

# ***AMSER Case of the Month***

## ***May 2024***

***70 y/o M with ankle pain after ~10ft fall***

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**AMSER**

# Patient Presentation

- **HPI:** 70 y/o M nonsmoker who presents with bilateral leg and foot pain after ~10ft fall from ladder during which R leg was tangled within struts.
- **PMHx:** BPH, Class I obesity (BMI 30.1)
- **PSHx:** None
- **Vitals:**
  - HR 127, BP 144/88
  - T: 98.2F, Resp 19, SpO2 94%
- **Labs:**
  - CBC, BMP, UA: WNL
- **Physical Exam:**
  - **Left leg**

Leg does not tolerate ROM exam 2/2 pain

Severe tenderness to palpation of tibial plateau
  - **Right leg**

Leg 5/5 extensor and flexor strength, full ROM

**Right ankle edematous, ecchymotic, severe anterior TTP, minimal ROM 2/2 pain**

# Ottawa Ankle Rules:

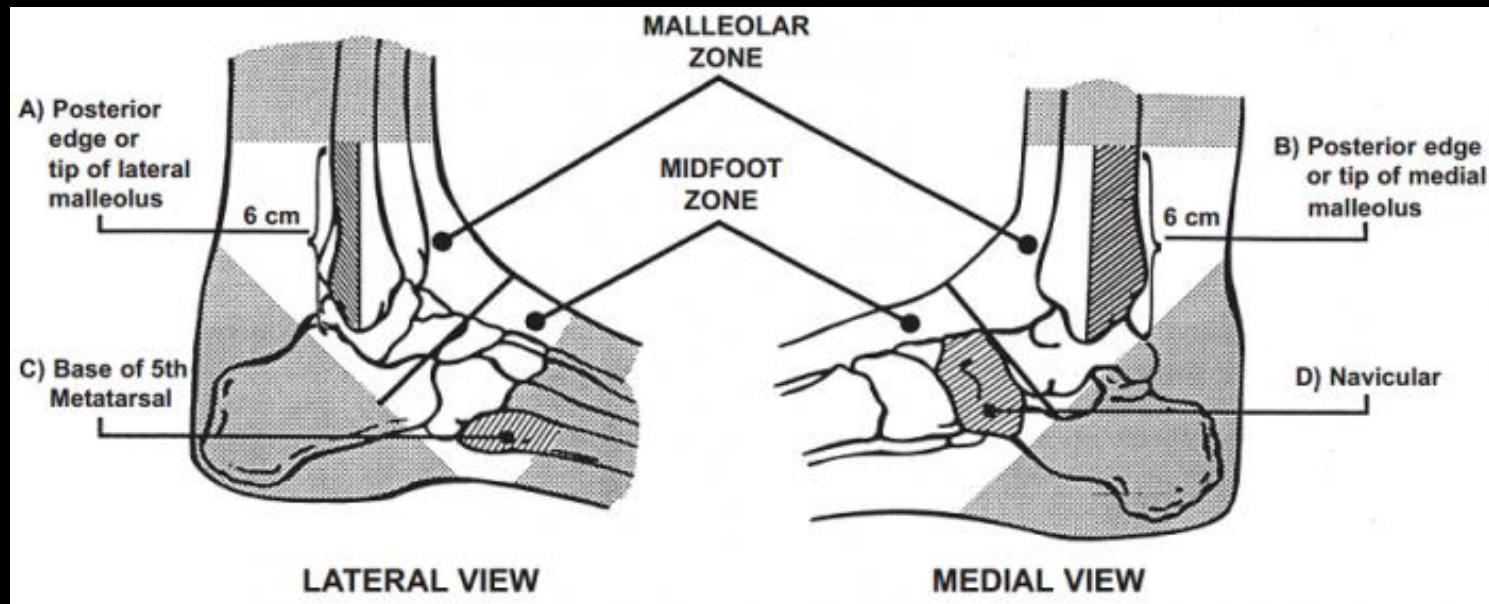
1. Inability to bear weight immediately after the injury

OR

2. Point tenderness over the medial malleolus, the posterior edge or inferior tip of the lateral malleolus, talus, or calcaneus

