P907

Ventriculo-vascular interaction in patients with severe aortic stenosis: a comparison of three different clinical settings

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Funding Acknowledgements: This work was supported by CREDO Project - ID: 49182, financed through the SOP IEC -A2-0.2.2.1-2013-1 cofinanced by the ERDF

Ventriculo-arterial coupling (VAC) reflects the interaction between the ventricle and the arterial system and its prognostic role was studied in different clinical settings. VAC can be assessed with echocardiography as the ratio between the arterial elastance (Ea) and the end-systolic left ventricular elastance (EES). Data concerning the role of VAC in severe aortic stenosis (AS) are scarce.

We aimed to determine VAC in patients (pts) with severe AS and assess its relationship with symptoms.

We included 61 consecutive pts with severe AS (vave area < 1 cm2) and we divided them in 3 groups according to their symptoms: group A consisted of 28 pts (81 ± 10 yrs, 14 men) admitted for acute pulmonary edema, group B consisted of 25 pts (76 ± 12 yrs, 13 men) with either angina, syncope or dyspnea class I-III NYHA and group C consisted of 8 asymptomatic patients (71 ± 19 yrs, 3 men). We determined the VAC non-invasively and we compared the results between the 3 groups using one-way analysis of variance and a post-hoc Tukey test.

There were no significant differences in age (p = 0.08) and aortic valve area (p = 0.18) between groups. Variations of Ea and EES between groups were not significant (p = 0.08 and p = 0.94, respectively). However, VAC differed significantly between the 3 groups, being most impaired in group A (1.11 ± 0.69), followed by 0.77 ± 0.23 in group B and 0.73 ± 0.16 in group C (p = 0.03). The left ventricular ejection fraction (EF) also differed significantly between groups: 41 ± 13% in group A, 51 ± 11% in group B and 57 ± 3% in group C (p < 0.001). VAC and the EF had a moderate negative correlation in group A (r=-0.52, p = 0.004) and group B (r=-0.51, p = 0.009), but no correlation in group C (p = 0.37).

VAC is impaired in patients with severe AS and acute heart failure and it differs significantly from VAC in severe AS with chronic, stable symptoms and from VAC in asymptomatic severe AS. This suggests that the progression of symptoms in severe AS might be related to the interactions between the left ventricle and the vascular load, making thus VAC a potential therapeutic target and a parameter to be considered in the thorough evaluation of patients with severe AS.

	Group A	Group B	Group C	
Ea	2.69 ± 1.31	2.09 ± 0.94	1.95 ± 0.60	p = 0.08
EES	2.93 ± 1.90	2.87 ± 1.33	2.71 ± 0.73	p = 0.94
VAC	1.11 ± 0.69	0.77 ± 0.23*	0.73 ± 0.16*	p = 0.03
EF	41 ± 13%	51 ± 11%*	57 ± 3%*	p < 0.001
*significant difference with group A				