The Dyspneic Dog: How to Distinguish & Treat Respiratory Disease vs. Congestive Heart Failure

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Respiratory disease in dogs often produces feelings of frustration accompanied by tired eyes that are the inevitable result of staring at nondiagnostic chest X-rays. Believe it or not, this is the specialty we have chosen. The dyspneic and coughing dog is what pays our mortgage. Determining the cause and eliminating these symptoms can often be immediate and thus rewarding. The approach to these patients can involve an accurate history, chest radiographs, clinical pathology analysis, fluoroscopic examination, echocardiogram, tracheal wash cytology, bronchoscopy, and sometimes a drug trial. The treatment is often much more simple than obtaining the diagnosis. Treatments for primary respiratory disease may involve antibiotics, antifungals, antiparasitic agents, bronchodilators, antihistamines, glucocorticoids, and stents.

Often by the time the owner presents for respiratory symptoms, there is some history that indicates the chronicity of the problem. This is a major factor in the final diagnosis or often suspected diagnosis. Patients with primary pulmonary disease often have a history of an acute exacerbation of a mild chronic cough. This would be a common history for tracheal collapse, chronic obstructive pulmonary disease, chronic bronchitis, or allergic bronchitis. Chronic bronchitis or chronic obstructive pulmonary disease patients often live in a home with tobacco smokers. Allergic bronchitis dogs commonly have symptoms of skin or food allergies such as itchy skin, licking the paws, shaking the head, or scratching the ears. These patients obviously have an overactive immune system and are more likely to have respiratory allergies. Congestive heart failure usually presents with an acute cough without prior history of chronic cough. A cough secondary to congestive heart failure is one that usually increases significantly over days to a few weeks. Some primary pulmonary diseases occur abruptly, but pulmonary edema cannot be assumed to be present for 2 years without requiring therapy.

Physical examination can be very helpful in distinguishing between respiratory and cardiac disease. Cardiac disease in older small breed dogs is almost always accompanied by a cardiac murmur. This is usually a left apical systolic murmur typical of degenerative mitral valve disease. Larger breed dogs may not have an audible murmur despite severe dilated cardiomyopathy. These patients often have some other clinical sign that increases the suspicion of cardiac disease such as an arrhythmia, weak femoral pulse, or the presence of a jugular pulse. The absence of these abnormalities makes a cardiac-induced cough less likely. Sometimes a loud right apical systolic murmur can be detected, but this often is not the cause of the respiratory distress, but rather a consequence of pulmonary hypertension. This often results in exertional dyspnea, but is not generally due to cardiac disease, with the exception of chronically elevated left atrial pressures.

There are several tests that can be run on serum and stool that can help differentiate between cardiac and respiratory disease. Evaluating a complete blood count is a means of assessing inflammation, infection, or infiltration. Fungal titers can be diagnostic in some diseases such as coccidioidomycosis. D-dimer values have been shown to be sensitive and specific for pulmonary thromboembolism and should be considered for acute onset dyspnea with minimal radiographic changes. In a study by Prosek et al. (2007), plasma atrial natriuretic peptide (NT-proANP), B-type natriuretic peptide (BNP), endothelin-I (ET-1), but not cardiac troponin-I (cTnI), appear useful for distinguishing between dogs with cardiac and non-cardiac causes of dyspnea, with plasma NT-proANP having the highest sensitivity and specificity. A prospective study that used the ELISA NT-proBNP suggested this test is useful in establishing or excluding the diagnosis of CHF in dogs with cough or dyspnea. Fecal flotation can be used to help identify certain pulmonary parasites, and the adult antigen test for Dirofilaria immitis is an effective and simple screen for heartworm disease.

