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Morphological Investigation on Mast Cells in Canine Anal Canal

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Light microscopic investigations upon mast cell localization in the wall of the anal canal were performed in healthy mongrel male dogs at the age of 3-4 years. It was found out that mast cells were situated in the three zones of the anal canal. In the columnar and intermediate zones, they were observed in the propria of the mucous coat, near the capillaries and the small blood vessels. In the mucous coat epithelium, mast cells were not found out. Mast cells were also present near the anal glands and their outlet ducts. In the smooth musculature of the anal canal, the mast cells were located among the smooth muscle bundles and around the smooth muscle cells, whereas in the external anal sphincter - in the peri- and the endomisium.

In the cutaneous zone, mast cells were discovered in the derma, near the sebaceous glands and their outlet ducts, near the sweat gland tubules, around the hairs and hepatoid circumanal glands (HCG). Mast cells were also present in the wall of perianal sinuses and their outlet duct.

The data of these studies allowed assuming that mast cells of anal canal's wall were involved in the local homeostasis and the function of musculature in this part of the intestinal canal.

Key words: mast cells, anal canal, dog.

Introduction

The anal canal of the dog has some specific structural features that are related both to the behaviour and communication of animals as well as to the pathogenesis of a number of pathological states [2, 3, 4, 6, 8]. The data about the presence of mast cells in the intestinal wall in animals are relatively few. These cells were described by single authors in the propria and the submucosa of the jejunum in swine [1].

The scarce data about the presence of mast cells in the anal canal of the dog motivated the present study aiming to elucidate their functional role on structures of the distal part of the gastrointestinal tract in this animal species.

Material and Methods

The material for the investigations was obtained from the wall of the anal canals of six mongrel healthy male dogs at the age of 3-4 years. The animals were euthanized with 5% thiopental solution. Pieces of 1 cm from all parts of the canal's wall were fixed in Carnoy's fixative for 4 hours at room temperature. Then they were dehydrated in ascending ethanol series, cleared in xylene and embedded in paraffin. From them, longitudinal and transverse cross sections of 6 μm, stained with 0.1% aqueous solution of toluidine blue (pH 3) were prepared.

Results and Discussion

During the light microscopic studies of specimens from the anal canal's wall, mast cells were discovered along and across in almost all its parts.

In the columnar and the intermediate zones, the relatively most regular distribution of mast cells was observed in the propria of the mucous coat and near the capillaries. Such cells were present also under the epithelium of the mucosa, and some of them were situated immediately near the basal membrane. Single mast cells were located both around the small blood vessels (in the propria and the submucosa) and in the vascular adventitia. Mast cells were detected in the subepithelial connective tissue around the anal sinuses and crypts as well. In the interstitium around the anal glands and their outlet ducts, a characteristic group of 3-4, less frequently of more cells, was observed (Fig. 1). Also, single mast cells were observed immediately

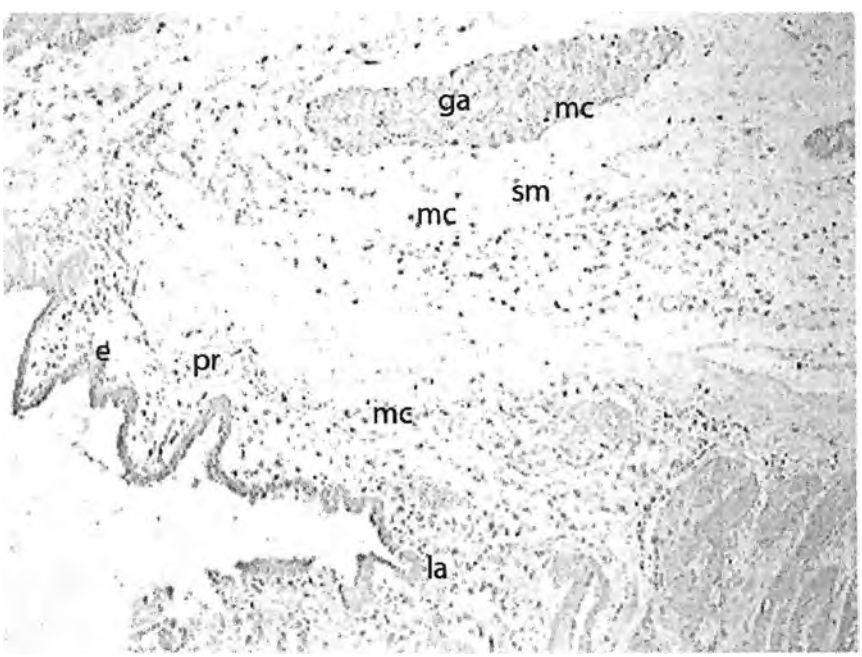

Fig. 1. Mast cells (mc) located in the propria (pr), beneath the epithelium (e), in the submucosa (sm) and around the anal glands (ga): la — linea anorectalis. × 100

near the epithelial basal membrane of glandular alveoli. Similar clusters were discovered in the connective tissue around the lymphatic follicles. The mast cells in the muscle layer of the wall were situated in the connective tissue stroma among the smooth muscle cells and bundles of the internal anal sphincter and of the longitudinal muscle layer. In the external anal sphincter, they were predominantly located in the perimisium whereas single cells could be also found more deeply.

