Case Report

Spontaneous Evacuation of a Vascular Metallic Stent through a Graft-Duodenal Fistula with Concomitant Non-Surgical Fistula Closure

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We report a patient who developed ileus caused by vascular stent migration into the duodenum with periprosthetic retroperitoneal abscess. The patient previously underwent removal of an infected abdominal aortic aneurysm with concomitant axillobifemoral arterial reconstruction. An occlusion of the graft leg was treated by a unilateral aortoiliac bypass where endovascular surgery with a metallic stent was later needed. The abscess and ileus were vigorously drained. Following the spontaneous evacuation of the metallic stent via the digestive tract, the abscess was completely drained and fistula closure was achieved without surgical intervention. The patient has remained healthy 6 years thereafter.

Keywords: graft-duodenal fistula, vascular metallic stent, endovascular surgery

Introduction

A graft-duodenal fistula has been recognized as one of the serious complications following aortic surgery. When an artificial prosthesis placed to facilitate arterial flow becomes connected to the digestive tract, this results in definite prosthesis infection and unavoidable bacteremia. Survival from this dangerous complication can be achieved by complete surgical removal of the infected prosthesis and concomitant fistula closure under continuous antibiotic administration. We encountered a patient who successfully recovered from this life-threatening complication without the surgery. The recovery process appears to be contrary to the common sense of vascular surgeons, being a rare and exceptional case of spontaneous evacuation of a vascular metallic stent through a graft-duodenal fistula with concomitant non-surgical fistula closure. This rare case suggests that the non-surgical removal of an infected prosthesis with concomitant fistula closure is possible under special circumstances.

Case Report

A 71-year-old man who suffered from diabetes mellitus presented with ileus accompanied by a high fever in another hospital to which he was admitted emergently. He was subsequently transferred to our hospital as a new patient. Before 8 years, the patient underwent vascular reconstruction to treat an abdominal aortic aneurysm infected with Salmonella. Repair was accomplished by performing aneurysm resection with infrarenal aortic closure by continuous sutures, followed by a right axillobifemoral bypass to avoid placement of an artificial prosthesis in the infected field (Fig. 1A). The right leg bypass graft was occluded 1 year later, and a unilateral left aortoiliac artery bypass (Gelseal, Vascutek, Terumo Company, Tokyo, Japan, $16 \times 8$ mm) was performed with plastic of the aortic stump under the interpretation of the absence of intra-abdominal infection (Fig. 1B). After 3 years of reoperation, endovascular surgery was performed to treat the stenosis that occurred inside the left aortoiliac artery bypass graft to relieve severe claudication. A metallic stent (Palmaz, Cordis, Cardinal Health, Dublin, Ireland, $8 \times 40$ mm) was placed into the prosthesis after balloon dilatation (Fig. 1B). However, the revised left aortoiliac graft with the femorofemoral bypass graft was similarly occluded 1 year later. At that time, that is, 3 years before his presentation to our hospital, computed tomography (CT) showed no evidence of infection around the occluded left aortoiliac bypass graft containing the metallic stent inside (Fig. 2A). On admission at this time, CT demonstrated ileus with a retroperitoneal abscess. His blood culture was negative although his body temperature was high at 38.2°C, his white blood cell count was 11600/µL, and his C-reactive protein level...
was 6.64 mg/dL. The retroperitoneal abscess was identified where the occluded left aortoiliac artery bypass graft with the stent had been placed. The prosthetic graft was neither recognized in the abscess nor in the intestine by CT. Notably, the metallic stent migrated from the graft into the duodenum was thought to be responsible for causing the mechanical obstruction (Fig. 2B). This stent migration indicates that the fistula between the duodenum and the vascular graft was sufficiently large for the stent to pass through.

The abscess was drained immediately under CT scan guidance using Ultrathane drainage catheter kit (Cook Japan, Tokyo, Japan), and about 50 mL of the pus with grayish white color was aspirated during the procedure. The pus was drained into a closed bottle without irrigation. The culture was positive for Enterococcus faecalis. Intravenous antibiotic therapy (e.g., meropenem (MEPM)) was started and the ileus was treated by decompression with a nasogastric tube. No bleeding episode was experienced during the treatment period. As the patient showed stable vital signs and prompt subsidence of his infected condition including the white blood cell count and C-reactive protein level, he refused any additional surgical procedure after having undergone multiple operations. The ileus was healed eventually by conservative treatment and the abscess was completely drained simultaneously. During that period, the metallic stent continually migrated through the digestive tract (Fig. 2C), and it was eventually evacuated via the rectum (Fig. 3). Endoscopic examination revealed small dimpling of the duodenum at the third portion, but no fistula was recognized. Thereafter, the patient started oral

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**Fig. 1** Schematic view of each surgical procedure. (A) The original procedure was removal of the infected abdominal aortic aneurysm, followed by arterial reconstruction with a right axillofemoral graft, which was performed 8 years ago. (B) When the right axillofemoral graft was occluded, a unilateral left aortoiliac bypass was achieved using a left leg of the bifurcated graft. The metallic stent was placed later (arrow) to treat graft stenosis. However, the entire grafts were occluded eventually afterwards.

