

# Anterior And Posterior Interbody Fusion With Multilevel Fixation For Lumbar Potts Spine: A Novel Approach

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## Abstract

*Spinal tuberculosis, also known as Pott's spine, represents up to 50% of skeletal tuberculosis cases, with a rising prevalence in endemic regions. This case report details a 19-year-old male who presented with progressive back pain, bilateral lower limb weakness, spinal deformity, and loss of bowel and bladder control over an eight-month period. MRI findings revealed destruction of the L2 and L3 vertebral bodies and severe collapse of the L3 vertebra, resulting in kyphoscoliotic deformity. Due to significant neurological impairment and the failure of conservative treatment, surgical intervention was performed. The patient underwent anterior column reconstruction and posterior column fixation, resulting in successful management of the condition. This case highlights the importance of early surgical management with anterolateral and posterior approach in patients with spinal tuberculosis who present with severe neurological deficits and spinal deformity.*

**Keywords:** #lumbar kyphosis, #pedicle screw, #pott's spine, #skeletal tuberculosis, #titanium cage

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## INTRODUCTION

The spinal tuberculosis prevalence is on the increase, particularly in endemic nations. Which represents up to 50 percent of skeletal tuberculosis cases that have been documented [1]. The most common clinical manifestation of spinal tuberculosis is osseous disease involving the vertebral column, also known as Pott's spine. Nonosseous involvement of the spine can also occur [2,3]. In cases of skeletal tuberculosis, there are two types of vertebral involvement: atypical (including the centrum or posterior elements but sparing the intervertebral discs) and typical (paradiscal) [4]. Spinal tuberculosis typically results in the devastation of the intervertebral disc space as well as adjacent vertebral bodies. This causes anterior vertebral wedging, which in turn causes the angular kyphotic deformity, also known as gibbus or knuckle, to occur [1]. With a 66% success rate in correction, thoracolumbar kyphosis deformity can be surgically corrected [5]. It is still worthwhile to investigate whether patients are having severe kyphosis brought on by spinal tuberculosis must undergo surgery. On the other hand, 7.15% of patients with severe scoliosis experienced internal fixation failure [6]. This case report presents a 19 year male with gradual progressive back pain since 8 months with progressive weakness in bilateral lower limb with gradual deformity, along with loss of bowel and bladder control. As per the clinical picture and Magnetic Resonance Imaging (MRI) findings are suggestive of the destruction of L2 & L3 vertebral bodies with the severe collapse of L3 vertebra with kyphoscoliotic deformity. Pott's spine having the active infection required surgical management due to the presence of severe neurologic involvement, the inability of conservative treatment to improve neurologic deficits, and the existence of a deformity in the spine. The patient was managed successfully with anterior column reconstruction with posterior column fixation.

