

Endovascular Repair of a Presumed Aortoduodenal Fistula

Shinichi Suzuki, MD,¹ Kiyotaka Imoto, MD,¹ Keiji Uchida, MD,¹ Naoki Hashiyama, MD,¹ and Yoshinori Takanashi, MD²

This report describes the use of transluminal endovascular grafting for the treatment of a presumed aortoduodenal fistula. The patient was a 71-year-old man who had undergone resection and graft replacement for an abdominal aortic aneurysm. Three years after operation, melena was caused by perforation of the duodenal wall by a pseudoaneurysm at the proximal graft anastomosis. The pseudoaneurysm was treated by transluminal endovascular grafting. The pseudoaneurysm was subsequently thrombosed and absorbed. The ulcer-like lesions at the site of the duodenal wall perforated by the pseudoaneurysm also resolved. Endovascular stent-grafts may have a role to play in management of aortoduodenal fistula. (Ann Thorac Cardiovasc Surg 2005; 11: 424–8)

Key words: transluminal endovascular grafting, a presumed aortoduodenal fistula

Introduction

The incidence of perforation of the gastrointestinal wall after abdominal aortic replacement ranges from 0.3% to 2.0%.¹⁻⁴⁾ Surgical mortality rates are high, ranging from 25% to 90%,^{1,2,5-7)} and outcome is extremely poor.

Few reports have documented the use of transluminal endovascular grafting for the treatment of an aneurysm with perforation of the gastrointestinal wall.⁸⁻¹²⁾ This procedure is less invasive than open surgery.

We report endovascular repair of a presumed aortoduodenal fistula.

Case Report

The patient was a 71-year-old man with melena who had a history of hypertension. He underwent resection and Y-graft replacement of an infrarenal abdominal aortic aneurysm on February 24, 2000. Immediately after surgery,

the patient had a bleeding gastric ulcer that did not respond to endoscopic treatment. A Billroth II distal gastrectomy was therefore performed. A postoperative computed tomographic (CT) scan of the abdomen revealed a pseudoaneurysm at the proximal anastomosis of the abdominal aorta graft. On June 7, 2002, the patient underwent resection and graft replacement of an aneurysm of the descending thoracic aorta. On April 1, 2003, he was readmitted to the same hospital because of transient ischemic attacks. Blood tests on admission revealed anemia and melena, but no potential sites of bleeding were found on upper or lower gastrointestinal endoscopy. An abdominal CT scan and angiographic examination reconfirmed the presence of a pseudoaneurysm at the proximal anastomosis of the abdominal aortic graft. Melena was attributed to perforation of the gastrointestinal wall by the false aneurysm, and the patient was transferred to our center on April 14, 2003 for further evaluation and treatment.

On admission the patient was in good general condition. Surgical wounds were present on the chest and abdomen. He passed tarry stools. Peripheral blood tests showed that the hemoglobin level was 11.2 g/dL on admission and decreased to 9.1 g/dL the next day. Stool was positive for occult blood. There were no other blood chemical abnormalities. The serum C-reactive protein

From Departments of ¹Cardiovascular Surgery and ²the 1st Surgery, Yokohama City University School of Medicine, Yokohama, Japan

Received May 24, 2005; accepted for publication July 11, 2005. Address reprint requests to Shinichi Suzuki, MD: Department of Cardiovascular Surgery, Yokohama City University School of Medicine, 4-57 Urafune-cho, Minami-ku, Yokohama, Kanagawa 232-0024, Japan.

