

AMSER Case of the Month

May 2021

69 year old male with R knee pain s/p motorcycle crash

Cecillia Lee

MS4 Cooper Medical School of Rowan University

Jean Sebestien Rowe, MD

Zachary Mikes, DO

Pauline Germaine, DO

Cooper University Hospital in Camden, NJ

Patient Presentation

- **HPI:** 69 year old M presents with right knee pain immediately following motorcycle crash. Pt was wearing a helmet and had no LOC. He was driving his motorcycle 20 mph at the time of accident.
- **PMH:** Hx of Left Rotator Cuff Tear, CAD, HCC, HLD, HTN
- **Past Surgical Hx:** Partial partial liver lobectomy
- **Family History:** None
- **Social History:** Former smoker (quit in 2000), does not drink alcohol currently

Physical Exam

- Vitals: BP 135/72; Pulse 65; Resp 20; SpO2 98%; Temp 98.1 F
- Pertinent Exam Findings:
 - Right Lower Extremity: Swelling and tenderness to right knee/lower leg with TTP in this region, several fracture blisters over medial knee with superficial abrasion, Motor and Sensory Intact, 2+ DP

What Imaging Should We Order?

Select the applicable 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	○

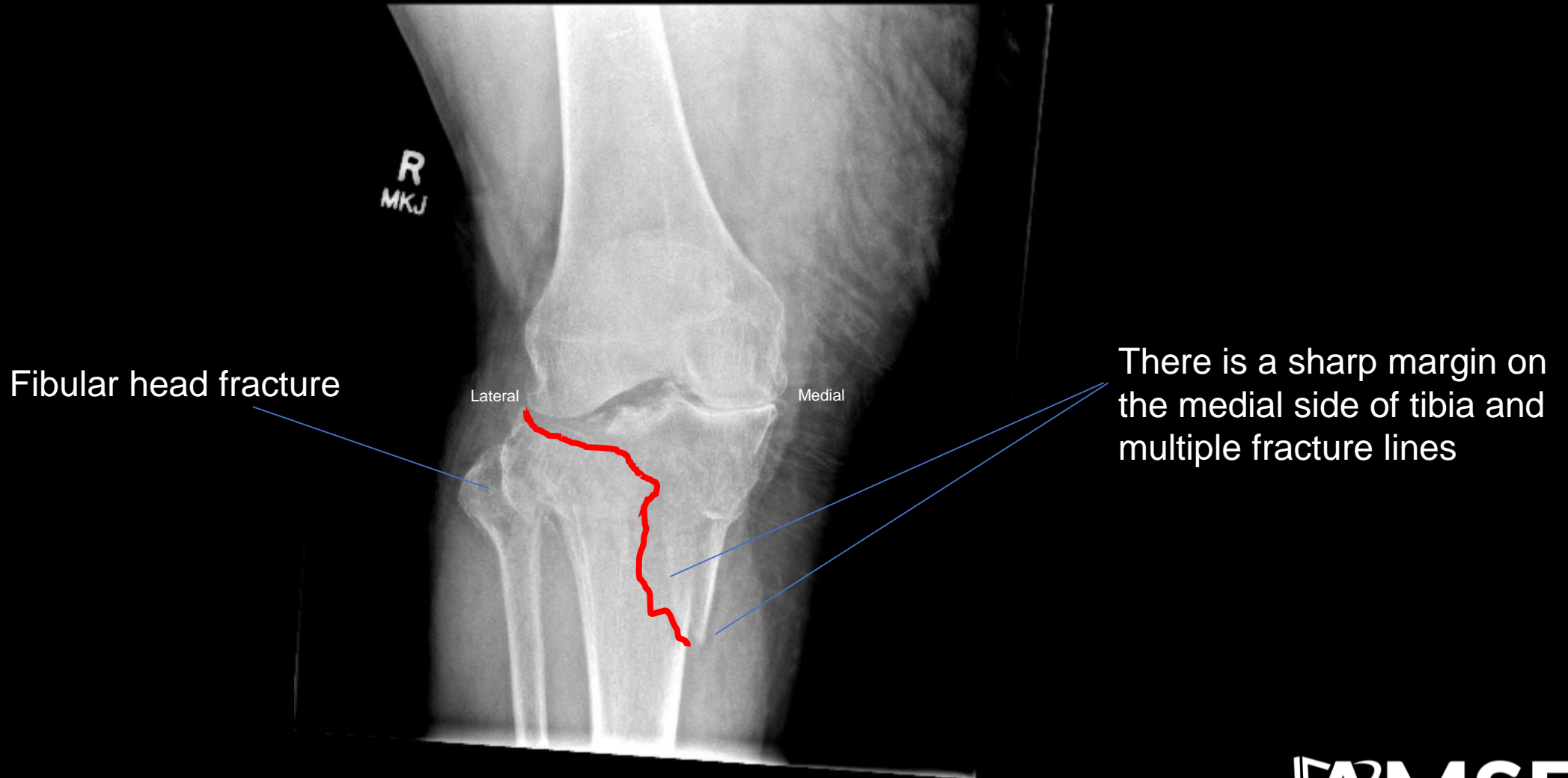
This imaging modality was ordered by the ER physician

