

Treatment of a duodenal-caval fistula secondary to peptic ulcer disease

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ABSTRACT

We have reported the case of a duodenal-caval fistula in a 46-year-old man with peptic ulcer disease. He had previously undergone an open Graham patch repair for a perforated anterior duodenal ulcer and had presented 1 month after surgery with an upper gastrointestinal bleeding episode. A duodenal-caval fistula was diagnosed after computed tomography and was confirmed by upper endoscopy. The patient underwent staged repair of his duodenal-caval fistula with inferior vena cava thrombectomy, pyloric exclusion, and gastrojejunostomy creation. (J Vasc Surg Cases Innov Tech 2022;8:396-8.)

Keywords: Duodenum; Fistula; Gastrointestinal hemorrhage; Inferior vena cava; Peptic ulcer

Duodenal-caval fistula is a rare life-threatening disease, with only limited literature available regarding its treatment. The typical presentation has been gastrointestinal hemorrhage or sepsis.¹ The most common etiologies include trauma, migration of an inferior vena cava (IVC) filter, ingested foreign bodies, peptic ulcer disease, and retroperitoneal tumor resection combined with radiotherapy.¹

CASE REPORT

The electronic medical records were reviewed retrospectively. The patient provided written informed consent for the report of his case details and imaging studies. A 46-year-old man with a history of benign prostatic hyperplasia and end-stage renal disease requiring hemodialysis had presented to the emergency department with peritonitis and septic shock. Computed tomography revealed a pneumoperitoneum, and the patient was taken to the operating room for diagnostic laparoscopy. On entry into the abdomen, gross bilious contamination of the entire peritoneal cavity was found. A perforation of the anterior duodenal bulb was identified, and a modified Graham patch was fashioned using a well-vascularized tongue of the greater omentum. An endoscopic leak test was performed, with positive results. Therefore, to revise the repair, the

procedure was converted to an open approach via a midline laparotomy. The Graham patch was reconstructed, and the results from a repeat endoscopic leak test were negative. The abdomen was irrigated, drains were placed by the repair, and the abdomen was closed in a standard fashion. His course was complicated by the development of an intra-abdominal abscess, which required percutaneous drainage on postoperative day (POD) 7. Additionally, he had a positive test result for *Helicobacter pylori*, and triple therapy (proton pump inhibitor, clarithromycin, and amoxicillin or an imidazole) was started. He was subsequently discharged on POD 9.

At 1 month after discharge from his operation, he had returned to the emergency room with hematochezia and symptomatic anemia requiring transfusion. Computed tomography angiography demonstrated an inferior vena cava thrombus with intraluminal air formation concerning for a duodenal-caval fistula (Fig 1). Upper endoscopy revealed clots and bleeding in the posterior wall of the second portion of the duodenum, confirming the diagnosis of a duodenal-caval fistula.

The patient was taken to the operating room for repair of the duodenal-caval fistula. Exploratory laparotomy was performed. First, the prior Graham patch was assessed, which appeared intact. A Kocher maneuver was performed to mobilize the duodenum, and the duodenal-caval fistula was identified. Proximal and distal control was obtained of the supra- and infrahepatic IVC and of the left renal artery and vein. A Pringle maneuver was also performed. The right renal artery, vein, and ureter were ligated to improve exposure. Control distal from the IVC thrombus was verified using transesophageal echocardiography and intraoperative ultrasound. The duodenum was completely dissected off the anterior wall of the IVC, revealing the full extent of the fistula where a large thrombus was identified. Clamps were placed at the central IVC, renal vein, and peripheral IVC, and thrombectomy was performed using transesophageal echocardiography to confirm complete evacuation of the thrombus and right ventricular integrity. Venorrhaphy was then performed in standard fashion using a running 2-0 Prolene suture, followed by repair of the duodenal perforation using 4-0

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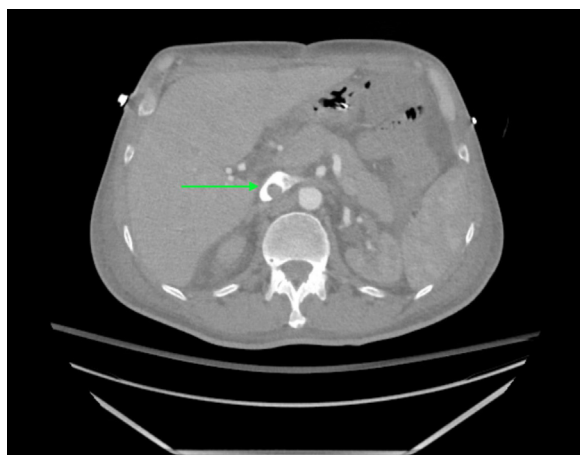


Fig 1. Computed tomography scan demonstrating a duodenal-caval fistula (arrow).

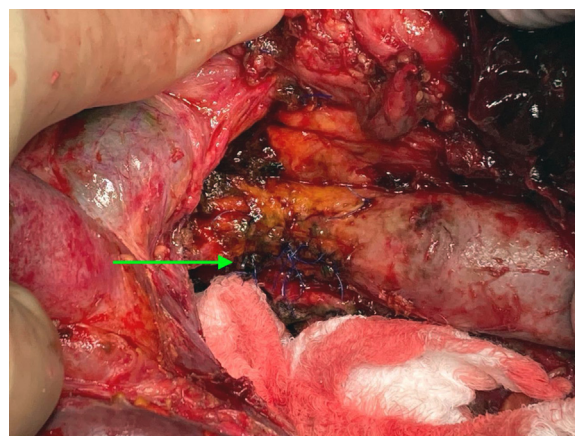


Fig 2. Intraoperative photograph of suture repair (arrow) of the inferior vena cava (IVC).

