

MAST-CELL TUMORS

BASICS

OVERVIEW

- Tumor arising from mast cells
- Mast cells are connective tissue cells that contain very dark granules; the granules contain various chemicals, including histamine; they are involved in immune reactions and inflammation; mast cells can be found in various tissues throughout the body
- Mast-cell tumors are graded as well differentiated (Grade 1), intermediately differentiated (Grade 2), and poorly differentiated or undifferentiated (Grade 3); in general, the more differentiated the mast-cell tumor, the better the prognosis
- Differentiation is a determination of how much a particular tumor cell looks like a normal cell; the more differentiated, the more like the normal cell

SIGNALMENT/DESCRIPTION of ANIMAL

Species

- Dogs and cats

Breed Predispositions

- Dogs—boxers and Boston terriers
- Cats—Siamese, susceptible to histiocytic cutaneous mast-cell tumors

Mean Age and Range

- Dogs—mean age, 8 years
- Cats—mastocytic form occurs at mean age of 10 years
- Cats—histiocytic form occurs at mean age of 2.4 years
- Reported in animals less than 1 year of age and in cats as old as 18 years of age

SIGNS/OBSERVED CHANGES in the ANIMAL

- Depend on the location and grade of the tumor

Dogs

- Tumor on the skin or under the skin (known as “subcutaneous”), may have been present for days to months
- Tumor may have appeared to fluctuate in size
- Recent rapid growth after months of inactive or subtle growth is common
- Recent onset of redness (known as “erythema”) and fluid build-up (known as “edema”) most common with high-grade skin and subcutaneous tumors
- Extremely variable; may resemble any other type of skin or subcutaneous tumor (benign and cancer [malignant]); may resemble an insect bite or allergic reaction
- Primarily a single skin or subcutaneous mass; but may have multiple masses located in various parts of the body (known as “multifocal” mast-cell tumors)
- Approximately 50% of mast-cell tumors are located on the trunk and perineum (area between the anus and vulva (female) or scrotum (male)); 40% on extremities; 10% on the head and neck region
- Lymph nodes may be enlarged in or near the area of the tumor (known as “regional lymphadenopathy”)—may develop when a high-grade tumor spreads (metastasizes) to the lymph nodes
- Enlarged liver (known as “hepatomegaly”) and enlarged spleen (known as “splenomegaly”)—features of wide-spread (disseminated) mast-cell cancer

Cats

- Lack of appetite (known as “anorexia”)—most common complaint with mast-cell tumor of the spleen
- Vomiting—may occur secondary to mast-cell tumors of the spleen or gastrointestinal tract
- Skin mast-cell tumors—primarily found in the tissue under the skin (subcutaneous tissue); may be papular (small, solid elevations) or nodular, single or multiple, and hairy or without hair (known as “alopecic”) or have an ulcerated surface; slight predilection for the head and neck regions
- Mast-cell tumor of the spleen—enlarged spleen (splenomegaly) is only consistent finding
- Intestinal mast-cell tumor—firm, segmental thickenings of the small intestinal wall; spread (metastasis) to the mesenteric lymph nodes, spleen, liver, and (rarely) lungs

CAUSES

- Unknown

RISK FACTORS

- Hereditary
- Previous inflammation

TREATMENT

HEALTH CARE

Dogs

- Aggressive surgical removal of the mast-cell tumor and surrounding tissue—treatment of choice
- Microscopic evaluation of the entire surgically removed tissue—essential to determine completeness of surgical removal and predict the biologic behavior of the tumor; if tumor cells extend close to the surgical margins, perform a second aggressive surgery as soon as possible
- Lymph-node involvement, but no generalized involvement in other parts of the body—aggressive surgical removal of the affected lymph node(s) and the primary tumor required; follow-up chemotherapy useful to prevent further spread of tumor cells (metastasis)
- Primary tumor and/or affected lymph nodes cannot be excised for microscopic disease—chemotherapy may have short-term benefit to make the patient feel better (known as a “palliative benefit”) of 1 to 4 months
- Generalized spread of tumor cells (metastasis) to other parts of the body—surgical removal of primary tumor and affected lymph nodes are of minimal benefit, but chemotherapy may have short-term palliative benefit (less than 2 months)
- Radiation therapy—good treatment option for mast-cell tumor of the skin in a location that does not allow aggressive surgical removal; if possible, perform surgery before radiation therapy to reduce the tumor to a microscopic volume; tumors on an extremity respond better than do tumors located on the trunk

Cats

- Surgery—treatment of choice for mast-cell tumors of the skin
- Surgical removal of the spleen (known as “splenectomy”)—treatment of choice for mast-cell tumors of the spleen
- Surgical removal of the spleen (splenectomy) and chemotherapy—may be beneficial when mast cells are circulating in the blood (known as “mastocythemia”) accompanies mast-cell tumors of the spleen

SURGERY

- Excisional biopsy with wide margins reasonable for very small tumors
- Incisional biopsy of large mast-cell tumors is recommended to obtain a tumor grade, predict prognosis, and establish a treatment plan; consider pretreatment with antihistamine therapy prior to incisional biopsy
- Biopsy of lymph nodes and other suspicious internal organs—appropriate
- Complete surgical removal with 3-cm margins in all planes recommended for all moderate Grade 2, high Grade 2, and Grade 3 tumors; margins of 2 cm or less may be adequate for Grade 1 and low Grade 2 tumors
- Surgical removal of regional lymph nodes recommended for all high Grade 2 and Grade 3 tumors

MEDICATIONS

Medications presented in this section are intended to provide general information about possible treatment. The treatment for a particular condition may evolve as medical advances are made; therefore, the medications should not be considered as all inclusive.

