Hemostasis Achieved Endoscopically for Diverticular Bleeding from the Horizontal Portion of the Duodenum

Yasumasa Matuso, Hiroshi Yasuda, Midori Suzuki, Shinya Ishigooka, Shun-ichiro Ozawa, Masaki Yamashita, Hiroyuki Yamamoto and Fumio Itoh

Division of Gastroenterology and Hepatology, St. Marianna University School of Medicine, Kawasaki, Japan.

ABSTRACT: Diverticulum of the horizontal portion of the duodenum is a rare cause of upper gastrointestinal (GI) bleeding. Since it is difficult to access the horizontal portion of the duodenum by standard upper GI endoscopy, only a very few cases of endoscopic hemostasis have been reported. Herein, we report a case of diverticular bleeding from the horizontal portion of the duodenum for which hemostasis was achieved using a small-caliber colonoscope, which has an insertion part designed with a passive-bending function/high-force transmission and a transparent tip hood.

KEYWORDS: diverticular bleeding, endoscopic hemostasis, duodenum, passive-bending function

CITATION: Matuso et al. Hemostasis Achieved Endoscopically for Diverticular Bleeding from the Horizontal Portion of the Duodenum. *Clinical Medicine Insights: Gastroenterology* 2015:8 61–64 doi:10.4137/CGast.S32421.

TYPE: Case Report

RECEIVED: August 3, 2015. **RESUBMITTED:** October 18, 2015. **ACCEPTED FOR PUBLICATION:** October 24, 2015.

ACADEMIC EDITOR: Melpakkam Srinivas, Editor in Chief

PEER REVIEW: Two peer reviewers contributed to the peer review report. Reviewers' reports totaled 301 words, excluding any confidential comments to the academic editor.

FUNDING: This work was supported in part by a Grant-in-Aid for Scientific Research from the Ministry of Education, Culture, Sports, Science, and Technology of Japan (H. Yasuda). The authors confirm that the funder had no influence over the study design, content of the article, or selection of this journal.

COMPETING INTERESTS: Authors disclose no potential conflicts of interest.

CORRESPONDENCE: hyasuda@marianna-u.ac.jp

Paper subject to independent expert blind peer review. All editorial decisions made by independent academic editor. Upon submission manuscript was subject to anti-plagiarism scanning. Prior to publication all authors have given signed confirmation of agreement to article publication and compliance with all applicable ethical and legal requirements, including the accuracy of author and contributor information, disclosure of competing interests and funding sources, compliance with ethical requirements relating to human and animal study participants, and compliance with any copyright requirements of third parties. This journal is a member of the Committee on Publication Ethics (COPE).

Published by Libertas Academica. Learn more about this journal.

Introduction

Duodenal diverticular bleeding is a rare cause of upper gastrointestinal (GI) bleeding and accounts for as low as 0.14% of all cases of upper GI bleeding.[1] Most of such diverticula are asymptomatic and located on the second part of the duodenum.[2] According to previous reports, surgery and transcatheter arterial embolization (TAE) have been performed for achieving hemostasis.[3–5] Compared to surgery, TAE is a less invasive procedure; however, it must be performed with extreme caution due to the complex vascular anatomy of the duodenum. Possible adverse events following TAE for hemorrhagic duodenal diverticulum include ischemic damage, duodenal obstruction, pancreatitis, and re-bleeding.[6,7]

Herein, we report a case of diverticular bleeding from the horizontal portion of the duodenum for which hemostasis was achieved endoscopically using a small-caliber colonoscope with a passive-bending function/high-force transmission.[8] The patient gave her written consent for publication of this report and the accompanying images.

Case Report

A 68-year-old woman visited our hospital with a chief complaint of black stool. She had a history of surgery for an atrial septal defect and was receiving oral administration of aspirin and warfarin. At the hospital visit, her vital signs were stable with a blood pressure of 120/70 mmHg and a pulse rate of 69/minute. No symptoms such as fever and abdominal pain were observed. A blood test showed a hemoglobin level of 12.7 g/dL, which did not indicate anemia. However, the serum blood urea nitrogen (BUN) level was 22.5 mg/dL and the serum creatinine level was 0.83 mg/dL, which indicated a mild elevation of serum BUN/creatinine ratio (27.1).

