

# Chapter 11

## Soft Tissue Injuries of the Hand

**Andrew D. Sobel**

**Keywords** Soft tissue • Hand • Penetrating • Burn • Crush  
• Bite

### Overview

Soft tissue injuries (Fig. 11.1) of the hand may result from a range of pathologies including penetrating injuries, burns, frostbite, crush injuries, and bites require thorough evaluation for neurovascular status, along with signs of tendon injury or infection. Neurovascular or infectious exam findings may escalate management.

### What to Ask

1. What is the mechanism of injury? Sharp/penetrating injuries with lacerations may have wider zones of injury and also injury to deeper structures than what may be obvious based

---

A.D. Sobel, MD  
Department of Orthopedics, Brown University,  
Providence, RI, USA  
e-mail: [andrew.d.sobel@gmail.com](mailto:andrew.d.sobel@gmail.com)



FIGURE 11.1 A soft tissue injury of the hand

on skin injury. Chemical burns require immediate removal of clothing and significant cleansing of skin with saline/water. Frostbite injuries require rapid warming. Crush injuries often compromise microvasculature to the skin and result in delayed tissue necrosis. Animal or human bites require specific antibiotic coverage and based on the location possible surgical intervention.

2. What is the neurovascular exam? Lacerations may result in arterial injury which may require emergent intervention. Injury to peripheral nerves typically result in focal deficits. Crush or burn injuries may have more global deficits. A major complication of frostbite injury is vascular thrombosis.
3. What is the exact location of the injury? Dorsal hand lacerations have a very different acuity and spectrum of injuries compared to palmar lacerations. The skin injury caused by “fight bites” may appear more proximal than when the fingers were flexed during impact, obscuring potential joint involvement.
4. How long ago was the injury? Especially with injuries involving the blood supply to the hand, temporality is important when considering revascularization, thrombolysis, rewarming, etc.

## What to Request

1. Consistent direct pressure placed onto site of active bleeding.
2. A blood pressure cuff which can be placed proximally as a tourniquet during wound exploration for hemostasis.
3. Rapid rewarming of patient (warm IV saline, forced-air warming unit, increased room temperature) and extremity (in water with temperatures around 40–42 °C) if frostbite has occurred or if there is consideration for a vascular repair.
4. Tetanus prophylaxis.
5. Removal of all clothes if chemical burn.
6. Patient should be immobilized until you arrive.
7. Analgesia for comfort.
8. Local anesthetic (e.g., lidocaine) for local or peripheral nerve block.
9. Hold antibiotics until a culture can be obtained (for infections).

## When to Escalate

1. Dysvascular limb (from laceration or thrombosis)
2. Critically ill/septic patient (from infection)
3. Flexor tenosynovitis

## Imaging

1. AP, oblique, lateral x-rays of the affected portion of the extremity
2. AP and lateral x-rays of any amputated structure

## Effective Communication

1. Location of injury
2. Mechanism of injury
3. Vascular/bleeding status
4. Peripheral/digital nerve exam

## What to Bring

1. Splint material
2. Suture/surgical instrument tray
3. Non-absorbable suture (tendon injury) and/or rapidly absorbing suture (skin closure)

## Key Exam Pearls

1. Vascular – Modified Allen test, Doppler signals
2. Nerve – Median, radial, and ulnar distributions. Digital nerves if necessary
3. Tendon:
  1. A tenodesis exam can elicit complete tendon injuries.
  2. Hold other fingers straight when testing flexion as the flexor digitorum profundus typically have a shared muscle belly.
  3. Juncturae tendinae, extensor indicis proprius, and extensor digiti minimi may confound your exam when evaluating for extensor tendon laceration.
4. Infection – Kanavel's cardinal signs
  1. Fusiform swelling
  2. Percussion tenderness along the flexor sheath
  3. Flexed resting posture
  4. Pain with passive extension

## Interventions and Procedures

### *Infection*

Depending on the location and severity of the infection, drainage in the ED may be possible. Paronychia may be incised along the nail fold, felons may be incised, septa may be broken up through an ulnar (except for thumb and small finger, when radial is preferred) mid-axial incision, and

dorsal hand and forearm abscesses may be incised, evacuated, and packed through a generous longitudinal incision to prevent early closure. Cultures must be obtained prior to giving antibiotics. Acute cat-bite tracts do not have to be incised acutely until failure of antibiotics or abscess formation. Volar infections or flexor tenosynovitis should be addressed in the operating room given the higher risk of damaging neurovascular structures. All patients should be immobilized.

### *Tendon Injury*

Dorsal tendon lacerations can be repaired acutely if the ends can be found easily. Local anesthesia may be all that is necessary, but a radial sensory nerve block can help with procedural pain. Braided nonabsorbable suture can be passed in a Kessler or locking-loop fashion to approximate and hold the tendon edges. Knot bulk should be kept to a minimum, and there should be at least 4 sutures crossing the tendon gap. A volar blocking splint helps prevent repair failure. Flexor tendon injuries should be fixed in the operating room given the higher risk of damaging neurovascular structures. The elbow, wrist, and fingers should be splinted in slight flexion to help keep the proximal tendon edge relatively close to the distal end prior to surgery.

### *Nerve Injury*

Nerve injuries must be fixed in the operating room under loupe or microscopic magnification. Skin injuries should be loosely closed and the patient should be splinted.

### *Artery Injury*

Tamponade for 10–15 min with direct compression (not a pressure dressing) may alleviate bleeding and allow a clot to

form. If direct compression is ineffective, a blood pressure cuff may be placed proximally on the arm and inflated above the patient's systolic blood pressure to prevent uncontrolled bleeding. A tourniquet should not be left on for a long period of time as lack of blood flow to the arm can cause distal necrosis. Intervention in the operating room is often necessary for continued bleeding or for injuries requiring revascularization or arterial repair.

### *Burn/Frostbite*

Clothing should be removed to prevent further damage in heat and chemical burns. An injury penumbra in frostbite injuries may be reduced by rapid rewarming of the extremity in lukewarm water and the patient as mentioned above (see *What to Request*). Thrombolysis may be indicated for severe frostbite injuries depending on the vascular status of the extremity and your institution's local practice. These injuries put the extremity at a considerable risk for swelling so elevation above the level of the heart is necessary.

### Follow-Up

1. Many procedures (other than the aforementioned) require advanced care in an operating room.
2. Specialists will be closely involved in the care of these injuries.
3. Admission to the hospital is typically necessary for infections, arterial injuries, and severe burns. Urgent surgical planning may be done as an outpatient for tendon and nerve injuries, but waiting longer than 2 weeks for an intervention is ill-advised.