

# Exercise Splint for Effective Single-finger Active Hook Exercises

*Digital stiffness is frequently encountered by hand therapists. There are a variety of treatment approaches ranging from exercise to splinting. The authors have taken techniques put forth by Sterling Bunnell, MD, and Judy Colditz, OTR/L, CHT, FAOTA, and developed a simple exercise splint.*—PEGGY L. FILLION, OTR, CHT, Practice Forum Editor

## EXERCISE SPLINT FOR EFFECTIVE SINGLE-FINGER ACTIVE HOOK EXERCISES

**Debbie Ahearn, MA, OTR/L, CHT**

*Eugene Hand Therapy  
Eugene, OR*

**Judy C. Colditz, OTR/L, CHT, FAOTA**

*HandLab  
Raleigh, NC*

Digital stiffness is a common problem seen by therapists in clinical practice. A variety of treatment approaches including passive and active range of motion exercises and mobilization splinting is commonly used to treat this problem.

Recently, Colditz<sup>1,2</sup> has proposed mobilization of the chronic and globally stiff hand by casting the wrist and metacarpophalangeal (MP) joints in extension. This blocked active hook position is designed to promote differential glide of the flexor digitorum profundus (FDP) and flexor digitorum superficialis (FDS) tendons within zone II, elongate the interosseous and lumbrical muscles, and place the FDP and FDS muscles in a position to efficiently mobilize the interphalangeal joints into flexion. The blocked position is advocated because the strength of the extensor digitorum communis is insufficient to maintain MP extension in the presence of significant interosseous muscle tightness or joint tightness.

Casting the entire hand is not always necessary when treating isolated digital stiffness after injury, especially if the adjacent fingers have maintained full motion. Examples are flexor tendon repair, tenolysis, proximal interphalangeal (PIP) dislocation, proximal phalanx fractures, or other isolated digital injuries. The involved digit may be the only finger that needs the positional exercise splint. The single digit exercise splint for the active hook position blocks the MP joint in hyperextension which facilitates interphalangeal joint flexion. This splint relies entirely on active range of motion to mobilize the stiffness while simultaneously regaining the differential tissue glide needed. This exercise splint concurrently reduces interosseous muscle tightness and the resultant intrinsic dominant movement pattern (initiation of flexion with the MP joint) frequently seen in digits with stiffness. Additionally, the patient experiences the long flexor muscles pulling the interphalangeal joints into flexion, facilitating motor cortex repatterning that reestablishes the normal pattern of finger flexion.<sup>3</sup>

The splint is easily made by the therapist and simple for the patient to use. The patient manually holds the splint in place to block the MP joint in hyperextension while actively flexing the proximal and distal interphalangeal joints. The splint supports the digit in a way that is not possible with manual blocking exercises (Figure 1). The authors have found high patient compliance resulting in effective mobilization of the stiff digit. Both acute and chronic digital stiffness is aided by the use of this splint.

## Materials

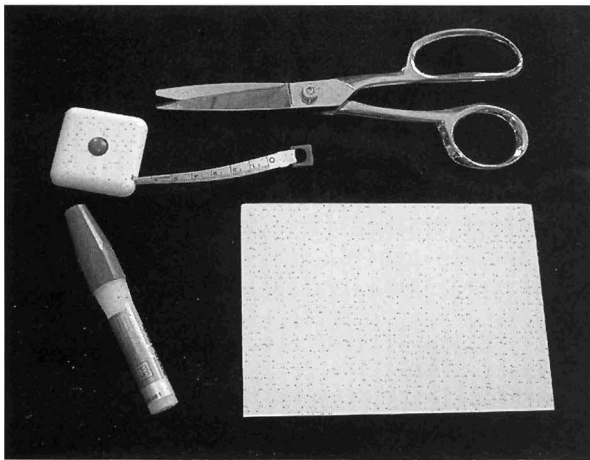
- 1/16-1/8 inch thick thermoplastic material approximately 5 by 3 inches long.

Correspondence and reprint requests to Debbie Ahearn, MA, OTR/L, CHT, Eugene Hand Therapy, 2866 Crescent Ave, Suite 107, Eugene, OR 97408; e-mail: <Ahearn9907@msn.com>.

