

# US-guided elbow injections

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# US-guided injections

*elbow tendons*

# US-guided injections

## Elbow tendons

- ✓ Minimally invasive
- ✓ Quick, cheap
- ✓ Safe, reliable

*Walsh JP, et al. Semin Musculoskelet Radiol. 2018*

## Indications

### Tendinosis/partial tendon tear

- ✓ Common extensor tendon (CET)
- ✓ Flexor - pronator mass
- ✓ Distal biceps brachii tendon (dBBt)
- ✓ Triceps brachii tendon (TBt)
  - Olecranon bursitis

### Calcific tendinopathy

- ✓ Common extensor tendon (CET)
- ✓ Triceps brachii tendon (TBt)

*Sconfienza LM, et al. Eur Radiol 2020*

# Elbow tendinopathy

## *Management*

### Conservative treatment

NSAIDs, physiotherapy, activity modification, rest

### US-guided injections

- corticosteroids
- PRP
- autologous blood
- sclerotherapy
- prolotherapy
- percutaneous needle tenotomy (dry needling, fenestration)

### Surgery

Refractory cases

# US-guided injections of elbow tendinopathy

## What is the evidence?

### Common extensor tendon

#### Acute phase (< 3 months)

##### Corticosteroid injection

- ✓ short-term benefit (3-8 weeks)
- ✓ lack of supportive evidence for medium- to long-term efficacy (> 6 months)
- ✓ high recurrence rate in long-term (1 year)
- ✓ adverse effects (tendon damage, fatty atrophy, skin discolouration)
- ✓ **not generally advised**, injected in selected cases

*Smidt N, et al. Lancet 2002*  
*Branson R, et al. J Sci Med Sport 2017*  
*Sconfienza LM, et al. Eur Radiol 2020*

#### Chronic phase (> 3 months)

##### PRP injection

- ✓ +/- percutaneous needle tenotomy
- ✓ ~ 80% improvement up to 1 year
- ✓ alternative agents: autologous blood, prolotherapy (hyperosmolar dextrose, sodium morrhuate), sclerotherapy

*Karaduman M, et al. J Orthop 2016*  
*Mishra AK, et al. Am J Sports Med 2014*  
*Uygur E, et al. J Shoulder Elbow Surg 2021*  
*Sconfienza LM, et al. Eur Radiol 2020*

##### Percutaneous needle tenotomy

- ✓ stand alone treatment
- ✓ improvement of pain/disability at 6 months

*Navarro-Santana MJ, et al. Clin Rehabil. 2020*  
*Uygur E, et al. Int Orthop. 2017*

## Flexor- pronator mass

### Corticosteroid injection

- ✓ short-term benefit (up to 6 weeks)
- ✓ no determined long-term efficacy

### PRP/autologous blood injection

- ✓ beneficial effect at 10 months

*Stahl S, et al. Knee Joint Surg Arthrosc 2005*  
*Suresh SPS, et al. Br J Sports Med 2006*

## Triceps brachii tendon

### Corticosteroid injection

- ✓ association with subsequent tendon rupture

*Mair SD, et al. Am J Sports Med 2004*

### PRP injection

- ✓ beneficial effect in partial tear

*Cheatham SW, et al. Int J Sports Phys Ther 2013*

## Distal biceps brachii tendon

### Corticosteroid injection

- ✓ association with subsequent tendon rupture

### PRP injection

- ✓ beneficial effect in tendinosis with partial tear

*Sanli I, et al. Knee Surg Sports Traumatol Arthrosc 2016*  
*Barker SL, et al. Shoulder Elbow 2015*

