

Retrograde Pancreatic Duct Stent Migration into the Biliary Tract Presenting as a Rare Early Complication of Pancreaticoduodenectomy (Whipple Procedure)

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Statistical Analysis C
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Conflict of interest: None declared

Patient: Male, 50-year-old
Final Diagnosis: Retrograde pancreatic duct stent migration into the biliary tract
Symptoms: Upper gastrointestinal bleeding
Medication: —
Clinical Procedure: —
Specialty: Surgery

Objective: Unusual or unexpected effect of treatment





Background: Pancreaticoduodenectomy (Whipple procedure) is an established surgical procedure for the treatment of carcinoma of the head of the pancreas. Modifications to this procedure include gastropancreaticoduodenectomy, which includes the removal of parts of the pancreas, duodenum, and stomach. Complications of surgery include fistula formation, failure of the anastomosis, and leak of pancreatic enzymes, which can be reduced by stenting the pancreatic duct. This report is of a rare complication of pancreaticoduodenectomy and describes a case of retrograde migration of a pancreatic duct stent into the biliary tract through the orifice of the hepaticojejunostomy.

Case Report: A 50-year-old man with a history of gastric cancer, underwent gastropancreaticoduodenectomy. Surgery was complicated by displacement of the pancreatic stent to the biliary system, which resulted in postoperative obstructive jaundice and bile leakage from the hepaticojejunostomy between the hepatic duct and the jejunum. An endoscopy was performed and the stent was successfully retrieved. The patient recovered rapidly, the bile leakage resolved, the patient's jaundice resolved, and was discharged home with no further surgical complications.

Conclusions: A case is reported of a rare early complication of pancreaticoduodenectomy in a patient with gastric cancer. Endoscopy successfully retrieved the pancreatic duct stent that had migrated into the biliary tract through the orifice of the hepaticojejunostomy.

MeSH Keywords: Gastrointestinal Neoplasms • Pancreaticoduodenectomy • Postoperative Complications • Biliary Tract

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Background

Pancreaticoduodenectomy (Whipple procedure) is an established surgical procedure for the treatment of carcinoma of the head of the pancreas. Modifications to this procedure include gastropancreaticoduodenectomy, which includes the removal of parts of the pancreas, duodenum, and stomach. Complications of surgery include fistula formation, failure of the anastomosis, and leak of pancreatic enzymes, which can be reduced by stenting the pancreatic duct. The development of pancreatic fistula results in a significant increase in patient morbidity and mortality due to complications that can include sepsis, intra-abdominal bleeding, and also leads to a prolonged hospital stay [1–5]. Therefore, surgical methods have been developed to reduce the risk of developing a pancreatic fistula. The placement of a pancreatic duct stent is commonly performed to bridge the anastomosis between the pancreatic remnant and the gastrointestinal tract [6]. The use of pancreatic duct stent also prevents the failure of the anastomosis site and leakage of pancreatic enzymes.

Complications directly associated with stent placement in pancreaticoduodenectomy have been rarely reported [7,8]. However, this report is of a rare complication of pancreaticoduodenectomy and describes a case of retrograde migration of a pancreatic duct stent into the biliary tract through the orifice of the hepaticojejunostomy that occurred following surgery.

Case Report

A 50-year-old man with a diagnosis of diffuse signet ring cell gastric adenocarcinoma initially presented with upper gastrointestinal bleeding that was controlled by gastroscopy. Staging computed tomography (CT) showed a localized gastric cancer, and staging laparoscopy showed no evidence of peritoneal seeding. A total gastrectomy with D2 lymph node dissection was performed, and the duodenal margin was sent for frozen section. Intraoperative histopathology confirmed the presence of adenocarcinoma in the duodenum. Therefore, the decision was made to proceed with gastropancreaticoduodenectomy to achieve R0 or complete surgical resection.

