

Case report

Intraperitoneal bleeding from the right gastroepiploic artery by endoscopic ultrasonography: a case report

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Abstract

Objective: To describe the case of a patient with intraperitoneal bleeding from the gastroepiploic artery by endoscopic ultrasound who was successfully treated with transcatheter arterial coil embolization.

Patient and Methods: An 87-year-old man was referred to our hospital for examination of a gallbladder tumor. Endoscopic ultrasonography was performed using an oblique-view echoendoscope. After the endoscopic ultrasound, the patient went into shock. Computed tomography revealed a huge intraperitoneal hematoma and an aneurysm in the right gastroepiploic artery that were not seen on previous computed tomography images. Thus, urgent catheter angiography was performed, which showed a pseudoaneurysm of the right gastroepiploic artery and extravasation of the contrast medium from the pseudoaneurysm.

Results: Transcatheter arterial coil embolization was subsequently performed, and the bleeding stopped. Thereafter, his hemodynamics stabilized and his general condition improved. The patient was discharged 22 days post-treatment with an uneventful course.

Conclusion: Observation-only endoscopic ultrasound without invasive procedures can cause intraperitoneal bleeding due to a ruptured splanchnic artery. Thus, endoscopic ultrasonography should be performed more carefully in elderly patients.

Key words: endoscopic ultrasonography, gastroepiploic artery, intraperitoneal bleeding

(J Rural Med 2022; 17(3): 184–188)

Introduction

Endoscopic ultrasonography (EUS) is widely performed to diagnose various biliary and pancreatic diseases and is generally considered safe. However, serious complications can occur in rare cases, including gastrointestinal perforation, bleeding, and aspiration pneumonia. Moreover, although rare, they can be fatal. A prospective study of 3,324 patients reported EUS complication and mortality rates of 0.3% and 0.06%, respectively¹⁾. Here we describe a case of intraperitoneal bleeding from the right gastroepiploic artery

(GEA) during EUS using an oblique-view echoendoscope that was successfully treated with transcatheter arterial coil embolization. A ruptured splanchnic artery caused by observation-only EUS is extremely rare. Our literature review revealed no other case reports of a ruptured GEA caused by observation-only EUS.

Case Presentation

An 87-year-old man presented to another hospital with epigastric pain. Bile duct stones were detected on abdominal ultrasonography and computed tomography (CT), and endoscopic retrograde cholangiopancreatography (ERCP) was performed to remove them. During the procedure, a gallbladder tumor was discovered, for which he was later referred to our hospital for further evaluation. The patient was asymptomatic when he visited our hospital. He had a medical history of a gastric ulcer at 72 years of age but no history of abdominal surgery, hypertension, or diabetes.

Contrast-enhanced CT (CE-CT) performed at our hospital revealed a wide-based 10-mm-diameter tumor with a contrast-enhanced effect in the gallbladder. The gallbladder

Received: January 17, 2022

Accepted: March 29, 2022

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tumor was also confirmed to be in the non-contrast phase on the CT images. CT also showed mild calcification in the abdominal aorta but no other abdominal blood vessels. A high possibility of gallbladder cancer was suspected, for which EUS using an oblique-view echoendoscope was planned. Sedation was performed with intravenous midazolam 5.5 mg and pentazocine 15 mg. Despite the absence of pyloric ring stenosis, the echoendoscope could not pass through the pyloric ring. Although only transgastric observation was possible during EUS, a distorted gallbladder tumor suggestive of cancer that did not invade the liver was detected (Figure 1). Two hours after the EUS, flumazenil

was intravenously infused because the patient had not awakened from the sedation. He did not complain of abdominal pain upon awakening; however, he fainted when he stood up and entered a state of shock with a blood pressure of 78/38 mmHg. An emergent CE-CT revealed a giant intraperitoneal hematoma and an aneurysm in the right GEA that were not observed on the previous CT images (Figure 2). Blood tests showed an increased white blood cell count and a decreased hemoglobin level (Table 1). He was immediately transferred to the intensive care unit, transfused with blood, and catecholamines were administered. As a result, his vital signs stabilized. Subsequently, urgent catheter angiography

