EFFECTIVE METHODS FOR DIAGNOSING MEDIUM-SEVERITY PNEUMONIA IN CHILDREN

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Abstract: *In Uzbekistan, the incidence of pneumonia in children ranges from 6.3 to 11.9%. One of the main reasons for the increase in the number of pneumonias is the high level of diagnostic errors and late diagnosis. The proportion of pneumonias, in which the clinical picture does not correspond to radiological data, has significantly increased, and the number of minimally symptomatic forms of the disease has increased. There are also difficulties in the etiological diagnosis of pneumonia, as over time, the list of pathogens expands and changes. Until relatively recently, community-acquired pneumonia was mainly associated with Streptococcus pneumoniae.*

Key words: *pneumonia, mycoplasma, segment, lymphocyte, phagocytosis.*

ЭФФЕКТИВНЫЕ МЕТОДЫ ДИАГНОСТИКИ ПНЕВМОНИИ СРЕДНЕЙ ТЯЖЕСТИ У ДЕТЕЙ

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Резюме: *В Узбекистане заболеваемость пневмонией у детей колеблется от 6,3 до 11,9%. Одной из основных причин увеличения числа пневмоний является высокий уровень диагностических ошибок и поздняя диагностика. Значительно возросла доля пневмоний, при которых клиническая картина не соответствует рентгенологическим данным, и увеличилось количество минимально симптоматичных форм заболевания. Существуют также трудности в этиологической диагностике пневмонии, так как со временем список возбудителей расширяется и меняется. До относительно недавнего времени внебольничная пневмония в основном ассоциировалась со Streptococcus pneumoniae.*

Ключевые слова: *пневмония, микоплазма, сегмент, лимфоцит, фагоцитоз.*

Relevance: Non-hospital pneumonia (HP) is one of the leading causes of hospitalization and mortality worldwide [1], particularly affecting people under 5 years of age [2,3]. It is known that TP is an infectious disease caused by bacterial or viral infections [4]. Bacterial pathogens such as Streptococcus pneumonia, Haemophilus influenza, Streptococcus pyogenes, and Staphylococcus aureus [5,8,9], as well as respiratory viruses such as respiratory sensitial virus [6], are common causes of VP in children.

Despite the high prevalence and severe outcomes associated with VP, the diagnosis of pathogens remains a complex task. Furthermore, the coincidence of VP symptoms with other respiratory diseases makes it difficult to make a precise diagnosis based solely on clinical signs and symptoms [7,9]. Therefore, it is necessary to improve existing diagnostic strategies to eliminate complications associated with TP in children.

Traditional diagnostic methods, including chest X-ray, have limitations in specificity and sensitivity [8] and are associated with risks such as radiation exposure [3,9]. Thus, there is a critical need for safer and more effective diagnostic tools. Pulmonary ultrasound has become a promising alternative with advantages such as the absence of radiation exposure and time savings. Studies have shown that lung ultrasound has higher specificity and sensitivity compared to RHK in the diagnosis of VP in children (respectively 78.5% and 95.2%) [6].

All this leads to untimely treatment correction, worsening of the patient's condition, prescription of additional medications, which ultimately affects the prognosis of the disease. Thus, despite a sufficiently detailed study of the problem of childhood pneumonia, there is a need to clarify the modern clinical features of pneumonia, to investigate the significance of various pathogens, including pneumotropic viruses, in this disease.   Purpose of the study: to identify modern clinical and laboratory etiological features of the course of pneumonia in children.

Materials and methods. A comprehensive examination of 166 children aged 1 to 15 years with community-acquired pneumonia, who were undergoing treatment at the pulmonology department of the Andijan Regional Children's Health Center, was conducted. Among the examined children, 85 (51.2%) were boys and 81 (48.8%) were girls. All patients were divided into 2 groups according to the morphological forms of pneumonia (patients with focal pneumonia and segmental pneumonia) and 4 groups according to age - young children (1-2 years), preschoolers (3-6 years), younger schoolchildren (7-10 years) and older schoolchildren (11-15 years).

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All patients underwent the following examinations: clinical blood analysis, general urine analysis, biochemical blood analysis with determination of C-reactive protein (CRP) levels, chest X-ray, microscopic and bacteriological examination of sputum for flora and antibiotic sensitivity. To detect respiratory viruses and S. pneumoniae, tracheobronchial aspirates were examined using polymerase chain reaction (PCR) in real-time to detect ribonucleic acid (RNA) of respiratory syncytial virus, rhinovirus, metapneumovirus, type 1, 2, 3, 4 parainfluenza viruses, deoxyribonucleic acid (DNA) of adenovirus and pneumococcus.

