Orbital adenocarcinoma of lacrimal gland origin in a dog

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Abstract. A 13-year-old intact female mixed-breed dog was presented for a progressive enlargement of the right eye, which had been treated previously for conjunctivitis. A round, firm mass, approximately 4 cm in diameter, was protruding from the superotemporal aspect of the right orbit, displacing the eyeball anteriorly and ventromedially. The mass was encapsulated, distinct from the eyeball, and not associated with the eyelids. On cut surface, there was a pale multilobulated periphery, with a dark red, soft, and depressed core. Histologically, tumor cells formed cords and tubules, which were stained with mouse anti-human cytokeratin antibody AE1/AE3. Residual glands were serous, and the majority of tumor cells were negative for mucin. The supraorbital location, encapsulation, and residual serous glands suggest that this mass was a low-grade adenocarcinoma of the lacrimal gland.

A variety of orbital neoplasms causing global displacements have been reported in dogs. Only a limited number of these neoplasms have been identified as arising from the lacrimal gland. Most tumors are associated with the lids or the third eyelid. At least 2 cases of adenoma and 3 cases of adenocarcinoma have been reported. Tumors infiltrating the orbit from the nearby zygomatic salivary gland are similar histologically and behaviorally, making definitive diagnosis of primary lacrimal neoplasms problematic. Normally, the main lacrimal gland is located in the superotemporal aspect of the orbit, and the zygomatic salivary gland is located in the infraorbital region. However, in disease conditions such as zygomatic salivary adenocarcinoma, masses may extend to the supraorbital region, further confusing the diagnosis. Zygomatic neoplasms are also rare in dogs. Only 2 cases of zygomatic adenocarcinoma, 1 in the retrobulbar region and the other in the infraorbital subcutis, both causing exophthalmos, have been reported. In dogs, the lacrimal gland is predominantly a serous gland with a mucus-secreting end piece, whereas the zygomatic salivary gland is predominantly serous with weak mucicarmine-stained luminal products stained strongly positive with PAS. The majority of neoplastic regions. The intracytoplasmic granularity in all positive cells were distinct with both stains, and the luminal products stained homogenously. The majority of residual serous glands were negative with mucicarmine, but some glands contained epithelium with weak mucicarmine-positive granules mixed in basophilic cytoplasm. The mucicarmine-stained luminal products ranged from negative to weakly positive in different residual tubules. The results of Alcian blue (pH 2.5) stain were parallel to those of the mucicarmine stain. These results supported a lacrimal gland origin.
Following deparaffinization and trypsinization, sections were immunostained with mouse antibody AE1/AE3 against human low-molecular-weight cytokeratins 1, 2, 3, 4, 5, 6, 7, and 8 (AE1) and high-molecular-weight cytokeratins 10, 15, 16, 17, and 19 (AE3) at a 1:40 dilution using the avidin-biotin complex method. Diaminobenzidine was used as the substrate. Mouse anti-human vimentin antibody was used at a 1:200 dilution. The neoplastic tissue stained positive with antibody AE1/AE3 in the solid cords (Fig. 4) and tubules and failed to stain with anti-vimentin antibody.

Immunohistochemistry and tubule formation by tumor cells confirmed the epithelial origin of the tumor. The supraorbital location of the mass, the predominantly serous residual glands, and a clear infraorbital location indicated a locally developed adenocarcinoma rather than a metastatic tumor. The infiltration of tumor cells into the loose connective tissue in the central core (Fig. 2) is consistent with the locally invasive nature of lacrimal neoplasms. The absence of tumor emboli, few mitotic figures, fine encapsulation, and clear demarcation from the surrounding tissues suggest a low-grade adenocarcinoma. Encapsulation may have limited the tumor mass from infiltrating the upper lids.

The probability that 2 tumors occurred in the same supraorbital location should be low, although cases of this type have been reported in humans. If this was a zygomatic adenocarcinoma, the mass would be expected to develop first in the infraorbital region before extending to the supraorbital location. In this case, the infraorbital region showed no enlargement (Fig. 1) on both clinical and gross examinations. Furthermore, the residual glands would be expected to be predominantly of the mucous type with recognition of serous demilune, as described for small carnivores. In this case, the residual serous glands was highly compatible with those described for the canine lacrimal gland. It is not clear whether those rare positive cells in the neoplastic regions represented residual mucus-secreting cells of the lacrimal gland or from the major mucus-secreting elements of the zygomatic
gland. These findings and the rarity of zygomatic neoplasms suggest that the possibility of a zygomatic gland origin is low.

There are several glands located in the periorbital region, and differentiation was required to identify the origin of this tumor. The common nasolacrimal duct or lacrimal sac is nonsecretory, extraorbital, and located further anterior, above the nasal bones. The gland of the third eyelid is seromucoid, located in the ventromedial part of the orbit, and should be associated with cartilage at its base. A deeper portion of this gland, Harder’s gland, is not present in dogs. The tarsal gland and the glands of Zeis are modified sebaceous glands and can be readily ruled out. The palpebral glands are serous and/or seromucoid, located in the palpebral conjunctiva, but their presence is inconsistent among species. The glands of Moll are a modified sweat gland, associated with the lid margin, near the cilia, muscle of Riolan, tarsal gland, and the glands of Zeis. The recognition of residual serous glands in this case should readily rule out the possibility of a neoplasm arising from a cutaneous sweat gland.

The zygomatic salivary gland should be located in the inferior-maxillary aspect and its histological features are not consistent with those observed in the mass in this dog.

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Sources and manufacturers
a. Dako, Carpinteria, CA.
b. Vectastain Kit, Vector Laboratories, Burlingame, CA.
c. Sigma Chemical Co., St. Louis, MO.
d. Dakopatts, Denmark.

References