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Case Report

Pott's paraplegia-satisfactory outcome in spite of poor prognostic factors, treated by a novel surgical technique of posterior spinal stabilization and anterolateral decompression with bone graft fusion: a case report

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ABSTRACT

A case of Pott's paraplegia of sudden onset and of more than two months duration in an aged female, treated by a novel surgical technique of anterior decompression and local kyphotic angle correction by spinal pedicular fixation is presented here. A 52-year female with Pott's paraplegia, ASIA-A with sphincters involvement and with flexor spasm, was treated by surgical intervention, in a single operation of two stages, the first by provisional posterior pedicular fixation and the second stage by anterolateral decompression and correcting the local kyphotic angle by cyclic changing the rods in increments of 5 degrees in compressive mode. The paravertebral abscess of opposite side was sucked out and at the end a tricortical bone graft harvested from iliac crest was impacted in between the space created by pedicular fixation maneuver in course of correcting kyphosis. There was steady dramatic improvement of clinical and neurological status within three weeks. Kyphotic correction was maintained with anterior tricortical interbody bone graft impacted in position. The novel surgical technique that is adopted for decompression, drainage including paravertebral abscess of opposite side, debridement and local kyphotic angle correction along with interbody bone graft fusion, in this case, offered a satisfactory outcome in spite of poor prognostic factors.

Keywords: Pott's paraplegia, Paraplegia in flexion, Anterolateral decompression, Thoracic tuberculosis, Pedicular fixation, Thoracic kyphosis correction

INTRODUCTION

Spinal tuberculosis is common in India.[1] When it affects the thoracic region it may lead to paraplegia. Neurological complication is the most dreaded, crippling and life threatening condition of spinal tuberculosis. The overall incidence in various series has been reported to be between 10 and 30 percent.[1] With national strategic plan for TB elimination in India the incidence of neurologic complications at presentation in the hospital has now reduced.

The study analyzed the clinical, functional (neurological) and radiological outcome of a case of Pott's paraplegia of sudden onset and of more than two months duration, presented to us, which was treated by a novel surgical technique of posterior spinal stabilization and anterolateral decompression and bone graft fusion.

CASE REPORT

A 52-year female presented to us with paraplegia (ASIA impairment scale grade A-motor 0, no sensory sparing S

4 and 5 with bladder and bowel involvement with flexor spasm and with a bed sore. It corresponds to Pott's paraplegia (based on motor weakness) stage IV (Goel 1967, Tuli 1985, Kumar 1988 and Jain 2002)-Paraplegia in flexion, sensory deficit more than 50% with sphincter involvement and bedsore. She gave a history of back pain of 6 months duration which was diagnosed as tubercular spondylitis of paradiscal thoracic 7 and 8 vertebrae 3 months back and was put on 4 drug antiTB drugs (RHZE, rifampicin 450 mg, isoniazid 225 mg, pyrazinamide 1200 ethambutol 825 mg/day). She developed paraplegia all on a sudden in a day more than 2 months back. She had earlier X-ray and necessary investigations done for clinical diagnosis before putting her on ATD (Figure 1). She had her MRI done on onset of paraplegia (Figure 2).

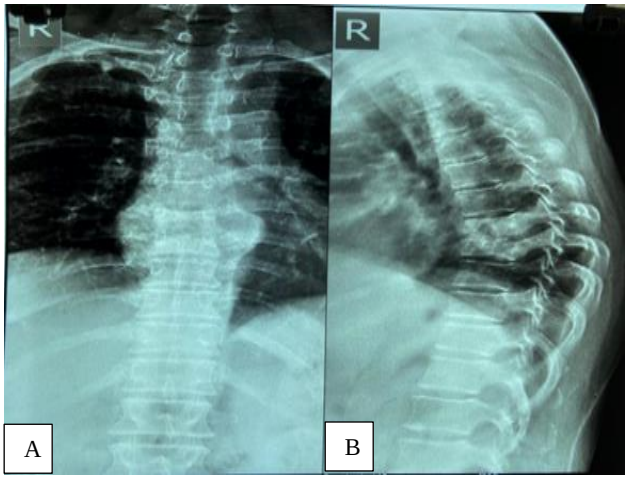

Figure 1 (A and B): Pre op X-ray of destruction of adjacent vertebral bodies of D7 and D8 with local kyphotic angle of 25 degree and with paravertebral abscess.

