Late Complications of Self-expandable Metallic Stent Placement for Malignant Gastric Outlet Obstruction

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Abstract

The patient was a 68-year-old man with pancreatic cancer exhibiting invasion into the superior mesenteric artery and stenosis of the third part of the duodenum. He subsequently received a duodenal stent for malignant gastric outlet obstruction. On day 43 after the placement of the duodenal stent, he reported feeling poorly, with hypotension and hematemesis. High-density areas were observed from the stomach to the rectum on computed tomography. We diagnosed the origin of bleeding as the last third of the duodenum; unfortunately, the patient died. This is the first report of massive gastrointestinal tract bleeding as a late complication of self-expandable metallic stent placement for malignant gastric outlet obstruction.

Key words: pancreatic cancer, malignant gastric outlet obstruction, self-expandable metallic stent, GI tract bleeding

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Introduction

Malignant gastric outlet obstruction is a common complication in patients with advanced gastric, duodenal or pancreaticobiliary cancer. Malignant gastric outlet obstruction dramatically diminishes the patient’s quality of life due to persistent nausea and vomiting.

The utility of self-expandable metallic stents for treating malignant gastric outlet obstruction is widely recognized, and placement of a self-expandable metallic stent is becoming common as a therapeutic alternative to surgical bypass in cases of malignant gastric outlet obstruction, particularly in patients with a short life expectancy (1-4). However, complications associated with the placement of a self-expandable metallic stent for malignant gastric outlet obstruction are reported in approximately 19.4-26.2% of cases (5, 6). We herein report a case of pancreatic cancer involving massive bleeding and a sudden fatal outcome due to a late complications of self-expandable metallic stent placement for malignant gastric outlet obstruction.

Case Report

The patient was a 68-year-old man who visited a nearby clinic with chief complaints of vomiting and upper abdominal discomfort. Carcinoma of the pancreas arising from the uncinate process, stenosis of the third part of the duodenum and a metastatic liver tumor were suspected based on the findings of computed tomography (CT). Therefore, the patient was transferred to our hospital for a detailed examination and treatment.

Abdominal CT showed a tumor in the pancreatic head, with invasion into the superior mesenteric artery, stenosis of the third part of the duodenum and expansion of the oral side of the narrowed segment on day 1 after admission to our hospital (Fig. 1a). Blood testing performed on admission showed the following results: white blood count, 7.8×10\(^3\)/μL; C-reactive protein, 2.09 mg/dL; carbohydrate antigen 19-9, 709 IU/mL; and s-pancreas-1 antigen, 420 U/mL. We subsequently performed an endoscopic ultrasound-guided fine-needle aspiration biopsy of the pancreatic tumor in the
stomach to the duodenum (Fig. 2b), although no active bleeding was detected on observation.

We diagnosed the origin of bleeding as the last third of the duodenum. Although we informed the patient’s family of the need to confirm the source of bleeding under interventional radiology, they did not give their consent for this intervention and instead opted for palliative medical care. The patient died 10 hours after the onset of hematemesis.

An autopsy was performed with the consent of the patient’s family. The region of the duodenum in which the stent had been placed had turned black (Fig. 3a), which was thought to indicate tumor necrosis. In the tumor region, relatively thick arteries had accumulated and subsequently ruptured, causing bleeding (Fig. 3b). The presence of many bacteria was identified in the necrotic material, including Gram-positive bacilli and cocci (Fig. 3c). Therefore, tumor necrosis had developed as a result of various factors, including stent placement. Because several types of bacteria, including aerogenes, were present in the necrotic material, the cause of death was considered to be bleeding due to the disruption of elastic arteries in the necrotic portion of the pan-

Figure 1. a) Abdominal computed tomography shows a tumor in the pancreatic head with invasion of the superior mesenteric artery, stenosis of the last third of the duodenum and expansion of the oral side of the narrowed segment. b) A self-expandable metallic stent was placed for malignant gastric outlet obstruction on day 12 after admission to the hospital.

Figure 2. a) Air was observed outside of the gastrointestinal (GI) tract around the stent in the third part of the duodenum. The air appeared to be localized to the pancreatic cancer site, and no widespread free air was found in the abdominal cavity or retroperitoneum; therefore, an aerobic infection was suspected. b) Esophagogastroduodenoscopy (EGD) showed a large quantity of clots extending from the stomach to the duodenum.

second third of the duodenum and diagnosed the patient with pancreatic cancer [T4,N0,M1 stage IV (Union for International Cancer Control; UICC)].

We placed a WallFlex duodenal stent (Boston Scientific, Natick, USA) for malignant gastric outlet obstruction on day 12 after admission to our hospital (Fig. 1b). The patient then resumed an oral diet on day 13 and began chemotherapy (GEM 1,000 mg/m² weekly, 2q3w and S-1 80 mg/body/day, d1-14, q3w) on day 15 after admission. On day 55, the patient reported feeling poorly, with cold sweats, hypotension and hematemesis. High-density areas were noted from the stomach to the rectum on CT imaging. Blood-related contents were suspected, and air was observed outside of the gastrointestinal (GI) tract around the stent in the third part of the duodenum (Fig. 2a). The air appeared to be localized to the pancreatic cancer site, and no widespread free air was found in the abdominal cavity or retroperitoneum; therefore, an aerobic infection was suspected. Esophagogastroduodenoscopy showed a large quantity of clotted blood from the stomach to the duodenum (Fig. 2b), although no active bleeding was detected on observation.

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creatic lesion as a result of self-expandable metallic stent placement for malignant gastric outlet obstruction.

**Discussion**

The utility of GI stenting for malignant gastric outlet obstruction of unresectable pancreatic cancer has been reported (1-5). Minor bleeding of the GI tract during early complications of self-expandable metallic stent placement for malignant gastric outlet obstruction occurs in 0-5% of cases (1, 3-6). Late complications of self-expandable metallic stent placement for malignant gastric outlet obstruction include stent occlusion, tumor ingrowth, tumor overgrowth, food impaction, stent migration and perforation (1, 5, 6), but not tumor necrosis or massive GI bleeding.

We believe that the stenting was the most likely cause of massive GI bleeding in this case. When chemotherapy is effective, pancreatic tumors transition to fibrotic tissue (7, 8). When chemotherapy is not effective, tumor growth may induce necrosis, but not GI bleeding. Therefore, we believe that the radial force generated by stenting was the cause of the patient’s massive GI bleeding.

There are three potential mechanisms underlying the pathogenesis observed in this case, including gastric variceal bleeding secondary to splenic vein occlusion, fistula formation from the blood vessel to the duodenum or direct tumor bleeding via the pancreatic duct, based on the literature of massive bleeding due to direct invasion of pancreatic cancer (9). However, there are no reports that the mechanism of massive bleeding includes the disruption of elastic arteries in necrotic portions of pancreatic tumors. Therefore, we concluded that this case is the first to describe massive GI tract bleeding induced by self-expandable metallic stent placement for malignant gastric outlet obstruction due to pancreatic cancer as a late complication.

In patients undergoing biliary stenting, it is important to consider the impact of radial and axial forces with respect to the clinical implications of self-expandable metallic stent placement (10). Therefore, stents with a low axial force should be chosen to avoid kinking at the ends (10).

et al. reported that The WallFlex duodenal stent has a high axial force (5). It is necessary to consider using stents with low axial and radial forces in order to avoid massive GI tract bleeding due to self-expandable metallic stent placement in cases involving invasive tumor arteries.

The authors state that they have no Conflict of Interest (COI).

**References**