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Mast cell tumours

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**Overview:**
Canine patients are commonly presented to veterinary clinics for evaluation of cutaneous and subcutaneous masses. One of the most common tumors with malignant potential that is diagnosed in this situation is the mast cell tumor. The importance of choosing an appropriate treatment strategy with these tumors is paramount; however, despite many studies dedicated to this topic, much is still not known.

Mast cells play several important roles in dogs and are integral to host defense mechanisms. Mast cell tumors are the most common canine cutaneous neoplasm, and several breeds including Boxers, bull terriers, and Labrador retrievers are noted to regularly develop mast cell tumors. When a mast cell tumor is suspected, the initial step in the diagnostic process is generally fine-needle aspiration. As mast cells exfoliate readily, diagnosis via cytology tends to be relatively straightforward.

After a mast cell tumor has been confirmed, clinicians must decide what further diagnostics should be considered prior to primary tumor treatment. For mast cell tumors on the lower limb, fine-needle aspiration of the draining lymph node is highly recommended as this can affect surgical dose and post-operative adjuvant therapy recommendations. If a mast cell tumor is located on the pelvic limb proximal to the popliteal lymph node, the treating clinician should consider an abdominal ultrasound to evaluate the intra-abdominal lymph nodes. An abdominal ultrasound can also be recommended to assess other locations where mast cell tumors can be found, most commonly the liver and spleen.

The mainstay of treatment for mast cell tumors is surgical removal. With mast cell tumors, the palpable mass often does not provide a complete picture for the location of the tumor as these tumors tend to have “tentacles” of mast cells extending from the bulky tumor itself. These areas of mast cells should also be removed during recurrence at a future date.

Several studies have evaluated outcomes with varying levels of margins. Additionally, there are now several studies about the outcome in cases with incomplete resections. There are many prognostic factors that have been evaluated in patients with mast cell tumors as well. Histologic grade and certain cellular characteristics (eg. mitotic index) are likely the most consistently evaluated factors, and these factors may impact recommendations. Chemotherapy is generally recommended for higher grade mast cell tumors (grade 3 or grade 2 with high mitotic index) or situations where metastatic disease has been diagnosed. In cases with an incomplete resection, a second surgery or radiation therapy can be pursued.

**VSSO Symposium 2016:**
During the VSSO symposium in Napa, California (2016), mast cell tumors were discussed. A pre-event electronic survey was sent to the VSSO listserv with questions pertaining to mast cell tumors and similar questions were reviewed during the meeting with live polling. During the VSSO discussion a group of surgeons, medical oncologists, radiation oncologists, pathologists as well as other individuals with specific interest in oncology, were actively involved using live polling. All polling answers were recorded. It should be recognized that the polling group consisted of individuals attending the VSSO Symposium, so results are heavily weighted along those lines.

**Results:**
Over twenty questions related to mast cell tumors were asked at the VSSO Meeting. Responses below will be divided into three categories: Pre-operative, Intra-operative and Post-operative.

**Pre-operative:**
When asked if individuals are pre-treating with drugs such as histamine blockers and steroids, nearly ¾ (73%), said yes. The percentage of people performing incisional biopsies prior to definitive therapy was variable: 28% never perform an incisional biopsy and 1% always perform an incisional biopsy. Just over 70% will consider this step and perform a biopsy in some cases.

When treating a cutaneous mast cell tumor, 40% of polled individuals will always perform a pre-operative abdominal ultrasound, while a larger percentage (54%) do so only when the biopsy results demonstrate a grade II or III mast cell tumor. For those individuals that perform an abdominal ultrasound, 75% stated that they would aspirate...
the spleen and liver only if the ultrasound appearance was abnormal (15% would do so regardless of appearance).

The use of neoadjuvant chemotherapy remains uncommon with 87% of individuals using this technique rarely and only 11% administering neoadjuvant chemotherapy routinely. The utilized drugs can be seen in the Figure 1.

![Figure 1: Chemotherapy Administered](image)

After administering chemotherapy, 67% of individuals would use the original margin for their excision, whereas 33% would use the reduced margin, and 68% thought that neoadjuvant chemotherapy was useful in achieving a complete margin.

**Intra-operative:**

Seven questions specifically related to the management of lymph nodes in dogs with mast cell tumors were asked. In cases where a lymph node has been aspirated and the results are negative, 73% and 27% of polled individuals would not remove and would remove, respectively; however, in cases where a lymph node has been deemed to be positive for metastasis, 95% of people would remove the lymph node. In the case of a positive lymph node that has been removed, 95% of polled individuals would also utilize post-operative radiation therapy to treat the nodal bed. When asked if the VSSO should endorse the histologic classification schemes of Weishaar and cytologic criteria of Krick, polled individuals said “yes” in 35% and 23%, respectively, although over 50% of people stated that they were not able to comment on these questions. Only 16% of people stated that they are regularly performing sentinel lymph node mapping, and of those, the following methods were used (methylene blue: 18%, lymphscintigraphy: 10%, and lipiodol: 2%).

When faced with a dermal mast cell tumor on the trunk (without a biopsy), the following margins would be taken: 2 cm (48%), 3 cm (24%) and proportional system (27%).

**Post-operative:**

In the experience of the individual answering the question, a 2 cm lateral margin with removal of a deep fascial plane was successful for removing a grade III mast cell tumor in only 44% of cases. When considering grading classification systems, 71% of people chose the Kiupel system, whereas 29% of people did not feel that they had enough experience comparing the 2 systems (Patnaik vs. Kiupel). Polled individuals were asked what definition they generally choose for “clean but close” and the following results were obtained: tumor cells extending within 2 m (36%), tumor cells extending within 3 mm (36%), and tumor cells extending within 5 mm (28%). Most people (73%) do not regularly request molecular testing such as proliferation markers and/or c-kit mutation status for grade II tumors.

**Discussion/Conclusions:**

1. Many individuals still pre-treat with medications to control clinical signs generally associated with mast tumor degranulation despite a lack of data to support this practice.
2. Many polled individuals will consider performing an incisional biopsy.
3. Neoadjuvant chemotherapy is uncommonly administered.
4. Interestingly, over a ¼ of people will remove a lymph node deemed to not contain neoplastic cells by cytological evaluation.
5. The approach to surgical margins is highly variable, and over ½ of polled individuals do not think that a 2 cm lateral margin is sufficient for grade III mast cell tumors.
6. There was no clear agreement on the definition of “clean but close” amongst the polled individuals.