ELSEVIER

Severe Compression of a Bailout Self-Expanding Chimney Stent for Rescuing the Miscoverage of Left Common Carotid Artery during TEVAR of a Type B Aortic Dissection

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A 54-year-old man who suffered from paraplegia due to type B aortic dissection was treated with a Valiant stent-graft. However, attempts to gain secure proximal sealing resulted in an inadvertent coverage of the left common carotid artery by the endograft. The blood flow in the left common carotid artery was restored by a transcarotid Smart Control stent in a chimney fashion. At 6- and 18-month follow-up, computed tomography scan showed that the chimney stent was severely compressed by the stent graft, although the patient remained neurologically asymptomatic.

CASE REPORT

A 54-year-old male patient was admitted to our hospital with sudden-onset acute thoracic and back pain. Physical examination on admission showed stable vital signs, normal pulse of bilateral upper and lower extremity arteries, and no tenderness and rebound of abdomen. Contrast-enhanced computed tomography (CT) scan and 3-dimensional reconstruction images demonstrated that the dissection started in the descending aorta (Fig. 1A), the proximal tear was adjacent to the orifice of the left subclavian artery (LSA; Fig. 1B), and the true lumen (TL) was severely compressed by the false lumen (Fig. 1C). Laboratory examination revealed an elevated creatinine level (170 mmol/L), which was still rising. The patient had a high blood pressure of 180/120 mm Hg on admission that gradually decreased to approximately 120/80 mm Hg after oral uptake of calcium antagonists, β-blockers, and diuretics. The patient had sudden paraplegia, with pallor in both lower limbs, on the third day after admission. Physical examination showed loss of sensation below the perineum level, bilateral lower limb paralysis, and pulselessness. Because such symptoms were probably caused by severe compression of the TL, a decision was made to treat this patient emergently using an endovascular method.

After general anesthesia, the right common femoral artery was exposed and punctured. Heparin was given intravenously to achieve systemic anticoagulation. A 5F pigtail angiographic catheter was forwarded to the descending aorta. A visceral arteries angiogram revealed that the TL was almost totally compressed by the false lumen (Fig. 2A). The pigtail catheter was then forwarded to the ascending aorta. A carotid and vertebral artery angiogram revealed that the left vertebral artery took off directly from the aortic arch, and the right vertebral artery was dominant and connected to the left vertebral artery via the basilar artery (Fig. 2B and C). An arch angiogram showed that the proximal tear was located adjacent to the orifice of the LSA (Fig. 2C), the distance between the LSA and the proximal tear was about 5 mm, and the distance between the left common carotid artery (LCCA) and the LSA was approximately 10 mm. It was decided that the covered part of the stent graft (SG) should start from the left margin of the LCCA to achieve ideal proximal sealing.

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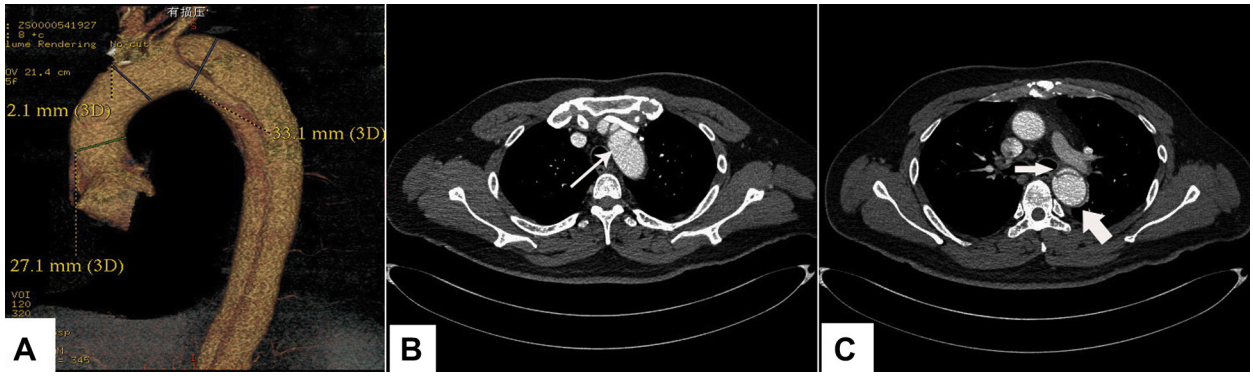

Fig. 1. Preoperative contrast-enhanced computed tomography. (**A**) Three-dimensional reconstruction shows that the left vertebral artery originated directly from the aortic arch; (**B**) cross section of the thoracic aorta shows that the proximal tear is adjacent to the orifice of the left subclavian artery (*white arrow*); (**C**) cross section shows that the true lumen was severely compressed by the false lumen.

