Thoracic aorta transobturator bipopliteal bypass as eventual durable reconstruction after removal of an infected aortofemoral graft

Yehuda G. Wolf, MD, Talia Sasson, MD, Dana G. Wolf, MD, J. Moshe Gomori, MD, Haim Anner, MD, and **Yacov Berlatzky, MD,**
Jerusalem, Israel

A 36-year-old man was referred with aortofemoral graft infection and perigraft duodenal erosion. The aortofemoral graft was removed, and bilateral axillo–superficial femoral grafts were constructed. Recurrent failures of these grafts prompted us to convert to a more-durable reconstruction. A straight graft was anastomosed to the lower thoracic aorta, routed retroperitoneally, and attached to an inverted U-shaped bilateral transobturator bypass graft, which was anastomosed to both above-knee popliteal arteries. After 3 years, the patient has remained well and the grafts are patent. This operation represents a durable in-line reconstruction that avoids all previously infected areas after removal of an infected aortofemoral graft. (J Vasc Surg 1997;26:693-6.)

Treatment of aortic graft infection remains a controversial and challenging issue. Complete removal of the infected aortic graft and maintenance of lower extremity arterial supply by axillofemoral bypass grafting is a well-established treatment method.[1,2] However, axillofemoral bypass grafts have a documented high failure rate,[3] and in cases of repeated failure consideration should be given to conversion to a more durable reconstruction.

We report here on a patient who underwent thoracic aorta transobturator bipopliteal bypass grafting for recurrent failure of axillofemoral grafts implanted after the removal of an infected aortofemoral graft.

CASE REPORT

A 36-year-old man was referred 10 months after construction of an end-to-end aortobifemoral Dacron bypass graft at another hospital. The patient had ischemic rest pain of the left leg and fever. On exploration of the left groin, infection of the left limb of the graft was suspected, and the left limb of the graft was excised and closed. A left axillo–superficial femoral bypass graft was constructed using ring-supported 8 mm polytetrafluoroethylene (PTFE), and the graft was routed laterally through a different wound. Cultures from the groin wound grew *Pseudomonas aeruginosa,* and on subsequent evaluation infection of the entire aortofemoral graft and a perigraft duodenal erosion were diagnosed. Intravenous antibiotics were administered, initially ciprofloxacin and vancomycin, and once sensitivity was known treatment was changed to ceftazidime and amikacin. The entire aortofemoral graft was removed, the aortic stump was closed, and the duodenum was repaired. To avoid the right groin and because the use of a cross-femoral graft in this situation may be hazardous, we constructed a right lateral axillo–superficial femoral graft, avoiding the contaminated wound in the groin. The patient recovered, and antibiotic therapy was stopped after 3 months. Over the subsequent 10 months, multiple operations were required for recurrent failure of both axillofemoral grafts. On the left, four thrombectomies and extension of the graft to the above-knee popliteal artery were performed. On the right, four thrombectomies and replacement of the distal portion of the graft for infection were carried out. The patient received low-dose aspirin throughout, and after the initial episode of axillofemoral graft thrombosis he was treated with warfarin. Lower extremity run-off deteriorated

From the Department of Vascular Surgery, the Department of Radiology (Drs. Sasson and Gomori), and the Department of Infectious Diseases (Dr. D. G. Wolf), Hadassah University Hospital.

Reprint requests: Yehuda G. Wolf, MD, Department of Vascular Surgery, Hadassah University Hospital, PO Box 12000, Jerusalem, Israel 91120.

