



Case report

Choroid plexus papilloma in a free ranging eared dove (*Zenaida auriculata*)

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Abstract

Choroid plexus tumors (CPT) are rare neoplasms and histologically classified as choroid plexus papilloma (CPP), atypical choroid plexus papilloma (APP), and choroid plexus carcinoma (CPC). These neoplasms have been described in humans, domestic animals (canine, feline, equine, caprine) and some wild animals (cetaceans and *Psittacidae* birds). To our best knowledge, herein we report the first CCP in a free-ranging eared dove (Columbiformes; *Zenaida auriculata*, de Murs 1847). Histologically, the ventricle was dilated, with a papillary proliferation (arboriform pattern) in topography of CP. The neoplasm was well-differentiated, composed by a single layer of cuboidal cells, anchored in a delicate fibrovascular stroma. The neoplastic cells exhibited moderate stroma, with well-defined borders and round nuclei, with vesicular chromatin and inconspicuous nucleoli. Mitotic activity was low (<1 mitosis per 10 high-power fields). Immunohistochemistry for cytokeratin markers (AE1/AE3 antibody) were implemented, however, both neoplastic cells and normal epithelial tissues do not show immunoreactivity.

Key words: Neoplasms; Biodiversity; Wildlife; Choroid plexus tumors.

Introduction

The choroid plexus (CP) is a vascular structure present in the vertebrate brain; CP consists of epithelial cells, fenestrated blood vessels, and the stroma, and is responsible for the production of the cerebrospinal fluid (CSF) (16). Experimental ultrastructural studies in avian species (chickens and pigeons) demonstrate that CP differs from mammals with respect to the number and position of the cilia, and it is hypothesized that cilia may be related to transport functions (8, 15). However, in general it is considered that the anatomophysiology functions of CP between birds and mammals are similar (1).

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(CPC), choroid plexus papilloma (CPP), and atypical CPP (ACPP) (2, 17). These neoplasms have been described in humans, dogs, horses, goats, cows, cetaceans and budgerigars (Beluga whale, *Delphinapterus leucas*) (3-5, 7, 10-13). CPT represents between 7–13% of all primary brain tumors in dogs (14). Grossly, they are well-circumscribed, reddish, cauliflower-like intraventricular growths with a tendency to bleed (9). Microscopically, benign tumors are easily recognized by distinctive arboriform or papillary patterns and redundant epithelium. Malignant variants, however, are more difficult to diagnose, and their undifferentiated appearance may be confused with ependymomas or metastatic carcinomatosis (6). The present report describes a CPP in a free ranging eared dove (*Zenaida auriculata*).

Case report

In February 2021, this eared dove was found in the backyard of a citizen's house; the animal was apparently injured and was sent for clinical attention. On clinical examination, the animal shows good nutritional condition, absence of ectoparasites, developing feathers, moderate dehydration, head tilt to the left, and hypothermia. During the hospitalization period the animal never stopped presenting incoordination and head tilt. Seven days later, due to the poor prognosis and the maintaining of the clinical signs, the animal was euthanized. At necropsy, the main findings were multifocal punctate areas of yellowish coloration in the hepatic right lobes, presence of food in the trachea, the absence of intracavitary adipose tissue and atrophy of the pectoral muscles, no macroscopic alterations were observed in the central nervous system.

Within the framework of the project of wildlife epidemiological and laboratorial surveillance: potential for the emergence and re-emergence of infectious diseases (SES-PRC-2020/32339 - PROC. 28/2020), implemented by the Anatomic Pathology Nucleus (NAP) of the Adolfo Lutz Institute (São Paulo, Brazil), formalin-fixed organ/tissue samples of several taxa (wild birds and mammals) are received for the research of mortalities associated to infectious diseases, in birds immunohistochemical and molecular inquiry of West Nile Virus (WNL) is carried out as a contribution to the identification of potential reservoirs and/or amplifiers of this agent.

Histologically, the lateral ventricle was dilated, with a papillary proliferation (arboriform pattern) arising from CP. The neoplasm was well-differentiated, composed by a single layer of cuboidal cells, anchored in a delicate fibrovascular stroma (Fig. 1B). The neoplastic cells exhibited moderate cytoplasm, with well-defined borders and round nuclei, with vesicular chromatin and inconspicuous nucleoli (Fig. 1C).

Mitotic activity was low (<1 mitosis per 10 high-power fields). Immunohistochemistry was performed on representative dewaxed and rehydrated sections of the tumor, submitted to antigen retrieval in pressure cooker (citric acid solution 10mM pH 6.0). After endogen peroxidase blockage, anti-pan cytokeratin was applied (AE1/AE3- Biocare Medical, Concord, California, USA) and anti-West Nile virus - in house IEC Evandro Chagas, Belém, Pará, Br). The signal was amplified with micropolymers conjugated with peroxidase HiDef detection (Cell Marque, Rocklin, CA, USA)) and visualized with 3,3 diaminobenzidine (DAB) (Sigma D5637, MO, USA) chromogen. Positive control consisted of epithelial cells in other tissues. In negative control, the antibody step was omitted. Neoplastic cells did not show immunoreactivity for the AE1/AE3 antibody. Based on these findings, a diagnosis of CCP grade I was established (6). Other microscopic findings were moderate multifocal to coalescent heterophilic fibrinonecrotizing hepatitis; mild multifocal heterophilic splenitis and mild multifocal splenic hemosiderosis. WNL immunohistochemistry was negative.

