

## SHORT REPORT

# Saphenous Vein Spiral Graft: Successful Emergency Repair of a Mycotic Aneurysm with Aortoduodenal Fistula

J.T. Heikens,\* H.M.E. Coveliers, D.H.C. Burger, D.P. van Berge Henegouwen and P.W. Vriens

*Department of Vascular Surgery, St. Elisabeth Hospital, Tilburg, The Netherlands*

*Mycotic aneurysms leading to aortoduodenal fistula (ADF) are associated with high morbidity and mortality. We report a patient with a mycotic aneurysm and ADF who required emergency laparotomy. After excision of the aneurysm, vascular reconstruction was performed using an autologous graft. The left long saphenous vein was harvested and constructed into a spiral graft. The graft was inserted using a standard inlay technique. After 12 months the patient is in good health. No inflammation or dilation of the saphenous vein spiral graft has been noted.*

*We suggest that in the emergency treatment of mycotic abdominal aneurysm, aortic reconstruction with saphenous vein spiral graft is a valuable option.*

*Keywords: Mycotic aneurysm; Infrarenal aorta; Saphenous vein spiral graft; Aortoduodenal fistula.*

## Introduction

Mycotic aneurysms leading to aortoduodenal fistula (ADF) are rare and associated with high morbidity and mortality.<sup>1,2</sup> Standard treatment includes resection of the aneurysm and infectious tissues, restoration of bloodflow and repair of the enteric defect.<sup>3</sup> We report successful emergency reconstruction with a spiral graft of the saphenous vein.

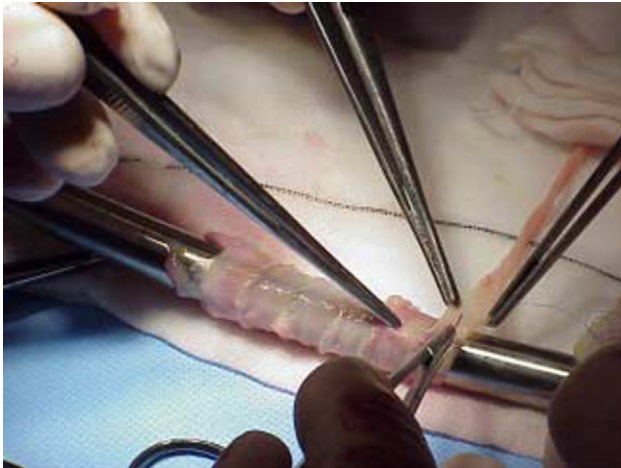
## Report

A 78-year-old woman was admitted to hospital with signs of small bowel obstruction and fever (40 °C). Lab results showed elevated white blood cell count and C-reactive protein (98 mg/l). Bloodcultures showed *Escherichia Coli* and antibiotics were given accordingly. Esophagogastroduodenal endoscopy (EGD) showed external compression of the third and fourth part of the duodenum with intact mucosal lining.

Enhanced computed tomography (CT) revealed a saccular aneurysm of the infrarenal aorta of 4.3 cm and reactive para-aortal lymph nodes. An open reconstruction of the aorta was planned. The next day she developed abdominal pain and hematemesis. CT showed increase in diameter of the aneurysm to 5.0 cm. She became haemodynamically unstable and required emergency operative intervention.

Laparotomy confirmed a ruptured aneurysm of mycotic origin and an aortoduodenal fistula of the fourth part of the duodenum. Cefuroxime, tobramycin and metronidazole were started intraoperatively. We temporarily clamped the infrarenal aorta, stabilising the patient's haemodynamic condition. Both iliac arteries were clamped. The distal duodenum at the site of the ADF was resected and stapled. An extensive debridement of the infectious mass including the aneurysm was performed. We harvested 50 cm of the proximal LSV using a venous stripper. Subsequently the LSV was cut open longitudinally and placed on an anal dilator of 15 mm. A spiral graft, 8 cm long, was constructed using continuous 6/0 sutures (Fig. 1). The harvesting and reconstruction took 45 minutes. The saphenous vein spiral graft was used to reconstruct the aorta with a standard inlay technique (Fig. 2). Two aortic anastomosis took

\*Corresponding author. J.T. Heikens, MD, St. Elisabeth Hospital, Postbus 90151, 5000 LC Tilburg, The Netherlands.  
E-mail address: [j.heikens@elisabeth.nl](mailto:j.heikens@elisabeth.nl)



