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INFECTIOUS DISEASE OF THE LUNG AND PLEURA

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INFECTIOUS DISEASE OF THE LUNGS

Bacterial pneumonia is a life-threatening disease, but occurs very rarely in otherwise healthy animals. Cats are subject to bacterial pneumonia far less frequently than are dogs. Most bacterial pneumonia occurs in ill, debilitated, or immunodeficient animals, or when physical defenses have been breached. Efforts should be made in any animal with bacterial pneumonia to identify a predisposing cause such as megaesophagus or immunodeficiency states.

Diagnosis of bacterial pneumonia begins with history and physical examination. Such pneumonia can be either a rapidly progressive, life-threatening disease state associated with respiratory failure and/or sepsis, or it can be a much milder presentation with simply lethargy and cough. Profound differences exist in the presentation of animals with pneumonia depending on the severity of disease, including whether the disease involves multiple lung lobes or is unilateral. Usually animals with bacterial pneumonia are anorectic and depressed. Typical physical findings would include fever (not a uniform finding), soft productive cough, nasal discharge, increased bronchovesicular lung sounds with or without crackles, and tachypnea or even overt dyspnea. Neutrophilia with or without left shift is typical. The classic radiographic appearance is of an alveolar pattern, often with a ventral distribution (aspiration pneumonia most often occurs in the right middle lung lobe or in the caudal portion of the left cranial lung lobe). Pathogens incriminated are usually opportunistic, and include Bordetella, Streptococci, Staphylococci, E.coli, P. multocida, Pseudomonas, and Klebsiella pneumoniae. Enteric pathogens account for up to half of all cases of bacterial pneumonia, and anaerobic infections may account for up to 25%. Polymicrobial infections are quite common. Transtracheal wash (or in cats and small dogs, transoral wash through an endotracheal tube) provides material for cytologic exam and culture prior to initiation of broad-spectrum antibiotics. Identification of degenerative neutrophils containing bacterial debris is highly supportive of the diagnosis of bacterial pneumonia. Culture and sensitivity should tests for aerobic organisms, anaerobic organisms, and Mycoplasma.

Therapy for bacterial pneumonia depends somewhat on severity of illness. Treatment of severe bacterial pneumonia is outlined elsewhere in these proceedings. Antimicrobial therapy should ideally be based on C&S results, but is begun to cover the likely spectrum of infection including gram negative and anaerobic pathogens. Combination therapy with a beta lactam and a fluoroquinolone is often the initial empiric therapy. Supportive therapy is imperative in the treatment of bacterial pneumonia, and includes maintenance of hydration (systemically and airway hydration via nebulization), oxygenation, and nutrition. Physiotherapy can also prove helpful. Suppression of cough is contraindicated in animals with pneumonia as the goal should be to promote clearance of infected mucus.

Viral pneumonia is usually part of a systemic disease presentation. Viral pneumonia is often complicated by secondary, opportunistic bacterial infection. Canine distemper, Feline Infectious Peritonitis (FIP), and the viral etiologies of both the feline and canine upper respiratory disease complexes may be implicated in viral pneumonia. These pathogens include rhinotracheitis virus, and calicivirus (cats) as well as parainfluenza virus, adenovirus, and herpes virus (dogs). Each of these viruses may cause disease other than pneumonia as well, and these additional manifestation may provide the support for a tentative diagnosis. For instance, dogs with distemper virus infection often develop gastrointestinal, neurologic, or ocular manifestation of disease as well as the respiratory manifestations. Young and unvaccinated animals are most susceptible, and in fact viral pneumonia is unusual in well vaccinated adult animals. Viral pneumonia is frequently complicated by secondary bacterial infection with resident airway flora. There are few specific therapies for viral pneumonia. Instead, treatment is often identical to treatment of bacterial pneumonia. Antimicrobial drugs are used to treat secondary bacterial infection while supportive care is provided.

Fungal pneumonia is regionally distributed. The most common types include Blastomycosis in the Mississippi and Ohio River Valleys, Histoplasmosis in the Missouri, Mississippi, and Ohio River Valleys, and Coccidioidomycosis in the Southwestern USA including the San Joaquin River Valley. Uncommon causes of fungal pneumonia with a less regional distribution include Cryptococcus, Aspergillus, and Penicillium. Each of these infections may involve tissues other than the lungs. For instance, Blastomycosis and Coccidioidomycosis may also affect the eyes, skin, and bones, while Histoplasmosis frequently causes ocular and GI manifestations of disease. The classic radiographic appearance of fungal pneumonia is that of a miliary interstitial pattern with hilar lymphadenopathy. Diagnosis is based on recovery and identification of organisms. Often, lesions outside the lungs provide the simplest means of diagnosis (touch imprints of dermal lesions, peripheral lymph node aspirates). Recover of organisms via transtracheal wash, lung aspirates, or bronchoalveolar lavage is possible but is made more difficult by the interstitial localization of the pathogens. Serologic titers are useful in the diagnosis of Coccidioidomycosis, but are less so in the diagnosis of Blastomycosis or Histoplasmosis. Treatment consists of long term administration of systemic anti fungal drugs, often using itraconazole as the drug of choice. When pulmonary involvement is severe, animals may worsen soon after initiation of treatment as the organisms begin to die. Supportive care during this period can be crucial, and on occasion involves short term anti inflammatory therapy.

