THE STATUS OF IMMUNE AND VEGETATIVE NERVE SYSTEM IN CHILDREN AT THE EARLY AGE WITH SEPSIS

The study explores features of the immune status and justifies the role of the autonomic nervous system in the pathogenesis of sepsis in infants. We observed 172 children in early age; the study group included 135 children with sepsis (septicemic and septicopyemic types). Compared group comprised 37 patients with local types of infection (uncomplicated pneumonias, pyelonephritis, pseudofurunculosis, and others); and control group included 20 healthy children. Significant violations of adaptive-compensatory features with deep disturbances in the regulatory system were revealed in septic patients. Changes in the indices of cardiointervalography such as decreasing of the mode (MO), increasing of the mode amplitude (AMO) and significant increasing of the tension index (TI) testified on increasing of sympathetic-adrenergic effects.

Keywords: Children, sepsis, immunity, vegetative nerve system.

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Introduction

Despite availability of significant accumulated material concerning modulated influence of the hypothalamic structures for the immune processes, delivery mechanism of these effects in children with sepsis demand further specification.

The aim of our study was to study the features of the immune status and to substantiate the role of vegetative nerve system in the pathogenesis of sepsis in children at the early age.

Material and methods of investigation

172 sick children at the early age were observed. The basic group comprised of 135 children with sepsis (septicemic and septicopyemic types). The comparison group included 37 patients with local types of infection (uncomplicated pneumonias, pyelonephritis, pseudofurunculosis and others). The control group included 20 healthy children in similar age contingent.

Results and discussion

The analyses of the anamnestic data showed that 84% of patients had different perinatal pathology. In 59% of antenatal mothers, whose children suffered from sepsis, had gestosis in the second part of pregnancy, placental presentation and postmaturity which could cause chronic hypoxia of fetus due to disorders of the uteroplacental circulation. In 64% of mothers it was noted pathology in the delivery (weakness of the labor, premature detachment of placenta, accelerated labor, cord entanglement which could cause asphyxia in children during the labor). Anemia in the moderate and severe degree was the most often observed (in 89% of women) of the extra-genital types of pathology. In addition, in 31% of women it was noted clinical manifestations of the chronic nidus of infection (chronic bronchitis, tonsillitis, maxillary sinusitis, inflammatory diseases of urinary tract). 12% of women had treatment during the pregnancy due to genital diseases. All enumerated abnormalities in ante- and intranatal periods, undoubtedly, left traces in the
development of the perinatal brain injures which could be accompanied by the
development of the diencephalic pathology.

The results of the investigation of anti-infection resistance in the sick children at the early
age testify about significant changes in the parameters of both cellular and humoral
immunity. So the relative amount of T-lymphocytes in the peripheral blood was
40.7±0.48% in the contrast of the indices in the children with local infection (p<0.001).

The investigation results of subpopulation of T-lymphocytes testified that in children with
sepsis the indices of T-helpers pool were reliably at decreased level; and they reliably
differed from the level in the healthy children and in children the local infection (p<0.001
in both comparisons).

In the group of patients with septicemic and septicopyemic types of sepsis it was
registered increase amount of T-cytotoxic cells (Tc) in the peripheral blood which was
manifested reliably difference (p<0.001) in the both investigated groups. The coefficient
of Th/Ts in the sepsis was 3.66±0.11 and it was significantly lower from the indices in
local forms of infection (p<0.001).

The analyses of the parameters of the humoral part of the immunity in children with
sepsis also testified about the decrease of immunoreactivity in such pathology. So, in
sepsis the level of circulated B-lymphocytes in the absolute indices in the peripheral blood
was 0.3±0.05*10^9/ L.

In general, the found misbalance in the subpopulation of T-l in sepsis indicated about
 disorders of its regulatory function on the immunologic homeostasis. In sepsis we
registered the decreasing amounts of IgA (p<0.001) and IgG (p<0.02) in the blood serum.
The level of IgM in septicemic and septicopyemic types of sepsis did not differ from the
level of indices in healthy children and we considered it as an inadequate reaction of the
organism to the inflammation.

The amount of circulated immune complexes in the blood (CIC) (biological activity of
which was stipulated by the damaging effect of granulocytes, increase of permeability of
the membrane, degeneration of the tissues, construction of smooth muscles in patients
with sepsis) was increased twofold comparing the level of it in healthy children.

We have evaluated phagocyte index by the calculation of the complete phagocytosis. The
level of phagocyte index in 92% of sick children with sepsis was high. However, the index
of complete phagocytosis in almost all patients with sepsis was low. It testified about the
lagged ability of leucocytes to complete phagocyte reaction comparing the absorption
ability; otherwise, in the most cases phagocytosis in sepsis was not completed.

Thus, the determined immune misbalance in sepsis gives evidence about pathogenetic
significance of the status of immunocompetitive cells and unspecific part of the immunity
in maintenance of the inflammation process. It characterizes the inability of the immune
system to localize inflammation process as the basic factor of sepsis development.

The immune status could not be realized only within the bounds of autonomic-functional
and self-regulating immune system and depends on the series neurohumoral factors.
Neurohumoral influences have the modulated character: they, in definite limits, regulate
the intensity of the immune reaction, provide the optimal development state of the
immune reaction (its timeliness and intensity), specificity of which is determined by
coordination of the antigen and lymphoid cells.

The carried out investigation concerned the functional activity of sympathoadrenal
parasympathetic and humoral mechanisms of the vegetative provision of the organism in
children with sepsis. The study used cardiointervalography with the analyses of the
constants and its correlation. Significant disorders in adaptation-compensation ability with
deep disorders in the regulation system were found in septic patients. This was testified by
changes in the initial indices: decreasing of the mode (MO), increasing of the mode
amplitude (AMO) and significant increasing of the tension index (TI). Analysis of the
remote consequences of antenatal hypoxia for the status of the cardio-vascular system in children determined the increase of the tonus of sympathetic part of VNS, functional instability and exhausting of the adaptive mechanisms in the children at the early age.

**Conclusion**

The features of the determined changes of the immunological reactivity indices, which conditioned the development of sepsis, could be considered as a consequence of the dysfunction of the high regulatory centers of the sympathetic and parasympathetic parts of nerve system. Such dysfunction leads to change of trophic influence of the regulatory centers to the organs and tissues, disturbance of the duration of metabolic and immunological processes.

**References**


