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13<sup>th</sup> Annual Orthopaedics for the Primary Care Practitioner &  
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# Commonly missed lower extremity fractures

## Causes of Missed Lower Extremity Fractures

- Patient factors
- Patients avoid workup at time of initial injury
- “Hope” the symptoms get better
- “Its just a sprain”
- “I’ll just walk it off”
- Impairment: Dementia, substance abuse, neuropathy



## Causes of Missed Lower Extremity Fractures

- Level of suspicion too low, appropriate workup not completed
- Absent or incomplete radiographic workup
  - Insufficient radiographic views
  - Non-weightbearing views
  - Failure to obtain advanced imaging



## Lower Extremity Fractures

- Refusal or Inability to ambulate should raise significant suspicion

## Evaluation of Lower Extremity Injuries

- As always, a good history and physical exam should guide management
- Understanding underlying anatomy is key in differentiation
- Understand common injuries based on mechanism

## Pelvic Ring Injuries: Acute, Traumatic

- Low energy falls
- Geriatric patients
- Refusal/difficulty ambulating without obvious deformity

# Pelvic Ring: Acute, Traumatic



## Pelvic Ring: Acute, Traumatic

- Pelvis xrays, often single AP view will show even non-displaced fractures
- If uncertain, CT scan helpful in identification of acute fractures
- Complete and displaced ring injuries warrant early evaluation with orthopedic trauma, possible stabilization

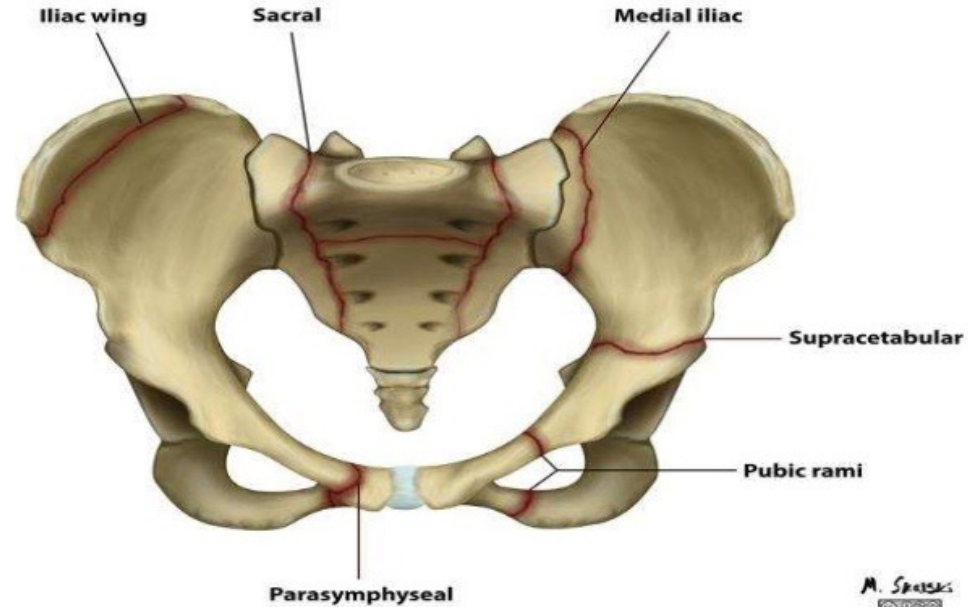


## Pelvic Ring Injuries: Atraumatic

- History of progressively worsening anterior and/or posterior pelvic ring pain, with decreasing ability to ambulate
- Osteoporotic patients
- Post radiation therapy for malignancy to pelvis
- Underlying bone disorders which increase risk of stress injuries
- Malnutrition, metabolic abnormalities

