A case of aortocolonic fistula caused by sigmoid diverticulitis

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ABSTRACT

The development of a secondary aortoenteric fistula is a well-described complication after open or endovascular repair of an abdominal aortic aneurysm. However, evidence regarding aortocolonic fistulas (ACFs) and their pathogenesis is currently limited. We present a case of ACF that developed 18 years after open repair of an abdominal aortic aneurysm with atypical symptoms. The patient was successfully treated with total resection of the involved aorta, prosthetic graft, and sigmoid colon, with extra-anatomic bypass and primary anastomosis of the residual colon. Pathologic examination revealed that the pathogenesis of ACF was attributed to sigmoid diverticulitis. This case report highlights the uncommon pathogenesis of ACF and the importance of considering revascularization and intestinal reconstruction in the surgical strategy for each individual case. (J Vasc Surg Cases and Innovative Techniques 2019;5:78-81.)

Keywords: Aortoenteric fistula; Aortocolonic fistula; Abdominal aortic aneurysm

The development of secondary aortoenteric fistula (AEF) is an uncommon, life-threatening complication after the repair of abdominal aortic aneurysm (AAA).[1] The development of AEF is prompted by various factors regardless of the open or endovascular repair of AAA. The aortoduodenal fistula is the major secondary AEF and is discussed extensively in the literature.[1-3] However, evidence regarding the presence of AEF in the sigmoid colon is currently limited. We report a case of aortocolonic fistula (ACF) and discuss its pathogenesis attributed to sigmoid diverticulitis. The patient provided informed consent for the publication of this report.

CASE REPORT

A 76-year-old man presented to another hospital with abdominal discomfort. The patient had a history of open surgical repair (aortobi-iliac graft) of a ruptured AAA 18 years earlier. Two days after the operation, the patient required additional femorofemoral bypass for the treatment of obstruction of the right graft limb. No other intervening procedure was performed before ACF. He had an undiagnosed abdominal pain with slight fever several times a year. Despite the intravenous administration of ceftriaxone for 3 weeks, the symptoms did not resolve completely. He was referred to our hospital for further examination and treatment. Physical examination revealed a body temperature of 38.0°C, blood pressure of 112/68 mm Hg, and heart rate of 90 beats/min. The patient did not report any abdominal or back pain and melena. Contrast-enhanced computed tomography revealed an enlarged (68 mm) aneurysmal sac with gas bubbles surrounding the replaced graft (Fig 1, *a*). Computed tomography also revealed three round high-density spots localized between the surface of the enlarged aneurysmal sac and the sigmoid colon (Fig 1, *b*), which led to a tentative diagnosis of secondary AEF. The patient underwent combined resection of the abdominal aorta, including all portions of the previous repair and sigmoid colon, with concurrent right axillary-common femoral bypass and reconstruction of the residual colon 6 days after admission.

Repeated midline laparotomy was performed after the right axillary-common femoral bypass using an 8-mm FUSION vascular graft (Maquet Cardiovascular, Wayne, NJ) and systemic heparinization (1 mg/kg). Unexpectedly, no abscesses, pus, or active inflammatory findings were observed in the abdominal cavity caused by severe adhesion between the sac and the sigmoid colon. The aorta above the proximal anastomosed site and the bilateral external and internal iliac arteries were clamped. After resection of the proximal aorta, aortic stump closure was performed using 4-0 polypropylene continuous sutures reinforced with a bovine pericardium strip. After resection of the bilateral external and internal iliac arteries, the right iliac arteries were ligated. The left external and internal iliac arteries were anastomosed directly to each other using 5-0 polypropylene continuous sutures. Subsequently, the aorta, replaced prosthetic graft, and sigmoid colon of 9-cm length were removed in collaboration with gastrointestinal surgeons. The extent of resection is shown in Fig 2. The preserved colon was anastomosed through mechanical stapling without colostomy. The total operating time was 11 hours, and the patient was transferred to the intensive care unit after extubation. Piperacillin-tazobactam (4.5 g every 8 hours) was administered for 2 weeks after the operation, followed by oral administration of levofloxacin (500 mg every 24 hours) to date. The postoperative course was uneventful, and the patient was discharged from the hospital 1 month after surgery. He was followed up for 1 year without development of any complications, including recurrence of the infection.

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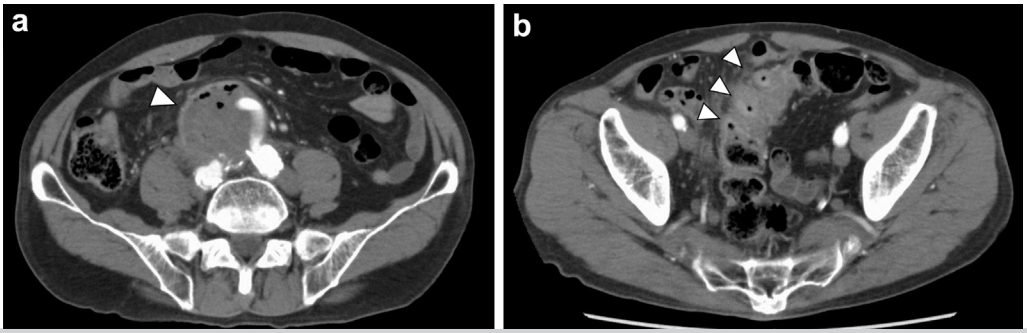

Fig 1. Preoperative computed tomography showing **(a)** an enlarged sac around the occluded right leg of the prosthetic graft with gas bubbles surrounding the graft; **(b)** three high-density spots between the enlarged sac and sigmoid colon.

