A Single Shot Myocardial Delayed Enhancement technique compared to Conventional 2D MDE

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Purpose

Myocardial delayed enhancement (MDE) is a technique by which infarcted tissue can be distinguished from normal myocardium following contrast administration. The most common current technique (2D MDE) consists of a segmented inversion recovery fast gradient-recalled imaging sequence. Contrast between infarcted and normal tissue is due to the differences in T1 relaxation times. The 2D MDE technique is acquired using a single slice acquisition and scan times typically 12-18 seconds per slice.

This paper describes a novel technique (sshmde) used to decrease acquisition times (approximately 2 seconds per slice) while maintaining image quality on a consistent basis compared to 2D MDE.

Methods

Single shot MDE (sshmde) is a fast gradient recalled echo technique in which all data for a single slice is acquired in 3 R/R (1 R/R to bring the slice to steady state and 2 R/R to acquire all of the lines in k-space). TI was selected using a multi TI sequence and typically ranged between 175-225 msec for both sequences. The 2DMDE and sshmde were acquired consecutively.

Results

14 patients were referred for myocardial viability evaluation using 2D MDE and sshmde. Both sequences were evaluated and rated for perceived SNR, perceived CNR, myocardial suppression, infarct visualization, image artifacts, and overall image quality by a radiologist experienced in cardiac MRI. All sequences were evaluated on a scale of 1 (poor) to 5 (excellent). The scores were averaged and then compared. The 2D MDE and sshmde sequences had comparable scores in each category except for myocardial suppression, where 2D MDE was slightly preferred (Table 1).

Table 1	2DMDE	SSHMDE	p value
Perceived SNR	3.57	3.79	0.402
Perceived CNR	4.21	3.86	0.142
Myocardial Suppression	4.36	3.86	0.036
Artifacts	3.71	3.86	0.529
Overall Image Quality	3.86	3.86	1.000

Discussion

Preliminary results are promising using sshmde to decrease over all exam times while maintaining image quality to that of the conventional 2D MDE technique (Fig. 1). Further evaluations needs to be performed to demonstrate that this technique produces consistent image quality.

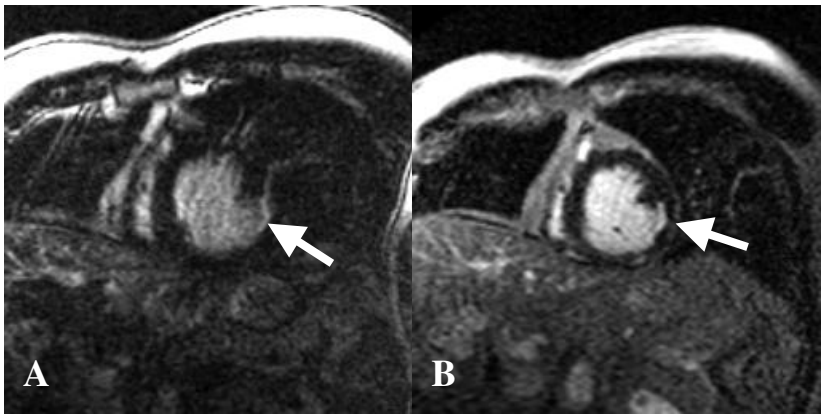

Figure 1: 2D MDE (a) compared to sshmde (b) in a patient with a subendocardial lateral wall infarction (arrow). The 2D MDE image is limited by motion artifacts due to the patient's limited breath hold capacity.