# Pelvic Ring - Insufficiency

## Pelvic insufficiency fractures



3/4/2015

M. Spasas  
Radiopaedia.org



## Pelvic Ring: Atraumatic

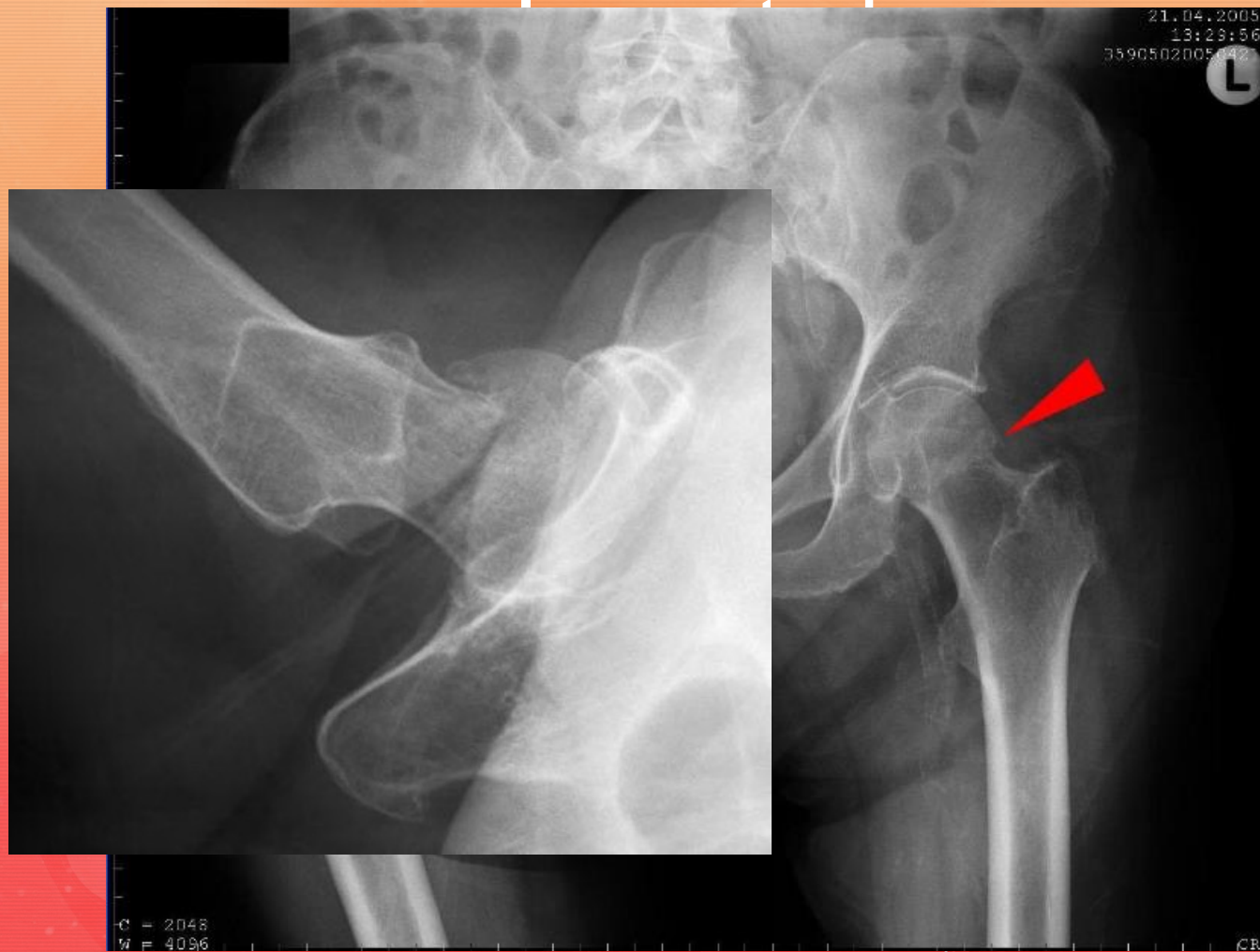
- Plain film imaging may or may not demonstrate abnormality
- Advanced imaging often indicated
  - CT scan, or MRI (more sensitive)
- Prophylactic fixation can help decrease pain and increase functional level
- Consider hormonal, metabolic, nutritional workups to treat underlying issues



## Femoral Neck: Traumatic

- Elderly patients, osteoporotic bone
- Most commonly a result of ground level fall
- Hip/groin pain, often able to ambulate, but with significant pain and limp
- Warrant imaging, beginning with plain films, although minimally displaced fractures are often missed
- Advanced imaging, CT, will show any displacement

