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Case Report

Balloon-occluded antegrade transvenous obliteration of rectal varices: A case report☆,☆☆,★

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ABSTRACT

Patients with liver cirrhosis frequently experience rectal variceal bleeding subsequent to portal hypertension. Unlike gastroesophageal variceal bleeding, a well-established guideline does not exist in terms of management of bleeding rectal varices. A 75-year-old male with non-alcoholic-steatohepatitis induced cirrhosis presented with a 3-day history of severe rectorrhagia. Considering patient's clinical history, TIPS was not performed and thus, a novel endovascular technique termed balloon-occluded antegrade transvenous obliteration was considered. Under conscious sedation, an occlusion was made through balloon catheter by sclerotic agents including air/sodium tetradecyl sulfate/Lipiodol. After the procedure, and in the 6 months follow up period the patient's hemodynamic status was stable and he recovered without any serious complications. Balloon-occluded antegrade transvenous obliteration is a feasible and safe modality for treating rectal varices bleeding and could be used as an alternative approach in patients with contraindications to traditional treatments.

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Abbreviations: EUS, endoscopic ultrasound; TIPS, trans-jugular intrahepatic portosystemic shunt; BATO, balloon-occluded antegrade transvenous obliteration; NAFLD, non-alcoholic fatty liver disease; US, ultrasound; CT, computed tomography; SMV, superior mesenteric vein; ICU, intensive care unit; FFP, fresh frozen plasma; HIPAA, Health Insurance Portability and Accountability Act; IMV, inferior mesenteric vein; STS, sodium tetradecyl sulfate; EIS, endoscopic injection sclerotherapy; BRTO, balloon-occluded retrograde transvenous obliteration; AVP2, amplatzer vascular plug 2.

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Introduction

Rectal varices are portosystemic collaterals that develop subsequent to portal hypertension and are defined as dilated veins originating from 4 or more centimeters above the anal verge [1]. The prevalence of rectal varices is between 38% and 56% in cirrhotic patients but it can be as high as 94% in patients with extrahepatic portal vein obstruction [2]. Massive hemorrhage is a rare complication of rectal varices that occurs in only 0.5%-5% of cases; nevertheless, it is life-threatening and requires prompt treatment [3]. Rectal varices are mainly diagnosed by conventional endoscopy but endoscopic ultrasound (EUS) and color Doppler ultrasonography have also shown high diagnostic accuracy [4,5]. As for the management of rectal varices, various modalities have been introduced including beta-blockers, trans-jugular intrahepatic portosystemic shunt (TIPS), embolization, endoscopic band ligation and injections, and balloon-occluded antegrade transvenous obliteration (BATO); however, no established guideline exists in terms of the optimal management strategy [6,7].

BATO is an endovascular technique that causes occlusion of the venous outflow by using a balloon which is then followed by the injection of a sclerosing agent into the varices [8]. To our knowledge, thus far, BATO has been applied for the management of only 5 patients with rectal variceal bleeding who were not suitable candidates for TIPS. Herein, we report our successful attempt of treating active rectal variceal bleeding in a 75-year-old man with cirrhotic non-alcoholic fatty liver disease (NAFLD) using the BATO technique.

Case presentation

A 75-year-old conscious man with a 7-year history of NAFLD cirrhosis and portal hypertension presented with severe rectorrhagia starting from 3 days ago, which was accompanied by fatigue and dizziness. He did not report hematemesis or abdominal pain but complained of long-term constipation. On physical examination, the patient had pale conjunctiva and nonicteric sclera. His abdomen was soft without tenderness on palpation; however, moderate ascites was detectable. Digital rectal examination was positive for bright red blood without any evidence of hemorrhoids. The patient reported a previous episode of esophageal variceal bleeding that had required endoscopic band ligation. He also had a history of heart failure, hypertension and diabetes mellitus for which he was taking daily propranolol, losartan, furosemide and regular insulin injections.

