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# Intra-Aortic Balloon Occlusion (IABO) may be useful for the management of secondary aortoduodenal fistula (SADF): A case report



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## ABSTRACT

**INTRODUCTION:** Secondary aortoduodenal fistula (SADF) is a rare but life-threatening complication after aortic reconstruction. Although a number of reports describing treatments for SADF have been published, the optimal management is unclear. A review of the literature suggested methods of reconstruction, control of bleeding, and reduction of infection in the management of SADF. The most important factor for acute intervention is controlling the bleeding from the fistula. We report one case treated using intra-aortic balloon occlusion (IABO) for SADF.

**PRESENTATION OF A CASE:** We describe a case of secondary aortoduodenal fistula that occurred seven years following aortobifemoral reconstruction for abdominal aortic aneurysm.

**DISCUSSION:** Early control of bleeding is essential for survival of the patient. Emergency laparotomy or endovascular stenting frequently have been chosen as interventions, although each approach has significant limitations. Emergency laparotomy for patients with hemodynamic instability may create excessive physiologic stress, and endovascular stenting may not be available at every surgical facility. The use of IABO for cases of intraperitoneal bleeding due to trauma has been previously described. IABO is relatively easy to implement, and enabled us to control the bleeding from the aorta more rapidly than other strategies.

**CONCLUSION:** Based on a review of the literature and our own experience, IABO should be considered as one option for the management of SADF.

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## 1. Introduction

Aortoenteric fistula occurring after aortic aneurysm repair is an uncommon and life-threatening condition. Urgent control of bleeding is of paramount importance. We describe a case that was managed initially with the novel use of intra-aortic balloon occlusion prior to definitive surgical intervention.

## 2. Case report

An 80-year-old male patient with a history of surgical reconstruction of abdominal aortic-aneurysm seven years prior was admitted to our hospital with melena. The melena occurred 3 hours before admission. The patient was not taking anticoagulant therapy and had no other significant past medical history. On admission, his abdomen was soft and flat. He had no symptoms including abdom-

inal pain, tenderness, nausea, or vomiting. There was some fresh melanotic stool noted in digital rectal examination, but no tumor or hemorrhoid was noted. His blood pressure was 111/55 mmHg, heart rate was 60 beats per minute, and temperature was 35.5 °C. His hemoglobin was 11.0 g/dl (Table 1). We suspected intestinal bleeding, but no acute intervention was planned since his vital signs were stable. Computed tomography (CT) without intravenous contrast did not reveal the source of melena.

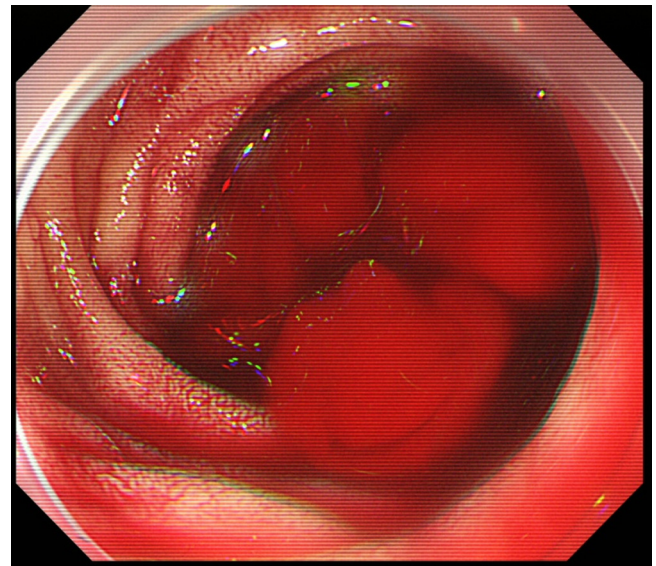
Approximately 2 h after admission, the patient experienced a rapid increase in both hematemesis and melena associated with hypotension. (Table 2) An emergency endoscopy was performed, revealing scars of previous ulcer disease along with blood clots (Fig. 1), but no fresh bleeding was noted in the stomach or duodenum. His blood pressure increased gradually after intravenous fluid resuscitation. Two hours later, hematemesis reoccurred, and a second emergency endoscopy was performed. On repeat examination, the duodenum was full of fresh blood, making identification of the site in the hemorrhage impossible (Fig. 2). During the endoscopic procedure, the patient again developed hemorrhagic shock. Blood pressure could not be maintained with transfusions alone, so we decided to use intra-aortic balloon occlusion (IABO) to con-

