

Restrictive Cardiomyopathy in Cats

(a Type of Heart-Muscle Disease)

Basics

OVERVIEW

- The heart of the cat is composed of four chambers; the top two chambers are the left and right atria and the bottom two chambers are the left and right ventricles; heart valves are located between the left atrium and the left ventricle (mitral valve); between the right atrium and the right ventricle (tricuspid valve); from the left ventricle to the aorta (the main artery of the body; valve is the aortic valve); and from the right ventricle to the main pulmonary (lung) artery (pulmonary valve)
- “Cardiomyopathy” is the medical term for disease of the heart muscle; “restrictive cardiomyopathy” is a disease in which the muscle is “stiff” and does not expand, such that blood cannot fill the ventricles normally
- “Restrictive cardiomyopathy” in cats is characterized by restricted filling of the chambers of the heart (known as “diastolic dysfunction”), severe atrial enlargement, normal left ventricular wall thickness, and normal to near normal pumping of the heart (known as “systolic dysfunction”)
- Scar tissue (fibrosis) of the heart muscle layer may be present; in addition, other changes or damage in the muscle may be associated with other heart-muscle disorders, including inflammatory or immune-mediated diseases

GENETICS

- Primary disease can be spontaneous or run in families (genes identified in humans, none yet identified in cats)

SIGNALMENT/DESCRIPTION OF PET

Species

- Cats

Mean Age and Range

- Middle-aged to older cats, male predisposition

SIGNS/OBSERVED CHANGES IN THE PET

If Cat **Does Not Have Congestive Heart Failure** (Congestive heart failure is a condition in which the heart cannot pump an adequate volume of blood to meet the body's needs)

- Some cats have no clinical signs
- Sluggishness (lethargy)
- Poor appetite and weight loss
- Fainting (known as “syncope”)—rare; usually indicates serious irregular heartbeats (known as “arrhythmias”)



- Weakness, partial paralysis (paresis) or paralysis (signs of blockage of blood flow secondary to the presence of a blood clot in the artery [condition known as “arterial thromboembolism”])
- Depression
- Extreme weight loss with muscle wasting (known as “cachexia”)
- Rapid heart rate (known as “tachycardia”)
- Irregular heartbeats (arrhythmias)
- Sequence of three heart sounds (known as a “gallop rhythm”), when listening to the heart with a stethoscope; heart beat sounds like a galloping horse instead of normal “lub-dub”
- May have a heart murmur (uncommon)

If Cat Has Congestive Heart Failure

- Cat has signs as previously described, plus the following:
 - ◆ Difficulty breathing (known as “dyspnea”)
 - ◆ Rapid breathing (known as “tachypnea”)
 - ◆ Panting
 - ◆ Open-mouth breathing
 - ◆ Bluish discoloration of the skin and moist tissues (known as “mucous membranes”) of the body caused by inadequate oxygen levels in the red blood cells (known as “cyanosis”)
 - ◆ Enlarged liver (known as “hepatomegaly”) or fluid buildup in the abdomen (known as “ascites”), with enlarged abdomen (swollen, distended)
 - ◆ Enlargement or distension of the jugular veins (located on either side of the neck)
 - ◆ Short, rough snapping sounds (known as “crackles”) heard when listening to the chest with a stethoscope
 - ◆ Muffled heart or lung sounds heard when listening to the chest with a stethoscope, if the cat has fluid buildup in the space between the chest wall and lungs (known as “pleural effusion”)
 - ◆ Weakness or paralysis with loss of femoral pulses; one or more limbs may be cold and painful (signs of blockage of blood flow secondary to the presence of a blood clot in the artery [condition is “arterial thromboembolism”])

CAUSES

- True cause(s) unknown (so-called “idiopathic disease”); often no “predisposing” disease can be documented—genetic basis in people
- Suspected initiating causes include end-stage heart muscle disease with thickening of the heart muscle of the left ventricle (known as “hypertrophic cardiomyopathy”), possible link to previous pneumonia (interstitial)

Treatment

HEALTH CARE

- Pets with sudden (acute), severe congestive heart failure are hospitalized for emergency care; “congestive heart failure” is a condition in which the heart cannot pump an adequate volume of blood to meet the body's needs
- Pets that do not have clinical signs or have mild signs can be treated with outpatient medical management
- Pets with severe difficulty breathing (severe dyspnea) will receive oxygen via oxygen cage, nasal cannula, or mask
- Life-threatening fluid buildup in the space between the chest wall and lungs (pleural effusion) is reduced via tapping and draining the chest (known as “thoracocentesis”) as necessary to relieve difficulty breathing (dyspnea)
- Treat associated conditions (such as dehydration or low body temperature [hypothermia]) with low sodium fluids administered cautiously; heating pad may be necessary
- Begin medication and sedation may be done if pet is anxious due to breathing difficulty

ACTIVITY

- Maintain a low-stress environment to decrease pet anxiety (such as cage rest, minimize handling)
- Most cats in congestive heart failure will limit their own exercise; congestive heart failure is a condition in which the heart cannot pump an adequate volume of blood to meet the body's needs

DIET

- Low-salt diet may decrease fluid retention, but strict adherence to dietary changes will be avoided in sudden (acute) congestive heart failure in order to maintain food intake
- Hand-feed, as necessary

Medications

Medications presented in this section are intended to provide general information about possible treatment. The treatment for a particular condition may evolve as medical advances are made; therefore, the medications should not be considered as all inclusive

