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Dilated cardiomyopathy

Dilated cardiomyopathy, DCM

Affected Animals:

The dogs most frequently diagnosed with DCM are large and giant purebred dogs, including Scottish deerhounds, Doberman pinschers, boxers, Saint Bernards, Afghan hounds, Newfoundlands, and old English sheepdogs. Recently, both English and American cocker spaniels have been diagnosed more frequently with DCM than other small breed dogs. Most dogs with DCM are older, as the prevalence of DCM increases with age. Male dogs are affected more commonly than female dogs for most breeds.

Overview:

The term cardiomyopathy literally means "sick heart muscle." Dilated cardiomyopathy, or DCM, occurs when the heart muscle is thin, weak, and does not contract properly. DCM most commonly affects large or giant purebred dogs, but it also can be seen in smaller breeds such as cocker spaniels, and in mixed breed dogs. The condition can lead to congestive heart failure, in which fluid accumulates in the lungs, the chest or abdominal cavities, or under the skin. Because of reduced blood flow to the rest of the body, DCM also can result in weakness, fainting, and exercise intolerance. Abnormal heart rhythms, or arrhythmias, frequently accompany DCM, and can complicate the treatment of dogs with this disease.

In rare cases, supplementation with substances such as l-carnitine or taurine may dramatically reduce signs in individual patients, but for most dogs, the main goals of treatment are to lessen signs due to congestive heart failure and to attempt to improve the heart's ability to pump blood. The long-term outlook for dogs with DCM is usually quite poor, and most dogs with DCM eventually die from the disease. Despite the poor long-term outlook, however, many dogs with DCM can benefit from medical treatment that helps control symptoms.

Clinical Signs:

Signs may be consistent with right heart failure, left heart failure, or both. Right heart failure signs can include abdominal distention due to ascites, jugular venous engorgement or pulsation, hepatomegaly, pleural effusion, edema, pericardial effusion, and weight gain due to fluid retention. Left heart failure signs can include cough due to

pulmonary edema, shortness of breath, tachypnea, and dyspnea. Some signs can be seen with right or left sided heart failure, including fatigue and weakness, exertional dyspnea, gallop rhythm, pallor, increased capillary refill time, cyanosis, cool extremities, and weight loss.

Symptoms:

Dogs with dilated cardiomyopathy can show symptoms due to right-sided congestive heart failure including abdominal enlargement; distention of the veins in the neck or other parts of the body; and fluid accumulation in the abdomen or chest, in the sac around the heart or underneath the skin, especially in the legs and on the underside of the body. This fluid retention can lead to weight gain. Other dogs will show evidence of lung problems due to left-sided congestive heart failure, including shortness of breath, rapid, shallow breathing, difficulty resting comfortably at night, and coughing.

It is also common for dogs with DCM to show signs of both right and left heart failure. These signs can include weakness and exercise intolerance, and difficulty breathing with increased activity. Weight loss is common in dogs with DCM that do not retain fluid. Some animals exhibit signs due to reduced blood flow to tissues, including pale mucous membranes, bluish color to the mucous membranes, and cold feet and legs. Fainting may occur if abnormal heart rhythms are present, or if the heart's output is severely reduced.

Description:

Heart failure occurs when the blood returning to the heart from the rest of the body cannot be pumped out fast enough to meet the demands of body tissues. Heart muscle disease is one of the potential causes of heart failure. Dilated cardiomyopathy is a condition characterized by a variety of changes in the heart muscle that result in pump failure. As the name implies, the heart chambers are usually dilated or enlarged, and the heart muscle itself is usually thin and weak, contracting with much less vigor than normal. The term cardiomyopathy literally means "sick heart muscle."

The primary abnormality occurring with DCM is impaired function of the ventricles due to decreased strength of the heart muscle. The left ventricle pumps blood from the lungs to the rest of the body, and the right ventricle pumps blood from the rest of the body to the lungs. When the heart muscle fails, pressures can increase and ultimately lead to left- or right-sided heart congestive heart failure. Reduced output from the heart may result in signs such as weakness, exercise intolerance, fainting, and shock. Heart valve insufficiencies, abnormal heart rhythms or arrhythmias, and the results of the body's compensatory responses to reduced heart muscle performance can compound the problems seen with DCM. Ventricular arrhythmias can often lead to sudden death, especially in boxers and Doberman pinschers. The development of an atrial arrhythmia called atrial fibrillation can have important short-term and long-term consequences for dogs with DCM. This arrhythmia can be seen in all breeds of dogs.

Medications are used to treat the consequences of heart muscle failure, to attempt to improve the heart muscle's ability to contract, and to normalize or improve rhythm disturbances. Drugs used to accomplish these goals include diuretics, digoxin, and angiotensin converting enzyme inhibitors. Supplementation with substances such as taurine or L-carnitine may be helpful for some dogs with DCM.

