HAND EXAMINATION
&
COMMON INJURIES OF THE HAND

Majoring in Minors Conference
16-17th January 2013
Derriford Hospital
Objectives

• Anatomy & Terminology
• History
• Examination
  Look
  Feel
  Move
  Investigations
• Specific injury patterns and tests
Anatomy & Terminology
Terminology

Can you name the anatomical structures?
Terminology
Name the bones of the hand...
Muscles of the Hand
Muscles of the Hand

Hand Muscles
Lumbricals

Interossei
Flexor Tendons in the Fingers
Collateral ligaments & Volar plate
Extensor tendon anatomy
Extensor compartments
Name the nerves!
Nerves of the Hand

Median Nerve

Area of sensation

Ulnar Nerve

Area of sensation

Radial Nerve

Nerves of the Hand

Area of sensation
Sensory supply of hand by defined nerves

• Ulna Nerve
  – Ulna 1 ½ fingers

• Median Nerve
  – Radial 3 ½ fingers

• Radial Nerve
  – Highly variable area centred on 1st web space dorsally
History
History

- Age
- Handedness
- Occupation/hobbies
- Timing and MECHANISM of injury – predicts injured structures
- Previous injuries/relevant conditions affecting hands/upper limb
- Past medical history/ Psychiatric history
- Allergies and medication
- Smoking
- Support at home esp if bilateral injuries!
Examination
Look

- Adequate exposure!!
- Colour
- Swelling/deformity/dislocations/bruising?
- Wounds - ?size/site
- Active bleeding? (consider tourniquet for examination)
- Position hand/fingers. Digital cascade?
- Muscle wasting?
- RINGS OFF?
Hand Alignment

With the hand flexed, all finger tips point toward the scaphoid.
Feel

• Sites of tenderness esp. area of maximum tenderness?
• Crepitus/deformity
• Notta’s nodes (+/- other incidental conditions e.g. OA/RA/Dupuytrens nodules etc)
• Temperature/sweating?
• Allen’s test/capillary refill
• Sensation - Autonomous zones/digital nerves incl. light touch/pinprick/2 point discrimination
Assessing sensation

- Light touch
- Pinprick
- 2 point discrimination
- In children – think other methods e.g. sweat test

NB. If sensory deficit both digital nerves THINK carefully re revascularisation
Move

- Gross movement - AGCF, tip to palm distance
- Extension (extensor lag)
- Flexion incl ?painful/weak movement against resistance (NB. Pts with absent FDS to little finger/ linked FDS RF and LF)
- Abduction, adduction, circumduction, flexion, opposition and extension of thumb
- Wrist movements – flexion/extension/ulnar and radial deviation
- Tenodesis/forearm flexion test
- Power of muscles
- Crepitus/locking or triggering
- Collaterals and joint stability
- Rotation/scissoring of digits
Range of movement

- Functional distance measured by tip to palm distance
- MCPJ = 10-45 degrees hyperextension (↑ radial to ulnar)  
  80-100 degrees flexion (↑ radial to ulnar)
- PIPJ = 0-15 degrees hyperextension (↑ ulnar to radial)  
  90-110 degrees flexion (↑ ulnar to radial)
- DIPJ = 0-15 degrees hyperextension (no difference)  
  60-90 degrees flexion (no difference)
- IPJ thumb = 30-40 degrees hyperextension  
  80 degrees of flexion

NB. Difference between flexion deformity and FIXED flexion deformity ? passive movement
Finger malrotation
Testing collateral ligaments
Investigations

• XRAYS - ?Bony injury - need at least 2 views
  - usually AP/Oblique/Lateral
  ?Soft tissues e.g FB

• ?Others
Hand examination
Practice
Specific injuries and tests
Nailbed injuries

- Probably most common hand injury esp. children
- Classically crush injury e.g. door
- Often assoc with underlying #
- May also be assoc with pulp injury
- If no nail avulsion – can usually be managed conservatively +/- trephine/splint if underlying #
- If nail avulsed/perinychial injury will usually require nailbed repair
Paronychia / Felon

