



WINN FELINE FOUNDATION

For the Health and Well-being of All Cats

637 Wyckoff Ave., Suite 336, Wyckoff, NJ 07481 • www.winnfelinefoundation.org

Toll Free 888-9MEOWIN (888-963-6946) • Local Phone 201-275-0624 • Fax 877-933-0939

Cardiac Disease in Cats

Matthew Kornya, DVM ©2016

Cardiac Disease is term referring to a wide range of diseases of the muscles, valves, and vessels of the heart. There are many different types of heart disease in cats and other species, which involve widely varied courses of disease, ages of onset, and prognoses. Heart diseases are a major cause of morbidity and death in cats worldwide.

Heart Murmurs

One of the most obvious signs of cardiac disease is often the heart murmur. This is readily detected on physical exam and represents turbulent blood flow within the heart. Heart murmurs are described on a 1-6 scale (6 being the loudest) as well as with their location (eg. apical, sternal, etc) and timing (eg. pansystolic, continuous). While these descriptions carry some indication of severity, auscultation of a murmur cannot reliably indicate which type of heart disease – if any- is present, except in rare cases (for example, continuous “machinery” murmurs in kittens are almost always associated with a patent ductus arteriosus). Approximately 50% of cats with hypertrophic cardiomyopathy will have a heart murmur. 15-27% of healthy cats will also have a murmur (1). Kittens may have low grade “innocent” murmurs that represent a part of normal growth, however these are less common than in puppies.

Arrhythmias, or irregular heart rates, are also an indicator of cardiac disease that may be heard on physical exam. Severe arrhythmias may be associated with a higher risk of sudden death, however some are benign.

Workup

A physical exam is the most important first step in diagnosing cardiac disease. This allowed for measuring core temperature, heart rate and rhythm, listening for murmurs, examining mucous membrane color, and listening for lung sounds. It also allows assessment of pulses and overall mentation. The most common presenting complaints for cats with heart disease include dyspnea (difficulty breathing); blood clots leading to strokes or paralysis of limbs; or fainting episodes. Blood pressure is often low in these cats and body temperature is cold.

Bloodwork

Blood testing may be done to evaluate for underlying causes of heart disease, such as hyperthyroidism. Certain “cardiac biomarkers” are also available that may assess the probability of heart disease existing. The most commonly used of these is “nt-pro-BNP”, which assess the amount of stretch on heart muscle cells. This test may indicate the probability that difficulty breathing is due to heart disease, and (less reliably) may indicate the potential for underling cardiac disease existing in heathy cats.

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Other blood tests more common in human medicine (such as troponin-I) have limited use in veterinary medicine.

Radiographs

Chest X-Rays are a key part of evaluating a cat for heart disease. Most importantly, they allow determination of fluid in or around the lungs (pulmonary edema and pleural effusion). They also allow determination of heart and pulmonary vessel enlargement, and evaluation of other causes of difficulty breathing (such as asthma or cancer). It is important to note that, unlike dogs, cats with heart disease often do not have a significantly enlarged heart and may only have specific chamber enlargement.

Electrocardiogram

This is potentially the most useful tool for assessment of arrhythmias in cats. It allows evaluation of conduction disturbances, atrial fibrillation, or other common causes of irregular heart rates. Its use in detecting chamber enlargements has largely been supplanted by the echocardiogram.

Echocardiogram

This is often considered the gold standard in the diagnosis of heart disease. Echocardiography allows measurements of specific chamber sizes and wall thicknesses, assessment of contractility, measurement of blood flow rate and turbulence, and detection of blood clots. They also allow visualization of cardiac defects, fluid around the heart, and tumors or masses in the cardiac region. This is a technically difficult procedure that should be performed by veterinarians with specific training and may require assessment by a certified cardiologist.

Congenital Heart Disease

Kittens may be born with a variety of heart defects that range from benign to life-threatening. These may include “holes” in the heart, leaky or stenotic valves, or other developmental issues. One common congenital disease is a “patent ductus arteriosus” (PDA), which is one of the few diseases that may be surgically corrected. Other congenital issues include atrial or ventricular septal defects (holes in the heart). Many of these congenital conditions never progress and are not definitively diagnosed, however some result in heart failure. Clinical disease may occur in young cats, or may develop slowly with age. Full workup of cats with congenital cardiac diseases entails radiographs and an echocardiogram.

