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Case Report

A Case of Infected Abdominal Aortic Graft with Pancreatic Fistula: Successful Treatment through a Staged Approach with Percutaneous Catheter Drainage and Partial Graft Excision

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A man in his 60s developed a pancreatic pseudocyst postoperatively after an open graft replacement for a ruptured abdominal aortic aneurysm. Endoscopic drainage was performed; however, this led to an aortic graft infection due to macroscopic communication with the perigraft cavity. Percutaneous drainage was performed to manage the pancreatic fistula and graft infection simultaneously. Although the pancreatic pseudocyst diminished, the aortic graft infection persisted. Subsequently, partial aortic graft replacement with greater omental flap coverage was performed. He was discharged with oral antibiotics, with no recurrence of infections at 10 months.

Keywords: aortic graft infection, pancreatic fistula, pancreatic pseudocyst

Introduction

Pancreatic fistula is a rare complication of open graft replacement for a ruptured abdominal aortic aneurysm (AAA). Although the standard treatment for aortic graft infection consists of the administration of intravenous antibiotics, total removal of the infected graft, debridement of adjacent infected tissue, and revascularization, it is difficult to determine the timing of the operation or the range of graft excision in cases of pancreatic fistula. We present a case of a patient with abdominal aortic graft infection secondary to pancreatic fistula, which was successfully treated with a staged approach using percutaneous catheter drainage and partial graft excision.

Case Report

A man in his 60s underwent open graft replacement for a ruptured AAA. Intraoperatively, part of the pancreatic capsule was peeled off because of a hematoma. Open abdominal management using a negative pressure therapy system was employed to prevent abdominal compartment syndrome, and delayed abdominal wall closure with a component separation technique was performed 3 days after the operation. On computed tomography (CT) images before abdominal closure, a fluid collection was not observed around the pancreas. However, CT images 1 week after the first operation showed a pancreatic pseudocyst, which was treated conservatively as it was asymptomatic and stayed a stable size during admission (**Fig. 1A**). The patient was discharged 2 months after the surgery but visited our hospital complaining of abdominal pain 1 month later. Enlargement of the pancreatic pseudocyst and a splenic artery aneurysm were identified on enhanced CT images (**Fig. 1B**). The perigraft cavity was also enlarged; however, its continuity with the pancreatic pseudocyst was unclear. The patient was admitted and underwent emergency embolization of the splenic artery aneurysm. Subsequently, endoscopic ultrasonography-guided pancreatic pseudocyst drainage was performed, and two drainage tubes were placed. The first tube was placed to drain pancreatic leakage into the stomach (internal fistula). The second was a nasopancreatic drainage tube to drain leakage from the pancreatic pseudocyst to the outside of the body via the nasal tract (external fistula). The culture of the drainage was negative for growth. However, the patient developed a high fever, and the white blood cell count increased to 13100/ml the next day. CT images

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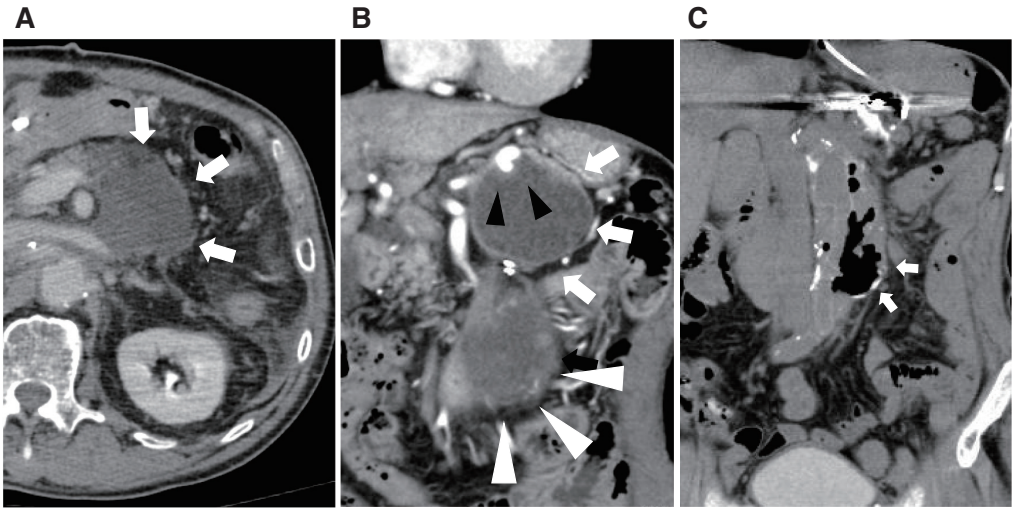

