Arterial stiffness determination by oscillometric method in children treated with anthracyclines for malignant disease

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Introduction: Anthracyclines are associated with cardiovascular toxicity and are the major cause of cardiovascular events in the group of survivors of childhood malignancy. Arterial stiffness is an independent predictor of cardiovascular disease. The aim of the study was to determine whether anthracyclines used for the treatment of malignant disease in childhood could increase arterial stiffness measured as the aortic pulse wave velocity (PWVao) and aortic augmentation index (AIxao). In addition, the aim was to identify the clinical parameters correlating with PWVao and the cutoff PWVao value discriminating healthy and diseased subjects.

Methods: A total of 119 children and adolescents aged 7-20 years were examined, 69 of them (mean age 13.69±4.45 years) having completed anthracycline therapy for malignant disease according to various protocols at least a year before. Study patients were free from clinical and laboratory signs of malignant or cardiac disease. Control group included 50 healthy children, mean age 12.68±3.22 years. Arterial stiffness was determined by measuring PWVao and AIxao using oscillometric method on an Arteriograph TensioMed device.

Results: PWVao was significantly higher (6.25±1.31 m/s vs. 5.64±0.66 m/s; P<0.001) and AIxao was higher (8.7±9.69% vs. 5.64±5.15%; P=0.044) in subjects with a history of anthracycline treatment as compared with control group. Univariate analysis yielded positive correlation of PWVao with age, body weight, body height, blood pressure, heart rate, mean arterial pressure and central arterial pressure in the group of patients previously treated with anthracyclines. There was no correlation of PWVao with anthracycline dosage and time elapsed from treatment completion. Multivariate regression analysis indicated body height, heart rate and physical activity to be the main PWVao predictors. The cutoff value of PWVao was 6.25 m/s (95%CI 0.591-0.765; P<0.0002; sensitivity 44.9%; specificity 90%).

Conclusions: PWVao and AIxao are significantly higher in patients treated a year or more before with anthracyclines as compared to healthy children. The effect of anthracyclines on late mortality in individuals treated for malignant disease in childhood may not be exclusively due to their cardiotoxicity, but also to the increased arterial stiffness.