Skin and Soft Tissue Infections in the ED

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Skin and Soft Tissue Infections in the ED

- **Recognize the most common skin and soft tissue infections and the FEW infections which are TRUE EMERGENCIES**
- **Discuss the diagnosis and treatment of common cases of cellulitis and abscesses**
- **Discuss indications for surgical consult, admission and systemic antibiotics**
- **Evaluate the treatment of "Special Cases" in skin and soft tissue infections!**

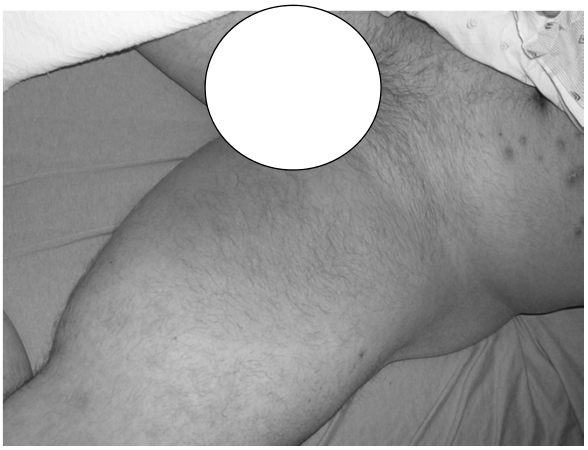
Cellulitis

Cellulitis

- Involves skin and sub-cutaneous tissues
- Etiology: Group A Strep, S. aureus
- Usually inciting trauma, skin break or tinea
- Differential Diagnosis
  - DVT
  - Erythema Nodosum
  - Venous Stasis
  - Dermatitis

Cellulitis

- **What you should expect to see… warmth, erythema and swelling**



Cellulitis Treatment

- **Penicillinase-resistant penicillin**
- **Cephalosporin**
- **Clindamycin**
- **If MRSA suspected clindamycin or Bactrim/cephalexin, doxycyclene**

Lymphangitis

- **Etiology: usually Group A Strep with spread into the subcutaneous lymphatics and enlarged tender regional LNs**
- **Clinically: red streaks with distal site of infection and proximal adenopathy**
- **Treatment: rest, elevation, Penicillinase resistant pcn or macrolide and close follow-up or admission**

Pearls and Pitfalls

- **Consider X-rays or CT to check for gas**
- **Mark the borders of the cellulitis**
- **Cultures of the ”leading edge”**
  - **Yield = 10%**
- **Know your local susceptibilities**
- **BEWARE of toxic presentations!**

Case

Breast feeding female with breast pain, fever, myalgias and pain. Four weeks post partum.

Mastitis

- **Involves skin and sub- cutaneous tissues**
- **Etiology: S. aureus and at times MRSA**
- **Usually due to poor drainage and breast engorgement if lactation mastitis**
- **Differential Diagnosis:**
  - **Plugged duct, galacticele, abscess, dermatitis, inflammatory breast cancer**

Mastitis

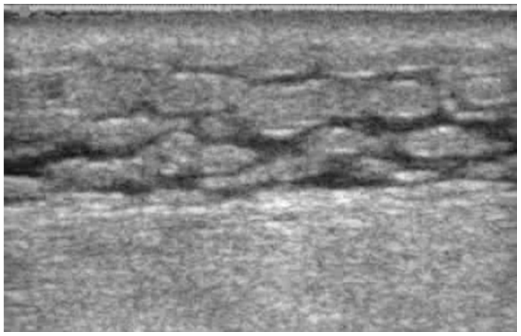
- **What you should expect to see…**
  - **warmth, erythema, swelling, firmness**

Mastitis

- **Treatment: empty the breast by breast feeding or pumping**
- **Dicloxacillin, cephalexin or clindamycin**
- **If MRSA risk factors; clindamycin or trimethoprim-sulfamethoxazole**

Pearls and Pitfalls

Consider using ultrasound to screen for abscess or cobble-stone pattern



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Case

- **Male in his 50s with chronic venous stasis changes now presents with redness, warmth and swelling of the lower extremity**

