UTHealth
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Ankle and Foot Fractures

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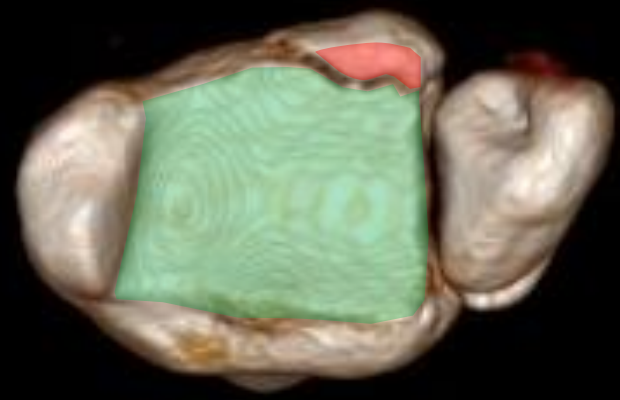


Nothing to disclose

Objectives

Things that are broken

Why the posterior malleolus is important

Why the talar neck causes so much trouble

Why we worry about this fracture

Start off easy….

No comparisons

"Mildly displaced transverse medial malleolus fracture.
Comminuted, Weber C distal fibular fracture.
The ankle mortise is intact."

That’s a Weber C fracture! Do you know what the “C” stands for?

The ankle mortise
“Can’t” be intact

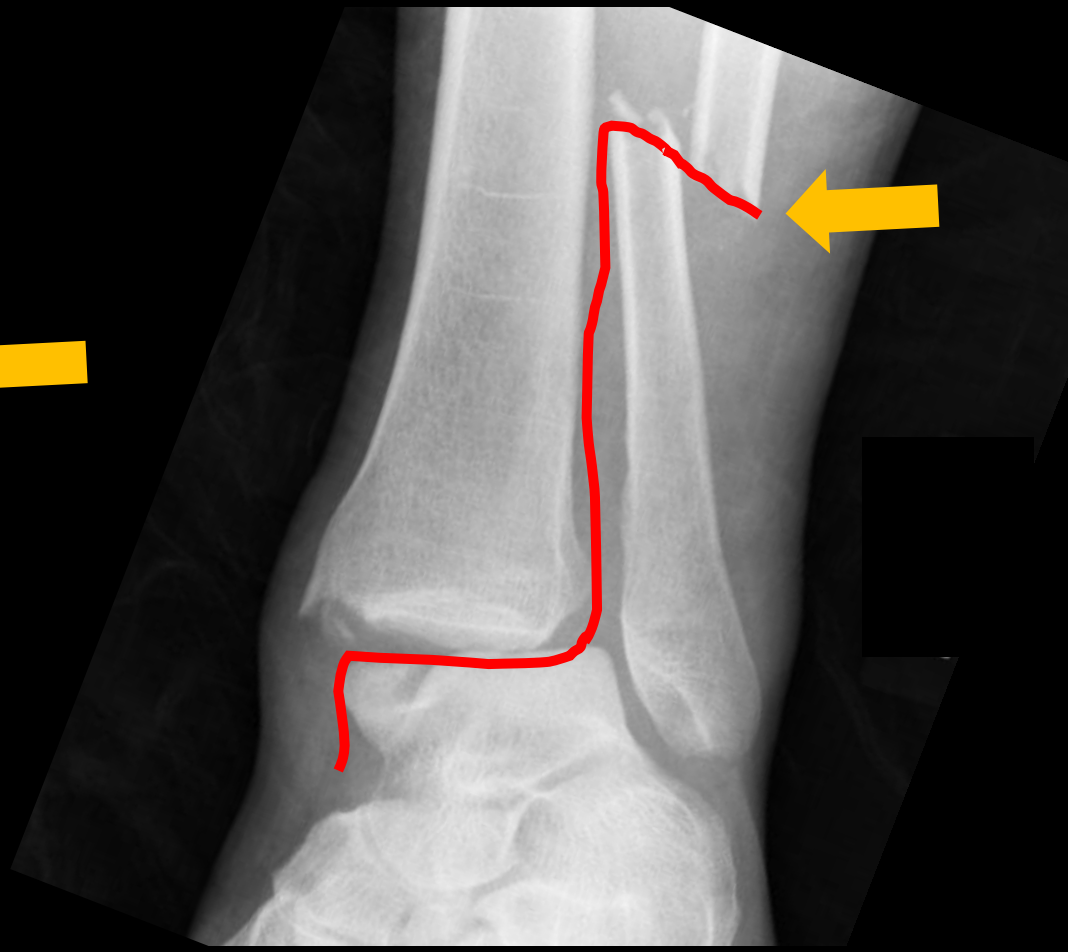
Intact: “Not damaged or impaired in any way. Complete.”
–Oxford English Dictionary

The Weber Classification

w PER

AAAAlll good

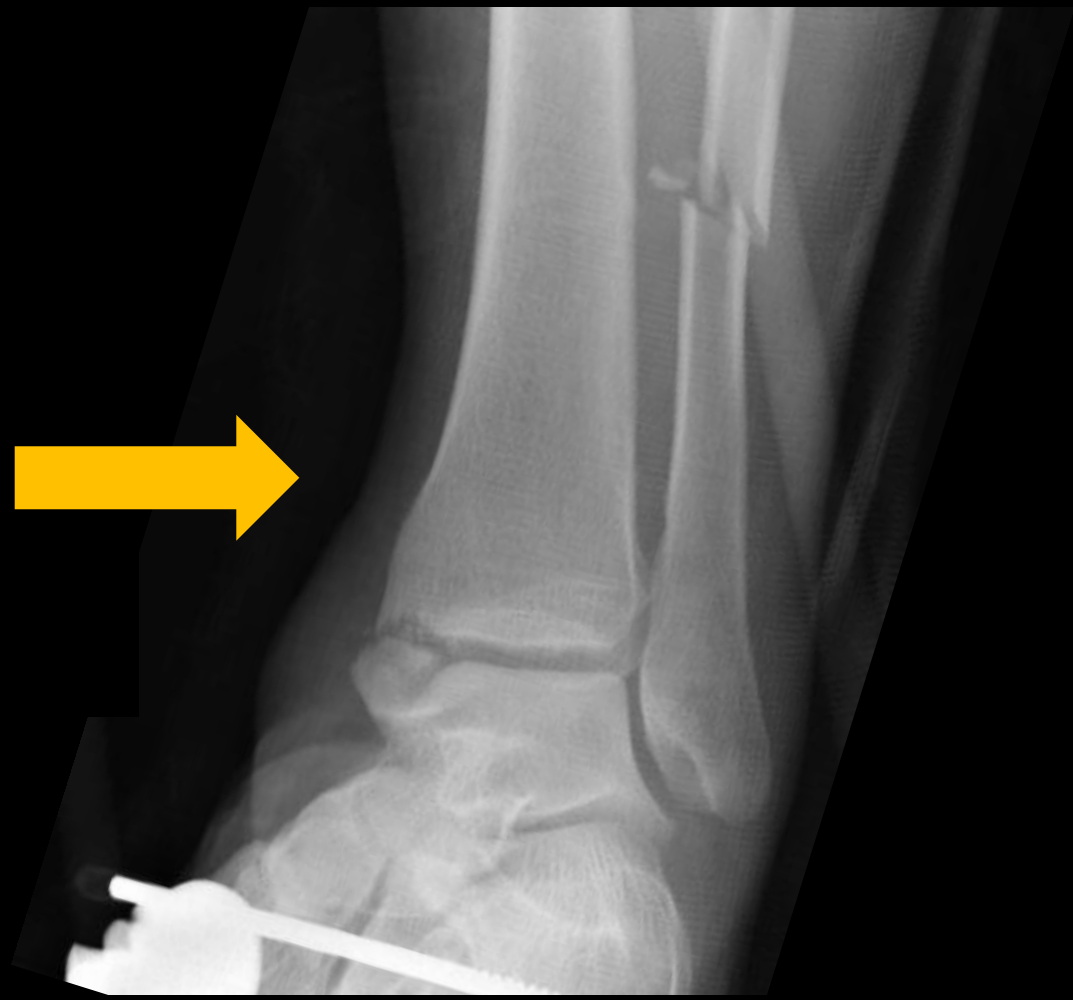
To B or not to B…
intact



“Can’t” be intact

The ankle mortise might be “aligned” or “congruent” but not…intact.

The ankle mortise
Can’t be intact



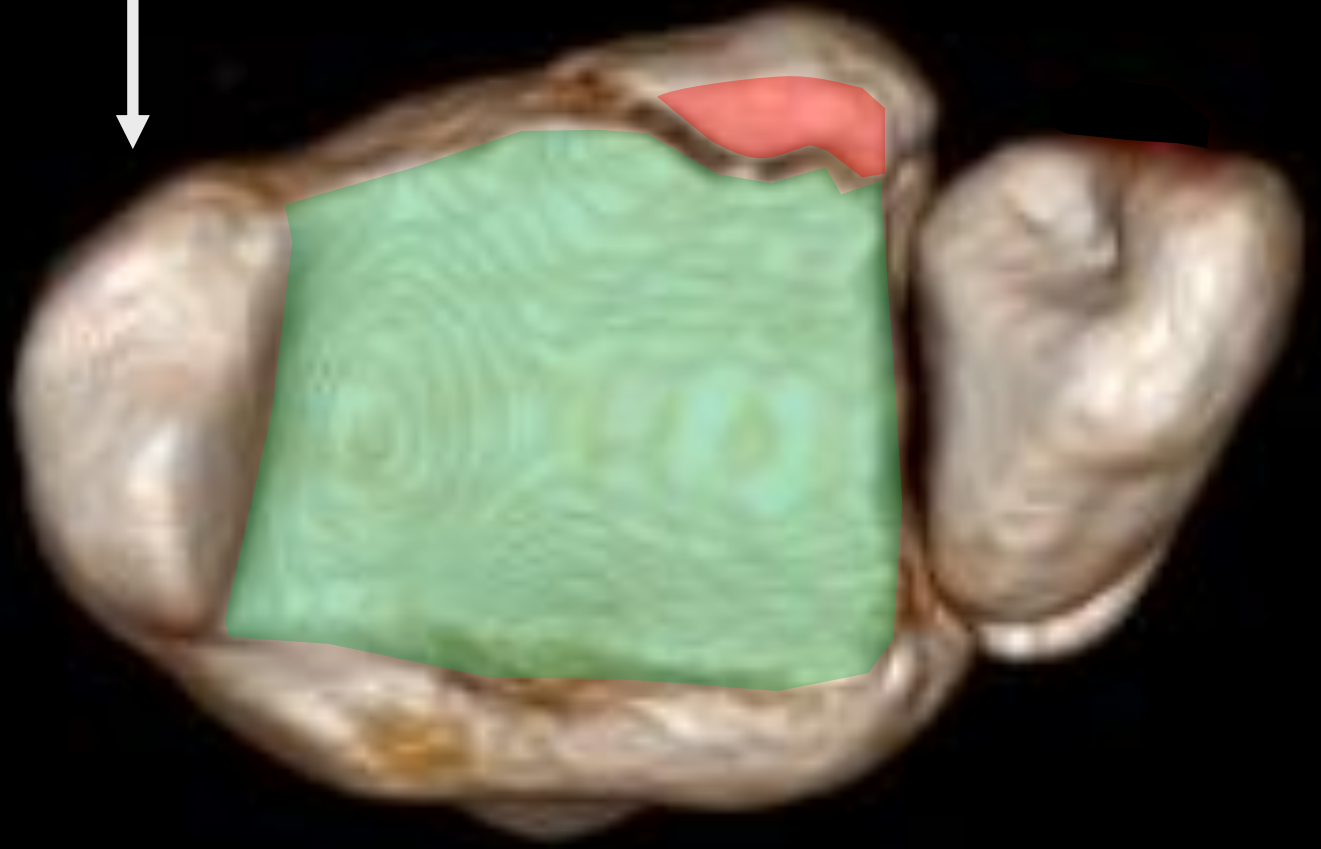
Here’s a fracture we see…all the time. Do you guys get asked to CT these?