Findings: (unlabeled)



Findings (labeled)

- Radiograph shows **acute comminuted tibial plateau fractures**



Select the applicable ACR Appropriateness Criteria

Variant 5:

Adult or child 5 years of age or older. Fall or acute twisting trauma to the knee. Tibial plateau fracture on radiographs. Suspect additional bone or soft-tissue injury. Next study.

Procedure	Appropriateness Category	Relative Radiation Level
MRI knee without IV contrast	Usually Appropriate	○
CT knee without IV contrast	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	☼
MR arthrography knee	Usually Not Appropriate	○
MRA knee without and with IV contrast	Usually Not Appropriate	○
MRA knee without IV contrast	Usually Not Appropriate	○
MRI knee without and with IV contrast	Usually Not Appropriate	○
US knee	Usually Not Appropriate	○

Next study ordered

Findings: (unlabeled)

AST - RIGHT 73700



Coronal View
Slide 36/84

T - RIGHT 73700

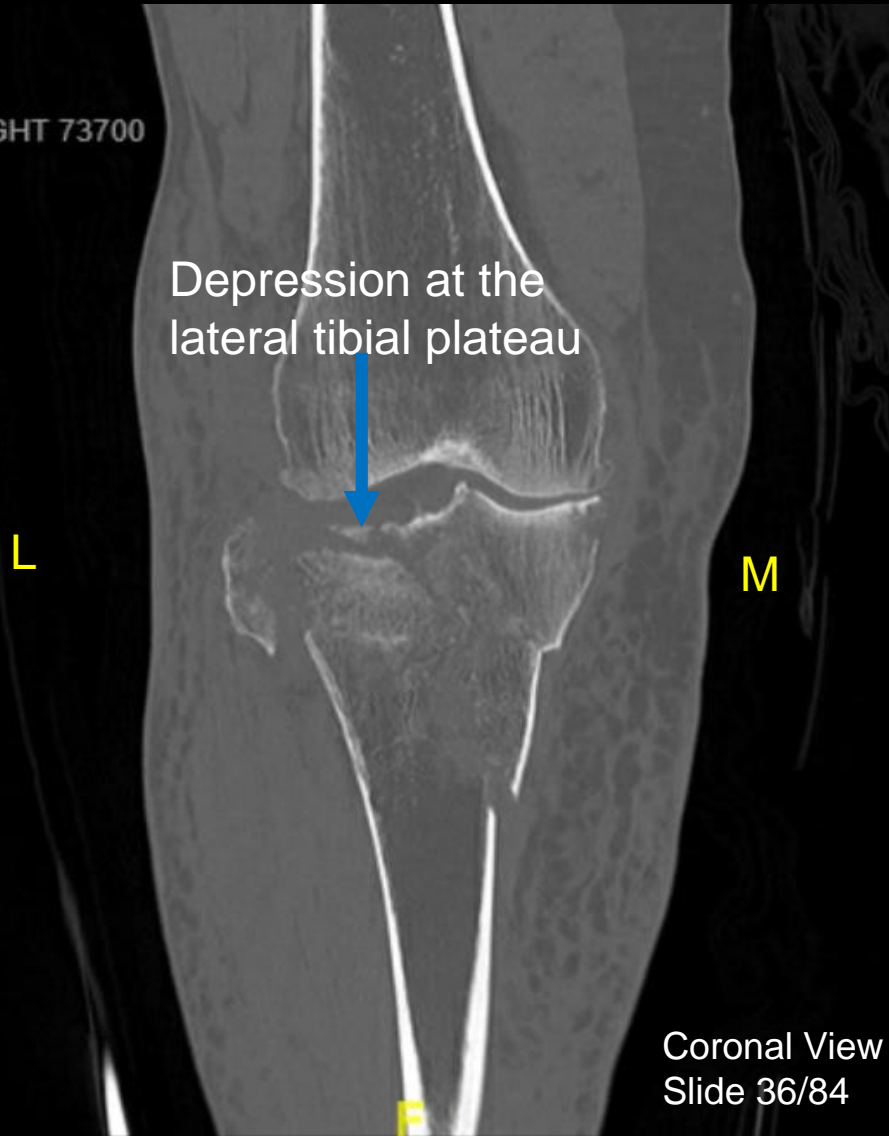


Coronal View
Slide 41/84

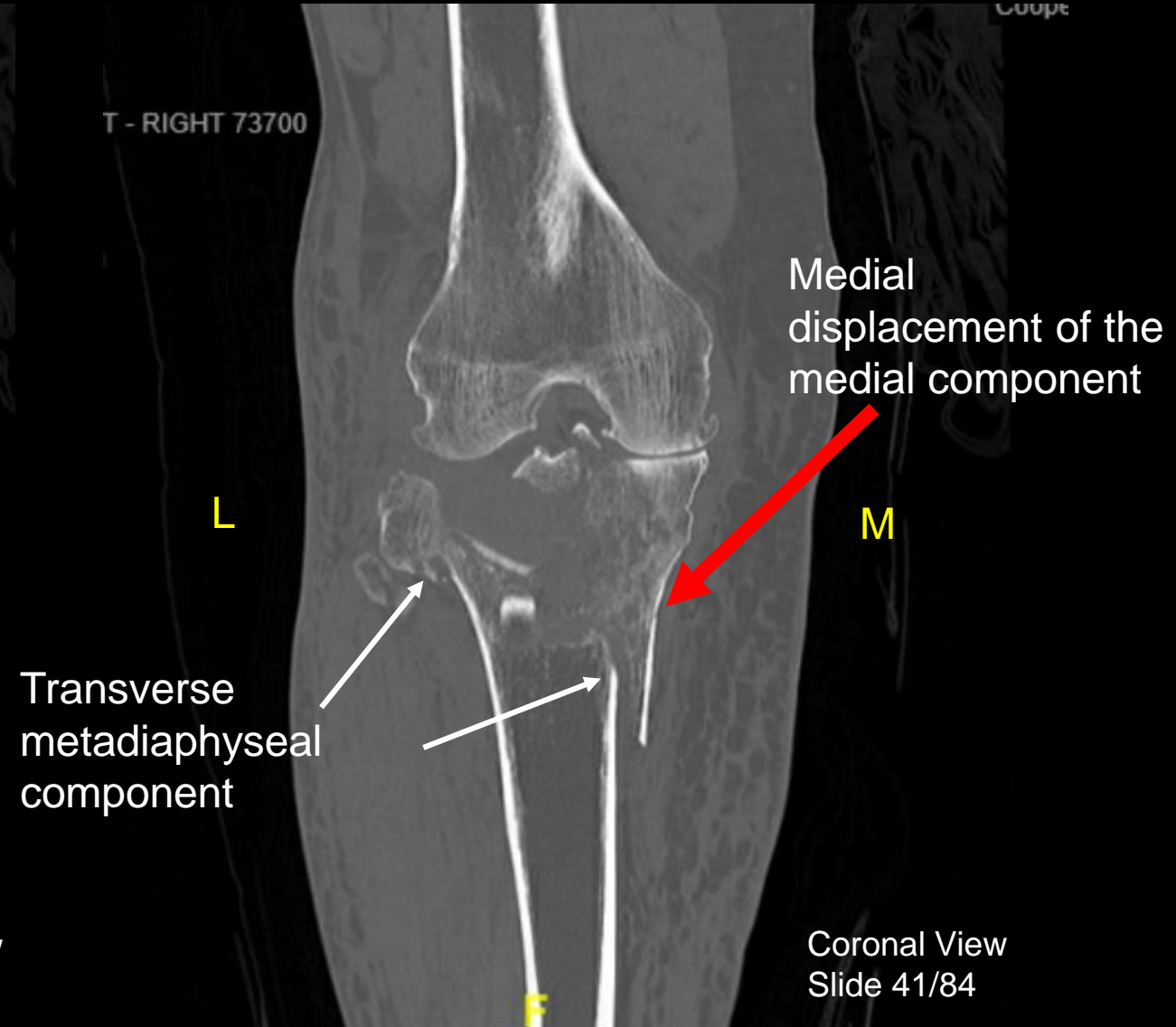
Coupe

Findings: (labeled)