To examine the problem of black stool in detail, upper GI endoscopy was performed with a GI endoscope with water jet function (GIF-Q260J; Olympus). No abnormality was observed in the esophagus. Further, the stomach showed only chronic atrophic gastritis, with neither blood retention not any source of bleeding. No lesion was observed from the duodenal bulb to the descending portion of the duodenum. When the scope was inserted up to the proximal part of the inferior duodenal angulus, a small volume of fresh blood was observed, suggesting bleeding from the distal duodenum or the jejunum. Further insertion was difficult with GIF-Q260J, and the scope was then replaced with a small-caliber colonoscope, PCF-PQ260L (Olympus),[8] attached with a transparent cap on the tip of the endoscope. This scope measuring 9.2 mm in diameter and 1,680 mm in length with a passive-bending function facilitated the observation of an area up to the horizontal portion of the duodenum.

A large volume of fresh blood was found to be retained in the horizontal portion of the duodenum, and a diverticulum was also detected. Blood was linearly and continuously gushing out from the diverticulum. To avoid losing the bleeding point, the duodenal mucosa contralateral to the diverticulum was marked with a clip in order to serve as a guide. While the bleeding point was anteriorly viewed by pressing the mucosa with the transparent tip hood, hemostasis was performed successfully (Fig. 1). Contrast-enhanced abdominal computed tomography (CT) by argon plasma coagulation performed after the treatment

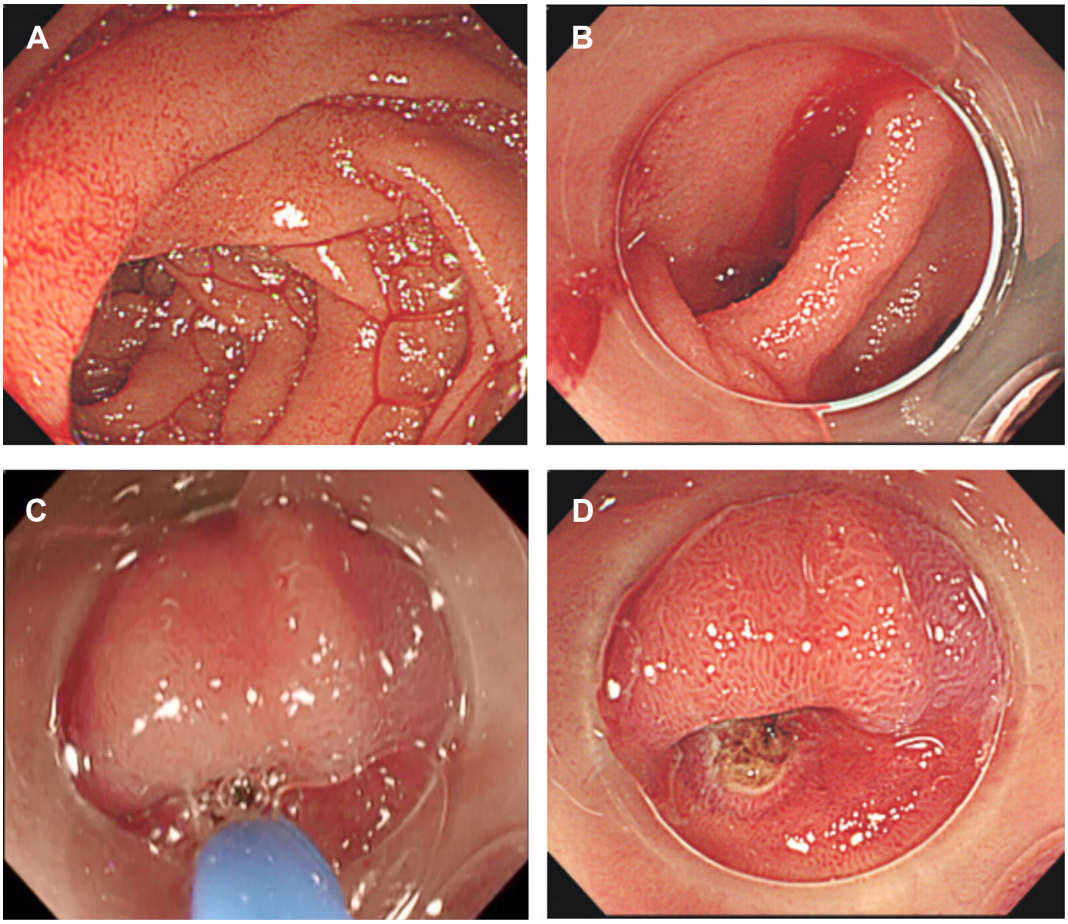

Figure 1. Endoscopic images. (**A**) No blood was retained in the duodenal bulb; however, a small volume of fresh blood was observed in the inferior duodenal angulus. (**B**) After the scope was replaced with Olympus PCF-PQ260L, continuously gushing blood was observed from a diverticulum in the horizontal portion of the duodenum. (**C** and **D**) Subsequently, hemostasis was performed by argon plasma coagulation after the lesion was anteriorly viewed through a transparent tip hood.

showed that there was no free air or other changes around the diverticulum (Fig. 2).

