

AMSER Case of the Month

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An 8-year-old male presenting with hip pain and ongoing fevers

Nicole Debski, M3

Cooper Medical School of Rowan University

Mary Woodruff, DO

PGY 4, Cooper University Hospital, Camden, NJ

Farooq Hassan, DO

PGY3, Cooper University Hospital, Camden, NJ

Thomas J Presenza, DO

Cooper University Radiology, Camden, NJ



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

Variant 1:

Suspected osteomyelitis or septic arthritis or soft tissue infection (excluding spine and diabetic foot). Initial imaging.

Procedure	Appropriateness Category	Relative Radiation Level
Radiography area of interest	Usually Appropriate	Varies
US area of interest	Usually Not Appropriate	0
MRI area of interest without and with IV contrast	Usually Not Appropriate	0
MRI area of interest without IV contrast	Usually Not Appropriate	0
3-phase bone scan area of interest	Usually Not Appropriate	☼☼☼
CT area of interest with IV contrast	Usually Not Appropriate	Varies
CT area of interest without and with IV contrast	Usually Not Appropriate	Varies
CT area of interest without IV contrast	Usually Not Appropriate	Varies

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.



Right femur



Right knee

Select the applicable ACR Appropriateness Criteria

Variant 3:

Suspected osteomyelitis. Initial radiographs normal or with findings suggestive of osteomyelitis. Next imaging study.

Procedure	Appropriateness Category	Relative Radiation Level
MRI area of interest without and with IV contrast	Usually Appropriate	0
MRI area of interest without IV contrast	Usually Appropriate	0
3-phase bone scan area of interest	May Be Appropriate	⊕⊕⊕
3-phase bone scan and WBC scan and sulfur colloid scan area of interest	May Be Appropriate	⊕⊕⊕⊕
3-phase bone scan and WBC scan area of interest	May Be Appropriate	⊕⊕⊕⊕
FDG-PET/CT area of interest	May Be Appropriate	⊕⊕⊕⊕
WBC scan and sulfur colloid scan area of interest	May Be Appropriate	⊕⊕⊕⊕
CT area of interest with IV contrast	May Be Appropriate	Varies
CT area of interest without IV contrast	May Be Appropriate	Varies
US area of interest	Usually Not Appropriate	0
WBC scan area of interest	Usually Not Appropriate	⊕⊕⊕⊕
CT area of interest without and with IV contrast	Usually Not Appropriate	Varies

This imaging modality was ordered by the pediatric physician

Findings (unlabeled)

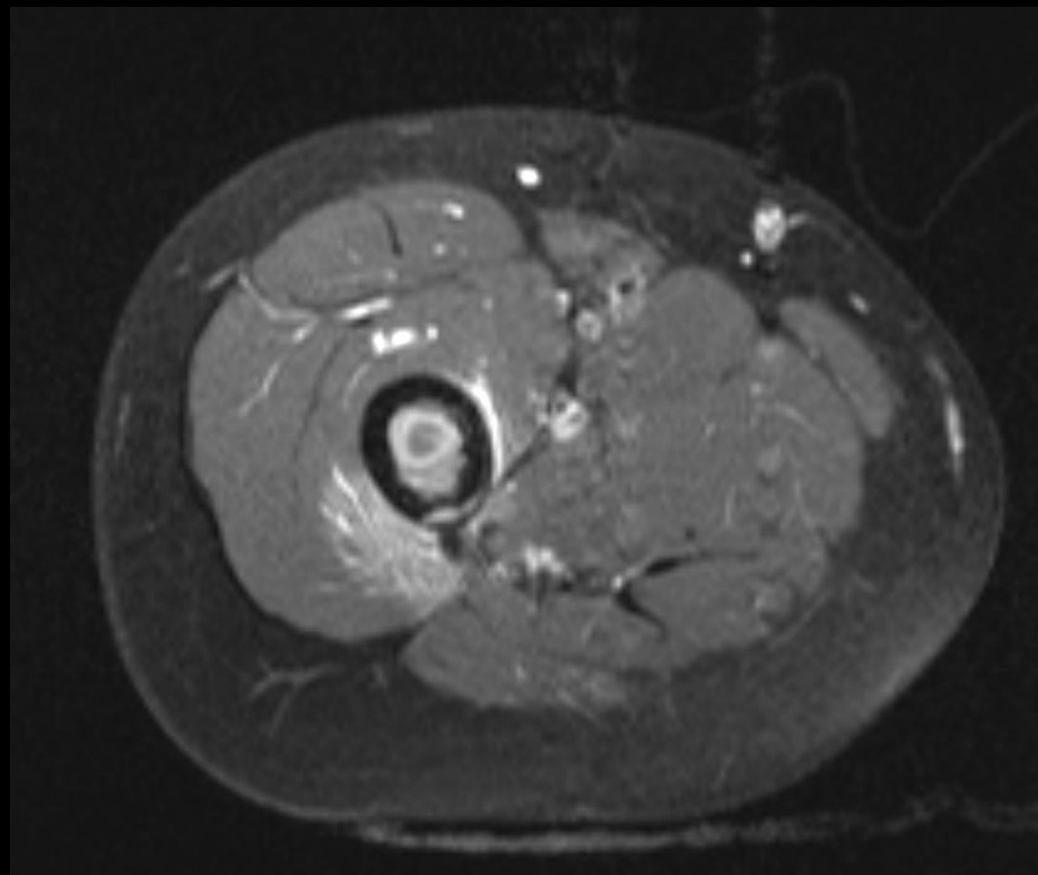


Coronal T1 of the lower extremity



Coronal STIR of the lower extremity

Findings (unlabeled)



