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#### SEPSIS AND PATHOMORPHOLOGY OF LYMPH NODES IN NEWBORNS

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**Annotation:** In this work, we studied the clinical and anamnestic data and the features of morphological and morphometric changes in the lymph node in neonatal children who died from various forms of sepsis. Sepsis is often detected in premature children (34.7%), hypotrophic (64.3%) in the presence of a pre-offensive background (rickets, anemia) - 51.5%. Morphologically, atrophy of the cortex, paracortex with reticulosis and sclerosis was noted. As a result of prolonged exposure to infectious factors in the lymph node, all morphofunctional elements are completely blocked and paralysis of immunogenesis occurs.

Key words: sepsis, newborn, neonatal period, lymph node, prematurity, immunodeficiency, morphology.

Аннотация: В данной работе проведено исследование клинико-анамнестических данных и особенностей морфологических и морфометрических изменений лимфоузла у детей неонатального периода, умерших от различных форм сепсиса. Сепсис часто выявлено у детей недоношенных (34,7%), гипотрофичных (64,3%) при наличии преобидного фона (рахит, анемия) (51,5%). Морфологически отмечалась атрофия коры, паракортекса с ретикулезом и склерозом. В результате длительного воздействия инфекционных факторов в лимфоузле полностью блокируются все морфофункциональные элементы и наступает паралич иммуногенеза.

Ключевые слова: сепсис, новорожденный, неонатальный период, лимфоузел, недоношенность, иммунодефицит, морфология.

Annotatsiya: Ushbu ilmiy ishda neonatal davrida sepsisning turli klinik shakllaridan vafot etgan chaqaloqlarning limfa tugunlaridagi oʻziga xos morfologik va morfometrik oʻzgarishlar hamda klinik-anatomik ma'lumotlar oʻrganilgan. Sepsis koʻp hollarda chala tugʻilgan (34.7%), gipotrofik (64.3%), premorbid fonli ( raxit, anemiya-51.5%) chaqaloqlarda kuzatiladi. Limfa tugunlari poʻstlogʻida va parakorteksda atrofik, sklerotik hamda retikulyoz oʻzgarishlar morfologik aniqlangan. Infeksion omillarning uzoq vaqt ta'siri natijasida limfa tugunlarida barcha morfofunksional elementlarining toʻliq bloklanishi va immunogenez falaji kelib chiqadi. Kalit soʻzlar: sepsis, chaqaloq, neonatal davr, limfa tuguni, chala tugʻilish, immunodefitsit,

Kalit so'zlar: sepsis, chaqaloq, neonatal davr, limfa tuguni, chala tug'ilish, immunodefi morfologiya.

**Relevance.** The essence of the septic process is the inability of the body to destroy microbes, associated primarily with an immunodeficiency state [1,2,3]. The latter can be background, i.e. present in the body before the onset of the infectious process, as well as naturally occurring during it as a result of the action of pathogens and their toxins, and as a result of therapy. Thus, sepsis almost always occurs in a child with some background condition, which, as a rule, is accompanied by IDS. Infectious diseases in immunodeficiency states are particularly severe and long-lasting, the development of unusual complications, often sepsis [2,3,4]. At the same time, in the etiology of infectious processes, the main role, as a rule, belongs to microorganisms with low pathogenicity. With a defect in the cellular link of immunity, infectious diseases are caused mainly by fungi, viruses and gram-negative flora, with a defect in humoral immunity - by grampositive bacteria.

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To date, the morphofunctional state of the immune organs, in particular, the peripheral organ - the lymph node in sepsis in newborns remains poorly understood [5,6]. In particular, data on morphological changes in the lymph node that occur in various infectious diseases remain contradictory. Recently, the problem of the growth of immunodeficiency states developing under the influence of environmental, genetic and infectious factors has become particularly relevant in pediatrics.

The aim of the study is to investigate clinical and anamnestic data and features of morphological and morphometric changes in the lymph node in newborns who died in the neonatal period from various forms of sepsis. Clinical and morphological analysis was carried out taking into account the state of full-term and prematurity, hypotrophy and premorbid background diseases.

**Materials and methods of research.** The object of the study were the lymph nodes of 36 newborns who died in the neonatal period from sepsis. During the autopsy, the lymph nodes were isolated, weighed and the lymph node weight coefficient (LWC) was determined. For histological examination, the lymph nodes were fixed in 4% formalin solution on a phosphate buffer and after dehydration in alcohols were embedded in paraffin. Sections 5-8 µm thick were stained with hematoxylin and eosin, according to Van Gison and the PAS reaction was performed. To unify the accounting of morphological changes in the lymph node in neonatal conditions and various pathologies, an algorithm for assessing morphological features was developed.

**Results of the study and their discussion.** The results of the clinical and morphological analysis of observations with sepsis showed that this disease, as the most severe form of infection, often found in children, developed in premature (34.7%), hypotrophic (64.3%) in the presence of a premotile background (rickets, anemia - 51.5%). Of great importance in the development of sepsis were various congenital defects of organs and tissues, including congenital heart defects (23.8%), brain (14.6%), kidneys and liver (7.3%) and other congenital malformations (13.1%). The specified defects were more common in children of early infancy, and often led to septic lesions of the lungs, intestines, brain, and serous cavities.