## Limited evidence

The same treatment approaches to lateral epicondylitis might be used

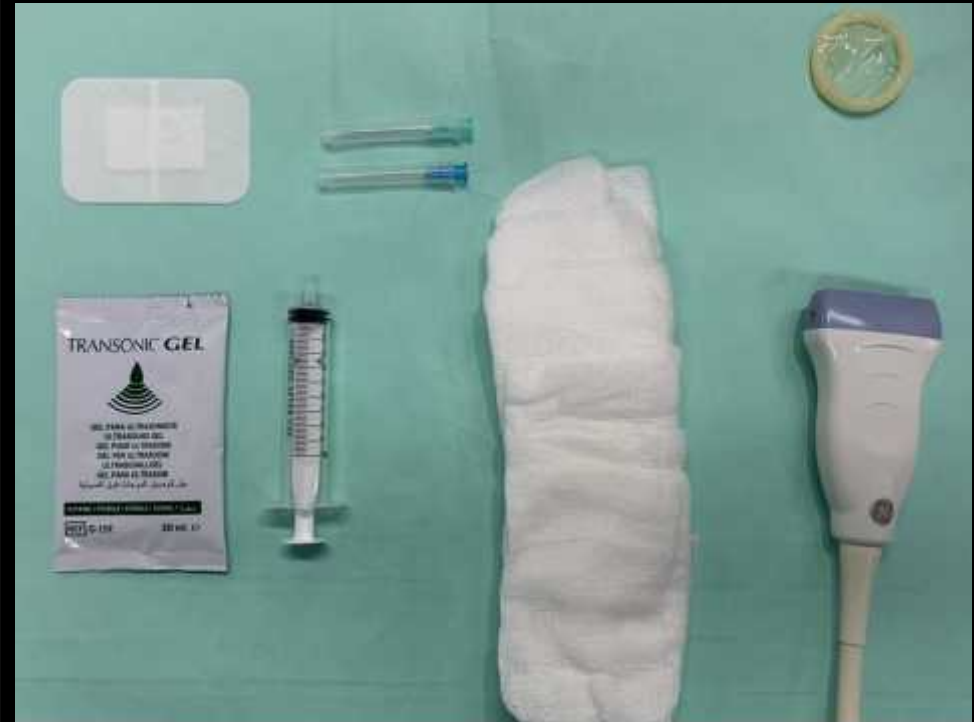
*Sconfienza LM, et al. Eur Radiol 2020*

# US-guided injections of elbow tendons

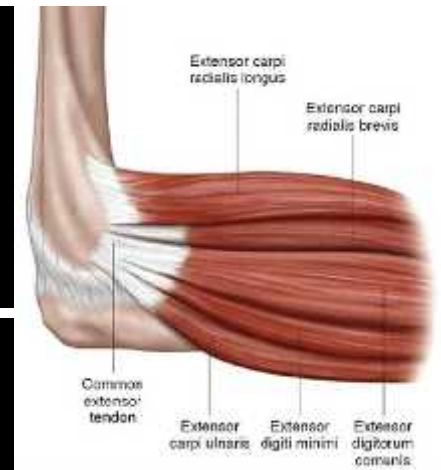
## *Equipment*

### What we need:

- ✓ high - frequency linear transducer
- ✓ sterile cover
- ✓ sterile gel
- ✓ sterile gauze
- ✓ needle (25 to 38 mm, 18-25 gauge)
- ✓ syringe
- ✓ plaster



# Common extensor tendon Pathology



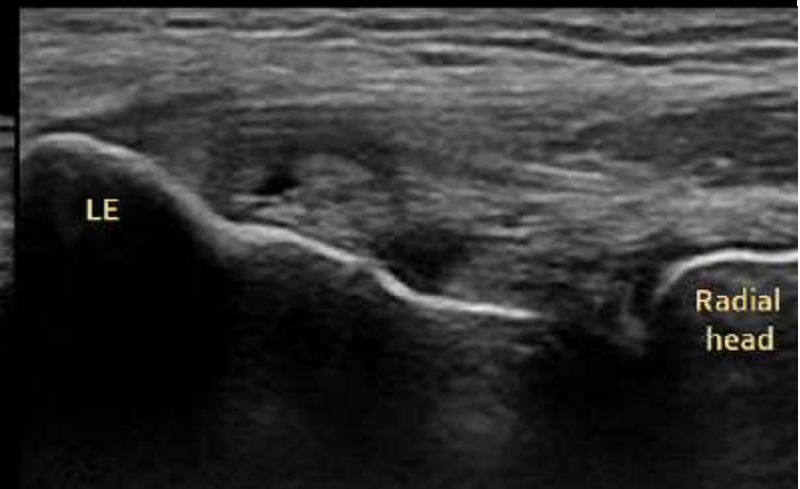
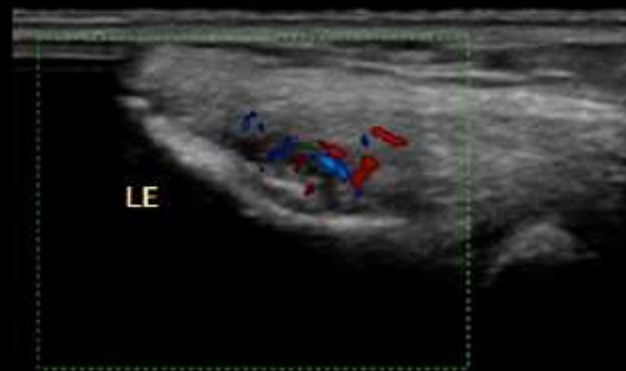
## Lateral epicondylitis (“tennis elbow”)

### Tendinosis due to mechanical overload

- angiofibroblastic degeneration of CET, only initial inflammatory insult
- ECRB, EDC, Edm, ECU

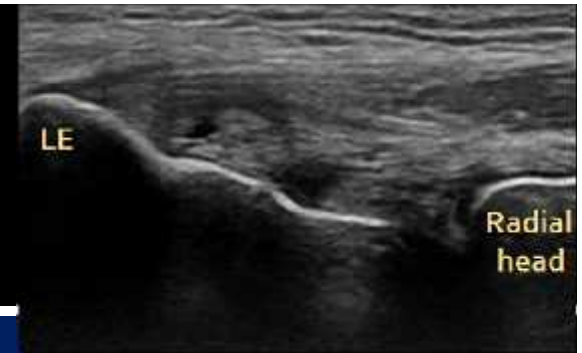
### ECRB: mostly involved

- ✓ horizontal intra-muscular tendon inserting on the LE
- ✓ the only exclusive wrist extensor





