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Breakout Session Common Radiology Cases

Disclosures:

- No financial disclosures

Objectives:

- Basic radiographic evaluation of major joints
- Basics of CT, MRI, and contrast
- Indications for cross sectional imaging and arthrography
- Common radiology cases along the way

Radiography basics

- Please begin all workups with radiographs
- We need at least two views
- Please make sure to cover the area of pain and adjacent joints



Radiography basics

- Additional views may be helpful depending on question being asked
 - Oblique c-spine: foramina
 - Oblique l-spine: pars
 - Spine flex extension
- Lower extremity weight bearing



Radiography basics

- A: Alignment
- B: Bones
- C: Cartilage
- s: soft tissues, effusions, etc.



CT Uses and Indications

- CT: Uses photons (radiation) to image patients
- Inferior to MRI for soft tissue contrast and bone marrow abnormalities
- Wonderful for specific indications:
 - Complex trauma and fracture characterization
 - Finding small intra-articular fragments
 - Fracture healing
 - Post operative joint/spine imaging if significant metal fixation causing artifact on MRI
 - May need intra-articular or intra-theatal contrast injection
 - Pre-surgical planning - fractures, arthrodesis, arthroplasty

MRI Uses and Indications

- MRI: Imaging is performed via magnetization of hydrogen. No radiation. Much slower than CT.
- Superior for soft tissue contrast and anatomy
- Wonderful for specific indications:
 - Internal derangement of joints
 - Muscular/soft tissue injury
 - Soft tissue masses
 - Marrow replacing lesions, non displaced fracture detection
 - Bone and soft tissue infection

MRI Signal

- Imaging is dependent upon tissue dependent parameters related to magnetization and proton (H) density as well as the pulse sequence being utilized
- Typical exams will include ~ 4-6 sequences in different anatomic planes
- Common sequences:
 - T1
 - T2
 - PD
- These may or may not include fat suppression

MRI Signal

- T1: Fluid hypointense (dark)
- T2: Fluid hyperintense (bright)
 - Often fat suppressed
 - STIR: more homogeneous fat suppression but slower and cannot be used with contrast
- PD: Signal proportional to proton density not magnetic relaxation time

MRI Signal

- T1

- Bright

- Fat
- Gadolinium
- Subacute blood
- Protein
- Melanin

- Dark

- Fluid/edema
- Fibrous tissue
- Cortical bone
- Old blood/hemosiderin
- Metal/air- susceptibility artifact
- Flowing blood

- T2

- Bright

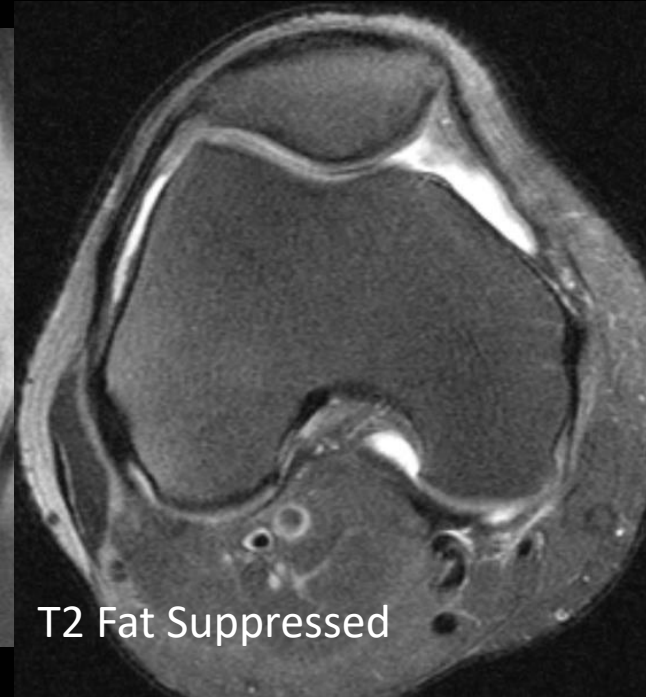
- Fluid/edema
- Most neoplasms
- Fat -unless we change that
- Gadolinium
- Subacute blood

- Dark

- Fibrous tissue
- Cortical bone
- Old blood/hemosiderin
- Metal/air- susceptibility artifact
- Flowing blood

Basic MRI: General Points

- T1:
 - Anatomy
 - Marrow replacement
- T2:
 - Identifying pathology
 - Ligaments and tendons
 - Cartilage
 - Marrow edema



Basic MRI: General Points

- MRI **without** contrast
 - Most joint and spine evaluations
 - Diagnostic for osteomyelitis
- MRI **with** contrast
 - Only arthrograms
- MRI **with and without** contrast
 - Tumors, cystic vs solid, mass detection
 - Infection: abscess, viable vs non viable tissue
 - Inflammation: arthritis, synovitis, tenosynovitis, myositis
 - Similar indications in spinal imaging

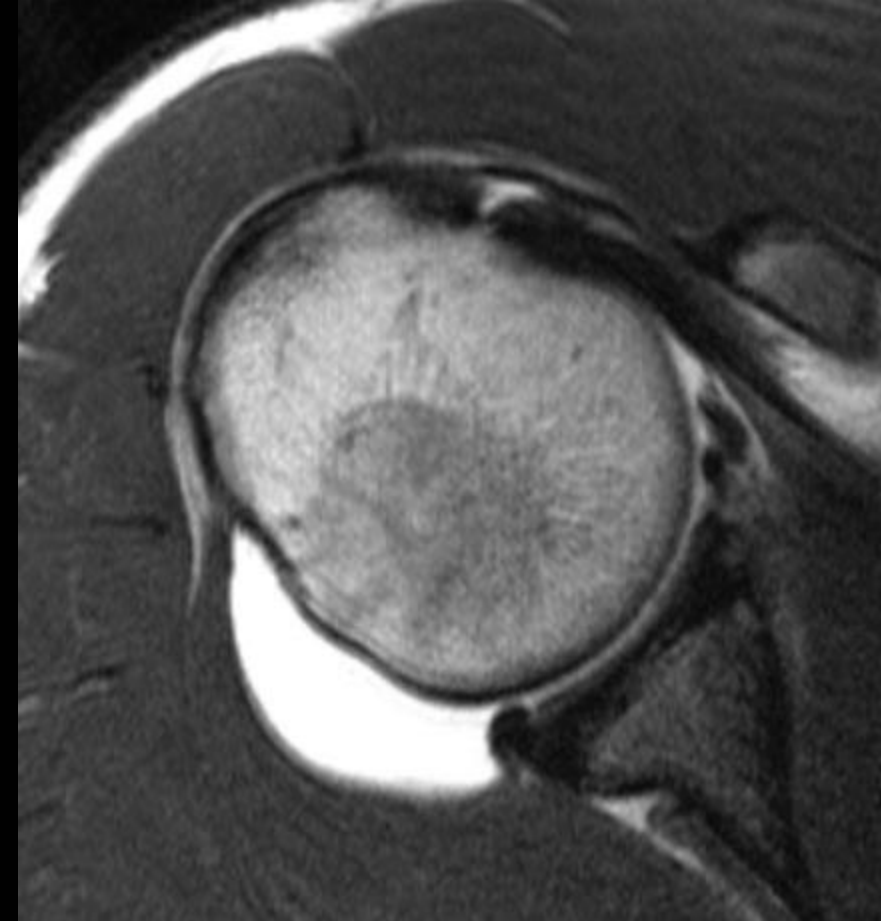
Basic MRI: Arthrography

- Injection of intra-articular contrast solution
 - Fluoroscopic or ultrasound guidance
 - MRI: Gadolinium based contrast agent
 - CT: Iodine based contrast agent
- Distension of joint
 - Expose apposed structures, separate structures to increase conspicuity
- Contrast
 - Brightness of contrast in cartilage defects, labral tears, meniscal tears increases ability to detect small abnormalities



Basic MRI: Athrography

- Shoulder: Instability, labral tear, ?? Rotator cuff
- Elbow: UCL, RCL, LUCL
- Wrist: Scapholunate, lunotriquetral, TFCC
- Hip: Labrum, FAI
- Knee: Re-tear of repaired meniscus
- Ankle: ?? ATFL
- All joints: Chondrosis/Osteochondral lesions, loose bodies



Basic MRI: Summary

- CT

- Acute trauma
- Complex fracture classification
- Surgical planning
- Post operative imaging
- MR contraindications

- MRI

- Derangement of joints, intra-articular pathology
- Soft tissue injury
- Bone/soft tissue infection
- Tumor staging
- Marrow
- Arthritis imaging



Shoulder

Shoulder: Radiographic Anatomy



Shoulder: Radiographic Anatomy



Case

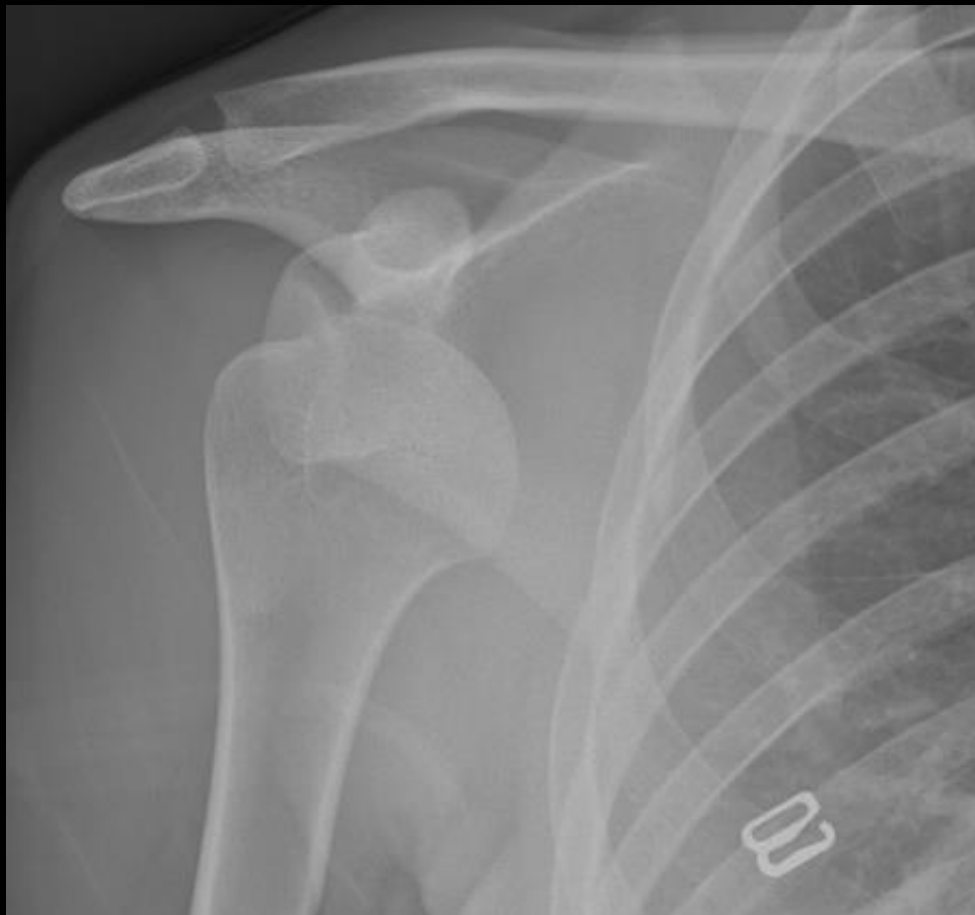


Case

- Neer classification
 - Defines parts as pieces of humerus displaced by $> 1\text{cm}$ or rotated by > 45 degrees
- Other methods of classification
 - AO/OTA
- CT may be helpful if considering surgical management



