Splinting Workshop

Broward General Medical Center

Introduction

- Evidence of rudimentary splints found as early as 500 BC.
- Good evidence that Moses was wearing double sugar-tong when parting Red Sea.
- Used to temporarily immobilize fractures, dislocations, and soft tissue injuries.
- Circumferential casts abandoned in the ED - increased compartment syndrome and other complications, splints easier to apply, splints ideal for the ED - maximum swelling.

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!)

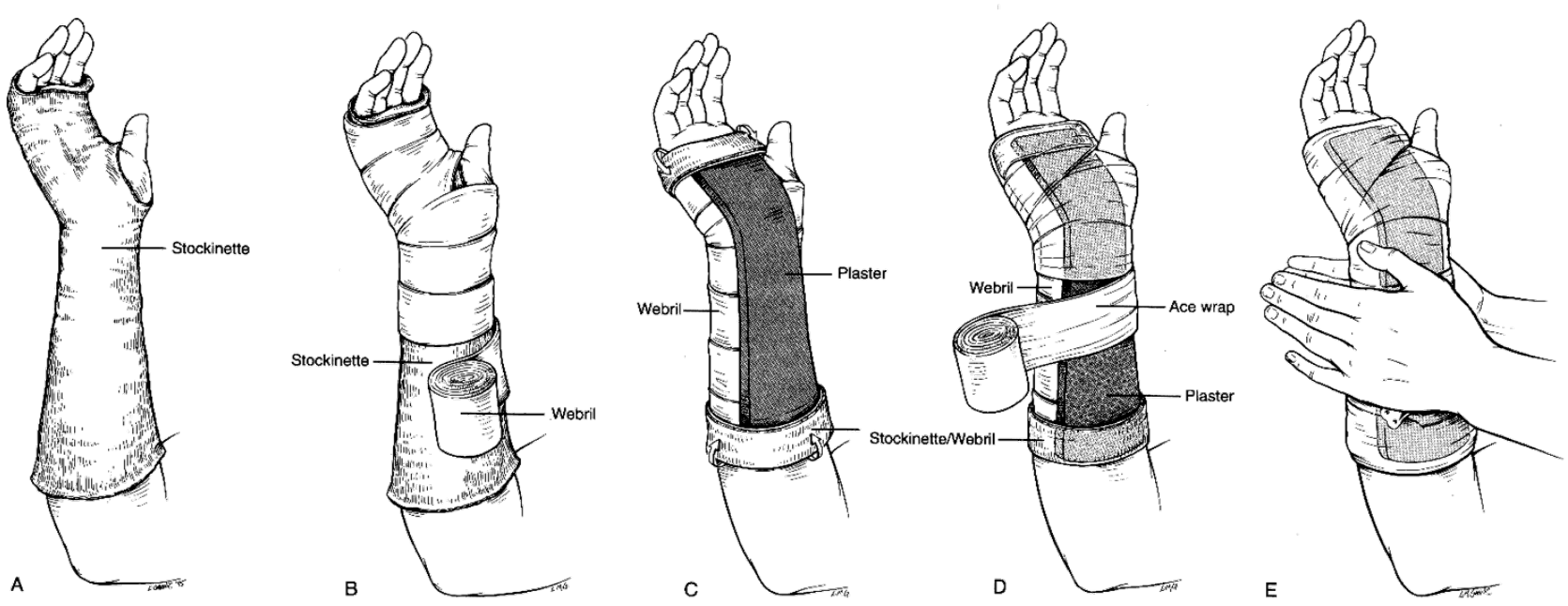
Splinting Equipment

- **Ready Made Splinting Material**
  - **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
  - 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!
- **Ace wraps**

General Principles of Splint Application



Stockinette applied to extend abt 2 - 3 inches beyond plaster.

2-3 layers of Webril are applied and smoothed.

Plaster applied and stockinette rolled over plaster edge.

Ace wrap applied over plaster.

Plaster molded as it dries.

