NCC Pediatrics Continuity Clinic Curriculum: **Pharyngitis**

Faculty Version

Goals & Objectives:

- To recognize the common etiologies of pharyngitis in children and their associated clinical presentations
- To understand the indications for diagnostic testing for Group A strep pharyngitis
- To learn the appropriate treatment for Group A strep pharyngitis
- To recognize the suppurative and non-suppurative complications of Group A strep pharyngitis

Pre-Meeting Preparation:

Please read the following:

- "A Clinical Approach to Tonsillitis, Tonsillar Hypertrophy, and Peritonsillar and Retopharyngeal Abscesses," (*PIR 2017*)
- Summary of IDSA Clinical Practice Guidelines (*2012*)
- Modified Centor Score (excerpt from *JAMA 2004*)

Conference Agenda:

- Review Pharyngitis Quiz
- Complete Pharyngitis Cases

Extra-Credit Readings:

- "Clinical Practical Guidelines for the Diagnosis and Management of Group A Streptococcal Pharyngitis: 2012 Update by the Infectious Diseases Society of America" *(no updates since 2012)*
- "Empirical Validation of Guidelines for the Management of Pharyngitis in Children and Adults" *(JAMA, 2004)*
- "Acute Rheumatic Fever and Rheumatic Heart Disease" (*Nature, 2016*)
- "Some of the People, Some of the Time: Susceptibility to Acute Rheumatic Fever" *(Circulation, 2009)*
- "Diagnostic Methods, Clinical Guidelines, and Antibiotic Treatment for Group A Streptococcal Pharyngitis: A Narrative Review" *(frontiers in Cellular and Infection Microbiology, 2020)*
- "Antibiotic Treatment, Mechanisms for Failure, and Adjunctive Therapies for Infections by Group A Streptococcus"*(frontiers in Cellular and Infection Microbiology, 2020)*
- "Overprescription of Antibiotics for Sore Throat Surged During the Covid-19 Pandemic" *(NEJM Catalyst, 2021)*
- "Strep A Vaccine Development No Longer 'A Bridge Too Far'" *(BioIT World, 2021)*
- "Evaluating the Diagnostic Paradigm for Group A and Non–Group A Streptococcal Pharyngitis in the College Student Population" *(Open Forum Infectious Diseases, 2021)*
- CDC Website: Group A Streptococcal (GAS)Disease

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A Clinical Approach to Tonsillitis, Tonsillar Hypertrophy, and Peritonsillar and Retropharyngeal Abscesses

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Practice Gap

Despite established guidelines for group A *Streptococcus* pharyngitis diagnosis and treatment, pediatricians are overtreating and mistreating sore throat in children. (1) This results in unnecessary antibiotic use and contributes to antimicrobial resistance, increased health care costs, and risk for adverse drug reactions. In addition, controversy exists among pediatricians regarding the indications for tonsillectomy and adenoidectomy in children.

Objectives

After completing this article, readers should be able to:

1. Describe the clinical presentation, differential diagnosis, diagnostic evaluation, and management of tonsillitis/pharyngitis in pediatric patients.
2. Describe the clinical presentation, diagnostic evaluation, and management of peritonsillar abscess in pediatric patients.
3. Describe the clinical presentation, diagnostic evaluation, and management of retropharyngeal abscess in pediatric patients.
4. Describe the indications for tonsillectomy and adenoidectomy in pediatric patients and associated complications.

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ABBREVIATIONS

ALPS	Autoimmune lymphoproliferative syndrome
ARF	Acute rheumatic fever
CMV	Cytomegalovirus
CT	Computed tomography
EBV	Epstein-Barr virus
GAS	Group A *Streptococcus*
HIV	Human immunodeficiency virus
NSAIDs	Nonsteroidal anti-inflammatory drugs
OSA	Obstructive sleep apnea
PFAPA	Periodic fever, apthous stomatitis, pharyngitis, and adenitis
PSGN	Poststreptococcal glomerulonephritis
PTA	Peritonsillar abscess
RADT	Rapid antigen detection test
SDB	Sleep-disordered breathing
T&A	Tonsillectomy and adenoidectomy

TONSILLITIS, PHARYNGITIS

Epidemiology

Sore throat is a common complaint in children and adolescents. Most cases of pharyngitis are viral and self-limited. Group A *Streptococcus* (GAS) pharyngitis is the only commonly occurring infectious pharyngitis in which antimicrobial treatment is indicated. Treatment of GAS decreases the risk of acute rheumatic fever (ARF), suppurative complications and transmission of disease, and provides symptomatic relief. GAS pharyngitis accounts for 20%-30% of office visits for sore throats in children. (2) Infection typically occurs in school-age children and

adolescents, and is uncommon in children younger than 3 years. GAS pharyngitis occurs most commonly in the winter and early spring months and is spread through contact with oral and respiratory secretions of other humans. The relative predominance of the common viral causes varies by season with predominantly cold viruses (eg, rhinovirus, coronavirus, respiratory syncytial virus, parainfluenza) in the winter and enteroviruses in the warmer months.

Clinical Presentation

The signs and symptoms of pharyngitis due to GAS and other pharyngitides overlap and there is no universally agreed upon algorithm to guide clinicians' decision to forgo GAS testing. However, the history and physical examination should directly focus on differentiating between viral etiologies and GAS to guide the need for GAS testing. Fever, throat pain, and pharyngeal and/or tonsillar exudates are nonspecific findings. Concomitant cough, rhinorrhea, hoarseness, diarrhea, and/or the presence of oropharyngeal vesicles are highly suggestive of a viral etiology. Although nonspecific in isolation, the presence of scarletiniform rash, palatal petechiae, pharyngeal exudate, vomiting, and tender cervical nodes in combination increase the likelihood of GAS to greater than 50%. (3) Stridor, neck stiffness, or head tilt, limitation of neck movement, drooling, respiratory distress, or a toxic appearance are concerning for more serious diseases such as epiglottitis, retropharyngeal abscess, or Lemierre syndrome. Click on the following link, http://pedsinreview.aappublications.org/content/38/2/81.figures-only, for a video demonstration of the oropharyngeal examination technique.

Differential Diagnosis

Recognized viral etiologies of acute pharyngitis include adenovirus, rhinovirus, Epstein-Barr virus (EBV), parainfluenza, influenza, coxsackie, measles, and herpes simplex virus. *Mycoplasma pneumonia* is a common bacterial cause of pharyngitis. Pharyngitis can be a predominant symptom of acute retroviral syndrome secondary to infection with human immunodeficiency virus (HIV). Sexually active adolescents may also present with an acute pharyngitis caused by infection with *Neisseria gonorrhea*. Mononucleosis, commonly caused by EBV or cytomegalovirus (CMV) infection, often presents with an exudative pharyngitis, tender cervical lymphadenopathy, and constitutional symptoms. Immunocompromised patients are susceptible to opportunistic infections such as pharyngeal candidiasis (thrush) caused by *Candida albicans* infection. *Corynebacterium diphtheria* and *Haemophilus influenzae* b are uncommon causes of acute pharyngitis in developed countries but are possible in recent immigrants and unvaccinated children. A person infected with *Francisella tularensis* from ingestion of undercooked wild game meat may complain of pharyngitis. Traumatic or chemical pharyngitis can result from foreign body or caustic ingestion, respectively. Table 1 lists the full differential diagnosis and Table 2 infectious pathogens involved.

Diagnosis

Pharyngitis is a clinical diagnosis; additional testing should be focused on identifying children with the treatable causes of pharyngitis, atypical symptoms, and prolonged illness. Children and adolescents with signs and symptoms of acute pharyngitis in the absence of overt viral symptoms should be tested for GAS pharyngitis either with throat culture or rapid antigen detection test (RADT). Throat culture is the gold standard and most cost-effective test, with a sensitivity of 90% to 95%. The RADT has a specificity of 95% but variable sensitivity (ie, false-negative results occur).(2) A negative RADT should therefore be followed by throat culture for confirmatory testing. The sensitivity of throat culture and RADT are dependent on proper specimen collection that requires vigorous swabbing of both tonsils

TABLE 1. **Differential Diagnosis of Tonsillitis/Pharyngitis**

Infectious	Viral Bacterial Fungal Peritonsillar abscess Lemierre syndrome Epiglottitis Tracheitis Croup Lateral/retropharyngeal abscess Uvulitis
Allergic/inflammatory	Kawasaki disease PFAPA Stevens-Johnson syndrome Behçet syndrome Angioedema Anaphylaxis
Environmental exposure	Foreign body ingestion Chemical exposure Irritative pharyngitis
Referred pain	Psychogenic pharyngitis Referred from dental abscess, otitis media, cervical adenitis
Oncologic	Lymphangioma, hemangioma of the airway

PFAPA=periodic fever, apthous stomatitis, pharyngitis, and adenitis.

