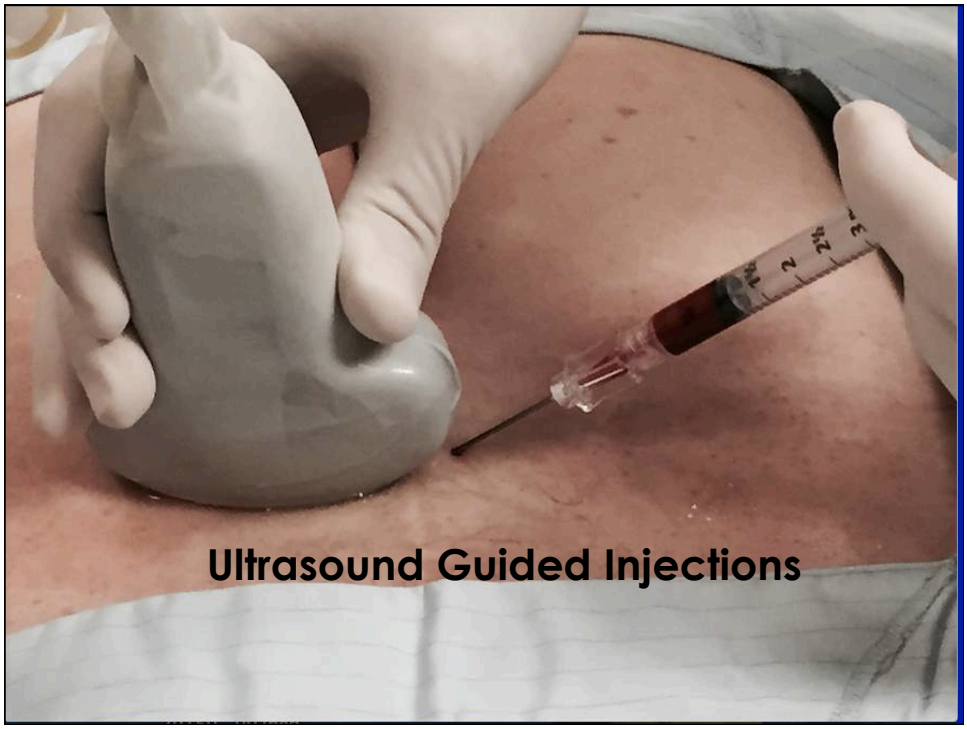
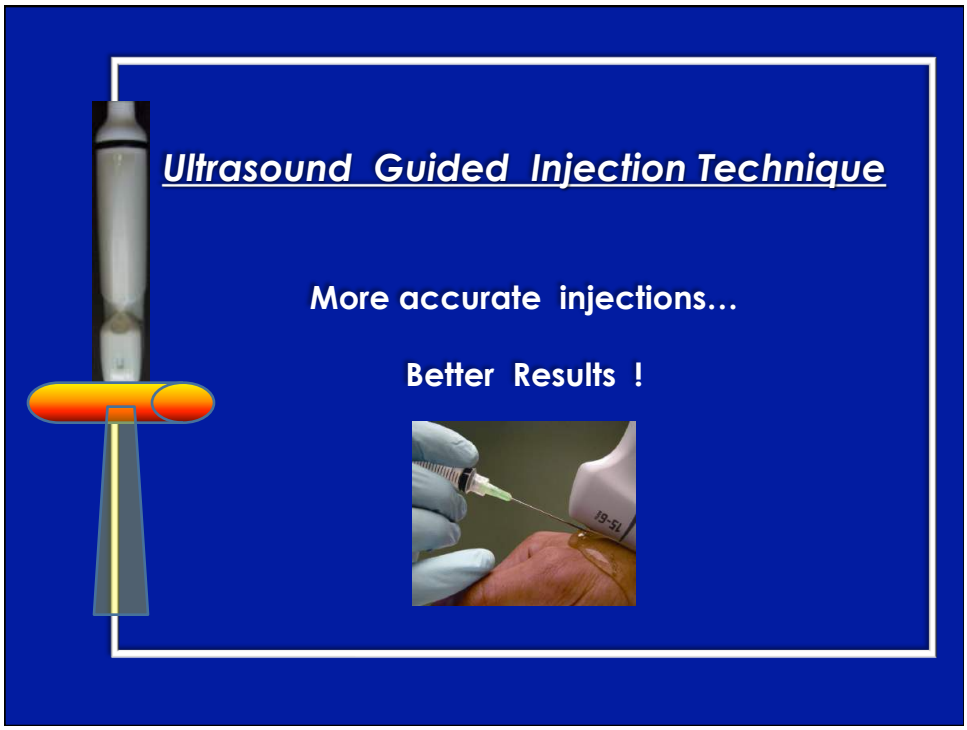