Fig. 1 Preoperative CT findings. (**A**) Seven days after open graft replacement for a ruptured AAA. White arrows show the pancreatic pseudocyst. (**B**) CT image 2 months postoperatively demonstrates the splenic artery aneurysm (black arrowheads), enlargement of the pseudocyst (white arrows), and enlargement of the perigraft sac (white arrowheads). (**C**) Air in the perigraft cavity was observed on the CT image the next day after endoscopic ultrasound-guided pancreatic pseudocyst drainage. AAA: abdominal aortic aneurysm; CT: computed tomography

revealed air in the perigraft cavity (**Fig. 1C**). A retrograde infection was suspected, and intravenous antibiotic therapy was initiated. CT-guided percutaneous drainage was performed, and a new drainage tube was placed in the perigraft cavity from the patient's back. Endoscopically placed drainage tubes were removed. Although the blood culture was negative, *Enterococcus faecalis* and *Escherichia coli* were detected in the drainage cultures. The amylase concentration was 6871 U/ml in the drainage fluid and 70 U/ml in the serum. Sinography through the percutaneous drainage tube revealed communication between the perigraft cavity and the pancreatic pseudocyst (**Fig. 2A**). Although no pancreatic fistula from the main pancreatic duct was observed on endoscopic retrograde cholangiopancreatography, a nasopancreatic drainage tube was placed to facilitate drainage of pancreatic secretions into the duodenum. Routine saline irrigation and exchanges of drainage tubes were performed to control infection in the perigraft cavity. The pancreatic pseudocyst gradually shrank, and the amylase concentration in the drainage fluid decreased. Six weeks later, the drainage volume became negligible, and the drainage fluid's amylase concentration decreased to 40 U/ml (**Fig. 3**). The size of the pancreatic pseudocyst decreased, and the perigraft cavity shrank on CT imaging. On sinography, retrograde contrast enhancement of the pancreatic fistula from the perigraft cavity was no longer observed. (**Fig. 2B**). However, the drainage culture remained positive, and residual aortic graft infection was suspected. Consequently, re-laparotomy and infected graft excision were planned 53 days after admission. To prevent the recurrence of the pancreatic fistula, the proximal main body of the graft, which had strong adhesion with surrounding tissues, was left, and only the bilateral graft legs were replaced with new grafts (J graft, Japan Lifeline, Tokyo, Japan) covered with a pedicled omental flap. The operative time was 343 min. Postoperative CT images revealed no recurrence of the pancreatic pseudocyst. The patient's postoperative course was uneventful, and he was discharged home on the 27th postoperative day. The patient has continued oral antibiotics, and no clinical or laboratory signs suggestive of graft infection recurrence have been observed over the past 10 months.