Do you know why they got this CT?

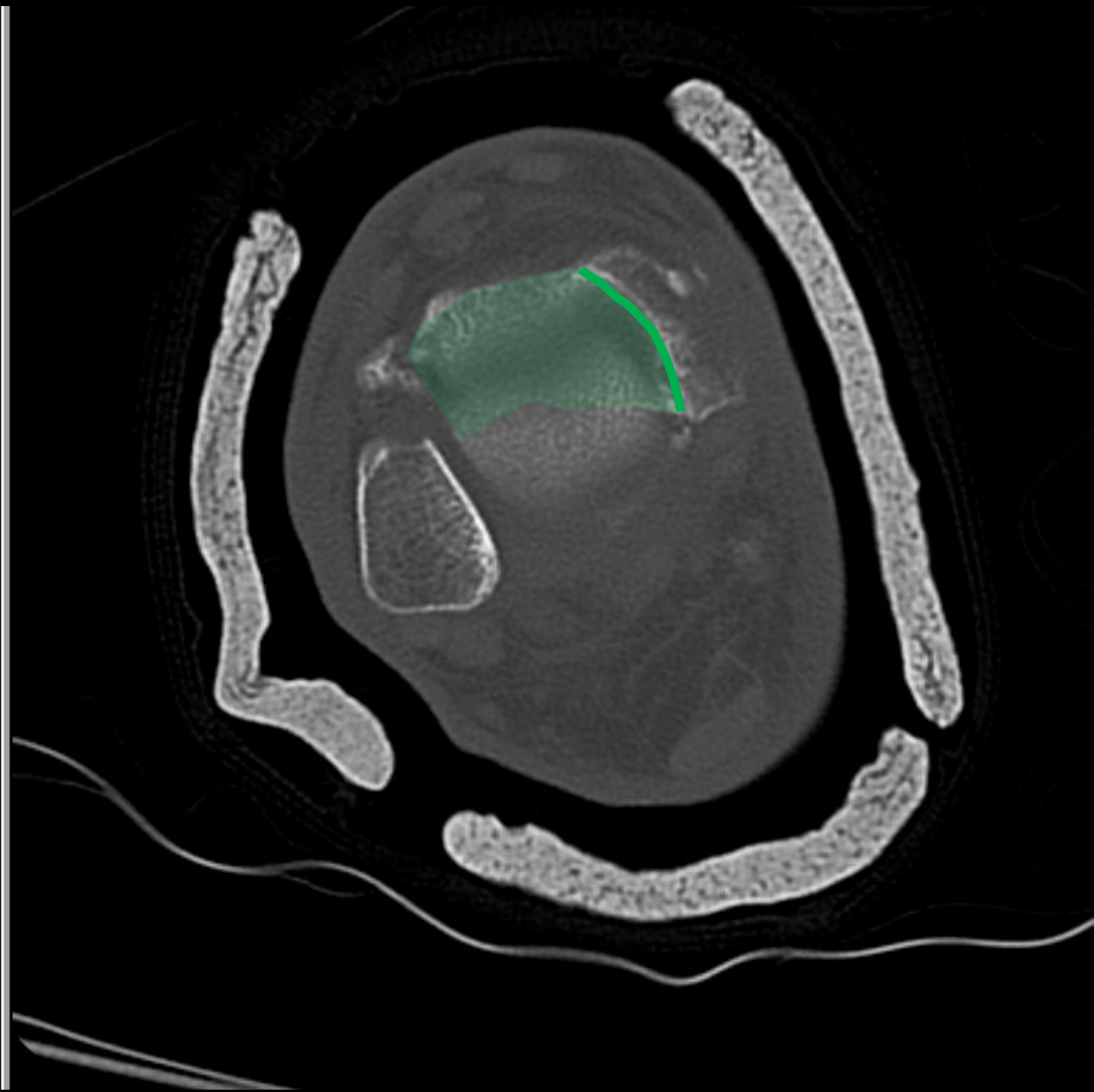
"CT scans are not optional, but instead are an essential part of this process for all fractures where there is evidence, or suspicion, of a fracture of the posterior malleolus. Plain radiographic analysis is a poor way of determining the size, site, and displacement of a posterior malleolus fracture.[13,14]"

Solan M. C. and Sakellariou A. Posterior malleolus fractures. JBJS 2017 99-B:11, 1413-1419

Exclude the medial malleolus – you don't walk on that



They want to know about the posterior malleolus

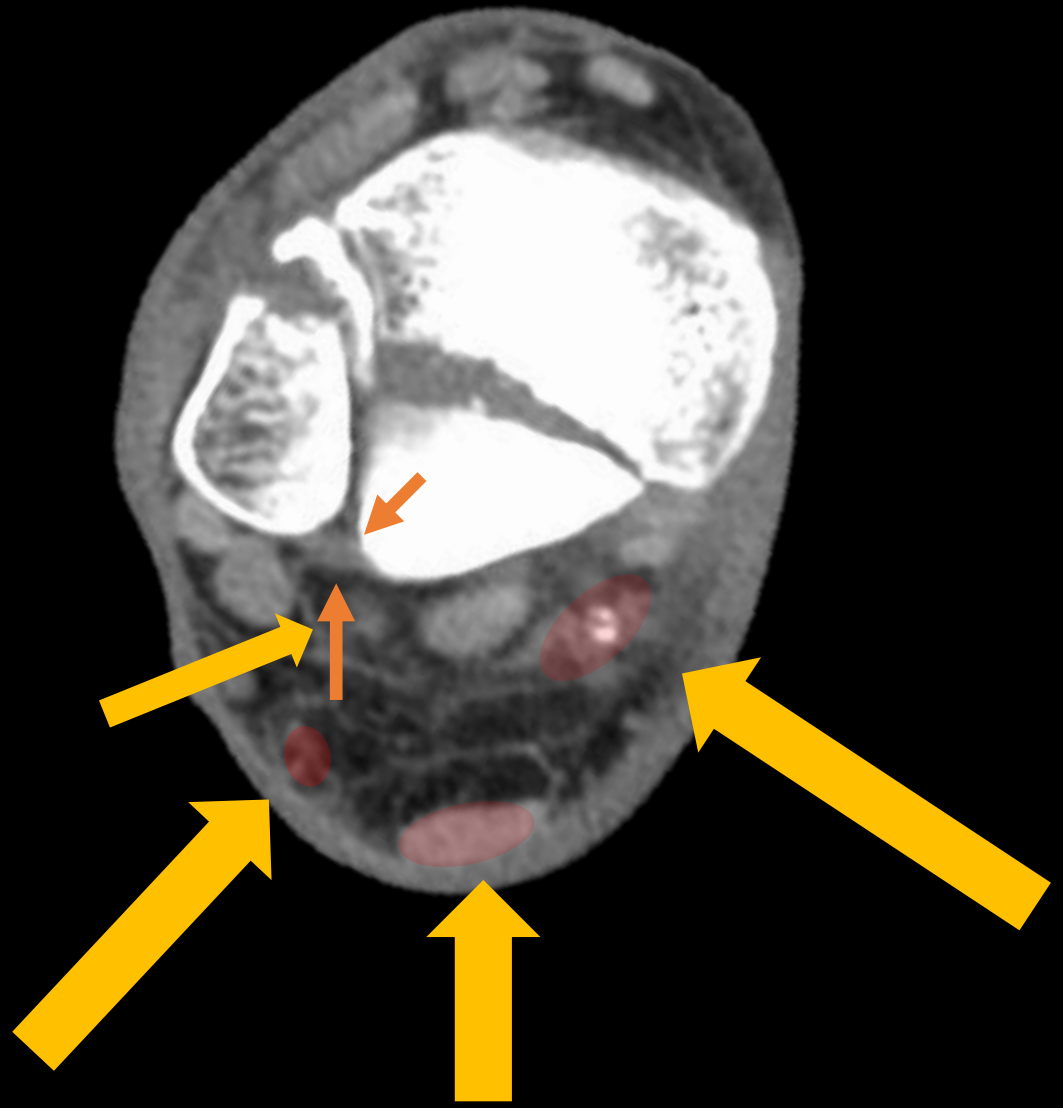


What's the big deal with the posterior malleolus?

- PITFL is attached, so plays a role in syndesmotic stability
- Large, offset fragments predispose to ankle arthritis

So if you broke your posterior malleolus, you'd definitely want it fixed, right?

After all, what could go wrong?



