



AGE REGULARITIES OF MORPHOLOGICAL CHANGES OF URINARY BLADDER IN ACUTE CYSTITIS

Urology

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KEYWORDS

Age regularities of morphological changes of urinary bladder in acute cystitis – Morphological changes of urinary bladder in acute cystitis were studied during the experiment. It was found when the simulated pathology unevenly and disproportionately grows the spatial characteristics of the membranes, and nuclei and cytoplasm of epithelial cells of the mucous membrane are impaired in nuclear-cytoplasmic changes in these structures. Structural changes were dominating in the wall of the damaged urinary bladder of animals in the older age group.

ENTRY.

It is known that the bladder often becomes involved in various pathological processes, whose frequency increases with age. At the age of 20-40 years, the frequency of 25-35%. Approximately 30% of women throughout their life face the acute cystitis, even one time. Today a lot of methods are being applied for investigation of the bladder, but pay special attention to the methods that give the opportunity to study in detail the structure, topography and functionality of this organ. In this day a lot of morphologists, physiologists, urologists they are interested to know about the morphological changes of the bladder. What is needed to mention is that the age peculiarities of morphological changes of the bladder in acute cystitis is not studied completely.

Recently morphometric methods are used more in biomedical research, that allows to obtain quantitative characteristics of physiological and pathological processes and to explain them logically.

The aim of this work was to study the remodeling age peculiarities of the structures of the bladder wall in acute cystitis.

MATERIALS AND METHODS.

Materials: 19 bladders of mature pigs (Vietnamese breeds), divided into 4 groups. The first group consisted of 4 intact animals at the age of 5-6 months, 2-and – 5 in intact pigs at the age of 11-12 months, 3-1 – 5 research the age of 5-6 months, which had the modeled acute cystitis by the introduction into the bladder of a 2% solution of silver nitrate, 4-and - 5 pigs at the age of 11-12 months with the above simulated pathology. All animals were in normal conditions and standard diet of the vivarium. Euthanasia of experimental animals was carried out by bloodletting in terms of thiopental anesthesia in 3 days from the start of the experiment.

Results and their discussion.

The obtained morphometric parameters of the bladder wall intact animals and in simulated cystitis are shown in tables 1,2. All analysis presented in these tables, the showed us that there was intensive remodeling of the structures of the bladder wall.

So, in the senior age-related group thickness of mucous membrane of investigated organ statistically evident ($p < 0.05$) decreased on 7.6%, submucosa – by 4.0%, muscular membrane – on 5.9% and the thickness of adventitia increased on 5.8% comparatively with the junior age-related group of experience animals. Submucous - mucous index increased on 4.2%.

Height of epithelium cells in the 2-nd group of investigation statistically evident ($p < 0.01$) decreased on 6.3%, diameter of them nucleus – on 4.4%. Nuclear-cytoplasmic relations in investigated cells of the bladder 1-st and 2-nd observations groups were the same, demonstrating the structural stability of cellular homeostasis. The relative volume of damaged epithelial cells with age increased on 8.7%, which can be explained by apoptosis of studied cells

In acute cystitis, the thickness of the mucous membrane of the investigation organ in young animals increased from (280.5 ± 7.2) to (310.8 ± 12.3) mcm, it is 10.8%. Given numeric values statistically evident were different from each other ($p < 0.05$). The thickness of the submucosa of the bladder in these pathological conditions increased from (266.2 ± 3.6) to (291.8 ± 2.7) mcm. Between the morphometric parameters was found statistically significant ($p < 0.01$) difference. The last digital value exceeded the previous on 9.6%.

Thickness of muscular membrane of urinary bladder in acute cystitis appeared also grow up. So, in the control observations, this morphometric parameter was equal to (1020.6 ± 21.3), and at the investigated pathology (3-rd group of supervisions) – (1087.9 ± 23.1) mcm. The last digital value exceeded the previous on 5.9% and statistically evident was different from it ($p < 0.05$). The thickness of the adventitia of the urinary bladder in the conditions of the investigated pathology exceeded an analogical control index on 5.6%. Submucous - mucous index decreased on 1.3% too.

The height of the epithelial cells of the bladder in cystitis in the junior age-related group of animals increased with the high degree of evidence ($p < 0.001$) from ($12,70 \pm 0,15$) to ($15,60 \pm 0,12$) mcm, it is 22.8%. Diameter of them nucleus in the conditions of the investigated pathology appeared also decreased on 27.5%. Uneven growth of the cytoplasm of epithelial cells and them nucleus resulted a change in the relations between their spatial characteristics that adequately represented nucleocytoplasmic relations. So, the indicated morphometric parameter in control supervisions was equal ($0,220 \pm 0,005$), and in the cystitis - ($0,238 \pm 0,005$). Last digital index statistically evident ($p < 0,05$) on 8.2% exceeded an analogical previous morphometric parameter. The revealed changes of the studied quantitative indicators reveal a violation of tissue and cellular homeostasis, pronounced changes which can lead to dysfunction of the organ.

