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Malignant Mesenchymal Neoplasm in a Blue-and-yellow Macaw (*Ara ararauna*) Under Human Care-Case Report

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Case Report
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Abstract

Neoplasms of various tissue origins have become increasingly recognized in geriatric psittacines under human care. This report describes a case of malignant mesenchymal neoplasia in a male blue-and-yellow macaw (*Ara ararauna*) maintained in a zoological collection. The bird was admitted with a history of chronic gastrointestinal signs and died during hospitalization. At necropsy, a portion of the pancreas was interposed between the distal proventriculus and the ventriculus. Histopathological examination revealed an infiltrative, non-encapsulated mesenchymal neoplasm involving the pancreas, proventriculus, and ventriculus, composed of interlacing bundles of spindle cells supported by moderate fibrovascular stroma. The morphological diagnosis was malignant mesenchymal neoplasia, with leiomyosarcoma and gastrointestinal stromal tumor (GIST) as the main differential diagnoses. This case highlights the importance of considering malignant mesenchymal neoplasms among the differential diagnoses of chronic gastrointestinal disease in geriatric psittacines and contributes to the limited literature describing these tumors in avian species.

Keywords: Psittacine; Zoological Medicine; Tumor; Sarcoma

Introduction

The blue-and-yellow macaw (*Ara ararauna*) is a large psittacine species native to the Neotropical region. It exhibits predominantly frugivorous and granivorous feeding habits, playing a fundamental ecological role in seed dispersal [1]. However, individuals confiscated from the illegal wildlife trade frequently present with critical clinical conditions resulting from poor sanitary conditions, severe transport-related stress, and chronic malnutrition associated with inadequate diets [2]. Consequently, referral to zoological institutions and wildlife rehabilitation centers is essential, where nutritional management and preventive diagnostic evaluation provide the foundation for ex situ conservation [3].

The avian stomach is composed of two distinct compartments: the proventriculus (glandular stomach), which is responsible for gastric acid and enzyme secretion, and the ventriculus, or gizzard (muscular stomach), characterized by a thick smooth muscle layer that mechanically grinds ingested food [4]. Closely associated with this region is the pancreas, a mixed gland that plays a vital role in the exocrine secretion of digestive enzymes and the endocrine regulation of metabolism [5]. The substantial increase in the life expectancy of animals maintained under

human care, resulting from advances in nutrition, husbandry, and specialized veterinary medicine, has led to a higher prevalence of chronic degenerative and neoplastic diseases in geriatric individuals [6-8].

These conditions are well documented in captive populations, as the absence of natural selective pressures allows animals to reach advanced ages rarely observed in free-ranging populations [7-9]. In wildlife medicine, particularly among geriatric psittacines, neoplasms of diverse tissue origins have become increasingly recognized as common diagnostic findings [6], requiring tailored therapeutic approaches to preserve welfare and maintain quality of life in these patients [8].

Gastrointestinal neoplasms constitute a heterogeneous group with distinct morphological, histopathological, and molecular characteristics, in which mesenchymal tumors represent a significant and challenging portion since they share extreme histomorphological similarities [10]. Aiming to discuss these challenges and their diagnostic differences, the present article reports a case of a malignant mesenchymal neoplasm in a Blue-and-yellow Macaw (*Ara ararauna*) under human care.

Case Report

A male blue-and-yellow macaw (*Ara ararauna*) of undetermined age, weighing 770 g with a body condition score of 2/5, had been housed in a zoological collection for eight years after being confiscated from the illegal wildlife trade. The bird was admitted with a presumptive diagnosis of gastrointestinal parasitism. Fecal parasitological examination confirmed the presence of Capillaria sp. eggs. Hematological and serum biochemical analyses revealed mild anemia (erythrocytes: 2.13 × 10^6/µL; hematocrit: 30%; hemoglobin: 9.1 g/dL), heterophilia (13,430/µL) with a left shift (1% immature heterophils), toxic heterophils, lymphopenia (1,896/µL), monocytosis (316/µL), and hyperuricemia (9.2 mg/dL), ALT 121 UI/L, AST 66 UI/L, CK 20 UI/L, Uric Acid 9,20 mg/dL.

