Echocardiographic Assessment of Left Ventricular Filling Pressures Using Data from Invasive Left Ventricular Filling Pressures in Patients with Normal Left Ventricular Ejection Fraction

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Introduction: The aims of this study were to assess the accuracy of multiple echo parameters of diastolic dynamics and the 2016 ASE/EACVI algorithm to detect elevated invasive LV diastolic pressures in patients with normal ejection fraction; the accuracy of the 2016 algorithm was compared to that of a newly derived algorithm.

Methods: Patients (n=120) underwent left heart catheterization and coronary angiography for chest pain due to suspected coronary artery disease. Transthoracic echocardiography and LV pressure recordings were simultaneous. Receiver-operating characteristic curves were constructed to define optimal cut points for multiple echocardiographic parameters. Five were selected for new algorithm to estimate LV diastolic pressures: velocity of tricuspid regurgitation (> 280 cm/s), average e' (Av e'< 9), average E/e' ratio (AvE/e'>13), velocity of pulmonary vein A wave reversal (PV ArV > 32 cm/s) and left atrial volume index (LAVi >32 ml/m2). The accuracy of the algorithm was examined for a LV pre-A >12 mmHg and LV end diastolic pressure (LVEDP) i.e. post-A >15 mmHg.

Result: Patients (n=120) underwent left heart catheterization and coronary angiography for chest pain due to suspected coronary artery disease. Transthoracic echocardiography and LV pressure recordings were simultaneous. Receiver-operating characteristic curves were constructed to define optimal cut points for multiple echocardiographic parameters. Five were selected for new algorithm to estimate LV diastolic pressures: velocity of tricuspid regurgitation (> 280 cm/s), average e' (Av e'< 9), average E/e' ratio (AvE/e'>13), velocity of pulmonary vein A wave reversal (PV ArV > 32 cm/s) and left atrial volume index (LAVi >32 ml/m2). The accuracy of the algorithm was examined for a LV pre-A >12 mmHg and LV end diastolic pressure (LVEDP) i.e. post-A >15 mmHg.

Conclusion: Simultaneous recordings of LV diastolic parameters and invasive LV pressures in a homogenous cohort confirmed that no single echocardiographic parameter can accurately assess LV diastolic pressures. Importantly, left ventricular diastolic pressures in patients with a normal LVEF were fairly reliably assessed by the 2016 guidelines. The new algorithm improved the accuracy of detecting abnormal LV filling pressures.