Case Report

Management of jejunal bleeding by jejunal variceal embolization and portal venous recanalization after pylorus-preserving pancreaticoduodenectomy

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A B S T R A C T

Gastrointestinal (GI) bleeding is a life-threatening condition that typically presents with hematemesis, melena, or hematochezia and can have various causes. Treatment strategies differ in accordance with the focus of the bleeding. Imaging modalities can reveal the bleeding focus but often cannot discriminate arterial from portal venous bleeding. The management of bleeding from ectopic varices is especially challenging because access to the bleeding point is difficult. Esophagogastric varices are usually caused by portal venous hypertension, but postoperative complications can also cause ectopic GI bleeding. Bleeding caused by portal venous obstruction can be managed with portal vein (PV) stenting, a portosystemic shunt, and adjunctive embolization of varices. We report a case of active jejunal bleeding from a portal venous obstruction after pylorus-preserving pancreaticoduodenectomy managed by PV stenting and selective jejunal variceal embolization.

Keywords: Embolization, therapeutic; Gastrointestinal hemorrhage; Portal vein; Stents

Introduction

Ectopic varices are portosystemic collaterals that develop in any part of the gastrointestinal (GI) tract, except for the esophagus and stomach, and they are rare, accounting for 1% to 5% of variceal bleeding.1 In cases of jejunal variceal bleeding, endoscopy and angiography often fail to reveal the bleeding focus. Only imaging modalities such as computed tomography (CT) and scintigraphy can detect the bleeding location and activity status. For these reasons, jejunal variceal bleeding is difficult to diagnose and manage. Pancreaticoduodenectomy is often associated with portal vein (PV) stenosis and thrombosis especially in cases of PV resection and anastomosis, and makes the portal venous collateral system. PV thrombosis after pylorus-preserving pancreaticoduodenectomy (PPPD) can result in unique cavernous transformation via the jejunal collateral pathway and in massive variceal bleeding.

There are various approaches to the management of jejunal variceal bleeding. Lee et al1 reported percutaneous trans-splenic embolization of jejunal varices, Hwang et al2 attempted to manage such bleeding with PV stenting, and Chu et al3 combined PV stent-graft placement and variceal embolization for such patients. Here, we report a case of jejunal variceal bleeding after 60 months of PPPD treated by PV stenting and selective embolization of the varices.

Case Report

A 78-year-old woman was referred to our hospital due to hematemesis and melena that had persisted for 15 days. She had undergone PPPD for early stage (T1N0 M0, stage IA) cancer of the distal common bile duct five years ago. No adjuvant radiation therapy was performed. During the postoperative period, she had no evidence of recurrence. A serial CT follow-up obtained during her initial admission revealed a gradual increment of PV thrombosis and concurrent development of cavernous transformation. During her recent admission, she had undergone eight esophagogastroduodenoscopies, which revealed only a grade I esophageal varix. A colonoscopy showed no bleeding focus. The last CT scan before transfer revealed active bleeding in the jejunum and near complete obstruction of the PV (Fig. 1).

Tc-99m labeled red blood cell scintigraphy showed mild tracer...
accumulation in the right upper abdomen, suggestive of a small amount of active bleeding. Celiac and superior mesenteric arteriograms showed no definite bleeding focus. Although her vital signs were stable, laboratory studies showed decreased hemoglobin levels (4.8 g/dL).

The patient was referred to us for percutaneous recanalization of the PV. Under fluoroscopic guidance, percutaneous transhepatic puncture of the segment VI PV was performed with a 21-gauge Chiba needle (Cook, Bloomington, IN, USA). The needle was then exchanged with a 4-French coaxial dilator, followed by the introduction of a 7-French long sheath over a 0.035-inch guidewire. Using a 0.035-inch angled hydophilic stiff guidewire (Radifocus; Terumo, Tokyo, Japan) and a 5-French Cobra catheter (Cook), successful navigation of the main PV was achieved. The portogram through the Cobra catheter confirmed a 6-cm-long, segmental obstruction of the main PV caused by thrombus and cavernous transformation, which suggested jejunal varices (Fig. 2A). The pressure gradient between the hepatic PV and superior mesenteric vein was 24 mmHg. Using an 8-mm balloon catheter (Synergy; Boston Scientific, Marlborough, MA, USA), venoplasty across the thrombus was performed. Residual thrombi were aspirated by a 7-French McNamara catheter (Cook). Portal flow was improved, and the flow in the collaterals was decreased, although stenosis was still noted in the main PV. A self-expanding stent (Zilver; Cook) with a diameter of 12 mm and a length of 8 cm was deployed in the stenotic portion, and additional balloon venoplasty with a diameter of 8 mm was performed. The pressure gradient decreased to 13 mmHg. A final portogram showed further improvement in the PV flow and a marked decrease in the jejunal collateral flow (Fig. 2B). The transhepatic tract was embolized with a mixture of N-butyl cyanoacrylate (Histoacryl; B. Braun, Tuttingen, Germany) and Lipiodol Ultrafluid (Laboratoire Guerbet, Aulnay-Sous-Bois, France) at ratio of 1:2 (total dose of Histoacryl mixture; 5 mL).

