Gd-EOB-DTPA in patients with primary sclerosing cholangitis (PSC) – An analysis of the hepatobiliary excretion kinetic

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Introduction:

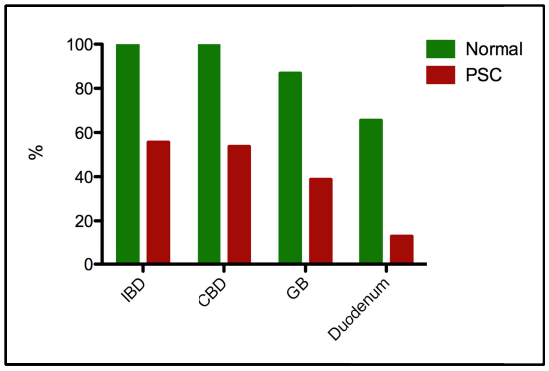
Primary sclerosing cholangitis (PSC) is a chronic cholestatic liver disease of unknown etiology, that is characterized by diffuse fibrosing inflammation of the intra- and / or extrahepatic bile ducts, resulting in bile duct obliteration, biliary cirrhosis and over the course of time in eventually hepatic failure. The spectrum of MR imaging appearances of PSC is diverse. It has been speculated, that hepatobiliary contrast agents, such as Gd-EOB-DTPA may be used to evaluate the progressive loss of the biliary polarization, and the impairment of the microstructure of the biliary secretion [1]. In contrast to extracellular contrast agents Gd-EOB-DTPA shows an uptake by hepatocytes and subsequent biliary excretion, which is about 50% in patients with normal liver and kidney function. The purpose of this study was to assess temporal Gd-EOB-DTPA excretion into different segments of the hepatobiliary system in patients with PSC and to work out a possible correlation with severity of disease.

Materials and Methods:

111 patients (36 female, 75 male, mean age 41.5 years) with confirmed diagnosis of PSC who underwent contrast enhanced hepatic MRI after injection of Gd-EOB-DTPA were included in this retrospective IRB-approved study. All hepatocyte phase images (range 1-493 min p.i.) were evaluated for presence of contrast agent in the intrahepatic bile ducts (IBD), the common bile duct (CBD), the gallbladder (GB) and the duodenum. In a subset analysis of patients (n=54) in whom hepatocyte phase scans were acquired within 10-20 min p.i., a Kruskal-Wallis test was performed to determine whether excretion was affected by liver function tests (LFT, namely serum bilirubin, alkaline phosphatase, γ-glutamyltransferase,). In addition, hepatobiliary excretion was compared with data collected in a previous study [2] from patients without liver disease (control group) by means of a Mann-Whitney U test.

Results:

Opacification of different hepatobiliary segments increased obviously over time and was significantly dependent on bilirubin level ($p<0.05$), but not on alkaline phosphatase, γ-glutamyltransferase or demographic data such as patient sex or age. Subset analysis: Compared with the control group (CG), hepatobiliary contrast excretion was significantly delayed in patients with PSC: 20 min p.i. Gd-EOB-DTPA could be detected in the IBD in 55.5% (CG: 100%), CBD in 53.7% (CG: 100%), GB in 38.8% (CG: 87%), duodenum in 13% (CG: 66%), respectively (figure).



Comparison of hepatobiliary contrast excretion 20 min p.i.

Discussion:

Hepatobiliary contrast excretion of Gd-EOB-DTPA in patients with PSC is significantly delayed, necessitating eventual adjustments of the MR imaging protocol. In patients with bilirubin elevation >50% hepatocyte phase images approximately 4h p.i. may be necessary in order to achieve contrastation of at least the IBD and the CBD. In patients with bilirubin elevation <50% hepatocyte phase images acquired 60 min p.i. are sufficient in approximately 90% in order to obtain contrastation of the respective segments.

References:

[1] Lee JM, Zech CJ, Bolondi L, Jonas E, Kim MJ, Matsui O, Merkle EM, Sakamoto M, Choi BI. Consensus report of the 4th International Forum for Gadolinium-Ethoxybenzyl-Diethylenetriamine Pentaacetic Acid Magnetic Resonance Imaging. Korean J Radiol 2011; 12(4):403-15.

[2] Ringe KI, Husarik DH, Gupta RT, Boll DT, Merkle EM. Hepatobiliary transit times of gadoxetate disodium (Primovist®) for protocol optimization of comprehensive MR imaging of the biliary system – what is normal? Eur J Radiol 2011; 79: 201-205.