Mammary Tumors

Mammary Tumors in dogs and cats

- Mammary (or breast) tumors are common in female dogs, but rare in male dogs and cats.
- Surgical resection is recommended for the majority of mammary tumors.
- Chemotherapy may be required following surgery in some cases.
- The prognosis is good following surgical resection for most mammary tumors in female dogs, but the prognosis is worse for certain tumors in dogs and all mammary tumors in cats.

Risk Factors:

- Mammary tumors are more common in female dogs that are either not spayed or were spayed after 2 years of age.
- The risk of a dog developing a mammary tumor is 0.5% if spayed before their first heat (approximately 6 months of age), 8% after their first heat, and 26% after their second heat. Spaying does not provide a protective effect against mammary tumor development after 2 years of age.
- Cats spayed before 6 months of age have a 7-times reduced risk of developing mammary cancer and spaying at any age reduces the risk of mammary tumors by 40% to 60% in cats.
- Dogs treated with certain hormonal drugs, such as estrogens and progestins, may be at an increased risk of developing mammary tumors.
- Diet has also been implicated with mammary tumors more common in obese dogs and dogs fed home-made meals consisting of higher proportions of beef and pork and lower proportions of chicken.

Incidence and Prevalence:

- More than a quarter of unspayed female dogs will develop a mammary tumor during their lifetime. The risk is much lower for spayed female dogs, male dogs, and cats of either gender.
- In female dogs, 50% of mammary tumors are benign and 50% are malignant. However, few of the malignant mammary tumors are fatal.
- In contrast, over 85% of mammary tumors in cats are malignant and most of these have an aggressive biologic behavior (i.e., mammary tumors in cats tend to be locally invasive and metastasize to distant sites such as the lymph nodes and lungs).

Signs and Symptoms:

- A palpable mass underneath the skin of the abdomen is the most common findings in dogs and cats with mammary tumors.
- There may be a single mass or multiple masses. In fact, over 50% of dogs with mammary tumors will have more than one tumor.
- Dogs have 5 pairs of mammary glands which are numbered 1 through 5 from front to back. Although any gland can be affected, the majority (greater than 65%) of mammary tumors develop in the fourth and fifth mammary glands.
- Benign tumors are often small, well-circumscribed, and firm. Malignant tumors can be similar to benign tumors, but may also exhibit more aggressive behavior, such as rapid growth, poorly defined borders, fixation to skin or underlying tissue, and inflammation or ulceration.
- Inflammatory mammary carcinoma is an aggressive type of mammary tumor seen in dogs and humans. Dogs with inflammatory mammary carcinoma are often painful with swollen mammary glands. The swelling is often diffuse and can involve either a single mammary chain (i.e., all glands on either the left or right side) or all mammary glands. Other signs include inappetence, weight loss, generalized weakness, and swelling of one or both hind legs.

Treatment Options:

- Surgery is recommended for all mammary tumors except inflammatory mammary carcinoma. Inflammatory mammary carcinoma is generally NOT surgically removable.
- Treatment options are few and these are best handled by a veterinary oncologist.
- Advice from a veterinary surgeon is recommended for all animals with mammary tumors, particularly cats where more extensive surgery is recommended because of the high risk of metastasis.
- The type of surgery depends on the size, location, and number of mammary tumors.

- In general, surgery is conservative for dogs with mammary tumors and involves removal of either the mass alone or the affected mammary gland.
- However, in cats, more aggressive surgery is recommended with removal of one or preferably both mammary chains.

Diagnostic Tests:

Physical examination, blood tests (complete blood count and serum biochemistry), abdominal ultrasound, and chest radiographs are recommended for cats and dogs with mammary tumors.

- Physical examination is necessary to assess general health status; the number, size, and location of mammary tumors; and regional lymph nodes for evidence of metastasis (or spread) of the mammary tumor.
- Blood tests are recommended to assess general health status as many animals with breast cancer are older and may have other problems which should be considered when developing a treatment plan. Occasionally, a coagulation profile will also be recommended as a tendency for bleeding (disseminated intravascular coagulation) has been reported in some dogs with malignant mammary tumors.
- Abdominal ultrasound and chest radiographs are used to assess the presence or absence of metastasis to sites such as the regional and intra-abdominal lymph nodes, liver, and lungs.

