

The Use of a Self-expandable Aortic Stent to Incarcerate Microcoils and to Create a Favourable Infrarenal Neck in an Unusual Case of Endovascular Abdominal Aortic Aneurysm Repair

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Introduction: We report a case of an emergency high-risk patient with a pararenal aortic aneurysm.

Report: Our patient had a pararenal aneurysm with two components: a wide-neck saccular aneurysm below the left renal artery and a fusiform aneurysm. A self-expandable aortic stent was deployed covering both renal arteries, the saccular aneurysm was embolised with microcoils and a bifurcated aortic endograft was anchored inside the aortic stent. The aortic stent imprisoned the microcoils and avoided proximal type I endoleak. The tomography done 15 months after the procedure showed no endoleaks.

Discussion: A self-expandable aortic stent can provide an alternative for emergency high-risk patients with pararenal aortic aneurysms.

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Abdominal aortic aneurysms that closely approach or involve the renal arteries can be classified as pararenal aneurysms. Due to inadequate proximal neck length, standard endovascular aortic aneurysm repair cannot provide a minimally invasive alternative for high-risk patients with these complex aneurysms.

CASE REPORT

A 77-year-old male patient came to the emergency department of Nossa Senhora das Graças Hospital complaining of intense abdominal pain.

In the physical examination, he had a pulsatile mass in the abdomen and his blood pressure was 135/80 mmHg. A contrast-enhanced computed tomographic angiography (CTA) with three-dimensional reconstruction (Fig. 1A–C) showed a pararenal aortic aneurysm with two components: a saccular aneurysm with a wide neck measuring 4.1 cm (maximum diameter) beginning just below the left renal artery, associated with a 7.2-cm fusiform aneurysm with circumferential thrombus below the right (lowest) renal artery. The diameter of the aorta at the level of the coeliac trunk was 24 mm.

The patient was a heavy smoker, and his creatinine clearance was 70 ml/min/1.73 m². He was considered to be a high-surgical-risk candidate for open repair¹ with supra-renal clamping.

After informed consent was obtained, he was taken immediately to the angiography suite. A self-expandable aortic stent (E[®]-XL, 28 mm × 7 cm, JOTEC[®], Hechingen, Germany) was deployed across the renal arteries. A 5-F vertebral catheter was negotiated over a 0.035-in guidewire and positioned inside the saccular aneurysm, through the E[®]-XL aortic stent cells (Fig. 1D). Using a coaxial technique, a 0.014-in microguidewire and a 0.021-in microcatheter were introduced inside the aneurysm and it was embolised using 10 spherically shaped detachable microcoils (MicruSphere 3D coils, Micrus Endovascular[®], San Jose, CA, USA) (Fig. 1E). To avoid coil migration through the stent, the diameter of the deployed coils has to be larger than the size of the stent cells; in this case, the deployed coils had 10 mm in diameter.

At that point, a GORE[®] Excluder C3 repositionable bifurcated endograft (W.L. GORE & Associates, Flagstaff, AZ, USA) was deployed immediately below the right renal artery to treat the fusiform aortic aneurysm. The trunk-ipsilateral endoprosthesis was 28.5 mm in diameter. A final angiography showed exclusion of both aneurysms from the circulation and good blood flow to both limbs.

The patient made a full recovery, the abdominal pain disappeared and he was discharged 2 days postoperatively.

A follow-up CTA (Fig. 2A–C) done 15 months after the procedure confirmed the exclusion of both aneurysms from the circulation. The maximum diameter of both aneurysms decreased: from 4.1 to 3.6 cm (saccular) and from 7.2 to 6.4 cm (fusiform).