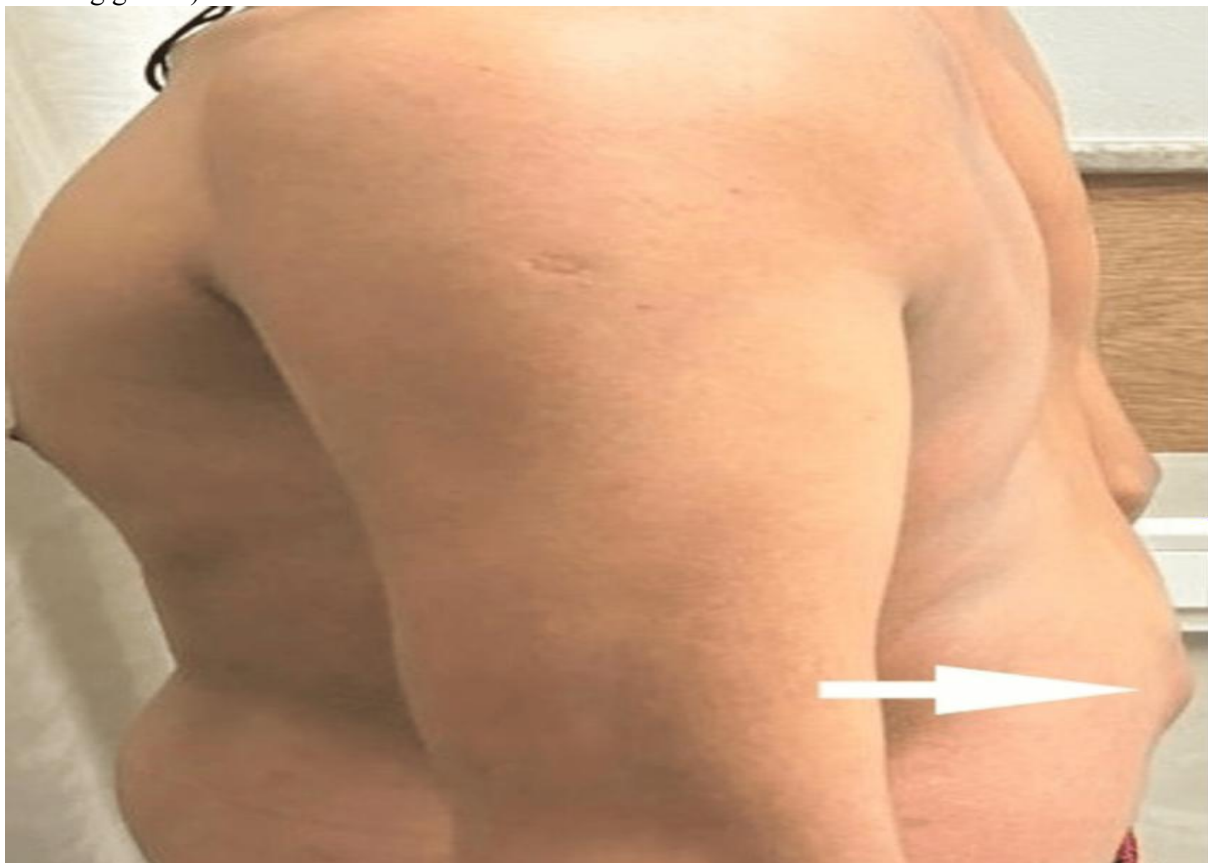
### Case Presentation

A 19-year male presented in out patient department with chief complaints of low back pain for 8 months which was insidious in onset, gradually progressive, non-radiating initially. Later pain started radiating to both lower limbs. The pain was associated with bilateral lower limb weakness so he was not able to stand. Patient also had developed bladder or bowel involvement. Patient was having symptoms of urinary

incontinence and loss of control over anal sphincter. Patient didn't have any history of constitutional symptoms except for a low grade of fever and there was no significant family history.



**Figure 1: Clinical photo of the patient presenting to outpatient department.** Clinical photo of patient when presented in out patient department taken from posterior side showing gibbus (white arrow showing gibbus)



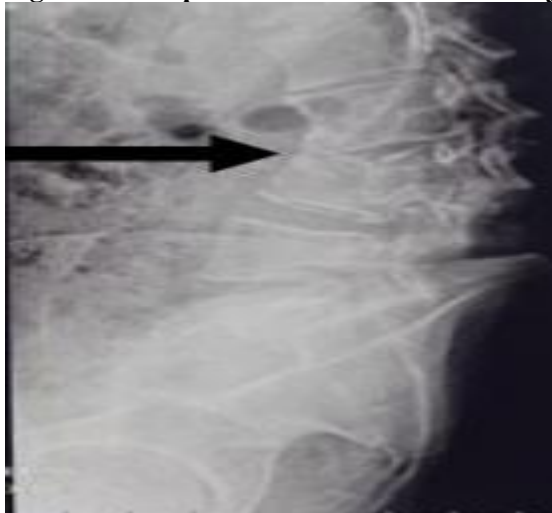
**Figure 2: Clinical Image from lateral view.**

Clinical image showing taken from lateral view showing kyphotic deformity at lumbar spine (white arrow showing Gibbus)

On examination as shown in Figure 1 and Figure 2 on inspection, there was kypho-scoliotic deformity at the lower back. On palpation there was gibbus at lower back. Examinations for his upper limb neurologic function, cranial nerve function, and higher mental function were all normal. Hypotonic paraparesis of both lower limbs with a normal Babinski sign with down-going toes, and diminished deep tendon reflexes (ankle jerk and knee jerk) were noted.