Discussion

A pancreatic pseudocyst secondary to pancreatic fistula is a rare complication of open abdominal aortic replacement for ruptured AAA. In this case, the pancreatic fistula probably resulted from damage to the pancreatic capsule caused by a rapidly expanding hematoma immediately after AAA rupture. Conservative treatment resolves pancreatic pseudocysts in many cases[1]; however, intervention is warranted in patients with symptoms, persistent expansion, or in situations where there is a risk of dehiscence at the anastomosis site. Various treatment options can be considered, including percutaneous drainage with ultrasound or CT guidance, endoscopic treatment, and operative treatment. However, there is no consensus on the ideal treatment. Endoscopic ultrasound-guided cyst drainage has been reported to have a high success rate; however, cystic infections have been noted as a complication of this procedure.[2,3] In this case, the pancreatic fistula was

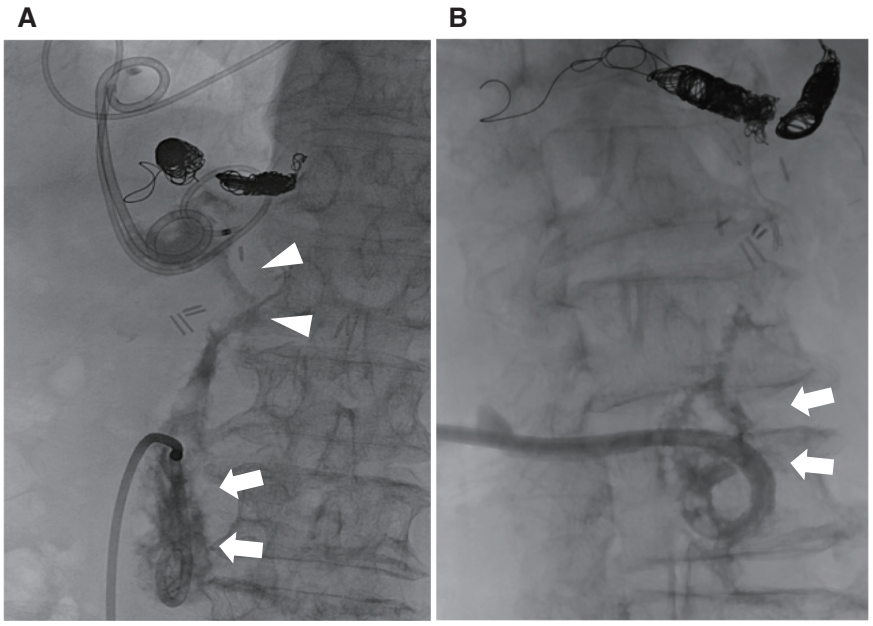

Fig. 2 Sinography images through the percutaneous drainage tube. (**A**) White arrowheads show the communication between the perigraft cavity (white arrows) and the pancreatic pseudocyst. (**B**) Six weeks after starting percutaneous drainage. The perigraft cavity shrank (white arrows) and communication diminished

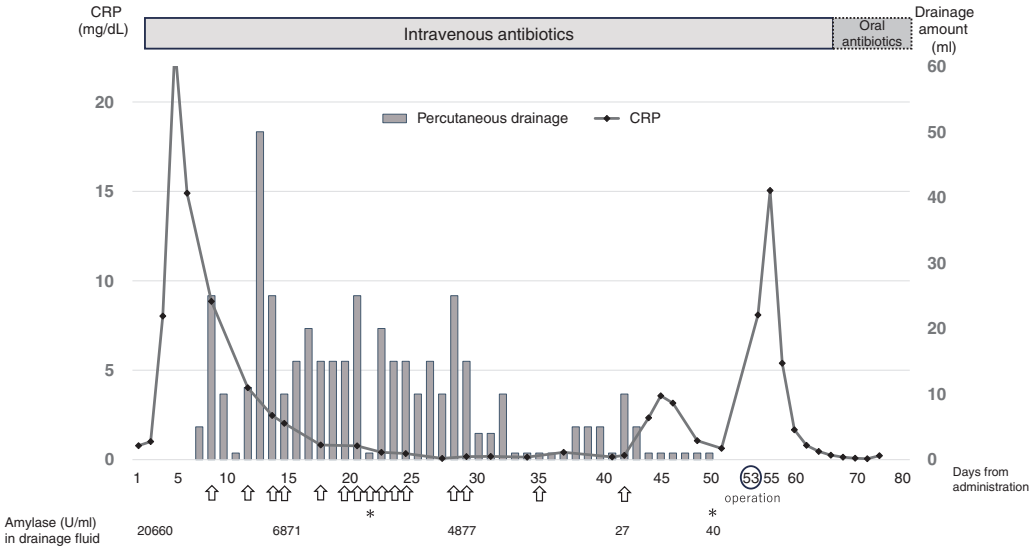

Fig. 3 Drainage amount and CRP over time. The white arrow shows the day on which saline irrigation was performed. The asterisk shows the day on which the drainage tube was changed. CRP: C-reactive protein

