

Magnetic Resonance Imaging of HCC: Predictive Findings of Post-transplant Tumor Recurrence in a Screening Population

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Introduction: Hepatocellular carcinoma (HCC) is a common complication of chronic liver disease; liver transplantation remains the most validated curative intervention for early HCC within Milan criteria. Eligibility for liver transplantation for HCC is governed by pretransplant tumor staging related to size and number of tumors, with the overall aim to reduce the frequency of posttransplant tumor recurrence. MRI is a foundation for staging patients listed for liver transplantation, however approximately 10% of patients transplanted with HCC demonstrate recurrence despite accurate presurgical staging. The identification of additional imaging features (outside of number and size of tumors) that may predict tumor recurrence would be extremely valuable to better triage patients with respect to transplant priority.

Purpose: To determine potential MRI features of hepatocellular carcinoma (HCC) that may be predictive of an increased risk of tumor recurrence in patients who underwent liver transplantation.

Materials and Methods: This study was IRB-approved and HIPPA-compliant. Between 6/2004-6/2010, 58 patients with HCC identified on pretransplant MRI underwent liver transplant. Two experts in body MRI retrospectively reviewed the pretransplant MRIs, blinded to histological results and patient outcomes. Each tumor was assessed for lesion size, capsule thickness, T2 signal, degree of arterial-phase enhancement on multi-phase, postgadolinium enhanced MRI, hepatic lipid and tumor lipid. Signal intensity was assessed qualitatively and scored on a scale from -3 to +3. Clinical recurrence data was collected from available clinical, imaging and pathologic records. A T-test used to compare lesion size and capsule thickness, while a Wilcoxon's rank sum test was used to compare T2 signal and arterial-phase enhancement; a Fisher's exact test was used to compare the presence of hepatic and tumor lipid between recurrent and nonrecurrent patients.

Results: Elevated T2 signal of pretransplant HCC was a significant predictor of post-transplant recurrence; patients with recurrent HCC after transplant had average scoring of pretransplant tumor T2 signal of +2.2 (range +1 to +3), while patients without recurrent tumor had average pretransplant HCC T2 signal score of +0.8 (range -1 to +3), p value = 0.0006. Additional predictors of recurrence included increased capsule thickness (p = 0.05), increased lesion size (p = 0.02) and higher degree of arterial enhancement (p = 0.05). The presence of lipid either within the tumor (p = 1.0) or within the adjacent liver (p = 1.0) were not found to be significant predictors of recurrence.

Conclusion: Our results demonstrate that a qualitative assessment of elevated T2 signal on preoperative MRI was predictive of increased recurrence risk after transplant. Increased lesion size, capsule thickness and degree of arterial enhancement were also found to be predictive, though to a lesser extent.

References:

Mazzaferro V, Llovet JM, Miceli R, et al. Predicting survival after liver transplantation in patients with hepatocellular carcinoma beyond the Milan criteria: a retrospective, exploratory analysis. *Lancet Oncol* 2009. 10(1):35-43.

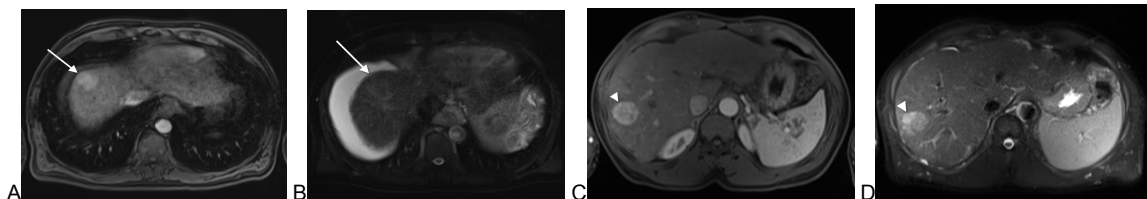


Figure: Patient #1 (A,B) shows tumor T2 signal that is relatively isointense to background liver, scored as 0; patient #1 had 822 days of follow-up without evidence of tumor recurrence. Patient #2 (C,D) shows HCC with elevated T2 signal, scored as a +3. Patient #2 presented with recurrent tumor 259 days after transplant.