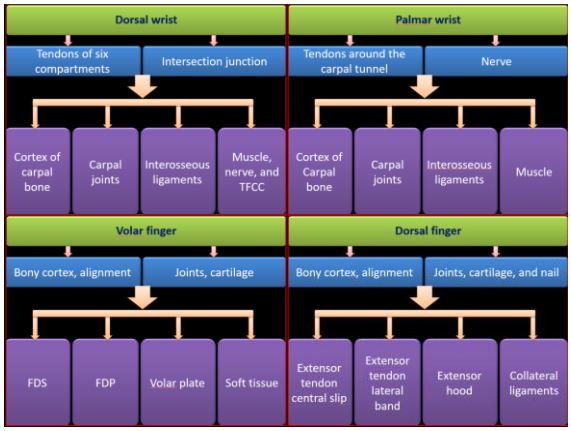
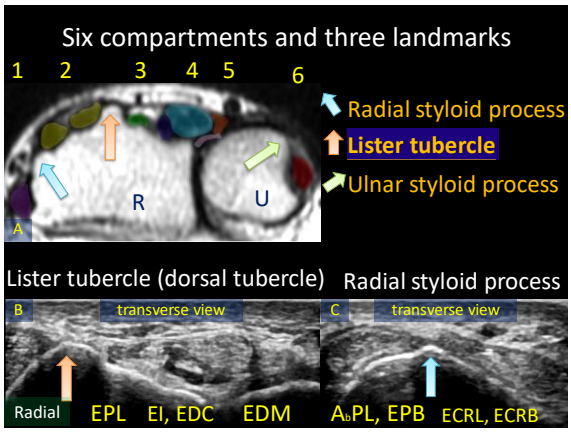
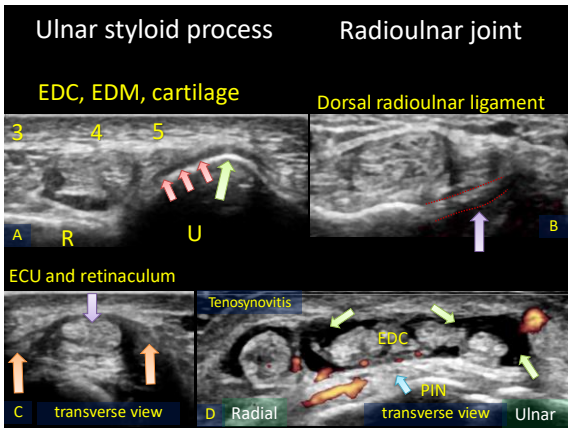
Advanced Ultrasound for Wrist and Finger: From Anatomy to Clinic

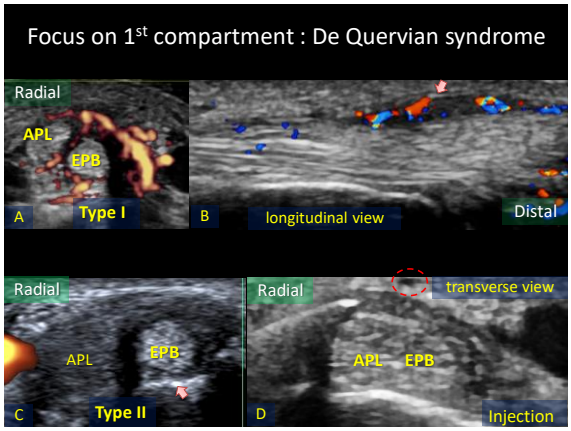
Wei-Ting Wu, 吳威廷
MD, CKTP, CIPS, RMSK

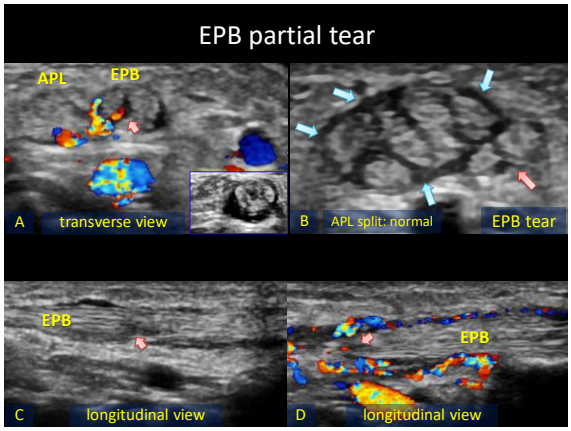
National Taiwan University Hospital,
Beihu Branch
wwtaustin@yahoo.com.tw



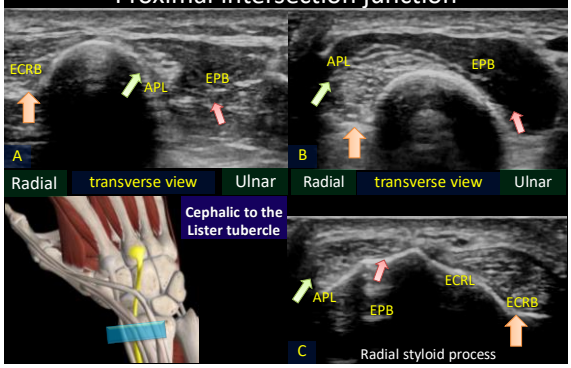




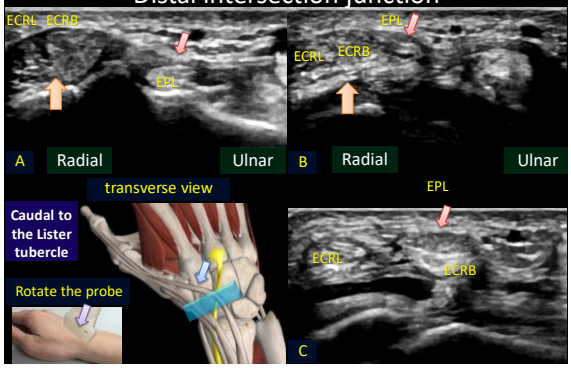




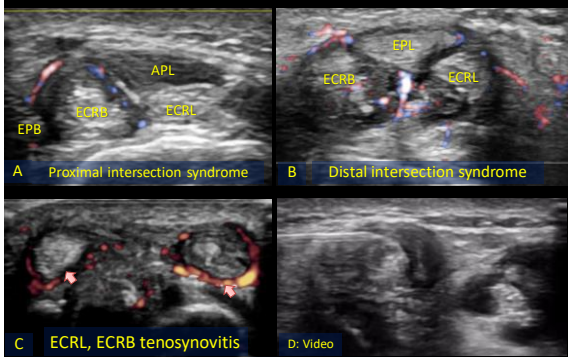
Focus on 2nd compartment: Proximal intersection junction



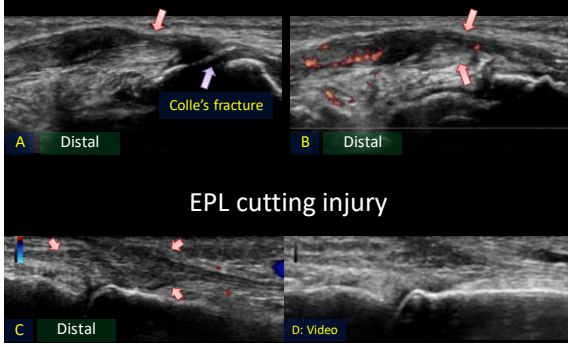
Focus on 2nd compartment : Distal intersection junction



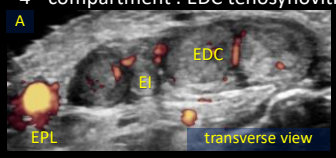
Proximal and Distal intersection syndrome



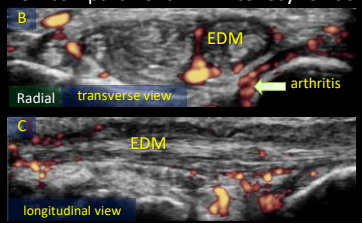
3rd compartment : EPL partial tear because of the Colle's fracture



