

Scar-coronary cardiac MR imaging acquired by navigator-gated 3D fat-suppressed delayed-enhancement imaging technique

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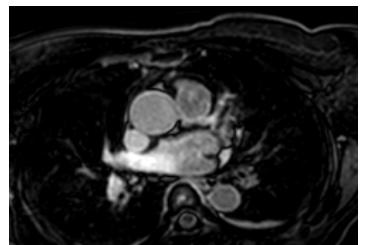
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INTRODUCTION

Simultaneous assessment of coronary arteries and myocardial scar or perfusion is valuable for the assessment of ischemic myocardial diseases and culprit coronary diseases. Although fusion images using coronary CT angiography and perfusion nuclear medicine or scar MR imaging are made for these purposes, the misregistration and large differences in spatial resolution between the source images acquired by each imaging method can interfere the accurate image interpretation. The purpose of this study was to acquire scar-coronary MR images using a single navigator-gated 3D fat-suppressed delayed-enhancement MR imaging (3D FS-DE-MRI) examination.

METHODS

Twenty-five patients with various myocardial diseases underwent navigator-gated 3D FS-DE-MRI following 2D delayed-enhancement MRI (DE-MRI), using a 3.0T imager (Achieva, Philips). They consisted of hypertrophic cardiomyopathy (HCM), HCM after septal ablation, chronic myocardial infarction and other myocardial diseases. The imaging parameters of the 3D FS-DE-MRI were as follows: TR, 3.4ms; TE, 1.8ms; flip angle, 15 degrees; view-per-segment, 35; and spatial resolution, 1.5x1.25x3.0mm³. The inversion recovery pulse was used to suppress the normal myocardial signals and spectrally-selective inversion-recovery pulse was used to suppress the epicardial fat signals.



The ability of the 3D FS-DE-MRI, scar-coronary imaging, to detect the scar was compared with that of 2D DE-MRI. The CNR between myocardium and blood and that between normal myocardium and myocardial scar were compared between 2D DE-MRI and 3D FS-DE-MRI. The visualization of coronary arteries (AHA 1-15 segments) by the scar-coronary imaging was scored (1: poor to 3: excellent).

RESULTS

Nineteen of the 25 patients and 247 coronary artery segments within the scan coverage were analyzed, by excluding 6 patients because of failure of navigator gating (n=3), metallic artifacts (n=2), and serious image deterioration (n=1).

Among 61 scars shown by the 2D DE-MRI in 10 patients, the 3D scar-coronary imaging detected 58 scars (95%). There were no significant differences between the 2D DE-MRI and 3D FS-DE-MRI for the CNR between myocardium and blood ($P = 0.44$) and for the CNR between normal myocardium and myocardial scar ($P = 0.40$). The scar-coronary imaging visualized the coronary arteries with the mean score of 1.79, and the proximal coronary arteries were visualized with the mean score of 2.26. The relation between coronary arteries and myocardial scar was defined by the scar-coronary imaging in some patients (Figures).

CONCLUSION

Scar-coronary cardiac MR imaging using a single navigator-gated 3D FS-DE-MRI was feasible for visualization of the myocardial scar and patent proximal coronary arteries.

References 1.. Gaemperli O. JNM 2007; 48: 696. 2. Stolzmann P. Eur Radiol 2010; 20: 1174.