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Musculoskeletal ultrasound protocol

The Wrist

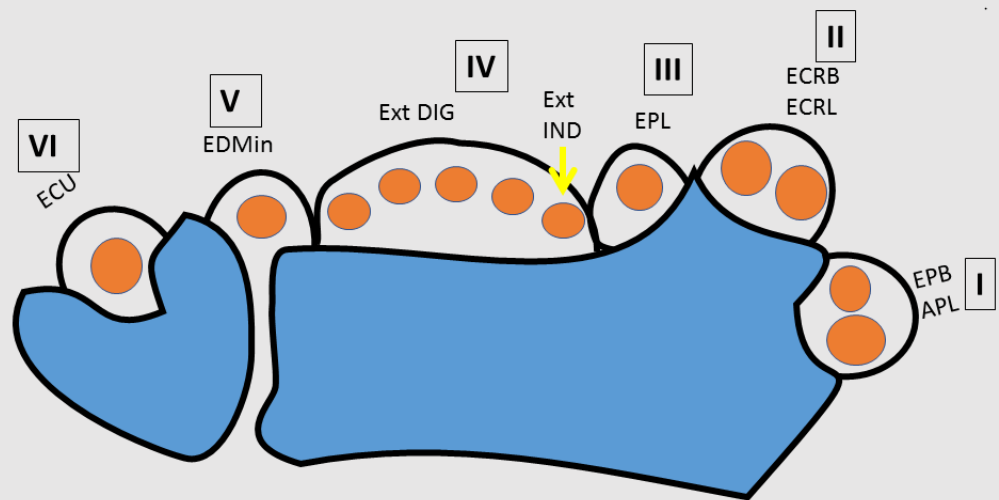


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The Wrist



Dorsal compartments



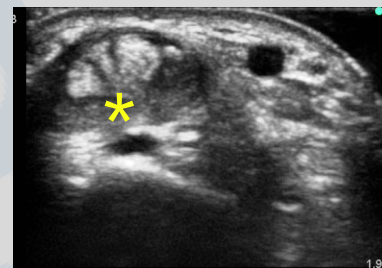
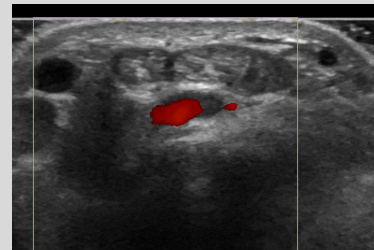
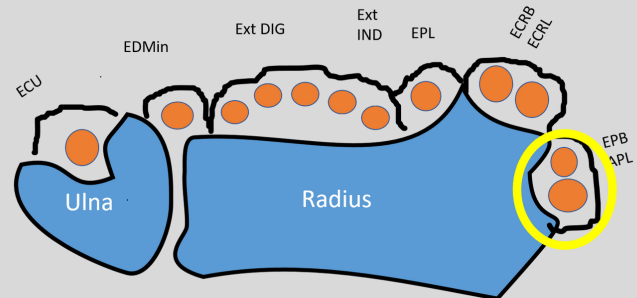
Location of all 6 wrist extensor compartments in relation to the profile of the dorsal aspect of the distal radius and ulna



The Wrist - Stage 1



Compartment I -APL/EPB



Compartment 1 contains the abductor pollicis longus (radial / palmar) and extensor pollicis brevis (ulnar / dorsal). The abductor pollicis longus tendon is significantly larger than the extensor pollicis brevis. There are a number of normal anatomical variants within the first compartment. Abductor pollicis longus may present as a number (1-3) of tendinous slips * (multilamellar) and should not be misinterpreted as a longitudinal split tear.

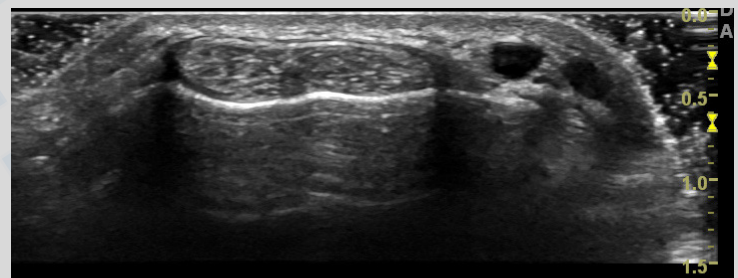
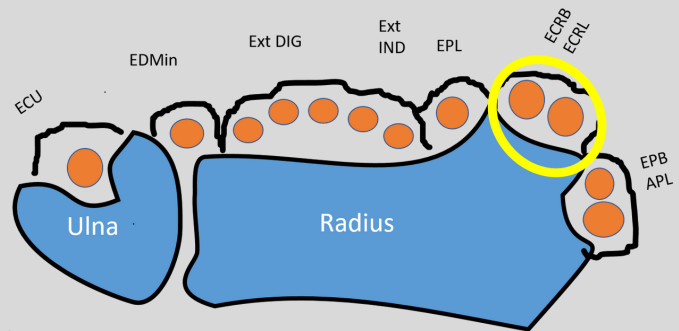
When visualising compartment 1 the radial artery which lays towards the palmar aspects. Also note the sensory branch of the radial radial nerve when scanning more proximally to the wrist, which is positioned towards the palmar aspect of first compartment but moves more superficially and dorsal to the first compartment as you scan more distally. Again this may have clinical implications for performing ultrasound guided injections to avoid injury to the sensory branch of the radial nerve.





