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Spinal Tuberculosis- A Complete Review

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***Abstract*: Tuberculosis of the spine, also known as tuberculosis spondylitis or Pott's disease is a type of extra pulmonary TB that accounts for skeletal TB that affects the different regions of the vertebral column, mainly the thoracic region. Children and young adults are more likely to develop spinal tuberculosis and it accounts for 10% of extra pulmonary tuberculosis and 50% of the total skeletal tuberculosis cases around the world. Spinal tuberculosis is caused by a bacterium known as Mycobacterium tuberculosis. The bacterium mainly spreads through air droplets released into the air during coughing and sneezing. The hematogenous spread of Mycobacterium tuberculosis from the primarily affected region such as the lung or the genitourinary system to the cancellous bones of the vertebral column through the lymph nodes leads to spinal tuberculosis. The most common signs and symptoms include back pain, fever, night sweats, anorexia(loss of appetite) which leads to unhealthy weight loss, local pain and tenderness, muscle spasms, a cold abscess(abscess that lack intense inflammation). The diagnosis of spinal tuberculosis is made accordingly with the presence of specific clinical and neuroimaging findings. Early diagnosis and management help to improve the prognosis of the disease and prevent permanent neurological defects and helps to reduce spinal deformities. This review covers the detailed aspects of spinal tuberculosis. Using the PubMed and Google Scholar databases, an extensive review of the literature was conducted**

***Keywords*: Spinal tuberculosis, TB, extra pulmonary, skeletal TB, Mycobacterium tuberculosis.**

1. Introduction

Tuberculosis (TB) is an infectious disease that commonly affects the lungs. It is mainly caused by the bacterium known as mycobacterium tuberculosis. It also spreads to other parts of the body, such as the brain and spine. Tuberculosis of the spine, also known as tuberculosis spondylitis or Pott's disease is a type of extrapulmonary TB that accounts for skeletal TB that affects the different regions of the vertebral column, mainly the thoracic region. Sir Pericivall Pott, a British surgeon was the first person who described the disease in the late 18th century, hence the name pott's disease. Children and young adults are more likely to develop spinal tuberculosis and it accounts for 10% of extrapulmonary tuberculosis and 50% of the total skeletal tuberculosis cases around the world [1]. Spinal tuberculosis is also caused by the bacterium Mycobacterium tuberculosis which spreads from the lungs or genitourinary system to the cancellous bones of the vertebral column through blood and lymph nodes. Other areas of the body are usually infected before moving into the spine. Spinal tuberculosis can cause permanent neurological problems and severe spinal deformities which can be controlled in most cases. Early diagnosis and treatment of the disease helps to prevent permanent neurological defects and helps to reduce spinal deformities.

2. Spinal Tuberculosis

Spinal tuberculosis is a spinal infection where the bacterium invades the spinal column which leads to the destruction of intervertebral disc space, inflammation of bones (osteomyelitis), spinal deformities such as kyphosis (hunchback), destruction of the mechanical stability of the spine, and neurological defect such as paraplegia. The most common signs and symptoms include back pain, fever, night sweats, anorexia(loss of appetite) which leads to unhealthy weight loss, local pain and tenderness, muscle spasms, a cold abscess(abscess that lack intense inflammation[2].

1) Cause and spread of the disease

Spinal tuberculosis is caused by a bacterium known as Mycobacterium tuberculosis [3]. Diabetes mellitus, malnutrition, immunosuppressive treatment, chronic alcoholism, HIV are the predisposing factors for tuberculosis which is also the same for spinal tuberculosis [4]. The bacterium mainly spreads through air droplets released into the air during coughing and sneezing. The hematogenous spread of the Mycobacterium tuberculosis from the primarily affected region such as the lung or the genitourinary system to the cancellous bones of the vertebral column through the lymph nodes leads to spinal tuberculosis [5]. Once infected the fibrous annular wall of the vertebrae weakens, decay and collapse causing the disc space to close which then squeezes down on nerve root causing pain. The infection then spreads to vertebral bodies above and below the disc.

2) Diagnosis

The diagnosis of spinal tuberculosis is made accordingly with the presence of specific clinical and neuroimaging findings.

