Prognostic value of diastolic function parameters in significant aortic regurgitation. The role of the left atrial strain

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Background: The management of patients with asymptomatic significant aortic regurgitation (sAR) is often challenging and appropriate timing of aortic valve surgery remains controversial. There are no strong indicators to recommend early surgery in patients with sAR, however delaying the time for the intervention could bring potential negative consequences, such as the risk of permanent left ventricular (LV) dysfunction. The prognostic value of diastolic parameters has been demonstrated in several cardiac diseases. In particular, left atrial (LA) function has been shown to be an important determinant of morbimortality.

Purpose: The purpose of this study was to analyze the prognostic significance of diastolic function parameters, included LA strain, in asymptomatic patients with sAR and to evaluate whether these parameters could help to identify patients at high risk of adverse events that could benefit from early cardiac surgery.

Methods: From February 2013 to November 2019 consecutive asymptomatic patients with chronic sAR evaluated in the Heart Valve Clinic with a comprehensive transthoracic echocardiogram (TTE) were included. Combined clinical endpoint included hospital admission due to heart failure, cardiovascular mortality, or indication for aortic valve surgery.

Results: A total of 126 patients were included. During a mean follow up of 33±19 month, 25 (19.8%) patients reached the combined end-point.

In a sub-group of 57 patients with TTE performed in the Philips stations, LA auto-strain analysis was obtained (figure 1).

Univariate analysis showed that LV volumes, LVEF, E wave, E/e' ratio, LA volume and LA reservoir strain (LASr) were significant predictors of events, whereas LA diameter, and LV diastolic diameters were not. Multivariate model 1 that tested all echocardiographic variables statistically significant in the univariate model showed that the LVEDV and E/e' ratio, were significant predictors of events. In the subgroup of patients with LA auto-strain analyzed, a second multivariable model was built, including the previous significant variables for the first model (LVEDV and E/e' ratio), as well as the LA volume and LASr. It showed that LVEDV and LASr were the most significant predictors of cardiovascular events (figure 2).

Conclusions: In this population of asymptomatic patients with sAR and normal LV systolic function, baseline diastolic parameters were prognostic markers of cardiovascular events; among them, LA reservoir strain played a strong independent predictor role. In addition, our results also showed that LV volumes had greater prognostic value that LV diameters in patients with asymptomatic sAR.

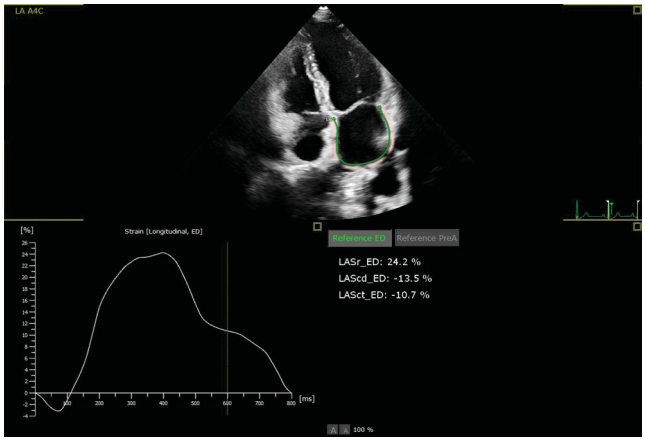

Figure 1

	Univariate analysis		Multivariate analysis 1		Multivariate analysis 2	
	HR (95% CI)	*P*	HR (95% CI)	*P*	HR (95% CI)	*P*
LVEDV	1.01 (1.01 – 1.02)	<0.001	1.02 (1.01 – 1.03)	<0.001	1.05 (1.01 – 1.09)	0.02
LVESV	3.85 (1.44 – 10.33)	0.007				
LVEF – biplane	0.95 (0.90 – 1.00)	0.053				
E	1.02 (1.00 – 1.03)	0.015				
E/e'	1.10 (1.04 – 1.17)	0.002	1.12 (1.03 – 1.23)	0.01		
TR (grade)	1.63 (0.77 – 3.44)	0.200				
LA volume	1.02 (1.00 – 1.04)	0.013				
LASr_ED	0.93 (0.87 – 0.99)	0.021	---	---	0.80 (0.65 – 0.98)	0.038
LA diameter	1.02 (0.94 - 1.1)	0.637				
LV diameter	1.03 (0.97 – 1.1)	0.377				

CI, confidence interval; HR, hazard ratio; LVEDV, left ventricular end-diastolic volume, LVESV, left ventricular end-systolic volume, LVEF, left ventricular ejection fraction; and TR, tricuspid regurgitation.

Figure 2