Getting to the heart of cardiac conditions in dogs and cats

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Carciac conditions can account for approximately 10% of all medical cases seen within general veterinary practice (Martin and Corcoran, 1997).

Although most of us are aware of the most common breeds affected and the conditions presented – such as middle-aged cavalier King Charles spaniels with exercise intolerance and cough – this article is aimed at providing a better understanding of how these conditions affect the heart.

Many nurses will carry out second vaccinations, dental checks and various other nursing clinic activities on a daily basis, and it is here we get the opportunity to examine patients – and auscultation should be part of this.

Any concerns picked up should be forwarded to the veterinary surgeon for confirmation. This also allows the vet to discuss the issues with the client in detail. Veterinary nurses also have a great deal of responsibility when explaining medical management and care to clients with cardiac patients. Therefore, general understanding of the underlying procedures is beneficial when managing these patients.

Heart murmurs

Table 1. Heart murmur classification (click to view).

Heart murmurs can affect dogs and cats from any age, but not all murmurs are harmful to the patient. Murmurs are created due to the vibration of structures within the heart, set in motion by abnormal, turbulent blood flow. On chest auscultation, normally only two heart sounds are present – often described as “lub” and “dub”.

A murmur is an abnormal, extra sound commonly present between the “lub” and “dub”, and makes a “shooshing” or “whooshing” noise. Murmurs can be divided into three categories: benign murmurs, congenital murmurs and acquired murmurs, which are also graded according to loudness (intensity) from 1 to 6. One is the quietest and 6 the loudest. However, this does not indicate the severity of the condition. Note that murmurs graded 5/6 and 6/6 mention precordial thrill – this is a fine vibration that can be palpated on the chest wall (**Table 1**).

Benign murmurs are those where no apparent heart disease is present. These are most commonly found in puppies, and can occur in cats at any age. Benign murmurs are very quiet and soft, and can be intermittent – they generally disappear between 12 and 15 weeks of age. This type of murmur can also be associated with excitement, fever and, in some cases, anaemia. This type of murmur is uncommon in adult dogs.

Congenital murmurs can be very difficult to detect in small puppies and kittens, and may go undetected until they are older.

Figure 1. A feline patient wearing a Holter monitor; this allows continuous ambulatory ECG

monitoring, and is commonly used to detect arrhythmic causes of syncope and presyncope.

An acquired heart murmur is one an animal develops during its life. These can be benign, but are more often associated with heart or valve disease development. However, the chances of developing heart disease are higher in dogs than in cats. **Figure 1** shows a cat undergoing ECG monitoring.

Degenerative valve disease

Degenerative valve disease (DVD) accounts for more than 75% of cardiovascular disease patients in dogs (Prosek, 2007). DVD is also known as endocardiosis, valvular regurgitation, valvular insufficiency or chronic valve disease – a noninfectious degeneration of the heart valves.

Cardiac diseases affecting the valves may be acquired or congenital – DVD is an acquired disease. This is very common in dogs, but very rarely affects cats.

The only valves affected by DVD are the atrioventricular valves, called the mitral and tricuspid valves. These allow blood to move through the four chambers of the heart. They create a seal between the atrium and ventricles to prevent regurgitation. When degeneration occurs, the valves have impaired closure, resulting in regurgitation. This causes excess blood to accumulate in the heart chamber and vessels.

Figure 2. A heart affected by mitral regurgitation (MR). Key: AL arterial leaflet; PL posterial leaflet;

AO aorta; LA left atrium; LV left ventricle; RA right atrium; RV right ventricle; MV mitral valve; TV tricuspid valve.

Regurgitation may occur on the right and/or left side of the heart, depending on which valves are affected. The most commonly affected valve is the mitral valve, which divides the left atrium and left ventricle (**Figure 2**). In approximately 60% of dogs with DVD, the mitral valve will be affected, 30% will have mitral and tricuspid valve degeneration, and 10% will be affected by tricuspid valve disease. Valvular disease is the most common cause of left-sided congestive heart failure (CHF) in dogs, with a higher incidence in older dogs and small to medium-sized breeds, such as the cavalier King Charles spaniel, miniature poodle and cocker spaniel.