Upon hospital admission, routine lab tests were performed, indicating the presence of microcytic anemia (hemoglobin: 6.8 g/dl [reference range 12-15], mean corpuscular volume: 78 fl [reference range 80-97]). Initial patient's lab data were as follow: platelet (Plt): 60 K/ul [reference range 140-400], and albumin: 3.3 g/dl [reference range 3.88-5.82]. Other routine laboratory test results were normal. Initial evaluation with upper endoscopy showed stable esophageal varices with no active bleeding but further assessment with colonoscopy revealed grade 3-4 ectopic rectal variceal bleeding with the red color sign being present. Abdominal ultrasound (US) and contrast-enhanced computed tomography (CT) were also performed. US findings were consistent with liver cirrhosis, partial thrombosis of portal vein and complete thrombosis of superior mesenteric vein (SMV), and moderate amount of ascites. CT also confirmed US findings (Figs. 1A-D).

Although the patient was hemodynamically stable at the time of admission (table 1), he started to display signs of hypovolemia within hours. To maintain hemodynamic stability, he was admitted to the intensive care unit (ICU) and received multiple units of packed red blood cell, fresh frozen plasma (FFP) and platelet transfusion as well as terlipressin and carvedilol. As the patient had a history of heart failure, TIPS procedure was not feasible; thus, interventional radiology was consulted to consider alternative endovascular treatment options. Eventually, the patient was referred to the interventional radiology ward for consideration of BATO.

Written informed consent was obtained from the patient prior to the procedure. Our university hospital ethical board committee has approved the present study and, it was performed in compliance with the 1996 Health Insurance Portability and Accountability Act (HIPAA). The procedure was performed under conscious sedation. First, under the guidance of US, a 10F peritoneal drainage catheter was inserted into the abdomen and 3 liters of clear ascites fluid was drained.

Subsequently, ultrasound-guided percutaneous transhepatic puncture was performed using an 18-gauge Chiba needle and a 6F vascular sheath was successfully inserted into the right portal vein branch (Fig. 2A). Initial splenoportography and mesenteric venography (achieved by using a 5F Cobra catheter) displayed antegrade flow down the inferior mesenteric vein (IMV) and superior rectal vein (Fig. 2B). A balloon catheter with a diameter of 8*40 mm (Abbott Vascular, Armada 35, Costa Rica) was implanted in the superior rectal vein, proximal to the dilated variceal veins. Then, the balloon catheter was inflated to occlude the flow and superselective contrast was injected in the rectal varix via the balloon catheter, demonstrating enlarged rectal varices without connecting directly into the systemic circulation (Fig. 2C). Subsequently, as the balloon was inflated, a 3:2:1 ratio of air/sodium tetradecyl sulfate (STS)/lipiodol with 9 ml air, 6 ml of STS 3% and 3 IU Lipiodol (Ultra fluid, Guerbet, France) were injected into the rectal varix (Fig. 2D). The balloon was kept inflated for 3 hours and then deflated. After balloon deflation, three 7mm coils (MReye Embolization Coil, COOK medical, Denmark) were placed to achieve a satisfactory stasis (Fig. 2E). Contrast injection of IMV revealed complete rectal variceal obstruction. Since increase in the hepatic venous pressure gradient may worsen pre-existing esophageal varices, four 8 mm coils (MReye Embolization Coil, COOK medical, Denmark) were used for prophylactic obliteration (Fig. 2F). After the procedure, the patient's hemodynamic status was stable and he recovered without any serious complications. At the time of last follow-up, approximately 6 months after the procedure, the patient did not report any further episodes of bleeding and his hemoglobin level had remained above 10 mg/dl. However, he had experienced raised creatinine levels and died shortly after due to renal failure complications. Unfortunately an autopsy did not performed.

