

Case Report

Successful emergency endovascular treatment of juxtarenal and infrarenal mycotic aortic aneurysms in patients with small diameter aortae using Cook[®] Zenith ESLE Stentgrafts

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BACKGROUND: Endovascular repair of mycotic aneurysm is an alternative to open repair if the patho-anatomy is suitable. The aortic size above and below the mycotic aneurysm may be small.

METHODS: A retrospective review was made of prospectively collected departmental computerised database.

RESULTS: Three oriental patients with juxta- and infra-renal mycotic aortic aneurysms with a small aortic diameter of 17 mm to 18 mm underwent successful emergency endovascular treatment using Cook[®] Zenith ESLE stentgrafts. These are ancillary devices aimed at iliac extensions usually.

CONCLUSION: This is to our knowledge the first case series of Cook[®] Zenith ESLE iliac component endografts for the treatment of aortic mycotic aneurysms with small aortae, and short- and mid-term results are encouraging.

KEY WORDS: Endovascular; Mycotic; Small aorta; Oversizing; Cook[®] Zenith ESLE Stentgrafts

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INTRODUCTION

Convention treatment of mycotic aortic aneurysms usually involves wide local debridement, resection of the infected aorta, followed by revascularization via *in situ* or extra-anatomical bypass grafts, together with long-term antibiotic treatment.^[1,2] There are many reports on successful endovascular repair of infrarenal or juxtarenal mycotic aortic aneurysms with different types of stentgrafts.^[3-6] Abdominal aortic cuffs and thoracic stentgrafts have also been used successfully.^[7]

We report three oriental patients with juxta-renal and infra-renal mycotic aortic aneurysms with small aortic diameters who underwent successful emergency endovascular surgery using Cook[®] Zenith ESLE stentgrafts. This is to our knowledge the first reported

cases in the literature for the use of these iliac devices for the treatment of aortic mycotic aneurysms, and as such has been successful in avoiding conventional open surgery. There may be no structural difference between the Cook[®] Zenith ESLE iliac extender and stentgrafts from other manufacturers, but the ESLE stentgrafts are readily available to us at short notice, and thus can be used in emergency cases.

Case 1

A 88-year-old man was admitted to the hospital with one week's history of fever and left loin discomfort. An initial non-contrast CT showed inflammation around the aorta. Urine culture grew *Escherichia coli*, and emergency contrast CT scan one week later showed a

rapidly enlarging juxta-renal aortic aneurysm with a neck of a 5.1 cm which was 0.9 cm below the left renal artery. Blood cultures were repeatedly negative. The aortic diameter was small and measured 15 mm above and below the aneurysm (Figures 1A-C). A juxta-renal (with infrarenal neck less than 1cm from the lowest renal artery) mycotic aneurysm was diagnosed, and the patient opted for endovascular surgery. Because the aortic diameter was very small, commercially available aortic stentgrafts showed risk of severe over-sizing. Emergency endovascular aneurysm repair was performed using a Cook® ESLE stentgraft (20 mm diameter, 55 mm long) (Cook, Bloomington, Ind). The patient recovered well, and was maintained on life-long oral ceftibuten and levofloxacin. Follow-up CT scans a year later showed that the aneurysm was successfully treated (Figure 1D), and the adjacent soft-tissue stranding was minimal.

Case 2

A 53-year-old man presented with abdominal pain for two months, three days' history of diarrhoea, and syncope on the morning of admission. Clinical examination showed a tender pulsatile mass, and stool culture showed *Salmonella enteritidis* species. Blood cultures were repeatedly negative. An emergency CT scan showed a heterogenous soft tissue mass, with a

5.2 cm saccular infrarenal aortic aneurysm, with a neck of 2.5 cm below the left renal artery (Figures 2A-C). The infrarenal aorta was narrow (18 mm diameter). After discussion with informed consent, the patient underwent emergency endovascular aneurysm repair using a Cook® Zenith ESLE stentgraft (20 mm diameter, 55 mm long) (Cook, Bloomington, Ind). The procedure was uneventful, and the patient completed a 6-week course of treatment with intravenous ceftriaxone and cloxacillin, and was discharged on life-long oral levofloxacin. CT scans more than one year later showed a progressively decreasing inflammatory mass, with a successful endovascular treatment of the mycotic infrarenal aneurysm (Figure 2D).

