

# AMSER Case of the Month

## September 2020

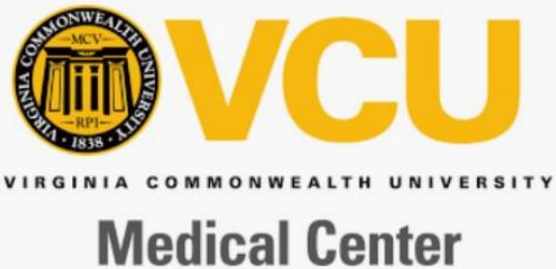
61-year-old with right ankle pain status post fall

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VCU Health



# Patient Presentation

- **HPI:** A 61-year-old female presents to the ED after tripping and falling down the stairs. Patient endorses non-radiating pain of the right ankle with normal sensation that is worse with movement. Patient denies head injury, loss of consciousness, and previous MSK injuries.
- **PMHx:** HTN, HLD
- **SurgHx:** none
- **FamHx:** none
- **SocialHx:** occasional EtOH and marijuana, denies smoking

# Exam

- **Review of Systems:** negative aside from right ankle pain
- **Physical Exam:**
  - RUE, LUE, LLE: no instability/pain with ROM of the upper extremities and lower left extremity. 5/5 muscle strength of all compartments. Fully intact neurovascular exam with 2+ radial pulses and 2+ dorsalis pedis pulse. Stable ligamentous left knee exam.
  - **RLE:** On inspection, no wounds, **positive soft tissue ankle swelling. Palpation of the medial and lateral malleoli produce moderate pain.** Stable ligamentous knee exam. Full ROM and strength of hip, knee, extensor hallucis longus, flexor hallucis longus, ankle dorsi/plantar flexion. **Sensation intact to light touch (SILT). 2+ dorsalis pedis pulse.**

# Pertinent Labs

- **Basic preoperative labs:**
  - BMP, CBC, Coagulation studies – all normal
- **Fragility fracture labs:**
  - TSH – normal
  - PTH – normal
  - Vit-D, 25OH – **22.9ng/mL**, (normal range, 30 – 100)
  - Calcium – normal

What Imaging Should We Order?

# ACR Appropriateness Criteria

## American College of Radiology ACR Appropriateness Criteria® Acute Trauma to the Ankle

### Variant 3:

Adult or child 5 years of age or older. Acute trauma to the ankle. Exclusionary criteria are present (eg, neurologic disorder, neuropathy, or other). Patient does not meet requirements for evaluation by the Ottawa Ankle Rules. Initial imaging.

← Patient is over 55-years-old

Procedure	Appropriateness Category	Relative Radiation Level
Radiography ankle	Usually Appropriate	☼
CT ankle without IV contrast	May Be Appropriate	☼
US ankle	Usually Not Appropriate	○
Radiography ankle stress views	Usually Not Appropriate	☼
MRI ankle without and with IV contrast	Usually Not Appropriate	○
MRI ankle without IV contrast	Usually Not Appropriate	○
CT ankle with IV contrast	Usually Not Appropriate	☼
CT ankle without and with IV contrast	Usually Not Appropriate	☼
Bone scan ankle	Usually Not Appropriate	☼☼☼