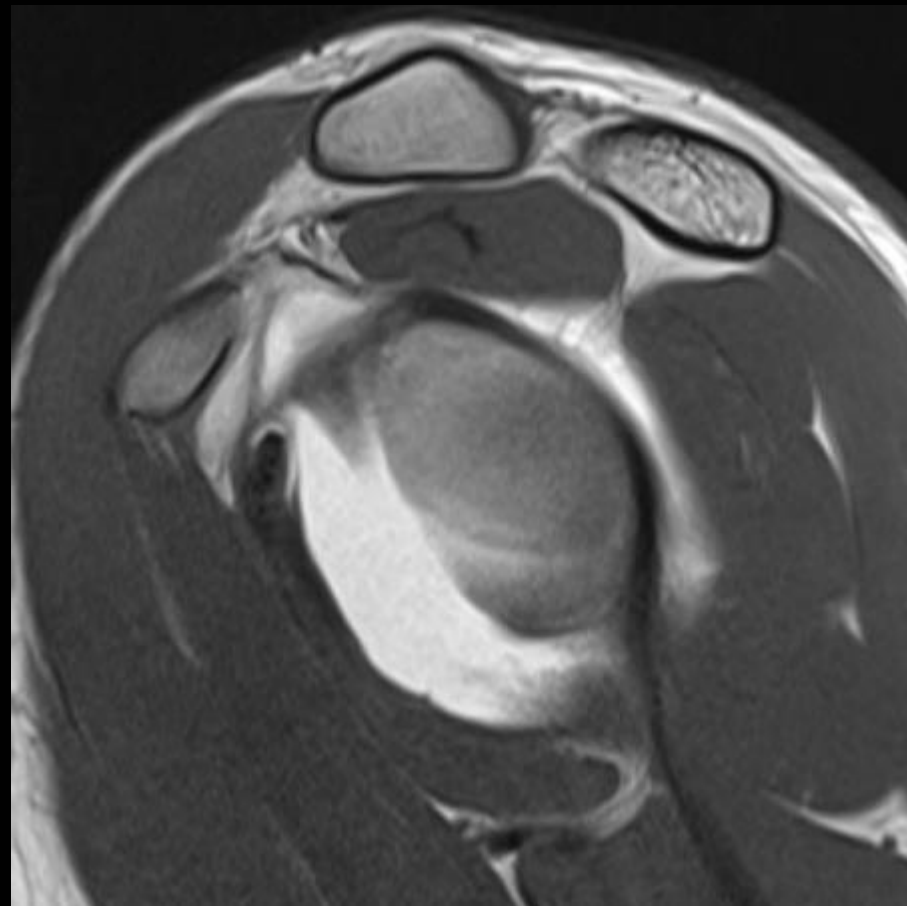
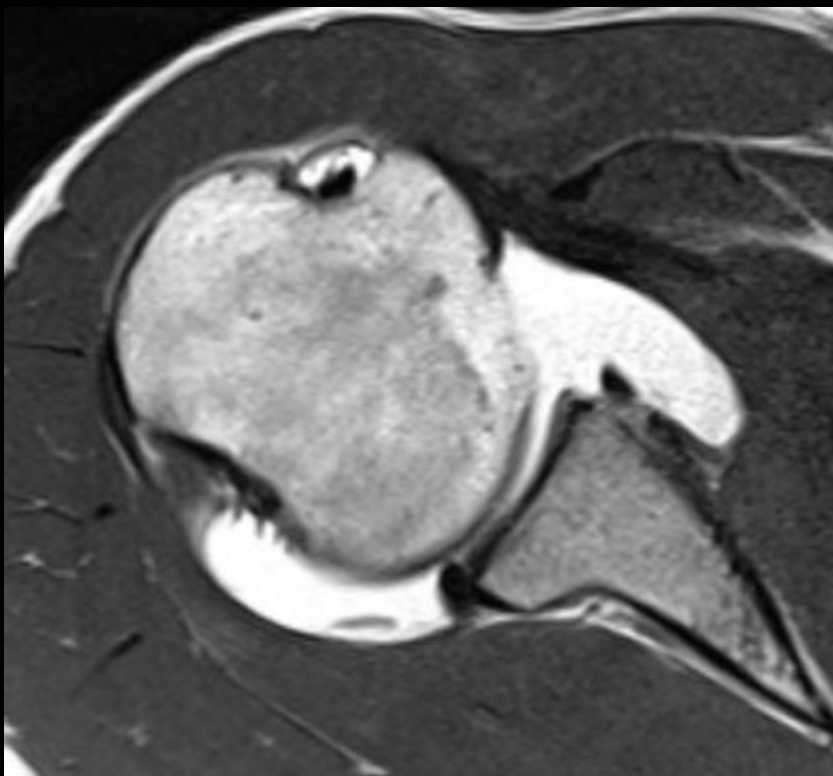
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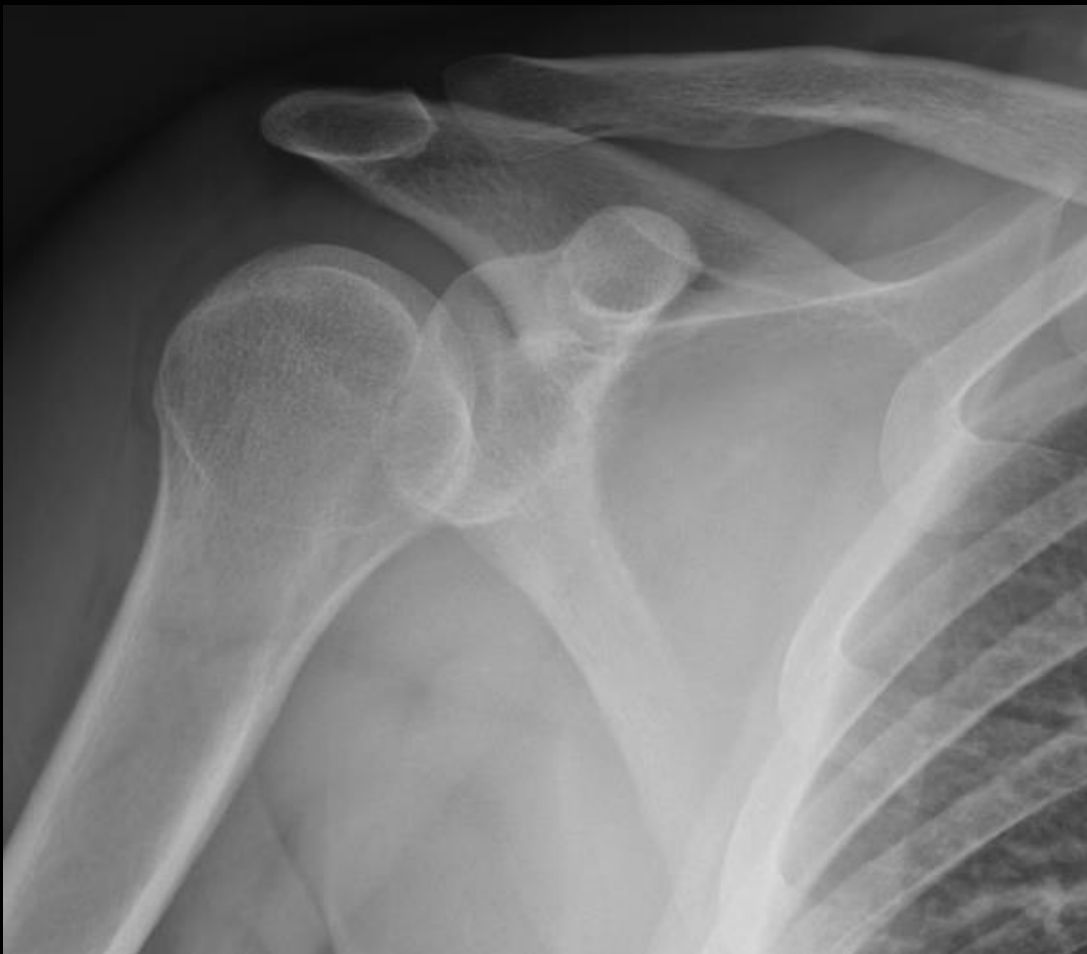
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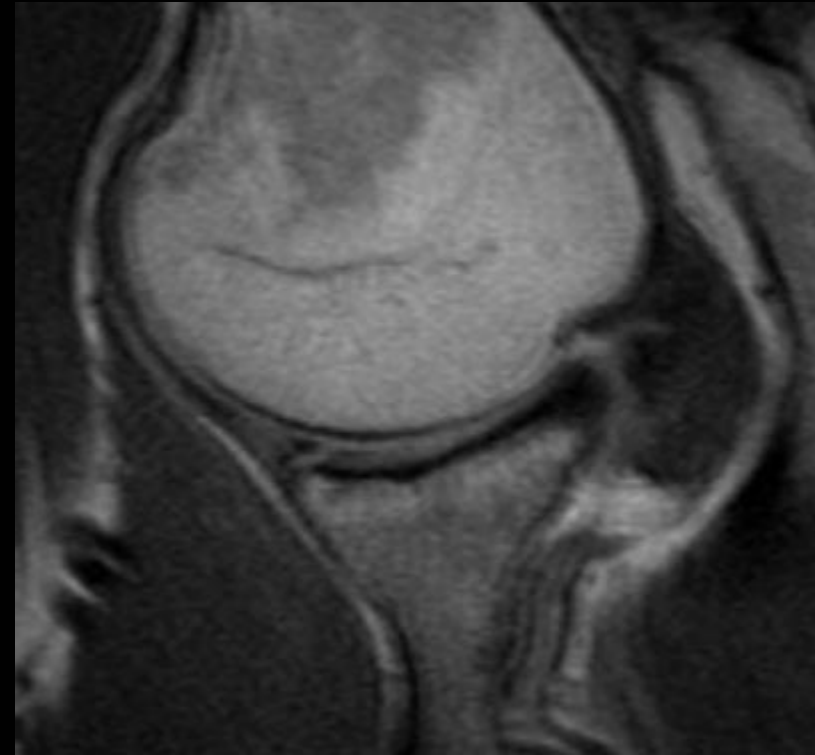
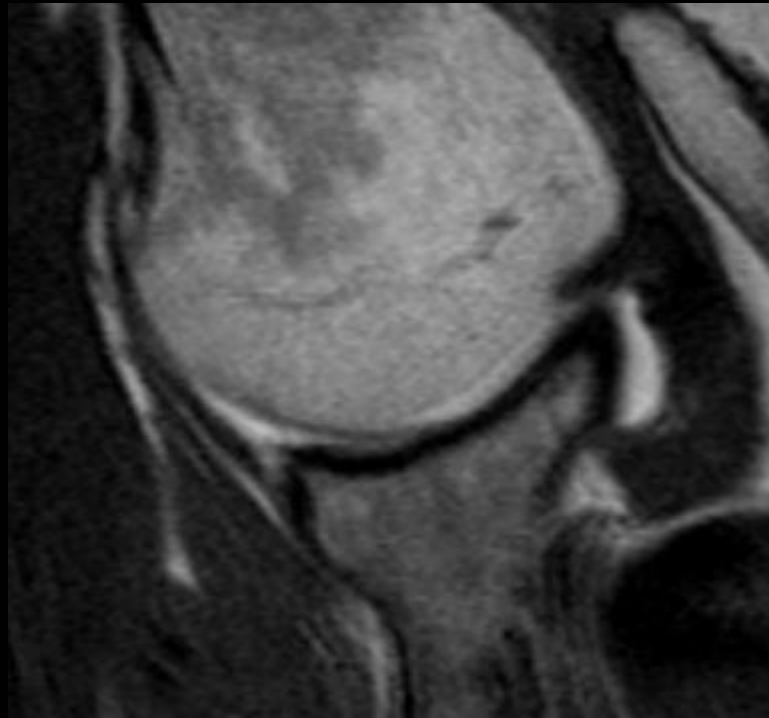
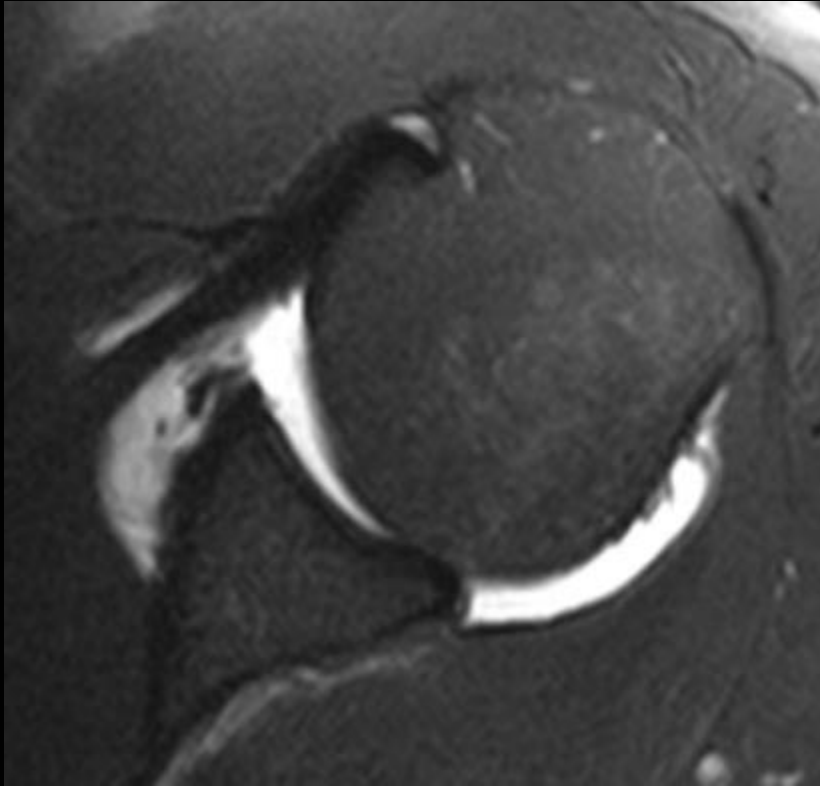
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Case