Cardiomyopathies

Several types of cardiomyopathy exist in cats, as described below:

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- **Hypertrophic Cardiomyopathy (HCM):** This is the most common form of heart disease in domestic cats. In humans, HCM has a genetic basis, and several hundred mutations have been associated with the disease. HCM is known to be inherited in several breeds, and genetic mutations (in “Myosin Binding Protein C”) have been documented to cause the disease in Maine Coons and Ragdolls. While genetic causes have not been recognized in other breeds, HCM can occur in any cat, and is indeed most commonly seen in Domestic Shorthairs. HCM is characterized by a gradual thickening of the heart muscle. This may be generalized or focal, and affects mainly the left ventricle. As the heart wall thickens, less blood is able to be effectively pumped to the body and blood pressure increases in the lungs. The left atrium enlarges, predisposing to blood clots. As disease progresses, arrhythmias may develop and the thickened heart muscle obstructs blood flow out of the heart (called “Dynamic Left Ventricular Outflow Tract Obstruction”, or “Systolic Anterior Motion of the Mitral Apparatus”). The heart muscle weakens as it is replaced by scar tissue due to lack of oxygen. This eventually leads to congestive heart failure and death.
Please see the related handout on “Hypertrophic Cardiomyopathy” for more information
- **Dilated Cardiomyopathy (DCM):** This was previously recognized as a common heart disease in cats, but in the modern day has been largely eradicated. DCM is characterized by a thinning of the heart muscle and increased size of heart chambers. As the heart muscle weakens, blood is not pumped out of the heart as effectively, leading to decreased blood flow to the body and increased pressure in the lungs. Enlarged chambers increased turbulence, leading to clots. In the 1970s, the cause of DCM in cats was identified as being due to a deficiency in the amino acid taurine. Supplementing taurine in cats with DCM results in stabilization of disease, and even full recovery in some cats. Since this point, taurine has been supplemented in all commercial cat foods, virtually eliminating DCM. In the modern day, DCM is rarely diagnosed, generally in cats eating poorly balanced home cooked or raw-food diets.
- **Restrictive Cardiomyopathy (RCM):** This form of cardiomyopathy is characterized by a failure of diastole, or inability of the heart muscle to relax. Cats with RCM experience clinical signs similar to those with HCM, but without obvious thickening of the heart muscle. While there are some changes to the heart suggestive of RCM on echocardiogram (such as the presence of false tendons) definitive diagnosis is more challenging than HCM and often requires advanced echocardiographic techniques such as “Tissue Doppler”. Treatment is very similar to HCM, with prognosis anecdotally worse.
- **Unclassified Cardiomyopathy (UCM):** This “catch all” group represents animals with cardiac muscle diseases that are not able to be classified as HCM, DCM, or RCM. Treatment is generally similar to the other cardiomyopathies listed above.
- **Other Cardiomyopathies:** Other cardiomyopathies are much less commonly recognized in cats. These include arrhythmogenic right ventricular cardiomyopathy and excess moderator band cardiomyopathy. Further discussion is beyond the scope of this article, other than stating that they are rarely encountered.

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Myocardial infarctions, or “heart attacks” are rarely seen in cats, and are usually associated with other conditions. Other heart diseases include infections of the heart (endocarditis or myocarditis), and thyrotoxic heart disease (associated with severe hyperthyroidism).

Congestive Heart Failure

Regardless of the underlying pathology, the end stage of heart disease is congestive heart failure (CHF). This is characterized by the buildup of fluid within the chest as the heart is no longer able to successfully pump blood to the tissues. This may manifest as pulmonary edema (fluid within the lungs) or pleural effusion (fluid between the lungs and chest wall). Less commonly, fluid may build up in the sac around the heart (pericardial effusion). Cats with CHF usually present with difficulty breathing and may require oxygen therapy.

Abdominal effusion is rare in cats with CHF, in contrast to dogs where it is common.

Thromboembolic Disease

Due to increased turbulence within the heart, blood clots are prone to developing in cats with cardiac disease. These generally develop within the left atrium. Clots may dislodge and travel to the blood vessels in the body, resulting in a loss of blood flow to this tissues. The most commonly recognized embolic disease in cats is the “aortic thromboembolism” (saddle thrombus). These lodge at the bifurcation of the main artery away from the heart, where it splits into the arteries supplying the legs. This results in paralysis of the legs and death of the tissues. Saddle thrombosis is extremely painful and carries a poor prognosis- severely affected cats are often euthanized, though modern techniques may have some success in mildly affected cats. Clots may also travel to the forelimbs, with similar signs.

Clots may travel to other parts of the body, leading to strokes, pulmonary emboli, or other diseases depending on the location.

