MAMMARY TUMORS 2024: DOGS VS CATS

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CANINE MAMMARY TUMORS (CMT)

WHAT IS IT:

Mammary tumors are one of the most common tumors in female dogs and cats, but the disease varies considerably. A simple rule for dog mammary tumors is that 50% are benign, 50% are malignant, and approximately 50% of those will metastasize. Therefore 75% of dogs with mammary tumors will be cured with surgery alone.

WHAT I SAY:

Mammary tumors are one of the most common tumors in female dogs, and the most common tumors in female intact dogs. Mammary cancer in dogs is similar to breast cancer in women in that early detection is important. Dogs have 10 glands, and I recommend monthly exams at home. Mammary cancer in dogs is different than women in that half are benign and only 25% will need chemotherapy after surgery. But 50% of cases will present with multiple masses, so we need to examine for more masses.

RISK FACTORS:

It is well accepted that spaying dogs before 2.5 years of age is protective against the development of cancer. Schneider et al showed the risk rose to 26% for dogs spayed after the second heat, compared to 0.5% and 8% if spayed before 1st or 2nd estrus, respectively. The protective effect is not seen after 2 estrus cycles, likely because the sex steroid hormones have already had their primary effect on target cells. Intact females and females spayed after 2 years of age have a seven-fold greater risk of neoplasia compared to those spayed before 6 months of age. Body condition and diet in dogs with lean body condition at 9-12 months also has reduced risk. Hormone therapy can increase benign and malignant tumors by twofold.

CLINICAL APPEARANCE:

Middle-aged (9 to 11 years old) female intact dogs are most often affected, with an increased incidence beginning at about 6 months of age. The incidence is about 2 in 1000. Male dogs are not completely protected, and 1% occur in male dogs**.** Half of cases in dogs and cats will present with multiple masses. Dogs can have concurrent benign and malignant masses, so all excised lesions must be submitted for histology.

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DIAGNOSTIC WORK UP: Measure the primary tumor(s) and describe if it is fixed, ulcerated, and invasive into surrounding tissues. Cytology of the tumor may help to distinguish non-mammary tumors such as MCT or lipomas, but cytology alone is typically not helpful to determine if the mammary tumor is benign or malignant.

Lymph nodes should also be evaluated for metastasis and staging. Palpation alone is not adequate, and pre-operative cytology of palpable lymph nodes is recommended to determine disease extent. Metastasis may be present in lymph nodes that palpate normally. In addition to a minimum database (CBC, chemistry panel and urinalysis), imaging is recommended especially if malignancy is confirmed, as approximately 50% of malignant mammary tumors will metastasize. Three-view chest radiographs and abdominal ultrasound are important to rule out pulmonary metastasis and distant visceral metastasis. Three-views significantly decreases the false-negative rate. Metastasis is typically to regional lymph nodes and lung, but liver, abdominal lymph nodes, and bone may also be involved. A coagulation profile is recommended in cases of inflammatory mammary carcinoma (IMC) to rule of DIC.

Histology: Biopsy (incisional or excisional) and histology are required for a diagnosis. Patients can have concurrent benign and malignant masses, so all excised lesions must be submitted for histology. The most

common malignancy is complex carcinoma. Histology of carcinomas is based on tubule formation, nuclear pleomorphism and mitotic index and is prognostic. Mixed mammary tumors typically consist of epithelial, myoepithelial and mesenchymal tissues.

PROGNOSTIC FACTORS: The 3 most important prognostic factors are size (> 3 cm), lymph node metastasis, and WHO stage (size, LN, metastasis). Histology is also prognostic (see below). In addition to histology, additional prognostic factors include skin ulceration, invasive growth or fixed to adjacent tissue (29 months vs 12 months), increased age, GSD breed, advanced stage, tumor size >3 cm, high grade, nodal metastasis, not spayed, and vascular and/or lymphatic invasion, and male gender. Higher clinical stage at diagnosis is also associated with a worse prognosis (larger tumors, LN involvement, distant metastasis)

TREATMENT:
Complete surgical excision is the goal for dogs. For dogs, lumpectomy or simple mastectomy is recommended.
Surgery: Surgery is the treatment of choice for mammary tumors when there is no evidence of distant metastasis based on staging tests. *The type of surgery in dogs is not prognostic for survival if margins are complete based on histology*. Surgery can be minimal as long as the excision is adequate. Most commonly, this will be a lumpectomy for small lesions (<0.5 cm) or a partial mastectomy. It is recommended to always remove the inguinal lymph node with caudal gland tumors and the axillary lymph node only if metastasis is recommended.
An exception to the rule is if the dog is intact (and staying intact). In a 2008 study, 58% of intact dogs who underwent a regional mastectomy developed a second mammary tumor in the ipsilateral chain, and 75% were malignant. In these cases, unilateral radical mastectomy should be considered.

The effect of **ovariohysterectomy** (**OHE**) at the time of mammary tumor excision is controversial. The concern is that ER (estrogen receptor) positive tumors would benefit from the hormone ablation effects of OHE. Two studies have demonstrated survival advantage of OHE. In one study, dogs that were spayed within 2 years of mammary tumors or at time of tumor excision survived 45% longer than FI dogs or spay was greater than 2 years. Another study showed that spayed dogs were more likely to survive at least 2 years after surgery, especially for complex carcinomas. A practical issue is you may not know if the mass is benign or malignant at the time of surgery. But if malignancy is suspected, OHE should be recommended.

Chemotherapy: The goal of chemotherapy is to achieve is to delay the metastatic disease in high-risk patients, including high grade tumors and those with tumor emboli on histology. Various protocols have been adapted from human oncology, and often include doxorubicin, 5-FU (5-fluorouracil) cyclophosphamide, mitoxantrone, paclitaxel and carboplatin. Additional studies are needed to confirm the role of chemotherapy. COX-2 inhibition with NSAIDs may also have an anti-cancer activity.

