

Postoperative Pancreatic Fistula Leading to Catastrophic Portal Vein Bleed: A Rare Complication of the Whipple Procedure

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ABSTRACT

Background:

Ampullary adenocarcinoma is a rare gastrointestinal malignancy often diagnosed early due to biliary obstruction. Pancreaticoduodenectomy (PD) remains the gold standard for curative treatment. Despite technical advances, postoperative complications such as pancreatic fistula and hemorrhage contribute significantly to morbidity and mortality.

Case Presentation:

We report a case of a 68-year-old male with obstructive jaundice secondary to ampullary adenocarcinoma. He underwent PD after preoperative biliary drainage and nutritional optimization. The early postoperative period was complicated by a high-grade pancreatic fistula, followed by intra-abdominal sepsis. On postoperative day 9, the patient developed sudden-onset hemorrhagic shock secondary to portal vein rupture. Despite emergent re-exploration, he succumbed to hemorrhage and multiorgan failure.

Discussion:

This case illustrates the fatal potential of delayed hemorrhage due to vascular erosion in the setting of pancreatic fistula. Portal vein hemorrhage, while rare, presents unique surgical challenges and high mortality. Early identification of high-risk patients, vigilant drain monitoring, and timely radiologic or surgical intervention are essential to improve outcomes.

Conclusion:

Postoperative pancreatic fistula remains a key driver of delayed hemorrhagic complications following PD. Multidisciplinary surveillance and early intervention are critical to reduce failure-to-rescue in such high-risk scenarios.

KEYWORDS: Ampullary adenocarcinoma, Pancreaticoduodenectomy, Postoperative pancreatic fistula, Portal vein hemorrhage, Surgical complications.

INTRODUCTION

Ampullary adenocarcinoma is a rare gastrointestinal malignancy that often presents early due to biliary obstruction, allowing for potentially curative resection by pancreaticoduodenectomy (PD) (1). While surgical mortality has declined in high-volume centers, morbidity remains high, primarily due to postoperative pancreatic fistula (POPF) and postpancreatectomy hemorrhage (PPH)(2,3). POPF occurs in up to 25% of PD cases and significantly increases the risk of secondary complications, including intra-abdominal sepsis and vascular erosion (4). PPH, particularly delayed hemorrhage, is often linked to these leaks and is associated with high mortality(5). We report a fatal case of portal vein hemorrhage following grade C POPF, highlighting the challenges of postoperative management and the importance of early recognition and multidisciplinary intervention.

CASE PRESENTATION

We present a case of a 49 year old female patient, with a family history of digestive cancer in her brother and breast cancer in her mother and aunt. The patient presented with cholestatic-type jaundice evolving for 2 months. Physical examination revealed no particular signs beside the jaundice and scratching lesions, she had KPS of 80, reflecting her ability to perform normal activities with some effort.

A magnetic resonance cholangiopancreatography (MRCP) identified a 13 × 7 mm lesion of the biliopancreatic confluence causing complete obstruction of the distal main pancreatic duct and marked narrowing of the common bile duct at the lower choledochus (figure 1A). This resulted in upstream dilation of the common bile duct up to 20 mm, intrahepatic bile duct dilatation, and distension of the gallbladder. The imaging findings were suggestive of either a pancreatic head tumor or a biliary tract tumor.

A thoraco-abdomino-pelvic CT scan revealed a tissue lesion at the biliopancreatic confluence, with no evidence of secondary localization (figure 1B).

