

Prevalence of paradoxical low flow/low gradient severe aortic stenosis measure with 3 dimensional transesophageal echocardiography

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Background: The diagnosis of paradoxical low flow/low gradient (PLFLG) severe aortic stenosis (SAS) transthoracic echocardiogram (TTE) with 2-dimensional (2D) imaging and Doppler is based on measure of stroke volume index (SVi) which depends on left ventricular outflow tract (LVOT) measurement. The TTE 2D imaging and doppler assumes an incorrect geometry of LVOT, leading to overestimation of PLFLG cases. Transesophageal echocardiography (TEE) 3 dimensional (3D) does not assume any geometry, so would improve the measure of LVOT and SV.

Objective: To determine the prevalence of PLFLG among patients with SAS and how many patients has PLFLG measured by TTE3D vs TTE2D.

Methods: 37 patients (p) with SAS (aortic area <0.6 cm²/m²) were evaluated with TTE2D and TEE3D. SVi and LVOT were estimated according to guidelines by TTE2D. PLFLG was defined as SVi < 35 ml/m², mean gradient (MG) <40 mmHg and ejection fraction (EF) > 50%. TEE3D SVi and area of LVOT was obtained by multislice technique and planimetry during mesosystole and anatomic and effective aortic valve area (AVA) by planimetry.

Results: Total population TTE2D LVOT diameter was 2.01 ±0.28 cm, effective AVA 0.66 ±0.21 cm², MG 8.7 ±12.8 mmHg and EF 55 ±12.2 %. 17 of 34 patients (47%) had low SVi by TTE2D (26.2 ±5.1 ml/m²). 12/17 (p)(70%) were re classified as normal SVi (36.9 ±6.0 ml/m²) re measured LVOT by TEE3D (p <0.001 vs TTE2D). 8/17 patients (21%) with low SVi were PLFLG by TTE2D (EF 65.4% ±9.6, MG 33.1 ±6.0, SVi 29.1 ±4.1). With TEE3D after correction of LVOT 7 /8 (p) showed normal flow (SVi 39.3 ±2.0; p 0.01 vs TTE2D SVi). The comparison between areas of LVOT, SVi, AVA with low flow (LF) can be showed in table 1 (*< p 0.001 vs AVA LF ETT2D, ** <0.001 vs AVA LFF ETT2D)

Conclusions: In this population, most of patients were re categorized from LF to normal flow using TEE3D, due to a correction of measure of LVOT. Although the increase of SVi , all patients remain as SAS.

	mean ± SD	95 % CI Bland & Altman agreement	Lin Coefficient
LVOT area TTE 2D (cm ²)	3,23 ± 0.87		
LVOT area TEE 3D (vs LVOT area TTE 2D) (cm ²)	3.91 ± 0.94	-1.8 a -0.46	0.61
SVi TTE2D (ml/m ²)	33.6 ± 8.08		
SVi TEE3D (vs SVi TTE2D) (ml/m ²)	40.9 ± 8.5	-19 a 5.5	0.5
Effective AVA (TT2ED) (cm ²) LF patients	0.56 ± 0.19		
Effective AVA TEE3D (vs AVA TTE2D) LF	0.78 ± 0.16*	-0.659 a 0.218	0.34

Anatomic AVA TEE3D (vs AVA TTE2D) LF	0.72 ± 0.10**	-0.459 a 0.208	0.5
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SD=Standard deviation; CI=confident interval; * < p 0.001 vs AVA LF TTE2D, ** < 0.001 vs AVA LF TTE2D