Postprandial Electronegative Very-Low-Density Lipoprotein is Positively Associated with Atrial Dilatation in Metabolic Syndrome

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Introduction: Electronegative fraction of very-low-density lipoprotein (VLDL-\(\chi\)) in metabolic syndrome (MetS) exerts cytotoxicity to endothelial cells and atrial myocytes. The role of VLDL-\(\chi\) in atrial remodeling is unknown. This study was aimed to investigate the association between VLDL-\(\chi\) and left atrial dilatation.

Methods: We evaluated 87 MetS and 81 non-MetS individuals from 23 to 74 year-old (50.6% men) without any overt cardiovascular disease. Blood samples were collected on fasting and on postprandial states (at 0.5-, 1-, 2-, and 4-hour after a unified meal). The VLDL was isolated by ultracentrifuge and the percentile concentration for VLDL-\(\chi\) (%) was determined by ultra-performance liquid chromatography. The correlations with left atrial diameter (LAD) for variables including VLDL-\(\chi\), LDL-C, HDL-C, triglyceride, and glucose, as well as blood pressures were analyzed by multiple linear regression models. Hierarchical linear model was conducted to test the independencies for each specific variable correlation to LAD.

Result: The mean LAD was 3.41 ± 0.53 cm in non-MetS and 3.89 ± 0.51 cm in MetS (P< 0.01). The VLDL-\(\chi\), BMI, waist, and hip, as well as blood pressures were positively correlated with LAD (all P<0.05) after adjustment for age and gender. None of fasting lipid profiles was associated with LAD. We observed significant interaction between VLDL-\(\chi\) and blood pressure, waist, and hip. When adjusted for variables of obesity and blood pressure, the 2 hour's postprandial VLDL-\(\chi\) (mean 1.30 ± 0.61%) showed a positive correlation with LAD in MetS. Each 1% increment of VLDL-\(\chi\) was estimated to increase LAD by 0.62 cm.

Conclusion: Postprandial VLDL-\(\chi\) is associated with atrial remodeling. The VLDL-\(\chi\) may be a therapeutic target to control progress of atrial cardiomyopathy in MetS.