Hypogastric Preservation

A simple technique for preserving the hypogastric artery during AAA endograft procedures.

BY KARTHIKESHWAR KASIRAJAN, MD

Hypogastric artery preservation during open or endovascular repair of abdominal aortic aneurysms (AAAs) is a topic of debate. The difficulty of achieving hypogastric preservation during AAA endograft procedures has resulted in a variety of techniques to embolize or occlude the hypogastric artery with additional endograft limb extensions to the external iliac artery. Unfortunately, the result of hypogastric occlusion is highly unpredictable. Although major complications such as buttock necrosis or colon ischemia are rare after unilateral hypogastric occlusion, they have been reported.[1] Simultaneous occlusion of both hypogastric arteries should be avoided due to the increased risk of complications. Most physicians would prefer to preserve hypogastric circulation if available technology would allow for this. This article describes a simple technique for hypogastric preservation using currently available endovascular devices.

Figure 1. A CT image of a large right common iliac artery aneurysm.

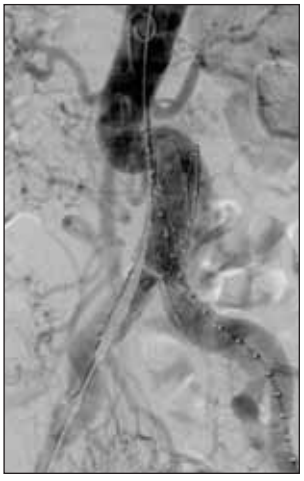

Figure 2. Angiography after anatomical fixation of the AFX main body. Note the severe proximal neck angulation.

CASE REPORT

A 61-year-old woman with chronic obstructive pulmonary disease presented with a computed tomographic (CT) diagnosis of a 5-cm right common iliac artery aneurysm, a 2.7-cm left common iliac artery aneurysm, and a 4.2-cm AAA (Figure 1). Although the intent was to treat the right common iliac artery aneurysm, the AAA and the left common iliac artery aneurysm would have to be addressed during the same procedure due to the close proximity. The infrarenal aorta had two ≥ 90° angles at the proximal neck that presented additional challenges for the endograft procedure (Figure 2).

TECHNIQUE

Initially, we achieved femoral access and placed a 28-mm AFX stent graft (Endologix, Inc., Irvine, CA) at the aortic bifurcation to achieve anatomical fixation. The unique anatomical fixation of the AFX stent graft maintains the anatomic location of the native aortic bifurcation and allows transfemoral cannulation of the contralateral hypogastric artery. The 34-mm proximal extension stent graft was then deployed after angiographic identification of the renal arter-

Figure 3. The proximal extension adapts to the neck angle with excellent seal.

Figure 4. This image demonstrates the ability to cross up and over for contralateral hypogastric cannulation and sheath placement.

Figure 5. Viabahn and external iliac limb extension grafts have been deployed.

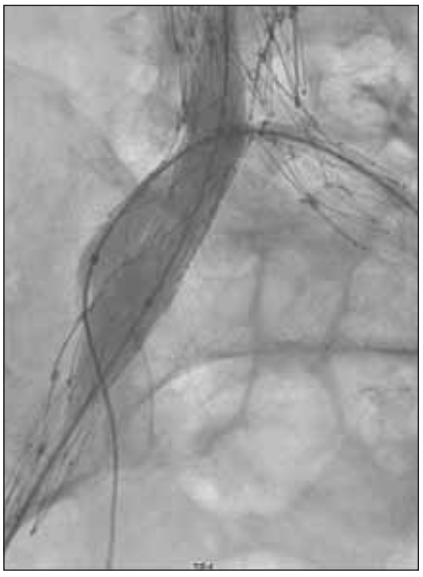

Figure 6. Kissing-balloon angioplasty.

ies. Despite severe proximal neck angulation, the graft was able to accommodate to the tortuosity, with an excellent proximal seal (Figure 3). Next, using a Simmons catheter from the left femoral route, the contralateral (right) hypogastric artery was cannulated with a Glidewire (Terumo Interventional Systems, Somerset, NJ). This was subsequently exchanged for a Rosen wire over a vertebral catheter. A 6-F, 45-cm sheath was then tracked up and over the aortic bifurcation into the contralateral hypogastric artery (Figure 4).

