1. Infections of the Bones and Joints

Case 1

A 9 year old girl with a recent history of a sty of her eyelid developed fever and right hip pain. Initial radiographs of the hip showed an increase in the joint space, evidence of infection of the right hip.
Case 1: Radiograph 1

Four weeks later, a repeat radiograph showed progressive destruction of the joint with the loss of joint space and bony lesions involving the proximal femur, ileum and ischium. This case illustrates septic arthritis progressing to osteomyelitis.
5. Case 1: Radiograph 2

![Case 1: Radiograph 2](image)

6. Osteomyelitis

**Osteomyelitis**

Definition: Infectious process involving the various components of bone characterized by progressive inflammatory destruction of bone, necrosis and new bone formation

- Acute osteomyelitis
- Chronic osteomyelitis
7. Pathophysiology of Osteomyelitis (1)

Pathophysiology of Osteomyelitis

- Hematogenous spread
  - Children – distal femur, proximal tibia
  - Adults – axial skeleton
- Contiguous spread
- In association with vascular insufficiency

8. Brodie’s Abscess
9. Pathophysiology of Osteomyelitis (2)

Pathophysiology of Osteomyelitis

- Hematogenous spread
  - Children – distal femur, proximal tibia
  - Adults – axial skeleton
- Contiguous spread
- In association with vascular insufficiency

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10. Risk Factors for Osteomyelitis

Risk Factors for Osteomyelitis

- Foreign materials
- Sickle cell disease
- Diabetes
- Congenital PMN defects
- Soft tissue infection
- Surgery
- Trauma?

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11. Diagnosis of Osteomyelitis (1)

Diagnosis of Osteomyelitis

History
- Presence of risk factors
- Symptoms of inflammation

Physical examination
- Signs of inflammation
- Decreased range of motion
- Drainage, sinus tracts, ulceration

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12. Diagnosis of Osteomyelitis (2)

Diagnosis of Osteomyelitis

Radiographic studies
- routine radiographs
- bone scan
- computed tomography (CT scan)
- magnetic resonance imaging (MRI)

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13. Radiographic Findings of Osteomyelitis

Radiographic Findings of Osteomyelitis

Salmonella osteomyelitis of the tibia:
• cortical destruction
• new bone formation
• fissure in cortical bone

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14. Diagnosis of Osteomyelitis (3)

Diagnosis of Osteomyelitis

Radiographic studies
• routine radiographs
• bone scan
• computed tomography (CT scan)
• magnetic resonance imaging (MRI)

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15. Diagnosis of Osteomyelitis: Radiograph 1

![Radiograph 1](image1)

16. Diagnosis of Osteomyelitis: Radiograph 2

![Radiograph 2](image2)
17. Diagnosis of Osteomyelitis (4)

Diagnosis of Osteomyelitis

Bone biopsy
- Pathology: abundant PMN
- Microbiology: positive culture

18. Major Pathogens in Osteomyelitis

Major Pathogens in Osteomyelitis

Neonates:
- *S. aureus*, streptococci

Infants:
- *S. aureus*

Later in life:
- *S. aureus*
- “Mixed infections”
19. Special Pathogens in Osteomyelitis

- *Salmonella* - immunocompromised, sickle cell disease
- *Pasteurella multocida* - cat bites
- *M. tuberculosis* - hematogenous spread during primary disease
- Fungi - intravenous device infections or immunosuppression

20. Treatment of Osteomyelitis

**INDIVIDUALIZE!**

Medical and surgical modalities

Treatment “failures”
21. Medical Treatment of Osteomyelitis

Medical Treatment of Osteomyelitis

Antibiotics
- Treats live infected bone
- Ex. S. aureus osteomyelitis – oxacillin +/- aminoglycoside
- Duration – long-term

Optimal management of underlying conditions (ex. diabetes)

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22. Surgical Treatment of Osteomyelitis

Surgical Treatment of Osteomyelitis

Debridement

Revascularization

Ablation or amputation

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Case 3

A 53 year old woman presents to the emergency room with a 2 to 3 day history of fever and chills, followed by the abrupt onset earlier in the day of wrist pain, swelling and redness.
25. Septic Arthritis

**Septic Arthritis**

Definition: Infection of the joint space

- Monoarticular
- Polyarticular
- Suppurative
- Nonsuppurative

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26. Pathogenesis of Septic Arthritis

**Pathogenesis of Septic Arthritis**

- Hematogenous spread
- Direct inoculation
- Contiguous infection
- Rapidly destructive process

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27. Groups at High Risk for Septic Arthritis

Groups at High Risk for Septic Arthritis

- Elderly
- Children < 2 y of age
- Injection drug users
- Hemodialysis patients
- Sexually active persons
- Persons taking steroids
- Diabetics

Patients with
- Cancer
- Rheumatoid arthritis
- Joint prostheses
- Trauma
- Intravenous catheters

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28. Diagnosis of Septic Arthritis

Diagnosis of Septic Arthritis

- History
- Physical examination
- Radiographs?

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29. Tuberculous Arthritis of the Hip

- Extensive destruction of the femoral head and neck due to bony resorption
- Protrusio Acetabula
- Soft tissue abscess

30. Laboratory Examination in Septic Arthritis

- Blood Culture – 10-50% are positive
- Synovial Fluid
  - WBC usually > 50,000/mm³
  - Gram stain – 1/3 are positive
  - Culture – 25-80% are positive
- Causative organisms identified in 2/3 of cases
31. Microbiology of Septic Arthritis

**Microbiology of Septic Arthritis**

Gram positive bacteria (70-80%)
- *S. aureus* - most common (> 35 to 40% of cases)
- *Streptococcus* species

Gram negative aerobic rods (9-20% of cases)
Gram negative cocci – *Neisseria gonorrhoeae*

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32. Gonococcal Septic Arthritis

**Gonococcal Septic Arthritis**

Incidence: 3 to 7.5 % of all cases
Sexually active persons
Disseminates from a mucosal site
Two presentations:
- Monoarticular septic arthritis
- Dermatitis-septic arthritis syndrome

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33. Case 3: Picture 2

34. Treatment of Septic Arthritis
35. Medical Treatment of Septic Arthritis

Medical Treatment of Septic Arthritis

Antibiotics

- Longterm
- Ex: *S. aureus*: oxacillin +/- aminoglycoside
- Ex: *N. gonorrhoeae*: ceftriaxone

Percutaneous arthrocentesis

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36. Surgical Management of Septic Arthritis

Surgical Management of Septic Arthritis

Arthroscopic or open surgical drainage for:

- Poorly accessible joints (hip)
- Suspected soft tissue extension
- Inadequate response to antibiotics
- Previously damaged joints (ex. rheumatoid arthritis)

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