Reading Hospital School of Health Sciences
Medical Imaging Program

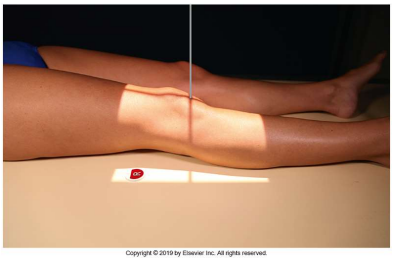
MI 238: Clinical Seminar III
Knee and Femur
Image Critique and Pathology

2022

1

Trauma and Non Trauma AP Knee

- Evidence of proper collimation and the presence of a side marker placed clear of the anatomy of interest
- Knee fully extended if patient's condition permits
- Entire knee without rotation
  - Femoral condyles symmetric and tibia intercondylar eminence centered
  - Slight superimposition of the fibular head if the tibia is normal
  - Patella completely superimposed on the femur
- Open femorotibial joint space, with interspaces of equal width on both sides if the knee is normal
- Bony trabecular detail and surrounding soft tissues



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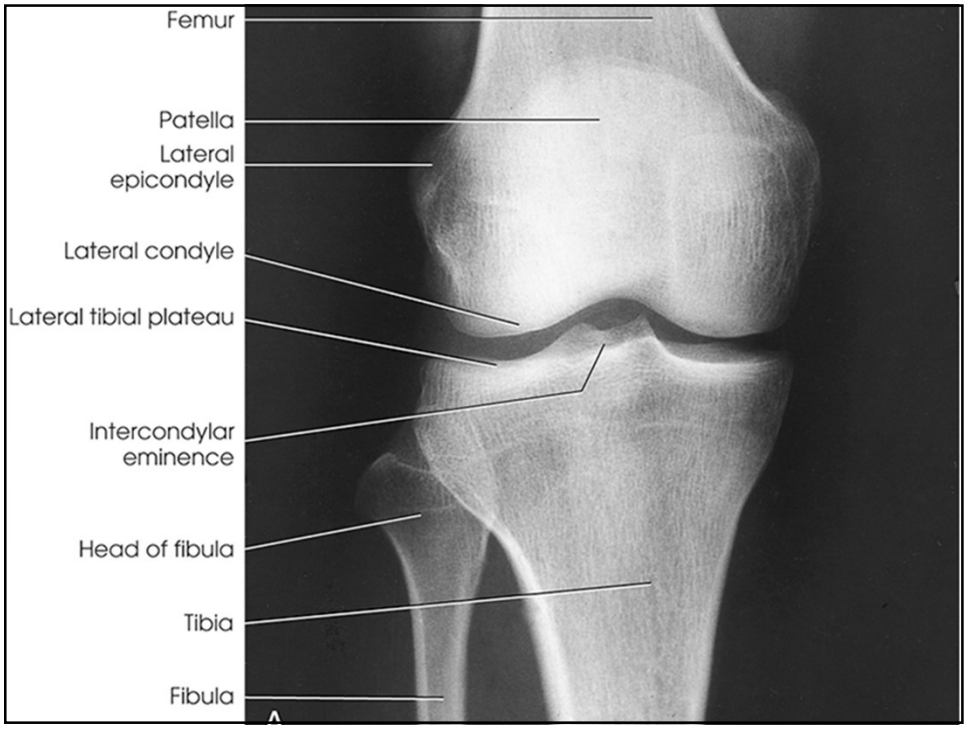

Femur
Patella
Lateral epicondyle
Lateral condyle
Lateral tibial plateau
Intercondylar eminence
Head of fibula
Tibia
Fibula

3

1.

EI: 220

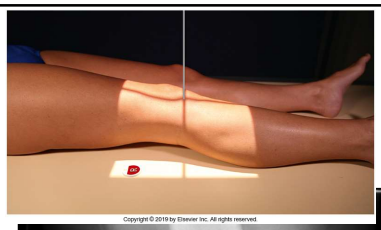
4

2.

