Acute Osteomyelitis:
Pathogenesis, Early Identification and Prevention of Complications

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Pathogenesis

Infection Starts in Metaphysis
BACTERIA (Hematogenous Inoculum) →
Localise in metaphysis (Developing Metaphyseal Vessels Hair pin Bends >> Sluggish Circulation: Gaps in endothelium: Poor Phagocytosis in Metaphysis) →
Bacteria pass out of vessels →
Adhere to Type 1 collagen

Inflammatory response in “Inexpansile Rigid Compartment”
- Increased pressure in bone
- Decrease blood flow

Death of Bone
Pus and Necrotic Tissue
JOINT INVOLVEMENT in Children younger then 2 years
Blood Vessels cross the physeal area !!!!

HIP joint most commonly affected (Physes are intra-articular)

Other joints-Radial Neck /Distal Fibula /Proximal humerus.
Bacteriology

- **Infants**
  - Streptococcus B
  - Staphylococcus
  - E. coli

- **Children**
  - Staphylococcus aureus
  - Streptococcus pyogenous
  - Hemophilus influenzae

- **Adult**
  - Staphylococcus epidermidis
  - Staphylococcus aureus
  - Pseudomonas aeruginosa
  - E. coli
Early Diagnosis is Mandatory
History and Physical Examination

- High index of suspicion >> (Refusal)

- Fever is not always a consistent finding in INFANTS

- Classical triad
  - Pain and Tenderness (Most Common)
  - Fever
  - Swelling
• WBC increased in only 30-50% !!!

• Left Shift in 65%

• ESR increased 91%...24-36hrs, peak 3 to 5 days

• CRP increased 97%...4-6 hrs, peaks in 2 days
• **Blood Culture**
  - Positive in 30-60%
  - Decreased with antibiotic
  - Multiple cultures no significant increase in yield
  - 48 hours to get most organisms
Radiographs >> -ve Early case

**Soft Tissue**
- Swelling, obscured soft tissue planes, haziness

**Osseous (7-10 days).**
- Demineralization < Hyperemia
- Lysis (when > 40% resorbed)
- Periosteal reaction
- Sclerosis (late)
Bone Scan

- Mostly used – $^{99m}$Tc
- Positive within 24 to 48 hours
- Sensitivity 90 to 95%
- If negative rules out the diagnosis
MRI

• Sensitivity 98-100%, Specificity 98%

• Show early inflammatory changes in bone marrow and soft tissue.

• Detect Subperiosteal, Intraosseous pus and provide anatomic detail. (Soft tissue extension)

• Also helpful, when acute osteomyelitis does not respond to antibiotic therapy and localized abscess is suspected.

• Excellent for pelvis and Spine (Modic, RCNA, 1986)
  – Sensitivity 96%, Specificity 92%, Accuracy 94%
Aspiration Biopsy

- Very Useful, false negative in only 10-15%

- Area of maximum swelling and tenderness, usually long bone metaphysis

- Subperiosteal space should be aspirated, if no material, obtain marrow aspirate.

- Grams Stain, Culture, HPE
Complications

**Infection**
- Growth plate injury
- Recurrence
- Chronic osteomyelitis
- Pathologic fracture

**Antibiotics**
- Diarrhea
- Thrombocytopenia
- Neutropenia
- Rash
Prevention of Complications

Do Not Delay Diagnosis & Treatment
Treatment

General

- Hospitalization
- Hydration
- Electrolyte Balance
- Analgesia
- Immobilization (Rest to the affected part)
Antibiotics

- Early to PREVENT COMPLICATIONS

- Cephalosporins ..... 1\textsuperscript{st} drug of choice.

- Change as per culture

- Initially IV >>> then oral combinations

- 4 to 6 week depending on response

- Follow WBC / ESR/ CRP (CRP better then ESR )
Surgical Drainage

Indications:
• Demonstrable Pus
• Associated septic arthritis
• Failure of clinical response to antibiotics over 2-3 days

Procedure:
• Decompress abscess cavity
• Remove infected devitalized bone
• Surgery to improve local environment

Drilling:
For intraosseous abscess
Treatment

• Four principles
  – Identify organism (ultimate purpose)
  – Select correct antibiotics
  – Deliver the antibiotic to organism
  – Stop the tissue destruction
What is Osteomyelitis?

• **Inflammation of the bone caused by infecting organism.**

• Infection may be limited to a single portion of bone or may involve marrow, cortex, periosteum and surrounding soft tissue.

• **Usually Hematogenous- Children**
Poorly defined!

- Hematogenous spread
- Direct inoculation
- Local invasion
Evaluation of Acute Osteomyelitis

- History and Physical Examination
- Laboratory Tests: White blood cell count, ESR, CRP
- Plain Radiographs
- Technetium-99m Bone scan
- MRI
- Aspiration of Suspected Abscess
Radiographs

Early – Usually negative

Bony Changes – Delayed (7-10 days)
Differential Diagnosis

- Acute Septic Arthritis
- Acute monoarticular rheumatoid arthritis
- Sickle cell crisis
- Cellulitis
- Ewing’s Sarcoma