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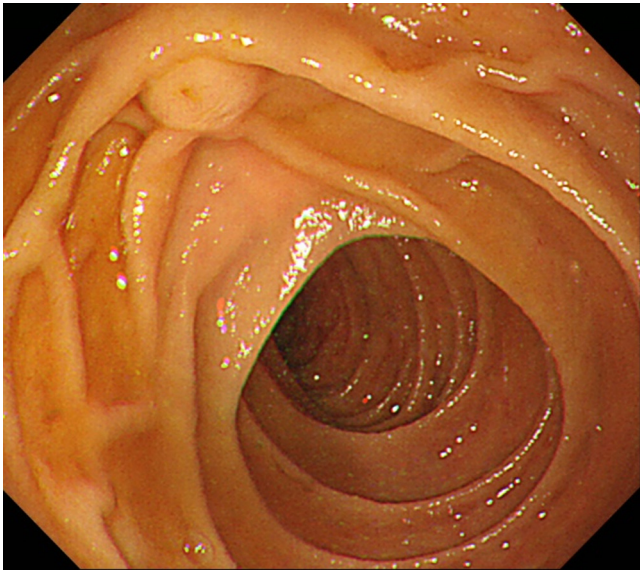
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**Table 1**  
Laboratory data on admission.

Laboratory data on admission				
WBC	13,500	/μl	BUN	26 mg/dl
RBC	345 × 104	/μl	Cre	1.6 mg/dl
Hgb	11.0	g/dl	Na	139 mEq/l
Hct	33.7	%	K	4.0 mEq/l
PLT	16.3 × 104	/mm3	Cl	101 mEq/l
TP	6.7	g/dl	BS	174 mg/dl
ALB	3.5	g/dl	CRP	3.6 mg/dl
AST	17	IU/L	BUN	26 mg/dl
ALT	10	IU/L		
T-Bil	1.0	mg/dl		



**Fig. 2.** The second emergency endoscopy showed the duodenum was full of fresh blood, making identification of the site in the hemorrhage impossible.



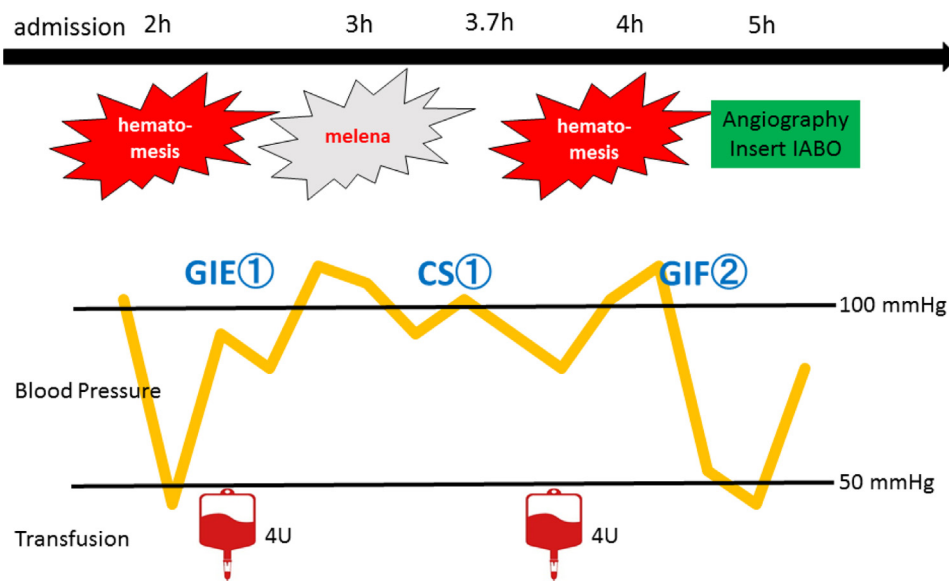
**Fig. 1.** The first emergency endoscopy revealed scars of previous ulcer disease along with blood clots, but no fresh bleeding was noted in the stomach or duodenum.

control the bleeding and support the blood pressure. After insertion of the balloon, angiography revealed extravasation of dye from the abdominal aorta into the duodenum (Fig. 3), establishing that the cause of bleeding was a secondary aortoenteric fistula. The patient's vital signs gradually stabilized, and he was taken to surgery for urgent laparotomy.