Supportive treatment was initiated and included fluid therapy, fenbendazole, enrofloxacin, and vitamin supplementation. Because the bird exhibited selective feeding behavior and reduced voluntary food intake, a commercial hand-feeding formula for psittacines was introduced as a nutritional supplement.

After seven days of hospitalization, on a particularly hot day, the bird was found in its enclosure exhibiting open-mouth breathing, marked dyspnea, coughing, regurgitation-like movements, and a markedly distended crop. Oxygen therapy was immediately initiated, and anesthesia was induced with isoflurane to facilitate crop evacuation and minimize the risk of aspiration. The crop was markedly distended and contained a large amount of dark, foul-smelling ingesta. Metoclopramide was administered; however, approximately 20 minutes later, the bird developed another episode of severe respiratory distress. Despite immediate cardiopulmonary resuscitation, it died.

On external examination, the bird was mildly underconditioned, with minimal fat reserves. No fecal staining was observed around the cloaca. Dark fluid was present within the oral cavity. On internal examination, the air sacs were opaque. The heart was pale, with multifocal dark discoloration of the coronary vessels and tracheal vessels. The lungs ranged in color from dark red to yellowish. The liver was pale and exhibited multifocal small yellow foci. The spleen was mildly pale, and mild renomegaly was observed. The proventriculus was markedly dilated, occupying a large portion of the coelomic cavity (Figures 1). A portion of the pancreas was interposed between the distal proventriculus and the ventriculus (Figure 2). Dark gastrointestinal content was present throughout the entire gastrointestinal tract.

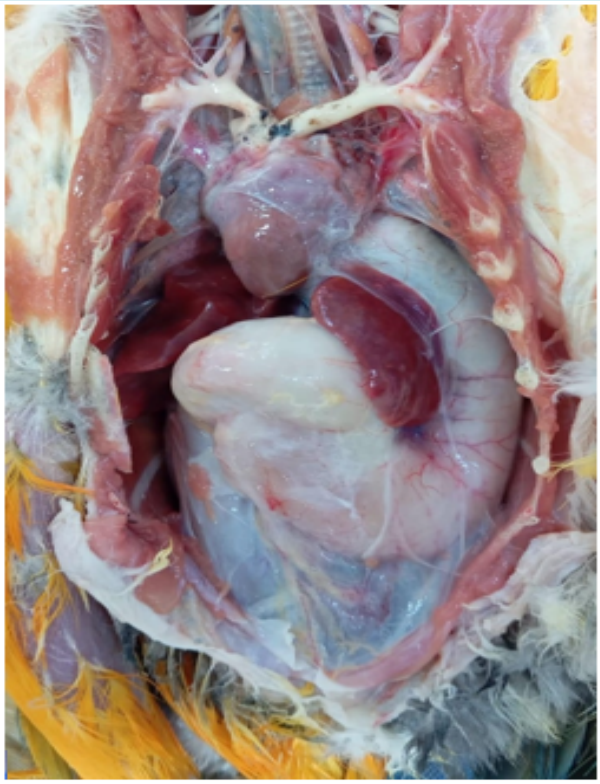


Figure 1: Gross appearance of the markedly dilated proventriculus occupying a large portion of the coelomic cavity.

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Figure 2: Gross close-up of the markedly enlarged proventriculus and ventriculus, showing a portion of the pancreas interposed between the distal proventriculus and the ventriculus.

Histopathological examination revealed marked diffuse pulmonary congestion. The liver exhibited moderate diffuse vacuolar hepatocellular degeneration associated with mild multifocal sinusoidal congestion. The kidneys showed marked diffuse acute tubular necrosis. The trachea, esophagus, heart, major vessels, stomach, spleen, small intestine, and large intestine showed no significant abnormalities.

Pancreas/Proventriculus/Ventriculus: Histopathological examination revealed an infiltrative, non-encapsulated mesenchymal neoplasm composed of interlacing bundles of elongated spindle cells supported by a moderate fibrovascular stroma. The neoplastic cells exhibited moderate amounts of eosinophilic, fibrillar cytoplasm with indistinct cell borders and elongated to oval nuclei containing loosely arranged chromatin and prominent nucleoli. Moderate cellular pleomorphism and anisokaryosis were observed, along with frequent mitotic figures (Figure 3). The neoplasm extensively infiltrated and separated the muscular layers of the adjacent organs. The histomorphological features were consistent with a malignant mesenchymal neoplasm, with leiomyosarcoma and gastrointestinal stromal tumor (GIST) considered the main differential diagnoses.

