

## Skin Infections

- The skin has a variety of natural defenses, making infection by bacteria more difficult. These include:
- Arid surface, antimicrobial properties of secreted lipids, and competition from the normal bacterial flora. In addition, the skin has an active immune system that combats invasion.
- Factors that promote infection include :
- Chronic moisture and occlusion, as may occur in the body folds, breaks in the surface of the skin (e.g. after scratching or from bug bites), decreased lipids, as occurs during isotretinoin therapy, and a compromised immune system.
- External factors can add to this and include infrequent bathing and poor hygiene.
- In addition there are several points on the integument that are weaknesses in the body's defenses. Specifically, the follicle is a common site for bacterial invasion and proliferation, as well as the potential space between the periungual skin and nail.

### Common Bacterial Skin Diseases

#### **Staphylococcus aureus**

- Folliculitis
- Furunculosis (boils)
- Impetigo.
- Methicillin (meticillin) resistant Staph. aureus
- Staphylococcal scalded skin syndrome
- Toxic shock syndrome.

#### **Streptococcus pyogenes**

- Cellulites.
- Erysipelas.
- Impetigo.
- Necrotizing fasciitis.
- Scarlet fever.

#### **Corynebacterium spp.**

- Erythrasma.
- Pitted keratolysis.
- Trichomycosis axillaris.

#### **Less common bacterial infections include:**

- Neisseria gonorrhoeae
- Neisseria meningitides
- Haemophilus ducreyi: **chancroid**
- Pseudomonas aeruginosa: wound infections, athlete's foot, and gram negative folliculitis.  
Calymmatobacterium granulomatis: **Granuloma inguinale**.
- Treponema species: **syphilis**, yaws and pinta.
- Mycobacterium species: **Tuberculosis, leprosy** and atypical Mycobacteria.

## Staphylococcal Skin Infections

**Staphylococci** can be divided into two clinically relevant groups:

- Coagulase-positive staphylococci (*Staphylococcus aureus*) producing both invasive and toxin-mediated infections.
- Coagulase-negative staphylococci (*Staphylococcus epidermidis*), causing variety of hospital infections.

## Folliculitis

Hair follicle staphylococcal infections include:

- Folliculitis (surface pustules) including sycosis barbae
- Furunculosis (deeper boils)
- Abscesses: lesions greater than 0.5cm

**Definition:**

- Hair follicle infection or irritation. The most common forms are caused by invasive staphylococci, but other bacteria, viruses, and fungi, physical and chemical irritations are also may be responsible.

**Clinical features:** Tiny pustules with erythematous border localized in superficial aspect (Infundibulum) of follicle.

**Site:** In children, usually scalp; in adults, trunk, buttocks, thighs, beard area.

**Therapy:**

- Topical antiseptics or antibiotics (mupirocin, fusidic acid or erythromycin).
- If lack of response, systemic antibiotics (penicillinase-resistant penicillins or first-generation cephalosporin for 7–10days).

## Furuncles

**Clinical features:**

- Deep follicular infection that starts as firm red nodule which rapidly becomes painful and then, after a few days, fluctuant.
- Heals with scarring over Weeks.
- In some individuals, chronic-recurrent.

**Site:** Neck, face, axillae, groin, upper back.

**Caution:** There is a risk of sepsis in immunosuppressed patients.

**Complications to Avoid:** Furunculosis in the nasal and Perioral area can result in Cavernous sinus infection. Bacteremia can also result causing significant morbidity and mortality

**Therapy:**

- Avoid manipulation; topical antiseptics, systemic antibiotics (penicillinase-resistant penicillin or first-generation cephalosporin for 7–10days).
- Solitary furuncle: Systemic antibiotics; incision and drainage after several days when fluctuant.

**Recurrent furuncles (Furunculosis):**

- Systemic antibiotics (often clindamycin 300mg for 7–10days),
- search for predisposing factors (diabetes mellitus, Immunosuppression, perineal or nasal carriage of *Staphylococcus aureus*)

## Carbuncle:

- Is a confluence of furuncles with multiple sinus tracts.
- The posterior neck is a typical location.
- Occasionally these more complex lesions are associated with fever, malaise, and lymphadenopathy.
- Chronic staphylococcal carriage, diabetes, and obesity are predisposing factors.

