Laparoscopic Ileostomy in Severe, Obscure Gastrointestinal Hemorrhage

Diagnostic Laparoscopic Ileostomy

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**Hypothesis:** Laparoscopic diverting ileostomy should help define whether a severe, obscure gastrointestinal hemorrhage is in the upper or lower gastrointestinal tract in preparation for subtotal resection without increasing risk of patient morbidity and mortality.

**Design:** Case reports.

**Setting:** University hospital.

**Patients:** Patient 1 is an 83-year-old woman. Patient 2 is a 75-year-old woman. Both were admitted to the hospital for massive gastrointestinal hemorrhage, which required multiple blood transfusions. Extensive workup revealed multiple diverticula in the small and large intestines without identification of any source of active bleeding in either patient.

**Intervention:** Laparoscopic exploration of the abdominal cavity was performed. The terminal ileum at the ileocecal valve was identified and, 5 cm proximal to the ileocecal valve, the small bowel was transected. The distal end staple line was secured in end-to-side fashion to the proximal end, and the proximal end was brought out as an end ileostomy. Patients were then observed for bleeding into the ostomy bag or in the rectum.

**Main Outcome Measure:** Localization of the source of bleeding as upper or lower, occurrence of surgical complications, and clinical outcome.

**Results:** No intraoperative complications occurred in either patient. Patient 1 had significant bleeding into her ileostomy bag on postoperative day 1. She was taken back to the operating room for empirical small bowel resection. She was discharged, had no further bleeding, and underwent closure of the ileostomy 2 months later. The postoperative course of patient 2 was complicated by a small para-stomal abscess that resolved with percutaneous drainage and antibiotics. Patient 2 returned on postoperative day 22 with bleeding in the rectum. She was taken to the operating room for laparoscopic total colectomy with ileosigmoid anastomosis and ileostomy closure. Both patients recovered uneventfully and had no recurrent bleeding.

**Conclusions:** Our experience with these 2 patients suggests that in cases in which the risk of blind resection appears ill-advised, laparoscopic compartmentalization of the small bowel from the colon via end ileostomy may be safely performed.

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**See Invited Critique at end of article**

outside hospital the patient required a total of 18 U of packed red blood cells and 2 U of platelets. The patient was transferred to our institution for management of massive gastrointestinal bleeding.

After transfer, a workup included esophagogastroduodenoscopy, mesenteric angiography, and tagged red blood cell scan, all of which produced results initially suggestive of, but not confirmatory for, lower gastrointestinal tract bleeding. A computed tomographic angiogram of the abdomen and
pelvis demonstrated linear enhancement of the distal aspect of the ileum, suggestive of angiodysplasia. Diverticula were also noted in the distal third of the duodenum but were not believed to be the source of the bleeding, given the lack of bleeding during the esophagogastrroduodenoscopy. Colonoscopy demonstrated pandiverticulosis without an identifiable source (Figure 1A). Capsule endoscopy was performed but was unhelpful in treating the patient. Next, anterograde and retrograde double balloon enteroscopy (DBE) was performed, which again identified diverticulosis of the small bowel but failed to identify a source (Figure 1B). The patient continued to bleed intermittently during the next 2 weeks, reaching 50 U of packed red blood cells since the initiation of the bleeding; therefore, she was taken to the operating room for an end ileostomy to localize the site of the bleeding.

Laparoscopic exploration of the abdominal cavity was performed. The terminal ileum at the ileocecal valve was identified and, 5 cm proximal to the ileocecal valve, the small bowel was transected with a stapler (Endo GIA stapler; Tyco Healthcare, Mansfield, Massachusetts). The distal end staple line was secured in end-to-side fashion to the proximal end with a 2-0 polyester nonabsorbable suture (Surgidac; Covidien Plc, Dublin, Ireland) and the proximal end brought out as an end ileostomy if needed. Pathological analysis revealed small bowel diverticulosis.

CASE 2

A 75-year-old woman with a medical history of diabetes mellitus and hypertension presented to the emergency department with 2 episodes of melenic stool on March 24, 2004. She had had a history of gastrointestinal bleeding in 2004, which had required admission to a medical intensive care unit. No source for her gastrointestinal bleeding had been found at that time.

