COMPANION OR PET ANIMALS

Lingual mast cell tumour in a cat

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SUMMARY

A 12-year-old male neutered domestic shorthair cat was presented for staging and treatment recommendations of a lingual mast cell tumour (MCT). Cytology after fine-needle aspiration of the mandibular lymph nodes revealed regional metastasis. There are limited reports of the biological behaviour, response to treatment and overall prognosis of feline oral MCT. The clinical presentation, cytological and histological features, and response to treatment of a feline lingual MCT are discussed.

BACKGROUND

Mast cell tumours (MCTs) are one of the most common tumours in cats, accounting for up to 15 per cent of all tumours in this species (Pulley and Stannard 1990, Henry and Herrera 2013). Feline MCT most commonly arise in three distinct locations: skin, spleen and intestine (Withrow and others 2013). There are rare reports of oral involvement (Stebbins and others 1989) and a single case report of a sublingual MCT (Wright and Chretin 2006). The staging approach to feline MCT has not been standardly defined as in dogs; staging for canine patients includes assessing regional lymph nodes with cytology, abdominal ultrasound ±liver and spleen cytology, and thoracic radiographs. While not useful in the dog, buffy coat screening may be more helpful in the cat as mastocytosis is caused almost entirely by mast cell neoplasia (Skeldon and others 2010). Its role in peripheral feline mast cell disease is undefined. The biological behaviour of feline MCT ranges from benign to malignant and is highly dependent on the location and histological appearance. Feline cutaneous MCTs have a very low rate of metastasis; anisocytosis, hyperchromasia and mitotic activity appear to indicate likelihood of metastasis (Mauldin and Peters-Kennedy 2016). Solitary cutaneous feline MCTs usually have a benign behaviour with good response to local surgical excision. However, multiple cutaneous or recurrent tumours, primary splenic disease and intestinal MCT typically carry a more guarded to grave prognosis (Litster and Sorenmo 2006).

The Patnaik grading system used in dogs cannot be applied to feline MCT as there is no widely accepted grading scheme for feline MCT (Blackwood and others 2012, Mauldin and Peters-Kennedy 2016). Histologically, feline MCT can be divided into two groups that may correlate with prognosis: the mastocytic form, similar to MCT in dogs, and the atypical form. The mastocytic form is further divided into well-differentiated or pleomorphic categories. The majority of cases are classified as well-differentiated, which is associated with a more benign biological behaviour. While the pleomorphic form is less commonly identified, prognosis seems to be debatable (Johnson and others 2002, Sabattini and Bettini 2010, Blackwood and others 2012).

Surgery and radiation are typically employed for local control of cutaneous MCT in cats. Unlike in dogs, however, quality and quantity of surgical margins are not predictive of outcome and recurrence rates (Molander-McCrary and others 1998, Litster and Sorenmo 2006). Strontium-90 (^{90}Sr) plesiotherapy has been used in treatment of cutaneous MCT with local control in 98 per cent of cases (Turrel and others 2006). Surgery is also recommended as a first-line therapy in visceral forms of feline MCT; while cats with splenic disease can have an increased survival time after splenectomy, intestinal MCTs can carry a more guarded prognosis (Halsey and others 2010). Systemic treatment with chemotherapy may help improve tumour control and survival time when radiation or surgery is not possible or has been unsuccessful. Lomustine has been shown to have antitumour activity in cats with MCT with a response rate of 50 per cent (Rassnick and others 2008). However, cats in this paper also received vincristine, vinblastine, cyclophosphamide and chlorambucil, and other papers have limited data supporting these agents' utility (Litster and Sorenmo 2006). In another feline oral MCT case report, lomustine and methylprednisolone resulted in a complete remission of at least nine months (Wright and Chretin 2006). Receptor tyrosine kinase inhibitors have also been reported in cats, although major studies using toceranib are lacking in comparison to canine MCT literature (Isotani and others 2010, Daly and others 2011). Corticosteroids are often employed, although there is no proven efficacy in the treatment of feline MCT. In the case of gross, bulky MCT disease, antihistamines are also warranted (Henry and Herrera 2013).

CASE PRESENTATION

A 12-year-old male neutered domestic shorthair cat was presented to the Louisiana State University Veterinary Teaching Hospital (LSU VTH) for further treatment recommendations of a previously excised mass on the ventral aspect of the tongue, rostral to the lingual frenulum. The referring veterinarian originally noted the mass during routine dental prophylaxis; the cat was overall feeling well, except for recurrent urinary issues. After incisional biopsy, a diagnosis of round cell tumour was made

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based on histopathology. On routine H&E staining, the round cells had moderately abundant eosinophilic cytoplasm with frequent binucleated and multinucleated cells arranged in solid sheets and rows throughout the stroma. Differentials for the round cell tumour included plasmacytoma or pleomorphic MCT.