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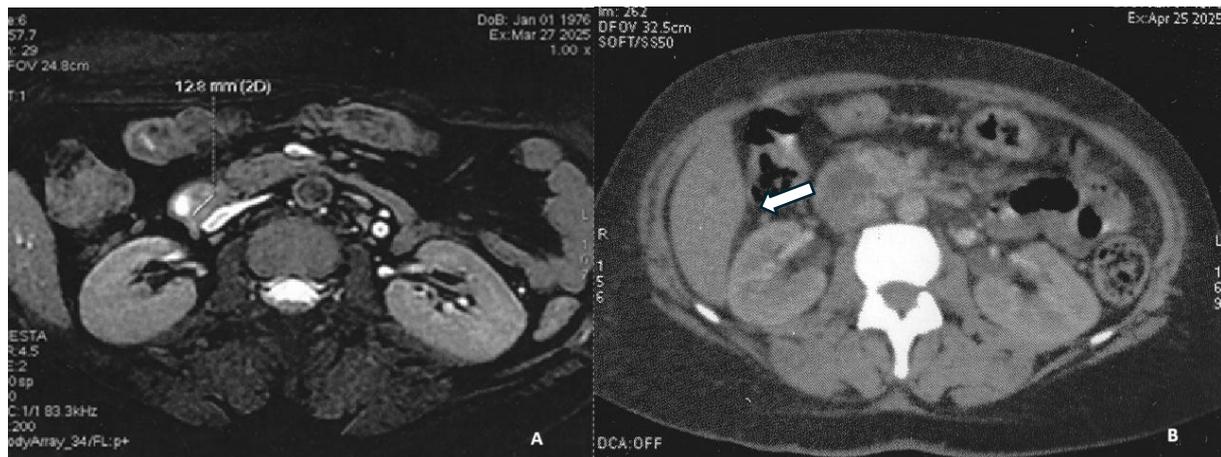


Figure 1 : Imaging findings of a lesion of the biliopancreatic confluence in both MRI (A) and (B)

A duodenoscopy was performed and revealed an ampullary tumor (ampulloma) with endocanalicular growth and ulceration around the orifice. On complementary EUS, the 22 mm ampullary mass showed extension into the common bile duct (CBD) over more than 15 mm, with suspected invasion of the muscularis layer. Given the elevated bilirubin level (>250 mg/L), a 6 cm / 10 mm plastic biliary stent was placed following an infundibulotomy. Histological examination of the biopsies revealed a moderately differentiated adenocarcinoma with infiltrative features.

Tumor markers CA 19-9 and CEA were negative. After a comprehensive preoperative evaluation, the case was reviewed at a tumor board meeting and the patient underwent surgery.

Preoperative laboratory workup revealed hypoalbuminemia, with a serum albumin level of 21 g/L. The patient received preoperative nutritional support along with multiple albumin transfusions to optimize her general condition prior to surgery.

Patient underwent surgery. Exploration revealed a 2 cm ampullary tumor with endocanalicular growth, associated with a small-volume peritoneal effusion composed of ascitic fluid, without evidence of peritoneal carcinomatosis or hepatic nodules.

A cephalic duodenopancreatectomy (Whipple procedure) was performed, including an end-to-end pancreaticojejunostomy, an end-to-side hepaticojejunostomy, and a gastrojejunostomy according to Child's method, along with lymphadenectomy of the hepatic pedicle extended to the celiac trunk. Two Delbet drains were placed in a retroanastomotic position near the hepaticojejunostomy and pancreaticojejunostomy, and a Salem tube was positioned in the subhepatic space.

The postoperative course was marked by the development of a pancreatic fistula on postoperative day 5, confirmed by elevated lipase levels in the fluid collected from the Delbet drains (>3 times the normal value; 82,624 U/L). A CT scan revealed a large intraperitoneal collection involving the duodenopancreatic lodge, along with a moderate-volume peritoneal effusion (figure 2). The patient underwent ultrasound-guided percutaneous drainage of the collection.

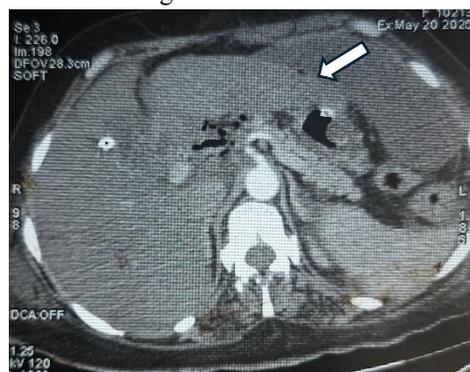


Figure 2 : Axial abdominal CT scan showing a large intraperitoneal collection in the duodenopancreatic lodge.

On postoperative day 9, the patient experienced bleeding of approximately 600 cc through the Delbet drain, accompanied by a drop in hemoglobin level from 10.9 g/dL to 7.6 g/dL. She was stabilized following transfusion of 2 units of packed red blood cells and 3 units of fresh frozen plasma, and was taken back to the operating room for surgical re-exploration.

