

Scarlet fever

Scarlet fever is a childhood infectious disease caused by Group A *Streptococcus pyogenes* (GAS – Group A Streptococci).

Scarlet fever usually occurs at the same time as streptococcal throat infections, but can also follow streptococcal pyoderma (purulent inflammation of the skin) and wound infections.

The disease most often occurs in the colder months (late autumn, winter and early spring).

Scarlet fever is most common in children and adolescents. Scarlet fever rarely affects children under the age of three.

The cause

Scarlet fever is caused by infection with *Streptococcus pyogenes* (beta-haemolytic group A streptococcus). The strains of *S. pyogenes* that cause scarlet fever secrete erythrogenic (pyrogenic) exotoxins.

Reservoir

Humans are the only reservoir for group A streptococci (GAS). In humans, *S. pyogenes* is found in the nasopharynx and on the skin.

Transmission

The source of infection is patients and persons without symptoms and signs of disease (germ carriers). Infection is acquired by close contact, and the entry site of streptococci is usually the mucous membranes of the pharynx (drip transmission by talking, coughing and sneezing through contact with droplets of saliva or nasal discharge), or, less commonly, affected skin.

Indirect transmission through contaminated surfaces, objects and food plays a lesser role in the spread of infection.

People with scarlet fever are much more infectious than people without symptoms and signs of the disease (germ carriers).

Risk factors

The most common risk factor is close contact with another person with scarlet fever. Adults who have frequent contact with children, e.g. parents of school-age children, have an increased risk of scarlet fever and the infection often spreads to other people in their household.

Crowding, e.g. in kindergartens and schools, increases the risk of spreading disease

Incubation

The incubation period (the time between infection and the onset of first symptoms/signs of disease) lasts from 1–7 days, usually 2–5 days.

Clinical picture

Disease symptoms and signs typical of scarlet fever are the following:

- Sore throat is very red, the palate is enlarged and inflamed, with or without discharge, often covered with whitish-yellow plaques;
- Headache, chills, fever (usually above 38.5 °C);
- Abdominal pain, nausea and vomiting;
- Painful and enlarged anterior cervical lymph nodes;
- On the second day of illness, a red rash appears on the skin of the torso, spreading to the neck and limbs;
- The rash is rough, may be itchy and fade on pressure;
- Distinct red cheeks, pallor around the mouth between the tip of the nose and the chin (Filat's triangle);
- Individual dots of bleeding may be visible on the skin and mucous membranes (e.g. soft palate);
- The rash is often concentrated in transverse lines in the folds (skin folds on the neck, under the armpits, groin, elbows and knees) (Pastio's sign);
- A white-coated tongue, which flakes off and becomes distinctly raspberry-shaped within four days;
- About a week after the rash, the skin begins to peel.

Body temperature peaks on the second day of illness and can exceed 40 °C, accompanied by a rapid heartbeat.

Complications and outcome of the disease

Complications of scarlet fever are rare. Complications occur due to the spread of bacteria to nearby and/or distant tissues and organs early in the course of the disease. Scarlet fever can be complicated by:

- Otitis media;
- Peritonsillar abscess and cellulitis (inflammation of the skin and subcutaneous tissue around the palate);
- Retropharyngeal abscess (lymph node swelling in the posterior and lateral pharyngeal wall),
- acute sinusitis and mastoiditis (acute inflammation of the paranasal sinuses and inflammation of the mastoid bone);
- Streptococcal pneumonia;
- Purulent meningitis and cerebral abscess (purulent inflammation of the meninges and cerebral corpus callosum);
- Osteomyelitis (inflammation of the bone marrow and bone);

- Arthritis (inflammation of the joints);
- Streptococcal toxic shock syndrome (serious infection with pyogenes, which secrete exotoxins that damage tissues, enter the blood and can lead to sepsis, multi-organ failure and death);
- Sepsis (an extreme systemic response of the body to an infection that triggers a chain reaction of tissue damage, organ failure and can lead to death).

Late immune-mediated complications such as acute poststreptococcal glomerulonephritis (inflammation of the kidneys occurring 7–21 days after infection) and acute rheumatic fever (inflammatory rheumatic systemic disease occurring 2–3 weeks after infection) and poststreptococcal arthritis (inflammation of the joints occurring 1–2 weeks after infection) are very rare.

