



Intra-abdominal bleeding as a rare complication after colonic endoscopic mucosal resection in a patient taking direct oral anticoagulants

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Abstract

We describe the case of an 84-year old female who was taking rivaroxaban 30 mg/day and had a medical history of atrial fibrillation. She underwent endoscopic mucosal resection of a 5-mm adenoma located in the hepatic flexure of the transverse colon. Following the procedure, she developed gradually intensifying abdominal pain, with the appearance of small amount of blood in the feces. For that reason, she visited our facility on the 5th day post-endoscopic mucosal resection. At the time of the visit, contrast-enhanced abdominal computed tomography revealed no extravasation or free air; however, bloody ascites was confirmed in the peritoneal cavity. Thus, the patient was diagnosed with post-endoscopic mucosal resection intra-abdominal hemorrhage and hospitalized the same day. After admission, rivaroxaban was discontinued and patient condition monitored. Because subsequent abdominal computed tomography revealed no distinct increase in bloody ascites, no interventional radiological or surgical procedure was performed, and the patient was discharged after providing only conservative treatment. While hemorrhage and perforation are the main complications after colonic endoscopic mucosal resection, so far, there have been a few reports on the occurrence of intra-abdominal hemorrhage following endoscopic mucosal resection. Emergency treatment is sometimes required in patients with intra-abdominal hemorrhage. It is important to keep in mind that this complication, although very rare, may occur, particularly in patients taking anticoagulants.

Keywords Intra-abdominal bleeding · Colonic endoscopic mucosal resection · Complication · Direct oral anticoagulants

Introduction

Intra-abdominal hemorrhage is a condition that sometimes requires emergency treatment involving an interventional radiological or surgical procedure, and it is classified as traumatic or non-traumatic based on its etiology [1]. Non-traumatic causes may be iatrogenic or tumor-related or may include clotting abnormalities, gynecological diseases, and vascular lesions such as aneurysms [1]. The source of bleeding in intra-abdominal hemorrhage cases is often unknown, and reports suggest that bleeding is associated with warfarin

intake and Ehlers–Danlos syndrome, among other reasons [2, 3].

Regarding endoscopy-related complications, intra-abdominal hemorrhage was reported in a case of splenic injury after colonoscopy [4, 5] and in another case after retrograde cholangiopancreatography (ERCP) [6]. Moreover, case reports on intra-abdominal hemorrhage following a polypectomy are extremely limited [7, 8]. Here we report a very rare occurrence of intra-abdominal hemorrhage after EMR in a patient who was taking direct oral anticoagulants (DOACs).

Case report

The patient was an 84-year old female with a height of 155 cm, body weight of 36 kg, and body mass index of 16.0 kg/m². She had a medical history of atrial fibrillation and was taking rivaroxaban 30 mg/day. Apart from that, she

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had no medical history of liver disease or any other disease. A 5-mm adenoma was detected in the hepatic flexure of the transverse colon through lower gastrointestinal endoscopy after the patient's positive fecal immunochemical test result. Because she was taking rivaroxaban, EMR was selected as the treatment modality during hospitalization.

On the day of EMR, rivaroxaban was discontinued. Endoscope was used H290AZI (Olympus Co., LTD, Tokyo, Japan). For local injection, saline was used, and ESG-100 (forced coagulation mode 20 W, pulse cut mode 20 W) (Olympus Co., LTD, Tokyo, Japan) was used as a

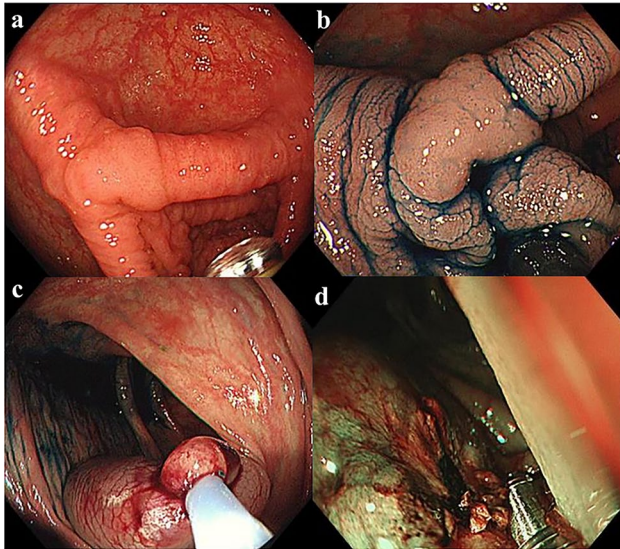


Fig. 1 Lower gastrointestinal endoscopy findings. **a** White light image. **b** Indigo carmine dye image. A 5-mm flat, elevated lesion was detected in the transverse colon. **c** After a submucosal injection of normal saline, a 10-mm Snare was used to resect the adenoma. **d** On narrow band imaging, we confirmed no apparent perforation and residual tumor

