

Editorial Comment

The Pivotal Role Of Studying The Left Atrium By Speckle Tracking In Heart Failure

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The principal role of the left atrium (LA) appears to be the adjustment of the left ventricular (LV) filling and cardiovascular performance. It achieves this by functioning as a reservoir for pulmonary venous return during ventricular systole, a conduit for pulmonary venous return during early ventricular diastole, and a booster pump that increases ventricular filling during late ventricular diastole.¹

Thus, it is important to understand the tight interrelationship that exists between atrial function and myocardial performance throughout the cardiac cycle. There is increasing recognition of the importance of LA size and function as a marker of cardiovascular outcomes.¹⁻² The first index used is LA size, measured by 2-dimensional echocardiography (2DE). Maximal LA volume indexed to body surface area is most strongly associated with cardiovascular disease and is the most sensitive in predicting cardiovascular outcomes.³

LA function is most often assessed echocardiographically using volumetric analysis, together with spectral Doppler evaluation of transmitral, pulmonary venous, and LA appendage flow and tissue. Doppler and deformation analysis (strain and strain-rate imaging) are used to evaluate the function of the LA body.¹ In particular, 3D speckle-tracking echocardiography (STE) can readily analyze myocar-

dial deformation, including the evaluation of the LA endocardial area. Overcoming limitations that exist in 2DSTE, (Figure 1), 3DSTE allows a detailed evaluation of LA function through volumetric measurements and strain analysis.¹

Concerning 2DSTE, we recently reported that there is a lack of standardization of the acquired data among different manufacturers. Although the results for global longitudinal systolic strain were comparable, with almost the same normal cutoff values, the evaluation of segmental systolic strain, especially in the basal segments, must be viewed with caution.⁴

A direct comparison of the accuracy of 3D and 2DSTE for the assessment of LA volume and function revealed that 3DSTE was superior.⁵

LA evaluation remains crucial in the prediction of the development of heart failure, irrespectively of systolic function. If heart failure is established, then atrial size and function are a powerful predictor of clinical outcomes, especially in patients with dilated cardiomyopathy.¹ LA dimension was a significant predictor of mortality and hospitalization for congestive heart failure in patients enrolled in the SOLVD study.¹

Several studies support the pivot role of left atrial volume indexed to body surface area (LAVi) as an independent predictor of cardiac events and hospitalizations in heart failure patients.⁶ LA en-

