University of Washington School of Medicine
Division of Emergency Medicine

EM Clerkship: Splinting Lab

Splinting Objectives

- Gain awareness of the variety of splint materials available
- Understand principles behind the selection of splints
- Develop skills necessary to successfully fabricate splints
- Assess proper fit and function of splints completed

General Principles

Indications

Temporary immobilization of fracture, soft tissue injury

Protection of injured extremity when occult injury suspected but Xrays are negative

Immobilization to control pain from

- Arthritis
- Contusions
- Soft tissue injury (e.g. laceration)

Contraindications

Unstable or open fracture

Concern for compartment syndrome

High risk for skin infection

Equipment

Trauma shears
Gloves
Stockinette
Webril
Plaster slabs or rolls
Bucket
Elastic bandage

Stockinette/Webril

- Stockinette
  - First layer to protect skin from splint
  - 3” upper ext, 4” lower ext. Extend 15cm beyond splint to be later folded back
- Webril
  - Protect skin (e.g. between digits)
  - Protect bony prominence/pressure points
  - 2” hands/feet, 3-4” upper ext, 4-6” lower ext

Plaster Slab/Roll

- Width
  - Slightly greater than limb being splinted
- Length
  - Estimate by using uninjured extremity
- Thickness
  - 8 sheets upper ext, 12-15 sheets lower ext

Plaster Slab/Roll(cont’d)

- Can be ripped or cut to size
- Dip in H2O (hotter = shorter molding time)
- Squeeze out excessive H2O, smooth out

Lastly . . .

- Apply an ACE wrap around the exterior and fold back the Webril edges
- Check circulation, motor, sensation 3 times
  - Before application
  - After splint placement
  - Before leaving ED

Cases

Case 1

- 35 year old male snowboarding for the first time
- Fall on outstretched hand (FOOSH)
- Mechanism: forceful hyperextension of the wrist
- Examination:
  - Tenderness on dorsal aspect of wrist (just distal to radial styloid)
  - Maximum tenderness over anatomic snuff box
  - Tender with axial loading of the thumb
  - Pain with radial deviation of wrist
  - Normal brachial/radial pulses, <2 sec cap refill
  - Normal motor and senory function of Median/Radial/Ulnar nn

Case 1

1. What type of fracture is this?
2. What is a complication from this fracture?
3. How should it be splinted?
4. What is the appropriate follow-up?

□ THUMB SPLINT

4. The thumb splint is made by applying a plaster slab from the tip of the thumb to approximately two thirds of the way along the forearm as shown, *B*. In applying the plaster be certain that the width is wide enough so that the two ends overlap at the distal tip of the thumb as shown, *C*. After applying cotton roll under the plaster slab, apply the plaster as shown in *A* above and [illegible] wrap with an elastic bandage.

Thumb Spica

Extends from thumb tip to midforearm
Wrist neutral
Thumb neutral

Applicable Fractures
Scaphoid
1st metacarpal

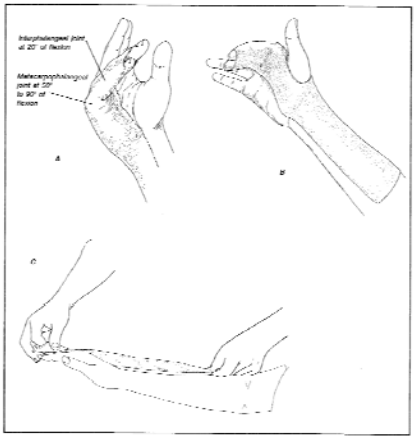
Soft Tissue Injury
Game keeper's thumb *
De Quervain's tenosynovitis

* Slight adduction of the thumb is used

Case 2

- 25 year old male punched a door in frustration over his hospital bill
- Mechanism: direct impact with a clenched fist
-
- Examination:
  - Tenderness and swelling over the 5th MCP joint
  - Normal brachial/radial pulses, <2 sec cap refill
  - Normal motor and senory function of Median/Radial/Ulnar nn

1. What type of fracture is this?
2. How should it be splinted?
3. What is the appropriate follow-up?



□ GUTTER SPLINTS

Gutter splints are used for the treatment of phalangeal and metacarpal fractures as discussed in the text. Fractures of the ring and little finger are immobilized in an ulnar gutter splint as shown in *A*. Fractures involving the index finger and the long finger are immobilized in a radial splint as shown in *B*. The splint is made by using plaster sheets cut to the proper size. The measurement should be from the tip of the finger to a point two thirds of the way down the forearm (*C*).

Ulnar Gutter

From PIP joint to midforearm
Wrist held in 15-30 degrees extension
MCP at 90 degrees flexion

Applicable Fractures
4th and 5th metacarpal
Ulnar styloid
Carpal injuries on ulnar side
Unstable phalangeal fractures of ring and little finger

Radial Gutter

From PIP joint to midforearm
Wrist held in 15-30 degrees extension
MCP at 90 degrees flexion

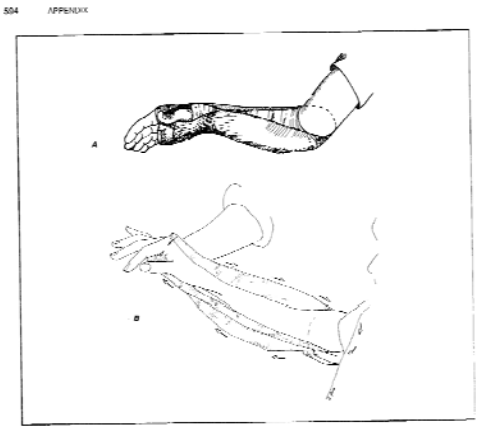
Applicable Fractures
2nd and 3rd metacarpal
Carpal injuries on radial side
Unstable phalangeal fractures of 2nd and 3rd digits

