

Distal Femoral Fracture

Joaquin Santoy

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RAD 4001

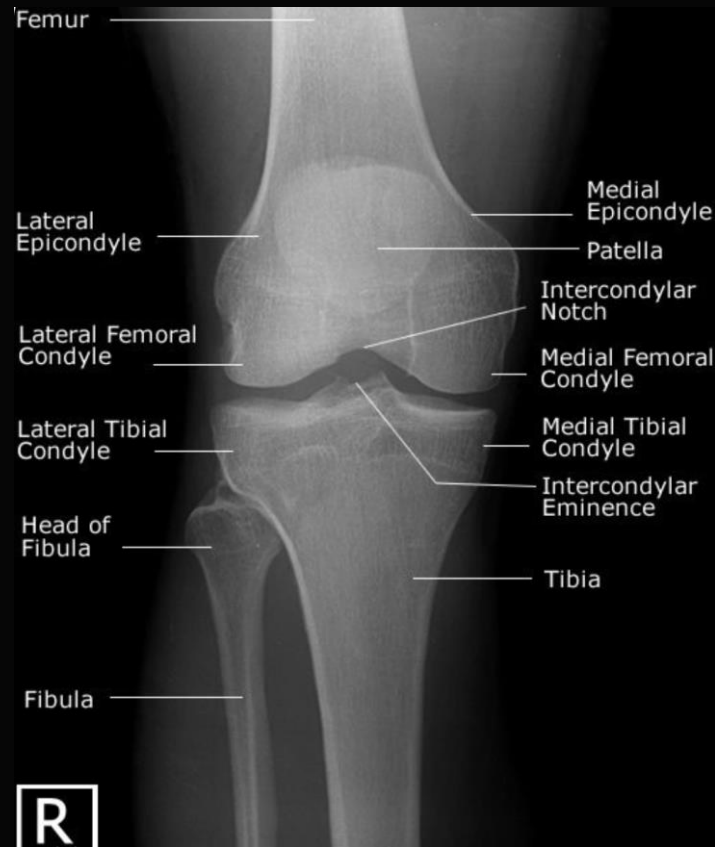
Case provided by: Sandy, Scott PGY2

Clinical History

CC: "They say I broke my leg."

- 30-year-old Hispanic male with PMH of quadriplegia s/p MVC in 2007 with neurogenic bladder requiring home catheterizations and recurrent UTIs who presented with a left femur fracture and complicated UTI.
 - Vitals: 100.9°F, BP: 143/96, Pulse: 112, RR:18, SpO₂: 98%
 - Left leg in splint, swelling in the left knee and the remainder of the physical exam findings were unimpressive.
- XRAY knee (AP/LAT/B OBL)
- CT w/o contrast LLE

