Splinting – Sculpting Stability

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I have no financial interests or relationships to disclose.

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- US Ski and Snowboard
- USA Hockey
- USA Figure Skating
- NFHS: SMAC/Grant awardee
- Board Member – Korey Stringer Institute

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Learning Objectives

- Review the core principles of splinting to ensure effective patient immobilization and maximize comfort
- Examine common pitfalls and potential complications associated with splinting, and strategies to avoid them.

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Purposes of Splinting

- To immobilize and stabilize acute fractures or dislocations
- Immobilize ligamentous or tendinous injuries
- To reduce pain and prevent further injuries
- Immobilize wounds near mobile joints
- To provide support for sprains and strains

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Indications for Splinting

- Acute arthritis pain, including acute gout pain
- Severe contusions and abrasions
- Skin lacerations that cross joints
- Tendon lacerations
- Tenosynovitis
- Puncture wounds/bites to the hands, feet, and joints
- Fractures and sprains
- Stabilizing an unstable joint (or after reducing a dislocated joint)

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Basic Principles

- Include the proximal and distal joint … in general
- Avoid creating compartment syndrome
- Avoid pressure necrosis
- Properly address underlying wounds

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Basic Setup

- A splint consists of 3 layers:
  1. Deep layer = padding
  2. Middle layer = splint material
  3. Outer layer = compressive dressing
- Types
  - Plaster
  - Fiberglass
  - Premade

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Materials

- Stockinette
- Padding
- Splint material
  - Plaster of Paris
    - Strips or rolls
    - 2”, 3”, 4”, 6” width
  - Prefabricated Splint Roll
    - Fiberglass with polypropylene padding
- Elastic Wrap and tape
- Shears
- Water

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General Rules of Application

- Layer between skin and material
  - Avoid wrinkles
  - Pad bony prominences well
- Be mindful of how you activate the material
- Neurovascular checks pre and post application

- LOOKS MATTER!!
  - Staring at a messy splint all day one can imagine a patient will question your ability to treat them.

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Plaster of Paris

- Made from gypsum powder and used for short-term splinting
- Takes up to 48 hours to dry completely
- Provides excellent support and can be used to make custom splints

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Fiberglass/Orthoglass

- Made from a fiberglass material
- Dries and sets in just 15 minutes
- Provides good support and is easy to apply

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Preformed Velcro Splints

- Made from a foam material and are pre-cut to a specific shape and size
- Provide uniform support and are easy to apply
- Can be used for various indications including sprains, strains, and stable fractures

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Plaster of Paris for Splinting

PROS

- - Inexpensive and widely available
- - Can be easily molded to the shape of the affected limb, providing a custom fit
- - Relatively easy to apply and can be used for a variety of injuries

CONS

- - Takes longer to dry and set than other materials, such as fiberglass
- - Heavier and less durable than other materials, and can break or crack if not handled carefully
- - Not waterproof, so it must be kept dry to maintain its strength and shape

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Orthoglass for Splinting

PROS

- Made from a fiberglass material and used for long-term immobilization
- Dries and sets in just 15 minutes
- Provides excellent support and is easy to apply

CONS

- More expensive than other materials, such as plaster of Paris
- Not as easily moldable to the shape of the affected limb as plaster of Paris
- Not be as widely available as other materials

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Preformed Velcro Splints

PROS

- Versatility in use, ease of application, and adjustability.
- Easily adjusted to provide support for different stages of healing.

CONS

- Less rigid support, bulkiness, and durability issues.
- Not recommended for longer immobilization periods
- Can cause skin irritation in some patients.

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THE LAYERS (Pop and Fiberglass)

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Stockinette

- Between skin and padding
- Makes for neat edges
- Using your shears, cut the length to be 2-3 inches longer than the expected splint length.
- Use this to measure out the length of the plaster you will need

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Stockinette

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Padding/Webril

- Apply 5 layers
- Avoid wrinkles
- Place extra around bony prominences
- Place extra between digits

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Splint Material - Plaster

- Slightly wider than diameter of the limb
- Cut - 1-2 cm longer than the length of your projected splint - shrinks when it hardens
- Can measure on contralateral extremity
- Prepare 6-10 layers for the upper extremities and 12-15 layers for lower extremities.

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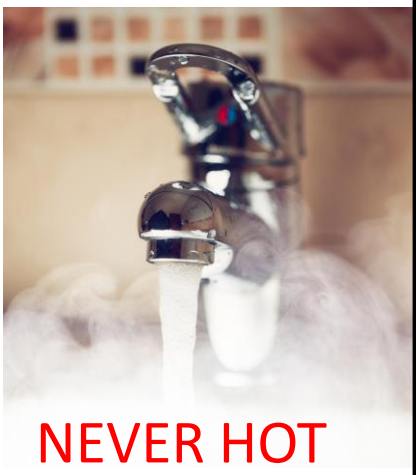
Plaster

1. Place stockinette and padding loosely.
2. Submerge plaster in cool water
3. Squeeze out the water without making wrinkles to harden your splint
4. Conform the material +/- layer of webril
5. Wrap the elastic bandage from distal to proximal
6. Fold stockinette over the finished product to make clean edges.
7. Check NV status



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Orthoglass

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Splint Material – Fiberglass/Orthoglass

1. Place stockinette and padding loosely.
2. Dries even with air but can put a small amount of COLD water.
3. Wrap the elastic bandage from distal to proximal and form the desired shape of your splint.

