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INFECTIOUS DISEASE OF THE AIRWAYS
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Often, infectious diseases of the airways are mixed infections. The combination of viral and bacterial infection is particularly common. Viral disease may damage epithelial tissues and impair local defenses leading to secondary opportunistic bacterial infection. In many clinical cases, it is not necessary or warranted to try to tease out the specific names of the pathogen(s) involved in the syndromes of self-limiting respiratory signs. Symptomatic therapy may be all that is warranted.

Infectious tracheobronchitis (ITB) is one such syndrome. It is often caused by mixed infection (viral, bacterial, Mycoplasma). The most common viral causes are canine parainfluenza virus (CPIV) and canine adenovirus-2 (CAV-2). Bordetella bronchiseptica is the most common bacterial isolate associated with ITB, and it may be either a primary or a secondary pathogen. Mycoplasma spp. (fastidious microbes which lack a cell wall) may play either a primary or secondary role. Other bacterial species are likely opportunistic pathogens. Canine distemper virus infection is not a part of ITB complex, but is worthy of mention as another cause of respiratory airway infection in dogs. ITB is most commonly encountered in situations where dogs are closely housed (hence, “kennel cough”). These infections are acute and highly contagious. Paroxysmal coughing is the most consistent clinical sign; the cough may be dry, hacking, or productive. Mild fever, anorexia, depression, and mucopurulent nasal discharge are also common. While uncomplicated cases are not associated with severe systemic illness, secondary infection, or infection in young or unvaccinated dogs may result in more complicated disease. Uncomplicated ITB is self-limiting, but persistent, paroxysmal coughing in the absence of pneumonia can be suppressed with opioid antitussives. Antibiotics, although not necessary, may decrease duration of clinical signs and prevent opportunistic infection. Appropriate antibiotics include doxycycline, trimethoprim-sulfonamide, macrodilides, fluoroquinolones, and amoxicillin-clavulanate. Nebulization of antimicrobials (particularly aminoglycosides) has been advocated by some. Animals with uncomplicated ITB should be isolated from other dogs, and hospitalization is generally not advised. Complicated ITB requires intensive care with treatment similar to that of bacterial pneumonia.

Vaccinations protect to some extent against infectious components of the ITB syndrome, limiting severity of signs. Many vaccine types are available for the common pathogens associated with ITB (especially CPIV, CAV-2, and B. bronchiseptica), either alone or in combination products. Different vaccines may be given either parenterally or topically via intranasal instillation. Both routes of vaccination result in attenuation of clinical signs if the dog should become infected, and no route or vaccine can completely eliminate the risk of infection. Topical administration has the theoretical benefits of stimulating local mucosal immunity, a lack of interference by maternal antibody, and perhaps a more rapid onset of action. Parenteral vaccines are more convenient to administer. There is no proof that either route is inherently more effective than the other. Severe adverse reactions have been reported when a product intended for intranasal instillation has been accidently given by a parenteral route. Duration of immunity from the vaccines for viral causes of ITB is at least a year and maybe much longer. Recently, a vaccine including CAV-2 (as well as distemper and parvovirus) with challenge data demonstrating a three year duration of efficacy has been marketed. Bacterin vaccines for B. bronchiseptica do not impart as long a duration of immunity as do viral vaccines. Most vaccine manufacturers recommend annual revaccination for B. bronchiseptica. Duration of immunity may be even less than a year. Often, revaccination at least 5 days prior to anticipated exposure (e.g., boarding) is recommended for dogs that have not been vaccinated within the prior 6 months. Of course, dogs at low risk of exposure for this typically self-limiting disease may not require vaccination for B. bronchiseptica at all, and this vaccine is currently not considered a “core” vaccine.

