

# AMSER Case of the Month

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56-year-old male presents with acute lower right leg  
discomfort

Dhruv Govil (MS-2) – Cooper Medical School of Rowan University

Hasan Habib, DO (PGY-2) – Cooper University Hospital

Mark T. DiMarcangelo, DO, MSc, FACR, FAOCR – Cooper University Hospital



# Patient Presentation

HPI: 56-year-old male, with a history significant for prior right leg fracture treated with ORIF, presents with acute lower right leg discomfort near a prior external fixator incision, with no new trauma.

PMH: Cardiomyopathy, hypertension, and type-2 diabetes mellitus

Medications: Empagliflozin (JARDIANCE), Metformin (FORTAMET), Valsartan-Sacubitril (ENTRESTO), Carvedilol (COREG), Digoxin (LANOXIN)

Allergies: None

Vitals: BP: 121/72 mmHg, HR: 106, RR: 20, SpO2%: 99%, Temp: 97.7°F

Physical Exam: Asymmetric enlargement and swelling of the right lower leg. Right lower leg tenderness to palpation.

# Patient Presentation

## Pertinent Laboratory Findings

### Complete Blood Count (CBC) with Differential

Normal RBC ( $5.42 \times 10^6/\mu\text{L}$ )

Normal WBC ( $8.76 \times 10^3/\mu\text{L}$ )

Normal Hemoglobin (16.6 g/dL)

Normal Platelets ( $167 \times 10^3/\mu\text{L}$ )

↓ MCH (30.6 pg)

↑ MPV (13.0 fL)

### Basic Metabolic Panel (BMP)

Normal Sodium (137 mmol/L)

Normal Potassium (4.8 mmol/L)

↑ Glucose (165 mg/dL)

↓ CO<sub>2</sub> (21 mmol/L)

### C-Reactive Protein

↑ CRP (0.94 mg/dL)

### Alkaline Phosphatase

↑ 201 U/L

What Imaging Should We Order?

# ACR Appropriateness Criteria

Revised 2024

American College of Radiology  
ACR Appropriateness Criteria®  
Stress (Fatigue-Insufficiency) Fracture Including Sacrum Excluding Other Vertebrae

**Variant 1:** Adult. Suspect stress fracture, excluding vertebrae. Initial imaging.

Procedure	Appropriateness Category	Relative Radiation Level
Radiography area of interest	Usually Appropriate	Varies
Bone scan whole body with SPECT or SPECT/CT area of interest	May Be Appropriate (Disagreement)	⊕⊕⊕
US area of interest	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	○
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

## Findings (unlabeled)

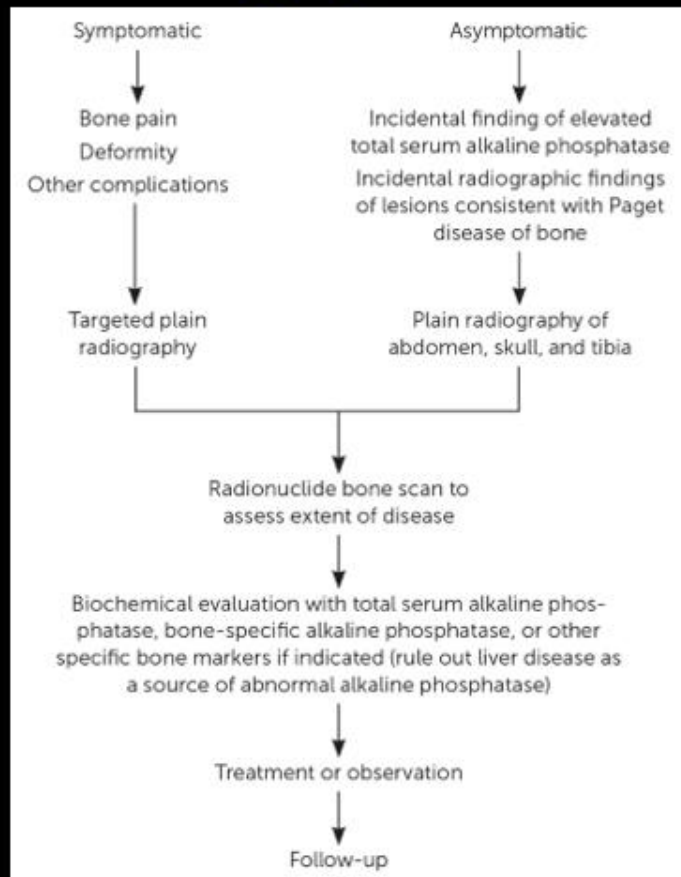


## Findings (labeled)

Cortical and trabecular thickening within the tibia. Transverse insufficiency fracture of the distal tibial diaphysis with surrounding callous formation. An anteriorly displaced fibular fracture traverses the proximal diaphysis.

