【 CASE REPORT 】

Successful Endoscopic Treatment of Severe Pancreaticojejunostomy Strictures by Puncturing the Anastomotic Site with an EUS-guided Guidewire

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Abstract:

Pancreaticojejunostomy stricture (PJS) is a late complication of pancreaticoduodenectomy. The endoscopic treatment of PJS is very challenging due to the difficulty of locating the small anastomotic site and passing the stricture using a guidewire. We herein report two cases of severe PJS. These patients could not be treated using only double-balloon endoscopy or endoscopic ultrasound-guided puncture of the main pancreatic duct because of severe stenosis at the anastomotic site. However, we could treat them by the rendezvous technique using the rigid part of the guidewire to penetrate PJS. This method was useful and safe for treating severe PJS.

Key words: pancreaticoduodenectomy, late complication, pancreaticojejunostomy stricture, endoscopic ultrasound, rendezvous technique

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Introduction

Pancreaticoduodenectomy is a common surgical treatment for malignant diseases of the pancreatic head and periampullary regions (1). Refinements of the technique, along with advances in anesthesia and critical care, have reduced the morbidity and mortality associated with this operation (2-4). However, it is crucial to address the late complications of pancreaticoduodenectomy to improve the survival rate after pancreaticoduodenectomy. Pancreaticojejunostomy stricture (PJS) forms after pancreaticoduodenectomy at a frequency of 2-11% of the total patients undergoing pancreaticoduodenectomy (5-8). It can cause recurrent obstructive pancreatitis, pancreatic fistula, and bleeding, leading to the requirement of a second operation. Despite recent advances in endoscopic techniques and devices for PJS, the success rates remain poor (9). Although passing a guidewire through the anastomotic site is the most critical factor for the successful treatment of PJS, there is no useful established method for passing a PJS due to severe stenosis. We herein describe two cases in which severe PJS was successfully treated by puncturing the anastomotic site with the rigid part of a guidewire.

Case Reports

Case 1

A 55-year-old man underwent right hepatectomy and subtotal stomach-preserving pancreaticoduodenectomy for diffuse bile duct carcinoma in 2012. He was referred to our hospital for abdominal pain in April 2014. CT revealed massive ascites and a dilated main pancreatic duct (Fig. 1a). He was diagnosed with pancreatitis and the rupture of a pancreatic pseudocyst associated with PJS. Although we could in-
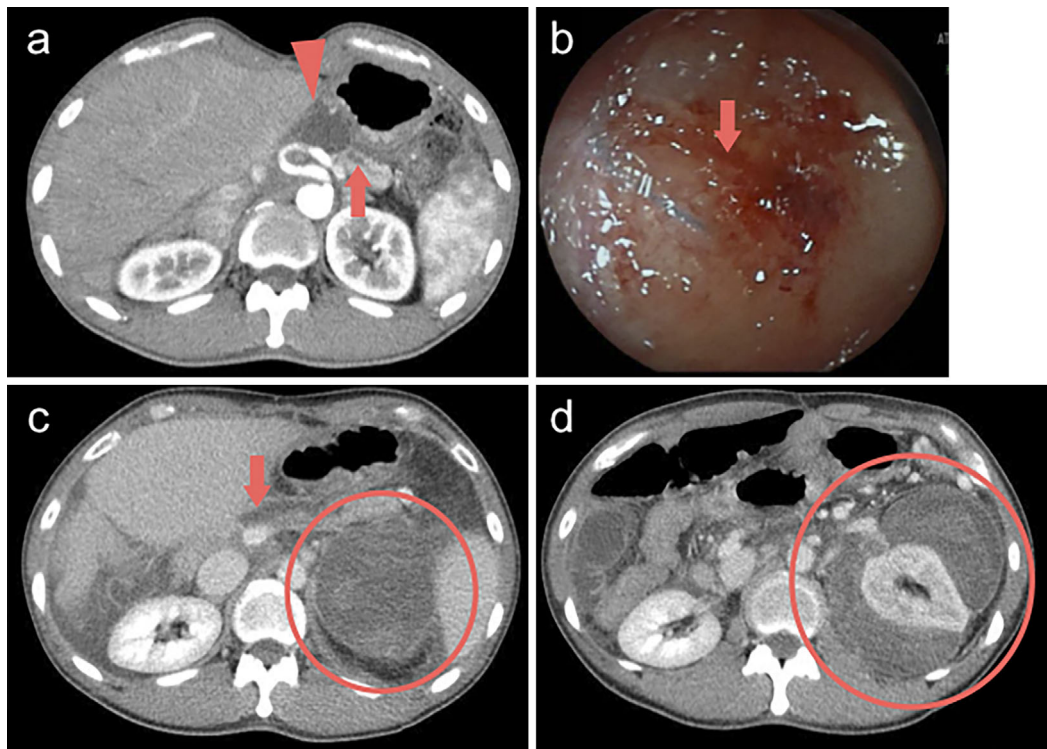
Figure 1. (a) CT revealed a pseudocyst in the pancreatic head (arrowhead) and the dilation of the main pancreatic duct (arrow). (b) Double-balloon endoscopy revealed a membranous pancreaticojejunostomy stricture. (c, d) CT demonstrated the dilation of the main pancreatic duct (arrow) and high-density fluid from the pancreatic tail to the perirenal cavity (circle).

