

Comminuted Distal Femoral Fracture

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RAD 4001

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Clinical History

- 47 y/o F presenting to ED by Life Flight following highway MVC. Patient agitated on scene and intubated. Pelvic binder in place and tourniquet placed over RLE.
- PMHx, PSHx, Soc Hx, Fam Hx and ROS unable to be obtained due to neurological status (GCS 3)

Objective

Vital Signs

- T: 97.6 F
- HR: 135 bpm
- RR: 22
- BP: **90/60 mm Hg**
- SpO2: 92%

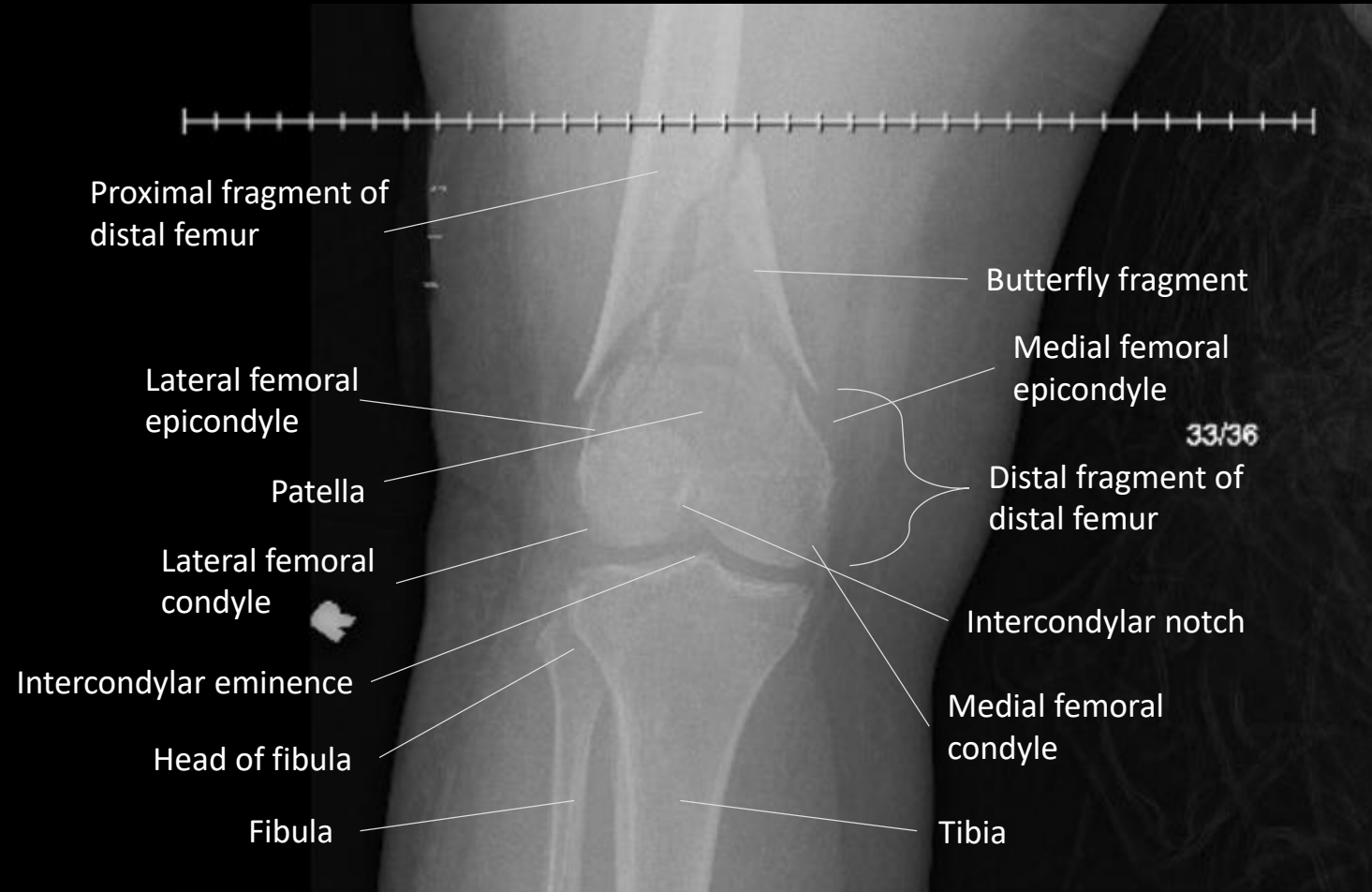
Physical Exam

- Head: normocephalic, ecchymosis over forehead
- Eyes: PERRL
- ENT: intubated, lacerations over chin
- CV: tachycardic, regular rhythm
- Lungs: clear to auscultation bilaterally
- Abdomen: soft, nondistended
- MSK: RLE tourniquet in place, **obvious deformity to R femur**, pulses present on Doppler

