

RIGHT VENTRICULAR OUTFLOW TRACT FRACTIONAL SHORTENING: A NEW ECHOCARDIOGRAPHIC INDEX OF THE RIGHT VENTRICULAR SYSTOLIC FUNCTION



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ABSTRACT

Assessing right ventricular (RV) systolic function remains a challenge because of its complex morphology. Tricuspid annular plane excursion (TAPSE), fractional area change (FAC), tissue Doppler imaging (TDI) and speckle-tracking echocardiography (SPE) have been used to assess RV systolic function in healthy dogs and dogs with pulmonary artery hypertension (PAH). We hypothesized that RV outflow tract (RVOT) function might provide a simple, useful estimate of RV function and PAH. Specifically, we measured RVOT fractional shortening (RVOT-FS) to determine if this index helps identify RV dysfunction in dogs with PAH (tricuspid regurgitation velocity-TRV >2.9 m/sec).

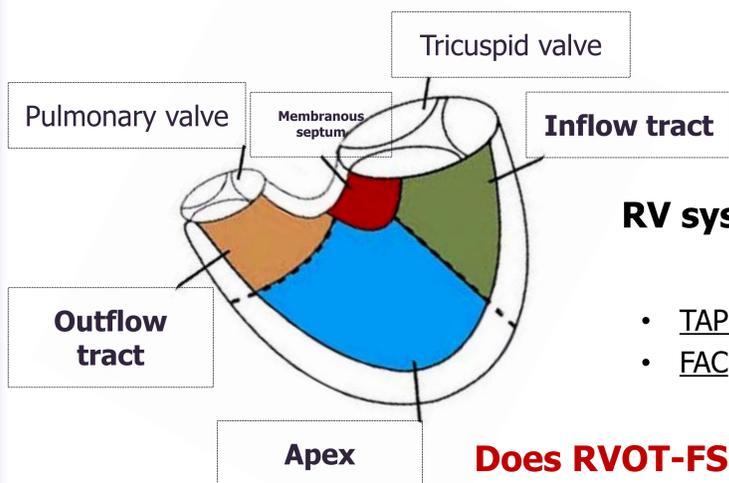
One hundred thirty-six dogs [47 healthy dogs, 51 dogs with mitral valve disease (MVD) without PAH and 38 dogs with PAH] underwent complete echocardiographic evaluation. We acquired 2D guided M-mode recordings of the RV outflow tract from the parasternal short axis view at the level of the aortic root. We placed the M-mode line perpendicular to RVOT and parallel to the commissure of the aortic valve between the non-coronary and left-coronary cusps. RVOT-FS was calculated as: RVOT dimensions (end-diastole – end-systole) / end-diastole *100. A mean of 3 measurements from each dog was used for the statistical analysis.

Healthy dogs and MVD dogs without PAH had higher RVOT-FS than dogs with PAH ($P < 0.000001$). No dogs with RVOT-FS >51% had PAH. All dogs with TRV ≥ 3.72 m/sec had RVOT-FS <45%. A cut-off of 44% had 100% specificity and 60% sensitivity for identifying PAH. No relationship of body weight (BW), left-atrial-to-aortic ratio (LA:Ao) or heart rate and RVOT-FS could be identified ($P > 0.1$).

Our data suggest that RVOT-FS might help identify a subset of dogs with PAH. RVOT-FS was significantly modified in dogs with severe and moderate PAH, suggesting a RV systolic dysfunction only in these classes of PAH.

BACKGROUND

Right ventricle has a complex morphology



RV systolic function indices

- TAPSE
- FAC
- TDI
- SPE

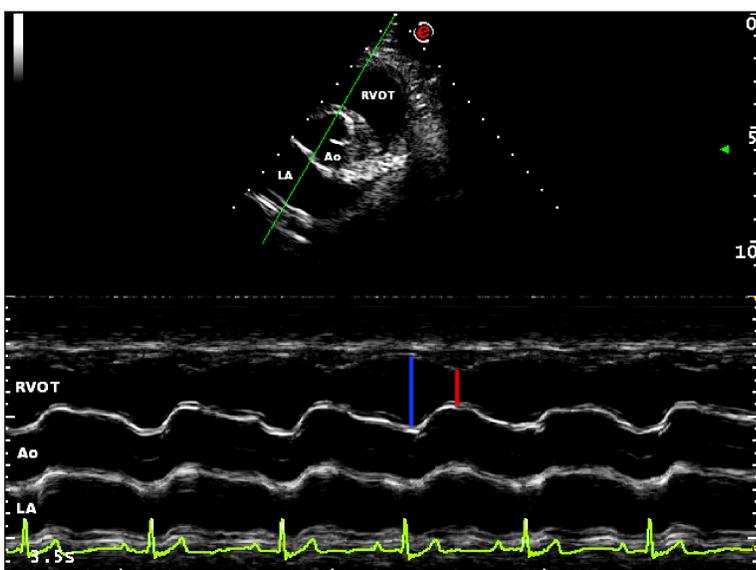
Does RVOT-FS help identify dogs with PAH?

