


A Study to Determine if Addition of Palatal Petechiae to Centor Criteria Adds More Significance to Clinical Diagnosis of Acute Strep Pharyngitis in Children

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Abstract

Objective. A study to determine if addition of palatal petechiae to Centor criteria adds more value for clinical diagnosis of acute strep pharyngitis in children. **Hypothesis.** In children, Centor Criteria does not cover all the symptoms and signs of acute strep pharyngitis. We hypothesize that addition of palatal petechiae to Centor Criteria will increase the possibility of clinical diagnosis of group A streptococcal pharyngitis in children. **Methods.** One hundred patients with a complaint of sore throat were enrolled in the study. All the patients were examined clinically using the Centor Criteria. They were also examined for other signs and symptoms like petechial lesions over the palate, abdominal pain, and skin rash. All the patients were given rapid strep tests, and throat cultures were sent. No antibiotics were given until culture results were obtained. **Results.** The sample size was 100 patients. All 100 had fever, sore throat, and erythema of tonsils. Twenty of the 100 patients had tonsillar exudates, 85/100 had tender anterior cervical lymph nodes, and 86/100 had no cough. In total, 9 out of the 100 patients had positive throat cultures. We observed that petechiae over the palate, a very significant sign, is not included in the Centor Criteria. Palatal petechiae were present in 8 out of the 100 patients. Six out of these 8 with palatal petechiae had positive throat culture for strep (75%). Only 7 out of 20 with exudates had positive strep culture. Sixteen out of the 100 patients had rapid strep test positive. Those 84/100 who had negative rapid strep also had negative throat culture. **Statistics.** We used Fisher's exact test, comparing throat culture positive and negative versus presence of exudates and palatal hemorrhages with positive and negative throat cultures and the resultant *P* value <.0001. **Conclusion.** Our study concludes that addition of petechiae over the palate to Centor Criteria will increase the possibility of diagnosing acute group A streptococcal pharyngitis in children.

Keywords

critical care, emergency medicine, general pediatrics, infectious diseases, allergy/immunology

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Background

The typical symptoms of streptococcal pharyngitis are sore throat, fever of greater than 38°C, tonsillar exudates, and enlarged tender cervical lymph nodes. Other symptoms include headache, nausea, vomiting, abdominal pain, muscle ache, scarlatiniform rash, and petechiae on the palate. The diagnosis of strep throat is unlikely with symptoms of red eyes, hoarseness, runny nose, or mouth ulcers. It is also less likely in the absence of fever. The most common bacterial organism causing acute pharyngitis in children is group A β -hemolytic streptococci.

Our study used the modified Centor Criteria.¹ The Centor Criteria are widely accepted in the adult literature for the evaluation and management of acute streptococcal pharyngitis.² Each of the criteria is assigned a point³ (see Table 1):

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Table 1. Modified Centor Score.

Points	Probability of Strep	Management
1 or <	<10%	No antibiotic or culture
2	11% to 17%	Culture all
3	28% to 35%	Antibiotics only for positive culture
4 or 5	52%	Empiric antibiotics

- Absence of cough
- Swollen and tender cervical lymph nodes
- Temperature $>38^{\circ}\text{C}$ (100.4°F)
- Tonsillar exudate or swelling
- Age less than 15 years (3-14 years)
- Age 15 to 44 years (0 point)
- Age 45 years or older (-1 point)

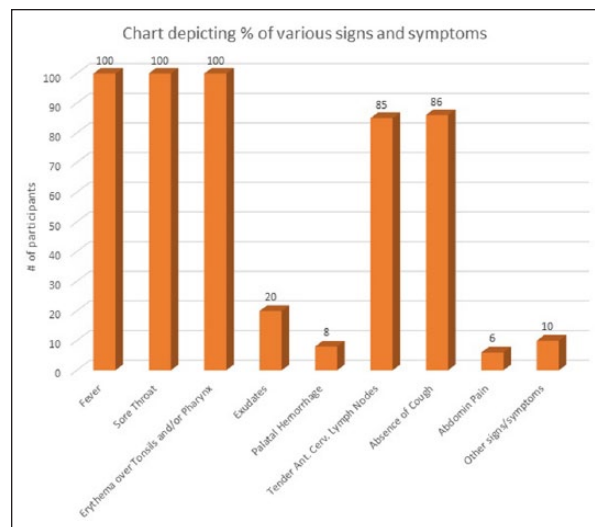
In addition, we also observed erythema over the tonsils in all subjects, petechiae over the palate and skin rash in some patients, and some patients complained of abdominal pain.⁴

Methods

This was a prospective, nonrandomized observational study. It is a part of another institutional review board-approved study: "Leukocyte Esterase Detection From Throat Swab for Rapid Diagnosis of Acute Bacterial Pharyngitis in Children 4 to 17 Year of AGE." One hundred patients with a complaint of sore throat were enrolled in the study. All the patients were examined clinically using the Centor Criteria. They were also examined for other signs and symptoms such as petechiae over the palate and abdominal pain. All the patients had rapid strep tests and throat culture. No one was given any antibiotic till the culture results were obtained. All the observed data were obtained in another institutional review board-approved study, as mentioned above.