**Fig. 2** CT showed migration of the vascular stent. (A) When the aortoiliac graft was occluded, the stent was recognized in the graft (arrow). (B) When the patient was admitted for the treatment of ileus, the stent migrated into the duodenum (arrow). (C) During the treatment period, the stent continuously migrated by peristalsis through the digestive tract (arrow). CT: computed tomography.
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was cured without any surgical intervention and he has been healthy without taking any antibiotics after 6 years since the spontaneous evacuation of the stent, contrary to the standard surgical removal process. Although one case of aortoduodenal fistula secondary to biliary stent placement has been reported, the present case showing the spontaneous resolution of a graft-duodenal fistula which allowed the passage of a vascular stent has not yet been reported in the literature.

The precise course of healing remains to be clarified, and the underlying reasons for the spontaneous resolution need further understanding. We speculate that the following underlying process would cause this exceptional resolution: the original operation for the treatment of the infected abdominal aortic aneurysm was completed successfully because no salmonella was cultured thereafter and open surgery could be performed safely 1 year later. Following endovascular surgery, inflammation occurred around the stent which might have triggered the formation of the graft-duodenal fistula owing to the adhesion between the graft and the duodenum. A self-expandable

Discussion and Conclusion

A secondary aortoenteric fistula is recognized as a fatal complication after vascular reconstruction with a synthetic prosthesis. As part of their common sense, vascular surgeons believe that sepsis due to graft infection cannot be completely cured unless the graft is removed surgically. In the present case, the migration of the metallic stent that was placed in the vascular prosthesis into the duodenum implied the formation of a large fistula between the vascular prosthesis and the digestive tract, and that the stent with the fabric graft migrated into the duodenum through the fistula. Surprisingly, the patient intake without any symptoms. The oral antibiotics (e.g., cefdinir (CFDN)) were continued for 2 years without the recurrence of infection but were eventually discontinued owing to hepatic dysfunction. The patient has shown no infective signs or symptoms 6 years after the evacuation of the metallic stent although his disabling claudication required treatment with antiplatelet drugs.

Fig. 3  Abdominal radiography. (A) The stent was observed beside the psoas muscle (circle) when the graft was occluded. (B) After the patient was admitted, a drainage tube was placed under CT guidance (arrow). The stent was shown in the right upper quadrant (circle), which suggested its migration. (C) The stent continually migrated to the left abdomen through the digestive tract (circle). The drainage tube was placed in the same location (arrow). (D) In 1 month with the ileus and abscess cured, the stent was ejected spontaneously. The drainage tube or stent was not recognized in any part of the abdomen. CT: computed tomography
A stent would have been better for use than a balloon expandable stent because detachment from the prosthetic graft seems less likely. Fortunately, a secondary graft-duodenal fistula was formed after occlusion of the graft, and the stent inside migrated through this fistula without any bleeding episodes. The fabrics of the graft around the stent underwent degeneration in the duodenum and the metallic stent that was located in the lumen caused ileus owing to mechanical obstruction. We deduce that the concomitant, prompt decompression of the stomach for the ileus and the CT-guided drainage for the abscess promoted the process of fistula closure and abscess resolution. The stent migrated through the digestive tract by peristalsis concomitantly with the closure of the fistula. When the stent was evacuated extracorporeally, the fistula was completely closed and the abscess disappeared. Although the underlying process is limited to the authors’ speculation because of the non-surgical treatment, this exceptionally fortunate case suggests that the complete removal of an infected artificial prosthesis remains the gold standard of treatment, which is the key for curing procedure-related infections or complications.

In conclusion, this exceptionally fortunate case showed that it is possible for a graft-duodenal fistula to be cured by conservative treatment alone, under strict conditions that infection of the occluded graft is controlled effectively by localizing the infection, and that the infected artificial material is removed concomitantly.

Disclosure Statement

Shunya Shindo, Hidenori Inoue, Shinya Motohashi, Hirotomo Uchiyama, and Junetsu Akasaka have no conflicts of interest as presented in conflict of interest (COI) files.

Author Contributions

Data collection: SS, HI, SH, HU, and JA
Manuscript writing: SS
Critical review and revisions: all authors
Final approval of the article: all authors
Accountability for all aspects of the work: all authors

References

1) Back MR. Local complications: Graft infection. In: Cronenwett JL, Johnston KW, eds. Rutherford’s Vascular Surgery. 7th ed. Philadelphia: Saunders, 2010: pp 643-61.
2) Kashyap WS, O’Hara PJ. Local complications: Aortoenteric fistulae. In: Cronenwett JL, Johnston KW, eds. Rutherford’s Vascular Surgery. 7th ed. Philadelphia: Saunders, 2010: pp 663-74.
3) Lee TH, Park DH, Park JY, et al. Aortoduodenal fistula and aortic aneurysm secondary to biliary stent-induced retroperitoneal perforation. World J Gastroenterol 2008; 14: 3095-7.