EI: 500

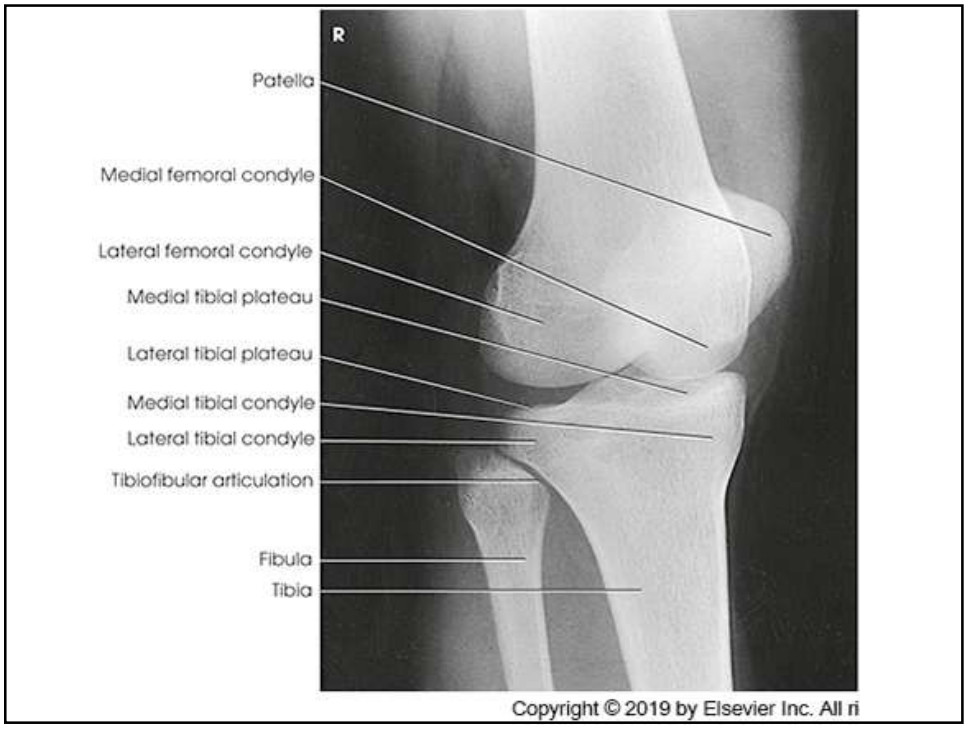
5

Trauma Medial Oblique



- Evidence of proper collimation and the presence of a side marker placed clear of the anatomy of interest
- Tibia and fibula separated at their proximal articulation
- Posterior tibia
- Lateral condyles of the femur and tibia
- Both tibial plateaus
- Margin of the patella projecting slightly beyond the medial side of the femoral condyle
- Open knee joint
- Bony trabecular detail and surrounding soft tissues

6


R
Patella
Medial femoral condyle
Lateral femoral condyle
Medial tibial plateau
Lateral tibial plateau
Medial tibial condyle
Lateral tibial condyle
Tibiofibular articulation
Fibula
Tibia
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7

3.

EI: 250


RIGHT

8

4.

EI: 130

9

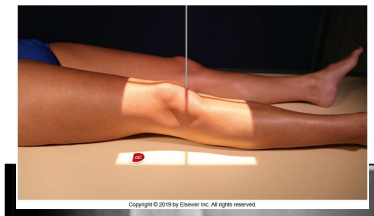
5.

EI: 170

10

Trauma Lateral Oblique

- Evidence of proper collimation and the presence of a side marker placed clear of the anatomy of interest
- Medial femoral and tibial condyles
- Tibial plateaus
- Fibula superimposed over the lateral half of the tibia
- Margin of the patella projected slightly beyond the edge of the lateral femoral condyle
- Open knee joint
- Bony trabecular detail and surrounding soft tissues



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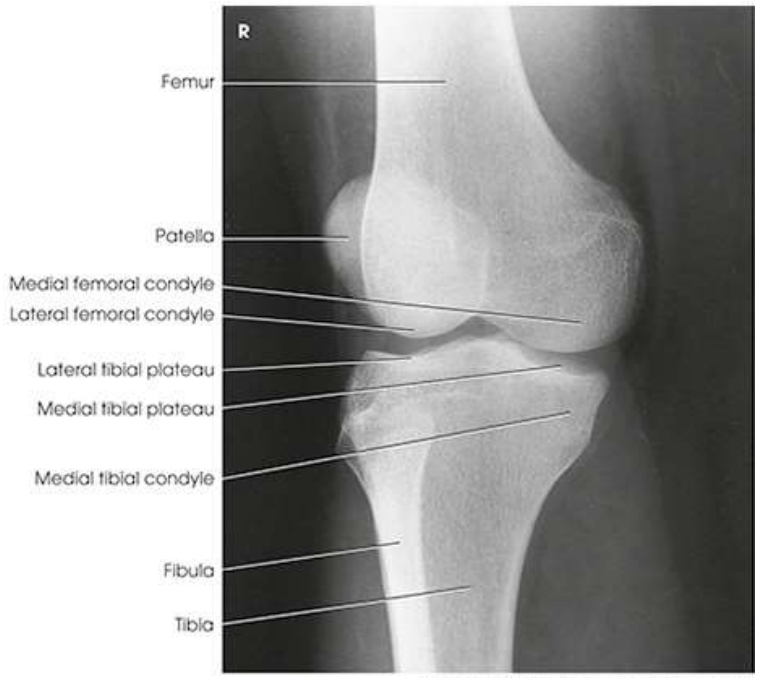


12

6.

EI: 100

13

7.

EI: 110

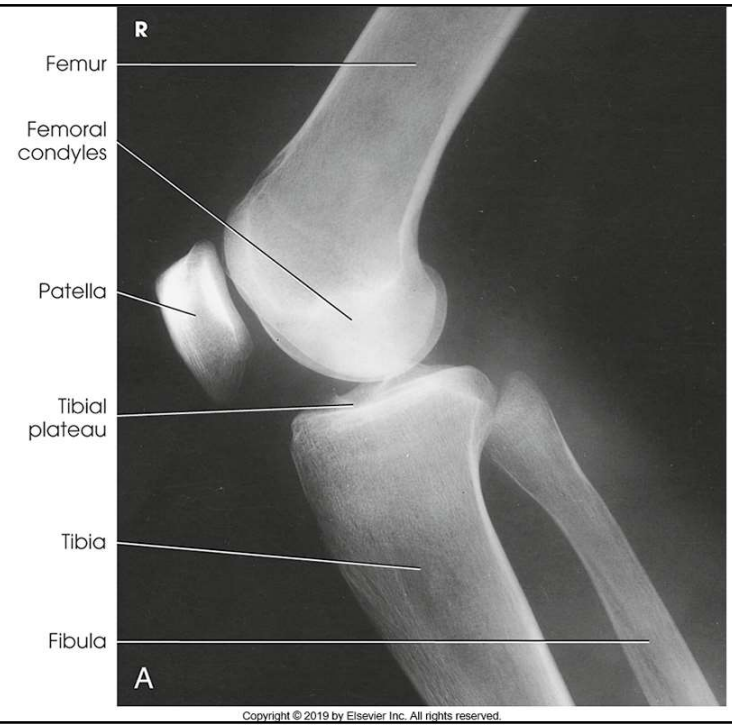
14

Trauma and Non-Trauma Lateral Knee

(Mediolateral)

