

Short Communication

Mammary Carcinosarcoma in a Domestic Shorthair Cat

Araya Suebkhampet¹, Thanongsak Mamom²

¹Department of Anatomy, ²Department of Pathology, Faculty of Veterinary Medicine, Mahanakorn University of Technology, Bangkok

Abstract The ulcerative tumor (7.5cm in diameter) of a 10-year old female domestic shorthair cat was investigated at the right fourth mammary gland region, which appears more than six month previously. The tumor mass and regional lymph node were surgically removed and submitted for histopathological diagnosis. Histopathological features indicated that the tumor composed of 2 main cancer cell components consisting of the glandular epithelial cell and mesenchymal cell components. Clusters of the cartilaginous tissue were also found in the mass. Immunohistochemistry results revealed that the mesenchymal and spindle cell component in the tumor mass were immuno-reactive to anti-vimentin marker while the metastatic foci in lymph node were immunoreactive to anti-pancytokeratin marker but they showed negative results for anti-vimentin marker indicating that they originate from the epithelial cell origin. Histopathological diagnosis and immunohistochemistry results indicated that it was a mammary carcinosarcoma or malignant mixed mammary tumor. Most of the tumors found in cats are adenocarcinoma however the incidence of feline mammary carcinosarcoma is rare. *Chiang Mai Veterinary Journal* 2010;8(2):139-146

Keywords: Mammary carcinosarcoma, Malignant mixed tumor, Mammary gland, Cat

Introduction

Mammary tumors are the third most common tumors in cats. They occur less frequently in cats than dogs^(1,2). Domestic shorthair and Siamese cats appear to have higher incidence of mammary tumors than other breeds⁽³⁾. The tumors

usually arise in old cats (average 10-14 years of age)⁽²⁾. Hormonal influences are possibly involved in the pathogenesis of mammary tumors since the association between use of hormonal factors and the development of feline mammary tumors has been reported⁽⁴⁾. Most of the tumors (at least 85%) are malignant which are classified mainly as adenocarcinoma^(1,2). However, incidence of feline mammary carcinosarcoma is very rare⁽⁵⁾. This article describes the histopathological features of mammary carcinosarcoma in a domestic shorthair cat displaying complex morphology.

Case History

A 10-year old spayed female domestic shorthair cat showing the abnormal mass (7.5cmx7.5cmx5cm) at the right fourth mammary gland region, which appears more than six month previously, was investigated. The mass was firm and had an ulcer with necrotic tissue and pus covered the ulcerative surface (Fig.1) It did not adhere to the underlying tissue. A hemogram was in the normal range except mildly neutrophilia. The cat was never treated with any hormonal contraceptive injection and she was ovariohysterectomized at the age of 2-year old.

The tumor mass, surrounding tissues and regional lymph nodes were surgically removed and submitted to the Mahanakorn Veterinary Diagnostic Center (MVDC) for histopathological diagnosis.

Histopathology and Immunohistochemistry

The samples were trimmed, fixed in 10% neutral buffered formalin, embedded in paraffin, sectioned to 4 μ m thickness, and stained with Hematoxylin & Eosin (H&E). Additional sections were immunostained with 2 antibodies: anti-pancytokeratin and anti-vimentin using streptavidin-biotin-peroxidase method. The sections were treated with 3% hydrogenperoxide in 70% ethanol to quench endogenous peroxidase. Antigens were retrieved by microwaving the tissues immersed in 0.01 M citrate buffer (pH 6.0) for 5 min at the highest power and an additional 5 min at low power. To block for non-specific binding, the sections were incubated for 20 min at room temperature with normal horse serum in PBS. The sections were incubated with 1 μ g/ml anti-pancytokeratin or 0.2 μ g/ml anti-vimentin (Lab vision, Corp., Fremont, CA, USA) for 60 min at room temperature (or overnight, 4°C). After successive washing with 0.1% Tween 20 in PBS, antigen-antibody interaction was detected using the

LSAB+System-HRP kit (DAKO, North America, Inc., Carpinteria, CA, USA). This involved treatment of the sections with biotinylated secondary antibody (30 min, room temperature), followed by incubation with streptavidin conjugated to horseradish peroxidase (HRP) and detection by reaction with a peroxidase substrate, diaminobenzidine. Concentrations of chemicals and conditions for these treatments were as described by the manufacturer. The brown color product of the peroxidase reaction signified cytokeratin or vimentin localization. The sections were then counterstained with hematoxylin and examined under light microscope (Carl Zeiss, Germany).

