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MAST CELL TUMORS IN DOGS AND CATS - A REVIEW
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Abstract Mast cell tumor (MCT) is a type of malignant tumor consisting of mast cells (mast cells are immune cells located in the skin and other tissues, that are normally responsible for allergic reactions). They are usually noticed in middle aged patients but can occur in patients of any age. Mast cell tumors typically form nodules or masses in the skin, but they can also affect other areas of the body, including the spleen, liver, intestine, and bone marrow. MCTs are the most common skin tumors in dogs and the second most frequent ones in cats (following basal cell carcinoma). They can be a raised lump or bump on or just under the skin, and may be red, ulcerated, or swollen. While some may be present for many months without growing much, others can appear suddenly and grow very quickly. Sometimes they can suddenly grow quickly after months of no change. They may appear to fluctuate in size, getting larger or smaller, even daily. These size changes can occur spontaneously or when the tumor is handled, which causes degranulation and subsequent swelling of the surrounding tissue due to the histamine release. This cancer is typically diagnosed using fine-needle aspiration (FNA). The whole tumor is graded from I-III, with grade I as much less aggressive than grade III. Higher-grade tumors have a higher tendency to metastasize. Surgical removal of MCT is the preferred treatment once the animal is diagnosed with this disease. MCT invade into surrounding tissues and wide surgical margins are necessary to ensure removal of all cancerous cells. This paper wishes to underline the most important aspects of this tumors in dogs and cats, with a special emphasis on clinical signs, diagnosis, and treatment options.

Keywords: mast cell tumor, oncology, dog, cat.

• Introduction

The abnormal growth of mast cells (MCs), known as a mast cell tumor (MCT; also called mastocytoma or MC sarcoma), is the most frequently observed skin tumor in dogs and the second most common skin tumor in cats (uncommon to rare in other species). Systemic manifestations of the disease are typically referred to as mastocytosis.

MC precursors exit the bone marrow and travel to various tissues throughout the body, where they differentiate into mature MCs, characterized by their cytoplasmic granules. These granules contain several bioactive substances, such as heparin, histamine, preformed tumor necrosis factor-alpha, and various proteases.

Canine and feline forms of the disease are considered separately due to significant differences in histologic type, biological behaviour, treatment, and prognosis.

Unlike MCTs in dogs, which are primarily cutaneous or subcutaneous, MCTs in cats typically manifest in three distinct syndromes, though there can be some overlap among them. These syndromes are cutaneous MCT, splenic/visceral MC disease, and intestinal MCT.

• Material and method

A total number of 30 articles (published mainly in the last 10 years), having as a topic of interest veterinary oncology, most specific mast cell tumors, species – dogs and cats, were selected for this review (using PubMed, Google Academic, Web of Science).

• Results and discussions

DOGS

About 50% of cutaneous MCTs are found on the trunk and perineal region, 40% on the limbs, and 10% on the head and neck. MCTs have also been reported in various other locations, such as the conjunctiva, salivary gland, nasopharynx, larynx, oral cavity, ureter, and spine.

Well-differentiated MCTs are usually solitary, small, and slow-growing tumors that may have been present for several months. They are not typically ulcerated, though the overlying hair might be lost. In contrast, undifferentiated MCTs tend to be rapidly growing, ulcerated lesions that cause significant irritation and can become quite large. The surrounding tissues may become inflamed and edematous, and small satellite nodules may develop nearby. Tumors of intermediate differentiation exhibit characteristics that fall between these two extremes. Additionally, a subcutaneous form of MCT, which feels soft and fleshy upon palpation, is often clinically misdiagnosed as a lipoma.

CATS

The usual presentation of feline cutaneous MCT is a single, raised, firm, well-defined, hairless nodule on the skin, typically ranging from 0.5 to 3.0 cm in diameter. These nodules often appear white, although occasionally they may present as pink and erythematous. Approximately 25% of cases exhibit superficial ulceration. Other clinical variations include a flat, pruritic plaque-like lesion resembling eosinophilic plaques, as well as discrete subcutaneous nodules.

