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 extremity, 4” lower extremity. 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 extremity, 4-6” lower extremity

Plaster Slab/Roll

- **Width**
  - Slightly greater than limb being splinted

- **Length**
  - Estimate by using uninjured extremity

- **Thickness**
  - 8 sheets upper extremity, 12-15 sheets lower extremity

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 sensory 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 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 sensory 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?
**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

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**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

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**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 dorsal wrist
  - Normal median nerve function
  - Normal brachial/radial pulses, <2 sec cap refill
  - Normal motor and sensory function of Median/Radial/Ulnar nn

1. What type of fracture is this?
2. What is a complication from this fracture?
3. How should it be splinted?
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**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 malleolus
  - Normal DP/PT pulses, normal capillary refill,

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
- 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

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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?

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B. Before splint is applied and just after application
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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

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**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