• Paronychia = infection of nailfold.
• Felon = pulp space infection

⇒ ? Need drainage
Amputations

- Fingertip injuries
  - may be suitable for composite grafting if immediate presentation in children

Ulna oblique

Radial oblique
• Proximal amputations
• Amputated part must be maintained adequately
  – wrapped in clean gauze, soaked in SALINE then wrung out so only damp NOT soaking wet and NOT immersed in water/saline.
  – then placed in sealed plastic bag
  – plastic bag then placed on ice/in icy water
• Xray of both stump and amputate
• Need replantation ideally within 6 hours of injury
Volar plate injury

- Typically following dorsal dislocation or significant hyperextension injury
- Tearing of volar plate +/- avulsion fracture
- Tender maximally on volar aspect of joint with increased pain on hyperextension
- May be associated with collateral ligament injury

⇒ Dorsal blocking splint 6/52
Closed FDP ruptures

- AKA “Jersey finger” – caused by forced extension of DIPJ whilst in resisted flexion e.g. rugby jerseys/rockclimbing
- Typically RF
- FDP tendon retracts
  → may be palpable clinically
  → otherwise USS may help determine end of tendon
- Needs prompt repair
Flexor sheath infection

- Often secondary to penetrating injuries incl. small puncture wound of flexor surface
- e.g. thorn, bites

- 4 Kanavels signs
  - Finger held flexed position
  - Fusiform swelling whole finger
  - Excessive tenderness whole sheath
  - Very painful passive movement

- Surgical emergency!!
• Can progress into palmar spaces
• Also think of palmar space infections if wound more proximal
• Signs incl
  – Severe pain
  – Dorsal oedema
  – Loss of palmar concavity
  – Fixed finger posture
  – Thumb abduction
# Extensor tendon injuries

<table>
<thead>
<tr>
<th>Component</th>
<th>Cause</th>
<th>Assessment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Extensor tendon</td>
<td>Laceration, Attritional rupture</td>
<td>Unable to actively extend at MCPJ, Inability to maintain passively extended digit, Retain ability to extend at IPJ</td>
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<tr>
<td>Sagittal bands</td>
<td>Closed trauma, Rupture of sagittal band (usually radial)</td>
<td>Subluxation of extensor, Inability to actively extend, Able to maintain passive extension, Retain extension at IPJ</td>
</tr>
<tr>
<td>Central slip</td>
<td>Laceration, Closed traumatic rupture, Avulsion, Attritional rupture.</td>
<td>Leads to Boutonniere deformity. Able to extend MCPJ, initially able to extend PIPJ, later ability to extend PIPJ lost, Hyperextension of DIPJ. Specific test = Elson’s test</td>
</tr>
<tr>
<td>Lateral band</td>
<td>Unilateral laceration, Bilateral lacerations rare</td>
<td>No clinical deficit</td>
</tr>
<tr>
<td>Distal extensor tendon</td>
<td>Laceration, Attrition rupture</td>
<td>Inability to extend DIPJ i.e. Mallet deformity</td>
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</table>
Mallet Finger

- Typically “end-on” (axial load) type injuries e.g. ball sports / stubbing finger
- Soft tissue or bony
- Clinical lag with inability to actively extend DIPJ
  \[ \Rightarrow \text{Mallet splint 8-10/52} \]
Central slip rupture

• Traumatic rupture of central extensor slip
  ⇒ Loss of extension at PIPJ

• Boutonniere deformity if not splinted/surgically managed
  ⇒ may become fixed ie. poor outcome if missed

• Elson's test – PIPJ’s passively flexed to 90° over table. Attempt active extension at PIPJ against resistance
Attrition tendon ruptures

• Rheumatoid arthritis e.g.
  → rupture of extensor tendons at ulna side of wrist (Vaughan-Jackson syndrome)
  → rupture of EPL over Lister’s tubercle
  → rupture of FPL from bony spur in carpal tunnel (Mannerfelt syndrome)

• Iatrogenic e.g. metalwork from previous injuries
De Quervain’s tenosynovitis

- Inflammation of 1st extensor compartment i.e APL and EPB
- Finkelstein’s test
- Steroid injection/physio/splint
UCL thumb injuries

