Whole heart effect of cancer therapy in women with HER2+ breast cancer

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Background:

Identification of cancer therapy related cardiac dysfunction (CTRCD) has primarily focused on functional changes involving the left ventricle (LV). The impact of cancer therapy on all four cardiac chambers (left and right atria (RA), left and right ventricles) and its timing in relation to cancer therapy has not previously been described.

Methods:

This was a prospective cohort study of women with HER2+ early-stage breast cancer aged ≥18 years of age receiving treatment with anthracyclines followed by trastuzumab. Echocardiography and cardiac MRI were performed prior to cancer therapy and 3 monthly subsequently up to 15 months with the commencement of trastuzumab at 3 months. Echo measures included, 2D left ventricular ejection fraction (LVEF), LV global longitudinal strain (GLS), right ventricular (RV) GLS, RV free wall longitudinal strain and left and right atrial strain (reservoir, contractile and conduit). All strain analyses were performed using EchoInsight (Epsilon imaging). Echocardiographic parameters were compared according to CTRCD status which was defined using cardiac MRI LVEF and the Cardiac Review and Evaluation Committee (CREC) criteria.

Results:

136 patients were included (mean age 51.1 ± 9.2 years), of these 37 (27%) developed CTRCD. The 2D-LVEF, LV GLS and RV strain all declined with cancer treatment with the impairment observed as early 3 months with nadir reached after 6 months of trastuzumab therapy (Figure 1). The nadir was lower in those with CTRCD. This mirrors LA and RA reservoir and conduit strain parameters which also reached nadir at 6 months with worse strain in those with CTRCD. All strain parameters across all 4 cardiac chambers trended towards baseline by the end of treatment, however did not completely return back to baseline especially in those with CTRCD.

Conclusion:

Strain measurement of all 4 cardiac chambers demonstrate that sequential anthracycline and trastuzumab therapy affects the "whole heart" demonstrating the significance of the injury. This is most pronounced at 6 months into trastuzumab therapy highlighting the fact that this may be the most important timing for cardiac surveillance in this population. The potential impact of changes to all 4 chambers versus only changes to the left ventricle on long term cardiovascular events warrants assessment.

Figure 1:

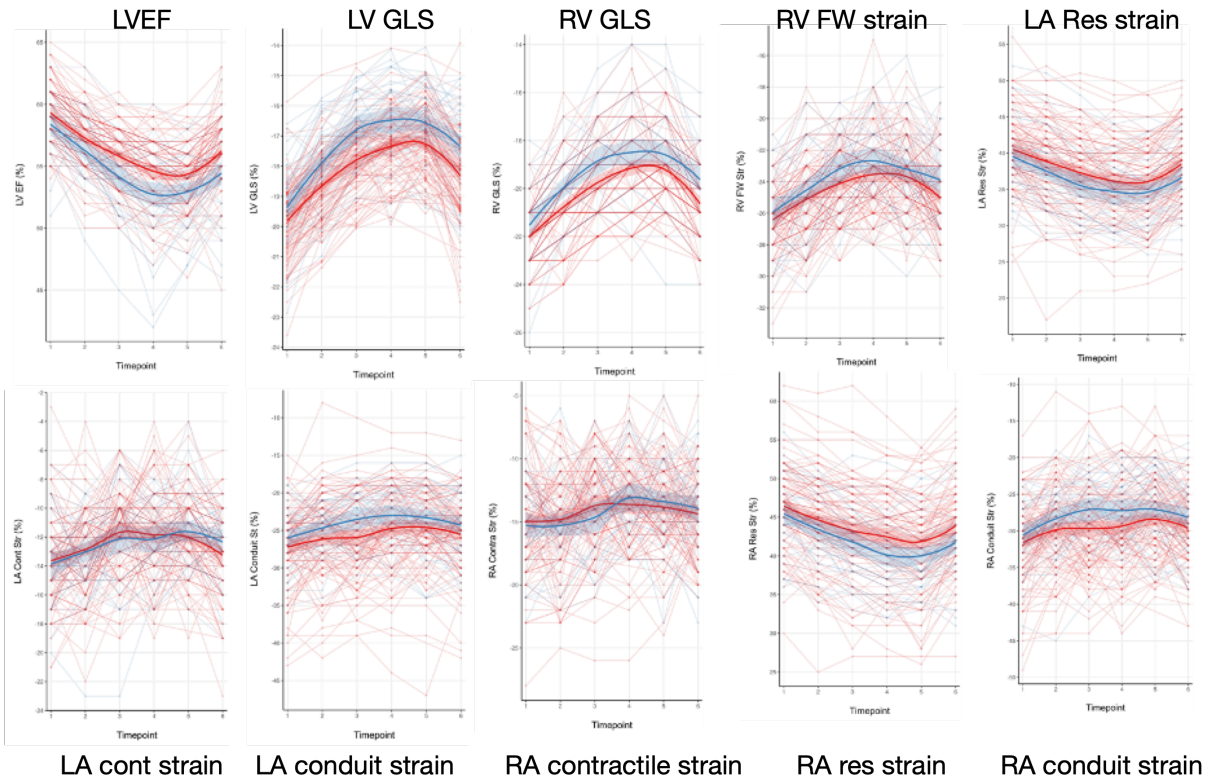

Figure 1: Trajectory of individual 2D-echo parameters including LVEF, LV-GLS, RV-GLS, RV free wall LS, LA and RA conduit, reservoir and contractile strain in patients without CTRCD (red) and with CTRCT (blue).