PROGNOSIS: The prognosis is extremely variable. Dogs with benign mammary tumors are cured with a complete excision. For dogs with malignant tumors, the prognosis ranges from cure for a low-grade malignancy to rapid recurrence and/or metastasis within the first year. The three most important prognostic factors are size > 3 cm, lymph node metastasis, and WHO stage (size, LN, metastasis). So, dogs with large tumors, lymph node positive, and distant metastasis have a worse prognosis.

For the malignant tumors, a better prognosis is associated with the histology of carcinoma in situ and adenocarcinomas. Of the carcinomas, solid carcinomas (MST = 6.5 months) have a worse prognosis than tubular or papillary carcinomas. Other tumors with poor prognosis are mixed malignant tumors (carcinosarcomas MST 18 months), sarcomas (MST = 10 months), and inflammatory mammary carcinoma (IMC) have a grave prognosis. An anaplastic high-grade invasive tumor with vascular or lymphatic invasion has a worse prognosis than a well-differentiated low-grade non-invasive lesion. These are definitely a heterogeneous group of tumors with variable prognoses.

FELINE MAMMARY CANCERS (FMC)
WHAT IS IT: Feline mammary tumors are the third most common tumor (after skin tumors and lymphoma), representing about 20% of tumors in the female cat. Mammary tumors in cats are generally malignant (80-90%), with adenocarcinomas most common, and metastasis is common (80%), typically to lungs, pleura and lymph nodes.

WHAT I SAY: FMC is like breast cancer in women in that it needs to be treated locally with aggressive surgery and followed with adjunct chemotherapy due to the high metastatic rates. Like dogs, half of cases will present with multiple masses, and both chains can be affected.

RISK FACTORS:
Siamese cats have a 2-fold risk of developing and have a higher incidence of malignancy with lymphatic invasion. Persian cats may have a higher incidence of benign tumors. Spaying cats is protective against the development of cancer. There is a 91% risk reduction if spayed < 6 months, 86% reduction if spayed 7-12 months, vs 11% reduction if OHE between 13-24 months. The protective effect is not seen after 2 years old. Hormone therapy (progesterone, estrogen) can increase benign and malignant tumors by threefold.

CLINICAL APPEARANCE: Tumors can be discrete or infiltrative, soft or firm, ulcerated and may be fixed to underlying tissues. Ulceration is common in cats and suggestive of malignancy.

DIAGNOSTICS: Early detection and diagnostics are key. As with dogs, mammary masses are often incidental findings during routine wellness exams in older females, or owners find them. Owners should be encouraged to palpate their cats monthly for skin and subcutaneous masses –See Something, Do Something (SSDS). Why Wait? Aspirate.®

The work up includes tumor measurement, lymph node evaluation, imaging (chest radiographs and abdominal ultrasound), and histology of the tumor. Incisional biopsy can be considered if a benign tumor is suspected, but in most cases, histology is performed on tissue removed at radical mastectomy. Size is the most reliable prognostic factor for cats. Unlike dogs, cats should be staged before surgery due to the high malignancy rate.

PROGNOSTIC FACTORS:
- Size matters! Size is the most reliable prognostic factor for cats. Finding tumors smaller than 2 cm is key
- Surgery type: radical mastectomy decreases recurrence locally
- Gender: male cats do poorly
- Histology: complex carcinoma MST 33 months vs 15 months for other carcinomas
- Grade: higher grade, shorter survival time
- Lymphatic invasion
- Higher clinical stage at diagnosis is also associated with a worse prognosis
- Inflammatory mammary carcinoma (IMC) has a similar poor prognosis to dogs

TREATMENT:
Surgery: Surgery is the first treatment of choice for mammary tumors when there is no evidence of distant metastasis based on staging tests. Unlike dogs, adjuvant chemotherapy is typically part of the recommended treatment protocol. ***The type of surgery in cats is different than dogs. The recommended surgery is radical mastectomy****, and staged bilateral radical mastectomy is recommended if bilateral disease is present.* Radical mastectomy reduces the risk of local recurrence. Local recurrence is >50% with incomplete resections. Underlying muscle and fascia should be removed en bloc. It is recommended to always remove the affected lymph node with the chain. In cats with unilateral disease, the benefit of bilateral surgery is not clear.

Chemotherapy The goal of chemotherapy is to achieve is to delay the metastatic disease in high-risk patients, including cats with poor prognostic factors. Additional studies are needed to determine the best protocols and survival advantage. Various protocols often include doxorubicin, cyclophosphamide, and carboplatin.
Radiation Unfortunately, there is little information about RT but can be considered as palliation for non-resectable tumors.

PROGNOSIS:
With partial mastectomy or incomplete excision, local recurrence rates are greater than 50%. The recommended surgery is radical mastectomy. Size is the most reliable prognostic factor for cats. Median survival time (MST) is based on tumor size with surgery alone:

<2 cm: > 3 years with mastectomy for females, 14 m for males
2-3 cm: 1-2 years for females, 5.2 months for males

> 3 cm: 4-6 months for females, 1.6 months for males

High grade is associated with a worse prognosis, as is clinical stage which takes into account size, lymph node metastasis, and distant metastasis.

More studies are needed on the survival advantage of post-op chemotherapy.
1-year survival: 33-50% surgery alone, 59% with adjuvant chemotherapy
2-year survival: 15-20% surgery alone, 37% with adjuvant chemotherapy

EARLY DETECTION:
I recommend owners do a monthly exam and show them how in my YouTube video. https://youtu.be/z_Ec2h5ZC-M I also recommend pet owners keep track with skin maps available on my website. https://drsuecancervet.com/skin-maps/

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