

# Biventricular heart remodeling after percutaneous and surgical pulmonary valve implantation: a CMR study

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## Background

Percutaneous pulmonary valve implantation is an alternative to surgical pulmonary valve replacement in selected patients with congenital right ventricular outflow tract obstruction.

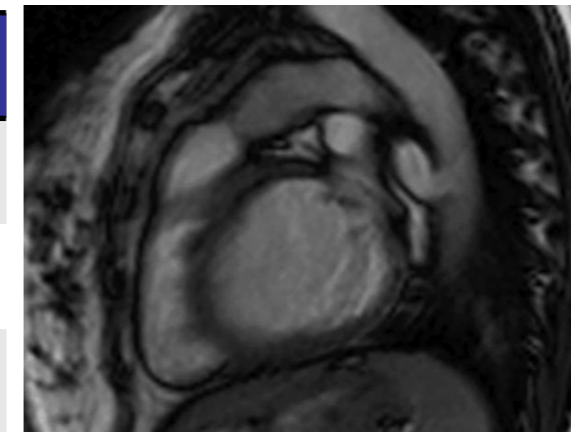
## Purpose

Objective of this study is to evaluate the medium-term impact of percutaneous pulmonary valve implantation and surgical pulmonary valve replacement on biventricular function as assessed by cardiac magnetic resonance (CMR).

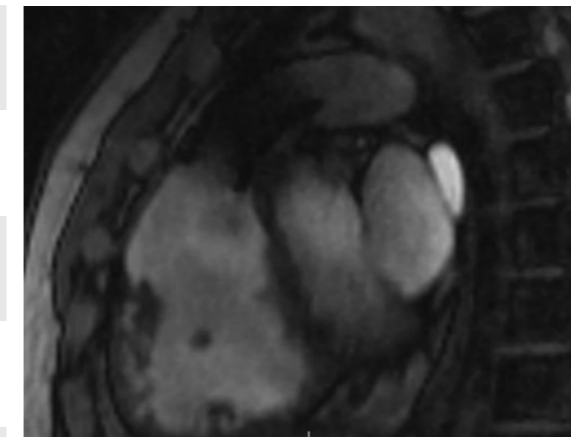
## Methods

From 2008 to 2013, 33 patients (20±8 years) underwent percutaneous pulmonary valve implantation, while 16 patients (30±11 years) underwent surgical pulmonary valve replacement. A cono-truncal disease was present in 29/49 patients, previous Ross operation in 9/49. CMR was performed before and after an average of 10 months (range 3-15). Ventricular measurements were made on short-axis SSFP cine images.

Variable	Percutaneous pulmonary valve implantation			Surgical pulmonary valve implantation		
	Pre	Post	Pvalue	Pre	Post	Pvalue
RVEDVI (ml/m <sup>2</sup> )	81 ± 37	68 ± 16	<b>0.03</b>	142 ± 34	88 ± 21	<b>≤0.01</b>
RVESVI (ml/m <sup>2</sup> )	43 ± 35	32 ± 13	<b>≤0.01</b>	75 ± 29	41 ± 15	<b>≤0.01</b>
RVSVI (ml/m <sup>2</sup> )	36 ± 11	35 ± 9	NS	71 ± 40	47 ± 13	<b>≤0.01</b>
RVEF (%)	49 ± 14	53 ± 12	0.109	46 ± 11	53 ± 9	<b>0.03</b>
LVEDV (ml/m <sup>2</sup> )	66 ± 16	74 ± 17	<b>≤0.01</b>	61 ± 7	66 ± 12	<b>≤0.05</b>
LV ESV (ml/m <sup>2</sup> )	28 ± 10	32 ± 12	<b>≤0.01</b>	24 ± 7	25 ± 7	0.2
LV SV, (ml/m <sup>2</sup> )	38 ± 12	41 ± 11	<b>0.04</b>	35 ± 10	40 ± 8	<b>≤0.05</b>
LV EF (%)	57 ± 10	56 ± 11	0.509	60 ± 9	62 ± 6	0.379



Native pulmonary valve



Pulmonary valve after Melody Valve implantation

## Conclusions

Improvement of the right ventricular outflow tract function is associated with reduction of RV volume and positive effects on ventricular–ventricular interaction supported by the increased LVSVI after the procedure. In the follow-up LV function improvement is delayed in the surgical group. Medium-term follow-up shows permanent beneficial effect of pulmonary valve replacement in both groups.

## Results

- ✓ The right ventricular end-diastolic volume index (RVEDVI) decreased significantly for both procedures.
- ✓ Right ventricular ejection fraction (RVEF) increased significantly in the surgical pulmonary valve replacement group compared to the patients treated percutaneously.
- ✓ The left ventricular end-diastolic volume index (LVEDVI) increased more significantly after the procedure in the percutaneous pulmonary valve group; while changes were less evident and delayed in the surgical patients.
- ✓ Left ventricular stroke volume index (LVSVI) increased in both groups after the procedure.
- ✓ There was an inverse correlation between the RV and LVEDVI: as the RVEDVI decreased in the follow-up, the LVEDVI increased.



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