**Figure 3: Pre operative Anterio Posterior x ray view.** Black arrow showing collapse of vertebral body.



**Figure 4: Pre operative x ray of lumbar spine lateral view.** Black arrow showing kyphotic deformity.

X ray images as shown in Figure 3 and Figure 4 revealed the collapse of the L3 vertebral body with kyphotic deformity computerised tomography (CT) was done to check deformity.

Magnetic resonance Imaging (MRI) revealed erosion, and destruction of the L2, and L3 vertebral bodies. A severe collapse of the vertebral body was seen. Severe marrow edema was noted in the L2 and L3 vertebrae. Mild kyphoscoliotic deformity noted at L2-L3 level due to collapse L3 vertebral body. Mild retropulsion of the L3 vertebrae was noted as shown in Figure 5. Large soft tissue thickening and edema (an abscess) were noted in the prevertebral, and bilateral paravertebral regions, extending from L2-L5 levels. A large abscess was noted involving the bilateral psoas muscles. Psoas abscess measures approx 11.5x4.5x4.1cm on the right side and 9 x 4 x 2.5 cm on the left side. Posterior extension of the abscess was noted in the anterior epidural space at L2-L3, L3-L4 levels and causing central canal stenosis and narrowing of the bilateral neural foramina at these levels causing compression over bilateral traversing and exiting nerves.



**Figure 5: Pre operative whole spine saggital MR.** Black arrow showing L3 vertebral body collapse; white arrow showing abscess

A CT guided aspiration/biopsy was taken from L3 which was sent to the microbiology lab for detection of causative organism for discitis and abscess formation. The report confirmed the Rifampicin sensitive Tubercular bacilli. On the basis of the microbiology and imaging investigations patient which has been started on Isoniazid, Rifampicin, Ethambutol, Pyrazinamide (Antitubercular drug therapy) as per Directly observed therapy short course (DOTS) preoperatively.