DISCUSSION

Our patient needed urgent treatment, had an unusual pararenal aneurysm and was considered high-risk for open repair.¹

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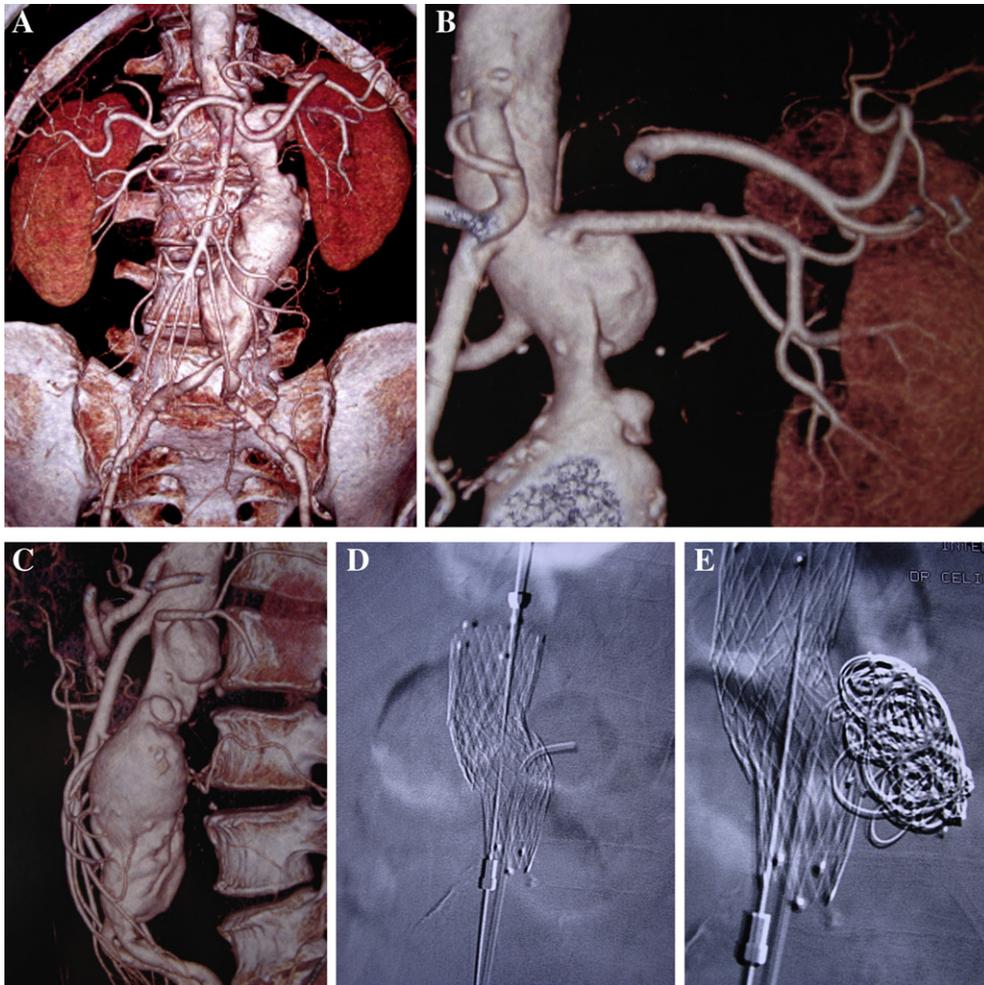


Figure 1. A: Contrast-enhanced computed tomographic angiography (CTA) with 3-dimensional reconstruction showing a pararenal aneurysm with two components: a saccular aneurysm with a wide-neck just below the left renal artery, associated with a fusiform aneurysm starting below the right renal artery. B: CTA with a larger view of the saccular aneurysm measuring 4.1 cm in maximum diameter. C: Lateral view of the CTA showing the saccular aneurysm with a wide-neck, just below the left renal artery. D: Aortic stent deployed across the renal arteries. A 5F vertebral catheter is positioned inside the saccular aneurysm, through the aortic stent cells. E: The saccular aneurysm was embolised using 10 spherically shaped detachable microcoils. The aortic stent imprisoned the microcoils, avoiding distal migration.

Although fenestrated² and branched stent-graft repair were considered in this case, it would take at least 3 weeks to manufacture the devices and to have the appropriate materials available in our service. Due to the intense abdominal pain, we felt that our patient could not wait to have this repair done.

We also considered the chimney technique. Type I endoleak is actually considered the major problem with this method. In a recent review article,³ type I endoleaks were present in 10.7% (10/93) of patients post-operatively, excluding three endoleaks that were detected and treated intra-operatively. The existence of a short healthy neck between the chimney graft and the aneurysm sac is advantageous, and the presence of thrombus in the sealing zone may be a severe impediment of this technique.³ Our patient had circumferential thrombus (no-neck) below the right renal artery and also some thrombus immediately below the left renal artery; for this

reason, we thought the chimney technique would not be appropriate for him.

