

Scarlet Fever

Scarlet fever is an acute infectious disease primarily caused by *Streptococcus pyogenes* (group A beta-hemolytic streptococcus, GABHS), a bacterium responsible for various human infections. Characterized by a distinctive erythematous rash and fever, scarlet fever is most common in children aged 5-15 years but can occur in individuals of any age. The disease is transmitted through respiratory droplets or direct contact with infected secretions, including from the throat, skin, and mucous membranes. Scarlet fever is generally associated with a preceding or concurrent streptococcal infection of the tonsils, pharynx, or skin, and although rare in the post-antibiotic era, it can lead to significant complications if untreated.

Pathophysiology

The hallmark feature of scarlet fever is the presence of a red, blotchy rash that occurs due to the systemic effects of a toxin produced by the causative bacterium, specifically the *streptococcal pyrogenic exotoxins* (SPEs). These toxins, particularly the erythematogenic toxin, trigger an inflammatory response, which induces vasodilation and increases vascular permeability. This leads to the characteristic rash, which is typically accompanied by fever and other systemic symptoms. The rash is exacerbated in areas of the body folds (e.g., axillary, groin, and elbow creases), and the skin may have a sandpaper-like texture.

The body's immune response, following the release of these toxins, also plays a role in other symptoms, including the distinctive changes in the tongue. Initially, a white coating appears on the tongue, known as the "white strawberry tongue," which eventually peels off to reveal a bright red and swollen tongue, termed "red strawberry tongue". Desquamation, or shedding of the skin, often occurs on the hands and feet, usually after the rash has begun to fade, typically between days 4 to 7 of infection.

Clinical Manifestations

- **Rash:** The rash is the primary feature of scarlet fever, beginning 12-48 hours after the onset of fever and sore throat. It starts as fine, red papules on the chest and spreads to the rest of the body, typically sparing the face except for a characteristic pale area around the mouth (circumoral pallor). The rash is most intense in the body folds, such as the elbows, knees, and groin.
- **Fever and Pharyngitis:** Fever is usually high, often above 101°F (38.3°C), and is frequently accompanied by a sore throat, which is often the first sign of the infection. The pharynx is erythematous, and tonsillar exudates are common.

- **Strawberry Tongue:** The tongue initially appears coated with a white layer, known as the "white strawberry tongue," which later peels, revealing a bright red, swollen appearance, characteristic of "red strawberry tongue." This change in the tongue is considered a classic feature of scarlet fever.
- **Desquamation:** As the rash fades, peeling of the skin (desquamation) occurs, particularly on the palms and soles, often within 4 to 5 days after the onset of the rash.
- **Lymphadenopathy:** Swollen, tender lymph nodes, especially in the neck, are common.

Diagnosis

The diagnosis of scarlet fever is primarily clinical, based on the characteristic rash, fever, and sore throat in conjunction with a history of exposure to group A streptococcal infection. To confirm the diagnosis and identify the specific strain of *Streptococcus pyogenes*, throat or skin cultures are obtained. Rapid antigen detection tests (RADTs) can provide a quick diagnosis of streptococcal infection, but cultures remain the gold standard for definitive diagnosis.

In addition to cultures, blood tests may be ordered in certain cases to assess for complications, such as streptococcal toxic shock syndrome (STSS) or scarlet fever-related glomerulonephritis, although these are rare. Elevated white blood cell counts and an elevated C-reactive protein (CRP) can also be indicators of systemic infection.

Treatment

The primary treatment for scarlet fever is antibiotic therapy aimed at eradicating the *Streptococcus pyogenes* infection and preventing complications such as rheumatic fever or post-streptococcal glomerulonephritis.

- **Antibiotic Therapy:**
 - Penicillin is the first-line treatment for scarlet fever due to its effectiveness against *Streptococcus pyogenes*. For patients with penicillin allergies, alternatives such as erythromycin or a first-generation cephalosporin (e.g., cephalexin) are commonly used.
 - Antibiotics are typically administered for 10 days to ensure complete eradication of the bacteria. Oral antibiotics are effective in most cases, though intravenous antibiotics may be necessary for patients with severe manifestations or complications.
- **Symptomatic Treatment:**
 - Acetaminophen (paracetamol) or ibuprofen can be used to manage fever and alleviate pain associated with the sore throat or headache.
 - Hydration and rest are also critical components of supportive care to facilitate recovery.
- **Follow-up Care:**

- Regular follow-up is important to ensure complete resolution of the infection and to monitor for any potential complications. In some cases, a repeat throat culture may be performed to confirm the eradication of the pathogen, especially if the patient is not improving or complications arise.

Complications

While most cases of scarlet fever resolve with appropriate antibiotic treatment, untreated or inadequately treated infections can lead to serious complications, including:

- **Rheumatic fever:** This is an inflammatory disease that can affect the heart, joints, and nervous system, potentially leading to long-term complications such as rheumatic heart disease.
- **Post-streptococcal glomerulonephritis:** This is a kidney disorder that can occur after a streptococcal infection and may lead to kidney damage.
- **Streptococcal toxic shock syndrome (STSS):** Although rare, this severe systemic infection can lead to multi-organ failure and requires immediate medical intervention.

Prevention

Prevention of scarlet fever primarily involves good hygiene practices, including frequent hand washing and avoiding close contact with individuals who have an active streptococcal infection. There is no vaccine available for scarlet fever, and the best preventive measure is early identification and treatment of streptococcal infections.

Conclusion

Scarlet fever remains a significant pediatric infectious disease, though it is now less commonly seen due to the widespread use of antibiotics. Prompt treatment with appropriate antibiotics is essential to prevent complications, and a thorough understanding of the disease's clinical manifestations and progression is crucial for effective management. With timely medical care, the prognosis for scarlet fever is generally excellent, with most patients making a full recovery.

References

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