Journal of Cardiovascular Magnetic Resonance

Poster presentation

Open Access

Assessment of the accuracy and reproducibility of right ventricular volume measurements in patients with congenital heart disease

Christopher J Clarke*, Patrick T Norton, Matthew J Gurka and Andrew W Hoyer

Address: University of Virginia, Charlottesville, VA, USA
* Corresponding author

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):P21 doi:10.1186/1532-429X-12-S1-P21

This abstract is available from: http://jcmr-online.com/content/12/S1/P21

Introduction

Quantification of right ventricular volumes is extremely important for the management of patients with congenital heart disease (CHD). Cardiac magnetic resonance (CMR) is widely considered to be the most accurate method for making such measurements. However, contour tracing of the RV entails uncertainty and arbitrary judgments.

Purpose

To determine if right ventricle (RV) volume measurements are more accurately and reproducibly measured by CMR in the axial orientation or in the short-axis orientation in patients with CHD.

Methods

Data from 24 patients (mean age 19 years; range: 0.2 to 51 years) with CHD who underwent CMR were reviewed. Patients with ventricular level shunts and more than mild tricuspid regurgitation were excluded. Cine steady state free precession imaging was acquired in stacked axial and short-axis slices. RV contours were traced manually. Argus software was used to compute the end systolic volume (ESV) and end diastolic volume (EDV) using Simpson's method, and stroke volume (SV) by subtracting ESV from EDV. RV SV was also measured directly by phase contrast (PC) imaging, acquired in the main pulmonary artery. Flow measurements were made using Argus software. Measurements were made twice by one skilled observer to assess intra-observer variability. A second skilled observer repeated these measurements in a blinded fashion to assess inter-observer variability. Agreement between PC SV and SV measured in the axial and short-axis planes was assessed using Lin's concordance correlation coefficient (CCC). Inter- and intra-observer variability was also assessed using Lin's CCC.

Results

The mean RV SV by PC was 68 mL/m^2 (range 23-141 mL/m^2), by axial 65 mL/m^2 (29-106 mL/m^2), and by short-axis 64 mL/m^2 (30-114 mL/m^2). The CCC for axial vs. PC was not significantly different than for short-axis vs. PC (0.80; 95%CI: 0.61-0.90 and 0.76; 95%CI: 0.55-0.88, respectively). There was not a significant difference in the inter-observer variability between axial and short axis methods (CCC = 0.97; 95%CI: 0.94-0.99 and CCC = 0.91; 95%CI: 0.80-0.96, respectively). Intra-observer variability was low and similar for both the axial and short axis methods (CCC = 0.96; 95%CI: 0.90-0.98 and CCC = 0.95; 95%CI: 0.88-0.98, respectively).

Conclusion

There is no difference in the accuracy or reproducibility of the two contour tracing methods. These results support performing RV volumetric analysis on the same short axis acquisition used to obtain left ventricular measurements, thus increasing efficiency by eliminating the time required for axial acquisitions.