

# Chronic Rhinitis in Cats

Ned F. Kuehn, DVM, MS, DACVIM

Chronic rhinitis is a common and important problem in cats potentially resulting from a number of intranasal or systemic disorders. Idiopathic chronic rhinosinusitis and nasal neoplasia are the most common causes of chronic nasal disease in cats. For most cats with chronic rhinitis, diagnostic imaging, endoscopic studies, and nasal biopsy will be required to establish a diagnosis. A discussion of some of the more common causes of chronic nasal disease is presented.

Clin Tech Small Anim Pract 21:69-75 © 2006 Elsevier Inc. All rights reserved.

**KEYWORDS** chronic rhinitis, feline, chronic rhinosinusitis

Chronic rhinitis is a common and important problem in cats that may result from a number of intranasal or systemic disorders (Table 1). Idiopathic chronic rhinosinusitis and nasal neoplasia are the most common causes of chronic nasal disease in cats.<sup>1</sup> Nasopharyngeal polyps, fungal rhinitis, nasal foreign bodies, dental disease, and nasopharyngeal stenosis are less frequent, but important, causes of chronic rhinitis in cats.

## Clinical Signs Associated with Chronic Nasal Disease

Nasal discharge, sneezing, stertorous respiration, and open-mouth breathing (rare) are typical signs associated with chronic nasal disease in cats.<sup>2,3</sup> Chronic sneezing is a common clinical sign in cats and often is accompanied by nasal discharge. Epiphora may be seen with obstruction of the nasolacrimal duct. Gagging, dysphagia, or halitosis may occur when the disease involves the oral or pharyngeal cavities. Facial deformity may occur in advanced stages of nasal, extraocular, or oral neoplasia or fungal rhinitis. Chronic nasal disease may be seen concurrent with otitis externa or vestibular disease in cats with nasopharyngeal polyps. Behavior changes, seizures, or obtundation in cats with a chronic history of nasal disease may occur with neoplasia or fungal rhinitis resulting from compromise of the cribriform plate with extension of disease into the brain.

The type and location of the nasal discharge may help limit differential diagnoses. Unilateral nasal discharge may be seen with nasal foreign bodies, early nasal neoplasia, and dental disease. Bilateral nasal discharge is most commonly seen and

does not further define the cause for the rhinitis. Mucopurulent nasal discharge is most common type resulting from secondary bacterial infection from a large number of primary causes for rhinitis. Serous discharges are uncommon and typically seen with allergic rhinitis or early viral infection. Serous discharges are often modified to mucoid or mucopurulent types with persistence of the underlying cause for the nasal disease. Blood may be seen intermittently in mucopurulent discharges from a wide variety of underlying nasal diseases due to erosion of blood vessels and sneezing. Epistaxis is not commonly seen in cats, as compared with dogs, with chronic nasal disease. Epistaxis is seen with aggressive intranasal diseases causing erosion of blood vessels (eg, neoplasia, inflammation) or coagulopathies. Oronasal fistula in adult cats or cleft palate in kittens may be associated with food material appearing in the nasal discharge.

## Signalment, History, and Physical Examination with Chronic Nasal Disease

Age, breed, and lifestyle may be helpful in narrowing the list of potential causes for chronic rhinitis. Young to middle-aged cats will not likely have neoplastic disease as opposed to older cats (>8 years of age).<sup>1</sup> Nasopharyngeal polyps are typically seen in cats <8 years of age.<sup>4</sup> Brachycephalic breeds (eg, Persians), cats coming from a high-density housing situations (eg, multicat households, poorly maintained catteries, or pet stores), or stray and barn cats may be more likely to develop idiopathic chronic rhinosinusitis secondary to previous upper respiratory viral infections.<sup>5</sup> Outdoor cats have a higher occurrence of nasal foreign bodies, nasal trauma, and fungal rhinitis.<sup>1,6-9</sup> Prior vaccination history is important for the affected cat as well as other cats in the household. Vaccination will not prevent viral upper respiratory tract infection, but may diminish the severity of clinical signs. Viral infection should be suspected when acute upper respiratory tract in-

Diplomate of the American College of Veterinary Internal Medicine, Chief of Internal Medicine, Michigan Veterinary Specialists, Southfield, MI. Address reprint requests to Dr. Ned F. Kuehn, Michigan Veterinary Specialists, 29080 Inkster Road, Southfield, MI 48034, USA. E-mail: nedkuehn@comcast.net.

