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Retrobulbar Leiomyosarcoma in a Budgerigar (*Melopsittacus undulatus*): A Case Report

This case study documents a rare instance of retrobulbar leiomyosarcoma in a 5-year-old budgerigar. Gross pathological and histological assessments identified a well-circumscribed mass composed of pleomorphic spindle cells encasing the right eyeball. Microscopically, the tumor exhibited tightly interwoven fascicles of spindle-shaped neoplastic cells with elongated, cigar-shaped nuclei, prominent nucleoli, and abundant eosinophilic cytoplasm. The mitotic index was estimated at approximately five mitoses per high-power field, indicating moderate proliferative activity. Immunohistochemical analysis revealed strong cytoplasmic positivity for vimentin and smooth muscle actin, while staining for desmin was negative, supporting a smooth muscle origin. These findings underscore the importance of integrating histomorphological characteristics with immunohistochemical profiling for the accurate diagnosis of orbital leiomyosarcoma, particularly in distinguishing it from other spindle cell tumors in the periocular region. This case emphasizes the need to consider poorly differentiated leiomyosarcoma in the differential diagnosis of avian orbital neoplasms.

Key Words: Avian, Budgerigar, retrobulbar leiomyosarcoma, histopathology, immunohistochemistry

Muhabbet Kuşunda (*Melopsittacus undulatus*) Retrobulbar Leiomyosarkom: Olgu Sunumu

Bu olgu çalışması, 5 yaşındaki bir muhabbet kuşunda retrobulbar leiomyosarkom olgusunu belgelemektedir. Makroskopik patolojik ve histolojik değerlendirmeler, sağ göz küresini saran pleomorfik iğsi hücrelerden oluşan, iyi sınırlanmış bir kitleyi ortaya koydu. Mikroskopik olarak tümör, uzamış, puro şeklinde çekirdekleri, belirgin çekirdekçikleri ve bol eozinofilik sitoplazmaları olan iğsi şekilli neoplastik hücrelerden oluşan sıkı örülmüş demetler sergilemiştir. Mitoz indeksi, yüksek büyütmeli alanda yaklaşık beş mitoz olarak tahmin edilmiş ve bu da orta düzeyde proliferatif aktiviteye işaret etmiştir. İmmünohistokimyasal analiz, vimentin ve düz kas aktini için sitoplazmik olarak güçlü pozitiflik gösterirken, desmin boyaması negatif bulunmuş ve bu bulgular tümörün düz kas kökenli olduğunu desteklemiştir. Bu bulgular, orbital leiomyosarkomun doğru tanısı için histomorfolojik özelliklerin immünohistokimyasal profille entegrasyonunun önemini vurgulamaktadır; özellikle perioküler bölgedeki diğer iğsi hücreli tümörlerden ayırt edilmesinde kritik rol oynamaktadır. Bu olgu, kanatlılarda görülen orbital neoplazmların ayırıcı tanısında kötü diferansiye leiomyosarkomun göz önünde bulundurulması gerektiğini vurgulamaktadır.

Anahtar Kelimeler: Avian, muhabbet kuşu, retrobulbar leiomyosarkom, histopatoloji, immünohistokimya,

Introduction

Sarcomas are malignant neoplasms that arise from mesenchymal cells and encompass a wide spectrum of tumor types with variable histological features and clinical behaviors. These tumors are characterized by their capacity to originate in multiple tissue types, including blood vessels, nerves, adipose tissue, skeletal and smooth muscle, cartilage, and bone. In both human and veterinary medicine, sarcomas present diagnostic and therapeutic challenges due to their aggressive nature, local invasiveness, and tendency to recur following incomplete excision. In avian species, soft tissue sarcomas are relatively uncommon but have been increasingly recognized with improved diagnostic capabilities and reporting standards. Among these, leiomyosarcomas (LMSs), which arise from smooth muscle cells, represent a distinct subset of mesenchymal tumors. LMSs have been reported with some frequency in birds, particularly affecting the reproductive and gastrointestinal systems of chickens, quail, and budgerigars (1). These neoplasms typically exhibit a non-encapsulated, infiltrative growth pattern, contributing to their aggressive clinical course and complicating surgical management (1, 2).

