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CASE REPORT

Transcatheter Arterial Embolization of Pseudoaneurysm after Endoscopic Ultrasound-guided Hepaticojejunostomy: A Case Report

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Abstract:
Endoscopic ultrasonography-guided biliary drainage has been reported as an alternative technique when transpapillary endoscopic biliary drainage fails. This case study describes a case of pseudoaneurysm, one of the complications unique to endoscopic ultrasonography-guided biliary drainage. An 87-year-old woman who underwent endoscopic ultrasonography-guided hepaticojejunostomy with a partially covered metallic stent developed hematochezia. Contrast-enhanced computed tomography revealed a pseudoaneurysm of the left hepatic artery adjacent to the stent. During coil embolization, angiography revealed bleeding, passing through the covered portion of the stent into the jejunum, and coil embolization was successfully performed. In cases after bile duct stent placement, where a tamponade effect can be expected, hepatic artery pseudoaneurysm may occur as a complication of puncture, and embolization may be required.

Keywords:
pseudoaneurysm, embolization, endoscopic ultrasonography-guided biliary drainage, endoscopic ultrasonography-guided hepaticojejunostomy

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Introduction

Acute cholangitis is a common condition that ranges from mild to severe. In life-threatening cases, prompt and appropriate interventions are essential. Endoscopic biliary drainage (EBD) is the first-line treatment.

Recently, endoscopic ultrasonography-guided biliary drainage (EUS-BD) has been reported as an alternative drainage technique in the case that transpapillary EBD fails [1]. There are various types of EUS-BD, including EUS-guided choledochoduodenostomy, EUS-guided hepaticogastrostomy (EUS-HGS), and EUS-guided hepaticojejunostomy (EUS-HJS). EUS-BD involves the creation of a new drainage pathway, which is related to several complications unique to EUS-BD, including bile leak, peritonitis, bleeding, pseudoaneurysm, internal stent migration, perforation of the gastrointestinal tract, and portobiliary fistula [2]. Although there are few reports of complications related to EUS-BD, severe complications can occur, requiring clinicians to be proficient in the diagnosis and treatment. This case describes a pseudoaneurysm adjacent to the stent that caused hematochezia and hyperbilirubinemia 1 month after EUS-HJS, which was detected on contrast-enhanced CT (CECT) and treated with TAE.

Case Report

An 87-year-old woman presented to our emergency department with a chief complaint of hematochezia. Her medical history included a total gastrectomy and Roux-en-Y anastomosis for gastric cancer and an intraductal papillary neoplasm of the bile duct. In addition, EUS-HJS was performed 1 month prior to admission. Under EUS guidance, the bile duct was punctured from the jejunum using a 19 G needle through the liver parenchyma. After dilation of the puncture route, an HJS was created with a partially covered metallic stent (Spring Stopper, 8 mm × 12 cm [Taewoong Medical, Gimpo, South Korea]) (**Fig. 1**).

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On admission, the initial investigation results revealed significant anemia (hemoglobin 5.1 g/dL). However, CECT of the abdomen and pelvis did not reveal a cause of the anemia. Blood transfusion was performed, and a gastrointestinal endoscope was scheduled on a standby basis. On day 4 of hospitalization, the patient again developed hematochezia. Blood test results showed worsening anemia (decrease in hemoglobin from 10.7 to 7.3 g/dL). An esophagogastroduodenoscopy performed on day 4 of hospitalization showed no active bleeding from the stent insertion site, and no other clear source of bleeding was identified. A CECT was conducted on day 4 of hospitalization, and revealed a pseudoaneurysm of the left hepatic artery adjacent to the EUS-HJS stent (**Fig. 2**), with no evidence of hematoma in the jejunum or around the stent insertion site. Bleeding from the pseudoaneurysm was suspected to be the cause of the anemia, and TAE was performed on day 5 of hospitalization.