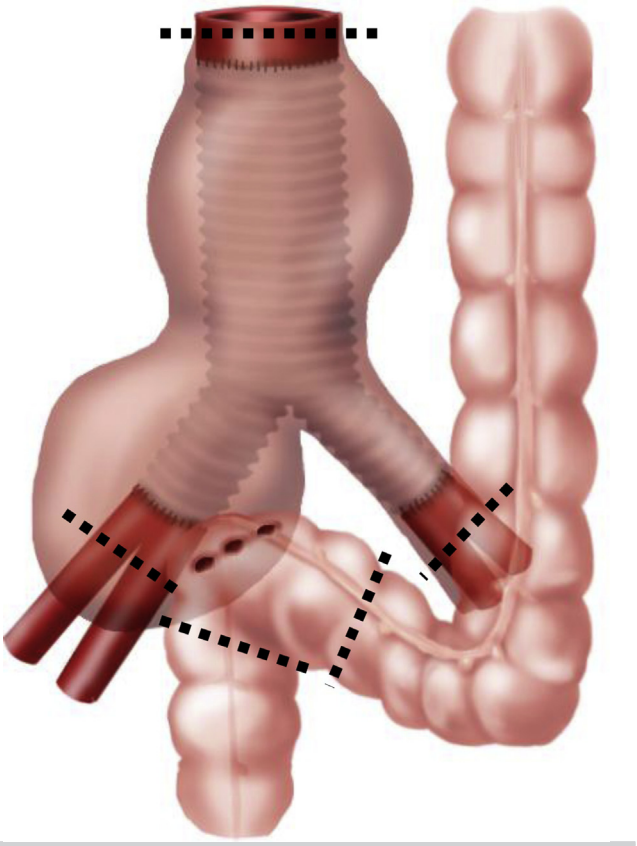

Fig 2. Schema of the presented aortocolonic fistula (ACF) showing the resection line of the aorta, prosthetic graft, and sigmoid colon (*dotted line*).

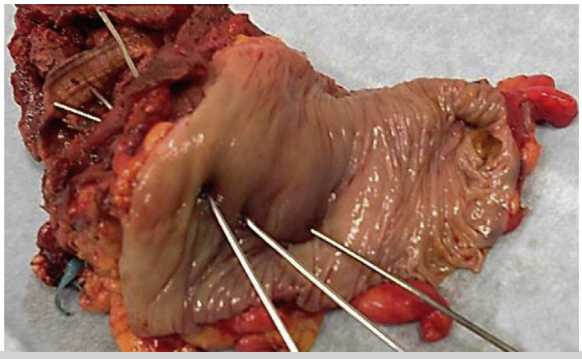

Fig 3. The resected specimen confirms the presence of three aortocolonic fistulas (ACFs) and pseudoaneurysm surrounding the site of the ruptured distal anastomosis.

Macroscopic findings confirmed the failure of the polypropylene sutures and the formation of a pseudoaneurysm surrounding the site of the right distal anastomosis. Moreover, the specimen showed the presence of three ACFs (Fig 3). Histopathologic examination revealed the following: an unclear demarcation line between the sigmoid colon and the aorta as a result of the advanced fibrosis (Fig 4, *a*); loss of intestinal smooth muscle continuity near the fistulas, accompanied by granulation and marked neutrophilic infiltration (Fig 4, *a* and *b*); and the presence of substantial intestinal tract content in the aneurysmal sac (Fig 4, *c*). On the basis of these findings, the patient was diagnosed as having ACF caused by sigmoid diverticulitis.

DISCUSSION

Despite the recent increase in the total number of reported AEF cases,[4] the rate of AEF occurrence in the colon is merely 5%.[1] Moreover, the available data regarding survival in these cases are limited.[5] The mesosigmoid usually allows the sigmoid colon to move freely and prevents attachment to the abdominal aorta under normal conditions. However, this case had a history of laparotomy in addition to failure of the distal anastomosis sutures, which may be partially responsible for the development of the ACFs. Pathologic findings confirmed sigmoid diverticulitis, an important trigger for the formation of fistulas. These findings suggest the following pathogenesis: diverticulitis in addition to contact with the fixed colon and enlarged aneurysmal sac due to the failed distal anastomosis caused ACFs; and the infection affected only a limited part owing to the advanced fibrosis around the fistulas. This case has heightened the index of suspicion for a possible secondary ACF, including those having an endoleak after endovascular aneurysm repair. Especially patients with a history of laparotomy will have an increased risk of ACF

