Quantitative assessment of left ventricular function by 2D-speckle tracking during exercise: A feasibility study

C. Szymanskia, R. Campanab, J. Magna, M. Roscà, L. Pierarda, P. Lancellottia

a Heart Surgery Unit, Brescia, Italy
b Cardiology Department, Liège, Belgium

**Background.**— Accurate assessment of LV functional reserve during stress testing is challenging. For this purpose, the value of LV ejection fraction is limited. 2D-speckle tracking allows accurate quantification of LV regional function at rest. However, no study has evaluated the exercise-induced changes in myocardial deformation in normal subjects.

**Objectives.**— To study the feasibility of quantifying left ventricular (LV) function by 2D-speckle tracking of myocardial deformation during exercise echocardiography in normal subjects.

**Methods.**— Fifty-three consecutive normal subjects underwent quantitative assessment of LV function using 2D-speckle tracking at rest and during a semi-supine graded exercise echocardiography. All strain and LV rotation parameters were measured at rest and at exercise to assess longitudinal strains in apical views and radial strains in parasternal short-axis view.

**Results.**— During test, LV ejection fraction increased significantly from rest to peak exercise (64.3 ± 5.6% vs 74.6 ± 6.4%, P < 0.0001) whereas LV end-systolic volume decreased (P < 0.001). All strains and LV rotation parameters were increased during test. Changes in LV ejection fraction during exercise were well correlated with changes in longitudinal function (R² = 0.379, P = 0.018). LV apex rotation and rotation rate also increased during test (11.5 ± 3.8 to 21.8 ± 2.5 deg, P < 0.0001 and 122.2 ± 47.7 to 209.5 ± 41.9 deg s⁻¹; P = 0.0001 respectively for rotation and rotation rate). Intra- and inter-observer agreements for strain measurements were good. The variability between observers ranged from 0.5 to 6.4%.

**Conclusion.**— Evaluation of LV function by 2D-speckle tracking during exercise is feasible. This method can thus be used to accurately assess LV functional reserve during stress.

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Speckle tracking is a feasible and reproducible method for the assessment of right ventricular function in patients operated on for congenital heart diseases

M. Morel, Y. Bernard, V. Descotes-Genon, N. Meneveau, F. Schiele

CHU Jean-Minjoz, 25030 Besançon, France

**Aim.**— Right ventricular (RV) function is a major determinant of prognosis in patients (pts) with congenital heart diseases (CHD), but its evaluation remains challenging. We evaluate feasibility and reproducibility of speckle tracking (2D strain) for analysis of RV function in these pts.

**Methods.**— Transthoracic echocardiogram (TTE) was performed in all pts. Systolic RV function was estimated in the apical 4-chamber view by percentage RV surface shortening, tricuspid annular plane systolic excursion (TAPSE) and 2D strain. Longitudinal maximal systolic strain was evaluated. RV was divided into 6 segments (3 septum, 3 free wall). Intra- and inter-observer reproducibility were compared using the Bland & Altman test.

**Results.**— We included 16 pts aged 11—46 years (25 ± 10), operated on for CHD. Five had been operated on for transposition of the great arteries by the Mustard/Senning procedure and had systemic RV; 10 for tetralogy of Fallot and had significant pulmonary valvular regurgitation. All parameters were decreased in all pts: 37 ± 0.7% on average for RV surface shortening, 15 ± 5.1 mm for TAPSE. Global RV systolic strain was −16.2 ± 3.0%, free wall strain was −17.1 ± 3.2%, septal strain was −15.2 ± 3.5% on average. Only 7/384 segments could not be analysed. Intra-observer reproducibility was excellent: mean difference (MD) −0.1%, SD 1.25% [range: −2.17, +2.33] (observer 1), −0.4%, SD 1.6% [−3.43, +2.13] (observer 2) for global strain. Inter-observer reproducibility was good, mean difference −1.2%, SD 2.4% [−7.88, +1.38] between measurements for global strain.

**Conclusion.**— Speckle tracking is an interesting method, easy to perform and reproducible for assessment of RV function in CHD.

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