**Table 1** Differential Diagnosis for Chronic Rhinitis in Cats

<b>Viral infection</b>
Feline rhinotracheitis virus
Feline calicivirus
<b>Bacterial infection</b>
<i>Mycoplasma</i> spp
<i>Pasteurella multocida</i>
<i>Bordetella bronchiseptica</i>
Anaerobic bacteria
<b>Fungal infection</b>
<i>Cryptococcus</i> spp
<i>Aspergillus</i> spp
<b>Parasitic infection</b>
Cuterebra
<i>Eucoleus (Capillaria) boehmi</i>
<b>Neoplasia (nasal, oral, extraocular)</b>
<b>Dental disease</b>
<b>Foreign body</b>
<b>Palatine defects</b>
<b>Hyperviscosity syndrome</b>
<b>Coagulopathy</b>
<b>Idiopathic chronic rhinosinusitis</b>
<b>Lymphoplasmacytic rhinitis</b>
<b>Allergic rhinitis</b>
<b>Nasopharyngeal polyp</b>
<b>Stenotic nares</b>
<b>Extranasal disease</b>
Nasopharyngeal stenosis
Pneumonia
Vomiting
Esophageal stricture
Cricopharyngeal disease

fection is present in multiple cats within a household. The prior history of a cat obtained at a later age should be obtained (if possible) in regard to previous lifestyle, housing, and vaccination status. Many cats with prior viral upper respiratory tract infection will have recurrent bouts of rhinitis throughout their lives. Any sudden change in the nature or severity of nasal disease should prompt investigation into other causes for chronic rhinitis (eg, neoplasia, fungal rhinitis). Acute onset of sneezing and nasal discharge should prompt investigation into nasal foreign bodies, nasal trauma, and coagulopathies. Chronic nasal discharge is more often associated with idiopathic chronic rhinosinusitis, neoplasia, dental disease, lymphoplasmacytic rhinitis, and nasopharyngeal polyps.

A thorough physical examination with particular attention to orofacial structures is important in the evaluation of cats with chronic rhinitis.<sup>3</sup> The maxillary and frontal sinus regions should be visualized and palpated for evidence of asymmetry or swellings. The eyes should be examined for any evidence of exophthalmia. The external nares should be studied for patency, symmetry, and masses protruding through the openings. Facial asymmetry or exophthalmia would suggest an underlying neoplastic process or the presence of fungal rhinitis. Approximately 35% of cats with nasal cryptococcosis have prominent swellings over the bridge of the nose and some cats with nasal cryptococcosis will have a polypoid mass protruding through the nostril. The patency of airflow through each nostril may be determined by noting condensation on a glass slide held in front of the nose or

alternately holding each nostril closed with assessment of airflow through the opposite nostril. Lack of airflow through one or both nostrils indicates the presence of obstructive disease, but does not define an underlying cause. Plugs of inspissated mucopurulent debris will be as likely to obstruct airflow as a space-occupying mass (eg, neoplasia, fungal granuloma). Oral examination should be attempted (depending on the temperament of the cat) with visualization around the teeth and the hard plate for the presence of masses or clefts within the hard or soft palate. The teeth should be evaluated for fractures or oronasal fistulae (the latter is often best accomplished using a dental probe with the cat under anesthesia). The mandibular lymph nodes should be palpated for enlargement or asymmetry. An otoscopic examination should be performed to detect signs of otitis, which may occur in cats with nasopharyngeal polyps. Finally, a complete ophthalmic examination should be conducted to detect signs of systemic or fungal disease (eg, anterior uveitis, chorioretinitis, optic neuritis) and for evidence for hypertension or hyperviscosity syndrome (eg, retinal hemorrhage, tortuous vessels, retinal detachment).

## Diagnostic Evaluation for Chronic Nasal Disease

Cats with chronic rhinitis are frequently a diagnostic challenge. A complete blood count, chemistry profile, and urinalysis should be performed to rule out extranasal systemic causes for the nasal discharge (eg, hyperviscosity syndrome, polycythemia, thrombocytopenia). A coagulation profile is indicated if epistaxis is present and a coagulopathy is suspected. Blood pressure should be determined if hypertension is suspected. Serum titer for cryptococcal antigen is a very specific and sensitive test for cryptococcosis and should be performed if clinical findings are suggestive of this disease.<sup>8</sup> Thoracic radiographs are of limited value, but should be performed if pneumonia is suspected. Culturing of nasal discharge for bacterial or fungal organisms is not recommended as secondary bacterial contaminants are typically isolated. Deep culture of nasal tissue is of potential value in those patients where idiopathic chronic rhinosinusitis is suspected (see Idiopathic Chronic Rhinosinusitis below).

