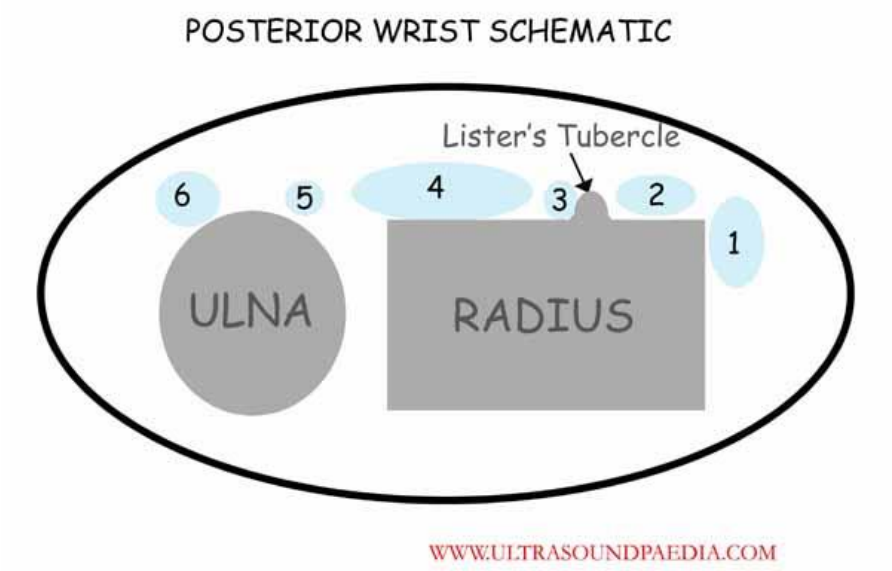
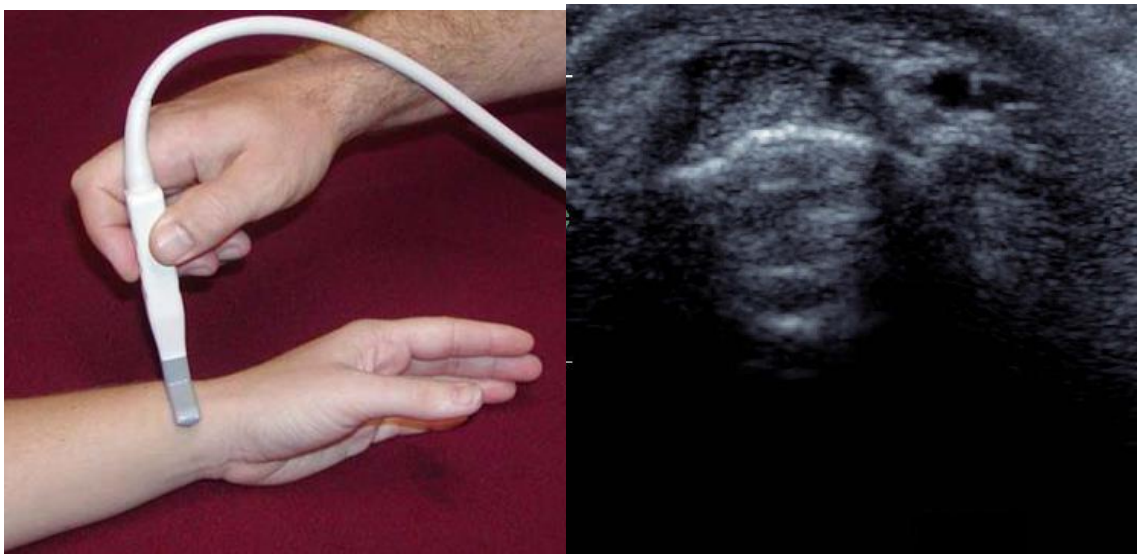
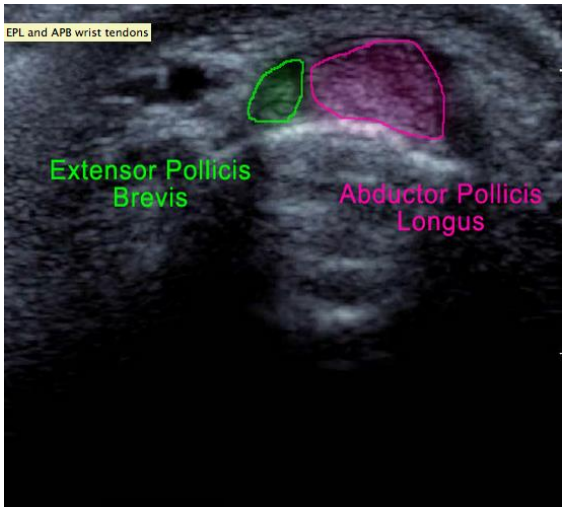
MSK Wrist Ultrasound Protocol