# Common extensor tendon *US-guided injection technique*



## Corticosteroid injection

**Target point:** peritendinous region

*(between subcutaneous fat and superficial aspect of CET)*

✓ betamethasone acetate (1 mL) +/- lidocaine hydrochloride 1 % (3-4 mL)

**Probe/needle direction:**

- ✓ distal-to-proximal needle direction
- ✓ in-plane approach (CET, long axis)



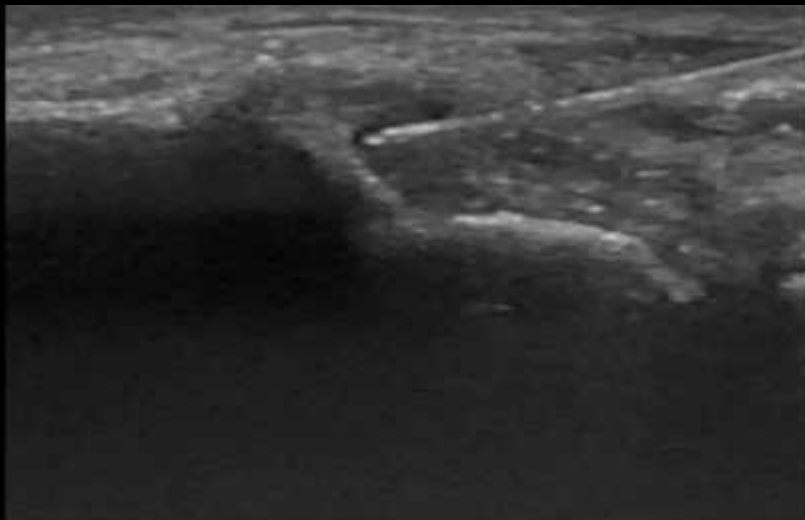
# Common extensor tendon *US-guided injection technique*

## **Percutaneous needle tenotomy/PRP injection**

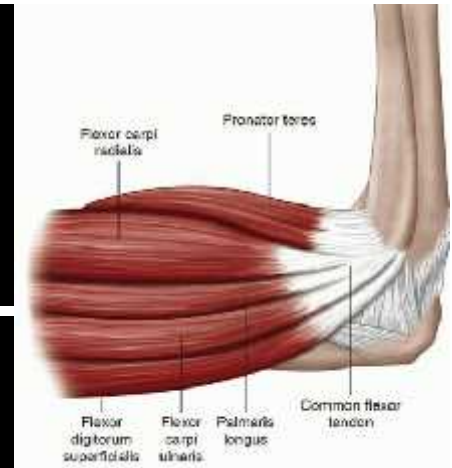
**Target point:** intratendinous region

*areas of maximal abnormality on US*  
*partial tears*

- ✓ local anesthesia
  - lidocaine hydrochloride 1% (5 mL), superficial to CET
- ✓ +/- dry needling (15- 20 punctures)
- ✓ PRP (or alternative) injection (~ 2-3 ml)