sert a double-balloon endoscope through the anastomotic site of the pancreatojejunostomy, it could not pass through or dilate the PJS because of a membranous obstruction (Fig. 1b). We chose conservative medical treatment. However, the patient was readmitted with similar symptoms in August 2015. The patient's laboratory data showed anemia and elevated levels of pancreatic enzymes. CT showed fluid collection with high density from the pancreatic tail to the perirenal cavity (Fig. 1c, d) due to rupture and bleeding of the pancreatic pseudocyst. After obtaining written informed consent, endoscopic ultrasound (EUS) was performed. The pancreatic duct was visualized using a curved linear EUS device (GF-240UCT; Olympus, Tokyo, Japan) from the gastric body and punctured using a 19-gauge needle (Expect™ 19ga Flex Needle; Boston Scientific Japan, Tokyo, Japan) (Fig. 2a). We carefully inserted a 0.025-inch guidewire (RevoWave; Piolax Medical Devices, Yokohama, Japan) and the catheter to the anastomotic site along the guidewire. However, the guidewire and contrast medium could not pass through the anastomotic site due to the severe stricture (Fig. 2b). The guidewire was therefore removed from the catheter and inserted backwards and the anastomotic site was punctured using the rigid portion of the guidewire (Fig. 2c). The guidewire was then changed to the flexible portion, and was advanced to the jejunum along with the catheter. The communication between the pancreatic duct and the jejunum was confirmed using flow contrast media (Fig. 2d). After the placement of the guidewire, we changed

the EUS device to a double-balloon endoscope, which was advanced to the pancreatojejunostomy, to perform the rendezvous technique. Balloon dilation of the anastomotic site was performed using an 8-mm balloon dilator (ZARA; Century Medical, Tokyo, Japan) (Fig. 2e). A 5-Fr endoscopic nasopancreatic drainage catheter (ENPD) was placed into the main pancreatic duct through the anastomotic site (Fig. 2f). No adverse events occurred during the procedure. The patient was discharged after the removal of the ENPD. No symptoms were detected at a 6-month follow-up examination, and a CT scan showed no signs of recurrence.

