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Meeting abstract

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1127 Optimal scanning conditions for whole-heart coronary MR angiography in clinical practice

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Introduction

In whole-heart coronary MR angiography (WH-CMRA), positional changes due to respiratory motion are corrected using Real-Time Motion Correction (RMC) or are suppressed by instructing the patient to hold his or her breath. The present study was conducted to investigate the optimal scanning conditions for obtaining the required information within a specified time period in WH-CMRA with the objective of making WH-CMRA a useful imaging method in clinical practice.

Purpose

The present study was conducted to investigate the optimal scanning conditions for obtaining the required information within a specified time period in WH-CMRA with the objective of making WH-CMRA a useful imaging method in clinical practice.

Methods

All studies were performed using a 1.5-T MRI system combined with an 8 channel QD Torso SPEEDER coil. A 3D-trueSSFP sequence was employed, with the scanning plane set to SG, TR to 4.3 ms, TE to 2.2 ms, FA to 120, slice thickness to 1.5 mm, FOV to 28 × 35 cm, MTX to 168 × 256, SPEEDER factor in the PE direction to 1.5, and SPEEDER factor in the SS direction to 1.5.

WH-CMRA was performed using three methods on 5 volunteers who gave informed consent to participate in the study: <1> single-slab acquisition with RMC during free breathing, <2> single-slab acquisition during intermittent breath-holding, and <3> multislab acquisition during intermittent breath-holding. In method <3>, the slab was divided into 8 smaller slabs, with each sub slab corresponding to 10 slices.

To investigate the relationship between signal-ratio of blood to myocardium and the number of slices, different sub slabs (10, 20, 40 and 80 slices) were obtained in method <3> for three volunteers.

Image quality was compared based on the signal-ratio of blood to myocardium and on the results of visual evaluation of coronary artery detectability.

Results

In the scanning methods employing breath-holding (methods <2> and <3>), WH-CMRA could be completed when the subject repeated 20- to 25-s breath-holds 10 to 12 times. The scan time was shorter in methods <2> (3.5 ± 0.5 min) and <3> (3.9 ± 0.5 min) than in method <1> (4.18 ± 1.8 min). The variance of the scan time was also less in methods <2> (± 0.5 min) and <3> (± 0.5 min) than in method <1> (± 1.8 min).

Signal-ratio of blood to myocardium was 0.95 ± 0.14 for methods <2> to <1>, and 1.33 ± 0.23 for methods <3> to <1>. In method <3>, the additional result for the signal-

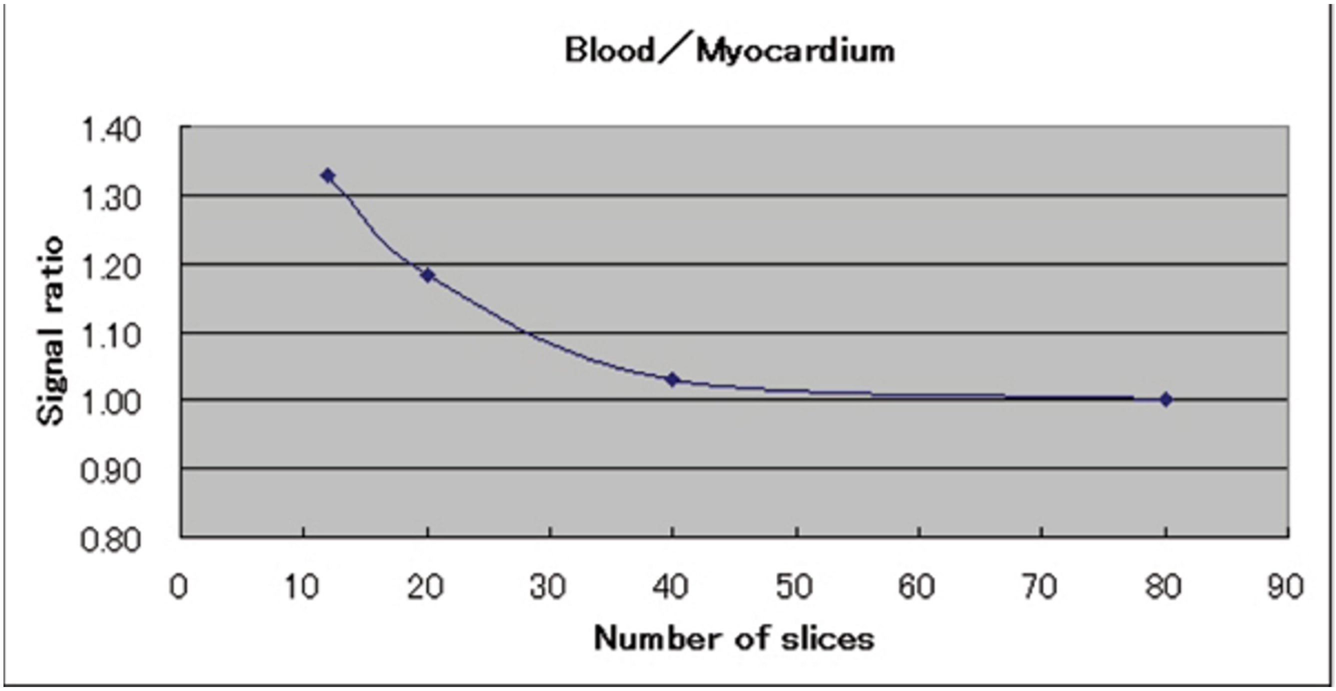

Figure 1
Signal ratio of blood to myocardium vs. number of slices.

ratio of blood to myocardium after setting the number of slices to 10, 20, 40, 80 was 1.33 ± 0.14 for 10 slices, 1.18 ± 0.04 for 20 slices, and 1.03 ± 0.07 for 40 slices, when the signal-ratio of blood to myocardium was set to 1 for 80 slices (Figure. 1).

The signal-ratio of blood to myocardium slightly increased under 20 slices (3 cm slab thickness), which corresponds to dividing the single slab into more than 4 slabs.

Image score was 1.41 ± 0.68 for methods <1>, 1.49 ± 1.04 for methods <2> and 1.98 ± 0.47 for methods <3>. These results show that method <3> is the best for clinical practice from the viewpoint of highest image quality, shorter scan time and smaller scan time variance.

Conclusion

The results of this study suggest that multislab acquisition during intermittent breath-holding is an effective method for improving image quality in WH-CMRA, because the signal-ratio of blood to myocardium is increased by acquiring a thin slab in each scan and can be performed with shorter scan time and smaller scan time variance.