

Stent-graft treatment for extrahepatic portal vein hemorrhage after pancreaticoduodenectomy

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Abstract

We report a case of intraperitoneal hemorrhage from the extrahepatic portal vein after pancreaticoduodenectomy for distal bile duct carcinoma. A stent-graft was deployed from the superior mesenteric vein to the main portal vein using a transhepatic approach. After the procedure, the patient remained free of intraperitoneal hemorrhage and was discharged 2 months later.

Keywords

Stent-graft, hemorrhage, portal vein, pancreaticoduodenectomy

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Introduction

Pancreaticoduodenectomy is the standard surgical procedure for resecting tumors arising from the periampullary area and pancreatic head. The results of pancreaticoduodenectomy have improved recently, with significant reductions in operative mortality to less than 4% (1). However, postoperative massive hemorrhage remains a life-threatening complication. Early hemorrhage occurs within 24 h after surgery, mainly due to intraoperative arterial injury or inadequate hemostasis. And, delayed hemorrhage after the first postoperative day is mainly caused by pseudoaneurysm of the main visceral arteries, with a frequency of 3% (2). With the improvement of endovascular techniques and devices, arterial embolization and stent-graft treatment have gained recognition as first-line therapeutic options for arterial hemorrhage.

Portal vein hemorrhage after pancreaticoduodenectomy is quite rare as a complication, although the exact incidence remains unclear. We report herein a case of postoperative portal vein hemorrhage that was successfully treated with stent-graft deployment.

Case Report

A 75-year-old man underwent pancreaticoduodenectomy for distal bile duct carcinoma. He developed pancreatic anastomotic leakage postoperatively. Contrast-enhanced computed tomography (CT) showed fluid collection around the pancreatic anastomosis and main portal vein (Fig. 1a). The fluid had been discharged from abdominal drains that had been placed intraoperatively. Eleven days postoperatively, the patient developed sentinel bleeding from a drainage tube placed in the foramen of Winslow. He remained hemodynamically stable and was managed by

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Fig. 1. (a) Contrast-enhanced CT 7 days after surgery shows fluid collection (arrowhead) around the pancreatic anastomosis and main portal vein. A drain (arrow) that was placed intraoperatively is seen crossing the main portal vein. (b) Contrast-enhanced study via the drainage tube shows the main portal vein (arrowhead) and peritoneal cavity (arrow). The common hepatic artery had already been embolized with microcoils.

transfusion of 4 units of packed red blood cells and intravenous fluids. Emergency angiography was also performed. Common hepatic arteriography showed protrusion and dilatation at the stump of the gastroduodenal artery. Although this later proved to be incorrect, we considered the stump of the gastroduodenal artery as the cause of hemorrhage. This patient showed an anatomical variant of the hepatic artery, with the left hepatic artery arising from the left gastric artery. We therefore embolized the common hepatic artery using microcoils. After embolization, arterial flow to the liver was preserved through collateral flow from the left hepatic artery.

At the same time, to exchange the drainage tube located in the foramen of Winslow, traction was placed on the drain and contrast medium was injected via the drainage tube. This contrast study showed not only the peritoneal cavity due to pancreatic leakage, but also the main portal vein, indicating portal vein injury (Fig. 1b). The point of damage to the portal vein was just above the confluence of the splenic and superior mesenteric veins. Recurrent hemorrhage from the drain then occurred. The drainage tube was subsequently reinserted, and tentative hemostasis was achieved. Three hours later, recurrent hemorrhage from the drain occurred once more. The hemoglobin levels dropped from 10.4 to 9.1 g/dl within a period of 3 h, and systolic blood pressure decreased from 120 mmHg to 80 mmHg. The patient was taken to an operating room for definitive surgical repair. However, surgical repair was difficult because of severe post-operative intra-abdominal adhesions. The therapeutic strategy intraoperatively was therefore changed to stent-graft deployment.

