In the prediction of the risk of cardiovascular events, the role of the left ventricle (LV) has been established for a long time, in the general population and especially in patients with heart failure. LV dimensions and systolic function, the latter mainly expressed as ejection fraction, were the first variables investigated; over the years, the role of predictors of cardiovascular outcomes has been extended to an increased LV mass (ie, hypertrophy) and altered chamber geometry, to an increase in stiffness and parallel reduction in filling properties (diastolic dysfunction), and more recently, to subclinical alterations of systolic function (myocardial strain and strain rate), in an attempt to identify predictors of risk at an early stage of dysfunction, when ejection fraction may still be normal.

The opinions expressed in this article are not necessarily those of the editors or of the American Heart Association.

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Circ Cardiovasc Imaging is available at http://circimaging.ahajournals.org

DOI: 10.1161/CIRCIMAGING.116.004494
known as diastolic heart failure or heart failure with preserved ejection fraction), moderate diastolic dysfunction was present in only one third of cases, a proportion that was slightly but not significantly higher than that observed in hypertensive or even healthy individuals. Even so, heart failure patients did show significant LA dilatation and LAEF impairment compared with the other subgroups; however, there was no possibility to separate patients with heart failure and preserved LV ejection fraction from others. LA volumes and function may be affected differently in systolic and diastolic heart failure, especially when phasic volumes are considered. LA minimum (diastolic) volume has been shown to be more strongly associated with LV diastolic dysfunction,11 which seems reasonable given the fact that the atrium is directly exposed to the LV pressure during diastole, when the mitral valve is open. In Gonçalves et al’s article, LA minimum volume was strongly associated with LAEF in the entire study group, whereas LA maximum (systolic) volume was not associated with LAEF when pertinent covariates were taken into account (Table 2). LA minimum volume was the strongest correlate of LAEF in every diagnostic subgroup, whereas LA maximum volume was associated with LAEF only in hypertensive individuals and to a lesser degree than the minimum volume (Table 3). Evidence has been accumulating that LA minimum volume may be a better predictor of outcome than the traditionally used maximum volume. LA minimum volume has been shown to be a better predictor of the development of atrial arrhythmias than the maximum volume;12,13 also, LA minimum volume has been shown to be more strongly associated than maximum volume with subclinical cerebrovascular disease detected by brain magnetic resonance imaging,14 providing an initial indication of its possible role as a stronger predictor of outcomes. The use of LA phasic volumes, and especially of the minimum volume in addition to the traditionally used maximum volume, is one of the important methodological aspects that the article by Gonçalves et al indirectly supports.

The study has some limitations that are inherent to the composition of the study cohort and to the study design and are, therefore, unavoidable. The older age of the studied cohort is at the same time an advantage and a limitation. If, on one hand, it allows the study of the variables of interest in the elderly, the age group that has the highest frequency of risk factors and cardiac abnormalities and the highest risk of heart failure development, on the other hand, it prevents the full appreciation of the effects of age on the variables under examination. Because of the race-ethnic composition of the study population (85% white), the generalization of the results to populations with a larger representation of minorities, and potentially different risk factors profiles, may not be possible. More importantly, as the authors remind us, this is a cross-sectional study and is, therefore, in the condition to suggest associations between variables, but not to establish causality, and to suggest, but not prove, the predictive value of the examined echocardiographic parameters for cardiovascular disease. In the end, the success of newer diagnostic modalities, such as 3-dimensional echocardiography, will lie in how much they can improve on what is already available. In the specific, 3-dimensional echocardiography has been shown to be more accurate than 2-dimensional echocardiography for LA volume determination18–20, the challenge will be to demonstrate that it can also perform better in the prediction of cardiovascular outcomes. The best echocardiographic variables, or combination thereof, will have to be defined from a host of available candidates of both atrial structure and function (phasic volumes; LAEF; LA global longitudinal strain), and their actual predictive power for clinical outcomes will have to be established in appropriately designed outcome studies. If 3-dimensional echocardiographic imaging of the LA is to become a risk-stratification tool in individual patients, age- and sex-specific cutoffs of increased risk will have to be defined for the best predictive parameters. When those conditions are met, 3-dimensional assessment of LA structure and function may well become an invaluable tool for refining the prediction of cardiovascular risk.

Disclosures

None.

References


Key Words: Editorials ▪ cardiovascular disease risk factors ▪ heart failure ▪ heart ventricles ▪ left atrium ▪ myocardium

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Left Atrial Morphology and Function: The Other Side of Cardiovascular Risk
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doi: 10.1161/CIRCIMAGING.116.004494

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