REAL-TIME 3- AND 2-DIMENSIONAL ECHOCARDIOGRAPHIC ASSESSMENT OF EFFECTIVE REGURGITANT ORIFICE AREA IN DOGS WITH MYXOMATOUS MITRAL VALVE DISEASE

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Effective regurgitant orifice area (EROA), calculated from a 1-dimensional measurement of the width of vena contracta (VC) as the narrowest portion of the proximal regurgitant jet, might be used to estimate severity of mitral regurgitation (MR). However, this simplified assumption only holds when the EROA is circular, which might not be true in dogs with myxomatous mitral valve disease (MMVD). The aim of the study was to compare measured EROA using color Doppler real-time 3 dimensional echocardiography (RT3D) with calculated EROA estimated by 2 dimensional echocardiography (2D) in 4 chamber (4ch) and 2 chamber (2ch) views of the left ventricle (LV) in dogs with MMVD.

Ninety-three privately owned dogs of 32 breeds diagnosed with naturally acquired MMVD were examined using 2D and RT3D. According to the ACVIM classification of congestive heart failure (CHF), 23 dogs were classified with CHF (2 in class C1 and 21 in class C2) and 70 dogs without CHF (65 dogs in class B1 and 5 dogs in class B2). Age ranged from 1 to 15 years (median 10 years), and body weight ranged from 2.5 to 35 kg (median 10 kg). Fifty-nine males (63%) and 34 females (37%) were included, and heart rate ranged from 80 to 222 beats/minute (median 126 b/min).

EROA was calculated from 2D measurements of VC diameter, in the 4ch view only (assuming a circular regurgitant orifice), and from measurements of VC diameter in both 4ch and 2ch views (assuming an eliptical regurgitant orifice) of LV. Bland-Altman plots were used to compare EROA measured by RT3D with calculated EROA obtained from 2D 4ch and 4ch/2ch LV views.

None of the 2D estimations of EROA showed good agreement with the measured RT3D EROA when corrected for BSA, and the difference between methods increased with increasing EROA. The difference between RT3D and 2D methods normalized to the mean EROA value did not increase with increasing EROA, but showed a systematic underestimation of EROA by 60% (4ch) and 40% (4ch/2ch), respectively, compared to RT3D. The beat-to-beat variation of EROA assessed by RT3D (n= 56) had a coefficient of variation ranging from 2.8% to 68% (median 30%).

In conclusion, substituting assessment of EROA with a measurement of VC in 1 or 2 dimensions might underestimate the MR severity in dogs with MMVD. In some dogs, the beat-to-beat variation of the EROA was large, thereby necessitating the need for several consecutive measurements.

Conflicts of interest: No conflicts of interest reported