Specific Splints and Orthoses

Upper Extremity

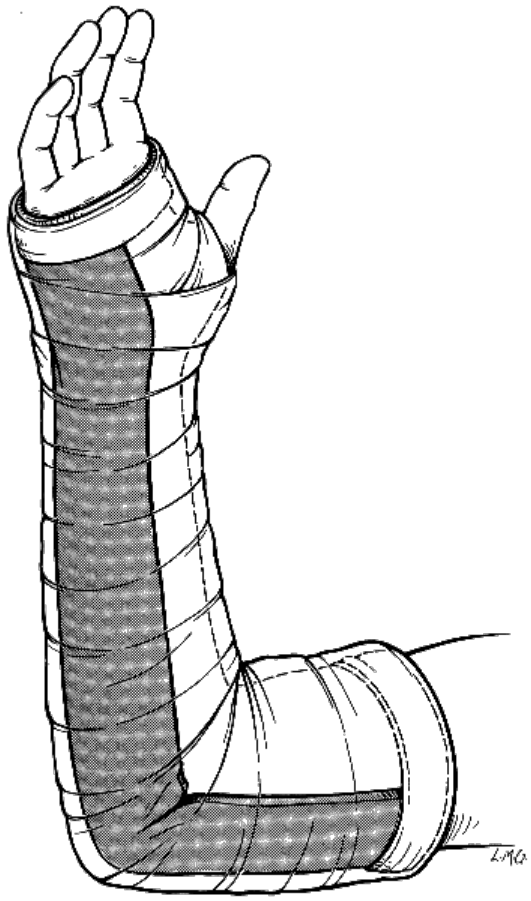
- **Elbow/Forearm**
  - Long Arm Posterior
  - Double Sugar - Tong
- **Forearm/Wrist**
  - Volar Forearm / Cockup
  - Sugar - Tong
- **Hand/Fingers**
  - Ulnar Gutter
  - Radial Gutter
  - Thumb Spica
  - Finger Splints

Lower Extremity

- **Knee**
  - Knee Immobilizer / Bledsoe
  - Bulky Jones
  - Posterior Knee Splint
- **Ankle**
  - Posterior Ankle
  - Stirrup
- **Foot**
  - Hard Shoe

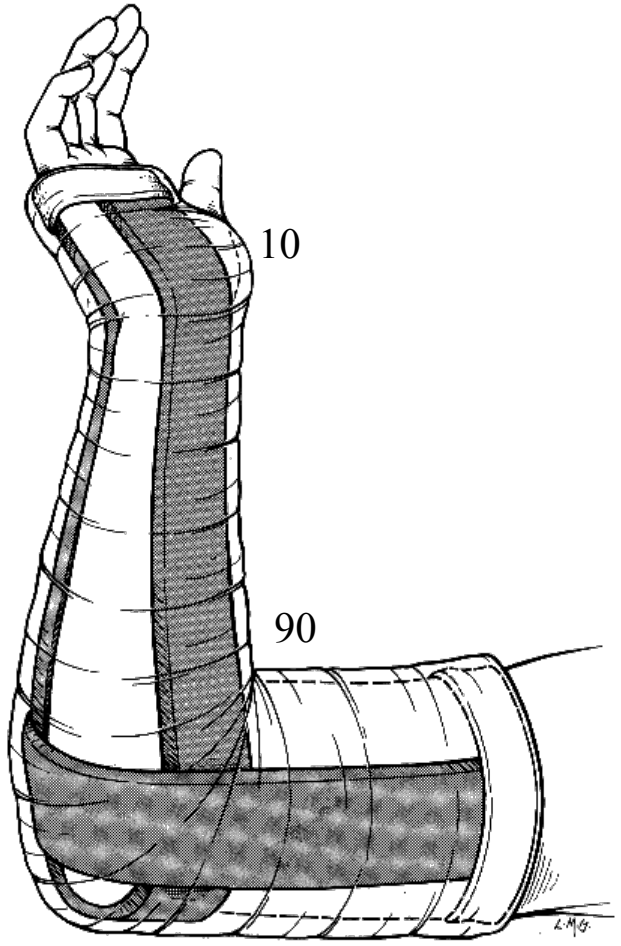
Long Arm Posterior Splint

- 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.



