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## Ceruminous gland adenocarcinoma in a domestic Persian-mix cat (*Felis catus*)

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### Abstract

A nine years old Persian-mix female cat has been suffering from recurrent bilateral ceruminous gland adenocarcinoma for many years. Masses were first noticed and resected five years ago, but reoccurred later on two more occasions. The animal has usually experienced distressful ear canal problems in association with these masses. The tumor cellular morphology was reviewed, described and discussed. This article is the first in documenting ceruminous gland adenocarcinoma in a Persian-mix cat in Libya.

**Key words:** Ceruminous gland adenocarcinoma, Feline ear tumors, Feline tumors, Otitis externa.

### Introduction

Ceruminous glands are modified apocrine tubular sweat glands located in the external auditory canal. Its secretion combines with that of the sebaceous glands to form cerumen which is a brown waxy material that protect the ear canal and keeps the tympanic membrane moist and pliable (Banks, 1981).

Abnormalities in the ceruminous glands are infrequent but their impact ranges from mere discomfort to life threatening. Many lesions have been reported including ceruminous gland cysts in cats as well as glandular hyperplasia, dysplasia, adenoma and adenocarcinoma in dogs and cats (Withrow and Vail, 2007). Among other types of tumors in the ear canal, ceruminous gland adenoma and adenocarcinoma are most commonly encountered in dogs and cats where malignancy predominates in the later (Moisan and Watson, 1996). The usual development of these tumors secondary to otitis externa may suggest a role for inflammatory process in their initiation.

Otitis externa and interna, on the other hand, may be established following auditory canal tumors which are completely obstructive (London *et al.*, 1996). Others have suggested that inspissated apocrine secretions from hyperplastic ceruminous glands may stimulate carcinogenesis in the ear canal (Gotthelf, 2005; Sharp and Dohme, 2011).

Ceruminous gland adenocarcinoma is locally invasive and may metastasize to regional lymph nodes and to the parotid salivary gland. Distant metastasis to the lung is rare (Sharp and Dohme, 2011).

The current paper is intended to investigate the pathology of a bilateral complex ceruminous gland adenocarcinoma in a cat which showed reoccurrence after many surgical excisions.

### Case Details

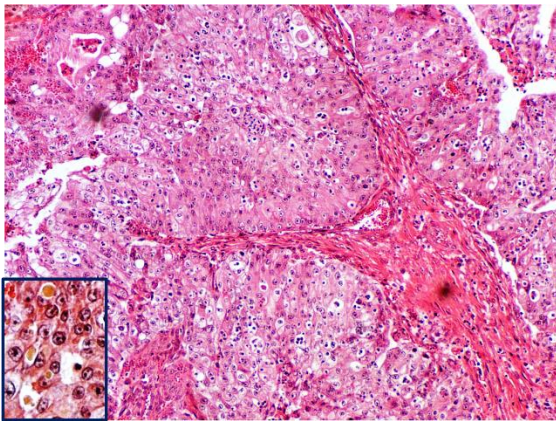
A nine years old Persian-mix female cat was presented with ear complaint associated with otorrhea, head shaking, rubbing and scratching of ear regions. The animal was depressed and off food. There was bilateral exudative otitis externa along with multiple bean-size dome-shaped masses which have nearly blocked the outer auditory canal in both sides. Abnormal masses were first recognized and resected five years ago, but reoccurrence and further resection have also taken place on two occasions before the current admission. The decision for surgical removal was taken as the only available solution and in order to provide optimum relief for ear canal infection. Bean-sized hard ulcerated masses were removed surgically under general anesthesia and were processed for light microscopic examination (Fig. 1).

Tissue trimmings were fixed in 10% NBF for 24 hours, dehydrated in ascending concentrations of Ethyl Alcohol, dipped in Paraffin wax and 5 $\mu$  thick sections were stained with Hematoxyline and Eosin (H&E) (Lillie, 1965) The growth was that of an expansive non-capsulated subcutaneous collection of glandular, myoepithelial and mesenchymal elements. The glandular element was composed of irregular network of ductules distended with large atypical swollen epithelial cell rich in cerumen-containing vacuoles. Most of those ductules were completely obliterated by the proliferating neoplastic epithelial cells (Fig. 2) but others displayed sieve-like cribriform or comedo patterns when centrilobular core of epithelial necrosis existed (Fig. 3&4). The epithelial cells were moderately to poorly differentiated and displayed marked pleomorphism, hyperchromatia, increased N:C ratio, prominent nuclei and high mitotic activity.