Case



Case



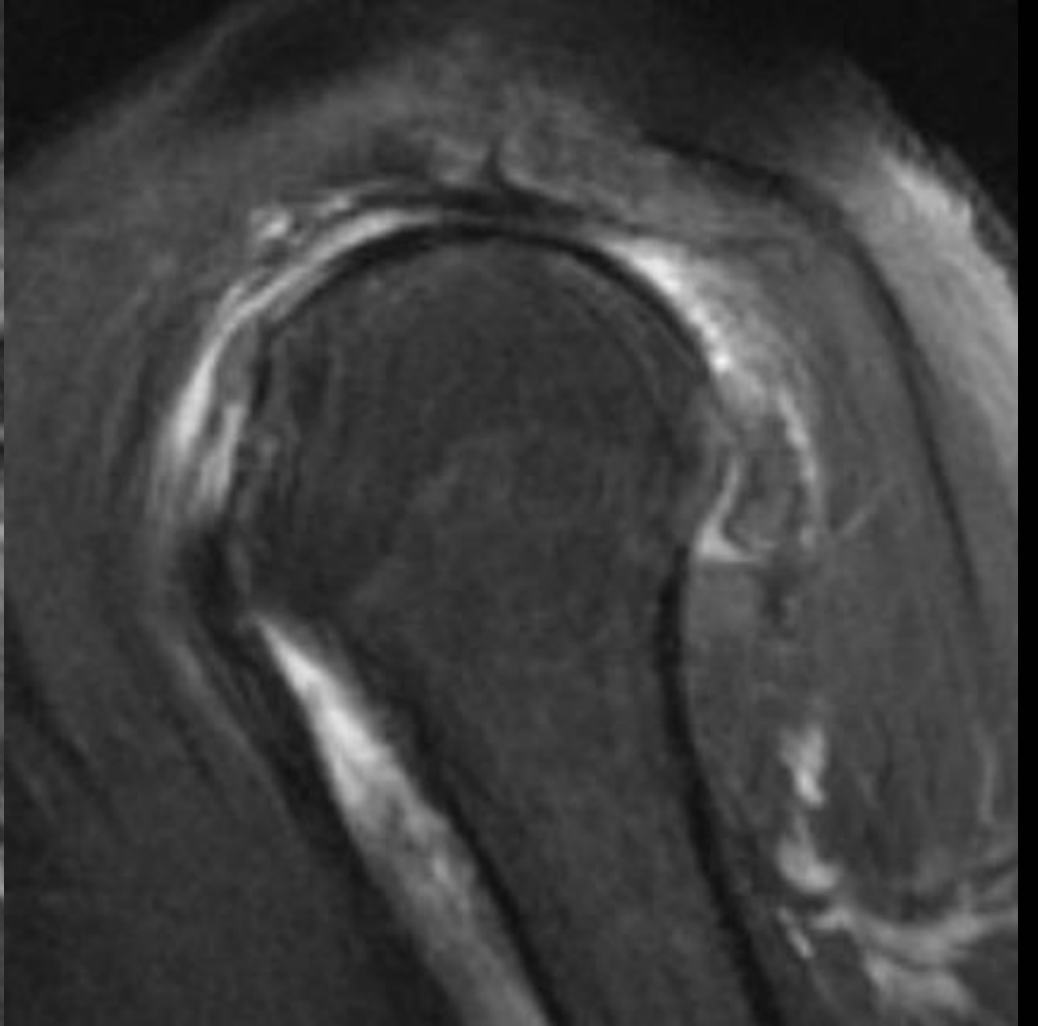
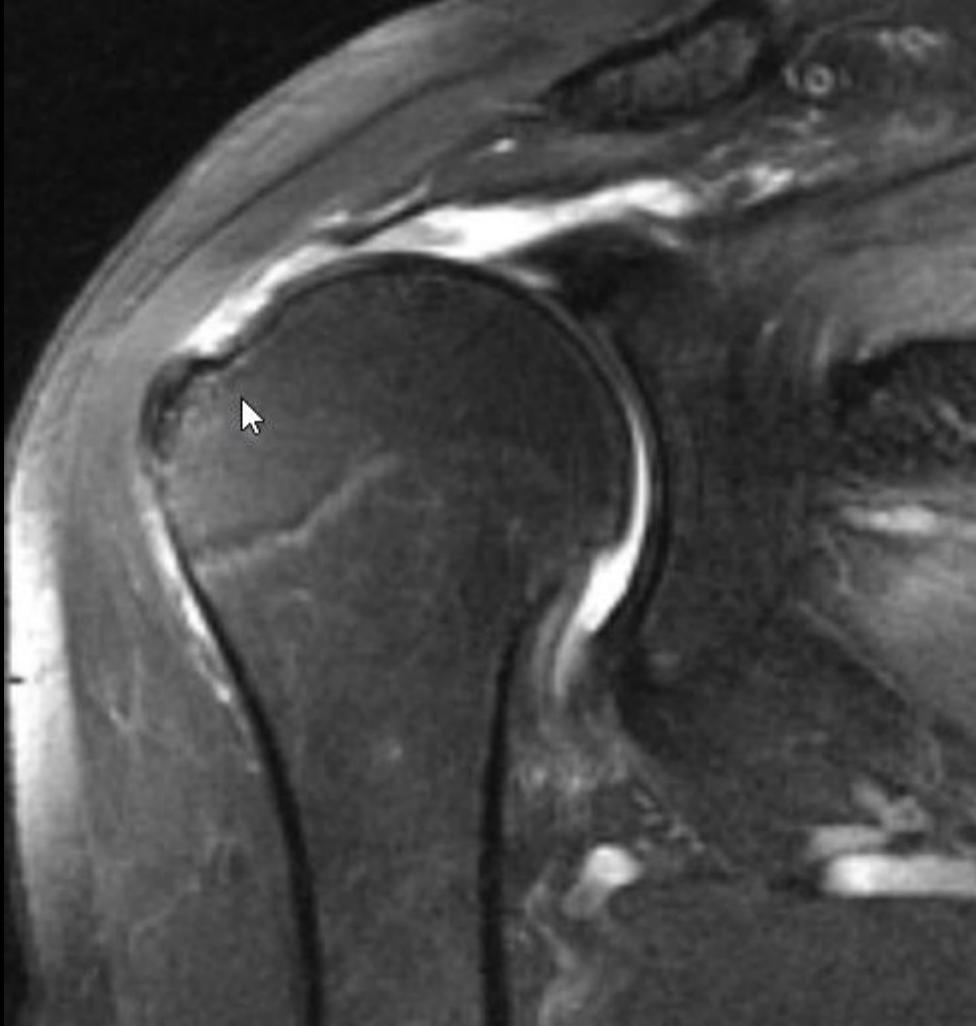
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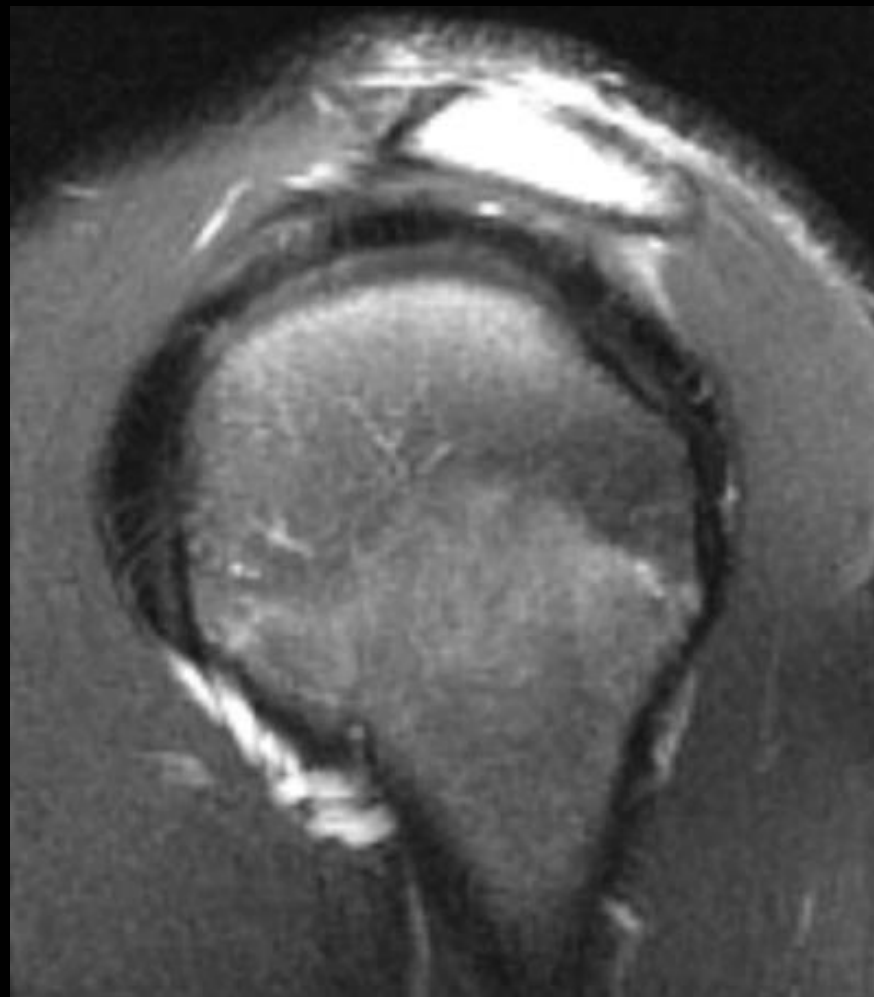
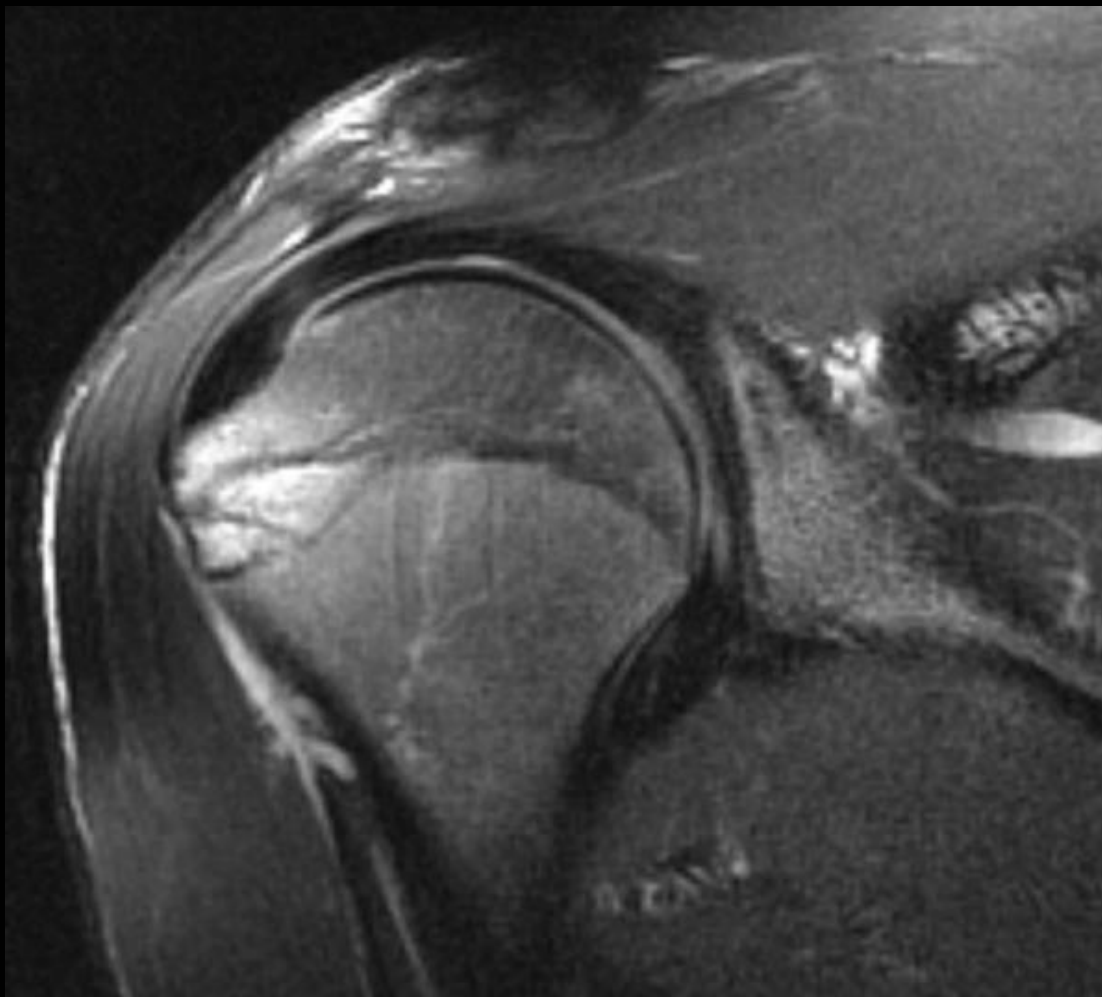
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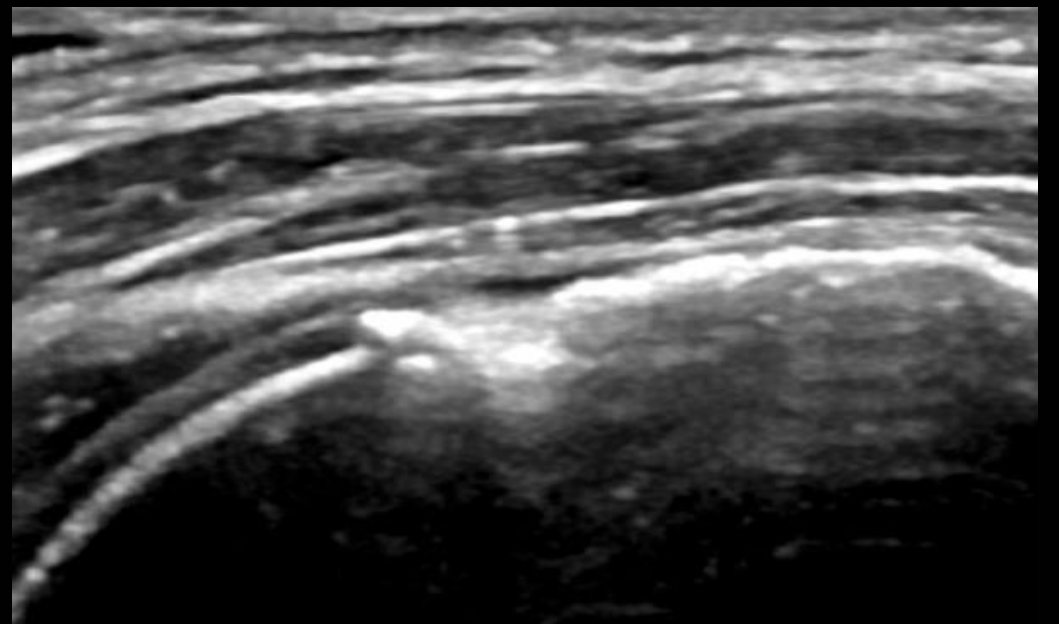
