

Osteomyelitis in Children

Clinical Revision Sheet for 4th-Year Medical Students

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1. Definition

Osteomyelitis is an infection of the bone, usually caused by hematogenous spread of bacteria. It is an orthopedic emergency because delayed diagnosis may lead to bone destruction, growth disturbance, septic arthritis, or chronic infection.

2. Etiology

Common Pathogens

Age/Condition	Most Common Organisms
Neonates	Staphylococcus aureus, Group B Streptococcus, Escherichia coli
Infants & children	Staphylococcus aureus (most common), Kingella kingae (6 months–4 years)
Sickle cell disease	Salmonella spp., S. aureus
Penetrating foot injury	Pseudomonas aeruginosa

 Clinical Pearl: Staphylococcus aureus is the leading cause in all pediatric age groups.

3. Risk Factors

- Recent bacteremia or skin infection
- Minor trauma
- Male sex
- Sickle cell disease
- Immunodeficiency
- Neonates with central venous catheters
- Penetrating injuries or open fractures
- Orthopedic implants or prostheses

4. Clinical Presentation

Neonates

- Pseudoparalysis
- Irritability
- Pain with limb movement
- May be afebrile
- Multifocal disease is common

Older Children

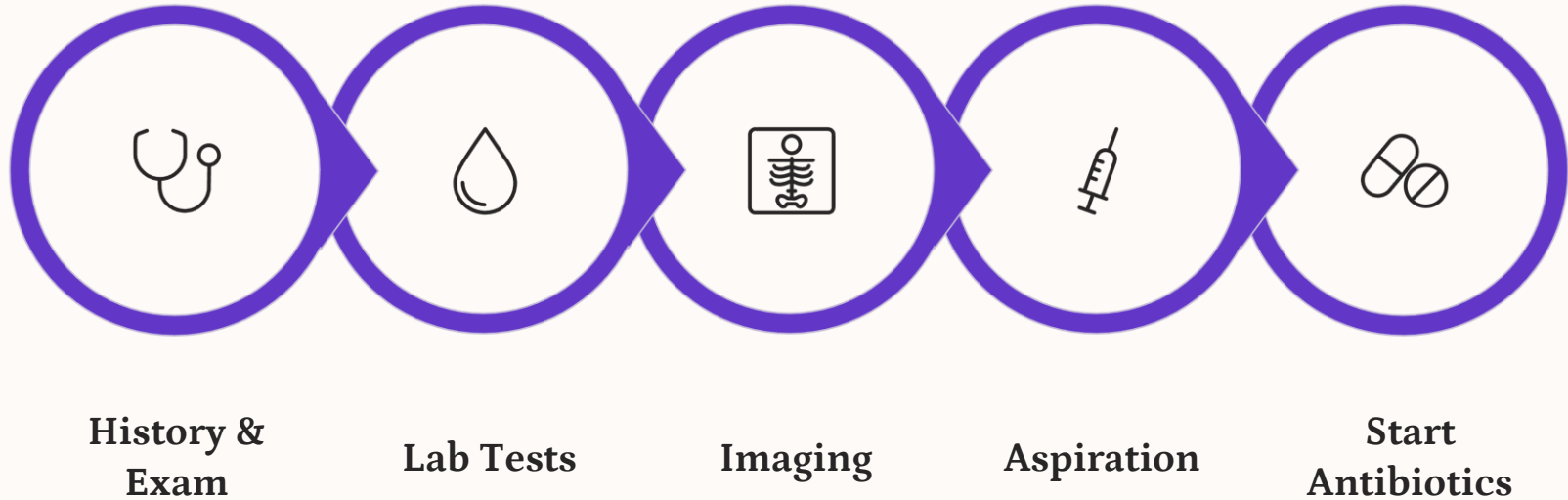
- Fever
- Localized bone pain
- Swelling
- Warmth
- Tenderness
- Refusal to bear weight or limp

Special Presentations

Site	Presentation
Pelvis	Hip, thigh, or abdominal pain
Vertebra	Back pain ± localized tenderness
Tibia	Brodie abscess (subacute osteomyelitis)

Most commonly affected bones: Femur and tibia.