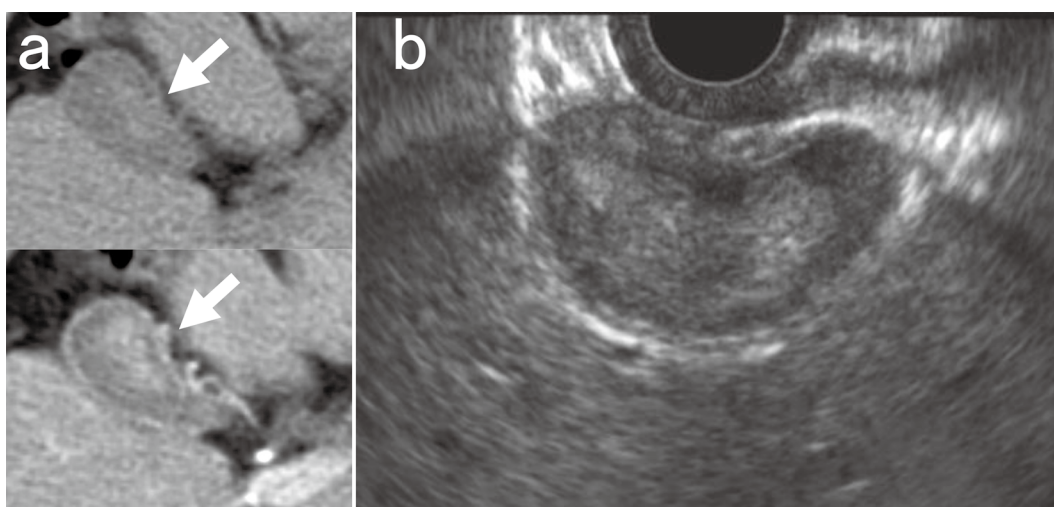


Figure 1 a: Contrast-enhanced computed tomography at our hospital revealed a wide-based 10-mm-diameter tumor (arrow) with a contrast-enhanced effect in the gallbladder. The upper image shows the non-contrast phase, whereas the lower image shows the contrast-enhanced phase. The gallbladder tumor was also confirmed in the non-contrast phase on computed tomography. b: Endoscopic ultrasonography revealed a distorted gallbladder tumor suggestive of cancer that did not progress to the liver.

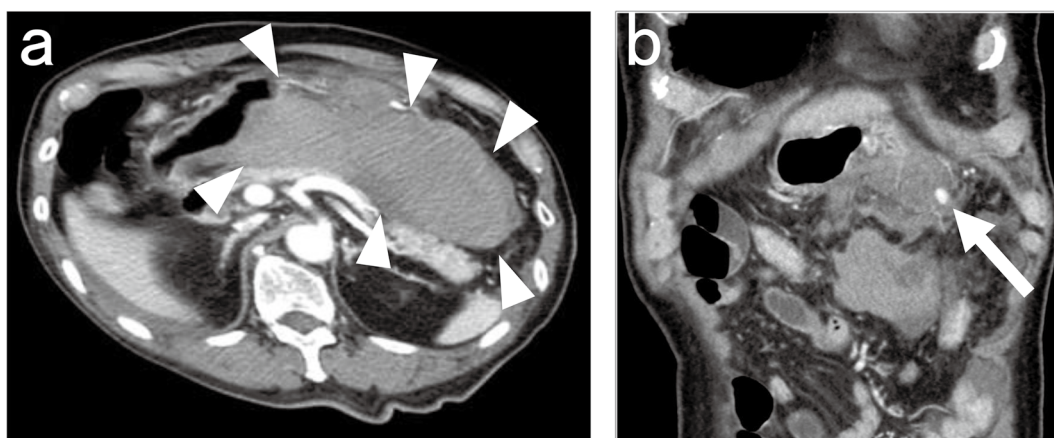


Figure 2 Emergency contrast-enhanced computed tomography revealed a peritoneal hematoma (arrowhead) and an aneurysm (arrow) in the right gastroepiploic artery that was not observed on previous computed tomography images. a: Image of intraperitoneal hematoma. b: Image of the aneurysm in the right gastroepiploic artery.

revealed a pseudoaneurysm of the right GEA and extravasation of the contrast medium from the pseudoaneurysm. Coil embolization was subsequently performed. The blood vessels flowing out of the pseudoaneurysm were coil-embolized first, followed by the blood vessels flowing into the pseudoaneurysm, which isolated the pseudoaneurysm and stopped the bleeding (Figure 3).