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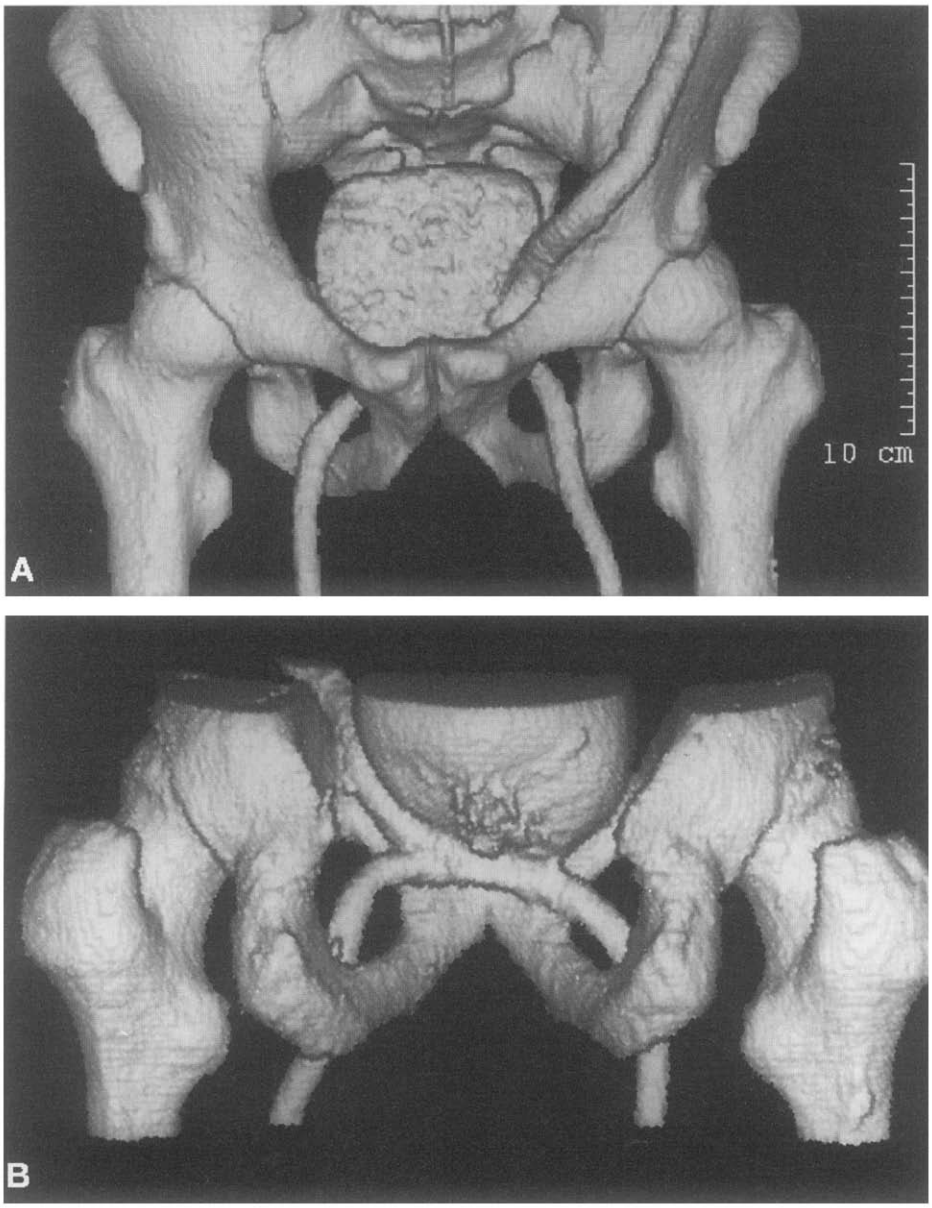

Fig. 1. Helical computed tomogram of pelvic region reconstructed to show prosthetic graft. **A,** Anterior view demonstrates graft descending in left iliac fossa to join transobturator graft, which is seen exiting through both obturator foramina. **B,** Posterior view with removal of sacrum shows aortic graft anastomosed to transverse segment of transobturator graft behind urinary bladder.

appreciably over this period. On the right the profunda artery occluded, and of two-vessel runoff only the posterior tibial artery remained patent to the foot on both sides. Each episode of thrombosis was associated with limb-threatening ischemia, and a more durable reconstruction was in order. In view of the recent infection and multiple operations, we decided to route the bypass graft in previously uninvolved areas.

Through a left thoracoretroperitoneal approach, the lower descending aorta was exposed. A defect posterior to the diaphragm was created, and a tunnel was developed in the retroperitoneum and into the lesser pelvis. Both internal obturator membranes were exposed. Both above-knee popliteal arteries were exposed, and an upward directed tunnel was created posterior to the adductor magnus muscle up to the external obturator membrane. The internal obturator membrane was cut lateral and inferior to the obturator canal from within the pelvis using electrocautery,

and the tunnelers were passed from the thighs through the defect into the pelvis. A ring-supported 6 mm PTFE graft was placed so that it ascended one thigh, entered the pelvis through the obturator foramen, went past the midline behind the urinary bladder, exited the pelvis through the contralateral obturator foramen, and descended in the other thigh, to create an inverted U-shaped graft through both obturator foramina.

A 10 mm PTFE graft was anastomosed end-to-side to the lower descending aorta and passed posterior to the diaphragm down the retroperitoneum into the lesser pelvis. The aortic graft was anastomosed end-to-side to the transverse portion of the transobturator graft behind the urinary bladder (Fig. 1). On the right, the graft in the thigh was connected to a reversed saphenous vein that was anastomosed sequentially to the popliteal artery above the knee and to the posterior tibial artery. The graft on the left was anastomosed to the popliteal artery above the knee, and a side-graft connected to its proximal portion in the upper thigh was anastomosed to the profunda artery. All dissection in this procedure was done in previously uninfected tissue planes.

