ELSEVIER

Use of Internal Endoconduits as an Adjunct to Endovascular Aneurysm Repair in the Setting of Challenging Aortoiliac Anatomy

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The combination of Trans-Atlantic Intersociety Consensus (TASC) D aortoiliac occlusive disease as well as a symptomatic abdominal aortic aneurysm (AAA) is not a common occurrence. Extensive calcified atherosclerotic disease, occlusions, and small iliofemoral segmental arteries make transfemoral access difficult, if not impossible, for endovascular aneurysm repair (EVAR) in these patients. We present a case in which "controlled rupture" of the external iliac artery with a covered stent allowed transfemoral delivery of an aortouni-iliac stent graft with a completion femoral-to-femoral bypass. The patient is a 60-year-old male with a 5.3 cm symptomatic infrarenal AAA and a history of one block right leg claudication. Preoperative computed tomography angiography revealed the patient to have occlusion of the right common iliac artery, extensive calcified stenoses of his aortoiliac segments, and a prohibitively small left external iliac artery, which measured 4.5 mm at its narrowest diameter. The patient, despite discussions concerning the suitability of his iliac arteries as conduits for the delivery of the stent graft, insisted on an endovascular approach to lessen his chances of postoperative sexual dysfunction as well as minimize his length of stay. Access was obtained through bilateral femoral artery cutdowns, and attempts at dilating the left external iliac artery using 16-French dilators were performed without success. An 8 mm $\times$ 5 cm covered self-expanding stent was deployed in the diseased 4.5 mm left external iliac artery, followed by angioplasty performed with an 8 mm noncompliant balloon to disrupt the vessel. This endoconduit now allowed accommodation of our 18-French introducer for the aortouni-iliac stent graft. The operation was completed with a femoral–femoral bypass. Flow to both hypogastric arteries was preserved. We believe use of such techniques will ultimately expand the number of patients eligible for EVAR and avoid devastating access-related complications.

CASE REPORT

The patient is a 60 year old male who was referred for severe bilateral thigh, buttock, and calf claudication of several years' duration in the setting of known aortoiliac occlusive disease (AIOD). He was also referred with a report of an asymptomatic 4.7 cm infrarenal abdominal aortic aneurysm (AAA). An extensive discussion with the patient was held at that time regarding the natural history of AAA as well as AIOD and treatment of this disease. At follow up in January 2008 a computed tomography (CT) angiogram was performed at the treating institution, which demonstrated a 5 cm infrarenal AAA as well as Trans Atlantic Intersociety Consensus (TASC) D AIOD. His symptoms of claudication were worse on the right and had improved from one block to two blocks after successfully completing a smoking cessation program and a supervised walking program. He continued to deny any symptoms related to the aneurysm and was advised to return in 6 months for follow up imaging. The patient missed his 6 month follow up CT and appointment. In September 2008 he presented to the emergency department complaining of several days of left flank and abdominal pain with tenderness over his aneurysm on examination. He was hemodynamically stable on presentation and in no acute distress. A CT angiogram was performed, which revealed the aneurysm to have grown to 5.3 cm without evidence of rupture (Fig. 1). The right common iliac artery was occluded, as was the celiac artery and inferior mesenteric artery.

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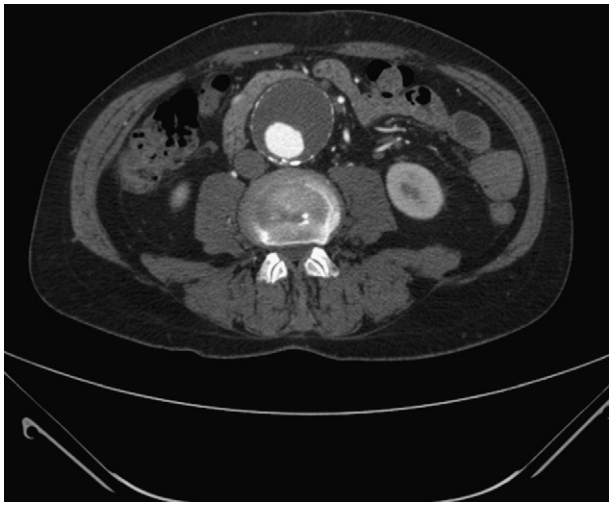

Fig. 1. CT angiogram demonstrating 5.3 cm AAA without evidence of rupture or leak.

Additionally, the left common iliac artery was noted to contain extensive calcified vascular disease (Fig. 2).

