

Update on Feline Upper Respiratory Diseases: Introduction and Diagnostics

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Abstract: Clinical signs of upper respiratory disease are common in cats. Common diagnostic differentials include viral, bacterial, and fungal infections; chronic rhinosinusitis; foreign bodies; tooth root disease; neoplasia; inflammatory polyps; nasopharyngeal stenosis; and trauma. A complete diagnostic workup is important to determine the etiology so that the treatment regimen can be appropriately directed and maximal response to therapy obtained.

Clinical signs of upper respiratory disease, including sneezing and nasal discharge, are common in cats. Some diseases are commonly associated with sneezing, and others are more commonly associated with sonorous breathing with or without gagging; coughing can sometimes be present, as well as epiphora, halitosis, and dysphagia.¹⁻³ Sneezing is a superficial reflex that originates in the mucous membranes lining the nasal cavity and is easily induced by chemical or mechanical stimuli. During a sneeze, air is forcefully expelled through the respiratory passageways at a great velocity to clear them. Nasal discharge can be serous, mucopurulent, or hemorrhagic.

Etiologies and Clinical Signs

Relatively common causes of sneezing or nasal discharge in cats that primarily involve the nasal cavity or nasopharynx include infections, chronic rhinosinusitis, foreign bodies, tooth root disease, neoplasia, inflammatory polyps, nasopharyngeal stenosis, trauma, and cleft palate¹⁻³ (**TABLE 1**). In addition, vomiting or regurgitation can lead to sneezing or nasal discharge if gastrointestinal contents are aspirated into the nose via the nasopharynx.

Serous nasal discharge is characteristic of most acute diseases of the nasal cavity and may precede mucopurulent nasal discharge. Chronic serous nasal discharge is most commonly associated with viral and allergic etiologies. Mucopurulent nasal discharge (**FIGURE 1**) is a sign of inflammation and occurs in association with fungal disease, primary bacterial disease, or overgrowth of normal bacterial flora secondary to chronic nasal disease (neoplasia, chronic rhinosinusitis, oronasal fistula, foreign body, inflammatory polyp, or viral disease). Epistaxis alone is most common with trauma, acute foreign body, hypertension, or coagulopathy. Epistaxis that develops in conjunction with, or after, mucopurulent dis-

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A companion article on disease-specific tests and therapies will be published in January 2010.

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**FIGURE 1****Clinical appearance of chronic mucopurulent nasal discharge.****About AAFP**

The American Association of Feline Practitioners improves the health and well-being of cats by supporting high standards of practice, continuing education, and scientific investigation. Feline practitioners are veterinary professionals who belong to this association because they are "passionate about the care of cats"!

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charge is most common with fungal disease, neoplasia, oronasal fistula, and, occasionally, chronic foreign bodies. Vasculitis is a rare cause of nasal discharge in cats; it is a more common cause in dogs with diseases such as ehrlichiosis and bartonellosis. Unilateral nasal discharge is more likely with foreign bodies, oronasal fistula, and neoplasia, although discharge can become bilateral as neoplasia progresses. Bilateral discharge is a nonspecific sign that can have almost any etiology.¹

Infectious agents are commonly associated with sneezing or nasal discharge in cats. The primary viral agents are feline herpesvirus 1 (FHV-1; **FIGURE 2**) and feline calicivirus (FCV).⁴⁻⁸ Bacterial agents that have been described as primary respiratory patho-

gens in cats include *Bordetella bronchiseptica*, *Chlamydophila felis*, *Streptococcus canis*, and *Mycoplasma* spp; *Corynebacterium* spp, *Escherichia coli*, *Pasteurella multocida*, *Pseudomonas aeruginosa*, *Streptococcus viridans*, and *Staphylococcus intermedius* are also commonly detected but are generally thought to be secondary invaders.⁷⁻¹⁶ *Cryptococcus neoformans* and *Aspergillus* spp are the most common fungal causes of upper respiratory disease in cats.^{17,18}