1. Blood Tests- complete blood count shows an increase

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in leukocytes and elevated erythrocyte sedimentation rate (ESR >100mm/h) is observed.

2. Tuberculin skin test (Mantoux test)- shows positive for most of the patients with spinal TB.
3. ELISA test shows the presence of anti TB antibodies.
4. Chest X-Ray- chest X-ray helps to confirm the coexisting pulmonary TB.
5. Radiographs- vertebral radiography provides sufficient information for the diagnosis of spinal tuberculosis. The main radiographic findings include destruction of the vertebral body along with erosion and wedging. Reduction of the disc space indicates an early sign. Various deformities can be observed depending on the number of vertebrae affected [6].
6. Computed Tomography of the spine (CT scan) - CT helps to demonstrate the presence of any cold abscess in the spine.
7. Magnetic Resonance Imaging (MRI) -MRI helps in the easy diagnosis of cold abscess, spinal deformities, destruction of the disk, or vertebral collapse [7].
8. Bone scan- it helps in the identification of metastatic lesions in the bones.
9. Biopsy of the lesion- Computed Tomography guided needle biopsy from the affected site is a gold standard technique for diagnosis of spinal tuberculosis, the specimen is then submitted for microbiology and culture.

3) Treatment

Spinal tuberculosis is mainly managed with anti-tuberculosis chemotherapy and surgery [8]. The basic principles of management include early diagnosis, expeditious medical treatment, surgical approach, and prevention of deformity. The duration of treatment is mainly 12 months which may be extended to 18 months depending on the cases.

4) Antituberculosis chemotherapy

The treatment of spinal tuberculosis belongs to category I of WHO guidelines for the treatment of tuberculosis. It includes

- The initial phase and continuation phase.

Antitubercular drugs	Dose	Duration of therapy
Isoniazid(H)	5 mg/kg	2 months
Rifampin(R)	10-15 mg/kg	
Pyrazinamide(Z)	20-25 mg/kg	
Ethambutol(E)	25 mg/kg	

- Continuation phase(daily or 3 times weekly)

Isoniazid(H)	5 mg/kg	4 months
Rifampin(R)	10-15 mg/kg	

Isoniazid(H)	5 mg/kg	6 months
Ethambutol(E)	25 mg/kg	

Second line agents include- Amikacin, ciprofloxacin, Para-aminosalicylic acid, Kanamycin, Levofloxacin, Clarithromycin, Rifabutin, and Azithromycin. They are indicated in case of drug resistance observed with first line agents.

5) Surgery Procedures

Surgery procedures are mainly carried out in patients with neurological defects, spinal deformities like kyphotic deformities, and paravertebral abscess. The main surgical techniques include

1. Debridement surgery- It focuses on the removal of puss, caseous tissue, sequestrum without the removal of unaffected bone, and decompressing the spinal cord
2. Anterior and posterior debridement and reconstruction- helps in the long-lasting correction of kyphosis [9].
3. Radical surgery- involves the radical excision of tuberculous focus and repair of the gap formed with autogenous bone graft.
4. Costotransversectomy- this technique helps to evacuate abscess in the dorsal spine.
5. Anterolateral Decompression- this technique is used to correct spinal deformity.
6. Transthoracic Transpleural approach- this technique is described for anterior lesion clearance and reconstruction by bone grafting.

3. Conclusion

Spinal tuberculosis accounts for 10% of the total extrapulmonary tuberculosis cases around the world. It is the infection of the spinal column by Mycobacterium tuberculosis that destroys intervertebral disc space, inflammation of bones (osteomyelitis), spinal deformities such as kyphosis (hunchback), destruction of the mechanical stability of the spine, and neurological defect such as paraplegia. Spinal tuberculosis is mainly managed with antituberculosis chemotherapy and surgery early diagnosis and management help to improve the prognosis of the disease. Antitubercular chemotherapy is generally effective and surgical procedures are carried out in cases of spinal deformities, abscess formation, and paraplegia. Spinal tuberculosis mainly affects children and young adults and the only way of preventing it is by controlling the spread of tuberculosis.

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