Brace Yourself: Orthopedic Splinting Workshop

BY TRIA DENINNO, MPAS, PA-C AND

TARA MCSWIGAN, MPAS, PA-C

Disclosures

We have no relevant relationships with ineligible companies to disclose within the past 24 months. (Note: Ineligible companies are defined as those whose primary business is producing, marketing, selling, re-selling, or distributing healthcare products used by or on patients.)

Objectives

At the conclusion of this session, participants should be able to

- Identify common extremity injuries that warrant immobilization with splinting
- Execute proper techniques and placement of upper and lower extremity splints
- Appreciate contraindications to splint use, as well as post application complications

Who's Who?

Depending on healthcare or community demographic, splinting can be utilized in several disciplines

- Orthopedic providers
- Emergency Medicine providers
- Urgent Care providers
- Primary Care providers

Why Splint?

- Immobilize/stabilize injuries
- Promote and expedite healing
- Prevent exacerbation of injuries
- Improve pain

Splinting Features

- Non-circumfrential – allows for swelling to occur without risk for complications
- Temporary (3-5 days)
- Easily Removable – monitoring of skin conditions
- Quick application

Which Injuries Can Be Splinted?

- Fractures
- Sprains
- Tendon injury/rupture
- Inflammation/tenosynovitis
- Soft tissue infections/cellulitis

Consider the Mechanics

When approaching an injury…

Use clinical history to narrow differential

\+ Understand mechanics of the injury

Anticipate specific injury and confirm with exam findings and imaging

Radiographic Imaging

- Intended to confirm suspected mechanical injury with visualized details
  - Obvious fractures (angulation, alignment)
  - Presumed fractures based on other radiographic findings (fat pads, patterns of swelling)
  - Dislocations/subluxations
- Focus on your exam findings, which may or may not be demonstrated on imaging

Application of Splint - Supplies

- Supplies needed
  - Cool water
  - Towel
  - Measuring tape
  - Scissors
  - Elastic bandages
  - Splinting material (fiberglass vs. plaster)
    - Plaster – limited by drying time, user experience
    - Fiberglass – lighter, more porous, more expensive
  - Assistant
- Have ALL supplies ready before splint is applied

Splint Sizing

- Splinting material comes in a range of width sizes (1 inch-6 inch)
- Upper extremity
  - Adult: 2-4 inch width
  - Pediatric: 1-3 inch width
- Lower Extremity
  - Adult: 4-6 inch width
  - Pediatric: 2-3 inch width

Application of Splint

- Pre-splinting Procedures
  - Address all skin abnormalities (lacerations, wounds, open fractures)
  - Assess for skin tenting/prominences
  - Remove all jewelry (watches, bracelets, rings)
  - Address pain needs
  - Check neurovascular status – must document!
    - Circulation (pulses, capillary refill)
    - Motor function
    - Sensation

Application of Splint

- Ensure splint edges are covered
- Use elastic bandage to wrap extremity starting distally and moving proximally (avoid wrapping too tightly)
- Smooth splinting material with palm of hand to prevent wrinkles/ridges in splinting material
- When able, splint the joint above and the joint below fracture

Application of Splint

- Positioning of splint
  - Proper alignment of splint is key to promote optimal healing and prevent complications
- Position of function
  - Wrist – slight dorsiflexion with fingers flexed
  - Elbow – 90 degree flexion
  - Ankle – 90 degree flexion (one exception)