5. Diagnostic Approach



Child with fever + localized bone pain/limp → History and physical examination → Laboratory tests (CBC, ESR, CRP, Blood culture) → Plain X-ray → MRI (preferred imaging) → Bone or abscess aspiration (if possible before antibiotics) → Start empirical antibiotics

6. Investigations

First-line

- CBC
- CRP
- ESR
- Blood culture
- Plain radiograph
- MRI (gold standard imaging)

Diagnostic Specimens

- Blood culture (obtain before antibiotics)
- Bone or abscess aspiration for Gram stain and culture

Additional Tests (Selected Cases)

- PCR for *Kingella kingae*
- CT scan (if MRI unavailable or contraindicated)
- Bone scan (multifocal disease or uncertain site)

7. Differential Diagnosis

Condition	Distinguishing Features
Septic arthritis	Painful restricted joint movement, joint effusion
Cellulitis	Soft tissue infection without bone involvement
Transient synovitis	Hip pain with normal inflammatory markers
Bone tumor	Chronic pain, atypical imaging findings
Trauma/fracture	History of injury, radiographic evidence
Leukemia	Bone pain with hematologic abnormalities

Condition

Septic arthritis

Cellulitis

Transient synovitis

Bone tumor

Trauma/fracture

Leukemia

Distinguishing Features

Painful restricted joint movement, joint effusion

Soft tissue infection without bone involvement

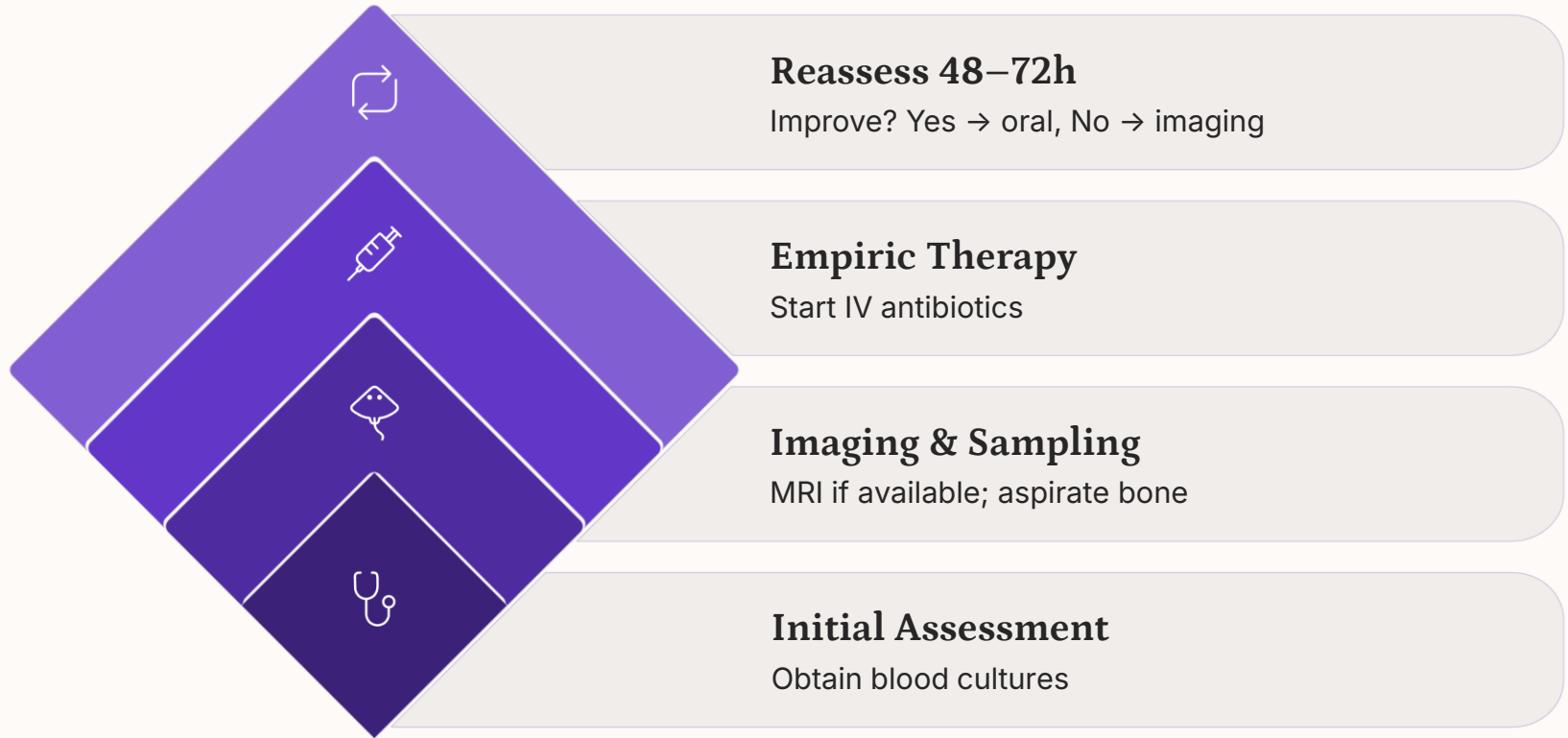
Hip pain with normal inflammatory markers