Maybe, maybe not

- 44% delayed wound healing with the posterolateral approach
- Hallux flexion deficit in 30%
- Sural nerve lesions in 38%

> “In contrast, we did not see infections nor sural nerve lesions following the posterolateral approach.”

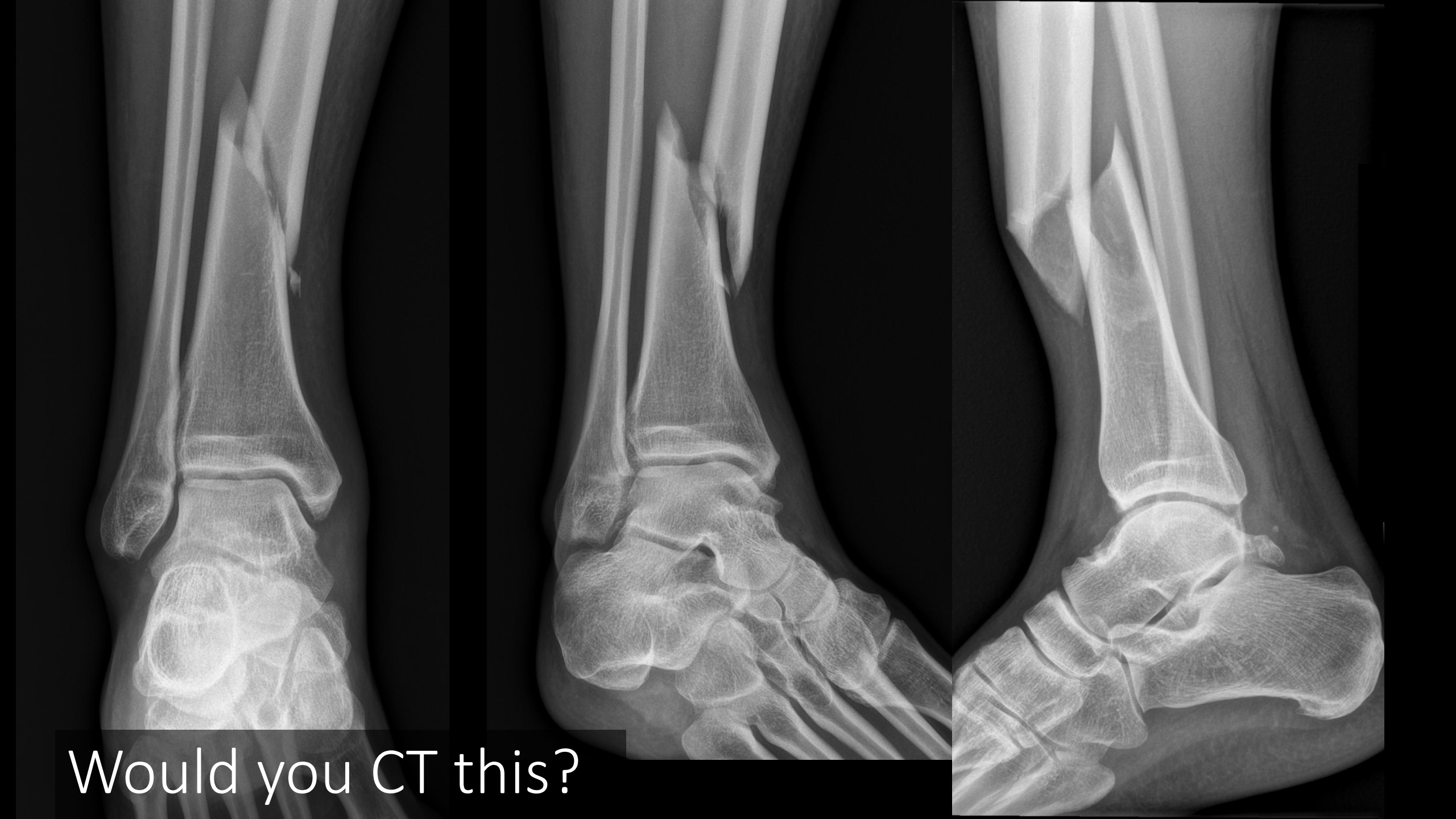
Neumann, A.P., Kroker, L., Beyer, F. *et al.* Complications following surgical treatment of posterior malleolar fractures: an analysis of 300 cases. *Arch Orthop Trauma Surg* (2022)

Bottom line: there's risk in fixing them and risk in…not

Surgeons debate the threshold for fixing these, but knowing the condition of the posterior malleolus is the first step!

Tell them the answer that's hidden on the x-ray alone:
size, site and displacement of the posterior mall fracture

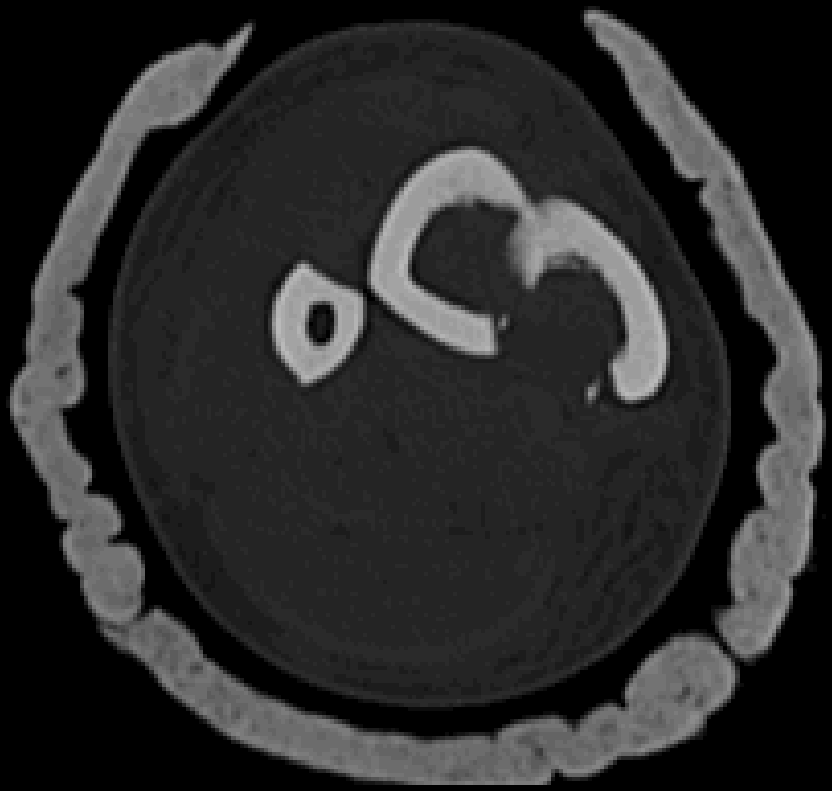
IMPRESSION: Trimalleolar ankle fracture with the posterior malleolus fragment involving 25% of the posterolateral articular surface with 2mm displacement.



Would you CT this?

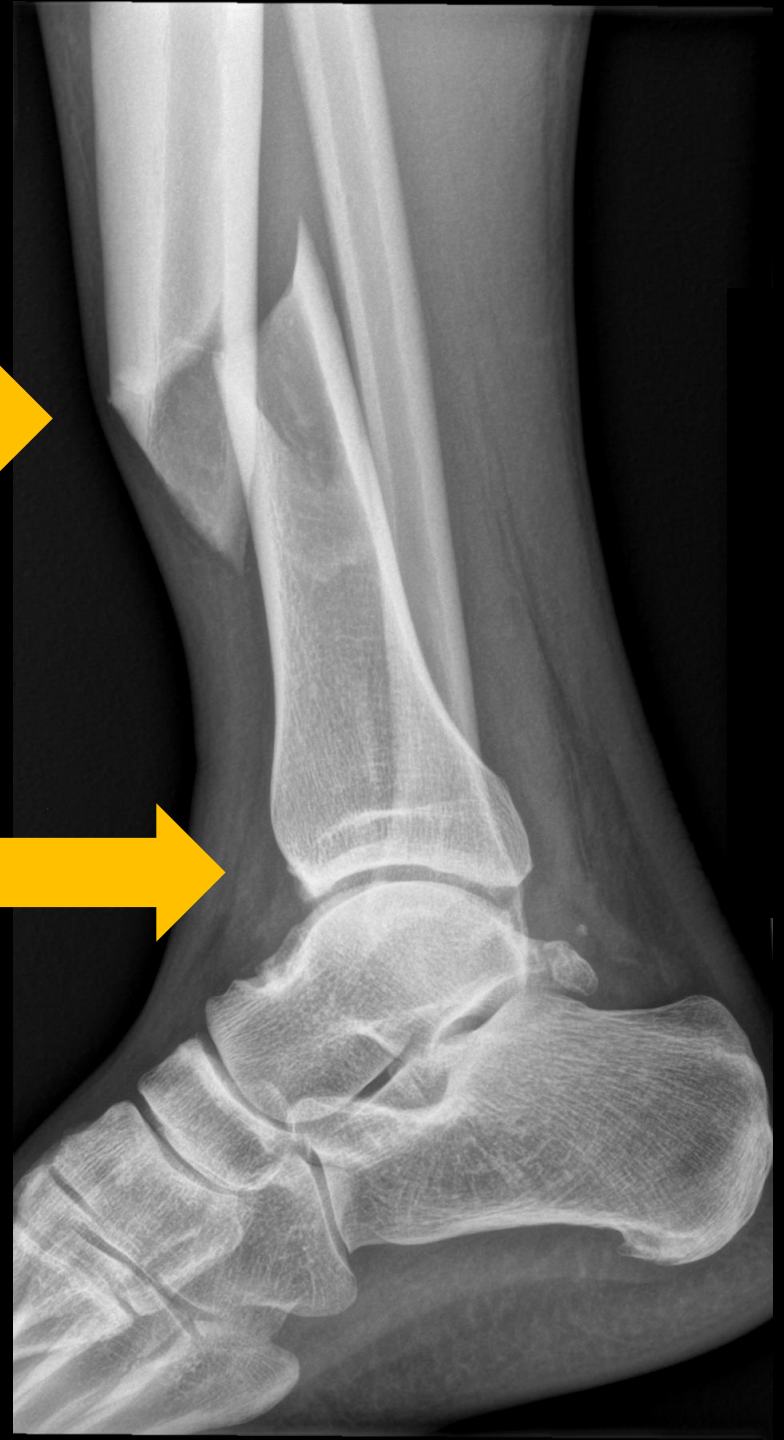

What if I told you there was no intra-articular extension?

