Comparison of Pyogenic Spondylitis and Tuberculous Spondylitis

dr. Ira Juliet Anestessia, SpOT
Faculty of Medicine, Universitas Trisakti
Department of Surgery
25 July 2025

Introduction

- Pyogenic spondylitis and tuberculous spondylitis are common cause of spinal infection
- Tuberculous spondylitis common in developing countries. It accounts for 1% of all tuberculous infection and 25% to 60% of all bone and joint infections.

Classification

According to

1. Histologic response
   - Pyogenic (bacteria)
   - Granulomatous (mycobacteria., fungi, brucella, and syphilis)
   - Parasitic
2. Anatomic location and spread route
   - Vertebral osteomyelitis
   - Discitis
   - Epidural abscess
   - Hematogenous (according to spread route)

Incidence

Pyogenic Spondylitis

- Pyogenic spondylitis is rare (0.15% to 3.9% of all osteomyelitis cases)
- Pyogenic infection is more common in lumbar, followed by thoracic and cervical spine

Tuberculous Spondylitis

- Bone joint involvement is about 10% of patient with tuberculosis and half of these have tuberous infection.
- Tuberous infection is more common in thoracic region, followed by lumbar and cervical spine

Aetiology and Bacteriology

Pyogenic Spondylitis

- Spondylodiscitis (bacterial, mycobacterial, fungal and parasitic).
- Staphylococcus aureus is the predominant pathogen accounting for half of non tuberculous case (range 20%-84%)
- Streptococci (viridans type B haemolytic streptococci, particularly group A and B) and enterococci are well known to be cause of spondylodiscitis (5%-20%)
- Probable source of infection are soft tissue and respiratory tract infection.
- Gram negative organism are Escherichia coli, Pseudomonas sp, and proteus. Patient related to genitourinary tract infection

Tuberculous Spondylitis

- Tuberculous spondylitis is most commonly caused by Mycobacterium tuberculosis

Pathogenesis and Pathology

Pyogenic Spondylitis

- Hematogenous spread, direct inoculation or from contigous tissue
- Arterial route to metaphyses and cartilaginous end plates
- Disc is destroyed by bacterial enzyme
- Involves the thoracic and lumbar spine

Tuberculous Spondylitis

- Venous route (Batson's paravertebral venous plexus)
- Destruction of anteriorinferior part of vertebral bodies and spread beneath the anterior spinal ligament (abscesses)and periosteum
- Do not destroy disc

Diagnosis

Variable	Pyogenic Spondylitis	Tuberculous Spondylitis
Age	Relatively old	Relatively young
Duration to diagnosis	Short symptoms to diagnosis	Long symptoms to diagnosis
Clinical symptoms	Non specific severe pain High Fever Neurologic manifestation	No pain No fever Gradual progress
ESR, CRP, PCR	Markedly increased ESR, CRP	Mildly increased ESR, CRP, formaldehyde solution-fixed, paraffin-embedded tissue specimen (+)
Radiologic Exam	Narrowing disc space, irregularity of endplate, osteolytic changes and followed by new bone formation and osteosclerotic changes at vertebral margin.	In the early tuberous spondylitis the disc space is preserved more than pyogenic spondylitis. Osteoporosis of body and irregularity endplate.