TABLE 2. **Infectious Pathogens That Cause Tonsillitis/Pharyngitis**

Viral	Epstein-Barr virus, cytomegalovirus, adenovirus, enterovirus (coxsackie A and B), herpes simplex virus, HIV, influenza, RSV, parainfluenza, rhinovirus, coronavirus
Bacterial	Group A *Streptococcus*, *Mycoplasma pneumonia*, *Corynebacterium diphtheria*, *Neisseria gonorrhea*, *Arcanobacterium haemolyticum*, other Streptococci (group G and C), *Haemophilus influenza* type b, *Francisella tularenis*, *Fusobacterium necrophorum*, *Chlamydia pneumoniae*, *Chlamydia trachomatis*, *Yersinia enterolitica*, *Coxiella burnetii*
Fungal	*Candida* species

HIV=human immunodeficiency virus; RSV=respiratory syncytial virus.

and posterior pharynx without touching the tongue or buccal mucosa. Serologic tests are not routinely used in the diagnosis of acute GAS pharyngitis because antibody response does not occur until 2 to 3 weeks after initial infection. In general, testing for GAS in children younger than 3 years and in asymptomatic family or classroom contacts is not recommended.

The judicious and targeted use of the RADT is warranted. The ease of use and availability of the RADT in children with complaints of sore throat can lead to overuse in children with viral pharyngitis. This can, in turn, lead to the identification and unnecessary treatment of GAS carriers who are exposed to unnecessary courses of antibiotics. Standing orders for ancillary personnel to perform a RADT in every child with a chief complaint of sore throat before a clinical evaluation to assess for a viral etiology should be avoided.

Additional testing may be useful to diagnose non-GAS infectious tonsillopharyngitis. The need for additional testing should be individualized based on clinical signs and symptoms. With respect to EBV infection, in many cases, a clinical diagnosis can be made. However, in cases of diagnostic uncertainty and when an explanation is desired for persistent symptoms, a definitive diagnosis may be sought. There are several approaches, but no consensus exists regarding a diagnostic algorithm for EBV infection. The usefulness of the available tests varies with the duration of illness and age of the patient. In children older than 4 years who have symptoms for 2 weeks, a positive heterophile antibody test in conjunction with an absolute increase in the number of atypical lymphocytes is often considered diagnostic. The EBV viral capsid antigen immunoglobulin M test may be used in younger patients. If *Neisseria gonorrhea* is suspected, nucleic acid amplification testing or culture on special media (Thayer-Martin or Martin-Lewis medium) is necessary for diagnosis. Specimens should be obtained using swabs with plastic or wire shafts and rayon, polyester textile fabric, or calcium alginate tips because wood shafts and cotton tips may be toxic to the organism. (4) If acute retroviral syndrome is suspected, the combination HIV antibody/antigen test should be performed because it is the most sensitive immunoassay for HIV. Serologic testing is used to diagnose tularemia and should be ordered in patients with exposure history.

Treatment

Early antibiotic therapy for GAS pharyngitis (up to 9 days after illness onset) has been shown to prevent ARF, decrease symptom duration and severity, and reduce suppurative complications. (2) Whether antibiotic therapy reduces the risk of poststreptococcal glomerulonephritis (PSGN) is uncertain. Oral penicillin V is the treatment of choice for GAS pharyngitis given its proven efficacy, narrow spectrum, safety, and low cost. Oral amoxicillin may be used as a more palatable alternative that is equally effective. A single dose of intramuscular penicillin G benzathine can be used for patients who cannot tolerate a 10-day course of oral therapy, in patients with a history of poor compliance to oral therapy, and in those at increased risk for ARF. First-generation cephalosporins are an acceptable alternative for patients who report a penicillin allergy but do not have a history of anaphylaxis. Macrolides or clindamycin are acceptable alternatives in patients with a history of anaphylactic reactions to penicillin or with an unclear allergy history. Sulfonamide antibiotics, tetracyclines, and fluoroquinolones should not be used for treatment of GAS infections. Improvement is expected by 3 to 4 days after antibiotic initiation. Children are no longer considered contagious after 24 hours of treatment and may return to school. Table 3 provides specific antibiotic dosing information. (5)

Treatment of viral pharyngitis is symptomatic. Systemic analgesics are the mainstay of treatment and may be used for moderate to severe throat pain (nonsteroidal anti-inflammatory drugs [NSAIDs], acetaminophen). Although glucocorticoids may reduce pain from sore throat, there is limited high-quality evidence for this indication and, therefore, their use is not recommended in children at this time. Topical therapies include oral rinses, sprays, and lozenges. Oral rinses containing salt water have not been systematically studied. Rinses containing topical anesthetics (eg, lidocaine) and topical NSAIDs (eg, benzydamine hydrochloride) have been studied systematically, mainly in patients with postoperative

TABLE 3. **Antibiotic Treatment of GAS Tonsillitis/Pharyngitis**

ANTIBIOTIC	DOSE	ROUTE	DURATION
Penicillin V	400,000 U (250 mg) 2-3 times per day for children <27 kg 800,000 U (500 mg) 2-3 times per day for children >27 kg	Oral	10 days
Penicillin G benzathine	600,000 U (375 mg) for children <27 kg 1,200,000 U (750 mg) for children >27 kg	Intramuscular	1 time dose
Amoxicillin	50 mg/kg daily (max 1,000-1,200 mg)	Oral	10 days
First-generation cephalosporins	Cephalexin 20 mg/kg/dose twice a day (max 500 mg/dose)	Oral	10 days
Clindamycin	20 mg/kg/day in 3 divided doses (max 1.8 g/day)	Oral	10 days
Macrolides	Azithromycin 12 mg/kg/day max 500 mg daily Clarithromycin 7.5 mg/kg/dose BID max 250 mg/dose	Oral	5 days azithromycin 10 days clarithromycin

BID=twice a day; GAS=group A Streptococcus.

throat pain or throat pain because of chemotherapy-induced mucositis. The current evidence base is insufficient to draw conclusions. Sprays and medicated lozenges containing local anesthetics (benzocaine, phenol) are no more effective than candy at relieving throat pain and are not recommended because of the risk for methemoglobinemia and allergic reactions.

Group A *Streptococcus* Carriers

Asymptomatic patients with cultures that remain positive after a full course of treatment are likely carriers. Carrier status may be as high as 25% of asymptomatic children in high prevalence areas. (2) Carriers are not at increased risk for ARF or suppurative complications. Carriage of GAS can persist for many months but the risk of transmission from a carrier to another person is low. (2) A "test of cure" for GAS and repeated antimicrobial courses are, therefore, not indicated. Although it is possible that the child with frequent sore throats and positive cultures for GAS has recurrent GAS infections, it is more likely the child is a GAS carrier with recurrent viral illnesses. Compliance with oral therapy should be assessed, and the decision to treat should be made based on clinical findings and epidemiologic factors (patient age, season, history of contact with a person with GAS infection, family history of ARF or PSGN). Because it is not possible to differentiate a carrier state from an active GAS infection in real time, treatment is often chosen. The best strategy to avert this is to avoid overtesting and retesting. Exceptions to this rule are a personal or family history of ARF, community outbreaks of ARF or PSGN, GAS pharyngitis outbreaks in "closed" communities such as a daycare center, and "ping-pong" episodes of GAS pharyngitis among family members. (2) Children in these exceptional circumstances should be retested and re-treated despite suspicion for carrier status. GAS carriage is difficult to eradicate with conventional antimicrobials. Oral clindamycin at a dose of 30 mg/kg per day divided into 3 doses (maximum 900 mg/day) for 10 days is the recommended treatment for GAS carriers. (2)

PERITONSILLAR ABSCESS

Epidemiology

Peritonsillar cellulitis and abscess are among the most common deep space neck infections in children and adolescents. Peritonsillar abscess (PTA) is defined as a suppurative infection of the tissue between the palatine tonsil capsule and the pharyngeal muscles. The term peritonsillar cellulitis is used when tissue inflammation is present without a discrete pus collection. According to one US study, the incidence of PTA was 9.4 per 100,000 children younger than 20 years in 2009. (6) Its incidence peaks in adolescence with an average age of 13.6 years. (6) Most PTAs are polymicrobial, with *Streptococcus* and *Fusobacterium* species being the most common etiologic agents.