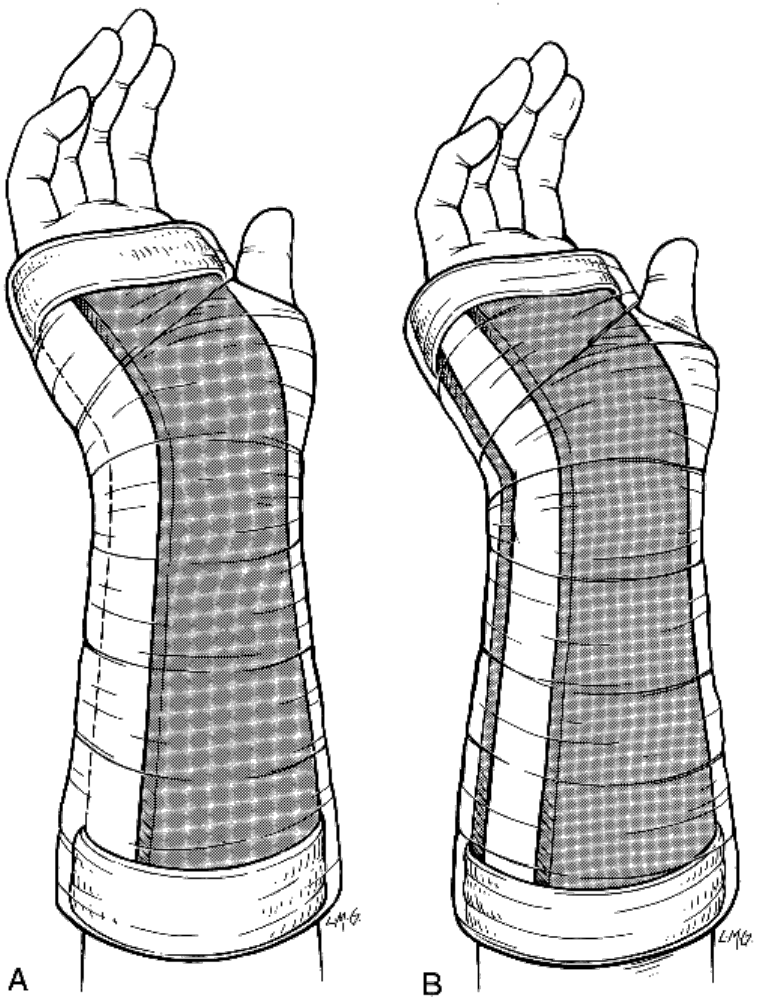
Double Sugar Tong

- 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.



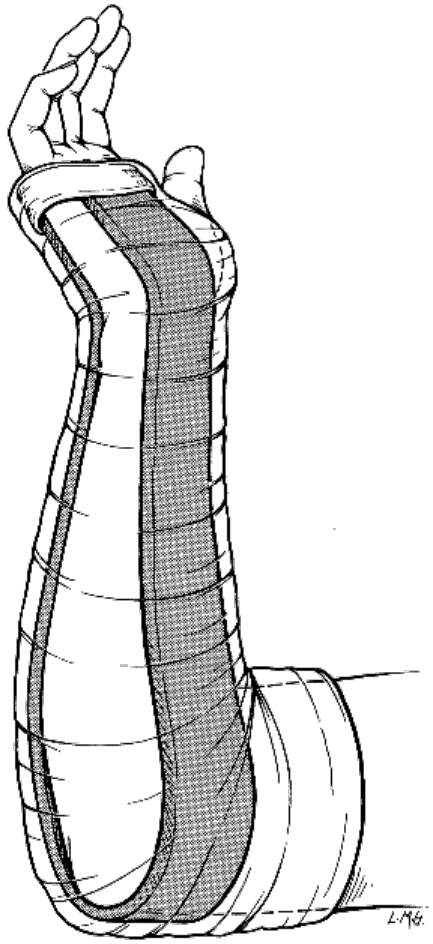
Forearm Volar Splint aka ‘Cockup’ Splint

- 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.



