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Morphological Changes in the Adrenal Glands in Chemical Burn of the Digestive Tract

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Abstract: The article is devoted to morphological changes in the adrenal glands in chemical burns of the digestive tract. In this case, various structural changes develop in both the cortex and medulla of the adrenal glands. When exposed to irritants, there is a corresponding response from the adrenal glands, especially the hormones of the medulla. At the early stages of exposure to stressors, activation of the adrenal glands is noted, and at later stages, inhibition of its function. And very few works are devoted to the morphology of the adrenal glands in chemical burns

Keywords: acetic acid, morphology, adrenal glands, cortex, medulla.

Introduction

The most characteristic feature of the adrenal glands' reaction to the action of various factors, as well as in the pathology of internal organs, is an increase in the organ's weight and the width of the cortex, associated with hypertrophy of hormone-producing cells. In this case, there is an increase in the secretion of cortical hormones [Lencher O.S., 2016]. Compensatory-adaptive reactions in the adrenal glands of this type are detected already in the early stages of myocardial infarction, with congenital heart defects and circulatory failure [Siddikov K.M., 2022]. Also, in animals and humans exposed to stress, an important role of adrenal cortex hormones in the formation of hypertensive status and, accordingly, an increase in adrenal activity has been shown [Kaktursky L.V. et al., 2022].

Along with increased production of corticosteroids by the adrenal cortex in response to stress reactions, reactive changes in the sympathoadrenal system occur. In this case, massive amounts of adrenaline are released into the blood and accumulate in the tissues, with a parallel decrease in the content of noradrenaline. Adaptation in the adrenal glands during critical anemia and hyperoxia of the body occurs first due to the medulla, then due to the cortex. Even short-term hypodynamia and hypokinesia contribute to the tension of the adrenal cortex, which is manifested by an increase in their mass, the volume of cells and their nuclei, a decrease in the amount of lipids in the areas of the cortex of the organ. In the pathogenesis of depletion of the functional resources of the adrenal cortex during prolonged immobilization stress, a certain role is given to the activation of lipid peroxidation processes, the cause of which is possibly a decrease in the content of ascorbic acid and a-tocopherol in the cortex of the organ.

Methodology

Preliminary administration of synthetic corticotropin - synactone during immobilization of animals from one to 72 hours causes an increase in the functional activity of the cells of the zona

fasciculata of the adrenal cortex and has an adaptogenic effect, protecting the cells from overstrain and destruction of cytoplasmic structures [Kopteva E.S. et al., 2019].

An increase in the flow of physical factors perfused through the adrenal glands increases the function of the adrenal cortex. Activation of their intracellular regeneration is also noted. At the initial stage of development, an increase in the morphofunctional activity of the adrenal cortex occurs mainly due to the zona fasciculata. Restoration of the adrenal cortex under the influence of various factors occurs primarily in the zona fasciculata. The zona fasciculata plays a major role in the compensatory and adaptive reactions of the adrenal gland; when its activity decreases, the zona glomerulosa and zona reticularis cannot provide the required level of corticosteroid secretion [MomoC. etal., 2014].

When exposed to irritating factors, there is a corresponding response from the adrenal glands, especially the hormones of the medulla. The development of a uniform reaction of the adrenal glands is characteristic of various types of stressors: prolonged soft tissue crush syndrome, exogenous hyperthermia, hemic hypoxia, hemolytic anemia, endotoxin shock, reflex intestinal paralysis, exposure to pesticides, as well as hypo- and hyperthyroidism. At the same time, at the early stages of exposure to stressors, activation of the adrenal glands is noted, at later stages - inhibition of its function [Narkevich D.D., et al., 2022]. Also, with influenza pneumonia, obstructive bronchitis, cholecystitis, cryptococcosis, an increase in the glucocorticoid function of the adrenal glands is noted at the onset of the disease, and later - inhibition of their activity. The long-term course of diseases apparently leads to the depletion of the reserve capacity of the adrenal cortex [Muraoka Y. et al., 2017].

When examining the adrenal glands of patients who died with pulmonary and cerebral variants of thanatogenesis, a change in the morphological structure of the adrenal cortex was noted. After death, atrophic and dystrophic changes in the epithelial cells of the cortex prevailed in the adrenal glands, proliferation and sclerosis of the stroma were observed [Stepanyan Yu.S., Korenev S.A., 2021]. An increase in the functional activity of the adrenal glands in people who have undergone gastric resection occurs already by the 3-7th day after surgery. In the body of children, the adaptive reserves of the adrenal glands depend on the degree of their maturity. The ability of the adrenal glands to compensatory growth obviously does not change throughout their life, although the stimuli for such an adaptive response at different ages may be different [WangF. et al., 2018].