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SHARP EDGES

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Specific Splints

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Splints

Upper Extremity

- Long arm posterior splint
- Volar splint
- Sugar tong splint
- Thumb spica splint
- Ulnar gutter splint
- Radial gutter splint
- Finger splints

Lower Extremity

- Posterior knee splint
- Jones compression dressing
- Posterior ankle splint
- U-splint/stirrup splint

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Upper Extremity

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Intrinsic Plus Position

- Wrist to hand – 10-30 degrees
- MCP – 80-90 degrees
- PIP and DIP – 0 degrees

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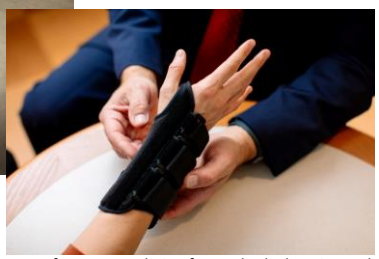
Volar Splint

- Single forearm bone buckle (torus) fracture
- Carpal/2-5th Metacarpal fractures
- Wrist Sprain

Landmarks

- Palm at MC heads to proximal forearm



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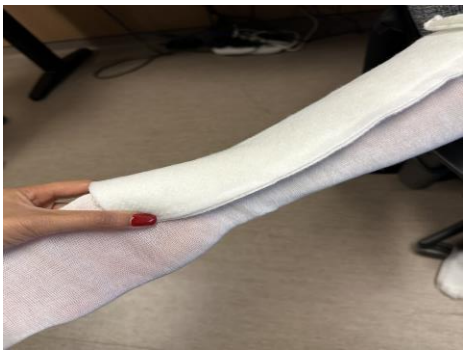
Radial Gutter Splint

- 2nd or 3rd Metacarpal fractures, soft tissue injuries, or dislocations
- 2nd or 3rd Proximal phalanx fractures or tendon injuries

Landmarks

- Mid forearm proximally to distal to the DIP joint of 2nd and 3rd digits



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Ulnar Gutter Splint

- 4th or 5th Metacarpal fractures, dislocations, or soft tissue injuries.
- Significant 4th or 5th phalanx fractures or tendon injuries

Landmarks

- Mid forearm to just beyond DIP joint including 4th and 5th digits

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Thumb Spica Splint

- Thumb fractures, dislocations, sprain or tendon injury
- Suspected scaphoid fracture, lunate fracture

Landmarks

- Mid forearm to distal to the IP joint

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Finger Splint

Buddy Tape

- Indications
  - PIP or DIP dislocations
  - Sprains

Aluminum Finger Splint

- Indications
  - Phalangeal fractures
  - Tendon injuries

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Long Arm Splint

- Sugar Tong (ST) or Posterior (P)
- Indications
  - Radius or Ulna fractures of forearm (ST)
  - Dislocations at wrist (ST) or elbow (P)
  - Distal humerus fractures (P)

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Not "Joint Above and Below"

World Journal of Orthopedics

Short arm cast is as effective as long arm cast in maintaining distal radius fracture reduction: Results of the SLA-VER noninferiority trial

Giovanni Dib, Tommaso Maluta, Matteo Cengarle, Alice Bernasconi, Giulia Marconato, Massimo Corain, Bruno Magnan

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Specific Splints – Lower Extremity

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Posterior Knee Splint

- Angulated fractures
- Injuries being transported
- Can't fit in knee immobilizer

Landmarks

- Start below gluteal fold dorsally to about 6 cm above the malleoli
- Keep knee slightly flexed

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Posterior Ankle Splint

- High ankle sprains
- Can't fit in knee immobilizer

Landmarks

- Start below popliteal fossa dorsally to midfoot

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Posterior Combination Splint

- Distal Tibia and Fibula fractures
- High grade ankle sprains
- Achilles tendon injuries
- Mid-foot or metatarsal fractures

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Knee Immobilizer

Any extensor injury to the knee

- Patellar dislocation
- Patellar/Quadriceps tendon rupture

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Plantar Fasciitis

- Keep ankle at 90 degrees at night
- Can use a boot or a splint
- Can make a posterior splint

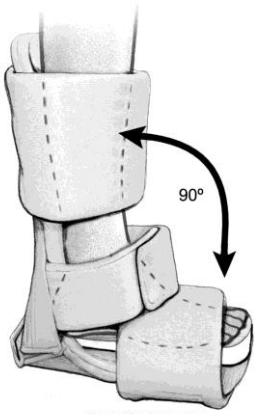

Figure 10. Night splint

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Discharge Instructions

- Rest, Ice, Elevation (2-3 days)
- Loosen ace wrap if paresthesias or digital color changes develop
- Analgesia - NSAIDS
- Crutches or Slings as indicated
- Do not get wet
- Arrange follow up

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Complications

- Minor
  - Dermatitis, Stiffness, Pain, Heat Injury, Breakdown
- Moderate
  - Burns, Pressure sores, Atrophy, Chronic Pain
- Severe
  - Ischemia, Gangrene, Neurologic Injury, Compartment Syndrome

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- James R. Roberts, MD & Martha Roberts, ACNP, PNP. The Procedural Pause - The Nitty-Gritty of Splinting. Monday, May 1, 2017. @https://journals.lww.com/em-news/blog/theproceduralpause/pages/post.aspx?PostID=70

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What Is the Purpose of a Splint?

A. Cover the fracture, sprain, or strain with a breathable fabric and prevent mold under the cast
B. Keep the area injured from use until the doctor orders regular activity, allow for showering and swimming with splint
C. Allow the patient to move the extremity normally without pain until the healing has been completed
D. Reduce pain, protect from further injury, begin healing, allow swelling while not cutting off circulation

When Placing a Plaster Splint, How Many Layers of Padding and Plaster for the UE?

A. 10/10
B. 5/10
C. 2/15
D. 2/7

What Is a Potential Complication of a Splint (Can Select More Than One)?

A. Burn
B. Compartment syndrome
C. Stiffness
D. Ischemia