

Heart Disease in Dogs: An Overview

Heart disease in dogs is a commonly diagnosed condition. A dog's heart, lungs, and blood vessels combine to form his circulatory system. The heart is the central player in this delicate circuit, and there are things that can go wrong, resulting in heart disease.

The Normal Dog Heart

When learning about canine heart disease, it helps to understand how the normal dog heart functions. The heart is divided into four areas, or *chambers*-- the right and left *atria* at the top of the heart and the right and left *ventricles* at the bottom. Each chamber is separated from the others by heart muscle tissue. When the muscle contracts, blood is moved from chamber to chamber through thin pieces of tissue called *valves*, which open and close when the heart pumps. In this way, blood moves through the circulatory system according to the following scheme:

- **Right atrium:** When the oxygen in the blood has been used by the dog's body, it is returned by the veins to the right atrium. From there, it travels into the right ventricle through the *tricuspid valve*.
- **Right ventricle:** The right ventricle fills with blood from the right atrium, then pumps it into the *pulmonary artery* and then into the lungs. There, the blood is relieved of carbon dioxide and picks up oxygen.
- **Left atrium:** Once the blood has been oxygenated in the lungs, it is returned to the heart's left atrium, where it is pumped into the left ventricle through the *mitral valve*.
- **Left ventricle:** Blood leaves the left ventricle through the *aortic valve* and is pumped throughout the body, to every cell, to provide oxygen.

The heart muscle itself also needs to be supplied with oxygen in order to do its work. *Coronary arteries* perform this task.

Canine Heart Disease

Heart disease in dogs comes in many forms. Sometimes a dog is born with a heart condition that is present immediately or develops over time. This is called a *congenital* condition. Other times, certain factors present in the dog's life may lead to the development of heart disease. Parasites, bacteria, and viruses can all damage the heart and cause it to malfunction. These are known as *acquired* conditions. Below are some of the causes of canine heart disease:

- **Heartworm disease** is the result of a parasite being introduced into the dog's circulatory system through a mosquito bite. Adult heartworms live and grow in the pulmonary artery, heart and lungs and cause the right side of the dog's heart to fail.
- **Cardiomyopathy** occurs when a dog's heart muscle becomes weak and doesn't function properly. The types of cardiomyopathy are:

- **Dilated cardiomyopathy (DCM):** This type of heart disease occurs when the heart muscle becomes weak and stretches. This increases the volume of the affected chamber(s), most commonly the left side, and makes it harder for the heart to pump effectively. Large and giant breed dogs are more prone to developing DCM, especially Doberman pinschers, Irish wolfhounds, boxers, and Great Danes. Many cases of DCM have an unknown cause, but deficiency in the amino acid *taurine* has been associated with the condition in Cocker spaniels and Newfoundlands. Certain medications, like doxorubicin, a chemotherapy agent used to fight some cancers, can cause DCM as well.
- **Hypertrophic cardiomyopathy (HCM)** occurs when the heart muscle thickens, decreasing the heart's ability to pump blood. This condition is uncommon in dogs.
- **Boxer arrhythmogenic cardiomyopathy** is a genetic disease that usually appears in adult boxers. The heart muscle in the right ventricle of these dogs is replaced by fatty or fibrous tissue, resulting in abnormal heart rhythms.
- **Patent ductus arteriosus (PDA)** is the most common inherited heart condition in dogs. This disorder occurs when the blood vessel that allows blood to bypass the non-functioning lungs in the developing fetus does not close normally after birth. Blood continues to be diverted from the aorta into the pulmonary artery instead of out to the rest of the body. This results in the heart being required to work harder in order to get enough oxygenated blood to the body tissues.
- **Subaortic stenosis** is an inherited condition in which there is a narrowing below the aortic valve. This causes the blood leaving the left ventricle bound for the aorta and the rest of the body to be slowed down. The heart has to work harder to pump enough blood through the narrower opening to oxygenate the body.
- **Pulmonic stenosis** is a narrowing in or around the pulmonary valve connecting the right ventricle to the pulmonary artery. This inherited condition can cause the right side of the heart to overwork.
- **Ventricular septal defect (VSD)** is a hole in the heart muscle wall that separates the ventricles, the two lower heart chambers. Blood flows abnormally between the two chambers, and this can result in extra workload for the heart. VSD is fairly uncommon in dogs.
- **Atrial septal defect (ASD)** is a hole in the heart muscle wall between the atria, the two upper heart chambers. Blood may flow from one atrium to the other, resulting in an increased workload. This is also a fairly uncommon condition in dogs.
- **Degenerative valve disease (DVD)** is the cause of about 75% of canine heart disease. In this condition, a valve in the heart becomes thickened or malformed and doesn't seal properly. This allows blood to return to the atrium from the ventricle. In the majority of dogs, the mitral valve on the left side of the heart is the one affected by DVD, which is also called *endocardiosis*. The rest of the affected dogs have either mitral and tricuspid valve or only tricuspid valve involvement. Older, small breed dogs develop DVD more commonly than other breeds and ages of dogs.

