SHORT REPORT

An Alternative to Aorto-uni-iliac EVAR and Femoro-femoral Crossover in a Patient Having an Aorto-iliac Aneurysm with an Occluded External Iliac Artery

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Introduction. An endovascular procedure for excluding an aorto-iliac aneurysm whilst simultaneously preserving one internal iliac artery is described in a patient with complex iliac pathology.

Report. The procedure involved the use of Advanta V12 covered stents to bridge the gap between the contralateral limb of the main body of a custom-made Zenith stent graft and the internal iliac artery on the side of an external iliac artery occlusion.

Discussion. Minimal modifications to the standard design of modular stent grafts make it possible to treat high risk patient with complex pathology with minimal morbidity.

Keywords: Endovascular aneurysm repair; Common iliac artery aneurysms; Internal iliac artery; Occluded iliac artery.

Introduction

In order to successfully perform endovascular aneurysm repair (EVAR), a 2.5 cm landing zone for the distal attachment is usually required. If one of the common iliac arteries (CIA) is aneurysmal, common practice is to occlude the internal iliac artery (IIA) and seal the stent-graft in the external iliac artery (EIA).1,2 In patients with bilateral CIA aneurysms, occlusion of both IIA is undesirable because of the high risk of serious pelvic ischemia.3,4 Various techniques for external-to-internal iliac artery bypass have been devised to allow both EIA to be used as landing zones whilst at the same time preserving one IIA.5 In patients with an occluded iliac system, aorto-uni-iliac devices are usually combined with a femoro-femoral crossover bypass. We present a novel technique of EVAR with preservation of one IIA in a patient with aortic and bilateral CIA aneurysms, and occluded EIA, femoral and popliteal arteries.

Report

A 63 year-old gentleman was referred with a 6 cm abdominal aortic aneurysm. Further imaging (Fig. 1) revealed that both CIA were aneurysmal, both IIA were patent, but the left EIA, and common and superficial femoral arteries were occluded with the profunda, which was the only conduit to the left leg, filling via collaterals. Cardiac co-morbidities precluded open repair.

A custom-made device was designed in conjunction with Zenith Endovascular Planning (Cook, Australia). The procedure was carried out under general anaesthesia with endovascular access via the right common femoral and left axillary arteries. A Zenith side branch occluder (Cook, Australia) was introduced through the right common femoral artery and deployed to cover the origin of the right IIA, sealing the right CIA aneurysm and proximal normal EIA. The main body was introduced via the right common femoral artery and deployed immediately distal to the origin of the renal arteries. This main body was custom designed with the left limb having a diameter of 10 mm (as opposed to the usual diameter of 12 mm in Zenith grafts). A standard ipsilateral
(right) limb extension was inserted, landing in the right proximal EIA. Via the left axillary artery, a 0.035" stiff shaft Glidewire (Terumo Medical) was advanced through the thoracic aorta, and the deployed main body, out of its left (contralateral) limb to cannulate the left IIA. The wire was advanced into a distal side branch of the IIA, and exchanged through a straight catheter for an Amplatz Superstiff Guidewire (Boston Scientific). An 8 Fr Shuttle sheath (Cook) was inserted. After appropriate angiography, three 10 mm x 59 mm Advanta V12 covered stents (Atrium Medical) were deployed, distally to proximally, from the IIA to the left limb of the main body (Fig. 2a). Completion angiography revealed no endoleaks and preservation of all the left IIA branches, including the collaterals passing down to the profunda-femoris artery (Fig. 2b). The patient made an uneventful recovery and remains well and free of endoleak at three months follow up.

Fig. 1. CT scan (a) and pre-procedural planning angiogram (b) demonstrating the right common iliac aneurysm, the occluded left external iliac artery and patent left internal iliac artery.

Fig. 2. Peri-procedural digital subtraction angiography (a) confirming the position of the second Advanta V12 covered stent (Atrium Medical) prior to its deployment. Post-completion digital subtraction angiogram (b) demonstrating a good distal seal in the right external and the left internal common iliac arteries, no endoleaks, and preservation of the branches of the left internal iliac artery.
Discussion

This case highlights how relatively minor modifications to the standard design of modular stent grafts can be used to increase the applicability of EVAR in clinical practice. This patient was unfit for an open procedure, entailing a bifurcated graft with distal anastomoses onto the iliac bifurcation on the right, and the IIA or profunda femoris on the left. Endovascular options in patients with an occluded iliac system include angioplasty and stenting of the occluded iliac system prior to device delivery or the use of aorto-uni-iliac system with or without femoro-femoral crossover. The former option was not possible since the left common femoral artery was also occluded, and the latter option would have occluded both IIA. Although some authors have reported sequential occlusion of both IIA with impunity, others have reported devastating sequelae. Since covered stents have been used extensively in the endovascular treatment of peripheral aneurysms and in conjunction with the fenestrated Zenith endograft, it was decided to use covered stents to bridge the gap between one limb of the main body and the IIA. This avoided the risks associated with conventional open surgery and also preserved pelvic blood flow and, in this case, left limb blood flow via one IIA. We used balloon expandable covered stents in preference to self-expandable ones, since with the former, it is possible to up-size the balloon and further increase the diameter of the stent. This is particularly useful in the case of an unsuspected endoleak on the completion run. Balloon expandable stents also have greater radial strength, making them less likely to separate.

Another alternative, that was considered in the management of this gentleman, was to use an aorto-uni-iliac stent graft in combination with the recently introduced Zenith Bifurcated Iliac Side Branch Device to preserve flow to the right internal iliac artery, and to perform a femoro-profunda cross-over bypass graft to maintain flow to his left lower limb. The Zenith Bifurcated Iliac Side Branch Device resembles a standard Zenith limb extension but has a side branch attached to its body approximately half way down its length. Covered stents are used to bridge/seal the gap between the origin of the internal iliac artery and the side branch. Since this patient had an occluded left superficial femoral artery and his walking distance was limited by his cardiac co-morbidities, we felt that this option would only add to the operative risk without providing the patient with any significant benefit.

The combined use of a customized modular endograft and covered stents, made it possible to treat a high risk patient with relatively complex iliac pathology with minimal morbidity. With the current progress in endovascular technology less contraindications to EVAR remain. Whether such a repair should be performed in a particular patient will however depend on an understanding of the patient’s medical co-morbidities and the risks of conventional surgical options, versus the unknown long-term durability of the new technology.

Acknowledgements

We would like to thank Dr Michael Lawrence-Brown and Mr David Hartley, consultants for Cook, Australia for their help and advice in planning this custom device.

References


Accepted 11 November 2006
Available online 11 December 2006

Eur J Vasc Endovasc Surg Vol 33, May 2007