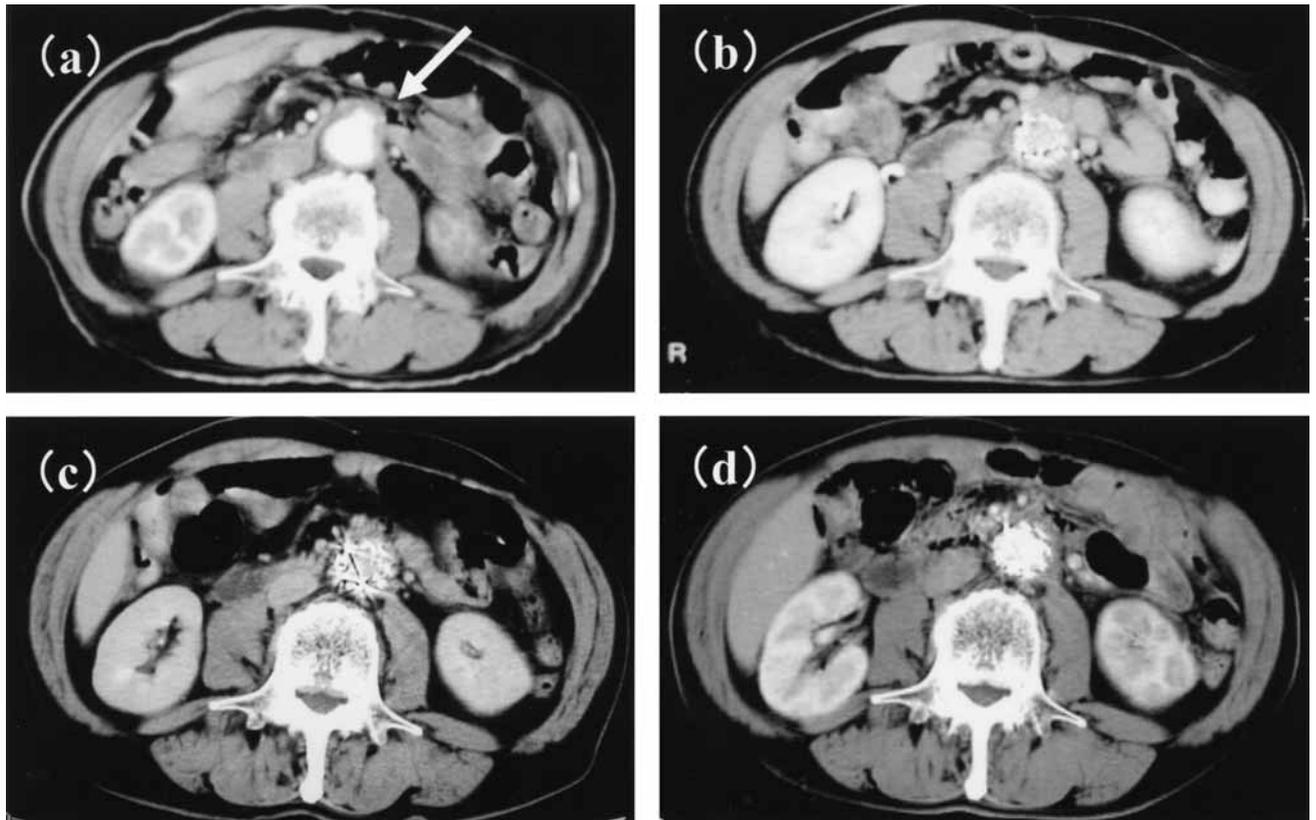


Fig. 1.

(a) A computed tomographic (CT) scan before surgery, showing a pseudoaneurysm at the graft anastomosis (arrow). CT scans on postoperative day 4 (b), postoperative day 21 (c), and postoperative month 6 (d).

level was 0.1.

An abdominal CT scan after admission revealed a pseudoaneurysm protruding towards the abdomen, located at the proximal anastomosis of the abdominal aortic graft (Fig. 1a). Angiography confirmed the presence of a pseudoaneurysm at the proximal graft anastomosis (Fig. 2a). Upper gastrointestinal endoscopy showed a compressed external wall of the afferent duodenal loop and an ulcer at the apparent site of perforation of the gastrointestinal wall by the aortic pseudoaneurysm (Fig. 3a).

Duodenal perforation caused by a pseudoaneurysm arising at the proximal anastomosis of the abdominal aortic graft was diagnosed. Four days after transfer to our center, the patient underwent transluminal endovascular grafting to treat the pseudoaneurysm of the abdominal aorta. The procedure was performed under general anesthesia. The right femoral artery was used as the access route. An 18-French polytetrafluoroethylene (Teflon) delivery sheath (Cook Inc., Bloomington, IN,

USA) was introduced into the abdominal aorta by the tug of wire technique. A Gianturco Z-stent (outer-diameter, 30 mm; length, 75 mm; Cook Inc.) covered with thin-walled woven graft material (Ube graft; Yamaguchi, Ube, Japan) (outerdiameter, 24 mm) was deployed in the abdominal aorta during ATP-induced cardiac arrest. Blood flow into the false aneurysm was successfully obliterated. Aortography immediately after deployment showed no endoleaks (Fig. 2b). The operation time was 1 hour 25 minutes.

