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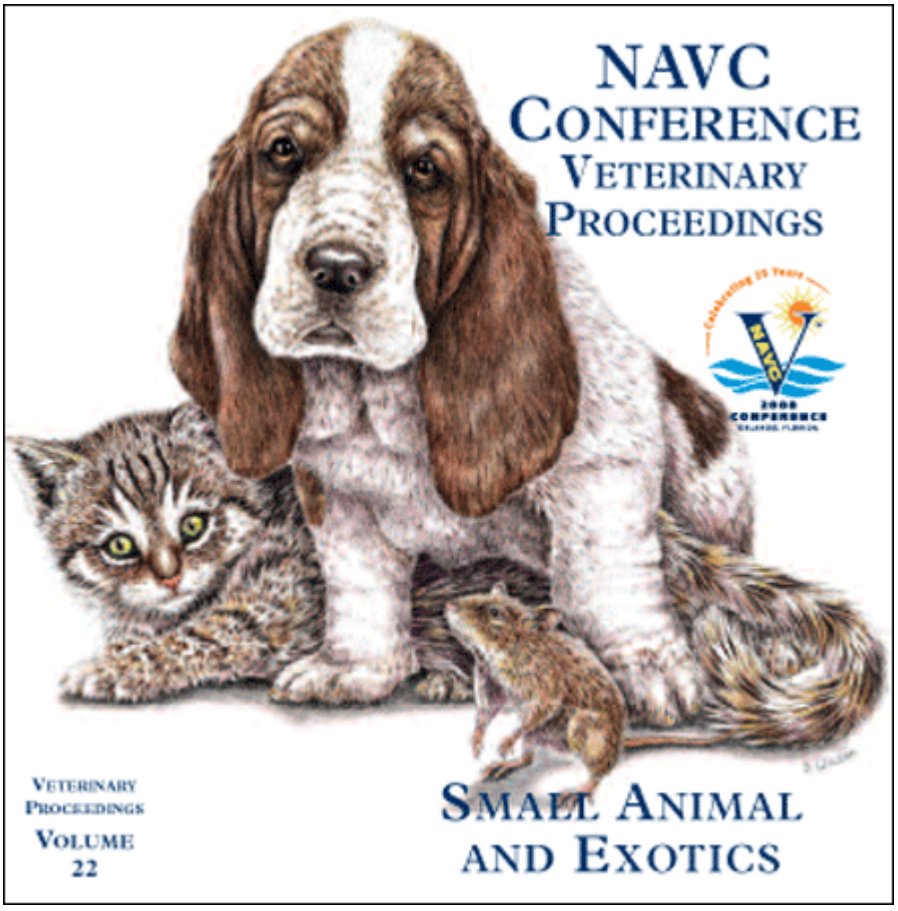

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HOW I TREAT FELINE BRONCHITIS

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STRENGTHEN THE DIAGNOSIS OF IDIOPATHIC DISEASE

Although most cats with bronchitis have idiopathic diseases, a search for specific causes of bronchitis is highly recommended. Identifying a specific etiology for clinical signs may allow for specific treatment and even cure of an individual cat. Differential diagnoses for cats presenting with signs of bronchitis include allergic bronchitis, pulmonary parasites (*Aelurostrongylus abstrusus*, *Capillaria aerophila*, and *Paragonimus kellicotti*), heartworm disease, bacterial bronchitis, and mycoplasmal bronchitis. Occasionally cats with typically interstitial lung diseases can present with signs suggestive of bronchitis. Additional differential diagnoses to consider include carcinoma, toxoplasmosis, and idiopathic pulmonary fibrosis.

