Back To Chiropractic Continuing Education Seminars
X-ray of Sport Injuries: Lower Extremity ~ X-Ray ~ 6 Hours

Welcome:
This course counts as 6 Hours of CE for X-ray of Sport Injuries: Lower Extremity ~ X-Ray for the Chiropractic Board of Examiners for the state of California.

This course counts as 6 Hours towards your Radiography Supervisor and Operator
Permit renewal. Course must be completed before your permit expires.

There is no time element to this course, take it at your leisure. If you read slow or fast
or if you read it all at once or a little at a time it does not matter.

How it works:

Go to the home web page backtochiropractic.net to the online registration section.

To download your course or courses click on the Notes and Exam next to the course or courses you registered for. (Be Patient these are large files)

You need THE LATEST version of Adobe Reader, download PDF Reader if you don't have it.

Helpful Hint: Print the exam only and read through the notes on your computer screen and answer the questions as you read.

Printing notes will use a ton of printer ink, so not advised.

Read through course materials.

Take exam; e-mail letter answers in a NUMBERED vertical column to: marcusstrutzdc@gmail.com

Take exam; e-mail letter answers in a NUMBERED vertical column to: marcusstrutzdc@gmail.com

Please include your name, DC license # and course you took.

If you pass exam (70%), I (Marcus Strutz) will email you a certificate, within 24 hrs, if you do not, you must repeat the exam. If you do not pass the second time then you must retake and pay again.

If you are taking the course for DC license renewal you must complete the course by the end of your birthday month for it to count towards renewing your license.

I strongly advise to take it well before the end of your birthday month so you get send in your renewal form early.

If you are taking the X-ray courses and Arthritis course, these courses count toward your Radiography Supervisor and Operator Permit renewal and must be completed by the expiration date on your permit for it to count towards renewing your permit.

The Board of Chiropractic Examiners requires that you complete all of your required CE hours BEFORE you submit your chiropractic license renewal form and fee.

NOTE: It is solely your responsibility to complete the course by then, no refunds will be given for lack of completion.

X-ray of Sport Injuries: Lower Extremity

Review & Case Studies

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Chiropractic Radiologist

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Radiography Review of the Lower Extremity

- X-ray search Pattern-ABCs (alignment, bone, cartilage/joint spacing, and soft tissue)
- Review of patient positioning
- Case Studies
  - Find x-ray pathology; Discuss mechanism of Injury (MOI), complications, appropriate advanced Imaging, treatment and referral.

Things to Remember Before We Get Started:

- Radiography positioning book or reference is strongly advised.
  - This presentation is only a review

- When tilting the x-ray tube: For every 5 degrees of rotation or tilting the tube, the tube is moved one inch closer to the patient to reduce distortion/magnification.
  - Example: Tube tilt of 15 degrees= Move tube closer to patient 3 inches

FYI: MRI versus CT for musculoskeletal injury

- MRI
  - Does not show bony detail
  - Soft tissue pathology such as tumor, muscle, ligament/tendon, disc, nerve, spinal cord, etc
  - Pathology in the bone such as tumor, stress fracture, etc.
- CT
  - Bony detail
  - Fracture fragments and dislocation

Lower Extremity

- Hip & Pelvis
- Knee
- Ankle
- Foot/Toes

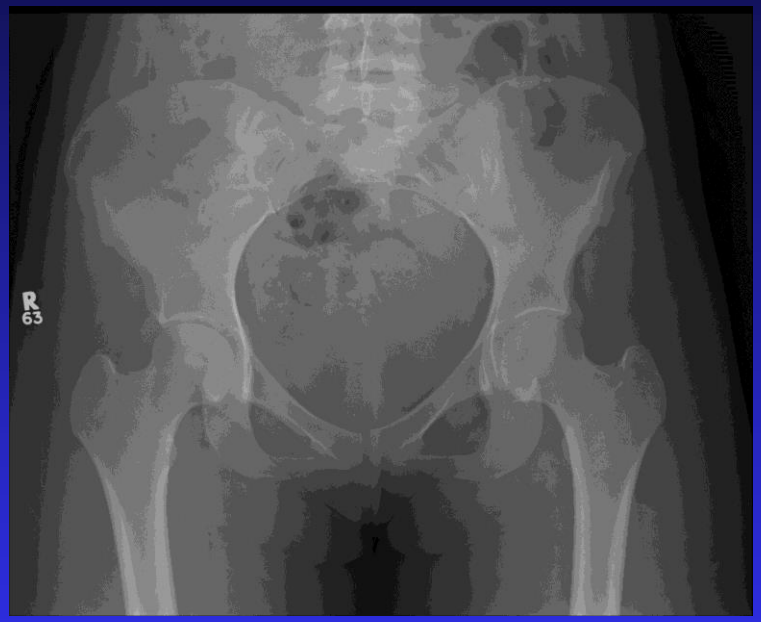
Hip & Pelvis

Hip & Pelvis: 3 Views

- AP Pelvis
- AP spot view of hip
- Lateral Frog-leg view of hip

Radiographs of the Hip and Pelvis

- **3 Projections**
  - AP view of the pelvis
    - Bilateral internal rotation of the femur 20 degrees
  - AP and lateral frog-leg spot views
    - AP- internally rotated femur 20 degrees.



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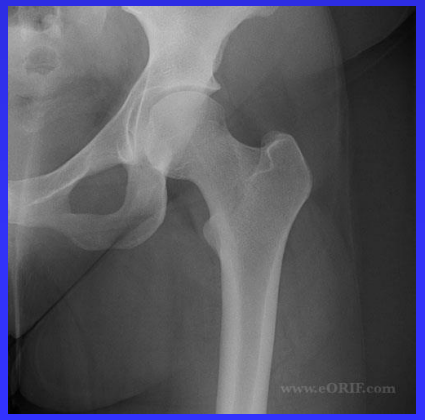

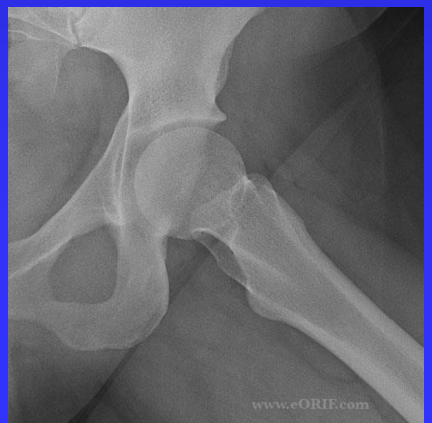

AP Pelvis

- **Focal Film Distance (FFD)** 40”
- **Collimation** 14x17 landscape
- **Central ray (CR)** Place the top of the light at the iliac crest; and midline

Remember: Bilateral femoral internal rotation of 20°

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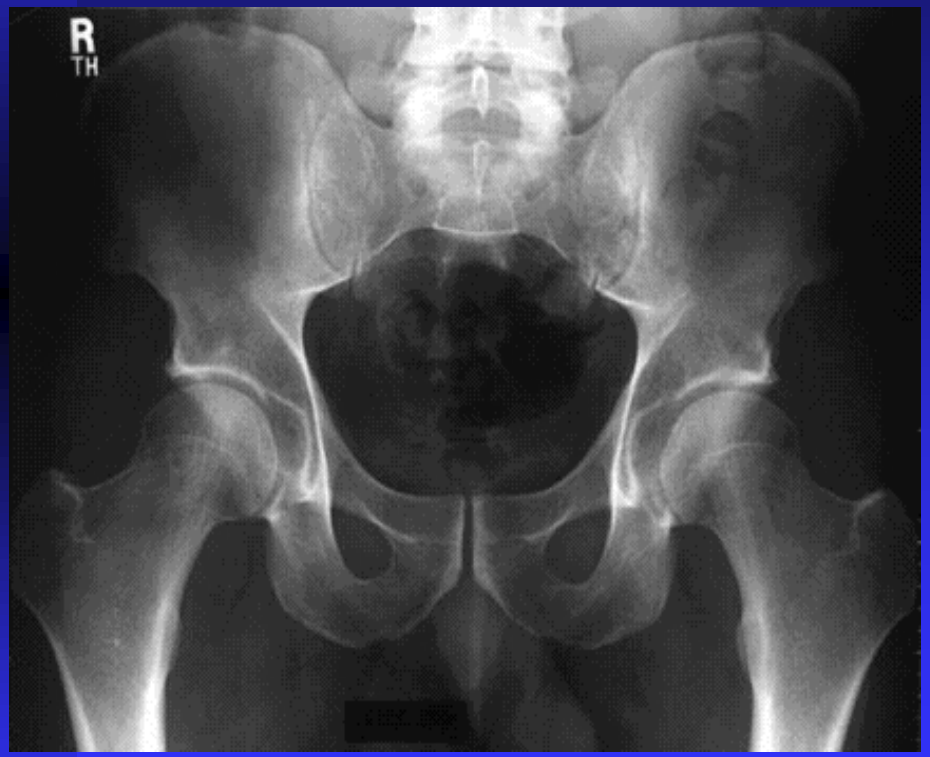
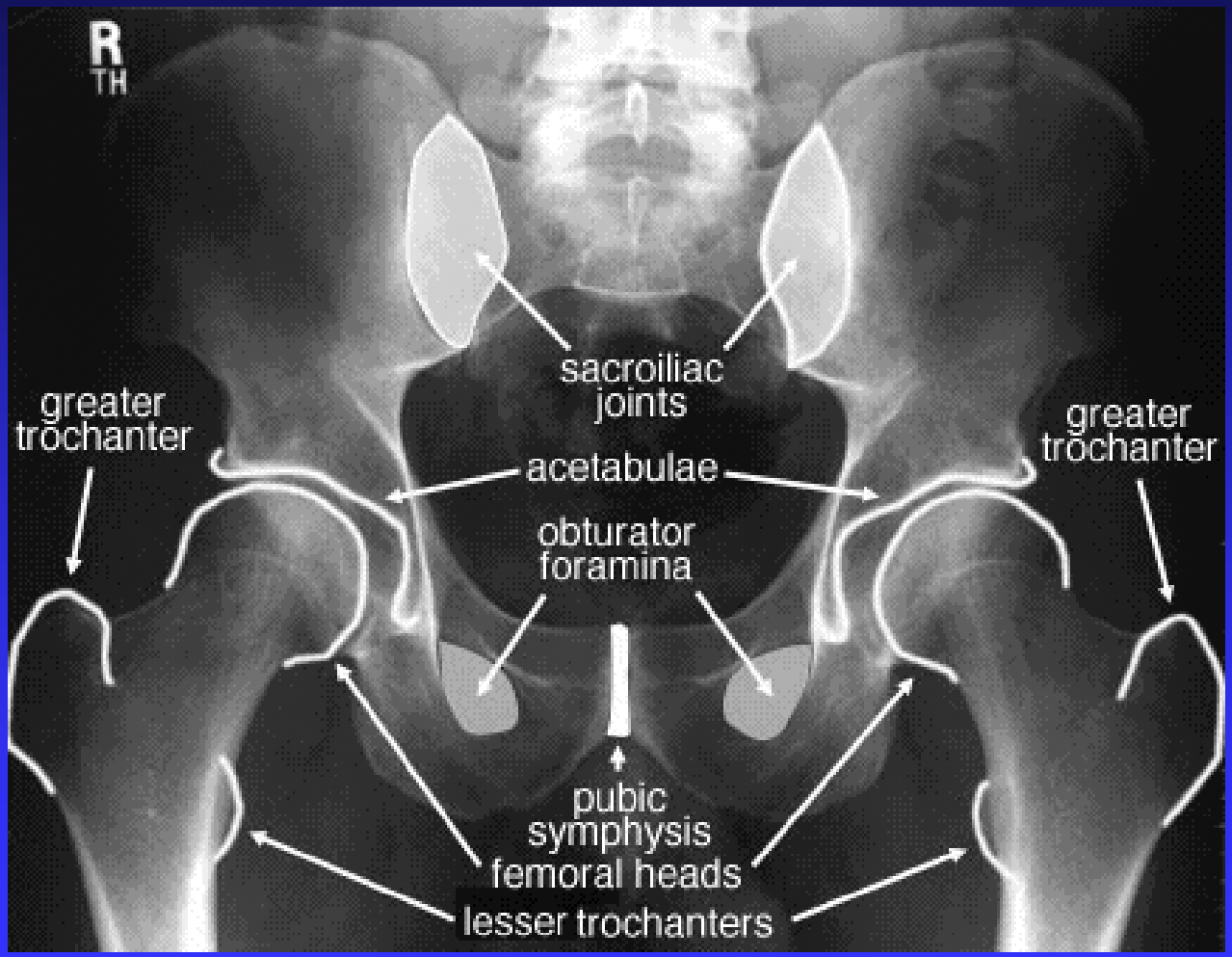
AP PELVIS



Structures Visualized

- SI Joints
- Hip Joints
- Pubic Symphysis
- Greater and Lesser Trochanters
- Obturator Foramen
- Femoral Heads

AP PELVIS - Labeled



AP Spot View of the Hip

- **FFD** 40”
- **Collimation** 10x12
- **Central ray (CR) Fe**moral pulse, mid groin
- **Remember: Femur internally rotated 20°**

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AP SPOT HIP

Structures Visualized

- Femoral Head
- Femoral Neck
- Greater and Lesser Trochanter
- Femoral Shaft
- Kohler's Teardrop
- Pubic Rami
- Iliac Fossa

LATERAL FROG-LEG VIEW

- **FFD** 40”
- **Collimation** 10x12 landscape
- **CR** Femoral pulse
- **Remember to flex, abduct and external rotate the femur**

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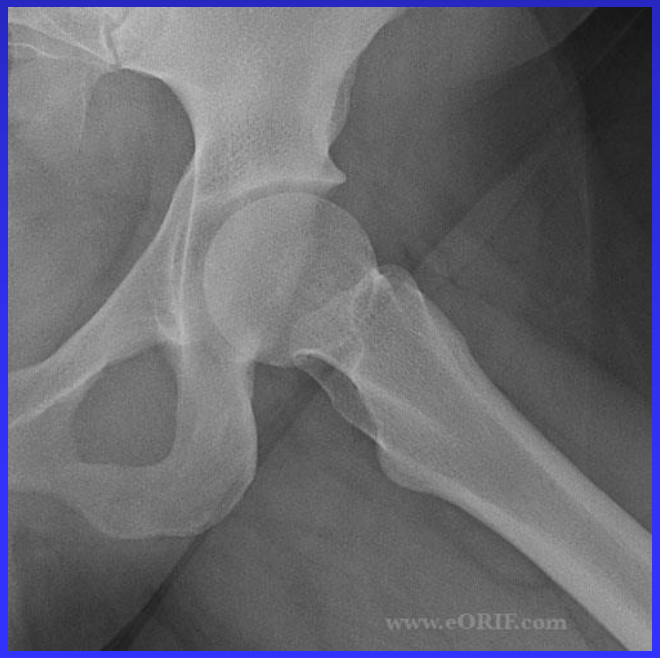
FROG-LEG (HIP)

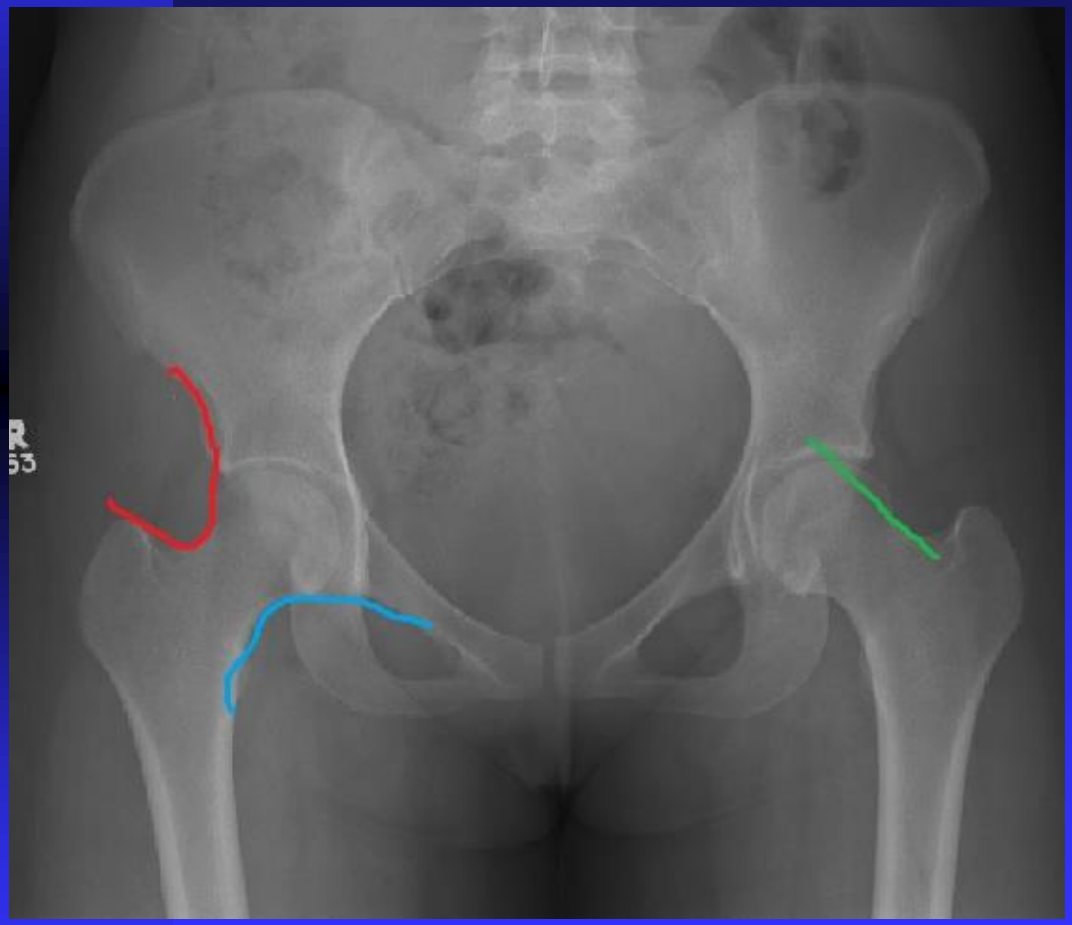
Structures Visualized

- Femoral head
- Femoral Neck
- Hip Joint space
- Kohler's Teardrop
- Pubic Rami
- Obturator Foramen
- Femoral Shaft

