



Arthrography

Dr. Tudor H. Hughes M.D., FRCR
Department of Radiology
University of California School of Medicine
San Diego, California



General indications

- Assessment of internal derangement
- Intraarticular bodies
- Aspiration for sepsis or crystals
- Steroid injections
- Diagnostic LA injection

General Arthrography Technique

- Consent
- Clean
- LA usually
- Enter joint
- Aspirate
- Confirm position with contrast
- Contrast flows away from needle
- Use dynamic subtraction if available esp. wrist
- Stop if blob
- Fill joint with appropriate contrast
- Take full radiographic series no matter what

Technique

Septic arthritis

- Multi-use lidocaine is often bacteriostatic
 - avoid in joint
 - Aspirate through different needle



- If dry tap
 - Confirm needle position with air
 - Non ionic contrast possibly not bacteriostatic
 - Irrigate with - Non bacteriostatic saline
 - Use bung on syringe, or transport medium

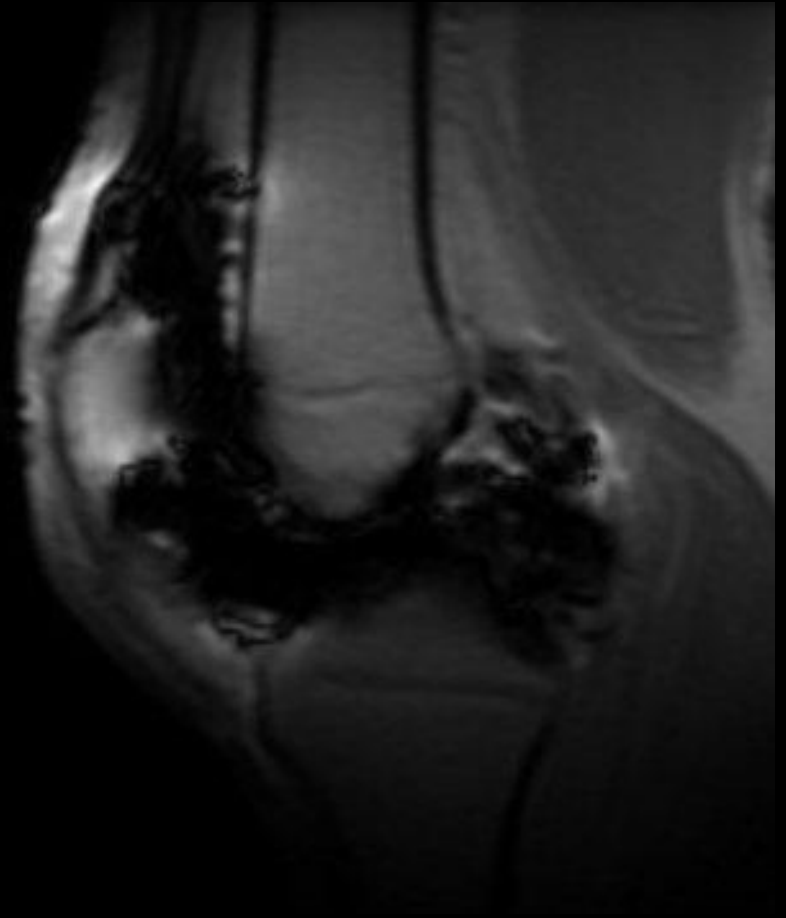
MRI Arthrography Technique

- Gd 1:200-250 dilution
- Tech. usually adds 1ml of Gd to 100ml bag of saline (or 5 to 500) = 1:100 Gd
- You draw up X mls of this and add X mls of 300 mg/dl iodine = 1:200 Gd
- This allows for dilution by any joint fluid
- Get rid of air
- Don't dilly dally after injection
 - Contrast is absorbed from joint
 - Especially in synovitis
 - Check MRI is ready for patient

MRI Arthrography Technique



T1FS



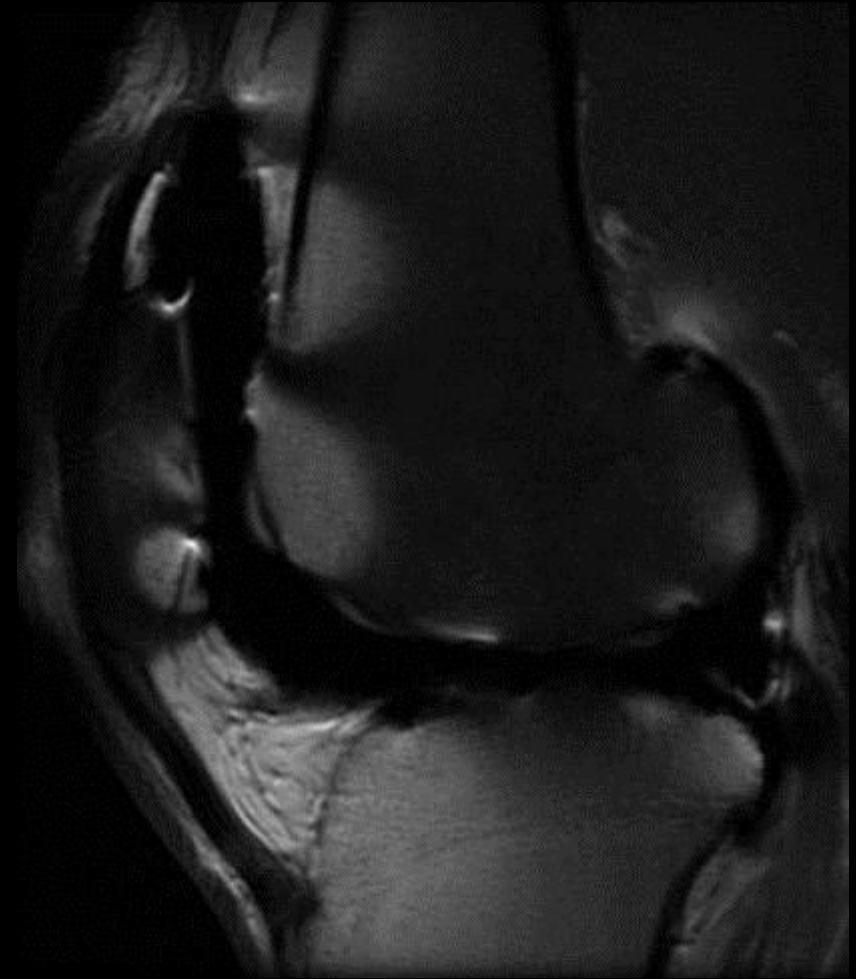
Undiluted Gd

MRI Arthrography Technique



Sag PD

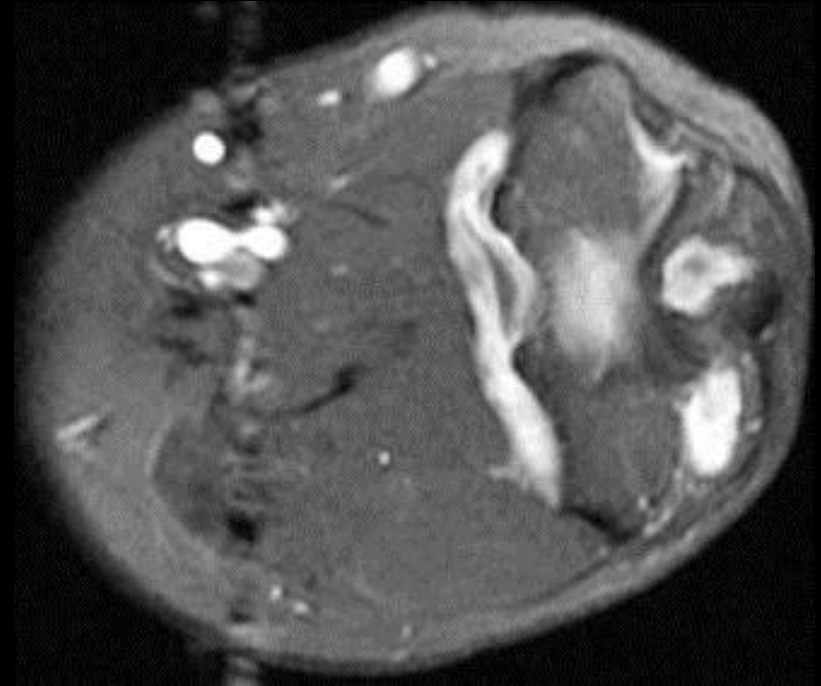
Undiluted Gd



Sag T2

MRI Arthrography Indirect Technique

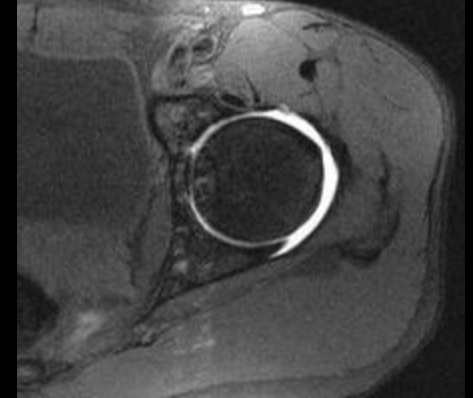
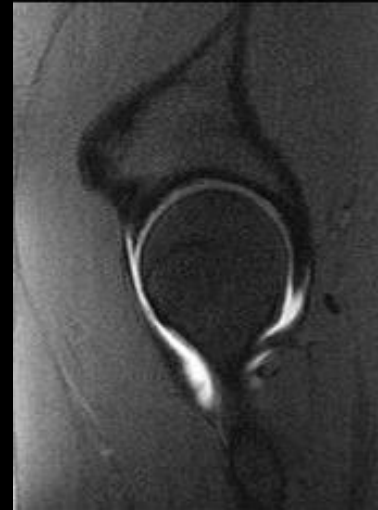
- 10mls of Gd IV
- Wait 15-30 mins to scan
- Best with inflamed joints



Elbow cocci

MR Hip Arthrography - Sequences

- 3 planes of imaging with T1 fat-sat
- Preferred plane IR or T2-w FSE



Anesthetic Arthrography Technique

- Pain will recur prior to steroid effect
- Keep a diary - Activity V's pain
 - Until see referring physician
- Record where contrast/LA goes
- Second dose usually more effective
- Keep it simple
 - Only use Bupivacaine/Marcaine if pain intermittent
- 1-5mls of 1% sufficient
- Give steroid first before joint fills up
 - Top up with LA
 - Patient wants the steroid

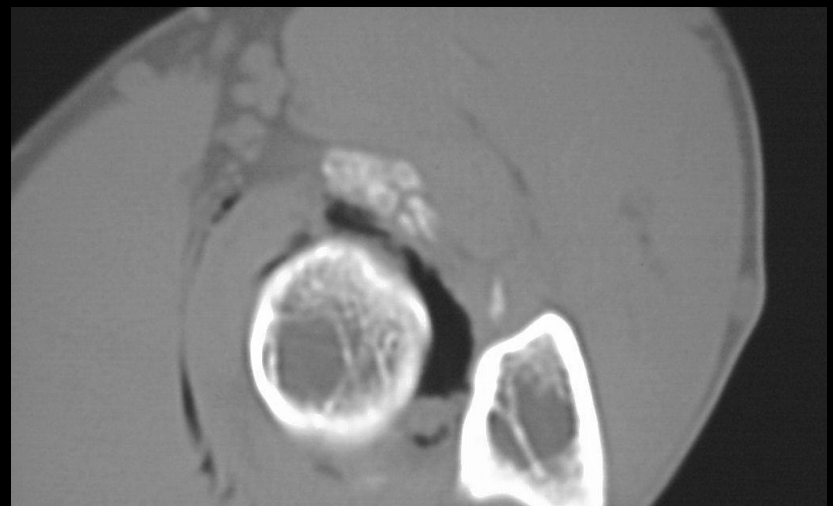
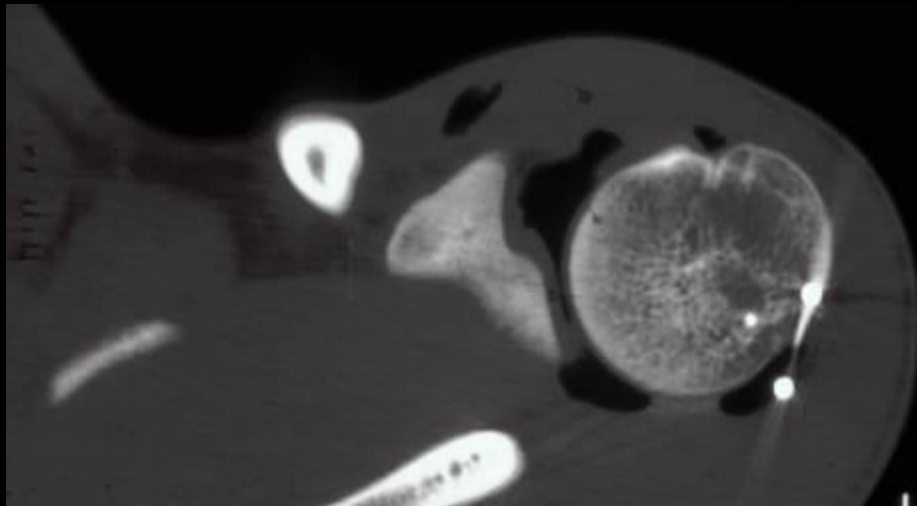
Single contrast - Iodine

- Most commonly used in shoulder
- Outlines articular surface
- Combine with CT for knee menisci
- 240 mg/dl



Single contrast - Air

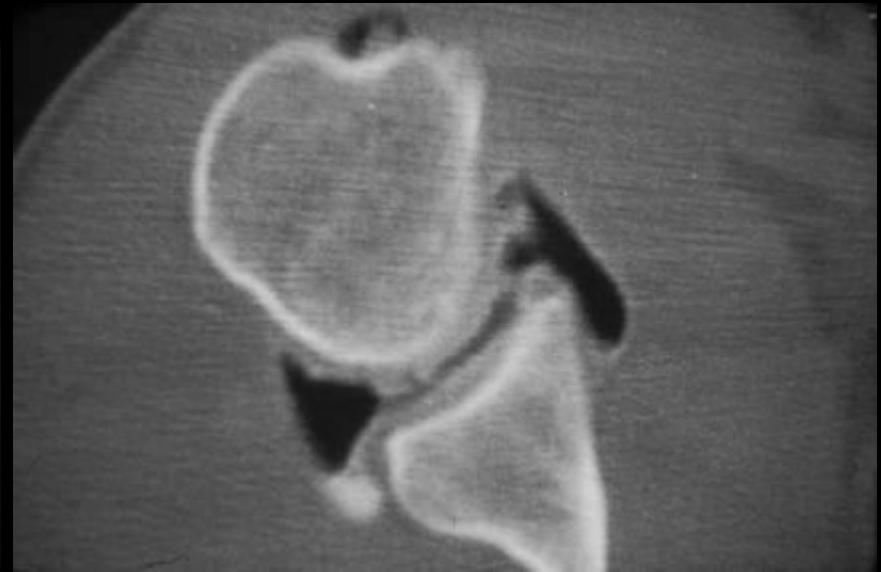
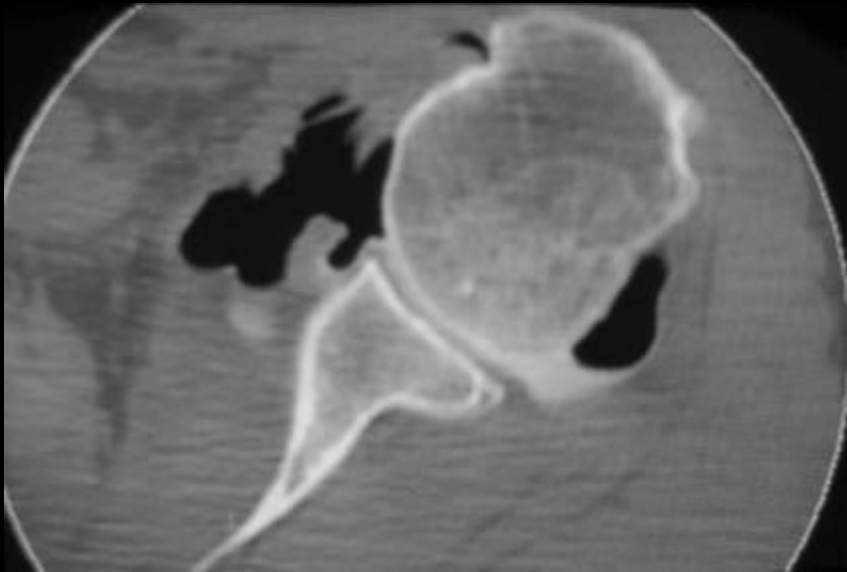
- No iodine
- Usually combined with CT
- Best for IA bodies inc. GSW
- Most commonly used in elbow



Shotgun pellets in joint

Double contrast

- Tiny amount of iodinated contrast to line joint
- Fill up with air
- CO₂ rapidly absorbed
- Shoulder with CT for labrum
- Shoulder for rotator cuff tear



Joint volumes

- Shoulder 10-12 mls
- Elbow 5 mls
- Wrist 2-3 mls
- Hip 10 mls
- Knee up to 50 mls
- Ankle 5mls
- Subtalar 3-5 mls
- TMJ 1 ml

General contraindications

- Few
- Controversial to inject contrast if aspirate pus

Imaging for Access

- Fluoroscopy usually sufficient
- CT may be of benefit for SIJ in elderly with OA to see osteophytes
- Ultrasound probably complicates matters
 - Great for bursa

Joint	Approach	Technique	Aristospan	Aristocort/ Kenalog	Depo- medrol	Dexa- methasone
Hip	Anterolateral	Fluoro	20mg	40mg	80mg	4mg
Knee	Subpatella	Fluoro	20mg	40mg	80mg	4mg
Ankle	Anterior	Fluoro	10mg	20mg	40mg	2mg
Subtalar	Lateral	Fluoro	5mg	10mg	20mg	1mg
SIJ	Posterior	Fluoro/CT	10mg	20mg	40mg	2mg
Shoulder	Anterior/Post	Fluoro	20mg	40mg	80mg	4mg
Elbow	Lateral	Fluoro	10mg	20mg	40mg	2mg
Wrist	Posterior	Fluoro	5mg	10mg	20mg	1mg
Sub deltoid bursa	Anterior	US	10mg	20mg	40mg	2mg
Tendon sheaths		US	5mg	10mg	20mg	1mg

