717±23. <https://doi.org/10.1007/s00402-012-1618-0> PMID:23053192
- Chen ST., Zhao LP, Dong WJ, Gu YT, Li YX, Dong LL, et al. The Clinical Features and Bacteriological Characterizations of Bone and Joint Tuberculosis in China. *Sci Rep.* 2015; 5:11084. <https://doi.org/10.1038/srep11084> PMID: 26053666
- Sandher DS, Al-Jibury M, Paton RW, Ormerod LP. Bone and joint tuberculosis: cases in Blackburn between 1988 and 2005. *J Bone Joint Surg Br.* 2007; 89(10):1379±81. <https://doi.org/10.1302/0301-620X.89B10.18943> PMID: 17957082
- Yin XH, Zhou ZH, Yu HG, Hu XK, Guo Q, Zhang HQ. Comparison between the antero-posterior and posterior only approaches for treating thoracolumbar tuberculosis (T10-L2) with kyphosis in children: a minimum 3-year follow-up. *Childs Nerv Syst.* 2016; 32(1):127±33. <https://doi.org/10.1007/s00381-015-2935-8> PMID: 26499349
- Zhang H, Zeng K, Yin X, Huang J, Tang M, Guo C. Debridement, internal fixation, and reconstruction using titanium mesh for the surgical treatment of thoracic and lumbar spinal tuberculosis via a posteriorly approach: a 4-year follow-up of 28 patients. *J Orthop Surg Res.* 2015; 10(150).
- Tosun B, Erdemir C, Yonga O, Selek O. Surgical treatment of thoracolumbar tuberculosis: a retrospective analysis of autogenous grafting versus expandable cages. *Eur Spine J.* 2014; 23(11):2299±306. <https://doi.org/10.1007/s00586-014-3565-7> PMID: 25205385
- Shen XJ, Liu HZ, Wang GP, Liu XY. Single-stage posterior-only approach treating single-segment thoracic tubercular spondylitis. *Int J Clin Exp Pathol.* 2015; 8(9):11051±9. PMID: 26617823
- Sahoo MM, Mahapatra S, Sethi GC. Posterior-only Approach Surgery for Fixation and Decompression of Thoracolumbar Spinal Tuberculosis. *J Spinal Disord Tech.* 2013; 25:217±23.
- Sundararaj GD, Amritanand R, Venkatesh K, Arockiaraj J. The use of titanium mesh cages in the reconstruction of anterior column defects in active spinal infections: can we rest the crest? *Asian Spine J.* 2011; 5(3):155±61. <https://doi.org/10.4184/asj.2011.5.3.155> PMID: 21892387
- Gong K, Wang Z, Luo Z. Single-stage posterior debridement and transforaminal lumbar interbody fusion with autogenous bone grafting and posterior instrumentation in the surgical management of lumbar tuberculosis. *Arch Orthop Trauma Surg.* 2011; 131(2):217±23. <https://doi.org/10.1007/s00402-010-1138-8> PMID: 20556616
- Korovessis P, Petsinis G, Koureas G, Iliopoulos P, Zacharatos S. Anterior surgery with insertion of titanium mesh cage and posterior instrumented fusion performed sequentially on the same day under one anesthesia for septic spondylitis of thoracolumbar spine: is the use of titanium mesh cages safe? *Spine* 2006; 31(9):1014±9. <https://doi.org/10.1097/01.brs.0000215049.08622.9d> PMID: 16641778
- Ozdemir HM, Us AK, Oğün T. The role of anterior spinal instrumentation and allograft fibula for the treatment of pott disease. *Spine.* 2003; 28(5):474±9. <https://doi.org/10.1097/01.BRS.0000048666.17934.17> PMID: 12616160
- Yin XH, Liu SH, Li JS, Chen Y, Hu XK, Zeng KF, et al. The role of costotransverse radical debridement, fusion and postural drainage in the surgical treatment of multisegmental thoracic spinal tuberculosis: a minimum 5-year follow-up. *Eur Spine J.* 2016; 25(4):1047±55. <https://doi.org/10.1007/s00586-015-4283-5> PMID: 26467341
- Gao Z, Wang M, Zhu W, Zheng G, Meng Y. Tuberculosis of ultralong segmental thoracic and lumbar vertebrae treated by posterior fixation and cleaning of the infection center through a cross-window. *Spine J.* 2015; 15(1):71±8.

<https://doi.org/10.1016/j.spinee.2014.06.025>

PMID: 25011095

16. Shi J, Tang X, Xu Y, Zhou T, Pan X, Lin H, et al. Single-stage internal fixation for thoracolumbar spinal tuberculosis using 4 different surgical approaches. *J Spinal Disord Tech.* 2014; 27(7):E247±57. <https://doi.org/10.1097/BSD.0000000000000100> PMID: 24739228
17. Pang X, Shen X, Wu P, Luo C, Xu Z, Wang X. Thoracolumbar spinal tuberculosis with psoas abscesses treated by one-stage posterior transforaminal lumbar debridement, interbody fusion, posterior instrumentation, and postural drainage. *Arch Orthop Trauma Surg.* 2013; 133(6):765±72. <https://doi.org/10.1007/s00402-013-1722-9> PMID: 23503890
18. Wang B, L G, Liu W, Cheng I. Anterior radical debridement and reconstruction using titanium mesh cage for the surgical treatment of thoracic and thoracolumbar spinal tuberculosis: minimum five-year follow-up. *Turk Neurosurg.* 2011; 21(4):575±81. PMID: 22194119
19. 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±4. PMID: 8235878