OR

3. Inability to ambulate for 4 steps in the emergency department



*\*Patient history and physical exam met all of these criteria*

# What Imaging Should be Ordered

Procedure	Appropriateness Category	Relative Radiation Level
Radiography ankle	Usually Appropriate	☼
US ankle	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	☼
CT ankle without IV contrast	Usually Not Appropriate	☼
Bone scan ankle	Usually Not Appropriate	☼☼☼

***\*Acute trauma to the ankle or acute trauma to the ankle with persistent pain for more than 1 week but less than 3 weeks.\****

# Findings: Right Ankle (Unlabeled)



*Lateral Radiograph*



*Coronal*



*Axial*

*Non-Contrast CT*

# Findings: Right Ankle (Labeled)



Lateral Radiograph



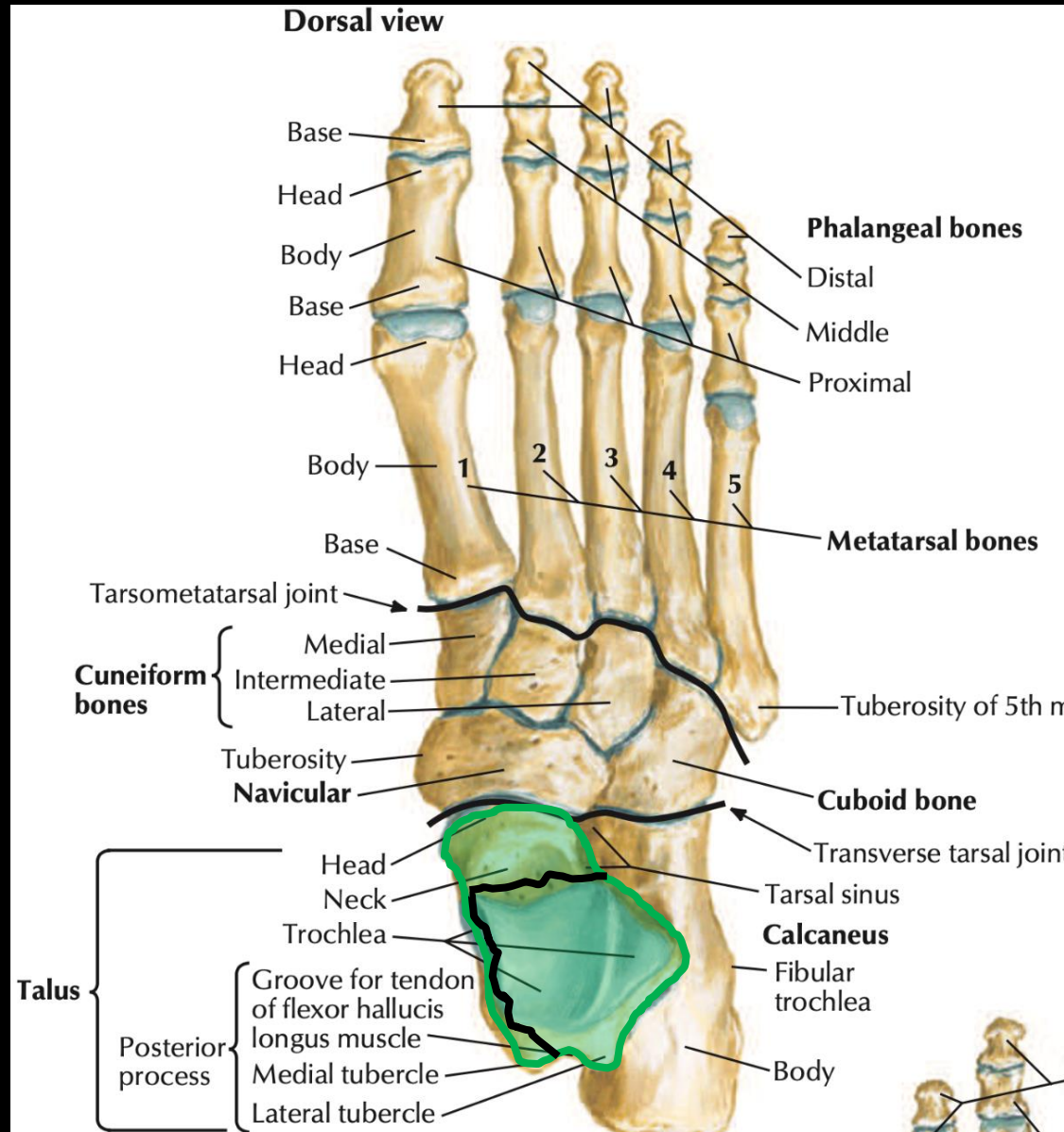
Coronal

Non-Contrast CT



Axial

# Anatomy and Fracture



# Open Reduction and Internal Fixation



*Radiographs: 1-, 2-, & 3- month follow-up*



# *Patient Presentation (4 mo Post-Op)*

- *HPI: Continued pain and inability to bear weight*
- *Physical Exam:*
  - *Minimal ROM 2/2 pain*
  - *Diffusely edematous*

# What Imaging Should be Ordered

Procedure	Appropriateness Category	Relative Radiation Level
MRI area of interest without IV contrast	Usually Appropriate	○
MRI area of interest without and with IV contrast	May Be Appropriate	○
CT area of interest without IV contrast	May Be Appropriate (Disagreement)	Varies
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

***\*Clinically suspected osteonecrosis (any bone). Normal radiographs or radiographs that show findings suspicious for osteonecrosis. Next imaging study\****