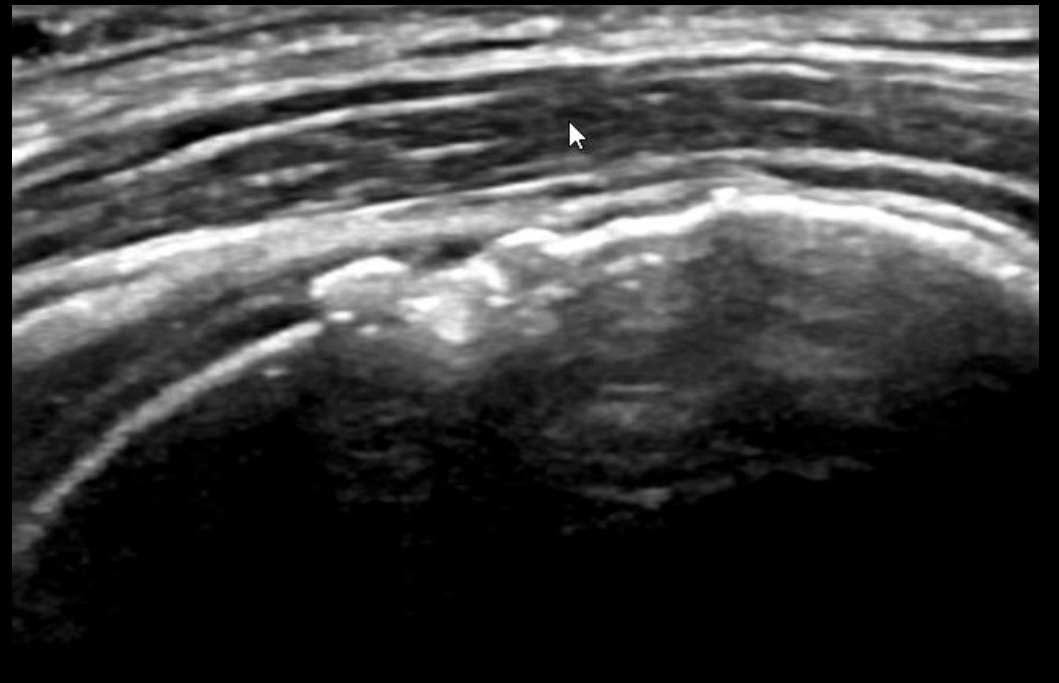
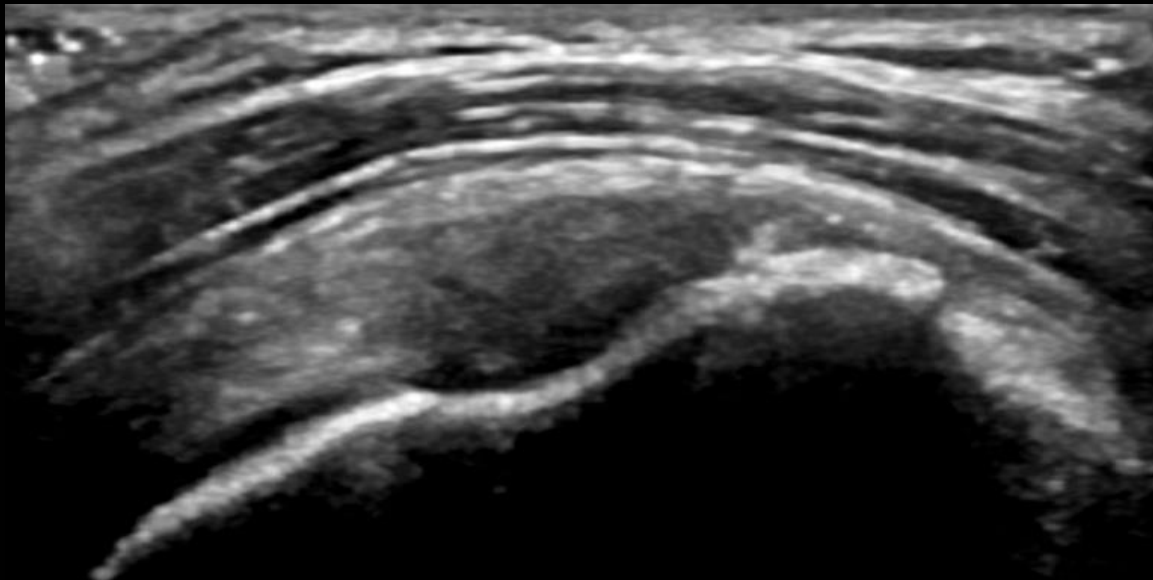
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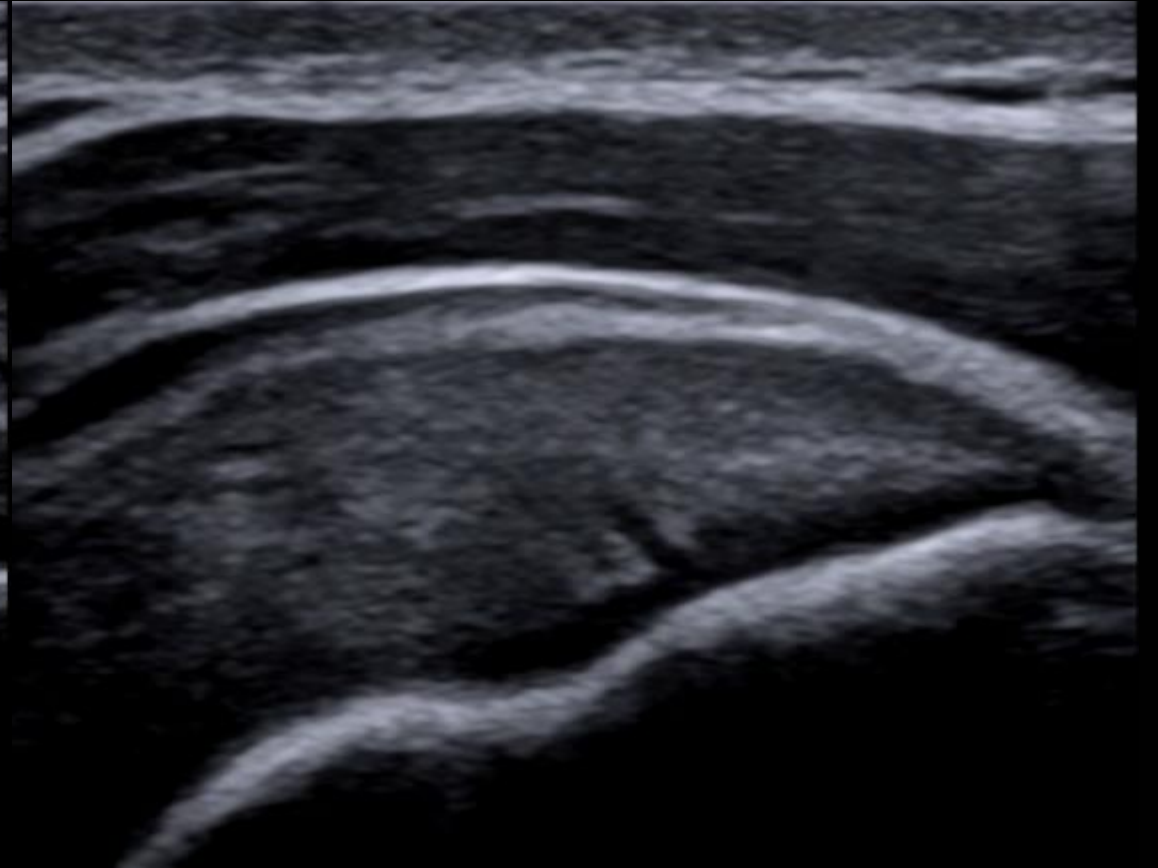
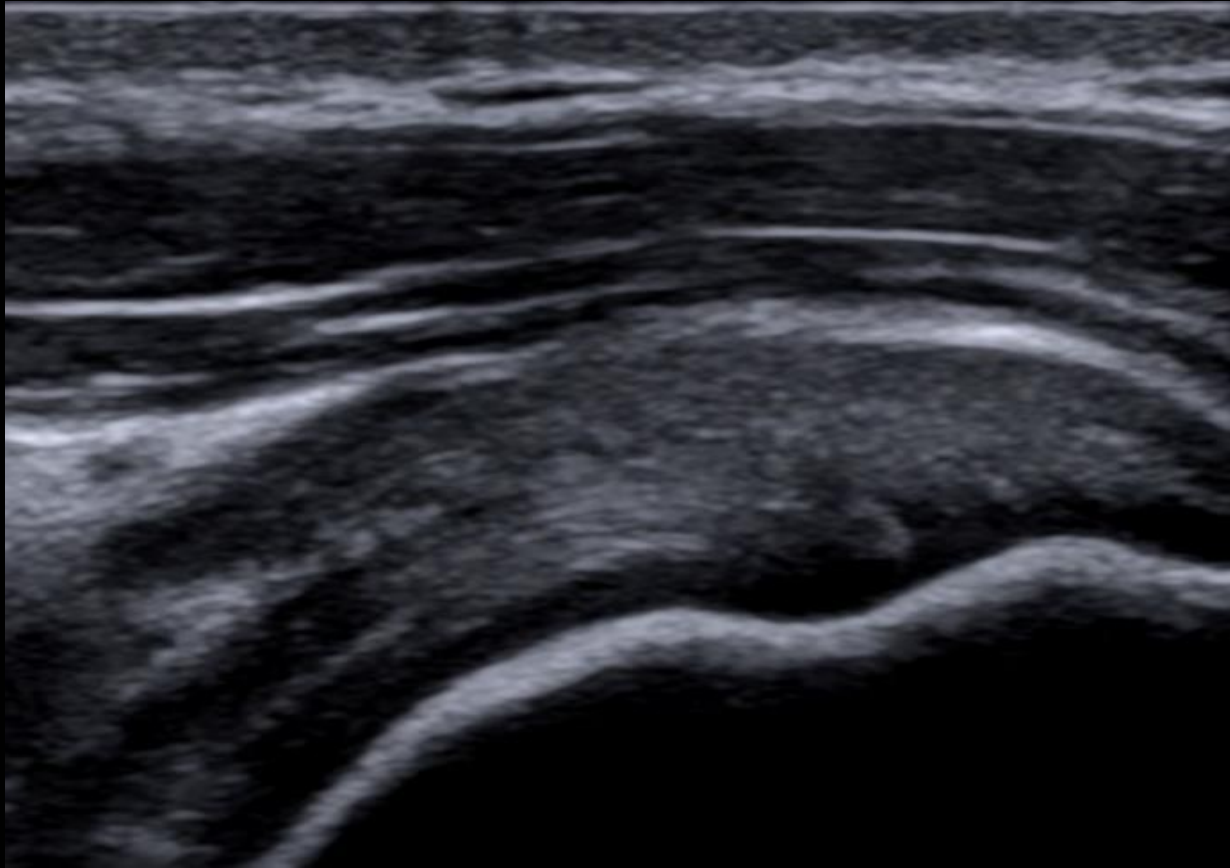
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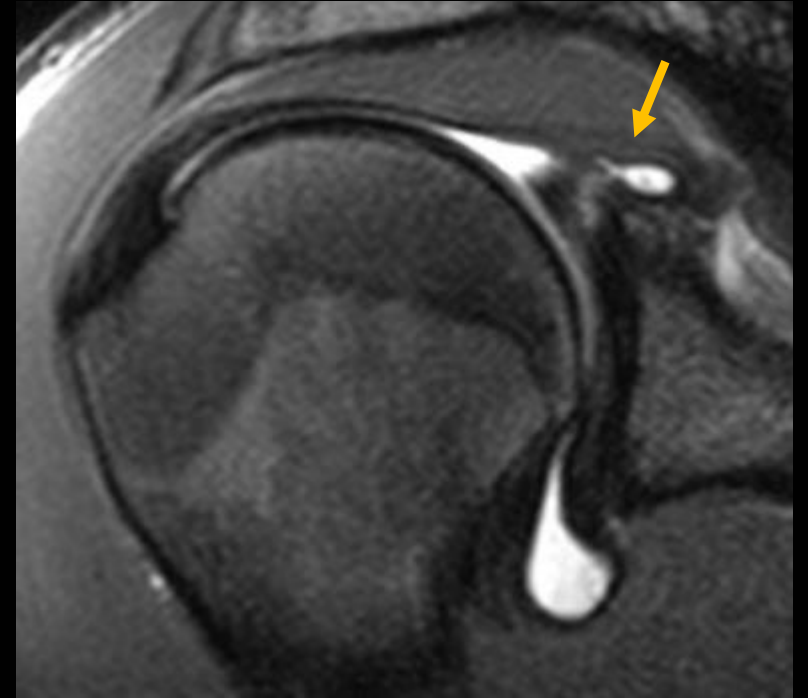
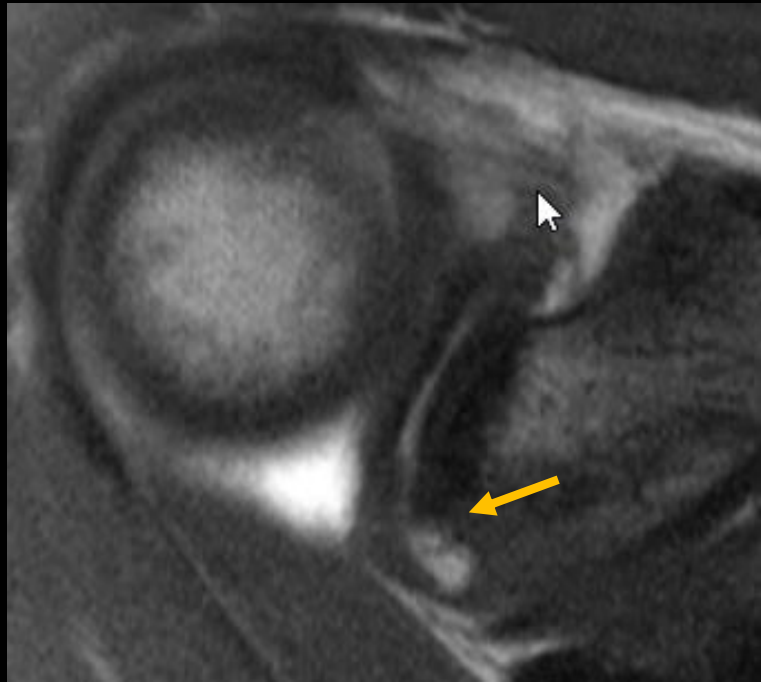
Case