For most cats with chronic rhinitis, diagnostic imaging and endoscopic studies and nasal biopsy will be required to establish a diagnosis. Diagnostic imaging studies must be completed before endoscopic studies of the nose or nasal biopsy are performed. The introduction of instruments into the nose often induces hemorrhage, which will obscure or confuse the diagnostic imaging studies. General anesthesia is required for further evaluation of cats with chronic rhinitis. Before diagnostic imaging, the oral cavity should be carefully inspected and probed for the presence of masses, oronasal fistulae, or clefts in the hard or soft palate. A periodontal probe should be used to evaluate all teeth in the upper dental arcade, even if the teeth appear normal. This is especially important if unilateral chronic rhinitis is present. The probe is placed into the gingival sulcus and advanced to the depth of the periodontal pocket. The probe will advance into the nasal cavity or maxillary sinus in cats with chronic rhinitis secondary to dental disease. The soft palate should be palpated for the

presence of masses (eg, nasopharyngeal polyp) in the nasopharyngeal region. If a mass is palpated above the soft palate, a spay hook may be used to gently retract the soft palate forward for visualization of the mass. If a nasopharyngeal polyp is identified, otoscopic examination should be performed to detect involvement of the ear canal. In cats with polyps, a mass may be identified in the vertical or horizontal canal or bulging of the tympanic membrane may be present with otic involvement. Traction avulsion of the polyp through the oral cavity may be performed if there is no otic involvement. Should otic involvement be identified, bulla osteotomy is indicated to diminish the chances of recurrence. In cats where nasal neoplasia is highly suspected, I perform retroflex nasopharyngoscopy (ie, a flexible scope is turned 180° around the caudal margin of the soft palate to visualize the dorsal surface of the soft plate, nasopharyngeal region, and caudal nares) before diagnostic imaging studies, as many times a mass may be visualized protruding through the caudal nares into the rostral nasopharyngeal region.

Following thorough oral and nasopharyngeal examination, skull radiographs or preferably nasal computed tomography should be performed (see articles on Nasal Radiology, pages 46-54 and Nasal Computed Tomography, pages 55-59, this issue). Imaging studies must be performed while the cat is anesthetized and before performing any invasive procedures within the nasal cavities. Radiography may greatly underestimate the extent or severity of disease due to overlying structures, low-contrast resolution, and complexity of nasal anatomy.<sup>10</sup> For these reasons, computed tomography is preferred for evaluation of the sinonasal cavities and surrounding structures in cats with chronic rhinitis. The only exception is if dental disease is suspected following detailed examination of dental structures. High detailed dental films will offer superior information in regards to tooth roots and surrounding bony structures.

Rhinoscopy is often of limited value because of the specialized equipment required and the small size of the nasal passages in cats. The rostral and middle regions of the nasal cavity may be evaluated using a small rigid scope. Only the very rostral region of the nasal cavity may be evaluated using a small diameter otoscope cone. The nasopharyngeal region can readily be evaluated with the use of a small diameter flexible endoscope. The scope is advanced orally to the caudal margin of the soft palate and then the tip is turned 180° to visualize the area above the soft palate and caudal nares. Alternatively, a spay hook may be used to carefully pull the caudal margin of the soft palate forward and downward and a dental mirror with aid of a light source (eg, otoscope light, pen light) is used to view the nasopharyngeal region.

Tissue biopsies of nasal tissue is collected with the cat under anesthesia and only following diagnostic imaging and rhinoscopic studies. Small clam-shell forceps are suitable for collecting nasal tissue using blind techniques in cats. The biopsy forceps are directed to mass lesions based on radiographic or tomographic findings. Multiple random samples should be obtained with diffuse disease. Tissue samples are preferred over brush cytology, as the latter has poor ability to correctly identify chronic inflammation.<sup>11</sup> The nose of the cat should be pointed at a downward angle to minimize the pooling of blood within the nasopharynx and caudal oropharynx. If idiopathic chronic rhinosinusitis is suspected,

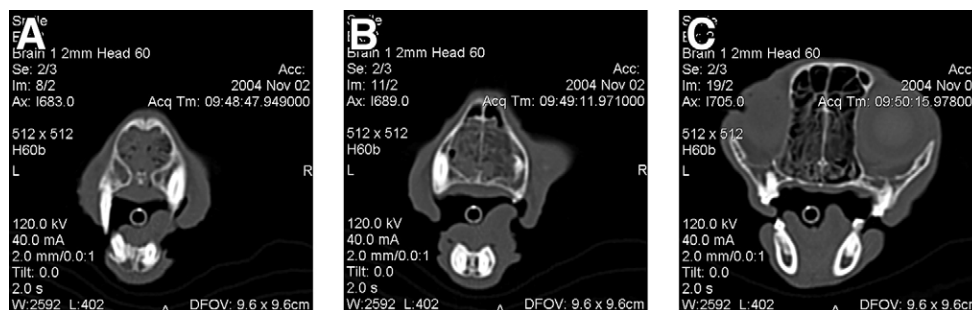
deep tissue samples also should be submitted for aerobic and anaerobic bacterial cultures. Tissue samples also may be submitted for fungal cultures should fungal rhinitis be of consideration. In cats with facial deformity, cytologic specimens may be obtained via fine-needle aspiration over the site of the deformity. Alternatively, a stab incision may be made in the skin over the swelling and tissue samples may be collected with a biopsy instrument. Hemorrhage is the only major complication following biopsy and may be managed using diluted 1:10,000 or 1:100,000 epinephrine in cold saline. The caudal pharyngeal region should be suctioned following nasal biopsy to remove blood clots, hemorrhage, and other secretions. Pain management should be implemented post-biopsy. Meloxicam often is highly effective and may be given before the procedure and continued for 1 to 3 days after the procedure.