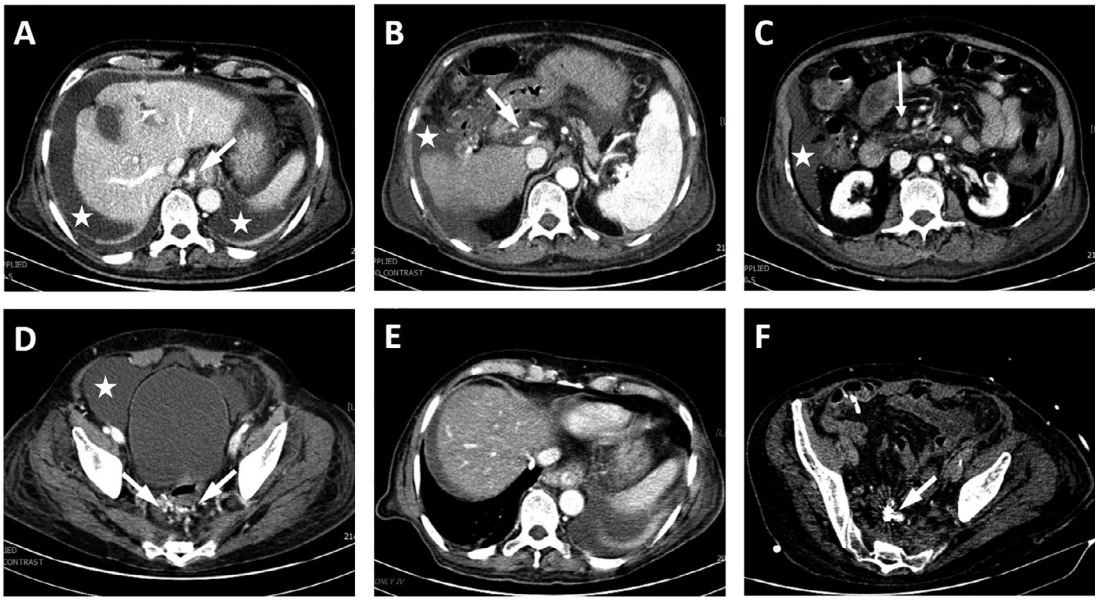

Fig. 1 – (A-D) **Axial abdominopelvic CT images with iodinated contrast material 1 day before embolization. (A) Coronary vein and esophageal varices *(arrow)* appeared in gastrohepatic and paraesophageal spaces. (B) Portal vein partial thrombosis *(arrow)* and (C) complete superior mesenteric vein thrombosis were detected. (D) Dilated variceal veins were observed around the rectum and moderete ascitis was noted in the abdominopelvic ccavity *(asterisk)*.** (E-F) **Follow-up study after 10 days. (E) Disappearance of esophegeal varices is noted. (F) Rectal variceal oblitration and residual Lipiodol are seen.**

