



Two-stage pancreaticoduodenectomy: A case report

✉Egemen Ozdemir^{a,*}, ✉Orgun Gunes^b, ✉Fatih Sumer^c, ✉Cuneyt Kayaalp^d

^aIstanbul University-Cerrahpaşa, Faculty of Medicine, Department of General Surgery, Istanbul, Türkiye

^bAtaturk Education and Research Hospital, Department of General Surgery, Izmir, Türkiye

^cIrmet Hospital, Department of Surgery, Tekirdag, Türkiye

^dPrivate Practice, Istanbul, Türkiye

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Abstract

Pancreaticoduodenectomy is one of the major gastrointestinal surgeries and still has significant complication rates. Although most complications appear postoperatively, severe intraoperative difficulties and complications can occur in certain circumstances. Here, we presented the management of two cases who underwent two-stage pancreaticoduodenectomy due to intraoperative problems. Two patients have become hemodynamically unstable during an elective pancreatic resection combined with both arterial and venous reconstructions. All the gastrointestinal reconstructions were postponed to second sessions for damage control surgery. A two-stage pancreaticoduodenectomy is an option to be considered in a hemodynamically unstable patient during elective pancreaticoduodenectomy.

Introduction

Pancreaticoduodenectomy is still an operation with high morbidity. Although most complications occur postoperatively, serious intraoperative difficulties may arise in some cases. Here, we presented the management of two cases who underwent two-stage pancreaticoduodenectomy due to intraoperative problems.

Case Report

Case 1

A 71-year-old male was referred to our institute for a mass of about four cm in diameter at the head of the pancreas. Preoperative contrast-enhanced computed tomography imaging revealed tumour invasion in the portal, splenic and inferior mesenteric veins (Figure 1). In the abdominal exploration, tumor invasion was detected in the portal vein and its tributaries and also in the gastroduodenal artery. Pancreaticoduodenectomy was finally performed together with a 4-cm-long portal vein and the



Figure 1. Preoperative contrast-enhanced computed tomography imaging of Case 1: The arrow indicates the tumour and its invasion into the portal, splenic and inferior mesenteric veins.

*Corresponding author:

Email address: egemenozdemirr@hotmail.com (✉Egemen Ozdemir)

other invaded vessels. Portal vein was reconstructed with a Dacron vascular graft using 6-0 polypropylene suture. During the reconstruction, bleeding occurred from the common hepatic artery. After bleeding control by suturing, the hepatic artery flow disappeared. Then, the common hepatic artery was reconstructed by end-to-end anastomosis using 6-0 polypropylene suture to the splenic artery. After 10 hours of operation, the patient was hemodynamically unstable and the blood pressure could not be regulated. And so, intestinal reconstructions were postponed. Drainage of the main hepatic duct and duct of Wirsung were taken into 16F external drainage catheters. Drainage of stomach was maintained with a nasogastric catheter. The patient was taken to the intensive care unit (ICU) postoperatively.

The patient had liver failure postoperatively and underwent two sessions of Molecular Absorbent Recirculating System (MARS) therapy. In Doppler ultrasonography, common hepatic artery and portal vein was patent. In the following days, liver function tests tended to improve. The condition of the patient went well and a second operation for reconstructions was planned on the sixth postoperative day. In the second operation, the tip of the pancreaticostomy catheter was displaced. The duct of Wirsung was not distinguishable and considering the age, locally advanced disease and general condition of the patient, the cut surface of the pancreas was just sutured without an anastomosis. Afterwards, an end-to-side hepaticojejunostomy and a duodenojejunostomy were performed. The patient did not develop any complications postoperatively and finally discharged on the 12th postoperative day with normal liver function tests and no additional problems. Pathological examination revealed a moderately differentiated pancreatic ductal adenocarcinoma with a diameter of 3x4 cm at the head of the pancreas and 11 peripancreatic lymph node metastases. The patient did not have a surgical problem in subsequent follow-up and received gemcitabine therapy. The patient died at the 11th month because of the metastatic disease.

Case 2

A 52-year-old male with a complaint of back pain was referred to our institute for a mass of about three cm in diameter at the head of the pancreas. He also had replaced right hepatic artery originating from superior mesenteric artery (SMA) (Figure 2). In the abdominal exploration, replaced right hepatic artery was passing through the mass and it was necessary to cut the right hepatic artery after its exit from the SMA. Replaced right hepatic artery was reconstructed with a 2-cm-long vascular graft maintained from inferior mesenteric vein (IMV) to the gastroduodenal artery using 8-0 polypropylene suture. Lateral wall of the portal vein was also invaded with the tumour. After resecting the invaded part of the portal vein, the portal vein defect was closed with a patch of parietal peritoneum taken from the abdominal wall using 6-0 polypropylene suture. Pancreaticoduodenectomy was completed after 10 hours and it was decided to postpone intestinal reconstructions to a second session due to the hypotension. 12F and 5F catheters were placed in the common hepatic duct and duct of Wirsung respectively to maintain external

