Imaging in cardiovascular disease (radiology, ultrasonography, nuclear medicine, CT, MRI)

[gw22-e0124]

ALTERATION OF LEFT ANNULI MOVEMENTS DURING CARDIAC CYCLE IN DILATED CARDIOMYOPATHY AND HEALTHY ADULTS

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10.1136/heartjnl-2011-300867.700

Purpose Dilated cardiomyopathy (DCM) is a common myocardial disease characterised with the dilatation of left or both ventricles and presents with a progressively impaired pump function associated with poor prognosis. Echocardiography plays an important role in both the diagnosis of DCM and the evaluation of dysfunction. Recent studies indicate that mitral and aortic annuli excursions (AE) in the longitudinal direction may reflect the left ventricular (LV) global shortening deformation and aortomitral angle (AMA) may affect annuli coupling. However, the evaluation of annular movement only limited to animal experiments or small population of healthy humans, little was known about the alteration of left annuli movement during the cardiac cycle in DCM patients. This article compares AE and AMA variation during the cardiac cycle using two-dimensional (2D) speckle tracking echocardiography (STE) and hypothesizes there may be some physiological links between them, which may be functionally associated with the impaired systolic function.

Methods 2D transthoracic echocardiography were performed in 53 DCM patients and 53 age matched healthy adults. Clinical and echocardiographic characteristics were collected. Aortic annulus AE, mitral annulus AE, maximal AMA, minimal AMA and the difference between them were measured by 2D-STE. Continuous data were compared between groups by using Student's unpaired t-test. Correlations between LV ejection fraction (LVEF) and AMA variation, AEs were tested using liner regression.

Results The maximum AEs of each tracked point were larger and AMAs were differed significantly between DCM patients and healthy controls ($p < 0.001$). Both AEs and AMAs were positively correlated with systolic function in DCM patients and healthy controls. Additionally, there were significant correlations between AMA variation and AE of posterior mitral annulus ($r = 0.427$, $p = 0.001$), AE of right aortic annulus ($r = 0.464$, $p < 0.001$) and AE of mid-aortic annulus ($r = 0.313$, $p = 0.022$) and AE of mid-mitral annulus ($r = 0.346$, $P = 0.011$) but not with AE of fibrous junction ($r = 0.163$, $p = 0.244$) in DCM patients. Also, the results showed AMA(max-min) had a good correlation with AE of right aortic annulus ($r = 0.339$, $p = 0.013$) in healthy controls.

Conclusions AEs and AMAs differ significantly between DCM patients and healthy controls and AEs and AMA variation are correlated with decreased systolic function in DCM patients. Our findings support that the mitral and aortic annuli move as integral structure during cardiac cycle. This knowledge may be benefit to the treatment for DCM with severe mitral regurgitation and contribute to the LV ejection fraction evaluation in DCM patients.

Keywords Speckle Tracking, Echocardiography, Annulus Excursion, Aortomitral Angle, Dilated Cardiomyopathy