## Frequent Causes of Chronic Nasal Disease in Cats

### Idiopathic Chronic Rhinosinusitis

Chronic rhinosinusitis is an extremely significant cause of chronic rhinitis, representing one of the two most common causes of sneezing and nasal discharge in cats.<sup>1,11</sup> Chronic rhinosinusitis may follow severe acute upper respiratory tract infection, particularly in kittens or adults cats exposed to an infected cat. Acute upper respiratory tract disease is presumed to be caused by infection with feline herpesvirus type 1, feline calicivirus, *Chlamydia felis*, or some combination of these agents.<sup>5</sup> Although viral (especially feline herpesvirus type 1) or *Chlamydia* infection is often implicated as the initiating cause of acute rhinitis, the pathogenesis of idiopathic chronic rhinitis is unknown and it is uncertain whether acute rhinitis is related to the chronic syndrome.<sup>12</sup> Even though cats with idiopathic chronic rhinosinusitis have similar clinical signs, the disease syndrome appears heterogeneous among the population perhaps due to individual susceptibility to microbial pathogens, genetic characteristics of the inflammatory response, and environmental factors (eg, stress) having a role in the development of clinical signs.<sup>12</sup> The relative importance of previous or concurrent viral or bacterial infection (or both) and the complex interrelationship of viral or bacterial organisms involved in the disease process when combined with the individual uniqueness of the inflammatory response may be important factors in the genesis of chronic rhinitis. A thorough understanding of these characteristics would likely facilitate treatment recommendations for patients so affected.

Feline herpesvirus type 1 is estimated to account for the majority of cases of acute severe upper respiratory disease in cats, although calicivirus may be more prevalent in some populations. Feline herpesvirus type 1 is possibly an important pathogen for initiating chronic rhinitis.<sup>12-14</sup> Experimental infection of germ-free cats with feline herpesvirus type 1 can cause severe upper respiratory disease in the absence of microbial flora. In the natural cat population, it is likely that the interrelationship between herpesvirus type 1 and various bacterial organisms is an important factor affecting the severity and duration of upper respiratory disease. Clinical signs of chronic rhinosinusitis may be perpetuated by chronic or re-



**Figure 1** Computed tomography images of the nasal cavity from a cat with idiopathic chronic rhinitis. (A, B) Turbinate structures are obscured due to the presence of mucosal edema and soft-tissue densities (mucopurulent debris) within the air passages. (C) The caudal nasal cavity and frontal sinuses were relatively free of disease in this patient.

current bacterial infection within the nasal cavities and paranasal sinuses, an exuberant inflammatory response to the presence of bacteria or virus, permanent destruction of nasal epithelium and bony turbinates following acute viral cytolysis during a bout of acute severe rhinitis, or cumulative destruction of nasal epithelium and bony turbinates following chronic reactivation of virus from the trigeminal ganglia into nasal tissue.<sup>12</sup> The role any one or combination of microbial agents plays in the pathogenesis of chronic rhinosinusitis is ultimately not understood.<sup>15</sup> Identification of bacterial or viral organisms via culture, antibody titers, or molecular techniques does not imply that the organism or organisms found are responsible for the clinical signs. In summary, a complex progression of microbial, physiological, anatomical, and immunological interactions are likely responsible for development of chronic rhinosinusitis.

Idiopathic chronic rhinosinusitis may be seen in cats of any age, although younger cats are most often afflicted.<sup>12</sup> Affected cats with this disease syndrome typically have a recurrent history of chronic intermittent or progressive sneezing, stertor, and nasal discharge. The nasal discharge is usually copious, bilateral, and mucopurulent to purulent, although occasionally the discharge can be unilateral or intermittently contain blood. Systemic or ocular disease is generally not present. Older cats may develop anorexia due to loss of smell, which may exacerbate other underlying disease conditions (ie, chronic renal failure, liver, or gastrointestinal disease). The primary list of differential diagnoses that merit most consideration include nasal neoplasia, fungal rhinitis, nasopharyngeal polyp, dental-related disease, and nasopharyngeal stenosis. Physical examination findings are generally unremarkable other than abnormalities confined to the upper respiratory tract. The dental arcade (eg, gingivitis, tooth root abscessation, oronasal fistula), hard palate (eg, neoplasia, oronasal fistula), soft palate (eg, nasopharyngeal mass or polyp), and regional lymph nodes (eg, lymphadenopathy) are all structures that should be carefully evaluated. A fundic examination is recommended if Cryptococcosis is suspected.

