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Pott's Spine: Diagnosis and Management

(Original Article)

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ABSTRACT
Spinal tuberculosis (TB) or Pott's spine is the commonest extrapulmonary manifestation of TB. It spreads through hematogenous route. Clinically, it presents with constitutional symptoms, back pain, tenderness, paraplegia or paraparesis, and kyphotic or scoliotic deformities. Pott's spine accounts for 2% of all cases of TB, 15% of extrapulmonary, and 50% of skeletal TB. The paradiscal, central, anterior subligamentous, and neural arch are the common vertebral lesions. Thoracic vertebrae are commonly affected followed by lumbar and cervical vertebrae.
Surgical procedures such as single stage anterior and posterior stabilization, extrapleural dorsal spine anterior stabilization and endoscopic thoracoscopic surgeries have reduced the mortality and morbidity of the surgical procedures. is rapidly progressing. It is a challenge to treat MDR-TB Spine with late onset paraplegia and progressive deformity. Physicians must treat tuberculosis of spine on the basis of Culture and sensitivity.
Keywords: *Pott's spine Computed tomography, Magnetic resonance imaging, management.*

Introduction

Percival Pott was the first person to present the classic description of spinal tuberculosis (TB) in 1779; hence, spinal TB was called 'Pott's Disease'.[1,2,3,4] TB of the spine is one of the oldest demonstrated diseases of mankind and is the common extrapulmonary form of TB. The morbidity and mortality rate due to spinal TB is higher than other infections in developing countries with dense population. Since the advent of antituberculous drugs and improved public health measures, spinal TB has become uncommon in industrialized countries, although it is still a significant cause of disease in developing countries. Spinal TB has the potential for serious morbidity, including permanent neurologic deficits and severe deformity.[1,2,3,4]

With biological control of the disease by the employment of modern antitubercular drugs, the present day physician can give a better quality of

life to the patient and better function to the involved joint. We have now broken the myth that "antitubercular drugs do not penetrate the skeletal tuberculous lesion in sufficient concentrations," and ankylosis of the joint is the only method to achieve no recurrence of disease. If diagnosed and managed effectively by "functional treatment," early disease can resolve completely. In moderately advanced disease, many joints will heal with retention of functional arc of motion for many years; in advanced disease, surgical treatment can offer a mobile joint with healed status.[5]

Natural Course of the Disease

Spinal involvement is usually a result of hematogenous spread of *Mycobacterium tuberculosis* into the dense vasculature of cancellous bone of the vertebral bodies. The primary infection site is either a pulmonary focus or other extraosseous foci such as lymph nodes, gastrointestinal, or any other viscera which may be active or quiescent.[6,7] Predisposing factors for spinal TB include poverty, overcrowding, illiteracy, malnutrition, alcoholism, drug abuse, diabetes mellitus, immunosuppressive treatment, chronic peritoneal dialysis, previous tuberculous infection, and HIV infection.[8]

Spread occurs either via the arterial or venous route. Anterior and posterior spinal arteries in the subchondral region of each vertebra facilitate hematogenous spread of the infection in paradiscal regions. Batson's paravertebral venous plexus in the vertebra is a valve-less system that allows free flow of blood in both directions depending upon the pressure generated by intraabdominal and intrathoracic cavities following strenuous activities like coughing. Spread of the infection via the intraosseous venous system may be responsible for central vertebral body lesions. Spinal TB is initially apparent in the anterior inferior portion of the vertebral body. Later on, it spreads into the central part of the body or disc. Paradiscal, anterior, central, and neural arch lesions are the common types of vertebral involvement.