POSTERIOR WRIST

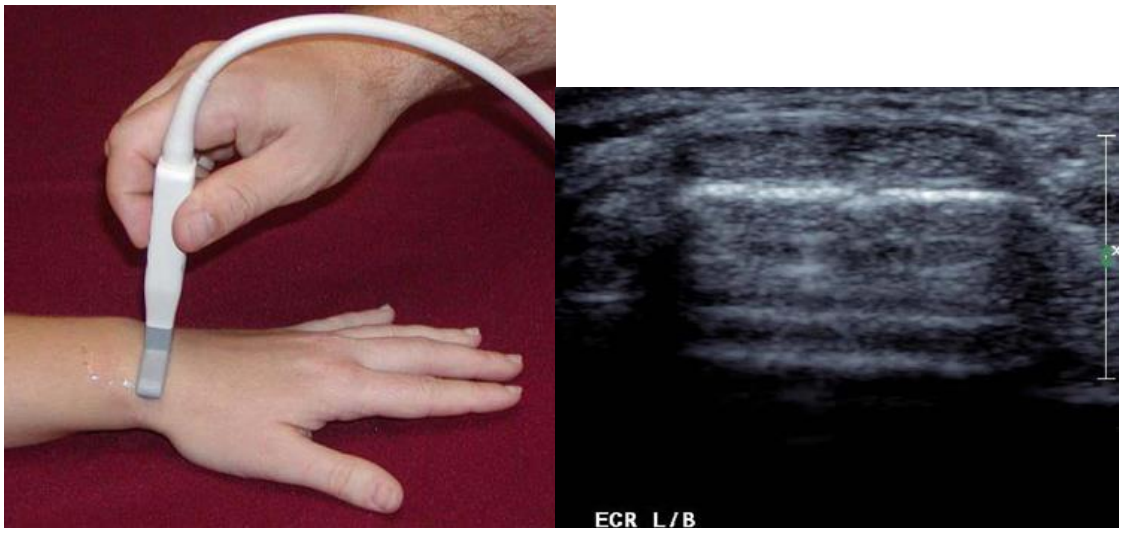


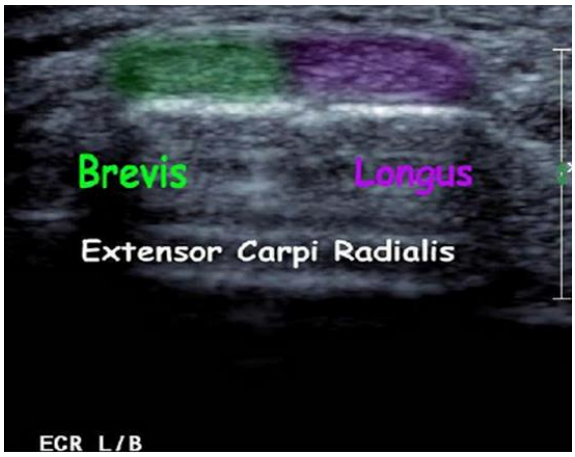
Dorsal Wrist Compartments



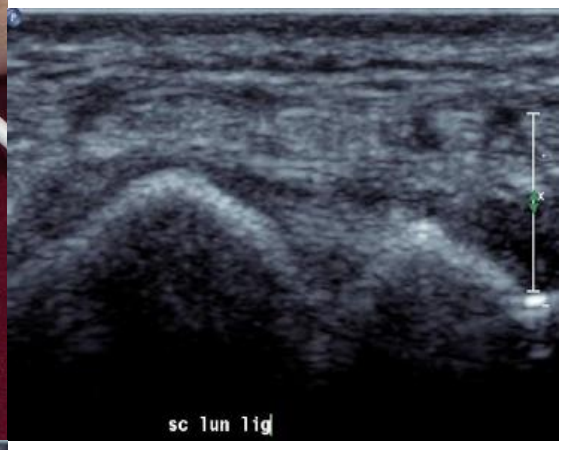


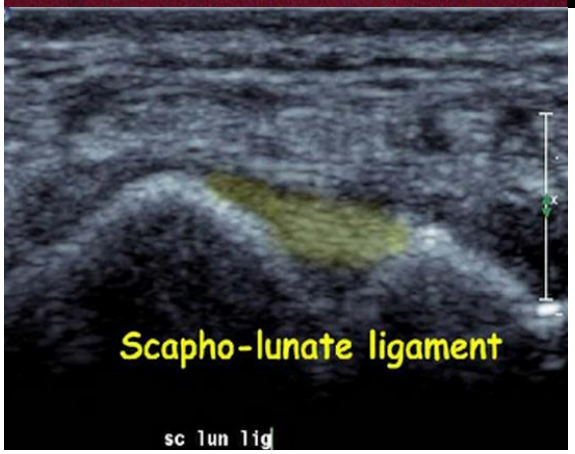
Compartment 1 scan plane: *APL/EPB*





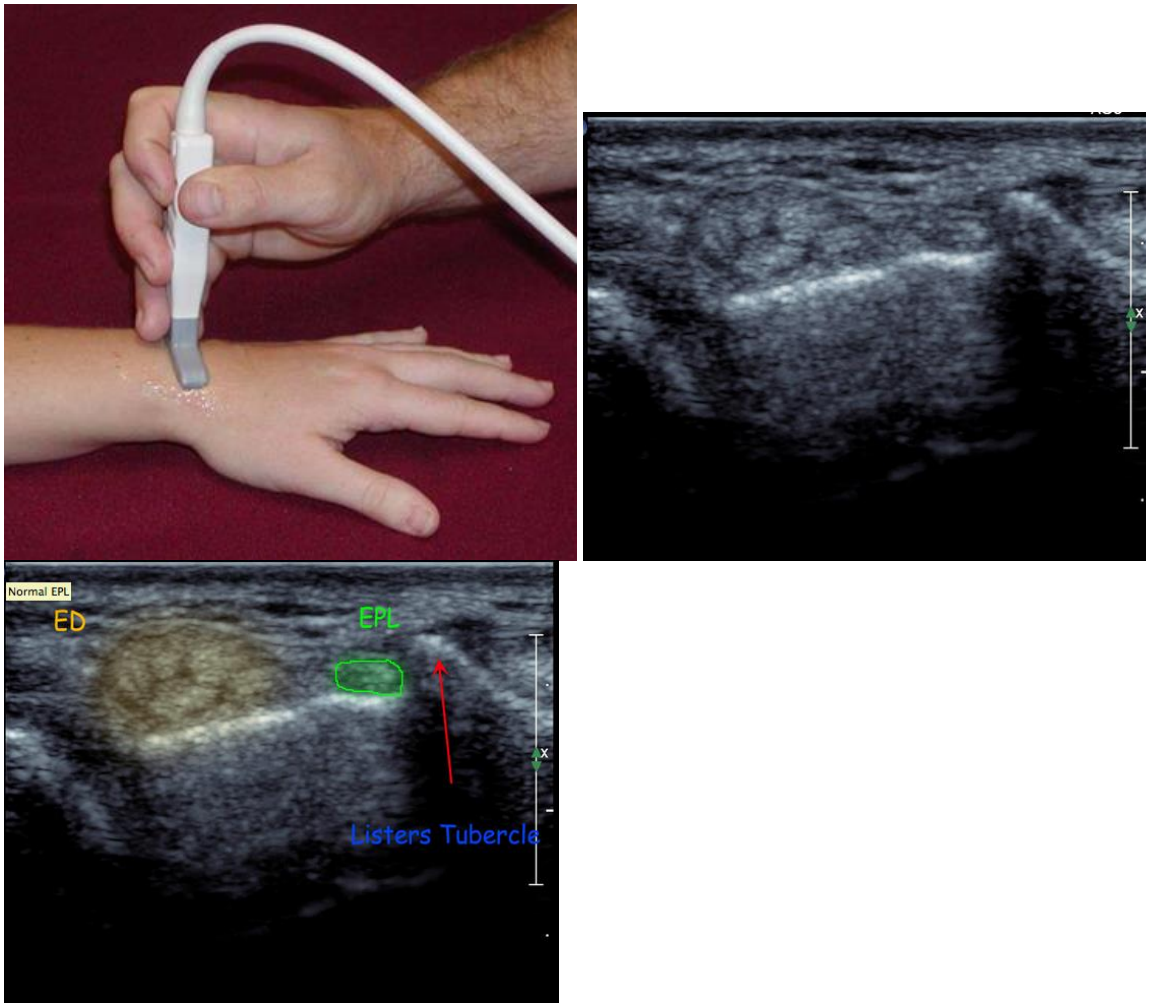
