Diagnostic performance of delayed hepatobiliary imaging post gadoxetic acid combined with DWI vs. dynamic contrast-enhanced imaging for HCC detection: Pilot Data.

Cecilia Besa [1], Nancy A Cooper[1], Sara Lewis[2], Amita Kamath[1], Sasan Roayaie[3], Marcelo Facciuto[4], Isabel I Fiel[5], and Bachir Taouli[6]

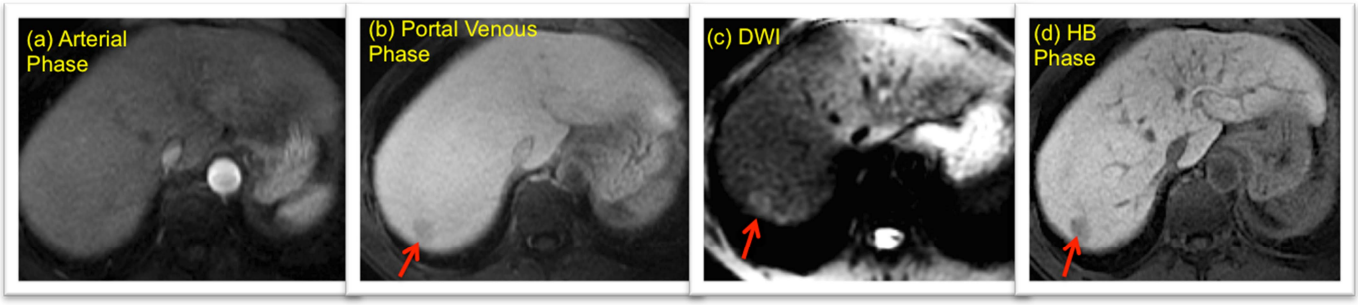
[1]Radiology, Mount Sinai Medical School, New York, NY, United States, [2]Radiology, Mount Sinai Medical School, New York, NY, United States Minor Outlying Islands, [3]Surgery, Mount Sinai Medical School, New York, NY, United States, [4]Surgery, Mount Sinia Medical School, New York, NY, United States, [5]Pathology, Mount Sinai Medical School, New York, NY, United States, [6]Mount Sinai School of Medicine, New York, NY, United States

Target audience: Radiologists, physicists and technologists with interest in liver disease.

Purpose: The accurate identification of the number, size, and location of hepatocellular carcinoma (HCC) is critical for staging and treatment planning. However, in practice this can be challenging due to the imaging variability of HCCs and high prevalence of benign lesions in cirrhotic livers. Hepatobiliary phase (HBP) imaging after Gadoxetic acid (Gd-EOB-DTPA, Primovist/Eovist, Bayer) injection, a recently approved liver-specific gadolinium-based contrast agent has shown potential for HCC detection [1-3]. This study assesses the diagnostic performance of a short MRI protocol combining HBP imaging post Gd-EOB-DTPA and DWI compared to dynamic contrast-enhanced (CE) imaging (using AASLD 2011 criteria) for HCC detection.

Methods: 208 patients with liver disease who underwent Gd-EOB-DTPA-enhanced MRI for HCC screening from 01/2011 to 12/2011 were included in this IRB approved retrospective single center study. 98 patients with HCC and 110 patients without HCC (controls) were identified. Two sets of images were analyzed independently by 3 readers: HBP/DW-set (HBP at 20 min post injection + DWI using b 0-50-500-1000) and dynamic CE-set (CE imaging including pre-contrast, arterial, portal venous and late venous 3D T1WI after the administration of 10 mL of Gd-EOB-DTPA). Readers had access to T2WI and T1 in- and opposed-phase sequences for both data sets to allow differentiation of common benign lesions such as hemangiomas and cysts. Reference standard was represented by histopathologic findings and imaging evaluation by 2 separate readers in consensus. HCCs were defined as lesions > 1 cm with hypointensity on HBP and/or restricted diffusion (hyperintensity on b500/1000 and low ADC) on the HBP/DW-set and typical wash-in/wash-out on the CE-set. Sensitivity, specificity, PPV and NPV were calculated for each image set.

Results: Pilot data is presented here. 40 initial patients with 48 HCCs (mean size 21 mm, range 11- 80 mm) and 12 patients without HCC were evaluated by a single reader. 44/48 (92%) HCCs demonstrated hypointensity on HBP with/without restricted diffusion (Fig.), while only 37/48 (77%) had typical wash-in/wash-out. A combination of hypointensity and/or restricted diffusion yielded sensitivity, specificity, PPV and NPV of 95.8%, 83.3%, 93% and 83% for the HBP/DW-set, and 77%, 91.6%, 50% and 97% for AASLD criteria, respectively. Two false positive cases were seen on HBP/DW-set demonstrating hypointensity and restricted DWI: a hemangioma and nodular confluent fibrosis.



Hypovascular HCC (arrows) in the right hepatic lobe showing lack of arterial enhancement (a) with hypovascularity on portal venous phase (b). The lesion demonstrates restricted diffusion on b1000 (c) and hypointensity on HBP post Gd-EOB-DTPA (d)

Discussion: Pilot data demonstrate better sensitivity and lower specificity when using a short MR protocol combining HBP imaging post Gd-EOB-DTPA and DWI compared to dynamic phase images for detection of HCC > 1 cm. Data analysis of more cases is pending.

Conclusion: If combined HBP imaging plus DWI proves to have accuracy equivalent or higher than traditional ASSLD imaging criteria with dynamic CE imaging, a fast post-contrast liver MRI protocol consisting of Gd-EOB-DTPA injection outside the MRI room with DWI can be proposed for HCC screening, which could provide shorter and less expensive MRI exams, with better patient throughput. A future prospective study utilizing this short protocol would be necessary to prove this hypothesis.

References

1) Park MJ, et al. *Radiology* 2012; 264(3): 761-70
2) Ahn SS, et al. *Radiology*. 2010; 255(2): 459-66
3) Lee MH, et al. *AJR* 2011;197:868-875