On referral to the LSU VTH, physical examination was unremarkable aside from a flat, approximately 3-mm ulcerated plaque on the right ventral aspect of the tongue (Fig 1). Staging tests performed included complete blood count, serum biochemistry, thoracic radiographs, abdominal ultrasound and fine-needle aspirate and cytology of the mandibular lymph nodes, liver, spleen and jejunal lymph nodes; the jejunal nodes were enlarged on abdominal ultrasound and easily accessible. LSU clinicians also requested a microscopic histopathology description with special stains. Buffy coat smear and bone marrow biopsy were not performed.

INVESTIGATIONS

Cytological evaluation of the fine-needle aspirates of both mandibular lymph nodes revealed an increased mast cell population (Fig 2). The mast cells were individualised to rarely in close association (3–4 cells) and exhibited moderate anisocytosis and anisokaryosis. Nuclei were round, variably located and ~1–2 times the size of a red blood cell. Further nuclear morphology could not be assessed due to degree of granularity. These cells had a moderate amount of basophilic cytoplasm that contained many fine purple granules. Free purple granules, cytoplasmic fragments and lysed nuclei were in the background. The cytological interpretation was consistent with metastatic mast cell disease; however, a reactive population could not be entirely excluded. Results of the other staging tests were unremarkable.

On further histopathological evaluation, the submitted lingual mass was non-encapsulated, poorly circumscribed and composed of round to polygonal cells arranged in dense sheets with small amounts of intervening/supporting collagenous stroma. Cell borders were usually distinct and cytoplasm was moderately abundant and eosinophilic to amphophilic with occasional fine granularity. Nuclei were round to oval with stippled chromatin and small inconspicuous nucleoli. A high percentage of cells were multinucleated giant cells with up to 15 nuclei per cell. Eosinophils were infrequently observed and mitotic figures were not observed in 10 high-power fields (Fig 3). The mass extended to several margins. Approximately 60 per cent of tumour cells had faintly positive metachromatic cytoplasmic granules with toluidine blue special stain (Fig 4). The final diagnosis was feline pleomorphic MCT.

DIFFERENTIAL DIAGNOSIS

MCTs are often distinguished from other round cell neoplasms including plasmacytoma, lymphoma, histiocytoma and transmissible venereal tumours by their cytoplasm loaded with coarse

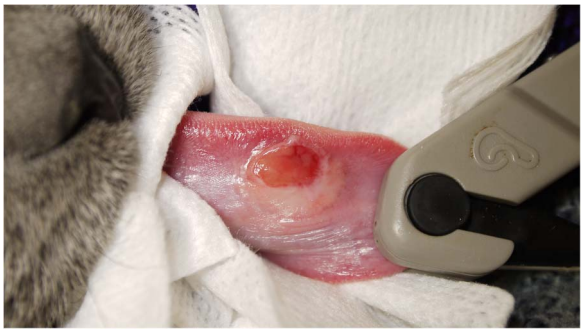

FIG 1: Initial presentation at referral. Approximately 3-mm-diameter ulcerated mass on ventral surface of the tongue

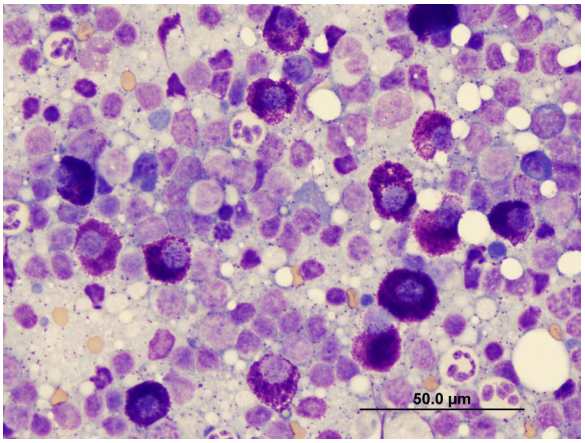

FIG 2: Cytology of a fine-needle aspirate of the metastatic right mandibular lymph node. Wright-Giemsa, ×50 objective