Is there any point to this?



Not for this

For THIS!



Why would you even CT this?

High Association of Posterior Malleolus Fractures with Spiral Distal Tibial Fractures

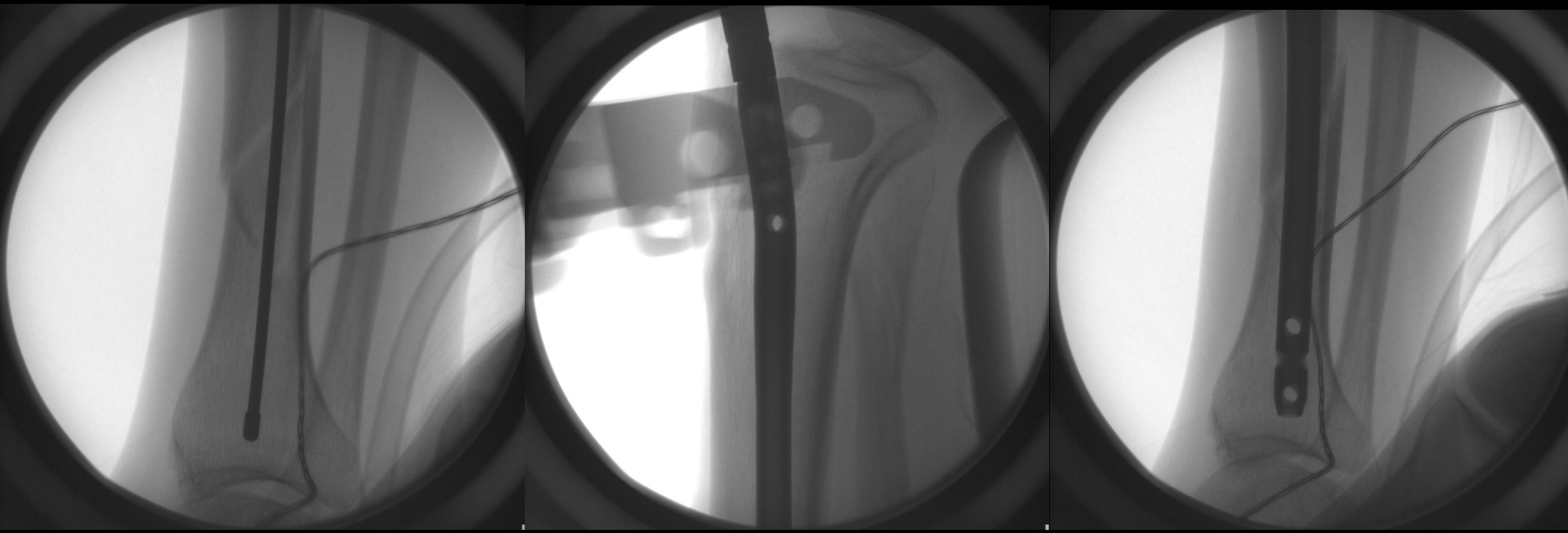
Sreevathsa Boraiah MD, Michael J. Gardner MD,
David L. Helfet MD, Dean G. Lorich MD

So what?

It’s COMPLETELY nondisplaced…

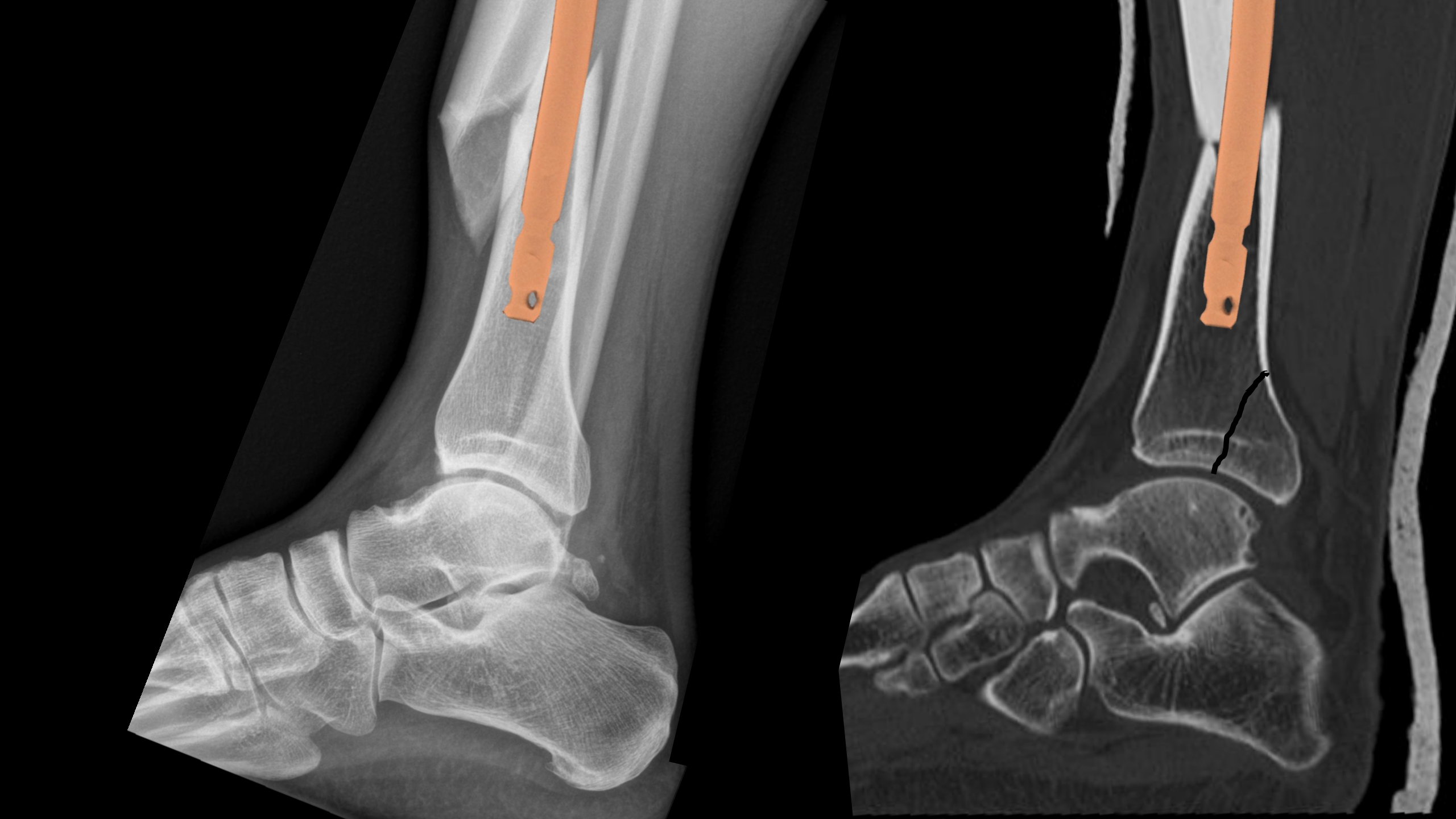
So what does it even matter? I wouldn’t have gone by it if it was *displaced* or *important*….

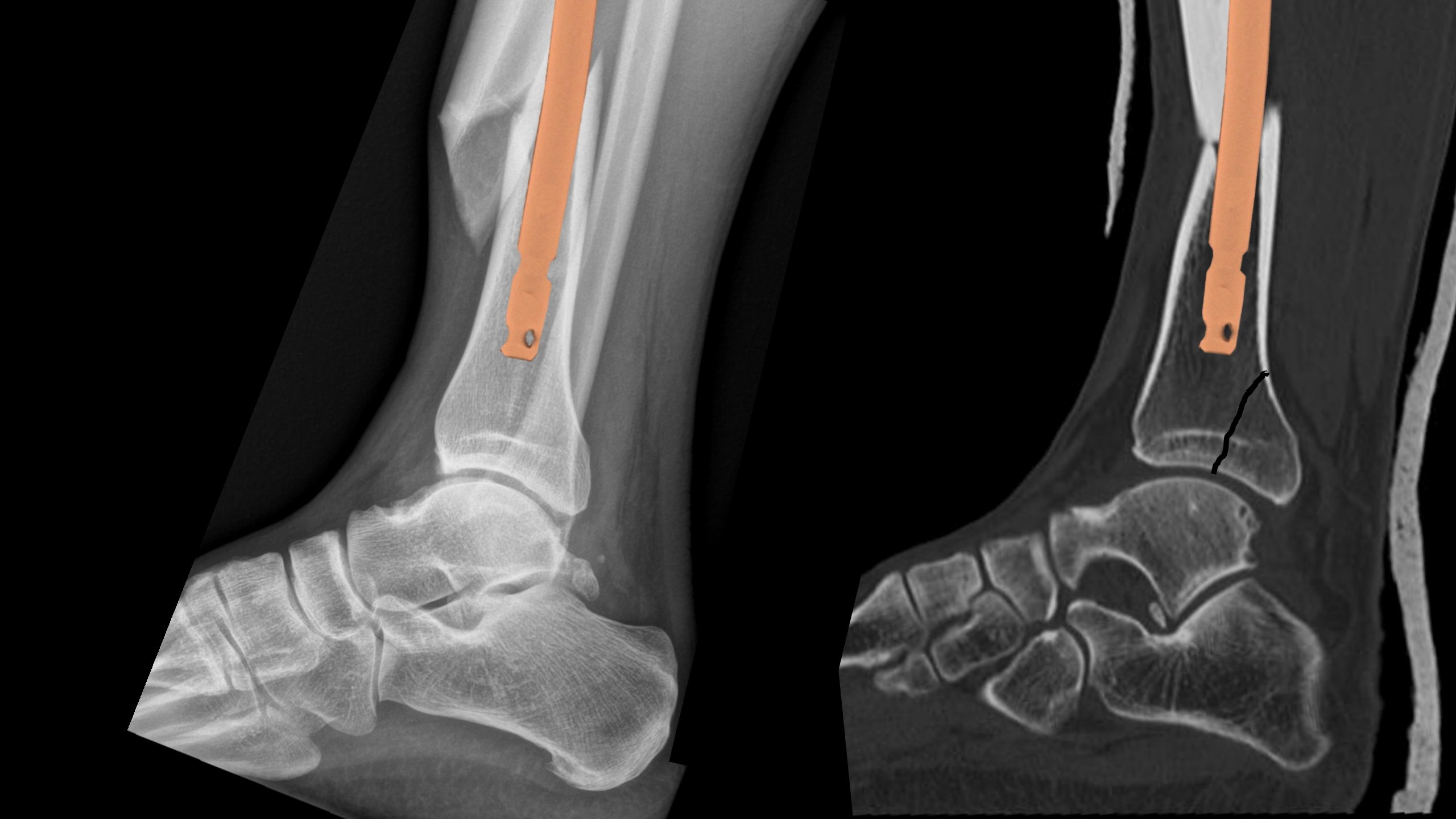
How do these tibial shaft fractures get fixed?