Case 2

A 21-year-old woman underwent subtotal stomach-preserving pancreaticoduodenectomy for carcinoma of the duodenal papilla in June 2013. The tumor was classified as Stage IVb according to the TNM classification (Unio Internationalis Contra Cancrum, UICC; pT4N2M0). Although TS1 adjuvant chemotherapy was performed after surgery, the chemotherapy was changed to gemcitabine and cisplatin after 6 months due to the detection of multiple liver metastases. Imaging studies revealed that stable disease progression was maintained for approximately 2 years; however, she was referred to our hospital with pancreatitis and pancreatic leakage from the pseudocyst due to PJS in August 2015 (Fig. 3a, b). Her laboratory data showed anemia and elevated levels of pancreatic enzymes. She was admitted to our hospital due to acute pancreatitis and a ruptured pancreatic
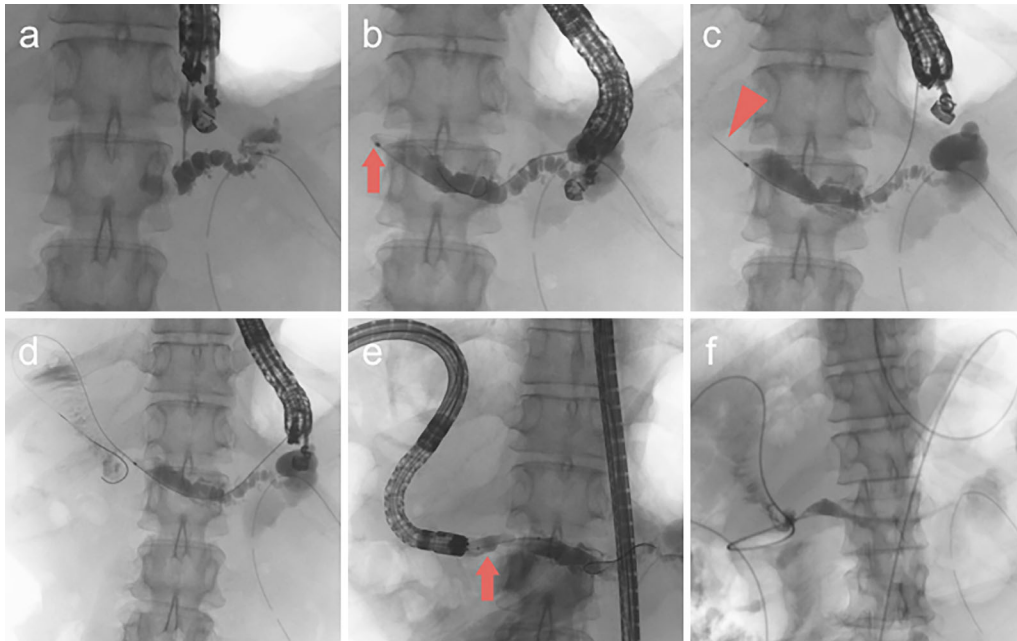
Figure 2. Pancreatic duct drainage using the rendezvous technique in case 1. (a) A 19-gauge needle was used to puncture the pancreatic duct. Pancreatography, with the injection of contrast medium through the 19-gauge needle revealed a dilated pancreatic duct. (b) A 0.025-inch guidewire and catheter were advanced but the guidewire and contrast medium did not reach the jejunum (arrow). (c) The rigid portion of the guidewire (arrowhead) was used to puncture the anastomotic site. (d) The guidewire and contrast medium confirmed the communication between the pancreatic duct and the jejunum. (e) After changing the EUS device to a double-balloon endoscope in order to perform the rendezvous technique, the anastomotic site was dilated using a balloon catheter (arrow). (f) A 5-Fr endoscopic nasopancreatic drainage catheter was placed into the main pancreatic duct through the anastomotic site.
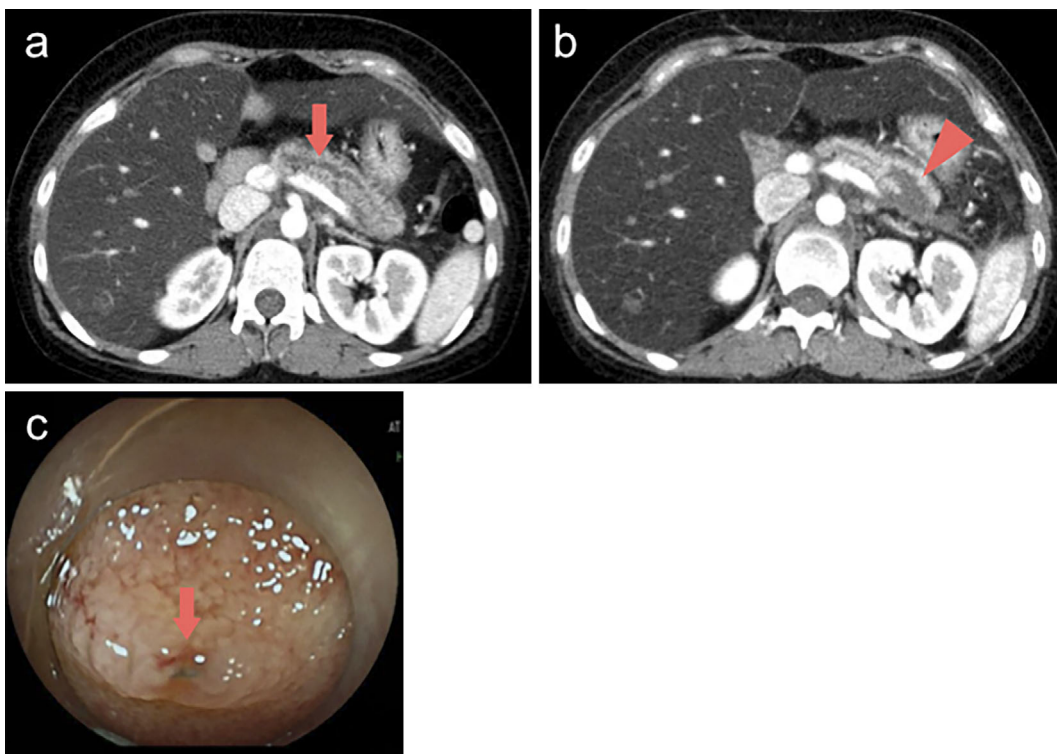