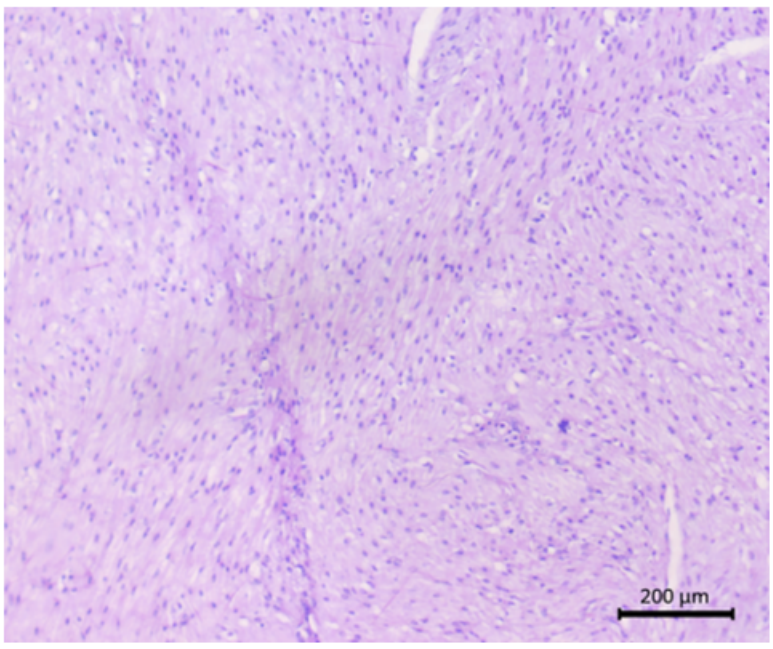


Figure 3: Histopathological aspects of the malignant mesenchymal neoplasm in the proventricular and ventricular region. Hematoxylin and eosin (H&E) stain. 10x objective.

Discussion

Considering that gastrointestinal stromal tumors (GISTs) are the most common mesenchymal neoplasms of the gastrointestinal tract and have been described in multiple animal species, they should be considered one of the primary differential diagnoses. Leiomyomas and leiomyosarcomas are also widely recognized mesenchymal neoplasms. Immunohistochemical markers are valuable and indispensable for the definitive diagnosis of these neoplasms; however, their high cost often precludes a conclusive diagnosis. GISTs, which originate from the interstitial cells of Cajal, exhibit strong and diffuse immunoreactivity for CD117 (c-KIT) in approximately

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90% of cases, in addition to frequent CD34 positivity, particularly in gastric GISTs. Immunoreactivity for α-smooth muscle actin (α-SMA) may also be observed, whereas desmin immunoreactivity is generally absent. In contrast, leiomyomas and leiomyosarcomas originate from smooth muscle cells and typically exhibit positive immunoreactivity for desmin, although its expression may be variable in poorly differentiated leiomyosarcomas. α-SMA is expressed in most smooth muscle tumors, whereas c-KIT immunoreactivity is typically absent [11,12].

Despite the undeniable importance of immunohistochemistry for the definitive diagnosis of mesenchymal neoplasms, its routine application in avian medicine faces significant practical obstacles [10]. One of the primary limitations is the high financial cost associated with the broad antibody panels required to accurately differentiate these tumors, which often precludes a conclusive diagnosis in clinical practice. Furthermore, there is a notable scarcity of species-specific immunohistochemical markers validated for avian tissues. Consequently, veterinary pathologists must rely on cross-reactive antibodies originally developed for mammalian species, applying these commercial clones to avian samples [11]. While markers such as CD117 (c-KIT) and smooth muscle actins have successfully demonstrated cross-reactivity and positive immunolabeling in some psittacine cases, the lack of bird-specific markers can sometimes lead to variable staining patterns or reduced sensitivity, making the precise classification of these challenging neoplasms even more complex.