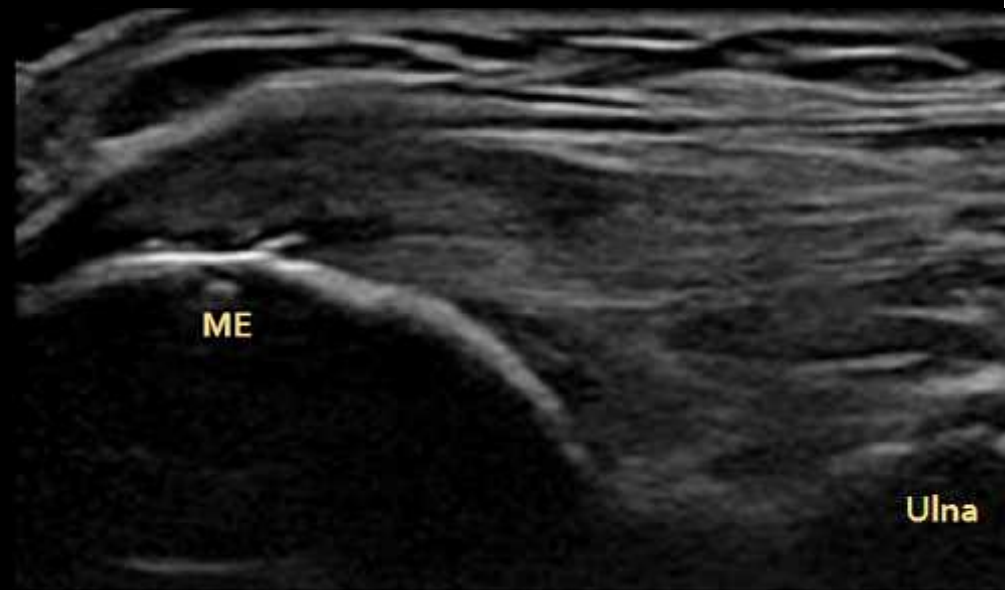
# Flexor-pronator mass Pathology



## Medial epicondylitis (“golfer’s elbow”)

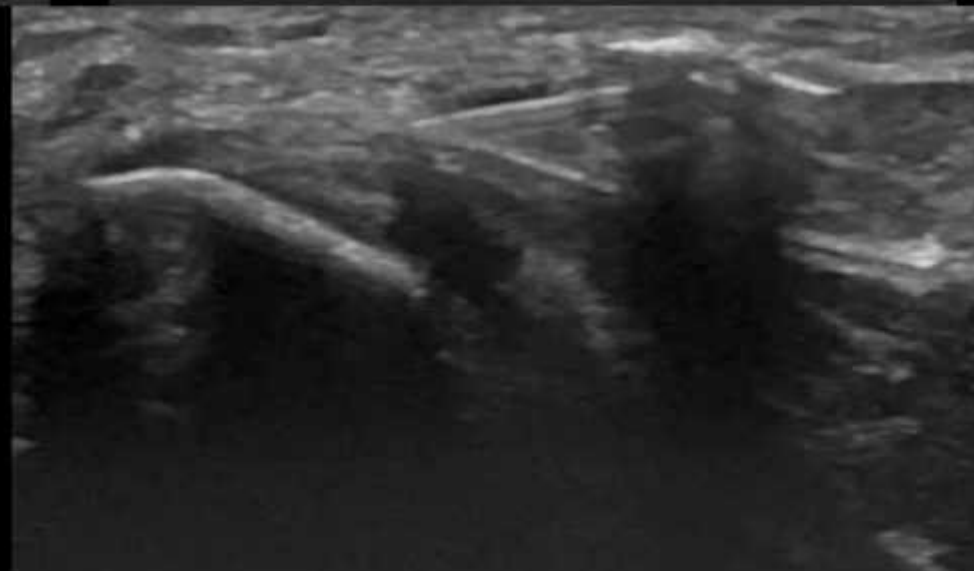
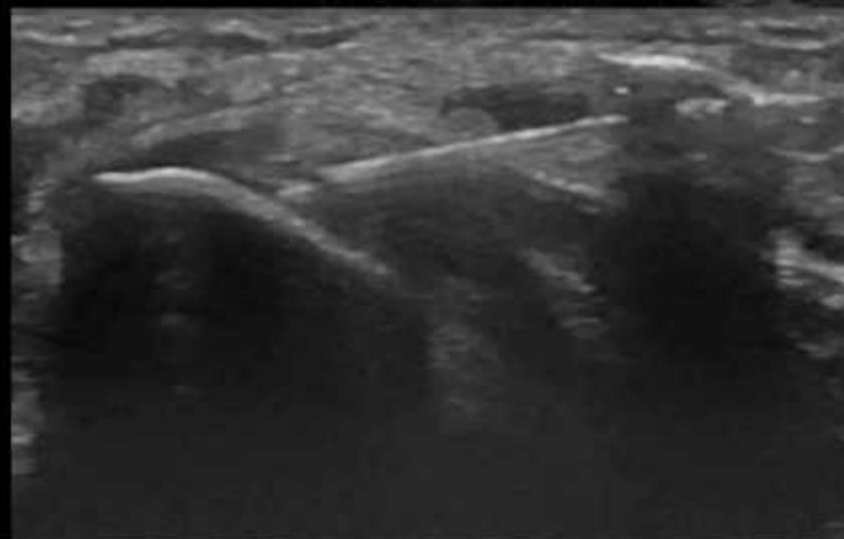
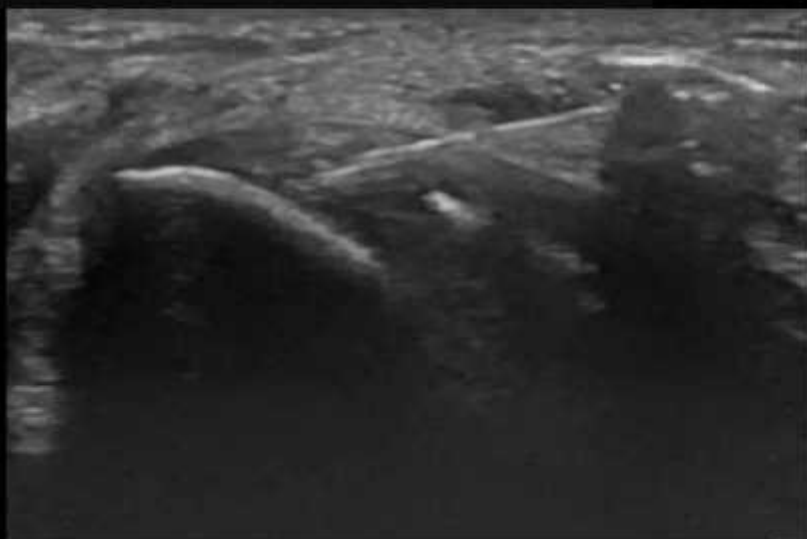
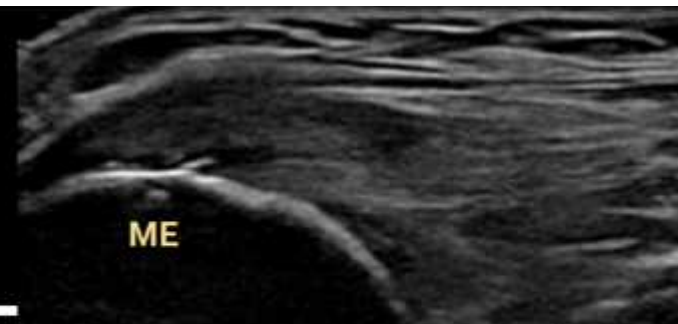
### Tendinosis of flexor-pronator mass due to overuse/repetitive stress