General Diagnostic Considerations

Signalment and lifestyle often help refine the differential diagnosis and direct a diagnostic workup. Brachycephalic breeds may be predisposed to nasal disorders due to physical

TABLE 1**Clinical Manifestations of Upper Respiratory Diseases in Cats**

Disease	Signalment and History	Sneezing	Nasal Discharge	Respiratory Noise
Acute viral infection	Young to any age; acute	Often	Serous to mucopurulent	Sometimes
Bacterial infection	Any age; chronic	Sometimes	Mucopurulent	Sometimes
Fungal infection	Any age; chronic	Sometimes	Mucopurulent to hemorrhagic	Sometimes
Nasopharyngeal polyp	Young; chronic	Sometimes	Mucopurulent	Often
Chronic rhinosinusitis	Any age; chronic	Often	Mucopurulent to hemorrhagic	Sometimes
Neoplasia	Older; chronic	Sometimes	Mucopurulent to hemorrhagic	Often
Nasopharyngeal stenosis	Any age; chronic	Rarely	Uncommon	Often
Foreign body	Any age; acute	Often	Variable	Rarely

conformation.¹⁹ Neoplasia is more likely in older cats,¹ and nasopharyngeal polyps are more common in younger cats.²⁰ Outdoor cats are more likely to acquire foreign bodies, sustain trauma, or develop infectious etiologies.¹ Cats in crowded housing conditions such as catteries, shelters, or multicat households are more likely to develop acute or chronic viral or bacterial rhinitis.⁶ Obtaining a complete history is important for determining the duration of the clinical signs. Acute onset of clinical signs is common with viral agents, foreign bodies, and trauma. The diagnostic workup of sneezing and nasal discharge is commonly completed in three phases.

Phase 1

Most cats with acute disease are evaluated with noninvasive tests and therapeutic trials. A complete physical examination with careful attention to the head and neck, including ocular retropulsion, should be performed. An otic examination should be completed to evaluate the tympanum for bulging or discoloration; these changes commonly occur with nasopharyngeal polyps. Deformation of the nose or face, exophthalmia, or pain on palpation of the nasal or facial bones is most consistent with fungal disease or neoplasia.¹ An oral examination should be performed to assess for dental disease that could be causing an oronasal fistula, gingivostomatitis that could be consistent with FHV-1 or FCV infection, and defects in the hard or soft palate. External ocular examination may reveal conjunctivitis, which can be a sign of infection with FHV-1, FCV, *Mycoplasma* spp, or *C. felis*. A fundic examination is performed to evaluate for lesions consistent with lymphoma or *C. neoformans* infection. A cold microscope slide placed in front of the nose can aid in assessing airflow and determining whether obstruction is unilateral or bilateral, although these findings should not limit diagnostic investigation to one side of the nose.

Although identification of fungal organisms is uncommon, cytology should be performed on samples of mucoid to mucopurulent nasal discharge to evaluate for the presence of *C. neoformans* or hyphae consistent with *Aspergillus* or *Penicillium* spp. Neutrophils and bacteria are commonly detected if mucopurulent disease is present, but their presence does not prove primary bacterial disease. Likewise, hyphae do not confirm primary fungal disease because they may represent contamination or infection secondary to another underlying cause. Secondary infections result in the same types of discharge as primary infections. If lymph nodes draining the head are enlarged, they should be aspirated to evaluate for the presence of lymphoma, metastatic neoplasia, and fungal agents.

FIGURE 2



Clinical appearance of a kitten with herpesvirus infection.

infected cats. In addition, only approximately 40% of seropositive cats are currently infected; therefore, a positive serologic test result does not prove bartonellosis.²⁴

A complete blood cell count (CBC), a serum biochemical panel, and urinalysis are recommended to rule out other systemic disease processes in cats with chronic disease. In general, CBC results are of low yield but may reveal eosinophilia in some cats with fungal or allergic disease, thrombocytopenia in some cats with epistaxis, or other cytopenias that might accompany FeLV or FIV infection. FeLV and FIV do not cause sneezing and nasal discharge primarily, but they have been associated with lymphoma and may induce immunodeficiency that predisposes to other infections; therefore, testing for these agents is indicated. A *Cryptococcus* antigen test is also recommended as a preliminary test for cats with chronic nasal discharge, particularly those with nasal deformation, lymphadenopathy, or retinal lesions.²⁵ Although thoracic radiographs are generally normal, they are indicated to rule out pulmonary involvement of fungal disease and metastatic neoplasia. In cats with epistaxis, a blood pressure reading, coagulation profile, and buccal mucosal bleeding test are recommended, and thromboelastography may also be useful.