Fig. 1. A 78-year-old woman who underwent pylorus-preserving pancreaticoduodenectomy 5 years before presenting with hematemesis and hematochezia. (A) Computed tomography revealing portal vein thrombosis (arrow) and associated cavernous transformation and ascites. (B) Extravasation of contrast media (arrow) in the jejunum suggesting active bleeding in the afferent loop.

Fig. 2. (A) Transhepatic portogram showing a filling defect suggests obstruction in the portal vein (arrows), suggestive of thrombus and extravasation of contrast media (arrowheads) to the jejunum. (B) Balloon dilatation, thrombectomy, and stent placement restored portal vein flow and decreased collateral flow.
After the procedure, the patient’s GI bleeding symptoms improved, but her hematemesis recurred four days later. A subsequent CT revealed in-stent thrombus and rebleeding in the afferent loop. The segment V PV was cannulated in the same manner as described above, and a 7-French sheath was introduced. The in-stent thrombus was traversed with a stiff guidewire and a 5-French Cobra catheter, and, using a 2.2-French microcatheter (Progreat; Terumo), jejunal varices were selected. Angiography through the microcatheter showed active contrast media leakage to the jejunal lumen (Fig. 3A). To preserve collateral flow, the specific bleeding focus was selectively embolized with four microcoils (Nester; Cook) and a mixture of Histoacryl and Lipiodol at ratio of 1:2 (total dose of Histoacryl mixture: 2 mL).

For remaining stenosis of stent and in-stent thrombosis, aspiration thrombectomy, balloon venoplasty (8 mm, Synergy), and placement of a metal self-expanding stent of 10 mm in diameter and 4 cm in length (Epic; Boston Scientific) were performed. Direct portography through the 5-French Cobra catheter showed a successful recanalization of the PV and no active bleeding (Fig. 3B). After removal of the sheath, the transhepatic tract was embolized with the Histoacryl mixture.

A follow-up CT scan showed a patent PV and decreased collateral flow, ascites, congestive colonopathies, and pleural effusion. The patient was discharged with improvements in her clinical symptoms and serum hemoglobin level (10.2 g/dL). Laboratory findings associated with hepatic function were within normal ranges, i.e., aspartate transaminase 30 IU/L, alanine transaminase 23 IU/L, and total bilirubin 0.3 mg/dL.

**Discussion**

PV obstruction typically leads to cavernous transformation and portal hypertension. Most variceal bleeding events are caused by esophagogastroduodenal varices and are generally associated with intra-abdominal surgery. The incidence of GI bleeding among ectopic varices is about 18%. The management strategies for this are recanalization of the PV flow with or without embolization of the variceal bleeding, and the treatment approach is selected on a case-by-case basis.

In our present case, stent placement and variceal embolization were performed as previously described. However, we additionally performed selective embolization of jejunal varices. In patients with PV obstruction after PPPD, jejunal collaterals are important hepatic collateral channels. Despite stent placement, restenosis and in-stent thrombosis frequently occur in such cases. In cases of total embolization of a jejunal portosystemic shunt, recurrence of PV obstruction can lead to hepatic failure.

Transhepatic or trans-splenic approaches are safe approaches to accessing the PV. If PV access is subsequently required in our present case, a trans-splenic route will be available because both segments V and VI portal branches were embolized. In this patient, recanalization of the PV was also initially sufficient to treat her condition; however, persistent prominent collateral flows, residual PV stenosis, and lack of anticoagulation drugs led to recurrent PV obstruction in less than four days. In previous reports, venoplasty and anticoagulation alone were sufficient to maintain patency during follow-up. In fear of acute re-bleeding, one week after cessation of bleeding, anticoagulation with low-molecular-weight heparin and warfarin was started. In our present case, at the second session of intervention, embolization of the varices were inevitable; fortunately, however, we located the specific bleeding focus and avoided total embolization of major hepatic collaterals. It is assumed that there is a competition in blood flow between the PV stent and the adjacent collaterals, the portal venous flow could be directed to the collaterals even with a mild disturbance in the in-stent blood flow. The cause of rebleeding in this patient was likely the prominent, non-embolized collaterals.

Bleeding from jejunal varices is difficult to diagnose due to its rarity and because this is out-of-scope during an endoscopic examination. In cases of massive bleeding, a history of pancreateco-duodenectomy, and portal hypertension, a suspicion of jejunal variceal bleeding can avoid repetitive endoscopy and transarterial angiography. Recanalization of the PV with stent placement and embolization of the jejunal varix may also be effective. If possible, selective embolization of the bleeding focus is a safer option.

**Conflicts of Interest**

No potential conflict of interest relevant to this article was reported.

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