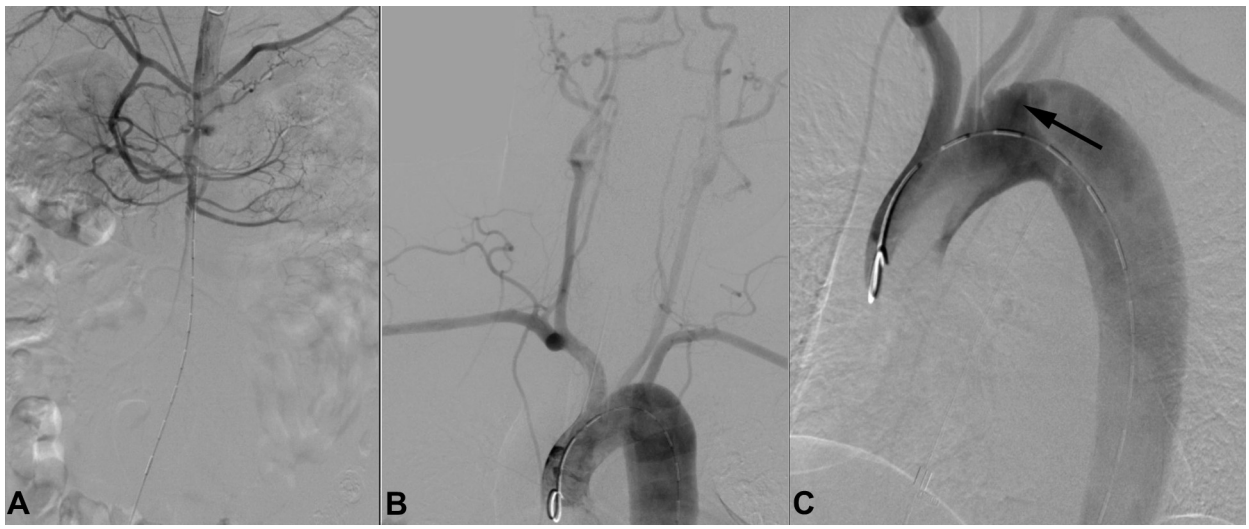

Fig. 2. Intraoperative angiogram. (**A**) The visceral arteries angiogram shows that the true lumen was almost totally compressed by the false lumen. (**B**) The anterior-posterior angiogram shows that the Willis circle was complete. (**C**) The 45° left anterior oblique angiogram shows that the proximal tear was located near the trunk of left subclavian artery (*black arrow*) and the left vertebral artery originated directly from the aortic arch.

A 34 mm × 200 mm Valiant SG (Medtronic, Minneapolis, MN) was advanced over a Lunderquist super stiff guidewire until the leading edge was adjacent to the innominate artery, and then deployment was initiated. However, the control angiogram revealed inadvertent complete coverage of the LCCA by the SG (Fig. 3A). The LCCA pulse was lost on further examination.

The LCCA was then exposed with a cervical longitudinal incision. A 6F sheath was placed retrogradely into the LCCA. A vertebral artery catheter was introduced through this sheath over a Terumo glide hydrophilic wire and advanced alongside the upper surface of the SG into the ascending aorta. After changing to the Amplazt stiff wire, a 10 mm × 60 mm Smart Control self-expanding stent (Cordis, Miami Lakes, FL) was forwarded and deployed with the proximal edge adjacent to the leading edge of the Valiant SG and extending into the LCCA. A flush angiogram demonstrated restoration of blood flow in the LCCA. The aortic SG was then dilated with a Coda balloon (Cook, Bloomington, IN) whereas the Smart Control stent was simultaneously dilated with a 10 mm × 40 mm P3 balloon (Cordis) to optimize apposition of the aortic endoprosthesis and expansion of the LCCA stent (kissing technique). Dilation of the stents was performed with rapid inflation/deflation fashion to avoid prolonged outflow obstruction.