On hospital day 2, a second-look upper GI endoscopy was performed to confirm the absence of bleeding, and the patient was started on a liquid diet. On hospital day 3, oral administration of antiplatelet and anticoagulant agents was resumed. Hypotonic duodenal imaging revealed that the diverticulum was solitary, extraluminally protruding from the cranial part of the central horizontal portion of the duodenum by 15 mm (Fig. 3).

After confirming that there was no evidence of re-bleeding even after the start of the diet, the patient was discharged on hospital day 6. After more than one year, no episode of re-bleeding was noted.

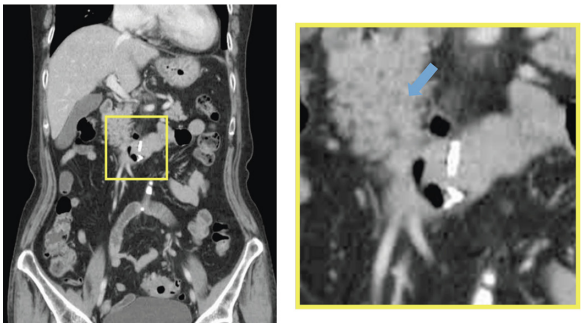

Figure 2. Contrast-enhanced abdominal CT images taken after hemostasis. A clip for marking persisted. There was no free air or other changes around the diverticulum.

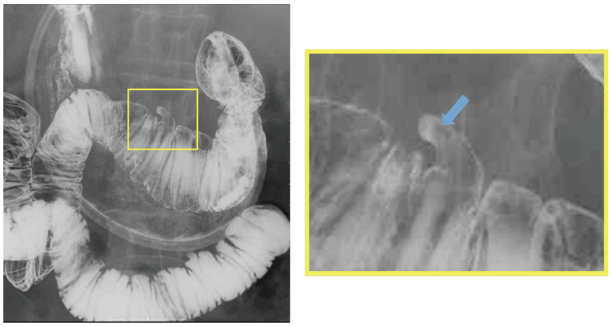

Figure 3. Hypotonic duodenal images. A solitary diverticulum measuring 15 mm was detected at the cranial part of the horizontal portion of the duodenum.

Discussion

We herein report a case of diverticular bleeding from the horizontal portion of the duodenum, for which hemostasis was achieved endoscopically. Besides diverticular bleeding, other causes of bleeding from the horizontal portion of the duodenum include ulceration associated with allergic purpura, infectious diseases such as cytomegalovirus and tuberculosis, epithelial tumors, malignant lymphoma, and self-destructing submucosal tumors. Among GI diverticula, duodenum is a common site after colon, which is detected in 22% of autopsied cases.[2] A common site of duodenal diverticula is the area proximal to the papilla of Vater, which accounts for 60% or more of the diverticula. Most of such diverticula are asymptomatic, and bleeding from the horizontal portion of the duodenum is a rare GI emergency.[9]

While the diverticula in the descending portion of the duodenum can be examined endoscopically by stretching the endoscope to straighten the flexed portion in the stomach, the horizontal portion cannot be reached in most of the cases (Fig. 4A and B). In fact, previous reports on endoscopic hemostasis indicated that two or more sessions were required before duodenal diverticular bleeding was identified.[1] Apart from the location, the bleeding may be intermittent or the diverticulum may be missed. Because of the difficulty in endoscopic examination, diverticular bleeding from the horizontal portion of the duodenum was earlier considered as a surgical disease. There are a number of potential management options to detect diverticular bleeding from the distal duodenum, including contrast-enhanced CT,[10,11] technetium 99m-red blood cell scintigraphy, and mesenteric angiography.[12,13]

An endoscope PCF-PQ260L (Olympus), which was used for hemostasis in the present case, is a lower GI endoscope measuring 1,680 mm in length with a passive-bending function/high-force transmission. This endoscope is originally designed as a "rescue colonoscope" for patients in whom cecal insertion failed because of sharp angulations due to previous abdominal surgery or inflammations such as diverticulitis, loop formation, and pain.[8] Because the duodenum and the fixed large intestine are structurally similar, we applied this endoscope to examine the distal duodenum. Thus, we replaced the endoscope with PCF-PQ260L, which allowed us the observation of the horizontal portion of the duodenum clearly, following which endoscopic hemostasis of the bleeding diverticulum was achieved. Fluoroscopic images using training model for upper GI endoscopy indicated that with standard upper GI endoscopy, the endoscope is bent inappropriately in the stomach and cannot be reached to the horizontal portion (Fig. 4A). With PCF-PQ260L, the passive-bending function worked effectively in the stomach to reach the endoscope into the horizontal portion of the duodenum (Fig. 4C).

