AJPMHS
GLOBAL RESEARCH NETWORK

AMERICAN Journal of Pediatric Medicine and Health Sciences
Volume 01, Issue 10, 2023 ISSN (E): 2993-2149

Structural Changes in Liver Tissue for Simulated Skin Burns of Rats

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Abstract: Immediately after a thermal burn, significant qualitative and quantitative changes in metabolic processes occur in the body. The work reveals the histopathological features of the structure of hepatocytes in the liver tissue of rats both normally and under the influence of a simulated thermal burn. The morphological characteristics of the liver of experimental groups of rats treated with various drugs were studied. It has been established that under conditions of burn exposure in rats, significant hemodynamic disturbances, numerous small hemorrhages, and swelling and necrosis of small areas of the organ parenchyma, fatty hepatosis. Identification of pathomorphological transformations of organs in burn wounds of the skin will allow optimizing an integrated approach to the treatment of burn disease.

Introduction

The liver is an organ where nutrients absorbed from the digestive tract are processed and stored for later use by other body systems. Consequently, the liver is a connecting link between the digestive and circulatory systems [4]. The position of the liver in the vascular system is optimal for collecting, modifying and filling metabolites, for neutralizing and eliminating toxic substances [2, 4]. The liver performs diverse functions and is a vital organ [7]. The metabolic functions of the liver are extremely important for maintaining the vitality of the body, and therefore this organ is called the biochemical laboratory of the body [3, 8].

In the pathogenesis of various injuries to the body, an extremely important link is dysfunction of the liver [8]. It is known that immediately after thermal injury, the liver is exposed to toxic products against the background of a sharply reduced antitoxic function [1, 2]. However, there are very few works on the study of morphological changes in liver tissue during thermal trauma to the skin of rats in the analyzed literature [1, 2, 8]. In connection with the above, it is of scientific interest to study the histological state of the liver in the post-burn period in rats.

The purpose of the study was a histomorphological analysis of the structure of the liver tissue with simulated superficial skin burns in rats.

Materials and methods

The experiments were carried out on 40 outbred male rats of 5 months of age. The animals were divided into 4 groups depending on the type of post-burn treatment:

Group I – animals that were not exposed to burns and did not receive treatment (control, 10 pcs.).

Group II – animals exposed to burns and not receiving therapy (10 pcs.). The wounds regenerated naturally.

Group III – animals exposed to burns and treated with applications of 10% synthomycin liniment ("Syntomycin emulsion") (10 pcs.).

Group IV – animals exposed to burns and treated with "Rescuer" ointment balm (10 pcs.).

Therapeutic treatment of wounds was carried out immediately after the formation of a burn lesion on the skin of rats and at the same hours skin applications were carried out with 10% liniment of synthomycin and balm ointment form "Rescuer". After 3 days of the experiment, the animals were euthanized under etaminal-sodium anesthesia (4 mg per 100 g of animal weight, intraperitoneal). After necropsy, the livers of the experimental animals were removed. Liver fragments were fixed in a solution of 10% neutral formalin. Histological examination was carried out according to generally accepted methods [3].

Morphofunctional assessment of the liver was carried out according to the scale of Zhuravleva G.F., Zemkova G.V. [6], where 1 point corresponded to the absence of any morphological abnormalities, 2 points – slight changes in the liver in the form of mild degeneration of hepatocytes, small cellular accumulations around the vessels of lymphatic cells and histiocytes. Morphological changes in the liver with a score of 3 were characterized by the presence of moderate lymphoid-histiocytic infiltrates around the vessels and portal tracts, granular and vacuolar degeneration of liver cells, vascular congestion, and stasis. When assessed at 4-5 points, the changes were more pronounced - in the form of areas of hepatocyte necrosis, significant or extensive infiltrates around blood vessels, with microcirculation disorders and the presence of regeneration elements. Changes scored 3 or more points were defined as pathological.

Results and discussion

A study of the histostructural state of the liver of intact rats (group No. 1 - control) showed that the liver is distinguished by epithelial parenchyma and a very thin connective tissue stroma; the structural and functional units of the liver are liver lobules, which are clearly contoured, that is, the architecture of the organ is preserved. Moreover, the slices are of different sizes; they resemble hexagonal pyramids in shape, in the center of which there are central veins, also of different diameters. In separate pyramids, the cavities of the two central veins were combined. The diameters of the central veins are relatively wide, their cavities are without blood cells; the inside is lined with a very thin layer of endothelium. Intralobular hemocapillaries pass between the hepatic beams (trabeculae), and are generally straight. These hemocapillaries belong to the sinusoidal type of capillaries. Hepatocytes have an irregular polygonal shape and a different surface. There are apical (billiary) and basal (vascular) surfaces of hepatocytes facing the sinusoidal capillaries; With their lateral surfaces, hepatocytes form hepatic beams. Very fine granularity was found in the cytoplasm of hepatocytes. In their central part there are one or two cores. Moreover, some nuclear polymorphism is noted: giant nuclei and medium-sized nuclei with a large number of nucleoli were found. In the cavities of intrahepatic vessels and sinusoidal capillaries there are single shaped elements.