Pathologically, bilateral large-focal pneumonia with abscess formation and necrosis of the affected foci, ulcerative-necrotic, fibrous-ulcerative enterocolitis, sometimes with metastatic abscesses in the liver were revealed. Purulent metastases were also found in the brain, epicardium, in rare cases purulent peritonitis was observed. In the neonatal period, sepsis was encountered in children with artificial or mixed feeding and as a complication of viral-bacterial pneumonia, enterocolitis caused by pathogenic microbes, occurring in the form of septicemia.

Thus, sepsis developing in weakened newborns under conditions of reduced immunological reactivity of the microorganism and in the presence of a premorbid background was severe, with polymorphic lesions of internal organs, as indicated by other authors (2,4). It should be emphasized that very often in an immunocompromised child the development of sepsis is caused even by opportunistic microorganisms. Our studies have shown that sepsis in one-year-old children is caused mainly by opportunistic microbes (75.7%), such as E. coli, Klebsiella, Signenosus bacillus, Staphylococcus epidermidis, Proteus, and viral infection, yeast-like and mold fungi were added.

Immunological examination revealed that the content of immunoglobulins and T- and B-lymphocytes varied depending on the degree of prematurity and the severity of sepsis. Septicopyemia against the background of prematurity, premotile conditions and congenital malformations was characterized by a significant decrease in the level of immunoglobulins of all classes. The level of cortisol and immunoglobulin E in the blood was also reduced. In septicemia with the addition of a viral infection, an increase in the level of immunoglobulin G to 16.7 g / 1, an increase in cortisol to 10256.31 nmol / 1 was noted. In the age group of 7 - 12 months, in almost

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all cases the level of immunoglobulin M was increased, on average -  $4.03 \pm 0.19$  g / l, and the level of immunoglobulins A ( $0.31 \pm 0.05$ ) and G ( $6.55 \pm 1.33$  g / l) was relatively low.

When diagnosing secondary immunodeficiencies in children, we took into account the clinical history, when there are primary infectious diseases caused by viruses, virulent bacteria, parasites, as well as when there are metabolic diseases such as thesaurismoses and nutritional diseases - hypotrophy, anemia, etc.

Pathomorphologically, secondary immunodeficiencies were manifested by phases IV-V of accidental transformation, acquired atrophy of the thymus. In the peripheral organs of immunogenesis, in particular the lymph nodes - devastation of structural-functional zones, their replacement by reticular and connective tissue, as well as the absence of activation of lymphocytes, light centers of reproduction.

In infectious diseases, depending on the duration of the disease, various phases of premature organ involution were noted in the lymph node. In the initial stages of a viral infection, most often influenza and adenovirus infection, the thymus is somewhat enlarged and edematous. Microscopically, loosening of the lymph node layers is noted due to edema, massive disintegration of lymphocytes and reticular cells. The disintegration of lymphocytes located in the paracortical zone was especially pronounced, large macrophages and nurse cells with a large number of phagocytic lymphocytes appeared. In the medulla, there are also lymphocytes in a state of karyolysis and karyopyknosis. Large cells with hyperchromic nuclei appear in the lumen of the cerebral sinuses, resembling viral metaplastic cells of other organs.

In subsequent stages of the disease, a decrease in the volume of the cortex and expansion of the medulla are observed; this process is accompanied by thickening of the interstitial tissue due to reticulosis and sclerosis. In the cortex, reticular cells predominate over lymphocytes. The cytoplasm of reticular cells undergoes dystrophic changes and disintegrates. Intercellular distances expand.

In subsequent stages, the lymphoid follicles of the cortex of the lymph node begin to collapse, where lymphocytes almost disappear, reticulocytes disintegrate, and sometimes giant cells with large hyperchromic nuclei appear. At this phase of premature involution of the lymph node, lymphocytes predominate in the medulla and are in an active blast-transformed state. On the part of the interstitial tissue, fibrosis of the connective layers with a predominance of fibrous structures is noted; lymphatic sonuses collapse. Reticular cells of the paracortical zone metaplasia into fibroblasts, then connective tissue cells acquire a spindle-shaped form and grow toward the cortex and medulla sinuses. At first, they occupy the cortex, and then penetrate the medulla in the form of strands.

Histometric studies of the lymph node in acquired immunodeficiencies showed that its weight was reduced by two times compared to the control group and averaged  $0.26\pm0.08$  g. Its weight index was also significantly below the norm ( $1.03\pm0.17$ ). The cortex of the lymph node was uniformly collapsed, their thickness was  $1164\pm87$  µm, of which  $497\pm53$  µm was in the paracortical zone,  $667\pm71$  µm in the lymphoid follicles. Stroma thickening was observed -  $288\pm23$  µm, and the ratio of stroma to parenchyma was  $0.24\pm0.04$ , which is significantly higher than the norm.

**Conclusion:** Thus, premature involution of the lymph node occurs with complete metaplasia of reticulocytes into reticulosis and sclerosis, disappearance of lymphocytes from the paracortical zone, disruption of the reticular stroma of the cortex, obliteration of the lymphatic sinuses and vessels where lymphocyte recirculation normally occurs, sclerosis of the postcapillary venules of the paracortical zone of the lymph node. In short, as a result of prolonged exposure to pathogenic factors in the lymph node, all morphofunctional elements are completely blocked and paralysis of immunogenesis occurs. As a result, delymphotization of T-dependent zones of all peripheral

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lymphoid organs occurs, the relationship between T- and B-lymphocytes is disrupted, and hypoplasia of B-dependent zones occurs secondarily.

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