Montreal Children's Hospital – McGill University Health Center
Emergency Department Fracture Guideline

Disclaimers

This document is designed to assist MUHC pediatric physicians in caring for children (under 18 years of age) with extremity traumatic injuries. The recommendations contained within this guideline do not preclude the need for a complete and thorough patient assessment or indicate an exclusive course of action. Variations taking individual patient circumstances into account may be appropriate. All open fracture or those with neurovascular impairment require urgent management in consultation with the appropriate surgical specialty. This guideline pertains to closed fractures. It does not cover open fractures which need urgent referral to orthopedics.

Who to call for clinical advice

For Health Care Professionals requiring additional assistance call the on-call orthopedic or plastics service for immediate advice at 514-412-4400 extension 53333.

For doctors outside of the MCH who have diagnosed a fracture, please refer patients:

DIRECTLY to the OUT-PATIENT Orthopedic or Plastic Surgery Clinic

- NON-DISPLACED AND IMMOBILIZED INJURIES (ex. temporary slab, wrist guard)
- Referral can be submitted (directly by patient) via the website: https://www.thechildren.com/request-appointment

To the EMERGENCY DEPARTMENT

- DISPLACED FRACTURES AND / OR UNABLE TO TEMPORARILY IMMOBILIZE
  - Send patient *with a consult (legible name and license) and any imaging already done*

Specifications on organizing follow-up

- For orthopedic and plastics follow-up, write on the consult form:
  Age, Sex, Side, Bone, Location, Fracture Type, Cast-Type (ex. 8-year-old girl, Right distal radius fracture, below elbow molded cast)
- If closed reduction done, please indicate (ex. Left D5 Boxer's Fracture, post-reduction, Ulnar gutter cast)
- If PRN follow up is indicated, document in chart and provide patient/family phone number to clinic (514-412-4040)

Immobilization Recommendations

Slabs: are recommended, when a follow-up is within 1 week.

- Synthetic slab (Dynacast™, wrist guard) should be used to immobilize non-displaced simple fractures
- Plaster 3-way slab should be used to immobilize displaced fractures, complex fractures, extremities with significant or potential swelling.

Circumferential casts: are recommended to ensure better immobilization especially when a closed reduction was performed

Materials

Child proof cast is the standard of care. It is made of 3M™ cotton sleeve, cotton soft roll, and fiberglass cast tape. It is stronger and lighter than a standard plaster cast.

Waterproof cast is made of Delta-Dry™ stockinette, Delta-Dry™ soft roll, and fiberglass cast tape. It may be offered to patients whose follow up is at 3 weeks or more. It can only be use for casts below large joints (examples: below elbow cast). When Waterproof casts become hard, their shape or form cannot be adjusted, nor extended, like plaster of Paris casts could. If cast shape is inadequate, it is then recommended to remove the cast and redo it.

Plaster of Paris cast is made of 3M™ cotton sleeve, cotton soft roll, and plaster of Paris cast tape. It is recommended for extremities that require the cast to be adjusted to specific anatomy (i.e. swollen extremities, young children that were able to remove their fiberglass cast). Also, Plaster of Paris cast is indicated when the cast needs to be molded by the physician, all closed reductions, and if wedging is anticipated. It can also be used for any cast if fiberglass cast tape is unavailable.

WARNING:

Pressure sores and skin wounds can rapidly develop under the cast due to:

1) Type of injury (i.e., complex fracture with large amount of swelling)
2) Type of immobilization (i.e., temporary slabs allowing movement of injured extremity, not enough padding on bony prominences)
3) Potential contamination of the skin close to or in the cast (i.e., moisture, feces, dirt, sand or foreign objects)
4) Patients risk factors (i.e., decrease sensation in paraplegic patient, pain or altered neurovascular signs, decrease mobility)

Consult wound care nurse through locating for wound treatment or prevention.

