

Paediatric Hand Trauma: Fractures and ligament injuries



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The Royal Children's Hospital
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Presentation outline

- Incidence & common injuries
- Paediatric specific considerations
- Paediatric fractures
- Ligament injuries

Incidence & Common Injuries

Age: 0-6 years

- Distal phalanx crush injury
- Often injured at home



Age: 6-14 years

- Proximal phalanx SH2 #
- Thumb metacarpal #
- 5th digit metacarpal #
- Most commonly injured in sport



Paediatric Specific Considerations

- Healing time frames
- Impact of growth
- Inability to specify or verbalise pain
- Behaviour and occupations
- Mobility – stiffness is not usually an issue

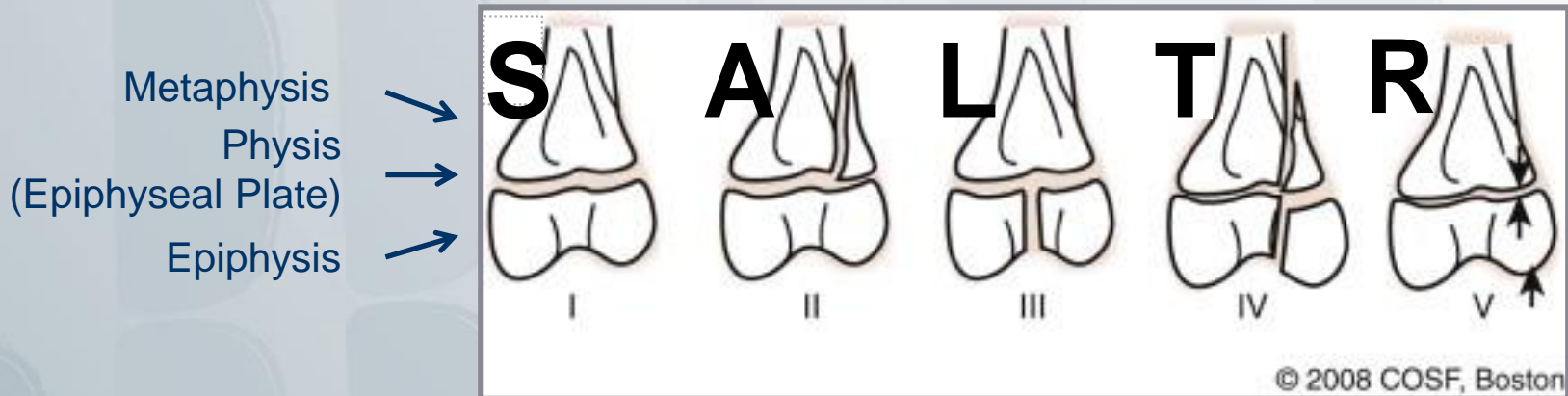


Paediatric Fractures



- Bone healing
 - Mineralisation
 - Epiphyseal Growth plates
 - Thick periosteum

- Fractures involving the growth plate are unique to children: Salter Harris classification system



Treatment

Goals of therapy:

- Protect healing fracture
- Facilitate occupational performance during healing phase as able
- Correct mild deformities
- Return to normal hand function

Considerations:

- Healing occurs faster in children than in adults
- Compliance may be limited by developmental and behavioural factors, therefore immobilisation
- Remodelling potential

Treatment: Immobilisation

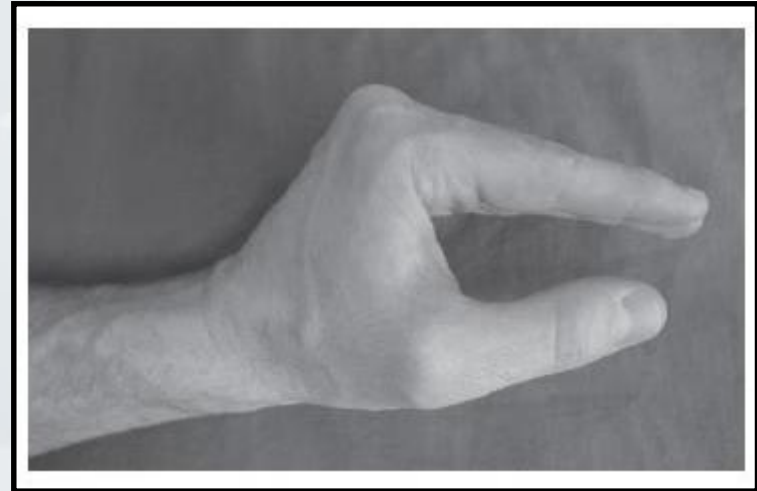
- Position of safe immobilisation:

Wrist 20-30° Ext

MCPj >70 ° Flex

IPj 0 ° Flex

Thumb abducted &
opposed



- Ideal: include one joint proximal & one joint distal to fracture in splint or plaster
- Reality: may need to include more joints to ensure the splint or plaster remains in place

Conservative Treatment: A guide

0-4 wks

- Full time immobilisation in a plaster or splint
- Oedema management:
Tubular compression bandage or coban tape
- +/- buddy taping to maintain alignment for proximal phalanx or metacarpal fractures



Conservative Treatment: A guide

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| 3-6 weeks | <ul style="list-style-type: none">• Commence active ROM exercises differential - tendon glide• Continue splint for protection for during "at risk" tasks eg school, outside play times• Avoid sports• Continue with buddy taping at all times for proximal phalanx and metacarpal #'s• Light functional hand use eg writing, computer, eating, indoor play• Commence corrective splinting if required |
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Conservative Treatment: A guide

