

Scarlet Fever

Scarlet fever is an upper respiratory tract infection associated with a characteristic rash, which is caused by GAS.

The rash appears within 24-48 hr after onset of symptoms. It often begins around the neck and spreads over the trunk and extremities, blanches on pressure. It is often accentuated in the creases of the elbows, axillae, and groin. The skin feels rough. The cheeks are often erythematous with pallor around the mouth.

After 3-4 days, the rash begins to fade and is followed by desquamation

Diagnosis

Examination reveals the same findings as with GAS pharyngitis

After desquamation, the reddened papillae are prominent, giving the tongue a strawberry appearance.

Identification of GAS in the pharynx (by culture) confirms the diagnosis. Culture of a throat swab on a sheep blood agar plate is effective

Rapid antigen detection tests are available for the identification of GAS directly from throat swabs. (Rapid identification and treatment of patients with streptococcal pharyngitis can reduce the risk for spread of GAS and can reduce the acute morbidity of this illness).

The antistreptolysin O (ASO) assay is the streptococcal antibody test most commonly used. But because streptolysin O also is produced by groups C and G streptococcus, the test is not specific for group A infection.

The anti-DNase B responses are generally present after either skin or throat infections.



TREATMENT: Antibiotic therapy for patients with GAS pharyngitis can

- 1- prevent acute rheumatic fever,
- 2- shorten the clinical course of the illness,
- 3- reduce transmission of the infection to others,
- 4- and prevent suppurative complications.

GAS is sensitive to penicillin and cephalosporins. Penicillin or amoxicillin is therefore the drug of choice (except in patients who are allergic to penicillins) for pharyngeal infections as well as for suppurative complications.

Oral penicillin V (250 mg/dose for children weighing ≤ 30 kg and 500 mg/dose for children weighing >30 kg PO) is recommended but must be taken for a full 10 days even though there is symptomatic improvement within 3-4 days.

A 10-day course of a narrow spectrum oral cephalosporin is recommended for most penicillin-allergic individuals.

Oral clindamycin is an appropriate agent for treating penicillin allergic patients.

An oral macrolide (erythromycin or clarithromycin) or azithromycin is also an appropriate agent for patients allergic to penicillins (Ten days of therapy is indicated except for azithromycin, which is given once daily for 5 days).

COMPLICATIONS:

1 - **Suppurative** complications from the spread of GAS to adjacent structures were extremely common in the preantibiotic era. Cervical lymphadenitis, peritonsillar abscess, retropharyngeal abscess, otitis media, mastoiditis, and sinusitis still occur in children in whom the primary illness has not treated or in whom treatment of the pharyngitis has been inadequate.

GAS pneumonia can also occur.

2 -Nonsuppurative; Acute rheumatic fever and acute poststreptococcal glomerulonephritis ((They are both characterized by disease remote from the site of the primary GAS infection)). Both differ in their clinical manifestations, epidemiology, and potential morbidity. In addition, **((acute glomerulonephritis follows a GAS infection of either the upper respiratory tract or the skin, but acute rheumatic fever only follows an infection of the upper respiratory tract.))**

PROGNOSIS: The prognosis for appropriately treated GAS pharyngitis is excellent, and complete recovery is the rule. When therapy is instituted acute rheumatic fever is almost always prevented.

PREVENTION: The only specific indication for long-term use of an antibiotic to prevent GAS infections **is for patients with a history of acute rheumatic fever and/or rheumatic heart disease.** Several vaccines are in development, including a 30-valent M protein-based recombinant vaccine. These vaccines are in relatively early stages of development.

Parvoviruses B19

The parvoviruses are small, single-stranded DNA viruses. They are common infectious agents of a variety of animal species. There are now 4 different types of parvoviruses known to infect humans. **B19** is the most clinically important of the human parvoviruses and the cause of **erythema infectiosum or fifth disease.**

Transmission of B19 is by the respiratory route, presumably via nasopharyngeal viral shedding. Although respiratory spread is the primary mode of transmission, B19 is also transmissible in blood and blood products.

