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Case Report

Portal Vein Stenting to Treat Portal Vein Stenosis in a Patient With Malignant Tumor and Gastrointestinal Bleeding

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This report describes the successful use of portal venous stent placement for a patient with recurrent melena secondary to jejunal varices that developed after subtotal stomach preserved pancreatoduodenectomy (SSPPD). A 67-year-old man was admitted to our hospital with tarry stool and severe anemia at 2 years after SSPPD for carcinoma of the head of the pancreas. Abdominal computed tomography examination showed severe stenosis of the extrahepatic portal vein caused by local recurrence and showed an intensely enhanced jejunal wall at the choledochojejunostomy. Gastrointestinal bleeding scintigraphy also revealed active bleeding near the choledochojejunostomy. Based on these findings, jejunal varices resulting from portal vein stenosis were suspected as the cause of the melena. Portal vein stenting and balloon dilation was performed via the ileocecal vein after laparotomy. Coiling of the jejunal varices and sclerotherapy of the dilate postgastric vein with 5% ethanolamine oleate with iopamidol was performed. After portal stent placement, the patient was able to lead a normal life without gastrointestinal hemorrhage. However, he died 7 months later due to liver metastasis.

Key words: Portal vein stenosis – Portal vein stent – Pancreatoduodenectomy

Obstruction of the extrahepatic portal vein can lead to portal hypertension, splenomegaly, and gastrointestinal bleeding due to esophageal or gastric varices. Malignant portal vein stenosis accounts for 15 to 24% of all cases of portal venous stenosis or occlusion and usually results from portal

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vein tumor thrombus or external compression of the portal vein by neoplasms.[1–4] When a patient with malignant tumors undergoes subtotal stomach preserved pancreatoduodenectomy (SSPPD), formation of hepatopetal collaterals is precluded by lymph node dissection and resection of the peribiliary vascular plexus around the hepatoduodenal ligament. Instead, jejunal varices form at the choledochojejunostomy site. The treatment of portal vein stenosis remains controversial, and the indications for portal vein stent placement have not yet been clarified.

This report describes a case of successful portal vein stenting for a patient with portal vein stenosis and repetitive bleeding from jejunal varices that developed after SSPPD.

Case Report

A 67-year-old male patient with a diagnosis of pancreatic cancer 9 months prior underwent SSPPD. The tumor was 60 × 30 mm in size, and no lymph node metastases were noted. The histological type of the tumor was moderately differentiated adenocarcinoma. A small induration in the surface of the liver was detected during the operation, but it was not clear whether or not it represented a metastasis according to intraoperative findings. However, pathologic examination of the resected specimen several days after surgery suggested that this lesion was, in fact, a liver metastasis. The final pathological report was consistent with pTNM stage IVb [T3 N0 M1 (liver)] disease.

The patient was treated with adjuvant chemotherapy with an oral fluoropyrimidine drug (S-1) for 9 months after surgery, at which point he was admitted to our hospital for evaluation of tarry stool. Laboratory examination revealed severe anemia (hemoglobin level, 6.2 g/dL). Tumor marker levels were as follows: CA19-9, 14015 U/mL and DUPAN-2, 1040 U/mL. Upper gastrointestinal endoscopy was performed but no obvious bleeding point was detected.

The patient had recurrent melena after admission and received a blood transfusion with a total 2800 mL of packed red blood cells. Abdominal computed tomography (CT) examination revealed liver metastasis, portal vein stenosis due to compression of the portal vein by local recurrence, and dilated jejunal veins at the choledochojejunostomy (Fig. 1A and 1B). Gastrointestinal scintigraphy revealed active bleeding near the choledochojejunostomy. The bleeding was considered a rupture of the jejunal varices caused by extrahepatic portal hypertension.

Operative management via laparotomy was elected under general anesthesia. A 6-Fr sheath was inserted into the portal vein through a guidewire from the ileocecal vein. Then, portography was performed and the portal venous pressure was measured. Prestenotic portal pressure was 20 mm Hg; and post-stenotic pressure was 10 mm Hg. Portography revealed stenosis of the portal vein, jejunal varices, retrograde flow in the splenic vein, and gastric varices with a dilated postgastric vein due to portal hypertension (Fig. 2A, 2B, and 2C). Via the ileocecal vein, the patient underwent embolization of jejunal and gastric varices, sclerotherapy of gastric varices with a total 3 mL of 5% ethanolamine oleate with iopamidol, portal venous stenting (diameter, 8 mm; length, 6 cm; SMART Control; Cordis/Johnson & Johnson, Warren, NJ) and post-dilation of the stent with a balloon catheter (diameter, 8 mm) because of insufficient dilation after stent placement area were performed. After stent placement, prestenotic portal pressure was 16 mm Hg, and post-stenotic portal pressure was 12 mm Hg. Pressure gradients decreased from 10 mm Hg before stent placement to 4 mm Hg after stent placement. Repeated portography after portal venous stent placement showed no residual filling of the jejunal and gastric varices (Fig. 2D). Approximately 10,000 IU of heparin was administered daily for 3 days after stent insertion, followed by institution of aspirin (100 mg daily) for antiplatelet therapy. At 1 week after stent placement, enhanced CT revealed patency of the portal vein. The patient's postoperative course was uneventful, and he was discharged on the 10th day after surgery. The patient was able to lead a normal life in response to treatment with S-1, gemcitabine, and vaccine therapy. However, he died of liver metastasis at 7 months after stent insertion.

