

T2-weighted VISTA of the Liver: Parameter Optimization and Its Clinical Application in Gadoxetate-enhanced MR Imaging

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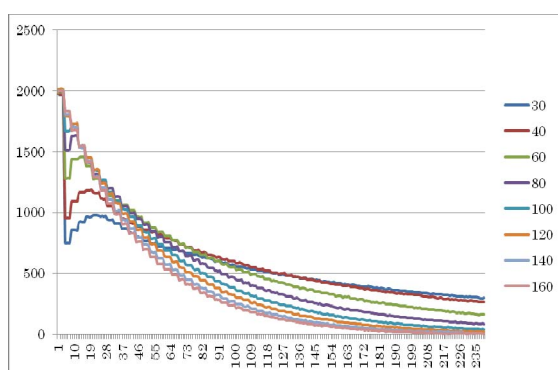
Purpose: To optimize the parameters of 3D T2-weighted Volume Isotropic TSE Acquisition (VISTA) for liver imaging and confirm its usefulness in patients who underwent gadoxetate-enhanced MRI (EOBMR) as compared to 2D T2-weighted TSE (TSE).

Materials and Methods: A 1.5 T clinical unit was used. Utilizing phantom and three volunteers, various refocusing flip angle (RFA), TSE factors, and turbo directions were tested for liver imaging by VISTA, and best parameter setting was sought. VISTA with optimized parameters (slice/interval=2.5-3/1.2-1.5 mm, respiratory navigated, scan time 5-8 min) and TSE (TR/TE=10000/120 ms, 7/8 mm, breath-holding, 20 sec) were obtained after gadoxetate injection in 91 patients who underwent EOBMR. Two radiologists interpreted all images independently and rated lesion visualization using 5-point scale. The smallest 10 lesions were selected and their detection rates were compared between the two sequences in each patient. Overall image quality was also assessed. Contrast ratio (CR: difference of signal intensity between lesions and liver divided by that of saline phantom) was calculated for all lesions larger than 2cm in diameter. Artifacts in VISTA were also evaluated.

Results: We found RFA of 30 degrees best reduces flow signal and provides best pseudo-steady state, TSE factor of 100 along with TE of 160 ms provides optimal signal of liver parenchyme, and linear radial order best reduces artifacts related to cardiac or intestinal motion. In clinical study, detection rate of hepatocellular carcinoma (HCC), hemangioma, and metastasis, was higher for VISTA than for TSE in both readers (p<0.01). No difference was seen in that of cysts. For overall rating, the superiority of VISTA was suggested by both readers with a kappa value of 0.95. CR of HCC, hemangioma, and metastasis was higher in VISTA, but that of cysts was higher in TSE (p<0.01). Artifact was observed in the left lobe, within ascites or pleural effusion, which are considered related to motion.

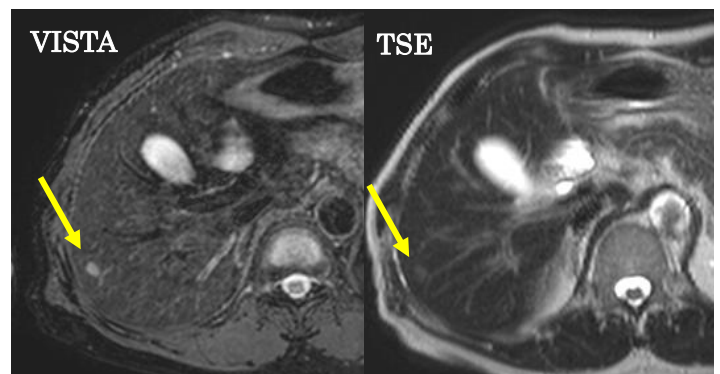
Conclusion: Optimized T2-weighted VISTA provided better T2-weighted images than TSE in EOBMR, without extending examination time. Because of its susceptibility to motion, however, signal reduction within ascites or pleural effusion is frequently seen and therefore concurrent use of TSE may be recommended.

Fig.1 Signal intensity vs RFA



RFA 30 provides best pseudo-steady state.

Fig.2 VISTA vs TSE in a clinical case (metastasis)



Lesion conspicuity and contrast is much better in VISTA.