- PT, CFT (FCR, PL, FDS, FCU)
  - ✓ CFT: shorter and broader than the CET



# Flexor-pronator mass

*US-guided injection technique*



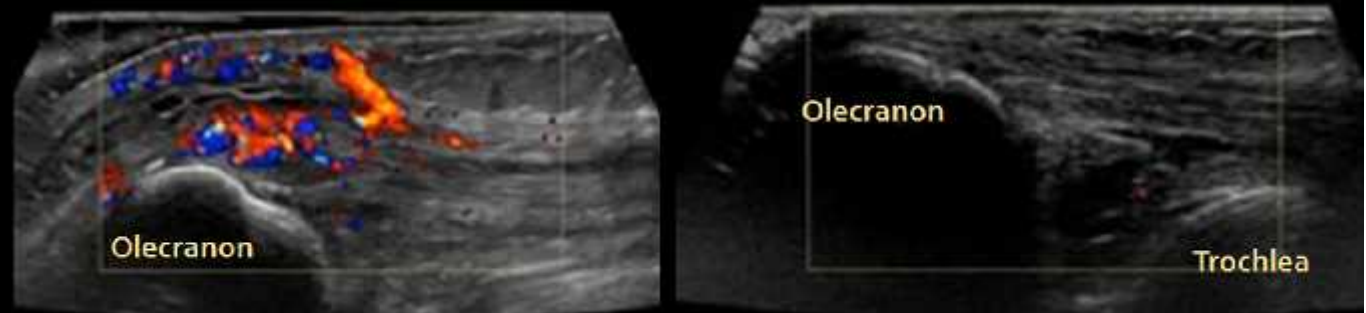
# Triceps brachii tendon Pathology

## Tendinosis due to overuse

- 3 heads, 1 thick tendon attaching on the olecranon (1 cm distal to the tip)
  - ✓ rare condition
- \* **Olecranon bursitis**: bursal inflammation due to microtrauma
- **non-operative management** (compression, rest, NSAIDs)
- **aspiration**
  - ✓ variable outcome
- **corticosteroid injection**
  - ✓ +/- aspiration
  - ✓ faster resolution compared to conservative treatment and aspiration alone
  - \* consider adverse effects (infection, skin atrophy, TBt rupture)

