TUBERCULOSIS OF BONES & JOINTS

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General Considerations
(1) Specific life-threatening infection before the invention of effective antibiotics and chemotherapy.

(2) Now incidence of TB increase. (different etiology between developing & developed country)

(3) Tuberculosis often overlooked in differential diagnosis.
Mycobacterium tuberculosis infection of the musculoskeletal system occurs mainly from hematogenous spread and typically involves the vertebral column or a single bone or joint.
Foci of infection maybe be found in the lungs, gastrointestinal tract, or kidneys but are often occult.
Pathological stage

- Stage 1  effusion
- Stage 2  proliferation
- Stage 3  cheesy degeneration

3 results (turnover)
- Fibration or Calcification---healed
- Infection localized---balance
- aggravation
CLASSIFICATION

(1) Skeletal TB: cancellous (central, edge); cortical; metaphysis.

(2) Articular TB: synovial TB; articular TB.

(3) Pott’s disease (tuberculosis of the spine).
A. Symptoms and Signs:
Generally

- Common manifestation of TB:
  - low-grade fever;
  - debilitation;
  - night-sweat;
  - Decreased food appetite;
  - weight loss
• The onset is usually insidious, with gradually developing limitation of motion and mild pain that is worse at night.
Extremities

- Swelling and tenderness of local area
- With joint involvement, contracture develops, and adjacent muscles become atrophied from disuse.

- "Cold abscess" formation: An abscess not accompanied by heat or other usual signs of inflammation.
- This type of abscess may appear anywhere on the body, but it is most commonly found on the spine, hips, lymph nodes, or in the genital region.
- **Sinus formation**: An abscess may drain spontaneously to produce a sinus.
Tuberculosis of the hip---sinus formation
Spine

• Bone destruction can produce deformity, particularly a sharply angled gibbus resulting from thoracolumbar spine involvement.

• Back pain from stimulus of nerve and local disorganization.

• Spinal cord or nerve root affected---paralysis and paraesthesia of extremities
“Cold abscess” formation

Paravertebral abscess: retropharyngeal, retrotracheal, paraspinal line, psoas, iliac fossa etc

Psoas abscesses frequently calcify in a “snowflake” dense pattern.

Five percent of spine TB develop a psoas abscess.
Findings from surgical exploration

Caseating necrosis

Synovial hypertrophy with pannus formation

Rice bodies (small, free white bodies composed of compact masses of fibrin, necrotic synovial villi, cartilage fragments)
- Laboratory finding WBC, ESR, tuberculin skin test (or PPD test)
- Histologic findings of caseating necrosis and giant cells may be characteristic but are not specific for the causative organism.
Discovery of *M. tuberculosis* (or other mycobacteria) from joint fluid, pus, or a tissue specimen is the key to diagnosis.

**Acid-fast stain**

Special culture techniques are required.
C. Imaging Studies:
Radiologic features (spine)

a. Spinal tuberculosis is most common at L-1, with lower thoracic and upper lumbar also being favored sites.

b. Early signs for spine are lytic endplate destruction, loss of disc height, anterior “gouge defects”, paraspinal swelling (retropharyngeal, retrotracheal, paraspinal line, psoas).

c. Advanced sign for spinal involvement are vertebral body collapse, gibbus formation, and obliteration of the disc.

d. “Long vertebra” is found associated with extensive gibbus deformity from tuberculosis.
Details

Early

Lytic destruction at the anterior subchondral endplate
Loss of disc height

Late

Vertebral collapse
Obliteration of the disc space
Gibbus formation
Abscess formation
  Retropharyngeal (cervical spine)
  Paravertebral (thoracic spine)
  Psoas (lumbar spine)
Multiple segments involved
Anterior vertebral scalloping (gouge defects)
Radiologic features (extremities)

- Tubercular arthritis is common in the hip and knee.
- Uniform joint-space narrowing, early destruction of the subchondral cortex (cortical white line), “moth-eaten” bone destruction, and juxtaarticular osteoporosis are the cardinal roentgen signs of tubercular arthritis.
Details

Extremities

Early

- Joint widening secondary to effusion
- Soft tissue swelling
- Marginal erosions (corner defects)

Late

- Symmetrical obliteration the joint space
- Destruction of the subcortical bone (white line)
- Juxtaarticular osteoporosis

