

Case Report

Papillary Cystadenocarcinoma in a Budgerigar
(*Melopsittacus undulatus*)Amir Asghari Baghkheirati¹, Sara Shokrpour^{2*}, Mohammad Hassanzadeh¹, Javad Javid Nezhad¹, Jamshid Razmyar¹

1. Department of Avian Diseases, Faculty of Veterinary Medicine, University of Tehran, Tehran, Iran.

2. Department of Pathology, Faculty of Veterinary Medicine, University of Tehran, Tehran, Iran.



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**ABSTRACT**

Budgerigar (*Melopsittacus undulatus*) is a tiny colorful parrot and one of the most popular pets worldwide. This study was performed on a 5-year-old male budgerigar with a large and fluid-filled mass in the anterior part of the neck. Fine needle aspiration was accomplished to determine tumor origin, and the tumor content was cultured on blood and MacConkey agars (aerobic and anaerobic conditions). Besides, tumor ultrasonography and whole-body radiographs were done in the lateral and ventrodorsal positions. Finally, the tumor was removed, fixed in 10% neutral buffered formalin, and stained with hematoxylin and eosin (H & E). The radiology and ultrasonography results showed that the tumor (5.2×4×3.7 cm) had a homogenous structure filled with echogenic fluid content. The tumor content culture revealed no bacterial growth. Histopathologically, the mass was composed of cystic spaces with invagination of the lining epithelial cells, forming intraluminal papillae. The tumor was diagnosed as a papillary cystadenocarcinoma.

Keywords: Budgerigar, Cystadenocarcinoma, Histopathology, Radiology, Ultrasonography

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*** Corresponding Author:**

Sara Shokrpour, Assistant Professor.

Address: Department of Pathology, Faculty of Veterinary Medicine, University of Tehran, Tehran, Iran.

Phone: +98 98 (21) 61117065

E-mail: shokrpour@ut.ac.ir

1. Case History

Budgerigar is an attractive colorful parrot native to Australia. This little bird is a monogamous species that is widely kept as a domestic pet all around the world. Although most parrots are at risk, budgerigars have stable populations and are not considered endangered (Kalmar et al., 2010). This gregarious parrot has a short breeding cycle; its lifespan is 10-15 years (Kubiak, 2020; Banaszewska et al., 2014). Adenomas and cystadenomas are benign neoplasms derived from glandular epithelium. Adenomas have been identified in different organs of budgerigar, including the oviduct, uropygial gland, adrenal gland, thyroid (Robat, 2017), pituitary gland (Langohr et al., 2012), proventriculus (János et al., 2011), and kidney (Simova-Curd et al., 2009). To the best of our knowledge, there is no previous report about the occurrence of papillary cystadenoma in a budgerigar (*Melopsittacus undulatus*).

2. Clinical Presentation

A 5-year-old budgerigar (*M. undulatus*), weighing 65.7 g, with a huge, soft, and fluid-filled mass in the anterior part of the neck and respiratory distress was referred to the Faculty of Veterinary Medicine, University of Tehran (Figure 1). The bird was fed a high-energy, seed-based diet, and the owner had little information about proper psittacine diet requirements and care. Based on the morphological characteristic (cere color: Blue) and molecular sex determination test, the bird was a male budgerigar. The bird could not maintain its balance or sit on a perch properly due to its large mass. Also, some of the bird's normal activities (such as flying, eating, and drinking) were limited. The owner declared that he had not used any specific medication before. Initially, aminophylline (ampoule 250 mg/10 mL) was used in a NE-C900 nebulizer (Omron Co, Japan) to improve the respiratory status of the bird. A fine-needle aspiration (biopsy was used for the determination of the mass nature). Also, standard whole-body radiographs (DirectView Classic CR System; Kodak, Rochester, USA) were taken in the lateral and ventrodorsal projections. In addition, ultrasonography (GE Vivid7 Ultrasound, Horten, Norway) of the mass was done. Also, 100 µL of the mass content was used for bacterial culture on blood and MacConkey agars (Merck KGaA, Darmstadt, Germany). The culture media were transferred to the Avian Microbiology Laboratory, Faculty of Veterinary Medicine, University of Tehran, and incubated aerobically in a Memmert

INB200 incubator (Memmert GmbH+Co.KG, Schwabach, Germany) at 37°C for 24 to 48 h.