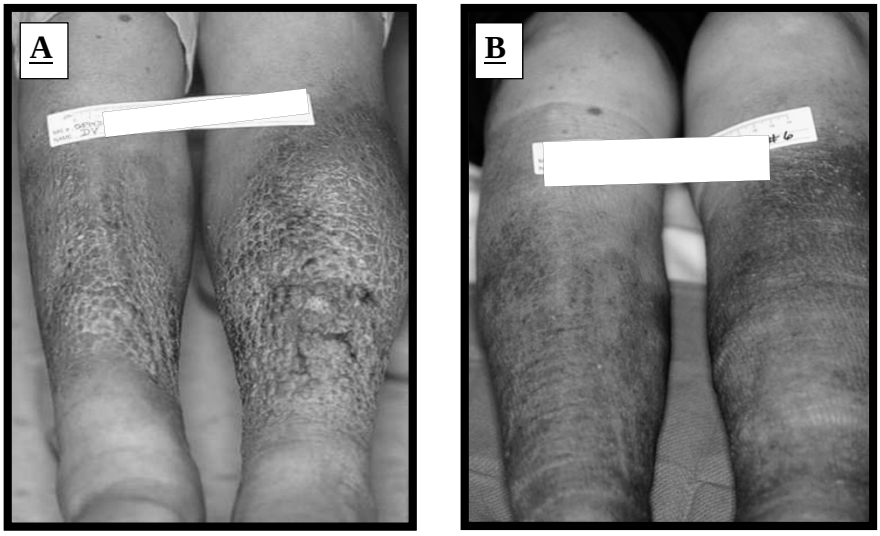
Venous Stasis

- **Important to recognize the normal look of venous stasis dermatitis**
  - **Swelling**
  - **Redness**
  - **Brown discoloration**
  - **Scaling**
  - **Itching or pain**
  - **Oozing**
  - **Open areas (cracking or larger ulcers)**

Venous Stasis

Venous Stasis—Not Infected

Venous Stasis—Not Infected



Severe Infection

Infected Venous Stasis

- Usually happens with open skin—ulcers, cracks
  - All open ulcers are colonized
  - Not all require treatment
- Common Bacteria: Can be polymicrobial
  - Strep species, Staph (+/-MRSA), Enterobacteriaceae, Pseudomonas, anaerobic Strep, Bacillus fragilis

Treatment

- **Severe infections**
  - **Doripenem, Meropenem, Imipenem (not ertapenem)**
  - **Pipericillin/Tazobactam**
  - **Ciprofloxacin/Levofloxacin + Metronidazole**
  - **Cefipime/Ceftazidime + Metronidazole**
  - **+/- Vancomycin if MRSA is suspected**

Pearls and Pitfalls

- **Not all ulcers are infected**
- **Minor infections or uncomplicated cellulitis can be treated outpatient**
- **Do not do swab cultures! Do a tissue culture!**

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Case

46 yo female with cold symptoms for a week and now redness around her left eye

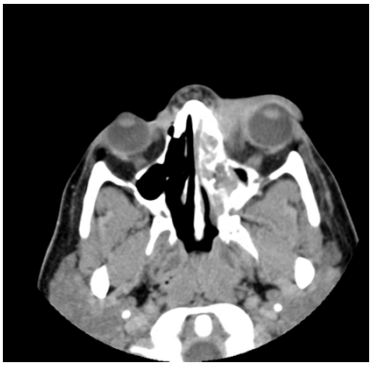
Preseptal Cellulitis

- **Involves tissues anterior to orbital septum not the eye and ocular contents. Comes from face as well as paranasal sinuses (ethmoid)**
- **Etiology: S. aureus, S. pneumonia at times MRSA**
- **Differential:**
  - **Orbital cellulitis, allergic reaction, dacriocystitis, hordeolum (stye), conjunctivitis cancer**

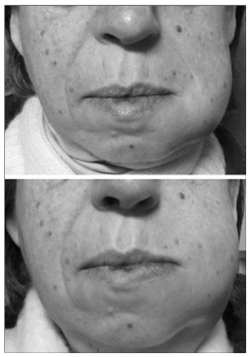
Preseptal Cellulitis

What you should expect to see…

Eyelid swelling to both lids, pain, redness



Not Preseptal Cellulitis



Preseptal Cellulitis

- **Treatment: clindamycin or trimethoprim sulfamethoxazole + (amoxicillin, amox-clavulanate or 3rd generation cephalosporin)**

Pearls and Pitfalls

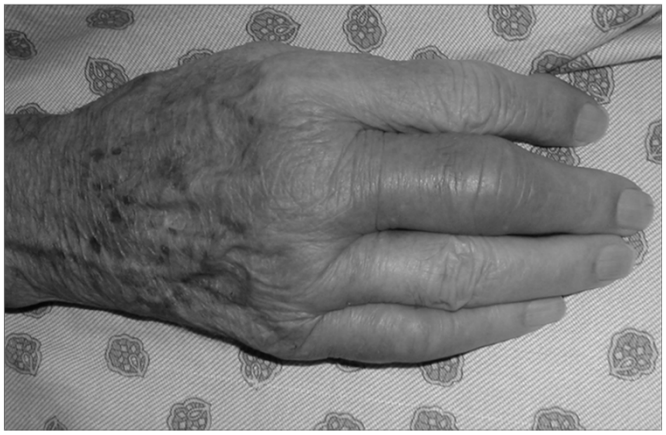
Imaging the sinuses should be considered

Proptosis, eye entrapment and abnormal vision suggest orbital cellulitis

Case

Patient in his 20s had a small puncture wound to his right thumb and 2 days later cannot straighten his thumb

