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Some Indicators of Immune Status in Severe Pneumonia in Young Children with Acute Herpetic Stomatitis

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Abstract The aim of this study: is to analyze the clinical and immunological features of the course of severe pneumonia in young children with acute herpetic stomatitis. Research methods: analysis, clinical observations, X-ray, immunological studies. Results: clinical and immunological features of the course of severe pneumonia in young children against the background of acute herpetic stomatitis were determined.

Keywords Pneumonia, Herpetic stomatitis, Young children, Immunology

1. Introduction

Respiratory diseases of both bacterial and viral nature attract more and more attention of specialists due to their high prevalence in children, high frequent relapse and transition to chronic pneumonia, as well as insufficient effectiveness of antibacterial therapy.

An unfavorable background for the course of the pneumonic process in young children is rickets, protein and energy deficiency, anemia, dysbactriosis, etc. they largely determine the recurrence of pneumonia in a child, the duration of their course, and the tendency to exacerbations, relapses, and complications.

Herpes infection is one of the most widespread and poorly controlled infections of the human body. The herpes simplex virus (HSV) causes various diseases of the central and peripheral nervous system, liver and other parenchymal orgones, eyes, skin, mucous membrane of the ventricular-muscular tract, sexual orgones, and also has a limited significance in the intrauterine pathology of the fetus. Often, there is a combination of different clinical forms of herpetic infection-one of the most common forms of herpetic infection is acute herpetic stomatitis (OGS). OGS takes the first place among all diseases of the oral mucosa and is included in the leadinggroup among all infectious diseases of childhood. Children with various age groups suffer from OGS, but most often OGS occurs in children aged from 6 months to 3 years. This is explained by the fact that at this age, antibodies obtained from matter through the placenta disappear in children. In addition, morphological features of the structure of the oral mucosa are important. At this age, there is a high prevalence of pure haematological barriers, a thin epithelial cover, a low level of glycogen and nucleic acids, looseness of the basement membrane, low differentiation of connective tissue fibrous structures, and exchange vascularization. As a result of the development of the immune system in the developing child's body, the absence of a mature system of specific immunity, a low level of cellular immunity, a high content of mast cells and their low functional activity are characteristic.

OGS causes an increase in the duration of treatment of patients inspecialized clinics, deterioration of the condition due to the development of complications that often lead to the patient's death.

In the entire arsenal of antibacterial agents, the cephalosporin group is most widely used in pediatric practice due to its highefficacy, low toxicity, and goodtolerability. However, in recent years, in children with OGS, the tendency of the child's body to give a dysbiotic state of the intestine, a violation of the esophageal-absorption function, causes massive inflammatory changes in the bronchoalveolar system in early childhood. Antibiotics should be used cautiously in the complex therapy of pneumonia occurring against the background of OGS.

Dysbacteriosis causes an increase in the duration of treatment of patients in specialized clinics, deterioration of the condition due to the development of complications, often leading to the death of patients.

In the treatment of patients with pneumonia on the background of intestinal dysbiosis, many doctors often encounter difficulties-traditional means and methods of treatment oare not effective enough and cause diseases.

In recent years, the state of the microflora of the gastrointestinal tract attracts the attention of microbiologists, immunologists, pediatricians, which consists in studying some physiological processes in the body. This is replaced by the dynamic interrelation of microorganism and

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macroorganism not the functioning of immune systems in the organism as a whole. In particular, the microbial flora of the intestine develops morpho-and immunogenic effects, determines the state of metabolic processes of the macroorganism, disposes of undigested food substances, and activates biologically active compounds released with digestive juices, synthesizesvitamins and enzymes.

The above data dictate the need to study clinical manifestations in vzoimosvedi with immunological ones on the background of OGS in young children in order to optimize the diagnosis and treatment of the disease.

2. Purpose of the Study

To study the clinical features and nature of the immune response, the state of microflora of the gastrointestinal tract, the course of severe pneumonia in young children with acute herpetic stomatitis in order to optimize, diagnose and treat the disease.

3. Material and Methods

Up to 60 children were examined, including 60 children with severe pneumonia on the background of OGS, aged from 6 months to 3 years, who were treated in a hospital. The control group consisted of 20 proctically healthy children.

Along with general clinical studies, bacteriological culture from the pharynx, bronchial smiv, blood was performed to determine the sensitivity of microflora to antibiotics, X-ray, immunological, and microbiological studies.