# *Findings: 4mo Post-op (Unlabeled)*



*Sagittal*



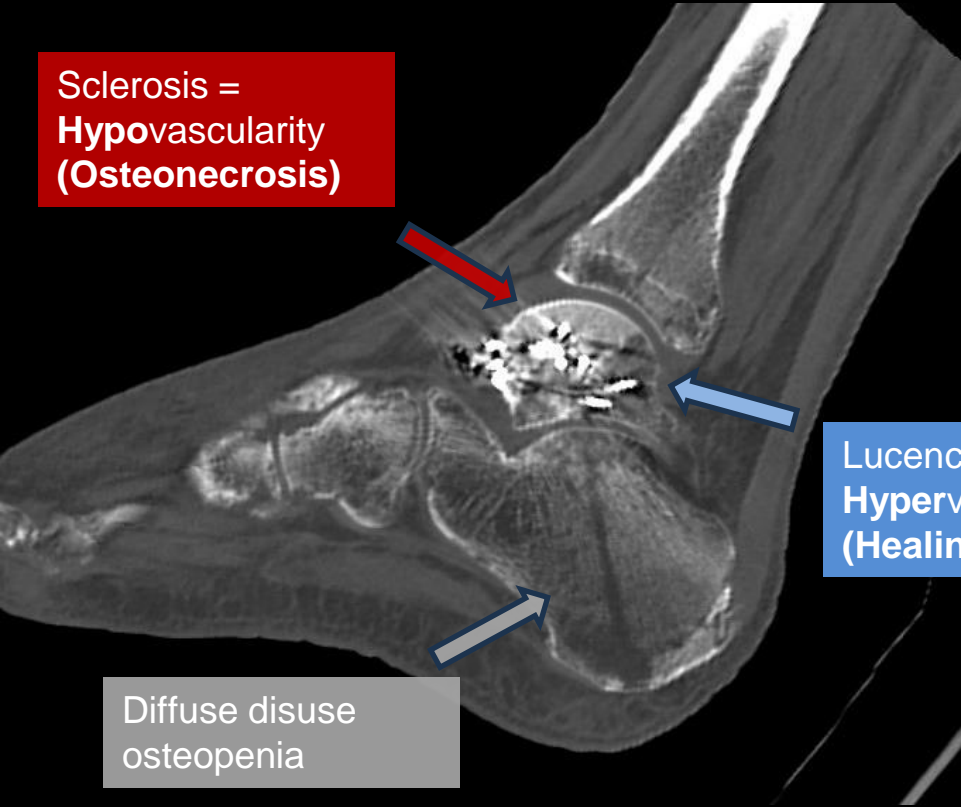
*Axial*



*Axial*