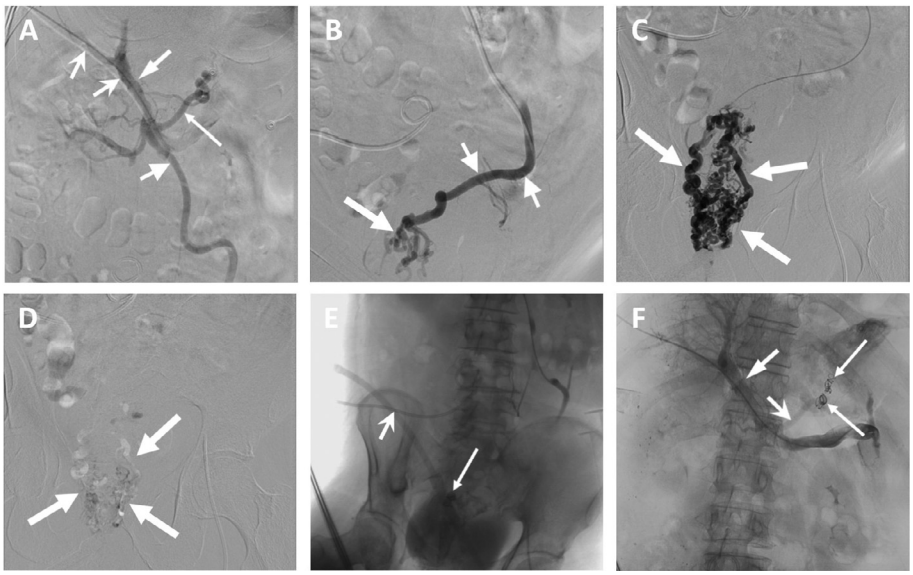

Fig. 2 – (A-E) **Percutaneous transhepatic portography with selective catheterization of the inferior mesenteric vein and rectal varix. (A) Portogram demonstrates a 6F vascular sheath *(wide arrows)* in a right portal vein branch and the main portal vein *(arrow)*. The left gastric vein *(thin arrows)* in the proximal of the main portal vein and inferior mesenteric vein *(thick arrow)* are noted. (B) The inferior mesenteric venogram shows inferior mesenteric vein *(thick arrow)* and rectal varices *(long arrow)*. (C) The super selective rectal vein venogram with balloon catheter shows serpiginous variceal veins around the rectum *(long arrow)*. (D) The rectal varices were successfully occluded with sclerotic agents *(long arrow)*. Negative air contrast beside Lipiodol particles is noted. (E) Embolization coils are depicted in the pelvic *(thin arrows)*. Peritoneal drainage catheter is depicted in mid-abdomen *(wide arrow)*. (F) Portography shows successful occlusion of the left gastric vein *(wide arrow)* and esophageal varix with coils *(thin arrow)*.**

Discussion

Two different venous plexuses are formed by the rectal veins; the intrinsic plexus that lies in the submucosa and the extrinsic plexus, which is situated outside of the muscular wall of the rectum. The intrinsic venous plexus itself consists of 2 groups of veins that drain in opposite directions; dilation of the submucosal vessels of the superior group is responsible for rectal varices. The variceal veins generate a shunt between the portal and systemic circulation via anastomosis between the superior rectal vein, and the middle and inferior rectal veins [9]. In other words, rectal variceal veins shunt blood from high-pressure portal circulation to low-pressure systemic circulation with the purpose of decreasing portal venous pressure [1].

The prevalence of rectal varices in cirrhotic patients ranges between 38% and 56% [2]; nevertheless, life-threatening variceal bleeding manifesting as massive hematochezia is a rare incident [3]. Although a definite guideline for the management of rectal varices has not yet been established, a variety of strategies from medical and endoscopic treatment to more invasive approaches such as interventional radiology (e.g. TIPS, embolization and BATO) or surgical procedures have demonstrated acceptable efficacy.

Initially introduced in 1982, TIPS remains the gold standard treatment for upper gastrointestinal variceal bleeding [10]. TIPS has also been shown to be effective for the management of bleeding rectal varices, both as a bridge to transplantation and as a definite treatment for patients with severe hepatic decompensation who are not suitable candidates for surgery [1]. Despite this, TIPS is associated with serious adverse events such as increased susceptibility to encephalopathy, recurrent bleeding and a 3%-15% risk of mortality [6,10].

Another frequently used method is embolization, which applies materials such as coils, thrombin, gel foam and ethanol to occlude the feeding veins to the rectal varices. Embolization has a high risk of failure and rebleeding after 1 year; therefore, it is mostly performed in combination with band ligation or TIPS to reduce its undesirable outcomes. In a retrospective study on 32 patients with rectal varices treated with endoscopic injection sclerotherapy (EIS), all patients were successfully managed without developing any serious complications; however, after 1-year follow up, 24% experienced recurrent bleeding [11]. In another study by Misra et al., EIS showed fewer recurrence rates and complications in comparison to endoscopic band ligation [12]. Successful outcomes have also been reported with endoscopic ultrasound-guided glue injection followed by embolization coils but serious glue-related side effects such as systemic embolization, stroke and multi-organ failure have limited its application [13].

More recently, BATO and balloon-occluded retrograde transvenous obliteration (BRTO) have been used as alternative or complementary therapies for managing gastric variceal bleeding. However, there have been minimal attempts to use this technique for control of bleeding ectopic varices such as rectal varices.

