Abdominal and epicardial adipose tissue, coronary atherosclerosis, and circulating levels of endothelial progenitor cells

ABSTRACT

Introduction: Lower levels of circulating endothelial progenitor cells (EPC) have been associated with the presence of vascular risk factors (RF) and coronary artery disease (CAD). Epicardial adipose tissue (EAT) has also been recently proposed as a marker of vascular risk and its active role in the local coronary atherosclerotic process has been suggested. However, the performance of these new risk markers and their relations with classical RF, anthropometric measures and atherosclerotic burden are still poorly defined.

Purpose: To study the relations of EAT and EPC with coronary atherosclerosis, classical RF and validated prognostic imaging methods (determination of abdominal visceral fat and coronary calcium quantification) - in a low-to-intermediate risk population.

Population and Methods: All patients without known CAD referred to MSCT for coronary angiography during a 6 month period were included in our study after informed consent. All patients underwent a: 1) short anamnesis 2) anthropometric measurements 3) blood pressure and heart rate assessment; 4) blood tests and 5) MSCT (including quantification of visceral fat, Agatston Calcium Score (CAC) and coronary angiography).

Results: 215 patients, mean age 58±11 years (26-84), 61% males, with mean body mass index (BMI) of 28±4 kg/m2 were included. 27% met the ATP III criteria for metabolic syndrome. Dyslipidemia (59%) and hypertension (57%), were the most prevalent risk factors in this population. Mean "Framingham risk score" was 12±9. Sixty seven percent of the patients had no significant CAD. 64% had some degree of coronary calcification (CAC>0) and mean CAC was 186±433 with a median of 16 (interquartile range 0 to 143). 67% had no significant CAD.

EAT volume, was directly associated with male sex, age, BMI, abdominal circumference, visceral fat ($p<0.01$ to all) and with the presence of metabolic syndrome components ($p<0.05$). CAC increased by 14.7% per additional 10 ml of EAT volume. After adjusting for age, gender and visceral abdominal fat changed this increase to 7.5%. After adjusting for all considered confounders, there was still an independent association of EAT volume and CAC with a CAC increase of 3.7% per additional 10ml.

Mean EPC counts in the peripheral blood was 0.05±0.08% (0.0-0.58). EPC levels in the peripheral blood were inversely related with the presence of Diabetes Mellitus and Smoking and positively related with PCR. No significant relations were found between EPC counts and other CV risk factors, anthropometric and image measurements of adiposity, atherosclerotic burden or severity of coronary artery disease.

Conclusions: In patients without known CAD referred for MSCT, EAT volume was positively related to the degree of coronary calcification; this correlation was shown to be independent from visceral abdominal fat. Circulating EPC levels in the peripheral blood do not strongly correlate to baseline patient characteristics, measures of adiposity and the presence / severity of CAD.