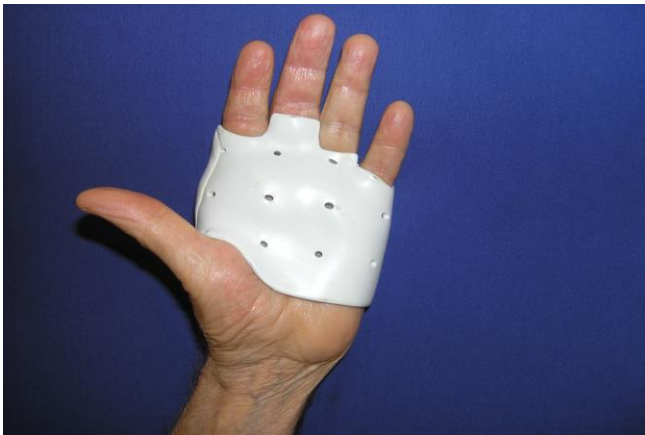


Smart Design

The Art of Splinting



Metacarpal Phalangeal Joint Blocking Splints

Hand Based MP Blocking Splint

Materials, Tools and Hardware

- 1/8" thermoplastic with minimum to moderate resistance to stretch, such as Polyform® or TailorSplint®
- Sticky back Velcro® hook (optional)
- Cushion or loop strap material (optional)
- Cotton stockinette

Diagnoses

- Intrinsic tightness or joint stiffness in the digits secondary to:
 - Distal radius fracture
 - Metacarpal or phalangeal fracture
 - Hand multi-trauma
 - Arthritis
 - Stiff hand
- Promotion of differential FDS/FDP tendon gliding after flexor tendon repair/reconstruction

Instructions for Splint Fabrication

The purpose of this splint is to facilitate flexion of the interphalangeal (IP) joints while blocking the metacarpal phalangeal (MP) joints. This splint is primarily used for therapeutic exercise. Below are step-by-step instructions for fabricating a hand based MP joint blocking splint.

1. Trace hand and draw pattern as shown.
2. The volar portion of the pattern has concrete landmarks and is therefore relatively easy to draw. The dorsal extension is not easy to visualize. Make a broad guess at it when you draw the pattern and then mark it on the patient and trim [see splint pattern].
3. Be generous with the height of the dorsal piece. It is not a problem if the dorsal edge is higher than the PIP joints. It is a problem if it is lower because you lose mechanical control of the proximal phalanx when the material is too short dorsally.
4. Indicate on your pattern the following landmarks:
 - Wrist crease on the ulnar side of the hand
 - PIP joint lines of digits II-V
 - First web space
5. Cut the pattern out and test on the patient to ensure a proper fit. Adjust as necessary.
6. Place a piece of stockinette on the patient's hand.
7. Reheat the thermoplastic material in preparation for molding the splint.
8. Align splint on palmar side of hand. Wrap the material through the first web space and over the dorsal aspect of the hand. Overlap the thermoplastic material on the ulnar side of the hand. While molding the splint take great care to contour to all digit web spaces palmarly while

- maintaining MP joint extension. The splint must conform fully to proximal phalanges of digits II-V while allowing full PIP joint flexion.
9. Allow thermoplastic material to fully cool. Pop open overlapped portion of the thermoplastic material on the ulnar side of the hand.
 10. Create Velcro closure or permanently bond thermoplastic material on the ulnar side of the splint.