Ultrasound Guided Injections


Ultrasound Guided Injection Technique
More accurate injections…
Better Results !

Ultrasound Guided Injections

Benefits:
Increased Level of Certainty…
ie : really know how accurate

PRP/Prolotherapy

Avoid damage to articular cartilage

Joint aspiration and injection

Tendon sheath injection

Bursa injection/aspiration

Ultrasound Guided Injections

Free Hand Technique

<u>Transducer Selection</u> :

High Frequency for Superficial Anatomy
Lower Frequency for Deeper Anatomy
(hip and spine)

"Acoustic Footprint"
Probes should span the joint space
Visualize both osseous landmarks

Ultrasound Guided Injections

Why is Image Guidance Needed ?

1.Confirm the indication for guided procedure
- * Previous failed response to injection…or enhance
- * Patient habitus
- * Degenerative joint disease…narrowed margin
- * Patient safety…proximity of neurovascular bundle
- * Standard of care…intra-articular placement imperative (viscosupplementation)

2. US is a safe procedure…

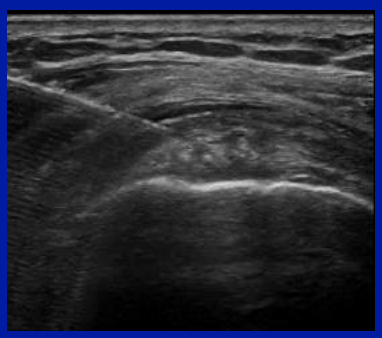
It's not a "game changer" !

Simply adding an image to your current skill set !

Ultrasound Guided Injections

Needle Visualization

Maintaining a perpendicular position



Ultrasound Guided Injections

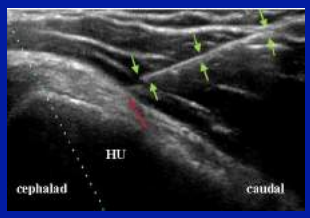
Needle Visualization

Free Hand In-Plane Technique

Transducer Orientation Relative to Needle

Long axis of the needle ***PARALLEL*** with ***and*** ***CENTERED*** on long axis of the probe.

Goal is to always see the entire length of the needle… including the tip



Ultrasound Guided Injections

Needle Visualization

Long axis of the needle ***PARALLEL*** with ***and*** ***CENTERED*** on long axis of the probe.

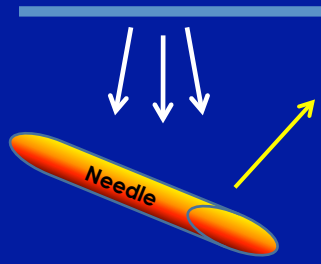


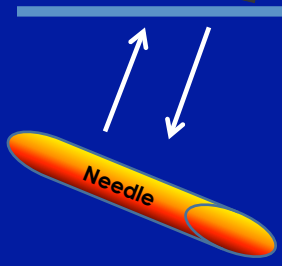
True In plane position must be maintained for successful needle visualization

Ultrasound Guided Injections

Needle Visualization with probe manipulation

HEEL – TOE
Maneuver
Rocking probe on long axis. Align beam w/ needle. Return echoes to probe

