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Morphological status of the liver of offspring born from mothers with toxic liver lesions

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Summary. Chronic toxic damage to the mother's liver negatively affects the processes of postnatal development and the formation of the offspring's liver. In the vascular-tissue structures of the liver of the offspring in the early periods of postnatal development, inflammatory-reactive and dystrophic changes are observed. These morphological changes in the liver of the offspring subsequently led to a slowdown and lag in the rate of growth and development and formation of the vascular-tissue structures of the liver of the offspring, compared to the offspring of control intact animals.
Key words: chronic toxic hepatitis, mother-offspring, liver, blood vessels, tissues

Relevance. The birth and development of healthy children primarily depends on the health of the mother. In this regard, it is relevant to study the influence of maternal pathology on the offspring (5). The question of the influence of various maternal pathologies during pregnancy on the fetus and offspring has long attracted the attention of researchers, since it is often one of the causes of death in young children and often leads to a variety of severe damage to the internal organs of the offspring (1,3,6). Acute and chronic diseases of the liver and biliary tract are quite common in women during pregnancy. which affect the metabolism and condition of the mother's organs and systems. Therefore, questions about the impact of liver pathology on pregnancy have long attracted the attention of obstetricians and gynecologists, especially since chronic diseases of the hepatobiliary system are widespread among women. Many issues of the influence of the pathology of the mother's hepatobiliary system on the morphofunctional state of the internal organs of the offspring have not been sufficiently studied to date (2, 4, 7).

The purpose of the study was to study the effect of experimental chronic toxic hepatitis in the mother on the postnatal morphogenesis of the liver of the offspring.

Materials and methods of research. The experiments were carried out on outbred white laboratory rats. The animals were divided into 2 groups of 30 animals each: group 1 (control) - offspring of intact rats, group 2 - rats that were injected with the alkaloid heliotrine weekly for 6 weeks to create a model of chronic toxic hepatitis in rats 0.5 mg/100 g weight. 10 days after the last injection, males were added to them and to the females of the control group. Rats born and nursed by mothers with chronic toxic hepatitis on the 3rd, 7th, 21st and 30th days of postnatal development were decapitated and pieces of liver tissue were taken for histological examination. The material was subjected to general morphological, morphometric and electron microscopic studies.

Results and its discussion. A study of histological preparations of the liver of rat pups born and nursed by mothers with chronic toxic hepatitis on the 3rd-7th day of postnatal life, the following picture was observed in the vascular tissue structures of the liver: in the microstructure of the liver, hepatocytes were located loosely and randomly, separated by wide and full-blooded sinusoidal hemocapillaries. In some hepatocytes, the phenomena of hydropic degeneration were observed; in some cells, pyknosis and lysis of nuclei were observed. The size of hepatocytes increased compared to the indicators of the control group of animals (control 12.0 + 0.4). The number of binucleate liver cells is relatively higher, 2.7 + 0.3 (in the control 1.2 + 0.04). The hepatic lobules and beams are poorly contoured. First of all, it drew attention to itself attention to a slight decrease in the number and size of islands of extamedullary hematopoiesis, constituting up to 15% of the total mass of the organ in animals of the control series. Hepatocytes are located loosely, randomly, separated by wider and more plethoric venous sinuses. The hepatic lobules and beams are poorly contoured. Hydropic degeneration was observed in many hepatocytes. In the cytoplasm of hepatocytes they have a fine granular structure with higher than normal basophilia. Pyknosis or nuclear lysis was observed in a number of cells. The connective tissue stroma remained unchanged. Cytometry results indicated a state of high functional stress in the liver of newborn rat pups. This was indicated by a sharp increase in the size of liver cells, their nuclei and

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cytoplasmic-nuclear ratio. The mitotic index decreased, and the number of binucleate liver cells increased. Glycogen reserves in the liver of the experimental offspring decreased to a lesser extent than in the control. Only individual cells constituting the periphery of the developing hepatic lobules were poor in glycogen. There were no such changes in the cytoplasm of the remaining liver cells. These accumulations of hematopoietic tissue consisted of 4-5 elements (Fig. 1.). Megakaryocytes were rare. At the same time, the number of stellate endothelial cells was noticeably higher than normal. In places in the interlobular connective tissue, infiltration and expansion of sinusoidal hemocapillaries was revealed.

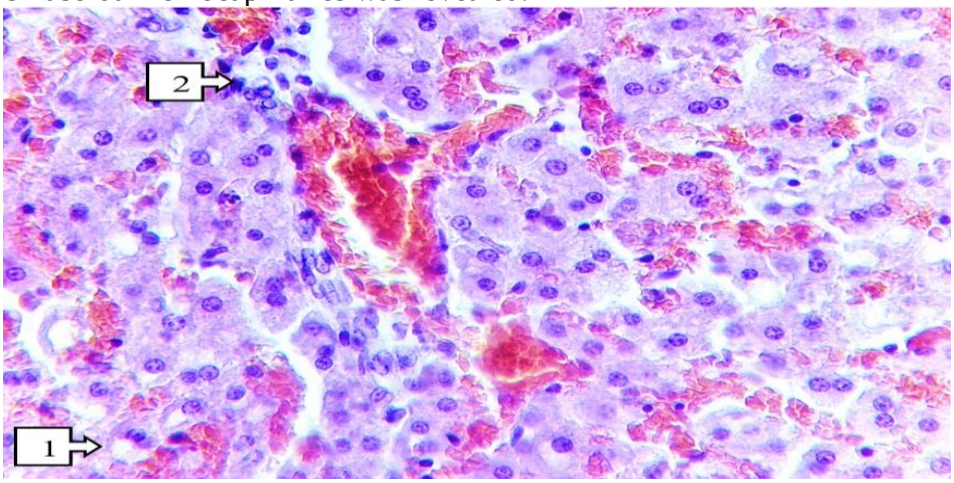

Fig.1. Morphological state of the liver of rat pups born from CTG mothers on the 7th day of postnatal life. In hepatocytes there is a phenomenon of hydropic degeneration (1), in the stroma there is lymphohistiocytic infiltration (2). Hematoxylin-eosin. 10x40.

