

*Yakubova S.K., Khankeldieva H.K., Khodjamberdieva Sh.Kh.*

*Department of Hospital and Emergency Pediatrics*

*Andijan State Medical Institute*

**FEATURES OF THE COURSE OF COMMUNITY-ACQUIRED  
PNEUMONIA AND THE LEVEL OF RESISTANCE OF  
PNEUMOCOCCI IN CHILDREN**

**Resume:** Pneumonia is a frequent and rather serious respiratory disease. Respiratory diseases in childhood, including pneumonia, according to official statistics, occupy the third place in the structure of causes of death in our country. Pneumonia among them is the most important cause of death of children worldwide. At the same time, there is a constant increase in community-acquired pneumonia in children all over the world.

**Keywords:** pneumonia, pneumococcus, childhood, community-acquired pneumonia.

*Якубова С.К., Ханкелдиева Х.К., Ходжамбердиева Ш.Х.*

*Кафедра госпитальной и экстренной педиатрии*

*Андижанский государственный медицинский институт*

**ОСОБЕННОСТИ ТЕЧЕНИЯ ВНЕБОЛЬНИЧНОЙ  
ПНЕВМОНИИ И УРОВЕНЬ РЕЗИСТЕНТНОСТИ  
ПНЕВМОКОККОВ У ДЕТЕЙ**

**Резюме:** Пневмония является частым и достаточно серьезным заболеванием органов дыхания. Болезни органов дыхания в детском возрасте, в том числе пневмония, согласно официальной статистике, занимают третье место в структуре причин смерти в нашей стране. Пневмония же среди них является важнейшей причиной смертности детей во всем мире. В то же время во всем мире наблюдается постоянный рост внебольничной пневмонии у детей.

**Ключевые слова:** пневмония, пневмококк, детской возраст, внебольничная пневмония.

**Introduction.** Streptococcus pneumoniae is the main causative agent of pneumonia, more than 95% of pneumococcal pneumonias are community-acquired [2]. In addition, pneumococcal infection is a common cause of morbidity and mortality in many countries of the world. According to WHO, about 1 million children die annually from various forms of pneumococcal infection. Currently, mortality from diseases caused by pneumococcal infection can be prevented by vaccination [5].

Nasopharyngeal colonization and carrier are considered the main factor and stage in the pathogenesis of diseases of pneumococcal etiology. The use of pneumococcal vaccine in different countries of the world has shown high clinical efficacy in the prevention of pneumonia, otitis media and bacterial transmission of pneumococcus in the nasopharynx. In Canada, the incidence of pneumococcal infection in children under 18 years of age decreased by more than 60% over the two-year period of use of pneumococcal conjugate vaccine. In Denmark, 1 year after the start of vaccination, the number of cases of pneumococcal infection in children of the first 2 years of life decreased by 57%. In Norway, under the same vaccination conditions, the incidence decreased by 52%. In Spain, vaccination contributed to a decrease in the incidence of children of various age categories by 37.5–64.3%, and the carriage of pneumococcus in children under 5 years also decreased. In the UK, the incidence decreased by 34% after 4 years of vaccination with pneumococcal vaccine. In the USA, the decline in the number of pneumococcal etiology diseases in children under the age of 5 years over a seven-year period was 76%. [1]. According to some data, since 2000, about 200 thousand deaths have been prevented thanks to vaccination with pneumococcal vaccine [4].

According to various studies, mass vaccination of children under the age of 1 in our country with pneumococcal conjugate vaccine reduces the carriage of pneumococcus and the number of exacerbations in children with chronic pathology of ENT organs, as well as the number of cases of pneumonia by 2.4 times, it has shown economic efficiency and significantly reduces the cost of therapy for pneumococcal infections. Analysis of the prevented costs for the treatment of pneumococcal infection in vaccinated children revealed that they are associated with a decrease in the incidence of acute otitis media and pneumonia. Moreover, mass vaccination with pneumococcal conjugate vaccine helps to reduce the incidence of pneumococcal infection in unvaccinated children, i.e. the development of a population effect [6].

However, as the pneumococcal vaccine is used, the medical community faces a natural question about maintaining its effectiveness, which is associated with the serotypes of the microorganism prevailing among the local target population groups.

In this regard, the study analyzing the clinical and anatomical and morphological characteristics of pneumonia at the present time, which is important for its timely diagnosis, as well as the dependence of the occurrence of the disease on the availability of vaccination carried out in a particular region, is of particular relevance and scientific significance.

**The aim of the study** is to study the clinical manifestations and anatomical and morphological forms of community-acquired pneumonia in children at the present stage. The objective of the study was to assess the frequency of occurrence of diagnostic criteria, anatomical and morphological forms of the disease, the dependence of the development of pneumonia on the presence of specific prevention against pneumococcal infection.

**Material and methods of research.** A retrospective study of 115 case histories of all children who were treated with community-acquired pneumonia in the pediatric department of the AOMPDB was conducted.

**The results of the study and their discussion.** The study group of children consisted of 61 (53%) boys and 54 (47%) girls. By age, the patients were distributed as follows: infants were 24 (20.9%), young children – 36 (31.3%), preschool age – 13 (11.3%), primary school age – 30 (26.1%), senior school age – 12 (10.4%).

Out of 34 (29.6%) of children immunized against this infection, 24 children (70.6%) received a complete vaccination, including half of the patients received a revaccination.