## Impetigo

- Is a contagious, superficial skin infection may be caused by staphylococci, streptococci, or by both together.
- As a useful rule of thumb, the bullous type is usually caused by Staphylococcus aureus.
- whereas the crusted ulcerated type is caused by  $\beta$ -haemolytic strains of streptococci.
- The streptococcal form predominates in warm, humid climates,

### Clinical Presentation:

- A thin-walled flaccid clear blister forms, and may become pustular before rupturing to leave an extending area of exudation and yellowish crusting (honey color).
- Lesions are often multiple, particularly around the face. The lesions may be more obviously bullous in infants.
- Impetigo may occur as a secondary phenomenon in atopic eczema, scabies and head louse infection.

### Course:

- The condition can spread rapidly through a family or class. It tends to clear slowly even without treatment.

### Complication:

- Streptococcal impetigo can trigger an acute glomerulonephritis.

### Investigation and Treatment:

- The diagnosis is usually made on clinical grounds. Swabs should be taken and sent to the laboratory for culture, but treatment must not be held up until the results are available.
- Systemic antibiotics (flucloxacillin, erythromycin or cephalexin) are needed for severe cases or if a nephritogenic strain of streptococcus is suspected (penicillin V).
- For minor cases the removal of crusts and a topical antibiotic such as Mupricine neomycin, fusidic acid.

## Streptococcal Infections

- **Streptococcus pyogenes** (group A,  $\beta$ -hemolytic streptococci) account for 90% of infections.
- Streptococcus viridans ( $\alpha$ - hemolytic streptococci) and Streptococcus pneumoniae are other important members of the group.
- The principal human skin pathogen is occasionally found in the throat and may persist after an infection.
- It is sometimes carried in the nose and can contaminate and colonize damaged skin.

## Erysipelas:

**Definition:** Acute superficial cellulitis involving dermal lymphatics; caused by Group A- streptococci.

**Pathogenesis:**

- There is usually a portal for entry. On the face, it is often herpes simplex; on the legs, interdigital tinea with maceration.
- The streptococci come from nasal or perineal carriage, or from respiratory tract infections.

**Clinical features:**

- Bright red, sharply demarcated, rapidly spreading erythematous patch. On the face, usually symmetrical involving the cheeks.
- On the legs, unilateral with associated swelling, Fever, chills, & malaise.

**Complications:**

- Recurrent infections lead to lymphatic damage and then lymphedema.
- Glomerulonephritis.

**Caution:**

- In immunosuppressed patients, there is a risk of sepsis, necrotizing Fasciitis or shock if treatment is not prompt.

**Diagnostic approach:** Lesion very difficult to culture; can attempt aspirates from edge. Elevated white blood cell count, and C-reactive protein.

**Therapy:**

- High-dose penicillin i.v.; raise limb; cool compresses.
- Later attempt to address portal of entry; consider compression, prophylactic antibiotics.

## Cellulitis:

**Definition:** Deep infection involving dermis and subcutaneous fat, and often extending to muscles or bones.

**Pathogenesis:**

- Staphylococci and streptococci are the most common causes, but many other organisms may be involved including *Clostridium* (gas gangrene), *Haemophilus influenzae* (facial cellulitis), Gram-negative bacteria, and often mixed infections.
- Often a history of trauma or impaired circulation is present.

**Clinical features:**

- Localized deep erythematous process usually associated with systemic signs and symptoms.

**Therapy:**

- Culture-directed systemic antibiotic therapy.
- Incision and drainage may also be needed.

## Ecthyma

**Definition:** Ulcerative infection usually caused by group A streptococci.

**Epidemiology:** Patients often show immunosuppression, inadequate nutrition, poor hygiene (homeless, drug abusers). Also common in tourists following visits to the tropics.

**Clinical features:**

- Punched-out ulcers, usually on legs, presumably at sites of minor trauma.
- Typically 0.5–3.0cm with peripheral erythema.
- Healing is slow and with scarring.

