

Pyoderma

Pyoderma is a **purulent skin infection**. It is most often caused by *Staphylococcus aureus* and group A beta-hemolytic streptococci - e.g. *Streptococcus pyogenes*.^[1] The most common pyoderma includes impetigo, furuncle, carbuncle, phlegmon, and erysipelas, in children the dominant one is impetigo contagiosa. The onset of infection depends on the overall condition of the body, the local condition of the skin, the virulence of bacteria, and the influence of the external environment.

Skin protection against infection

- the skin is populated by microbes with low virulence - the so-called resident bacterial flora, which prevents the colonisation of the skin by pathogenic microorganisms;
- corynebacteria and other resident microorganisms release lipases that break down sebum and the released fatty acids, which contributes to defence against pathogenic streptococci and staphylococci;
- propionibacteria produce propionic acid which has high antimicrobial activity;
- cutaneous immune system:
 - Langerhans antigen-presenting cells;
 - keratinocytes producing a number of cytokines, many antimicrobial peptides and proteins (**β-defensin 2** against gram-negative bacteria and fungi and **β-defensin 3** against *Pseudomonas aeruginosa*).^[2]



Impetigo

Pathogens and their virulence

- ***Staphylococcus aureus*** - produces *coagulase* and *hemolysins* that facilitate the penetration of infection along the hair follicles and sebaceous glands into the deeper layers;
- **group A beta-hemolytic streptococcus** - produces *streptokinase* and *hyaluronidase*, which allow surface spread;
- some strains of streptococci and staphylococci are able to produce *exotoxins* that act either directly (staphylococcal epidermolytic toxin → "staphylococcal scalded skin syndrome") or by releasing other biologically active mediators such as cytokines, leading to toxic shock syndrome;
- streptococci and staphylococci are able to penetrate the bloodstream and lymphatic system and cause disseminated manifestations such as coagulopathy and vasculopathy.^[2]

Impetigo contagiosa

- contagious skin infection affecting the surface layers of the skin (superficial pyoderma);
- relatively common, affects children and adults, spreads rapidly, especially in children's groups (especially preschool and school children);
- **etiology**: *Streptococcus pyogenes*, *Staphylococcus aureus*, or both;
- incidence is higher in the summer (heat, humidity);
- characteristic **clinical picture**; maculovesicular ("nebulous" - more common), bullous, and mixed forms are distinguished;
 - nebulous form: red macular deposits with a diameter of about 2 cm, on which very small blisters are formed → they crack → eroded reddish deposits are formed → they gradually cover with honey-yellow or yellow-green crusts, caused by drying of the secretions, other deposits form very quickly in the vicinity;
 - bullous form - etiology: coagulase positive *Staphylococcus aureus* producing exotoxins - exfoliatin or epidermolytic toxin A or B; a blister (bulla) on the reddish base → it cracks → oozing red deposits with a border of scales on the periphery form;
- most often on the face, but can be anywhere on the body;
- sometimes lymphadenopathy is present;
- **treatment** - according to the extent of manifestations:
 - topical: antiseptic solutions and antibiotic ointments (mupirocin, fusidic acid, bacitracin, etc.);
 - general: antibiotics according to susceptibility;

When group A hemolytic streptococci are detected, general treatment is appropriate due to the risk of glomerulonephritis - it's necessary to perform repeated urine tests.^[2]

 For more information see *Impetigo*.

Perianal dermatitis

- **etiology**: *Streptococcus pyogenes*, rarely *Staphylococcus aureus*;

- in 70% of cases it affects boys aged 6 months to 10 years; in 10% concurrent pharyngitis; often relapses;
- **clinical picture:** redness surrounding the anus, sometimes with mild infiltration and swelling → painful fissures and psoriasiform deposits covered with yellowish crusts → make defecation difficult;
- **treatment:** penicillin p.o. for 10 days; in staphylococcal infection, clindamycin; + topical antibiotic ointment.^[2]

Purulent inflammations of the hair and hair follicles

- relatively common;
- the infection is facilitated by mechanical influences (rubbing with clothes, shaving, etc.) in combination with sweating and staying in a humid environment → they damage the infundibulum of the follicles;
- **etiology:** *Staphylococcus aureus*;

According to the location of inflammation

- **osteofolliculitis** - purulent pustule in the mouth of the follicle → antiseptic or antibiotic solutions;
- **folliculitis** - purulent inflammation of the entire follicle, painful → pustule ruptures → yellow-green crusts;
 - predisposing factors: sweating and friction in intertriginous locations, abrasion by clothing, poor hygiene, obesity, diabetes;
 - antiseptic or antibiotic solutions, event. during a chronic progression, antibiotics in general;
 - **folliculitis** caused by *Pseudomonas aeruginosa* ("Hot Tub Folliculitis") - follicular pustules with erythema in the vicinity;
 - after a stay in poorly maintained and low-chlorinated pools, whirlpools and aqua centres;
 - most often on the torso, buttocks, lower limbs, and in areas under the swimsuit;
 - sometimes mild general symptoms: headache, nausea, fever and arthralgia; urinary tract infections;
 - skin manifestations resolve spontaneously in 7-10 days; in case of complications, general antibiotic treatment is appropriate;
- **furuncle** - follicular skin abscess arising either from folliculitis or primarily;
 - follicularly bound pustule with the gradual formation of a reddening painful bump with central yellowish pin → coliquation in the central part of the bump → release of the central necrotic pin → emptying of the purulent bump → destruction of the follicle → scar;
 - most often on the neck, external auditory canal, nose, armpits, buttocks and groin;
 - lymphadenopathy, sometimes subfebrile temperature; antibiotic treatment locally or generally;
- **carbuncle** - is formed by the connection of several neighbouring furuncles;
 - treatment with antibiotics in general.^[2]