Alignment Evaluation

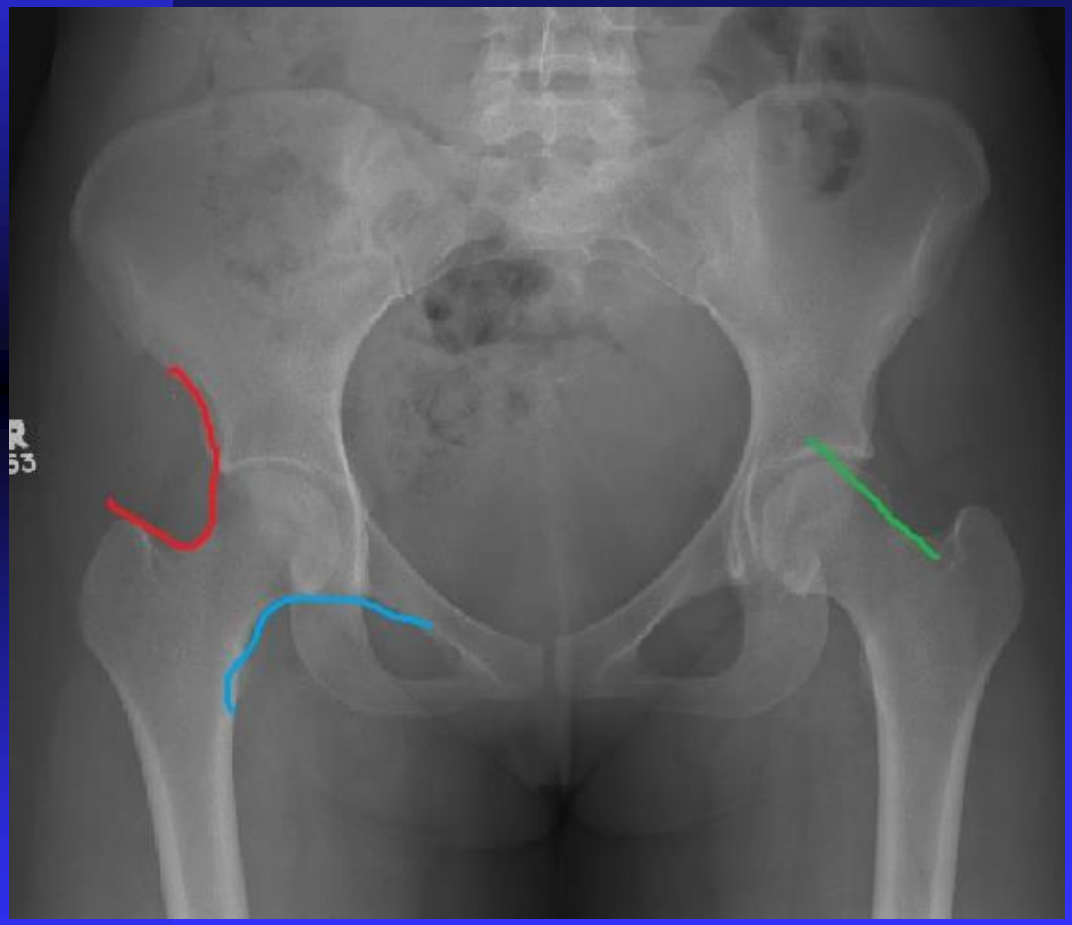
- Iliofemoral, Klein's, and Shenton's line
- Iliopectineal line and ilioischial line



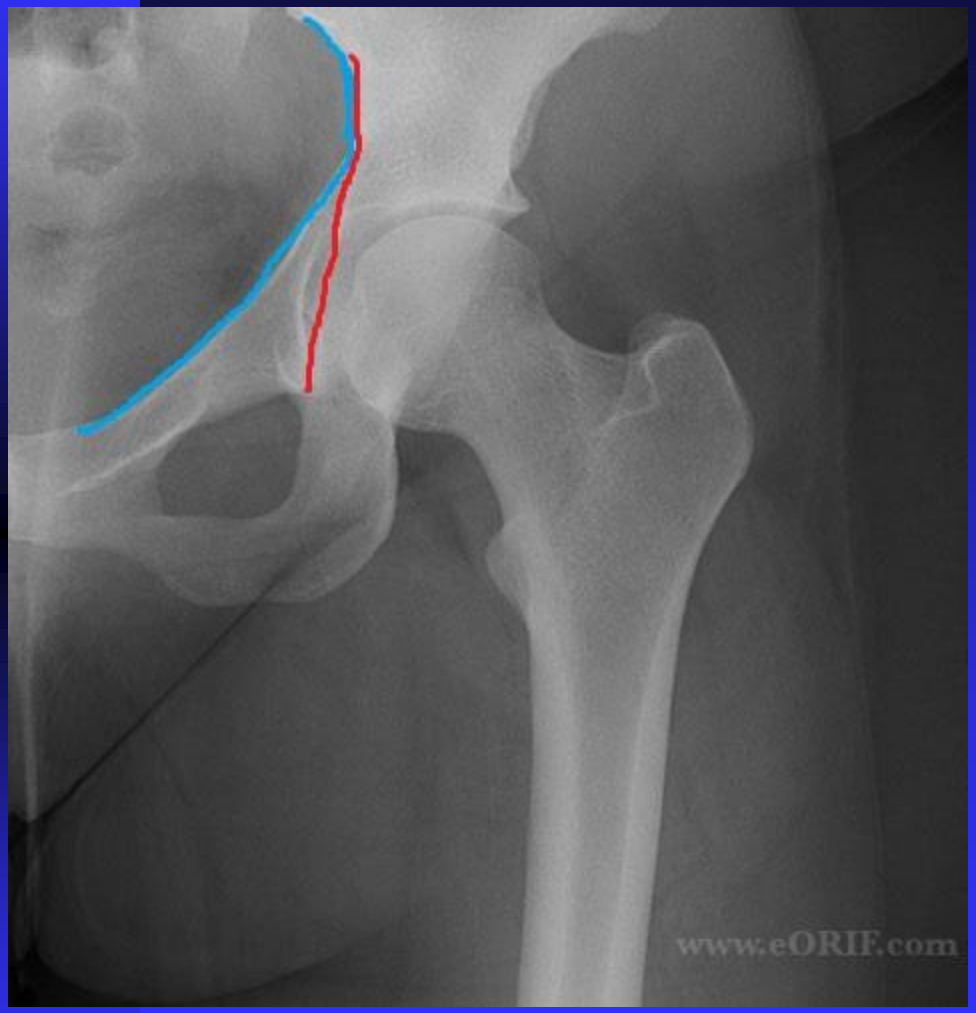


- Red= Iliofemoral Line should be a smooth arc
- Blue= Shenton's Line should be a smooth arc
- If not a smooth arc transition, the femur has been displaced.

www.raddaily.com



- Green= Klein's Line should intersect the femoral epiphysis. If the line does not intersect the femoral epiphysis then the epiphysis has migrated medially.



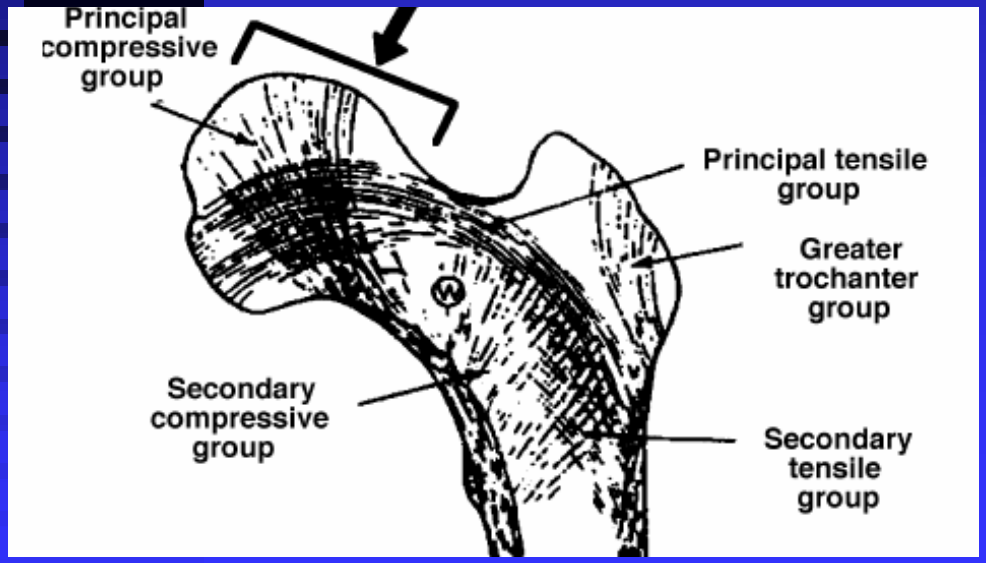
- Blue= Ilioischial Line
- Red= iliopectineal Line

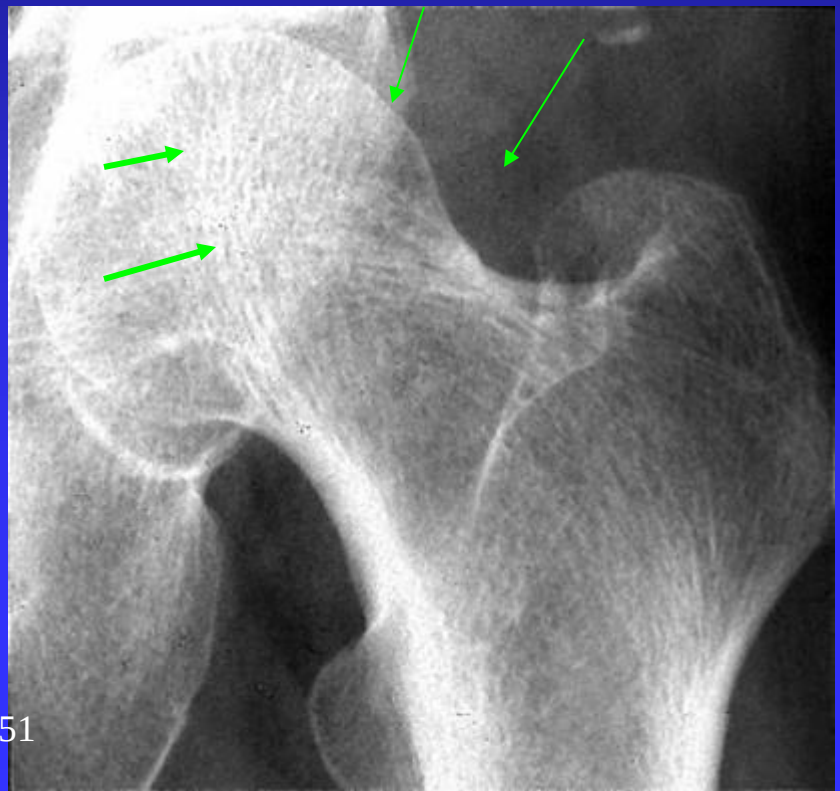
Both lines should not be disrupted and femoral head should not cross these lines.

In general, these lines help with your search pattern. Don’t miss a subtle fracture ☺

Trabecular Pattern of Femoral Neck

- Trabecular pattern within the femoral neck should be intact. If disrupted, the trabecular pattern typically demonstrates linear area of sclerosis traversing the femoral neck. Disrupted trabecular pattern= FRACTURE



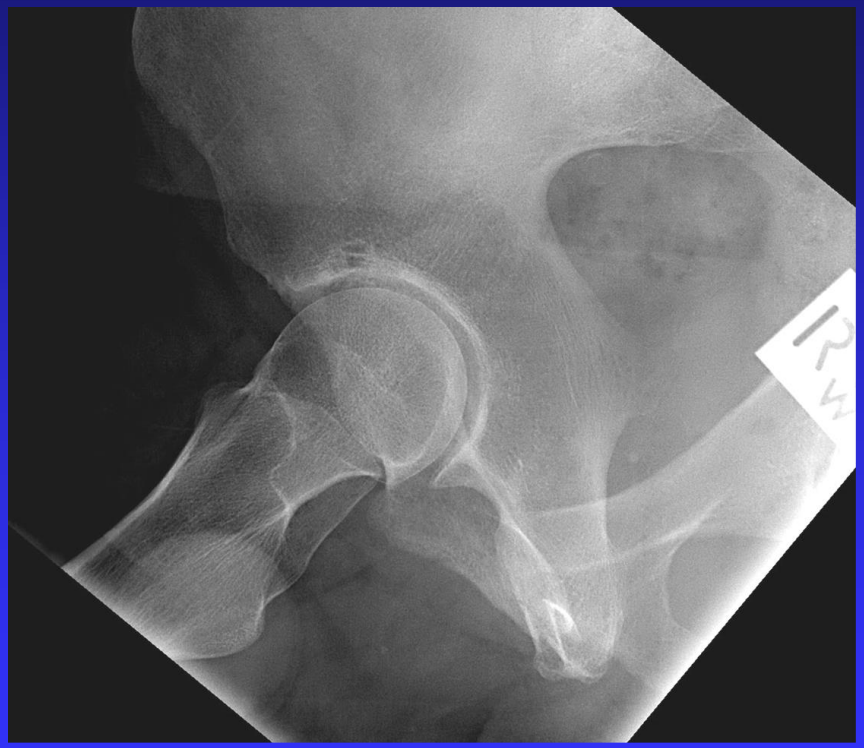


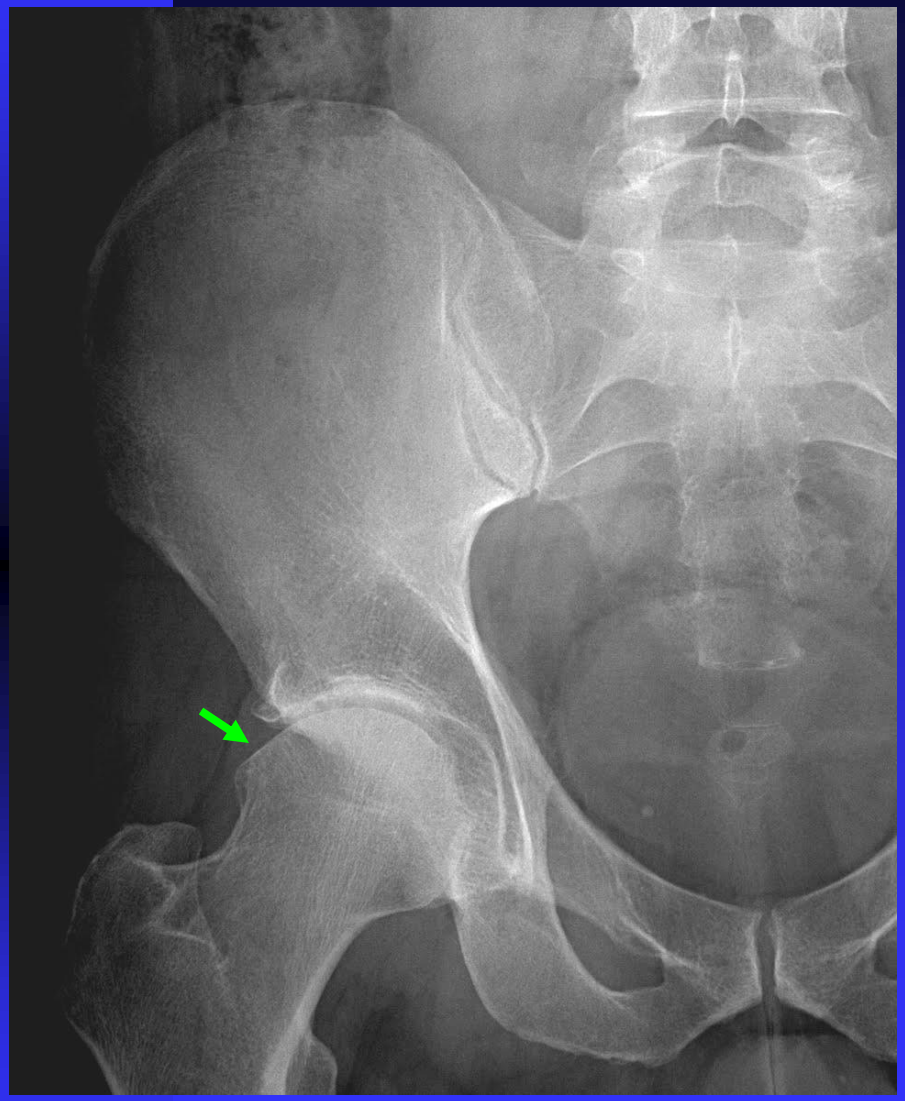
Journal of Biomedical & Pharmaceutical Engineering 1:1 (2007) 45-51

Case

- Hx: Hip and groin pain

AP Pelvis and Right Frogleg Lateral- Where is the abnormality?





Osseous bump at the lateral aspect of the head-neck junction of the right femur with secondary degenerative changes. This ‘bump’ was not caused by acute trauma.

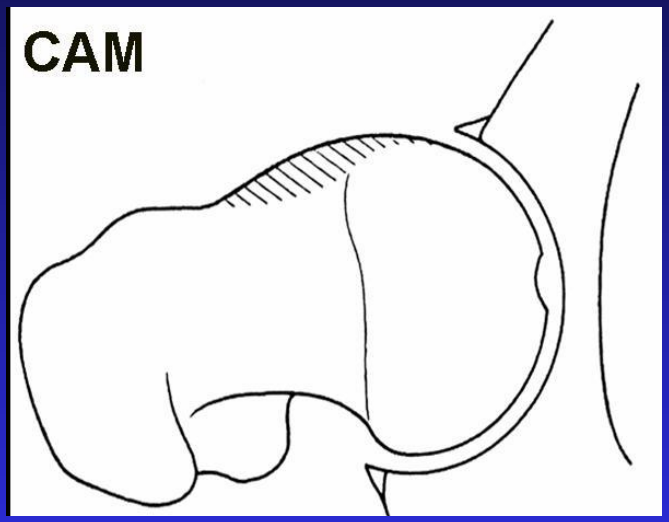
Femoroacetabular Impingement Syndrome (FAI)

- FAI, cam type
  - Osseous bump at the lateral aspect of the head-neck junction of the femur

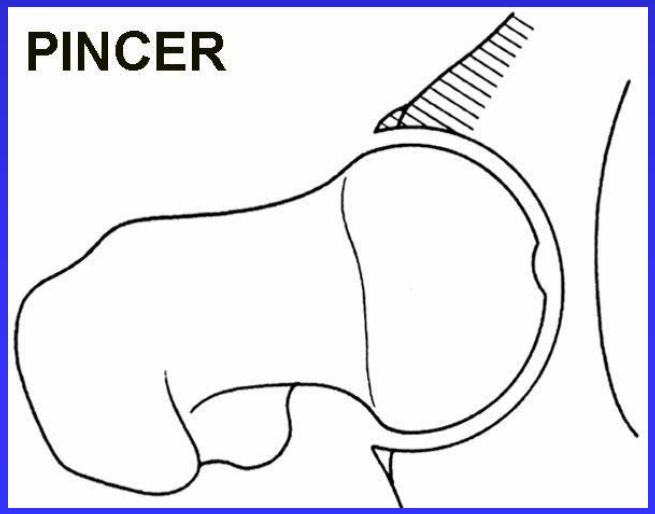
- FAI was not caused by the acute trauma. The patient had these bony prominences. FAI is associated with labral tear.

Femoroacetabular Impingement

- Lateral osseous bump along the femoral head-neck junction= **cam**
  - *"Pistol grip" deformity*



- Osseous extension of the lateral aspect of the acetabulum resulting in *overcoverage* of the femoral head= **pincer**



Radiographic Findings

Associations:

- Os acetabuli: ossicle adjacent to the lateral aspect of the acetabulum
- Herniation pit: oval radiolucency within the osseous bump

www.radiopedia.com

- Herniation pit is from wearing of the lateral aspect of the femur due to contacting with the acetabulum creating a synovial-filled ‘divot’ or cavity.

Clinical Findings

- **Chief Complaint:** groin pain with hip rotation in the sitting position or during/after sports; or trochanteric pain radiating to the lateral thigh.
  - Decreased range of motion & pain with **flexion, adduction and internal rotation of the femur**

FYI on FAI

- **Think of sport specific limitations: patient with FAI would not be a candidate as a hockey goalie since it requires hip flexion and femoral internal rotation.**

Complications of FAI

- Decreased joint clearance between femoral neck and acetabulum

- Premature degeneration, and tears in the labrum and adjacent articular cartilage

Filigenzi F and Bredella M. MR imaging of Femoroacetabular Impingement. Applied Radiology, April 2008, 12-19.

