AMSER Case of the Month
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An 8-year-old male presenting with hip pain and ongoing fevers

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Patient Presentation

**HPI:**
An 8-year-old male presents with right hip pain and daily fevers for the past 2 weeks. The hip pain radiates to the thigh and knee with new onset swelling and inability to bear weight. Pain is worse in the morning and improves with NSAIDS.

Patient presented 9 days earlier to an outside hospital. Bloodwork was significant for elevated ESR and CRP with negative radiographs at that time.

**ROS:**

(+) fever, weight loss, right hip and knee joint pain

(-): rashes, redness, swelling of small joints
Patient Presentation

**PMHx:** ADHD

**Vitals:** BP 95/54; Pulse 155; Temp 103.2; Resp 28; SPO2 98

**Physical Exam:**
- Constitutional: (+) fever, weight loss
- MSK: (+) joint pain, tenderness in the proximal right leg; inability to bear weight on right leg (-) rashes, redness, swelling, limited ROM
- Skin: (-) rash
- Endo/Heme/Allergies: does not bruise/bleed easily
Pertinent Labs

CBC w/ diff
- Hemoglobin: 10.1 (L)
- Platelet count: 460 (H)
- WBC: 10.18

Infectious:
- Lyme Ab negative
- RMSF Ig not detected

Hematology/Misc:
- HLA B27 unknown
- HLA B51 negative

Inflammatory:
- ESR (H)
- CRP (H)
What Imaging Should We Order?
Select the applicable ACR Appropriateness Criteria

<table>
<thead>
<tr>
<th>Procedure</th>
<th>Appropriateness Category</th>
<th>Relative Radiation Level</th>
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</thead>
<tbody>
<tr>
<td>Radiography area of interest</td>
<td>Usually Appropriate</td>
<td>Varies</td>
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<tr>
<td>US area of interest</td>
<td>Usually Not Appropriate</td>
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<td>MRI area of interest without and with IV contrast</td>
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This imaging modality was ordered by the pediatric physician.
Findings - Xray (unlabeled)
Findings - Xray (labeled)

Normal radiographs of the femur. No acute fracture or dislocation, bone or joint abnormality.
Select the applicable ACR Appropriateness Criteria

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Findings (unlabeled)

Coronal T1 of the lower extremity

Coronal STIR of the lower extremity
Findings (unlabeled)

T1 contrast enhanced MRI of lower extremity
Findings (labeled)

Coronal T1 of the lower extremity

T1: Hypointensity/marrow replacing process in the proximal right femur

Coronal STIR of the lower extremity

Corresponding STIR hyperintensity of the right femur and surrounding soft tissues indicating edema
Findings (labeled)

T1 contrast enhanced MRI of lower extremity

Abnormal enhancement of bone marrow with central rim enhancing focus compatible with intraosseous abscess

Additional enhancement/signal abnormality in the surrounding soft tissues representing edema/soft tissue infection
Final Dx:

Osteomyelitis with intraosseous abscess in femur
Case Discussion

Osteomyelitis:
Bone inflammation and destruction due to infection

• Pathogens infect bone either via hematogenous (from a remote source) or exogenous (from nearby tissue) spread
• In pediatric patients, hematogenous spread is most common
• **Risk factors:** recent trauma, surgical implants/hardware, immunocompromised, poor tissue perfusion
• **Intraosseous Abscess:** potential complication of osteomyelitis, pus-filled cavity with a surrounding rim of granulation tissue within bone
Osteomyelitis + Intraosseous Abscess

Clinical presentation

Initial symptoms of hematogenous osteomyelitis can be non-specific. The clinician should consider osteomyelitis in children with findings suggesting bone infection, including:

• **Constitutional symptoms:** malaise, irritability, decreased appetite/activity, (+/-) fever
• **Localized signs of inflammation:** warmth, swelling, point tenderness
• **Limitation of function:** refusing to bear weight on extremities, limited use of extremity

Differential Diagnosis:

Septic arthritis, avascular bone necrosis, bone tumors (Ewing sarcoma, osteosarcoma), leukemia
Osteomyelitis + Intraosseous Abscess

**Initial Evaluation:** blood tests (CBC, CRP, ESR), imaging

**Imaging:**
- **Plain film radiographs:** Initial imaging study. Radiographs can appear normal in early osteomyelitis. Periosteal reaction, bone destruction, and joint effusion may be seen in advanced cases.
- **Magnetic Resonance Imaging:** modality of choice for evaluating hip/pelvic osteomyelitis. Can demonstrate marrow replacement, marrow edema, joint effusion, and associated intraosseous and soft tissue abscess.
- **Radionuclide scan:** bone scintigraphy can be used in children with suspected osteomyelitis and normal radiography if MRI unavailable.

**Management:**
- Empiric antimicrobial therapy recommended; may delay in well/mildly ill appearing children for 24-48 hours until cultures are obtained to tailor antibiotics.
- Surgical debridement may be required.
References:

• ACR appropriateness Criteria: https://acsearch.acr.org/docs/3094201/Narrative/
• https://radiopaedia.org/articles/bone-marrow?lang=us