The patient has been doing well since that time, for 3 years. He is ambulating freely, and his ankle-arm pressure index is 1.0 on both sides. For documentation and follow-up, we performed helical computed tomography (Fig. 1) and magnetic resonance angiography (Fig. 2), which demonstrated patency of the grafts.

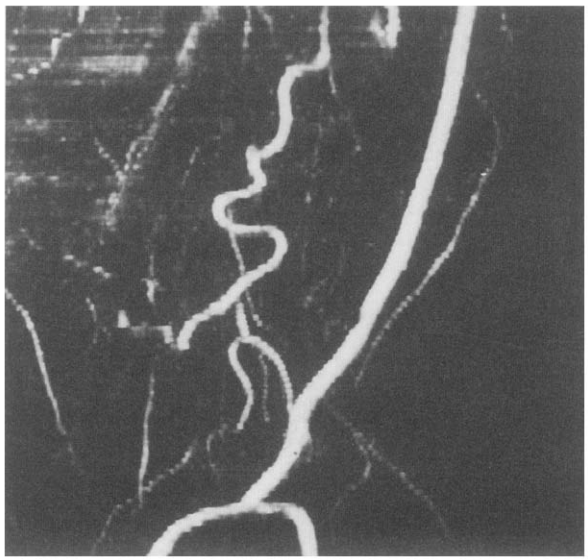

Fig. 2. Maximum intensity projection of axial two-dimensional time-of-flight magnetic resonance angiogram demonstrates flow in aortic graft continuing into biobturator graft. Abdominal arteries are seen in the background.

DISCUSSION

Aortic graft infection remains a challenging problem and still carries a reported 30-day mortality rate of at least 14% to 24%.[2,4] In recent years several series that evaluated different management schemes for aortic graft infection have been reported. These include antibiotic irrigation, limited surgical debridement and conservation of the graft,[5] removal of the infected graft and in situ aortic graft reconstruction,[6] reconstruction with aortic homograft,[7] and reconstruction with deep veins from the lower extremities.[8] Still, the best established procedure and probably the most commonly used procedure is complete removal of the aortic graft preceded by or followed by extraanatomic reconstruction by axillofemoral bypass grafting.[1,9,10]

The mean cumulative patency rate at 3 years for all cases of axillofemoral bypass grafting is 61% or less.[11] Although the reported patency rates and the attitude towards the construction of axillofemoral bypass grafts vary widely, it is generally accepted that the patency rate for all cases is not as good as that for aortic in-line reconstruction.[3] It is still worse in patients who have infrainguinal occlusive disease and compromised outflow, in whom patency is reduced to a cumulative 2-year secondary rate of 38% and is probably adversely affected by unifemoral versus bifemoral anastomoses.[11-14] Recurrent infection of the axillofemoral bypass graft understandably increases the likelihood of major amputation.[4] All of these adverse factors were present in the patient described and resulted in frequent, recurrent axillofemoral graft failure accompanied by acute lower limb ischemia.

In such cases, conversion of the extraanatomic bypass graft to a more durable in-line reconstruction is warranted. After removal of an infected aortic graft and closure of the infrarenal aorta, and especially after repair of a duodenal erosion, as in our case, approach to the infrarenal aorta may be quite difficult and hazardous. To avoid dissection in the upper abdomen, several groups have based their revascularization procedures on the lower thoracic aorta and have constructed bypass grafts to the iliac or femoral arteries.[15-19] In most of these cases the femoral graft was routed retroperitoneally to one groin and, if required, a cross-femoral graft was constructed. Because of recent infection in both groins, we preferred to avoid these areas and did not wish to construct a cross-femoral bypass, which is prone to infection under these circumstances.[20] We therefore chose to use a well-described extraanatomic route for such circumstances, the obturator bypass.[21-23] Both obturator foramina in the pelvis are remarkably close, and

the biobturator bypass graft we inserted had a rather short transverse segment within the pelvis behind the urinary bladder. The graft that originated in the thoracic aorta terminated in this transverse section of the biobturator graft. To our knowledge, construction of a graft with such a configuration has not been reported. The obturator bypass graft was particularly suitable in this setting because the graft remained in a posterior position throughout its course in the lower thorax, retroperitoneum, and pelvis and did not have to course anteriorly for a connection in the groin. A potential drawback of this deep placement of the grafts is the relative difficulty of performing a thrombectomy or revision when required, although this is feasible. The operation has achieved its goal, and the patient has been fully functional and free of symptoms since.

The described operation provides an option for a durable reconstruction after removal of an infected aortofemoral graft. It allows for construction of a relatively short, in-line, well-protected bypass graft with dependable inflow, while avoiding previously infected or dissected areas.

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