Tannast M, et al. Femoroacetabular Impingment: Radiographic Diagnosis-What The Radiologist Should Know. AJR:188;1540-1552, June 2007.

Follow-up

- **MRI with arthrography:** evaluate for labral tears, and articular cartilage damage

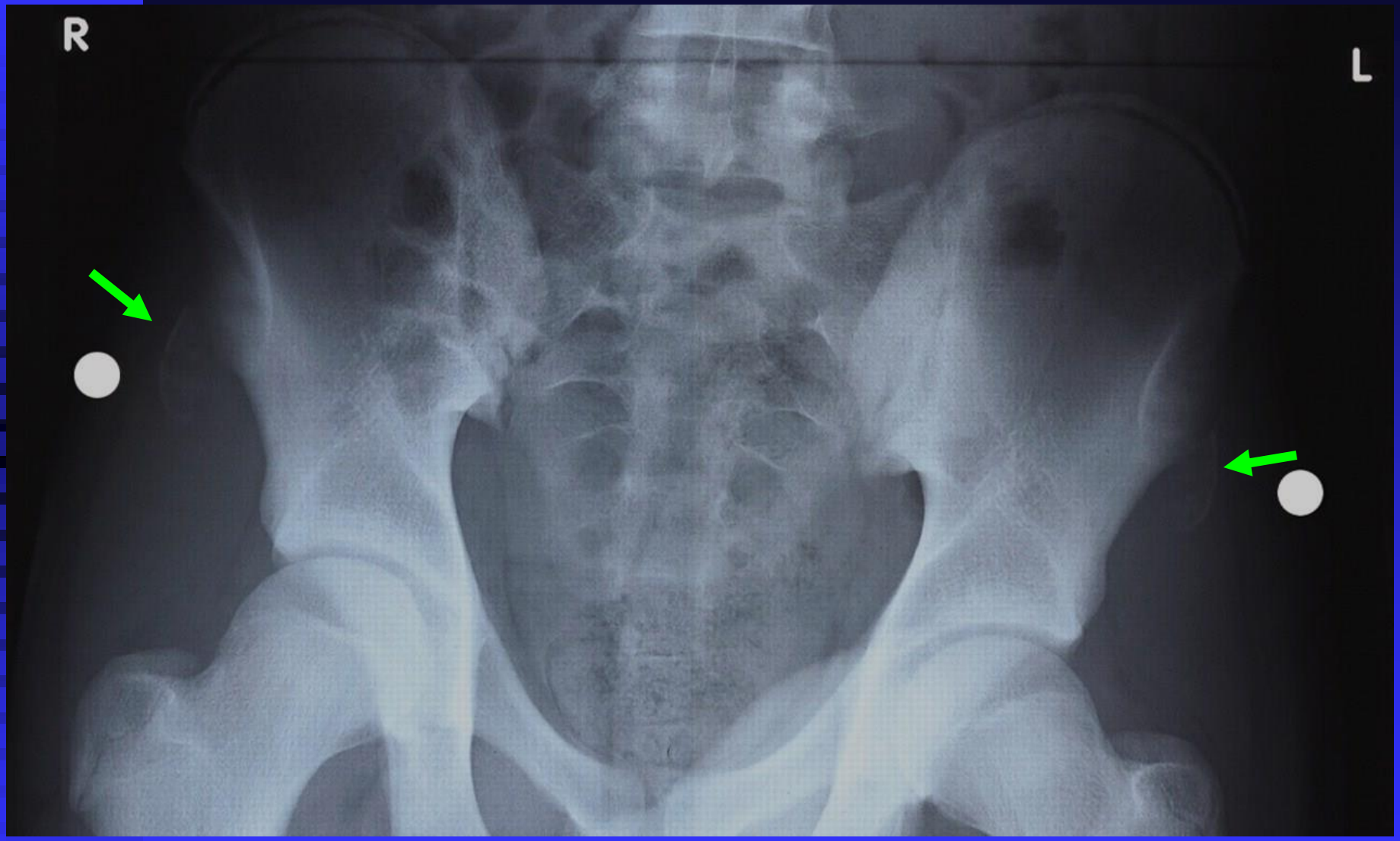
- Orthopedic surgeon **consultation**
  - Osseous resection
  - Labral repair/refixation with suture anchors or labral debridement

Larson C and Giveans M. Arthroscopic Management of Femoroacetabular Impingement: Early Outcome Measures. J of Arthroscopic and Related Surgery, May 2008, 24 (5); 540-546.

Case

Hx: 16 year-old female (yof) sprinter with bilateral hip pain.

AP Pelvis- Where is the abnormality?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Bilateral Avulsion of ASIS

- Attachment of the Sartorius and Tensor fascia latae tendon/muscle
- Normal open growth plates of the iliac crest
- Subtle bilateral femoroacetabular impingement, cam type.

Anterior Superior Iliac Spine (ASIS) Avulsion

Mechanism of injury (MOI): forceful extension of hip

Treatment: rest>>>rehab; healing 4-6 weeks to 6 months

Surgical: displacement greater than 2 cm; complication is nerve entrapment with displacement.

Case

Hx: 13 yom complains of *knee* pain

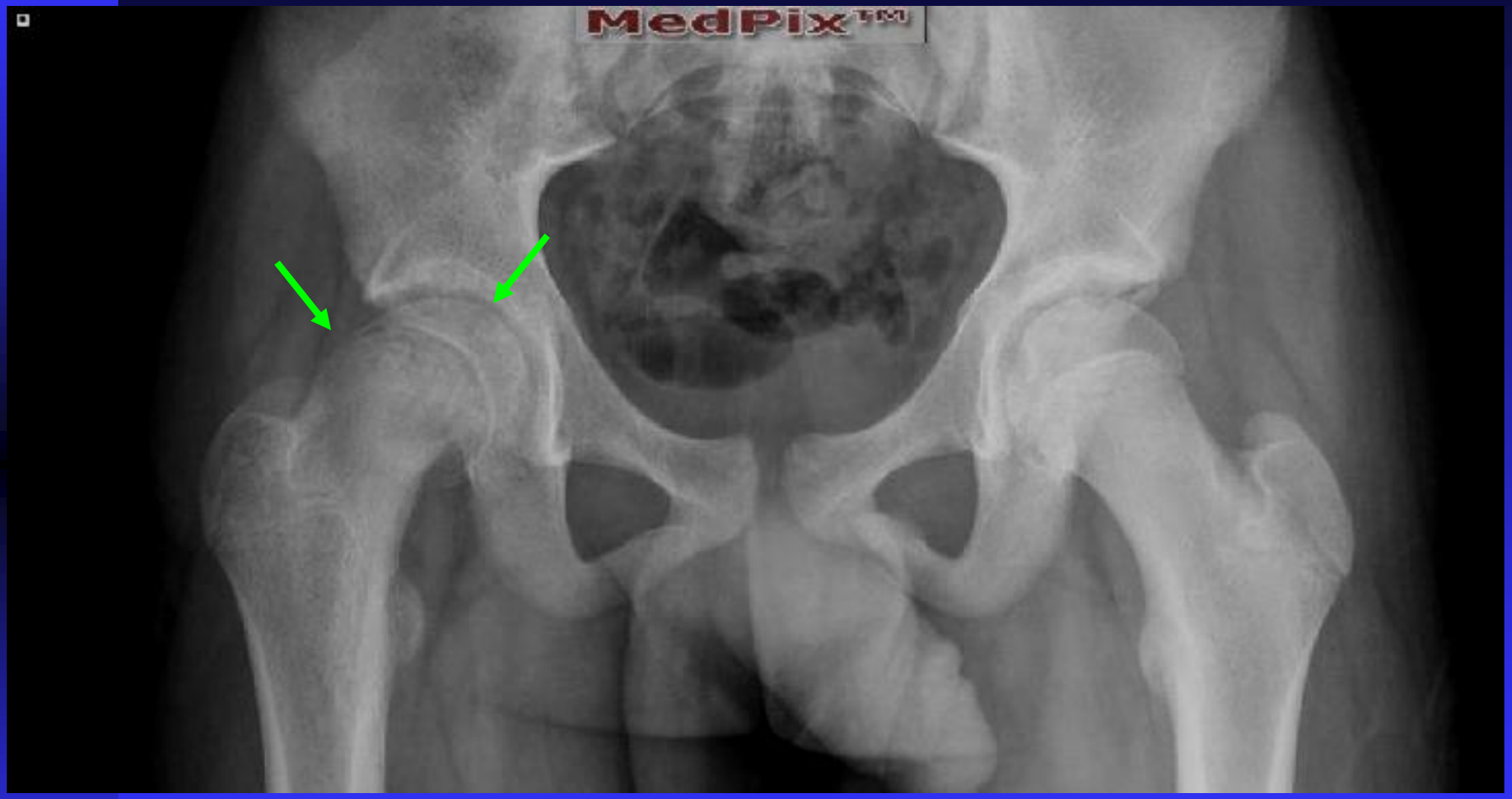
What other regions should be evaluated beside the knee joint, particularly in a young individual?

Other regions or joints need to be evaluated:

- Ankle/foot
- Knee
- Hip
- And Lumbar

AP Pelvis- Where is the abnormality?

Recumbent Bilateral Lateral Frog-leg View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Radiographic Findings

- Medial migration of the right femoral epiphysis
  - Positive Klein's Line- not intersecting the femoral epiphysis.
- Decreased femoral epiphyseal height and size
- Decreased bone density, subtle
- Varus deformity of the femoral neck ('bending appearance')

Slipped Capital Femoral Epiphysis

- Age: 10-17 yoa of boys; 8-15 yoa of girls

- **Causes (separate or combination of)**
  - Overweight
  - New activity- strenuous exercise
  - Growth spurt
  - Trauma

Resnick D. Diagnosis of Bone and Joint Disorders, 4th ed. 2002; 2729-34.

SCFE

Complications

- Severe varus deformity and foreshortening
- Osteonecrosis
- Premature degenerative joint disease

Follow-up

- Orthopedic surgeon consultation
  - Reduction
    - Severe cases: Pin the femoral epiphysis at the current location

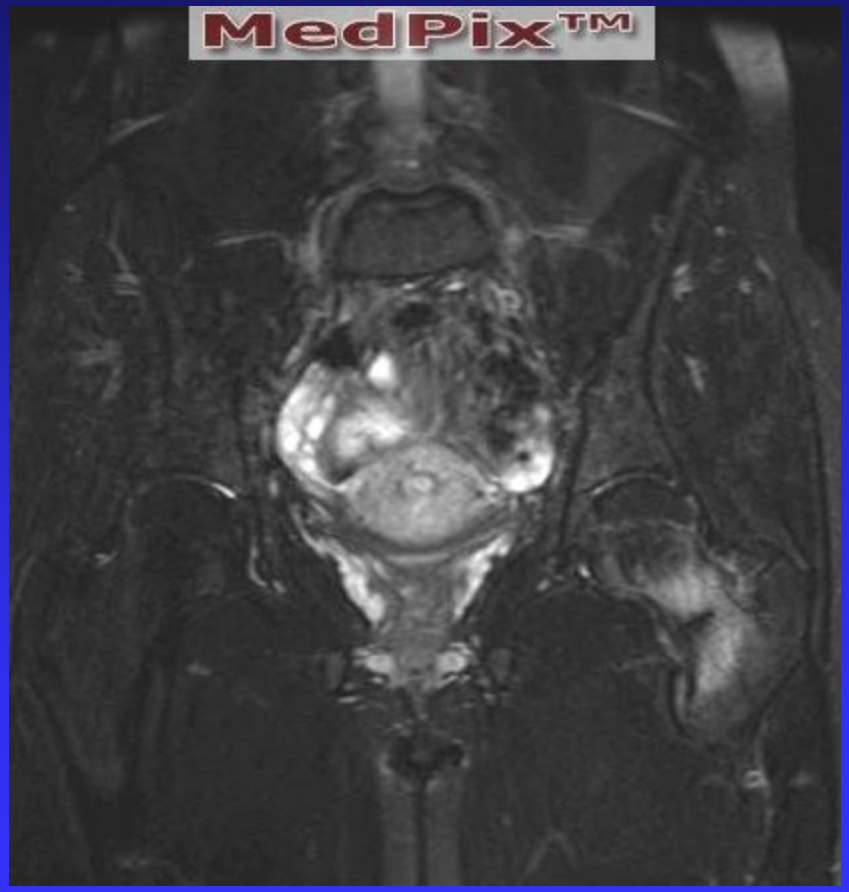
Case

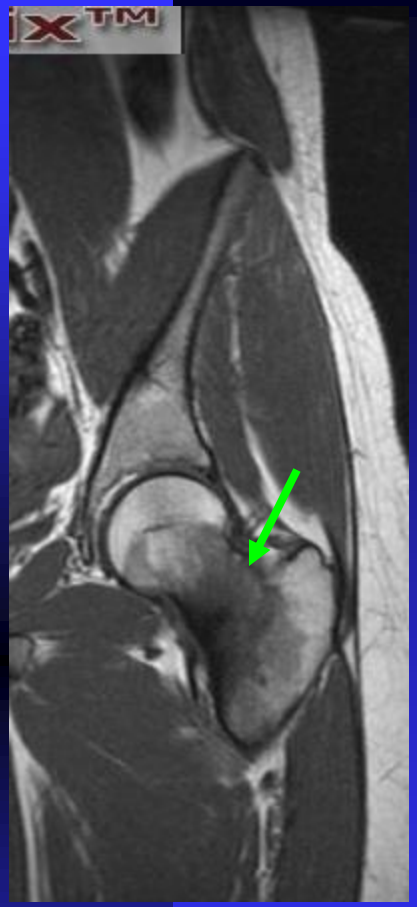
Hx: 18 yof athlete complains of hip pain

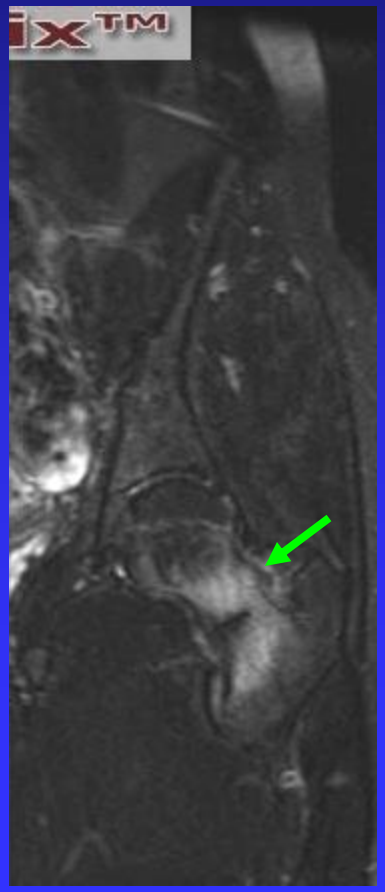
AP Pelvis- Can you find the abnormality?

- X-ray demonstrated no findings. The patient continued to have pain.
- Further History: The 18 yof patient is a long distance runner, and is running 60 miles per week
- **What is your differential diagnosis? What advanced imaging would be best for this patient?**

MRI: Coronal T1 & T2 Weighted Images







Diffuse, fanned appearance is noted within the femoral neck with high signal on T2 and low signal intensity on T1 weighted images. Also, a linear low signal is noted within the medial aspect of the femoral neck.

Stress fracture of the left femoral neck

- Normal density with abnormal stress
- Bone scan and MRI would be positive
- Treatment: Non-weight bearing activity, for example swimming.

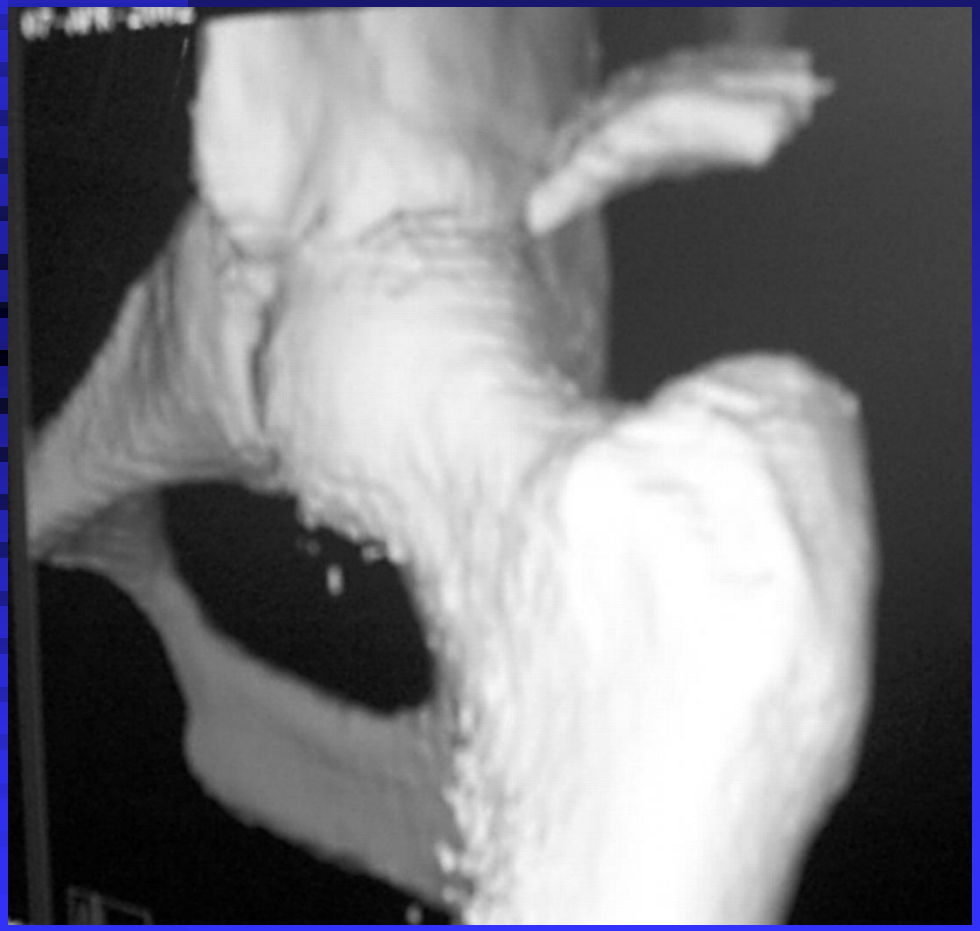
Case

- 28 year-old soccer player was hit from behind falling forward; inducing hip flexion and internal rotation

Hip Fracture/Dislocation

- Posterior wall fracture of the acetabulum fracture and dislocation
- Treatment (Tx): Reduction; surgical
- Remember: Incidence of avascular necrosis of the femoral head greatly increases if the time to reduction is greater than six hours
  - **Br J Sports Med** 2004

3D CT & Post-surgical



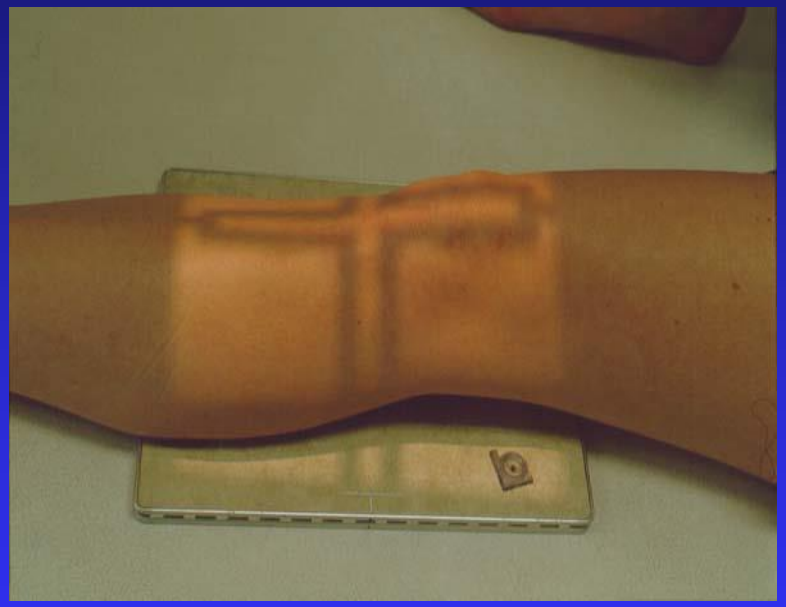
Knee

Knee Views

- AP
- Lateral
- Tunnel
- Tangential (Sunrise)

AP Knee

- **Collimation** 8x10
- **CR** patellar apex
- **Tube tilt** 5 ° cephalad
- If standing & PA, 15 degree cephalad tube tilt.



