

Poster presentation

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Simplified assessment of right ventricular function with cardiac MR using tricuspid annular plane systolic excursion in pulmonary arterial hypertension

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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):P283 doi:10.1186/1532-429X-12-S1-P283

This abstract is available from: <http://jcmr-online.com/content/12/S1/P283>

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Introduction

Right ventricular function (RVF) is a key prognostic factor in pulmonary arterial hypertension (PAH). While cardiac MRI is the gold standard for assessment of RVF, quantitative measurement is effort-intensive. Measurement of tricuspid annular plane systolic excursion (TAPSE) using echo is a simplified measure of RVF that correlates well with invasive hemodynamics, RVF, and predicts outcomes in PAH.

Purpose

We tested the hypothesis that MR measured TAPSE correlates with echo measured TAPSE and with invasively measured hemodynamics.

Methods

25 patients with suspected PAH were prospectively evaluated with same day right heart catheterization, cardiac MRI and transthoracic echo. Echo TAPSE was measured as the mean apical displacement (cm) of the lateral tricuspid annulus in the apical 4 chamber view. MR TAPSE was measured both as apical displacement (cm) of the coronary sinus (TAPSE Cor) and the midpoint of the tricuspid annulus (TAPSE TV) in horizontal long axis cine images. RV EF was calculated from 3D MR reconstructions using commercially available software (QMass, Medis Inc).

Results

TAPSE TV was moderately well correlated with echo ($r = 0.46$, $p = 0.02$) and RVEF ($r = 0.54$, $p < 0.01$). TAPSE Cor was similarly correlated with RVEF ($r = 0.49$, $p = 0.01$) and nonsignificantly correlated with Echo TAPSE ($r = 0.38$, $p = 0.06$).

All methods performed well to detect moderately depressed (<0.40) RVEF, with areas under the curve 0.87, 0.73 and 0.71 respectively for echo, TAPSE TV and TAPSE Cor. There was no significant difference in AUC between methods ($p = 0.56$). The optimum cutoff value to detect RVEF <0.40 was 1.65 cm for echo (LR + 5.1, LR - 0.18), 1.1 cm for TAPSE TV (LR + 4.42 LR - 0.32) and 1.2 cm for TAPSE Cor (LR + 2.2, LR - 0.40).

Both MR TAPSEs correlated moderately well with pulmonary vascular resistance index (TAPSE TV: $r = -0.43$, $p = 0.03$; TAPSE Cor $r = -0.40$, $p = 0.04$) and stroke volume index (SVI) (TAPSE TV: $r = 0.42$, $p = 0.04$; TAPSE Cor $r = 0.41$, $p = 0.04$). Echo TAPSE correlated well with mean PA pressure ($r = 0.70$ $p < 0.001$), PVRI ($r = 0.82$, $p < 0.001$) and SVI ($r = 0.64$, $p < 0.001$).

Conclusion

Both methods of MR TAPSE measurement correlate modestly well with previously validated echo methods and

with invasive hemodynamics. The cutoff values for MR TAPSE to predict moderate or greater RV dysfunction are lower than with echo.

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