- **Infectious endocarditis** occurs when one or more of a dog's heart valves becomes infected, usually with a bacterial organism, though viral and fungal infections can happen as well. The valve then becomes deformed, and this leads to heart dysfunction. The valve disease that occurs secondarily to infectious endocarditis is usually permanent.
- **Heart-based tumors** can occur in dogs, and the most common of these is *hemangiosarcoma*. These tumors may cause fluid to build up in the heart's sac, or they may cause severe signs including collapse by bleeding suddenly.
- **Arrhythmias (abnormal heart rhythms)** occur due to a disturbance in the electrical impulses that control the heart's pumping action. Some arrhythmias are secondary to another heart condition while others are primary. Arrhythmias can also be the result of other problems going on with the dog, such as severe anemia.

Congestive Heart Failure in Dogs

Congestive heart failure is the state in which a dog's heart can no longer keep up with its responsibilities. Either it is unable to pump out the amount of blood that is delivered to it, or it isn't able to pump enough blood forward to meet the oxygen needs of the dog's body. This may be the result of any of the above heart conditions. The most common causes of canine heart failure are mitral valve disease (in small dogs) and cardiomyopathies (in large dogs).

Signs of Heart Disease in Dogs

Signs that may be exhibited by a dog with heart disease vary depending on the condition's cause and severity. Many heart diseases do not produce any signs of illness in the early stages. In fact, signs often don't develop until the dog is in heart failure, which is the state in which the heart isn't able to keep up with the body's blood supply needs. The following signs are commonly seen at various stages of many heart disease processes:

- **Decreased appetite:** A decreased or absent appetite in dogs may be a sign of many disease processes. It should be evaluated in conjunction with exam findings and other signs of illness to determine whether it is related to heart disease.
- **Behavior changes:** Dogs with heart problems often act differently than usual. They may be more withdrawn, less likely to play, or slower to respond to their owners.
- **Weight loss** is common as heart disease progresses. Dogs may also develop *cardiac cachexia*, which is a fast, significant weight loss. The weight that is lost is fat and muscle.
- **Fatigue or exercise intolerance**, or tiring more quickly than expected when playing or during exertion, is a common early sign of heart disease.
- **Coughing** is a common sign of heart failure when the left side of the heart is involved. Coughing is usually worse at night for dogs with heart disease.
- **Change in heart rate:** A dog with heart disease may have a slower or faster than normal heart rate, depending on the condition.

- **Increased respiratory rate**, or rapid breathing, may occur when heart failure has resulted in the build-up of fluid in or around the lung tissue.
- **Labored breathing**, including difficulty breathing or shortness of breath, may occur after exercise in some dogs with heart disease. It may progress to being present most or all of the time as the condition advances.
- **Abdominal swelling** may be seen during congestive heart failure. The swelling in this case is *ascites*, or fluid in the abdominal cavity, and it is caused by failure of the right side of the heart.
- **Weakness** can occur in dogs with advanced heart disease as their heart begins to have trouble keeping up with the oxygen demands of the body.
- **Blue tongue or gums** are a sign of severe heart disease, and they indicate that adequate oxygenated blood isn't being pumped out to the body.
- **Collapse** may occur if a dog's congestive heart failure becomes severe enough that the he can't breathe or if an abnormal heart rhythm (arrhythmia) becomes bad enough that the heart can't pump efficiently.
- **Sudden death** may occur with heart disease in some instances, especially arrhythmias.

Diagnosis of Canine Heart Problems

In order to properly treat a dog's heart condition, it must be accurately diagnosed. The first step is a thorough veterinary examination in conjunction with a detailed history of any signs that the owner has been noticing at home.

Then, the veterinarian will listen to the dog's heart with a stethoscope, taking into account the heart rate, rhythm, and whether any *heart murmurs* can be heard. A heart murmur is an abnormal heart sound that indicates turbulent blood flow, and many heart conditions can cause one.

Next, the doctor will feel for pulses in the inner rear legs and the neck, evaluating their strength and character and noticing whether there is any distension of the veins.

If the veterinarian suspects that heart disease is present after the examination is complete, any or all of the following tests may be ordered:

- **Blood work** is often done as part of the initial work-up for heart disease. The function of the other organs is important to assess while deciding on the prognosis and treatment of the heart condition.
- **NT-proBNP blood test** is a biomarker test that can be done in dogs. The test results typically increase as the heart muscle stretches. This test may potentially be used to try and get a better idea of when heart failure may occur in a dog with certain types of heart disease, especially mitral valve disease. Treatment does not provide any positive results in those dogs until heart failure is present, so being aware that it may be imminent can help an owner and veterinarian be more diligent about spotting it and beginning medication.
- **Thoracic (chest) x-rays** are done to evaluate the size and shape of the heart, the surrounding vessels, and the condition of the lungs. Veterinarians can use this information to narrow down

the exact cause of the heart disease as well as to assess how advanced it is and whether heart failure is present.

