

ASSESSMENT OF THE MORPHOLOGY OF THE PANCREAS IN DIABETIC COMPLICATIONS

Ergashev Ulugbek Yusufjanovich

DSc., professor Head of department General surgery №2

Tashkent Medical Academy

Mominov Alisher Tashgarkanovich

Senior Lecturer of department General surgery №2

Tashkent Medical Academy

Minavarkhujaev Ravshankhuja Rahmatkhuja ogli

Assistant of department General surgery №2

Tashkent Medical Academy

Malikov Nodirbek Muzaffarovich

Assistant of department General surgery №2

Tashkent Medical Academy

Annotation

Study of the effect of the new drug "Rheomannisol" on vital organs, taking into account pathomorphological aspects in the complex treatment of experimental diabetic foot syndrome.

Keywords: experimental model of diabetic foot, experimental animals, diabetes mellitus, alloxan, surgical debridement, reomannisol.

Introduction

Diabetes mellitus (DM) is a chronic disease characterized by relative or absolute insufficiency of insulin, resulting in metabolic disorders that are the main cause of late complications of DM [1]. Early disability and high mortality among DM patients have made the treatment of this disease one of the priorities of national health systems [2]. In light of this, the search for new methods of treatment and the discovery of drugs that are easy to use and have minor side effects remain an urgent problem in medical science today [3]. To conduct such studies in the field of diabetology, various models of DM are used, one of which is the alloxan model [4]. Morphological aspects of the healing of complicated human wounds have not been sufficiently developed, approaches to wound treatment are ambiguous, especially in relation to the wound process against the background of diabetes mellitus [1]. Wound healing proceeds according to the general laws and standard principles of tissue regeneration. The pace of this process, its outcome depends on the degree and depth of wound damage, the structural features of the affected organ, the general condition of the body, and the methods of treatment used. The

problem of stimulation of reparative and regenerative processes and the fight against pathogenic microflora in a purulent wound against the background of diabetes mellitus remains extremely urgent [4]. At the same time, the issue of local treatment of the wound process against the background of diabetes mellitus remains insufficiently studied, despite the variety of means and methods proposed for this purpose [5].

Purpose of the study. Study of the effect of the new drug "Rheomannisol" on vital organs, taking into account pathomorphological aspects in the complex treatment of experimental diabetic foot syndrome.

Materials and research methods. The work was done on experimental material. Healthy rats were selected for the experiment. Experimental studies were carried out on 110 outbred male rats weighing 220-250 g, kept in the TMA vivarium. The rats were kept under optimal conditions, all rats lived in a room with a 12-hour light-dark cycle and a constant temperature of 22-25°C, with free access to water. All rats were given sufficient normal ad libitum rodent diet (rodent diet, GOST R50258–92) and tap water daily. Operations and all manipulations with animals were carried out using general anesthesia, in compliance with the principles of humanity set forth in the directives of the European Community (86/609/EEC) and the Declaration of Helsinki, in accordance with the "Rules for working with experimental animals". The experimental animals were divided into 3 groups: the 1st group was intact; 2nd control group - against the background of alloxan diabetes, the creation of an experimental model of a diabetic foot using traditional complex treatment; 3rd experimental group - on an experimental model of diabetic foot - traditional treatment and reomannisol.

After a 24-hour fast, the rats were weighed and a solution of alloxan 2%, diluted in 0.9% saline, was administered to the animals intraperitoneally as a single dose, corresponding to a dose of 20, 15, 12 mg of alloxan per 100 g of animal weight. Food and water were given to the animals only 30 minutes after the administration of drugs. On the 3rd day, the level of glucose in the blood was assessed. Determination of glucose concentration in the peripheral blood of animals. Diabetes was confirmed 3 days after the determination of the concentration of glucose in the blood. Peripheral blood glucose concentration was measured with an AccuChekActive glucometer (RocheDiagnostics, Germany), the linear measurement range was 0.6–33.3 mmol/L. Blood sampling to study the level of glycemia was performed from an incision in the tip of the tail. An experimental model of diabetes mellitus (type I DM) has been developed [5]. The day of verification of diabetes mellitus was considered the zero day of its development (DM).

Research results. The body weight of rats before the experiment varied from 220 to 250 g. Group 1 - intact animals (10 rats each), served as controls for groups 2 and 3. The rats were given intraperitoneal 2% alloxan at a dose of 12 mg per 100 g, the 2nd control group was created on 50 rats and the 3rd experimental group n=50 rats. In both groups until the end of the experiment (17 days) no death was recorded.

Visual inspection. The first signs of diabetes were manifested in the form of a sharp increase in water consumption of 70-80 ml, polyphagia, polyuria, hyperglycemia. With alloxan-induced diabetes mellitus in animals during the experiment, lethargy, apathy, low activity, tarnishing and loss of coat, weight loss, clouding of the pupil and sclera, small-point erosion in the tails and limbs were noted. The wool of animals normally has a peculiar luster and is usually adjacent to the skin. In dynamic observation in rats of the experimental group, by the seventh day, the condition of the animals and appetite began to improve, they became active, slightly aggressive, the frequency of the coat increased, ulcers on the skin surface healed, polyuria and polydipsia began to decrease. Rare grooming appeared in animals of the control group, but no shine of wool was noted, they remained aggressive, ulcers on the skin surface did not heal. By 10 days in rats from the experimental group, the neatness of the coat was restored, erosion in the body disappeared. In the control group, until the end of the experiment, apathy, lethargy remained, they sat more in the corner of the cage, when picked up, the animals remained aggressive, grooming did not fully recover.

