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FREE-BREATHING 3D LATE GADOLINIUM ENHANCEMENT CARDIAC MR FOR THE EVALUATION OF LEFT VENTRICULAR INFARCTION IN A SWINE MYOCARDIAL INFARCTION MODEL

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Objectives The purpose of this study was to evaluate a new free-breathing 3D phase sensitive inversion-recovery (PSIR) turbo FLASH pulse sequence for the detection of left ventricular myocardial scar in a swine myocardial infarction model.

Methods After inducing a myocardial infarction, eight mini Chinese swine's were examined on a 1.5-T MR scanner for myocardial late enhancement after the administration of gadopentetate dimeglumine using a segmented 2D PSIR turbo FLASH sequence followed by a navigator-gated 3D PSIR turbo FLASH sequence. Image quality was scored by two independent readers using a 4-point Likert scale (0=poor, nondiagnostic; 1=moderate, diagnostics may be impaired by artefacts; 2=good, some artefacts but not interfering in diagnostics; 3=excellent, no artefacts). Scars were compared quantitatively in volume and graded qualitatively on the basis of size and location in these two sequences.

Results One pig died from anaesthetic accidents. The quality of the 3D PSIR images was acceptable in 6 pigs. Qualitative analysis of scar area (p=0.88), and scar location (p=0.81) were similar for both techniques. More hyperenhanced scar volumes (p=0.02) and small hyperenhanced scars (p=0.03), corresponding mostly to nonischaemic distribution patterns, were detected using 3D PSIR than 2D PSIR. Although 2D and 3D results were found to be highly correlated for scar volume, Bland-Altman analysis indicated a systematic smaller infarct volume on the 2D PSIR scans (R2=0.81).

Conclusions Free-breathing 3D PSIR turbo FLASH imaging is a promising technique for the assessment of left ventricular scar particularly for scar quantification and the detection of small non-ischemic scars in the myocardium. It can be an alternative method to detect of the infarcted myocardium in the clinic, particularly suitable for patients who cannot breath-hold.