Myocardial Strain Imaging by Cardiac MRI for Detection of Subclinical Myocardial Dysfunction in Breast Cancer Patients Receiving Trastuzumab and Chemotherapy

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Abstract

Aims: Our objectives were to evaluate the temporal changes in CMR-based strain imaging, and examine their relationship with left ventricular ejection fraction (LVEF), in patients treated with trastuzumab.

Methods and Results: In this prospective longitudinal observational study, 41 women with HER2+ breast cancer treated with chemotherapy underwent serial CMR (baseline, 6, 12, and 18 months after initiation of trastuzumab [treatment duration 12 months]). LVEF and LV strain (global longitudinal [GLS] and circumferential [GCS]) measurements were measured by 2 independent blinded readers. Of the 41 patients, 56% received anthracycline-based chemotherapy. Compared to baseline (60.4%, 95%CI 59.2-61.7%), there was a small but significant reduction in LVEF at 6 months (58.4%, 95%CI 56.7-60.0%, p=0.034) and 12 months (57.9%, 95%CI 56.4-59.7%, p=0.012), but not at 18 months (60.2%, 95%CI 58.2-62.2%, p=0.93). Similarly, compared to baseline, GLS and GCS decreased significantly at 6 months (p=0.024 and <0.001, respectively) and 12 months (p=0.002 and <0.001, respectively), but not at 18 months. There were significant correlations between the temporal (6 month-baseline) changes in LVEF, and all global strain measurements (Pearson r=-0.60 and r=-0.75 for GLS and GCS, respectively, all p<0.001).

Conclusion: There was a significant reduction in LV strain during trastuzumab treatment, which correlated with a concurrent subtle decline in LVEF. LV strain assessment by CMR may be a promising method to monitor for subclinical myocardial dysfunction in breast cancer patients receiving chemotherapy. Future studies are needed to determine its prognostic and therapeutic implications.