

Oral presentation

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Myocardial scar in pulmonary hypertension: relationship to pulmonary hemodynamics, right ventricular function and remodeling

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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):O51 doi:10.1186/1532-429X-12-S1-O51

This abstract is available from: <http://jcmr-online.com/content/12/S1/O51>

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Introduction

Right ventricular (RV) functional and structural monitoring is important as a prognostic measure in pulmonary hypertension (PH) patients. Cardiac magnetic resonance (CMR) imaging is the standard of reference for RV anatomical and functional assessment. Using delayed enhancement (DE)-CMR, presence of myocardial scar in association with PH was typically described at the RV septal insertions. However, its etiology in relation to RV remodeling, altered regional mechanics and pulmonary hemodynamics has not been fully assessed.

Purpose

To identify predictors of scar burden at the RV septal insertions in PH patients.

Methods

We prospectively evaluated 38 patients with suspected PH with right heart catheterization (RHC) and CMR. 10 age-matched controls were included for CMR study comparison. Septal DE mass was quantified at the RV insertions. Systolic septal eccentricity index (EI), global RV function and remodeling indices were quantified using cine short axis images. Regional peak systolic circumferential (E_{CC}) and longitudinal (E_{LL}) strain were measured at the DE-

corresponding sites using conventional tagged and Fast strain encoding acquisitions respectively.

Results

PH was diagnosed in 32 patients. DE was noted in 31/32 PH patients and 1/6 suspected but absent PH patients (mean DE mass \pm SD = 4.6 g \pm 3.3 and 0.6 g \pm 1.5 for both

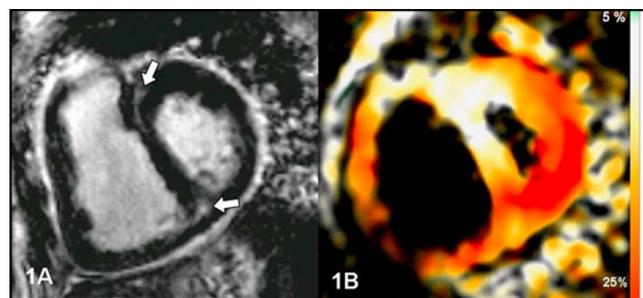


Figure 1
72 yr old PH patient (mPAP = 53 mmHg). 1A) GRE inversion recovery image demonstrating areas of LV DE at the basal anterior and posterior RV septal insertions (arrows). 1B) Corresponding peak systolic Fast-SENCE image demonstrating reduced E_{LL} at the anterior RV septal insertion (white) compared to posterior septal insertion (red).

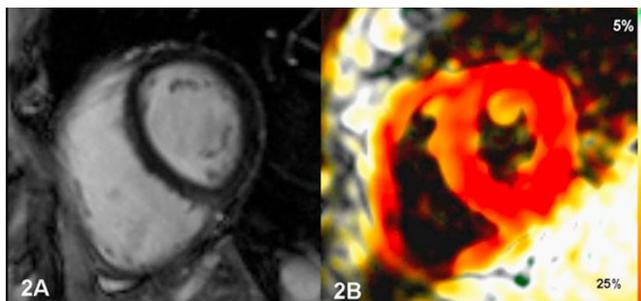


Figure 2
59 yr old non PH patient (mPAP = 18 mmHg). 2A) GRE inversion recovery image at the base of LV. 2B) Corresponding peak systolic Fast-SENSE image demonstrating normal E_{LL} at both RV attachment sites.

groups respectively, $p = 0.001$). No DE was detected in controls. DE was more prevalent at the posterior septal insertion (PSI) compared to the anterior septal insertion (ASI). DE mass correlated with reduced RV function and increased RV remodeling indices. DE mass was associated with reduced E_{LL} at the base ($r = 0.6$, $p < 0.01$) (Figure 1, 2). Similarly, it correlated with reduced EI ($r = -0.4$ for ASI-DE, $r = -0.5$ for PSI-DE, $p < 0.05$). Using multivariate regression including RV and LV mass indices, RV ejection fraction, EI and mPAP as parameters, RV mass index was an independent predictor of total DE mass ($\beta = 0.65$, $p < 0.001$). On regional analysis including: mPAP, RV mass index, EI, E_{LL} and E_{CC} as parameters, E_{LL} at the base remained an independent predictor of DE mass at the ASI ($\beta = 0.69$, $p = 0.002$), whereas, elevated mPAP was an independent predictor of DE mass at the PSI ($\beta = 0.4$, $p = 0.03$).

Conclusion

In PH, total scar burden at the RV septal insertions is predicted by measures of RV remodeling in response to increased RV after-load. Local scar mass at the ASI is associated with reduced regional longitudinal contractility at the base of the left ventricle.

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