Chapter 12
Adult Digital and Metacarpal Injuries

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Overview

Adult digital and metacarpal injuries including metacarpal fractures (Fig. 12.1), interphalangeal dislocations (Fig. 12.2), amputations, and nailbed injuries are common and require prompt evaluation. It is important to assess the neurovascular status, need for antibiosis, mechanism of injury, and presence and extent of nail plate injuries.

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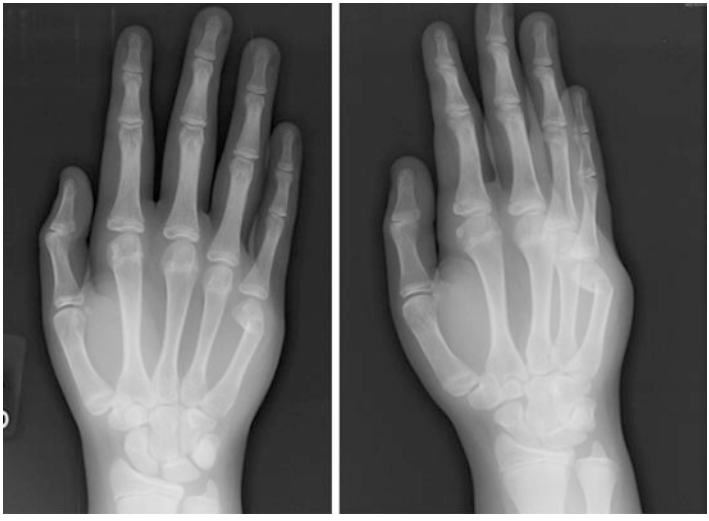

FIGURE 12.1 Radiographs of a fifth metacarpal fracture

FIGURE 12.2 A proximal interphalangeal joint dislocation

What to Ask

1. What is the neurovascular exam?
2. Has the patient been given any numbing agent, and where? Local/digital/peripheral block?
3. Is this an open injury? If so, immediate tetanus prophylaxis and antibiosis should be given.
4. What is the mechanism of injury?
    1. Crush and avulsion injuries portend worse outcomes if salvage is performed.
    2. High-pressure injection injuries have a wide zone of injury and necrosis.
    3. Metacarpal neck fractures caused by self-inflicted trauma (i.e., punching) may indicate poor compliance.
    4. "Ring avulsion" injuries may have proximal neurovascular traction injury.
5. Is there a subungual hematoma? Treatment for distal phalanx fractures and subungual lacerations varies based on the presence and extent of nail plate injuries with concomitant hematoma.
6. Does the patient smoke? Patent vascularity is important for tissue survival and treatment decision-making.
7. Has anyone attempted reduction of the interphalangeal dislocation? Repeated reductions may increase swelling or cause entrapment of tissue in the joint preventing closed reduction. Failure of appropriate closed reduction may also indicate tissue incarceration necessitating open treatment.

What to Request

1. Patient should be immobilized until you arrive.
2. Open soft tissue injuries should be dressed in wet gauze.
3. Analgesia for comfort.
4. Local anesthetic (e.g., lidocaine) for local or peripheral nerve block that you will perform.

5. Ensure that no one has locally or digitally blocked the digit prior to your arrival.
6. If an amputation has occurred, ask that the amputated tissue be wrapped in moist gauze and placed on ice.

When to Escalate

1. If an amputation has occurred by a sharp, clean laceration, replantation may be appropriate.
2. Severe soft tissue injury – ring avulsions, crush injuries, and high-pressure injection injuries.