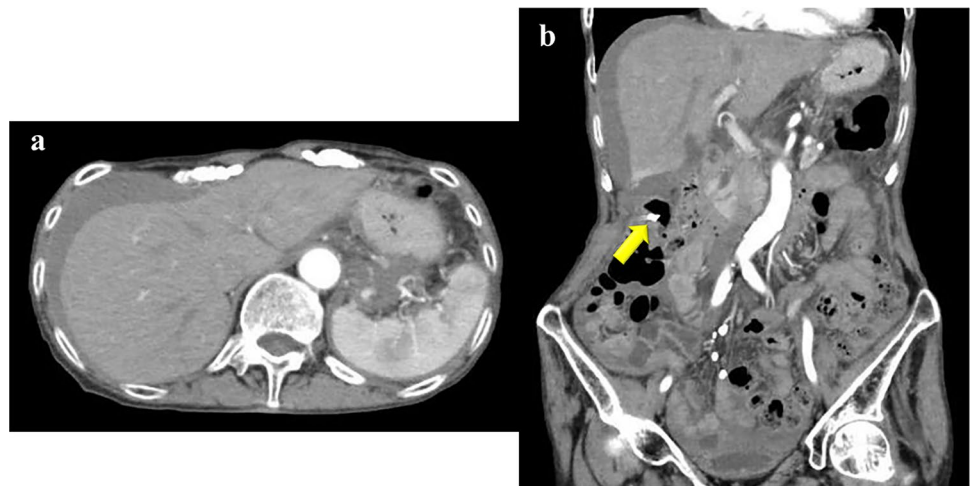
high-frequency device. Insertion of the scope proceeded without any issues, and the cecal intubation time was 7 min. For EMR, after a sufficient local injection into the submucosal layer, resection was performed using 10-mm snare master (Olympus Co., LTD, Tokyo, Japan). EMR of the 5-mm adenoma (macroscopic type IIa) was performed without no complication (Fig. 1a–d). Two clips (HX-610-135, Olympus Co., LTD, Tokyo, Japan) were sutured at the ulcer to prevent bleeding after the EMR. Resected specimen was 5 mm. Because no abdominal symptoms appeared the following day, rivaroxaban was resumed and the patient discharged. However, since the day after discharge, the patient experienced gradual pain in the right hypochondrium, and on day 4 after discharge, the abdominal pain worsened, and because of a small amount of blood appearing in the feces, she sought medical care. On arrival at the hospital, the patient's vital signs were as follows: body temperature, 36.6 °C; blood pressure, 96/52 mmHg; and heart rate, 68 bpm. On physical examination, the patient was found to have tenderness in the right hypochondrium without any signs of peritoneal irritation. Although rectal examination revealed small amount of blood-tainted feces, there were no findings suggesting active bleeding.

Blood examination results on arrival at the hospital revealed severe anemia (Hb, 6.8 g/dL) (Table 1). No abnormalities were observed in the coagulation test results; however, biochemical test results showed a mild increase in C-reactive protein levels. Emergency contrast-enhanced computed tomography (CT) was performed. While retention of ascites was confirmed on the liver surface as well as in the pouch of Douglas, no extravasation, free air, splenic injury or intramural hematoma of the colon was observed. Because the CT value was 44.0 Hounsfield unit, we diagnosed as bloody ascites (Fig. 2a, b). CT could not identify the source of bleeding, but because there was severe

Table 1 Blood examination results on arrival at the hospital

Peripheral blood		Blood chemistry			
WBC	5600/ μ L	TP	6.9 g/dL	γ -GTP	15 U/L
RBC	215×10^4 / μ L	Alb	2.6 g/dL	Cr	0.57 mg/dL
Hb	6.8 g/dL	T-Bil	0.5 mg/dL	BUN	12 mg/dL
Ht	20%	D-Bil	0.1 mg/dL	Na	136 mEq/L
MCV	92.7 fL	AST	16 U/L	K	3.6 mEq/L
MCH	31.4 Pg	ALT	5 U/L	Cl	102 mEq/L
Plt	5.9×10^4 / μ L	ALP	151 U/L	CRP	1.16 mg/dL
Coagulation test					
PT					69%
PT-INR					1.2
APTT					37.5 s
APTT-Cont					30.9 s

Fig. 2 Contrast-enhanced CT findings at hospital arrival. **a** Axial image. **b** Coronal image. **a** Bloody ascites (CT value: 44.0 Hounsfield unit) was identified on the surface of the liver. There was no finding of splenic injury. **b** The figure shows clips in the transverse colon and in the hepatic flexure (yellow arrows). No extravasation, free air, or hematoma was observed in the vicinity. There is accumulation of bloody fluid in the pouch of Douglas



pressure tenderness in the right hypochondrium, a diagnosis of post-EMR intra-abdominal hemorrhage was made, and the patient was immediately hospitalized. Conservative treatment was selected over interventional radiology (IVR) or surgery because contrast-enhanced CT findings did not show any peritoneal irritation and perforation or extravasation. After hospitalization, two units of blood were transfused and fasting and fluid replacement started. In addition, rivaroxaban was discontinued after explaining the risk of thromboembolism.

