Evaluation and Management of Skin Infections and Abscesses

Carol O’Mara DNP, APRN, FNP-C
Robert Hieger, MSN, APRN, FNP
September 2019

Objectives

- Discuss the diagnosis of skin abscess
- Discuss other common “mimickers” of skin abscess
- Discuss the pathophysiology of abscess
- Discuss the Emergency Department management of skin abscess
- Discuss the guidelines of management by the Infectious Disease Society of America (IDSA)
- Discuss the role of antibiotics
- Discuss the role of MRSA

Abscess Definition

- An skin abscess is a tender mass on the skin that is generally made up of a consolidation of pus in a cavity in the body
- An abscess can be found anywhere on the body
- A cutaneous abscess is a collection of pus in the dermis and/or deeper structures
- The abscess is generally surrounded by an area of coloration from pink to deep red.
- The center elevation and/or the entire area of coloration is generally painful and warm to touch.
**Abscess Definition**

An abscess is an enclosed collection of liquefied tissue, known as pus, somewhere in the body. It is the result of the body's defensive reaction to foreign material.

### Types of Abscesses

<table>
<thead>
<tr>
<th>Septic</th>
<th>Sterile</th>
</tr>
</thead>
<tbody>
<tr>
<td>Can occur anywhere in the body</td>
<td>A milder form of the same process</td>
</tr>
<tr>
<td>Required elements</td>
<td>Caused by nonliving irritants (drugs) rather than germs</td>
</tr>
<tr>
<td>Germ and immune response of host</td>
<td>Remaining drug causes irritation of the tissues</td>
</tr>
<tr>
<td>Produce enzymes to attack the germ</td>
<td>Same response but results in sterile abscess</td>
</tr>
<tr>
<td>Digest the germ but also body tissue</td>
<td>Will often turn into hard, solid lumps as they scar, rather than remaining pockets of pus</td>
</tr>
<tr>
<td>Result: the thick yellow liquid pus that contains digested germs, tissue, wbc’s and enzymes</td>
<td></td>
</tr>
<tr>
<td>4 cardinal signs</td>
<td></td>
</tr>
<tr>
<td>Heat, swelling, erythema, pain</td>
<td></td>
</tr>
</tbody>
</table>

### Causes of Abscess Formation

- **Causes**
  - The obstruction of oil (sebaceous) glands or sweat glands
  - Inflammation of hair follicles
  - Breaks or punctures of the skin - may be microscopic
- **Epidemiology**
  - Bacteria gets under the skin surface and into the sebaceous glands
  - The body’s defense mechanism is to mount an inflammatory response in an attempt to kill the bacteria
  - Visits to the Emergency Department for cutaneous abscesses more than doubled from 1.2 million to 3.3 million from 1996 to 2005

### Pathogenesis of an Abscess

- Middle of the abscess liquefies and contains dead cells, bacteria and debris
- The area begins to enlarge in reaction to the inflammatory response
- This enlargement will cause increased tension under the skin and increase the inflammatory response
- The body defense mechanism continues to attempt to destroy the bacterial cells
- The pressure and inflammation are responsible for the increasing pain
Pathogenesis of an Abscess

- Typical organisms
  - *Staphylococcus aureus*
  - Group A & B *Streptococcus*
  - *Streptococcus pyogenes*
  - Mixed aerobic and anaerobic
- In deep abscesses:
  - Gram-negative particularly E coli
  - Anaerobes (e.g., *Bacteroides*)

Characteristics/Risk factors for Abscess development

- Individuals with weakened immune system
- Chronic steroid use
- Chemotherapy
- Diabetes
- Cancer
- AIDS
- Peripheral Vascular Disease
- Severe burns
- Alcoholics/IV drug users
- Environmental
- Exposure to unclean environments
- Exposure to persons with skin infections
- Poor Hygiene
- Poor circulation in living space

Physical exam

- Skin surface
  - Redness
  - Pain
  - Swelling
  - Fluctuance
  - May have “pointing” or “tenting” of the skin in the center
- Ultrasound
- Incision and Drainage
Indications for Incision and Drainage

- Abscess on the skin which is palpable
- Enlarged abscess
- Evidence at the abscess site of erythema and/or pus
- Exceptional tenderness at / or adjacent to the abscess
- Incision and drainage is a definitive treatment
- Antibiotics alone are ineffective

Contra-indications to Incision and Drainage

- Extremely large abscess which requires extensive incision, debridement or irrigation
- Deep abscess in very sensitive area (supralevator, ischiorectal, perirectal) which require a general anesthetic to obtain proper exposure
- Palmar space abscess
- Deep plantar space abscess
- Abscess in the nasolabial folds
- Abscess of surgical incision (relative)

The Abscess “mimicker”

