

Principles of Splinting

Understanding Functional Anatomy of the Hand

Splints/casts need to fit well to improve patient compliance and minimise risk. This requires a good understanding of functional anatomy and the influence the positioning of joints has on anatomical structures.

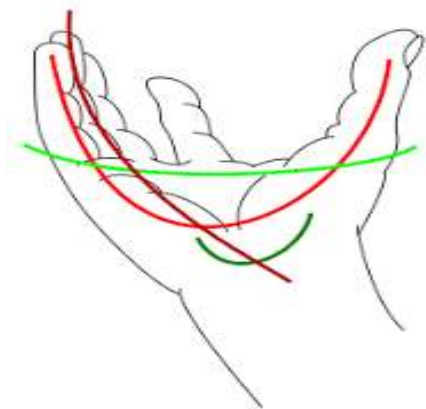
DORSAL SKIN

- Fine, supple and mobile skin - allowing for full stretch into flexion
- Hair follicles are tactile and reinforce protection of underlying tissues
- Significant venous and lymphatic channels

BONY LANDMARKS

- Ulnar styloid
- Dorsal tubercle of the radius
- Radial styloid (SBRN)
- MCP joints

Arches of the Hand



- Transverse proximal and distal (heads of MCPs)
- Longitudinal- long lines of metacarpal and carpal bones along third finger
- Oblique – opposition along little finger to thumb

What is the purpose of your splint?

- Pain Relief – Acute Or Chronic i.e. OA/RA Carpal tunnel
- Support/Position During Function i.e. nerve palsy
- Protection/Immobilisation i.e. post open reduction internal fixation
- Prevention/Correction of Deformity i.e. RA
- Oedema Control i.e. RA,OA
- Maintenance/Restoration of ROM i.e. tendon repair
- Scar Remodeling i.e. burns

POP can be classified into casts, slabs, braces and spicas. Casts are circumferential immobilise the affected joints. Slab is partial support volar or dorsal to the joint affected.

Design and Pattern Construction Principles

1. Mechanical Advantage
Use long levers, two thirds up the forearm. This is to counterbalance the weight of the hand. If increasing the splint length is not possible consider increasing circumference.
2. Contour
Strength is enhanced by adding contours. Contours can be added by rolling edges or extending the splint around the limb or digit. A forearm trough or finger/thumb gutter should be at least 50% of the circumference of that part. But if too high the straps will not secure the splint.
3. Surface Area
Use the largest surface area available without blocking unnecessary joints. If you can't increase the length use increased circumference. Flaring or rolling an edge will help prevent pressure areas. Dissipate forces on corners but rounding them.
4. Avoid Shear Force
Ensure the splint is moulded closely (contours) to the hand/arm. This eliminates shear (friction). The harder surface will erode the softer one! Maintain the arches of the hand. Remould regularly to ensure the close fit is maintained.

Position of Safe Immobilisation (POSI)

- Wrist: **20-30° extension**
- Finger MCP jts: **70-90° flexion**
- Finger PIP/DIP jts: **NEUTRAL** -watch for PIP jt flexion deformities (also swan neck deformity when 10-20° flexion is advised)
- THUMB: **maintain 1st web 'c' shape** - mid circumduction, no MCP jt hyperextension



WRIST

- Prevents volar wrist ligament contracture (thicker than dorsal)
- Prevents compression or stretch of median nerve

FINGER MCP jts

- Prevents dorsal capsular tightness and shortening of collateral ligaments
- Greater bone area surface contact creating more joint stability

FINGER PIP/DIP jts

- Reduces volar plate and collateral ligament contractures as structures are tight
- Avoid creating fixed flexion deformity of the PIP jt

THUMB

- Prevents 1st web and MCP jt dorsal capsule contractures

Indications for use of POSI

Index- little finger Metacarpal fractures	Proximal phalanx fractures
Reduce Finger Dislocations	Soft Tissue injuries
Hand Infections/Bites	Burns
Transplants	RA/OA fingers
Prevention of scarring, joint stiffness and contractures	