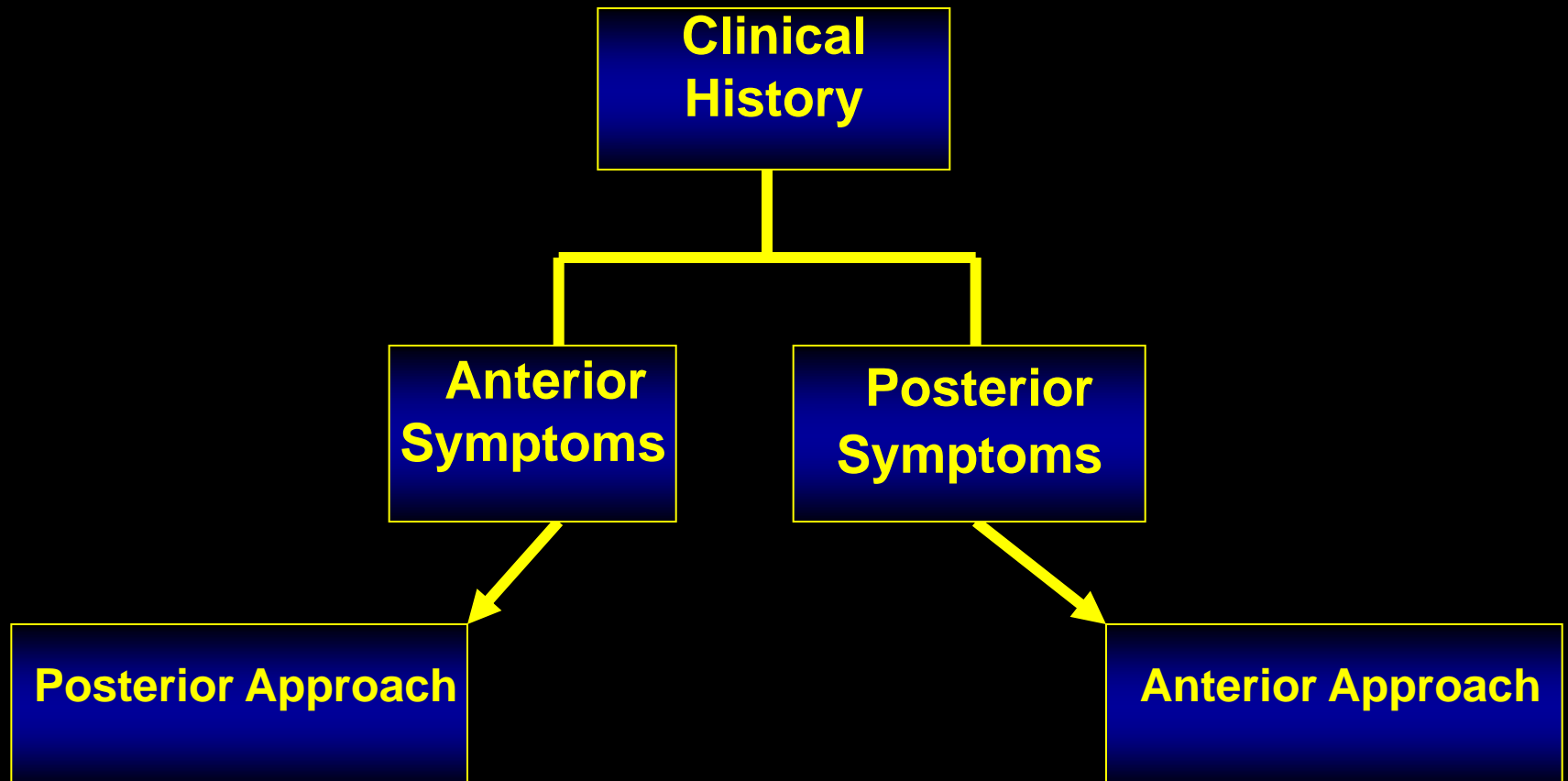
Double this is maximum at one time, can be repeated after 3/12

Shoulder Arthrography Indications

- RCT
- Labral pathology
- Synovitis
- Adhesive capsulitis



Tailored Approach to MR Arthrography

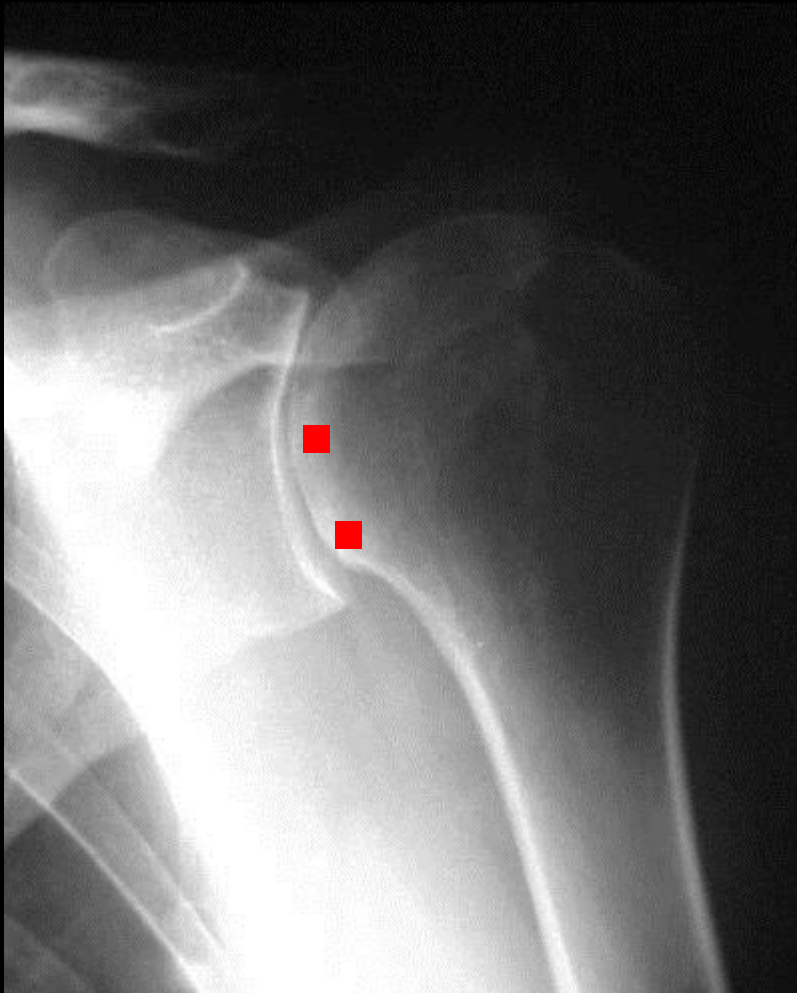


Standard Anterior Approach

- Patient supine
- Arm external rotation
- Weight

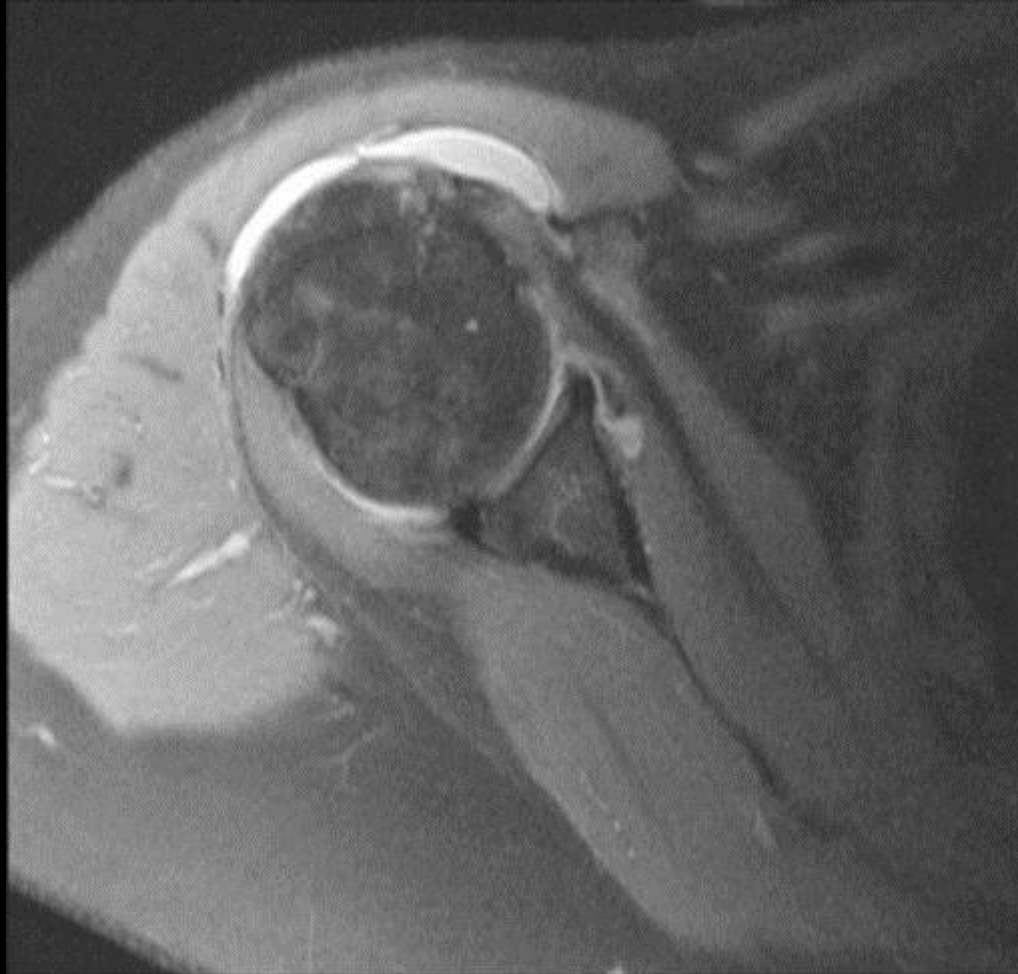


Shoulder Arthrography Technique



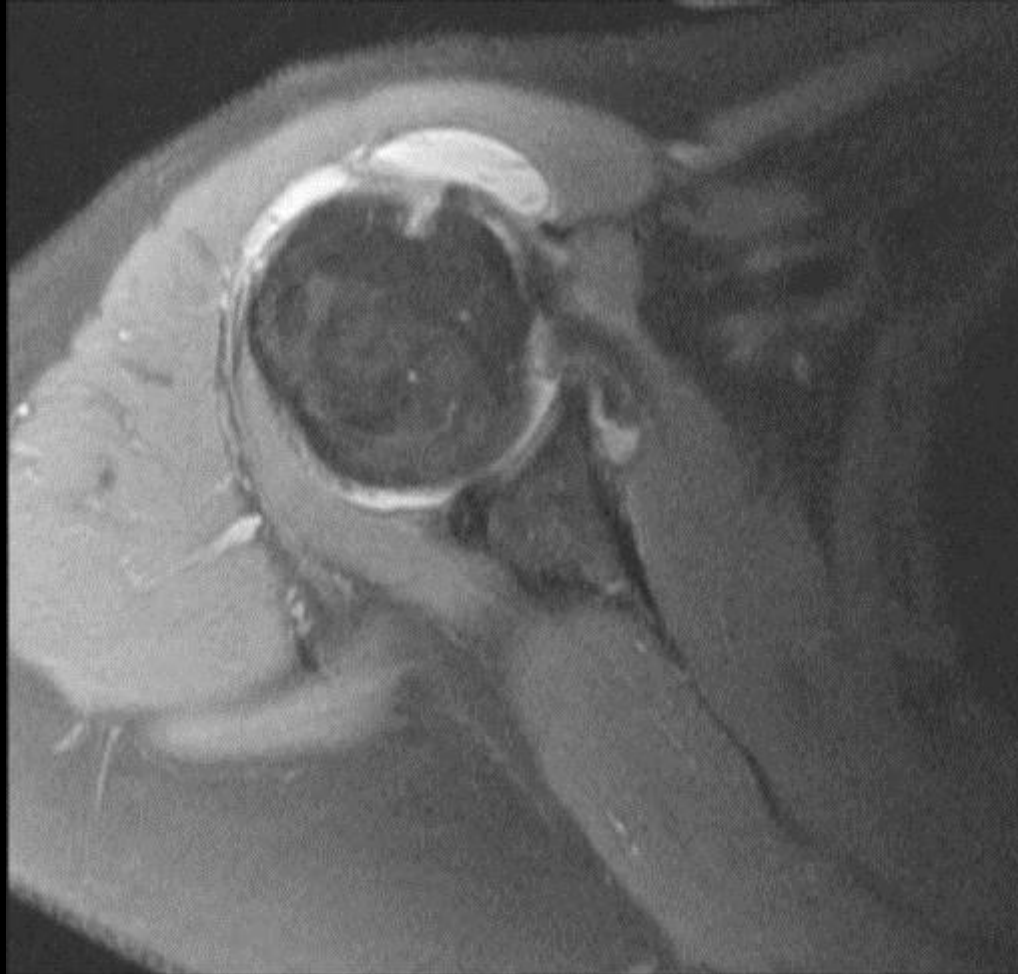
- Anterior approach
 - External rotation
 - Keep below subcoracoid bursa
- Posterior approach
 - Internal rotation
- Rotator interval approach
 - ER
 - Stay medial to biceps

