

Left atrial function: the HbA1c for the cardiologist and even more

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This article refers to ‘Measures of left atrial function predict incident heart failure in a low-risk general population: the Copenhagen City Heart Study’ by D.M. Andersen *et al.*, published in this issue on pages 483–493.

The left atrium plays an important role in facilitating left ventricular filling by acting as a reservoir, passive conduit, and active booster pump, as well as a regulator of blood volume. Since the 90’s epidemiological data have shown consistently the prognostic importance of left atrial (LA) size even by using simple linear measurements.¹ At present, several parameters are readily obtainable by echocardiography for the quantification of LA function. These include, LA volumes, ejection fraction, expansion index, LA reservoir strain, and booster strain.^{2,3}

Should we move forward for a combination of LA volume and function in every single echocardiography report? From a pathophysiological standpoint these two are tightly coupled and describe the progression of LA cardiomyopathy.⁴

Indeed, increasing number of studies provide evidence in favour of using many of these metrics as an integral part of the echo report. Impairment of LA reservoir strain is the earliest abnormality that can be detected by echocardiography in the spectrum of atrial cardiomyopathy.^{3,5–7} It is easy to measure, reproducible and clearly associated with the risk of major clinical endpoints like cardiovascular hospitalization.

In this issue of the Journal, the study by Andersen *et al.*⁸ is underscoring minimal indexed LA volume (LAVImin) as a predictor of heart failure development. LAVImin is a simple parameter to obtain by manual measurement or by automated contouring (also required for the speckle tracking analysis mentioned below) from most patients seen in the echo-labs. Olsen *et al.*⁵ recently published the changes in LA sizes over a decade in the Copenhagen City Heart Study with an excellent reproducibility of the measurements. Others have demonstrated that LAVImin is correlated with capillary wedge pressure and with the occurrence of dyspnoea. The large cohorts like the one of Andersen *et al.*⁸ are worth being

highlighted. It has not always been so clear how an imaging tool could be used as a relevant biomarker for risk prediction in the general population. In 347 patients with heart failure with preserved ejection fraction, Shin *et al.*⁹ recently reported that LAVImin was more predictive of cardiovascular outcome than indexed maximal LA volume. LAVImin is supposed to better reflect left ventricular filling pressures. E/e’, which is a widely adopted parameter in clinical practice, is considered as a ‘competitor’ to LAVImin. Their respective prognostic value was close.

We would like to thank deeply the authors for the presented results from a large epidemiological study, the Copenhagen City Heart Study, which is a tremendous contribution demonstrating that LA size and function are fundamental parameters in the assessment of clinical outcomes.⁸ LAVImin has been proposed previously as an important parameter for assessing left ventricular filling pressure and clinical outcomes, yet its use has not been included in the guidelines so far as an indicator for these purposes. The relationship between LAVImin and the prognosis is linear. It is difficult to set a single cut-off value because the cut-off is changing as far as the goal is a moving target including the prediction of atrial fibrillation development, success of ablation, embolic stroke, heart failure development and mortality. From this perspective it could be more appropriate to think about the continuum of the LA remodelling process and place LAVImin to its due position in the process (Figure 1).

Left atrial strain has been reported as a ‘biomarker’ for predicting global cardiovascular risk and also for predicting the risk of atrial fibrillation and the risk of thromboembolic stroke.^{3,10–12} There are very demonstrative studies about the value of LA strain and the risk of developing atrial arrhythmias.¹³ Others are not less demonstrative about the value of LA strain in regard to the characterization of diastolic function. A recent consensus document of the European Association of Cardiovascular Imaging (EACVI) on heart failure with preserved ejection fraction is advocating the use LA strain.¹⁴ Thus, LA strain is not anymore limited to the research ground, it is an integral part of assessing myocardial mechanics and