Flexor Tenosynovitis



Flexor Tenosynovitis

- **Etiology: Staph, Strep, GNR and anaerobes with infection traversing the tendon sheath**
- **Differential Diagnosis:**
  - **Cellulitis**
  - **Joint infection**

Flexor Tenosynovitis

- **What you would expect to see…Kanavel's Tetrad**

  1. **Flexion contracture—Finger in flexion**
  2. **Fusiform swelling along the finger**
  3. **Tenderness along the sheath and MCP**
  4. **Pain with passive extension**

Flexor Tenosynovitis

- **Treatment**
  - **Hand surgery**
  - **Vancomycin + Ciprofloxacin or Ceftriaxone**

Pearls and Pitfalls

- **Early surgical therapy which includes tendon sheath irrigation and drainage plus or minus debridement**

Other Hand Infections

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Cases

A 17 yo male presents with a bite to his leg from a dog

Animal Bites—Dog, Cat and Human

Animal Bites—Dog, Cat and Human

- **Dog—Only 5% of untreated dog bites will become infected, which is the same as any non-bite laceration**
- **Cats—With sharper, narrower teeth get pasturella deeper into wounds–30-80% will become infected!**
- **Human–10-15% get infected. Direct bites and fight bites!**

Human Bite

Fight Bite

Pathology of Animal Bites

- All are polymicrobial but some bugs predominate. Drugs directed at these bugs
  - Dog: Pasteurella canis, Strep and Staph
  - Cat: Pasteurella multocida
  - Human: Eikenella corrodens, Viridans strep, Staph epi, Bacteroides, and Peptostreptococcus

Obviously Infected Bites

- Treatment with antibiotics
- Easy to remember!
  - Cat, Dog, Human all get Amoxicillin/clavulanate
  - AKA "Dogmentin"
- Penicillin allergic—
  - Dog: Clindamycin and fluoroquinolone
  - Cat: Cefuroxime or Doxycycline
  - Human: Clindamycin and fluoroquinolone

What About Fresh Bites?

- **Tintinalli's, Trotter, Roberts and Hedges, and Rosen's:**
  - **The only evidence-based benefit is for dog or cat bites of the hands, where infection may decrease to <2% with antibiotics**
  - **High risk uninfected wounds deserving antibiotics: All cat bites, all human bites, all bites in the immunocompromised, deep dog puncture wounds, hand wounds, and any injury requiring surgery**
  - **Tetanus prophylaxis**

Pearls and Pitfalls

- **Suspect a fight bite in anyone with a wound over the MCP joint**
- **Rabies…Talk to your local health department!**
  - **Raccoons, skunks, bats, foxes, and coyotes—Rabies vaccination is a YES!**

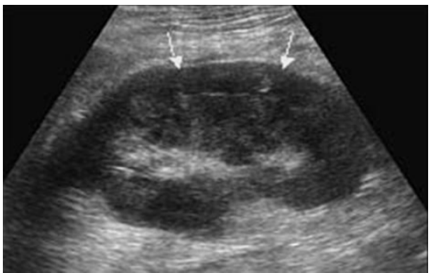
Abscesses

Doc, I Think I Got a Spider Bite!

"Devious MRSA Spider Bites Yet Another Antecubital Fossa, Remains at Large"—Gomer Blog

Abscesses

- Usually begin from skin flora and somehow find their way subcutaneously
- The center is usually liquefied or pus
- Organisms include S. aureus but also Strep and mixed flora are also possible
- Incision and drainage; main treatment



Cutaneous Abscesses

- Staphylococcal strains commonly cause rapid necrosis of tissue, large amount of creamy yellow pus
- Strep usually causes more tissue edema and less necrosis
- Anaerobic bacteria near mouth or genital areas usually cause foul smelling, brown pus

Cutaneous Abscesses

- **Treatment is incision and drainage**
- **What about antibiotics?**

Literature Summary

- **Schmitz et al. demonstrated that their was no significant difference in treatment failure at 7 day follow-up for uncomplicated abscesses following I/D between the tmp/smx and placebo group. There was a significant difference between new lesions at 30 days between the tmp/smx and placebo group.**
- **Rajendran et al. demonstrated that their was no significant difference in cure rates after I/D of uncomplicated abscess in the cephalexin vs. placebo group**

Literature Summary

- **Duong et al also observed similar improvement between tmp/smx and placebo in ED children, with treatment failure in 4% of patients with antibiotics and 5% without.**
  - **They also found significantly more new lesions in the placebo group at 10 days (26% versus 13%) but no such difference at 3 months.**

Literature Summary

- **Talan, et al, NEJM, March 2016. TMP/SMX vs. Placebo**
  - **In the setting of a high prevalence of MRSA, the addition of TMP/SMX to I & D resulted in a higher cure rate than placebo**

