

Reversible left ventricle remodeling after surgical treatment for severe aortic regurgitation is related to near - normal ejection fraction prior to aortic valve surgery

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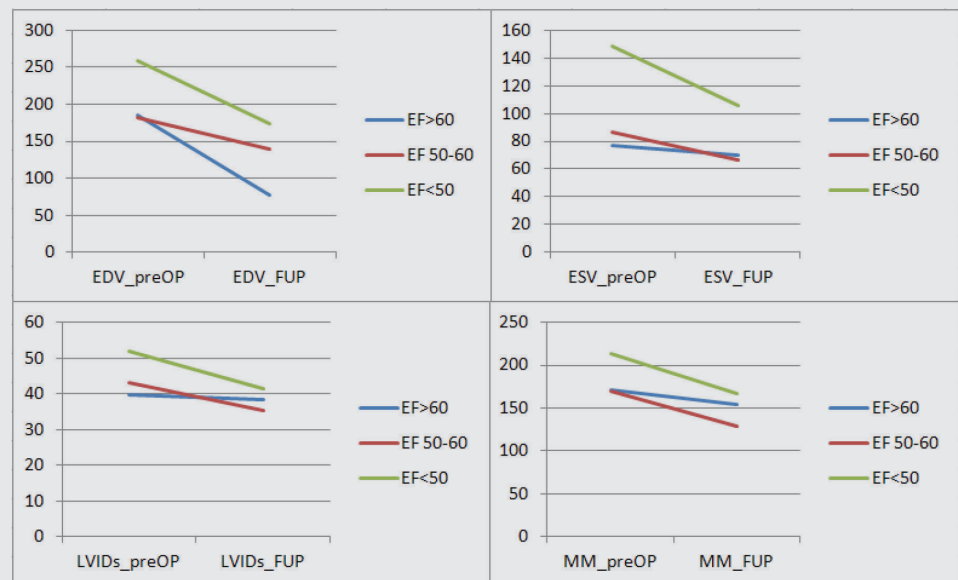
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Introduction: Significant aortic regurgitation (sAR) results in left ventricle (LV) remodeling and LV dysfunction due to chronic pressure and a volume overload. Timing of surgical intervention is defined by left ventricle ejection fraction (LVEF) <50% and end-systolic diameter (LVIDs) > 50 mm.^{1,2} The aim of this study was to investigate if there is difference in LV positive remodeling after AV surgery, according to LVEF above cut of value (EF>50%) at the timing of surgery.

Patients and Methods: We retrospectively analyzed echocardiographic (ECHO) database for 52 patients (pt) who underwent aortic valve surgery (AVR) from January 2017 to April 2021 due to sAR, in UHC Zagreb. Preoperative ECHO data as well as during follow-up (FU) were analyzed. The study population was divided in three groups according to initial LVEF values: group (I) included 17 pt with EF>60% (mean age 54+/-9.4), group (II) 16 pt with EF 50-60% (mean age 52+/-15.7) and group (III) 19 pt with EF<50% (mean age 60+/-6.3). ECHO parameters of LV remodeling; end-diastolic volume (EDV, ml), end-systolic volume (ESV, ml), myocardial mass (MM, g/m²) and left ventricular internal dimension at end-systole (LVIDs, mm) were compared prior surgery and in the mean FU time of 38 months.

Results: The change in absolute values of ECHO parameters and their calculated mean change are shown in (Figure 1) and (Table 1). Preoperatively, group III revealed the highest EDV/ESV/LVIDs values



EF = ejection fraction; preOP = prior aortic valve surgery; FUP = in follow-up; EDV = end-diastolic volume (ml); ESV = end-systolic volume (ml); LVIDs = left ventricle end-systolic diameter (mm); MM = myocardial mass (g/m²).

FIGURE 1. Change in absolute values of end-diastolic volume, end-systolic volume, myocardial mass, and left ventricular internal dimension at end-systole after aortic valve surgery in patients surgically treated due to significant aortic regurgitation.

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TABLE 1. Absolute values and calculated change in end-diastolic volume, end-systolic volume, myocardial mass, and left ventricular internal dimension at end-systole in 3 patient groups divided according to ejection fraction prior to aortic valve surgery due to aortic regurgitation.

	Group						p
	EF>60%		50%<EF<60%		EF<50%		
	Mean	Standard Deviation	Mean	Standard Deviation	Mean	Standard Deviation	
EDV pre	186.11	62.46	182.21	52.65	259.18	87.95	0.002
EDV post	138.74	59.56	138.88	50.30	174.55	61.26	0.101
EDV delta	44.94	55.13	40.25	63.69	80.74	81.31	0.115
ESV pre	76.83	24.71	86.84	28.39	148.59	50.02	0.000
ESV post	69.74	38.89	66.81	22.05	105.75	53.67	0.018
ESV delta	8.47	35.10	20.63	34.26	40.37	42.92	0.006
MM pre	170.76	58.20	169.72	74.96	213.76	104.38	0.281
MM post	154.05	54.29	128.50	45.53	166.60	56.21	0.054
MM delta	18.63	79.81	34.63	44.33	43.68	111.59	0.774
LVIDs pre	39.68	7.45	43.22	6.66	51.82	10.34	<0.001
LVIDs post	38.29	11.06	35.38	4.86	41.45	11.50	0.192
LVIDs delta	1.50	12.30	11.16	13.48	13.52	23.14	0.006

pre = prior aortic valve surgery; post = in follow-up; delta = calculated change (pre-post); EF = ejection fraction; EDV = end-diastolic volume (ml); ESV = end-systolic volume (ml); MM = myocardial mass (g/m²); LVIDs = left ventricle end-systolic diameter (mm); p = statistical significance.

259.18/148.6/51 compared to group I and II (186.11/76.83/39.6 vs. 182.21/86.8/40.2). During FU after AVR, no difference in reduction in EDV and MM (EDV p=0.115, MM p=0.774) was noticed between the 3 groups, while absolute values almost reached normal ranges only in group I and II (EDV 138.7 in I and 138.8 in II). Importantly, normalization of ESV and LVIDs during FU was shown only in group I and II, while rate of change was highest in group III (Δ ESV 40.3, Δ LVIDs 13.5), LVIDs decreased more in more dilated LV (p=0.006) and even though ESV reduced in all three groups, in group III it remained enlarged (p=0.006), as expected.

Conclusion: Our results confirmed LV positive remodeling after AVR due to chronic AR, indicating that initial LVEF prior AVR could predict residual LV dilatation despite the reduction in EDV after AVR. In patients with LVEF>60% preoperatively, reversible positive remodeling after AVR may occur with complete normalization of ESV/EDV and LVIDs values during FU.

LITERATURE |

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