Subdeltoid effusion to explain reason for low approach to joint



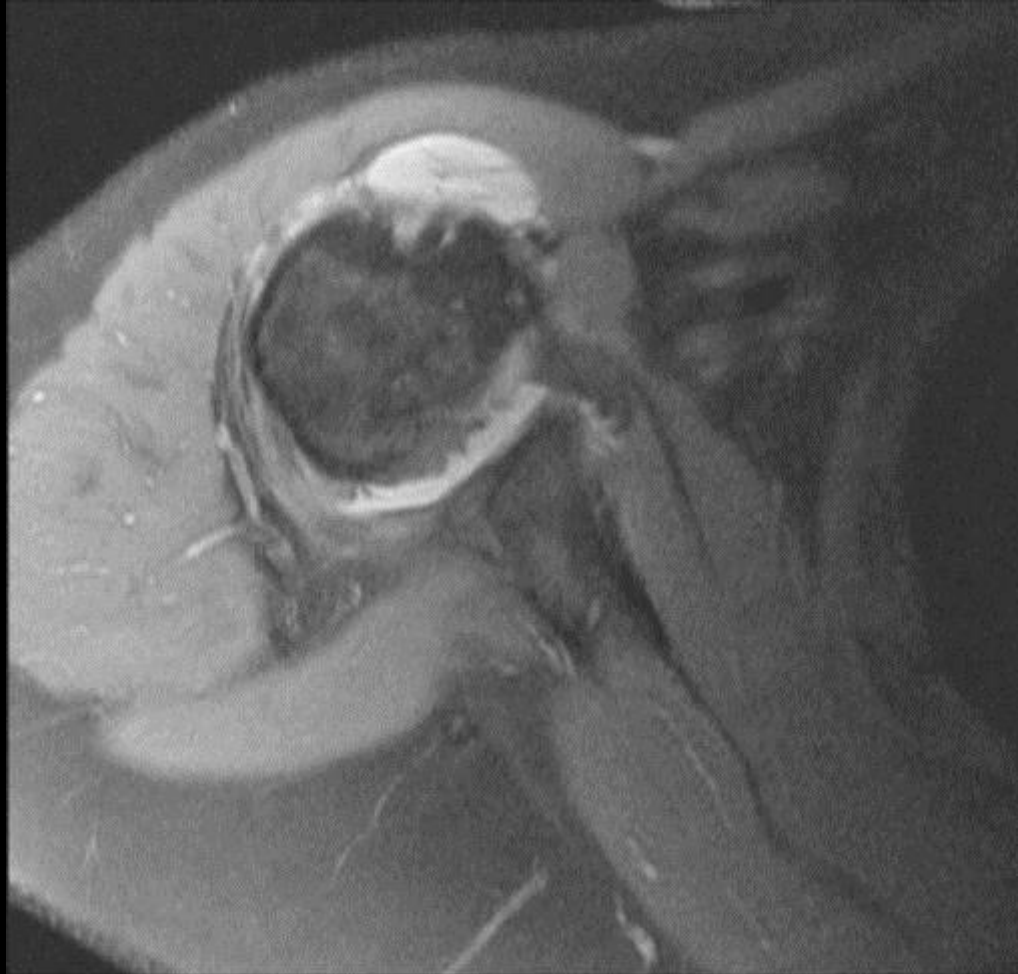
W 1121 : L 360

Subdeltoid effusion to explain reason for low approach to joint



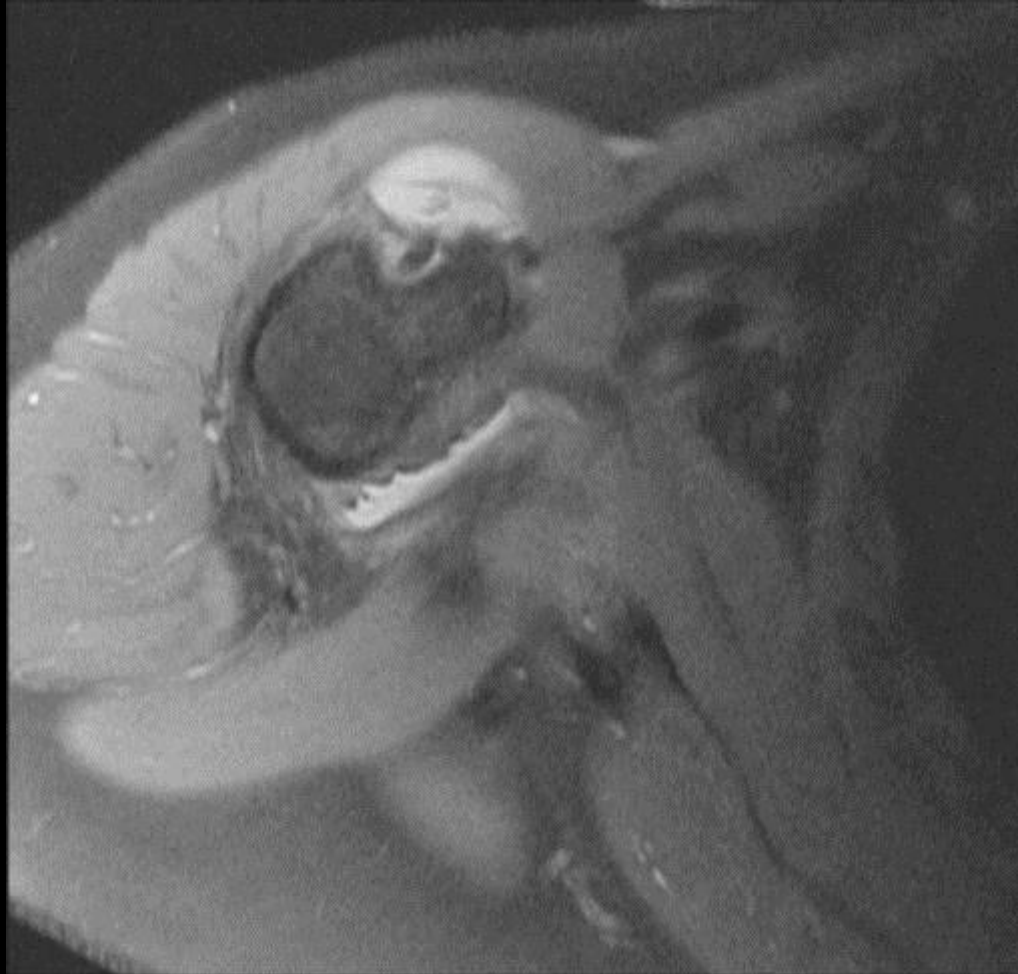
W 1121 : L 360

Subdeltoid effusion to explain reason for low approach to joint



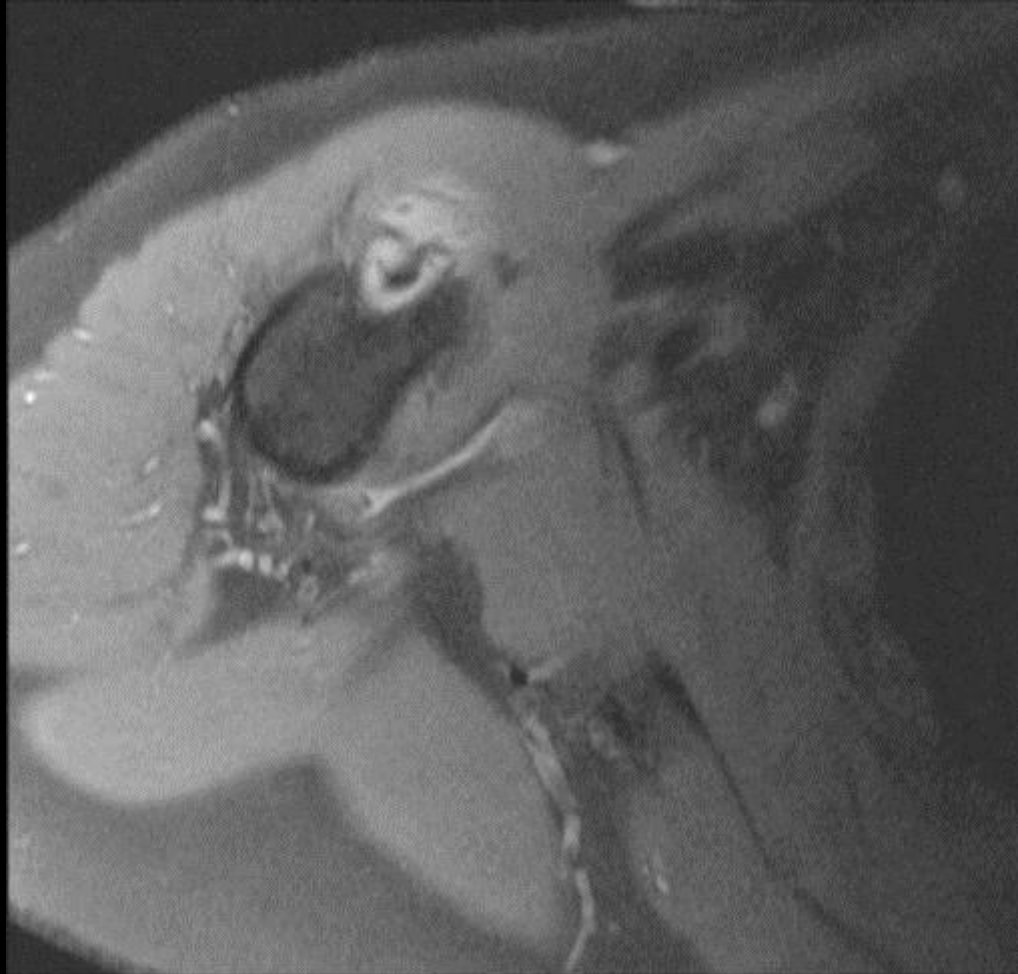
W 1121 : L 360

Subdeltoid effusion to explain reason for low approach to joint



W 1121 : L 360

Subdeltoid effusion to explain reason for low approach to joint



W 1121 : L 360

Subdeltoid effusion to explain reason for low approach to joint

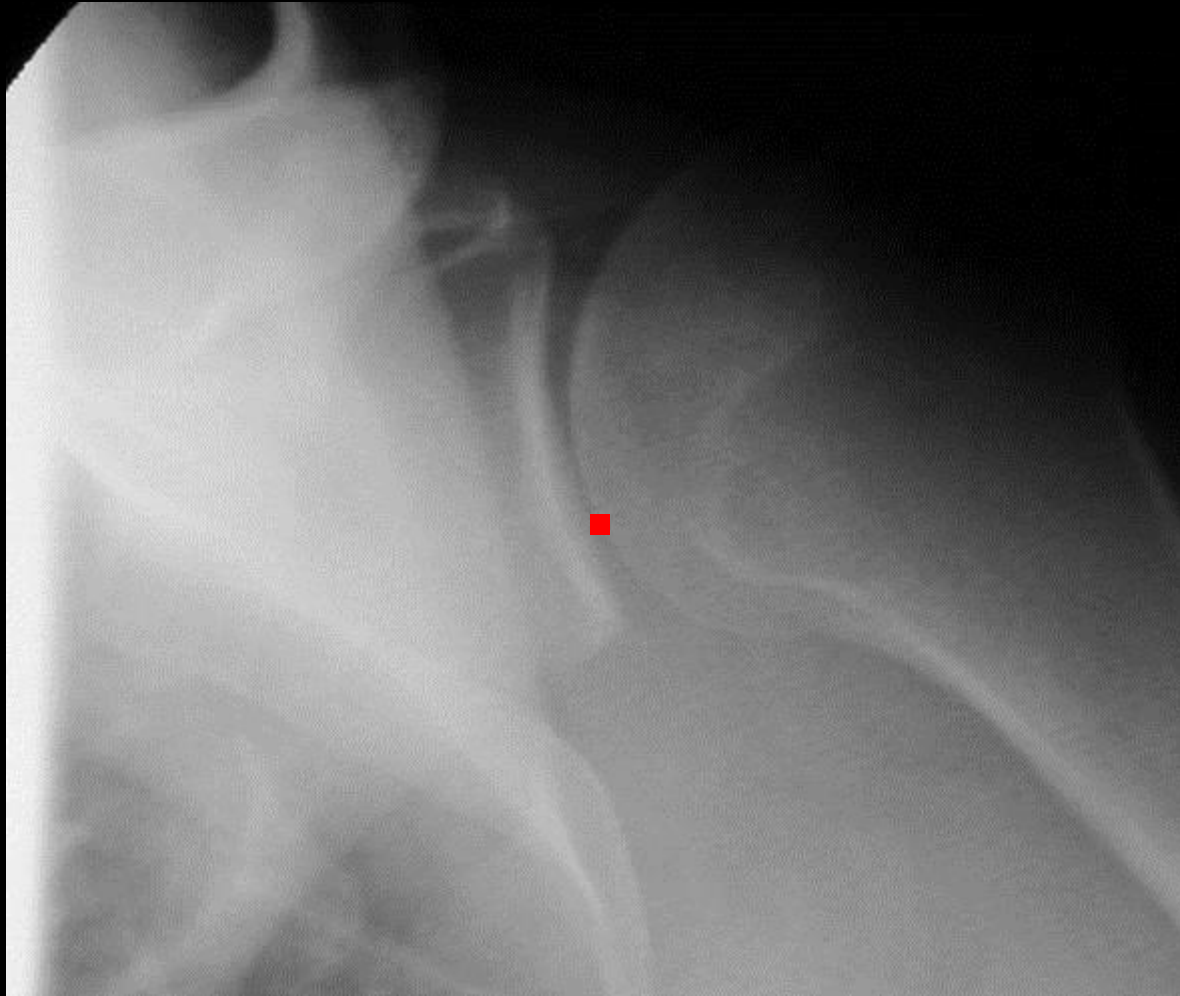


W 1121 : L 360

Posterior Approach

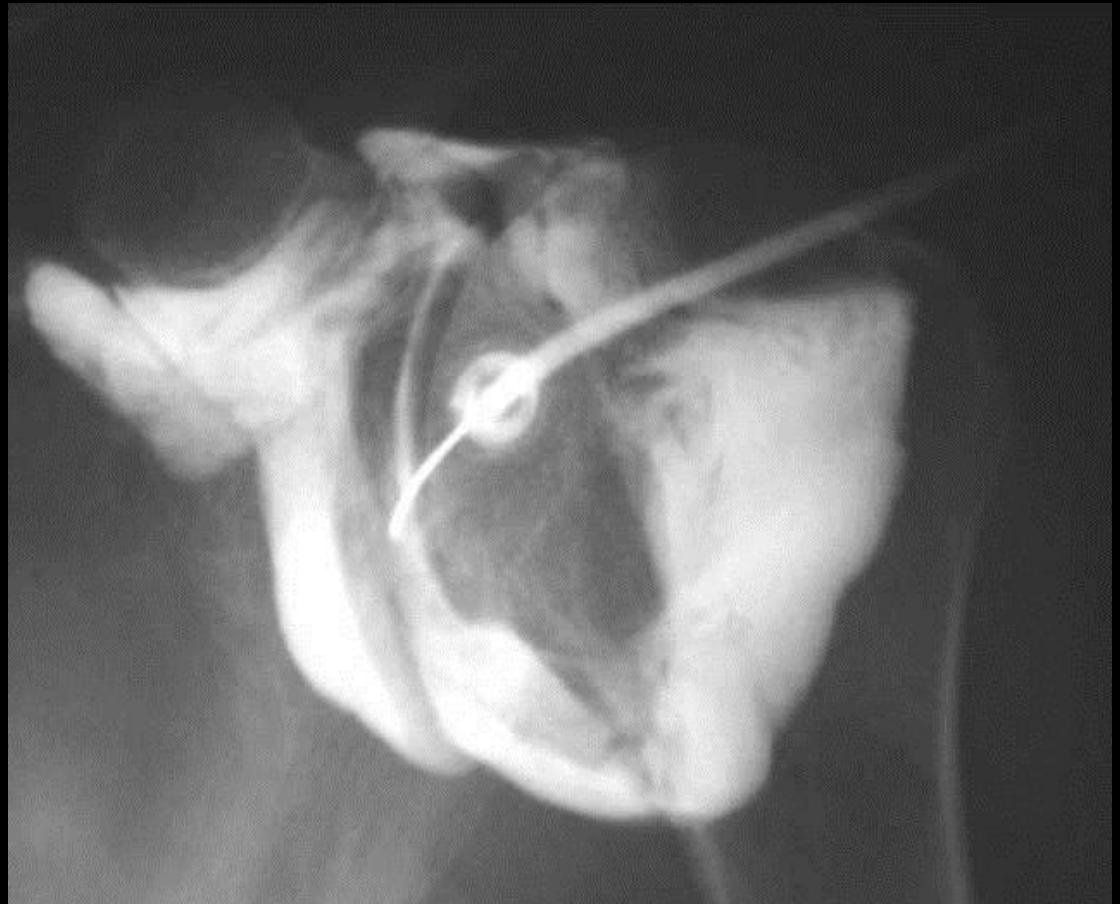


Posterior Approach



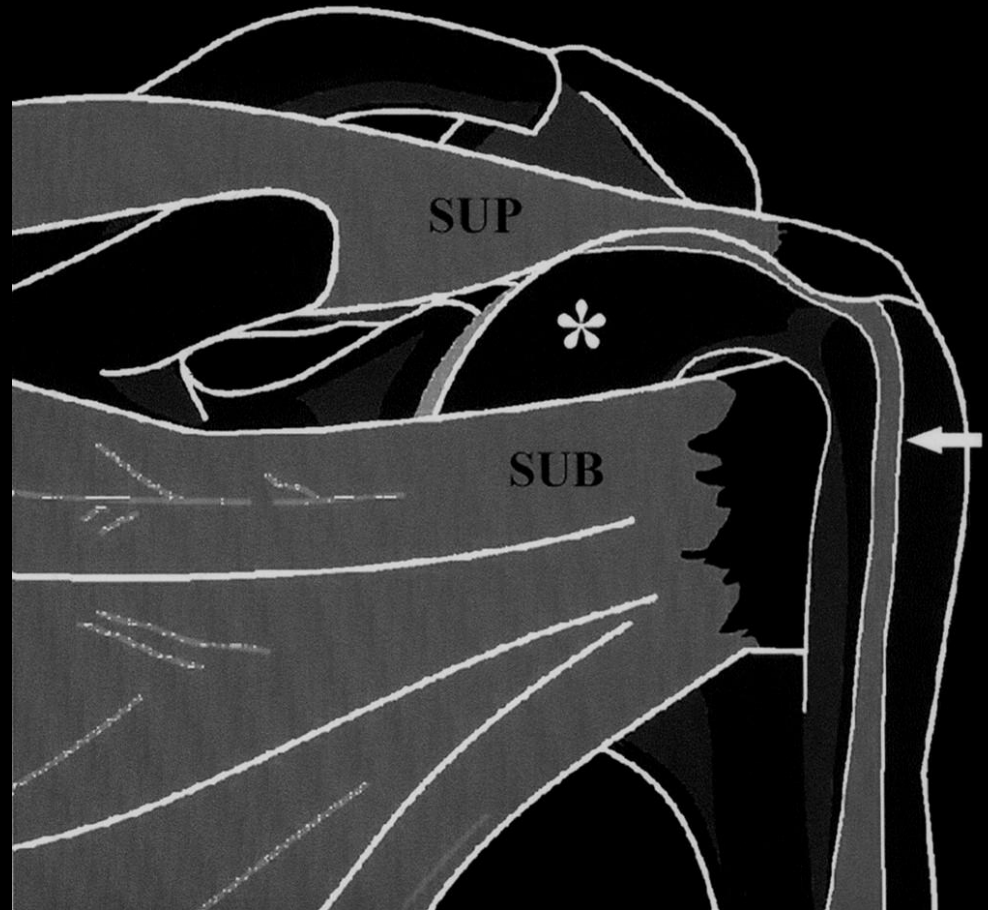
Posterior Approach Arthrography

- Posterior approach right shoulder



Rotator Interval Approach

- Easy
- 38mm needle
- Less pain



Rotator Interval Approach

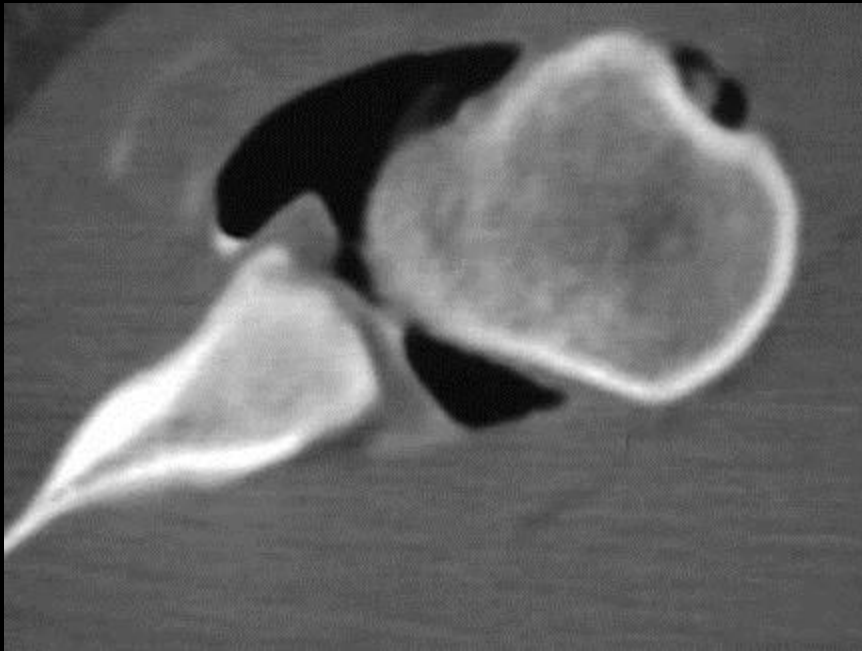


Shoulder Arthrography Radiography

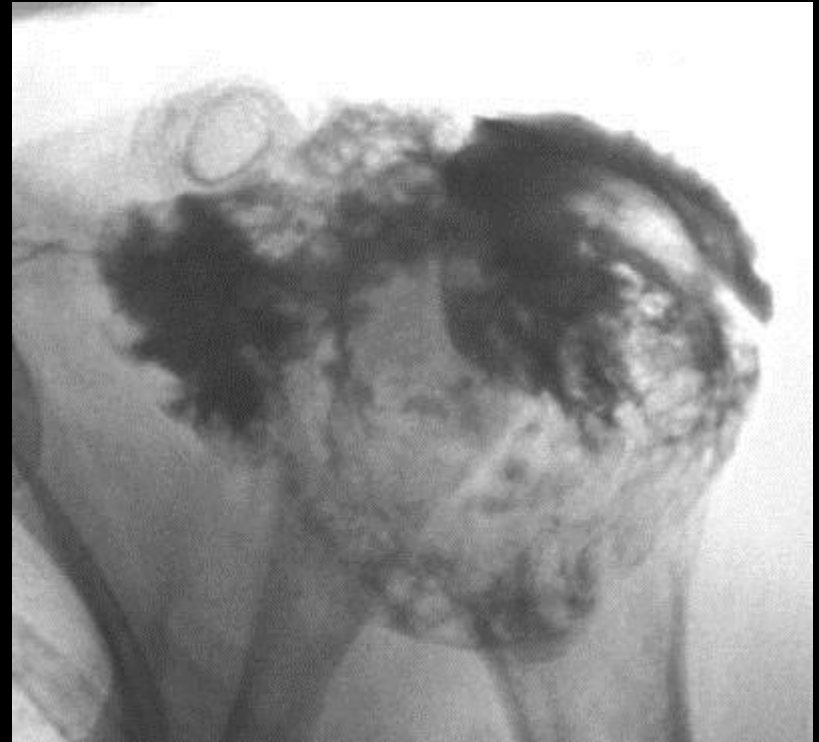


- AP + caudal
 - IR
 - ER
 - Traction
 - Abduction
- Lateral Y

Shoulder Arthrography - Pathology



Bony Bankart

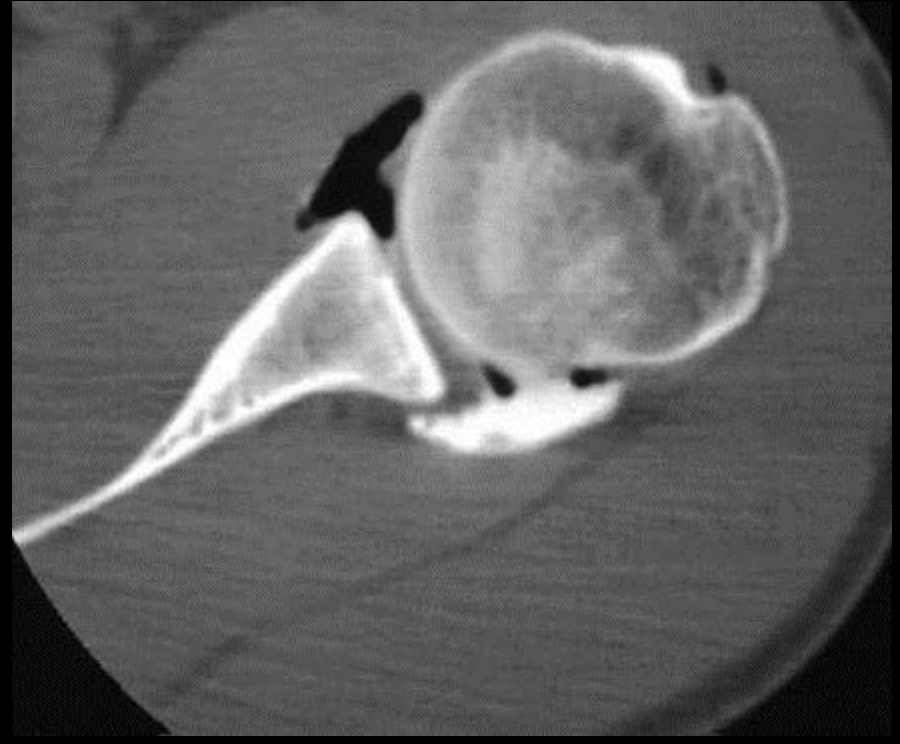


RhA

Shoulder Arthrography - Pathology

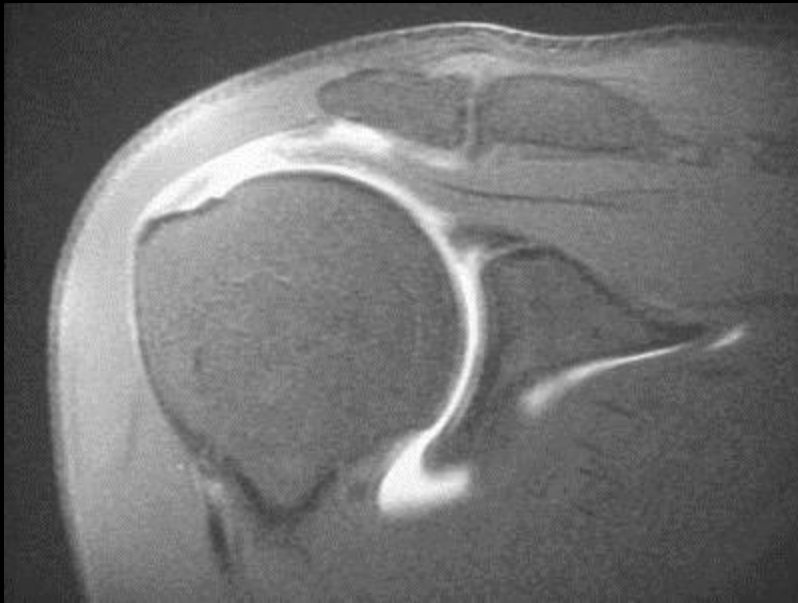


Hill Sachs



