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CLINICAL AND FUNCTIONAL FEATURES OF ACUTE PNEUMONIA IN YOUNG CHILDREN

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Abstract:
The article presents the clinical and functional characteristics of acute pneumonia in young children, emphasizing its pathogenesis, diagnostic features, and course of the disease. Acute pneumonia remains one of the most common respiratory infections in early childhood, often leading to severe complications if not diagnosed and treated promptly. The study analyzes clinical manifestations such as fever, cough, respiratory distress, and auscultatory findings, as well as functional parameters including oxygen saturation and respiratory rate. The importance of early identification of severe forms, rational use of antibiotics, and monitoring of respiratory function is highlighted. The findings indicate that timely and adequate management of acute pneumonia in young children significantly reduces morbidity and mortality rates and improves long-term respiratory outcomes.

Keywords: acute pneumonia, young children, respiratory function, clinical features, diagnosis, treatment, complications, morbidity, pediatric infection

INTRODUCTION

Acute pneumonia remains one of the most common and clinically significant infections in young children. According to various authors, children in the first year of life are most vulnerable to developing severe forms of the disease, due to the anatomical and physiological characteristics of the respiratory system, immature immune response, and high levels of comorbidity [1, 2]. It has been established that anemia, rickets, perinatal nervous system damage, malnutrition, and exudative-catarrhal diathesis significantly worsen the course of pneumonia and contribute to the development of complications and a protracted inflammatory process [3, 4].

The course of acute pneumonia in young children is characterized by polymorphic clinical manifestations, frequent development of cardiorespiratory syndrome, respiratory failure, neurotoxicosis, and other complications [5]. Furthermore, the high degree of endogenous intoxication in this category of patients is due not only to the active inflammatory process, but also to the body's reduced detoxification capacity, enzymatic deficiency, tissue hypoxia, and metabolic disorders [6].

A comprehensive analysis of the clinical characteristics of pneumonia, depending on the child's age, the nature of the underlying pathology, and the severity of the condition upon admission to hospital, remains relevant. This is essential for timely diagnosis, prognosis, and the selection of appropriate therapy [2, 5, 7].

STUDY OBJECTIVE

To assess the clinical and functional status of young children with acute pneumonia depending on age group, severity, and underlying pathology.

STUDY MATERIALS AND METHODS

The study was conducted at the Pediatric Pulmonology Department of the I-Clinic and the Central Research Laboratory of the Tashkent Medical Academy. The analysis included 100 children with acute pneumonia, aged 6 months to 3 years, who were hospitalized between 2000 and 2004. The control group consisted of 30 apparently healthy children, matched for age and gender.

