Internal Medicine
The Japanese Society of Internal Medicine
doi: 10.2169/internalmedicine.6394-20
Intern Med 60: 1703-1707, 2021
http://internmed.jp

【 CASE REPORT 】

Development of Severe Acute Pancreatitis Following Uncovered Metallic Stent Placement: A Rare Case Report

Makoto Takaoka[1], Masaaki Shimatani[1], Takuya Takayama[1], Hideaki Miyoshi[1], Toshiyuki Mitsuyama[1], Masataka Masuda[1], Takashi Ito[1], Koh Nakamaru[1], Sachi Miyamoto[1], Mitsuo Tokuhara[1], Tsukasa Ikeura[1], Kazuichi Okazaki[1,2] and Makoto Naganuma[1]

Abstract:
Self-expandable metallic stents (SEMSs) are widely used for malignant biliary stricture (MBS). Acute pancreatitis is an early complication following SEMS placement. In the present case, the patient developed severe acute pancreatitis after SEMS placement for MBS because of metastatic lymph nodes. Endoscopic retrograde cholangiopancreatography, endoscopic sphincterotomy and an endoscopic nasobiliary drainage tube placement were performed. After seven days, an uncovered SEMS was placed; however, severe acute pancreatitis occurred, and the SEMS was drawn out emergently. In SEMS placement for patients with MBS caused by non-pancreatic cancer, SEMS should be selected carefully while considering each patient's case.

Key words: severe acute pancreatitis, extrahepatic bile duct obstruction, malignant biliary stricture, self-expandable metallic stent

(Intern Med 60: 1703-1707, 2021)
(DOI: 10.2169/internalmedicine.6394-20)

Introduction

Self-expandable metallic stents (SEMSs) have been widely used for malignant biliary stricture. Acute pancreatitis is an early complication that can follow SEMS placement in between 0% and 24% of cases (1-11). However, there are few reports on severe acute pancreatitis onset after SEMS placement (12).

We herein report a rare case of severe acute pancreatitis after SEMS placement for malignant distal bile duct stricture and discuss the development of acute pancreatitis after metallic stent placement.

Case Report

A man in his 70s who was receiving chemotherapy for advanced squamous cell carcinoma of the lung complained of jaundice. Hepatobiliary enzymes and bilirubin levels were markedly elevated, and the patient was referred to our department.

Computed tomography (CT) revealed multiple liver metastases, hepatomegaly, multiple swollen abdominal lymph nodes, and extrahepatic bile duct dilatation (Fig. 1). Magnetic resonance cholangiopancreatography showed intrahepatic and extrahepatic bile duct dilatation, distal bile duct obstruction, and smooth main pancreatic duct without dilatation (Fig. 2). Endoscopic retrograde cholangiopancreatography (ERCP) revealed distal bile duct stricture due to metastatic lymph node (Fig. 3a). After endoscopic sphincterotomy (EST) with a small incision, an endoscopic nasobiliary drainage (ENBD) tube was placed (Fig. 3c, e), and the yellowing effect was confirmed. After 7 days, ERCP was performed a second time, and an uncovered SEMS (10 mm in diameter and 8 cm in length; Bonastent®, Sewoon Medical, Cheonai, Korea) was placed without any additional procedures, including contrast medium injection and guidewire insertion into the pancreatic duct, a biopsy, and intraductal ultrasonography (Fig. 3e, f). These ERCP-related procedures were performed by a well-experienced endoscopist in 11 minutes.

