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Pregnancy Disease - Patomorphology of Preeclampsia

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Abstract In this scientific article, pregnancy-related disease - pathomorphological changes in the liver specific to preeclampsia were studied. As material, the livers of 18 women who died of preeclampsia in the last 10 years were studied at the macroscopic and microscopic levels. The main role in the pathogenesis of preeclampsia is diffuse vascular spasm and hypertension. Vasospasm leads to hypoxia, decreased anticoagulants, hypercoagulability, and disseminated intravascular coagulation syndrome (DICS). As a result, the microcirculation in the liver is disrupted, the permeability of the microtubule wall is increased, the outflow of blood fluid and plasma proteins into the tissue, leading to the development of dystrophic and necrobiotic changes in tumor and parenchymal cells. The results of morphological examination show that under the influence of preeclampsia in the liver is initially detected circulatory, ie dilatation and fullness of all blood vessels, a large number of background fluids. Another characteristic pathomorphological feature of preeclampsia was the central necrosis of the liver fragments. In the periportal area of the liver, specific capillary infarction foci and accumulation of fibrin protein in the sinusoidal peripheral cavity were detected.

Keywords Pregnancy, Preeclampsia, Liver, Morphology, Histology

1. Introduction

Preeclampsia is a disease that develops in the third trimester of pregnancy, as a complication of pregnancy, with tissue tumors, proteinuria, arterial hypertension, and persistent dysfunction of vital organs. There are mild, moderate, and severe degrees of preeclampsia [1,2,3]. In moderate and severe forms, of course, the morphofunctional status of the liver is impaired, resulting in a sharp rise in liver enzymes, decreased platelet count, impaired blood clotting system, impaired blood circulation in liver tissue, hemorrhage, acute dystrophic and necrotic changes in the liver parenchyma [4].

The main role in the pathogenesis of preeclampsia is diffuse vascular spasm and hypertension. Vascular spasm occurs as a result of damage to the endothelium, which is confirmed by an increase in the amount of fibronectin in the blood and glycoprotein from subendothelial tissue. As a result of vascular spasm, endothelin is released into the blood, which activates renin-angiotensin and increases the release of aldesterone and adrenaline into the blood [5,6]. Vasospasm leads to hypoxia, decreased anticoagulants, hypercoagulability, and DICS. As a result, the microcirculation in the internal organs, often in the liver, is disrupted, the permeability of the microvascular wall is increased, blood fluid and plasma proteins are released into the tissue, leading to the development of dystrophic and necrobiotic changes in tumor and parenchymal cells.

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2. Materials and Methods

During the last 10 years, 2011-2020, the Republican Center for Pathological Anatomy of the Ministry of Health of the Republic of Uzbekistan conducted autopsy examinations of 18 women who died of moderate and severe preeclampsia, macroscopic and microscopic examination. Liver pieces were solidified in 10% neutralized formalin for 48 h and washed in running water. It was dehydrated in increasing concentrations of alcohol, paraffin with wax was added, and bricks were prepared. Histological sections were stained by hematoxylin-eosin, van-Gizon, and Periodic Acid - Schiff (PAS)-reaction methods. The drugs were examined under a light microscope and images were taken from the desired areas.

3. Results and Discussion

Microscopic examination of liver tissue in preeclampsia showed that the strongest pathomorphological changes occurred in the blood vessels, i.e., the central vein and sinusoids dilated paralyzedly, the histostructure was disrupted, and numerous small focal hemorrhages occurred

in the liver parenchyma. Hemorrhagic foci are observed to appear around the disse cavity, at the site of necrosis, and between hepatocytes (Fig. 1). Macrophages and lymphoid cells are found in and around the foci of hemorrhage. Hepatocytes are found to be disordered in most areas, disrupting their columnar location. It is observed that the tissue of the portal tract is enlarged due to strong swelling and inflammatory infiltrate, the connective tissue fibers in it are homogenized by fibrinoid swelling.

When the liver tissue is examined under a large lens under a microscope, massive foci of hemorrhage in the periportal area, diapedesis hemorrhage in the disse cavity are detected (Fig. 2). As a result, the predominant location of hepatocytes is disturbed and it is determined that they are located in a chaotic and indeterminate form. It is found that in the cytoplasm of hepatocytes develops protein hyaline-droplet dystrophy, the nuclei take on different shapes and sizes, some of them show signs of karyopyknosis and karyolysis. Among hepatocytes, it is observed that Kupfer cells are hypertrophied in the Disse cavity and lymphoid cells are formed.

