Tuberculous Spondylodiscitis
A systematic Review of Literature

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List of Abbreviations

Abb.	Full term
ADC-MRI	*Apparent Diffusion Coefficient*
AFB	*Acid Fast Bacilli*
ATT	*Anti-tuberculosis therapy*
BCG vaccine	*Bacillus Calmette-Guerin vaccine*
CBC	*Complete Blood Count*
CSF	*Cerebro spinal fluid*
CT scan	*Computerized Tomography*
DW-MRI	*Diffusion Weighted MRI*
EHL	*Extensor Hallucis Longus*
ELISA	*Enzyme Linked Immunosorbent Assay*
ESR	*Erythrocyte Sedimentation Rate*
GATA	*Gulhane Askeri Tip Akademisi*
HIV	*Human Immunodeficiency Virus*
IGRA	*Interferon Gamma Release Assay*
IV	*IntraVenous*
MRI	*Magnetic Resonance Imaging*
PAS	*Para-aminosalicylic acid*
PCNA	*PerCutaneous Needle Aspiration*
PCR	*Polymerase Chain Reaction*
PPD	*Purified Protein Derivatives*
SD	*Standard Deviation*
SPD	*SPondyloDiscitis*
SPwD	*SPondylitis without Disc involvement*
STIR	*Short Tau Inversion Recovery*
TB	*Tuberculosis*
TST	*Tuberculin Skin Test*

Abstract

Drug resistant tuberculosis results from previous irregular chemotherapy, patient noncompliance and spread of drug resistant strains. Treatment with individualized chemotherapy according to susceptibility testing and surgery give the best results.

Spinal tuberculosis in children is usually associated with bone loss and disturbed growth even if treated surgically. Antituberculosis chemotherapy in children is strictly used according to bodyweight. Surgical treatment is indicated in case of neurological complications, progressive deformity or spinal instability.

In our systematic review, we used literatures discussing results of anterior and posterior approaches to compare between both approaches as regard effectiveness and safety. The results include preoperative and postoperative kyphotic angle and the final kyphotic angle at the last follow up, blood loss, operative time, preoperative neurological deficits and neurological recovery after surgery and lastly the recorded complications. we concluded that both anterior and posterior approaches are effective and safe for surgical treatment of spinal tuberculosis and the choice for suitable approach depend on location of TB lesion within the vertebral column, site of the lesion within the vertebra, number of levels involved, chest condition of the patient, presence and size of paraspinal abscess.

Key words: *Polymerase Chain Reaction* **-** *Standard Deviation- Tuberculosis- Tuberculin Skin Test*

INTRODUCTION

Spinal tuberculosis is a destructive form of tuberculosis. It account approximately for half of all cases of musculoskeletal tuberculosis. Although the majority of cases of TB occur in developing countries, the incidence is increasing in developed countries. This emergence of TB is due to increase incidence of drug abuse, HIV infection and immunosuppression.[1]

In tuberculous spondylodisctis, there is destruction of intervertebral disc and adjacent vertebral bodies, collapse of spinal column and anterior wedging leading to kyphosis. However, there may be multilevel non contiguous vertebral tuberculosis. Two distinct forms of spinal tuberculosis are identified. The classic form, called spondylodiscitis (SPD) and atypical form characterized by spondylitis without disc involvement (SPwD). Spinal tuberculosis is the leading cause of non traumatic paraplegia and a common cause of kyphotic deformity.[2]

Anti-tuberculosis chemotherapy remain the cornerstone of treatment of spinal tuberculosis while surgery may be preserved for indicated cases including, cold abscess, severe kyphosis, vertebral instability, evolving neurological impairment and failure of medical treatment.[3]

Drug resistant TB is becoming a serious challenge which arises from previous irregular chemotherapy and the spread of drug resistant strains. Treatment with combination of surgery

and individualized chemotherapy according to drug susceptibility testing give the best results.[4]