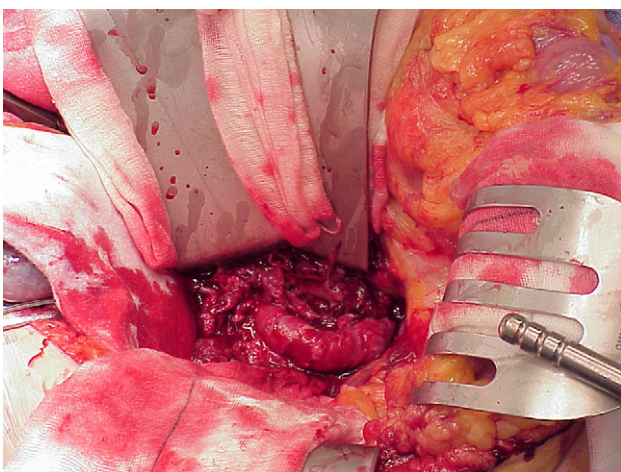
**Fig. 1.** Saphenous vein spiral graft reconstruction after harvesting of left long saphenous vein.

25 minutes, giving a total clamp time of 70 minutes. The saphenous vein spiral graft was covered with omentum.

Subsequently a side-to-side anastomosis between the jejunum and the proximal part of the duodenum was performed. Immediately postoperatively an embolectomy of the right femoral artery and a fasciotomy of the lower leg was necessary. Debridement cultures confirmed an *Escherichia Coli* and antibiotics were switched to amoxicillin.

An abdominal compartment syndrome complicated the postoperative course. A sub-total colectomy and an ileostomy were performed because of ischaemic colon. Chronic oral passage problems and a regressive neurologic deficit complicated recovery. Co-trimoxazol and fluconazol were given for *Citrobacter* and *Candida*.

The patient recovered slowly after a two months' stay in the intensive care unit. Follow-up angiography



**Fig. 2.** Saphenous vein spiral graft in situ.

and computed tomographic scans documented a functioning graft without evidence of residual infection or leakage. 2 ½ months after the initial operation the patient was discharged from the hospital in good health. Twelve months after operation the patient was free of inflammatory findings and CT reveal no graft dilatation. She had regained her normal weight.

## Discussion

The term *mycotic aneurysm* is used to describe an infected aneurysm regardless of its pathogenesis. This may result from bacteremia and embolization of infectious material, causing superinfection of the atherosclerotic surface of the artery.<sup>4,5</sup> This process weakens the arterial wall and allows formation of the aneurysm. Alternatively, due to aneurysmatic growth of the aorta, an extravascular focus such as adjacent duodenum may lead to a spontaneous development of a connection between the aneurysm and duodenum. The proposed theories for the formation of ADF are direct wear and inflammatory destruction triggered by infection, foreign bodies or erosion.<sup>6</sup>

The diagnosis of a mycotic aneurysm with an ADF is challenging. Early recognition is important. Resection of the mycotic aneurysm with aggressive and extensive debridement of the periaortic tissues is to be performed and reestablishment of the arterial flow is the next phase. Both open reconstruction and EVAR could be feasible. In our case emergency open reconstruction was required as the patient was haemodynamic unstable. An extra-anatomic bypass avoids placing a prosthetic graft in a contaminated region. However extra anatomic bypasses are known to have a reduced patency, moreover patients are at risk of a blow out of the aortic stump, thrombosis and infection.<sup>7</sup> Several studies show that the mortality rates are in favor of those with in situ compared to ex situ reconstructions.<sup>4,8,9</sup>

The conduits available for insitu repair include: femoropopliteal vein, artery, LSV or cryopreserved homograft, and rifampicin-bonded prosthetic grafts.<sup>1,10-12</sup> Earnshaw, in a review on the role of rifampicin-bonded grafts, concluded that this technique is best avoided in patients with extensive infection. Rifampicin has questionable activity against some Gram-negative pathogens. Results of trials comparing rifampicin-bonded grafts to routine prophylaxis recorded no evidence of benefit.<sup>13</sup>

Cryopreserved homografts are presumed to be more resistant to infection, however Lavigne *et al.* and other surgeons report poor results including rupture of the allograft implantation and advocate ex situ reconstruction for an ADF.<sup>12</sup>

In reconstructing the abdominal aorta to re-establish circulation to the lower extremities we were left with two options: autologous reconstruction using the femoropopliteal vein or constructing a spiral graft from the LSV thus allowing for a matching diameter to the native aorta. Harvesting the femoropopliteal vein was considered inappropriate. Given our concern about ischaemic time, stripping of the LSV and constructing a spiral graft was thought to be appropriate. The total clamp time in this case was 70 minutes. However the right leg did develop a compartment syndrome due to thrombosis of the femoral artery.

