Covered Stent in the Superior Gluteal Artery in a Hybrid Approach to Treat Internal Iliac Artery Aneurysm: A Technical Note

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ABSTRACT

This brief report describes a hybrid endovascular and open procedure to treat internal iliac artery (IIA) aneurysms and preserve pelvic blood flow. A covered stent was deployed before surgery in the superior gluteal artery, extending across the IIA aneurysm, with the proximal end in the common iliac artery lumen. During open aortoiliac aneurysm repair, the stent graft was anastomosed in an end-to-side manner to the surgical graft. Four aneurysms were treated in 3 patients. Technical success was achieved in all cases. There were no complications or repeat interventions. Stents were all patent at imaging follow-up (range, 6–25 mo). Patients were free from buttock claudication.

ABBREVIATIONS

CIA = common iliac artery, EIA = external iliac artery, IBG = iliac branch graft, IIA = internal iliac artery, SGA = superior gluteal artery

Internal iliac artery (IIA) aneurysms are commonly seen with extensive aortic and iliac aneurysmal disease. They are present in 29% of patients with common iliac artery (CIA) aneurysms (1). Coil embolization of IIA aneurysms is widely accepted as a treatment with a high technical success rate and a low rate of repeat intervention (2). However, occlusion of the IIA may lead to symptoms of pelvic ischemia. Buttock claudication was reported in as many as 31% of cases of unilateral IIA embolization for treatment of IIA aneurysms (2). Open surgical treatment includes aortoiliac aneurysm repair with ligation of the IIA, with the same high incidence of buttock claudication (3). To preserve IIA flow and limit the risks of buttock claudication, open repair with anastomosis distal to the IIA aneurysm and preservation of IIA distal branches is possible in selected cases, but it is highly challenging considering the location deep in the pelvis (3). Iliac branch grafts (IBGs) are used to preserve IIA flow in the treatment of CIA aneurysms, but the presence of aneurysmal IIAs has been associated with increased repeat intervention rates and lower technical success rates (4,5). The present technical note describes a hybrid endovascular and open procedure for treatment of IIA aneurysms and preservation of antegrade pelvic blood flow in patients who are candidates for open aortoiliac aneurysm repair.

MATERIALS AND METHODS

Patients

Retrospective review of the included cases was approved by the institutional research ethics board. The procedure was performed for four IIA aneurysms in three male patients between June 2011 and April 2014. Patients were 53, 68, and 71 years of age. All patients had bilateral CIA aneurysms (range, 39–56 mm), bilateral IIA aneurysms (range, 19–30 mm), and abdominal aortic aneurysms (range, 30–57 mm). Patient characteristics and comorbidities are summarized in **Table 1**. The mean superior gluteal artery (SGA) size measured on computed tomographic (CT) angiography was 6.9 mm (range, 6.1–7.6 mm). The decision to perform an open

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repair was made at the weekly multidisciplinary vascular rounds by consensus between interventional radiologists and vascular surgeons. It was based on the anatomy of the abdominal aortic aneurysm neck, patient comorbidities and age, and patient preference. The indication to treat IIA aneurysms was size $\geq$ 3 cm. The patients were physically active, and preservation of IIA flow was considered important to reduce the risks of buttock claudication. The procedure was performed as an adaptation and extension of current techniques and skills.