Laparotomy revealed that there was a large blood clot in the intestine and confirmed the presence of a fistula between the graft and the third portion of duodenum but no intraabdominal hemorrhage (Fig. 4). We confirmed the diagnosis of secondary aorto-duodenal fistula by deflating the balloon temporarily. No other fistulae were identified. Since there was no evidence of abscess

**Table 2**  
Timeline from admission.

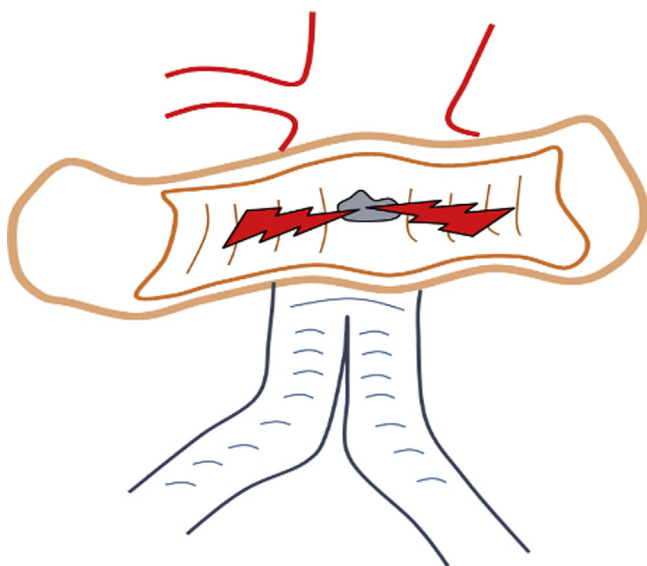
Timeline form admission



GIE : Gastorintestinal Endoscopy  
CS : Colonoscopy



**Fig. 3.** Angiography revealed the extravasation from the proximal side of prosthesis.



**Fig. 4.** There was a fistula between the proximal end of graft and the third portion of duodenum.

or infection around the surgical site, we debrided scar tissue near the fistula or graft, then sutured the defects of the aorta with 4-0 prolene® and felt, and sutured the hole of duodenum by layer to layer with 4-0 polydioxanone. To prevent surgical site infection, we wrapped the graft with the greater omentum. By the time of his return to the intensive care unit, he had been transfused with 10 units of packed red cells, 16 units of fresh frozen plasma, and 2 units of platelet concentrates for circulatory support. Broad-spectrum antibiotics (biapenem, 0.6g/day) were administered for 1 week post-operatively. Blood cultures remained negative.

The patient developed a high fever around 38°C on day 14 post-operatively. Contrast-enhanced computed tomography (CT) showed an abscess near the omentum, and the patient under-

went percutaneous drainage. After abscess drainage and a change in antibiotics, the abscess had resolved 2 weeks later. The patient was discharged from the hospital on the 44th post-operative day, and was given oral antibiotics for 6 months after discharge. At 12 months follow-up, there was no evidence of recurrence of the abscess.

### 3. Discussion

Secondary aortoenteric fistula (SAEF) is one of the rare complications seen after aortic reconstruction with prosthetic implants [1,2]. According to previous report, a small percentage of patients may develop SAEF following reconstruction. The interval between reconstruction and occurrence of SAEF may be nearly immediate or delayed (range, 2 days to 18 years) [1–6]. The main cause of SAEF is thought to be mechanical pressure of the graft against the bowel, or a pseudoaneurysm due to perigraft infection or perigraft hematoma [1]. In the current case, there was no abscess or evidence of infection around fistula, making chronic inflammation from mechanical pressure was the most likely cause of his fistula.

Three factors are very important for the treatment of SAEF: control of bleeding, prevention of infection, and reconstruction [1,7,8]. The most important factor for acute management is controlling the bleeding from the fistula. As seen in the present case, aortoenteric fistula (AEF) may result in a large amount of intestinal bleeding. Recent developments in interventional radiology have enabled us to plan a two-stage operation, with definitive surgery delayed until after temporary control of bleeding from the stent graft [2,9–11]. In our case, we were not able to perform endovascular aortic repair (EVAR), nor send him to another facility, due to his unstable condition. IABO is recognized as a feasible strategy for temporary control for intraabdominal bleeding or shock with trauma [12–16]. IABO is relatively easy to implement, and it enabled us to control the bleeding from the aorta more easily and quickly than other strategies. In our case, we gained immediate control of the bleeding from the fistula by using IABO, enabling us to rescue the patient.