- Evidence of proper collimation and the presence of a side marker placed clear of the anatomy of interest
- Knee flexed 20 to 30 degrees in true lateral position as demonstrated by femoral condyles superimposed (locate the more magnified medial condyle)
  - Anterior surface of medial condyle closer to patella results from over-rotation toward the image receptor (IR).
  - Anterior surface of medial condyle farther from patella results from under- rotation away from the image receptor (IR).
  - Inferior surface of medial condyle caudal to lateral condyle results from insufficient cephalad central ray (CR) angle.
  - Inferior surface of lateral condyle caudal to medial condyle results from too far cephalad CR angle.
- Fibular head and tibia slightly superimposed (over rotation causes less superimposition, and under rotation causes more superimposition)
- Patella in a lateral profile
- Open patellofemoral joint space
- Open joint space between femoral condyles and tibia
- Bony trabecular detail and surrounding soft tissues

15



16

8.

EI: 90

17

9.

EI: 240

18

Non Trauma PA Erect (RH)

(patient age 40 and older)

- Evidence of proper collimation and the presence of a side marker placed clear of the anatomy of interest
- Both knees without rotation (RH only does the side of interest)
- Knee joint spaces centered to the exposure area (RH only does the side of interest)
- Bony trabecular detail and surrounding soft tissues

Must use Erect marker or annotate Erect on image

**Can be done AP weight bearing*

19

10.

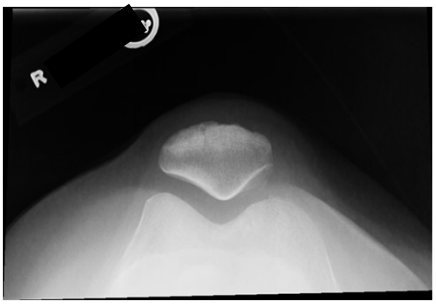
EI: 360

20

Non Trauma Patella
Erect Settegast method (Tangential)

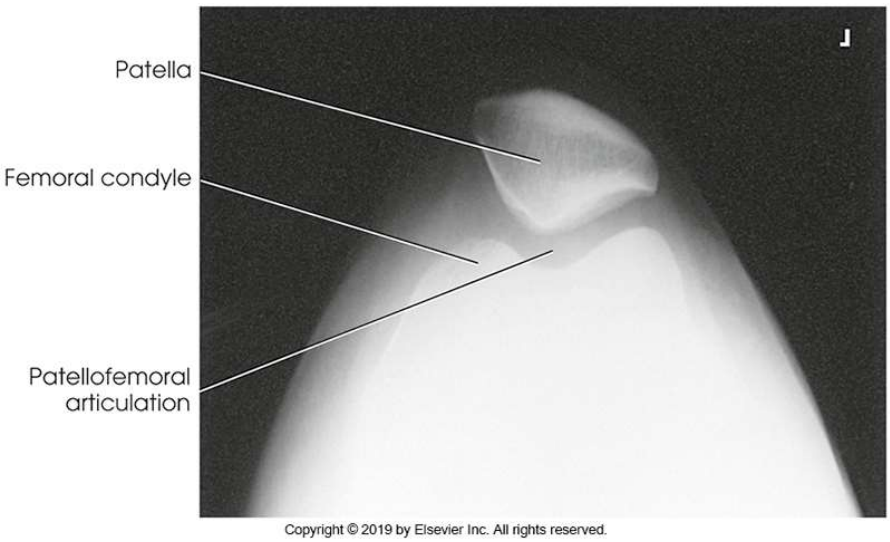
(Patient age 9 years and older)

- Evidence of proper collimation and the presence of a side marker placed clear of the anatomy of interest
- Patella in profile
- Femoral condyles and intercondylar sulcus
- Open patellofemoral articulation
- Bony trabecular detail and surrounding soft tissues



*Place marker on lateral side

21



22

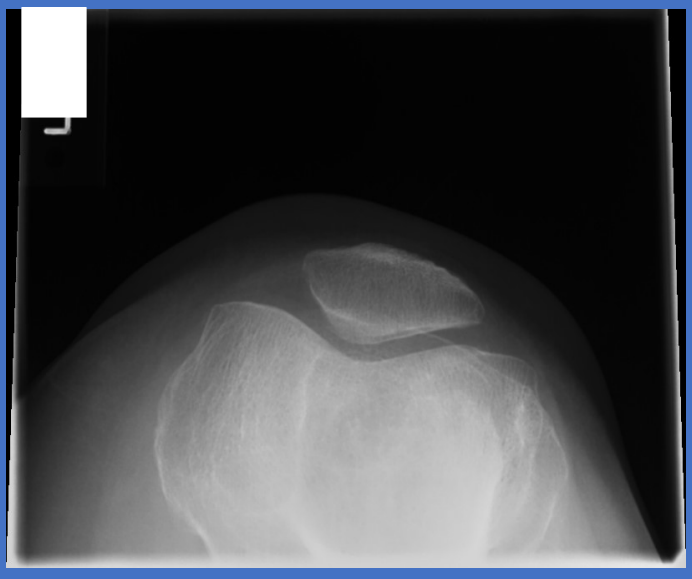
11.