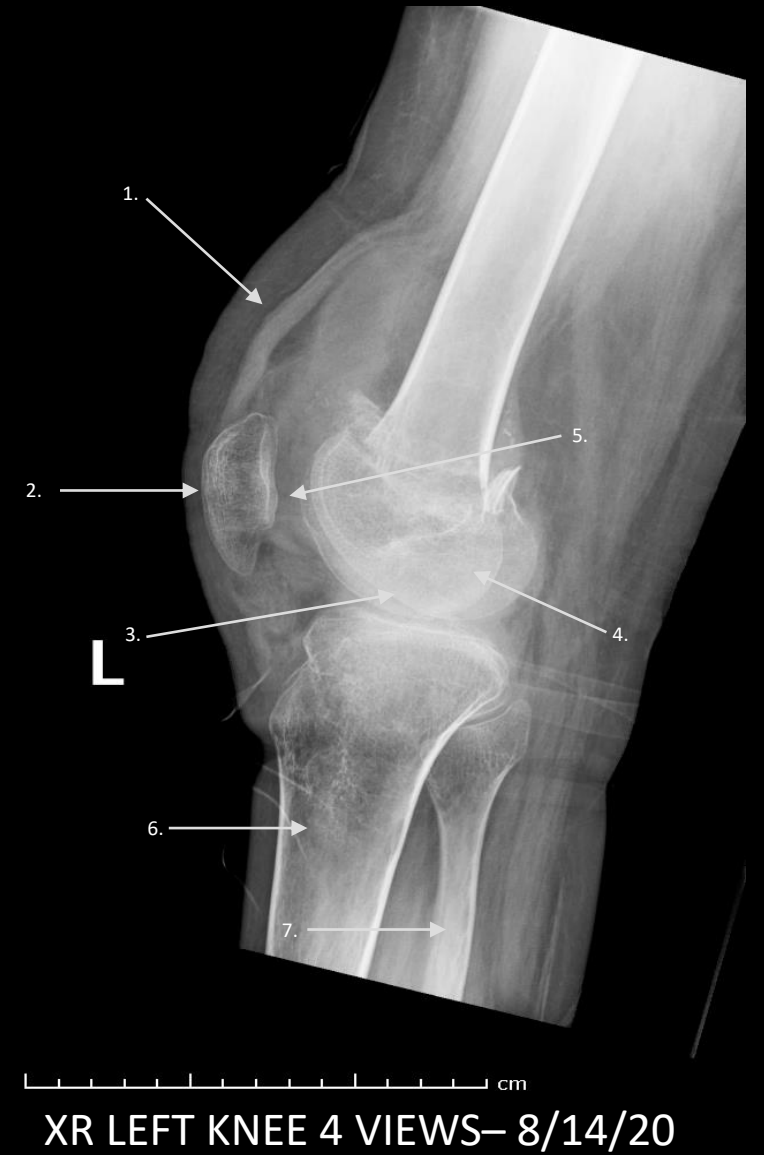
Relevant Imaging



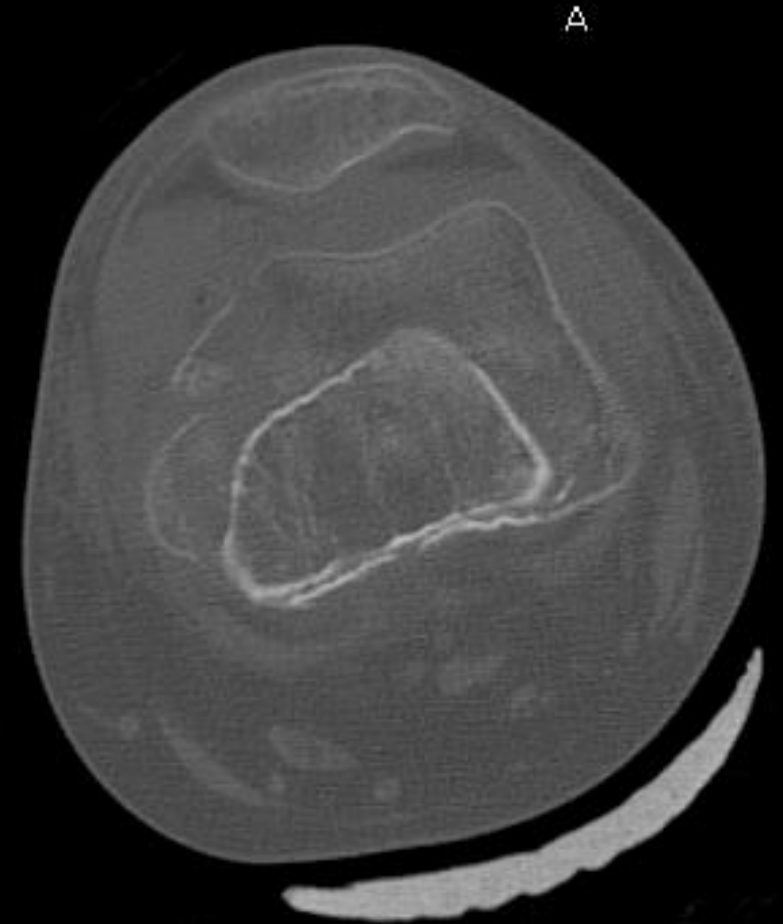
XR LEFT KNEE 4 VIEWS – 8/14/20

More relevant imaging

- 1. Quadriceps tendon
- 2. Patella
- 3. Medial femoral epicondyle
- 4. Lateral femoral condyle
- 5. Patellofemoral joint
- 6. Tibia
- 7. Fibula



More relevant imaging



CT w/o contrast LLE – 8/14/20

Differential Diagnosis

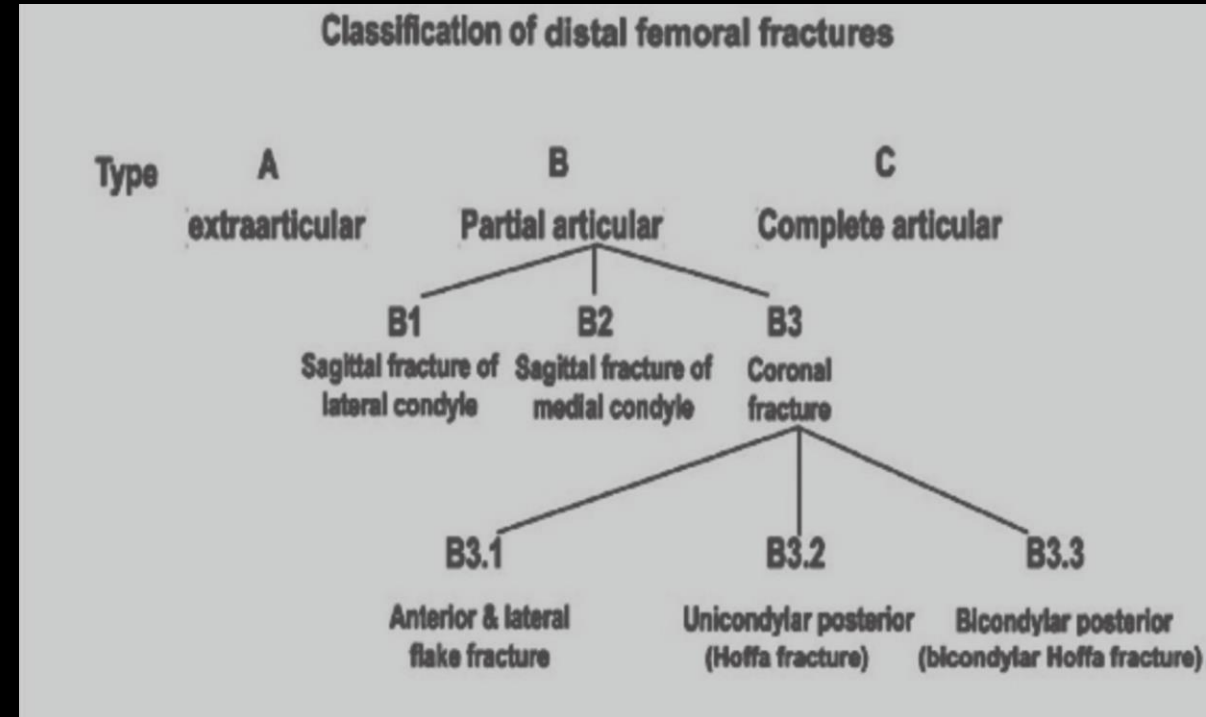
- Identification of a distal femur fracture is readily apparent on imaging, timing of diagnosis may be the challenge, as in this patient, who's fracture was found incidentally.
- Tibial plateau fracture
- Suprapatellar fat pad
 - Does not change on repositioning in contrast to lipohemarthrosis.

