

Distal Tibial Fracture

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RAD 4014

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History 7/8/2020

- 20s F
- MVC at highway speeds
- Only reports R forearm pain, also presents with forehead hematoma, confused, and GCS 11
- Could not get reliable exam so pan-scanned
 - XR R ankle, elbow, foot, forearm, tibia fibula, and chest
 - CT chest/ab/pelvis, head/neck, and cervical spine
- R Ankle Imaging: XR 7/8/20, CT 7/9/20

Differential Diagnosis for Ankle Injury

- Fracture
- Hemarthrosis
- Ligament Injury
- Soft Tissue Edema
- Complex Regional Pain Syndrome

XR R Ankle

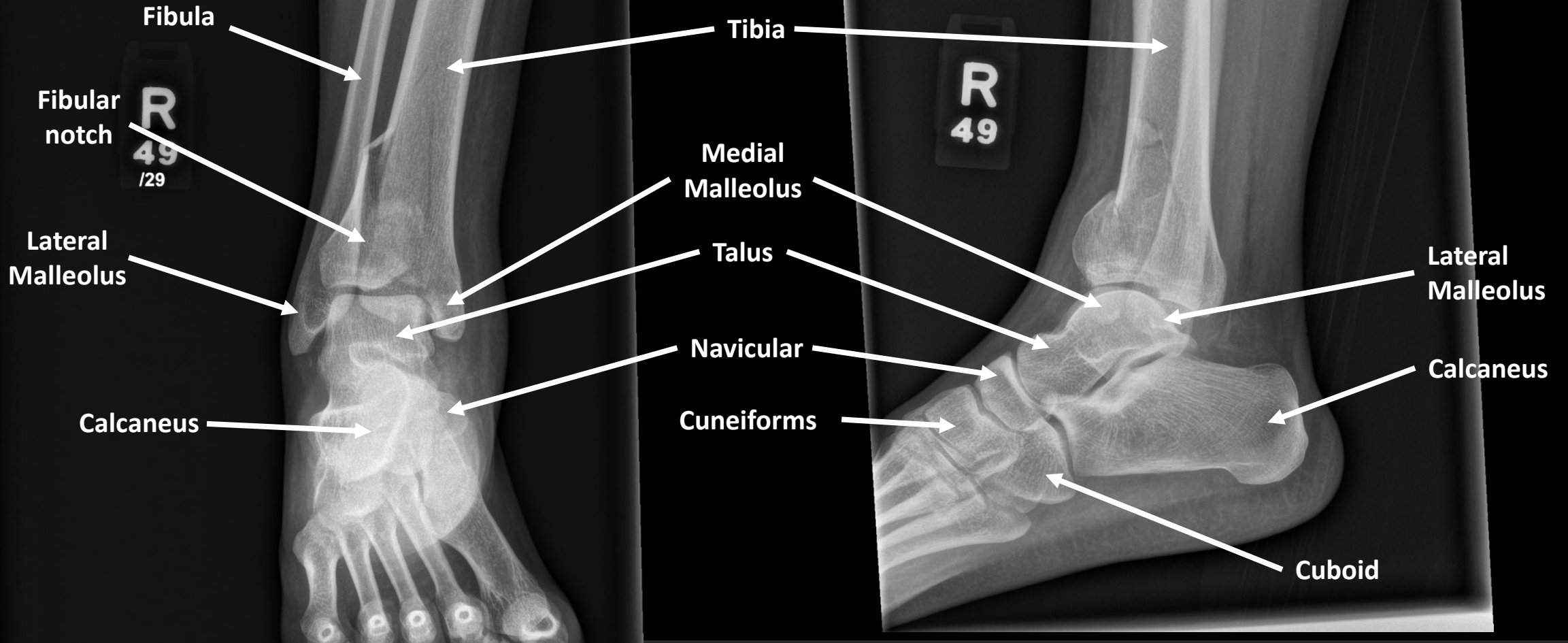
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XR R Ankle



XR R Ankle

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XR R Ankle

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- Comminuted, impacted pilon fracture of distal right tibia
- **Definition: Pilon fracture is a type of distal tibial fracture involving the tibial plafond.**

XR R Ankle



XR R Ankle



- 3 mm cortical offset at the posterior 3rd of the articular surface of the tibial plafond