Treatment

Unlike in human medicine, surgical correction of feline heart disease is very rarely an option (with the exception of some congenital diseases, however cost and surgical risk are major limiting factors). As such, medical therapy is the mainstay of treatment.

With the exception of taurine deficient DCM, there are no specific therapies for heart disease. Due to the very limited data on long-term effects of therapy, there are a wide variety of treatment plans used to treat heart failure with approximately equal success. There is little argument that furosemide (a diuretic that removes fluid from the lungs) must form the core of treatment. Any other therapies will vary depending on the clinician. Some of the most common drugs are described below:

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- Furosemide- Commonly called “Lasix” this drug removes fluid from the lungs and causes it to be urinated out. It also decreases blood volume, making the workload on the heart easier. It is the standard therapy for treatment of acute and chronic heart failure.
- Benazepril- This “ACE Inhibitor” works to decrease blood pressure and blood volume, and is often used in conjunction with furosemide. It may also have effects in decreasing fibrosis of the heart and anecdotally may lead to “remodeling” of cardiac disease. Because of this potential for remodelling it is sometimes used prior to the onset of heart failure to improve cardiac function and slow disease progression, however there is little evidence for this use. Cats treated with benazepril will eventually experience “ACE-Escape” leading to the drug no longer working, as such some cardiologists advocate waiting until the onset of heart failure to use it.
- Atenolol- This is the most commonly used “beta-blocker” in feline medicine. It has properties as an anti-arrhythmic, and slows down a cat’s heart rate allowing the heart to fill with blood more effectively. It also decreases the degree of obstruction and reduces the severity of murmurs in certain subsets of HCM. Despite these apparent benefits, its effectiveness in preventing/ delaying heart failure is unclear. It is commonly used prior to the onset of heart failure in cats with significantly elevated heart rates or severe outflow obstruction.
- Diltiazem- This drug slows heart rate and eases ventricular filling, much like atenolol. It has largely fallen out of favor in recent years, with atenolol replacing it. Reliable studies have not shown a significant difference between the two drugs, however side effects are often worse with diltiazem. The two drugs cannot be used together.
- Spironolactone- This potassium-sparing diuretic has traditionally been used to compliment furosemide therapy. Recent data suggests it may have cardio protective effects aside from its diuretic use.
- Pimobendan- This calcium sensitizer has been used in dogs for the treatment of DCM and valvular disease. In cats it has been reserved as a last-line drug for the treatment of end stage HCM, however recent data suggests it may be effective earlier in the course of disease. More research is needed to elucidate its role in feline medicine.
- Clopidogrel – This anti-coagulant drug is used to decrease the risk of blood clots. Its effects have been shown to be superior to aspirin, which it has largely superseded. It is often used when risks of blood clots are high.

While many drugs are described above, it is important to remember than administering multiple medications to a cat several times a day may put significant stress on the animal, which in itself can worsen heart disease. Due to the unknown or limited efficacy of many of these drugs, many owners and veterinarians follow more conservative protocols.

For cats with pleural effusion (or, less commonly, pericardial effusion) thoracentesis (or “chest taps”) may be needed to drain fluid off of the lungs or heart in order to allow better lung function.

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Prognosis

Prognosis for cats in CHF is poor; regardless of treatment, survival is generally less than 6 months. Prior to entering into CHF, cats with sub clinical heart disease may survive for many years. DCM caused by taurine deficiency is the exception, as it may be treated by taurine supplementation.

Cat who present with a thromboembolic episode who are not in heart failure may survive up to one year with anti-coagulant therapy, though this is an average and many do not live this long. This assumes that the cats survive the first few days after the embolic event; more than 50% do not survive this time period with severe embolus.

Decompensation may occur in several ways. Congestive heart failure or thromboembolic events are the most common.

In rare cases, CHF induced by severe stress may enter into remission; however this is the exception rather than the rule.

Please Note: Winn Feline Foundation provides the feline health information on this site as a service to the public. Diagnosis and treatment of specific conditions should always be in consultation with one's own veterinarian. Winn Feline Foundation disclaims all warranties and liability related to the veterinary information provided on this site.

See Also:

Hypertrophic Cardiomyopathy for Breeders

<http://www.winnfelinefoundation.org/docs/default-source/cat-health-library-educational-articles/hypertrophic-cardiomyopathy-for-breeders.pdf?sfvrsn=2>

Cornell HCM

<http://www.vet.cornell.edu/hospital/Services/Companion/Cardiology/conditions/HCM.cfm>

ICatCare Cardiomyopathy

<http://icatcare.org/advice/cat-health/cardiomyopathy-heart-disease-cats>

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