

Surgical Treatment of Small Intestinal Bleeding Caused by Arterial Gastrointestinal Fistula: A 2-Case Report

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Abstract

Background: This study aims to better understand diagnosing and treating arterial gastrointestinal fistulas. **Methods:** The diagnosis and treatment of two patients with arterial gastrointestinal fistulas were reported, and the experience with diagnosis and treatment was summarized. **Results:** In these two cases, both patients were admitted with bleeding as the primary complaint, both underwent emergency laparotomies, and both patients were diagnosed with small intestinal bleeding before surgery. The first patient died as a result of an abdominal aortic aneurysm rupture caused by chronic vascular repair and postoperative implant infection; the second patient underwent vascular repair on time, we treated him with third-generation cephalosporin, and after he was stabilized, we performed left total iliac stent placement and left internal iliac artery embolization; he had no fever after surgery, his incision was healed, and he was successfully discharged from the hospital. **Conclusion:** Aortic gastrointestinal fistula is rare and has a high mortality rate, attention should be paid to distinguishing it from small intestinal bleeding. Timely diagnosis and rapid surgical treatment are keys to improving survival.

Keywords

Ileocecal Valve, Abdominal Aortic Aneurysms, Laparotomy Probe, Angiography, Primary Aortoenteric Fistula

1. Introduction

Small intestinal bleeding usually refers to the bleeding caused by intestinal lesions between the beginning of the Treitz ligament and the ileocecal valve, ac-

counting for 5% - 10% of the entire gastrointestinal bleeding, but the cause of the bleeding is an arterial gastrointestinal fistula, which is very rare. The incidence of this disease is low, the disease is dangerous, and the mortality rate is extremely high. Primary aortoenteric fistula (PAEF) is a rare but extremely serious complication of abdominal aortic aneurysms. Diagnosis and treatment are often delayed due to a poor understanding of the disease, resulting in extremely high mortality. Here we report 2 cases of small bowel bleeding due to rare causes admitted in February 2021 at our hospital.

2. Case 1: Abdominal Aortic-Duodenal Fistula

A 60-year-old male has been admitted to Tacheng District hospital complaining of passing intermittent blood in his stool for 8 days with one attack of bloody vomiting. The initial investigation in that hospital has shown erosive gastritis and bulbar duodenitis (gastroscopy), multiple colonic polyps, proctitis, and internal hemorrhoid (colonoscopy). The patient was referred to the emergency room of our hospital for further management, the patient was kept under observation but developed passing a large amount of blood in the stool and hematemesis. Emergency gastroscopy revealed evidence of a possible small gut bleeder, he was resuscitated with intravenous fluid and blood transfusion.

Diagnosis and Treatment

Vital signs revealed a body temperature of 37°C, pulse rate of 85 beats per minute, respiratory rate of 20 breaths per minute, clear breath sounds in both lungs, and blood pressure of 110/76 mmHg (micro-pump norepinephrine). Physical examination showed mild abdominal tenderness, no rebound tenderness, and hyperactive bowel sound (7 times/minute). The results of hematological, and biochemical showed (hemoglobin 45.00 g/L; serum albumin 28.64 g/L) the abdominal pelvic contrast CT suggests local luminal dilation of the abdominal aorta (**Figure 1**). Gastroscopy showed active bleeding in the digestive tract, and small intestinal bleeding was more likely. Intervention and Outcome: Despite resuscitating the patient with fluid and blood transfusion, hematocrit progressively decreased, and the patient entered an impending shock state, so an emergency explorative laparotomy was decided. We did an intraoperative exploration of the anterior wall of the antrum and there was a palpable limited thickening of the tube wall, the opening of the gastrocolic ligament, and clearing of the duodenal surrounding tissues, then suddenly seeing a large amount of blood reflux in the antrum. We decreased the bleeding by applying pressure to the duodenal horizontal, and we asked the gastroenterologist to perform an intraoperative gastroscopy during the operation considered the abdominal aortic aneurysm-duodenal fistula, however, we use a titanium clip to locate it, and consult with a vascular surgeon. There were multiple atherosclerotic plaques in the abdominal aorta wall, tumor-like abdominal aorta, and abdominal aorta rupture into the duodenum, the bleeding site was clear, and gauze tamponade is



Figure 1. Abdominal pelvic CT showing the site of a left internal iliac artery-ileal fistula.

used to stop the bleeding in this case we should consider the abdominal aortic aneurysm resection and artificial vascular replacement surgery, Postoperative implant infection is likely, so abdominal aortic aneurysm stent endoluminal isolation was performed after the condition was stabilized, but the patient had sudden ventricular fibrillation and cardiac arrest during the operation, and was transferred to the intensive care unit after the rescue and died after the ineffective rescue.

