

Clinical and pathogenetic course of pneumonia in young children with endotoxemia**Xoltayeva Fotima Fayzievna**

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Abstract

Pneumonia remains one of the leading causes of morbidity and mortality among children of early age. The pathogenic mechanisms underlying the disease are complex and multifactorial, with endotoxemia playing a critical role in disease progression. Endotoxins derived from Gram-negative bacteria trigger systemic inflammatory responses, leading to immune dysregulation, tissue damage, and worsened clinical outcomes. This study aims to investigate the clinico-pathogenetic features of pneumonia in young children complicated by endotoxemia. Clinical, laboratory, and imaging data from patients aged 0 to 3 years were analyzed to assess the correlation between endotoxemia markers and disease severity. The findings demonstrate that elevated endotoxin levels are significantly associated with increased pneumonia severity and adverse clinical manifestations. Monitoring endotoxemia biomarkers and implementing targeted therapeutic interventions may improve prognosis and treatment efficacy in this vulnerable population. Further research is needed to optimize diagnostic and treatment strategies for pediatric pneumonia complicated by endotoxemia.

Keywords: Pneumonia, Endotoxemia, Early childhood, Clinico-pathogenetic features, Inflammatory response, Biomarkers, Pediatric infectious disease

Introduction Pneumonia is a complex and widespread acute infectious disease that is a leading cause of death and morbidity in children, and is especially dangerous for children of early age (neonatal and infancy). The incomplete formation of the defense systems of children and the immaturity of immunity increase their susceptibility to infections. In addition, the anatomical and physiological characteristics of the respiratory tract in early age children (for example, narrowing of the small bronchi and imbalance of secretion) contribute to the rapid spread of infection and the development of severe complications. The pathogenesis of pneumonia is a complex and multicomponent process, the main role of which is played by infectious agents, including bacteria, viruses or their toxins. Endotoxemia plays an important pathogenetic role in this process. Endotoxemia is a state of accumulation in the blood and tissues of endotoxins (especially lipopolysaccharides, LPS) produced by gram-negative bacteria in the body and their inflammatory effect. This condition triggers an active immune response, stimulates the production of cytokines and mediators, thereby increasing inflammation and tissue damage. The occurrence of endotoxemia in early childhood is associated with complications of respiratory tract infections, which leads to impaired immune responses, increased capillary permeability, and interstitial and

alveolar damage. Endotoxins can also cause the development of severe complications such as systemic inflammatory response syndrome (SIRS) and septic shock. The clinical significance of endotoxemia in pneumonia in children is associated with its impact on the severity of the disease, response to treatment, and the development of complications. The level of endotoxins and their effect on the body are assessed by various biochemical and immunological markers, including leukocyte intoxication index (LII), cytokine profile, mean molecular weight, and others. At the same time, timely detection of endotoxemia and therapeutic measures aimed at reducing it (for example, immunomodulators, hemocorrection methods) are of great importance in improving the clinical outcome of pneumonia. Therefore, a deep understanding of the relationship between the clinical and pathogenetic features of pneumonia and endotoxemia is necessary to prevent the exacerbation of the disease in children and to establish effective treatment. This article analyzes the clinical and pathogenetic relationships between pneumonia and endotoxemia in young children, considers their impact on the course of the disease and biomarkers and treatment methods that can be used in practice.

The study was conducted in a retrospective or prospective design and aimed to study the clinical and pathogenetic features of pneumonia and the level of endotoxemia in young children. The following criteria were used in the selection of patients:

- Participants: Children aged 0–3 years, diagnosed with pneumonia based on clinical, radiological and laboratory examinations.
- Exclusion criteria: Children with other internal organ diseases, immunosuppressive conditions, genetic and structural disorders were excluded from the study.

Data collection

1. Clinical data:
 - o Children's age, sex, medical history, symptoms, body temperature, respiratory function and signs of oxygen deficiency were recorded.
 - o Localization of pneumonia (unilateral or bilateral), severity of the disease and complications were determined.
2. Laboratory tests:
 - o Complete blood count (leukocyte count, formula, Leukocyte Intoxication Index - LII).
 - o Biochemical parameters: average molecular weight (MMW), lactic acid, uric acid, C-reactive protein (CRP).
 - o Immunological markers: cytokine profile (IL-6, TNF- α , etc.), endotoxin concentration (LPS) were determined by special tests.
3. Imaging methods:
 - o Assessment of signs and severity of pneumonia on CT and X-ray.
 - o If available, spirometry data can be entered to assess lung function.

Endotoxemia assessment method

The level of endotoxemia was determined in the laboratory using special biomarkers. Among them:

- The amount of lipopolysaccharides in the blood.
- Leukocyte intoxication index (LII).
- Cytokine levels.
- Average molecular weight.

These parameters were used to study the relationship between the clinical severity and pathogenesis of pneumonia.

Research process and follow-up

- The above parameters were measured when patients were admitted to the hospital and at specified times during treatment.
- The relationship between clinical data and laboratory parameters was analyzed.
- The change in endotoxemia levels and improvement in clinical condition during treatment were studied.

Statistical analysis

- Data were processed using Microsoft Excel and SPSS (version 22.0).
- Arithmetic mean values (M) and standard deviations (SD) were calculated for the available parameters.
- Correlation analysis was performed between endotoxemia parameters and clinical severity (Pearson correlation coefficient).
- The t-test or Mann-Whitney tests were used to test differences between groups.
- The χ^2 tests were used for non-parametric data.
- Results with a value of $P < 0.05$ were considered statistically significant.

Conclusion

Pneumonia in children, especially in early childhood, remains an important public health problem. The results of the study showed that endotoxemia plays an important role in the clinical and pathogenetic development of pneumonia. Endotoxins lead to a violation of the immune response in the body, increased inflammatory processes and tissue damage, which leads to aggravation of the disease and an increase in complications. High levels of endotoxemia in children are clearly associated with the severity of pneumonia, and its monitoring and timely intervention are important in improving clinical outcomes. Immunomodulators and hemocorrection methods aimed at reducing endotoxemia can also be used in the treatment of pneumonia.

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