Infections may be a source of considerable morbidity

Expeditious treatment is necessary
General Principles

- **Microbiology**
  - Staphylococcus aureus (50%-80%)
  - Streptococcal species
  - Gram negatives

- Work & Home acquired infections
  - Single gram + species
- IV drugs, bites, diabetics
  - Polymicrobial
- Chronic indolent infections
  - Suggestive of atypical Mycobacterium or fungi
General Principles

- **MRSA**
  - Increase in past decade
  - Risk factors
    - DM, history of antibiotic use, immunocompromise, IVDU...
  - Some recommend empiric treatment of all hand infections for MRSA, pending culture results

General Principles

- **Culture and Staining**
  - Routine
    - aerobic & anaerobic, gram stain
  - Atypical mycobacterium
    - AFB
  - Fungi
    - KOH prep
  - Herpes
    - Tzanck smear
General Principles

- Etiology
  - Direct penetration
  - Spread from local compartments
  - Hematogenous dissemination

- May involve
  - Skin and subcutaneous tissue
  - Fascia
  - Tendon sheaths
  - Joint
  - Bone
General Principles

- History
  - Complain of pain, swelling, redness
  - Trauma
  - Comorbidities
  - IVDU, recent infections, etc.

General Principles

- Physical Exam
  - Swelling, erythema, warmth, tenderness, painful motion, fluctuance, drainage, etc.
  - Lymphangitis, adenopathy
  - Systemic symptoms
General Principles

- Labwork
  - CBC with diff, ESR, CRP

- Imaging
  - Xrays
  - Ultrasound
  - MRI
  - Bone Scan

General Principles

- Treatment
  - Rest, elevation, splint immobilization
  - Empiric abx
  - Tetanus booster
  - I&D if indicated
Types of Infections

- Cellulitis
- Subcutaneous abscess
- Paronychia
- Felon
- Septic flexor tenosynovitis
- Deep space infections
- Septic joint
- Osteomyelitis
- Necrotizing fasciitis
- Infections secondary to bites, atypical mycobacteria, viruses, fungi
Cellulitis

- Inflammation of skin & subcutaneous tissue
- Characterized by hyperemia, leukocytic infiltration & edema
- May be initiated by skin trauma, ulceration, dermatitis, lymphedema or nothing at all
- Most often caused by group A beta hemolytic strep
- S. aureus causes less extensive cellulitis

Cellulitis

- Diagnosis is primarily clinical
- Examine closely to rule out abscess, deep space infection, or septic joint
- Oral vs IV antibiotics
- Splint, frequent reassessment
Subcutaneous Abscess

- Usually results from a puncture wound
- Local area of fluctuance and edema with surrounding cellulitis
- S. aureus most common organism
- I&D
  - leave wound open
- Abx appropriate to clinical scenario

Paronychia

- Abscess beneath the nail fold
**Paronychia**

- Very common
- Usually S. Aureus
- May extend between nail & matrix
- Early soaks, abx
- May require I&D

**Incision and drainage**
- Digital block
- Lift nail fold from nail plate to decompress
- If suspect abscess between nail & matrix, then remove part of the nail
- Place wick for continued egress
- Daily dressing changes and warm soaks
Chronic Paronychia

- Important to differentiate from acute paronychia
- Intermittent inflammation around the eponychium
- Often recalcitrant to Rx
- Marsupialization & removal of nail plate.
- Topical steroid-antifungal ointment

Felon

- Closed space infections of the volar pulp space
Felon

- Present with severe, throbbing pain
- Penetrating injury to pulp
- Staph Aureus most common organism
- Early
  - elevate, oral abx & warm soaks
- Late
  - I&D critical to avoid pulp space necrosis, osteomyelitis and flexor tenosynovitis

I&D
- High lateral (B) & mid-volar (A) incisions preferred.
- Try to avoid high lateral on ulnar side of thumb & radial side index
- Pack open, soaks
Septic Flexor Tenosynovitis

- Distal palmar crease to distal phalanx
- Thumb sheath contiguous with radial bursa
- Small sheath contiguous with ulnar bursa
- Both radial & ulnar extend to carpal tunnel
- Radial & ulnar bursa communicate in over 50% of individuals - horseshoe abscess

Septic Flexor Tenosynovitis

- Rapidly spreading bacterial infection within sheath as a result of penetrating trauma
- Staph Aureus most common organism
- Chronic, often indolent, infections may be due to atypical mycobacterium
Septic Flexor Tenosynovitis

- Kanavel's Four Cardinal Signs
  - Flexed posture of affected digit
  - Tenderness along flexor tendon sheath
  - Diffuse swelling
  - Pain with passive extension
Septic Flexor Tenosynovitis

- Very early cases
  - IV abx, splint, elevate
- Surgery
  - limited incision
  - Extensile incision
- Institute mobilization with OT early
Septic Flexor Tenosynovitis

1 week follow-up

3 week follow-up

Septic Flexor Tenosynovitis

Final Result
Septic Flexor Tenosynovitis w/ Proximal Extension
Deep Space Infections

- Closed compartments of the hand
  - Dorsal subaponeurotic space
  - Thenar space
  - Midpalmar space
  - Interdigital subfascial web space
  - Parona’s quadrilateral space
- These are prone to infection from penetrating trauma, local spread and hematogenous dissemination.
**Septic Arthritis**

- Aspirate to differentiate from crystalline arthropathies
- Early drainage important to prevent destruction

**Osteomyelitis**

- History of open fracture, penetrating trauma
- S. Aureus & Strep. most common
- Present w/ pain, erythema, swelling
- MRI for early marrow edema
- Xrays
  - local osteopenia, periosteal rxn
  - Erosions and destruction
Osteomyelitis

- Index of suspicion should be heightened when a presumed soft tissue infection does not respond to standard Rx
- Debridement and IV abx hallmarks of Rx with extended coverage for 4-6 weeks
Osteomyelitis

Typically clenched fist injuries from punch to mouth
Over 40 different strains of bacteria
May seem innocuous due to multiple planes of injury that alter alignment in different hand positions
Wound over MCP should be considered intrarticular until proven otherwise to avoid potential consequences of untreated septic arthritis

Human Bites
Human Bites
**Human Bites**

**Animal Bites**

- Dogs > cats > rodents
- Pasteurella multocida very common along with Staph, Strep & anaerobes
- Careful exploration and debridement if infection or suspicion of tendon, nerve, bone, or joint involvement
Dog bite s/p debridement

Alloderm tx
10 weeks postop

10 weeks postop
Necrotizing Fasciitis

- LIFE & LIMB THREATENING EMERGENCY
- Some cases are polymicrobial, although group A Strep is most common

Necrotizing Fasciitis

- Severe pain, rapid advancement, cellulitis w/ poor margins, tense swollen skin
- Unstable pt should raise index of suspicion
Necrotizing Fasciitis

Necrotizing Fasciitis
Necrotizing Fasciitis
Mycobacterial infections

- 75% of atypical mycobacteria infections are in the hand
- M. marinum is most common
- May be cutaneous, subcutaneous or deep
- Typically indolent course

M. marinum infection
Herpetic Whitlow

- Herpes simplex infection involving the hand
- Clear vesicles mature, unroof & leave ulcerated base
- Ulcer subsides over the ensuing weeks
Thank You