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Incremental Value of Left Atrium Two-Dimensional Strain in Patients with Heart Failure

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Left atrial (LA) size and function is an important determinant of cardiovascular morbidity and mortality. Assessment of LA strain using two-dimensional speckle tracking imaging or velocity vector imaging has been recently introduced for the quantification of regional and global LA deformation. Furthermore, LA strain measurement has been proposed as an alternative method for the estimation of left ventricular (LV) filling pressure (1, 2). Decreased LA strain has been correlated with increased left ventricular end-diastolic pressure (1, 3). Cameli et al. (4) demonstrated that in a group of patients with advanced systolic heart failure, E/Em ratio correlates poorly with invasively obtained LV filling pressures. Nevertheless, LA longitudinal deformation analysis by speckle tracking imaging correlates well with pulmonary capillary wedge pressure, providing a better estimation of LV filling pressure in this particular clinical setting.

Recent studies have shown the clinical importance of LA strain in atrial fibrillation, LV systolic and diastolic dysfunction, mitral valve disease, and cardiomyopathies (4, 5). In this issue of the journal, Esmaeilzadeh et al. present interesting data regarding the usefulness of LA 2D strain measurement via velocity vector imaging in LV systolic heart failure patients. They found substantially low 2D LA strain in systolic heart failure patients compared with normal subjects and demonstrated a significant relationship between LA strain and degree of diastolic dysfunction in patients with systolic heart failure. The investigators suggested that a cut-off value of total average LA strain $\geq 23.28\%$ can differentiate between normal and abnormal LA function with sensitivity of 93% and specificity of 100%. The study in question, however, does not mention the effect of other confounding factors such as hypertension and diabetes on LA 2D strain. Mondillo et al. (6) reported reduced peak atrial longitudinal strain in patients with hypertension (29.0 ± 6.5%) and those with diabetes (24.7 ± 6.4%) in comparison with controls (39.6 ± 7.8%). Additionally, they demonstrated that the reduction was more pronounced in patients with both diabetes and hypertension and concluded that LA deformation mechanics are impaired in patients with a normal LA size who have hypertension or diabetes. Dogan et al. (7) confirmed that LA strain has a significant correlation with LV ejection fraction (r = 0.51, P value = 0.001). The authors also reported a significant inverse correlation between LA strain and B-type natriuretic peptide (BNP) level (r = -0.41, P = 0.001) in acute ST-elevation patients.

It is, however, worthy of note that different software packages and echocardiography machines are liable to yield different results, rendering the cut-off values incomparable.

It seems reasonable to conclude that LA 2D strain is a useful noninvasive tool for the evaluation of LA function in patients with systolic heart failure in as much it correlates well with diastolic dysfunction and LV filling pressure.

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Left atrium 2D strain is a useful noninvasive method for quantification of regional and global LA deformation.

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