Clinical Presentation

Patients with PTAs most commonly present with sore throat and fever. Other symptoms include dysphagia, odynophagia, voice change, drooling, and trismus (due to spasm of the internal pterygoid muscle). Physical examination signs include uvular deviation toward the contralateral side,

ipsilateral tonsillar bulging, the presence of a tender neck mass, and cervical and/or submandibular lymphadenopathy. Patients may appear anxious or irritable and be unable to take anything by mouth. Younger children are less likely to complain of sore throat and are more likely to present with a neck mass. (7) Clinicians should suspect PTA in patients with symptoms of pharyngitis who have a prolonged or progressive course. Untreated PTA can lead to serious complications such as airway obstruction, aspiration pneumonia, carotid artery pseudoaneurysm or rupture with resulting sepsis and hemorrhage, and septic thrombophlebitis of the internal jugular vein (Lemierre syndrome). The differential diagnosis is similar to that for tonsillopharyngitis (Table 1).

Diagnosis

Diagnosis of a PTA is largely made on clinical suspicion, and laboratory evaluation is usually unnecessary. Similarly, imaging studies are generally not required. If the diagnosis is in question, intraoral ultrasonography was recently found to be an effective tool to determine the presence or absence of a fluid collection. Although contrast-enhanced computed tomography (CT) of the neck is also effective in determining the presence of a PTA, its use should be avoided if possible because of the close proximity of radiation-sensitive tissues such as the thyroid gland. Clinicians are encouraged to consult the American College of Radiology Appropriateness Criteria before considering CT for this indication. (8) According to the criteria, any recommended imaging studies for children who present with neck masses must take into consideration the risk of sedation and radiation dose. CT of the neck with contrast has a relative radiation level of 0.3 to 3 millisievert compared to zero radiation risk with ultrasonography. However, CT of the neck with contrast may be appropriate if there is concern for malignancy or a deep neck abscess that may require surgical drainage.

Treatment

Because PTA is a disease process found more commonly in adolescents, drainage while awake is considered the treatment of choice. This can often be performed under local anesthesia in the emergency department or in the office of a pediatric otolaryngologist. For younger or uncooperative patients, general anesthesia may be required. Controversy exists regarding needle aspiration versus incision and drainage. With the patient in an upright sitting position, topical or infiltrative anesthesia is applied and an 18-gauge needle is used to localize and aspirate the abscess pocket, usually in the soft palate superior to the superior tonsillar pole. If an incision is to be made, it is created at the area of maximal bulging in a lateral to medial fashion. A clamp can then be used to open the abscess pocket and drain additional purulent material. An experienced clinician, usually an otolaryngologist, should perform these procedures. Cultures of any recovered material should be performed. Patients can usually be discharged after the procedure with oral antibiotic therapy for 7 to 10 days. Penicillins, cephalosporins, or clindamycin are good empirical options while awaiting culture results. Indications for admission include the need for intravenous hydration due to poor oral intake, pain management, no reliable outpatient follow-up, and management of complications after drainage such as severe bleeding or respiratory distress secondary to aspiration of abscess contents into the patient's airway. In the past, quinsy tonsillectomy (tonsillectomy in the presence of a PTA) was used as a drainage treatment; however, this has largely been abandoned as a first-line treatment.

RETROPHARYNGEAL ABSCESS

Epidemiology

A retropharyngeal abscess is a suppurative deep neck infection that occurs in the potential space extending from the base of the skull to the posterior mediastinum between the posterior pharyngeal wall and prevertebral fascia. The retropharyngeal space houses a chain of lymph nodes that drains the nasopharynx, adenoids, eustachian tubes, middle ears, and posterior paranasal sinuses. The pathogenesis of retropharyngeal abscess is thought to frequently follow an upper respiratory tract infection with resulting suppuration of the retropharyngeal lymph nodes and abscess formation. The abscess may also form secondary to trauma from an ingested foreign body or instrumentation in the posterior oropharynx. According to one US study, the incidence of retropharyngeal abscess has increased from 2.98 to 4.10 per 100,000 children younger than 20 years from 2003 to 2012. (9) Incidence is highest among children younger than 5 years and in boys. (9) The microbiology of retropharyngeal abscesses is often polymicrobial. Streptococcal, staphylococcal species, and respiratory anaerobes are the most common organisms isolated.

Clinical Presentation

Presentation of retropharyngeal abscess is variable and no particular constellation of symptoms and signs is diagnostic. Patients commonly present with complaints of fever, neck pain, and dysphagia. Other symptoms include sore throat, odynophagia, decreased oral intake, drooling,

dyspnea, and even chest pain if there is mediastinal extension. Common physical examination signs include cervical lymphadenopathy, limited neck movement or meningismus, torticollis, and the presence of a palpable neck mass. Tonsillar displacement, dysphonia, trismus, and stridor may also be appreciated. Patients may appear ill and anxious, and exhibit posturing. Care must be taken when examining these children because the stress of the oropharynx examination can result in partial or complete airway obstruction. There is also a risk of abscess rupture. For ill-appearing patients with signs of partial upper airway obstruction such as stridor or stertor, performing the oropharynx examination in the operating room where an emergent surgical airway can be established, if necessary, is recommended. Untreated retropharyngeal abscess can lead to serious infectious and obstructive complications similar to those described for PTA. Additional complications include atlantoaxial dislocation and mediastinitis because of the proximity of the retropharyngeal space to these critical structures. The differential diagnosis includes causes of sore throat and airway obstruction as outlined in Table 1. In patients presenting with neck pain or stiffness, the differential diagnosis should also include meningitis, cervical spine arthritis, spinal trauma, dystonic reaction, tuberculous abscess of the spine, and various toxin-mediated diseases (tetanus, black widow spider bite, scorpion bite).

Diagnosis

If the diagnosis is apparent from history and physical examination findings, laboratory studies may not be necessary. In cases of diagnostic uncertainty, a complete blood cell count may be helpful to identify signs of inflammation (leukocytosis, thrombocytosis). A throat culture for GAS and a peripheral blood culture, if positive, can help guide antibiotic therapy. Other tests to consider, especially in patients with unusual presentations, include EBV, CMV and toxoplasmosis titers, purified protein derivative placement, erythrocyte sedimentation rate, and C-reactive protein.

Imaging should be reserved for cases in which the diagnosis is in question, if operative management is required or no improvement is seen after 48 to 72 hours of intravenous antibiotic therapy. Lateral neck radiography is often the first imaging modality pursued and may reveal thickening of the prevertebral soft tissues (Fig 1). At the level of the second cervical vertebrae, thickening greater than 7 mm is considered abnormal, or greater than 14 mm at the level of the sixth cervical vertebrae. Unfortunately, lateral neck radiography has a high false-positive rate secondary to variations in positioning, swallowing, and respiration. In addition, plain radiography cannot differentiate between phlegmon and frank abscess formation. A chest radiograph should be obtained if mediastinitis is suspected. Contrast-enhanced neck CT is the imaging modality of choice to differentiate abscess from phlegmon and for operative planning (Figs 2 and 3). However, judicious use of CT is recommended given the harmful effects of radiation exposure in children. For example, one should limit CT to children who have failed conservative treatment and require operative management. Ultrasonography is generally not helpful unless an associated neck mass is identified.

