Liver vessel enhancement of Gd-BOPTA and Gd-EOB-DTPA

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The aim of this study was to compare the enhancement dynamics in the liver of Gd-BOPTA (MultiHance®) and Gd-EOB-DTPA (Primovist®).

The conventional MRI contrast agents based on Gd-DTPA display the vascularity of organs and lesions. When imaging liver lesions an added liver specific enhancement and a biliary secretion of the contrast agent is often desired. Optimal detection, characterization and staging of most liver lesions are dependent upon imaging of both the vascularity and the liver specific enhancement. In this study we have tried to elucidate the enhancement dynamics of two liver specific gadolinium contrast agents, Gd-BOPTA and Gd-EOB-DTPA in healthy volunteers.

MATERIALS AND METHODS: After permission from the local ethics committee, ten healthy subjects, aged 29 years +/- 11 years (4 men and 6 women) were evaluated with each contrast agent for a total of twenty MR examinations. Exams were performed early in the morning after >7 hours of fasting using a 1.5 T Siemens Vision and a body coil. The amounts of contrast media used were 0.025 mmol/kg for Gd-EOB-DTPA, and 0.1 mmol/kg for Gd-BOPTA. Axial breath-hold T1-weighted scans (TE 1.9 ms, TR 4.5 ms, FOV 40 cm and 120 slices, 1.7 mm thickness) of the liver were performed before contrast media, during arterial and portal venous phases and thereafter at 10 and 130 min after intravenous contrast medium injection. The signal intensity of the common hepatic artery, the middle liver vein, a segmental branch of the right portal vein and the liver parenchyma was obtained from a single representative slice.

RESULTS: The difference in signal intensity of the vessels compared to the liver at the different imaging intervals is shown in the two graphs below. The peak intensity in liver parenchyma was obtained after 10 min when using Gd-EOB-DTPA and 1 min 30 seconds when using Gd-BOPTA. The image contrast between liver and vessels was greater when using MultiHance (Fig. 1a) compared to Primovist (Fig. 1b).

DISCUSSION: The long and intense vascular enhancement with Gd-BOPTA simplifies imaging of the liver arteries and veins and the vascularity of the liver parenchyma. Gd-EOB-DTPA, on the other hand, has a short and less intense vascular enhancement (Fig. 2) that according to our experience may restrain the diagnosis of e.g. portal and liver vein thrombosis and hypovascularized lesions. However, an advantage with the short vascular enhancement and the fast biliary enhancement of Gd-EOB-DTPA reduces the time of the investigation and increases the contrast between liver and non-liver in the liver specific phase. This might be of benefit in characterizing some lesions. We conclude that Gd-BOPTA is better in clarifying the vascularity whereas Gd-EOB-DTPA more clearly displays the liver specific enhancement.

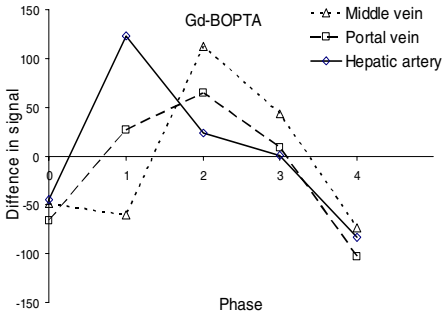

Fig. 1a

The difference in signal intensity of vessels in comparison to liver parenchyma (i.e. the image contrast between liver and vessels) at

0) native phase
1) arterial phase
2) portovenous phase
3) 10 min after contrast injection
4) 130 min after contrast injection.

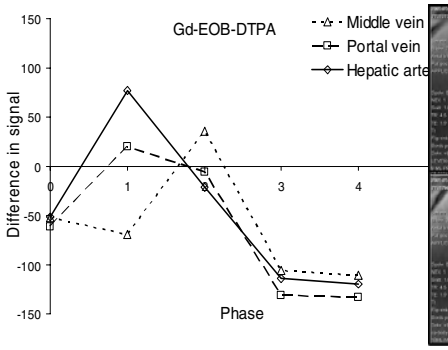

Fig. 1b

The washout of Gd-EOB-DTPA is faster than that of Gd-BOPTA. After 10 minutes all vessels have less signal intensity compared to the liver parenchyma.

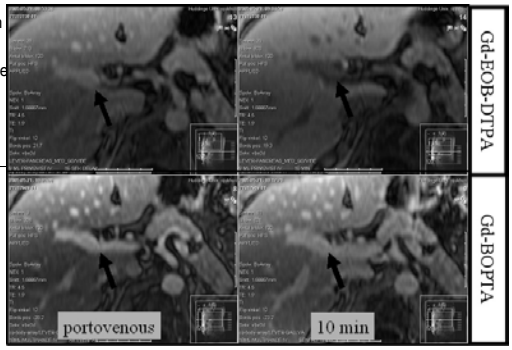

Fig 2

Compared to liver non-liver structures are less enhanced in the delayed portovenous phase (10 minutes) when using Gd-EOB-DTPA, but when using Gd-BOPTA the non-liver structures are still enhanced. Note for instance the signal intensity of the portal vein (arrow).