Ultrasound of the Finger

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Why Ultrasound of the Finger?

- Small and complex anatomy
- High resolution US allows for examination of extra articular pathology
- Both Static and Dynamic assessments of the anatomy
- Wide range of pathologies and histories
  - OA, RA, Degeneration
  - Gout
  - Sports Injuries, Falls, Post trauma
  - Movement Restrictions
Ultrasound Examination of the Finger

- **Volar/ Palmar Aspect**
  - Joints and Volar Plates
    - MCPJ
    - PIPJ
    - DIPJ
  - Pulleys
    - A1, A2, A3, A4, A5
  - Flexor Tendons
    - Flexor Dig Superficialis (FDS)
    - Flexor Dig Profundus (FDP)

- **Dorsal Aspect**
  - Joints
    - MCPJ
    - PIPJ
    - DIPJ
  - Extensor Hood
    - Central Slip
    - Lateral Bands
    - Terminal Tendon
    - Sagittal Bands

- **Lateral Ligaments**
  - Radial Collateral Ligaments
  - Ulnar Collateral Ligaments

*High frequency probe, linear or hockey stick
Use stand off pads if needed*
Joints and Volar Plates

**Joints**
- Assess in both volar and dorsal
- 3 Joints per finger
- MCPJ
  - Metacarpophalangeal joint
- PIPJ
  - Proximal Interphalangeal Joint
- DIPJ

**Volar Plates**
- Thick fibrocartilage structure
- Provides stability to the joint
- Limit hyperflexion of the finger
Volar Plate Rupture

- Occurs in hyperextension injuries
- Common in ball sports
- Associated with avulsion fractures and ligament injuries
Pulleys

- Pulleys play an important role in the movement of the flexor tendon
- Series of 5 retinacular band-like structures in which the flexor tendon sheath thickens up at that point
- Wrap around the tendon onto the bone securing the tendon in place
- The longest and thickest pulley is A2
- 5 Pulleys A1-A5:
  - A1 over the MCPJ
  - A2 over the Proximal Phalanx
  - A3 over the PIPJ
  - A4 over the Mid Phalanx
  - A5 over the distal phalanx
- NB: There are also 3 Cruciate ligaments that complete the pulley system that are not seen on ultrasound
Pulleys

- Pulleys appear as linear structures in longitudinal plane over lying the flexor tendon
- Difficult to see on ultrasound when normal
- Easy to see when there is pathology or thickening of the pulley
- A1, A2, and A4 are easily seen while A3 and A5 are harder to see
- Most common to rupture is A2
- Most commonly inflamed is A1
Trigger Finger

- AKA stenosing tenosynovitis
- Commonly occurs in the ring finger and the thumb
- Higher incidence in patients with gout, diabetes and rheumatoid arthritis
- Occurs when the flexor tendon becomes thickened and catches on the A1 pulley at the MCPJ
- In severe cases of trigger finger, the finger can become locked in a bent position
- A1 pulley becomes thickened not allowing the tendon to move smoothly through the pulley
- Following this, the flexor tendons can become thickened getting stuck on the A1 pulley
Pulley rupture

- “Rockclimber Finger”
- A2 pulley most commonly ruptured
- Sometimes involves the A3 pulley in severe cases
- Causes the flexor tendon to come off the bone
- Bowstring appearance of the tendon as the tendon comes of the bone when the flexor contracts
Flexor Tendons

- 2 tendons:
  - Flexor digitorum superficialis (FDS)
  - Flexor digitorum profundus (FDP)
- FDS lies superficial at the level of the MCPJ
- Splits and Inserts onto middle phalanx
- FDP inserts onto the distal phalanx
- Focal or diffuse

Assess Dynamically!
Flexor Tenosynovitis

- Inflammation of the FDS/FDP tendon and its sheath
- Common in patients with a history of gout, RA, diabetes
- Also can occur in post trauma to the hand or finger
- Associated with trigger finger but not always

- Ultrasound Appearance
  - Thickened tendon
  - Loss of tendon fibres
  - Fluid within sheath
  - Increased vascularity
Extensor Tendons

- Complex structure formed by tendons and ligaments
- The Extensor branches into 3 bands, the central slip/tendon inserts onto the middle phalanx while the 2 lateral bands insert onto the distal phalanx
- Extensor hood is a complex aponeurotic sheath in which the tendons insert onto the phalanx
  - Formed by the lumbrical, palmar interossei, dorsal interossei and ED tendons
- At the level of the MCPJ the triangular extensor hood expands and connects to the transverse metacarpal ligament and the volar plate
- At the proximal phalanx the extensors are connected to sagittal bands that stabilize the extensor tendon from lateral displacement
Terminal Tendon Disruption

- AKA Mallet Finger or Swan Neck Deformity
- Most common injury of the extensor tendon
- Occurs when the terminal tendon (2 lateral bands) rupture
- The distal phalanx drops
- Patient is unable to extend the distal phalanx
Sagittal Band Rupture

- The sagittal bands are located at the level of the proximal phalanx
- 2 sagittal bands located on the radial and the ulnar aspects of the finger
- Rupture of one of the sagittal bands causes lateral deviation of the extensor tendon
- In rupture the extensor tendon will be displaced laterally to the opposite side of the ruptured sagittal band
Central Slip Rupture

- Boutonniere deformity
- Injury or rupture of the central slip at the PIPJ or middle phalanx base
- 2nd most common injury of the extensor tendon
- Patient is unable to extend their finger or has limited extension of the PIPJ
- This places pressure on the lateral bands and terminal tendon and forces extension of the DIPJ
Collateral Ligaments

- Present at each joint of the finger
- Radial collateral prevent ulnar displacement
- Ulnar collateral prevent radial displacement
- Rupture of these ligaments can cause the joint to become unstable
- Injuries are common in fractures and dislocation

Grading injuries

- Grade 1: normal ligament
- Grade 2: thickened in tact ligament with increased flow, partial tear
- Grade 3: no fibres seen, fluid, bony change, complete tear / rupture
**References**

- https://www.ultrasoundpaedia.com/normal-handfinger/
Thank you!