EDITORIAL

New Anatomical, Physiological and Clinical Challenges of Three-Dimensional Echocardiography

Nuevos desafíos anatómicos, fisiológicos y clínicos de la ecocardiografía tridimensional

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Medicine is the continuous act of listening to someone, trying to understand peculiarities, walking forward, coming back, rearranging the puzzle; going through and out of the maze. In that so broad, challenging and unique plural sense, new diagnostic techniques are always very, very welcome. Somewhere, somehow and absolutely wisely in the past, an undoubtedly brilliant physician once said: "I have loved no darkness, sophisticated no truth, nursed no delusion, allowed no fear", William Bart Osler (1849-1919). Most probably, Prof. Osler drew his attention to the utmost need of walking through the future, into "l'avenir", without bringing worries, touching no unquestionable truths, definitely riding out the storm. And this is by far absolutely appropriate and adequate for medical situations in which there is an urgent need for early detection of possible life threating moments. Also, in the age of technology it may be sometimes really thrilling to find out new tools that could without question help to resolve old queries and problems. Furthermore, it may be surely exciting to add new data to very well established medical directions.

Leaving philosophy aside, coming into common daily practice, I would like to congratulate Saad AK et al. for the publication of the manuscript "Evaluación de la función del ventrículo izquierdo en pacientes con lupus eritematoso sistémico mediante ecocardiografía tridimensional", in the Revista Argentina de Cardiología. This study is related to the use of a new technique, three dimensional echocardiography (3D echo) strain in a population with systemic lupus erythematosus (SLE). This new technique adds new information to a very well established technology (2D echocardiography and Doppler echocardiography) for the analysis of left ventricular structure and systolic and diastolic function. We have to keep in mind that all current cardiology is by far mostly based on left ventricular ejection fraction assessment and its eventual timing and follow up changes. In addition, diameters are considered landmarks of structural- anatomical changes as well as of modifications in the derived hemodynamic cardiac pressures. Thus, it is a lot to expect from a new technique, but it is absolutely necessary for a better mental integration and real quantification of a tridimensional structure such as the heart, as the so called old techniques (if we could establish so) present fundamental 2D limitations and limited concepts for cardiac geometric scanning. (1-5) In fact, 3D echo could and should be observed as a 5D technique, taking into consideration the 3 orthogonal planes, the dimension of time and the plane of cardiac flow. The concept of 3D echo was first developed in the 70s', but at that time it was not possible to overcome technical problems that were very well understood and decreased in the future with the use of nanotechnology and computer advances. Three-dimensional transesophageal technology was developed throughout the 80's, 90's and the beginning of the 21st century, as well as the possibility of grasping and understanding real time cardiac physiology, for a better observation of different cardiac diseases.

So far, new ideas are available employing old anatomical concepts as described centuries ago by Leonardo da Vinci (1-5). Today, it is in our hands the decision to study strain (in longitudinal, radial and circumferential fibers), strain rate, strain area, twist and torsion. This is a new horizon, and unquestionable new opportunities open to implement a medicine based on prevention, much more a preventive medicine than a more therapeutic one built on the development of aggressive therapies applied to advanced states of the disease. In this sense, the paper from Saad AK et al. provides very important data by demonstrating that 3D strain echo is different in patients with SLE compared with the control group (Table 3), but absolutely more relevant was the information that 3D strain echo was different in patients with active or inactive SLE, as shown in Table 4. This is the usefulness and the reason why a new technique should be examined and used to reveal important clini-

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cal situations. In the same sense, at the moment, we are investigating and studying at Hospital Israelita Albert Einstein, Sao Paulo, Brazil the possible use of 3D strain echo for the early detection of myocardial mechanical changes in breast cancer patients treated with anthracyclines.

To our understanding, this paper from Saad AK et al. presents even another very valuable eventual information concerning the possibility of differentiating active and inactive SLE with the analysis of the three-dimensional left ventricular dyssynchrony index % (3D DI), which could be correlated to different antiphospholipid antibodies (aPL), such as lupus anticoagulant, aCL IgG, IgM, and IgA. It is possible to hypothesize different SLE sorological patterns concerning different 3D DI distributions. Another interesting aspect to explore from this paper is the relationship between left atrial 3D volumes, 3D DI (as a parameter to demonstrate electromechanical coupling) and 3D strain to integrate electrical pathways, atrial remodeling and preferential strain in different fibers in distinct anatomical and physiological planes.

In any case, as Prof. Osler has so well established many years ago "I have loved no darkness, sophisticated no truth…"

Conflicts of interest

None declared.

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

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