T1 contrast enhanced MRI of lower extremity

Findings (labeled)

5/31

Coronal T1 of
the lower
extremity



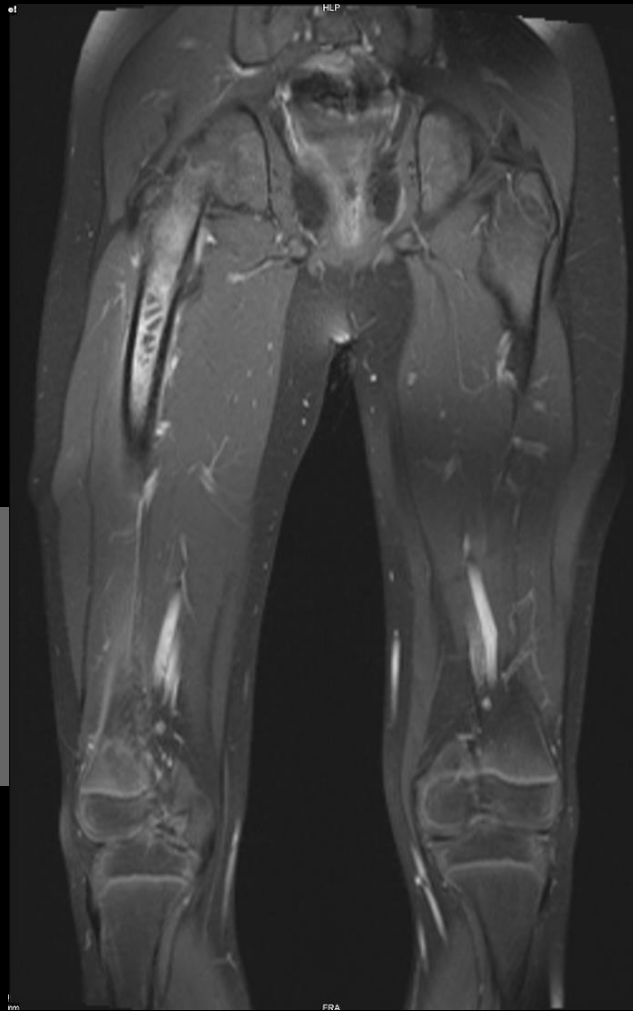
T1: Hypointensity/marrow replacing
process in the proximal right femur



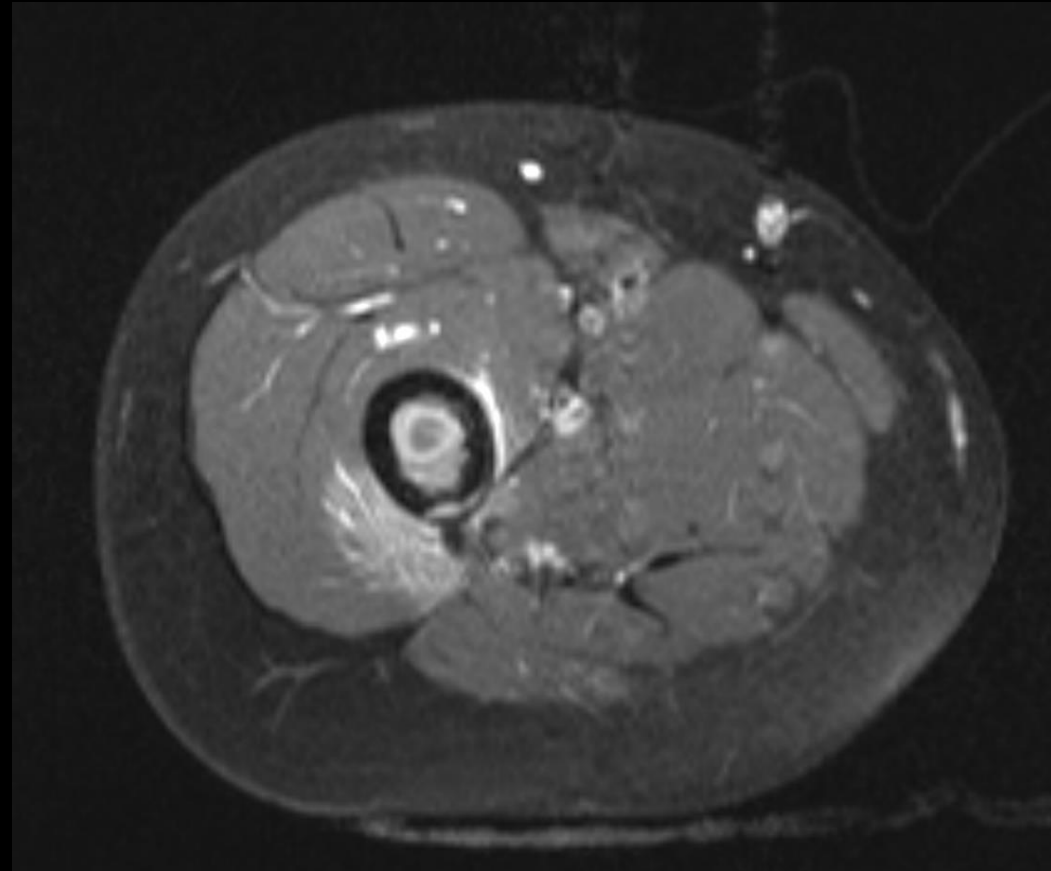
Coronal STIR of
the lower
extremity

Corresponding STIR hyperintensity of
the right femur and surrounding soft
tissues indicating edema

Findings (labeled)



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

T1 contrast enhanced MRI of lower extremity

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/>
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