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Cardiac Ultrasound Mini Series

Session Three: Feline Cardiac Disease, Thoracic Ultrasonography, Discussion of Clinical Cases

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Echocardiography
in small animals
Part 3

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Feline cardiac disease

Echocardiography is a very useful tool when investigating a cat in respiratory distress. The presence of left atrial enlargement usually indicates that cardiac disease is present. This finding combined with the presence of pleural effusion or pulmonary oedema on radiographs is indicative of congestive heart failure. The risk of ATE can also be evaluated by evaluating left atrial size and presence of smoke within these basic views. A working diagnosis can also sometimes be achieved with basic echocardiography and a description of the two most common cardiomyopathies (HCM and RCM) can be found below. However, it should be borne in mind that a definitive diagnoses of the underlying cardiac disease including systolic and diastolic function requires a full comprehensive echocardiography, which includes the use of other views and Doppler techniques.

HCM:
-Left (sometimes right also) ventricular thickening (>6mm)-often asymmetric
-Frequently systolic anterior movement of the mitral valve (HOCM) is seen
-Abnormally prominent or thickened papillary muscles
-LA enlargement –LA size depends on disease severity and is the most important prognostic factor-
-Smoke (slow moving blood) or clots
-Left ventricular cavity obliteration is often observed
-A heterogeneous myocardium is sometimes observed
-Areas of myocardial infarction (i.e. akinetic thin areas) are occasionally observed

RCM:
-Normal left ventricular wall thickening
-Normal left ventricular luminal dimension
-Endomyocardial form: there is involvement of the endocardium and obvious thickening or scarring of the endocardium with LV fibrous bands may be observed
-A normal systolic function is usually observed (normal fractional shortening and left ventricular dimension in systole)
-A large left atrium is observed and is usually significantly enlarged (>20mm) by the time of diagnosis because cases tend to present in congestive heart failure
-Smoke (slow moving blood) or clots can also be seen
-They usually present in CHF with pleural effusion and/or pulmonary oedema

DCM:
-Left ventricular and left atrial dilatation, often right sided as well
-Spherical-looking left ventricle
-Severe systolic dysfunction (Marked increase in left ventricular dimension in systole and marked decreased of fractional shortening-usually <20%-)
-Smoke and clots as per the other cardiomyopathies
-They usually present in CHF with pleural effusion and/or pulmonary oedema

Pericardial effusion

The echocardiographic findings in pericardial effusion include:

-Echo free or hypoechoic space between the epicardium and the epicardial sac
-Swinging motion of the heart when the amount of effusion is significant
-Cardiac tamponade with diastolic collapse of right atrium and/or ventricle in severe cases.
-The effusion is not seen behind the left and right atrium (this helps differentiating it from pleural effusion)

-Neoplasia. Heterogeneous masses located at the right atrium or right ventricle are usually haemangiosarcomas. Homogenous masses (often hyperechoic) located adjacent to the aortic root/ascending aorta are usually chemodectomas. Masses are best seen when pericardial effusion is still present.

Aortic endocarditis

Aortic endocarditis occurs in dogs and cats primarily at the aortic and mitral valves. The echocardiographic findings in aortic endocarditis include:

-Vegetative lesions, which are usually oscillating proliferative lesions often hyperchoic but which can be of mixed echogenicity.
-Valvular regurgitation (rarely stenosis) of variable severity in the affected valve.
-Cardiac remodelling (left atrial and/or left ventricular enlargement).
-Evidence of increase filling pressures (heart failure).

Congenital cardiac disease

The echocardiographic findings in a PDA include:

Patent ductus arteriosus:

-Left sided volumen overload with left atrial and left ventricular enlargement and normal or mildly/moderately decrease systolic function
-Pulmonary artery dilation
-Visualisation of the PDA (right parasternal short axis and left apical views)
-A continous flow is observed in color Doppler with a left to right (aorta to pulmonary artery) flow. The peak velocities are usually above 4.5m/sec, lower velocities may indicate pulmonary hypertension.

Pulmonic stenosis

-Right ventricular concentric hypertrophy and posible right atrial enlargement depending on disease severity. Often severe right ventricular outflow tract obstruction.
-Usually valvular with a narrow annulus, dysplastic leaflets and/or fused leaflets.
-Post stenotic dilatation.
-Spectral Doppler across the stenosis shows high peak velocities indicative of high gradients. Gradients below 40mmHg indicate mild disease, gradients between 40-80 indicate moderate disease and gradients above 80 indicate severe disease.

Subaortic stenosis

-Small nodules, ridge or ring of tissue at the level of the left ventricular outflow tract below the aortic valve.
-Left ventricular concentric hypertrophy
-Variable degree of left atrial enlargement and potentially congestive heart failure
-Spectral Doppler across the stenosis shows high peak velocities indicative of high gradients. Gradients below 40mmHg indicate mild disease, gradients between 40-80 indicate moderate disease and gradients above 80 indicate severe disease.

Ventricular septal defect

-Communication between the left and right ventricles (usually perimembranous and subcristal-between the left ventricular outflow tract and the right ventricle). This is best seen on a right parasternal left ventricular outflow tract view or on a right parasternal short axis view.
-Doppler shows the communication usually with left to right shunt. The flow is systolic and velocities are expected to be above 4.5m/sec otherwise pulmonary hypertension should be suspected.