Indian J. Vet. Pathol., 49(3) : 258-261, 2025: DOI: https://doi.org/10.56093/xyjees24

CASE REPORT

Cytological diagnosis of canine cutaneous mast cell tumour with nodal metastasis

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Received: 29.1.2025; Accepted: 21.5.2025

ABSTRACT

A thirteen year old male mongrel dog was presented at Sanchu animal hospital, Palavakkam, Chennai for treatment of two months old wound infected with maggots in the interdigital space of the left forelimb. Physical examination of the animal revealed the presence of a large ulcerated wound infested with maggots and a foul smelling discharge from the interdigital space between 3rd and 4th digit of the left forelimb. In addition, left prescapular lymphnode showed marked enlargement. Radiological examination of the affected limb revealed complete osteolytic lesions in the distal phalanges (P2 and P3) of the 4th digit, while no abnormalities were noticed in thorax and abdomen. After five days of treatment with ivermectin and antibiotics, maggots disappeared completely leaving an ulcerated nodule with soft consistency and measuring 4 cm in diameter. Impression smears from the site showed presence of numerous discrete round cells having moderate amounts of pale basophilic cytoplasm with varying numbers of characteristic metachromatic granules, suggestive of mast cell tumour (MCT). Fine needle aspirates from enlarged lymphnode also showed clusters of neoplastic cells comprised of mast cells along with numerous neutrophils, confirming its metastasis. Based on the laboratory findings, diagnosis was confirmed as cutaneous MCT with nodal metastasis (stage II). Thus, the present paper reports the cytological findings of cutaneous MCT with lymph node metastasis in a mongrel dog.

Keywords: Cytology, mast cell tumour, mongrel dog, node metastasis

Mast cell tumors (MCT) resulting from uncontrolled proliferation of mast cells of hematopoietic origin have been reported in both domestic and wild animals, including dogs, cats, horses, cattle, pigs, ferrets, wild dogs, lion, jaguar, tiger, squirrel, hedgehog and walrus. Among the animal species affected, MCT is more common in dogs followed by cats and is less frequent in other species[1-3]. In dogs, it ranks second among the most frequently diagnosed cutaneous malignant tumours[4]. It is highly invasive and metastatic, comprising 16 to 21 percent of all skin tumors encountered[5] and its biologic behavior is highly variable, ranging from solitary benign to highly malignant multiple masses which are potentially fatal[6]. It can be focal or multicentric affecting the skin and may occasionally spread to the distant sites such as spleen, liver, intestines and bone marrow[1]. The cutaneous forms are mostly located on the hind limbs, abdomen, perineum and scrotum. The tumours affecting preputial, inguinal and sub inguinal regions and other mucocutaneous sites tend to be more aggressive[7]. The tumours which grow slowly and remain localized for a long duration carry a better prognosis. In contrast, rapidly growing tumours with high infiltrating behaviour usually indicate a poor prognosis[8]. Among various breeds affected, Boxers, Boston terriers, Beagles and Labrador retrievers are more prone to MCTs. Malignant transformation of mast cells resulting from mutations in the c-kit tyrosine kinase receptor has been thought to be responsible for the malignant transformation in these breeds. Regarding age affected, middle-aged to older dogs are prone to MCTs. However, younger dogs which are less than three weeks old may also get affected. In dogs, gender predilection has not been reported for MCT[9,10].

Approximately 50 percent of the MCT affected dogs with normal or palpable regional lymphnodes showed either early metastatic or overtly metastatic disease, while the remaining 50 percent revealed lymphnodes with no evidence of metastasis or minimal metastasis[11]. Hence, cytologic evaluation of the regional lymphnodes is advocated for confirming the metastatic involvement and staging of MCTs. Based on the cytological findings, five categories associated with increasing risk of malignancy have been proposed namely normal lymphnodes, hyperplastic lymphnodes, possible, probable and certain metastasis based on the number of mast cells and the number and size of mast cell aggregates[12]. For localized MCT, surgery is advised as the best choice of treatment while for disseminated, non-resectable and high-grade tumours, chemotherapy is recommended[13]. Though numerous reports are available on the incidence in

How to cite this article : Ramesh, S., Kumar, S.D., Harish, L.J., Balakumar, A., Preetha, S. and Kumar, V. 2025. Cytological diagnosis of canine cutaneous mast cell tumour with nodal metastasis. Indian J. Vet. Pathol., 49(3) : 258-261.