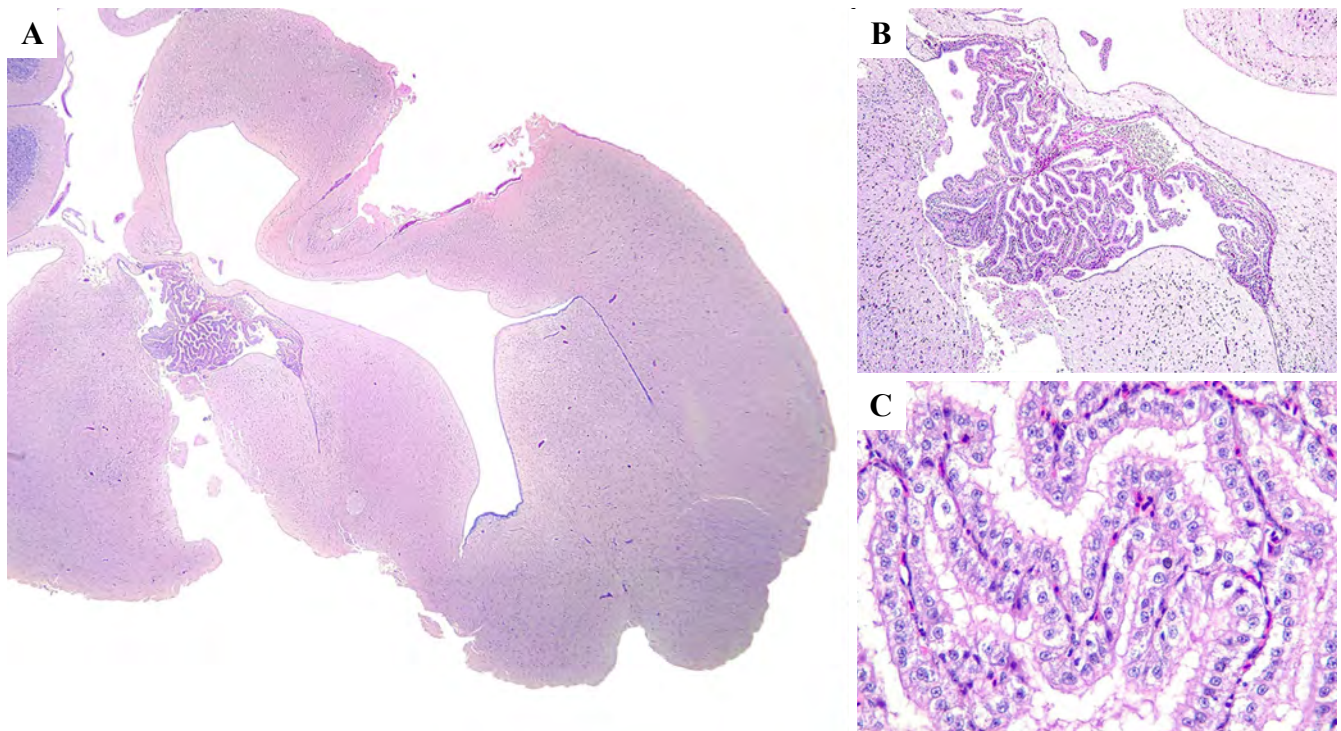


Figure 1. A. Eared dove, brain, note the dilatation of the ventricle with a papillary proliferation in choroid plexus topography (HE, 20x); B. Papillary proliferation has arboriform pattern (HE, 100x); C. The neoplasm was well-differentiated, composed by a single layer of cuboidal cells, anchored in a delicate fibrovascular stroma (HE, 200x).

Discussion

Central nervous system (CNS) intracranial tumors are extremely rare in birds. Other primary CNS tumors reported include ependymoma, CPP, adenoma and adenocarcinoma of the adenohypophysis (12). To the best of our knowledge, in birds CPP has only been reported in the order Psittaciformes in a budgerigar, with histological features of cuboidal or columnar cells arranged in simple to pseudostratified layers overlying vascularized connective tissue cores in papillary formations (12). As in our case, immunohistochemical characteristics were not reported in this neoplasm.

IHC for cytokeratin, glial fibrillary acidic protein (GFAP), E-cadherin, N-cadherin, and beta-catenin can be useful to support a diagnosis of CPT, but these immunomarkers lack specificity and often provide inconsistent results (2). As observed in our case, the lack of immunoreactivity in neoplastic tissues for antibodies classically used in diagnostic routine such as glial fibrillary acid protein (GFAP), vimentin, cytokeratin and neuron-specific enolase (NSE) has been reported in birds (12). Despite this, the diagnosis was made based on histological features, which are classical.

To our best knowledge this is the first CCP affecting a free-ranging eared dove (*Zenaida auriculata*). Reports on CPT in birds are scarce. The most likely explanation could be that the brains of wild birds are not often routinely examined. That a brain neoplasm had not been suspected as the cause of death in this case emphasizes the importance of routinely examining the brains of wild birds dying in the wild or in captivity.

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