Diagnostic studies should be undertaken once it is established that chronic refractory rhinosinusitis is present so that other treatable conditions may be excluded and to further characterize the disease present.<sup>12</sup> A complete health profile with serology for feline leukemia virus and feline immunodeficiency virus is essential to assess systemic health. This should be followed by general anesthesia for a thorough oral examination and skull radiographs or computed tomogra-

phy. The nasal passages, paranasal sinuses, and tympanic bulla are often involved in the disease process. The intraoral radiographic view achieved using dental radiographic film often provides sufficient detail of both nasal cavities, although subtle changes in turbinate structures and distinction of soft-tissue densities may be difficult to discern. Imaging will generally show variable turbinate lysis and increased fluid density within the nasal cavities. Because the frontal sinuses are small in cats, frontal sinus projections can miss disease within these structures. In general, computed tomography provides better localization of lesions and determination of extent of disease within the nasal cavity, paranasal sinuses, and tympanic bulla than do radiographs.<sup>16</sup> Findings often seen with computed tomography include soft-tissue opacification of the nasal cavity and frontal or sphenopalatine sinuses, lysis of nasal and frontal bones, turbinate destruction, and asymmetry of the cribriform plate<sup>12,15,16</sup> (Fig. 1). Computed tomography is also superior for differentiation of neoplastic and fungal diseases. Once diagnostic imaging procedures are completed, the nasal cavity and nasopharyngeal region should be evaluated as completely as possible. The nasopharyngeal region and caudal nares can be evaluated with a flexible endoscope retroflexed around the caudal margin of the soft palate. Alternatively, the soft palate can be retracted cranially with a spay hook and a dental mirror is passed into the oropharynx to observe the nasopharyngeal region. Careful observation should be made for mass lesions projecting through the caudal nares or for masses or foreign bodies within the nasopharynx. Rostral rhinoscopy can be performed with either a small flexible endoscope or rigid arthroscopic equipment. Cats with idiopathic chronic rhinitis have mild to severe hyperemia of nasal mucosa, moderate to large amounts of mucoid to purulent discharge between turbinates, and varying severities of turbinate destruction (although in some cats the turbinates may be normal).<sup>12,16</sup> The degree of observed abnormalities may vary between each side of the nasal cavity. It must be understood that the appearance of the nasal cavity does not necessarily reflect on the presence or absence of underlying pathology. Histopathology is of critical importance and both sides of the nose should be biopsied. There may be considerable discordance between visualized abnormalities and those detected histologically.<sup>17</sup> Cats with relatively normal-appearing nasal tissue may have moderate to severe histological inflammation. Histopathology findings may include moderate to severe neutrophilic, lymphocytic, or pleiocellular inflammation with epithelial ulcer-

ation, turbinate destruction and remodeling, fibrosis, necrosis, and glandular hyperplasia. Histologic changes may be predominately unilateral rather than bilateral. Nasal biopsy samples or material cultivated from deep nasal aspiration should also be submitted for microbial culture and sensitivity. Aerobic, anaerobic, and Mycoplasma cultures should be requested. Following visualization of the nasal cavity and collection of biopsy materials, the nasal cavities should be suctioned and flushed with copious amounts of warm isotonic solution to remove secretions and provide temporary improvement in clinical signs. When flushing fluids within the nasal cavity, the tip of the nose should be pointed downward and the oropharynx should be packed with gauze to prevent aspiration of the lavage solution and nasal secretions into the trachea.