Therapeutic trials are commonly attempted in cats with mild disease and usually consist of antibiotics, antiviral drugs, immunomodulators, or antihistamines.

Phase 2

If the physical examination indicates the need for further diagnostic workup, a definitive diagnosis is not made during Phase 1, or if routine therapeutic trials fail, more aggressive diagnostic testing (requiring general anesthesia) should be pursued. Phase 2 diagnostics usually consist of pharyngeal examination, computed tomography (CT) or skull and dental radiography, rhinoscopy, bacterial and fungal cultures, and biopsy for histology. In anticipation of the potential for biopsy, a platelet estimate and an activated clotting time or other coagulation function test should be conducted before anesthesia is induced.

QuickNotes

Signs of nasal disease are non-specific, and a diagnostic workup is necessary to pinpoint the etiology and direct therapy.

Bacterial culture and antimicrobial susceptibility testing of nasal discharge samples are generally not recommended because the results typically yield normal intranasal bacterial flora and are, therefore, difficult to interpret.²¹ However, in respiratory outbreaks in catteries, pet stores, shelters, or multiple cat households, culture may be indicated to determine whether pathogenic *B. bronchiseptica* is present. Molecular diagnostic assays are available for many respiratory agents, including FHV-1, FCV, *C. felis*, *Mycoplasma* spp, and *B. bronchiseptica*. However, cats can be asymptomatic carriers of these agents, and the FHV-1, FCV, and *C. felis* assays also amplify vaccine strains; therefore, positive results do not prove a disease association, especially for FHV-1 and FCV, which may have relatively high prevalences in the healthy cat population.^{4,5,22} A recent study²³ failed to link infection with *Bartonella* spp to rhinitis in cats, so the question of whether to perform serology, culture, or polymerase chain reaction (PCR) assays for *Bartonella* spp in cats with rhinitis is controversial. If a clinician chooses to test for evidence of *Bartonella* infection, samples should be evaluated by PCR or culture in addition to serology, as serology alone has been shown to produce false-negative results in up to 15% of

FIGURE 3

Computed tomography (CT) images of two cats presented for upper respiratory signs.



CT appearance of mild chronic rhinitis.



CT appearance of a nasal tumor. A mass effect is noted in the nasal cavity. The *white arrow* indicates bony lysis and loss of the nasal septum; the *red arrow* indicates complete obstruction of the nasopharyngeal canal by the mass.

QuickNotes

Although computed tomography is more expensive, it has many advantages over skull radiography.

General anesthesia is induced by administering approximately one-third of an induction dose of propofol, a short-acting thiobarbiturate, or ketamine combined with diazepam. The arytenoid cartilages are examined to make sure both are abducting normally on inspiration. Oropharyngeal examination is performed to evaluate thoroughly for masses,

foreign bodies, or palate defects. A spay hook and dental mirror can be used to help manipulate the soft palate to allow visualization of the nasopharynx to check for polyps, other masses, foreign material, or nasopharyngeal stenosis. A thorough dental examination should be performed and all teeth probed for evidence of an oronasal fistula. If a definitive diagnosis is not made, CT or nasal, sinus, and dental radiography is conducted. Radiography must be performed with the patient under anesthesia for accurate positioning and include lateral, ventrodorsal, intraoral, and open-mouth bullae views. Nasal imaging can reveal increased density in the nasal cavity or bony lysis that could be consistent with a mass, turbinate destruction consistent with chronic rhinosinusitis or fungal disease, radiopaque foreign objects, or tooth-root abscessation.^{26,27} Although more expensive, CT has the advantages of allowing better visualization of the sinuses and tympanic bullae, better assessment of bony lysis, and assessment of the cribriform plate and brain to evaluate the extent of a lesion.²⁸ It is also quicker to conduct than

