

**4<sup>th</sup> Annual  
National Conference  
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2023**



**RhAPP**  
RHEUMATOLOGY ADVANCED  
PRACTICE PROVIDERS

# Joint Injection Workshop

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# Faculty Disclosures

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- Shannon Ghizzoni, PA-C:
  - Speakers Bureau: Abbvie, Amgen
  - Advisory Board: Abbvie
- Andrea Mace, PA-C:
  - No relevant financial relationships to disclose
- Jennifer McGill, PA-C:
  - No relevant financial relationships to disclose
- Jennifer Simpson, DNP
  - Speakers Bureau: Janssen, Abbvie
  - Advisory Board: Sanofi, AstraZeneca

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# Objectives

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- APPs' will be able to demonstrate knowledge and proficiency in the topics stated below:
- Overview of anatomy of joints
- Overview of Clean Technique for injection
- Brief overview of medications
- Indications for joint injections
- Overview and demonstration of approaches for injections based on each joint
- How to incorporate Ultrasound for joint injections
- APPs to practice and gain confidence in administering joint injections

# Injection Preparation

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## Clean technique

- Betadine swab/chlorhexidine swab
- Alcohol pad
- Band aid
- Syringe with medication and appropriate sized needle
- Ethyl chloride spray or local anesthetic
- Gauze
- Gloves
- Hemostat – if aspirating

# Needle/Syringe sizes

- Large joint: 22-gauge or 25-gauge x 1.5 inches in length
- Medium joint: 25-gauge x 1.5 inches in length
- Small joint: 25-gauge x 1 inch or ½ inch in length
- Aspirations: 18-gauge x 1.5 inches



# Corticosteroid Medications

Medication Name	Strength	Dose-Large	Dose-Medium	Dose-Small
Kenalog-40 (triamcinolone)	40mg/mL	80mg or 2mL	40mg or 1mL	20mg or 0.5mL
Celestone (betamethasone)	6mg/mL	24mg or 4mL	12mg or 2mL	3-6mg or 0.5-1mL
Depo-Medrol (methylprednisolone)	40mg/mL	80mg or 2mL	40mg or 1mL	20mg or 0.5mL
Decadron (dexamethasone)	4mg/mL	4mg or 1mL	2mg or 0.5mL	0.8-1mg or ~0.25mL
Zilretta (triamcinolone) Long- acting	32mg/5mL	32mg or 5mL Indicated for knees only	Not Indicated	Not Indicated



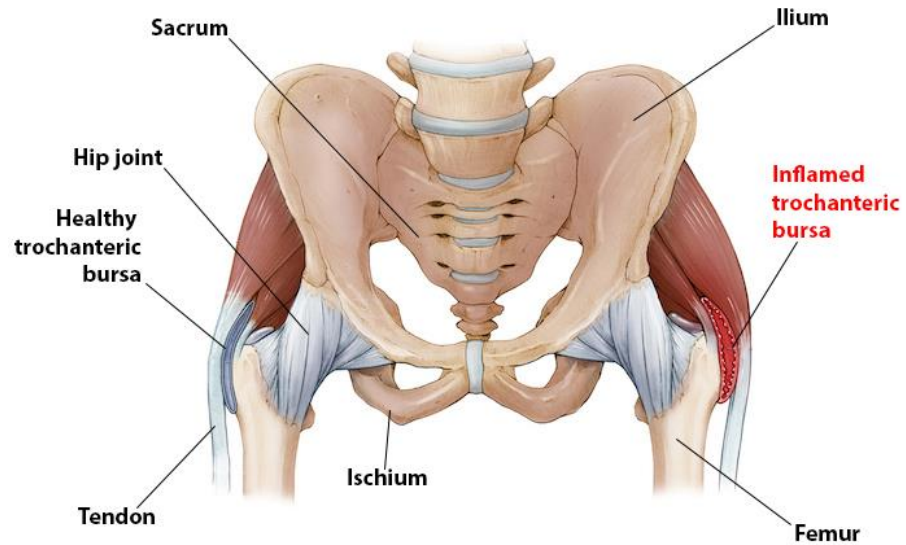
# Basic Joint Injections

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- Hip – Greater Trochanteric Bursitis
- Shoulder Joint
- Knee joint

# Hip Anatomy

## HIP BURSITIS



# Trochanteric Bursa Injection

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## Hip Bursa Anatomy

- The trochanteric bursa is located over the lateral prominence of the greater trochanter of the femur. Trochanteric bursitis is confirmed by palpation of tenderness, and occasionally swelling over this bursal region
- Can be precipitated by repeated pressure or trauma to the area
- Contributing factors – osteoarthritis, rheumatoid arthritis, obesity and leg-length discrepancies

## Indication for Injection:

- Confirmed trochanteric bursitis which has been resistant to conservative treatments (i.e., ice, heat, topical and/or oral NSAIDs, physical therapy)

# Trochanteric Bursa Injection

## Patient Positioning

- Patient should be positioned supine, lying laterally on opposite hip of the affected side

## Landmark Palpation

- Identify the greater trochanter by palpating the femur from the mid-shaft proximally until the area of bony protrusion is reached
- The injection site is the point of maximal tenderness or swelling

## Pharmaceutical/Equipment Choice

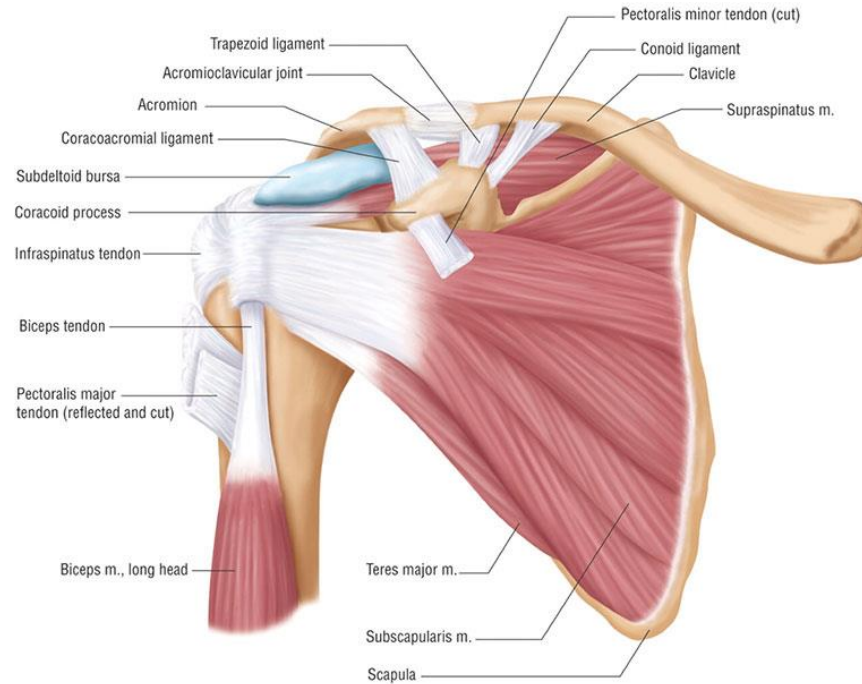
- Syringe: 5 to 10 mL
- Needle: 22- or 25-gauge 1.5 inch
- Corticosteroid: 40-80 mg of methylprednisolone or triamcinolone
- Anesthetic: 1:1 ratio of Lidocaine to Corticosteroid
- Ethyl Chloride can be used as option topical anesthetic
- Area should be cleaned using sterile technique