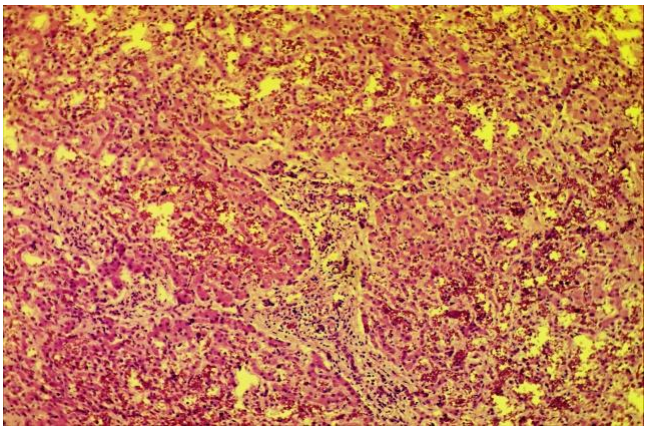

Figure 1. 29 age, died of severe preeclampsia. All the blood vessels in the liver dilated, and numerous foci of hemorrhage appeared. Paint: G-E. Zoom: 10x10

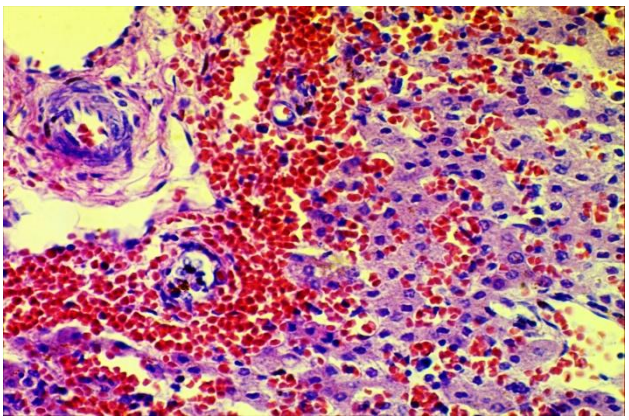

Figure 2. 29 age, died of severe preeclampsia. Massive periportal area, diapedesis blood transfusion into the disse cavity, lymphoid cells appeared in the interstitial tissue. Paint: G-E. Zoom: 10x40

In severe forms of preeclampsia, massive necrosis and hemorrhagic foci are detected in the liver, centrolobular areas. The foci of necrosis are found to occupy the central and intermediate area of the liver fragments, the 2nd morphofunctional area, the necrosis of hepatocytes (Fig. 3), and the destruction of transfused blood cells into an unstructured pigment-rich, eosin-reddish-brown substance. It is observed that macrophages and other histiocytic cells are activated mainly around the necrosis. It was found that the liver parenchyma was preserved without necrosis in the periportal area, the sinusoids and disse cavities between hepatocytes were sharply enlarged, and Kupffer cells were activated. Lymphoid infiltration is observed in the tissue of the portal tract.

In order to study the specific subtleties of centralobular necrosis, examination of liver tissue under a large microscope revealed that the central vein narrowed, the cell and tissue structures in the wall disintegrated and became unstructured, the surrounding hepatocytes were not identified, and an unstructured substance appeared in their place. Among the necrotic tissue structures, macrophages and lymphoid cells are observed to form. The process of necrosis is observed to spread to the surrounding liver parenchyma, resulting in swelling and enlargement of hepatocytes, the development of vacuolar and hyaline-droplet protein dystrophy in the cytoplasm.

