



Streptococcal Pharyngitis (Strep Throat)

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Sore throat is a very common reason for a visit to a health care provider. While the major treatable pathogen is group A beta hemolytic *Streptococcus* (GAS), this organism is responsible for only 15-30% of sore throat cases in children and 5-10% of cases in adults. Other pathogens that cause sore throat are viruses (about 50%), other bacteria (including Group C beta hemolytic *Streptococci* and *Neisseria gonorrhoea*), *Chlamydia*, and *Mycoplasma*. In this era of increasing microbiologic resistance to antibiotics, the public health goal of all clinicians should be to avoid the inappropriate use of antibiotics and to target treatment to patients most likely to have infection due to GAS.

Clinical Manifestations

Pharyngitis due to GAS varies in severity. The most common presentation is an acute illness with sore throat, fever (often $>101^{\circ}\text{F}/38.3^{\circ}\text{C}$), tonsillar exudates (pus on the tonsils), and tender cervical adenopathy (swollen glands). Patients may also have headache, malaise, and anorexia. Additional physical examination findings may include petechiae of the soft palate and a red, swollen uvula. Many patients have a milder illness without exudates. Nausea, vomiting, and abdominal pain may be prominent in children. Interestingly, the presence of cough, coryza, runny nose, hoarseness, conjunctivitis, and diarrhea make infection with GAS less likely.

Scarlet fever is caused by certain strains of GAS. These patients have a diffuse, erythematous rash with the texture of sandpaper that blanches when pressed. The rash is most visible on the neck

and chest and in the folds of the skin and usually spares the face, palms, and soles. Flushing of the cheeks and pallor around the mouth is common, and the tongue becomes swollen, red, and mottled (“strawberry tongue”). Both skin and tongue may peel during recovery.

Pharyngitis due to GAS is usually a self-limited condition with symptoms resolving in 2-5 days even if untreated. Treatment has been shown to prevent some complications of GAS pharyngitis.

Complications

Two classes of complications exist: suppurative and non-suppurative. Suppurative complications of GAS pharyngitis include the following infections:

- retropharyngeal infections, including cellulitis or abscess;
- otitis media;

*Streptococcal
Pharyngitis
(Strep Throat).
Inflammation of the
oropharynx with
petechiae, or small
red spots, on the soft
palate.
Photo courtesy
of the CDC*

- sinusitis; and
- rare complications due to bacteremia, such as necrotizing fasciitis, meningitis, or brain abscess.

Some studies have shown that antibiotic therapy of GAS can decrease the incidence of otitis media and sinusitis.

The most common non-suppurative complications are acute rheumatic fever and acute post-streptococcal glomerulonephritis. Acute rheumatic fever (ARF) is an inflammatory disease involving the heart, joints, connective tissue, and nervous system. This usually arises within 2-4 weeks of pharyngitis and can result in progressive rheumatic heart disease. ARF happens in < 3% of untreated cases of GAS during an epidemic and in < 0.5% of sporadic cases. Penicillin therapy for treatment of GAS pharyngitis within 9 days of onset of symptoms has been shown to decrease the incidence of ARF by 75%.

Acute post-streptococcal glomerulonephritis is due to infection with certain strains of GAS that can affect the kidneys and complicates approximately 5% of cases of GAS pharyngitis in children. Most cases occur in children younger than 7 years of age. The glomerulonephritis usually occurs within 10 days following a GAS upper respiratory infection. The clinical presentation is variable, ranging from asymptomatic microscopic hematuria to acute nephrotic syndrome with proteinuria, edema, hypertension, and acute renal failure. Unlike ARF, antimicrobial therapy does not prevent acute post-streptococcal glomerulonephritis. Recurrence is rare, and the disease does not usually lead to residual renal damage. A very rare non-suppurative complication of GAS pharyngitis is streptococcal toxic shock syndrome, a severe systemic illness with shock and organ failure. Recently a new syndrome called PANDAS (Pediatric Autoimmune Neuropsychiatric Disorder Associated with Group A Streptococci) has been described. The syndrome involves obsessive-compulsive disorder or tic disorder with other neurologic abnormalities of abrupt onset in association with GAS infections. A clear-cut relationship of the syndrome with GAS infection has yet to be established.

Prevalence and Distribution

GAS most often affects children and young adults (5-15 years of age). Infection is most common during the winter and early spring. GAS is the cause of approximately 15-30% of acute pharyngitis in children and 5-10% in adults.

Transmission

GAS spreads when a person coughs or sneezes infected droplets into the air that come into contact with another person's mucous membranes. Crowded settings such as schools and shelters heighten the chance of transmission among pupils and guests. On rare occasions outbreaks have been attributed to contaminated food.

The average incubation period is 1-4 days, and the highest risk of transmission occurs during the acute stage. The rate of transmission of GAS in untreated patients is approximately 35% in close contacts, such as family members or schools. After an infected person completes 24 hours of therapy with penicillin, the risk of transmission diminishes significantly.

Sometimes people "carry" the GAS infection, but they are not sick with GAS and pose no risk to spread the disease. Carriers are those in whom GAS has colonized the nose, throat, or skin and who do not have clinical evidence of illness. These persons rarely transmit streptococcal infection and are not at risk for developing rheumatic fever.

Clinical Diagnosis

Since sore throat is such a common problem and distinguishing viral infection from GAS infection can be difficult, several clinical prediction rules have been developed. These rules can help providers predict which patients are likely to have GAS and need treatment, which patients should be tested, and which patients are unlikely to have GAS and in whom antibiotics can be safely withheld. Because of recent overuse of antibiotics and the emergence of antibiotic resistance, some experts recommend that only patients with positive cultures or rapid antigen tests should be treated.

