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Case Report

Balloon Venoplasty for Liver Failure Due to Stenosis of the Left Hepatic Vein After Right Tri-Segmentectomy

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A 41-year-old male patient with hepatitis B underwent right tri-segmentectomy and total caudate lobectomy for a huge hepatocellular carcinoma associated with complete occlusion of the inferior vena cava with thrombosis of the infrahepatic inferior vena cava due to tumor compression. Five months later, he was readmitted for ascites and hyperbilirubinemia. Venography revealed stenosis and tortuosity of the left hepatic vein and the inferior vena cava, for which balloon angioplasty of the left hepatic vein and the inferior vena cava was performed using an 8-mm and 10-mm balloon, respectively. The left hepatic venous pressure decreased from 65 mmHg to 25 mmHg after dilatation. The patient made a satisfactory recovery thereafter and remains well with normal liver functions and without ascites. Balloon angioplasty may be useful for liver failure due to hepatic vein stenosis after hepatic resection.

Key words: Balloon dilatation – Hepatocellular carcinoma – Liver failure – Outflow block

Although outflow block is one of the causes of postoperative liver failure (PLF) after liver surgery, especially in liver transplantation,[1,2] such a complication is rare after hepatic resection for hepatocellular carcinoma. We herein report a case of successful balloon angioplasty under venography for liver failure due to stenosis of the left hepatic vein after right tri-segmentectomy and caudate lobectomy for a massive hepatocellular carcinoma (HCC).

Case Report

A 41-year-old male patient with hepatitis B underwent right tri-segmentectomy and total caudate lobectomy for a huge HCC with occlusion and thrombosis of the infrahepatic inferior vena cava

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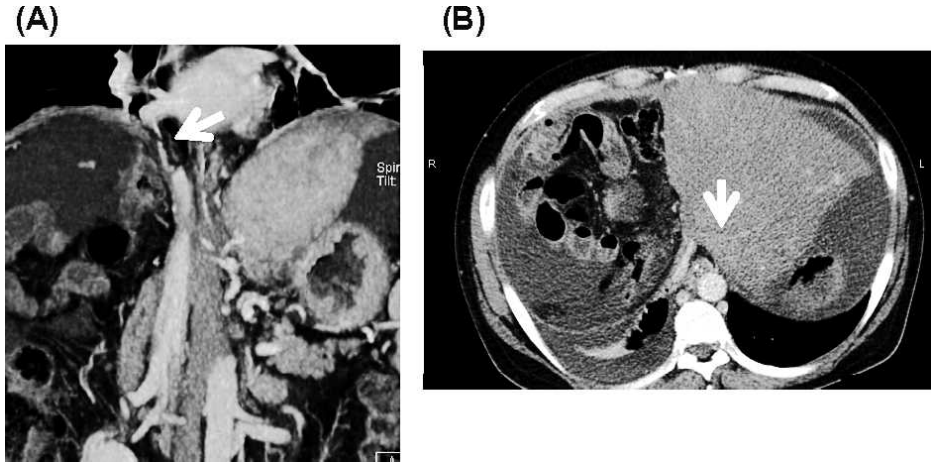

Fig. 1 Enhanced CT revealed stenosis of (A) the inferior vena cava on frontal section (arrow), and of (B) the left hepatic vein on transverse section (arrow).

(IVC) due to tumor compression after transarterial chemoembolization (TACE) for tumor-volume reduction. The remnant liver was the lateral segment and was completely freed from the IVC. The patient made a satisfactory recovery without complications and remained well for 3 months. However, ascites and hyperbilirubinemia developed gradually thereafter, and the patient was readmitted to our hospital. Doppler ultrasonography of the left hepatic vein showed a monophasic wave pattern, and abdominal enhanced computed tomography (CT) suggested stenosis of the IVC (Fig. 1). Venography revealed stenosis and tortuosity of the left hepatic vein and the inferior vena cava. For liver failure with intractable ascites and serum total bilirubin of 11.7 mg/dL and prothrombin time-international ratio (PT-INR) of 1.5, balloon angioplasty of the left hepatic vein and the inferior vena cava was performed under venography instead of venoplasty by laparotomy. After balloon dilatation using an 8-mm balloon, the left hepatic venous pressure decreased from 65 mmHg to 25 mmHg (Fig. 2). The inferior vena cava was dilated using a 10-mm balloon (Fig. 3). The patient suffered from temporary right heart failure immediately after treatment, which was controlled by diuresis. His ascites and hyperbilirubinemia subsided in 2 weeks, and enhanced CT at 4 months after the venoplasty revealed patent left hepatic vein (Fig. 4). The patient remains well without recurrence of both PLF and HCC as of 15 months after the dilatation.