Case 3

A 46-year-old man presented with a 3-month history of lower back pain and left leg swelling. Left iliac deep vein thrombosis was confirmed by duplex, and he was treated with warfarin from the referring hospital. In view of the persistent pain, a CT scan showed a left sided hydronephrosis, and a 2.9 cm saccular aneurysm of the infrarenal aorta and a 4.6 cm saccular aneurysm of the left internal iliac artery. There was stranding around these aneurysms suggesting that they may be mycotic (Figures 3A-C). All cultures were negative, but

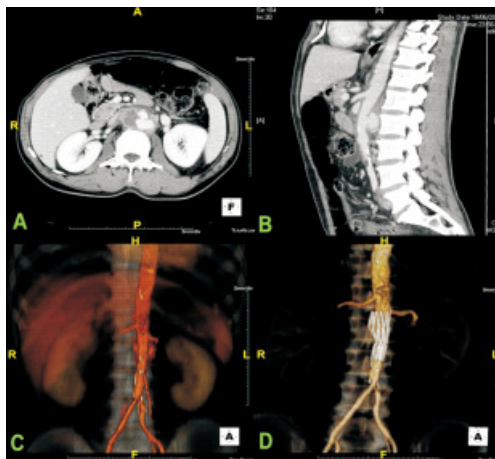


Figure 1. CT scan showed a juxta-renal aortic aneurysm with neck of a 5.1 cm aneurysm 1cm below the left renal artery, with peri-aortic inflammation (Figure 1A and 1B). Figure 1C and 1D showed three-dimensional aortic reconstruction pre- and twelve-months post-endovascular aneurysm repair was performed using a Cook® Zenith ESLE stentgraft.

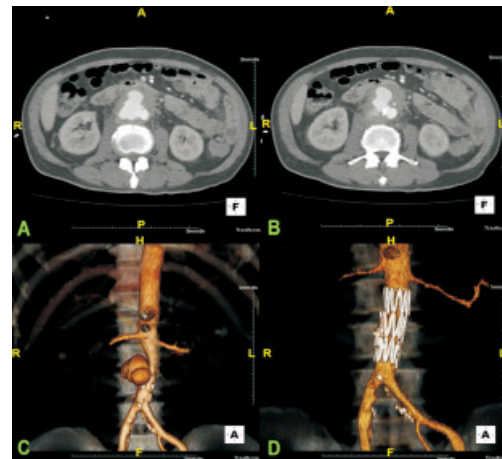


Figure 2. CT scan showed an extensive heterogenous soft tissue mass surrounding the abdominal aorta, with a 5.2 cm saccular infrarenal aortic aneurysm, with the neck 2.5 cm below the left renal artery (Figure 2A and 2B). Figure 2C and 2D showed three-dimensional aortic reconstruction before and 12 month after endovascular aneurysm repair using a Cook® Zenith ESLE stentgraft.

Table 1.

Patient	Location of mycotic aneurysm	Presumed organism	Presumed septic source	Antibiotics
1	Juxta-renal	<i>Escherichia coli</i>	Urine	Ceftibuten, levofloxacin
2	Infra-renal	<i>Salmonella enteritidis</i>	Stool	Levofloxacin
3	Juxta-renal and left internal iliac	<i>Burkholderia pseudomelli</i> , <i>Staphylococcus aureus</i>	Right atrium endocarditis	Doxycycline

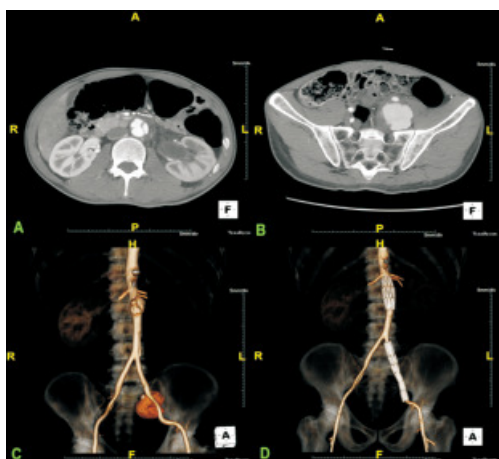


Figure 3. CT which showed a left sided hydronephrosis, and a 2.9 cm saccular aneurysm of the infrarenal aorta and a 4.6 cm saccular aneurysm of the left internal iliac artery (Figure 3A and 3B). Figure 3C and D showed three-dimensional aortic reconstruction before and one-month after endovascular aneurysm repair using a Cook® Zenith ESLE stentgraft.

serology was positive for *Burkholderia pseudomelli*, and intravenous meropenem was commenced. The patient's infrarenal aortic diameter was 17 mm. He underwent emergency endovascular stentgrafting of the juxtarenal aorta with Cook® Zenith ESLE (20 mm diameter, 55 mm long) (Cook, Bloomington, Ind), and the left common iliac stentgrafting with Cook® Zenith TFLE (10 mm x 88 mm) with exclusion of the origin of the left internal iliac artery. CT performed one month later showed a decrease in the sizes of the aneurysms (Figure 3D). The patient remained well, and was put on oral doxycycline after intravenous treatment with meropenem for six weeks,