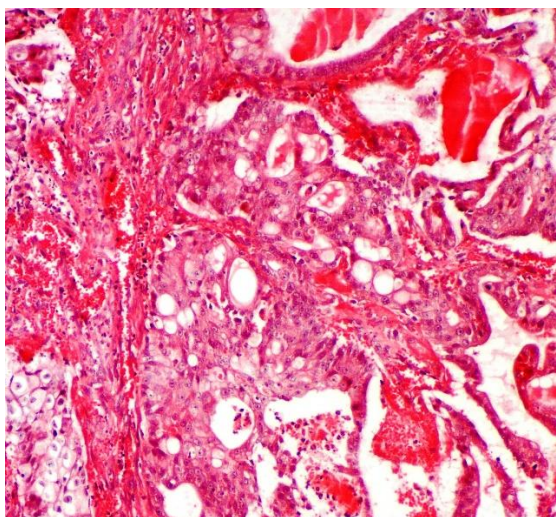
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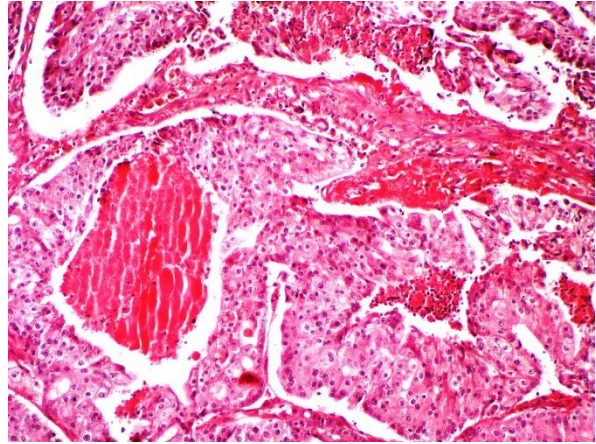
**Fig. 1.** A chick pea- size ulcerated tumor mass almost occluding the entrance of the left ear canal.



**Fig. 2.** Distended ductules with their lumen largely occupied by proliferating neoplastic epithelium. These ductules were separated by interrupted layers of myo- epithelium. Inset: epithelial intracytoplasmic cerumen pigment-containin.



**Fig. 3.** Cribriform pattern of epithelium lining of a ductule (H&E, x10).



**Fig. 4.** Comedocarcinoma with a central core of necrosis in the lining epithelium (H&E, x10).

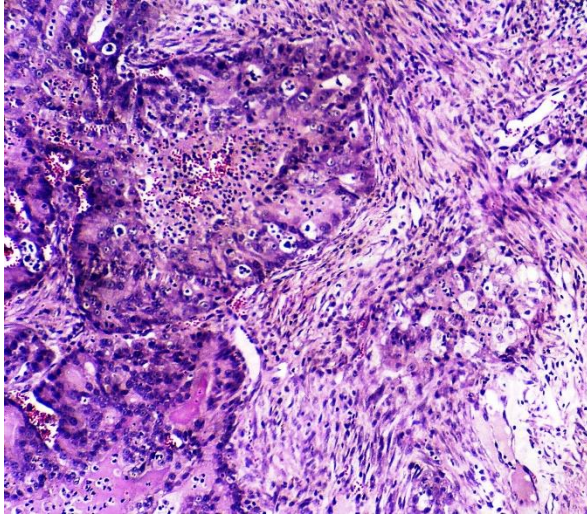
Criteria of carcinogenesis were most evident on glandular epithelial cells which invaded the stroma and the lymphatics (Fig. 5&6). The glandular acini displayed adenomatous changes. They were irregularly dilated with folded hyperplastic epithelium (Fig. 7). Bundles of myoepithelium were seen in varying densities which separates the glandular element into smaller compartments.

Infected granulation tissue was seen close to the ulcerating edges of the tumor while chronic inflammatory cells existed throughout the tissue. The existence of myoepithelium in this tumor suggests a complex ceruminous gland adenocarcinoma. The cat survived the surgical removal of the tumors but follow up was not possible.