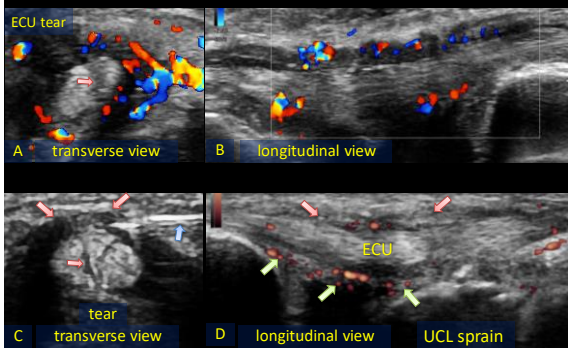
4th compartment : EDC tenosynovitis

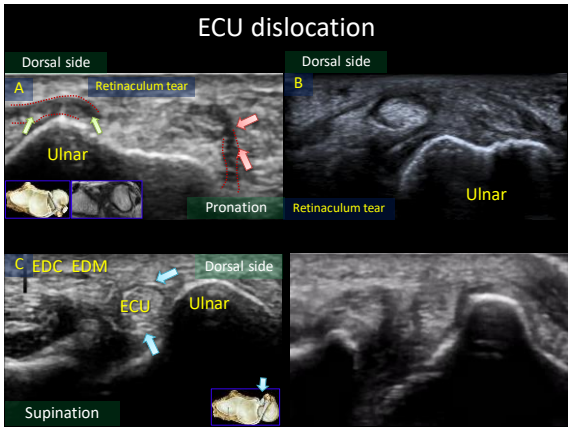


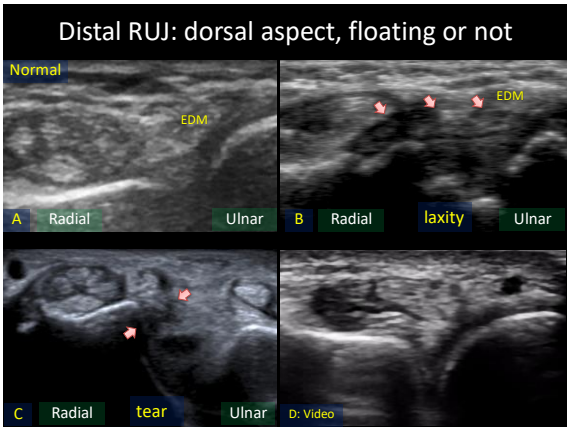
5th compartment : EDM tenosynovitis

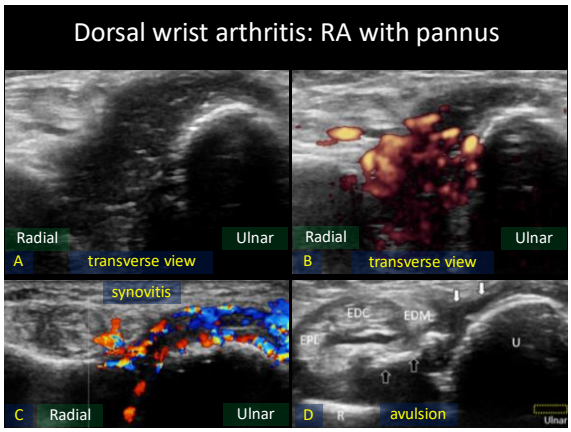


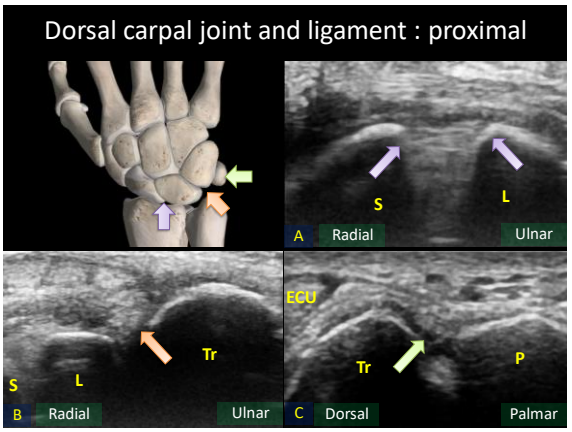
6th compartment : ECU tear and tenosynovitis

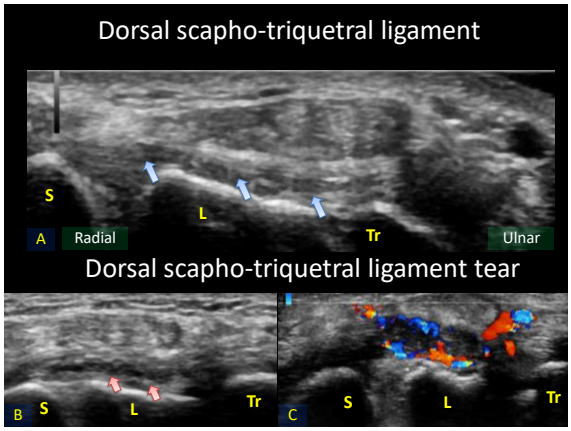


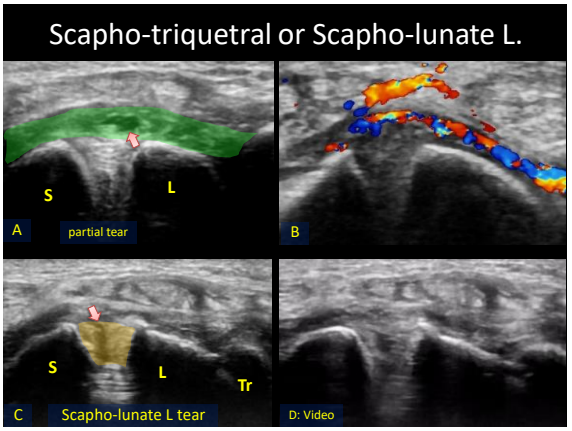

ECU dislocation
Dorsal side
A
Retinaculum tear
Ulnar
Pronation
Dorsal side
B
Retinaculum tear
Ulnar
C
EDC EDM
Dorsal side
ECU
Ulnar
Supination


Distal RUJ: dorsal aspect, floating or not
Normal
EDM
A
Radial
Ulnar
EDM
B
Radial
laxity
Ulnar
C
Radial
tear
Ulnar
D: Video

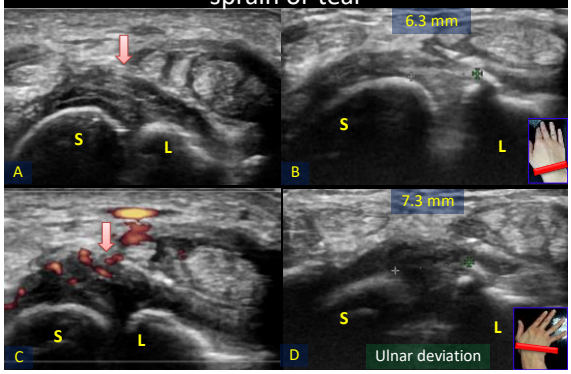

Dorsal wrist arthritis: RA with pannus
Radial
Ulnar
A
transverse view
Radial
Ulnar
B
transverse view
synovitis
C
Radial
Ulnar
EDC
EDM
EPL
U
D
avulsion


Dorsal carpal joint and ligament : proximal
S
L
A
Radial
Ulnar
Tr
S
L
B
Radial
Ulnar
ECU
Tr
P
C
Dorsal
Palmar

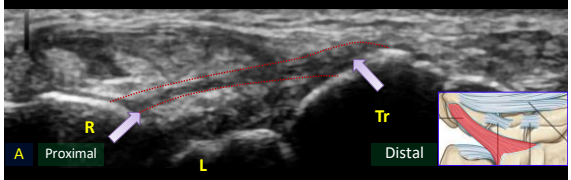

Dorsal scapho-triquetral ligament
S
L
A
Radial
Tr
Ulnar
Dorsal scapho-triquetral ligament tear
B
S
L
Tr
C
S
L
Tr