The Wrist - Stage 2

Compartment II - ECRB/ECRL



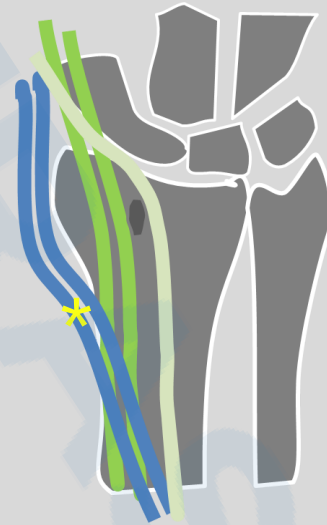
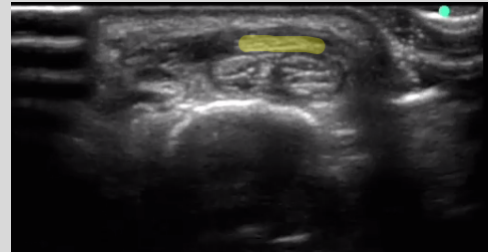
Compartment two is located to the radial side of Lister's tubercle and contains extensor carpi radialis longus (radial) and extensor carpi radialis brevis (ulnar), they appear much more equal in size than the tendons of compartment one and they sit upon a broader flatter surface. Confirming the presence of Lister's tubercle immediately adjacent to extensor carpi radialis brevis will also help to ensure that compartment 1 and 2 can be easily distinguished from one another. They attach distally to the base of the second and third metacarpal bones respectively.





The Wrist - Stage 3

Intersection region



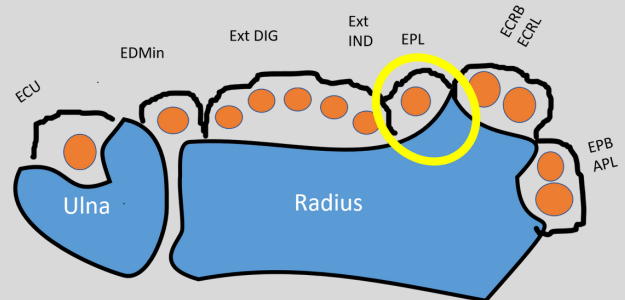
Approximately 4-8 cm proximal to Lister's tubercle lies the intersection (*) between the first and second compartments with the tendons of the first compartment crossing above the tendons of the second compartment. It is thought that the approximation of these tendons at this point may cause inflammation or irritation. At this level the musculotendinous junction of abductor pollicis longus will usually be present and thus in transverse view it is important to distinguish the hypoechoic appearance of the muscle around the abductor pollicis longus tendon from local effusion which can be a common pitfall when scanning this area.





The Wrist- Stage 4

Compartment III : EPL



Compartment three is located on the ulnar side of Lister's tubercle and contains only the tendon of extensor pollicis longus. As it travels distally, it curves around Lister's tubercle and crosses above the tendons within the second compartment and is the site of the distal intersection syndrome. It continues on its path to the base of the distal phalanx of the thumb. It forms the ulnar border of the anatomical snuffbox and is a tendon vulnerable to trauma following distal radius fracture.

Frequently, a significant groove in Lister's tubercle can be observed which the extensor pollicis longus tendon sits within as it travels around this bony structure.