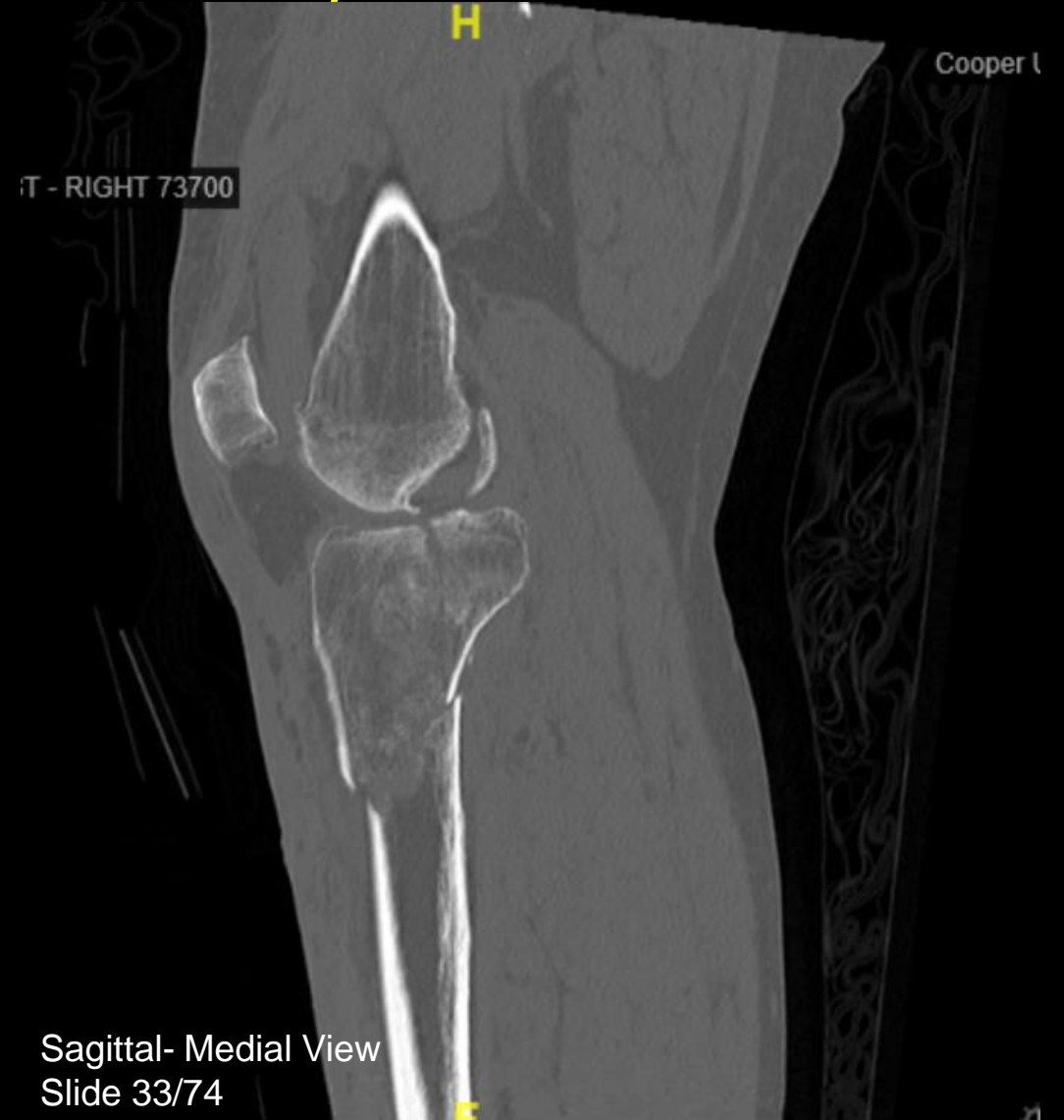
AST - RIGHT 73700



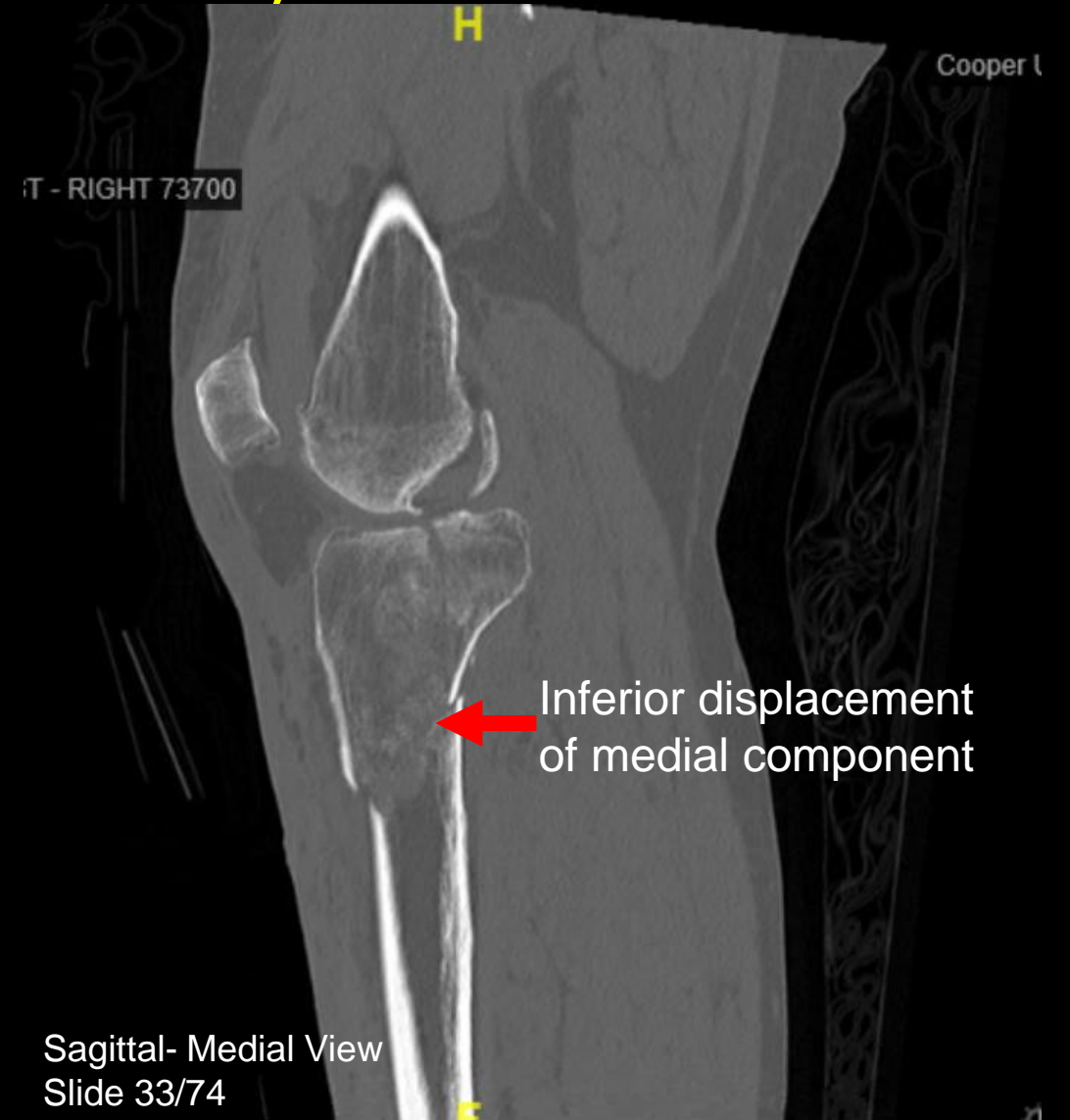
