Editorial Comment

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Analysis of Two-Dimensional Strain in Hypertrophic Cardiomyopathy

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The Hypertrophic Cardiomyopathy (HCM) is an inherited disorder characterized by myofibrillar disarray with chaotic alignment of myofibrils, disruption of structural architecture of the myocardium, deposition of intercellular matrix and irregular replacement by fibrosis, with considerable phenotypic heterogeneity in distribution and magnitude of the left ventricular hypertrophy, leading to local disruptions of the contractile function of this chamber.

The myocardium is a single muscle band that wraps in the form of recurrent spiral with their ends anchored in the pulmonary and aortic rings, respectively. This arrangement explains how contraction and relaxation occur - myocardial strain - which occur with high mechanical efficiency. This myocardial strain studied in the article published in this issue of the Journal by Parro Junior et al.[1], in its longitudinal component - which measures the percentage of apical displacement of the mitral annulus during systole - is around 20-25% in normal individuals, in absolute values[2.]

The strain is a clinical index for assessing the myocardial strain introduced and subsequently validated by using sonomicrometry and MRI[3-5.] It was established as the percentage of change in length of a myocardial segment in relation to the length of that segment at the end of diastole, and is expressed in percentage. In the myocardium a progressive increase of the strain occurs longitudinally to the fiber during systole, peaking at the end of this phase of the cardiac cycle. It is also known that there is a strain gradient from the base up to the apex of the left ventricle in healthy individuals[2,6.]

Initially assessed by echocardiography in the recent past by means of tissue Doppler, it was recently introduced the measurement by speckle tracking technique derived from the two-dimensional mode, which uses the tracking of natural acoustic markers existing in the myocardium *(speckles)* during one cardiac cycle. The main advantage being the fact that the strain by *speckle tracking* (2DS) is not an angle-dependent method like all methods derived from Doppler - as the strain measured by tissue Doppler - allowing evaluating not only the longitudinal component but also the radial and circumferential components, in addition to myocardial twist. It also demonstrates excellence in determining overall systolic function of the left ventricle, with great correlation with the ejection fraction obtained by Simpson's method (r = 0.82)[7.] Among its limitations is the imperative need for a good quality acoustic window, the use of relatively low frequency of pulse repetition (*frame rate* between 40 and 80 fps) with consequent impossibility to perform in individuals with elevated heart rate[2,6-8.]

In his article, Junior Parro et al.[1] analyzed the use of 2DS to evaluate patients with HCM, corroborating data obtained by Serri et al.[9], Afonso et al.[8], among others, [10,11] on the usefulness of the technique in detecting reduced overall longitudinal stain of the left ventricle as an early marker of systolic function impairment of the left ventricle, even in the presence of normal ejection fraction.

Another interesting data of the article in question is the demonstration of localized reduction of stain in the segments affected by hypertrophy, notably the septal region, in agreement with other studies[10,12.13.] The exception was the HCM, in its apical form, in which Parro et al. did not demonstrate reduction of regional stain. This may be due to, as noted by the author, the small number of patients with this form of HCM in their casuistry, and more, the 2DS technology used by them, as there are reports in the literature of regional reduction of stain, also in the apical form [8.]

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It was also demonstrated that HCM patients, unlike healthy individuals, show no strain gradient from the base up to the apex of the left ventricle, serving this data, as well as the previous ones, as a further differentiation between HCM, secondary hypertrophy (to arterial hypertension, for example), and athlete hypertrophy. In a very interesting work, [8] the 2DS was able to differentiate these forms of hypertrophy from each other, proposing also a cut-off value for the overall longitudinal stain of 11.5% (absolute value), below which we would be facing a HCM patient, ruling out other forms of hypertrophy, with specificity greater than 99% and sensitivity between 50 and 57%.

As possible issues to this work are the fact that part of its casuistry of HCM patients, although with normal ejection fraction, were symptomatic (NYHA functional class II and III in 24.8%), or had associated arterial hypertension, diabetes mellitus, and / or coronary artery disease, which can also present changes in the values of longitudinal stain in isolation, regardless of the presence of HCM; in addition to the fact that some individuals were taking drugs (diuretics, ACE inhibitors, beta blockers, and calcium channel blockers). Another extremely important data not mentioned in the study are the parameters that were used in the acquisition of images, such as average frame-rate and total number of segments capable of analysis and how many individuals were excluded for impossibility of evaluating the strain, such data being capable of interfering on or even hampering the assessment of the overall strain accurately.

Currently, functional parameters provided by new techniques, in parallel with morphological data, have an important role in therapeutic making decisions, and Parro Junior et al.[1] have merit in showing elegantly the efficacy of this new technology of assessment of myocardial function, derived from two-dimensional echocardiography as a tool for investigating early involvement of this function in HCM patients. Combine to this the fact that echocardiography is a low cost method with great portability, and thus we are facing a huge potential.

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