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Some Morphometrics Features on Mast Cells in Feline Pelvic Urethra

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The dense, shape and dimensions of mast cells in the pelvic urethra of 9 sexually mature clinically healthy male European shorthair cats were investigated following euthanasia.

The material was fixed in Carnoy's fixative, dehydrated, embedded in paraffin and stained with 0.1% toluidine blue.

The light microscopy revealed that most mast cells were present in the propria of pelvic urethra. Mast cells were also present in the urethral musculature and the intermuscular stroma. A relatively high concentration of mast cells was observed in the internal longitudinal smooth muscle layer. The observations on mast cells' shape and dimensions showed that they were the most elongated in the circular muscular layer. The mast cells in the musculature had a fusiform shape, those in the prostate lobules — oval and in the propria — oval and elongated. The morphometric data were statistically processed.

Key words: mast cells, pelvic urethra, tomcat.

Introduction

It is known that the anatomy of feline pelvic urethra has a number of specific features [11].

The studies about the localization, number and distribution of mast cells of tryptase-containing mast cells in human testes with either normal or abnormal spermatogenesis [14]. In cases with abnormal spermatogenesis, the number of mast cells was increased and their shape was rounded or elongated, indicating their degranulation. The results evidenced that mast cells and their secretory products were involved in the thickening of the wall of convoluted seminiferous tubules and other changes, observed in sterile testes.

Human testicular mast cells are divided into interstitial and peritubular. In impaired spermatogenesis, the number of interstitial mast cells was higher than that of peritubular ones. The mast cells in testes were considerably more numerous in sterility unlike their lower number in inflammations or neoplasms [1, 4].

The density of mast cells in the ventral part of prostate in the rat was high and decreased with age [3].

The number of mast cells was higher following castration in the connective tissue of the ventral prostate in gerbils [9].

Few mast cells were observed in the testicular interstitium of healthy boars. In boars with unilateral abdominal cryptorchism, mast cells were few whereas in bilateral cryptorchids, there were numerous mast cells [7].

The mast cells in the testicular interstitium of mice were found to be considerably more dense in the intact testis after transperitoneal unilateral torsion of the other testis [8].

The lack of data about the density, the shape and dimensions of mast cells in the pelvic urethra of male cats motivated the present study in order to elucidate their role in the function of male urethra in this animal species.

Material and Methods

Pelvic urethras of 9 clinically healthy, sexually mature male European shorthair cats, weighing 2.8-4 kg were studied. The cats were euthanized i.v. with 200 mg Thiopental (Biochemie, Austria).

The material was fixed in Carnoy's fixative for 4 hours, then put in 70° ethanol for 12 hours, dehydrated in an ascending alcohol series, cleared in xylene and embedded in paraffin.

The cross -sections (5-7 μm) were stained with 0.1% solution of toluidine blue in McIvane's buffer, pH 3 [6].

The density of mast cells (number, in mm^2) and dimensions (in μm) were measured with an eyepiece micrometer and shape were determined via light microscopy and their

The data were statistically processed (Data analysis, StatMost for Windows).

Results and Discussion

The total area of studied histological sections was 572 mm^2, with the greatest share of the external smooth muscle layer (165 mm^2 — 28.8%), followed by the middle circular layer, the propria with the erectile tissue and the internal longitudinal layer, whereas the disseminate prostate area was the lowest one — 36 mm^2 (6.3%). Of a total of 4060 mast cells studied, the greatest number were observed in the propria - 1100 (27.3%), followed by the middle circular, internal and external longitudinal muscle layers and the lowest - in the disseminate prostate - 33 (0.9%). The greatest density of these cells per mm^2 was observed in the propria — 9.41 ± 0.68, followed by the internal, the circular and the external muscular layer. The lowest density was that in disseminate prostate - 0.92 ± 0.24. Mast cells were the longest in the circular muscle layer - 16,36 ± 0,33 mm, the shortest - in disseminate prostate - 7.36 ± 1.69 mm, the thickest - in the propria - 8,22 ± 0,27 mm, and the thinnest - in disseminate prostate - 4.23 ± 0,98 mm (Table 1).

The light microscopic study showed that the most significant density of mast cells occurred in the propria of pelvic urethra. Significantly higher mast cell density was observed in the internal longitudinal smooth muscle layer followed by the middle and the external layer. The studies on the shape and dimensions of mast cells showed that they were relatively elongated (fusiform) in the circular muscle layer followed by the other two muscle layers and the propria and they were oval in disseminate prostate (Fig. 1).