doi:10.1197/j.jht.2005.04.016

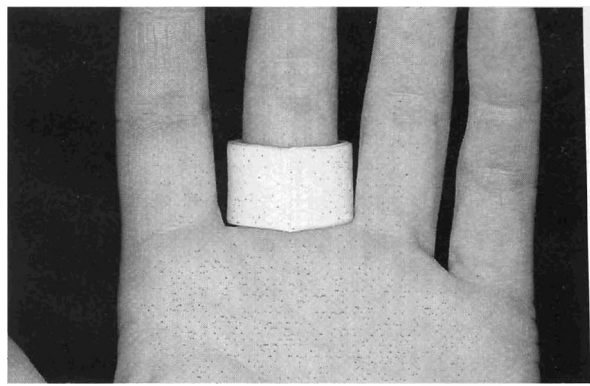


**FIGURE 1.** The single finger active hook exercise splint is held in place by the patient.

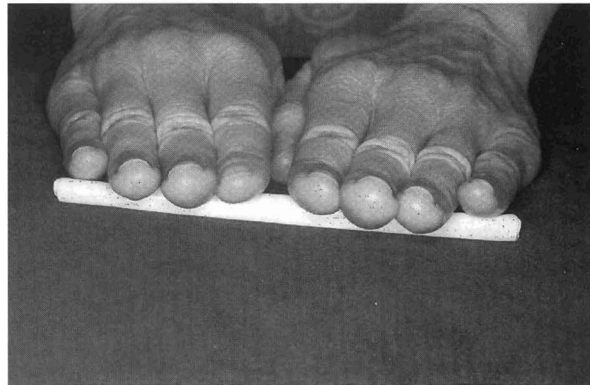


**FIGURE 2.** Materials needed are (1) measuring tape, (2) scissors, (3) glue, and (4) a scrap of splinting material.

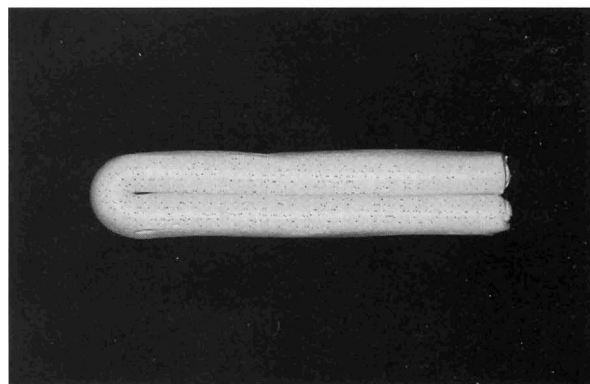
- self-bonding adhesive or Super Glue. If the splinting material is coated, a solvent material is necessary to remove coating.
- measuring tape
- scissors
- heat gun, as needed (Figure 2)



**FIGURE 3.** A closed ring that has been molded around the proximal phalanx.



**FIGURE 4.** The warmed splinting material is wrapped in a cylinder shape and rolled.



**FIGURE 5.** While the material is still warm, the roll is bent in the middle, forming a U-shape.

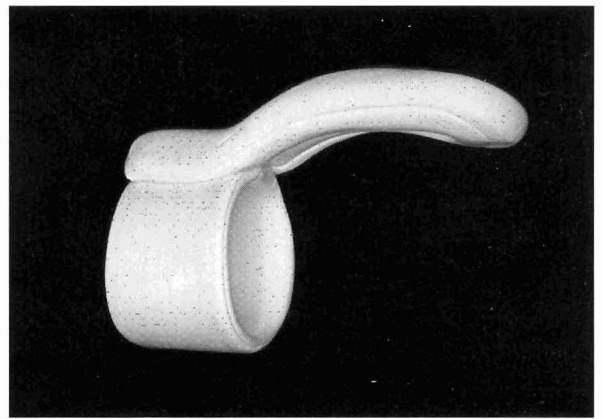
## Fabrication

The splint is made of two pieces: a ring and a U-shaped component that attaches to the ring.

Measure the circumference of the involved digit at the proximal phalanx. Add one-quarter inch



**FIGURE 6.** The U-shaped piece is molded to the contour of the palm while the MP joint is held in hyperextension.



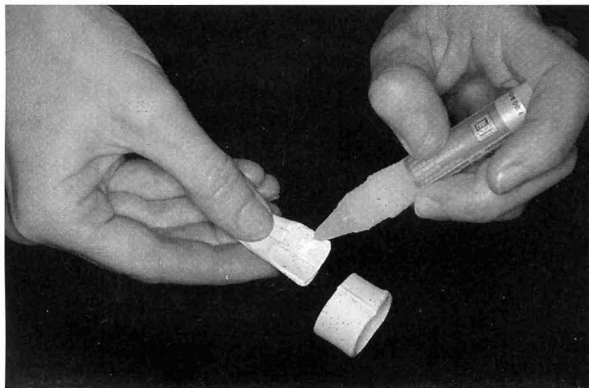
**FIGURE 8.** The final splint.

more to allow for overlap. The width of this piece should be approximately half the distance from the volar PIP joint crease to the proximal end of the digit.

Heat the above piece to create a ring shape around the proximal phalanx (Figure 3). Bond the edges together, using a heat gun if necessary.

Measure from the distal end of the ring to the distal palmar crease. Double this length and cut a second piece of material. The width should be approximately 1 to 1.5 inches.

Heat the above piece and roll into a tube shape. Fold the tube in half to make a U-shape (Figures 4 and 5).



**FIGURE 7.** Cyanoacrylate glue (Super Glue) is placed on the overlapping U-shape and then held in place on the ring.

While still warm, mold the U-shaped piece so the cut ends overlap the volar surface of the ring. At the same time ensure that the MP joint is in as much obtainable extension/hyperextension as possible. The proximal end of this piece should follow the natural shape of the palm and should just clear the distal palmar crease proximally (Figure 6).

Apply an adhesive to hold the U-shaped piece to the ring component. Allow the adhesive to dry (Figure 7). Alternatively, attach the U-shaped component by removing the splint material coating with a solvent and heating the U-shaped piece and bonding it to the ring component. See Figure 8 for a picture of the final splint.

### Use of exercise splint

It is recommended that the patient hold the splint in place to maintain MP joint in hyperextension while performing ten to 20 repetitions hourly of active interphalangeal flexion and extension. The splint is removed after exercise.

### REFERENCES

1. Colditz JC. Plaster of Paris: the forgotten splinting material. *J Hand Ther.* 2002;15:144-57.
2. Colditz JC. Therapist's management of the stiff hand. In: Macklin EJ, Callahan A, Skive T, Schneider LH, Oysterman AL (eds). *Rehabilitation of the Hand.* 5th ed. St. Louis: Mosby, 2002, pp 1021-49.
3. Arbuckle JD, Microetcher DA. Measurement of the arc of digital flexion and joint movement ranges. *J Hand Surg [Br].* 1995;20:836-40.