There are data on the structural, functional and morphological interactions of blood vessels, interstitium and parenchymal complexes of the adrenal glands. A sharp weakening of blood flow in the adrenal glands is considered as a manifestation of the blockade of the production and extrusion of steroid hormones. It occurs immediately after the hyperemia phase, accompanied by an active release of corticosteroids and an increase in their level in the circulating blood, which, according to the principle of negative feedback, inhibits steroidogenesis. An increase in the functional activity of the adrenal glands after blood loss led to an increase in the area occupied by reticular fibers in them, a decrease in the relative volume, thinning of collagen fibers, as well as increased blood filling and opening of capillaries [Yunyashina Yu.V. et al., 2014].

In acute hypoxia, introduction of toxins, irradiation in the adrenal cortex, first of all, blood capillaries expand, then lipids and ascorbic acid disappear, and the nuclei and nucleoli of glandular cells increase. In the resistance stage under prolonged stress, along with cell hyperplasia in the thickness of the cortex and in the capsule, nodules and adenomatous structures in a state of significant secretory activity are revealed. In some cases, accessory nodules of adrenocortical tissue serve as a source of tumor development [Andreev A.V., 2013]. Under conditions of chronic deficiency of adrenergic innervation, compensatory-adaptive reactions develop in the adrenal medulla of rats, aimed at normalizing the tissue content of biogenic amines. Moreover, chromaffin cells perform both a protective and regenerative role [Bulbenko M.M. [et al., 2022].

Results and discussion

The activation of various adaptive mechanisms in the adrenal glands was detected when animals were raised to a height. Thus, the animals showed a protrusion of the cortex surface, as well as the disappearance of the compression layer between the glomerular and fascicular zones. The width of the fascicular zone narrows to the control, but hypertrophy of cell nuclei and a decrease in cytoplasm vacuolization are noted in it. Subsequently, a small compression zone appears between the glomerular and fascicular zones, the cells of which contain a large number of ascorbic acid granules. In this experiment, a columnar arrangement of adrenocorticocytes was found in the reticular zone of the organ. Such a restructuring of the reticular zone can lead to a change in corticosteroid synthesis, when a certain part of the cells of the reticular zone begins to produce glucocorticoids [Matyushchenko N.S. et al., 2015].

The compression zone is located at the site of the so-called sudanophobic layer. When exposed to exogenous factors, the sudanophobic layer between the fascicular and glomerular zones expands in the adrenal glands within 24 hours. It contains a cluster of cells that are intermediate forms between the cellular elements of the glomerular and fascicular zones. Mitotic figures often appear in the subcapsular areas and partly in the outer layer of the fascicular zone. Later, the sudanophobic layer narrows at the border with the fascicular zone [Kvaratskhelia A.G. et al., 2014].

Consequently, the adaptive capabilities of the adrenal cortex are manifested differently when various substances are administered. The adrenal gland's ability to undergo compensatory hypertrophy after exposure to various factors is well known. However, compensatory growth of the remaining adrenal gland does not lead to complete restoration of the lost glandular tissue. Hypertrophy of the remaining adrenal gland is provided by hyperplasia and increase in the size of cortex cells [Volkov V.P., 2014].

After unilateral adrenalectomy, the content of ascorbic acid, lipids, and ketosteroids in the remaining adrenal gland is normalized by the 15th day after surgery. Histochemical data are consistent with the concentration of steroids in the blood of the operated animals. In adult mammals [rats, mice], restoration of the adrenal cortex is possible after various types of damage - excision of wedge-shaped areas, burns, irradiation, exposure to poisons, enucleation of the remaining intact groups of cells of the glomerular zone adjacent to the capsule. These groups can make up an insignificant amount, only 5-8% of the tissue of the entire glomerular zone of the intact adrenal gland [Gubina-Vakulik G.I., 2013]. In animals with simulated arthritis, in the adrenal glands under the capsule, the cortical cells partially dedifferentiate and begin to proliferate. After 7 days, proliferating groups of cells are clearly visible throughout the newly formed cortex. In this case, histological differentiation of the adrenal cortex into three zones is clearly outlined - glomerular, fascicular and reticular [Memetova E.Ya. et al., 2014].