METHODS



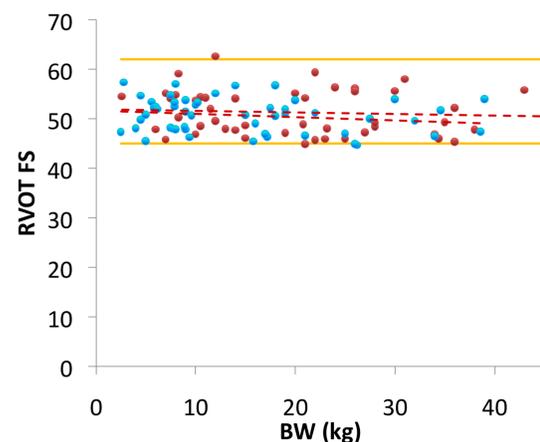
47 Healthy
51 MVD (no PAH)
38 PAH

- 2D guided M-mode of the RV outflow tract from the parasternal short axis view at the level of the aortic root
- M-mode line perpendicular to RVOT and parallel to the commissure of the aortic valve between the non-coronary and left-coronary cusps



- RVOT-FS: RVOT dimensions [end-diastole (blue line) – end-systole (red line)] / end-diastole *100

RVOT-FS is BW-independent



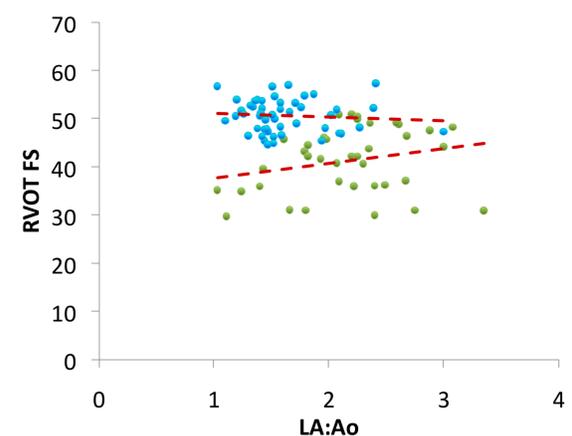
Upper RI: 62%

Lower RI: 45%

Healthy and MVD without PAH dogs have similar RVOT-FS

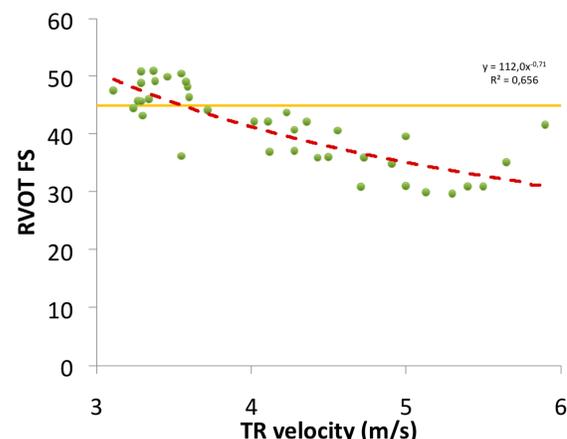
Red dots: Healthy dogs Blue dots: MVD dogs (no PAH)

RVOT-FS is independent of LA:Ao

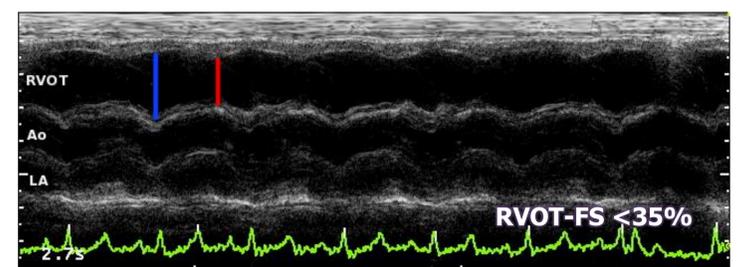


Blue dots: MVD dogs (no PAH) Green dots: PAH dogs

RVOT-FS decreases with worsening PAH



All dogs with TRV ≥ 3.72 m/s had RVOT-FS <45%



CONCLUSIONS

- RVOT-FS was significantly decreased (<45%) in dogs with severe and moderate PAH
- RVOT-FS is unaffected by isolated left heart disease
- RVOT-FS is independent of BW
- RVOT-FS is independent of LA:Ao

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The investigators have no conflicts of interest to declare