EI: 280

23

12.

EI: 375



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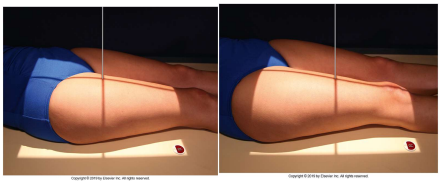
AP Femur

- Evidence of proper collimation and the presence of a side marker placed clear of the anatomy of interest
- Most of the femur and the joint nearest to the pathologic condition or site of injury (a second projection of the other joint is recommended)
- Femoral neck not foreshortened on the proximal femur
- Lesser trochanter not seen beyond the medial border of the femur or only a very small portion seen on the proximal femur
- No knee rotation on the distal femur
- Gonad shielding when indicated, but without the shield not covering proximal femur
- Any orthopedic appliance in its entirety
- Bony trabecular detail and surrounding soft tissues



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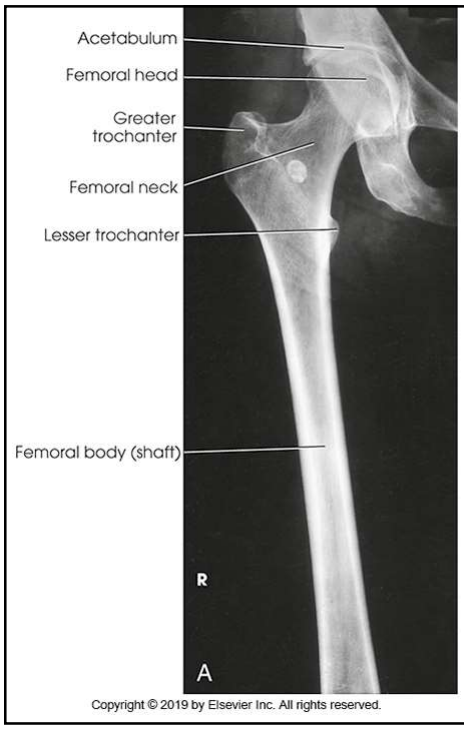


26

13.

EI: 110

27

14.

EI: 245

28

15.

EI: 150

29

Lateral Femur

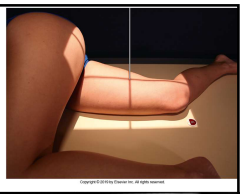
- Evidence of proper collimation and the presence of a side marker placed clear of the anatomy of interest
- Most of the femur and the joint nearest to the pathologic condition or site of injury (a second projection of the other joint is recommended)
- Any orthopedic appliance in its entirety
- Bony trabecular detail and surrounding soft tissues

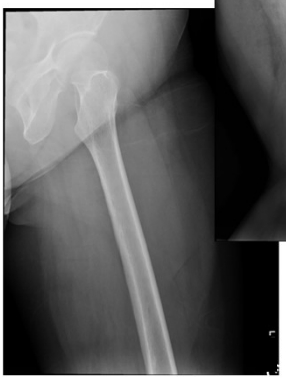
With knee included (distal)

- Superimposed anterior surface of the femoral condyles
- Patella in profile
- Open patellofemoral space
- Inferior surface of the femoral condyles not superimposed because of divergent rays

With the hip included (proximal)

- Opposite thigh not over proximal femur and hip joint
- Greater trochanter superimposed over distal femoral neck
- Lesser trochanter visible on medial aspect of proximal femur





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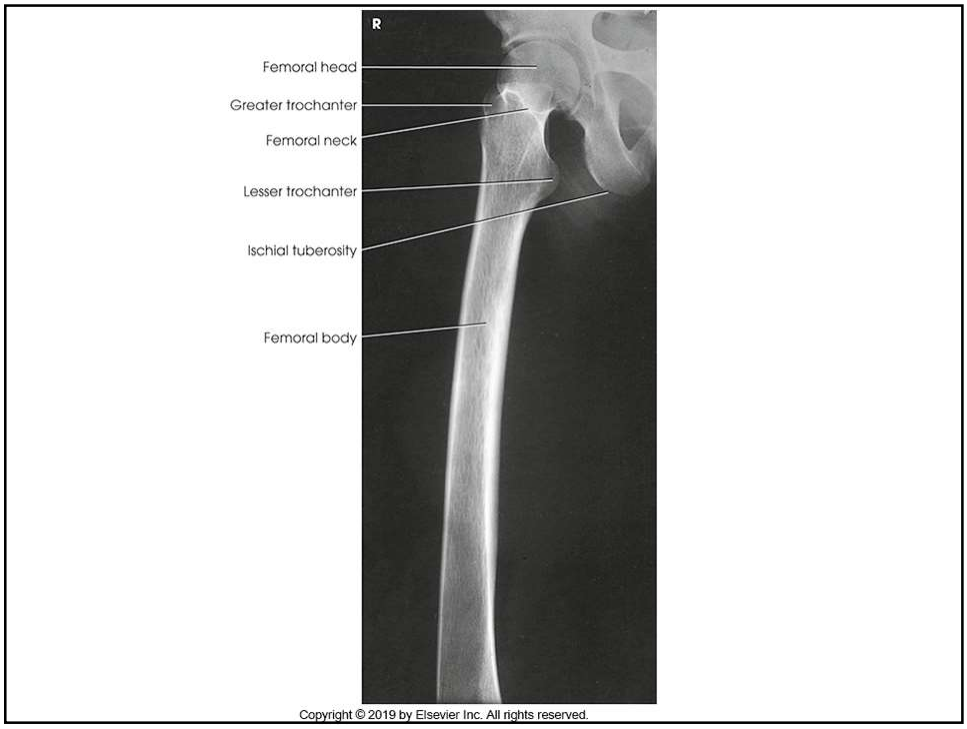

