



CASE REPORT

MICROSPORIDIAL GRANULOMATOUS CONJUNCTIVITIS IN A BEARDED DRAGON (*POGONA VITTICEPS*): A CASE REPORTLadislav Novotný^{1,2*}, Petr Soukup^{3,4}, Martin Květoň^{5,6}, Jan Misík¹

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Ethical considerations: When reporting experiments on animals Observation of the ARRIVE guidelines 2.0: Updated guidelines for reporting animal research, published on July 14, 2020 (DOI: 10.1371/journal.pbio.3000410), is applied. The authors ensure that all procedures were performed in compliance with the guidelines for animal care of their institutions or with national/international guidelines.

ABSTRACT

An eight-month-old female bearded dragon (*Pogona vitticeps*) was presented with chronic nodular conjunctivitis of the left lower eyelid that failed to respond to previous topical antibiotic and anti-inflammatory therapy. Histopathological examination of an excisional biopsy revealed marked granulomatous inflammation in the lamina propria and submucosa. Special stains (Gram, PAS) demonstrated numerous microsporidia within sporophorous vacuoles, while Ziehl–Neelsen staining for acid-fast bacteria was negative. Based on the histopathological findings and results of special stains, a diagnosis of microsporidial granulomatous conjunctivitis was established. Postoperatively, the patient was treated with tobramycin–dexamethasone eye drops in a tapering regimen for four weeks, resulting in local resolution of the lesion. However, the animal died two months after the initial ophthalmological examination. As post-mortem examination was not performed, systemic microsporidial infection, previously reported in bearded dragons, cannot be excluded. This case highlights microsporidia as a potential cause of chronic conjunctival lesions in bearded dragons and emphasizes histopathology with special stains as a key diagnostic tool.

Key words: *Encephalitozoon pogonae*; histopathology; ocular infections; reptiles

INTRODUCTION

Ocular disorders are relatively common in bearded dragons (*Pogona vitticeps*); however, infections caused by microsporidia are reported only sporadi-

cally. Microsporidia are obligate intracellular eukaryotic parasites that, based on molecular phylogenetic studies, are currently classified within the kingdom Fungi [1]. They can infect a broad range of vertebrate hosts, including reptiles [2]. In reptiles, microsporidial infections are

typically associated with chronic, multisystemic granulomatous inflammation and high mortality, most often due to granulomatous arteritis and subsequent organ failure [3, 4]. Ophthalmic manifestations of microsporidial infection include keratitis, conjunctivitis [5], and blepharoconjunctivitis [6]. The present report describes a rare case of microsporidial granulomatous conjunctivitis in a juvenile bearded dragon and discusses its diagnostic and clinical relevance.

CASE PRESENTATION

An eight-month-old female bearded dragon (*Pogona vitticeps*) was examined for a several-week history of conjunctival thickening of the left eye. The animal was housed individually in a terrarium with appropriate temperature gradients and ultraviolet (UV) lighting and was fed crickets supplemented with calcium and vitamin D₃.

Ophthalmological examination revealed marked conjunctival hyperaemia and chemosis, predominantly affecting the lower eyelid, with no other ocular abnormalities detected (Fig. 1). Visual function appeared to be preserved. A clinical diagnosis of nodular conjunctivitis was made. Previous treatment with topical antibiotics (tobramycin eye drops) and anti-inflammatory agents failed to induce regression of the lesion.

An excisional biopsy of the thickened conjunctiva (6 × 3 × 3 mm) was performed, and the tissue was submitted for histopathological examination. No additional laboratory investigations were undertaken.

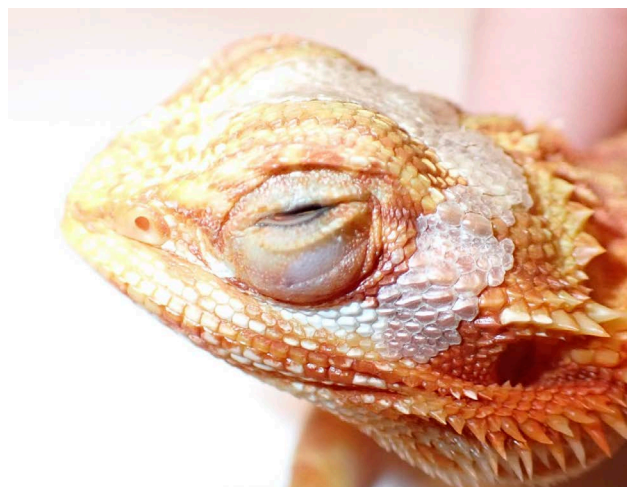


Fig. 1. Bearded dragon (*Pogona vitticeps*) with marked swelling of the conjunctiva of the left lower eyelid.

RESULTS

Histopathology

In the haematoxylin-eosin-stained sections, the conjunctival epithelium was focally attenuated. The lamina propria and submucosa were expanded by multifocal to coalescing, dense inflammatory infiltrates composed predominantly of macrophages, with fewer small lymphocytes and heterophils. The inflammatory infiltrate multifocally formed granulomas with central necrosis (Fig. 2). The cytoplasm of a subset of macrophages was conspicuously pale and abundant, suspicious for the presence of intracellular microorganisms (Fig. 3). The inflammatory process extended to the surgical margins. No neoplastic tissue was identified.

