FEATURES OF REACTIVE CHANGES DURING THE FORMATION OF DAMAGE IN SOFT TISSUE AND INTERNAL ORGANS

Ibragimov Botirjon Inomidinovich
Andijan State Medical Institute
Ruziev Sherzod Ibadullaevich
Tashkent Pediatric Medical Institute

Abstract. *This article is devoted to an expert assessment of reactive changes in soft tissues and renal parenchyma that develop at various times in the post-traumatic period. Pathomorphological data obtained as a result of a series of experimental simulations of blunt trauma to the kidneys and soft tissues in laboratory animals were analyzed.*

Keywords: *kidney, soft tissues, blunt trauma, pathomorphology, prescription.*

INTRODUCTION

Hemorrhages were chosen as the main damage during the study, since they are formed in most cases of mechanical trauma. To identify pathomorphological changes in soft tissues and the kidney during mechanical trauma, depending on the duration of formation of the damage, all experimental material was divided into 9 groups: 1st group - duration of injury 1 hour, 2nd group - 3 hours, 3rd group - 6 hours, 4th group - 12 hours, 5th group - 1 day, 6th group - 2 days, 7th group - 3 days, 8th group - 5 days. The ninth group was a control group; laboratory animals in this group were decapitated immediately after simulating soft tissue and kidney injuries.

MATERIALS AND METHODS

Microscopy examined sections stained with hematotoxylin and eosin, as well as Perls. Microscopic examination was carried out on a Carl Zeiss Axio Scope A.1 microscope with an Axio Cam ICc 3 video camera.

Microscopic examination of cases in the control group revealed uneven blood filling of vessels of all calibers in the soft tissues. In a number of visual fields, the formation of hemorrhages was noted, represented by clusters of loose and compact masses of erythrocytes located perivascularly and in the intermuscular spaces.

Already 1 hour after the injury, swelling and a focal leukocyte reaction appeared in the soft tissues in the area of hemorrhage, which was represented by accumulations of neutrophilic leukocytes - perivascularly.

RESULTS AND DISCUSSION

When examining the kidney 1 hour after the formation of the damage, hemorrhage was clearly visible under the capsule of the organ and into the substance of the kidney itself - the parenchyma. It should be noted that focal hemorrhages were observed both in the glomerulus and in the capsule. Due to the resulting hemorrhage, an expansion of the capsule space was observed; sometimes the hemorrhages completely filled the capsule lumen. The vessels of the microcirculatory bed were unevenly filled with blood. Signs of circulatory disorders were noted in the form of empty glomerular vessels. When assessing the condition of the nephrothelium, signs of uneven staining of the epithelial cells of the proximal tubules, similar to metachromasia, were revealed. At the same time, the epithelial cells of the tubules were swollen and had slightly enlarged nuclei. The cytoplasm of the epithelium of the proximal tubules was unevenly stained. In some epithelial cells of the proximal tubules, the absence of nuclei was noted.

As the injury period increased to 3 hours, an increase in soft tissue edema was noted, while the connective tissue fibers of the soft tissues were slightly swollen with an expansion of the spaces between the fibers, due to which they looked more loose. The red blood cells included in the hemorrhage retained their contours. A diffuse arrangement of leukocytes was noted in the hemorrhages.

When examining the kidney 3 hours after the formation of the damage, hemorrhage was detected under the capsule and into the substance of the organ with a moderately pronounced diffuse leukocyte reaction. The microcirculatory vessels remained unevenly filled with blood. Swelling of the kidney parenchyma was observed around the hemorrhages. When morphologically assessing the condition of the epithelium of the proximal tubules, a narrowing of the lumen of the tubules was noted due to pronounced swelling of epithelial cells. In addition, in certain fields of view, epithelial cells were presented in the form of separate eosinophilic clumps of different sizes. It was related with progressive necrobiotic changes in the nephrothelium.

In the third study group, 6 hours after the injury, severe swelling of the soft tissues was noted. The hemorrhages were presented as granular masses, in which the contours of red blood cells were poorly distinguishable. When examining hemorrhages, it was noted that along with diffuse leukocyte infiltration, the appearance of macrophages could be observed.

When microscopying the kidney 6 hours after the formation of the damage, subcapsular hemorrhages with a diffuse leukocyte reaction, as

well as the appearance of single macrophages, were observed. Along with the described changes, progression of necrobiotic changes in the epithelium of the proximal tubules was observed.

In many fields of view, a significant narrowing of the lumen of the tubules was noted; the lumen of some of the tubules was indistinguishable. The expansion and congestion of the vessels of the venous bed were noted; the arteries were in a state of spasm and therefore were barely distinguishable.

CONCLUSION

The morphology of the tubular epithelium indicated the development of focal colliquation necrosis of epithelial cells in the form of pronounced balloon degeneration; the basement membrane of the tubules was exposed in many fields of view. The causes of the development of balloon dystrophy of the tubular epithelium are pronounced disturbances in the protein and water-electrolyte balance, which lead to acute disorders of colloid osmotic pressure in the cell, while disturbances in the permeability of cell membranes develop, which is accompanied by their disintegration [2, 4]. The development of necrobiotic changes is accompanied by the activation of hydrolytic enzymes of lysosomes, which lead to pronounced alterative changes due to breaks in intramolecular bonds [5].

5 days after the injury, the development of reparative regeneration processes continued in the soft tissues. In the kidney, in areas of hemorrhage and perifocally, necrosis of the tubular epithelium was observed.

Thus, based on the study, we can conclude that during mechanical trauma there is a more active cellular reaction of soft tissues compared to the kidney. The different dynamics of the development of reactive changes in soft tissues and internal organs is explained, first of all, by the peculiarities of the course of redox, metabolic and trophic processes associated with the organ specificity of soft tissues and internal organs.

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