

Mammary Tumors

by Pamela A. Davol

Malignant tumors of the mammary glands occur with a higher incident than any other form of cancer in female dogs.

Additionally, evidence suggests that females with benign tumors of the mammary glands run a 20-40% chance of these tumors progressing to a malignant state. Male dogs may also develop mammary cancer, however, occurrence in males is only 1% of occurrence found in females.

Average Age of Onset

Cancerous lesions usually present with the highest frequency between the ages of 6-10 years and rarely prior to 2 years of age.

Cause

Both mutations for activation of oncogenes and inactivation of tumor suppressor genes have been identified in canine mammary tumors. Additionally, strong evidence links hormones associated with the estrus cycle ("heat" or "season") of the female to play a major in-direct role in development of this disease.

Symptoms

Malignant tumors may present as a single lump, a mass, or multiple swellings in the tissues comprising the mammary glands. Most frequently these tumors occur in the glands

situated closer to the rear legs. Compared to benign growths, malignant growths may grow rapidly, have irregular shape, feel "fixed" to the skin or underlying tissue, and/or become ulcerated. Malignant tumors may occur simultaneously with mastitis in lactating females and become apparent when symptoms of mastitis are resolved with antibiotic treatment. Inflammatory carcinoma, an extremely aggressive form of mammary cancer, is similar to mastitis in appearance but should be immediately suspected when its symptoms occur in a non-lactating female. This cancer presents as a mass that may involve several or a chain of the mammary glands. The effected area appears red, swollen, and warm to the touch. In fact, touching the area results in obvious discomfort to the female.

Diagnosis

Physical examination alone is not sufficient to distinguish between a benign and malignant mammary tumor. Fine-needle aspiration biopsies have been found to be very accurate for determining the presence of malignant cells within mammary tumors. However, in instances where a fine-needle biopsy is negative for cancer, but the mammary tumor is behaving as a malignant lesion (as described under symptoms above), complete surgical resection of the tumor may be advisable for accurate diagnosis. This course of action is further substantiated by evidence that many benign tumors in the dog progress to malignant lesions over a period of time.

Treatment

In early stage, localized mammary cancers, surgery is the first choice of treatment if the dog is in otherwise good health and can endure stress of the procedure. In such instances, radical surgery for removal of the entire effected mammary chain and regional lymph nodes (usually the superficial inguinal node located in the groin which holds the highest risk for harboring metastatic cells from the adjacent mammary chain) provide 100% cure. Spaying the dog may circumvent the need to remove the second mammary chain to prevent new benign growths. Additionally, spaying will allow easy detection of any new tumors that may arise in the second chain since following surgery the mammary tissue will shrink (atrophy). In advanced mammary cancers where metastasis has occurred or in which the tumor is fixed to the underlying tissues, surgery will not be curative but may be considered an option to reduce local tumor-burden and improve quality of life (palliative therapy). Additionally, radiation therapy may provide local control of inoperable mammary cancers. Use of chemotherapeutic drugs has produced complete and partial remissions of disease in only some isolated cases. Clinical studies examining the efficacy of the systemic chemotherapeutic agent Tamoxifen for advanced mammary cancer in dogs has shown no measurable therapeutic gain in any of the dogs within the study. Another report, however, indicates that administering the drug Adriamycin, either alone or in combination with other drugs, may decrease risk of cancer recurrence following surgery in dogs.

Prognosis

It is estimated that at the time of presentation at least 50-70% of dogs with malignant mammary tumors will already have distant metastasis and thus, be in an advanced stage of disease. Despite surgical intervention, 40-60% of dogs with mammary cancer will experience tumor-related death within the first two years.

Prevention

Risk for developing benign mammary tumors, but not malignant tumors has been linked to the female reproductive hormone, progesterone. Despite this, however, spaying a female prior to 2-1/2 years significantly decreases risk for both benign and malignant mammary tumors. Spaying after this time reduces risk for benign tumors but appears to have no advantage for prevention of malignant tumors. These results would indicate that hormones do not have a direct mutagenic effect on mammary cells. Rather, it is believed that hormones, through their promotion of cellular growth, increase the number of cells that may be susceptible to malignant transformation. This is consistent with the finding that benign growths are susceptible to becoming malignant. Early spaying may therefore, reduce occurrence of malignant lesions because the procedure removes the source of the hormones that cause some mammary cells to lose growth control, which puts these dividing cells at high risk for mutation and malignant

transformation by environmental carcinogens. In fact, recent reports have identified activation of a specific oncogene in a number of canine mammary tumors. Interestingly, pregnancy and lactation appear to have no influence on mammary cancer risk, however, evidence suggests that females bred extensively beginning at an early age have a slightly lower risk for mammary cancer.

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