PATHOGENESIS: The primary target of B19 infection is the erythroid cell line,. Viral infection produces cell lysis, leading a transient arrest of erythropoiesis. From 7-11 days after inoculation, subjects had viremia and nasopharyngeal viral shedding with fever, malaise, and rhinorrhea. Reticulocyte counts dropped to undetectable levels but resulted in only a mild, clinically insignificant fall in serum hemoglobin. **Some manifestations of B19 infection, such as transient aplastic crisis, appear to be a direct result of viral infection, whereas others, including the exanthem and arthritis, appear to be postinfectious phenomena related to the immune response.**

Humoral immunity is crucial in controlling infection. Specific immunoglobulin (Ig) M appears within 1-2 days of infection and is followed by anti-B19 IgG, which leads to control of the infection, restoration of reticulocytosis, and a rise in serum hemoglobin. **Individuals with impaired humoral immunity are at increased risk for more serious or persistent infection with B19, which usually manifests as chronic RBC aplasia**

B19 can cross the placenta and cause fetal infection during primary maternal infection.



CLINICAL MANIFESTATIONS:

Infected children characteristically demonstrate the rash illness of erythema infectiosum.

#Erythema Infectiosum (Fifth Disease) The most common manifestation of parvovirus B19, also known as fifth disease, which is a benign, self-limited exanthematous illness of childhood. The incubation period for erythema infectiosum is 4-28 days (average: 16-17 days). The prodromal phase is mild and consists of low-grade fever, headache, and symptoms of mild upper respiratory tract infection. The hallmark of erythema infectiosum is the characteristic rash, which occurs in 3 stages

The initial stage is an erythematous facial flushing, often described as a “slapped-cheek” appearance.

in the 2nd stage The rash spreads rapidly or concurrently to the trunk and proximal extremities as a diffuse macular erythema.

in the 3rd stage Central clearing of macular lesions occurs promptly, **giving the rash a lacy, reticulated appearance. The rash tends to be more prominent on extensor surfaces, sparing the palms and soles.**

Affected children are afebrile and do not appear ill. Some have petechiae. The rash resolves spontaneously without desquamation, but tends to wax and wane over 1-3 wk.

Arthropathy: Arthritis and arthralgia may occur in isolation or with other symptoms.

Transient Aplastic Crisis: The transient arrest of erythropoiesis and absolute reticulocytopenia induced by B19 infection leads to a sudden fall in serum hemoglobin in individuals with chronic hemolytic conditions. This occurs in patients with all types of chronic hemolysis and/or rapid RBC turnover, including sickle cell disease, thalassemia, hereditary spherocytosis

Fetal Infection: Primary maternal infection is associated with nonimmune fetal hydrops and intrauterine fetal demise, with the risk for fetal loss after infection estimated at <5%. The mechanism of fetal disease appears to be a viral induced RBC aplasia leading to profound anemia, high-output cardiac failure, and fetal hydrops

. Most infants infected in utero are born normally at term, including some who have had ultrasonographic evidence of hydrops.

DIAGNOSIS: The diagnosis of (erythema infectiosum) and (transient aplastic crisis in a child with sickle cell disease) is generally made on clinical grounds without specific virologic testing.

Determination of anti-B19 IgM is the best marker of recent/acute infection .

(Serologic diagnosis is unreliable in immunocompromised persons; diagnosis in these patients requires methods to detect viral DNA).

TREATMENT: There is no specific antiviral therapy for B19 infection. Commercial intravenous immunoglobulin (**IVIG**) have been used with some success to treat B19-related episodes of anemia and bone marrow failure in immunocompromised children.

B19-infected fetuses with anemia and hydrops have been managed successfully with intrauterine RBC transfusions.

COMPLICATIONS: Erythema infectiosum is often accompanied by arthralgias or arthritis in adolescents and adults that may persist after resolution of the rash. The incidence of stroke may be increased in children with sickle cell disease following B19-induced transient aplastic crisis.

Diphtheria (*Corynebacterium diphtheriae*)

Diphtheria is an acute toxic infection caused *Corynebacterium diphtheriae*. Although diphtheria was reduced from a major cause of childhood death to a medical rarity. Recurring cases emphasize the necessity to continue control principles across the global community.

ETIOLOGY: *Corynebacteria* are aerobic, nonencapsulated, non-spore-forming, mostly nonmotile, Gram-positive bacilli .

EPIDEMIOLOGY: Spread is primarily by airborne respiratory droplets, direct contact with respiratory secretions of symptomatic individuals, or exudate from infected skin lesions. Skin infection and skin carriage are silent reservoirs of *C. diphtheriae*, and organisms can remain viable in dust or on fomites for up to 6 mo. Cutaneous diphtheria: This indolent local infection, compared with mucosal infection, is associated with more prolonged bacterial shedding, greater contamination of the environment, and increased transmission to the pharynx and skin of close contacts.