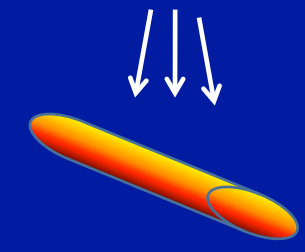


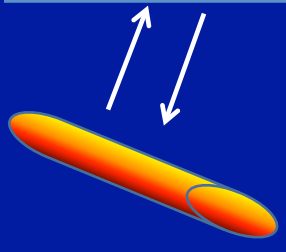


Ultrasound Guided Injections

Needle Visualization with probe manipulation

TOGGLING
"wag the tail of the probe"

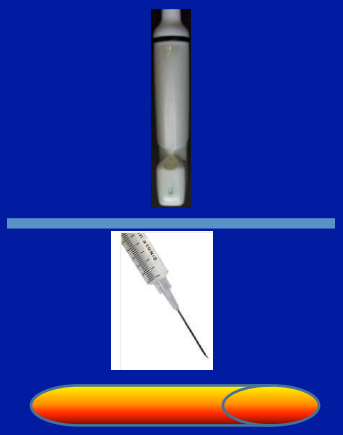




Ultrasound Guided Injections

Needle Visualization with probe manipualtion

Translation: Changing probe position
<u>WITHOUT</u> changing beam angle



Ultrasound Guided Injections

Planning the procedure

1.Probe selection: Linear for most procedures.

Curved array mainly for hip, spine, SI joints.

2. Scouting Image: *<u>Identify undesirable or unexpected</u>*

3. Plan the approach: Proximal to distal ? In Plane ?

Out of plane ? Patient position ?

4. Needle length: <u>Pre-Injection measurement !!</u>

5. Determine the "target": Targeting the correct <u>tissue interface</u>.

Ultrasound Guided Injections

Planning the procedure

Skin Marking : use skin marker or pen

= Puncture Site and… white arrow = Reference point on monitor
Needle will be seen advancing from top left or right corner
An "In Plane Advance of Needle

Ultrasound Guided Injections

Planning the procedure

Free Hand In-Plane Technique

Skin Marking : use skin marker or pen

= Puncture Site and… white arrow = Reference point on monitor
Needle will be seen advancing from top right corner)
An "In Plane Advance of Needle

Maintaining Sterility

Planning the procedure

**Clean probe with Chloraprep foam or non-alcoholic cleanser*

** Prep patient skin with Chloraprep Sponge.*

• Remove betadine with alcohol swabs
No damage to probe, but does stain

• Probe covers are rarely used. (4x4 Tegaderm)

• Apply small amount of sterile gel or Maxi-cleanse

**Introduce lidocaine (doctor discretion)*

Ergonomics: Room Set Up

Planning the procedure

Free Hand Technique

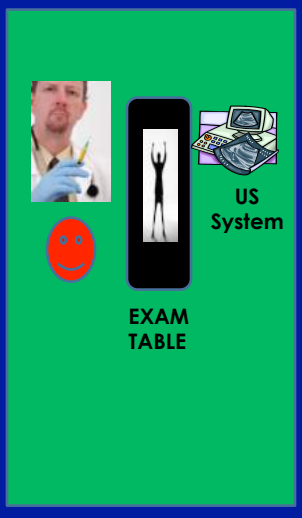
* Having exam table centered in treatment room allows flexibility and access to all extremities.

* Doctor on near side of exam table

* Patient on exam table

* US System on opposite side of exam table

* Sitting down is helpful … Support for doctor's arms. Steady !

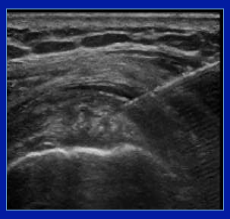


Ultrasound Guided Injections
Advancing the Needle

Free Hand Technique

•Place probe on patient…visualize bony landmarks

*Insert needle BEVEL UP at a very shallow angle… 1cm… STOP !
Visualize the needle…redirect to target



•Toggle …"Heel-Toe" or… probe Translation if necessary

• Elongate the needle on image… see entire length

• *Advance under visualization*

Ultrasound Guided Injections

Suprapatellar Bursa Short Axis Probe

Full length of needle not visualized… because slightly off-plane

Ultrasound Guided Injections
Advancing the Needle

Free Hand Technique
Needle Advancement

- Try not to move needle if full length is not seen. Needle bevel may be most visible.