Soft Tissue Bankart

Shoulder Arthrography - Pathology

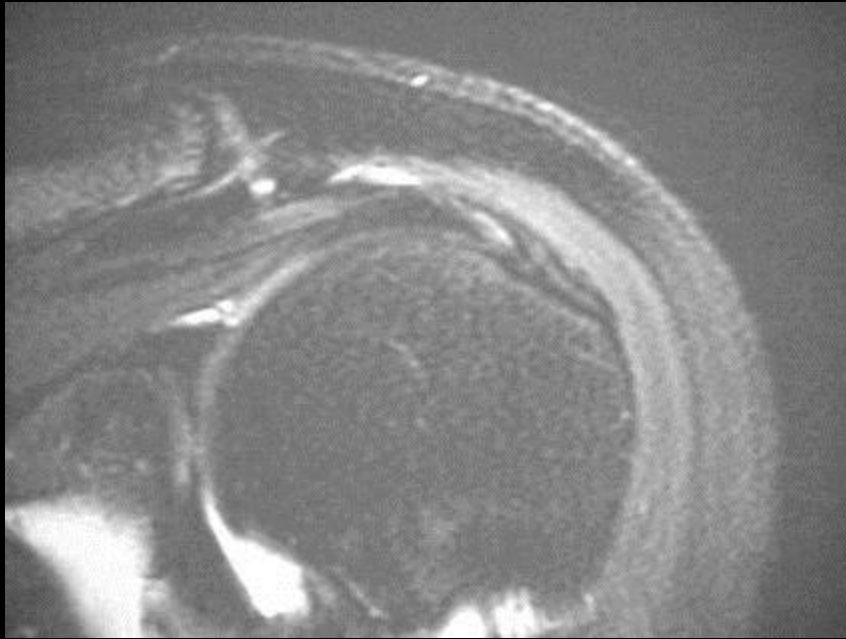


RCT



Normal RC

Shoulder Arthrography - Pathology

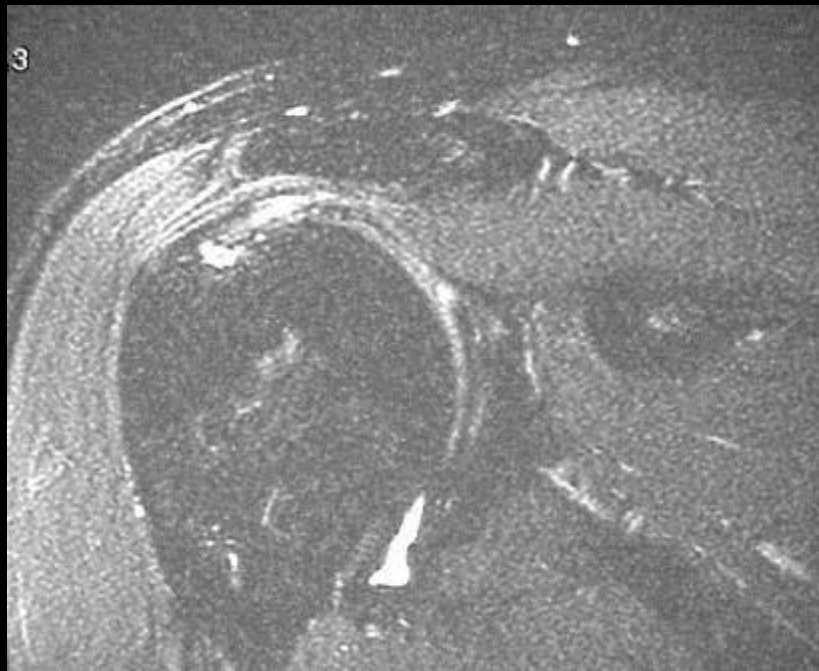


Cor T2FS

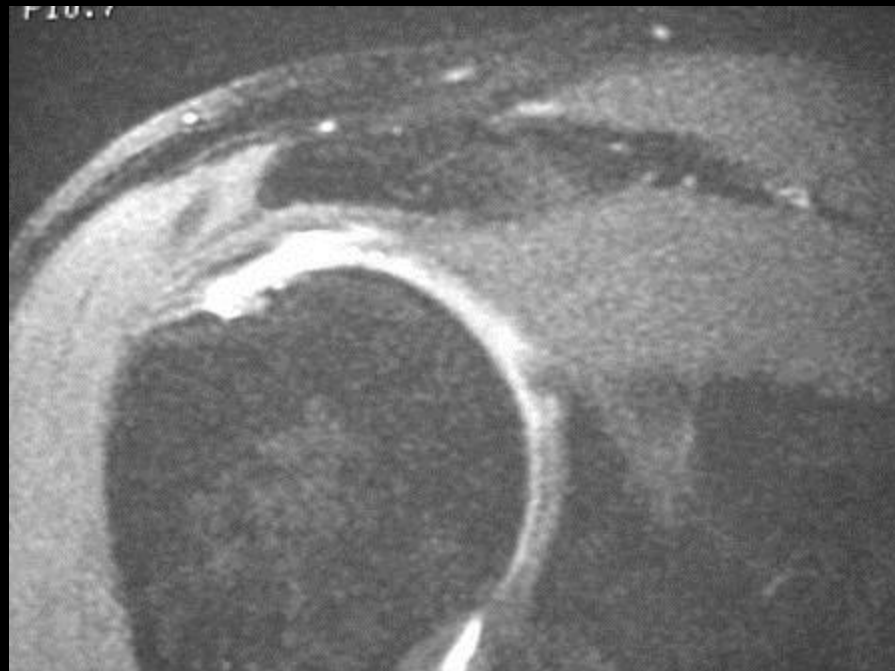


Cor T1FS IA Gd

Shoulder Arthrography - Pathology



Cor T2FS



Cor T1FS IA Gd

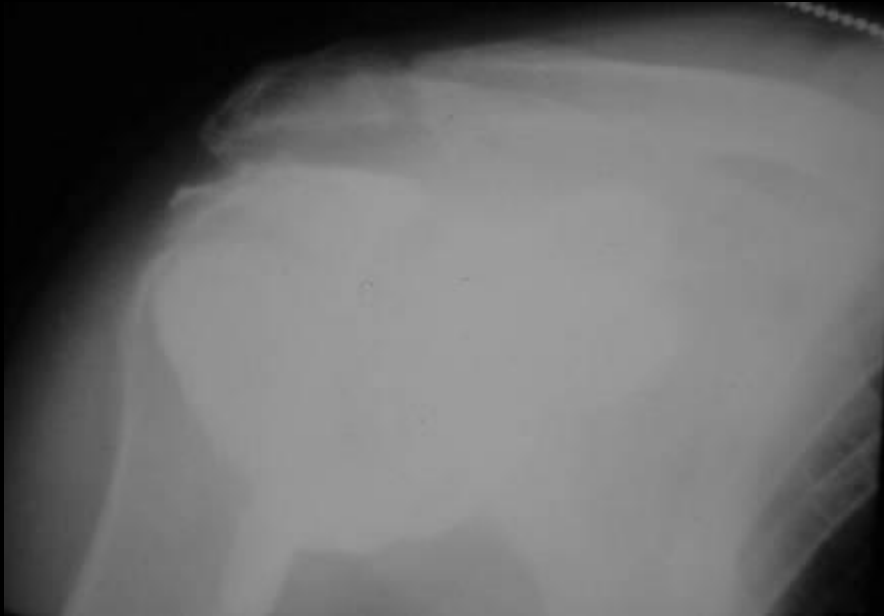
Partial undersurface tear infraspinatus

Shoulder Arthrography - Pathology

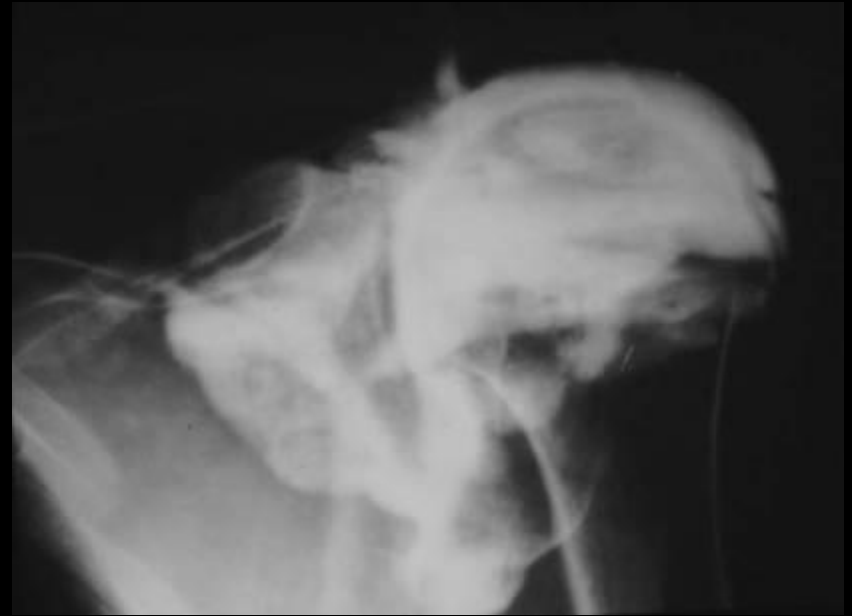


Old surgical neck Fx IM contrast

Shoulder Arthrography - Pathology



Partial undersurface RCT



RCT

Shoulder Arthrography - Pathology



Adhesive capsulitis

MRI Arthrography - ABER

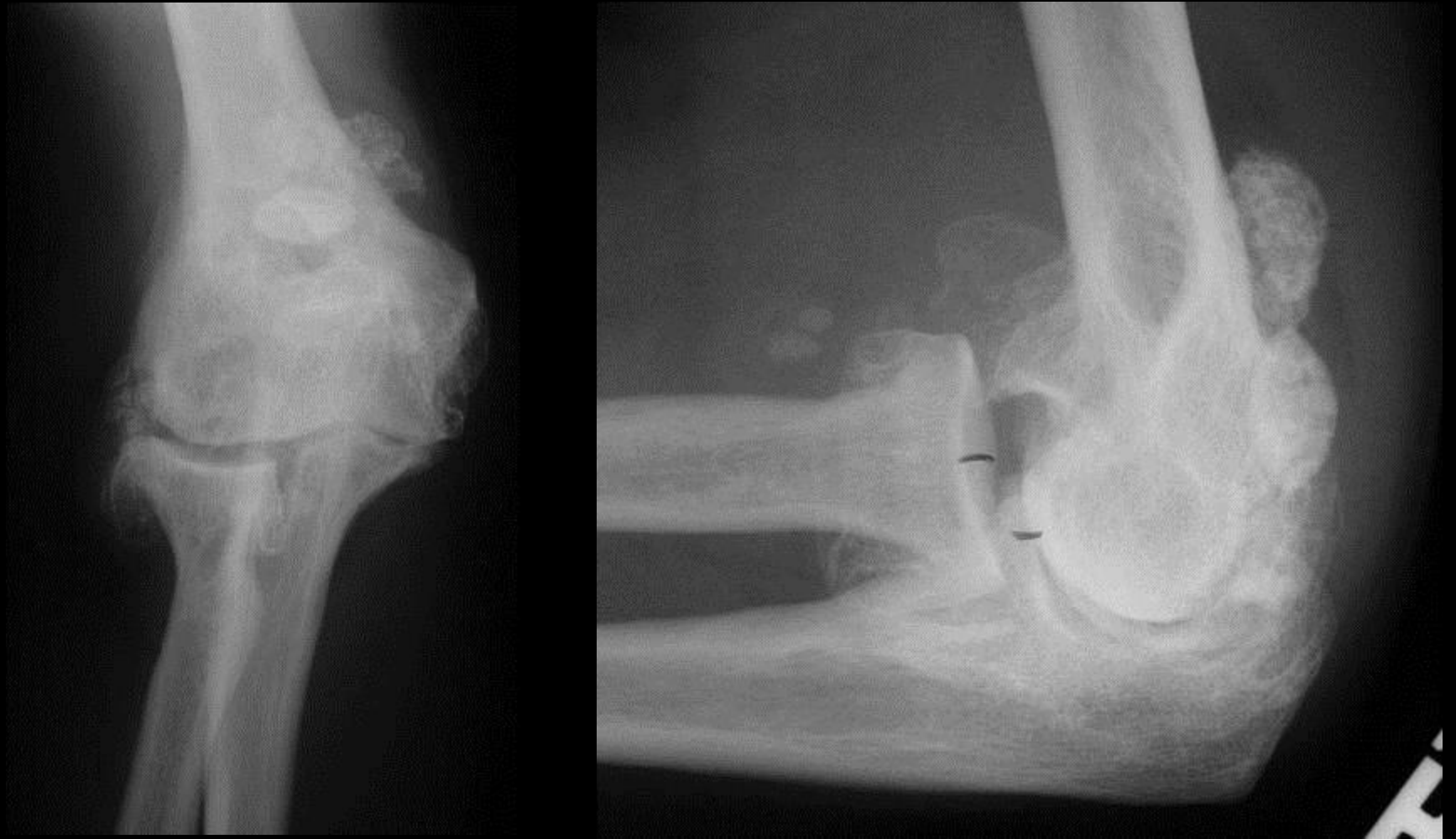


Elbow Arthrography Indications

- IA bodies
- Internal derangement



Elbow Arthrography Indications



Elbow Arthrography Technique

- Hand on tummy
- Neutral rotation
- Pad under elbow
- 38mm 21-23G



Elbow Arthrography Technique

- Prone
- Arm above head



Elbow Arthrography Technique

- Sitting on chair
- Arm on table



Elbow Arthrography - Pathology

- AP
- Lateral



IA bodies



RhA synovial cyst

Elbow Arthrography CT

- Arm above head
- Avoid scanning in plane of radius and ulna
- Scan all injected contrast + or –
- 1 mm
- Recon all 3 orthogonal planes
- Less good – arm by side