microscopically connected to the perigraft cavity. Aortic graft infection was strongly suspected, and urgent re-laparotomy was considered for the excision of the infected aortic graft, debridement of the adjacent infected tissue, and revascularization. However, opening the perigraft sac is associated with risks such as pancreatitis, generalized peritonitis, disruption of the anastomosis site, and necrosis of the greater omentum. Therefore, the pancreatic fistula was treated first while controlling for aortic graft infection. Percutaneous drainage was chosen, and a drainage tube was placed in the perigraft cavity. As a result, pancreatic leakage decreased, and the pancreatic pseudocyst disappeared. The communication between the pancreatic pseudocyst and the perigraft cavity also closed. The aortic graft infection was localized but residual, and an excision of the infected aortic graft was required to prevent the recurrence of the pancreatic fistula. Belair et al. reported treatment results for 23 patients with graft infection, where

11 patients were initially treated with percutaneous drainage. Sepsis was resolved in nine patients. Of these, four patients only needed percutaneous drainage; however, removal of the infected graft was required in the remaining five patients.[4] Kennedy et al. reported the outcomes of percutaneous drainage of an infected aortic sac or periaortic abscess cavity in 12 patients after endovascular or open surgical graft replacement. Seven patients were managed with drainage and antibiotic therapy without surgical intervention, and six had long-term survival.[5] Lawrence et al.[6] reported contraindications for conservative treatment as follows: hemorrhage from the suture line, infection involving the anastomosis, concomitant arteriovenous fistula or enteric fistula, or infection with an aggressive bacteria such as *Salmonella spp*. Furthermore, they reported that gram-negative bacteria such as *Salmonella*, *Pseudomonas*, and *Escherichia coli* species are less suitable for conservative therapy. Although *Escherichia coli* was detected in this case, the local burden of infection may have been reduced by drainage, routine saline irrigation, and drainage tube changes. Percutaneous drainage has the additional advantage of obtaining samples for culture, which is especially useful in cases with negative blood cultures and performing sinography to rule out enteric fistulas.[7] Although reports on the efficacy of transcutaneous drainage are limited, this procedure could be a valid treatment option, especially for patients with a high operative risk.

We had to leave the main body of the graft to prevent pancreatic fistula recurrence. Jamieson et al. reported two successful cases of abdominal aortic graft infection which were cured only by debridement and omental wrapping, preserving the infected aortic graft.[8] However, a meta-analysis indicated a higher recurrence rate in the partial resection group than in the total resection group[9]; therefore, careful observation is required. Although there is no consensus on the optimal length of antibiotic therapy and imaging studies, we have performed a CT scan and a blood test every 3 months to check for recurrence and intend to keep lifetime oral antibiotics.

Conclusions

We successfully treated an aortic graft infection with a pancreatic fistula using a staged approach involving percutaneous catheter drainage and partial graft excision. Percutaneous drainage is an effective method to control not only pancreatic fistulas but also aortic graft infections.

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Patient Consent Statement

Appropriate informed consent was obtained from the patient to publish this case report.

Disclosure Statement

The authors declare that they have no conflicts of interest.

Author Contributions

Study conception: TI
Data collection: TI, RT, RN, and TS
Analysis: TI and YK
Investigation: TI
Manuscript preparation: TI
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Critical review and revision: all authors
Final approval of the article: all authors
Accountability for all aspects of the work: all authors.

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