In adults, the Centor criteria are most often used. The 4 criteria are:

- tonsillar exudates;
- tender anterior cervical adenopathy;
- fever by history;
- absence of cough.

Persons with three or four of these criteria may be treated empirically for GAS. Those with zero or one criterion do not need to be tested or treated. If two or three criteria are present, testing should be performed and patients treated only if the test is positive.

The McIsaac modification of the Centor criteria has been studied in children. Points for a patient are added based on the following scoring:

- history of fever or T>101°F (38°C) +1
- absence of cough +1
- tender anterior cervical adenopathy +1
- tonsillar swelling or exudates +1
- age <15 years +1
- age > or = 45 years -1

Children with 0 points are unlikely to have GAS infection and do not need to be tested. Those with 1-3 points should be tested and treatment based on the test result. Those with 4-5 points have a high likelihood of having GAS infection and may be treated empirically or tested and treated if the test is positive.

Laboratory Diagnosis

Throat culture is the gold standard for the definitive diagnosis of GAS pharyngitis. Although it takes 24-48 hours to obtain results from a culture, delaying therapy for this period of time will usually not be harmful to patients. In the shelter settings where follow-up may be difficult, clinicians must make a clinical determination whether to treat empirically or wait for the culture results.

Rapid antigen-detection tests are available in some settings and can provide an immediate diagnosis. If the rapid antigen test is positive, treatment should be initiated. If the rapid antigen test is negative, a throat culture should be obtained. False positive throat cultures and rapid antigen tests may result from a GAS carrier who has pharyngitis due to another organism, such as a virus.

Antibody tests, such as anti-streptolysin O (ASLO), can confirm streptococcal infection in the recent past but do not help with the diagnosis of acute disease.

Treatment

Antibiotic treatment can prevent local complications and limit the spread of disease, an important consideration in the shelter setting. Treatment can reduce the duration and severity of symptoms if begun within 48-72 hours of symptom onset and can also prevent rheumatic fever if begun within 9 days of the onset of illness.

Penicillin is the treatment of choice for those with no history of allergy. Penicillin has a narrow spectrum, low cost, and proven efficacy. An oral regimen of penicillin VK (Pen-Vee K™) 250 mg 2-3 times daily in children and 500 mg 2-3 times daily in adults for 10 days is recommended. Alternatively, intramuscular benzathine penicillin G (Bicillin L-A™), 1,200,000 units for adults and



Streptococcal Pharyngitis (Strep Throat). The tonsils are swollen and reddened in this child with a fever, tender anterior cervical lymph nodes, and an absence of cough. Photo courtesy of the CDC

children >60 pounds, and 600,000 units in children < 60 pounds), may be a more practical regimen for those who will have difficulty following the oral regimen. If oral therapy is chosen, completion of the full 10-day course is essential to ensure adequate treatment. Symptoms generally subside before the therapy is complete.

For penicillin-allergic patients, erythromycin (Eryc™, E-mycin™) is the recommended therapy. Many broader spectrum antibiotics have been shown to be effective in treating GAS pharyngitis, such as azithromycin (Zithromax™), clarithromycin (Biaxin™), cephalosporins and amoxicillin-clavulanate (Augmentin™). However, the use of these agents is not recommended as they have the potential to increase antibiotic resistance among respiratory pathogens.

Prevention and Control

Prompt diagnosis and treatment of infections can prevent transmission. Caregivers should ensure that patients complete the full course of therapy even when their symptoms have resolved. Patients with a history of rheumatic fever may prevent recurrent bouts by using continuous antibiotic prophylaxis.

Close contacts of an acute case of GAS pharyngitis should have a throat culture if symptoms develop within 2 weeks of exposure to an infectious case. Epidemics of GAS infection must be reported to the local board of health or appropriate health agency.

Summary

Many different organisms cause throat infections. Group A beta-hemolytic streptococci (GAS) account for less than 30% of throat infections, but diagnosis and treatment of GAS pharyngitis is essential to prevent complications.

GAS pharyngitis is most common in children and young adults. GAS spreads when a person coughs or sneezes infected droplets into the air that

another person inhales. The symptoms of infection with GAS are sore throat, fever, and neck glands that are swollen and tender. The symptoms usually resolve in several days, even without treatment.

The definitive diagnosis of GAS pharyngitis is by throat culture or rapid antigen testing, although some people should be treated based on clinical signs and symptoms. Infected people receive penicillin or erythromycin treatment for 10 days. Symptoms will disappear before the completion of treatment, but the full 10-day course of therapy is necessary to completely eradicate the infection and to prevent complications.

Infections such as GAS pharyngitis spread easily in shelters. A guest or staff member who has symptoms of strep infection should see a doctor, physician assistant, or a nurse practitioner immediately, since prompt diagnosis and treatment can prevent further infection in this population. ■■

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| Streptococcal Pharyngitis Medication List | | |
|--|-------------------|-------------|
| Generic | Brand Name | Cost |
| amoxicillin-clavulanate | Augmentin | \$\$\$ |
| azithromycin | Zithromax | \$\$ |
| benzathine penicillin G | Bicillin | \$ |
| clarithromycin | Biaxin | \$\$\$ |
| erythromycin | Eryc, E-Mycin | \$ |
| penicillin V | Pen-Vee K | \$ |

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