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Can 3D echocardiography give a contribute to the diagnosis of Arrhythmogenic Right Ventricular Cardiomyopathy (ARVC)?

A. Mazzanti¹, K. Addetia², R. Maragna¹, M. Yamat², E. Pagan³, L. Monti⁴, V. Bagnardi³, S.G. Priori¹

¹ICS Maugeri - IRCCS, Pavia, Italy; ²The University of Chicago, Department of Medicine - Heart & Vascular Center, Chicago, United States of America; ³University of Milan-Bicocca, Department of Statistics and Quantitative Methods, Milan, Italy; ⁴Clinical Institute Humanitas IRCCS, Rozzano, Italy

Background: The diagnosis of ARVC is based on the structural assessment of the heart with 2D echocardiography (2DE) and cardiovascular MRI (CMR) to detect the presence of global and segmental right ventricular (RV) abnormalities. Little is known about the diagnostic value of 3D echocardiography (3DE) in ARVC. The aim of this study was to assess whether a combination of 2DE and 3DE could replace 2DE and CMR combination with similar diagnostic accuracy in patients with suspected ARVC.

Methods: Thirty-nine subjects (59% males, 47±15 years, 41% with desmosomal mutations) with suspected or confirmed diagnosis of ARVC underwent evaluation of the RV with the use of CMR, 2DE, 3DE.

3DE and CMR were independently used to obtain RV volumes, ejection fraction and presence of segmental RV abnormalities. These studies were blindly classified as meeting none, minor, or major criteria for ARVC in accordance with the 2010 TFC. Kappa statistics were used to assess the concordance between 2DE-CMR and 2DE-3DE diagnostic approaches.

Results: Using the 2DE-CMR approach, patients were classified as follows: 5 not affected, 8 with possible, 9 with borderline and 17 with definite ARVC diagnosis. The evaluation of TFC criteria with the 2DE-3DE approach yielded a high degree of concordance with the standard of care (2DE-CMR approach, K=0.93 with 95% CI: 0.84–1.0). There was complete agreement between the 2DE-CMR and 2DE-3DE approaches for individuals with definite ARVC diagnosis (n=17) and in individuals not affected by ARVC (n=5). Two patients with possible and borderline ARVC diagnosis using the 2DE-CMR approach were confirmed as definite ARVC with 2DE-3DE approach.

Conclusions: The use of 2D and 3D echocardiography allows bedside evaluation of patients with suspected ARVC, which is diagnostically comparable to that obtained using the traditional combination of 2DE-CMR. This information is particularly relevant for patients who cannot undergo CMR such as patients with ICD.

		Traditional Approach (2D echo + cardiac MR)				
		No ARVC	Possible diagnosis	Borderline diagnosis	Confirmed diagnosis	Total
New Approach (2D echo + 3D echo)	No ARVC	5	0	0	0	5
	Possible diagnosis	0	7	0	0	7
	Borderline diagnosis	0	0	8	0	8
	Confirmed diagnosis	0	1	1	17	19
	Total	5	8	9	17	39

The diagonal line identifies patients with a concordant diagnosis of ARVC between the two diagnostic methods (traditional approach: 2D echocardiography + cardiac MR vs. new approach: 2D echocardiography + 3D echocardiography)

Contribution of 3D echo to ARVC