Subsequently, a 6-mm Viabahn covered stent graft (Gore & Associates, Flagstaff, AZ) was tracked through the 6-F up-and-over sheath and positioned to seal in the hypogastric artery (5-mm diameter) with the cranial end at the level of the top of the right common iliac artery limb (Figure 5). The limbs of the AAA endograft device selected for this patient were 16 mm in diameter. Hence, at this point, a 16-mm-diameter limb extension was tracked via the right femoral route for extension to the right external iliac artery. The top of this iliac extension limb and the Viabahn were aligned proximally, and the Viabahn was left undeployed within the 6-F sheath. The right external iliac limb extension was then deployed and the balloon dilated, after which the 6-F sheath from the contralateral femoral artery was withdrawn to expose the Viabahn graft. The Viabahn graft was then deployed with the cranial end at the level of the top of the right external iliac extension. Kissing-balloon angioplasty was per-

Figure 7. A large compliant aortic balloon is inserted via the left femoral route to prevent cranial buckling of the sheath during the right-to-left crossover maneuver.

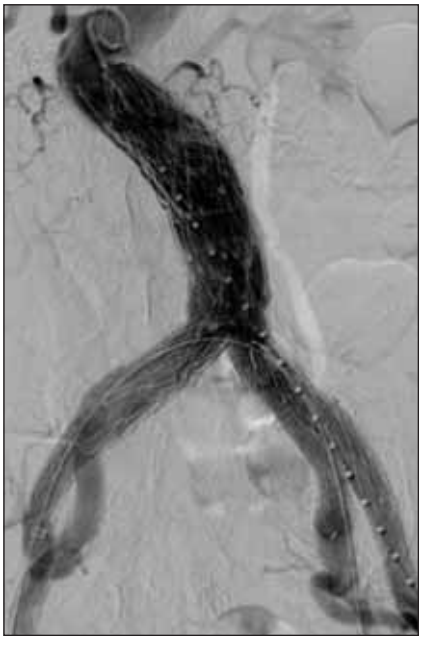

Figure 8. Completion angiography shows excellent flow to both the hypogastric artery and external iliac with no endoleak.

Figure 9. Computed tomography images demonstrate good aneurysm exclusion with flow preservation to the hypogastric artery.

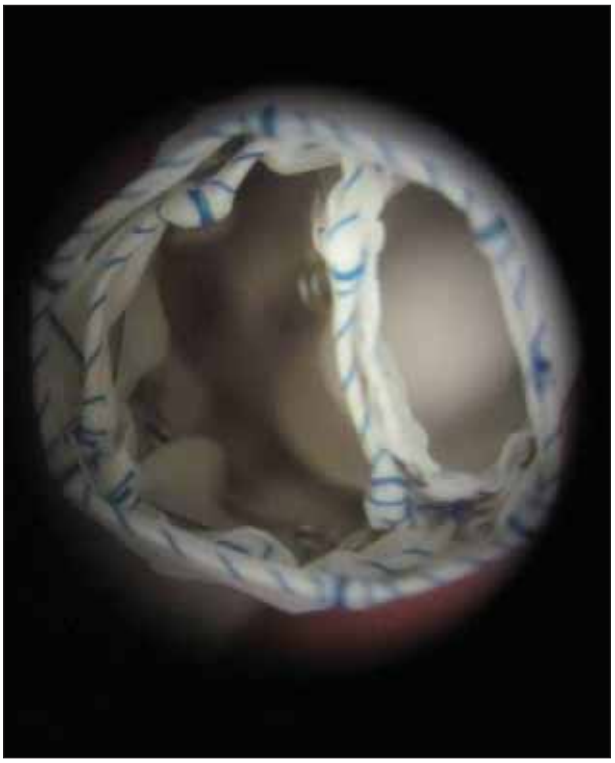

Figure 10. Endoluminal view of the snorkel technique.

formed (Figure 6) for adequate graft seal. Angiography revealed excellent flow to the right external iliac and hypogastric artery with exclusion of the right common iliac aneurysm.