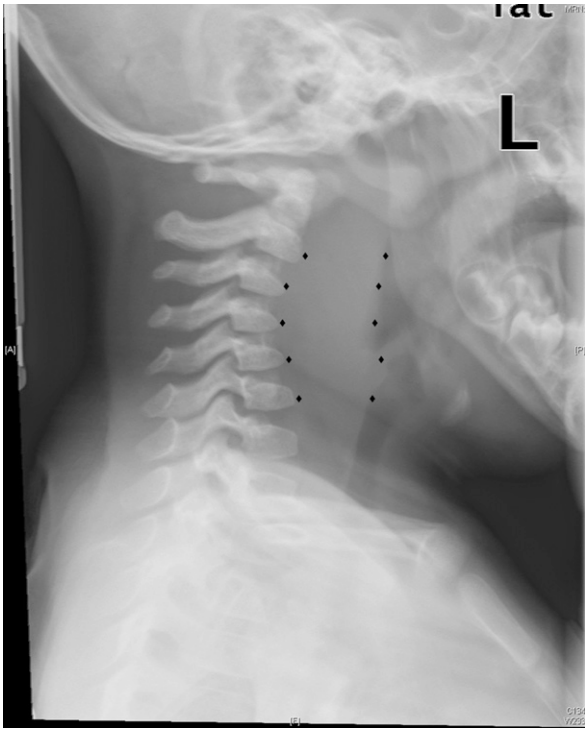


Figure 1. Lateral neck radiograph showing widening of the prevertebral soft tissue suggestive of retropharyngeal abscess.

Treatment

When considering management of retropharyngeal abscesses, the first consideration is the airway. Supplemental humidified oxygen, nasal trumpet, or positive pressure ventilation may be sufficient for moderate airway obstruction, but intubation or tracheotomy is rarely necessary. Although this topic continues to be debated, deep neck space infections are commonly treated initially with 24 to 48 hours of broad-spectrum parenteral antibiotics (eg, clindamycin, cephalosporins, β-lactamase penicillins), because approximately 60% of infections may resolve with medical management alone. For patients who fail to improve or progress despite antimicrobial therapy, surgical treatment should be considered. Generally a transoral approach is used to drain the abscess via an incision in the posterior pharyngeal

wall. For abscesses with cervical extension lateral to the great vessels, inferior to the hyoid bone or into other neck spaces, a transcervical approach is generally applied. Purulent fluid is sent for culture and a biopsy may be taken if another process is suspected. CT-guided drainage by interventional radiology can also be considered for abscesses in difficult to access locations. Recurrent abscesses should be considered for patients who fail to improve or whose symptoms return after a short period of improvement.

TONSILLAR AND ADENOIDAL HYPERTROPHY

Indications for Tonsillectomy and Adenoidectomy

Tonsillectomy and adenoidectomy (T&A) is the second most common surgery performed in the United States. (10) The 2 main indications for tonsillectomy are sleep-disordered breathing (SDB) and severe recurrent throat infections.

Severe throat infection, as defined by the Paradise criteria (11) is a documented sore throat plus 1 of the following: temperature greater than 38.3°C, cervical lymphadenopathy (tender nodes or >2 cm in diameter), tonsillar exudate, positive GAS RADT or culture. Recurrent infection is defined as more than 7 documented episodes of severe throat infections in 1 year, more than 5 episodes per year for 2 consecutive years, or more than 3 episodes per year for 3 consecutive years. Patients who do not meet these strict criteria should be evaluated for the presence of modifying factors that may make them candidates for T&A (eg, family or personal history of ARF, history of PTA, Lemierre syndrome, periodic fever, apthous stomatitis, pharyngitis, and adenitis [PFAPA], and multiple antibiotic allergies).

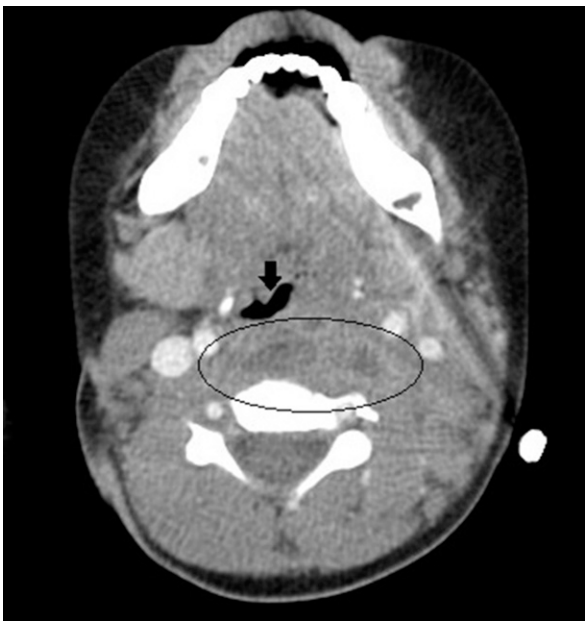


Figure 2. Contrast axial computed tomographic image showing heterogenous material with areas of hypodensity (circled) representing phlegmon with developing retropharyngeal abscess. The airway is displaced anteriorly (arrow) secondary to the retropharyngeal process.

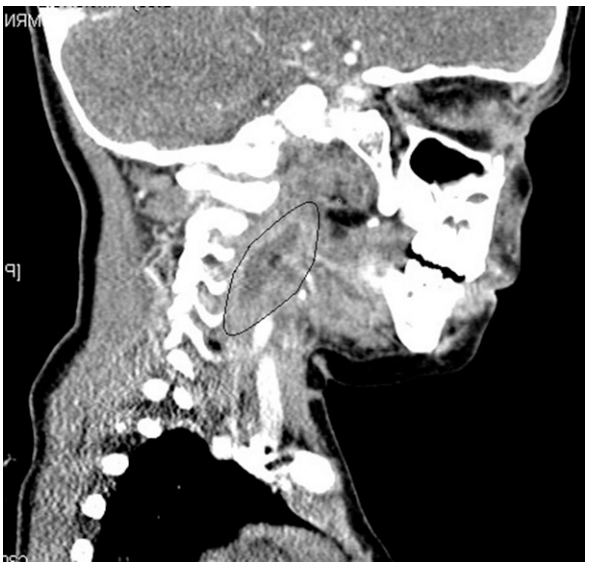


Figure 3. Contrast sagittal computed tomographic image demonstrating a retropharyngeal abscess (circled).

T&A is now being performed much more commonly for obstructive rather than infectious indications. (12) It should be considered for patients with SDB who also have comorbid conditions (eg, growth restriction, poor school performance, nocturnal enuresis, behavioral problems). (12) The role of polysomnography before T&A is controversial. According to the American Academy of Otolaryngology and Head and Neck Surgery, polysomnography is not necessary before T&A in otherwise healthy children with SDB but may be helpful in certain situations: in children predisposed to obstructive sleep apnea (OSA) and, therefore, at risk for perioperative respiratory complications (eg, children with trisomy 21, morbid obesity, neuromuscular disorders, or craniofacial abnormalities). (12)(13) The American Academy of Pediatrics recommends screening of otherwise healthy children and adolescents for snoring and signs/symptoms of SDB at routine health maintenance visits. They also recommend polysomnography or referral to a specialist such as a pediatric otolaryngologist for those who have positive screening results. (14) Polysomnography, although not necessary before T&A for SDB, is helpful to quantify the severity of OSA and the risk for postoperative complications. The current literature generally supports T&A as an acceptable treatment for

