QUANTITATIVE EVALUATION OF CANINE MITRAL VALVE IN DOGS USING THREE-DIMENSIONAL ECHOCARDIOGRAPHY

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Real time three-dimensional echocardiography (3DE) has provided new insights into mitral valve (MV) morphology and function in human myxomatous mitral valve disease (MMVD).
Objective: Assess the feasibility of 3DE for evaluating the MV in dogs and describe the 3DE features of the MV in normal dogs and dogs with MMVD.
Materials and Methods: 3DE was used to evaluate 85 consecutive, non-sedated dogs that weighed more than 5 kg. The study population for the morphologic study included 15 normal dogs, and 41 dogs with ACVIM Stages B1 or B2-C MMVD. 3DE image data were digitally recorded and then analyzed offline, using commercially available software.
Results: 3DE image acquisition was feasible in 67/85 (78.8%) consecutive dogs. Patient anxiety (6), arrhythmias (6) and panting (5) explained failure to obtain a 3DE dataset. Forty-one of 67 (61.2%) datasets were of analyzable quality. Body weight and heart rate were significantly lower in dogs for which it was possible to perform 3DE. Dogs with analyzable 3DE datasets were significantly older and weighed less than dogs in which 3DE could not be analyzed.
The mitral valve of normal dogs is saddle shaped (annulus height to commissural width ratio (AHCWR): 0.22±0.06 [mean ± SD]) and has an elliptical annulus (sphericity index (SI): 0.91±0.07). The following measurements were significantly related to body surface area (BSA): antero-posterior diameter (APD) (R^2=0.46, $p<0.01$), anterolateral-posteromedial diameter (ALPMD) (R^2=0.38, $p<0.05$), annulus area (AA) (R^2=0.39, $p<0.05$), anterior leaflet length (ALL) (R^2=0.38, $p<0.05$), anterior leaflet area (ALA) (R^2=0.38, $p<0.05$). These variables were indexed (i) to BSA for subsequent statistical analyses.
Dogs with MMVD had a significantly greater SI, non-planar angle, APDi, ALPMDi, ALAi and ALLi, while having a significantly lower posterior leaflet area (PLA), posterior leaflet length (PLL), annulus height (AH), tenting height (TH), tenting volume (TV), tenting area (TA), and AHCWR compared to normal dogs. AH, TV and TA were significantly greater in normal dogs, compared to dogs with MMVD. SI, APDi, ALPMDi, AAi, ALAi and ALLi were significantly greater in dogs with Stages B2-C MMVD, compared to normal dogs and those in Stage B1. PLL and PLA were significantly lower in B2-C dogs, compared to normal dogs. TH was significantly different between the three groups; greatest in normal dogs and lowest in dogs in Stages B2-C, suggesting that flattening of the MV occurs with disease progression.
Conclusions: 3DE assessment of the canine MV is feasible. Morphologic changes associated with MMVD progression are presented.

Conflicts of interest: This research is founded by CEVA Santè Animale.