Disease with acute poststreptococcal glomerulonephritis, acute rheumatic fever and poststreptococcal arthritis can be confirmed by the presence of antistreptococcal antibodies in the patient's blood a few weeks after infection with *S. pyogenes*.

Most complications are prevented by timely and consistent treatment with appropriate antibiotics.

The disease is mostly mild. The signs of the disease, including the rash, usually disappear within a week or so. Death from scarlet fever is extremely rare.

Diagnosis

The diagnosis is based on a characteristic clinical picture.

Laboratory tests reveal a moderately increased leucocyte count with a predominance of neutrophilic granulocytes in the blood and the presence of isolated eosinophilic granulocytes, as well as a moderately elevated C-reactive protein.

The clinical diagnosis of scarlet fever is confirmed by the presence of *S. pyogenes* antigen in a throat swab (rapid tests) or by isolation of the bacterium on culture.

Differential diagnosis

Some other skin infections or diseases of the skin and subcutaneous tissue have a similar clinical picture, e.g.:

- Viral rash diseases (adenovirus, enterovirus, respiratory viruses and others) (no signs of bacterial infection, confirmed by laboratory and microbiological diagnosis and absence of pyogenes antigen);
- Staphylococcal scarlet fever (skin more tight than in streptococcal scarlet fever, tongue not raspberry-like);
- Infection caused by *Mycoplasma pneumoniae* (skin lesions are less than one centimetre, only the colour of the affected skin area is changed);
- Kawasaki disease (systemic inflammatory disease, bilateral conjunctivitis and severe reddening of the oral mucosa);
- Allergic reactions (local or generalised reaction of the organism to an allergen, a vesicular rash may be present at the site of allergen entry).

Treatment

Antibiotic treatment is necessary and professionally justified because it reduces the duration and intensity of symptoms, reduces the likelihood of transmission of infection and prevents the development of complications.

Scarlet fever is usually treated with penicillin for 10 days. A different antibiotic group is only chosen for patients who are hypersensitive to penicillin. Associated symptoms (fever, pain) are treated with analgesics and antipyretics.

Chemoprophylaxis

Chemoprophylaxis aims to protect people from infection and disease with the right medicines. Patients and their close contacts who have had acute poststreptococcal glomerulonephritis or acute rheumatic fever need appropriate antibiotic protection, usually benzathine-penicillin. The alternative antibiotic group should only be chosen in patients who are hypersensitive to penicillin. The duration of chemoprophylaxis is determined individually.

If a scarlet fever outbreak occurs in a kindergarten, school or other group and is spreading intensively despite the implementation of preventive measures, and severe forms of scarlet fever, invasive GAS infections and deaths occur, we may exceptionally decide to chemoprophylaxis the whole group to stop the outbreak. The decision should be made carefully weighing the benefits and side effects of mass chemoprophylaxis. The decision shall be made by an epidemiologist.

Prevention

There is no vaccine against scarlet fever.

Avoiding close contact with the patient and maintaining good personal and general hygiene are important to prevent infection. In particular, good hand hygiene is important, especially after coughing and sneezing and before food preparation.

To prevent the spread of scarlet fever, it is important to:

- Avoid contact with people and use a mask during infectivity (isolation);
- Frequently wash hands with soap and water for at least 20 seconds;
- Use of hand sanitisers;
- Cover mouth and nose with a tissue when coughing and sneezing and dispose of tissues in the garbage;
- Cough and sneeze into the upper sleeve or elbow, not into the hands;
- Wash glasses, cutlery and plates used by the sick person;
- Frequently ventilate enclosed spaces.

Infectiousness

The patient is infectious from the onset of symptoms until 24 hours after treatment with penicillin. The patient must be isolated for the first 24 hours of treatment. He/she should stay away from work, school

or kindergarten until 24 hours have elapsed since the start of penicillin treatment and until he/she has a fever.

Immunity

Immunity develops only against the specific erythrogenic (pyrogenic) exotoxin secreted by the strain with which the patient is infected. Because of the differences between the erythrogenic (pyrogenic) exotoxins secreted by different strains of *S. pyogenes*, a person who has had scarlet fever may become ill again in the future. People rarely get scarlet fever more than once.

Scarlet fever is listed as a notifiable infectious disease in Slovenia under the Communicable Diseases Act. The physician is obliged to submit a notification to the NIJZ in accordance with the notification criteria published and updated in the document Definitions of notifiable infectious diseases for the purposes of epidemiological surveillance, which can be found on the NIJZ website.