Journal of Cardiovascular Magnetic Resonance

Poster presentation

Open Access

CMR assessment of epicardial fat volume in human morbid obesity at 3 T: relationship to cardiac function and morphology

Bénédicte Gaborit*[1], Frank Kober[2], Pierre-Julien Moro[2], Alexis Jacquier[2], Alexandre Vignaud[2], Frédéric Dadoun[2], Patrick J Cozzone[2], Monique Bernard[2] and Anne Dutour[3]

Address: [1]Unité de recherche du syndrome métabolique, tissu adipeux et risque vasculaire, UMR U626, Centre de Résonance Magnétique Biologique et Médicale, CNRS UMR N°6612, Université de la Méditerranée, Marseille, France, [2]Centre de Résonance Magnétique Biologique et Médicale, CNRS UMR N°6612, Université de la Méditerranée, Marseille, France and [3]Unité de recherche du syndrome métabolique, tissu adipeux et risque vasculaire, UMR U626, Université de la Méditerranée, Marseille, France

* Corresponding author

from 13th Annual SCMR Scientific Sessions
Phoenix, AZ, USA. 21-24 January 2010

Published: 21 January 2010

Journal of Cardiovascular Magnetic Resonance 2010, **12**(Suppl 1):P268 doi:10.1186/1532-429X-12-S1-P268

This abstract is available from: http://jcmr-online.com/content/12/S1/P268

Introduction

Ectopic fat accumulation within and around the myocardium is involved in the pathogenesis of obesity-related cardiomyopathy and cardiovascular disease. Earlier MR studies have been restricted to a mildly obese population due to magnet bore size limitations. For this study, a 70 cm bore 3 tesla MR system offered the possibility to assess left-ventricular (LV) morphology and function along with EFV in patients with severe obesity.

Purpose

To assess epicardial fat volume (EFV) in severely obese patients with CMR at 3 T, and to determine its potential correlations with left-ventricular function and morphology.

Methods

CMR was performed with a Siemens Verio 3 T system in 24 obese patients (15 with morbid obesity and 9 with diabetes, mean BMI = 42.3 ± 5.7 kg/m^2) and in 14 healthy controls (mean BMI = 22.4 ± 2.1 kg/m^2). The scanner was equipped with a 32-channel phased-array coil. Sixteen short-axis slices covering the heart and its surrounding adipose tissue were obtained within four breathholds using a balanced SSFP cine sequence with 4-fold GRAPPA k-space reduction (FOV = 340 × 340 mm^2, TE = 1.2 ms, TR = 61 ms, matrix = 134 × 192, slice thickness 6 mm). The absolute volume of epicardial fat was assessed by manual delineation on every slice from base to apex. Parameters of LV function and morphology were obtained using the same short-axis dataset. All patients underwent an intraabdominal CT scan for visceral adipose tissue (VAT) assessment and biological evaluation.

Results

EFV was increased twofold between lean (64 ± 29 mL) and obese non-diabetic (123 ± 44 mL) subjects. Another twofold increase in EFV was observed in obese diabetic patients (240 ± 140 mL) ($p < 0.0001$). EFV was strongly correlated with age ($r = 0.71$, $p < 0.0001$), VAT ($r = 0.89$, $p < 0.0001$), BMI ($r = 0.68$, $p < 0.0001$), waist circumference ($r = 0.73$, $p < 0.0001$), fasting plasma triglycerides ($r = 0.62$, $p = 0.018$), and negatively correlated with thigh circumference ($r = -0.45$, $p = 0.03$) and superficial subcutaneous abdominal fat ($r = -0.44$, $p = 0.03$). Patients with metabolic syndrome (MS) had higher EFV than patients without MS ($p < 0.0001$). After multivariate adjustment, only VAT remained independently associated with EFV. EFV was negatively correlated with stroke volume ($r = -0.46$, $p = 0.005$), cardiac output ($r = -0.46$, $p = 0.005$) and LV end diastolic volume ($r = -0.46$, $p = 0.004$), Figure 1.

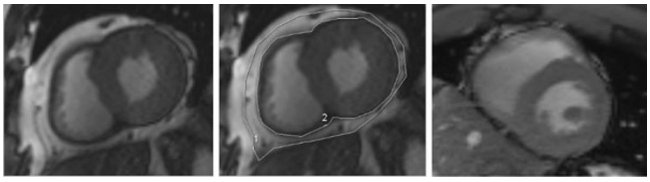

Figure 1
Epicardial fat in a diabetic obese patient on a short-axis view (left), manual segmentation by drawing the key lines dividing epicardial from paracardial fat and myocardium (middle), and an image from a healthy volunteer (right).

Conclusion

CMR at 3 T allowed quantification of epicardial fat volume and LV morphology and function in severely obese subjects. A significant correlation was shown between LV function and EFV.