Balloon-Occluded Retrograde Transvenous Obliteration for Portal-Systemic Encephalopathy due to Superior Mesenteric-Caval Shunt via the Right Gonadal Vein

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Key words: portal-systemic encephalopathy, mesenteric-caval shunt, balloon-occluded retrograde transvenous obliteration

Portal-systemic encephalopathy (PSE) is caused by various collateral pathways of portal systemic shunts (PSS). The most common collateral pathway of PSS is the coronary-gastroesophageal route; a superior mesenteric-caval shunt is rare. Although splenorenal or gastrorenal shunts are the most frequent in patients with PSE, a superior mesenteric-caval shunt is rare (1). Balloon-occluded retrograde transvenous obliteration (B-RTO) has been used for the treatment of solitary gastric varices (2), and it has recently been reported as useful therapy for PSE (3), mainly for splenorenal and gastrorenal shunts, but rarely for superior mesenteric-caval shunts. Here, we report a case of successful treatment of PSE by B-RTO for superior mesenteric-caval shunt via the right gonadal vein.

A 57-year-old man with a history of alcoholic liver cirrhosis developed PSE despite conservative treatment. He was admitted to our hospital in June 2006 for further management of PSE. Physical examination showed flapping tremor and laboratory tests revealed platelet count 72×10^3/mm^3, prothrombin activity 39%, total bilirubin 3.3 mg/dl, albumin 3.1 g/dl, ammonia level 158 μg/dl, and indocyanine green retention rate at 15 minutes (ICG-R15) of 80.0%. Endoscopy showed esophageal varices with small straight form. Computed tomography (CT) showed atrophic liver with splenomegaly and large mesenteric-caval shunt from superior mesenteric vein (SMV) into the inferior vena cava (IVC) via the right gonadal vein (Fig. 1A, B). Doppler flowmetry showed a hepatofugal blood flow of the portal vein. Based on the poor liver function, surgical ligation was contraindicated. Therefore, we performed B-RTO for obliteration of PSS. Superior mesenteric arterial venography showed a collateral vein arising from SMV into IVC via the right gonadal vein, and lack of hepatopetal blood flow. We inserted a balloon catheter into the shunt and inflated the balloon. During balloon-occlusion for approximately half an hour, the patient did not show any symptoms such as nausea and abdominal pain associated with hematostasis of intestinal tract. Since a repeat superior mesenteric arterial venography showed hepatopetal blood flow of SMV and inferior mesenteric vein (IMV) via collateral communications between SMV and IMV, we decided to obliterate the shunt by B-RTO.

To attempt complete obliteration of PSS, and reduce the total amount of 5% ethanolamine olate with iopamidol (EOI), five metallic coils were placed in the shunt, and a microcatheter was inserted over the coils for gradual instillation of 5% EOI to a total amount of 20 ml (Figure 1C). We confirmed the sclerosant did not leak into SMV. After obliteration, superior mesenteric arterial venography revealed hepatopetal blood flow in SMV and IMV (Figure 1D). The inflated-balloon catheter was kept in situ, and 24 hours later, retrograde venography from the balloon catheter revealed complete obliteration of the mesenteric-caval shunt.

B-RTO resulted in marked improvement of encephalopathy within 24 hours, with a precipitous fall in ammonia level to 37 μg/dl. CT revealed obliteration of the shunt, as well as extensive thrombosis of the SMV (Fig. 1E, F). However, the thrombosis was not associated with any symptoms, and Doppler flowmetry showed hepatopetal blood flow in the portal vein. Six months later, no recurrence of encephalopathy was noted and CT revealed complete obliteration, no new collaterals and no worsening of splenomegaly. Laboratory data showed improvement of hepatic reserve (platelet count 70×10^3/mm^3, prothrombin activity 56%, total bilirubin 2.9 mg/dl, albumin 3.8 g/dl, ammonia level 67 μg/dl, ICG-R15 of 52.5%). While worsening of esophageal varices was observed, it was controlled well by endoscopic injection sclerotherapy.

To our knowledge, there are only a few reports on B-RTO for superior mesenteric-caval shunt (4, 5); these described significant improvement of encephalopathy and no severe complications. The application of B-RTO for mesenteric-caval shunt, however, could cause mesenteric vein thrombosis (MVT). In the present case, superior mesenteric arteriography during balloon occlusion showed that distal superior
Figure 1. Computed tomography showed large mesenteric-caval shunt (white arrowhead) from the superior mesenteric vein (SMV) (white arrow) into the inferior vena cava (black arrow) via the right gonadal vein (black arrowhead) (A, B). With the balloon (arrow) causing occlusion, five metallic coils were placed in the shunt, and a microcatheter was inserted and its tip placed over the coils. Then, 5% ethanolamine oleate with iopamidol was injected slowly to a total volume of 20 ml (C). After obliteration, superior mesenteric arterial venography revealed hepatopetal blood flow in SMV (black arrows) and IMV (white arrows) via collateral communications between SMV and IMV (D). Five days after the B-RTO, computed tomography revealed complete obliteration of the shunt (arrowheads), and also extensive superior mesenteric vein thrombosis (arrows) (E, F).

Mesenteric blood flow was indistinct, so we predicted MVT would occur. But according to hepatopetal blood flow of IMV via collateral communications between SMV and IMV, we estimated that even if MVT appeared, it would not cause hematostasis of the intestinal tract, or any clinical symptoms.

Although there is still a need to understand the precise changes in portal hemodynamics before and after balloon occlusion, B-RTO for superior mesenteric-caval shunt via the right gonadal vein could be useful for treatment of PSE, as a less invasive interventional procedure.

References