We planned to anchor a stent in the normal suprarenal aorta. The aorta diameter at that point was 24 mm and we needed a good oversize (between 15% and 20%) to avoid distal migration. We decided to use the E[®]-XL aortic stent for two reasons: it could expand to 28 mm and the closed-cell structure at either end gives this aortic stent maximum radial force to ensure optimal stent fixation. An extra-large balloon-expandable stent would expand only to 25 mm. As our patient had a luminal narrowing below the saccular aneurysm, we decided to use a 28.5-mm endograft inside a 28-mm stent.

The E[®]-XL stent converted a previously untreatable anatomy into a treatable one. The aortic stent imprisoned the microcoils used to embolise the saccular aneurysm and prevented migration of the endograft anchored inside it. To our knowledge, this is the first time this technique was

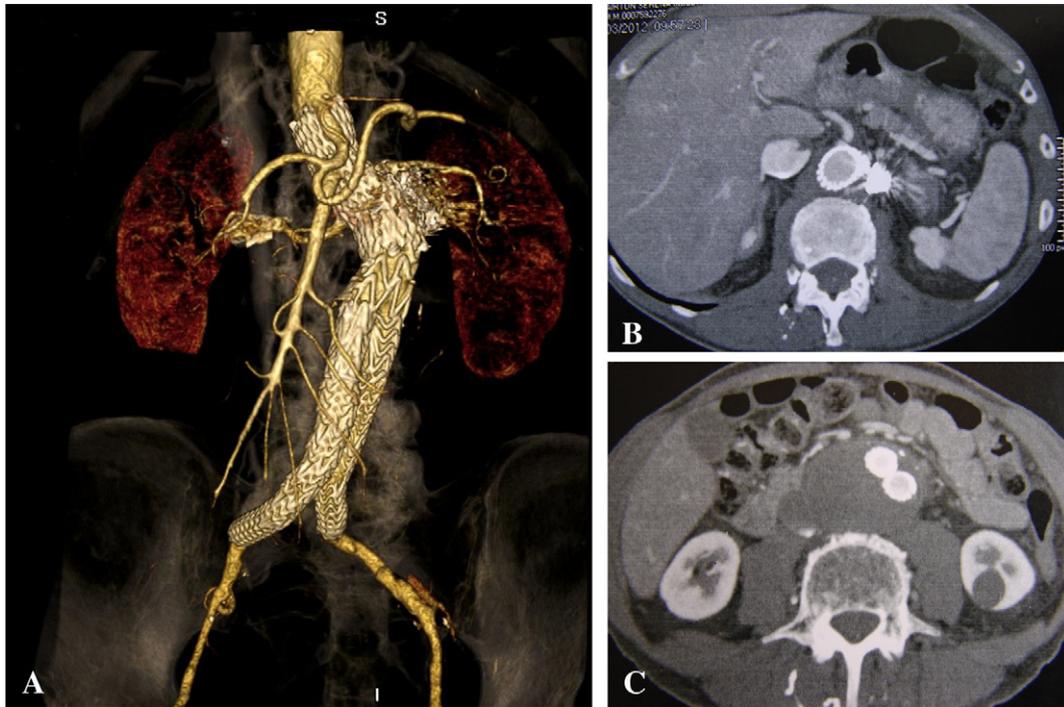


Figure 2. A: CTA with 3-dimensional reconstruction done 15 months after the procedure showing patency of the coeliac trunk, superior mesenteric artery and renal arteries, correct positioning of the self-expandable aortic stent and bifurcated endograft, and exclusion of both aneurysms from the circulation. B: CTA axial slice at the level where the saccular aneurysm reaches its maximum diameter, done 15 months after the procedure, showing no endoleak. Some artefact can be seen because of the presence of the microcoils. C: CTA axial slice at the level where the fusiform aneurysm reaches its maximum diameter, showing no endoleak.

used. Long-term data will be needed to evaluate the safety, efficacy and durability of this procedure.

AUTHORS' CONFLICT OF INTEREST

None.

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