There were no postoperative complications. Food and liquids were withheld after surgery. CT scanning and upper gastrointestinal endoscopy were performed once a week. CT scanning revealed thrombosis (Fig. 1b) and gradual consolidation and shrinkage (Fig. 1c) of the pseudoaneurysm. Upper gastrointestinal endoscopy showed that the protruded lesions in the duodenal mucosa gradually resolved. Sloughing of the site of ulceration was confirmed, with no bleeding (Fig. 3b). Fecal occult-blood became negative 2 weeks after surgery. Up-

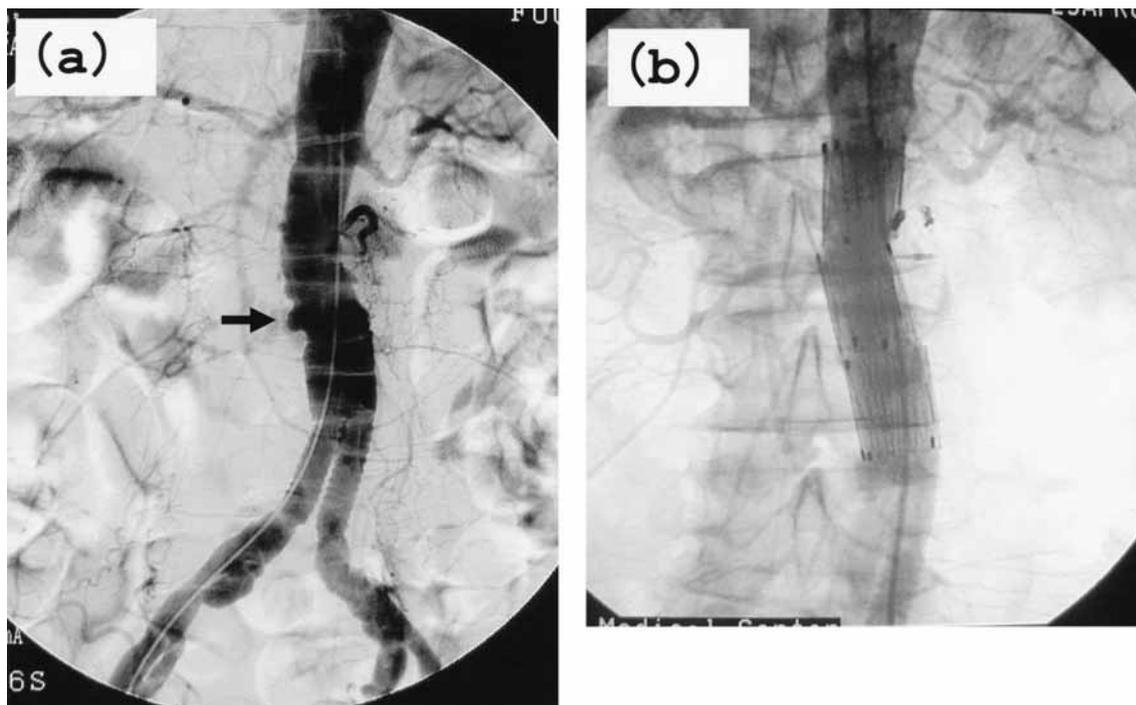


Fig. 2.

- (a) A digital-subtraction angiogram before surgery, showing a pseudoaneurysm at the graft anastomosis (arrow).
 (b) An aortogram obtained after surgery.

per gastrointestinal endoscopy 1 month after surgery showed that the mucosal protrusions had nearly disappeared, with complete resolution of the ulcer (Fig. 3c). A liquid diet was started. The patient's progress was good after the resumption of food intake; there were no abnormalities. The serum C-reactive protein level was highest (10.9) on the third postoperative day and became normal (0.1) on the 21st postoperative day. There were no signs or symptoms of stent-graft infection. The patient was discharged in good condition on the 40th postoperative day. A CT scan 6 months after surgery revealed disappearance of the retroperitoneal edema around the stent graft, seen immediately after surgery (Fig. 1d). No abnormalities were seen on upper gastrointestinal endoscopy.

As of 20 months after operation, he is being treated on an outpatient basis; there has been no evidence of stent-graft infection.

Discussion

The incidence of gastrointestinal perforation by a pseudoaneurysm after graft replacement of the abdominal aorta is low (0.3% to 2.0%),¹⁻⁴⁾ but the operative

mortality rate remains extremely high (25% to 90%).^{1,2,5-7)} Reoperation is often required to control bleeding, eliminate potential sources of infection, repair the duodenum, and reconstruct the vasculature. Prevention of recurrent postoperative infections is another important problem. Extra-anatomic bypass surgery has been reported to prevent recurrent infections.¹⁾ The secondary rupture rate of the abdominal aorta is 9% to 17%.^{1,2,5)} Recent studies have reported that homografts¹³⁾ and omental-patch closure⁴⁾ are useful for controlling postoperative infection, but the value of these techniques remains questionable.