On presentation, the patient was hemodynamically stable with a hemoglobin level of 10.2 g/dL (to convert to grams per liter, multiply by 10). Her workup included an esophagogastroduodenoscopy, the results of which were essentially normal. A colonoscopy was performed next, the results of which demonstrated blood throughout the colon and the distal 20 cm of the ileum. Multiple diverticula were noted, but no active source of bleeding was identified (Figure 2C). A video capsule endoscopy was then performed, which revealed reddish-tinged mucosa in the distal aspect of the small bowel and blood in the colon. Again, no active source of bleeding was identified.

Lower DBE was then performed. The terminal ileum was unable to be intubated during this procedure. Blood was

![Image](https://jamanetwork.com/09/26/2023)
noted throughout the colon and within multiple diverticula. However, the precise site of bleeding was not identified. Upper DBE was attempted next. The endoscope was able to be advanced only 120 cm because of angulated, fixed bowel. Two diverticula were noted in the proximal jejunum, but no blood was noted in the small bowel (Figure 2D). However, this was an incomplete study.

Because attempts to localize the source of the bleeding had heretofore failed, computed tomographic angiography was then performed to rule out a small bowel mass. The angiography results were unremarkable except for multiple right-sided pulmonary emboli, necessitating placement of an inferior vena cava filter.

During the workup, the patient required transfusion of 14 U of packed red blood cells. Although no obvious source of gastrointestinal bleeding had been identified, potential sources of bleeding from diverticula were noted in the small and large bowels. The patient was taken to the operating room for diagnostic laparoscopy. On thorough inspection and palpitation of the entire intestinal tract, no blood was noted in the small bowel or ascending colon. Two diverticula were identified in the proximal jejunum, and 1 area of densely matted adhesions in the middle jejunum was visualized. A diagnostic end ileostomy was constructed at the terminal aspect of the ileum, similar to the procedure performed on the first patient.

The patient was prescribed therapeutic enoxaparin sodium postoperatively and was bridged to warfarin sodium. Her postoperative course was complicated by a small parastomal abscess that resolved with percutaneous drainage and antibiotics. The patient had no additional bleeding while in the hospital and was discharged on postoperative day 10.

The patient returned to the emergency department on postoperative day 22 with bleeding in the rectum, indicating that the colon was the source of her gastrointestinal hemorrhage. A laparoscopic total colectomy with ileosigmoid anastomosis and ileostomy closure was performed. The patient recovered uneventfully and had no recurrent bleeding at the 1-month and 3-month follow-up visits. Pathological analysis revealed colonic diverticular disease.

These case reports demonstrate the effectiveness, ease, and safety of a diagnostic ileostomy to compartmentalize the upper and lower gastrointestinal tract. These 2 patients represent diagnostically difficult and uncommon cases because approximately 80% of gastrointestinal bleeding neither is hemodynamically significant nor requires any intervention before resolving spontaneously. When initiating a workup to locate and control the source of bleeding, several modalities are now available that often obviate the need for empirical intestinal resection, including upper and lower endoscopy, angiography, computed tomography, tagged red blood cell scan, DBE, and capsule endoscopy. Upper endoscopy can rule out a source of bleeding up to the ligament of Treitz, which is responsible for gastrointestinal hemorrhage in 80% of cases. Colonoscopy is successful at reaching the cecum in more than 95% of patients who present with lower gastrointestinal tract bleeding, making it useful for ruling out a source in the colon and rectum. In many cases, the terminal ileum can also be intubated. The diagnostic yield of colonoscopy has been reported to range from 69% to 80% in some studies.

Although rare, upper and lower endoscopy can fail to identify the source of bleeding, requiring the use of angiography, capsule endoscopy, and DBE. In this setting, endoscopy may be more sensitive than colonoscopy, having a sensitivity of 40% to 86% and a specificity of 100%. Capsule endoscopy has a diagnostic yield for obscure gastrointestinal bleeding of 59% to 74%. This procedure is limited by the inability to completely visualize the bowel lumen because of the lack of dissection usually achieved in traditional endoscopy. Double balloon enteroscopy has a diagnostic yield that has been reported at 60% to 76% and can be achieved in up to 60% to 86% of cases. With various combinations of these studies, the source of gastrointestinal hemorrhage can be identified in approximately 90% of cases, whereas 70% of the bleeding episodes can be successfully treated endoscopically. Surgical intervention is therefore reserved for patients who have massive acute hemorrhage or stable patients with continuous bleeding that requires multiple transfusions.