- **Electrocardiogram (EKG or ECG)** is done to determine the electrical health of the heart. It evaluates the heart rate and rhythm.
- **Holter monitoring** is a way to place an ECG monitor on a dog to collect information about the heart rhythm over time.
- **Blood pressure** may be taken to determine if the heart disease is causing hypertension that needs treatment with medication.
- **Echocardiogram** is an ultrasound of the heart. The veterinarian can watch the heart beat in real time, measure the velocities of the blood flow through each valve, see whether blood is flowing the wrong direction through a defect in the heart, measure the thickness of the heart muscle walls, and more. This is the most accurate way to get an exact diagnosis of canine structural heart disease.

Your veterinarian may refer you to a veterinary cardiology specialist for some or all of this testing.

Treatments for Heart Disease in Dogs

The treatment for your dog's heart disease is going to depend on its cause and severity. Surgery is possible for patent ductus arteriosus. Heartworm is treated with medication that kills the worms. Endocarditis requires antibiotic or antifungal medication and supportive therapy. Many types of heart disease do not respond positively to any treatment until the dog is in heart failure. At that point, there are several medication choices that may help slow down the signs and prolong the dog's quality and quantity of life. Some of these medications include:

- **Diuretics** are medications that increase urine production. This can help drain the lungs of fluid that is accumulating because the heart can't keep up.
- **Low sodium diets** can help decrease the fluid load in the body and its build-up in the lungs or abdomen of a dog in heart failure.
- **ACE inhibitors** are medications that help keep sodium from being retained in the body. Retained sodium leads to retained fluid, which the weak heart is unable to deal with. ACE inhibitors also helps dilate blood vessels, making it easier for the diseased heart to pump blood through them.
- **Pimobendan** is a medication that helps the heart muscle pump more efficiently and dilates blood vessels, aiding the weak heart in its work.

Prevention of Canine Heart Disease

It isn't possible to prevent many cases of heart disease in dogs. However, dogs with heart conditions that are known to have a genetic component should not be bred. If your dog has heart disease, you can improve her heart health and decrease the work load on her heart in an attempt to delay the onset of heart failure by using the following (tips):

- Keep your dog at a **healthy weight**.

- Feed a good quality diet for the lifetime of your pet.
- Make sure to provide **good dental care** for your dog throughout his entire life. Bacteria from the mouth may travel to the heart and complicate heart disease or, in rare cases, cause bacterial endocarditis.
- Ask your veterinarian whether an **NT-proBNP blood test**, described above, is appropriate for your dog.

Questions to Ask Your Veterinarian If Your Dog Is Diagnosed With Heart Disease

If your dog is diagnosed with heart disease, there are several questions you may want to ask your veterinarian, including:

- **What is the long-term prognosis for my dog?** The answer to this will depend on the diagnosis and how advanced the disease process is.
- **What treatments are available for my dog, and what type of monitoring will need to be done for him?** The treatments available will depend on the disease process and how advanced it is. Monitoring may include periodic blood pressure checks, x-rays, or echocardiograms to track the disease progression. If your pet is on medications, blood work may be monitored at intervals to assess how your dog's other systems are handling the medication or being affected by the heart disease.
- **Are there any holistic treatment options that we can explore for my dog?** There are several alternative and holistic treatments that may be available for dogs with heart disease. These include:
 - **Coenzyme Q10** is an antioxidant that may be low in dogs with heart disease. Supplementing it can support heart health.
 - **Herbs** such as Hawthorne, motherwort, ginger, and fo-ti root are all used to support dogs with heart disease. Pet Wellbeing's own Young at Heart for Dog Heart Disease is a great natural supplement that supports healthy and normal heart function.
 - **L-carnitine and taurine** are amino acids that are lacking in some dogs with certain types of heart disease. Supplementing these nutrients may help slow down the disease process in some dogs.
 - **Vitamins E, C, and B-complex** all encourage heart health.
 - **Omega-3 fatty acids** support heart health.
 - **Acupuncture** is often used to help support dogs with heart disease.

The diagnosis of heart disease in your dog is difficult to hear. Working closely with your veterinarian to develop a holistic plan can add quality and quantity to your dog's life.



1-877-633-2401

by Dr. Jan Huntingford - August 12, 2015

<http://www.petwellbeing.com/blog/dogs/heart-disease-in-dogs>