3. Case 2: Left Internal Iliac Artery-Ileal Fistula

A 71-year-old male presented to our department with a history of 7 years of intermittent blood discomfort in the stool. Upon admission, the patient presented with abdominal pain (followed by syncope), a dark red stool (the specific amount is unknown), and no sign of fever, cough, vomiting, diarrhea, constipation, constipation seizures, asthma, dyspnea, or other discomforts. Following the admission, we performed the following treatment: colonoscopy prep. After colon polyp electrocoagulation, metal titanium clip closure, acid inhibition, hemostasis, and other symptomatic treatments, the patient has been improved and discharged, but despite the treatment, the patient appeared to have significant blood in the stool 3 - 4 times a day. The patient came back to the hospital for further treatment.

3.1. Diagnosis and Treatments

Vital signs revealed a body temperature of 37°C, pulse rate of 76 beats/min, respiratory rate of 19 breaths/min (clear breath sounds in both lungs) arrhythmia, no murmur, and blood pressure of 108/52 mmHg. Physical examination showed normal bowel sounds, blood routine test showed (hemoglobin 51 g/L, biochemi-

stry: serum albumin 33.5 g/L) Patient has history of hypertension for 20 years, and 7 years ago, due to a “rectal malignant tumor”, the patient underwent “rectal cancer radical resection”.

3.2. Treatment and Outcomes

After admission, a CT of the abdomen and pelvis shows left ureteral disruption, iliac common artery bifurcation, level ureteral wall thickening, and a nodule (**Figure 2(A)**). A colonoscopy reveals ulceration of the small intestine with possible bleeding. At the same time as the laparotomy probe, the patient re-dissolves the blood three times, accompanied by syncope, an increased heart rate, a progressive decrease in blood pressure and hemoglobin, and shock manifestations, we actively stop the bleeding by giving a blood transfusion, and shock correction. As per intraoperative exploration, there was a lot of adhesion in the greater omentum, intestine, ileum, and posterior peritoneum, and the adhesion has been resolved. There was a large amount of blood gushing out of the adhesion site, and the amount of bleeding was uncontrollable, so we put pressure on the blood vessel with gauze, and the bleeding situation was better than expected. Furthermore, a vascular surgeon was asked to assist in the intraoperative resection of a portion of the ileum and to perform a lateral anastomosis after the operation, the patient was moved to the ICU, and after treatment, he was transferred to the vascular surgery department for left iliac vein stenting. He recovered smoothly after the operation and was cured and discharged from the hospital after one month. The patient did a CTA of the entire aorta 5 months after surgery, which revealed that the left common iliac artery stenting had changed, and the artificial blood vessels were still functional; the calcium plaque of the aorta, right common iliac artery, and bilateral internal and external iliac arteries were normal (**Figure 2(B)**).



Figure 2. Abdominal CTA shows (A) after the left internal iliac artery embolism, which also shows the site of the left common iliac artery stent implantation. (B) shows the site of vascular repair before the embolization of the left internal iliac artery.

4. Discussion

Aortic gastrointestinal fistula is a rare cause of gastrointestinal bleeding, with a low incidence and a very high mortality rate. It can be divided into primary and secondary. Secondary aortic gastrointestinal fistulas are common after an aneurysm or arterial occlusive disease after aortic reconstruction. Erosion, rupture of the arterial wall, and penetration of adjacent digestive tracts (esophagus, duodenum, jejunum, ileum, colon) cause primary aortoenteric fistula (PAEF). occurs mainly in the horizontal and ascending parts of the lower renal abdominal aorta and duodenum, accounting for about 83% of all cases; the rest can occur between the aorta and the small intestine, colon, and stomach. Foreign studies have reported that the most common cause of PAEF is abdominal aortic aneurysm, of which 85% originate from an atherosclerotic abdominal aortic aneurysm, 15% from infectious diseases, and a very small number from malignant tumors, duodenal ulcers, foreign bodies, or abdominal radiotherapy [1]. Traumatic or fungal aneurysms are the second most common cause, and other less common causes include radiation, infection, tumors, peptic ulcers, inflammatory bowel disease, and foreign body ingestion.

