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The role of speckle-tracking echocardiography in early detection of cardiotoxicity in asymptomatic cancer survivors children

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Introduction. Advances in cancer treatment have led to 5-year survival rates approaching 80% for the majority of paediatric malignancies; however, late effects of therapy on cancer survivors are now becoming a relevant concern. Although cancer treatment-related heart damage often becomes apparent years later, conventional echocardiography cannot identify patients that will develop toxicity in a pre-clinical stage. Consequently, we are not able to apply early intervention measures preventing damage progression. The aim of this study is to evaluate the role of speckle-tracking echocardiography in early detection of cardiotoxicity in asymptomatic cancer survivors children.

Patients and Methods. We performed an echocardiographic study in a cohort of 32 cancer survivors children who received anthracyclines for a haematological malignancy and completed cancer therapy at least 2 years earlier. Patients were stratified into two groups (low/high risk) according to the existence of known risk factors for cancer treatment-related cardiotoxicity - e.g. anthracyclines cumulative dose, total mediastinal irradiation dose, number of haematopoietic stem-cell transplantation (HSCT) procedures. Cardiac function was assessed by evaluating parameters obtained from both conventional and speckle-tracking echocardiography. We compared measures to reference values of an age-balanced population and correlated with the presence of risk factors.

Results. After a median follow-up of 7 years, at conventional echocardiography none of the patients manifested an evident LV systolic or diastolic dysfunction; however, 13/32 survivors (41%) showed an alteration of either LV diastolic or dimensional parameters or both. At speckle-tracking echocardiography, all patients showed a significant reduction in global longitudinal strain (GLS) systolic peak (mean difference: -7.5%, p-value <0.001), with the highest decrement observed in the high-risk group (z-score mean difference between groups: 1.1; p-value <0.025). We observed a statistical correlation between GLS reduction and the number of HSCT procedures (z-score mean difference between ≥ 2 transplantation and no transplantation: 1.4; p-value <0.025), but not with anthracyclines or mediastinal irradiation doses.

The present study shows that speckle-tracking echocardiography can detect early heart dysfunction in cancer survivors, allowing us to reveal subclinical toxicity in the entire study population. We observed that the number of HSCT procedures is the only independent risk factor correlating with the extent of strain alteration.