

Intraoperative transillumination with water-filling of lumen for localizing lesions in occult small bowel bleeding

Case report

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Abstract

Rationale: Occult small bowel bleeding is always difficult to locate by either radiological examination or endoscopy. When the site of bleeding cannot be found by nonsurgical measures, exploratory laparotomy becomes necessary.

Patient concerns: A 63-year-old woman with a half-month history of occult gastrointestinal bleeding failed to many conservative therapies.

Interventions: Intraoperative transillumination with water-filling of lumen was performed.

Diagnoses: Small bowel bleeding was diagnosed intraoperatively.

Outcomes: Segmental resection of the diseased small bowel with side-to-side anastomosis was performed while the histology showed no significant abnormality.

Lessons: The technique of intraoperative transillumination with water-filling of lumen allows simple, accurate, and rapid localization of lesions in occult small bowel bleeding and facilitates precise and definitive surgery.

Keywords: case report, intraoperative transillumination, occult gastrointestinal bleeding, water-filling

1. Introduction

Small bowel bleeding can be caused by many types of lesions, such as angiodysplasia, ulcers, and benign and malignant neoplasms.^[1] However, occult bleeding in the jejunum and ileum remains difficult to locate by traditional methods such as red blood cell scintigraphy, selective mesenteric angiography, enteroclysis computed tomography scan, and pull-and-push enteroscopy.^[2] Despite the existence of endoscopic localization and therapy with video capsule endoscopy and double-balloon enteroscopy,^[3–5] exact localization of obscure small bowel bleeds still poses a challenge. For patients with occult or recurrent intestinal bleeding that fails to respond to these conservative treatments, exploratory laparotomy is the treatment of choice.^[6] However, occult small bowel bleeding is difficult to locate during

surgery. A case of intraoperative transillumination with water-filling of lumen for successful localization of a bleeding site in small intestine is here described. The work proposes a creative technique to resolve a difficult clinical problem.

2. Case report

A 63-year-old woman presented with recurrent dark red bloody stool for 1 day in September 2015. The patient had a half-month history of occult gastrointestinal bleeding, but the lesion had not been located by repeated gastroscopy, colonoscopy, or capsule endoscopy in other hospitals. She was anemic at the time, with a hemoglobin level of 68 g/L. Gastroscopy was carried out when the hemodynamics stabilized after transfusion therapy, which showed no bleeding lesions in the stomach or descending duodenum. Colonoscopy showed blood coming from the ileum into the colon. Double-balloon enteroscopy showed extensive blood and blood clot retention in the terminal ileum. Mesenteric angiography was also performed but failed to locate the lesion. Due to ongoing recurrent drops in hemoglobin levels and a perceived failure to identify a definite bleeding site, surgery was attempted 1 week later.

During the operation, blood clot coating in the terminal ileum was visualized. The blood-coated segment was meticulously inspected by transillumination with a shadowless lamp but failed to show any abnormality in either the mesentery or the small bowel. After an enterotomy above the blood-coated segment, a colonoscope was introduced through the incision to inspect it. Thorough endoscopic examination of the mucosal surface showed it to appear normal with no intraluminal bleeding or obvious angiodysplasia to be seen. In consideration of blood-coated ileum, enteral irrigation with physiological saline from the incision was performed. Then, when the lumen was rinsed and filled with water, the vessels on the wall of the ileum were

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The ethical committee of Liaocheng People's Hospital provided ethical approval for this study. The patient provided written informed consent.

The authors have no conflicts of interest to disclose.

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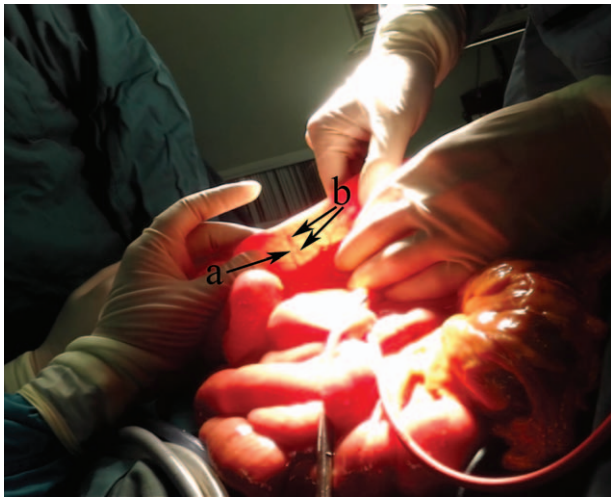


Figure 1. (A) The bleeding vessel. (B) The blood.

perfectly silhouetted by transillumination test using shadowless lamp. All the vessels appeared remarkably uniform, except in 1 area, located 60 cm away from the cecum, where a slightly tortuous vessel with gossamer-like bleed floating in the water was clearly seen to be macroscopically totally distinct from all others (Fig. 1). Segmental resection of the diseased ileum with side-to-side anastomosis was performed. The lesion was marked with a black silk stitch to aid the pathologist. As usual in angiodysplasia, histology showed no significant abnormality. The patient was followed up with normal blood index at 1 month, 3 months, 6 months, and 1 year after surgery.

