ELLIPtical LEFT VENTRICULAR OUTFLOW TRACT IN PATIENTS WITH CALCIFIC AORTIC STENOSIS: IMPLICATIONS FOR ECHOCARDIOGRAPHIC CONTINUITY EQUATION AND ASSESSMENT OF DISEASE SEVERITY

ACC Poster Contributions
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Background: In aortic stenosis (AS), estimation of aortic valve area (AVA) uses continuity equation on transthoracic echocardiography (TTE), incorporating left ventricular outflow tract (LVOT) diameter, which is assumed to be circular. We sought to evaluate a) the shape of LVOT on multidetector computed tomography (MDCT) b) differences in TTE & MDCT AVA & c) whether incorporation of MDCT LVOT area into TTE continuity equation, improves association between continuity AVA derived & planimetered AVA (AVAp).

Methods: We included 51 patients (age 81 ± 8 years, 61% men, mean gradient 42 ± 12 mm Hg) with suspected calcific AS (bicuspid AS excluded) that underwent TTE & contrast cine-MDCT. Standard TTE parameters were recorded: systolic LVOT diameter (D), continuous & pulsed wave (CW and PW) time velocity integrals (VTI’s) through LVOT & mean gradient across AV. Continuity AVA [(D2 x 0.786 x VTI pw)/ VTIcw] & dimensionless index (DI) [VTI pw/ VTIcw] were calculated. Systolic LVOT area, ratio of maximal to minimal LVOT diameter (“eccentricity index”) & AVAp were measured on MDCT. We substituted MDCT LVOT area into TTE continuity equation to calculate “corrected” AVA.

Results: MDCT “eccentricity index” was 1.3± 0.2 & 96 % patients had an eccentric LVOT. TTE-AVA was significantly smaller than AVAp (0.67± 0.1 vs. 0.82 ± 0.3 cm2, p < 0.01). There was no significant difference between AVAp & “corrected” AVA (0.82 ± 0.3 vs. 0.86 ± 0.3 cm2). Correlation of DI was greater with “corrected” AVA & AVAp as opposed to TTE-AVA (r=0.73, 0.77 & 0.63 respectively, all p < 0.001). Similarly, correlation of mean AV gradient (albeit lower than DI) was significantly greater with “corrected” AVA & AVAp compared to TTE-AVA (r=−0.39, -0.39 & -0.24, respectively, all p < 0.001). Using TTE measurements alone, only 73% patients had congruence for severe AS (DI < 0.25 & continuity AVA < 0.7 cm2). However, using “corrected” continuity equation, that congruency increased to 92 %.

Conclusions: In patients with suspected severe AS, majority of LVOT’s are elliptical. Incorporation of LVOT area measured by MDCT into TTE-derived continuity equation increases congruence between “corrected” AVA & parameters of AS severity (AVAp and DI/gradient).