Acknowledgement and Approvals

- Latest revision: June 2023 - MCH Emergency Department (I. Greenstone, D. Kudirka), Orthopedic (T. Benaroch), Plastic Surgery (S. Cugno)
- Past revisions: Nov 2021, June 2022
- Original version July 1, 2018 - Approved by MCH Emergency Department, Orthopedic, Plastic Surgery, and Trauma. Authours: S. Dubrovsky, A. Bretholz, T. Benaroch, N. Saran, S. D. Friedman, D. Kudirka, Frechette, and E. Cote (family partner)
- Special acknowledgements: I. Greenstone, D. Brody, D. Diksic, members of MCH ED's CASTED (casts and splints in the emergency department) LEAN QI project team.

UPPER EXTREMITY
Consult ORTHOPEDICS for follow-up

Abbreviations: **Above elbow = A/E** **Below elbow = B/E** **Distal third of bone = DISTAL**
Wrist guard = W/G **Salter-Harris Classification = SH**

Age definitions: YOUNG = ♀ < 10 or ♂ < 12 OLDER = ♀ ≥ 10 or ♂ ≥ 12

Fracture	Details	Indication to reduce	Immobilization type	Follow up guidelines
Radius &/or Ulna	Buckle, SH-1 undisplaced Definition of Buckle fracture: Incomplete fracture of the bone characterized by bulging of **ONE cortex only**. ** buckle fracture needs to be differentiated from greenstick and complete fractures**		W/G	No sports 4-6 weeks If YOUNG, PRN f/u if anyconcerns >6 weeks If OLDER, 4 weeks
	SH-2 undisplaced		YOUNG, W/G → 4 weeks OLDER, B/E → 1 week	
	SH-1,2 displaced	Reduce in ED	B/E Molded (consider A/E molded if < than 5 years)	1 week
	SH- 3,4,5	CALL ORTHOPEDICS		1 week
	DISTAL undisplaced DISTAL "minimally" displaced (greenstick or transverse) - "minimally" defined as: YOUNG < 10 degrees OLDER < 5 degrees		B/E (If concern, treat as DISTAL displaced)	1 week
	DISTAL displaced (greenstick or transverse)	Reduce in ED if: Age<6 ≥ 20 degrees YOUNG ≥ 15 degrees OLDER ≥ 5 degrees	B/E Molded (consider A/E molded <5yrs)	1 week
	Shaft(s) undisplaced		A/E	1 week
	Shaft(s) displaced	Reduce in ED	A/E	1 week
	Plastic deformity (clinically visible)	CALL ORTHOPEDICS		1 week
	Radial neck buckle		YOUNG, A/E → 3 weeks OLDER, Sling → 1 week	
	Head undisplaced		A/E	3 weeks
	Head displaced	CALL ORTHOPEDICS		1 week

UPPER EXTREMITY
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Age definitions: YOUNG = ♀ < 10 or ♂ < 12 OLDER = ♀ ≥ 10 or ♂ ≥ 12

Fracture	Details	Indication to reduce	Immobilization type	Follow up guidelines
Elbow	Dislocation	Reduce in ED and note "stability" post-reduction on referral	A/E Slab	1 week
	Olecranon undisplaced		A/E Slab	1 week
	Olecranon displaced	CALL ORTHOPEDICS		Operative
	Lateral condyle	CALL ORTHOPEDICS		Usually operative
	Medial epicondyle displaced	CALL ORTHOPEDICS		1 week
	Medial epicondyle undisplaced	CALL ORTHOPEDICS	A/E	1 weeks
	Effusion (fat pad sign)		YOUNG, A/E → 3 weeks OLDER, Sling → 1 week	
Humerus	Supracondylar Type I		A/E	1 week
	Supracondylar Type II or III (displaced)	CALL ORTHOPEDICS		Operative
	Neck undisplaced		Stevenson	4 weeks
	Neck displaced	CALL ORTHOPEDICS (ONLY IF "OLDER")	Stevenson	YOUNG, 4 weeks OLDER, 1 week
	Shaft		Stevenson	YOUNG, 4 weeks OLDER, 1 week
	Shaft displaced	CALL ORTHOPEDICS		
Shoulder	Dislocation	Reduce in ED	Stevenson	4-6 weeks in Sports clinic
Clavicle	Undisplaced: ALL ages		Sling PRN 1st week	6 weeks No contact sports x 3 months
	Displaced, comminuted, or tenting		Stevenson	1 week