Scapho-triquetral or Scapho-lunate L.
S
L
A
partial tear
B
S
L
Tr
C
Scapho-lunate L tear
D: Video

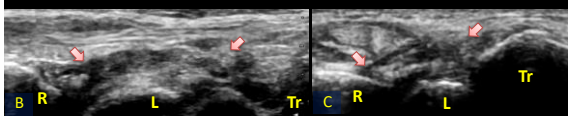
Scapho-triquetral / Scapho-lunate L. sprain or tear



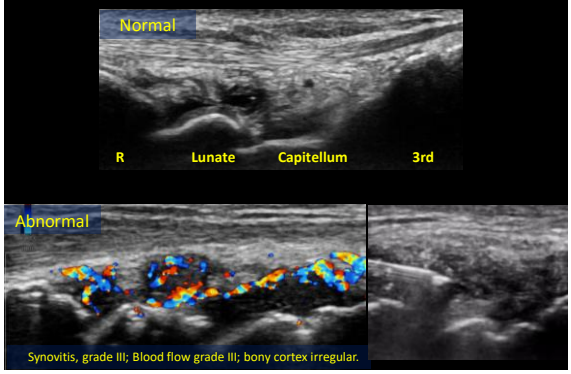
Dorsal radio-triquetral ligament



Dorsal radio-triquetral ligament tear



Dorsal wrist: Bone and joints survey



Special Topic: Triangular Fibrocartilage complex injury

Mechanism of traumatic cause

- The load exerted on the ulnar shaft and carpal joints.
- The most common scenario is fall on the pronated outstretched hand.

Mechanism of degenerative cause

- Repetitive pronation-supination as the axis of the twisting passes through the articular disc.
- Repetitive axial loading on the ulnar aspect of the wrist.

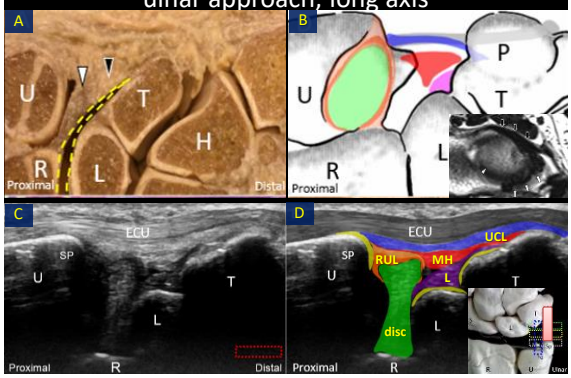
Physical examination

- Tenderness over palmar side of the ECU tendon → ulnar fovea sign.
- Pain at the ulnar aspect of wrist during passive forearm rotation
- Handgrip strength decrease
- Limited ROM in pronation-supination
- Dorsal radioulnar joint instability
- The ulnocarpal stress test → passive maximum ulnar deviation
- The screwdriver test → axial load on the ulnocarpal joint while rotating the forearm from full supination to pronation

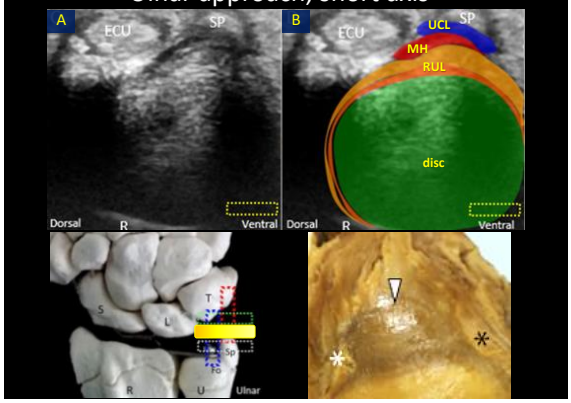
Table 1. Ultrasonic classification of TFCC lesions

Class 1 trauma
A. Central tear of the articular disc
B. Ulnar attachment tear of the articular disc
C. Radial attachment tear of the articular disc
D. Horizontal tear of the articular disc
E. TFCC component injury other than the articular disc: meniscus homologue, radioulnar ligaments, lunotriquetral ligament, ulnocollateral ligament and extensor carpi ulnaris tendon sheath injury.
Class 2 degeneration
A. Articular disc wear
B. A+ chondromalacia of the lunate or the ulna
C. B+ articular disc rupture
D. C+ lunotriquetral ligament rupture and cartilage abnormalities
E. D+ ulnocarpal/radioulnar arthritis

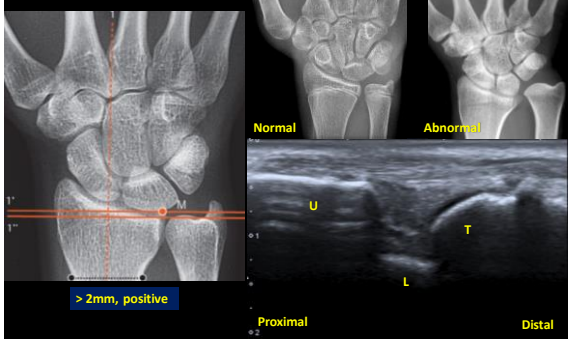
Triangular Fibrocartilage complex: ulnar approach, long axis



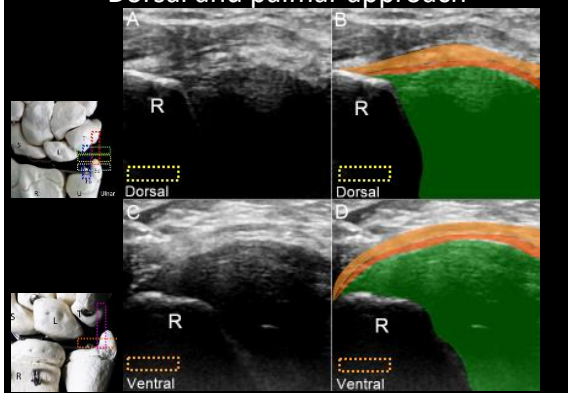
Ulnar approach, short axis



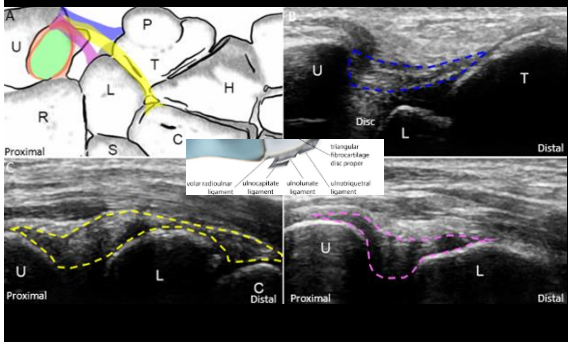
Positive ulnar variance or acute traumatic event