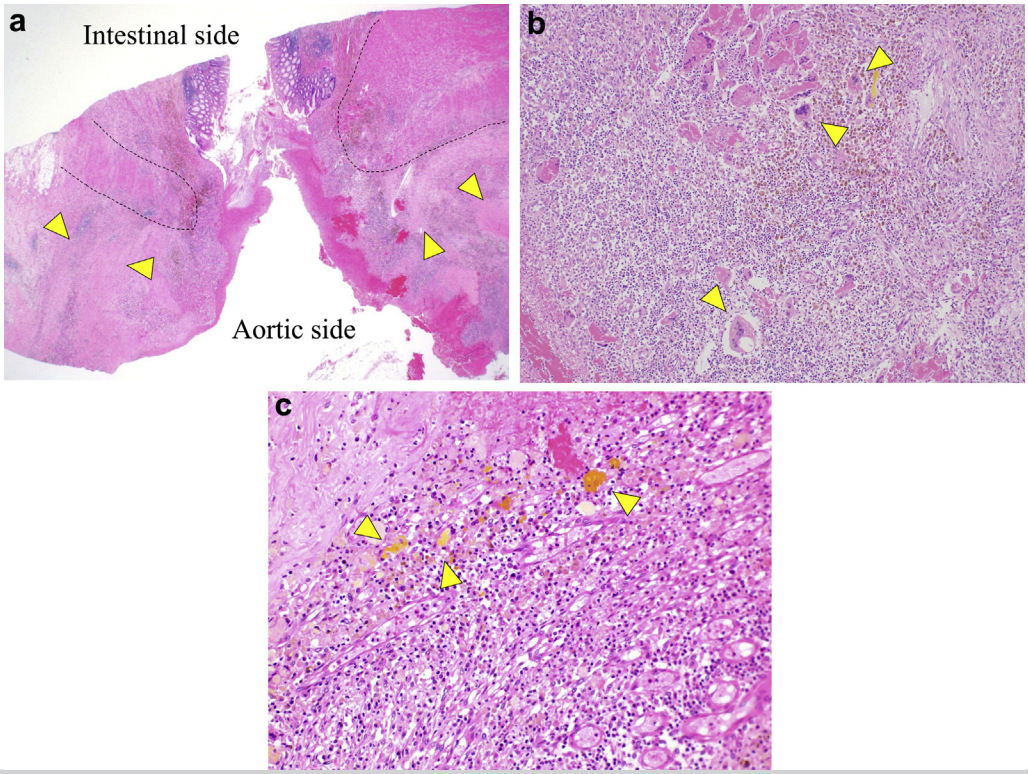

Fig 4. Microscopic pathology. **a,** Low-power field showing that the demarcation line between the pseudoaneurysm and sigmoid colon was unclear because of advanced fibrosis (*arrowheads*). In addition, loss of intestinal smooth muscle continuity was observed near the fistulas (*dotted line*). **b,** High-power field on the intestinal side of the fistula showing granulation with marked neutrophilic infiltration. **c,** High-power field on the aortic side of the fistula showing the presence of substantial intestinal tract content in the aorta (*arrowheads*).

because anatomic conditions similar to those observed in this case may occur.

Controversies still exist about the systematic approach to the management of graft infection, particularly in complex infections such as AEF. This case was successfully treated with combined resection of the abdominal aorta and sigmoid colon, followed by extra-anatomic bypass and primary anastomosis of the residual colon. Other revascularization techniques for aortic graft infection have been reported, including the neoaortoiliac system (NAIS) procedure using deep femoral veins, hemi-NAIS procedure, and in situ repair using a cryopreserved allograft.[6-8] We chose extra-anatomic bypass for two reasons: to remove the artificial materials contaminated with the intestinal tract content to the greatest extent possible and to reduce the ischemic interval for the lower extremities if unexpected bleeding occurred. Cryopreserved allografts cannot be used in our country. Thus, if re-revascularization is needed in the future, we will perform the NAIS procedure, which has a good limb salvage rate. Clinical outcomes with NAIS are better in non-AEF cases than in AEF cases[6]; therefore, we think NAIS should be a second option after AEF repair.

Regarding intestinal reconstruction, both macroscopic and microscopic findings showed that the inflammation and vascular insufficiency spread to a limited region with the presence of smooth colonic mucosa of the margin. This is because the fistulas were caused by local inflammation of the diverticulum. This case, with its rare clinical circumstances, was successfully treated with primary anastomosis of the colon. Only a few cases of successful primary anastomosis of the colon have been reported,[5] but the Hartmann procedure should also be considered, depending on the state of the patient and the colon. The lack of sufficient evidence leads to controversy in the therapeutic management of the involved intestine.

CONCLUSIONS

These clinical and pathologic findings highlight the uncommon pathogenesis of ACF caused by sigmoid diverticulitis. More experience should be accumulated to establish the most appropriate surgical strategy, considering revascularization and intestinal reconstruction in each individual case.

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