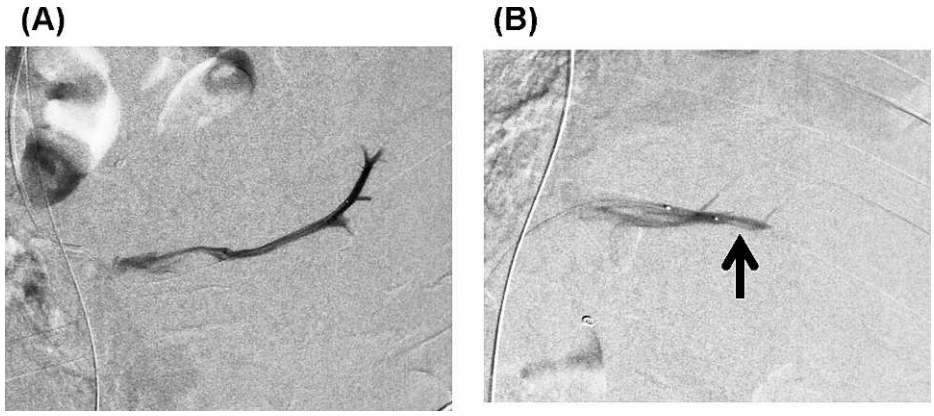

Fig. 2 On venography before balloon dilatation (A), the left hepatic vein was barely patent. After balloon dilatation (B), the left hepatic vein was well contrasted (arrow). The pressure gradient across the left hepatic venous anastomosis decreased from 65 mmHg to 25 mmHg.

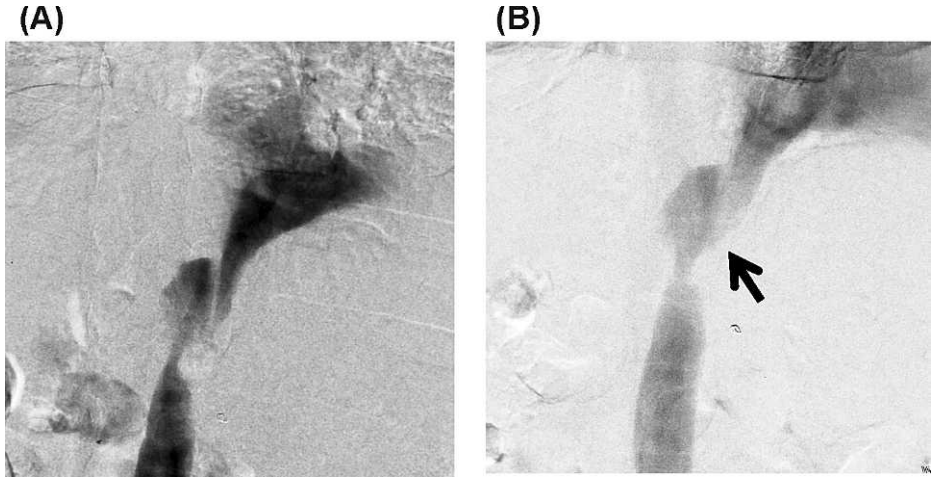

Fig. 3 Venography before balloon dilatation (A) revealed stenosis and tortuosity of the inferior vena cava. After balloon dilatation (B), the tortuosity of the inferior vena cava was improved (arrow).

Discussion

PLF is characterized as failure of one or more of the hepatic synthetic and excretory functions, including hyperbilirubinemia, hypoalbuminemia, and prolonged prothrombin time.[3] Although many factors, such as inadequate hepatic regeneration, preexisting cirrhosis, and prolonged liver ischemia during resection, have been proposed to be associated with an increased risk of PLF, outflow block has rarely been reported as a complication of hepatic resection.[3] After living donor liver transplantation (LDLT), however, thrombosis, twist of the graft, twist or kinking of hepatic vein, compression by hypertrophied graft parenchyma or hypertrophic endothelium around anastomosis sites, and anastomotic stenosis are reported as causes of outflow block.[4,5] Ducerf *et al* reported that pressure difference across the hepatic vein anastomosis was almost less than 3 mmHg in 40 cases of cadaveric liver transplantation with piggyback reconstruction.[6] Kubo *et al* indicated that hepatic venous stenosis with pressure difference of more than 3 mmHg is a criteria for treatment.[1]

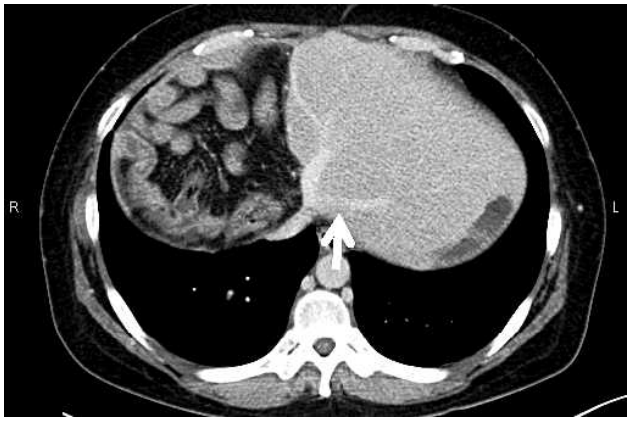

Fig. 4 Enhanced CT at 4 months after balloon dilatation demonstrated widely patent left hepatic vein.

Treatment for outflow block due to hepatic vein stenosis includes balloon dilatation and stent placement under venography, and angioplasty under laparotomy.[1,4–7] Shin *et al* have reported that endovascular treatment is a safe and curative treatment even if shortly after transplantation.[2] Ninomiya *et al* reported successful treatment of PLF due to outflow block with left hepatic vein stenosis after extended right lobectomy using balloon angioplasty and stent placement.[8] Since the current case remains free of recurrent stenosis, stent placement may not be mandatory.

Our patient suffered from temporary right heart failure immediately after balloon angioplasty, which was controlled by diuresis. Right heart failure may be caused by increase of pre-load from hepatic vein and reflects improvement of outflow block of the liver due to stenosis of the hepatic vein.

Conclusion

Balloon angioplasty seems to be a useful treatment for outflow block due to hepatic vein stenosis with PLF after extensive hepatectomy.

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