The majority of DVD cases will go undiagnosed until clinical symptoms are noticed by the owner. Therefore, it is very important clients are made aware of the importance of annual checks, especially for breeds predisposed to heart conditions.

Unfortunately, valve replacements are not available in veterinary medicine, so palliative treatments are the only option for these patients. DVD treatment involves eliminating CHF signs by using medication to resolve disease symptoms. Patients with right-sided CHF may require abdominal paracentesis to relieve the pressure caused by fluid in the abdomen (ascites). Patients suffering from left-sided heart failure may require thoracocentesis due to pleural effusion. **Table 2** explains symptoms, diagnostic procedures and treatment, and Table 3 refers to commonly used cardiac drugs.

DVD is not curable, but treatment can increase the patient's life expectancy. It is vitally important clients are informed of the importance of giving medication, and the detrimental effects of not doing so.

Table 2. Common cardiac diseases, symptoms, diagnosis and treatment.

Table 3. Medical treatments for cardiac disease.

Dilated cardiomyopathy

Four different types of cardiomyopathy (heart muscle disease) are seen in dogs and cats, with some breeds more affected than others. The two most common – dilated cardiomyopathy (DCM) and hypertrophic cardiomyopathy (HCM) – are described.

DCM is one of the most common acquired canine heart diseases, and is more commonly seen in middle-aged male dogs weighing more than 15kg. This slowly progressive disease also appears to be breed related, affecting Dobermanns, springer spaniels, cocker spaniels, great Danes, Irish wolfhounds, St Bernards and German shepherd dogs.

In cats, this disease was more common before commercial cat foods were supplemented with taurine, but it mainly affected Siamese, Abyssinian and Burmese breeds. In some dogs, DCM is due to taurine deficiency, which affects the development and function of the myocardium. Studies have also been conducted into a link between DCM and canine anticancer drug doxorubicin (Martin and Corcoran, 1997).