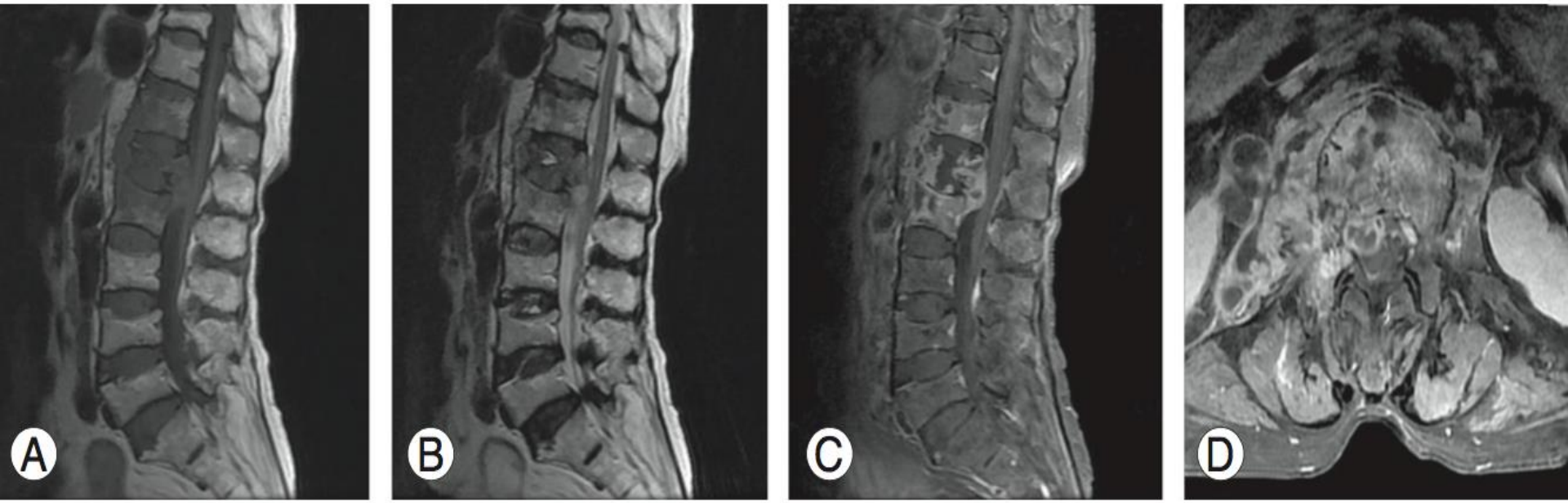
Magnetic Resonance Imaging

- Acute fase: low signal in T1-weight and high signal intensity in T2-weighted due to edema of bone marrow.
- Chronic Fase: high signal intensity in T1-weighted or low signal intensity in both T1 and T2 weight if vertebral bodies has collapse and has irregular endplate sclerosis.
- Hence contrast of godalinium are required to differenciate tuberculous spondylitis.

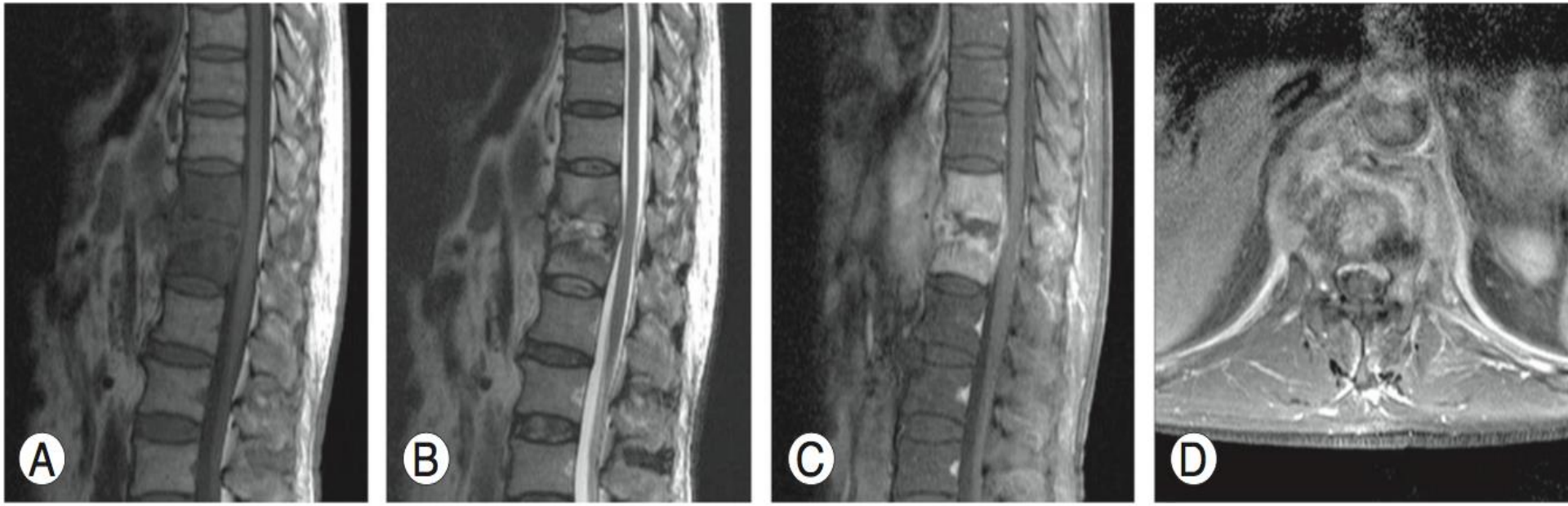
MRI findings in Pyogenic compare to Tuberculous Spondylitis

