Impact of epicardial adipose tissue on global longitudinal strain: a study in patients with normal left ventricular ejection fraction

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Background: Epicardial adipose tissue (EAT) locates anatomically and functionally contiguous to the myocardium and coronary arteries. It has been suggested that EAT accumulation is associated with cardiac remodeling and impaired cardiac performance. However, its role in left ventricular (LV) wall strain remains unclear.

Purpose: In this study, we aimed to clarify: whether EAT accumulation is related to global longitudinal (GLS), circumferential (CS) and radial strain (RS); and if so, in which extent or by which amount of EAT are required to deteriorate these strain.

Methods: Total 180 patients who had no obstructive coronary artery disease (CAD) on multi-detector computed tomography (MDCT) coronary angiography and normal left ventricular ejection fraction (LVEF) on conventional echocardiography were recruited. Cardiac CT was used to quantify EAT volume (EATV) and echocardiographic speckle tracking was used to measure the GLS, CS and RS. EATV index (EATV/Body surface area) was determined as: EAT volume, the sum of the EAT area from the base to the apex of the heart (cm³) /body surface area (m²). Adipose tissue was determined as the density range between -190 to -30 Hounsfield unit. According to the median value (68 cm³/m²), patients were divided into lower and higher EATV index two groups.

Results: In higher EATV index group (95 ± 19 cm³/m²), mean age, body mass index (BMI), prevalence of hyperlipidemia and prevalence of CAD were larger than in lower EATV index group (48 ± 14 cm³/m²). Male gender, hypertension, diabetes, smoking and LV mass index were comparable between two groups. Patients in higher EATV index had lower GLS than those in lower EATV index (-19.4 ± 1.2% vs. -18.8 ± 1.3%, p=0.002). However, there were no significant difference between two groups regarding to the CS and RS. Linear regression analysis showed that there was strong correlation between EATV index and GLS ( R= 0.216, p=0.004); whereas, both RS and CS were strongly associated with the interventricular septum thickness (RS: R=0.248, p=0.003; CS:R= -0.192, p=0.023) and relative wall thickness (RS: R=0.178, p=0.036; CS:R= -0.184, p=0.030) but not with EATV; on multiple regression analysis, EATV was a predictor of GLS independent of age, male gender, BMI, diabetes, hyperlipidemia, hypertension and CAD(Adjusted R²=0.238, p<0.001).

Conclusion: EATV is independently associated with GLS despite the preserved LVEF and lacking of obstructive CAD, and may play a significant role in estimating impaired longitudinal LV performance.

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