Cardiac Emergencies: How You and Your Patient can Survive Using Practical Advice

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Abstract

This presentation is intended to describe the typical presentation of several different types of cardiac emergencies in dogs and cats, and materials used will include case information such as ECGs, thoracic radiographs, and echocardiography. Diagnosis and therapeutic intervention will be reviewed, focusing on a practical way to approach these cases. Topics covered will include congestive heart failure, pericardial effusion, and feline arterial thromboembolism.

Keywords: heart failure, pericardial effusion, thromboembolism

Congestive Heart Failure

Dogs with congestive heart failure (CHF) will likely have either myxomatous mitral valve disease (MMVD) or dilated cardiomyopathy (DCM), as these are the most common acquired diseases in the dog. The criteria to diagnose left-sided CHF are the same, regardless of disease, namely: acute onset of coughing/respiratory signs (1-2 days), caudodorsal/perihilar interstitial to

alveolar pulmonary pathology, pulmonary venous distention, and an enlarged left heart (LA and LV, which is easier to appreciate in small breed dogs, but harder to discern in large breeds like Dobermans).¹ Disease severity and amount of pulmonary edema dictate how aggressive therapy needs to be. I have generally less concern about severity if a dog presents with: resp rate $\sim 40 - 80$ bpm; has mild to moderate interstitial pattern; has focal / multifocal distribution on rads. I have generally more concern about severity if a dog presents with: resp rate > 80 bpm; severe interstitial pattern; mild to moderate alveolar pattern; large areas of the lungs affected; outstretched neck; or red frothy nasal discharge.

Treatment approach should be similar, but tailored to disease severity / your concern as a clinician. Dogs should receive a FONSP approach: Furosemide, Oxygen, Nitroprusside (+/-), Sedation, and Pimobendan. Most of the changes in treatment are in furosemide dose. For cases with less concern, generally a total of 8-12 mg/kg in 24hrs is needed. For cases with more concern, generally a total of 14 – 24 mg/kg in 24hrs is needed. Other things to do include: butorphanol 0.2 mg/kg SQ/IM/IV; nitroprusside paste inner pinna (if you have it – this works for some dogs, but does not work for all dogs); 40-60% oxygen cage if available; 0.5 mg/kg pimobendan PO if able (above-label dose helps more in beginning, be sure to follow with a few drops of water to encourage swallow). My goal for the first 12-18 hrs is to decrease the RR by 50% (or less than 40 bpm). Once RR < 40 bpm, back off Lasix (q8h dosing, stop CRI). Dobermans (or other large breed dogs) with CHF due to DCM may need a CRI of dobutamine (~2-10 mcg/kg/min) additionally. Cats rarely need more than ~5-7 mg/kg furosemide over an 18-24 hr period to clear their edema (FONS-T, where 'T' is for thoracocentesis if pleural effusion is present - *Remember: Lasix prevents further accumulation of fluid – it won't do anything to* pleural effusion already present. Therefore, you have to physically remove if present).

Feline Arterial Thromboembolism

Feline arterial thromboembolism (FATE) is a severe disease syndrome, but even this can be managed successfully. Like many other diseases we treat, the client communication aspect of management is a very important consideration. Recognizing FATE as soon as possible and understanding how to move forward through the case is paramount. A common history includes: acute onset (i.e. just found like that); vomiting min to hours prior (~15%); no previous dx of cardiac disease (very common). A common physical examination includes: cold, pulseless, pale limbs and toe pads; initially painful and contracted muscles; lower motor neuron signs. The sites of thromboembolism may be: "saddle" i.e. both rear limbs (75% of cases); one rear limb (10% of cases); right fore limb (10% of cases); and possibly the renal, mesenteric, or cerebral arteries. The underlying etiology is most often left atrial enlargement (any cardiomyopathy), but can also be from hyperthyroidism or a pulmonary mass