Despite emerging technology to diagnose and treat gastrointestinal bleeding, surgeons can still find themselves in a situation in which gastrointestinal bleeding is clinically severe, the source is unidentified, and the need to operate compelling. Under these circumstances, the surgeon is forced to balance the compelling need to act with the reluctance to blindly resect. The 2 cases herein presented are interesting, given that both patients had diverticula identified in the small bowel and colon, findings that are not unexpected in our increasing population of elderly patients. Small bowel diverticulosis occurs in 0.07% to 1% of patients studied by contrast examination and in 0.7% to 8% of autopsy studies, and the prevalence of colonic diverticula is high. Because the results of empirical resection based on the presence of diverticular disease alone for massive bleeding are unknown, reluctance to operate without an identified source remains high.

Our experience with these 2 patients suggests that in cases in which the risk of blind resection appears ill-advised, laparoscopic compartmentalization of the small bowel from the colon via end ileostomy may be safely performed and potentially helpful. Once performed, the site of bleeding may declare itself immediately or remotely. Although there are risks to this procedure, as evidenced by the development of a parastomal abscess, they can be successfully managed. In both cases, definitive resection of the presumed site of bleeding was performed laparoscopically and allowed for minimal morbidity and wound complications. This anecdotal experience should be explored on a larger scale to determine its usefulness as an adjunct to a standard approach.

Evaluation of a patient with gastrointestinal bleeding should proceed in a stepwise fashion to locate the source of the bleeding, using all available endoscopic and/or radiologic...
All Bleeding Stops Eventually

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at when you can, sleep when you can, and never mess
with the pancreas.” “Never let the sun set on a bowel
obstruction.” “All bleeding stops eventually.” These
are just a few of the clinical platitudes commonly passed
on from one generation of surgical trainees to the next.
Each comment is slightly sarcastic and, for the most part,
based on real frustrations surgeons encounter. Significant
and occult gastrointestinal bleeding is on the list of most
every surgeon’s least favorite patient consultations. Do we
watch the patient continue to bleed, hoping the bleeding
will stop or the source may become more obvious? Do we
operate and run the risk that we may encounter multiple
potential sources or none at all? Do we deduce the most
likely source in an attempt to locate the gastrointestinal
hemorrhage have failed and the patient continues to have
significant bleeding, most surgeons agree on the necessity
of lifesaving empirical resection. When multiple potential
sources are found on endoscopic and radiologic evalua-
tion, total empirical bowel resection need not be inevi-
table: diagnostic ileostomy enables a more guided ap-
proach in the patient who requires bowel resection for
massive gastrointestinal bleeding.

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REFERENCES

2. Waye JD, Bashkoff E. Total colonoscopy: is it always possible? Gastrointest Endosc.
3. Jensen DM, Machicado G. Diagnosis and treatment of severe hematochezia: the
   219-220.
7. Pannizzo M, Santucci R, Rondonotti E, et al. Outcome of patients with obscure
gastrointestinal bleeding after capsule endoscopy: report of 100 consecutive cases.
8. Ell C, Remke S, May A, Helou L, Henrich R, Mayer G. The first prospective con-
trolled trial comparing wireless capsule endoscopy with push enteroscopy in
parison with push enteroscopy in patients with gastroscopy and colonoscopy
   obscure gastrointestinal bleeding: a comparative study with push enteroscopy.
sule in patients with obscure digestive bleeding: blinded comparison with video
12. Heine GDN, Hadithi M, Groenen MJM, Kuipers EJ, Jacobs MAJM, Mulder CJJ.
   Double-balloon enteroscopy: indications, diagnostic yield, and complications in a
   series of 275 patients with suspected small-bowel disease. Endoscopy. 2006;
13. Hadithi M, Heine GDN, Jacobs MAJM, van Bodegraven AA, Mulder CJJ. A pros-
  pective study comparing video capsule endoscopy with double-balloon enter-
   balloon enteroscopy in patients with GI bleeding of obscure origin. Gastrointest
   Endosc. 2006;64(1):135-140.
15. Sun B, Rajan E, Cheng S, et al. Diagnostic yield and therapeutic impact of double-
   balloon enteroscopy in a large cohort of patients with obscure gastrointestinal
17. Miller RE, McCabe RE, Salomon PF, Knox WG. Surgical complications of small

 INVITED CRITIQUE

Patel and colleagues have presented a unique and clever
method for “compartmentalizing” the gastrointestinal tract
in the most difficult gastrointestinal bleeding cases. To my
knowledge, this technique has not been described elsewhere.
Although this is a technique I hope never to have to try, it
is a useful trick to remember just in case.

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