Despite the growing recognition of LMSs in avian pathology, other soft tissue sarcomas, especially those occurring in less commonly examined anatomical regions, remain poorly documented. Retrobulbar rhabdomyosarcomas, for example, have been reported in birds but remain exceedingly rare among avian species (3). The retrobulbar space—a confined anatomical region behind the eye—is particularly difficult to evaluate clinically in birds due to the compact structure of the avian skull and limited physical access during routine examination. Consequently, tumors in this region may be overlooked or misdiagnosed, especially in the absence of advanced imaging or

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postmortem histopathological investigation. The rarity of documented cases may reflect both true low incidence and significant diagnostic limitations. Subtle or nonspecific clinical signs, such as exophthalmos or periocular swelling, may be mistaken for more common conditions such as retrobulbar abscesses, trauma, or inflammatory granulomas.

This case report presents a rare case of retrobulbar sarcoma in a budgerigar (*Melopsittacus undulatus*), detailing the histopathological and immunohistochemical characteristics of the tumor.

Case Presentation

A five-year-old budgerigar (*Melopsittacus undulatus*) was presented to the surgical department of Pathology, Veterinary Faculty, Firat University with clinical signs of right-sided exophthalmos and marked periocular edema. The bird exhibited no other systemic abnormalities at the time of examination. Given the anatomical complexity of the region and the suspicion of an underlying space-occupying lesion with a poor prognosis, euthanasia was elected by the owner. A complete postmortem examination was performed. Gross inspection revealed a well-defined, firm mass within the retrobulbar space, enveloping the tissues surrounding the right globe. The tumor appeared discrete yet unencapsulated, suggesting local invasiveness consistent with mesenchymal neoplasia.

Histopathology and Immunohistochemistry: During necropsy, tissue samples including the eyes were fixed in 10% formalin, processed using routine protocols, and stained with hematoxylin and eosin (H&E) for light microscopic examination.

Staining Protocol: Deparaffinization, rehydration, and antigen retrieval (specific retrieval method and buffer dependent on the antibody; typically heat-induced epitope retrieval using citrate or EDTA buffer) were performed according to standard protocols. Endogenous peroxidase activity was blocked using 3% hydrogen peroxide. Following appropriate blocking steps to prevent non-specific binding, sections were incubated with the respective primary antibodies (Table 1) at room temperature for 30 minutes. Antibody dilutions were optimized based on manufacturer recommendations and in-house validation using known positive and negative control tissues. Subsequent steps included incubation with appropriate secondary antibodies conjugated to a horseradish peroxidase (HRP)-labeled polymer detection system (e.g., Dako EnVision+System). The chromogenic reaction was developed using 3,3'-diaminobenzidine (DAB) as the substrate. Sections were counterstained with hematoxylin, then dehydrated, cleared, and mounted using a synthetic resin.

Table 1. Antibody details

Target	Host	Clonality	Clone	Manufacturer
Vimentin	Mouse	Monoclonal	V9	Dako Cytomation
Desmin	Mouse	Monoclonal	D33	Dako Cytomation
SMA	Mouse	Monoclonal	1A4	Dako Cytomation

Analysis: Stained sections were evaluated by light microscopy.

Postmortem examination revealed a retrobulbar leiomyosarcoma causing periorbital swelling. The tumor was localized in the retrobulbar region, extending into adjacent eye muscles (Figure 1A). The mass exhibited distinct boundaries and a well-defined structure, deforming the globe (Figure 1B).

Macroscopic Findings: The tumor occupied the retrobulbar space, causing marked distortion and anterior displacement of the globe (exophthalmos).

Histopathological Findings: Microscopic examination revealed a hypercellular neoplastic mass composed of spindle cells arranged in interwoven fascicles (Figure 1C). Neoplastic cells exhibited size variability, elongated nuclei with blunt ends, prominent nucleoli, and eosinophilic cytoplasm ranging from fibrillary to granular. Infiltrative growth into periocular striated muscle was observed, with swirling growth patterns, mitotic figures, coagulative necrosis, hemorrhage, lymphocytic infiltrates and multinucleated giant cells (Figure 1D). Vascular congestion in the choroid was secondary to mass effect.

Immunohistochemical Findings: Neoplastic cells showed strong cytoplasmic positivity for SMA (Figure 1E) and, vimentin (Figure 1F) supporting mesenchymal and smooth muscle origin.

