A Single Slice Measure of Epicardial Adipose Tissue Can Serve as an Indirect Measure of Total Epicardial Adipose Tissue Burden and is Associated with Obstructive Coronary Artery Disease

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Background: Epicardial adipose tissue (EAT) is unique both in its metabolic properties, which can contribute to an inflammatory milieu, and its location, which puts it in direct contact with the coronary vessels. Furthermore a heavier burden of EAT has been associated with the presence of coronary artery disease (CAD) and adverse cardiac outcomes. However current methods used in cardiac CT to quantify EAT may not be conducive in a busy clinical practice.

Objective: To assess the relationship between total epicardial adipose tissue (EATTotal), traditionally a very time consuming metric to obtain, with EAT on a single axial CT slice at the level of the left main coronary artery (EATLM), a novel and more rapid approach to assessing EAT, and obstructive coronary artery disease (CAD).

Study Design: Quantification of EATTotal and EATLM was performed on non-contrast CT scans of consecutive patients (without history of revascularization, cardiac transplantation, device implantation and congenital heart disease) who underwent coronary artery calcium (CAC) scoring and computed tomographic coronary angiography (CTA) between May 2011 and July 2011. The correlation between EATTotal and EATLM was assessed. Each measure was then assessed for its incremental value to traditional cardiac risk factors for predicting the presence of obstructive coronary artery disease.

Results: 192 patients were evaluated of which 47 had obstructive CAD (>50% stenosis). EATLM (3.79± 2.21cm3) and EATTotal (126.2 ± 56.3 cm3) were highly correlated (r=0.89, p<0.001). Multivariate analysis revealed that EATLM is associated with obstructive CAD (OR 1.200 per 1 cm3, 95% CI 1.022-1.409, p=0.026), while there was a trend towards significance for EATTotal (OR 1.062 per 10 cm3, 95% CI: 1.000-1.138, p=0.054). ROC curve analysis revealed EATTotal and EATLM are of incremental value in detecting CAD, when compared to clinical risk scores (NCEP plus EATTotal plus BMI and NCEP plus EATLM plus BMI vs. NCEP alone; AUC 0.7090, p=0.009 and 0.7167, p=0.003 vs. 0.6069, respectively) Excellent intra- and inter-observer agreement was found for EATLM. (ICC values of 0.997 (95% CI 0.993 – 0.999) and 0.994 (95% CI 0.986 – 0.998) respectively)

Conclusion: Measuring epicardial adipose tissue on a single slice at the level of the left main coronary artery may serve as an indirect measure of total epicardial adipose tissue burden. EATLM is independently associated with obstructive coronary artery disease and is incremental to traditional risk factors for predicting its presence and has the advantage of being more efficient and is highly reproducible.