SECTION: VETERINARY MEDICINE

PATHOMORPHOLOGICAL DIAGNOSIS OF MAST CELL TUMORS SN DOGS

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Significance. Mast cell tumors, a type of neoplasm composed of mast cells, hold the third position in terms of occurrence frequency among skin tumors in dogs, comprising 11% of skin cancer cases, following basal cell carcinoma and squamous cell carcinoma [1]. The presence of this tumor type correlates with breed predisposition and the age of the dog. Certain breeds, such as Boxer, Bull Terrier, Golden Retriever, Labrador Retriever, French Bulldog, Shar Pei, and Dachshund, exhibit a heightened susceptibility to mast cell tumors. Conversely, German Shepherd, Chihuahua, Poodle, Yorkshire Terrier, and Cocker Spaniel are less prone to this tumor type [2]. Typically, this condition is more prevalent in older dogs, starting around 8 to 9 years of age, although it can also affect younger dogs [3]. Given the prevalence of mast cell tumors in specific breeds, genetic factors are presumed to play a role in their development. The presentation of mast cell tumors can vary significantly, occasionally leading to misinterpretation as non-neoplastic skin issues. Well-differentiated mast cell tumors typically manifest as solitary, slow-growing nodules, whereas more malignant tumors can exhibit rapid growth. Additionally, mast cells can elicit various local or systemic clinical symptoms through the release of biologically active substances from granules. Activation of histamine, heparin, and other vascular regulatory factors can result in swelling, redness, and itching of the tumor and surrounding tissues, contributing to tumor enlargement. This observation is commonly reported by many pet owners, as growths on a dog's body may fluctuate in size [4]. Despite extensive literature on the prevalence, clinical presentations, and treatment modalities of mast cell tumors, certain aspects of their histogenesis and pathomorphological expression remain inadequately explored. Thus, the objective of this study was to delineate the distinctive features of pathomorphological diagnosis of mast cell tumors in private veterinary clinics in Dnipro city.

Materials and Methods. We examined 36 instances of cutaneous mast cell tumors in dogs that were diagnosed during their treatment from 2021 to 2023 in veterinary clinics located in Dnipro, Ukraine. Pathomorphological investigations were carried out at the Department of Animal Anatomy, Histology, and Pathomorphology of Dnipropetrovsk State Agrarian University. The diagnosis of mast cell tumors was comprehensive, considering the medical history, clinical findings, results of cytological and histopathological analyses, and an additional modality - ultrasonography (USG). Following surgical excision of the tumors, they underwent pathomorphological examination.

Results. The investigation indicated that among the 36 dogs diagnosed with cutaneous mast cell tumors, 23 were males and 13 were females. The age of the animals varied between 5 and 15 years, with no specific breed inclination towards this ailment noted. Predominantly, mast cell tumors were localized on the trunk area (44.4%) and limbs (33.4%), less frequently appearing on the head, neck, as well as in the axillary, inguinal, and perianal regions (22.2%). In 13 instances (36.1%), afflicted animals exhibited tumors that swiftly enlarged, accompanied by manifestations of inflammation and swelling in adjacent tissues. Conversely, in 23 cases (63.9%), animals displayed a primarily gradual tumor growth, advancing independently from neighboring tissues. Generalized mast cell tumor diagnosis was confirmed in eight animals (22.2%). Ultrasonographic assessments unveiled metastases in the liver, lymph nodes, spleen, and other organs. In scenarios of systemic mastocytosis, distinct confined lesions in the liver, measuring up to 3 cm or larger in diameter, were observed, exhibiting regions of calcification, necrosis, and hemorrhage. Cytological assessments indicated a notable presence of mast cells, which are cells found in loose connective tissue, in smears derived from material extracted from mast cell tumors. These mast cells are mesenchymal cells typically measuring 10-13 μm in diameter and containing numerous basophilic granules within the cytoplasm. Evaluation of microslides based on diagnostic parameters encompassed the cellularity of the smear, presence of cells exhibiting basophilic cytoplasmic granularity, size and abundance of cytoplasmic granules, occurrence of mitoses, nuclear variability, presence or absence of binucleations or multinucleations, and anisokaryosis.

Examination of microslides of mast cell tumor samples stained with toluidine blue not only discerned tumors exhibiting low and high degrees of differentiation but also those demonstrating moderate differentiation. Tumors displaying high differentiation were characterized by the presence of abnormal polymorphic mast cells, typically situated in the dermis amidst hair follicles, forming strands or small clusters separated by collagen fibers. These cells appeared round and uniform, containing medium-sized granules and rounded nuclei with condensed chromatin within the cytoplasm. Tissue edema was minimal, necrosis was absent, and mitotic figures were rare. In cases of moderately differentiated mast cell tumors, infiltrative growth was evident, causing profound damage to the layers of the dermis and subcutaneous adipose tissue. Cells were predominantly round or oval, occasionally spindle-shaped, moderately polymorphic, and clustered with areas of hyalinization

and intensely stained granules in the cytoplasm. Nuclei appeared oval, sometimes irregular in shape and hyperchromatic. Mitotic figures were infrequent (ranging from 0 to 2 per field of view), and the tissue displayed indications of edema and necrosis.

In instances of poorly differentiated mast cell tumors, there was notable variability in the granularity of cell cytoplasm, spanning from very small to larger sizes. Some cells also displayed mitotic activity. Connective tissue alterations encompassed inflammation, swelling, hemorrhage, cellular infiltration, and necrotic changes.

Hence, employing an additional staining technique on histopathological samples (using toluidine blue) disclosed that among 36 animals with mast cell tumors, 23 cases (63.9%) exhibited benign tumors. Within this group, 14 animals (38.9%) demonstrated highly differentiated tumors, while 9 cases (25%) showed moderate differentiation. Thirteen dogs (36.1%) exhibited low differentiation of mast cells, indicative of a heightened malignancy in tumor growth.

Conclusion, analysis of 36 cases of mast cell tumors in dogs revealed benign neoplasms in 23 animals (63.9%), while 13 animals (36.1%) exhibited malignant tumors. The study delineated the distribution patterns of mast cell tumors in the investigated animals, with 44.4% located on the trunk, 33.4% on the limbs, and 22.2% in various head, neck, axillary, inguinal, and anal-perianal regions. Employing an additional staining method for histopathological specimens (toluidine blue) facilitated a more nuanced differentiation of mast cell tumors. Among the 23 (63.9%) dogs with benign mast cell tumors, 9 (25%) displayed tumors of moderate differentiation, and 14 (38.9%) exhibited tumors of high differentiation. Such a three-tiered diagnostic approach enables the effective determination of treatment strategies.

References

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