

Non-contrast-enhanced MR Portography using spin labeling technique: comparison of balanced SSFP and half-Fourier FSE sequence.

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PURPOSE

Several MRA techniques have been implemented for non-invasive imaging of the portal vein. A time-spatial labeling inversion pulse (time-SLIP) technique was reported using a free hand spatial selection and tag-on and tag-off alternating scan and MIP processing to only depict the marked blood while canceling the background signals at any specified inversion time [1]. The purpose of this study was to make a comparison between 3D balanced steady state free precession (SSFP) sequence and 3D half-Fourier FSE to explore the non-contrast-enhanced MR portography using spin labeling technique.

MATERIALS AND METHODS

The subject of this study was 50 consecutive patients (23 women, 27 men; mean age, 65.4 years, range 31-85) with pancreato-biliary disease. All examinations were performed on a 1.5-T magnet (EXCELART Vantage; Toshiba). The imaging protocol consisted of the following pulse sequences: a) 3D balanced SSFP sequence, TR/TE/TI=5/2.5/1300msec, flip angle=120. b) 3D half-Fourier FSE, TR/eTE/TI=2981~13110/80/1300msec, refocusing flip angle=160, matrix=256x256, thirty 3.5-mm section slices, respiratory triggering, parallel reduction factor=2.0, fat suppression. The time-SLIP pulse was placed to mark both the splenic and superior mesenteric vein that flows into the portal vein. The CNR of vessel to liver was calculated. Four radiologists who were blind to the clinical history performed the qualitative analysis (anatomic visualization, contrast of vessel to liver). Using contrast-enhanced CT images as truth, a receiver operating characteristics curve was generated and a statistical analysis of time-SLIP portography was performed.

RESULTS

The CNRs between the first branches and liver were higher in time-SLIP portography with the half Fourier FSE sequence (right; 3.49 ± 1.72 , left; 3.03 ± 1.12) than that in the portography with the SSFP (right; 3.30 ± 1.61 , left; 0.37 ± 0.30). There was no significant difference between two sequences for the CNR of main portal trunk (FSE; 3.45 ± 1.53 , SSFP; 3.56 ± 2.01). In the qualitative analysis, the contrast of intra-hepatic portal branches on the half-Fourier FSE was higher than that on the SSFP (FSE; 3.7 ± 1.1 , SSFP; 3.2 ± 1.3). Anatomical visualization of main portal trunk in the SSFP images was better than that in the half-Fourier FSE.

DISCUSSION AND CONCLUSION

To investigate intra-hepatic portal branches, the MR Portography using half-Fourier FSE technique provides better quality images than that with SSFP sequence. The 3D balanced SSFP sequence is suitable for the investigation of main portal trunk because of lower burring artifacts. The MR Portography using the time-SLIP technique serves as a useful tool for screening procedures of portal vein.

REFERENCES

1. Miyazaki M, Lee VS. Nonenhance MR angiography. Radiology 2008;248:20-43.



Figure: Non-enhanced MR portography in a 39-year-old female by using the 3D half-Fourier FSE (left) and using the 3D balanced SSFP sequence (right). To investigate intra-hepatic portal branches, the time-SLIP portography using the half-Fourier FSE sequence provides better quality images than that using the SSFP.