

Meeting abstract

Open Access

218 A cardiovascular mri derived energy model reliably differentiates severe idiopathic pulmonary hypertension from secondary pulmonary hypertension

Vikas K Rathi

Address: Allegheny General Hospital, Gerald McGinnis Cardiovascular Institute, Pittsburgh, PA, USA
from 11th Annual SCMR Scientific Sessions
Los Angeles, CA, USA. 1–3 February 2008

Published: 22 October 2008

Journal of Cardiovascular Magnetic Resonance 2008, 10(Suppl 1):A79 doi:10.1186/1532-429X-10-S1-A79

This abstract is available from: <http://jcmr-online.com/content/10/S1/A79>

© 2008 Rathi; licensee BioMed Central Ltd.

Introduction

In patients with long standing pulmonary hypertension (PH) the RV is the primary organ to withstand the increased pulmonary arterial pressure (PAP) which over-time leads to insidious RV failure. Despite the final common outcome of RV failure in PH, the RV remodels dissimilarly (hypertrophy vs. chamber dilatation).

Hypothesis

We hypothesize that 1) RV volumetrics and geometry will be different between idiopathic PH (iPH) vs secondary PH (sPH) 2) The Energy Model will predict differences between groups based on the internal and external energy expenditure.

Methods

Pts (32; 55 ± 16 yrs) with severe PH were divided in two groups: 10 pts with iPH and 22 with sPH. All pts underwent cardiac MRI (CMR) on a GE 1.5 T scanner, measuring 3D RV EDV, ESV, EF and mass index. The PAP was obtained from right heart catheterization performed ± 1 mo of CMR.

Results

All Pts had severe PH (63 ± 29 mmHg) with no difference in PAP between iPH vs. sPH (78 ± 22.8 vs 64 ± 22 , $p = \text{NS}$). The RV EDVi and ESVi were higher in iPH vs. sPH (138 ± 92 vs. 93 ± 44 ml/m² $p = 0.06$; 96 ± 82 vs. 52 ± 35 ml/m² $p = 0.04$ respectively). Both groups displayed similar RV hypertrophy (RVMi 36 ± 34 vs. 24 ± 10 gm/m²; $p = \text{NS}$). Despite higher volumes in iPH the two groups showed similar 3D geometry when assessed as a ratio of RVMi to RVEDVi (0.25 ± 0.07 vs. 0.28 ± 0.08 , $p = 0.4$). Using energy model, the baseline energy index (BEi) and total

work were significantly higher in iPH vs. sPH (4302 ± 4540 vs. 1978 ± 1291 , $p < 0.05$ and 7839 ± 6171 vs. 5123 ± 2440 , $p < 0.05$ respectively) whereas the external energy measured by Emax, stroke work and Eam were similar between the groups ($p = \text{NS}$) despite differences in the ESVi.

Conclusion

Surprisingly, RV remodeling is similar between iPH and sPH. Despite this, for the first time we have shown that *internal* energy use expressed in BEi is significantly higher in idiopathic vs secondary PH despite similar pulmonary pressures and at the expense of *external* energy. This suggests energy utilization or mechanical efficiency is superior in sPH. Whether this more fully explains the underlying pathophysiologic perturbation is unknown, yet it points towards a non-classical manner in which to more effectively differentiate the otherwise disparate disease entities.