A Case of Chronic Aspergillus Rhinitis in a Captive Ocelot (Leopardus pardalis)

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Abstract
A ten-year-old, intact, male ocelot (Leopardus pardalis) housed at the Emperor Valley Zoo experienced intermittent episodes of coughing, open-mouth breathing, sneezing, rales and intermittent, bilateral, mucopurulent and bloody nasal discharge for three years. He was diagnosed with chronic fungal rhinitis secondary to sinusitis associated with bilateral apical nasal fistulas and a nasal epithelial tumour.

Key words: Aspergillus, epithelial tumour, feline, ocelot, rhinitis, sinusitis

Introduction
Chronic rhinitis is a common and important problem in cats and may result from a number of intranasal or systemic disorders1. Idiopathic chronic rhinosinusitis and nasal neoplasia are the most common causes of chronic nasal disease in cats. Nasopharyngeal polyps, fungal rhinitis, nasal foreign bodies, dental disease and nasopharyngeal stenosis are less frequent but important causes of chronic rhinosinusitis in cats. Other causes include viral infection with feline rhinotracheitis virus or feline calicivirus, bacterial infection with Mycoplasma spp., Pasteurella multocida, Bordetella bronchiseptica and anaerobic bacteria, fungal infection with Cryptococcus spp., or Aspergillus spp., parasitic infection with Cuterebra (larva), coagulopathies, lymphoplasmacytic rhinitis, allergic rhinitis and intranasal disease such as pneumonia and eosinophilic strictures.

Typical signs associated with chronic nasal disease include nasal discharge, stertorous respiration, open-mouth breathing and chronic sneezing1. Obstruction of the nasolacrimal duct can result in epiphora1. If the oral or pharyngeal cavities are compromised by disease, gagging, dysphagia and halitosis can occur1. Advanced stages of nasal, extraocular, oral neoplasia or fungal rhinitis can cause facial deformity1. Behavioural changes and seizures can occur with neoplasia resulting from compromise of the cribriform plate with extension of disease into the brain1. A unilateral nasal discharge might suggest nasal foreign body, early nasal neoplasia and dental disease, however, a bilateral nasal discharge is most commonly seen1. Mucopurulent nasal discharge is the most common type resulting from secondary bacterial infection whereas, serous discharge is uncommon and typically seen with allergic rhinitis or early viral infection1. Blood may be seen intermittently in mucopurulent discharges from a wide variety of underlying nasal disease due to erosion of blood vessels and sneezing1. Epistaxis is not as common in cats as dogs and it usually occurs with aggressive intranasal diseases causing erosion of blood vessels (eg. neoplasia, inflammation) or coagulopathies. Food particles in the nasal discharge can be seen with an oronasal fistula1.

Case History
“Broko”, a ten-year-old, intact, male ocelot weighing 15kg was one of fourteen captive ocelots housed in a Trinidad Zoo. Some years ago, he had fractured the right distal radius and ulna which resulted in non-union, hence the name “Broko”. He was vaccinated annually against feline rhinotracheitis virus, feline calicivirus, feline panleukopenia virus and Chlamydia psittaci using a modified-live vaccine. “Broko” was housed alone and his enclosure was cleaned daily. His diet consisted of rats, mice, day-old chicks, ducklings
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and horse meat. His appetite was good, stool was normal and his deworming status was up to date. Wood shavings had been used as bedding for a couple of years. Two years later, all the ocelots started sneezing and developed a nasal discharge. Consequently, the wood shavings were replaced with dried leaves as bedding, and the clinical signs were reported to have resolved in all the ocelots except “Broko”. For three years, “Broko” had intermittent episodes of open-mouth breathing, sneezing and a mucopurulent and sometimes bloody bilateral nasal discharge. He was treated for a sinusitis with Septra (trimethoprim and sulfamethoxazole) tablets (480mg twice daily) for two weeks at one time with cepalexin (500mg twice daily) for two weeks at another time. Clinical signs resolved for six months, then reoccurred and the nasal discharge became thicker and haemorrhagic over time.

A distance examination was performed on 27th July 2007 at the zoo. “Broko” appeared to be slightly depressed but alert and responsive, with a body condition score (BCS) of 7/9. His face was symmetrical with no unusual lumps and he had bilateral serous ocular and bloody nasal discharges.

The causes of chronic rhinitis considered as potential differential diagnoses in this case included:
- Idiopathic Chronic Rhinosinusitis
- Fungal rhinitis
- Nasal neoplasia
- Dental disease
- Foreign body rhinitis
- Bacterial infection

On 27th July 2007, “Broko” was anaesthetized at the zoo with a combination of xylazine, (2mg/kg) and ketamine (10mg/kg). Blood was taken for hematology and nasal swabs were taken for culture and cytology.

