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## Chapter 29

# FINGERTIP AND NAIL BED INJURIES

### KEY FIGURES:

Digital tourniquet

Bone rongeur

Fingernail with hematoma

Thenar flap

Repair of nail bed

Hand injuries are commonly encountered by health care providers throughout the world. In the United States alone, the hand is involved in approximately 10% of all accident cases seen in the emergency department.

Hand injuries are particularly important to treat, because good hand function frequently is necessary to hold a job and support a family. Specific injuries and their basic evaluation and treatment are discussed in this and subsequent chapters.

Although specialists are required for optimal final treatment of some injuries, often the care given by the first-line provider has a dramatic effect on the ultimate outcome. Accurate evaluation and proper initial basic care can significantly improve outcome and decrease disability.

You should be aware of the basics of treatment in case you find yourself the only health care provider around.

### ***Fingertip Injuries***

Fingertip injuries are probably the most commonly encountered hand injury. The best treatment is usually the simplest. A fingertip injury can cause short-term disability but generally should not affect long-term hand function. Improper treatment, however, can result in a stiff finger and reduce long-term hand function.

#### *Initial Care*

It is often useful to start by giving a digital block with either lidocaine or bupivacaine (see chapter 3, “Local Anesthesia”). The block allows you to examine and evaluate the finger completely. Although the

wounds may not be large, fingertip injuries are often quite painful. It may be necessary to place a digital tourniquet to control slow bleeding from the wound, which prevents a thorough examination.

### *Digital Tourniquet*

A digital tourniquet is easy to create and makes exam and repair much simpler. Do not keep the tourniquet in place for more than 25–30 minutes. The tourniquet can be made from a surgical glove that is one size smaller than the patient's hand:

1. Cut off the ring or little finger from the glove; then cut off its tip.
2. Put the piece of glove on the injured finger.
3. Roll the cut end of the glove from distal to proximal to force the blood out of the finger and to control bleeding.



Digital tourniquet. *Left*, Cut off the finger from a glove and place it on the injured finger. *Right*, Roll the glove proximally to create the tourniquet.

Clean the wound with gentle soap and water, and irrigate it with saline.

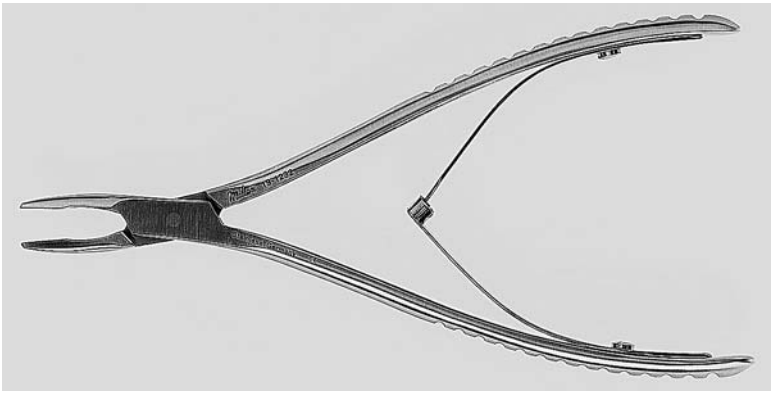
Remove all foreign material and dead tissue. To remove grease, Bacitracin or another petrolatum-based antibiotic ointment is often useful.

### *Treatment*

**If the skin can be sutured together**, use a few loose, simple sutures. A tight closure can lead to further tissue loss.

**If no skin is available for closure and no bone or tendon is exposed**, the wound can be left open and treated with dressings.

**If only a few millimeters of bone are exposed**, try to shorten the bone, using a bone rongeur (see figure below) or other instrument. Shorten the bone enough that it can be covered by soft tissue. Because the profundus flexor tendon inserts on the proximal half of the bone, do not be too aggressive.



Bone rongeur. (Photo courtesy of Moore Medical Corporation.)

4. **If a segment of the fingertip has been amputated**, the skin can be defatted and used to cover the soft tissue as a full-thickness skin graft. To defat the skin, take a pair of scissors and cut away the fat on the undersurface of the skin. See chapter 12, "Skin Grafts," for a more detailed description of this technique. Although the graft may not survive, it will serve as a biologic dressing and may decrease pain and hasten healing.
5. **If more than a few millimeters of bone have been exposed**, see "Complicated Fingertip Injuries" later in this chapter.

### *General Aftercare*

Apply antibiotic ointment and a simple dry dressing 1–2 times/day.

Clean with gentle soap and water with each dressing change.

If the wound was closed with sutures, after a few days the dressings can be stopped.

If the wound was left open, continue the dressing changes until the wound has healed. If the wound becomes covered with a grayish material, change to a wet-to-dry saline dressing for a few days, until wound appearance improves.

Encourage the patient to use the finger and hand to prevent joint stiffness. Active and passive range-of-motion exercises also should be encouraged.

Initially, acetaminophen alone may be insufficient to control pain. Fingertip injuries can be quite painful for the first several days.

Strongly encourage the patient not to smoke. The use of tobacco products significantly slows the healing process of fingertip wounds.