Intraoperative findings revealed a loculated peritoneal effusion in the supramesocolic compartment, consisting of pancreatic fluid, and a dehiscence of the pancreaticojejunostomy. A subhepatic hematoma was also identified, fed by a 3 cm laceration of the portal vein. Immediate proximal and distal clamping of the vein was performed (figure 3), and the defect was successfully repaired using 6/0 Prolene sutures (figure 4). The pancreaticojejunostomy was then reconstructed, and the main pancreatic duct was drained using a transjejunal catheter (figure 5).

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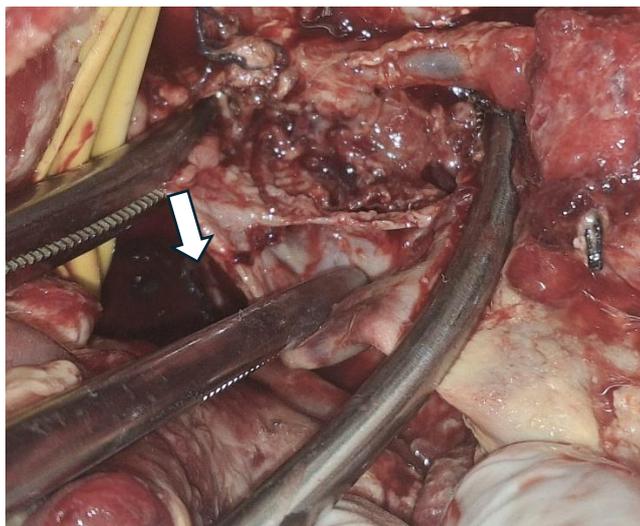


Figure 3 : The 3 cm laceration of the portal vein.

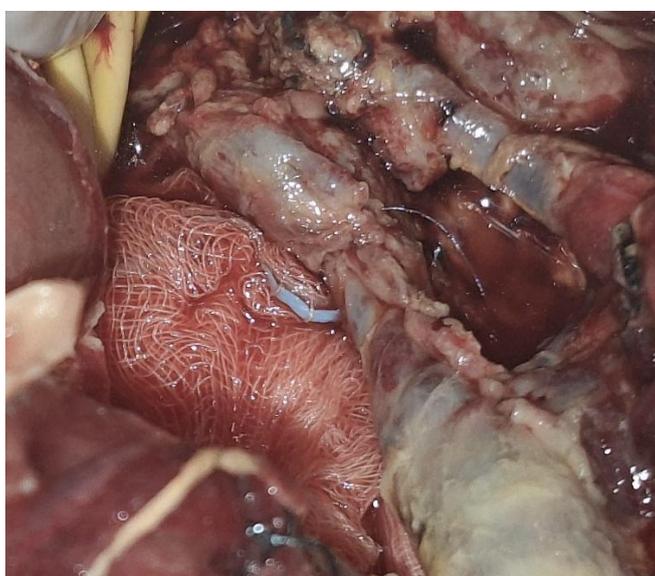


Figure 4 : The repaired portal vein using 6/0 prolene.



Figure 5 : The main pancreatic duct was drained using a catheter.

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Postoperatively, the patient was transferred to the intensive care unit under norepinephrine support, but died 24 hours later due to multiorgan failure.

DISCUSSION

Pancreaticoduodenectomy (PD) is the standard treatment for resectable ampullary tumors and has seen substantial reductions in mortality in high-volume centers(6). However, the morbidity remains considerable, largely due to pancreatic fistulas and hemorrhagic complications(7)—both of which manifested fatally in our case.

Pancreatic Fistula as a Precursor to Vascular Catastrophe

POPF is defined by the International Study Group of Pancreatic Surgery (ISGPS) as the presence of drain fluid with an amylase level exceeding three times the upper normal serum level, accompanied by a clinically relevant condition attributable to the fistula(2). It is the most common major complication following PD, with reported rates ranging from 10% to 25%, particularly in cases involving a soft pancreas or small duct diameter (<3 mm)(6,7). Our patient, with no prior chronic pancreatitis and presumed normal gland texture, fits this high-risk profile. According to the ISGPS classification, grade C fistulas—those requiring reoperation or resulting in organ failure—are associated with the highest mortality, as seen here (2).