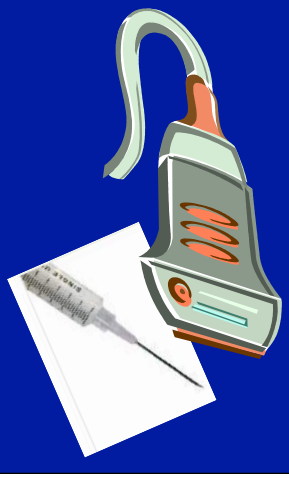
- Do not move probe and needle simultaneously.

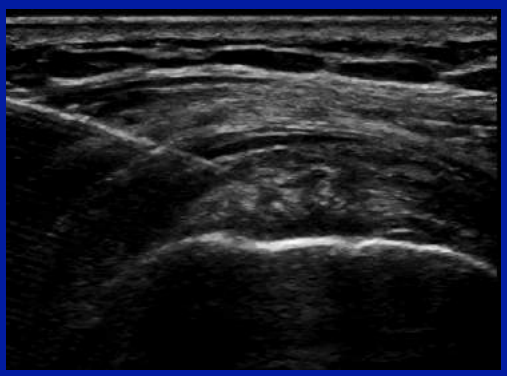
- Injecting a small amount of medicine may help locate needle

Ultrasound Guided Injections
Maintaining proper angle of needle relative to beam

Needle best seen when more PERPENDICULAR to sound beam

Needle echoes reflected directly back to the probe.

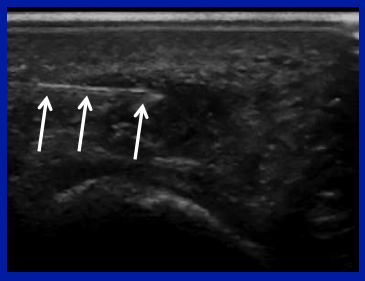


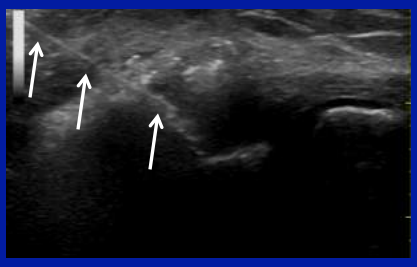


Ultrasound Guided Injections

Maintaining proper angle of needle relative to beam

Deep vs Shallow Targets





Shallow Target
Bright, crisp needle reflection.

A very _ shallow or "flatter" approach makes needle more reflective

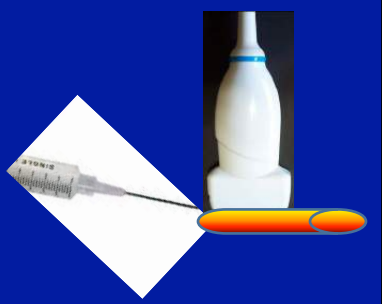
Deep Target
Less bright, "fuzzy" needle reflection

A "more steep or sharp' approach still reflects the needle… but NOT as crisp.

Ultrasound Guided Injections

Shallow Targets : Needle Entry Site

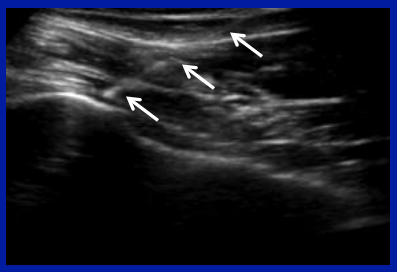
Adjacent…very close to probe



Needle Entry
Adjacent to probe
Shallow "near perpendicular" advance.