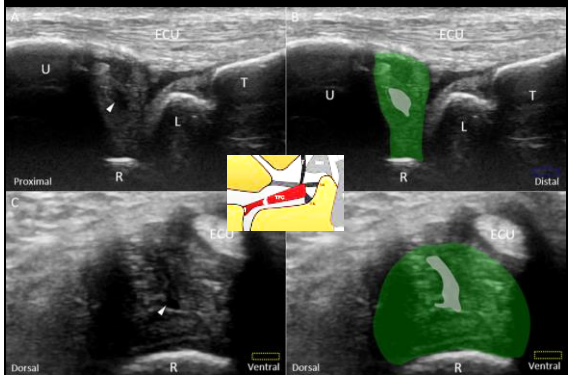
Dorsal and palmar approach



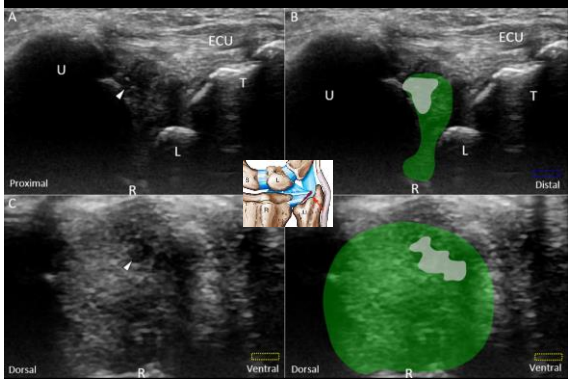
Ligaments at palmar side



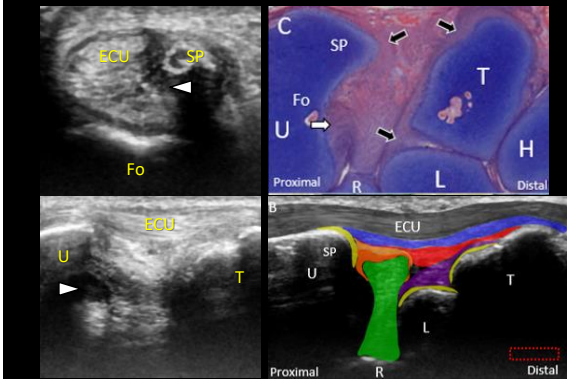
1A central tear



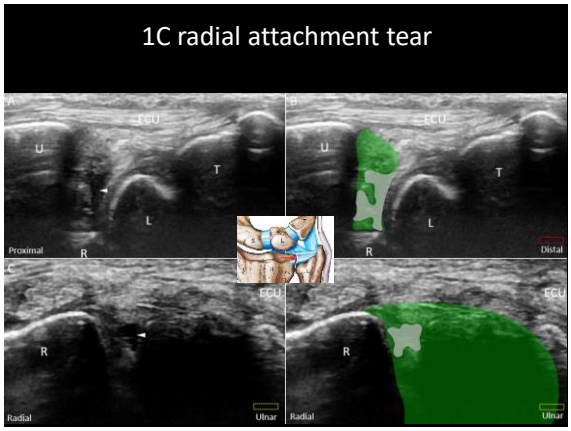
1B ulnar attachment tear



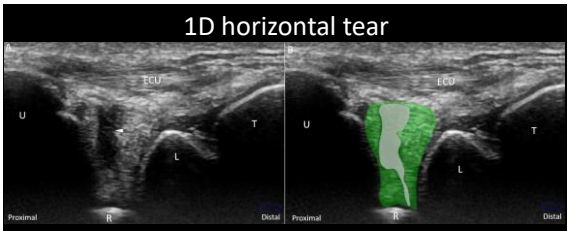
Ulnar fovea injury



1C radial attachment tear

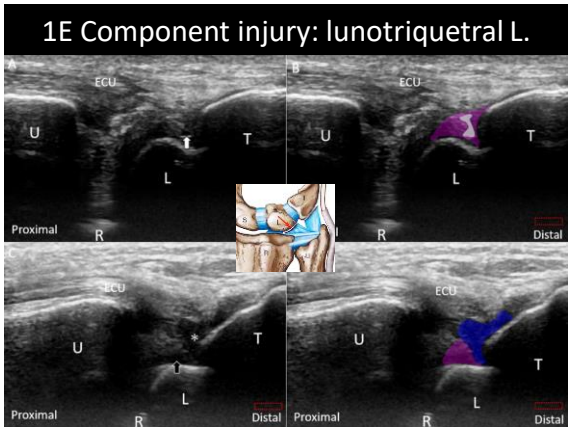


1D horizontal tear

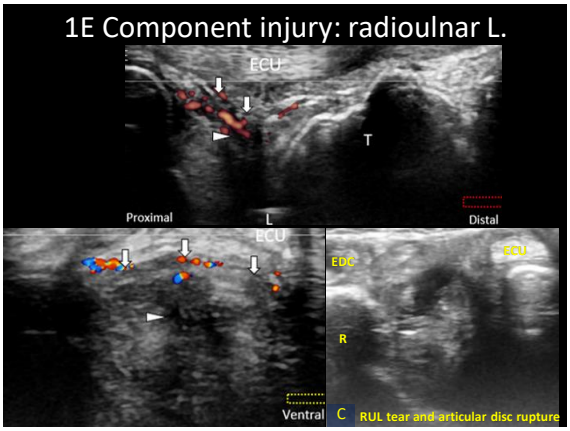


1E Component injury: meniscus homologue

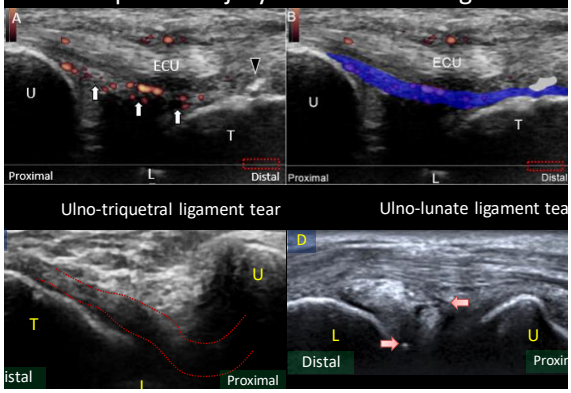
1E Component injury: lunotriquetral L.



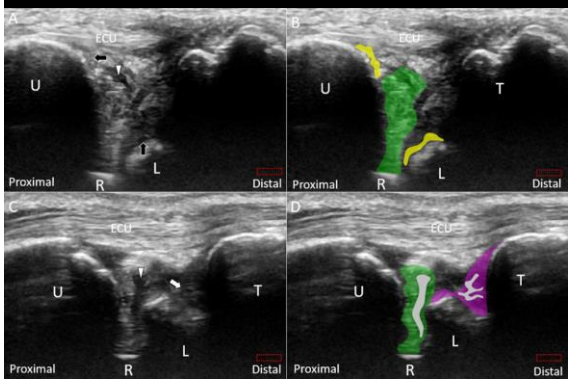
1E Component injury: radioulnar L.

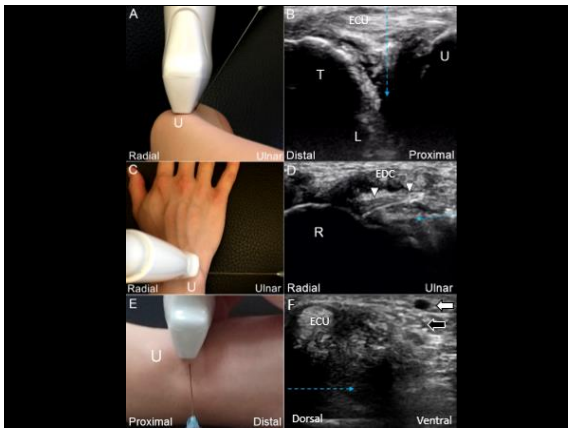


1E Component injury: ulnocollateral ligament



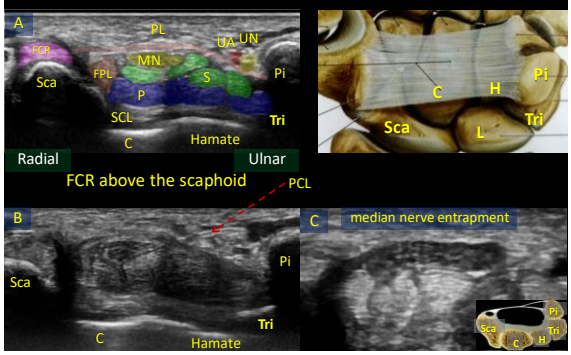
Class 2





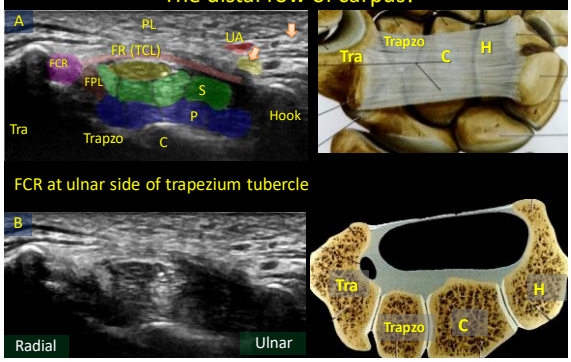
Carpal tunnel inlet

Not the proximal row of carpus!