Identifying pathogenic organisms in wet smears and stained cytological samples was important. Therefore, fresh and direct fecal samples and Gram staining were used for wet mount preparation. The glass slides were examined with 400× and 1000× magnification. In addition, the smears obtained from the mass content were subjected to Gram and Giemsa staining methods. After that, a CH30 light microscope (Olympus Co, Japan) was used to examine the stained smears. Because of the bird's condition and poor response to therapy, the owner declined further treatment options like surgery and elected euthanasia. The mass was removed for histopathological evaluation at necropsy, fixed in 10% neutral buffered formalin, dehydrated, embedded in paraffin wax, and stained with hematoxylin and eosin (H & E).

3. Diagnostic testing

A viscous, translucent, and yellow-orange fluid was collected during tumor fine needle aspiration and used in aerobic and anaerobic bacterial cultures, but no bacterial growth was observed. Different cell cycle phases (including metaphase and telophase) were identified in the cytological evaluation of Giemsa-stained smears. In other words, the mitotic figure was one of the features of the examined slides. Furthermore, fecal samples were examined, but no signs of bacterial, fungal, or parasitic diseases were found in wet and Gram-stained smears. The radiology and ultrasonography results showed that the tumor (5.2×4×3.7 cm) had a homogenous structure filled with echogenic fluid content. As shown in Figure 2a, the tumor occupies the anterior part of the bird's neck (from the lower jaw to the thoracic inlet). Also, rim vascularization was observed in ultrasonography examination (Figure 2b). No bone involvement was detected, and no evidence of metastases was found in other organs. Postmortem examination revealed mild hyperemia of the lungs. No other gross lesions were observed.

Histopathologically, the mass was composed of cystic spaces of variable size and showed invagination of the lining epithelial cells to form intraluminal papillae. The cysts were supported by fibrovascular stroma (Figure 3a, 3b). The lining of the cystic structures was simple to lightly stratified layers of neoplastic cuboidal to columnar epithelial cells (Figure 3a, 3c). Several cystic lumens contained necrotic and desquamated epithelial cells. Neoplastic cells had small and round to oval nuclei, inconspicuous nucleoli, and a moderate eosinophilic cytoplasm (Figure 3c). These cells showed little nuclear or cellular pleomorphism. Mitotic figures were occasionally visible (Figure 3c, 3d).



Figure 1. A male budgerigar with a large mass in the anterior part of the neck (arrows)

4. Assessments

Cystadenomas are primary tumors that consist of fluid-filled cystic spaces. However, they are found in any tissue. The ovary and kidney are the most commonly affected organs (Hochleithner, 1990; Reavill, 2004; Powers et al., 2019). Cystadenocarcinomas are a discrete group of epithelial tumors described by invasive growth and cystic structures often organized in a papillary pattern (Azmanis et al., 2013; Baron et al., 2020). Cystadenomas and cystadenocarcinomas have been reported in a variety of avian species, including the African grey par-

rot (*Psittacus erithacus*) (Hochleithner, 1990), Timneh African grey parrot (*Psittacus erithacus timneh*) (Azmanis et al., 2013), rainbow lorikeet (*Trichoglossus moluccanus*) (Baron et al., 2020), saker falcon (*Falco cherrug*) (Samour et al., 2001), sulfur crested cockatoo (*Cacatua galerita*) and galahs (*Eolophus roseicapilla*) (Raidal et al., 2006). The grade and clinical stage of the tumor are important criteria in the prognosis of avian tumors. Tumors with high grades have a poor prognosis. Although surgical excision is a proper approach for low and intermediate-grade tumors and can be done without difficulty (Kubiak, 2020). The owner declined more treat-