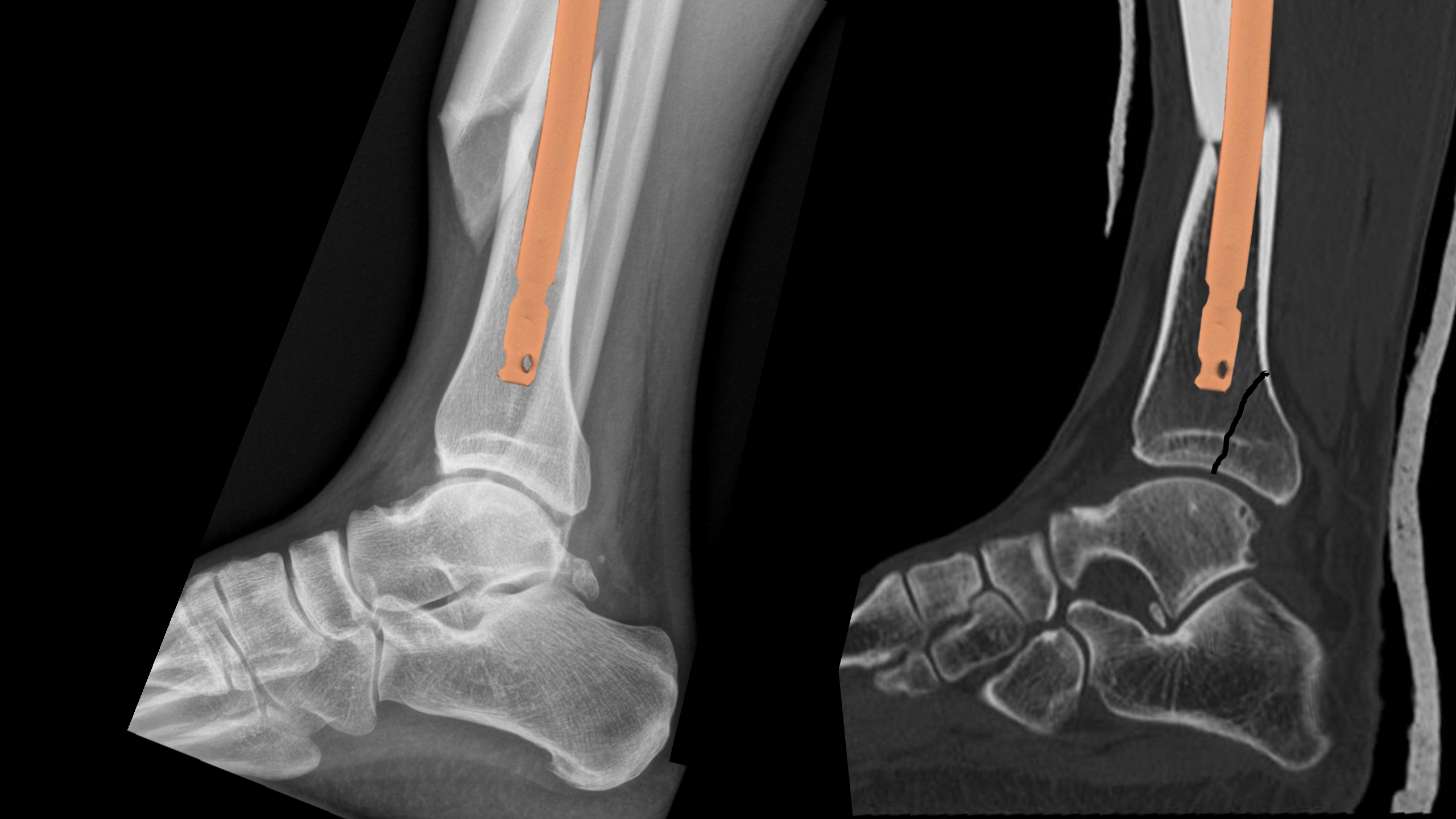


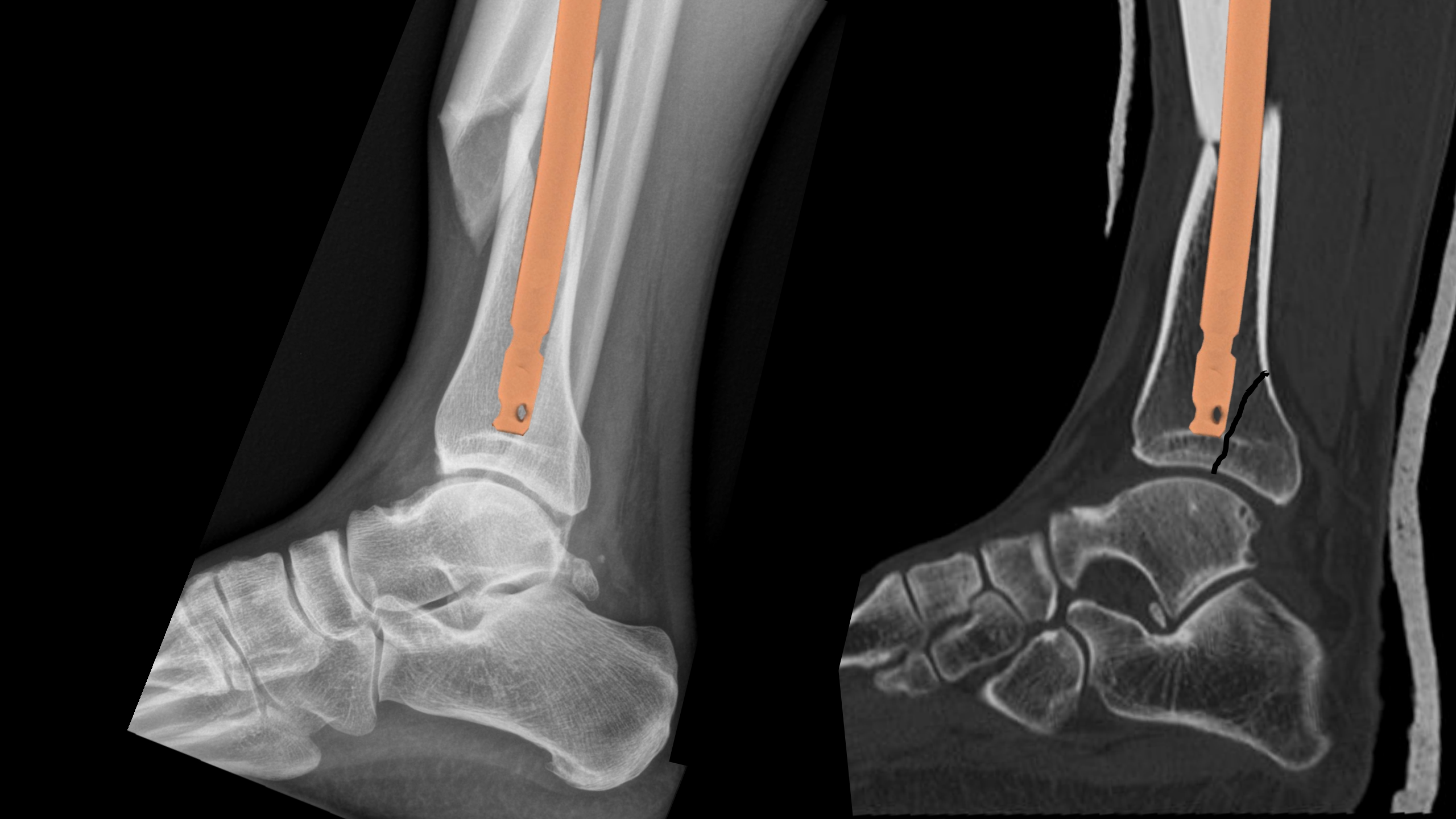
Guide…ream….

then with a feather light touch…









So if the posterior malleolar fracture *doesn't* get seen….?

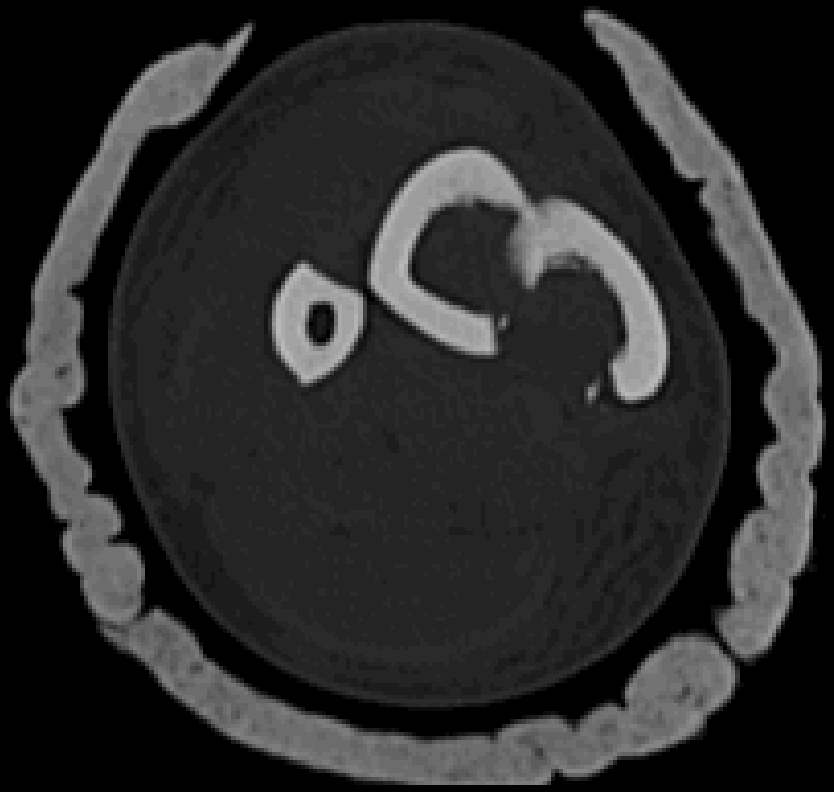

First post-op x-ray
Pre-op

But if it *does* get seen?

