

A Thermoplastic Thumb Splint after Amputation of the Thumb

Typically the patient who amputates a digit, especially a thumb, has multiple problems with adjusting to their loss. Not only can the loss of function be catastrophic, but also the sensory alteration can affect their ability to cope and deal with the healing process. These authors have designed a splint to help individuals with an amputated thumb return to activities of daily living early in the recovery period.—PEGGY FILLION, OTR, CHT, Practice Forum Editor

A THERMOPLASTIC THUMB SPLINT AFTER AMPUTATION OF THE THUMB

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The thumb accounts for 40% of the function of the hand and 25% of the function of the whole body.¹ The loss of a thumb will have a devastating effect on function and often can result in anxiety, depression, guilt, fear, frustration, sadness, and anger.² In contrast, partial amputation of the thumb results in no diminution of power grip in manual workers and little deficit in total hand function as long as fine touch is preserved.³

The goal of primary care of thumb injuries for the hand surgeon is to preserve as much length as possible. However, in certain circumstances this is not possible. The options for thumb reconstruction after traumatic thumb amputation include replantation, phalangization of the first metacarpal, lengthening of remaining stump, osteoplastic reconstruction, microsurgical reconstruction with sensate flap's (wraparound technique), toe-to-thumb-free transfer, and pollicization.⁴ The choice of reconstruction depends on the age, occupation, hobbies, culture, general condition, and sex of the patients, all of which influence the functional demands made on the thumb.

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Despite these major advancements, there are a number of patients with hand mutilating injuries who may during the course of their recovery be best served with the use of a thermoplastic thumb splint. A temporary splint may be used to target the functional needs of the patient, as well during the transitional period before pollicization. The intent of this practice forum paper is to share how to fabricate a thermoplastic splint as an adjunct to a thumb prosthesis.

DESCRIPTION AND FABRICATION OF THERMOPLASTIC THUMB SPLINT

The thermoplastic thumb splint is a passive prosthesis that is placed in palmar abduction with respect to the digits with the interphalangeal joint (IP) joint flexed to 10 degrees (Figure 1), which enables the fingers to use the thumb during grasping (Figure 2) and to perform daily activities. Fabrication time of this thumb splint is approximately 30 minutes.

Material Used

- Three-mm thermoplastic sheet.
- Adhesive hook and plain *Velcro* loop (1 in).
- Lining material (self-adhesive jersey plush) (Figure 3).

Fabrication

- Trace the normal thumb. Extend the outline 1 in on the proximal end and ½ in on the distal end of either side to cover the thumb (Figure 4).
- An outline of the affected hand is taken on a separate sheet. Extend 2 in ulnarly from the proximal crease and gradually taper it down to

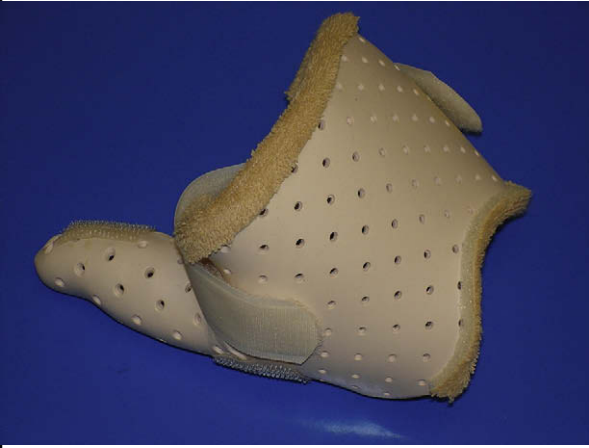


FIGURE 1. Completed thumb splint.

the wrist crease. Extend 2 in radial from the proximal crease. The extended line is brought down to the metacarpophalangeal joint (MP) joint of thumb and then gradually tapered down to the wrist crease radial (Figure 5).