Discussion

Extrahepatic portal hypertension is mainly due to the development of porta hepatis neoplasms, portal reconstruction, radiation, and recurrent neoplasm leading to portal stenosis or occlusion.[5–7] Development of hepatopetal collaterals in the hepatoduodenal ligament is common in patients with extrahepatic portal hypertension. However, in patients that undergo SSPPD, formation of hepatopetal collaterals is precluded by lymph node dissection.

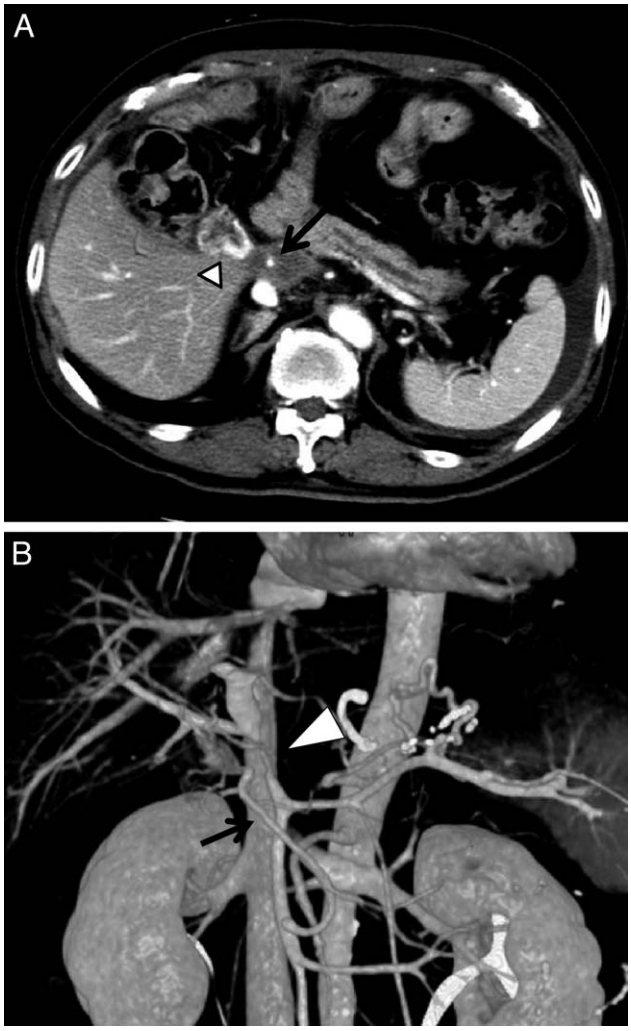

Fig. 1 (A) Abdominal-enhanced CT revealed severe stenosis (arrow) of the portal vein and intensive enhanced jejunal wall (arrowhead) at the choledochojejunostomy. (B) 3D-CT angiography also revealed portal stenosis (arrowhead) and a dilated jejunal vein (arrow).

Instead, varices form in the jejunum at the choledochojejunostomy.[8]

Symptoms of portal hypertension include severe gastrointestinal bleeding, refractory ascites, and thrombocytopenia.[7,9] In our case, gastrointestinal scintigraphy was useful for the identification of a bleeding point. By contrast, upper gastrointestinal endoscopy failed to detect a bleeding point.

Several reports published approximately 10 years ago described the use of jejunal resection or shunt surgery for bleeding jejunal varices caused by extrahepatic portal venous stenosis.[10,11] More recently, interventional radiology (IR) techniques using a balloon or stent have been increasingly used for the management of portal venous stenosis.[2,7,8] Further, some reports describe the use of a stent for management of portal vein stenosis; procedures have included percutaneous transhepatic portal vein (PTP), transileocolic portal vein (TIP), and transjugular intrahepatic portosystemic shunt.[12,13] These methods are effective for the management of portal venous stenosis. In the present case, coiling of the varices was performed to stop bleeding, and portal venous stenting was used to address portal vein stenosis. Preprocedure-enhanced CT in this patient showed portal stenosis and jejunal varices, which represents a technical challenge in terms of advancing a guidewire in the context of PTP. Therefore, we utilized TIP, which provided easier access to the jejunal lesions via the guidewire in this case.

