Detection of Hepatocellular Carcinoma in pre-liver transplant patients: diagnostic performance of DWI compared to Gadolinium-enhanced imaging

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Introduction:
Accurate diagnosis of tumor burden is critical in patients with hepatocellular carcinoma (HCC) before liver transplantation. Despite the use of state-of-the-art MRI techniques, the overall sensitivity of Gd-enhanced MRI has been reported to have a wide range (33%-85%). There has been no report about the usefulness of DWI in the diagnosis of HCC before transplantation. Our objective was to compare the diagnostic performance of DWI vs. Gd-enhanced 3D T1WI for the diagnosis of HCC in pre-liver transplant patients. We hypothesize that DWI has a better specificity than Gd-enhanced sequences.

Methods:
52 patients with cirrhosis who underwent DWI and Gd-enhanced 3D T1WI at 1.5 T within 90 days of liver transplantation were assessed by 2 independent observers. First, the observers reviewed pre-contrast T1, T2, and DWI; and then pre-contrast T1, T2, and Gd-enhanced 3D T1 sequences. Lesion detection and confidence levels were recorded. Sensitivity of detection per patient was calculated; as well as sensitivity, specificity, positive predictive value (PPV), negative predictive value (NPV) and accuracy per lesion, using explant as the reference.

Results:
At liver explant, 97 HCCs were present in 35 patients (mean size 1.5 cm, range 0.3-6.2 cm). 63/97 HCCs (64.9%) had a size < 2 cm. Results for both readers are shown in Tables 1 (per patient detection) and 2 (per lesion detection). The overall detection of HCC on Gd-enhanced MRI was higher than that on DWI both per patient and per lesion. However, the specificity and PPV of DWI were higher than those of Gd-enhanced 3D T1 per lesion analysis. In addition, the sensitivity of Gd-enhanced 3D T1 for detection of HCCs < 2 cm was higher (58.7% and 52.4%) than that of DWI (50.9% and 26.2%).

Discussion:
One of the pitfalls of Gd-enhanced MRI in the diagnosis of HCC in patients with cirrhosis is the presence of arterial enhancing non-tumorous pseudolesions (arterioporal shunts) that may limit the specificity of Gd-enhanced sequences. In contrast to HCCs, AP shunts do not show diffusion restriction. Our results showed that DWI was helpful in discarding AP shunts, resulting in higher specificity and PPV. DWI could have a complementary role to Gd-enhanced sequence for the accurate diagnosis of HCC, even though the overall accuracy of DWI is lower than that of Gd-enhanced imaging.

References:

Fig: Gd-enhanced early arterial (A) and late arterial (B) images show a small arterial enhancing lesion in segment 5 in a cirrhotic liver (arrow). The lesion was vaguely seen on the portal venous phase (C) and was interpreted as HCC by both of the reviewers on contrast-enhanced images. The lesion is not identified on DWI (b=500, D). No HCC was identified on explant, this likely represents a shunt.