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MORPHOMETRIC PARAMETERS OF THE SMALL INTESTINE IN EXPERIMENTAL PULMONARY FIBROSIS.

Khasanova Dilnoza Ahrorovna
DSc, Associate Professor of the Department of Anatomy, Clinical Anatomy (OSTA)
(e-mail: akwamarin80@gmail.com)
BarnoevAkhtamIstamovich
Doctoral student of the Department of Anatomy, Clinical Anatomy (OSTA)
(e-mail: axtambarnoyev@gmail.com)

Department of Anatomy, Clinical Anatomy (OSTA) of Bukhara State Medical Institute named after Abu Ali Ibn Sino, Republic of Uzbekistan, Bukhara 200118, Navoiave. 1

Annotation

The aim is to study the histological features of the small intestine in white rats with experimental pulmonary fibrosis.

Materials and methods of research. To solve the tasks, 131 laboratory white male rats, weighing 120-150 grams, served in vivarium conditions. All the animals were divided into two groups. In the first group there were 36 intact rats. The second group consisted of 95 mature males, the effect of experimental lung fibrosis on the tissue structures of the small intestine was studied. For general morphological studies, pieces of tissue from 3 sections (duodenum, jejunum and ileum) of the small intestine were fixed in a neutral 10% solution of formalin, Carnois fluid. After the appropriate wiring, the material was poured into paraffin. Further, sections 4-6 microns thick with the strictest orientation after dewaxing were stained with hematoxylin-eosin for morphological and morphometric studies.

Results. Morphological characteristics of tissue structures of the small intestine in experimental pulmonary fibrosis, inflammatory and destructive changes in the form of intercellular edema and infiltration of intestinal tissue structures were observed throughout the small intestine. After 30-60 days with experimental pulmonary fibrosis, destructive and atrophic changes worsen, the height of the villi decreases and, accordingly, the number of epithelial cells in the villi.In the late stages of the study, atrophic processes progress in all layers of the intestinal wall, especially in the mucous membrane. The villi acquire a bizarre shape, especially in the jejunum. However, in some places there is a development of compensatory and restorative processes. In these areas, swelling and infiltration decrease, villi and crypts acquire a normal shape, and their morphometric parameters approach the control indicators.

Conclusions. In experimental pulmonary fibrosis, certain structural changes occur, characterized by the development of inflammatory and destructive changes in the tissue structures of the small intestine. The beginning of stabilization of processes was noted up to 60 days. The nature of changes in the tissue structures of all layers of the wall of the small intestine is especially pronounced in the mucous membrane, duodenum and jejunum.

Key words: experimental fibrosis, small intestine, lymphoid follicles.

The primary element of the immune defense of the digestive tract is the lymphoid tissue of the intestine, which makes up a quarter of the entire mass of the immune system, which includes the lymphoid nodules of the small intestine [10, 13].

On the one hand, the mucous membrane of the digestive system is a barrier structure that prevents the penetration of various agents of the external world into the body, and on the other hand, it participates in metabolic processes between the external and internal environment of the body [2,5,14].

Of considerable interest is the restructuring of local immune reactions, which manifests itself in the formation of small and larger lymphoid nodules in the mucous membrane (partially in the submucosal base) [1,7,16].

Despite considerable interest and progress in the study of local immunity of the gastrointestinal tract, it must be recognized that many questions still remain unanswered. Conducting further in-depth studies of the immune system of the gastrointestinal tract is extremely promising, both in fundamental and practical aspects [6,11,17].

Analysis of the literature data shows that subtle and complex mechanisms of disorders in lymphoid organs occur in lung fibrosis, requiring further detailed study to predict and possibly correct immunological and biochemical shifts [4,8]. At the same time, such immune shifts are a reflection of the inflammatory process [3, 12].

Meanwhile, further progress in the knowledge of the lymphatic system is hardly possible without taking into account the processes that occur around the lymphatic capillaries and in the interstitial [6,7,9,15].

The aim of the study: to improve the assessment of morphological changes in the tissue of the small intestine in experimental pulmonary fibrosis.

The object of the study was 131 rats on the 3rd, 60th and 90th days of life. The rats were divided into 2 experimental groups. The first group included 36 intact males; the second group – 95 mature male rats subjected to experimental lung fibrosis.

The subject of the study was the materials of the small intestine (duodenum, small intestine and ileum) of experimental rats.

Research methods. The study used morphological, morphometric methods, as well as histological and statistical analysis.

131 laboratory white male rats, weighing 120-150 grams, served to solve the tasks in vivarium conditions.