In the paradiscal lesion, infection spreads through arterial plexus. The infection begins from the anterior vertebral body adjacent to the end plate, involving the disc and resulting in disc destruction. With further progression, anterior wedging of vertebra occurs with resultant kyphosis. Intraosseous and extraosseous abscess formation are often found in this type of lesions which is major risk of cord damage due to pressure effect by the abscess, displaced bone, or ischemia from spinal artery thrombosis.[9,10]

Symptoms and Signs

In the active stage, patients present with malaise, loss of weight, loss of appetite, night sweats and evening rise of temperature. The spine is stiff and painful on movement, with localized kyphotic deformity that would be tender on percussion. There is a persistent paraspinal muscle spasm around the involved vertebral bodies, which relaxes during sleep, permitting movement between the inflamed surfaces, resulting in typical night cries. A cold abscess may be present. Careful examination may reveal a small knuckle kyphosis on palpation of the spinous process.

In the healed stage, the patient neither looks ill nor feels ill, regains his lost weight and there is no evening rise of temperature or night sweats. There is no pain or tenderness in the spine and paraspinal spasm is also absent. The deformity that has already occurred in the active stage persists.

Unusually, the first presenting symptom may be neurological deficit. Abscess or sinus can present far away from the vertebral column along the fascial plains or course of the neurovascular bundles.

Diagnosis

Diagnosis of spinal TB is made on the basis of typical clinical presentation along with systemic constitutional manifestation, evidence of past exposure to TB or concomitant visceral TB, and

neuroimaging modalities.[9] Skin test and hematological investigations like complete blood count (CBC), erythrocyte sedimentation rate (ESR), Montoux test, enzyme-linked immunosorbent assay (ELISA), and polymerase chain reaction (PCR) are also done in diagnosing spinal TB.[11] Bone tissue or abscess samples are obtained to stain for acid-fast bacilli (AFB) and isolate organisms for culture, antibiotic sensitivity, and histopathology; the method widely used is CT guided or ultrasonography (USG) guided needle biopsy and/or aspiration or surgical biopsy.[12,13]

Tuberculin skin testing

This test is of limited use in determining active disease, however, and is best used for screening for latent infection in high-risk populations. Although skin test positivity has been reported to be as high as 90% in immunocompetent patients with bone and joint tuberculosis, [14] positivity neither confirms nor excludes the diagnosis.

Radiology

Plain radiographs

Spinal tuberculosis is most difficult to recognize radiologically in its early stage. There are four common sites of vertebral tuberculosis: paradiscal type, central type, anterior type, appendicial type.[1]

Plain radiographs are usually the initial investigation in patients with spinal TB. For a radiolucent lesion to be apparent on a plain radiograph, there must be 30% of bone mineral loss.[5,15]

Figure 1 – A plain lateral radiograph of the cervical spine showing destruction of C3–4 with loss of anterior body height and kyphosis of the upper cervical spine.

Computed tomography & Magnetic resonance imaging

CT and MRI are of special help for posterior spinal disease, tuberculosis of craniovertebral junction and cervicodorsal region, sacroiliac joints and of the sacrum where early lesions do not show in routine X-ray. Various pattern of destruction of vertebral bodies, delineation of the shape, extent and the route of spread of a cold abscess can also be very well visualized by CT scan.

MRI has been found to be extremely useful in the diagnosis of tuberculous infection of difficult and rare sites like craniovertebral region, cervico-dorsal region, disease of the posterior element and vertebral appendages and infection of the sacroiliac region. MRI is the most sensitive test for early diagnosis of spinal tuberculosis.