T a b l e 1. Area (mm^2) of studied pelvic urethra regions with number and dimensions (μm) of mast cells within

Parameter	EM	MM	IM	PE	DP	Total
Area	165	143	110	118	36	572
%	28.8	25	19.2	20.7	6.3	100
Number	936	1033	948	1100	33	4060
%	23.1	25.4	23.3	27.3	0.9	100
Number — mm^2	5.67±0.36	7.22±0.34	8.62±0.61	9.41±0.68	0.92±0.24	6.97±1.5
Min — max	3.6-8.6	5.5-11.2	5.9-13.4	6.1-14.5	0-3.3	0.92-9.41
SD	1.59	1.43	2.57	2.88	1.03	3.36
Length	12.25±0.65	16.36±0.33	11.26±0.34	12.84±0.46	7.36±1.69	12.01±1.45
Min — max	7.9-17	13.6-19	9.5-15	10.2-16.3	10.2-18.7	7.36-16.36
SD	2.74	1.41	1.45	1.95	7.19	3.23
Thickness	6.97±0.34	6.3±0.37	6.17±0.31	8.22±0.27	4.23±0.98	6.37±0.65
Min — max	4.5-9.5	3.4-6.8	4.8-8.5	6.8-10.2	6.8-11.9	4.23-8.22
SD	1.44	1.56	1.32	1.15	4.14	1.45

EM — external longitudinal muscle layer; DP — disseminate prostate; MM — middle circular muscle layer; PE — propria and erectile tissue; IM — internal longitudinal muscle layer

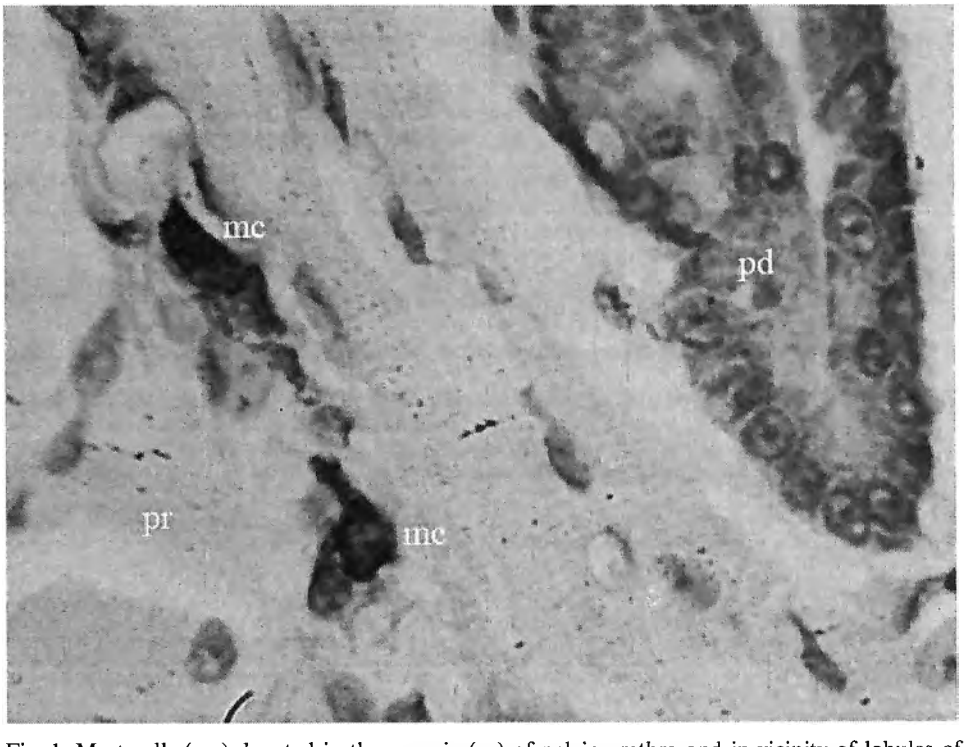

Fig. 1. Mast cells (mc), located in the propria (pr) of pelvic urethra and in vicinity of lobules of disseminate prostate (pd). × 400

The present study describes for the first time mast cells in feline pelvic urethra, observing a considerable predilectional, connective tissue presence. The obtained data added to the knowledge about these cells' distribution in the interstitial tissue of male genitals in rats, mice, boars, gerbils and humans [2, 3, 7, 13, 8, 9].

The data allowed us to support the assumption about the dominating affinity of mast cells towards the fibroelastic elements of pelvic urethra [11], corresponding to their known localization in the testicular interstitium in rats, mice and men [1, 3, 5, 8].

The considerably higher number of mast cells in the propria of pelvic urethra (9.41) and the muscle layers (from 5.67 at the external longitudinal to 8.62 at the internal layer) vs their density in disseminate prostate (0.92) suggested their role in the motility of fibromuscular elements, the regulation of vascular tonus and the microcirculation similarly to that described in the ureter of domestic pigs [10].

In our opinion, the fact that mast cells in the middle circular layer were with the most elongated shape compared to the other two longitudinal layers, deserves attention. It allowed us to assume that the marked elongation of cells was due to the high contractile amplitude of the circular layer.

In conclusion, the results of our study showed convincingly that the relatively higher dimensions (length and thickness) of mast cells in the propria vs those into the disseminate prostate, were indicative about their more active involvement in the connective tissue of feline pelvic urethra.

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