For the restoration of the adrenal gland after its enucleation, the integrity of the capsule covering it is a necessary condition. Some authors are inclined to consider the subcapsular layer of the organ a kind of cambium, without which regeneration does not occur. In newborn rats, for example, the subcapsular layer is quite clearly outlined and has a significant thickness. It is distinguished by the presence of cells with an intermediate structure between fibroblasts and glandular cells of the glomerular zone. Although the size of the subcapsular zone decreases sharply with the age of animals, some researchers consider it to be the source of adrenal regeneration after enucleation in adult animals. After local damage to the adrenal cortex, especially many mitoses are found in the glomerular zone and the outer parts of the fascicular zone. Mitoses are rare in the inner zones of the cortex. Currently, most researchers reject the hypothesis of the so-called capsular blastema, according to which adrenocorticocytes can be formed from undifferentiated cells of the capsule and connective tissue layers of the adrenal gland. The results of numerous studies show that the source of restoration of the cortex is its own glandular cells [Utiger R.D., 2021].

Conclusion

It is suggested that the layers adjacent to the adrenal capsule are a kind of cambium, where the proliferation of cortical elements occurs and from where they migrate during life, replenishing the dying cells of the internal zones. The adrenal medulla is restored due to clusters of chromaffin cells located in the cortex directly under the capsule, in the area of the vascular-nerve pedicle of normal adrenal glands. With many effects, its reparation is possible only if at least a small number of intact chromaffin cells are preserved in the remainder of the organ [Arezzo A. et al., 2018].

Therefore, under functional loads and in pathology, the activity of the adrenal glands is accompanied by the activation of adaptive reactions in them. Thus, promoting faster compensation for the reduced function of the gland, hypertrophy of the cells of the cortex, especially its fascicular zone, occurs. The cortex has two layers that ensure the regeneration of adrenocorticocytes - the subcapsular layer and the sudanophobic zone. The medulla also has a fairly pronounced ability to reparate. A study of scientific literature has revealed that the widespread use of pesticides in agriculture as a defoliant and desiccant often has a pathogenic effect on the body of mammals and humans. Damage to them leads to changes in various organs and systems of the body. In this case, damage to the cardiovascular, digestive and hematopoietic systems has been studied most thoroughly, and to a lesser extent - to the organs of the endocrine system, in particular the adrenal glands. Information on damage to the adrenal glands due to poisoning with defoliants is scattered and incomplete. Meanwhile, the morphofunctional capabilities of the adrenal glands largely determine the vital activity and viability of the body.

Literature

1. Андреев А.В., Губина-Вакулик Г.И. Перинатальная гипоксия как причина патологических изменений надпочечников плодов и новорожденных //Международный медицинский журнал. –2013. -No 3. -С.63-69.
2. Бульбенко М.М., Корсиков Н.А., Долгатов А.Ю., и др. Некоторые особенности структурно -морфологической реорганизации органов эндокринной системы при гипотермических поражениях. Перспективы дальнейшего изучения // Современные проблемы науки и образования. 2022. No 1.
3. Волков В.П. Функциональная морфология коры надпочечников в возрастном аспекте // Современная медицина: актуальные вопросы. 2014. No31. URL:
4. Кактурский Л. В. и др. Морфология внезапной сердечной смерти //Внезапная сердечная смерть. -2022. -С. 31.
5. Кварацхелия А.Г. Структурная реорганизация коры надпочечников при пероральной принудительной алкогольной интоксикации в сочетании с введением витамина Е // Журнал анатомии и гистопатологии. –2014. Т. 3, No 1. –С. 27 –32.
6. Коптева Е.С., Устюгова К.В., Пономаренко. Е.В. Нарушения секреции и патологии надпочечников // Научное обозрение. Педагогические науки. –2019. –No 5-3. –С. 81-84
7. Shomurodova Mukhayo Rakhmonovna, (May 6, 2023). Morphological Features and Morphometric Parameters of the Lungs after Correction with an Immunomodulator Under the Conditions of Experimental Chemotherapy. Journal of Natural and Medical Education (pp. 55-60).
8. Shomurodova Mukhayo Rakhmonovna, (05 2023) Mastopatiya. Yosh Patmorfolog Nigohida. Amaliy va tibbiyot fanlari ilmiy jurnali (193-197) https://sciencebox.uz
9. Shomurodova Muxayyo Raxmonovna (05 2023) Morfometricheskie Pokazateli Legkix Posle Korreksii Immunomodulyatorom V Usloviyax Eksperimentalnoy Ximioterapii Amaliy va tibbiyot fanlari ilmiy jurnali (198-202) https://sciencebox.uz
10. Shomurodova M. R. (2023). Morphological Changes in Lungs Caused by Chemotherapy in Breast Cancer. American Journal of Pediatric Medicine and Health Sciences (2993-2149), 1(10), 341–344. Retrieved from http://grnjournal.us/index.php/AJPMHS/article/view/2088