

## Hand injuries

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### Background

- Children's hands are different to adults' hands
  - growth plates
  - ossification centres
  - tendency to fracture without as much compressive force compared with adult bones.
- Prolonged hand or finger immobilisation should be avoided, as fingers rapidly become stiff. Neighbour strapping should be for a maximum of 2 weeks.
- **Any deep or penetrating wound, or possibility of tendon, nerve or vessel damage should be referred to the Orthopaedic Registrar, bleep 8629.**
- Most hand injuries can be dealt with by CED Clinicians. If specialist advice is required acutely, contact the Orthopaedic team in the first instance as there is no acute Plastic Surgery team at BSUH.
- If Plastic Surgery is required, or Orthopaedics request it, contact the Plastic Surgery Team at Queen Victoria Hospital, East Grinstead (Tel: 01342 414000). You will need to photograph injuries and refer via TRIPS (<https://www.trips.nhs.uk>). Discuss with CED Senior if unsure.
- If Orthopaedics are following up, arrange virtual fracture clinic if < 16 years (via PANDA), or hand clinic if 16 years.

### Assessment

Ask about:

- mechanism of injury, timing of injury, swelling or deformity, and what treatment (if any) they have had.
- hand dominance and participation in competitive sports or musical instruments played.

### Hand Injury Examination (and documentation)

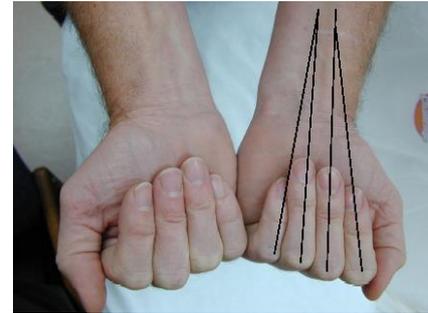
Examine the patient looking at the wrists and hands, and assess range of motion of the affected parts comparing with unaffected hand.

- Swelling
- Deformity
- Rotational deformity in flexion and extension: check finger cascade (see image below) comparing with the other side. If full flexion or extension is not possible due to swelling or pain this should be recorded.
- Flexion and extension against resistance at each individual finger joint in any mechanism of injury which may cause tendon damage.

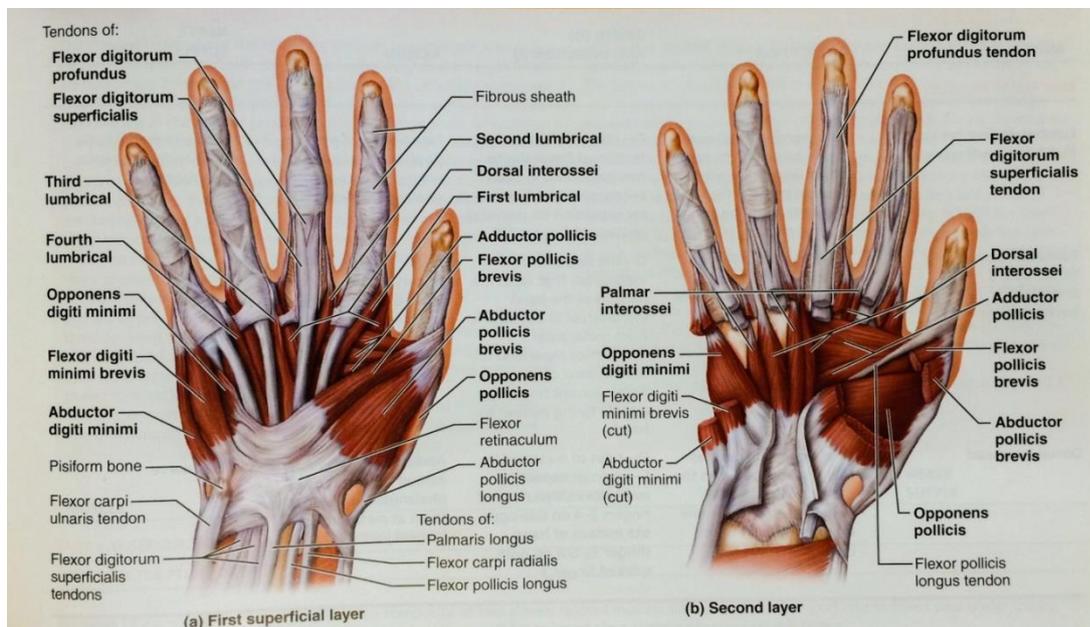
- Neurovascular status: sensation – both sides of the digit, not just the tip.
- Circulation: Colour, CRT, venous congestion.



