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Diagnosis and prediction of late cardiotoxicity in non Hodgkin"s lymphoma by 3D echocardiography, vascular ultrasound, and cardiac biomarkers

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CHOP chemotherapy in non-Hodgkin"s lymphoma (NHL) is limited by the risk of cardiotoxicity. Aim. To define new parameters, such as 3D LV deformation, arterial stiffness and biomarkers able to detect late cardiotoxicity. Methods. 69 patients (29 men, 59 ± 11 years) with NHL, scheduled to receive CHOP, with LVEF > 50%, were assessed at baseline, at the end of chemotherapy and 1.5 years after therapy completion by 3D echo for LV EF and deformation-longitudinal, radial, circumferential, area strain (LS, RS, CS, AS), by Echo-tracking for pulse wave velocity (PWV) and by biomarkers (troponin I, NTproBNP). Cardiotoxicity was defined as a decrease of LVEF <50%, with >10% from the baseline value. Results. 12 patients (group I) developed cardiotoxicity, while 57 patients did not (group II). There was a significant reduction of LS, CS, AS and an increase of arterial stiffness, but group I had greater changes (p = 0.001) (table). LVEF decrease correlated with changes of LS, AS, PWV and troponin (r = 0.62,r = 0.46,r=-0.33,r=-0.31, p < 0.05). LS reduction at the end of chemotherapy was the best independent predictor for LVEF decrease after 1.5 years from therapy completion (R^2=0.41, p = 0.002). LS decrease with more than 23% at the end of treatment predicted late cardiotoxicity after 1.5 years (sensitivity of 84%; specificity of 73%). Conclusion. Assessment of 3D myocardial deformation, arterial stiffness and biomarkers is able to detect late cardiotoxicity and to predict further LVEF decline in NHL.

LV deformation and vascular parameters

	CHOP	Group I	Group II
LS(-%)	Baseline	22 ± 2	22 ± 2
	Final	15 ± 2†	19 ± 2†
	After 1.5years	12 ± 1†	17 ± 1†
CS(-%)	Baseline	21 ± 2	21 ± 2
	Final	15 ± 1†	18 ± 2
	After 1.5years	13 ± 1†	16 ± 1†
AS(%)	Baseline	37 ± 3	38 ± 2
	Final	29 ± 3†	35 ± 2†
	After 1.5years	25 ± 2†	32 ± 1†
PWV(m/s)	Baseline	7.1 ± 1.2	7.1 ± 0.9
	Final	8.8 ± 1.1†	7.4 ± 1.1†
	After1.5years	10.4 ± 1.0†	8.1 ± 1.2†

LS longitudinal strain; CS circumferential strain; AS area strain; PWV pulse wave velocity. † p < 0.001.