



LATERAL EXTRACAVITARY APPROACH FOR DECOMPRESSION AND FIXATION FOR THORACIC SPINE TUBERCULOSIS

Neurosurgery

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ABSTRACT

Background: Spine tuberculosis commonly affects thoracic region. Surgical aim is decompression, stability and deformity correction. Anterior approach allows direct access to the pathology. However, anterior fixation reduces the biomechanical stability of the spine, with less kyphosis correction and loss of correction at the end of treatment. Combined anterior plus posterior procedures were associated with more morbidity. Lateral extracavitary approach surgery is a good alternative, as it leads to adequate decompression, lesser morbidity and good spinal stability. This case series indicates the success of single stage lateral extracavitary approach surgery for decompression and fixation in dorsal spine tuberculosis. **Case Description:** 4 cases of dorsal pott's spine were operated between December 2022 to August 2024. Operative indication was dorsal pott's with instability, severe pain or neurological deficits. All cases underwent single stage surgery LECA with decompression and fixation with continued anti tubercular medications. Cases observed for neurological recovery, improvement in pain and deformity prevention/correction. All patients tolerated the procedure well and showed significant reduction in pain, good neurological recovery and correction of kyphosis which was maintained on follow up. **Conclusion:** A single-stage surgery, LECA with fixation can be a good option for most patients with thoracic spine TB as it leads to adequate decompression, lesser morbidity, less complications, reduced hospitalization and good spinal stability.

KEYWORDS

Thoracic spine tuberculosis, Lateral Extracavitary Approach, spinal stability, ventral decompression, kyphosis correction.

INTRODUCTION:

Thoracic spine is the most prevalent sites of TB spine. Mostly, the infection begins at paradiscal part of the vertebrae. Vertebral body destruction, para-vertebral collections are common.⁽¹⁾ Presentation includes local pain and tenderness, severe pain on loading, constitutional symptoms and neurological deficits. Spinal deformity continues to progress during disease, even after healing, due to biomechanical stress on the weaker spine. Surgery is indicated if the neurological deficit is emerging, not improving or deteriorating. Surgery also used in instability pain. By removing compression, surgery aids in the neurological recovery, healing and bone fusion by increasing vascularity and improving medication delivery to the affected site. Anterior fixation considered most popular approach because it gives direct access and hence provides good decompression. However, it diminishes the stability of the spine, and residual deformity is observed at the end of treatment. Studies have revealed that anterior instrumentation has no effect on the kyphosis, especially on gradually deteriorating kyphosis.⁽²⁾ Some surgeons advised combined anterior approach for decompression and a posterior approach for fixation. By these complete debridement can be done, fusion is increased, infections are minimized and kyphosis is corrected. However this method significantly increases surgical time, blood loss, tissue trauma, perioperative morbidity, and hospital stay.^(3,4) Lateral extracavitary approach (LECA) with fixation leads to adequate decompression and lesser blood loss, less post-op morbidity, shortened hospital stay, good kyphosis correction along with long term maintenance. Therefore we follow LECA with transpedicular fixation as a single stage surgery in thoracic spinal tuberculosis.

Case Descriptions:

Case 1

A 42Y/F presented with back ache, progressive lower limb weakness for 45 days. She was having power grade 2/5 in both lower limbs with increased deep tendon reflexes and grade 4 spasticity. MRI was suggestive of collapsed D7 and D8 Vertebrae with severe cord compression and para-vertebral collection. ATT was started. She underwent LECA for ventral decompression, D6-D9 inter-body cage placement, D5-D10 pedicle screw Fixation. Her axial pain on sitting improved significantly to minimal during stay. Over the time her lower limb power improved to 4+/5 at 3 month and 5/5 at 12 month follow up. Her lower limb spasticity showed gradual improvement and disappeared. Post op X-ray at 3 month and 1 year showed implants in

situ without any worsening of thoracic curvature with good fusion.

Case 2

A 32y/M presented with dorsal back ache, progressive lower limb weakness for 1 month, frequency and urgency in urination and constipation for last 15 days. For last 10 days he had severe axial pain in upper back and he was totally bed ridden. On examination he was having grade 5 spasticity with lower limbs in flexion deformity. MRI was suggestive of D7-D8 spondylodiscitis with collapse, pre and para-vertebral collection with cord compression. ATT was started. Patient underwent LECA for ventral debridement, D6-D9 inter-body cage placement, D5-D10 pedicle screw fixation. He was ventilated till next morning. During stay significant improvement of spasticity, pain on weight bearing and improvement of lower limb power to grade 3/5 was observed. At 3 month follow up visit he was with power 4+/5 and gained bladder bowel control completely. At 1 year follow up he was mobile without any support but DTR's were brisk in lower limbs. Post op X-rays at 3 and 12 month were satisfactory with good fusion and maintained thoracic curvature.