The left common iliac artery aneurysm was then addressed in a similar fashion, with Viabahn extension into the left hypogastric artery and parallel snorkel external iliac limb extension. Difficulty in tracking a sheath up and over is easily facilitated by placing a compliant aortic balloon at the aortic bifurcation with moderate caudal traction to prevent cranial buckling of the transfemoral sheath during tracking (Figure 7). Completion angiography demonstrated excellent seal at all points, including the infrarenal neck and at both iliac arteries (Figure 8). A 6-month follow-up CT scan showed exclusion of the aneurysms with flow preservation to the bilateral hypogastric arteries (Figure 9).

DISCUSSION

Outcomes after hypogastric occlusion can be unpredictable. Unilateral hypogastric occlusion is often well tolerated, especially with proximally placed vascular plugs, which preserve the distal collateral flow. However, when symptoms occur, they can be of varying severity, from hip and buttock claudication to colon ischemia, paraplegia, and pelvic necrosis.[1] Hence, if feasible,

> "Most physicians would prefer to preserve hypogastric circulation if available technology would allow for this."

hypogastric preservation may be the preferred route. Unfortunately, branched iliac grafts are not commercially available in the United States market. Various authors have described a variety of endoluminal techniques using currently approved devices in an off-label fashion.[2,3] However, these are not universally applicable due to the need for adequate length from the renal to the iliac bifurcation to be able to accommodate two tandem AAA endografts. Additionally, the need for a transbrachial approach introduces the risk of cerebral complications due to the required arch manipulations.

Branched iliac endografts may allow for easier hypogastric preservation once approved. In a recent analysis of published data for iliac branched grafts, the author describes 187 patients who were treated with these devices.[4] Operating and fluoroscopy time was significant at 215 minutes and 52 minutes, respectively. Technical success was 86% per patient, and early hypogastric occlusion was reported in 9.5%, with late loss of hypogastric flow in 14% of patients. Additionally, external iliac limb occlusion was reported in 6%, suggesting a need for further device improvement.[4]

The technique described in this case report utilizes approved endovascular devices with known durability in the vascular space. The anatomical fixation afforded by the AFX stent graft allows for the ability to complete the entire procedure via the transfemoral route. The same technique that is used for hypogastric coil embolization is adapted by using a Viabahn graft, and most physicians can easily adapt this technique. Technical notes that facilitate seal with the sandwich between the Viabahn and the external iliac limb include the need for initial deployment of the external iliac limb extension and subsequent Viabahn deployment. A circumferential seal can then be achieved between the common iliac limb and the external iliac extension, subsequently allowing the Viabahn to peel a small gutter during its deployment (Figure 10).

With the AFX device, as the expanded polytetrafluoroethylene (ePTFE) is not sewn to the stent at all points, care needs to be taken to avoid getting between the stent and the ePTFE shell. We typically use a 6- X 4-mm balloon once contralateral hypogastric access has been obtained to confirm correct wire position. If it is impossible to stay inside the stent struts, the transfemoral wires may need to be snared in the suprarenal position; hence, it is important to avoid losing wire access (we have never had to use this technique). Simultaneous Viabahn and external iliac limb deployment should be avoided because it results in a competition for space, with the possibility of multiple graft infolds.

The ability of the unconstrained ePTFE cover to move independent of the stent, which is unique to the AFX endograft, allows for a more reliable seal with this technique. It is also recommended that the external iliac extension match the diameter of the common iliac limb to provide adequate circumferential seal. To date, more than 80 cases have been performed using this technique. In the radial force competition between Viabahn and the AFX limb extension, the Viabahn tends to win. Hence, occasional external iliac limb dysfunction has been reported, with no reports of Viabahn occlusion. This has led to the recommendation to support the external iliac limb if a ≥ 8-mm-diameter Viabahn is required, with a self-expanding stent to line up with the cranial end of the external iliac limb extension.

CONCLUSION

This is the first case report, to our knowledge, of bilateral hypogastric preservation using this technique and shows promise for patients who may require one or both hypogastric arteries to be preserved. ■

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