Case



Case





Knee

Knee: Radiographic Anatomy



AP



Lateral

L
J

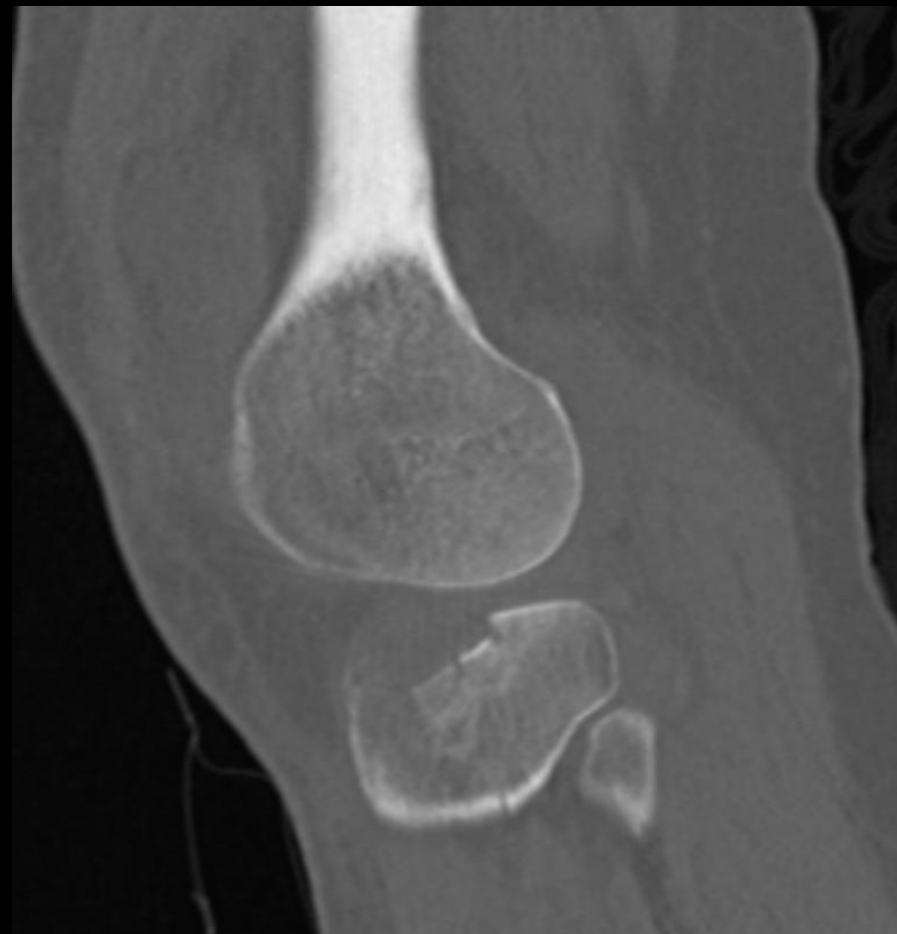


Tangential Patellar

Case



Case



Case



Case



Case



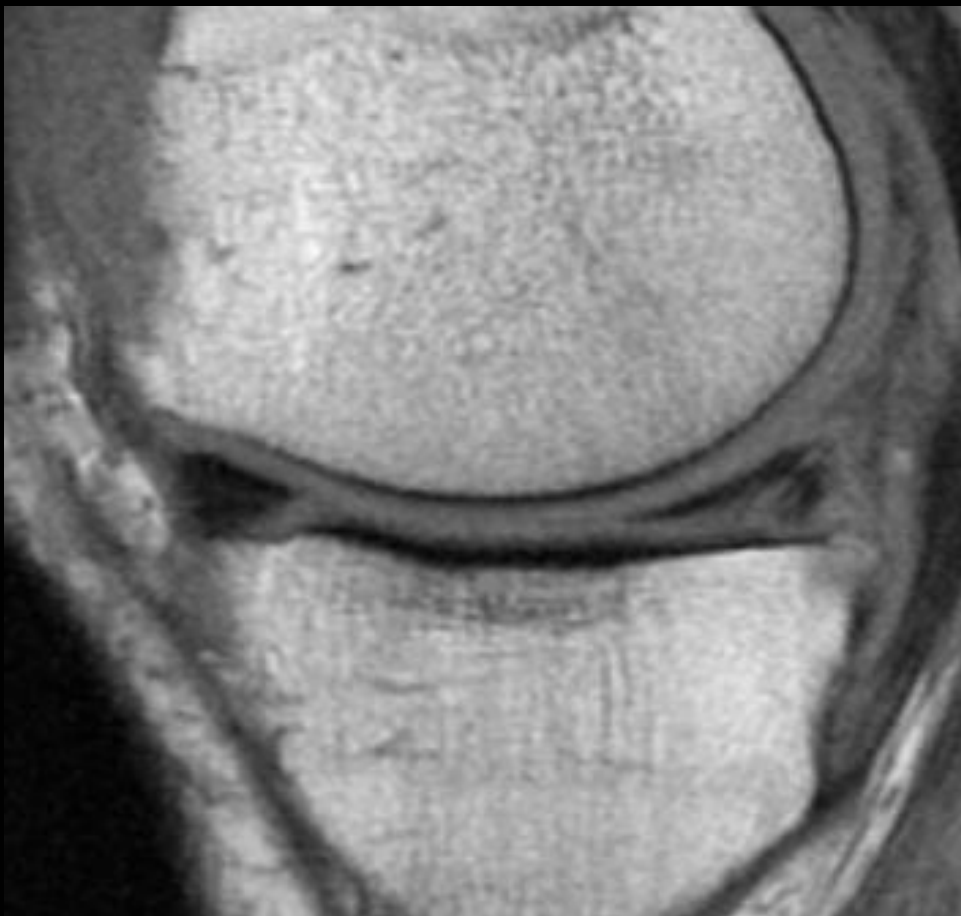
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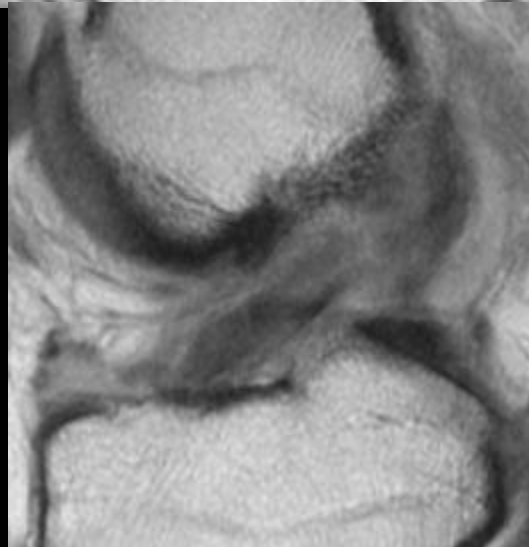
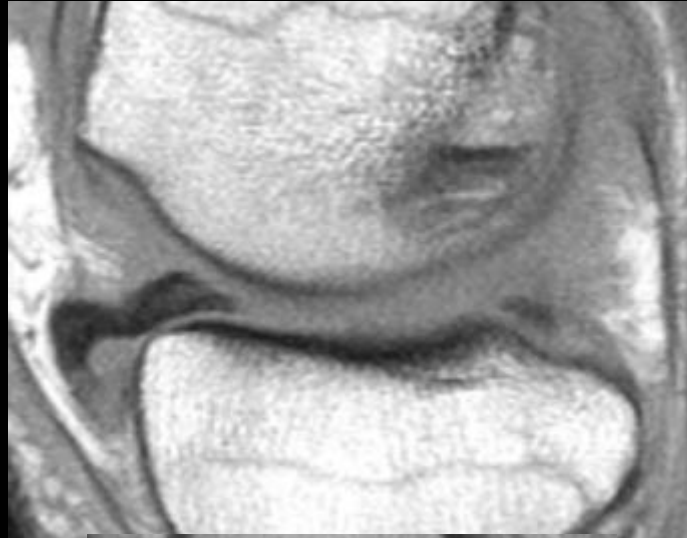
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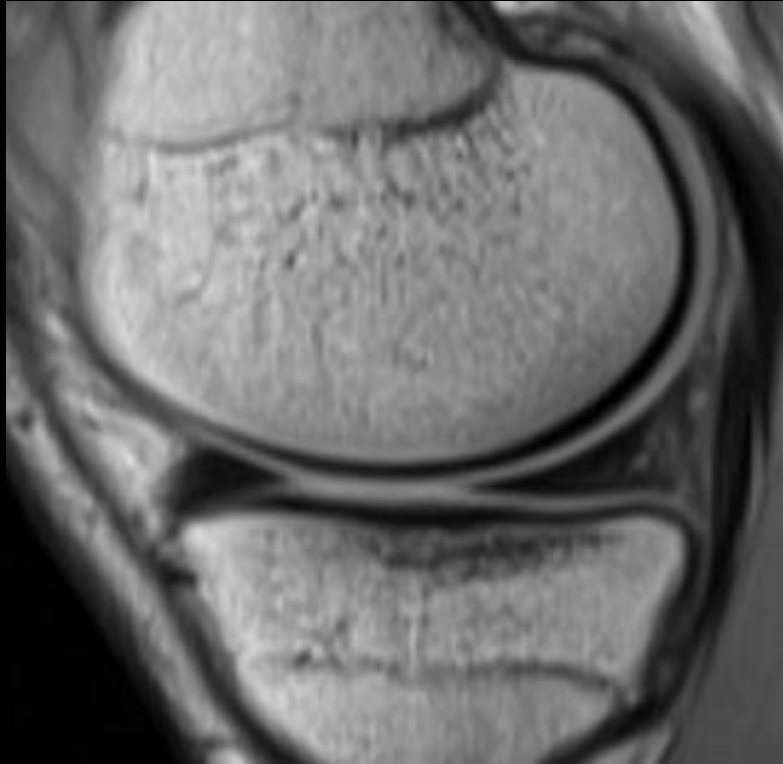
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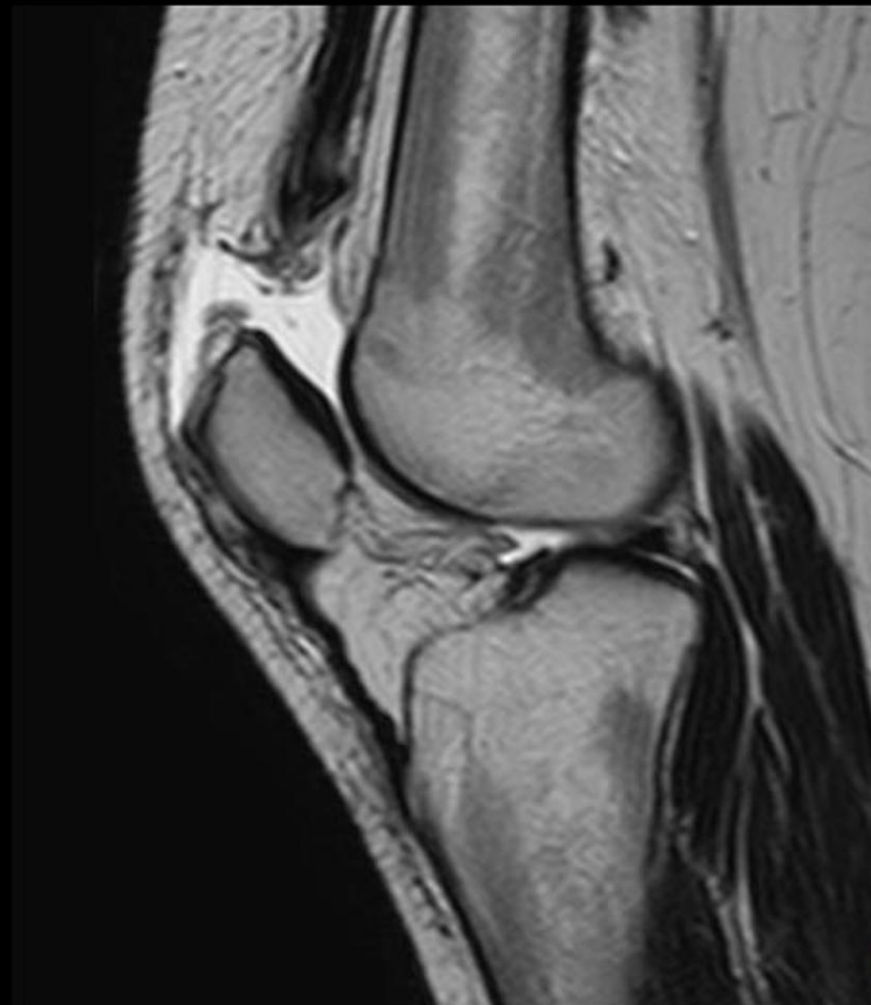


Case



Follow up

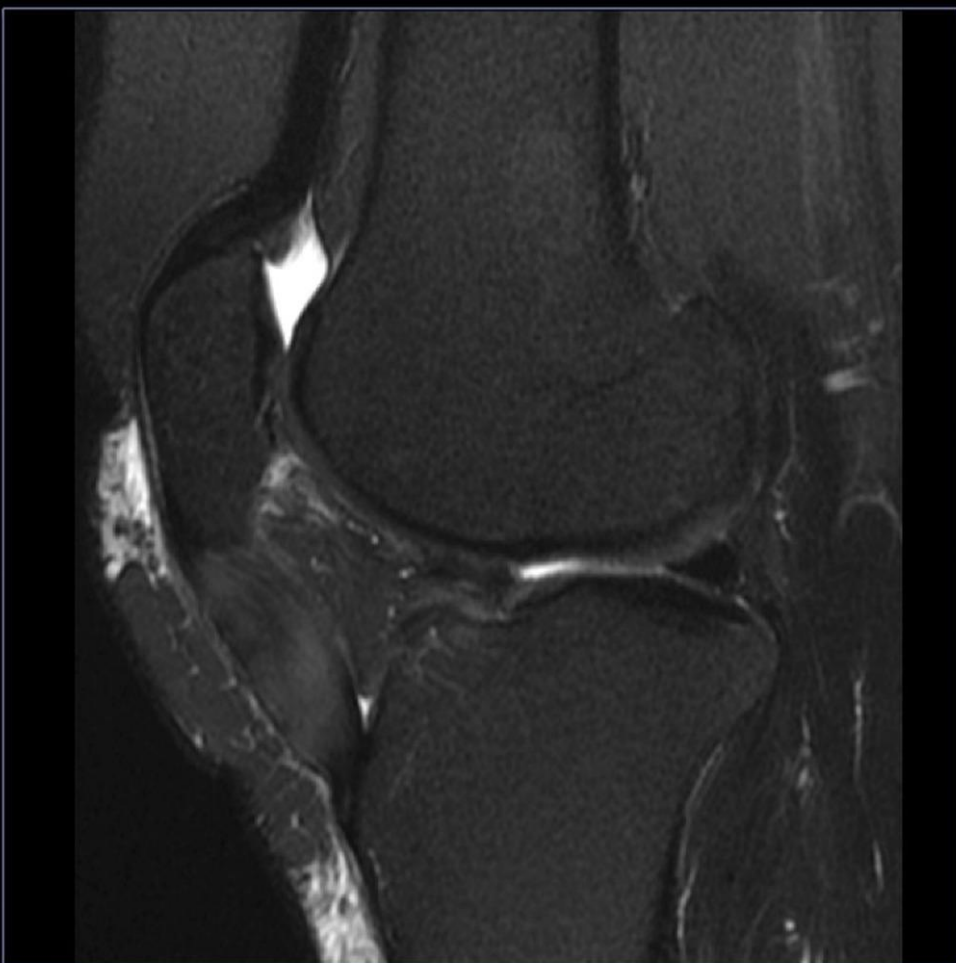
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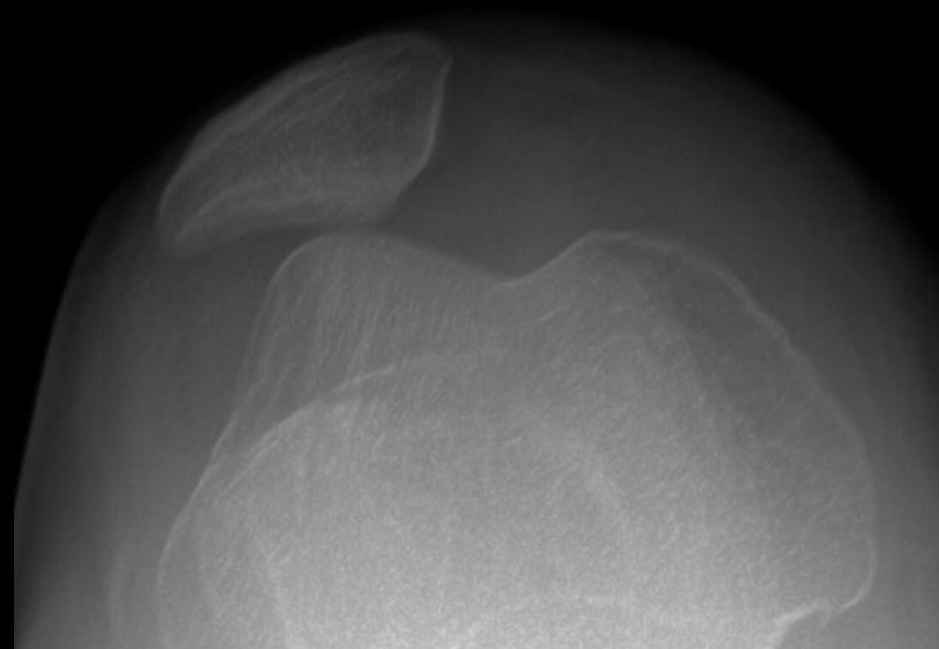
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Case