FIGURE 4



Rhinoscopic image from a cat with chronic rhinitis. The mucosa is irregular, erythematous, and swollen, and there is loss of turbinate structure.

a full series of skull radiographs and allows for radiotherapy treatment planning, if indicated. CT is the preferred imaging modality, especially if a mass is suspected (**FIGURE 3**). Images should be obtained before rhinoscopy and biopsy are performed to avoid hemorrhage obscuring details in the nasal passages.

Depending on the radiography or CT findings, the nasopharynx is examined with a flexible rhinoscope, and rigid rhinoscopy of the anterior nasal cavity is conducted. Rhinoscopy allows direct visualization of the nasal cavity, detection and removal of foreign objects, detection and debridement of fungal plaques, and assessment for inflammation, turbinate destruction, and masses (**FIGURE 4**). However, if a mass is present, rhinoscopy does not allow assessment of the extent of bony lysis, making additional imaging important. In addition, the gross appearance of the nasal mucosa on rhinoscopy does not always correlate with the histopathologic diagnosis, so biopsy samples should always be obtained.²⁹

If no foreign material is visualized on rhinoscopy, the nasal cavity is flushed with sterile saline to evaluate for the presence of hidden material. The cuff of the endotracheal tube should be checked for full inflation before nasal lavage is performed with saline administered under pressure. In cats, we recommend lavaging from the anterior nares caudally. Gauze should be placed in the oropharyngeal area, and a 20-, 35-, or 60-mL syringe can be used to forcefully flush saline through the nose while the nares are pinched off to create pressure. Material flushed from the nose (or oropharynx) should be caught on the gauze and examined for foreign bodies. If no foreign material is found, biopsy samples are taken using a bone curette or the largest biopsy instrument that can be passed through the nares. Most rigid endoscopes are too large for use with the biopsy sleeve in many cats; however, a gastroscopic biopsy instrument can often be passed next to the camera of a small rigid scope to perform a directed biopsy. Alternatively, the biopsy site can be chosen based on the results of diagnostic imaging or rhinoscopy. If indicated, flushed material or

biopsy samples can be submitted for bacterial and fungal cultures.³⁰

Phase 3

Exploratory rhinotomy allows direct visualization of the nasal cavity to identify foreign objects, masses, or fungal plaques and is occasionally conducted in dogs to aid in the diagnostic workup and in the treatment of some diseases. However, it is rarely conducted in cats, except for cases requiring removal of chronically embedded foreign bodies or cases of *Aspergillus* or other sinus infections that were refractory to treatment or for which endoscopic debridement was insufficient. Nasal cryptococcosis rarely requires debulking in cats. In general, there is no added benefit of debulking nasal tumors before chemotherapy (for lymphoma) or radiation therapy. While removing turbinate tissue can increase airflow through the nasal cavities, bacterial osteomyelitis and some nasal discharge often persist, so this procedure is generally not recommended for cats with chronic inflammatory rhinitis.

Conclusion

Clinical signs of upper respiratory disease are common in cats. Viral upper respiratory infections, trauma, and foreign bodies are perhaps the most common diagnostic differentials when the onset of clinical signs is acute, but when the signs are more chronic, bacterial and fungal infections, chronic rhinosinusitis, chronically embedded foreign bodies, tooth root disease, neoplasia, inflammatory polyps, and nasopharyngeal stenosis must be considered. A diagnostic workup can be performed in several stages. A minimum database, cytology, infectious disease assays, diagnostic imaging, and biopsy may be required to determine the etiology so that the treatment regimen can be appropriately directed and maximal response to therapy obtained. **C**

QuickNotes

The gross appearance of the nasal mucosa on rhinoscopy does not always correlate with the histopathologic diagnosis, so biopsy samples should always be obtained.



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