- Place the thumb outline on a 3-mm thermoplastic material (Figure 6). Heat material and mold it

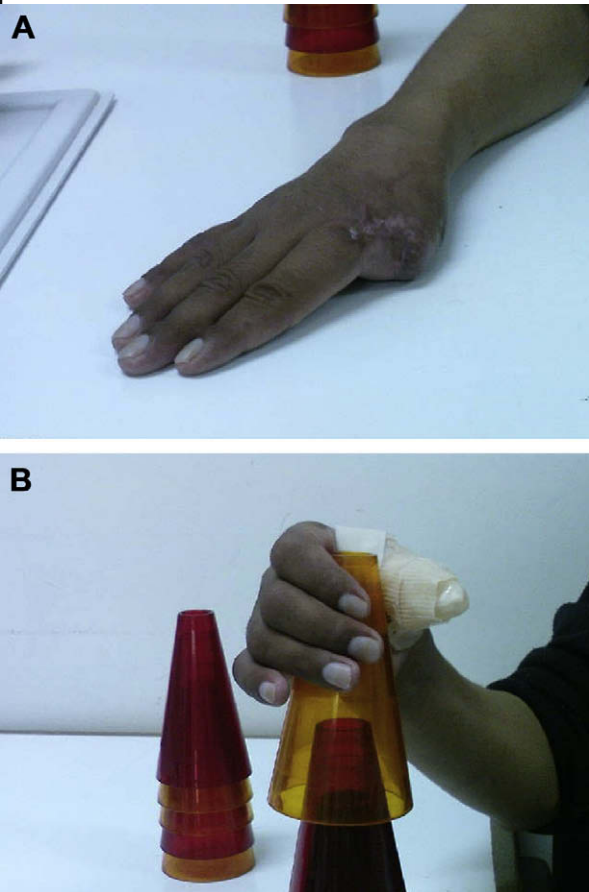


FIGURE 2. A. Patient with thumb amputation. B. Patient performing a light gripping activity.

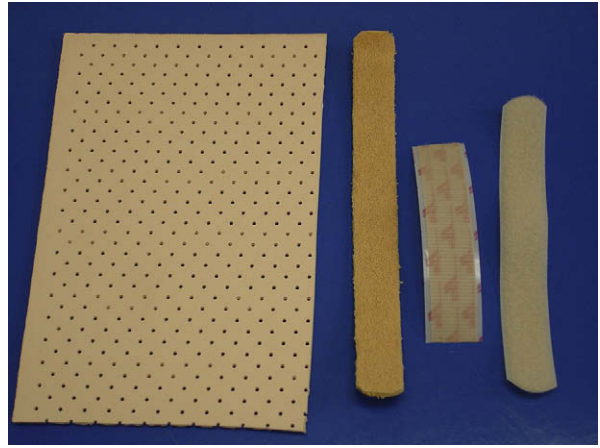


FIGURE 3. Splinting material.

on the unaffected thumb.

- The proximal end of the splint should be molded carefully because it is to be used on the other hand.
- Care is taken to mold the thumb in 50 degrees of palmar abduction and IP joint flexed in 10 degrees.

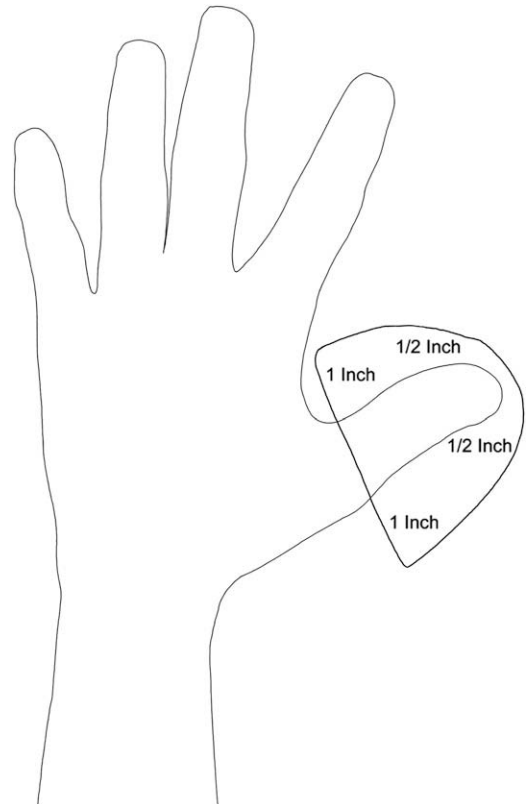


FIGURE 4. Outline of the thumb on the noninvolved hand for pattern piece.

