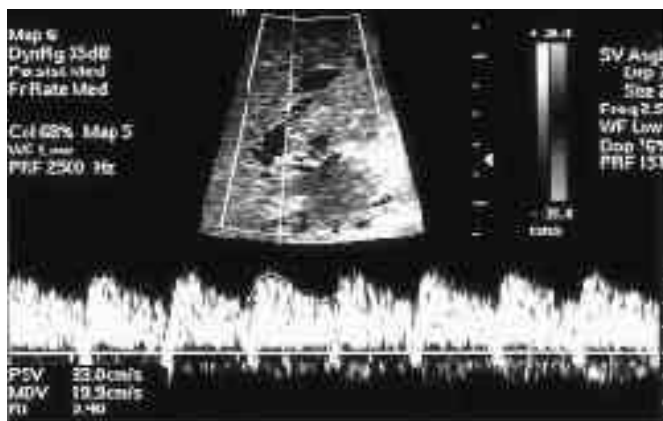


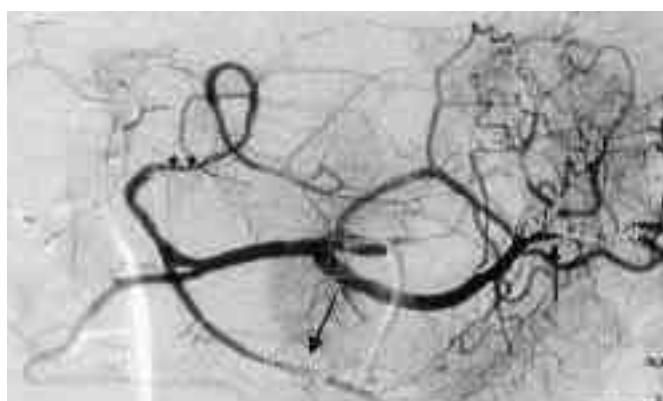
. 가  
가  
. ,  
.  
,  
6  
ischemic time) 가, ABO  
가 10% (1). 1 가  
6 50% . 6  
(2).  
가  
가  
85% 93% a)  
(5). , b) (parvus waveform), c)  
가 가(increased systolic acceleration time)  
(tardus waveform) d)  
(dampened systolic peak) (high-resistance wave- form), e) (5).  
3%-5% ,  
가 6%-9% 9 %-15% (3).  
가 50 %- 가  
58% 가 (3), 27 %-30% 가 (4).



A



B



C

Fig. 1. Hepatic artery thrombosis.

A. Duplex sonogram of the right hepatic artery shows a tardus parvus waveform (ie, a low resistance waveform with a resistive index less than 0.5 and increased systolic acceleration time).

B. Angiogram obtained with a contrast injection of the celiac axis demonstrates complete occlusion of hepatic artery at the anastomosis (arrow).

C. Image obtained after thrombolysis and balloon dilatation shows recanalization of hepatic artery (double arrows). Also coil embolization of splenic artery and right gastric artery was done (large arrow).



A



B



C

Fig. 2. Hepatic artery stenosis and pseudoaneurysm.

A. Duplex sonogram of the right hepatic artery shows a tardus parvus waveform (ie, a low resistance waveform with a resistive index less than 0.5 and increased systolic acceleration time).

B. Gray-scale US shows a ill-defined geographic echogenic area of ischemic zone (arrows).

C. Angiogram obtained with an injection of the celiac axis demonstrates tight stenosis (small arrows) and pseudoaneurysm (large arrows) at the anastomosis.

(tardus), (low resistance) (resistance) 가, , ,  
 index) . Dodd 가 0.5  
 가 0.1 (Fig.1B,C)  
 (6) (Fig. 1A).  
 가 가  
 가  
 가 , 가  
 가  
 , (parvus), (tardus),  
 (low resistance) (Fig. 2A).  
 2-3m/sec (6).