My Practice…

- **Antibiotics = NO for uncomplicated, immunocompetent without valvular heart disease**
- **Consider antibiotics for lymphangitits, large surrounding cellulitis, immunocompromised, systemic symptoms, etc.**
- **Consider antibiotics if MRSA is likely**

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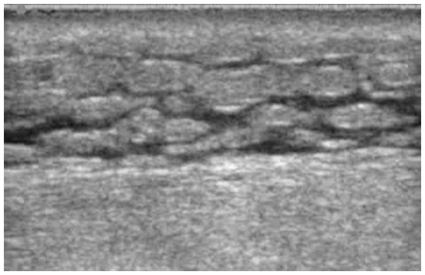
Case

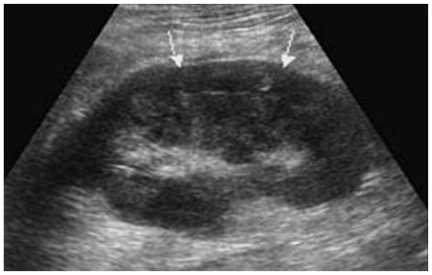
Breast feeding female with breast pain, fever, myalgias and pain. Four weeks post partum.

Courtesy of Michael J Dixon, MD.

Breast Abscess

- **Similar presentation to the case of mastitis but now ultrasound is positive for abscess**





Breast Abscess

- **Treatment:**
  - **I & D**
  - **Needle aspiration with ultrasound guidance**
  - **Dicloxacillin, cephalexin, penicillin or clindamycin**
  - **If MRSA risk factors; clindamycin or trimethoprim-sulfamethoxazole, doxycycline**

Pearls and Pitfalls

- **Usually 2 to 3 aspirations needed and surgery if skin necrosis or compromised**
- **Abscesses involving the nipple or around the areola might involve ducts…best done by a surgeon**

Case

- **25 yo male college student presents with a painful lump on his buttocks at the top of the gluteal cleft**

Skin and Soft Tissue Infections in the ED

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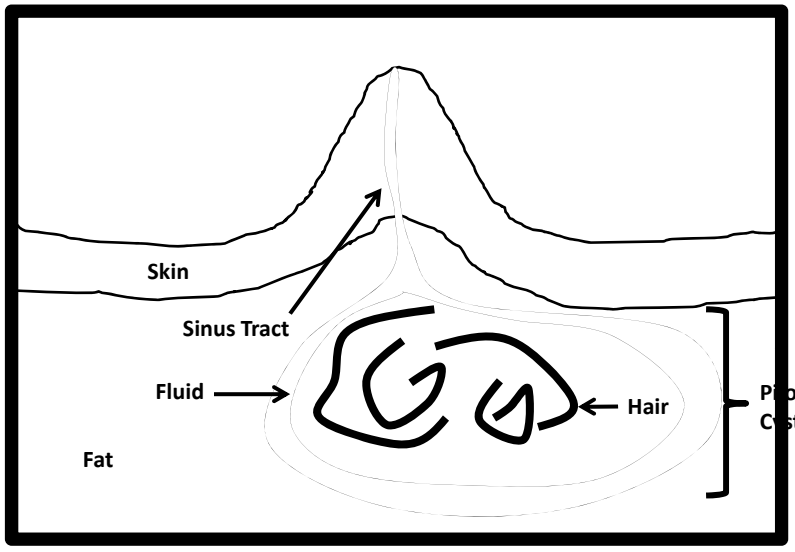
Pilonidal Abscess (Gluteal Cleft Abscess)

- **70,000 a year in the US**
- **Pilonidal disease varies from a chronically inflamed area in the gluteal cleft and/or sinus with persistent drainage to the acute presentation of an abscess or extensive subcutaneous tracts**

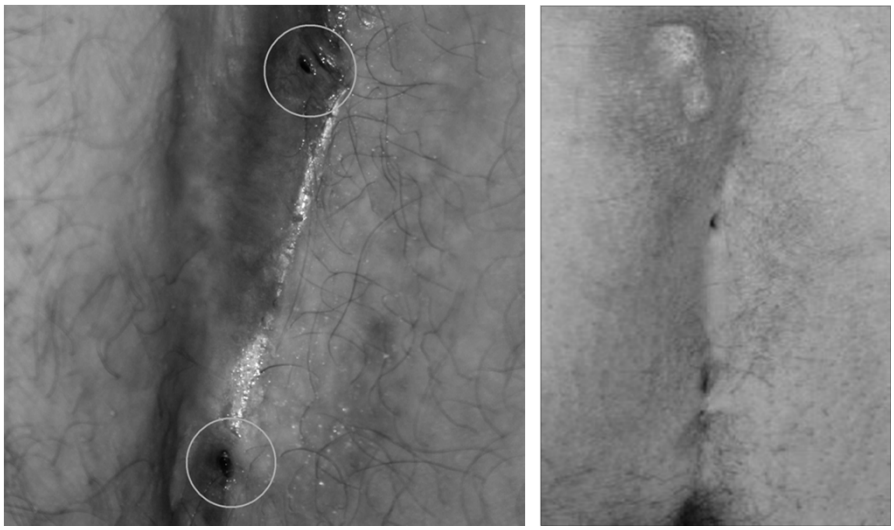
Pathophysiology

- **Originally felt to be congenital secondary to abnormal skin in the gluteal cleft**
- **The current thinking is that pilonidal disease as an acquired condition related to the presence of hair in the cleft**
  - **Foreign body reaction resulting midline pits and, in some cases, secondary infection**

