Splinting & Bracing
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Hey Kids,

Learn How to Splint in 10 Easy Lessons!!!!

Amaze Your Friends !!!

Be the First on your Block !!!

As Seen On TV!!

WOW !!!
Introduction

• Evidence of rudimentary splints found as early as 500 BC.
• Used to temporarily immobilize fractures, dislocations, and soft tissue injuries.
• Circumferential casts abandoned in the ED
  – increased compartment syndrome and other complications
  – ideal for the ED – allow swelling
  – splints easier to apply
Indications for Splinting

- Fractures
- Sprains
- Joint infections
- Tenosynovitis
- Acute arthritis / gout
- Lacerations over joints
- Puncture wounds and animal bites of the hands or feet
Splinting Equipment

- **Plaster of Paris**
  - Made from gypsum - calcium sulfate dihydrate
  - Exothermic reaction when wet - recrystallizes (can burn patient)
  - Warm water - faster set, but increases risk of burns
  - Fast drying - 5 - 8 minutes to set
  - Extra fast-drying - 2 - 4 minutes to set - less time to mold
  - Can take up to 1 day to cure (reach maximum strength)
  - Upper extremities - use 8-10 layers
  - Lower extremities - 12-15 layers, up to 20 if big person (increased risk of burn!)
Splinting Equipment

• Ready Made Splinting Material
  – Polymer (Exos)
    • Lightweight, moldable, reusable
  – Plaster (OCL)
    • 10-20 sheets of plaster with padding and cloth cover
  – Fiberglass (Orthoglass)
    • Cure rapidly (20 minutes)
    • Less messy
    • Stronger, lighter, wicks moisture better
    • Less moldable
Splinting Equipment

• **Stockinette**
  • protects skin, looks nifty (often not necessary)
  • cut longer than splint
  • 2,3,4,8,10,12-in. widths

• **Padding - Webril**
  • 2-3 layers, more if anticipate lots of swelling
  • Extra over elbows, heels
  • Be generous over bony prominences
  • Always pad between digits when splinting hands/feet or when buddy taping
  • Avoid wrinkles
  • Do not tighten - ischemia!
  • Avoid circumferential use

• **Ace wraps**
Specific Splints and Orthoses

**Upper Extremity**
- **Elbow/Forearm**
  - Long Arm Posterior
  - Double Sugar - Tong
- **Forearm/Wrist**
  - Volar Forearm / Cockup
  - Sugar - Tong
- **Hand/Fingers**
  - Ulnar Gutter
  - Radial Gutter
  - Thumb Spica
  - Finger Splints

**Lower Extremity**
- **Knee**
  - Knee Immobilizer / Bledsoe
  - Bulky Jones
  - Posterior Knee Splint
- **Ankle**
  - Posterior Ankle
  - Stirrup
- **Foot**
  - Hard Shoe
Long Arm Posterior Splint

• Indications
  – Elbow and forearm injuries:
  – Distal humerus fx
  – Both-bone forearm fx
  – Unstable proximal radius or ulna fx (sugar-tong better)

• Doesn’t completely eliminate supination / pronation -either add an anterior splint or use a double sugar-tong if complex or unstable distal forearm fx.
Double Sugar Tong

- Indications
  - Elbow and forearm fx - prox/mid/distal radius and ulnar fx.
  - Better for most distal forearm and elbow fx because limits flex/extension and pronation / supination.
Forearm Volar Splint aka ‘Cockup’ Splint

- Indications
  - Soft tissue hand / wrist injuries - sprain, carpal tunnel night splints, etc
  - Most wrist fx, 2nd -5th metacarpal fx.
  - Most add a dorsal splint for increased stability - ‘sandwich splint’ (B).
  - Not used for distal radius or ulnar fx - can still supinate and pronate.
Forearm Sugar Tong

- Indications
  - Distal radius and ulnar fx.
- Prevents pronation / supination and immobilizes elbow.
Hand Splinting

- The correct position for most hand splints is the position of function, a.k.a. the neutral position.
- This is with the hand in the “beer can” position (which may have contributed to the injury in the first place): wrist slightly extended (10-25°) with fingers flexed as shown.
- When immobilizing metacarpal neck fractures, the MCP joint should be flexed to 90°.
- Have the patient hold an ace wrap (or a beer can if available) until the splint hardens.
- For thumb fx, immobilize the thumb as if holding a wine glass.
Radial and Ulnar Gutter

**Indications**
- Fractures, phalangeal and metacarpal, and soft tissue injuries of the little and ring fingers.

**Indications**
- Fractures, phalangeal and metacarpal, and soft tissue injuries of index and long fingers.
Thumb Spica

- **Indications**
  - Scaphoid fx - seen or suspected (check snuffbox tenderness)
  - De Quervain tenosynovitis.
- Notching the plaster (shown) prevents buckling when wrapping around thumb.
- Wine glass position.
Finger Splints

- Sprains - dynamic splinting (buddy taping).
- Dorsal/Volar finger splints - phalangeal fx, though gutter splints probably better for proximal fx.

[Diagram of finger splints with labels for webbing or gauze padding and half-inch adhesive tape]
Jones Compression Dressing - aka Bulky Jones

• Indications
  – Short term immobilization of soft tissue and ligamentous injuries to the knee or calf.
  – Allows slight flexion and extension - may add posterior knee splint to further immobilize the knee.

• Procedure
  – Stockinette and Webril.
  – 1-2 layers of thick cotton padding.
  – 6 inch ace wrap.
Posterior Ankle Splint

- Indications
  - Distal tibia/fibula fx.
  - Reduced dislocations
  - Severe sprains
  - Tarsal / metatarsal fx
- Use at least 12-15 layers of plaster.
- Adding a coaptation splint (stirrup) to the posterior splint eliminates inversion / eversion - especially useful for unstable fx and sprains.
Stirrup Splint

- Indications
  - Similar to posterior splint.
  - Less inversion /eversion and actually less plantar flexion compared to posterior splint.
  - Great for ankle sprains.
  - 12-15 layers of 4-6 inch plaster.
Other Orthoses

- **Knee Immobilizer**
  - Semirigid brace, many models
  - Fastens with Velcro
  - Worn over clothing

- **Bledsoe Brace**
  - Articulated knee brace
  - Amount of allowed flexion and extension can be adjusted
  - Used for ligamentous knee injuries and post-op

- **AirCast / Airsplint**
  - Resembles a stirrup splint with air bladders
  - Worn inside shoe

- **Hard Shoe**
  - Used for foot fractures or soft tissue injuries
Complications

• **Burns**
  - Thermal injury as plaster dries
  - Hot water, Increased number of layers, extra fast-drying, poor padding - all increase risk
  - If significant pain - remove splint to cool

• **Ischemia**
  - Reduced risk compared to casting but still a possibility
  - Do not apply Webril and ace wraps tightly
  - Instruct to ice and elevate extremity
  - Close follow up if high risk for swelling, ischemia.
  - When in doubt, cut it off and look
  - Remember - pulses lost late.

• **Pressure sores**
  - Smooth Webril and plaster well

• **Infection**
  - Clean, debride and dress all wounds before splint application
  - Recheck if significant wound or increasing pain

Any complaints of worsening pain - Take the splint off and look!