

# AMSER Case of the Month: February 2025

17-year-old male with right tibia pain

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# Patient Presentation

- HPI: Patient presented to the ED for 1 month of right tibia pain that suddenly worsened while running to catch the school bus. He also reported pain at night and pain that wakes up. ROS is otherwise negative.
- PMHx: None.
- PSHx: High school basketball player. Lives with parents and younger sister.
- FHx: No significant family history. No family history of malignancy.
- PE showed full ROM of BL UE and LE. There was **mild proximal right tibia tenderness**. No edema or erythema.
- ED labs
  - **Alk phos and LDH were elevated**
  - Rest of metabolic panel, CBC and CK level were unremarkable

What Imaging Should We Order?

# Select the applicable ACR Appropriateness Criteria

**Variant 1:** Suspect primary bone tumor. Initial imaging.

Procedure	Appropriateness Category	Relative Radiation Level
Radiography area of interest	Usually Appropriate	Varies
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
FDG-PET/CT whole body	Usually Not Appropriate	☢☢☢☢
MRI area of interest without and with IV contrast	Usually Not Appropriate	○
MRI area of interest without IV contrast	Usually Not Appropriate	○
Bone scan whole body	Usually Not Appropriate	☢☢☢
US area of interest	Usually Not Appropriate	○

This imaging modality was ordered by the ER physician

# Findings (unlabeled)

Right Lateral



Right AP



Left AP



# Findings (labeled)



Smooth periosteal reaction along the lateral aspect of proximal tibial diaphysis

Absent on left comparison radiograph



# Findings (zoomed in)



# Periosteal Reactions on Radiographs

The **periosteum** is a membrane that covers the outer surface of all bones

Periosteal reaction is when periosteum is elevated from cortex. Indicates new bone formation in reaction to the abnormal stimulants. It is a **nonspecific** finding.

Unilateral - Can be due to localized trauma, infection, or tumor

Symmetrical reactions are often due to nonlocalized processes. Some differentials include hypertrophic osteoarthropathy, chronic venous insufficiency, hypervitaminosis A

Goal is to recognize presence rather than the specific subtype because there is significant overlap in disease entities that result in it

Radiographs in many cases cannot distinguish between benign and malignant underlying causes and further work up is needed.

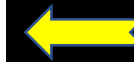


# Select the applicable ACR Appropriateness Criteria

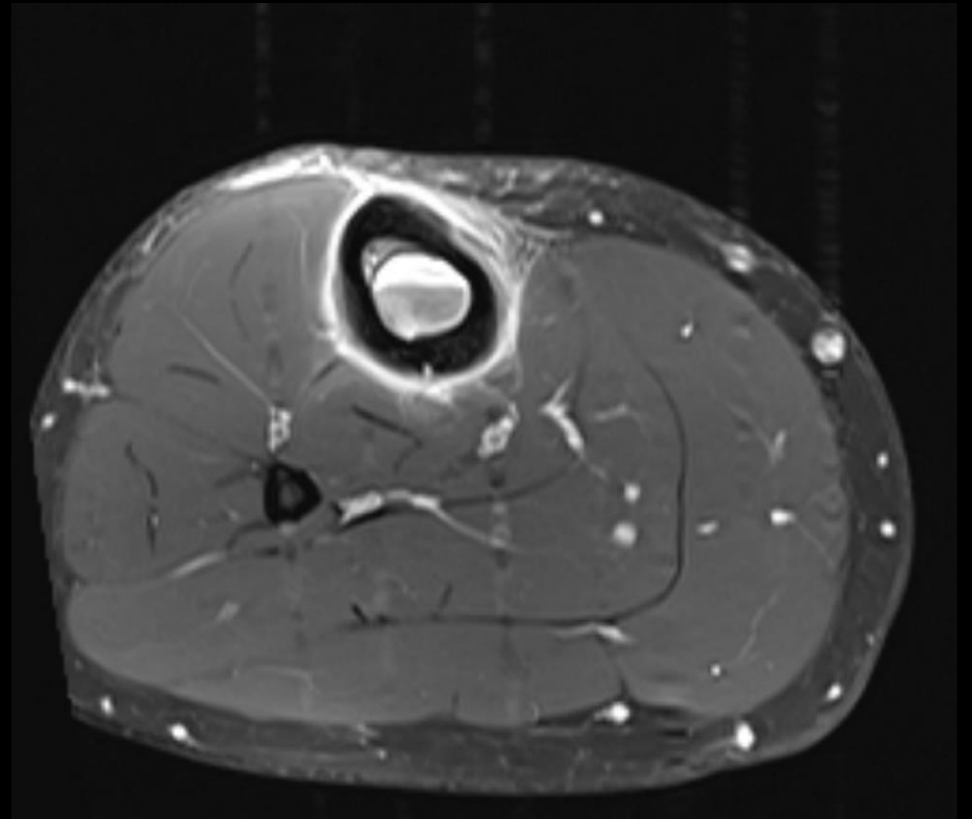
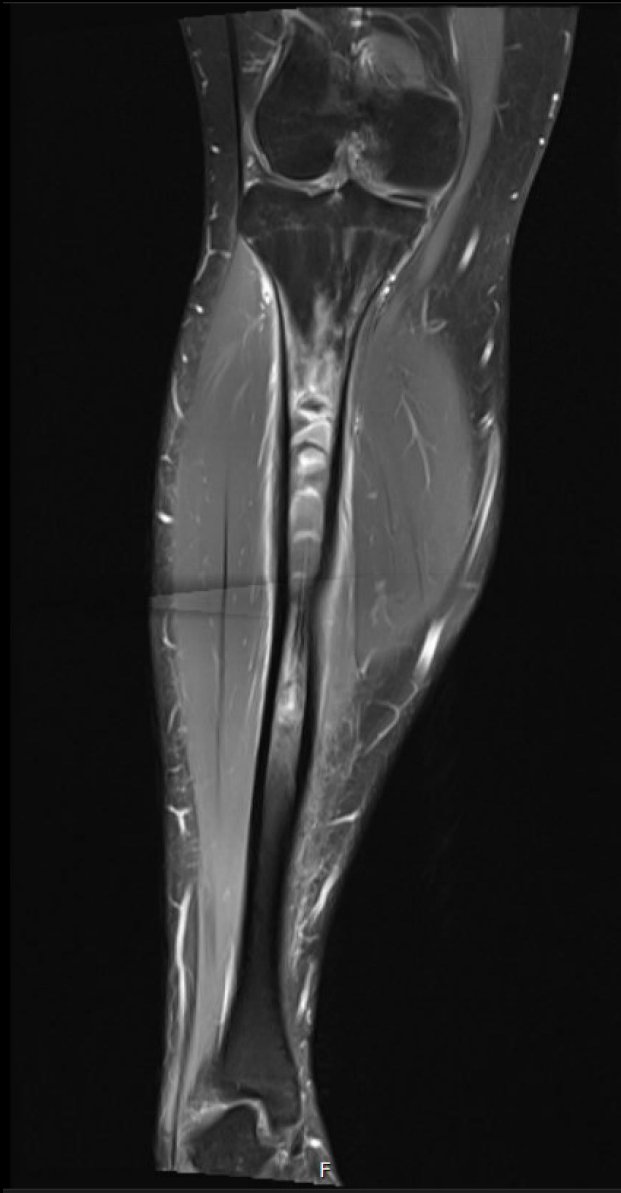
**Variant 5:** Suspect primary bone tumor. Lesion on radiographs. Indeterminate or aggressive appearance for malignancy. Next imaging study.