Cats with idiopathic chronic rhinosinusitis frequently prove to be very refractory to treatment.<sup>12</sup> Broad spectrum antibiotics are often used for treatment of secondary bacterial colonization or infection within the nasal and paranasal sinus cavities. Recent work has disclosed that potentially pathogenic bacteria and a wider variety of bacterial species are isolated from cats with idiopathic chronic rhinitis than from cats without disease.<sup>15</sup> Mycoplasma spp and anaerobic bacteria were only isolated from cats with idiopathic chronic rhinosinusitis. Antibiotic therapy should be determined from culture of nasal biopsy material or specimens collected from a deep nasal flush. Antibiotics recommended include doxycycline, clindamycin, amoxicillin-clavulanic acid, cefpodoxime, marbofloxacin, and azithromycin. Cats with idiopathic chronic rhinitis demonstrating an initial response to antibiotic therapy should have treatment continued for 6 to 8 weeks or longer. Antiviral therapy is not routinely recommended as the role of active viral infection in cats with idiopathic chronic rhinosinusitis is not established. Positive proof has not been established regarding a primary role for feline herpesvirus type 1 in this disease syndrome.<sup>15</sup> However, it is likely that feline herpesvirus type 1 may play a role in the disease of certain cats. Lysine (500 mg PO q12h) therapy may benefit some cats. Lysine replaces arginine in viral proteins rendering them nonfunctional and thereby reducing viral replication. For those cats demonstrating response to lysine, therapy may be continued indefinitely as it is safe to use in young or older cats. The role of immunosuppressant agents in the management of idiopathic chronic rhinosinusitis is poorly understood. Glucocorticoids could exacerbate viral infection, cause recrudescence of viral shedding, or suppress immune response to bacterial infection. Piroxicam is a nonsteroidal antiinflammatory agent that can ameliorate clinical signs in some cats with idiopathic chronic rhinosinusitis.<sup>12</sup> Piroxicam is generally well tolerated at a dose of 0.3 mg/kg orally daily or every other day. Side effects may include anorexia, diarrhea, or vomiting. Piroxicam may also be combined with antibiotic therapy. Moisturization of nasal secretions promotes sneezing and evacuation of mucous from the nasal cavity. Some cats will tolerate the instillation of saline drops within the nasal cavity. Finally, there are no clinical studies with evidence to support the use of immune simulators (eg, interferon) in the management of this disease.<sup>12</sup>

In summary, the prognosis for cats with idiopathic chronic rhinosinusitis is extremely guarded. The chronic nasal dis-

charge and sneezing are very difficult to control, and once control is achieved, it is often temporary with recurrence expected. A number of surgical techniques have been described but are attended with generally disappointing results and not initially recommended. However, frontal sinus ablation can be effective in controlling clinical signs, although sneezing and nasal discharge will not be resolved with this procedure.<sup>12</sup> Frontal sinus ablation is technically difficult to perform and an especially troubling potential complication of this procedure is persistent anorexia due to loss of smell.

## Neoplasia

Nasal neoplasia and idiopathic chronic rhinosinusitis are the most common causes of chronic rhinitis in cats.<sup>1</sup> Although there are exceptions, neoplasia is of greatest concern in cats >8 years of age. Nasal lymphoma is most common with various carcinomas occasionally seen and other neoplasms encountered much less frequently. Many cats with severe lymphoplasmacytic rhinitis progress to develop nasal lymphoma. It is likely that, at the time of initial diagnosis, the lymphoma is in either a preneoplastic or an early neoplastic stage of disease. Immunohistochemical staining for B-cell and T-cell markers should be requested in cats with severe lymphoplasmacytic inflammation to rule out lymphoma. The reader is referred to the article on nasal neoplasia for further information on tumors of the sinonasal cavities.

## Lymphoplasmacytic Rhinitis

Lymphoplasmacytic rhinitis is a relatively uncommon disease of unknown etiology in cats.<sup>3,18</sup> These cats generally do not have a history of a preceding acute episode of feline upper respiratory tract infection. The evolution of the disease is progressive with minimal signs of nasal disease early on. Lymphoplasmacytic rhinitis should only be considered when all other causes for the chronic rhinitis are excluded. Lymphoplasmacytic inflammation may accompany other diseases, especially neoplasia. If the clinical findings are highly suggestive of neoplasia, the diagnosis of lymphoplasmacytic rhinitis should be highly provisional and repeat biopsies or rhinotomy should be strongly entertained. Severe lymphoplasmacytic inflammation may be associated with lymphoma or progress to lymphoma. Immunohistochemical staining for B-cell and T-cell markers should be requested in cats with severe lymphoplasmacytic inflammation to rule out lymphoma.

## Fungal Rhinitis

Fungal rhinitis is an uncommon cause of chronic rhinitis in cats, although in some geographic areas the disease is seen frequently.<sup>8,9,19</sup> Nasal cryptococcosis is most common and nasal aspergillosis is only occasionally encountered. Facial deformity of the rostral aspect of the nose is often striking in cats with cryptococcosis. Occasionally granulomatous tissue may be seen projecting through the external nares. The clinical signs of cryptococcosis are obstructive rhinitis with mucopurulent nasal discharge. Mucopurulent conjunctivitis may develop in some cats. Cytology can be highly diagnostic for nasal cryptococcosis. Fresh material from granulomatous lesions within the nose are gently smeared on a slide and

stained with India ink. *Cryptococcus* spp. organisms are recognized as a thick, encapsulated round-to-oval yeast.