Other gastrointestinal diseases should also be considered during the diagnostic investigation. Macrorhabdiosis, caused by the yeast Macrorhabdus ornithogaster, has a tropism for the proventriculus and may produce a similar clinical presentation, including regurgitation, progressive weight loss, and high mortality [13]. Psittacines are considered the avian group most frequently affected (Gonçalves, 2026). Proventricular dilatation disease (PDD), caused by Psittaciform 1 bornavirus (PaBV), should also be included in the differential diagnosis, as it affects the enteric nervous system and is commonly reported in captive psittacines. Clinical signs include regurgitation, weight loss, passage of undigested seeds in the feces, lethargy, and neurological abnormalities such as ataxia [14].

Although an earlier diagnosis of the neoplasm might have allowed surgical exploration, complete surgical excision would likely have been unfeasible because of its extensive local invasion. The mass extensively involved the pancreas and infiltrated a large portion of both the proventriculus and ventriculus, making complete resection technically impractical and unlikely to achieve adequate surgical margins. Consequently, the prognosis would likely have remained poor even if the neoplasm had been diagnosed at an earlier stage.

Conclusion

Mesenchymal neoplasms should be considered among the differential diagnoses for coelomic masses in psittacine birds. Histopathological examination provides valuable diagnostic information; however, immunohistochemical analysis remains essential for the definitive characterization and classification of mesenchymal tumors. In the present case, immunohistochemistry could not be performed because of financial constraints, representing a limitation to the definitive diagnosis.

Conflicts of Interest

The author has no conflicts of interest to declare.

References

1. Sick H (1997) Ornitologia Brasileira. Rio de Janeiro: Nova Fronteira.

2. Funayama FK (2026) Tráfico de Psitacídeos e disseminação de doenças infecciosas no Brasil. Pubvet 20(1): e1887.

3. Grespan A, Raso TF (2014) Psittaciformes (Araras, Papagaios, Periquitos, Calopsitas e Cacatuas). In: Cubas ZS, Silva JCR, et al. (Eds.), Tratado de Animais Selvagens: Medicina Veterinária. In: 2nd (Edn.), São Paulo: Roca, pp: 550-589.

4. Getty R (1986) Sisson/Grossman Anatomia dos Animais Domésticos. In: 5th (Edn.), Rio de Janeiro: Interamericana, 2.

5. King AS, McLelland J (1984) Birds: Their Structure and Function. In: 2nd (Edn.), London: Bailliere Tindall.

6. Baine K (2012) Management of the geriatric psittacine patient. Journal of Exotic Pet Medicine 21(2): 140-148.

7. Föllmi J (2007) A scoring system to evaluate physical condition and quality of life in geriatric zoo mammals. Animal Welfare 16(3): 309-318.

8. Krebs BL (2018) Managing aged animals in zoos to promote positive welfare: A review and future directions. Animals 8(7): 116.

9. Gage LJ (1999) Geriatric medicine in aged captive pinnipeds. In: Annual Conference of the International Association for Aquatic Animal Medicine. 30th (Edn.),

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Boston: IAAAM.

10. Costa ML, Sueiro FAR, Jark PC, Carvalho LL, Rodrigues MA, et al. (2023) Histomorphological and immunophenotypic diagnoses of gastrointestinal stromal tumors and other sarcomas that affect the intestine of dogs. Brazilian Animal Science 24: e-75610E.

11. Paranhos GF, Silva LC, Duarte JLC, Oliveira Filho HS, Nery TFL, et al. (2024) Proventricular and ventricular gastrointestinal stromal tumor (GIST) in a scarlet macaw (*Ara chloropterus*). Brazilian Journal of Veterinary Pathology 17(1): 60-65.

12. Hirota S (2018) Differential diagnosis of gastrointestinal stromal tumor by histopathology and immunohistochemistry. Translational Gastroenterology and Hepatology 3: 27.

13. Gonçalves GAM, Tonin AA (2026) Analysis of the clinical profile of macrorabdiosis cases: a retrospective study. Brazilian Journal of Hygiene and Animal Health 20(1): 1-8.

14. Araujo JL, Cristo TG, Morais RM, Costa LS, Biezus G, et al. (2017) Proventricular dilatation disease (PDD) outbreak in blue-and-gold macaws (*Ara ararauna*) in the State of Santa Catarina, southern Brazil. Pesquisa Veterinária Brasileira 37(11): 1331-1335.

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