

Meeting abstract

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2110 Single shot inversion recovery gradient-echo MRI at 3 T for diagnosis of venous thrombosis

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Introduction

Although high resolution 3D magnetic resonance angiogram (MRA) is the sequence of choice for the assessment of venous thrombosis, image quality is highly dependent on a patient's breathhold capability. A fast and reliable technique to differentiate thrombosed from nonthrombosed vessels is necessary, especially for patients who are not able to hold their breath or when intravenous contrast administration is contraindicated.

Purpose

The purpose of our study was to evaluate the accuracy of an optimized 2D T1-weighted magnetization-prepared (slice selective inversion recovery) single-shot gradient echo (IR-GRE) sequence in the diagnosis of venous thrombosis.

Methods

Thirty two thrombotic veins on abdominal MRI of 23 patients were retrospectively reviewed in consensus by two radiologists. Using a 3.0 T system (Magnetom Trio, Siemens, Erlangen, Germany), axial 2D single-shot IR-GRE images (TI, 1100 ms; TR, 1800 ms; TE, 2 ms; flip angle, 10°; Echo spacing mm, 4.6; slice thickness, 6 mm; bandwidth, 400 Hz/px) were compared with routine delayed post-contrast 3D fast GRE angiography. Diagnosis was confirmed by another imaging technique (ultrasound and/or computed tomography) in all patients.

The discernability of venous thrombus was qualitatively evaluated according to the following criteria: 1, not discernible; 2, poor; 3, good; 4, excellent. The signal intensity of selected patent veins (IVC and portal system, each at three levels) on both sequences was compared with the signal of paravertebral muscles in the same image using a 4-point scale: 1, iso- or hypointense; 2, slightly higher; 3, bright; 4, very bright.

Results

Venous thrombosis was detectable in 31 of 32 thrombotic veins using IR-GRE sequence as low signal intensity areas with an average discernability score of 2.91 ± 0.66 compared with contrast-enhanced MR (3.35 ± 0.64). Single shot IR-GRE did not show splenic vein thrombosis in one patient. For patent vessel's signal intensity, the confluence of the IVC with hepatic veins and the IVC at the level of the main portal vein (PV) were better shown on IR-GRE sequence ($p < 0.0001$ and $p = 0.0005$, respectively). The main PV and its intrahepatic branches were equally well shown on both techniques. The confluence of the PV with the splenic vein and the IVC with renal veins were better shown with contrast enhanced MR ($p = 0.0295$ and $p = 0.0703$, respectively).

Conclusion

Single shot IR-GRE images have high diagnostic value in the diagnosis of venous thromboses compared with gadolinium-enhanced T1-weighted gradient-echo images. Single shot IR-GRE can be used in MR-protocols for the

diagnosis of venous thromboses, especially in patients who can not hold their breath or when contrast injection can not be done.

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