Normal finger cascade



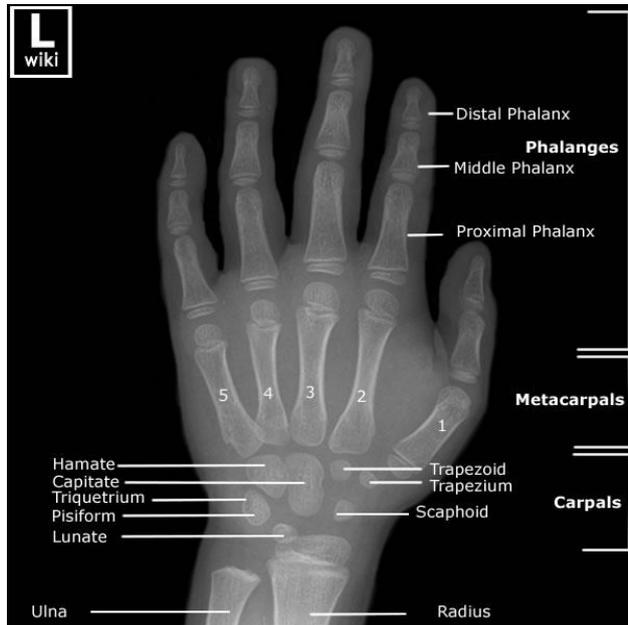
### Examination of Tendons



- **Flexor digitorum profundus (FDP):** Flexion at the DIPJ with PIPJ held in extension.
- **Flexor digitorum superficialis (FDS):** Flexion at the PIPJ, other fingers held in extension to neutralise the effect of flexor profundus.
- **Extensor digitorum (ED):** Proximal lesion: Extension of the digit with hand held palm down on flat surface.
- **Extensor digitorum middle slip:** Extension at PIPJ with MCPJ held extended to neutralise effects of lumbricals.
- **Extensor digitorum terminal slip: (Mallet Finger)** Extension of the DIPJ with middle phalanx supported.
- **Flexor pollicis longus (FPL):** Flexion of the thumb IPJ with proximal phalanx fixed.
- **Extensor pollicis longus (EPL):** Lift thumb when hand held palm down on flat surface (Tendon visible & palpable).

## Imaging

Request AP and lateral views of the hand or affected finger.



1 = thumb  
2 = index finger  
3 = middle finger  
4 = ring finger  
5 = little finger

Normal Paediatric hand x-ray with growth plates

## Management

### Fractures and dislocations

- Usually sports injuries. Metacarpal neck fractures of ring or little finger are commonly seen in punch injuries.
- Thumb sprains require checking of the ulnar and radial collateral ligaments for stability (compare with other hand). This may be difficult on the day of injury due to pain or swelling. Use a wool and crepe / Easifix spica to rest the injury, and arrange follow up for testing in CED review clinic or virtual fracture clinic if < 16 years or hand clinic if 16.

Site of fracture	Notes	Treatment
Thumb metacarpal	Testing of the ulnar and radial collateral ligaments is necessary but may be difficult due to pain or swelling.	<u>Minor avulsion, buckles or minimally displaced fractures:</u> - Wool and crepe / Easifix thumb spica, or thumb backslab - Virtual fracture clinic if < 16 years or hand clinic if 16
		<u>Displaced fractures, especially those involving joint:</u> - Refer Orthopaedic Reg