Prolene suture (Fig 2). The vena cava was inflamed; however, the defect was small enough (~5% in circumference) that primary repair could be performed without narrowing of the lumen due to the redundancy of the vena cava, therefore patch angioplasty was not performed. Additionally, by avoiding patch angioplasty, we hoped to avoid potential infectious complications. A nasogastric tube was placed in the stomach for decompression, after which the abdomen was temporarily closed using an AbThera wound vacuum device (Acelity, San Antonio, TX). The patient was transferred to the intensive care unit postoperatively.

The patient was returned to the operating room for re-exploration on POD 2. After removing the temporary abdominal closure, the peritoneal cavity was inspected. Open cholecystectomy was performed to prevent future biliary complications. Additionally, right nephrectomy was performed. The abdominal cavity was again closed temporarily with an AbThera device (Acelity), and the patient was transferred to the intensive care unit. The next day, the patient returned to the operating room to complete the repair. After opening the abdomen, inspection of the previous duodenal repair showed a small opening, which was closed using 3-0 PDS (polydioxanone suture). An omental patch was placed on the duodenal repair and the IVC repair. Pyloric exclusion was performed via a gastrostomy created along the greater curvature of the stomach. The pylorus was closed with two purse string sutures using 2-0 PDS. Enterolysis was performed to mobilize enough intestine to create a gastrojejunostomy using a 30-cm afferent jejunal limb from the ligament of Treitz. A decompressing nasojejunal tube was placed in the proximal limb, and a distal feeding tube was placed in the efferent limb. Drains were placed, and the abdomen was closed in standard fashion. The patient was transferred to the intensive care unit.

The patient's postoperative course was complicated by hemorrhagic shock on POD 6, which had resulted from intraluminal bleeding from an anomalous duodenal artery originating from the abdominal aorta (Fig 3). This required emergent angioembolization by interventional radiology. He additionally required

percutaneous drainage of a subhepatic fluid collection on POD 13. The patient experienced another episode of bleeding from the same anomalous duodenal artery that had been previously embolized and underwent repeat angioembolization on POD 23. The patient was ultimately discharged home on POD 40 and at his latest outpatient follow-up visit was doing well.

DISCUSSION

A duodenal-caval fistula is a rare, but severe, complication from peptic ulcer disease and has only been described in case reports. Other causes of duodenal-caval fistulas include IVC filters, radiotherapy, foreign bodies, or malignancies. The typical presentation is intraluminal bleeding, which is often first diagnosed endoscopically. Patients can also present with sepsis. Prompt surgical intervention is indicated to achieve source control and prevent exsanguination. Early surgical intervention has been associated with improved outcomes.¹

Surgical management of duodenal-caval fistulas involves division of the fistulous connection, with repair of the IVC and repair of the involved duodenum. A diverting procedure such as gastrojejunostomy is often performed. In cases caused by peptic ulcer disease, an acid reducing procedure, such as a vagotomy or antrectomy, can be performed. Schroder et al² reported decreased 30-day mortality for patients with bleeding gastroduodenal ulcers who had undergone vagotomy during their operation.

Recently, Boisvert et al³ described using endovascular techniques to manage duodenal-caval fistulas. They reported the case of a patient with a duodenal-caval fistula that had occurred as a complication from chemotherapy for treatment of a germ cell tumor. For their patient, a staged approach was selected, with an initial stent graft placed in the IVC to temporize the bleeding and allow the patient to continue chemotherapy before undergoing definitive surgical resection. The patient later underwent orchiectomy and left hepatectomy with repair of



Fig 3. Fluoroscopic image of active hemorrhage (arrow) from an aberrant duodenal artery.

the duodenal-caval fistula and removal of the endograft, which had become infected. Their report demonstrated that an endovascular-first approach can be feasible for select patients.

An alternative minimally invasive approach to endovascular therapy in these cases could be laparoscopy. Laparoscopic surgery of the vena cava has been performed for tumors involving the IVC, even for extensive tumors.⁴ Additionally, laparoscopic IVC filter removal has been described.⁵ Although, at present, no descriptions of laparoscopic management of duodenal-caval fistulas have been reported, it could provide a potential alternative approach in the care of these patients. However, the use of laparoscopy for duodenal-caval fistulas would likely be challenging and require sufficient prior experience with laparoscopic surgery of the IVC.

In our patient, we performed prophylactic cholecystectomy to prevent future biliary complications that could

potentially necessitate cholecystectomy in a reoperative field. The rationale was that this would add only minimal morbidity to our procedure, with the benefit of preventing a potentially difficult cholecystectomy in the future. Prophylactic cholecystectomy has been shown to have low morbidity and to not significantly prolong the operative time.⁶ However, long-term follow-up did not demonstrate a significant difference in the incidence of clinically significant biliary complications,⁷ suggesting that the role of prophylactic cholecystectomy might not be as effective as previously anticipated.

CONCLUSIONS

The findings from the present case have demonstrated successful treatment of a duodenal-caval fistula secondary to peptic ulcer disease with open repair and pyloric exclusion with gastrojejunostomy.

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