



## **MITRAL VALVE DISEASE AND HEART FAILURE IN DOGS**

### ***What is the mitral valve?***

The heart has four chambers. The upper chambers are called atria (singular: atrium), and the lower chambers are called ventricles. The heart is also divided into right and left sides.

Blood flows from the body into the right atrium. It is stored there briefly then pumped into the right ventricle. The right ventricle pumps blood into the lungs where it receives oxygen. It flows from the lungs into the left atrium where it is held a few seconds before going into the left ventricle. The left ventricle is surrounded by the largest and strongest of the heart muscles. This large muscle is necessary to pump blood to all parts of the body.

Each side of the heart has a valve to keep blood from going backward from the ventricles to the atria. The valve between the left atrium and left ventricle is called the mitral valve. Because of the very large pressure created when the left ventricle contracts, the mitral valve wears out in many dogs. This wearing out process begins with a small leak that gradually gets more severe.

### ***How common is mitral valve disease?***

This is the most common cause of heart failure in small dogs. Large breeds have a lower incidence.

### ***What are the consequences of a leaking mitral valve?***

The earliest sign of a leaking mitral valve is a heart murmur. This is produced by the turbulence created when some of the blood goes backward through the leaking valve and into the left atrium. Many dogs develop a murmur from the mitral valve as early as six years of age. This problem is especially common in small breeds of dogs; most of them will have a murmur by 10 years of age. However, a murmur does not mean that heart failure is imminent. But as time goes on, the leak becomes more severe and more and more blood goes backwards. This results in reduced pumping efficiency and, eventually, congestive heart failure. From the time a murmur develops, it may be a few months to several years until heart failure occurs.

### ***How will I know if heart failure is present?***

When the heart is not properly pumping blood, the blood moves more slowly through the lungs. This results in small amounts of fluid leaking out of the capillaries into the air passageways. This fluid collection produces the earliest signs of heart failure. These are: attempts to gag up fluid from the lungs (as if trying to clear the throat), a chronic, hacking cough, and lack of stamina when exercised.

### ***Does that mean that heart failure will occur soon?***

Congestive heart failure begins when the body is not able to provide blood with adequate oxygen for the tissues. Without adequate oxygen, the body's cells become desperate and trigger a series of responses. Various hormones are released in an attempt to correct the problem. These hormones conserve fluid in an effort to increase blood volume and the output of blood and oxygen by the heart. For several months, these compensatory responses help the situation. However, eventually, the increased fluid retention becomes a detriment. More and more fluid leaks out of capillaries causing increased gagging and coughing, reduced stamina, and increased fluid collection in the abdominal cavity and body tissues. Fluid in the lungs is called pulmonary edema, fluid below the skin is called peripheral or limb edema, and fluid in the abdomen is called ascites. When these are present, congestive heart failure is present.

### ***What tests are done to assess the situation?***

There are several tests that are used. All provide valuable information while looking at different aspects of heart function.

1. **Listening with a stethoscope (auscultation).** This valuable tool permits identification of murmurs, their location, and their intensity. It also allows us to hear lung sounds so that we can better understand what is happening within the lungs.
2. **Blood and urine tests.** These do not give direct information about heart function, but they allow detection of other disorders in the body that may have significance to heart function.
3. **Chest radiographs (x-rays).** The chest radiograph is useful for examining the lungs and for viewing the size and shape of the heart.
4. **Electrocardiogram (ECG or EKG).** This is an assessment of the electrical activity of the heart. It allows accurate determination of heart rate and rhythm. Arrhythmias (abnormal rhythms) can be detected and evaluated.
5. **Ultrasound examination (Sonogram, Echocardiogram).** This test uses sound waves that bounce off the structures of the heart and are read on a TV-like monitor. It gives the best look at the size of each heart chamber, and permits visualization of the heart valves. This is seen on the monitor in actual time so the contractions of the heart can be evaluated.

The combination of all of these tests give the best evaluation of the dog and its heart function. However, if cost considerations prohibit performing all of them, two or three will provide much valuable information.

#### *Is there a treatment for a leaky mitral valve and heart failure?*

A leaky heart valve can be replaced surgically in people. However, this is usually not feasible in dogs. There are several drugs that will improve heart function, even in the presence of a leaky valve.

1. **Diuretics.** These drugs stimulate the kidneys to remove excess fluid from the body.
2. **Nitroglycerin.** This drug dilates the veins throughout the body, especially the ones going to the heart muscle. This permits better heart contractions and allows blood to move more freely to the other body tissues. However, it is only effective for 1-2 days before the body builds tolerance (resistance) to it.
3. **Digitalis.** This drug improves heart function in several ways, including the regulation of excess hormones that have been released, slowing the heart rate, and strengthening each contraction of the heart.
4. **Enzyme blockers.** These are relatively new drugs that can directly block the compensation system that has gotten out of control. They are proving extremely effective in giving dogs added months or years of quality life.
5. **Vasodilators.** These drugs dilate the arteries and veins of the body to permit better blood flow. They may be used long-term because they continue to be effective, as opposed to the short-term effects of nitroglycerin.
6. **Salt restricted diet.** Dietary salt restriction prevents retention of excessive fluids. Several veterinary prescription diets are available to achieve this.

Not all of these drugs are used in each dog in heart failure. The results of the various tests will determine which ones are appropriate.

#### *How much longer will my dog live?*

There are many factors that must be considered before that question can be answered. The results of the tests are important, and the response that occurs within the first few days is another indicator. If response does not occur within a few hours to days, the prognosis is not good. However, most dogs that stabilize quickly will live for many months or a few years.