Hybrid Approach to Limb Salvage in the Setting of an Infected Femoral–Femoral Bypass Graft

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Prosthetic vascular graft infection in patients with advanced peripheral arterial disease can lead to multiple additional procedures, including extra-anatomic bypass or even amputation. We report the case of an 88-year-old woman with critical limb ischemia and an infected prosthetic femoral–femoral bypass graft. Using a planned hybrid 2-stage approach, we performed endovascular recanalization of the native left iliac arterial system using remote access via the superficial femoral artery to avoid infected groin wounds. Recanalization of the patient's Trans-Atlantic Inter-Society Consensus II D chronic iliac occlusion allowed for removal of the infected graft and placement of a profunda femoris artery to proximal posterior tibial artery bypass, thereby restoring inflow and avoiding the infected left groin. Newer endovascular techniques coupled with open surgical options may lead to limb salvage in patients with previously unreconstructable peripheral arterial disease.

CASE REPORT

An 88-year-old woman was admitted with a prosthetic femoral–femoral bypass graft infection, recently placed for critical left lower extremity ischemia (Rutherford Class 5). Her medical history was significant for atrial fibrillation, coronary artery disease, diabetes mellitus, obesity, and a benign pelvic sarcoma. She had also previously undergone coronary artery bypass grafting. Examination was notable for a 1.5-cm ulcer over the posterior left heel with exposed Achilles tendon and purulent drainage from bilateral groin incisions.

One month before, she underwent angiography, demonstrating multilevel occlusive disease from the left common iliac to posterior tibial artery. She subsequently underwent right common femoral endarterectomy and right-to-left femoral–femoral bypass with 8 mm externally supported polytetrafluoroethylene graft at our institution. Postoperatively, she was discharged to a rehabilitation facility where she developed persistent drainage from bilateral nonhealing groin incisions. Cultures of the fluid grew *Escherichia coli*, *Proteus mirabilis*, *Enterococcus faecalis*, and *Bacteroides fragilis*.

She was readmitted and started on broad spectrum IV antibiotics. A computed tomography scan was obtained which showed fat stranding around the femoral–femoral bypass as well as a 2.8-cm fluid collection in the left groin adjacent to the bypass graft (Fig. 1). She had no evidence of healing of her ankle ulceration. A monophasic Doppler signal was detected over her left posterior tibial artery.

To treat her prosthetic graft infection and revascularize her left lower extremity, a hybrid 2-stage treatment plan was developed, involving: (1) repeat attempt of percutaneous recanalization of her native left iliac arteries and then (2) removal of the infected femoral–femoral bypass graft and left lower extremity distal bypass to the posterior tibial artery. The goals of this treatment plan were to provide durable blood flow to the foot to allow wound healing, while minimizing the risk of persistent infection.

To avoid the infected left groin wound, the left superficial femoral artery (SFA) was accessed percutaneously just proximal to where it became occluded in the mid thigh with a micropuncture system under ultrasound guidance. Using a stiff-angled glidewire (Terumo,

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Ann Vasc Surg 2014; 28: 1565.e9–1565.e13
http://dx.doi.org/10.1016/j.avsg.2014.01.014

Manuscript received: September 11, 2013; manuscript accepted: January 8, 2014; published online: February 8, 2014.

