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POSTER PRESENTATION Open Access

Feasibility of three-dimensional (3D) balanced steady-state-free-precession (bSSFP) myocardial perfusion MRI at 3 Tesla using local RF Shimming with dual-source RF transmission

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Background

Three-dimensional myocardial perfusion MRI offers better myocardial coverage than conventionally used two-dimensional methods. bSSFP three-dimensional myocardial perfusion MRI at 3 Tesla potentially offers further improvement of signal characteristics and may enhance the use of three-dimensional myocardial perfusion MRI for clinical application.

Methods

Twenty-five healthy volunteers and 2 patients were included upon written informed consent and local ethics committee approval. Dynamic contrast-enhanced 3D bSSFP perfusion imaging was performed on a 3 Tesla MRI scanner equipped with dual-source RF transmission technology (MultiTransmit; Philips Healthcare, The Netherlands).

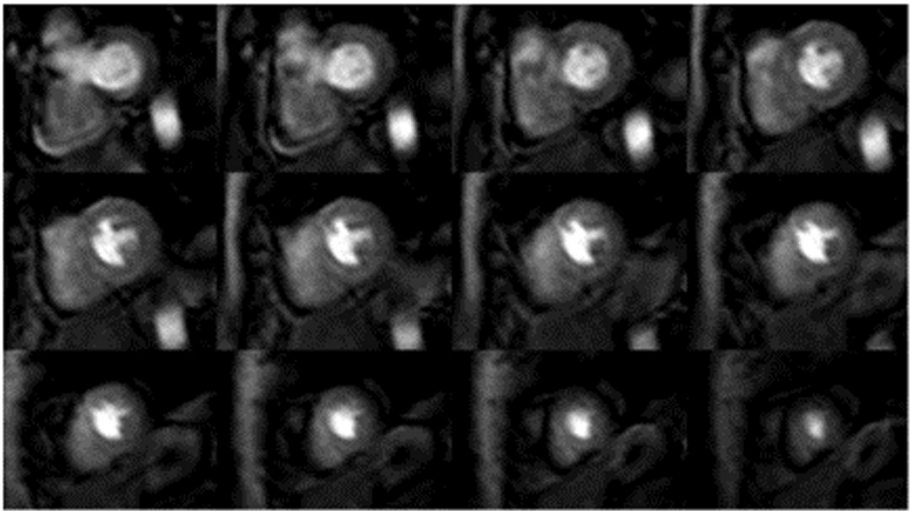

Figure 1 Volunteer example of 3D balanced steady state free precession (bSSFP) acquisition

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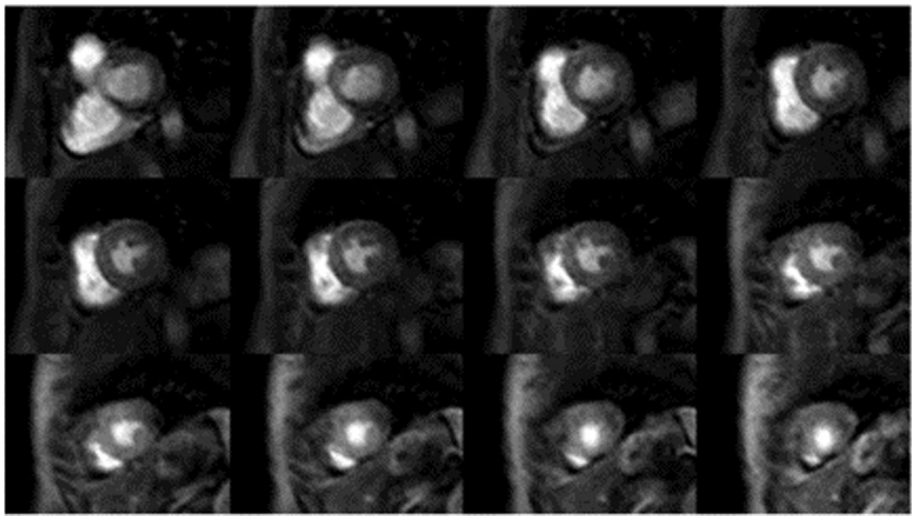

Figure 2 Volunteer example of 3D spoiled gradient echo (TFE) acquisition

Results

Local RF Shimming with dual source RF transmission significantly improved B1 field homogeneity (P=0.0107). For bSSFP perfusion imaging, it allowed a reduction of TR from 3.4 to 2.2 ms at the same flip angle. Image quality was similar for TFE and bSSFP but there were more artefacts for bSSFP (Figure 1).

Compared with an equivalent 3D spoiled gradient echo method (TFE), mean SNR was (30.4 vs 24.4, respectively, P=0.24), but signal homogeneity measured in the myocardium was improved (14.98% vs 11.15%, respectively, p=0.015).

Conclusions

Three-dimensional bSSFP myocardial perfusion MRI using local RF Shimming with dual-source RF transmission at 3 Tesla is feasible with improved signal characteristics. Image artifacts however remain an important limitation.

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