T - RIGHT 73700



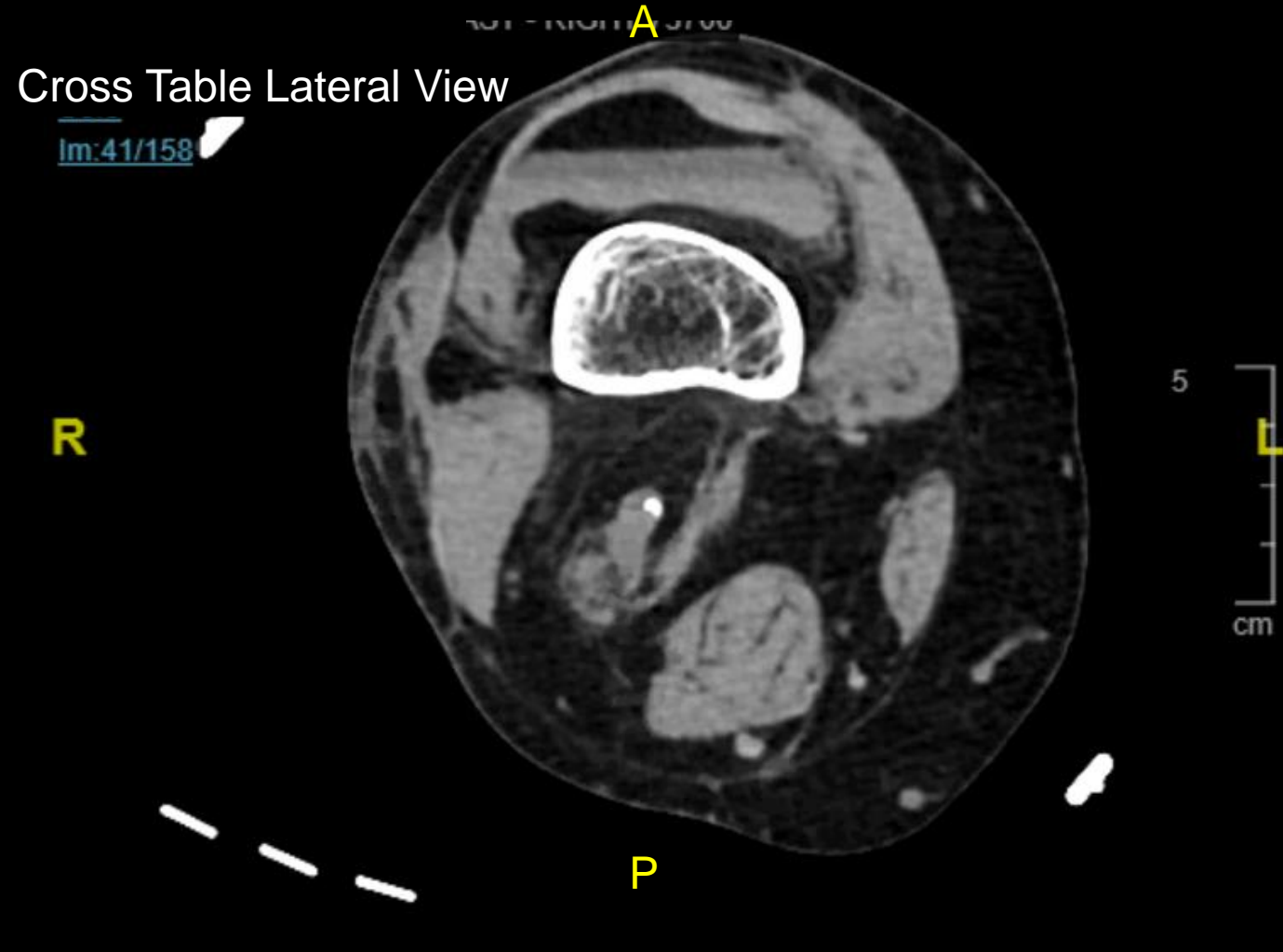