Surgical treatment of spinal tuberculosis aims to remove necrotic tissue, relieve spinal compression, and reconstruct spinal stability. However, the ideal surgical method of treating spinal tuberculosis remains controversial. Anterior approach gives good access to diseased tissue and proper decompression of spinal cord but it cannot correct or prevent deformity. Posterior approach has the advantage of better correction of deformity and fixation of the construct.[5] So, in multilevel spinal TB posterior instrumentation should be done in all cases to prevent long term progression of deformity. Extended posterior circumferential decompression can combine the advantages of both single and two-stage operation for adequate debridement, fusion, correction of deformity and restoration of spinal stability in addition to the benefits of less operative time and reduced hospital stay.[6]

Correction of an established spinal deformity is both difficult and hazardous with high rate of complications even in experienced hands. So, prompt treatment with follow up of kyphosis angle and surgical intervention whenever indicated is best way to avoid future kyphosis.[7]

Pathoanatomy:[27]

Spinal involvement results from hematogenous spread of mycobacterium tuberculosis into the highly vascular cancellous bone of the vertebral bodies. Hematogenous spread occurs

either arterial through anterior or posterior spinal arteries (paradiscal infection) or venous through Batson paravertebral venous plexus (central infection). The disk is primarily involved in younger age patients because it is more vascularized. While in older age patients, the disk is not primarily involved due to its age-related avascularity and infection of the disk occurs by direct spread from adjacent infected vertebral body.

The lower thoracic and upper lumbar vertebrae are most commonly involved sites. The pathology usually starts anteriorly in the vertebral body however it less commonly starts in the posterior elements of the spine.

It is characterized by destruction of the intervertebral disk and the adjacent vertebral bodies, collapse of the vertebrae, and anterior wedging leading to the characteristic kyphosis.

Risk factors for spinal tuberculosis include:

- Poverty.
- Overcrowding.
- Illiteracy.
- Elderly.
- Malnutrition.
- Alcoholism.
- Diabetes mellitus.
- Agammaglobulinemia.

- Malignancy.
- Renal failure.
- IV drug abusers.
- Immunosuppressive drugs as steroids and chemotherapy.

Early infection:

- Begins in the metaphysis of vertebral body.
- Spread under anterior or posterior longitudinal ligament leading to contiguous multilevel involvement, skip lesion (noncontiguous) in 15% or paraspinal abscess formation which is usually anterior and large. Involvement of more than one vertebra also results from the segmental arteries which bifurcate to supply two adjacent vertebrae.
- Initially doesn't involve disc space (distinguished from pyogenic spondylodiscitis) but can be misdiagnosed as neoplastic lesion.

Chronic infection:

Characterized by development of severe kyphosis and spinal instability.

Paraplegia is a devastating complication of spinal tuberculosis. Two types of paraplegia exist:

- Early onset paraplegia which develops with active stage of the disease, considered an indication for surgical management and carries better prognosis. It is caused by compression of the spinal cord by debris, cold abscess,

granulation tissue or subluxation of vertebrae in case of spinal instability.

- Late onset paraplegia which develops later after healing of the disease and has worse prognosis. It is often related to severe deformity.

Diagnosis:

Diagnosis is based on constitutional symptoms, clinical presentation and history of possible exposure to TB in addition to investigations including laboratory investigation (CBC, ESR, ELISA, and PCR), sample from abscess for bacteriological examination and radiological studies.[9]

Clinical manifestations: [9]

Symptoms of spinal tuberculosis are non specific and the clinical course is usually indolent which usually lead to delay in diagnosis with resultant progressive vertebral destruction. Presentation depends on site and stage of the disease, presence of complications as neurological deficits abscess or sinus formation.

Generally: insidious onset of malaise, loss of weight, loss of appetite and night sweating.

Locally: back pain (the earliest and most common symptom), swelling of cold abscess or discharging sinus.

Immunocompromised patients show longer delay in presentation and diagnosis due to weak inflammatory response.

Radiology:

Plain radiographs: [9]

It's usually the initial investigation. In early stages of the disease, it's difficult to have positive findings on plain radiographs unless 30% or more of bone loss which can demonstrate radiolucent lesion. In late stages plain radiographs can detect destruction of disc space with compression and collapse of adjacent vertebral bodies with development of kyphosis (Figure 1&2).

Figure (1): X-ray lumbosacral spine (lateral view) showing sclerotic changes and minimal erosion of upper end plate of L5 vertebra with decreased disc space at L4-5. [1]