The patient should keep the affected hand elevated to decrease swelling and pain and to promote healing.

### *More Complicated Fingertip Injuries*

#### *Open Fracture of the Distal Phalanx*

Open fractures involve a soft tissue wound around the fracture site. They are more serious than closed fractures because of the higher risk for infection.

When the fracture does not involve the distal interphalangeal (DIP) joint, it usually can be treated by manipulating the fracture into alignment and closing the soft tissues. Closing the soft tissues serves to splint the bone.

If the fracture involves the joint surface, full reduction (proper alignment of the pieces) is necessary to preserve joint motion. Full reduction requires special skills and equipment (often K-wires or screws) that belong to the realm of the hand surgeon. Without the intervention of a hand surgeon, the wound will heal, but the patient probably will be left with a very stiff joint and little normal motion.

The wound should be cleansed thoroughly, and the patient should be given oral antibiotics for several days. The antibiotics prevent bone infection (osteomyelitis), which can become a chronic problem and may be quite difficult to treat.

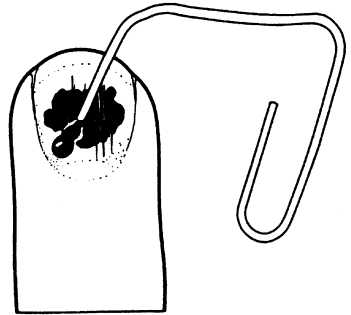
The finger should be immobilized in a splint that prevents the patient from moving only the DIP joint. The DIP joint should be in an extended position. The proximal interphalangeal (PIP) and metacarpophalangeal (MCP) joints should be free. The splint should be used until the fingertip is no longer tender (probably 7–10 days). No other stabilization of the bone usually is required.

### *Subungual Hematoma*

Many injuries, especially those with a crush component (as when the patient hits a finger with a hammer), result in a subungual hematoma (blood clot under the nail). Treatment depends on the size of the hematoma.

A **small subungual hematoma (< 50% of the nail surface)** usually heals on its own, but the pressure of the blood under the nail can be extremely painful. Heat the tip of a needle or the end of a paper clip until it is red hot. Then use it to puncture the nail, and let the accumulated blood escape. Alternatively, an electrocautery unit can be used to make the drainage hole in the nail.

Drainage of a subungual hematoma. (From Simon RR, Brenner EE (eds): *Emergency Procedures and Techniques*, 3rd ed. Baltimore, Williams & Wilkins, 1994, with permission.)



In patients with a **large hematoma ( $\geq 50\%$  of the nail surface)**, the usual recommendation is to remove the nail. Often there is a significant laceration in the nail bed, which can be repaired once the nail is removed. See “Nail Bed Injuries” later in this chapter for further details.

### *Fracture of the Bone with Nail Bed Injury*

Fracture of the bone with nail bed injury is considered an open fracture. The patient should be given oral antibiotics for a few days.

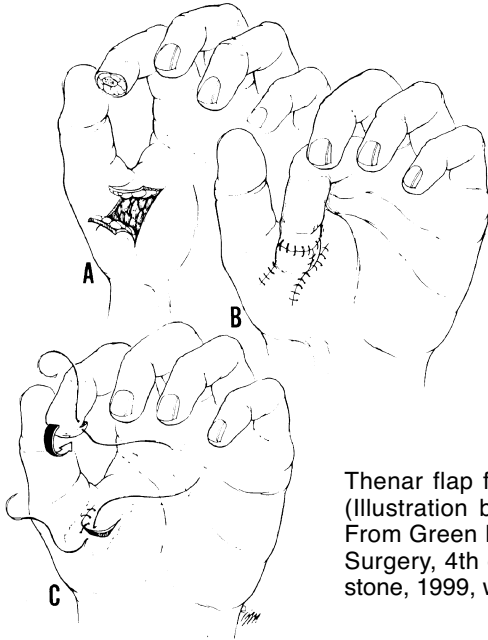
**If more than just a few mm of bone is exposed:**

A skin graft will not heal over exposed bone, and in the finger, little local tissue is available to cover the bone reliably. A distant flap, such as a chest flap or cross-arm flap, may be required to cover the bone.

Another useful flap for a small wound (1–2 cm at most) is the thenar flap.

### *Thenar Flap*

A thenar flap involves bending the injured finger to the thenar eminence at the base of the thumb (by the MCP flexion crease). The injured finger is essentially sutured into the palm so that the finger and the skin flap from the thenar eminence grow together. Later, the finger is separated with its newly acquired tissue.



Thenar flap for coverage of fingertip injury. (Illustration by Elizabeth Roselius © 1998. From Green DP, et al (eds): *Operative Hand Surgery*, 4th ed. New York, Churchill Livingstone, 1999, with permission.)

**Indications.** A thenar flap is used to cover a fingertip injury when bone is exposed and preservation of finger length is important. Thenar flaps should be done only in patients younger than 30 years. Significant joint stiffness may result if they are used in older patients.