Histopathological analysis revealed a large well-demarcated, non-capsulated tumor nodule with focal extension to epidermis and subsequent ulceration. The tumor nodules compose of epithelial components arranged in tubulo-alveolar to papillary pattern (Fig. 2a and 2b) with the presence of tumor emboli in the lymph vessels (Fig. 2e). Spindle cell components arranged in the short interlacing bundles among the epithelial components. The epithelial components were large cuboidal cells with pale basophilic, vacuolated cytoplasm with large round

nuclei and single prominent nucleoli. The spindle cells located among the epithelial components were elongated cells with eosinophilic cytoplasm and oval to elongated nuclei with one or more prominent nucleoli. Mitotic figure in spindle component range from 5-8 per high power field (Fig. 2c) with some atypical mitosis. Multifocal necrosis and hemorrhage were observed with some thrombi in vessels and many bacterial colonies. Anisocytosis, anisokaryosis and multinucleated cells were also detected. Multiple areas of cartilaginous metaplasia (Fig. 2d) and myxomatous change were seen. Dermal lymphangectasia were found over the neoplastic nodules. Lymph node metastasis of epithelial component was observed in cortex and medulla with medulla necrosis (Fig. 2f).

Immunohistochemical study revealed that the epithelial components of the tumor mass and the metastases to lymph node were immunoreactive for anti-pancytokeratin (Fig. 3b), but they showed negative results for anti-vimentin. However, the immunoreactivity to anti-vimentin was found in the spindle cell components (Fig. 3a), mesenchymal cells and area of cartilagenous metaplasia in the tumor mass.



Figure 1 Gross appearance of the mammary mass. (Bar = 1cm)

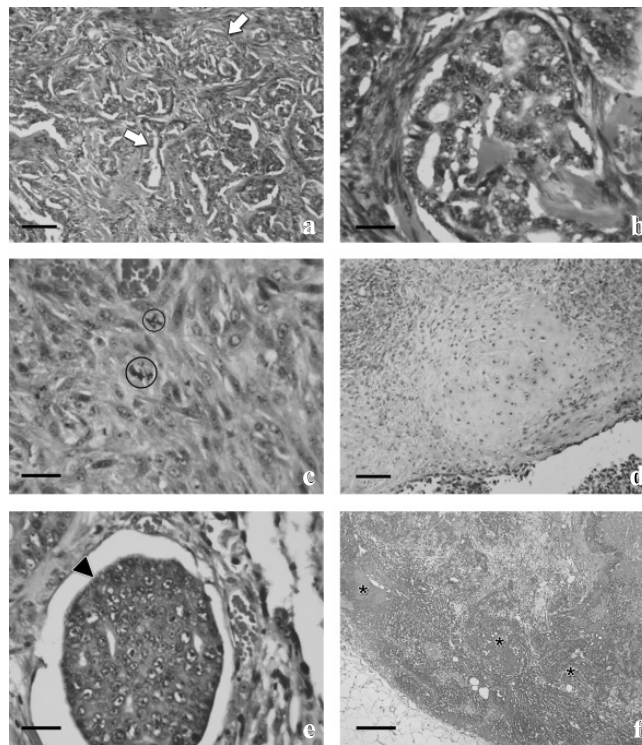


Figure 2 Histopathology of the mammary mass (H&E stained). a) Histopathologic feature of epithelial component of mammary mass arranges in tubuloalveolar and papillary patterns (arrows). b) Higher magnification of epithelial component in a). c) Spindle cell component presents within the mass with high mitotic figures (circles). d) Multiple areas of cartilaginous metaplasia presents within the tumor mass. e) Tumor embolus presents in the lymph vessel of the tumor mass (arrow head). f) Metastatic foci (asterisks) of epithelial components are in medulla and cortex of lymph nodes. (Bar: a, d = 50 μ m; b, c, e, f = 20 μ m)