# Trochanteric Bursa Injection

- Approach: Needle should be inserted at 90-degree angle to skin at the area of most tenderness until resistance is met by bone or needle is fully inserted. If resistance is met, needle should be withdrawn very slightly (2-3 mm), aspirate and then inject full amount of syringe



# Shoulder Anatomy



# Shoulder Injection Indications

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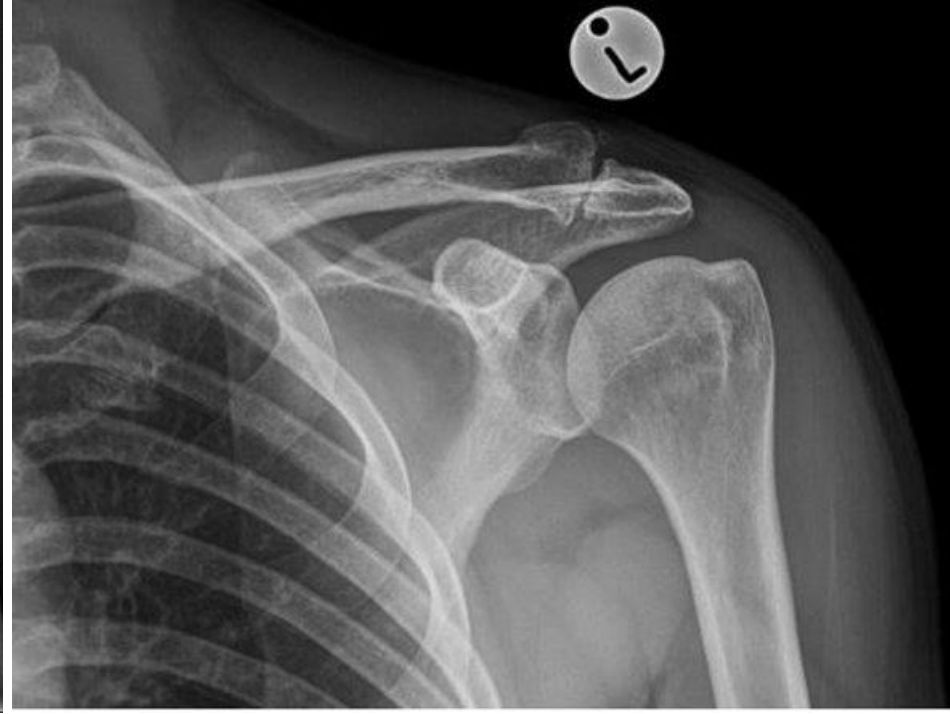
- Primary arthritis of the glenohumeral joint
- Subacromial bursitis
- Acromioclavicular arthritis
- Rotator cuff tendonitis
- Impingement syndrome
- Adhesive capsulitis

# Shoulder Patient Positioning

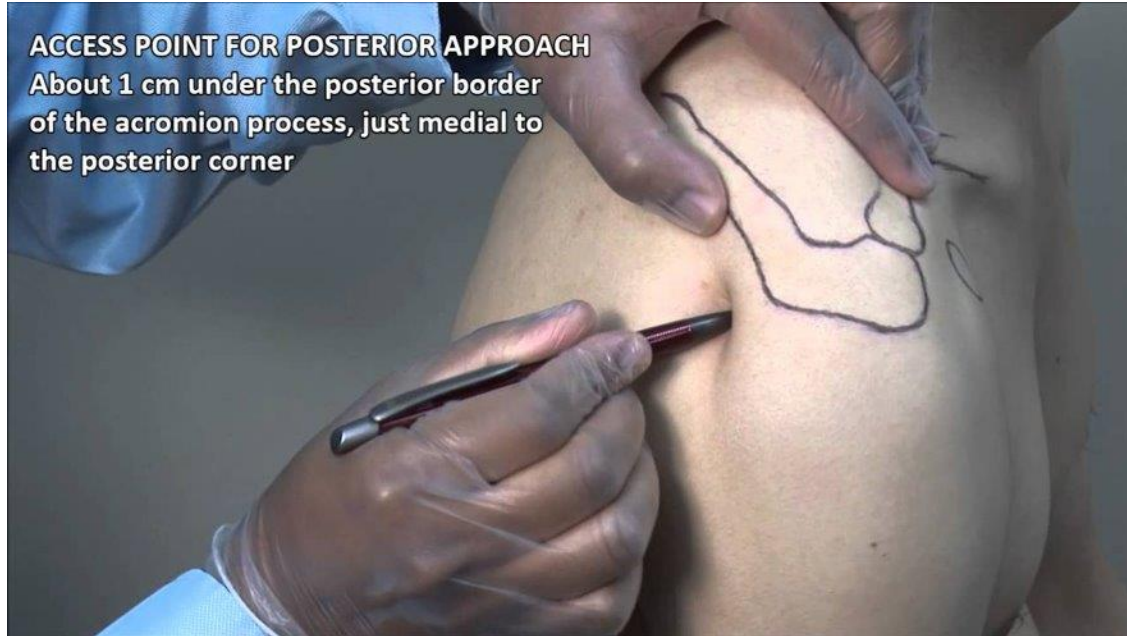
- Positioning: Patient sitting on the exam table in a gown with access to the posterior, lateral and anterior shoulder. Provider position will depend on approach for the injection.
  - Posterior: stand behind the patient
  - Lateral: stand posterior/lateral to the patient
  - Anterior: stand in front of the patient
- Equipment:
  - Syringe: 5-10mL
  - Needle: 22-gauge 1.5 inches in length
  - Anesthetic: Lidocaine or Ethyl chloride spray



# Shoulder Arthritis on X-ray



# Posterior Approach-Shoulder



- Subacromial bursa-angle about 45-degrees up
- Glenohumeral joint-angled 90-degrees or perpendicular to the shoulder

