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Ocular Mast Cell Tumour (MCT) in a mongrel dog: Cytological and immunocytochemical diagnosis

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Abstract
This report describes a case of Ocular Mast Cell Tumour (MCT) diagnosed by cytological and immunocytochemical evaluation in a ten-year-old male mongrel dog presented to the Ophthalmology unit, Surgery, of Madras Veterinary College Teaching Hospital (MVCTH) with a six-month history of a progressively enlarging, ulcerating mass of the Right Upper Eyelid (OD). Ophthalmological examination revealed prolapse of the third eyelid membrane. Fine Needle Aspiration Cytology (FNAC) of the eyelid mass demonstrated numerous discrete mast cells containing characteristic intracytoplasmic metachromatic granules. Subsequent immunocytochemical analysis of the aspirate revealed discrete mast cells with intracytoplasmic metachromatic granules. Subsequent immunocytochemical analysis of the aspirate showed strong and diffuse expression of c-Kit leading to confirmatory diagnosis of mast cell tumour.

Keywords: MCT, canine, ocular disorders, ocular tumours, mast cell tumour, mongrel dog

Introduction
Mast cell tumours (MCTs) represent the most prevalent cutaneous neoplasms in dogs, accounting for approximately 21% of all skin tumours (Tham *et al*., 2024) [11]. Among the various ocular neoplasms reported in canine, the commonly encountered tumours include squamous cell carcinoma (SCC), MCTs, melanomas, and the extragenital form of transmissible venereal tumours (TVTs). Despite the mortalities associated with ocular malignancies, enucleation of the eye in a way to limit the damage due to ocular tumours results in loss of vision and thereby worsening the quality of life of affected dogs (Rugmini *et al*., 2025) [7].

Mast cell tumours (MCTs) exhibit variable gross morphology and are frequently associated with ulceration. Barsotti *et al*. (2007) [1] described the gross presentation of an ocular MCT as an elongated, partially pigmented mass originating from the conjunctival region.

Cytologically, MCTs appear as discrete, round neoplastic cells containing intracytoplasmic deep purple stained granules (Fife *et al*., 2011) [2]. Accurate cytological evaluation plays a key role in distinguishing neoplastic from non-neoplastic ocular lesions (Morgan *et al*., 2014) [5]. Cytology is a reliable, easy, non-invasive tool in diagnosis of MCTs in dogs, yet, in anaplastic MCTs presented with poor morphological features, immunohistochemistry can prove vital in diagnosis and molecular studies by employing conventional PCR and qRT-PCR can aid in confirming the aggressiveness of MCTs by identifying the presence of gene mutation in c-Kit gene and changes in fold expression of c-Kit (Subapriya *et al*. (2024) [10].

Histopathologically, MCTs are characterized by round neoplastic cells arranged in linear patterns and sheets, displaying marked anisokaryosis and anisocytosis. These cells typically contain round to vesicular nuclei with prominent single to multiple nucleoli, abundant intra and extracellular metachromatic granules, and scant to moderate eosinophilic cytoplasm (Meuten, 2002) [4].

In immunohistochemical studies on canine cutaneous MCTs, Subapriya *et al*. (2021) [9] demonstrated moderate expression of c-Kit. Likewise, Fischer *et al*. (2024) [3] observed elevated c-Kit expression in mast cell tumours of eyelid and conjunctiva and further observed poor prognosis in such tumours.

Given the heterogeneous presentation of ocular masses in dogs, a comprehensive diagnostic approach by undertaking cytological, histopathological, and immunohistochemical evaluation is essential for accurate diagnosis and effective therapeutic planning of MCTs. In this context, the present report details a case of an ocular mast cell tumour in a mongrel dog, diagnosed using cytological and immunocytological techniques.

Materials and Methods

A ten-year-old male mongrel dog was presented to the Small Animal Clinic-Outpatient Unit, Ophthalmology Ward, Madras Veterinary College Teaching Hospital (MVCTH), Chennai-600007, with a six-month history of a progressively enlarging and ulcerated mass on the right upper eyelid (OD). Ophthalmic examination revealed complete masking of the globe due to prolapse of the third eyelid membrane.

Fine Needle Aspiration Cytology (FNAC) was performed on the eyelid mass to obtain cellular material for diagnostic evaluation. Smears were prepared from the aspirate on clean glass slides, air-dried, and stained using the Leishman-Giemsa (LG) cocktail stain.

For immunocytochemical analysis, an additional fine needle aspirate was collected, and ocular impression smears were prepared on APES/Poly-L-Lysine precoated slides. The air-dried smears were either fixed immediately or post-fixed prior to staining using 95% ethanol or cold acetone for 30 minutes. Slides were then wrapped in aluminium foil and stored at −20 °C until further processing. Immunocytochemical staining was subsequently performed using commercial antibodies specific to c-Kit as per Przezdziecki and Sapierynski (2014) [6].