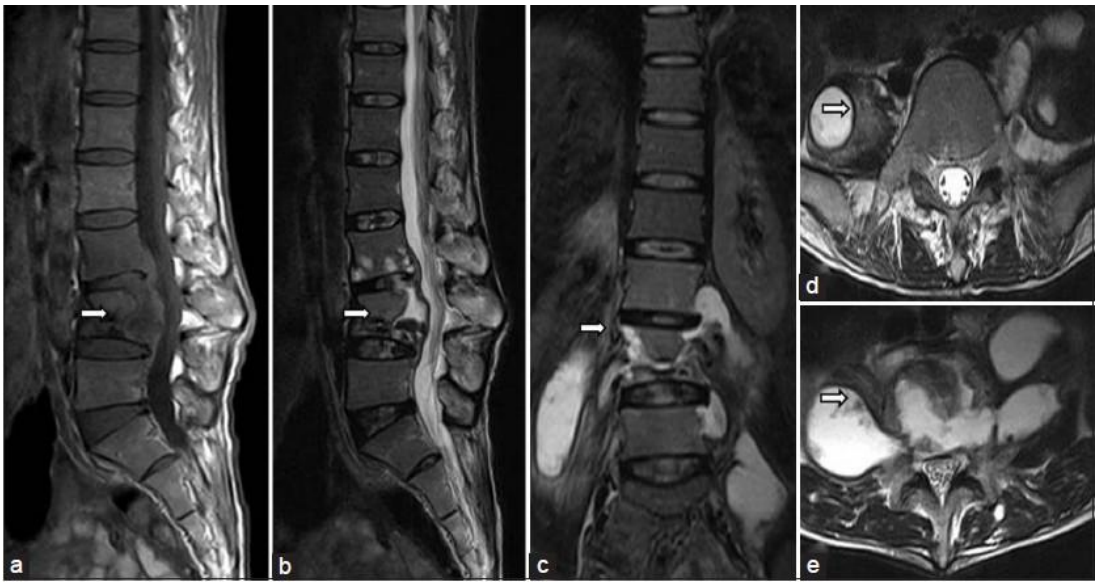

Figure 2: Magnetic resonance imaging of lumbar spine showing tuberculous spondylitis of L2, L3 and L4 vertebral bodies and bilateral pedicles with collapse (a-e).

Figure 3: Magnetic resonance imaging of dorsal spine showing multilevel tuberculous spondylitis of D7-D11 vertebral bodies and bilateral pedicles (a-e).

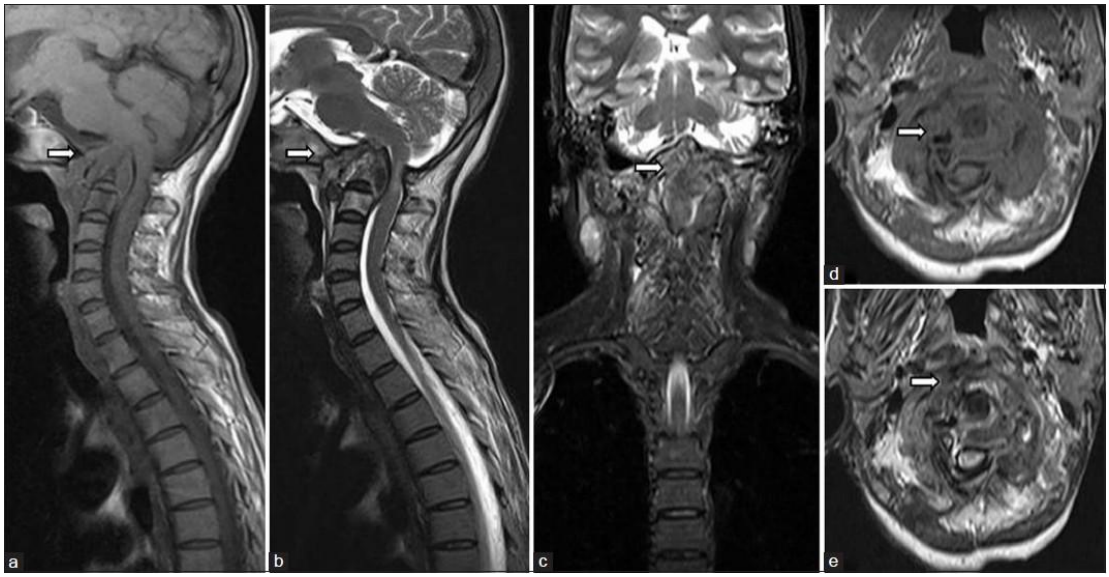

Figure 4: Magnetic resonance imaging of cervical spine showing tuberculous spondylitis involving C1-C2 and clivus (a-e).

