

Infections of the hand

Infections of the hand may be classified according to their anatomic location, pathologically as to whether they are localized or spreading, and bacteriologically as to the organism causing them.

The spreading infections - lymphangitis and cellulitis, often streptococcal in origin, have broken down cellular barriers or there are no cellular barriers to their extension. They may be extensive or trivial, in either case present dangerous potentialities. To this group belong the most feared and most destructive, and the fatal infections. They call for utmost conservatism in care- the natural forces must be supported to combat the invader. Operative intervention is absolutely forbidden until localization has taken place, fatal cases almost invariably show a premature incision or incision both premature and under local anesthesia.

The localized infections, may start as spreading infections, they may be subcutaneous, (watch out for collar button abscess)

subfascial, especially in palm, and about then are muscles

carbuncle, usually history of "squeezed" folliculitis.

paronychia- start usually as nail wall infection.

felon- most frequently maltreated of hand infections. Two main faults- incision too small and on volar surface- bone involvement is curetted with subsequent spread. Bone must be allowed to separate spontaneously.

lumbrical space infections-

collar button infections- bilocular processes may occur anywhere on hand. Two most frequent are- frog-felon, lumbrical abscess: - finger-tip where there is a subcuticular process associated with a felon.

Tenosynovitis- relatively rare process-

1. requires immediate incision
2. recognized by 4 cardinal symptoms-
 - a. symmetric swelling of finger
 - b. tenderness outlined by sheath
 - c. finger held in slight flexion
 - d. extension of finger is very painful.
3. volar tendons most frequent but dorsal rarely involved.
4. tendons are destroyed easily hence early drainage is imperative.

fascial space infections-

middle palmar space from ring and middle finger tendon sheathes
thenar space from index finger rarely, from direct inoculation
most often.

retrotendinous space in forearm from radial or ulnar bursae.

Most infections of the hand may be traced to one or both factors-

- a. avoidable secondary contamination of a wound
- b. unnecessary secondary traumatization of injured or infected tissues.

Prophylaxis:

- a. Proper care of wounds of hand.
 1. Cleanse
 2. Close with suture, graft, or dressing.
 3. Cover wound- (even tiny scratches heal more quickly if covered.)
 4. Splint (for any wound except the most trivial.)

- b. Proper care of minor infections.
 1. Protect from trauma.
 2. Put at rest.
 3. Warm moist packs at least suggestion of spread.

Active treatment.

- a. Diagnosis. Where is the infection and where may it spread?
Is it localized or spreading?
What is the infecting organism?
- b. Prompt treatment.
Localized infections require drainage.
Spreading infections require rest, warm moist packs, fluids, possibly chemotherapy.
- c. Conserve the utmost possible function of the hand.
 - A. Prevent vicious position of the hand by placing in POSITION OF FUNCTION.
 - B. Begin gentle active motion in arm bath as soon as acute stage has passed.
 - C. Do not immobilize uninvolved fingers.
 - D. Physical therapy as soon as healed- warm soapy soaks.

Anesthesia- General anesthesia always indicated.

Never freeze.

Never inject local anesthesia, danger of spreading of infection and gangrene of digit.

Bloodless field is necessary - apply blood pressure cuff, elevate arm for 30 seconds and inflate to 270 mm.HG .

Incisions-

Slowly, carefully, identify all structures.

Be careful not to carry infection into uninvolved spaces.

Follow skin creases as much as possible.

Avoid mid-line incisions.

Large enough for adequate drainage.

Immobilize in position of function:

Wrist dorsiflexed to 45 degrees.

Thumb rotated to grasping position.

Fingers slightly flexed (10 to 15 degrees) at all joints.

Fingers abducted from each other about 15 degrees.

Forearm midway between pronation and supination.

The warm moist pack.

Essentials of this consist in:

Immobilization of part in splint and large dressings.

Continuous warmth and moisture.