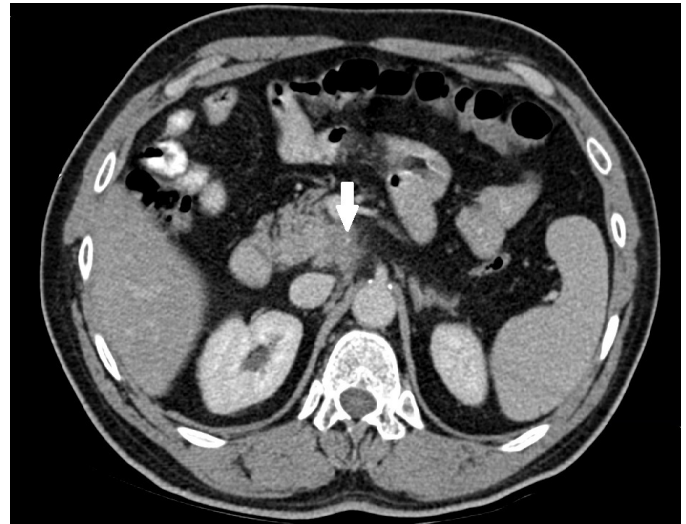


Figure 2. Preoperative contrast-enhanced computed tomography imaging of Case 2: The arrow indicates the tumour and replaced right hepatic artery surrounded by the tumour.

drainage. A 14F gastrostomy tube was also placed into the stomach. The patient was taken to ICU postoperatively. Postoperative Doppler ultrasonography showed no flow in the main portal vein and the patient was reoperated on the same day. In the exploration, main portal vein flow was occluded by thrombus. The previously placed peritoneal patch and thrombi in the portal vein were removed. About a two-cm-long part of the main portal vein containing the defect was resected. Approximately a two-cm-piece of the left renal vein as a vascular graft was used for the reconstruction of the main portal vein. In the intraoperative Doppler ultrasonography, common hepatic artery and main portal vein were patent.

The patient had liver failure postoperatively. In the Doppler ultrasonography, common hepatic artery and main portal vein were patent. The patient underwent two sessions of MARS and one session of plasmapheresis therapies for his liver failure. Liver function tests and general condition of the patient tended to improve in the following days and he was re-operated for enteric reconstructions on the seventh postoperative day. After 6F external drainage catheter was placed in the duct of Wirsung, end-to-side Wirsungojejunostomy was performed. Then end-to-side hepaticojejunostomy was performed together with 4F external drainage catheter on the same limb. A Roux-en-Y reconstruction was used to perform end-to-side duodenojejunostomy. A jejunostomy tube for enteral nutrition was inserted. The patient was extubated on the following day and was taken to the inpatient clinic on the sixth postoperative day after the last surgery. The patient had grade B pancreatic fistula which required percutaneous drainage and intravenous antibiotic therapy postoperatively. He was discharged on the postoperative 30th day. Pathological examination revealed a poorly differentiated pancreatic ductal adenocarcinoma with a diameter of 2.8 cm at the head of the pancreas and no peripancreatic lymph node metastasis. Also, the tumour was 1 mm away from the

cut replaced hepatic artery. The patient had no other surgical problems other than a mild wound drainage. The patient had adjuvant FOLFIRINOX therapy and died at 18th month due to metastatic disease.

Discussion

The most important reason of morbidity and mortality of pancreaticoduodenectomy is related to pancreatic fistulas. The incidence of pancreatic fistulas varies from 3 to 45% [1,2]. In our institute, the overall mortality and grade B/C pancreatic fistula rates of elective pancreaticoduodenectomy are 13.6% and 27.2%, respectively. Pancreatic fistulas may lead to serious intra-abdominal infections, sepsis, and life-threatening bleeding from vascular stumps. In hemodynamically unstable traumatic or high-risk elective patients, the rate of pancreatic fistula increases. In the study of Thompson et al., patients who underwent two-stage surgery had lower rates of sepsis (17% vs. 100%, $p=0.01$) and enterocutaneous fistula (8% vs. 67%, $p=0.04$) compared to the single-stage surgery group [3]. For that reason, postponing enteric reconstructions to a second session is a recommended option for these patients [4]. When our patients have become hemodynamically unstable following pancreatic resections during elective surgeries, the reconstruction phases of the operations were postponed to second sessions due not to extend the operation time and not to increase the risk of postoperative mortality and morbidity.

Completion total pancreatectomy of the remaining part of the pancreas or suturing the pancreatic duct are also other options that can be performed in these patients. Total pancreatectomy resolves the pancreatic leak problem but has poor prognosis and is associated with poor quality of life due to pancreatic endocrine and exocrine insufficiency [2]. Besides, splenectomy may be needed during a total pancreatectomy and it may result in gastric venous ischemia.

Suturing the pancreatic duct has the advantages of shortening the operation time and getting rid of an unsafe anastomosis. On the other hand, some patients may develop pancreatitis. In most patients, pancreatic fistula develops, but since there is no contact with enteric enzymes, it occurs as a subclinical leak and resolves with a conservative treatment approach. Malabsorption may develop in majority of patients and these patients need oral digestive enzyme supplementation [5]. In our first case, considering the age, locally advanced disease and general condition of the patient, suturing the pancreatic duct was preferred to reconstruction.

Vascular resections are frequently required to achieve an R0 resection during pancreaticoduodenectomies. However, morbidity and mortality of the operation also increases [6]. Autologous vascular grafts are good options for vascular reconstructions, especially if a vascular graft is needed immediately during an operation and it has not been previously planned. In addition, autologous grafts are less likely to be thrombosed and infected [7,8]. For the same reasons, we needed to use autologous grafts in our second case. The peritoneal graft was thrombosed but IMV and left renal vein grafts were successful and patent.

Conclusion

A two-stage pancreaticoduodenectomy is an option to be considered in a hemodynamically unstable patient during elective pancreaticoduodenectomy.

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