Stell IM. J R Soc Med 1999  
Kim JY, et al. Clin Orthop Relat Res 2016

Kim JY, et al. Clin Orthop Relat Res 2016





# Triceps brachii tendon and olecranon bursa

## *US-guided injection technique*

### Distal triceps tendon

**Patient positioning:** decubitus

**Elbow joint:**

flexed to 90°, shoulder internally rotated, palm on the bed

### Olecranon bursa

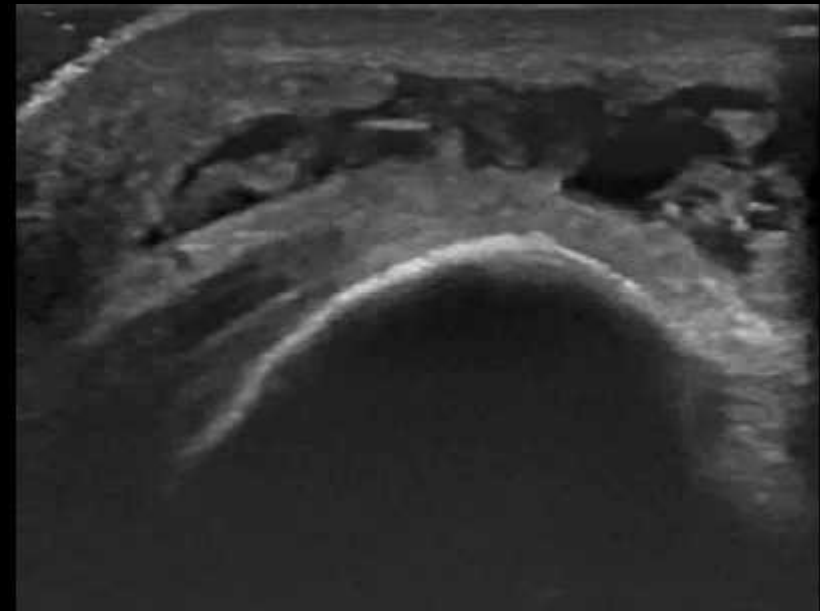
**Patient positioning:** prone

**Elbow joint:**

flexed to 90°, forearm hanging off the side of bed

**Probe/needle direction:**

- ✓ in-plane approach (TBt, long/short axis)
- ✓ distal-to-proximal/lateral-to-medial needle direction



# Distal biceps brachii tendon *US-guided injection technique*

**Patient positioning:** supine

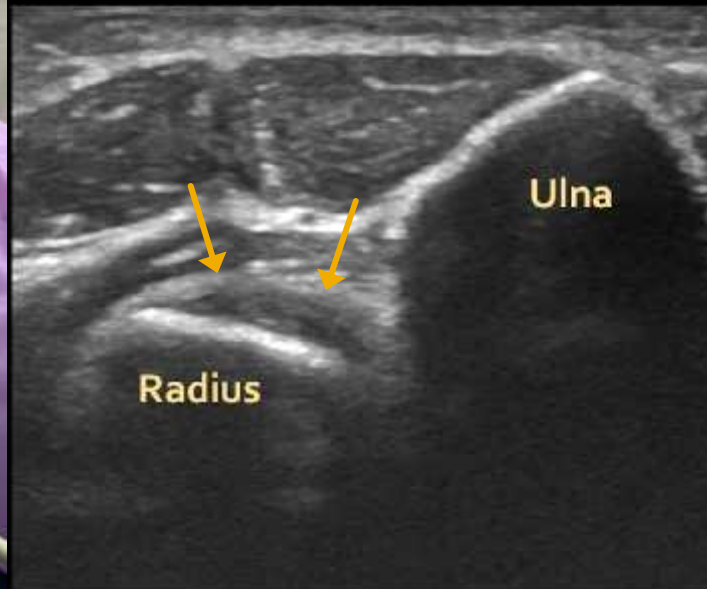
**Elbow joint:**

elbow flexed, wrist flexed and forearm in full pronation

**Probe/needle direction:**

- ✓ in-plane approach
- ✓ lateral-to-medial needle direction

**partial/complete  
a/overuse**



# US-guided injections

*elbow nerves*



# US-guided injections

## Elbow nerves

### 22-27 gauge needle

The bevel of the needle should be rotated to face the nerve

Slow injection rate

Surrounded on at least half its circumference

## Indications

### Nerve blocks

- ✓ ~ 3-5 ml of anesthetic (bupivacaine 0.25 -0.5%, lidocaine hydrochloride 1-2%)

### Therapeutic procedures

Neuropathy - ulnar nerve, deep motor branch of radial nerve, median nerve

- ✓ ~ 1-5 mL of anesthetic + corticosteroid mixture

(bupivacaine 0.75%, ropivacaine 0.5% + betamethasone 6 mg/mL, triamcinolone 40 mg/mL)

- ✓ ~ 5 mL D5W

*Klauser AS, et al. Semin Musculoskelet Radiol 2018*

## Clinical outcome-evidence

- Beneficial effect in the short- and mid-term (up to 6 months)
- No positive effect of steroid injection compared with placebo in ulnar neuropathy

