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POSTER PRESENTATION Open Access

Detailing the role of parametric T_1- and T_2-mapping for differentiation of acute and chronic myocardial infarction

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Background

T_1- and T_2-mapping in myocardial infarction may be helpful to discriminate acute from chronic stages (AMI, CMI). This study examines the role of T_1- and T_2-mapping versus today's T_1- and T_2-weighted imaging standard along with interpretation modes for discrimination of AMI from CMI.

Methods

Eight male patients with acute ST-elevation myocardial infarction underwent CMR at 3T (Siemens Verio) acutely and after >3 months. Imaging techniques included: T_2-weighted imaging, late enhancement (LGE) as well as T_2-mapping (3 single-shot SSFP-images), native T_1-mapping (MOLLI, 11 single-shot SSFP-images), and T_1-mapping 10min after 0.2mmol gadobutrol using non-product sequences. Image analysis included: 1) Visual assessment: Five independent readers assessed the presence (yes/no) of an infarct-like myocardial lesion. 2) Quantitative assessment per segment: Myocardial T_2- and T_1-relaxation times were determined for every segment and correlated to LGE. 3) Quantitative assessment per pixel: Based on reference T_2- and T_1- relaxation times, abnormal pixels were identified and correlated to LGE.

Results

1) T_2-weighted images showed an infarct-like lesion in 82.9% of AMI and 27.8% of CMI, LGE in 95.0% / 100%, T_2-map in 69.2% / 35.0%, native T_1-map in 86.8% / 57.5%, and post-contrast T_1-map in 95.0% / 91.9%. 2) The pattern of segmental abnormalities of T_2- and T_1-relaxation times in infarcted segments compared to remote myocardium was not consistent for a confident diagnosis of AMI and CMI. 3) Pixelwise threshold-based analysis of T_2- and T_1-maps exposed infarcted regions in the myocardium in AMI and CMI. The presence of T_2-abnormalities in the chronic state and the classification of remote pixels as abnormal limited its diagnostic value. The figure shows the various images and maps as well as segmental relaxation times of one representative patient.

Conclusions

Referring to the studied mapping sequences, pixelwise analysis of T_2- and T_1-maps based on predefined thresholds that separate normal from abnormal was the most promising approach to read maps, whereas visual assessment and segmental analysis of T_2- and T_1-maps were less favorable. The discrimination of AMI and CMI is not facilitated using the tested T_2- and T_1-maps.

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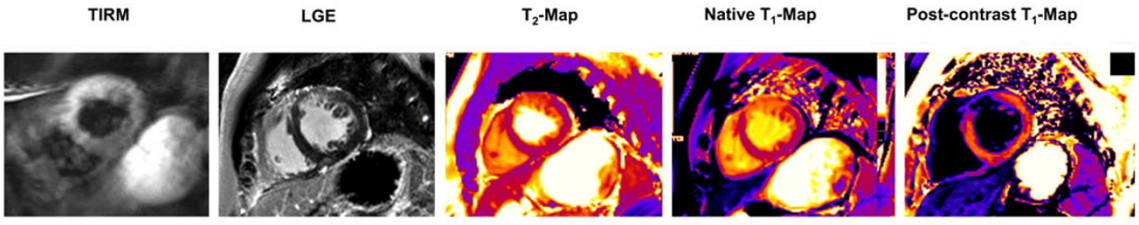
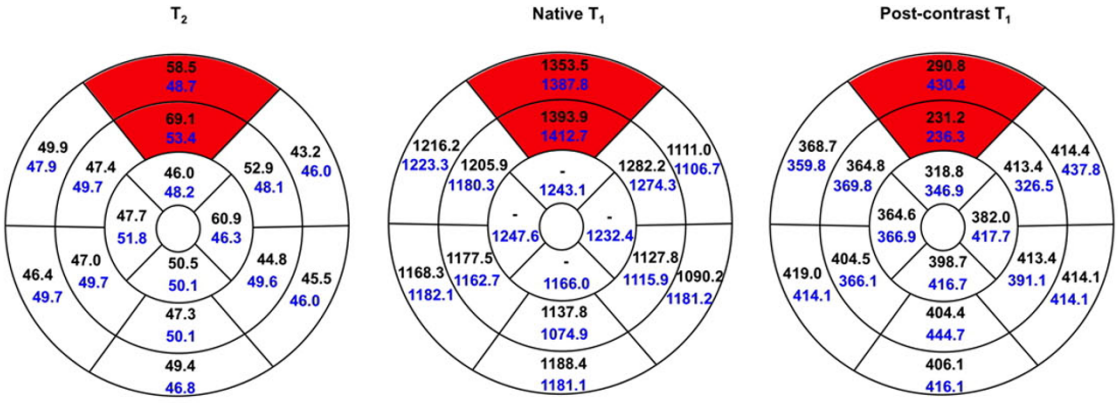
SECTION 1 – Qualitative assessment of the presence of myocardial infarction. (Images from one representative patient)



SECTION 2 – Quantitative analysis of T2- and T1- relaxation times by myocardial segment. The segments with late enhancement indicating myocardial infarction are highlighted in red. (Images from the same patient as in section 1)



SECTION 3 – Quantitative analysis of T2- and T1- relaxation times by myocardial segment. The segments with late enhancement indicating myocardial infarction are highlighted in red. (Images from the same patient as in section 1)

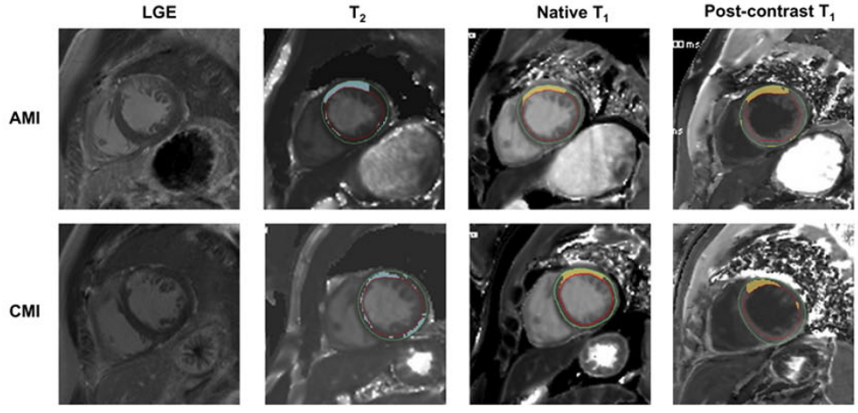


Figure 1

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