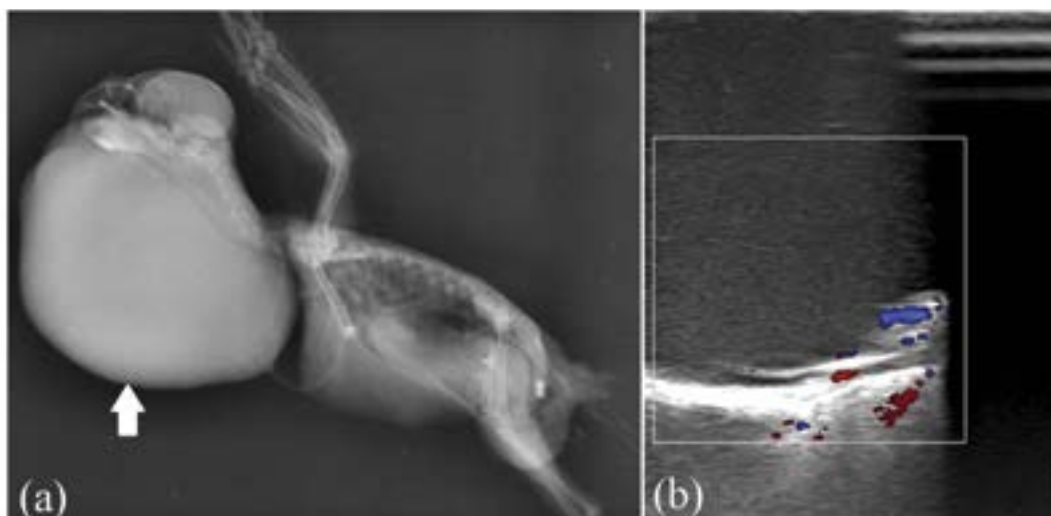


Figure 2. a) A soft tissue mass (arrowhead) in the frontal aspect of the neck in radiography, b) Tumor rim vascularization in ultrasonography examination

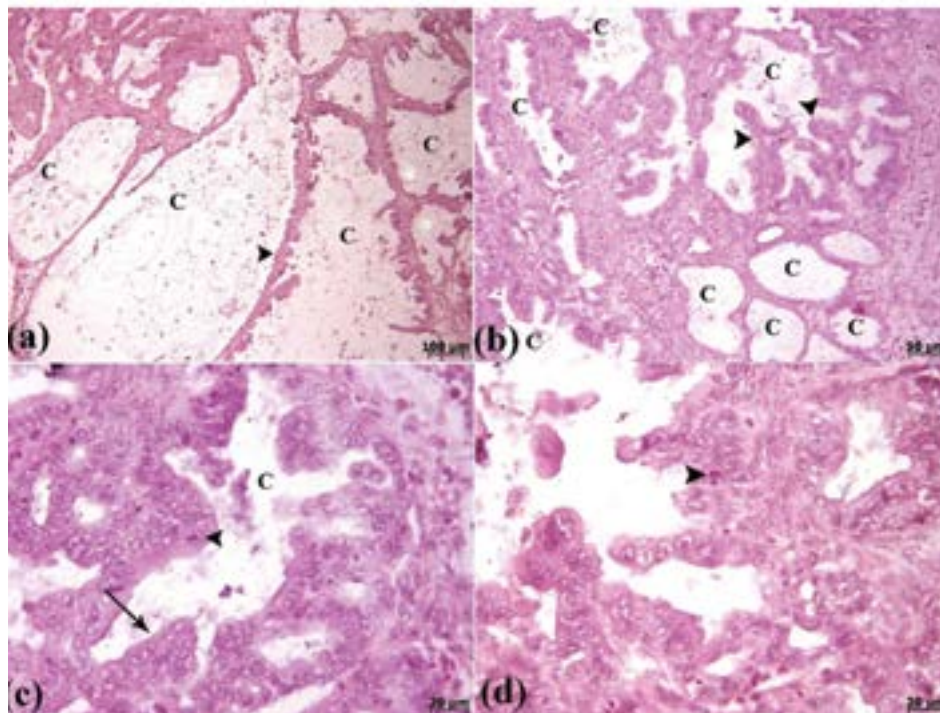


Figure 3. Histopathological findings of papillary cystadenocarcinoma

a) Variable size of cystic structures (c) The cystic wall by a simple layer of neoplastic epithelial cells (arrowhead), b) Dilated cysts (c) lined by intraluminal papillae (arrowheads), c) The cystic wall, (c) lined by stratified layers of neoplastic columnar epithelial cells (arrow), mitotic figure (arrowhead), d) Mitotic figure (arrowhead) hematoxylin and eosin