• Hyperabduction injury
  aka. “skiers thumb” (acute injury)
  Also “gamekeepers thumb” (chronic attritional injury)
• With or without bony avulsion fragment
In 2/3 of cases the adductor aponeurosis interposes between the bone and the torn end of the ligament $\Rightarrow$ STENER lesion. If not treated will not heal $\rightarrow$ weak pinch.
– Assess for tenderness at origin/insertion of UCL
– Examine for laxity with thumb in extension and in 30 degrees flexion at MCPJ.
– ?Endpoint
– If too painful to allow adequate examination try LA infiltration
– If Stener lesion present, MAY be able to palpate mass dorsal/lateral to MCPJ
– Xrays to look for avulsion fragment
Grading of UCL thumb injury

- Grade 1 - no laxity, painful movement i.e. Strain
  ⇒ Mobilise.
- Grade 2 - laxity WITH an endpoint, i.e. Partial tear
  ⇒ Splint.
- Grade 3 - laxity with NO endpoint, i.e. Complete tear
  Can’t exclude Stener lesion ⇒ Operative fixation.

N.B. If associated with undisplaced bony avulsion fracture then avoid excessive manipulation and treat in splint.
Hand Fractures

- Common!!
- Low energy v High energy
- ?Open or closed
- If open → treat as per other open fractures. Need abx and formal washout
- If closed consider:
  - Fracture pattern i.e. transverse/oblique/spiral
  - ?Intra-articular
  - ?Displacement/Angulation/Shortening
  - ?Stability
  - Functional impairment ie. extensor lag/rotation or scissoring
Paediatric Hand Fractures

- Salter Harris Classification
  - SH II most common
Median Nerve at the Wrist

• Common nerve to be injured at the wrist as very superficial
• Can also occur as part of carpal tunnel syndrome → compression as it goes through the carpal tunnel
• It’s between FCR and PL
• Look for PL as it’s very obvious
Median Nerve Lesions at the Wrist

• Loss of function of the LOAF muscles of the hand
  – Specifically examine opposition/thumb abduction (APB)
  – Will eventually lead to thenar eminence atrophy
• Altered sensation in median nerve distribution
• Tinels
• Phalens
Carpal Tunnel Syndrome

Phalen’s Test

Tinnel’s Test
Ulnar Nerve Lesions

• Supplies in Forearm
  – Flexor Carpi Ulnaris
  – Ulna half of FDP in Hand
  – Superficial Branch
    • Palmaris Brevis
    • Sensation to 1 ½ fingers volarly
  – Deep Branch
    • All other small muscles of the hand except the ‘LOAF muscles’
    • Sensation to 1 ½ fingers dorsally
Ulnar nerve injury-general examination

- Loss of function of intrinsic muscles of hand i.e. absent abduction and adduction of fingers as well as hypothenar muscles
- Hypothenar wasting/wasting of interossei causing “guttering” on dorsum (LATE)
- Altered sensation to little finger and ulnar border of ring finger
- Froment’s test
Ulnar nerve injury in the Forearm

- Wrist flexion is maintained as FCU innervated
- More significant claw as ulna FDPs are intact therefore flexion at all IPJ’s
  ‘THE ULNAR PARADOX’
Guyon’s Canal Syndrome

- Can be a chronic problem similar to carpal tunnel syndrome
- Can be acute, as in Hook of Hamate fractures
- If distal, only superficial branch of nerve affected
  i.e. sensory only
- More proximal lesions may affect both sensory and motor branches
  \[\therefore\] hypothenar/intrinsic muscles
Specific Clinical Tests

• Froment’s Sign
  ▪ With no functioning adductor pollicis individual can only hold paper like this by using FPL

• Wartenberg’s Sign
  ▪ Inability to adduct little finger
  ▪ So directly test for adduction (ADM)
Radial nerve lesions

• Again depends on level of injury/lesion
  – Superficial radial nerve branch $\Rightarrow$ loss of sensation on dorsum of hand - 1$^{st}$ webspace
  – Posterior interosseus branch $\Rightarrow$ loss of extension of fingers and wrist
Objectives

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so does anyone have any questions?