A marked increase in pancreatic enzymes was observed

[1]The Third Department of Internal Medicine, Kansai Medical University, Japan and [2]Kansai Medical University Kori Hospital, Japan
Received: September 28, 2020; Accepted: November 15, 2020; Advance Publication by J-STAGE: December 29, 2020
Correspondence to Dr. Makoto Takaoka, takaokam@hirakata.kmu.ac.jp

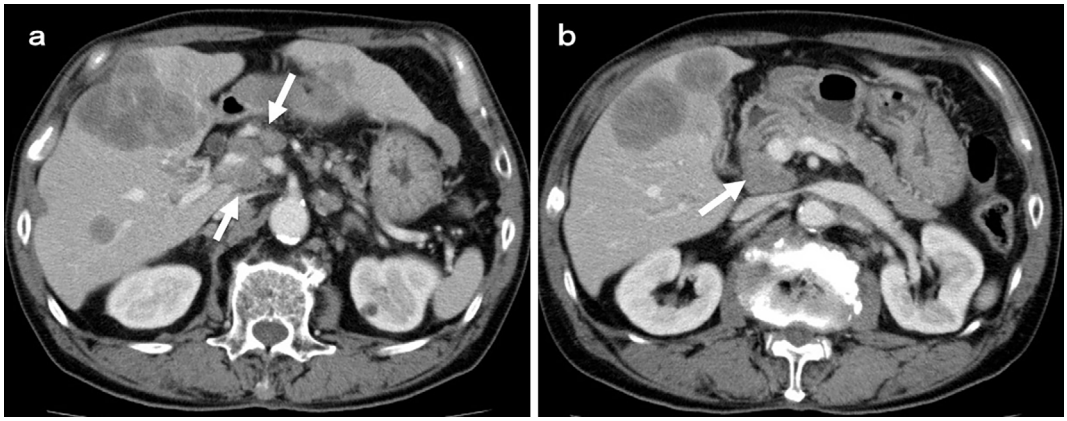

Figure 1. **Contrast-enhanced computed tomography showing multiple metastatic liver tumors and metastatic lymph node swelling. a: Lymph node swelling around the extrahepatic bile duct (arrows). b: Lymph node swelling near the pancreatic head (arrow).**

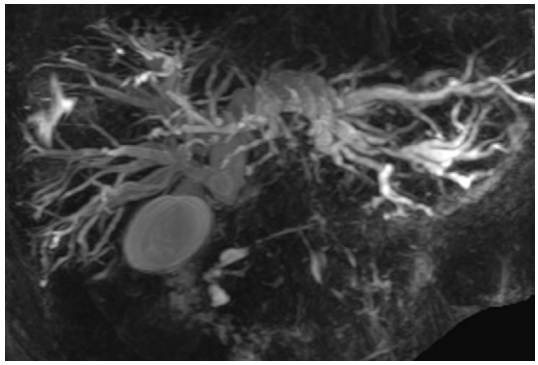

Figure 2. **Magnetic resonance cholangiopancreatography showing the intrahepatic and extrahepatic bile duct dilatation, the distal bile duct (lower bile duct) obstruction, and the smooth main pancreatic duct in the pancreatic head to body without dilatation.**

(serum amylase level 2,266 U/L after 2 hours, and 4,841 U/L the following day), and CT showed swelling of the pancreas, peripancreatic inflammation, and the spread of inflammation toward the inferior pole of the left kidney (Fig. 4). We considered severe acute pancreatitis with CT grade 2 according to the Japan Medical Care Guideline of acute pancreatitis. We believed that the cause of severe acute pancreatitis was SEMS placement and immediately performed ERCP. We smoothly drew out the SEMS via the forceps channel of the endoscope using snare forceps without resistance and placed a tube stent and an ENBD tube; 2 days later, severe acute pancreatitis which was CT grade 2 and fulfilled 3 prognostic factors [C-reactive protein (CRP), 29.3 mg/dL; lactate dehydrogenase, 2,872 U/L; and age, >70 years old] according to the established guidelines (Fig. 5). The Bedside Index for Severity in Acute Pancreatitis score was 3 points out of 5 (blood urea nitrogen, age, pleural effusion); the Acute Physiology and Chronic Health Evaluation II score was 17 points.

The patient received conservative treatment, including 3,800-4,000 mL infusion, 1,500 mg of gabexate mesylate, and 13.5 g of tazobactam piperacillin hydrate intravenous administration daily continuously. Following the removal of the SEMS, the pancreatic enzyme levels dropped dramatically, and the CRP levels declined steadily. The recovery of severe acute pancreatitis was confirmed by laboratory data and CT at 21 days after the first ERCP procedure; a fourth ERCP procedure was subsequently performed, and another tube stent was placed. The patient was discharged 29 days after the first ERCP procedure without pancreatitis onset.

