

Treating a Type III Endoleak

An aorto-uni-iliac stent graft placement successfully repairs an endoleak secondary to fabric tear.

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A 69-year-old man with dyslipidemia, a family history of coronary artery disease, and a long history of smoking, underwent a screening ultrasound that revealed a 5-cm abdominal aortic aneurysm (AAA). The patient then underwent computed tomographic angiography (CTA) to further define the anatomy. The AAA measured 54 mm in maximal diameter (Figure 1A). The proximal neck had no angulation and measured 26 mm in diameter and 25 mm in length. The left common iliac artery was aneurysmal and measured 31 mm in diameter, with the aneurysm extending to the origin of the internal iliac artery (Figure 1B). The patient underwent cardiac evaluation with a stress nuclear medicine study, which revealed an ejection fraction of 61% and no reversible ischemic changes. Endovascular exclusion of the AAA and the left common iliac aneurysm with embolization of the left internal iliac artery was planned.

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PROCEDURE

Due to diseased common femoral arteries, bilateral femoral cutdowns were performed. Heparin was administered to maintain an activated clotting time of > 250 seconds. Access into the right femoral artery was achieved, and catheterization and embolization of the left internal iliac artery was accomplished with use of an 8-mm Amplatzer Vascular Plug II device (AGA Medical Corporation, Plymouth, MN). A 32- X 88-mm Zenith Flex AAA bifurcated stent graft device (Cook Medical, Bloomington, IN) was advanced via the right femoral artery and deployed in a standard fashion (see the Instructions For Use). The contralateral limb was catheterized via the left femoral artery, and a 12-mm-diameter X 88-mm-long left iliac limb was deployed with its distal portion within the left external iliac artery to exclude the embolized left internal iliac artery aneurysm. The ipsilateral (right) common iliac limb, measuring 16 mm in diameter and

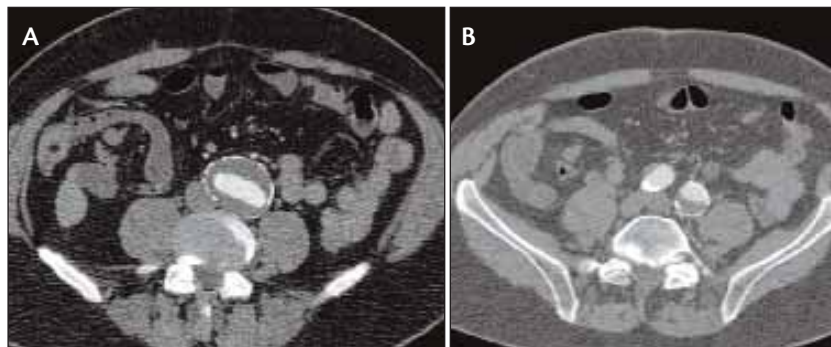


Figure 1. Axial CTA images show the infrarenal AAA measuring a maximum of 54 mm (A) and the left internal iliac aneurysm measuring a maximum of 31 mm (B).



Figure 2. A fluoroscopic image during inflation of a low-pressure balloon shows the distal migration of the balloon against the flow divider.

54 mm in length, was deployed while maintaining patency of the right internal iliac artery.

The proximal aortic component of the endograft, as well as the overlapping endograft components and the distal components, were balloon-molded using a compliant balloon (32-mm Coda, Cook Medical). The balloon was hand-inflated to profile under fluoroscopic monitoring while maintaining the mean arterial pressure of the patient (< 65 mm Hg). During inflation of the balloon in the proximal neck, the balloon migrated distally against the flow divider of the endograft, partially extending into the ipsilateral limb (Figure 2).

The postdeployment angiogram with the catheter placed in the suprarenal aorta showed a type III endoleak. Selective angiograms within each limb of the endograft suggested a tear within the flow divider at its junction with the proximal ipsilateral limb (Figure 3A).

A plan was made to seal the leak by relining the right limb flush with the flow



Figure 3. A digital subtraction angiogram (DSA) image after initial deployment shows a type III endoleak likely arising from the flow divider (A). A DSA after placement of upside-down right iliac limb to line the suspected fabric tear site shows a persistent but smaller leak (B).

divider. A 22-mm-diameter X 54-mm-long iliac limb was deployed ex vivo in an 18-F transitional sheath. The purpose of this maneuver was to reverse the normal orientation of the device, with the 12-mm aspect of the endograft being distal and the 22-mm portion oriented proximally. The device was then advanced through the right-sided delivery sheath using a blunt dilator as a push rod, deploying the 22-mm end proximally and the



Figure 4. A DSA image after placement of the aorto-uni-iliac device with exclusion of the type III endoleak.



