SHORT REPORT

A Modification of the Treatment of Prosthetic Graft Infection Complicating an Aorto-Duodenal Fistula

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The replacement of infected prosthetic graft material, usually bifurcated abdominal aortic grafts associated with aorto-duodenal fistulae, is a difficult surgical procedure. In this paper, an original modification of the surgical treatment of a secondary aorto-duodenal fistula in four cases is presented. An oblique incision from the left costal arch to the right anterosuperior iliac spine and retroperitoneal approach was used. In this way the retroperitoneal space was exposed and the aorto-duodenal fistula was dissected. The duodenal fistula was closed with two layers of stitches and additionally protected with a pedicle of the greater omentum, placed retrocolically in the retroperitoneal space.

Introduction

Infection following vascular operations, particularly involving synthetic prosthetic graft implantation, is a serious complication of vascular surgery.1–4 The employment of vascular prosthetic grafts has contributed to the considerable development of vascular surgery. Their routine application has resulted in an increase in the number of successfully treated patients as well as an increase in the number of infectious complications.1–4 Secondary aorto-enteric fistula results from the infection of vascular prostheses used for the treatment of arteriosclerosis or aneurysm.5–10 Restoration of aortic patency at the place of anastomosis or performing re-operations directly after a primary procedure are rare causes of fistula creation. Aorto-enteric fistulae occur between vascular prostheses and adjacent lengths of intestine, usually the duodenum. The anastomosis usually forms between the duodenum and the proximal vascular anastomosis.5 Rarely, the fistula can arise directly between the intestinal lumen and the prosthetic wall as a result of the digestive effects of the bowel contents on the graft wall.5

Surgical treatment comprises the complete removal of the infected vascular graft followed by restoration of blood flow.1–4 The grafts used for vessel reconstruction include prosthetic grafts more resistant to infection (antibiotic-bonded and silver-coated vascular prostheses) as well as venous and arterial autografts and homografts.1–4 The next stage consists of closing the defect in the digestive tract, which is vital for the operation to be successful.6–10 The replacement of an infected prosthetic graft (most often of a bifurcated prosthesis) and the closing of an aorto-enteric fistula, is a difficult and hazardous surgical procedure, whose results are unpredictable.3–10

Report

In the years 2002–2003 four patients (males), between the ages of 42–78, underwent surgery for secondary aorto-duodenal fistula, which had been generated as a complication of vascular prosthetic infection. The primary vascular surgery was performed from 3 to 7 years before the onset of graft infection. Two patients suffered from obliterative arteriosclerosis of the aorta, iliac and femoral arteries, and two from abdominal aortic aneurysm. The implantation of vascular grafts was performed using a transperitoneal approach through a midline laparotomy. In all cases of aorto-duodenal fistula, haemorrhage into the upper digestive tract occurred. We observed haemorrhagic shock in two patients with vomiting of fresh blood and fresh