*Non-Contrast CT. Indication: pain w/ indeterminate radiograph*

# Findings: 4mo Post-op (Labeled)



Sagittal



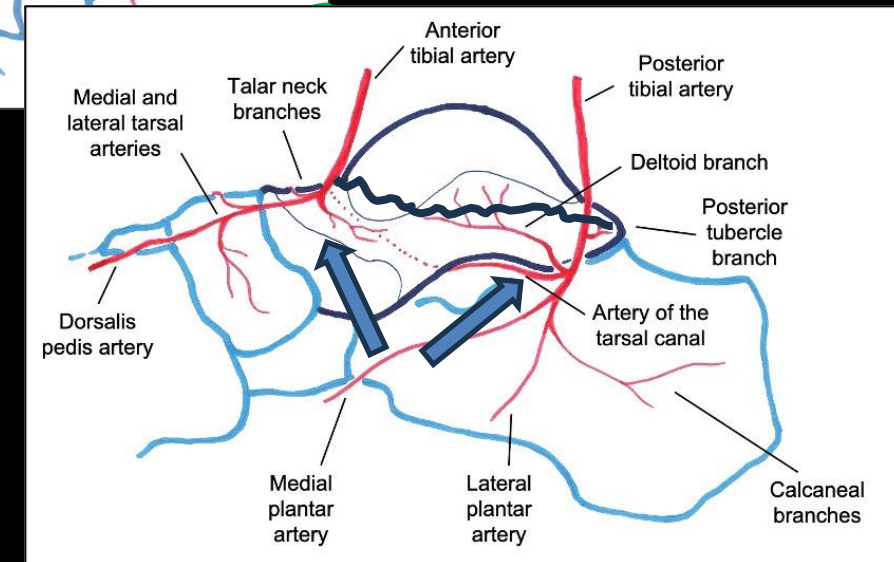
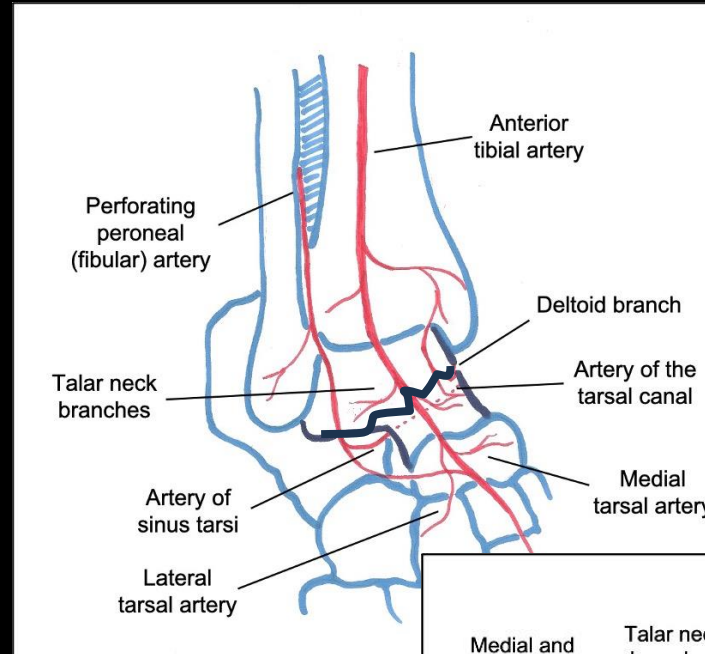
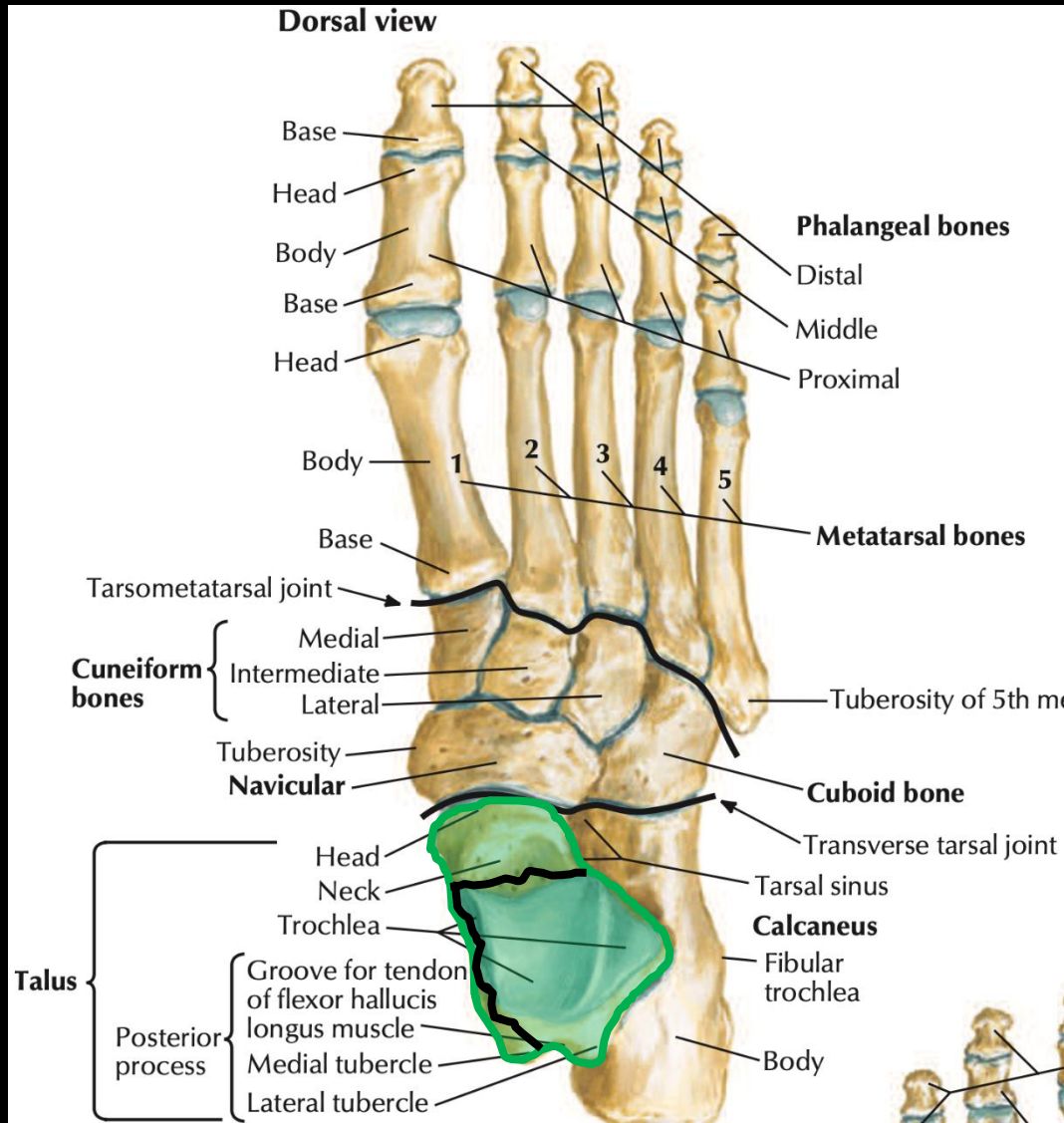
Axial