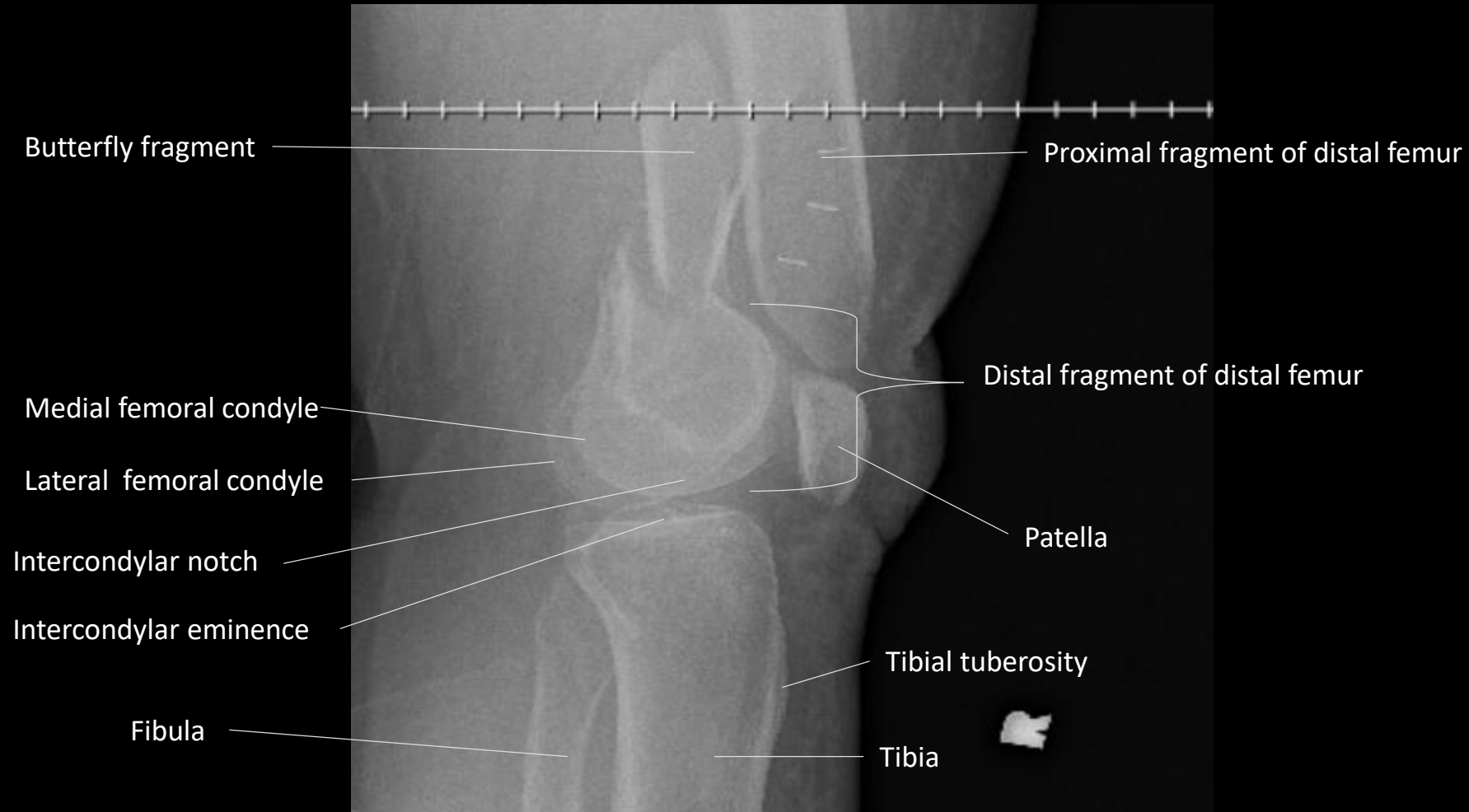
Initial Management

- L subclavian line and central line placed
- FAST negative but hypotensive so went for ex-lap
- CT head, C-spine, chest/abdomen/pelvis
- CXR, pelvic X-ray, radiographs of all extremities
- Ortho consulted due to deformity over R femur
- Concerns for ICH; cervical, thoracic, and lumbar spine injuries; R femoral fracture