Compartment 2 Scan plane: *Extensor Carpi Radialis, Longus and Brevis. Transverse view of the extensor carpi radialis longus and brevis tendons.*





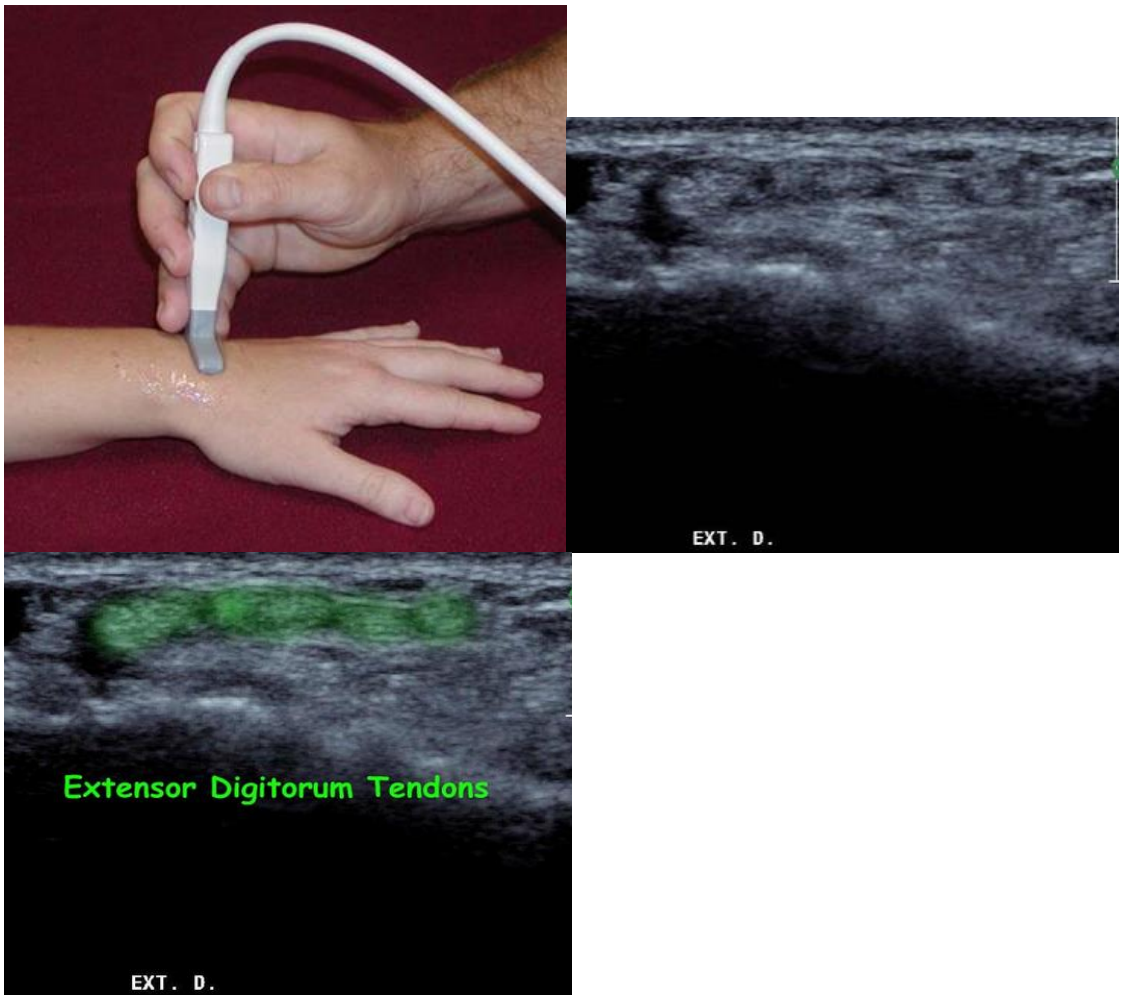
Scapho lunate ligament scan plane. Scapho-lunate ligament is seen as a fibrillar tight band.

