

Supplementary File – Tables and Figures citations

FIGURE LEGENDS

Figure 1 – *Distribution of patients according to the number of LV RR definitions met (a) and according to the LV RR definition (b)*

- (a) The numbers 0 to 5 represent how many LV RR criteria were met. Specifically, 13% of patients met none of the criteria, 21% met one, 35% met two, 19% met three, 10% met four, and 2% met all five criteria as defined in the Methods section. Overall, 87% of patient met at least one LV RR criterion.
- (b) Regression in LVMI ($\Delta\text{LVMI}^{\text{CMR}}$) was the most commonly observed indicator of structural reverse remodeling, present in 77 patients (65.3%). In contrast, $\Delta\text{GLS}^{\text{TTE}}$ was the least frequently observed criterion, which was anticipated given the wide variability in GLS changes (50%). This is consistent with our cohort, which predominantly comprises patients with high-gradient/high-flow aortic stenosis and preserved LVEF, where large GLS variations are not to be expected.

Legend: GLS, global longitudinal strain; LV, left ventricle; LVEDV, LV end-diastolic volume; LVEF, LV ejection fraction; LVMI, LV indexed mass; RR, reverse remodeling

Figure 2 – *Kaplan-Meier survival curves regarding different left ventricular reverse remodeling parameters (a-f)*

In the Kaplan-Meier survival analysis, overall LV reverse remodeling was not associated with improved outcomes (a). However, when evaluating each criterion individually, LVMI regression ($\Delta\text{LVMI}^{\text{CMR}}$) demonstrated an independent association with a better survival (e). For this analysis, we used a single predefined threshold (delta) for each LV RR criterion, as described in the Methods section.

Legend: LV, left ventricular, LV RR, Left ventricular reverse remodeling

SUPPLEMENTARY FIGURES

Supplementary Figure 1 – *Violin plots illustrating changes in Left Ventricular structure and function before and after Surgical Aortic Valve Replacement*

Violin plots illustrating the evolution of different LV structural and functional parameters, before (yellow) and after (orange) SAVR.

Legend: GLS, global longitudinal strain; LV, left ventricle; LVEDV, LV end-diastolic volume; LVEF, LV ejection fraction; LVMI, LV indexed mass; SAVR, surgical aortic valve replacement

Supplementary Figure 2 – Association of baseline Aortic Stenosis severity with the presence of LV Reverse Remodeling

a) and b) illustrate the difference of aortic stenosis severity between patients with (yellow) and without LV RR criteria (orange).

c) and d) illustrate the difference of aortic stenosis severity between patients with LV RR, as defined by $\Delta\text{LVMI}^{\text{CMR}}$ (blue), and those without (purple).

Legend: AVAi, indexed aortic valve area; LVMI, Left ventricle mass indexed; LV RR + refers to the presence of at least one criteria of left ventricle reverse remodeling; LV RR – refers to the absence of LV reverse remodeling criteria. $\Delta\text{LVMI}^{\text{CMR}}$ + refers to the presence of LV RR defined by LV mass regression, while $\Delta\text{LVMI}^{\text{CMR}}$ – refers to the absence of LV RR defined by LV mass regression.

TABLE LEGENDS

Table 1 – Baseline clinical and laboratory data.

Legend: Values are median (interquartile range); n (%); mean $\pm$ standard deviation. BSA, body surface area; CABG, Coronary artery bypass graft; NT-proBNP, N-terminal pro B-type natriuretic peptide; NYHA, New York Heart Association, Htc, haematocrit.

Table 2 – Pre-operative imaging and histopathology data.

Legend: Values are median (interquartile range); mean $\pm$ standard deviation, CVF, collagen volume fraction; ECV, extra-cellular volume; EDV, end-diastolic volume; EF, ejection fraction; EMB, endomyocardial biopsy; LGE, late gadolinium enhancement; LV, left ventricle

Table 3 – Relationship between clinical and imaging variables and LV Reverse Remodeling

LV RR+ represents the group of patients who met at least one LV RR criterion (87% of the cohort), indicating the presence of some degree of LV RR. LV RR– refers to patients who did not meet any LV RR criterion (13% of the cohort). Each LV RR criterion is calculated by the difference in the specific measure (e.g., LVMI, GLS) between post-SAVR and pre-SAVR assessments. p-value < 0.05 denotes statistical significance.

Legend: Values are median (interquartile range); mean $\pm$ standard deviation, AS, aortic stenosis, AVAi, indexed aortic valve area, CVF, collagen volume fraction; ECV, extracellular volume; FUP, follow-up; hs-TnI, high-sensitivity troponin I, LGE, late gadolinium enhancement, LV, left ventricle; LVMI, Left ventricle indexed mass

SUPPLEMENTARY TABLES

Supplementary Table 1 – *Changes in Left Ventricular structure and function before and after Surgical Aortic Valve Replacement*

Left ventricle RR criteria were defined as the change (Δ) from pre- to post-SAVR measurements.

Legend: Values are median (interquartile range); mean $\pm$ standard deviation, CMR, Cardiac magnetic resonance; GLS, Global longitudinal strain; EDV, end-diastolic volume; EF, ejection fraction; LV, left ventricle; LVMI, Left ventricle indexed mass; RR, Reverse remodeling; SAVR, Surgical aortic valve replacement

Supplementary Table 2 – *Cox Regression Analysis of LV Reverse Remodeling Criteria*

Table 2a) displays the results of the univariate Cox proportional hazards regression analysis evaluating the association between each individual LV RR criterion and the primary clinical endpoint (a composite of all-cause mortality, heart failure hospitalization, or worsening heart failure). Table 2b) displays the results of the multivariate Cox proportional hazards regression analysis evaluating the association between Δ LVMI^{CMR} criteria and the primary clinical endpoint, considering several clinical and imaging parameters (i.e., concomitant myectomy, CABG, aortic stenosis severity). Hazard ratios (HR), 95% confidence intervals (CI), and p-values are reported. An HR < 1 indicates a protective association with the outcome,

while a p-value < 0.05 denotes statistical significance. LV RR criteria were defined as the change (Δ) from pre- to post-SAVR measurements.

Legend: AVAi, indexed aortic valve area; CABG, Coronary artery bypass graft; CMR, Cardiac magnetic resonance; GLS, Global longitudinal strain; EDV, end-diastolic volume; EF, ejection fraction; HR, Hazard ratio; LV, left ventricle; LVMi, Left ventricle indexed mass

Supplementary Table 3 – *Cox Regression Analysis of different combinations of LV Reverse Remodeling Criteria*

This table displays the results of the univariate Cox proportional hazards regression analysis evaluating the association between different combinations of LV RR criterion and the primary clinical endpoint (a composite of all-cause mortality, heart failure hospitalization, or worsening heart failure). Hazard ratios (HR), 95% confidence intervals (CI), and p-values are reported. An HR < 1 indicates a protective association with the outcome, while a p-value < 0.05 denotes statistical significance. LV RR criteria were defined as the change (Δ) from pre- to post-SAVR measurements. The number of patients meeting each combination criterion is indicated in parentheses next to each combination in Supplementary Table 3.

Legend: CMR, Cardiac magnetic resonance; GLS, Global longitudinal strain; EDV, end-diastolic volume; EF, ejection fraction; HR, Hazard ratio; LV, left ventricle; LVMi, Left ventricle indexed mass