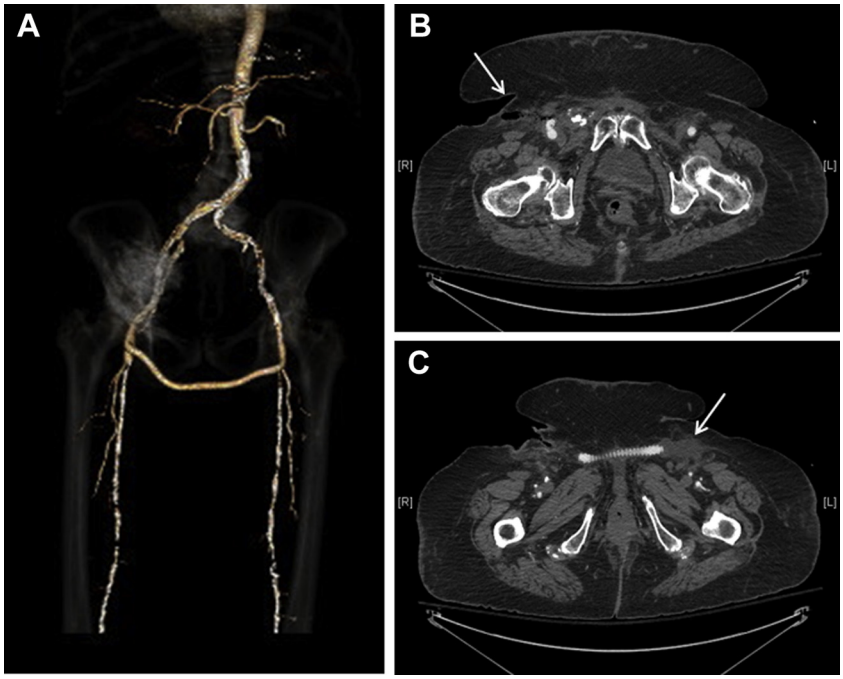

Fig. 1. CT scan obtained following femoral–femoral bypass. (**A**) CT reconstruction shows the femoral–femoral bypass. (**B**) Axial view through the area of the right femoral anastomosis shows groin defect and pockets of air, indicated by *arrow*. (**C**) In the left groin, a fluid collection surrounding the graft is seen, indicated by *arrow*. CT, computed tomography.

Boston, MA), the left external iliac artery (EIA) and common iliac artery (CIA) occlusions were crossed retrograde in a subintimal dissection plane, but reentry into the aorta could not be achieved using standard wire and catheter manipulations. An attempt at aortic reentry was made with the Outback Reentry device (Cordis, Bridgewater, NJ), but the device could not be passed secondary to heavy calcification. From a left brachial artery approach, antegrade access was gained to the occluded left CIA and a stiff-angled glidewire was able to be passed into a subintimal dissection plane in the CIA. The antegrade wire was manipulated into a sheath that had been placed from the left SFA, creating brachial–femoral through wire access. After predilatation, an 8 mm × 38 mm iCast (Atrium, Hudson, NH) balloon-expandable covered stent was placed at the origin of the left CIA, then two 7 mm × 5 cm Viabahn (W.L. Gore, Flagstaff, AZ) covered stents were placed distally (Fig. 2). An additional 8 mm × 60 mm Everflex bare metal stent (ev3, Plymouth, MN) was placed distally, extending the stented area to the left proximal common femoral artery and avoiding placement of a covered stent close to an area of active infection. Completion angiogram showed successful revascularization of the left iliac arteries with excellent flow through the left CIA and EIA stents (Fig. 3). Because the SFA was chronically occluded distal to our access site, a single 0.035″ Tornado coil (Cook Medical, Bloomington, IN) was deployed for hemostasis as the sheath was removed.

Two days later, the infected femoral–femoral graft excised and the common femoral arteries were repaired by patch angioplasty using saphenous vein. A left profunda femoris artery to proximal posterior tibial artery bypass was performed with reversed greater saphenous vein. A right rectus femoris flap and left sartorius flap were mobilized for coverage of bilateral groins. She received a 2-week course of intravenous antibiotics. At 2 months follow-up, she was seen in the office and surveillance duplex ultrasonography showed elevated velocities in her bypass graft. An angiogram was performed which showed a patent graft with a 2-cm mid-graft stenosis. This was treated with balloon angioplasty with good result (Fig. 4). The patient has had no recurrence of claudication or rest pain. The left ankle wound has healed with wound care and a split-thickness skin graft.

DISCUSSION

Combined endovascular and open surgical techniques (hybrid procedures) have come to play an increasingly important role in the treatment of multilevel lower extremity atherosclerotic disease.[1,2] Techniques for multiple forms of combined peripheral procedures are well described.[3–7] Typically, endovascular techniques have been employed to treat proximal stenoses in an effort to improve