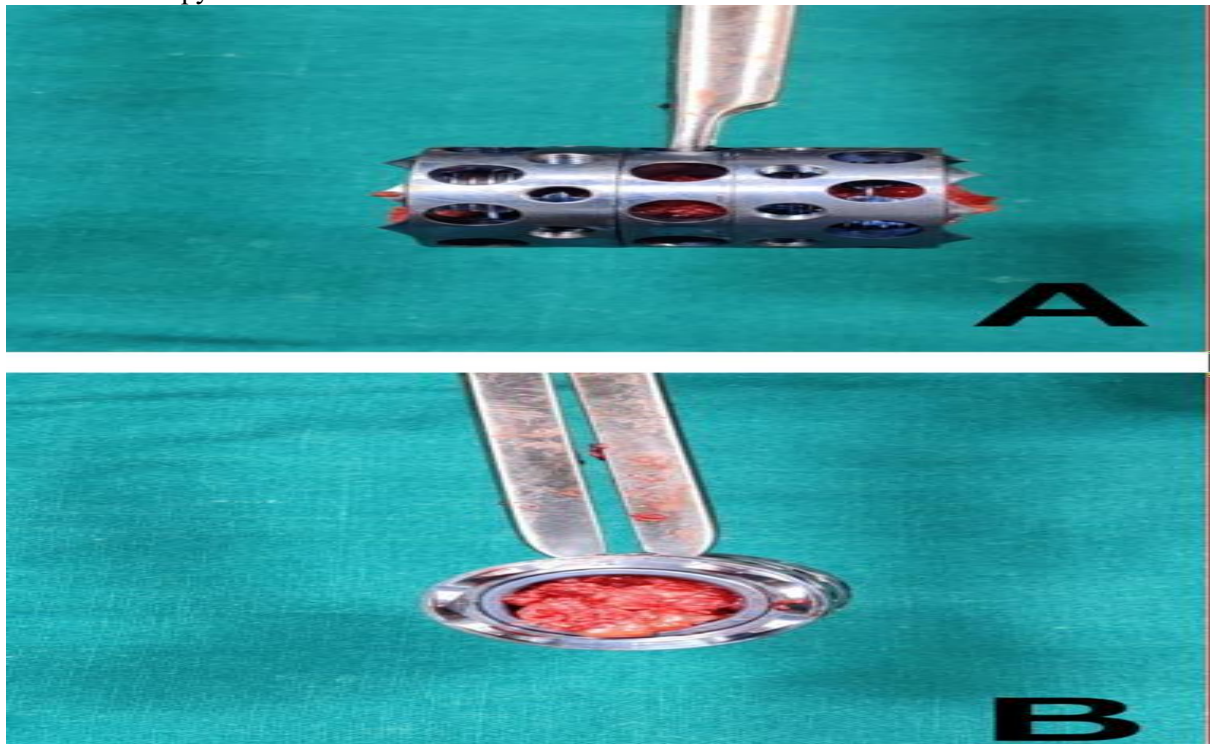
**Figure 6: Showing Skin Marking For Incision For Antero Lateral Approach of Spine.** Skin Incision For Antero Lateral Approach of Spine taken after scrubbing painting and draping.

A two-staged procedure was planned in a single sitting for both anterior column reconstruction and posterior column Fixation. In the first stage anterior column reconstruction was done, the patient was taken in the right lateral position, horizontal 6-7 cm long incision on the left lateral side 3 cm above the iliac crest taken as showing in Figure 6. After superficial dissection, external and internal oblique muscles bluntly dissected. Psoas muscle retracted anteriorly to enter the retroperitoneal cavity. Spinal column lateral border at the level of L3 - L4 exposed. Abscess collection was seen and drained out. Completely collapsed and necroses L3 and superior half of L4 vertebra removed. Edges of the inferior end plate of L2 and part of L4 were freshened.