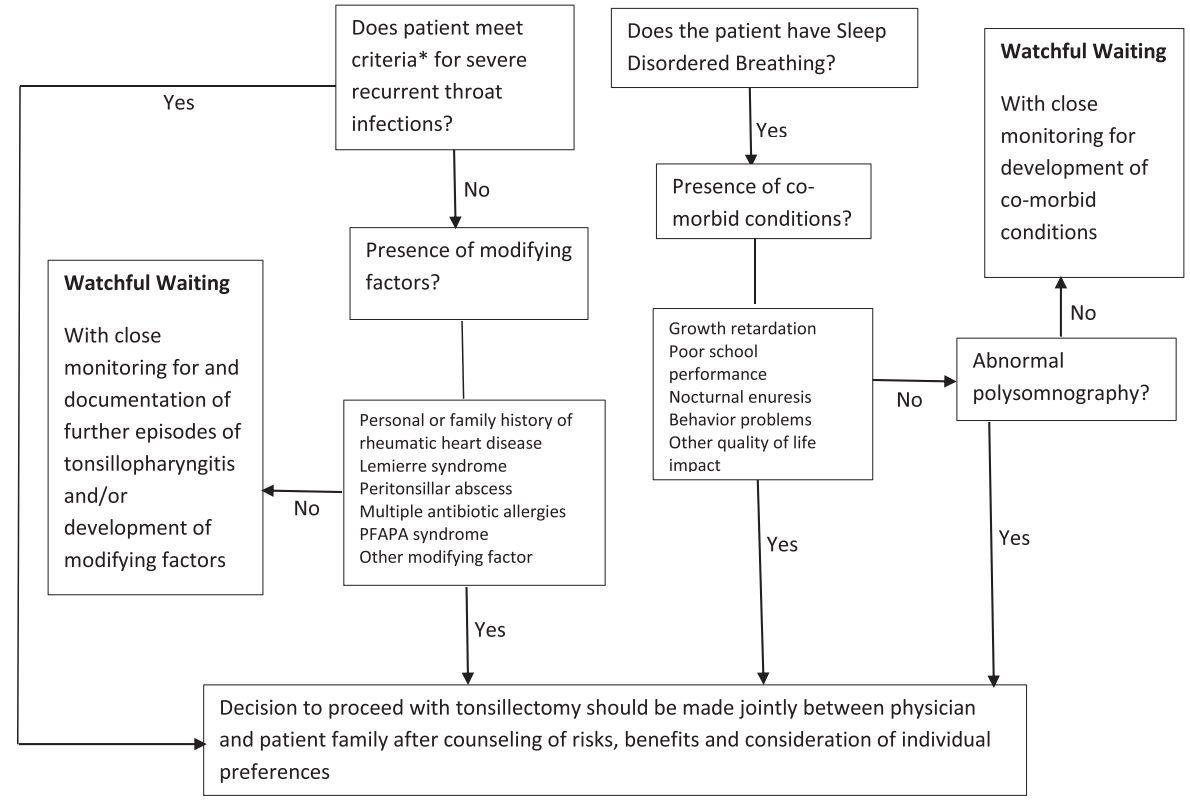
SDB/OSA. Studies have reported polysomnography normalization and improvement in parent- and patient-reported quality of life measures after T&A. However, OSA resolution is less likely in children with obesity, those of African American race, and those who have severe OSA at baseline. (13)

The decision to proceed with T&A should, therefore, be made jointly between the physician and patient family after counseling about risks, benefits, and consideration of individual preferences. (12) Shared decision-making tools such as option grids (15) are helpful to empower patients with the information necessary for them to take an active part in the decision-making process. Watchful waiting with close monitoring for and documentation of further episodes of tonsillopharyngitis, development of modifying factors, and/or development of comorbid conditions associated with SDB are recommended for patients who do not meet the aforementioned criteria. Figure 4 shows our recommended clinical decision pathway.

The main indication for adenoidectomy alone is severe nasal obstruction. Symptoms of severe nasal obstruction include mouth breathing, hyponasal speech, and impaired olfaction. Symptoms must present for more than 1 year and must persist despite conservative treatment such as a trial of antimicrobial therapy and nasal corticosteroids to exclude infectious and allergic causes of adenoidal hypertrophy. Relative indications for adenoidectomy include refractory chronic sinusitis, recurrent acute otitis media, and chronic otitis media with effusion in children who failed tympanostomy tube placement.

Complications

The overall frequency of postoperative complications after T&A is around 19%. (16) Postoperative bleeding occurs in



Modified Paradise Criteria*

1. Frequency of Episodes: > 7 episodes in 1 year, > 5 episodes per year for 2 years, >3 episodes per year for 3 years
2. Episode Criteria: Sore throat and 1 of the following: T>38.3, Cervical lymphadenopathy (tender or > 2cm), tonsillar exudate, positive GAS

Figure 4. Decision tree for tonsillectomy.
GAS=group A *Streptococcus*, PFAPA=periodic fever, apthous stomatitis, pharyngitis, and adenitis.

TABLE 4. **Conditions Associated with Tonsillar and Adenoidal Hypertrophy**

Infection
Allergy
Chronic inflammation
Malignancy- lymphoma or squamous cell carcinoma of the tonsil
Autoimmune lymphoproliferative syndrome
Lysosomal storage diseases and mucopolysaccharidoses
Idiopathic

approximately 5% of T&As. (16) Bleeding is characterized as primary if it occurs within the first 24 hours after surgery and secondary if it is more than 24 hours after surgery. Secondary hemorrhage is thought to be due to premature separation of eschar from the tonsillar bed and occurs most frequently on postoperative day 5 to 6. The bleeding usually stops spontaneously but sometimes requires repeat surgical intervention. Preoperative assessment of personal or family history of bleeding dyscrasias and postoperative anticipatory guidance regarding this potential complication are therefore essential.

Respiratory complications occur in approximately 9.4% of T&As. (16) These may be minor such as increased postoperative snoring or mouth breathing but may also be more serious. Perioperative desaturations, apneas or respiratory failure requiring supplemental oxygen, continuous positive airway pressure, oral or nasal airway insertion or reintubation, and assisted ventilation have been reported. Children with OSA are 5 times more likely to have perioperative respiratory complications than those undergoing T&A for other indications. (16)

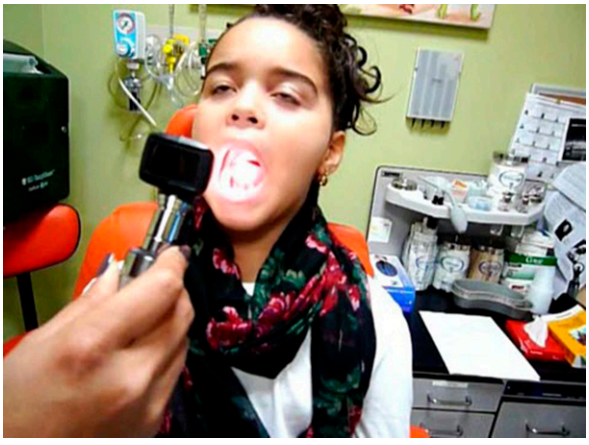
Velopharyngeal insufficiency, characterized by hypernasal speech, nasal air emission, and nasal liquid regurgitation, may also occur after T&A. Patients with cleft palate, submucous clefts, bifid uvula, neuromuscular disorders, and 22Q11 syndrome are particularly at risk for this complication. When it occurs postoperatively, velopharyngeal insufficiency is most often temporary. Nasopharyngeal stenosis may also occur after adenoidectomy. This presents with hyponasal speech and difficulty breathing through the nose.

