Case Report

Successful Balloon-Occluded Retrograde Obliteration of Duodenal Varices Due to Chronic Portal Vein Thrombosis: A Feasible Treatment Option for Duodenal Varices with Atrophic Intrahepatic and Extrahepatic Portal Veins

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Abstract

A 61-year-old man with a history of septic portal vein thrombosis presented with an enlarging duodenal varix. Prominent atrophic changes of the intrahepatic and extrahepatic portal veins were observed on computed tomography. Balloon-occluded retrograde transvenous obliteration (BRTO) of the varix was performed, approaching from the right jugular vein, using 50% glucose and 5% ethanolamine oleate as a sclerosant. During venography, flow to the hepatic hilum was observed, which suggested a hepatopetal flow directly through the varices. Complete occlusion of the varix was obtained without complications. Neither recurrence nor new varix formation was observed during the 5-year follow-up period. Gradual re-enlargement of the main trunk of the portal vein was also observed.

Key words: duodenal varices, balloon-occluded retrograde transvenous obliteration, non-cirrhotic portal hypertension, portal vein thrombosis

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Introduction

Gastrointestinal varices occasionally occur in patients with noncirrhotic portal hypertension caused by portal vein thrombosis, surgical trauma, or tumor compression. Duodenal varices are relatively rare, but bleeding of duodenal varices can be massive or fatal. Therapeutic options include pharmacologic management with β-blockers, endoscopic procedures such as banding or sclerotherapy, and surgical portosystemic bypass, although outcomes are not always satisfactory. Endovascular treatment, such as balloon-occluded retrograde transvenous obliteration (BRTO) or transjugular intrahepatic portosystemic shunt (TIPS), plays an important role in treating duodenal varices [1, 2]. Portal vein recanalization or stenting is another treatment option, especially in acute or subacute settings. However, these endovascular procedures can be also challenging when the intrahepatic portal veins are not easily accessible. We report a case of duodenal varices in a patient with prominent portal vein atrophy that was successfully treated with BRTO. Institutional review board exemption was granted for this report.

Case Report

A 61-year-old man presented with an enlarging duodenal varix. He had a history of septic portal vein thrombosis 7 years prior. He also had a history of diabetes mellitus, hypertension, and cardiac infarction, but had no known coagulopathy. His liver function was class A according to the Child-Pugh classification. The total bilirubin, albumin, alanine aminotransferase (ALT), and aspartate aminotrans-
Figure 1. Enhanced abdominal computed tomography (CT) images of the portal phase: A axial image, B coronal image, and C axial image at the level of the liver. D Endoscopic image. The CT images show a varix at the second portion of the duodenum (A, B arrows). The liver parenchyma shows prominent central hypertrophy. Cavernous transformation can be observed at the hepatic hilum. Both the right and left portal veins could not be identified. The intrahepatic portal branches are well visualized only in a portion of the left lobe (C arrows). The endoscopic image shows a very large varix with wall tension at the second portion of the duodenum, near the papilla of Vater.

Figure 2. The volume-rendering CT image shows the varix (arrows). The main feeders of the varix are the inferior anterior and inferior posterior pancreaticoduodenal veins (arrow heads). The main drainer is the right gonadal vein (dotted line). Cavernous transformation can be observed at the hepatic hilum (dotted circle).

Ferrase (AST) levels were 0.8 mg/dL, 3.5 g/dL, 53 IU/L, and 58 IU/L, respectively. The prothrombin time international normalized ratio (PT-INR) was 2.10 under therapy with 3-mg/day warfarin, which was initiated after the episode of portal vein thrombosis. On computed tomography (CT), the liver parenchyma showed prominent central hypertrophy. Cavernous transformation was observed at the hepatic hilum. Both the right and left portal veins were unidentified. The intrahepatic portal branches were well visualized only in a portion of the left lobe. Varices were identified at the second portion of the duodenum, the size of which had been increasing on follow-up CTs and endoscopies (Fig. 1). The CT images showed that the main feeders of the varix were the inferior anterior and inferior posterior pancreaticoduodenal veins. The main drainer was the right gonadal vein (Fig. 2). Considering the risk of varix rupture, BRTO was planned after a multidisciplinary discussion. Informed consent was obtained from the patient.

