418

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IS URINE AN IMPORTANT FACTOR IN THE DEVELOPMENT OF BLADDER INFLAMMATION?

Hypothesis / aims of study

The urinary bladder is normally impermeable to hostile environmental factors and toxic urinary wastes. This protection is provided by the integrity of the apical membrane of the umbrella cells, the surface glycosaminoglycans (GAG) layer and the tight junctions. Any disruption of this permeability barrier would permit leakage of urine constituents into the underlying cells layers and subsequent inflammation. These are proposed factors in the pathophysiology of interstitial cystitis (IC).

Protamine sulfate (PS), a polycation quaternary amine, increases urothelial permeability. We previously described a neutrophilic inflammatory infiltrate at the 1st after intravesical instillation of PS in an experimental model of non-bacterial cystitis. The aim of this study is to examine the role of urine in the development of bladder inflammation.

Study design, materials and methods

Wistar female rats had their bladder catheterized and instilled with either PS (10 mg) or sterile saline, for 30 minutes. In order to exclude the urine, other groups of rats underwent bilateral nephrectomy and the same procedure was employed. One day after the instillation their bladders were removed for histopathological analysis. Edema and vascular congestion were graded from 0 to 3, signifying none to severe, respectively. Polymorphonuclear (PMN) and mast cell were counted in five cross sections at the most infiltrated area. Mann-Whitney non-parametric test was performed for statistical analysis.

Results

The intravesical instillation of PS in non-nephrectomized rats led to bladder inflammation, in contrast with rats instilled with saline. On the other hand, nephrectomized rats exhibited no inflammatory changes following instillation of either PS or saline. Mast cell count was similar in all groups (table).

	Protamine (n=5)	Saline (n=5)	Nephrectomy + protamine (n=5)	Nephrectomy + saline (n=5)
Edema (grade)	2.0±0.8*	0.6±0.5	0.7±0.4	0.5±0.4
Vascular congestion (grade)	2.7±0.5*	1.2±0.4	1.1±0.5	1.0±0.6
PMN count (median)	13*	0	1	1
Mast cell count (median)	0	1	1	1

* p<0.05

Interpretation of results

The association of PS, which increases bladder permeability, and urine, was responsible for initiating the inflammatory process in the bladder. In contrast, PS instillation without urine caused no damage to the bladder.

Concluding message

Bladder inflammation in this experimental model of non-bacterial cystitis was not due to PS itself. The association of PS and urine was necessary to trigger the inflammatory cascade. Thus, urine plays indeed an important role in the development of bladder inflammation in an environment of higher urothelial permeability.

References

FUNDING: NONE

ANIMAL SUBJECTS: This study followed the guidelines for care and use of laboratory animals and was approved by Sao Paulo Hospital Ethics and Reserach Committee