

Dynamic three-dimensional evaluation of tricuspid valve morphology and function in patients with pulmonary hypertension

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Pulmonary arterial hypertension (PAH) is a common cause of tricuspid valve (TV) dilatation. Because of the impact of PAH on the right ventricle (RV), in-depth understanding of TV morphology and function is important.

Methods: Novel custom software was used to trace and measure TV annulus (TVA) in 10 patients with PH and 10 control subjects (CTRL). To trace the TVA, points were selected in rotated planes and then interpolated. TVA was automatically tracked throughout cardiac cycle. Commissures were identified and used to divide the TVA into three segments. After initialization of the coaptation the TV leaflets were identified. The following parameters were automatically computed in 3D throughout the cardiac cycle: annular area, height, eccentricity and displacement, as well as intercommissural segment lengths.

Results: Compared to CTRL, in patients with PAH, TVA was larger. The TA was also more circular and with less longitudinal displacement. Changes in annular remodeling were not uniform. The anterior and posterior segments were enlarged, while the septal remained unchanged, probably because the septal leaflet is fixed between the fibrous trigones.

Conclusions: This novel software revealed that PAH affects size, shape and function of the TVA, suggesting that 3D analysis may be useful for evaluation of different RV disease states.

*, p<0.05 unpaired t-test	Maximum Displacement (mm)	Minimum Area (cm²)	Maximal Area (cm²)	Eccentricity	Anterior length (cm)	Posterior length(cm)	Septal length(cm)
CTRL (n=10)	15.9±2.8	8.0±1.7	8.5±2.4	0.62±0.1	3.3±0.7	2.9±0.8	3.3±0.6
PH (n=10)	6.8±1.9*	9.3±1.4*	11.2±1.3*	0.49±0.1*	4.0±0.6*	3.7±0.5*	3.3±0.5

