

# Symblepharon with aberrant protrusion of the nictitating membrane in the snowy owl (*Nyctea scandiaca*)

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## Abstract

Two young snowy owl chicks were presented with aberrant protrusion of the nictitating membranes. This was caused by conjunctival adhesions causing symblepharon secondary to a previous septicemia episode. While symblepharon has been noted in birds before, this unusual presentation of the nictitating membrane has not been reported. Surgical intervention ameliorated the clinical signs, allowing vision in one bird by removal of the nictitating membranes, a technique which appeared to have no deleterious effects on the ocular surface.

**Key Words:** avian, nictitating membrane, septicemia, symblepharon

## INTRODUCTION

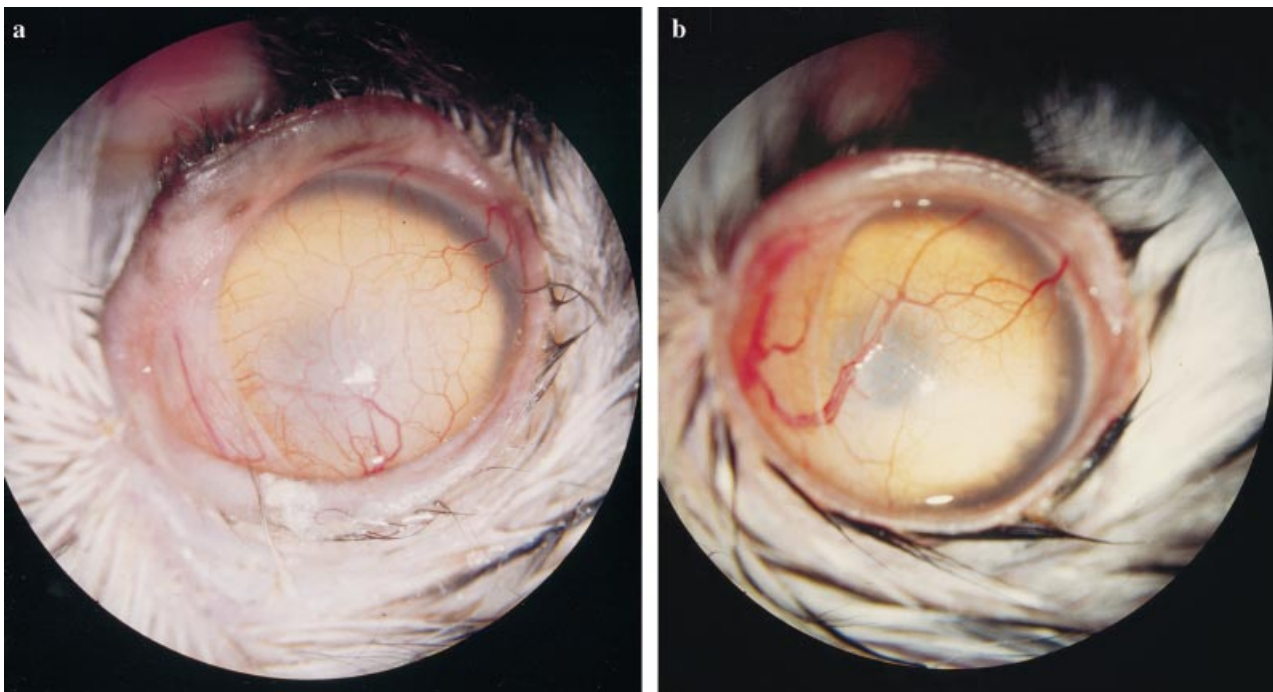
The avian third eyelid or nictitating membrane is a thin translucent sheet of tissue situated dorsomedial to the globe. It is actively retracted ventrolaterally by the pyramidalis muscle which originates in the posterior sclera and loops over the optic nerve through a sling formed by the bursalis muscle.<sup>1</sup> Generally considered to be important in ocular protection and in spreading the precorneal tear film,<sup>2</sup> conditions of the avian nictitating membrane reported in the literature have been limited to granulomas associated with candidiasis,<sup>3</sup> neoplasms, such as squamous cell carcinoma, basal epithelioma, xanthoma<sup>3</sup> and chondrosarcoma<sup>4</sup> and foreign bodies<sup>5</sup> or nematodes<sup>6</sup> trapped between the membrane and the cornea. Removal is not generally recommended other than for neoplastic lesions. We report here an unusual syndrome of protrusion of the nictitating membrane as the presenting sign of symblepharon in two young snowy owl (*Nyctea scandiaca*) chicks and describe amelioration of signs by surgical intervention.

## CASE REPORT

Two young snowy owl chicks originating from a large zoologic collection (Whipsnade Wild Animal Park, Zoological Society of London) were presented for ophthalmic examination. The birds were hatched from a clutch of four eggs artificially incubated and hand reared after hatching. One chick died at 7 days of age with a mixed *Salmonella typhimurium*/*Escherichia coli* septicemia. Two other birds were similarly affected 7 days after the first chick died. They were treated

with antibiotics and recovered, although were noted to have subcutaneous emphysema 4 days later, probably subsequent to clavicular airsac rupture. The ophthalmically affected birds, one of which had been ill, presented with opaque ocular surfaces at 29 and 36 days of age. They were examined using indirect and direct ophthalmoscopy and slit lamp biomicroscopy. Both owls were determined to be blind as no menace response or avoidance behavior was present and neither bird followed visual stimuli such as cotton wool balls dropped in front of the bird. Ocular lesions were confined to large engorged blood vessels running across the entire ocular surface with an apparent severe corneal opacity (Fig. 1a,b) together with inflamed conjunctiva. A presumptive diagnosis of vascular keratoconjunctivitis was made and a diagnostic cytologic sample from the corneal surface was taken. During sample acquisition with a Kimura spatula, it was noted that the blood vessels moved without associated globe rotation. A further examination revealed no clear margin of the nictitating membrane visible in either eye of both birds. The blood vessels traversing the palpebral aperture were determined not to be within the cornea but rather associated with the nictitating membrane. Indeed, the free margin of the membrane could be grasped and the structure retracted to demonstrate an apparently normal cornea and globe underneath. Globe size was normal in all birds. A presumptive diagnosis of symblepharon resulting in aberrant protrusion of the nictitating membrane was made. A fourth chick was unaffected.