Pilonidal Cyst



Pilonidal Cyst Draining to Surface



Diagnosis

- **The diagnosis of pilonidal disease is most often clinical based on the patient's history and physical findings in the gluteal cleft**
  - **Especially in patients with chronic or recurrent disease**
- **Differential Diagnosis**
  - **Hidradenitis suppurativa, infected skin abscesses, Crohn's disease, perianal fistula**

Treatment

- Shaving the affected area can help in chronic disease
- Antibiotics have limited value
  - Amoxicillin/Clavulanate, clindamycin, metronidazole
- Incision and Drainage—40% recurrence rate
- Wide excision with primary closure or healing by secondary intention—8-15% recurrence

Pearls and Pitfalls

- Effective emergency department I & D may be best accomplished with procedural sedation!
  - Also for axillary abscesses or other particularly painful areas
- Antibiotics may be helpful in patients with a lot of surrounding cellulitis
- Warn the patient of likely recurrence and need for possible definitive surgery

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Case

- **Pain near rectal area but also with bowel movements and systemically ill**

Perianal versus Perirectal Abscess

- **Perianal = infection of an anal crypt gland but can penetrate deeper structures**
- **Etiology: Anaerobes versus S. aureus and at times MRSA**
- **Differential: Hemorrhoid, Plugged duct**

Perianal vs. Perirectal Abscess

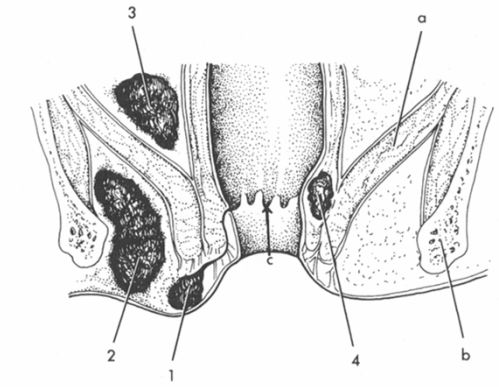


FIG. 157-2. Perirectal abscesses. *a,* Levator ani. *b,* Ischeal tuberosity. *c,* Anal crypts. *1,* Perianal abscess with anal fistula. *2,* Ischiorectal abscess. *3,* Supralevator ani (pelvirectal) abscess. *4,* Intersphincteric abscess.

Perianal vs. Perirectal Abscess

- What you should expect to see…
  - Pain, swelling, firmness
  - Systemic signs
  - Purulent drainage

Perianal vs. Perianal Abscess

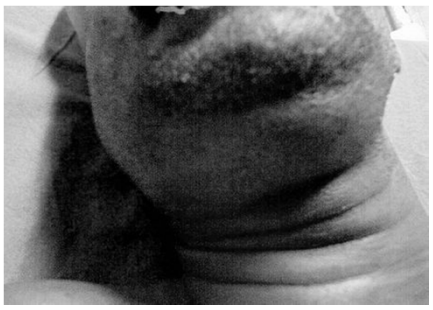
- Treatment: Perianal can be drained in the ED/office Many may need to go to the OR
  - Ischiorectal
  - Inter-sphincteric
  - Supralevator
- Broad spectrum antibiotics (with anaerobic coverage)

Pearls and Pitfalls

- **DO THE RECTAL EXAM!!**
- **Consider CT, MRI or EDUS…can be used if highly suspicious**

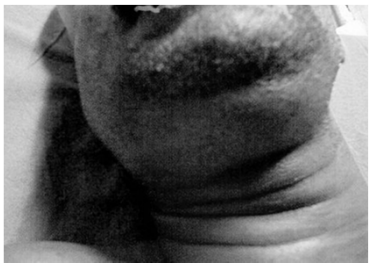
Case

- **This 40 year old male noted swelling beneath her chin after after a recent molar was extracted because of a possible infection. He has pain with swallowing or talking.**



What is the diagnosis?

