Staged total aortic hybrid repair for DeBakey type I dissection: Report of a case

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Open surgical repair for extensive aortic disease represents a great challenge, and staged approaches involving multiple hybrid procedures have emerged as an appealing alternative to conventional open repair.1 We report a case of DeBakey type I aortic dissection treated with a total aortic repair through a staged hybrid approach.

CLINICAL SUMMARY
A 45-year-old man who had undergone a Bentall procedure for an acute DeBakey type I aortic dissection (Figure 1, A-C) 7 years previously was referred to our institution. Computed tomographic scan (Figure 1, D-F) documented a chronic postdissection aneurysm of the aortic arch and thoracoabdominal aorta (70 mm) with proximal entry tears at the brachiocephalic trunk and aortic isthmus. At the descending thoracic aorta, the true lumen was narrow (4 mm) and circumferentially dissected; multiple reentry tears were located in the distal aorta, and all visceral vessels originated from the true lumen except for the right renal artery. A staged hybrid approach was offered. The patient initially underwent a complete arch replacement with a wide fenestration of the descending intimal flap and elephant trunk construction. The arch vessels were reimplanted by means of the separate graft technique with a 28-mm Siena 4-branched aortic graft (Vascutek Ltd, Glasgow, Scotland; Figure 1, G-I). Antegrade selective cerebral perfusion with moderate hypothermia was used for cerebral protection.2 Two months later, graft replacement (28 mm) of the descending thoracic aorta was performed with temporary left heart bypass, sequential clamping, and cerebrospinal fluid drainage for spinal and visceral protection (Figure 1, J-L). Four months later, the patient was readmitted for treatment completion of the residual thoracoabdominal aortic aneurysm. Through a median laparotomy with a transperitoneal approach, the infrarenal abdominal aorta was replaced and the visceral vessels were revascularized with a 28-mm multi-branched Coselli thoracoabdominal graft (Vascutek). Selective renal perfusion with cold crystalloid solution was used for renal protection (Figure 2, A-D). During the same hospitalization, endovascular exclusion of the remaining thoracoabdominal aorta was then performed; 2 Valiant Medtronic stent-grafts (34-36 mm) were implanted with a 20% to 30% oversizing. Graft-to-graft overlaps of 4 and 3 cm were achieved in the proximal and distal landing zones, respectively. Cerebrospinal fluid drainage was applied for spinal cord protection. The predischarge computed tomographic scan showed a total aortic replacement with a partially thrombosed false lumen as a result of residual endograft porosity (Figure 2, E-H). All postoperative courses were totally uneventful. At 6-month follow-up, the patient remains well, with unchanged aortic appearances and stable aortic diameters.

DISCUSSION
Reoperations for extensive open aortic replacement are associated with considerable morbidity and mortality. During the last decades, hybrid and endovascular repair
FIGURE 1. Multidetector computed tomographic axial (A, D, G, and J), longitudinal (B, E, H, and K), and 3-dimensional (C, F, I, and L) images. A-C, Onset of DeBakey type I aortic dissection. D-F, Residual chronic postdissection aneurysm of the aortic arch and thoracoabdominal aorta (70 mm), with narrow and circumferentially dissected false lumen at the descending thoracic aorta, 7 years after Bentall procedure. G-I, Predischarge computed tomographic scan after complete arch replacement with fenestration of the descending intimal flap and elephant trunk construction. The white arrows indicate the free-floating segment of the elephant trunk. J-L, Predischarge computed tomographic scan after open replacement of two thirds of the descending aorta.
techniques have emerged as interesting alternative options for high-risk patients.\(^1\) We have described a successful case of a 5-stage total aortic hybrid repair.

Of note, after complete arch replacement with elephant trunk, endovascular repair of descending thoracic aorta was excluded, and an open replacement of two thirds of the descending aorta was performed instead. In fact, the extremely narrow and concentric true lumen (Figure 1, A and D) would not have ensured a safe and fully open stent-graft deployment and would have carried a high risk of uncontrolled laceration of the distal intimal lamella. For abdominal aortic replacement and visceral vessel debranching, a prefabricated 4-branched Dacron polyester fabric graft was used. Relative to separate grafts for the branch arteries, this prosthesis, designed for revascularization of visceral vessels, can greatly simplify abdominal

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FIGURE 2. Multidetector computed tomographic longitudinal (A and E), 3-dimensional (B, C, and F), and axial (D, G, and H) images. A-D, Computed tomographic scan after replacement of the infrarenal abdominal aorta and debranching of visceral vessels. E-H, Final computed tomographic scan after the 5-stage hybrid aortic repair. The entire native aorta, from root to iliac bifurcations, has been replaced.
Temporary extracorporeal left ventricular assist device support for implantable left ventricular assist device replacement cases

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Replacement of an implantable left ventricular assist device (LVAD) may be required for infection, thrombosis, or mechanical or electrical failure.1,2 In certain instances, replacement of implantable LVADs poses a very high risk of either reinfection or death. This report describes 4 cases in which implantable LVADs required urgent removal but replacement of an implantable system was delayed by a period of support with an extracorporeal temporary device.

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In conclusion, a staged hybrid approach for total aortic repair is feasible and can represent a valid form of treatment for selected patients with extensive aortic disease. It may help reduce morbidity and mortality among these high-risk patients.

References