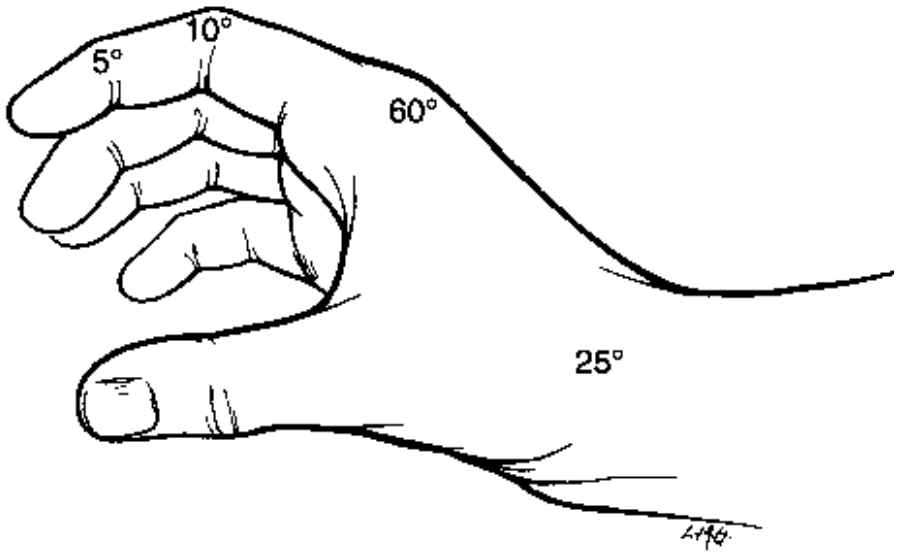
Forearm Sugar Tong

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

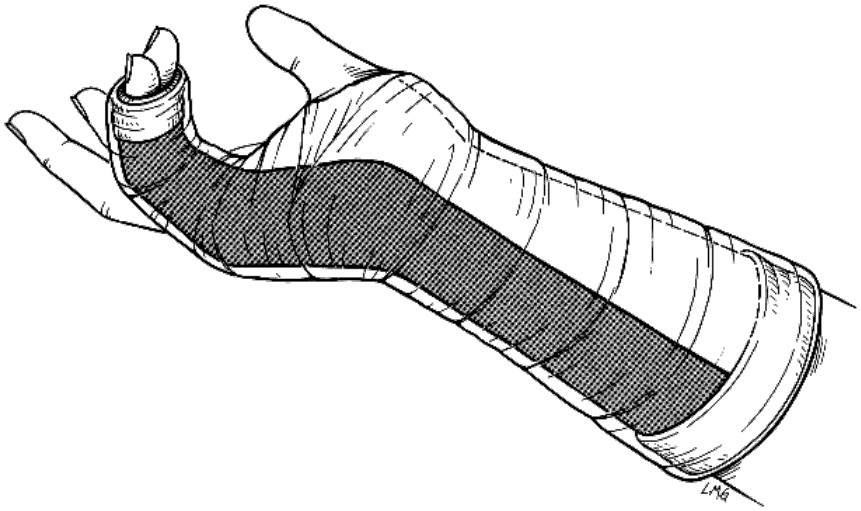


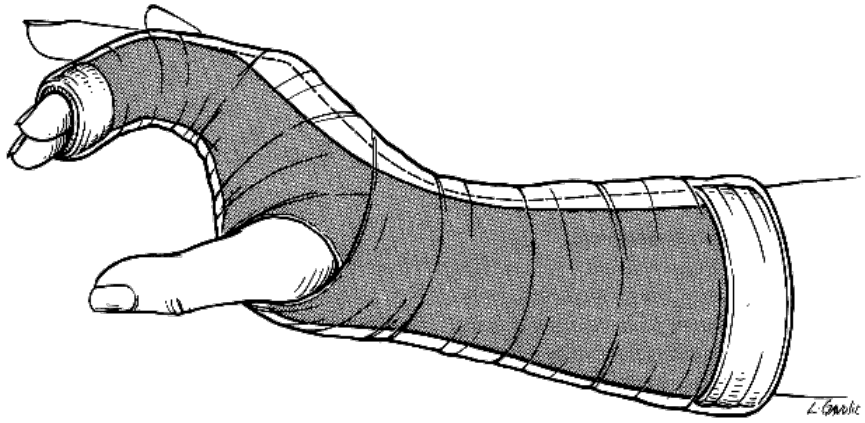
Hand Splinting

- The correct position for most hand splints is the position of function, a.k.a. the neutral position. This is with the 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