Elbow Arthrography - Pathology



Synovial osteochondromatosis

Wrist Arthrography Indications

- Internal derangement
 - TFCC
 - SLL
 - LTL



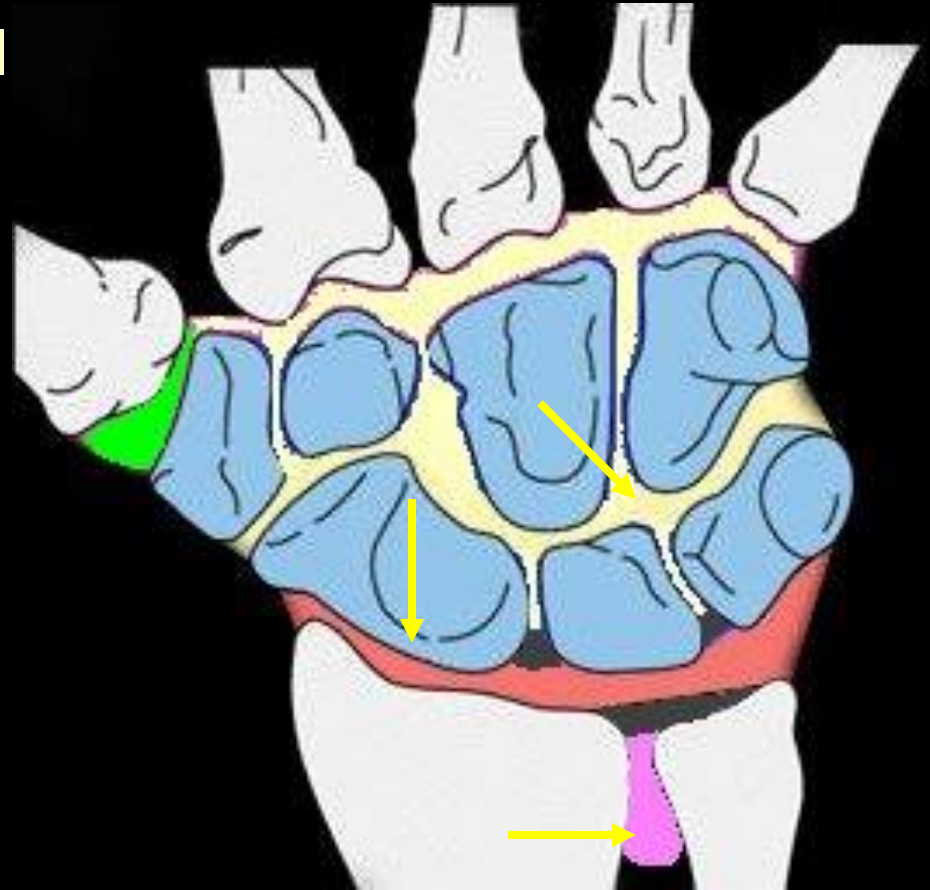
Wrist Arthrography Indications

- Intercarpal ligaments
- Triangular fibrocartilage
- Scaphoid nonunion
- Soft tissue ganglia
- Wrist prosthesis



Wrist compartments

- First carpometacarpal
- Midcarpal, which communicates with common carpometacarpal
- Radiocarpal
- Distal radioulnar



Target sites

Wrist arthrography

- Controversy about which compartments and how many compartments need to be injected
- Most common single injection is radiocarpal



Wrist arthrography

Technique 1



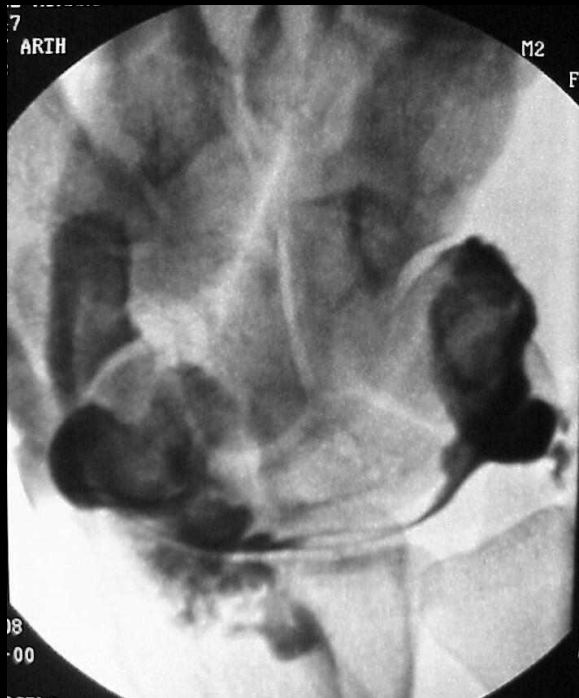
Wrist arthrography

Technique 2



Wrist arthrography

Technique 3



Palmar flexion



Radial deviation



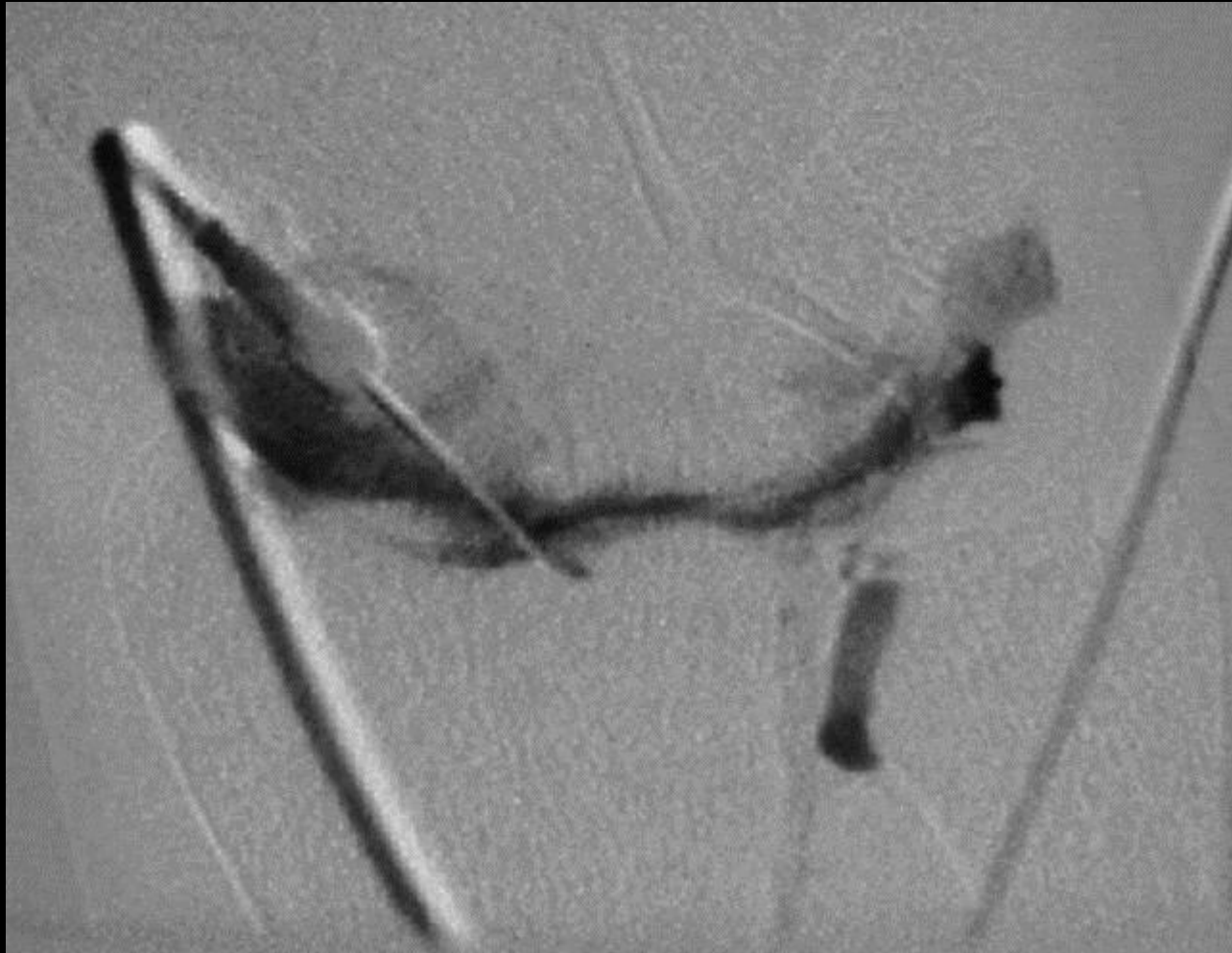
Ulna deviation

Normal study

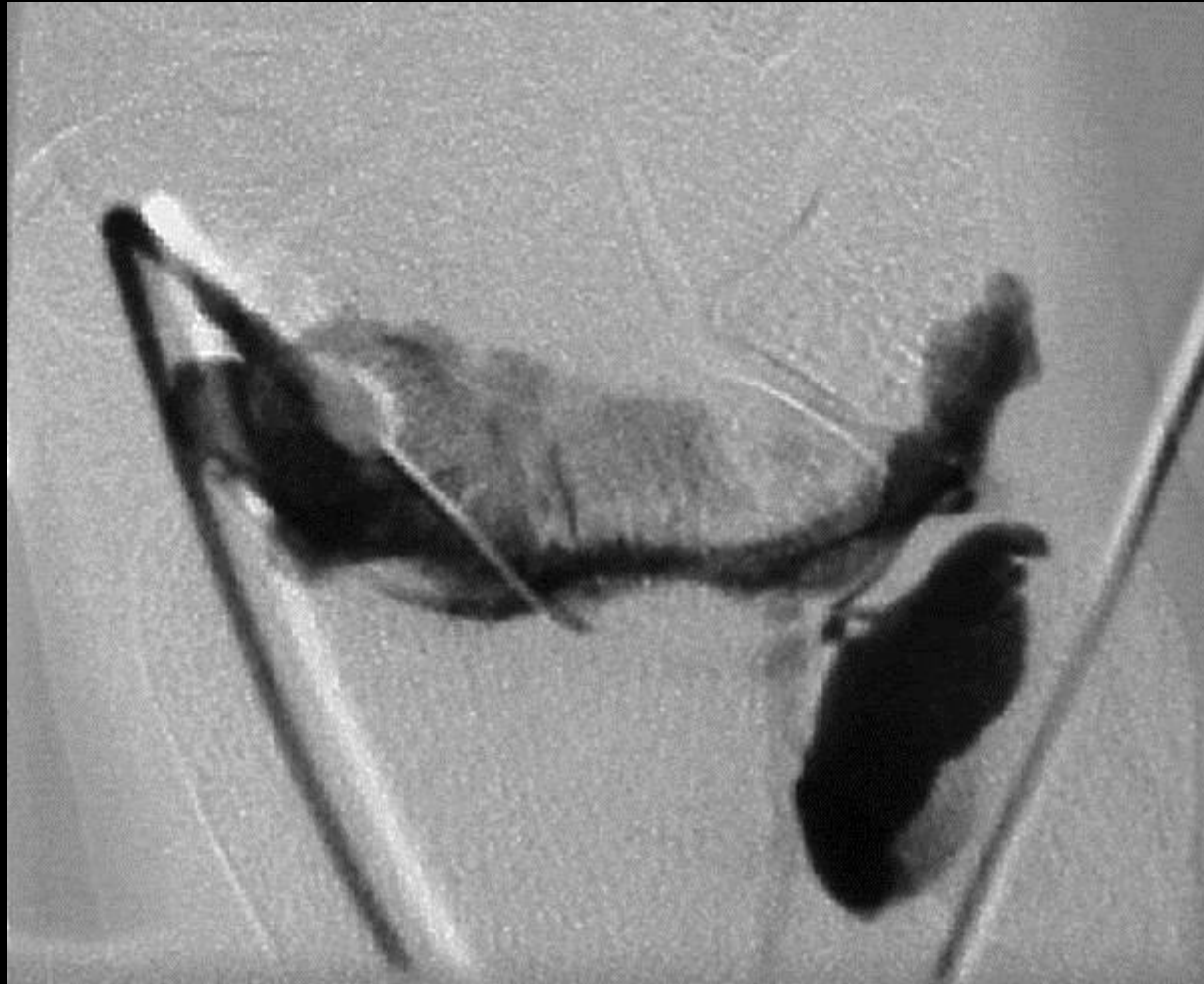
Wrist Arthrography - DSA



Wrist Arthrography - DSA



Wrist Arthrography - DSA



Wrist Arthrography - DSA

1. Ratio: 10.0

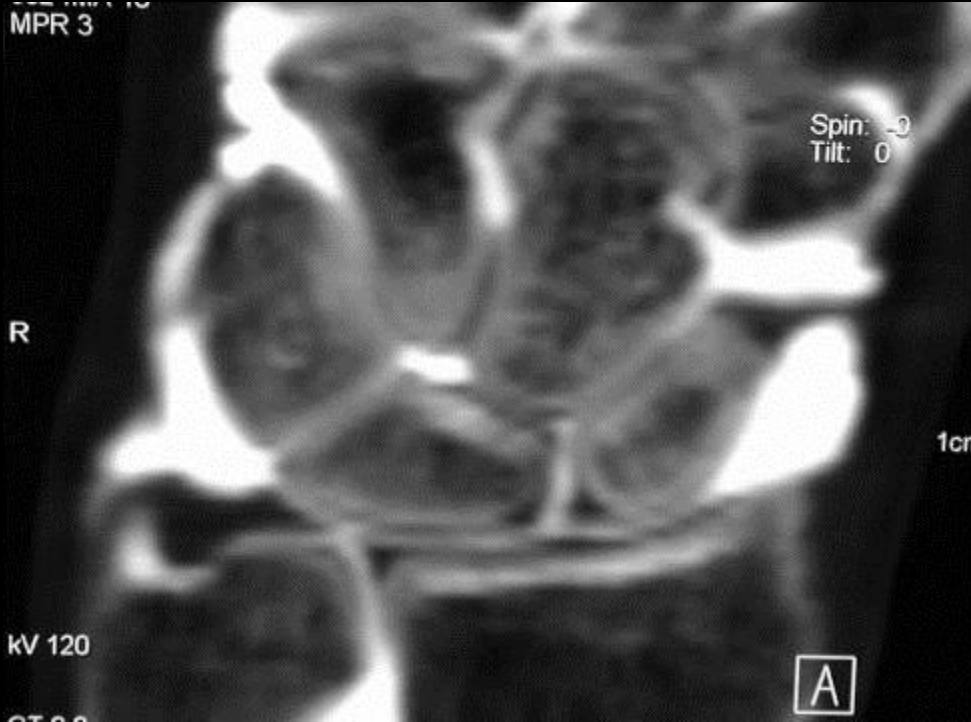


Wrist Arthrography - DSA

1. Ratio: 10.1



Wrist Arthrography



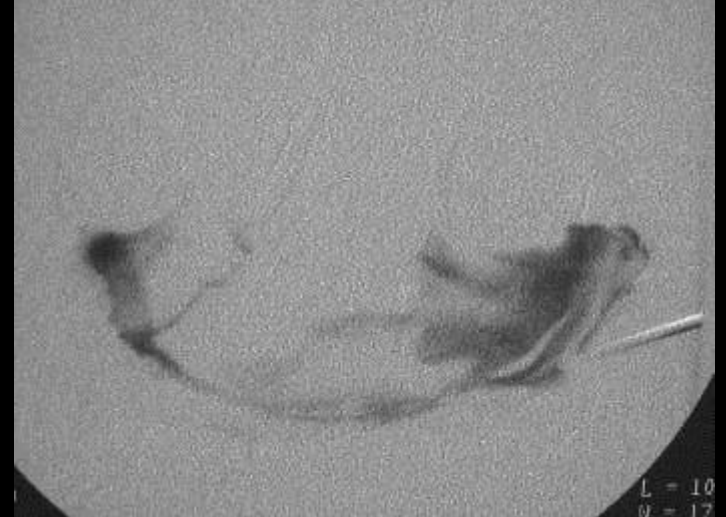
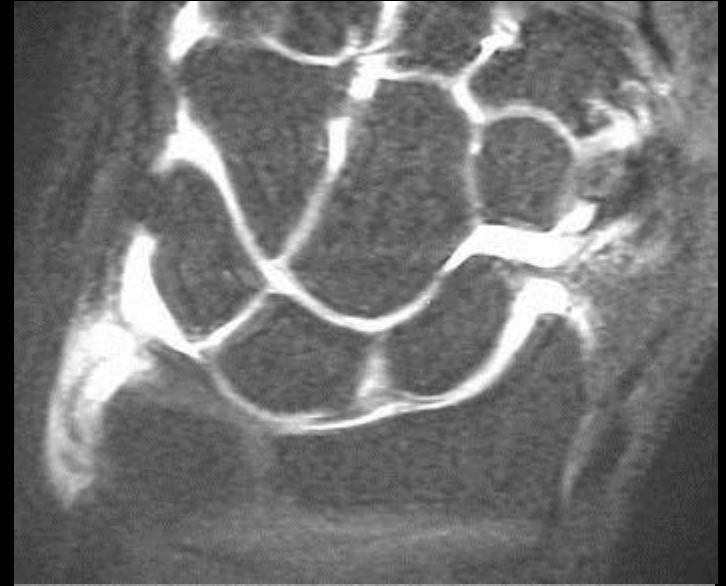
CT arthrography