Procedure	Appropriateness Category	Relative Radiation Level
MRI area of interest without and with IV contrast	Usually Appropriate	○
MRI area of interest without IV contrast	May Be Appropriate	○
CT area of interest without and with IV contrast	May Be Appropriate (Disagreement)	Varies
CT area of interest without IV contrast	May Be Appropriate	Varies
FDG-PET/CT whole body	May Be Appropriate	⊕⊕⊕⊕
Bone scan whole body with SPECT or SPECT/CT area of interest	May Be Appropriate	⊕⊕⊕
Bone scan whole body	Usually Not Appropriate	⊕⊕⊕
CT area of interest with IV contrast	Usually Not Appropriate	Varies
Radiography skeletal survey	Usually Not Appropriate	⊕⊕⊕
US area of interest	Usually Not Appropriate	○

This imaging modality was recommended by the radiologist



# Findings (unlabeled)



# Findings labeled)

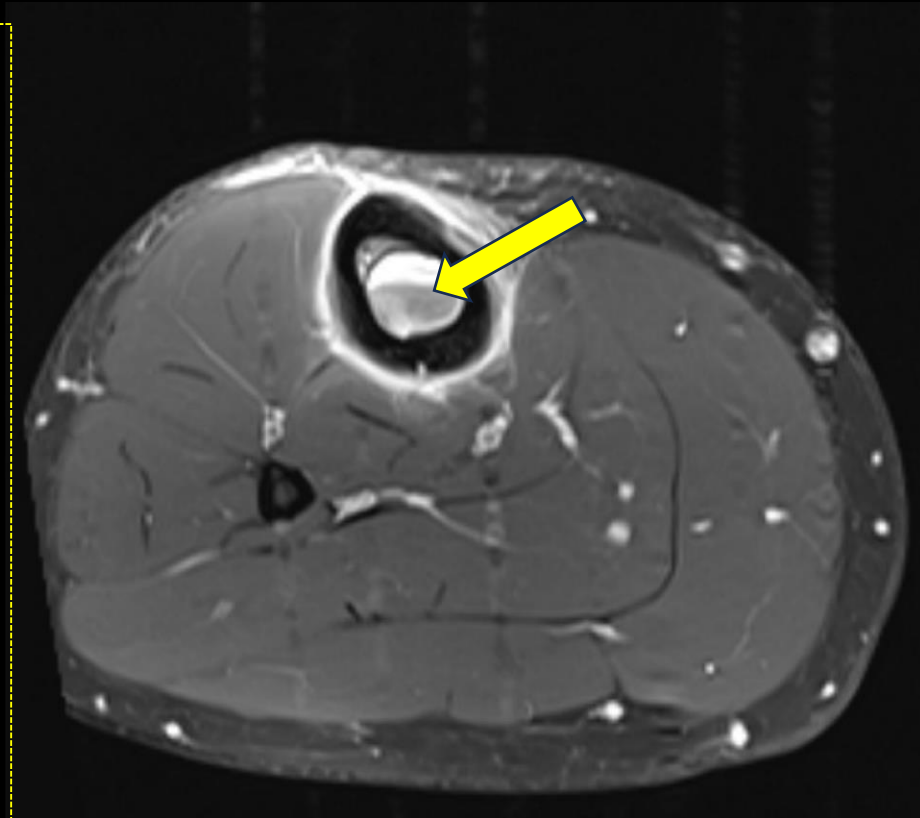


Within the proximal diaphysis of the tibia there is an intramedullary lesion

There is severe periosteal reaction about the proximal diaphysis of the tibia circumferentially at the level of the lesion. There is moderate marrow edema about the lesion as well both proximally and distally.

Cystic appearance with multiple fluid-fluid levels

Post-contrast, there is enhancement within multiple septations which appear thickened especially at the proximal aspect.



# Next Steps

- Orthopedic oncology consultation was recommended. Advised non-weight bearing in the meantime.
- CT guided biopsy of right tibia was done
- Biopsy showed “high grade (G3, poorly differentiated) osteosarcoma with telangiectatic features”
- CT chest was negative for metastatic disease
- PET-CT showed multiple avid lymph nodes. Biopsy of lymph nodes was negative for disease

Final Dx:

Telangiectatic osteosarcoma

# Case Discussion

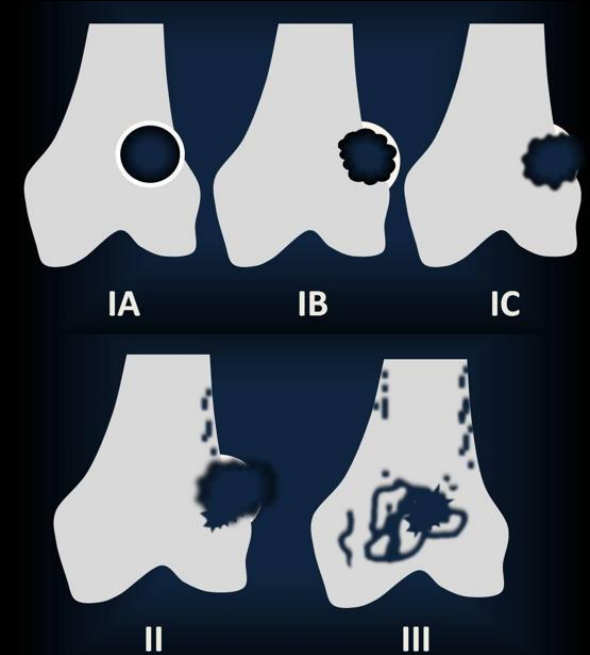
- It is a rare, aggressive, high-grade sub-type of osteosarcoma (2-12%) that differs in radiographic, microscopic, and gross appearance. Characterized by cystic spaces filled with blood, separated by septa
- Typically affects adolescents and young adults, with male predominance
- Common tumor sites: the distal femoral metaphysis (42%), the proximal tibia (17%), the proximal humerus (9%), and the proximal femur (8%).
- No difference in the clinical presentation of telangiectatic and conventional osteosarcoma – both can present with pain, tenderness, swelling, erythema
- Imaging
  - X-rays: Lytic appearance, periosteal reaction
  - MRI: Fluid-fluid levels (cystic spaces filled with hemorrhagic material)

# Case Discussion

- The treatment is similar to conventional osteosarcoma which included chemotherapy followed by wide surgical resection and limb salvage or amputation.
  - Patient in the case had localized disease; he received chemotherapy and surgical resection with placement of intercalary allograft. He was doing well post-op.
- The survival rate of telangiectatic is 70%, similar to that of conventional osteosarcoma.
- Complications include high rate of pathological fractures, higher than conventional osteosarcoma

# Differential: Aneurysmal Bone Cyst

- ABCs are benign vascular lesions comprised of blood-filled channels. Though benign, they are destructive and require treatment
- Telangiectatic osteosarcoma resembles ABCs on gross and microscopic exam.
- The sarcomas may have high platelet count, white cell count, alkaline phosphatase, and LDH
- ABCs tend to have type IA and IB pattern based on Lodwick classification of lytic lesion (refer to image)
- Radiographic findings favoring ABC included a less aggressive pattern of bone destruction, a purely lytic appearance, an expanded but intact cortex, no periosteal response and no soft tissue mass.
- MRI features significantly favoring ABC included smaller tumor size, absence of soft tissue mass, > 2/3 of the lesion filled with fluid levels and thin septal enhancement following contrast.



<https://radiopaedia.org/articles/lodwick-classification-of-lytic-bone-lesions>



# References

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