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Meeting abstract

2022 Sequence optimization for T2 weighted imaging in acute myocardial infarction

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Background

T2 weighted magnetic resonance imaging has been shown to be a clinically useful tool for visualization of cell edema in acute myocardial infarction. However artifacts such as signal inhomogeneities and a low contrast to noise ratio can impair image quality. These limitations are proposed to be solved by different strategies, including different methods for fat suppression and the use of the body coil as signal receiver. So far, the ability of these strategies to improve image quality has not been assessed.

Methods

As a first step we evaluated the signal homogeneity of five different T2 sequences on a 1.5 T scanner (Siemens Magnetom Avanto). Each sequence was tested on eight patients without myocardial disease: (1) T2-prepared Trufisp (T2-Trufisp), (2) fat saturated T2-TSE with surface coil (TSE-fatsat) and (3) body coil receiver (TSE-fatsat BC) and (4) T2-TSE with STIR fat suppression with surface coil (STIR) and (5) body coil receiver (STIR BC). Signal intensity was measured in three short axis slices (basal, medial and apical). The coefficient of variance (COV) was calculated within the slice (SD/mean) and between slices (SD of slice mean/overall mean).

As a second step we evaluated 8 scans each of T2-Trufisp and TSE-fatsat sequence in patients with acute myocardial infarction. Location and extend of the perfusion defect was identified by Tc99*-MIBI SPECT imaging prior to myocardial reperfusion therapy. Signal intensity (SI) was measured in three representative short axis slices both in the perfusion defect and the remote myocardium.

Results

The results for signal homogeneity are shown in Table 1:

Signal homogeneity was best in T2-Trufisp and TSE-fatsat. Compared to TSE-fatsat, STIR images suffered from significantly more noise. As expected the body coil receiver measurements had more noise within the slice. But this was not compensated by a better homogeneity between slices suggesting a good surface coil attenuation of the scanner used.

In the measurement of the perfusion defect in acute myocardial infarction the absolute contrast in TSE-fatsat was better than in T2-Trufisp (see Table 2). This was compensated in part by the lower noise of T2-Trufisp but overall

Table 1:

	Normal Myocardium		
	mean ± SD	COV in slice	COV between slices
T2-Trufisp	56.4 ± 11.3	20%	4%
TSE fatsat	112 ± 19.1	17%	4%
TSE fatsat BC	418 ± 104	26%	11%
STIR	47.6 ± 22.3	47%	29%
STIR BC	184 ± 77.1	44%	39%

Table 2:

Acute Myocardial Infarction			
	mean ± SD lesion	mean ± SD remote	CNR
T2-Trufisp	58.2 ± 7.48	46.2 ± 6.42	1.66
TSE fatsat	179 ± 20.3	133 ± 18	2.29

the contrast to noise ratio (CNR) of TSE-fatsat was significantly better (p = 0.02).

Conclusion

For the scanner used the standard T2-weighted TSE sequence with fat saturation shows the best image contrast and homogeneity for detecting perfusion defects in acute myocardial infarction.