Chronic pain, atypical imaging findings

History of injury, radiographic evidence

Bone pain with hematologic abnormalities

8. Management Algorithm



Suspected Osteomyelitis → Obtain blood culture → MRI (if available) → Bone aspiration if feasible → Start empirical IV antibiotics → Clinical improvement after 48–72 hours? YES: Switch to oral antibiotics → Complete 4–6 weeks of therapy. NO: Repeat imaging → Look for abscess → Surgical drainage if needed.

9. Empirical Antibiotic Therapy

Patient	Recommended Therapy
Neonates	Oxacillin (or nafcillin) + cefotaxime (vancomycin if MRSA suspected)
Children	Cefazolin or nafcillin (MSSA); clindamycin or vancomycin if MRSA risk
Sickle cell disease	Vancomycin or clindamycin + cefotaxime
Immunocompromised	Broad-spectrum therapy (e.g., vancomycin + ceftazidime or piperacillin-tazobactam)

 Important: Adjust antibiotics according to culture and susceptibility results.

10. Duration of Therapy

- IV antibiotics until:
 - Afebrile for 48–72 hours
 - Clinical improvement
 - CRP decreasing
- Switch to oral therapy when stable.
- Total duration: Usually 4–6 weeks (minimum 3–4 weeks for uncomplicated cases).

11. Indications for Surgery

- Subperiosteal or bone abscess
- Failure to improve after 48–72 hours of antibiotics
- Foreign body or penetrating injury
- Chronic osteomyelitis with sequestrum
- Associated septic arthritis requiring drainage

12. Monitoring Response

Monitor:

- Fever
- Pain
- Ability to bear weight
- CRP (best marker for response)
- ESR
- WBC count

CRP usually falls within 5–7 days after effective treatment.

13. Complications

- Septic arthritis
- Growth plate injury
- Pathological fracture
- Chronic osteomyelitis
- Sepsis
- Venous thrombosis
- Limb deformity

14. Red Flags (Urgent Orthopedic Consultation)

Toxic appearance or septic shock

Inability to bear weight

Suspected septic arthritis

Neurological deficit (vertebral involvement)

Abscess on MRI

Failure to improve after 48–72 hours of antibiotics

15. Clinical Pearls

- Staphylococcus aureus is the most common pathogen.
- Consider Kingella kingae in children aged 6 months–4 years.
- MRI is the imaging modality of choice.
- Obtain blood cultures before starting antibiotics, if this does not delay treatment.
- CRP is the best laboratory marker to monitor treatment response.
- Switch from IV to oral antibiotics once the child is clinically improving and afebrile for 48–72 hours.
- Early diagnosis and treatment reduce the risk of permanent bone and growth plate damage.

One-Page Take-Home Message

Think Osteomyelitis When:

- Fever
- Localized bone pain
- Limp or refusal to bear weight
- Elevated CRP/ESR

Common Organism

- *Staphylococcus aureus*

Best Investigation

- MRI

Essential Laboratory Tests

- CBC
- CRP
- ESR
- Blood culture

Treatment

1. Obtain cultures.
2. Start empirical IV antibiotics.
3. Drain abscess if present.
4. Switch to oral therapy after clinical improvement.
5. Complete 4–6 weeks of antibiotics.

Remember

Delay in treatment increases the risk of growth disturbance, chronic osteomyelitis, and permanent disability.

Suggested improvements over your original draft

01

Remove the detailed pathophysiology (e.g., Haversian systems, Volkmann canals, transphyseal vessels), as it exceeds the needs of a general physician.

02

Add a differential diagnosis table, since distinguishing osteomyelitis from septic arthritis, transient synovitis, fractures, and bone tumors is a common clinical challenge.

03

Use diagnostic and treatment algorithms, which are easier to remember and more clinically applicable.

04

Emphasize practical management, including obtaining cultures before antibiotics when feasible, indications for MRI, when to switch from IV to oral therapy, and when surgical consultation is required.

05

Highlight key pathogens by age, especially *Kingella kingae* in young children and *Salmonella* in sickle cell disease, as these are frequently tested and clinically relevant.