



IMAGING AND DIAGNOSTIC TESTING

AUTOMATED 3-D QUANTIFICATION OF LEFT VENTRICULAR STROKE VOLUME BY TRANSTHORACIC REAL-TIME VOLUMETRIC COLOR FLOW DOPPLER IMAGING: COMPARISON WITH SPECTRAL DOPPLER AND 3-D VOLUMETRIC STROKE VOLUME

ACC Poster Contributions

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Background: We investigated the feasibility of the real-time, every heart beat full volume color flow Doppler (V-CFD) to image, and automatically quantify left ventricular (LV) inflow and outflow.

Methods: V-CFD from 22 subjects with normal valves were enrolled (EF \leq 50% in 4, $56 \pm 10\%$, range 30–65%). Mean acquisition volume rates was 15.2 ± 3 vps. A 3-D flow quantification software was used which automatically computes the volume of LV, inflow and outflow from V-CFD. LV, mitral annulus and LV outflow tract were identified and computed automatically by integrating instantaneous color Doppler samples over the cross sectional flow area. Data from 3 ~ 5 Consecutive cardiac cycles were calculated and averaged. LV stroke volume (SV) from a fully automated LV volume analysis tool (validated with MRI by us) and from pulsed wave Doppler of LV outflow tract (LVOT-PW) were used for comparison.

Results: LVSV from LV volume had no difference compared with LVSV from LVOT-PW (70.1 ± 20.8 ml, 69.7 ± 16.7 ml, $p > 0.05$) with good correlation ($r = 0.78$, $p < 0.001$). 3-D LV inflow and outflow volumes (73.6 ± 16.3 ml, 67.6 ± 14.6 ml) had no difference and correlated well with LVSV from LV volume and from LVOT-PW respectively ($r = 0.77$, 0.91 , $p < 0.001$). 3-D LV inflow was 5.9 ± 5.1 ml higher than 3-D LV outflow ($p < 0.05$). This is indicative of trivial MR which may be present even in healthy subjects.

Conclusions: This is the first validation of automatic cardiac flow volume quantification using real-time, every heart beat full-volume CFD imaging.