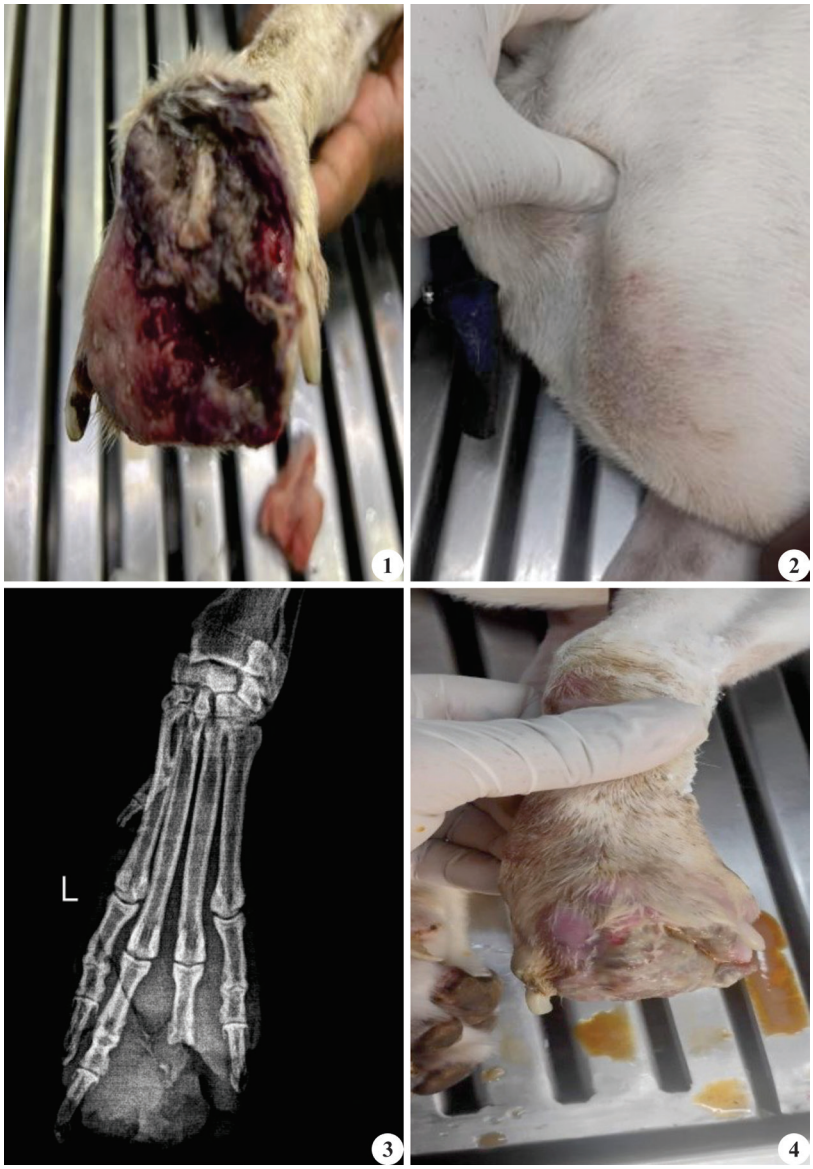

Fig. 1. An ulcerated wound infested with maggots in the interdigital space of the left forelimb; **Fig. 2.** Mongrel dog showing enlarged prescapular lymphnode; **Fig. 3.** Mongrel dog affected with MCT-Radiograph showing complete osteolytic lesions of distal phalanges (P2 and P3) of the 4th digit; **Fig. 4.** Mongrel dog showing growth in the interdigital space of the left forelimb.

dogs, records pertaining to cytology of primary tumour with affected regional lymphnodes are scanty. Hence the present paper reports the cytological diagnosis of cutaneous MCT with nodal metastasis in a mongrel dog, presented at Sanchu animal hospital, Chennai.

