



Streptococcal Pharyngitis

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Perhaps better known to families as strep throat, this illness and the bacterium that causes it gets a lot of professional and lay person attention. Sore throats with or without fever are one of the most common reasons for pediatric office visits. There are myriad reasons for the frequent office visit for sore throat and central among those reasons is the perception that sore throats are best treated with antibiotics. That perception is one worth examining.

Streptococcal pharyngitis is caused by Lancefield group A streptococcus. Also known as *Streptococcus pyogenes*, this bacterium is the sole cause for strep throat. The reality is that in many quarters, sore throat and strep throat are regarded as interchangeable terms as much as soda water and Coca-Cola or tissue and Kleenex are in some people's minds. The actual truth is that *Streptococcus pyogenes* only causes twenty to thirty percent of all the sore throats, so only a very small fraction of sore throats are "strep throats."

This is important because virtually all the remainder are caused by various viral pathogens that will not improve with antibiotic use (viruses don't) and expose unnecessarily, the patient to potential side effects of antibiotic use, some of which can be quite serious. Strep throats are further stratified by age. They are most common in children from approximately age four to age ten. Before and after that the frequency of streptococcal pharyngitis is less even than the overall rate of twenty to thirty percent of sore throats. Strep is quite rare between ages two and three years. Strep is still more rare from age one to two years. It's so rare below age one that checking for group A strep infection except in the most unusual of circumstances is unwarranted.

Streptococcal pharyngitis has a specific constellation of symptoms that often, but not always include fever, sore throat, enlarged and painful lymph nodes in the neck, nausea, limited vomiting, headache and rash. The full constellation of symptoms will only be present a percentage of the time making the less than full expression of symptoms a clearly more challenging diagnostic situation. Though it's important to know what symptoms suggest strep, it's equally important to know what symptoms do not suggest strep. Strep is not congestion, cough, and runny nose or eye inflammation.



Those symptoms are much more typically associated with viral respiratory illness, allergy and perhaps asthma. Except in the rare circumstance where one illness is superimposed on another, the dichotomy in presenting symptoms will usually separate streptococcal pharyngitis from the viral and allergy pretenders.

Trying to identify whom likely has streptococcal pharyngitis based on age and presenting symptoms from those who likely do not is an important issue. It would seem, without discussion, that it would be simple enough to just test everybody with a sore throat and let the test results dictate who gets antibiotics and who does not. This would certainly be preferable to the situation where the doctor inspects the throat and declares whom has strep based on the visual appearance of the throat alone. It's been said that even in the hands of an experienced physician, accurate diagnosis of streptococcal pharyngitis based on the visual inspection of the throat is no better than fifty percent. Most would agree we should strive for accuracy that exceeds that of a coin toss. I would suggest we should strive for perfection (elusive) in the diagnosis of streptococcal pharyngitis. The physical signs of the patient with strep including inflamed throat, enlarged tonsils, pus on the tonsils, enlarged and painful lymph nodes and rash overlap the physical findings in various viral and allergic illnesses. Agreeably, this is starting to sound like an impossible puzzle to unravel. So read on to the next paragraph for another confounder.

So now we're back to why it's better to have strong suspicions based on the history and physical exam **before** testing for strep versus just testing everybody with a sore throat complaint. Seasonally, more in spring and summer, up to twenty percent of children will, when they are well, have Strep pyogenes in the throat. This subset of children can be referred to as "strep carriers." They are not sick, will not suffer health consequences and will not spread strep to family or peers as a result of being a carrier. Over a period of a few months (one hundred days is a reasonable estimate), the majority of carriers will naturally (without intervention) return to non-carrier status. While they are carriers, throat tests for strep will be positive. So if we just test everyone with a sore throat, we're accepting up to a twenty percent error rate in diagnoses and children who otherwise would not need antibiotics will receive them with the small, but certain risk attached to taking any medication. The confounding presence of the carrier state of Strep pyogenes is a difficult diagnosis. Differentiating it from a true illness caused by Strep pyogenes can be difficult. As a consequence, most authorities would agree that once Strep pyogenes is recovered from a patient throat with antigen testing or throat culture,



treatment should be the likely outcome. Once the specter of recurrent infection and the carrier state begins to be considered, eradication of the carrier state can become a priority so that future care of sore throats in that patient is less confusing. The doctor should strive to avoid repeated administration of antibiotics to a "carrier" just because repeated strep tests return a positive result. As the physician, if you've fallen into this quagmire and you need to eliminate the "carrier state", most experts would agree that the best antibiotic approach would include the use of a seldom-used antibiotic, clindamycin. Since most children who will be prescribed this will be pre-pill swallowing in age, it is unfortunate that the taste is unacceptable and is customarily administered three to four times per day. The current art of flavoring liquid medications to improve acceptance can be of help with this.

