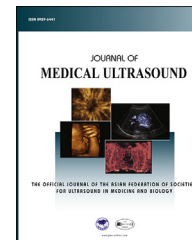


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TECHNICAL NOTE

Ultrasonic Contrast Portography for Demonstration of Intrahepatic Porto-systemic Shunts



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Abstract Spontaneous intrahepatic porto-systemic shunts (IHPSS) can be disclosed with ultrasound (US) and color Doppler ultrasound (CDU). However, direct evidence of the shunt on US or CDU may not be convincing. In this report we demonstrate the presence of IHPSS by ultrasonic contrast portography with intravenous injection of microbubble-based contrast agent (MBCA). With this technique, the MBCA was depicted to enter the hepatic vein through the shunt, and then flowed into the inferior vena cava.

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Introduction

Spontaneous shunt between portal veins and hepatic portal and hepatic veins, an intrahepatic vascular malformation, is a rare disease entity [1–7]. Early diagnosis is important to prevent hepatic encephalopathy and hematemesis. Fewer than 50 cases of spontaneous intrahepatic porto-systemic shunts (IHPSS) have been reported in the literature [6–11]. IHPSS may be disclosed with ultrasound (US) or color Doppler ultrasound (CDU) [10–12]. However, direct evidence of IHPSS on US or CDU may not be convincing. In

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this report we demonstrate the IHPSS by using ultrasonic contrast portography with intravenous injection of microbubble contrast agent (MBCA).

Techniques

A suspension of galactose microparticles in distilled water (Levovist; Schering, Berlin, Germany) was used as an MBCA. The microbubbles formed after vigorous shaking of the microparticle suspension for 10 seconds are estimated to have an average diameter of 2–8 μm . A total of 2.5 g of levovist in a concentration of 300 mg/ml (8 mL) was injected manually at a speed of 1 mL/s through a 20-gauge cannula inserted in the antecubital vein, and was flushed with an additional 10 mL of normal saline. A US study was performed using a Logiq 9 scanner (GE Medical System, Milwaukee, WI, USA) equipped with coded harmonic function. A 24-MHz curved linear array broadband transducer was used. The mechanical index was set at 0.60.8. Before the contrast study, a routine fundamental hepatic sonography was performed to demonstrate the location with suspected abnormal vasculature. The best scanning plane was chosen, and then the coded harmonic US function was switched on. Ten seconds after injection of Levovist suspension the patient was instructed to hold his breath so that the blood flows in the vessels of the porta hepatis enhanced by the MBCA could be continuously monitored and the suspected abnormality could be traced. The whole course of the US contrast study was recorded with a compact disk recorder.

Illustration of a case

A 70-year-old man was admitted with the chief complaints of abdominal fullness and two episodes of passage of tarry stool in the past month. The past history was unremarkable except for occasional nose bleeds. On physical examination, he had anemic conjunctivae and a few telangiectasis on the tongue, lips, nasal septum, and the turbinates bilaterally. He had a regular pulse with a Grade 2/6 precordial systolic murmur on auscultation. The vertical span of the right hepatic lobe was ~ 15 cm on percussion, indicating mild hepatomegaly. The other parts of abdomen were otherwise normal. The laboratory values were within normal range except for a minimally elevated alkaline phosphatase (220 IU/L) and alanine aminotransferase (52 IU/L). To investigate the cause of hepatomegaly, a US study of the upper abdomen was undertaken, which disclosed dilated common hepatic artery (maximal diameter: 8.5 mm). Multiple tortuous tubular structures representing vascular channels in the right hepatic lobe were noticed. By careful US tracing and color Doppler US evaluation of the right lobe vessels, communication between the right portal branch and the right hepatic vein through these vascular channels was suspected (Figure 1). Based on the clinical manifestations and US findings of the liver, a diagnosis of Osber–Weber–Rendu disease (OWRD) was made. The liver pathology was attributed to IHPSS. To verify the existence of shunting, intravenous ultrasonic contrast portography was done. Cloud-like contrast-enhanced blood flow was demonstrated in the right portal

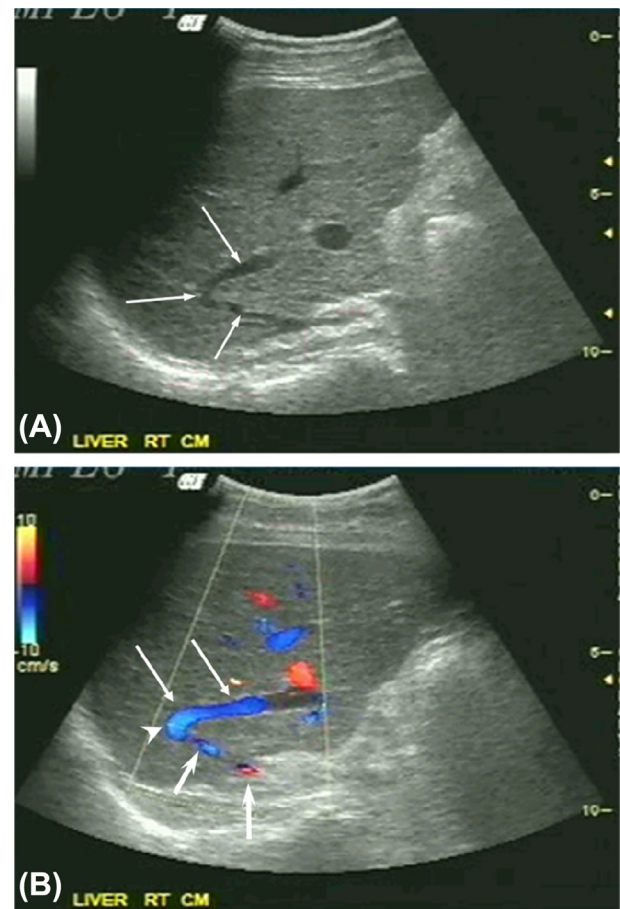


Figure 1 Gray-scale and color Doppler US studies of the liver. (A) Gray-scale US of the right hepatic lobe (intercostal scan) demonstrates a venous structure which is suspected to run in a curved course (arrows), and connection between a portal branch and a hepatic vein is possible; (B) color Doppler US depicts a possible communication (arrowhead) between a branch of the right portal vein (small arrows) and the right hepatic vein (large arrows). However, the continuity of the vessels cannot be well portrayed. US = ultrasound.

branch. Via the communicating collateral venous channels, the enhanced blood ran toward the right hepatic vein and then to the inferior vena cava (Figure 2). A diagnosis of hepatic angiodysplasia with IHPSS was confirmed on the basis of intravenous ultrasonic contrast portographic findings. The patient was therefore treated conservatively for his gastrointestinal bleeding, and has been doing well since then for 3 years.

Discussion

The cause of IHPSS is still unclear. It has been contributed to injury, congenital malformations, or collaterals as a result of portal hypertension such as in cirrhosis of the liver and Budd–Chiari syndrome [10–13]. Patients with SPVS can be asymptomatic and their vascular abnormalities are incidentally found during abdominal imaging. However, several clinical manifestations can be present at the time of diagnosis, including hematemesis, ascites, abnormal behavior,

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