Surgical treatment is thus associated with high mortality, as well as recurrent postoperative infections. Transluminal endovascular grafting is a minimally invasive treatment for aortic diseases that has received considerable attention and may also be useful for the management of aortoenteric fistula. However, clinical experience remains limited.⁸⁻¹²⁾ Previous studies have consistently reported that transluminal endovascular grafting successfully obliterates flow into aneurysms and arrests gastrointestinal bleeding. Short-term results have been satisfactory. Transluminal endovascular grafting is also considered effective for transient con-

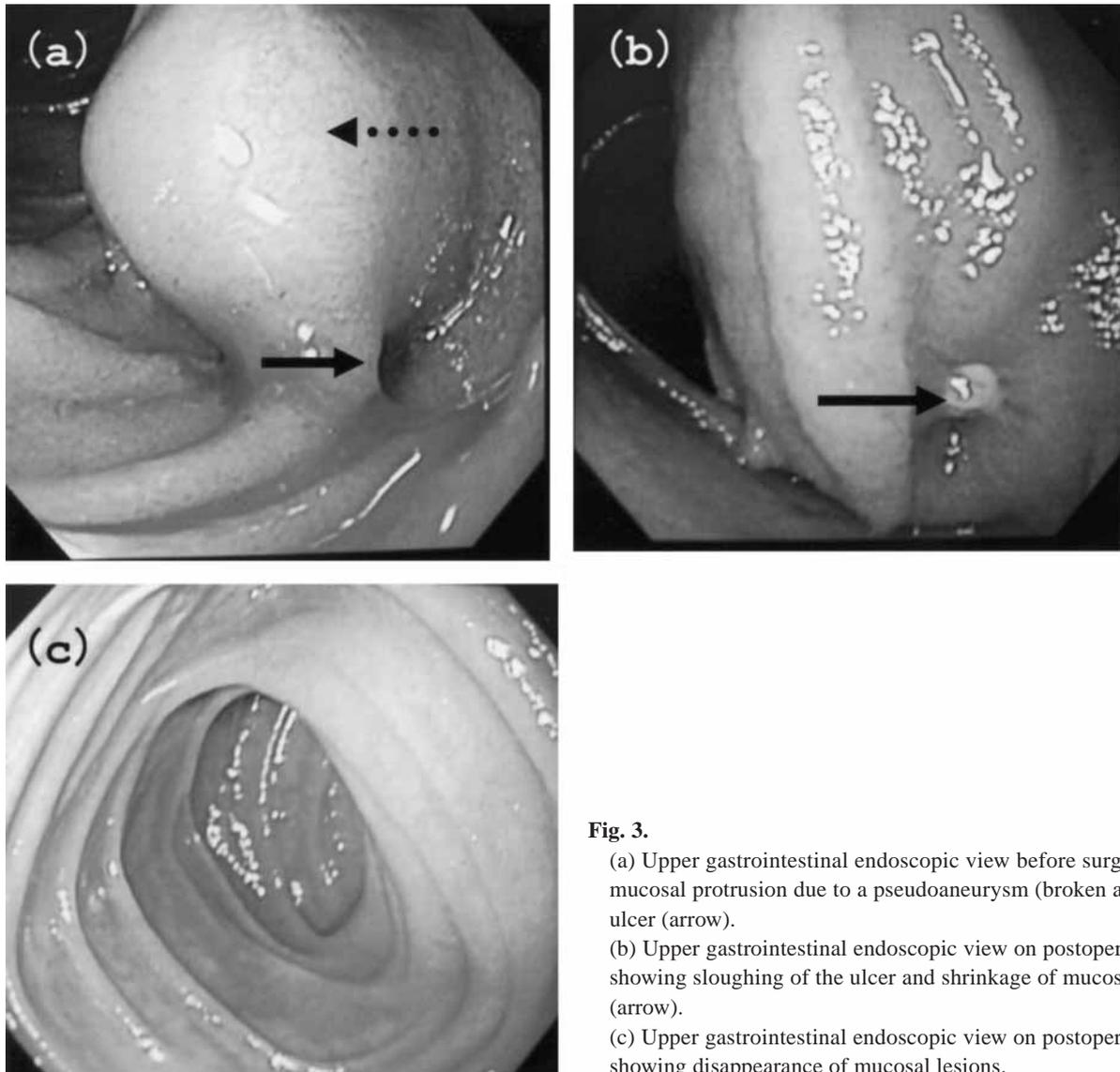


Fig. 3.