The hematocrit revealed mild neutrophilia and the clinical chemistry was unremarkable. Examination of the nasal swabs showed numerous neutrophils, (a large proportion (40%) of which were degenerate) with abundant proteinaceous debris. A few large cocci bacteria organisms were seen. The cytological examination gave the impression of septic inflammation. A few mononuclear cells, apparently normal, were also seen. Pasteurella multocida, Staphylococcus aureus, Staphylococcus intermedius, Corynebacterium spp., Bacillus spp., Enterobacter spp., as well as growths of Aspergillus fumigatus were isolated from swabs.

The working diagnosis was chronic, fungal rhinitis secondary to a sinusitis. Itraconazole (100mg per day) and Amoxicillin (10mg/kg twice per day) were prescribed for 7 weeks. The epistaxis stopped by the 28th November 2007 and “Broko” was eating and doing well until the 19th January 2008 when he was admitted to the Veterinary Teaching Hospital (VTH) because the epistaxis had reoccurred.

“Broko” was sedated with xylazine (2mg/kg) and ketamine (10mg/kg) and maintained on isoflurane. Blood was taken for CBC and biochemistry and swabs were taken for microbiology and cytology again. This time, a biopsy of the nasal mucosa was taken for histopathology, radiographs of the skull were taken and the nasal cavity was examined by rhinoscopy using the MedRx® endoscopic system (MedRx, Inc., FL, USA).

The hematology and clinical chemistry were again unremarkable, but the radiographs showed that both canine teeth had apical nasal fistulas with the trajectory of the fistulas leading into the nasal cavities. The microbiology and mycology report stated that there was no growth of Aspergillus spp. However, E.coli (1+), Klebsiella spp. (1+), and Pasteurella spp. (2+) were cultured. The cytology report stated that large cells with round nuclei containing prominent nucleoli were observed in the smear. These round cells were arranged in sheets, and had basophilic cytoplasm filled with fine reddish granules that give the cytoplasm a granular appearance. Numerous neutrophils and cocci were observed in the smears. The cytology presented a picture of an epithelial tumour with secondary septic inflammation. Histopathology in this case was inconclusive because a blood clot was taken for a tissue sample. Rhinoscopy revealed a loss of nasal turbinates (fig.1), purulent nasal discharge (fig.2) and white, plaque-like lesions on the nasal mucosa (fig.3).

A diagnosis of bilateral apical abscess leading to a bilateral apical-nasal fistula was made, and both maxillary canine teeth were extracted. An infraorbital nerve block using 2% lidocaine was performed and an incision made caudal and rostral to the right upper canine. An open surgical flap extraction was performed using a tungsten metal burr and a high-speed turbine with appropriate water cooling in order to remove the vestibular alveolar bone and root with its associated periodontal fibres. The canine was extracted using a dental extraction forceps. A flap was used to cover the post-extraction defect, using a single layer, L shaped, full thickness muco-periosteal flap sutured with 4-0 polyglyconate 910 absorbable suture in a simple interrupted pattern. The same was done for the left maxillary canine. “Broko” was placed on Clindamycin (11mg/kg) every 12 hours for seven days.
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Figure 1. Rhinoscopic image taken from “Broko”. Notice the loss of nasal turbinates.

Figure 2. Rhinoscopic image taken from “Broko”. Notice the purulent nasal discharge.

Figure 3. Rhinoscopic image taken from “Broko”. Notice the white, plaque-like lesions on the nasal mucosa.
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The zookeepers were also told to feed minced meat for a couple days after the surgery.

The final diagnosis was a chronic fungal rhinitis (Aspergillus spp) secondary to sinusitis associated with bilateral apical nasal fistulas and a nasal epithelial tumor. The epistaxis returned some 5 weeks later. “Broko” still had a healthy appetite and was doing well. On 1st April 2009, “Broko” was found dead in his enclosure.

Discussion

A complete blood count, chemistry profile and urine analysis should be performed to rule out extra nasal, systemic causes for the nasal discharge. Thoracic radiographs are of limited value, but should be performed if pneumonia is suspected. Computed tomography is preferred for evaluation of the sinonasal cavities and surrounding structures. Culturing of nasal discharge for bacterial or fungal organisms is not recommended as secondary bacterial contaminants are typically isolated. For most cats with chronic rhinitis, diagnostic imaging, endoscopy and nasal biopsy will be required to establish a diagnosis.

The results of the complete blood count on the 27th July 2007 indicated that “Broko” had a slight neutrophilia suggesting chronic inflammation. His cytology results also suggested a local septic inflammation. On the mycology report, the isolation of Aspergillus fumigatus from the nasal cavity of this ocelot suggested a diagnosis of chronic fungal rhinitis secondary to a sinusitis. Aspergillus is very common in the environment, and most infections occur in animals that have been on prolonged antibiotic therapy, have had a prior sinus infection, or a deficient immune system. “Broko” had been under a long course of antibiotic therapy for sinusitis. Aspergillus fumigatus grows most abundantly in decaying vegetation, sewage sludge compost, decomposing wood chips, moldy hay and organic compost piles. It is possible that the wood shavings played the role of a fomite for Aspergillus spp. His injured forelimb may have also forced “Broko” to spend all his time on the cage ground covered with the shavings, predisposing him to a larger infective dose than the other ocelots who could escape by gaining higher ground in the trees and platforms.