Feline Upper Respiratory Disease Complex (FURD) may also be caused by any one of a number of viral or bacterial organisms, or by a combination of more than one organism simultaneously. The clinical signs are most pronounced in the uppermost airways, especially as sneezing and nasal discharge (see separate proceedings notes). Common causes of FURD include Calicivirus (FCV), Herpes virus (FHV, or rhinotracheitis), Bordetella, Mycoplasma, and Chlamydophila felis. These most often infect young kittens or unvaccinated adult cats. All of these infections are highly contagious. The clinical signs vary with the organisms responsible for infection. Anorexia, sneezing, and fever are common presentations. Other associated signs, such as the presence of conjunctivitis, dendritic ulcers, or lameness, may provide clues to exact organisms present. Coughing is often most pronounced in B. bronchiseptica infection in cats, similar to the predominant sign of this infection in dogs. As for ITB, there are diagnostic tests that may facilitate a specific etiologic diagnosis, but this is not routinely indicated. Care is largely supportive (antimicrobial therapy for B. bronchiseptica or secondary infection, nutrition, hydration, nursing care, etc.). Similar to ITB, vaccination prevents or limits severity of disease. Commonly used parenteral vaccines protect against FHV and FCV infection. There is a topical vaccine available for B. bronchiseptica in cats, but its use is not as widespread as the vaccine for dogs. It is important to realize that a chronic carrier state is common following FHV or FCV infection, and there may be disease recrudescence during times of stress later in the cat’s life.

There are a few conditions that may lead to bacterial infection of the airways that deserve special mention. The term “chronic bronchitis” is generally reserved for an inflammatory condition of the airways in which infection does not play a significant role. That said, the airways of healthy dogs and cats are not necessarily sterile. Bacteria may be isolated from the airways of animals with bronchitis or other inflammatory bronchial diseases at a rate greater than that for healthy animals. It is up to the clinician to gauge the relevance of bacterial isolated during diagnostic evaluation of animals with signs of chronic bronchitis. Often, exacerbations of clinical signs in a dog with previously diagnosed bronchitis may be related to opportunistic secondary infections, and a short course of an appropriate (doxycycline, macrolides, fluoroquinolones) antimicrobial may be warranted. Such therapy can in no way “cure” bronchitis, but may allow improved medical control of clinical signs.
Ciliary dyskinesia is a condition in which the cilia that normally protect the respiratory epithelium by sweeping away pathogenic bacteria fail to function; although there are acquired causes of ciliary dysfunction, congenital ciliary defects are very well described. This defect leads to chronic and recurrent rhinitis, sinusitis, and pneumonia. Infections respond to antibiotics, but reoccur after treatment is discontinued.

Bronchiectasis is an irreversible dilatation of the bronchi. Bronchiectasis may be the result of chronic inflammation or infection, and often occurs secondary to either bronchial foreign body or in association with primary ciliary dyskinesia. Bronchiectasis can result not only in chronic cough, but in recurrent pneumonia as well. Animals with bronchiectasis will be predisposed to airway and pulmonary infection for life, and may require periodic antimicrobial therapy. If only one lung lobe is affected by bronchiectasis, removal of that lobe may prevent further infectious respiratory disease.

While fungal disease of the nose and pulmonary parenchyma are relatively common, fungal tracheitis or bronchitis is very rare. There are a number of parasites that may infect the airways. While most such infections are asymptomatic, they can lead to clinical signs including cough or even respiratory distress. Aberrant Cuterebra migration may result in larvae within the trachea of cats, resulting in stridor and respiratory distress. Treatment for this condition involves physical removal of the larvae, using care not to “break” the parasite as severe hypersensitivity reactions may follow such exposure. Oserus osleri may result in nodules in the major bronchi of the dog and may also produce respiratory distress. While Aelurostrongylus abstrusus infection of cats is typically asymptomatic, it can mimic feline “asthma”. Both dogs and cats are susceptible to airway infection with Capillaria aerophila. Filaroides hirthi and Crenosoma vulpis are both able to infect the airways of dogs as well. Many of these infections are best detected with Baermann fecal test rather than routine fecal floatation.

There are special considerations in the treatment of airway infections as opposed to infections of other tissues, especially in regards to antimicrobial therapy. The mucus layer overlying the respiratory airway epithelia may become thick or contain debris that can hamper antimicrobial activity. For instance, magnesium and calcium in mucus can chelate amino glycosides or tetracyclines, making these drugs less effective. More importantly, there is a “blood-bronchus barrier” which limits penetration of antimicrobials into the airway secretions in much the same way the blood-brain barrier or blood-prostate barrier limits drug penetration into those tissues. Since many bacterial airway infections remain largely on the luminal airway surface, penetration into the airway secretions becomes important. In general, lipid soluble compounds are better able to penetrate the barrier and reach adequate concentrations at the airway surface.