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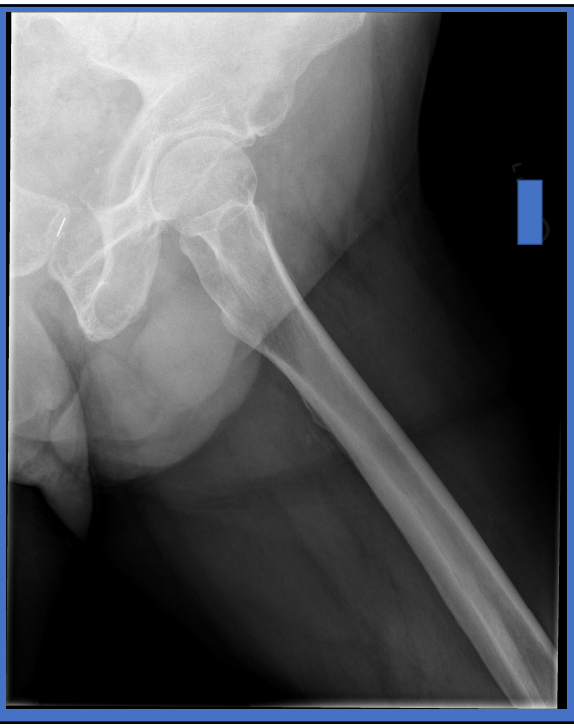
16.

EI: 130

32

17.

EI: 325



33

18.

EI: 200

34

19.

EI: 210

35

20.

EI: 80

36

Pathologies

Osgood Schlatter's
Osteochondroma
Osteoarthritis
Stellate Fracture

37

Osgood Schlatter

Incomplete separation or avulsion of the tibial tuberosity.

Cause: Repeated stress to tibial tuberosity growth plate
- stress will lead to the tendon pulling away

Complications: are uncommon, chronic pain or localized swelling, bump in the area

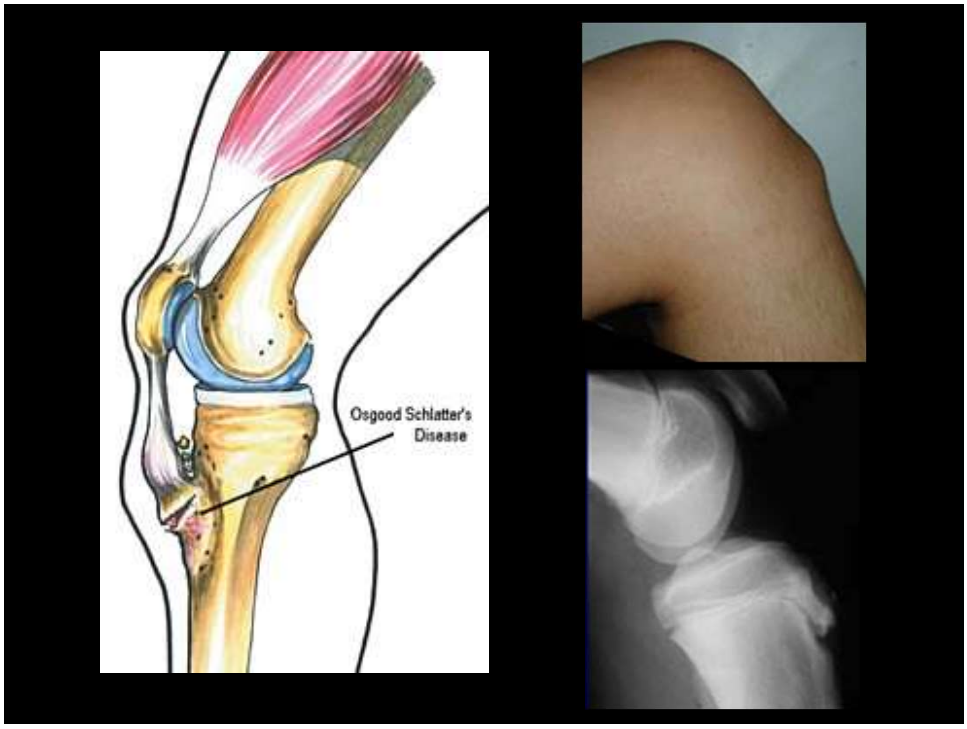
Radiographic Appearance: prominent soft tissue swelling and an avulsed ossific fragment

Technical: No manual exposure factor change

Prognosis: good, resolves normally on its own once the bones stop growing

Information obtained from: http://www.mayoclinic.com/health/osgood-schlatter-disease/DS00392 , http://emedicine.medscape.com/article/411842-overview#a19 and Merrill's