Discussion

Acute pancreatitis is an early complication that can occur after SEMS placement for malignant biliary stricture. In endoscopic SEMS placement, acute pancreatitis has been reported to occur in 0-14% of cases in the past decade (1-10). Although the frequency varies among reports, acute pancreatitis occurs with a certain probability. However, there are few reports of severe acute pancreatitis following SEMS placement (12).

In our institution, SEMS placement was performed for 559 patients with malignant biliary stricture over the 12-year period between 2008 and 2019. Of the 559 patients, acute pancreatitis occurred in 14 patients (2.5%). These 14 patients underwent EST and biliary drainage using ENBD and/or tube stent at the first ERCP procedure and SEMS placement at the second or third ERCP procedure. Of these patients, urgent ERCP and SEMS removal were performed in 3 (0.54%), including the present case, due to the rapid increase in pancreatic enzyme levels observed, which was considered to have been caused by SEMS placement. Of these three patients, two had partially covered SEMS, and 1 had an uncovered SEMS; both were braided-type SEMS. Among these 3 patients, severe acute pancreatitis only developed in the current case (0.18%).

Acute pancreatitis after metallic stent placement is considered to occur as a consequence of SEMS obstructing the pancreatic duct orifice of the papilla of Vater, which blocks pancreatic juice outflow and consequently induces acute

