


Case Report

Life-saving case of cardiopulmonary arrest by secondary aortoenteric fistula formed in the anastomotic site between the inferior mesenteric artery and aortic graft

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Background: Secondary aortoenteric fistula is a fatal cause of gastrointestinal bleeding after aortic reconstructive surgery with a prosthesis. In most cases, the proximal suture line is involved. We herein report a rare case in which the fistula formed between the suture line of inferior mesenteric artery reimplantation and the jejunum.

Case Presentation: An 82-year-old man was transferred to our hospital due to hematemesis with severe hypovolemic shock. Although he fell into cardiopulmonary arrest, immediate resuscitation achieved return of spontaneous circulation. As his surgical history of aortic reconstruction and computed tomography findings suggested potential secondary aortoenteric fistula, emergency surgery was carried out. The anastomosis between the inferior mesenteric artery and aortic graft was communicating with the jejunum. Partial jejunal resection was undertaken, and the aortic graft was replaced.

Conclusion: The anastomosis between the inferior mesenteric artery and aortic graft in the previous aortic replacement can become the site of secondary aortoenteric fistula.

Key words: Acute care surgery, aortic replacement, inferior mesenteric artery, open abdominal management, secondary aortoenteric fistula

INTRODUCTION

SECONDARY AORTOENTERIC fistula (SAEF) is a rare but fatal cause of upper gastrointestinal bleeding after aortic reconstructive surgery with a prosthesis.¹ Secondary aortoenteric fistula usually arises between a suture line of a vascular graft and the intestine. In most cases of SAEF, the proximal suture line is involved, and while not common, the distal suture line is also a possible site of fistulization.¹ We herein report a rare and life-threatening case of SAEF in which the fistula was at neither the proximal nor distal suture line. The fistula developed between the suture line of inferior mesenteric artery (IMA) reimplantation and the jejunum.

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CASE REPORT

AN 82-year-old man who had undergone aortic bifemoral bypass 6 years ago was transported to the hospital for hematemesis and loss of consciousness. Based on blood test and computed tomography (CT) findings, he was diagnosed with upper gastrointestinal bleeding that required emergency endoscopic hemostasis and referred to our hospital.

He appeared pale with cold clammy skin and was in shock at arrival to our emergency room. His blood pressure was 77/51 mmHg, and laboratory data showed the hemoglobin level was 5.0 g/dL. Suddenly, massive fresh blood drained from the gastric tube and was vomited, resulting in cardiac arrest. We immediately started cardiopulmonary resuscitation and massive blood transfusion. Shortly, return of spontaneous circulation was achieved. To stabilize the circulation, resuscitative endovascular balloon occlusion of the aorta was carried out, and aortic occlusion was achieved.

Because of the risk of fatal bleeding, we decided to undertake surgical hemostasis. However, more information about

the bleeding site was required before the surgery could be carried out. While preparing for emergency surgery, esophagogastroduodenoscopy (EGDs) was performed, revealing fresh blood in the upper gastrointestinal tract, but the site of bleeding could not be identified (Fig. 1A). Computed tomography carried out at the referring hospital had shown no extravasation of blood into the intestinal tract or anywhere else. However, adhesion of the jejunum to the aortic graft and the loss of tissue between them were pointed out (Fig. 1B). Considering the medical history of aortic replacement by a prosthesis for abdominal aortic aneurysm, this was suspected to be a case of SAEF.

The operative findings showed solid adhesion between the jejunum and aortic graft. We detached them, and then the fistula was identified. On the aortic side, the fistula was located at the anastomotic site between the IMA and aortic graft (Fig. 2). Replacement of the aortic graft with a new prosthesis and partial jejunectomy were carried out. To prevent graft infection and fistula, the new prosthesis was covered with great omentum. Because of ischemia-induced reperfusion syndrome and the risk of abdominal compartment syndrome, we decided to perform open abdominal management (OAM) (Fig. 3).

After the operation, the patient underwent OAM for 6 days. Intraperitoneal irrigation was carried out every 2 days, and the abdominal wall was left open using vacuum packing. Intestinal edema remained on day 6 after the primary surgery. However, as the edema was gradually decreasing, and there was concern about abdominal wall

regression and infection of the aortic graft, reconstruction of the intestinal tract and abdominal wall closure with a bilateral anterior rectus abdominis sheath turnover flap were performed.