Nasal aspergillosis is rare in cats. The clinical signs are initially copious unilateral mucopurulent nasal discharge. Bilateral mucopurulent nasal discharge can be seen later in disease. Intermittent bleeding is not uncommon. Nasal pain is often present. Anorexia and depression may develop as the disease progresses, especially with frontal sinus involvement or with destruction of maxillary bones. Extensive turbinate destruction is present. The extent of destruction and determination of sinus or maxillary bone involvement is best demonstrated with computed tomography. The diagnosis of aspergillosis is made by direct observation of fungal plaques, identification of fungal elements in biopsy specimens or direct cytology obtained from affected tissue, or positive fungal culture of affected tissue.

### Nasopharyngeal Polyps

Nasopharyngeal polyps and, less frequently, nasonasal polyps occur predominately in young cats or kittens.<sup>2,4,18,20</sup> Nasopharyngeal polyps usually arise from the middle ear and grow down the eustachian tube to the nasopharyngeal region. Polyps occasionally may be visible in the external ear canal. Clinical signs are caused by direct obstruction of either the oropharynx or the nasopharynx. Chronic rhinitis develops secondary to polyps within the nasopharyngeal region due to secondary bacterial overgrowth due to the lack of clearance of nasal secretions. Clinical signs observed in the early stage of disease include stertorous respiration (snuffling sound), gagging, and minimal sneezing or nasal discharge. As the polyps attain greater size, obstructive breathing and increased nasal discharge with sneezing are seen. These signs may be indistinguishable from those of idiopathic chronic rhinitis, especially in a young cat with a prior history of acute upper respiratory tract infection. For this reason, any cat with chronic rhinitis (especially those of young age) should be carefully evaluated for the presence of polyps.

The diagnosis of nasopharyngeal polyp is relatively straightforward. Oropharyngeal examination and palpation of the area above the soft palate for a mass or direct visualization of the nasopharyngeal region is diagnostic. Once the diagnosis of nasopharyngeal polyp is made, skull radiographs (obtained with the cat under general anesthesia) or computed tomography of the bulla region should be performed. Careful evaluation of the osseous and tympanic bulla and petrous temporal bones is essential for evidence of middle ear inflammation or infections characterized by osseous bulla thickening, soft-tissue densities within the tympanic cavity, or sclerosis of the petrous temporal bone.<sup>4</sup> Radiographic evidence of middle ear inflammation or infection may not always be present, whereas computed tomography offers enhanced discrimination of middle ear involvement.

Nasopharyngeal polyps may be removed by traction avulsion; however, recurrence is common.<sup>4,20</sup> Bulla osteotomy is definitely indicated and should be performed in cats when radiography or tomographic evidence of middle ear involvement is present. It has been advocated that bulla osteotomy should always be performed on the side of polyp origin, even without radiographic changes without the osseous bulla. For polyps with recurrence following traction avulsion, bulla os-

teotomy on the side of polyp origin should always be recommended to allow for removal of the origin of the polyp.

### Foreign Body Rhinitis

Nasal or nasopharyngeal foreign bodies are infrequent in cats and are usually due to blades of grass lodged within the nasal cavity.<sup>6,7</sup> Seeds and grass awns are less frequently encountered. Clinical signs associated with foreign bodies within the nasopharyngeal region are often peracute with coughing, gagging, and hard swallowing response usually observed. With time, stertorous respiration, phonation changes, nasal discharge, and sneeze may develop with nasopharyngeal foreign bodies. Clinical signs associated with foreign bodies confined within the nasal passages may be acute or chronic and often consist solely of sneezing and nasal discharge. Cats having nasal foreign bodies not immediately expelled from the nose will develop progressively increasing nasal discharge, often attended by occasional hemorrhage. Severe granuloma tissue response may occur with long-term foreign bodies. Foreign bodies usually wind up within the nasal cavity by entry through the caudal nares. Foreign material is ingested and then either gagged or vomited, inadvertently transferring the foreign material into the nasopharynx and then through the caudal nares into the caudal nasal cavity.

Grass blades and similar material can usually be removed under direct examination of the nasopharynx or nasal cavities. Retroflex nasopharyngoscopy is diagnostic for nasopharyngeal foreign bodies. Alternatively, a spay hook may be used to retract the soft palate forward (with or without the aid of a dental mirror) to observe the nasopharyngeal region. Flushing the nose with copious amounts of warm saline may dislodge smaller particles (eg, seeds) within the nasal cavity. The nose should be directed downward and the caudal oropharynx should be packed with gauze to prevent aspiration of saline and nasal secretions into the trachea. Rhinotomy may be required for longstanding cases with excessive granulation tissue or foreign bodies resistant to direct removal (eg, grass awns).