Results

The sample size is 100 patients. All 100 patients had fever, sore throat, and erythema of tonsils. Twenty of the 100 patients had tonsillar exudates, 85/100 had tender anterior cervical lymph nodes, and 86/100 had no cough. In total, 9 out of the 100 patients had positive throat cultures (see Figures 1 and 2). We observed that palatal petechiae, a very significant sign, is not included in the Centor Criteria. Petechiae over the palate were present in 8 out of the 100 patients. Six out of these 8 with palatal petechiae had positive throat culture for strep (75%).

**Figure 1.** Percentage of patients with various signs and symptoms.

Only 7 out of 20 with exudates had positive strep culture. Sixteen out of the 100 patients had positive rapid strep. Those 84/100 who had negative rapid strep also had negative throat culture. None of our patients, on follow-up, had any suppurative complications or any evidence of rheumatic fever. The percentage of signs and symptoms observed in our subjects with strep pharyngitis are given in Table 2. A comparison of petechiae over the palate, exudate, and throat culture for strep is provided in Table 3.

Statistics

We used Fisher's exact test, comparing throat culture positive and negative versus presence of exudates and palatal hemorrhages with positive and negative throat cultures and the resultant P value $<.0001$.

Discussion

Pharyngitis is defined as an irritation of the pharynx and/or tonsils. The typical symptoms of streptococcal pharyngitis are sore throat, fever of greater than 38°C , tonsillar exudates, and enlarged tender cervical lymph nodes. Other symptoms include headache, nausea, vomiting, abdominal pain, muscle ache, scarlatiniform rash, and petechiae on the palate. The diagnosis of strep throat is unlikely with symptoms of red eyes, hoarseness, runny nose, or mouth ulcers, and also less likely in the absence of fever. The etiology is usually infectious, with most cases being of viral origin. These cases are benign and self-limiting for the most part. Bacterial causes of

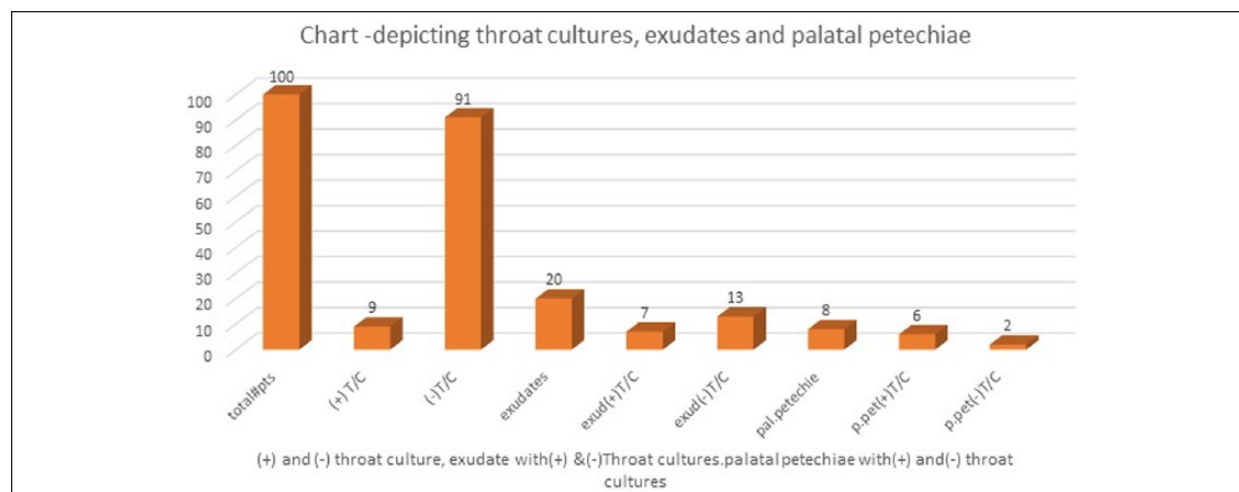


Figure 2. Comparing palatal petechiae, exudate, and throat culture for strep.

Table 2. Percentage of Signs and Symptoms in Our Study of Acute Pharyngitis.

Patients	Temperature >101°F	Sore Throat	Erythema Over Tonsils and/or Pharynx	Exudates	Petechiae Over the Palate	Tender Anterior Cervical Lymph Nodes	Absence of Cough	Abdominal Pain	Other Signs/Symptoms Like Skin Rash, Vomiting
100	100/100	100/100	100/100	20/100	8/100	85/100	86/100	6/100	10/100

Table 3. Comparing Petechiae Over the Palate, Exudate, and Throat Culture for Strep.