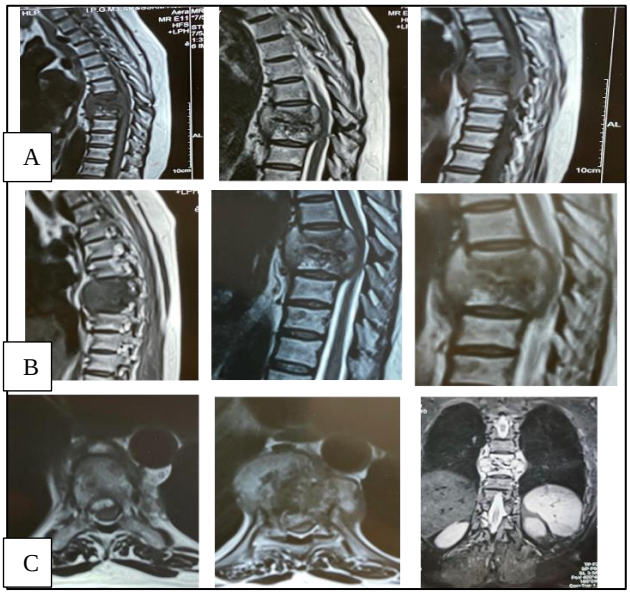

Figure 2 (A-C): Pre-op MRI of compression of cord by liquid pus from anterior into extradural space with alteration of cord signal.

On admission we prepared for surgical intervention.

Under general endotracheal anaesthesia, in the first stage, in prone position, bilateral pedicular fixation of dorsal 5 and 6 to dorsal 9 and 10 was done. In this stage no attempt was made to correct the local kyphotic deformity. The pedicular screws and rods were placed and tightened provisionally keeping option open for correction of local kyphotic deformity (angle) in the second stage of surgery once the anterior compressing elements of spinal cord are removed. In the second stage, the patient was turned to right lateral position and through left anterolateral approach, drainage, debridement, decompression of D 7 and 8 was done. The resected 7th and 8th rib exhibited heads almost eroded with normal facet for costotransverse articulation (Figure 3). On opening the paravertebral abscess, about 50 ml of caseous material and fluid pass spontaneously expelled out of the wound (Figure 4). With a plastic suction nozzle with multiple holes at the tip part and open slit hole in the handle which could control the suction power, the cavity of the left paravertebral abscess was sucked out, followed by debridement and decompression of all anterior compressing elements. Wound was thoroughly irrigated. At this stage, the left spinal fixation rod was changed to a new rod with corrected bend of 5 degree less of previous and placed into screw heads (top loading) of distal screws of D 9 and 10 and were tightened with locking nuts. All the locking nuts of screws of the right rod were loosened and a little compression was applied. Compression device was kept *in situ*. With gentle maneuver in an attempt to straighten local kyphotic deformity under direct vision it was observed that the proximal end of the left rod sat automatically into the heads of screws of left D 5 and 6 and vertebral bodies of D 7 and D 8 opened up anteriorly making fulcrum of posterior edge of vertebral body. The locking nuts of screws of left D 5 and D 6 were placed and tightened with rod. At this point the compression device was removed and the right spinal fixation rod was changed with a new rod with corrected bend of 5 degree less of previous rod and all four locking nuts were loosely placed in position in order to hold instrumented segment of spine in axial and coronal stability but keeping provision for 5 degree more correction in sagittal plane. Again the left spinal fixation rod is changed with a new rod with corrected bend of 5 degree less of previous rod and tightened with distal D 9 and D 10 screw heads with locking nuts. the compression device was applied on right pedicular fixation and again a bit compression is applied and was kept *in situ*. With gentle maneuver in an attempt to straighten spine same thing as previous was observed. Local kyphotic angle was more corrected under direct vision with more opening of anterior edge of vertebral bodies of D7 and D8 making fulcrum of posterior edge of vertebral bodies which were kept apposed in all time by use of compressive device. This cycle of correcting local kyphotic angle in steps of increments of 5 degrees under direct vision and in compressive mode making fulcrum of posterior edge of diseased vertebral bodies was repeated in 4 times for total correction of 20 degrees (Figure 5 and

6). Reduction screws would be conveniently used for the kyphotic correction maneuver.

Figure 3: The resected 7th rib showing normal facet for costotransverse joint and almost completely eroded head part.

Figure 4: Caseous material spontaneously expelled out on opening the paravertebral abscess (over the rod for pedicular fixation).

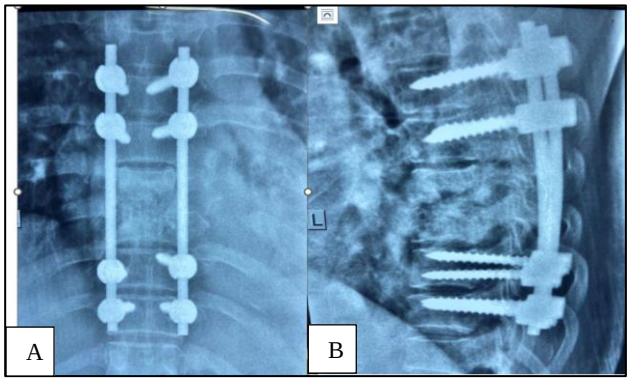

Figure 5 (A and B): Post-op X-ray showing bilateral pedicular fixation D5, D6-D9, D10 with correction of local kyphotic angle from pre op 25 degree to 5 degree and graft impacted in position between D7 and D8.