In the liver of rats of group No. 2, exposed to burns and not receiving therapy, a high degree of fatty degeneration with significant structural changes in hepatocytes was noted. Architectonics liver lobules was noticeably changed: some hepatic lobules lost their pyramidal shape due to disruption of the beam structure, which was caused not only by the accumulation of lipids by cells, but also by tissue swelling. Hepatocytes with edema were without clear boundaries, "smeared" and swollen, somewhat enlarged in size, with "turbid", foamy cytoplasm, the spaces of Disse were not visible. In some areas of the liver, liver lobules were not identified at all, in others they resembled circles. Infiltration of vessel walls with lymphocytes and monocytes increased. From the inside, dark, dense, convex nuclei of stellate cells became noticeable in the vascular walls; in some places of the walls, the endothelium was necrotic. Hemolysis of erythrocytes was detected in large vessels. Intralobular capillaries had different diameters, lost

their straightness, and became relatively short compared to the control. They contained single lymphocytes. Necrosis of groups of hepatocytes was observed. Many cells have lost their nuclei. The polymorphism of the remaining nuclei was noted: many nuclei were displaced towards the cell membranes, that is, they were located eccentrically. Some nuclei retained their round shape, were transparent, light, with (2-3) nucleoli, others became small, dense, dark-colored. Cells with 2 nuclei were present in small numbers. The tall columnar epithelium of the bile ducts has changed dramatically: in some of these ducts, detachment of the epithelial layer from the basement membrane has occurred; many epithelial cells have lost their nuclei; the remaining kernels acquired a dark color and became very dense. The boundaries of the epithelium of the bile ducts were not determined due to tissue edema; the walls of the ducts were infiltrated with lymphocytes.

Microphotographs of liver preparations from rats treated with applications of 10% synthomycin liniment ("Synthomycin emulsion") under burn conditions (group No. 3) revealed significant structural transformations: in the peripheral areas of the liver there were no clear boundaries of the hepatic lobules. There is a noticeable difference in the color of the organ parenchyma; where the liver lobules are clearly visible, it is lighter. Where the boundaries of the lobules were not defined, the color was dark. There were small hemorrhages near the walls of the vessels; in addition, the walls of blood vessels are infiltrated with lymphocytes. In some vessels, hemolyzing erythrocytes, accumulations of lymphocytes with very dense dark nuclei, as well as neutrophils with dark-stained nuclei were found. Intralobular hemocapillaries were noticeably narrowed and only at the edges of the central veins they were widened and straight. In other places of the organ parenchyma they are sharply narrowed and tortuous. In the narrow cavities of intralobular hemocapillaries, there were mainly hemolyzing erythrocytes and single lymphocytes with dark, dense nuclei. Due to swelling of the organ parenchyma, clear cell boundaries were not determined. Quite rare giant nuclei were discovered, round, light-colored with (5-6) nucleoli. The nuclei of medium-sized cells were often shifted from the center of the cell to its periphery. They were mainly round, light-colored, containing (1-3) nucleoli; many nuclei had a darker color. Necrosis of individual hepatocytes was detected; there were cells with small, dense, dark-colored nuclei. The cytoplasm of hepatocytes had a fine granularity.

In rats exposed to burns and treated with balsamic

By using the ointment form "Rescuer" (group No. 4), the liver architecture was slightly changed: the lobules were of different sizes and degrees of color: from light to darker, but some retained the shape of the pyramids. The central veins had different diameters, and their walls were infiltrated with lymphocytes. Necrosis of the vessel endothelium occurred in some of the walls. Most often these vessels were empty. Hemolysis of erythrocytes was observed in large intrahepatic vessels. Some intralobular hemocapillaries retained their straightness, but more often they became tortuous, with different diameters along their length; basically they were narrowed. The boundaries of hepatocytes were not determined due to parenchymal edema. The cytoplasm was filled with small granules, that is, dust-like obesity of hepatocytes (fatty hepatosis) caused by burn intoxication was found in the liver cells. Obesity of liver cells developed centrobularly. It should be noted significant polymorphism of hepatocyte nuclei; Individual giant, round, light or darker colored cells were observed. Some medium-sized nuclei were shifted to the periphery of the cells; most of these nuclei were quite dark in color; a smaller number of small, dark, dense nuclei were noted; many cells had 2 nuclei. Intralobular sinusoidal capillaries had different diameters; a small part of them was expanded, the other part was sharply narrowed. In the narrowed part there were mainly single lymphocytes with dark dense nuclei. In larger vessels, remains of hemolyzed erythrocytes were detected. Necrosis of small groups of hepatocytes, small hemorrhages around the walls of blood vessels, and necrosis of part of the endothelium of intrahepatic vessels were detected.