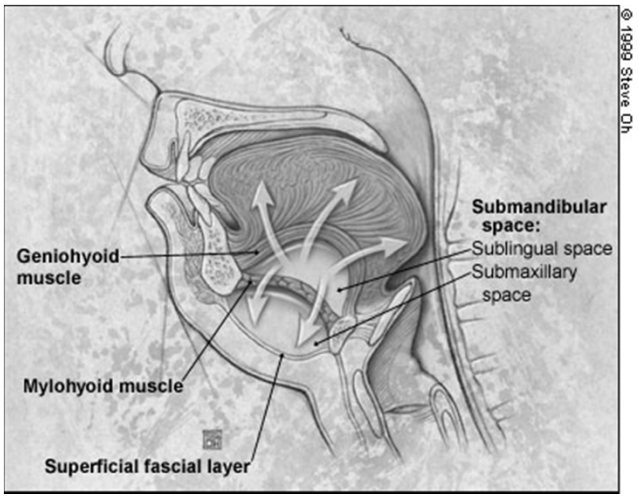
a. Peritonsilar abscess
b. Mumps
c. Herpangina
d. Vincent's angina
e. Ludwig's angina



Ludwig's Angina

- Involves submandibular and sublingual spaces and begins in floor of mouth at 2nd or 3rd mandibular molar = odontogenic origin
- Etiology: Strep viridans, Staph aureus and anaerobes especiallly Bacteroides
- Differential Diagnosis: Lemierre's, PTA, mono, periodontal abscess

Ludwig's Angina



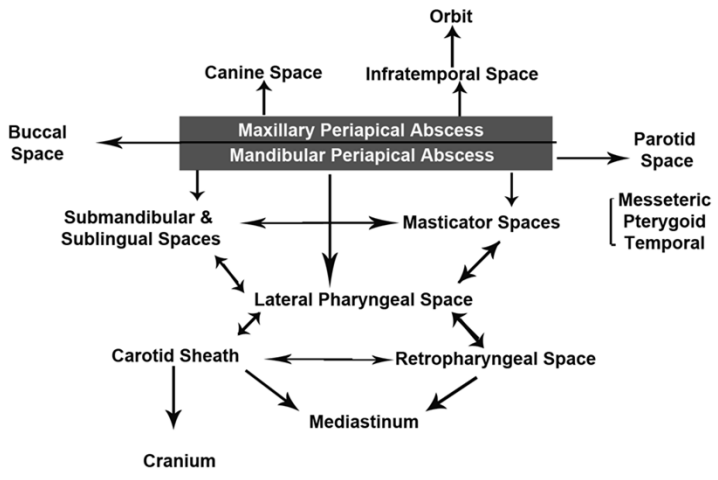
http://www.aafp.org/afp/1999/0701/p109.html

Ludwig's Angina

- What would you expect to see…
  - Mouth pain, trismus, submental swelling, muffled voice, dental pain
  - Exam with trismus, tongue elevation, stridor, Woody swelling to submandibular area. Floor of mouth is firm and tender.

Ludwig's Angina

- **Treatment: Plan for definitive airway (up to one third may require airway)**
- **Antibiotics should include pcn or 3rd gen cephalosporin and anaerobic coverage such as clindamycin or metronidazole**
- **Surgical drainage usually required,**
- **May develop DNM**



Potential pathways of extension in deep fascial space infections.

Ludwig's Angina

- Complications
  - DNM
  - Jugular venous thrombosis
  - Empyema
  - Arterial injury
  - Pericarditis
  - Osteomyelitis
  - Sepsis

Pearls and Pitfalls

- Palpate the floor of the mouth
- Neck CT with contrast is the best diagnostic test and 2nd mandibular molar is the most common source
- Submandibular swelling + tongue elevation

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Very, Very Bad Stuff That Will Kill Your Patient!!

Case

- **65 year old poorly controlled diabetic female presents with a rapidly evolving cellulitis of the lower extremity. It is extremely painful.**

Necrotizing Soft Tissue Infections

- **Includes: Necrotizing fasciitis, crepitant anaerobic cellulitis, non-clostridial myonecrosis, Fournier's disease**
- **500-1500 cases/yr**
  - **Mortality 20-40%**
  - **Survivors usually have severe morbidity**

Necrotizing Fasciitis

- **Clinical: Commonly on the lower extremities but anywhere post-op where tissue injured and more likely in patients with comorbid illnesses**

Necrotizing Fasciitis

- Findings include rash, swelling, warm skin with blisters, fever and extreme pain, crepitus, drainage
- Two distinct types of NF

Type 1 Necrotizing Fasciitis (NF)

- 85% of NF
- Patient demographics
  - PVD, immune compromise, diabetes, or surgery
- Inciting factor
  - Wound - Trauma to the skin
    - Decubitus ulcer, postoperative wound, animal or insect bite, or insulin injection site

Type 1 NF

- **Polymicrobial disease**
  - **Aerobic and anaerobic bacteria**
    - **Staphylococcus aureus, Escherichia coli, Bacteroides fragilis, and various species of Streptococci, Enterococci, Peptostreptococcus, Prevotella, Porphyromonas, and Clostridium**
  - **Group A Beta-hemolytic strep (pyogenes) makes up the largest quantity of organisms**