The procedure was performed under local anesthesia. Approaching from the right jugular vein, a 6-F balloon catheter (MP catheter, TERUMO, Tokyo, Japan) was advanced to the right gonadal vein. Venography under balloon inflation revealed multiple collateral drainage pathways and fenestration formation of the right gonadal vein. The target varices were
Figure 3. Digital subtraction venographic images: A AP and B oblique AP views. A Under the balloon inflation of the right gonadal vein, the venogram from the microcatheter provides full visualization of the duodenal varices (A arrows). B The venogram also shows flow to the hepatic hilum, which suggests hepatopetal flow directly through the varices (B arrows).

not visualized. The balloon catheter was advanced further to the more distal part of the right gonadal vein, and a microcatheter was then successfully advanced coaxially to the varices. Venography from the microcatheter allowed full visualization of the varices (Fig. 3A), although stasis of flow was not achieved given the contrast agent slowly washing out even under balloon inflation. During the venography, flow to the hepatic hilum was also observed, which suggested a hepatopetal flow directly through the varices (Fig. 3B). With the intention of reducing the flow of small collaterals around the varices, 5 ml of 50% glucose was first injected from the microcatheter. Subsequently, 16.5 ml of 5% ethanolamine oleate (EO) (Oldamine, Mochida Pharmaceutical, Tokyo, Japan) diluted with an equal part of contrast medium (Iopamiron 300, Schering, Osaka, Japan) was slowly injected. Good localization of the sclerosant was identified, although it gradually washed out. To prevent renal damage, 2000 units of hepatoglobin (Mitsubishi Pharma, Osaka, Japan) were administered intravenously before the injection of 5% EO. The system was placed overnight. Contrast-enhanced CT on the following day revealed complete disappearance of flow in the varices, and subsequent venography also showed no remnant flow. The whole system was removed thereafter. The patient was discharged after the procedure without complications. Neither recurrence nor new varix formation in other areas was observed during the 5-year follow-up (Fig. 4). Gradual re-enlargement of the main trunk of the portal vein was also observed, which suggested an increase in hepatopetal flow (Fig. 5).

Discussion

For treatment of gastrointestinal varices with portal vein thrombus, various successful procedures have been reported, such as TIPS, percutaneous transhepatic approach, transmesenteric approach, and a combination of these approaches [3-6]. However, in cases with prominent atrophic change or complete occlusion of the portal vein, such as that observed in this patient, these interventional procedures would be quite challenging to perform. The usefulness of percutaneous transsplenic approach to the portal system has been also reported [7], although this can be challenging as well. Concerning BRTO, Saad et al reported the potential risk of closing the portosystemic shunt for patients with portal vein thrombosis in consideration of venous mesenteric ischemia and splenic engorgement, but they also mentioned that BRTO would be feasible when well-established cavernous transformation or collateral formation exists [8]. Borghei et al reported two cases of gastric varices that developed after portal vein thrombosis successfully treated with BRTO [9]. On the other hand, little has been reported on BRTO for duodenal varices with chronic portal vein occlusion.

