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## A case report of mammary carcinoma with pulmonary metastasis in dog

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### Abstract

Mammary tumors, known as the most frequent malignant neoplasm of intact female dogs, constitute an important problem in Veterinary Medicine. A 9 year-old female, intact Labrador Retriever was brought for post mortem examination. External examination revealed one growth of around 7×4 cm in the right Inguinal mammary gland. After opening the carcass, small white nodular lesion observed on the surface of the lung parenchyma and enlargement of heart. Histopathological examination revealed the presence of proliferating glandular epithelial cells arranged predominantly in a papillary pattern indicating papillary adenocarcinoma. Metastatic Foci of neoplastic epithelial cells were found in heart and lungs. The neoplastic epithelial cells showed positive nuclear expression of the PCNA marker and Cytokeratin (AE1/AE3) in lung and Heart.

**Keywords:** Metastatic mammary carcinoma, malignant, histopathology, immunohistochemistry

### Introduction

Mammary tumors pose a significant challenge in both Medical and Veterinary fields, being the second most common tumor in dogs and the most common tumor in humans. Mammary neoplasms are prevalent in dogs, cats, and humans but are infrequent in most other species. They are common in intact females, with occurrences in males being rare (Meuten 2016) [5]. In canines, the incidence of mammary tumors is estimated at 50% of all neoplasms of which approximately 60% are benign and 40% malignant (Brearley, 1989) [2]. According to Yamagami *et al.* (1996) [8] only 36% of bitches with metastases to locoregional lymph nodes and almost 14% with metastases to internal organs survive two-year post-operative period, while absence of the metastases increases the proportion of animals surviving the period up to over 90%. The present paper describes mammary adenocarcinoma with metastasis to lungs and heart in Labrador Retriever Dog.

### Materials and Methods

A 9 years old dog was brought to the Regional Animal Disease Diagnostic laboratory for post-mortem examination, died with the history of respiratory distress and surgical removal of mammary tumor. Detailed post mortem examination was conducted and tissue samples from mammary gland, lung, liver, kidney and heart were collected in 10% formalin for histopathology and Immunohistochemistry. Sections measuring 4 µm were obtained and stained using the routine Haematoxylin and Eosin staining method (Bancroft, 1996) [1]. Immunohistochemistry was conducted using a mouse monoclonal primary PCNA (Proliferating Cell Nuclear Antigen) and Cytokeratin AE1/E3 with a Super-sensitive Polymer-HRP detection kit.

### Results and Discussion

Grossly tumor mass was located at right Inguinal mammary gland (Fig-1), presence of small foci of nodules on surface of lungs (Fig-2) were observed. Jung *et al.* (2004) [3] stated that metastases from malignant mammary and superficial neoplasms frequently localize in the

lungs. These metastatic lesions can present as solitary or multiple nodules within the lung tissue, or they may appear as lymphangitic or endobronchial metastases. The heart appeared enlarged without exhibiting any nodular lesions. Histopathological examination revealed the presence of proliferative epithelial cells arranged in papillary pattern with prominent nucleoli, mitotic figures and high nuclear cytoplasmic ratio (Fig-3). These histopathological lesions were similar to the lesions stated by Misdrop *et al.* (1973) [6]. He explained the features of papillary adenocarcinoma, cells within the neoplastic tubules are arranged predominantly in a sessile or pedunculated papillary fashion. Lungs revealed the presence of foci of neoplastic cells arranged in papillary pattern (Fig-4). In heart foci of neoplastic epithelial cell aggregates (Fig-5) were found. These findings were in accordance with Marcin *et al.*, (2007) [4], he described the metastasis of mammary adenocarcinoma to heart and lungs. Immunohistochemistry for Cytokeratin AE1/AE3 revealed strong positive cytoplasmic expression in mammary gland, lungs and heart confirming the epithelial origin of tumor (Fig-6,7,8). Immunohistochemistry for PCNA revealed strong nuclear expression in mammary gland, lungs and heart (Fig-9,10,11) indicating the malignant nature of the tumor with high proliferation rate. In this case following surgical removal of the tumor, growth was observed in the inguinal mammary gland, which is a highly unfavourable prognostic indicator. The animal subsequently died due to severe respiratory distress. Marcin *et al.*, (2007) [4] stated that localisation of a malignant tumour in the last pair of the mammary gland represents a very unfavourable prognostic factor. According to the studies of Szczubiał *et al.* (2002) [7] over 63% bitches with so localised tumour died or were subjected to euthanasia due to metastases and/or local relapse within 24 months after excision of the tumour.