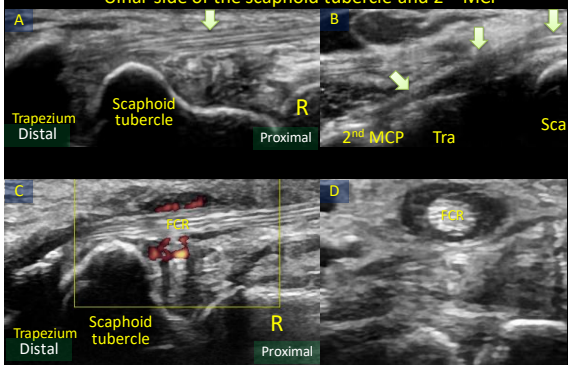
Carpal tunnel outlet

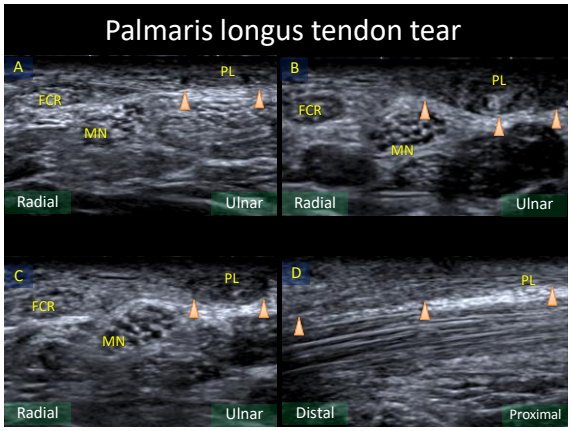
The distal row of carpus!

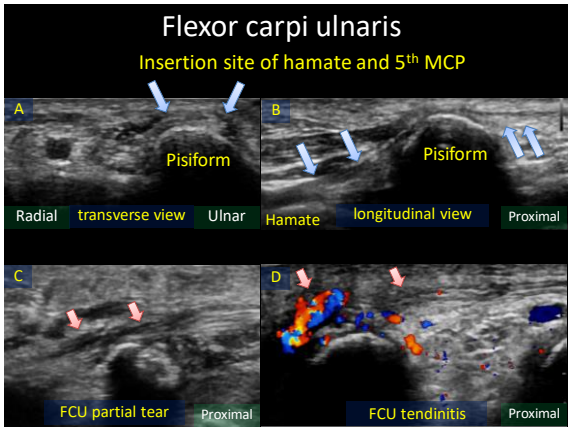


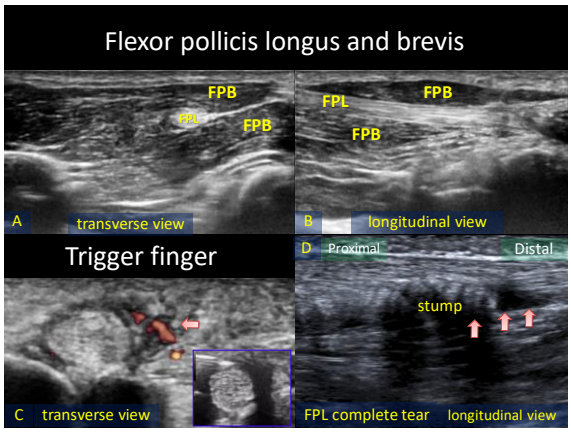
Flexor carpi radialis

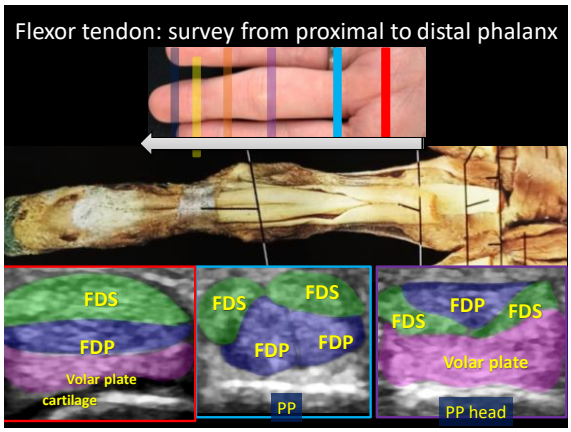
Ulnar side of the scaphoid tubercle and 2nd MCP

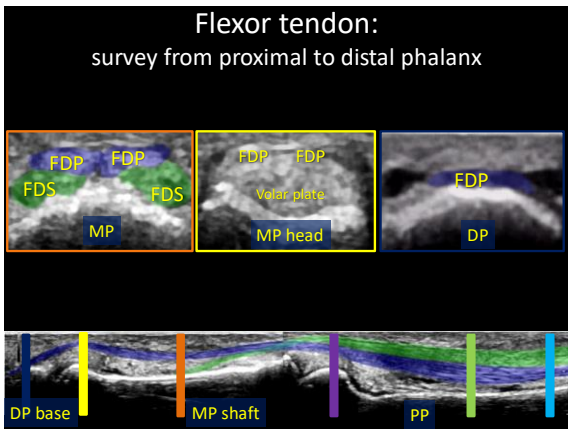


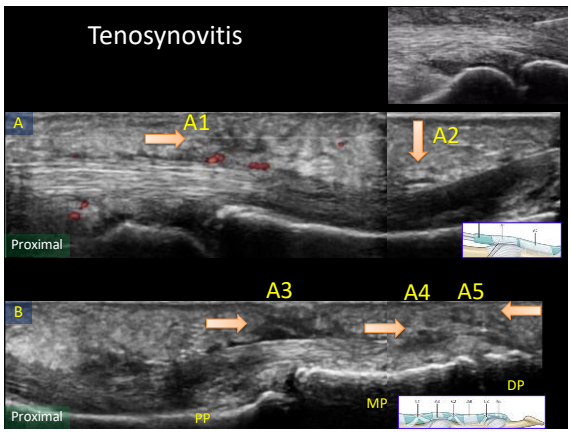

Palmaris longus tendon tear
A
PL
FCR
MN
Radial
Ulnar
B
PL
FCR
MN
Radial
Ulnar
C
PL
FCR
MN
Radial
Ulnar
D
PL
Distal
Proximal

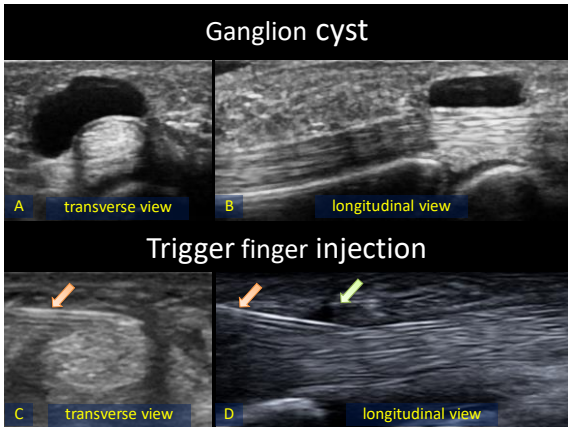

Flexor carpi ulnaris
Insertion site of hamate and 5th MCP
A
Pisiform
Radial
transverse view
Ulnar
B
Pisiform
Hamate
longitudinal view
Proximal
C
FCU partial tear
Proximal
D
FCU tendinitis
Proximal