**Therapy:**

- Address predisposing factors; compression therapy may be needed.
- Topical disinfectants or fusidic acid ointment, mupirocin ointment. Culture-directed systemic antibiotics.

## Gram-positive Bacteria: Corynebacteria

### Erythrasma:

- A dry, reddish-brown, slightly scaly and usually asymptomatic eruption that affects the body folds.
- It fluoresces coral-pink with Wood's light, due to the production of porphyrins by the corynebacteria minutissimum.
- Imidazole creams, topical fusidic acid or oral erythromycin are effective.

### Trichomycosis axillaris:

- This is a common condition, seen, if looked for, in up to one-quarter of adult males.
- The axillary hairs become beaded with concretions, usually yellow, made up of colonies of commensal diphtheroids.
- Clothing becomes stained in the armpits.
- Topical antibiotic ointments, or shaving, will clear the condition.

### Pitted keratolysis

- The combination of unusually sweaty feet and occlusive shoes encourages the growth of diphtheroids organisms that can digest keratin.
- The result is a cribriform pattern of fine punched-out depressions on the plantar surface, coupled with an unpleasant smell.
- Fusidic acid or mupirocin ointment is usually effective.
- Occlusive footwear should be replaced by sandals and cotton socks if possible.

## Gram-negative Bacterial Infections

### Pseudomonas infections:

*Pseudomonas aeruginosa* causes a wide variety of cutaneous infections, ranging from harmless to life-threatening.

### Pseudomonas Paronychia

**Definition:** Infection of nail apparatus with *Pseudomonas aeruginosa*.

#### Clinical features:

- Patients usually have prolonged exposure of hands to water and lack an intact cuticle.
- Painful erythematous swelling of nail fold with green-gray discoloration of nail.

#### Diagnostic approach:

- Wood's light examination as *Pseudomonas aeruginosa* produces a green fluorescent pigment.
- Bacterial and fungal cultures.

**Differential diagnosis:** All forms of paronychia, especially candidal.

#### Therapy:

- Drying measures, topical antiseptics, acetic acid (vinegar soaks, followed by blow drying).
- Correcting the predisposing factors.
- If mixed infection with *Candida albicans*, also treat with imidazole solution or systemic fluconazole.
- In rare circumstances, systemic antibiotic therapy; check with public health for patterns of resistance of organism.

## Wound and Burn Infections

- *Pseudomonas aeruginosa* is a common colonizer of burns and extensive wounds, imparting a green color and sweet-sour smell to the exudate.

### Diagnostic approach:

- Culture and sensitivity;
- the wounds can be screened with Wood's light, as the green bacterial pigment fluoresces.

### Therapy:

- Most patients have superficial infections which can be treated with wet dressings using disinfectants.
- Risk of pseudomonas sepsis, especially in patients with diabetes mellitus or immunosuppression.

## Pseudomonas Sepsis

- Life-threatening infection with *Pseudomonas aeruginosa*, which can sometimes be diagnosed early on the basis of skin findings.
- Predisposing factors include immunosuppression, diabetes mellitus, malignant tumors, and long-term antibiotic therapy.

### Clinical features:

- Initially hemorrhagic vesicles and blisters, solitary or grouped, and widespread.
- Tendency towards ulceration in flexural areas.
- Also widespread hemorrhagic lesions known as *ecthyma gangrenosum*.
- Advances to subcutaneous abscesses and cellulitis gangrenosa, which resembles decubital ulceration but not localized at sites of pressure.

**Diagnostic approach:** Suspect in acutely ill patient with risk factors and cutaneous hemorrhage or ulceration; Gram stain of smear; tissue for culture and histology.

### Differential diagnosis:

Almost any organism can cause sepsis in immunosuppressed patients. Possibilities include meningococcal sepsis and purpura fulminans.

### Therapy:

- Broad-spectrum antibiotic coverage based on culture and sensitivity results;
- Initial therapy with tobramycin, perhaps combined with broad-spectrum penicillins or cephalosporins.