Helpful Hints

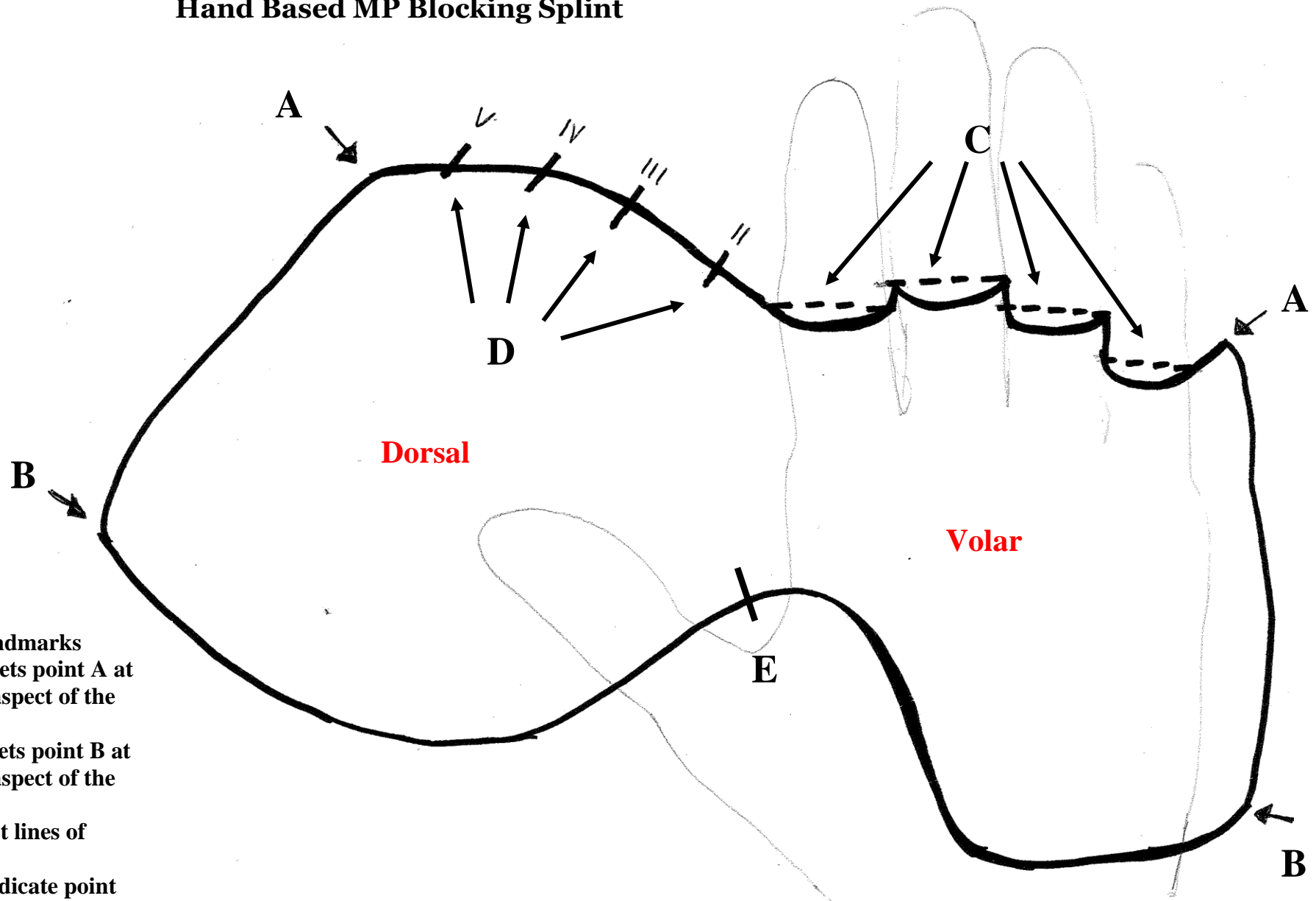
- Excellent conformity is crucial for strict control of the MP joint in extension.
- Maintain the MP joints in full extension during the molding process. A second set of hands can be useful to achieve proper positioning.
- Splint must permit full PIP motion
- The splint can be bonded shut on the ulnar aspect or an overlapping closure with a strap can be created if fluctuating edema is an issue or if room is needed for donning/doffing.
- Attempt to create comfortable, distinct “troughs” for each digit (II-V).
- It is possible to make this splint as two separate pieces (dorsal and volar) that you later fuse together into one piece. If you mold it this way, mold the volar piece first, holding the MP joints in maximum allowable extension. Allow piece to become firm. Then mold the dorsal piece while the volar piece is on the hand. Bond the radial and ulnar edges, or bond just the radial edge if an opening is necessary to permit don/doff.