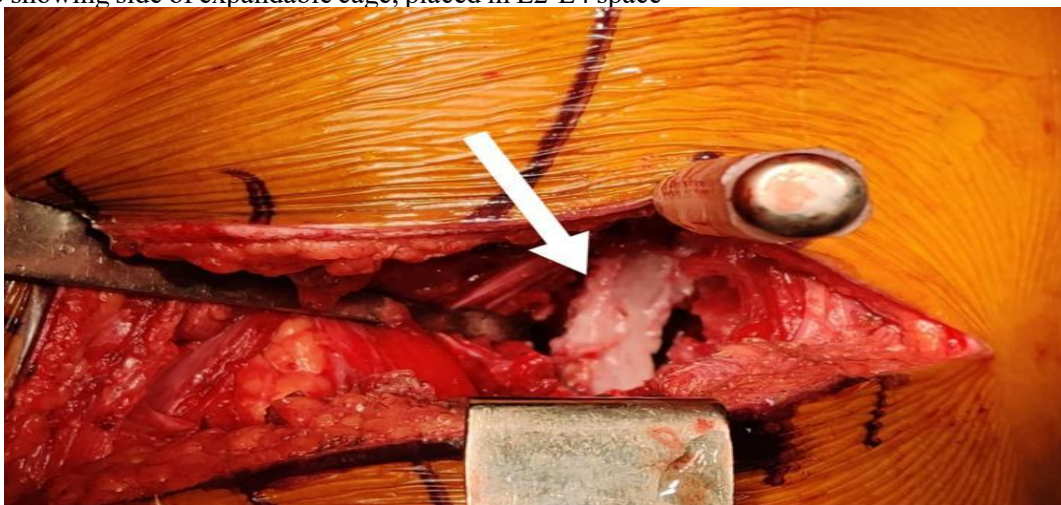


Reconstruction of anterior column done with 20 mm Expandable cage impacted with a cancellous bone graft from iliac crest in L2-L4 space as described in Figure 7 and Figure 9. Reconstruction enforced with tricortical iliac crest strut graft as shown in Figure 8. A thorough wash was given and drain no. 16 was secured. And closure is done in layers. For the second staged procedure patient shifted to the prone position. Using the posterior approach complete decompression of the spinal cord is achieved with laminectomy achieved at the level of neurological compression. The posterior column is fixed using 6.5mm pedicle screws of various lengths and rods from D12-S1.

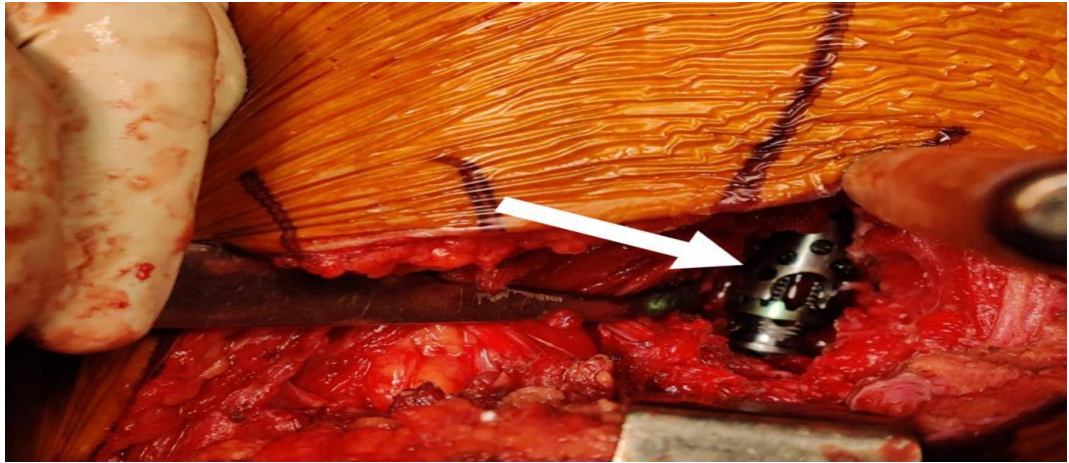
Postoperatively Anti Tubercular therapy continued. The patient was mobilized after the removal of a drain on 3rd postoperative day with the support of Taylor's brace and wheelchair. Stitches were removed on postoperative day L4. Follow-up was taken every 15 days till 3 months using American Spinal Injury Association (ASIA) Impairment Scale. The patient regained complete sensory-motor and bowel bladder functions over the period of 3 months. Fusion of bone graft confirmed with 3d CT scan of lumbar spine (Figure 12). The patient was mobilized without support after 3 months as as shown in Figure 13. Anti-tubercular therapy continued.