Case 3

- 85 year old female slipped and fell at the casino
- Fall on outstretched hand (FOOSH)
- Examination:
  - Obvious deformity of the wrist ("dinner -fork" appearance)
  - Tenderness and swelling at doral wrist
  - Normal median nerve function
  - Normal brachial/radial pulses, <2 sec cap refill
  - Normal motor and senory function of Median/Radial/Ulnar nn

Case 3

1. What type of fracture is this?
2. What is a complication from this fracture?
3. How should it be splinted?
4. What is the appropriate follow-up?



504 APPENDIX

□ SUGAR TONG SPLINT

4. This splint is used in distal forearm fractures, especially fractures of the distal radius (Colles'). The forearm can be supinated or pronated during the application of the splint. A cotton bandage is first applied to the injured limb. After this a single long plaster splint is applied by encircling the elbow (B).

Coaptation (Sugar Tong)

From palmar crease, around elbow to dorsal MCP
Wrist neutral
Elbow at 90 degrees flexion

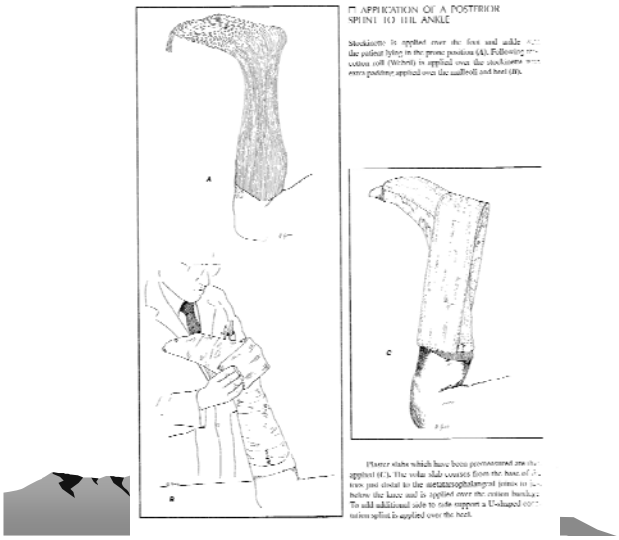
Applicable Fractures
Any radius or ulnar fractures
(except ulnar styloid and radial head)

Case 4

- 45 year old female running downstairs
- "Twisted" her ankle on the steps
- Mechanism: rotational force about the ankle (supination-adduction)
- Examination:
  - Unable to weight bear
  - Marked swelling and ecchymosis of the lateral ankle
  - Tenderness of the lateral malleoulus
  - Normal DP/PT pulses, normal capillary refill,

Case 4

1. What type of fracture is this?
2. How should it be splinted?
3. What is the appropriate follow-up?



Posterior Leg Splint

From toes to upper calf (not into posterior knee)
Ankle flexed 90-110 degrees
(except achilles tendon injury- plantar flex)

Applicable Fractures
Fibular shaft fractures
Isolated malleolar fractures
2nd and 3rd metatarsal fractures
Achilles tendon rupture
Severe ankle sprains

Complications

Compartment syndrome

Skin breakdown over bony prominence
Skin breakdown and maceration in areas of excessive pressure

Paresthesia

Inadequate immobilization of unstable fracture

Joint stiffness or adhesion from prolonged immobilization

References

- Clinical Procedures in Emergency Medicine, James Roberts and Jerris Hedges, 2009
- Emergency Orthopedics Robert R. Simon, 4th ed, 2000
- eMedicine.com – Clinical Procedures

Pop Quiz!!

Question 1

14 yo male with FOOSH. Pain in wrist but no fracture on x-ray. Where must you examine and splint if there is pain?

A. Ulnar styloid
B. 5th MCP
C. Anatomic snuff box
D. Thenar eminence

Answer

14 yo male with FOOSH. Pain in wrist but no fracture on x-ray. Where must you examine and splint if there is pain?

A. Ulnar styloid
B. 5th MCP
C. Anatomic snuff box
D. Thenar eminence

Question 2

How often must you check CMS in a patient requiring a splint?.

A. Once
B. Before splint is applied and just after application
C. Before and after splinting and just before leaving the ED
D. This test doesn't need to be performed

Answer

How often must you check CMS in a patient requiring a splint?.

A. Once
B. Before splint is applied and just after application
C. Before and after splinting and just before leaving the ED
D. This test doesn't need to be performed

Question 3

What is the correct position prior to immobilization with sugar tong splint.

A. Have the patient give the "Fonzi" sign (thumb extended)
B. Elbow at 90 degrees with “palm up.”
C. In a position of comfort
D. Elbow at 90 degrees with thumb up position

Answer

What is the correct position prior to immobilization with sugar tong splint.

A. Have the patient give the "Fonzi" sign (thumb extended)
B. Elbow at 90 degrees with “palm up.”
C. In a position of comfort
D. Elbow at 90 degrees with thumb up position

Question 4

What temperature of water is used when forming a plaster splint to maximize molding time?

A. Ice water
B. Cool
C. Warm
D. Hot

Answer

What temperature of water is used when forming a plaster splint to maximize molding time?

A. Ice water
B. Cool
C. Warm
D. Hot