Rhinitis/Sinusitis - Case Report

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Abstract

A brief review of the anatomy of the avian respiratory sinus system and the aetiology, diagnosis and treatment of rhinitis/sinusitis is provided. A case of chronic rhinitis/sinusitis in a green-winged macaw (*Ara chloroptera*) with special reference to the techniques of contrast sinus radiography, sinus irrigation and sinus trephination are discussed.

Anatomy

The avian respiratory sinus system is made up of a labyrinth of complex interconnecting air spaces within the bones of the skull. There is considerable variation between avian species in the complexity of the sinus system. The upper respiratory system is made up of the nasal cavities and the infraorbital sinuses[4,7]. Air passes in through the external nares, past the operculum and over the chonchae. The right and left nasal cavities are separated by a nasal septum. Air then passes through the choanae into the glottis and trachea. There are several small communications between the nasal cavities and the infraorbital sinuses.

The infraorbital sinuses lie lateral to the nasal cavities and almost surround the eye in many species. There are many diverticula from the main sinus with portions extending into the bones of the skull. The lateral walls of the sinus are formed in part by the facial muscles and skin. The left and right infraorbital sinuses communicate with each other in psittacine birds through a central nasal sinus, often situated in the caudal portion of the beak (the rostral diverticulum). In passerine birds the left and right sinuses do not communicate.

The infraorbital sinus communicates with the oral cavity via the nasal cavity as well as with the cervicocephalic air sacs.

Rhinitis/Sinusitis

Rhinitis/sinusitis is common in avian species, particularly psittacine birds[1,5,6]. Aetiologies include bacteria (*Escherichia coli*, *Enterobacter* sp, *Pseudomonas* sp, *Aeromonas* sp, *Pasteurella* sp, *Klebsiella* sp, *Haemophilus* sp, *Mycoplasma* sp, *Mycobacterium* sp), fungi (*Aspergillus* sp, *Cryptococcus* sp), viruses, chlamydia, environmental sensitivities (cigarette smoke, bird dander, dust), foreign bodies, neoplasia and malnutrition (vitamin A deficiency).

Clinical signs include nasal discharge (serous, seromucinosis, serosanguinosis), epistaxis, crusted/soiled feathers around the nares, obstructed nares, sneezing, ocular discharge, periocular swelling and erythema, other facial swellings and dyspnoea. Rhinitis/ sinusitis may be associated with systemic disease or occur alone.

Diagnosis is based on clinical signs, microbiology (Gram's stain and culture and susceptibility testing on sinus aspirates or washes or choanal swabs), haematology, chlamydia testing and radiography (plain and contrast).

The effective treatment of rhinitis/sinusitis will depend on a definitive diagnosis of the aetiology. Early cases can be treated conservatively with antibiotics and sinus irrigation. However, if left untreated or not detected early, rhinitis/sinusitis can be very difficult to treat. The complex anatomy of the infraorbital sinus allows for the accumulation of exudate and the development of abscessation. Although irrigation may dislodge portions of exudate, surgical investigation and curettage may be necessary to effect a cure[1,2,3,7].

Case Report

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This report describes chronic rhinitis/sinusitis of at least 6 years duration in an adult (exact age unknown, but older than 50 years), male green-winged macaw (*Ara chloroptera*) held at Taronga Zoo. Clinical signs included serous to sero-mucinosis bilateral nasal discharge, with staining and crusting of feathers around the nostrils, staining of the beak, periodic epistaxis from the left nostril and occasional dyspnoea and stridor. The bird's condition, appetite and attitude generally remained stable. An episode of purulent air sacculitis prior to 1986 when the bird was held at Adelaide Zoo is noted in the bird's history. No clinical signs or definitive diagnosis were given.

In 1990 samples were taken for microbiology, haematology and chlamydia testing. Cultures of tracheal and choanal swabs, and sinus aspirates yielded *Haemophilus paragallinarium*.

The bird was placed on a course of doxycycline for thirty days, resulting in a slight improvement. Haematology revealed slight leucocytosis with heterophilia (see Table 1). The bird was mildly hypoproteinaemic. Laparoscopy revealed slightly thickened air sacs but no active air sacculitis.

Table 1: Haematology Results

		1/3/90		**8/5/90**		**4/4/90**
WBC x 10^9/l		18.7		16.1		19.2
Heterophils x 10^9/l		15.7		11.4		13.82
Lymphocytes x 10^9/l		2.4		3.7		2.5
Monocytes x 10^9/l		0.6		1.0		2.88
PCV %	47		42		50	
TPP g/dl		2.5		3.0		2.4

In 1992 the bird was anaesthetised with isoflurane and oxygen for nasal/sinus irrigation. This technique involves forcing 10 to 15 mL (or more) of warmed saline (± antibiotics) using a syringe with a small length of rubber or plastic tubing attached, into the nasal and sinus cavities via the external nares. In small birds the syringe nozzle can be used without tubing. In smaller birds and tame large birds this procedure can be carried out without anaesthesia. For large, aggressive birds anaesthesia is recommended. The bird is held in sternal recumbency with the head tilting downward. The fluid should flow freely and exit through the choanal slit. It will normally enter the ipsilateral infraorbital sinus and sometimes the contralateral sinus. Fluid may flow from the opposite nostril. In cases of chronic rhinitis/sinusitis some resistance to the flow of fluid may be experienced. This was the case with the right nostril of this bird.

