



Chapter 28

HAND SPLINTING AND GENERAL AFTERCARE

KEY FIGURES:

Neutral position for basic splinting

Neutral position splint

Splint for flexor tendon injury

Splint for extensor tendon injury

Thumb spica splint

Ulnar gutter splint

Finger immobilization

Proper elevation of injured hand

Splinting

The hand and fingers often need a period of immobilization after injury to allow the tissues to heal properly. For most hand injuries, a splint rather than a cast is the method of choice.

Splint vs. Cast

A cast immobilizes the injured hand by completely surrounding it with hard, inflexible materials (plaster or fiberglass). The inflexibility of a cast can cause serious problems if the injured tissues swell or if the cast is placed too tightly. Potential problems include skin loss due to pressure on the skin from the tight cast or possibly development of a compartment syndrome (see chapter 55, “Hand Crush Injury and Compartment Syndrome”) if the tightness compromises blood circulation to the extremity.

A splint is essentially a half cast used for immobilization. The extremity is not completely bound by inflexible materials. Therefore, a splint is safer than a cast because it usually can accommodate tissue swelling without becoming too tight.

Materials

Place cotton gauze between each finger to absorb perspiration.

Rolls or sheets of plaster of Paris are used to make the splint. Fiberglass rolls also can be used but are much more expensive than plaster rolls. Fiberglass is used in the same way as plaster for creating a splint.

Padding is important. You need cotton padding to protect the hand and forearm from the heat of the plaster (splint materials become quite warm as they dry and can burn unprotected skin). The padding also prevents the splint from rubbing or putting too much pressure on the skin.

An Ace or other soft wrap is needed to hold the splint in place.

How to Make the Splint

1. Measure the required length of the splint. To immobilize the hand and fingers adequately, the splint should be long enough to cover from the mid-forearm to the fingertips.
2. Place four layers of cotton padding between the patient's skin and the plaster.
3. Cut another layer of cotton padding to place on the outer side of the plaster. This outer layer makes it easier to remove the splint to reexamine the hand and allows the splint to be reused.
4. Use approximately 12 layers of plaster of Paris of a width appropriate for the extremity. The splint should be a bit wider than the extremity; cut it if necessary.
5. Wet the plaster with lukewarm water, and squeeze out the excess water. The plaster should be damp, not soaking wet. *Do not* use hot water. Because the plaster heats as it dries, hot water increases the risk of burning the patient.
6. Place the four layers of cotton padding on the plaster, and place the splint on the patient's extremity. Be sure that the cotton padding is directly against the patient's skin. This rule sounds simple, but it is easy to make a mistake.
7. Place the single layer of cotton padding on the outside of the plaster.
8. Secure the splint in position with an Ace or other soft wrap. *Do not wrap tightly.* If the Ace wrap is tight, it will become inflexible, making the splint as potentially dangerous as a cast. Wrap the extremity lightly—just tight enough to secure the splint in position.
9. Hold the splint in the appropriate position (see below) until it dries. It will take a few minutes for the plaster to cool and dry.

Position and Contour of the Splint

The contour of the splint is determined by the hand injury.

Neutral Position

The neutral position is used for basic splinting of an injured or infected hand. The purpose of the splint is to allow the hand to rest in a

safe position—that is, a position that will not lead to hand dysfunction if stiffness results. The wrist is placed in 20° of extension, the metacarpophalangeal (MCP) joints are positioned in 70° of flexion, and the interphalangeal (IP) joints should be straight. The splint usually is placed on the volar side of the hand. *Exception:* a burn on the volar surface of the hand may require a dorsal splint.



The neutral position is a safe position for immobilization of an injured hand. The IP joints are straight, the MCP joints are flexed, and the wrist is slightly ex-



Splinting the hand in neutral position. The splint usually is placed on the palmar surface of the hand and forearm.

For a Flexor Tendon Injury

The splint should hold the hand in a position that prevents extension of the hand and finger. For this reason, the splint is placed on the dorsal side of the hand. The wrist is flexed $20\text{--}30^{\circ}$, the MCP joints are positioned in 70° of flexion, and the IP joints are flexed slightly at

10–20°. Do not put anything rigid (anything that prevents passive flexion of the fingers) on the volar side of the hand or fingers.



Splinting the hand with a flexor tendon injury. The splint is on the dorsal surface of the hand. The wrist and MCP joints are flexed.

For an Extensor Tendon Injury

The splint is used to prevent flexion of the hand and fingers. For this reason, the splint is placed on the volar side of the hand. The wrist should be placed in 20° of extension, the MCP joints are positioned in 10–15° of flexion (they should not be completely straight), and the IP joints should be straight. (See figure on following page.)