Avoid this…

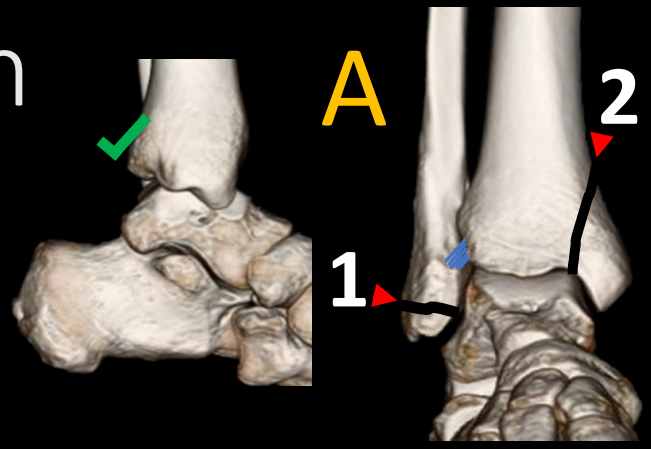
Pre-op

By looking for these…

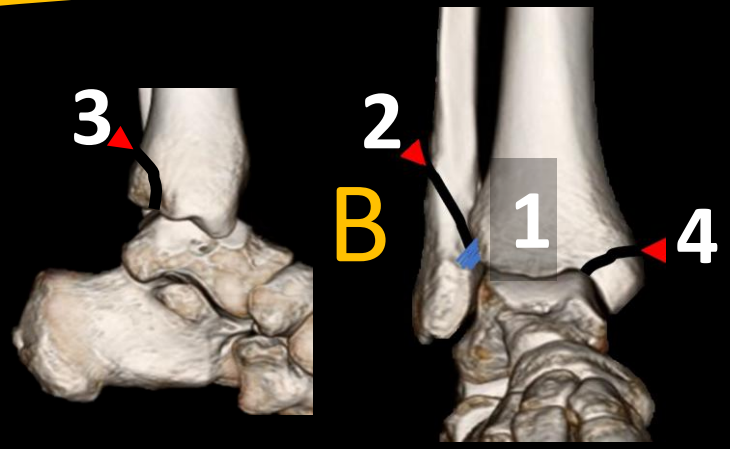


Sometimes they only show up on one or two slices right along the joint line, but you know exactly where to stop and look!

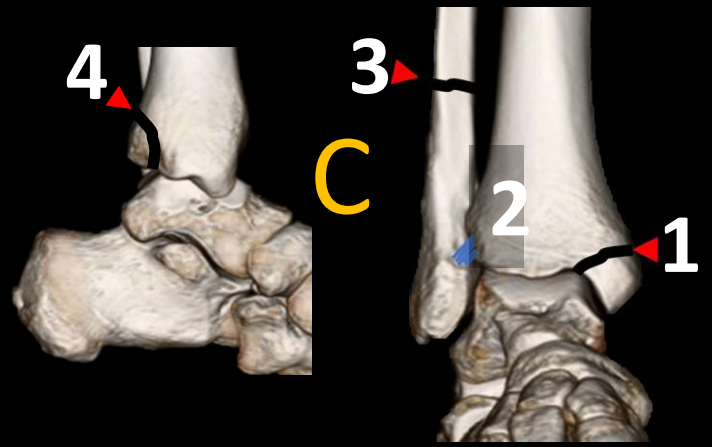
Lauge-Hansen



Supination adduction



Supination external rotation



Pronation external rotation

Weber

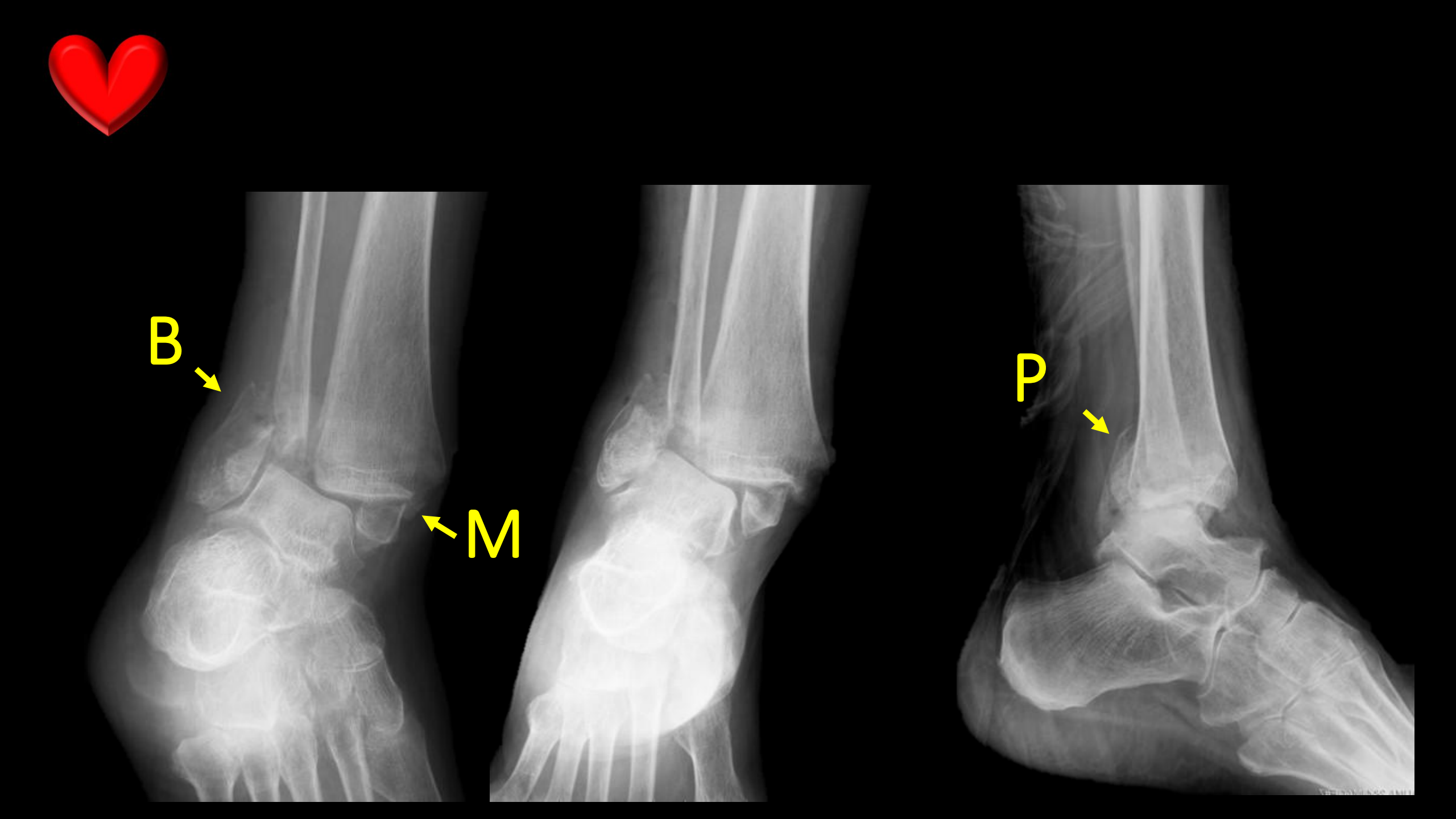
You may have realized by now that I'm obsessed with the posterior malleolus

→ BPM

BPM

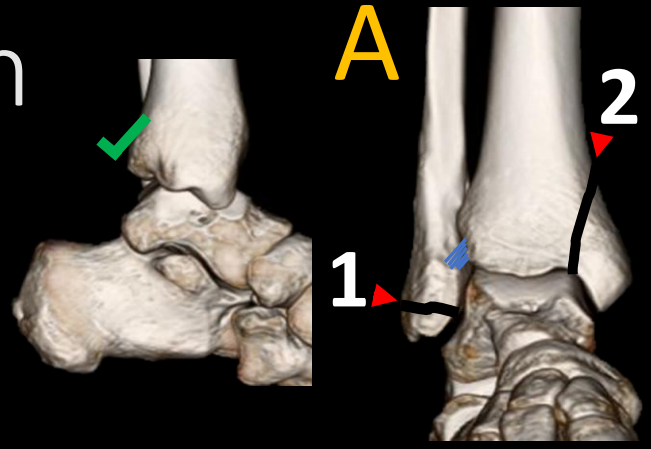
This is the order the fractures* occur in…

As the twisting injury becomes more severe, you accumulate these fractures one by one


B
M
P

Lauge-Hansen

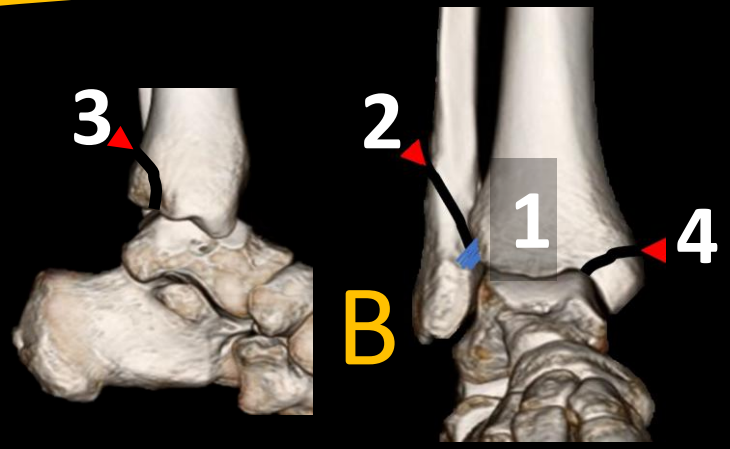
Supination adduction



Posterior malleolus injury?