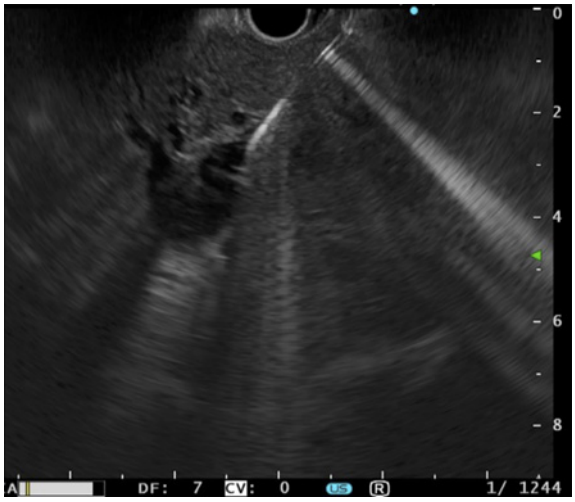

Figure 1. Ultrasound images during the EUS-HJS procedure show that dilated B3 is punctured and the puncture needle does not pass through the blood vessel.
EUS-HJS: endoscopic ultrasonography-guided hepaticojejunostomy

An introducer sheath was inserted into the right common femoral artery, and a 4 French catheter (shepherd hook type [Hanaco Medical, Saitama, Japan]) was advanced. Celiac angiography revealed a pseudoaneurysm in the left hepatic artery adjacent to the stent (**Fig. 3**). The outflow tract of pseudoaneurysm was accessed using a 1.9 French microcatheter (Progreat lambda19 [Terumo, Tokyo, Japan]), and coil embolization (C-STOPPER COIL 0.016 inch 30 mm ×2, 0.014 inch 30 mm×1 [Piolax Medical Device, Kanagawa, Japan], Hilal 0.018 inch ×2 [Cook Medical, Bloomington, IN]) was performed using an isolation technique. During coil embolization, after placing the coil distal to the pseudoaneurysm, the pseudoaneurysm ruptured, leading to active bleeding to the jejunum through the stent (**Fig. 4**). The proximal portion of the pseudoaneurysm was then immediately embolized with coils. A subsequent hepatic angiogram showed the disappearance of the pseudoaneurysm, which confirmed appropriate embolization.

The patient's condition was stable after TAE, and blood test results on day 1 after TAE revealed improvements in anemia. On day 7 after TAE, colonoscopy showed no evidence of hematoma entering from the ileocecum, and no other clear source of bleeding was identified. The postoperative course was uneventful, and the patient was discharged on day 20 of hospitalization (**Fig. 5**).

Discussion

HJS is a technique similar to HGS and is used in patients with anastomosis between the esophagus and jejunum after total gastrectomy. In the HGS/HJS group, the intrahepatic bile duct in the lateral segment of the liver is punctured un-