Indications for portal vein stent placement and embolization of jejunal varices have not yet been clarified. In 85 to 88% of patients with malignant portal stenosis, stent placement reduces portal venous pressure and alleviates the symptoms of portal hypertension.[1,9] However, early stent occlusion due to thrombosis can occur in some patients. Some reports suggest that a sufficient blood flow is needed in the stent in order to prevent thrombosis.[9] Yamakado *et al* studied 40 patients that underwent stent placement for malignant portal venous obstruction and reported that the stent remained patent in 60% of the patients during a mean follow-up of 11.9 months.[14] Stent occlusion was found in 40% of the patients, with a mean period until occlusion of 3.7 months. Further, multivariate analysis showed that significant factors affecting patency of the portal vein included splenic vein involvement, severe hepatic dysfunction, and obstruction of the portal venous system. These results suggest that there is a strong relationship between stent occlusion and blood flow through the portal vein. In our case, only stent placement remains the risk of rerupture of jejunal varices because restenosis occurs by development of the tumor. Therefore, embolization of jejunal varices should be performed to prevent rerupture to maintain sufficient portal blood flow via obstruction of collateral vessels.

The utility of anticoagulation for patients undergoing portal stenting has not been clarified. Yamakado *et al* suggested that anticoagulant therapy and/or antiplatelet therapy are essential to prevent stent thrombosis, because the stent itself exhibits thrombogenicity.[14] However, half the cases of stent occlusion described by Yamakado *et al* were related to thrombus formation despite anticoagulation.

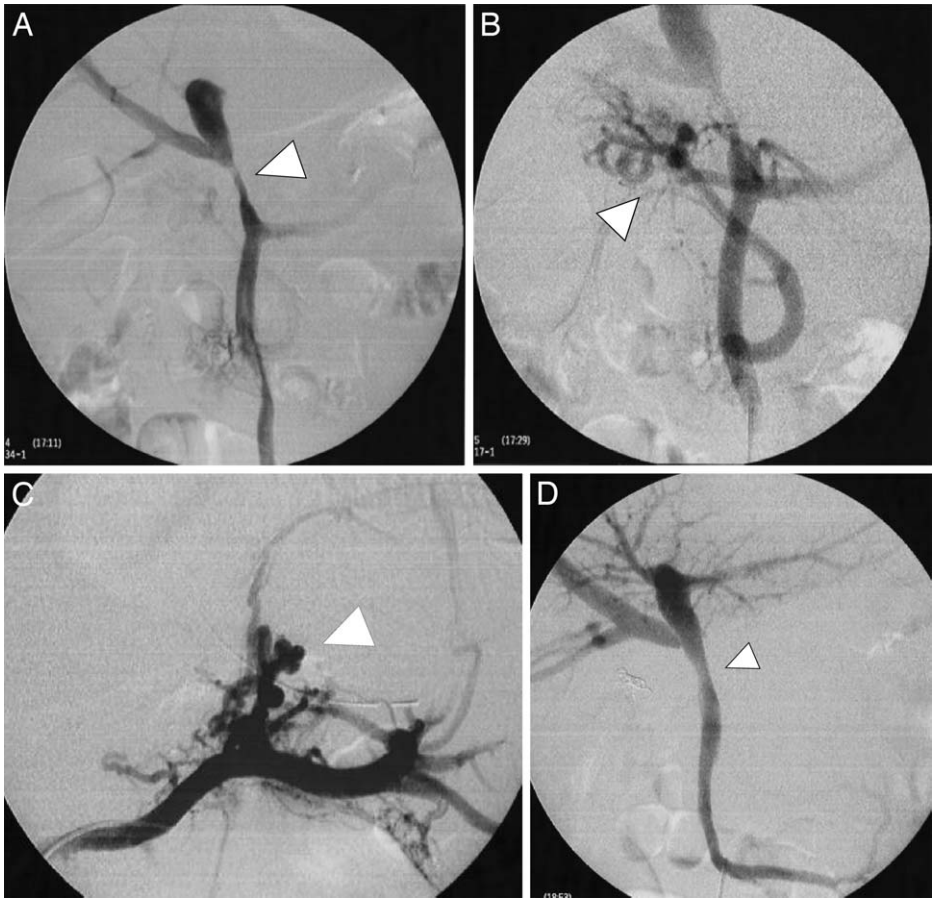

Fig. 2 (A) Direct portography revealed portal vein stenosis (arrowhead) and retrograde flow in the splenic vein. (B) Portography in the jejunal branch revealed jejunal varices (arrowhead) at the choledochojejunostomy. (C) Portography in the splenic vein revealed gastric varices with a dilated post-gastric vein (arrowhead). (D) An expandable wall stent was placed at the site of portal vein stenosis (arrowhead). At baseline, prestenotic and post-stenotic portal venous pressures were 20 and 10 mm Hg, respectively. After portal venous stenting, prestenotic and post-stenotic portal venous pressures were 16 and 12 mm Hg, respectively.

