Abstract: P614

Comparison of echo parameters with cardiac MRI in the assessment of Right ventricular function

Authors:
P Agasthi¹, NR Venepally¹, F Mookadam¹, CE Jokerst¹, F Marcotte¹, L Brown¹, OI Semkiv¹, P Wang¹, S Konduru¹, AR Fath¹, R Arsanjani¹, ¹Mayo Clinic - Phoenix - United States of America,

Topic(s):
Echocardiography: Systolic and Diastolic Function

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Introduction:

Systolic right ventricular (RV) function has prognostic significance both in acquired and congenital heart diseases. However accurate assessment of RV ejection fraction (EF) with transthoracic echocardiography (TTE) remains challenging due to the complex geometric shape of the RV. Magnetic resonance imaging (MRI) remains the gold standard modality for assessment of RV function; however the cost and availability limits the regular use of MRI in clinical practice. The RV strain measured by speckle tracking (RVS) is a novel method of assessing RV EF.

Purpose:

The purpose of the study was to assess the accuracy of RVS compared RV fractional area change (FAC%), tricuspid annular peak systolic excursion (TAPSE) and Doppler tissue imaging-derived isovolumic acceleration and peak systolic velocity (S’) at the lateral tricuspid annulus in the assessment of impaired RV EF.

Methods:

We retrospectively identified patients who had a cardiac MRI between 2012- 2017 and only included patients with a TTE within 1 month of the MRI for our final analysis. Baseline characteristics, TTE and MRI parameters were extracted from chart review. RV strain was measured retrospectively using ECHOINSIGHT software. Four TTE parameters including RVS, TAPSE, S’ and FAC% were tested for accuracy to identify impaired RV EF (defined as EF<45%) using receiver operator curves.

Results:

The study cohort included 500 patients with mean age 55 yr ± 18 and right ventricular systolic pressure 33.7 ± 13.6 mmHg. The proportion of female gender, diabetes, hypertension and obstructive sleep apnea were 38%, 15.6%, 43% & 19.8% respectively. The area under ROC for TAPSE, S’, FAC% and RVS were 0.58 (95% confidence interval [CI] 0.51-0.65, p=0.03), 0.59 (95% CI 0.52 – 0.66, p=0.03), 0.67 (95% CI 0.61-0.73, p=0.03) and 0.70 (0.64 – 0.76, p=0.03) for assessing RV EF < 45%.

Conclusion:

Right ventricular strain most accurately detected impaired right ventricular ejection fraction as obtained by MRI.
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