Dressing changes only every 24 to 48 hours.

Bed rest for patient.

Fluid enough to produce 1200 to 1500 cc. of urine.

Method of application: aseptic technic.

Spread out large sterile towel

Place sterile splint on towel.

Lay enough sterile abdominal pads over splint and towel so that

finished dressing will extend well up on arm or even into axilla.

Over this large amount of fluffed gauze.
 Lay arm on dressing and splint.
 Pin towel and dressings up over arm so as to ~~cover~~ it completely.
 Pour warm sterile saline or water into dressings so as to moisten
not soaking wet.
 Place about this some external source of heat.
 Electric pad
 Electric baker
 Hot water bottles
 Cover all with blankets or duck to conserve heat.
 Pour sterile solution into dressings every 2-3 hours as needed to
 keep them moist.
 Change dressings once a day or every - other day.

The arm soak.

Large sterile basin filled $\frac{1}{2}$ - $\frac{3}{4}$ full of warm sterile water or saline solution. Brought to the bed covered with a sterile towel. Dressings removed and arm and hand are placed in bath. Bath covered with sterile towel to prevent dust and bacteria from falling into it. Warm solution is added occasionally. Hand kept in bath for about 30 minutes--to an hour and patient instructed to move fingers. On removal from the bath the hand is laid out on a sterile towel under an electric light and dried for 20 minutes. The dressing then applied.

Soakings

This is a physiotherapeutic measure. It consists in patient washing of the hand for 30 minutes in warm soapy water. Indicated after all wounds are healed and infection is over.

Blood pressure apparatus for bloodless field.

Used for hemostasis during operations. Applied to upper arm over a few layers of gauze. When ready to inflate the arm is elevated for 30 seconds and cuff rapidly pumped up to 270 mm.HG. Watch the dial so as to prevent the pressure from dropping. If pressure falls the venous bleeding may be furious. At end of operation maintain manual pressure with gauze for a few minutes after release of pressure. This controls the hyperemic bleeding.

Incisions.

Make incisions deliberately, there is no hurry, see what you are doing-- know where you expect to find pus- know the anatomy of the hand so as to avoid nerves and vessels- remember there are many spaces in the hand near the one being drained which may be contaminated from the infected space. Make incision long enough to drain adequately. Do not depend on gauze or rubber. Keep edges of incision from agglutinating by inserting a strip of vaseline soaked gauze in corner of wound. Do not stuff the wound full of gauze. Remove drain in 24 to 48 hours.

Most frequent incisions:

Paronychia: Early paronychia may occasionally be aborted by shaving off the epithelium over the tender spot in the nail wall. Apply warm moist pack and splint.

If this does not cure then typical paronychia incision: Short longitudinal incisions, one to either side of nail at base about $\frac{3}{8}$ ths inch long, avoid nail bed. Cut down to nail and raise eponychium from nail, lift up undermined nail and cut off with scissors. Be sure that nail is removed far enough distally that the eponychium on falling back does not impinge on nail and thus shut off drainage.

Felon

Lateral hockey stick incision, slightly back of mid point between volar and dorsal surfaces. Essential is to divide the perpendicular trabeculae which bind the skin to anterior surface of bone. Sweep the knife transeversely across phalanx midway between skin and bone. Do not cut through the skin on the opposite side.

Do not scrape the bone even if an osteomyelitis is present- nature will separate the infected bone.

Subcutaneous infections of fingers.

Site of incision will vary with site of pus--usually lateral incision is required since as a rule pus extends over more than one phalanx. However where pus is over one phalanx a transverse incision is advised. The incision must be made under blood pressure control because surgeon must visualize all structures. Tendon sheath must be seen both to avoid opening it if it is uninvolved and to open it if it is involved. The subcutaneous infection may rupture into sheath or the subcutaneous pus may simply be the result of rupture of tendon sheath.

Tendon sheath infections-

Certain points need emphasis.