Application of POSI Slab

Preparation of Equipment

1. Cut a length of fabric stockinette the length of patient's fingers to elbow with two fingers width extra both ends.
2. Make small opening in stockinette for thumb.
3. Apply stockinette to patient
4. Apply circumferential application of padding starting from wrist moving distal then proximal overlapping by 50% and generally in two layers.
5. Use double thickness for any bony prominences. Avoid any wrinkling or bunching of material.
6. Make a hole, tear or cut padding to accommodate thumb and web space.
7. Cut to length 8 layers of 7.5cm width POP to cover from the tips of the patients fingers to two fingers from the elbow crease.
8. Immerse the plaster in cold water and hold under until bubbles stop.
9. Drain the plaster and place the slab longitudinally in position to the volar surface (POSI) or dorsum of the hand (flexor hood).
10. Mould by smoothing with your hands ensuring edges are smooth. Fold over excess padding.
11. Apply gauze bandage overlapping 50% circumferentially around limb starting distally and wrap proximally.
12. Hold limb in correct position approximately 5 mins until plaster hardens.

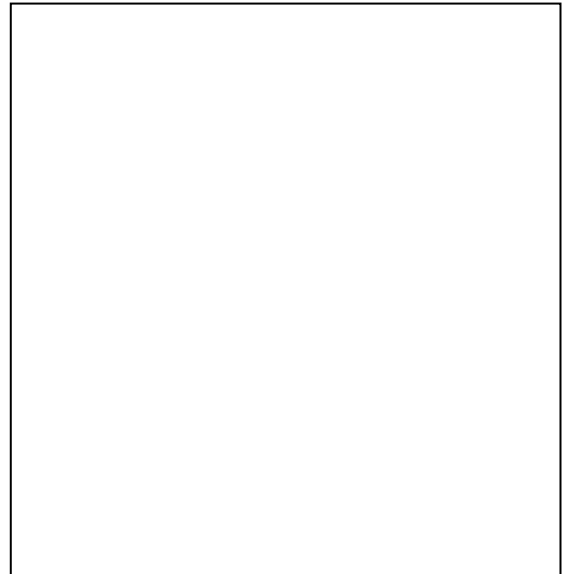
Aftercare following POP

Educate the patient for symptoms of

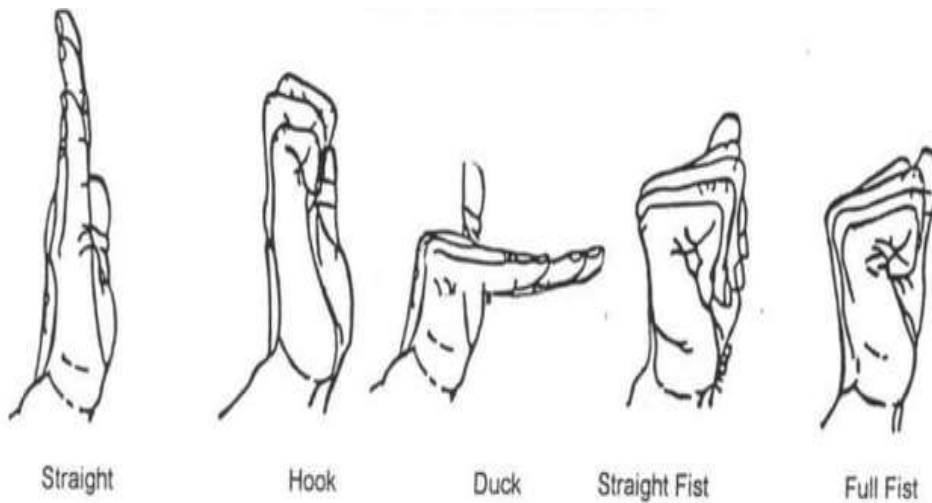
- Excessive pain
- Excessive swelling
- Limb discolouration

Ensure patient knows how to manage their cast/slab by

- Keeping the cast dry
- Mobilising all joints that are free from casting
- Elevation of affected limb at heart level



reflect and splint or cast:



Evaluate, critique your

- Does it do what you set out to do?
- Does it look cosmetically acceptable?
- Is it blocking or restricting joints that should be able to move fully
- Does it fit securely and cannot be easily shifted, will it fall off?
- Does the patient understand how/when to wear it & how to look after it?
- Can they put splint on/off correctly?
- When will you review the splint? Is it still needed?