# Lateral Approach- Shoulder

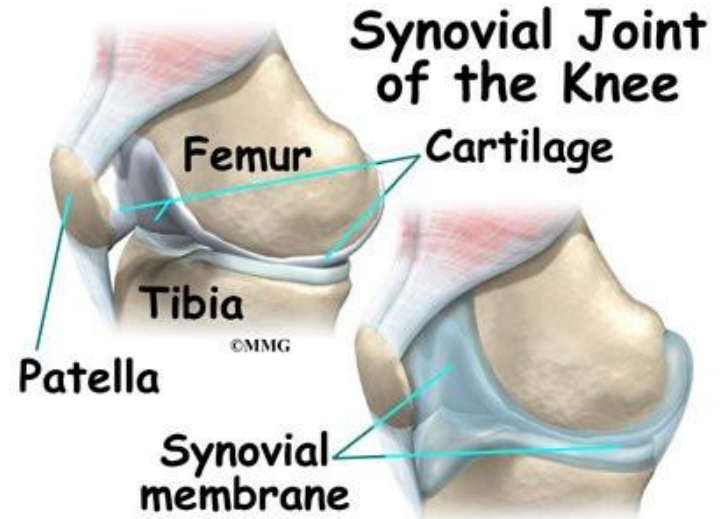
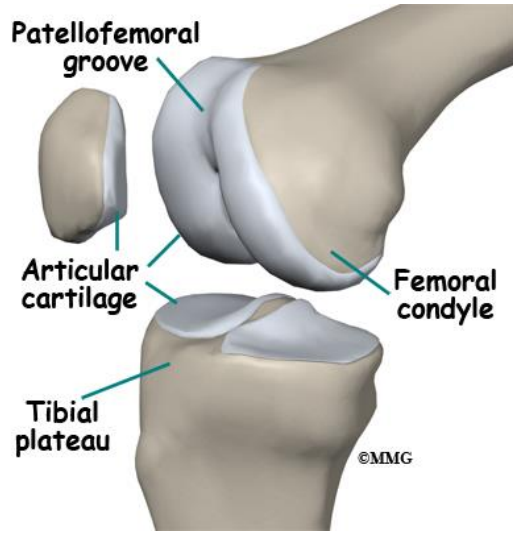


# Ultrasound-Shoulder



# Knee Anatomy

Two functional joints – the femoral-tibial and the femoral-patellar



# Knee- Indications for Injection/Aspiration

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- Relieve discomfort associated with effusion
- Aid in diagnosis of unexplained effusion (rule out septic arthritis, should be performed immediately if suspected i.e., monoarticular red, hot swollen joint)
- Corticosteroids for advanced osteoarthritis or other noninfectious inflammatory arthropathies such as RA, gout or CPPD
- Visco-supplementation used to treat the pain of knee osteoarthritis



# Knee Injection/Aspiration

## Patient Positioning

- For aspiration patient should be supine with the knee slightly flexed with posterior support
- For injection can be supine or seated with legs at 90-degrees dangling from exam table

## Landmark Palpation

- Knee joint can be accessed medially, laterally or anteriorly. Choice is provider preference, but lateral is most common. Begin by palpating all borders of the patella, needle insertion should be at the deepest groove

## Pharmaceutical/Equipment Choice

- Syringe: 5 to 10 mL for injection, 20 mL or larger for aspiration
- Needle: 22-gauge 1.5 inch for injection, 18-20 gauge for aspiration
- Corticosteroid: 40-80 mg of methylprednisolone or triamcinolone
- Anesthetic: 1:1 ratio of Lidocaine to Corticosteroid
- Ethyl Chloride can be used as option topical anesthetic
- Area should be cleaned using sterile technique

# Approach-Knee



Approach: In the anterior approach, the knee is flexed 60- to 90-degrees, and the needle is inserted just lateral to the patellar tendon and parallel to the tibial plateau. In seated position, needle is inserted into the soft tissue between the patella and femur directed at a 45-degree angle aiming behind the patella to the middle of the joint. For aspiration, injection 1-2 mL Lidocaine and aspirate until no longer able, then inject corticosteroid.



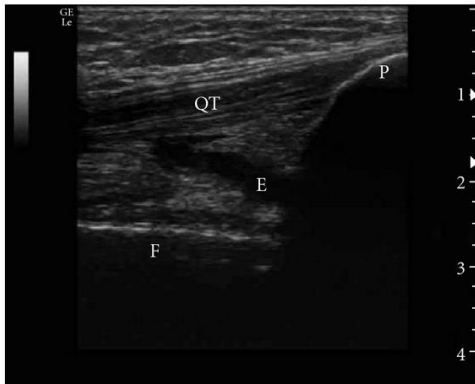
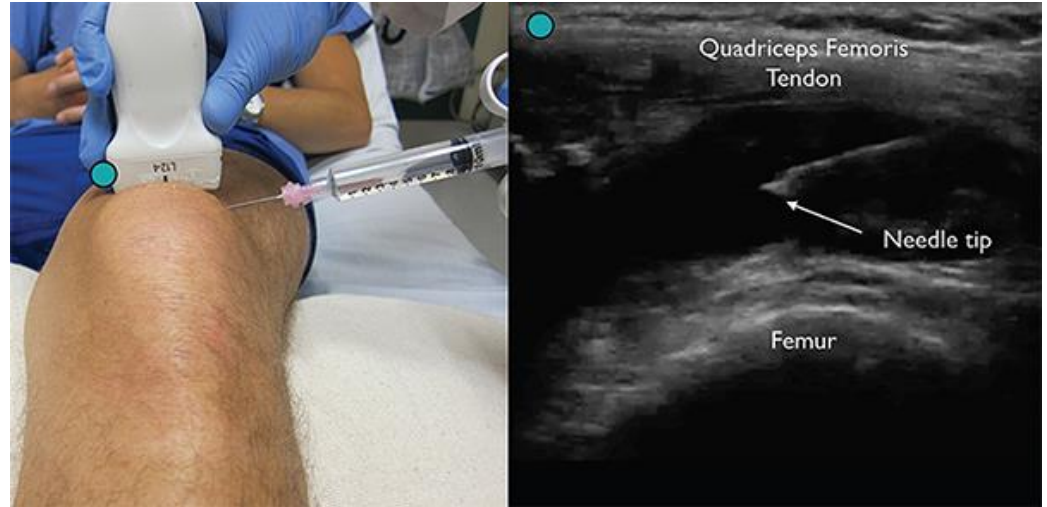
# Approach- Knee



# Ultrasound- Knee



(a)