Special stains: Gram stain revealed numerous microsporidia within sporophorous vacuoles in the cytoplasm of macrophages (Fig. 4). Ziehl–Neelsen staining for acid-fast bacteria was negative. Microsporidial spores were lightly basophilic with a darker polar cap and measured approximately 3–5 µm. A histopathological diagnosis of microsporidial granulomatous conjunctivitis was established.

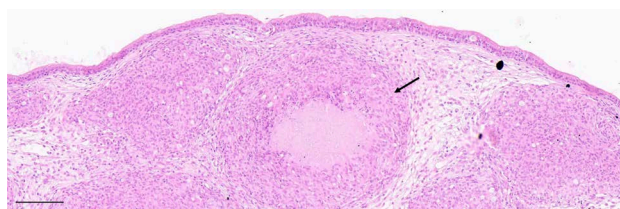


Fig. 2. Histological section of conjunctiva with multiple granulomas; larger granulomas show central necrosis (arrow). Haematoxylin and eosin. Scale bar = 100 µm.

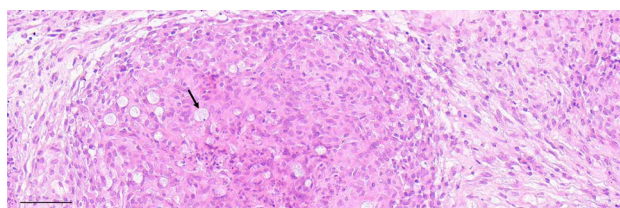


Fig. 3. Higher magnification showing weakly staining organisms within the cytoplasm of macrophages in a granuloma (arrow). Haematoxylin and eosin. Scale bar = 50 µm.

MANAGEMENT AND OUTCOMES

Following excisional biopsy, topical therapy with tobramycin–dexamethasone eye drops (TOBRADEX 3 mg/ml +

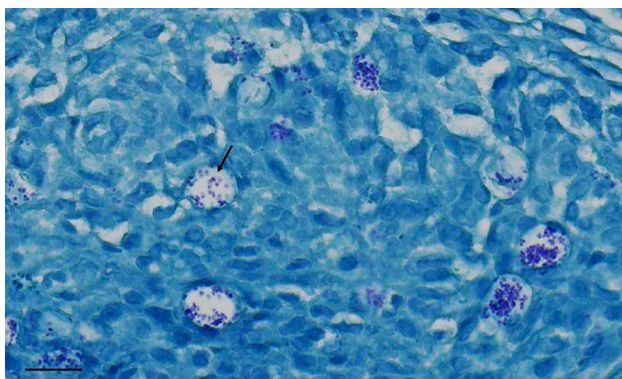


Fig. 4. Gram stain revealing numerous microsporidian spores within macrophage cytoplasm (arrow). Scale bar = 20 μ m.

1 mg/ml, Novartis Pharma GmbH) was instituted in a tapering regimen over four weeks, resulting in complete local healing of the conjunctival lesion. Nevertheless, the animal died approximately two months after the initial ophthalmological examination. A necropsy was not permitted.

DISCUSSION

The findings in the present case are consistent with chronic granulomatous conjunctivitis caused by microsporidia, a condition that is rare but documented in lizards [6, 7]. In bearded dragons, microsporidian infections have been reported not only as localized ocular disease but also as systemic infections affecting multiple organs [5], frequently with a fatal outcome [3, 4]. In the present case, death occurred two months after the initial ophthalmological examination, despite complete local resolution of the conjunctival lesion following surgical excision and topical therapy.

Because post-mortem examination was not performed, systemic microsporidian infection could not be confirmed, and the exact cause of death remains undetermined. In previously published cases, microsporidian keratoconjunctivitis required combined surgical and antifungal therapy, including enucleation and systemic antifungal treatment (itraconazole, fenbendazole, voriconazole) [7, 8]. In another report, the diagnosis of ocular microsporidiosis was supported by histopathology and PCR with genomic sequencing, leading to definitive identification of *Encephalitozoon pogonae* [6].

In the present case, the diagnosis was established by direct histological demonstration of microsporidia within sporoporous vacuoles. The morphology and intracellular

localization of the spores are consistent with *Encephalitozoon pogonae*; however, definitive species identification would require PCR-based molecular typing. Differential diagnoses for granulomatous conjunctivitis in reptiles include atypical bacterial and fungal infections, mycobacteriosis, protozoal infections, and non-infectious causes such as foreign bodies or keratin accumulation.

CONCLUSION

Chronic inflammatory lesions of the eyelids, conjunctiva, and cornea in bearded dragons may be caused by microsporidian infection and should therefore be considered in the differential diagnostic work-up of chronic ocular disease in reptiles. Conjunctival biopsy, followed by histopathological examination with appropriate special stains, is a crucial step in establishing an aetiological diagnosis.

Data Availability Statement

The raw data supporting the conclusions of this article will be made available by the authors, without undue reservation.

Ethical Statement

This case report is based on the examination of a privately owned animal presented for clinical care. No experimental procedures were performed; therefore, specific ethical approval was not required.

Conflict of Interest

The authors declare no conflict of interest.

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Generative AI Statement

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Authors' Contributions

L.N. and J.M. performed the histopathological evaluation and interpretation. P.S. conducted the ophthalmological examination and clinical management. M.K. performed the special stains, contributed to the interpretation of findings and literature review. All authors contributed to manuscript preparation and approved the final version.

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