The thenar flap is best used to provide coverage for the index and middle fingers. The ring and little fingers do not reach the thenar area very well. A similar type of flap can be designed over the hypothenar eminence for coverage of injuries of the ring and little fingers.

**Procedure.** A thenar flap can be done under local anesthesia using a wrist block. The following steps are essential:

1. Observe where the injured finger makes contact with the thenar eminence just proximal to the MCP joint of the thumb.

2. Mark the three sides of a proximally based flap (i.e., the skin should stay attached at the side closest to the wrist). The flap should be slightly longer and wider than the defect.
3. Incise the three sides of the flap, and raise the flap with subcutaneous tissue attached to the skin. Do not go too deeply; you may injure the digital nerves of the thumb.
4. Suture the flap loosely to the fingertip.
5. A full-thickness skin graft can be sutured to the donor site, or the donor area can be allowed to heal on its own with dressings.
6. Apply a dorsal splint to keep the affected finger flexed into the palm. The splint prevents the patient from accidentally extending the finger and thereby pulling the finger off the flap.
7. Divide the flap (i.e., cut through area where the skin remains attached to the palm) after 10–14 days. Sew the edge of the flap to the open wound of the finger very loosely. Do not worry about achieving perfect skin closure; small gaps between the flap and fingertip will heal with dressings.
8. Antibiotic ointment and dry dressings should be used as needed postoperatively.

### ***Nail Bed Injuries***

The nail bed is often involved with injuries to the fingertips. Unfortunately, even with the most precise repair, the nail may not grow back with a completely normal appearance. Be sure to warn the patient about this risk.

Nails grow slowly. A normal, uninjured nail takes approximately 100 days to reach full length (to the end of the finger). With injury to the nail bed or fingertip, growth is delayed by almost 1 month.

As noted above, if a nail bed injury is associated with a fracture of the distal phalanx, treat the injury as an open fracture.

If a subungual hematoma is > 50% of the nail surface, a significant laceration usually is found in the nail bed. Repair of the laceration warrants removal of the nail for formal exploration.

Repair of an injured nail bed can be quite difficult because the tissues are very delicate and friable. Recent studies have shown that if the nail and surrounding nail margin are intact, removal of the nail and repair of nail bed lacerations are unnecessary in both children and adults. But you must still drain the hematoma.

If a subungual hematoma is accompanied by injury to the margin of the nail, the nail should be removed to allow proper repair of the nail bed and its surrounding tissues. A digital block and a digital tourniquet make the procedure much easier. Nail bed tissue is *highly* vascular.

### *Removing the Nail*

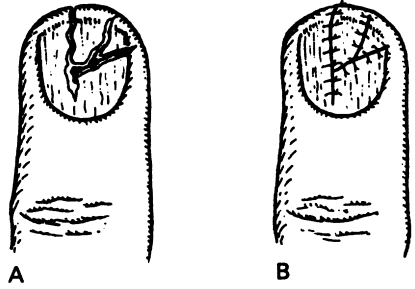
1. Use a digital block. This procedure hurts!
2. Place the digital tourniquet once the finger is anesthetized. Alternatively, you can wait to place the tourniquet until the nail has been removed.
3. Place a small hemostat clamp just beneath the nail (between the nail and nail bed).
4. Gradually spread the clamp (open its jaws) to free the nail completely from the underlying nailbed.
5. Gradually advance the clamp proximally, until it is under the proximal portion of the nail (where it emerges from under the skin).
6. Grab the nail with the clamp, and pull. It may take some effort.
7. Clean the nail, and save it in saline-moistened gauze or a cleansing solution (e.g., Betadine). The nail may be useful for splinting the nail bed repair.

### *Repair*

1. Use as small an absorbable suture as you can find (6-0 chromic is best) to repair the nail bed. Some type of magnification often is helpful. (See figure on following page.)
2. Nail bed tissue is highly friable and difficult to sew—much like suturing wet toilet paper. Take small amounts of tissue, and do not pull up on the needle as you pass through the tissue. Take your time. This procedure can be frustrating.
3. Once the repair has been completed, place the nail back on the nail bed to serve as a splint. Be sure to slide the proximal part of the nail under the skin fold at the base of the nail. This technique prevents the skin fold from scarring down to the nail bed.
4. If necessary, place a single stitch through the nail and the distal fingertip skin to hold it in place. Remove this stitch after a few days.
5. The injured nail will be pushed off by the growth of the new nail.



Nail bed lacerations are often multiple and uneven. (From Foucher G (ed): *Fingertip and Nail Bed Injuries*. London, Churchill Livingstone, 1991, with permission.)



### *Aftercare*

Place a small amount of antibiotic ointment around the nail, and cover the fingertip with light gauze.

After 1 or 2 days the fingertip can be left open without a dressing.

The hand should be kept elevated at all times. The finger will start to throb if the hand is dependent.

Encourage the patient to move all the joints of the finger to prevent stiffness.

Remember pain medication. Fingertip and nail bed injuries are quite painful.

Strongly encourage the patient to refrain from using tobacco products, which significantly delay healing.

### ***Bibliography***

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