How “essential” is arthrography?

“Arthrography”: Opacify a Joint

Isn’t this an archaic technique?

NO!

UW 2009:

>1100 joint injections

Of all of you sitting here, how many have been asked to stick a needle into a joint at least once this year?

Arthrography common pre-MRI

Double Contrast Knee Arthrography

1960 – 1990

@UW 1990: 800!

Therapeutic Tool

Inject therapeutic agent into a joint

- Hyaluronan (visco-supplementation)
  - FDA approved for OA knee

Typically injected blindly in clinic. May ask for image guidance when can’t feel landmarks in knee.

- Steroid: weeks - months pain relief
**Steroids in joints**

Concern cartilage loss

Lidocaine Potentiates the Chondrotoxicity of Methylprednisolone  

Tend NOT inject steroids into large joints (hip, shoulder, knee)
- Unless specifically requested
- Patients awaiting arthroplasty
- Often inject small joints
- Deep (Facets, SI): Triamcinolone  
- Superficial (AC): Dexamethasone

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**Steroids UW MSK**

Triamcinolone
- Suspension, not solution
- Granular, stays locally
- Need to re-suspend prior to use
- Commonly used for spine injections  
  - UW 2009: >1000 ESI, NRB

Dexamethasone 10mg/ml
- Solution, used superficial structures
- Less subcutaneous fat atrophy

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**Arthrography: 21st Century**

**Therapeutic Tool**
- Inject therapeutic agent into a joint
  - Hyaluronan (visco-supplementation)
  - Steroid: weeks-months pain relief

**Diagnostic Tool**
- Inject anesthetic agent into a joint
  - Prove pain is coming from within joint
    - e.g. Pt with bad DJD of hip and bad DDD of lumbar spine. Want to prove pain is from hip prior to hip arthroplasty surgery.

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**Anesthetics UW MSK**

**Intra-articular: Ropivacaine**
- Longer acting than Lidocaine
- (Bupivacaine is chondrotoxic)
- DON’T mix in Bicarbonate
- Will precipitate
- Can mix in Lidocaine

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**Anesthetics UW MSK**

ALWAYS provide skin anesthesia
- 1% Lidocaine: Bicarbonate (9:1)

Our surgical colleagues often do not provide skin anesthesia prior to their steroid injections... it really hurts!

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Which injection cocktail for which joint?

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Injection Cocktails

Therapeutic Tool
- Inject therapeutic agent into a joint
  - Hyaluronan (visco-supplementation)
  - Steroid: weeks-months pain relief

Diagnostic Tool
- Inject anesthetic agent into a joint
  - Prove pain is coming from within joint
- Aspirate fluid from joint
  - Septic → Culture (Gram Stain, Cell count)
  - Crystals → Polarizing microscopy
  - Prudent to first confirm there IS fluid in joint

Sub-deltoid Bursitis (No fluid in joint)

Don’t need to do fluoroscopic-guided aspiration of shoulder capsule...
Instead, do ultrasound-guided aspiration of bursal fluid collection.

Arthrography: 21
d Century

Therapeutic Tool
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  - Inject contrast prior to MR or CT

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Arthrography: 21st Century
No longer used as a primary diagnostic tool
Nowadays, surgeons want to see more…
They want to see torn end of supraspinatus:

Contrast in capsule ➔ Needle in capsule ➔ Contrast in joint

Arthrography: Why we do it
Therapeutic Tool
Inject therapeutic agent into a joint
✓ Hyaluronan (visco-supplementation)
✓ Steroid: weeks-months pain relief

Diagnostic Tool
Inject anesthetic agent into a joint
✓ Prove pain is coming from within joint
Aspirate fluid from joint
✓ Septic ➔ Culture (Gram Stain, Cell count)
✓ Crystals ➔ Polarizing microscopy
Inject contrast prior to MR or CT

Arthrography: What we need
IMAGE GUIDANCE
➢ Can’t be assured of getting a needle into hip/shoulder without imaging
✓ With experience, should be able to blindly get a needle into knee
✓ Knees commonly injected in clinic
✓ Clinics may request image guidance when injecting knees of “larger” pts.
➢ Young patients: Ultrasound

Ultrasound: Pediatric Hips
Right
Fri 20:20
UW Peds ER
Right
Fri 23:30
UW Peds ER
Post aspiration 2ml pus

Arthrography: What we need
IMAGE GUIDANCE
➢ Can’t be assured of getting a needle into hip/shoulder without imaging
✓ With experience, should be able to blindly get a needle into knee
✓ Knees commonly injected in clinic
✓ Clinics may request image guidance when injecting knees of “larger” pts.
➢ Young patients: Ultrasound
➢ Most patients: Fluoroscopy
➢ Preferably C-arm Fluoroscopy
Positioning Patient

Shoulder:
- External Rotation
- Sandbag

Hip:
- Internal Rotation
- Sandbag

Arthrography: What we need

TARGET SITE

Keys to Arthrography

Target is NOT the joint
- Don’t necessarily need to position needle between 2 articular surfaces

Target is the CAPSULE
- Just need to have the needle touch a bone within the capsule
Joint Capsule: Shoulder
TARGET SITE ⊗: RC Interval

Arthrography: What we need
Non-sterile tray
- Metal pointer & marker
  - To localize & mark target ⊗
- Metal R/L
  - To prove which side

Arthrography: What we need
IMAGE GUIDANCE
TARGET SITE ⊗
NON-STERILE TRAY
STERILE TRAY

Sterile Tray
If tray is set up before patient enters it is important to COVER TRAY to prevent patient contaminating it!