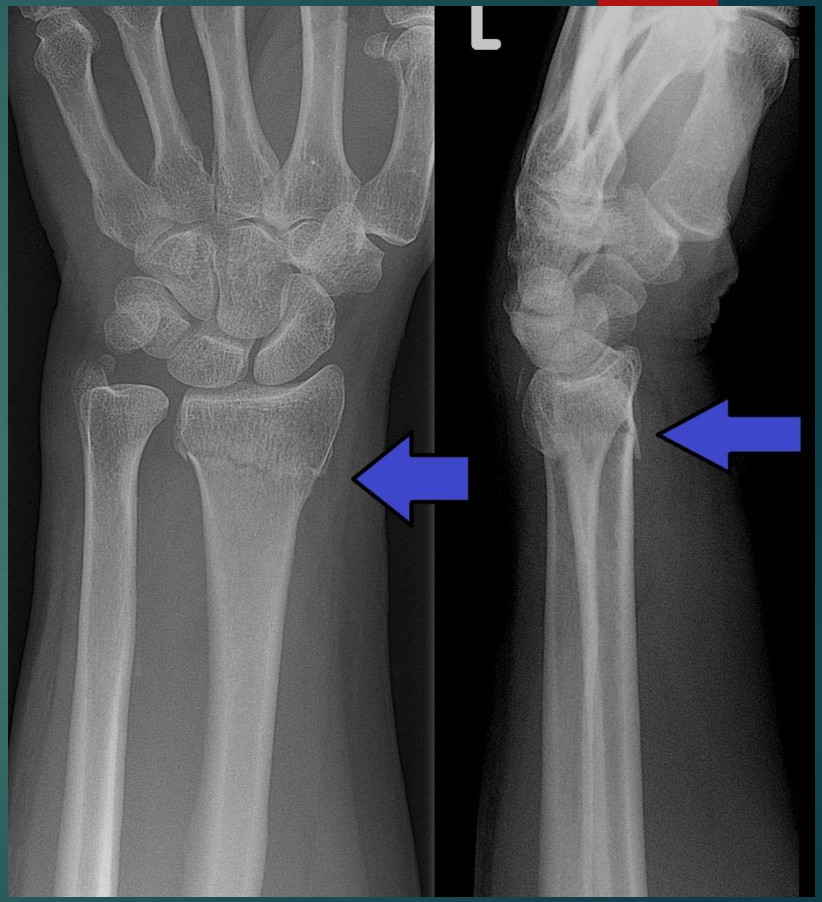
Application of Splint - Aftercare

- Post-Splinting Procedure
  - Check and document neurovascular status
    - Circulation (capillary refill, pulses)
    - Motor
    - Sensation
  - Splint care/patient instructions
    - Ice and elevation
    - Keep clean and dry
    - Instruct patient to continue to monitor neurovascular status
    - Do not remove splint unless needed (wound care, compromised neurovascular status)
    - Instructions for follow-up specialty care (2-3 days)

Upper Extremity Splints: Volar

- Stabilization against flexion/extension of wrist and MCP joints
- Indications
  - Stable distal radius and/or ulnar fractures
  - Buckle fractures
  - 2nd-3rd metacarpal fractures
  - Wrist sprains
  - Synovial infections (extensor tenosynovitis due to animal bites, puncture wounds)

https://commons.wikimedia.org/wiki/File:Collesfracture.jpg



Upper Extremity Splints: Volar

https://radiopaedia.org/cases/distal-radius-fracture-with-triquetral-avulsion?lang=us

Upper Extremity Splints: Volar

- Splint width:
  - Adult 3-4 inch
  - Child 2-3 inch
- Distribution
  - Palmar crease to 2 inches distal to elbow
  - Slight dorsiflexion of wrist and flexion of fingers

https://www.benecaredirect.com/products/precut-moulded-splint

Volar Splint Application

Upper Extremity Splints: Thumb Spica

- Indications
  - Thumb fractures
  - Thumb Dislocation (post reduction)
  - 1st metacarpal fractures
  - Navicular/scaphoid fractures
  - DeQuervain's tenosynovitis

https://www.google.com/url?sa=i&url=https%3A%2F%2Fwww.flickr.com%2Fphotos%2F6x7%2F437545989&psig=AOvVaw3Y8mF1GKDd7ntv8TOEDwNL&ust=1645459133057000&source=images&cd=vfe&ved=0CAsQjRxqFwoTCKC70JnTjvYCFQAAAAAdAAAAABAK

Upper Extremity Splints: Thumb Spica

https://radiopaedia.org/cases/scaphoid-fracture-9?lang=us

Upper Extremity Splints: Thumb Spica

- Splint width:
  - Adult 2-3 inch
  - Child 1-2 inch
- Distribution
  - Tip of thumb around dorsal forearm to 2 inches distal to elbow on ULNAR side
  - Slight dorsiflexion of wrist

https://oboi-online.com/ass/11233.php

Thumb Spica Application

Upper Extremity Splints: Boxer/Ulnar Gutter

- Indications
  - Fracture of 4th or 5th metacarpal bones (Boxer's fracture)
  - Isolated ulnar styloid fracture

https://commons.wikimedia.org/wiki/File:Boxerfraktur.png

Upper Extremity Splints: Boxer/Ulnar Gutter

https://radiopaedia.org/cases/boxer-fracture-40?lang=us

Upper Extremity Splints: Boxer/Ulnar Gutter

- Splint width:
  - Adult 3-4 inch
  - Child 2-3 inch
- Distribution
  - Tip of 5th finger (including 4th finger) forming gutter around forearm on ulnar side to 2 inches distal to elbow
  - Slight dorsiflexion of wrist