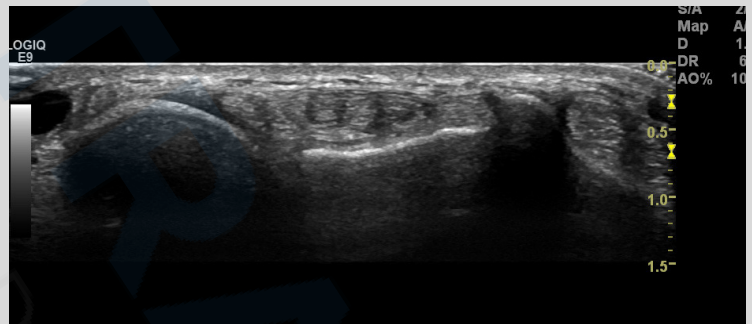
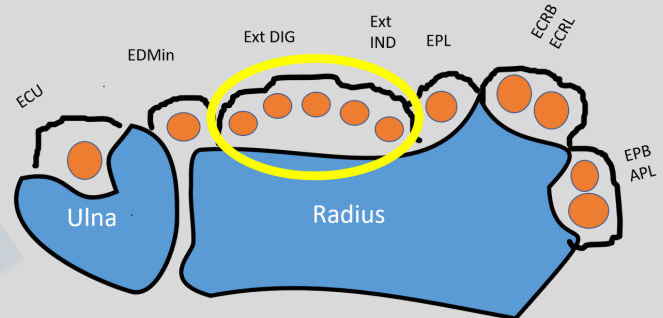
Careful scanning in cross-section allows this tendon to be tracked, and gentle flexion and extension of the interphalangeal joint of the thumb allows this tendon to be depicted more clearly on its route to the distal insertion.





The Wrist - Stage 5

Compartment IV: ED and EI



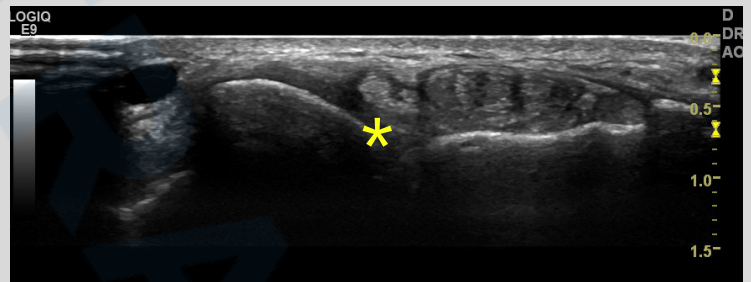
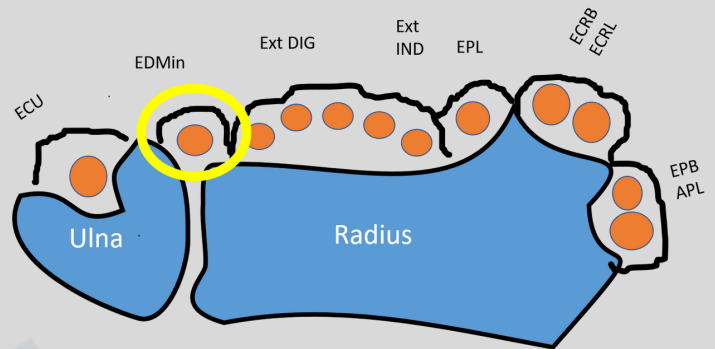
Compartment 4 sits to the ulnar side of compartment 3 over the distal radius and contains the extensor digitorum and extensor indicis tendons, dynamic scanning whilst 'wiggling' the fingers (flexion and extension of proximal and distal interphalangeal joints) allows differentiation of the tendons. The extensor retinaculum is at its thickest and most easily visualised as it crosses the fourth compartment.





The Wrist - Stage 6

Compartment V: EDM



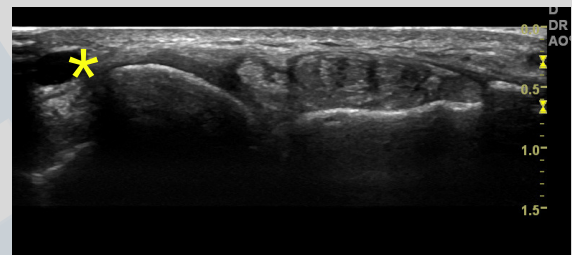
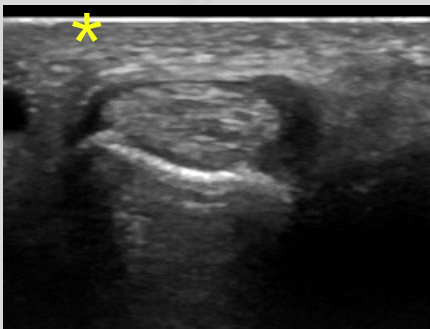
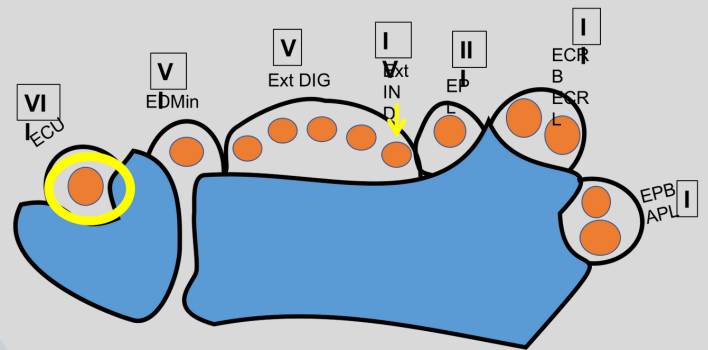
Compartment five sits dorsal to the distal radioulnar articulation and contains extensor digiti minimi only. Again, dynamic scanning with movement of the little finger (fifth digit) allows this tendon to be more easily differentiated.