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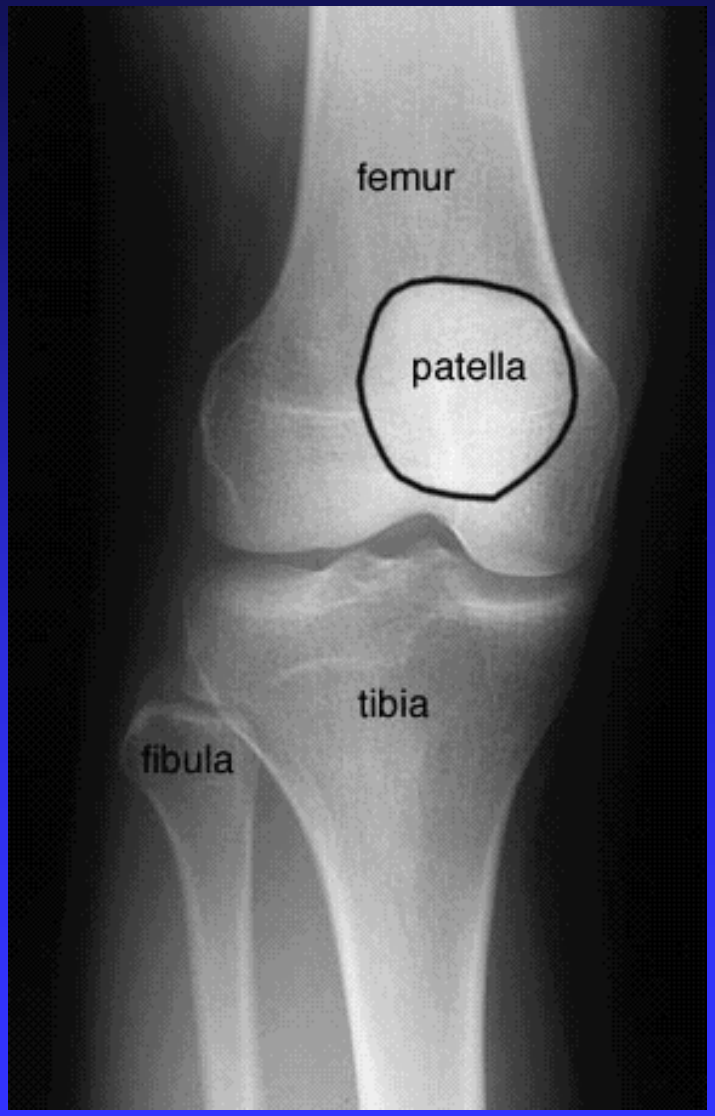
AP KNEE

Structures Visualized

- Patella
- Femur
- Tibia
- Fibula
- Condyles of the Tibia and Femur
- Adductor tubercle
- Joint Space

AP KNEE - Labeled



LATERAL KNEE

- **FFD** 40”
- **Collimation** 8x10
- **CR** Joint line

- **Knee flexion of 90-120 degrees**

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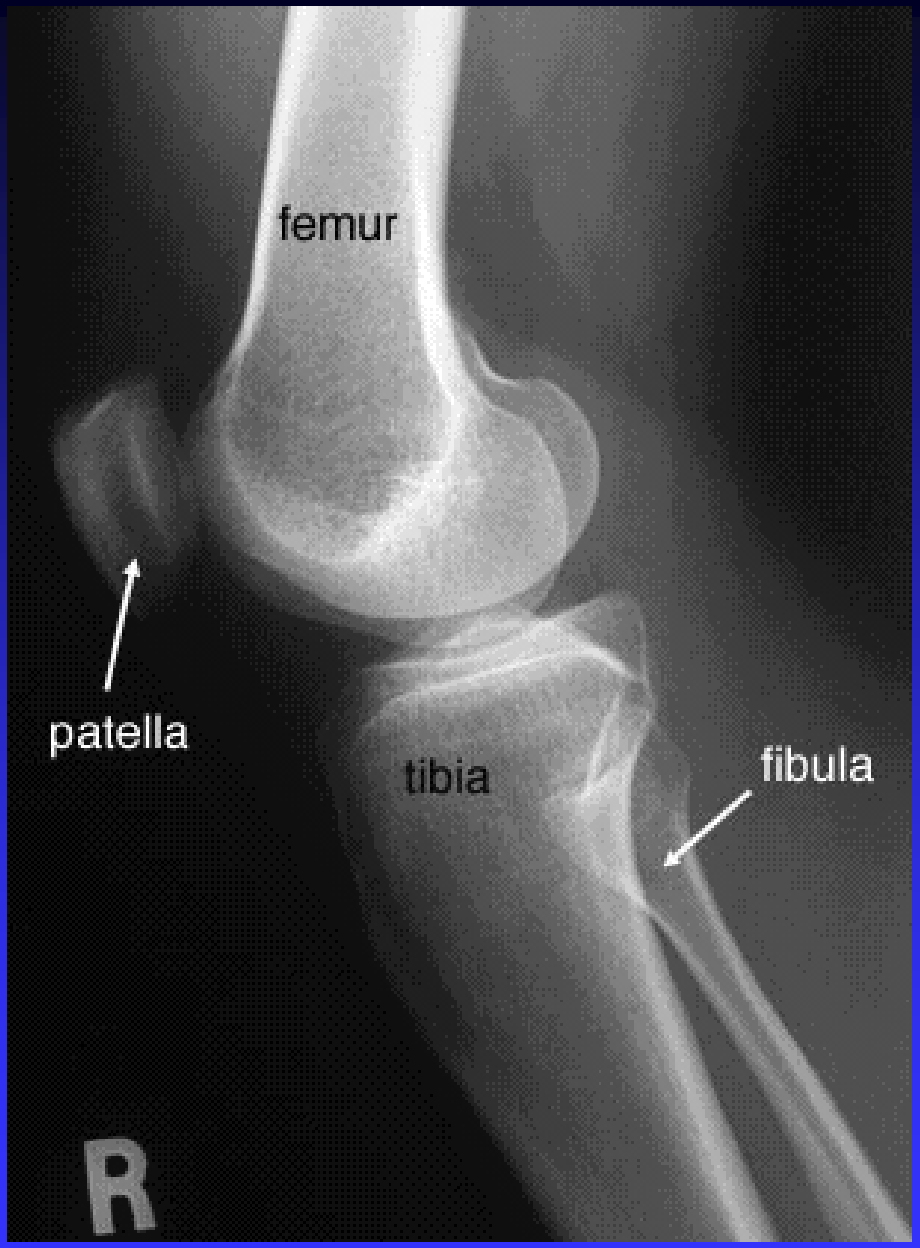
LATERAL KNEE

Structures Visualized

- Patella
- Femur
- Tibia
- Fibula
- Infra & Supra Patellar Fat Pads

LATERAL KNEE - Labeled



Tunnel View

- **FFD** 31 (corrected 40-9)
- **Collimation** 8x10
- **CR** Joint line
- **Tilt** 45 ° caudad
- **Measure from mid-hamstring to anterior knee (not just through popliteal fossa)**

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TUNNEL VIEW (KNEE)

Structures Visualized

Intercondylar notch

Femoral condyles

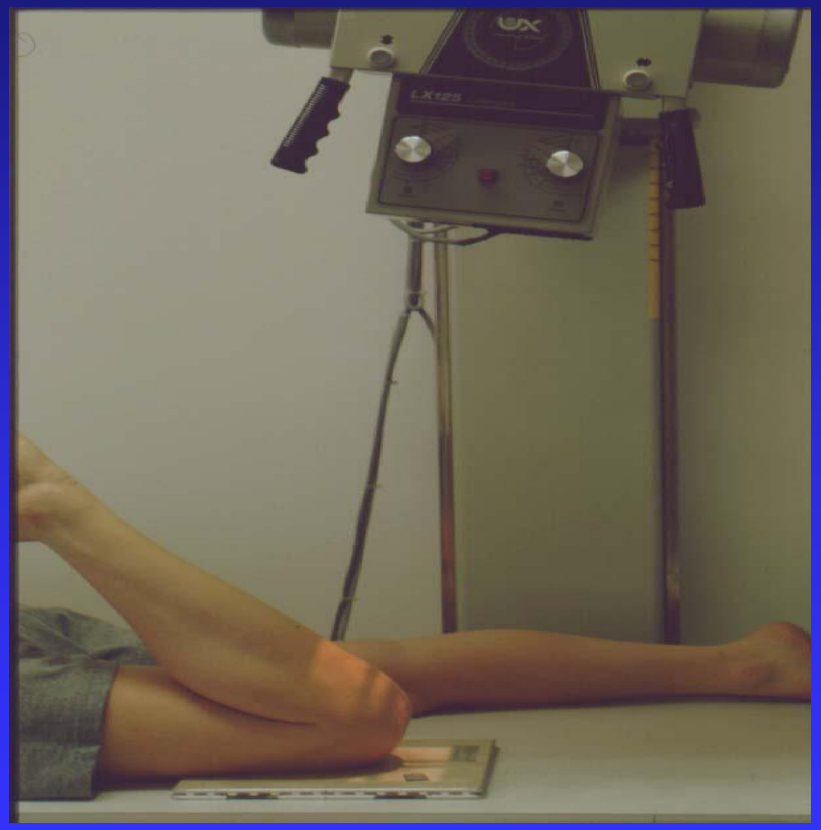
Intercondyar eminences

Tibia

Fibula

Sunrise/ Tangential View

- **FFD** 40”
- **Collimation** 8x10
- **CR** Patellofemoral joint



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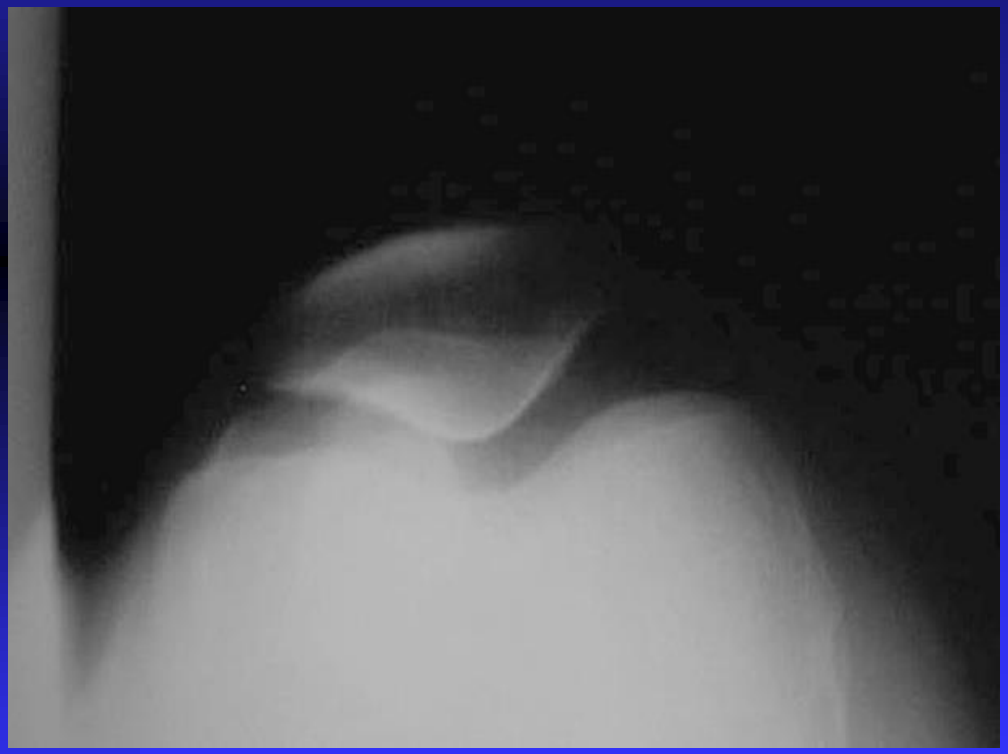
TANGENTIAL (SUNRISE) VIEW



Structures Visualized

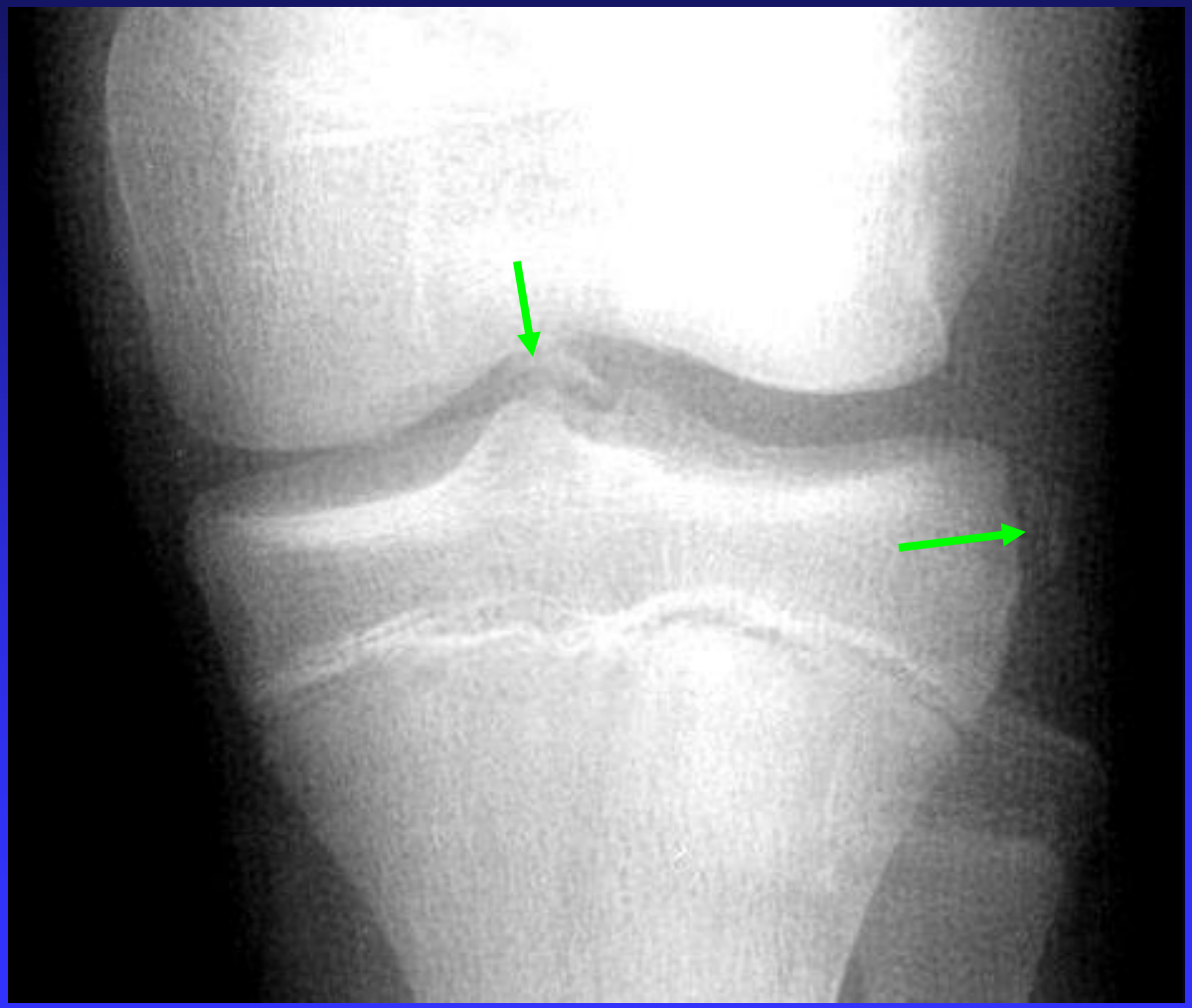
- Medial and Lateral Patellofemoral Joint
- Patella
- Patellar facets
- Trochlear groove
- Femoral Condyles

Case

Hx: 15 yom twisted his knee during basketball

AP View-Where is the abnormality?

Magnified



Findings

- Avulsion along the proximal lateral tibia.
  - Segond fracture at the insertion site of the lateral (fibular) collateral ligament and fibers of distal iliotibial band.
    - Associated with 75-100% ACL tear due to mechanism of injury
- Avulsion of the Tibial eminences
  - Associated with anterior cruciate ligament tear

Avulsion: Segond & Avulsion of Tibial Eminences

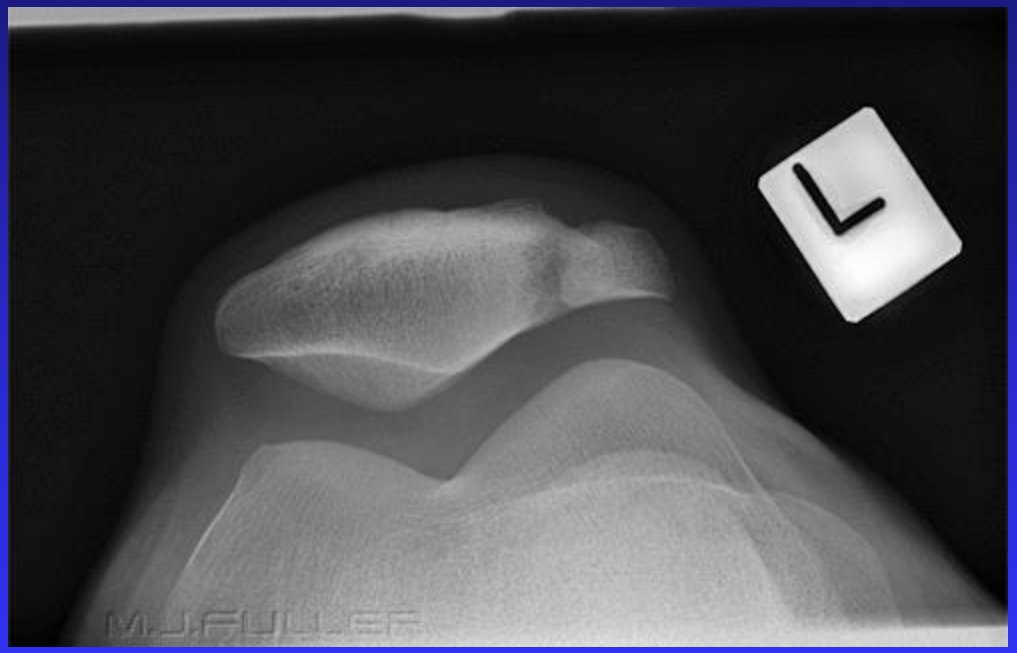
- Mechanism of Injury (MOI): Excessive internal rotation and varus stress of tibia

- MRI
  - Anterior cruciate ligament, Lateral collateral ligament & distal Iliotibial band
  - Most commonly tear of the medial mensicus.