38



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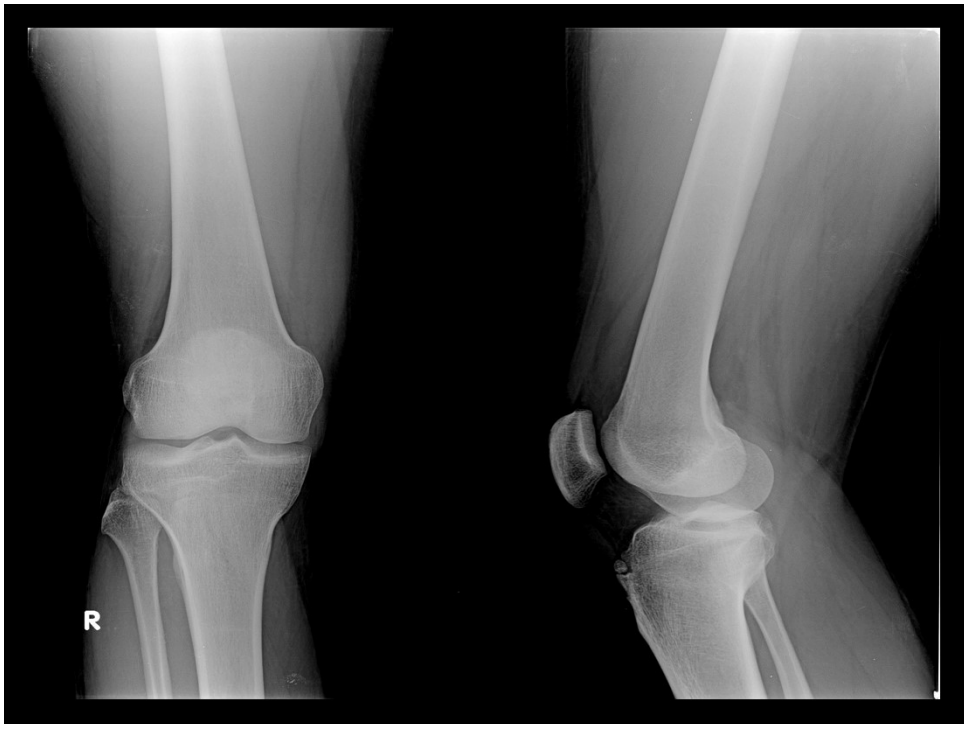

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Osteochondroma *(Exostosis)*

Benign projection of bone with a cartilaginous cap

Cause: idiopathic, hereditary

Complications: may turn malignant, pain, fracture of stalk

Radiographic Appearance: long axis of bone growth runs parallel to the parent bone and points away from nearest joint

Technical: No manual exposure factor change

Prognosis: Good, surgery only needed when there are mechanical impingements

Some information obtained from: http://emedicine.medscape.com/article/1256477-overview

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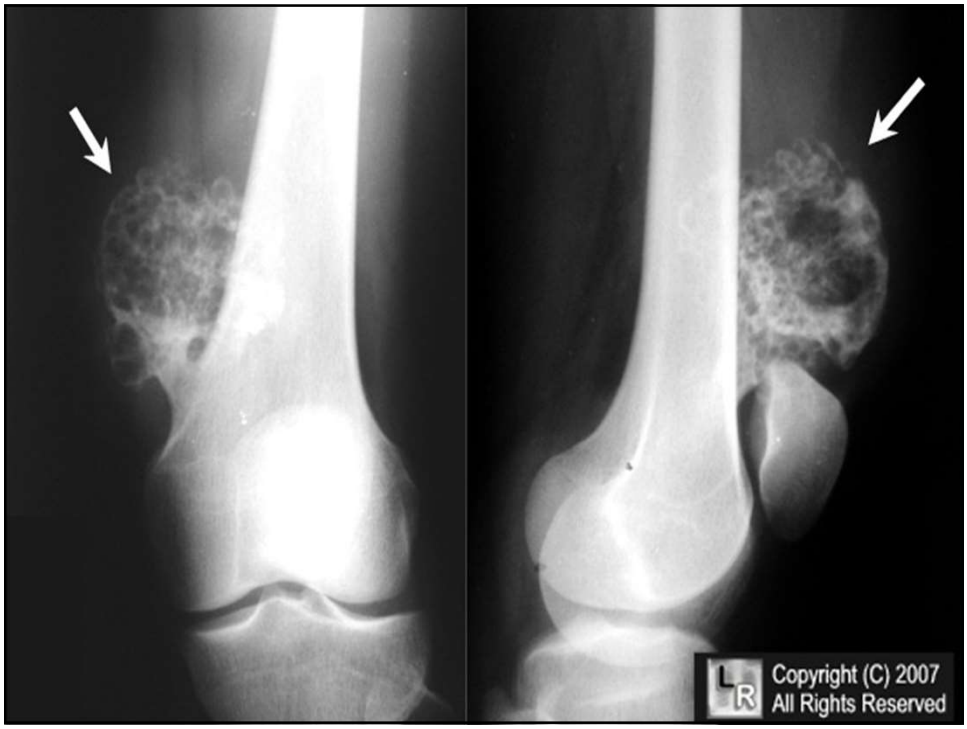