- (a) Upper gastrointestinal endoscopic view before surgery, showing mucosal protrusion due to a pseudoaneurysm (broken arrow) and an ulcer (arrow).
- (b) Upper gastrointestinal endoscopic view on postoperative day 12, showing sloughing of the ulcer and shrinkage of mucosal protrusion (arrow).
- (c) Upper gastrointestinal endoscopic view on postoperative day 30, showing disappearance of mucosal lesions.

control of bleeding in patients with life-threatening gastrointestinal hemorrhage. We used transluminal endovascular grafting to treat an abdominal aortic aneurysm with perforation of the duodenal wall. Flow into the pseudoaneurysm was successfully obliterated, and the aneurysm thrombosed and shrank. The duodenal mucosal lesions due to compression and perforation of the duodenal wall by the aneurysm also resolved after surgery.

However, gastrointestinal perforation caused by an anastomotic pseudoaneurysm after graft replacement has a high probability of leading to graft infections. Therefore, stent-graft placement at this site may have a high risk of stent-graft-related infections. Chuter et al. reported that reoperation was needed because of stent-

graft-related infection 8 months after endovascular repair of an aortoenteric fistula.⁹⁾ Schlensak et al.¹²⁾ reported that reoperation was needed because of recurrence of a secondary aortoduodenal fistula 5 months after surgery. However, Deshpande et al.¹⁰⁾ reported no signs or symptoms of infection for 6 months after surgery in a patient given long-term postoperative treatment with antibiotics.

During the first 20 months of postoperative follow-up in our patient, CT scanning has confirmed thrombosis and consolidation of the pseudoaneurysm, with no evidence of stent-graft infection. However, stent-graft-related infection remains a risk; the patient must therefore be carefully followed.

References

1. Kuestner LM, Reilly LM, Jicha DL, et al. Secondary aortoenteric fistula: contemporary outcome with use of extraanatomic bypass and infected graft excision. *J Vasc Surg* 1995; **21**: 184–96.
2. Menawat SS, Gloviczki P, Serry RD, et al. Management of aortic graft-enteric fistulae. *Eur J Vasc Endovasc Surg* 1997; (Suppl A): 74–81.
3. Bunt TJ. Synthetic vascular graft infections. II. Graft-enteric erosions and graft-enteric fistulas. *Surgery* 1983; **94**: 1–9.
4. Montgomery RS, Wilson SE. The surgical management of aortoenteric fistulas. *Surg Clin North Am* 1996; **76**: 1147–57.
5. Bergqvist D, Bjorkman H, Bolin T, et al. Secondary aortoenteric fistulae—changes from 1973 to 1993. *Eur J Vasc Endovasc Surg* 1996; **11**: 425–8.
6. van Baalen JM, Kluit AB, Maas J, et al. Diagnosis and therapy of aortic prosthetic fistulas: trends over a 30-year experience. *Br J Surg* 1996; **83**: 1729–34.
7. Sierra J, Kalangos A, Faidutti B, et al. Aorto-enteric fistula is a serious complication to aortic surgery. Modern trends in diagnosis and therapy. *Cardiovasc Surg* 2003; **11**: 185–8.
8. Eskandari MK, Makaroun MS, Abu-Elmagd KM, et al. Endovascular repair of an aortoduodenal fistula. *J Endovasc Ther* 2000; **7**: 328–32.
9. Chuter TA, Lukaszewicz GC, Reilly LM, et al. Endovascular repair of a presumed aortoenteric fistula: late failure due to recurrent infection. *J Endovasc Ther* 2000; **7**: 240–4.
10. Deshpande A, Lovelock M, Mossop P, et al. Endovascular repair of an aortoenteric fistula in a high-risk patient. *J Endovasc Surg* 1999; **6**: 379–84.
11. Grabs AJ, Irvine CD, Lusby RJ. Stent-graft treatment for bleeding from a presumed aortoenteric fistula. *J Endovasc Ther* 2000; **7**: 236–9.
12. Schlensak C, Doenst T, Spillner G, et al. Palliative treatment of a secondary aortoduodenal fistula by stent-graft placement. *Thorac Cardiovasc Surg* 2000; **48**: 41–2.
13. Vogt PR, Turina MI. Management of infected aortic grafts: development of less invasive surgery using cryopreserved homografts. *Ann Thorac Surg* 1999; **67**: 1986–9.