Immunological studies included determining the main parameters of cellular and humoral immunity by identifying differentiation SD3, SD4, SD8, SD16, and SD20 cluster son the cell surface using Seri LT monoclinal antibodies (Too “Sorbent”, Moscow, Russia). The concentration of serum immunoglobulins A, M and G in the peripheral blood was determined by the G. Manchini method, the level of cytokines (IL-1β), IL-4 (interlekin) and TNF (necrosis factor) in the blood serum was determined by the NFA (enzyme immunoassay) method (“Cytokine LLC, St. Petersburg) according to the instructions. Quantitative parameters and species composition of intestinal microflora were evaluated according to the standard method before and after treatment.

All the obtained research results were subjected to statistical processing on a personal computer using the Microsoft office Excel-2019 software. The methods of variational parametric and nonparametric statistics were used to calculate the arithmetic mean (M), standard error of the mean (m), and correlation coefficient (r). The statistical significance of changes in comparisons averages was calculated using the C-student criterion C (t).

The studies were carried out in dynamics: instrumental and generalие laboratory studies- before and after treatment; ELISA and immunological studies-before and one month after treatment.

4. Results of the Discussion

When making the diagnosis of pneumonia, we used the classification adopted in Moscow at the symposium on improving the classification of non-specific lung diseases in children (1995), the WHO classification (1999) and the results of the symposium of pediatricians-pulmonologists of Russia and the Meeting of the Problem Commission on Pediatric Pulmonology and Hereditary-determined Lung Diseases. Scientific Medical Council of the Ministry of Health of the Russian Federation (2000).

Parents of sick children complained mainly of an increase in the child's body temperature, anxiety, the presence of catarrhal phenomena, cough, and pronounced weakness. Shortness of breath, sleep disorders, decreased appetite, dyspeptic symptoms.

Pneumonia in children with OGS occurred more often against the background of sub febrile, normal temperature, in 67% - with copious catarrhal phenomena from the nasopharynx-rhinitis, conjunctivitis, pharyngitis with a partial wet cough. At the same time, at the peak of the body temperature rise, elements of the lesion appeared on the hyperemic and edematous mucosa, both in the oral cavity and on the facial skin in the perioral region in the main group: in the oral cavity, usually from 10 to 25 elements of the lesion 43 (0.45), during this period in 25 (0.32) children salivation increased, saliva became viscous and viscous, and 16 (0.25) children had pronounced inflammation and bleeding of the gums in the area of all teeth. After the rash of elements of the lesion, the body temperature usually decreased to 37-36.8%.

However, the rash often recurred, which coincided with the next rise in body temperature to the previous level. Children had decreased appetite, sleep disorders, and increased symptoms of intoxication. Examination of the oral cavity revealed elements of the lesion that are at different stages of clinical and morphological development – plaques 10 (0.10), aphthae 34 (0.37), erosion 20 (0.22) and spots (false polymorphism).

Radiological, long-lasting fine-focal infiltrative shadows were observed. From the blood side, frequent eosinophilia, leukocytoses, ESR acceleration to 15-25 mm/h were noted.

In the comparison group, these syndromes usually had from 10 to 25 elements of lesion in the oral cavity (0.42), 24 (0.32) children had increased salivation and 17 (0.23) children had pronounced inflammation in the area of all teeth. When examining the oral cavity-plaques 24 (0.32). Aphthae 20 (0.22). The effect of antibacterial therapy in these children was insignificant.

Bacteriological examination of sputum, pharyngeal smear revealed in children Staphylococcus aureusi in detey, Staphylococcus pneumonia in 3 children, Streptococcus pyogenes in 2, Haemophilus influenza, mixed microflora, Staphylococcus epidermis, Escherichia coli in 2. In the rest of the patients, the microflora was not detected.

In the semiotics of respiratory damage, breathing was primarily manifested with mixed dyspnea in all patients, as

well as respiratory tract resistance during exhalation in children. At the same time, in 10 patients, exhalation was particularly difficult, that is, there was a pronounced obstructive syndrome.

Violation of the function of external respiration was manifested in inflating the wings of the nose in 12 patients, sinking of the pliable places in 7 patients. The frequency of individual toxic, aggravating manifestations significantly decreased in the examined children to 42.9±0.4.

From the side of humarrhal immunity, patients showed an increase in the level of IgA, IgG (P<0.001).

Children in the control group who received basic therapy showed a change in T-lymphocytes ($SD3^+$) of 46.0±1.0% versus 43.2 ± 0.8% before treatment (P<0.0,05); B-lymphocytes (SD 20+) 25,5±1,1%-28,5±1,0% (P<0,0,05); T-helpers ($SD4^+$) 24,5±0,7%-21,4±1,0% (P<0.0,05) and T-suppressors ($SD8^+$) to 12.4±0.9% vs. 11.1±0.8% (P<0.0,05). Significant changes in the parameters of immunoglobulins (IgA, IgM, IgG P<0,0,05) are detected.

