Echocardiographic Diagnosis - by Darren Fry

The echocardiographic diagnosis of advanced dilated cardiomyopathy (DCM) in the dog is relatively straightforward. Ventricular dimensions will exceed reference values quite markedly in both systole and diastole with a resultant severely reduced fractional shortening. Cases presenting in congestive heart failure will already be at this advanced stage which is usually the end of a degenerative process lasting many months or years. However, diagnosing subclinical or "occult" DCM before this stage has been reached can be very challenging. There are several situations where it may be advantageous to make an early diagnosis of DCM. For example, a decision may have to be made regarding the breeding status of a dog or the dog may be faced with a major surgery which may not be undertaken if early stages of DCM are present. In addition, the early clinical signs of DCM may be subtle and a decision may have to be made regarding early therapeutic intervention. Given the efficacy of new drugs such as pimobendan and the possible role of taurine, L-carnitine and thyroid supplementation in the treatment of DCM, it would be advantageous to be able to diagnose these cases before they have progressed to the easily recognisable "end stage".

In breeds such as Dobermans and Boxers, where ventricular arrhythmias are a major feature of the disease, 24 hour Holter ECG recording can be a very useful early screen. However, in most other breeds, echocardiography has to be relied upon to make an early diagnosis. In these situations, in addition to the "standard" measurements of ventricular internal dimensions and fractional shortening, other parameters have to be taken into consideration: The sphericity index can be calculated. Dogs with DCM generally have a slightly "spherical" shape to their left ventricle which can be assessed subjectively. However, by comparing the left ventricular diastolic length with the cross-sectional left ventricular diastolic dimension, a "sphericity index" can be calculated.

A ratio of < 1.65 is thought to be abnormal.

Mitral valve E-point to septal separation (EPSS) is thought to be a relatively reliable indicator of left ventricular dysfunction in DCM. In a normal dog in diastole, the mitral valve at maximal opening (the E-point) should closely appose the left ventricular wall. However, in dogs with DCM, this distance is often increased (see Fig 1).

The left ventricular pre-ejection period (PEP) to ejection time (ET) ratio can also be calculated. The PEP is measured from the onset of systole (as judged by ECG monitoring) to the initial opening of the aortic valve. The ET is the time that the aortic valve remains open (see Fig 2). In dogs with DCM, the PEP will be prolonged and once the valve is "forced open", then the ET will tend to be reduced. Thus, a PEP:ET ratio of >0.4 is likely to be abnormal.

Recently, the European Society of Veterinary Cardiology has proposed a "points" system taking into account these criteria in addition to the recognised standard measurements. This points system may well prove useful in the diagnosis of occult DCM and certainly provides a standardised way of assessing and recording these difficult cases.

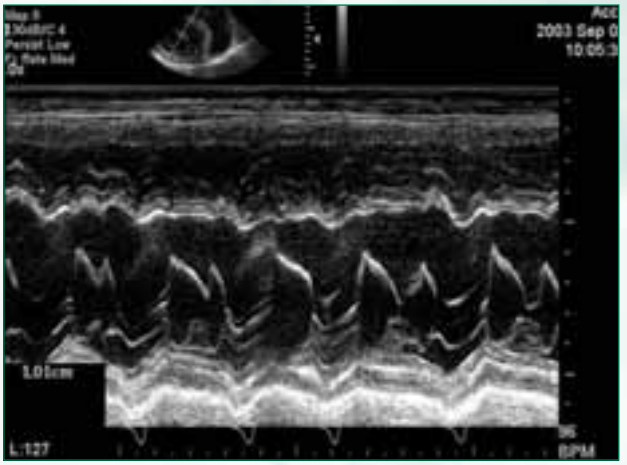

Figure 1 *The distance between the mitral valve at maximal opening and the interventricular septum can readily be measured with M-mode echocardiography. In this case of DCM, the EPSS is increased at 1.01cm.*

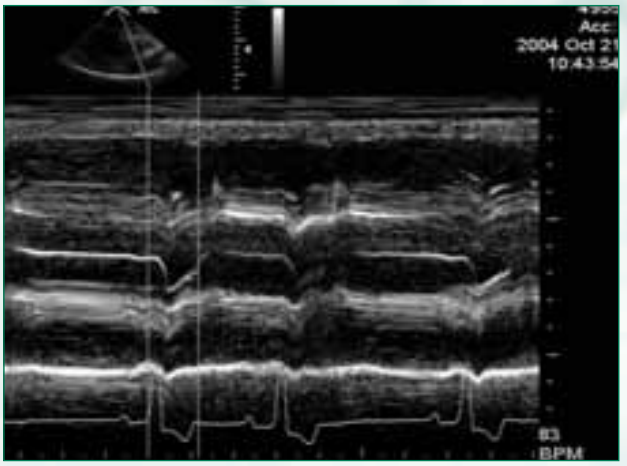

Figure 2 *M-mode echocardiography, with concurrent ECG monitoring can be used to generate the PEP:ET ratio. In this frame, the cursor is placed at the onset of systole and also towards the end of aortic valve opening. Dividing this interval allows calculation of the PEP:ET ratio.*