Choanal Atresia in an African Grey Parrot (Psittacus erithacus erithacus) and an Umbrella Cockatoo (Cacatua alba)

A four-month-old Congo African Grey Parrot and a four-year-old Umbrella Cockatoo with histories of chronic nasal and ocular discharge respectively, were presented to the University of Georgia, College of Veterinary Medicine for evaluation. The choanal slit was absent in the Umbrella Cockatoo. In its place was a flat bony palatine region with no evidence of choanae. The choanal region appeared grossly normal in the African Grey Parrot. During routine nasal flushing of both birds, it was noted that fluid would not pass from the nasal cavity into the oral cavity. Rhinograms indicated that there was no patent connection between the nasal and oral cavities. Endoscopic evaluation of the palatine region of the African Grey Parrot revealed a membrane covering the choanae. These two anatomically unique cases of choanal atresia are considered previously unreported congenital malformations in psittacine birds.

Case 1. At four days of age, an African Grey Parrot (Psittacus erithacus erithacus) was removed from the nest box to be hand-raised. The aviculturist noted that the bird had copious amounts of bilateral nasal discharge. The bird had no other observable abnormalities.

At one month of age, the bird continued to have the nasal discharge and was taken to a local veterinarian for evaluation. Flushing of the sinuses would temporarily alleviate the discharge, which resumed when flushing was discontinued. Therapy with multiple antibiotics and diphenhydramine had little or no effect.

When the bird was three months old, a second veterinarian cultured the nasal passages and recovered organisms sensitive to chloramphenicol. A 20-day regimen of oral chloramphenicol did not resolve the nasal discharge. Other neonates and adults to which this chick was exposed remained clinically normal.

At four months of age, the bird was referred to the University of Georgia, College of Veterinary Medicine. The bird was bright and alert, and weighed 405 grams. A bilateral, copious, serous nasal discharge was present. During nasal flushing, fluid introduced through a nostril would enter the nasal cavity and exit via the opposite nostril. At no time did fluid injected through the nostrils pass into the oral cavity. The oral cavity and choanal slit appeared normal by direct visualization. Subtle open-mouth breathing was observed when the bird was at rest. The beak was in normal apposition, but a small feather near the mouth moved in conjunction with respiration. The white blood cell count, packed cell volume, total solids, albumin, calcium, aspartate aminotransferase (AST), lactate dehydrogenase (LDH) and uric acid levels were all within established limits. Survey radiographs of the whole body and skull were normal.

With the bird intubated under isoflurane anesthesia, a rhinogram (nasal sinus contrast study) was performed by administering 0.2 ml of Iohexol 300 consecutively into each nostril. Contrast medium flowed normally from the right nostril into both infraorbital sinuses, confirming communication between the left and right sinuses (Figure 1). A similar finding was observed.
when contrast medium was introduced through the right nostril. The contrast material moved ventrally through the nasal cavity and stopped abruptly at the level of the palate (Figure 2). At no time did contrast material enter the oral cavity. The contrast medium was removed from the nasal passages by flushing with lactated Ringer’s solution (LRS) and the use of mild suction. Figure 3 demonstrates movement of contrast medium in a normal Bare-eyed Cockatoo (Cacatua sanguinea).

Endoscopy of the choanal slit and surrounding structures revealed a membrane covering the choanae at the level of the palate. All other oral structures were normal. The diagnosis was choanal atresia.

**Case 2.** A few months after purchasing a hand-raised six-month-old Umbrella Cockatoo (Cacatua alba), the owner noticed that the bird had an ocular discharge. Over the next three years, the bird continued to have a bilateral, copious, serous ocular discharge. Occasionally, the discharge would become purulent or was accompanied by a nasal discharge. Repeated cultures of the choanal slit area and sinuses indicated the presence of several bacteria, with *Pseudomonas* being the most commonly isolated organism. Varied antibiotics and flushing of the sinuses changed the character of the ocular discharge from purulent to serous, but the volume of discharge did not change appreciably.

At four years of age, the bird was presented to the University of Georgia, College of Veterinary Medicine because of continued ocular discharge. Abnormal feather formation, diarrhea and a cloacal prolapse were other presenting complaints.

At presentation, the eyes were retracted in their sockets. A copious, serous, bilateral ocular discharge was present, and was associated with periorcular and facial feather loss and thickening of the underlying tissue. Nasal discharge was not present. Mature remiges and rectrices were damaged with a pattern consistent with feather chewing. Two interrupted sutures had been placed by the referring veterinarian at the lateral margins of a flaccid cloaca to prevent prolapse.

Leukocytosis (white blood cell count 18,455, 73% heterophils, 20% lymphocytes, 7% monocytes) and anemia (packed cell volume 32%) were present. The total solids, albumin, calcium, AST, LDH and uric acid levels were within established limits.

Visual examination of the oral cavity revealed the absence of a choanal slit. The roof of the mouth was flat and bony, with papillae scattered randomly. Choanae were not present. During nasal flushing, fluid did not pass from the nares to the oral

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**Fig. 2.** Lateral view of rhinogram performed on an African Grey Parrot (Case 1). Contrast material moved ventrally through the nasal cavity (open arrow) and stopped abruptly at the level of the palate (closed arrow), revealing a blockage that was confirmed by endoscopy to be a persistent membrane.