*vanVeen KE, et al. Muscle Nerve 2015*

*Alblas CL, et al. Eur J Neurol 2012*

*Choi CK, et al. Ann Rehabil Med 2015*

- Hydrodissection (D5W): effective up to 6 months

*Chen LC, et al. Arch Phys Med Rehabil. 2020*

# US-guided injection

## Ulnar nerve

**Patient positioning:** supine

**Elbow joint:**

flexed 90°, shoulder abducted

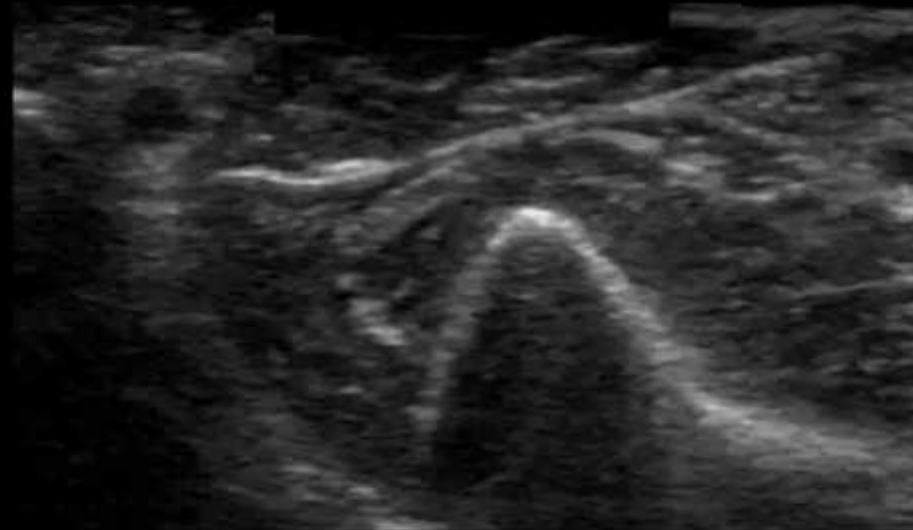
**Probe/needle direction:**

- ✓ transverse to condylar groove
- ✓ inject proximal tunnel
- ✓ in-plane approach
- ✓ medial-to-lateral/lateral-to-medial needle direction

*Plesl D, et al. J Musculoskelet Res 2014*



*Proximal cubital tunnel*



# US-guided injection

## Radial nerve-deep branch

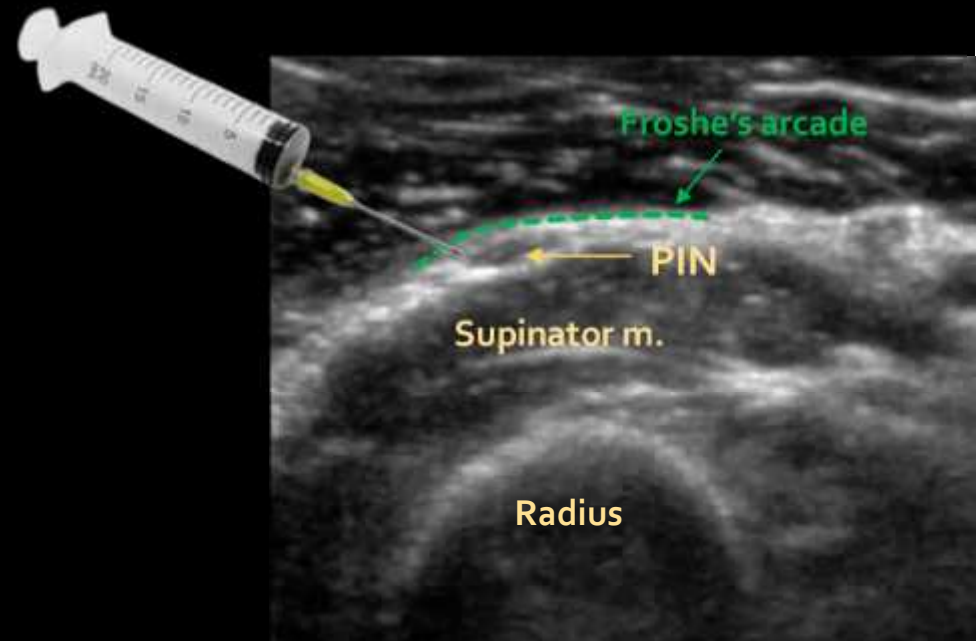
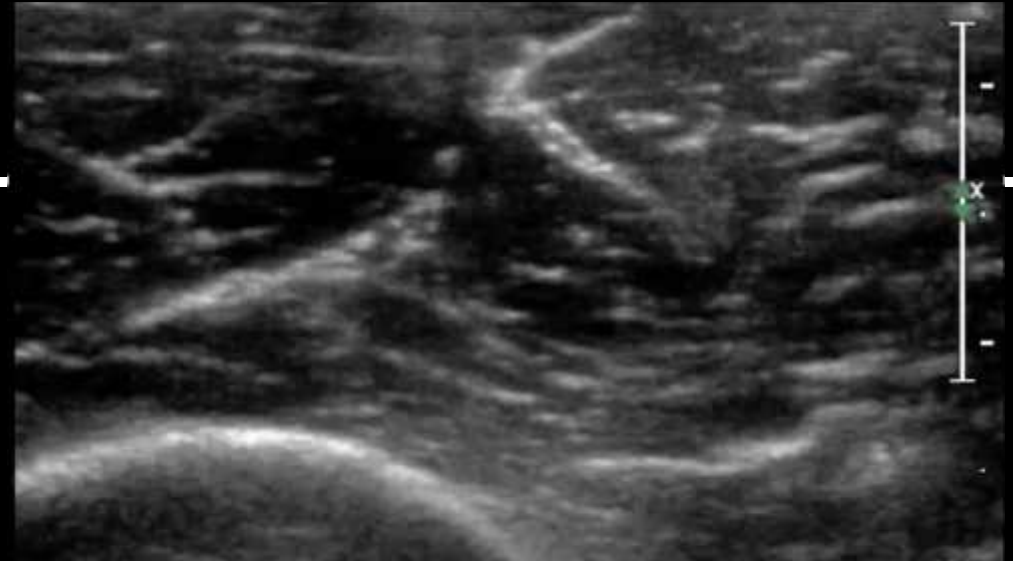
**Patient positioning:** supine