Sterile Tray: Prep & Drapes
Clean & sterilize skin
Sticky drape with hole
4x4" sponges
Additional sterile drapes/towels
Sterile covers for image intensifier and controls

Sterile Tray: Syringes
Local anesthetic (1% Lido:Bicarb 9:1)
- 10ml syringe w/skin needle ↑
Contrast (iomeprol 300 mg/l/ml)
- 5ml syringe w/connecting tube ↘
Cocktail
- 10ml syringe w/18g drawing up ↑ needle
Arthrography: How we do it

Local anesthesia

“You will feel a bee sting”

“This will burn for a few seconds, and then will be numb”

2 needles
- Skin: 30g ½" needle
- Deeper: 1½" needle

Local Anesthesia

Skin: 30g ½" needle
- DON’T raise a wheal

Advancing needle vertically

Shoulder: RC Int
- Can reach bone with 1½" needle
- Use 22g
  - Anesthesia
  - Advance needle through capsule, touching bone

Local Anesthesia

Skin: 30g ½" needle
Deeper: 1½" needle

Hip:
- Can’t reach bone with 1½" needle
- Use 27g
  - Anesthesia only
- Use 22g 3½" spinal needle to reach bone

Sterile Tray: Needles

Local Anesthesia

Skin: 30g ½" needle
Deeper: 1½" needle

Advance needle vertically

Keys to Arthrography

ADVANCE NEEDLE SLOWLY
Don’t just jab it in there…
**Keys to Arthrography**

ADVANCE NEEDLE SLOWLY

Use 2 hands:
- One hand on needle hub
- One hand on patient’s skin
- Allow needle to pass between your thumb & index finger tips so you can feel the needle being advanced
- Advance just a few mm at a time
- Check fluoro, readjust position

**Example: Hip Arthrogram**

ADVANCE UNTIL HIT BONE

- Don’t stop at the capsule

WATCH FIRST DROP OF CONTRAST

- Should flow away from needle tip
- If contrast stays by needle tip, needle is NOT in a space! (Extravasation)

**Recognizing Extravasation: Hip**

Contrast flowing away from needle

Needle repositioned

Contrast stays by needle

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Recognizing Extravasation: Hip & Repositioning Needle

- Needle re-repositioned
- Contrast flowing away from needle

Recognizing Extravasation: Hip

- Not contrast flowing into capsule
- Extravasation into muscle

Recognizing Extravasation: Shoulder

- Slight amount contrast NOT flowing away from needle
- Mixed Injection (½ in, ½ out)

Recognizing Extravasation: Shoulder & Repositioning Needle

- Contrast filling capsule
- Extravasation into subscapularis

Sterile Tray: Syringes

- Arthrogram MR/CT
- Local anesthetic (1% Lido:Bicarb 9:1)
  - 10ml syringe w/skin needle
  - Deep sub-Q needle
  - ½” (hip)

- 20ml syringe
  - 5-10ml iohexol 300mg/ml
  - 50% anesthetic (5ml 1% Lido, 5ml Rop)
  - 0.1ml Gd
  - Extra needle
Two Tips…

**MR Arthrogram**

1. Make sure Gd gets into cocktail!
   - 0.1ml Gd in 1ml (tuberculin) syringe

   Make sure Gd doesn't get trapped in the hub, but actually enters solution.

2. Avoid Air Bubbles!
   - Air in joint causes susceptibility artifact
   - Get air out of arthrogram needle hub
   - Extra needle on connecting tube

   Drop tip extra needle into hub of arthro needle. Fill the hub from bottom to top. Remove extra needle and do wet-connect.

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**Metal Hip: Injecting**

Prove you’re “in” by seeing contrast flow into synovial capsule

- Can’t see metal needle thru metal prosthesis
- Capsule is thick and fibrotic (like wood)

Skin
Sub-Q Fat
Don't stop when touch wood...
Go until touch metal
Capsule → Synovium

Target: Head-Neck Junct

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**Metal Hip: Aspirating**

 Loose acetabular component r/o infection pre replacement
Requested aspiration

When aspirating suspected pus, use: 18g Needle
20ml Syringe

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**Metal Hip: Aspirating**

 Test needle location by injecting contrast:
- Not flowing into synovial capsule

1st Needle placement
Asp = No Fluid

When aspirating suspected pus, use: 18g Needle
20ml Syringe

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