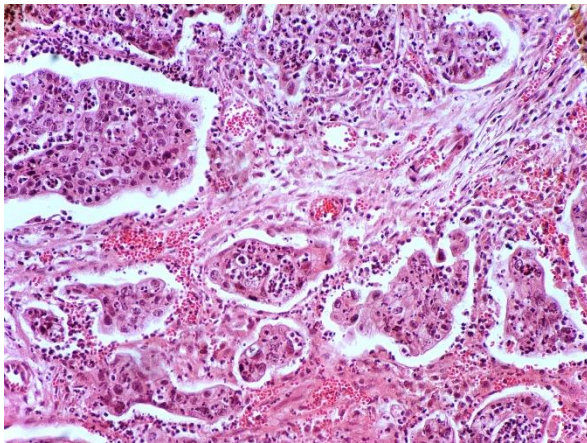
#### Discussion

The true incidence of ear canal tumors in cats is not known, but based on surveys of total submissions to pathology laboratories, less than 2% of all tumors in cats occur in the ear canal. The most common tumors, however, are ceruminous gland adenoma and adenocarcinoma. Other tumors include squamous cell carcinoma, mast cell tumor, malignant melanoma, hemangiosarcoma, fibrosarcoma, lymphoma and basal cell carcinoma (Rogers, 1988; Moisan and Watson, 1996). Identification of ceruminous gland adenoma and adenocarcinoma is basically dependant on the location and the gross and microscopic appearance. Immunohistochemical localization of specific tissue markers including Epithelia Membrane Antigen (EMA), CK, S-100 and others are employed especially in man for further confirmation (Crain *et al.*, 2009). The existence of wide range of cellular growth patterns in the current case agreed well with the finding of others (Withrow and Vail, 2007; Sharp and Dohme, 2011). They basically explained that cellular diversity on the existence of a preceding chronic otitis media (Gotthelf, 2005).

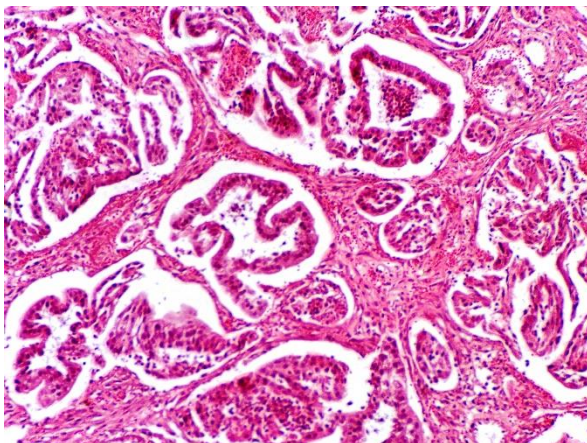




**Fig. 5.** Invasion of neoplastic epithelial cells in the stroma. These cells are Pleomorphic and hyperchromatic and displayed poor acinar arrangement (H&E , x10).



**Fig. 6.** Dilated lymphatics containing clusters of tumor emboli formed of poorly differentiated neoplastic cells (H&E, x10).



**Fig. 7.** Adenomatous irregularly dilated glandular acini containing sloughed folded and fragmented epithelium (H&E, x10).

Chronic otitis media is associated with an increase in lipofuscin-laden phagocytes which provide continued cytokine and growth factor production contributing to the perpetuation of glandular hyperplasia. Hyperplasia along with chronic inflammation may predispose for cellular transformation into adenoma and adenocarcinoma. In our case, there was profuse intracellular and extracellular cerumen along with lipofuscin-laden macrophages. The progression to malignancy noticed in our biopsy is consistent with the basic knowledge about recurrent neoplasms reviewed by Moulton (2002). It has been stated that conservative ear resection of ceruminous gland adenocarcinoma is expected to provide a 10 months disease-free interval, a 60% recurrence rate and a 33% one year survival (Mariano *et al.*, 1994). Our cat has first had her nodules 5 years ago and was undergone conservative resection on three occasions. The relative long time of survival of this cat probably reflects the progressive pattern of growth from glandular hyperplasia and/or ectasia into adenocarcinoma which usually last longer to establish. Such presumption was adopted by Gotthelf (2005). In this case, the tumor cell aggressiveness and the huge invasive involvement of vasculature suggested poor prognosis.

#### **Conflict of interest**

The authors declare that there is no conflict of interests.

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