Obviously chest radiographs are the principal diagnostic test for the coughing or dyspneic dog in general and specialty practice. There is simply no substitute for a good set of chest films. For primary respiratory disease we often recommend both left and right laterals, and a ventrodorsal view. For cardiac disease, obtaining a left or right lateral is acceptable; however, the cardiac silhouette can look different with alternate recumbencies, so choose a lateral that you like and get in the habit of taking that lateral. We typically view the lateral thorax with the patient in left lateral recumbency. A dorsal ventral view is also typically recommended, because it is generally easier to see the pulmonary vasculature in the caudal lung fields from a dorsoventral position. Dyspneic patients often tolerate a dorsoventral position better than a ventrodorsal view. Indicators of cardiac disease on the lateral chest radiograph...
include loss of the angle between the trachea and spine, an upright appearance at the caudal border of the cardiac silhouette, a significant bulge in the area of the left atrium, increased vertebral heart scale measurement, pulmonary venous distention, indistinct margins of the pulmonary veins, and a perihilar or caudodorsal interstitial to alveolar pattern. A dorsoventral view often reveals a left auricular bulge at the 3 o’clock position of the cardiac silhouette, a double-density sphere between the left and right caudal mainstem bronchi with splaying of the same bronchi, compression of the left mainstem bronchus, distention of the caudal lobar arteries, and a caudal, medially radiating interstitial pulmonary pattern. We can often put dyspneic cardiac patients into 3 radiographic categories: those that have obvious cardiogenic pulmonary edema, those that are obviously not in congestive heart failure, and that frustrating group of equivocal congestive heart failure. For the latter group, we need to consider other possible pulmonary diseases that can have the appearance of mild pulmonary edema.

Radiographic patterns for primary pulmonary disease can be very diverse, some of which look nothing like cardiogenic pulmonary edema. These patterns are important to recognize, but diseases that can be more difficult to distinguish are those that have a similar pulmonary pattern to congestive heart failure. These include non-cardiogenic pulmonary edema, pulmonary thromboembolism, chronic bronchitis, allergic bronchitis, bronchopneumonia, or perihilar lymphadenopathy with associated inflammation. These diseases may occur in concert with degenerative valve disease or dilated cardiomyopathy, which can reduce the diagnostic value of the appearance of the cardiac silhouette. Under these circumstances, critical evaluation of the pulmonary vasculature is essential, and pulmonary parenchymal patterns must be accurately identified. This is often where the radiologist is at a disadvantage, because we as clinicians have the benefit of hearing the history, performing the physical examination on the patient, and often reviewing laboratory results the radiologist has not seen. Gathering all of this information can help reduce the list of possible differentials. A history of upper airway obstruction or seizure may help increase our suspicion of non-cardiogenic pulmonary edema. A positive D-dimer test in a patient with sudden onset dyspnea with a large, truncated pulmonary artery and surrounding inflammation can help us diagnose a pulmonary embolism. A positive coccidioidomycosis titer can help increase our suspicion of a perihilar lymphadenopathy. If our evaluation leaves some doubt, we often turn to more advanced imaging as a supplement to the radiographic assessment. This usually includes echocardiography, but may include fluoroscopy and often a diagnostic drug trial.

Echocardiography has a distinct advantage over radiography in that it can assess the function, hemodynamics, and internal dimensions of the heart. Newer techniques are constantly emerging to evaluate chamber and vascular pressures using spectral and tissue Doppler. These can be used concurrently to help differentiate the causes of dyspnea and cough. Fluoroscopic examination is mainly used to evaluate tracheal disease, but can be used in the treatment of collapsing trachea with endotracheal stents.

A diagnostic drug trial is typically used in a patient with equivocal radiographs, but in essence is used in every patient we treat. Fortunately, the list of drugs used for respiratory and cardiac disease is a short one. Tracheal disease is often managed with cough suppression and corticosteroids. Small airway disease may be treated with antibiotics for secondary infections, bronchodilators such as Beta2-agonists (albuterol, terbutaline), and methylxanthines (theophylline, aminophylline) and corticosteroids. The list for cardiac disease is growing somewhat, but the old staples such as furosemide and enalapril have not changed. Drugs like pimobendan, carvedilol, spironolactone, hydrochlorothiazide, and amlodipine are now being used to reduce symptoms and thereby extend life in cardiac patients. Using the history, physical examination, and diagnostic tests previously described, we can come to a diagnosis of the problem and develop a treatment regime that should produce the desired outcome. Because response to therapy is really the only thing our clients care about.

References