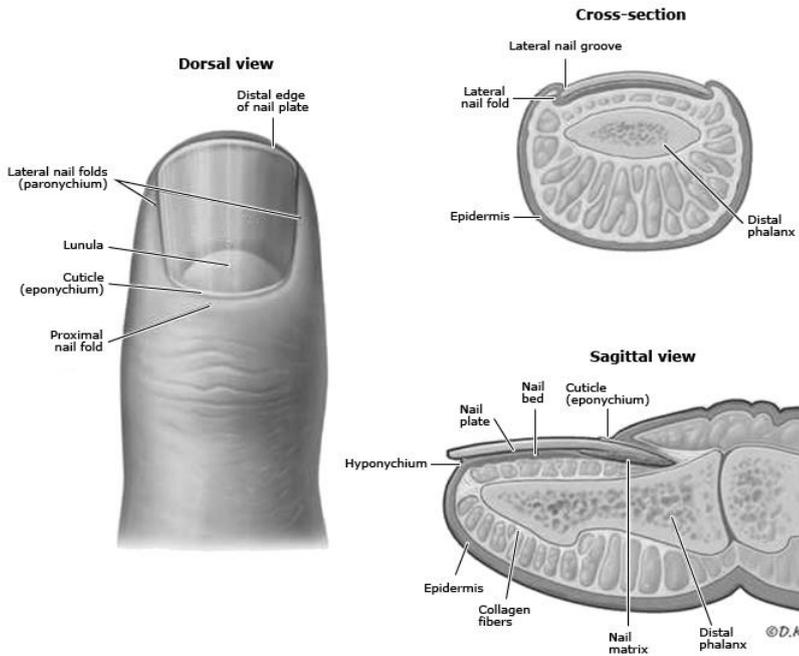
Site of fracture	Notes	Treatment
Other metacarpals	Imperative to look for rotational deformity. Can have disruption of extensor mechanism at MCP joint.	<u>Minor avulsion, buckle or minimally displace fractures:</u> <ul style="list-style-type: none"> <li>- Neighbour strapping</li> <li>- Virtual fracture clinic if &lt; 16 years or hand clinic if 16</li> </ul>
		<u>Significant angulation / displacement:</u> <ul style="list-style-type: none"> <li>- Discuss with Ortho Reg. May be appropriate to manipulate in CED. Angulation up to 45° allowed usually accepted.</li> </ul>
		<u>Multiple metacarpal fractures:</u> <ul style="list-style-type: none"> <li>- Refer to Ortho Reg</li> </ul>
Thumb dislocation at MCP joint	As many as 50% will be irreducible.	<ul style="list-style-type: none"> <li>- Attempt reduction in CED with adequate analgesia and Entonox.</li> <li>- Check x-ray for position</li> <li>- Backslab or wool and crepe / Easifix thumb spica</li> <li>- Virtual fracture clinic if &lt; 16 years or hand clinic if 16</li> <li>- Failed reduction – refer Ortho Reg</li> </ul>
Proximal and middle phalanx fractures	Check for rotational deformity and ability to extend finger.  Most finger buckle fractures with little or no angulation can be neighbour strapped for 2 weeks with no follow up. If unsure, ask a CED Senior.	<u>Minor buckles, proximal phalanx SH I and II:</u> <ul style="list-style-type: none"> <li>- Neighbour strap for 2 weeks</li> <li>- No follow up</li> </ul>
		<u>Angulation or significant rotation:</u> <ul style="list-style-type: none"> <li>- Manipulate in CED. Digital nerve block or Entonox.</li> <li>- Check x-ray</li> <li>- Neighbour strapping</li> <li>- Virtual fracture clinic if &lt; 16 years or hand clinic if 16</li> </ul>
		<u>Volar plate avulsion injuries of base of middle phalanx with &gt; 30% joint involvement:</u> <ul style="list-style-type: none"> <li>- Neighbour strapping with finger splinted in slight flexion</li> <li>- Virtual fracture clinic if &lt; 16 years or hand clinic if 16</li> </ul>
		<u>All other fractures:</u> <ul style="list-style-type: none"> <li>- Neighbour strapping</li> <li>- Virtual fracture clinic if &lt; 16 years or hand clinic if 16</li> </ul>
PIP and DIP joint dislocations	Angulated fractures may mimic dislocations. If in doubt, x-ray first.	<u>Open injuries / significant instability:</u> <ul style="list-style-type: none"> <li>- Refer Ortho Reg acutely</li> </ul>
		<u>Others:</u> <ul style="list-style-type: none"> <li>- Reduce with Entonox / digital nerve block</li> <li>- Check x-ray</li> <li>- Neighbour strapping</li> <li>- Virtual fracture clinic if &lt; 16 years or hand clinic if 16</li> </ul>