Literature reported 189 cases of PAEF, of which 147 (83%) had an aortic-duodenal fistula, mainly located in segments 3 and 4 of the duodenum. The autopsy detection rate was only 0.04% - 0.007%. PAEF was first reported and described by Sir Astley Cooper in 1829, and PAEF was first patched by Zenker in 1954. At present, there are few relevant studies, mostly seen in some case reports, and its onset population is mainly elderly patients over 60 years old. The main symptoms of PAEF include abdominal pain, abdominal mass, hematemesis, or melena. The triad of abdominal pain, abdominal fluctuating mass, and gastrointestinal bleeding is a typical symptom of PAEF, but the incidence of the triad is only 11% - 25% [2]. Sentinel bleeding, an intermittent mild to moderate bleeding that is a precursor to major bleeding, is a characteristic manifestation of an aortic gastrointestinal fistula. This is due to the temporary cessation of bleeding when the fistula is blocked by an organic thrombus during the first bleeding, followed by catastrophic hemorrhage due to increased arterial pressure after thrombus movement, shedding, or volume replacement [3].

This intermittent time window of bleeding is longer than 7 hours in more than 70 percent of patients, 50 percent over 24 hours, and 29 percent longer than one week, providing valuable timing for surgery [4]. The diagnosis of PAEF is difficult, and the preoperative diagnosis rate is only 0% - 36% [5]. In February 2021, our hospital admitted a patient with a left iliac ileal fistula. In this case, the patient was blood-based, and there was no obvious abnormality in the gastroscopy, and the colonoscopy showed that a small intestinal ulcer and bleeding may be possible because capsule endoscopy has certain limitations for patients with hemodynamic instability, previous surgical history, and possibly intestinal stenosis, so combined with the patient's symptoms and signs and gastrointestinal endoscopy results, the cause of small intestinal bleeding was unknown. The co-

lonoscopy showed that a small intestinal ulcer and bleeding may be possible because capsule endoscopy has certain limitations for patients with hemodynamic instability, previous surgical history, and possibly intestinal stenosis. The abdominal-pelvic CT and intraoperative exploration revealed that the cause of small bowel bleeding was the common iliac artery-ileal fistula. In patients who undergo radical rectal cancer resection for rectal malignancy, the intestinal tube may adhere and involve the iliac artery, eventually forming a left internal iliac artery-ileal fistula. The patient's abdominal-pelvic CT can only indicate the location of the lesion and suggests that there may be a lesion in the common iliac artery, which cannot be diagnosed, and colonoscopy shows that small bowel ulcers and bleeding may be possible, combined with the patient's abdominal-pelvic CT, colonoscopy, and intraoperative exploration results, to confirm the diagnosis of a left internal iliac artery-ileal fistula. In addition to clinical manifestations, the diagnosis of this disease mainly relies on abdominal and pelvic CT and colonoscopy, but both have their limitations. CT is often recommended as the test of choice, but a negative CT cannot be completely ruled out. In addition, colonoscopy is often normal when the bleeding stops, so this method should be performed whenever possible when bleeding is active. The key to the treatment of this disease lies in early diagnosis and timely surgery, and the mortality rate of non-surgical treatment can reach 100%. Patients with high suspicion of an aortic gastrointestinal fistula should be examined without hesitation to clarify the diagnosis. Rapid, noninvasive, contrast-enhanced CT is often used as a first-line diagnostic measure. Endoscopy may reveal active bleeding lesions and is important for differential diagnosis; however, it is difficult to detect distal duodenal PAEF because fistulas are often located in the distal duodenum to the jejunum, which most endoscopy cannot detect, and may cause massive bleeding by moving fresh thrombus at the fistula. Notably, endoscopy tends to entangle in diagnosing gastritis, ulcers, and other manifestations, resulting in delayed treatment and serious consequences. Although patients who had timely surgery had good treatment outcomes, stenting and surgical treatment may be safer in patients who are clinically rare, inexperienced in diagnosis, or unable to complete an angiography or abdominal CTA before surgery. In addition, sepsis and retroperitoneal infection are likely to occur in such patients due to arteries communicating with the intestine, eventually leading to surgical failure, so anti-infective therapy should be actively strengthened after surgery [6].

5. Conclusion

Fistulae formation between the intestinal tract and aorta or one of its branches remains an uncommon cause of intestinal bleeding with great mortality. Bidirectional endoscopic procedures may point to the small gut as the source of bleeding but usually fail to localize and diagnose the exact cause. In suspected hemodynamically stable cases, CT-Angiography of the abdomen and pelvis is the imaging modality of choice for the diagnosis. Hemodynamically unstable patients

with evidence of massive bleeding should immediately undergo either endovascular repair of the aorta (EVAR) or more invasive explorative laparotomy.

Patient Consent for Publication

Written informed consent for publication of the present report was obtained from the patient.

Author's Contribution

Maieryemu Sulaiman and Sakarie Mustafe Hidig conceived and designed this case report and wrote the initial draft of the report. All authors have read and approved the final version of the manuscript.

Conflicts of Interest

The authors declare no conflicts of interest regarding the publication of this paper.

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