The content of EC / ($SD16^+$) lymphocytes in children of the control group was increased, amounting to 6.5±0.6 compared to the indicators before treatment (P<0.0,05).

Neutrophil phagocytic activity was 42.2±1.00% versus 42.2±0.9% (P<0.0,05) before treatment.

Against the background of manifested deep immune processes, clinically proceeded with the following syndromes: obstructive u-11, cardiorespiratory u-2, dyscirculatory u-4, with DIC sidroma u-2, exicosis - in 2.

As a rule, dstalny wheezes were diagnosed. Exhalation is carried out with the participation of auxiliary muscles, children showed anxiety, sometimes bronchophonia, percussion box sound. Intestinal syndrome manifested itself from the onset of the disease 2-3 weeks after admission and was leading throughout the acute period.

The content of TNF-a in the blood serum of children with OGS TNF a was significantly increased to 3.6±3.3 pg/ ml (in practically healthy children 25.2±5.5 pg/ml; P<0.0,01), the level of HL-1β-to 16.5±4.9 pg/ ml (in practically healthy children 43.4±3.4 pg/ ml; P<0.0,01). In children with normal pneumonia, the level of TNFA was also significantly higher (58.3±2.9 pg/ ml). The level of HL-1β was 14.3±4.1. The obtained data suggest that there is a certain dependence of the production of TNFa, HL-1β on the nature of the pathological process, as evidenced by the high level of its secretion in children with severe pneumonia with OGS.

According to our data, the content of HL-4 in children with OGS increased slightly to 9.3±1.3 pg/ ml (in practically healthy children-7.8±3.1 pg/ ml), in children with normal pneumonia-even less – up to 8.9±1.1 pg/ ml.

Our research has shown that intestinal dysbiosis (DK) is also a factor in its aggravation. Depending on the severity of OGS, the manifestations and degree of dysbiosis were diverse: from mild to severe clinical forms. Studies of 59 children with OGS showed significant differences in the quantitative parameters and species composition of the intestinal micro flora. There is a shift towards gram-negative flora and anaerobic microorganisms. In the anaerobic group, there was a decrease in all the studied parameters, the most pronounced (P<0.0,01) in relation to bifidobacteria and lactobacilli (4.6±0.2 and 3.2±0.1 KOE/ml, respectively). In the facultative group, a decrease was observed in the coccoid group of microbes, and in the gram-negative flora, an increase the sensitivity, especially for the lactose-negative Escherichia strain the protea microbe.

In severe pneumonia with OGS, the number of microbes in the of the anaerobic and facultative groups was reduced. In the anaerobic group, bifido bacteria were not so what all, lactobacilli amounted to 2.5±0.1 KOE/ml, which is not 70.1% lower than normal (P<0.0,05), increased in seeding, especially strains of pathogenic staphylococci (St. aureus) and Candida fungi Candida. These microbes have a large set of pathogenicity enzymes and can be an important factor in the development of other pathological processes.

Thus, when studying the immune status of pneumonia in young children with OGS and typical bacterial pneumonia with mixed immunodeficiency, both in term so cellular and humeral immunity, a decrease in the level of T-lymphocyte populations ($SD3^+$ and $SD4^+$) was noted (as in acute bacterial pneumonia). On the part of the humarrhal immune system in children with OGS, dysimmunoglobulinemigo was observed due to an increase in the level of IgM, IgA and a decrease in IgG (as in bacterial pneumonia). The study in the blood serum of TNFa, HL - 1β and HL-4 revealed an increase in the level of TNFa, HL-1β and a slight increase in the content of HL-4 and their correlations HL - 1β / HL-4, TNFa (HL-4).

5. Conclusions

1. In case of pneumonia on the background of OGS in young children, significant changes in the immune system were revealed, manifested by a decrease in the number SD^+ - (SD of SD^+ helpers (inducers, $SD8^+$ cytotoxic lymphocytes and the $SD4^+$ immune regulatory index ($SD8^+$ with an increase in the level of natural $SD16^+$ killers, disimmunoglobulinemia due to an increase in IgM content, as well as increase in serum levels of pro-inflammatory cytokines TNFa by 3.2 times, HL - 1β by 3.7 times, TNFa / HL – 4 ratios by 3 times and HL-1β / HL – 4 by 3.5 times according to with typical bacterial pneumonia.
2. Traditional complex treatment does not provide normalization of immune parameters in patients with pneumonia on the background of OGS, and before discharge, they retained pronounced changes in immunological reactivity.
3. Further studies are needed to evaluate the feasibility of immunomodulators in therapy.
4. It should be emphasized once again that prescribing any therapeutic program without taking into account the changes in the patient's immune response, as well as the system, is impractical, since it will not allow achieving the desired effectiveness.

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