An overview of sore throat, strep throat and tonsilitis

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Abstract

Pharyngitis and tonsilitis are common reasons why people seek medical care. These diseases are commonly caused by viral and bacterial infections, with group A β-haemolytic streptococcus being pharyngitis's most common bacterial pathogen. The majority of tonsilitis cases are of viral aetiology. The symptoms of viral and bacterial infections often overlap, making it difficult to distinguish them. These symptoms generally resolve within a few days with symptomatic treatment, however, in some cases, the use of antibiotics is necessary. The prescription of antibiotics for the treatment of pharyngitis and tonsilitis should be justified to avoid irrational antibiotic prescribing, which contributes to antimicrobial resistance. This article provides a brief overview of the symptoms, diagnostic methods, and treatment of pharyngitis and tonsilitis.

Keywords: Group A β-haemolytic streptococcus, penicillin pharyngitis, strep throat, tonsilitis

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Pharyngitis

During the recent outbreak of the severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2), a lot of individuals suffered from a sore throat, one of the symptoms that signify a SARS-CoV-2 infection.[1] In primary healthcare, a sore throat/pharyngitis is one of the common reasons why patients consult with their medical practitioners.[2] Though viral infections are responsible for some pharyngitis cases, 20–35% of cases are of bacterial aetiology, specifically, the group A β-haemolytic streptococcus (GABHS/strep throat).[3]

Although studies on the global incidence of GABHS infection in adults are limited, approximately 288.6 million annual cases of strep throat occur amongst children aged 5 to 14 years globally, which accounts for more than 100 000 disability-adjusted life-years globally.[4] Additionally, one in three children experience one or more episodes of a sore throat over a 12-month period.[4] Based on 2005 estimates, it was postulated that GABHS is the 5th most lethal pathogen, causing 163 000 global deaths annually.[5]

Clinical evaluation and treatment of pharyngitis

Additional to a sore throat, symptoms of strep throat include headache, fever, chills and, in some cases, abdominal pain, nausea and vomiting.[6] Distinguishing the clinical features of viral and bacterial pharyngitis is challenging due to similarities in presentation.[7] Diagnosis of strep throat is often complicated due to the substantial overlap of symptoms across different aetiologies.[6] This necessitates more in-depth diagnostic tests in addition to physical examination of the patient. There are five types of diagnostic tests that are routinely used to confirm the presence of GABHS infection, namely clinical scoring systems, throat culture, rapid antigen detection tests (RADTs), nucleic acid amplification tests (NAATs), and machine learning and artificial intelligence (AI) (Table I).[8]

Numerous clinical scoring systems have been designed and implemented, the most popular being the Centor criteria and McIsaac scoring system, but there is uncertainty regarding the ability of these systems to provide an adequate basis for GABHS diagnosis.[8] As such, clinical scoring systems are often used to inform the appropriateness of implementing other diagnostic tests, such as RADTs, NAATs or throat cultures, which offer increased diagnostic accuracy and are able to distinguish between viral and bacterial aetiologies of pharyngitis.[9,10]

Complications associated with GABHS are divided into suppurative and non-suppurative complications. Suppurative complications are caused by the involvement of structures near the area of infection, or the spread of the infection to drainage areas.[16] These suppurative complications include sinusitis, otitis media, peritonsillar abscess, cellulitis, necrotising fasciitis, and meningitis.[16] On the other hand, non-suppurative complications include glomerulonephritis, acute rheumatic fever, and reactive arthritis.[16]

Strep throat is self-limiting, and often resolves within 10–14 days without the use of any therapeutic interventions.[17] Available treatment strategies aim to provide symptomatic relief, shorten duration of the disease, reduce the risk of transmission, prevent non-suppurative and suppurative complications, and reduce the use of antibiotics.[18]

Symptomatic relief is achieved through analgesics and antipyretic drugs such as paracetamol and ibuprofen.[19] Oral corticosteroids can be used to facilitate healing and reduce pain in patients with a sore throat.[20] Various randomised clinical trials in the

Table I: Different methods used in the diagnosis of strep throat

Diagnostic method	Principle	Comments
Clinical scoring systems[10]	These scoring tools use algorithms that integrate information from different variables to assess the likeliness of GABHS infection.	Since these tools do not require specialised equipment or tests, they are easy to implement by healthcare providers to complement further diagnostic tests.
Rapid antigen detection tests[11]	Following a throat swab, the presence of GABHS-specific cell wall antigen (Lancefield group A carbohydrate) is ascertained through an immunological reaction.	Although substantial variation in the specificity and sensitivity of RADTs has been reported, these tests are still useful clinical tools in the detection of GABHS. This is attributed to their low cost, ease of use and speed of delivering results.
Throat culture[12]	A nasopharyngeal swab is taken and cultured. Assessment of colony morphology, Gram staining and serogrouping are used to identify GABHS.	Considered to be the gold standard for diagnosing GABHS, throat culture displays high sensitivity and specificity and is relatively cheap. Its main disadvantage is that test results are only obtained after 24 to 48 hours, delaying diagnosis and treatment.
Nucleic acid amplification tests[13]	Nucleic acid sequences specific to GABHS are probed for, amplified, and detected. Various amplification techniques exist, including isothermal and polymerase chain reaction techniques.	NAATs possess higher sensitivity than RADTs, but the excessive cost thereof prohibits the extensive use of NAATs in the clinical setting.
Machine learning and artificial intelligence[14,15]	Image capture and processing algorithms may be employed to diagnose GABHS infection from pictures of patients' throats. The automation of examining throat cultures is made possible by artificial intelligence algorithms.	These techniques may provide improved diagnostic accuracy and decrease clinicians' workload, but further validation studies are needed before they can be implemented.