Photographs of completed hand based MP blocking splints



Splint Pattern

Hand Based MP Blocking Splint



Landmarks

Point A meets point A at the radial aspect of the hand

Point B meets point B at the radial aspect of the hand

C: PIP joint lines of II-V

D: Lines indicate point area of splint that will lie over dorsal aspect of digits II-V

E: Thumb web space

Forearm Based MP Blocking Splint- Interphalangeal Joints **Free**

Materials

- 1/8" thermoplastic with minimum to moderate resistance to stretch, such as Polyform® or TailorSplint®
- Sticky back Velcro® hook
- Loop or cushion strap
- Cotton stockinette

Diagnoses

- Extensor tendon repair proximal to the MP joint (protocols and surgeon preference vary widely on this)
- Tendon transfer to EDC
- Metacarpal phalangeal (MP) joint arthroplasty
 - NOTE: This splint is made along with volar extension piece that includes the IP joints and holds them in extension at night. This becomes a removable piece. The volar extension piece is also an option for the other diagnoses if PIP flexion contractures are a concern.

Instructions for Splint Fabrication

The purpose of this splint is to support the wrist and MP joints in extension while allowing full IP joint flexion. Below are step-by-step instructions for fabricating a forearm based MP joint blocking splint.

1. Position the patient's hand and forearm on a piece of paper towel palm down. Trace the forearm, thumb and index and small finger borders.
2. Indicate on your pattern the following landmarks:
 - Wrist crease
 - PIP joint lines of digits II-V
 - Web space
 - 2/3 the length of the forearm
3. When drawing the distal portion of be sure to draw your lines just below the PIP joint line to allow full PIP joint flexion.
4. The finished splint should cover 2/3 the length of the forearm and 2/3 of the width of the forearm along the radial and ulnar borders, so take this into account when drawing the pattern. Once the forearm is traced, add about 1 inch or less on either side on the pattern – this can be adjusted as needed to accommodate the height of the forearm. If the sides of the splint come up too high, the straps will not be able to securely hold the splint in place. If the sides are too low, there will be a loss of structural integrity.
 - The forearm is conical in shape and the pattern needs be wider towards the bottom of the splint
5. Cut the pattern out and test on the patient to ensure a proper fit. Adjust as necessary.
6. Place a piece of stockinette on the patient's forearm.

7. Trace the pattern on a piece of thermoplastic material, heat the material and cut out the pattern. It is nice to cut along the inside of the lines so that the pencil marks do not show on the splint.
8. Once the pattern is cut out and the thermoplastic material is still warm, roll the edges of the splint along the thenar eminence and web space back approximately $\frac{1}{4}$ ". Rolling the edge of the splint away from the patient increases comfort and tolerance to wearing the splint. When rolling the splint material, be sure to roll toward the proper side (away from the patient) because it is very difficult to fix the splint if the edge is rolled incorrectly.
9. Place the patient's forearm in supinated position with the wrist and dorsum of the hand supported by a small towel roll. This position will allow gravity to assist you in molding the splint and allows for easier control of the thermoplastic material.
10. If the patient is unable to fully supinate the forearm you can mold the splint with the elbow propped up on the table with the wrist in a slightly extended position. An ace wrap can be used to help mold the forearm portion of the splint while you work on the hand portion of the splint.
 - Be sure not to wrap the ace wrap too tight (it will leave an imprint on the thermoplastic material and the edges of the splint will bother the patient).
 - Leave the ace wrap in place long enough for the thermoplastic material to set but remember that the portion of the splint that was wrapped with the ace wrap will need some more time to cool.
11. While molding the splint take great care to contour the material to each digit web space palmarly and maintain full MP joint extension. The splint must conform fully to proximal phalanges of digits II-V and permit clearance for full PIP joint flexion.
11. Typical strapping configuration for this splint includes: one strap across the proximal phalanges, one strap across the MP joints, one strap from the tab to the ulnar side of the hand and two straps across the forearm portion of the splint