**Fingertip injuries**

Commonly crush injuries in small children e.g. fingers trapped in doors, particularly the hinge-side of the door.

May have a variety of injuries including:

- subungual haematomas
- nail avulsion and nail bed lacerations
- fingertip amputation (partial or complete)



- Describing injuries:**
1. Subungual haematoma – percentage of nail covered
  2. Nail avulsion from proximal nail bed / fold
  3. Nail bed lacerations extending from nail edge or proximally into nail matrix
  4. Finger tip amputation – percentage of circumference of finger or complete
  5. Amount of bone on display

Scarring of the matrix, as occurs with nail trauma, can disrupt nail growth and lead to nail deformity or permanent loss of the nail.

Injury	Notes	Treatment
<b>Subungual haematoma</b>	<p>Usually causes severe throbbing pain.</p> <p>X-ray if &gt; 50% nail involved, as distal phalanx 'tuft' fractures are common.</p> <p>Distal phalanx fractures with a subungual haematoma = open fracture, BUT prophylactic antibiotics in healthy children are not always required. Discuss with CED Senior if unsure.</p>	<p><u>Subungual haematoma with significant pain:</u></p> <ul style="list-style-type: none"> <li>- Use trephining device (available in CED CD cupboard) to relieve pressure</li> <li>- Dress with jelonet and gauze</li> <li>- Follow up with practice nurse</li> </ul> <p><u>Subungual haematoma associated with distal phalanx fracture:</u></p> <ul style="list-style-type: none"> <li>- Trephine if significant pain</li> <li>- Clean thoroughly and dress with jelonet and gauze</li> <li>- Splint DIP joint in extension</li> <li>- Virtual fracture clinic if &lt; 16 years or hand clinic if 16</li> </ul>

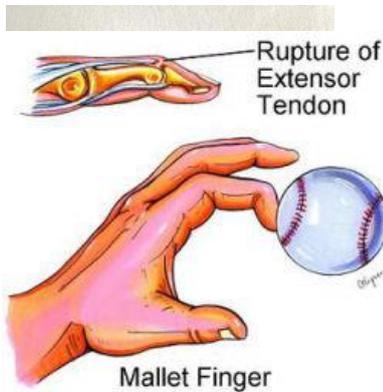
Injury	Notes	Treatment
Subungual haematoma (cont)		<p><u>Subungual haematoma associated with nail fold injuries:</u></p> <ul style="list-style-type: none"> <li>- Appropriate analgesia</li> <li>- Dress loosely</li> <li>- Refer to Orthopaedic Reg</li> </ul>
<b>Nail avulsion and nail bed lacerations</b>	<p>Complete or partial nail avulsions out of the proximal nail fold usually require surgery to remove the nail, repair any nail bed lacerations, and fix the nail back into fold.</p> <p>In small children, this is likely to require a general anaesthetic.</p>	<p><u>Proximal nail fold injury or nail bed laceration:</u></p> <ul style="list-style-type: none"> <li>- Provide appropriate analgesia</li> <li>- Clean and dress with jelonet and gauze</li> <li>- x-ray to check for distal phalanx fracture</li> <li>- refer to Orthopaedic Reg</li> </ul> <p><u>Simple nail injuries not involving the nail fold or matrix:</u></p> <ul style="list-style-type: none"> <li>- clean and dress with jelonet and gauze</li> <li>- Follow up with Practice Nurse or Plastics Wednesday dressings clinic (L5 RACH)</li> </ul>
<b>Fingertip amputation</b>	<p>May involve extensive damage to the proximal nail fold and nail bed lacerations.</p> <p>Simple tip of finger amputations in children do extremely well with conservative treatment.</p> <p>May be associated with distal phalanx fracture – x-ray after appropriate analgesia.</p>	<p><b>Refer acutely for Orthopaedic review</b> if any of following:</p> <ul style="list-style-type: none"> <li>• exposure of bone or fractured ends</li> <li>• de-gloving injuries or significant amount of soft tissue loss</li> <li>• amputation proximal to nail bed</li> </ul> <p><u>Simple fingertip partial or complete avulsions:</u></p> <ul style="list-style-type: none"> <li>- Analgesia</li> <li>- X-ray</li> <li>- Clean wound</li> <li>- May require steristrips to hold tissue in place</li> <li>- Dress with jelonet and gauze</li> <li>- Follow up in Wednesday dressings clinic (L5, Plastics clinic).</li> </ul>