### Nasopharyngeal Stenosis

Nasopharyngeal stenosis is a rare complication of acute upper respiratory tract infections or following episodes of severe vomiting (eg, aspiration rhinitis).<sup>1</sup> Initially progressively worsening stertor is present with absence of nasal discharge. With severe stenosis, nasal discharge and extreme difficulty with nasal breathing is observed. Retroflex nasopharyngoscopy will often reveal circumferential stricturing or narrowing of a focal region of the nasopharynx. Early stenosis may be managed by stretching the affected region followed by corticosteroid therapy to reduce scar tissue and reformation of the stricture. Recurrence unfortunately is very common, necessitating extensive surgical techniques to remove the stenotic region.

### References

1. Henderson SM, Bradley K, Day MJ, et al: Investigation of nasal disease in the cat—a retrospective study of 77 cases. *J Feline Med Surg* 6:245-257, 2004
2. Gruffydd-Jones TJ: Chronic sneezing in cats, in 2002 British Small Animal Veterinary Association 2002 Annual Congress, Gloucester, England, British Small Animal Veterinary Association, 2002, pp 229-230

3. Forrester SD, Jones JC, Noftsinger MH: Diagnostically evaluating cats with nasal discharge. *Vet Med* 97:543-551, 2002
4. Kapatkin AS, Matthiesen DT, Noone KE, et al: Results of surgery and long-term follow-up in 31 cats with nasopharyngeal polyps. *J Am Anim Hosp Assoc* 26:387-392, 1990
5. Maggs DJ: Update on the diagnosis and management of feline herpesvirus-1 infection, in August JR (ed): *Consultations in Feline Internal Medicine*, vol 4. Philadelphia, PA, Saunders, 2001, pp 51-61
6. Aronson LR: Nasal foreign bodies, in King LG (ed): *Textbook of Respiratory Disease in Dogs and Cats*. Philadelphia, PA, Saunders, 2004, pp 302-304
7. Riley P: Nasopharyngeal grass foreign body in eight cats. *J Am Vet Med Assoc* 202:299-300, 1993
8. Malik R, Jacobs GJ, Love DN: Cryptococcosis: etiology, pathogenesis, diagnosis, and clinical management, in August JR (ed): *Consultations in Feline Internal Medicine*, vol 4. Philadelphia, PA, Saunders, 2001, pp 39-49
9. Whitney BL, Broussard J, Stefanacci JD: Four cats with fungal rhinitis. *J Feline Med Surg* 7:53-58, 2005
10. Lamb CR, Richbell S, Mantis P: Radiographic signs in cats with nasal disease. *J Feline Med Surg* 5:227-235, 2003
11. Michiels L, Day MJ, Snaps F, et al: A retrospective study of non-specific rhinitis in 22 cats and the value of nasal cytology and histopathology. *J Feline Med Surg* 5:279-285, 2003
12. Johnson LR: Update on feline rhinosinusitis, in 2003 21st Annual ACVIM Forum Proceedings, Lakewood, CO, American College of Veterinary Internal Medicine, 2003
13. Reubel GH, Ramos RA, Hickman MA, et al: Detection of active and latent feline herpesvirus 1 infections using polymerase chain reaction. *Arch Virol* 132:409-420, 1993
14. Hoover EA, Greisemer RA: Bone lesions produced by feline herpesvirus. *Lab Invest* 25:457-464, 1971
15. Johnson LR, Foley JE, De Cock HEV, et al: Assessment of infectious organisms associated with chronic rhinosinusitis in cats. *J Am Vet Med Assoc* 227:579-585, 2005
16. Schoenborn WC, Wisner ER, Kass PP, et al: Retrospective assessment of computed tomographic imaging of feline sinonasal disease in 62 cats. *Vet Radiol Ultrasound* 44:185-195, 2003
17. Johnson LR, Clarke HE, Bannasch MJ, et al: Correlation of rhinoscopic signs of inflammation with histologic findings in nasal specimens of cats with or without upper respiratory tract disease. *J Am Vet Med Assoc* 225:395-400, 2004
18. Allen HS, Broussard J, Noone K: Nasopharyngeal diseases in cats: a retrospective study of 53 cases (1991-1998). *J Am Anim Hosp Assoc* 35:457-461, 1999
19. Mathews KG: Fungal rhinitis, in King LG (ed): *Textbook of Respiratory Disease in Dogs and Cats*. Philadelphia, PA, Saunders, 2004, pp 2847301
20. Holt DE: Nasopharyngeal polyps, in King LG (ed): *Textbook of Respiratory Disease in Dogs and Cats*. Philadelphia, PA, Saunders, 2004, pp 328-332