

Assessment of post interventional hepatocellular carcinoma using morphological and functional MRI data

THESIS

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Abstract

Purpose: To evaluate the role of dynamic contrast enhanced (DCE) and diffusion weighted MRI in the assessment of response to treatment and detection of residual tumor viability of hepatocellular carcinoma after trans catheter arterial chemoembolization (TACE) and radiofrequency ablation (RFA).

Subjects and methods: Pre contrast T₁, in and out phase, T₂, T₂ SPAIR, respiratory triggered diffusion weighted MR images (b factor 400, 800 s/mm²) and dynamic contrast enhanced MRI with post processing subtracted images and color mapping obtained in 20 patients with hepatocellular carcinoma (10 post RFA and 10 post TACE). Dynamic post gadolinium-enhanced & Diffusion-weighted MR images were assigned confidence levels for post interventional HCC residue/recurrence and we categorize the patients into resolved and unresolved groups. The sensitivity, specificity, PPV, NPV and accuracy for both the dynamic and the DWI images in post RFA & post TACE patients were calculated. Apparent diffusion coefficients (ADCs) were calculated for entire treated zone, malignant lesions and perilesional reactive parenchymal changes for the different study groups.

Results: In post TACE lesions, dynamic MRI had a sensitivity of 90%, a specificity of 100%, a positive predictive value of 100%, a negative predictive value of 93.8% and an accuracy of 96% compared to 100%, 77.6%, 77.6%, 100% and 80% respectively of diffusion weighted imaging. In post RFA lesions, dynamic MRI had a sensitivity of 100%, a specificity of 92.9%, a positive predictive value of 91.7%, a negative predictive value of 100% and an accuracy of 96% compared to 100%, 71.4%, 73.3%, 100% and 84% respectively of diffusion weighted imaging. The mean ADC value of the recurrent or residual malignant lesions was significantly lower than that of the post interventional perilesional parenchymal changes (P value 0.001**).

Conclusion: Dynamic contrast enhanced MRI is superior to diffusion weighted MRI in evaluating HCC response to locoregional therapy. DWI helps to improve the sensitivity for detecting marginal tumor recurrence of HCCs after locoregional therapy, especially in indeterminate hyper vascular lesions without definite venous washout, yet, DWI has lower specificity compared to dynamic MRI with increased false positives due to intra-lesional hemorrhage and perilesional parenchymal changes causing diffusion restriction and decreasing PPV. Dynamic study with complementary diffusion imaging and ADC measurements allow better tissue characterization and help in effective monitoring of tumor response to locoregional therapy.

Key Words: Hepatocellular carcinoma, MRI, ablation, chemoembolization , residual, dynamic, subtraction, diffusion, ADC.