Visualising the SCL does not exclude carpal instability.



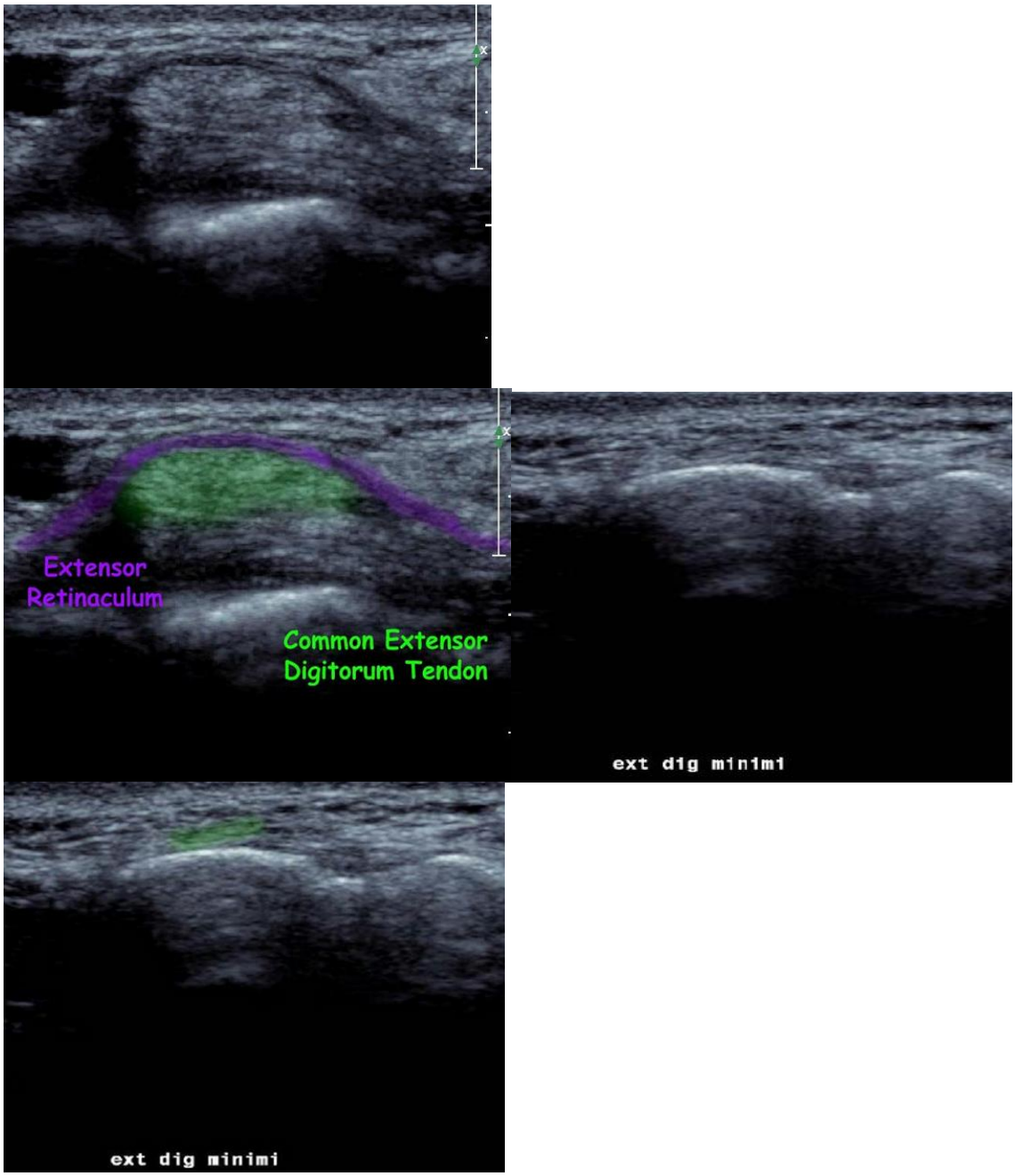
Compartment 3 scan plane: *Extensor Pollicis Longus*

The EPL tendon is tucked against Lister's Tubercle. The Extensor digitorum longus common tendon is adjacent in compartment 4.



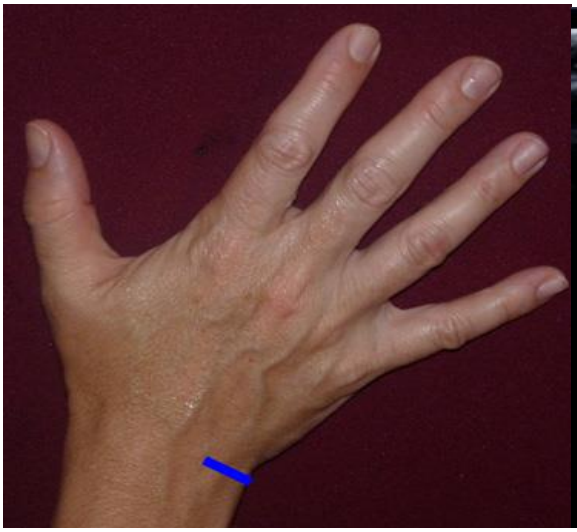
Compartment 4 Scan plane: *Extensor digitorum.*