The data obtained during the study were processed using the STATISTICA 6.1 software product. During the analysis, the calculation of elementary statistics, the construction and visual analysis of correlation fields between the analyzed parameters, and the comparison of frequency characteristics were carried out using nonparametric hi-square, hi-square with Jets correction, and Fisher's precise method.

Comparison of quantitative indicators in the studied groups was carried out using Student's t-test with normal sample distribution and Wilcoxon-Mann-Whitney's U-test with non-normal distribution. The relationship between individual quantitative traits was determined using the Spearman rank correlation method. Differences in average values and correlation coefficients were recognized as statistically significant at the significance level.

Research results and their discussion. Among those examined, patients with focal pneumonia prevailed - 113 children (68.07%), children with segmental pneumonia were 2 times fewer - 53 (31.93%), of whom 15 (28.3%) had polysegmental pneumonia. The majority of hospitalized patients were young children - 67 (40.36%), as well as preschool children - 54 (32.53%). The average age of the patients was 5.05± 3.93 years.

Table 1.

Distribution of children by age groups for focal
and segmental pneumonia

Age-related group	Total		Focal pneumonia		Segmental pneumonia	
	n	%	n	%	n	%
1-2 years	67	40,62	49	43,37	18	33,82
3-6 years	54	33,23	38	33,63	16	29,21
7-10 years	22	13,25	10	8,85	12	22,33
11-15	2	1	1	14,	8	11

years	3	4,55	6	12		,21
Total	66	1 00	1 33	68, 07	5 3	31 ,93

Children were admitted to the hospital on average 8.0±4.7 days from the onset of the disease for focal pneumonia and 7.7±4.6 days for segmental pneumonia. Most frequently, right-sided lung damage was noted - in 95 cases (57.23%), left-sided damage was almost 2 times less common - in 51 cases (30.72%), bilateral - in 20 children (12.05%). A similar situation was observed in both groups. At the same time, the right-sided inflammation developed more frequently in the 5th (39.29%) and 4th (16.67%) lung segments, while the left-sided inflammation developed in the 5th (26.23%), 10th (22.95%) and 9th (18.03%) lung segments (p=0.01). Mostly, pneumonia with a moderate course prevailed - 155 cases (93.37%). Meanwhile, severe pneumonia was noted in only 11 children (6.63%), with the majority of them being segmental - 81.8% (p <0.001). Among hospitalized patients, respiratory failure of the 2nd degree was more common - 81.93% (136), and the 1st degree - 17.47% (29). Its signs were absent in 1 case (0.6%).

The average level of leukocytes upon admission in the group with focal pneumonia was 9.04±3.9 x109/l, segmental pneumonia - 10.4±8.2 x109/l. In the segmental pneumonia group, the ESR value was higher than in focal pneumonia - 19.11±17.36 mm/h versus 12.67±13.1 mm/h, respectively (p<0.001). After the complex treatment, a significant decrease in the level of leukocytes from 9.49±5.7 x 109/l to 7.65±2.1 x 109/l (p<0.001) and ESR from 15.05±14.9 mm/h to 6.14±5.2 mm/h (p<0.001) was noted in the control blood tests compared to the blood tests upon admission.

All these patients also underwent bacteriological examination of their sputum. Among 30 patients with isolated pneumococcal DNA, bacteriological examination of sputum gave a negative result in half - 16 (53.3%), of which 6 (20%) had only Candida albicans, 4 (13.3%) had Streptococcus viridans, 2 (6.7%) had Pseudomonas aeruginosa, and another 2 (6.7%) had Proteus mirabilis and Proteus vulgaris in non-diagnostic titer. In 10 patients, in whom pneumococcus was not isolated by PCR, no bacterial flora growth was detected during sputum culture. The inadequacy of bacteriological examination of sputum can be explained by the fact that most children (63.3%) received antibacterial therapy outpatiently.

CONCLUSIONS:

1. The most common clinical and morphological form of pneumonia in children at the present stage is focal right-sided pneumonia with a moderate course and localization in the middle lobe (4th and 5th lung segments).

2. Segmental pneumonia is more characterized by a severe course with persistent febrile body temperature, pronounced local symptoms, and pronounced laboratory changes.

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3. Most patients (75%) have pneumonia of pneumococcal etiology. At the same time, examining sputum by PCR for pneumococcus is more informative than examining it for flora.

4. Respiratory viruses play a significant role in the development of pneumonia, having been isolated in 30% of patients, and in half of them - in combination with pneumococcus.

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