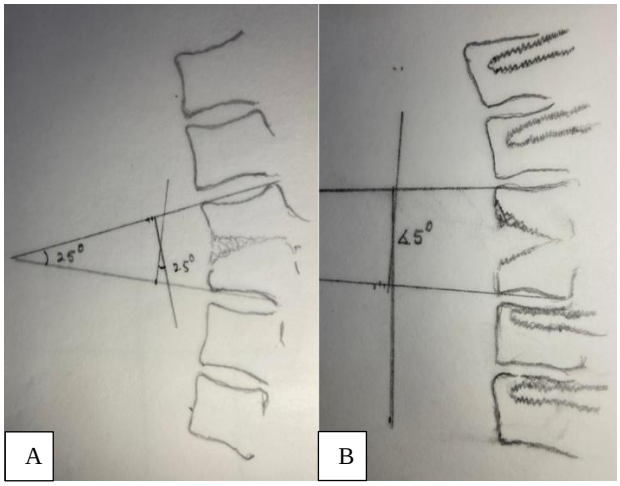

Figure 6 (A and B): Local kyphotic correction from 25 degree to 5 degree.

This created an opening (separation) of anterior intervertebral gap between D7 and D8 vertebral bodies. At this point the tip of plastic nozzle having diameter of 8 mm was easily passed through the passage, so created, between eroded bodies of D7 and D8. to the opposite right paravertebral abscess. The right paravertebral abscess was drained with low suction and thoroughly irrigated with saline. The debrided material, eroded bone, granulation tissues were sent for histopathological examination (Figure 7) and also sent for culture and sensitivity including AFB culture. Wound was closed in layers leaving an intercostal drain (ICD) as there was a pleural tear, happened during retro-pleural dissection after costotransversectomy of D7 and D8. The pleura was adherent to paravertebral abscess and was very friable. The ICD was removed after 24 hours when the left lung was found fully expanded and no collection was found coming out through the drain in the immediate 24 hours post op period. The post operative recovery was steady with minor event of left sided pleural effusion of 30 ml which was aspirated under USG guidance and sent for study, the report showed in favour of transudate.

There was steady and marked clinical improvement of general condition in respect of gaining weight, improvement of appetite, malaise and there was sense of well-being. The ESR improved from 112 mm/hr to 60 mm/ hr. C-reactive protein (CRP) improved from 331 mg/dl to 20 mg/dl within three weeks post operative period.

There was steady sensory improvement of all modalities from immediate post operative period and the voluntary contraction of right quadriceps was observed on sixth post operative day. There was steady improvement of motor of both hips, knees, voluntary power of grade 4-MRC within 3 weeks (Figure 8). Tone of muscle steadily changed from spasticity to more or less normal tone and flexor spasms/ ankle and patellar clonus also steadily near normalized over that period. The planter reflex was still

extensor, a positive Babinski sign consisting of dorsiflexion of the great toe with fanning of other toes. The anal reflex had come back to sluggish and anal sphincter tone and contraction had come back to near normal during that period

Local kyphotic angle improved from preoperative 25 to 5 degree with strut bone graft in position impacted between vertebral bodies of D7 and D8 (Figure 5).

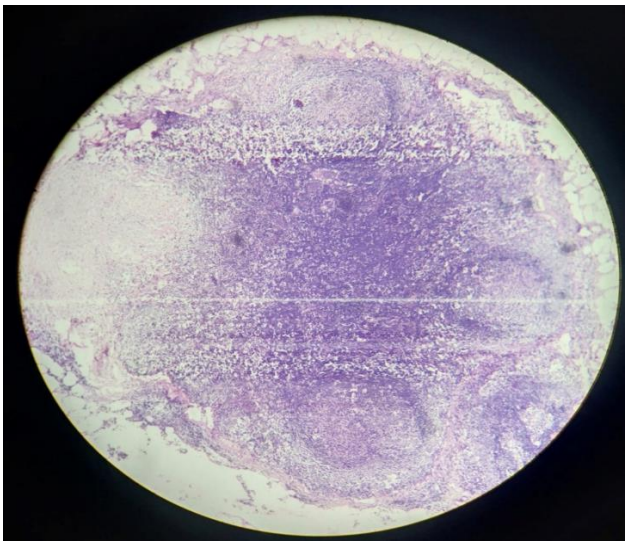

Figure 7: Photomicrograph of histological picture of biopsy material showing epitheliod cells surrounded by lymphocytes in the configuration of tubercle with granuloma suggestive of tuberculous lesion.