- Spider bite
  - There are > 37,000 species of spiders
  - Local reactions:
    - Erythema, swelling, itching, pain
    - Continues to worsen > 24 hours
  - Black widow
    - Fang marks identifiable
    - Local symptoms of: erythema, swelling, itching
    - Systemic symptoms of: chills, muscle cramps, body aches, tachycardia
    - Brown recluse
      - Occurrence: April to October
      - No erythema & wound is dry
      - Evidence of necrotic tissue
Pharmacology of Local Anesthetics

- **Lidocaine:**
  - short onset (1-2 minutes) and 1-2 hour duration
- **Bupivacaine, Marcaine, Sensorcaine:**
  - 10-15 min onset and 2-6 hr duration
  - These anesthetics are part of the hydrophilic amide group
  - Amide is heat stable
  - Work by interfering with sodium influx across the nerve membrane
  - High lipid solubility allows for neural sheath solubility
  - Drug passes through lipid membrane if ionized
  - Alkaline environment required for drug to be ionized

Incision and Drainage Procedure

- **Incision and Drainage:**
  - Use curved hemostat to break up loculations
  - If purulent drainage large, can use Yankauer to suction out drainage
- **Irrigation**
  - With normal saline
  - Vigor of cleansing
- **Packing**
  - To pack or not to pack ??
  - Purpose is to keep the wound open
  - No advantage with iodoform over plain
  - Follow up in 48 hours

Abscess drainage - needed tools
Types of incisions

- **Simple linear:**
  - Carry the incision the entire length of the cutaneous abscess (controversial)
  - Allows for more complete drainage
  - Facilitates break up of loculations
  - “Stab” incision:
  - May produce pus after initial stab
  - Not adequate for complete drainage of the abscess

- **Cruciate:**
  - Use in specialized areas ONLY
  - An elliptical skin incision
  - Should be AVOIDED in routine care of simple cutaneous abscesses
  - Tips of the flaps are more susceptible to necrosis - resulting

**PROCEDURE**
- Clean incision
- Care adequate local anesthesia
- Make sure to take out all the pus

Video for I & D Abscess

- **Cruciate:**
  - https://www.youtube.com/watch?v=sqYchIXOPnQ

- **I & D**
  - https://www.youtube.com/watch?v=XV1j0-EaNO4

- **Loop:**
  - https://www.youtube.com/watch?v=df4k085Z-JM

Abscess drainage by incision and loop

**Needed tools**
Incision and loop Drainage

Pros:
- Better tolerated by patient
- More patient involvement in self care
- Better cosmesis
- More cost effective

Cons:
- Second incision
- Patient must remember to move the loop
- More dressing care/changes

Video of Incision and loop drainage:
https://www.bing.com/videos/search?q=abscess+incision+and+loop+drainage&qpvt=abscess+incision+and+loop+drainage&view=detail&mid=0BD2F2D3DE63D7AF6A940BD2F2D3DE63D7AF6A94&FORM=VRDGAR

Packing versus Loop Drainage

Message

A

B

Source: Scott 2016 | CC BY-NC-ND 3.0
Antibiotics: To give or not to give

- Very little evidence that skin abscess cause bacteremia
- Bacteriology is polymicrobial
- Antibiotics NOT recommended
  - For immunocompetent patients
  - If must use antibiotics,
    - Include those that have activity against MRSA
    - In the presence of cellulitis
    - Immunocompromised patient, diabetic patient, pilonidal cysts
    - Prophylaxis against infective endocarditis

The spider bite

MRSA wounds

MRSA Day 1-2  MRSA Day 3-4
The Pack/No-pack Controversy

- Based on the literature currently available:
  - Research studies in 2009 (n=48), Kessler et al 2012 (n=57)
  - Review of the literature in 2014 by D. Baalmann MD
  - Insufficient evidence to support routine packing of subcutaneous abscess
  - No evidence of increased recurrence of abscesses
  - Positive evidence of increased pain to patient
  - Packing small abscesses less than 5 cm is not warranted
  - This excludes the immunocompromised, diabetic population, & pilonidal cysts
  - Packing does not decrease the need for re-intervention or follow-up
  - It often increases the pain for patients, necessitating pain (opioid) medications
  - If packing: Pack loosely and minimal to moderate amount

- Limitations to current research:
  - All studies were small in number of participants
  - All patients with the above co-morbidities were excluded from the study
Infectious Disease Society of America:
Skin & Soft Tissue Infections (SSTI) Guidelines

- Purulent Infections:
  - Mild, purulent infections: I & D
  - Moderate, purulent infections: I & D / C & S
    - Presence of systemic signs of infection (fever, abnormal WBC, etc)
  - Severe, purulent infections: I & D / C & S
    - Empiric tx with vancomycin or daptomycin (Cubicin) or linezolid (zyvox) or Televancin (Vibativ) or Ceftaroline (Teflaro)
    - If Methycillin Resistant Staph Aureus (MRSA)
      - continue empiric treatment
    - If Methycillin Sensitive Staph Aureus (MSSA)
      - give nafcillin or cefazolin or clindamycin