EDITORIAL

The Dawn of Third-generation Stress Echocardiography?

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In this edition of the *Journal*, Jorge Lowenstein et al. indicate the possible way to third generation stress echocardiography. (1) The authors used three tools together during the realization of the unique stress echo with dipyridamole potentiated with atropine to evaluate three different objectives: the bidimensional echocardiogram (2D echo) for the semiquantitative evaluation of the regional wall motion analysis, supported by the habitual practice, and at the same time qualitative and subjective, colour pulsed Doppler for the evaluation of the coronary reserve in the anterior descending artery (ADA) and the strain 2D for the expected quantitative evaluation of the left ventricle longitudinal function. All this in only one imaging test which is fast, safe, free of radiations, objective and inexpensive and with high diagnostic precision.

GEORGE'S VISION: FUTURE IS NOW

During stress echo era there are three important periods: Palaeolithic echocardiogram 2D period, (2) Neolithic where echo 2D was combined with the evaluation of the coronary reserve by transthoracic echocardiography (3) and, nowadays the advent of the quantitative evaluation of wall motion through advanced technology systems that translate the obtained data into a number and take them to a bull's-eye diagram.

Stress echo methodology did not have modifications during the eighties and nineties. Actually, the technology of imaging methods was continuously improving, in an obvious and fine way, with the introduction of digital imaging, second harmonic imaging and the contrast echocardiography with the prescription of second generation agents with the capacity to cross the pulmonary barrier and improve the view of the endocardial edge in individuals and segments with suboptimal images.

However, over the last 20 years it was impossible to attain that contrast echocardiography for the quantitative evaluation of myocardial perfusion and the determination of myocardial velocity for the analysis of the regional function were clinically possible methods. These methods were not useful for the clinical application despite the hard efforts of industries, scientists and marketing businesses. (4-6)

However, in the last 10 years a new technique which changed the appearance and the diagnostic performance of the stress echocardiography has been created: the simultaneous evaluation of wall motion and the coronary reserve with pulsed Doppler in the medium and distal segments of the ADA. (7). The evaluation of coronary reserve dramatically expands the prognostic possibilities of the stress echo, as the patient with no alterations of wall motion and with decrease of coronary reserve has bad prognosis, although a bit better than the patient with alterations of wall motion and decrease of coronary reserve. (8) Therefore, we can now evaluate function and flow simultaneously using the same premise "killing two birds (flow and function) with one stone" (vasodilator stress). Although the analysis of the coronary reserve is still in development and has not reached its full state, it is considered a new standard in the clinical application of stress echo. (9)

Nowadays, to achieve a numerical value for the evaluation of motion wall during stress echo not depending on the operator would be the third step of importance. The application of stress echo is "intelligent" (useful information), but results cannot be reduced to a "beautiful" graphic and at the same time be perceptible for a non specialized observer. These limitations should be broken with the development of an objective and quantitative method for the analysis of wall motion during stress. In the past we have experienced too many disappointments, so we cannot confuse feasibility (as this work shows) with effectiveness (which needs a great number of patients, multicenter studies and new technology). However, Lowenstein et al. approach is acceptable and convincing: the vasodilator used as pharmacological element alters only minimally the imaging quality and the analysis of the movement of natural acoustic makers (speckle tracking) is based on bidimensional echocardiographic images in gray-scale, and it is independent of scan angle, unlike tissue Doppler and deformation velocity (strain rate). Of course, these results cannot be considered conclusive and Lowenstein et al. study is not perfect. (1) The size of the sample is little; the reference method is questionable, as gamma camera is not very specific in coronary heart disease detected through angiography. (8) Therefore, and to reinforce the conclusions, the persons who perform stress echocardiography should make an exhaustive validation of the method, and compare it with another one more adequate as coronary angiography (or even with intravascular ultrasound scan). Once achieved this point, George (Diego Armando Lionel), the argentine "Wonder Boy" would be ready to start the game at the Maracana stadium during the final of the FIFA World Cup 2014.

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	First	Second	Third
Era	Palaeolithic	Neolithic	Modern
Tool	2D Echo	ADA pulsed Doppler	Strain 2D
Objective	Wall motion disorder	Coronary reserve	Longitudinal, radial and of torsion stress
Evaluation	Qualitative	Quantitative	Quantitative
Period	Early 80s	Late 90s	2010
State	Clinical state	Advanced clinical standard	In validation process

Table 1 The three generations for stress echocardiography

STRAIN 2D DURING STRESS ECHO: ANOTHER EXAMPLE OF MAGIC REALISM

This is the perspective. Over the time, we could see that American and European guidelines had included the "magic realism" of echocardiography in their recommendations. Mathew Strecher defined magic realism as that what happens when a detailed and realistic scene is invaded with something strange to believe. In fact, 25 years ago echocardiographic techniques of wall motion evaluation during drug infusion were created, (9) 10 years ago coronary reserve evaluation arose (10) and now strain 2D simultaneous evaluation for the wall motion quantitative analysis was developed. All these methodologies invaded the realistic scene of stress imaging of coronary heart disease (Table 1). Probably, echocardiographic "magic realism" reflected in George's work would soon be a solid reality; at least this should be the scientific and clinical perspective of the echocardiographic community in the following years.

"Utopia is in the horizon. I walk two steps, she moves away two steps. I walk ten steps and the horizon goes ten steps beyond. Although walking much, I would never reach her. What is utopia for? For this: for walking" (Eduardo Hughes Galeano).

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