

MONITORING THE ETIOLOGICAL ASPECTS OF COMMUNITY-ACQUIRED PNEUMONIA IN CHILDREN



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БОЛАЛАРДА ШИФОХОНАДАН ТАШҚАРИ ПНЕВМОНИЯНИНГ ЭТИОЛОГИК ЖИҲАТЛАРИНИ КУЗАТИШ

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МОНИТОРИНГ ЭТИОЛОГИЧЕСКИХ АСПЕКТОВ ВНЕБОЛЬНИЧНОЙ ПНЕВМОНИИ У ДЕТЕЙ

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Резюме. Болаларда пневмония касаллиги педиатриянинг долзарб муаммоларидан бири бўлиб, айниқса у ёш болаларда касалланишнинг юқори даражаси ва прогнознинг оғирлиги билан белгиланади. Самарқанд вилоятида яшовчи пневмония билан касалланган болаларни клиник, рентгенологик, лаборатор текширув натижаларига асосланиб, уларни касалхонага ётқизиш маълумотларига кўра болалардаги бронх-ўпка патологиялари таркибидаги ўрни ўрганилди. Шифохонадан ташқари пневмониянинг этиологик тузилиши, пневмотроп микрофлоранинг асосий антибиотик гуруҳларига сезгирлиги кўрсатилган. Олинган натижалар болалардаги шифохонадан ташқари пневмониянинг кечишини ёшга боғлиқ хусусиятларининг аҳамиятли эканлигини таъкидлайди.

Калит сўзлар: шифохонадан ташқари пневмония, болалар, этиология, балгамни бактериологик текшириш, кўкрак қафаси рентгенограммаси.

Abstract. Pneumonia in children is one of the urgent problems of pediatrics, which is determined by the continuing high level of morbidity and the severity of the prognosis, especially in young children. The results of clinical, radiological, laboratory examination of children with community-acquired pneumonia living in the Samarkand region, its place in the structure of bronchopulmonary pathology in children according to hospitalization data are presented. Shown is the etiological structure of community-acquired pneumonia, the sensitivity of pneumotropic microflora to the main groups of antibiotics. The results obtained underline the age-related characteristics of the course of community-acquired pneumonia in children.

Key words: community-acquired pneumonia, children, etiology, bacteriological examination of sputum, chest x-ray.

Relevance. Pneumonia in children is one of the most pressing problems in pediatrics; it is characterized by a high frequency and severity of prognosis, especially in young children [1,5]. Despite the clear clinical and instrumental criteria for the diagnosis of pneumonia, available in patriotic pediatric practice, the issues of hypo- and overdiagnosis of the disease remain relevant [7]. Pneumonia in children is often collective and has many clinical forms. Seasonal

acute pneumonia is most common in children, although it occurs throughout the year. The etiological approach is fundamentally important in the diagnosis of acute pneumonia [3,8].

Difficulties in the etiological diagnosis of pneumonia in children are associated with its polyetiology. The causative agents of infection in pneumonia can be common bacterial agents (for example, *Streptococcus pneumoniae*, *Streptococcus*

pyogenes, *Staphylococcus aureus*) and atypical pathogens (*Mycoplasma pneumoniae*, *Chlamydia pneumoniae*, and respiratory viruses) [2]. In general, the increase in the incidence of collective pneumonia in recent years is often caused by atypical pathogens [6]. The share of acute pneumonia in the general respiratory pathology is relatively small, but the risk of harm to the child's health, the development of long-term and chronic pathologies in the form of carditis, as well as the economic costs associated with treatment are very high. [9].

The aim of the study was to study the etiological aspects of collective pneumonia in children on the basis of clinical and radiological manifestations.

Materials and research methods. In the Samarkand branch of the Republican Scientific Center for Emergency Aid, a comprehensive clinical, laboratory, X-ray examination of children with collective pneumonia, admitted to the clinical departments of emergency pediatrics and children's intensive care, was carried out. 2019 to 2020 Children diagnosed with pneumonia made up 22.4 percent (534) of the total (2378), which is almost a quarter of patients seeking inpatient treatment. A group of children diagnosed with pneumonia was randomly selected, which included 64 patients. Children of the first year of life accounted for 44.2%, from 1 to 3 years old - 36%, over 3 years old - 18.8%.

The material for bacteriological studies was sputum collected using a disposable device for collecting fluid from children who did not receive antibiotic therapy before and during hospitalization with antibiotic therapy under the following conditions: To exclude as much as possible the possibility of infection with microflora. Sputum was examined by quantitative and semi-quantitative methods.

