Non Invasive Imaging (Echocardiography, Nuclear, PET, MR and CT)

SYSTOLIC STRAIN DYSFUNCTION PATTERNS IN LOW FLOW VERSUS HIGH FLOW SEVERE AORTIC STENOSIS WITH PRESERVED EJECTION FRACTION

Poster Contributions
Poster Hall B1
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Background: We hypothesize subclinical strain dysfunction is the cause of the paradoxical Low Flow (LF) state, defined as an indexed stroke volume (SVi) ≤35ml/m2, in some patients with severe aortic stenosis and normal ejection fraction (AS). To test this hypothesis we performed an in depth strain analysis in these patients.

Methods: Patients were included if they had an ECHO performed in 2010, aortic valve area index ≤0.6cm2/m2 and ejection fraction (EF) ≥50%. Two flow groups were defined: High Flow AS (HF)= SVi ≥35ml/m2 and LF= SVi <35ml/m2. Strain analysis was performed using speckle-tracking. Peak global longitudinal strain (GLS) and strain rate (GLSR) were derived from the average of the apical 2, 3, 4-chamber views. Peak global circumferential strain (GCS) and strain rate were derived from the average of the segments of the basal, middle and apical short axis views.

Results: Please refer to Table 1 for the results of the comparative analysis. Impaired GLS and decreasing SVi were found to have a moderate correlation (Pearson's r= 0.422 p<0.001) on linear regression. On receiver operating characteristic GLS produced an area-under-curve of 0.74 (p<0.001) for predicting LF AS.

Conclusion: Patients with paradoxical LF severe AS have smaller aortic valve areas, lower EF and markedly worse GLS, GLSR and GCS as compared to HF AS patients. Subclinical strain dysfunction is likely a contributor to the LF state and GLS quantification can be used to detect true paradoxical LF AS.

Table 1: Comparison between flow groups

Variable (mean±SD; number (%))	HF AS	LF AS	P value
N	77	45	
Age	75.5±14.9	77.1±15.2	0.5394
Male	26 (34)	16 (36)	0.324
Echocardiographic data			
Indexed aortic valve area (cm^2)	0.49±0.09	0.40±0.11	**<0.001**
Ejection fraction (%)	68±9	61±8	**0.019**
Indexed stroke volume (ml/m^2)	44±6	29±5	**<0.001**
Mean gradient (mmHg)	38±14	32±18	0.250
Relative wall thickness	0.52±0.11	0.53±0.11	0.056
Left ventricle mass index (g/m^2)	104±27	105±26	0.253
Longitudinal Strain			
Peak global longitudinal strain (%)	-20.7±3.5	-17.5±3.6	**<0.001**
Peak global longitudinal strain rate (1/s)	-1.19±0.22	-1.02±0.22	**<0.001**
Circumferential Strain,			
Peak global circumferential strain (%)	-25.2±5.1	-22.8±5.8	**0.018**
Peak global circumferential strain rate (1/s)	-1.76±0.45	-1.59±0.50	0.120
Rotation			
Peal apical rotation (degrees)	4.8±3.6	5.0±3.2	0.469
Peak basal rotation (degrees)	-3.5±3.0	-3.5±2.8	0.093

AS, aortic stenosis; HF, high flow; LF, low flow; SD, standard deviation.