DIAGNOSIS

Cytology - Fine-needle aspirates of MCTs involve taking a small sample of the



Fig. 1 - mast cell tumors in a dog, clinical aspect
(<https://vccanada.com/your-pet/mast-cell-tumors-in-dogs>)



Fig. 2 - mast cell tumors in a cat, clinical aspect
(https://www.kxvdl.org/resources/news/diagnostic_insights/november2019/feline-mast-cell-tumors.html)

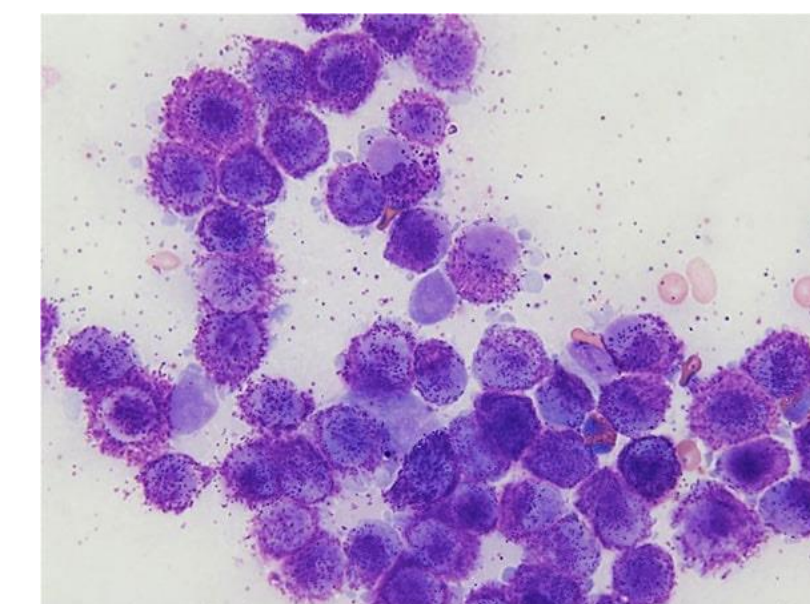


Fig. 3 - mast cells - cytology
(<https://www.nadex.co.uk/information-sheets/canine-mast-cell-tumours>)

tumour with a thin needle. This is generally a straightforward procedure which can be done conscious and without sedation in most patients. It should be performed prior to any surgery, because a pre-operative diagnosis of MCT influences the type and extent of surgical intervention required.

Biopsy - This involves taking a larger piece of tumour tissue and sending it away to a pathologist for analysis. This can be very instructive in the decision about the best treatment for the patient.

Additional tests may be required to determine the stage of the tumor, or whether or not it has already spread: sampling of nearby lymph nodes, chest X-rays and abdominal ultrasound scanning.

TREATMENT

Low grade (grade 1) tumours and around 75% of intermediate (grade 2) tumours are cured with complete surgical excision. Unfortunately, most high grade (grade 3) tumours and around 25% of intermediate grade tumours have already spread by the time they are diagnosed.

Surgery is the cornerstone of management of MCTs, and complete surgical removal is often curative in dogs with low or intermediate grade MCTs.

If complete removal is not possible, or where the tumour appears to be more aggressive (e.g. high-grade) then radiation therapy, chemotherapy (e.g. Vincristine, Lomustine, Pred/Vinblastine, Pred/Cyclophosphamide/Vinblastine etc.) and other anti-cancer drug therapy treatments become more useful. The optimum treatment depends on the tumour grade, stage and other factors unique to the individual dog.

• Conclusions

MCTs are a common issue in dogs and cats skin pathology. Correct and rapid diagnosis is of a great importance. Given the prevalence and variable biological behaviour of MCTs, the cost of treatments, and the potential emotional stress on owners, it is crucial to accurately prognosticate cutaneous MCTs and select the most appropriate therapeutic approach.