AbstractID: 10624 Title: Effects of slice orientation and parallel acquisition on EPI-based PASL Perfusion Imaging in areas with susceptibility artifact

Purpose

GE EPI is commonly applied for acquiring perfusion MRI with arterial spin labeling (ASL). A key problem is the long echo train that causes problems in image quality due to the susceptibility artifact. This study aimed to focus on the orbitofrontal cortex (OFC) region and evaluate the effects of slice angle combined with parallel imaging technique on ASL image quality.

Methods

FAIR combined with a single-shot GE EPI was applied with TI = 1400 ms, TR/TE/FA = 3000 ms /20 ms /90^0, 5mm slice thickness, 7 slices, NEX = 15, FOV = 220 mm and matrix = 64. The slice tilt was set from -45°, 0 to +40° relative to the AC-PC direction. Images were obtained both with and without applying the SENSE (factor = 2). Signal-to-noise ratio (SNR) and contrast was calculated from the nonselective (M_{NS}) and the selective inversion image ($M_{NS)}$.

Results

The SNR became more stable when the parallel imaging was used (Fig.1). On the contrary, the susceptibility gradient caused a greater effect on the SNR without parallel acquisition with a maximum at -15° slice tilt. At two of the slice orientations the resulted images exhibited greater SNR in the OFC region due to reduced susceptibility artifact. The changes of SNR can be appreciated from the spatially normalized images showed in Fig. 2. Figure 3 demonstrated slight varied contrast at different slice orientation measured with parallel imaging. The highest value is about 1.8% at -15° slice tilt.

Conclusion

For the purpose of reducing signal losses in OFC, this study found the optimal slice tile without parallel imaging. However, parallel imaging may be preferable because it was less subject to slice orientation. Further studies with more subjects and anatomical areas are required to better understand the changes in inflow contrast as the slice tilt.