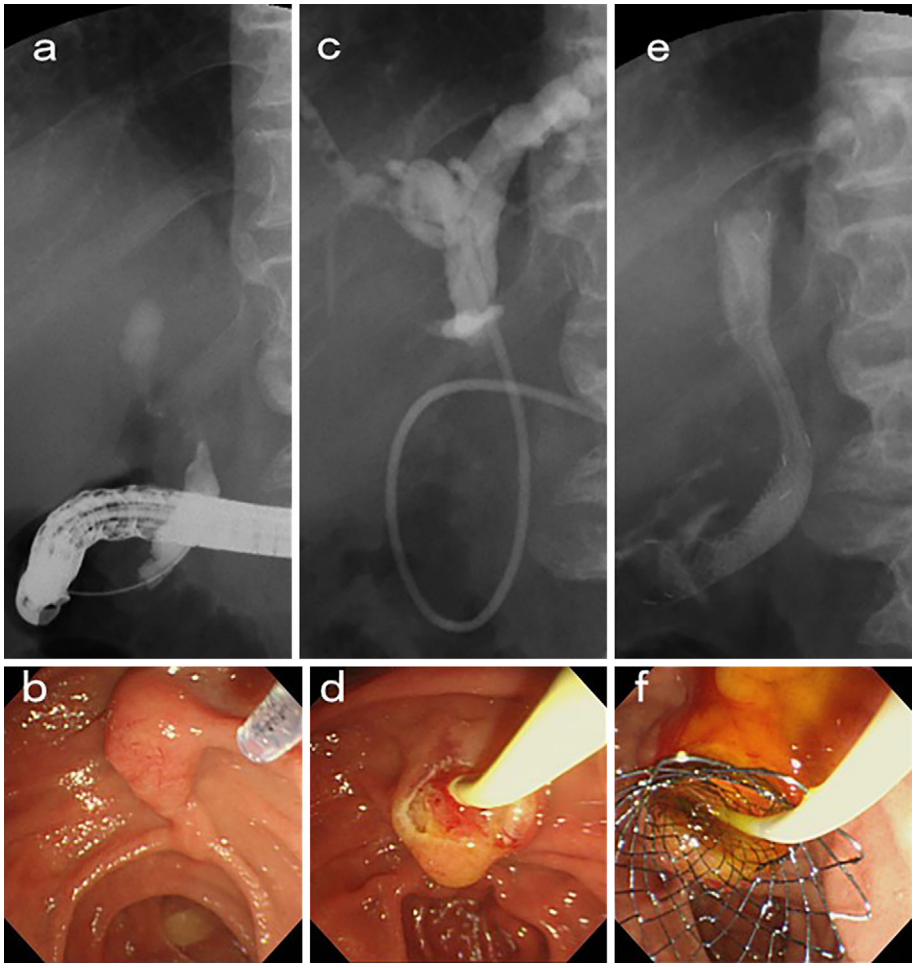

Figure 3. **ERCP findings. a: Endoscopic cholangiography reveals lower-to-middle bile duct stricture. b: The papilla of Vater was of normal size and shape. c: An endoscopic nasobiliary tube was placed. d: Endoscopic sphincterotomy with a middle incision was performed. e, f: An endoscopic metallic stent was placed after 7 days using an uncovered braded type metallic stent (10 mm in diameter and 8 cm in length). ERCP: endoscopic retrograde cholangiopancreatography**

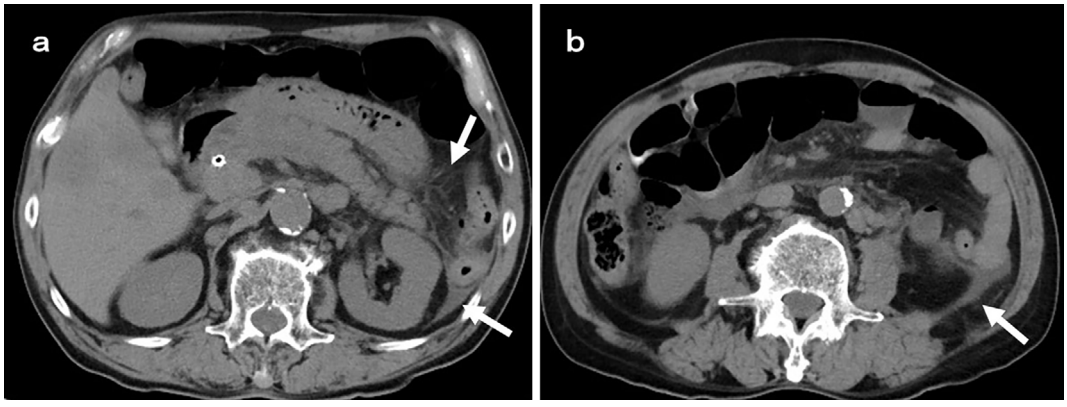

Figure 4. **Computed tomography showing severe acute pancreatitis findings. a: The swollen pancreas and spread of inflammation to the abdominal cavity and retroperitoneum (arrows). b: The inflammation spread toward the inferior pole of the left kidney (arrow).**

pancreatitis. The use of EST can help avoid pancreatic duct obstruction to some extent. Indeed, Sugawara et al. reported that 24% of patients with acute pancreatitis were observed after percutaneous transhepatic biliary SEMS placement across the papilla without EST (11). However, EST has been reported to be unrelated to the development of pancreatitis following SEMS placement (8, 9). In previous reports, the etiology of biliary stricture was limited to pancreatic cancer

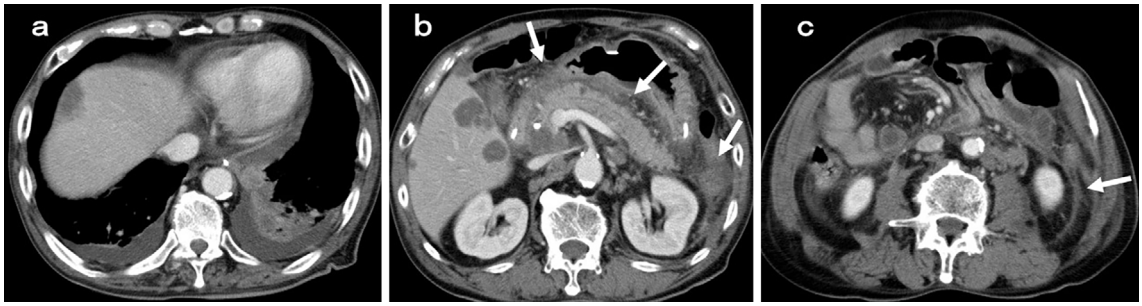

Figure 5. Contrast-enhanced computed tomography two days after the second ERCP procedure showing continuing severe acute pancreatitis findings. a: Bilateral pleural effusion and atelectasis in the left lung. b: Peripancreatic inflammation and inflammation to the abdominal cavity (arrows). c: Inflammation spread around the left kidney (arrow). ERCP: endoscopic retrograde cholangiopancreatography