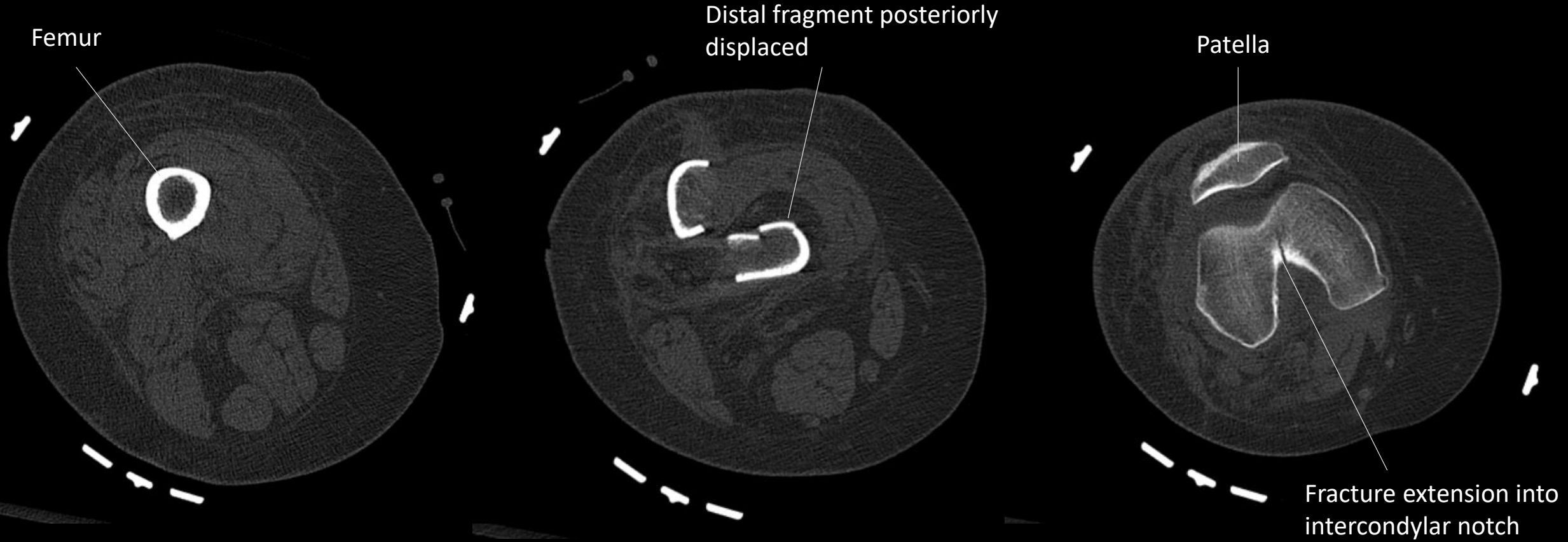
AP X-ray R knee (7/6/2020)



Lateral X-ray R knee (7/6/2020)



CT Axial view R knee (7/6/2020)