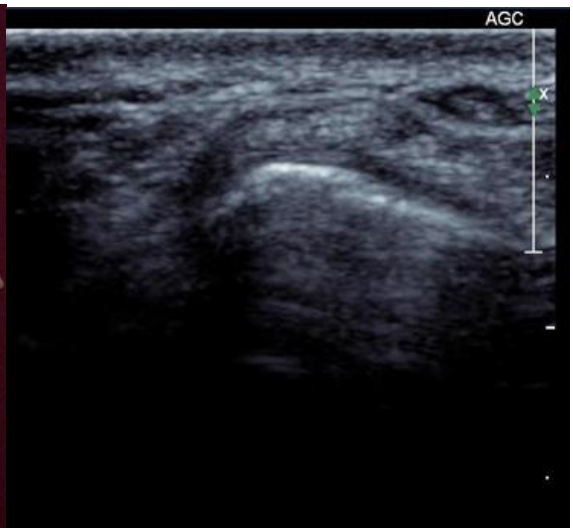
The common extensor digitorum tendon divides into 4 prior to the wrist crease.

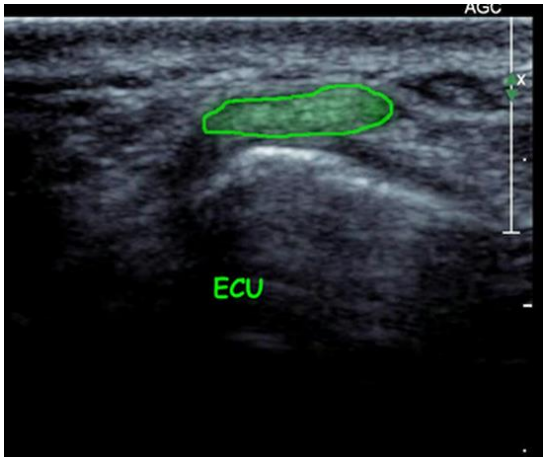


Common extensor Digitorum with the overlying extensor retinaculum.

Compartment 5 : Extensor digiti minimi*, immediately medial to the extensor digitorums.*

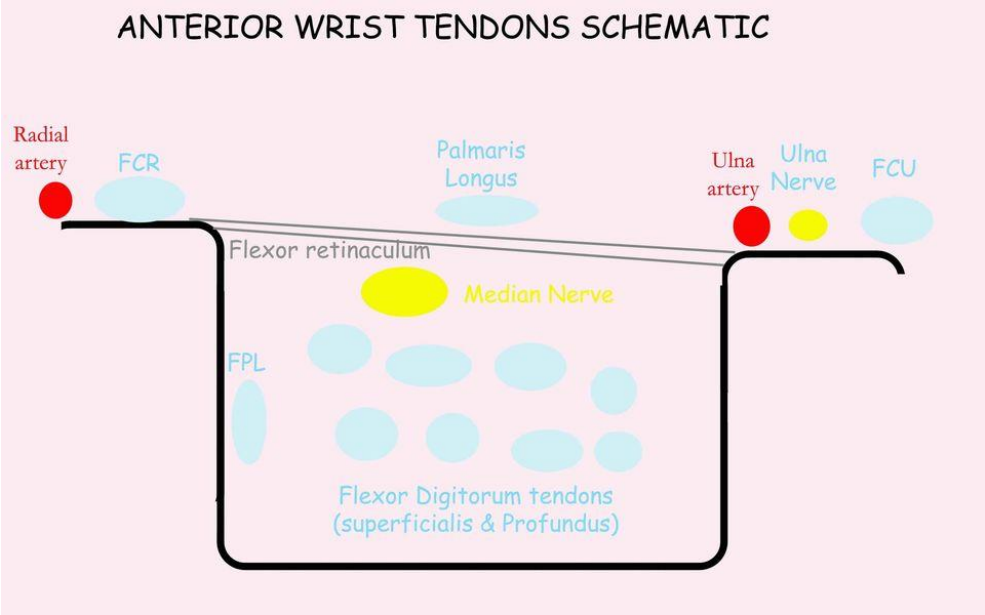




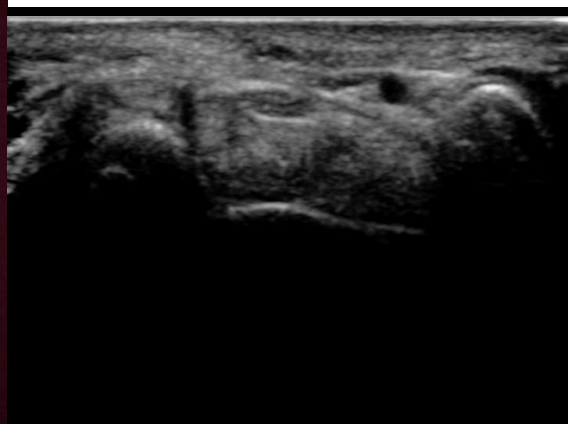


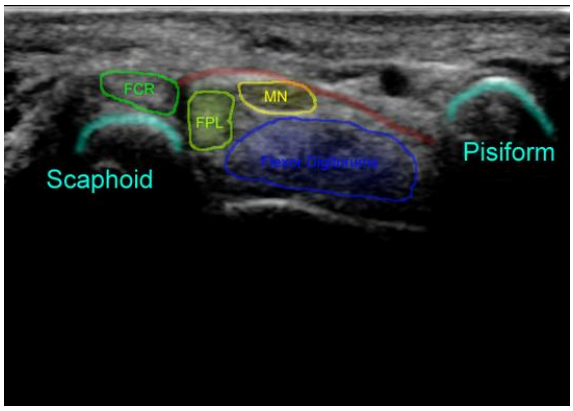
Compartment 6 Scan plane: *Extensor Carpi Ulnaris*, *Extensor carpi ulnaris*