Findings: (unlabeled)



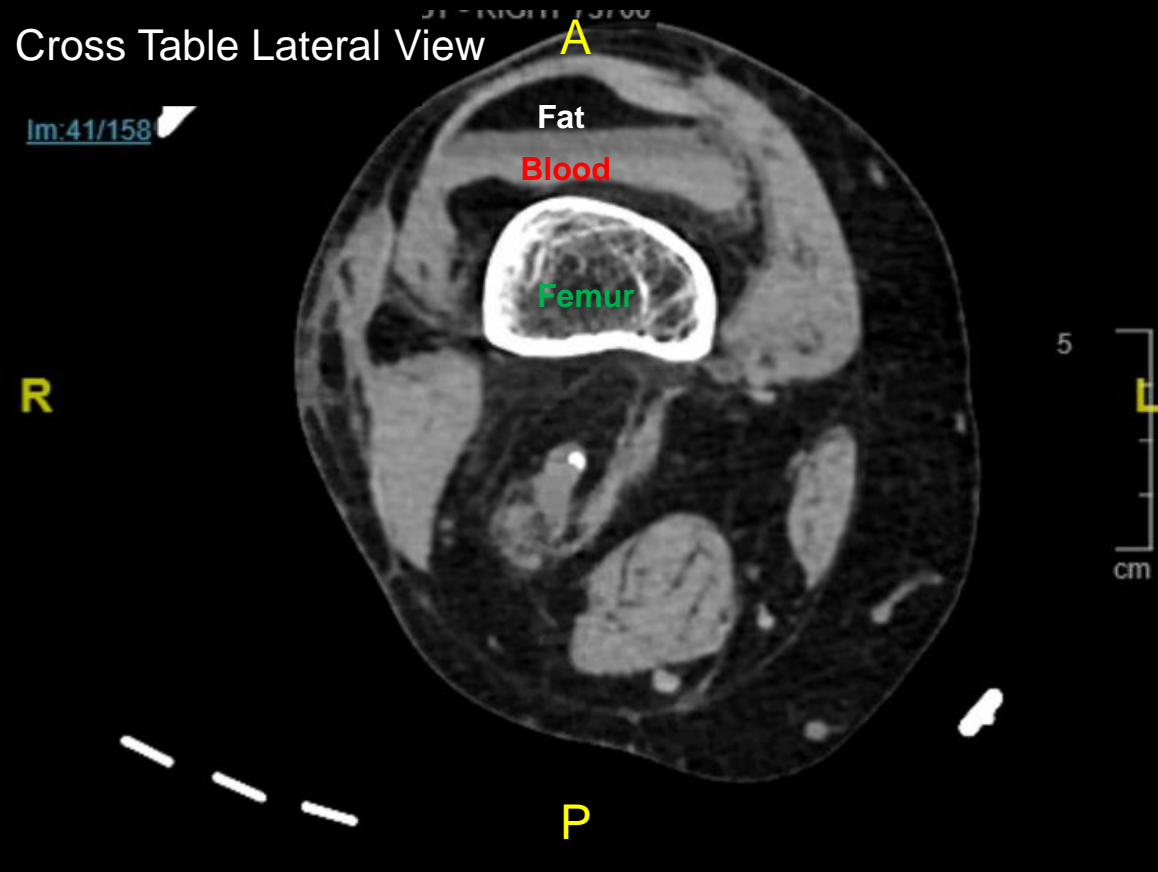
Findings: (labeled)



