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Case Report

Duodenal bleeding outside covered stents identified by selective computed tomography during arteriography that was successfully treated by embolization: A case report ☆,☆☆

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ABSTRACT

The patient was a man in his 60s who previously underwent placement of covered stents in the duodenum for a duodenal stricture caused by pancreatic cancer invasion. He experienced multiple episodes of hematemesis and hematochezia during hospitalization. Emergency upper and lower gastrointestinal endoscopies were performed but were unable to reveal the bleeding source. Based on these findings, we suspected small intestinal bleeding and emergency angiography was performed for the purpose of hemostasis. Computed tomography during arteriography was performed from the superior mesenteric artery and revealed extravasation outside the covered stents in the descending portion of the duodenum. Angiography of the inferior pancreaticoduodenal artery revealed extravasation in the descending portion of the duodenum, and the inferior pancreaticoduodenal artery was embolized with *n*-butyl cyanoacrylate. There were no postoperative symptoms indicative of intestinal ischemia or pancreatitis, and there was no rebleeding after embolization. In patients with bleeding outside the duodenal-covered stents, it can be difficult to identify the bleeding source by upper gastrointestinal endoscopy. In this case, selective computed tomography during arteriography and angiography revealed bleeding outside the duodenal-covered stents that was successfully treated by arterial embolization with *n*-butyl cyanoacrylate.

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Introduction

Upper gastrointestinal bleeding refers to bleeding originating from the esophagus, stomach, or duodenum. Clinical symptoms vary depending on the severity of bleeding, ranging from occult bleeding to hematemesis, hematochezia, or hemorrhagic shock. The causes of upper gastrointestinal bleeding include digestive ulcers, Mallory–Weiss tears, erosive gastritis, gastroesophageal reflux disease, vascular malformations, invasion of malignant tumors, and stent fractures [1]. Upper endoscopy is the first choice of treatment for upper gastrointestinal bleeding and, in most cases, the bleeding site can be identified and hemostasis treatment can be performed simultaneously [2]. Endoscopic treatments include clipping, thermal coagulation, injection of sclerosing agents or adhesives, and placement of covered stents. However, if endoscopic treatment fails, prompt vascular intervention or surgery is required [3]. When performing a vascular intervention, it is necessary to identify the bleeding source using multidetector row computed tomography (MDCT) or angiography. The sensitivity of MDCT for detecting the bleeding source exceeded 80% [1].

We report a rare case in which upper endoscopy could not identify the source of duodenal bleeding outside covered stents. However, we were able to identify the bleeding source by performing selective computed tomography (CT) during arteriography and angiography, and the bleeding was successfully treated using arterial embolization with *n*-butyl cyanoacrylate (NBCA).

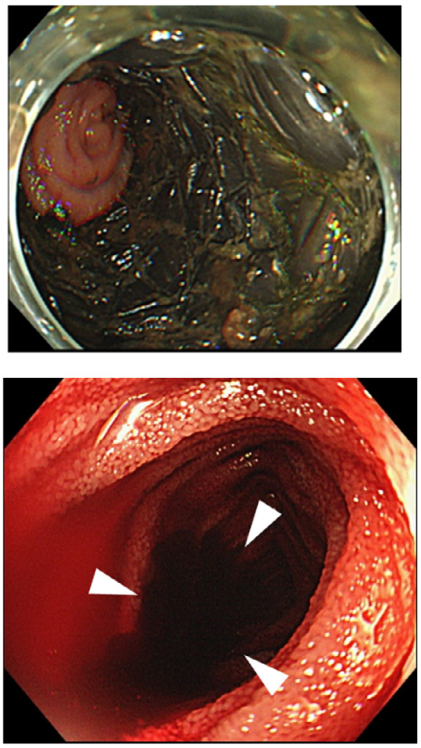

Fig. 1 – (A) Upper gastrointestinal endoscopy showing no bleeding in the duodenum. (B) Lower gastrointestinal endoscopy showing blood clots (arrowheads) in the terminal ileum.

Case presentation

Informed consent for publishing this report was obtained from the patient. The patient was a man in his 60s who previously underwent placement of 2 bare stents (Niti-S stent, 22 × 80 mm, 22 × 60 mm; Taewoong Medical, Seoul, Korea) in the duodenum for a duodenal stricture caused by pancreatic cancer invasion. One year and 4 months later, the bare stent was found to be fractured and a covered stent (Niti-S Combi Stent, 20 × 120 mm) was placed at the fracture site. One week later, he vomited bloody fluid and an endoscopy revealed oozing in the duodenal bulb. Therefore, we placed 2 more covered stents (Niti-S Combi Stent, 20 × 120 mm, 20 × 100 mm) in the duodenum.