ANTERIOR WRIST

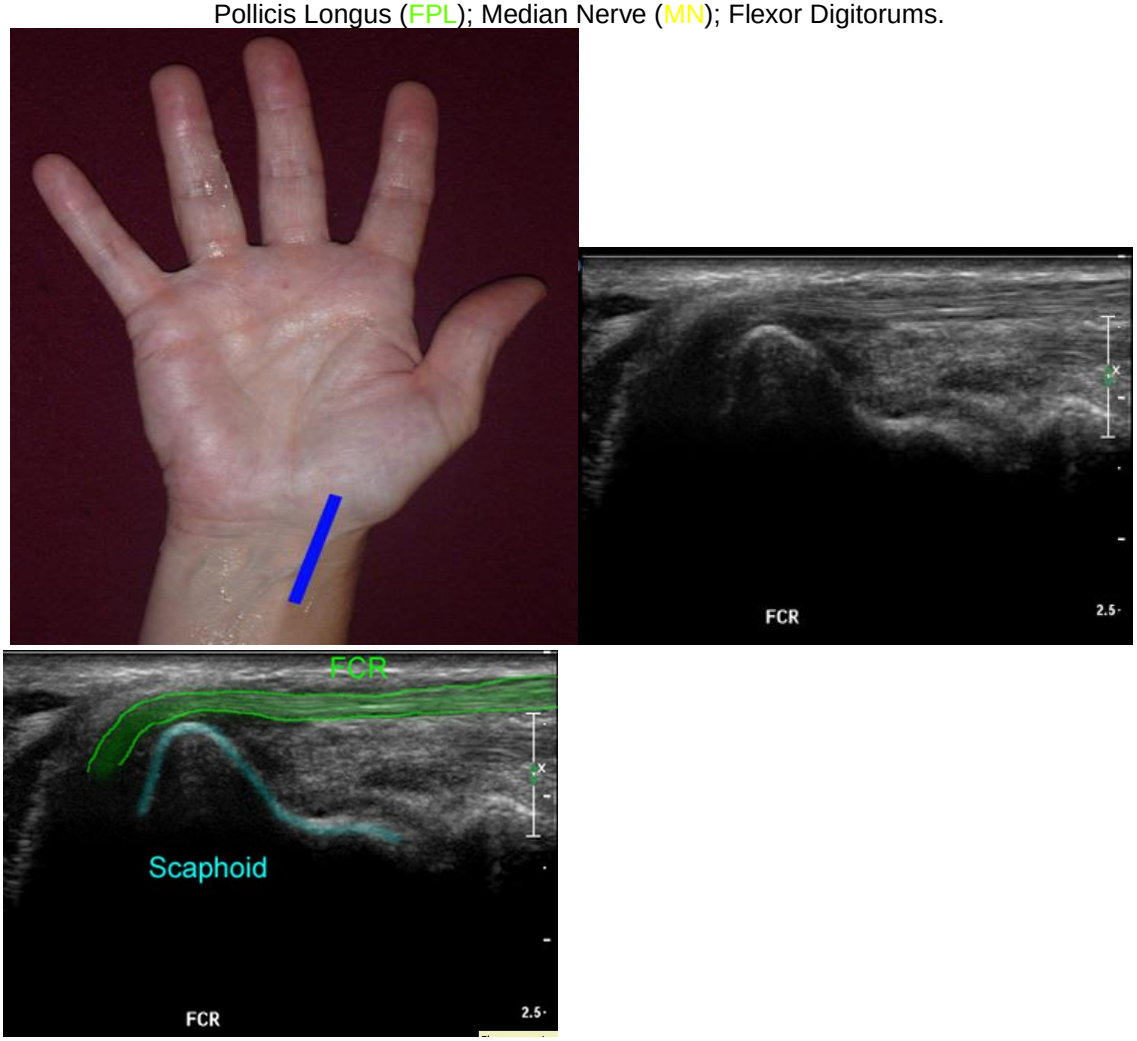


A basic schematic of the anterior wrist tendons and Carpal Tunnel.



