



**Ettinger: Textbook of Veterinary Internal
Medicine, 7th Edition
Canine and Feline Cardiomyopathy
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What is cardiomyopathy?

Cardiomyopathy is the name applied to an abnormality of heart muscle function. The heart's pumping ability is diminished, resulting in such signs as inability to exercise; fatigue; fainting; fluid collection in the lungs, abdomen, and limbs; or emboli (clots that arise in the heart and travel to the kidney, brain, or legs). Although some patients with cardiomyopathy do not develop clinical signs, others experience rapid progression of their disease or sudden death. The causes of cardiomyopathy include genetic predisposition, infections, toxic causes (drugs and chemical compounds), specific dietary insufficiencies, and unknown causes. Whereas some cases are entirely reversible, others are not and are treated with various levels of success.

Three major forms of cardiomyopathies occur in the canine and feline species. In *dilated cardiomyopathy*, the heart muscle is weak and flaccid (floppy). This condition is associated with a reduction in heart muscle function during contraction (systole) and a decrease in forward flow of blood. Subsequent upper heart chamber (left atrial) enlargement is associated with backup of blood and then fluid into the lungs (pulmonary edema).

Hypertrophic cardiomyopathy is a thickening of the lower heart muscle chambers (ventricles). The results are inappropriate heart function, obstruction of blood flow from the heart into the circulation, and enlargement of the upper heart chambers (atria). This abnormality is called *diastolic dysfunction*, a condition in which the heart fails to relax fully, fill, and then empty. The resulting backup of pressures into the lung is responsible for the clinical signs of respiratory distress, coughing, and systemic emboli (blood clots).

Unclassified or restrictive cardiomyopathies are unidentified disease conditions in which heart problems are associated with severely enlarged upper chambers and diminished pumping ability. The clinical signs resemble those of hypertrophic cardiomyopathy. Although not thickened, the ventricular muscle is dysfunctional and the heart is unable to fill and then pump adequately.

What are the signs of cardiomyopathy?

Cardiomyopathies are seen in both dogs and cats. The form in dogs is usually dilated, whereas hypertrophic and unclassified forms are identified most often in cats. The diagnosis of cardiomyopathy is based on a history of weakness, coughing, panting, fainting, or fluid collection around the lungs and in the abdominal cavity. Weight loss

occurs, and seizures associated with fainting may occur. Emboli (clots) can result in blood vessel blockage, sudden lameness, and cold painful limbs. Clinical signs usually develop suddenly, often without apparent prior illness. In addition to these signs, the diagnosis depends on abnormalities found at the physical examination. Irregularities occur in the heart's rhythm and rate, and abnormal heart sounds (murmurs) are heard with the stethoscope. Radiographs (x-rays) of the chest show heart enlargement. Evaluation of the blood may identify complicating organ problems. The electrocardiogram can diagnose an irregular heart rhythm and substantiate heart enlargement. Ultrasound examination of the heart confirms the suspicion of cardiomyopathy. Dilatation of the heart cavity, poor contractility of the heart muscle, and left atrial enlargement occur with dilated cardiomyopathy. Thickening of the heart muscle, obstruction of the flow of blood into the circulation, and left atrial enlargement identify hypertrophic cardiomyopathy. Normal muscle thickness with disturbed function and enlarged left atria indicates restrictive cardiomyopathy.

What treatment is needed?

Treatment varies with the type of cardiomyopathy. Dilated cardiomyopathies, indicative of a loss of contractile heart strength, require medications to improve strength (digitalis), to remove excess fluid accumulation (diuretics), and to counteract abnormal hormone levels that contribute to heart failure (angiotensin-converting enzyme inhibitors). A low-salt diet is important to reduce sodium levels and subsequent water retention. Nutrients such as taurine and carnitine may be required to counteract specific deficiencies. Manual removal of excess fluid accumulation is sometimes necessary.

Treatment of hypertrophic and unclassified cardiomyopathies requires drugs to allow the ventricular muscle to relax. This improves heart filling and blood flow to the body. Beta-adrenergic blocking agents or calcium-channel blocking agents often are used for this purpose. Removal of excess fluids from the body (diuretics) and sometimes manual removal of fluid from the chest space are necessary to improve comfort. Low-salt diets to counteract salt and water retention are indicated but may be difficult to achieve with a finicky and ill cat. Aspirin is used to reduce the likelihood of blood clot formation within the heart. Antiarrhythmic agents to control irregularities of the heart's rate and rhythm are called upon at times, as are nutritional supplements (taurine and/or carnitine) in known deficiencies.

What is the prognosis?

The prognosis for survival with cardiomyopathies varies from poor to good. Once cardiomyopathy has been recognized, much of the damage to the heart muscle has already occurred. The result is congestive heart failure, the signs and symptoms of which may be treated for a variable period of time (often 3 to 12 months, which is equivalent to 3 to 5 years in a human). Although the pet may enjoy a period of good health and comfort, the long-term prognosis continues to indicate that heart failure will recur. As a result, the pet will become less responsive to medical intervention. Surgery is not yet an option for any form of cardiomyopathy.