Fungal rhinitis is uncommon in cats and there are few reported cases of nasal aspergillosis. Clinical signs include epistaxis and mucopurulent discharge. Sneezing, stertorous breathing and facial pain are associated clinical findings. In rare cases, the infection may erode through the cribriform plate and cause central nervous system involvement. Computed tomography (CT) imaging and rhinoscopy are useful in assessing the extent of the disease and in obtaining diagnostic samples. Fungal cultures may lead to false negative or positive results and serological testing is not always useful.

In most cats, a diagnosis of nasal aspergillosis was made on post mortem. Goodall reported successful treatment in one cat using rhinotomy, curettage and local iodine therapy. Another study reported success when cats were treated with oral itraconazole therapy. However, when itraconazole therapy was discontinued prematurely, clinical signs recurred. In dogs, surgical exposure and curettage have been used with 10% iodine flushes instilled through a surgically exposed open nasal cavity. Enilconazole can be infused intranasally as well. Systemically administered drugs used have included thiabendazole, ketoconazole (used for 6-8 weeks), itraconazole and fluconazole.

On the 19th January 2008, “Broko” was admitted to the Veterinary Teaching Hospital (VTH) because the epistaxis had recurred. This time he had a thrombocytopenia. A cogulopathy could not have been ruled out since neither an activated partial thromboplastin time (PTT) test nor a prothrombin time (PT) test was done. He was also hypoproteinemic which could have been due to acute blood loss from the nostrils. The cytology results showed that “Broko” had an epithelial tumour. Although the mycology report stated that there was no growth of Aspergillus spp., the white, plaque-like lesions, typical of a fungus, were evident on the nasal mucosa (fig.3). This inconsistency may be due to the lack of sensitivity with culture as a method of diagnosis.

Nasal neoplasia is one of the most common causes of chronic rhinitis in cats. In cats there is some indication that chronic rhinitis may be an initiating factor for the subsequent development of nasal neoplasia. In the case of “Broko”, the tumour could have developed due to the prolonged irritation of the nasal epithelium by the chronic rhinitis. The majority of nasal tumours are malignant and are primarily locally invasive but infrequently metastasize. The mean age of cats with nasal tumours is eight to ten years. Clinical signs can range from seven days to five years. Clinical signs include epistaxis, sneezing, epiphora and facial deformity. Radiographs will show soft tissue opacities and loss of turbinates. Cytology can be diagnostic but biopsy and routine histopathology are recommended to obtain a definitive diagnosis prior to the initiation of therapy.

Lymphosarcoma as part of a multicentric tumour problem is the most common endonasal neoplasm in the cat, but other carcinomas...
are seen occasionally. The median survival time of cats with nasal lymphoma treated with a single agent or combinations of chemotherapy and radiation, are both 536 days. There is evidence that higher doses of radiation therapy (>32 Gy) would lead to greater local disease control. One study reported that the treatment of squamous cell carcinoma of the nasal planum with radiation therapy alone or after surgery resulted in initial regression of the tumour with eventual reoccurrence. There was a mean survival time of 17.7 months. All cats with fibrosarcomas of the nasal planum, treated with cryosurgery remained alive with no reoccurrence. Cats with adenocarcinoma or undifferentiated carcinoma, treated with surgery alone, had a mean survival of 2.5 weeks post operative. Cats with adenocarcinoma treated with nasal curettage and cobalt radiation therapy still experienced recurrences in all cases and in some cases death. There was only one report of squamous cell carcinoma of the auditory canal in an old female ocelot kept in captivity in a Brazil zoo. This is the first time a case of neoplasia had been reported in an ocelot.

“Broko” also had a bilateral apical-nasal (from the apex of the root to the nasal cavities) fistula which was visible on the radiographs. The right upper canine had an old crown fracture with pulp exposure and as a consequence the pulp became necrotic and the tooth died. The left upper canine also had a necrotic pulp but this time as a consequence of old trauma applied to the tooth thus the discoloration of the tooth. Both teeth had apical nasal fistulas and the trajectory of the fistulas leading into the nasal cavities. An oronasal fistula should be suspected in patients with chronic rhinitis, dental disease and trauma.

Clinical signs include a chronic, unilateral or bilateral nasal discharge that may be serous, mucopurulent, or hemorrhagic. An oronasal fistula is formed when bacteria enter the pulp cavity causing a pulpitis and oedema. The oedema results in strangulation and pressure necrosis which destroy the alveolar bone and periodontal ligament thereby making a pathway for the fistula.

The final diagnosis was a chronic fungal rhinitis secondary to sinusitis associated with bilateral apical nasal fistulas and a nasal epithelial tumour. This was based on the diagnostic tests performed. However, the order in which they appeared remains unclear.

References