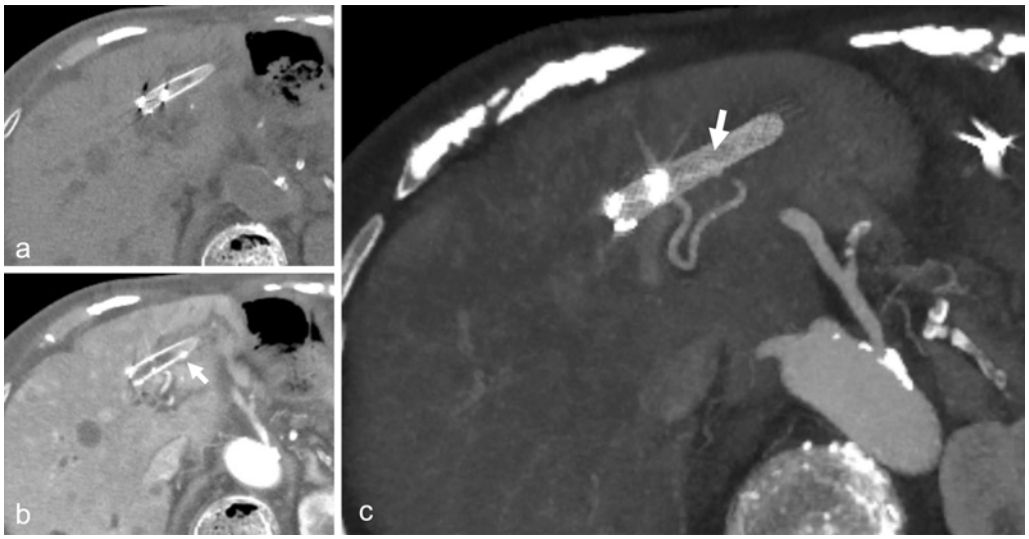

Figure 2. By comparing non-contrast CT (a) with CECT (b), it is possible to identify a pseudoaneurysm that exists along the bile duct stent. The slab maximum intensity projection (c) suggests continuity between the pseudoaneurysm (arrow) and the left hepatic artery.
CECT: contrast-enhanced CT

der EUS guidance. Arterial injury or pseudoaneurysm can occur during or after EUS-HGS via the needle puncture route, with a reported frequency of 3.7% [3], and stent placement often achieves hemostasis by compressing the injured vessels [2, 3]. In this case, a partially covered metallic stent was placed, and the possibility of bleeding from the puncture site was not initially anticipated. However, the contrast agent entered the uncovered portion, bypassing the covered portion of the stent and flowed into the jejunum; based on the behavior of the contrast agent, we inferred that bleeding had occurred in the same manner. This suggests that stent placement did not completely occlude the blood supply to the pseudoaneurysm.

Figure 3. A celiac angiogram showing a pseudoaneurysm (arrowhead) of the left hepatic artery (A3, arrow) adjacent to the stent of HJS.
HJS: hepaticojejunostomy

CECT is useful for diagnosing postoperative bleeding or pseudoaneurysms. In this case, as in previous reports [4, 5], the pseudoaneurysm was found adjacent to the stent. It is important to note that detecting pseudoaneurysms on CECT can be challenging due to metallic streak artifacts from the stent. Reformatted images may reveal arterial injuries more

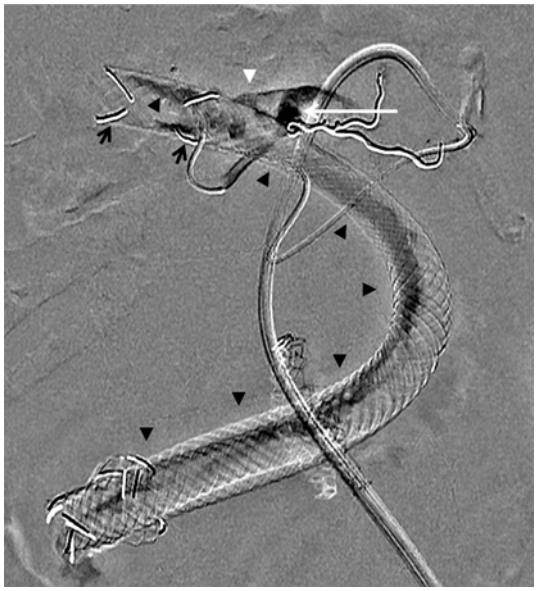

Figure 4. An angiogram during coil embolization showing a ruptured pseudoaneurysm (white arrow). The HJS is created with a partially covered self-expandable metal stent (Spring Stopper). The area between the X-ray markers (black arrows) is the uncovered portion. The contrast agent is distributed around and borders the covered portion of the stent (white arrowhead). In the uncovered portion, contrast is distributed in the lumen and drains toward the jejunum (black arrowheads).
HJS: hepaticojejunostomy