The need for urgent intervention for his symptomatic AAA was discussed with the patient. Given the extent of his AIOD, classified as TASC D because of right common iliac artery occlusion with his aneurysm, an open aneur ysmorrhaphy and aortobifemoral bypass was recommen ded. The patient refused an open repair, citing his unwillingness to accept a risk of erectile dysfunction as high as 85% following open repair.[1] We ultimately agreed to attempt endovascular aneurysm repair (EVAR) with an understanding from the patient that if, despite our best efforts, we would be unable to deliver the stent graft, then open repair remained an intraoperative option.

The operation was performed with bilateral femoral artery cutdowns, exposing the left common femoral artery for eventual delivery of our stent graft. A 7 French intro ducer sheath (Cook Medical, Bloomington, IN) was placed into the left common femoral artery with insertion of a Benson wire (Cook Medical). Under fluoroscopic guid ance, the Benson wire was directed across the calcified stenoses of the iliac segmental arteries and into the abdominal aorta. An aortoiliac angiogram was performed with a calibrated catheter. The left external iliac artery was severely stenosed, measuring 4.5 mm at its narrowest point (Fig. 3). An Amplatz (Cook Medical) stiff wire was exchanged through the calibrated catheter and placed into the aorta. We attempted first to utilize serial dilation catheters over the wire under fluoroscopy but were unsuccessful in crossing the lesions. We selected an 8 mm × 5 cm Viabahn Endoprosthesis (W. L. Gore & Asso ciates, Newark, DE) for use as an internal endoconduit to line the left external iliac artery with our proximal landing zone just distal to the hypogastric artery. With the Via bahn Endoprosthesis deployed, an 8 mm × 2 cm noncom pliant balloon angioplasty catheter was positioned within it, and under controlled, metered insufflation to its full profile, the Viabahn stent was dilated to its maximum diameter along its entire length. An angiogram was then

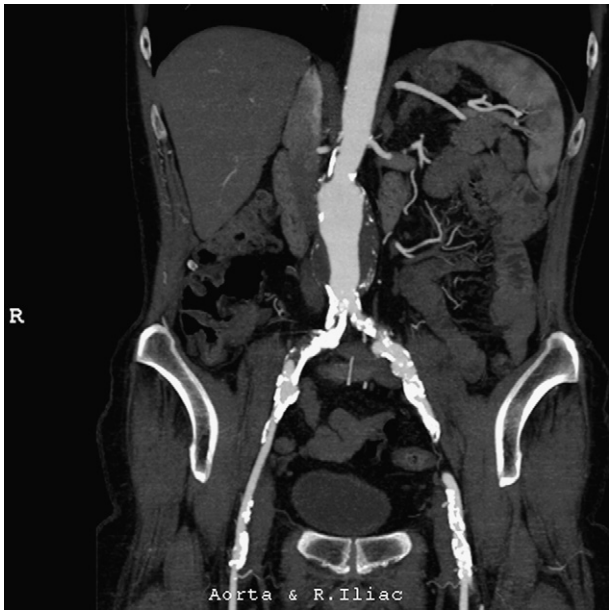

Fig. 2. Coronal reconstructions from CT angiogram demonstrating right common iliac artery occlusion and severe left common iliac artery calcified stenoses.

performed to ensure proper dilation of the left external iliac artery and that free rupture of the vessel had not occurred. The angiogram was satisfactory, and the patient remained hemodynamically stable. With the left external iliac artery now dilated to 8 mm, we were able to insert a Zenith (Cook Medical) 22 × 133 mm aortouni iliac stent graft mounted on an 18 French delivery system with an extension into the common iliac artery with a 10 × 71 mm limb extender (Fig. 4). We landed the distalmost portion of the limb extender just proximal to the left hypo gastric origin, ensuring continued patency. A completion angiogram revealed no evidence of endoleak (Fig. 5). A left to right femoral–femoral crossover bypass was per formed with a 10 mm ringed polytetrafluoroethylene (PTFE) prosthetic graft (W.L. Gore & Associates) to revas cularize the right lower extremity.

Postoperatively, the patient had an uneventful recovery and no complications. He was eventually dis charged to home on day 6 of his postoperative course. On 1 and 6 month follow up, a CT angiogram was per formed, which demonstrated no evidence of endoleak, continued patency of the endoconduit in the left external iliac artery, continued patency of the left hypogastric artery, and retrograde perfusion of the right hypogastric artery (Fig. 6A, B).

DISCUSSION

Given the current state of technology for EVAR, challenging aortoiliac anatomy continues to be one of several limiting factors in its applicability to all patients with AAA. Small caliber, severe calcified stenoses, and severe angulation of the iliac anatomy,

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