To date, very few cases have been reported in the literature that have used BATO for the management of rectal variceal bleeding [8,14–19]. In one of these reports, BATO was successfully considered for treating persistent large rectal variceal bleeding in a 51-year-old man with decompensated cirrhosis. This patient also underwent liver transplant 19 days after BATO and did not report further bleeding at 6 months follow-up. According to the authors, this treatment decision was made on the basis of size of the varix and the patients' history of encephalopathy and coagulopathy [17]. Minamiguchi and colleagues used BATO in combination with microcoil embolization for managing bleeding in 2 patients with treatment-refractory rectal varices; microcoil embolization was applied to reduce the risk of recanalization. Follow-up endoscopy showed successful variceal eradication in both patients [18]. In another study by Okazaki et al., BATO yielded promising results in a patient with hepatic encephalopathy and poor hepatic reserve. In this study, the balloon was kept inflated for 24 hours and no major complications were reported. Four-weeks after the procedure, follow-up sigmoidoscopy indicated disappearance of rectal varices [15]. For the first time in 2016, a novel technique was introduced by Abdel-Aal and colleagues, which simultaneously used BATO and amplatzer vascular plug 2 (AVP2) to treat bleeding rectal varices [19]. This novel modality was used to treat a 59-year-old female with NASH induced cirrhosis with rectal variceal bleeding who had a history of encephalopathy and portal vein thrombosis. The intention of applying AVP2 was to prevent intraperitoneal bleeding. During the follow-up period, no further bleeding and signs of recanalization were reported.

In the case presented here, BATO was considered as an alternative therapy for treating rectal varices as the patient was not a suitable candidate for TIPS. Furthermore, endoscopic band ligation and EIS were not used due to factors such as patient's hemodynamic and also high risk of recurrence and developing complications with this method. Similar to most of the previously reported studies, we used a percutaneous transhepatic technique to reach the portal system. However, Shin et al. reported using a transjugular intrahepatic approach to gain access to the portal system in a patient with coagulopathy, thrombocytopenia, and large ascites. The authors hypothesized that this approach will avoid traversal of liver capsule, thus, minimizing the risk of access-related hemorrhagic complications. Although complete eradication of rectal varices was achieved with this technique, an episode of hematemesis was observed 36 hours following the procedure, which was successfully managed with endoscopic banding [8]. This complication can be contributed to progression of pre-existing gastroesophageal varices due to occlusion of the rectal portosystemic collaterals. This finding is supported by the results of a study by Choi et al., which demonstrated worsening of co-existing gastric varices after occluding rectal portosystemic collaterals by BRTO [20]. To address this important issue, we used coils as prophylaxis to prevent worsening of our patients' pre-existing esophageal varices.

Our case demonstrates a successful attempt for treating rectal variceal bleeding in a cirrhotic patient with portal hypertension who was not a suitable candidate for TIPS. We believe that BATO has the potential to be used as a feasible and minimally invasive approach for the management of rectal varices in patients with contraindications for endoscopic treatment. Nevertheless, further studies are warranted to in-

vestigate the long-term safety and efficacy of BATO for control bleeding rectal varices.

Patient consent

Ethics approval and consent to participate: Written informed consent was obtained from the patient prior to the procedure. Tehran university of medical sciences hospital ethical board committee has approved the present study and, it was performed in compliance with the 1996 Health Insurance Portability and Accountability Act (HIPAA).

Consent for publication: The patient filled the written consent form for his information to be published in the Radiology case report journal.

Availability of data and materials

The datasets used and/or analysed during the current study are available from the corresponding author on reasonable request.

Author's contributions

AA was major contributor in study design, definition of intellectual content, clinical studies, manuscript preparation, data acquisition, manuscript editing and review. AH was major contributor in literature search, data and statistical analysis, design, data acquisition, manuscript preparation editing and review. NK was major contributor in literature search, data analysis, manuscript editing. HR was a major contributor in design, definition of intellectual content, clinical studies, manuscript preparation and review, guarantor.

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