Abstract: P3554

CMR Fast-SENC intramyocardial LV & RV segmental strain helps manage cardioprotective therapy in patients exhibiting cardiotoxicity during cancer treatment

Authors:
H Steen¹, M Montenbruck¹, P Wuelfing², S Esch³, AK Schwarz³, B Gersak⁴, S Kelle⁵, G Korosoglou⁶, D Lenihan⁷, ¹Marien hospital, Cardiac imaging, cardio-oncology - Hamburg - Germany, ²Jerusalem hospital, mammma center - Hamburg - Germany, ³Marien Hospital - Hamburg - Germany, ⁴University of Ljubljana - Ljubljana - Slovenia, ⁵Charite University Hospital - Berlin - Germany, ⁶GRN-Klinik, Cardiology - Weinheim - Germany, ⁷Washington University School of Medicine - St Louis - United States of America,

Topic(s):
Cardiotoxicity of Drugs and Other Therapies

Citation:

Background:
Cardiotoxicity during cancer treatment has become an acknowledged problem of chemotherapy medications and radiation therapy. Limitations of biomarkers and imaging tests such as echocardiography left ventricular ejection fraction (LVEF) hinder early detection of cardiotoxicity and proactive cardioprotective therapy. Once the heart is unable to compensate for subclinical dysfunction, systemic damage and remodeling occurs increasing the potential for heart failure. Fast-SENC segmental intramyocardial strain (fSENC) is a unique cardiac magnetic resonance imaging (CMR) test that regionally detects subclinical intramyocardial dysfunction in 1 heartbeat. This study evaluates the ability of fSENC to detect subclinical cardiotoxicity and manage cardioprotective therapy in cancer patients.

Methods:
This single center, prospective Prefect Study was used to evaluate cardiotoxicity and the impact of cardioprotective therapy in Breast Cancer and Lymphoma patients (NCT03543228). fSENC was acquired with a 1.5T MRI and processed with the MyoStrain software to quantify intramyocardial strain. Segmental strain was measured in three short axis scans (basal, midventricular & apical) with 16LV / 6RV longitudinal segments & three long axis scans (2-, 3-, 4-chamber) with 21LV / 5RV circumferential segments. fSENC CMR was performed before chemotherapy, during and after anthracycline/taxan therapy, at 1 year follow-up, and as needed in between designated follow-up periods. Cardioprotective therapy was offered to patients meeting the definition of cardiotoxicity by the ESC Guidelines on Cardiotoxicity and/or ESMO Clinical Practice Guidelines or those observing a substantial decline in cardiac function. Comparisons were made with paired t-Test with a 95% confidence interval.

Results:
Two hundred eight (208) CMRs were performed in fifty-two (52) patients (44 female). Patients had an average (± stdev) age of 53 (15) yrs, BMI of 26 (5) kg/m2; 77% had breast cancer, 23% had Lymphoma. fSENC CMRs required 11 (2) min total exam time. Figure 1 shows bar graphs of the % of normal LV myocardium (e.g. % LV MyoStrain Segments < -17%) at baseline and sequential follow-ups for patients without cardiotoxicity and with cardiotoxicity requiring cardioprotective therapy. Patients observing cardiotoxicity had a statistically significant decline in cardiac function measured by segmental fSENC (p = 0.0002) which resolved after cardioprotective therapy.

Conclusion:
Segmental fSENC intramyocardial strain detects subclinical cardiotoxicity during chemotherapy and impact of cardioprotective therapy. The ability to serve as a surrogate safety endpoint for chemotherapy or other pharmacological agents, and aid management of cardiotoxicity by serving as a surrogate efficacy endpoint for cardioprotection agents, dosage, and patient compliance may help physicians detect subclinical cardiac dysfunction, and proactively manage cancer patients to avoid early or late heart failure.