Figure 3. (a) CT revealed the dilation of the main pancreatic duct (arrow). (b) CT also revealed a pseudocyst in the pancreatic body (arrowhead) due to the leakage of pancreatic juice. (c) Double-balloon endoscopy showed the membranous pancreaticojejunostomy stricture (arrow).
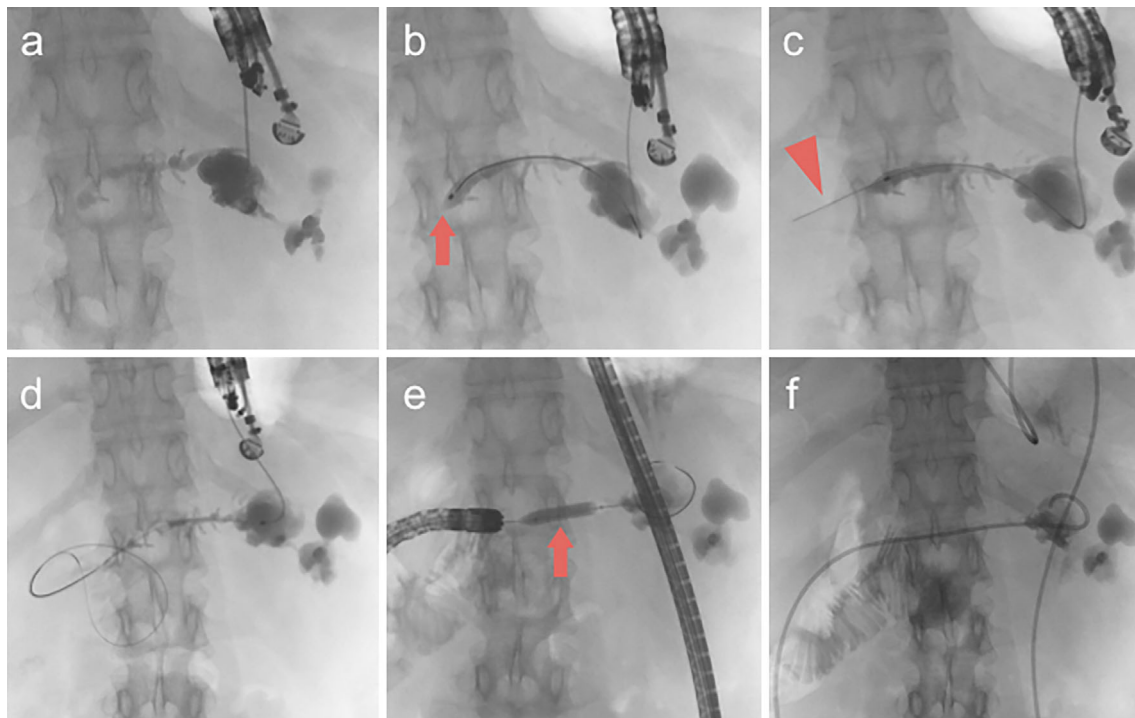
Figure 4. **Pancreatic duct drainage using the rendezvous technique in case 2. (a) A 19-gauge needle was used to penetrate the pancreatic duct. Pancreatography with the injection of contrast medium through the 19-gauge needle revealed a dilated pancreatic duct. (b) A 0.025-inch guidewire and catheter were inserted, but the guidewire and contrast medium did not reach the jejunum (arrow). (c) The rigid portion of the guidewire (arrowhead) was punctured through the anastomotic site. (d) The passing of the guidewire and contrast medium confirmed the communication between the pancreatic duct and the jejunum. (e) After changing the EUS device to a double-balloon endoscope for the rendezvous technique, the anastomotic site was dilated using a balloon catheter (arrow). (f) A 5-Fr endoscopic nasopancreatic drainage catheter was placed into the main pancreatic duct through the anastomotic site.**