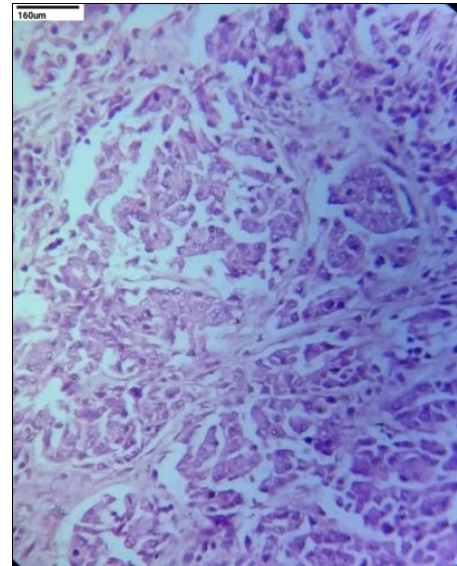
Based on the gross, histological and immunohistochemical findings the present case was diagnosed as Mammary adenocarcinoma metastasized to lungs and heart in Labrador Retriever Dog.



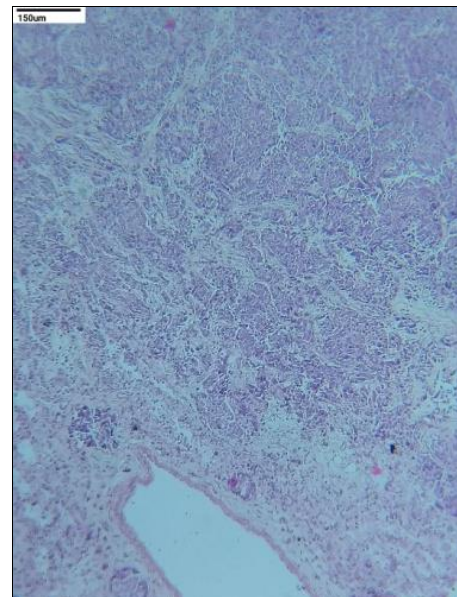
**Fig 1:** Tumor growth at Inguinal Mammary gland



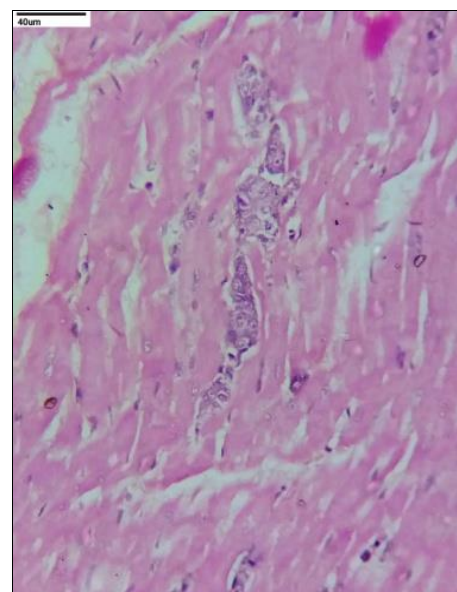
**Fig 2:** Pulmonary metastatic lesions showing Variable sized nodules



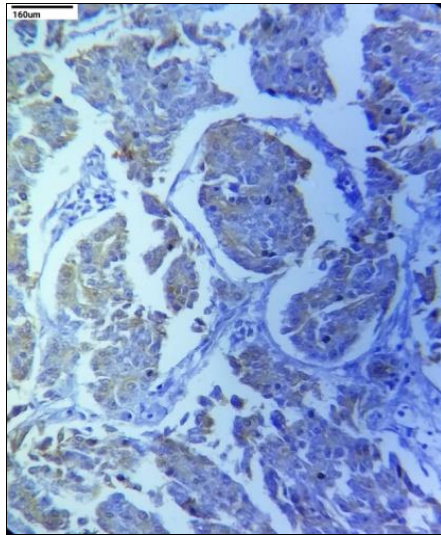
**Fig 3:** Mammary Gland: Neoplastic cells arranged in papillary pattern (H&E 400x)



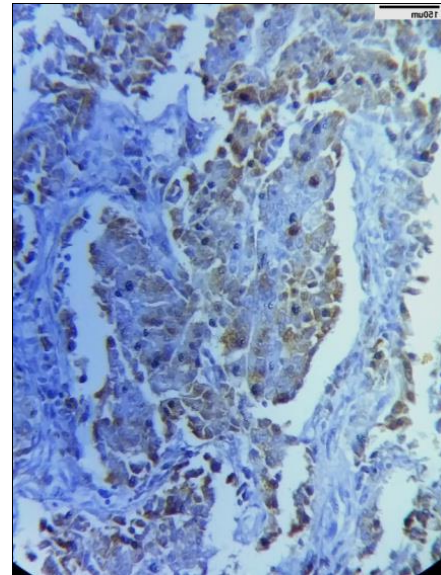
**Fig 4:** Lung: Neoplastic cells arranged in papillary pattern (H&E 400x)



