EVALUATION OF UPTAKE AND EXCRETION OF GD-EOB-DTPA IN NORMAL AND CIRRHOTIC LIVERS

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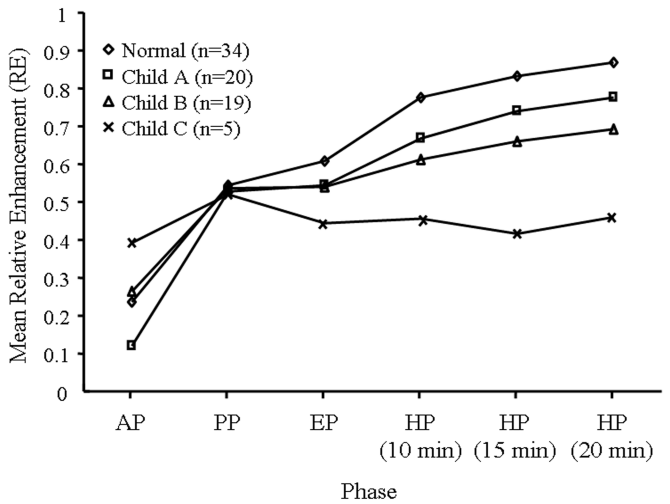
Purpose: To assess differences in enhancement effects of liver parenchyma and activity of biliary and renal excretion between normal and cirrhotic livers on contrast-enhanced MR imaging (CE-MRI) obtained with gadolinium ethoxybenzyl diethylenetriamine pentaacetic acid (Gd-EOB-DTPA).

Methods and Materials: A total of 78 patients with cirrhotic liver (n=44; Child A=20, Child B=19, Child C=5) and with normal liver (n=34) underwent Gd-EOB-DTPA enhanced MR imaging. CE images were obtained before contrast injection, in the arterial phase (AP) at 25 s, in the portal phase (PP) at 70 s, in the equilibrium phase (EP) at 3 min, and in the hepatobiliary phase (HP) at 3 times (10, 15 and 20 min). In the evaluation of hepatic uptake of Gd-EOB-DTPA, relative enhancement (RE) of liver parenchyma at all phases was compared to assess changes in enhancement effects according to the time course in each liver function group, and to assess differences in enhancement effects between normal and cirrhotic livers in each imaging phase. CE images were also reviewed to visually assess the homogeneity of contrast enhancement (homogeneous or heterogeneous) for liver parenchyma. In the evaluation of biliary and renal excretion of Gd-EOB-DTPA, CE images were compared to assess differences between normal and cirrhotic livers, regarding; 1) timing of the excretion of contrast agent into extrahepatic bile duct (0=not visible, 1=20 min, 2=15min, 3=10min or earlier), 2) grade of the contrast enhancement in upper portion of intrapancreatic common bile duct (CBD) at 20 min HP (0= no enhancement, 1= minimal intraluminal CBD enhancement, 2= moderately enhanced CBD lumen, 3= well enhanced CBD lumen), 3) presence or absence of contrast agents in duodenum at 20 min HP, and 4) RE of renal medulla and portal vein at 20 min HP.

Results: In normal-liver and Child-Pugh class A and B patients, mean RE of liver parenchyma increased significantly (p<0.001) with time until 20-min HP. Conversely, mean RE for Child-Pugh class C patients did not show any increasing tendency after PP. Mean RE of liver parenchyma at EP and HP (10-, 15- and 20-min) was highest in normal liver, followed by Child-Pugh class A, B and C cirrhosis (p<0.03-0.001). Hepatic parenchymal enhancement in patients with cirrhosis was significantly heterogeneous in comparison with that in patients with normal liver (p<0.001). Timing score of biliary excretion of contrast agents in cirrhotic liver was significantly lower than that in normal liver (P<0.001). Grade of contrast enhancement in CBD in normal liver was significantly better than that in cirrhotic liver (p=0.003). Contrast agents were demonstrated in duodenum in 8/44 (18%) cirrhotic liver while they were seen in 15/34 (44%) normal liver (P=0.013). Enhancement effects of renal medulla and portal vein in cirrhotic liver were significantly higher than those of normal liver (p=0.043 and p<0.001, respectively).

Conclusion: Hepatic parenchymal, biliary and renal enhancement on CE-MR images obtained using Gd-EOB-DTPA is affected by the hepatic function.



Mean relative enhancement (RE) of liver parenchyma during arterial phase (AP), portal phase (PP), equilibrium phase (EP), and three hepatobiliary phases (HP; 10, 15 and 20 min) of CE-MRI using 3D T1-weighted gradient-echo sequence obtained with Gd-EOB-DTPA in normal subjects and Child-Pugh class A, B and C patients.