The patient was admitted to hospital for chemotherapy of pancreatic cancer, and he experienced multiple episodes of hematochezia during hospitalization. His systolic blood pressure was in the 80s (mm Hg), and his heart rate was approximately 120 beats per minute, indicating hypovolemic shock. His anemia progressed rapidly and the hemoglobin level decreased to 5.0 g/dL. Therefore, emergency upper and lower gastrointestinal endoscopies were performed. Upper gastrointestinal endoscopy did not reveal any bleeding in the stomach or duodenum (Fig. 1A). Lower gastrointestinal endoscopy showed blood clots in the terminal ileum (Fig. 1B). Based on these findings, we suspected small intestinal bleeding and emergency angiography was performed for the purpose of hemostasis. A 4 Fr sheath (Terumo, Tokyo, Japan) was inserted retrogradely from the right femoral artery, and angiography of the gastroduodenal artery (GDA) and superior mesenteric artery (SMA) was performed using a 4 Fr RC2 catheter (Medikit, Tokyo, Japan) and a microcatheter (1.9/2.8 Fr Tellus; Asahi Intecc, Aichi, Japan). However, extravasation of the contrast material was not observed (Figs. 2A and B). Next, CT during aortography was performed from the descending thoracic aorta using a 4 Fr pigtail catheter (Medikit) but did not reveal extravasation (Fig. 3A). Therefore, CT during arteriography was performed from the SMA and revealed extravasation outside the covered stent in the descending part of the duodenum (Fig. 3B). The images were acquired using a 64-row detector scanner (Aquilion 64; Canon Medical Systems Corporation, Otawara, Japan) on the following settings: a tube voltage of 120 kV, a tube current of 287-410 mA, and a slice thickness setting of 3 mm. The images were obtained at 6 and 30 seconds after the injection of the contrast materials during CT during arteriography from the SMA. Angiography of the inferior pancreaticoduodenal artery (IPDA) showed extravasation in the descending part of the duodenum (Fig. 4A). We, therefore, embolized the IPDA using 1 mL of a mixture of 20% NBCA (Histoacryl; B. Braun, Melsungen, Germany) and Lipiodol (Lipiodol Ultra-Fluide; Guerbet, Roissy, France) (Fig. 4B). Postoperative angiography of the SMA confirmed the extravasation had disappeared (Fig. 4C). There were no postoperative symptoms indicative of intestinal ischemia or pancreatitis, and there was no rebleeding at 3 months after embolization.

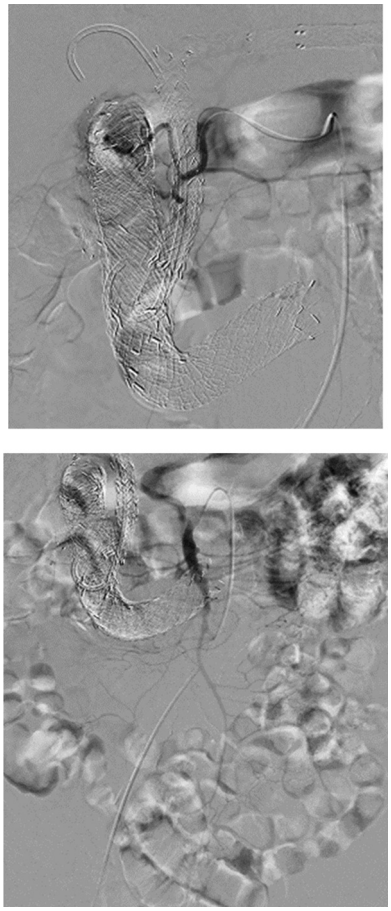

Fig. 2 – (A) Angiography of the gastroduodenal artery showing no extravasation of the contrast material. (B) Angiography of the superior mesenteric artery showing no extravasation of the contrast material.

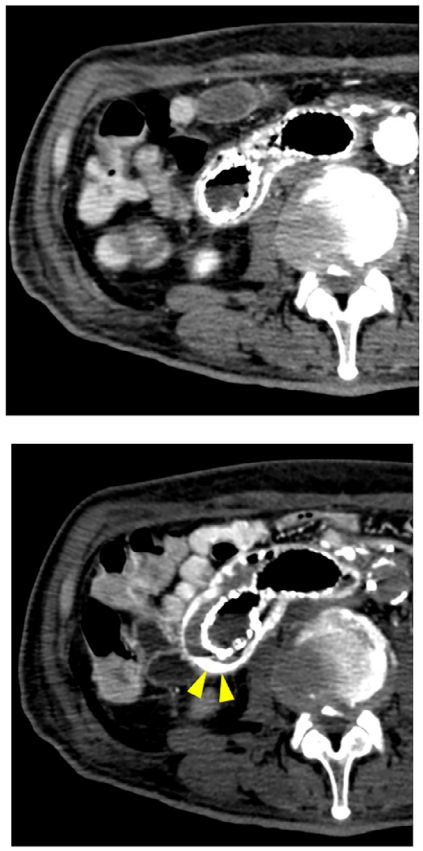

Fig. 3 – (A) Computed tomography (CT) during aortography of the thoracic descending aorta showing no extravasation in the duodenum. (B) CT during arteriography of the superior mesenteric artery showing extravasation (arrowheads) outside the covered stents in the descending portion of the duodenum.