Diagnosis:

The diagnosis often is first suspected when symptoms compatible with DCM are present in a large or giant purebred dog or cocker spaniel. Physical examination abnormalities frequently include the presence of an extra heart sound called a gallop rhythm, or a soft heart murmur. Arrhythmias can be detected while listening to the heart with a stethoscope and while feeling for the pulse or heartbeat. Abnormal lung sounds are heard in dogs with left-sided heart failure, while distention or pulsation in the jugular veins, liver enlargement, or abdominal fluid accumulation may be present in dogs with right-sided heart failure. In addition, laboratory results may indicate mild changes in serum protein concentrations, sodium and potassium levels, liver enzymes, and mild increases in serum urea nitrogen and creatinine levels, or kidney values.

Although they will not always reveal major changes, chest x-rays should always be evaluated in patients suspected of having heart disease. Heart enlargement and blood vessel changes consistent with heart failure may be seen, and fluid accumulation in or around the lungs can be identified if heart failure has developed.

The most definitive diagnostic test for DCM is the echocardiogram, an ultrasound evaluation of the heart. Heart chamber dilation and enlargement, reduced heart muscle wall thickness, and decreased heart muscle wall movement are the hallmarks of DCM. In addition, mild heart valve abnormalities may be seen. Doppler echocardiography may be used to assess the severity of valvular abnormalities based on changes in blood flow through the heart.

The electrocardiogram may identify abnormal rhythms or changes in the normal tracings. The most common rhythm disturbance occurring with DCM is atrial fibrillation, a condition characterized by a tremendous increase in the rate of contraction of the atria, the uppermost chambers of the heart, coinciding with an increased rate of contraction of the ventricles, the lower and larger chambers of the heart. Other rhythm disturbances, including premature ventricular beats, may be detected.

Prognosis:

Currently, DCM is almost always fatal. Most dogs die within six to 24 months after being diagnosed. Severely ill dogs often do not survive the first two days in the hospital. Doberman pinschers may have a worse prognosis compared to other breeds. However, the response to treatment will vary for any individual dog. Treatment should always be attempted before rendering a prognosis. As with almost any disease, dogs diagnosed with DCM before serious complications have developed may be able to live longer with treatment.

Transmission or Cause:

There appears to be a strong association between breed and DCM. Infectious diseases, including Lyme disease, bartonellosis, and trypanosomiasis, have been reported in association with DCM and are usually accompanied by other symptoms.

Treatment:

DCM generally is not curable, and spontaneous recovery is unlikely. The primary goals of treatment are to lessen clinical signs of heart failure and to prolong survival. Treatment of an individual dog is dictated by the severity of its signs at the time of diagnosis, and the presence or absence of changes such as congestive heart failure and arrhythmias. The primary drug to reduce fluid accumulation secondary to congestive heart failure is furosemide, marketed as Lasix. It can be used to treat acute, life-threatening fluid accumulation or to control and prevent congestive abnormalities in chronic settings.

Digoxin is used for several reasons in the treatment of DCM. It may help increase the heart's ability to contract and slow down the ventricular response rate in dogs with atrial fibrillation. Digoxin also blunts some of the neurological and hormonal responses to heart failure that lead to worsening of the condition. Drugs such as dobutamine, amrinone, and milrinone may be used to increase the heart muscle's ability to contract, but they are indicated primarily for short-term emergency situations.

Recently, the use of drugs called angiotensin converting enzyme, or ACE, inhibitors has been shown to benefit dogs with DCM by reducing the signs due to heart failure and improving exercise tolerance. ACE-inhibitors have many effects, including blood vessel dilation, which reduces the resistance the heart has to pump against. The drug also remodels the diseased heart muscle. Other types of blood vessel dilators can be used in the short-term or long-term treatment of DCM to reduce the load that the heart has to pump against to get blood to flow.

Other drugs control heart rhythm disturbances. Digoxin is commonly used in dogs with atrial fibrillation. Other anti-arrhythmic drugs, including procainamide, marketed as Procan, and mexiletine, marketed as Mexitil, are used for dogs with ventricular arrhythmias due to DCM.

L-carnitine is a compound that plays an important role in fatty acid metabolism and in neutralizing potential toxins in cells. Carnitine deficiency in the heart muscle has been shown to be potentially reversible in at least one family of boxers with DCM. Although the diagnosis of heart muscle carnitine deficiency is difficult, and the appropriateness of supplementation with l-carnitine for all dogs with DCM is unknown, such supplementation is not known to be harmful. L-carnitine supplementation can be considered for all dogs with DCM.

Another substance that may play a role in the treatment of DCM, particularly in cocker spaniels, is taurine. Taurine deficiency was found to be the most important factor associated with DCM in cats in the 1980's, and correction of cat food formulations to

eliminate taurine deficiency resulted in the almost complete elimination of DCM as a major heart muscle disease in cats. However, the exact role of taurine in the treatment of DCM in dogs remains undetermined. Other substances, such as coenzyme Q-10, may also play a role in the treatment of this disease.

Prevention:

Affected dogs should not be bred. Early screening of dogs of breeds that have a high incidence of DCM may help identify important changes prior to the onset of signs. This can help prevent the breeding of dogs that could pass DCM on to their offspring.