

**Speckle tracking echocardiography -based tissue motion annular displacement in assessing the longitudinal cardiac function among anthracycline-exposed survivors of childhood cancer**

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**Introduction:**

Our aim was to study left (LV) and right ventricular (RV) longitudinal systolic function by different echocardiographic methods and relate the results with volumetric data obtained with three-dimensional echocardiography (3DE) and cardiac magnetic resonance (CMR) among anthracycline-exposed long-term childhood cancer survivors (CCS).

**Methods:**

Study group consisted of 75 (41 girls and 34 boys) long-term CCSs with a mean age of 14.3±3.1 yrs. Median (inter-quartile range) cumulative anthracycline dose was 223 (163-301) mg/m<sup>2</sup>, age at diagnosis 3.8 (2.0-6.7) yrs and follow-up time 7.1 (6.0-10.0) yrs. Control group consisted of 75 gender-, body surface area- and age-matched healthy children.

All subjects underwent conventional and speckle tracking echocardiography (STE), tissue Doppler imaging (TDI) (both apical 4-chamber view) and 3DE for LV. Sixty-one survivors also underwent CMR. Analysis on inter- and intra-observer variability for TMAD was included.

**Results:**

CCSs had lower myocardial systolic velocities at LV basal septal (7.4±1.0 vs. 7.8±0.8 cm/sec, P=0.004) and lateral walls (10.2±1.7 vs. 10.9±2.0 cm/sec, P=0.016). RV lateral wall systolic velocities did not differ between the groups. STE-based tissue motion annular displacement (TMAD) values describing LV and RV systolic longitudinal fractional shortening (MAD mid% and TAD mid%, respectively) were lower among the survivors than controls (MAD mid% 15.4±2.4 vs. 16.1±2.2, P=0.049; TAD mid% 22.5±3.0 vs. 23.5±3.0, P=0.035), respectively. STE-derived mitral and tricuspidal annular midpoint displacements (mm, MAD mid and TAD mid, respectively) were measured. MAD mid correlated with 3DE-derived LV end-diastolic volume (EDV) (r=0.540, P<0.001), end-systolic volume (ESV) (r=0.419, P<0.001), as well as the CMR-derived LV EDV (r=0.463, P<0.001) and LV ESV (r=0.428, P=0.001). TAD mid showed correlation with the CMR-derived RV EDV (r=0.381, P=0.002) and RV ESV (r=0.334, P=0.009). Mean differences and limits of agreements for inter-observer MAD mid% were -1.3 (-5.5 to 2.9) and TAD mid% -0.9 (-6.8 to 5.0), and for intra-observer 0.1 (-2.4 to 2.5) and 0.5 (-1.7 to 2.7), respectively.

**Conclusion:**

Anthracycline-exposed long-term CCSs have impaired LV and RV longitudinal systolic function compared with healthy controls. Assessment of the displacement of mitral and tricuspidal valve annulus using the STE-based TMAD is a useful and easy method for studying cardiac longitudinal function.