Successful Remodeling and Endovascular Repair of a Ruptured Type B Chronic Aortic Dissection 12 Years after Primary Surgery

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A 70-year-old woman with a medical history of descending aorta replacement for chronic type B aortic dissection 12 years prior was admitted to our hospital with sudden back pain and hemoptysis. The patient was diagnosed with ruptured residual dissected thoracic aortic aneurysm and underwent emergent endovascular treatment. Two TAG thoracic endoprosthesis of different sizes were used to accommodate the discrepancy in size of the true lumen, resulting in a successful closure of the entry tear and hemostasis, without any damage to the intima. Computed tomography performed 3 months after surgery revealed successful remodeling of the remaining aorta. Thoracic endovascular aortic replacement may be considered as an option in the treatment of chronic dissected aortic aneurysm, achieving not only entry closure but possibly remodeling, as well.

Keywords: chronic dissection, thoracic endovascular aortic repair, remodeling, rupture

Introduction

Stanford type B dissection is a lethal disease that continues to be associated with overall mortality of 27.4% as reported by the International Registry of Acute Aortic Dissection (IRAD) study.1) Medical therapy has been the standard care for acute management of uncomplicated Stanford type B dissections. However, 20% of patients require surgical intervention for life-threatening complications such as progression of dissection, aneurismal enlargement, rupture, and malperfusion.2) We experienced a successful endovascular treatment of a residual aneurysm that ruptured 12 years after descending aorta replacement for chronic Stanford type B dissection.

Case

A 70-year-old woman with chronic type B aortic dissection was admitted to our hospital with sudden back pain and hemoptysis. The patient underwent a descending aorta replacement with a prosthetic graft via a left thoracotomy at another hospital 12 years previously. A postoperative annual follow-up with computed tomography revealed gradual enlargement of the remaining false lumen.

Contrast-enhanced computed tomography on admission revealed an enlarged false lumen and a narrowing true lumen. The false lumen at the descending aorta was enlarged to 60 mm in diameter, and a hematoma was observed in the left thoracic cavity (Fig. 1A and 1B). Hence, the patient underwent emergent operation for ruptured aneurysm of the descending aorta, using TAG thoracic endoprosthesis (W.L. Gores & Associates, Newark, Delaware, USA).
The aneurysm was enlarged from the distal anastomosis site of the previously implanted prosthetic graft. We decided that the implanted graft could serve as the proximal landing zone, which was 30 mm in diameter and 35 mm in length. The true lumen was narrowed down to 20 mm in diameter, at 10 cm distal to the anastomosis site. It was decided that a 34-mm TAG thoracic endoprosthesis should be inserted from the proximal landing zone. To prevent infolding of the stent graft and intimal injury, size reduction of the device was required; hence, a 28-mm TAG thoracic endoprosthesis was selected for use at the distal landing zone.

The right femoral artery was exposed for delivery of the endoprosthesis. A Lunderquist guide wire (Cook Medical, Bloomington, Indiana, USA) was introduced through the right femoral artery up to the ascending aorta. A 28-mm TAG thoracic endoprosthesis was introduced. To prevent intimal injury from the flare of the stent graft, the stent graft was inserted while positioning the flare proximal to the most stenotic lesion. The 34-mm TAG thoracic endoprosthesis was then inserted from the previously implanted prosthetic graft.

The computed tomography performed 1 week after the operation revealed thrombosis of the false lumen. The patient was discharged from the hospital without any major complication. The computed tomography performed 3 months after the operation revealed successful remodeling of the true lumen (Fig. 2A–2F).

Discussion

The IRAD data indicated that complications of acute type B dissection in patients who underwent open repair for malperfusion, or impending rupture, resulted in a 30% perioperative mortality rate. However, with the introduction of the stent graft treatment, the result had improved. Stent graft implantation for Stanford type B dissection has been highly successful involving a shorter operating time, less blood loss, shorter hospital stay, less risk of paraplegia, and lower morbidity and mortality rates.

Thoracic endovascular aortic replacement (TEVAR) for aortic dissection provides entry closure, leading to remodeling of the dissected aorta, which is an aortic morphologic changes characterized by expansion of the true lumen and regression of the false lumen. Remodeling occurs shortly after TEVAR and remains predictable up to 5 years. Kim, et al. also reported that a lack of increase in the true lumen volume was associated with endoleaks or distal reperfusion, indicating the importance of remodeling after treatment.
The remodeling grade may be associated with the time of onset of the aortic dissection to the stent graft implantation. In the present case, the stent graft implantation, 12 years after the onset of the aortic dissection showed successful remodeling of the aorta (Fig. 2A–2F). Although, the present remodeling may not be as profound as the ones performed at an earlier phase, successful entry closure led to thrombosis of the false lumen, leading to closure of the re-entry tear as well.

The goal of stent graft placement for aortic dissection may be different at each phase. Entry closure using a stent graft at an early phase may provide a more profound remodeling of the aorta due to the dissected mobile septum leading to regression of the false lumen. In contrast, entry closure at a later phase provides a securely closed false lumen owing to chronic thickening of the septum, resulting in thrombosis of the false lumen. However, as shown in this case, the thrombosis of the false lumen may further proceed to remodeling. Regression or thrombosis of the false lumen may prevent further propagation of the dissected aorta, provided that persistent false lumen patency was an independent risk factor for aneurismal degeneration of medically treated dissections.5)

Fig. 2 Contrast-enhanced computed tomographic images showing remodeling of the aorta: (A) before the operation; (B) 1 week after the operation; (C) 3 weeks after the operation; and (D) 3 months after the operation. Axial views of the size increase of the true lumen and size decrease of the thrombosed false lumen: (E) preoperative image and (F) 3 months postoperative image.
Conclusion

We experienced a successful remodeling of a chronic aortic dissection by entry closure using 2 TAG endoprostheses of different sizes. Because the anatomical morphology of the true lumen in chronic aortic dissection is often complicated by size discrepancy and curvature, the device should be carefully selected to prevent iatrogenic injury of the intima. Although achieving remodeling of chronic aortic dissection is not warranted, endovascular repair for high-risk patients or complicated acute and chronic type B dissection may be considered as an option to prevent propagation of the dissected aorta by remodeling or thrombosis of the false lumen.

Disclosure Statement

I acknowledge that 1) we have no financial or other interest in the manufacture or distribution of the device and that 2) we do not have a financial interest in the manufacturer of the device, or receive financial incentives from the manufacturer.

References