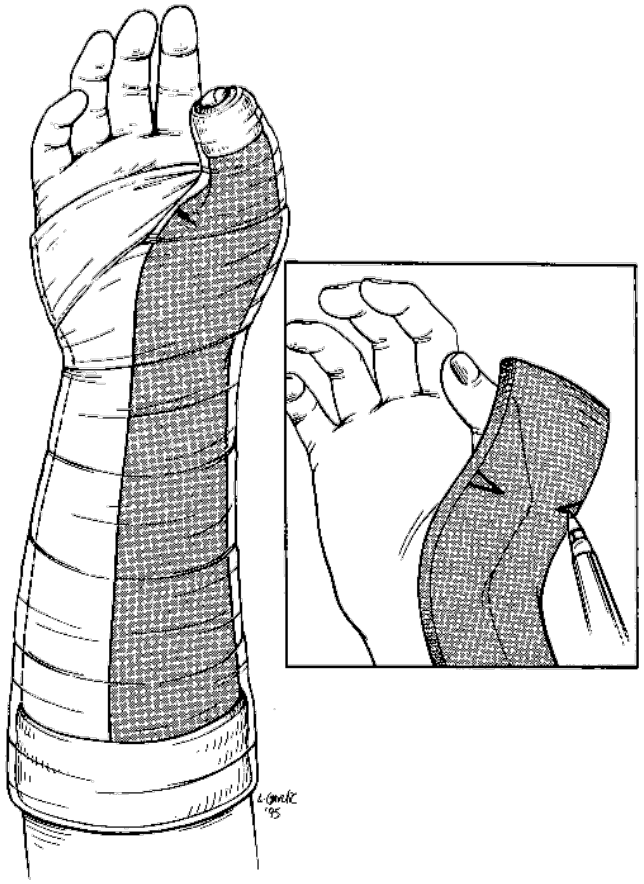


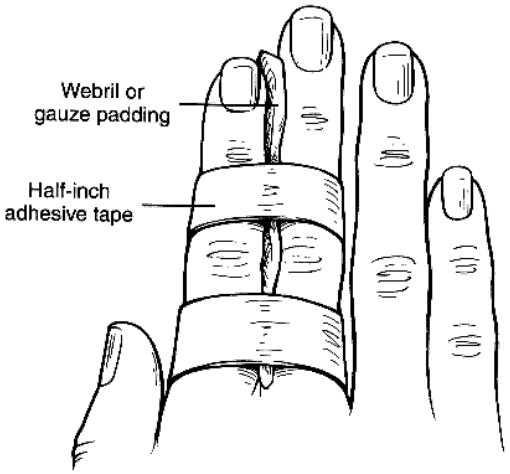
- Indications
  - Fractures, phalangeal and metacarpal, and soft tissue injuries of the little and ring fingers.

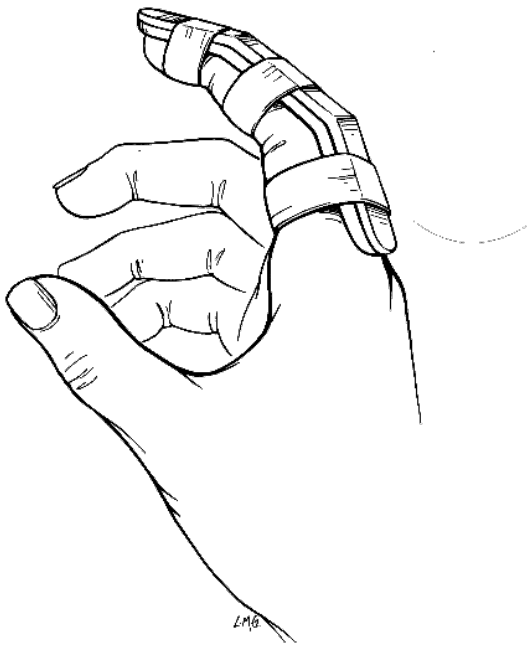
- Indications
  - Fractures, phalangeal and metacarpal, and soft tissue injuries of index and long fingers.

Thumb Spica

- Indications
  - Navicular fx - seen or suspected (check snuffbox tenderness)
  - Lunate fx, lunate or perilunate disl'n.
  - All thumb fx.
  - 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 fxs.