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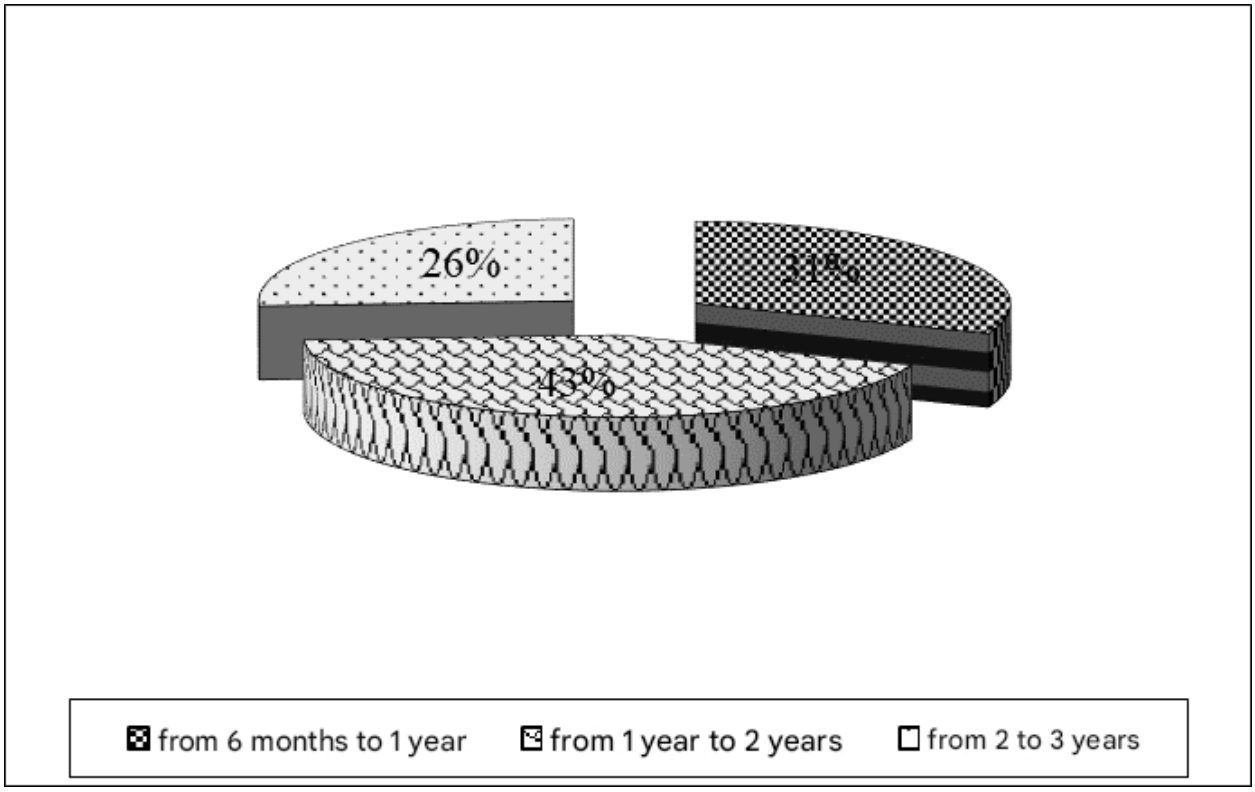

Fig. 1. Distribution of sick children depending on age.

Patients were divided into three age groups:
Group I – 6 months to 1 year (n=31),
Group II – 1 to 2 years (n=43),
Group III – 2 to 3 years (n=26).
Diagnosis was based on medical history, clinical and laboratory data, and chest X-ray. The severity of the condition, the type of pneumonia, and the length of hospitalization were recorded upon admission.
All patients underwent a standard examination, including a complete blood count, bacteriological examination of nasopharyngeal and pharyngeal swabs, and X-ray examination.

STUDY RESULTS

The general condition of patients upon admission was assessed as moderate in 14 patients, severe in 63, and extremely severe in 23%. The most severe condition was typical for age group I (32.3%), while in age groups II and III it was 18.6 and 19.2%, respectively (Table 1). Severe condition was observed in 67.7, 69.8, and 41.2%, respectively, by age. Moderate condition was observed in only 15.2 and 34.5% of patients in age groups II and III.

Table 1

Распределение больных по степени тяжести

Condition	Total number, n=100	Age groups		
		I, n=31	II, n=43	III, n=26
Moderate	14±3,49%	-	11,6±4,94%	34,6±9,51%
Severe	63±4,85%	67,7±8,54%	69,7±7,09%	46,1±9,97%
Extremely severe	23±4,23%	32,3±8,54%	18,6±6,00%	19,2±7,58%

Thus, upon admission to hospital, children with acute pneumonia were most often in extremely severe and severe condition in children in their first year of life.
A high frequency of unfavorable underlying conditions was observed among the observed children. This group is known to be characterized by increased susceptibility to infections, primarily due to decreased immunological reactivity and metabolic disorders (decreased protein synthesis activity, acidosis, and polyhypovitaminosis).

