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360° spinal fixations through posterior only approach in a child with pott's disease: a case report

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Abstract

Tuberculosis (TB) is caused by acid-fast bacilli Mycobacterium tuberculosis and rarely by M. bovis, which is very common in developing countries like Bangladesh. Vertebral bodies are common site of extra-pulmonary involvement by TB. Although spinal TB is not very common in young children, pott's disease affecting children and requiring surgical intervention have been reported. But in children, this surgery is often challenging due to greater technical difficulty with instrumentation. A 9-year-old girl presented with paraplegia due to compressive dorsal myelopathy due to pott's disease at D4- D5 level. Anti-TB medication was started and two weeks later she underwent decompression of neural elements by D5 Laminectomy and corpectomy and stabilization by bilateral trans-pedicular screws and rods at D3, D4, D6 and D7 and fusion by mesh cage filled with autologous bone chips. Her post-operative recovery was uneventful. Histopathology report shows Granulomatous inflammation, compatible with tuberculosis. At the last follow-up, the patient was clinically and radiographically stable.

Introduction

Tuberculosis is a granulomatous inflammation involving various organs. The prevalence of TB is high in developing countries¹. High risk groups include the IV drug abusers, immunocompromised and HIV-infected people, prisoners and nursing home residents². Vertebral tuberculosis, also known as Pott disease, is relatively common in certain regions of the world and is found in 1%–2% of TB cases worldwide^{3,4}. Spinal TB is the most common site of extrapulmonary TB. The majority of Pott's disease patients present with destruction and collapse of vertebrae and involvement of adjacent tissue. The disease may end up with spinal deformity and neurological complications like arachnoiditis, intramedullary tuberculoma and epidural abscesses⁵.

We report upper thoracic Pott's disease in a 9-year-old girl with myelopathy. She was treated surgically with vertebral column resection and 360° reconstruction via a posterior-only approach to prevent the progression of neurological deficit and stabilize the deformity.

Case Report

History and Presentation

A 09 years old girl, 2nd issue of her non-consanguineous parent presented with the complaints of pain in the upper back for 02 months, weakness in both lower limbs for 2 weeks. Her weakness of lower limbs was sudden, asymmetrical (Left>right) and non-ascending type. Weakness was progressive and she became unable to walk or stand even with support 01 week later. She had no history of fever, convulsion, diarrhoea, vomiting, and headache. There was no history of contact with TB patient. Her bowel and bladder functions were normal.

Physical examination

Her lower limbs reveal visible muscle wasting of both legs, muscle tone was slightly increased, muscle power was MRC grade 0 in both lower limbs, deep tendon reflexes were exaggerated, planter were bilaterally extensor, sensory and autonomic function were intact. Upper limbs were neurologically intact, cerebellar sign absent, cranial nerve palsy absent; gait could not be assessed.

Investigations

1. CBC: Hb% 12gm/dl, ESR 47 mm in 1st hour, TC of WBC 7000/cmm, Neutrophil 65%,

2. Imaging: MRI of D/L spine with screening of whole spine shows T1 hypo & T2 hyperintense signal change with heterogenous contrast enhancement at D4 & D5 vertebral bodies and intervening intervertebral disc with almost complete collapse of D5 vertebral body with similar signal intensity pre and para vertebral soft tissue swelling at the same level with epidural extension causing spinal canal stenosis with cord compression and bilateral nerve root compression. Similar lesion is also present at S1 vertebral body.

Operative Procedure

Anti-TB medication started and two weeks later she underwent decompression of neural elements by D5 Laminectomy and corpectomy and stabilization by bilateral trans-pedicular screw and rod at D3, D4, D6 and D7 and fusion by mesh cage filled with autologous bone chips (Fig.2).

Postoperative course

Her post-operative recovery was uneventful. Her back pain was improved and she could walk without support. Histopathology report shows Granulomatous inflammation, compatible with tuberculosis. An 18 months antitubercular therapy was planned. During the first 3 months she got 4 drug regimen and for the rest of the 15 months, 2 drug

regimen was advised. Pyridoxin was advised throughout the course of anti-TB therapy.

Follow Up

On 2nd post-operative day her lower limb muscle power improved to 3/5 and 02 weeks post op muscle power was 4-/5 and became able to walk without support and became pain-free. The patient was advised for follow-up in every 3 months (Fig. 3).