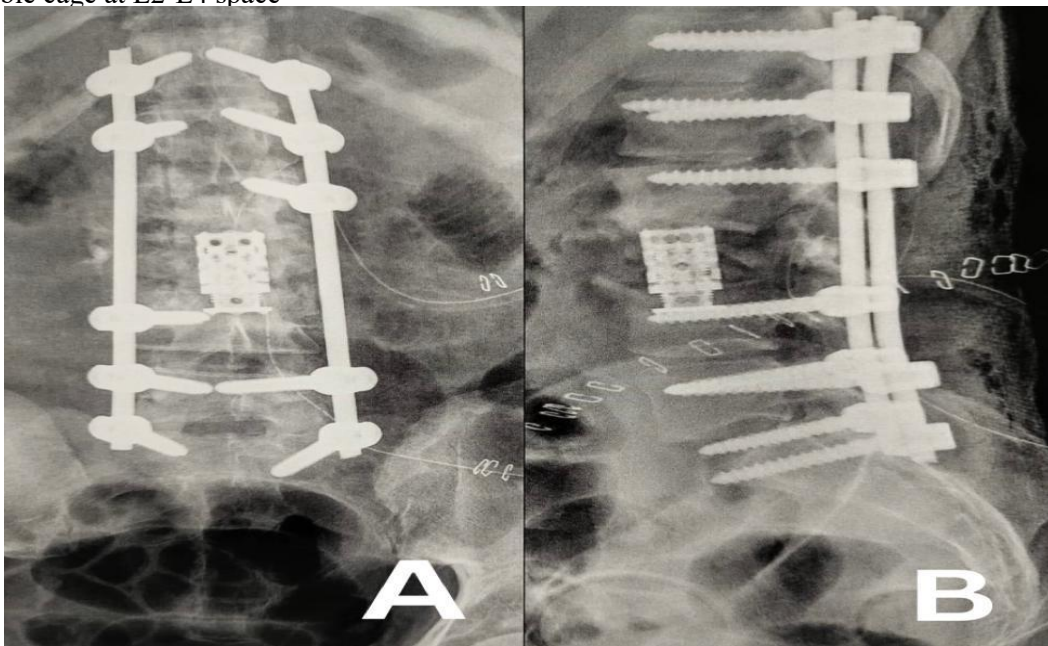
**Figure 7: Expandable cage with tricortical iliac graft.** Figure A showing front view of expandable cage; Figure B showing side of expandable cage, placed in L2-L4 space



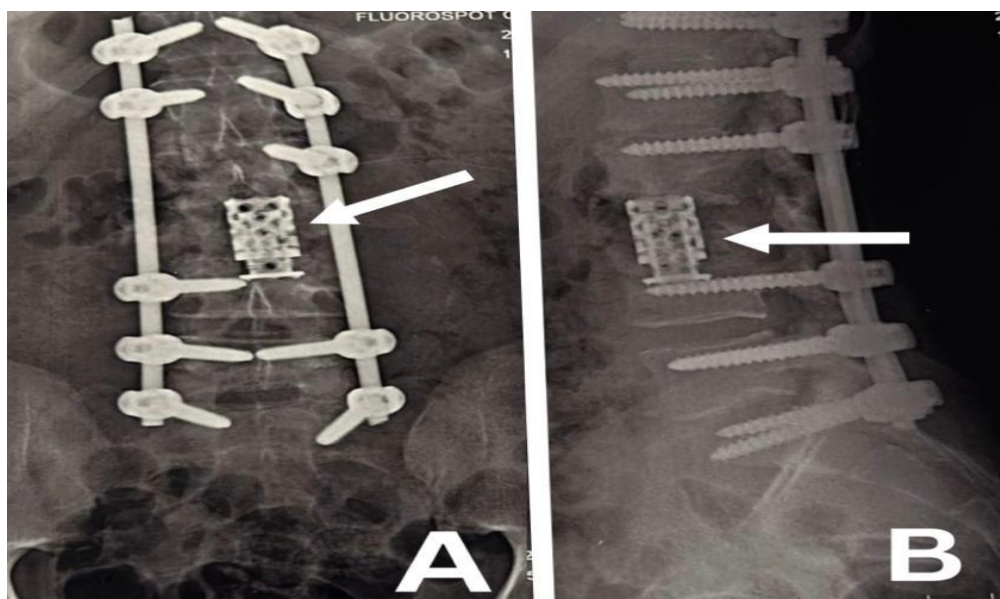
**Figure 8: Intraoperative Image.** White arrow showing iliac strut graft



**Figure 9: Intra operative image of Antero Lateral Approach.** white arrow showing insertion of expandable cage at L2-L4 space