Throat Culture Positive	Throat Culture Negative	Patients With Exudates	Exudates and Positive Throat Culture	Exudates With Negative Throat Culture	Patients With Petechiae Over Palate	Palatal Petechiae With Positive Throat Culture	Palatal Petechiae With Negative Throat Culture
9/100	91/100	20/100	7/20	13/20	8/100	6/8	2/8

pharyngitis are also self-limiting, but are concerning because of suppurative and nonsuppurative complications. Other causes include allergy, trauma, toxins, and neoplasia.³

The most common bacterial organism causing acute pharyngitis in children is group A β -hemolytic streptococci.

Centor Criteria have been used in the past as a way to diagnose and treat group A streptococcus (GAS) pharyngitis.¹ These include the following:

- Fever
- Anterior cervical lymphadenopathy
- Tonsillar exudate
- Absence of cough

One point is awarded for each of the criteria met, with patients scoring 0 to 1 unlikely to have GAS infection and patients with a score of 4 more likely to have

GAS. A clinical diagnosis of GAS infection using these criteria can result in an overestimation of the incidence of streptococcal pharyngitis, as many bacterial and viral cases of pharyngitis can be indistinguishable on clinical grounds. This can lead to an overtreatment of pharyngitis with antibiotics. In adults, the positive predictive value of the Centor Criteria for predicting GAS pharyngitis is around 40% if 3 criteria are met, and about 50% if 4 criteria are met. These criteria along with other clinical features should be used to guide treatment for pharyngitis in adults.¹

The McIsaac modification of the Centor Criteria has been studied in children.² Points for a patient are added based on the following scoring:

- History of fever or temperature >101°F (38°C) = +1
- Absence of cough = +1
- Tender anterior cervical adenopathy = +1
- Tonsillar swelling or exudates = +1

- Age <15 years = +1
- Age >45 years = -1

Children with 0 points are unlikely to have GAS infection and do not need to be tested. Those with 1 to 3 points should be tested and treatment should be based on the test result. Those with 4 to 5 points have a higher likelihood of having GAS infection and may be treated empirically or tested and treated if the test is positive.²

In our study, we included all the Centor Criteria as the basis for selection/treatment. We have also observed for other signs such as erythematous tonsils or pharynx, palatal hemorrhages, and skin rash and complaints of abdominal pain. Acute bacterial pharyngitis in children is most commonly caused by group A β -hemolytic streptococci. According to Robert P. Blereau, MD, palatal petechiae are present along with exudative tonsillitis and cervical adenitis, and with a positive test or culture result, the diagnosis is more secure. He also writes that although palatal petechiae are seen with streptococcal tonsillitis, they are not pathognomonic.⁵ However, in our study, 6 out of 8 patients with only palatal hemorrhages grew culture for group A β -hemolytic strep.

Palatal hemorrhages may also accompany infectious mononucleosis, rubella (Forschheimer spots), roseola, viral hemorrhagic fevers, thrombocytopenia, and palatal trauma. In the setting of acute tonsillitis, treatment is recommended for all children who are antigen or culture positive for group A β -hemolytic *Streptococcus*.^{6,7}

Throat culture is the criterion standard for diagnosis of GAS infection (90% to 99% sensitive). Although less expensive than the rapid antigen detection test, it is not be the best test to use in the emergency department because of difficulty with follow-up. The guidelines that recommend cultures for GAS screening are aimed at office-based practices and not the emergency department. A study by Cohen et al suggested that criteria-based selective testing strategies for children with pharyngitis do not have a sufficient combination of sensitivity and specificity to determine which patients should be tested for group A streptococcal infection. Using an external validation cohort of 676 children, the investigators determined that none of the clinical predictors and rules used in the study reached the investigators' diagnostic accuracy target, specifically a sensitivity and specificity of greater than 85%.⁸

GAS pharyngitis is usually a self-limited disease, and most signs and symptoms resolve spontaneously in 3 to 4 days. If administered early, antibiotics can shorten the duration of the illness by up to 1 day, but the main reason they are given is for prevention of acute rheumatic fever.

This rationale is being questioned by many as the incidence of acute rheumatic fever in the United States

is extremely low. In addition, pain medications such as nonsteroidal anti-inflammatory drugs or acetaminophen have been advocated for symptomatic treatment.⁹ Steroids can alleviate the symptoms associated with GAS pharyngitis.⁹ Antibiotics do not prevent acute glomerulonephritis. Steroids may be used for airway compromise and symptomatic relief.¹⁰

Conclusion

Our study concludes that addition of petechiae over the palate to the Centor Criteria will increase the possibility of clinical diagnosis of acute group A streptococcal pharyngitis in children.

Declaration of Conflicting Interests

The author(s) declared no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

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