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According to the medical history, the majority of patients with pneumonia we observed had anemia (95%) and rickets (57%). Perinatal encephalopathy occurred in 4% of cases, malnutrition in 20%, and exudative-catarrhal diathesis in 12% of cases (Table 2). All of these factors disrupt metabolic processes, enzymatic activity, and vitamin levels, reduce the body's immunological reactivity and resistance, and contribute to the risk of constant readiness for various diseases, including pneumonia, and, if the latter occurs, create a protracted course of the disease.

Table 2

Frequency and nature of concomitant pathology in young children with acute pneumonia

Concomitant diseases Anemia	Age groups					
	I, n=31		II, n=43		III, n=26	
	n	%	n	%	n	%
Rickets	30	96,7±3,26	41	95,3±3,26	24	92,3±5,33
PEP	23	74,1±7,99	27	62,7±7,46	7	26,9±8,87*
Seizures	20	64,5±8,74	18	41,8±7,61	3	11,5±6,38*
Hypotrophy	4	12,9±6,12	4	9,3±4,48	4	15,4±7,22
ECD	17	54,8±9,09	2	4,5±3,19*	1	19,2±7,88*
Concomitant diseases	11	35,5±8,74	1	2,3±2,31*	0	0*

*Note: * - significant differences in relation to the values of group I (P<0.05).*

Anemia was common across all age groups (96.7%, 95.3%, and 92.3%, respectively, in age groups I, II, and III), while rickets, perinatal encephalopathy, malnutrition, and exudative-catarrhal diathesis were common in age group I (75.1%, 64.5%, 54.3%, and 35.5%). In age group II, they were found in 62.7%, 41.7%, 4.5%, and 2.3%, while in age group III, they were found in 26.9%, 11.5%, and 19.2%, while ECD was not detected in this group. It should be noted that the frequency of seizures was approximately the same across all age groups, averaging 12%.

Complicated pneumonia was observed in all children hospitalized in the clinic (Table 3). Focal pneumonia was the predominant type detected (76%), with the prevalence across age groups being 83.9%, 72.9%, and 73.1%, with minor differences between age groups. Segmental acute pneumonia was detected in 14% of children, with age distribution showing the following: 9.6%, 13.9%, and 19.2%, respectively, in age groups I, II, and III. As can be seen from the presented data, the frequency of segmental pneumonia increases with age.

Table 3

Frequency of occurrence of acute pneumonia by forms according to classification, %

Forms	Total number, n=100	Age groups		
		I, n=31	II, n=43	III, n=26
Focal	76±4,29	83,9±6,71	72,9±6,86	73,1±8,87
Segmental	14±3,49	9,6±5,38	13,9±5,34	19,2±7,88
Focal-confluent	10±3,01	6,4±4,47	11,6±4,94	11,5±6,38
Croupous	0	0	0	0
Interstitial	0	0	0	0
Acute	100±0	100±0	100±0	100±0
Protracted	-	-	-	-
Complicated	100±0	100±0	83,7±5,69*	80,9±7,86*
Community-acquired	88±3,27	100±0	100±0	100±0
Hospital-acquired	12±3,27	19,3±7,21	9,3±4,48	7,6±5,3

*Note: * - significant differences in relation to the values of group I (P<0.05).*

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According to the current classification, community-acquired and nosocomial infections play a leading role in the etiopathogenesis of pneumonia. Community-acquired infections were the most common in the children we examined, accounting for 88% of cases, with a similar prevalence across all age groups. Nosocomial infections were observed in 12% of children, most often occurring in children in their first year of life.

Epidemiological, clinical, and traditional radiographic laboratory criteria, of course, in some cases provide support for the probable etiological diagnosis of pneumonia (pneumococcal, staphylococcal, etc.). However, unfortunately, they cannot serve as the basis for a reliable determination of the infection responsible for the development of pneumonia in a given case. Microbiological studies were conducted on 50 patients: 11, 25, and 14 children in age groups I, II, and III. Most of these studies only allow a definitive conclusion to be reached after the second week of illness or only retrospectively help establish an etiological diagnosis. Therefore, an etiologic factor was detected in only 50% of the patients we examined. This was primarily observed in age groups 1 and 2 (27.3 and 32%, respectively). Among the isolated microorganisms, St. P., St. Poteus, E. coli, and St. Aureus were noted.