ment in this study, and the Budgerigar was humanely euthanized using appropriate techniques. Some studies did not identify the tumor's origin for various reasons. In 1990, Hochleithner observed a large, fluid-filled mass near the left eyelid of a 15-year-old African grey parrot. According to the histopathological findings, the tumor was diagnosed as a cystadenoma. The exact origin of the mass was not identified, but the author proposed the lacrimal glands as a tumor's origin because of the tissue type and location (Hochleithner, 1990). In another study, Simova-Curd et al. (2009) identified a well-demarcated retrobulbar mass in an African grey parrot which was histologically diagnosed as adenoma. Although the origin of the adenoma was not determined in their study, the harderian gland was suggested as the origin due to the location of the neoplasm (Simova-Curd et al., 2009). Adenocarcinomas of the ovary, oviduct, pancreas, kidney, proventriculus, and pituitary gland have been reported from different species in a common manner but rarely described in salivary glands (Simova-Curd et al., 2009, János et al., 2011), Langohr et al., 2012; Robat, 2017). Finally, similar to other studies (Hochleithner, 1990; Simova-Curd et al., 2009), based on histopathological findings and the location of the mass, salivary glands were suggested as the origin of the papillary adenocarcinoma in Budgerigar.

5. Conclusion

The origin of the papillary cystadenocarcinoma remained unknown in the present study, but based on histopathological findings and the location of the mass, we suspect that it may have been from the salivary glands.

Ethical Considerations

Compliance with ethical guidelines

This study was performed based on guideline for the care and use of laboratory animals in Iran.

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Authors' contributions

All authors equally contributed to preparing this article.

Conflict of interest

The authors declared no conflict of interest.

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گزارش موردی

آدنوکارسینوم کیستیک پاپیلاری در یک باجریگار

امیر اصغری باغ خیراتی^۱، سارا شکرپور^۲، محمد حسن زاده^۱، جواد جاویدنژاد^۱، جمشید رزم یار^۱

۱. گروه بیماری های طیور، دانشکده دامپزشکی، دانشگاه تهران، تهران، ایران.

۲. گروه پاتولوژی، دانشکده دامپزشکی، دانشگاه تهران، تهران، ایران.

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چکیده

باجریگار (*Melopsittacus undulatus*) طوطی کوچک رنگارنگ و حیوان خانگی محبوب در سرتاسر جهان است. این مطالعه بر روی یک باجریگار ۵ ساله همراه با توده بزرگ و پر از مایع در قسمت قدامی گردن انجام شد. به منظور تعیین منشأ تومور، اسپیراسیون با سوزن ظریف انجام شد و محتوای تومور بر روی آگار خون‌دار و مک کانکی (هوازی و بی هوازی) کشت داده شد. به علاوه سونوگرافی از تومور و رادیوگرافی کل بدن در موقعیت جانبی و پشتی-شکمی انجام شد. در نهایت تومور برداشته و در فرمالین بافر خنثی ۱۰ درصد تثبیت شد. با رنگ آمیزی معمول هماتوکسیلین-ئوزین (H&E)، رنگ آمیزی شد. براساس نتایج رادیولوژی و سونوگرافی، تومور (۵/۲ سانتی متر × ۴ سانتی متر × ۳/۷ سانتی متر) ساختاری همگن داشت و با مایع اکوژنیک پر شده بود. رشد باکتری در کشت محتویات تومور مشاهده نشد. از نظر هیستوپاتولوژی، توده از فضاهای کیستیک همراه با تکثیر سلول های اپیتلیوم پوششی، در جهت تشکیل پاپیلای داخل لومن تشکیل شده بود. تومور به عنوان آدنوکارسینوم کیستیک پاپیلاری تشخیص داده شد.

کلیدواژه ها: باجریگار، آدنوکارسینوم کیستیک، هیستوپاتولوژی، رادیولوژی، سونوگرافی



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* نویسنده مسئول:

سارا شکرپور

نشانی: تهران، دانشگاه تهران، دانشکده دامپزشکی، گروه پاتولوژی.

تلفن: ۶۱۱۱۷۰۶۵ (۲۱) ۹۸+

رایانامه: shokrpour@ut.ac.ir