Other complications of T&A include anesthesia-related bronchospasm/laryngospasm, electrocautery burn injuries, and temporomandibular joint dysfunction from the mouth gag used during the procedure. Postoperative pain, nausea, vomiting, and dehydration are also common. Acetaminophen with or without ibuprofen is recommended for postoperative pain control with sparing use of opioids due to increased risk for respiratory complications with this class of medication. (12) As with any surgical procedure, there is also a risk of infection. However, the American Academy of Otolaryngology–Head and Neck Surgery recommends against routine perioperative antimicrobial prophylaxis. (12) Studies have documented weight gain as a potential complication after T&A due to the decreased work of breathing postoperatively. It is therefore important to counsel all patients planning to undergo T&A about healthy nutrition and physical activity. Other rare complications of T&A include Grisel syndrome, a nontraumatic subluxation of the atlantoaxial joint that presents as severe neck pain and torticollis. Children with trisomy 21 are more predisposed to this complication. The risk of mortality with T&A is 1 in 16,000 to 35,000. (16)

In general, one should consider postoperative hospitalization in children who are younger than 3 years, children with severe OSA at baseline, and those with significant preoperative comorbid conditions that put them at increased risk for postoperative respiratory complications (eg, obesity, cardiac disease, neuromuscular disorders, prematurity, and craniofacial abnormalities). (13)

Conditions Associated with Tonsillar/Adenoidal Hypertrophy

In addition to acute or chronic infection, other processes can lead to tonsillar and adenoidal hypertrophy. In the case of unilateral tonsillar enlargement, it is important to evaluate for potential neoplastic processes such as lymphoma or human papillomavirus–associated squamous cell carcinoma of the tonsil. Although very rare,



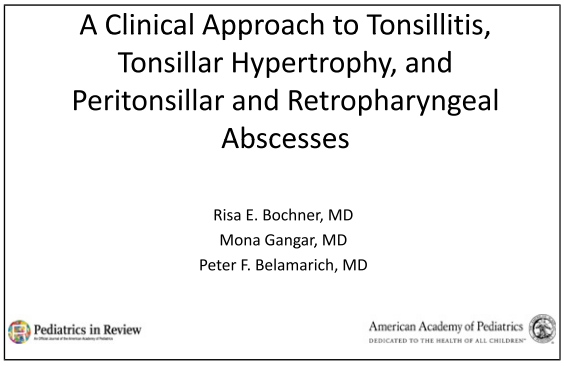
Video. Click here to view the video. Video shows the oropharyngeal examination technique.

autoimmune lymphoproliferative syndrome is also possible. In addition, some lysosomal storage diseases such as the mucopolysaccharidoses are associated with tonsillar and adenoidal hypertrophy (Table 4).

Summary

- On the basis of strong research evidence (level A), children older than 3 years with sore throat in the absence of viral symptoms should be tested for group A *Streptococcus* (GAS) pharyngitis.
- On the basis of strong research evidence (level A), oral or intramuscular penicillin and amoxicillin are first-line treatments for GAS pharyngitis.
- On the basis of research evidence (level B), first-generation cephalosporins, macrolides, or clindamycin are acceptable alternatives for penicillin-allergic patients.
- On the basis of research evidence (level B), asymptomatic carriers of GAS should not be treated with antibiotic therapy.
- On the basis of limited evidence (level C), diagnosis of peritonsillar abscesses can usually be made based on clinical suspicion and laboratory testing/imaging are often unnecessary.
- On the basis of research evidence (level C), imaging for retropharyngeal abscess should be reserved only when the diagnosis is in question, when operative management is required, or when there is lack of improvement after 48 to 72 hours of intravenous antibiotic therapy.
- On the basis of expert opinion (level D), decision to proceed with tonsillectomy and adenoidectomy (T&A) should be made jointly between the physician and patient family after counseling them about the risks, benefits, and consideration of individual preferences. Cases that do not meet the criteria for T&A (severe recurrent throat infections, moderate throat infection with modifying factors, sleep-disordered breathing with comorbid conditions and/or abnormal polysomnography) should be managed by watchful waiting.

To view the teaching slides that accompany this article, visit http://pedsinreview.aappublications.org/content/38/2/81.supplemental.



References for this article are at http://pedsinreview.aappublications.org/content/38/2/81.

Parent Resources from the AAP at HealthyChildren.org

- Tonsillitis: https://www.healthychildren.org/English/health-issues/conditions/ear-nose-throat/Pages/Tonsillitis.aspx
- The Difference between a Sore Throat, Strep & Tonsillitis: https://www.healthychildren.org/English/health-issues/conditions/ear-nose-throat/Pages/The-Difference-Between-a-Sore-Throat-Strep-and-Tonsillitis.aspx

For a comprehensive library of AAP parent handouts, please go to the *Pediatric Patient Education* site at http://patiented.aap.org.

Summary of IDSA Clinical Practice Guidelines for the Diagnosis and Management of Group A Streptotoccal Pharyngitis: 2012 Update by the Infectious Diseases Society of America

RECOMMENDATIONS FOR THE DIAGNOSIS OF GAS PHARYNGITIS

How should the diagnosis of GAS pharyngitis be established?

1. Swabbing the throat and testing for GAS pharyngitis by rapid antigen detenction test (RADT) and/or culture should be performed because the clinical features alone do not reliably discriminate between GAS and viral pharyngitis except when overt viral features like rhinorrhea, cough, oral ulers, and/or hoarseness are present. In children and adolescents, negative RADT tests should be backed up by a throat culture. Postive RADTs do not necessitate a back-up culture because they are highly specific.
2. Routine use of back-up throat cultures for those with a negative RADT is not necessary for adults in usual circumstances, because of the low incidence of GAS pharyngitis in adults and because the risk of subsequent acute rheumatic fever is generally exceptionally low in adults with acute pharyngitis. Physicians who wish to ensure they are achieving maximal sensitivity in diagnosis may continue to use conventional throat culture or to back up negative RADTs with a culture.
3. Anti-streptococcal antibody titers are not recommended in the routine diagnosis of acute pharyngitis as they reflect past but not current events.

Who should undergo testing for GAS pharyngitis?

4. Testing for GAS pharyngitis usually is not recommended for children or adults with acute pharyngitis with clinical and epidemiological features that strongly suggest a viral etiology (i.e. cough, rhinorrhea, hoarseness, and oral ulcers).
5. Diagnostic studies for GAS pharyngitis are not indicated for children <3 years old because acute rheumatic fever is rare in children <3 years old and the incidence of streptococcal pharyngitis and the classic presentation of streptococcal pharyngitis are uncommon in this age group. Selected children <3 years old who have other risk factors, such as older siblings with GAS infection, may be considered for testing.
6. Follow-up posttreatment throat cultures or RADT are not recommended routinely but may be considered in special circumstances.
7. Diagnostic testing or empiric treatment of asymptomatic household contacts of patients with acute streptococcal pharyngitis is not routinely recommended.

RECOMMENDATIONS FOR THE TREATMENT OF PATIENTS WITH GAS PHARYNGITIS

What are the treatment recommendations for patients with a diagnosis of GAS pharyngitis?

8. Patients with acute GAS pharyngitis should be treated with an appropriate antibiotic at an appropriate dose for a duration likely to eradicate the organism from the pharynx (usually 10 days). Based on their narrow spectrum of activity, infrequent adverse reactions, and modest cost, penicillin or amoxicillin is the recommended drug of choice for the non-allergic to these agents.
9. Treatment of GAS pharyngitis in penicillin-allergic individuals should include a first generation cephalosporin (for those not anaphylactically sensitive) for 10 days, clindamycin or clarithromycin for 10 days, or azithromycin for 5 days.

Should adjunctive therapy with NSAIDs, acetaminophen, aspirin, or corticosteroids be given to patients diagnosed with GAS pharyngitis?

10. Adjuctive therapy may be useful in the management of GAS pharyngitis.
    a. If warranted, use of an analgesic/antipyretic agent such as acetaminophen or an NSAID for treatment of moderate to severe symptoms or control of high fever associated with GAS pharyngitis should be considered as and adjunct to an appropriate antibiotic.

b. Aspirin should be avoided in children.
c. Adjunctive therapy with a corticosteroid is not recommended.

Is the patient with frequent recurrent episodes of apparent GAS pharyngitis likely to be a chronic pharyngeal carrier of GAS?

11. We recommended that clinicians caring for patients with recurrent episodes of pharyngitis associated with laboratory evidence of GAS pharyngitis consider that they may be experiencing >1 episode of bona fide streptococcal pharyngitis at close intervals, but they should also be alert to the possibility that the patient may actually be a chronic pharyngeal GAS carrier who is experiencing repeated viral infections.
12. We recommend that GAS carriers do not ordinarily justify efforts to identify them nor do they generally require antimicrobial therapy because GAS carriers are unlikely to spread GAS pharyngitis to their close contacts and are at little or no risk for developing suppurative or nonsuppurative complications.
13. We do not recommend tonsillectomy solely to reduce the frequency of GAS pharyngitis.

