EDITORIAL

Left Atrial Speckle Tracking: The Importance of Rest and Stress Measurements!

Speckle tracking auricular izquierdo: importancia de las mediciones en reposo y estrés!

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The role of left atrial (LA) function and volume in the evaluation of left ventricular (LV) diastole, also described in the most recent European and American recommendations (1), has become fundamental in all cardiac pathologies. (2)

USE OF STRAIN IN THE EVALUATION OF ATRIAL FUNCTION

Atrial function, with its three different phases (reservoir, conduit and pump during atrial contraction), is related to the risk of stroke in atrial fibrillation (AF), (3, 4) heart failure, ischemic disease and also in Tako-tsubo syndrome. (5) Many efforts have been made to measure its function with several methods such as LA strain and strain rate by speckle tracking echocardiography (6), and also to detect LA appendage stunning after cardioversion for atrial fibrillation. (7, 8)

These studies already defined the normal values for LA strain and strain rate in healthy subjects (6) indicating the usefulness of LA function and diastolic dysfunction as early predictors of cardiovascular events. However, very limited data is currently available on the effect of stress on LA strain. (9)

In the light of these studies the paper from Zertuche et al. (10) is very interesting, since it manages to describe the reference value of LA longitudinal strain at rest and during peak exercise stress echo in healthy subjects and to analyze the relationship between deformation and E/e' ratio to determine changes in atrial stiffness.

In these 29 healthy subjects they analyzed strain curves in the atrial reservoir phase at rest and at the maximum load attained during exercise (since it was the most representative and reproducible), and in addition, they calculated indexed biplane atrial volumes and the E/e' ratio to obtain atrial stiffness indexed values. One of the interesting points of this work is the completeness of diastolic function data and the capability to measure indirectly atrial stiffness using the E/e' ratio and atrial strain values. The analysis of LA strain curves in the reservoir phase was performed in 12 segments, 6 in 4-chamber view and 6 in 2-chamber view, both at rest and during stress exercise, as shown in a very good representative figure.

They found that the mean LA reservoir deformation had a significant increase during exercise (44.9±7.8 % at rest vs. 58.9±9.4 % at maximum load with $p < 0.0001$), which was different from the E/e' ratio and the atrial stiffness values. Furthermore they demonstrated that the assessment of the LA reservoir function at rest and during exercise stress was feasible and reproducible, with a valuable small intraobserver and interobserver variability (2.2±1.6% and 6±7%, respectively, at rest).

Although atrial function can be assessed using volumetric, spectral or tissue Doppler imaging, or speckle tracking techniques, LA indexed volume remains currently the basis of remodeling evaluation and is a powerful prognostic tool, especially in young or healthy patients with risk of developing atrial fibrillation, such as athletes or individuals with hypervagotonia. Compared with assessment of atrial strain, volumetric measures of LA function may be limited by lower sensitivity in early disease stages and in this context the development of three-dimensional techniques such as 3D transesophageal echocardiography could improve morphology, geometry and atrial volume evaluation. (11) Furthermore Mochizuki et al. showed that 3D is more sensitive than 2D speckle tracking in the assessment of LA longitudinal dysfunction detection in patients with paroxysmal atrial fibrillation, even in the absence of LA morphologic changes. (4)

DIASTOLIC STRESS TESTING

Moreover, according to the latest recommendation of the echocardiographic evaluation of LV diastolic function, diastolic stress testing would not be indicated in patients with completely normal diastolic function at rest. However, testing of these patients can be valuable to assess the incremental value of newer candidate indices such as LV end-diastolic volume reserve or LV deformation.

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In addition, patients with normal LV diastolic function at rest can also increase LV filling pressures when exercising; thus, the study of atrial function could help to stratify the risk of these patients. (9) In the prospective international study "Stress echo 2020" (12), one of the principal aims is to assess the prognostic value of stress echo indices for the prognostic stratification of heart failure with preserved ejection fraction, and in this scenario the analysis of strain deformation both for the left atrium and the left ventricle could be a great parameter to stratify the risk of patients on the initial examination and also during follow-up.

Although it is already known that a decrease of ventricular contractile reserve assessed by strain, with either pharmacological or exercise stress echo, plays an important prognostic role in different scenarios, such as heart failure with preserved ejection fraction, coronary artery disease and heart valve disease, there are few data regarding atrial strain during exercise. In the present interesting study the authors showed that the assessment of the LA reservoir function at rest and during exercise stress was feasible and reproducible in healthy subjects, with a significant increase of strain values but without changes in atrial stiffness with exercise. (10)

However some minor limitations of the study can be observed in the population included. Since all patients performed a stress echo, part of the patients could have been affected by early stages of ischemic heart disease. Moreover, there are several technical difficulties in measuring LA speckle tracking due to the difficulty in tracking the left atrium borders at 1 mm from the mitral valve annulus, and manually adjusting the width of the region of interest to cover atrial wall thickness. This is also described by Zertuche rt al., where they failed to measure LA speckle tracking in 5 over 34 patients (3 at rest and 2 during exercise), with the exclusion of 14.7% of the sample population from the final analysis, due to technical reasons.

FUTURE PERSPECTIVES

Although there are numerous parameters derived from 2D echocardiography to evaluate atrial function, the use of speckle tracking could afford added value in the stratification of patients at higher risk of developing dysfunction or atrial remodeling. Moreover, such techniques as 3D transesophageal technique or cardiac magnetic resonance with tissue tracking deformation (13) could provide important information of LA morphology, geometry and function. (12) However, future studies are needed to evaluate the applicability of these parameters in clinical settings, especially during the execution of stress tests

Conflicts of interest

None declared.

(See authors' conflicts of interest forms on the website/Supplementary material).

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