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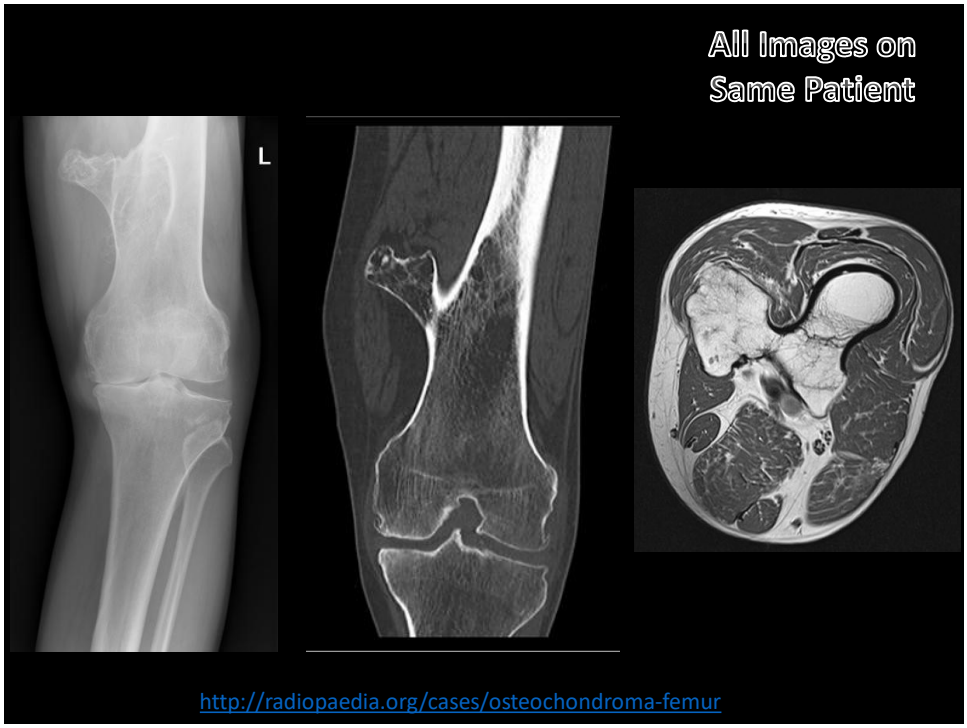

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Osteoarthritis
(Degenerative Joint Disease)

Generalized disorder pathologically characterized by loss of joint cartilage and reactive new bone formation.

Cause: traumatic, stress to joints

Complications: joint pain, stiffness, trouble using joints for walking, grasping, etc

Radiographic Appearance: irregular narrowing of joint spaces and development of small bony spurs (osteophytes)

- Knee – articular ends become increasingly dense and joint narrowing is asymmetric
- Fingers – affect distal joints, marginal spurs produce well defined bony protuberances (can palpate and see knobby appearance)
- Hip – asymmetric narrowing of joint space (superiorly and laterally)

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Technical: Advance Stage – Subtractive disease
- May require slight decrease

Prognosis: Some patients are unaffected by osteoarthritis while others can be severely disabled.
- Joint replacement surgery for some results in the best long-term outcome.

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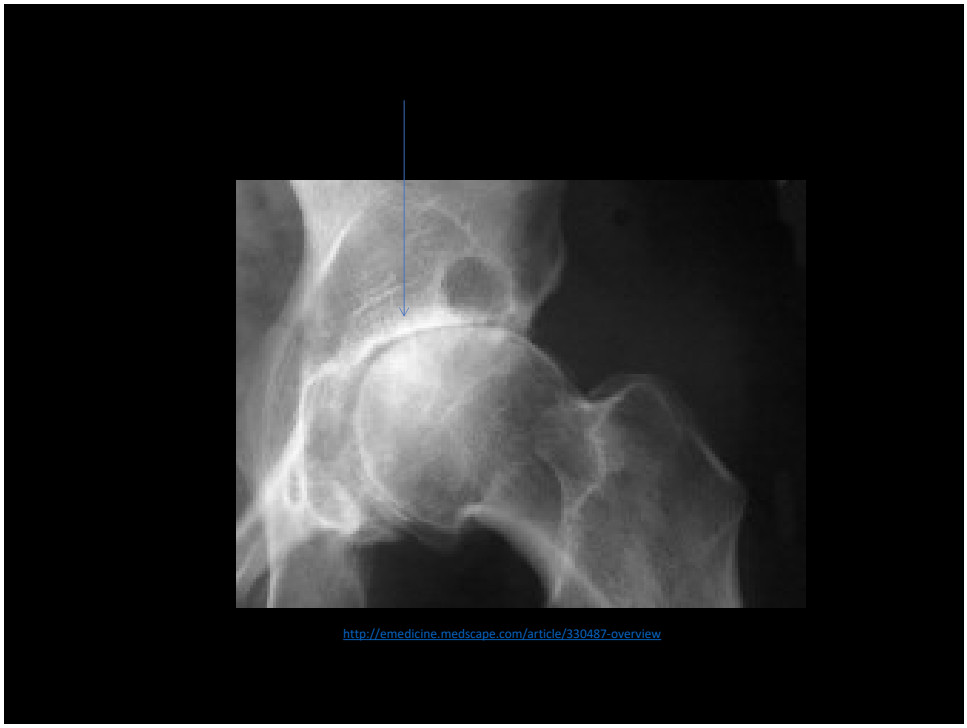

