Correlation of Pericardial, Mediastinal and Total Intrathoracic Fat with Coronary Artery Disease, Metabolic Syndrome, and Cardiac Risk Factors

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Background

- Obesity has been shown to correlate with coronary artery disease (CAD) and to be an important component of metabolic syndrome.
- Fat distribution has been shown to be a stronger predictor of CAD compared to overall body fat quantity.
- Abdominal visceral fat has been shown to be an independent risk factor for CAD, to correlate with metabolic syndrome (MS) and to correlate with intrathoracic fat.
- Intrathoracic fat has been shown to correlate with CAD; and pericardial fat to correlate with both CAD and MS.
- There are limited data assessing the components of intrathoracic fat (pericardial fat and mediastinal fat) and the association with CAD and MS.

Objectives

To assess the association of pericardial, mediastinal and total intrathoracic fat quantified by cardiac magnetic resonance (CMR) with:
1. The presence and severity of CAD
2. Metabolic syndrome
3. Cardiac risk factors

Methods

We enrolled 218 consecutive patients who underwent CMR for cardiac evaluation.

All patients had a coronary angiogram performed within 12 months of the CMR.

All patients were followed by phone using a standardized questionnaire. Medical records were reviewed to confirm positive outcomes including myocardial infarction and death.

Definitions

1) Metabolic Syndrome

The presence of at least 3 out of 5 of the following:
1. Obesity: BMI ≥30
2. Elevated serum triglycerides ≥150 mg/dl
3. HDL cholesterol <40 men; <50 women
4. HTN
5. Diabetes mellitus

2) Coronary Artery Disease

Significant CAD was defined as any stenosis ≥75% on coronary angiogram.

Severity of CAD was determined based on the Duke CAD Jeopardy score.

Results

Table 1. Baseline Characteristics

<table>
<thead>
<tr>
<th>Characteristics</th>
<th>Entire Group (n=218)</th>
<th>No CAD (N=96)</th>
<th>CAD (N=122)</th>
<th>P value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age (years)</td>
<td>64.5±13.3</td>
<td>61.2±15.6</td>
<td>67.1±10.5</td>
<td>0.001</td>
</tr>
<tr>
<td>Female gender</td>
<td>36.4±13.5</td>
<td>34.2±15.1</td>
<td>39.3±11.7</td>
<td>0.022</td>
</tr>
<tr>
<td>BMI ≥30</td>
<td>52 (23.5%)</td>
<td>21 (21.9%)</td>
<td>31 (25.4%)</td>
<td>0.67</td>
</tr>
<tr>
<td>Coronary Artery Disease</td>
<td></td>
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</tbody>
</table>

3) Duke CAD Jeopardy Score

A branch with a stenosis ≥75% or a branch distal to a stenosis ≥75% scores 2 points. Maximal score: 12 points.

4) CMR and Measurement of Fat Surface Area

Pericardial Fat: The fat observed on the free wall of the right ventricle, apex, and anterior region of the left ventricle within the parietal pericardium.

Mediastinal Fat: The fat present within the thoracic cavity, external to the parietal pericardium.

Fat Ratio: The ratio of pericardial fat to mediastinal fat.

Measurements: The fat surface area was measured by computer analysis from drawing the region of interest curves and expressed in cm². The fat was measured from a single four chamber cine view at end systole.

Follow-up

Patients were followed for a mean of 12.5±9.9 months. Twenty-five patients had a myocardial infarction, 34 patients died and 56 patients had a combined outcome of death or MI. No statistically significant difference in fat surface area was found between patients with and without events.

Conclusion

- This study does not confirm an association between mediastinal, pericardial or intrathoracic fat and coronary artery disease or metabolic syndrome.

References