treatment of patients aged 5 or older, with clinical signs of acute tonsillitis, pharyngitis and sore throat have demonstrated that corticosteroids such as dexamethasone (maximum dose: 10 mg) provide pain relief without an increase in serious adverse events.[20] Lozenges, anti-inflammatory gargles, and local anaesthetics can additionally be used for symptomatic relief.[21]

Antibiotics may reduce the development of suppurative and non-suppurative complications of GABHS. The rate of the transmission of GABHS is 35%,[22] and antibiotics may reduce the communicability to 24 hours, which limits the spread to high-risk patients.[18] In achieving these goals, the benefit of antibiotic use must outweigh the associated costs. In medical settings, there is an overprescription of antibiotics for the treatment of pharyngitis. For example, a 2015 study in Egypt reported that antibiotics were prescribed in 86% of patients with pharyngitis.[23] Irrational prescribing of antibiotics in patients with pharyngitis results in wasteful expenditure.[18] The unnecessary use of antibiotics can lead to the development of side effects such as diarrhoea and allergies.[18] Moreover, the irrational use of antibiotics in the treatment of GABHS has contributed to resistance to broad-spectrum macrolides and fluoroquinolones.[24] As such, patients unlikely to benefit from antibiotic treatment are advised to seek medical help if there is no remission of symptoms after one week, or when the symptoms worsen.[21]

Antibiotics with narrow spectrums are recommended for the treatment of GABHS, with penicillin V being the antibiotic of choice of many physicians.[18] In South Africa, the standard treatment guidelines and the essential medicines list recommend 500 mg penicillin V, two to three times a day for 10 days in adults and adolescents weighing more than 30 kg as first-line treatment for patients with GABHS.[21] Relatively low costs, fewer side effects and a narrow spectrum of activity render penicillin the favourable drug of choice when treating GABHS. Additionally, penicillin is useful in the reduction of the incidence of rheumatic fever in patients with strep throat infection.[25] Although there are conflicting opinions on the efficacy and safety of using a shorter course of penicillin, a recent systematic review and meta-analysis of 50 clinical trials suggested that long-term penicillin V treatment should remain the first-line therapy in patients with a GAHBS infection.[26] Some cephalosporins can be used as an alternative to penicillin therapy. For example, cefprozil has been demonstrated to have higher eradication rates of GAHBS compared to erythromycin.[27] Furthermore, despite significant in vitro efficacy of penicillin, studies have reported the inability to eradicate GAHBS in 35% of patients with pharyngitis.[28] In contrast, a once-daily dose of cefprozil has the ability to eradicate the streptococcal carrier state.[28]

Allergies and intolerance can limit the use of penicillin in some individuals. In such cases, the National Institute for Health and Care Excellence recommends a dose ranging from 250 mg to 500 mg of clarithromycin twice daily for 5 days as alternative first-line therapy.[29] In patients with resistance to macrolides, a 7 mg/kg dose of clindamycin can be administered three times daily.[21] The disease is usually no longer contagious after 24 hours of antibiotic treatment, and individuals may return to school or work after this time period. Follow-up visits are not usually required following treatment.[25]

Tonsilitis

Closely related to pharyngitis, tonsilitis is the inflammation of the tonsils – the lymph nodes found on the lateral oropharynx, and makes up about 1.3% of outpatient visits.[30] Similar to pharyngitis,

tonsilitis can be caused by virus or bacteria, however viral aetiologies are more common.[30] The GABHS pathogen is commonly responsible for bacterial tonsilitis, however, *Staphylococcus aureus*, *Streptococcus pneumoniae, Mycobacterium tuberculosis*, and *Haemophilus influenza* have also been implicated.[31] Common viral causes include the pathogens that cause the common cold (rhinovirus, adenovirus, and coronavirus).[32] Other viral causes of tonsilitis include HIV, Epstein-Barr, cytomegalovirus, and Hepatitis A.[32] In sexually active adults, various sexually transmitted infections should be considered as a probable cause.[33] Although rare, complications associated with tonsillitis include glomerulonephritis, scarlet, and rheumatic fever.[30]

Clinical evaluation and treatment of tonsilitis

Evaluation of tonsillitis involves physical examination, stratification of patents according to the Centor score, and evaluation of the need for collection of samples for antigen testing/throat culture.[34] Imaging is not often required, however, in complicated cases where there are unstable vital signs, difficulty swallowing, and toxic appearance, more investigations may be required.[35] These investigations include computerised tomography imaging and further laboratory tests on blood samples.[30]

Owing to the common viral aetiology of tonsilitis, supportive care involving adequate hydration and analgesics, with corticosteroids often used as an adjunct therapy, is sufficient for treatment.[36] In cases of bacterial tonsilitis, and when antibiotic therapy is needed, a similar treatment strategy for the treatment of GABHS pharyngitis is followed.[28] When tonsilitis is recurrent, partial or complete tonsillotomy or tonsillectomy, respectively, can be used as treatment strategies. Careful consideration and adherence criteria for surgical management decision making should be conducted prior to surgical intervention.[37]

Conclusion

Pharyngitis and tonsilitis are commonly encountered in various outpatient settings. Although these conditions are self-limiting and resolve without the need for hospitalisations, they sometimes lead to complications that put patients' health at risk. As such, careful evaluation should be conducted when deciding whether to use antibiotics as therapy. This evaluation will prevent the irrational prescribing of antibiotics, which ultimately contributes to antibiotic resistance, a current threat to human health around the world.

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