Symptomatic Polycystic Liver Disease Treated With Transcatheter Hepatic Arterial Embolization and Inferior Vena Cava Stenting: A Case Report

Takeshi Fujita,1 Masahiro Tanabe,2 Koichi Uchiyama,3 Hideyasu Matsuyama,3 Naofumi Matsunaga2

Abstract
Autosomal-dominant polycystic kidney disease is frequently complicated by polycystic liver disease. Some patients with polycystic liver disease have a full-stomach sensation and intractable ascites. We report a 56-year-old woman with polycystic liver disease waiting to receive a liver transplant, with a chief complaint of a full-stomach sensation and refractory ascites, wherein the transcatheter hepatic arterial embolization and inferior vena cava stenting were begun simultaneously, and the signs were favorably alleviated.

It is important to recognize the risk of liver failure after the complete embolization of both the right and left hepatic arteries; however, performance of transcatheter hepatic arterial embolization and inferior vena cava stent placement also are indicated for patients awaiting a liver transplant for early alleviation of symptoms.

Key words: Autosomal-dominant polycystic kidney disease, Polycystic liver disease, Transcatheter hepatic arterial embolization, Inferior vena cava stenting

Introduction
Autosomal-dominant polycystic kidney disease is frequently complicated by polycystic liver disease. Many cases are asymptomatic, but some patients with significant cystic hepatomegaly also may complain of a full-stomach sensation on occasion. Depending on the patient, hepatomegaly may compress the inferior vena cava (IVC) of the liver, resulting in lower-extremity edema or ascites, the so-called inferior vena cava syndrome. Similarly, compression of the portal vein owing to hepatomegaly also is known to cause portal hypertension, resulting in varices. In such cases, surgical resection or interventional procedure (eg, transcatheter arterial embolization [TAE]) can be implemented to alleviate symptoms.

A self-expandable metallic stent also has been used (although not greatly) for inferior vena cava syndrome. However, to the extent that we searched, we found no reports where TAE and IVC stenting had been implemented simultaneously in the same patient. We report a patient with polycystic liver disease (PCLD), complicated by autosomal-dominant polycystic kidney disease, with a chief complaint of a full-stomach sensation and refractory ascites, wherein both TAE and IVC stenting had been implemented simultaneously, and the symptoms had been alleviated.

Case Report
A 56-year-old woman had been receiving dialysis 3 times per week because of renal failure caused by autosomal-dominant polycystic kidney disease for 8 years earlier. Two years earlier, she had developed an intense full-stomach sensation and ascites. A plain abdominal computed tomography scan showed PCLD and ascites, and showed compression of the IVC owing to hepatomegaly (Figure 1). Admission blood test results showed near normal liver function tests (alanine aminotransferase, 0.18 μkat/L [normal range, 0.17-0.58 μkat/L]; aspartate aminotransferase, 0.18 μkat/L [normal range, 0.17-0.58 μkat/L]; alanine transaminase, 0.18 μkat/L [normal range, 0.17-0.58 μkat/L]).
0.19 μkat/L [normal range, 0.17-0.60 μkat/L]; albumin, 35 g/L [normal range, 35-47 g/L]; total bilirubin, 8.0 μmol/L [normal range, 5-17 μmol/L]; prothrombin time, 14.1 seconds; and prothrombin time control, 11.9 seconds).

Believing that the full-stomach sensation had been caused by the cystic hepatomegaly and that the ascites had been caused by compression of the IVC, we decided to perform a transcatheter hepatic arterial embolization to reduce the multiple cysts in the liver, and place a self-expandable metallic stent to relieve the compression and stenosis of the IVC. Blood test data immediately before the procedure showed hypoalbuminemia, renal failure, and anemia.

First, an angiogram of hepatic artery was performed with a right femoral approach. The PCLD had caused hepatomegaly, and the hepatic artery was extended (Figure 2). A microcatheter was inserted into the right hepatic artery, and a 1.0 mL mixture of iodized oil (Lipiodol Ultra Fluid; Mitsui Seiyaku, Tokyo, Japan) and N-butyl cyanoacrylate (NBCA; Histoacryl, B-Braun), mixed at a 7:1 ratio, was injected into the right hepatic artery; eight 3.0 × 4.0-mm microcoils were used to embolize the right hepatic artery. Similarly, the left hepatic artery also was embolized with 1 mL of the mixture and 7 microcoils. After embolization, a linear casting accumulation of Lipiodol had been observed in the hepatic artery, and postembolization angiography did not visualize the hepatic artery at all, indicating favorable efficacy of the embolization (Figure 3).

