A quantity analysis of hepatic perfusion in patients with liver cirrhosis before liver transplantation: by using dynamic MR imaging

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Introduction

Several studies have proved that MR and CT perfusion imaging can evaluate the micro-blood supply of liver (1-2), but by now, no research concerning the hepatic perfusion of adult cirrhosis recipients before liver transplantation has been published. Our purpose was to analyze the hepatic perfusion index got by a new dynamic enhanced MR imaging technique in normal adults and patients with liver cirrhosis before liver transplantation, evaluating the clinical value of this new method.

Materials and methods

98 normal adults (age 30-60 years old, 52 female, 46 male, all been consulted and get agreement before exam) and 52 pre-liver transplantation recipients with cirrhotic liver (age 28-52years old, 20 female, 32 male, all been consulted and get agreement before exam) underwent MR imaging after bolus injection of 15-mL Gd-DTPA at 5-mL/sec followed by 20-mL normal saline using a power injector, a coronal two section 2D FSPGR sequence at 1.5T (6/1.5/ 60º, 1.0-sec/acquisition) was used for perfusion imaging, 120 consecutive slices were got in each patient in one minute and a breath navigator is used. Their row data were transferred to a personal computer for post-processing and were classified to four groups (normal adults were divided into three groups--group I: 30-40, group II: 40-50 and group III: 50-60 years old respectively; group IV: cirrhosis). Temporal enhancement of the aorta, portal vein, and liver parenchyma was assessed through a region-of-interest (ROI) analysis. Artery and portal vein phase is divided by using the time-intensity curves of abdominal aorta and portal vein, and then positive enhancement integrals (PEI) of each patient's right and left hepatic lobe were calculated separately in both phases. Hepatic perfusion indexes [HPI= artery PEI / (artery PEI + portal vein PEI) ×100%] of the two lobes were calculated and lab results of each recipient were collected. For statistics, one way ANOVE and Student t test were used to determine if there was a statistically significant difference in the HPI values between groups.

Results

All studies were considered technically adequate. The HPI of right hepatic lobe were 19.7±5.8%, 19.2±4.5%, 19.0±4.1% in group I, II, III and were 21.0±6.7%, 20.0±5.4%, 17.4±4.0% respectively in left hepatic lobe. The HPI values of normal adults showed a tendency of decrease when the age becomes older and were lower than known physiological results. No statistical difference was shown in gender and between different lobes of the same age group. The HPI difference between group I, II, III showed no statistically significant (one way ANOVE, $p>0.05$) in both right and left hepatic lobe. The HPI of right and left hepatic lobe were 25.3±4.9%, 25.3±5.0% respectively in group IV. The HPI difference between normal adults (as a whole) and group IV showed statistically significant (t-test, $p<0.01$) in both right and left hepatic lobes (Table1).

Table1: analyzing of HPI of normal and cirrhosis livers

	Right lobe HPI	Left lobe HPI	t-test
normal	19.2±4.6%	19.5.±5.4%	P>0.05
cirrhosis	25.3±4.9%,	25.3±5.0%	P>0.05
t-test	P<0.01	P<0.01	

Conclusion

This dynamic MR imaging technique can analyze hepatic blood supply in vivo no invasively; this method is feasible and useful in evaluating the perfusion of cirrhotic liver recipients before liver transplantation.

References

1. Materne R et al. Magn Res Med 2002; 47: 135-142.
2. Van Beers B.E. et al. AJR 2001; 176: 667-673.