# Femoral Neck – Valgus





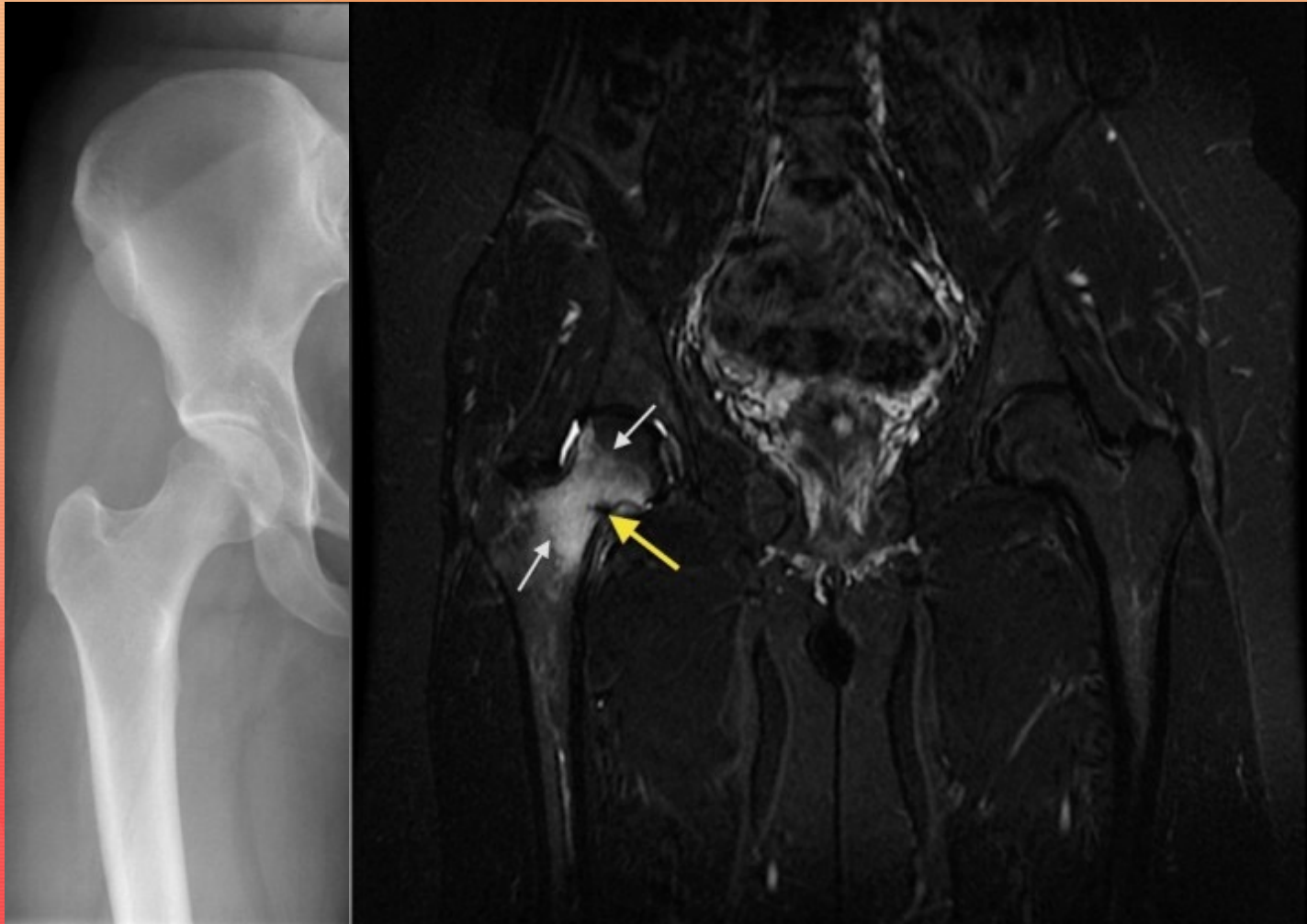
## Femoral Neck: Traumatic

- Hesitant to treat conservatively, as percutaneous fixation maintains alignment and decreases patient discomfort
- Significant impaction/displacement warrants discussion of arthroplasty due to long term disability with leg length and offset changes

## Femoral Neck: Atraumatic, Stress Injuries

- Most commonly seen in younger patient population, sports
- Stress injury from rapid increase in training intensity
- Long distance runners
- CT less helpful, MRI or bone scan will show edema, increased uptake along the femoral neck

# Femoral Neck - Stress



## Femoral Neck: Atraumatic, Stress Injuries

- Raise suspicion for metabolic/nutritional/hormonal issues in younger females
- Often can be treated with limited weightbearing and nonoperative management

## Slipped Capital Femoral Epiphysis

- Obese children
- Endocrine component common
- Common initial complaint of knee pain
  - Make habit to image both hip and knee
- No history of specific injury, insidious onset
- Plain film imaging should identify the slip

# SCFE





## SCFE

- Complex problem with lifelong implications
- Often bilateral involvement
- Referral to hospital with pediatric orthopedic surgery or pediatric orthopedic trauma
- Multiple surgical options, closed versus open stabilization, fixation in situ versus reduction