Diagnostics that may be helpful include: thoracic radiographs to rule out CHF (ONLY IF STABLE ENOUGH); echocardiography (ONLY IF STABLE ENOUGH); blood chemistry panel (most interested in BUN, CREA, CK, AST, Electrolytes); or you could use NOVAs paired – central vs. affected limb (affected limb glucose lower and lactate higher). Prognostic information to tell the owner should include both short-term and long-term information. In the short-term: ~50% survive to discharge; often ~72 hours of treatment needed (2-5 days); cats will go home with motor impairments. In the long-term: it may take 4-6 weeks to fully regain motor function; unless this was caused by uncontrolled hyperthyroidism, it is not "fixable"; if this was caused by a cardiac etiology, it will happen again (6 hrs, 6 days, 6 months – no way to know for sure). Some prognostic factors to keep in mind include: any motion function is good; unilateral limb better than bilaterally affected; rectal temperature (hypothermia of less than 99° F at intake

has a less than 50% chance of survival); and heart rate (cats presenting with bradycardia of 150 bpm or less have a worse prognosis).

The initial treatment should include: Lasix 1 mg/kg IM/IV (even if thoracic radiographs have not been taken, and therefore the definitive diagnosis of pulmonary edema has not yet been made); pain meds (Methadone 0.6 mg/kg IV q4-6h or Fentanyl 3-5 mcg/kg IV bolus and then 2-5 mcg/kg/h CRI (Buprenorphine likely insufficient for this amount of pain); and an anticoagulant. I recommended giving Clopidogrel 75 mg tab PO once, and then decreasing to the standard dosing afterwards. In addition to clopidogrel, an additional anti-coagulant is needed concurrently, such as: Apixaban 0.2 mg/kg PO BID; Low molecular weight heparin (Dalteparin 200 units SQ BID); Aspirin 81 mg PO q72h (efficacy is questionable, and it risks GI side effects. If heart failure is also diagnosed, then administration of the following is recommended: Lasix 1-2 mg/kg q6h (usually only need 4-7 mg/kg over 24 hours); supplemental oxygen; and NO FLUIDS. If there is not heart failure present, then IV fluids may be helpful to help restore perfusion and balance electrolyte concentrations. Methadone / fentanyl is needed for ~48hrs, and then you can decrease to buprenorphine 0.2 mg/kg q6-8h.

In-hospital monitoring should include: NOVA/biochemistry analysis q 6-12 h (hyperkalemia may develop with reperfusion and is sometimes fatal) and an ECG q 6 h. The ECG is especially useful if you are unable to get frequent blood samples, as we are monitoring for hyperkalemic ECG changes including bradycardia, QRS widening, tall T-wave, and ST depression. Supportive care is an important aspect to provide and should not be overlooked. These cats with motor deficiencies may need help with accessing the litter box. They may need towels to keep warm (heating pads may burn ischemic skin easily). They may also need to have passive range of motion performed (especially if any motor present / returns). The long-term outlook was

described by the FATCAT study.² That study described a 443 day median survival after the first thromboembolism when given clopidogrel, with endpoints including the second thromboembolic event or death. Once a cat has heart failure, they may have another 2-3 years of life left. Frequent rechecks (q 1 - 3 months) are recommended.

Pericardial Effusion

Pericardial effusion is a common cardiac emergency in canine medicine. There is a long list of differential diagnoses for the underlying etiology of pericardial effusion in the dog, including: cardiac neoplasia, idiopathic effusion, right sided heart failure, left atrial rupture, pericardial cyst, pericardio-peritoneal diaphragmatic hernia, pericarditis, anticoagulant overdose, and an infectious etiology. However, the most common etiologies are neoplastic and idiopathic. Together these 2 disease entities comprises ~80% of all cases of pericardial effusion in the dog. Roughly 60% of these cases are neoplastic in origin, the two most common types including hemangiosarcoma and chemodectoma.

References

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