After 14-21 days of postnatal development, some preservation of the severity of the pathomorphological changes described above was observed in the animals of the experimental group. In some places, against the background of a distinct beam-lobular structure of the liver, places with a lack of complete liver parenchyma were revealed; the liver cells were located randomly. In places, some infiltration of mononuclear cells was observed in the interlobular connective tissue. Immunohistochemically, the venous vessels of the hepatic triad are dilated, full-blooded, in the hepatic nuclei and cytoplasm there are small amounts of acidic mucopolysaccharides, Schiff (8 GX+) positive (Fig. 2). In some centers of the lobules there is a decrease in the number of hepatocytes.

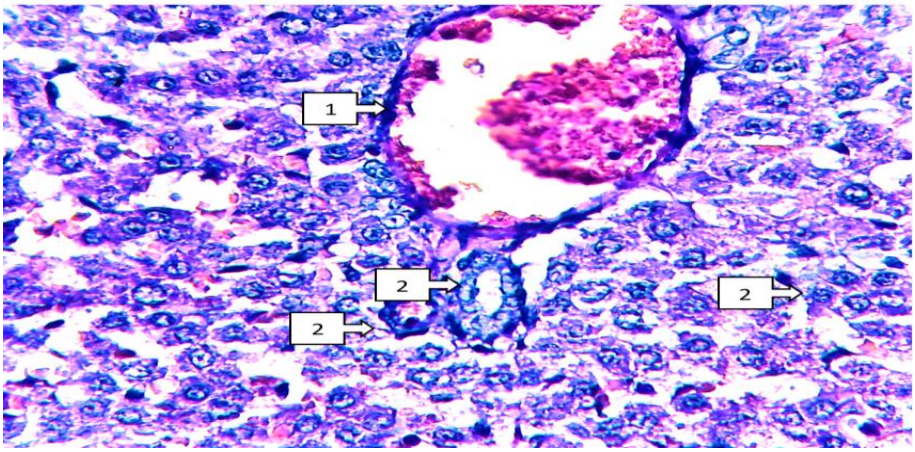

Fig.2. Liver of rat pups born from HTG mothers on the 14th day of postnatal life. The state of the venous vessels of the hepatic triad (1), in the hepatic nuclei and cytoplasm there are small amounts of acidic mucopolysaccharides, Schiff (8 GX+) positive (2). Alcian blue. 40x10.

When studying animals in more distant periods of postnatal development (on the 30th day), significant individual fluctuations in the severity of pathomorphological changes in the liver and the nature of age dynamics were noted in the experimental group of animals. While in some rat pups these pathomorphological changes gradually subsided somewhat with age, in other animals they still persisted, as well as some swelling

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of the portal tracts. In places there were hepatocytes with destructive-due to degenerative changes in the nucleus and cytoplasm of the liver, the parenchyma is divided into thin layers. The interlobular connective tissue forms the stroma in which the vessels and bile ducts are located, and the beam and lobular structure is preserved. Vessels with moderate blood filling. Parenchymal cells are 70% mononuclear, and 30% cells have 2 nuclei. The nuclei of some cells were deformed and were subject to pyknosis or lysis. Along with this, there were areas of parenchyma with pronounced compensatory and regenerative phenomena.

Thus, the results of our studies showed that chronic pathology of the maternal liver leads to morphological changes in the organ similar to the maternal one. These morphological changes in subsequent periods of postnatal development lead to a delay and lag in processes compared to the offspring of intact rats. Analyzing the above processes, we came to the conclusion that these processes are based on a violation of normal relationships in the mother-fetus-offspring system in the antenatal and postnatal periods of development as a result of chronic toxic hepatitis in the mother. The negative influence of the perverted products of the mother's metabolism during the antenatal periods of fetal development, the early onset of compensatory and adaptive processes in the body of the developing fetus, aimed at its existence and development in response to these processes, are apparently the cause of morphological changes in the liver of the offspring during postnatal periods of development.

Conclusions:

1. Chronic toxic damage to the mother's liver will negatively affect the processes of ante- and postnatal development and formation of the offspring's liver, leading to inflammatory-reactive and dystrophic changes in the vascular-tissue structures of the offspring's liver.
2. As a result, mothers with chronic toxic hepatitis give birth to children with a "low start of viability", a morphologically immature liver, this was evidenced by an increase in mitotic activity, an increase in the number of binucleate cells, a longer period of hematopoiesis, later structural formation and formation of vascular tissue structures livers of offspring born from mothers with liver pathology.
3. All these processes are a morphological indicator of a violation of the dynamics of the evolutionarily established processes of organo- and histogenesis in the body of the offspring.
4. The data obtained indicate the prospects of the results in terms of preventing morphofunctional disorders, in the development of effective methods for predicting, preventing, early diagnosis and treatment of liver diseases of women and their children in the early stages of the disease.

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