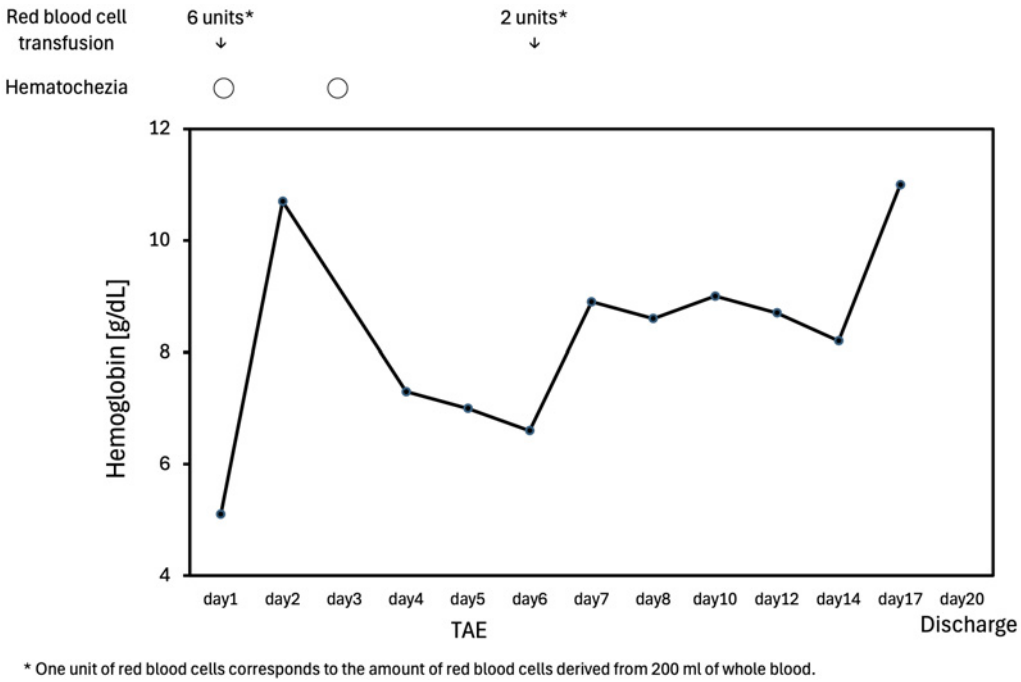

Figure 5. The clinical course of the patient. The postoperative period was uneventful.

clearly than axial images alone [6]. Therefore, it is essential to carefully examine the puncture route and the area adjacent to the stent using reconstructed images. However, a CT scan may not identify the source of bleeding, and angiography should be considered.

When selecting embolic materials for TAE, various factors are considered, including the parent artery and the patient's coagulation status. Coils were chosen as the embolic material to prevent unnecessary non-target embolization and achieve the intended isolation. If the patient had impaired coagulation or unstable vital signs at the start of TAE, n-BCA was considered from the outset. Additionally, if it was impossible to advance the catheter distal to the pseudoaneurysm, n-BCA was considered. Previous reports [4, 5] have utilized coils as the embolic material.

In this case, a pseudoaneurysm ruptured during the embolization procedure. In a previous study, the incidence of rupture during embolization of visceral artery pseudoaneurysms has been reported as 6% (3/47). This is suggested to be related to the increase in internal pressure of the pseudoaneurysm after distal embolization, as well as the manipulation of microcatheter and microguidewire [7]. A similar mechanism is suspected in this case as well. It may be useful to either handle the microcatheter and microguidewire carefully or avoid inserting them distal to the pseudoaneurysm to prevent rupture of the pseudoaneurysm. Additionally, it may be useful to avoid using high injection pressures for contrast media or to refrain from using contrast altogether to prevent an increase in the internal pressure of the pseudoaneurysm. After the rupture of the pseudoaneurysm, coil embolization was performed. The additional coil placement could be performed more immediately than n-BCA injection because preparation was required for the use of it. Isolation was successfully achieved, and no severe complications arose.

This study has been presented at the 53rd annual meeting of the Japanese Society of Interventional Radiology.

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Conflict of Interest: None

Author Contribution: Study conception: MI, SW. Investigation: MI. Writing: MI. Critical review and revision: all authors. Final approval of the article: all authors.

Informed Consent: Written informed consent was obtained from the patient both for the procedure and the publication of the case report.

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