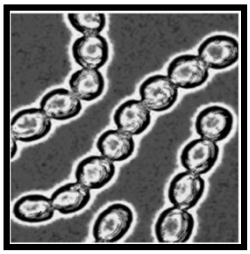
Type 1 NF in DM

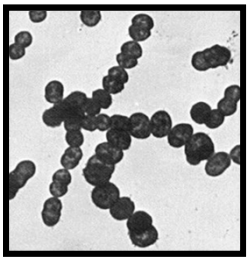
Type 1 NF in a Dialysis Pt

Type 1 NF in a Dialysis Pt

Type 2 Necrotizing Fasciitis

- **Monomicrobial: Almost exclusively group A beta-hemolytic strep (pyogenes)**
  - **Small "blip" of MRSA**
- **10-15% of all NF**





Type 2 NF

- **Type 2 NF can develop spontaneously in apparently healthy people who have minimal or no prior trauma and in the absence of a known causative factor or portal of entry for bacteria**

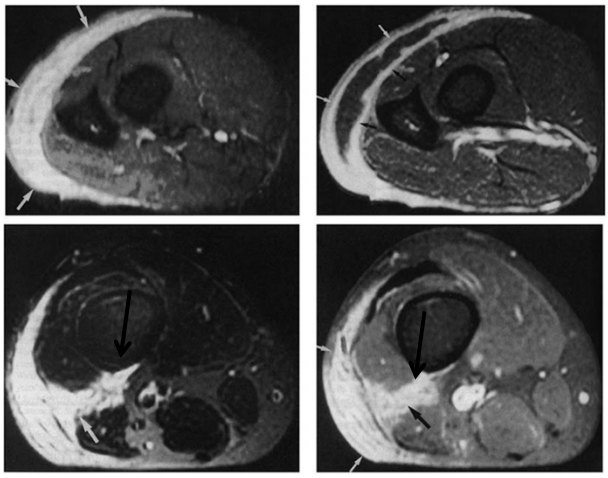
Really Bad Type 2: BB Gun

Type III NF

- Although not universally accepted, some experts use the designation of a Type III
- Vibrio vulnificus
  - This is seen in costal communities and is associated with exposure of an open wound to warm sea water

NF

- **Gas is present in only 25% of cases!!**
- **Hard diagnosis to make early**
- **MRI can help in equivocal cases**



Necrotizing Fasciitis

- **Treatment: Surgery!!!**
- **Antibiotics are secondary**
  - **Beta-lactam/beta lactamase (ticarcillin-clavulanate or piperacillin-tazobactam or carbapenem)**
  - **Clindamycin or Metronidazole for anaerobes**
  - **Consider aminoglycoside or FQ**

Hyperbaric Oxygen in NF

- **HBO is always adjunctive to the OR!**
- **Unless OR is delayed, HBO after debridement**
- **2 Treatments daily until clinical condition achieves maximal improvement**
- **Can treat right out of the OR, intubated and on pressors!**

HBO in NF Escobar, et al - 2005

- Standard regimen for HBO added to aggressive surgical debridement, antibiotic therapy and critical care
  - Mortality of 11.9%, compared with the national average mortality rate of 34%
  - There were no amputations in the HBO-treated group compared with the reported rate of 50% nationally

Fournier's Gangrene

- Polymicrobial infection, usually enteric organisms
  - Diabetes: 40 - 60%
  - Chronic ETOH: 25 – 50%
  - Immunosuppression
- 10x more in men
  - Age 60-80 most common

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- Polymicrobial infection, usually enteric organisms
  - Diabetes: 40 - 60%
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- 10x more in men
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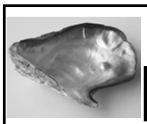
Fournier's in Women

- Typically arises from vulvar or Bartholin's abscess and spreads to involve the vulva or perineum
  - It may also complicate episiotomy, hysterectomy, septic abortion, and cervical or pudendal nerve blocks



Pearls and Pitfalls

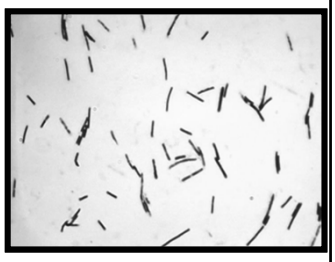
- **Pain out of proportion and rapid spread are the keys to diagnosis**
- **Don’t let a surgery resident or attending talk you out of NF without seeing the patient!**

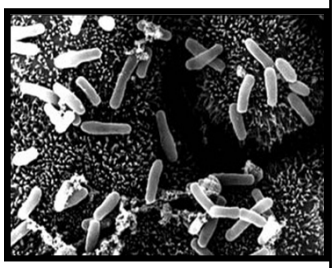
Case

- **50 yo man presents with with severe, sudden foot pain from a puncture wound he sustained when stepped on the tine of a gardening rake yesterday afternoon while gardening. He is hypotensive and tachycardic.**

