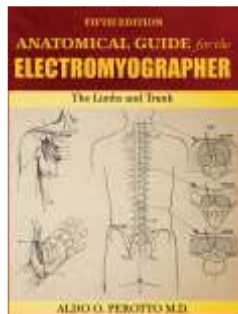


## Ultrasound localisation of forearm muscles



## Commonly injected forearm muscles

- Elbow flexor
  - Brachioradialis
- Pronators
  - Pronator teres
- Wrist flexors
  - Flexor carpi ulnaris
  - Flexor carpi radialis
- Finger flexors
  - Flexor digitorum superficialis
  - Flexor digitorum profundus
  - Flexor pollicis longus



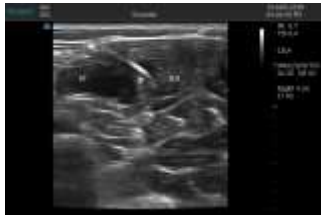
### BRACHIORADIALIS



**Electrode Insertion (X)**  
Midway between biceps tendon (BT) and lateral epicondyle (LE) along flexor crease; insert electrode to a depth of one-half inch.

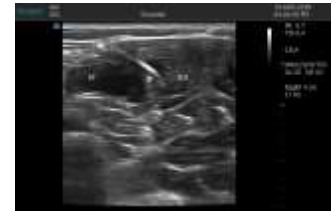


**PRONATOR TERES**



**Electrode Insertion (X)**  
Two fingerbreadths distal to the midpoint of a line connecting the medial epicondyle (ME) and biceps tendon (BT).

**FLEXOR CARPI RADIALIS**



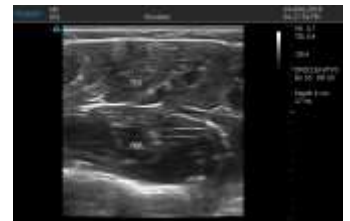
**Electrode Insertion (X)**  
Three to four fingerbreadths distal to the midpoint of a line connecting the medial epicondyle (ME) and biceps tendon (BT).

**FLEXOR CARPI ULNARIS**



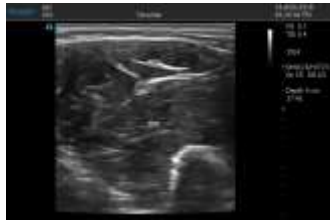
**Electrode Insertion (X)**  
Two fingerbreadths volar to ulna (U) at the junction of the upper and middle thirds of the forearm.

**FLEXOR DIGITORUM SUPERFICIALIS**



**Electrode Insertion (X)**  
Grasp with operator's palm to volar surface of subject's wrist. Point index finger to biceps tendon (BT) and insert needle electrode just ulnarly to tip of index finger.

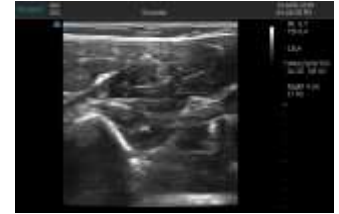
**FLEXOR DIGITORUM PROFUNDUS**



**Electrode Insertion (X)**

Place tip of little finger on olecranon (O) and ring, middle and index fingers along shaft of ulna. Insert needle electrode just beyond tip of index finger just ulnarly to shaft. The ulnar innervated portion is the more superficial (1–2 cm), while the median innervated portion is deeper (3–5 cm).

**FLEXOR POLLICIS LONGUS**

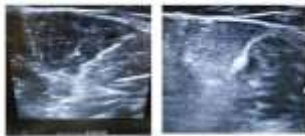


**Electrode Insertion (X)**

In the middle of the forearm the needle electrode is inserted from the radial aspect just volar to the radius. The electrode will travel through the flexor carpi radialis and the flexor digitorum superficialis

**Technical challenges**

- Loss of normal muscle architecture or anatomical planes



Muscle architecture in normal and spastic muscles

**Tips**

- Remember relation of muscle to surrounding structures
- Characteristic shape/architecture
- Do injection under electrical stimulation and ultrasound guidance simultaneously





## Basics of ultrasound guided injection

- Echogenicity of tissue
  - **Muscle fibres** are hypo-echoic separated by hyper-echoic interfaces. Hyper-echoic fascia surrounds each muscle belly delineating muscle groups
  - **Fascia** – hyper-echoic, thin, with well defined margins
  - **Bone** – highly hyper-echoic linear/curvi-linear line with acoustic shadowing
  - **Nerve** – hypo-echoic linear bundles separated by hyper-echoic interfaces

## SUPINATOR



### Electrode Insertion (\*)

Just radial to the most distal part of insertion of the biceps tendon (BT). The electrode will travel through the extensor digitorum communis