This imaging modality was ordered by the ER physician

# X-Ray Findings (unlabeled)

Mortise View



AP View

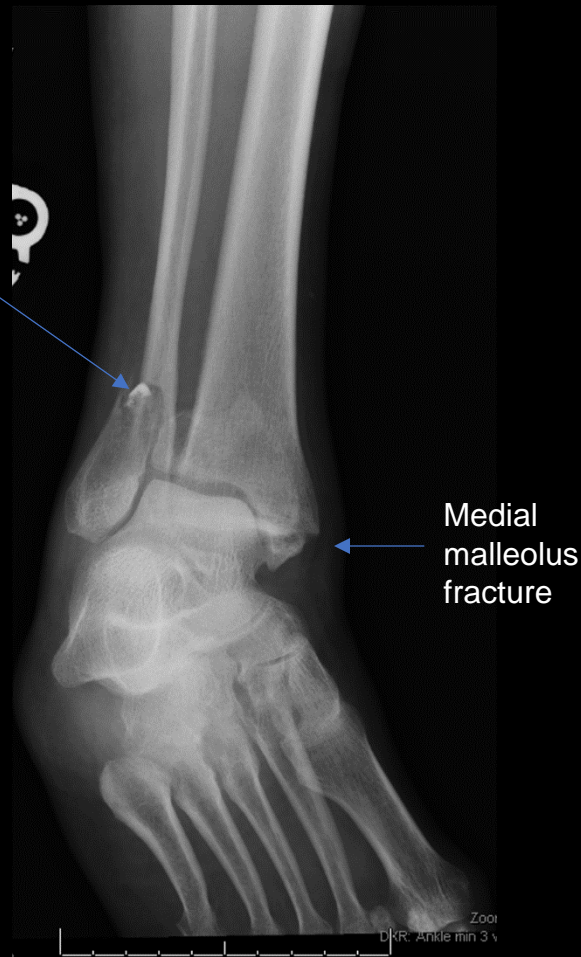


Lateral View



# X-Ray Findings: (labeled)

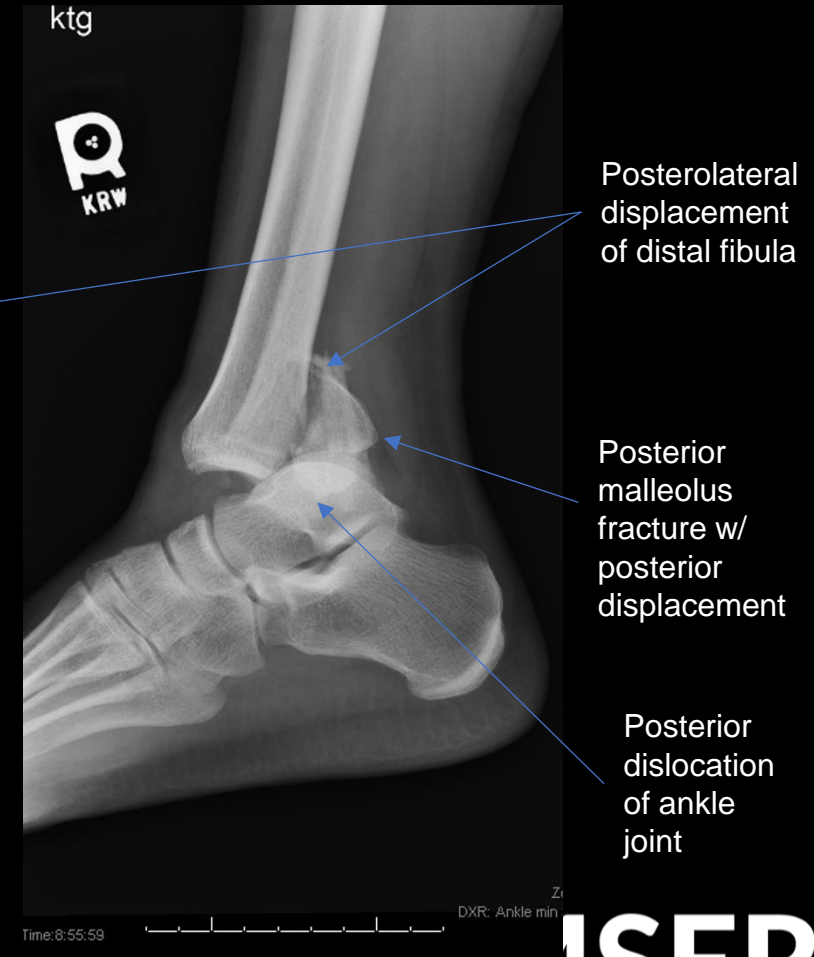
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AP View



Lateral View





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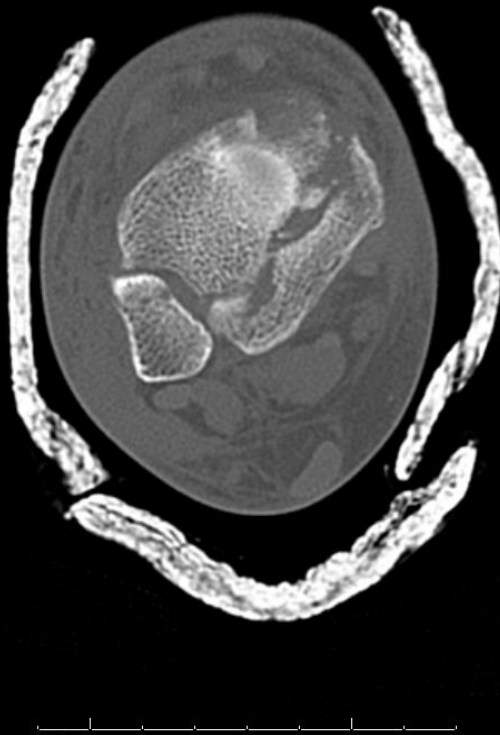
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This imaging modality was ordered by the orthopedic physician due to articular surface involvement



