Jugaad

The SPIDER Graft: A New Hybrid Device for Thoraco-abdominal Aortic Repair

Eike Sebastian Debus *, **Tilo Kölbel, Sabine Wipper**

Department for Vascular Medicine, German Aortic Centre Hamburg, University Heart Centre, University Hospital Eppendorf, Hamburg, Germany

INTRODUCTION

Despite reasonable success when performed in highly specialised centres, current techniques for thoraco-abdominal aortic repair, including open repair, hybrid, and total endovascular repair, are associated with serious complications, including spinal cord ischaemia, which remains an unsolved problem.

TECHNIQUE

In the style of the "frozen elephant trunk" (FET) technique, a new hybrid graft was developed for thoraco-abdominal repair to avoid thoracotomy and extracorporeal circulation (ECC). The device consists of a proximal stent graft for trans-abdominal retrograde delivery to the descending thoracic aorta, combined with a distal six branched abdominal device for open abdominal aortic repair (Fig. 1). The subphrenic abdominal aorta, including both common iliac arteries, is exposed via retroperitoneal access following midline abdominal incision. The right iliac branch is first and temporarily anastomosed end to side to the distal aorta via partial clamping. Following aortic puncture just above the coeliac axis, the proximal stent graft portion of the device is inserted and deployed into the descending thoracic aorta during cardiac inflow occlusion to minimise the windsock effect. Antegrade aortoiliac and retrograde visceral blood flow are maintained via the iliac side branch. Thereafter, visceral, renal, spinal, and iliac arteries are sequentially anastomosed by clamp repair technique, finally changing the first iliac end to side anastomosis (Fig. 2A and B). No thoracotomy is needed and ECC is avoided. This technique was successfully performed in a human, following extensive animal feasibility research. The device has limitations, as it is not applicable to all thoraco-abdominal aortic aneurysms (TAAA) and type B acute aortic dissections (TBAD). Its indication is seen predominantly in patients with type III and IV TAAA, especially in patients with unsuitable anatomy for total endovascular repair. Additionally, patients following thoracic endovascular aneurysm repair and/or FET might be suitable for this device, specifically in patients with genetic aortic syndromes. Further studies, including haemodynamic measurements are needed, and a pivotal trial has begun.

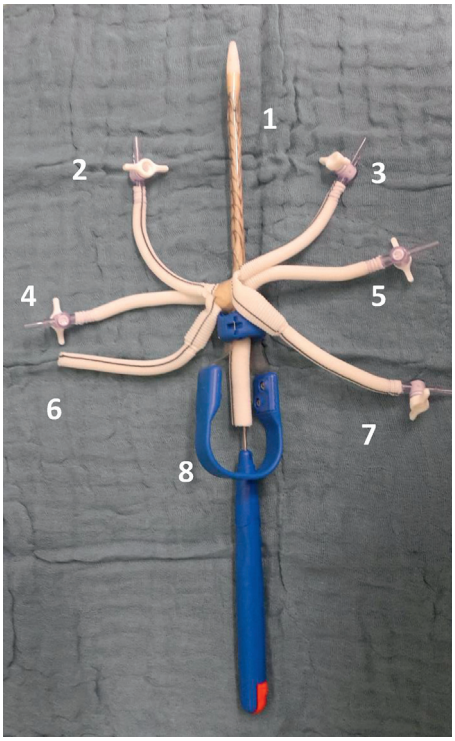

Figure 1. The SPIDER graft with proximal stent part (1 = size 150/32 mm) to be inserted and deployed into the descending thoracic aorta with the Seldinger technique via para-truncal aortic puncture. The distal Dacron branches (6 mm for the visceral and renal arteries, 8 mm for the common iliac arteries) are anastomosed end to end to the visceral (2, 3), renal (4, 5), and iliac (6, 7) arteries. Branch 8 contains the sheath and is then used for re-attachment of spinal cord arteries.

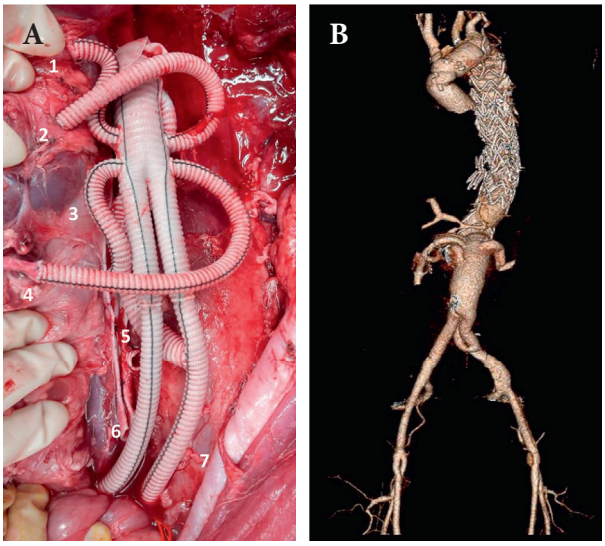

Figure 2. (A) Final view following complete implantation with end to end anastomoses to the coeliac trunk (1), superior mesenteric artery (2), both renal arteries (3, 4), lumbar arteries (5), and both common iliac arteries (6, 7). (B) Post-operative computed tomography angiography, showing the SPIDER graft *in situ* (thoracic stent in stent from previous thoracic endovascular repair), open branches to the visceral and renal arteries, and the restored iliac axis on both sides.

CONCLUSION

A novel hybrid technique utilizing the SPIDER graft avoids thoracotomy and ECC for open surgical thoraco-abdominal aortic repair.

ACKNOWLEDGMENTS

The development of this device was kindly supported by Vascutek/Glasgow.

* Corresponding author. Department for Vascular Medicine, German Aortic Centre Hamburg, University Heart Centre, University Hospital Hamburg Eppendorf, Martinistr. 52, 20246 Hamburg, Germany.

E-mail address: debus@uke.de (Eike Sebastian Debus).

https://doi.org/10.1016/j.ejvs.2018.10.001