

Echocardiography in cats and dogs

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MIKE JOHNSON examines how the use of echocardiography has grown over the past two decades and offers tips for success in canine and feline patients

ECHOCARDIOGRAPHY has been performed in the veterinary field for the past 20 years. Traditionally, a referral service for cardiac patients has been offered by veterinary cardiologists attached to the universities. Recently, a growing number of specialist cardiology private practices have offered a similar service.

Our own private referral practice in Kenilworth employs three veterinary cardiologists who deal exclusively with cardiac and respiratory cases in dogs and cats. Referring veterinarians receive a faxed report on the day of examination.

An increasing number of general practices (perhaps 50 per cent) now have ultrasound facilities and an expanding number of practitioners perform their own echocardiographic examination in routine cases. Not all the scanners in general practice have spectral or colour flow Doppler, but all of the specialist practices have this facility.

One of the most common reasons to undertake echocardiography in our practice is to investigate murmurs in newly acquired puppies or kittens. However, adult pets are also presented for investigation of exercise intolerance, syncope or with signs suspicious of left or right heart failure. Several breeds of dogs with a relatively high incidence of dilated cardiomyopathy (DCM), aortic stenosis or early-onset mitral endocardiosis are examined prior to breeding. Breeding is not advised from affected dogs.

Purpose-built veterinary scanners, usually smaller and less sophisticated than the medical machines, are available. However, the specialist practices frequently use new or second-hand medical units. We use a new Esaote Biomedica machine with pulse wave, continuous wave and colour flow Doppler facilities. We use two transducers – a 2.5/3.5 MHz and a 5/7.5 MHz sector transducer. The former is used in larger dogs, the latter in small dogs and cats.

Dogs and cats are clipped over three areas: the right and left parasternal regions and caudal to the xiphisternum. Almost all examinations are performed without sedation, but it is occasionally used in patients of dubious temperament if a muzzle is deemed insufficient protection. Sedation can also be useful in dogs that pant excessively, making examination difficult. Panting most commonly occurs in hyperexcitable or nervous dogs or in those with short noses such as bulldogs or boxers. Excessive wriggling, particularly in young pets, is controlled with sedation.

Examination is performed in right and left lateral recumbency with the pet lying on a table containing a “cutout” section. The seated operator scans from the recumbent side, through the cutout. In general, the echocardiographic views are superior to those obtained in humans due to the markedly lower incidence of gross obesity and the narrow chest conformation.

Four positions are used. The right parasternal position, including both long and short axis views, is the most important. All standard measurements, including M-mode examination of the left ventricle, are performed from this position. The left caudal parasternal position provides a superior view of the mitral and tricuspid valves when assessing for regurgitation. A left cranial parasternal view optimises visualisation of the pulmonary artery and of a patent ductus arteriosus, if present. The subcostal view, performed in the midline caudal to the xiphisternum, provides the best alignment for aortic flow velocity. This is an important view in larger breeds of dogs where aortic stenosis can be problematic.

The most common congenital defects in dogs are aortic stenosis, pulmonic stenosis and patent ductus arteriosus. In cats, these are ventricular septal defect and mitral or tricuspid valve dysplasia.

Among the acquired diseases, small breed dogs suffer from mitral and, to a lesser extent, tricuspid valve endocardiosis. The problem is so common in one particular breed, the cavalier King Charles spaniel, that a breeding scheme has been established to try to reduce the incidence of the disease. Large or giant breed dogs are predisposed to dilated cardiomyopathy with valvular endocardiosis being uncommon.

Cats present most commonly with hypertrophic cardiomyopathy (HCM), which may be diagnosed from six months of age onwards. Restrictive and dilated cardiomyopathy are also diagnosed, but are much less common. HCM may be obstructive or non-obstructive. Obstructive cases frequently show systolic anterior motion of the mitral valve leading to mitral regurgitation and increased aortic outflow velocity.

Pericardial effusion, seen chiefly in dogs rather than cats, is uncommon. About 50 per cent of cases are due to idiopathic pericarditis with the remainder due to neoplasia usually involving the right atrium or heart base. Pericarditis cases do not appear to be related to prior illness or infections. Certain breeds, such as the golden retriever or St Bernard, are predisposed for unknown reasons. Therapeutic pericardiocentesis is performed under ultrasound guidance. Endocarditis is rarely diagnosed. Fortunately, coronary heart disease is very rare in dogs and cats.

Case study

An example of a recent case report involved an 11-year-old female collie presented with a history of recent coughing, exercise intolerance and a distended abdomen. Examination revealed a pansystolic murmur over the left apex. Heart rate was 200/minute with a marked arrhythmia present. The abdomen was tense due to the presence of ascites, which was confirmed as a modified transudate.

An ECG revealed atrial fibrillation. Thoracic radiographs showed marked cardiomegaly with a prominent left atrial bulge and a perihilar alveolar pattern consistent with pulmonary oedema. Echocardiography revealed marked bi-atrial enlargement due to severe mitral and tricuspid regurgitation. Advanced mitral and tricuspid endocardiosis were diagnosed.

Valve replacement or repair is not performed on animals. However, the dog was successfully maintained on frusemide, an ACE inhibitor and digoxin (unlicensed) for 10 months. At this time it developed a haemorrhagic pleural effusion due to disseminated carcinoma and was euthanised.

An extensive list of diseases are recorded in dogs and cats, remarkably similar to the lists found in medical cardiology text books, however coronary disease is notably absent.

Dogs

Acquired

Mitral (+/- tricuspid) valve disease (myxomatous degeneration, endocardiosis)

Dilated cardiomyopathy

Arrhythmias

- supraventricular tachycardia (often macro re-entrant)
- atrial fibrillation (usually secondary to atrial enlargement)
- ventricular arrhythmias
- heart block
- sinus arrest (sick sinus syndrome)

Pericardial effusion (idiopathic or neoplastic)

Pulmonary hypertension (thromboembolism, cor pulmonale)

Heartworm disease

Endocarditis (aortic or mitral valve)

Congenital

Aortic stenosis (most commonly subaortic)

Patent ductus arteriosus

Pulmonic stenosis

Mitral or tricuspid valve dysplasia

Ventricular septal defect

Cats

Acquired

Hypertrophic cardiomyopathy

Hyperthyroid heart disease

Systemic hypertension

Restrictive cardiomyopathy

Systemic thromboembolism

Congenital

Ventricular septal defect

Cushion defects

Patent ductus arteriosus

Pulmonic stenosis

Peritoneopericardial diaphragmatic hernia

BOX 1. Common heart diseases in dogs and cats in order of prevalence