EMERGENCY STABILIZATION

Emergency stabilization includes administration of a bronchodilator and rapid-acting glucocorticoids, and providing supplemental oxygen. For cats in severe distress, terbutaline (0.01 mg/kg SC, repeated in 10–15 min if necessary) is administered subcutaneously. Onset is rapid and stress is minimized. If distress is less severe, aminophylline (5 mg/kg PO q12h) or theophylline base (immediate release; 4 mg/kg PO q12h) can be administered orally. Do not administer long-acting theophyllines for emergency stabilization because they require a longer period to reach therapeutic concentrations.

Albuterol can be given by metered-dose inhaler (MDI) or by nebulization in cats that fail to respond to systemic bronchodilators. This route of administration can be stressful for cats that are not used to a face mask. It is possible to nebulize a chamber (oxygen hood or oxygen cage), but large volumes of drug will be needed for a therapeutic effect in a large space and the mist created in the process can result in a wet patient. During episodes of distress, constriction and obstruction of airways may preclude the travel of drug deep into the lungs. Multiple, repeated treatments may be needed for effect. Unfortunately, a maximum tolerable dose has not been established. Careful attention is paid to heart rate and attitude for any sign of toxicity.

Prednisolone sodium succinate is the recommended glucocorticoid for a life-threatening crisis (up to 10 mg/kg IV). If intravenous administration is too stressful, the drug can be given intramuscularly. Alternatively, dexamethasone sodium phosphate (up to 2 mg/kg IV) can be given.

As soon as appropriate drugs are administered, the cat is placed in a cool, stress-free, oxygen-enriched environment. Respiratory rate should be recorded and monitored for objective evidence of progress.

MANAGEMENT OF STABLE PATIENTS

Environment

Any patient with inflammatory airway disease can benefit from improvement of air quality. Some cats with a diagnosis of idiopathic bronchitis may have allergic airway disease, as the latter diagnosis is difficult to confirm. More importantly, irritants in the environment will exacerbate any ongoing inflammation. Potential sources of allergens or irritants are determined through careful owner questioning. Smoke can be particularly irritating and should be eliminated from the cat's environment. The effect of litter perfumes can be evaluated by replacing the litter with sandbox sand or plain clay litter. Indoor cats may show improvement in response to measures taken to decrease the level of dusts, molds, and mildew in the home. Such measures include carpet, furniture, and drapery cleaning; cleaning of the furnace and the frequent replacement of air filters; and the use of an air cleaner. The American Lung Association has a useful website with non-proprietary recommendations for improving indoor air quality (www.lungusa.org). Any beneficial response to an environmental change is usually seen within 1 to 2 weeks.

Glucocorticoids

Most cats with idiopathic bronchitis require glucocorticoid treatment for control of signs. Results can be dramatic. However, drug therapy can interfere with environmental testing; therefore the ability of the animal to tolerate a delay in the start of drug therapy must be assessed on an animal-by-animal basis. Glucocorticoids will relieve the clinical signs in most cats and may protect the airways from the detrimental effects of chronic inflammation. Short-acting products such as prednisolone are recommended because the dose of drug can be tapered to the lowest effective amount.

Prednisolone is recommended, rather than prednisone, based on anecdotal experience and a preliminary study suggest that prednisolone may be more effective in cats than prednisone. An initial dosage of 0.5 to 1 mg/kg every 12 hours is prescribed initially. If signs are not controlled within 1 week, the dosage is doubled. Once the signs are controlled, the prednisolone is tapered to the least effective amount. A reasonable goal is to administer 0.5 mg/kg or less every other day. Depot steroid products, such as methylprednisolone acetate (10 mg/cat intramuscularly is effective for up to 4 weeks), are not ideal for long term management but can be an effective alternative for cats that spend prolonged periods out of door or are difficult to handle due to temperament.

