INFECTIONS OF THE UPPER EXTREMITY

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Introduction
- Hand infections are frequent
- Taking into account the countless functions of the hand and the hand’s high contact with the surrounding environment, it is amazing that serious hand infections do not occur very often
- Treatment depends on an intimate knowledge of the anatomy

Hand Infections
- Acute Paronychia
- Chronic Paronychia
- Felon
- Web Space Abscess (Collar Button)
  - Hourglass configuration of abscess
- Deep Palmar Space Infections
- Pyogenic Flexor Tenosynovitis
- Bites
- Septic Boutonniere

Paronychia
- An infection of the perionychium (also called eponychium) -- epidermis bordering the nail
  - Commonly is precipitated by localized trauma.
- Usually becomes evident 2-5 days post-insult.

Eponychium
- The fold of skin overlying the root of the nail is defined (Shrewbury et al, 1975)
  - Distally by its free margin
  - Proximally by the fascial attachment of the skin to the base of the distal phalanx just distal to the insertion of the extensor tendon
  - Laterally by the firm attachment of the margin of the nail to the lateral ligament of the distal phalanx

Paronychia
- The nail fold is especially susceptible to minor injuries
Paronychia

- Treatment consists of incision and drainage, warm-water soaks and oral antibiotics

Felon

- An abscess of the distal pulp of the fingertip

Septa attach to the periosteum of the distal phalanges

Flexor Sheath Infections

- A knowledge of the anatomy of the synovial sheaths is essential for proper diagnosis and treatment
- Infection of the synovial sheaths remains rare but its prognosis is severe
- Any delay in diagnosis or treatment will affect the final outcome which is directly correlated with the stage of lesion progression

Suppurative Flexor Tenosynovitis

- Mechanism
  - Bacterial multiplication in the CLOSED SPACE of the flexor tendon sheath
  - Culture-rich synovial fluid medium
- Outcome
  - Tendon necrosis
  - Disruption of the tendon sheath
  - Digital contracture

Suppurative Flexor Tenosynovitis

- Penetrating trauma
- Most infections caused by native skin flora, 
  - Staphylococcus and Streptococcus species
  - Most common organism is Staphylococcus aureus
Anatomy

- The flexor tendon sheaths of II, III, IV extend from the distal phalanges to the distal palmar crease, and generally do NOT communicate.
- The thumb flexor sheath begins at the terminal phalanx and extends to the volar wrist crease, where it communicates with the radial bursa.

Suppurative Flexor Tenosynovitis

4 Kanavel signs

1. Finger held in slight flexion
2. Fusiform swelling
3. Tenderness along the flexor tendon sheath
4. Pain with passive extension of the digit

Kanavel signs may be absent

- Recently administered antibiotics
- Early manifestations of the condition
- Immunocompromised state
- Chronic infections

Differential diagnosis

- Inflammatory (nonsuppurative) flexor tenosynovitis
- Herpetic whitlow
- Pyarthrosis
- Gout
- Dactylitis
- Phalanx fracture
- Arthritis

Non-suppurative conditions

- Synovial fluid
  - Nonbirefringent crystals (gout)
  - Birefringent crystals (calcium pyrophosphate deposition disease [CPPD] or pseudogout)
- ESR is not elevated in non-suppurative conditions
**Eikenella corrodens**

• Pasteurella multocida - High index of suspicion if the infection develops within 24 hours after a cat bite
• Eikenella corrodens - Higher incidence with human bite wounds (Streptococcus and Streptococcus species still most common cause)
• Anaerobes (Bacteroides and Fusobacterium species most common)
• Capnocytophaga canimorsus – (Can infrequently be isolated after dog bites)

**Suppurative Flexor Tenosynovitis**

- Bite wounds
  - Hematogenous spread
    - Mycobacterium tuberculosis
    - Neisseria gonorrhoea
  - Mycobacterium species
    - Chronic more indolent infections

**Michon Classification Scheme**

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<tr>
<th>Infection Stage</th>
<th>Characteristic Findings</th>
<th>Treatment</th>
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<tbody>
<tr>
<td>Stage I</td>
<td>Suppurative fluid in sheath</td>
<td>Catheter irrigation</td>
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<tr>
<td>Stage II</td>
<td>Pronounced tenderness, granulomatous synovium</td>
<td>Minimal invasive drainage, +/- indwelling catheter irrigation</td>
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<tr>
<td>Stage III</td>
<td>Necrosis of the tendon, pulleys, or tendon sheath</td>
<td>Extensive open debridement and possible amputation</td>
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**Herpetic Whitlow**

- Results from autoinoculation of type 1 or type 2 herpes simplex virus into broken skin.
- May occur as a complication of primary oral or genital herpes lesions
- Fever, lymphadenitis, and epitrochlear and axillary lymphadenopathy may be present.
- Small, clear vesicles initially are present.
- Usually is self-limited and resolves in two to three weeks

**Deep Palmar Abscesses**

- Deep Space Infections represent 5-15% of hand infections.
- There are five deep space infections
  - Web space
  - Midpalmer
  - Dorsal subaponeurotic space
  - Thenar Space
  - Hypotenar Space

**Herpetic Whitlow**

- Abrupt onset of edema, erythema, and significant localized tenderness of the infected finger.
- Often, the pain is out of proportion to the physical findings.
Palmar Abscesses

Deep Palmar Abscesses

- Web space (collar button abscess):
  - Significant swelling and pain in the web space and distal palm with the fingers slightly abducted.
  - Drainage via a longitudinal incision in the web space.

The term collar-button abscess refers to the hourglass shape of the abscess and the resemblance to the collar buttons used for dress shirts in the early 1900s.

Deep Palmar Abscesses

- Mid-palmar space:
  - Maximal tenderness in the mid palm with loss of the normal concavity of the palm.
- Dorsal subaponeurotic space:
  - Located between the extensor tendons and metacarpals.
  - Dorsal hand swelling that is tender to palpation with painful finger extension.

Less Common Hand Infections

- Actinomycosis
  - Closed fist injury
  - Yellow sulfur granules
- Cat-Scratch Disease
  - Rachi-lineae henselae (Gram – bacillus)
- Hansen’s Disease (Leprosy)
  - Now treated effectively with Rifampin
  - Previously with Dapsone
  - Diagnosed by Armauer Hansen in 1872 with M. leprae
    - Grown in lab in mouse foot pad
    - Loves nine-banded armadillos
  - Affects Peripheral Nerves

Hansen’s Disease (Leprosy)

- Cardinal Signs
  - Anesthesia (rare complaint)
  - Thickened nerves (pain)
  - Skin lesions (hypopigmented macule)
  - Slit skin smears (Acid-fast bacilli)
The End

Did You Wash Your Hands?

You spread germs if you don't!