Erysipelas

Erysipelas is an acute localised inflammation of the skin with an alteration of the general condition (fever, chills, headache, exhaustion). Erysipelas most often occurs on the feet and face. The gateway to the infection is a broken skin barrier. The disease tends to recur.

- deep pyoderma - acute skin and subcutaneous tissue infection accompanied by general symptoms;
- rarely in children, eg during immunosuppression;
- **etiology:** *Streptococcus pyogenes*, rarely other bacteria;
- the gateway is usually a small abrasion or erosion → it spreads through the lymphatic system;
- sudden onset - chills, shivering, nausea, headaches and fevers up to 40 ° C → in a few hours, edema and erythema develop in the affected area - most often the face or limbs, extending into the periphery, the skin is painful and warm to the touch; enlarged and painful regional lymph nodes, sometimes with lymphangitis;
- **treatment:** penicillin i.v. or i. m. for 10-14 days, terminated by the application of pendepon; clindamycin used in penicillin allergy; cold compresses, anti-inflammatory ointments.^[2]

 For more information see *Erysipelas*.

Phlegmon

Phlegmon is an acute form of inflammation that spreads not only in the skin but also in the subcutaneous tissue and other soft tissues. The tissue is slushy and pus droplets leak out of it.

 For more information see *Exsudative interstitial inflammation*.

Toxin-induced syndromes

Staphylococcal scalded skin syndrome (SSS syndrome)

- **etiology:** **exfoliatin**-producing staphylococci (most commonly phagotype 71);
- affects infants and young children;
- a very serious illness accompanied by alterations in the child's general condition and febrile illness;
- exfoliatin causes blisters to form, up to large bullae, with subsequent exfoliation in the epidermis - the clinical picture resembles extensive second-degree burns;
- the toxin is released into the body often from a distant focal deposit (omphalitis, otitis, pharyngitis, impetigo), distributed through the bloodstream - it first causes scarlatiniform rash (first in the central parts of the face,

perigenital and perianally);

- **treatment:** parenteral administration of antistaphylococcal antibiotics in the pediatric ICU (risk of damage of the internal environment, development of pneumonia and sepsis); topical treatment such as in burns;

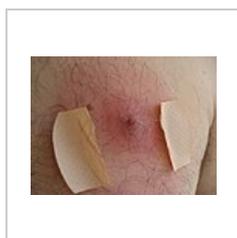
Toxic shock syndrome

- rare severe shock with skin symptoms and multi-organ involvement;
- **etiology:** toxin-producing staphylococci and streptococci;
 - Group A beta-hemolytic streptococci (source: soft tissue infections with bacteremia) produce pyrogenic exotoxins, streptococcal superantigens and mitogenic factors;
 - staphylococci (the source is not apparent) produce toxic shock syndrome toxin -1, enterotoxins and exfoliative toxins;
- severe condition, fever, hypotension, organ involvement (gastrointestinal, renal, CNS, musculoskeletal and hematological);
- generalised macular exanthema → after 1-2 weeks linear peeling of the skin, especially of the palms and soles, raspberry tongue, erythema and mucosal erosion;
- treatment: in the pediatric ICU - anti-shock treatment, generally i.v. antibiotics, possibly also i.v. immunoglobulins.

Scarlet fever

- **etiology:** group A beta-hemolytic streptococcus producing pyrogenic exotoxin;
- sore throat with fevers → erythematous maculopapular rash reminiscent of "goosebumps", rough to the touch and affecting in particular the cubital hollow, axillae, lower abdomen, groin, and inner thighs; redness in the face with fading around the mouth, raspberry tongue, small petechiae on the palate → after 1-2 weeks there is a peeling of the skin mainly on the palms and soles;
- treatment: parenteral penicillin, event. cephalosporins or clindamycin; isolation of the patient at home or in the infection department.^[2]

Gallery



Furuncle



Carbuncle



Impetigo on the forearm



Erysipelas

Links

Bibliography

- ŠTORK, Jiří. *Dermatovenerologie*. - edition. Galén, 2008. ISBN 9788072623716.

References

1. MUDR. ČAPKOVÁ, Štěpánka. Hnisavé kožní infekce (pyodermie). *POSTGRADUÁLNÍ MEDICÍNA*. 2009, vol. 10, no. 6, p. 38-43, ISSN 1212-4184.
2. BARTOŇOVÁ, Jiřina. Bakteriální onemocnění kůže v dětské ambulanci. *Pediatric pro praxi* [online]. 2014, vol. 15, p. 206-208, Available from <<https://www.pediatricpropraxi.cz/pdfs/ped/2014/04/06.pdf>>.