"A fine-needle aspirate does not differentiate benign from malignant tumors and hence is not often performed."

- Similarly, a biopsy is not frequently recommended as the results will not change the type or extent of treatment (i.e., surgery). However, a fine-needle aspirate should be performed to distinguish mammary tumors from other skin masses, such as mast cell tumors.
- Furthermore, fine-needle aspiration of the regional lymph nodes is recommended to assess for evidence of metastatic disease, especially in cats where up to 50% will have lymph node metastasis but only 20% of these lymph nodes have abnormalities which are externally obvious or palpable.
- Biopsy is recommended for the diagnosis of inflammatory mammary carcinoma.

Differential Diagnoses

- The most important differential diagnosis for dogs with mammary tumors is other skin masses, such as mast cell tumors, soft tissue sarcomas, and epithelial inclusion cysts.
- Other possibilities, especially for inflammatory mammary carcinoma, include mastitis and dermatologic disease (i.e., atopy or other allergies).
- Mammary hyperplasia, in addition to the above differential diagnoses, should be considered in cats with mammary masses or enlargement.

Complications:

Disease-related complications can be divided into local and metastatic categories.

- Local problems are most often associated with rapidly-growing malignant tumors and include inflammation, ulceration, and infection. If left untreated, this can progress to systemic illness with poor appetite, weakness, and lethargy.
- Malignant mammary tumors have the potential to metastasize to draining lymph nodes, liver, lungs, and other sites. Clinical signs associated with metastatic disease may not be apparent and depend on the site of metastasis.

Surgical Options:

- Surgical resection of the local mammary tumor is recommended in both dogs and cats, especially if the tumor is not metastatic.
- Surgery may still be indicated if the tumor is metastatic, particularly if the mammary tumor is ulcerated and infected.
- Surgery usually involves removal of the mass(es) or affected mammary gland(s) in dogs.
- In cats, however, removal of all mammary tissue is recommended (i.e., bilateral mastectomy). The draining lymph node should also be resected in cats, if possible, to assess for evidence of metastasis. The mammary tumor and draining lymph node should be submitted to a veterinary pathology laboratory for diagnosis, grading, and assessment of surgical margins. This will provide information on whether or not further treatment is required.
- The role of spaying female dogs with mammary tumors is controversial. The majority of studies have shown no beneficial effect of spaying in preventing the development of new mammary tumors or influencing the aggressiveness or metastatic potential of existing mammary tumors. However, spaying at the time of mammary tumor resection should be considered as it may have a beneficial effect in dogs with mammary tumors (based on recent studies) and may prevent unrelated diseases, such as pyometra.

- The role of chemotherapy in cats and dogs with malignant mammary tumors has not been defined. For most mammary tumors in cats and dogs, hormonal therapy, immunotherapy, and radiation therapy have either not been investigated or are not beneficial.
- Surgery is not recommended for dogs with inflammatory mammary carcinoma because it does not improve survival rate. Unfortunately, an effective treatment has not been discovered. Radiation therapy in combination with a non-steroidal anti-inflammatory drug called piroxicam has been shown to provide the most effective palliation in dogs with inflammatory mammary carcinoma, but the prognosis remains poor.

Complications of Surgery:

- Infection and wound breakdown are the most common surgical complications.
- Infection occurs in less than 5% of cats and dogs following surgery. Wound breakdown is unusual but more common following resection of tumors from the fourth and fifth mammary glands in dogs (due to movement of the hind legs slowing wound healing) and most surgeries in cats (because the removal of large amounts of tissue [i.e., one or both mammary chains] results in high tension on the wound).
- Body bandages and cage confinement for 10 to 14 days after surgery may minimize the risk of wound breakdown in these cases.
- Local recurrence of the mammary tumor is possible if the tumor has not been completely resected.
- The surgical margins should be assessed by a pathologist for the completeness of excision. Further surgery or radiation therapy may be indicated if the tumor has been incompletely resected.
- Local recurrence should be distinguished from the development of new tumors.
- Multiple mammary tumors are relatively common in both dogs and cats and new mammary tumors can develop after surgery (and are independent of surgery and the completeness of surgical resection).
- Furthermore, surgery does not prevent metastatic disease from developing and chemotherapy should be considered following surgery in cats and some dogs with malignant mammary tumors. The complications associated with chemotherapy are dependent on the drug used and the species (i.e., cat or dog).