A thirteen years old male mongrel dog was presented at Sanchu animal hospital, Palavakkam, Chennai for treatment of wound that was two months old and infested with maggots in the interdigital space of the left forelimb. A thorough physical examination was carried out on the affected dog. In addition, radiological investigations were carried out to assess the extent of tissue damage in the affected limb and to rule out thoracic and abdominal lesions. The wound was cleaned and the animal was treated with Inj. ivermectin and oral cefpodoxime. After five days of treatment, impression smears from the ulcerated lesion and fine needle aspirates from the enlarged prescapular lymphnode were collected for cytological diagnosis. The smears were air dried, stained with Leishman and Giemsa cocktail stain and subjected to microscopic examination[14].

On physical examination of the animal when presented on the first day of examination, the interdigital spaces between the third and fourth digits as well as the respective digital pads of the left forelimb were found to be severely necrotic and ulcerated with presence of numerous maggots. The lesions appeared irregular and multinodular, about half the lesions showed blackish

brown discoloration while the remaining half was pinkish with foul smelling discharges (Fig. 1). In addition, massive enlargement of left prescapular lymphnode was noticed (Fig. 2).

Radiological examination of the affected forelimb revealed complete osteolytic lesions in the distal phalanges (P2 and P3) of the 4th digit (Fig. 3), while thorax and abdomen showed no abnormalities. After five days of treatment, the wound appeared as small, nodular, soft in consistency, measuring 4 cm in diameter with pus filled ulcerated surface (Fig. 4) devoid of maggots.

Cytological examination of impression smear collected from the ulcerated mass showed the presence of discrete round cell population with indistinct cellular borders containing moderate amount of cytoplasm. The cytoplasm which was pale basophilic contained numerous fine to coarse metachromatic granules with centrally to eccentrically placed spherical nucleus, suggestive of mast cells (Fig. 5 & 6). Mild anisocytosis and anisokaryosis of the mast cells were also observed. In addition, extracellular granules released from mast cells were also noticed in many areas along with few non-degenerate neutrophils and eosinophils. Cytological examination of lymphnode aspirates also revealed small clusters of neoplastic cells comprising of mast cells, confirming its metastasis (Fig. 7 & 8). In addition, inflammatory cells, chiefly neutrophils along with few bacterial cocci and bacilli were also observed. Based on the present cytological findings, the ulcerated mass was confirmed as mast cell tumour (MCT) with nodal metastasis. The present case of MCT was classified under the clinical stage II, based on clinical staging system for canine MCTs (Table 1) as per World Health Organisation (WHO) (Table 1) which specifies the presence of single mast cell tumour with involvement of a regional lymph-node.

The present gross findings of an ulcerated lesion measuring 4 cm in diameter were in accordance with that of previous workers[15] who also noticed masses measuring 2 to 10 cm diameter with or without ulcerations in 177 dogs affected with MCT. A dark red ulcerated nodular mass was noticed on the cranial aspect of right forearm with the size measuring 0.5 to 0.7 cm in diameter in a six years old pug affected with MCT[16]. A small elevated nodule, whitish in colour, soft in consistency, measuring approximately 1 cm in diameter was noticed on the perianal region of a senile male captive bush dog housed in a zoological garden diagnosed with MCT histologically[3].

The present radiological findings of thorax and abdomen which revealed no abnormalities were also observed in a six years old dog diagnosed with cutaneous MCT[13].

