



ORAL PRESENTATION

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Non-invasive estimation of increased LV filling pressures in LV hypertrophy with normal systolic function: Comparison between CMR and Doppler, validated by invasive PCWP measurements

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Introduction

Transmitral flow is unreliable for the estimation of left ventricular (LV) filling pressures in hypertrophy and normal systolic function. Mitral early peak filling velocity E divided by mitral annulus early peak velocity Ea (E/Ea) and global diastolic strain rate (SR) during peak filling provide a relatively load independent measurement of global myocardial performance.

Purpose

We aimed to compare Doppler and cardiovascular magnetic resonance (CMR) assessed E/Ea and non-tagged CMR assessed global diastolic SR for the estimation of filling pressure, in comparison with invasive measurement.

Methods

Sixteen patients with hypertensive heart disease (LV mass index: 111 ± 18 g/m²), absence of valvular regurgitation and with normal systolic function (LV ejection fraction: 67 ± 7 %) referred for cardiac catheterization were studied. Measurement of mitral flow and mitral annulus velocities were performed by Doppler and phase-contrast CMR. CMR derived global longitudinal and global volumetric SR during early peak filling was measured using long-axis cine CMR images. These data were validated by catheter based mean pulmonary capillary wedge pressure (PCWP).

Results

Mitral flow E/A had no significant correlation with mean PCWP. E/Ea (Doppler $r = 0.74$, $p < 0.01$ and CMR

$r = 0.56$, $p < 0.05$), longitudinal diastolic SR ($r = 0.65$, $p < 0.01$) and long-axis volumetric diastolic SR ($r = 0.51$, $p < 0.05$) related to invasively measured mean PCWP.

Best prediction of elevated mean PCWP was performed by Doppler assessed E/Ea (sensitivity 75%, specificity: 100%, area under the curve: 0.88, $p < 0.05$). CMR assessed E/Ea, longitudinal volumetric diastolic SR and long-axis volumetric diastolic SR had similar sensitivity (respectively 75%, 87.5 % and 75 %), specificity (respectively 75%, 62.5 % and 87.5 %) and area under the curve (respectively 0.80, 0.80 and 0.80, $p < 0.05$) for the prediction of elevated mean PCWP.

Conclusions

Non-invasive estimation of increased LV filling pressures in LV hypertrophy with normal systolic function can be performed with CMR and Doppler techniques. Doppler assessed E/Ea provided best prediction of elevated LV filling pressure.

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