On day 22, the patient left the intensive care unit. Although local infection did not occur, the patient was treated with intravenous antibiotics for 4 weeks for ventilator-related pneumonia. After the patient's general condition had improved, he was transferred to a rehabilitation hospital.

DISCUSSION

WE SUCCESSFULLY TREATED SAEF at an atypical fistula site—anastomotic site between the IMA and aortic graft—by emergency open repair with an anatomical synthetic graft. The patient was transferred from another hospital for endoscopic treatment of hematemesis. Although it was difficult to diagnose this case, we switched to surgery at an appropriate time for definitive diagnosis and treatment. As a result, the patient survived despite going into temporary cardiopulmonary arrest.

The incidence of SAEF reportedly varies from 0.36 to 1.6% after aortic reconstructive surgery with prosthesis,^{1,2} and the mortality was reported to range from 27.4 to 30.7%.^{3,4} In many cases, the fistulas occur between the proximal suture line of the aortic graft and the third or fourth portions of the duodenum. In rare cases, the aortic side of the fistula is located at the distal suture line. However, there have been several sites of fistulas on the intestinal side,

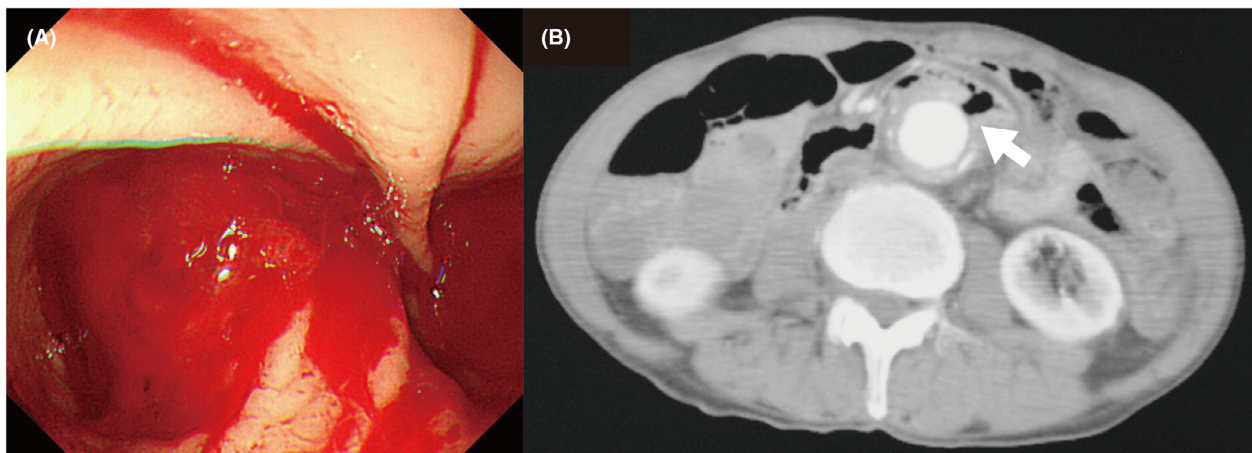


Fig. 1. Esophagogastroduodenoscopy and computed tomography findings in an 82-year-old man with secondary aortoenteric fistula. A, Esophagogastroduodenoscopy carried out before surgery. The duodenum was observed up to the second portion, but the blood could not be sufficiently suctioned away, and the observation was poor. B, Computed tomography carried out at the primary hospital. There was little tissue between the abdominal aorta (graft) and the jejunum in front of it.

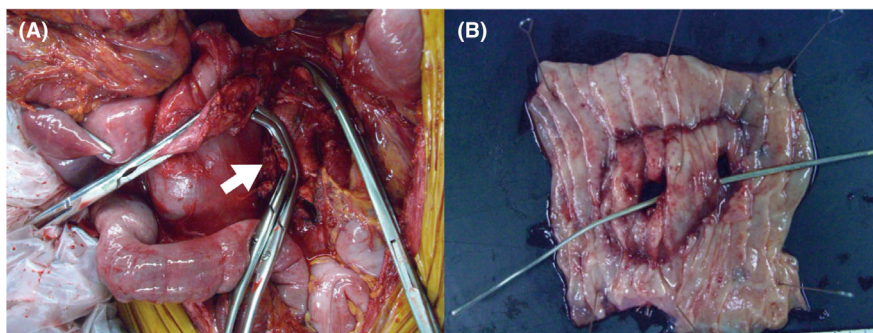


Fig. 2. Operative findings in an 82-year-old man with secondary aortoenteric fistula. A, Aortic cross-clamping and dissection of the jejunum and aortic graft were carried out. The arrow indicates the anastomotic site to the inferior mesenteric artery. B, Excised jejunum.