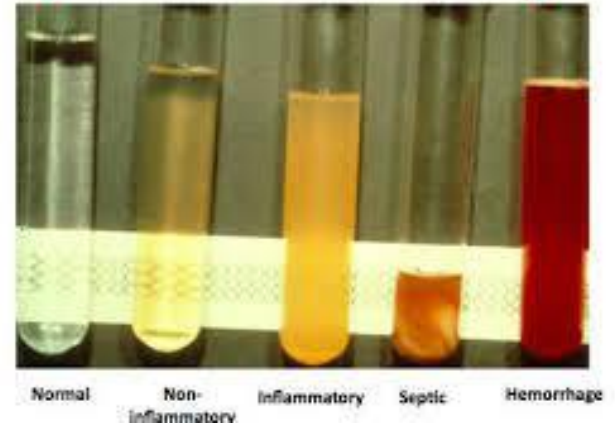
(b)

# Joint Aspiration

## Synovial Fluid Analysis Characteristics

	Volume (mL)	Viscosity	Clarity	Color	WBC/mm <sup>3</sup>
Normal	< 3.5	High	Clear	Colorless/ Straw	< 150
Noninflammatory	> 3.5	High	Clear	Straw/ Yellow	< 3000
Inflammatory	> 3.5	Low	Cloudy	Yellow	> 3000
Septic (purulent)	> 3.5	Mixed	Opaque	Mixed	> 50,000
Hemorrhagic	> 3.5	Low	Mixed	Red	Similar to blood level

### Synovial Fluid Color and Clarity

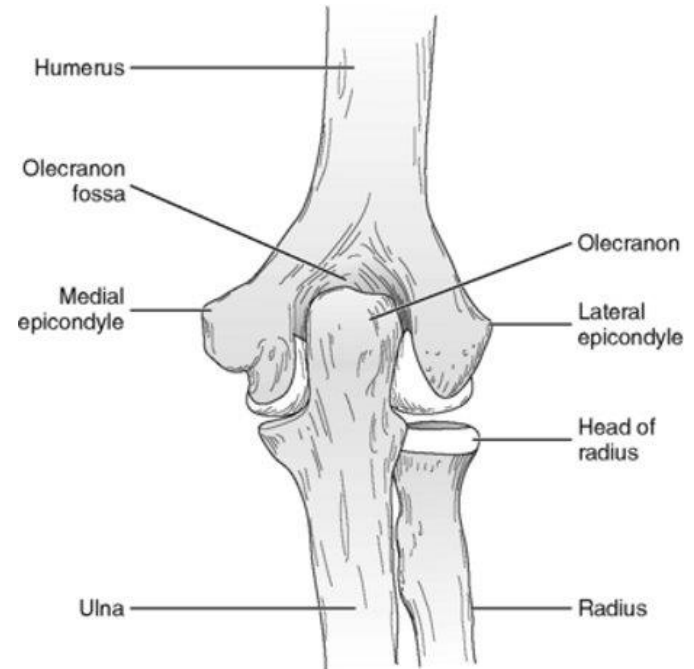
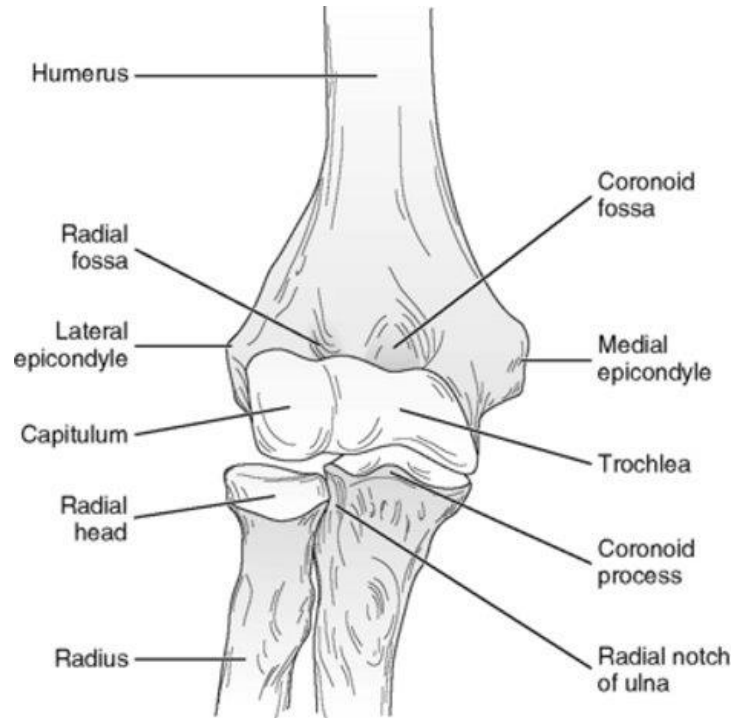


# Advanced Joint Injections

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- Elbow joint
- 1<sup>st</sup> CMC joint
- Ankle joint

# Elbow Anatomy



# Elbow Joint Injection Indications

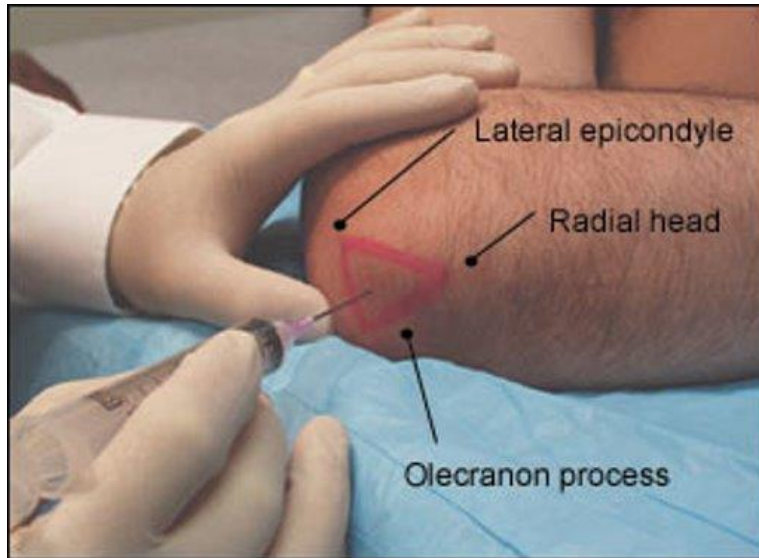
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- Arthritis
- Lateral Epicondylitis – Tennis elbow
- Medial Epicondylitis – Golfer's elbow
- Ulnar neuritis
- Olecranon bursitis
- Equipment:
  - Syringe: 5-10mL for injection or 10-20mL for aspiration of bursa
  - Needle: 22-gauge 1.5 inches in length or 18-gauge 1.5 inches in length for aspiration
  - Anesthetic: Lidocaine or Ethyl Chloride spray