For an Injury to the Thumb

If the thumb is the only injured part of the hand, it is possible to immobilize the wrist and thumb with a thumb spica splint and leave the fingers free. The patient thus can use the hand for light activities. The splint is placed on the radial side of the forearm and brought over the thumb, all the way out to the tip. The thumb should be slightly abducted (positioned away from the rest of the hand). Mold the plaster so that it wraps half-way around the thumb to keep it immobilized. (See figure on following page.)

For a flexor tendon injury, the wrist should be slightly flexed; for an extensor tendon injury, the wrist should be slightly extended, as described above. The thumb IP joint should be held straight for either injury.

Splinting the hand with an extensor tendon injury. The splint is on the palmar surface of the hand. The wrist is extended, and the MCP joints are almost, but not quite, at 10–15° of flexion.



Thumb spica splint. The thumb and wrist are immobilized, but the rest of the fingers are free.

For an Injury to the Little Finger

If the little finger is the only involved finger, it is possible to immobilize the wrist and little finger with an ulnar gutter splint and leave the rest of the hand free. The patient thus has more use of the hand. The splint is placed on the ulnar side of the forearm and hand and then extended just beyond the little finger. Mold the plaster so that it partially

wraps around the little and ring fingers. The ring finger is included to add extra protection to prevent accidental movement of the little finger. The wrist, MCP joints, and IP joints should be positioned as with flexor or extensor tendon injury, depending on the exact nature of the injury to the little finger.



Ulnar gutter splint for the little finger. The little and ring fingers as well as the wrist are immobilized. The thumb and index and middle fingers are free.

For Injury to a Single Finger

Commercially available aluminum splints with foam rubber padding can be shaped to the proper position to immobilize a single digit. This type of splint is indicated for immobilization of a phalangeal fracture or dislocation. If such splints are not available, plaster with padding or a tongue depressor cut to the appropriate size also can be used.



When only one finger needs to be immobilized, an aluminum splint is quite useful.

General Aftercare

Basic aftercare recommendations should be explained thoroughly to all patients, no matter what their injury. More specific instructions, tailored to each injury, are given in subsequent chapters.

Elevation of the Extremity

Elevation is the cornerstone of the treatment of hand injuries. Hand elevation decreases swelling and thus improves wound healing. Hand elevation also significantly decreases pain.

When the patient is resting or reclining, elevating the affected hand by placing it on a pillow is usually sufficient. Be sure that the hand is higher than the elbow.

When the patient is walking, the hand should be held up and not allowed to dangle by the side. I generally do not recommend arm slings, because patients tend to become too dependent on them and do not move their shoulder. This tendency can lead to shoulder stiffness, which may become problematic.



Proper elevation of the injured hand at rest. The hand should be higher than the elbow to promote drainage and decrease swelling.

Dressings

The specific type of dressing depends on the injury. (See chapter 9, "Wound Care," for specific details.)

Motion

It is your responsibility to tell the patient when it is permissible to start moving the hand and fingers. Specific information is given for different hand injuries in subsequent chapters. Once patients are allowed to start moving the injured hand and fingers they should be given instructions for various ways to exercise the hands.

Passive Range-of-motion Exercises

The patient (or another person) gently moves the finger joints passively (i.e., without use of the patient's own muscle contractions).

Active Range-of-motion Exercises

The patient should actively flex and extend the entire finger by using the muscles of the forearm and hand. To exercise the distal IP joint and prevent stiffness, the patient should hold the finger straight at the proximal IP joint and actively move the distal IP joint.

The above exercises can be easier to do if the patient places his or her hand in warm water for a few minutes before attempting the exercises. Warmth allows the fingers to move more easily by making the tissues more supple. The patient can even do the exercises while the hand is soaking.

Duration of Splinting

Unless you tell the patient to remove the splint to clean the hand or to do gentle range-of-motion exercises, the splint should be removed only under your supervision. However, be sure to show the patient how to wrap the splint in place so that it can be loosened if the patient feels that the splint is tight.

Specific information about how long to splint the hand after various hand injuries is discussed in subsequent chapters.

Smoking

Vigorously counsel the patient not to smoke during the healing process. Smoking considerably reduces blood circulation in the hand and thus may lead to unnecessary tissue loss, delayed bone and tendon healing, and poor functional outcome.

Bibliography

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2. Falkenstein N, Weiss-Lessard S: Hand Rehabilitation: A Quick Reference Guide and Review. St. Louis, Mosby, 1999.