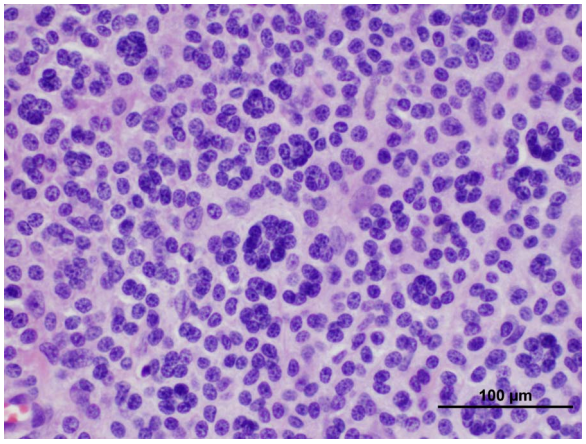

FIG 3: Mast cell tumour with sheets of minimally granulated mast cells including multiple multinucleated giant cells (H&E stain; bar=100 µm)

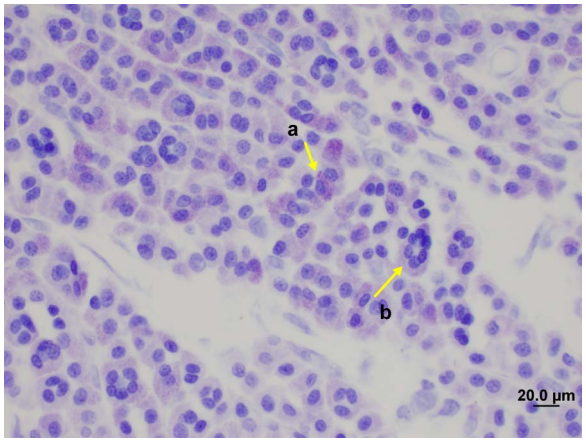

FIG 4: Positive red-purple granules in mast cells with toluidine blue special stain. Moderate (a) to faint (b) cytoplasmic metachromasia; bar=20 µm

metachromic granules. However, as demonstrated in this case, occasionally mast cell granules do not stain well with routine stains. Therefore, the importance of applying special histological stains such as toluidine blue to identify mast cells by their red-purple cytoplasmic granules is highlighted (Wilcock and others 1986, Mauldin and Peters-Kennedy 2016).

TREATMENT

The patient received a single dose of 100 Gy of ^{90}Sr plesiotherapy following incomplete excision. The patient was started on prednisolone (1 mg/kg orally once daily) and chlorambucil (0.2 mg/kg orally every other day) with the intent of continuing treatment for at least six months after diagnosis if there was a good response to therapy. Chemotherapy was instituted due to the metastatic nature of the neoplasm; type of chemotherapy was agreed upon due to ease of the ease of administration (oral and at home) of chlorambucil.

OUTCOME AND FOLLOW-UP

Approximately two months following diagnosis, the patient was in remission and chlorambucil was discontinued due to an unrelated diagnosis of recurrent urethral obstruction. At least 11 months following diagnosis, there is no gross evidence of disease recurrence on the ventral lingual surface. However, repeat aspirates of the aforementioned metastatic lymph nodes again showed evidence of mast cell invasion; however, hepatic and splenic aspirates showed no evidence of disease. No further therapy has been instituted as the cat has continued to have ongoing urinary issues associated with its previous perineal urethrostomy surgery.

DISCUSSION

Complete staging for MCTs and other round cell tumours should always include aspiration and cytological evaluation of the regional draining lymph node, even if normal on palpation (Withrow and others 2013). In this case, the mandibular lymph nodes palpated normal yet cytological evaluation revealed regional metastatic disease.

Limited information regarding treatment and prognosis of oral MCTs in feline patients is available. In this case, there was evidence of regional metastasis suggesting a more malignant biological behaviour; yet following incomplete excisional biopsy, good local control was achieved with postoperative plesiotherapy. The value of chemotherapy in this patient is questionable as the treatment protocol was stopped after only two months duration. Chlorambucil and prednisolone may have had antitumour activity as the cat had no evidence of locoregional recurrence while receiving chemotherapy; chlorambucil was well tolerated at a dose of 0.2 mg/kg orally every other day. It is unclear to the authors whether continuing the chemotherapy protocol indefinitely would have prevented eventual nodal recurrence of disease.

Future retrospective and prospective studies evaluating feline oral MCT grade in conjunction with stage and response to therapy are needed. Indeed, the authors' ability to decipher the response to chemotherapy and plesiotherapy in this patient was clouded by underlying disease. More information is needed about the true utility of chemotherapy in feline MCT patients.

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Contributors BCS wrote the initial draft of this document and oversaw some of the cat's treatment. BKF oversaw treatment and made final edits to the case report. DE contributed to the histopathological evaluation. SDG and SD contributed to the cytological evaluation.

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