



# Atrioventricular Valve Endocardiosis

## Basics

### OVERVIEW

- “Atrioventricular valve” refers to the heart valves between the top chamber (known as the “atrium”) and the bottom chamber (known as the “ventricle”) of the heart; two atrioventricular valves are present in the heart—one on the right side of the heart and one on the left side of the heart
- “Endocardiosis” is the medical term for long-term (chronic) formation of excessive fibrous tissue of the atrioventricular valves
- The heart of the dog or cat is composed of four chambers; the top two chambers are the right and left atria and the bottom two chambers are the right and left ventricles; heart valves are located between the right atrium and the right ventricle (tricuspid valve); between the left atrium and the left ventricle (mitral valve); from the right ventricle to the main pulmonary (lung) artery (pulmonary valve); and from the left ventricle to the aorta (the main artery of the body; valve is the aortic valve)
- The atrioventricular valves are the tricuspid valve (right side) and the mitral valve (left side)
- “Atrioventricular valve endocardiosis” is a long-term (chronic) disease characterized by a decline in the function or structure of the tricuspid and/or mitral valves, leading to inability of the valves to work properly (known as “valvular insufficiency”) and 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

### GENETICS

- Some breeds (such as the Cavalier King Charles spaniel and dachshunds) appear to have an inherited component to atrioventricular valve endocardiosis

### SIGNALMENT/DESCRIPTION OF PET

#### Species

- Mainly dogs, but may be seen in old cats

#### Breed Predilections

- Typically smaller-breed dogs (dogs that weigh less than 20 kg [44 lbs]); seen less frequently in larger dogs
- Highest prevalence—Cavalier King Charles spaniel, Chihuahua, miniature schnauzer, Maltese, Pomeranian, cocker spaniel, Pekingese, fox terrier, Boston terrier, miniature poodle, toy poodle, miniature pinscher, and whippet

#### Mean Age and Range

- Onset of congestive heart failure at 10–12 years of age, although may detect a murmur several years earlier; Cavalier King Charles spaniels typically affected much earlier (6–8 years of age); congestive heart failure is a condition in which the heart cannot pump an adequate volume of blood to meet the body’s needs

## **Predominant Sex**

- Males are 1.5 times more likely to have atrioventricular valve endocardiosis than are females

## **SIGNS/OBSERVED CHANGES IN THE PET**

### **Asymptomatic Valve Disease (Pet Has No Clinical Signs of Heart-Valve Disease)**

- Heart murmur
- As the disease progresses, the heart murmur typically gets louder and radiates more widely; with severe disease, the murmur may decrease in frequency and loudness
- Initially pet will have no obvious changes on x-rays (radiographs) or on an echocardiogram (use of ultrasound to evaluate the heart and major blood vessels); as the disease progresses, changes indicating heart enlargement (known as “cardiomegaly”) will be seen

### **Mild Congestive Heart Failure (Condition in Which the Heart Cannot Pump an Adequate Volume of Blood to Meet the Body’s Needs)**

- Coughing, exercise intolerance, and difficulty breathing (known as “dyspnea”) with strenuous exercise
- Occasionally fainting (known as “syncope”) may be the only sign noted by the owner

### **Moderate Congestive Heart Failure**

- Coughing, exercise intolerance, and difficulty breathing (dyspnea) most of the time

### **Severe Congestive Heart Failure**

- Severe difficulty breathing (dyspnea); profound weakness; abdominal swelling or distention; productive coughing (that is, coughing up pink, frothy fluid); standing with the elbows away from the body in an attempt to increase lung capacity (known as “orthopnea”); 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 (condition known as “cyanosis”); and fainting (syncope)

### **Refractory Congestive Heart Failure (Pet Does Not Respond to Medical Treatment)**

- Clinical signs persist despite medical treatment

## **CAUSES**

- Unknown (so-called “idiopathic disease”)

## **Treatment**

### **HEALTH CARE**

- Treat pets that need oxygen support as inpatients; if stable, pets may be treated at home, where they may be less stressed
- Oxygen therapy as needed for low levels of oxygen in the blood (known as “hypoxemia”)

### **ACTIVITY**

- Absolute exercise restriction for pets with clinical signs
- Stable pets receiving medical treatment—restrict exercise to leash walking; avoid sudden, intense exercise

### **DIET**

- Prevent extreme weight loss with muscle wasting due to heart disease (known as “cardiac cachexia”) by ensuring adequate calorie intake—primary objective in dietary management of pets with long-term (chronic) heart-valve disease
- A salt-restricted diet is recommended, if tolerated, for a pet in 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
- Low levels of sodium in the blood (known as “hyponatremia”) may develop as congestive heart failure progresses and in pets fed severely salt (sodium)—restricted diets in conjunction with medications to remove excess fluid from the body (known as “diuretics”) and certain heart medications (angiotensin converting enzyme [ACE] inhibitors)
- If the pet develops low levels of sodium in the blood (hyponatremia), switch to a less salt (sodium)-restricted diet (such as a kidney or geriatric diet)