MR arthrography

Arthrographic technique

- Radioscaphoid
- Always obtain plain film series
- DSA 1 frame/sec preferred



Wrist Indirect Arthrography

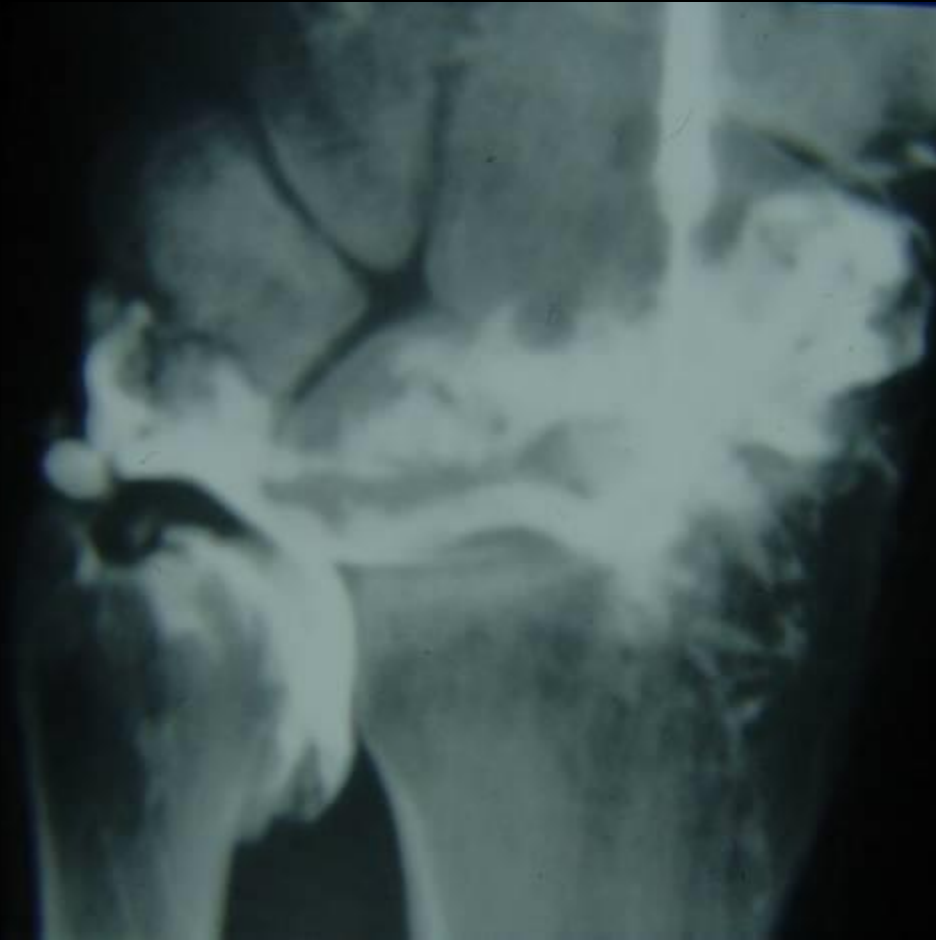


Cor T2FS



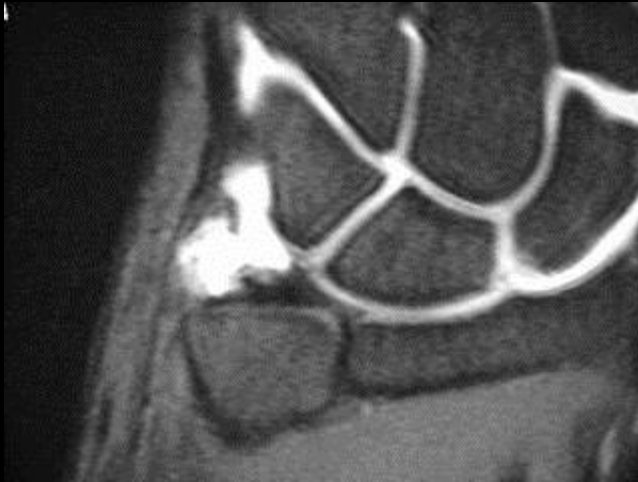
Cor T1FS IV Gd

Wrist Arthrography - Pathology



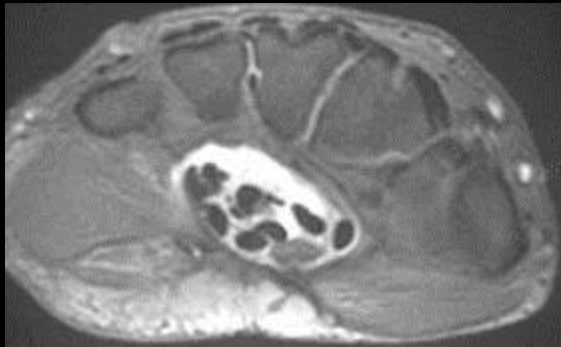
Gout synovitis

Wrist Arthrography - Pathology



TFCC ulna disruption T1FSGd

Wrist Arthrography - Pathology

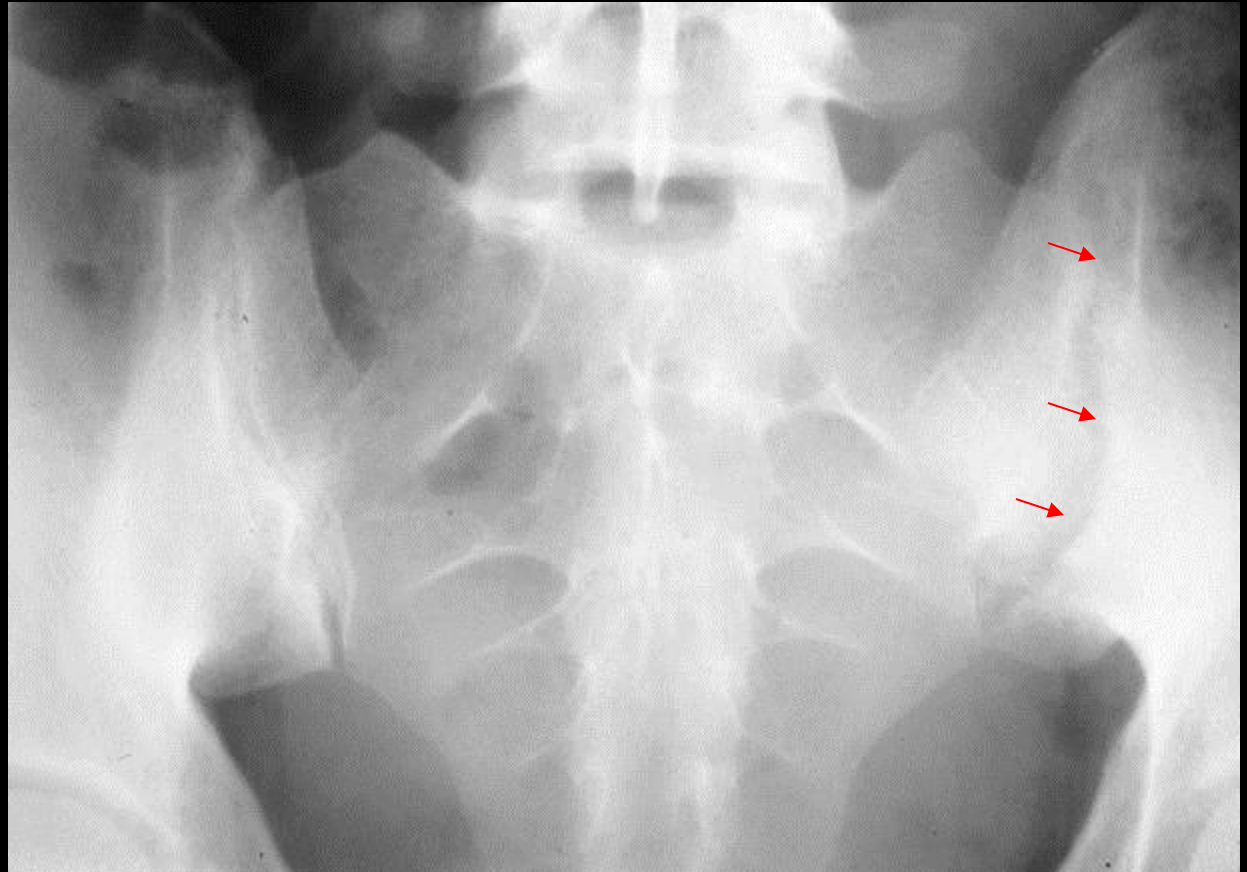


TFCC name origins



SIJ Arthrography Indications.

- Usually steroid injection, or aspirate for infection



SIJ Arthrography Technique

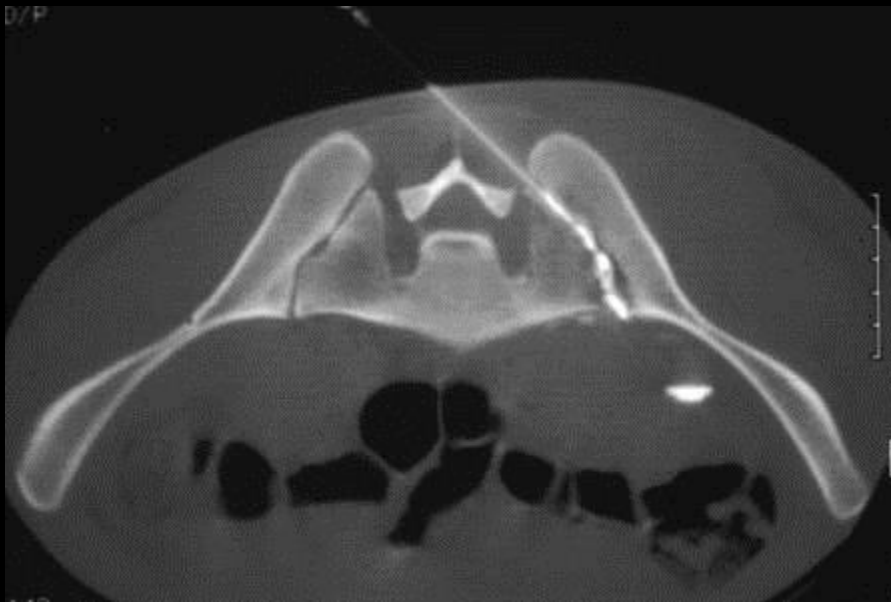
- Remember anatomy
- Joint close together posterior
- Wide apart anterior
- Patient prone
- Roll onto side of interest to line up joint
- Aim for inferior joint



SIJ septic arthritis with psoas abscess

SIJ Radiography

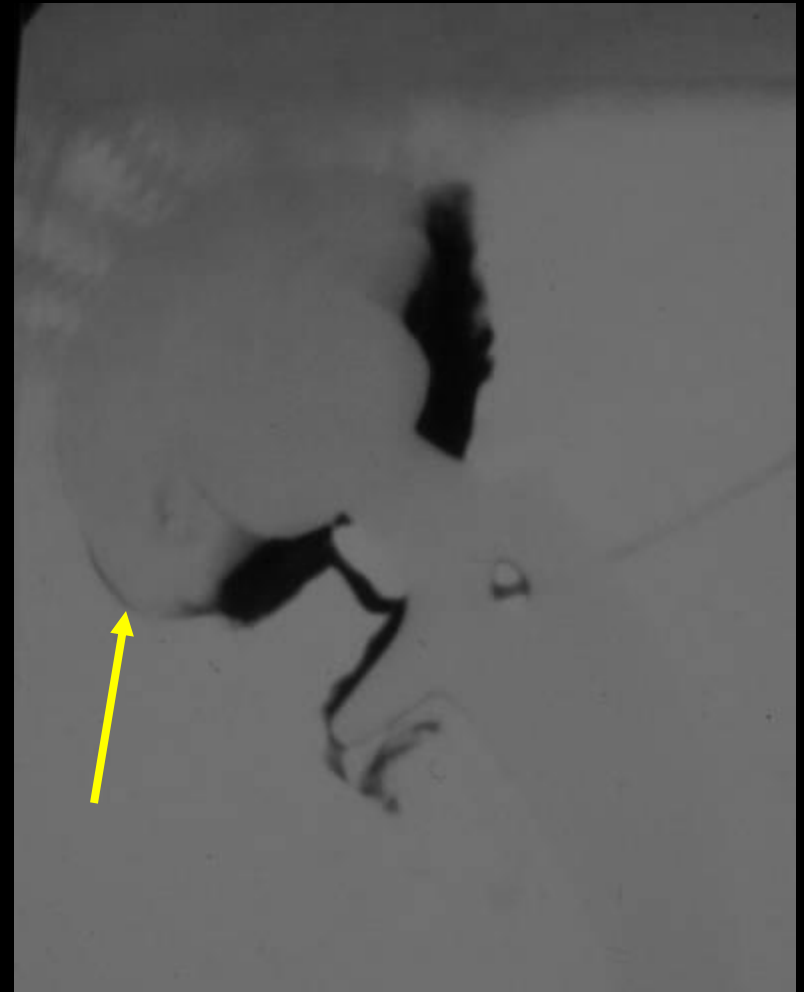
- Radiography
 - Show distribution of contrast
- CT
 - Joint top to bottom
 - + any extravasated contrast



SIJ septic arthritis with psoas abscess

Hip Arthrography Indications

- Labral pathology with MRI
 - Tear
 - Paralabral cyst
 - DDH
- Post THR for loosening/infection
- Fistula confirmation
- Intraarticular bodies



Indications

- Infection
- Pain
 - Diagnosis
 - Before MRI
 - Lidocaine
 - (Loosening)
 - Treatment
 - Steroid injection

Hip MR Arthrography - Indications

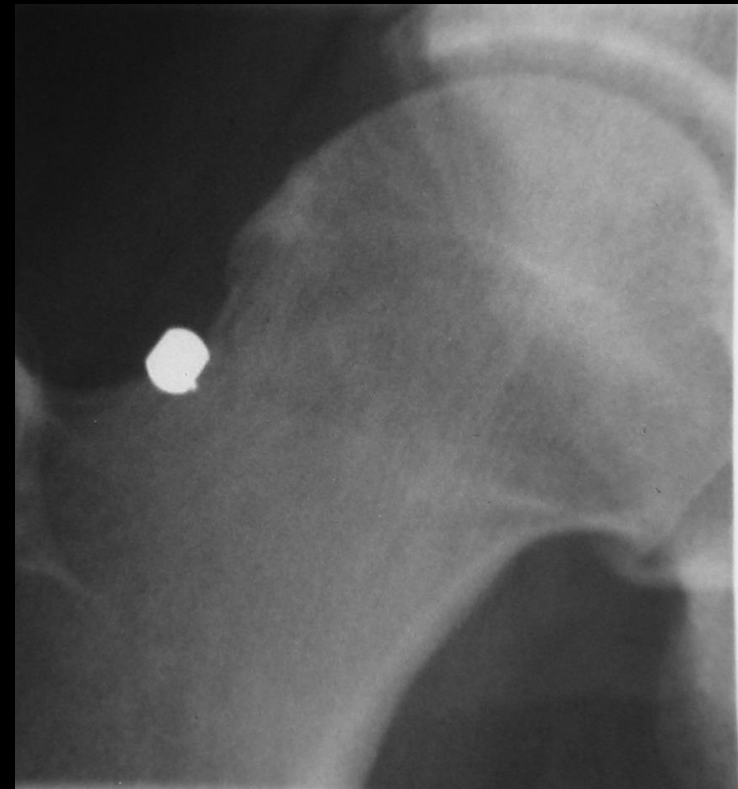
- Labral tear
- Paralabral ganglion
- Preoperative assessment of DDH
- Intraarticular bodies



Normal

Hip Arthrography - Positioning

- Patient supine
- 15 degrees internal rotation of the hips
 - Toes taped together
- Knees slightly bent
 - Pillow under the knees



Lateral approach

Hip Arthrography - Technique

- Feel artery
- Draw artery on skin
- Nerve lateral to artery
- Mark mid neck
- Mark intertrochanteric
- Aim in line of femoral neck

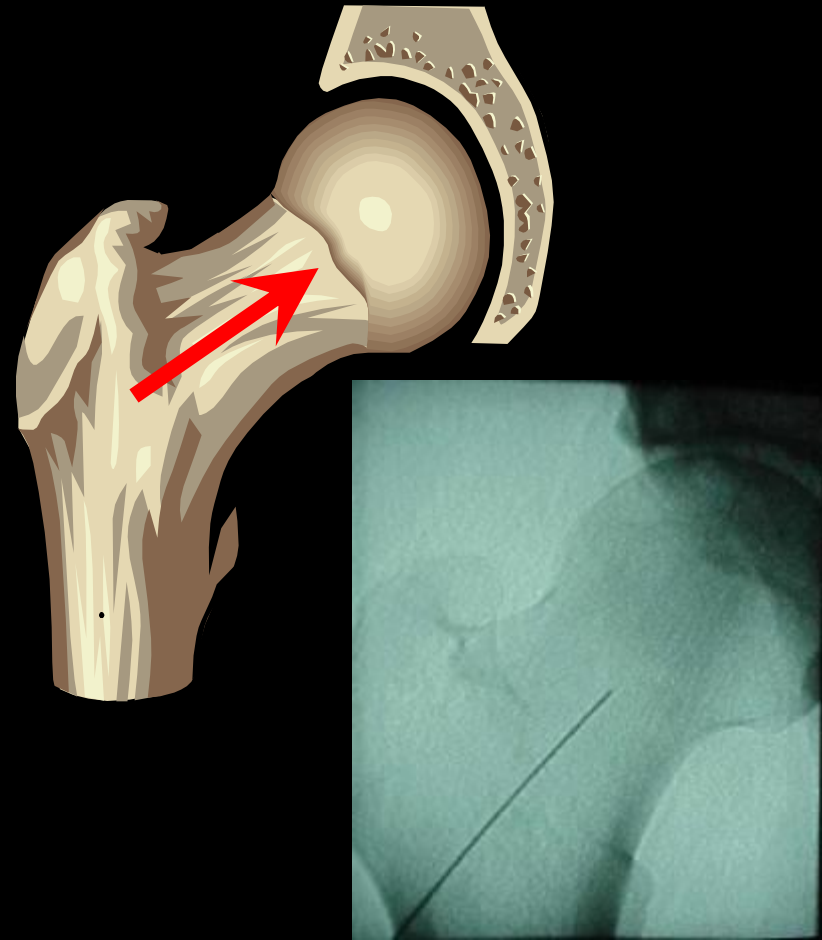


Needle

- Injection
 - 22G or 20G
- Aspiration
 - 20G or 18G

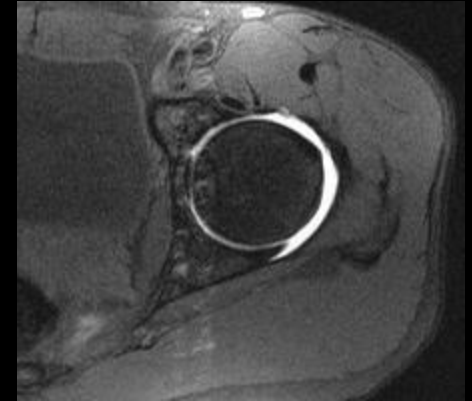
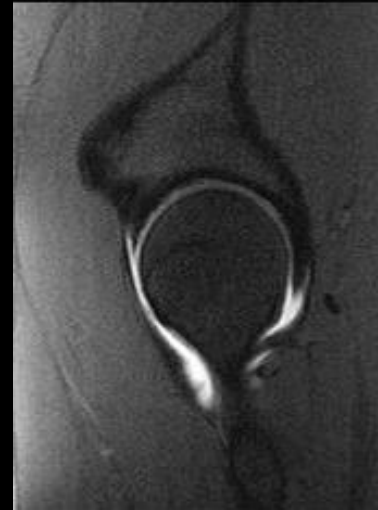
Hip Arthrography - Technique