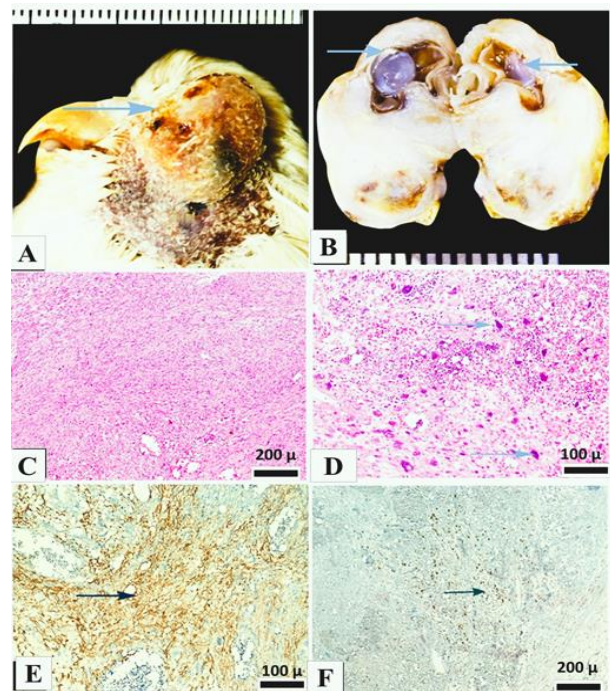


Figure 1. Gross, histopathological, and immunohistochemical findings: **A.** Tumor enveloping the eye (arrow), causing exophthalmos. **B.** Tumor encircling and deforming the eyeball (arrows) in cross-section. **C.** Spindle-shaped cells with cigar-shaped nuclei in intersecting fascicles (arrow) (H&E). **D.** Multinucleated cells (arrows) and lymphocytic infiltrate around the tumor mass (H&E). **E.** Strong and diffuse immunoreactivity for SMA (arrow). **F.** Focal desmin immunoreactivity in neoplastic cells (arrow).

Discussion

Leiomyosarcoma is a malignant mesenchymal tumor showing smooth muscle differentiation and can arise in various anatomical locations, including rare orbital involvement. Orbital leiomyosarcomas are exceptionally uncommon and typically present with nonspecific signs like progressive exophthalmos due to mass effect (4, 5). In this case, the histomorphology—interlacing fascicles of spindle cells with cigar-shaped nuclei, eosinophilic cytoplasm, and mitotic activity—was consistent with high-grade malignancy. Phenotypic heterogeneity (epithelioid transformation, cytoplasmic degeneration) further suggested poor differentiation.

Immunohistochemical profiling corroborated the diagnosis: SMA+/vimentin+/desmin– aligns with poorly differentiated leiomyosarcomas in veterinary and human pathology (1, 2). Desmin negativity, though unexpected, has been documented in undifferentiated avian cases (6, 7). Postmortem findings revealed local aggressiveness, with tumor encasement of the globe and muscle infiltration. Similar invasive potential is reported across species, including dogs, birds, and humans (2, 8-10).

While rhabdomyosarcoma has been reported in budgerigar retrolbulbar space (3), this represents the first retrolbulbar leiomyosarcoma in this species.

Leiomyosarcomas are more frequently documented in other avian locations/species, such as pheasant wings (9) or cutaneous/visceral presentations in pigeons (6, 7). Histologically and immunohistochemically, this tumor aligns with leiomyosarcomas in mammals and other avian cases (1, 2, 7-10).

Retrolbulbar localization remains unique. Primary retrolbulbar leiomyosarcomas are reported in dogs (8) and humans (9, 10), showing similar profiles and aggressive behavior. No previous avian cases with retrolbulbar involvement exist, suggesting extreme rarity or underdiagnosis due to limited resources in avian medicine.

Differential diagnoses included granulomatous inflammation, lymphoma, and other more common avian soft tissue sarcomas. Leiomyosarcoma was initially ruled out due to its extreme rarity in this location/species. Retrolbulbar neoplasms in birds are typically associated with rhabdomyosarcoma, lymphoma, or spindle cell tumors (3).

This case highlights diagnostic features of poorly differentiated orbital leiomyosarcoma. Characteristic morphology combined with IHC profiling (SMA+/vimentin+/desmin–) is essential for diagnosis.

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