**Elbow joint:**

extended, forearm supinated

**Probe/needle direction:**

- ✓ transverse, radial elbow
  - ✓ in-plane approach
  - ✓ lateral-to-medial needle direction
- direction



# US-guided injection

## *Median nerve*

**Patient positioning:** seated/supine

**Elbow joint:**

extended, forearm supinated

**Probe/needle direction:**

- ✓ in-plane approach
- ✓ medial-to-lateral needle direction  
(distal-to-proximal for hydrodissection)



# US-guided injections

*intraarticular*

# US-guided injections

## *Intraarticular*

**Patient positioning:** seated

**Elbow joint:**

flexed to 90°, forearm prone

**Probe/needle direction:**

- ✓ along humero-radial joint
- ✓ in-plane/out-of-plane approach



OA

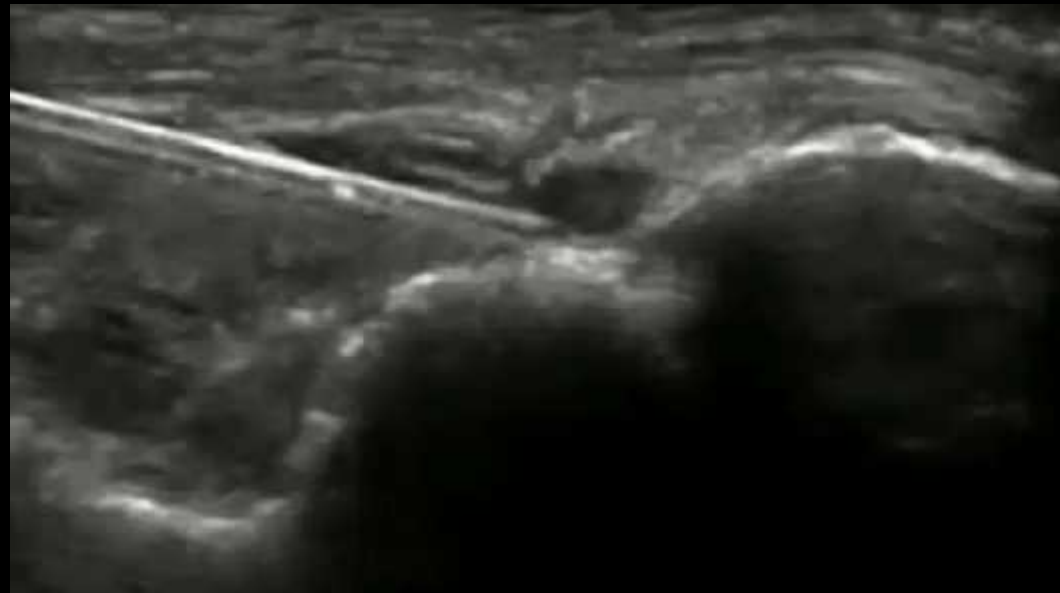
**Patient positioning:** prone

**Elbow joint:**

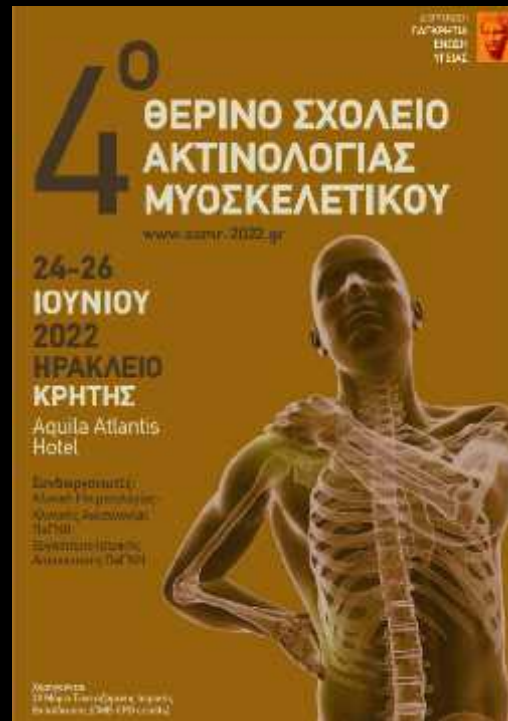
flexed to 90°, forearm hanging off the side of bed

**Probe/needle direction:**

- ✓ short/long axis to TBt
- ✓ in-plane approach
- ✓ lateral-to-medial or proximal-to-distal needle direction







**Thank you!**

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