- Combination chemotherapy— prednisone, vinblastine, cyclophosphamide; recent information suggests that lomustine may be more effective than cyclophosphamide
- Prednisone—short-term remission only when used alone (although occasional exceptions do occur); is beneficial in some cases to achieve reduction in tumor load before surgery
- Other chemotherapeutic drugs (such as lomustine, vinblastine, cyclophosphamide)—add to length of remission of prednisone-sensitive tumors
- Mast-cell tumor of the skin not controlled by surgery or radiation therapy—medical treatment appropriate; in author’s experience, prednisone and chemotherapy not beneficial for aggressive skin (cutaneous) tumors in cats
- Prednisone-resistant tumor—chemotherapy does not appear to be beneficial
- Intestinal tumor and systemic mastocytosis (abnormal proliferation of mast cells in various tissues throughout the body) after surgical removal of the spleen (splenectomy) in cats—prednisone and chemotherapy indicated
- Measurable tumor (dogs)—vincristine alone induced partial remission in 21% of patients
- Histamine-blocking agents (such as cimetidine)—helpful, particularly for systemic mastocytosis (abnormal proliferation of mast cells in various tissues throughout the body) or when massive histamine release is a concern

FOLLOW-UP CARE

PATIENT MONITORING

- Evaluate any new masses microscopically
- Evaluate regional lymph nodes at regular intervals to detect spread (metastasis) of Grade 2 to 3 tumors
- Check complete blood count (CBC) at regular intervals, if patient is receiving chemotherapy
- Check liver enzymes on serum biochemistry profile, if patient is on long-term lomustine therapy

POSSIBLE COMPLICATIONS

- Bleeding
- Bloody inflammation of the gastrointestinal tract (known as “hemorrhagic gastroenteritis”)
- Poor wound healing, if surgical margins inadequate

EXPECTED COURSE AND PROGNOSIS

Dogs

- Location of primary tumor is important prognostic factor: tumors located around the prepuce (known as “peripreputial”); beneath the claw (known as “subungual”); around the anus (known as “perianal”); in the mouth (known as “oral”); and on the muzzle region are associated with more undifferentiated tumors and poorer prognosis
- Tumors of the inguinal, perineal and muzzle regions tend to be more aggressive than their histologic grade might suggest; these tumors should always be considered to have the potential for metastasis
- Historical survival data (Bostock) after surgery only indicates the following survival times—Grade 1, 77% alive; Grade 2, 45% alive; Grade 3, 13% alive; the relevance of these historical statistics is questionable as patients with mast-cell tumor currently undergo aggressive staging and are treated more aggressively with surgery (that is, surgical removal of regional lymph nodes)
- Lymph-node metastasis—degree of lymph-node involvement does affect prognosis; patients with Grade 2 mast-cell tumors with microscopic confirmation of lymph-node metastasis, without evidence of lymph-node enlargement, have a very good long-term prognosis when complete surgical resection of the primary tumor and lymph node is performed, followed by a 6-month chemotherapy regimen; survival time for patients with Grade 3 tumors also is improved, compared to less-aggressive surgery or no follow-up chemotherapy, but most do not survive beyond 1 year; when the lymph nodes are enlarged grossly, prognosis remains guarded (even when aggressive resection and chemotherapy are administered)
- **Prednisone** alone—effectively induced remission and prolonged survival time in 20% of patients with Grade 2 or 3 tumors; only one of the five responding patients had documented lymph-node metastasis when prednisone was initiated

Cats

- Single mast-cell tumor of the skin—prognosis excellent; rate of recurrence low (16% to 36%) despite incomplete excision; less than 20% of patients develop metastasis
- Survival after surgical removal of the spleen (splenectomy) for mast-cell tumor of the spleen—reports of greater than 1 year
- Concurrent development of mast cells circulating in the blood (mastocytomia)—prognosis poor; prednisone and chemotherapy may achieve short-term remission
- Intestinal tumor—prognosis poor; survival times rarely greater than 4 months after surgery

KEY POINTS

- Twenty percent of dogs diagnosed with a mast-cell tumor will have two or more unrelated mast-cell tumors in their lifetimes; each of these has the potential for being cured with appropriate surgical intervention
- Fine-needle aspiration and microscopic examination should be performed as soon as possible on any new mass
- Appropriate surgical excision should be done as soon as possible on any new mast-cell tumor