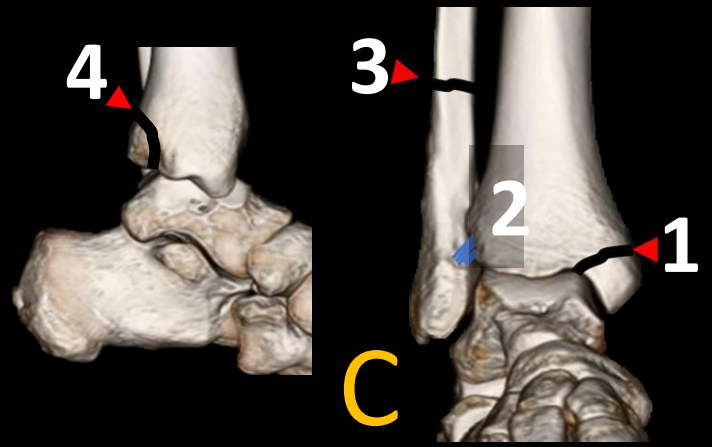
Aaaallll good

Supination external rotation



→ BPM

Pronation external rotation



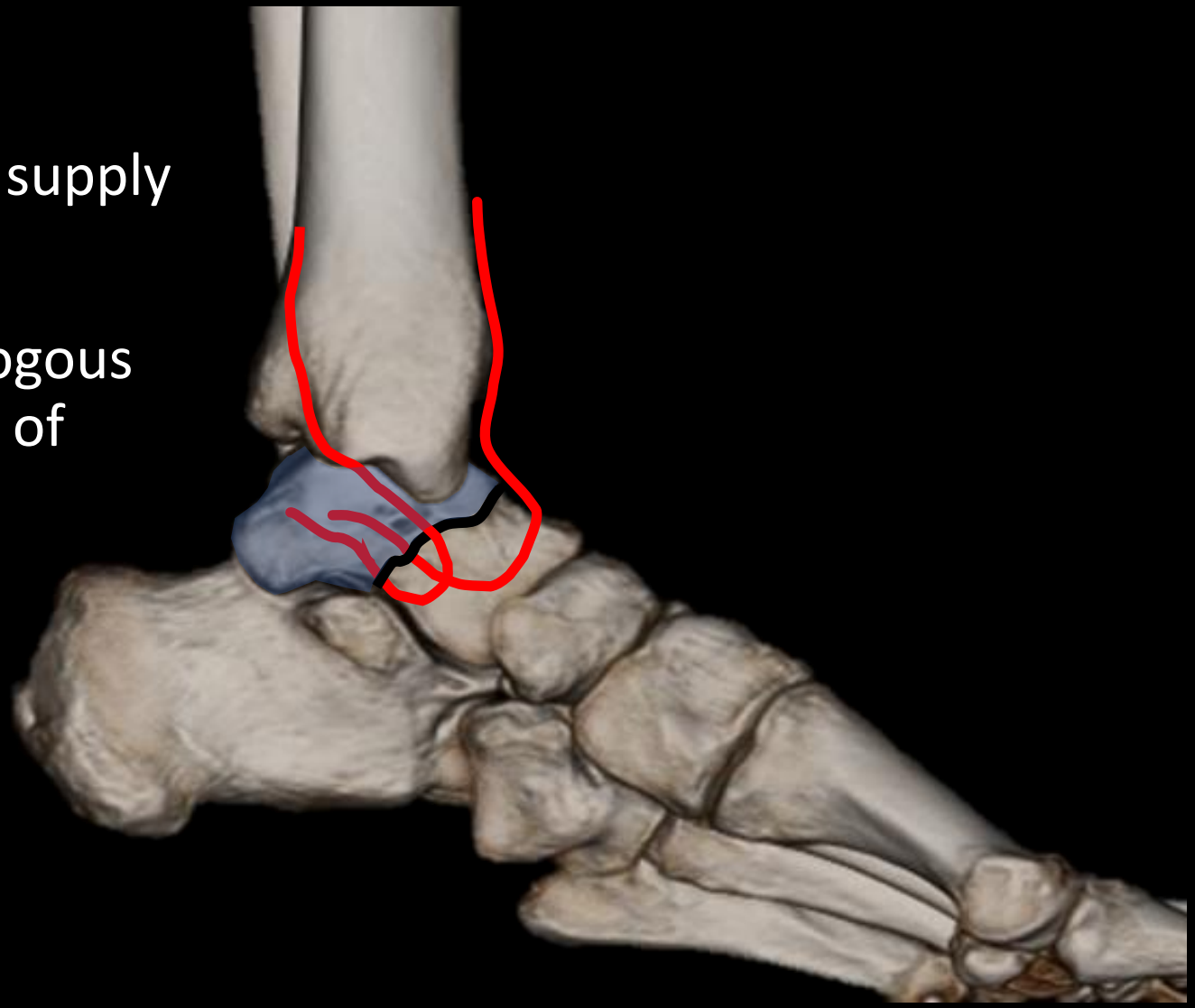
So now we know all about the ankle…

Let’s talk about the talus

Talar neck fractures – Implications

Talus has a primarily retrograde blood supply

=> fractures of the talar neck are analogous to fractures of the scaphoid waist: risk of avascular necrosis/osteonecrosis

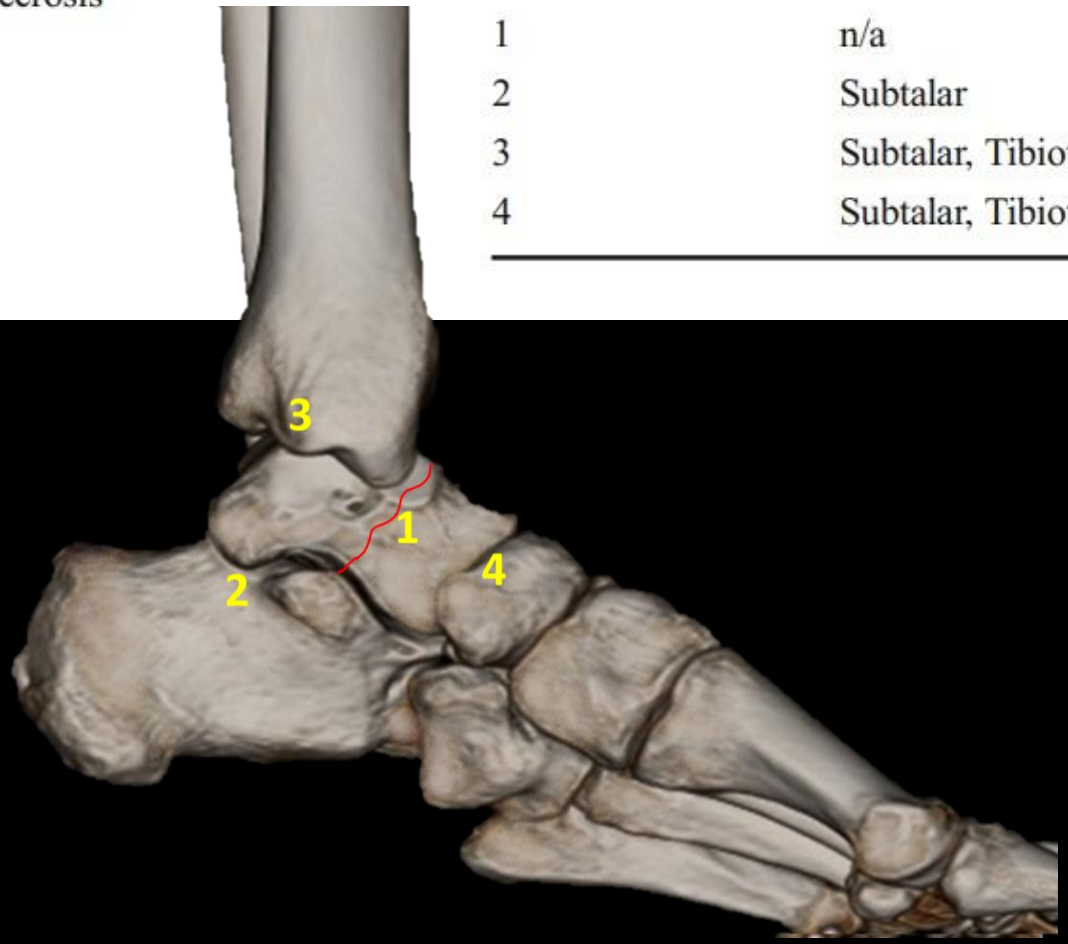


Whitaker C, Turvey B, Illical EM. Current Concepts in Talar Neck Fracture Management. *Curr Rev Musculoskelet Med*. 2018;11(3):456-474.

Talar neck fractures – Hawkins classification

Table 1 Hawkins classification, incidence, and rate of osteonecrosis

Hawkins type	Associated joint subluxation/dislocation	Incidence	Rate of osteonecrosis
1	n/a	21%	0–5.7%
2	Subtalar	43%	15.9–20.7%
3	Subtalar, Tibiotalar	31%	38.9–44.8%
4	Subtalar, Tibiotalar, Talonavicular	5%	12.1–55%



Whitaker C, Turvey B, Illical EM. Current Concepts in Talar Neck Fracture Management. *Curr Rev Musculoskelet Med*. 2018;11(3):456-474.