Figure 5. At 6-month follow-up, a CTA three-dimensional image shows the AAA stent graft in place and the patent femoral-femoral bypass graft. The right internal iliac artery is patent (arrow).

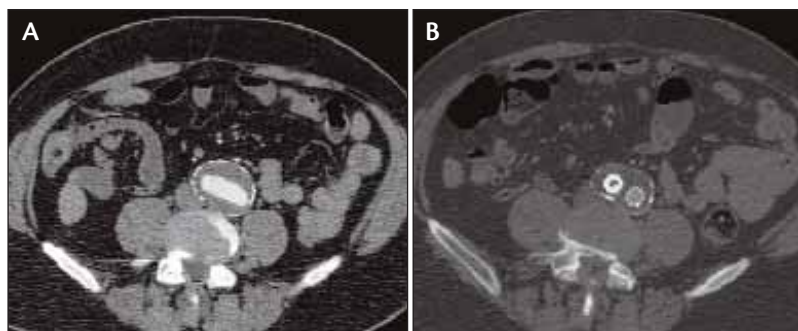


Figure 6. Before (A) and 6 months after (B), axial CTA images show interval shrinkage of the aneurysm sac from 54 to 37 mm.

12-mm end distally. This device was also balloon-molded. A repeat angiogram showed a smaller but persistent endoleak. It was concluded that the tear within the endograft likely involved the apex of the flow divider (Figure 3B).

We decided to exclude the leak with an aorto-uni-iliac device. A 32- X 80-mm aorto-uni-iliac converter device (Aorto-uni-iliac converter, Cook Medical) was deployed from the left groin access. The right limb was occluded using an iliac occluder device (Iliac plug, Cook Medical). A follow-up angiogram showed exclusion of the

aneurysm and no endoleak (Figure 4). A left-to-right femoral-femoral bypass graft with an 8-mm polytetrafluoroethylene graft was then performed.

The patient's hospital stay was uneventful, and he was discharged home after 24 hours of observation. He was seen in follow-up at 1 and 6 months postoperatively, and CTA scans and noninvasive evaluation of lower extremity blood pressures were performed at each visit. The maximum aneurysm sac diameter

decreased to 37 mm. No endoleak was

visualized, and all arterial segments that were embolized remain occluded (Figures 5 and 6). However, the patient developed mild, intermittent, left buttock and hip claudication despite widely patent bilateral profunda femoris and right internal iliac arteries and reconstitution of distal left internal iliac artery branches through left profunda femoris and right internal iliac artery collaterals (Figure 7). Ipsilateral buttock claudication has been described to occur in 28% of patients after unilateral embolization of the internal iliac artery before endograft placement.¹



Figure 7. Multiplanar reformatted CTA image shows patency of the distal branches of the right and left internal iliac arteries (arrows) at 6-month follow-up.

DISCUSSION

Type III endoleaks can lead to aneurysm sac enlargement, and their presence increases the risk of rupture. Type III endoleaks have commonly been reported as a result of modular component separation. Politz et al described three cases of aneurysm rupture after placement of an AneuRx device (Medtronic Inc., Minneapolis, MN).² Two of these patients had modular component separation. One patient had separation of the proximal aortic extender cuff with subsequent rupture, whereas the other patient had separation of the contralateral iliac limb from the primary aortic component. Fabric tears are rarely reported as a cause of type III endoleaks. Reports of both early and late type III endoleaks were secondary to fabric tear, which were managed either by endovascular technique or by open surgery.³⁻⁶

With type III endoleaks caused by defects in the fabric material of the endograft, one endovascular treatment option is to reline the stent graft with new components to seal the suspected site of the fabric tear. In this case, an attempt was made to reline the right iliac limb by placing an upside-down iliac limb to seal the suspected site of the tear. However, this maneuver was unsuccessful, which is likely due to the extension of the tear into the apex of the flow divider. Another treatment option for type III endoleaks, which was also per-

formed in this case, is to exclude flow from the site of the fabric tear by placing an aorto-uni-iliac device and embolizing the remaining iliac limb to prevent retrograde flow to the tear.

Although a manufacturing defect cannot be totally excluded, the type III endoleak was likely iatrogenic due to balloon-induced trauma to the flow divider. Therefore, it is advised to restrict balloon molding of the stent graft to the proximal neck and component attachment zones while minimizing trauma to the flow divider. ■

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