The literature strongly supports that fistula-related sepsis and enzyme-mediated tissue degradation contribute to erosion of adjacent vasculature, particularly the gastroduodenal artery stump and portal venous system(5,7). The postoperative course of our patient was consistent with this pathway, beginning with a high-output fistula and progressing to intra-abdominal sepsis and portal vein rupture.

Postpancreatectomy Hemorrhage (PPH): A Lethal Cascade

PPH is one of the most feared complications after PD, occurring in 3–16% of cases. Late-onset PPH (after 72 hours) is usually secondary to an underlying pancreatic or biliary leak (3,7). In a retrospective analysis by Sauvanet et al., 75–90% of late hemorrhages were directly linked to pancreatic or bilioenteric anastomotic leaks, with mortality rates reaching 20%(7).

This is echoed by Kinny-Köster et al. in a high-impact, multicenter study of 4,474 PD cases: vascular events—like hemorrhage or ischemia—accounted for 25.6% of all postoperative deaths, with a median onset of 4.5 days and a rescue window of approximately 11 days (8). The portal vein rupture in our patient occurred on day 9, within this high-risk window. These findings support the need for early, aggressive radiological surveillance in the presence of any pancreatic leak.

Current Prevention and Rescue Strategies

Literature emphasizes a few critical points for prevention and management:

- **Risk stratification** using gland texture, duct size, and intraoperative blood loss as predictors of POPF and bleeding (4).
- **The use of somatostatin analogues**, particularly octreotide, is a common surgical strategy aimed at preventing postoperative pancreatic fistula (POPF) following pancreatic resections. However, evidence regarding their effectiveness remains inconclusive due to significant heterogeneity across studies. While some trials have reported a potential reduction in POPF rates following distal pancreatectomy (DP), their impact after pancreaticoduodenectomy (PD) appears limited. Notably, certain analyses have found no significant difference in the incidence of clinically relevant POPF after PD with somatostatin analogue use. Furthermore, the lack of sufficiently powered randomized controlled trials (RCTs) limits the ability to draw definitive conclusions. As highlighted by recent systematic reviews, further high-quality RCTs are urgently needed—particularly to evaluate their role in DP. Thus, the prophylactic efficacy of somatostatin analogues in reducing POPF after pancreaticoduodenectomy remains an open and debated question in pancreatic surgery.(9,10)
- **Drain management**, including early imaging if POPF is suspected. Delayed hemorrhage often presents with a “sentinel bleed” before catastrophic rupture—an opportunity for pre-emptive embolization (11).
- **Radiologic embolization** is preferred for stable patients, while surgical re-exploration is reserved for hemodynamically unstable ones. Success with endovascular therapy reaches ~80%, yet not all vascular territories are accessible(7,12).
- **Portal vein haemorrhage**, as in our case, remains particularly challenging due to anatomical constraints. While technically repairable, the associated systemic inflammatory response often precipitates multiorgan failure, with survival depending on early intervention and organ support.

This case underscores the delicate balance required in managing high-risk PD patients. Despite timely surgical intervention and postoperative care, the combination of pancreatic fistula, sepsis, and vascular erosion led to a fatal outcome. As demonstrated in large cohort studies, timely recognition of at-risk patients and early, targeted interventions remain pivotal. Multidisciplinary postoperative surveillance—including surgical, radiological, and critical care expertise—is essential to improving survival after this complex procedure.

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CONCLUSION

This case highlights the lethal interplay between postoperative pancreatic fistula and delayed vascular hemorrhage following pancreaticoduodenectomy. Despite appropriate surgical and supportive measures, portal vein erosion led to catastrophic bleeding and death. Early detection of fistula, vigilant monitoring, and timely multidisciplinary intervention remain critical to preventing such fatal outcomes.

Provenance and peer review

Not commissioned, externally peer reviewed.

Consent

As per international standard or university standard, patient(s) written consent has been collected and preserved by the author(s).

Ethical approval

As per international standard or university standard written ethical approval has been collected and preserved by the author(s).

Conflicts interests

Authors have declared that no competing interests exist.

Source of funding

None

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