pseudocyst. Double balloon endoscopy (DBE) was initially attempted to treat the PJS; however, it failed because of a membranous obstruction (Fig. 3c). After obtaining informed consent, the pancreatic duct was detected using a curved linear EUS device from the stomach was and punctured using a 19-gauge needle (Expect™ 19ga Flex Needle; Boston Scientific Japan) (Fig. 4a). We carefully advanced a 0.025-inch guidewire (VisiGlide2; Olympus Medical Systems) and the catheter to the anastomotic site (Fig. 4b). However, the guidewire and contrast medium could not pass the anastomotic site due to the presence of a severe stricture. We punctured the anastomotic site using the rigid portion of the guidewire, which enabled the guidewire to pass through (Fig. 4c). The guidewire was then reversed to the flexible portion, and advanced along with the catheter to the jejunum. The communication of the pancreatic duct with the jejunum was confirmed using contrast medium (Fig. 4d). To perform the rendezvous technique, we changed the endoscope from a curved linear EUS device to a double-balloon endoscope after placement and inserted the guidewire in the pancreatojejunostomy. Balloon dilation of the anastomotic site was performed using a 6-mm balloon dilator (ZARA; Century Medical) (Fig. 4e) and a 6-Fr ENPD was placed

into the main pancreatic duct through the dilated anastomotic site (Fig. 4f). No adverse events occurred during the procedure. The patient was discharged 2 weeks after the procedure without any symptoms. No symptoms were detected at a 6-month follow-up examination and no signs of recurrence were observed on CT.

