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Congenital Cardiology Solutions

EARLY ECHOCARDIOGRAPHIC CHANGES AFTER PERCUTANEOUS IMPLANTATION OF THE EDWARDS SAPIEN TRANSCATHETER HEART VALVE IN THE PULMONARY POSITION

ACC Moderated Poster Contributions

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Background: The feasibility of the SAPIEN transcatheter pulmonary valve (TPV) has recently been demonstrated. We evaluated changes in pulmonary valve function and the right ventricle (RV) after SAPIEN TPV placement.

Methods: TPV implantation was successful in 33 of 34 patients from 4 centers. We evaluated echocardiograms at baseline, discharge, 1 and 6 months after TPV placement in these 33 patients (129 studies). Pulmonary regurgitation severity was graded from 0-4. TPV peak and mean gradients were measured. Measures of RV size and function included apical end-diastolic and end-systolic area indexed to body surface area, fractional area change, tricuspid valve (TV) Z-score and TV annular plane systolic excursion. Tricuspid regurgitation (TR) gradient and TR jet area indexed to body surface area were measured. Doppler and tissue Doppler (TDI) parameters included TV inflow E and A, TDI E', A', and S velocities for the TV annulus and the septum, and derived ratios (E:A, E:E').

Results: At baseline, 31/33 patients demonstrated pulmonary regurgitation of 2-4. This decreased to 4/29 at discharge and 4/28 at 6-months ($p < 0.01$). Statistically significant changes in other parameters are shown in the Table.

Table

Measure	Baseline (time 1)	Discharge (time 2)	30-day Follow-up (time 3)	6-month Follow-up (time 4)	Repeated Measures ANOVA (p-value)	Significant Paired t-tests ($p < 0.05$)
Conduit Stenosis Peak Gradient (mmHg)	41.9±26.3	22.3±13.7	24.1±19.4	18.1±13.7	<0.01	Time 1vs2,3,4
Conduit Stenosis Mean Gradient (mmHg)	23.0±15.0	13.2±8.0	12.2±8.9	11.3±8.5	<0.01	Time 1vs2,3,4
Indexed RV End-Diastolic Area (cm ² /m ²)	23.3±5.6	23.5±4.9	21.4±4.9	21.0±5.2	<0.01	Time 1vs3,4 Time 2vs3,4
TR Peak Gradient (mmHg)	55.9±20.6	47.4±17.7	41.5±15.0	40.2±11.7	<0.01	Time 1vs2,3,4 Time 2vs3,4
Indexed TR Jet Area (cm ² /m ²)	0.18±0.20	0.11±0.12	0.11±0.17	0.10±0.09	<0.01	Time 1vs3,4
TDI: Tricuspid A (cm/sec)	6.5±2.9	7.5±3.1	7.4±2.0	7.6±2.7	0.15	Time 1vs2
TDI: Tricuspid S (cm/sec)	7.9±2.1	8.9±2.1	7.8±1.7	7.9±1.7	<0.01	Time 1vs2 Time 2vs3,4
TDI: Septal E (cm/sec)	8.7±2.6	9.1±3.0	8.0±2.2	8.3±2.1	0.02	Time 2vs3,4
TDI: Septal A (cm/sec)	6.2±2.3	7.3±2.7	6.4±1.9	6.6±1.6	<0.01	Time 1vs2 Time 2vs3,4
TDI: Septal S (cm/sec)	6.3±1.7	7.2±2.3	5.8±1.3	6.0±1.0	<0.01	Time 1vs2 Time 2 vs3,4

Conclusion: Improvements in echo measures of pulmonary regurgitation and stenosis, RV size, and TR gradient and severity are seen after SAPIEN TPV placement. Parameters of RV diastolic function improve immediately after TPV implantation, but return to baseline by 6 months. RV systolic function is unchanged.