Axial

Non-Contrast CT

# Watershed Vascular Supply



Netter, Frank H. (2018). *Atlas of human anatomy* (8th). Philadelphia, PA: Saunders/Elsevier.

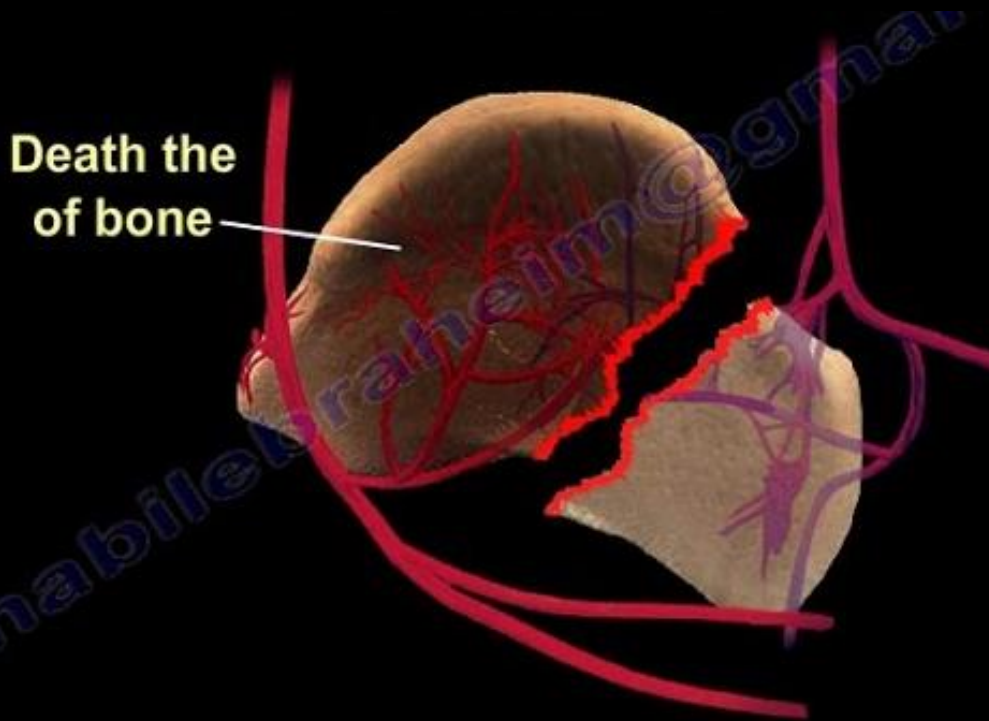
Avascular necrosis. Accessed March 4, 2024.

<https://www.bofas.org.uk/hyperbook/miscellaneous/avascular-necrosis>

# ***The Hawkins Sign***

- *Subchondral lucency in talar dome after talar neck fracture (>/= 6-8 weeks s/p injury)*
- *Evidence of sufficient vascularity and reduced likelihood of later osteonecrosis*
- *May be complete or incomplete*
- *Absence of Hawkins sign (subchondral sclerosis) signals vascular insufficiency and suggests underlying osteonecrosis*

# Talar Avascular Necrosis Pathophysiology



## **Fracture-Induced Avascularity**

- Talar neck fractures (75% of cases) disrupt tenuous retrograde watershed blood supply

**Ischemia leads to cellular necrosis and osseous breakdown**

**Inflammation and necrosis disrupts fracture remodeling**

## **Clinical Manifestations**

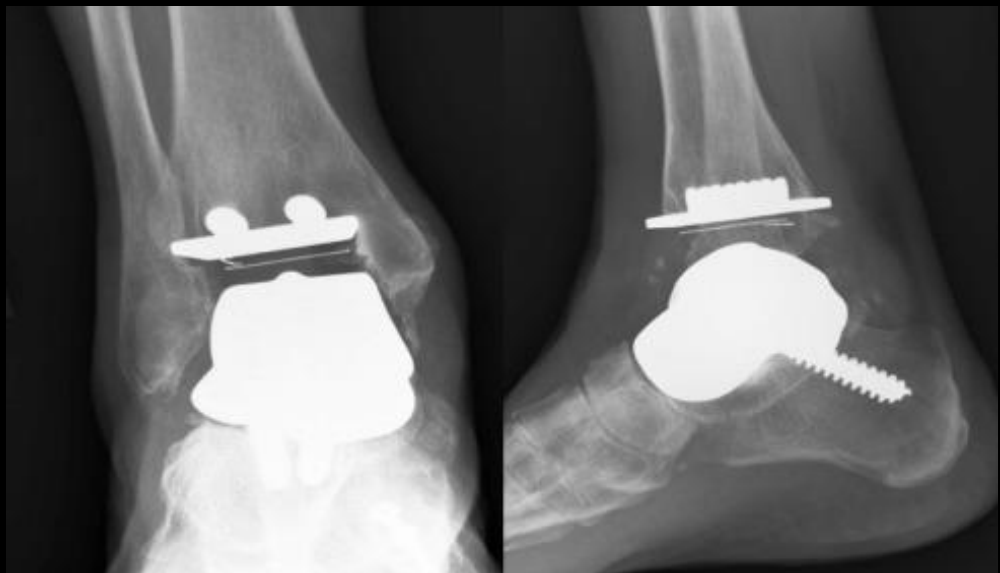
- Lack of improvement
- Evolving pain at rest (red flag)