Summarized from *Shulman et al. Clinical practice guidelines for the diagnosis and management of group A streptococcal pharyngitis: 2012 update by the infectious diseases society of America. Clin Infect Dis. 2012 Nov 15; 55(10): 1279-82.*

EXCERPT FROM *Empirical Validation of Guidelines for the Management of Pharyngitis in Children and Adults*

Strategy 5: Modified Centor Score and Culture Management Approach

Perform throat culture on all children and adults having a Centor score of 2 or 3 and treat those having positive culture results. Treat those having a score of 4 or more empirically. (*Clinical outcome of this approach*: 100% sensitivity, 90% specificity for Group A strep. 6.4% of prescriptions written using these criteria were "unnecessary" based on negative throat culture).

MODIFIED CENTOR SCORE	
Criteria	**Points**
Temp >38°C	1
Absence of Cough	1
Swollen, Tender Anterior Cervical Nodes	1
Tonsillar Swelling or Exudate	1
Age *3-14 Years* *15-44 Years* *45 Years or Older*	 1 0 -1

Modified from McIsaac et al. Empirical validation of guidelines for the management of pharyngitis in children and adults. JAMA. 2004. Apr 7;291(13):1587-95.

Pharyngitis Quiz

1. Name 3 non-infectious causes of pharyngitis in children: _____, _____, _____.

   gastroesophageal reflux, postnasal drip, allergic rhinitis, chronic cough, foreign body, inhaled irritants, tobacco, caustic ingestions, malignancy, rheumatologic syndromes

2. The most common causes of acute pharyngitis in children are **VIRUSES**.

3. The most common bacterial cause of pharyngitis is **GROUP A STREPTOCOCCUS**, causing **15-30%** of acute pharyngitis in children. Peak incidence is between **5-15** years. Infection is rare before **2-3 years**. Carrier status may be as high as **25%** in some populations.

4. One rash manifested by Group A strep infection concentrates along flexor creases (antecubital fossa, axillary, inguinal areas), these are called **Pastia lines.**

5. Match the clinical description with the most suspicious etiology:

Adolescent with 2 weeks of sore throat, fatigue, and hepatosplenomegaly. **EBV**	NEISSERIA GONORRHOEAE
4-year-old girl with vesicles along posterior pharynx, hands, and feet. **ENTEROVIRUS**	ADENOVIRUS
2-year-old boy with pharyngeal erythema and vesicles isolated to lips and buccal mucosa. **HSV**	EBV (Infectious mononucleosis)
Exudative pharyngitis with conjunctivits after swimming in pool during summer. **ADENOVIRUS**	ENTEROVIRUS
Teenage girl with exudative pharyngitis following oral-genital sexual contact. **NEISSERIA GONORRHOEAE**	HSV (gingivostomatitis)

6. RADTs for Group A Strep have a high **SPECIFICITY** (95-99%) but lower **SENSITIVITY** (70-90%). A negative RADT **should/should not** be followed up with a confirmatory throat culture. PCRs for Group A Strep have high **SPECIFICITY** (98-100%) and high **SENSITIVITY** (98-100%). A confirmatory throat culture is **sometimes/"never"/always** necessary**.**

7. The primary goal of treating Group A Strep infections is to prevent **ACUTE RHEUMATIC FEVER** (effective within **9** days of symptom onset) as well as suppurative complications such as **RETROPHARYNGEAL** and **PERITONSILLAR ABSCESS**. Treatment is not effective in preventing **GLOMERULONEPHRITIS.**

8. The first-line treatment for Group A strep infections is **PENICILLIN**, given as 10-day oral course of **PENICILLIN VK** or single IM injection of **BENZATHINE PENICILLIN G.** In younger children, oral **AMOXICILLIN** may be used as a more palatable alternative.

9. **TRUE/FALSE:** Tonsillectomy is recommended for patients with recurrent Group A Strep infections (without other complications). **FALSE**

10. A throat culture you sent on a patient grows out *Group C beta-hemolytic streptococci*. Will you treat with antibiotics?
    Group C strep can cause acute pharyngitis with clinical features similar to those of group A strep pharyngitis. However, there is currently no convincing evidence of clinical improvement after treating Group C strep with antibiotics. Additionally, Group C strep has not been shown to cause acute rheumatic fever. Therefore, there is not a strong indication to treat with antibiotics. (If one does decide to treat, the antibiotic regimen should be similar to Group A strep infection with penicillin as first-line treatment).

11. **True/False:** Laboratory testing and radiologic imaging are usually unnecessary in diagnosing peritonsillar and retropharyngeal abscesses. **TRUE**

PHARYNGITIS CASES

Case 1

You log into AHLTA and see that your first appointment is Henry Lemierre for "sore throat". Reviewing the chart, you see that Henry is a previously healthy 7-year-old boy with no acute visits in the recent past. Henry has checked in late and is just being brought back by the corpsman to get vitals. While you are waiting you think of the questions you will ask his parents. What would you like to know? **PMHx:** Any history that could point to a non-infectious cause of sore throat such as gastroesophageal reflux, postnasal drip, allergic rhinitis, chronic cough. Prior history of pharyngitis (Group A strep or viral).

HPI:
-**A**ny history of caustic ingestions, inhaled irritants, foreign body
-Time of year (i.e. influenza and Group A strep more likely in winter, adenovirus in summer, enterovirus in late summer/early fall)
-Duration of complaint—generally speaking viral pharyngitis has more gradual onset with longer duration of symptoms (>4-5d) whereas Group A strep pharyngitis has more sudden, abrupt onset with shorter duration of symptoms (3-5d).
-Associated symptoms such as fever, decreased energy level.
    -Viral: coryza, cough, hoarseness, stridor, stomatitis, conjunctivitis, diarrhea, myalgias, nonspecific rash, hepatosplenomegaly
    -Group A strep: headache, nausea, vomiting, abdominal pain, palatal peticheae, scarlatiniform (sandpaper) rash, difficulty swallowing , sour breath
-Sick contacts, school/daycare attendance
-Medications tried at home such as ibuprofen/Tylenol, OTC cough medicine
-Hydration status—PO intake, urine output

Henry is accompanied by his mother, who states that he was completely fine until he came home from school yesterday looking "wiped out" and said that his head, throat, and stomach hurt. Since then he has thrown up twice and eaten very little but mother has been pushing fluids. Denies any congestion or cough. Has not taken any medications. His vitals show T *103.7* HR *95* BP *95/57* RR *15* SpO2 *100% on room air*. What will you focus on and look for on exam?

-HEENT: Oropharynx: tonsil size and symmetry, uvula (+/-deviation), erythema, exudates, peticheae, vesicles/ulcerations, any difficulty opening mouth wide; Nose: rhinorrhea, tenderness; Eyes: conjunctivitis, injection, discharge; Sinuses: tenderness to palpation; Neck: lymphadenopathy, tenderness to palpation or motion or difficulty turning head to the side; voice changes (hoarseness vs. hot potato)
-Skin: rash—nonspecific maculopapular, vesicular, or scarlatiniform (sandpaper, blanching, Pastia lines), desquamation
-Abdomen: tenderness to palpation, hepatosplenomegaly

On exam, Henry is lying curled up on the table and appears uncomfortable when asked to sit up. His tonsils are symmetrically enlarged with bilateral purulent exudate and palatal petechiae and he has scattered palpable anterior cervical lymph nodes. He has moist mucous membranes with cap refill <2 seconds. Exam is otherwise normal.

What is your suspected diagnosis?

Group A strep pharyngitis

How will you initially confirm your diagnosis?

RADT for Group A strep (rapid strep). It would also be appropriate to start treating based on strong clinical suspicion with picture consistent with Group A strep pharyngitis (regardless of RADT result).