After embolization of the coil, the patient's hemodynamics stabilized and his general condition improved. No re-bleeding was observed thereafter. He was transferred to the general ward 4 days post-treatment and discharged 22 days post-treatment, with an uneventful course. Since the patient did not wish to undergo surgery or systemic chemotherapy for the gallbladder tumor, it was not examined further.

This case report was conducted in accordance with the principles of the Declaration of Helsinki. Oral informed consent was obtained from the patient for the publication of his case and any accompanying images.

Discussion

Splanchnic artery aneurysms (SAA) are rare, accounting for 0.1% of cases based on autopsy statistics². Among them, gastropiploic artery aneurysms (GEAA) are extremely rare and have an incidence of approximately 0.1%–0.4%^{3,4}. Most SAA cases originate from splenic artery aneurysms (60%), followed by hepatic artery aneurysms (20%), superior mesenteric artery aneurysms (5.5%), celiac artery aneurysms (4%), and GEA (0.4%)³. SAA are associated with arteriosclerosis, aortic dissection, infection, inflammation, trauma, and vasculitis⁵. The mortality rate after SSA rupture is reportedly as high as 70%; therefore, cases should be treated early after discovery⁶.

Typical symptoms of ruptured GEAA are abdominal pain, unconsciousness, and shock secondary to intraperitoneal hemorrhage⁷. Many patients were previously diagnosed using angiography. However, increasing numbers of

Table 1 Laboratory data

WBC	12,200/ μ L	T-BIL	0.9 mg/dL	PT	55%
RBC	335×10^4 / μ L	LDH	136 IU/L	APTT	32.5 sec
Hb	11.3 g/dL	ALP	231 IU/L		
Plt	13.0×10^4 / μ L	γ -GTP	31 IU/L	CEA	0.9 ng/mL
		Na	140 mEq/L	CA19-9	9.2 U/mL
TP	4.6 g/dL	K	3.8 mEq/L		
Alb	2.6 g/dL	BUN	16.0 mg/dL		
AST	19 IU/L	Cre	1.04 mg/dL		
ALT	17 IU/L	CRP	0.0 mg/dL		

WBC: white blood cell; RBC: red blood cell; Hb: hemoglobin; Plt: platelet; TP: total protein; Alb: albumin; AST: aspartate aminotransferase; ALT: alanine aminotransferase; T-BIL: total bilirubin; LDH: lactate dehydrogenase; ALP: alkaline phosphatase; γ -GTP: γ -glutamyltransferase; BUN: blood urea nitrogen; Cre: creatinine; CRP: C-reactive protein; PT: prothrombin time; APTT: activated partial thromboplastin time; CEA: carcinoembryonic antigen; CA19-9: carbohydrate antigen 19-9.

