The clinical pattern of group C streptococcal pharyngitis in children

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Introduction

Streptococcal pharyngitis is a common infectious disease of the upper respiratory tract in children. The vast majority of occurrences are attributed to group A Streptococcus pyogenes (GAS). However, other streptococci belonging to groups C (GCS) and G (GGS) have also been implicated as causative agents of pharyngitis in children and young adults.1–10 It is accepted, despite the contradictions, that GCS and GGS can cause not only endemic5,7 but also sporadic3,6,8 pharyngitis. Because nonGAS organisms are inhabitants of the oropharynx, proof of their pathogenicity in symptomatic patients requires serological evidence of infection. Indeed, demonstration of an immune response provides strong evidence of pathogenicity, as it is known that GCS elaborates streptolysin O, and therefore elevation of antistreptolysin O (ASO) verifies the nature of the infection.11

Of note, it is has not been fully evaluated whether the symptoms of pharyngitis in children are the same irrespective of the type of agent that is the causative factor and whether the Centor criteria12 can be validated in pharyngitis arising from GCS and GGS infections. Consequently, the aim of the present study was to investigate the clinical pattern of streptococcal pharyngitis arising from GCS and GGS infection, in comparison with pharyngitis arising from GAS infection or negative-culture pharyngitis, the latter being presumed to represent viral upper respiratory infection.

Patients and methods

All children aged 4–14 years old (mean age, 6.5 years; SD, 3.1) with pharyngitis who were examined at the outpatient clinic of our department for a 6-month period (January-June 2006) were included in the study. The children were eligible if they had not received any antibiotic treatment during the 4 weeks preceding their visit to the outpatient clinic. Overall, 144 children were included in the study.
The symptoms and the signs of the patients were recorded in a structured questionnaire which included the presence or absence of fever, cough, hoarseness, tonsillar hypertrophy, exudates, cervical adenitis, and painful cervical adenitis. Centor criteria, which include fever of more than 38°C, cervical adenitis, cough, and exudates, were also recorded in all patients. A throat culture for streptococcus of groups A, C, G, and F was taken from every patient and a latex agglutination test (Abbott Testpack Strep APlus; Abbott Laboratories, Abbot Park, IL, USA) was performed at the time of examination. For the throat culture, the swab was taken by scrubbing both tonsils vigorously, including the crypts and the posterior pharyngeal wall.

All patients with streptococcal pharyngitis, irrespective of the type of streptococcus, were given penicillin. Streptolyasin O antibody titers (ASO) were measured in blood samples taken prior to penicillin administration and 3 weeks later during the convalescent period. Information regarding treatment results, such as clinical and bacteriological response to antibiotic treatment, was not recorded.

The patients were divided into three distinct categories. Patients in group I (group A strep) consisted of all patients with GAS pharyngitis, patients in group II (GCS) included all children with streptococcus other than GAS, and patients in group III (nonstrep) comprised the remaining patients who did not have any causative agent isolated from the throat culture.

The study was approved by the Ethics Committee of the Department, and parental informed consent was given at the time of inclusion of the children in the study.

Laboratory methods

**Throat cultures**

Throat cultures were inoculated on Columbia blood agar plates and examined at 24 and 48 h. Streptococcus identification was confirmed by using 0.004IU Bacitracin discs (Becton Dickinson, Sparks, MD, USA) and a latex agglutination assay (Oxoid, Basingstoke, Hants, UK). The Lancefield group of streptococci in β hemolytic colonies was demonstrated using latex agglutination following enzymatic extraction of the group specific antigen (Streptex; Wellcome Diagnostics, Research Triangle Park, NC, USA).

**ASO titers**

Streptozyme-measured antibodies were determined by a microtiter method, as described previously.13

Statistical analysis

The χ² test was used for categorical data and the t-test and one-way analysis of variance (ANOVA) were used for the comparison of continuous variables. Logistic regression analysis was used for the identification of odds ratios (ORs), after controlling for confounding. SPSS, version 8 (Chicago, IL, USA) was used for the above-mentioned statistical tests.

**Results**

Of the 144 children in the study, 74 children had no agent isolated from the throat culture and comprised group III patients (nonstrep), whereas 70 had streptococcus isolated, and in 57 of them, it was GAS, i.e., these 57 children were group I patients (GAS strep). In the remaining 13 children (9%), i.e., group II patients, streptococcus GCS was isolated (GCS strep). Streptococcus GGS and GFS were not identified in any of the children. The three patient groups were not different with respect to age and gender. The latex agglutination test was positive in only 3 children (96% specificity) with negative cultures; it was positive in 55 group I patients (96.5% sensitivity) and in 8 group II patients (61.5% sensitivity).

At the beginning, the patients with streptococcus irrespective of type were compared to those with no causative agent. Sore throat was twice as common in patients with streptococcus (63% in streptococcal pharyngitis versus 43% in nonstreptococcal pharyngitis; OR, 1.1–4.3). The presence of cough did not differentiate the two groups. Tonsillar hypertrophy was three times more common in streptococcal pharyngitis (57% in streptococcal pharyngitis versus 31% in nonstreptococcal pharyngitis; OR, 1.3–6.1) whereas the presence of exudates was five times more common in streptococcal pharyngitis (68% in streptococcal pharyngitis versus 27% in nonstreptococcal pharyngitis; OR, 2.7–11.8). Similarly, adenitis was recorded four times more often in streptococcal pharyngitis (75% in streptococcal pharyngitis versus 24% in nonstreptococcal pharyngitis; OR, 2–8.6), whereas painful adenitis was six times more common in streptococcal pharyngitis (58% in streptococcal pharyngitis versus 19% in nonstreptococcal pharyngitis; OR, 2.1–16.5).

When group I patients were compared to group II patients, the two groups were not different with respect to fever, hoarseness, the presence of cough, tonsillar hypertrophy, exudates, adenitis, and painful adenitis. Only sore throat was three times more common in streptococcal pharyngitis in group I patients (OR, 1–14). Group II patients were not different from group III patients with respect to any of the tested parameters. The differences between group I patients and group III patients are listed in Table 1. These findings indicate that group I patients had a more severe course than group III patients, as most clinical features were far more commonly met in the group I patients. There was no difference as far as fever, hoarseness, and cough were concerned.

Centor criteria were present in all but one patient with GCS streptococcal pharyngitis, and in 10 patients (77%) more than two Centor criteria were found. In group I, two or more Centor criteria were recorded in 51 patients (89%), whereas in children with nonstreptococcal pharyngitis, two or more Centor criteria were identified in 55 patients (74%).