In 14 (12.2%) children, the analyzed case of pneumonia was repeated, while 12 of them (85.7%) were not vaccinated against pneumococcal infection.

13 (11.3%) children had no information about vaccination against pneumococcal infection, 68 (59.1%) patients were not vaccinated.

Children with pneumonia were admitted to the hospital at different times from the onset of the disease. Approximately half of the patients (n=59; 51.3%) were admitted in the first 3 days of the disease, slightly less than half (n=47; 40.9%) – within 4 to 7 days, after 7 days – 9 (7.8%) patients.

At the present stage, the diagnosis of pneumonia is based on the data of anamnesis, clinical picture and X-ray examination. The main clinical symptoms characteristic of pneumonia and suggesting this disease in a child are respiratory insufficiency (shortness of breath without obstruction, participation of auxiliary muscles in the act of breathing, cyanosis), fever more than 38.5 ° C for more than 3 days, pronounced symptoms of intoxication (refusal to eat, significant weakness, lethargy, headache), cough with the release of sputum, as well as local physical data (shortening of the percussion sound, weakened or bronchial breathing, small bubbly or crepitating wheezing over the affected areas). Radiological confirmation of typical pneumonia is the presence of a homogeneous shadow with clear boundaries.

The complaints presented at admission in the majority of children (n=86; 74.8%,  $P < 0.001$ ) were a combination of symptoms of respiratory system

damage (respiratory syndrome) and intoxication without noticeable symptoms of upper respiratory tract catarrh (nasal congestion, runny nose, sore throat, hoarseness of voice).

Fever for more than 3 days before hospitalization was observed in 33 (28.7%) patients. 63 (54.8%) patients had fever for less than 3 days, which is obviously due to early admission to the hospital and the beginning of antibacterial therapy. In a small part of children (n=19; 16.5%), the disease proceeded without fever.

Local shortening of percussion sound was observed in the clinical picture in the absolute majority of children ( $p < 0.001$ ), small-bubbly wet wheezing during lung auscultation was described in more than half of patients ( $p > 0.05$ ).

The radiological picture of the disease is diverse. The majority of hospitalized children (n=82; 71.3%,  $p < 0.001$ ) had a right-sided lesion. In more than half of children with right-sided pneumonia (n=53 out of 82; 64.9%,  $p < 0.001$ ), as well as in children with left-sided pneumonia (n=18 out of 30; 60%,  $p < 0.05$ ), the lower lobe was involved in the inflammatory process.

The features of the clinical and radiological picture of community-acquired pneumonia have also been studied by other authors. In one of the studies devoted to the peculiarities of the clinical course of pneumonia in children, the authors show that fever in this disease was observed in 81% of cases, cough – in 90% of cases, shortening of percussion sound – in 46% of cases, wheezing was heard in 60% of cases (mainly small-bubbly), shortness of breath of mixed type took place in 79% of cases, bronchoobstructive syndrome was observed in 18% of cases. Inflammation in 91% of cases was unilateral and localized mainly (64%) on the right, in the lower lobe (73%).

A significant increase in blood levels of C-reactive protein and other acute phase proteins is characteristic of severe bacterial pneumonia, including pneumococcal. In our study, an increase in C-reactive protein was found in 35 (30%) children.

The main manifestations of pneumonia in the study group of children are presented in the table.

Clinical signs, radiological and laboratory data for pneumonia

Antibacterial therapy in a hospital setting in most cases (n=77, 67%) was carried out with one antibiotic, in a third of cases (n=38, 33%) more than one course of antibacterial therapy was used. The majority of children (n=81; 70.4%) were hospitalized from 1 to 2 weeks; 26 (22.6%) patients – less than 1 week and discharged for outpatient treatment; 8 (7%) – more than 2 weeks.

In our observation, repeated cases of pneumonia were 6 times more common in children who were also not immunized against pneumococcal infection. During bacteriological examination of sputum, the pneumococcal etiology of the disease was confirmed in more than half of the children, while studies conducted in other regions show significantly less importance of pneumococcus in the etiology of community-acquired pneumonia in children and a decrease in the frequency of discharge in patients. Literature data indicate a high importance in the diagnosis of community-acquired pneumonia of an objective examination of the patient, which allows in 50-70% of cases to determine local symptoms indicative of the disease. The sensitivity of the combination of fever, tachypnea, local respiratory weakness and small-bubbly wet wheezing in the diagnosis of this disease is about 94%.

The pathological process was more often localized in the lower lobe of the right lung. However, in the literature it is possible to find data on significantly more frequent detection of bilateral focal pneumonia in young children. The practical significance of the study is to confirm the diagnostic criteria of community-acquired pneumonia, which is especially important for the diagnosis of bacterial pneumonia at the present time and differential diagnosis with viral lung damage. The role of pneumococcus in the etiology of the disease is also shown, which is important for the choice of etiotropic therapy. Competent and strict adherence to the vaccination calendar and mass vaccination coverage

against pneumococcal infection in children of the first years of life will contribute to reducing the incidence of bacterial community-acquired pneumonia in children and adolescents.

**Conclusion.** Community-acquired pneumonia was more often observed in children of the first 3 years of life among patients hospitalized in the pediatric department with this pathology, which is consistent with the literature data. Children who were not immunized against pneumococcal infection were significantly more likely to suffer from pneumonia.

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