PATHOGENESIS: The organism usually remains in the superficial layers of skin lesions or respiratory tract mucosa, inducing local inflammatory reaction, causes local tissue necrosis. Within the 1st few days of respiratory tractinfection (usually in the pharynx), a dense necrotic coagulum of organisms, epithelial cells, fibrin, leukocytes, and erythrocytes forms a gray-brown, leatherlike adherent pseudomembrane (**Diphthera is Greek for leather**). Removal is difficult and reveals a bleeding edematous submucosa. Paralysis of the palate and hypopharynx is an early local effect of diphtheritic toxin. Toxin absorption can lead to systemic manifestations: kidney tubule necrosis, thrombocytopenia, cardiomyopathy, and/or demyelination of nerves(Because the latter 2 complications can occur 2-10 wk after mucocutaneous infection, the pathophysiology in some cases is suspected to be immunologically mediated)



CLINICAL MANIFESTATIONS:

Respiratory Tract Diphtheria The primary focus of infection was the tonsils or pharynx, with the nose and larynx the next 2 most common sites.

After an average incubation period of 2-4 days, local signs and symptoms of inflammation develop. Infection of the anterior nares causes serosanguineous, purulent, erosive rhinitis with membrane formation. Shallow ulceration of the external nares and upper lip is characteristic.

In tonsillar and pharyngeal diphtheria, sore throat is the universal early symptom. Only half of patients have fever, and fewer have dysphagia, hoarseness, malaise, or headache. Mild pharyngeal injection is followed by unilateral or bilateral tonsillar membrane formation, which can extend to involve the uvula, soft palate, posterior oropharynx, hypopharynx, or glottic areas. Underlying soft-tissue edema and enlarged lymph nodes can cause a bull-neck appearance. Hoarseness, stridor, dyspnea, and croupy cough are clues ..

fatality due to airway compromise or toxin-mediated complications.

Note \\ The characteristic adherent membrane, extension beyond the faucial area, dysphagia, and relative lack of fever help differentiate diphtheria from exudative pharyngitis caused by *Streptococcus pyogenes* or Epstein-Barr virus.

Patients with **laryngeal diphtheria** are at **significant risk for suffocation** because of local soft-tissue edema and airway obstruction by the diphtheritic membrane. Establishment of an artificial airway and resection of the pseudomembrane can be lifesaving.

Cutaneous Diphtheria: Classic cutaneous diphtheria is an indolent, nonprogressive infection characterized by a superficial, ecthyma-like, nonhealing ulcer with a gray-brown membrane.

Extremities are more often affected than the trunk or head . Pain, tenderness, erythema, and exudate are typical. Respiratory tract colonization or symptomatic infection with toxic complications occurs in the minority of patients with cutaneous diphtheria.

DIAGNOSIS:

Specimens for culture should be obtained from the nose and throat and any other mucocutaneous lesion.

A portion of membrane should be removed and submitted for culture along with underlying exudate.

Toxigenicity and antimicrobial susceptibility tests should be performed for *C. diphtheriae* isolates.

COMPLICATIONS:

Respiratory tract obstruction by pseudomembranes may require bronchoscopy or intubation and mechanical ventilation.

the heart and the nervous system can be significantly affected by diphtheritic toxin

Toxic cardiomyopathy occurs in 10-25% of patients with respiratory diphtheria and is responsible for 50-60% of deaths. Tachycardia disproportionate to fever is common and may be evidence of cardiac toxicity or autonomic nervous system dysfunction.

Toxic Neuropathy: Acutely or 2-3 wk after onset of oropharyngeal inflammation, it is common for **local paralysis of the soft palate** to occur.

Weakness of the posterior pharyngeal, laryngeal, and facial nerves may follow, causing a nasal quality in the voice, difficulty in swallowing, and risk for aspiration.

Cranial neuropathies characteristically occur in the 5th wk, leading to **oculomotor and ciliary paralysis**, which can cause strabismus, blurred vision, or difficulty with accommodation.

Symmetric polyneuropathy has its onset 10 days to 3 mo after oropharyngeal infection and causes principally **motor deficits with diminished deep tendon reflexes. muscle**

Recovery from the myocarditis and neuritis is often slow but usually complete.

TREATMENT:

Specific antitoxin is the mainstay of therapy and should be administered on the basis of clinical diagnosis.

Equine diphtheria antitoxin is available. Antitoxin is administered as a single empirical dose of 20,000-100,000 units based on the degree of toxicity, site and size of the membrane, and duration of illness.

Antitoxin is probably of no value for local manifestations of cutaneous

diphtheria. Antitoxin is not recommended for asymptomatic carriers.