Histology

In cases where a biopsy was performed but material was not sent for mycobacterial culture, histology can be very useful in suggesting the diagnosis. Histological evidence of mycobacterial infection has been reported in 94% of the synovial biopsy specimens,[16]

Microscopically, the inflammation produced with TB infection is granulomatous, with epithelioid macrophages and Langhans giant cells along with lymphocytes, plasma cells, maybe a few PMN's, fibroblasts with collagen,

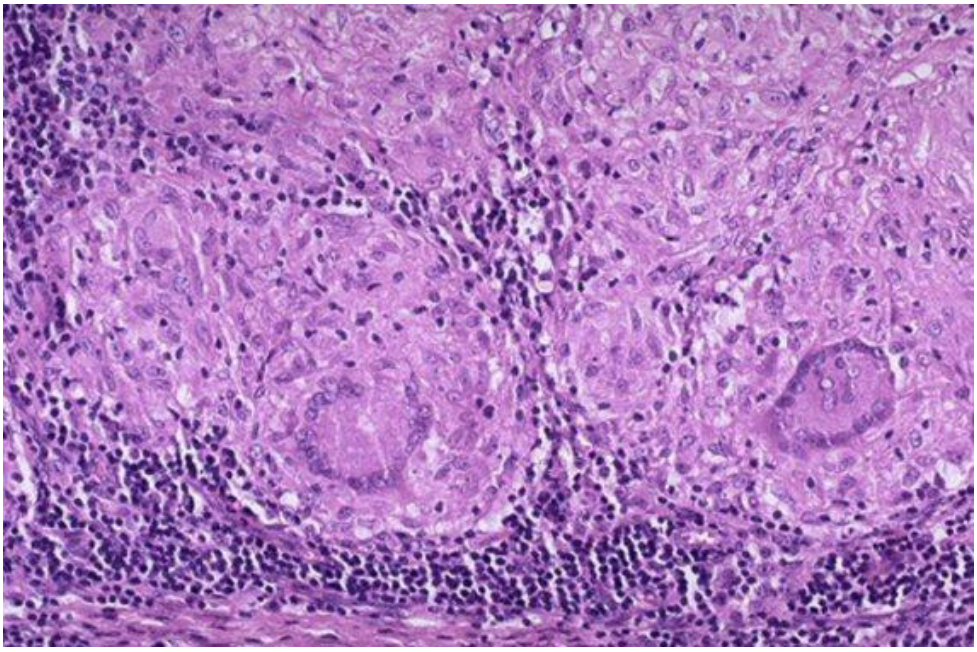

Fig 5: Under the microscope multinucleate giant cells and granulomatosis are seen

Treatment

Effective chemotherapy has been available for the treatment of TB for over 50 years now. Combined surgical and medical treatment gave excellent results. [17,18 ,19 ,20] Surgical treatment consisting of extensive posterior decompression/instrumented fusion and three-level posterior vertebral column resection, followed by anterior debridement/fusion

with cage reconstruction. A patient with progressive Pott's paraplegia and severe kyphotic deformity, for whom medical treatment failed, posterior vertebral column resection, multiple level posterior decompression, and instrumented fusion, followed by an anterior interbody fusion with cage was used to decompress the spinal cord, restore sagittal alignment, and debride the infection.[17,19,21,22,23]

Currently, treatment of spinal tubercular infections requires a multidisciplinary team that includes infectious diseases experts, neuroradiologists, and spine surgeons. The key to successful management is early detection and timely and judicious surgical intervention, the decision of which needs to be taken in view of clinicoradiological compression of the spinal cord and nerve roots, age of the patient and responsiveness of antitubercular therapy (ATT). [24,25,26,27]

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