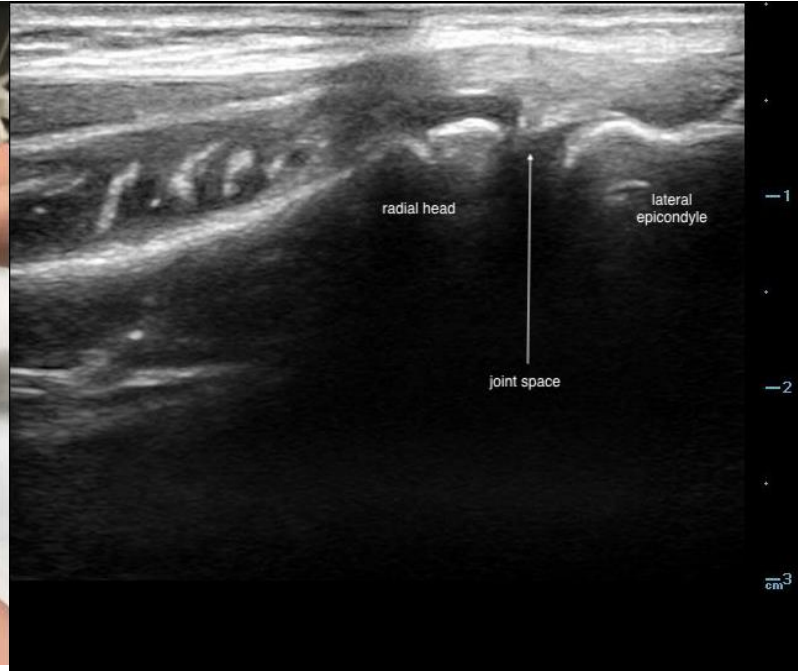


# Elbow Joint Injections

- Positioning:
  - Patient's resting arm on exam table with access to posterior aspect of the elbow



# Ultrasound-Elbow



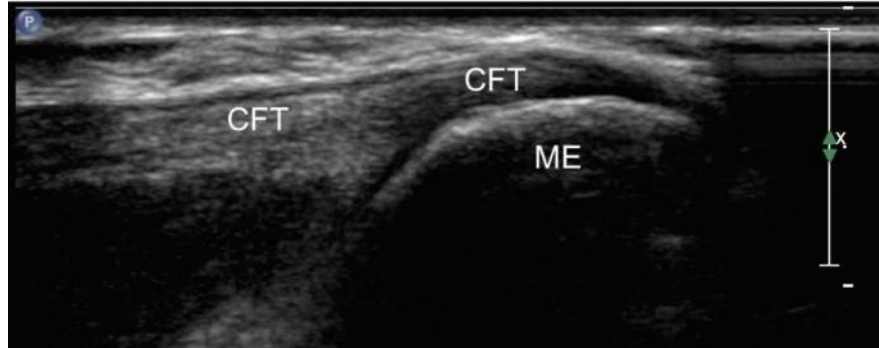
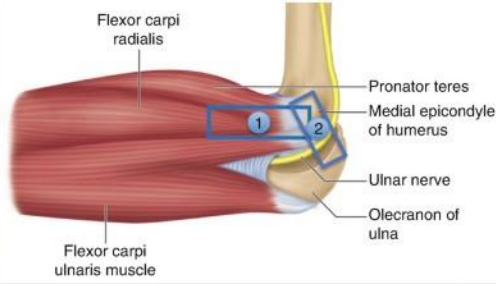
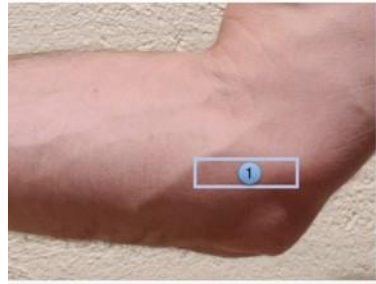


# Medial Epicondyle Elbow Injection

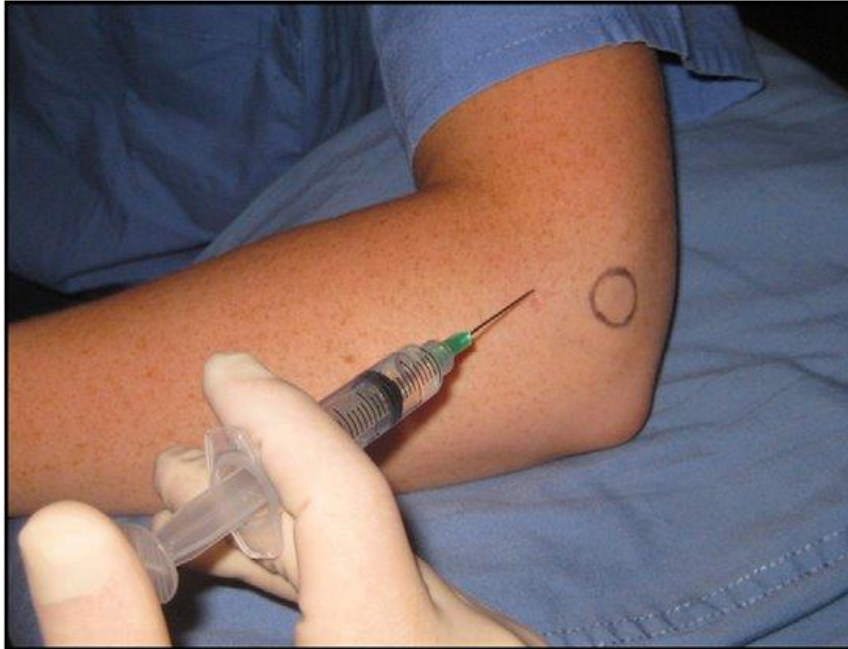
- Positioning
  - Patient laying supine on exam table with affected elbow/arm externally rotated



