A single center early experience with the AnacondaTM Fenestrated device used for the treatment of a para-renal abdominal aortic aneurysm: A case report

Panagiotis G. Theodoridis MD, MSc[1], Vasilios Argitis MD, MSc[1], Ilias Dodos, MD, MSc, PhD[1], Anastasios Potouridis, MD, MSc[1], Evaggelia Mastrokosta MD[2], Nikolaos Patelis, MD, MSc, PhD[3], Konstantinos Dervisis, MD, PhD[1]

[1]Department of Vascular Surgery, "Konstantopouleio" General Hospital of Nea Ionia, Athens, Greece
[2]Anesthesiology Department, "Konstantopouleio" General Hospital of Nea Ionia, Athens, Greece
[3]Athens Medical Centre, Athens, Greece

Abstract:

Endovascular abdominal aortic aneurysm repair (EVAR) is an alternative to open surgery for the treatment of infrarenal abdominal aortic aneurysms (AAAs) with exception in cases that involve visceral branches. In such cases preservation of visceral perfusion is of great importance. A wide range of custom-made devices have been used for this reason. The ANACONDA™ Fenestrated Endograft (Vascutek, Inchinnan, United Kingdom) has been used since 2011 for the repair of AAAs unsuitable for standard-EVAR. In this report we present our early experience with the Anaconda Fenestrated device implanted in a patient with a 63mm para-renal inflammatory AAA with successful result.

Keywords: *Anaconda Fenestrated Endograft, Juxtarenal AAA, Pararenal AAA, Thoracoabdominal aortic aneurysm*

INTRODUCTION

Endovascular abdominal aortic aneurysm repair (EVAR) is a well-established alternative to open surgery for the treatment of infrarenal abdominal aortic aneurysms (AAAs). Overall, the suitability of EVAR is primarily affected by anatomic criteria[1]. In these patients the Fenestrated Endovascular Aneurysm Repair (FEVAR) technique may be a valuable alternative[1,2]. The era of fenestrated/branched stent grafts (FBSGs) for the treatment of AAAs with short necks started in 1999[3,4].

The ANACONDA™ Fenestrated Endograft (Vascutek, Inchinnan, United Kingdom) has been used since 2011 for the repair of AAAs unsuitable for standard-EVAR[5]. The purpose of the current report is to present our initial experience with the ANACONDA™ fenestrated device implanted in a patient with a para-renal AAA.

CASE PRESENTATION

A 63 years old male presented in our institution with a 63mm asymptomatic inflammatory pararenal AAA diagnosed accidentally. His past medical history included hypertension, hyperlipidemia and coronary artery disease (ASA score II). The decision to treat the patient by endovascular surgical procedure was taken after an unsuccessful laparotomy due to excessive retroperitoneal fibrosis discovered intraoperatively. The aneurysm morphology was assessed by 3mm slices spiral computerized tomographic angiography (CTA) with axial and coronal reconstructions showing a left accessory renal artery perfusing the upper 2/3 part of the left kidney while the main renal artery raised from the sac and was almost fully thrombosed (Fig. 1a). A customized fenestrated device based on the Anaconda ™ system was designed according to the preoperative measurements. This included four fenestrations for the four main visceral arteries (celiac artery CA, superior mesenteric artery SMA'', and the two renal arteries RAs) (Fig. 1b).

Surgical Procedure

The procedure took place in the interventional radiology cathlab with the patient under general anesthesia. An arterial access and a urinary catheter were placed perioperatively for cardiovascular monitoring purposes. A bolus dose of 5000 IU of heparin was injected intravenously immediately before femoral artery cannulation, with additional boluses of heparin given as required by the duration of leg ischemia aiming at ACT of 250 seconds. Bilateral open femoral artery exposure was used as access points for the stent graft deployment system. The main body of the graft was inserted from the left iliac axis, oriented properly and partially deployed. The cannulation of the fenestrations made with a Vanshie-1 catheter through a long 45cm long arrow sheath and a 0,035" hydrophilic Terumo stiff guidewire.