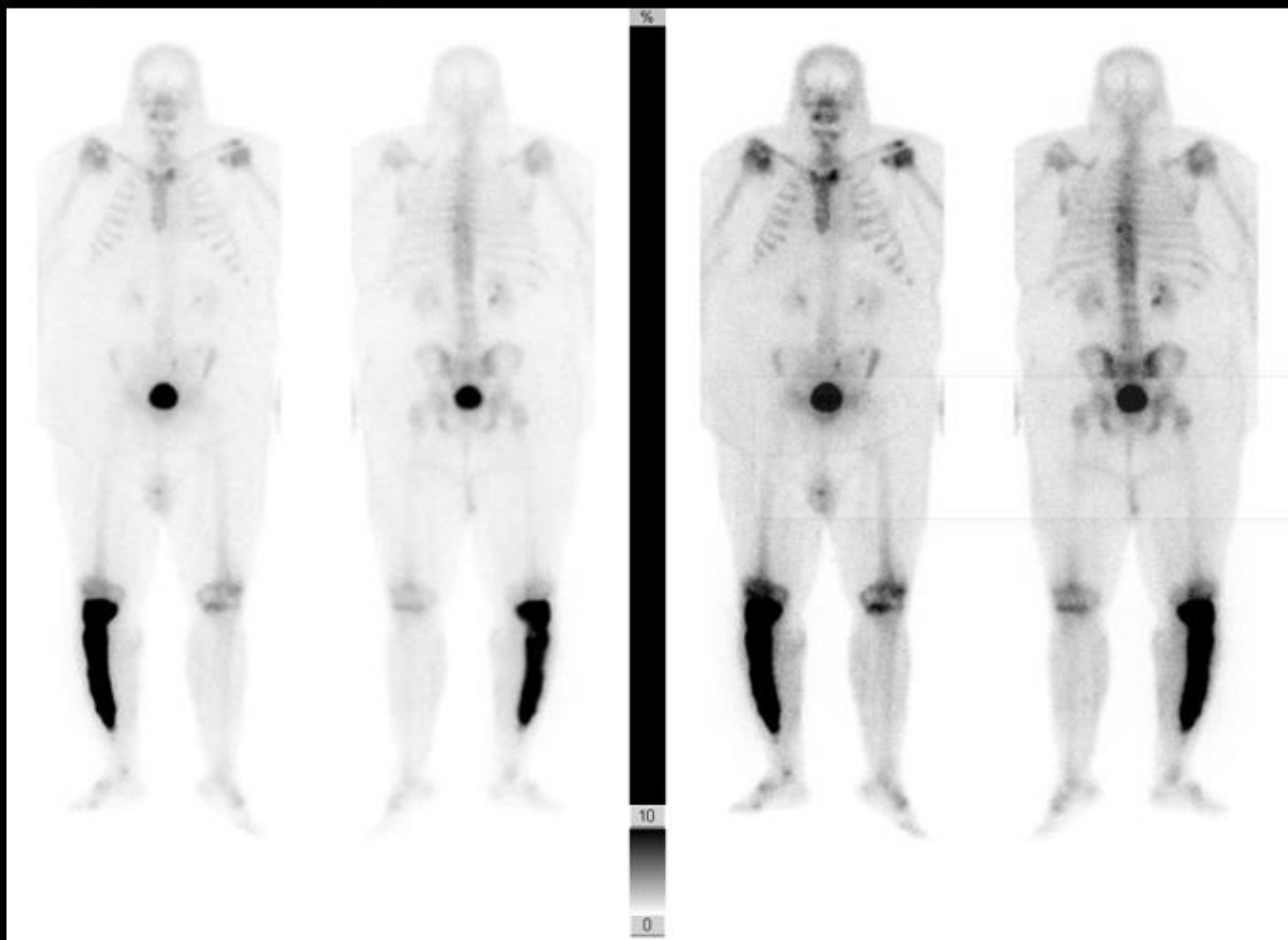


# What imaging to order next?





## Findings (unlabeled)



## Findings (labeled)

Anterior and posterior bone scintigraphy images show avid radiotracer uptake within the right tibia. Radiotracer uptake within the bilateral shoulders, sternoclavicular joints, knees and spine is consistent with degenerative joint disease.



## Differential Diagnosis

1. Paget's Disease
2. Fibrous dysplasia
3. Osteoporosis
4. Osteomalacia
5. Underlying bone malignancy

Final Diagnosis:

Paget's Disease

# Paget's Disease

## History of Paget's Disease:

- Paget's Disease was first detailed by Sir James Paget in a manuscript in 1877<sup>2</sup>
- He described it as osteitis deformans, suspecting an underlying inflammatory etiology<sup>2,3</sup>
- Paget's Disease is a chronic, progressive skeletal growth disorder featuring abnormal bone growth<sup>4,5</sup>
  - This can lead to skeletal deformities and pain

# Paget's Disease

## History:

- Paget's Disease refers to a skeletal growth disorder due to excessive bone resorption followed by abnormal bone formation<sup>4,6</sup>
- Back, hip, or neck pain
- Fractures
- Abnormally enlarged skull
- Bowed limbs or scoliosis
- Deafness
- Migraines
- Cranial nerve palsies
- Congestive heart failure
- Osteosarcoma (rare complication)

## Clinical Presentation:

Most patients present as asymptomatic.