Rapid strep returns positive. What is your management plan?
-**Antibiotics:** Penicillin is the first-line treatment for Group A strep pharyngitis. This can be given as a single intramuscular dose of benzathine penicillin G (600,000 units if <27kg, 1.2 million units if >27kg) or a 10-day course of oral penicillin VK (250mg twice daily if <27kg, 500mg twice daily if >27kg). Oral amoxicillin suspension is also an option for younger patients who are unable to tolerate pills, dosed at 50mg/kg daily (divided once or twice daily) for 10 days.
-**Adjunctive Therapy:** Per the 2012 clinical practice guidelines, use of an analgesic/antipyretic such as an NSAID or acetaminophen may be used for management of moderate to severe symptoms or control high fever. In studies, acetaminophen was not always equivalent to ibuprofen in improvement of symptoms. There are many topical OTC products including rinses, sprays, and lozenges. Topical anesthetic lozenges and sprays(ambroxol, lidocaine, benzocaine) are not recommended due to lack of efficacy and methemoglobinemia and allergic reaction risk. Lozenges are no more effective than hard candy and represent choking hazard for young children. Corticosteroids are also not recommended.
-**Follow-up:** Patients with Group A strep pharyngitis are no longer considered contagious after 24 hours of antibiotic therapy. He should be told to return if fevers persist >48 hours after being on antibiotics, or if he develops severe throat pain, neck stiffness/pain/decreased range of motion, voice changes or difficulty swallowing or breathing, or inability to keep down medications or drink enough to stay hydrated. Follow-up post-treatment throat cultures or RADTs are not routinely recommended. Suppurative complications from the spread to adjacent structures include peritonsillar and retropharyngeal abscess, cervical lymphadenitis, sinusitis, otitis media, and mastoiditis. Non-suppurative complications include acute rheumatic fever, acute poststreptococcal glomerulonephritis, and poststreptococcal reactive arthritis. The latent period for rheumatic fever is usually 2-4 weeks and 10 days for glomerulonephritis.

Henry's mother remembers that he was diagnosed with an ear infection in the emergency department when he was 15 months old and had an allergic reaction to amoxicillin. He got a rash and might have had mouth swelling, she can't remember. How would you treat him?

-Oral cephalosporins are recommended for most penicillin-allergic patients. Narrow-spectrum cephalosporins (i.e. cefadroxil, cephalexin) are preferred over broad-spectrum (i.e. cefuroxime, cefixime, cefdinir, cefpodoxime). If patients have immediate anaphylactic-type hypersensitivity to penicillin, oral clindamycin or an oral macrolide (i.e. erythromycin, clarithromycin, azithromycin) for 10-day course are reasonable options. For a questionable history, the patient can be observed after the first dose of medication (penicillin or cephalosporin) in the clinic or Emergency Department (depending on the provider's comfort level). Also consider a referral to allergy clinic. Most pediatric patients with a history that is fairly unconvincing for PCN allergy can be administered a penicillin challenge and be cleared of the allergy diagnosis.

Table 2. Antibiotic Regimens Recommended for Group A Streptococcal Pharyngitis

Drug, Route	Dose or Dosage	Duration or Quantity	Recommendation Strength, Quality[a]	Reference(s)
For individuals without penicillin allergy				
Penicillin V, oral	Children: 250 mg twice daily or 3 times daily; adolescents and adults: 250 mg 4 times daily or 500 mg twice daily	10 d	Strong, high	[125, 126]
Amoxicillin, oral	50 mg/kg once daily (max = 1000 mg); alternate: 25 mg/kg (max = 500 mg) twice daily	10 d	Strong, high	[88–92]
Benzathine penicillin G, intramuscular	<27 kg: 600 000 U; ≥27 kg: 1 200 000 U	1 dose	Strong, high	[53, 125, 127]
For individuals with penicillin allergy				
Cephalexin,[b] oral	20 mg/kg/dose twice daily (max = 500 mg/dose)	10 d	Strong, high	[128–131]
Cefadroxil,[b] oral	30 mg/kg once daily (max = 1 g)	10 d	Strong, high	[132]
Clindamycin, oral	7 mg/kg/dose 3 times daily (max = 300 mg/dose)	10 d	Strong, moderate	[133]
Azithromycin,[c] oral	12 mg/kg once daily (max = 500 mg)	5 d	Strong, moderate	[97]
Clarithromycin,[c] oral	7.5 mg/kg/dose twice daily (max = 250 mg/dose)	10 d	Strong, moderate	[134]

Henry lives at home with his parents and 1-year-old younger brother. No one else has symptoms. Ms. Lemierre wants to know if she should bring his brother and father in to have the whole family tested.

Not if they are asymptomatic. The likelihood of the spread of infection in a family is as high as 25%. The diagnostic testing for Group A strep pharyngitis is not routinely indicated in children <3 years of age. The prevalence of Group A strep pharyngitis is low in this age group, and reports of acute rheumatic fever in children <3 years of age is very rare. This is thought to be because it may take repeated exposures to Group A strep or priming of the immune system before there is an immune response to streptococcal pharyngitis that can lead to rheumatic fever. The low prevalence of Group A strep pharyngitis and the low risk of developing acute rheumatic fever in children <3 years of age limits the usefulness of diagnostic testing in this age group. However, if a child is <3 years of age and there is household contact with a school-aged sibling with documented streptococcal pharyngitis or the child attends daycare with a high rate of cases of Group A strep infection then it is reasonable to consider testing if the child is symptomatic. Of note, Group A strep infection in children <3 years old is often associated with fever, mucopurulent rhinitis, excoriated nares, and diffuse adenopathy (exudative pharyngitis is rare in the age group).

Ms. Lemierre wants to know if there is any way you can give the rest of the family a prescription to take to prevent them from getting strep throat?

No. Antimicrobial prophylaxis is not recommended except to prevent recurrent acute rheumatic fever in patients who have experienced a previous episode of rheumatic fever.

Case 2

Your next patient, a 5-year-old girl, Noa Dinah Fagia, is also running late. You see that her complaint is "ED f/u strep throat." Looking back in her AHLTA record, you see that she has been to the ED or urgent care for cough, congestion, and runny nose 3 times in the past 2 months and diagnosed with strep throat each time. Are you suspicious?

Patients with recurrent episodes of pharyngitis associated with laboratory evidence of Group A strep may be experiencing >1 episode of bona fide strep pharyngitis at close intervals, but you should be

suspicious that the patient may be a chronic pharyngeal carrier of Group A strep who is experiencing repeated viral infections.

Mr. Fagia carries Noa into the room and she is crying with a runny nose but otherwise well-appearing. Vital signs are normal with no concerning findings on exam (oropharynx clear, non-tender shotty anterior cervical lymphadenopathy). Mr. Fagia states that Noa has been having low-grade fevers for the past 4 days (Tmax 101) with mild sore throat, cough and a lot of congestion and runny nose. She has been fussy but symptoms are gradually improving. Her appetite has decreased but she has maintained normal fluid intake and urine output. They went the ED 3 days ago to get her checked out with her history of strep throat. At that time they performed a urinalysis and urine culture which were negative but rapid strep was positive. She was given a 10-day course of amoxicillin (50mg/kg/d), is on day 3 and tolerating well. She attends daycare and has experienced 2 similar episodes in the past 3 months, both lasting about a week. They went to the ED and urgent care with positive rapid strep both times. What are your thoughts on the history and recommended management recommendations?

Her story sounds more consistent with her being a chronic pharyngeal carrier of Group A strep with intercurrent viral upper respiratory infection. Of note, her modified Centor score is low at 1 (earned for age). She should finish the oral antibiotics since she is well into the course, but you should emphasize that she is likely a pharyngeal carrier. Parents should focus on supportive care with adequate fluid intake and NSAIDs/Tylenol as needed for fever or fussiness. She should come back once she is asymptomatic to undergo repeat throat culture to confirm the diagnosis as a chronic carrier.

Noa returns 1 month later and is asymptomatic. Repeat rapid strep and throat culture are positive, consistent with being a chronic pharyngeal carrier of Group A strep. Mr. Fagia wants to know if Noa needs to take antibiotics to get rid of it, and if she might spread it to others.

Chronic Group A strep (GAS) carriers have GAS present in the pharynx but have no evidence of an active immunologic response to the organism, such as rising ASO antibody titers. As many as 20% of asymptomatic school-aged children may be GAS carriers during the winter and spring. Individuals who are identified as chronic pharyngeal GAS carriers do not ordinarily require further antimicrobial therapy. Carriers are unlikely to spread the organism to their close contacts and are thought to be at very low risk, if any, for developing complications (suppurative or non-suppurative). Antimicrobial therapy to eradicate carriage is not indicated for the large majority of chronic streptococcal carriers.