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: 20 patients were included. The mean ejection fraction was 35.2%. The total number of myocardial segments evaluated was 907. Myocardial viability assessed by SPECT was normal in 52.9%, impaired in 13.9% and absent in 26.8% of segments evaluated. On MR viability study there were 59.7% of segments with no contrast enhancement showing no irreversible injury. 37.2% of segments contained both contrast enhanced and viable tissue and in 3.2% there was a predominance of contrast-enhanced irreversibly changed tissue. Comparing the two methods the results of viability assessment corresponded in 51.3% of segments. 42.7% showing no irreversible injury, 5.3% displaying impaired viability and 3.2% with prevailing irreversible injury. In 23.7% of segments that were assessed as non-viable by Thallium scintigraphy there were signs of viability using 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-TFE); 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 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.