Contrast-enhanced magnetic resonance imaging versus thallium scintigraphy in the detection of myocardial viability.

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Purpose: Contrast-enhanced magnetic resonance imaging (MR) is a new method in the assessment of myocardial viability. The aim of this study was to compare it to SPECT-Thallium scintigraphy.

Methods: The patients with documented coronary artery disease and impaired left ventricular systolic function defined by ejection fraction less than 45% were enrolled. Myocardial viability study was performed both by SPECT using 201Thallium and contrast-enhanced magnetic resonance imaging. SPECT of the myocardium was performed four hours after 201Thallium chloride administration. Cardiac MR imaging was done 20-30 minutes after administration of gadolinium contrast agent (0.2 mmol/kg). Short axis views of the myocardium were divided into segments. In each segment myocardial viability was scored semiquantitatively according to the 201Thallium activity (SPECT) and the relative amount of contrast enhanced tissue (MR). The results of viability assessment were compared in corresponding segments.

Results: 25 patients were included. The mean ejection fraction was 35.2%. The results of viability assessment were compared in corresponding segments. The patients with documented coronary artery disease and impaired left ventricular systolic function defined by ejection fraction less than 45% were enrolled. Myocardial viability study was performed both by SPECT using 201Thallium and contrast-enhanced magnetic resonance imaging. SPECT of the myocardium was performed four hours after 201Thallium chloride administration. Cardiac MR imaging was done 20-30 minutes after administration of gadolinium contrast agent (0.2 mmol/kg). Short axis views of the myocardium were divided into segments. In each segment myocardial viability was scored semiquantitatively according to the 201Thallium activity (SPECT) and the relative amount of contrast enhanced tissue (MR). The results of viability assessment were compared in corresponding segments.

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Contrast-enhanced MR study and almost one third of these segments showed no contrast-enhanced tissue. In 16.5% of segments that displayed normal Thallium activity there were signs of irreversible injury using MR. On the other hand in 8.6% of segments with decreased Thallium activity there was no contrast enhancement on MR study.

Conclusions: According the results of our study it seems possible that in comparison to Thallium scintigraphy the contrast-enhanced MR imaging can more accurately diagnose irreversible myocardial injury and better detect viable myocardium. The latter finding may be important in selecting the eligible candidates for myocardial revascularisation.

Free-Breathing, three-dimensional, bright blood coronary artery magnetic resonance angiography – Comparison of sequences.


Purpose: To compare six free-breathing, three-dimensional, magnetization-prepared magnetic resonance angiography sequences with respect to their suitability to depict the coronary arteries.

Materials and Methods: Six bright blood sequences were evaluated: Cartesian turbo field echo (C-TFE); radial turbo field echo (R-TFE); spiral turbo field echo (S-TFE); spiral fast field echo (S-FFE); Cartesian balanced turbo field echo (C-FFE); and radial balanced turbo field echo (R-bTFE). The right coronary artery was imaged in ten healthy volunteers using all six sequences in randomized order. Images were evaluated with respect to signal to noise ratio (SNR), contrast to noise ratio (CNR), visible vessel length, vessel edge sharpness, and vessel diameter, by two independent observers. A repeated-measure analysis of variance with Tukey-Kramer post-test was performed.

Results: C-bTFE depicted the coronary artery over the longest distance with very high vessel sharpness, good SNR, and excellent background suppression. C-TFE provided similar SNR and CNR, but more vessel blurring and visualized the vessels over a shorter length. S-FFE provided highest values of SNR and CNR, but reduced visible vessel length and sharpness. S-TFE was the fastest sequence used but showed reduced SNR and CNR. The radial approaches resulted in images with the highest vessel sharpness, excellent background suppression, and fair visible vessel length, but an increased noise level.

Conclusion: C-bTFE provided visualization of the longest length of the coronary artery, whereas S-FFE provided best SNR and CNR in the proximal vessel segment.

Does coronary artery bypass grafting correct ischemic mitral regurgitation?

