

Introduction to splinting

Presented by Jeff Harris, MD
Instructor Family Medicine
LSUHSC-Shreveport Louisiana

Goal

- Provide education about types of equipment available
- Provide basic knowledge about splinting preparation
- Provide basic splinting techniques with different types of splints
- Provide education for your patients

Equipment

- **EQUIPMENT** — The equipment necessary for application of a splint includes
 - Stockinette
 - Cotton bandage (eg, Webril®) for padding
 - Plaster slabs or rolls or prepadded fiberglass splint material (eg, OCL® and Orthoglass®) of various widths (2, 3, 4, and 6 inches)
 - Room temperature water
 - Elastic bandage (eg, Ace® bandage)
 - Adhesive tape

Equipment



What kind of splints?

- Plaster splints
- Fiberglass splints
- Prefabricated splints
- Air splints

Plaster splints

- Gauze impregnated with plaster of paris
 - powdered form of gypsium
- Gypsum hardens when comes into contact with water by releasing heat
- Water should be used at room temperature to prevent burns
- 2-8 minutes to set with max strength at 24 hours

Plaster Splints



Plaster splints



Advantage

- Easier to mold
- Less expensive

Disadvantage

- More difficult to apply
- Gets soggy when getting wet

Fiberglass Splints



Advantage

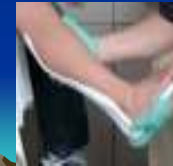
- Easier to apply
- Set more quickly
- Lighter
- Water resistant

Disadvantage

- More expensive
- More difficult to mold

Prefabricated splints

- Plastic shells lined with air cells, foam, or gel components
- Same advantages and disadvantages as fiber glass splints



Air splints

- Provide less support than plaster and fiberglass splints
- Used for ankle sprains rather than fractures or dislocations
- Used to prevent eversion/inversion while permitting free flexion and extension of ankle



Basic principles to keep in mind

- Providers should obtain emergent orthopedic evaluation for:
 - Open, angulated, or displaced fractures



Basic principles to keep in mind

- Dislocations that cannot be reduced



Basic principles to keep in mind

- Any injury that causes or could potentially cause Neurovascular compromise



Basic principles to keep in mind

- -Joints above and below the fracture site should be immobilized



Be aware of alarming signs

- 1) Impaired sensation
- 2) Excessive swelling
- 3) Circulatory Insufficiency

Preparing to place a splint

- Expose the injured extremity completely before splinting
- Clean, repair, and dress all open wounds before applying any splint
- Check for neurovascular compromise

Preparing to place a splint

- Choose the appropriate size and shape of splint to be used
 - Goal is to cover $\frac{1}{2}$ circumference of the extremity without overlap

Preparing to place a splint

- Prevent stiffness and loss of function by:
 - Preparing extremities to be Splinted in their position of function
 - Preparing extremities to be Splinted against gravity



Minimize swelling

- Rest, Ice, and Elevate
- Ice-apply to area where there is no plaster for no more than 15-20 minutes at a time
 - Longer may numb the extremity
 - shorter may not affect swelling
 - May use an ice bag with a wet rag or a bag of frozen peas

Follow up

- Instruct patient to return if numbness, tingling, or increased pain should occur
- Re-evaluate in 48 hours for neurovascular compromise
 - 5 P's-pain, pallor, paresthesia, pulselessness, and paralysis
- Orthopedic evaluation in 7-10 days for possibility of casting
 - allow time for swelling to subside

Complications of splinting

- Rarely occur if applied correctly
- Most common are sores, abrasions, and secondary infections from loose or ill-fitting splints
- Less common-neurovascular compromise from tight fitting splints, contact dermatitis, and thermal burns from heating of plaster

Splint application

- Varies depending of site of injury
- Most basic splints include a:
 - Layer of stockinette
 - Cast padding
 - Plaster of paris or fiberglass
 - Cast padding
 - Ace wrap
 - Tape

Splint application

- 1) Measure the stockinette and cut to fit an area above and below the joints being splinted



Splint application

- 2) Apply cotton cast padding to the extremity
 - one layer is sufficient except at bony prominences, heels, elbows, and fracture sites
- Allow 3-4 layers at both ends to prevent irritation



Splint application

- 3) Use 8-15 layers of plaster depending on the extremity to be splinted
- 4) Shape the plaster by tearing the pattern you feel would be of most benefit



Splint application

- 5) Submerge the plaster in room temperature water until it is completely soaked
- 6) Squeeze out all the water then milk out what is remaining