Fig. 3. Open abdominal management of an 82-year-old man with secondary aortoenteric fistula. Open abdominal management was undertaken using the silo closure method.

including the duodenum in 74%, small bowel (mostly jejunum or unspecified) in 19%, colon in 5%, and appendix in 1% of all cases.⁵ In the present case, a fistula on the aortic side was formed in the anastomotic site of the IMA reconstruction. To our knowledge, this is the first such case ever reported. Although adequate tissue coverage and reperitonealization of the graft to prevent the formation of fistulas are important in abdominal aortic replacement, our surgical findings indicated jejunum and IMA anastomotic site of the aorta had adhered directly without peritoneum or other tissues. Insufficient coverage might be the cause of this case.

In cases like these, diagnosis and treatment need to be promptly carried out. However, making the correct diagnosis with a limited amount of time is difficult. Identifying the bleeding site by EGD is often unsuccessful, as the fistula is

located at the third portion of the duodenum in many cases. In addition, massive bleeding also disturbs exploration. Computed tomography is the most sensitive of all diagnostic methods, and there are several features specific to SAEF visualized by CT, including ectopic gas, focal bowel wall thickening, loss of the normal fat plane between the aorta and the adjacent bowel, breach of the aortic wall, and pseudoaneurysm. Extravasation of contrast material into the bowel lumen is a rare but direct sign of SAEF.⁶ However, the final diagnosis is often made based on intraoperative findings. The preoperative diagnosis rate was reported to range from 14.3 to 36%,⁷ the rate of a definitive diagnosis by laparotomy was 62%,⁶ and the correct diagnosis rate of laparotomy was 91%.⁸

The most critical purpose of treatment for SAEF is maintaining hemodynamic stability by surgical intervention, but infection control is also important. There are three types of surgical treatment: *in situ* reconstruction, extra-anatomic bypass with aortic ligation, and endovascular treatment.^{3,9} Extra-anatomic bypass with aortic ligation could be advantageous, as it involves complete excision of the infected graft and revascularization through the uninfected area, thus eradicating the source of infection.⁶ However, the midterm patency is not as good as with other approaches, and there are disadvantages with regard to organ perfusion compared with *in situ* reconstructions. In previous studies, no difference in mortality or reinfection was observed between *in situ* revascularization and extra-anatomic bypass with aortic ligation.^{4,10} Endovascular treatment is minimally invasive and avoids complications associated with clamping of the aorta. It has been reported that endovascular repair might have lower perioperative mortality and hospital stay. However, there could be some risk of infection relapse secondary to incomplete removal of the infected graft.⁴ Furthermore, if IMA is also involved as in this case, more difficult and time-

consuming techniques such as adding embolization to IMA will be required.

In the current case, emergency laparotomy was carried out for both management of immediate aortic blockage and a definitive diagnosis because of uncontrolled hypovolemic shock. Based on the intraoperative findings, it was judged that infection could be controlled, as there was no local abscess formation, so we decided to promptly revascularize *in situ* and shift to intensive care.

CONCLUSION

WE EXPERIENCED SAEF at the anastomotic site of the inferior mesenteric artery after artificial blood vessel replacement for an abdominal aortic aneurysm and reconstruction of the IMA. For SAEF with unstable hemodynamics and diagnostic difficulty, immediate surgery for a definitive diagnosis and subsequent revascularization is needed.

DISCLOSURE

APPROVAL OF THE research protocol: N/A.

Informed consent: Written informed consent was obtained from the patient's son.

Registry and the registration no. of the study/trial: N/A.

Animal studies: N/A.

Conflict of interest: None declared.

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