The Wrist - Stage 7

Compartment VI: ECU



Compartment six is situated between the head and styloid process of the ulnar and it contains the extensor carpi ulnaris tendon. With high-frequency imaging the two bundles of tendon fibre can sometimes be distinguished due to the two heads of the extensor carpi ulnaris muscle obtaining some degree of distinction throughout the course of its tendinous structure. Care should be taken not to misinterpret this as a longitudinal split.

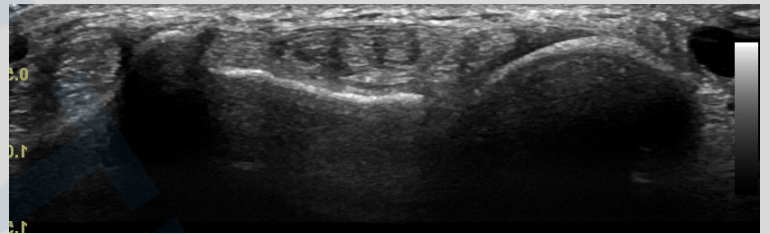
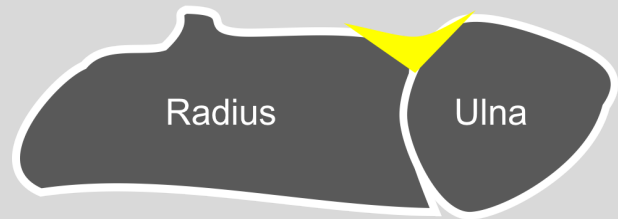
Fluid within the sheath of extensor carpi ulnaris can be seen in cases of tendinopathic change and in inflammatory arthritis. In longitudinal view this tendon can be tracked to its insertion at the base of the fifth metacarpal.





The Wrist - Stage 8

Distal radioulnar joint



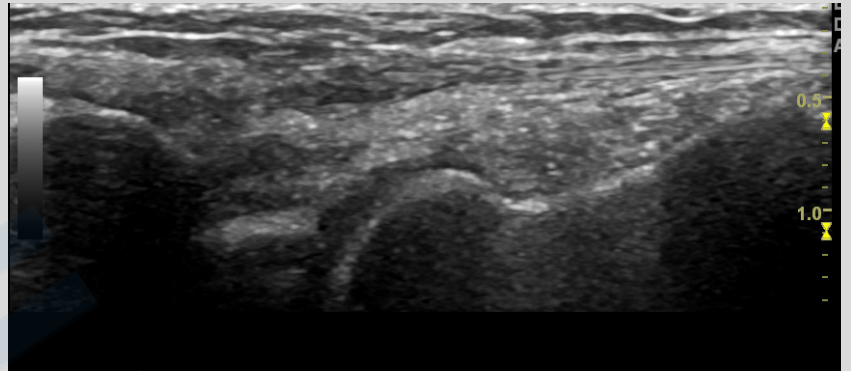
The Distal radioulnar joint can be visualised just proximal to the wrist joint in transverse ,with dorsal radioulnar ligament being seen.The ligament is visualised along its long axis as a fibrillar structure extending between the distal radius and the distal ulna.