Case



Case





Hip

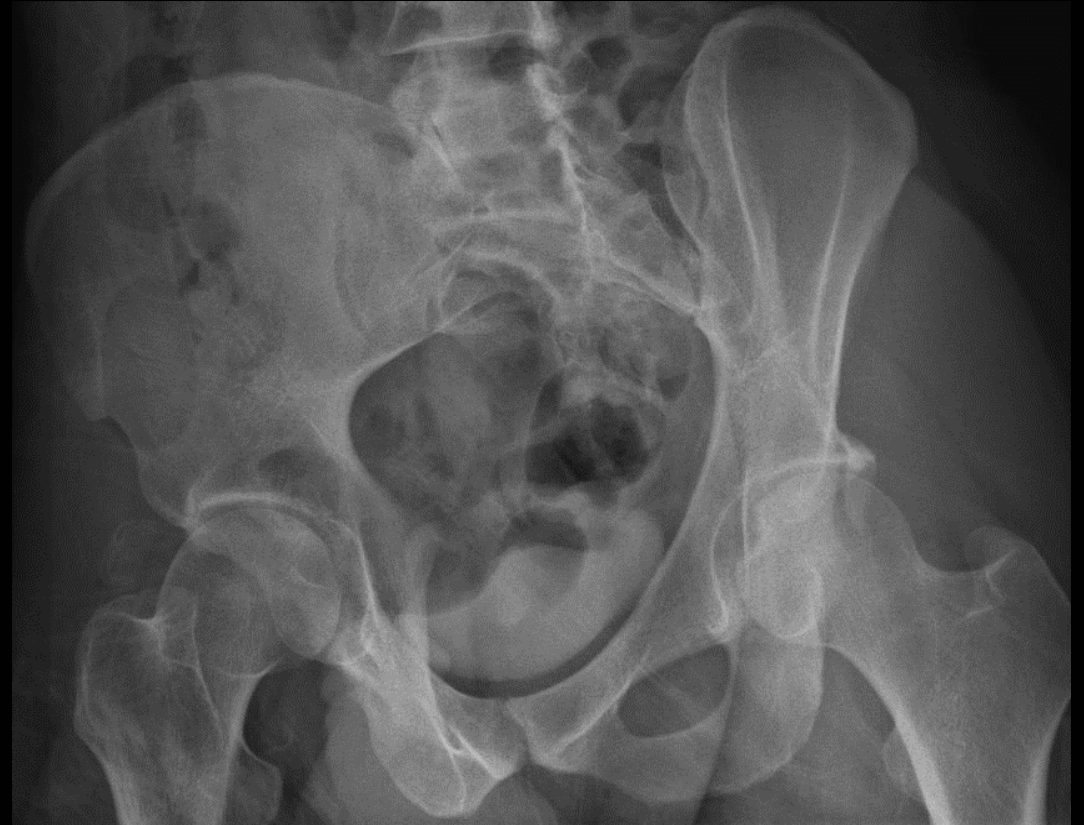
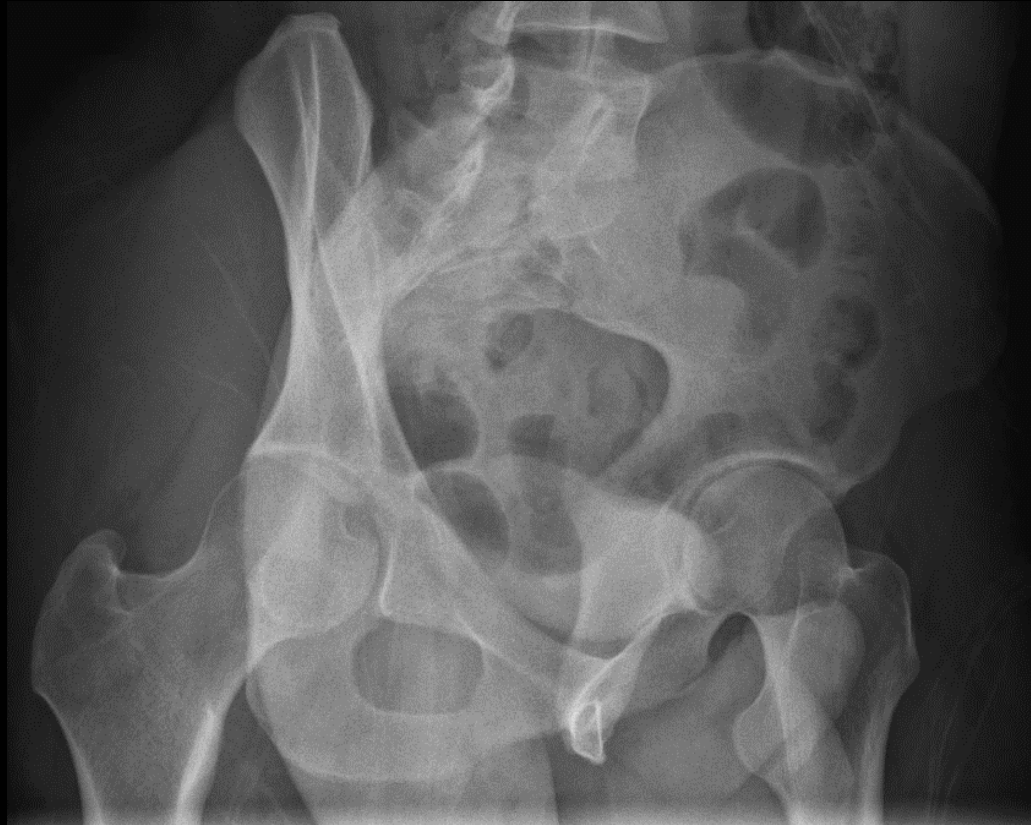
Hip: Radiographic Anatomy



Hip: Radiographic Anatomy



Hip: Radiographic Anatomy



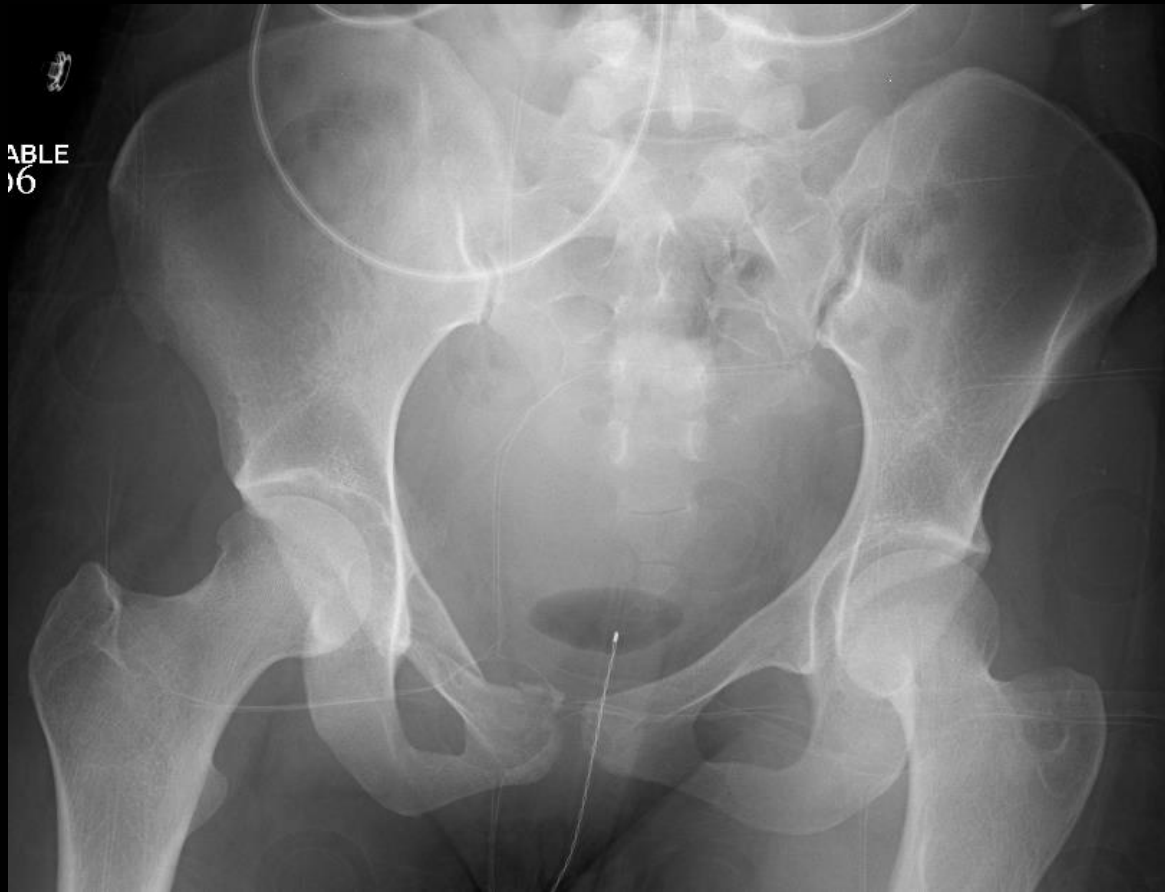
Hip: Radiographic Anatomy



Case

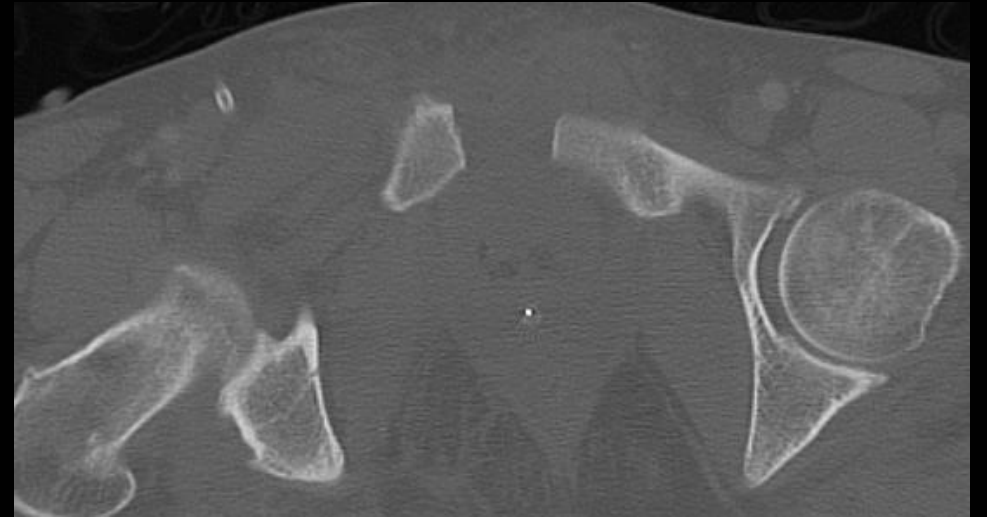


Case



Case

3
TABLE



Case



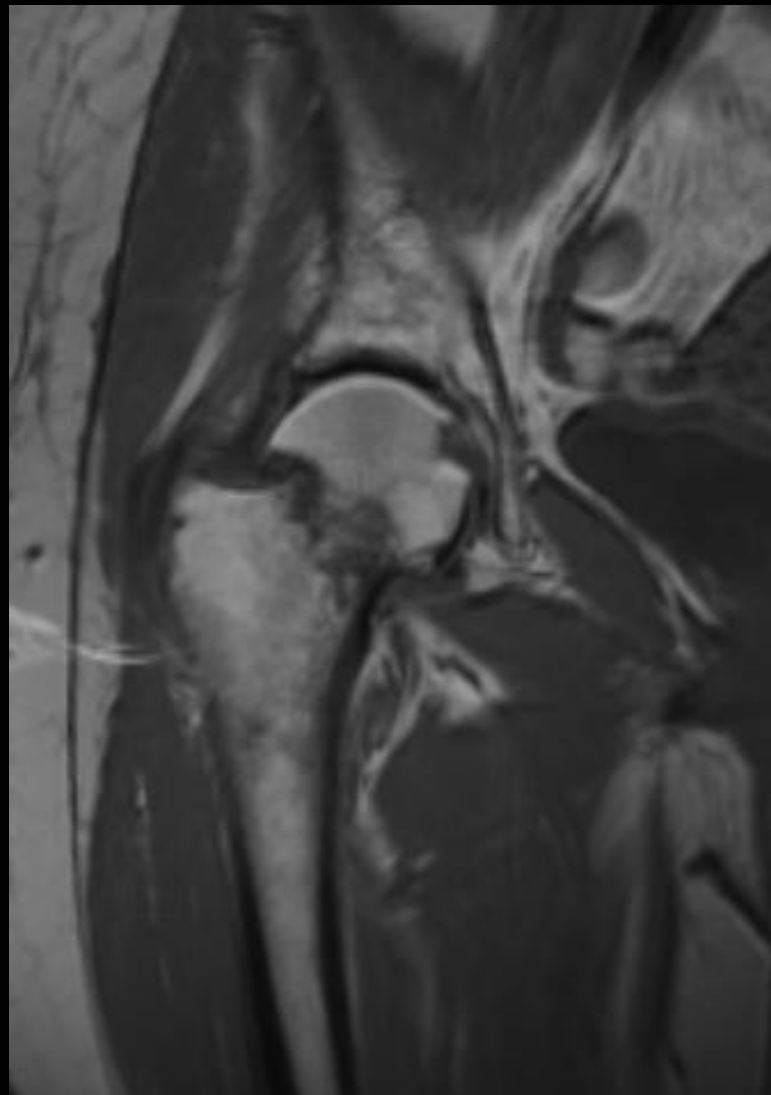
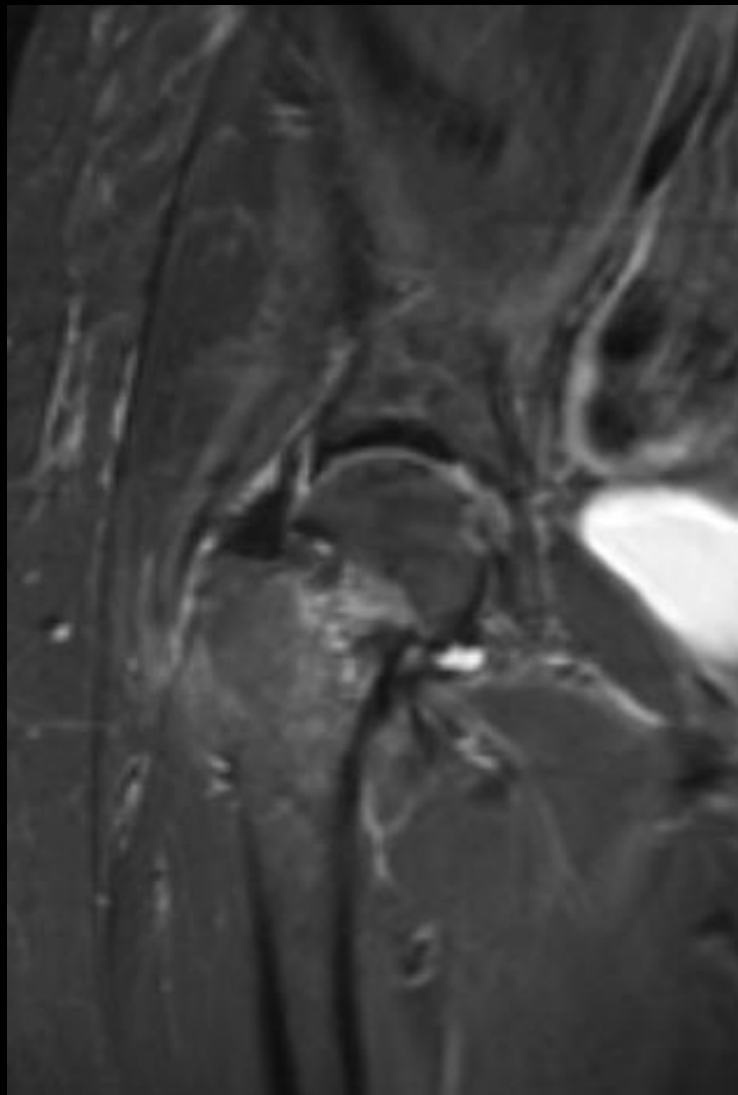
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Case