XR R Ankle

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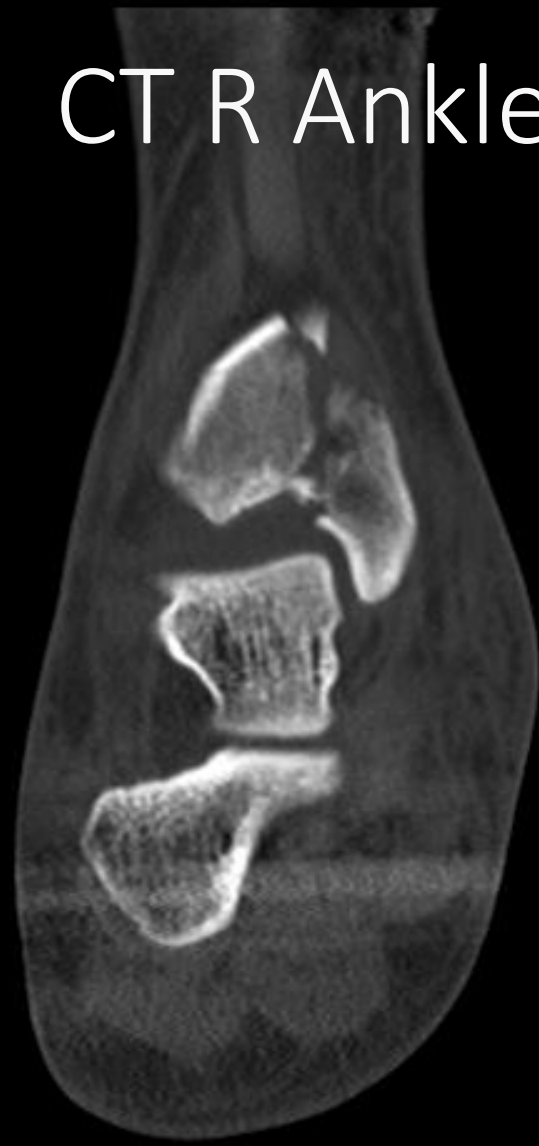


- Convex soft tissue swelling at the anterior medial aspect of right ankle

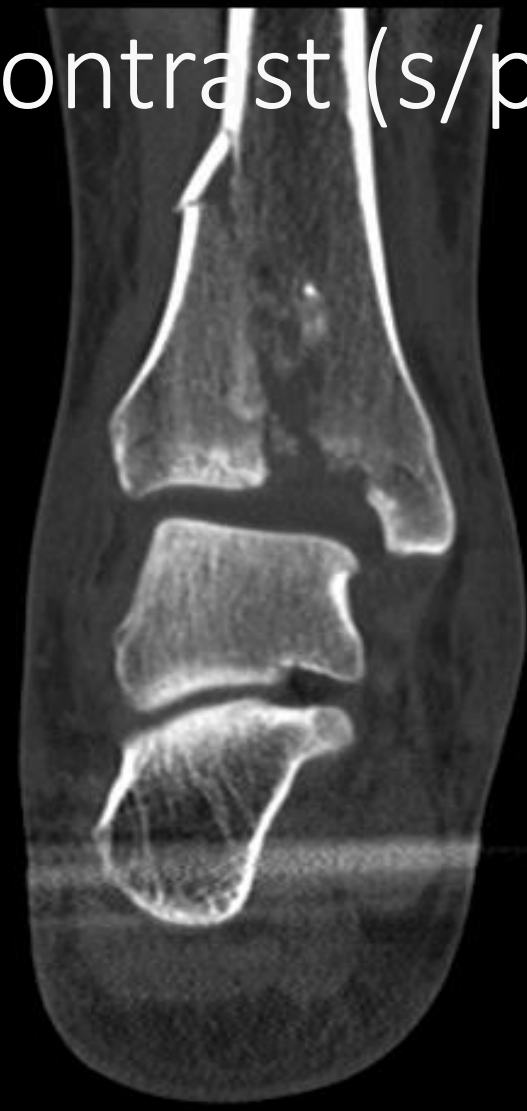
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CT R Ankle w/o Contrast (s/p ex fix) – Coronal



Anterior



→ → →



Posterior

CT R Ankle w/o Contrast (s/p ex fix) – Coronal



Anterior



Posterior

CT R Ankle w/o Contrast (s/p ex fix) – Sagittal



Lateral



Medial

CT R Ankle w/o Contrast (s/p ex fix) – Sagittal



Lateral



Medial

Key imaging findings

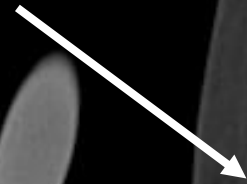
- Comminuted distal tibial fracture with coronally oriented fracture component, extending into the medial malleolus, with focal zone of depression comprising 30% of the tibial plafond with maximal depression of 1 cm.