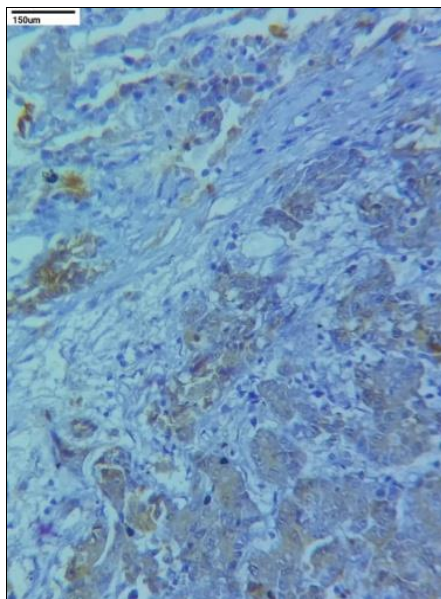
**Fig 5:** Heart: Clusters of neoplastic epithelial cells in Myocardium (H&E 400x)



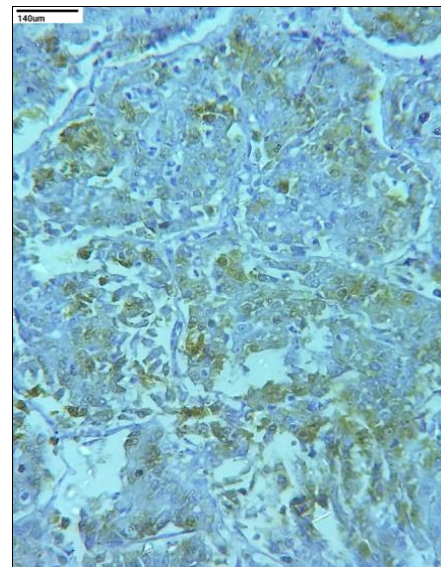
**Fig 6:** Positive cytoplasmic immunoreactivity in epithelial cells for Cytokeratin AE1/AE3 in mammary gland



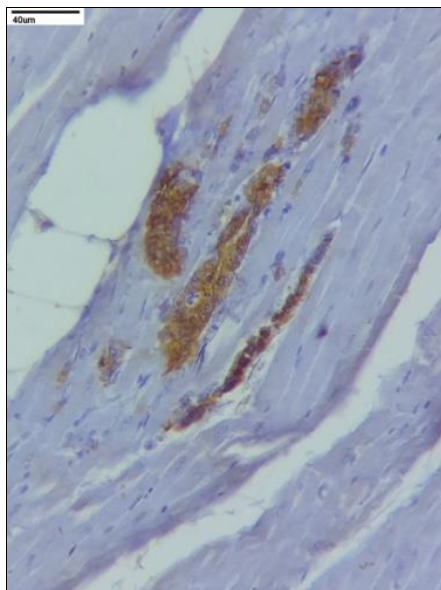
**Fig 9:** Positive nuclear immunoreactivity in proliferating epithelial cells for PCNA in mammary gland



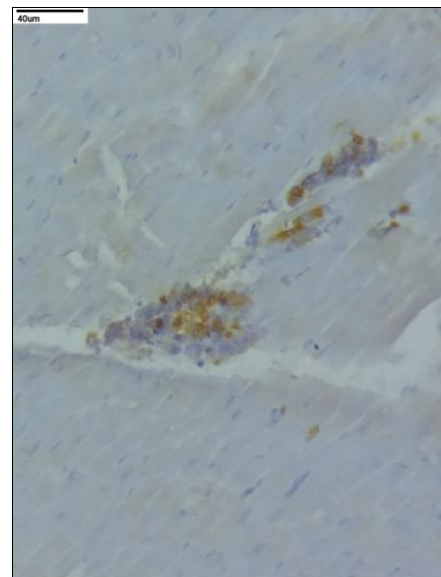
**Fig 7:** Positive cytoplasmic immunoreactivity in epithelial cells for Cytokeratin AE1/AE3 in Lungs



**Fig 10:** Positive nuclear immunoreactivity in proliferating epithelial cells for PCNA in Lungs



**Fig 8:** Positive cytoplasmic immunoreactivity in clusters of epithelial cells for Cytokeratin AE1/AE3 in Myocardium



**Fig 11:** Positive nuclear immunoreactivity in proliferating epithelial cells for PCNA in Heart

## Conclusion

Mammary tumors are a significant concern in veterinary medicine, paralleling their prevalence in humans. They represent a common neoplasm in intact female dogs, with a notable incidence rate. This case study highlights the aggressive nature of mammary adenocarcinoma in a Labrador Retriever, characterized by metastasis to both the lungs and heart post-surgical intervention. The findings underscore the diagnostic utility of gross examination, histopathology, and immunohistochemistry in confirming the epithelial origin and malignant nature of the tumor. Despite efforts through surgical excision, the recurrence at the original site and metastatic spread reflect the challenges in managing such advanced cases, emphasizing the importance of early detection and comprehensive treatment strategies. Further research and clinical efforts are warranted to improve outcomes and management protocols for mammary tumors in dogs.

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### How to Cite This Article

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