Management of feline heart failure

Virginia Luis Fuentes

MA, VetMB, PhD, CertVR, DVC, MRCVS, Dipl ACVIM Dipl ECVIM-CA (Cardiology), North Mymms, Hatfield, (UK)

Although congestive heart failure may be caused by many different types of cardiac disease, the therapeutic approach may be dictated more by clinical signs and stage of disease than by aetiology.

Stage A- at risk

Maine coons may be at increased risk of developing hypertrophic cardiomyopathy (HCM), so may be presented for screening. Obviously no treatment is indicated.

Stage B- asymptomatic heart disease

There are few studies of treatment in asymptomatic cats to help guide therapy. Beta-blockers and diltiazem have been suggested.

Stage C- the acutely-decompensated cat

It is rarely possible to carry out a detailed Doppler-echo exam on a dyspnoeic cat to confirm the type of myocardial disease, although when the diagnosis of congestive heart failure is in question, it may be less stressful to perform an ultra-rapid echo exam than to obtain thoracic radiographs.

If left atrial enlargement present → aggressive management of congestive failure
If large pleural effusion present → thoracocentesis
Note: more care required than in dogs with avoiding pre-renal azotaemia.

Administer O₂: cats are small enough for oxygen cages to be practical.

Sedation: It may be even more important to sedate cats than dogs, as dyspnoic cats often become very distressed (eg. butorphanol 0.25mg/kg IM)

IV furosemide: initial dose should be no more than 2 mg/kg, thereafter 1-2mg/kg every 60 mins until respiratory rate decreases.

Thoracocentesis: Significant pleural effusions are more common than in dogs with congestive heart failure, and these should be drained with a butterfly cannula.

Cats with low-output failure

Consider dobutamine, despite the theoretical contraindications of positive inotropes causing increased myocardial oxygen consumption and increased toxicity in cats

Dobutamine should be started at lower doses than in dogs (1.25mcg/kg/min) and an attempt should be made to wean cats off sooner: seizures may occur on the 2⁴th day of treatment. No data are available on the acute use of pimobendan in cats.

MONITOR EFFECTS OF THERAPY

• Monitor respiratory rate and effort in congestive failure
• Monitor attitude, body temperature, heart rate and arterial pressure in low output failure.
• Monitor renal function and electrolytes

Stage C- moderate congestive failure and maintenance therapy

The aims of chronic therapy are to eliminate abnormal fluid retention, modulate neurohormonal activation and optimize haemodynamic function. In addition, prevention of thromboembolism is important. There are fewer studies available to guide treatment options, although the initial results of a large-scale blinded study of feline diastolic heart failure suggested that furosemide remains the most important part of treatment.¹ In this study, treatment with atenolol hastened the recurrence of congestive failure or death, whereas ACE inhibitors and diltiazem were neutral.

Furosemide: (1-5 mg/kg q12-24h PO) oral furosemide is used at doses sufficient to eliminate pulmonary oedema, or until unacceptable azotaemia develops.

ACE inhibitors: although not proven to help with control of congestive signs, ACE inhibitors have not been shown to cause harm, even in cats with hypertrophic obstructive cardiomyopathy.² A target dose of benazepril would be 0.5 mg/kg q24h, but dosing should be started at half this dose.

There has been considerable interest in the concept that ACE inhibitors might be able to affect progression of hypertrophy in HCM, or even reverse hypertrophic changes.³ While angiotensin converting enzyme genotypes have been shown to influence the expression of hypertrophy in human HCM, there are no human studies as yet documenting regression of hypertrophy with ACE inhibitor use. One study has shown regression of hypertrophy with losartan in a rabbit model of HCM.⁴

DECREASE HEART RATE?

Traditionally, diastolic heart failure has been treated with atenolol or diltiazem to slow heart rate. In view of the preliminary results of the multicentre study by Fox et al., atenolol should only be used with caution in cats with a history of congestive failure, and not at all in cats with current signs of congestive failure.¹

Proceedings of the SCIVAC Congress, Rimini, Italy, 2007
Negative inotropes for dynamic obstruction: human HCM patients with LVOTO have a worse outcome, although the same may not be true in cats. Negative inotropes can decrease LVOTO gradients, and beta-blockers are more effective at this than diltiazem in cats. The importance of controlling LVOTO gradients in cats with HOCM is uncertain.

Positive inotropes for cats with systolic dysfunction: digoxin is relatively difficult to use in cats because of the high incidence of toxicity. Although there are no published data on the use of pimobendan in cats, it may be better tolerated.

Stage D- refractory congestive failure
- Furosemide: increase dose to effect (monitor renal function)
- Spironolactone: add to furosemide therapy (1 mg/kg q24h). Potassium levels should be monitored.
- Thiazides: in very refractory cases where furosemide is no longer effective, a thiazide can be added at low doses.

CONSIDERATIONS IN SPECIFIC CARDIAC DISEASES

DCM
Although nowadays most cases of feline dilated cardiomyopathy are not related to taurine deficiency, it is still worth measuring plasma taurine levels. Taurine supplementation (250-500 mg q12h PO) should be started until the results are received, and can be discontinued if taurine levels prove to be normal.

ARVC
Management of right-sided heart failure in ARVC can be frustrating, and the same approach is used as in other causes of feline congestive heart failure. Sotalol has been used for management of ventricular arrhythmias (2-4 mg/kg q12h PO).

Systemic hypertension
Although hypertension is not a common cause of congestive heart failure in cats, it should be treated when present. Amlodipine (1.25 mg/cat q12-24h PO) is the first choice treatment.

Hyperthyroidism
Hyperthyroidism should also be treated when present with congestive heart failure. If euthyroidism cannot be achieved (eg. when renal failure is present), diuretics and ACE inhibitors should be used to resolve congestive signs, and beta-blockers used for maintenance to minimize thyrotoxicosis.

Management of systemic thromboembolism
Arterial thromboembolism is a frustrating condition to treat, with more than 50% of cats before leaving the hospital. Cats that survive an acute episode are likely to suffer repeats bouts of thromboembolism, as the underlying myocardial disease predisposing to thromboembolism cannot usually be resolved. Principles of treatment include analgesia, management of electrolyte and acid-base abnormalities, and prevention of thrombus extension. Thrombolytic therapy is still controversial.
- Analgesia (butorphanol 0.2 mg/kg q8h SQ combined with acepromazine) or epidural anaesthesia.
- Fluid therapy to maintain urinary output (unless there is concurrent pulmonary oedema).
- Antibiotic therapy effective vs. anaerobic infection (e.g. ampicillin, amoxicillin).
- Heparin (200 to 300 IU/kg IV, then SQ q8h for 48-72 hours)
  Pulses often return within 72 hours, though use of the limb usually takes longer.

Prevention of thromboembolism
Antithrombotic options include aspirin, warfarin, low-molecular weight heparins and clopidogrel. Different doses of aspirin have been recommended (high dose: 40mg/cat q72h, or low dose: 5mg/cat q72h). Warfarin is extremely difficult to use, as there are substantial risks of haemorrhage even with careful monitoring. Low-molecular weight heparins must be administered by subcutaneous injection, and are associated with more risk of haemorrhage than aspirin, but less than warfarin. Their efficacy remains to be demonstrated in cats. Studies of clopidogrel are currently underway in cats.

Reference List