During gastropancreaticoduodenectomy, the residual pancreatic tissues were soft and the pancreatic duct was patent with a diameter of 3 mm. A dunking pancreaticojejunostomy anastomosis was performed with a 5 cm long 5 French nasogastric tube stent placement in the pancreatic duct. A hepaticojejunostomy was created 10 cm proximal to the pancreatic anastomosis. The common hepatic duct measured 4 mm in diameter. Bowel reconstruction was performed using a Roux-en-Y or end-to-side anastomosis. The postoperative histopathology

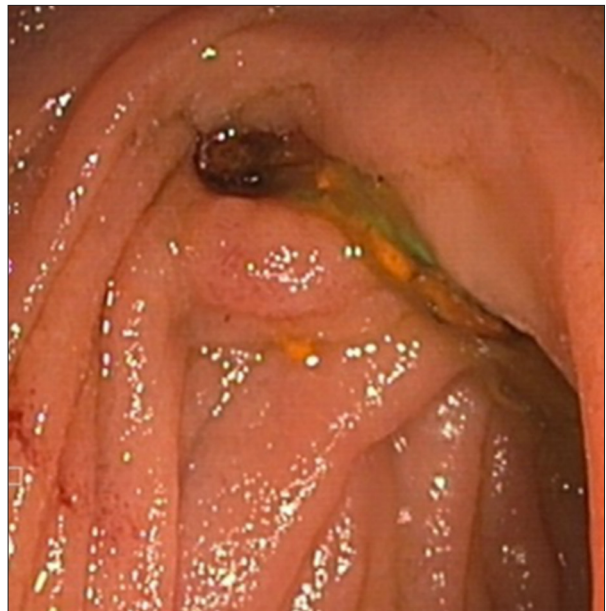


Figure 1. The operative finding of the migrated stent through the hepaticojejunostomy anastomosis. A pediatric colonoscope was used to examine the hepaticojejunostomy anastomosis site. The 5 French stent is present extending across the anastomosis between the bile duct and small bowel.



Figure 2. The operative finding of the migrated stent through the hepaticojejunostomy anastomosis. The 5 French stent is present, extending across the anastomosis between the bile duct and small bowel.

report confirmed complete tumor resection with satisfactory lymph node retrieval.



Figure 3. Endoscopic removal of the stent retrieved using endoscopic forceps. A pediatric colonoscope was used to view the hepaticojejunostomy anastomosis site. The 5 French stent was retrieved using endoscopic forceps.



Figure 4. The 5 French stent removed by endoscopic forceps.

Eight days postoperatively, routine laboratory tests showed increased levels of liver enzymes. The laboratory findings included an alanine transaminase (ALT) of 54.9 U/L (reference range, 7–40 U/L), aspartate transaminase (AST) of 60.8 U/L (reference range, 5–50 U/L), and alkaline phosphatase (ALP) of 227.9 U/L (reference range, 40–150 U/L). Ultrasound of the abdomen showed that part of the stent was in the common hepatic duct, suggesting the possibility of migration of the stent



Figure 5. Postoperative cholangiography was performed using a colonoscope after removal of the migrated stent. The cholangiogram confirms that all anastomoses are intact, and no residual bile leaks are present.

from the pancreaticojejunostomy anastomosis. However, no bile leak was present in the surgical drains. Further ultrasound findings confirmed the presence of the stent in the bile duct, at which time there was bile present in the surgical drains.

Endoscopy was performed 14 days postoperatively. The gastroenterologist advanced a pediatric colonoscope into the bilio-pancreatic limb up to the hepaticojejunostomy anastomosis site, where the 5 French stent was seen extending across the bilio-enteric anastomosis (Figures 1, 2). The stent was retrieved using endoscopic forceps (Figures 3, 4). There were no complications associated with stent retrieval.

Two days after removal of the stent, the laboratory results showed that the liver function tests had begun to normalize with an ALT of 43.6 U/L, an AST of 23.2 U/L, and an ALP of 286.0 U/L. Postoperative cholangiography showed that all anastomosis sites were intact, and there were no residual bile or fluid collections (Figure 5). A review of the contrast-enhanced CT scan that was taken before the removal of the stent confirmed that the stent removed endoscopically from the bilio-enteric anastomosis had been the cause of biliary obstruction and bile leak (Figure 6). The patient was discharged home on adjuvant chemotherapy with eight cycles of Xelox (capecitabine



Figure 6. Preoperative computed tomography (CT) scan with intravenous (IV) contrast. The red arrow shows that the stent had migrated into the biliary system.

plus oxaliplatin). At follow-up in the outpatient clinic, the patient's laboratory results were normal.