Case

- Boy fell off his bike and has knee pain

AP and Sunrise View- Abnormal?



www.wikiradiography.com

Bipartite Patella

- Normal variant, superolateral aspect of the patella
  - Smooth margins= not a fracture
  - Clinically correlate for symptoms of this region
- Most commonly bilateral with smooth margins
- Conservative treatment

Rajinder Singh Gaheer, MS, MRCS, MRCPS, MCh(Orth); Sandeep Kapoor, FRCS(Tr&Orth); Martin Rysavy, MD, PhD **Orthopedics; November 2009 - Volume 32 · Issue 11**

Bipartite Patella

- If symptoms of this region: MRI for further evaluation
- Trauma to bipartite patella can cause symptoms with effusion and bone marrow edema on MRI.

Case

- 15 yof with knee pain

AP and PA Tunnel View

Sunrise (patellofemoral) View

Patellar Fracture-Dislocation

- Laterally displaced patella with heterotopic ossification medially or avulsion site of the medial patellar retinaculum
- MOI- twisting; direct blow; anomalous
- Treatment- conservative; possible surgical
- What advanced imaging would be best to evaluate this region?

MRI for Patellar dislocation

- MRI would demonstrate:
  - Medial patellar retinaculum tear
  - Possible bone contusion/ bone marrow edema along medial patella and lateral femoral condyle (kissing contusion).

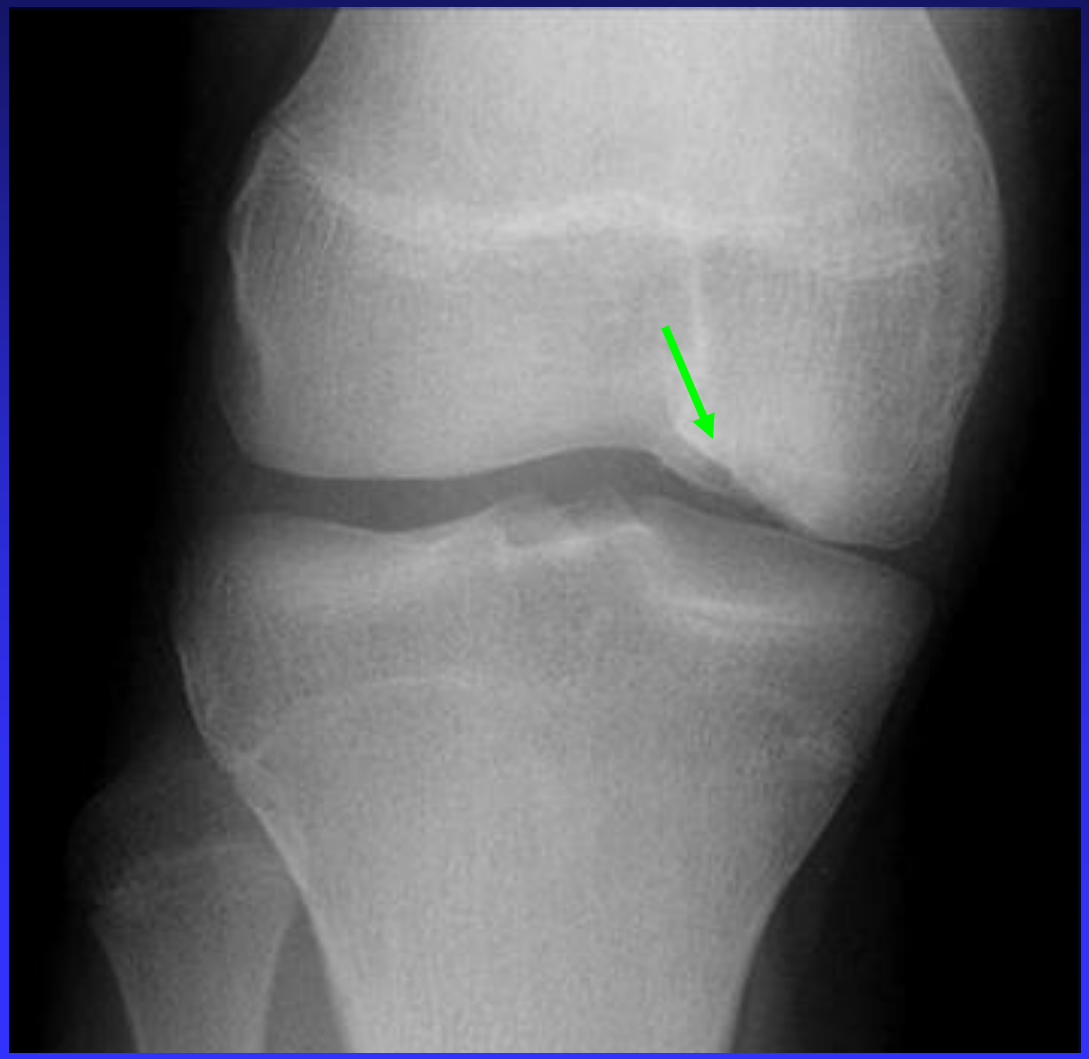
Case

Hx: Twisted knee

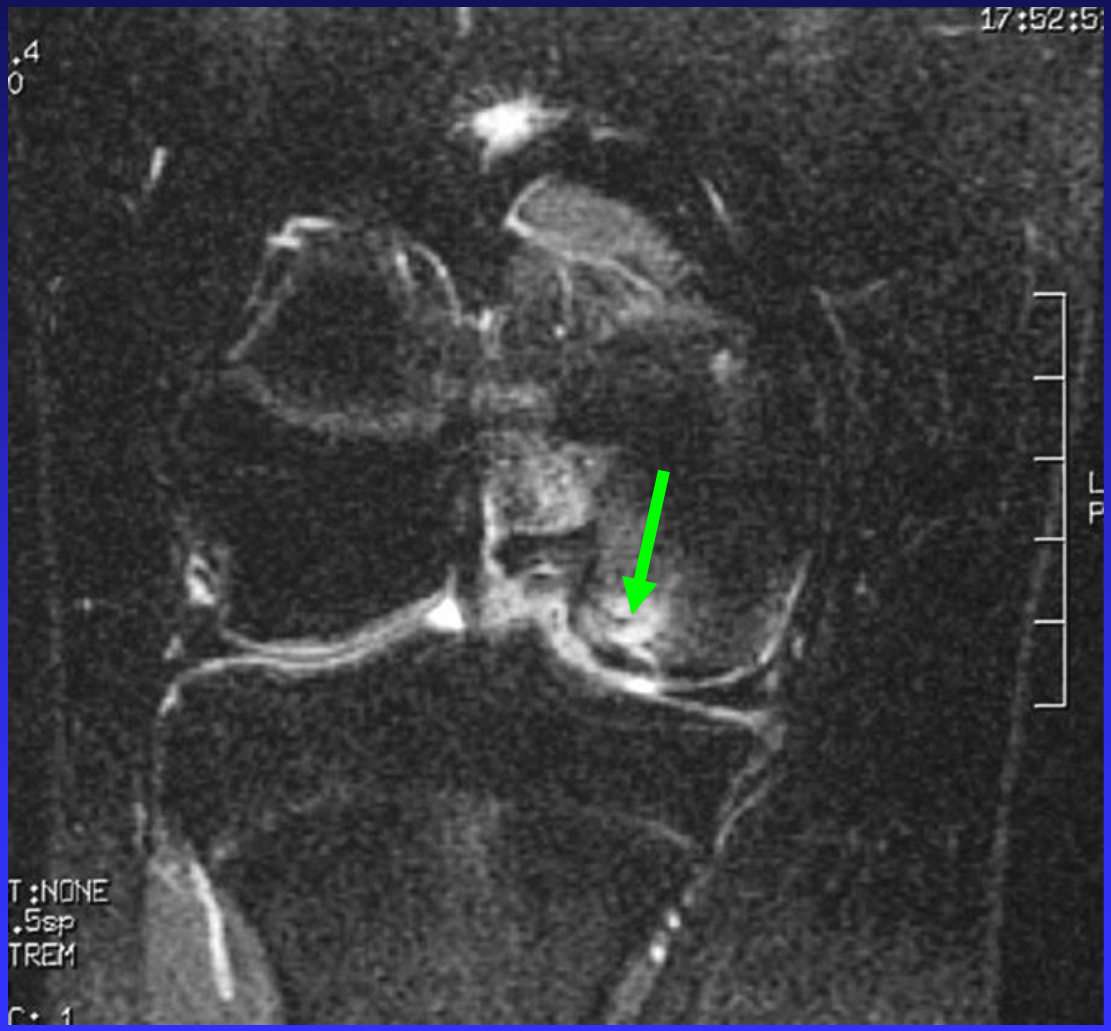
AP and Lateral View-Where is the abnormality?

Findings

- Radiolucency along the lateral aspect of the medial femoral condyle
- What advanced imaging should be performed for further evaluation?



MRI: Coronal T2 Weighted



Osteochondral Dissecans

- Age: 10-20
- Define: Necrosis of bone followed by reossification and healing
- Flap fragment with defect of the articular cartilage and fluid on MRI>>>unstable
  - surgical

OCD

- Mechanism of Injury (MOI): shearing and rotary forces

- Tx:
  - Intact cartilage: Walking with crutches, beneficial for the reconstitution of cartilage.

  - Fragment/Defect in Cartilage: surgical
    - Joint locking

Case

- 12 yom limping with knee pain


[H]
[F]

Findings

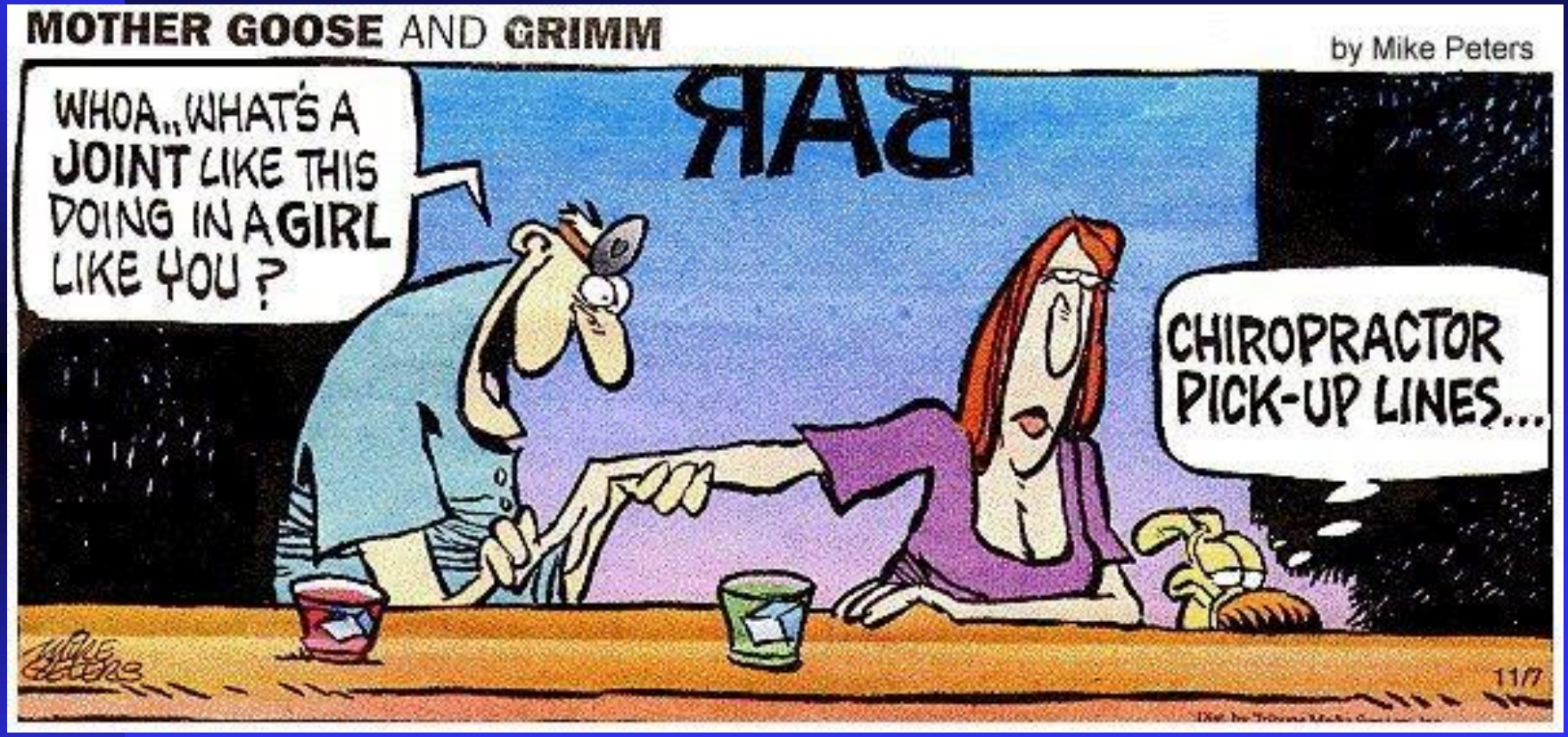
- Soft tissue effusion of Hoffa's (infrapatellar region) and suprapatellar bursa
- Thickening of the patellar tendon
- Fragmentation and displacement tibial tuberosity

Osgood-Schlatter's Disease

- **Traction apophysitis**: *Overuse injury* **age 9-14** with a male predominance.
- Repetitive strain from running, basketball, or other repetitive sports leads to chronic avulsion of the apophysis of the tibial tubercle.
- Callous formation with prominent tender tibial tuberosity

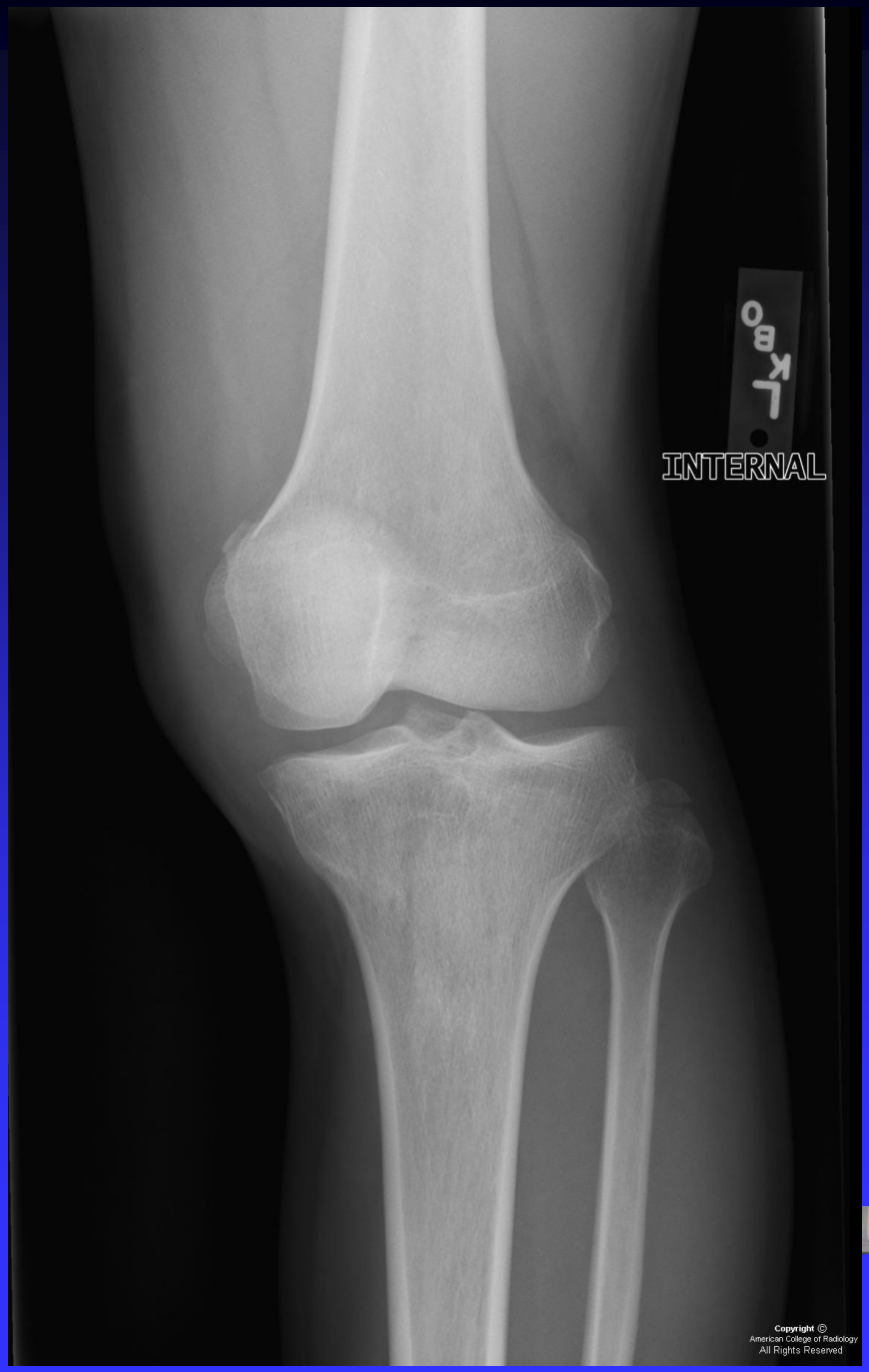
Osgood-Schlatter's

- S/S: Tenderness; tight quads; patella alta
- 2-6 months of conservative treatment; eliminate stressful activity
  - No jumping, running during rehab
- If chronic, possible surgical excision of ossicle.


