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MITRAL VALVE DISEASE AND HEART FAILURE IN DOGS

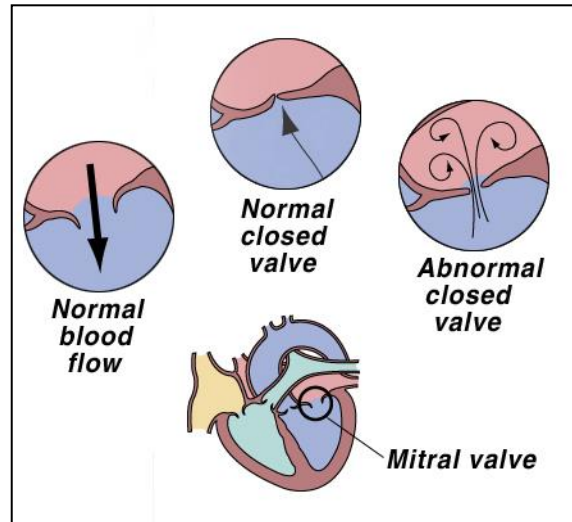
What is the mitral valve?

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

Unoxygenated 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 picks up oxygen. Blood flows from the lungs into the left atrium where it is held before flowing 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 throughout the body.

Each side of the heart has a one-way 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 high pressure created when the left ventricle contracts, the mitral valve may begin to leak or “wear out” in many dogs. This is known as *mitral valve insufficiency* (MVI) and is often associated with a heart murmur and left-sided congestive heart failure.



How common is mitral valve disease?

Many dogs will develop some form of heart disease. 80% of the heart disease seen in dogs is mitral valve insufficiency. MVI is more common in small dogs than large breeds.

What are the consequences of a leaking mitral valve?

The earliest sign of a leaking mitral valve is normally a heart murmur, an abnormal sound that is produced by the turbulence created when some of the blood goes backward through the leaking valve into the left atrium. Dogs may develop a murmur from a leaking mitral valve as early as six years of age. This problem is especially common in small breeds of dogs. A heart murmur does not mean that heart failure is imminent. But as time goes on, the leak becomes more severe and more and more blood flows backwards. This results in reduced pumping efficiency and, eventually, in 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 my dog has heart failure?

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 that include gagging as if trying to clear the throat, a chronic, hacking cough, and lack of stamina.

Does that mean that heart failure will occur soon?

Congestive heart failure begins when the body is unable to provide the tissues with adequate oxygen. 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. Eventually the increased fluid retention becomes a detriment as more and more fluid leaks out of capillaries and into the lungs, abdomen and other 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. Left-sided congestive heart failure is generally associated with MVI and most commonly results in pulmonary edema and coughing.

What tests are done to diagnosis heart valve disease?

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

Auscultation or listening with a stethoscope. This allows us to identify murmurs due to the improper closure of heart valves. It may be possible to predict which valve is affected based on the murmur's location and intensity. In addition, we can detect abnormal heart rhythms (arrhythmias and dysrhythmias) and evaluate lung sounds.



Blood and urine tests – We are especially concerned about liver and kidney function because these organs are often impaired in heart disease.

Chest X-rays – Chest radiographs allow your veterinarian to examine the lungs and measure the size and shape of the heart. Many forms of heart disease cause obvious enlargement of the heart, particularly the left side.

Electrocardiogram (ECG) – This is an assessment based on the electrical activity of the heart. It allows your veterinarian to accurately determine heart rate and to diagnose any abnormal rhythms.

Ultrasound examination (echocardiogram) – This gives the most accurate determination of each heart chamber's size and thickness of the heart walls. Measurements of the heart contractions can be taken to evaluate the heart's pumping efficiency.

The combination of all of these tests gives the best evaluation of the dog and its heart function.

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:



Chest X-Ray – Normal Heart

Angiotensin Converting Enzyme (ACE) inhibitors – ACE-inhibitors work by lowering blood pressure and reducing the after-load or resistance to blood flowing out of the heart. They are one of the most powerful and commonly used classes of drugs. ACE-inhibitors are the only drugs proven to extend life expectancy in both people and dogs. Enalapril and benazepril are commonly used ACE-inhibitors in dogs.

Diuretics – These are drugs that stimulate the kidneys to remove excess fluid from the body. Furosemide and spironolactone are the most commonly used diuretics.

Nitroglycerin – This drug dilates the veins throughout the body, especially the ones leading 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 one to two days before the body builds tolerance (resistance) to it.

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. Digoxin is the most common digitalis drug used in veterinary medicine.

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. They are effective long term treatments for patients with MVI. ACE-inhibitors are the vasodilators used most widely in the therapy of CHF due to MVI.

Sodium restricted diet. Dietary salt restriction may prevent retention of excessive fluids. Several veterinary prescription diets are available.

Not all of these treatments are used in an individual case of heart failure. The results of the various tests will determine which ones are appropriate for your pet's condition.

Pimobendan is a new veterinary medication that has dual functions of increasing the strength of the heart contractions and dilating the blood vessels to make it easier for the heart to work. This drug can be used in combination with diuretics and ACE inhibitors such as enalapril.

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 diagnostic tests are important and your pet's response to treatment is another indicator. Most dogs that stabilize quickly will live for many months or a few years.