The more caudal and deeper diverticuli of the infraorbital sinus can be entered by injecting through the skin (lateral wall) at a site midway and slightly ventral to a point equidistant between the nares and the eye. Fluid/antibiotics injected into this area will perfuse the infraorbital sinus area around the eye and can reach areas that nasal irrigation may not be able to reach.

Over a period of three months, repeated irrigation, a course of vitamin A injections, injectable and oral cortisone, irrigating with saline and dexamethasone and a course of injectable doxycycline (60 mg/kg once a week) resulted in some improvement.

In mid 1992 the bird was re-anaesthetised for detailed radiography of his head. Plain lateral, dorsoventral (DV) and ventrodorsal (VD) radiographs with the beak open and closed were taken. The lateral and DV radiographs with the beak open provided the best detail of the infraorbital sinus. The right nasal cavity and preorbital diverticulum of the infraorbital sinus appeared distorted with increased density compared to the left. Two small radiodense particles were present in this area. Contrast studies of first the right hand side, then the left hand side were carried out using Omnipaque® injected into the sinuses through the external nares (the technique used was the same as for nasal irrigation). Approximately 2 mL was used on each side. The right nasal cavity and infraorbital sinus was enlarged and distorted compared to the left. A small amount of contrast entered the rostral diverticulum while none entered the more caudal and deeper diverticulum of the infraorbital sinus.

It was suspected that the chronic rhinitis/sinusitis had resulted in extensive erosion of nasal choncae and bone surrounding the nasal passages and infraorbital sinus. Thickening of the mucosa, accumulations of discharge, abscessation and calcification possibly resulted in blockage of communications between sinus diverticula and between the nasal and oral cavity.

Sinus trephination was carried out on the right hand side in an attempt to curette the affected area and create a port for irrigation and instilling antibodies. The bird was anaesthetised with isoflurane and oxygen and intubated. The hole sites vary between species, but are made in the frontal bone at a point approximately 2/5 to midway between the most rostral plane of the eye and the nares, and slightly medially toward the midline of the skull. The site is prepared for surgery and the eye protected. An incision is made using electrosurgery or conventional instrumentation. Haemorrhage from the skin and bone is a problem and cautery is useful. The hole in the bone is made using a burr attached to a Dremel tool or dental drill. A thick layer of cancellous bone (almost 8 mm in this bird) is removed before the sinus is reached. Once the sinus is exposed the hole can be enlarged. The sinus can now be curetted and samples taken for microbiology. Irrigation through the hole should result in fluid passing through the external nares and choanae.

In this bird the sinus mucosa was very thickened (but not inflamed) and the sinus contained large amounts of exudate with multiple small calcified granules in the exudate. Samples for microbiology revealed no significant organisms. The sinus was extensively irrigated in an attempt to remove as much material as possible. The bird was put on a course of injectable doxycycline (60 mg/kg once a week IM). Daily irrigation through the opening continued for three weeks, by which time the hole had closed. Nasal irrigation was continued every second day. A slight nasal discharge still persisted.

The rostral diverticulum of the infraorbital sinus is relatively large in macaws. This is also the most ventral diverticulum of the sinus. In this case it was felt that it may be more appropriate to create a drainage port in this part of the sinus. Under anaesthesia a hole (5 mm diameter) was drilled on the right hand side of the beak into the rostral diverticulum (radiographs were used to decide on the site). Copious amounts of exudate and pus were irrigated through the hole. A drainage tube was inserted into the hole to prevent early closure and blockage of the hole. Daily flushings using saline and Varidase® (Lederle Laboratories) were carried out. Varidase® contains streptokinase and streptodornase. Streptokinase activates fibrinolytic enzymes and brings about rapid dissolution of blood clots and the fibrinous portion of exudates. Streptodornase liquefies the viscous nucleoprotein of dead cells or pus, and has no effect on living cells. Thus the combined action results in liquification of the 2 main viscous substances resulting from inflammatory or infectious processes, thereby facilitating drainage. This was continued for a month when the tube was removed. The hole in the beak healed uneventfully.

A slight right nasal discharge still occurs intermittently and the bird has had two episodes of epistasis from its left nostril.

Conclusion

The initial cause of the rhinitis/sinusitis and air sacculitis in this bird was not known. The chronic nature of his disease resulted in extensive damage to the nasal passages and infraorbital sinus. Plain and contrast radiography helped define the extent of the damage. Sinus trephination through the frontal bone provided a port for curettage and irrigation, but did not allow adequate drainage. Trephination into the rostral diverticulum provided a port for irrigation and better drainage.

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