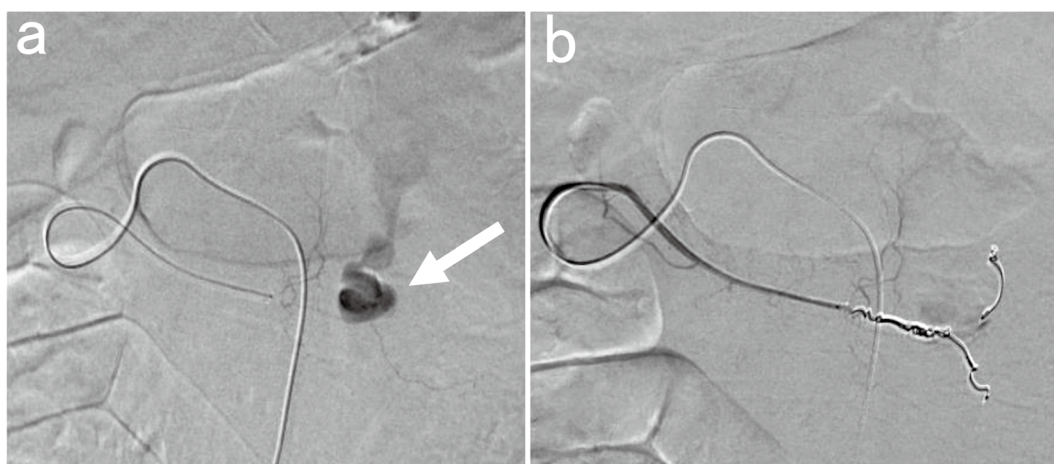


Figure 3 A pseudoaneurysm of the right gastroepiploic artery (a) and extravasation of the contrast medium from the aneurysm (arrow) were observed. Transcatheter arterial coil embolization was subsequently performed and the bleeding stopped (b).

patients are being diagnosed with CE-CT. CE-CT is a very useful method for diagnosing ruptured GEAA because of its low invasiveness and high resolution⁸.

Previous reports demonstrated that GEAA ruptures are treated by surgical therapy, including open surgery^{9, 10}, laparoscopic surgery¹¹, or transcatheter arterial embolization (TAE)^{12, 13}. The treatment strategy for ruptured GEAA depends on the patient condition and comorbidities. Open surgery should be immediately performed to control bleeding in patients with unstable vital signs, and laparoscopic surgery can be the treatment of choice for patients with stable vital signs. TAE is another treatment of choice for patients with stable vital signs and a high risk for surgery⁸. Our patient was at high risk for surgery because of his advanced age, and his vital signs were relatively stable with fluid replacement and blood transfusion; therefore, TAE, which is less invasive than surgery, was performed. Hemostasis was successfully achieved without rebleeding post-procedure, and the patient had an uneventful course.

In our case, GEAA was not identified on CE-CT before EUS; therefore, it was considered to have formed during EUS by the load on the right GEA. Intraperitoneal bleeding after gastrointestinal endoscopy without invasive endoscopic procedures is rare, especially that from the GEA. Although a few reports of SAA rupture by gastrointestinal endoscopy have been published¹⁴, no other reports of intraperitoneal bleeding from the GEA by observation-only EUS were identified in our literature review. Our case is considered very rare. In our patient, the echoendoscope did not pass through the pyloric ring because the stomach was stretched by pushing, and the pushing force was insufficient to pass the pyloric ring. We considered the following as pos-

sible mechanisms of the right GEA bleeding: pushing the scope caused pain due to gastric hyperextension, which then increased the blood pressure; and the right GEA, which was fragile due to arteriosclerosis, was torn and caused a pseudoaneurysm and bleeding.

The safety of EUS in older adults is controversial. According to a report targeting 600 patients who underwent ERCP and 400 who underwent EUS, the complication rates did not change, even in older adults¹⁵. However, a study targeting 5,586 patients who underwent gastrointestinal endoscopy and 2,484 who underwent colonoscopy reported that older age contributed significantly to increased complication rates¹⁶. Fewer EUS procedures are performed than gastrointestinal endoscopy or colonoscopy; thus, evaluating its safety in older adults is difficult. Our findings suggest that EUS should be performed more carefully in elderly patients.

Conclusion

Here we described a rare case of intraperitoneal bleeding from the right GEA detected by observation-only EUS using an oblique-view echoendoscope. The patient was successfully treated with transcatheter arterial coil embolization. Observation-only EUS can cause intraperitoneal bleeding due to splanchnic artery rupture. EUS should be performed more carefully in elderly patients.

Acknowledgments

The authors thank the staff who treated our patient at Chiba University Hospital. We also like to thank Enago for the English language review.