Ultrasound Guided Injections

Deep Targets: Needle Entry Site
+/- .5 Inch from probe

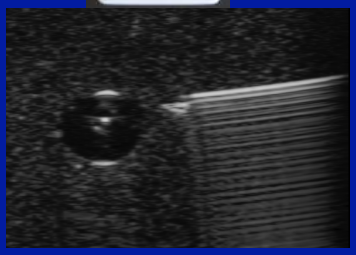


Needle Entry

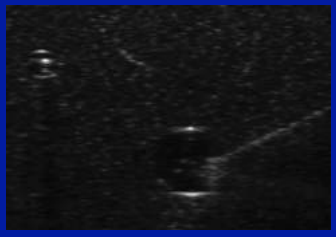
+/- **.5** inch away from probe
to allow more shallow advance.
Increase needle reflection/ visibility

Ultrasound Guided Injections

Shallow and Deep Targets:
Changes in Needle Reflectivity



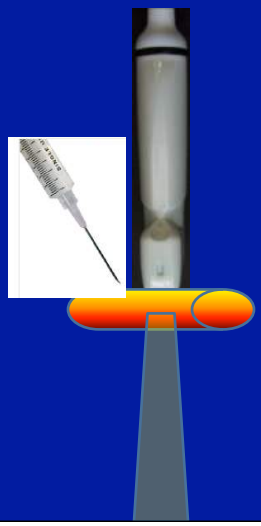
Shallow Target



Deeper Target

Ultrasound Guided Injections
Out of Plane" Approaches
Superficial targets only !!

The needle is advanced across the short axis … narrow width of the probe face.

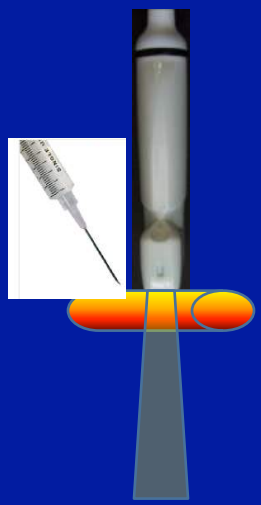


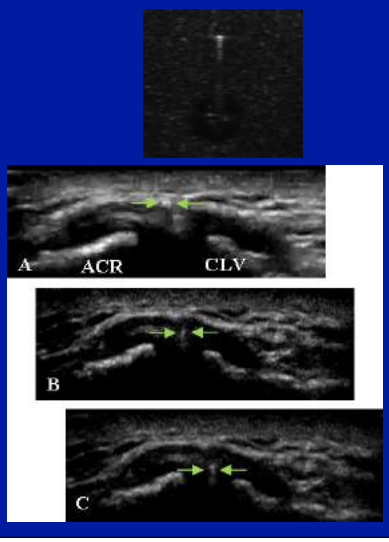
The challenge is <u>NOT</u> advancing the needle <u>TIP</u> beyond the dimension or thickness of the sound beam…

Ultrasound Guided Injections
"Out of Plane" Approaches
Superficial targets only !!

The needle is described as a "falling star" while descending to the target interface.

CMC
MCP
AC
TFCC
ATFL
SUBTALAR





Ultrasound Guided Injections

Technological Enhancements

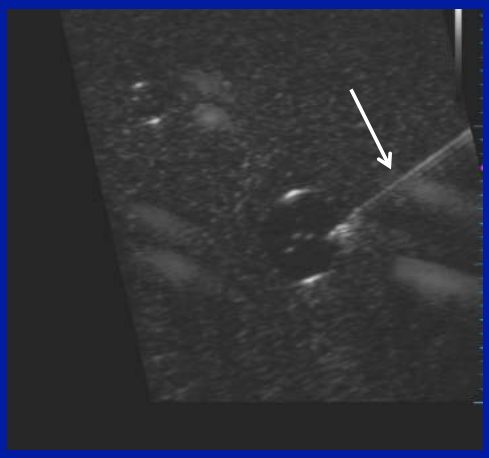
Beam Steering

The system electronically shifts the beam angle to "create"

