Coil Embolization of the False Lumen in Complicated Type B Aortic Dissection

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A patent false lumen with persistent flow after endovascular repair of type B aortic dissection (TBAD) is associated with an ongoing risk of aortic dilation and rupture. We describe the case of a 64-year-old man who initially underwent thoracic endovascular aortic repair for acute complicated TBAD, but continued to have symptomatic retrograde aneurysm filling and dilatation because of a patent false lumen. Coil embolization of the patent false lumen successfully excluded the aneurysmal thoracic aorta from further perfusion, and led to a decease in aneurysm size on follow-up. Our case report is followed by a discussion on this management strategy and a review of literature.

Uncomplicated type B aortic dissection (TBAD) is generally treated with medical therapy, although there is emerging evidence for thoracic endovascular aortic repair (TEVAR) because of a long-term mortality benefit.[1] However, complicated TBAD presenting with malperfusion syndrome, uncontrolled hypertension, impending rupture, or chronic aneurysmal degeneration leads to a high risk of death if untreated. The recently published Interdisciplinary Expert Consensus Document on Management of Type B Aortic Dissection recommends treatment of complicated TBAD with TEVAR as first line over medical and surgical therapy because of a survival benefit.[2] A case of complicated TBAD is presented, which was inadequately treated with TEVAR as the patient continued to have symptomatic retrograde aneurysmal filling and dilatation because of a patent false lumen. An additional intervention of coil embolization of the false lumen excluded the aneurysmal aorta from further perfusion and led to a decrease in aneurysm size.

CASE REPORT

A 64-year-old man underwent a Bentall procedure and aortocoronary bypass in 2009 for a dilated aortic root with 5.0-cm proximal thoracic aortic aneurysm, severe aortic insufficiency, and coronary artery disease.

He presented 1 year later with sudden onset of interscapular pain with right leg numbness, weakness, and absent femoral pulse. Computed tomography with angiography (CTA) revealed a TBAD originating in the aneurysmal 5.2-cm proximal descending aorta (Fig. 1A) and dissecting caudally into bilateral common iliac arteries, with obstruction of the right external iliac artery. The visceral, right renal, and left external iliac arteries were patent and supplied by the true lumen, whereas the false lumen supplied the patent left renal artery. He underwent an urgent left-to-right femoral–femoral crossover bypass to reperfuse his right limb.

By postoperative day (POD) 14, he was reintubated for uncontrolled hypertension, confusion,

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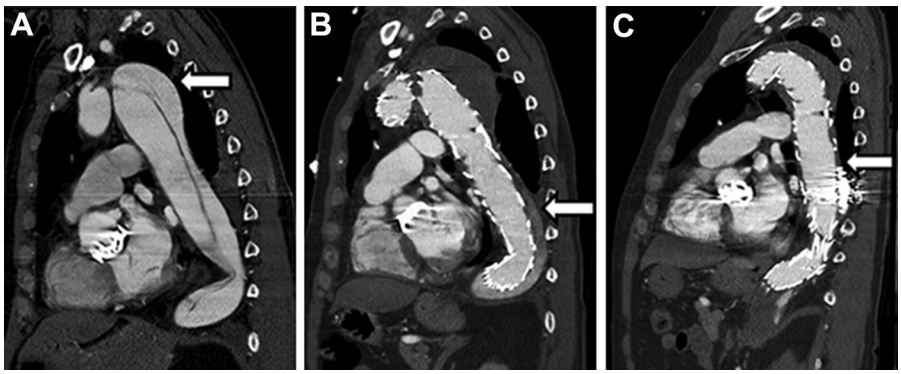

Fig. 1. Sagittal CTA showing the type B aortic dissection. **(A)** Initial CTA on presentation showing the aortic dissection starting just distal to left subclavian artery with a 5.2-cm dilated thoracic aorta (*arrow*). **(B)** CTA showing further dilatation of the thoracic aorta to 7.9 cm after TEVAR and retrograde perfusion in the false lumen (*arrow*). **(C)** 30-Month postembolization CTA showing a thrombosed false lumen proximal to level of embolization (*arrow*) and a shrinking aorta to 5.3 cm.

and dyspnea. Repeat CTA revealed enlargement of the thoracic aorta measuring 6.2 cm just distal to the left subclavian artery. A 2-stage repair of the thoracic aneurysm was planned. He first underwent a left common carotid to left subclavian artery bypass to protect his left internal thoracic artery graft and decrease risk of spinal ischemia.

The following day, general anesthesia was induced, spinal drain inserted, and left brachial and bilateral femoral arteries were accessed via surgical cut downs. A 36 × 36 × 200-mm thoracic stent graft (Valiant; Medtronic, Minneapolis, MN) was deployed in the thoracic arch, just distal to the left common carotid artery. An oversized 38 × 34 × 150-mm overlapping thoracic stent graft (Valiant; Medtronic) was deployed distal to the previous. Next, a 46 × 164-mm bare metal stent (Zenith Dissection Endovascular System; Cook, Bloomington, IN) was deployed overlapping with the previous stent, with the distal aspect just above the renal arteries' origins.

Arteriography demonstrated patent visceral arteries, but slow filling of the left renal artery. A 7 × 27-mm balloon-expandable stent (Express SD Renal; Boston Scientific, Natick, MA) was inserted into the left renal artery. Next, arteriography of the iliac system confirmed the dissection flap at the origin of the right external iliac artery. This was stented with a 9 × 60-mm Protege EverFlex Self-expanding Peripheral Stent (Covidien, Dublin, Ireland).

A 9 × 14-mm Amplatzer vascular plug (St. Jude Medical, St. Paul, MN) was deployed at the origin of the left subclavian artery via the left brachial artery. Completion arteriogram revealed no filling of the false lumen proximally and exclusion of the thoracic aneurysm. The femoral–femoral crossover bypass was removed before closure. A CTA done on POD 10 showed significant reexpansion of the true lumen and decrease in diameter of the false lumen from 2.4 cm to 7 mm. He was discharged on POD 18.

The patient returned to the hospital 3 weeks after discharge with new-onset hoarseness and interscapular pain. CTA revealed further dilatation of the thoracic aneurysm to 7.9 cm, and a type IB endoleak (Figs. 1B and 2A). The left femoral artery was accessed; the false lumen was entered via an abdominal fenestration and embolized at the T9–T10 position, which was the narrowest part of the false lumen (Fig. 3). This was done by deploying four 15-mm stainless steel coils (Cook) as a scaffold, followed by packing with six 8-mm stainless steel coils (Cook) and 8 Nester coils (6 to 10 mm; Cook). A total of 3.5 mL of N-butyl cyanoacrylate (NBCA) glue diluted with Lipidol in a 1:5 ratio was injected to complete the embolization. Final angiography showed embolization of the endoleak with no further flow into the thoracic aneurysm.

Two months after embolization the patient's hoarseness and pain completely resolved. CTA confirmed a thrombosed thoracic false lumen with a reduction in the aneurysm sac diameter by approximately 2 cm to 6.0 cm (Fig. 2B). Thirty months after embolization he remained asymptomatic with further shrinking of the sac to 5.3 cm. The false lumen, which extended to common iliac arteries bilaterally, filled with contrast distally, but remained thrombosed proximal to the embolization (Fig. 1C).