- A. Blood pressure absolute necessity.
- B. Incision made slowly and with care of anatomic dissection.
- C. Sheaths when approached from side lie buried in edematous fat and surgeon often thinks he is going too deeply.
- D. It is essential to drain the proximal cul-de-sac in the palm in case of the index, middle and ring fingers sheaths.
- E. Remember that the sheaths from the three middle fingers, (index, middle and ring) rupture into the palmar spaces (Middle palmar and thenar). The sheaths for the thumb and little finger (radial and ulnar bursae) continue up into the forearm, usually communicate with each other, and when they rupture, do so in the forearm.
- F. Persistent drainage from a tendon sheath means: 1. Insufficient incision 2. Dead tendon 3. Suppurative arthritis 4. Osteomyelitis
- G. Transverse incisions are preferable for the middle palmar space, and for the proximal cul-de-sac of the sheaths.
- H. The only sure guide for the lateral incisions on the fingers are the ends of the transverse creases. These are not obliterated entirely by the swelling and if the incision skirts along the outer ends of these, it will be truly lateral.

Middle palmar and thenar spaces.

Middle palmar space frequently involved from tenosynovitis.

Thenar space usually involved primarily, occasionally from index finger sheath.

Incision for middle palmar space runs parallel to the distal palmar crease, transversely across the palm. The space lies quite deeply beneath the tendons, and there is usually pus in the lumbrical canals.

Incision for thenar space runs obliquely across back of hand, about 1/3 inch back of web between thumb and index finger and on line joining the heads of the first and second metacarpals. On going thru the skin the surgeon encounters the distal borders of the first dorsal interosseus muscle, in front of this is the adductor pollicis and in front of this is the thenar space.

Lumbrical space infections:

These abscesses lie in the subcutaneous spaces at the base of finger on volar surface. They are frequent sequelae of infections starting in blisters beneath calluses and extend to either side of base of finger in the web. Two points are worthy of note: a. there is usually a small subcuticular collection of pus in the base of which there is a small hole leading into an abscess in the web space. b. They are best drained by a transverse incision almost directly over the metacarpalhalangeal joint, just distal to the transverse palmar crease.

Lymphangitis and the spreading infections:

These infections almost always give history of one or more of the following:

- A. Trivial injury which has been neglected.
- B. Too early incision of small area of non-localized infection.
- C. Local anesthesia used for incision.
- D. The area has been traumatized.
- E. Virulent inoculation often primary.
- F. The more severe the case the more likely there is to history of neglect, trauma, or premature incision. Fatal cases almost invariably show errors in care.
- G. The watch word in treatment is conservatism:
 1. Absolute bed rest.
 2. Immobilization of arm.
 3. Massive warm moist packs to include the axilla.
 4. Fluids to 50000 cc every day.
 5. Incise only when: Lymphangitis subsides.
Progression stops.
Localization is definite.
This may require 3 to 14 days. Do not be swayed in your judgement.
6. Sulphonamide drugs may be of great value if condition is due to drug-sensitive organism.
- H. Anticipate localization of infection according to following pattern.
Carried by lymphatics from volar to dorsal surface, become confluent in larger and larger channels progressively over dorsal surface. Lymphatics from little finger and ring finger filter through epitrochlear nodes before reaching axillary nodes. Those from the thumb and index pass directly to axillary nodes. Those

from middle finger (dangerous finger) may pass through the axillary nodes or they may skip these nodes and pass directly into the circulation.

Regardless of initial site of trouble the spreading infections are likely to localize on dorsum of wrist in the subcutaneous tissues, even if there is another localization as well.

Where the initial inoculation was on the dorsum localization will be on the dorsum, usually on the wrist, possibly on the forearm.

Where the initial inoculation was on volar surface of finger, a tenosynovitis almost always follows if there is localization.

Localization may occur at site of nodes:

- a. epitrochlear
- b. axilla.
- c. subpectoral.