a more perpendicular …

closer to 90 Degree

relationship between the needle and the sound beam



Ultrasound Guided Injections

Technological Enhancements

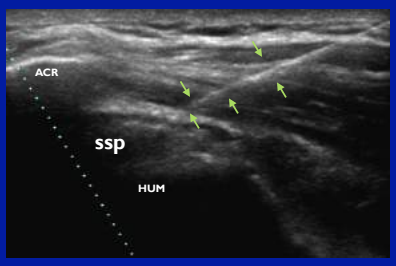
Beam Steering

To utilize Beam Steering…

Shift the beam TOWARD the end of the probe

where the skin puncture will occur

Ultrasound Guided Injections
Sub-Acromial In-Plane Injection

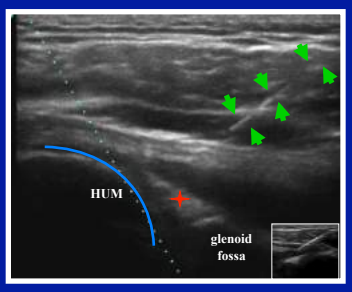


In Plane Approach
Anterior SubAcromial Injection: Inferior to Superior
➔ : Full length reflection of the needle is advanced to the linear, anechoic, horizontal line of the
SubAcromial/Deltoid Bursa above the Supraspinatus tendon
ACR : Acromion Hum : Humerus ssp : Supraspinatus

Ultrasound Guided Injections
Supraspinatus In-Plane Injection

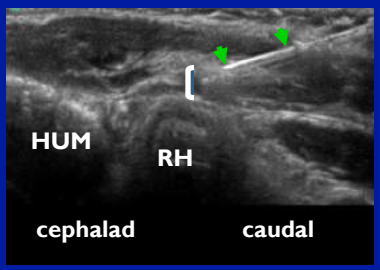
In Plane-Anterior Approach Supraspinatus
Inferior to Superior
Full length reflection of needle advanced to the hyperechoic line of the tendon sheath.

Ultrasound Guided Injections
Posterior Gleno-Humeral In-Plane Injection



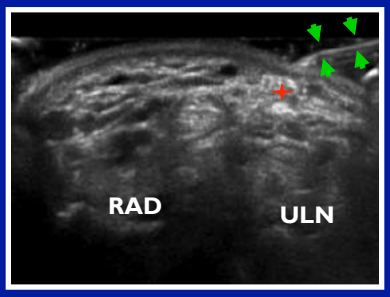
In Plane-Posterior Gleno-Humeral Injection
Medial to Lateral Approach
→ : Full length reflection of needle is advanced to the hyperechoic triangle of the glenoid labrum.
HUM : Humerus (Blue Arc) **Red Star : Glenoid Labrum**

Ultrasound Guided Injections
Lateral Epicondyle In-Plane Injection



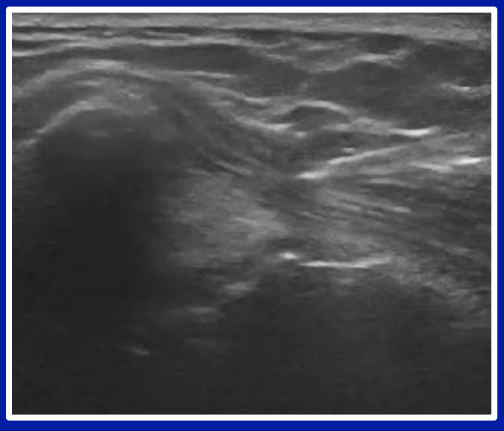
In Plane- Lateral Epicondyle/Common Flexor
Inferior to Superior Approach
→ : Full length reflection of needle is advanced to the hyperechoic extensor tendon. (blue bracket)
HUM : Humerus RH : Radial Head

Ultrasound Guided Injections
Median Nerve In-Plane Injection



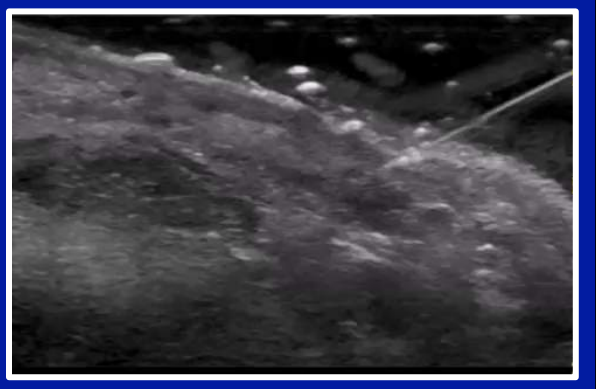
In Plane-Median Nerve/Carpal Tunnel
Medial to Lateral Approach
: Reflection of needle within "gel standoff"
before piercing the skin .
Red Star: Median Nerve
RAD: Radius ULN: Ulna