The severity of pneumonia in young children is determined by the involvement of other organs and tissues in the pathological process, which is manifested by various syndromes (Table 4). The main syndromes were cardiorespiratory syndrome, broncho-obstructive syndrome, toxic syndrome, cardiovascular failure, and neurotoxicosis. Thus, cardiorespiratory syndrome was detected in 95% of the children examined, equally across all age groups. Broncho-obstructive syndrome was detected in 28% of patients, also equally across all age groups. Respiratory failure of grades I, II, and III was observed in 29%, 41%, and 12% of children with acute pneumonia examined. Moreover, it was primarily observed in children in the first year of life (96.7%), while in the third age group, it was observed in 65.3% of children. It should be noted that severe respiratory failure was typical for children in the first year of life.

Table 4

Frequency of occurrence of acute pneumonia syndromes, %

Associated syndromes	Group I n=31		Group II n=43		Group III n=26		Total number of patients, n=100
	n	%	n	%	n	%	
Cattle syndrome	30	96,7±3,26	40	93,3±3,86	25	96,1±3,87	95±2,19
Bonotoxicosis	10	25,3±7,94	10	23,2±6,51	8	30,7±9,22	28±4,51
Neurotoxicosis	11	35,4±8,73	21	48,8±7,71	13	50±10	45±5,0
Toxic syndrome	12	38,7±8,89	20	46,5±7,7	8	30,7±9,22	40±4,92
Dyspepsia	8	25,8±7,98	18	41,8±7,61	14	53,8±9,87	40±4,92
CNS	7	22,5±7,62	7	16,2±5,68	8	30,7±9,22	22±4,16
DN 1	9	29±8,26	15	34,8±2,35	5	19,2±7,88	29±4,56
DN 2	15	48,8±9,12	18	41,9±7,61	8	30,7±9,22	41±4,94
DN 3	6	19,3±9,21	2	4,6±3,23	4	15,3±7,2	12±3,27

Cardiovascular failure was detected in 22% of the children examined. It was more common in the third age group. Toxic syndrome and neurotoxicosis were detected in 40% and 45% of children with acute pneumonia. Dyspepsia was characteristic of 40% of the examined children, with a higher prevalence in the second and third age groups, accounting for 41.8% and 53.8%, respectively. It developed as a result of the combined effects of the pathogen's toxin and tissue hypoxia. Both factors disrupt the central, humoral, and local regulation of blood circulation [19,106,134].

Neurotoxicosis syndrome (hypoxic encephalopathy) was characterized by a predominance of psychomotor agitation. In severe cases, children with the disease experienced clinical manifestations such as lethargy, decreased reflexes, adynamia, muscle weakness, headache, vomiting, and twitching of individual muscle groups.

CONCLUSION

Acute pneumonia in young children is characterized by marked clinical severity, especially in children under one year of age, who are more likely to have extremely severe forms of the disease, multiple clinical and syndromic manifestations, and a high frequency of underlying pathologies, including anemia, rickets, perinatal encephalopathy, and malnutrition. Focal pneumonia predominated in all age groups, but segmental pneumonia was more common in older children. All cases were complicated, with respiratory

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failure, toxic syndrome, and neurotoxicosis most often developing in children under one year of age. An etiologic factor could be identified in only 50% of patients, primarily in younger age groups. The data obtained highlight the need for early detection and a comprehensive approach to the management of children with acute pneumonia, especially in the infant group, with mandatory consideration of the degree of intoxication, underlying diseases, and syndromic disorders.

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