Skeletal Infections

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Pyogenic Osteomyelitis

- Hematogenous
- Usually children
- Metaphyseal
- Staphylococcus and strep most common
- Increasing incidence of gram negatives
Pathomechanics

- Sluggish metaphyseal blood flow
- Bacterial lodgment
- Abscess formation
- Increasing pressure and pain
- Subperiosteal spread
Pyogenic Osteomyelitis

- Vessel thrombosis
- Extension of thrombus
- Emigration of neutrophils and antibodies
Pyogenic Osteomyelitis
Pyogenic Osteomyelitis

periosteum

nutrient vessels
Pyogenic Osteomyelitis

Subperiosteal stripping extends

Metaphyseal abscess

Physeal plate acts as a barrier
Clinical Findings

• Abrupt onset of pain
• Swelling, erythema
• Pseudoparalysis
• Antalgic gait
• Focal tenderness to palpation
Laboratory Findings

• Elevated WBC
• Granulocytosis
• Elevated ESR, CRP
• Blood cultures positive in 50%
Differential Diagnosis - Kids

- Juvenile rheumatoid arthritis
- Ewing’s Sarcoma
- Rheumatic fever
- Acute pyarthrosis
Radiographic Findings

- Loss of soft tissue shadows
- Edema on MRI (bright T2 signal)
- Increased technetium, gallium, and indium uptake
- Periosteal elevation at 10 days
- Mottled metaphyseal lucency
Pyogenic Osteomyelitis
Pyogenic Osteomyelitis

Physeal plate is intracapsular

Pyarthrosis results from proximal femoral infection

Sequestered femoral diaphysis
Pyogenic Osteomyelitis

pathologic

dislocation
Pyogenic Osteomyelitis
Pyogenic Osteomyelitis

- Infarcted bone becomes sequestered
- Periosteum forms new ‘involucrum’
- Weakened bone may fracture
Pyogenic Osteomyelitis
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Limited response in patients treated with antibiotics
Pyogenic Osteomyelitis

Brodie’s abscess
Pyogenic Osteomyelitis

In the pre-antibiotic era, metastatic osteomyelitis, chronic draining sinuses, and physeal arrest were common. Mortality was approximately 50%.
Pyogenic Osteomyelitis
Pyogenic Osteomyelitis
Long Term Complications

- Fracture
- Deformity
- Recurrent drainage
- Squamous carcinoma
Pyogenic Osteomyelitis
Pyogenic Osteomyelitis

Squamous carcinoma arising in a chronic draining sinus
Exogenous Osteomyelitis

- Most often in adults
- Penetrating injury (trauma, surgery)
- Co-morbid conditions (DM, HIV)
- Often polymicrobial
Exogenous Osteomyelitis

Surgical implants, open fractures and diabetes are common sources of exogenous osteomyelitis.
Exogenous Osteomyelitis
Exogenous Osteomyelitis
Exogenous Osteomyelitis

Sequestrum after removal of an infected femoral nail
Pyogenic Arthritis

- Hematogenous from concurrent infection
- Penetrating trauma
- Staphylococcus, gonococcus
- Increased in diabetes, HIV
Pyogenic Arthritis Pathomechanics

- Synovial inoculation
- Joint effusion
- Acute inflammatory infiltrate
- Cartilage destruction
- Secondary osteomyelitis
Pyogenic Arthritis
Clinical Findings

- Acute onset
- Pseudoparalysis
- Joint effusion, erythema
- Elevated CBC, ESR, CRP
Pyogenic Arthritis
Differential Diagnosis

• Acute rheumatic fever
• Juvenile rheumatoid arthritis
• Other inflammatory arthritides
Pyogenic Arthritis
Pyogenic Arthritis
Pyogenic Arthritis
Pyogenic Arthritis

Femoral head from elderly diabetic with gram negative pyarthrosis showing loss of cartilage from the weight bearing surface.
Skeletal Tuberculosis

- Always secondary to a pulmonary or GI focus
- Increasing incidence in recent years mostly in association with HIV
- Spine most frequently involved
- Hips, knees, other in that order
Skeletal Tuberculosis
Pathomechanics

- Hematogenous spread
- Synovial or subchondral lodgment
- Granulomatous inflammation
- Cartilage destruction
- Cold abscess, sinus tracts
Skeletal Tuberculosis
Skeletal Tuberculosis

- ‘tubercle’
- histiocytes
- lymphocytes
- giant cells
Skeletal Tuberculosis

PAS positive organisms
Skeletal Tuberculosis
Clinical Findings

• Insidious onset
• Systemic symptoms precede skeletal ones
• Pott’s paraplegia, joint swelling, deformity
• Fever, elevated ESR
• Spine 30-40%
• Hip 20-25%
• Knee 15-20%
Skeletal Tuberculosis
Radiographic Findings

- Marginal joint erosion (‘rat bite’)
- Symmetrical joint narrowing
- Periarticular osteoporosis
- Soft tissue swelling/effusion
- Kissing sequestra
- Lymph node calcification
Skeletal Tuberculosis
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Skeletal Tuberculosis
Fungal Infection

- Rarely encountered
- Occur secondary to soft tissue infection
- Lesions are similar
- Blastomycosis - Eastern US
- Coccidioidomycosis - San Joaquin Valley
Fungal Infection

- granulomatous inflammation
- clusters of polys...
- histiocytes
Fungal Infection

budding yeast
forms of N.A.
blastomycosis
Fungal Infection

Coccidioidomycosis
Summary
Pyogenic osteomyelitis

- Most common in children, hematogenous
- Sluggish blood flow in the metaphysis
- Staph and strep are most common
- Blood cultures positive 50%
- IV Abx if no abscess
- Surgical debridement for abscess
- Chronic leads to deformities
Summary
Pyogenic osteoarthritis

- Hematogenous spread
- Staph and Gonococcus (young adults) is most common
- Pressure and inflammation cause erosion of joint cartilage
- Treatment: usually involves arthrotomy and IV Abx
Summary
Skeletal TB

• Incidence is on the rise
• Hematogenous spread
• Spine, hip and knee
• Significant hematogenous spread
• Granulomas and organisms seen on staining
• Treatment: TB meds and debridement
What is this?

Involucrum

What is this?

Sequestrum
Describe x-ray and give differential