### **SURGERY**

- Surgical heart-valve replacement and purse-string suture techniques to reduce the area of the opening of the

mitral valve have been used; experience with these techniques is limited, but surgical repair may be an option when access to a cardiovascular surgeon and heart-lung bypass (known as “cardiopulmonary bypass”) are available

## **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

- Recommended treatment depends on stage of the disease

### **ASYMPTOMATIC PETS (PET HAS NO CLINICAL SIGNS OF HEART-VALVE DISEASE)**

- No treatment may be needed, if the pet has no indication of heart enlargement identified through diagnostic tests
- Administering angiotensin converting enzyme inhibitors (such as enalapril or benazepril) to some asymptomatic pets with significant left-sided heart enlargement (cardiomegaly) to dilate blood vessels is advocated by some cardiologists

### **LONG-TERM (CHRONIC) CONGESTIVE HEART FAILURE (CONDITION IN WHICH THE HEART CANNOT PUMP AN ADEQUATE VOLUME OF BLOOD TO MEET THE BODY’S NEEDS)**

- Medications to remove excess fluid from the body (diuretics)—furosemide
- Heart medications, such as ACE inhibitors (examples are enalapril and benazepril), pimobendan, digoxin, calcium channel blockers,  $\beta$ -blockers, nitroglycerin ointment, and medications to control irregular heartbeats (medications known as “antiarrhythmics”)
- Spironolactone, while typically used for its diuretic effect in combination with other diuretics, has been shown to have a positive influence as heart disease progresses

### **SUDDEN (ACUTE) CONGESTIVE HEART FAILURE**

- Oxygen—administered in an oxygen cage or through a nasal catheter
- Medications to remove excess fluid from the body (diuretics)—furosemide

### **MEDICATIONS TO DILATE OR ENLARGE BLOOD VESSELS (KNOWN AS “VASODILATORS”)**

- Enalapril or benazepril
- Pimobendan (used alone or in combination with other vasodilators and/or digoxin)
- Hydralazine
- Nitroglycerin ointment or injectable
- Sodium nitroprusside
- Vasodilators to enlarge the arteries in the lungs (known as “pulmonary arterial vasodilators”), such as sildenafil, should be considered if high blood pressure in the lungs (known as “pulmonary hypertension”) is present

### **MEDICATIONS THAT IMPROVE HEART-MUSCLE CONTRACTION (KNOWN AS “POSITIVE INOTROPES”)**

- Pimobendan
- Digoxin
- Dobutamine
- Dopamine
- $\beta$ -blockers (such as carvedilol)

## **Follow-Up Care**

### **PATIENT MONITORING**

- Take a baseline chest x-ray (radiograph) when a heart murmur is first detected and every 6–12 months

thereafter to document progressive enlargement of the heart

- A test for brain natriuretic peptide (known as NTproBNP) may be used in a similar manner by taking a baseline test and then monitoring serial tests to determine significant change; “brain natriuretic peptide” is produced in the heart and is used in the diagnosis of congestive heart failure
- After an episode of congestive heart failure (condition in which the heart cannot pump an adequate volume of blood to meet the body’s needs), check pet weekly during the first month of treatment; may repeat chest x-rays (radiographs) and an electrocardiogram (ECG, a recording of the electrical activity of the heart) at the first weekly checkup and on subsequent visits, if any changes are seen on physical examination
- Monitor blood work (blood urea nitrogen [BUN] and creatinine) when medications to remove excess fluid from the body (diuretics) and ACE inhibitors are used in combination
- Monitor serum potassium levels when spironolactone (another diuretic) and ACE inhibitors are used together, especially when combined with digoxin

## **POSSIBLE COMPLICATIONS**

- Inflammation of the lining of the heart (known as “endocarditis”) because bacteria infecting the diseased mitral valve may be possible

## **EXPECTED COURSE AND PROGNOSIS**

- Progressive deterioration (degeneration) of valve changes and heart-muscle function occurs, necessitating increasing drug dosages
- Long-term prognosis depends on response to treatment and stage of congestive heart failure (condition in which the heart cannot pump an adequate volume of blood to meet the body’s needs)

## **Key Points**

- Atrioventricular valve endocardiosis is a progressive disease
- It is important to dose all medications consistently and to provide exercise management
- Prevent extreme weight loss with muscle wasting due to heart disease (cardiac cachexia) by ensuring adequate calorie intake—primary objective in dietary management of pets with long-term (chronic) heart-valve disease; discuss type and amount of food to be fed with your pet’s veterinarian
- Monitor your pet’s appetite carefully
- Monitor your pet’s breathing rate and heart rate at rest to detect changes that may suggest developing or recurring congestive heart failure (condition in which the heart cannot pump an adequate volume of blood to meet the body’s needs)
- If the pet develops worsening clinical signs or experiences unexpected changes in condition, notify the veterinarian immediately

# Notes

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