SUDDEN (ACUTE) CONGESTIVE HEART FAILURE

- Medication to remove excess fluid from the body (diuretic) administered by injection—furosemide
- Dobutamine (drug to increase contraction of the heart muscle) to increase function of the heart if blood pressure is low
- Nitroglycerin ointment, applied to the skin
- Oxygen delivered by cage, mask, or nasal tube
- Severe irregular heartbeats originating above the ventricles (supraventricular arrhythmias) may be treated with diltiazem
- Rapid ventricular heart rate (ventricular tachycardia) may resolve with resolution of congestive heart failure; treatment for sudden occurrence of ventricular tachycardia may include judicious use of lidocaine
- Pimobendan may be helpful to improve heart function as a back up therapy; it is not approved for use in cats
- Clopidogrel or heparin for anti-coagulation function (reduce clot risk)

LONG-TERM (CHRONIC) THERAPY

- Medication to remove excess fluid from the body (diuretic)—furosemide, gradually decreased to lowest effective dose
- Angiotensin converting enzyme (ACE) inhibitors may reduce fluid retention and decrease need for medications to remove excess fluid from the body (diuretics); example is enalapril
- Long-term (chronic) therapy with diltiazem decreases heart rate and improves irregular heartbeats that originate above the ventricles (supraventricular arrhythmias); added digoxin (a heart medication) may be used if atrial fibrillation (rapid, irregular heart rhythm involving the top two chambers of the heart [atria]) is present
- Sotalol may be used to treat irregular heartbeats that originate above or in the ventricles (supraventricular or ventricular arrhythmias)
- Pimobendan may be helpful to improve heart function in chronic failure; it is not approved for use in cats
- Warfarin may be administered to prevent blood clots (thromboembolism), but is not recommended unless close monitoring and repeated measurement of prothrombin time (a blood test to evaluate clotting) are feasible
- Clopidogrel may be used to decrease clumping of platelets; effectiveness is not proven; aspirin may be administered to prevent blood clots (known as “thromboembolism”); effectiveness is questionable; administer these drugs only under the direction of your cat's veterinarian; if changes on echocardiographic study suggestive of forming clots (smoke) or a prior episode of thromboembolism—these two drugs may then be used together

Follow-Up Care

PATIENT MONITORING

- Frequent serial physical examinations (initially, mostly hands-off to minimize stress to the pet) to assess response to treatment and resolution of fluid buildup in the lungs (pulmonary edema) and fluid buildup in body cavities (known as “effusions”)
- Monitoring of breathing rate to assess response to removing fluid from the space between the chest wall and lungs (pleural effusion) via tapping and draining the chest (thoracocentesis) or response to administration of medications to decrease fluid buildup in the body (diuretics); breathing rate will decrease with successful treatment

- Frequent assessment of hydration and kidney function is important in first few days of therapy to avoid removal of too much fluid from the body (known as “over diuresis”), low potassium levels in the bloodstream (known as “hypokalemia”) and development of excessive levels of urea and other nitrogenous waste products in the blood (known as “uremia” or “azotemia”)
- Repeated tapping and draining the chest (thoracocentesis) may be necessary to maintain the amount of fluid buildup in the space between the chest wall and lungs (pleural effusion) at a comfortable level
- “Hands-off” hourly assessment of breathing rate in first 12–24 hours in hospital
- Chest x-rays (radiographs) may be repeated in 12–24 hours
- Blood work (blood chemistries, especially creatinine and potassium) will be monitored at 3–7 days into therapy along with a repeat physical examination
- Electrocardiograms (ECGs, recordings of the electrical activity of the heart) and x-rays (radiographs) may be repeated, as your pet's veterinarian feels necessary
- Stable pets are reevaluated every 2–4 months, or more frequently if problems occur
- Repeat echocardiograms are generally done every 6–9 months

PREVENTIONS AND AVOIDANCE

- No known prevention of restrictive cardiomyopathy in cats
- Medications to prevent clumping of platelets (such as aspirin or clopidogrel) or to prevent blood clotting (such as warfarin) have been recommended to prevent complications from blood clots; effectiveness of such treatment is not proven

POSSIBLE COMPLICATIONS

- Congestive heart failure
- Loss of function of the legs or death of tissues due to lack of circulation (complication from blood clots secondary to restrictive cardiomyopathy)
- Death

EXPECTED COURSE AND PROGNOSIS

- Highly variable, based on presentation of disease and clinical signs
- Most cats with restrictive cardiomyopathy and congestive heart failure live 3–12 months; some live 2 years

Key Points

- “Restrictive cardiomyopathy” is a disease in which the heart muscle is “stiff” and does not expand, such that blood cannot fill the ventricles normally
- Pets with sudden (acute), severe congestive heart failure are hospitalized for emergency care; “congestive heart failure” is a condition in which the heart cannot pump an adequate volume of blood to meet the body's needs
- Pets that do not have clinical signs or have mild signs can be treated with outpatient medical management
- Monitor your pet's breathing rate at home and keep a written tracker of breathing rates; contact your pet's veterinarian if the breathing rate increases suddenly or progressively over several days
- Monitor your pet's food and water intake at home; the goal is that the pet maintains a stable food and water intake
- Most cats with restrictive cardiomyopathy and congestive heart failure live 3–12 months; some live 2 years