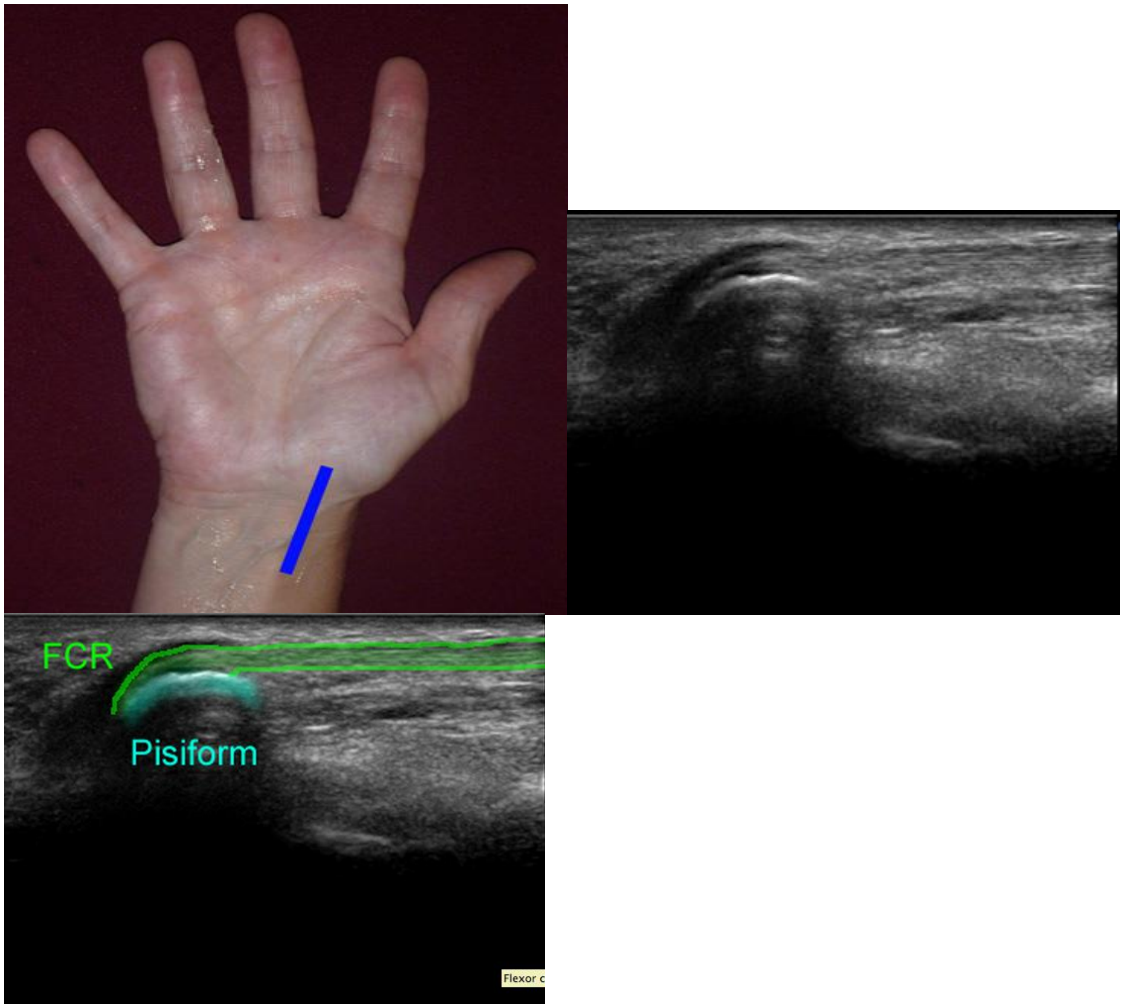


Scan plane for the carpal tunnel. Transverse carpal tunnel. Flexor carpi radialis (FCR); Flexor Pollicis Longus (FPL); Median Nerve (MN); Flexor Digitorums.



Scan plane for the FCR tendon

The flexor carpi radialis tendon curving over the scaphoid to insert onto the 1-2 metacarpal bases.



Scan plane for the FCU tendon. The Flexor Carpi Ulnaris tendon

ULTRASOUND OF THE WRIST PROTOCOL

ROLE OF ULTRASOUND

Ultrasound is a valuable diagnostic tool in assessing the following indications in the wrist:

- Muscular, tendinous and ligamentous damage (chronic and acute)
- Bursitis
- Joint effusion
- Vascular pathology
- Haematomas
- Soft tissue masses such as ganglia, lipomas
- Classification of a mass eg solid, cystic, mixed
- Post surgical complications eg abscess, oedema
- Guidance of injection, aspiration or biopsy
- Relationship of normal anatomy and pathology to each other
- Some bony pathology.

LIMITATIONS

Recent surgery or injections may degrade image quality through the presence of air in the tissue.

EQUIPMENT SELECTION

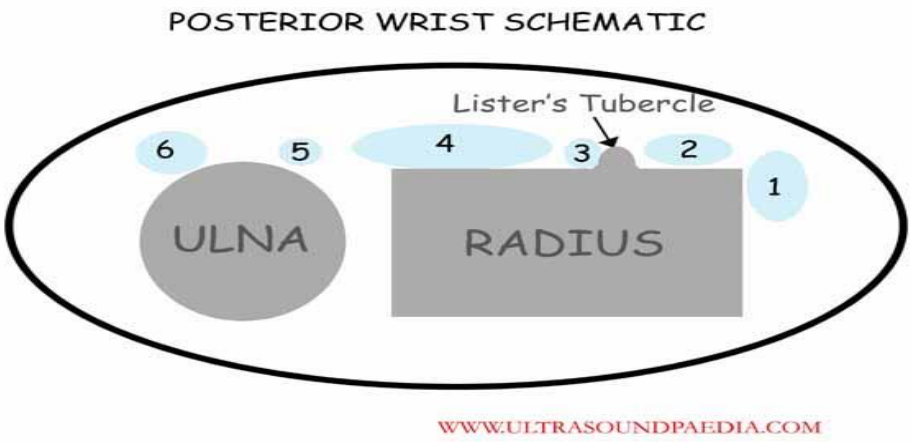
- Use of a high resolution probe (10-15MHZ) is essential when assessing the superficial structures of the knee.
- Careful scanning technique to avoid anisotropy (and possible misdiagnosis).
- Beam steering or compounding can help to overcome anisotropy in linear structures such as tendons.
- Good colour / power / Doppler capabilities when assessing vessels or vascularity of a structure.
- Be prepared to change frequency output of probe (or probes) to adequately assess both superficial and deeper structures.

SCANNING TECHNIQUE

- Begin your scan at the wrist crease.
- Initially, survey each tendon in transverse from the musculo-tendinous junction to the distal insertion.
- Then assess in longitudinal also.

- The tendon sheaths approximately extend for a couple of cm either side of the wrist crease.
- If necessary, you can compare with the contralateral side.

