Patients with acute congestive heart failure may not be tolerant of many diagnostics, and in the acute setting, the clinician must rely on a thorough history and complete physical exam to identify if the sources of respiratory difficulty and often the diagnosis may not be known at the time treatment is initiated.

Localizing the location of the problem is essential and much of this can be done with a distant and close physical exam, paying attention to respiratory rate, noises (with and without the use of a stethoscope), body position and characteristics of the respiratory pattern. A dys-synchronous pattern with muffled lung sounds may indicate pleural effusion, which would benefit from a thoracocentesis; however an increased respiratory rate and effort with or without harsh lungs sounds or rales may indicate pulmonary edema, warranting furosemide. Many patients may demonstrate hypothermia with CHF due to systemic vasoconstriction. Unfortunately, cats may also present with distal thrombosis, which may initiate concurrent congestive heart failure.

Patients that are identified early, may respond to simple initiation of medications. However, many patients present when symptoms are severe and more aggressive therapy may be necessary. One should be aware of the pharmacologic nature of furosemide: not only does it cause a diuresis, but mild bronchodilation may also be noted (meaning a response to therapy does not equate to a diagnosis). Furosemide can also cause dehydration, metabolic alkalosis and hypokalemia, and with large doses, acute kidney injury may also occur.

Administration of opioids (such as butorphanol, 0.2-0.4 mg/kg IM or IV) often alleviates anxiety without significantly impacting the patient’s ability to oxygenate or ventilation and will often allow simple procedures (such as IV catheter placement, thoracocentesis) to be performed.

Oxygen is necessary for any patient with respiratory distress, and can be administered as flow-by, cage, hood, mask or endotracheal intubation. Patients in cage or hood oxygen should have their temperature monitored closely; environmental oxygen, temperature, humidity and CO2 levels should also be monitored. Those in severe failure should have rapid sequence initiation of anesthesia for intubation and oxygen administration with positive pressure. Options for rapid injectable anesthesia include: propofol, alfaxolone or etomidate. Ketamine, dexmedetomidine and inhalant induction should be avoided. Rapid intubation of a cat can be challenging, and inversion (dorsal recumbence) of the patient may assist with intubation. Suction and other tools necessary for challenging intubation should be available. Those with severe failure may benefit from suction, postural drainage, thoracocentesis and positive pressure ventilation along with oxygen administration.

When a patient is anesthetized, it allows for a variety of interventions. Diagnostics may include radiographs, echocardiogram, blood and urine collection, blood pressure, and even tracheal samples can be collected for culture, cytology or PCR evaluation. Therapeutics may include postural drainage, suction, thoracic or pericardial centesis, administration of medications and placement of a nasal oxygen cannula. Monitoring should include ECG, BP, SpO2, ETCO2 for patients under anesthesia.

Radiographs of dogs in congestive heart failure are usually straight forward, and include cardiomegaly (a VHS should always be performed, normal is <10.5), LA enlargement and peri-hilar to diffuse edema. Radiographs of cats with CHF are extremely variable: pleural fluid may be noted as well as pulmonary edema in a variety of patterns: focal, patchy or diffuse. A right sided parasternal
evaluation of the heart can easily allow for identification of an LA/Ao ratio; if it is greater than 1.7, CHF is likely.

A variety of other techniques can be used for patients in fulminant failure. Altering blood vessel tone in a variety of ways; some patient may require vasodilation (which increases vessel capacitance and decreases afterload); this is commonly performed with nitroglycerine, hydralazine or vasopressin. Other patients may require pressor support due to low blood pressure, and medications such as epinephrine, norepinephrine, dopamine, isoproterenol, ephedrine or phenylephrine may be used. In animals with poor cardiac contractility, pimobendan, dobutamine or milrinone may be used; digoxin is less commonly used. Some patients may even require fluid support.

Patients may also have arrhythmias; depending on the type and severity of the arrhythmia, anti-arrhythmics may be used. Lidocaine, mexilitine and sotalol are commonly used for ventricular tachyarrhythmias when there is evidence of poor perfusion. R on T phenomenon, rates > 160-180 bpm or the rhythm is multiform. Supraventricular tachyarrhythmias (such as atrial fibrillation) may respond to digoxin or diltiazem; occasionally vagal maneuvers are used. Bradyarrhythmias are more difficult to treat; some may respond to atropine or glycopyrrolate, but the effects are often short lived; some may respond to beta-agonists, however many persistent brady arrhythmias require implantation of a pacemaker.

Once the pet is stabilized, initiation of chronic management should occur. Furosemide is often tapered to the lowest effective dose and should be paired (most of the time) with an angiotensin converting enzyme (ACE) inhibitor, or a similar drug and many heart diseases have demonstrated improved survival with pimobendan. Furosemide alone is insufficient for these patients as it results in a profound activation of the RAAS system left unchecked, which will result in compensatory (and detrimental) side effects such as hypertension. Management of any underlying diseases should occur concurrently. Pulmonary hypertension requires echocardiography to diagnose and sildenafil therapy should be started.

Patients should be rechecked 1-2 weeks after changes in medications (to monitor blood pressure, electrolytes and renal values at a minimum) and then every 3-4 months or with a change in activity, coughing or resting respiratory rate at home.

References discussed in this lecture:


We hope to see you at our next event on Thursday, November 9, 2017!

“Current Techniques in CPR” presented by Elke Rudloff, DVM, DACVECC, cVMA