# Ultrasound-Medial Epicondyle Elbow



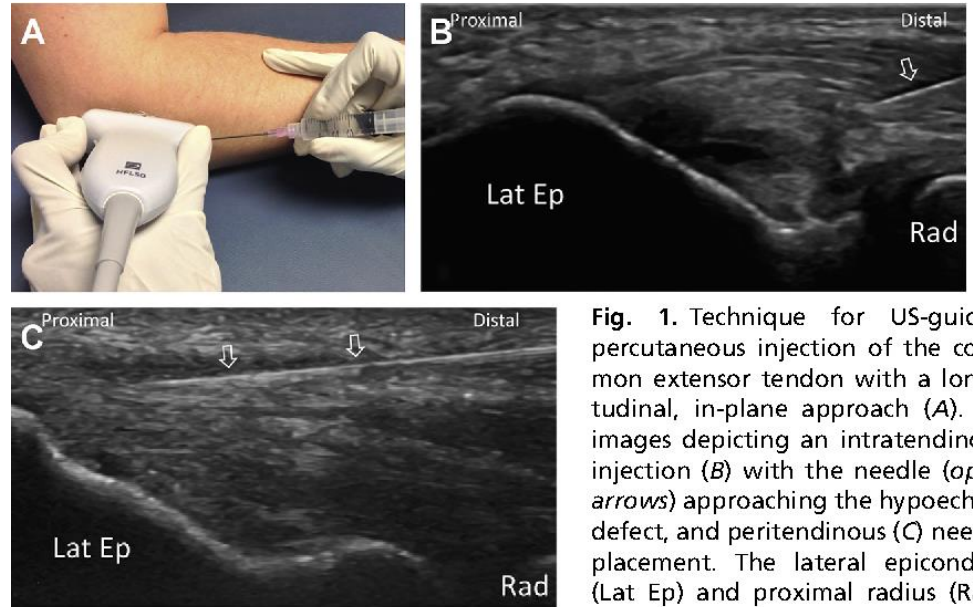
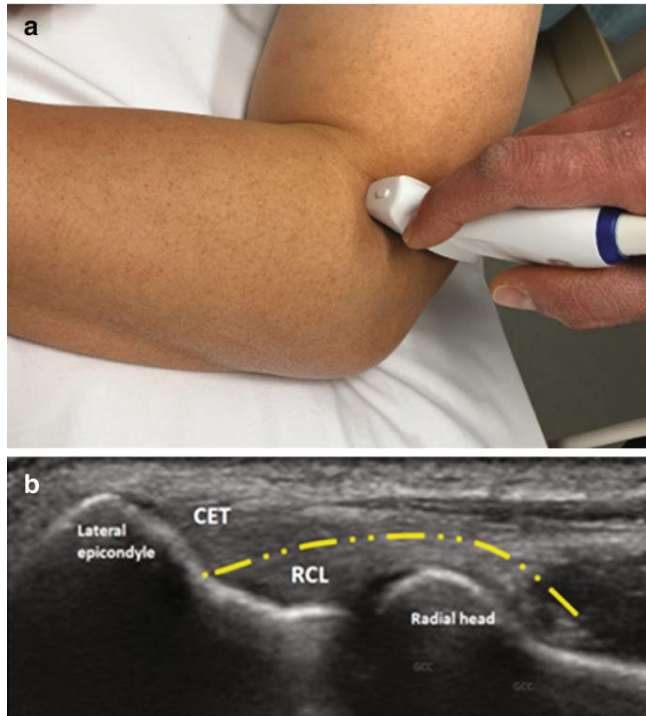
# Lateral Epicondyle Elbow Injection



**Figure 2** Lateral epicondylitis injection is performed w

- Positioning:
  - Patient sitting in a chair with elbow resting on exam table

# Ultrasound- Lateral Epicondyle Elbow



**Fig. 1.** Technique for US-guided percutaneous injection of the common extensor tendon with a longitudinal, in-plane approach (A). US images depicting an intratendinous injection (B) with the needle (*open arrows*) approaching the hypoechoic defect, and peritendinous (C) needle placement. The lateral epicondyle (Lat Ep) and proximal radius (Rad) serve as bony acoustic landmarks.

# Olecranon Bursae Aspiration

- Positioning:
  - Patient sitting in exam chair with posterior aspect accessible



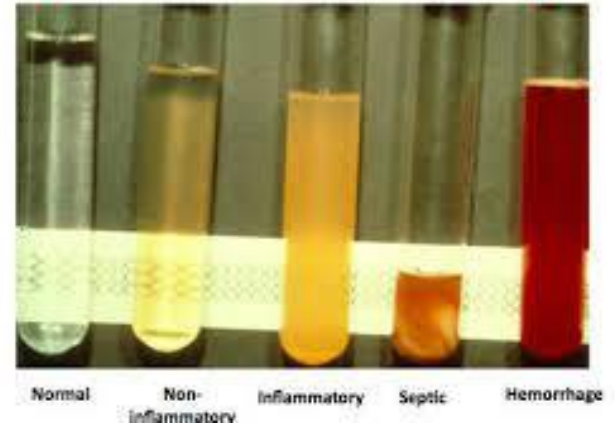


# Joint Aspiration

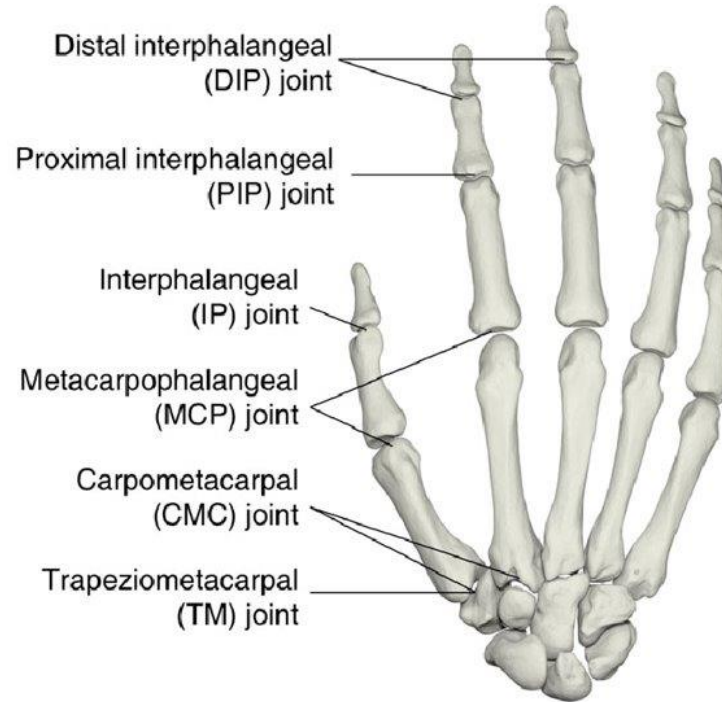
## Synovial Fluid Analysis Characteristics

	Volume (mL)	Viscosity	Clarity	Color	WBC/mm <sup>3</sup>
Normal	< 3.5	High	Clear	Colorless/ Straw	< 150
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Inflammatory	> 3.5	Low	Cloudy	Yellow	> 3000
Septic (purulent)	> 3.5	Mixed	Opaque	Mixed	> 50,000
Hemorrhagic	> 3.5	Low	Mixed	Red	Similar to blood level

### Synovial Fluid Color and Clarity



# 1<sup>st</sup> CMC Joint



# 1<sup>st</sup> CMC Joint Injection Indications



- Arthritis

## Positioning:

- Patient is sitting down with wrist on exam table. Radial side of the wrist is up. May need to distract the thumb to aid in opening the joint space

## Equipment:

- Syringe: 1mL or 3mL
- Needle: 25-gauge x 1 inch or ½ inch
- Anesthetic: lidocaine or Ethyl Chloride

