



SPINAL TUBERCULOSIS IN PEDIATRIC POPULATION

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ABSTRACT

Background: There is a lack of reports on spinal tuberculosis in children. We report a retrospective analysis of 124 children with TB spine treated over 30 years.

Materials and Methods: One hundred twenty-four patients were included in our study. Ninety-one children were treated conservatively, while 33 children were subjected to surgery for focal debridement (n=23), posterior interspinous wiring and cementation (n=4), and posterior instrumentation with rods and segmental wiring (n=14). Thus, some of the children in the current series belonged to conservative study patients.

Results: All children attained healed status and showed neural recovery (n=18). The patients attained healed status at 12 months. Spontaneous intracorporeal fusion occurred only in 8.06% of 124 children. Sagittal curves during growth showed three different patterns: Unchanged, decreased, and increased curves. The residual kyphosis was unavoidable in cases with growth plate damage. Kyphosis increased in cases with wedged monovertebra and fused wedged block vertebra, though it was different at a different level.

Conclusion: The posterior instrumented stabilization alone could correct or prevent the progress of the kyphosis. However, for active tuberculosis, posterior instrumented stabilization combined with anterior radical surgery should be reserved only for advanced tuberculosis with instability, the rapid progress of kyphosis, and unacceptable pre-existing kyphosis. There is a new trend of prophylactic posterior instrumentation, even for early tuberculosis.

KEYWORDS : Tuberculosis, children, kyphosis, spine,

INTRODUCTION:

Children are not the miniature of adults. Anatomically and physiologically, there are a lot of differences. Bones in children grow longitudinally and appositionally and model during growth. The destruction of bone in children is rapid and severe by the infection than that of the adults. However, bone lesions in children heal and model much faster than those of adults. The growth cartilage in children is relatively well preserved in the tuberculous lesions, and it is radically excised during radical resection of the lesion.^[1,2] Tuberculous spinal deformity in children can be corrected spontaneously during growth when the end-plate and apophyseal ring cartilage are preserved.^[3,4] In contrast, in adults, the established deformities do not correct spontaneously.

MATERIALS AND METHODS:

This study was performed from Jan 2019 to December 2020 in the Department of orthopedics, IGIMS Patna-14 Bihar. All patients with spinal tuberculosis in the various spinal segments were available for this analysis. None of the children had skip and multifocal lesions. Eighteen children developed neurologic deficits of various degrees. Only two had mild spasticity of the lower extremities. Twenty-six children had pulmonary tuberculosis. The follow-up of 34 children were not available up to healing of the disease. Laboratory tests including a complete blood count, erythrocyte sedimentation rate (ESR), and C-reactive protein (CRP) were performed to diagnose, to monitor the disease. Surgical indications were continuous pain, unsightly progressive kyphosis, segmental instability signs on radiograph, and worsening neurology. Twenty-three children with moderately advanced lesions with a large abscess at any level were subjected to simple abscess drainage and focal debridement. The combined interspinous wiring and cement fixation was done to stabilize and tether the posterior spinal growth in four children early. But none of the paraplegic children had emergency decompression surgery.

The discs were destroyed on the initial radiogram in two of 36 cervical, eight of 53 dorsal, and six of 31 lumbar spines. All children responded favorably to chemotherapy without drug-related complications, and finally, the disease healed in all. All 18 paraplegic children recovered neurologically within 1.5 months after chemotherapy, and three days after surgical decompression in all children subjected to decompression surgery. Chronological sagittal curve changes observed after conservative treatment. Cervical and cervicodorsal lesions in eight children, the curve (average 10° kyphosis) did not change. However, the curve on average increased from 8° to 14°, and the curve decreased from 8° to 3°, spontaneously during growth [Figures 1]. The increase of kyphosis was seen more in the advanced cases in which the growth plates were damaged regardless of the level of the lesion. The combined posterior instrumentation and anterior surgery in five adolescent patients could correct the kyphosis and maintain the restored sagittal curve. The lesion was gradually arrested at three months, was almost arrested at six months, and was assessed to be healed at 12 months.

Tuberculosis spondylitis is the most dangerous form of skeletal tuberculosis.^[5] The number of reported tuberculosis cases has increased because of the spread of HIV. The persisting issues related to spinal tuberculosis in children have been the delayed diagnosis and management because of delayed presentation for the treatment. The appropriate duration of chemotherapy has been a controversial issue. We observed whether non-operative and operative treatments would result in similar drug response, spontaneous intracorporeal fusion, residual kyphosis, and neurological recovery at the end of treatment.

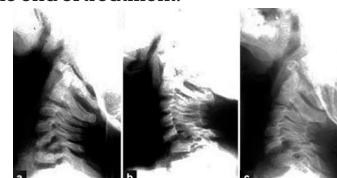


Figure-1

RESULTS AND DISCUSSION:-

Figure1- Tuberculosis of C3-6 in a five-year-old boy: (a) Initial lateral radiograph showing narrowed disc spaces of C3-4, C4-5, and C5-6 with round cervical kyphosis and huge prevertebral soft tissue shadow. Initially, cervical traction was applied in bed for three weeks under cover of the triple chemotherapy.

and anterior interbody fusion for tuberculous kyphosis of dorsal and lumbar spine. Spine (Phila Pa 1976)1995;17:1910-6.

(b,c) At 12 months, gradual spontaneous correction of kyphosis and visible undestroyed affected discs and reformation of the diseased vertebral bodies are shown.

We also observed whether progressive kyphosis after the disease healing would result during the growing period. Individualized treatment for each patient according to different therapeutic indications was essential to heal and minimize complications. A treatment model was suggested which might help to improve treatment outcomes and reduce complications. The cervical spine has coronally and obliquely (rather flat) oriented facet joints and a wide rather anteriorly and horizontally positioned transverse process projected directly from the body. The characteristic anatomy prevents the early vertical collapse, while it allows anterior slip, followed by kyphotic collapse by facet joint gaping in the later stage, particularly in children. Children's spine behaves differently from the adult spine because of the growth potentiality, remarkable remodeling capacity, and the difficulty of accurately assessing the percentile destruction of the bony vertebral body.^[6] The pediatric spine grows at an accelerated pace during growth spurts.^[7] The growth plate condition and vertebral peak height growth velocity should be contemplated in assessing and predicting the final kyphosis. Therefore, even after the healing, regular follow-up examinations are essential to assess the stability and the curve change of the kyphotic segment until growth maturity [Figures 1]. Spinal tuberculosis in the current series was effectively treated by chemotherapy despite of a slight increase of kyphosis. Reformation of the diseased bony vertebra could be observed when the growth plate cartilage was preserved. It was found that posterior instrumentation for active tuberculous kyphosis could effectively correct the kyphosis and maintain the restored sagittal alignment. Regarding the extent of instrumentation, the current authors recommend the short segment pedicle screw-rod stabilization instead of long-segment fixation because short segment instrumentation can provide sufficient stability until disease arrest. Posterior instrument aided correction and stabilization surgery is recommended when unacceptable preexisting kyphosis and any evidence are indicating the progress of kyphosis due to the disease-related wedged vertebrae and instability of the unfused healed segment.

CONCLUSION:

The posterior instrumented stabilization alone could correct or prevent the progress of the kyphosis. However, for active tuberculosis, posterior instrumented stabilization combined with anterior radical surgery should be reserved only for advanced tuberculosis with instability, the rapid progress of kyphosis, and unacceptable pre-existing kyphosis.

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