Streptococcal pharyngitis is a self-limiting illness (it will resolve on its own) in a matter of days. An active effort to identify and treat strep throat will only shorten the duration of the illness by a day or two. All of this effort to treat is aimed at limiting the severity and duration of the acute illness, reducing the frequency of the occasional infectious complication (peritonsillar abscesses and prevertebral cellulitis/abscess), and the later development of non-infectious (auto-immune) complications that though rare, can affect the heart, brain and debatably the kidney.

Strep testing has evolved to the extent that antigen detection tests (rapid tests) are commonly available. These tests have been available for such a number of years now that many cannot remember the day when strep throat testing relied on cultures whose results would not be available for a day or more. Certainly, the presence of antigen detection tests has allowed children to begin receiving therapy within minutes or hours of the time of an office / clinic visit. The best antigen detection tests have detection sensitivities that exceed ninety percent and are specific for *Strep pyogenes* when positive more than ninety-five percent of the time. The accuracy of the test requires adequate sample gathering and though children will object to this process, sample gathering is a key step in the diagnostic process. It makes the presence of well-trained and vigilant support personnel essential in the process. When first developed, if the antigen detection was negative, back up analysis with a throat culture was recommended. As the technology has evolved and improved, the FDA and most experts in the field would agree that if the sensitivity and specificity of the antigen detection test being used exceeds ninety percent, then a back-up throat culture is not needed. At the time of this writing, though our lab's antigen detection test exceeds these criteria, we still perform the backup throat culture. In the infancy of antigen detection tests some experts discussed the



theoretical issue that such rapid intervention with antibiotics in the course of strep illness could be associated with recurrent infection. So the theory of the day considered the possibility that a patient's ability to develop antibodies to *Strep pyogenes* was lessened by rapid antigen detection tests because the illness was abbreviated by antibiotic use. Rarely, would a clinician advocate delaying the use of antibiotics to take advantage of the theoretical use of the patient's own antibodies in future strep infections.

Typically the first line antibiotic therapy for strep pharyngitis is amoxicillin. It's inexpensive, usually well tolerated, has an acceptable taste and can be administered as infrequently as twice (some advocate for once) per day. Alternatives in the event of medication intolerance or recurrent / persistent infection include amoxicillin-clavulanate, or cephalosporins. Recurrent or persistent infections do occur and are most commonly due to failure to give the proper dose and proper number of doses on schedule. Other confounding situations can arise where the antibiotic may be inactivated by other resistant to amoxicillin bacteria in the throat or failure to adequately absorb amoxicillin well enough to eliminate the infection. Recurrent exposure in the crowded school or preschool environment can lead to frequent infections. These hypotheses are difficult to prove and leave open a conversation about *Strep pyogenes* antibiotic resistance. In an era where we so commonly hear about antibiotic resistance, *Strep pyogenes* has never been shown to have this evolved resistance. Where recurrent / persistent infection occurs, some one of these other more difficult to understand mechanisms (carrier state, poor administration of medication, coexistence of resistant bacteria in the throat) is responsible.

So after all of this, strep throat is common, but much less common than the viral and allergic pretenders. The history and physical exam findings overlap and differ in subtle and important ways to help guide the physician striving for accurate diagnoses. The judicious use of strep testing and thoughtful interpretation of the test results is warranted. The perfection we all strive for will likely always elude us because of the subtleties the diagnosis of strep infections. Therapy is quite effective and the patient usually feels much better inside of twenty-four hours. When improvement is not prompt, the usual issue is that the viral or allergic pretender has been misidentified as *Strep pyogenes* in the presence of the "carrier state" and as a consequence, improvement will be much slower as you would expect when a viral illness or allergy is inappropriately being treated with an antibiotic. The much less common probability of an infectious complication like cellulitis or abscess should be considered and reexamination when improvement is not as prompt as expected is quite reasonable.