Harvesting prior to clamping of the aneurysm would be favourable. This reduces circulation impairment, favourable to limb and renal function. In our case of emergency operative intervention we were forced to clamp the aorta to stop the bleeding. Reconstructing the aorta was a second step.

Optimal duration of postoperative antibiotic therapy is controversial. Bloodcultures in patients with mycotic aneurysms most often show colonisation with *Salmonella* and *Klebsiella*.<sup>14</sup> Given the refractoriness of arterial wall infections, the authors believe oral antibiotic therapy should be prescribed to the patient until the CRP levels have normalised and blood cultures remain negative for 3–6 months.

We suggest that in the emergency treatment of mycotic abdominal aneurysm, aortic reconstruction using a saphenous vein spiral graft is a valuable alternative to the use of a femoropopliteal vein graft.

## References

- MÜLLER BT, WEGENER OR, GRABITZ K, PILLNY M, THOMAS L, SANDMANN W. Mycotic aneurysms of the thoracic and abdominal aorta and iliac arteries: experience with anatomic and extra-anatomic repair in 33 cases. *J Vasc Surg* 2001;**33**:106–113.
- CINA CS, ARENA GO, FITURE AO, CLASE CM, DOOBAY B. Ruptured mycotic thoracoabdominal aortic aneurysms: a report of three cases and a systematic review. *J Vasc Surg* 2001;**33**:861–867.
- MONETA GL, Taylor Jr LM, YEAGER RA, EDWARDS JM, NICOLOFF AD, MCCONNELL DB *et al.* Surgical treatment of infected aortic aneurysm. *M J Surg* 1998;**175**:396–399.
- CHAN FY, CRAWFORD ES, COSELLI JS, SAHI HJ, WILLIAMS TW. In situ prosthetic graft replacement for mycotic aneurysms of the aorta. *Ann Thorac Surg* 1989;**47**:193–203.
- REDDY DJ, ERNST CB. Infected aneurysms. In: RUTHERFORD RB, ed. *Vascular surgery*. 4th ed. Philadelphia: WB Saunders, 1995: p1139–p1153.
- LEMONS DW, RAFFETTO JD, MOORE TC, MENZOIAN JA. Primary aorto-duodenal fistula: A case report and review of the literature. *J Vasc Surg* 2003;**37**:686–689.
- PASIC M, CARREL T, VOGT M, SEGESSER L, TURINA M. Treatment of mycotic aneurysm of the aorta and its branches: the location determines the operative technique. *Eur J Vasc Surg* 1992;**6**: 419–423.
- DAENENS K, FOURNEAU I, NEVELSTEEN A. Ten-year experience in autogenous reconstruction with the femoral vein in the treatment of aortafemoral prosthetic infection. *Eur J Vasc Endovasc Surg* 2003;**25**:240–245.
- TORSELLO G, SANDMANN W, GEHRT A, JUNGBLUT RM. In situ replacement of infected vascular protheses with rifampin-soaked vascular graft: early results. *J Vasc Surg* 1993;**17**:768–773.
- ODERICH GS, PANNETON JM, BOWER TC, CHERRY KJ, ROWLAND CM, NOEL AA *et al.* Infected aortic aneurysms: aggressive presentation, complicated early outcome, but durable results. *J Vasc Surg* 2001;**34**:900–908.
- NEVELSTEEN A, LACROIX H, SUY R. Autogenous reconstruction with lower extremity deep veins: an alternative treatment of prosthetic infection after reconstructive surgery for aortoiliac disease. *J Vasc Surg* 1995;**22**:129–134.
- LAVIGNE JP, POSTAL A, KOHL P, LIMET R. Prosthetic vascular infection complicated or not by aortoenteric fistula: comparison of treatment with and without cryopreserved allograft (homograft). *Eur J Vasc Endovasc Surg* 2003;**25**:416–423.
- EARNSHAW JJ. The current role of rifampicin-impregnated grafts: pragmatism versus science. *Eur J Vasc Endovasc Surg* 2000;**20**: 409–412.
- PAGNI S, DENATALE RW, SWEENEY T, McLAUGHLIN C, FERNEINI AM. Primary aorto-duodenal fistula secondary to infected abdominal aortic aneurysms: the role of local debridement and extra-anatomic bypass. *J Cardiovasc Surg* 1999;**40**:31–35.

Accepted 6 April 2006

Available online 16 June 2006