Complications of IABO are organ's ischemia and reperfusion damage during inflation. Ishihara et al. reported that blocking the flow of aorta over 45 min might cause irreversible dysfunction of organs [17]. Although we should make a radical cure as soon as possible, we can control the pressure or the place of inflation as we want. In this case, the fistula was mounted on the peripheral site of the root of left renal artery, so we could inflate this at the appropriate place without organ's ischemia. Moreover, during laparotomy, we could keep his blood flow of the lower limbs by deflating the balloon intermittently and switching to compression fistula with our hands. Several reports reveal EVAR has superiority in the management of SAEF because it enables us to control the bleeding from fistula and do definitive therapy for SAEF simultaneously. But there are several institutions where we couldn't choose it, IABO will be one of the valuable tools for the urgent management of SAEF.

Prevention of infection is important in these cases [7,8]. Debridement of infected tissues, followed by appropriate antibiotics, help to prevent infection. In our case, there was no evidence of infection, abscess, or infectious pseudoaneurysm, so we debrided only necrotic tissues and scars around the fistula without replacing the graft. We sutured the each defect carefully, and wrapped the aorta with greater omentum. We gave intravenous antibiotics of Biapenem for a full week after surgery. However, on the 14th post-operative day he developed a high fever over 38°C, and CT showed an abscess around the wrapped omentum. This may have developed because the area of debridement was insufficient. The abscess was localized in the same region we debrided, and there was no abscess in the other regions. We believe that the abscess was caused by bacterial migration across the fistula. In cases of

SAEF, we should consider that some enteric bacteria are present in the stent or graft even if there is no abscess or infectious aneurysm at the time of operation.

It is also possible that the duration of intravenous antibiotics was too short. We gave antibiotics for one week after the operation, guided by blood cultures. We believed that a week was sufficient since there was no abscess or evidence of infection. Ohta et al. [7] reported that their patients who had evidence of aortic graft infection received broad-spectrum antibiotics until the bacterial culture was identified, then changed to more selective antibiotics based on cultures and sensitivities until the C-reactive protein value normalized. Those patients then received antibiotics orally for 3–6 months after leaving the hospital. In our case, we started antibiotics again intravenously after abscess drainage during the hospital stay based on culture results, and then the patient received oral antibiotics for another 6 months after discharge. There was no evidence of abscess at the end of the follow-up period.

The method of reconstruction should be selected with prevention of infection in mind. Infection prevention guides decisions on how to remove infected grafts, infectious tissues, or scars. Some of the strategies available for reconstruction include simple closure of the aortic or intestinal defect, axillobifemoral bypass followed by total excision of infected grafts, and anastomotic reconstruction with a new graft followed by total debridement [2,7,8], but there is no consensus on which approach is best.

#### 4. Conclusion

Secondary aortoduodenal fistula is a rare but life-threatening complication of aortic reconstruction. Control of bleeding is the most important primary step to rescue patients who develop this dreaded complication. Several strategies for controlling bleeding have been reported, but the best method is uncertain. Intra-aortic balloon occlusion (IABO) is a fast and effective method for stopping or controlling bleeding from the fistula. We believe that IABO should be considered as a viable option for the urgent management of SADF.

#### Conflicts of interest

The authors have nothing to disclose.

#### Funding

The authors have nothing to disclose.

#### Ethical approval

This is an observation case report. No institutional review board approval is required.

#### Consent

Written informed consent was obtained from patient and next of kin for publication of this case report and accompanying images. A copy of written consent is available for review by the Editor-in-Chief of this journal on request.

#### Author contribution

Mr Kokichi Miyamoto : Data collection, data analysis, writing the paper.  
Mr Mototaka Inaba : Study design, revision of manuscript.  
Mr Toru Kojima : Data interpretation.  
Mr Takefumi Niguma : Study concept, revision of manuscript.  
Mr Tetsushige Mimura : revision of manuscript.  
All authors read and approved the final manuscript.

#### Guarantor

Kokichi Miyamoto.

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