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The aim of the study was to assess coronary artery bypass grafting (CABG) impact on ischemic mitral regurgitation (IMR) observed before surgery.

Materials and methods: We analyze consecutive 120 patients (pts) (63±12 years old, men:78, women 42) with history of O-wave myocardial infarction (MI) during last 6 months, qualified to CABG. In transhoracic echocardiography (TTE) before CABG we found no MR in 38 pts (group I), small MR in 46 pts (group II), moderate MR in 29 pts (group III) and severe MR in 7 pts (group IV). Two weeks after CABG TTE was done for MR evaluation. TTE was made using Philips Sonos 5500 and Hewlett-Packard 2500 and recorded on magnetooptic disc and SVHS tape for later assessment by 2 independent cardiologists.

At 7 pts with severe IMR CABG with mitral plasty was done, others 113 pts has CABG alone.

Results: Table 1. Analysis of IMR after CABG

<table>
<thead>
<tr>
<th>Group</th>
<th>No change</th>
<th>Decreased IMR</th>
<th>Increased IMR</th>
<th>p</th>
</tr>
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<tbody>
<tr>
<td>I</td>
<td>8</td>
<td>2</td>
<td>2</td>
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<tr>
<td>II</td>
<td>25</td>
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<tr>
<td>III</td>
<td>23</td>
<td>5</td>
<td>6</td>
<td></td>
</tr>
<tr>
<td>IV</td>
<td>2</td>
<td>1</td>
<td>1</td>
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</tbody>
</table>

In group I - there were no change in 27(71%) pts, 0 pts with decreased IMR and 11 pts with increased IMR. In group 2 we found no change of IMR in 29(63%) pts, 7 pts had decreased IMR and 10 pts increased. In group III there were no change of IMR in 19(65%) pts, 8 pts has decreased IMR and 2 pts increased. In group IV there were no IMR change in 0 pts, decreased IMR in 7 pts and increased in 0 pts.

Conclusions: 1. CABG alone has no significant impact on frequency and severity of mild and moderate IMR.

2. In group with decreased IMR were mainly pts with history of antero-lateral MI but the groups were similar in aspect of other echo parameters (LA, LVDD, EF, WMSI) before CABG.

Closed chest assessment of coronary anastomoses with a 13 MHz epicardial mini-transducer.

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Objective: Epicardial ultrasound is under renewed interest for intra-operative quality assessment of anastomoses under renewed interest for intra-operative quality assessment of anastomoses.

Methods: Both ITA’s were grafted to the LAD in 8 pigs (71-78 Kg), with anastomoses constructed to be fully patent (n=8) or contain an intended suture cross-over construction error (n=8). After chest closure and stabilization with a novel EndoOc- topus, the mini-transducer (15 x 6 x 9 mm, Aloka, Japan) was introduced through a port (diameter 15mm) and manipulated by the da Vinci telemanipulation system (real-time scan image displayed on master console) to obtain still longitudinal and transverse images and transverse sweeps using B-mode and Doppler imaging. Subsequently, the chest was opened and scanning repeated manually. Anastomoses were macroscopically inspected post mortem.

Results: All anastomoses were visualized in both open and closed chest condition. One control anastomosis revealed an irregularity at the level of the anastomotic orifice and outflow corner. Endoscopically measured dimensions (mm) of the anastomotic orifice, outflow corner and LAD distal to the anastomosis were 2.9 ± 0.9 (mean ± SD), 1.8 ± 0.3 and 1.9 ± 0.3 for control anastomoses and 2.5 ± 0.4 and 1.8 ± 0.3 for erroneous anastomoses respectively. For manual scanning this was 3.0 ± 0.9, 1.6 ± 0.2 and 1.6 ± 0.2 (patent) and 2.9 ± 0.3, 1.8 ± 0.7 and 2.0 ± 0.7 (erroneous). Scanning images corresponded with macroscopic inspection.

Conclusions: The 13 MHz ultrasound mini-transducer enabled both open and closed chest visualization and assessment of patent and erroneously constructed anastomoses.