DISCUSSION

Endovascular treatment with stentgrafts is recognized as an alternative to open surgery in the treatment of mycotic aneurysms, with the anticipation that minimally invasive endovascular procedure may reduce the risk of cardiopulmonary, neurological and renal complications in critically ill patients.^[1] The diagnosis of mycotic aneurysms can be made clinically with a combination of sepsis with aneurysm formation with peri-aortic stranding and inflammation, although blood culture can be negative. Our first and second patient had known sources of infections (*Escherichia coli* urinary tract infection and *Salmonella enteritidis* enteritis), and the third patient had positive serology for *Burkholderia pseudomelli*. Not all cases are suitable for stenting, and careful imaging of the aorta with CT angiogram is of paramount importance in delineating the patho-anatomy. The procedure is usually performed in the urgent and emergency setting, and time would not permit the

arrangement of custom-made stentgrafts.

In the published literature, most infrarenal and juxtarenal mycotic aortic aneurysms have used aorto-uni-iliac or aorto-bi-iliac devices. In our three patients, they all have very small juxta- and infra-renal aortic diameters of 17 to 18 mm, and the aortic length from the lowest renal artery to the aortic bifurcation is shorter than that of the standard commercialised devices. Patients with these small infrarenal aortic diameters create new challenges in endovascular treatment, especially if custom-made aortic stentgrafts are not immediately available.^[8] The smallest stentgraft diameter for the commercialized Cook® Zenith TX2 thoracic endovascular graft and Cook® Zenith AAA endovascular Graft is 22 mm, with the minimal length of 115 mm. The smallest aortic stentgraft diameter for the commercialized Medtronic Valiant® thoracic endovascular graft is also 22 mm, with the minimal length of 107 mm. The thoracic Gore-TAG endograft has a minimal diameter of 26 mm.^[8] These commercialized stentgrafts may excessively oversized compared to the narrow native aorta, and may cause infolding, kinking, or collapse, thus preventing adequate seal.

Stentgrafts designed for use in the iliac limbs have been used in the aorta previously. The long-term durability is a major concern as iliac limbs are usually not intended to be placed in the aorta, in fear of distal migration or kinking. Isolated case reports and small case series suggest that iliac limbs can be used in the aorta with success. Kam et al^[9] reported the use of a Medtronic Talent™ iliac extension stentgraft in a patient with *Salmonella* infrarenal mycotic aneurysm. Takach et al^[10] reported the use of a Medtronic AneuRx® iliac extension stentgraft in treating a mycotic aneurysm of the infrarenal aorta in a patient with methicillin resistant *Staphylococcus aureus*. McPhee et al^[11] used a Medtronic Talent™ thoracic endograft in a patient with thoracic aortic transection with an aortic diameter of 18 mm. The same authors also used stacked AneuRx aortic cuffs to treat patients with small aortic diameters.^[11] Various types of "stacked" abdominal endograft extension cuffs have also been reported.^[8] The use of the Cook Zenith proximal abdominal aortic (ESBE) cuffs with similar diameters to the ELSE iliac extenders may be an alternative.^[12] From the structural point of view, there may be no difference between the Cook® Zenith ELSE iliac extender and stentgrafts from other manufacturers, but the Cook® Zenith ELSE iliac extenders are readily available to us at short notice. All the Cook® Zenith ELSE iliac extenders we used in our three patients had a diameter of 20 mm and were 55 mm long.

We first report the use of Cook® Zenith ELSE iliac

extender for treatment of juxta- and infra-renal mycotic aortic aneurysms in patients with small diameter aortae. This is a self-expanding straight stentgraft usually employed for iliac limb extension. It consists of three stainless-steel Z-stents sewn inside a 5.5 cm long Dacron graft, with diameters ranging from 8mm to 24 mm.^[12] These devices have been used in treating young patients with traumatic thoracic aortic transection,^[13,14] as severe endovascular oversizing may result in sub-optimal conformability and collapse of the stentgraft.^[15-19]

There are a few limitations to this paper. Using these Cook[®] Zenith ESLE iliac extension limbs in these three patients appeared logical because of their small aortic diameters, but detailed follow-up information is still lacking in the literature. The long-term durability of the aorta is a concern as iliac stentgrafts limbs are not usually intended to be placed in the aorta. Until such time that smaller endovascular aortic devices are commercially readily available, we propose that Cook[®] Zenith ESLE iliac extension Stentgrafts can be used in the aorta, at least in patients who are deemed too high-risk for open operative repair. We agree with other vascular specialists^[16] that small aortic endovascular devices should be developed for patients of small statures in emergency transection, dissection, or mycotic rupture.^[20]

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Conflicts of interest: The authors have no financial or other conflicts of interest regarding this article.

Contributors: Chan YC proposed and drafted the manuscript. All authors read and approved the final manuscript.

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