

# Overview of Feline Mammary Tumors

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## ABSTRACT

After skin tumors and lympho-sarcoma, mammary cancer ranks as the third most common type of cancer in felines and has a high fatality ratio. That's why early diagnosis, intensive surgical treatment, and regular postoperative follow-up exams are required to increase animal life. Mammary tumors can affect both male and female cats but prevalence is high in queens. In this article different sizes of mammary tumors, their surgical removal, and chemotherapeutic agents to prevent them are studied.

### Introduction

The mammary tumors of the cats are mainly of epithelial origin and have a high prevalence rate in non-spayed cats. It accounts for almost 17% of total tumors affecting cats [1]. There are 25.4 reported cases for every 100,000 female cats each year of mammary gland tumors [1]. Mainly these tumors are of malignant nature but they can also metastasize in regional lymph nodes and other organs of the body. Survival rates of the affected cats were 31.8 and 17.7%, respectively, after 1- and 2 years' time of diagnosis, indicating this cancer's poor prognosis. That's why early diagnosis, intensive surgical treatment, and regular postoperative follow-up exams all significantly increase survival time [1]. Mostly these tumors occur in aged female cats falling in the age group of 10 to 12 years [2, 3]. Usually, the risk of these tumors is high in Oriental and Siamese cats [4]. These tumors also affect old-aged male cats, but are rare [5]. The female cat consists of four pairs of mammary glands two lie in the thoracic region while others are in the abdominal area [6]. Mammary cell carcinoma can affect any gland but mostly it affects the abdominal glands [7].

### Clinical Presentation of Mammary Tumors:

Tumors often appear as a single subcutaneous nodule or lump inside the mammary glands. These lesions can be distinct and movable or connected to the tissues beneath them and may even have an ulcerated appearance [8]. In one study, 60% of cats had multiple mammary tumors within several glands, which are frequently ipsilateral but occasionally bilateral [9]. In extremely severe inflammatory carcinomas with substantial lymphatic involvement, the glands may be massive, hot, and painful [10]. The nipples appear swollen and red and have yellow to tan color exudates [6].

### Diagnosis:

If the owner of a cat with probable mammary cancer is considering therapy, a thorough diagnostic work-up must be performed, including a clinical exam, full blood count, serum chemical profile, and urine [3]. Abdominal radiographs and ultrasonography are done to check the potential metastasis. Fine needle aspiration of tumor fluids and ulceration scrapping is also done for complete diagnosis [8]. The radiograph of a cat having a mammary tumor is shown in Fig 1.



**Fig 1:** Illustrating the radiographic presentation of the cat suffering from abdominal mammary gland carcinoma.

### Grading and Staging of Mammary Tumors:

The staging of feline mammary tumors is done exactly in the same pattern designed by the World Health Organization's TNM pattern for the grading of human breast tumors [11]. The tumor grading according to WHO is given in Table 1 [15]. After confirming the mammary tumor, the second main step is to measure the size of the tumor in centimeters, because it widely affects the prognosis of the case. Cats having less than

3 cm diameter of mammary tumors have more survival chances. A probing and aspiration of surrounding draining lymph nodes should be done when staging confirmed tumors because more than a quarter of cats had regional metastases when they were diagnosed [12]. A single inguinal lymph node predominates in cats (84-94%), but lymph angiography frequently detects the involvement of numerous axillary lymph nodes (58-75% of cases) [13]. 80% of cats with feline mammary neoplasia have the axillary and inguinal lymph nodes impacted, however, 30% of cats may also have the sternal lymph node affected [12]. Mammary tumors are divided into three categories based on the mitotic count: well-differentiated, moderately differentiated, and poorly differentiated [14].

**Table 1. Describing the classification of tumors according to the TMN scheme of WHO [15].**

Classification of mammary tumors on the basis of TNM			
Clinical stage	Diameter of tumor	Lymph node Regional	Metastasis
I	Less than 2cm	Negative	Negative
II	2-3 cm	Negative	Negative
III	More than 3cm	Positive	Negative
IV	Any diameter	May be positive or negative	Positive

### Effect of spaying on mammary tumor incidence:

Early OHE considerably reduces the chance of mammary tumor growth, according to studies done in other animals [16]. According to a study, intact cats had a 91% lower risk of acquiring mammary cancer than cats who were not spayed before the age of six months. Those who had their cats spayed or neutered before one year experienced an 86% decrease in risk. The results demonstrate that cats who are neutered or spayed before turning one have a significantly lower risk of getting feline mammary cancer [17].

