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REPRODUCIBILITY OF LEFT VENTRICULAR VOLUMES AND FUNCTION MEASURED WITH THREE-DIMENSIONAL SPECKLE TRACKING ECHOCARDIOGRAPHY

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Background: Recent remarkable advance of three-dimensional (3D) echocardiography has dramatically improved quality of imaging data. Moreover, recent computer software may provide high reliability of the echo image analysis. However, few studies have reported the reproducibility of the 3D echocardiography, especially left ventricular diastolic function such as strain and twist. Thus, we assessed the intra-observer repeatability in measurements of left ventricular mass, volumes and function with 3D speckle tracking echocardiography (STE).

Methods: Echocardiographic examinations with 3D STE were performed in 9 healthy men (age, 30±4 years old) (Epic7, Philips and LV Analysis 3.1, TomTec). The same measurement was repeated by the same observer >1 week later. End-diastolic volume (EDV), end-systolic volume (ESV), and stroke volume (SV) were estimated from 3D left ventricular volume curve constructed using automatic detection of endocardium with commercial computer software (LV Analysis 3.1, TomTec). Ejection fraction (EF) was calculated by the following formula; 100*SV/(EDV-ESV). Global longitudinal strain (GLS), global circumferential strain (GCS), and twist were assessed by 3D STE with the commercial software (LV Analysis 3.1, TomTec). Repeatability of two measurements was assessed by intra-class correlation coefficient (ICC) and typical error.

Results: Repeatability of SV and EF measurements showed good agreement (ICC: 0.60, 0.68; typical error: 0.9%, 1.3%, respectively). Repeatability of global strain measurements also showed good agreement, while the global circumferential strain (ICC: 0.61; typical error: 5.4%) was slightly superior to the longitudinal (ICC: 0.37; typical error: 2.8%). Repeatability of twist measurements showed moderate agreement (ICC: 0.47; typical error: 22%).

Conclusion: Our results may support the use of 3D STE for routine evaluation of SV and EF. Global strain measurements with 3D STE may be useful for assessing the LV diastolic function, whereas the twist measurements should require further improvement for clinical use.