Findings: (unlabeled)



Findings: (labeled)



- Fat-fluid level can be seen on the **cross table lateral view** of CT Knee.
- **Lipohemarthrosis** is indicative of an intra-articular fracture, but absence of this finding does not exclude an intra-articular fracture.

Final Dx:

Acute displaced comminuted bicondylar tibial plateau fractures with transverse metadiaphyseal component (Type 6)

and associated comminuted fracture of right fibular head

Case Discussion- Tibial Plateau Fracture

- Epidemiology:

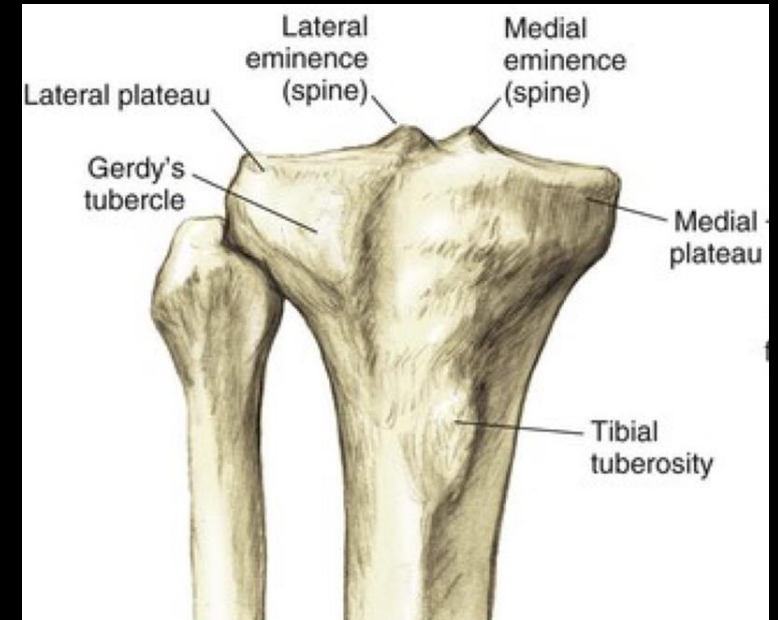
- Overall incidence is 10.3 per 100,000 people annually, M>F, mean age at time of injury is 52 years old
- Most commonly involves the lateral tibial plateau (over the medial)
- Occurs after a direct, forceful blow to the knee (motor vehicle accident, falls, trauma)

- Symptoms:

- Localized pain, swelling, and tenderness over the bone
- Compartment syndrome

- Physical Examination

- Pain with movement, which may limit knee exam
- For open fractures: puncture/missile wounds and lacerations
- Knee effusion (the aspiration will reveal hemarthrosis with lipid elements)

