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POLYCYSTIC OVARIAN MESOTHELIOMA IN AN AMERICAN CROCODILE (*CROCODYLUS ACUTUS*)

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Abstract: A captive adult female American crocodile (*Crocodylus acutus*), 3.6 m in length and at least 20 yr old, from the Summit Botanical Garden in Panama died after a brief illness in 1987. Necropsy revealed a giant polycystic mass that occupied most of the coelomic cavity. Histopathologic examination of the mass identified it as a polycystic ovarian mesothelioma, based on morphology and keratin-positive immunoreactivity.

Key words: American crocodile, *Crocodylus acutus*, ovarian mesothelioma, Reptilia, tumors.

INTRODUCTION

Ovarian mesotheliomas are neoplasms that arise from the mesodermally derived cells of the ovary,[7] are usually cuboidal or columnar, and resemble epithelium.[2] Virtually all are malignant and are rare in all species.[1,5,7] This report describes an unusually giant polycystic ovarian mesothelioma in a captive American crocodile (*Crocodylus acutus*) from Panama.

CASE REPORT

An adult 3.6-m-long female American crocodile kept at Summit Botanical Garden for more than 20 yr died after a brief illness in 1987. During the preceding 12 mo there was an increasingly noticeable coelomic distension. One wk before death, she experienced difficulty leaving the water pool, and her appetite diminished. The animal was fed approximately 9 kg of red meat or chicken three times/week. Although she occasionally shared her pool with other crocodiles, she was thought to be reproductively inactive.

At necropsy, the animal had a distended coelomic cavity filled with a highly vascularized polycystic mass that appeared to originate from the ovary. The cysts varied in size up to 5 cm in diameter, were filled with a translucent serosal fluid, and ruptured easily when touched. The weight of the neoplasm was estimated at 36–45 kg. The vascular supply of the mass was a hypertrophied ovarian artery and vein; the mass compressed the lungs, which showed focal pneumonic areas.

Sections of the polycystic mass and organs were fixed in 10% neutral buffered formalin, processed routinely in paraffin, sectioned at 6–8 μm, and stained with hematoxylin and eosin (H&E). Paraffin-embedded blocks were sent to the Registry of Pathology (AFIP accession number 2226242-1), Armed Forces Institute of Pathology, Washington, D.C., for confirmation of the diagnosis and immunohistochemical studies for immunoreactive keratin and factor VIII.

Microscopically, the mass was composed mostly of irregular cystic spaces, many resembling vascular channels lined by flattened cells and supported by a delicate fibrous stroma (Fig. 1). Cysts were also formed by walls of dense connective tissue with projections that filled the cyst lumen; some cysts were lined by cuboidal to low columnar epithelial cells. Occasional heterophilic infiltrates were seen in papillary projections of the connective tissue wall of the cysts. Some cysts contained eosinophilic material and scattered small eosinophilic globules. Sero-

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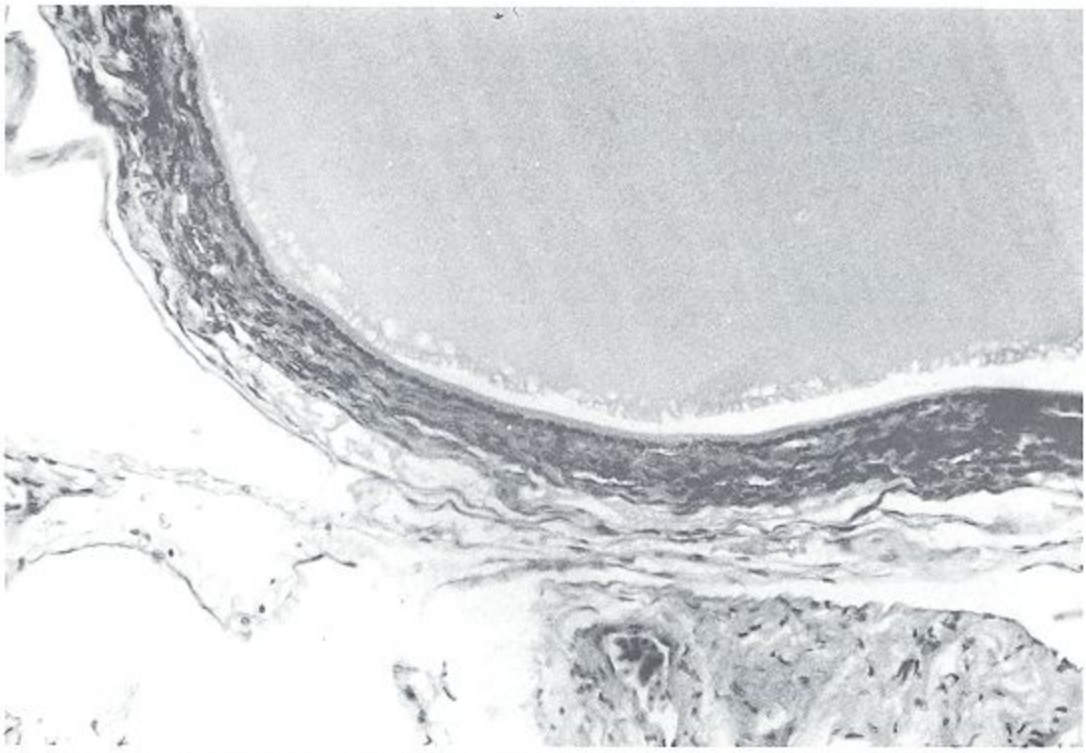

Figure 1. Photomicrograph of a polycystic ovarian mesothelioma in an American crocodile. Note that the cyst is lined by cuboidal mesothelial cells supported by discrete fibrous stroma. H&E, ×400.

sal vascularization was prominent. Mitotic figures were not seen. The cells lining the cystic spaces were immunoreactive for keratin but not for factor VIII.