Splint application

- 7) Place the splint to affected area and fold the edges back



Splint application

- 8) Wrap another layer of cast padding to cover the exposed splint to prevent the ACE wrap from sticking



Splint application

- 9) Allow 5-10 minutes for hardening of the plaster
 - At this time, molding of the splint should be accomplished



Splint application

- 10) Place an Ace wrap loosely and secure it with tape
 - Safety pin could cause injury
- 11) Allow 24 hours for full crystallization of plaster



Fiberglass splints

- Applied the same as above
- Allow yourself less time because it will set much faster

Types of splints

- **Upper extremity splints**
- Figure of eight
- Sling and swathe
- Sugar tong-proximal and distal
- Long arm posterior splint
- Ulnar gutter
- Thumb spica
- Finger splints

Figure of eight

- Use:
 - Clavicle fractures

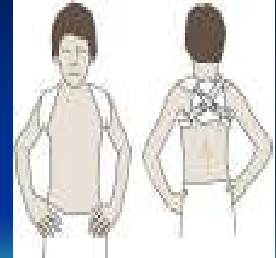


Figure of eight

- Most figure of eight splints are prefabricated and application is simple.
- Read the product information insert before applying the splint about the correct application process.



Figure of eight

- Apply with patient standing and hands on iliac crest. Shoulders should be abducted.



Sling and Swathe

- Use:
 - Shoulder and humeral injuries
- Slings supports weight of shoulder
- Swathe holds arm against chest to prevent shoulder rotation



Sling and Swathe

- Apply the sling and swathe with the patient standing.
- Place the injured arm in the sling with the elbow at 90 degrees of flexion.
- Next place the strap that is attached to the sling over the patient head so that the weight of the arm is supported



Sling and Swathe

- Apply the swathe.
 - This can be anything from an ACE wrap to a prefabricated swathe. This is designed to hold the patient's affected arm that is in the sling against the body.
- The swathe should wrap around the front and back of the sling keeping the affected extremity against the mid-abdomen



Sugar tong

- Use:
 - Humeral shaft, forearm, and wrist fractures
- 2 Types:
 - 1) Proximal sugar tong
 - 2) Distal sugar tong

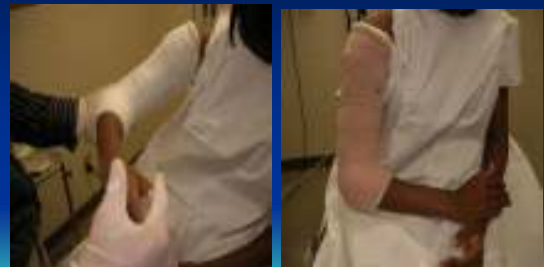


Proximal Sugar Tong

- 1) Proximal sugar tong
 - Used for humeral fractures
 - Applied from the axilla around the elbow and up the arm to lateral shoulder

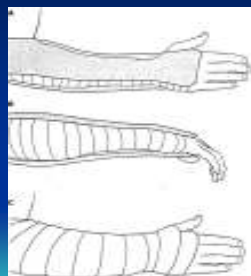


Proximal Sugar Tong



Distal Sugar Tong

- 2) Distal sugar tong
 - Wrist and distal forearm fractures
 - Extends from MCP joints on dorsum of hand, tracks along the forearm, wraps around back of elbow to volar surface of the arm, and extends down to midpalmer crease
 - Immobilizes wrist, forearm, and elbow



Long arm posterior splint

- Use:
 - Forearm and elbow injuries
 - Olecranon and radial head fractures
- Not recommended for unstable fractures
- Applied from palmer crease, wrapping around lateral metacarpals, extending up to posterior arm with elbow flexed at 90 degrees



Long arm posterior splint



Volar splint

- Use:
 - Distal forearm and wrist fractures
- Applied from volar palmer crease to 2/3 forearm
- Allows elbow and finger ROM



Volar Splint



Ulnar gutter splint

- Use:
 - Phalangeal and metacarpal fractures
- Most common use-Boxer fractures
 - 5th MCP fracture



Ulnar gutter splint

- Extends from DIP joint to the proximal 2/3 of the forearm
- Should immobilize the ring and little finger
- MCP should be in 70 degrees of flexion, PIP should be in 30 degrees of flexion, and DIP in no more than 10 degrees of flexion



Thumb spica splint

- Use:
 - Scaphoid fractures, thumb phalynx fractures or dislocations
- Most Common use:
 - 1) Gamekeepers thumb or skiers thumb
 - ulnar collateral ligament
 - 2) Dequervans tenosynovitis