**Figure 10: Immediate Post Operative X Ray.** X ray of spinal fixation; A) Anteroposterior View B) Lateral View showing corrected kyphotic deformity

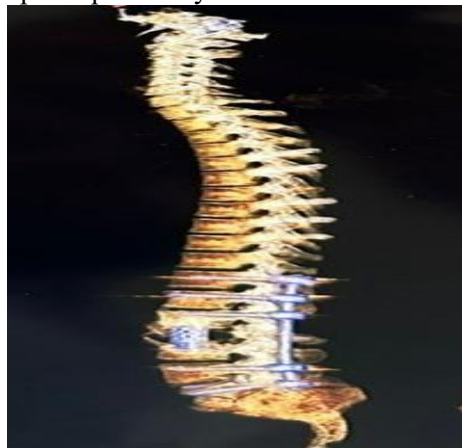




**Figure 11: 3 Months post operative X Ray.** White arrow showing fusion of the graft A) Anteroposterior View B) Lateral View



**Figure 12: Clinical Image of Patient 3 months Post Operatively on Follow up.** Patient is standing comfortably without support at 3 months post operatively.



**Figure 13: Post Operative 3 Dimensional computed tomography.** Image showing fusion of graft

## DISCUSSION

Potts spine is the most common type of extrapulmonary tuberculosis. Pott's spine, which is common in the elderly population, is primarily caused by latent or active pulmonary tuberculosis. Disease is typified by the degeneration of the vertebral body, which interferes with the body's ability to support its own weight and results in symptoms like exhaustion, kyphotic deformity, paralysis, and back pain [7]. In a population, about 1/2 of all cases involving bone and joint TB are linked to spinal TB [8]. Because of the poor nutritional status as well as the high likelihood of other extrapulmonary lesions coexisting, multilevel tuberculosis of the spine is particularly challenging to treat [9]. Chemotherapy which is the primary treatment for patients with spinal tuberculosis (TB); however, patients with neurological deficits, sinus tract, acute abscess, dead bone, severe kyphosis or scoliotyphotic deformity, and vertebral collapse must undergo invasive surgical intervention [10]. Surgery for Potts spine or other spine infections includes interbody fusion, single anterior debridement and fixation, single posterior debridement, and posterior pedicle screw fixation having the 1 & 2 stages of anterior debridement [11].

In the above-stated case patient had a tuberculosis of the spine which presented by progressive back ache with gradual decrease of power of bilateral lower limbs but with involvement of bladder and bowel functions. In addition patient also had a kyphoscoliotic deformity in the spine. Surgical intervention was indicated in this case because of the gradual worsening of back pain along with the involvement of neurological deficit and increasing spinal deformity. The patient was managed with anterior column reconstruction through antero-lateral retroperitoneal approach and the expandable cage was applied after freshening the inferior endplate of the L2 and superior half of L4 vertebra. The patient was then placed in the prone position and through a posterior approach and spinal fixation was done. The anterior approach eliminates infection effectively while the posterior approach gives stable fixation. So in this case 360 degree approach through debridement of necrotic caseous material along with stable reconstruction and fixation was achieved.

## CONCLUSIONS

In Pott's spine destruction as well as the collapse of complete vertebral bodies through debridement of disease and complete neurological decompression along with stable reconstruction and fixation can be achieved by addressing both anterior & posterior columns with the anterior and posterior approach.

Ethics Statement and Conflict of Interest Disclosures

**Human subjects:** Consent was obtained or waived by all participants in this study. Conflicts of interest: In compliance with the ICMJE uniform disclosure form, all authors declare the following: Payment/services info: All authors have declared that no financial support was received from any organization for the submitted work. Financial relationships: All authors have declared that they have no financial relationships at present or within the previous three years with any organizations that might have an interest in the submitted work. Other relationships: All authors have declared that there are no other relationships or activities that could appear to have influenced the submitted work.

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