Results and Discussion

In gross examination of both the eyes. An oval, ulcerating, pink-coloured mass was found in the right eye (Figure 1). The mass was located on the right upper eyelid and was accompanied by protrusion of the third eyelid membrane. Cytological evaluation of fine needle aspiration cytology (FNAC) smears from the mass revealed well-differentiated, homogenous, discrete mast cells arranged in sheets. The cells displayed eccentrically placed nuclei with coarse chromatin along with abundant metachromatic cytoplasmic granules (Figure 2). The granules were mostly arranged in a crescent-shaped pattern along the cell margins. Cytological indicators of malignancy were evident, including anisocytosis, anisokaryosis, increased nuclear-to-cytoplasmic ratio, binucleation, multinucleation, prominent nucleoli, and frequent mitotic figures, suggesting an aggressive tumour phenotype. These features align with those described by Subapriya *et al*. (2024) [10].

Immunocytochemical analysis using c-Kit staining on FNAC samples prepared on APES-coated slides demonstrated strong and diffuse cytoplasmic expression of c-Kit (Figure 3). This observation supports the findings of Subapriya *et al*. (2021) [9], who documented similar expression patterns in canine mast cell tumours. Earlier, Fischer *et al*. (2024) [3] reported that elevated c-Kit expression is associated with poor prognosis in eyelid and conjunctival tumours. However, in the present case, prognosis could not be conclusively determined due to lack of follow-up by the owner post-diagnosis.

Ocular wellness is very important for the survival and subjective well-being of every living creature, humans and animals (Rugmini *et al*., 2025) [8]. Therefore, a critical evaluation of ocular disorders is essential to implement effective corrective measures and ensure the overall well-being of animals. In the diagnostic evaluation of ocular tumours, particularly ulcerating masses, mast cell tumour (MCT) should be considered a primary differential. As a minimally invasive and clinically valuable tool, cytological examination can effectively differentiate MCTs from other round cell tumours such as transmissible venereal tumour (TVT), histiocytoma, lymphoma, and plasma cell tumour. However, in cases where cytological smears present with poor morphologic details suggestive of anaplastic round cell tumours or anaplastic MCTs, additional diagnostic modalities such as histopathology, immunohistochemistry, and immunocytochemistry are essential for confirmation. Features indicative of anaplastic MCT include pleomorphism of cells, nuclei, and nucleoli, as well as loss of cytoplasmic granularity. Thus, a definitive diagnosis of MCT in the right upper eyelid of a non-descript male dog was established in the present study through a combination of diagnostic parameters such as gross pathology, cytological evaluation, and immunocytochemical staining.

Fig 1: Dog-MCT-Right eye-ulcerating pink colored mass on upper eyelid

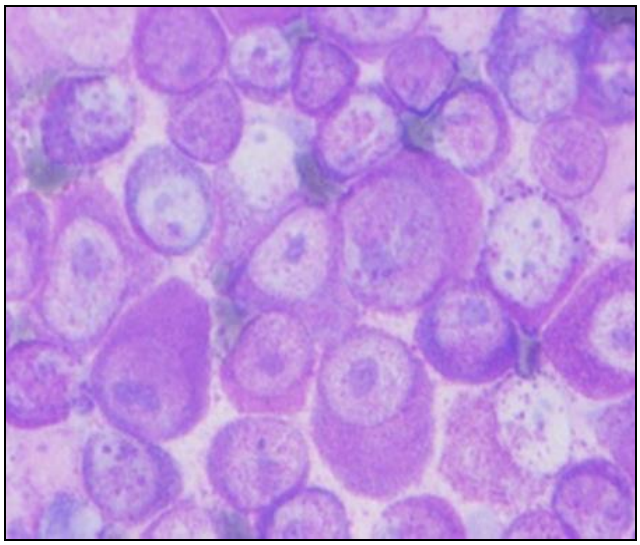

Fig 2: MCT-Cytology-Discrete mast cells-Cresent shaped arrangement of granules-Prominent nucleoli-LG x1000

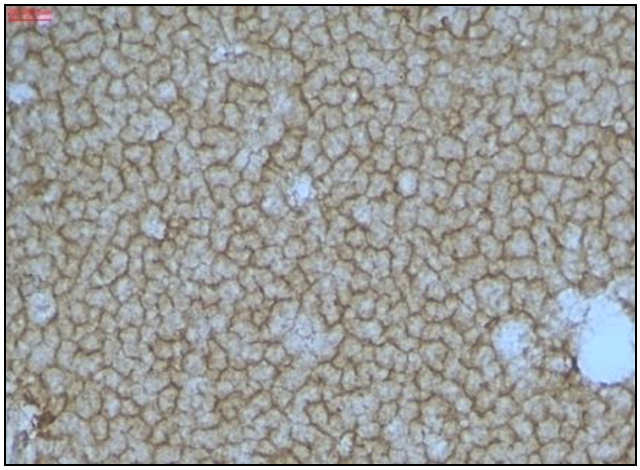

Fig 3: MCT-Immunocytochemistry-Diffuse expression of c-Kit

Conclusion

The present case highlights the diagnostic importance of combining cytological and immunocytochemical evaluations in identifying ocular mast cell tumours (MCTs) in dogs. MCTs are a class of round cell tumours which present in varied gross appearances and with undesirable aggressiveness. They should be considered a primary differential in dogs presented with ulcerated masses in eyes. Cytology offers a rapid, minimally invasive diagnostic tool, while c-Kit immunostaining aids in confirming anaplastic forms, especially when morphological features are inconclusive.

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Conflict of Interest

Not available

Financial Support

Not available

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