http://emedicine.medscape.com/article/330487-overview

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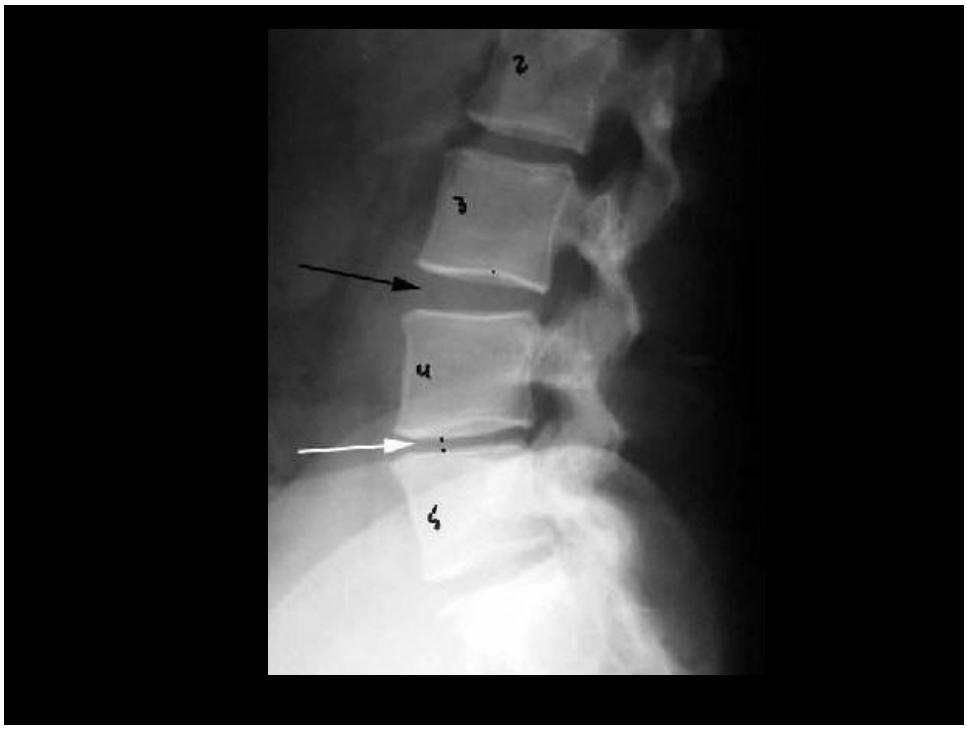

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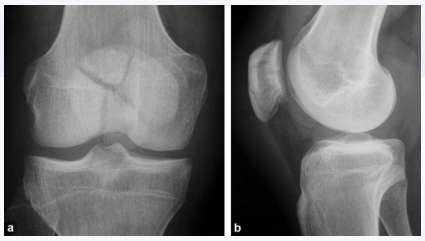
Stellate Fracture



- Fracture lines radiate form a central point of injury with a star like pattern
- Cause: Trauma - falling onto knees, knees hitting dashboard
- Complications: pain, weakness, infection, stiffness
- Radiographic appearance: comminuted fracture with a star like pattern
- No manual exposure factor change
- Prognosis/Treatment – Non operative and Operative

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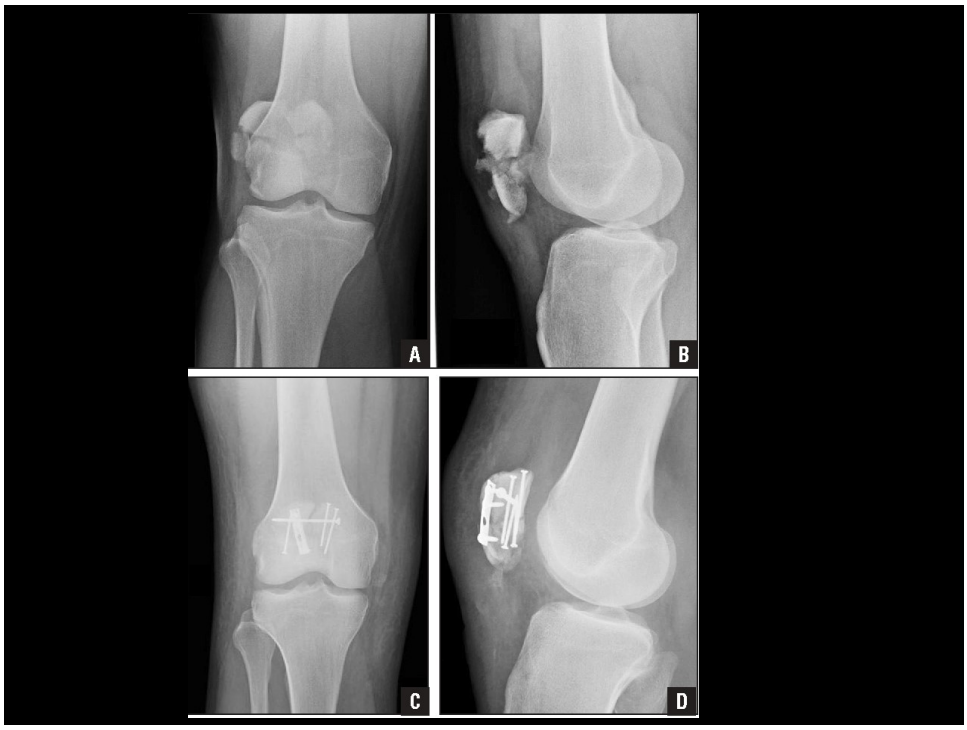

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