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Subclinical early systolic abnormalities are apparent already after low cumulative anthracycline doses in childhood acute lymphatic leukemia

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OBJECTIVES

Aim of the study was to assess the acute effect of chemotherapy on cardiac function of children with acute lymphatic leukemia (ALL) short before and after administration of Daunorubicin in the first chemo block. This chemo block starts immediately after diagnosis of ALL and lasts for four weeks.

METHODS

24 children (11 female, 13 male) diagnosed with ALL and treated with AIEOP-BFM ALL 2009 protocol were enrolled in a prospective study. Daunorubicin (DNR, 30 mg/m²/dose in 1 h i.v.) was administered on day 8, 15, 22 and 29 of Block Ia. Echo was performed and NT-pro-BNP and Troponin I was analyzed on day 8, 15, 22 and 29 short before and short after infusion of Daunorubicin. Transthoracic echocardiography Images were obtained by a GE Vivid 7 and GE E95-scanner with a 4 MHz and 6 MHz transducer according to age. Off-line analysis was performed by EchoPAC.

RESULTS

No patient developed heart failure or significant heart problems. No patient developed pathological Ejection fraction- (EF) or fractional shortening (FS) values. EF and FS-values did not decrease over time. In contrast longitudinal strain values showed from day 8 on a decrease over time in absolute values. Already there was a significant decrease in longitudinal strain in the basal septal and mid septal segment over time. NT-pro-BNP-values were in most cases elevated short after chemo but did not correlate with other values. Troponin I-values were not elevated after administration of Daunorubicin.

CONCLUSION

This is the first study focusing on the cardiac effects of Anthracyclines during the first four weeks of chemo (Block Ia). With a total of 8 echo examinations per patient meanwhile four weeks cardiac function was frequently analyzed. Results showed that abnormalities of systolic function detected by longitudinal strain are already apparent after administration of low cumulative doses of Anthracycline. Strain seems to be more sensitive in comparison to EF and FS. The fact that Troponin I values were not elevated is maybe a sign that myocardial cell apoptosis did not take part yet. The elevated NT-pro-BNP-values short after chemo are most likely an effect of hyperhydration on chemo day.