Conclusion

Under conditions of intoxication after burn exposure, histological studies of the liver of rats showed significant hemodynamic disturbances, numerous small hemorrhages, edema and necrosis of small areas of the organ parenchyma, and fatty hepatosis. In group No. 1, the control, no morphological changes were found, it was given a score of 1-2 points; in group 2, significant pathomorphological changes were found, its score was 4-5 points; the liver tissue of animals in group No. 3 was rated 3-4 points; liver condition of animals of group No. 4 – 3 points. In the liver of rats exposed to thermal effects, granularity of the cytoplasm of hepatocytes and modification of the liver beam structure were also noted. All this together may indicate suppression of immune processes under conditions of stress burn exposure, and, as a consequence, the presence of alteration of the liver structure.

Bibliography

1. Azhikova A.K., Zhuravleva G.F. Morphological changes in the liver of rats under conditions of hyperthermia // Mater. Intl. scientific-practical conf. Young scientists “Science and Health”, “Science and Healthcare”. Specialist. Issue No. 2, 2016. Kazakhstan, Semey. 2016. P. 11.
2. Azhikova A.K., Zhuravleva G.F., Fedorova N.N. Histopathological changes in the liver of hyperthermic rats during treatment with various drugs // Natural Sciences: Journal of Fundamental and Applied Research. 2016. No. 2 (55). pp. 39-45.
3. Avezova D. _ B. _. (2023). Experimental Macroscopic Changes in the Lungs in Chronic Renal Failure. Academic Research In Modern Science, 2(19), 78–79. https://doi.org/10.5281/zenodo.8153280
4. Avezova, D. _ (2023). Morphological Changes of the Lungs in Chronic Renal Failure. International Conference on Teaching in Higher Education, 1(7), 14–15. Retrieved from http://aidlix.com/index.php/de/article/view/1354 .
5. Avezova D.B., Khasanova D. (2023). Morphological changes observed in the lungs during chronic renal failure (experiment). International Journal of Pediatrics and Genetics, 1(3), 4–6. Retrieved from https://medicaljournals.eu/index.php/IJPG/article/view/47 .
6. Avezova, D. B., & Akhmedova, F. Q. (2023). Latin and medicine. International Journal of Formal Education, 2(6), 352–355. Retrieved from http://journals.academiczone.net/index.php/ijfe/article/view/1053 http://www.jazindia.com/index.php/jaz/article/view/1798/1361
7. Avezova Dilora Botirovna, & Khasanova Dilnoza Akhrorovna. (2023). Morphological Changes in The Lungs in The Model of Experimental Chronic Kidney Failure and Its Correction with Drugs. Journal of Advanced Zoology, 44(S-5), 2160–2162. https://doi.org/10.17762/jaz.v44iS-5.1798. More Citation Formats.
8. Jumaev L.R., Allaeva A.N., Pulatova Sh.K., Zhumaev A.L. The effectiveness of pathogenetic therapy for patients with chronic inflammatory diseases of the salivary glands. Integrative dentistry and maxillofacial surgery. 2023;2(1):103–107.
9. Jumaev LR, Allaeva AN, Pulatova Sh.K Main Diagnostic Aspects in Pathological Conditions of the Salivary Glands of Different Genesis//International Journal of Health Systems and Medical Science ISSN: 2833-7433 Volume 2 | No 5 | May - 2023
10. Kandova F.A., & Allaeva A.N. (2023). Basic Diagnostic Aspects for Pathological Conditions of the Salivary Glands of Various Origins. *European Journal of Interdisciplinary Research and Development*, *16*, 179–188. Retrieved from http://www.ejird.journalspark.org/index.php/ejird/article/view/643

11. Jumaev L.R., Allaeva A.N., Pulatova Sh.K. Results of antihomotoxic complex therapy for inflammatory diseases of the salivary glands. Integrative dentistry and maxillofacial surgery. 2023;2(2):92–97.
12. Kodirova Maftunabonu Komilovna, Allayeva Aziza Nasriddinovna, Amonov Said Jamsher o'g'li, & Narzilloyeva Zilola Jaxongirovna. (2023). A Method for Assessing The Effectiveness of Rehabilitation of Women of Fertile Age with Acquired Eyelid Defect. *Journal of Advanced Zoology, 44* (S5), 2172–2176. https://doi.org/10.17762/jaz.v44iS-5.1801 https://doi.org/10.17762/jaz.v44iS-5.1801
13. Allayeva A. N. (2023). DESCRIPTION OF DIAGNOSTIC AND THERAPEUTIC MEASURES AMONG ADULTS OF DIFFERENT AGES, SUFFERING FROM THE SALIVARY GLANDS DISEASES. *American Journal of Pediatric Medicine and Health Sciences (2993-2149), 1* (9), 46–49. Retrieved from http://grnjournal.us/index.php/AJPMHS/article/view/1280