

The effects of doxorubicin on left and right atrial mechanics in patients with lymphoma

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Background: Despite the associated dose-dependent cardiotoxicity, anthracyclines continue to form the backbone of modern chemotherapy regimens. Speckle Tracking Echocardiography (STE) has been a popular method of quantifying cardiac function but most studies have focused on left ventricular function. Research into the effects of anthracyclines on left atrial (LA) and right atrial (RA) function continues to be neglected.

Purpose: To investigate the effects of doxorubicin, a commonly used anthracycline, on both the LA and RA systolic and diastolic strain and strain-rate parameters in two groups of patients with lymphoma: Group 1 (G1) with a conventional drop in ejection fraction (EF <53%), and Group 2 (G2) without.

Methods: We retrospectively studied 46 patients treated for lymphoma between 2015 and 2018; G1 (n=12) and G2 (n=34). Echocardiograms performed at baseline (T0), mid-chemotherapy (T1), and post-chemotherapy (T2), were analysed by using offline vendor-independent software (TomTec, 2D Cardiac Performance Analysis). Using 2D STE, LA and RA reservoir, conduit and contractile strains, systolic and diastolic strain-rates were measured. Multi-level longitudinal model was used for statistical analysis. This study was ethically approved by the Health Research Association (REC Reference 18/SS/0139).

Results: Median age was 64 years (IQR 51–74 years) in G1, and 65 years (IQR 57–73 years) in G2. In G1, there was no significant change in LA reservoir strain with time, however a significant decline with an average mean difference of –7.52 was seen between T0 to T2 (p=0.016) in G2. LA conduit strain did not significantly change in either group with incremental doses of doxorubicin. However, LA contraction strain was seen to significantly increase in G1 between T1 to T2 (p=0.045) with an average change of 7.23. LA peak systolic strain rate, and late diastolic strain rate did not show any significant change with time in both groups. Yet, a significant increase was seen in LA early diastolic strain rate between T0 to T2 (p=0.017) in G1 but not G2. No significant changes were seen in the RA strain parameters in both groups.

Conclusion: In patient with a reduction in LV function, a significant change was noted in the left atrial contraction strain and early diastolic strain rate with incremental doses of doxorubicin. These changes shows the close relationship between the LA and LV, and the importance of LA in providing a compensatory mechanism for a decline in LV function secondary to anthracycline cardiotoxicity.