In the cutaneous zone, mast cells were located mostly in the derma, adjacently to sebaceous and sweat glands as well as around the hair follicles. These findings confirmed the observation of other investigators, who described a similar localization in dogs too [5, 7]. In our studies however, mast cells located near the epithelial basal membranes of the glandular acini and sweat gland tubules were found out; moreover, single cells were observed even intraepithelially. Also, it was shown for the first time that the major part of mast cells in hairs was located in their connective tissue sheath and only some of them — in the epithelial sheath.

In the epithelial layer of the mucosa of all three zones of the canal, mast cells were not discovered. The absence of intraepithelially located mast cells in the intestinal wall was reported in swine [1].

In the layer with CHG, mast cells were found out in the vicinity with some of glandular lobes, and also in the interlobular connective tissue. It should be noted that although less frequently, they were observed in the wall of glandular cysts, a similar localization being unknown until now.

In the wall of the outlet duct of perianal sinuses, mast cells were distributed relatively regularly in the connective tissue, located between the basal membrane of the covering epithelium and the sebaceous glands. Also, single cells were observed

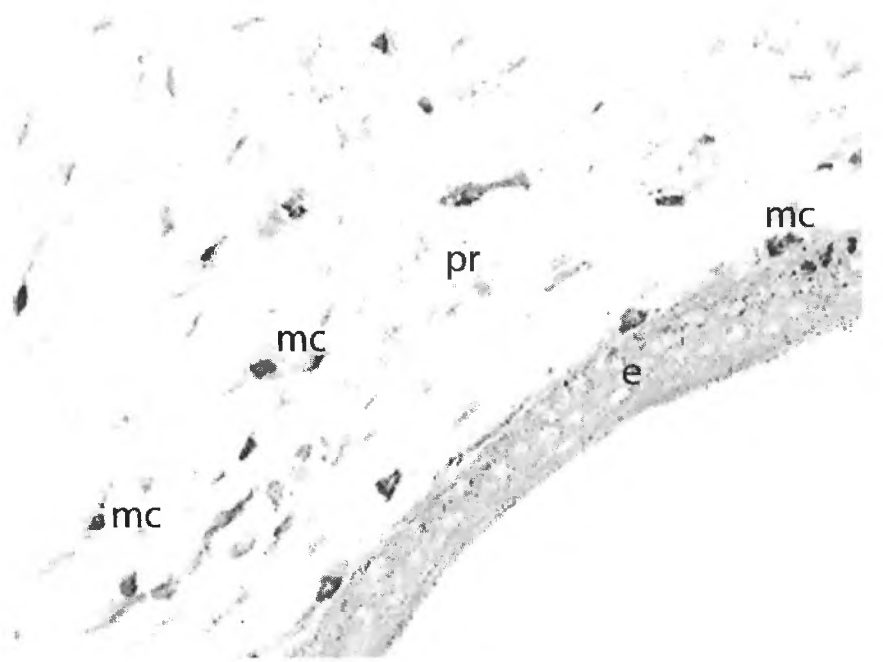

Fig. 2. Mast cells (mc) beneath the epithelium (e), in the propria (pr) of the wall of perianal sinuses. Single mast cells are situated near the basal membrane and intraepithelially. × 400

near the epithelial basal membrane of the aforementioned structures. A similar localization of mast cells was observed in the wall of sinuses too, the difference being that the respective glands were apocrine. In the muscle layer, the localization of mast cells was both in the perimisium and the endomisium. In some instances, an intraepithelial localization of mast cells in the covering epithelium was detected (Fig. 2). A similar position was also observed among the epithelial cells of some of glandular tubules, in the surrounding area of which, clusters of 3-4 mast cells were encountered and a localization immediately near the basal membrane could be frequently seen too.

In this study, along with confirming the known data, the localization of mast cells in some parts of the anal canal in the dog was described for the first time. The presence of these, undoubtedly important cells in the terminal part of the gastrointestinal tract in the dog, was certainly related to their barrier functions and mediating role in inflammations, as well as to the motor function of the striated and smooth musculature in the wall.

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