CT R Ankle w/o Contrast (s/p ex fix) – Coronal



CT R Ankle w/o Contrast (s/p ex fix) – Coronal

Anterior talofibular ligament



Deltoid Ligament



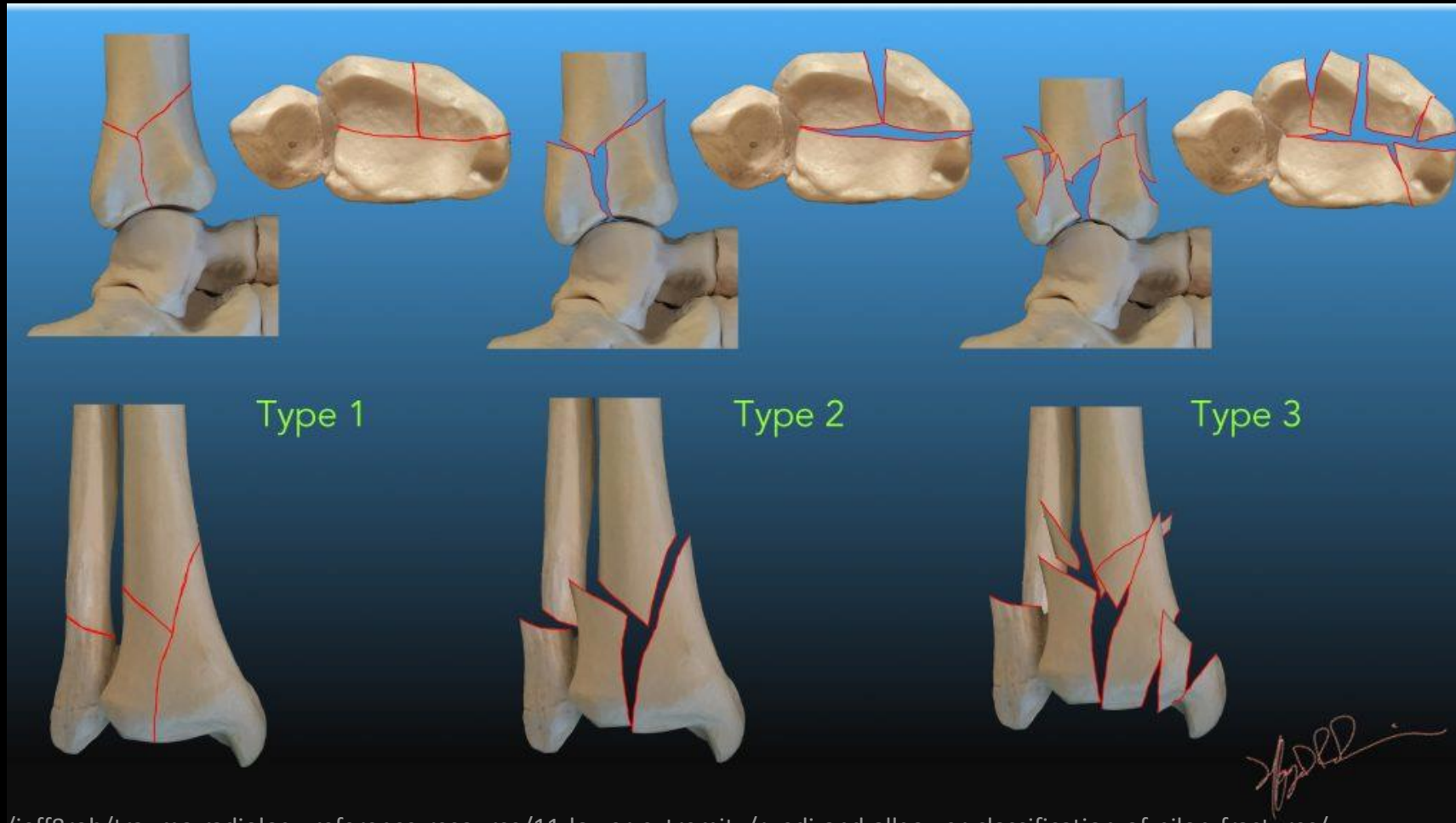
Key imaging findings

- Small avulsion fracture fragment at the talar attachment of the ATFL.
Small fracture fragment of the medial talar process.

