

Meeting abstract

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115 Parallel acquisition to improve temporal resolution in the rapid detection of myocardial infarction: comparison of image quality and artifacts

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Introduction

Imaging speed is of critical importance in Cardiac Magnetic Resonance (CMR) imaging especially in patients with severe cardiac disease. Parallel MR imaging uses spatial encoding inherent in phased-array radiofrequency coils to accelerate image acquisition to improve temporal resolution.

Purpose

Aim of the current study is to compare the CMR images of post-myocardial infarct (MI) patients acquired using single-shot inversion recovery, steady state free precession sequence with images acquired using parallel imaging technique (PAT).

Methods

Total 57 patients with either acute myocardial infarction (n = 38) or chronic myocardial infarction (n = 19) were included in the study. Delayed enhancement (DE) CMR was done using 1.5-T scanner (Sonata or Avanto, Siemens). Standard infarct images were acquired using single-shot, inversion recovery, steady state free-precession sequence. Parallel images were additionally acquired using Generalized Autocalibrating Partially Parallel Acquisition (GRAPPA) and modified Sensitivity Encoding (mSENSE) algorithms. An acceleration factor or "PAT" factor of 2 used to acquire parallel images. Images were blinded, randomized and scored for hyperenhancement visually on 17-segment model by consensus of 2 observ-

ers. Image quality (graded excellent, good or poor) and the presence of artifacts were also assessed (Figure 1).

Results

Parallel techniques had an average 40% reduction in acquisition times during diastole. There was no difference between the standard images and GRAPPA images in terms of extent of infarct (4.84 vs. 4.77, P = 0.43), micro-vascular obstruction (0.30 vs. 0.34, P = 0.42), transmural infarct score (1.18 vs. 1.13, P = 0.43), and total infarct score (10.78 vs. 10.45, P = 0.41). Similarly there was no difference between the standard images and mSENSE images in terms of extent of infarct (4.84 vs. 4.84, P = 0.50), micro-vascular obstruction (0.30 vs. 0.31, P = 0.47), transmural infarct score (1.18 vs. 1.29, P = 0.38), and total infarct score (10.78 vs. 10.81, P = 0.49). A greater number of standard and GRAPPA studies were graded excellent than mSENSE, and mSENSE had significantly greater artifacts than the others (P < 0.001). In patients with a heart rate >65 (n = 35), GRAPPA had greater excellent quality images (43%) than standard (29%, P < 0.05) or mSENSE (14%, P < 0.05). Also image artifacts were significantly more prevalent in mSENSE (43%) as compared to standard (9%, P < 0.001) or GRAPPA (9%, P < 0.001).

Conclusion

All imaging techniques can adequately assess the size and extent of infarction. However at faster heart rates, GRAPPA performed better with less artifacts and more

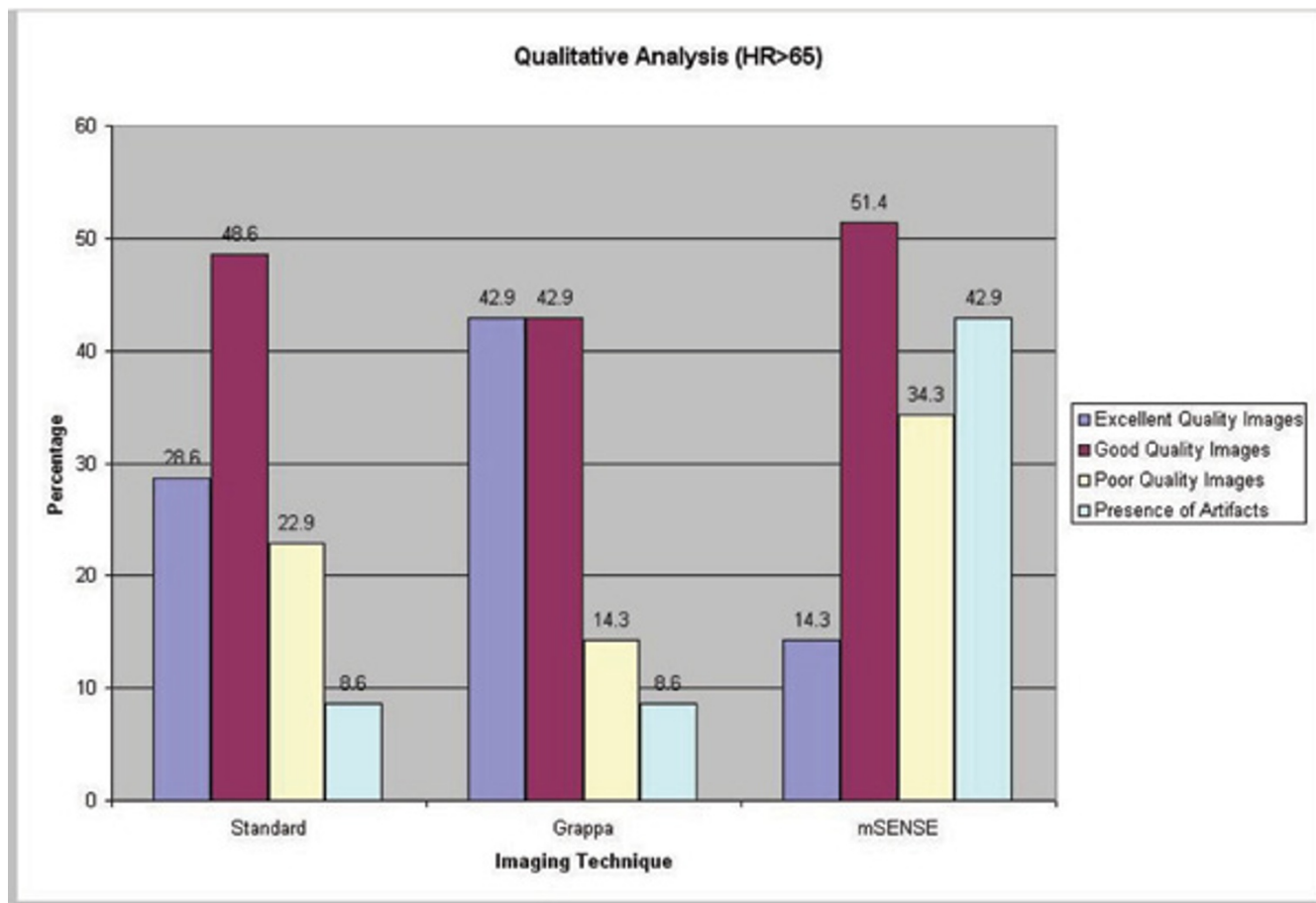


Figure 1
 Current study compares the conventional cardiac MRI images of post myocardial infarct patients with the images acquired using parallel imaging technique (PAT) by measuring the the size, extent of infarction and image quality.

number of excellent images than mSENSE. The high quality images with GRAPPA are due to an improvement in temporal resolution.

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