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Improved late gadolinium enhancement imaging of left ventricle with isotropic spatial resolution

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Background

Recent studies have shown the prognostic value of the infarct border zone of late gadolinium enhancement (LGE) images in patients with myocardial infarction [1]. This border zone has also been associated with ventricular arrhythmia [2,3]. The accuracy of the characterization of this area depends on spatial resolution of the imaging. 3D LGE allows improved spatial resolution, especially in through-plane direction. However imaging with an isotropic spatial resolution necessitates very long scan time. In this study, we sought to investigate if compressed-sensing (CS) based image acceleration method [4] allows LGE imaging with isotropic spatial resolution.

Methods

A prospective random under-sampling LGE acquisition was implemented on 1.5T Philips scanner. A free-breathing ECG-triggered inversion-recovery GRE sequence with navigator-gating was used for all acquisitions on 18 patients (5 females, 52.8±16.3 years) 10 to 20 minutes after bolus infusion of contrast agent. Each subject were imaged using two LGE sequence in random order: a) a 3-fold-accelerated LGE scan with isotropic spatial resolution of 1.2-to-1.7 mm^3, b) LGE scan with non-isotropic resolution of $1.7\times1.7\times4.0mm^3$ were performed with imaging parameters of TR/TE/α=5.2/2.6ms/25°, FOV=$320\times320\times100mm^3$. Random undersampling was implemented as described in [5], where the central k-space (45×35 in ky-kz) was fully-sampled. Acquisition times were 3 mins assuming 100% scan efficiency at 70 bpm for both scans. The images from the accelerated scans were reconstructed using an advanced CS-technique, called LOST [4].

Results

Figure 1 shows LGE images from a patient with hypertrophic cardiomyopathy acquired using two different approaches. An improved isotropic spatial resolution allows better characterization of the scar morphology. Figure 2 shows another example in a patient undergoing ICD implantation as a primary prevention of sudden cardiac death.

Conclusions

Accelerated LGE imaging with isotropic spatial resolution allows improved visualization of scar morphology. Further quantitative measurements of infarct border zones in a larger cohort of patients are needed to better understand the prognostic value of the improved scar imaging.

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References

1. Yan : **Circulation.** 2006.
2. Bello : **JACC.** 2005.
3. Nazarian : **Circulation.** 2005.
4. Akcakaya : **MRM.** 2011.
5. Basha : **ISMRM.** 2011.

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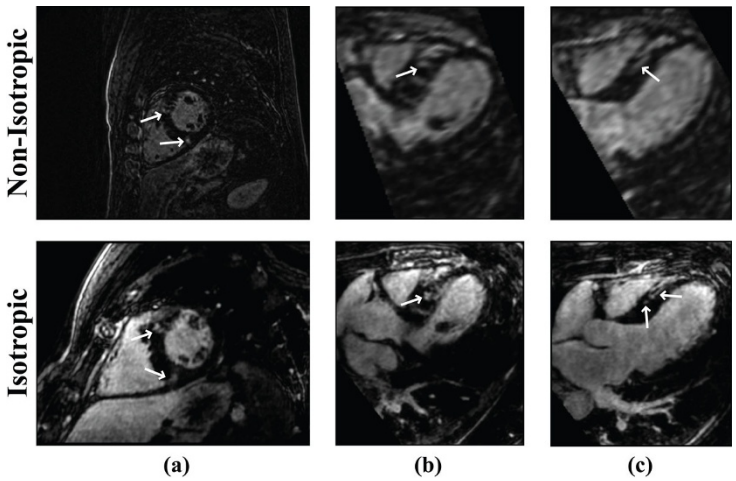

Figure 1 Reformatted LGE images from a patient with HCM, acquired using non-isotropic spatial resolution (top), and isotropic spatial resolution (bottom). An isotropic resolution allows better visualization of scar morphology in images acquired using LOST-accelerated acquisition.

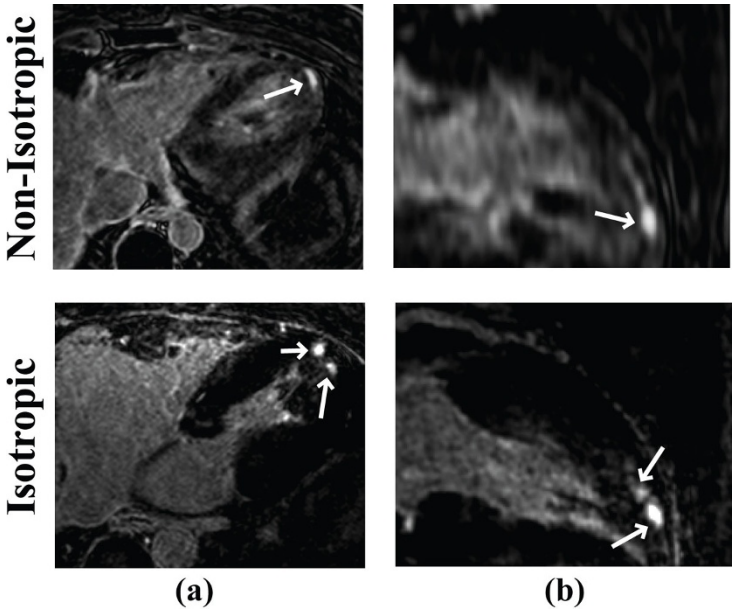

Figure 2 Axial (left) and reformatted long-axis (right) LGE images from a patient. Non-isotropic LGE was acquired with a spatial resolution 1.7×1.7×4.0 mm^3 (top), whereas LOST-reconstructed isotropic resolution images from the accelerated scan had a resolution of 1.2×1.2×1.2 mm^3 (bottom).

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