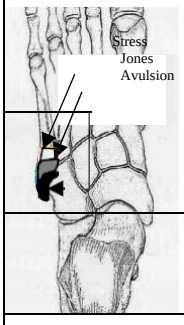
LOWER EXTREMITY
Consult ORTHOPEDICS for follow-up

Abbreviations: **Above knee = A/K** **Below knee = B/K**
Non-walking cast = NW **Walking cast = WC**
Distal third of bone = DISTAL **Proximal third = PROXIMAL**

Fracture	Details	Indication to reduce	Immobilization type	Follow up guidelines
Pelvis	Hip Dislocation / Fractures	CALL ORTHOPEDICS		
	Avulsion fractures		Crutches	Ischial tuberosity > 5 mm →1 week All others (displaced or not) →4 weeks
Femur	All types of fractures	CALL ORTHOPEDICS		Often operative
Knee	Patellar dislocation	Reduce in ED	Zimmer for 2 weeks	Physiotherapy after 2 weeks F/U 6-12 wks Sports Clinic
	Patellar fracture/dislocation with osteochondral fragment	CALL ORTHOPEDICS		
	Effusion without fracture Effusion without sprain		Ace bandage	Physiotherapy PRN F/U 6-8 wks Sports Clinic
	Subluxation, Ligamentous Tear, Meniscus Tear		Zimmer for 2 weeks	F/U 6-8 weeks Sports clinic
Tibia (Proximal or Shaft)	Tibial tuberosity avulsion with loss of active extension	CALL ORTHOPEDICS		Operative
	Tibial spine	CALL ORTHOPEDICS		1 week
	Proximal Buckle		AK NW	4 weeks
	Shaft undisplaced		A/K NW (in PLASTER)	1 week
	Shaft displaced	CALL ORTHOPEDICS		1 week
Tibia (Distal)	Toddler's fracture (i.e., no cortical disruption)		B/K WC *Consider A/K Plaster of Paris cast if <18 months old **A/K if PROXIMAL	< 3 years → 3 weeks > 3 years → 4 weeks
	Suspected toddler's fracture		Option 1: Watchful waiting Option 2: B/K WC if significant pain	→ PRN f/u >6 weeks → 4 weeks
Fibula (Proximal or Shaft)	Shaft (displaced or undisplaced)		Crutches ± Slab PRN	1 week
	Maisonneuve (spiral # of the proximal third of the fibula associated with a tear of the distal tibiofibular syndesmosis)	CALL ORTHOPEDICS		

LOWER EXTREMITY
Consult ORTHOPEDICS for follow-up

Abbreviations: **Above knee = A/K** **Below knee = BK** **Digit number = D#**
Non-walking cast = NW **Walking cast = WC**

Fracture	Details	Indication to reduce	Immobilization type	Follow up guidelines
Ankle	Sprain		Ace bandage	Physiotherapy No follow up "Ankle sprain kit"
	DISTAL fibula undisplaced (Buckle, SH-1,2, avulsion)	Option 1: ankle sprain Option 2: B/K WC if significant pain		→ No sports x 4 weeks → 4 weeks
	DISTAL tibia undisplaced (Buckle, SH-1,2, avulsion)		B/K NW	1 week
	DISTAL tibia or fibula displaced SH-1,2, and any SH-3,4,5	CALL ORTHOPEDICS		1 week
	Displaced/Unstable Tib-Fib	CALL ORTHOPEDICS		1 week
	Tillaux or Triplane fracture	CALL ORTHOPEDICS		1 week
	Spiral fibula (Weber a,b,c)	CALL ORTHOPEDICS		1 week
Metatarsal	D1 or D2-5 Undisplaced		Hard shoe	No f/u
	Multiple fractures		Consider B/K WC	4 weeks (if casted)
	Intra-articular or displaced	CALL ORTHOPEDICS		1 week
	Mid foot (navicular bone)	CALL ORTHOPEDICS		1 week
	Stress fracture 5th metatarsal "dancer's fracture"		B/K NW	4 weeks
	Jones fracture (5th metatarsal)		B/K NW	1 weeks
	Base 5th Avulsion		B/K WC or Camboot	4 weeks
Phalanges	D1 (proximal phalanx)	Reduce if clinical deformity	B/K WC	4 weeks
	D1 (distal phalanx, any) D2-5 (any)	Reduce if clinical deformity	Hard shoe ± buddy tape	4 weeks
	Multiple fractures		Hard shoe Consider B/K WC	4 weeks (if casted)