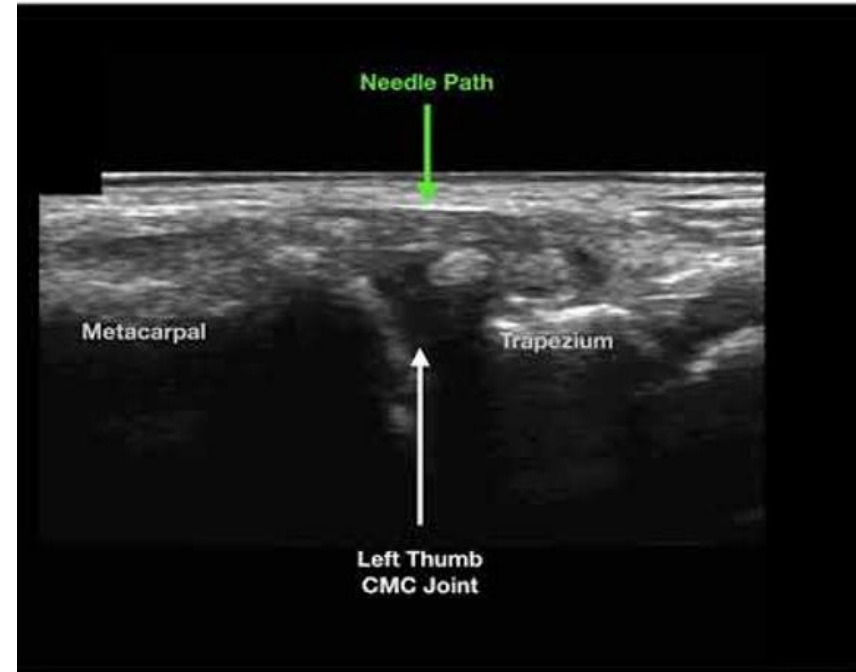


# Landmarks

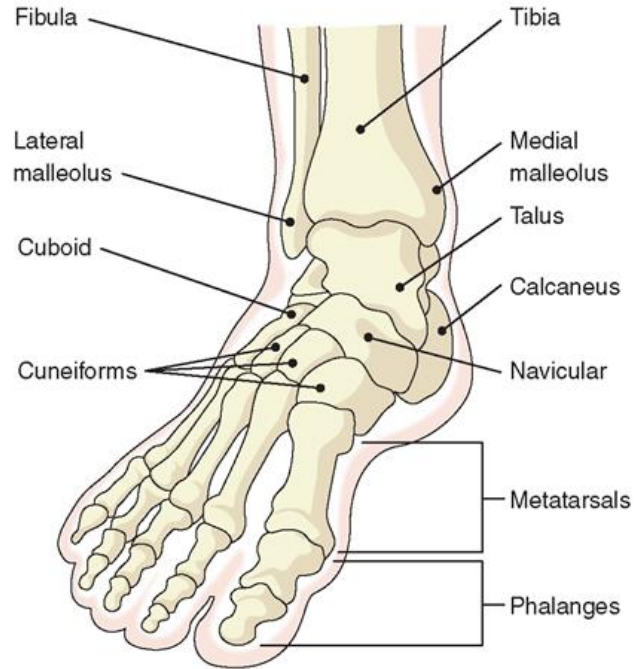
- EPL – extensor pollicis longus
- EPB – extensor pollicis brevis
- APL – abductor pollicis longus
- Anatomic snuff box



# Ultrasound- 1<sup>st</sup> CMC Joint



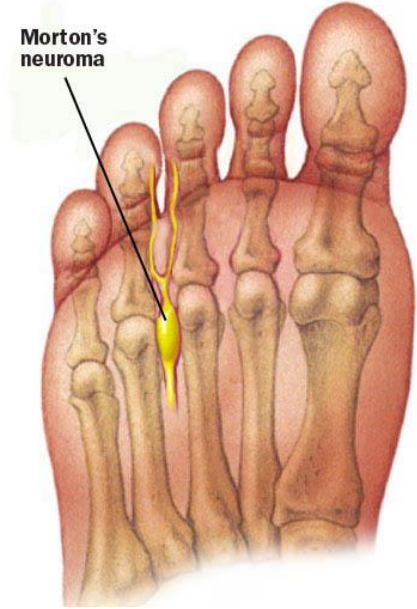
# Foot/Ankle Anatomy



# Foot/Ankle Injection Indications

- Morton's neuroma
- Bunion/1<sup>st</sup> MTP joint
- Arthritis- cuneiform joints or talofibular joint
- Plantar Fasciitis
- Equipment:
  - Syringe: 3-5mL
  - Needle: 22–25-gauge x 1-1.5 inches in length
  - Anesthetic: Lidocaine or Ethyl Chloride spray

# Foot/Ankle



# Foot/Ankle



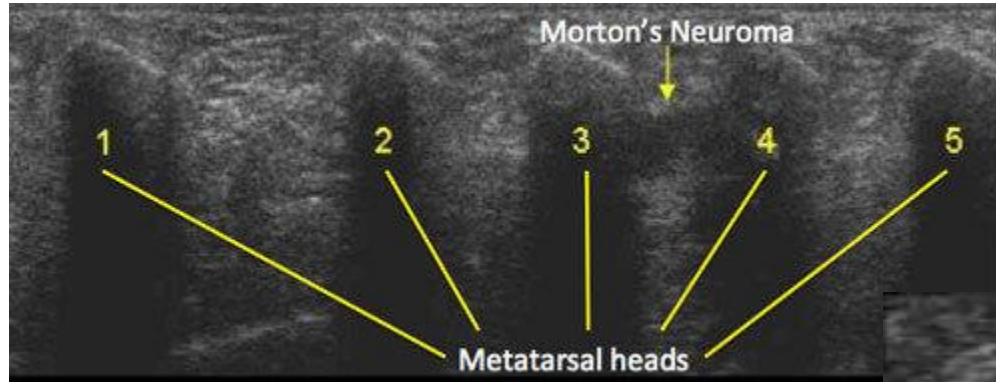
# Morton's Neuroma

- Positioning:
  - Morton's neuroma- patient supine on the exam table with knees flexed and foot flat on the exam table