Author for correspondence:

Panagiotis G. Theodoridis, MD, MSc

Department of Vascular Surgery "Konstantopouleio"
General Hospital of Nea Ionia, Athens, Greece.
Ag. Olgas 3-5, Zip Code: 14233 Nea Ionia, Athens
Tel: +30 6972710794
Fax: +30 2107494095
E-mail: pn.theodoridis@gmail.gr
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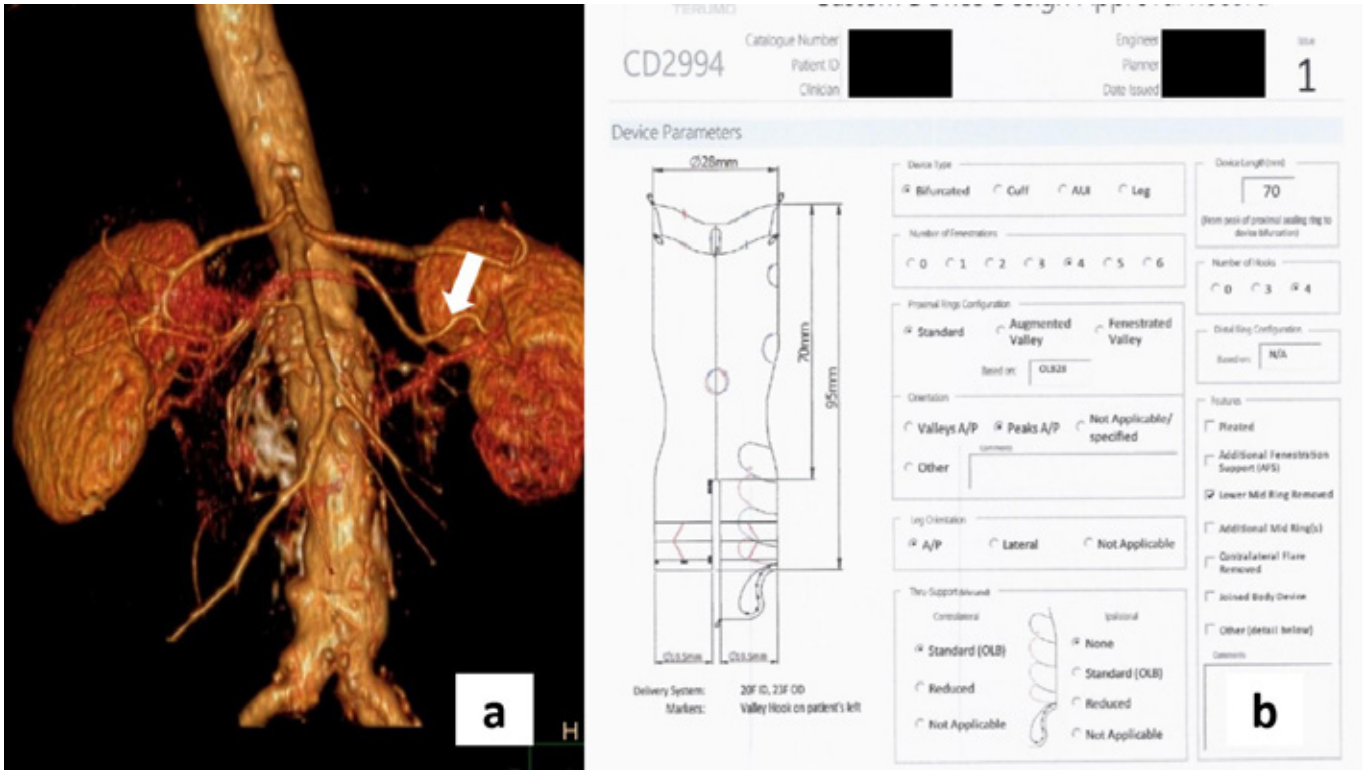

Figure 1. a. 3-D reconstruction of the pre-operative CTA* revealed the para-renal inflammatory abdominal aortic aneurysm with the accessory left RA** (white arrow) b. Preoperative drawing of the custom-made fenestrated stent-graft with tube configuration.