For endovascular treatment of duodenal varices secondary to portal thrombosis, it is essential to understand its complex
hemodynamics. That is, in contrast to cases with liver cirrhosis or gastric varices with portal thrombosis, the blood flow in the duodenal varices can be potentially partly hepatopetal, flowing directly or indirectly to the area of cavernous transformation in the hepatic hilum [10]. This implies a higher risk of sclerosant migration to the liver with potential hepatopetal flow, which can cause further portal flow disturbance or even severe liver damage. This hepatopetal flow would disturb the stagnation of the contrast medial sclerosant even under complete balloon block of draining flow to the systemic circulation. In our case, the 50% glucose injection before the EO injection might have been effective in reducing the flow through the varix. It is of course essential to ensure that neither migration to the hepatic hilum nor reflux to the peripheral mesenteric veins occurs when injecting the sclerosant. In our case, the main trunk of the portal vein, which was not well visualized before the procedure, had re-enlarged on follow-up CT, which suggested an increase in hepatopetal flow. In cases with prehepatic portal obstruction without liver parenchyma fibrosis, obliterating collaterals instead of creating a portosystemic shunt could potentially improve hepatopetal flow and liver function.

In conclusion, gastrointestinal varices with atrophic intra-hepatic portal veins are a clinically challenging condition, for which BRTO may be a good treatment option.

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References
1. Vidal V, Joly L, Perreault P, Bouchard L, Lafortune M, Pomier-Layrargues G. Usefulness of transjugular intrahepatic portosystemic shunt in the management of bleeding ectopic varices in cirrhotic patients. Cardiovasc Interv Radiol. 2006; 29(2): 216-219, doi: 10.1007/s00270-004-0346-4
2. Okahara M, Kiyosue H, Ueda S, Kashiwagi J, Tanoue S, Hongo N, Mori H. Anatomic features and retrograde transvenous obliteration of duodenal varices associated with mesocaval collateral pathway. J Vasc Interv Radiol. 2012; 23: 1339-1346, doi: 10.10.16/j.jvir.2012.06.030
3. Semiz-Oysu A, Keussen I, Cwikiel W. Interventional radiological management of prehepatic obstruction of the splanchic venous system. Cardiovasc Interv Radiol. 2007; 30(4): 688-695, doi: 10.1007/s00270-007-90970-3
4. Sabri SS, Caldwell SH, Kumer SC, Schmitt TM, Maluf DG, An-
gle JF. Combined transmesenteric and transhepatic recanalization of chronic portal and mesenteric vein occlusion to treat bleeding duodenal varices. J Vasc Interv Radiol. 2014; 25: 1295-1299, doi: 10.10.16/j.jvir.2013.11.021

5. Ko GY, Sung KB, Lee S, Yoon HK, Kim KR, Kim KM, Lee YJ. Stent placement for the treatment of portal vein stenosis or occlusion in pediatric liver transplant recipients. J Vasc Interv Radiol. 2007; 18(10): 1215-1221

6. Radosevich PM, Ring EJ, LaBerge JM, Peltzer MY, Haskal ZJ, Doherty MM, Gordon RL. Transjugular intrahepatic portosystemic shunts in patients with portal vein occlusion. Radiology. 1993; 186 (2): 523-527

7. Chu HH, Kim HC, Jae HJ, Yi NJ, Lee KW, Suh KS, Chung JW, Park JH. Percutaneous transsplenic access to the portal vein for management of vascular complication in patients with chronic liver disease. Cardiovasc Interv Radiol. 2012; 35(6): 1388-1395

8. Saad WE, Kitanosono T, Koizumi J, Hirota S. The conventional balloon-occluded retrograde transvenous obliteration procedure: indications, contraindications, and technical applications. Tech Vasc Interv Radiol. 2013; 16(2): 101-151, doi: 10.1053/j.tvir.2013.02.003

9. Borghei P, Kim SK, Zuckerman DA. Balloon occlusion retrograde transvenous obliteration of gastric varices in two non-cirrhotic patients with portal vein thrombosis. Korean J Radiol. 2014; 15(1): 108-113, doi: 10.3348/kjr.2014.15.1.108

10. Saad WE, Lippert A, Saad NE, Caldwell S. Ectopic varices: anatomical classification, hemodynamic classification, and hemodynamic-based management. Tech Vasc Interv Radiol. 2013; 16(2): 158-175, doi: 10.1053/j.tvir.2013.02.004

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