Highlight and summarize key imaging findings

- Comminuted impacted supracondylar fracture of the distal left femur with small intra-articular bone fragment by the lateral condyle.
 - Slight knee pain and soft tissue swelling associated with awkward twisting of the knee 5 days prior. Fracture found incidentally.
- Likely intra-articular extension of fracture into the patellofemoral joint.

Highlight and summarize key imaging findings continued

- Müller AO/ATO classification system
 - Describes three basic groups: type A fractures (extra-articular); type B fractures (partial articular); and type C fractures (complete articular with both condyles being detached from the diaphysis).



Discussion: Comminuted impacted supracondylar fracture of distal left femur with lipohemarthrosis

- Comminuted impacted supracondylar fracture of distal femur
 - Bimodal distribution of adult femur fractures; younger male patients secondary to high-energy mechanisms and elderly patients typically after low-energy mechanisms (ie, ground level-falls).
- Lipohemarthrosis
 - Intra-articular fracture with escape of fat and blood
 - Most frequently seen in the knee secondary to a tibial plateau fracture or distal femoral fracture

Treatment

- Orthopedic surgery opted for non-operative treatment with splinting.
 - Non-weight bearing activity with LLE and outpatient follow-up in two weeks recommended.
- Other common treatment options include: intramedullary nailing, screw fixation, periarticular locked plating and also LISS (Less Invasive Stabilization System) technique.
- Outcomes are typically correlated with classification of fracture.
 - Prognosis for a good outcome as classification of distal femur fracture progresses from type A to type C.
 - Complications: pain secondary to hardware placement, malunion, nonunion (rates up to 20%), range of motion loss

Final Diagnosis

- Comminuted impacted supracondylar fracture of distal femur with suprapatellar lipohemarthrosis
 - Type A distal femoral fracture via Muller AO/ATO classification system.

ACR appropriateness Criteria

- Initial study was appropriate via ACR Appropriateness Criteria – Acute Trauma to the Knee
- Cost of XR Left Knee: \$220
- Cost of CT w/o contrast LLE: \$1,150
- Total cost: ~\$1,370

Variant 2: Adult or child 5 years of age or older. Fall or acute twisting trauma to the knee. One or more of the following: focal tenderness, effusion, inability to bear weight. Initial imaging.

| Procedure | Appropriateness Category | Relative Radiation Level |
|---------------------------------------|--------------------------|--------------------------|
| Radiography knee | Usually Appropriate | ⊕ |
| Bone scan with SPECT or SPECT/CT knee | Usually Not Appropriate | ⊕⊕⊕ |
| CT knee with IV contrast | Usually Not Appropriate | ⊕ |
| CT knee without and with IV contrast | Usually Not Appropriate | ⊕ |
| CT knee without IV contrast | Usually Not Appropriate | ⊕ |
| MR arthrography knee | Usually Not Appropriate | 0 |
| MRA knee without and with IV contrast | Usually Not Appropriate | 0 |
| MRA knee without IV contrast | Usually Not Appropriate | 0 |
| MRI knee without and with IV contrast | Usually Not Appropriate | 0 |
| MRI knee without IV contrast | Usually Not Appropriate | 0 |
| US knee | Usually Not Appropriate | 0 |

Take Home Points / Teaching points

- XR AP/Lateral views of the knee are recommended when evaluating knee trauma.
- CT scan is indicated for evaluating intra-articular involvement.
- Müller AO/OTA classification system is ideal system for classifying distal femur fractures.

References

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- Traumatic Extra-capsular and Intra-capsular Floating Fat: Fat-fluid Levels of the Knee Revisited - <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4683790/>
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- Treatment Options for Distal Femoral Fractures – <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC5327816/>



Questions?