Next, a pigtail catheter was inserted via the right femoral vein approach for an IVC angiogram. Hepatomegaly had compressed and narrowed the IVC, and collateral circulation was observed in the surrounding area. The venous pressure at the caudal end of the stenotic site was 28 cm H2O, showing an apparent elevation of the venous pressure (Figure 4). Two Z-stents, 18 mm in diameter and 6 cm long (COOK Japan, Tokyo, Japan), were overlapped at 1 part and inserted in duplicate to fully cover the stenoses. After placing the Z-stents, the venous pressure at the caudal end of the stenotic site was reduced to 18 cm H2O, and an angiography immediately after inserting the stent showed mitigation of the stenosis and reduced tracing of the collateral circulation (Figure 5). No complications were observed during embolization or stent placement, or after surgery. In a subsequent follow-up, the full-stomach sensation had improved gradually, and accumulation of ascites also was reduced. A plain computed tomography scan taken
1 year and 4 months after treatment showed a reduction in the size of the liver, as well as a decrease in ascites (Figure 6). Despite the subsequent palliation of her symptoms and waiting to receive a liver transplant, the patient died 3 years after TAE and IVC stenting owing to liver failure (alanine aminotransferase, 0.20 μkat/L; aspartate aminotransferase, 0.21 μkat/L; albumin, 15 g/L; total bilirubin, 24 seconds; prothrombin time, 29.2 seconds; and prothrombin time control, 13.0 seconds.

**Figure 4.** Venography Showing the Stenosis of IVC (Arrow) and Collateral Vessels (Arrowhead) Before IVC Stenting

**Figure 5.** Improvement of Stenosis of the IVC after IVC Stenting. Collateral Vessels Disappear

**Figure 6.** A Plain Computed Tomography 1 Year and 4 Months After TAE and IVC Stenting (Arrow) Showing the Decrease of the Total Liver and Intrahepatic Cyst Volume. Ascites Also Disappear

**Discussion**

Several methods have been reported to reduce PCLD complicating autosomal-dominant polycystic kidney disease.⁴,⁵ Percutaneous treatments, such as cyst drainage, are less invasive than surgical resection and have become a mainstay of treatment; however, in cases of PCLD where numerous small cysts have accumulated (as in the present case) drainage is ineffective in alleviating symptoms.⁶

Transcatheter arterial embolization, which makes it possible to reduce the size of the liver overall, is generally used in most clinics and hospitals.⁵ A coil or a liquid embolic material, such as NBCA, has been used as the embolic materials, but the use of a coil alone may result in proximal embolization and fail to achieve adequate reduction in liver size.⁷ N-butyl cyanoacrylate, on the other hand, allows adequate embolization as far as the periphery. Wang and associates⁸ have reported that a mixture of NBCA and ethiodized oil injection had a useful effect in treating PCLD. We also believe that embolization with a mixture of NBCA, along with placement of indwelling metallic coils, allows for a strong embolization.⁷

 Placement of a self-expandable metallic stent in the IVC also has been reported to be useful, although not greatly, for PCLD.² Through compression of the IVC, hepatomegaly leads to an increase in venous pressure and causes ascites or lower-extremity edema. In the present case, placement of an IVC stent...
rapidly decreased the venous pressure and reduced the ascites.

Although both TAE and IVC stenting are useful treatments to alleviate and treat PCLD, there has not been a report of these treatments being used in the same patient. This is to say nothing of performing both procedures simultaneously. Even TAE alone is presumed to reduce the size of the liver and alleviate symptoms, but reducing the size of the liver takes time, and concurrently maintaining the patency of the IVC at an early stage is regarded as necessary to rapidly alleviate symptoms. After embolization of the hepatic artery, symptoms of post-TAE syndrome, including fever and pain, sometimes occur, but is always minor, and can often be addressed with medical treatment.5,8 Placement of an indwelling IVC stent also does not typically result in severe complications.2 Therefore, we implemented both treatments simultaneously and achieved rapid relief of symptoms without any apparent complications.

In a single procedure, the cysts can be reduced, and the patency of the IVC can be maintained, thus making it possible to reduce discomfort from surgery. Although it is important to recognize that there is a risk of liver failure after the complete embolization of the right and left hepatic arteries, we believe that simultaneous performance of TAE and IVC stent placement is useful in reducing symptoms of PCLD, and is also indicated for patients waiting for a liver transplant to alleviate symptoms early.

References