Case 3

58Y/F presented back ache on sitting and standing with radiation to right anterior part of chest for 20 days. On examination there was tenderness at D5 level. She was neurologically intact. MRI was suggestive of D5-D6 vertebral collapse, pre and para-vertebral collection causing cord compression. In view of significant pain, vertebral height loss and cord compression surgical option followed. Patient underwent right LECA for ventral decompression, D4-D7 inter-body cage placement, pedicle screw Fixation. There was significant improvement in pain during stay. ATT started as AFB staining was positive for pus. At 3 month she was mobile without support. Post op X-ray at 3 month showed subsidence of cage into D4 body. At 1 year cage had similar amount of telescoping and stable curvature hence plan is to follow the patient and intervene if indicated.

Case 4

A 27 Y/M, a known case of pulmonary tuberculosis presented with 1 month history of pain in thoracic region. He had progressive asymmetrical weakness both lower limb for last 10 days. Right and left lower limb was power grade 4/5 and 2/5 respectively. MRI was suggestive of D5-D6 vertebral collapse and anterior compression. Patient underwent right LECA for ventral decompression, D4-D7

inter-body cage placement, pedicle screw Fixation. In post operative period axial pain and left lower limb power improved . AT 3 month right and left lower limb power improved to 5/5 and 4+/5 respectively which improved to 5/5 in both lower limbs at 12 month. 3 and 12 month post op x ray suggestive of good fusion with implants in situ and maintained thoracic curvature.

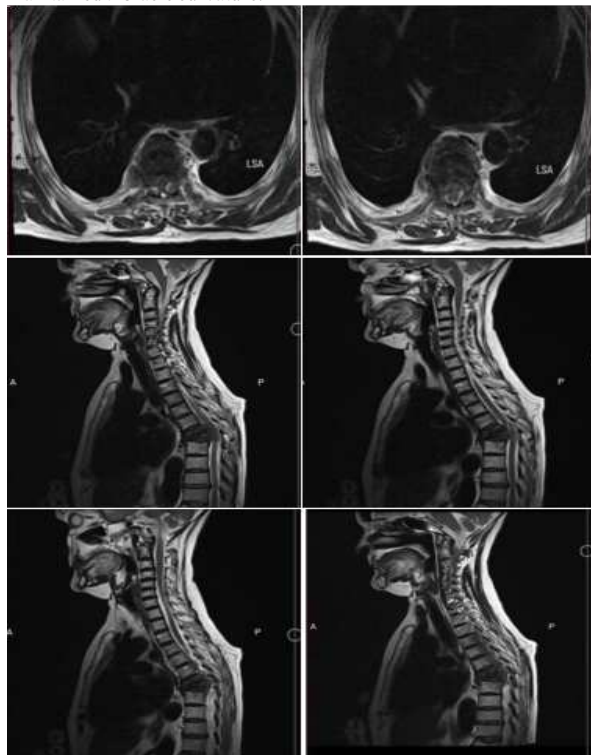


Fig1a MRI T2WI of 32 Y/M showing D7-D8 collapsed vertebra with pre and para vertebral collection with cord compression and Kyphosis Axial and sagittal view

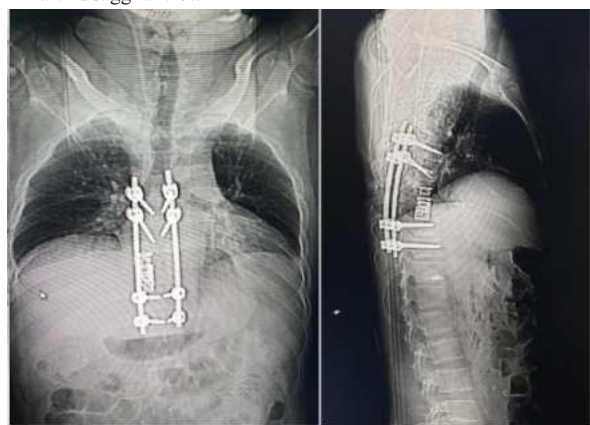


Fig1b Post op image of same patient showing implants in situ with correction of kyphosis and dorsal curvature.