However, a multitude of features can develop:

- Bone pain (most common)
- Diffuse joint stiffness

# Paget's Disease

## Epidemiology:

- Second most common metabolic bone disorder in older patients after osteoporosis
- Worldwide prevalence of 1.5% to 8.3%, affecting 1-3 million individuals in the US<sup>4</sup>
- Most commonly seen in Caucasians of Northern European origin<sup>4</sup>
- More commonly seen in individuals 50 years of age and older, with males and females affected equally
- Most commonly involves the pelvis, skull, spine, femur, and tibia<sup>8</sup>
- 1% have osteosarcomatous transformation.

# Paget's Disease

## Pathophysiology:

- Unknown cause but suspected interplay of genetic and environmental factors<sup>8</sup>
- Occurs in 3 stages
  - Lytic stage, featuring localized excess of osteoclastic activity leading to an initial lesion<sup>3,7</sup>
  - Hybrid lytic/blastic stage, featuring increased abnormal osteoblastic bone formation with concurrent osteoclastic resorption
  - Sclerotic stage, featuring osteoblastic woven bone formation with declining osteoblastic and osteoclastic activity, with little bone formation or resorption present

## Etiology:

- Risk factors include<sup>8</sup>:
  - Age (uncommon under 40)
  - Family History
  - Anglo-Saxon descent



# Paget's Disease

## Diagnostic Imaging:

- Radiography
  - Initial diagnosis
  - More specific than radionucleotide bone scan in making a diagnosis<sup>7</sup>
- Radionuclide bone scan (scintigraphy)
  - Most sensitive test in evaluation of extent of lesions<sup>7</sup>
  - During the osteoclastic lytic phase of disease, may underestimate disease activity<sup>7</sup>
- CT
  - Evaluate regions with articular abnormalities, and neurologic complications<sup>7</sup>
  - Better visualization of bone and posterior fossa<sup>7</sup>
- MRI
  - Evaluate regions with articular abnormalities and neurologic complications<sup>7</sup>
  - Better detailing of the brain, spinal cord, cauda equina, and soft tissues<sup>7</sup>
  - Pagetic sarcomas better evaluated<sup>7</sup>

# Paget's Disease

## Treatment:

- Treatment options for Paget's Disease consist of the following:
  - Bisphosphonates
    - First-line treatment<sup>4</sup>
  - Calcitonin
    - Second-line treatment, for patients unable to take or tolerate bisphosphonate therapy<sup>5</sup>
  - Denosumab
    - In the case of bisphosphonate contraindication or intolerance<sup>4</sup>
  - Calcium and Vitamin D supplements
  - NSAIDS for secondary osteoarthritis pain<sup>7</sup>

# References

1. PRACTICE PARAMETER *Skeletal Scintigraphy*. (n.d.). <https://www.acr.org/-/media/ACR/Files/Practice-Parameters/Skeletal-Scint.pdf>
2. *How Paget's disease got its name*. (n.d.). Paget.org.uk. <https://paget.org.uk/about-us/how-pagets-disease-got-its-name/>
3. Singer, F. R. (2000). *Paget's Disease of Bone* (K. R. Feingold, B. Anawalt, M. R. Blackman, A. Boyce, G. Chrousos, E. Corpas, W. W. de Herder, K. Dhatariya, K. Dungan, J. Hofland, S. Kalra, G. Kaltsas, N. Kapoor, C. Koch, P. Kopp, M. Korbonits, C. S. Kovacs, W. Kuohung, B. Laferrère, & M. Levy, Eds.). PubMed; MDText.com, Inc. <https://www.ncbi.nlm.nih.gov/books/NBK279033/#:~:text=Sir%20James%20Paget%20described%20a>
4. Bouchette, P., & Boktor, S. W. (2020). *Paget Disease*. PubMed; StatPearls Publishing. <https://www.ncbi.nlm.nih.gov/books/NBK430805/>
5. Shaker, J. L. (2009). Paget's disease of bone: a review of epidemiology, pathophysiology and management. *Therapeutic Advances in Musculoskeletal Disease*, 1(2), 107–125. <https://doi.org/10.1177/1759720x09351779>
6. Park, E.-T., & Sung Wan Kim. (2010). Radiography, Bone Scan, and F-18 FDG PET/CT Imaging Findings in a Patient with Paget's Disease. *Nuclear Medicine and Molecular Imaging*, 44(1), 87–89. <https://doi.org/10.1007/s13139-009-0013-4>
7. *Paget Disease Clinical Presentation: History, Physical Examination, Complications*. (n.d.). Emedicine.medscape.com. <https://emedicine.medscape.com/article/334607-clinical>
8. NIAMS. (2017, April 6). *Paget's Disease of Bone*. National Institute of Arthritis and Musculoskeletal and Skin Diseases. <https://www.niams.nih.gov/health-topics/pagets-disease-bone>