FELINE HEART DISEASE

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The lecture will cover the most common congenital and acquired forms of heart disease in felines. The emphasis of the lecture will be placed on detecting and diagnosing heart disease with descriptions of common conditions. A cursory discussion of congestive heart failure will also be discussed.

Cats with underlying heart disease may appear healthy. A thorough physical exam is essential for detecting various health issues, including cardiac disease. On auscultation, a heart murmur, gallop or arrhythmia may be present. Not all cats with underlying heart disease will have a murmur. Auscultation cannot differentiate between an innocent murmur or one caused by heart disease.

An echocardiogram is a cardiac ultrasound. It is the gold standard in diagnosing heart disease. It is relied upon heavily to determine prognosis and a treatment plan. Lastly, it is the best way to monitor for progression of heart disease. Feline echocardiography can be technically challenging and should be performed by a clinician with extensive experience, preferably a board certified cardiologist.

Thoracic radiographs are indicated if respiratory symptoms are present or if there is a concern for an ATE. ATE patients often have concurrent CHF. However, some ATE cats do not have underlying heart disease and thoracic radiographs can screen for other illnesses predisposing the cat to ATE, such as neoplasia.

Genetic testing may be considered to help guide safer breeding practices in Maine coons and Ragdolls.

An electrocardiogram is always indicated if an arrhythmia is noted. However, ECGs can be a rudimentary test to screen for heart disease (axis deviations, etc.).

Another helpful tool in diagnosing heart disease is the measuring of proBNP levels. The proBNP level provides quantitative assessment of heart health by measuring the concentration of NT proBNP, which is released by cardiac myocytes in response to cardiac stretch and stress. Cats with respiratory symptoms and elevated proBNP levels of >270pmol/L are likely in CHF. However, cats with concurrent disease such as systemic hypertension, hyperthyroidism and severe azotemia can produce elevated proBNP values. Normal proBNP levels can often rule-out CHF in cats with respiratory symptoms. ProBNP should be interpreted in combination with other diagnostics such as, thoracic radiographs, laboratory testing and echocardiography.

Laboratory testing can help identify issues predisposing cats to systemic hypertension and those with elevated thyroid levels. In addition, blood work is used to monitor the tolerance to cardiac medications.
Ventricular septal defect (VSD)

The interventricular septum separates the left and right ventricles. It is muscular at the apex and tapers to a membranous portion at the heart base. A VSD is a defect in the septum, allowing shunting of blood between the ventricles. VSDs can occur at numerous locations within the septum, but are most commonly seen within the membranous portion. Two major factors determine the consequences of VSDs: 1) size of the defect and 2) the relation between pressures and resistance of the ventricles. Most commonly, flow across the VSD is left-to-right. Rarely, right-to-left shunting may occur, which predisposes the cat to cyanosis and compensatory polycythemia. Small VSDs are often of limited hemodynamic significance and may not require treatment. They may even become smaller or close as the kitten matures. Large VSDs may require medical therapy and/or surgical correction.

Mitral valve dysplasia (MVD)

In MVD, the mitral valve is malformed at birth, resulting in mitral regurgitation or stenosis. The mitral valve leaflets, chordae tendineae and papillary muscles can all be affected. Chronic mitral regurgitation leads to volume overload, resulting in left atrial and left ventricular dilation. In mitral stenosis, there is incomplete opening of the mitral valve during diastole, resulting in obstruction of blood flow and filling of the left ventricle. This results in increased left atrial pressure and severe left atrial dilation. Both mitral regurgitation and mitral valve stenosis can cause congestive heat failure, arterial thromboembolism and/or arrhythmias. Prognosis is poor for cats that are severely affected and showing clinical symptoms. Cats that are mildly affected may experience fairly normal longevity, although they should be monitored for complications regularly.

Complex congenital heart disease

Often, echocardiographic findings demonstrate multiple congenital defects in one patient. Symptoms depend of the precise diagnosis and may include lethargy, weakness, cyanosis, exercise intolerance, syncope, labored breathing or they may be asymptomatic. Depending of the severity of the disease, medical or surgery options may be available. For patients with increased risk or current congestive heart failure, medical management with be initiated. Cats in CHF due to MVD will receive therapy with an ACE inhibitor to inhibit the renin angiotensin aldosterone axis. In addition, treatment with a diuretic, such as furosemide will recommended.