Discussion

Pancreaticoduodenectomy, or Whipple procedure, is a surgical procedure that is used to treat carcinoma of the head of the pancreas and other tumors involving the intestine, bile duct, stomach. Pancreaticoduodenectomy is a high-risk surgical procedure performed by removing the duodenum, the head of the pancreas, the gallbladder, and the bile duct [9]. A critical part of the procedure is the formation of the pancreatico-enteric anastomosis [10]. Therefore, a stent is usually sited to ensure healing of the anastomosis site and to reduce the risk of formation of a postoperative pancreatic fistula. The stent prevents the leakage of pancreatic enzymes, which can cause pancreatic

fistula in 24% of the cases, resulting in internal bleeding and sepsis that can result in postoperative mortality [11].

In most cases of pancreaticoduodenectomy, pancreatic duct stents are cleared from the intestine as they spontaneously migrate into the small bowel. However, in rare cases, instead of traveling through the small bowel, the stent may migrate into the biliary tree through the hepato-enteric anastomosis, as described in this case report. The stent may also remain at the site of the pancreatico-enteric connection or travel into the pancreatic duct. Pancreatic duct stent placement can be associated with early complications that include bleeding, duct rupture, and pancreatitis [12,13]. Late complications of stent placement also include infection. The stent can also fracture and lead to erosions or ductal perforation and bile leak. In some cases, the stent can migrate into the biliary system or cause a liver abscess. Other complications include intestinal obstruction [14]. In 5.2% of patients, the stent has been reported to migrate inward, while in 7.5% of patients, the stent has been reported to migrate outward [15]. These complications are detected approximately one year after stent migration [16]. Therefore, this case was particularly unique, as the complications associated with stent migration presented very soon after pancreaticoduodenectomy when compared with the other reported cases, as this patient presented with biliary leak and obstructive biliary symptoms within the first postoperative days.

Endoscopic retrograde cholangiopancreatography (ERCP) is the primary management procedure to retrieve the ectopic stents in the biliary system. The standard ERCP procedure uses a side-viewing duodenoscope, but in patients who have undergone pancreaticoduodenectomy with the associated anatomical changes, standard ERCP can be challenging. As an alternative to the duodenoscope, other options for performing ERCP include the use of a pediatric colonoscope or enteroscope [17]. Particularly in patients with altered postoperative anatomy, techniques such as double-balloon enteroscopy are important for performing the ERCP [18]. However, such techniques are not widely used due to the incompatibility of the ERCP accessories, and if ERCP is not feasible, surgery or percutaneous approaches could be used for removal of a migrated pancreatic stent may be performed [19].

Kadowaki et al. have described a different approach to avoid stent migration by reconstructing the hepaticojejunostomy at a site not distal to the pancreaticojejunostomy [20]. To prevent fistula leak post pancreaticoduodenal surgery, techniques other than stenting have been proposed. In 2013, Gurusamy et al. performed a systematic review and meta-analysis on the use of octreotide, a somatostatin mimic, compared with the use of placebo to prevent fistula formation in pancreatic surgery, and showed that octreotide was associated with a significantly

reduced incidence of pancreatic fistula [21]. However, other studies on the effects of somatostatin and its analogs did not support its role in the prevention of the complications associated with pancreatic surgery or reduce patient mortality [22]. Therefore, because of the lack of supportive results from controlled clinical trials, the use of octreotide is not routinely recommended for patients undergoing pancreaticoduodenectomy [22]. Other methods suggested to reduce the incidence of complications include changing the anastomosis site. Although there has been some controversy between the use of pancreaticogastrostomy and pancreaticojejunostomy, the available evidence does not suggest any significant difference between the two approaches in terms of clinical outcome [23]. Further randomized controlled studies are needed to establish the optimum technique for pancreatico-enteric anastomosis [23].

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Conclusions

A case is reported that describes a rare complication of pancreaticoduodenectomy, retrograde migration of a pancreatic duct stent into the biliary tract through the orifice of the hepaticojejunostomy, resulting in biliary obstruction, bile leak, and a rise in liver enzymes. The migrated pancreatic stent was removed using a pediatric colonoscope rather than endoscopic retrograde cholangiopancreatography (ERCP) due to the altered postoperative anatomy.

Conflict of interest

None.