Alternatively, glucocorticoids, such as fluticasone propionate (Flovent®, GlaxoSmithKline), can be administered locally to the airways by MDI. This means of drug delivery is routine for treating airway disease in people. Advantages of adminstration by MDI are a decrease in systemic side effects and relative ease of administration in some cats, compared with oral administration. To date, however, it is still not known how much drug is deposited in the lower airways, how

much remains in the oral and nasal cavities, and how much is absorbed systemically in cats. Theoretical concerns about the oronasal deposition of the potent glucocorticoid in cats, compared with people, include the high incidence of periodontal disease and latent herpesvirus infections and the inability to effectively rinse the mouth with water after use. However, some veterinarians have been using glucocorticoid MDIs to treat idiopathic feline bronchitis for many years without frequent, obvious adverse effects.

I prefer to obtain a clinical remission of signs using orally administered drug first, except in cats with relative contraindications for systemic glucocorticoid therapy such as having diabetes mellitus. By beginning with oral therapy I can determine the steroid responsiveness without adding the variable of unknown drug delivery. Cats that require a relatively low dose of oral glucocorticoids to control clinical signs, have no noticeable adverse effects, and that can be pilled without difficulty are often well maintained with oral therapy. Otherwise, once signs are in remission, treatment by MDI is initiated and the dosage of oral prednisolone gradually reduced.

A spacer must be used for effectively administering drugs by MDI to cats, and the airflow generated by the cat must be sufficient to activate the spacer valve. Padrid[2] has found the Optichamber (Respironics) to be effective. A small anesthetic mask, with rubber diaphragm, is attached to the spacer. Widening of the adapter of the anesthetic mask that is inserted into the spacer is necessary to create a snug fit. This is achieved by wrapping adhesive tape around the adapter. Alternatively, a mask and spacer specifically designed for use in cats is available (Aerokat, Trudell Medical International). The use of homemade spacers should be discouraged because they introduce another variable into the amount of drug delivered to the patient. Commercial spacers are designed specifically to minimize retention of drug on the spacer walls.

In my experience, cats are more tolerant of receiving drugs by MDI if they are acclimated to the device in advance. I recommend having the owner start by simply placing the face mask over the cat's nose for a brief period, associating the experience with a period of low stress followed by a favorite treat or game. Gradually, the additional steps required to actually administer drug are added. The cat is allowed to rest comfortably on a table or in the client's lap. The client places their arms on either side of the cat or gently steadies the cat's neck and head to provide restraint. The MDI, attached to the spacer, is actuated (pressed) twice. The mask is placed immediately on the cat's face, covering the mouth and nose completely, and it is held in place while the cat takes 7 to 10 breaths, inhaling the drug into its airways.

The following treatment schedule has been recommended. For cats with mild daily symptoms: 220 μg of fluticasone propionate by MDI twice daily and albuterol by MDI as needed. The maximum effect of fluticasone is not expected until 7 to 10 days of treatment. For cats with moderate daily symptoms: treatments with MDI as described for mild symptoms; in addition, prednisone is administered orally for 10 days (1 mg/kg every 12 hours for 5 days, then every 24 hours for 5 days). For cats with severe symptoms: dexamethasone is administered once (2 mg/kg IV), albuterol is administered by MDI every 30 minutes for up to 4 hours, and the cat is administered oxygen. Once stabilized, these cats are prescribed 220 μg of fluticasone propionate by MDI every 12 hours, and albuterol by MDI every 6 hours as needed. Oral prednisone is administered as needed.

Bronchodilators

Cats that require relatively large amounts of glucocorticoids to control clinical signs, that react unfavorably to glucocorticoid therapy, or that suffer from periodic exacerbations of signs can benefit from bronchodilator therapy. Albuterol administered by MDI is a convenient for the immediate, at-home, treatment of acute respiratory distress (asthma attack). Cats with idiopathic bronchitis are routinely prescribed an albuterol MDI, spacer, and mask to be kept at home for emergencies. As described for MDI glucocorticoids, it is helpful to acclimate the cat to the procedure *before* it is needed in an emergency situation.

