COMMON CARDIAC DISEASES IN DOGS

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Introduction:

This topic will include a review of the cardio-pulmonary cycle, examination techniques for and clinical signs of dogs with common cardiac diseases. These common diseases (degenerative mitral valve disease, dilated cardiomyopathy, patent ductus arteriosus), as well as congestive heart failure, will be discussed in detail. It will also cover the role of the veterinary technician in determining the presence of underlying cardiac disease. Finally, it will conclude with case examples and diagnostics that may be performed in the veterinary setting.

Review: basic cardiac anatomy and blood flow through the heart:

The canine heart is composed of four chambers (left atrium, left ventricle, right atrium, and right ventricle) and four valves (mitral valve, tricuspid valve, aortic valve, and pulmonic valve). The main veins and arteries that run to and from the heart include the cranial vena cava, caudal vena cava, the pulmonary arteries, the pulmonary veins, and the aorta. The blood flow through the heart, lungs, and body is a circular system. Beginning at the vena cavae, deoxygenated blood flows into the right atrium, through the tricuspid valve, into the right ventricle, through the pulmonic valve, into the pulmonary arteries, and then into the lungs (where the blood becomes oxygenated). From the lungs, the oxygenated blood flows through the pulmonary veins, into the left atrium, through the mitral valve, into the left ventricle, through the aortic valve, into the aorta, and out into the body.

Examination Findings:

During routine examinations, it is important to look for specific signs of underlying heart disease in canine patients. The heart rate and respiration rates are the first thing to note while taking a TPR. If the heart rate is faster than normal (tachycardia), or the patient is breathing faster than
average (tachypnea) or using too much effort to breathe (dyspnea), these may be signs of an underlying cardiac problem. They may also be signs of stress due the examination itself, so more information is required. While ausculting the heart, it should be noted whether or not a heart murmur is present. In many cases of canine cardiac disease, a heart murmur will be audible. A heart murmur is an abnormal heart sound that is sometimes described as a “whooshing” sound between heart beats. A murmur is most often easiest to auscult on the left side of the chest in dogs. However, it is important to also listen to the right side, as they occasionally can only be heard from this side. Heart murmurs are graded on a system of I-VI, based on intensity, with I/VI being very soft and hard to hear and VI/VI being very loud and obvious. The presence of a heart murmur can be an indication that there is turbulent blood flow somewhere within the heart. Most often, this blood flow turbulence is caused by a leaky valve due to degenerative changes. Other examination findings that could indicate underlying cardiac disease may be weak femoral pulses, pale or cyanotic mucous membranes, or an arrhythmia.

**Diagnostics:**

There are several diagnostic tools used to determine underlying cardiac disease. If respiratory symptoms such as labored breathing or coughing are occurring, many veterinarians will perform thoracic radiographs. Radiographs are useful for measuring the cardiac silhouette for possible cardiac enlargement. They can also show if there are any signs of congestive heart failure, enlarged pulmonary vessels, or disclose non-cardiac causes of coughing. Measuring systemic blood pressure may also be performed if a concern for hypertension is present. ECGs record the heart’s rhythm and conduction patterns and are very important in cases where an arrhythmia is suspected. Finally, an echocardiogram should be performed by a board-certified cardiologist to obtain a concrete diagnosis of cardiac disease. An echocardiogram is considered the “gold standard” in determining underlying heart disease in dogs. This provides the veterinarian with the most information needed to best treat a specific cardiac disease. An echocardiogram will allow for making exact measurements of the cardiac chambers, calculate the contractility of the heart muscle, and evaluate the blood flow velocity in and out of the heart valves. Together, all of these diagnostic tools provide a complete picture for each individual cardiac patient.
Degenerative valve disease (myxomatous valve disease):

The most common type of heart disease in dogs is degenerative valve disease. This is a disease that occurs with age and is most common in older, small breed dogs (poodles, shih tzus, dachshunds, Chihuahuas), but can be found in any breed. The mitral valve is most often affected. A heart murmur is almost always associated with degenerative valve disease and may be the first clinical sign of the disease. Most often this is a slowly progressive disease that begins when the connective tissue of the valve leaflets begins to break down with age. Over time, this causes the valve leaflets to weaken, and they are unable to close completely as the heart contracts. This, in turn, causes the blood to flow backward through the valve, creating “regurgitation”. The sound of the regurgitation is the heart murmur heard on examination. Over time, as the leak grows bigger and the heart has to work harder to pump the blood out into the body, the chambers of the heart may become enlarged. Specifically, the left atrium and left ventricle will become stretched and enlarged with degenerative mitral valve disease. This cardiac enlargement increases the dog’s risk for developing congestive heart failure. Some dogs may live for years with degenerative valve disease without any serious complications. However, other dogs may develop CHF fairly quickly in the disease process. Cavalier King Charles spaniels are a unique breed in that they are genetically predisposed for developing degenerative mitral valve disease. 90% of Cavaliers develop degenerative mitral valve disease by the time they are 8 years of age.