## **Ficat Classification**

- I. Normal radiographs
- II. **Cystic/sclerotic bone with normal contour**
- III. Subchondral collapse
- IV. Features of arthrosis, talar collapse

Osteonecrosis, AVN of the Talus. Osteonecrosis, AVN of the Talus. Accessed March 5, 2024. <https://nabilebraheim.mystrikingly.com/blog/osteonecrosis-avn-of-the-talus>

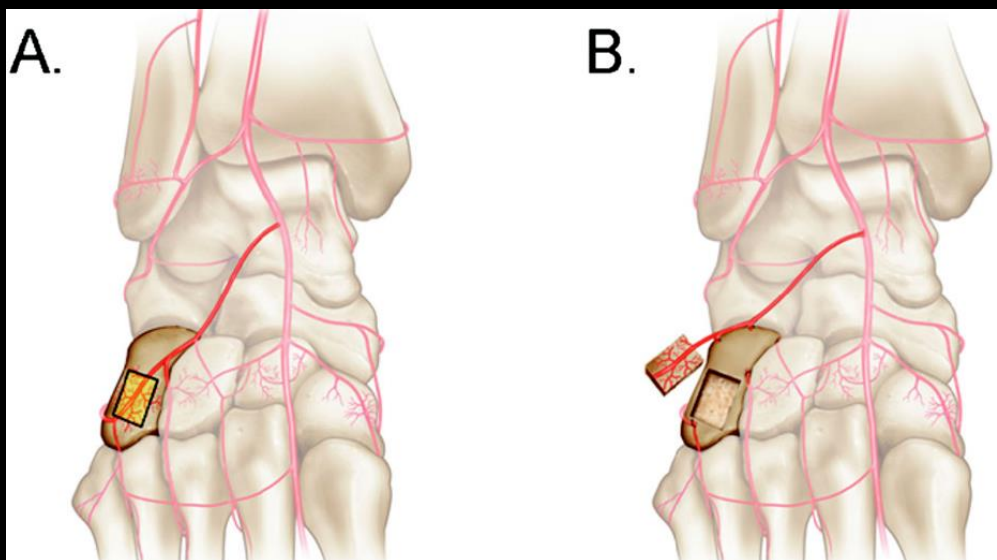
# Talar Avascular Necrosis Management



West TA, Rush SM. Total Talus Replacement: Case Series and Literature Review. *The Journal of Foot and Ankle Surgery*. 2021;60(1):187-193. doi:10.1053/j.jfas.2020.08.018

## Early Stages / Anatomic

- Usually conservative
- Non-opioid analgesia
- Casting, Limit weight bearing
- Extra-corporeal shock wave therapy



## Late Stages / Bone or Joint Deformity

- Core decompression
- Arthrodesis
- Prosthesis
- Vascularized bone grafting



# *Summary: Imaging Talar Fractures*

- *Due to tenuous vascular supply, talar neck fractures have high risk of avascular necrosis*
- *The Hawkins sign, subchondral lucency of the talus at  $\geq$  6-8 weeks, indicates good blood flow*
- *Subchondral sclerosis indicates avascularity and is a warning sign for osteonecrosis, especially with evolving pain at rest*

# References:

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8. Tehranzadeh J, Stuffman E, Ross SD. Partial Hawkins sign in fractures of the talus: a report of three cases. \*AJR Am J Roentgenol\*. 2003;181(6):1559-63. doi:10.2214/ajr.181.6.1811559.
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11. Dhillon MS, Rana B, Panda I, Patel S, Kumar P. Management Options in Avascular Necrosis of Talus. \*Indian Journal of Orthopaedics\*. 2018;52(3):284. doi:10.4103/ortho.IJOrtho\_608\_17