MOTHER GOOSE AND GRIMM
by Mike Peters
WHOA..WHAT'S A JOINT LIKE THIS DOING IN A GIRL LIKE YOU?
BAR
CHIROPRACTOR PICK-UP LINES...
11/7

Case

- Chronic knee pain; soccer player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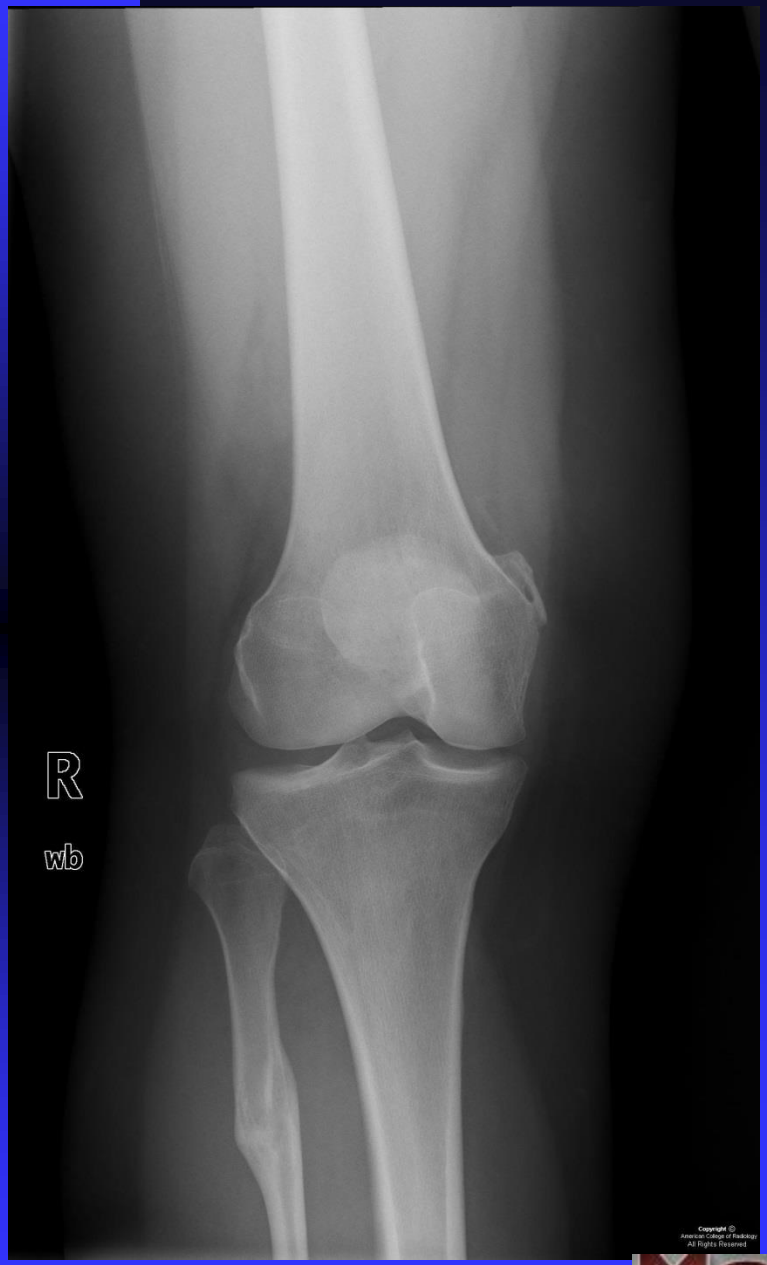
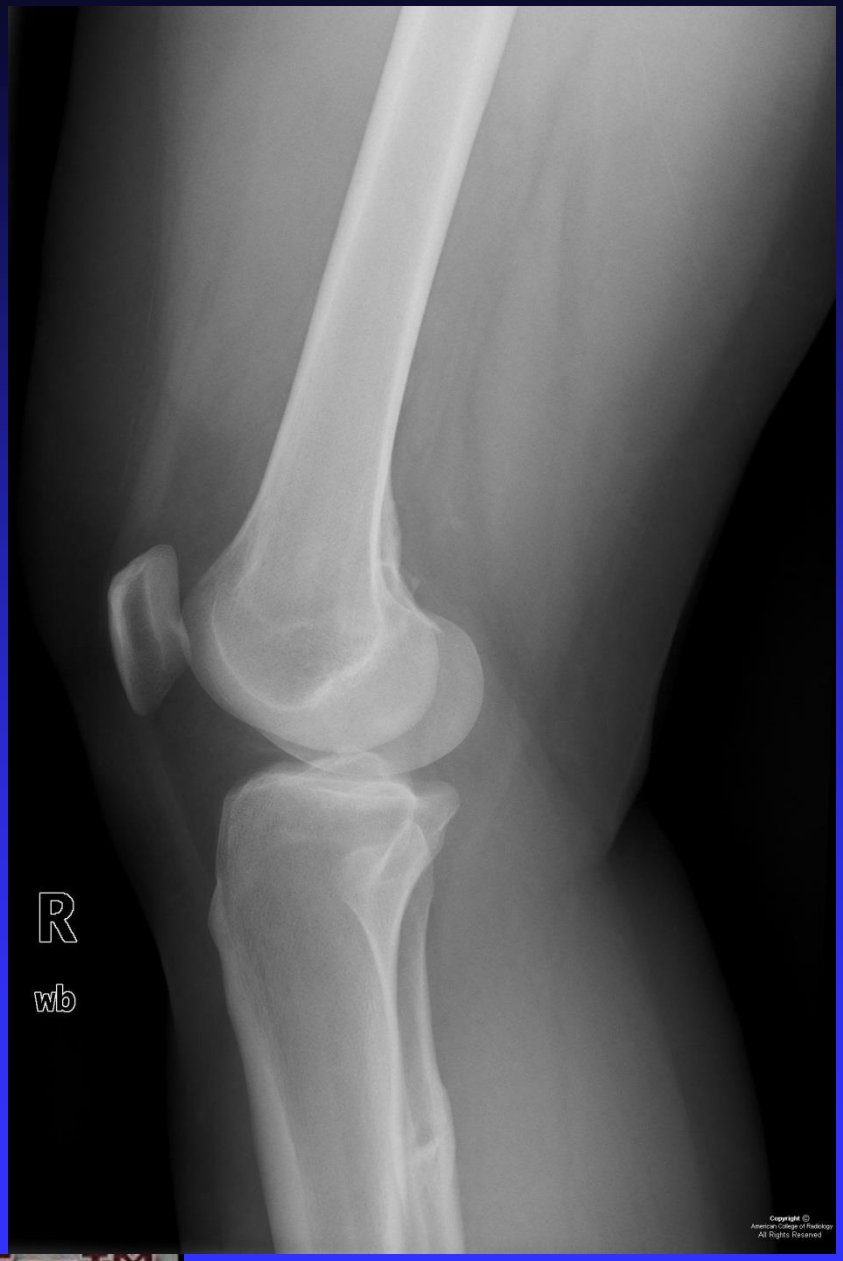
Arcuate Sign

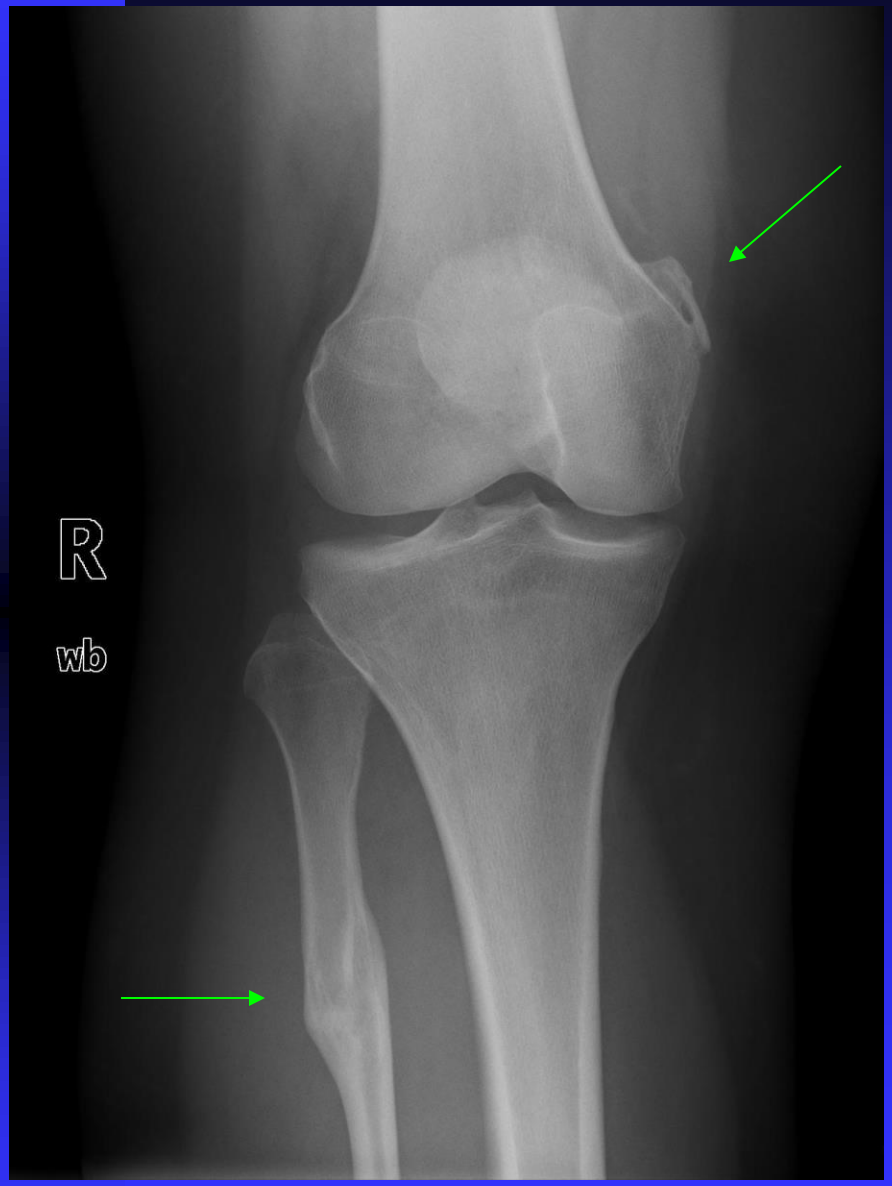
- Avulsion of the styloid process of the fibula at the insertion site of the fibular collateral ligament and bicep femoris.
- **Associated with posterior cruciate ligament tears**
- MOI: external rotation of tibia with varus stress; hyerperextension.

Case

- Chronic knee pain; previous trauma







•Malunion of the proximal fibula

•Heterotopic ossification along the medial aspect of the medial femoral condyle. **What attaches to this region?**

Findings

- Post-traumatic calcification along the medial femoral condyle
  - Medial collateral ligament attachment site.
- Malunion of proximal fibula from previous fracture.

Pellegrini Stieda Syndrome

- Avulsion (chronic) of the medial collateral ligament
- **Associated with anterior cruciate ligament and meniscal tears**
- MRI is the next step if clinically indicated.

Case

- Long jumper with knee pain and cannot extend the knee

Findings

- Soft tissue swelling surrounding the patella
- Cephalad migration of patella
- Calcific densities within the infrapatellar region may represent avulsion fragments

Avulsion of the Patellar Tendon

- Rupture of the patellar tendon from the tibial tuberosity
- MRI to evaluation the patellar tendon and retraction distance, and for other ligamentous or meniscal tears
- Orthopedic referral

Ankle

Ankle Views

- AP
- Medial Oblique
  - Optional: Lateral oblique
- Lateral

AP View

- **FFD** 40”
- **CR** between the malleoli

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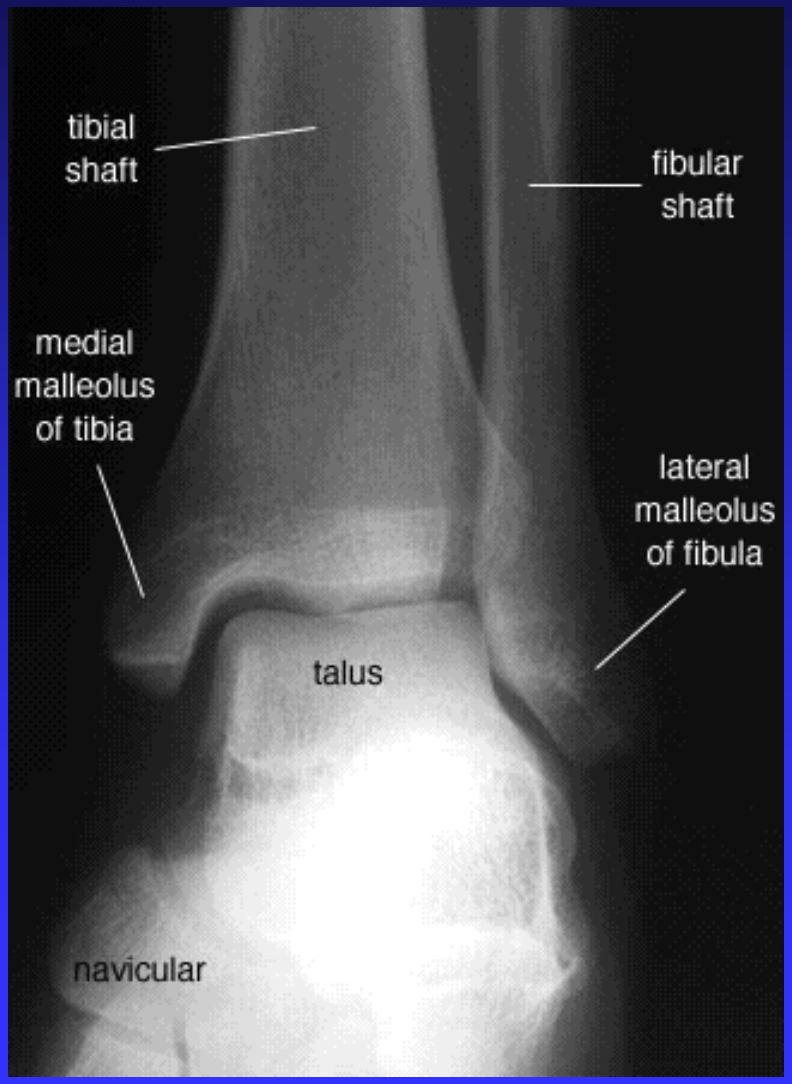
AP ANKLE

Structures Visualized

- Talar Dome
- Navicular
- Medial, Lateral and Posterior Malleoli
- Tibial shaft
- Fibular Shaft
- Tibial Plafond

AP ANKLE - Labeled



MEDIAL OBLIQUE ANKLE

- **FFD** 40”
- **CR** between malleoli

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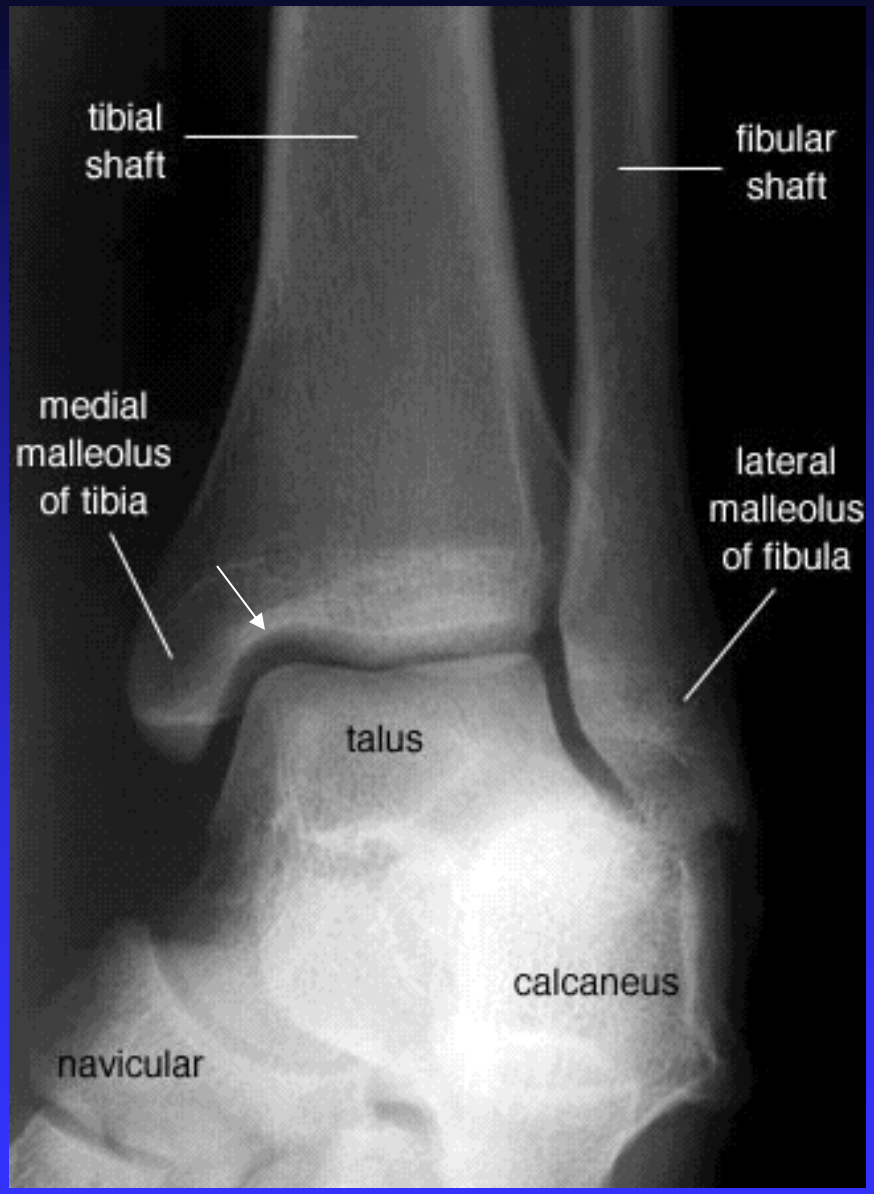
MEDIAL OBLIQUE ANKLE

Structures Visualized

- **Talar Dome**
- Medial, Lateral and Posterior Malleoli
- Tibial Plafond
- Navicular
- Calcaneus
- Tibia and Fibula

MEDIAL OBLIQUE ANKLE - Labeled



LATERAL ANKLE

- **FFD** 40”
- **CR** medial malleolus

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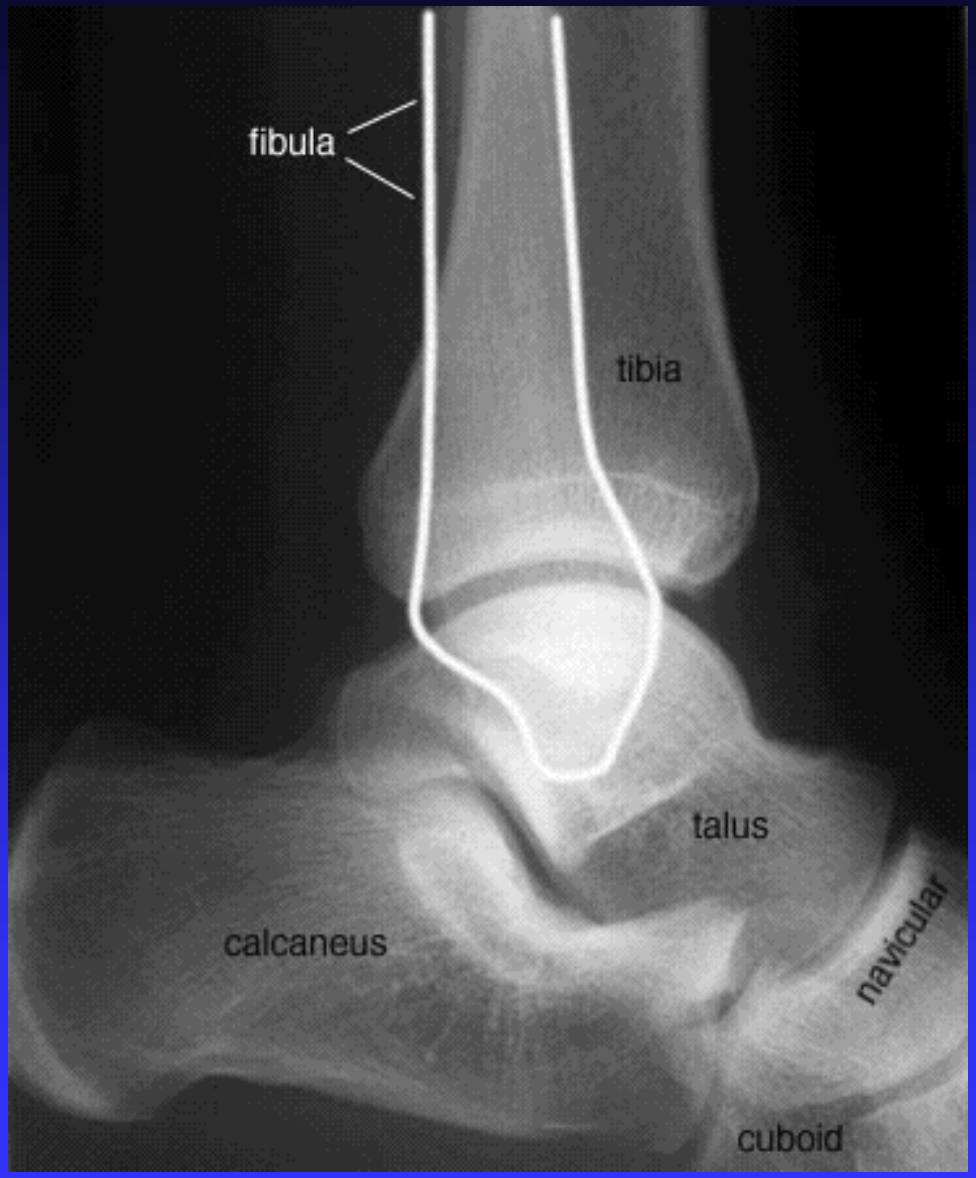
LATERAL ANKLE