Dilated Cardiomyopathy:

Dilated cardiomyopathy, or DCM, is a common disease that usually affects large breed dogs such as Dobermans, Irish Wolfhounds, and Great Danes. It is also fairly common in Cocker spaniels. In many cases, dogs with DCM will not show any clinical signs until the disease has progressed into the late stages. Clinical signs of DCM may include weakness, collapse (syncope), coughing/gagging, labored breathing, weak femoral pulses, or an arrhythmia. When DCM is present, all four chambers of the heart become enlarged. The left ventricular walls become thin and stretched out, and the myocardial contractility (squeezing and contracting of the left ventricle) is weakened. Because the main pumping chamber of the heart is weak, the blood
flow out in to the body is reduced, causing generalized weakness. Arrhythmias can also develop as the heart becomes stretched out. Atrial fibrillation, ventricular premature complexes, supraventricular tachycardia, and ventricular tachycardia can all be manifested due to DCM. Dobermans in particular are susceptible to DCM and usually have a poor prognosis once diagnosed. Dogs diagnosed with DCM are at increased risk for sudden death and congestive heart failure.

Patent Ductus Arteriosus:

A patent ductus arteriosus, or PDA, is the most common congenital defect found in dogs. The breeds that are most associated with PDAs are Maltese, poodle, Pomeranian, and German shepherd. It is more common in female dogs than males. A PDA occurs when the blood vessel that bypasses the lungs (ductus arteriosus) in utero, fails to close after birth. In normal developing hearts, this vessel will close hours after the dog is born. In dogs with a PDA, the vessel remains open (patent) and is considered a serious heart defect. The PDA can be easily detected on examination in the form of a loud, continuous heart murmur. The location of the heart murmur is best heard on the left side of the chest, at the heart base (axillary area). For dogs that have a PDA, correction via a surgical or cardiac catheterization technique is almost always recommended, unless a further complication is present. Puppies that undergo correction of a PDA may go on to have a normal life expectancy. If the PDA is not corrected, serious complications will occur within the first year of life. Severe left-sided heart enlargement and congestive heart failure will eventually occur. Without surgical correction, dogs with PDAs have a 50% mortality rate by one year of age. The majority of PDAs will have a left-to-right shunting of the blood flow, which is the cause of the loud murmur heard on examination. However, in rare cases the PDA can have a right-to-left shunting blood flow. In these cases, a heart murmur may not be heard, or it may be very soft. This is a much more complicated defect and usually carries a poor prognosis.

Congestive Heart Failure:

Congestive heart failure (CHF) can develop as a serious complication from many different types of heart disease, including the ones discussed above. CHF can develop when the heart has become weak or ineffective at pushing blood throughout the body. This causes a back-up within
the body’s system of blood vessels and organs, eventually leading to excess fluid build-up. This excess fluid can develop in different places, most often the lungs. Excess fluid within the lung tissue itself is called pulmonary edema, and is most often seen in dogs with late stage degenerative mitral valve disease and untreated PDAs. Pulmonary edema is caused by left-sided heart failure. This form of CHF is most often treated with diuretic therapy (oral or injectable) to help rid the body of the excess fluid. Other types of CHF are ascites (free fluid in the abdomen), pericardial effusion (free fluid between the heart and pericardial sac), and pleural effusion (free fluid around the lungs). These forms of CHF are caused by right-sided heart failure. The effusions may be manually removed via abdominocentesis, thoracocentesis, or pericardiocentesis. While congestive heart failure may be cured with medications or other procedures, the underlying heart disease responsible for the CHF cannot. Therefore, once a dog has developed CHF, the likelihood of it returning, even with therapy, is very high.

The Role of the Veterinary Technician:

When it comes to detecting early signs of heart disease in dogs, the veterinary technician plays a very important role. In most cases, the LVT is the first member of the veterinary staff to put their hands on the patient. They are often asked to take the temperature, pulse and respirations of the animal, along with obtaining a detailed medical history from the owner before the veterinarian even sees the pet. This is the time when a heart murmur can first be heard, or when the owner may mention that the dog has been coughing recently. These details should then be passed along to the veterinarian, so that they may pursue these findings in more detail. If these early signs are not brought the veterinarian’s attention, they may get lost among the other examination findings. A veterinary technician that is alert to the clinical signs of underlying heart disease may make a huge difference in the life of that pet.