Imaging

1. AP, oblique, lateral X-rays of the digit, hand, and wrist
2. X-ray of the amputated tissue
3. CT scan if concerned for carpometacarpal fracture/dislocation (often poorly visualized on X-rays)

Effective Communication

1. Mechanism
2. Soft tissue injury/loss
3. Fractures
4. Subungual hematoma
5. Previous reduction attempts
6. Nail plate injury

What to Bring

1. Splint material for individual finger or hand/wrist (aluminum foam splint, prefabricated splint, or plaster)
2. Antibiotic ointment, nonadhesive dressing to cover soft tissue injuries

3. Sterile tray with hand surgery instruments if revision amputation or tendon repair possibly required
4. Finger tourniquet or Penrose drain to provide hemostasis
5. Fluoroscopy for interphalangeal dislocations

Key Exam Pearls

1. Sensation (individual digital nerves).
2. Motor (FPL/EPL as well as EDC/FDP/FDS/IO for each digit).
3. Thorough inspection of lacerations/wounds to assess for small dermal violations.
4. Vascular exam – Allen's Test may assess radial/ulnar flow; a Doppler probe can assess patency of digital arteries.

Reduction/Procedures

Metacarpal Fractures

After assessing the soft tissues for significant injury or violations of the dermis, patients may be locally or peripherally blocked (ulnar nerve block at the wrist is extremely effective for fifth metacarpal fractures). The Jahss maneuver or a three-point mold may be employed for reduction of metacarpal neck fractures, if indicated. Splinting of the affected and bordering digits in the intrinsic plus position should be performed.

Interphalangeal Dislocations

Proper technique is crucial to successful closed reduction. Excessive traction or exaggeration of the deformity must *never* be used as this may incarcerate the volar plate or other tissues within the joint. Reduction may be performed after

digital block and under fluoroscopic guidance to ensure concentric reduction through full joint arc of motion.

The technique involves slight exaggeration of the deformity and a gentle force in the direction you wish the distal segment to travel (e.g., slight hyperextension and palmar directed force for dorsal dislocations). Most simple dislocations are stable through range of motion after reduction. Splinting of the affected digit is appropriate until early follow-up. Typically dorsal dislocations are splinted in slight flexion, and volar dislocations in relative extension.

Amputations

Salvage or replantation of the affected digit may be considered if it is a thumb, one of multiple digits, the amputation has occurred at the palm level, or the patient is a child. Contraindications include severe vascular issues/extensive smoking history, crush or avulsion mechanism, or a time from injury >6 hours. Replantation requires extensive counseling by the provider performing the surgery, so hasty involvement of a hand specialist is necessary. If replantation is not possible or indicated, flap coverage may be indicated. This is typically performed in an operating room.

If the injury involves minimal soft tissue loss and there is no bone or tissue loss, the lacerations may be cleaned thoroughly and dressed with the goal to have the injury close by secondary intention. Revision amputation may be performed if the injury is not amenable to the above treatments. This is performed by removing small amounts of bone to allow for soft tissue coverage. Enough bone must remain to support nail growth, so if this is a concern, the nail must be removed and the germinal matrix must be completely ablated (difficult to do outside of the OR). To prevent hypersensitivity and/or neuroma formation, traction neurectomies must be performed on the remaining digit with care taken not to injure the digital arteries. Ring avulsion injuries should be addressed in the OR.

Nail Bed Injuries

Subungual lacerations can be managed with trephination, regardless of the size of hematoma or presence of fracture if the nail plate is intact. If the nail plate is damaged or avulsed, nail plate removal and repair of any laceration to the nail bed with small (i.e., 6-0) fast dissolving suture (i.e., chromic) or dermal adhesive is appropriate. The nail fold does not need to be splinted open to allow for regrowth of the nail. Antibiotic ointment, nonadhesive gauze, and a bulky dressing may be used to cover the repair site.

Follow-Up

1. All injured extremities should be elevated and iced to control swelling.
2. Patients with metacarpal fractures and interphalangeal dislocations may follow up routinely in the office.
3. Patients with revision amputations and nail bed injuries should follow up in a few days for dressing removal and further instruction on care to the finger.
4. Patients whose amputations have been replanted must be admitted for tissue monitoring and advanced care.