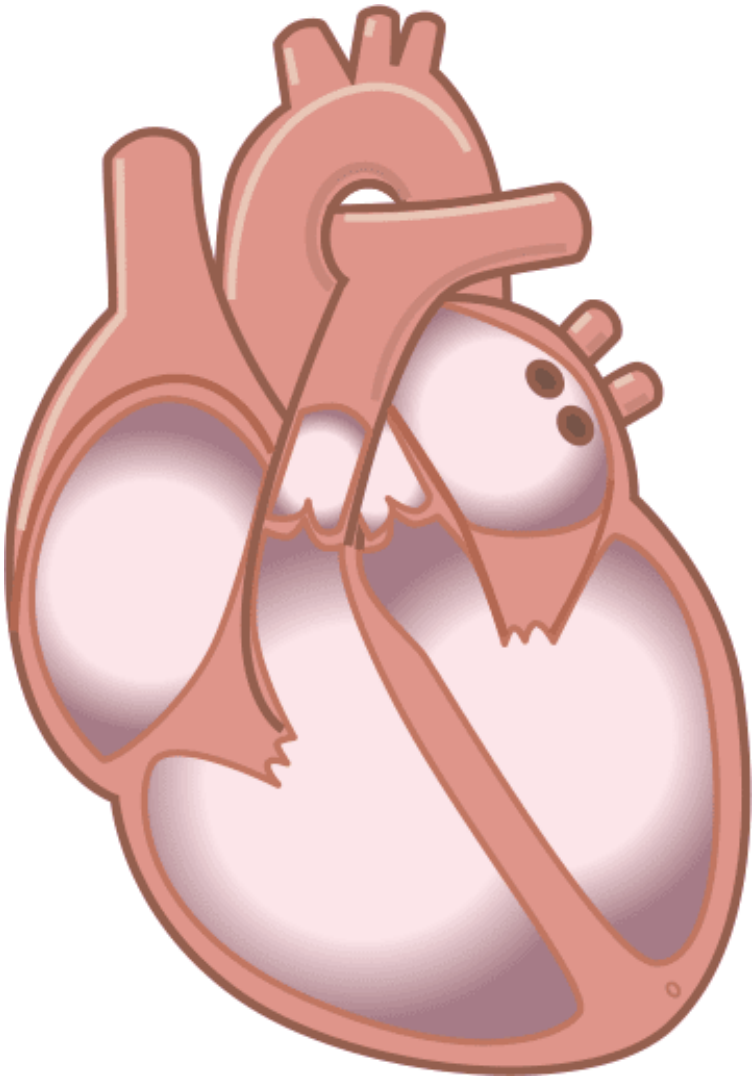

Figure 3. Dilated cardiomyopathy.

DCM is a disease affecting the heart muscle (myocardium). The ventricles lose their ability to contract normally and the affected myocardium is unable to generate the pressures required to maintain cardiac output (**Figure 3**). Both systolic and diastolic failure occurs, and ventricular filling is compromised when the ventricles fail to relax, causing poor cardiac output. Reduced cardiac output and poor ventricular contractility results in a weak pulse, tachycardia and poor peripheral perfusion in these patients.

DCM most commonly affects the left side of the heart, specifically the left ventricle, resulting in regurgitation. As a result, blood backs up, causing pulmonary oedema (left-sided CHF). Less commonly, DCM can affect the right side of the heart, resulting in ascites and pleural effusion (right-sided CHF). In some dogs, both sides of the heart may be affected, with an obvious detrimental effect. For DCM symptoms, diagnosis and treatment, see **Table 2**. In some breeds, such as Dobermanns and great Danes, fainting and/or sudden death may occur before CHF signs are

obvious.

Unfortunately, veterinary surgeons do not perform heart transplants, so the treatment for DCM is very similar to DVD. DCM is a progressive, irreversible and terminal illness. The life expectancy depends on the patient and the severity of the heart damage. With effective and supportive treatment, along with regular checks, patients can have a good quality of life.

Hypertrophic cardiomyopathy

Hypertrophic cardiomyopathy (HCM) is the most common acquired heart disease in cats, but is very rarely seen in dogs (Martin and Corcoran, 1997). This disease can affect cats at any age, and the aetiology is unknown. Secondary HCM may be triggered by hyperthyroidism and is more commonly seen in geriatric felines. HCM tends to run in families, and is often seen in Maine coons, Persians and American shorthairs, although it can be seen in any domestic cat.

HCM basically means thick heart muscle disease, where the heart muscle walls and ventricles become abnormally thickened, resulting in the ventricles being unable to fill adequately. This compromises the flow of blood pumping to and from the heart (**Figure 4**).