Variable	Pyogenic spondylitis	Tuberculous spondylitis
Para- or intraspinal abscess	Absence	Presence
Abscess wall	Thick and irregular	Thin and smooth
Postcontrast paraspiinal abnormal signal margin	Ill-defined	Well defined
Abscess with postcontrast rim enhancement	Disc abscess	Vertebral intraosseous abscess
Vertebral body enhancement pattern	Homogeneous	Heterogeneous and focal
Involvement of vertebral bodies	Involvement ≤2 vertebral bodies	Multiple body involvement
Commonly involved region	Lumbar spine involvement	Thoracic spine involvement
Degree of disc preservation	Moderate to complete disc destruction	Normal to mild disc destruction
Bony destruction more than half	Infrequent and mild to moderate	Frequent and more severe

Tuberculous Spondylitis



Pyogenic Spondylitis



Treatment

The aim:

- Eradicate the infection
- Restore and preserve the structure and function of the spine
- alleviate the pain

Conservative Management

- Antimicrobial
  - Parenterally given for 6 weeks followed with oral conversion
  - Tuberculous spondylitis: Multiple drugs based on the mechanism of the action and toxicity. Duration is 6 months consist of isoniazid, rifampin and pyrazinamide
- Physiotherapy
- Immobilization
  - Bed rest, to pain control and prevention deformity or neurologic deterioration
  - Orthosis
  - It depends on location of infection, degree of bone destruction, and deformity and response to treatment.

Surgical Management

Indication:

- To acquire bacteriological and histological verification
- If there is severe pain
- if clinically important abscess is formed
- If there is no response after injecting an appropriate antibiotic
- If spine is deformed or such need to prevented due to severe damage to the bone
- If ther is neurological deficit

The aim of surgery is:

- To drain abscess
- To debride sequestered bone and disc
- To decompress the spinal cord
- To stabilize the spine for prevention and correction deformity

Surgical management:

- Anterior or posterior approach

  Anterior app: adequate debridement

  Posterior app: better deformity correction, faster fusion, lower risk for infection

- Single-stage or two-stage surgery

  single-stage: lower complication rate, shorter hospital stay and early immobilization

  two-stage: shorter operation time, less blood loss, poorer general health

- With or without instrumentation

  titanium mesh cage give better anterior column support, lower adherence than stainless steel.

Mostly agree anterior radical debridement and strut graft fusion is superior, but anterior graft may not provide stable fixation especially if it is more than two-disc spaces.

conclusions

Pyogenic spondylitis and tuberculous spondylitis entail various type of clinical behavior and differential diagnosis is less likely to be conducted. Clinically and radiologic are beneficially utilized on differential diagnosis before culture examination or pathologic examination.

THANK YOU