1

2

3

4

Hawkins 1

Hawkins 2

Hawkins 3

1 week postop

Disuse osteopenia at 6 weeks post op…everywhere except the talar body

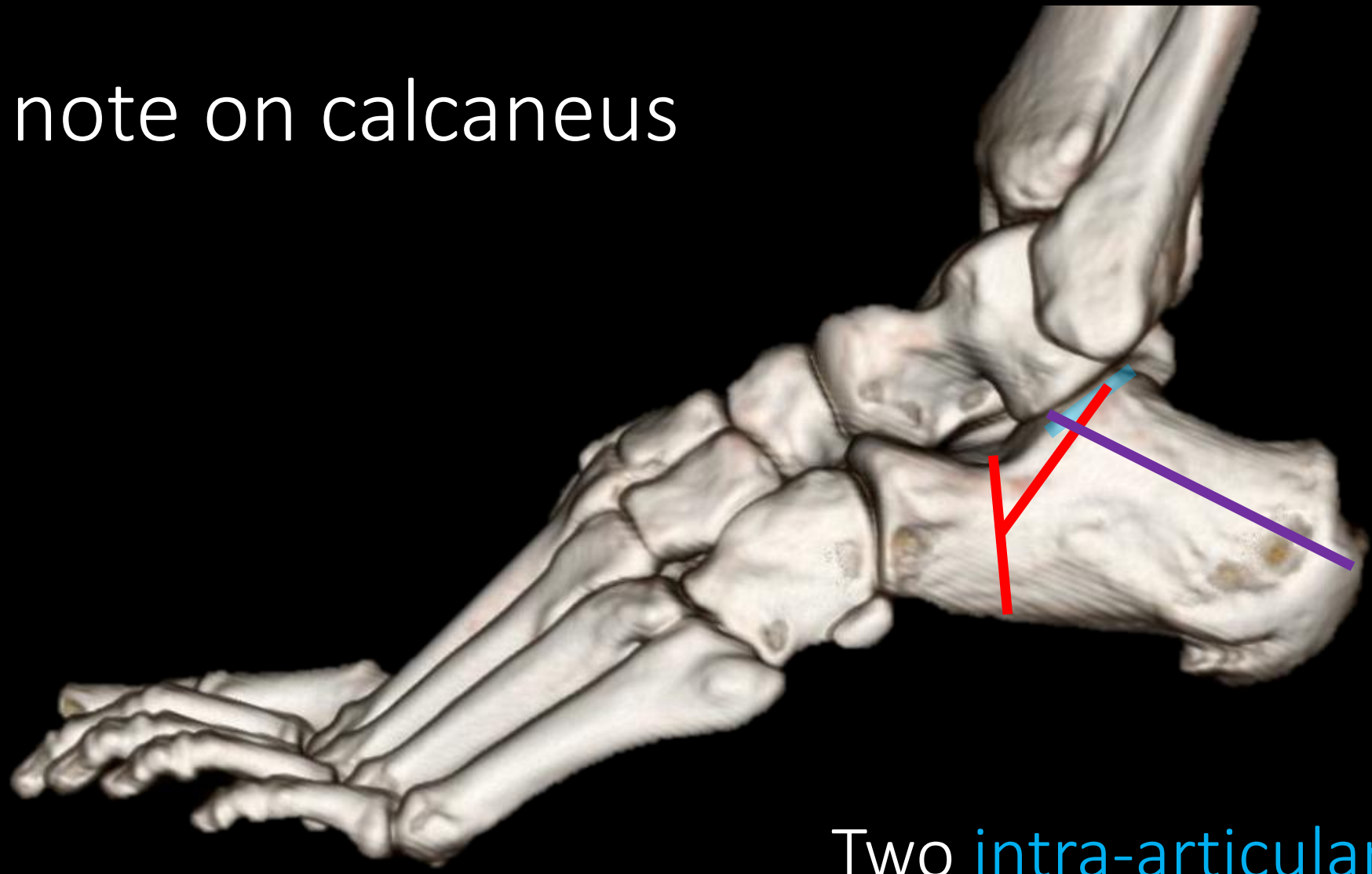
6 weeks postop

4 years later

Brief note on calcaneus frx

“Intra-articular” means fx involves the posterior subtalar facet

Brief note on calcaneus



Two intra-articular types:
joint depression
tongue-type

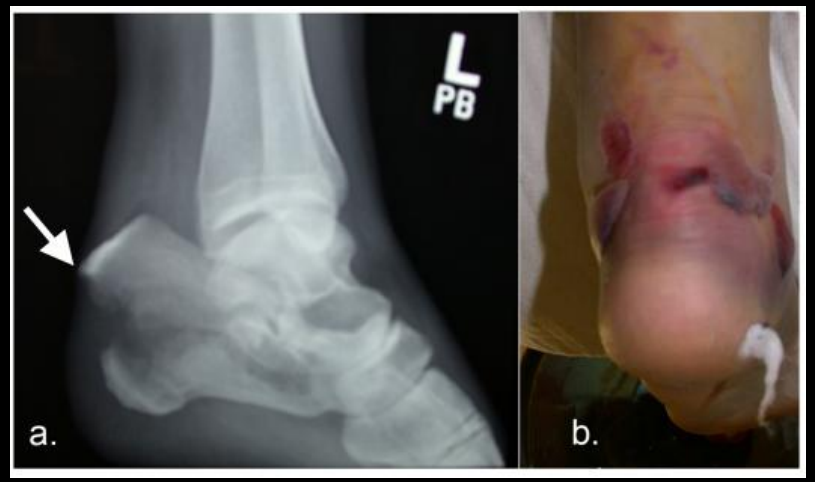
Intra-articular, tongue type

Which one of these makes you more nervous?

Intra-articular, joint depression

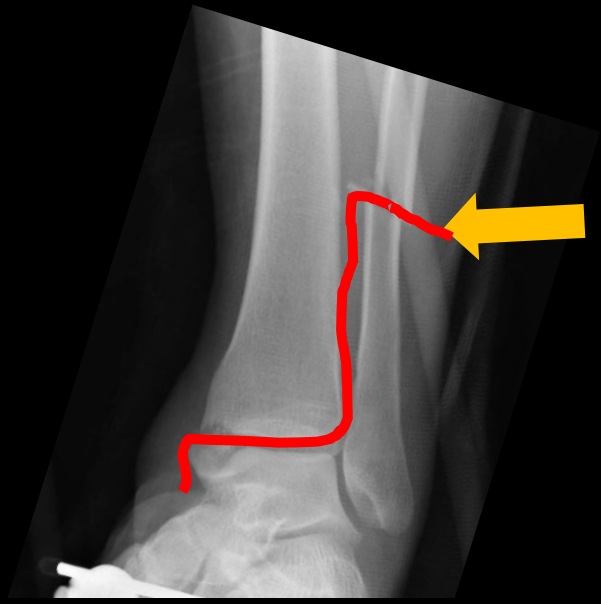
Up to 21% posterior skin compromise
Risk of infection, wound dehiscence, skin necrosis
Unlike joint-depression, displaced tongue types require urgent fixation

Yikes!

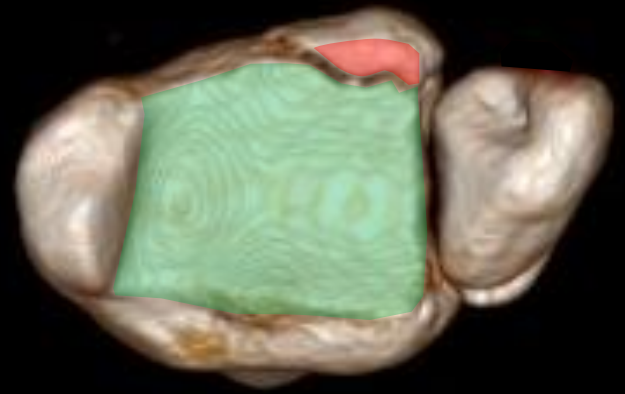


White EA et al. Intra-articular tongue-type fractures of the calcaneus: anatomy, injury patterns, and an approach to management. Emerg Radiol. 2019 Feb;26(1):67-74.

Spiral distal tib fx?
Check posterior malleolus



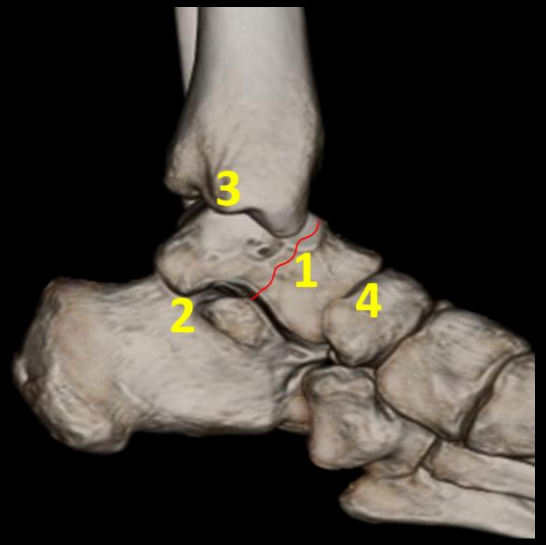
C = mortise “Can’t” be intact



On CT: eval size, site and displacement of the posterior malleolus fracture

BPM: cheat to catch that posterior malleolus fracture

Watch out for displaced tongue-type!



Evaluate each joint in turn…

References

1. Boraiah S, Gardner MJ, Helfet DL, Lorich DG. High association of posterior malleolus fractures with spiral distal tibial fractures. *Clin Orthop Relat Res*. 2008;466(7):1692-1698.
2. Neumann, A.P., Kroker, L., Beyer, F. *et al.* Complications following surgical treatment of posterior malleolar fractures: an analysis of 300 cases. *Arch Orthop Trauma Surg* (2022)
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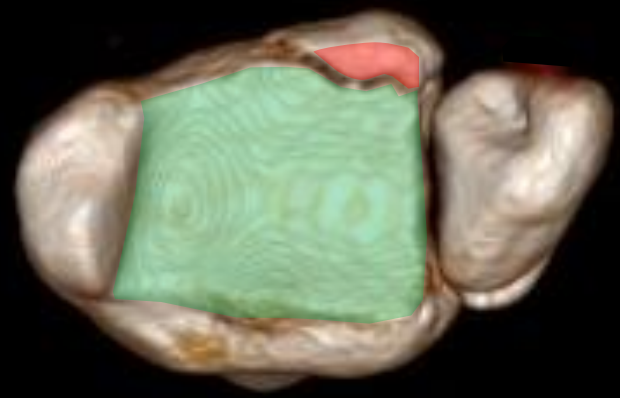
5. Ville V. Haapamaki, Martti J. Kiuru, and Seppo K. Koskinen, Ankle and Foot Injuries: Analysis of MDCT Findings Am J Roentgenology 2004 183:3, 615-622
6. White EA, Skalski MR, Matcuk GR Jr, Heckmann N, Tomasian A, Gross JS, Patel DB. Intra-articular tongue-type fractures of the calcaneus: anatomy, injury patterns, and an approach to management. Emerg Radiol. 2019 Feb;26(1):67-74.

Thank you!



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