

# **HEART DISEASE**

## **DILATED CARDIOMYOPATHY**

### **Briefly, how does the heart work?**

The heart has four chambers. The upper chambers are called atria (auricles.) One chamber is called an atrium, and the lower chambers are called ventricles. In addition to the upper and lower chambers, the heart is also considered to have a right and a left side.

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; it is held here briefly before going into the left ventricle. The left ventricle contains the largest muscle of the heart so the blood can be pumped out to all parts of the body.

### **What is dilated cardiomyopathy?**

Dilated cardiomyopathy means that the heart muscle, becomes unable to pump properly. The pressure of the blood inside the heart then allows this weakened heart muscle to stretch, resulting in a much larger left ventricular chamber. Therefore, the two characteristics of dilated cardiomyopathy are a heart wall that does not contract or pump normally and a chamber that is much larger than normal.

### **How common is dilated cardiomyopathy?**

Dilated cardiomyopathy is not the most common cause of heart failure in dogs in general. However, this is the most common cause of heart failure in large breeds of dogs. Small breeds are only occasionally affected. The most commonly affected breeds are Boxers, Dobermans and Great Danes. Occasionally, medium sized breeds, notably Cocker Spaniels and English Springer Spaniels, and occasionally German Shepherd Dogs are also affected.

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

There are many factors that must be considered before this 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 stabilise quickly will live for a period of a few months to many months, but the long-term prognosis is not good. It can be difficult to generate an accurate estimate for life-expectancy when a dog has heart disease because many variables impact on survival, not least of which is the dog's activity levels.

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

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

The heart has four chambers. The upper chambers are the atria (auricles, singular atrium). The lower chambers are the 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 and 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 6 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. As time goes on, the leak becomes more severe and more and more blood goes backwards into the atrium. 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 before 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. The dog 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 detrimental. 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 oedema, fluid below the skin is called peripheral or limb oedema, 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. Ultrasound examination (Echocardiogram, ultrasonography).** This examination uses sound waves which bounce off the structures of the heart and are read on a TV-like monitor. It gives the most accurate determination

of the size of each heart chamber, and permits measurement of the thickness of the heart walls. This is seen on the monitor in actual time so the contractions of the heart can be evaluated. Certain measurements can be taken which allow the actual strength of the heart's contraction to be measured as a number and compared to the normal animal. Ultrasound may not be available in all veterinary practices because of the additional training needed to learn how to perform the examination and because of the cost of the sophisticated equipment.

4. **Electrocardiogram (ECG).** This is an assessment of the electrical activity of the heart. It allows us to accurately determine heart rate and to more accurately identify any abnormalities of rhythm that may be present.

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

### **Is there a treatment for heart failure caused by dilated cardiomyopathy?**

If the dog has a sudden onset of heart failure, rapid administration of the proper drugs is essential to survival. The following drugs may be used at various stages of treatment. Initial stabilisation usually depends on the first two.

1. **Diuretics.** These drugs stimulate the kidneys to remove excess fluid from the body. Frusemide is most commonly used, although others will be selected in certain circumstances.
2. **Digitalis glycosides.** These drugs improve heart function in several ways. They regulate excess hormones that have been released, slow the heart rate, and strengthen each contraction of the heart.
3. **Enzyme blockers.** This is a relatively new class of drugs which can directly block the compensation system that has gone out of control.
4. **Vasodilators.** These drugs dilate the arteries and/or the veins of the body so that the heart doesn't have to generate as much pressure to eject blood. They are effective long-term to stabilise the patient.
5. **Bronchodilators** which help breathing in a fluid compromised lung.

## **Are there any signs of heart failure which would be noticeable to me?**

When the heart is not pumping properly, blood backs up into the vessels of the lungs. Increased pressure within the vessels results in small amounts of fluid leaking out of the capillaries and eventually into the air passageways. This fluid collection in the lungs produces coughing and/or gagging, the most obvious sign of heart failure. Dogs in heart failure also tire very easily from minimal exercise.

Congestive heart failure begins when the heart is not able to pump blood with adequate oxygen to the tissues. Without adequate oxygen, the body's cells become desperate and trigger a series of responses. Various hormones are released by several organs in an attempt to correct the problem. These hormones conserve fluid in an effort to increase blood volume and the output of oxygenated blood by the heart.

For a variable period, these compensatory responses help the situation. However, increased fluid retention eventually becomes harmful. More and more fluid leaks out of capillaries, causing increased gagging and coughing, and reduced stamina. Fluid may collect in the abdominal cavity and body tissues. Fluid in the lungs is called pulmonary oedema, fluid below the skin is called peripheral or limb oedema, and fluid in the abdomen is called ascites (dropsy). Congestive heart failure is a common cause of these signs.

## **My dog seemed to get very ill just in the last day or two. How can this happen?**

Dilated cardiomyopathy may have a very sudden onset. Some dogs go into severe heart failure in what appears to be a matter of hours. Rapid, heavy breathing, a blue tongue, excessive drooling, or collapse may be the first signs.

## **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 allows us to identify murmurs, their location, and their intensity and an abnormal heart rhythm (arrhythmia or dysrhythmia). It also allows us to hear lung sounds; this aids in our understanding of what is happening within the lungs. Thus the lungs are also affected.
- 2. Chest radiographs (x-rays).** These give us the best look at the lungs and a view of the size and shape of the heart. In most cases, dilated cardiomyopathy causes tremendous enlargement of the heart. These changes are usually very

apparent on the x-rays.

- 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).** 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 (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 visualisation of the heart valves. This is seen on the monitor in real 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. Digitalis glycosides.** These drugs improve 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.
- 3. Enzyme blockers** which are relatively new drugs that block the compensation system which has become out of control.
- 4. Vasodilators.** These drugs dilate the arteries and veins of the body to permit better blood flow. They are effective long term.
- 5. Nitroglycerin** which dilates the veins especially those going to heart muscle and is a useful drug for short term emergency use.

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 stabilise quickly will live for many months or a few years.