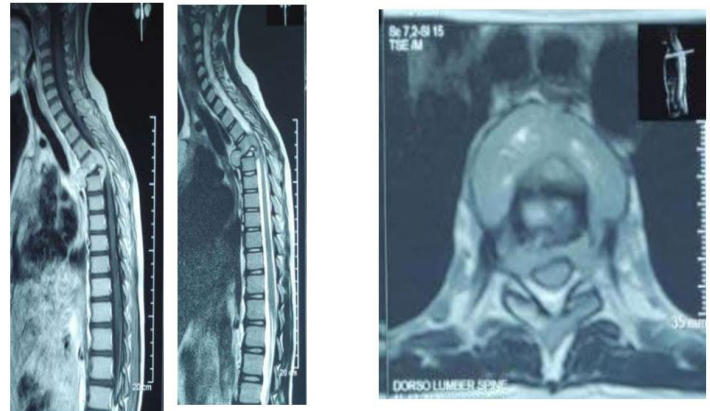


Figure 1: Preoperative MRI: T1-sagittal, T2- sagittal, T2-axial

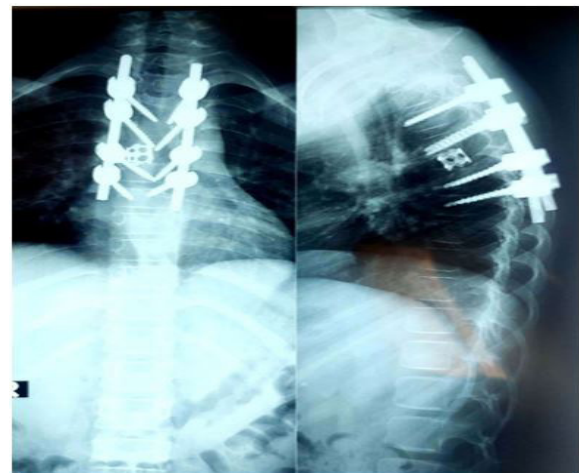


Figure 2: Postoperative X-ray



Figure 3: (With permission) after 02 weeks of operation patient can walk independently.

Discussion

Spondylitis is the most common manifestation of osseointerarticular TB, and 1%–3% of patients with TB have skeletal involvement. It is most common in the first 3 decades of life and is a leading cause of paraplegia⁶. Vertebral body involvement usually occurs through the extensive venous plexus of Batson, spreading infection to multiple spinal segments while characteristically sparing the disc space^{7,8}. Tuberculous spondylitis without any spinal cord compression or neurological deficits can be treated conservatively with anti-TB medications. Surgery is considered for patients with spinal cord compression or neurological compromise, significant spinal deformity, persistent severe axial pain or disease progression on maximal medical therapy^{9,10}. Multiple surgical approaches are available for treatment of TB spondylitis in the pediatric age group. Outcomes of extensive surgery is similar to debridement alone except better correction of kyphosis and deformity in case of extensive surgery¹¹. In addition, extensive surgery reduces the duration of chemotherapy¹². Although Pott's disease affecting young children are rare but its surgical management is technically challenging¹³. Presentation of vertebral TB in children are often insidious in onset and include back pain, fever and motor, sensory or autonomic dysfunction. Although chemotherapy is the first line of treatment, but surgery may be warranted if spinal cord compression or kyphotic deformity is present. Around 3% of children with pott's disease develop severe kyphosis (> 60°)¹⁴. Risk factors for kyphotic deformity includes age <10 years; involvement of ≥ 3 VBs; or involvement of thoracic spine¹⁵. Severe kyphosis is cosmetically unacceptable and causes spinal cord compression over the apex of the deformity and cardiopulmonary dysfunction from restrictive lung disease. Skeletal immaturity of young children must be taken into account during surgical intervention and number of fused segments should be minimized (particularly in dorsal spine) to avoid complications such as iatrogenic short stature, crankshaft deformity, and restricted growth of the rib cage causing pulmonary hypoplasia. Younger patients exhibit a more aggressive form of TB, with severe extra-pulmonary involvement and progressive VB collapse¹³, placing them at a higher risk for disabling complications in comparison to adults. So we performed surgery which halted progression of kyphotic deformity and improved neurological symptoms in our patient. The surgical technique of choice for spinal TB has been a matter of continuous debate¹⁶. Posterior-only surgical approaches in these cases had unfavorable outcomes because they were

usually limited to laminectomy with or without fusion but spinal cord compression is located anteriorly¹⁷. In our patient, we performed extensive surgery with vertebral column reconstruction with an anterior titanium cage and posterior instrumentation extending from 2 levels above and 2 levels below the lesion, even in the setting of acute infection which resulted in debridement of infectious focus and a reduced and stabilized kyphotic deformity. Our patient represents one of the few young patients treated with a single-stage, 360 vertebral column reconstruction with an anterior titanium cage and posterior pedicle screw fixation through posterior only approach. At follow-up, our patient's neurological examination and kyphotic deformity were stable. However, she needs to be followed for the next several years, given her young age and skeletal immaturity, to check for development of complications.

Conclusion

Pott's disease with spinal cord compression in children is very uncommon. Various treatment options may be considered. We report the successful use of single-stage, 360 vertebral column reconstruction with an anterior titanium cage and posterior pedicle screw fixation through posterior only approach to reconstruct a 9-year-old child's vertebral column for radical removal of the infectious TB focus and reduction of the kyphotic deformity. Although limited number of literature is available, surgical debridement and spinal fusion via posterior approach appear to provide a safe alternative to conservative treatment with prolonged bed rest.

Declarations

Authors Contributions: Conception, Diagnosis and Design, Radiological Diagnosis and Final approval of manuscript: Dr KM Tarikul Islam, Dr Md Rezaul Amin, Dr Md Ataur Rahman, Dr. Shamsul Alam, Prof. Moududul Haque

Manuscript Preparation, Technical Revision, and Manuscript editing and revision: Dr KM Tarikul Islam, Dr Md Rezaul Amin, Dr Md Ataur Rahman,

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