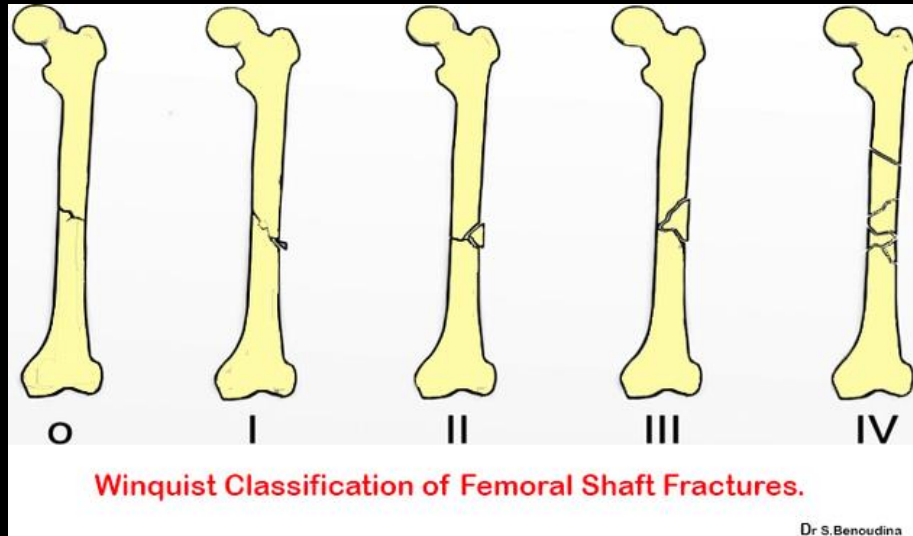


Key Imaging Findings

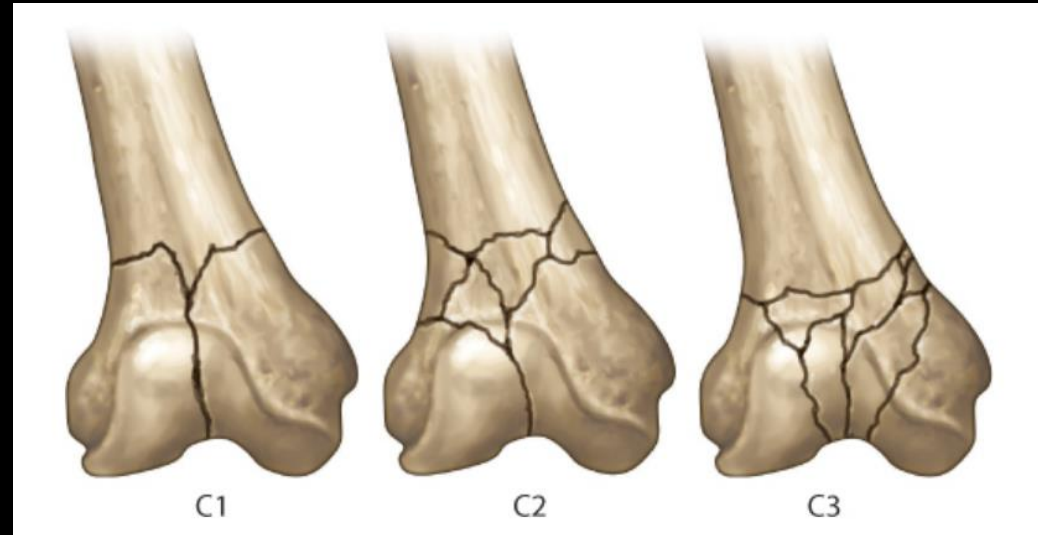
- Comminuted distal metadiaphyseal fracture of R femur
- Oblique fracture with posterior displacement by a full shaft width with fragments overlying
- Butterfly fragment present posteromedially
- Fracture extends into intercondylar notch

Final Diagnosis

- Comminuted R distal femoral fracture
 - Winquist classification: type IV (severe comminution)
 - OTA: Type 33-C2



<https://radiopaedia.org/articles/winquist-classification-of-femoral-shaft-fractures-1?lang=us>



<https://musculoskeletalkey.com/distal-femoral-fractures/>

Discussion

- 47 y/o F with distal femoral fracture s/p MVC
- Severe comminution on imaging in addition to obvious deformity on physical exam support diagnosis
- Ortho was consulted in this case for management of fracture
- Patient underwent external fixation followed by intramedullary nailing

Treatment of Femoral Fracture

- Non-operative (long leg or spica casting)
 - Uncommon – reserved for stable nondisplaced fractures in patients unfit for surgery
- Operative
 - Intramedullary nailing (IMN) – gold standard
 - External fixation with subsequent IMN
 - ORIF – worse outcomes than IMN due to higher rates of nonunion and infection



<https://www.orthobullets.com/trauma/1040/femoral-shaft-fractures>

ACR Appropriateness Criteria

Variant 7:

Adult or child 5 years of age or older. Significant trauma to the knee (eg, motor vehicle accident, knee dislocation). Initial imaging.

Procedure	Appropriateness Category	Relative Radiation Level
Radiography knee	Usually Appropriate	⊕
CTA lower extremity with IV contrast	Usually Appropriate	⊕⊕⊕
Arteriography lower extremity	May Be Appropriate	⊕⊕
CT knee with IV contrast	May Be Appropriate (Disagreement)	⊕
CT knee without IV contrast	May Be Appropriate	⊕
MRA knee without and with IV contrast	May Be Appropriate	○
MRI knee without IV contrast	May Be Appropriate	○
MRA knee without IV contrast	Usually Not Appropriate	○
Bone scan with SPECT or SPECT/CT knee	Usually Not Appropriate	⊕⊕⊕
CT knee without and with IV contrast	Usually Not Appropriate	⊕
MR arthrography knee	Usually Not Appropriate	○
MRI knee without and with IV contrast	Usually Not Appropriate	○
US knee	Usually Not Appropriate	○

Radiographs of knee should be initial study

CT w/o contrast not used initially, but is better for detecting and classifying fractures

Cost of Imaging

- Typical charges at TMC
 - Plain film knee (AP and lateral): \$523
 - CT knee w/o contrast: \$3,078

<https://www.memorialhermann.org/patients-caregivers/pricing-estimates-and-information/>

Take Home Points

- Distal femoral fractures typically result from major trauma such as MVC or falls from great heights
- Can present with obvious deformity on physical exam
- Radiographs should be the initial imaging of choice
- CT w/o contrast can be used to better visualize/classify fractures

References

- <https://radiopaedia.org/articles/distal-femoral-fracture?lang=us>
- <https://radiopaedia.org/articles/fracture-1?lang=us>
- <https://acsearch.acr.org/list>
- <https://www.orthobullets.com/trauma/1040/femoral-shaft-fractures>



Questions?