6-8 wks	<ul style="list-style-type: none">• Cease protective splinting• Commence resistive exercises and strengthening if required
8-12 wks	<ul style="list-style-type: none">• Return to sport and all functional tasks

Fracture types: Considerations

Tip crush/tuft, distal phalanx

- Minimal therapy required
- Sensitivity, nail deformity, DIPjt stiffness
- Seymour's fracture – development of mallet injury, swan neck

Proximal Phalanx

- Adhesions
- Angulation, rotation, growth plate problems
- PIPjt oedema and reduced flexion

Metacarpal

- Adhesions, extension lag, angulation/rotation

Fracture types: Considerations

Volar plate avulsion fractures:

- Treated differently to other fractures – have their own protocol
- Often associated with a dislocation injury therefore need to assess for other structural damage ie collateral ligaments and adjust treatment accordingly
- Protected mobilisation indicated immediately post fracture
- Oedema management is important to reduce PIPjt stiffness and scarring

Volar plate treatment: A guide

Stable –sprain only

Week 0-6	Mobilise immediately with buddy taping until pain and oedema subsides and full range is obtained
Week 6-10	Resisted exercises if required Return to full activity

Volar plate treatment: A guide



Unstable -complete disruption, avulsion fracture

Week 0-6	Finger based dorsal blocking splint - PIPjt positioned 30° flexion Increase extension 10° per week Controlled passive and active ROM into flexion. Active extension to hood of splint
Week 6-8	Wean splint - high risk times only
Week 8-12	Resisted exercises if required Return to full activity

Thumb collateral treatment: A guide

MCPjt collateral injury- Most common injury site

Week 1- week
4-6

Immobilise in plaster including thumb
and wrist. Digits free
Splint if compliant / older child with
wrist and thumb IPjt free

Week 4- week
6-8

Commence mobilisation
Wean splint /plaster- high risk times
only

Week 8-12

Gradual return to full functional hand
use
Resisted exercises if required

Case study: Jack

Social History: Ten year old boy, Grade 4 student

History of presenting condition: Volar plate injury to left 5th PIPjt - taking a mark at football

Presented to OT:

- 8/52 post injury, 8/52 dorsal block splint (worn incorrectly)
- Fixed flexion deformity of 80 degrees at PIPJ
- Full flexion, stable PIPjt
- Occupational performance issues: unable to play football as Jack experienced difficulty and pain when marking the ball, unable to put his hands in his pockets, embarrassed to hold hands with his peers when entering classroom after lunch time

Case study: Jack continued

Initial assessment:

Assessment:

- Gathered background information and set goals
- Measured active and passive ROM at PIPjt

Treatment:

- Heat treatment – paraffin wax bath prior to gentle passive extension stretch
- Serial casting of LF to gain extension – included PIPjt and DIPjt (ideally keen for DIPjt free however included in cast in order to get enough leverage for a reasonable hold at PIPjt.)

Weeks 2 and 3:

- Treatment: Casted weekly, increasing extension of PIPjt

Case study: Jack continued

Week 4:

- Commenced AROM exercises incorporating flexion and extension
- Splint: Volar, finger-based extension, worn near full time (remove for exercises and hygiene)

Week 5:

- Maintaining good extension
- Wean off splint – for night only
- Buddy tape for sport to reduce risk of injury due to awkward posturing/weakness/decreased proprioception of LF
- Resisted exercises to strengthen intrinsics (which act on PIPjt extension) and extrinsic extensors

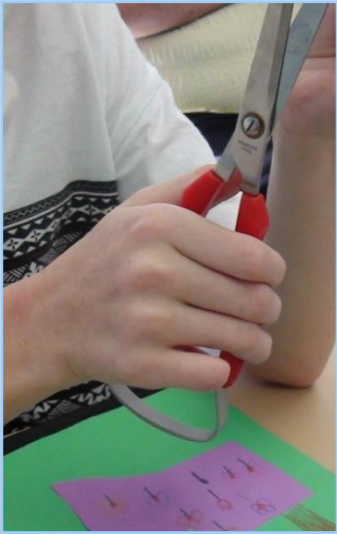
Case study: Jack continued

Week 6:

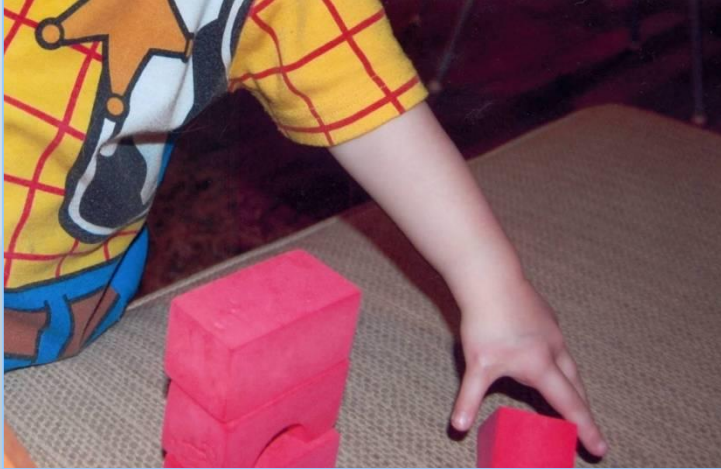
- Goals achieved, nil further occupational performance issues identified
- Full active and passive range
- To continue night splint and exercises for a further 2 weeks, then wean off over the following 2 weeks
- Educated to check for loss of full range
- Discharged from service – Jack's mother to contact OT if any loss of range is noted or issues arose

Therapeutic games and activities - general ideas for therapy

Flexion



Extension



Thumb





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