Microscopically in specimens of damaged bladder of a marked vascular disorders, characterized by plethora, by expansion of vessels of microhemocirculatory channel, stasis, swellings and hemorrhages around the vessels.

It costs also to notice, when the investigated defeat of urinary bladder on 1 mm^2 of mucous membrane substantially ($p < 0,001$) growing cell density infiltration from ($3042,8 \pm 33,6$) to ($5099,2 \pm 36,3$), id est in 1.7 times.

In the senior age-related group of animal remodeling structures of the wall of the bladder in acute cystitis was analogical described higher. Thus it should be noted, that structural changes in the wall of urinary

bladder of old animals were more intensive comparatively with the junior age-related group. The resulted was confirmed by more expressed changes of submucous-mucous index, nucleo-cytoplasmic relations and by the relative volume of damaged epithelium cells. Last morphometric parameter in 4-th investigation group equaled ($47,8 \pm 0,5$) % and with the high degree of authenticity ($p < 0,001$) exceeded an analogical control index in 19.1 times, and statistically evident ($p < 0,001$) exceeded the relative volume of damaged epithelium cells of 3-rd investigation group ($38,6 \pm 0,6$) % (junior age-related group) too. Microscopically histopathological changes specimens of urinary bladder of 4-th animals group were more expressed compared with observations of 3-rd group.

Table 1. Morphometric description of urinary bladder of intact animals.

Date	Group of supervision	
	1-st	2-nd
Thickness of mucous membrane, mcm	280,5 \pm 7,2	259,1 \pm 6,6*
Thickness of submucosa, mcm	266,2 \pm 3,6	255,5 \pm 3,0*
Thickness of the muscle membrane, mcm	1020,6 \pm 21,3	960,4 \pm 18,5*
Thickness of adventitia, mcm	64,1 \pm 1,2	67,8 \pm 1,2*
Submucous-mucous index	0,950 \pm 0,015	0,990 \pm 0,018*
Height of epithelial cells, mcm	12,70 \pm 0,15	11,90 \pm 0,15**
Diameter of the nucleus of the epithelial cells, mcm	5,96 \pm 0,08	5,70 \pm 0,09*
A nucleocytoplasmic relation in the epithelial cells	0,220 \pm 0,005	0,223 \pm 0,05
Cell density of infiltration in 1 mm ²	3042,8 \pm 33,6	3056,9 \pm 31,2
Relative volume of damaged epithelial cells, %	2,30 \pm 0,06	2,50 \pm 0,05*

Note. * - $p < 0,05$; ** - $p < 0,01$; *** - $p < 0,001$.

Table 2. Morphometric description of urinary bladder of test animals. (M \pm m)

Date	Group of supervision	
	3-rd, p 1	4-th, p 2
Thickness of mucous membrane, mcm	310,8 \pm 8,1*	291,5 \pm 6,3
Thickness of submucosa, mcm	291,8 \pm 2,7**	280,4 \pm 3,0
Thickness of the muscle membrane, mcm	1087,9 \pm 23,16	990,8 \pm 16,2
Thickness of adventitia, mcm	67,7 \pm 0,3***	72,30 \pm 0,9
Submucous-mucous index	0,938 \pm 0,012	0,960 \pm 0,012
Height of epithelial cells, mcm	15,60 \pm 0,12***	14,30 \pm 0,15
Diameter of the nucleus of the epithelial cells, mcm	7,60 \pm 0,09***	7,30 \pm 0,07
A nucleocytoplasmic relation in the epithelial cells	0,238 \pm 0,005*	0,260 \pm 0,004
Cell density of infiltration in 1 mm ²	5099,2 \pm 36,3***	6210,7 \pm 33,6
Relative volume of damaged epithelial cells, %	38,60 \pm 0,6	47,80 \pm 0,5

Note. p1 – authenticity of difference is between data of 3-rd and 1-st group, p2 – between 4-th and 5-th investigation groups.

CONCLUSION.

The results testify that the inflammatory process in the urinary bladder results in significant remodeling of the structures of its walls.

Also unevenly disproportionate grow up spatial descriptions of the membranes, nucleus and cytoplasm of epithelium cells, nucleocytoplasmic changes are violated in these cells too.

The detected structural changes prevailed in the investigated organ of older pigs. Established morphological changes become complicated by disfunction of investigated org

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