A CASE REPORT OF A CHILD WITH RECURRENT CATARRH CO-COLONIZED WITH FIVE *STREPTOCOCCUS PNEUMONIAE* SEROTYPES

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ABSTRACT

Streptococcus pneumoniae is one of the most common causes of widespread diseases. Pneumococci colonize asymptomatically the nasopharynx in children and could be responsible for severe, life-threatening illnesses such as pneumonia, sepsis and meningitis.

The case report shows co-colonisation in two-year-old child vaccinated with the 10-valent pneumococcal conjugate vaccine (PCV-10) suffering from recurring catarrh and found to carry 5 serotypes *S. pneumoniae*. The strains have been detected and typed using molecular methods: real-time polymerase chain reaction (real-time PCR) and allelic hybridization.

Monitoring *S. pneumoniae* colonization of human mucosa is crucial to reduce the likelihood of severe invasive pneumococcal diseases such as meningitis, pneumonia or otitis.

Keywords: *Streptococcus pneumoniae,* nasopharyngeal carriage, PCR typing.

INTRODUCTION

S. pneumoniae is one of the most common causes of diseases that are widespread.

Asymptomatic carriage is high in children (over 30%), especially in those under five years of age. Pneumococci colonize the nasopharynx in children and can cause severe, life-threatening diseases such as pneumonia, sepsis and meningitis (1, 2, 3).

The polysaccharide capsule is a major factor in virulence and immunogenicity of *S. pneumoniae* and it plays an important role in colonization. The serotypes in pneumococci are determined by variations in the structure of the polysaccharide capsule (4, 5). Simultaneous carriage of two or more serotypes of pneumococci was found to be around 30% in European children with increased competition between co-colonizing strains (6).

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CASE REPORT

We report a case of a two-year-old child suffering from frequent catarrh of the upper respiratory tract, in whom pneumococcal carriage and the presence of five serotypes of *S. pneumoniae* were established. The child was vaccinated (PCV-10, Synflorix®) with completed doses according to the Bulgarian immunization schedule. According to the written consent signed by the parents, antibiotic therapy consisting of azithromycin syrup 100 mg/5 ml powder for oral suspension has been applied for 3 days in 2,5ml dose with no improvement. Pneumococcal testing in NCIPD was done in the week of therapy discontinuation. The child was reported to have a sibling in a daycare facility.

Nasopharyngeal secretions sample was taken because of recurrent respiratory infections. DNA was extracted and analyzed with PCR amplification of the *lytA* gene (4). A pneumococcal infection of the nasopharynx was established. The presence of capsulated strains was demonstrated by amplification of the *cpsA* gene. Pneumococcal typing was performed by genetic methods conventional PCR and allelic hybridization for 76 serotypes.

The child was found to be a carrier of five pneumococcal serotypes: 6C, 23A, 23B, 10B and 15B/C. These serotypes are not present in PCV-10 vaccine administered in Bulgaria, with which the child has been immunized.

DISCUSSION

We investigated the serotype presentation in a single case of fully vaccinated child with manifestation of respiratory pneumococcal disease. He has been vaccinated with PCV-10 not containing the serotypes found: 6C, 23A, 23B, 10B and 15B/C. Most of these

serotypes (23A, 23B, 10B and 15B/C) are associated with invasive disease. The new 24-valent vaccine includes serotype 15B as frequently detected in pneumococcal disease in children and adults (7,9,10) In a previous study of invasive pneumococcal infection, 49% of the strains isolated from a sterile body site and the nasopharynx were of the same pneumococcal serotype, and additional serotypes were colonizing the nasopharynx (6). Pneumococcal diseases were associated with co-colonizaton in several studies (6,7). As antibiotic treatment decreases significantly the possibility for culture detection of pneumococcal strains, sampling should be done at the onset of disease (7). The use of PCV10 in Bulgaria has significantly decreased the risk of invasive pneumococcal diseases caused by vaccine serotypes. Pneumococcal strains in Bulgaria are reported to be highly resistant to macrolides, which explains the ineffective treatment with azithromycin (8). Recent antimicrobial therapy has been identified as the most important risk factor for colonization with penicillin- and erythromycin-resistant pneumococci. Additional factors to be considered are the age, nationality, previous or current breastfeeding, passive exposure to cigarette smoke and attendance in a day care center (9).

After the introduction of pneumococcal conjugate vaccines, diseases caused by pneumococcal vaccine serotypes have declined sharply, but the isolation of non-vaccine serotypes has been reported with increasing incidence (5, 7, 8, 9). Epidemiological data from Bulgaria and the region indicate the presence of serotypes not covered by PCV-10, which means that a higher morbidity associated with non-vaccine serotypes of *S. pneumoniae* can be expected in the future (8,9,10).

CONCLUSION

Monitoring the colonization of human mucosa with *Streptococcus pneumoniae* is crucial for reducing the likelihood of severe invasive pneumococcal diseases such as meningitis, pneumonia or otitis. The reported case demonstrates the need for a pneumococcal conjugate vaccine with a broader spectrum of serotype coverage to decrease the risk from non-vaccine serotypes. A worldwide problem is the increase in the incidence of invasive and non-invasive pneumococcal diseases caused by serotypes not included in vaccines.

It is essential to continue the detection of serotype dynamics in colonizing serotypes and determine the long-term effects of PCV10 use in the country.

DISCLOSURE OF CONFLICT OF INTEREST

All authors declare no conflict of interest. The study was reviewed and approved by the institutional review board (IRB) 00006384 and informed consent was obtained from the patient.

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