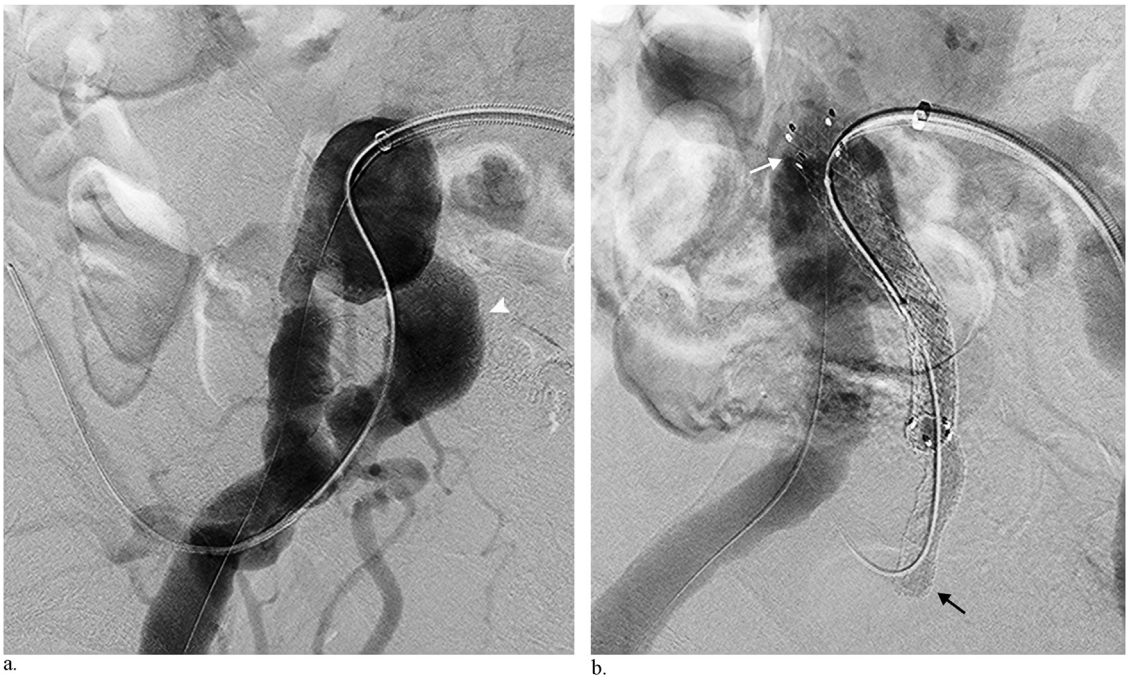
Technique

Endovascular. The endovascular procedure was performed the day before surgery. A contralateral percutaneous common femoral artery access was obtained, and pelvic angiograms were obtained to depict aortoiliac anatomy. An 8-F sheath was then advanced across the aortic bifurcation into the contralateral CIA. A hydrophilic guide wire and guiding catheter were used for selective catheterization of the IIA. There was imaging of the aneurysm and of IIA branches (Fig 1). The anterior division, posterior division, and SGA were identified. Because the main IIA trunk was aneurysmal in these patients, the SGA, which was the largest branch, was selected for stent-graft placement. A VIABAHN covered stent (W.L. Gore & Associates, Flagstaff, Arizona) was then deployed over a stiff wire in the SGA, with a distal sealing zone of at least 2 cm. The stent graft was extended proximally across the IIA aneurysm and into the lumen of the CIA. The proximal end was at least 2 cm proximal to the ostium of the IIA to allow enough length for surgical anastomosis (Fig 1). The stent graft was sized 10% larger than the diameter of the sealing segment of the SGA as estimated on angiography. A second stent graft with at least 2 cm overlap was used when more length was needed to reach the CIA lumen. As patients had aneurysmal CIAs, there was enough space for safe deployment of the VIABAHN device in the CIA lumen. Completion arteriography was performed to confirm there was no type Ib or type III endoleak and that the

Table 1. Patient and Aneurysm Characteristics

			Aneurysm Size (mm)				
Pt. No.	**Age (y)/Sex**	**Comorbidities**	**AAA**	**RCIA**	**LCIA**	**RIIAA**	**LIIAA**
1	53/M	Smoking, dyslipidemia	48	41	39	29	19
2	68/M	Smoking, hypertension	57	40	40	30	27
3	71/M	Hypertension, history of stroke, dyslipidemia	30	53	56	21	30

AAA = abdominal aortic aneurysm, LCIA = left common iliac artery aneurysm, LIIAA = left internal iliac artery aneurysm, RCIA = right common iliac artery aneurysm, RIIAA = right internal iliac artery aneurysm.



a. b.

Figure 1. **(a)** Right iliac angiogram in patient 2 before stent deployment with the sheath in the right CIA and the guide wire in the SGA. Arrowhead indicates the right IIA aneurysm. **(b)** Iliac angiogram in patient 2 after deployment of two overlapping stent grafts shows patency of the EIA. White arrow indicates the proximal end of the Fluency stent graft in the lumen of the CIA. Black arrow indicates the distal end of the VIABAHN stent graft in the SGA.