On the following day, Hb levels improved to 8.1 g/dL and simple abdominal CT showed no free air or increase in bloody ascites. Moreover, not an episode of bloody stool was observed since admission. In the lower gastrointestinal endoscopy performed the day after hospitalization, no distinct intraluminal blood retention was observed. The clip which was used to prevent bleeding at the post-EMR ulcer remained. Although a minor blood-tinged area was found, no obvious perforation findings and active bleeding were observed in the post-EMR ulcers. On the 4th day of

admission, abdominal symptoms improved, and because there was no increase in bloody ascites, as shown by abdominal CT, rivaroxaban and feeding were resumed from the 5th day. Thereafter, abdominal symptoms did not worsen, and blood tests did not show anemia progression; therefore, the patient was discharged on the 8th day. Contrast-enhanced abdominal CT performed 30 days after discharge showed disappearance of the bloody ascites (Fig. 3a, b), and outpatient follow-up was planned for the patient.

Discussion

Non-traumatic causes of intra-abdominal hemorrhage may be iatrogenic or tumor-related or may include abnormal coagulation, gynecological diseases, vascular lesions such as aneurysms, and unexplained idiopathic causes [1]. However, since the report of splenic injury-associated intra-abdominal hemorrhage by Wherry and Zehner [4] in 1974, 102 cases of colonoscopy-associated splenic injury have been reported

Fig. 3 Contrast-enhanced CT findings 30 days after discharge. **a** Axial image. **b** Coronal image. This image shows disappearance of the bloody fluid on the surface of the liver and the pouch of Douglas



[5]. In the report of Singla et al. [5], it was suggested that taking antithrombotic drugs, having inflammatory bowel disease, and a history of prior surgery are all risk factors for splenic injury. Shanker and Rowe [9] reported that tension in the splenic flexure due to the linearization of the S-shaped colonic loop during endoscopic insertion may be a cause of splenic injury. Moreover, only three cases of intra-abdominal hemorrhage without splenic injury during colonoscopy have been reported, indicating the rarity of this complication [10–12]. Intra-abdominal hemorrhage was thought to occur as a result of injury to the mesenteric blood vessels at the adhesion site due to the extension of the intestine during endoscopic insertion [10]. Moreover, there was a report of intra-abdominal hemorrhage after ERCP that was presumed to be due to endoscopic stretching of the stomach or duodenum [6].

Post-polypectomy intra-abdominal hemorrhage is a rare occurrence, with a few reports in worldwide [7, 8]. In the report of Voudoukis et al., the patient was on anti-coagulant treatment and visited hospital with the chief complaint of abdominal pain on the 12th day after polypectomy [7]. In this report the intra-abdominal hemorrhage was speculated to involve the clip that was used to prevent bleeding during the polypectomy. The main complications that may occur after polypectomy are bleeding, with frequencies of 1.2–2.0%, respectively [13–15]. However, the clip used for suturing after polypectomy prevents bleeding, and blood is not discharged into the intestinal lumen. The authors guessed that this blood accumulates in the intestinal wall resulting in an intramural hematoma, which ultimately ruptured and led to a fatal intra-abdominal hemorrhage. In the report of Neese et al. [8], while the patient presented with abdominal pain and hematochezia on the 6th day after polypectomy, emergency abdominal surgery revealed a large mesocolic hematoma. In our case, although the patient reported having small amount of hematochezia after EMR, not an episode of hematochezia was observed during hospitalization. Moreover, an intramural hematoma could not be clearly demonstrated by CT at the time of visit. However, in our case also a clip for hemorrhage prevention was placed after EMR. Because of this, intraluminal bleeding may have been blocked without our notice, which may have caused the intramural hematoma. And one cannot exclude possibility that this hematoma ruptured, leading to intra-abdominal hemorrhage. In addition, because it has been reported that the clips used to prevent bleeding after EMR may not benefit all patients [16], use of clip should be carefully determined based on the polyp size and patient's medication. As other causes of intra-abdominal hemorrhage, there is also the possibility that vessel injury due to local injection may have occurred during EMR. The cause of bleeding after EMR may have been the needle puncturing too deeply into the submucosal layer during local injection, injuring the blood

vessels of the intestinal membrane. In addition, the intake of the DOAC may have prevented hemostasis, leading to continuous bleeding. Moreover, while this patient had no previous surgical history, with no effects of adhesions, injury to the mesenteric blood vessels due to procedural intestinal stretching cannot be completely ruled out. However, this is only a speculation, and the true cause remains unknown because no surgery or IVR was performed.

In this study, we reported our experience of intra-abdominal hemorrhage after colonic EMR, which is a rare occurrence. Intra-abdominal hemorrhage is an emergency condition that sometimes requires surgery or IVR. Although a rare occurrence, intra-abdominal hemorrhage should be recognized as a complication after colonic EMR, particularly in patients taking anticoagulants.

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Compliance with ethical standards

Conflict of interest Drs. Yoshinori Sato, Yusuke Satta, Hiroshi Yasuda, Hirofumi Kiyokawa, Masaki Yamashita, Yasumasa Matsuo, and Fumio Itoh have no conflict of interest or financial ties to disclose.

Human/animal rights All procedures followed have been performed in accordance with the ethical standards laid down in the 1964 Declaration of Helsinki and its later amendments.

Informed consent Informed consent was obtained from patients for being included in the study.

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