- Local anesthesia
- Anterolateral approach to femoral head-neck junction
- Confirm needle position with <1 cc contrast
- Inject 12 cc of diluted Gd-DTPA



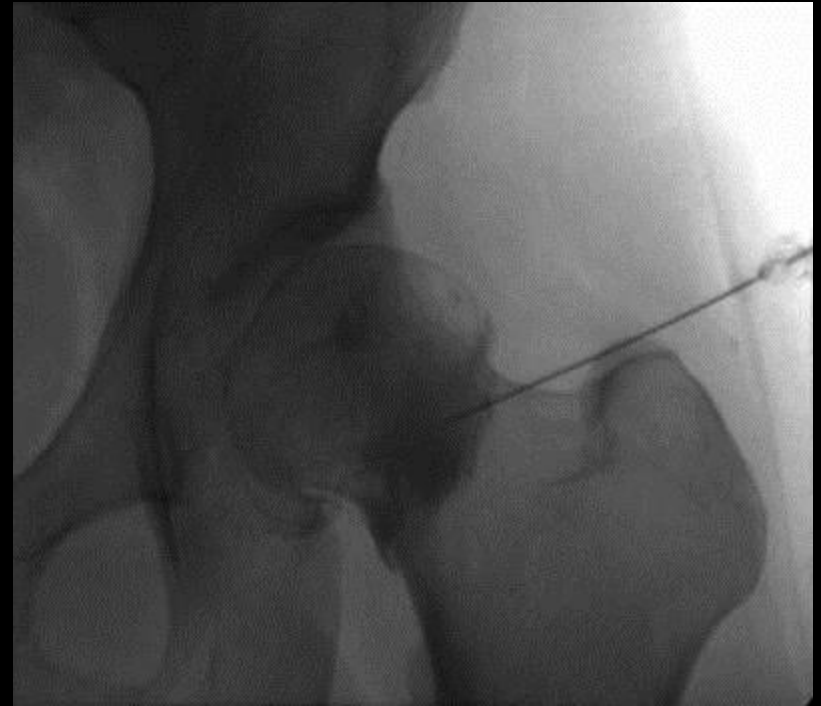
MR Hip Arthrography - Sequences

- Inject 12-15 cc of 1:200 Gd-DTPA
- 3 planes of imaging with T1 fat-sat
- Coronal IR or T2-w FSE



Hip Arthrography - Approach

- Lateral Oblique
- Inferior Oblique
- Medial
- Lateral

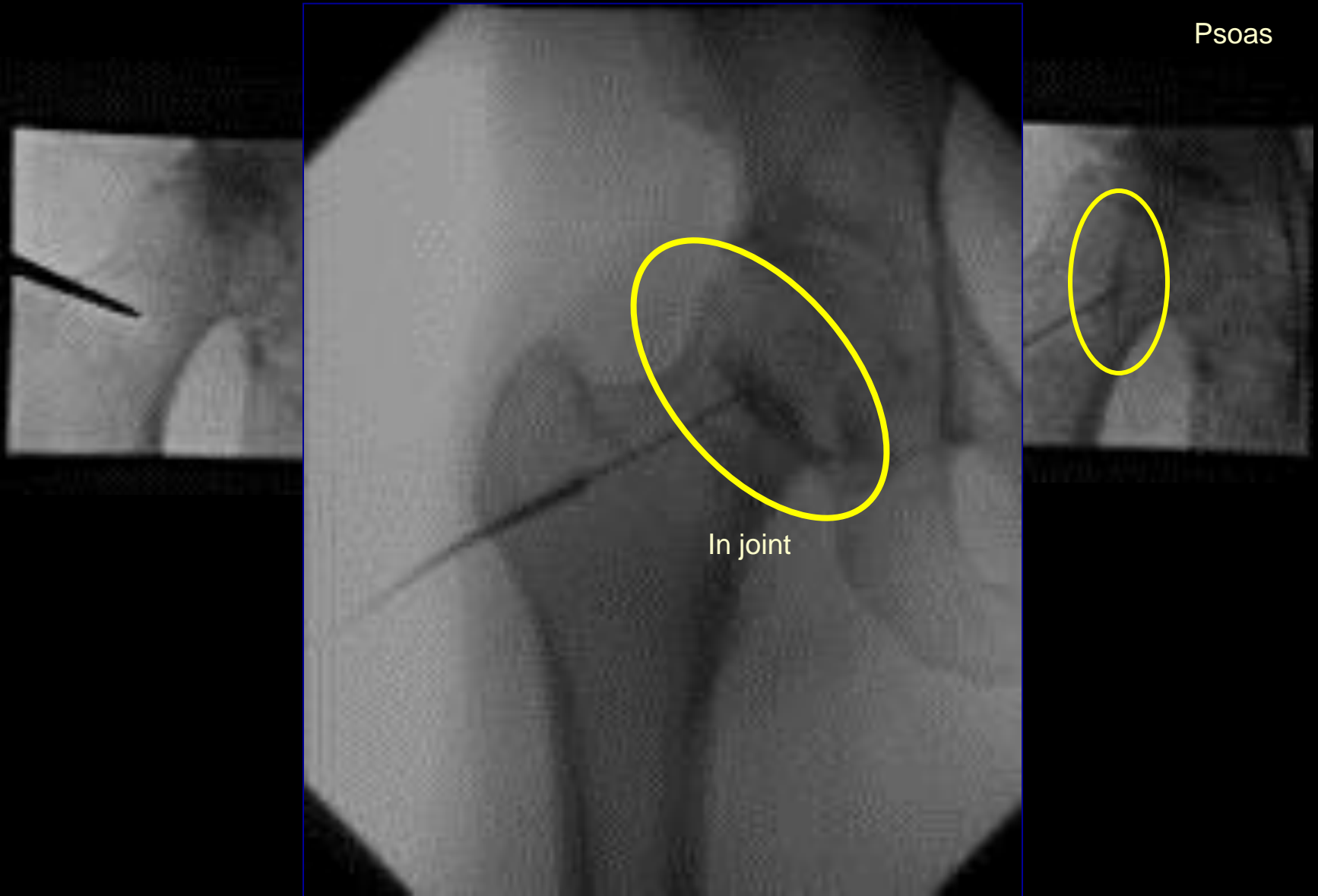


Hip Arthrography - Approach

- Lateral Oblique
- Inferior Oblique
- Medial
- Lateral



Oblique approach



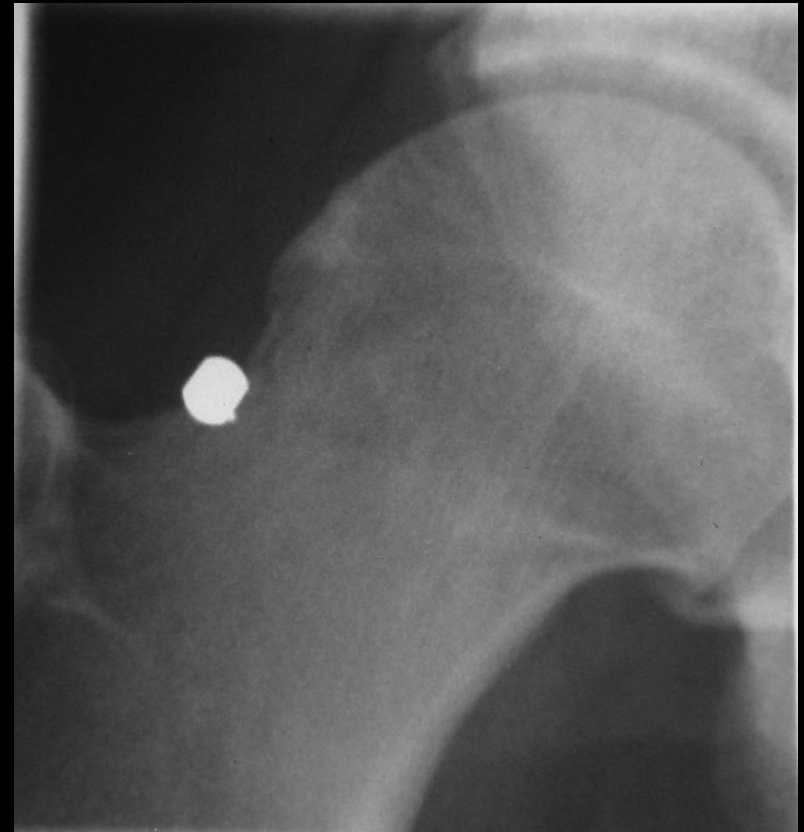
Hip Arthrography - Approach

- Lateral Oblique
- Inferior Oblique
- Medial
- Lateral



Hip Arthrography - Approach

- Lateral Oblique
- Inferior Oblique
- Medial
- Lateral



Less worry about femoral nerve and artery

Hip Arthrography - Radiography

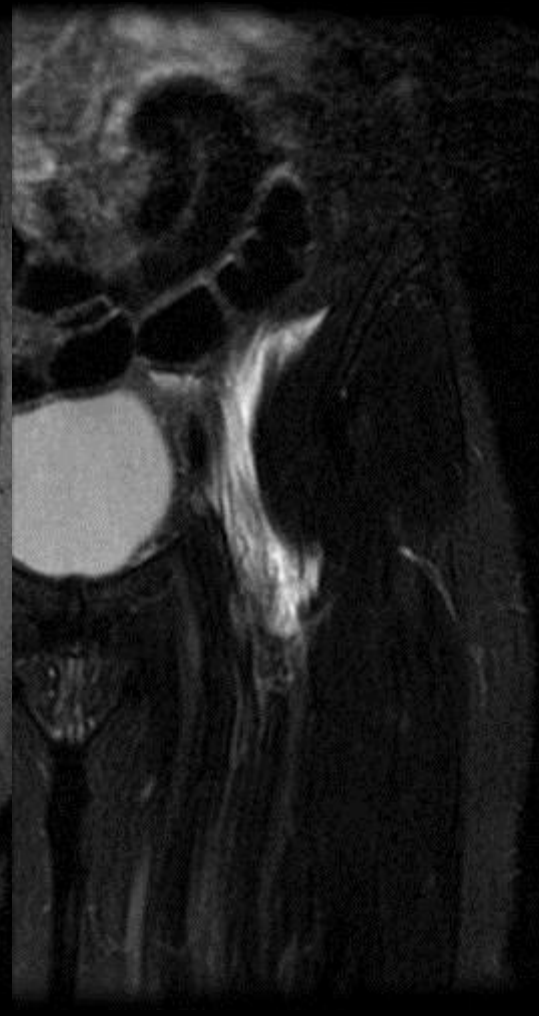
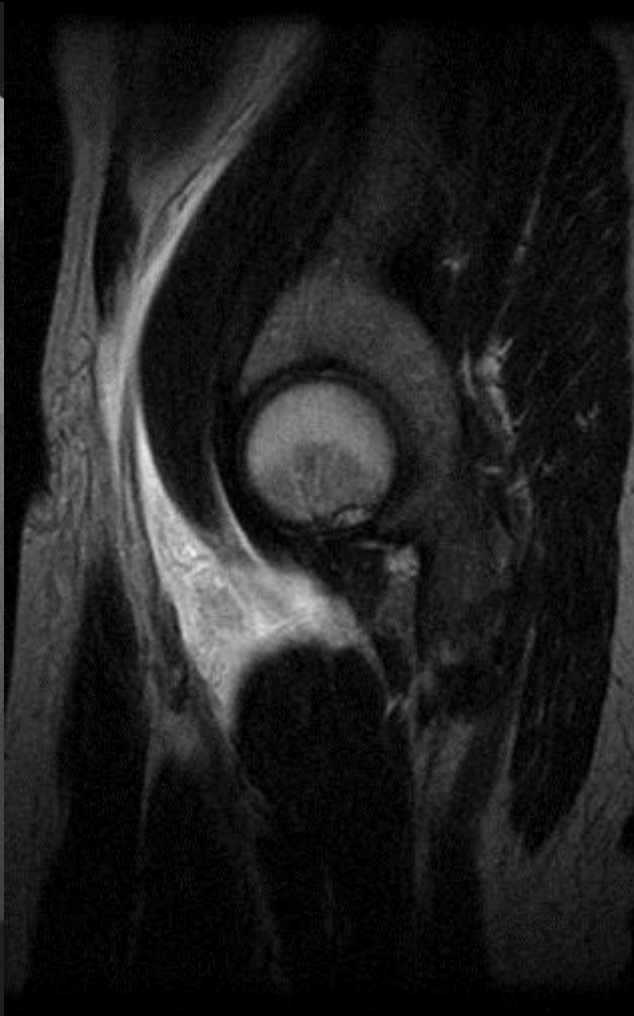
- AP
- 20deg side PO
 - AP
 - Cranial
 - Caudal
- Abduction



Joint + Iliopsoas



Iliopsoas only, no contrast in joint



Snapping Hip Syndrome

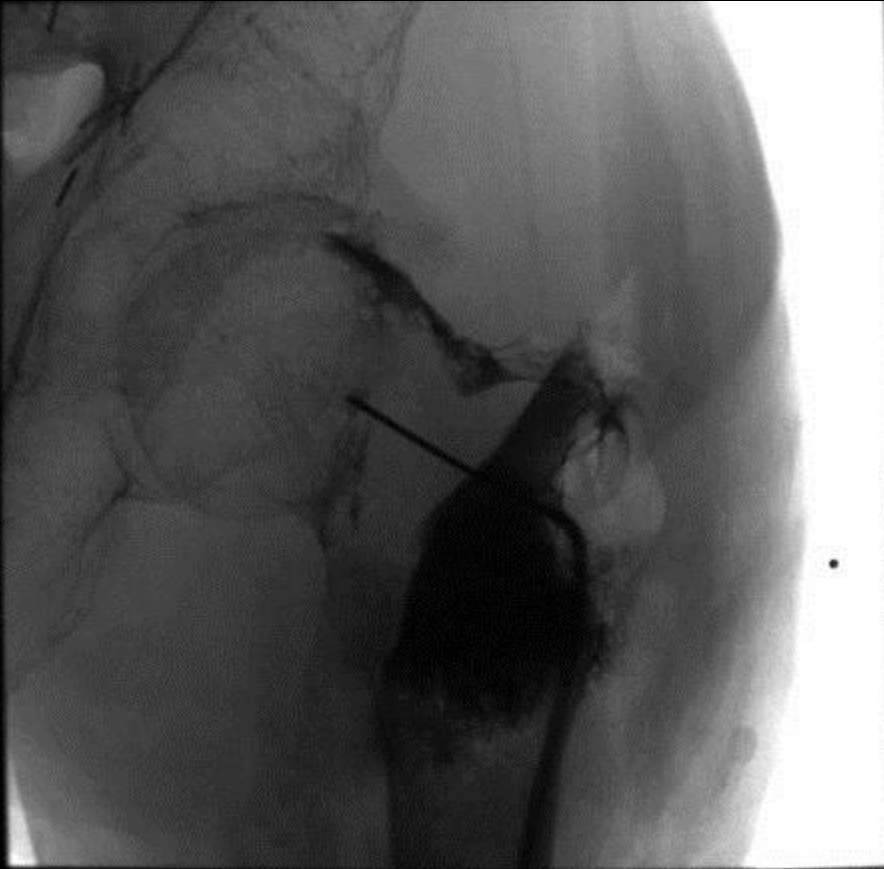


Extravasation

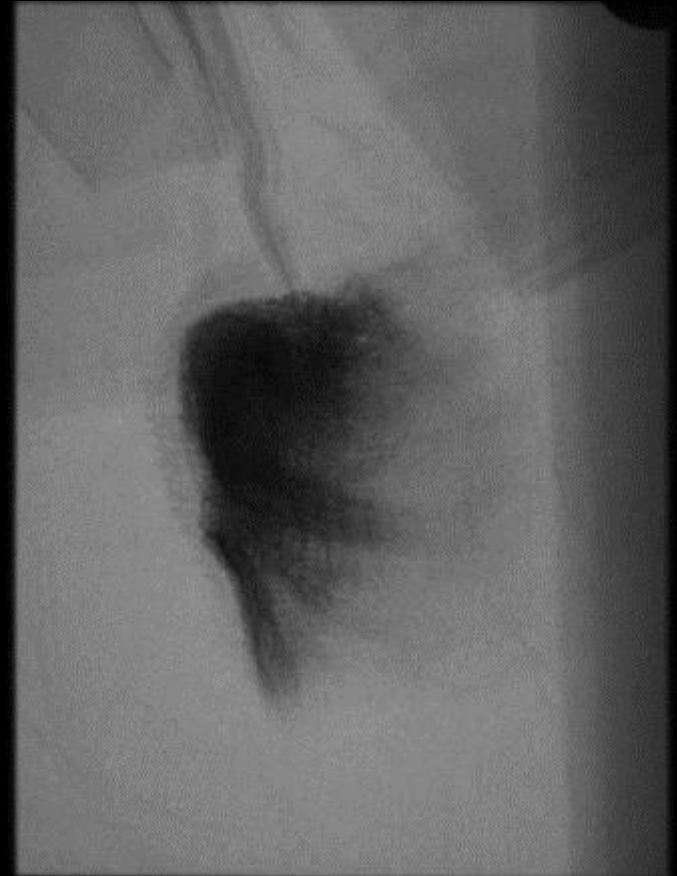
- No significant tissue toxicity
- No treatment necessary