Discussion

Pancreaticoduodenectomy is a complex, high-risk surgical procedure. While the rate of perioperative mortality has been decreasing, the rate of overall morbidity remains high (40%) in Japanese nationwide surveys (10). In addition to the major short-term complications, including bile leakage, anastomotic leakage, and pancreatic fistula, late complications, such as PJS, affect the prognosis (11). If conservative treatment is ineffective, percutaneous drainage or repeated surgery should be selected for the treatment of PJS. Secondary surgeries for PJS include two-layer duct-to-mucosa anastomosis (5-8), lateral pancreaticojejunostomy (5-8), and the dunking method (8). Although 26-78% of patients experience the resolution of abdominal symptoms after the resolution of PJS (5-8), in many cases, it is not possible to
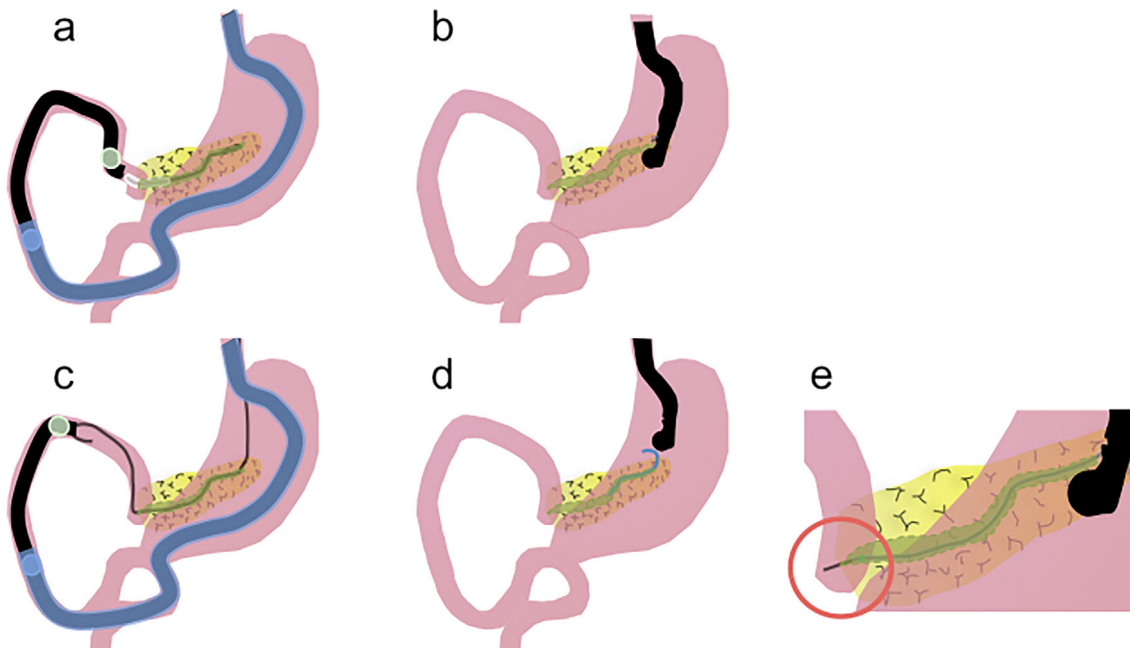
Figure 5. A schematic illustration of the approaches to PJS. (a) The Digestive tract procedure. (b) EUS-guided pancreatic duct puncture. (c) The rendezvous technique. (d) Pancreaticoenterostomy. (e) The rigid portion of the guidewire (circle) was able to pass through the severe PJS.

achieve technical success without recurrence (6, 12).

The success rate of the endoscopic treatment of PJS remains low (13-15) because of the excessive length of the afferent limb, which disturbs the advancement of a conventional endoscope to the site of pancreaticojejunal anastomosis. Although DBE has been shown to improve the success rate of endoscopic retrograde cholangiopancreatography for postoperative pancreaticoduodenectomy (Fig. 5a) and Roux-en-Y patients (16-22), several factors remain, including difficulties in detecting the anastomotic site and intubation of the catheter due to stenosis (23). Recently, EUS-guided interventions have been developed and used for patients with dilated pancreatic ducts. These interventions (Fig. 5b) are categorized into drainage and rendezvous techniques (24). In the drainage technique, a stent is placed in the pancreatic duct between the pancreatic duct and stomach through pancreaticogastrostomy by an antegrade approach (Fig. 5c). This technique requires the stent to be regularly exchanged in order to avoid stent obstruction or migration (25, 26). In the rendezvous technique, a stent is placed in the pancreatic duct using a retrograde approach with a guidewire inserted using the EUS-fine needle aspiration (FNA) method (Fig. 5d). The rendezvous technique has the advantage of being a radical treatment. However, in cases of severe PJS, the guidewire cannot pass through the anastomotic site, which hinders the use of this technique (25). In the present cases, we wanted to use the rendezvous technique to dilate the PJS. To accomplish this, we punctured the PJS from the pancreatic duct to the jejunum using the rigid part of a guidewire (Fig. 5e). This technique is associated with several risks, including perforation of the jejunum and bleeding due to vessel puncture. To avoid these risks, we performed

DBE to confirm the state of the PJS as a membrane-like scar before these procedures. A new plastic stent designed for PJS using EUS-guided pancreatic duct drainage was recently reported (27). This stent is positioned in the jejunum by an antegrade approach. However, stent placement by an antegrade approach through the pancreatojejunostomy is associated with a risk of perforation or bleeding because it is impossible to confirm the site of pancreatojejunostomy. The rendezvous technique in these cases was beneficial as it enabled to confirm the state of the pancreatojejunostomy after passing the guidewire through the puncture that was made using the rigid portion of the guidewire. Furthermore, this method does not necessitate the exchange of the stent and can achieve radical treatment. In the future, this procedure may be an alternative treatment for severe PJS or stricture of choledochojejunostomy.

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

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