Moreover, the outer diameter of the scope is 9.2 mm, which is same as the standard upper endoscope, with 2.8 mm forceps channel, which is appropriate for use in hemostatic devices. Although single- or double-balloon endoscope is a very useful method to examine the horizontal portion of the duodenum, it requires fluoroscope, the overtube, and an additional examination session.[14] In patients with bleeding from the upper GI tract of unknown origin, examination of the distal duodenum is required. If the insertion of the standard endoscope to the horizontal portion of the duodenum is difficult, PCF-PQ260L seems a very effective rescue scope for the examination of distal duodenum.

Of the 23 reported cases in which endoscopic treatment was used, injection therapy (hypertonic saline solution and epinephrine or 1% polidocanol) was the most commonly used technique, followed by coagulation, hemoclips, or combination therapy.[1] Duodenal perforation after endoscopichemoclip

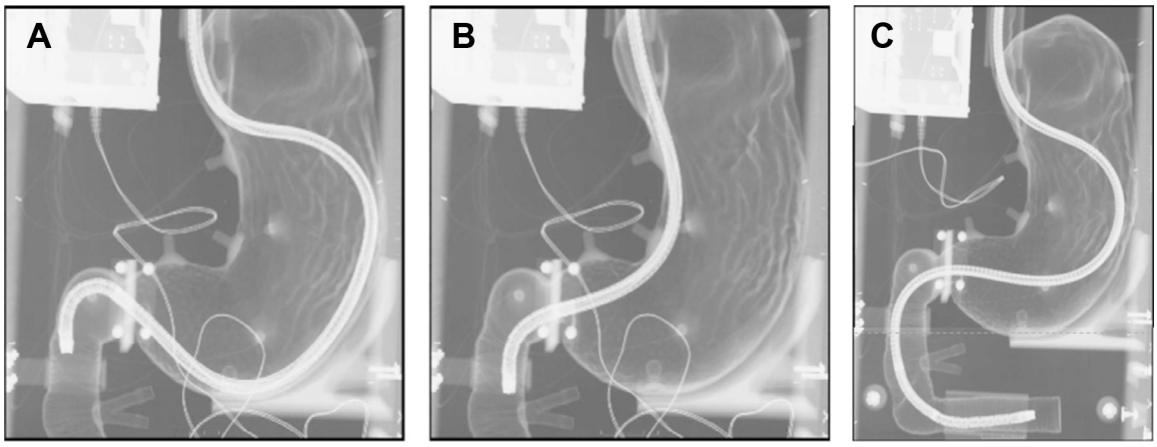

Figure 4. Fluoroscopic images comparing the approaches to the duodenum between Olympus GIF-Q260J and PCF-PQ260L. By using training models for upper gastrointestinal endoscopy under fluoroscopic monitoring, we examined how the endoscopes approached the duodenum. (**A** and **B**) Upper gastrointestinal endoscopes such as Olympus GIF-Q260J can reach only up to the descending portion. (**C**) The horizontal portion of the duodenum can be easily approached with Olympus PCF-PQ260L because the passive-bending function is effectively utilized in addition to its length.

application for bleeding from Dieulafoy's lesion in a duodenal diverticulum has been reported probably due to the relative thinness of the diverticular wall.[15] Accordingly, we applied argon plasma coagulation with extreme caution in the present case. However, a routine second-look endoscopy is not recommended after successful endoscopic hemostasis for a bleeding peptic ulcer with intravenous proton pump inhibitor (PPI).[16] We performed the second-look endoscopy because of dual therapy with warfarin and aspirin in the present case.[17]

In summary, bleeding from the duodenal diverticulum should be considered in the diagnosis of a patient who presents with upper GI bleeding of unknown origin. In the current case, we were able to achieve hemostasis effectively by using a small-caliber colonoscope with a passive-bending function/high-force transmission. Endoscopy is a useful tool to diagnose and treat patients with diverticular bleeding from the horizontal portion of the duodenum, which was previously considered a surgical disease.

