Abstract: 1185

Three-dimensional speckle tracking echocardiography for the global and regional assessment of myocardial deformation in breast cancer patients submitted to anthracyclines

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Introduction: Serial echocardiographic assessment of 2D/3D left ventricular ejection fraction (LVEF) and 2D global longitudinal strain (GLS) is the gold standard for screening for cancer therapeutics-related cardiac dysfunction (CTRCD). Although 3D speckle tracking echocardiography (STE) has several technical advantages, is more reproducible, and has a better correlation to magnetic resonance than 2D STE, it is still not currently used in this setting. We aimed to investigate the usefulness of 3D STE in evaluating left ventricle mechanics and its relation to CTRCD.

Methods: Prospective study of female breast cancer patients submitted to anthracycline chemotherapy who underwent one transthoracic echocardiography (ETT) before and at least one ETT during/after chemotherapy. Standard ETT parameters and 3D volumetric measurements were assessed. STE was used to estimate 2D GLS – average and 18 segments – and 3D GLS, global circumferential strain (GCS), global radial strain (GRS) and global area strain (GAS) – average and 17 segments. CTRCD was defined as an absolute decrease in 2D or 3D LVEF >10% to a value <54% or a relative decrease in 2D GLS >15%.

Results: 105 patients (mean age 53.8 ± 12.5 years, 52.4% immunotherapy, 77.2% radiotherapy, 2.8 echocardiograms/patient) were included. During a mean follow-up of 12.1 months, 24 patients (22.9%) developed CTRCD. During anthracycline therapy, there was a significant worsening of 2D LVEF (65.6 vs. 57.8), 3D LVEF (61.5 vs. 54.4), 2D GLS (-21.1 vs. -18.0), 3D GLS (-15.6 vs. -10.9), 3D GCS (-14.0 vs. -11.0), 3D GRS (42.0 vs. 28.5) and 3D GAS (-27.0 vs. -20.0) [all p <0.001]. More than 73% of patients presented 3D global strain values below the limits of normal during chemotherapy. On 3D strain regional analysis, impaired contractility was observed in the anterior, inferior and septal walls. Logistic regression analysis showed that 3D GRS and 3D GCS were associated with a higher incidence of CTRCD. In the multivariate model, 3D GRS remained the only independent predictor of CTRCD. The receiver operating curve analysis showed a good calibration and discrimination of 3D GCS and 3D GRS in predicting CTRCD with areas under de curve of 0.748 and 0.719, with the optimal cut-off values being 0.342 for GCS and 0.344 for GRS. These variations were observed a median of 45 days and 22.5 days before the diagnosis of CTRCD, respectively.

Conclusion: 3D strain parameters worsened during anthracycline therapy, with predominant involvement of septal, anterior and inferior walls. Variations of 3D GCS and GRS were predictive of subsequent CTRCD, and thus can be considered an earlier sign of CTRCD, with added value over the currently recommended 2D/3D LVEF and 2D GLS. Routine application of this technique should be considered in order to offer targeted monitoring and timely initiation of cardioprotective treatment.