Histological observations. Control group. Pancreas. The results of a morphological study of the pancreas after traditional treatment on the 3rd and 7th days of the experiment showed the preservation of severe atrophy of the endocrine islets and the growth of connective tissue along the interstitium of the gland. At the same time, endocrine cells are few in number, scattered, almost all cells are in a state of dystrophy and destruction. The interstitial tissue of the pancreas is thickened due to edema and proliferation of fibrous structures and an increase in the number of histiocytic cells. The exocrine glands are destructive and deformed, merge with each other in places, the nuclei of the glandular epithelium are in the form of vacuolization of the karyoplasm. On the 10th day after treatment with the traditional method, a widespread arrangement of endocrine cells along the interstitial connective tissue was noted in the pancreatic tissue (Fig. 1). At the same time, these cells are concentrated around the vessels and are characterized by a relatively wide eosinophilic cytoplasm and hyperchromic nuclei. In the interstitium of the gland, there is also an overgrowth of connective tissue in the form of an increase in fibrous structures and a disorderly arrangement of histiocytic cells. The exocrine glands, in contrast to the previous period of the study, are somewhat scattered due to the thickening of the interstitial tissue. Glandular cells of various shapes and sizes with swelling of exocrine cells, in which the nuclei are located on the basal part of the cell. On the 14th day of treatment by the traditional method, the above described pathomorphological changes persist, of which interstitial sclerosis intensifies.

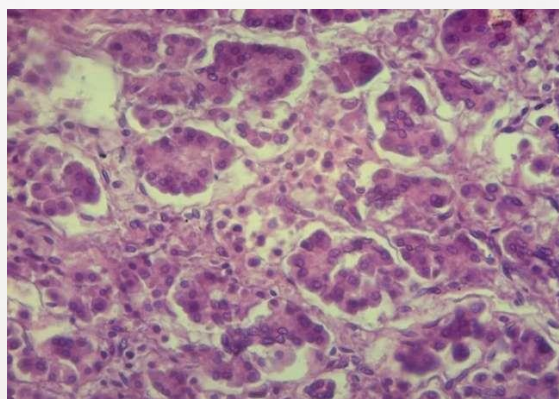


Figure 1. Morphological picture of the pancreas, traditional treatment, day 10. Diffuse arrangement of endocrine cells in the interstitium of the gland. Coloring: G-E. SW: 10x40.

Experienced group. Pancreas. On the 7th day after the treatment of alloxan diabetes with rheomannisol, an increase in the number of cells was noted in the islets of the endocrine part of the pancreas due to an increase in proliferative activity. At the same time, large and small, mainly hyperchromic activated cells are determined among the endocrine cells (Fig. 4). The activity of these cells is determined by the state of the cytoplasm, which is also strongly stained with eosin, which indicates an increase in the secretory substance in the cytoplasm. Exocrine glands are in a state of edema, dystrophy of cells, the nuclear structures of which are shifted to the periphery of the cell. By the 10th day after the treatment of alloxan diabetes with rheomannisol, increased hyperplasia of the cells of the endocrine islets is noted, among which the presence of cells of different sizes, staining and proliferative activity is determined. The area of the islet of Langerhans is expressed expanded, the entire area is filled with cells, most of which are in a state of proliferative activity. The cytoplasm and intercellular substance are filled with a mass intensely stained with eosin. The above morphological changes, showing the activation of the endocrine part of the gland, continue on the 14th day of the experiment (Fig. 5). The exocrine glands remain compressed due to interstitial edema.

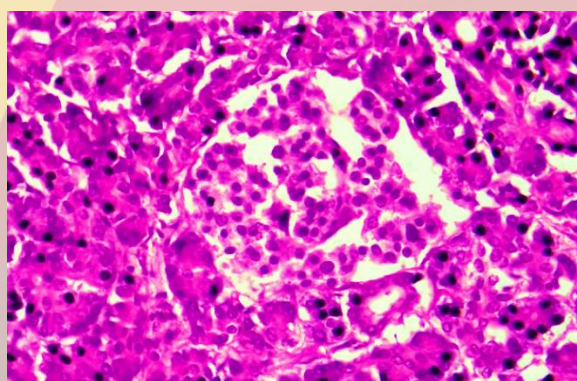


Figure 4. Morphological picture of the pancreas, treatment with rheomannisol, day 7. An increase in the number of cells in the islet apparatus. Coloring: G-E. SW: 10x40.

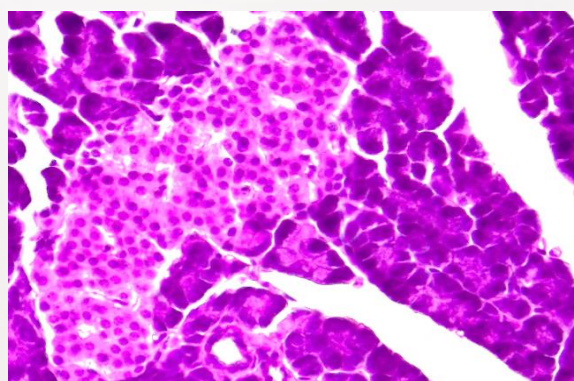


Figure 5. Morphological picture of the pancreas, treatment with rheomannisol, day 14. Hyperplasia of cells of the endocrine islets. Coloring: G-E. SW: 10x40.

Conclusion

The use of the drug rheomannisol in an experimental model of diabetic foot in the pancreas shows stabilization of dystrophic, destructive changes in both the endocrine and exocrine parts of the gland. There is a restoration of the islet apparatus in the form of hyperplasia and hyperchromasia of endocrine cells, which are morphological criteria for proliferative activity and an increase in the functional state of the endocrine part of the gland.

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