The intrahepatic portal branch was punctured using an ultrasound-guided transhepatic approach,

and a 5-F sheath inserted into the main portal vein. Portography showed no contrast extravasation. The splenic vein, gastric vein, and inferior mesenteric vein were embolized using coils and microcoils to prevent type 2 endoleak. The 5-F sheath was then exchanged for a 12-F sheath. On CT, the diameter of the main portal vein was 15 mm and that of the superior mesenteric vein 13 mm. A Gore Excluder contralateral leg endoprosthesis (16-14.5 mm × 70 mm; W. L. Gore & Associates, Flagstaff, AZ, USA) was loaded in a reversed position into the sheath using the upside-down technique (3). The stent-graft was deployed by a pusher rod. Subsequent portography showed favorable portal flow to the liver through the stent-graft (Fig. 2). At the end of the procedure, the punctured hepatic tract was closed with 6 mm coils.

After the procedure, the patient remained free of further hemorrhage. Pancreatic anastomotic leakage was improved and the patient was discharged 2 months later. As of 12 months after the procedure, the patient remains alive and portal flow through the stent-graft was intact.

Discussion

Although the exact mechanisms underlying delayed hemorrhage after pancreaticoduodenectomy remain elusive, pancreatic leakage and localized infection are thought to represent major contributors (2). In the present case, the patient experienced pancreatic leakage. In addition, the surgical drain, which was placed intraoperatively, was adjacent to the portal vein, suggesting that mechanical irritation of the portal vein may also have been promoted. It has been shown that among several crucial factors the time drainage tubes are left appears to affect



Fig. 2. Portography from the superior mesenteric vein after stent-graft deployment (arrows) shows good portal flow to the liver through the stent-graft. To prevent endoleak, the splenic vein, left gastric vein, and inferior mesenteric vein were embolized with coils and microcoils before stent-graft deployment (arrowheads).

the frequency of vascular and other complications unfavorably (4).

The utility of stent-grafting for arterial hemorrhage after pancreatic resection has been widely accepted, and is recognized as the first choice of treatment if the stent-graft can be technically and anatomically deployed to the appropriate site (5,6). On the other hand, postoperative portal vein hemorrhage is uncommon, and the utility of stent-grafting for this complication is unclear.

The standard treatment for extrahepatic portal vein hemorrhage and aneurysm is surgical repair (7,8). However, this method of treatment was not possible due to severe postoperative intra-abdominal adhesions in the present case. The only other therapeutic option to achieve hemostasis and preserve portal flow to the liver was stent-graft treatment.

In terms of stent-graft treatment for extrahepatic portal vein hemorrhage, only two other reports have been published. Ginsburg et al. described a similar case that resulted after pancreaticoduodenectomy (9). In that case, a contrast study via a drainage tube demonstrated the extrahepatic portal vein, but direct portography did not show active extravasation as in the present case. Charvat et al. reported another case with hemorrhage after multiple revisions after a complicating acute necrotizing pancreatitis (10). In both cases, stent-graft treatment was able to control the hemorrhage and the patients were discharged without

procedure-related complications. The reported number of patients, including the present case, is too small to permit meaningful analysis of the utility of stent-graft treatment for extrahepatic portal vein hemorrhage. The long-term outcomes also remain poorly understood. To evaluate the utility of this approach, additional reports are required.

To insert a stent-graft system into the main portal vein, either a transhepatic approach (9) or a transileocolic approach (10) can be applied. In our case, the procedure was performed during open surgery. However, if an ileocolic approach is selected, more time are required to expose the ileocolic vein. Thus, a transhepatic approach was selected.

In conclusion, the majority of delayed hemorrhagic complications after pancreaticoduodenectomy involve arterial hemorrhage. However, the portal vein also has the potential to cause delayed hemorrhage. Stent-graft treatment may represent a feasible therapeutic option for portal vein hemorrhage.

Conflict of interest

None declared.

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