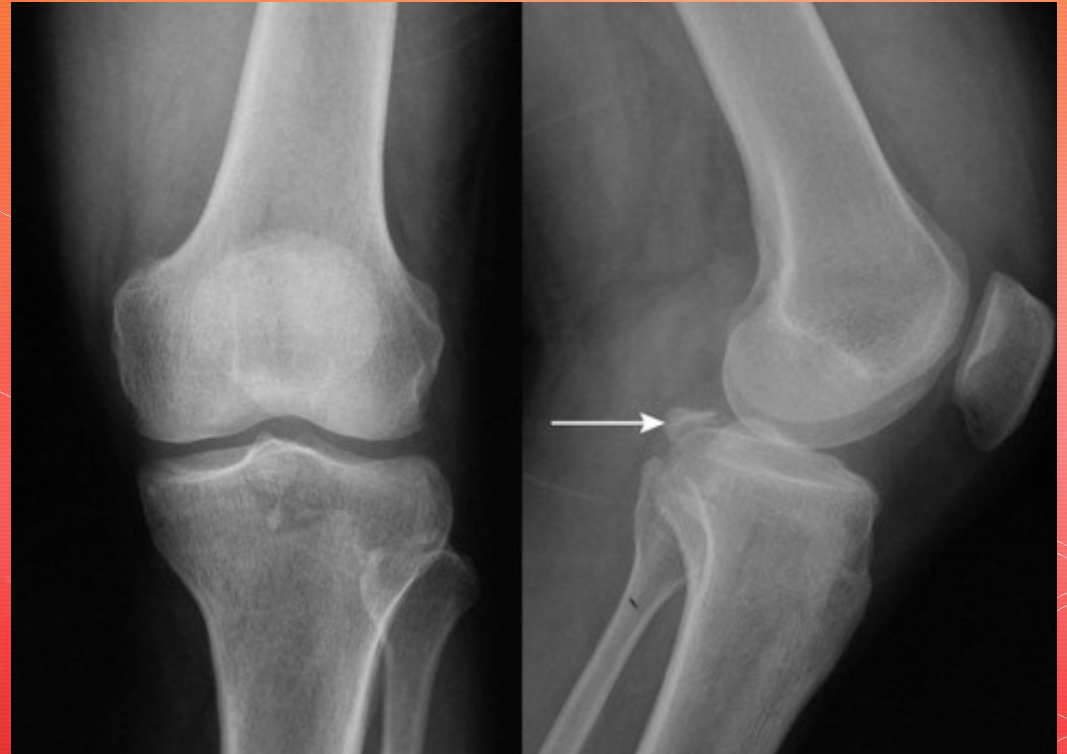
## Tibial Plateau

- Acute traumatic injuries
- Can be fractures of the weight bearing surface, or ligamentous avulsions
- Difficulty with weight bearing
- Large joint effusion commonly seen

# Tibial Plateau: Articular Injury



# Tibial Plateau: Avulsion Injuries





## Tibial Plateau

- Avoid weightbearing
- Immobilize the joint
- Advanced imaging: CT Scan, possible MRI if other ligamentous or meniscal involvement suspected
- Orthopedic evaluation for possible surgical intervention

## Pediatric Tibial Tubercle Avulsion

- Most commonly a sports related acute injury
- History of a jump or awkward landing with acute anterior knee pain
- Difficulty and pain with knee extension
- Plain film imaging will demonstrate the injury
- Risk of arterial injury leading to compartment syndrome
  - Anterior tibial artery

# Pediatric Tibial Tubercle





## Pediatric Tibial Tubercle Avulsion

- Most will require reduction and surgical fixation
- Due to risk of compartment syndrome, these should be referred urgently

## Isolated Syndesmotic Injury at the Ankle

- Rotational injury
- Often sports related
- No bony injury at ankle, but often high fibular fracture
- Stress radiographs will demonstrate instability

# Ankle (Maisonneuve)



## Isolated Syndesmotic injury at the Ankle

- Easily missed
- If suspicion for injury, immobilize and refer
- Disruption of the tibiofibular syndesmosis warrants consideration for reduction and fixation



## Talus Fractures

- Higher energy injuries
- Commonly missed due to the complexity of the hindfoot and midfoot bony anatomy
- Often imaging focused on ankle, failure to image hindfoot and talus appropriately