Structures Visualized

- Tibia
- Fibula
- Talus
- Calcaneus
- Navicular
- Cuboid

LATERAL ANKLE - Labeled



Case

- Long distance runner with foot and ankle pain

Lateral Ankle

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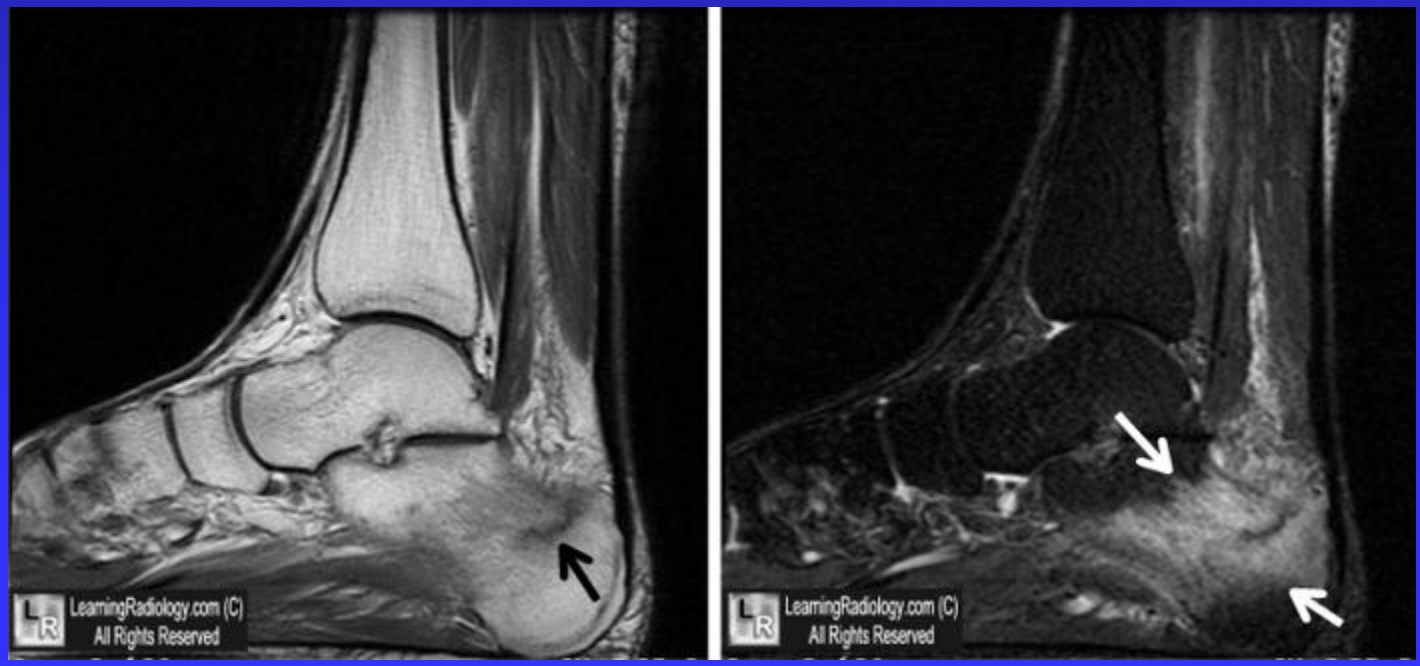
Linear sclerosis of the calcaneus.

What advanced imaging would be best for further evaluation?

Stress Fracture of the Calcaneus

- X-ray: Linear sclerosis or no x-ray findings
- MRI- Bone marrow edema with high signal intensity and linear fracture line



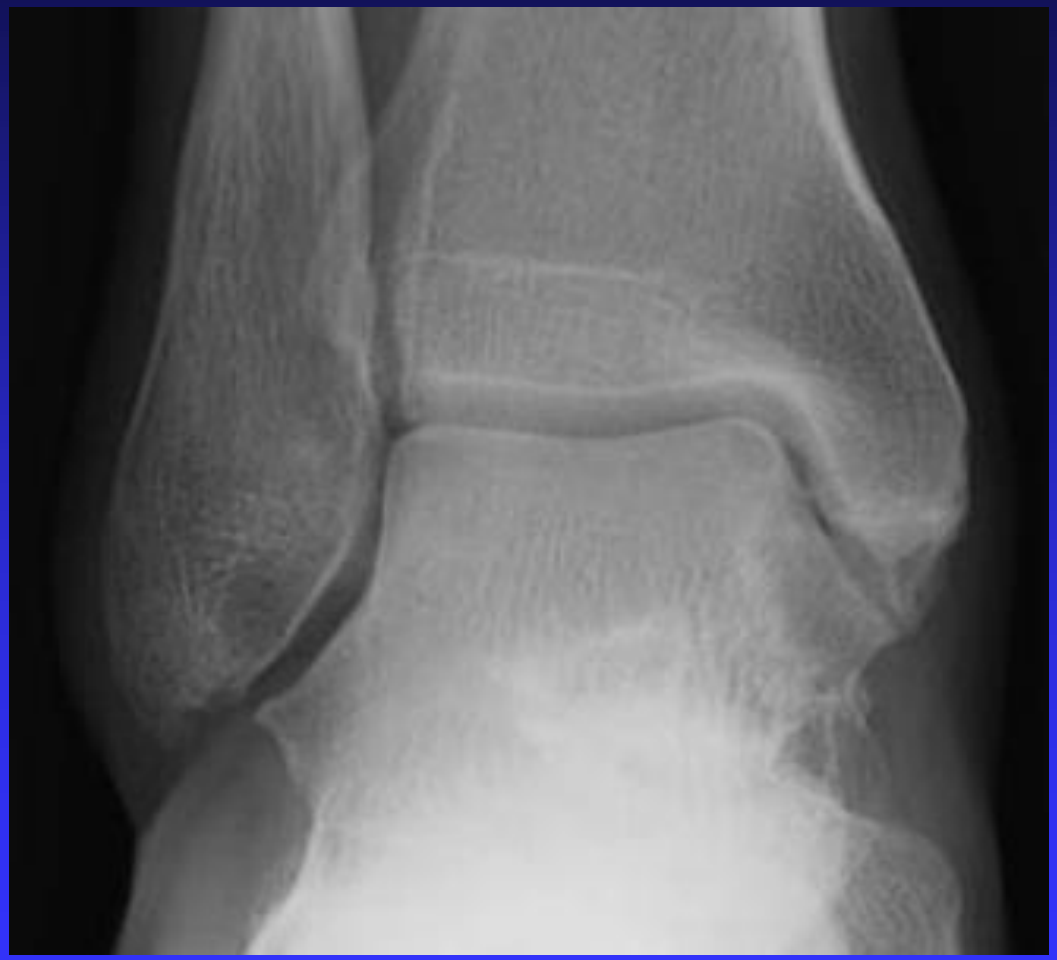
Stress Fracture

- Healing time: weeks to months
- Treatment: conservative care
  - First 6 weeks, reduced weight bearing followed by gradual weight bearing activities.

Case

- Football player twisted ankle

AP View



Findings

- Radiolucency along the medial aspect of the talar dome

MRI: Coronal T1 & T2 Weighted Images

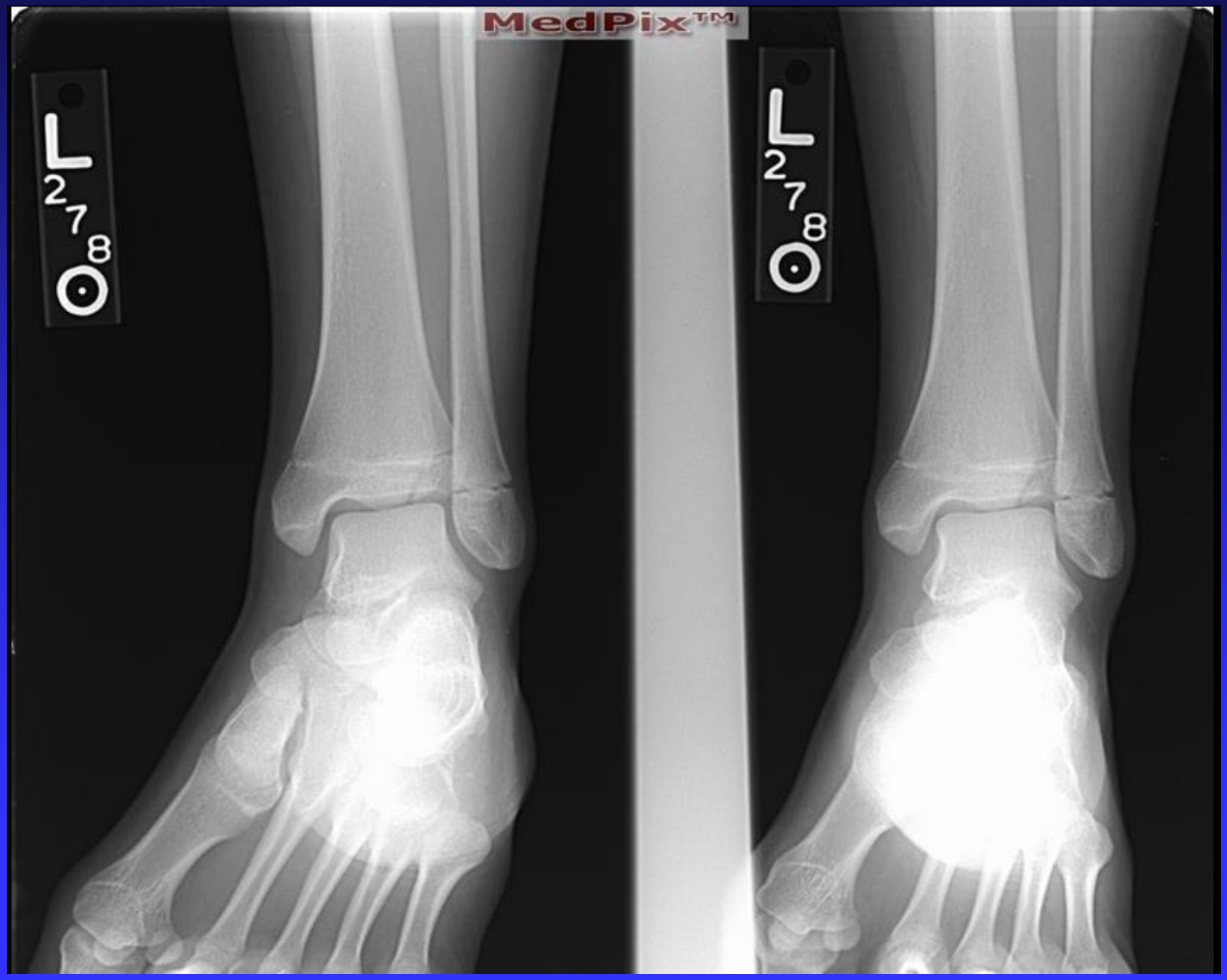
Osteochondral Lesion (OCL) of the Medial Talus

- MOI: Inversion+plantar flexion+external rotation of tibia on talus (medial OCL)
  - Shearing and rotary forces
- 25 yoa; 5-6th decade
- MRI necessary for further evaluation
- Conservative Treatment
  - **If flap or loose fragment, surgical.**

Case

Hx: 15 yom twisted ankle during soccer game

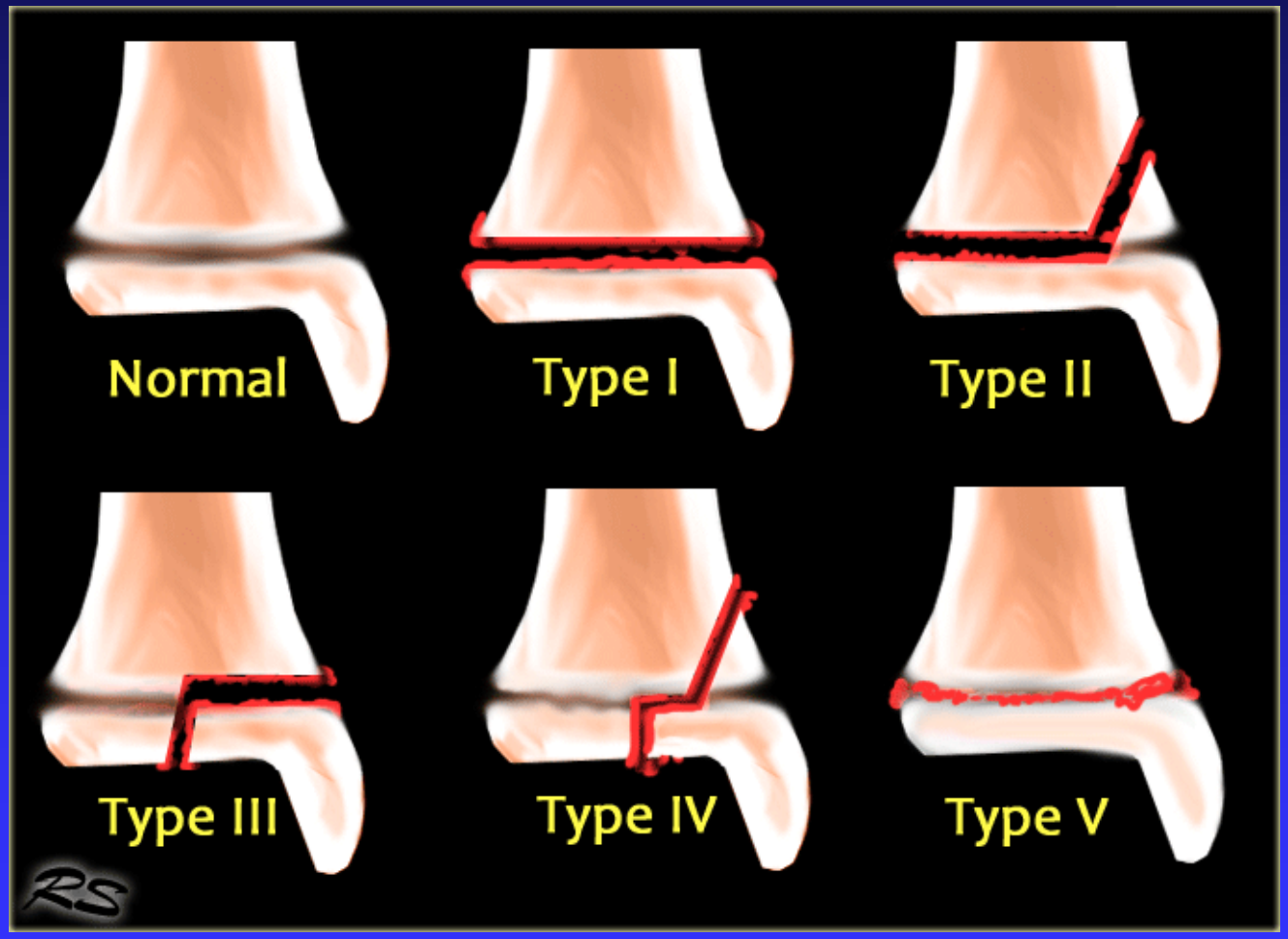
Medial Oblique and AP Views



Findings

- Salter Harris type III, Fracture of epiphysis extending to the growth plate
- MOI:Abduction and external rotation
- Complications- early closure; partial closure results in angular deformity

