Single Shot and Phasesensitive Detection for Assessment of Myocardial Infarction within a Single Breathhold

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Purpose: The aim of the study was to compare the diagnostic accuracy in imaging viability of the myocardium with a multislice Phasesensitive Inversions Recovery (PSIR) 2 D single shot (SS) TrueFISP sequence without the need for optimization of the inversion time and an established IR turboFLASH sequence.

Material and Methods: 21 patients with myocardial infarction were examined at a 1.5 Tesla MR System (Sonata, Siemens, Medical Systems) 10 minutes after application of contrast material with a single shot 2D multislice technique (IR TrueFISP), that allows to image the entire short axis during one breathhold, and with a 2D single slice technique (IR turboFLASH), that requires one breathhold per slice. The inversion time was optimized with a CINE TI-Scout sequence for IR turboFLASH, the PSIR-SS TrueFISP sequence was used with a fixed TI of 200 msec. The voxel size was 2.1 x .1.6 x 8 mm^3 for both MR techniques. Signal intensity was determined in normal myocardium, in infarcted myocardium and in the left ventricle. The CNR of normal and infarcted myocardium was determined. The areas of hyperintense infarctions on selected slices and the entire infarct volumes were compared for both sequence techniques.

Results: The PSIR-SS TrueFISP sequence has a similar contrast/noise ratio (CNR) as the IR turboFLASH sequence (mean values: 11.6.0 vs. 12.3, p>0.05, n,s,) for differentiation of viable and non viable myocardium. The CNR of infarction and blood in the left ventricular cavity has a higher value for the multislice technique compared to the single slice technique (1.8 vs. 1.2, p=0.038). The assessment of the area of infarction within one slice (r=0.96, p<0.003) and the volume of the entire infarction is possible with excellent correlation of both techniques (r=0.97, p<0.002).

Conclusion: PSIR-SS TrueFISP sequence allows for accurate determination of the area and volume of the infarction during data acquisition within a single breathhold without significant loss of CNR, thereby also obviating the time-intensive need for optimization of the inversion time