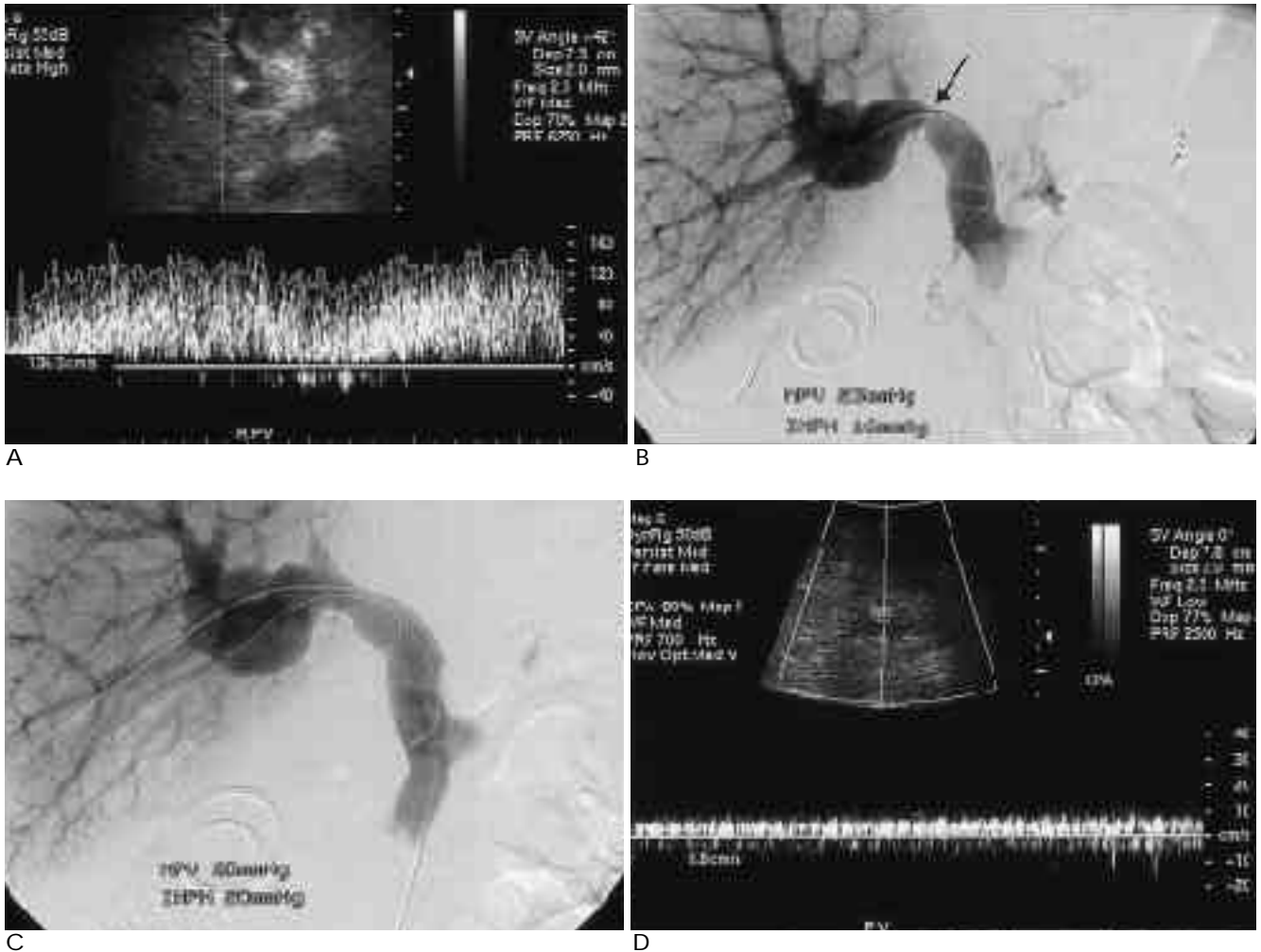


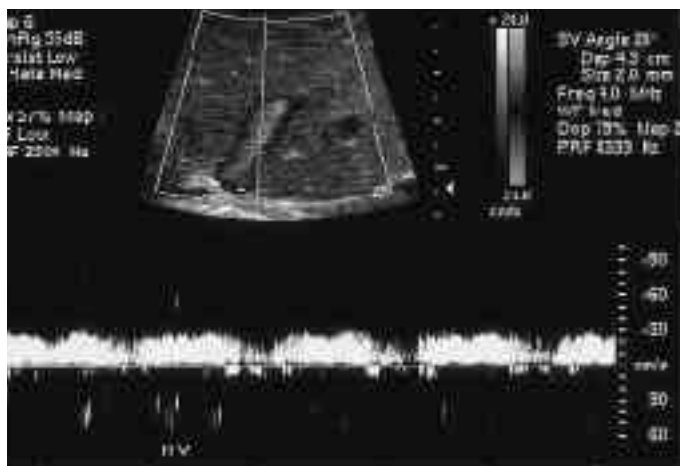
Fig. 3. Portal vein stenosis.

A. Duplex waveform of the portal vein at just beyond portion of stenosis shows an angle-corrected velocity of 136cm/sec, a greater than fourfold increase in velocity, suggestive of a hemodynamically significant stenosis.

B. Portogram demonstrates stenosis of the portal vein at the anastomosis site (arrow) with pressure gradient of 7mmHg.

C. Image obtained after stent placement demonstrates the successful treatment of the stenosis without pressure gradient.

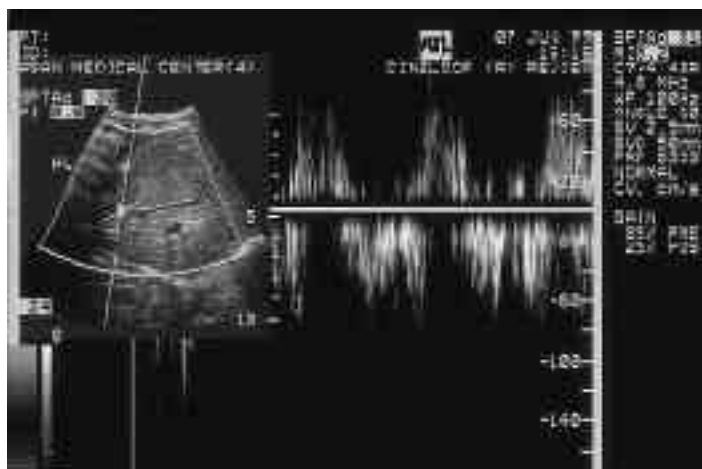
D. Normalized portal vein Doppler waveform of continuous flow pattern with velocity of 8.8cm/sec after stent insertion.



A



B



C

Fig. 4. Hepatic vein stenosis.

A. Duplex waveform of the left hepatic vein shows loss of the normal phasicity of the hepatic venous waveform.

B. Hepatic venogram shows focal stenosis at the anastomosis (arrows).

C. Normalized triphasic hepatic venous waveform after balloon dilatation.

가

(Fig. 2C)

가

3-4

(Fig. 3A)

가

가

가

가

(8).

가

(Fig. 3B).

가

(Fig.

3C),

(7).

(Fig. 2).

1%-13%

가

가

3-4

가

(9) (Fig. 4A).

(Fig. 4B).

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## Doppler US Findings of Vascular Complication after Liver Transplantation<sup>1</sup>

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Vascular complications after liver transplantation may involve the hepatic artery, and hepatic and portal veins. Arterial complications are common and significant vascular complications include thrombosis or stenosis, as well as pseudoaneurysms. Venous complications include thrombosis or stenosis of the inferior vena cava, or hepatic or portal vein. Since recent evidence has shown that emergent revascularization leads to improved graft salvage and patient survival with a relatively low rate of late biliary complications, accurate and prompt diagnosis of hepatic arterial complications is important. Doppler US is a relatively inexpensive, accurate, and non-invasive method of diagnosing the vascular complications which may arise from liver transplantation.

**Index words :** Liver transplantation  
Ultrasound (US), US, Doppler studies  
Hepatic arteries, thrombosis  
Hepatic veins, thrombosis

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