Journal of Cardiovascular Magnetic Resonance

Poster presentation

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Patient-specific changes in rv function by CMRI in Tetralogy of Fallot patients prior to pulmonary valve replacement

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from 13th Annual SCMR Scientific Sessions
Phoenix, AZ, USA. 21-24 January 2010

Published: 21 January 2010

Journal of Cardiovascular Magnetic Resonance 2010, **12**(Suppl 1):P26 doi:10.1186/1532-429X-12-S1-P26

This abstract is available from: http://jcmr-online.com/content/12/S1/P26

Introduction

Survival rates for children with tetralogy of Fallot (TOF) following initial repair are excellent but susceptible to varying long-term outcome. Current management uses clinical and imaging parameters to determine need and timing for pulmonary valve replacement (PVR) surgery. At present, no consensus exists on the preferred protocol or best criteria. Clinical imaging studies, in the TOF population, have shown deterioration in ventricular function prior to surgery and improvement following surgery. However, few serial imaging studies prior to PVR have been published to date. In this IRB approved study, we investigated progression of ventricular function parameters in 31 children with TOF, who underwent serial (two or more) MRI studies.

Methods

We examined 31 patients (16 M, 15 F) in serial MRI studies post repair and prior to PVR. The patients at time of initial MRI were 2 to 21 years of age (mean 11) and 0.6 to 5.4 years (mean 3) between the first and last MRI scan. The following cardiac function parameters were evaluated for both ventricles: ejection fraction (EF), cardiac output (CO), end-diastolic volume (EDV), end-systolic volume (ESV), stroke volume (SV) and pulmonary regurgitation (PR). All values except EF were normalized to body surface area. The interval change amount was normalized by the time between studies to show change per year.

Results

Review of the serial studies showed (mean value) decline in cardiac function in most parameters in a direction consistent with known disease progression patterns in TOF. However, changes are not significantly different from zero for all parameters in these patients and measurements. We observed significant change in RVESV (p = 0.045), RVEDV (p = .003), RVSV (p = .017), and a PR (p = .016). Table 1 shows changes per year in all observed ventricular function parameters. Figure 1 shows a histogram of the

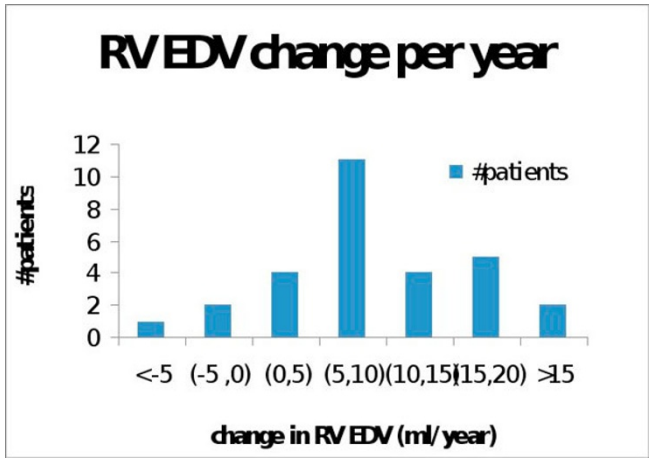

Figure 1
Histogram of the distribution of the changes (per year) in RVEDV for the 31 patients.

Table 1: Mean, Standard Error of the mean, and p-value of volumetric ventricular function parameters for MRI

	Mean	Standard Error	p-value
RV EF	-0.432	1.136	0.353
RV CO	0.143	0.138	0.155
RV ESV	3.575	2.011	0.043
RV EDV	6.657	2.199	0.003
RV SV	3.236	1.459	0.017
LV EF	-1.097	1.058	0.154
LV CO	-2.081	2.077	0.162
LV ESV	1.807	1.341	0.094
LV EDV	2.206	1.372	0.059
LV SV	0.260	0.739	0.364
RR	4.450	1.986	0.016

changes per year in RVEDV, where we found the highest significance in the change per year.

Conclusion

Serial MRI imaging is capable of showing an increase in volume load and decline in right ventricular function useful in monitoring disease progression in TOF post initial repair. The study supports the clinical significance of RVEDV as a more sensitive parameter for observing disease progression.