Occasional ankylosis
Radiologic features

Figure 12.42. DISCOVERTEBRAL INVOLVEMENT (TB). A. Observe the narrowing of the disc space between L2 and L3 and resorption of the subchondral cortical vertebral endplate on the inferior surface of L2 and the superior portion of L3. B. This tomographic projection demonstrates much further lytic resorption of the vertebral endplates of L2 and L3 than can be appreciated on the plain films. COMMENT: Most tubercular infections of the spine involve the discovertebral area, with extension into the vertebral pedicle and neural arch being rare. Most neural arch involvement in tuberculosis is found in tropical climates and occurs only in 2% of the spinal cases of tuberculosis.
Radiologic features

Figure 12.46. BILATERAL PARASPINAL ABSCESS FORMATION. Observe the linear radiopacities (arrows) adjacent to the extensive destruction of the lower thoracic spine. These represent necrotizing abscesses. Close inspection of the thoracic spine demonstrates collapse of the vertebral bodies (arrowheads) at the focus of the tubercular process. COMMENT: Abscess formation in tuberculosis can produce extensive soft tissue swelling on radiographs, which appears out of proportion to the degree of osseous and discal destruction. The swelling is usually fusiform in its appearance.
Radiologic features

**Figure 12.47. Psoas Abscess.**

**A.** There is a bilateral increased density in the area of the psoas muscles. Observe the “snowflake,” dense type of calcification present throughout both psoas muscles (arrows). The primary source of the tuberculosis was at the L1 and L2 vertebral segments, where loss of disc height and some destruction of the vertebral bodies can be visualized. (Reprinted with permission: Yochum TR, et al: Tuberculosis of L1/L2, with psoas cold abscesses. ACA J Chiro, Radiology Corner, June 1982)

**B.** There is an increase in density in the area of the soft tissues about the lesser trochanter (arrows) of the proximal femur. This represents the distal extension of a tubercular psoas abscess from more proximal disease in the lumbar spine. (Courtesy of Bryan Hartley, MD, Melbourne, Australia)

**COMMENT:** Psoas abscess is most commonly found paraspinally, between L1 and L5. Approximately 5% of the cases of tubercular spondylitis have associated psoas abscess formation. Calcification is a sign of inactivity of the infectious process and may become quite dense with progressive healing.
 Essentials of Diagnosis

1 Local signs of inflammation, abscess, synovial hypertrophy, or joint destruction on physical examination or radiographs.

2 Histologic confirmation of chronic inflammation with caseating granulomas.

3 Confirmatory cultures of acid-fast organisms on smear.
Differential Diagnosis
Other subacute and chronic infections of joints, bones, or the tendon sheath must be considered, in addition to rheumatoid arthritis, gout, and fibrous dysplasia of bone.
- Spinal tuberculosis is often mistaken for the metastatic cancer, a more common complication of malignant tumor.

- This error should be avoided because of the different treatments involved and the relatively good prognosis for recovery, even with the neurologic involvement, when tuberculosis of the spine is properly diagnosed and treated.
Complications
Spinal cord involvement with paralysis from spinal tuberculosis (Pott's disease) is the most serious musculoskeletal complication of this potentially life threatening systemic infection.
Deformity, ankylosis, abscess formation, and sinus tracts are, as mentioned above, other potential complications of untreated skeletal tuberculosis.
Treatment
Early skeletal tuberculosis will usually respond well to appropriate antibiotic treatment.

Nutritional support, rest, and immobilization are valuable adjuncts.
A. Medical Treatment
Chemotherapy of osteoarticular tuberculosis relies on **systemic administration** of drugs.

In vitro sensitivity testing helps to indicate which drugs should be used.
Isoniazid, rifampin, pyrazinamide, and ethambutol are the most widely used drugs.

Typical combinations include at least two of the four. A minimum of 6-9 months of adequate treatment is required.
B. Surgical Treatment:
Biopsy

Biopsy is often required to establish the diagnosis and obtain organisms for culture and sensitivity studies.
Drainage

Abscess should be drained surgically before drainage occurs spontaneously, creating a risk of superinfection.

Synovectomy

Synovectomy may speed recovery and help preserve function of involved joints and tendon sheaths.
Surgery is sometimes necessary.

a. Anti-TB drug had taken at least 2 weeks.

b. **Indication:**
   - large necrotic bone formation;
   - large abscess formation which could not be absorbed or drained spontaneously;
   - chronic sinus;
   - Spinal TB caused paralysis (spinal cord injury);
   - synovial TB or skeletal TB—**not controlled**—
   - articular TB

c. Debridement and bone graft.
Prognosis and progresses
Residual pain and limitation of motion may be problems following tuberculous arthritis of the joint.

If the disease is under medical control and has been quiescent for many years, satisfactory results can be achieved with total joint arthroplasty.
Thank you!