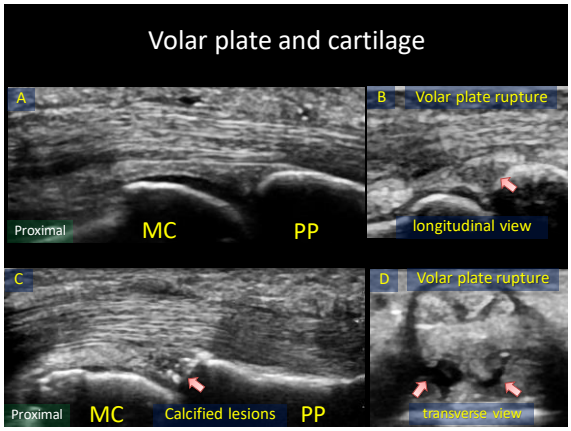

Flexor pollicis longus and brevis
FPB
FPL
FPB
A
transverse view
FPL
FPB
FPB
B
longitudinal view
Trigger finger
C
transverse view
D
Proximal
Distal
stump
FPL complete tear
longitudinal view

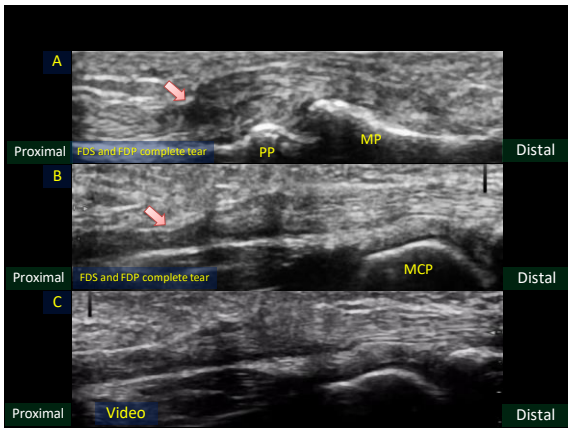

Flexor tendon: survey from proximal to distal phalanx
FDS
FDP
volar plate
cartilage
FDS
FDS
FDP
FDP
PP
FDP
FDS
FDS
Volar plate
PP head

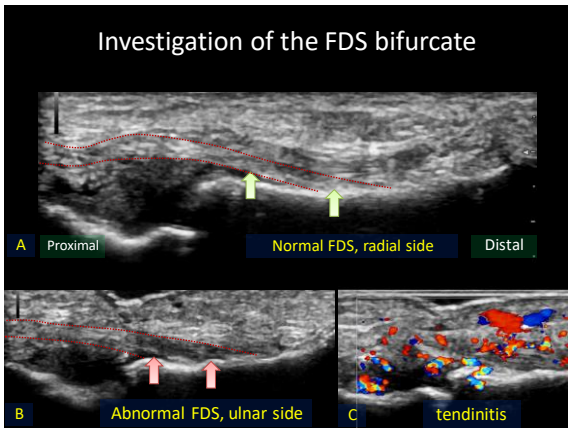

Flexor tendon:
survey from proximal to distal phalanx
FDP
FDP
FDS
FDS
MP
FDP
FDP
Volar plate
MP head
FDP
DP
DP base
MP shaft
PP

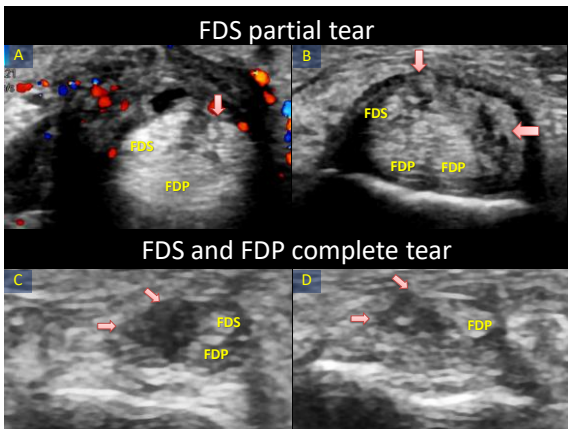

Tenosynovitis
A
A1
A2
Proximal
B
A3
A4
A5
DP
MP
Proximal
PP

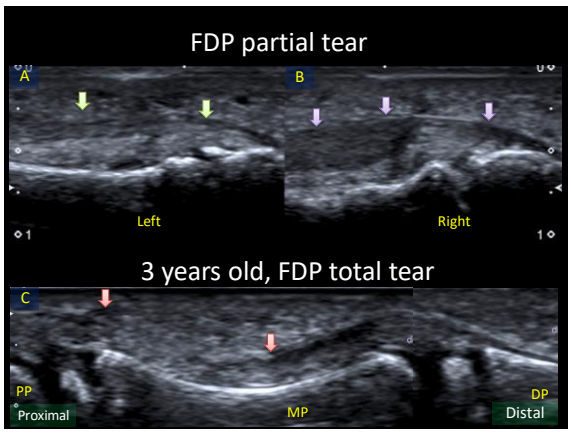

Ganglion cyst
A
transverse view
B
longitudinal view
Trigger finger injection
C
transverse view
D
longitudinal view

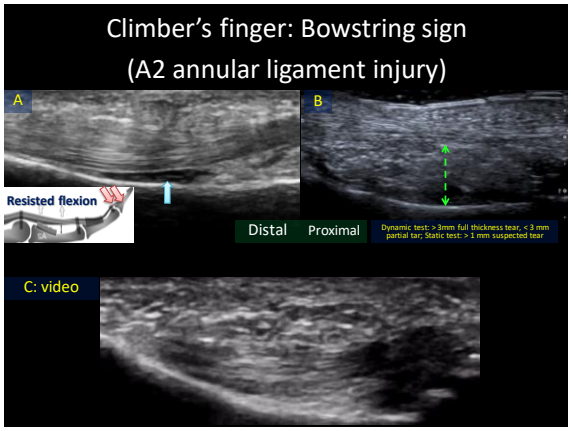

Volar plate and cartilage
A
Proximal
MC
PP
B
Volar plate rupture
longitudinal view
C
Proximal
MC
Calcified lesions
PP
D
Volar plate rupture
transverse view

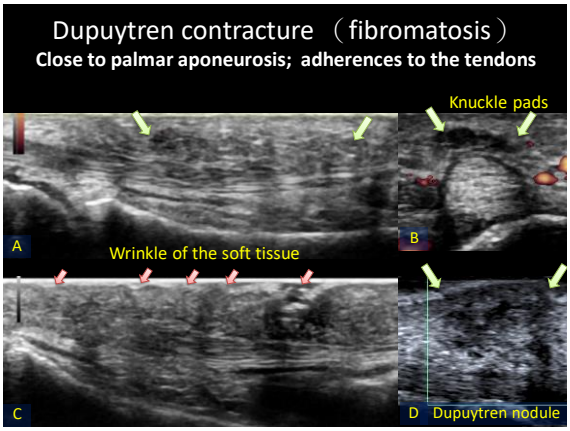

A
Proximal
FDS and FDP complete tear
PP
MP
Distal
B
Proximal
FDS and FDP complete tear
MCP
Distal
C
Proximal
Video
Distal

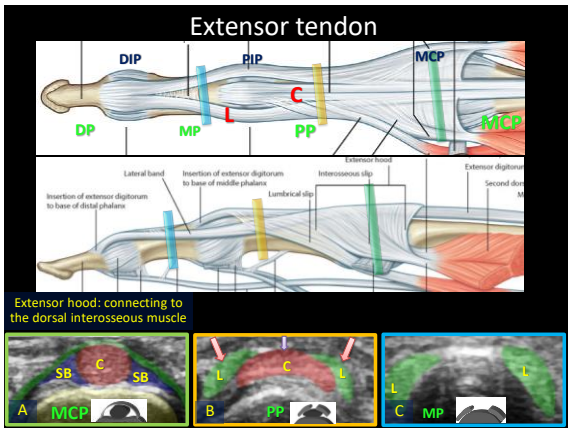

Investigation of the FDS bifurcate
A
Proximal
Normal FDS, radial side
Distal
B
Abnormal FDS, ulnar side
C
tendinitis

