

Evaluation of left ventricular filling pressure by echocardiography: incremental diagnostic information from left atrial strain

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Background: Elevated left ventricular (LV) filling pressure is an important diagnostic feature of heart failure.

Objectives: To investigate determinants of left atrial (LA) reservoir and pump strain and if these parameters may serve as markers of LV filling pressure.

Methods: In a multicenter study of 322 patients with cardiovascular disease of different etiologies, LA strain by speckle tracking echocardiography was compared to conventional echocardiographic markers using invasive pressure as reference.

Results: Left ventricular filling pressure correlated well with LA reservoir and pump strain (r-values

-0.52 and -0.57, respectively) (Figure). However, LV global longitudinal strain (GLS) was the strongest determinant of LA reservoir strain ($r = 0.64$), and correlated well with LA pump strain ($r = 0.51$). For both LA strains, association with filling pressure was strongest in patients with reduced LV ejection fraction. In patients with normal GLS ($\geq 18\%$), atrial strains provided no information regarding filling pressure (Figure). Reservoir strain $< 18\%$ and pump strain $< 8\%$ predicted elevated LV filling pressure better ($p < 0.05$) than the conventional indices LA volume, ratio of mitral early filling velocity/annular velocity and tricuspid regurgitation velocity. Accuracy to classify filling pressure as normal or elevated was 75% for both LA strains. When any one of the conventional indices were missing, and were replaced by LA strains, the combination of indices had accuracy 82% to correctly classify filling pressure.

Conclusions: Left atrial reservoir and pump strain may serve as clinical markers of LV filling pressure, but will be useful predominantly in patients with reduced systolic function. Due to limited diagnostic accuracy, LA strain should be used in combination with other indices.

Abstract Figure