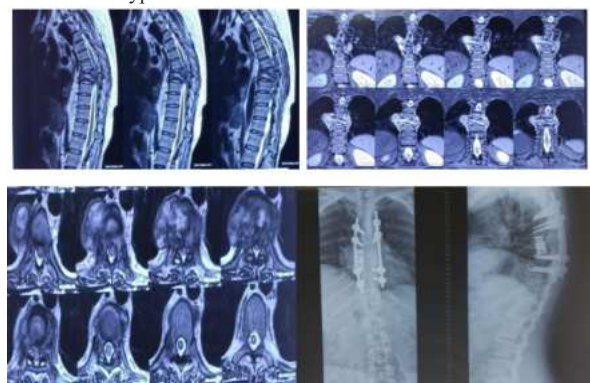


Fig 2 MRI T2WI of 42 Y/F showing D7-D8 collapsed vertebra with

pre and para vertebral collection with cord compression and Kyphosis . Saggital, coronal and Axial views.Xray showing implants in situ with correction of kyphosis and dorsal curvature

DISCUSSION

The origin of the lateral extracavitary approach dates back to 1894, when Menard developed what is now known as the "costotransversectomy" to improve lateral access to the spine for drainage of tubercular abscesses.⁽⁵⁾ In early 20th century, Capener developed the "lateral rachotomy" approach, which transversely divided the erector spinae muscles, improving ventrolateral access to the spine.⁽⁶⁾ Sanford Larson and his team transformed Capener's lateral approach in the 1970s and 1980s.^(7,8) Rather than divide the paraspinous musculature, they mobilized the musculature and retract it medially.⁽⁷⁾ This novel approach, named the lateral extracavitary approach (LECA), allowed for ventrolateral and posterior access to the spinal column. It is unique, as it allows ventral decompression in addition to posterior instrumentation through a single incision.

As TB spine is largely affecting the body and disc, an anterior approach is preferred for decompression and fusion. it offer direct access to ventral spinal pathology with minimal spinal cord manipulation. However, anterior approaches are limited by the morbidity of traversing the thorax and use of chest tubes. Microsurgery can be technically demanding across the depth of thorax and posterior instrumentation requires an additional dorsal procedure.⁽⁹⁾

Posterior approaches via laminectomy or transpedicular provide are less morbid approaches but visualization of ventral pathology is limited, often necessitating cord manipulation. Most authors recommend avoiding direct posterior approach for ventral thoracic pathology, as this risks damage to the spinal cord.^(8,10)

The costotransversectomy approach gives access to ipsilateral ventrolateral pathology extending to, but not across, the midline.⁽¹¹⁾ While transpedicular and costotransversectomy approaches are with technical ease and low morbidity, they do not allow for ventral decompression across the midline or anterior column reconstruction.

The advantage of LECA lies in more lateral trajectory which allows for ventral and across the midline access. This also permits anterior column reconstruction without cord manipulation. This approach has led to excellent neurological outcomes with nearly 75% of patients.^(12,13,7)

Pain respond well to the LECA, with fixation in approximately 85% of patients experiencing meaningful relief.^{12,13} In present study pain steadily and gradually decreased in all cases, most likely due to the stability of by fixation. By immobilizing the segment, the transpedicular fixation has proven to be effective in lowering pain caused by "instability catch" as well as by diminishing inflammation and infection. All patients showed signs of neurological recovery which were gradual and started from post operative period. We observed improvement in kyphosis and achievement of better dorsal curvature, all were maintained on follow up.

Complications rates with the LECA has varied widely leading to large variations (31% to 68%).^{11,14} LECA is uniquely prone to pulmonary complications. In our small series we have encountered with cage subsidence in one patient of advanced age with poor bone quality.

CONCLUSION:

In our experience, the LECA with decompression and transpedicular fixation is an effective method in relieving pain, correcting and preventing kyphosis, and improving neurological status in cases of pott's disease involving dorsal spine. Although the merits of anterior spinal surgery can not be underestimated, the present method is a less drastic and technically demanding with lesser post-operative morbidity, reduced blood loss, early mobilization, decreased hospital stays and reduced financial constrain.

Limitations:

The documented case series is limited by its very small sample size ,retrospective nature and the participation of a single surgeon. Reporting of a single surgeon's experience raises concern about the generalizability of the results.

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