*CTA: Computerized Tomographic Angiography

**RA: Renal Artery

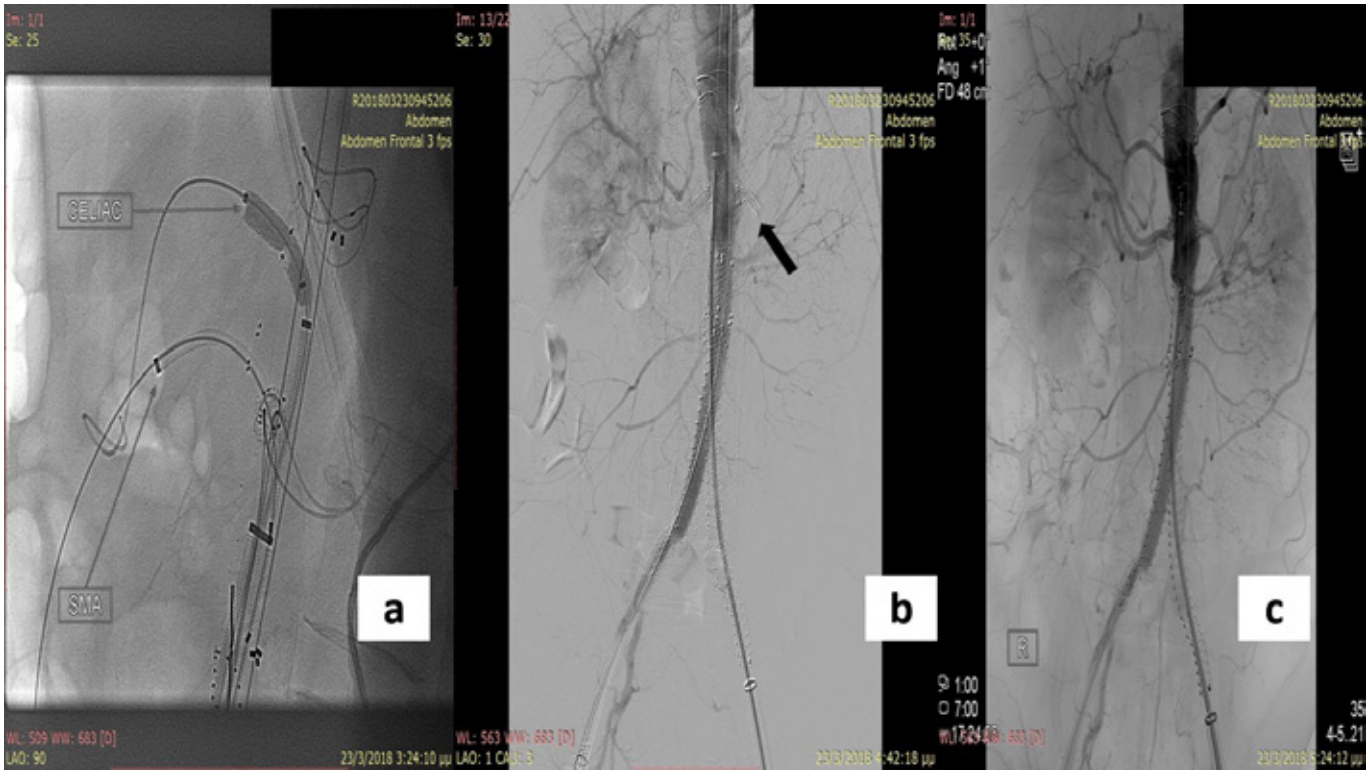

Figure 2. Intraoperative image; a. after insertion of the covered stents within the target arteries (celiac and superior mesenteric arteries) and partial deployment of the main body. b. occlusion of the left RA* covered stent due to transient vasoconstriction with absence of flow (black arrow). c. restoration of blood flow after balloon angioplasty and final angiography with satisfactory results.