Aftercare:

- Activity should be restricted to short, leashed walks until suture removal.
- The use of a body bandage or cage confinement should be considered for cats and dogs with a high risk of wound breakdown.

- The surgical wound should be checked twice daily for signs of infection or imminent breakdown. These signs include redness, swelling, watery to purulent discharge, and pain.
- If the mammary tumor is malignant, the surgical site and regional lymph nodes should be checked for local tumor recurrence and metastasis, respectively, every 3 months for the first 12 months after surgery and then every 6 months thereafter.
- Abdominal ultrasound and chest radiographs are also recommended every 6 months to assess for evidence of metastatic disease.
- Development of new mammary tumors is relatively common. Cats and dogs should be checked for new mammary tumors during annual general physical examinations.

Prognosis:

- In dogs, there are a number of factors that influence the prognosis following surgery. These prognostic factors include tumor size, clinical stage, histologic diagnosis and grade, and various other histologic criteria.
- Benign tumors are cured by complete surgical resection, although the development of new mammary tumors (both benign and malignant) is possible.
- For malignant tumors, inflammatory mammary carcinoma, ductular carcinoma, carcinosarcoma, and sarcomas have a poorer prognosis than other types of malignant mammary tumors.
- The median survival time for dogs with non-metastatic mammary adenocarcinoma is greater than 420 days, compared to 25 days for dogs with inflammatory mammary carcinoma and approximately 180 days for mammary sarcomas.
- Furthermore, less than 15% of dogs with mammary adenocarcinoma will die as a result of their tumor, compared to 65% with ductular carcinoma and 100% with carcinosarcoma and inflammatory mammary carcinoma.
- In dogs, the size of malignant mammary tumors is an important consideration when determining prognosis, both for local tumor recurrence and survival time.
- The median survival time following surgery for mammary tumors less than 5 cm in diameter is between 420 and 784 days, compared to 210 to 280 days for tumors greater than 5 cm in diameter.
- Furthermore, local recurrence is more common in mammary tumors greater than 3 cm in diameter, with 70% recurring compared to 30% for dogs with mammary tumors less than 3 cm in diameter.
- Tumor grade, which is calculated by pathologists, is also important in determining the risk of local tumor recurrence, with 24% of grade I, 68% of grade II, and 90% of grade III mammary carcinomas recurring at the surgery site after resection.
- The prognosis for cats with mammary tumors is guarded as mammary tumors tend to be more aggressive and metastatic in cats. Many of the prognostic factors used in dogs also apply to cats, although the extent of surgery is also important in cats.
- For tumor size, the median survival time for tumors less than 3 cm in diameter is over 2 years, compared to 6 months for cats with mammary tumors greater than 3 cm in diameter.

- The degree of tumor differentiation, which is also calculated by the pathologists, has an important influence on survival time with 100% of cats with well differentiated mammary tumors alive at 12 months, compared to 42% of cats with moderately differentiated tumors and no cats with poorly differentiated mammary tumors alive at 12 months.
- Survival time for cats with mammary tumors is also dependent on the extent and aggressiveness of surgical resection, with a median survival time of 917 days after bilateral mastectomy (i.e., surgical resection of all mammary tissue), 566 days after unilateral mastectomy (i.e., surgical resection of either the left or right mammary chains), and 216 days after lesser surgery, such as removal of either the mass alone or affected mammary gland.

Prevention:

- Mammary tumors can be prevented by spaying before 6 months of age. The risk of developing a mammary tumor is 0.5% in dogs spayed before 6 months of age (or their first heat) compared to 26% (and up to 71% in some reports) if spayed after 2 years of age.
- Cats spayed before 6 months of age have a 7-times reduced risk of developing mammary cancer and spaying at any age reduces the risk of mammary tumors by 40% to 60% in cats.
- Other factors that may reduce the incidence of mammary tumors include feeding a well-balanced diet and avoiding obesity and the administration of hormones (particularly progesterone or mixed estrogen-progesterone drugs).

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