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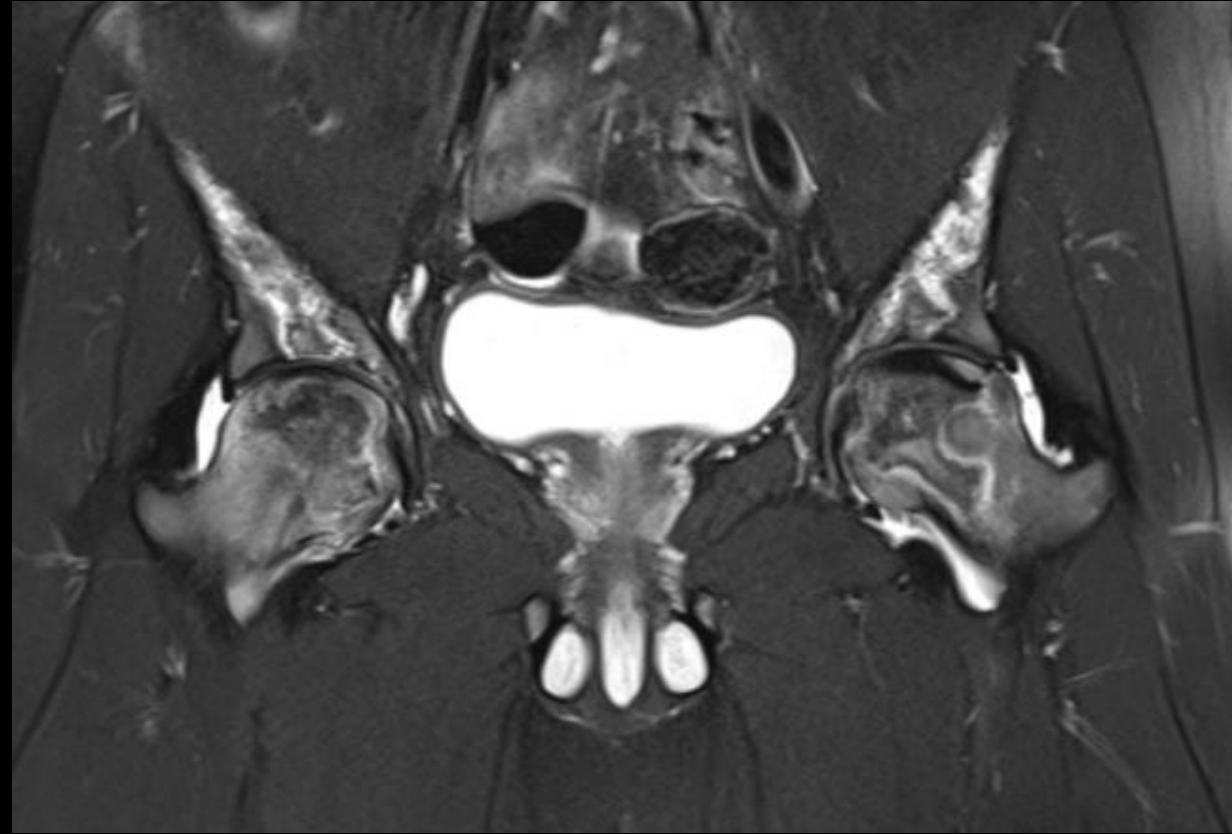
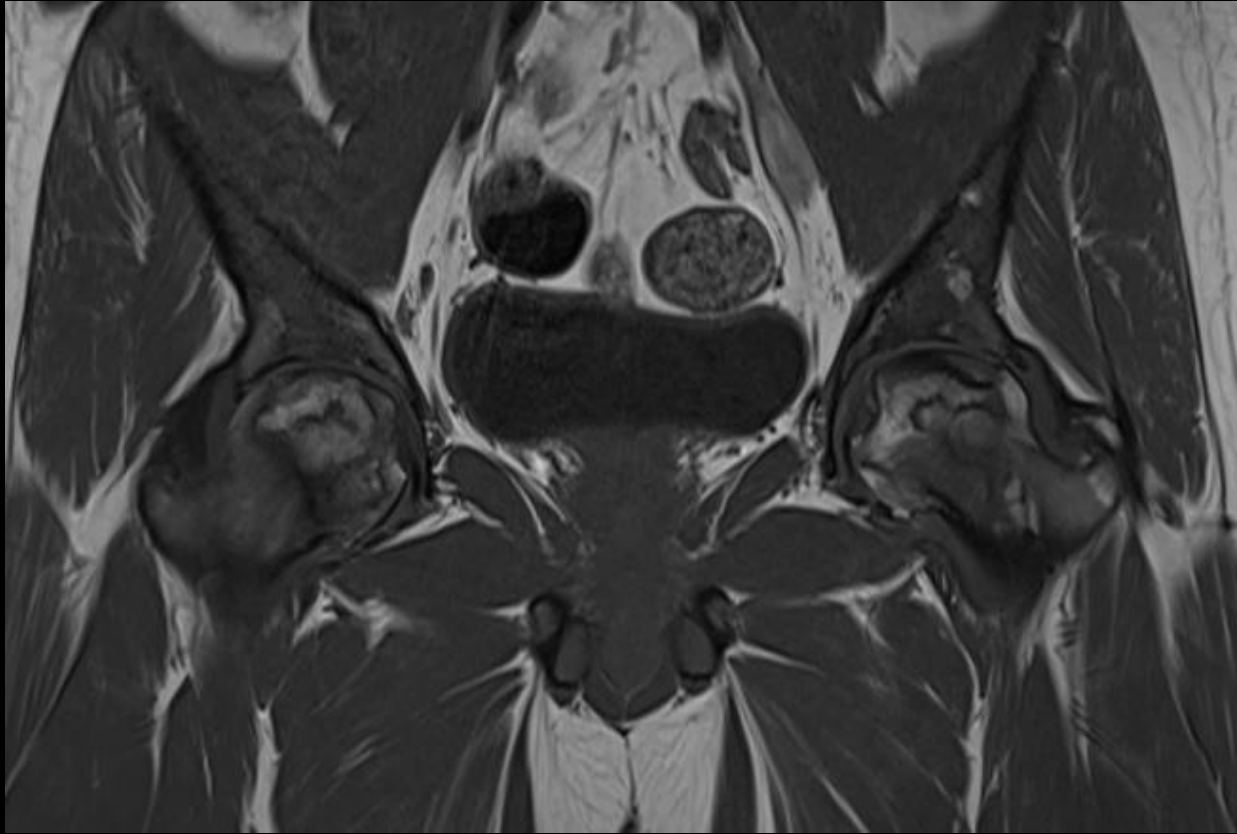
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Case



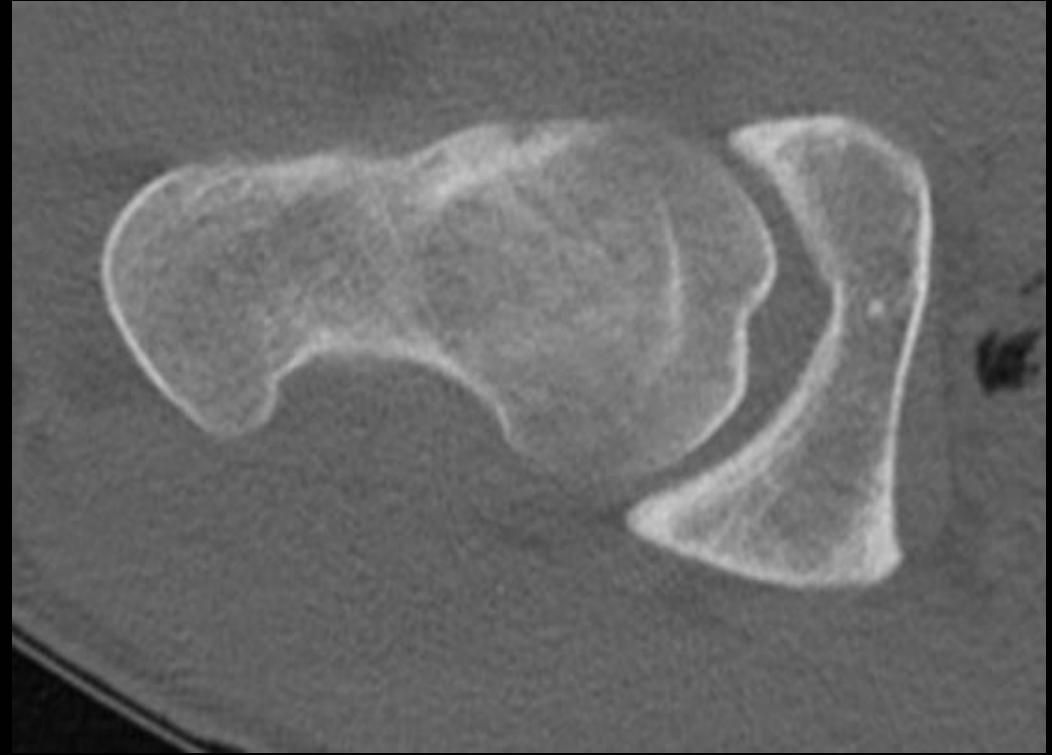
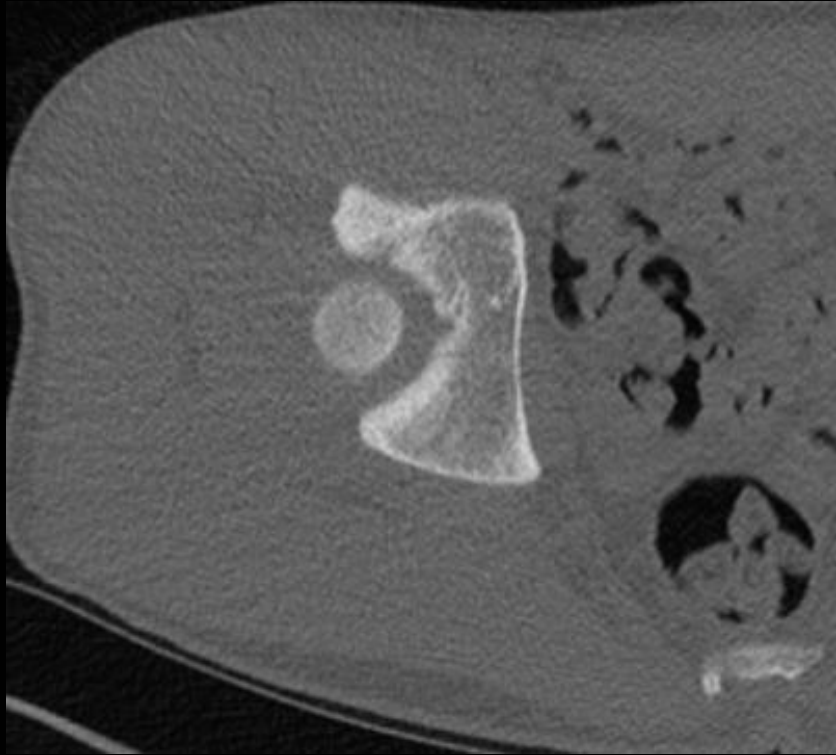
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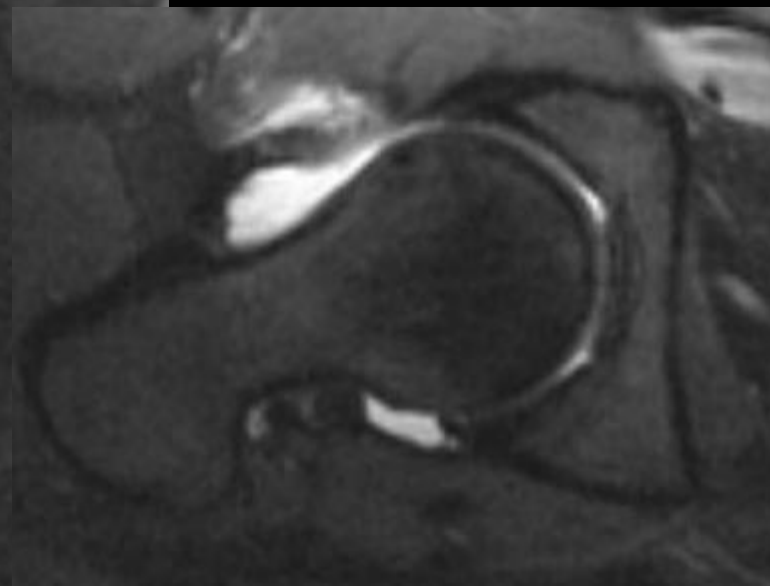
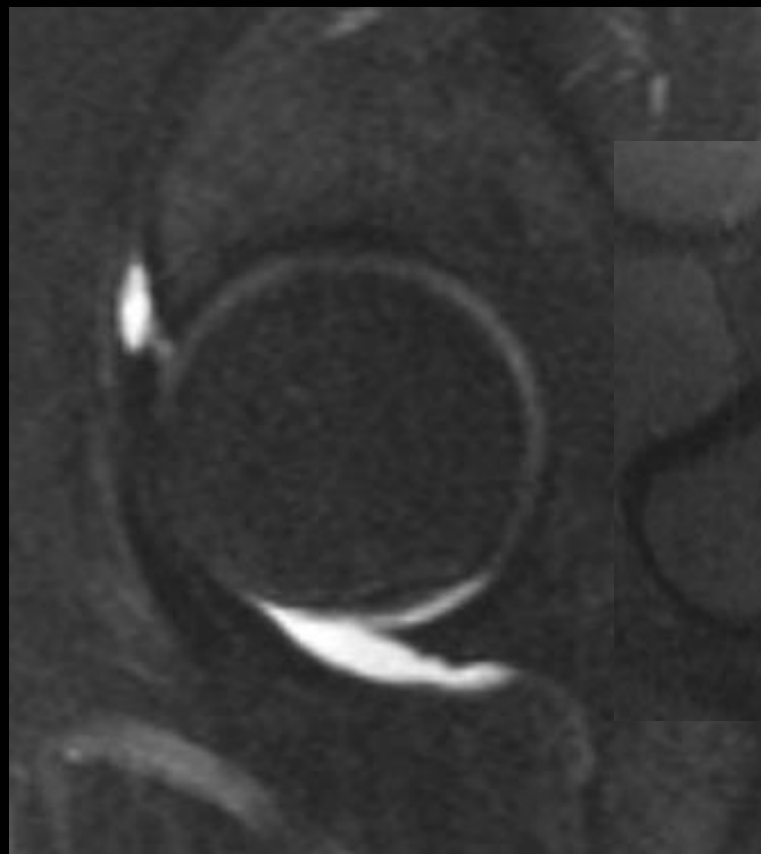
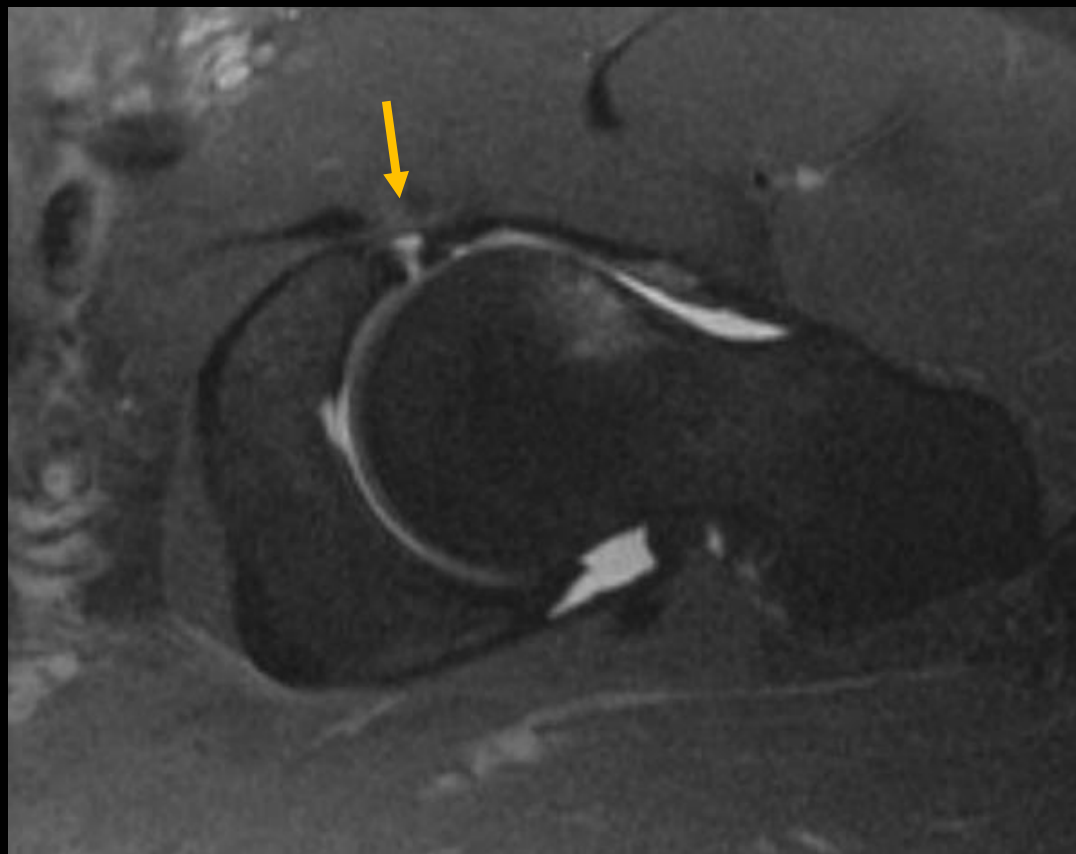
Case