(100%) (8), or there were many cases (82%) with dilatation of the main pancreatic duct, including pancreatic cancer (9). EST should be performed to reduce acute pancreatitis after SEMS placement, especially for patients with nonpancreatic cancer, as recommended in the European Society of Gastrointestinal Endoscopy Guidelines (13).

Covered SEMS may block the orifice of the pancreatic duct after EST, so these types of stent are thought to carry a higher risk of acute pancreatitis than others. It has been reported that acute pancreatitis occurs more frequently in cases with covered SEMSs than in those with uncovered SEMSs (1, 2); however, there are no marked differences in the rates of acute pancreatitis development between partially covered and uncovered SEMSs (3, 4). This may be related to the underlying disease, the presence or absence of dilatation of the main pancreatic duct, and/or atrophy of the pancreatic parenchyma (2, 5, 11). In patients with pancreatic duct obstruction, such as pancreatic head cancer, we empirically understand that acute pancreatitis is unlikely to occur, even if the pancreatic duct orifice is blocked because of chronic obstructive pancreatitis. In a randomized comparative study of covered versus uncovered SEMSs in cases of malignant bile duct stricture, 76-77% of the total patients had pancreatic cancer; the incidence of acute pancreatitis was reported as 1.5% and 2.0%, respectively (4).

Acute pancreatitis after fully covered SEMS placement has been reported in 9.3% of patients (n=602), while the presence of a moderate to high degree of acute pancreatitis was reported in 1.3% of patients (6). A relatively high rate of acute pancreatitis following fully covered SEMS placement was reported in a small number of patients with pancreatic cancer (n=169; 28%) and in >50% of the patients with a non-dilated pancreatic duct (n=349; 58%).

Acute pancreatitis is likely to occur in patients with no dilation of the main pancreatic duct and no pancreatic atrophy (9). In the current case, we suspected that the large metastatic lymph node had compressed the pancreatic parenchyma over the pancreatic duct due to SEMS placement, resulting in a sudden increase in pancreatic ductal pressure and simultaneous parenchyma damage and the development of acute pancreatitis. Generally, the mechanisms underlying aggravation of acute pancreatitis have been thought to be local inflammation, increased cytokine production that leads to systemic cytokine overflow, and the production of other mediators that induce systemic inflammatory syndrome. Systemic inflammation induces multiple organ failure and/or disseminated intravascular coagulation. However, the exact cause and mechanism of the progression of acute pancreatitis to severe acute pancreatitis were unknown in the present case.

In the context of acute pancreatitis during SEMS placement for malignant bile duct stricture due to non-pancreatic cancer, whether or not there are differences between partially covered/uncovered SEMS and fully covered SEMS is unclear. Further studies are needed to clarify this issue. When the risk of acute pancreatitis is considered high, particularly in patients with bile duct stricture due to non-pancreatic cancer, a stent with a smaller radial force and/or smaller stent diameter may be an option, as previously described (9). In addition, a braided stent that can be endoscopically removed in the unlikely event of acute pancreatitis may represent a viable option.

In conclusion, we herein report a rare case of severe acute pancreatitis after uncovered SEMS placement for malignant bile duct stricture due to metastatic lymph node from lung cancer. A SEMS with a smaller diameter and/or lower axial force may have been ideal. In cases of SEMS placement for patients with malignant biliary stricture due to non-pancreatic cancer, it is necessary to perform EST and select a stent after careful consideration of the patient-specific factors.

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

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