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blood in the stool. In the other two cases the bleeding was less dramatic, presenting as tarry stools with fresh blood observed during rectal examination. Vomiting of haemolysed blood was also noted. The period from patient admission to diagnosis ranged from 3 to 37 days. In two cases clinical examination confirmed graft suppuration with fistulæ in the groins. Tissue cultures from the tissues surrounding the fistula revealed the presence of *Staphylococcus epidermitis*. In the remaining patient liquid purulent collections around the graft were observed. Other symptoms were fever, raised acute phase protein levels above 65 mg/l in all cases and septic skin embolism. In USG and CT of the abdomen the presence of a false aneurysm or inflammatory infiltration of an upper vascular anastomosis was observed. Migration of Tc-99m labelled leukocytes to the wall of the graft confirmed infection. Duodenoscopy revealed fresh blood in the duodenum without identification of the site of bleeding. In all cases the presence of aorto-duodenal fistula was confirmed at surgery, and the fistula was found in the third part of the duodenum. The vascular prosthesis was removed, the duodenal fistula closed and blood flow was restored by reconstruction. Access was obtained using an oblique incision from the left costal margin down to the right anterior superior iliac spine (Fig. 1). The retroperitoneal space was entered and the abdominal aorta was dissected just above the renal arteries (Fig. 2). All patients underwent a retroperitoneal and retrocolic omentoplasty, and the site of fistula closure was protected with a pediculated flap of omentum fixed with additional sutures. The omentum was introduced retroperitoneally and tracked retrocolically along descending part of the duodenum to the place of reconstruction (Fig. 3). An intestinal catheter was placed into the lumen of the duodenum below the site of repair. In two cases the infected aorto-bifemoral graft was replaced with a fresh arterial homograft taken during harvesting. The arteries were excised with a wide safety margin to avoid graft damage. The homografts were stored using cold ischemia in UW (University of Wisconsin) solution at 4 °C with antibiotics (Vancomycin, Lincomycin) from 12 to 20 h. In all cases ABO compatibility and negative cross-match between donor and recipient were obligatory. After surgery both patients received 1–2 mg/kg of Cyclosporin A daily. Cyclosporin doses were adjusted to blood levels of 120–140 ng/ml. Vascular straight grafts impregnated with salts of silver and sealed with collagen were implanted in two patients. During follow up (from 8 to 13 months) in all of the patients laboratory and imaging examinations confirmed continuing lack of recurrence of infection. A decrease in the blood level of C-reactive protein was observed. Duplex Doppler color ultrasound revealed no perigraft fluid collections and scintigraphy displayed gradual regression of Technetium99m-labeled leukocyte migration at the site of surgery.

**Discussion**

In the surgical treatment of prosthetic aorto-bifemoral graft infection we used an oblique incision crossing the epigastrum from the left costal arch to the right antero-superior iliac spine. We found no cases of such surgical access described in literature. An important element of this approach is the exposure of the retroperitoneal space. This allows avoiding adhesions that most frequently occur in the sagittal plane of the body midline in the peritoneal cavity. There are also no problems with exposing the abdominal aorta above the proximal anastomosis, as well as with controlling the renal arteries and veins. The clamping of the aorta at this level and the ligation of vascular graft branches allow safe dissection of the aortic anastomosis even in the presence of false aneurysm proceed by anastomotic rupture. There is no possibility of haemorrhage from the aorta and there is also no problem with controlling possible bleeding from the iliac arteries.

![Fig. 1. Modification of surgical approach—an oblique incision.](image-url)
After excision of the proximal prosthesis, the same situation occurs in the case of aorto-duodenal fistula. The cessation of the inflow to the aorta and the outflow from its branches minimizes the risk of blood loss during dissection of the fistula. When the duodenum is affected by inflammatory infiltration, clamping of the aorta and the prosthesis branches facilitates precise dissection of the intestine without the danger of injury. The use of the oblique approach makes the extensive intestinal surgery in the presence of an aorto-duodenal fistula somewhat less difficult. Resection of the affected part of the duodenum followed by intestinal reconstruction is a more radical option. Intestinal reconstruction is performed by antecolic gastroenterostomy with jejuno-jejunal anastomosis and pyloroplasty. This procedure reduces the possibility of duodenal leakage but prolongs the time of the operation. This procedure should be considered especially in high-risk patients. Another option is fistula excision and duodenoplasty with two layers of sutures. The risk of this is related to the poor duodenal blood supply of the third part of the duodenum. A penduculated flap of omentum sutured to the reconstructed duodenum strengthens the repair. Usually transperitoneal omentoplasty is performed. The modified procedures—retrocolic and retroperitoneal omentoplasty have not been described before. Exclusion of the graft in the retroperitoneum peritoneum improves the chances of healing. Covering of the operated part of duodenum is more difficult in the case of transperitoneal omentoplasty. Communication between the retroperitoneum and the peritoneum increases the possibility of graft infection.

Conclusions

1. In our opinion the oblique approach simplifies the removal of the infected prosthesis in the treatment of massive aorto-bifemoral graft infection.
2. According to our experience, retrocolic and retroperitoneal omentoplasty seems to be a practical modification of aorto-duodenal fistula treatment with useful protection of the duodenal repair.

References


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