POSTERIOR WRIST



The posterior wrist is conveniently divided into 6 compartments:

1. Abductor pollicis longus(APL) and Extensor Pollicis Brevis (EPB)
2. Extensor Carpi Radialis (ECR) longus and Brevis
3. Extensor Pollicis Longus (EPL)
4. Extensor Digitorum (ED)
5. Extensor Digiti Minimi (EDM)
6. Extensor Carpi Ulnaris (ECU)

These are all tethered by the extensor retinaculum which overlies ,and in some areas reflects around, the tendons.

Begin by scanning over the lateral wrist crease at the anatomical “snuff-box”. You should see the APL & EPB in compartment 1. To check, both tendons should be able to be followed up the thumb. If they go to the carpus you have slipped medially onto compartment 2. Work your way sequentially across the wrist assessing each tendon individually.

De Quervain’s tenosynovitis

- Inflammation of the Abductor Pollicis Longus and Extensor pollicis Brevis tendons.
- Overuse injury.
- Patients present with focal, point tenderness laterally over the radial styloid.

Proximal intersection syndrome

Extensor Pollicis Brevis crossing over extensor Carpi Radialis longus & Brevis.

Distal intersection syndrome

Ext Pollicis *Longus* crossing over extensor Carpi Radialis longus & Brevis.

Scapho-lunate ligament

The wrist is essentially divided into 3 joint planes:

1. **and 2.** The radiocarpal and midcarpal joints allow wrist flexion, extension and lateral deviation.
3. The distal radio-ulnar joint allows the forearm and hand to rotate. (Pronation / Supination).

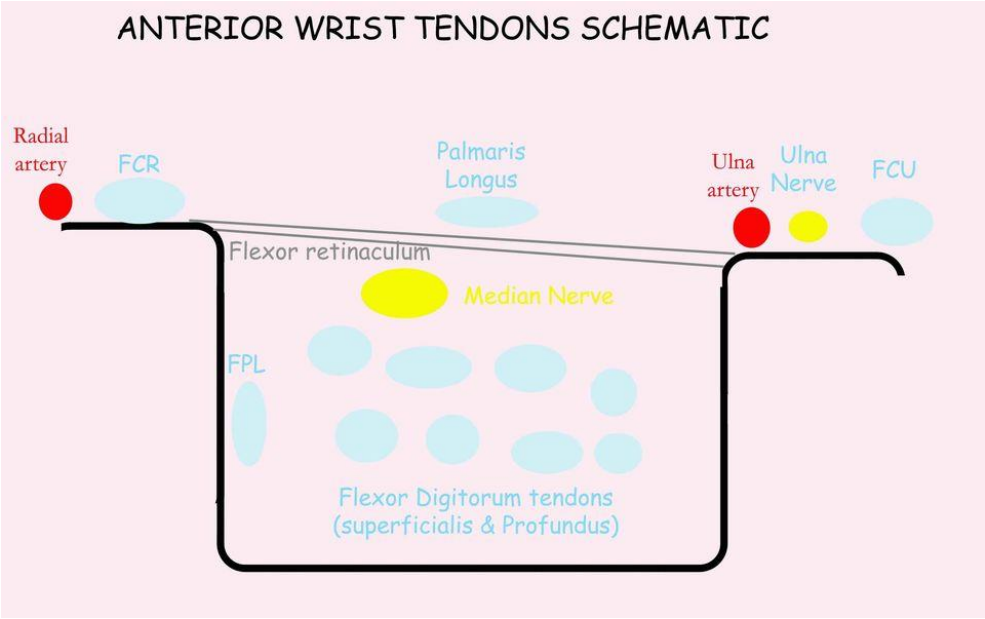
These joints are supported by a series of extrinsic and intrinsic ligaments. The scapholunate ligament is the most important dorsal intrinsic stabilizer.

- Injury occurs with a hyperextension of the wrist. Similar mechanism to a scaphoid fracture but results in a ligament tear instead.
- If only a partial tear it is usually stable.
- If complete, it results in Scapho-lunate instability. The scaphoid will rotate abnormally during wrist movement, which if left untreated can lead to significant chronic wrist degeneration.

NOTE:

Visualising the SCL does not exclude carpal instability. (REF: AJR article)

ANTERIOR WRIST



Carpal Tunnel Syndrome

This is the most common peripheral nerve entrapment. It occurs when the median nerve is compressed by the overlying flexor retinaculum.

IMPORTANT:

- Ultrasound cannot exclude Carpal tunnel syndrome. The accepted standard for diagnosis is a nerve conduction study.
- Our role is to identify possible causes for the patient's symptoms.

Look for:

- Tendon abnormalities
- Ganglia
- Fluid
- Accessory muscles
- Any asymmetry with the contra lateral side.

There have been several proposed methods of quantitative assessment for carpal tunnel. In our experience, these have not been reliable. They include:

- Nerve cross sectional area of >10square mm proximal to the retinaculum.
- Nerve flattening ratio of 3:1 (Yesildag et al - Clinical Radiology).

Guyons Canal Syndrome

Canal bordered by the pisiform & hamate and roofed by a reflection of the flexor retinaculum. The ulna nerve and artery pass through and may become entrapped or injured. Repetitive injury such as cycling or using heel of hand as hammer.

On *Ultrasound*: As with carpal tunnel look for ganglia, accessory muscles and asymmetry with the contra lateral side

Triangular FibroCartilage Complex (TFCC)

- A section of cartilage and ligaments at the distal ulna.
- Provides a continuous gliding surface along the forearm-carpal joint.

Affected by:

- Natural degeneration with age.

Or injuries:

- FOOSH
- Forced rotation (stuck drill)
- Racquet sports
- Direct blow to medial wrist

BASIC HARD COPY IMAGING

A wrist series should include images specific to the area clinically indicated from a thorough history and physical examination.

- Document the normal anatomy. Any pathology found in 2 planes, including measurements and any vascularity.