Figure 8: Three weeks post operative clinical and neurological status-can sit independently (sitting balance) with hip girdle muscles and quadriceps power MRC grade 4.

DISCUSSION

The aim of surgery in Pott's paraplegia has three objectives. Drainage, debridement, decompression of spinal cord and bone graft fusion.

To achieve, maintain, spinal stability from progressive deformity and to correct kyphotic deformity.

Dealing with factors influencing prognosis in cord involvement.

Various surgical procedures used in the treatment of adult thoracic spine tuberculosis, for the usual anterior vertebral body involvement, which basically by anterior only, posterior only and combined anterior and posterior surgical approaches, are as follows: Anterior debridement and strut bone grafting with or without instrumentation. Anterolateral decompression and strut bone grafting with posterior instrumentation. Posterolateral decompression and strut bone grafting with posterior instrumentation. Single stage transpedicular decompression and strut bone grafting with posterior instrumentation. Anterior debridement and strut bone grafting with posterior instrumentation.

Lots of studies are available in the surgical management of active thoracic tuberculosis with neurological involvement, where outcome of kyphosis, are described. However, only a few studies cover the broad principles of anterior decompression and kyphotic correction.[2-9]

In many of the studies, one stage or two stage surgeries were done to decompress the spinal cord and to stabilize the spine with the objective to prevent post operative deterioration of kyphosis and the few have described and analyzed the technique of correction of local kyphotic angle.[10-18]

The issues involved in decompression and correction of local kyphotic angle include: Since compressing element may be pus, caseous material, disc, granulation tissue and bony sequestrum, any attempt of correction of kyphotic angle without removing the anterior compressing elements, may endanger the cord. Hence anterior decompression is to be done before any attempt for correction of local kyphotic angle. As the vertebral column is shortened anteriorly by the vertebral body collapse, the spinal cord adapts itself with the shortening. Any abrupt straightening of vertebral column may put distraction stretch on spinal cord with wide separation of vertebral bodies. Hence careful gradual correction in stepped manner of 5 degrees incremental under direct vision and in compressive mode with instrumental control, making fulcrum of apposed posterior edge of diseased vertebral bodies, is applied in the present novel technique to take care of undue inadvertent cord stretching. In dealing with moderate to severe kyphotic angle with gross destruction of vertebral bodies, shortening of posterior column is desirable.

With advent of pedicular fixation in achieving stability, ease of controlled maneuver, correcting and maintaining kyphotic deformity, anterior (transthoracic) approach for debridement and anterior instrumentation has become

unpopular as it carries morbidity and hence not suitable for elderly malnourished patient.

Kyphotic angle is better corrected and maintained by pedicular fixation and offers a stable construct along with anterior strut graft fusion (interbody fusion).

Debridement using the posterior approach could cause central nervous system complications, such as tuberculous meningitis.[19,20]

Keeping all the above points in mind the present novel surgical technique has been improvised.

Out of the various factors influencing prognosis in cord involvement, grade of paralysis-ASIA-A, Pott's paraplegia stage IV (paraplegia in flexion with flexor spasms and sphincters involvement), sudden onset of complete paraplegia, longer duration of paraplegia (more than 2 months), older age (52 year) carries poor prognosis in this present case. However, in spite of these poor prognostic factors, patient is having an excellent neurological recovery within short post op period of 3 weeks, as experienced by us.

The essential pathology of Potts paraplegia in majority of the cases is pressure on neural tissue of cord which may be built up intrinsically or by extrinsic factors as follows: Inflammatory oedema (Intrinsic factor), extradural mass (mechanical compression), bony disorders, meningeal changes and infarction of spinal cord.

The details of the above is available in articles by Tuli.[1] It may be well presumed that out of all these factors the first two or three factors i.e. inflammatory oedema (intrinsic factor), extradural mass (external compression) and bony disorders are playing role in this particular case. Those factors are also revealed in MRI of the case.

CONCLUSION

The novel surgical technique of posterior spinal stabilization and anterolateral decompression with bone graft fusion, the technique adopted in the case of Pott's paraplegia with poor prognostic factors yielded a satisfactory clinical, neurological and radiological outcome in a short period of 3 weeks in spite of poor prognostic factors in the particular case. Regarding kyphotic correction in active disease the technique would be supplemented with posterior spinal column shortening for correcting a severe angle of kyphosis. The idea would be gentle gradual correction under direct vision so that at no point of correction there would be stretching or lengthening force on the spinal cord.

For ease of understanding the hinge of correcting an angle of kyphosis should always fall on anterior to posterior border of diseased vertebral bodies with no distraction force.

The technique adopted in this particular case may be widely applied and analytical study with large sample size of similar cases may be a future research model for a valid and reliable conclusion.

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