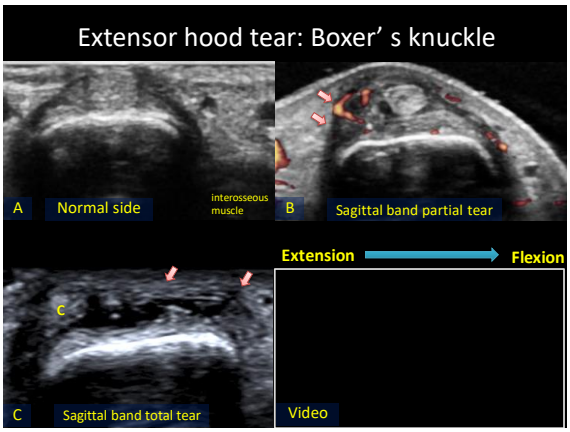

FDS partial tear
A
FDS
FDP
B
FDS
FDP
FDP
FDS and FDP complete tear
C
FDS
FDP
D
FDP

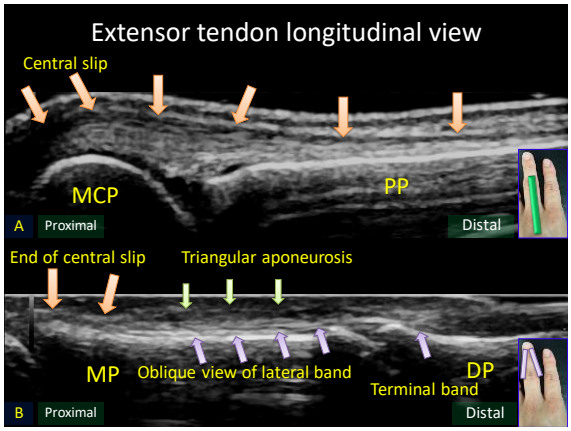

FDP partial tear
A
Left
B
Right
3 years old, FDP total tear
C
PP
Proximal
MP
DP
Distal

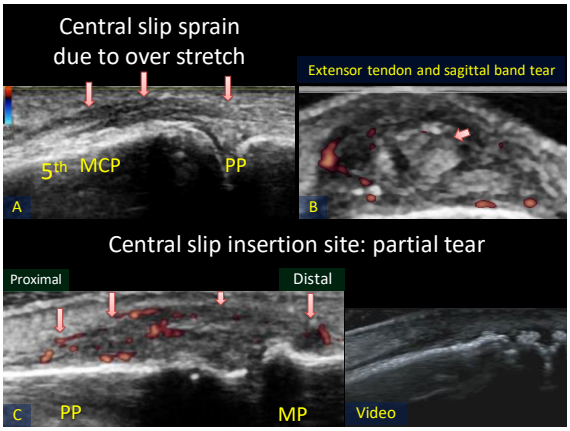

Climber's finger: Bowstring sign
(A2 annular ligament injury)
A
B
Resisted flexion
Distal
Proximal
Dynamic test: > 3mm full thickness tear, < 3 mm partial tar; Static test: > 1 mm suspected tear
C: video

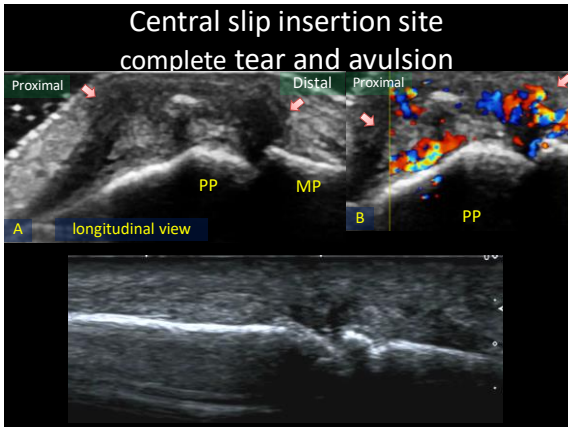

Dupuytren contracture （fibromatosis）
Close to palmar aponeurosis; adherences to the tendons
Knuckle pads
A
Wrinkle of the soft tissue
B
C
D Dupuytren nodule

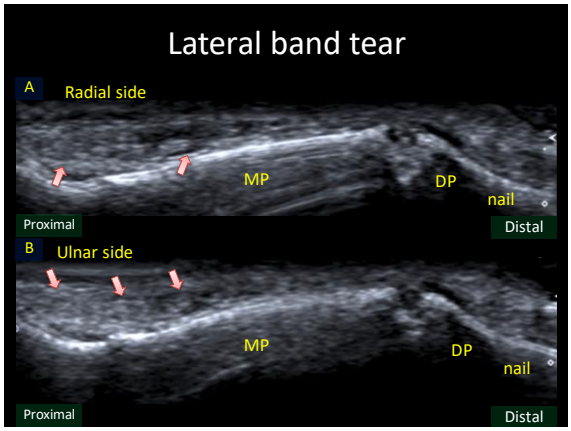

Extensor tendon
DIP
PIP
MCP
C
L
DP
MP
PP
MCP
Extensor hood: connecting to the dorsal interosseous muscle
SB
C
SB
A MCP
L
C
L
B PP
L
C MP

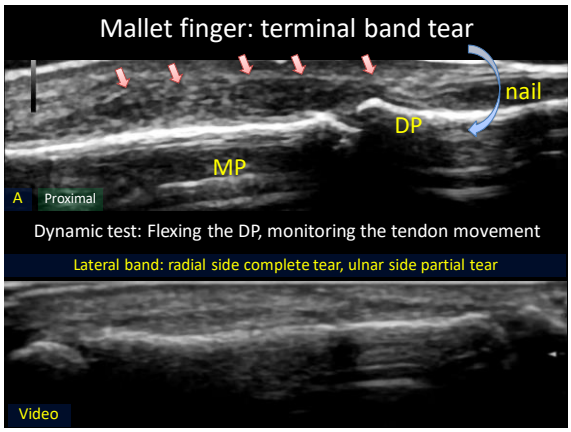

Extensor hood tear: Boxer' s knuckle
A
Normal side
interosseous muscle
B
Sagittal band partial tear
Extension
Flexion
C
C
Sagittal band total tear
Video

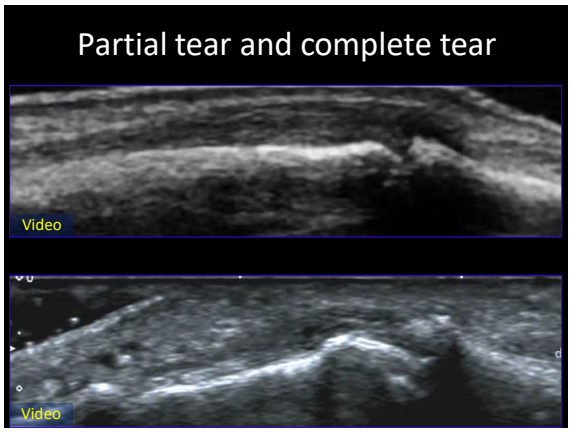

Extensor tendon longitudinal view
Central slip
MCP
PP
A
Proximal
Distal
End of central slip
Triangular aponeurosis
MP
Oblique view of lateral band
DP
Terminal band
B
Proximal
Distal

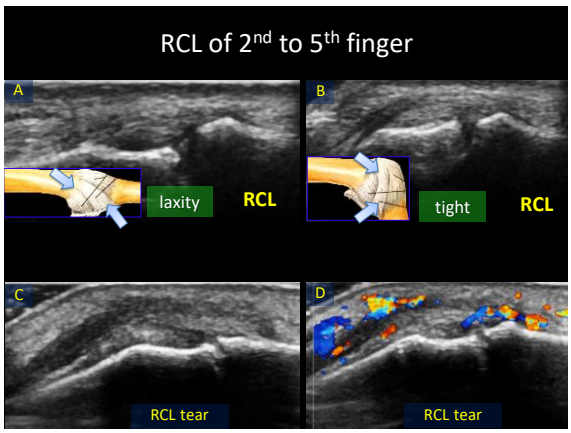

Central slip sprain
due to over stretch
Extensor tendon and sagittal band tear
5th MCP
PP
A
B
Central slip insertion site: partial tear
Proximal
Distal
C
PP
MP
Video