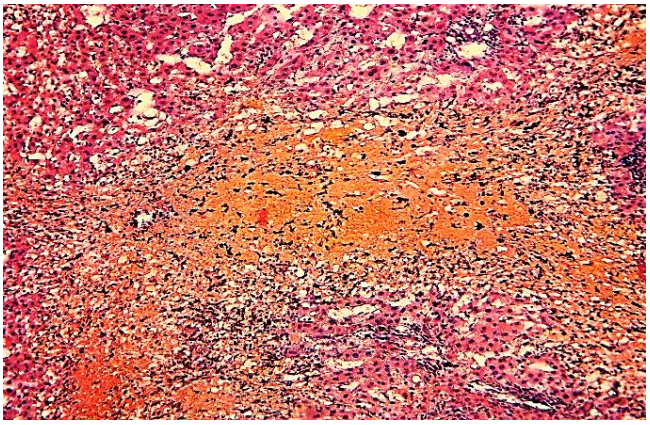

Figure 3. 32 age, who died of severe preeclampsia. Massive necrosis foci appeared in the centrolobular areas of the liver parenchyma. Paint: G-E. Zoom: 10x10

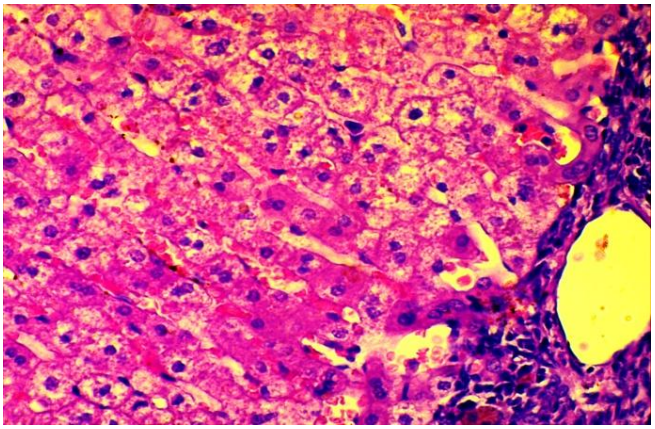

Figure 4. 36 age, died of severe preeclampsia. Necrosis of the liver parenchyma in the periportal area, i.e., infarction, and accumulation of fibrin protein in the Disse cavity. Paint: G-E. Zoom: 10x40

Another manifestation of the pathomorphological changes characteristic of preeclampsia was the infarct foci in the periportal region of the liver tissue and the accumulation of fibrin protein in the sinusoidal and disse space. In this case, lymphoid infiltration in the portal tract is detected. In the area adjacent to the portal tract of the liver parenchyma, hepatocytes are disordered, the cytoplasm is enlarged due to dystrophy, most of the nuclei are lost due to karyolysis and karyopyknosis, ie ischemic infarction. The sinusoids and the dissected cavity are enlarged, in which hemolyzed erythrocytes are found to accumulate fibrin protein in the form of eosinophilic granules (Fig. 4). In some places it is observed that the mass of erythrocytes broken down by fibrin is added, forming an unstructured necrotic substance.

4. Conclusions

We studied those who died during pregnancy, childbirth, and the postpartum period by autopsy as maternal mortality as a result of clinical-morphological analysis into 3 groups according to the origin of the disease. 1-group. Liver diseases developed in connection with pregnancy. 2-group. Liver disease associated with pregnancy. 3-group. Pregnancy developed against the background of chronic diseases of the liver.

Pregnancy-related liver diseases include: preeclampsia, pregnancy cholestasis, acute fatty liver disease. The main role in the pathogenesis of preeclampsia is diffuse vascular spasm and hypertension. Vasospasm leads to hypoxia, decreased anticoagulants, hypercoagulability, and DICS. As a result, the microcirculation in the internal organs, often in the liver, is disrupted, the permeability of the microvascular wall is increased, blood fluid and plasma proteins are released into the tissue, leading to the development of dystrophic and necrobiotic changes in tumor and parenchymal cells. The results of morphological examination show that under the influence of preeclampsia in the liver is initially detected circulatory, ie dilatation and fullness of all blood vessels, a large number of background fluids. Another characteristic pathomorphological feature of preeclampsia was the central necrosis of the liver fragments. In the periportal area of the liver, specific capillary infarction foci and accumulation of fibrin protein in the sinusoidal peripheral cavity were detected.

According to the literature, pathomorphological changes characteristic of preeclampsia, the appearance of infarcts in the periportal area of the liver fragments, necrosis in the center of the fragment, hemorrhage in the entire area. In our material, these changes were not always and not observed in all cases. The occurrence of infarction was detected in 62.6%, centralobular necrosis - in 86.4%, bleeding in almost all cases.

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