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Evaluation of different right heart parameters for the diagnosis of precapillary pulmonary hypertension in dogs with chronic respiratory disorders: a prospective study

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Pulmonary hypertension (PH) is a common complication of respiratory diseases in dogs, worsening clinical signs and prognosis. Echocardiography is currently the best non-invasive method for estimating PH probability, as described in the ACVIM consensus statement. This study investigates the diagnostic performance of previously published cut-off values of single echocardiographic parameters to identify intermediate to high probability of PH in at-risk dogs.

This prospective, cross-sectional, double-blinded study included client-owned dogs with chronic lower respiratory diseases, recruited between March 2022 and November 2024. All dogs underwent complete Doppler-echocardiography. PH probability was classified (low, intermediate, or high) by a board-certified cardiologist according to ACVIM criteria. Dogs with intermediate or high probability of PH were classified as affected, those with low probability as unaffected. Dogs with left atrial enlargement were excluded. Echocardiographic measurements were performed by a second blinded operator. Parameters were selected based on a review of the literature and included: right atrial size diameter (nRAD) and area (nRAA); right ventricular diameter (nRVIDd) and hypertrophy (RVFWd/Ao); septal flattening using eccentricity index (EId and EIs); nTAPSE; various pulmonary artery parameters assessing size (PVPA, nRPAmin, RPADi, nMPA) and flow profile (AT, AT/ET, Notch). The Mann–Whitney U test assessed comparisons between groups. Performance of previously published cut-off values was assessed using ROC curve analysis. AUC values were considered acceptable above 0.7, and indicative of excellent discriminative ability above 0.9. Data are expressed as median and interquartile range [Q1–Q3], significance was set at $p < 0.05$.

Fifty-four dogs were included (21 unaffected, 33 affected). Affected dogs had significantly lower body weight (8.30kg [5,3-10,0]) and higher tricuspid regurgitation pressure gradient 48.03mmHg [40.02–59.82] than unaffected dogs (11.10kg [6,3-25,8] and 27.46mmHg [17.89–28.77]). Affected dogs had significantly higher nRAD, RVFWd/Ao, EId, EIs, nMPA and nRPAmin (p<0,048),,whereas PVPA,AT, AT/ET, and RPADi were significantly lower (p<0,021). None of the parameters showed excellent discriminative ability. Four parameters had acceptable diagnostic performance according to ROC curve analysis, RVFWd/Ao (AUC:0,720), PVPA (AUC:0,764), AT (AUC:0,757) and AT/ET(AUC:0,7).

In this population of dogs with chronic respiratory diseases the best single parameters to detect a moderate to high probability of PH were right ventricular wall hypertrophy, pulmonary vein to pulmonary artery ratio and time interval of the pulmonary flow. However, no individual parameter demonstrated excellent discriminative ability to distinguish dogs with precapillary PH from unaffected dogs, suggesting that an approach using multiple combined echocardiographic variables could be more appropriate for clinical decision-making.