Hypertrophic cardiomyopathy (HCM)

HCM is the most common form of acquired heart disease seen in cats. It is often genetic. It is prominent in Maine coons, Ragdolls, Persians, Sphynx and the common domestic cat. It causes concentric hypertrophy, resulting in a stiff left ventricular chamber. The stiff chamber causes an increase in diastolic intraventricular pressure, left atrial enlargement and ultimately congestive heart failure. With severe HCM, cellular necrosis and myocardial scarring is observed. Left heart failure leads to pulmonary edema and pleural effusion. Severe left atrial dilation results in stagnate blood predisposing the cat to thromboembolisms. Sudden cardiac death is also a risk, it may be due to ATE or arrhythmias that develop.

Systolic anterior motion of the mitral valve (SAM) is a common cause of cardiac murmurs in cats with HCM. It is due to marked enlargement of the papillary muscles. The septal mitral
valve gets pulled in the left ventricular outflow tract during systole, then pushed up into the inter-
ventricular septum causing an obstruction of blood flow, resulting in a systolic murmur.

Arterial thromboembolism (ATE)

ATEs are a devastating sequela to cardiomyopathy. In diseased states when the left
atrium is severely enlarged, the blood becomes stagnate and thrombi may form. The most com-
mon site for the thrombi to lodge in is in the aortic trifurcation. This causes immediate ischemia
to the hind limbs. It is extremely painful. Recommended treatment includes, analgesia, unfrac-
tionated heparin and oral clopidogrel. Unfortunately, prognosis is poor and recurrent ATE is
common.

Thyrotoxic and hypertensive cardiomyopathies

Hyperthyroidism and systemic hypertension can result in cardiac changes similar to those
seen with HCM. Hyperthyroidism is a common endocrine disorder in geriatric cats. Systemic
hypertension is usually associated with another disease such as kidney disease. Depending of se-
verity of the changes, cardiac medications may be indicated in addition to managing the systemic
hypertension and thyroid function. Cardiac changes may be reversed if caught early and well
managed. If left untreated, cardiac remodeling can become permanent and lead to congestive
heart failure.

Restrictive cardiomyopathy (RCM)

RCM is characterized by bialtrial enlargement, extensive left ventricular fibrosis (scar for-
mation) and various arrhythmias. The fibrosis inhibits the left ventricle from relaxing and filling
appropriately. Systolic function is fairly normal with mildly decreased left ventricular wall
thicknesses. As the diastolic pressures increase, left atrial size increases leading to congestive
heart failure and predisposes the cat to ATE. Arrhythmias are also common in cats with RCM.

Dilated cardiomyopathy (DCM)

DCM is rarely seen today. Historically, it was linked to an amino acid deficiency (tau-
rine). Once this was identified, cat food manufactures corrected the problem by supplementing
the diets with appropriate levels of taurine. DCM causes poor myocardial function, enlarged
atria and dilated ventricles. DCM can lead to CHF, ATE and or forward output heart failure

Unclassified cardiomyopathy (UCM)

Occasionally, the echocardiographic changes in a patient are not consistent with the clas-
sically-described forms of cardiomyopathy. In these cases, cats are diagnosed with UCM. Echo-
cardiographic changes can be very diverse in this group. Affected cats may experience CHF,
ATE or sudden cardiac death.

Goals of Treatment

Therapy is typically palliative, because most feline heart disease conditions are incurable.
Patients presenting in acute CHF should be immediately placed into an oxygen-enriched cage.
Furosemide is the diuretic of choice for cats. Furosemide is routinely prescribed at 1-3mg/kg q
2-6 hours. Potential side effects of diuretic therapy are azotemia, dehydration and electrolytes
imbalance (hypokalemia, hyponatremia, hypochloremia, and hypomagnesemia). Hypokalemia
is a possible side effect and is most likely in those with poor appetites, concurrent renal disease
or those receiving high diuretic doses.
Clopidogrel is commonly prescribed to feline patients at increased risk for thrombi. Clopidogrel is a platelet aggregation inhibitor. ACE inhibitors (i.e. enalapril) are routinely prescribed in the management of CHF. Enalapril is used as a balanced vasodilator and to inhibit neurohormonal activation. Various other medications are available to help manage congenital disease and cardiomyopathies. In depth discussion of these treatments is beyond the scope of this discussion.

References

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