References

1. Mortensen MB, Fristrup C, Holm FS, *et al*. Prospective evaluation of patient tolerability, satisfaction with patient information, and complications in endoscopic ultrasonography. *Endoscopy* 2005; 37: 146–153. [[Medline](#)] [[CrossRef](#)]
2. Jakschik J, Decker D, Vogel H, *et al*. [Acute upper gastrointestinal hemorrhage caused by ruptured aneurysm of the right gastroepiploic artery]. *Zentralbl Chir* 1993; 118: 157–159 (in German). [[Medline](#)]
3. Stanley JC, Wakefield TW, Graham LM, *et al*. Clinical importance and management of splanchnic artery aneurysms. *J Vasc Surg* 1986; 3: 836–840. [[Medline](#)] [[CrossRef](#)]
4. Funahashi S, Yukizane T, Yano K, *et al*. An aneurysm of the right gastroepiploic artery. *J Cardiovasc Surg (Torino)* 1997; 38: 385–388. [[Medline](#)]
5. Takemoto YK, Fujikuni N, Tanabe K, *et al*. A rare case of spontaneous rupture of an aneurysm of the right gastric artery. *Int J Surg Case Rep* 2017; 40: 27–31. [[Medline](#)] [[CrossRef](#)]
6. Chandran S, Parvaiz A, Karim A, *et al*. Ruptured left gastric artery aneurysm successfully treated by thrombin injection: case report and literature review. *Scientific World Journal* 2005; 5: 20–23. [[Medline](#)] [[CrossRef](#)]
7. Sarigoz T, Carkit S, Topuz O, *et al*. Spontaneous rupture of right gastroepiploic artery aneurysm: a rare cause of hemorrhagic shock. case report. *Sao Paulo Med J* 2018; 136: 488–491. [[Medline](#)] [[CrossRef](#)]
8. Ishimine T, Tengan T, Nakasu A, *et al*. Successful transcatheter arterial embolization of a ruptured right gastroepiploic artery aneurysm: a case report. *Int J Surg Case Rep* 2018; 51: 158–160. [[Medline](#)] [[CrossRef](#)]
9. Faler B, Mukherjee D. Hemorrhagic shock secondary to rupture of a right gastroepiploic artery aneurysm: case report and brief review of splanchnic artery aneurysms. *Int J Angiol* 2007; 16: 24–26. [[Medline](#)] [[CrossRef](#)]
10. Ashrafi AS, Horkoff MJ, Yousuf J, *et al*. Ruptured gastroepiploic artery aneurysm: a case report. *Int J Surg Case Rep* 2017; 41: 132–133. [[Medline](#)] [[CrossRef](#)]
11. Murakami Y, Saito H, Shimizu S, *et al*. A case of unruptured right gastroepiploic artery aneurysm successfully resected by laparoscopic surgery. *Yonago*

- Acta Med 2017; 60: 56–58. [\[Medline\]](#)
12. Shimohira M, Ogino H, Kitase M, *et al.* Embolization of a right gastroepiploic artery pseudoaneurysm associated with Churg-Strauss syndrome. *J Vasc Interv Radiol* 2008; 19: 301–302. [\[Medline\]](#) [\[CrossRef\]](#)
 13. Koganemaru M, Abe T, Nonoshita M, *et al.* Follow-up of true visceral artery aneurysm after coil embolization by three-dimensional contrast-enhanced MR angiography. *Diagn Interv Radiol* 2014; 20: 129–135. [\[Medline\]](#)
 14. Ueda M, Yamaguchi H, Kagawa Y, *et al.* [Intra-abdominal bleeding caused after esophagogastroduodenoscopy: a case report]. *Nihon Shokakibyo Gakkai Zasshi* 2020; 117: 985–991 (in Japanese, Abstract in English). [\[Medline\]](#)
 15. Benson ME, Byrne S, Brust DJ, *et al.* EUS and ERCP complication rates are not increased in elderly patients. *Dig Dis Sci* 2010; 55: 3278–3283. [\[Medline\]](#) [\[CrossRef\]](#)
 16. Miyanaga R, Hosoe N, Naganuma M, *et al.* Complications and outcomes of routine endoscopy in the very elderly. *Endosc Int Open* 2018; 6: E224–E229. [\[Medline\]](#) [\[CrossRef\]](#)