Novellas *et al* reported that the decision to utilize anticoagulation should be weighed against the risk of gastrointestinal bleeding.[9] A prospective randomized study is likely needed to investigate the utility of anticoagulation therapy in this context.

In conclusion, jejunal varices with portal venous stenosis should be included within the differential diagnosis for patients with repeated melena after SSPPD. Portal stent placement is useful for management of extrahepatic portal venous stenosis and can help preserve quality of life in patients with relevant neoplasms.

References

1. Yamakado K, Nakatsuka A, Tanaka N, Fujii A, Isaji S, Kawarada Y *et al*. Portal venous stent placement in patients with pancreatic and biliary neoplasms invading portal veins and causing portal hypertension: initial experience. *Radiology* 2001;**220**(1):150–156
2. Tsukamoto T, Hirohashi K, Kubo S, Tanaka H, Hamba H, Shuto T *et al*. Percutaneous transhepatic metallic stent placement for malignant portal vein stenosis. *Hepatogastroenterology* 2003;**50**(50):453–455
3. Tanaka J, Andoh H, Yoshioka M, Furuya T, Asanuma Y, Koyama K. Palliative treatment with metallic stents for unresectable gallbladder carcinoma involving the portal vein and bile duct. *J Hepatobilliary Pancreat Surg* 2000;**7**(3):331–335
4. Higaki I, Hirohashi K, Kubo S, Tanaka H, Tsukamoto T, Omura T *et al*. Portal vein stenting to treat portal vein tumor thrombus in hepatocellular carcinoma. *Osaka City Med J* 2000; **46**(2):99–104
5. Shimizu Y, Yasui K, Fuwa N, Arai Y, Yamao K. Late complication in patients undergoing pancreatic resection with intraoperative radiation therapy: gastrointestinal bleeding

with occlusion of the portal system. *J Gastroenterol Hepatol* 2005;**20**(8):1235–1240
6. Yamazaki S, Kuramoto K, Itoh Y, Watanabe Y, Susa N, Ueda T. Clinical significance of portal venous metallic stent placement in recurrent periampullary cancers. *Hepatogastroenterology* 2005;**52**(61):191–193
7. Hiraoka K, Kondo S, Ambo Y, Hirano S, Omi M, Okushiba S *et al*. Portal venous dilatation and stenting for bleeding jejunal varices: report of two cases. *Surg Today* 2001;**31**(11):1008–1011
8. Ota S, Suzuki S, Mitsuoka H, Unno N, Inagawa S, Takehara Y *et al*. Effect of a portal venous stent for gastrointestinal hemorrhage from jejunal varices caused by portal hypertension after pancreatoduodenectomy. *J Hepatobiliary Pancreat Surg* 2005;**12**(1):88–92
9. Novellas S, Denys A, Bize P, Brunner P, Motamedi JP, Gugenheim J *et al*. Palliative portal vein stent placement in malignant and symptomatic extrinsic portal vein stenosis or occlusion. *Cardiovasc Intervent Radiol* 2009;**32**(3):462–470
10. Lein BC, McCombs PR. Bleeding varices of the small bowel as a complication of pancreatitis: case report and review of the literature. *World J Surg* 1992;**16**(6):1147–1149
11. Paquet KJ, Lazar A, Bickhart J. Massive and recurrent gastrointestinal hemorrhage due to jejunal varices in an afferent loop–diagnosis and management. *Hepatogastroenterology* 1994;**41**(3):276–277
12. Liu FY, Wang MQ, Duan F, Wang ZJ, Song P. Interventional therapy for symptomatic-benign portal vein occlusion. *Hepatogastroenterology* 2010;**57**(104):1367–1374
13. Hotta R, Hoshino K, Nakatsuka S, Nakao S, Okamura J, Yamada Y *et al*. Transileocolic venous balloon dilatation for the management of primary and recurrent portal venous stenosis after living donor liver transplantation in children. *Pediatr Surg Int* 2007;**23**(10):939–945
14. Yamakado K, Nakatsuka A, Tanaka N, Fujii A, Terada N, Takeda K. Malignant portal venous obstructions treated by stent placement: significant factors affecting patency. *J Vasc Intev Radiol* 2001;**12**(12):1407–1415