Salter Harris Fractures-growth plates



www.radiologyassistant.nl

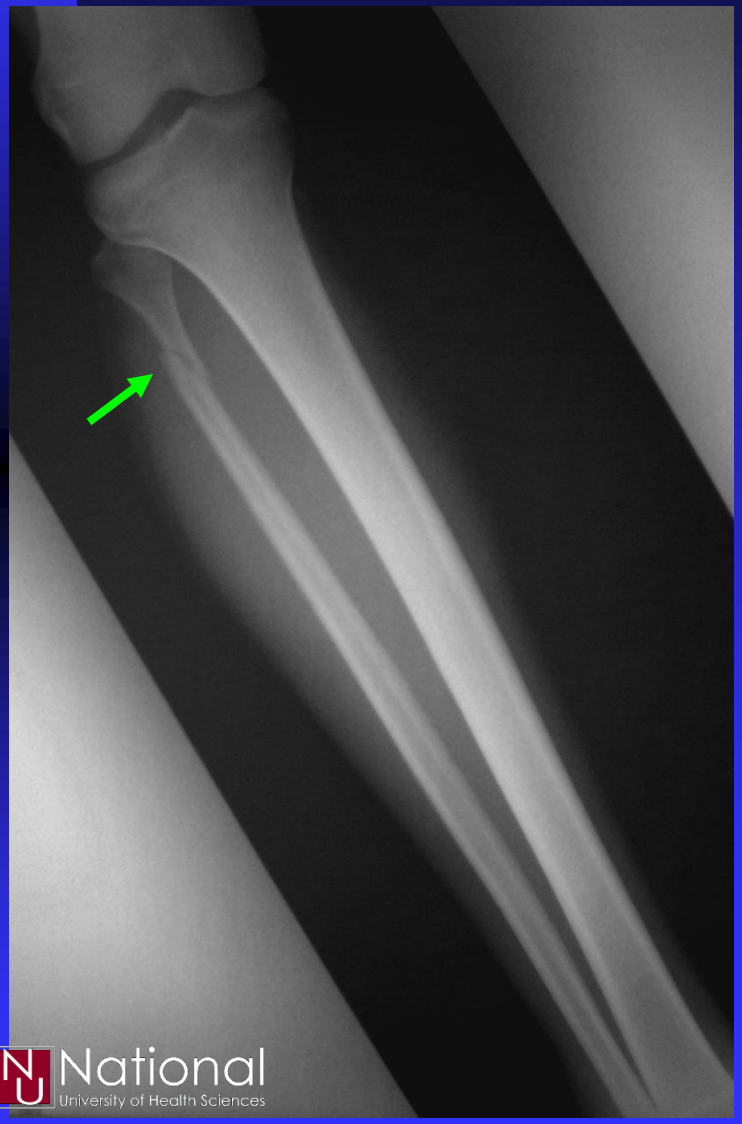
Case

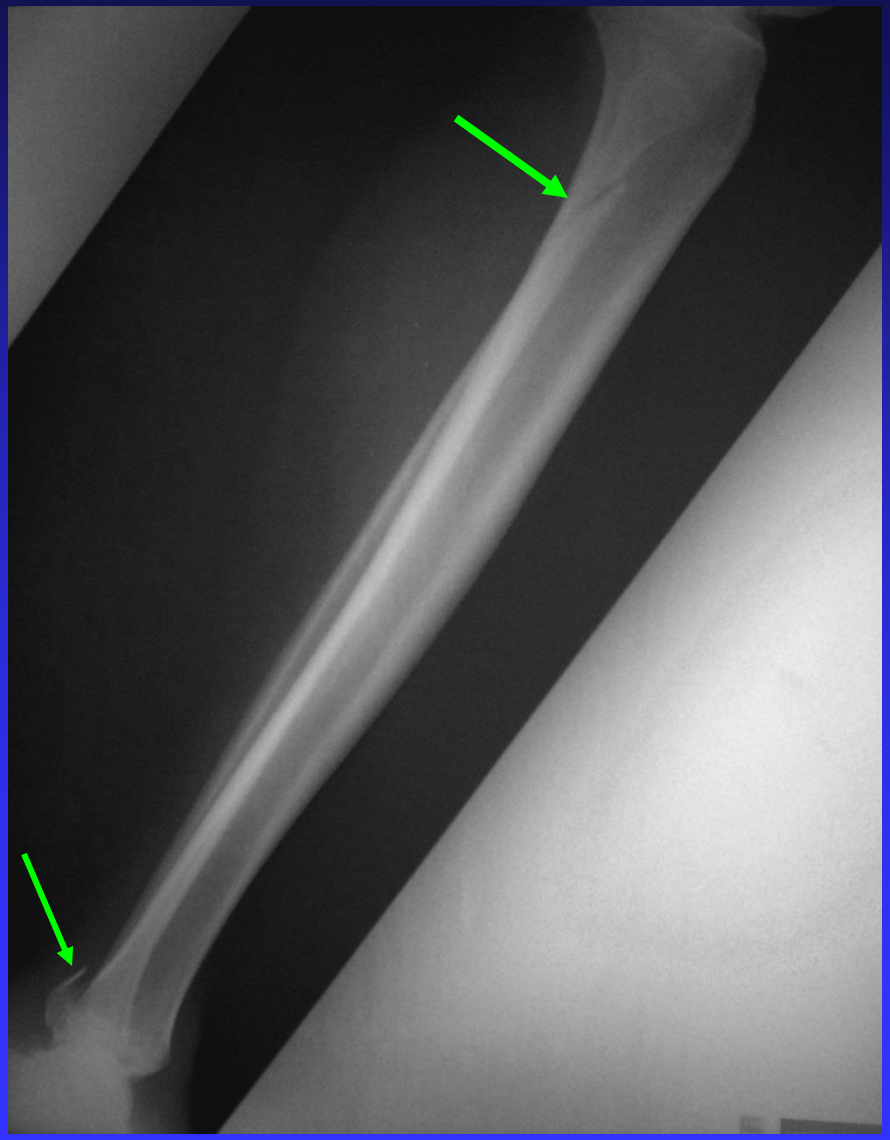
Hx: 23 yom, soccer player twisted his ankle with plantar flexion + inversion (high ankle sprain).

What other region should be evaluated?

AP and Lateral Ankle

AP and Lateral Tib/Fib





Masseoneuve Fracture

- Fracture of the medial malleolus extending posteriorly AND Fracture of proximal fibula.
- Associated with disruption of interosseous membrane & tibiofibular syndesmosis; deltoid ligament (medial); joint widening
- Treatment- closed reduction & cast

Case

Hx: 32 yom playing tennis and felt a sharp pain in the back of the lower leg.

Lateral View

Findings

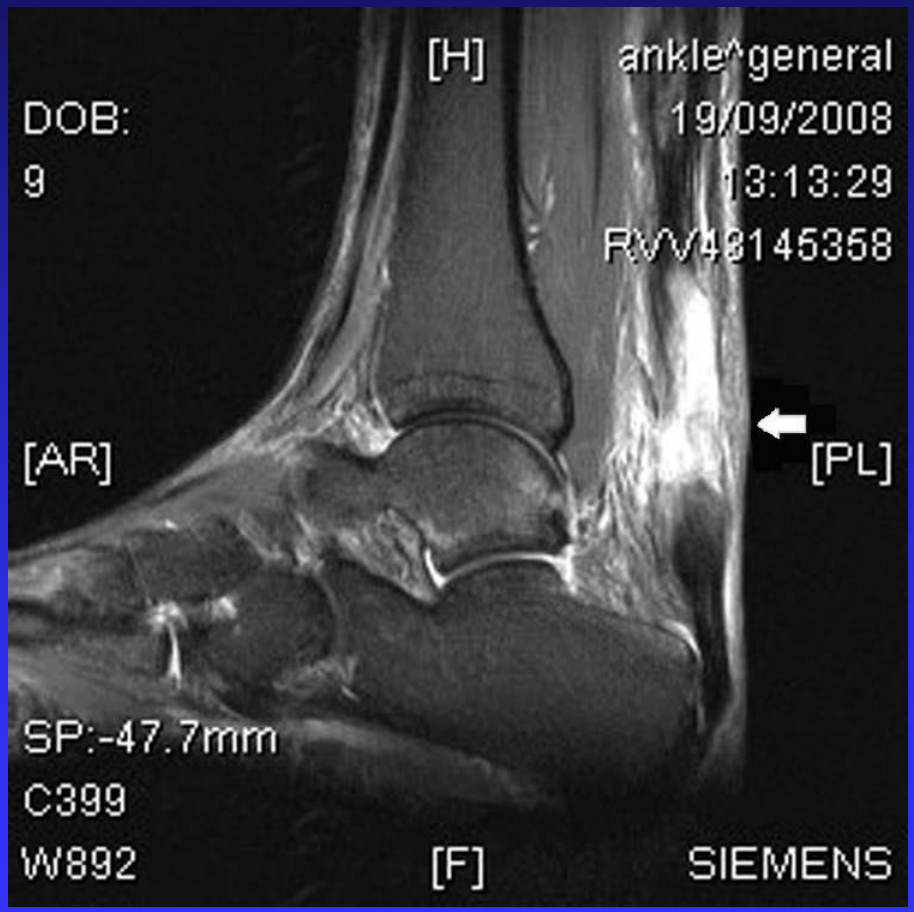
- Atherosclerosis of the Posterior tibial artery
- Indistinct Achilles tendon margins= soft tissue swelling

Achilles tendon rupture

- S/S: Indentation of tendon, weakness or loss of motion
- MRI and/or diagnostic ultrasound for further evaluaion

Normal MRI vs Abnormal

www.faoj.org



www.musculoskeletalmri.blogspot.com

Complete tear of Achilles

Rupture of Achilles Tendon

- Tx: Surgical
- Conservative care if no retraction: non-weight bearing with cast for 6 weeks; followed by short walking cast for 2 weeks
  - Rehab for 6 months; heel lift
- Surgical: Complete tear and retraction

Foot

Foot Views—Toes to the distal tibia

- DP
- Medial Oblique
- Lateral

DORSOPLANTAR FOOT (DP)

- **FFD** 40-2
- **Collimation** 8 X 10
- **CR** 3rd MT base
- **Tube Tilt** 10 ° cephalad

DORSOPLANTAR FOOT (AP)

Structures Visualized

- Cuboid
- Calcaneus
- Talus
- Navicular
- 1st-3rd Cuneiform
- 1st-5th metatarsals
- phalangeal bones

DORSOPLANTAR FOOT - Labeled

MEDIAL OBLIQUE FOOT

- **FFD** 40-2
- **CR** 3rd Metatarsal base
- **Tube tilt** 10 ° cephalad tube tilt

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MEDIAL OBLIQUE FOOT

Structures Visualized

- Calcaneus
- Talus
- Navicular
- Cuboid
- 1st-3rd Cuneiforms
- Metatarsals and sesamoids
- Phalanges

MEDIAL OBLIQUE FOOT - Labeled

LATERAL FOOT

- **FFD** 40”
- **CR** navicular

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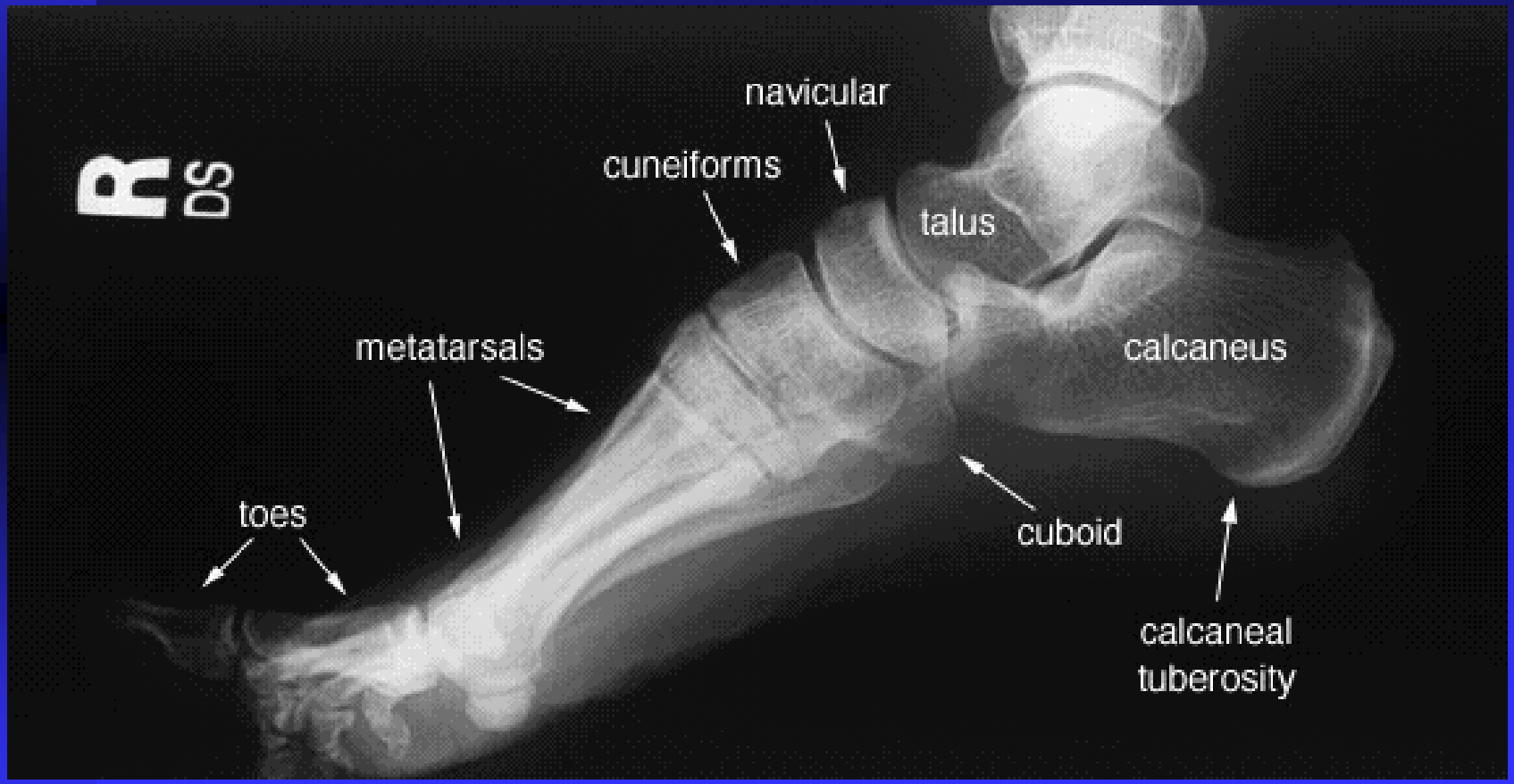
LATERAL FOOT

Structures Visualized

- Calcaneus
- Talus
- Navicular
- Cuboid
- Metatarsals

LATERAL FOOT - Labeled



Remember: X-ray Study of the Foot

- DP, medial oblique and lateral views of the foot should include the bony structures from the distal tufts or toes to the distal tibia.
  - Whereas the ankle x-ray studies do not include the toes.

Case

- Wrestling barefoot
- Foot pain

DP Foot

Donated by Dr. L. Nicholson

Magnified

Donated by Dr. L. Nicholson

Fracture of Proximal Phalanx

- Fracture of 4th proximal phalanx
- Bipartite sesamoid, normal variant
- Tx: immobilize/splint

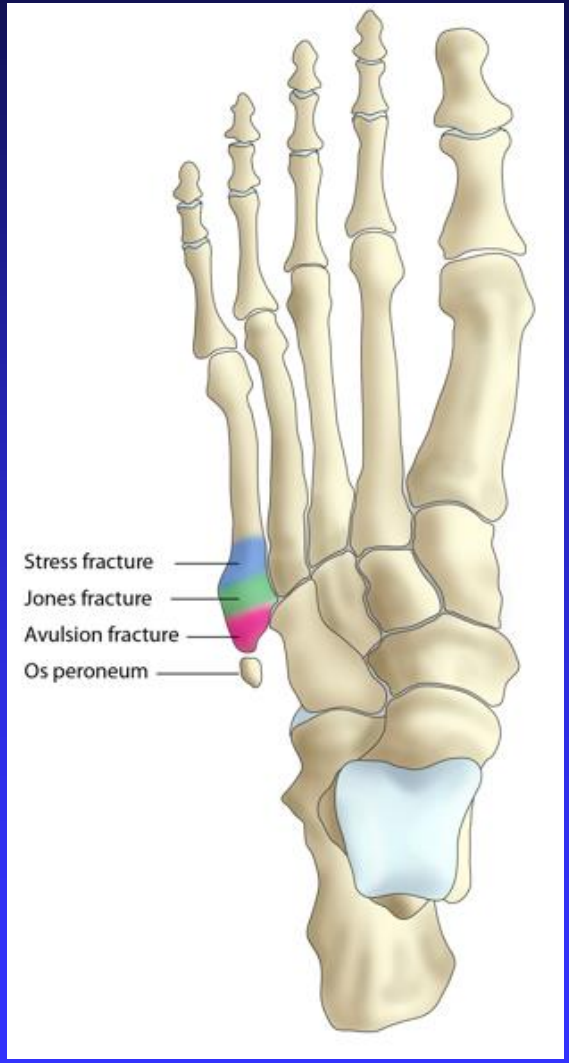
Case

- Twisted ankle with inversion + plantar flexion

Medial Oblique

Avulsion of the Styloid Process

- 5th metatarsal, styloid process, base of the 5th metatarsal.



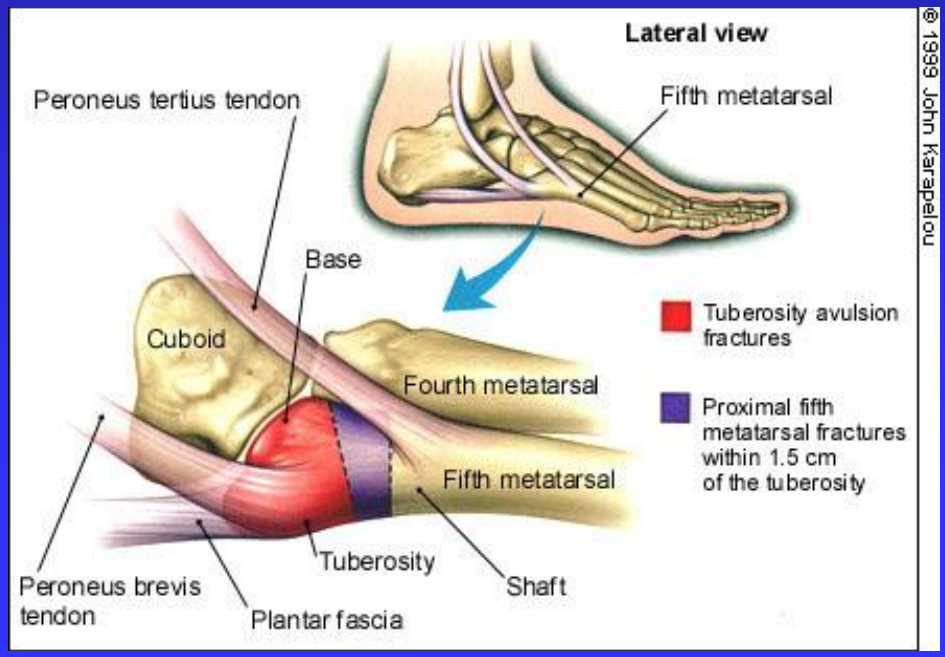
www.radiopaedia.org

Versus Normal Apophysis

Normal apophysis: parallel to the long axis of the proximal metatarsal.

Styloid Avulsion

- MOI: inversion with plantar flexion
- Avulsion from the lateral cord of the plantar aponeurosis, and/or peroneus brevis tendon



Treatment

- Non-displaced: Immobilize for 4-6 or 8 weeks; conservative.

- Surgical: Comminuted fracture; Displacement; and fracture involving greater than 30% of cubometatarsal articulation (articular surface)

Case

- Dull, achey foot pain for several weeks

Stress Fracture with Callous Formation

- Callous formation at the diaphysis of the 2nd metatarsal
- Aka March fracture
- Osteopenia, disuse
- Tx: Conservative care; reduce weight bearing activities

Case

- Athlete twisted his/her foot

Which foot and joint are affected?

Right Foot Pain and Swelling

Lisfranc Joint or Tarsometatarsal Diastasis (widening)

- Severe sprain or possible dislocation of the tarsometatarsal joint
- Widening of the tarsometatarsal joint; swelling
  - unable or difficult to bear weight; dropped arch
  - May have associated fracture (this patient does not have a fracture)
  - MOI: Twisting with plantar flexion of forefoot or direct blow.

X-ray Findings of Lisfranc Joint Fracture or Diastasis/Dislocation

- Evaluation of a Normal DP foot x-ray study
  - Alignment of 1st metatarsal to 1st cuneiform; and 2nd metatarsal to 2nd cuneiform
- Widening of 1st-2nd metatarsal interspace; Lateral dislocation of the metatarsals

Stress Radiograph for Lisfranc Injury

- Special Radiograph: Bilateral or unilateral weight bearing DP view of the feet, 10 cephalad tube tilt .

Lisfranc Joint Injury

- Lisfranc ligament (tarsometatarsal ligament) is a major stabilizer of the Tarsometatarsal (TMT) joint
  - Origin: first cuneiform
  - Insertion: medial aspect of the base of the second metatarsal.

Lisfranc Injury

- Remember: Disruption causes midfoot instability
  - This can end an athlete's career!!

Lisfranc Joint Injury: Follow-up

- Rest; boot>>>6-8 weeks or more
- Advanced Imaging
  - MRI- ligament and bone marrow edema
  - CT-fracture fragments
- If unstable, Surgical
  - Percutaneous wire or plate & screw fixation

MRI of Torn Tarsometatarsal ligament

If unstable=Surgery

www.jaaos.org

www.lisfranc.org

www.jbjs.org

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- Rajinder Singh Gaheer, MS, MRCS, MRCPS, MCh(Orth); Sandeep Kapoor, FRCS(Tr&Orth); Martin Rysavy, MD, PhD **Orthopedics; November 2009 - Volume 32 · Issue 11**

THANK YOU

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