All the animals were divided into two groups. In the first group there were 36 intact rats. The second group consisted of 95 mature male rats, the effect of experimental lung fibrosis on the tissue structures of the small intestine was studied. Before the experiment, the animals were thoroughly examined, their general condition was monitored. The observation periods were 3, 60 and 90 days after experimental pulmonary fibrosis

For general morphological studies, pieces of tissue from 3 sections (WPC, skinny and iliac) of the small intestine were fixed in a neutral 10% solution of formalin, Carnois fluid. After the appropriate wiring, the material was poured into paraffin. Next, the slices are 4-6 microns thick.in compliance with the strictest orientation, after dewaxing, hematoxylin-eosin was stained for morphological and morphometric studies. The thickness of the layers of the wall of the small intestine, the number of epithelial cells of villi and crypts were determined, for electron microscopy, samples of the mucous membrane of various parts of the small intestine of rats were fixed in a 1% buffered solution of glutaraldehyde, additional fixation was carried out in a 1% solution of osmium tetrachloride (OsO4) for 1.5-2 hours at a temperature of 4 °C (pH – 7.3-7.5). After dehydration in alcohols of increasing concentration, pieces of tissue were poured into an eponaraldite mixture. After contrasting with uranyl acetate and lead nitrate, ultrathin sections were viewed in an electron microscope "Hitachi H-600" (Japan).

The data obtained during the study were subjected to statistical processing on a computer using the Microsoft Office Excel - 2007 software package, including the use of built-in statistical processing functions. (L.A.Ponomareva B.M.Mamatkulov, 2004).

Morphological characteristics of tissue structures of the small intestine in experimental pulmonary fibrosis, inflammatory and destructive changes were observed throughout the small intestine in the form of intercellular edema and infiltration of intestinal tissue structures (see Fig. 1).

After 30-60 days in experimental pulmonary fibrosis, destructive and atrophic changes are aggravated, the height of the villi and, accordingly, the number of epithelial cells in the villi.

In the late stages of the study, atrophic processes progress in all layers of the intestinal wall, especially in the mucous membrane. The villi acquire a bizarre shape, especially in the jejunum. However, in some places there is a development of compensatory and restorative processes. In these areas, swelling and infiltration decrease, villi and crypts acquire a normal shape, and their morphometric parameters approach the control indicators (see Fig. 2).

Fig. -1. 3 days after experimental pulmonary fibrosis. The stroma of the villi is edematous, infiltrated by mononuclear cells. H&E.

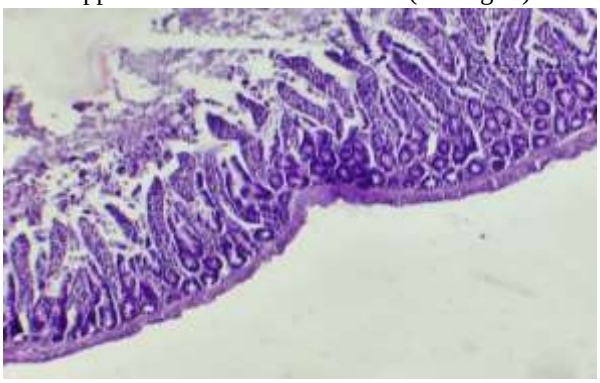

Fig.-2. 90 days after experimental pulmonary fibrosis. The villi are thinned, sometimes desquamation of enterocytes at the tips. H&E.

It should be emphasized that in the following follow-up periods (30-60 days), along with swelling and infiltration, atrophic changes in the tissue structures of the small intestine (especially the duodenum, skinny) are noted. There is a progressive decrease in the height of the villi and, accordingly, the number of capillaries in the stroma of the villi and crypts.

3 days after the experiment, inflammatory and destructive changes in the wall of the small intestine are detected. Fibrosis is noted in the stroma of the villi. Crypts are low, thinned, the lumen of most of them is expanded. The number of villi and the epithelium lining them decrease compared to the control.

The thickness of the mucous membrane of all the studied sections of the small intestine significantly decreases: the height of the villi and the depth of the crypts decreases. In experimental lung fibrosis in rats, there is a development of atrophic changes in the tissue structures of the wall of all parts of the small intestine. A similar pattern of pathomorphological changes persists until the end of the observation period.Edema and infiltration by

plasma-lymphocytic cells are noted. In the serous and muscular membranes, along with these, loosening of smooth muscle bundles was noted.

Infiltration by mononuclear elements takes place in the submucosa. In the mucous membrane there is a pronounced inflammatory–destructive process in the form of polymorphism of villi, tortuosity of crypts with the expansion of their lumen. In the duodenum and jejunum – stroma fibrosis, pronounced infiltration. The number of epithelial cells is reduced compared to the control series. Among these cells, a large number of goblet-shaped spherical cells filled with a secret were revealed.

At a later date (30-90 days), pathomorphological changes were replaced by progressive atrophic processes in the tissue structures of the small intestine. There was a noticeable thinning of all membranes and sections, especially pronounced in the duodenum and jejunum. There is a decrease in the number of epithelial cells, the height of the villi and the depth of the crypts.

Conclusion: in experimental pulmonary fibrosis, certain structural changes occur, characterized by the development of inflammatory and destructive changes in the tissue structures of the small intestine. The beginning of stabilization of processes was noted up to 60 days. The nature of changes in the tissue structures of all layers of the wall of the small intestine is especially pronounced in the mucous membrane, duodenum and jejunum.

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