

Supplementary Table 1: Reproducibility Analysis for Atrial and Ventricular Function Indices

| | Intraobserver ICC (95%CI) | Mean absolute diff | Interobserver ICC (95%CI) | Mean absolute diff | Test retest ICC (95%CI) | Mean absolute diff |
|---------------------|----------------------------------|---------------------------|----------------------------------|---------------------------|--------------------------------|---------------------------|
| RA reservoir strain | 0.90 (0.86-0.94) | 3.1±2.3 | 0.78 (0.74-0.92) | 3.8±2.9 | 0.86 (0.81-0.91) | 3.4±2.1 |
| RA booster strain | 0.91 (0.86-0.95) | 2.8±2.1 | 0.79 (0.75-0.93) | 3.6±2.7 | 0.85 (0.80-0.90) | 3.0±2.2 |
| RA volume index | 0.84 (0.80-0.88) | 4.1±3.4 | 0.73 (0.70-0.77) | 4.4±2.9 | 0.79 (0.73-0.84) | 3.8±2.5 |
| LA reservoir strain | 0.92 (0.90-0.94) | 2.4±1.7 | 0.84 (0.81-0.87) | 4.2±2.9 | 0.88 (0.83-0.92) | 3.2±2.6 |
| LA booster strain | 0.91 (0.88-0.94) | 2.1±2.0 | 0.82 (0.78-0.86) | 3.1±3.4 | 0.87 (0.83-0.91) | 2.8±3.1 |
| LA volume index | 0.89 (0.86-0.92) | 2.9±2.6 | 0.80 (0.77-0.84) | 3.8±2.7 | 0.82 (0.78-0.96) | 3.4±2.2 |
| RV GLS | 0.86 (0.80-0.92) | 1.1±1.3 | 0.81 (0.74-0.89) | 1.9±2.2 | 0.83 (0.78-0.90) | 1.4±1.5 |
| LV GLS | 0.91 (0.87-0.95) | 0.9±0.6 | 0.85 (0.81-0.91) | 1.1±1.3 | 0.87 (0.82-0.92) | 1.0±1.1 |

RA: Right atrium; RV: Right ventricle; LA: Left atrium; LV: Left ventricle; GLS: Global longitudinal strain; CI: Confidence interval; ICC: intraclass correlation coefficients; diff: difference

Supplementary Table 2: Determinants of postoperative improvement in aerobic capacity

| | Univariate analysis | |
|--|---------------------|--------|
| | OR (95% CI) | p |
| Age, years | 0.95 (0.92-0.98) | 0.001 |
| Male | 1.13 (0.65-1.68) | 0.8 |
| Body mass index, kg/m ² | 0.93 (0.72-1.44) | 0.3 |
| Tricuspid valve repair vs TVR | 1.43 (0.94-1.85) | 0.09 |
| Residual Trivial vs ≥mild TR severity | 0.92 (0.80-1.13) | 0.7 |
| History of atrial arrhythmia | 1.02 (0.85-1.226) | 0.4 |
| RA Maze vs no RA Maze | 0.98 (0.64-1.37) | 0.8 |
| Beta blockers | 1.04 (0.83-1.22) | 0.6 |
| Carpentier Type B | 0.89 (0.55-1.33) | 0.3 |
| Carpentier Type C | 0.94 (0.71-1.45) | 0.6 |
| Baseline echo indices | | |
| RA reservoir strain, % | 1.09 (1.04-1.15) | <0.001 |
| RA volume index, ml/m ² | 0.98 (0.97-0.99) | 0.03 |
| RA reservoir strain/RA max volume | 1.14 (1.08-1.21) | <0.001 |
| RV global longitudinal strain, % | 1.21 (1.03-1.44) | 0.01 |
| IVC collapsibility, % | 1.15 (0.97-1.53) | 0.2 |
| Estimated RA pressure, mmHg | 0.93 (0.87-0.99) | 0.03 |
| TR velocity, m/s | 0.96 (0.89-1.02) | 0.2 |
| LA reservoir strain, % | 1.13 (1.01-1.28) | 0.03 |
| LA volume index, ml/m ² | 0.96 (0.88-1.02) | 0.2 |
| LA reservoir strain/LA max volume | 1.10 (1.02-1.18) | 0.007 |
| LV end-diastolic volume index, ml/m ² | 1.05 (1.01-1.09) | 0.01 |
| LV end-systolic volume index, ml/m ² | 1.01 (0.94-1.08) | 0.4 |
| LV stroke volume index, ml/m ² | 1.09 (1.03-1.14) | 0.002 |
| LV ejection fraction, % | 0.98 (0.91-1.05) | 0.3 |
| LV global longitudinal strain, % | 1.02 (0.97-1.08) | 0.3 |
| Diastolic LV eccentricity index | 0.95 (0.91-0.99) | 0.02 |
| Lateral mitral E/e' | 0.97 (0.94-1.02) | 0.1 |
| Baseline exercise indices | | |
| Peak VO ₂ | 1.11 (1.02-1.27) | 0.02 |
| Oxygen pulse | 1.13 (1.09-1.18) | <0.001 |

RA: Right atrium; RV: Right ventricle; IVC: Inferior vena cava; TR: Tricuspid regurgitation; TVR: Tricuspid valve replacement; LA: Left atrium; LV: Left ventricle; E/e': ratio of mitral inflow pulsed wave Doppler early velocity to mitral annular tissue Doppler early velocity; OR: odds ratio; CI: Confidence interval; VO₂: Oxygen consumption

Note the tricuspid valve anatomic classification was modeled as categorical variables using Carpentier Type A as the reference group.