DISCUSSION

Certain histologic characteristics of this ovarian mesothelioma, such as the lack of mitotic figures, the lack of anaplastic or pleomorphic cells, and the structure of the cysts, are similar to those observed in the cystadenoma and cystadenocarcinoma of the chicken.[3,7] It is difficult to distinguish between tumor and reaction in mesotheliomas.[2] The PAS-diastase technique has been recognized as reasonably specific for epithelial mucin to differentiate proliferative ovarian epithelial from mesothelial lesions in humans.[4] However, the problem with the PAS-diastase stain is that frequently the cells in question do not stain.[2] Carcinoembryonic antigen (CEA) has been found less sensitive than PAS-diastase, although some workers considered mesotheliomas universally negative for CEA.[4]

For these reasons and based on the morphology of the cells lining the cystic spaces and their immunoreactivity to keratin, we suggest that the cells of this ovarian tumor are either epithelial or mesothelial and not of endothelial origin, and that the discrete cysts containing eosinophilic material and lined by cuboidal to low columnar epithelial cells (Fig. 2) represent different stages in the development of ovarian follicles in preexisting ovarian tissue.

These morphological and immunohistochemical observations, together with the lack of metastases, indicate a mesothelioma of the ovary rather than an adenocarcinoma or an ovarian cystic hyperplastic reaction.[8] Ovarian cystic hyperplasia has been observed in the American alligator (*Alligator mississippiensis*) (E. Jacobson, pers. comm.), but the cysts observed were much smaller than the ones described here.

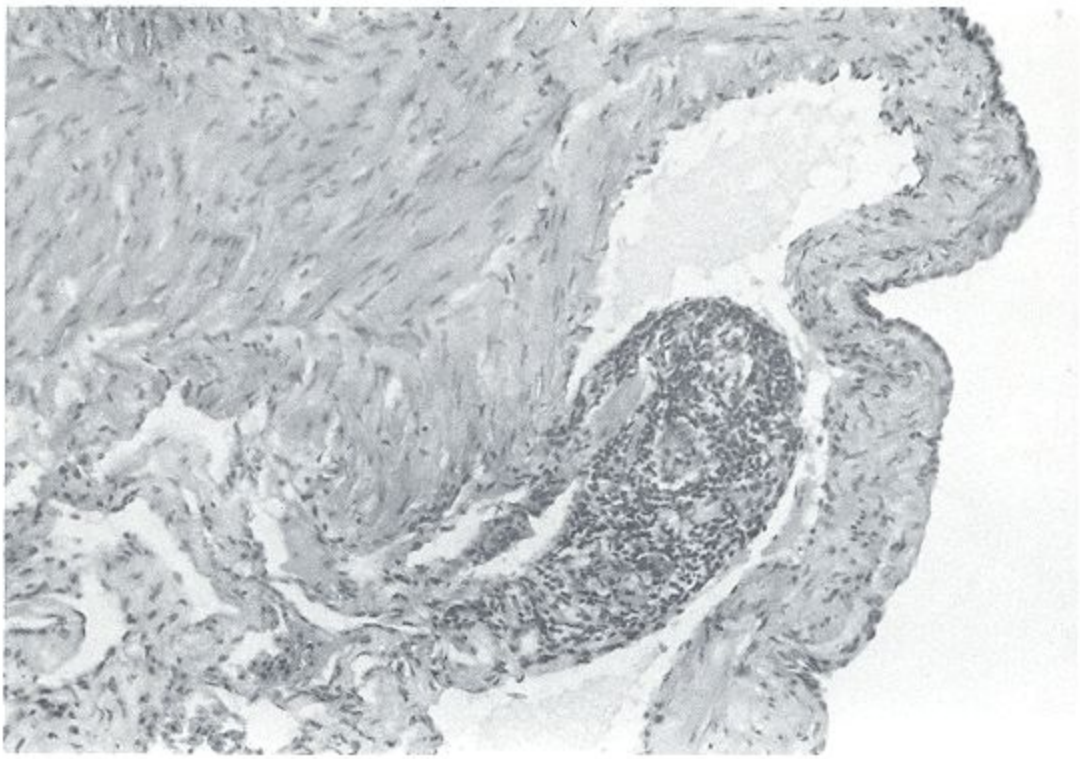

Figure 2. Photomicrograph of a polycystic ovarian mesothelioma in an American crocodile. The fibrous stroma projects papillae into the lumen of the cyst that is lined by flattened cells and infiltrated by heterophils. H&E, ×400.

The polycystic ovarian mesothelioma in this case may have originated from mesothelial cells as a consequence of a hormonal imbalance, which is thought to be the cause of adenocarcinomas of the ovary in other animal species.[3,4] Additional causative factors might include environmental substances, endometrial and tubal effluences,[8] or egg yolk,[6] which could all act as tissue irritants. Other possible diagnoses include a vascular hamartoma and a lymphangioma.[7] This case emphasizes the importance of neoplasia in the differential diagnosis of reproductive failure in female crocodiles.

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