Human/Animal Rights

All procedures followed were in accordance with the ethical standards of the responsible committee on human experimentation (institutional and national) and with the Helsinki. Declaration of 1964 and its later amendments.

Abbreviations

BUN, blood urea nitrogen; CT, computed tomography; PPI, proton pump inhibitor; TAE, transcatheter arterial embolization.

Author Contributions

Conceived and designed the experiments: YM and H. Yasuda. Analyzed the data: YM, H. Yasuda, MS, SI, SO, MY, H. Yamamoto, FI. Wrote the first draft of the manuscript: YM. Contributed to the writing of the manuscript: YM and H. Yasuda. Agree with manuscript results and conclusions: YM, H. Yasuda, MS, SI, SO, MY, H. Yamamoto, FI. Jointly developed the structure and arguments for the paper: FI. Made critical revisions and approved final version: H. Yasuda. All authors reviewed and approved of the final manuscript.

REFERENCES

1. Chen YY, Yen HH, Soon MS. Impact of endoscopy in the management of duodenal diverticular bleeding: experience of a single medical center and a review of recent literature. *Gastrointest Endosc*. 2007;66:831–835.
2. Afridi SA, Fichtenbaum CJ, Taubin H. Review of duodenal diverticula. *Am J Gastroenterol*. 1991;86:935–938.
3. Rioux L, Des Groseilliers S, Fortin M, Mutch DO. Massive upper gastrointestinal bleeding originating from a fourth-stage duodenal diverticulum: a case report and review of the literature. *Can J Surg*. 1996;39:510–512.
4. Yin WY, Chen HT, Huang SM, Lin HH, Chang TM. Clinical analysis and literature review of massive duodenal diverticular bleeding. *World J Surg*. 2001;25:848–855.
5. Mathis KL, Farley DR. Operative management of symptomatic duodenal diverticula. *Am J Surg*. 2007;193:305–308.
6. Poultsides GA, Kim CJ, Orlando R III, Peros G, Hallisey MJ, Vignati PV. Angiographic embolization for gastroduodenal hemorrhage: safety, efficacy, and predictors of outcome. *Arch Surg*. 2008;143:457–461.
7. Kwon YJ, Kim JH, Kim SH, et al. Duodenal obstruction after successful embolization for duodenal diverticular hemorrhage: a case report. *World J Gastroenterol*. 2009;15:3819–3822.
8. Sato K, Shigiyama F, Ito S, et al. Colonoscopy using a small-caliber colonoscope with passive-bending after incomplete colonoscopy due to sharp angulation or pain. *Surg Endosc*. 2013;27:4171–4176.
9. Leivonen MK, Halttunen JA, Kivilaakso EO. Duodenal diverticulum at endoscopic retrograde cholangiopancreatography, analysis of 123 patients. *Hepatogastroenterology*. 1996;43:961–966.
10. Yoon W, Jeong YY, Shin SS, Lim HS, et al. Acute massive gastrointestinal bleeding: detection and localization with arterial phase multi-detector row helical CT. *Radiology*. 2006;239:160–167.
11. Nakatsu S, Yasuda H, Maehata T, et al. Urgent computed tomography for determining the optimal timing of colonoscopy in patients with acute lower gastrointestinal bleeding. *Intern Med*. 2015;54:553–558.
12. Hamada N, Ishizaki N, Shirahama K, et al. Multiple duodeno-jejunal diverticula causing massive intestinal bleeding. *J Gastroenterol*. 2000;35:159–162.
13. Zink SI, Ohki SK, Stein B, et al. Noninvasive evaluation of active lower gastrointestinal bleeding: comparison between contrast enhanced MDCT and 99mTc-labeled RBC scintigraphy. *AJR Am J Roentgenol*. 2008;191:1104–1114.
14. Yamamoto H. Double-balloon endoscopy. *Clin Gastroenterol Hepatol*. 2005; 3(suppl 1):S27–S29.
15. Ko KH, Lee SYG, Hong SP, Hwang SK, Park PW, Rim KS. Duodenal perforation after endoscopic hemoclip application for bleeding from Dieulafoy's lesion in a duodenal diverticulum. *Gastrointest Endosc*. 2005;62:781–782.
16. Laine L, McQuaid KR. Endoscopic therapy for bleeding ulcers: an evidence-based approach based on meta-analyses of randomized controlled trials. *Clin Gastroenterol Hepatol*. 2009;7:33–47.
17. Yasuda H, Matsuo Y, Sato Y, et al. Treatment and prevention of gastrointestinal bleeding in patients receiving antiplatelet therapy. *World J Crit Care Med*. 2015; 4:40–47.