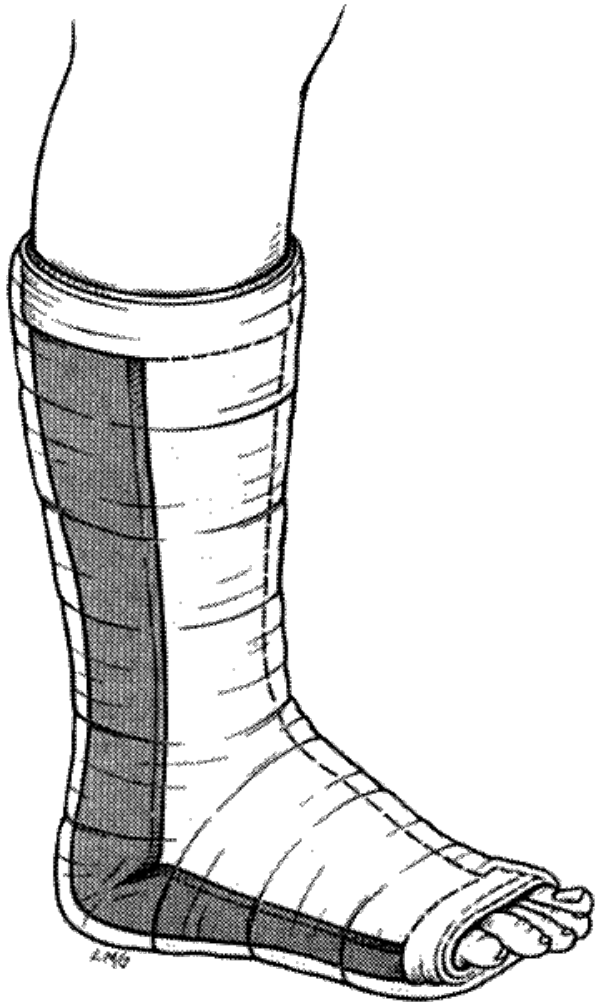
Jones Compression Dressing - aka Bulky Jones

- 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.

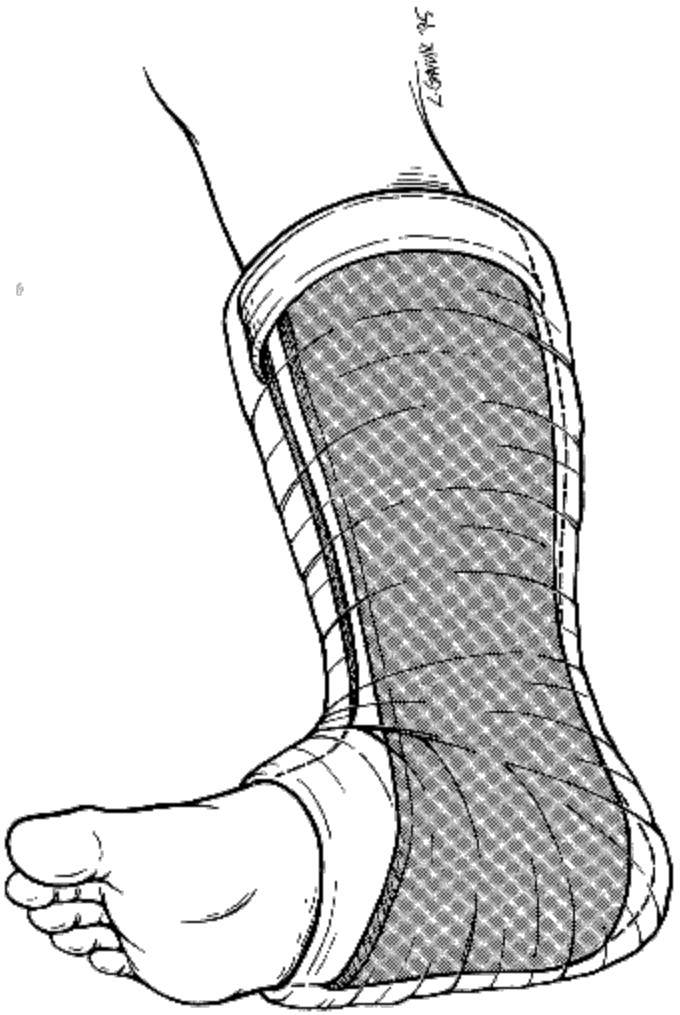
Posterior Ankle Splint

- 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
  - Similiar 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!