*RA: Renal Artery

The re-positioning system of the endograft was used to improve the apositioning. After that, the guidewire was exchanged with a 260 cm long J-tip stiff wire (Rosen wires for the renal arteries and Amplatz guidewires for the SMA and Celiac artery) and Advanta V12® covered stents (Atrium Medical, Hudson, NH) were delivered within the target arteries (Fig. 2a). These included one 7x32 for the CA, one 9x32 for the SMA and two 7x22 for the renal arteries. There were no major technical issues or intraoperative complications, apart from difficulty in advancing the covered stent in the SMA, where we used an extra micro-catheter to introduce the guidewire distally into the artery. The covered stent in the left renal artery occluded immediately after deployment due to the transient vasoconstriction with absence of flow in the left accessory RA (Fig. 2b). The left renal artery was catheterized again, and the vessel patency was restored after a balloon angioplasty. Thereafter, all stent grafts flared with a compliant aortic balloon. Final angiography demonstrated good apositioning of the device and patency of all the visceral vessels and both iliac arteries (Fig. 2c). Total operative time was 240 min, radioscopy time 169 min contrast used 270mL and blood loss was approximately 350mL. After the procedure, the patient was admitted to the ICU department for two days and discharged in the 8th post-operative day. The six-month follow-up was satisfactory with good device position and no endoleaks (Fig. 3).

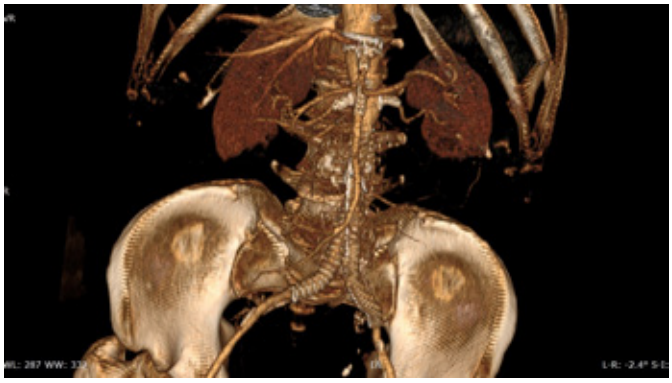

Figure 3. CTA* imaging six months after was satisfactory with good sealing of the device, patency in all visceral branches, the iliac arteries and no endoleak.

*CTA: Computerized Tomographic Angiography

DISCUSSION

EVAR has been established as an alternative to open surgery for the treatment of infrarenal AAAs, despite that EVAR is affected by the patients' anatomy. Current data regarding the use of EVAR for infra-renal AAAs have shown that using devices outside the instructions-for-use may result in significantly more late complications and graft-related adverse events[6]. However, the insertion of FBSGs for the treatment of AAAs with short proximal necks has been established as an alternative to open repair with a high degree of clinical, technical and satisfactory midterm outcomes according to data from the Global Star Registry[7]. Unfavorable anatomical criteria for the use of FEVAR were also identified including adequate landing zones, cannulation of visceral arteries and suitable diameter access vessels[8]. Nowadays, several fenestrated grafts are commercially available. Most of the currently available knowledge is based on the Zenith® custom-made fenestrated endograft device (Cook Medical, Brisbane, Australia). FSGs include devices with fenestrations (holes) or scallops (gaps or valleys in the upper margin of the graft) to access visceral arteries simply to allow extension of the sealing zone proximally, limited only by the desire to reduce the number of visceral vessels included into the repair[9]. Nowadays, the whole aorta, including the visceral vessels can be treated totally by endovascular means. If these devices are implanted successfully, they lead to complete exclusion of the aneurysm while maintaining sufficient perfusion to vital organs. The main disadvantage of the custom-made fenestrated devices is that they currently require a long period of time for the pre-procedural planning and manufacture of the stent graft. This limitation has led to the development of 'off-the-shelf' fenestrated and branched devices such as the Cook p-Branch and t-Branch as well as the Endologix Ventana[10]. On the other hand, open surgery for para-renal AAAs and type IV TAAA is technically challenging and linked to higher morbidity and mortality rates when compared to infrarenal aortic surgery, especially in patients who are frail for open repair. The suprarenal aortic clamping, by itself, has been variably associated with an increased morbidity and mortality, whilst the redo nature of the surgery after an open repair adds a degree of difficulty and prolongs recovery time.