Thumb spica splint

- Extends from DIP joint of thumb, incorporates the thumb, and extends up 2/3 of the proximal lateral forearm

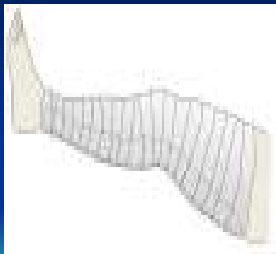


Lower extremity splints

- Knee splint
- Posterior leg splint
- Stirrup splint
- Budding taping

Knee splint

- Use:
 - Knee injuries and proximal Tib/fib fractures



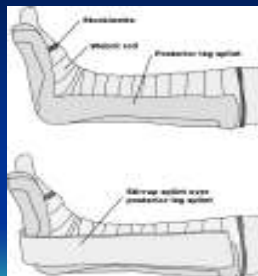
Knee splint

- Place knee in full extension
- The plaster is placed from the posterior buttocks to 3 inches above level of bilateral malleoli



Posterior leg splint

- Use:
 - Distal leg, ankle, tarsal/metatarsal fractures
 - Ankle dislocations
 - Severe sprains



Posterior leg splint

Placed from metatarsal heads on plantar surface foot, extends up back of leg to level of fibular neck



Posterior leg splint

- If ankle fracture is unstable
 - Use posterior leg splint with a stirrup splint
- No weight bearing



Stirrup splint

- Use:
 - Unstable ankle fracture
- Prevents eversion and inversion of the ankle
- Most commonly used in combination with posterior leg splint



Stirrup splint

The splint should be long enough to involve the leg from below the medial side of knee, wrap around the under surface of the heel, and back up to the lateral side of the same knee.



Posterior leg splint with Stirrup splint



Buddy taping

- Use:
 - Phalangeal fractures of the toes
- Small piece of wadding placed between toes to prevent maceration
- Fractured toe secured to adjacent toe with tape



Budding taping

- Use a small piece of wadding and place between the injured toe and an adjacent toe to prevent maceration
- The fractured toe is secured to the adjacent toe with a piece of tape



Summary

- Splinting plays a major role in the management of musculoskeletal injuries, particularly those involving extremity fractures and joint dislocations. Splinting may be the definitive treatment or a temporizing measure until the time of reevaluation and/or casting.

Summary

- Immobilization of the extremity through splinting decreases pain and bleeding and prevents further soft tissue, vascular, or neurologic compromise. Splinting should be performed immediately after the injury and splinting or casting should be maintained until the injury has healed completely. Compared to casts, splints permit swelling and may prevent neurovascular compromise. Thus, use of splints should continue until swelling is no longer a concern.

Splinting education-Handout

- **What is a splint?**
- A splint is a rigid support with padding made from metal, plaster, or plastic. It is used to support, protect, or immobilize an injured or inflamed part of the body. The splint is secured in place with an elastic bandage or an ACE wrap. The purpose of the splint is to prevent movement of the injured extremity which helps prevent further injury, and to minimize pain.

• **How do I minimize pain?**

- Apply ice to injured extremity for 15-20 minutes of each hour for 1-2 days. May use ice in zip lock bags or bags of frozen peas.
- Give acetaminophen (Tylenol) or ibuprofen (Advil) as directed on the box when needed for at least the first 2 days. Use prescription pain meds as instructed by your provider.
- If the injury involves an arm, it should be placed in sling and kept at or above the level of the heart for 24 hours to limit swelling.
- If the injury involves a leg, it should be placed on pillows while lying or sitting, and the patient should rest for 24 hours to limit swelling.

• **How do I take care of the splint?**

- Do not get the splint wet. Use plastic bags to cover the splint while bathing.
- Do not walk on the splint.
- Do not stick anything down the splint such as a coat hanger to scratch or itch. This may lead to injury and infection.

• **How do I know if the splint is too tight?**

- If you feel numbness, tingling, or increased pain, call your doctor immediately.
- If the fingers or toes start turning blue, call your doctor immediately.
- If the fingers or toes become swollen, call your doctor immediately.

- **When do I come back to the Doctor?**
- This is usually within a few days. Consult with your doctor and make a follow up appointment. Some injuries may require casting after the swelling goes down

- **What danger signs should I look for?**
- Numbness, tingling, increased pain, change in coloration of fingers or toes, or swelling in fingers or toes.
- If these symptoms occur, you should call your doctor immediately

THE END
Hit the slopes

