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Comprehensive Pharmacotherapy Of Acute Pneumonia In Young Children, Taking Into Account The Degree Of Endotoxemia And Disease Outcomes

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Abstract: This article analyzes the clinical course of acute pneumonia in young children, the pathogenetic significance of the level of endotoxemia, and the effectiveness of complex pharmacotherapy approaches. It is scientifically proven that an increase in endotoxin load is closely related to the exacerbation of the inflammatory process, intoxication syndrome, respiratory failure, and microcirculatory disorders. The study evaluated laboratory parameters, inflammatory mediators, and metabolic changes, and developed differential treatment methods depending on the level of endotoxemia. The complex pharmacotherapy included antibacterial, detoxification, inflammation-controlling, antioxidant, and symptomatic treatment methods. The results obtained showed that individualization of therapy taking into account the endotoxemia factor accelerates clinical recovery, reduces the risk of complications, and accelerates the regression of infiltrative processes in the lungs.

Keywords: Acute pneumonia, endotoxemia, early childhood, complex pharmacotherapy, intoxication syndrome, inflammatory mediators, metabolic disorders.

Introduction: Acute pneumonia in early childhood is one of the most common and clinically complex infectious diseases in pediatrics. At this age, the anatomical features of the respiratory tract, the relative narrowness of the bronchial lumen, the immaturity of the alveolar apparatus, and the functional weakness of the immune system create the basis for the rapid development and severe course of the disease. Also, the insufficient formation of the body's complex defense mechanisms significantly increases the risk of developing intoxication syndrome and respiratory failure in children. In the clinical picture of acute pneumonia, along with damage to the respiratory tract, general metabolic disorders, microcirculation insufficiency, and the accumulation of toxic substances in the body play an important role. In particular, an increase in the level of endotoxemia leads to a deepening of the inflammatory process, a violation of the balance of cytokines, an increase in oxidative stress, and an exacerbation of signs of intoxication. Under the influence of endotoxins, inflammatory infiltrates in the lungs expand, gas exchange in the alveoli is limited, and this condition leads to aggravation of the clinical course.

In recent years, it has been scientifically proven that relying solely on antibacterial therapy in the treatment of acute pneumonia is insufficient. Because although antibiotics are aimed at eliminating the infectious agent, they cannot fully cover such complex pathogenetic mechanisms as the accumulation of endotoxins, an imbalance of inflammatory mediators, and tissue hypoxia. Therefore, complex pharmacotherapy, i.e. the combined use of antibacterial, detoxification, immunomodulatory, antioxidant, anti-inflammatory, and symptomatic directions, is considered the most effective approach in today's pediatric practice. The level of endotoxemia in early childhood is considered one of the main factors determining the outcome of the disease. High endotoxin load can lead to a prolonged course of pneumonia, an increased risk of complications, and a longer rehabilitation period. Therefore, taking into account the level of endotoxemia when choosing a pharmacotherapy algorithm is of great importance both in the diagnosis of the disease and in the development of a treatment strategy. The relevance of

this study is due to the need to improve the clinical course of pneumonia in early childhood, reduce the impact of endotoxin load, and improve complex pharmacological approaches aimed at preventing complications. In-depth study of the pathogenetic mechanisms associated with endotoxemia, development of individually planned treatment methods, and analysis of clinical outcomes remain one of the priority areas of pediatric medicine.

The methodological basis of the study was the assessment of the clinical course of acute pneumonia in early childhood, the determination of the degree of endotoxemia and the study of the effectiveness of complex pharmacotherapy. This approach allowed for a deep analysis of the pathogenetic mechanisms of the disease, the identification of factors activating the inflammatory process and the formulation of individualized treatment strategies. The study was conducted in the form of clinical and practical observation, and early childhood children with confirmed diagnosis of pneumonia by laboratory, radiological and clinical signs were studied. The participants of the observation were divided into groups according to the degree of endotoxemia and the effectiveness of the elements of complex pharmacotherapy was compared in each group. In the children involved in the study, respiratory failure, intoxication syndrome and the level of activity of the inflammatory process were assessed as primary diagnostic criteria. Severe somatic defects, congenital independent diseases, severe deficiency of the immune system and pathologies limiting the compensatory capabilities of the organism were not taken as exceptions. Laboratory tests included general blood parameters, inflammatory markers, C-reactive protein, and cytokine profiles. Biochemical tests assessed parameters reflecting toxic load, oxidative stress markers, and antioxidant system activity. Using these indicators, the level of endotoxemia was determined, and children were divided into differential groups according to the severity of the altered condition. A complex pharmacotherapy algorithm was developed based on etiological, pathogenetic, and symptomatic approaches. Age-appropriate antibacterial drugs were used as part of etiological therapy. In the pathogenetic direction, infusion detoxification, antioxidant protection, agents that normalize inflammatory mediators, and drugs that improve microcirculation were selected. The symptomatic approach included bronchodilators, mucolytics, oxygen supply, and mechanical airway relief. The intensity of therapy was adjusted depending on the level of endotoxemia, the depth of respiratory failure, and the severity of general clinical symptoms. The main criteria for assessing the effectiveness of treatment were the dynamics of clinical symptoms, stabilization of body temperature, respiratory indicators, reduction of intoxication syndrome and reduction of inflammatory markers. Regression of radiological changes and reduction of infiltrative processes in the lungs indicated a stable result of therapy. The duration of recovery after the disease, the risk of complications and the normalization of the general functional state were also included in the assessment process. This methodology allowed for a thorough analysis of the role of endotoxin load in the acute course of pneumonia and served to substantiate the clinical effectiveness of the integrated approach.

CONCLUSION

In cases of high endotoxemia, when using infusion detoxification, antioxidants, immunomodulatory agents, and measures aimed at improving bronchial drainage, positive changes in clinical dynamics were observed more quickly. Individualized organization of therapy, i.e., changing the choice of drugs depending on the endotoxin load and severity of the clinical condition, helped to reduce the risk of complications in children, shorten the rehabilitation period after the disease, and restore the functional state of the lung tissue. Also, the normalization of laboratory parameters and regression of radiological signs confirmed the effectiveness of the integrated approach. In general, taking into account the level of endotoxemia in the treatment of acute pneumonia has become an important part of the clinical decision-making process. The results of this study substantiate that integrated pharmacotherapy is more effective in severe forms of acute pneumonia and increases the chances of a favorable outcome of the disease. This approach is of scientific and practical importance for improving individual, pathogenetically based treatment standards in pediatric practice.

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