Endovascular Exclusion of Ascending Aortic Graft Pseudoaneurysm with an Experimental Ascending Aortic Stent-Graft and Subsequent Removal

Background
Ascending aortic pseudoaneurysms are rare, life-threatening complications that can develop after aortic or cardiac surgery, trauma, or infection. They require urgent surgical management due to high risk for frank rupture. Contemporary aortic repair may combine open and endovascular approaches to tailor the intervention to the patient. We present the novel use of an experimental, ascending aorta stent-graft for endovascular exclusion of a proximal ascending aortic pseudoaneurysm, and we describe the later removal of this device as part of a subsequent repair to treat progressive aortic disease.

Case description
The patient was a 60-year-old man with a history of hypertension, Class I obesity, and chronic DeBakey type I aortic dissection. At an outside institution, he underwent aortic root replacement using a composite valve graft (CVG) with a 29-mm mechanical valve. He presented to us 6 months later with a pseudoaneurysm of the CVG. In creating a treatment plan, we considered that he would probably eventually need open surgical repair to treat the residual chronic type I aortic dissection, once a diameter-based threshold of repair was met; if endovascular repair to address the pseudoaneurysm were possible, we could avoid a redo sternotomy at this time and bridge the patient to future definitive repair.

To decrease the morbidity of future interventions by reducing the number of redo sternotomies, we opted for compassionate use of a novel endovascular approach in which an experimental 40-mm × 7-cm endovascular ascending aortic stent-graft was deployed to exclude the pseudoaneurysm. This successfully addressed the pseudoaneurysm (Figure). The residual dilated chronic dissection was closely monitored during imaging surveillance, as our intention was to intervene at a later date.

Two years later, the patient presented with a 6.5-cm distal arch aneurysm. To treat this expansion of the aortic arch and the proximal portion of the descending thoracic aorta, we used a modified frozen elephant trunk approach that combined open and endovascular approaches. First, we performed a total arch replacement by using a collared graft with a 26-mm elephant trunk graft extension into the descending thoracic aorta; to expand this "soft" trunk, which was placed within the true lumen, we deployed a 31-mm × 10-cm stent-graft over a guidewire in an antegrade fashion under direct vision. The collared graft facilitated the creation of a distal anastomosis proximal to the left subclavian artery, which was bypassed; the left common carotid and innominate arteries were reimplanted using an island technique. We then removed the previous ascending aortic stent-graft to facilitate a graft-to-graft proximal anastomosis between the previous CVG (which was trimmed slightly) and the new replacement graft. The prosthetic valve remained intact within the previously replaced aortic root.

The patient was discharged home without complications on postoperative day 12 and has done well in the 18 months since his aortic repair. He remains under surveillance because of the remaining residual chronic dissection of the downstream distal aorta, which will likely necessitate treatment in the future.

Conclusion
Pseudoaneurysms in the ascending aorta typically require open surgical repair. In patients unable to undergo open surgery, or when a future redo sternotomy is anticipated, repair with an endovascular stent can reduce the number of open reoperations.