

Doppler Assessment of Splanchnic Arterial Flow in Patients with Liver Cirrhosis: Correlation with Ammonia Plasma Levels and MELD Score

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ABSTRACT: *Purpose.* To assess the clinical significance of blood flow velocity and resistance index (RI) in the visceral arteries of patients with liver cirrhosis with respect to plasma ammonia (NH₃) level and liver function.

Methods. We included 80 patients with liver cirrhosis (58 men) and 20 healthy controls (11 men). Duplex Doppler ultrasonography was used to assess flow velocity and RI in the hepatic (HA), right (RRA), and left renal (LRA), and splenic (SA) artery. Plasma NH₃ was measured by biochemistry. Liver function was assessed by MELD score (model of end-stage liver disease).

Results. HA, LRA, and SA systolic flow velocities were greater, whereas RRA diastolic velocity was lower in patients with liver cirrhosis than in controls. RI was higher in LRA, RRA, SA, and HA in patients with liver cirrhosis than in controls. NH₃ levels were significantly elevated in all patients with liver cirrhosis ($p < 0.05$) and significantly correlated with RI of RRA, LRA, and SA.

Conclusion. We found greater renal, hepatic, and LA RI in patients with liver cirrhosis than in healthy controls. The correlation we found between elevated renal artery RI (≥ 0.70) and MELD score emphasizes the risk of renal dysfunction during progression of liver cirrhosis. © 2014 Wiley Periodicals, Inc. *J Clin Ultrasound* 42:264–269, 2014; Published online in

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Doppler ultrasound has been in use for the assessment of arterial blood flow in patients with liver cirrhosis for more than 20 years.^{1–3} Intrarenal vasoconstriction, caused by complex interactions between portal and systemic hemodynamics, occurs early in the nonascitic phase of cirrhosis and before the appearance of hepatorenal syndrome.^{4–6} Arterial resistance index (RI) is the most widely used Doppler variable for the estimation of intrarenal vascular resistance in clinical studies. Available data suggest 0.70 as the upper limit for normal intrarenal RI. RI has been shown to increase in interlobar renal arteries of patients with liver cirrhosis⁷ and hepatorenal syndrome.^{8,9} Hepatic artery RI > 0.70 was related to liver fibrosis.^{10–14} However, very few studies of splenic artery RI in patients with liver cirrhosis have been published.^{15–17} We found no report of correlations between plasmatic ammonia (NH₃) level and visceral arteries RI in the available literature, and only one study regarding cerebral arteries.¹⁸ Kidneys are not only ammonia-producing organs¹⁹ but can adapt to hyperammonemia in chronic liver disease, switching

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