

Meeting abstract

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205 I LV reverse remodeling imparted by aortic valve replacement for severe aortic stenosis; is it durable? A cardiovascular MRI study sponsored by the American Heart Association

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Background

In patients with severe aortic stenosis (AS), long-term data tracking surgically induced beneficial effects of afterload reduction on reverse LV remodeling are not available. Echocardiographic data is available short term, but in limited fashion beyond one year. Cardiac MRI (CMR) offers the ability to track changes in LV metrics with small numbers due to its inherent high spatial resolution and low variability. Following aortic valve replacement (AVR) for severe aortic stenosis there is initially marked improvement in many LV reverse remodeling metrics. The durability for such observations is explored.

Hypothesis

We hypothesize that progressive changes following aortic valve replacement (AVR) are detectable by CMR and changes in LV structure and function, triggered by AVR, continue for an extended period following AVR.

Methods

Ten patients (67 ± 12 yrs, 6 female) with severe, but compensated, AS underwent CMR pre-AVR and post AVR at 6 ± 2 mo, $1 \text{ yr} \pm 2$ mo, and up to $4 \text{ yrs} \pm 5$ mo. LV mass index (LVMI), LV geometry, volumetrics and EF were measured (GE, EXCITE 1.5 T, Milwaukee, WI). A Kruskal-Wallis one-way ANOVA was performed.

Results

All 10 pts survived AVR and underwent CMR at up to the 4-year time point (40 total time points). LVMI markedly decreased at 6 months (157 ± 42 to 134 ± 32 g/m², $p < 0.005$) and continued to trend down at 4 yrs (127 ± 32 g/m²). Similarly, EF increased pre to post AVR (55 ± 22 to $65 \pm 11\%$, ($p < 0.05$)) and continued trending upward, remaining stable at years 1–4 (66 ± 11 vs. $65 \pm 9\%$). LVEDV index, initially high pre AVR, normalized post AVR (83 ± 30 to 68 ± 11 ml/m², $p < 0.05$) trending even lower by yr 4 (66 ± 10 ml/m²). LV stroke volume increased rapidly from pre to post AVR (40 ± 11 to 44 ± 7 ml) continuing to increase at 4 yrs (49 ± 14 ml, $p = 0.3$). Most importantly, LVMI/volume, a 3D measure of LV geometry, remained unchanged initially but over 4 yrs markedly improved (1.07 ± 0.2 to 0.94 ± 0.24 , $p < 0.05$) all paralleling improvements in NYHA (3.2 ± 1.0 to 1.5 ± 1.1 , $p < 0.05$).

Conclusion

After the initial beneficial effects imparted by AVR in severe AS patients, there are, as expected, marked improvements in LV reverse remodeling. We have shown, via CMR, that surgically induced benefits to LV structure and function, including favorable alterations in LV geometry, are durable *and*, unexpectedly, show continued improvement through 4 years post-AVR concordant with

sustained improved clinical status. This supports down regulation of both mRNA and MMP activity acutely with robust suppression long term.

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