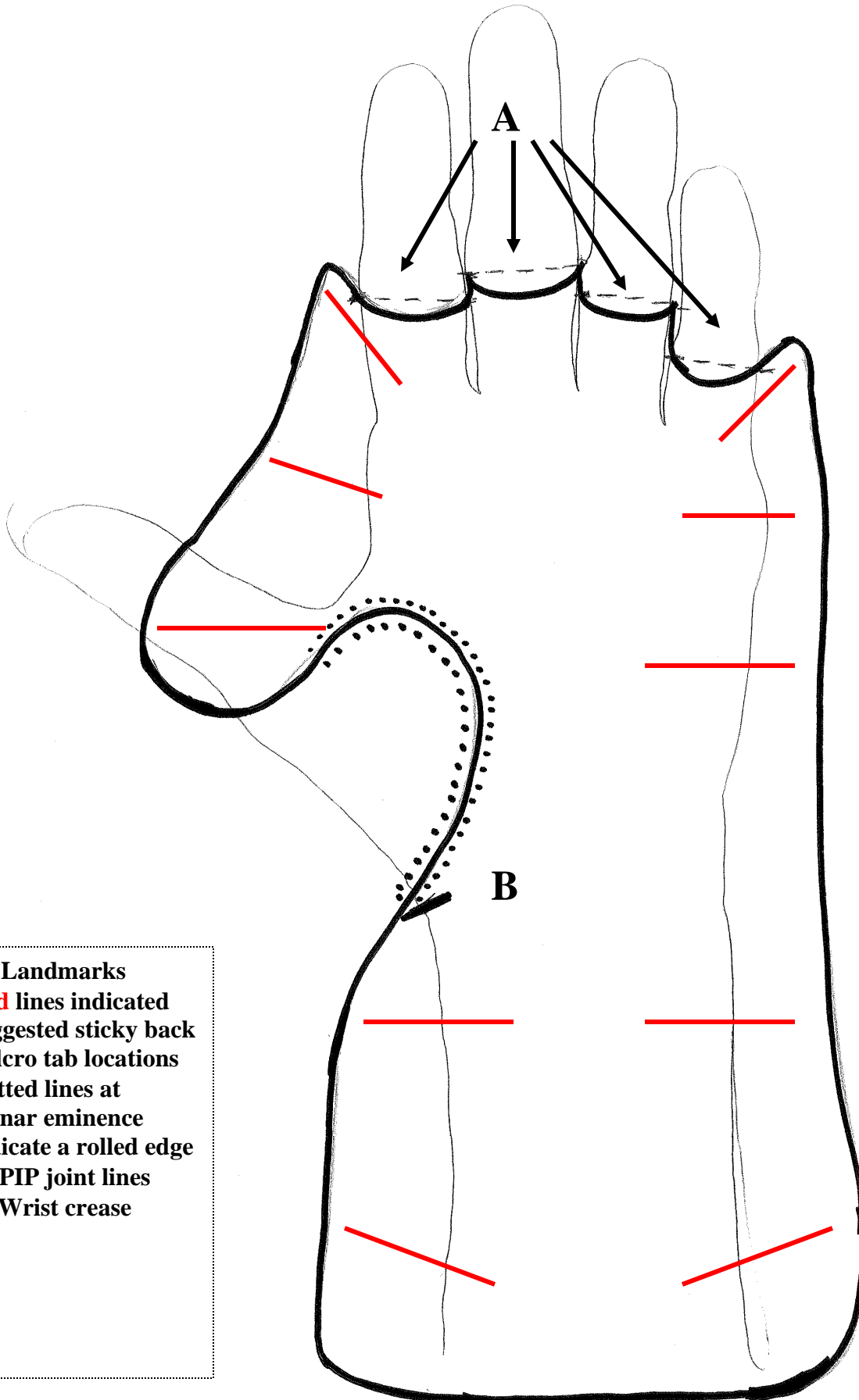
Helpful Hints

- Splint must permit full PIP joint motion.
- Excellent conformity is critical for strict control of the MP joint in extension.
- Maintain the MP joints in full extension during the molding process. A second set of hands can be helpful.
- Dorsal strapping must effectively control the strong tendency of the MP joints to flex. Foam padding under the straps can help control motion.



Splint Pattern

Forearm Based MP Blocking Splint-IPs Free



Landmarks

- **Red** lines indicated suggested sticky back Velcro tab locations
- Dotted lines at thenar eminence indicate a rolled edge
- **A**: PIP joint lines
- **B**: Wrist crease