Research results. According to hospitalization data in the clinical department for the period from 2019 to 2020. In the structure of bronchopulmonary diseases, pneumonia was 22% 4. Of the total number of patients, boys prevailed - 86.8%. Of these, 88.6% of children hospitalized with pneumonia are residents of the city. In most cases, community-acquired pneumonia according to the generally accepted classification [4] was diagnosed as "complicated", while the proportion of "complicated" pneumonia prevails in children under 1 year of age. The age of children isolating gram-negative flora was predominantly early - from 1 to 4 months. In the structure of the microbial composition, when studying the nature of the growth of bacteria on nutrient media, we noted a significant number of associations of the isolated significant agents with other bacteria, but contained in quantities below the diagnostic threshold - mainly titers of such bacteria. does not exceed 101-103 CFU / ml in sputum. Among these microorganisms, we did not take into account the species belonging to the normal flora of the pharynx and oral cavity, but at-

tributed them to the contaminating microflora (green streptococci, corynebacteria, *Neisseria*). However, bacterial species such as *Escherichia coli*, *Klebsiella pneumoniae*, *S. aureus*, *Enterococcus* spp. and others, identified from unusual habitats, were considered by us as indicators of a violation of the normal biocenosis of the upper respiratory tract. In the examined group, signs of a violation of the biocenosis of the upper respiratory tract were detected in 31.7% of children. Enterococci were found more often than other bacteria - in 14% of the examined children. This microorganism is conditionally pathogenic and its usual habitat is the intestine. There are two types - *Enterococcus faecalis* and *Enterococcus faecium*. We isolated both of these species from sputum, although the former was more common. Enterococci as pathogenic agents are often of clinical importance for purulent infections in surgical practice and urology, while in respiratory diseases they are not considered a significant pathogen [1]. However, its influence on the clinical course of pneumonia in children cannot be ignored, since the disturbed microbiocenosis of the respiratory tract has a direct correlation with immunity, with a change in resistance to colonization and, therefore, affects the nature of the course of the disease. inflammatory process. In the examined group of children, in 22% of cases, it was necessary to prescribe a repeated course of antibiotic therapy, although the main pathogen had a good sensitivity to the main antibiotics. The biocenosis of the upper respiratory tract with the participation of enterococci included such microorganisms as staphylococci, enterobacteria, fungi of the genus *Candida*; in some cases, *Pseudomonas aeruginosa* and non-fermenting gram-negative bacteria were found, that is, species not typical for this biotope. In 8.7% of cases, there were associations of enterococcus with pneumopathogens - *S. pneumoniae*, *H. influenzae*, and more often with the second. Resistance to antibacterial drugs was studied in the main etiological significant strains of isolated bacteria. In these groups of patients, the severity of the patient's condition is determined by the cardiorespiratory syndrome, which was diagnosed in 18.1% of cases in children during the first 3 years of life. Syndromes most characteristic of pneumonia take up a much smaller proportion. In the overwhelming majority of cases (74%), pneumonia had an acute onset, clinically manifested by a wet cough (80%), symptoms of intoxication (65%). The presence of fever in the first days of the disease was noted in 72% of cases. In 28% of cases, the disease proceeded with normothermia. In 37% of cases, the disease was preceded by ARVI. Most of the children were admitted in serious condition. An extremely serious condition was recorded in 3% of cases. Typical local physical changes in the lungs were detected only in 33% of cases. The rest of the children heard heavy breathing and rales of various sizes.

Table 1. Results of bacteriological examination children with community-acquired pneumonia (n = 64)

Pathogen type	n, abs.	n, %
<i>Streptococcus pneumoniae</i>	33	51,6
<i>H.influenzae</i>	11	17,1
<i>Streptococcus gr. A, B</i>	9	14,1
<i>Streptococcus aureus</i>	3	4,7
<i>Staphylococcus spp.</i>	2	3,1
<i>Enterobacteriaceae</i>	6	9,4

Tachypnea was noted in 32% of cases, tachycardia - in 47% of cases. In 17% of cases, limited cyanosis of the skin in the area of the nasolabial triangle was expressed even against the background of the disappearance of symptoms of intoxication, which indicates the presence of general circulatory disorders in these patients. In 9% of patients, according to hospitalization data, a moderate structure of bronchopulmonary diseases was revealed, and etiological monitoring was carried out.

The structure of syndromes and complications of community-acquired pneumonia in children: broncho-obstructive syndrome - 46.6%, intoxication syndrome - 22.22%, acute respiratory failure - 6.6%, atelectasis - 11.11% and toxic-infectious cardiopathy - 15.15% of cases, respectively.

The hemogram in the first days of the disease was characterized by leukocytosis (above $12.0 \cdot 10^9$ g / l) and a shift in blood counts in 17% of cases. The most frequently documented change in ESR, an increase in which from 15 to 35 mm / h was noted in 40% of cases, more than 33 mm / h - in 17% of cases. In all children, pneumonia was confirmed by X-ray. In 85.8% of cases, changes in the lung tissue were focal, in the rest - bronchogenic. Right-sided localization of pulmonary changes was more often noted (68.7%). In 22.9% of cases, the process was bilateral and was mainly observed in children of the first year of life. In 26% of cases, focal pneumonia with significant cardiomegaly was recorded radiographically in children, mainly in older children. Most of the children had a burdened premorbid background (71.6%). Among the background conditions, secondary immunodeficiency states (13%), CNS pathology (26.9%), lymphohypoplastic diathesis (18.2%), atopic dermatitis (7%) prevailed. The results of bacteriological examination of sputum in children with community-acquired pneumonia are presented in the table. 1. Thus, the conducted etiological monitoring revealed the most significant pneumotropic flora of community-acquired pneumonia, which in 51.6% of cases is represented by *Streptococcus pneumoniae*, highly sensitive to cephalosporins (94%), penicillin (87%), ampicillin (85%).