# Ultrasound- Morton's Neuroma

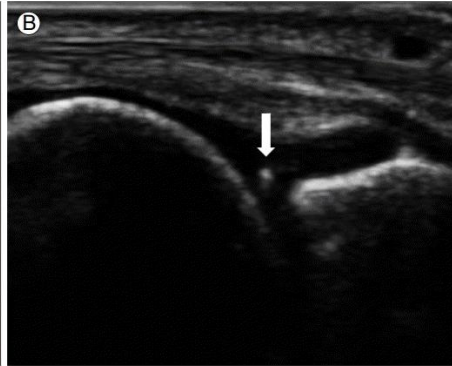




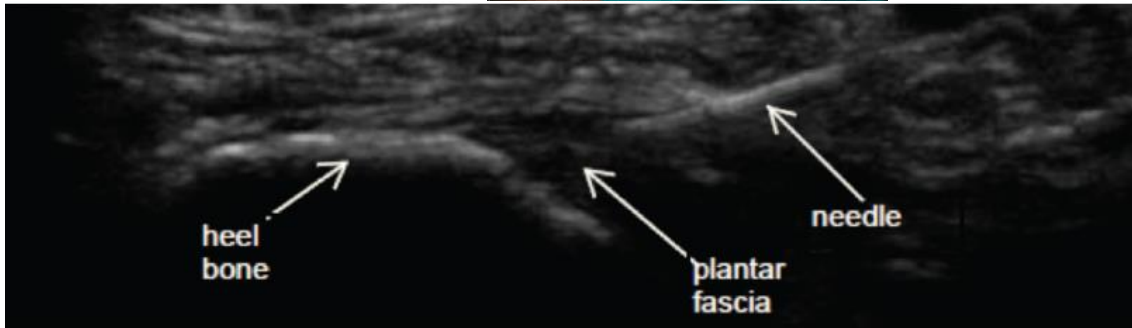
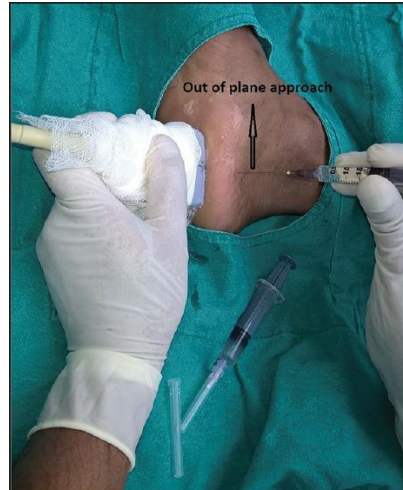
# Bunion/1<sup>st</sup> MTP Joint Injection



- Positioning:
  - Pt laying supine on exam table with knees hanging off the table, flex the knee up and rest heel on the bed of the foot being injected.
- Approach:
  - Identify the joint and distract the joint by pulling in a linear manor on the great toe. Needle will come in from the dorsal aspect of the great toe.



# Plantar Fasciitis



- **Positioning:**

- Pt laying in lateral decubitus position- side to be injected down; may want to flex up the opposite side to allow for comfort of pt.

- **Approach:**

- Ultrasound plantar surface; needle comes in from the medial (out of plane) or posterior aspect (in plane) of calcaneus

# Ankle Joint Injections

- Positioning:
  - Pt laying supine with heel off the table or heel on the table
- Approach:
  - Anteromedial- identify the anterior tibialis tendon and go medial to the tendon
  - Ultrasound probe just superior to needle insertion



# Charcot Foot



**DO NOT INJECT**

# Resources

- [Rheumtutor.com](http://Rheumtutor.com)
- <https://www.aafp.org/pubs/afp/issues/2003/0515/p2147.html>
- <https://www.perthortho.com.au/extra-information/shoulder-anatomy/>
- <https://www.youtube.com/watch?v=jo3gO5BLm4Q>
- <https://www.youtube.com/watch?v=YXtQQAd4n1E>
- <http://www.imreference.com/rheumatology/rheum-shoulder-pain?tmpl=%2Fsystem%2Fapp%2Ftemplates%2Fprint%2F&showPrintDialog=1>
- <https://anatomyinfo.com/foot-bones/>
- <https://www.footandankle-usa.com/types-of-bunions/>
- <https://www.mortonsneuroma.com/blog/mortons-neuroma-diagnostic-injection/>
- <https://www.semanticscholar.org/paper/Post-traumatic-ankle-arthritis.-Weatherall-Mroczek/75e0e0e40a9557f4f18c05868e1c8a4a3a0fed46>

# Resources continued

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- <https://anatomyinfo.com/foot-bones/>
- <https://www.footandankle-usa.com/types-of-bunions/>
- <https://www.orthobullets.com/foot-and-ankle/7047/diabetic-charcot-neuropathy>
- [https://www.pafootdoctors.com/media/k2/items/cache/68b62085e41e8f225811766f8d5eb2bb\\_S.jpg](https://www.pafootdoctors.com/media/k2/items/cache/68b62085e41e8f225811766f8d5eb2bb_S.jpg)
- <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC5044731/>
- <https://arapc.com/foot-pain-psoriatic-arthritis/>
- <https://www.aafp.org/pubs/afp/issues/2003/1001/p1356.html>.
- <https://www.mortonsneuroma.com/blog/ultrasound-examination-effective-identifying-mortons-neuroma/>



# Resources continued

- [https://www.ekjm.org/journal/Figure.php?id=f11-kjm-89-6-654&number=25207&p\\_name=0106\\_25207](https://www.ekjm.org/journal/Figure.php?id=f11-kjm-89-6-654&number=25207&p_name=0106_25207)
- <https://www.ajronline.org/doi/pdfplus/10.2214/AJR.16.16243?src=recsys>
- [https://link.springer.com/chapter/10.1007/978-3-319-43133-8\\_100](https://link.springer.com/chapter/10.1007/978-3-319-43133-8_100)
- [https://link.springer.com/chapter/10.1007/978-3-030-18371-4\\_20](https://link.springer.com/chapter/10.1007/978-3-030-18371-4_20)
- <https://www.semanticscholar.org/paper/Ultrasound-Guided-Elbow-Procedures.-Sussman-Williams/4fb4c3d5c027b2a7d4dc05939639df6576a03438>
- <https://www.acep.org/sonoguide/procedures/arthrocentesis/>
- [https://www.researchgate.net/figure/a-Suprapatellar-longitudinal-scan-of-the-knee-b-Ultrasound-image-of-the-fig1\\_221887518](https://www.researchgate.net/figure/a-Suprapatellar-longitudinal-scan-of-the-knee-b-Ultrasound-image-of-the-fig1_221887518)
- <http://reference.medscape.com/features/slideshow/arthro-practice>



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- Fam AG, Lawry GV, Kreder HJ. Musculoskeletal Examination and Joint Injection Techniques. Mosby Elsevier, Philadelphia, PA, 2006.
- <https://musculoskeletalkey.com/measurement-of-range-of-motion-of-the-elbow-and-forearm/>
- <https://i2.wp.com/musculoskeletalkey.com/wp-content/uploads/2020/03/C3-FF1.gif?w=960>
- <https://ars.els-cdn.com/content/image/1-s2.0-S221425091500013X-gr1.jpg>
- <https://i.ytimg.com/vi/5eYfuyXczL8/maxresdefault.jpg>
- <https://www.thespineandrehabgroup.com/hip-bursitis>