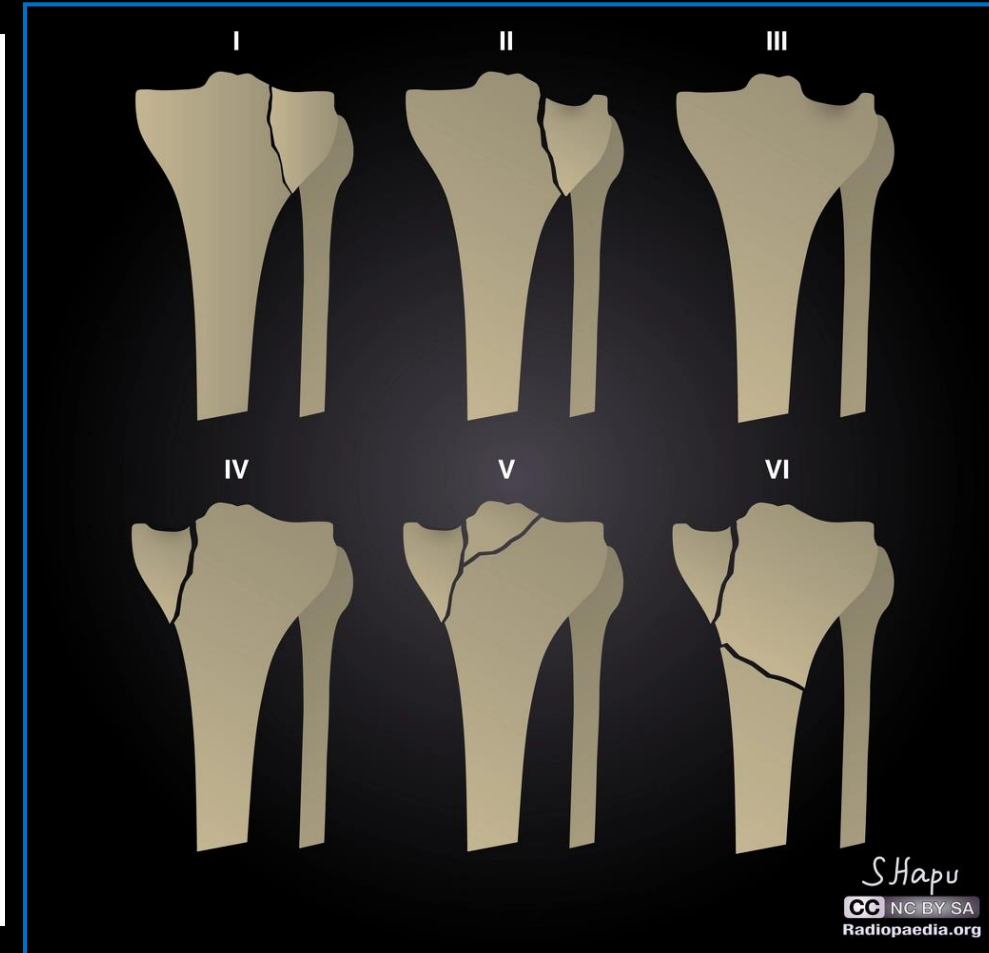


Case Discussion- Tibial Plateau Fracture

- **Work Up:**
 - Plain Radiograph (AP & Lateral View)
 - It is possible for XR to be unremarkable or underestimate the severity of the injury.
 - CT of the knee without contrast (Coronal, Sagittal, Cross-Table Lateral View)
 - CT imaging can better define the injury to the bone.
 - CT imaging can help with pre-operative planning for orthopedic fixation.
 - **Cross-Table Lateral View is important to look for lipoarthrosis.**
 - MRI of knee
 - To assess associated ligamentous and meniscal injury.

Case Discussion- Schatzker Classification

- **Schatzker I:** wedge-shaped pure cleavage fracture of the lateral tibial plateau, originally defined as having less than 4 mm of depression or displacement
- **Schatzker II:** splitting and depression of the lateral tibial plateau; namely, type I fracture with a depressed component
- **Schatzker III:** pure depression of the lateral tibial plateau; divided into two subtypes:
 - **Schatzker IIIa:** with lateral depression
 - **Schatzker IIIb:** with central depression
- **Schatzker IV:** medial tibial plateau fracture with a split or depressed component
- **Schatzker V:** wedge fracture of both lateral and medial tibial plateau
- **Schatzker VI:** transverse tibial metadiaphyseal fracture, along with any type of tibial plateau fracture (metaphyseal-diaphyseal discontinuity)



Case Discussion- Tibial Plateau Fracture

- **Complications**

- Acute compartment syndrome
- Varus or valgus deformity
- Inability to regain normal gait
- Accelerated osteoarthritis

- **Treatment**

- For tibial plateau fractures with any degree of displacement or depression, meniscal or ligamentous injury:
 - **Consult orthopedics within 48 hours** because the injury may require surgical open reduction and internal fixation.
- Otherwise, initial treatment involves:
 - Compression, icing, analgesics (if appropriate), and early mobilization

References:

- 1. ACR Criteria of Appropriateness: Acute Trauma to Knee.
<https://acsearch.acr.org/list>
- 2. Bickle I. Tibial plateau fracture| Radiology Reference Article | Radiopaedia.org. Radiopaedia. Accessed January 21, 2021. <https://radiopaedia.org/articles/tibial-plateau-fracture?lang=us>.
- 3. Fields, KB. Proximal tibial fracture. In: UpToDate, Post, TW (Ed), UpToDate, Waltham, MA, 2014.
- 4. Roberts D. Schatzker classification of tibial plateau fractures| Radiology Reference Article | Radiopaedia.org. Radiopaedia. Accessed January 21, 2021. <https://radiopaedia.org/articles/schatzker-classification-of-tibial-plateau-fractures-1?lang=us>.