The role of antimicrobial therapy is to

1-halt toxin production,

2-treat localized infection,

3- prevent transmission of the organism to contacts.

Appropriate therapy is

erythromycin (40-50 mg/kg/day divided every 6 hr by mouth [PO] Or intravenously [IV]; maximum 2 g/day),

aqueous crystalline penicillin G (100,000-150,000 units/kg/day divided every 6 hr IV or intramuscularly [IM]), or daily procaine penicillin (300,000 units/day IM for those <10 kg in weight; 600,000 units/day IM for those >10 kg in weight) for 14 days.

Elimination of the organism should be documented by negative results of at least 2 successive cultures of specimens from the nose and throat (or skin) obtained 24 hr apart after completion of therapy.

Epstein-Barr Virus

Infectious mononucleosis is the best-known clinical syndrome caused by Epstein-Barr virus (EBV). It is characterized by fatigue, malaise, fever, sore throat, and generalized lymphadenopathy.

Originally described as glandular fever, it derives its name from the mononuclear lymphocytosis with atypical-appearing lymphocytes that accompany the illness.

ETIOLOGY: EBV is a double-stranded DNA virus .Two distinct types of EBV, type 1 and type 2. EBV-1 is more prevalent worldwide .

CLINICAL MANIFESTATIONS:

The incubation period of infectious mononucleosis in adolescents is 30-50 days. In children, it may be shorter.

In older patients, the onset of illness is usually insidious and vague. Patients may complain of malaise, fatigue, acute or prolonged (>1 wk) fever, headache, sore throat, nausea, abdominal pain, and myalgia.

The classic physical examination findings are generalized lymphadenopathy (90% of cases), splenomegaly (50% of cases), and hepatomegaly (10% of cases).

Lymphadenopathy occurs most commonly in the anterior and posterior cervical nodes and the submandibular lymph nodes and less commonly in the axillary and inguinal lymph nodes. Epitrochlear lymphadenopathy is particularly suggestive of infectious mononucleosis.

Symptomatic hepatitis or jaundice is uncommon, but elevated liver enzymes are very common.

Splenomegaly to 2-3 cm below the costal margin is typical (15-65% of cases) and is seen in most cases by ultrasonography; massive enlargement is uncommon.

The sore throat is often accompanied by moderate to severe pharyngitis with marked tonsillar enlargement.

Palatal petechiae at the junction of the hard and soft palate are frequently seen.

#. Patients with infectious mononucleosis treated with ampicillin or amoxicillin may experience "ampicillin rash,". This morbilliform, vasculitic rash is probably immune mediated and resolves without specific treatment.

DIAGNOSIS: by the presence of typical clinical symptoms with atypical lymphocytosis in the peripheral blood. The diagnosis is usually confirmed by serologic testing, either for heterophile antibody or specific EBV antibodies.

Laboratory Tests:

#In >90% of cases there is leukocytosis of 10,000-20,000 cells/ μ L, of which at least two thirds are lymphocytes

#; atypical lymphocytes usually account for 20-40% of the total number.

Mild thrombocytopenia to 50,000-200,000 platelets/ μ L occurs in more than 50% of patients.

#Mild elevation of hepatic transaminases occurs in approximately 50% of uncomplicated cases, but is usually asymptomatic without jaundice.

Heterophile Antibody Test: also known as Paul-Bunnell antibodies, are IgM antibodies. The heterophile antibodies of infectious mononucleosis agglutinate sheep or, for greater sensitivity, horse red cells. Heterophile antibody tests are positive in 75% of cases in the 1st wk and 90-95% of cases in the 2nd wk .

TREATMENT:

There is no specific treatment for infectious mononucleosis.

The mainstays of management are rest, encouraging adequate fluid and nutrition intake, and symptomatic treatment with acetaminophen or nonsteroidal anti inflammatory agents to manage fever, throat discomfort, and malaise.

Short courses of corticosteroids may be helpful for airway obstruction, thrombocytopenia with hemorrhaging, autoimmune hemolytic anemia, seizures, and meningitis.

COMPLICATIONS:

Very few patients with infectious mononucleosis experience complications.

The most important complication is subcapsular splenic hemorrhage or splenic rupture. Rupture is commonly related to trauma, which is often mild.

Swelling of the tonsils and oropharyngeal lymphoid tissue may cause airway obstruction that manifests as drooling, stridor, and interference with breathing.

PROGNOSIS: The prognosis for complete recovery is excellent. The major symptoms typically last 2-4 wk followed by gradual recovery within 2 mo of onset of symptoms