There are other causes of infectious pneumonia worth mention. These include protozoal infections such as Toxoplasma gondii and Pneumocystis carinii. Acute Toxoplasmosis in the cat may result in pulmonary signs, often along with uveitis. Pneumocystis has been described in miniature Dachshunds, King Charles Cavalier Spaniels, and in severely immunosuppressed animals. Unique subsets of bacteria, such as rickettsia, mycoplasmas, and mycobacterium are also worthy of special mention. Both Ehrlichia and Rickettsia rickettsii may have pulmonary manifestation due to vasculitis. Mycoplasma, fastidious microbes that lack a cell wall, may play a primary or secondary role in pulmonary infection of dogs and cats. Mycoplasma require special culture conditions; these
organisms can also be isolated via polymerase chain reaction. They are resistant to many commonly used antibiotics, but are generally susceptible to macrolides, tetracyclines, chloramphenicol, and fluoroquinolones. Dogs and cats are rarely diagnosed with acid-fast mycobacterial infections. Basset hounds dogs and Siamese and Abyssinian cats are reported to have M. avium infections. M. bovis (tuberculosis) is a reverse zoonosis which dogs acquire from an infected human. Because of the typical hilar lymphadenomegally and nodular or interstitial nodular lung patterns, mycobacterial infections may mimic pulmonary neoplasia. Parasitic pneumonias are uncommon, but should be considered in the differential diagnosis of pulmonary disease, particularly in young, outdoor pets.

INFECTIOUS DISEASE OF THE PLEURAL SPACE

Plural space infections include bacterial pyothorax and viral infection with Feline Infectious Peritonitis (FIP). Other causes of infectious pleural space disease are rare. Pyothorax is an infection of the pleura resulting in the accumulation of purulent fluid with a low pH (<6.5) and a low glucose. Animals with pyothorax are typically systemically ill in addition to having evidence of respiratory compromise. Cough may occur, but is not a prominent sign of pyothorax. Common organisms isolated from cats, who often acquire infection via fight wounds, include Pasteurella, Bacteroides, Actinomyces, Clostridium. Dogs more often acquire infection from migration of plant awns, and common organisms in this species include Nocardia, Actinomyces, and Bacteroides. While waiting for culture of fluid obtained by thoracocentesis, broad-spectrum coverage should be initiated with care taken to provide antibiotics with a good anaerobic spectrum. If fluoroquinolones are used, either metronidazole or clindamycin should also be administered as fluoroquinolones alone do not possess an adequate anaerobic spectrum of action. Despite administration of appropriate antibiotics, these animals will not get better until you “drain the abscess.” Ideally, chest tubes should be placed to allow either intermittent or preferably continuous drainage. Drainage should be continued until the fluid accumulation subsides (ideally < 2 ml/kg/day) and the character of the fluid has changed from a purulent to non-purulent and aseptic exudate. There is not substantive evidence that thoracic lavage provides an improved outcome over simple thoracic evacuation, but is favored by many clinicians. If used, simple warmed saline solution may be infused at a dose of 10-20 ml/kg and left in place for 20-40 minutes prior to evacuation several times per day during the first several days of therapy. In dogs, there is retrospective evidence that outcome is improved by exploratory thoracotomy. This has not been evaluated in cats. Because pyothorax is apparently more often associated with foreign material in dogs than cats, surgical exploration may not provide an advantage in cats as it does in dogs. Thoracoscopy may provide a viable alternative to thoracotomy for exploration and debridement of the thoracic cavity in animals with pyothorax.

Feline Infectious Peritonitis is caused by the host’s response to dissemination of a mutated form of the feline enteric coronavirus. Seen most often seen in young or elderly cats, it may present with either a “wet” or “dry” form. The wet form results from deposition of circulating immune complexes in the vasculature. Pyogranulomatous vasculitis leads to exudation of protein-rich fluid into body cavities. Typically the fluid has a high protein content and low to moderate cellularity, with most cells either lymphocytes or macrophages. Other findings include fever, non-regenerative anemia with neutrophilia, hyperglobulinemia and hypoalbuminemia, +/- signs of organ involvement (ocular, hepatic, CNS, other - more common in dry form). Neither antibody titers nor polymerase chain reaction (PCR) can distinguish between exposure to enteric virus and the virulent, mutated form of the virus. In addition to supportive therapy (including thoracocentesis as needed to relieve respiratory distress and nutritional support), a variety of other therapies have been attempted for cats with effusive FIP. Immune suppression with glucocorticoids remains the most widely used such adjunct therapy. Unfortunately, FIP remains a fatal infection in most cats although occasional spontaneous remissions have been reported.

REFERENCES