Given that the abnormally protruding nictitating membrane was obscuring vision and precluding independent activities such as appropriating offered food items, the decision



**Figure 1.** Presenting signs of engorged blood vessels across the ocular surface of one chick.



**Figure 2.** Resection of the adherent edge of the vascular tissue shows it to be the nictitating membrane.

was made to ameliorate the protrusion of the nictitating membrane surgically. The constricting ventrolateral adhesions of the nictitating membranes were incised under isoflurane anesthesia, this resulting in a loose membrane which could be retracted (Fig. 2). Post-operatively the birds



**Figure 3.** The surviving chick at 1 year of age showing an apparently unremarkable ocular appearance following surgery.

recovered well and showed appropriate behavior such as menace and visual pursuit responses as well as independent feeding within the next days. However, the nictitating membranes were not fully retracted and appeared inflamed. Topical prednisolone acetate was thus applied to reduce

inflammation, and further resection of aberrant conjunctival adhesions at the ventromedial aspect of the globe was required in both birds. The chick with the more severe protrusion and inflammation was noted to be in poor condition with pustules on both of the eyelids and the nictitating membrane. Despite antibiotics comprising topical chloramphenicol and systemic amoxicillin followed by clindamycin, the bird declined further and was euthanized one week later. At postmortem examination widespread visceral abscesses were noted from which *Pseudomonas* sp. was isolated. The eyes of the second bird improved, and no further problems were reported until the age of 13 months at which stage further mild conjunctival adhesions were noted together with chronically dropped wings (Fig. 3). Given the poor long-term prognosis the bird was euthanized. At postmortem examination adhesions of the ventral palpebral conjunctivae were noted; these were determined to be fibrous in nature on histopathologic examination, and presumed to be a sequel of conjunctival inflammation. Histopathologic evaluation of the retrobulbar structures revealed fibrosis of the pulley mechanism by which the pyramidalis muscle retracts the nictitating membrane although the relevance of this to the signs observed is unclear.

## DISCUSSION

As noted above reported abnormalities of the third eyelid have been confined to trauma, infection, inflammation, neoplasia and foreign body retention. Here we describe the aberrant total bilateral protrusion of the nictitating membrane in two young snowy owls. This rendered the birds blind and gave the initial impression of an exuberant vascular keratitis.

The cause of this aberrant protrusion remains unclear. Postmortem findings indicated fibrous conjunctivitis with adhesions between the nictitating membrane and periocular conjunctiva together with fibrosis of the tendon of the pyramidalis muscle around the bursalis muscle sling. The persistent complete protrusion of the nictitating membrane

could be explained by conjunctival adhesions following systemic infection. However, in previously reported inflammatory diseases of the nictitating membrane, swelling of the nictitating membrane and partial prolapse have been the predominant findings<sup>3</sup> and not the complete protrusion of an engorged but not visibly swollen membrane, as in these cases. It may be that the protrusion was associated not so much with conjunctival adhesions but with fibrosis of the pyramidalis tendon, as noted at postmortem examination. Conjunctivitis has, to date, not been associated with septicemia in birds. While intraocular inflammation is more commonly associated with systemic bacterial infections, it is conceivable that circulating bacteria could seed to the conjunctival plexuses and thus cause conjunctivitis with subsequent symblepharon.

Despite the poor long-term survival of these birds, the surgical intervention was essential to restore vision and for one chick this was maintained for almost 1 year. Had other compromising factors not been present, it might have been possible to continue treatment resulting in a fully functioning adult bird suitable to enter a breeding program, the main aim of keeping such animals in captivity.

## REFERENCES

1. Martin GR. Eye. In: *Form and Function in Birds*, Vol. 3. (eds King AS, McLelland J) Academic Press, London, 1985; 146–187.
2. Ward DA. Diseases and surgery of the canine nictitating membrane. In: *Veterinary Ophthalmology*, 3rd edn. (ed. Gelatt KN) Lippincott, Williams & Wilkins, Baltimore, 1999; 609.
3. Kern TJ, Paul-Murphy J, Murphy CJ. Disorders of the third eyelid in birds. *Journal of Avian Medicine and Surgery* 1996; **10**: 12–18.
4. Spalding MG, Woodard JC. Chondrosarcoma in a great white heron from southern Florida. *Journal of Wildlife Disease* 1992; **28**: 151–152.
5. Mccrary MD, Bloom PH. Lethal effects of introduced grasses on red-shouldered hawks. *Journal of Wildlife Management* 1984; **48**: 1005–1008.
6. Thomas-Baker B, Dew RD, Patton S. Ivermectin treatment of ocular nematodiasis in birds. *Journal of the American Veterinary Medical Association* 1986; **189**: 1113.