The Anaconda fenestrated device (Vascutek, Inchinnan, United Kingdom) was designed for the treatment of patients with AAA unsuitable for standard-EVAR. The first four cases have been described by Bungay et al. in 2011, who concluded that Anaconda fenestrated stent graft device was suitable for AAAs repair in cases of hostile neck anatomy[5]. There are some technical issues that make the Anaconda device technology unique for complex cases such as the increased flexibility and fixability of the device.The main advantage of this stent graft is that it remains re-deployable. Hence, even after complete unsheathing of the device, the physician is still able to partially collapse and change the orientation or height of the stent graft. In our case, we did not face any major technical issues during device deployment. The results were satisfactory from both the technical success of the procedure and the six-month follow-up.

CONCLUSION

In this report we quote our initial experience with a new custom-made device for the treatment of a patient with complex aortic pathology unsuitable for standard-EVAR. The new Anaconda fenestrated device is a promising feasible option implanted without any major technical difficulties.

No conflict of interest.

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REFERENCES

1 Georgiadis GS, van Herwaarden JA, Antoniou GA, Giannoukas AD, Lazarides MK, Moll FL. Fenestrated stent grafts for the treatment of complex aortic aneurysm disease: A mature treatment paradigm. Vasc Med. 2016 Jun;21(3):223-38.

2 Verhoeven EL, Katsargyris A, Oikonomou K, Kouvelos G, Renner H, Ritter W. Fenestrated Endovascular Aortic Aneurysm Repair as a First Line Treatment Option to Treat Short Necked, Juxtarenal, and Suprarenal Aneurysms. Eur J Vasc Endovasc Surg. 2016 Jun;51(6):775-781.

3 Faruqi RM, Chuter TA, Reilly LM, Sawhney R, Wall S, Canto C et al. Endovasular repair of abdominal aortic aneurysm using a pararenal fenestrated stent-graft. J Endovasc Surg 1999;6(4):354-358.

4 Browne TF, Hartley D, Purchas S, Rosenberg M, Van Schie G, Lawrence-Brown M. A fenestrated covered suprarenal aortic stent. Eur J Vasc Endovasc Surg 1999;18(5):445-449.

5 Bungay PM, Burfitt N, Sritharan K, Muir L, Khan SL, De Nunzio MC et al. Initial experience with a new fenestrated stent graft. J Vasc Surg. 2011 Dec;54(6):1832-1838.

6 Wyss TR, Dick F, Brown LC, Greenhalgh RM. The influence of thrombus, calcification, angulation, and tortuosity of attachment sites on the time to the first graft-related complication after endovascular aneurysm repair. J Vasc Surg 2011 Oct;54(4):965-971.

7 British Society for Endovascular Therapy and the Global Collaborators on Advanced Stent-Graft Techniques for Aneurysm Repair (GLOBALSTAR) Registry. Early results of fenestrated endovascular repair of juxtarenal aortic aneurysms in the United Kingdom. Circulation 2012 Jun 5;125(22):2707-2715.

8 Rodd CD, Desigan S, Cheshire NJ, Jenkins MP, Hamady M. The suitability of thoraco-abdominal aortic aneurysms for branched or fenestrated stent grafts and the development of a new scoring method to aid case assessment. Eur J Vasc Endovasc Surg 2011 Feb;41(2):175-185.

9 Greenberg RK, Qureshi M. Fenestrated and branched devices in the pipeline. J Vasc Surg 2010 Oct;52(4 Suppl):15S-21S

10 Resch T. Pararenal aneurysms: currently available fenestrated endografts. J Cardiovasc Surg (Torino). 2013 Feb;54(1 Suppl 1):27-33.