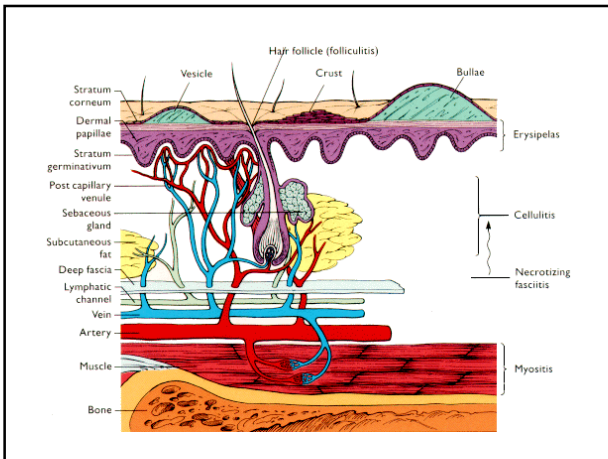


Wound-, skin- and soft tissue infections caused by bacteria

Normal flora of the skin

1. **resident:** coagulase-negative staphylococci, corynebacteria, micrococci, bacilli, alfa-haemolytic streptococci
 2. **transient:** S.aureus, Streptococcus pyogenes
- Protective mechanisms:
- Dry environment
 - acidic pH
 - lysozime
 - Cytokin production by keratinocytes



Skin infections

- I. **Pyoderma:** pyon=pus derma=skin
 1. Primary pyodermas
 - Infections of the skin and the subcutis
 - cellulitis
 - gangraena
 2. Secondary pyodermas
 3. Skin symptoms of systemic infections

Primary pyodermas I.



1. **Impetigo** (superficial purulent pyoderma with crusts)
 - a) impetigo contagiosa
 - Streptococcus pyogenes ± Staphylococcus aureus
 - other streptococci rarely „C“, „G“, „B“
 - b) bullous impetigo
 - Staphylococcus aureus

Primary pyodermas II.



2. **Folliculitis** (inflammation of hair follicles)
 - superficial and deep ~
 - S. aureus
 - Candida
 - P. aeruginosa– Enterobacteriaceae

Primary pyodermas III.



- 3. Furuncle, carbuncle**
Inflamed erythematous nodes
Clump of pus; may be fluctuating
➤ *S.aureus*

Primary pyodermas IV.



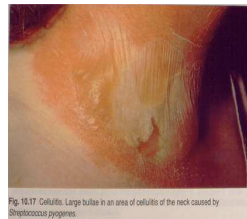
- 4. Paronychia (inflammation of nail margins)**
➤ *S. aureus*
➤ *Candida* spp.
5. Ecthyma (ulcer covered by crust)
➤ *S. aureus*, *S.pyogenes*
➤ *P. aeruginosa* (alcoholism, immunosuppression)
6. Pseudomembraneous ulcer
➤ *Corynebacterium diphtheriae*

Primary pyodermas V.



- 7. Erysipelas**
➤ *S. pyogenes* (extremely rarely „C”, „G”, „B”, or *S.aureus*)

Primary pyodermas VI.



- 9. Cellulitis**
Acute disease involving the skin and subcutaneous tissues
• Usually preceded by a microabrasion
• Spreads via lymph vessels
• Serious, possibility of bacteraemia
➤ *S. aureus*, *S. pyogenes*, streptococcus „B”, „G”, „C”
➤ *Erysipelothrix rhusiopathiae* – erysipeloid (pigs, poultry, raw fish)
➤ *H.influenzae*
➤ Gram-negatives (*proteus*, *serratia*, etc.) in the immunocompromised
➤ *E. coli* – in children with nephrosis sy.
➤ *Aeromonas hydrophila* – in fresh water through microabrasions

Primary pyodermas VII.

Necrotizing soft tissue infections :
Rapid course, extensive necrosis

- **Gas gangrene**
➤ *C. perfringens*, other clostridia (*C.septicum*)
- **Necrotizing fasciitis/myositis**
➤ *S.pyogenes/S.aureus*

Secondary pyodermas I.

- 1. Burnt wounds:** *P. aeruginosa*, *S.aureus*, (MRSA) streptococci
- 2. Ekzema:** Enterobacteriaceae, *Aspergillus*
- 3. Chronic ulcer (decubitus, foot ulcer):** coliforms, *P. aeruginosa*, enterococci, *Bacteroides* spp., peptostreptocci, *C. perfringens*, *S. aureus*, *S. pyogenes*
- 4. Traumatic lesion (bite):** *P. multocida*, *C. diphtheriae*, *S. aureus*, *S. pyogenes*
- 5. Acne conglobata:** *Propionibacterium acnes*

Secondary pyodermas II.

6. Lacerations and gunshot wounds

Infection risk is affected by:

- extent of tissue necrosis
- foreign body
- contamination with exogenous or endogenous bacteria
- S. aureus, S. epidermidis, streptococci, corynebacteria, P. aeruginosa, Enterobacteriaceae, Acinetobacter sp. clostridia, Bacteroides spp.
- C. tetani – potentially all wounds can be contaminated

Secondary pyodermas III.

Postoperative wound infections

source:

- Exogenous:
 - failed asepsis
 - air
- Endogenous:
 - resident flora of deep skin, opening of the gut
 - hematogenous (infectious focus)

predisposing factors:

- extent of tissue necrosis
- perioperative chemoprophylaxis
- underlying disease
- virulence and cfu of pathogens
- type of operation ('clean', etc.)
- local and systemic immune response

Microorganisms in decreasing frequency

- S.aureus
- CNS
- enterococci
- E.coli
- P.aeruginosa
- Enterobacter spp.
- Proteus mirabilis
- Klebsiella pneumoniae
- streptococci
- Candida albicans
- Bacteroides fragilis

Skin rash of systemic bacterial and fungal diseases

1. Bacteraemia (septicemia):

- S. aureus, S. pyogenes, viridans streptococci, N. meningitidis, N. gonorrhoeae, P. aeruginosa, S. typhi, H. influenzae

2. Fungaemia:

- Candida, Cryptococcus,

3. Listeriosis:

- L. monocytogenes

4. Leptospirosis:

- L. interrogans



meningococcaemia

Sample collection

1. Open wounds:

- skin disinfection around the wound
- necrectomy
- taking a swab specimen from the inflamed area
- putting it into a transport medium

2. Deep wound and/or wounds with a closed surface:

- skin disinfection around the wound
- needle aspiration or surgical specimen collection
- putting it into a transport medium or sending immediately to the laboratory in the airtightly closed syringe (**anaerobes!!!**)

Pus is sterile in most cases!

Therapy

- Local
 - antiseptics
 - modern bandages with liquid containment
 - targeted local antibiotic therapy
- systemic
 - targeted antibiotic therapy