Discussion

Endoscopy is the first-choice method for the diagnosis and treatment of nonvariceal upper gastrointestinal bleeding. Endoscopy of upper gastrointestinal bleeding was reported to have a maximum sensitivity of 98% and a maximum specificity of 100% [2,4]. However, there are several limitations of endoscopy, including the inability to perform an emergency endoscopy in critical patients, the difficulty of identifying the bleeding source in patients with massive bleeding, and the difficulty of observing the distal portion of the duodenum [5]. To our knowledge, there are no published reports in which the bleeding source could not be identified by endoscopy because bleeding occurred outside the covered stent. In this case, it is possible that the bleeding source was not identified because the 3 covered stents overlapped. Therefore, in patients with a covered stent in the duodenum, we should be extra cautious of the possibility of bleeding outside the covered stent.

The possible causes of duodenal bleeding in this case include duodenal invasion by pancreatic cancer or mechanical irritation of the duodenal mucosa owing to the fractured duodenal bare stent. The frequency of bleeding is significantly higher with bare stents than with covered stents [6]. Placement of a covered stent to treat duodenal bleeding caused by malignant tumors had hemostatic effects in 4 previously published cases [7–10]. However, all of those patients had small amounts of bleeding, and it is possible that the hemostatic effect of placing a covered stent is limited in patients with massive arterial bleeding, such as in this case. In addition, this patient also had a bare stent, and it is possible that the covered stent did not sufficiently compress the duodenal mucosa.

The sensitivity of angiography for detecting gastrointestinal bleeding varied widely across prior studies, with an average reported sensitivity of 60% [11]. The variable sensitivity is due to the intermittent nature of gastrointestinal bleeding, which can result in false negatives if active bleeding is not present during the examination [2]. Furthermore, it has been reported that more-selective angiography can improve the sensitivity for detecting upper gastrointestinal bleeding [12]. In the present case, angiography of the GDA or SMA and CT during aortography from the descending thoracic aorta did not reveal definite extravasation. However, extravasation was identified by CT during arteriography of the SMA and angiography of the IPDA. Therefore, selective CT during arteriogra-

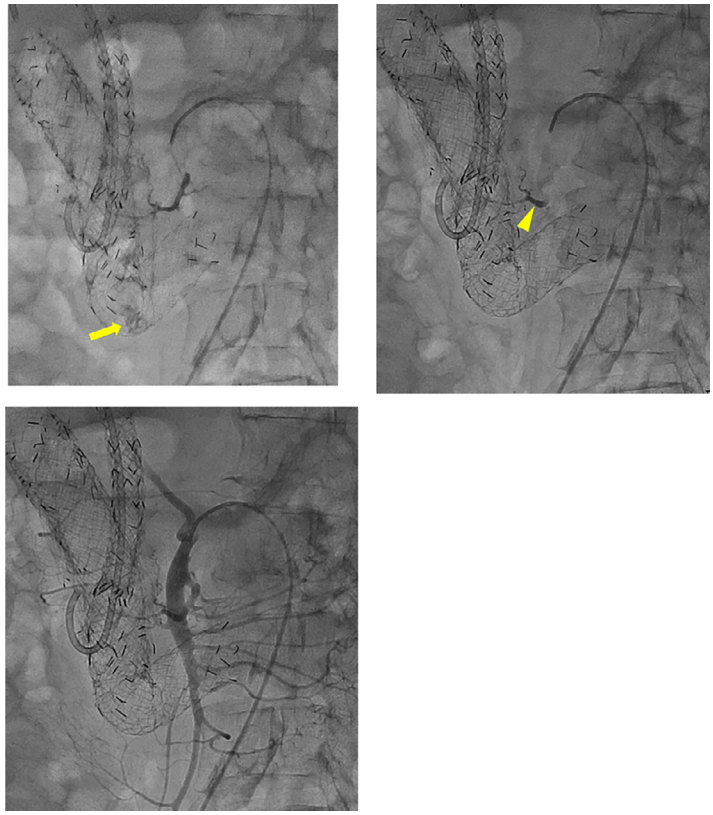

Fig. 4 – (A) Angiography of the inferior pancreaticoduodenal artery (IPDA) showing extravasation (arrow) in the descending portion of the duodenum. (B) Fluoroscopic image after embolization showing the presence of the *n*-butyl cyanoacrylate–Lipiodol mixture (arrowhead) in the IPDA. (C) Angiography of the superior mesenteric artery after embolization showing no extravasation.

phy or angiography may be necessary to increase the rate of detecting the source of gastrointestinal bleeding.

Conclusion

In patients with bleeding outside a duodenal-covered stent, it can be difficult to identify the bleeding source using upper gastrointestinal endoscopy. In this case, selective CT during arteriography and angiography revealed bleeding outside the duodenal-covered stents that was successfully treated using arterial embolization with NBCA.

Patient consent

The patient provided informed consent for the publication of this case report.

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