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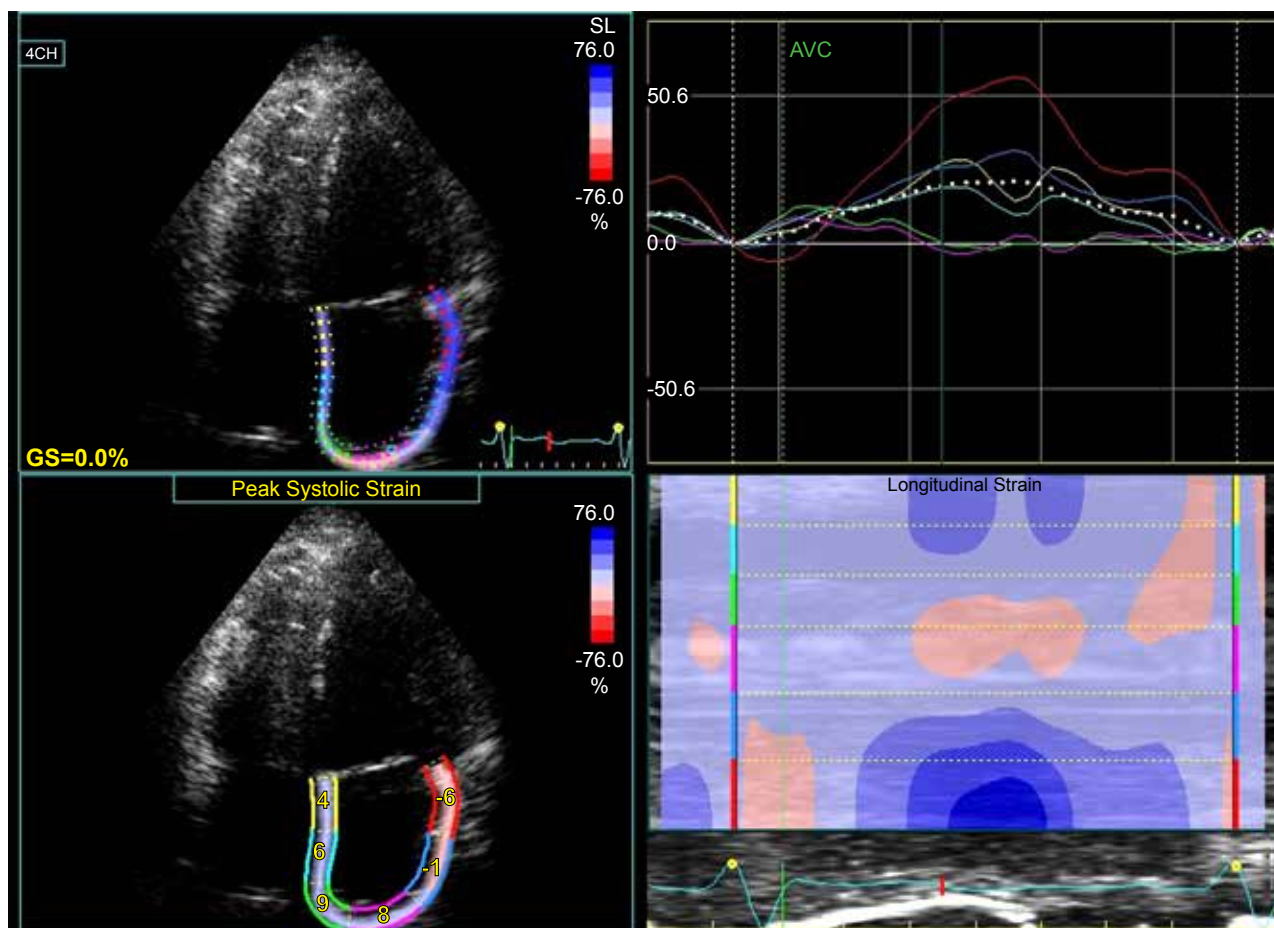


Figure 1. Illustration of 2D strain of the left atrium in a patient with heart failure

largement is also a marker of disease severity and predicts adverse cardiovascular events in patients with hypertrophic cardiomyopathy (HCM). HCM patients with LAVi >34 mL/m² had a significantly higher incidence of serious cardiovascular events than those with a smaller LAVi, but also had greater hypertrophy and more diastolic dysfunction.⁷

The study by Nemes et al in this issue of the HJC⁸ assessed LA volumes as well as volumetric and strain-based functional properties by 3DSTE in patients with noncompaction cardiomyopathy (NCCM). Left ventricular noncompaction, or “spongy myocardium”, is a rare congenital cardiomyopathy that can be diagnosed at any age. It is characterized by a thin, compacted epicardial layer and an extensive non-compacted endocardial layer, with prominent trabeculation and deep recesses that communicate with the left ventricular cavity but not with the coronary circulation, probably due to an arrest of compaction during intrauterine life. It can be isolated or associated with

other congenital diseases. Although there is no consensus on the diagnostic criteria, echocardiography is the main diagnostic tool.⁹

In 2001, Jenni et al proposed criteria based on an end-systolic ratio of non-compacted to compacted layers greater than 2. The segments involved are mid-ventricular (especially inferior and lateral) and apical, with color Doppler evidence of direct blood flow from the ventricular cavity into deep intertrabecular recesses.¹⁰

The MAGYAR-Path study is the first study to assess LA volumes and volumetric and strain-based functional properties by 3DSTE in patients with NCCM. LA ejection force was found to be increased in NCCM patients, while a reduced active atrial emptying fraction could be demonstrated during LA contraction. Moreover, all calculated LA volumes proved to be increased, while LA emptying fractions with respect to the cardiac cycle were decreased in NCCM patients, demonstrating significant alterations in all

LA functions. During strain analysis, all peak global and mean segmental strain parameters were lower in NCCM patients, confirming changes in LA reservoir function. These LA parameters showed a correlation with cardiac outcomes, despite the small number of patients included in the study.

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