Ultrasound Guided Injections
Anterior Longitudinal Sub-Acromial approach



Ultrasound Guided Injections

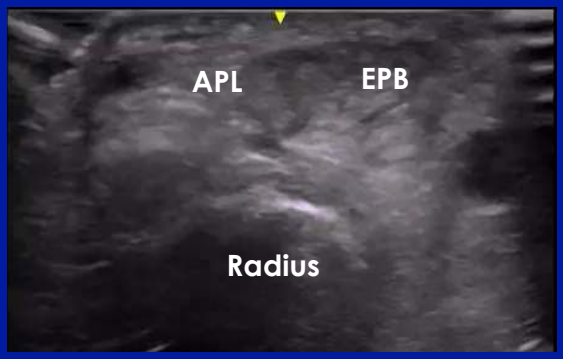
Median Nerve Palmar In Plane
Medial to Lateral Approach



De Quervain's Injection

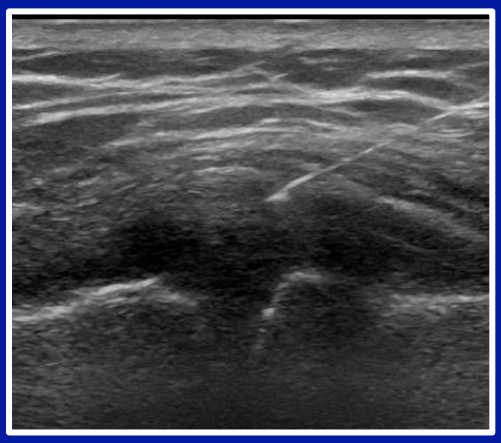
Out of Plane Approach
Dissecting the two tendons

Mid-Supination/Pronation to expose radial margin



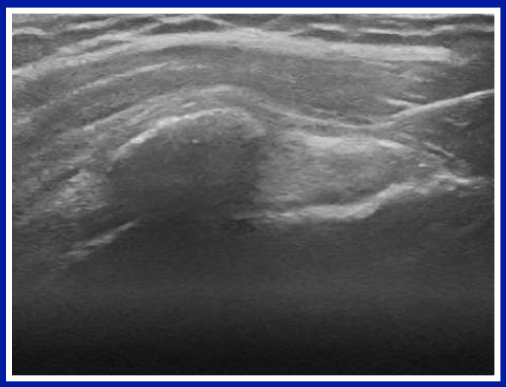
Ultrasound Guided Injections

Knee Injection: MCL In Plane approach



Ultrasound Guided Injections

Large Calcific Tendinosis within SSP



Ultrasound Guided Injections

Baker's Cyst aspiration

Ultrasound Guided Injections

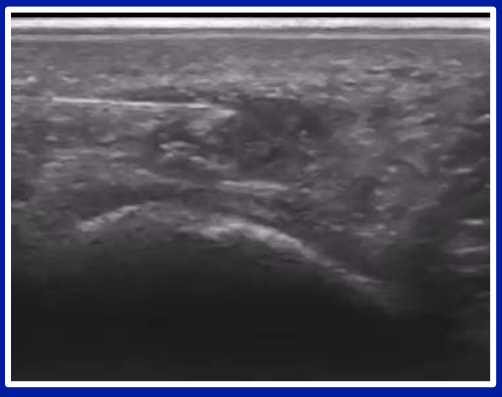
Lateral Epicondyle Injection

Ultrasound Guided Injections

Visualization of Meds dispersing

Ultrasound Guided Injections

Plantar/Calcaneal Bursa or Effusion



Thank You !