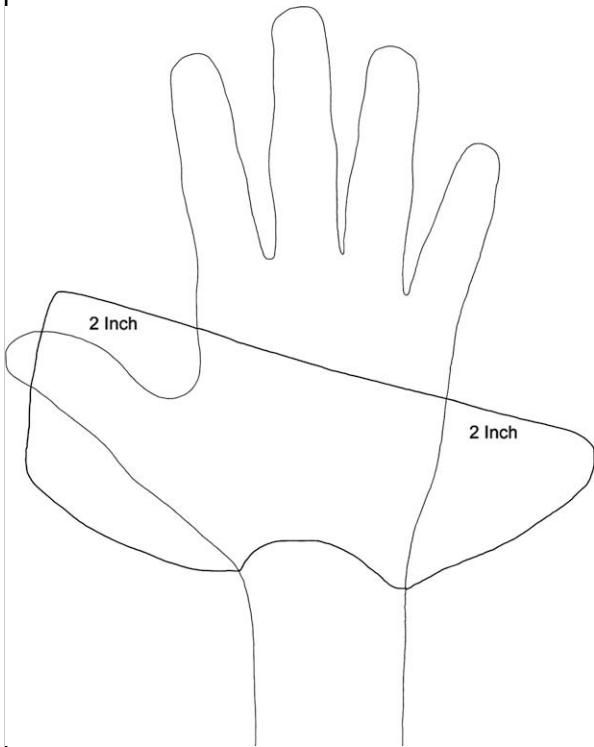


FIGURE 5. Outline of the involved hand for pattern piece.

- The outline taken from the involved hand is placed and cut out on the 3-mm thermoplastic material (Figure 6) and molded directly to the affected hand.
- The thumb piece from the uninvolved hand is attached to the hand piece separately using the heat gun (Figure 7). Care is taken to attach the thumb piece in palmar abduction.
- Stick the 1-in adhesive Velcro hook in the web

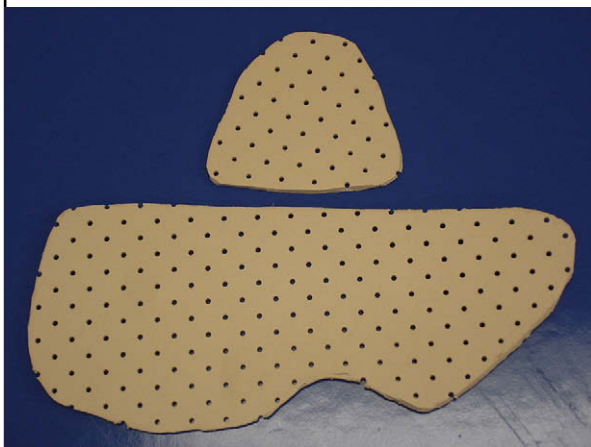


FIGURE 6. Cut thermoplastic material from previous pattern pieces.

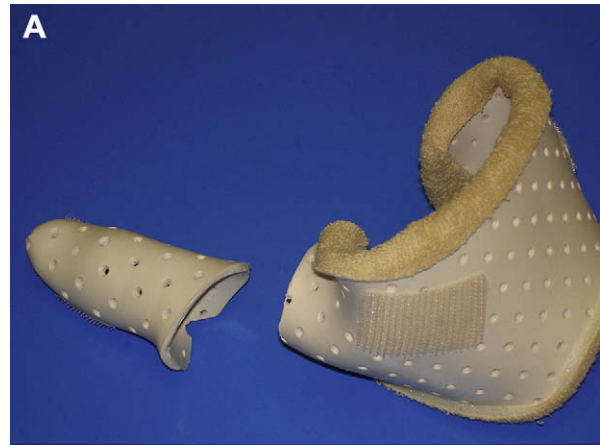


FIGURE 7. A. Picture showing the thumb piece and hand piece. **B.** Picture showing the thumb piece attached to hand piece using heat gun.

- space of the thumb and one in ulnar aspect of the splint.
- Stick Velcro hooks on volar aspect of the molded thumb for better grip.
- A Velcro strap is used in the web space to bring the thumb in palmar abduction.
- The self-adhesive jersey plush lining materials are used to pad the edges.

Summary Comments

The use of the thermoplastic thumb splint has helped to improve hand function and provide some psychological comfort in a subset of our patients. Some have claimed that they were able to drive a vehicle and do light activities with the splint. We personally have found that prehension is improved by using a piece of adhesive hook *Velcro*, on the volar aspect of the molded thumb tip. When a time gap exists between amputation and pollicization, this

thermoplastic thumb splint may be a simple alternative and clinical tool for patients after a thumb amputation.

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