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Mixed Mammary Gland Tumor Studies in an Aged Dog

J. G. Browne  
Iowa State University

F. K. Ramsey  
Iowa State University

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NEOPLASMS of the mammary glands are quite common in older female dogs. However, they are rarely permitted to reach the size noted in the present case.

A nineteen year old female fox terrier dog was given to the Department of Veterinary Anatomy of Iowa State University for the purpose of gerontological studies. The history obtained from the owner was rather vague. The tumor had apparently been developing for the past five years. Clinical examination did not reveal any evidence of metastasis to the lungs or abdominal viscera. Ulcerative gingivitis and bilateral cataracts were observed. The dog displayed a large fluctuating pendulous mass which was located in the area of the right inguinal mammary gland, Fig. 1. There was also a large swelling in the inguinal area on the left side, Fig. 2. The

Dr. Bowne is associate professor of Veterinary Anatomy at Iowa State University.

Dr. Ramsey is head of the Pathology Department at Iowa State University.

Fig. 1 Female fox terrier showing the large tumorous mass in the right inguinal mammary gland.
After the dog was euthanized and a complete postmortem examination was performed, the various tissues were fixed in mercury-formol fixative, sectioned and stained with Mallory's triple and aldehyde fuchsin stains to facilitate histopathological examination.

Schlotthauer (1940) states that a large proportion of mammary tumors of the dog are of the mixed variety, and that they usually develop slowly in dogs of advanced age. According to Schlotthauer, if the tumor contains more than one neoplastic element, they may be classified as mixed tumors. He also states that this classification, although convenient, does not indicate the grade of malignancy of the tumor. Schlotthauer indicates that the cartilage and bone found in mixed mammary gland tumors may arise from multipotent fibroblasts. He believes it is much safer to classify such tumors according to "Brodors" classification: carcinoma grade 1 or 2 in a case of low grade malignancy; carcinoma grade 3 or 4 in a highly malignant neoplasm.

Moulton (1954) classified as mixed tumors all benign mammary tumors showing fibroadenomatous proliferation with or without chondroid or osteoid metaplasia in the connective tissue stroma.

Post Mortem Findings

The large mass in Fig. 1 and 2 was found to be cystic and contained a large amount of amber colored fluid. The connective tissue was glistening white and very dense. A grayish semifluid material oozed from some of the smaller cysts. Tissues were taken from various regions of the tumor for histopathological examination.

The enlargement in the left inguinal area, Fig. 2, proved to be the left ovary and horn of the uterus which had herniated through the inguinal canal. Upon careful examination, the ovaries were found to consist mostly of multiple cysts.

**Fig. 2** Ventral view illustrating the large swelling the left inguinal area caused by a herniation of the left ovary and horn of the uterus.

**Fig. 3**—A. Photomicrograph of tumor showing fibrosis, duct hyperplasia, and cysts. 100x.
B. Photomicrograph illustrating a large epithelial lined cyst, which is apparently filled with the secretion of the epithelial cells, and connective tissue hyperplasia. 200x.
The right superficial inguinal lymph node and the lymph nodes receiving the efferent drainage of the right superficial inguinal node were preserved for histopathological examination.

Gross lesions were not observed in any of the parenchymatous organs. However, tissues were taken for histopathological examination.

**Histopathology**

Microscopic examination of the large mass in the right inguinal mammary gland indicated that it was neoplastic. There were multiple cysts lined with secreting epithelial cells. Fig. 3B illustrates an epithelial lined cyst apparently filled with a secretion. The lining cells showed the apocrine mode of secretion. Many desquamated epithelial cells were found within the cysts. The fibrous stroma showed the neoplastic characteristics of anaplasia, hyperchromatism and hypercellularity. Fig. 3A illustrates this mass of connective tissue elements. Fig. 4 shows the chondroid metaplasia of the fibrous connective tissue lining the largest cyst. Fig. 5 shows the neoplastic cells in the right superficial inguinal lymph node. Note the many mitotic figures present in the isogenous groups of cells in Fig. 5B. Metastasis of the neoplasm to the deep inguinal or internal iliac lymph nodes and to other tissues was not found.

**Summary**

This neoplasm is a mixed mammary gland tumor consisting of neoplastic glandular epithelium and fibrous connective tissue elements with areas of chondroid metaplasia.

**REFERENCES**


Researchers at the University of Illinois, College of Medicine found that dogs fed large amounts of onions developed anemia.

Although traditionally thought of as rabbit hounds, beagles in the Union of South Africa are used for hunting jackals.