HAND
Consult PLASTICS for follow-up

Abbreviations:	**Digit**	**= D**	**Metacarpal**	**= MC**
	Distal inter-phalangeal	**= DIP**	**Metacarpal-phalangeal**	**= MCP**
	Proximal inter-phalangeal	**= PIP**	**Range of motion**	**= ROM**
	Preformed splint	**= Splint**	**Follow-up**	**= f/u**
	3-way slab	**= Slab**	**Safe position**	**= safe**
	Below elbow	**= B/E**		

Hand injuries

- SAFE position is defined as wrist extension at 20 degrees, metacarpophalangeal (MCP) joint at 70 degrees flexion and the inter-phalangeal (IP) joints in full extension.
- Injuries requiring single digits to be immobilized may be done so with aluminum splints or "buddy taping".

Fracture	Details	Indication to reduce	Immobilization type	Follow up guidelines
Finger Dislocation		Reduce in ED	Safe Sab	3 weeks
D2-5 Distal Phalanx	Tuft alone		Buddy tape PRN	No f/u
	Tuft with nailbed injury	Repair as indicated	Splint DIP	3 weeks
	Mallet		24/7 splint in hyperextension	2 weeks
	Mallet with nailbed injury	CALL PLASTICS (r/o Seymour fracture)	24/7 splint in hyperextension	2 weeks
	Shaft (unstable)	Reduce in ED angulated or scissoring	Splint DIP	3 weeks
D2-5 Middle or Proximal Phalanx	Buckle, SH-1,2	Reduce in ED angulated or scissoring	If reduced, Slab in safe 3 weeks All others, buddy tape 3 weeks *** if reduction not satisfactory, f/u 1 week	
	Volar Plate (sprain or fracture)		Buddy tape	3 weeks
	Condylar fracture (unstable)	Consider reduction in ED (unstable)	Slab in safe	3 weeks *** if reduction not satisfactory, f/u 1 week
	Shaft (unstable)	Reduce in ED if angulated or scissoring	Slab in safe	1 week

HAND
Consult PLASTICS for follow-up

Fracture	Details	Indication to reduce	Immobilization type	Follow up guidelines
D2-5 Metacarpal	Neck (minimal or no angulation) D2-3 < 20 degrees D4-5 < 40 degrees		**D2 and/or D3** Radial gutter splint or Radial gutter cast **D4 and/or D5** Ulnar gutter splint or Ulnar gutter cast **D3 + D4 or ≥3 MCPs** Volar slab or Below elbow with volar extension Consider choosing the cast option for younger children Otherwise, splint or cast option depend on the physician's/family preference.	3 weeks
	Neck (angulated) D2-3 ≥20 degrees D4-5 ≥40 degrees or Scissoring	Reduce in ED	Slab in safe	1 week
	Shaft or Base	Reduce in ED if angulated or scissoring	If reduced, slab in safe All others, B/E in safe	3 weeks *** if reduction not satisfactory, f/u 1 week
D1 "thumb"	Phalanx (Distal or Proximal)	Reduce in ED if angulated or scissoring	If reduced, slab → All others, thumb spica →	1 week 3 weeks
	Ulnar Collateral Ligament (UCL; sprain or fracture)		If UCL instability, slab → All others, thumb spica →	1 week 3 weeks
	Metacarpal	Reduce in ED if angulated or scissoring	If reduced, slab All others, thumb spica	3 weeks *** if reduction not satisfactory, f/u 1 week
	Rolando or Bennett		Slab	1 week
Scaphoid	Fracture seen on X-ray	CALL PLASTICS (consider CT)	Slab	2 weeks
	Suspected		Slab	3 weeks