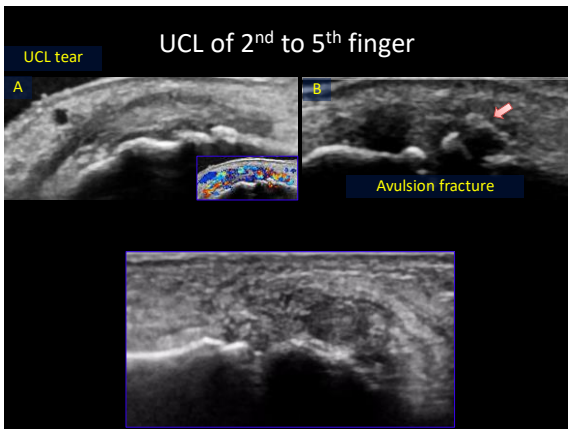

Central slip insertion site
complete tear and avulsion
Proximal
Distal
PP
MP
A
longitudinal view
Proximal
B
PP

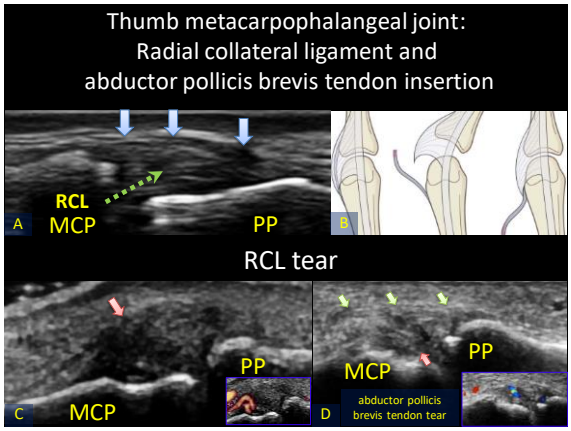

Lateral band tear
A
Radial side
MP
DP
nail
Proximal
Distal
B
Ulnar side
MP
DP
nail
Proximal
Distal

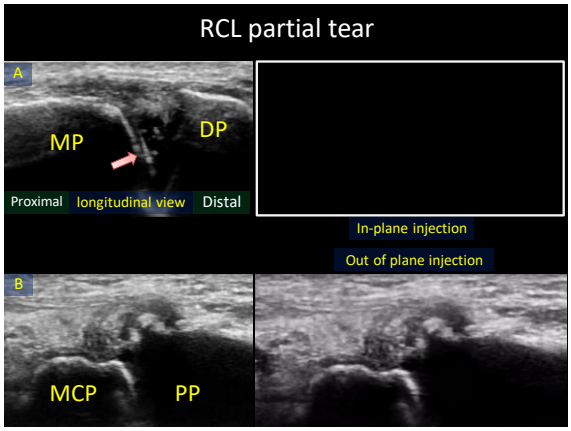

Mallet finger: terminal band tear
nail
DP
MP
A
Proximal
Dynamic test: Flexing the DP, monitoring the tendon movement
Lateral band: radial side complete tear, ulnar side partial tear
Video

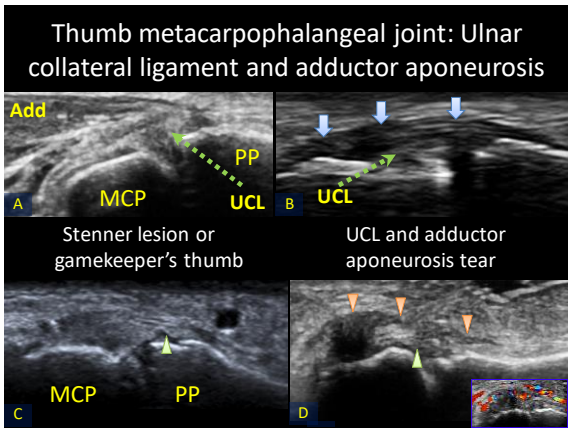

Partial tear and complete tear
Video
Video

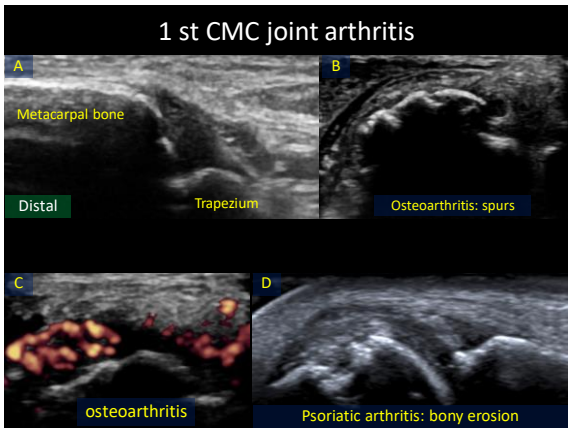

RCL of 2nd to 5th finger
A
laxity
RCL
B
tight
RCL
C
RCL tear
D
RCL tear

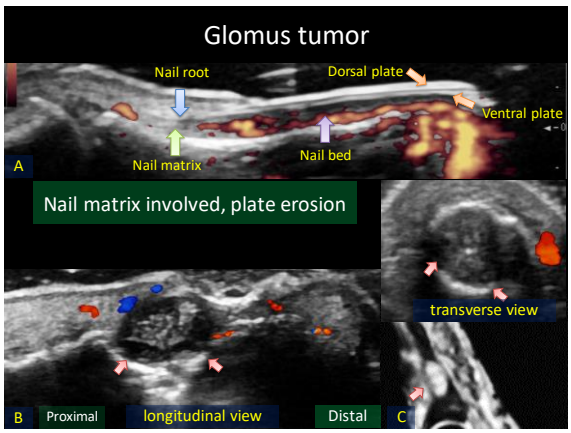

UCL of 2nd to 5th finger
UCL tear
A
B
Avulsion fracture

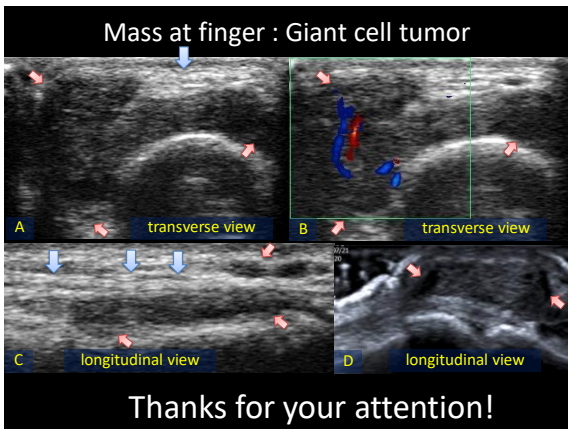

Thumb metacarpophalangeal joint:
Radial collateral ligament and
abductor pollicis brevis tendon insertion
RCL
A
MCP
PP
B
RCL tear
PP
C
MCP
MCP
PP
D
abductor pollicis
brevis tendon tear


RCL partial tear
A
MP
DP
Proximal
longitudinal view
Distal
In-plane injection
Out of plane injection
B
MCP
PP


Thumb metacarpophalangeal joint: Ulnar
collateral ligament and adductor aponeurosis
Add
PP
A
MCP
UCL
B
UCL
Stenner lesion or
gamekeeper's thumb
UCL and adductor
aponeurosis tear
MCP
PP
C
D


1 st CMC joint arthritis
A
Metacarpal bone
Distal
Trapezium
B
Osteoarthritis: spurs
C
osteoarthritis
D
Psoriatic arthritis: bony erosion


Glomus tumor
Nail root
Dorsal plate
Ventral plate
A
Nail matrix
Nail bed
Nail matrix involved, plate erosion
transverse view
B
Proximal
longitudinal view
Distal
C


Mass at finger : Giant cell tumor
A
transverse view
B
transverse view
C
longitudinal view
D
longitudinal view
Thanks for your attention!