The Wrist - Stage 9

Radiocarpal joint



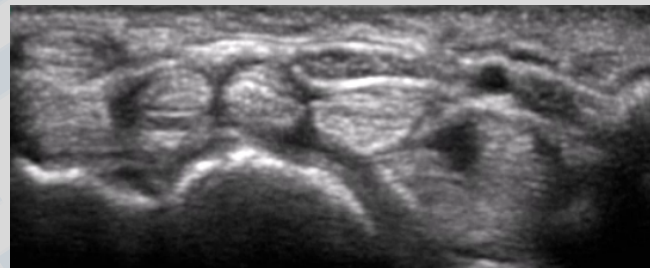
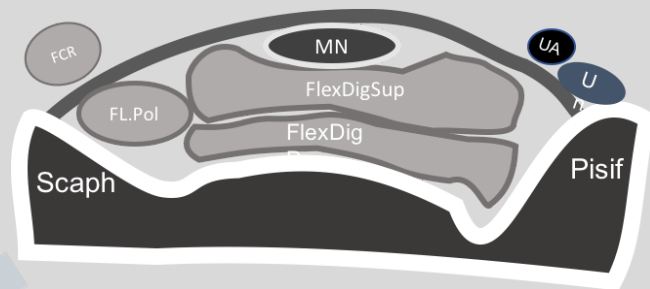
The Radiocarpal and midcarpal joints may be evaluated by placing the probe longitudinally from the Lister's tubercle proximally to the base of the third metacarpal distally in this position the distal radius, lunate, capitate and base of the third metacarpal along with their respective synovial recesses can be visualised. From this position sweeping the probe in the ulnar and radial directions allows further appreciation of any effusion or pathological changes within this region.





The Wrist - Stage 10

Carpal tunnel



A slight degree of extension at the wrist can be helpful for image optimisation. Scanning in transverse plane identify the scaphoid tubercle on the radial aspect. The flexor carpi radialis tendon can be tracked to its insertion onto the scaphoid tubercle. The transverse ligament forms the roof of the carpal tunnel and runs from scaphoid to pisiform. The probe position can be adjusted such that both bony landmarks of the pisiform (ulnar) and scaphoid tubercle (radial) are in view. Adjust the probe further to optimise the image of structures within the tunnel. There are nine flexor tendons (four from the flexor digitorum superficialis, four from the flexor digitorum profundus and the flexor pollicis longus radially) in the carpal tunnel.

Slightly radial of centre superficial and appearing slightly flatter and with the typical 'pepper-pot' appearance the median nerve can be clearly visualised.

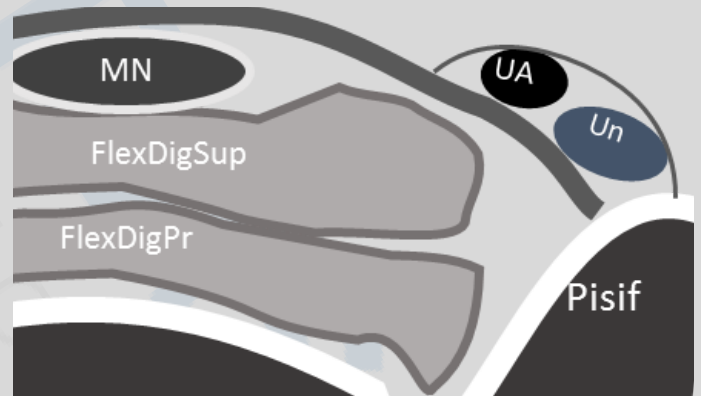
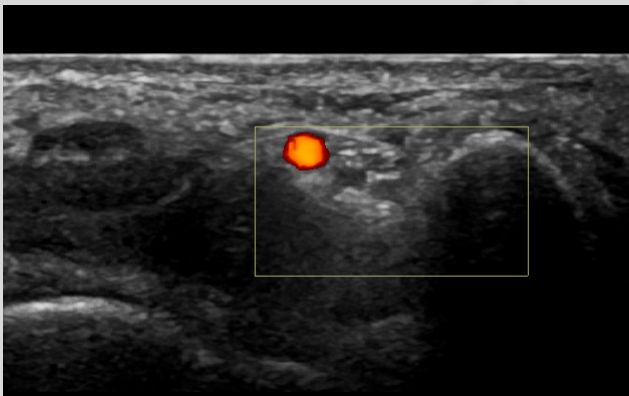
Bifid median nerves are commonly observed (approx 20% population), as are persisting median arteries (a branch from the ulnar artery) which can be clearly depicted on doppler immediately adjacent to the median nerve (ulnar side if single median nerve or between two branches if bifid) within the carpal tunnel, these two anatomical variants often occur together .





Stage 11

Guyons canal



Guyons canal can be identified at the ulnar border of the proximal carpal tunnel. The pisiform bony landmark sits to the ulnar side. Here the ulnar artery (radial-sided) and the ulnar nerve (ulnar-sided) can be clearly depicted

The nerve can be tracked distally on short-axis planes to examine its two divisional branches – the superficial sensory branch and the deep motor branch which courses alongside the hamate hook. A normal variant is observed with late bifurcation of the nerve in around 10% of subjects.