### Effect of Age on Mammary Tumor Incidence:

In other species, such as cats, dogs, mice, and humans, the length of hormone exposure determines the risk of developing a mammary tumor [18]. Research in several species demonstrates that the hormones estrogen, progesterone, prolactin, and growth hormone have an impact on the development of both healthy and malignant mammary tissue [19]. It is hypothesized that a mammary neoplasm develops from the hyper-proliferation of epithelial tissue under the influence of hormones and expands, eventually breaching the basement membrane, and transforming into a carcinoma [17]. Mammary epithelial cells proliferate as a result of prolonged sex-steroid exposure, which also makes it easier for genetic errors to accumulate and cause neoplasia later in life [20]. In this way, prolonged exposure to sex hormones leads to more chances of the development of mammary gland neoplasia.

### Surgical Treatment:

Surgery is still the mainstay of treatment for mammary tumors. The feline mammary gland's lymphatic drainage plays a role in determining the spectrum of surgery as tumor cells disseminate easily. The complete removal of neoplastic tissue is restricted due to ulceration or a wide area of tumor [8]. According to drainage studies, unilateral or bilateral mammary strips should be performed due to the possibility of interaction between individual glands and between the left and right sides [10]. Excision of the regional lymph node is necessary. Because it is attached

to the caudal mammary gland, the inguinal lymph node is also removed as part of a mammary strip. If the axillary lymph node is swollen or shows signs of tumor spreading, it should be removed [21]. There is no proof that having an ovariohysterectomy at the same time as a mastectomy has any positive effects on survival, tumor recurrence, or the advancement of cancer [2].

**Chemotherapy for the Treatment of Mammary Tumors:**

Some evidence suggests that chemotherapy may be effective for mammary cell lines in a laboratory environment [22]. Doxorubicin and cyclophosphamide treatment of mammary malignancy in vivo may reduce tumor size in 50% of cases and perhaps increase survival [22]. The main side effect of doxorubicin is that it is highly nephrotoxic for cats. The other drugs used for the treatment of feline mammary tumors are vincristine, 5-fluorouracil, prednisone, and methotrexate [23]. It is significant to remember that once metastases have actually occurred, mammary tumors typically respond poorly to chemotherapy.

**Other Methods:**

Radiation therapy is an option to cure feline mammary tumors but due to the absence of data supporting higher survival rates in cats, radiation therapy is rarely utilized to treat them [23]. Another option is immunotherapy. Immunotherapy is a type of cancer treatment that boosts the body's inbuilt defenses against tumor cells by using immunomodulators. Nonetheless, it has been shown to be ineffective in the treatment of feline mammary cancers [23].

**Prognosis:**

The prognosis is highly dependent upon the stage of the disease and the extent of metastasis. There are reports that it takes 10–12 months on average between the detection of the tumor and the death of the cats [7]. The prognosis depends on the tumor size, its clinical stage, its mitotic count, its histopathological grading, and its disease stage. The first manifestation of tumors, with lower survival periods of about 4-12 months is related to larger tumor volumes (>27 cm<sup>3</sup>) or larger tumor diameters (>3 cm) [24]. The different factors affecting the prognosis and their details are given in Table 2. The spread of the tumor has an inverse relation with the survival period of the cat.

**Table 2: Having the different prognostic factors related to feline mammary tumors [24].**

Factors	Details
Size of tumor	Diameter less than 3cm - 21-24 months' survival Diameter greater than 3cm - 4-12 months survival
Clinical stage	I – 29 months' survival II – 12.5 months' survival III – 9 months' survival IV – 1 month survival
Histopathologic al grading	Well-differentiated cells – 100% survival rate after one year of surgery Poorly-differentiated cells – 100% death rate after 1 year of surgery
Mitotic index	Less than 2% mitotic figures show longer survival rate

**Conclusion:**

Mammary tumors are highly fatal. Early spaying can reduce their risk. Surgical removal of the affected glands and related lymph nodes is the only option to increase the life of your pet. Cats having tumors greater than 3cm and having poorly differentiated cells with more than 2% mitotic figures have shorter survival times. Doxorubicin is the main drug of choice for feline mammary tumors.

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