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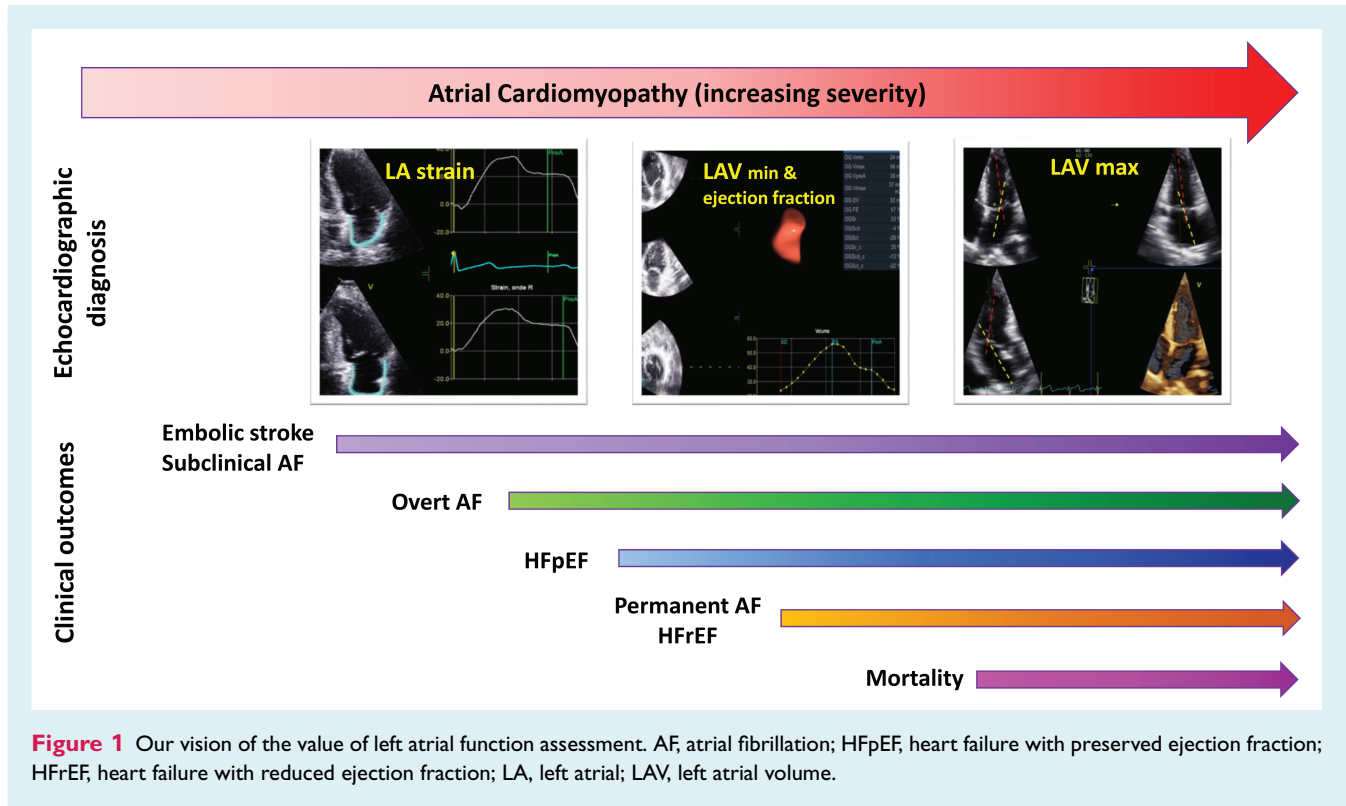


Figure 1 Our vision of the value of left atrial function assessment. AF, atrial fibrillation; HFpEF, heart failure with preserved ejection fraction; HFrEF, heart failure with reduced ejection fraction; LA, left atrial; LAV, left atrial volume.

haemodynamics. LA strain has been reported to correlate better with capillary wedge pressure than the classical E/e' as mentioned above¹⁵ (Figure 1).

How this evidence fits in our clinical practice? The measurement of LA strain has been the object of a EACVI/American Society of Echocardiography consensus paper.¹⁰ The measurement is easy to perform but mainly on the most advanced echo-machines. But it could be still a challenge and a matter of time for most practitioners who are busy making a lot of measurements. Could we move forward for a systematic measurement of LA strain as well as volumes by means of artificial intelligence that is progressively penetrating in our daily clinical practice? Probably yes, because we need to report on the left ventricular ejection fraction and also on left ventricular global longitudinal strain. Softwares that are used for the left ventricle and the left atrium are about the same and the speckle tracking technology is becoming mature enough on most echo-machines for automated or semi-automated quantification.^{16–18} Still the operator should be able to control the computer but most of the work could be undertaken automatically by the machine. So, the future of LA quantification is bright. The value of assessing LA has been demonstrated in large populations consistently as in the study of Andersen *et al.*,⁸ and we have tools that are becoming robust enough to integrate the data into clinical practice.

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