3. Discussion

Occult intestinal bleeding is difficult to diagnose using traditional endoscopic techniques that cannot easily reach the small bowel. Video capsule endoscopy is a newly developed method of detecting bleeding lesions. It has been reported to be superior to pull-and-push enteroscopy and to small bowel radiology in diagnosis of small intestinal lesions.^[3,7] However, video capsule endoscopy has no therapeutic effect. Another innovative technique is double-balloon enteroscopy, which plays an important role in the management of small intestinal bleeding.^[3,8] However, this technique is time-consuming and needs anesthetists and experienced endoscopists. It also has the same contraindications as traditional endoscopy, such as obstruction of gastrointestinal tract, intolerance, and instability of the critical patients.

Arteriography has been widely used in the evaluation of patients with bleeding of the small intestine. Selective injection of radiographic contrast into the superior mesenteric arteries can detect hemorrhaging at a rate of 0.5 mL/min or greater. Technetium 99m-red blood cell scintigraphy is useful for the diagnosis of active gastrointestinal tract bleeding. If bleeding is ongoing at the time of injection and initial imaging, technetium 99m-red blood cell scans can accurately identify a source of bleeding in up to 85% of cases.^[9] If bleeding is not active at the time of the initial study, or if delayed bleeding occurs, subsequent imaging performed to detect the luminal isotope can be inaccurate because of the sporadic movement of the tracer in the gut lumen.^[10] These 2 methods can identify intestinal hemorrhage in patients if they are actively bleeding at the time of contrast injection.

When the bleeding cannot be controlled by nonsurgical measures, exploratory laparotomy becomes necessary. For the surgeon, the main technical problem is that even when identified preoperatively by endoscopy or angiography, lesions are notoriously difficult to locate at laparotomy, being frequently impalpable, and invisible to the naked eye. Recently, small intestinal bleeds have been diagnosed by intraoperative enteroscopy,^[11,12] but not all bleeding sites can be detected as of the present report. Transillumination using shadowless lamp, a routine inspection, can display vessels in the mesentery, but it does not adequately reveal the anatomy of the bowel wall because of the blood coating or collapsed bowel, which is too thick to be transilluminated. As described in this case, the site of bleeding was successfully located using a new technique, transillumination with water-filling of lumen. In this technique, when enteral irrigation clears the blood clot from the intestine, contrast between vessels and bowel wall became improved, and as the bowel was filled with water, the intestinal mucosa is spread and the bowel wall distended, which rendered it thinner and more transparent. These advantages make this technique simpler and more effective than the others.

When the lesion is suspicious of an angiodysplasia within the small bowel, a resection is inevitable, and enteral irrigation can be introduced through an enterotomy without additional risk. This technique allowed visualization of the presumptive bleeding segment of intestine in under 20 minutes, whereas other methods require 45 minutes.^[13]

In conclusion, the technique of intraoperative transillumination with water-filling of lumen allows simple, accurate, and rapid localization of lesions in occult small bowel bleeding, and facilitates precise and definitive surgery.

References

- [1] Lewis BS. Small intestinal bleeding. *Gastroenterol Clin N Am* 2000; 29:67–95. vi.
- [2] Van Gossum A. Obscure digestive bleeding. *Best Pract Res Clin Gastroenterol* 2001;15:155–74.
- [3] Marmo R, Rotondano G, Piscopo R, et al. Meta-analysis: capsule enteroscopy vs. conventional modalities in diagnosis of small bowel diseases. *Aliment Pharmacol Ther* 2005;22:595–604.
- [4] Manabe N, Tanaka S, Fukumoto A, et al. Double-balloon enteroscopy in patients with GI bleeding of obscure origin. *Gastrointest Endosc* 2006;64:135–40.
- [5] Marmo R1, Rotondano G, Casetti T, et al. Degree of concordance between double-balloon enteroscopy and capsule endoscopy in obscure gastrointestinal bleeding: a multicenter study. *Endoscopy* 2009;41: 587–92.
- [6] Concha R, Amaro R, Barkin JS. Obscure gastrointestinal bleeding: diagnostic and therapeutic approach. *J Clin Gastroenterol* 2007;41: 242–51.
- [7] Hartmann D, Schmidt H, Bolz G, et al. A prospective two-center study comparing wireless capsule endoscopy with intraoperative enteroscopy in patients with obscure GI bleeding. *Gastrointest Endosc* 2005;61: 826–32.
- [8] Yamamoto H, Kita H. Double-balloon endoscopy. *Curr Opin Gastroenterol* 2005;21:573–7.
- [9] Gunderman R, Leef J, Ong K, et al. Scintigraphic screening prior to visceral arteriography in acute lower gastrointestinal bleeding. *J Nucl Med* 1998;39:1081–3.
- [10] Vernava AM3rd, Moore BA, Longo WE, et al. Lower gastrointestinal bleeding. *Dis Colon Rectum* 1997;40:846–58.
- [11] Hsu PS, Chen JL, Yu JC, et al. Accurate diagnosis and successful treatment for massive obscure small intestinal bleeding by means of intraoperative enteroscopy: a case report. *Eur J Gastroenterol Hepatol* 2008; 20:139–41.
- [12] Manzelli A, Rossi P, Petrou A, et al. Use of intraoperative endoscopy to localize bleeding in the small intestine. *Ann Ital Chir* 2012;83:29–32.
- [13] Bowden TA Jr, Hooks VH3rd, Mansberger AR Jr. Intraoperative gastrointestinal endoscopy. *Ann Surg* 1980;191:680–7.