Ruedi-Allgower Classification of Tibial Plafond Fractures

Classification	Description
Type 1	Cleavage fracture with no major articular disruption
Type 2	Fracture dislocation with major articular surface disruption, without comminution
Type 3	Major articular disruption with impacted and comminuted fracture

Ruedi-Allgower Classification of Tibial Plafond Fractures



<https://faculty.washington.edu/jeff8rob/trauma-radiology-reference-resource/11-lower-extremity/ruedi-and-allgower-classification-of-pilon-fractures/>

Final Diagnosis

- Tibial Plafond Fracture. Ruedi-Allgower type 3.

ACR appropriateness Criteria – Major Blunt Trauma

Variant 4:

Major blunt trauma. Hemodynamically stable. Suspected extremity trauma. Initial imaging.

Procedure	Appropriateness Category	Relative Radiation Level
Radiography extremity	Usually Appropriate	Varies
CT whole body with IV contrast	Usually Appropriate	⊕⊕⊕⊕
Radiography trauma series	Usually Appropriate	⊕⊕⊕
US FAST scan chest abdomen pelvis	Usually Appropriate	0
CT extremity without IV contrast	May Be Appropriate	Varies
CT whole body without IV contrast	May Be Appropriate (Disagreement)	⊕⊕⊕⊕
CTA extremity with IV contrast	May Be Appropriate (Disagreement)	Varies
CT extremity with IV contrast	Usually Not Appropriate	Varies
CT extremity without and with IV contrast	Usually Not Appropriate	Varies

ACR appropriateness Criteria – Acute Trauma to the Ankle

VARIANT 5:

Adult or child 5 years of age or older. Acute trauma to the ankle. No exclusionary criteria present. Radiographs demonstrate fracture or potential osteochondral injury. Next study.

Procedure	Appropriateness Category	Relative Radiation Level
MRI ankle without IV contrast	Usually Appropriate	0
CT ankle without IV contrast	Usually Appropriate	⊕
Radiography ankle Broden's view	May Be Appropriate	⊕
US ankle	Usually Not Appropriate	0
MRI ankle without and with IV contrast	Usually Not Appropriate	0
CT ankle with IV contrast	Usually Not Appropriate	⊕
CT ankle without and with IV contrast	Usually Not Appropriate	⊕
Bone scan ankle	Usually Not Appropriate	⊕⊕⊕

Cost - Inpatient at MHH (ankle)

- ANKLE COMPLETE 3+V UNILATERAL - \$847
- CT LOWER EXT W/O CON UNILAT - \$3,078
- TOTAL: \$3,925

Cost - Inpatient at MHH (all imaging)

- Chest 1 view = \$683
- Ankle 3 views unilat (x2)= \$847 x2 = \$1,694
- Elbow 3 views unilat (x2)= \$825 x2 = \$1,650
- Foot 3 views unilat = \$776
- Humerus 2 views - \$797
- NO READ Fluoro assist to 1 hour = \$1,450
- Wrist 2 views unilat = \$732
- Leg Tibia/Fibula 2 views unilat- \$863
- CT Pelvis/Abdomen w/ con- \$7,998
- CT head or B w/o = \$3,157
- CTA Head/Neck CT = \$4,460
- CT lower ext w/o contrast- \$3,078
- TOTAL: **\$26,679**

Take Home Points

- Be able to identify and classify distal tibial fractures
- Do not allow major trauma to distract from more subtle findings
- Imaging in emergency situations is based in clinical suspicion instead of solely patient history.

References

- <https://radiopaedia.org/articles/pilon-fracture-1?lang=us>
- <https://faculty.washington.edu/jeff8rob/trauma-radiology-reference-resource/11-lower-extremity/ruedi-and-allgower-classification-of-pilon-fractures/>
- American College of Radiology. ACR Appropriateness Criteria®. Available at <https://acsearch.acr.org/list> . Accessed 7/16/2020.
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