**Fig. 3.** Lateral view of rhinogram performed on a normal Bare-eyed Cockatoo, showing normal flow of contrast medium from nasal cavity (open arrows), through choanae at level of palate, and into nasopharynx and oral cavity (closed arrow).
cavity. A diagnosis of choanal atresia was made based on the physical examination findings.

Survey skull radiographs were normal. With the bird intubated under isoflurane anesthesia, a rhinogram was performed by administering 0.5 ml Iohexol 300 consecutively into each nostril. Contrast medium flowed normally from the left nostril into both infraorbital sinuses, confirming communication between the left and right sinuses. The contrast medium moved ventrally through the nasal cavity and stopped abruptly at the level of a thickened palate, confirming the diagnosis of choanal atresia (Figure 4). The contrast medium was removed from the nasal passages by flushing with LRS and the use of mild suction.

**DISCUSSION**

As a review of the avian upper respiratory tract, room air enters through the external nares and is warmed and moistened by the medial and caudal nasal concha. Caudal to the concha, the nasal cavity communicates with the infraorbital sinus, which is divided into five diverticuli: the rostral, periorbital, infraorbital, post-orbital and mandibular diverticuli. Caudally the infraorbital sinus communicates with both the cranial and cervical portion of the cervicocephalic air sac. The right and left infraorbital sinuses communicate in psittaciformes, but not in passeriformes.

The tube-like nasal cavity turns ventrally at the sinuses, and the air exits the two choanae (internal nares) at the level of the palate. The choanae are just dorsal and cranial to the choanal slit (choanal opening, choana), which is in the dorsal oral cavity or roof of the mouth. The choanae are separated by the nasal septum or vomer bone.

Choanal atresia has been reported in several domestic mammals and is seen most commonly in horses. This congenital problem has been described in humans, sometimes alone or as part of the CHARGE complex (Coloboma of eye, Heart defect, Atresia of the choana, Retarded growth and development, Genital hypoplasia, Ear anomalies/deafness). Relatively little information concerning congenital abnormalities in psittacine birds, but specific cases rarely have been reported in the literature. Other reported, but poorly documented, deformities include hydrocephalus, abnormalities of the pelvis, hock, feet, sternum and jaw, abnormalities of the pelvis, hock, feet, sternum and jaw, abnormalities of the pelvis, hock, feet, sternum and jaw, abnormalities of the pelvis, hock, feet, sternum and jaw, abnormalities of the pelvis, hock, feet, sternum and jaw, abnormalities of the pelvis, hock, feet, sternum and jaw, abnormalities of the pelvis, hock, feet, sternum and jaw, abnormalities of the pelvis, hock, feet, sternum and jaw.

Reports documenting congenital abnormalities of the upper respiratory tract in psittacine birds could not be located. A practitioner with a large, exclusively avian case load had observed choanal atresia in a Congo African Grey Parrot. The lack of documented congenital abnormalities in psittacine birds could be a result of under-reporting, rapid death in embryos with abnormalities, or undiagnosed congenital abnormalities in dead neonates. Additionally, the fact that psittacine birds have been domesticated only recently (and thus show a relatively low level of inbreeding), may result in a reduced expression of genes responsible for congenital abnormalities. If the latter were true, one would expect a higher incidence of abnormalities in budgerigars and cocka-
tiels, which have been domesticated longer than other psittacine birds. Reports in the literature would suggest that budgerigars, cockatiels and African Grey Parrots have a greater incidence of congenital deformities that do other psittacine species.4-6,13 However, this apparent propensity for genetic malformation may simply represent a higher prevalence of these birds in captivity.

Serous nasal discharges may result from foreign bodies, allergies or acute stages of viral, bacterial, fungal or chlamydial infections. With most infectious agents, the discharge will turn rapidly from serous to mucopurulent. Since the African Grey Parrot reported in this case consistently had a serous nasal discharge, it was unlikely the primary cause was an infectious agent. Also, an allergic condition would be unusual in a bird four days old. Inhalation of a foreign body was originally considered the most likely cause for the problems in these two birds. In essence, the choanal malformations described in this report could be viewed as naturally occurring foreign bodies. The abnormal sinus drainage in these birds predisposed them to secondary bacterial sinusitis. The ocular discharge in the Umbrella Cockatoo was due to abnormal lacrimal drainage. The Umbrella Cockatoo had both soft tissue and bony malformations, and therefore a more severe choanal atresia than the African Grey Parrot, which had only a soft tissue malformation consisting of a persistent membrane. The breeders of both birds have reported to the owners that no similar abnormalities exist in the parents or siblings of the affected birds. The choanal malformations in both birds are considered a congenital abnormality, but it is unknown whether the cause is inherited or acquired. Both birds have adjusted to their handicap, and the owners conscientiously clean the affected areas. The cause of the recurring cloacal prolapse in the Umbrella Cockatoo is unknown, but the bird may have other, as yet undocumented, congenital abnormalities.

A microsurgical approach for correcting these choanal malformations is currently being investigated.

Key words: choanal atresia, African Grey Parrot, Umbrella Cockatoo

Product mentioned in text:
a. Omnipaque, Winthrop, New York

REFERENCES