https://www.amazon.com/3M-Scotchcast-Conformable-Splint-72335/dp/B01DME2XX2

Boxer Splint Video

Upper Extremity Splints: Sugar Tong

- Stabilizes against flexion/extension AND supination of wrist
- Indications
  - Colle's fractures (distal radius and ulnar fracture with dorsal displacement)
  - Unstable wrist fractures

https://health.uconn.edu/msi/clinical-services/orthopaedic-surgery/hand-and-wrist/distal-radius-fracture-colles-fracture/

Upper Extremity Splints: Sugar Tong

https://radiopaedia.org/cases/distal-third-radius-fracture?lang=us

Upper Extremity Splints: Sugar Tong

- Splint width:
  - Adult 3-4 inch
  - Child 2-3 inch
- Distribution
  - Elbow flexed to 90 degrees
  - Splint from MCPs on palmar side, wrapping around elbow, to MCPs on dorsal side
  - Place extremity in sling after application of splint to prevent slippage with movement of extremity

http://www.quickmedical.com/bsn-medical-ortho-glass-splinting-system.html

Upper Extremity Splints: Long Arm

- Indications
  - Proximal forearm fractures/radial head fractures
  - Distal humerus fractures
  - Elbow sprain

https://commons.wikimedia.org/wiki/File:Fettpolsterzeichen_pathologisch_Ellenbogen.png

Upper Extremity Splints: Long Arm

- Splint width:
  - Adult 3-4 inch
  - Child 2-3 inch
- Distribution
  - Elbow flexed at 90 degrees
  - Splint from 5th MCP joint over ulnar aspect of forearm to 2 inches distal to axilla
  - Slight dorsiflexion of wrist
  - Place splinted extremity in sling

http://www.quickmedical.com/bsn-medical-ortho-glass-splinting-system.html

Lower Extremity Splints: Posterior Ankle

- Indications
  - Metatarsal fractures
  - Distal fibula fractures
  - Achilles tendon rupture (slight plantar flexion)

https://commons.wikimedia.org/wiki/File:AnkleFractureDislocation2008.jpg

Lower Extremity Splints: Posterior Ankle

https://radiopaedia.org/cases/distal-fibula-fracture-1?lang=us

Lower Extremity Splints: Posterior Ankle

- Splint width:
  - Adult 4-5 inch
  - Child 3-4 inch
- Distribution
  - MTP joints (2 in. toe pad) on plantar surface of foot to 2 inches distal to popliteal space
  - 90-degree flexion of ankle (Achilles tendon rupture – slight plantar flexion)
  - Discharge patient with crutches and advise non-weightbearing status

http://www.quickmedical.com/bsn-medical-ortho-glass-splinting-system.html

Posterior Ankle Application

Lower Extremity Splint: Stir up

- Indications
  - Bi/trimalleolar fractures
  - Unstable ankle fractures
  - Severe ankle sprain

https://radiopaedia.org/cases/trimalleolar-fracture-6?lang=us

Lower Extremity Splint: Stir up

https://radiopaedia.org/cases/trimalleolar-fracture-7?lang=us

Lower Extremity Splint: Stir Up

- Splint width:
  - Adult 4-5 inch
  - Child 3-4 inch
- Distribution
  - 2 inches below knee on medial side around calcaneus to 2 inches below knee on lateral side
  - 90-degree flexion of ankle
  - Discharge patient with crutches and advise non-weightbearing status

http://www.quickmedical.com/bsn-medical-ortho-glass-splinting-system.html

Splinting Complications

- Compartment syndrome
- Flexion contractures
- Burns
- Pressure sores (caution especially in patients with neuropathy)
- Compliance issues

Take Home Points

- When presented with an injury, choose the appropriate splint for optimal healing
- Use proper application techniques to avoid complications
- Ensure appropriate follow up care
- When in doubt, SPLINT!

QUESTION 2

All of the following supplies are needed for proper splint application EXCEPT

a) Hot water
b) Assistant
c) Elastic bandage
d) Splinting material

QUESTION 3

Splints should NOT be used for which of the following injuries?

a) Sprains/strains
b) Cellulitis
c) Injuries with neurovascular compromise
d) Unstable fractures

QUESTIONS?

triadeninno@yahoo.com
mcswigan1977@gmail.com