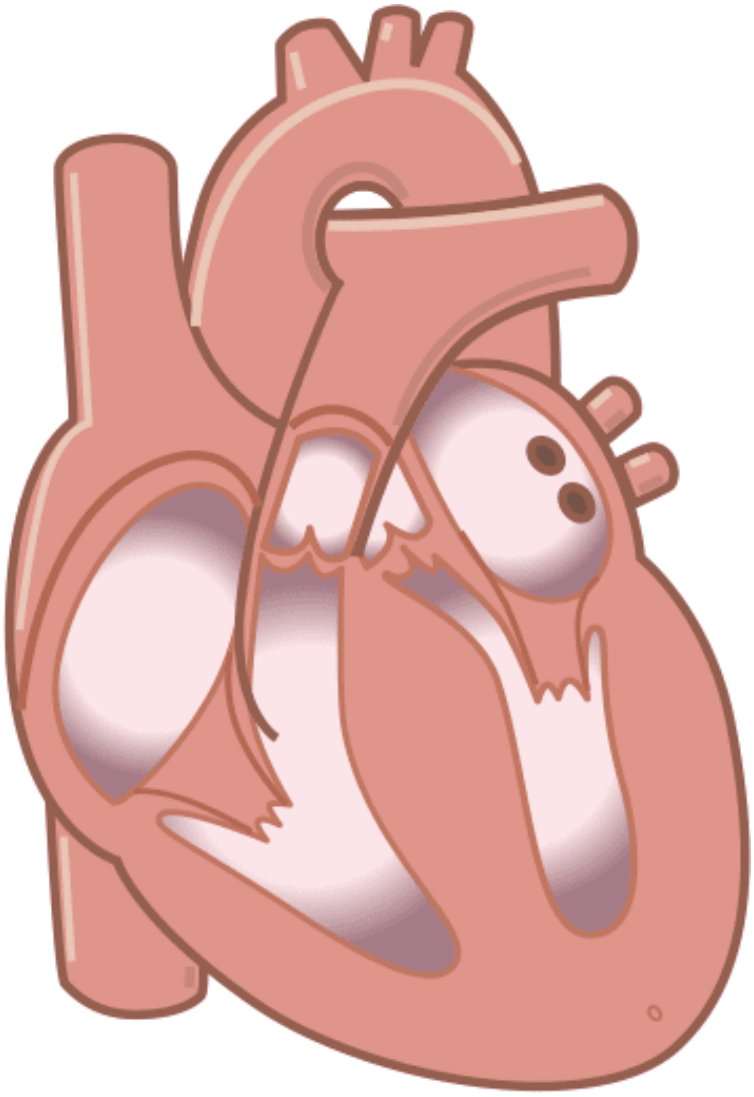

Figure 4. Hypertrophic cardiomyopathy.

HCM patients exhibit tachycardia as a mechanism to maintain adequate cardiac output. The degree to which the muscle is thickened determines the severity of the disease – some patients can live undiagnosed for years without any problems; others are severely affected and present CHF signs at a young age.

HCM has a similar effect on the body as DVD and DCM. As the disease develops and progresses, the patient may experience common CHF signs, resulting in pleural effusion and pulmonary oedema. Sudden death can also occur in HCM, when the muscle wall thickens and arrhythmias develop.

Some cats with HCM may suffer from aortic thromboembolism, blocking blood flow to the hindlimbs. This causes paralysis, severe pain and, commonly, death. HCM patients are commonly

prescribed aspirin to reduce the chances of this occurring.

As for most veterinary cardiac conditions, no surgical cure is available – only medical treatment to prevent and/or relieve symptoms and secondary conditions. **Table 2** shows the common symptoms of HCM and **Table 3** lists cardiac drugs.

Aortic stenosis

Aortic stenosis (AOS) is the most common congenital defect seen in dogs – boxers are thought to make up 50% of the number of dogs diagnosed in the UK (Martin and Corcoran, 1997). Other breeds commonly affected are Newfoundlands, German shepherds, golden retrievers, Samoyeds and Rottweilers.

Three types of AOS exist: the most common is subvalvular fibrous ring, followed by valvular and supravalvular (rare). Subvalvular stenosis is also known as subaortic stenosis. AOS is most commonly a narrowing or reduction just above or below the aortic valve, and very rarely affects the actual valve. This causes a partial obstruction of the blood flowing from the left ventricle through the aortic valves and into the aorta.

The result of this is hypertrophy of the left ventricle, due to it having to work harder to pump blood around the body. In mild-to-moderate cases, clinical signs are rare and can only be suspected when a murmur is picked up on examination. Severe cases of AOS show clinical signs, such as exercise intolerance, syncope, laboured breathing and, occasionally, sudden death.

As with all cardiac conditions, medical management may relieve CHF symptoms. Treatment is only required in patients presenting with moderate-to-severe symptoms. Beta-blockers can reduce the heart’s oxygen demands, and may reduce the incidence of arrhythmias. Balloon valvuloplasty can be performed in specialised hospitals to alleviate the outflow obstruction, although there is no evidence it prolongs the patient’s life longer than medical management.

Conclusions

Cardiac disease can affect patients of all ages and sizes, with certain breeds more predisposed to disease than others. Many different medications are available to help support cardiac patients with their condition, and improve quality of life.

From reading this article, the importance of regular clinical checks on all patients should be underlined. By making it clear to clients what these checks actually look for, they will hopefully be more willing to get them done and more cases will be detected before CHF occurs.

Acknowledgements

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