For cats that require constant treatment with a bronchodilator, theophylline can be prescribed. Theophylline is effective and inexpensive, can be given to cats once daily and plasma concentrations can be easily measured for the monitoring of difficult cases. Theophylline has been used for years for the treatment of chronic bronchitis in people. This drug became unpopular with physicians as newer bronchodilators with fewer side effects became available. However, recent research in people suggests that theophylline is effective in treating the underlying inflammation of chronic bronchitis even at concentrations below those resulting in bronchodilation (thus, reducing side effects), and that the anti-inflammatory effects may be synergistic with those of glucocorticoids. Theophylline may also improve mucociliary clearance, decrease fatigue of respiratory muscles and inhibit the release of mast cell mediators of inflammation. The possibility of these additional benefits beyond bronchodilation have not been explored in cats.

A disadvantage of theophylline is that other drugs, such as fluoroquinolones and chloramphenicol, can delay its clearance and cause signs of theophylline toxicity if the dosage is not reduced by one third to one half. Potential adverse effects include gastrointestinal signs, cardiac arrhythmias, nervousness, and seizures. Serious adverse effects are extremely rare at therapeutic concentrations.

The pharmacokinetics of theophylline products are different in cats compared with dogs, resulting in different dosages. Variability in sustained plasma concentrations in both species has been found for different long-acting theophylline products. Further, the individual metabolism of all of the methylxanthines is variable. No studies have been performed in cats using currently available products, but based on extrapolations from a study in dogs we currently use a dosage of 10 mg/kg q24h of a specific generic drug (Theochron,

Inwood Laboratories). Plasma theophylline concentrations are monitored in cats that respond poorly, are predisposed to adverse effects or show signs of adverse effects. Therapeutic peak concentrations, based on data from people, are 5 to 20 µg/mL. Plasma for the determination of these concentrations should be collected 12 hours after the evening dosing of the long-acting products and 2 hours after short-acting products. Measurement of concentrations immediately before the next scheduled dose might provide useful information concerning duration of therapeutic concentrations.

Sympathomimetic drugs can also be effective bronchodilators. Terbutaline is selective for beta-2 adrenergic receptors, lessening its cardiac effects. Potential adverse effects include nervousness, tremors, hypotension, and tachycardia. Note that the recommended oral dose for cats (one eighth to one fourth of a 2.5-mg tablet) is lower than the commonly cited dose of 1.25 mg/cat.

Other Potential Treatments

A therapeutic trial with an antibiotic effective against *Mycoplasma* is considered because of the difficulty in documenting infection with this organism. Either doxycycline (5 to 10 mg/kg every 12 hours) or chloramphenicol (10 to 15 mg/kg q12h) is administered for 14 days. For cats that are difficult to medicate, azithromycin (5 to 10 mg/kg q24h for 3 days, then every 72 hours) can be tried. Remember that administration of doxycycline should always be followed with a bolus of water to minimize the incidence of esophageal stricture.

Antihistamines are not recommended for treating feline bronchitis because histamine in some cats produces bronchodilation. However, an in vitro study has shown that the serotonin antagonist, cyproheptadine, has a bronchodilatory effect. A dose of 2 mg/cat orally every 12 hours can be tried in cats with signs that cannot be controlled with routine bronchodilator and glucocorticoid therapy. This treatment is not consistently effective.

Much interest has been shown among clients and veterinarians for the use of oral leukotriene inhibitors in cats (eg, Accolate®, Singulair®, and Zyflo®). However, the clinician should be aware that in people, leukotriene inhibitors are *less* effective in the management of asthma than glucocorticoids, and they are not used in the emergency management of the disease or for refractory cases. Their advantage for people lies in decreased side effects, compared with glucocorticoids, and ease of administration. To date, toxicity studies have not been performed on these drugs in cats. Further, several preliminary studies suggest that leukotriene inhibition in the cat would not be expected to have efficacy comparable to that in people. Therefore, their routine use in cats is not currently advocated. Further investigation into their potential role in treating feline bronchitis is certainly indicated.

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