# CT Findings (unlabeled)

Axial View



Coronal View



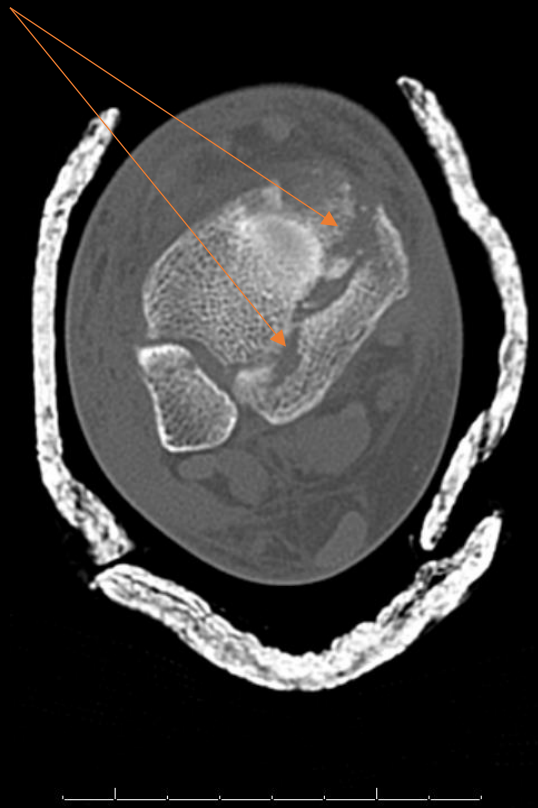
Sagittal View



# CT Findings (labeled)

Articular involvement with comminution

Axial View



Coronal View

Lateral malleolus fracture

Medial malleolus fracture with comminution



Sagittal View

Posterior malleolus fracture involving the articular surface with comminution



Final Dx:

Right ankle trimalleolar fracture / dislocation

# Case Timeline

- **Initial Evaluation:**

- Initial imaging showed a trimalleolar right ankle fracture with posterior dislocation
- Closed reduction was performed and confirmed with imaging
- Imaging showed articular surface involvement, so CT was ordered

- **Surgical Intervention:**

- External fixation was performed prior to internal fixation due to significant lower extremity soft tissue swelling
- Open reduction internal fixation (ORIF) surgery performed 2 weeks later

# Case Discussion

- **Trimalleolar fracture:** the medial malleolus, distal fibula, and posterior lip of the tibial plafond
- **Epidemiology/Pathology:**
  - Female > male
  - Mechanism of injury is usually supination and external rotation
  - Ankle fractures not typically associated with osteoporosis
  - Most commonly found in patients <60-years-old
- **Typical Ankle Fracture Work-up/Imaging:**
  - Films: AP, lateral, mortise views
  - CT: CT can be helpful especially if the fracture involves the articular surface of the ankle joint. Useful for preoperative planning.
- **Treatment (non-operative vs. operative):**
  - Nonoperative treatment usually is for patients who are not ambulatory at baseline or have stable, nondisplaced fractures that do not involve the articular surfaces
  - Operative treatment is indicated if there is greater than 25% of the posterior articular surface involved, if the fracture is displaced more than 3mm, or if there is talar shift. Operative treatment includes external fixation if there is significant soft tissue swelling, which is then followed by ORIF.

# Case Discussion

- **Osteoporosis:**

- Definition: when bone become porous due to decreased density secondary to high metabolic turnover rate and disruption of the normal balance between osteoclasts and osteoblasts
- Low Vit-D is important for bone strength and mineralization and can suggest osteoporosis (DEXA scan or fragility fracture is needed for diagnosis)
  - Vit-D insufficiency = <32ng/mL
    - Our patient's vit-D was 22.9ng/mL
  - Vit-D deficiency = <20ng/mL

- **Osteoporosis and ankle fractures:**

- 10% osteoporotic fractures are ankle fractures with increasing incidence and severity in elderly patients, warranting fragility labs when ankle fractures occur in the elderly population

# Case Discussion

- **Outcomes:**

- Overall success rate after ORIF is 90%, however recovery is expected to take 2 years
- Common complications:
  - Chronic pain
  - Malunion
  - Post-operative stiffness with loss of ROM
  - Post-traumatic arthritis/osteoarthritis – especially injuries involving the articular surface and/or posterior malleolus



# References:

- Juto H, Nilsson H, Morberg P. Epidemiology of Adult Ankle Fractures: 1756 cases identified in Norrbotten County during 2009-2013 and classified according to AO/OTA. *BMC Musculoskelet Disord.* 2018;19:441. doi: 10.1186/s12891-018-2326-x.
- Bukata SV, Digiovanni BF, Friedman SM, Hoyer H, Kates A, Kates SL, et al. A guide to improving the care of patients with fragility fractures. *Geriatr Orthop Surg Rehabil.* 2011;2(1):5–37. doi:10.1177/2151458510397504.
- Rammelt S. Management of ankle fractures in the elderly. *EFORT Open Rev.* 2017;1(5):239-246. Published 2017 Mar 13. doi:10.1302/2058-5241.1.000023
- <https://www.orthobullets.com/trauma/1047/ankle-fractures>