Case



Case



Contralateral comparison



Elbow

Elbow: Radiographic Anatomy



Case



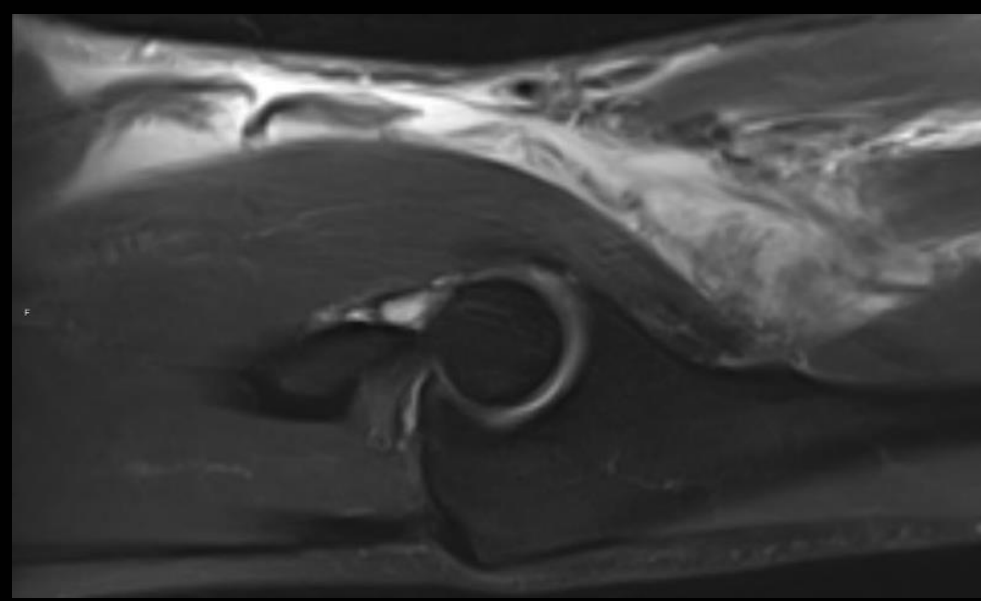
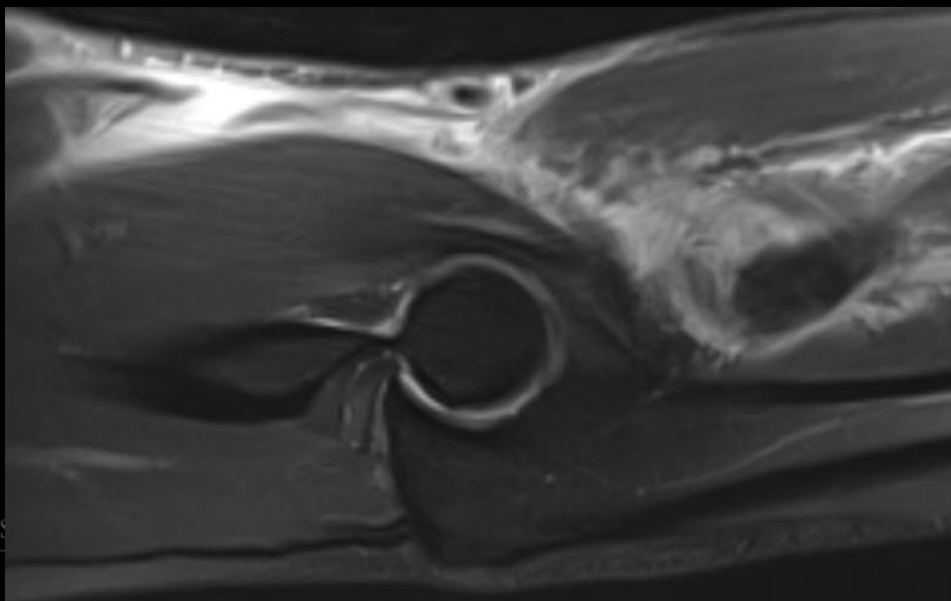
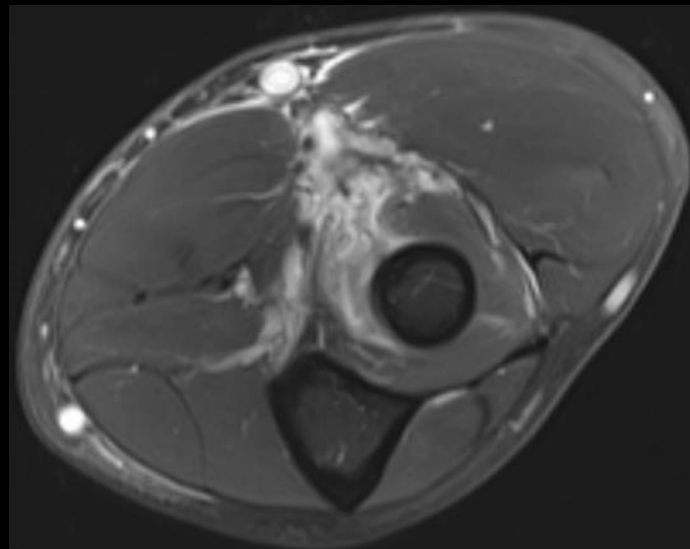
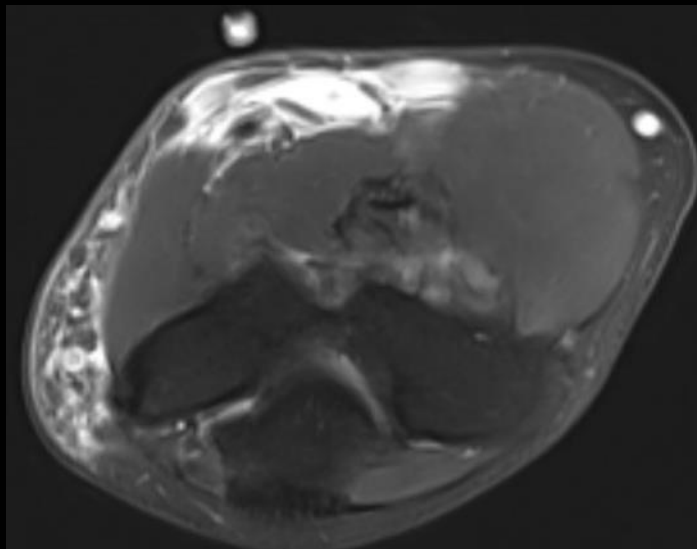
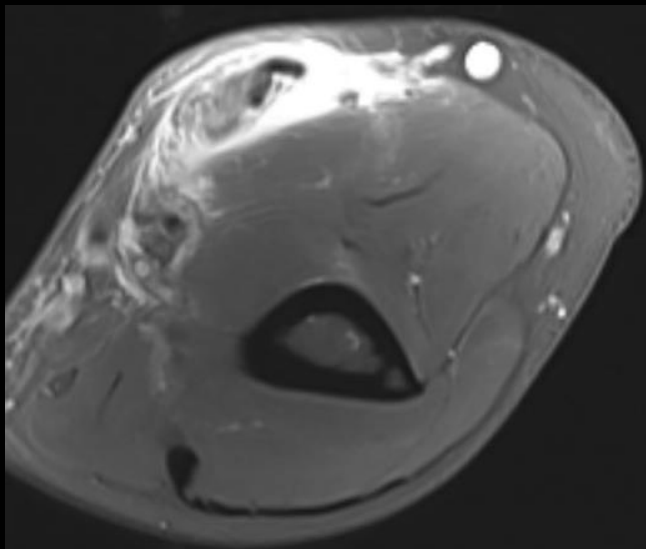
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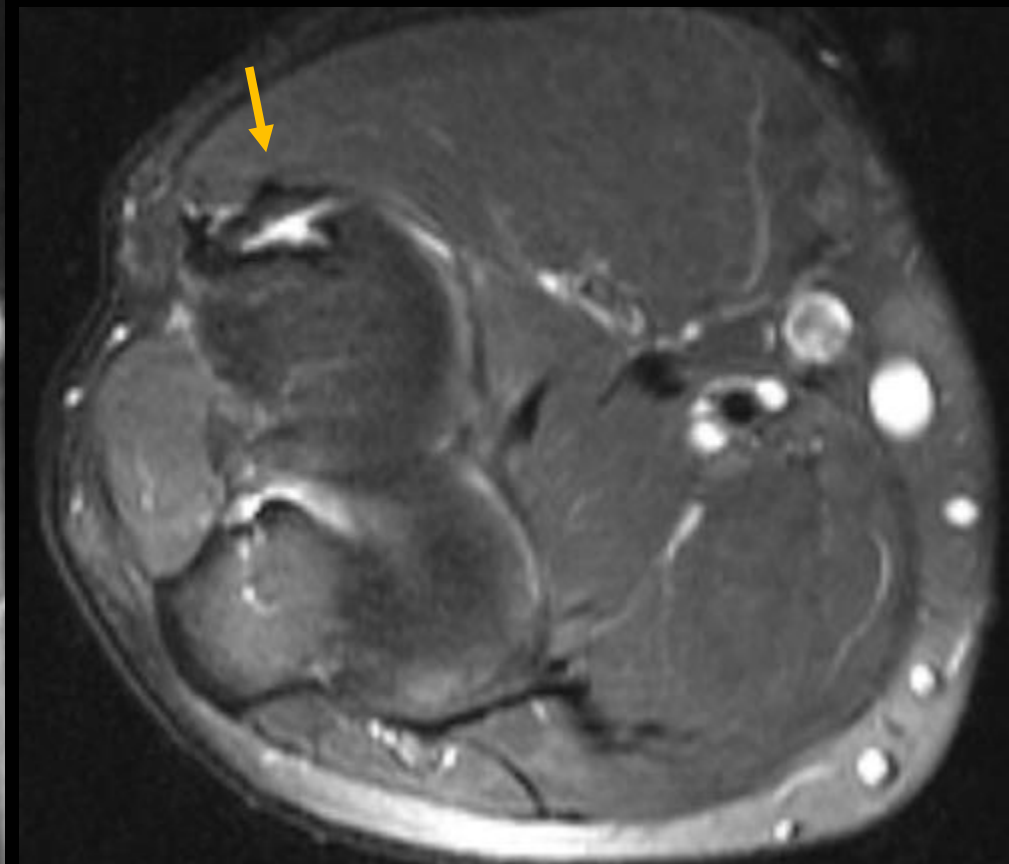
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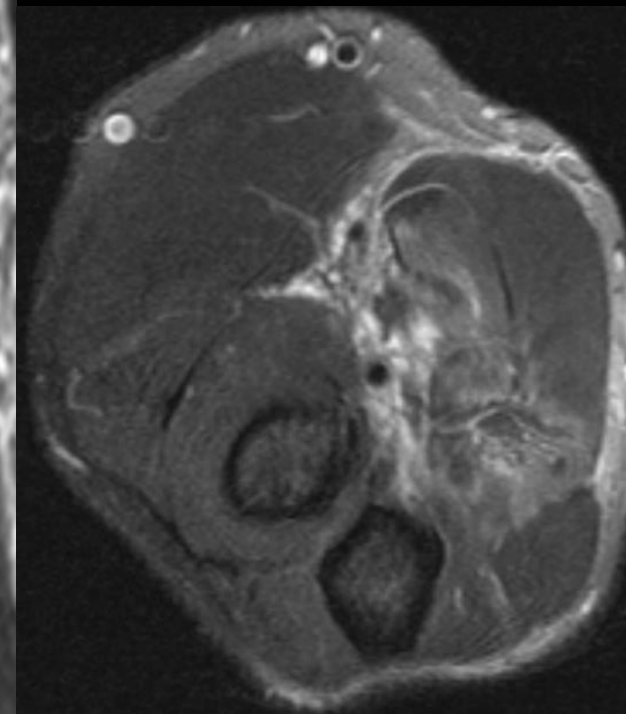
Case



Case



Case





Wrist

Wrist: Radiographic Anatomy



Case



Case



Case



Case



Case



Case



Case



Case



Case



Case





Ankle/Foot

Ankle: Radiographic Anatomy



Foot: Radiographic Anatomy



Case



Case



Case



Case



Case



Case



Case



Case



Case



Thank you!

- Questions?