# Talus





## Talus

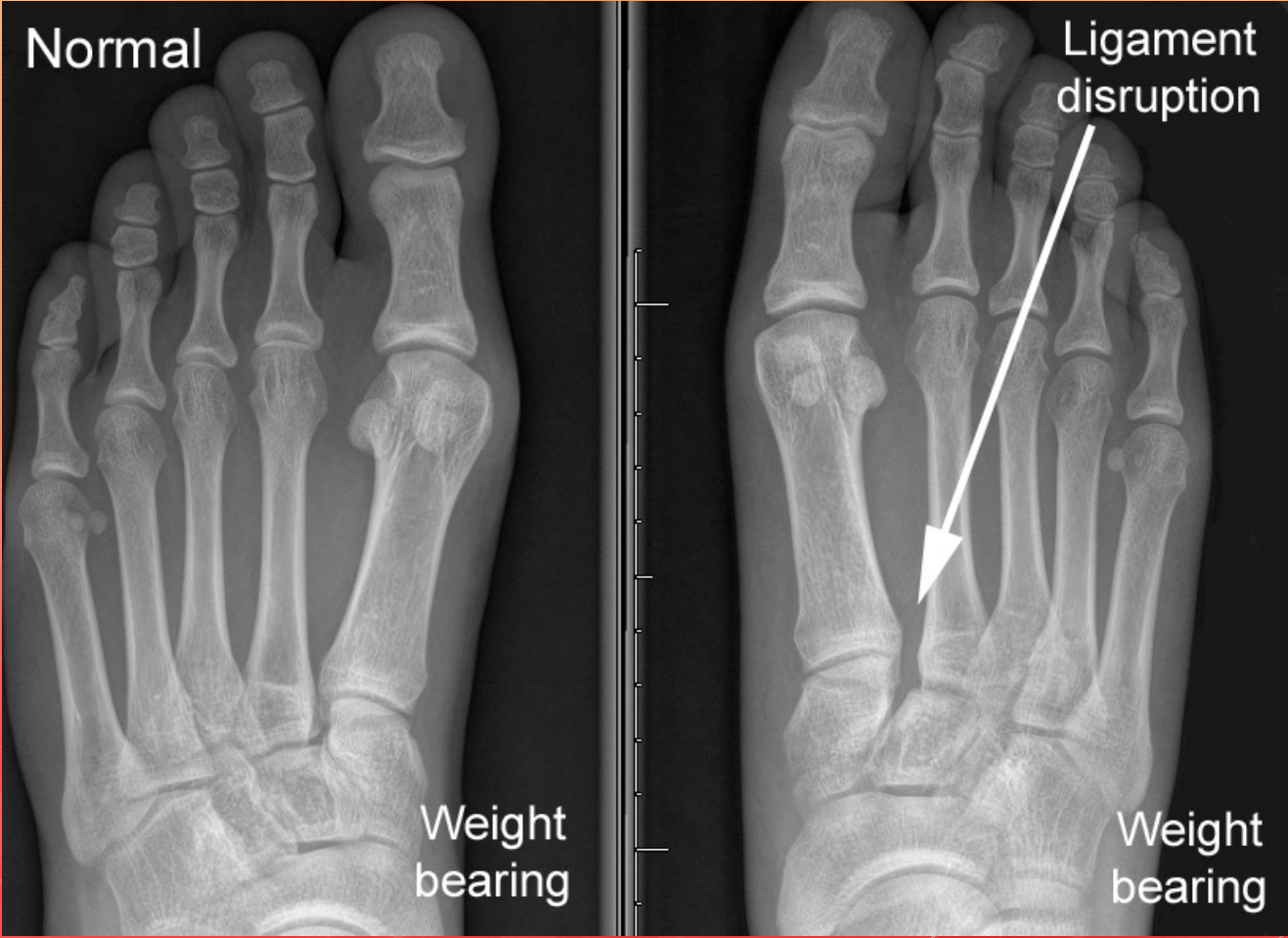
- Requires high index of suspicion
- Advanced imaging needed: CT scan
- Missed talus fractures can carry high morbidity, long term disability



## Lisfranc Injuries

- Hyper plantar flexion or dorsiflexion injuries through the junction of the midfoot and forefoot
- Pain with ambulation
- May be purely ligamentous, or associated with fractures
- Non-weightbearing imaging may miss ligamentous injuries
- CT warranted for further evaluation of structural injury and displacement
- MRI an option for purely ligamentous injuries with negative weight bearing xrays but continued suspicion

# Lisfranc



## Lisfranc

- Referral needed, as surgery usually indicated
- Reduction of alignment and stabilization versus fusion
- Evaluate for plantar ecchymosis



# Conclusions

- Fractures are first a Clinical Diagnosis
  - Require appropriate history and physical exam
- Confirm with Complete X-rays/Imaging
- When in Doubt for Subtle Injuries
  - Immobilize, Protect Weight-Bearing, Ensure Follow-up
  - Consider advanced imaging versus deferring additional imaging to specialist

Thank You