Etiotropic initial therapy for all children was prescribed empirically depending on age, conditions of infection, clinical and radiological features, previous antibiotic therapy, background state, followed by monitoring the effectiveness of antibiotic therapy.

Most often, cefazolin was prescribed as a starting antibiotic (43.7%), and cefotaxime (26.4%) was prescribed as an alternative antibiotic. Penicillin was prescribed less frequently - in 7% of cases. Combined antibiotic therapy was carried out in 10 patients, which accounted for 6.4%. The drugs were administered intramuscularly at age-specific dosages. A positive clinical and radiological effect from the appointment of these antibacterial drugs was achieved in 76% of cases. The rest of the children (24%) required a second course of antibiotic therapy. As the second course, cefotaxime was mainly used, in second place in the frequency of use of aminoglycosides (amikacin, gentamicin). In all observed cases, clinical recovery and complete radiographic resolution of focal changes in the lungs were achieved. The presented data characterize the regional features of the course of community-acquired pneumonia in children, consisting in a decrease in syndromes typical for pneumonia and the prevalence of broncho-obstructive and cardiorespiratory syndromes in the clinical picture of the disease, especially in young children. Functional changes in the lungs were diffuse in most cases.

The discussion of the results. In most cases, community-acquired pneumonia according to the generally accepted classification was diagnosed as "complicated", while the proportion of "complicated" pneumonia prevails in children under 1 year of age. The age of children isolating gram-negative flora was predominantly early - from 1 to 4 months. The biocenosis of the upper respiratory tract with the participation of enterococci included such microorganisms as staphylococci, enterobacteria, fungi of the genus *Candida*; in some cases, *Pseudomonas aeruginosa* and non-fermenting gram-negative bacteria were found, that is, species not typical for this biotope. As can be seen from the results of bacteriological research, the causative agents of community-acquired pneumonia in more than half of the cases are *Streptococcus pneumoniae*, followed by pneumonia is a complication of *Haemophilus influenzae*. In 8.7% of cases, there were associations of enterococcus with pneumopathogens - *S. pneumoniae*, *H. influenzae*, and more often with the second. Resistance to antibacterial drugs was studied in the main etiologically significant strains of isolated bacteria. In these groups of patients, the severity of the patient's condition is determined by the cardiorespiratory syndrome, which

is diagnosed in one third of cases in children during the first 3 years of life. Syndromes most characteristic of pneumonia take up a much smaller proportion. In children, mainly older children, radiographically confirmed focal pneumonia with significant cardiomegaly and in most cases pneumonia had an acute onset, clinically manifested by a wet cough, symptoms of intoxication. The presence of fever in the first days of the disease was noted in 72% of cases. In 28% of cases, the disease proceeded with normothermia. In 37% of cases, the disease was preceded by ARVI. Most of the children were admitted in serious condition. An extremely serious condition was recorded in 3% of cases. Typical local physical changes in the lungs were detected only in 33% of cases.

Conclusions. Thus, the results of the conducted etiological monitoring made it possible to identify the most significant pneumotropic flora of community-acquired pneumonia, which in more than half of the cases is represented by *Streptococcus pneumoniae*, then ARVI, as well as with mixed microflora, which allowed them to prescribe cephalosporins of groups I, II as empirical therapy. The influence of each of the causative agents of infection on the etiology of community-acquired pneumonia depends on the age group of patients, and the cause of the development of the disease in children in most cases is mixed bacterial or viral-bacterial infections, which in almost a third of a quarter of patients had radiographically confirmed cases of pulmonary tissue changes were focal, in the rest are bronchogenic. Right-sided localization of pulmonary changes was more often noted. Children are at the greatest risk of developing pneumonia, especially after respiratory viral infections, which when carrying out diagnostic and treatment measures in children with community-acquired pneumonia, it is necessary to take into account the age, premorbid state, etiology and clinical course of the disease, since in children the violation of the microbiocenosis of the respiratory tract has a direct correlation with immunity, with a change in resistance to colonization and, therefore, affects the nature of the course of the inflammatory process.

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МОНИТОРИНГ ЭТИОЛОГИЧЕСКИХ АСПЕКТОВ ВНЕБОЛЬНИЧНОЙ ПНЕВМОНИИ У ДЕТЕЙ

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Резюме. Пневмония у детей - одна из актуальных проблем педиатрии, что определяется сохраняющейся высокой заболеваемостью и тяжелым прогнозом, особенно у детей раннего возраста. Приведены результаты клинического, рентгенологического, лабораторного обследования детей с внебольничной пневмонией, проживающих в Самаркандской области, ее место в структуре бронхолегочной патологии у детей по данным госпитализации. Показана этиологическая структура внебольничной пневмонии, чувствительность пневмотропной микрофлоры к основным группам антибиотиков. Полученные результаты подчеркивают возрастные особенности течения внебольничной пневмонии у детей.

Ключевые слова: внебольничная пневмония, дети, этиология, бактериологическое исследование мокроты, рентгенография грудной клетки.