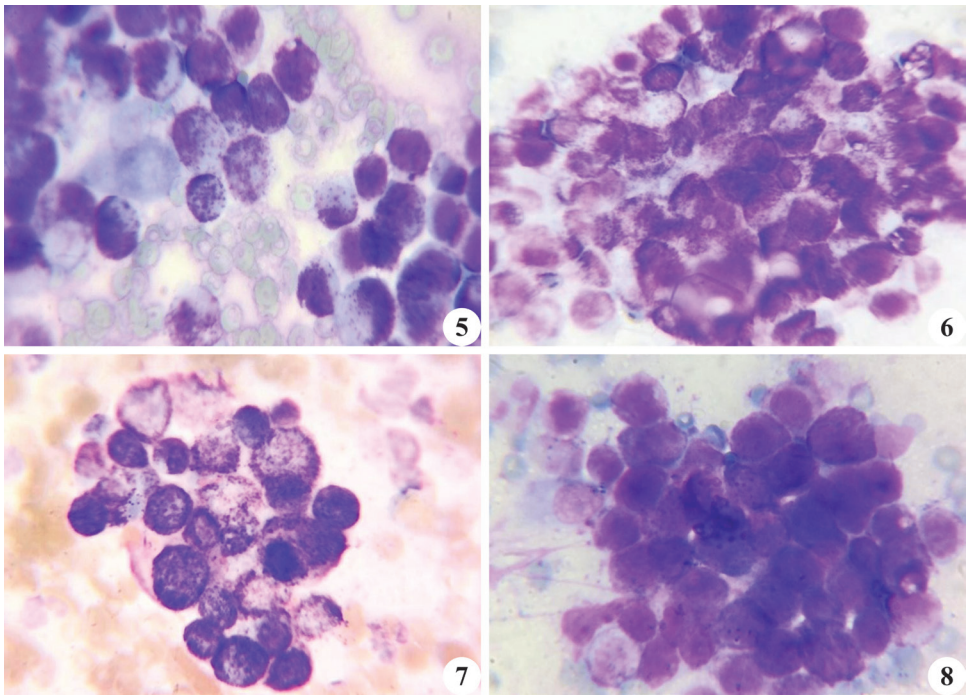

Fig. 5. FNAC from the interdigital mass of affected dog - showing numerous round cells containing spherical nuclei with metachromatic cytoplasmic granules (L&G stain X100); **Fig. 6.** FNAC from the interdigital mass of affected dog - showing numerous round cells containing spherical nuclei with metachromatic cytoplasmic granules (L&G stain X100); **Fig. 7.** FNAC of prescapular LN of MCT affected dog showing a cluster of numerous neoplastic cells comprised of mast cells (L&G stain X100); **Fig. 8.** FNAC of prescapular LN of MCT affected dog - showing a cluster of numerous neoplastic cells comprised of mast cells (L&G stain X100).

Table 1. WHO clinical staging system for canine mast cell tumors.

Stage I	One tumor confined to the dermis, without regional lymph node involvement
Stage II	One tumor confined to the dermis, with regional lymph node involvement
Stage III	Multiple dermal tumors or large infiltrating tumor with or without regional lymph node involvement
Stage IV	Any tumor with distant metastasis or recurrence with metastasis (including blood or bone marrow involvement)

The cytological findings of discrete round neoplastic cells containing metachromatic intracytoplasmic granules with spherical nuclei and presence of extra cellular granules observed in the aspirate collected from the interdigital mass during the present study were in accordance with that of previous workers[15] who also observed similar cytological changes in more than 150 dogs affected with MCT. Similar findings were also reported in an eight years old Pomeranian dog[17] and in a nine years old Dachshund dog affected with MCT[18]. The neoplastic cells were spherical to oval in shape and well differentiated with indistinguishable nuclei and cytoplasm due to the presence of numerous dense purple to pink granules. In addition, some mast cells were stained pale blue due to heavy degree of granulation and lack of stain penetration in the nucleus in the aspirate of cutaneous nodule of a male Frenchbull dog diagnosed with MCT[13].

Cytological findings in the present study of aspirate of enlarged prescapular lymph node confirmed the nodal metastasis and hence present MCT was grouped under stage II. Similar observations have also been documented by earlier researchers as discussed hereunder. Cytological examination of regional lymph node aspirates of 152 dogs affected with mast cell tumour revealed an incidence of 63.8% and 36.2% cases which belonged to stage I and II respectively[12]. However no such nodal metastasis was observed in a six years old dog affected with cutaneous MCT[13]. The presence of nodal metastasis has been considered as a negative prognostic indicator for MCT in dogs[19].

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