Hip Arthrography – Sinus tract

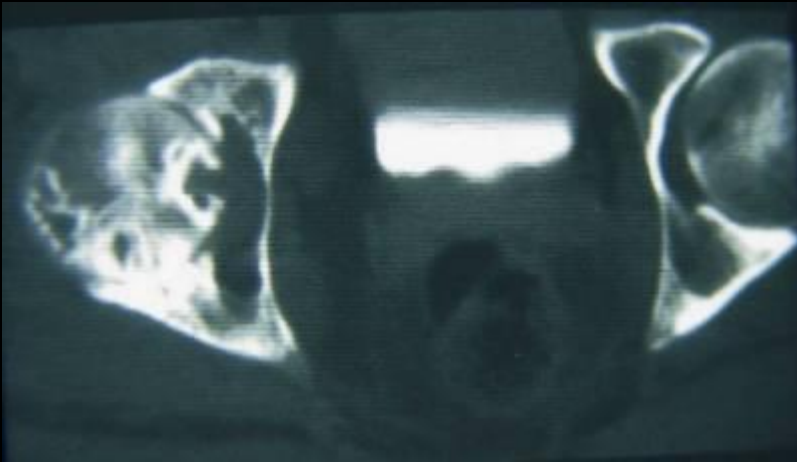


Fistula



Swab

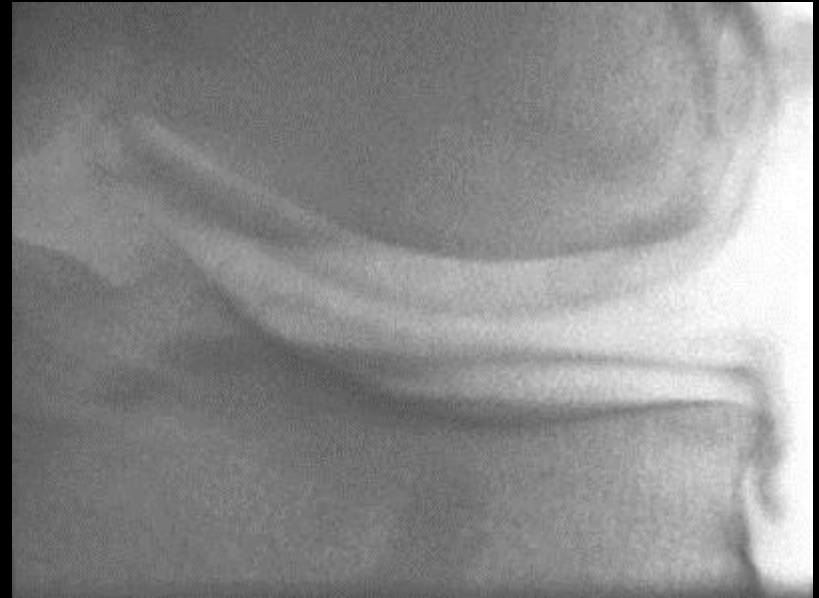
Hip Arthrography - Pathology



PVNS

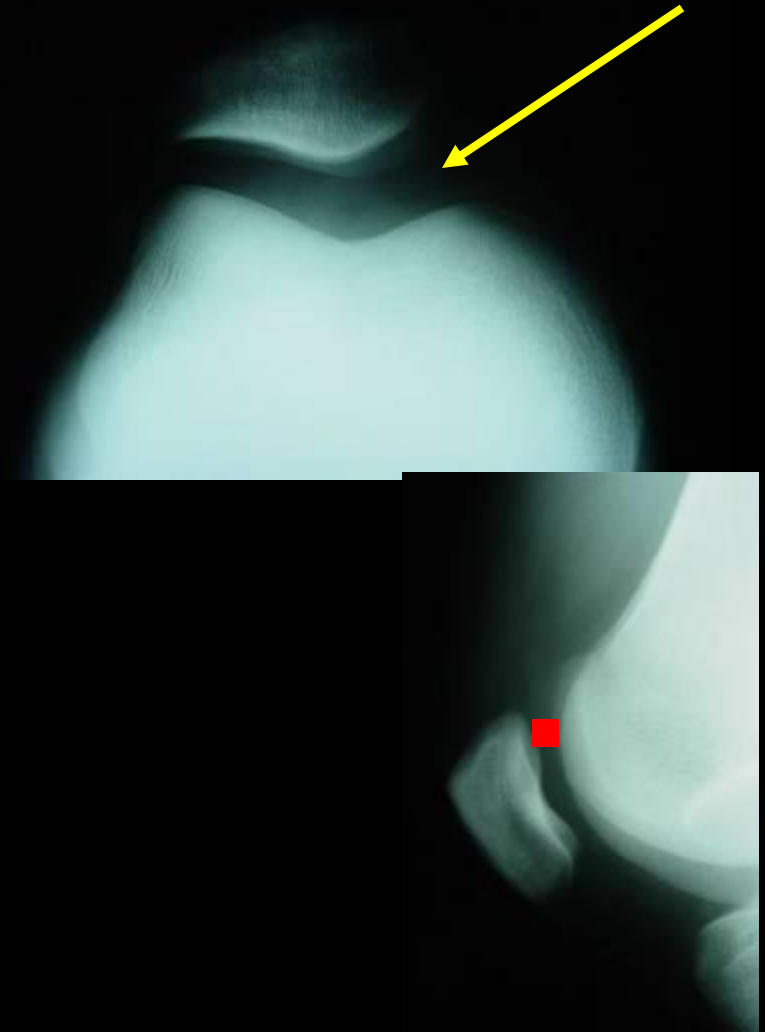
Knee Arthrography Indications

- Conventional arthrogram for meniscal injury
- Recurrent meniscal tear post surgery
- OCD stability



Knee Arthrography Technique

- Lateral V's medial
- 38mm 21G
- Prime needle and connecting tube
- Feel PF groove
- Imagine angle
- Single stab
- Finger on patella
- Alternative
 - Infrapatellar
 - Medial or lateral
 - Aim upwards

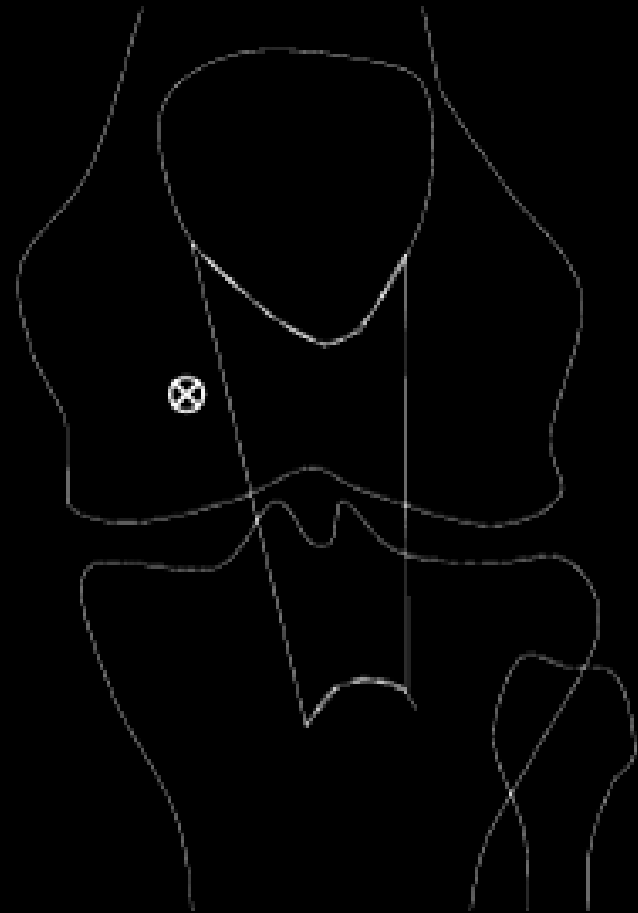
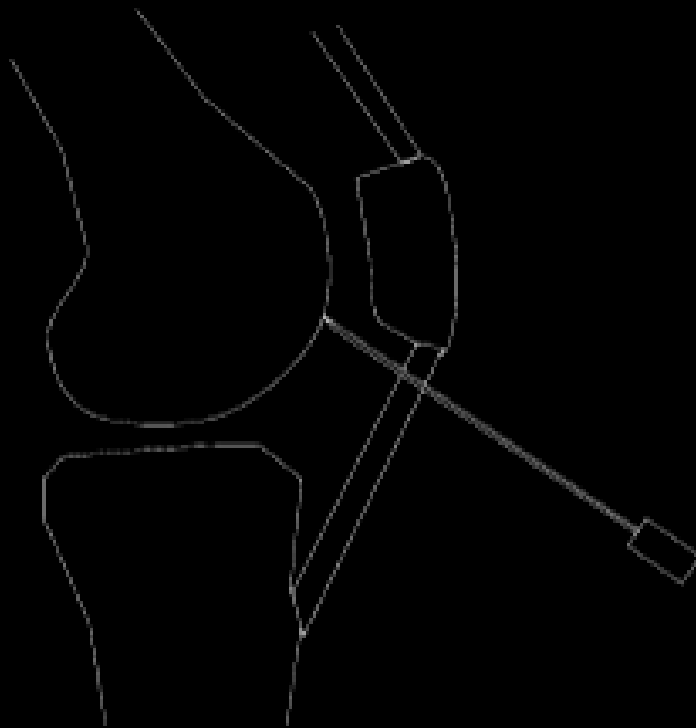


Knee Arthrography Technique

- Lateral V's medial
- 38mm 21G
- Prime needle and connecting tube
- Feel PF groove
- Imagine angle
- Single stab
- Finger on patella
- Alternative
 - Infrapatellar
 - Medial or lateral
 - Aim upwards



Knee Arthrography Infrapatellar Technique



Knee Arthrography Infrapatellar Technique

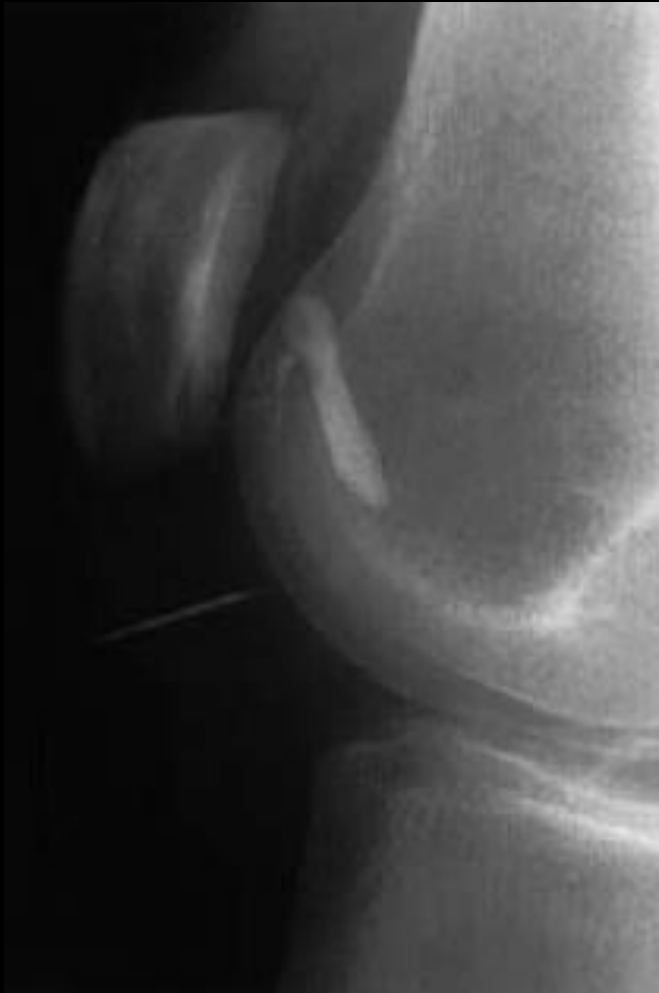


Knee Arthrography

Infrapatellar Technique

- One bit of advice regarding this approach - it is best to find the soft spot immediately below the inferomedial patella.
- This is simple if you put your finger on the patella, then slide down to the origin of the patellar tendon, then "slide off" the tendon medially.
- The key is not to go too inferior, because you will end up traversing a thicker part of Hoffa's fat pad and will need a longer needle

Knee Arthrography Infrapatellar Technique



Skeletal Radiol (2001) 30:354–356

John V. Zurlo

Jeffrey D. Towers

Saraswathi Golla

Anterior approach for knee arthrography

Knee Arthrography Infrapatellar Technique



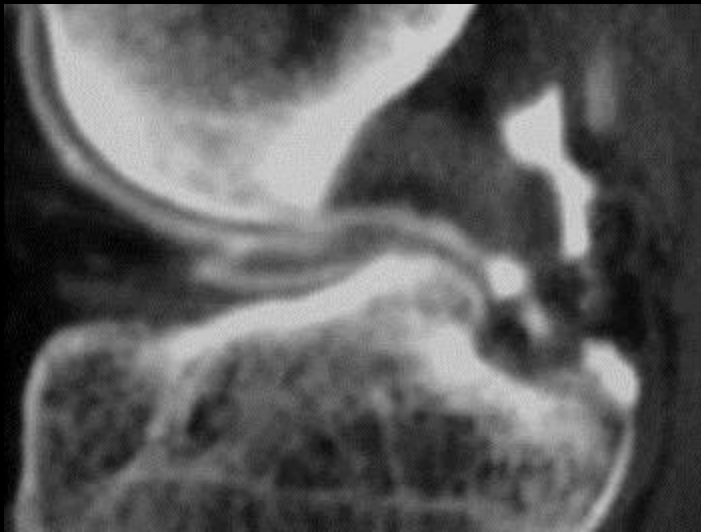
Knee Arthrography Radiography

- Divide knee into 4 quadrants
- Medial front to back
- Lateral front to back
- Roll patient and stress to open joint
- Needs good tech



54F Ruptured Bakers cyst

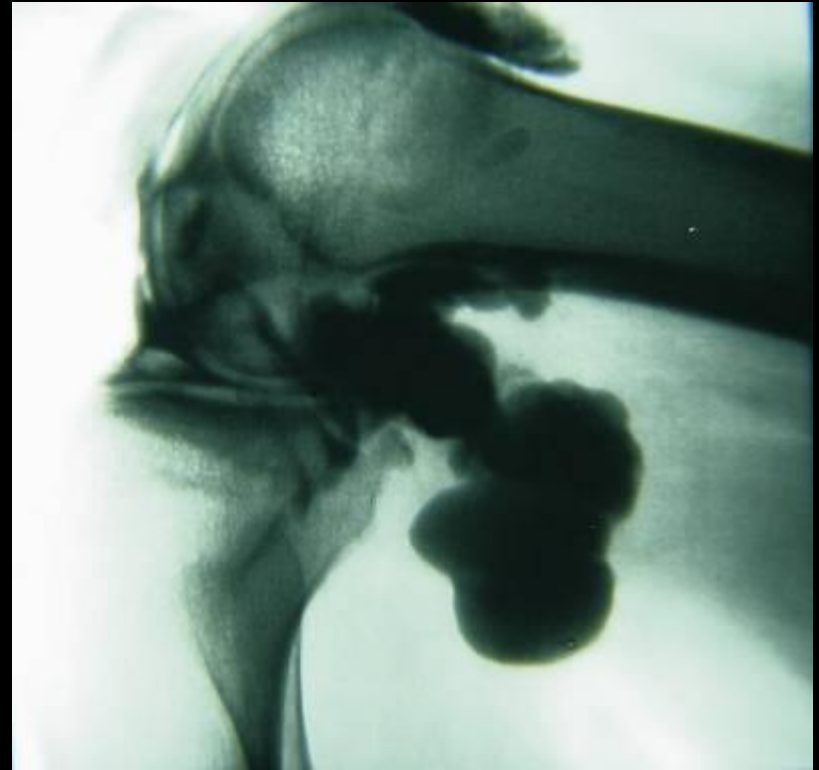
Knee Arthrography CTA



Knee Arthrography - Pathology



Knee Arthrography - Pathology



Ankle Arthrography Indications

- OCD
- Steroid

Ankle arthrography Technique

- Feel dorsalis pedis
- Mark on skin
- Screen AP
 - Mark middle of joint
- Turn lateral
 - 38mm needle
 - 21 gauge
 - Either side of artery
 - Aim for joint



Ankle arthrography Technique

- Feel dorsalis pedis
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Ankle arthrography Technique

- Feel dorsalis pedis
- Mark on skin
- Screen AP
 - Mark middle of joint
- Turn lateral
 - 38mm needle
 - 21 gauge
 - Either side of artery
 - Aim for joint



Ankle Arthrography Radiography

- AP
 - With dorsiflexion and plantarflexion
- Lateral

Subtalar Arthrography

Indications

- Usually anesthetic arthrogram to determine source of pain



Subtalar Arthrography Technique

- Lateral approach
- Roll foot to work out which is lateral
- Fluoro mark anterior aspect of posterior joint
- Must record communications of joint
- CT may be helpful



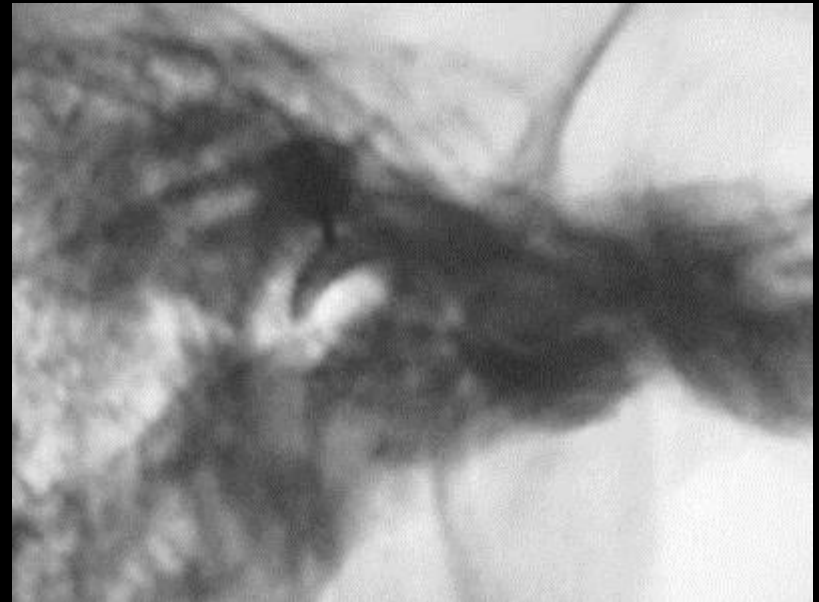
Subtalar Arthrography Radiography

- AP and Lateral and Axial (Harris Beath) to show communications



TMJ Arthrography Indications

- Clicking
- Pain
- Instability
- Negative conventional MRI



TMJ Arthrography Technique

- Palpate joint
- Mark
- Pray
 - Screening difficult



TMJ Arthrography Technique

- Open the mouth with the needle on the condyle, then advance



TMJ Arthrography Radiography

- Open and closed
- Sag T1FS and T2
- Cor T1FS