NB. Most children will require a finger dressing to hold the jelonet and gauze in place



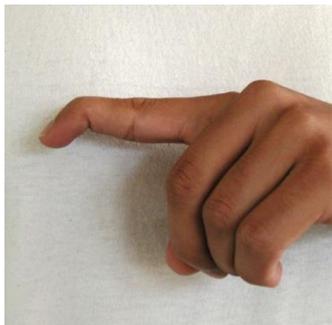
**Mallet Finger**

Loss of extensor tendon continuity at distal interphalangeal joint (DIPJ) causing the joint to rest in an abnormal flexed position.



- Usually follows a forced DIPJ flexion injury
- Inability to extend the distal joint
- full passive extension remains intact.
- Dorsum of the DIPJ may be slightly tender and swollen.

**Request x-ray**  
look for major fracture or malalignment of the joint



**Mallet finger confirmed**  
+/- avulsion

**Malalignment or major / open fracture?**  
Discuss with Orthopaedic Registrar (bleep 8629)

**Apply Mallet splint**  
(available in CED)  
Holds the DIPJ in extension



Discharge home with follow up Virtual fracture clinic if < 16 years or hand clinic if 16



**Parental advice**

The splint must remain in place for approximately 6 weeks.

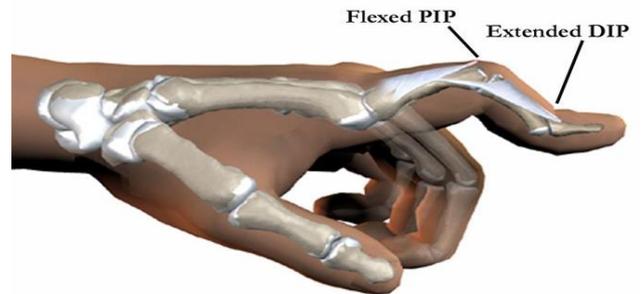
The DIPJ must never be allowed to bend during this time, even if the splint is being changed. Press the tip of the finger against a firm surface or hold straight whilst the splint is off.

### Boutonniere Deformity

Injury to central slip of extensor tendon at the PIPJ. Usually caused by a forceful blow to the dorsal side of a flexed PIPJ or a laceration on the dorsal aspect of the finger. Results in a deformed position of the finger in which the PIPJ is held in flexion while the DIPJ is hyperextended.

Signs of boutonniere deformity can develop immediately or up to 7 – 21 days following an injury to the finger.

- The finger at the middle joint cannot be straightened and the fingertip cannot be bent.
- Swelling and pain on the top of the middle joint of the finger.



#### Request x-ray

look for fracture or malalignment of the joint

Associated fracture or open injury?

Discuss with Orthopaedic Registrar (bleep 8629)

If no fracture and injury is closed, apply splint to the finger at the PIPJ to straighten it. This keeps the ends of the tendons from separating as it heals.

Discuss with Orthopaedic Registrar (bleep 8629) if unsure of ongoing management.



Discharge home with hand virtual fracture clinic if < 16 years or hand clinic if 16 follow up

Advise patient/ parents to wear splint at all times i.e. even if they remove the splint to clean it, they must keep the finger extended on a flat surface. Estimated healing time is usually 6 weeks.