Canine Mast Cell Tumors

Mast cell tumors (MCT) are very common in dogs, though extremely rare in humans. Mast cells are a special type of blood cell that is normally involved in allergies and inflammation. Tumors are named for the type of cell they originated from, so MCT is a type of tumor that grows when one or more mast cells become abnormal and start multiplying, usually within the skin but occasionally in other tissues or organs. ***MCT can look and feel like many other tumors***, so it is impossible to know if a lump is a MCT without looking at cells under the microscope. MCT are generally thought of as malignant (cancerous) tumors that have the ability to regrow after surgical removal, and some may spread to other organs.

Mast cells contain substances including histamines (what we take antihistamines to counteract) that can be released into the bloodstream and potentially cause effects distant from the immediate area around the tumor. These might include stomach ulcers, bleeding and/or allergic reactions (anything from swelling around the tumor to life-threatening shock).

These histamines can be released in large amounts when the tumor site is clipped and scrubbed for surgery, or during or after the surgery itself. Histamines and other inflammatory chemicals can cause low blood pressure and shock during surgery, and swelling and poor healing after surgery. Your dog may have complications, therefore, that could cause the price for surgery or aftercare to be higher than expected.

If the surgery incision fails to heal properly, long term care with bandages, rechecks and antibiotics may be needed. This doesn't mean that surgery shouldn't be performed, just that it has a higher risk than most tumor removals for problems afterward.

The skin is the most common site for MCT in the dog. These tumors are locally invasive, which mean they can extend outward and invade nearby tissues, even if they feel like a single, solid lump. They also can metastasize (spread) to other areas of the body. The most common sites of spread are the lymph nodes, bone marrow and liver/spleen.

The initial evaluation of a dog with a MCT requires a biopsy or fine needle aspirate, wherein either the entire tumor or some cells from the tumor are sent to the laboratory for analysis. A complete blood count, serum chemistry profile, urinalysis, lymph node aspirate and abdominal ultrasound (to look especially at the liver and spleen) may be done as well. In some cases, we may also X-ray the chest. The purpose of all this testing is to make sure that cancer has not already spread beyond the tumor and that other organs have not been affected.

The biopsy sample is sent to a pathologist. The pathologist assigns a "grade" to the tumor based on its appearance under the microscope. We use the grade to help predict how the tumor will behave. This influences both the prognosis and the recommended treatment. Low or intermediate-grade tumors, Grades I and II, are unlikely to spread. Complete

surgical removal of the tumor may be the only treatment required. High-grade or Grade III tumors, or tumors with lymph node spread, have a higher chance of spreading. If the tumor is Grade III we look very carefully for spread and consider using chemotherapy in addition to surgery. There are a few locations on the body that are associated with a higher likelihood of spread of cancer, such as the mouth and around or near the anus. We may treat tumors more aggressively if they were in one of these areas, even if the Grade of tumor is less than III.

Treatment Options

Treatment options for cutaneous MCT include surgery, radiotherapy, chemotherapy and symptomatic treatment. Surgery is usually our first and best treatment choice. Because these tumors are invasive, the surgeon must remove the tumor along with a large area of normal appearing tissue both around and underneath it to ensure complete removal. *MCT are deceptive, and sometimes what we can see and feel represents only a small part of the tumor.*

Even when a large margin is taken, sometimes tumor cells are still left behind. These would be seen by the pathologist examining the tumor under the microscope. If tumor cells extend to the edge of the tumor, the margin is said to be "dirty." If the edges of the sample show no tumor cells, the margin is termed "clean."

When the margin is dirty, and it is suspected that not all of the cancer was removed, additional treatment is needed; otherwise, there is a high likelihood that the tumor will regrow. Options include further surgery, radiotherapy or chemotherapy. It may not always be possible to perform additional surgery depending on the location of the tumor.

If additional surgery is not possible, another option is the use of a local form of radiotherapy, or radiation treatment. This involves the local application of a powerful form of radiation directly onto the tumor area. This treatment is most effective when treating *microscopic* tumor cells left over after surgery, but can be used against larger tumors as well. The current radiotherapy protocol at the UW- Madison School of Veterinary Medicine for MCT consists of a total of 15 treatments, delivered Monday through Friday over three weeks. Using the protocol after incomplete surgery, approximately 85-95% of dogs will live for two years without evidence of tumor regrowth. Cost for all 15 treatments, including anesthesia and hospitalization, is usually $3200-4000. The veterinary school is currently the only place in Wisconsin where this treatment can be done.

It is important to remember that surgery and radiotherapy are **local** treatments and have no effect on tumor cells that may have spread beyond the original tumor location. Tumors with a higher chance of spreading, called "high-grade" tumors, are tumors arising from the mouth, toenail, perianal (rectal) region and scrotum, or tumors that have spread to a lymph node. These may be treated with chemotherapy in addition to surgery.

Prednisone ("cortisone") is one effective chemotherapy agent. This is often combined with another drug, vinblastine, given as an injection. The available evidence strongly suggests that dogs with "high-risk" MCT may have a better outcome with chemotherapy than with surgery alone. Sixty percent of dogs with high-risk MCT will live two years with a combination of surgery and chemotherapy, compared with only 50% alive after eight months with surgery alone.

As mentioned above, we may prescribe additional medications to prevent tumor related side effects. These include an antihistamine (Benadryl, Atarax) and an antacid. We also ask that you watch your pet closely for problems such as vomiting (especially if there is fresh blood in the vomited material), diarrhea, loss of appetite or a very dark or black stool (this is a sign of digested blood and hence bleeding into the stomach or intestines). If any of these signs occur, we ask that you contact either us or the Animal Emergency Center immediately.

The prognosis for cutaneous MCT depends upon several things, including the microscopic appearance (grade) of the tumor, the location of the tumor and the presence or absence of spread. Many of these tumors are successfully treated if there is no evidence of

spread at the start of treatment. Any future "lumps and bumps" detected should be evaluated with a fine needle aspirate, because some dogs that have had one MCT are at greater risk for the development of additional, unrelated MCT. Early diagnosis and removal of these tumors will increase the likelihood of successful treatment.

MCT can occasionally arise inside the body, in the spleen or other organs. For those MCT that have already spread, cannot be removed or that occur in locations other than the skin, the prognosis is more guarded. The goal of treatment for these patients is to attempt to shrink the tumors with chemotherapy, and to maintain a good quality of life for as long as possible by controlling symptoms caused by the presence of mast cells in the body.

If you would like more information about mast cell tumors or your pet needs cancer treatment, we will usually refer you either to the veterinary school at the University of Wisconsin in Madison, or to a board certified oncologist (cancer specialist) at the Animal Emergency Center.