Gas Gangrene: Clostridial Myonecrosis

- **Anaerobic infection causing sepsis, edema, tissue death and gas formation**
  - **Gram positive, spore-forming rod, mildly aerotolerant**
    - **Clostridium perfringens (90%)**
    - **Clostridium septicum**





Gas Gangrene

- **Symptoms**
  - **Apprehension**
  - **Pain disproportionate to wound**
  - **Shock with fever, pallor and renal compromise**

Gas Gangrene

Gas Gangrene

Xray with Gas

Gas Gangrene

Gas Gangrene

Xray with Gas

WARNING: Gas is only demonstrable in 50% of cases

Gas Gangrene Treatment

- **Surgical debridement**
- **Antibiotics: Penicillin + Clindamycin**
- **Hyperbaric Oxygen**

HBO in Gas Gangrene

- HBO used for gas gangrene since 1960's
- HBO before OR – esp if patient is unstable!
  - Halting of alpha-toxin production lasts a number of hours
- Additional effects
  - Anti-anaerobic effect and Demarcation of good tissue
- HBO 3x in 24h then BID for 2-5 days

Pearls and Pitfalls

- Rapid, sudden pain at the wound site and shock are common
- Gas may not be seen on x-ray!
- Don't let a surgery resident or attending talk you out of the diagnosis without seeing the patient!

Skin and Soft Tissue Infections in the ED

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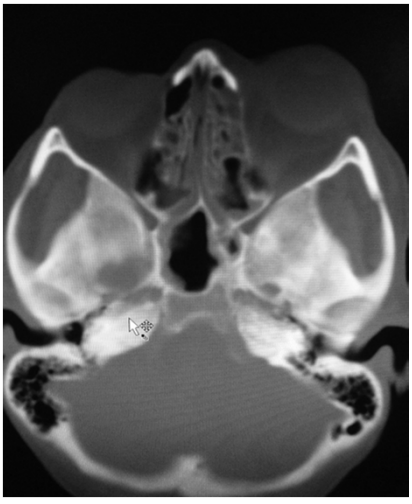
Case

Diabetic patient with chronic sinus symptoms, and now has ulcers to hard palate and thy are necrotic looking.



Mucormycosis

- **Organisms proliferate in high glucose, low acidity due to ketone reductase**
- **Infarction and necrosis of tissue characteristic due to vascular invasion**
- **Course is via rhino-orbital-cerebral with inhalation into sinuses**
- **Etiology: Mucormycosis; (order Mucororales) *Rhizopus*, *Mucor*, and *Rhizomucor***
- **Differential: Chronic sinusitis,**
- **Diagnoses with tissue, cultures or PCR**

Mucormycosis

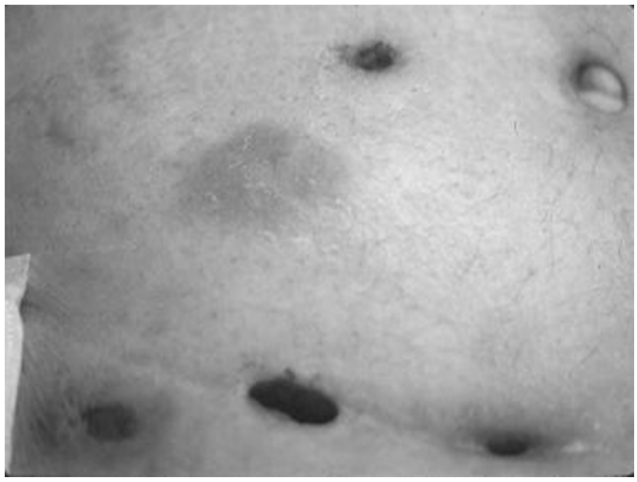
- **What would you expect to see…**
  - **Fever, sinus congestion, nasal discharge and headache**
  - **Palatal eschar is the hallmark**
  - **Orbital cellulitis can occur**
  - **Pulmonary, GI, skin, renal and CNS**

Mucormycosis

- **Treatment:**
  - **Surgical debridement**
  - **Antifungals; Amphotericin B**
  - **Control risk factors**
  - **HBO**

Pearls and Pitfalls

- **Mortality high at 25% to 60% and CT or MRI can help determine extent, iron may play a role**



Skin and Soft Tissue Infections in the ED

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Conclusions

- **Most infections can be dealt with using standard principles and common antibiotics**
- **Look for exceptions to the normally expected course!**
- **MRSA spiders are rare, until you can capture one!**
- **Stay current…with some things, this is a moving target!**

Image sources

Image of Pearl oyster: - Author: Manfred Heyde (CC BY-SA 3.0)
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Image of Caution sign - Author: Michael Pereckas (CC BY 2.0)
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