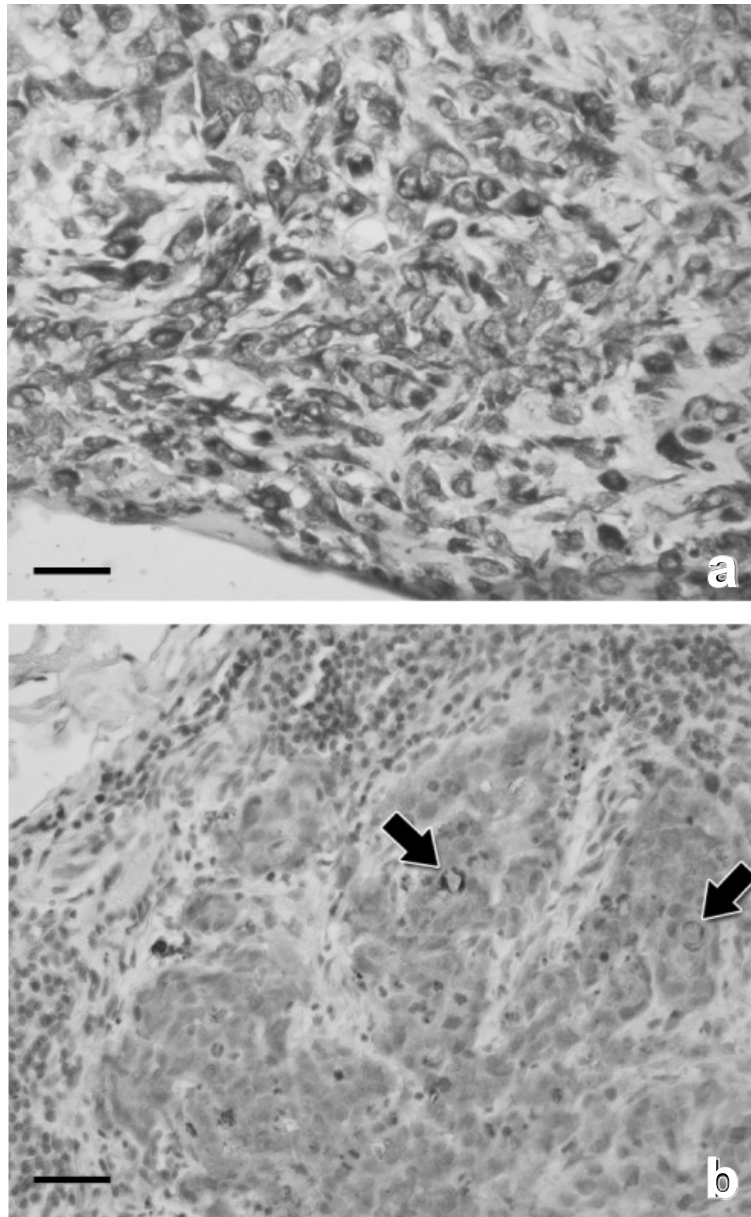


Figure 3 Immunohistochemistry of the mammary mass. a) Immunohistochemical staining for anti-vimentin show positive immunoreactivity in spindle cell component of the tumor. b) Immunohistochemical staining of lymph node reveals positive immunoreactivity to anti-pancytokeratin (arrow) in metastatic cancer. (Hematoxylin counterstaining) (Bar = 20 μ m)

Result and Discussion

Histopathological features of the tumor mass and immunohistochemical results indicated that it was a mammary carcinosarcoma or malignant mixed mammary tumor. This tumor composed of 2 main components consisting of the epithelial and mesenchymal components with their products of differentiation (such as cartilage or bone). Together with the history, macroscopic appearances of the tumor (for instance outline, firm nodule and ulceration), and the occurrence of lymph node metastasis supported its malignancy. In the present study, a tumor was classified according to the World Health Organization international histological classification of tumors of domestic animals indication⁽⁶⁾. Clinical Staging (TNM staging system) which evaluates the primary tumor, regional lymph node and distance metastasis of mammary tumor⁽⁷⁾ designated that it is in stage III. Unfortunately, after the mass was surgically removed for histopathological diagnosis, the owner refused to bring the cat back for further investigation. The owner informed that the cat had a recurrent mass at the same site and died after the operation for 8 months.

Incidence of feline mammary carcinosarcoma is very rare. Long-term prognosis

of the tumor in this case is guarded based on its malignancy. Lymph node involvement and size of the tumor are the important prognostic factor in cats. Cats with tumors larger than 3 cm in diameter have a median survival time of 6 months, but cats with tumors smaller than 2 cm in diameter have a median survival time of longer than 3 years⁽⁸⁾. These factors are corresponding with the case history as mentioned above.

The anterior mammary glands are more frequently affected than the posterior glands in the cat⁽⁹⁾. Nevertheless, in this case it affected the right posterior gland which is rare.

Surgery is the most widely used treatment of mammary tumors. Radical mastectomy which is a removal of the entire mammary glands and associated lymph nodes is a recommended procedure for malignant mammary tumors in cats. However, this surgical method has no affected the survival time. Therefore, local or regional mastectomy may be considered in some cases which are less aggressive. Additional therapies such as chemotherapy, radiation therapy or hormonal therapy could be applied according to the type of tumors⁽¹⁰⁾. Ovariohysterectomy may be performed since ovarian and uterine diseases occasionally coexist with

mammary tumors in cats⁽⁹⁾. Strong correlation between early spaying and a reduction in the incidence of mammary tumors in cats has been documented⁽¹¹⁾. This involves the regulation of sex steroids in development of mammary tumors⁽⁴⁾. Thus, a precaution for the owners in order to decrease the incidence of the tumors is to spay their cats before they come into their first estrus cycle and to avoid using sex steroids as a hormonal contraceptive.

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