



Hybrid Repair of Type B Aortic Dissection with Aberrant Right Subclavian Artery

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Abstract

The coexistence of type B aortic dissection and aberrant right subclavian artery is extremely rare. We report a case of a 71-year-old man who underwent hybrid open and endovascular therapy for dissecting a thoracic aortic aneurysm with an aberrant right subclavian artery. Extra-anatomic bypass and thoracic endovascular aneurysm repair were performed. Postoperative enhanced computed tomography and angiography showed type 1a endoleak into the aneurysm. We performed additional total debranching and thoracic endovascular aneurysm repair. The procedures were successful with complete aneurysm exclusion. For complex aortic arch disease, hybrid procedures may reduce perioperative complications in contrast to conventional open approaches.

Introduction

An Aberrant Right Subclavian Artery (ARSA) is a common congenital aortic arch anomaly with an estimated prevalence of 0.4% to 2.0% [1]. The coexistence of Type B Aortic Dissection (TBAD) and ARSA is extremely rare. Its anatomical characteristics necessitate more complicated treatment approaches comprising open surgery, hybrid surgery, and total endovascular therapy [2,3]. We report an extremely rare case of TBAD with ARSA successfully treated by total debranching and Thoracic Endovascular Aortic Repair (TEVAR).

Case Presentation

A 71-year-old man presented to the emergency department with sudden epigastric pain. His medical history included hypertension, hyperlipidemia, and lumbar disc herniation. Computed Tomography (CT) showed a type B acute thrombosed type aortic dissection (DeBakey type IIIB) and ulcer-like projection at the distal arch with an ARSA (Figure 1A). The maximum aortic distal diameter was 38 mm.

The ARSA originated from the aortic arch distal to the Left Subclavian Artery (LSCA). The intimal flap extended from the aortic arch distal to the LSCA and ARSA origin. The right vertebral artery arose from the right Common Carotid Artery (CCA). The celiac, superior mesenteric, and bilateral renal arteries originated from the true lumen.

He was also diagnosed with purulent spondylitis and prescribed bed rest along with antibiotics. Follow-up CT after four weeks revealed acute enlargement of the primary entry, aortic aneurysms with a maximum diameter of 54 mm, and false lumen (Figure 1B). Owing to his reduced daily activity, prolonged inflammation, and high surgical risk, a hybrid endovascular therapy approach was selected for primary entry closure.

To obtain adequate proximal landing zone and primary entry closure, TEVAR on zone 2 and ARSA and LSCA sealing were necessary.

ARSA and LSCA revascularization was accomplished using bilateral-carotid-to-axillary-artery bypass through the bilateral neck and infraclavicular incisions. An 8-mm ring-enforced polytetrafluoroethylene graft was placed between the bilateral carotid and axillary arteries with end-to-side anastomoses. A cTAG stent-graft (SG) (26 mm × 150 mm, W.L. Gore and Associates, Flagstaff, AZ) was deployed 20 cm distal to the LSCA origin, and another SG (34 mm × 150 mm) was deployed just distal to the left CCA origin via the femoral approach. Post-deployment balloon (Tri-lobe balloon, W. L. Gore and Associates) inflation was performed to ensure that the endograft formed a soft attachment with the surrounding vessel. Finally, embolization at the ARSA and LSCA was performed using an AMPLATZER Vascular Plug. Completion angiography showed patent

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Received Date: 11 Aug 2021

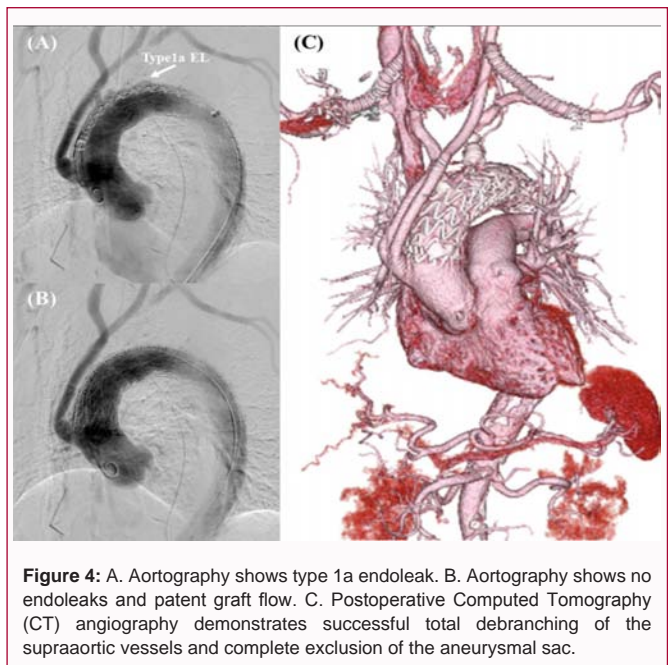
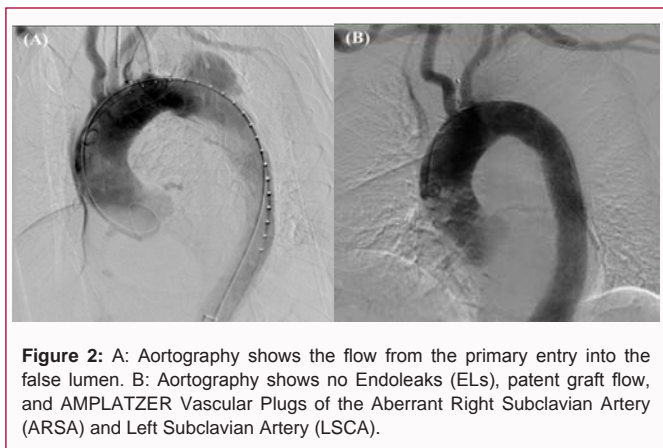
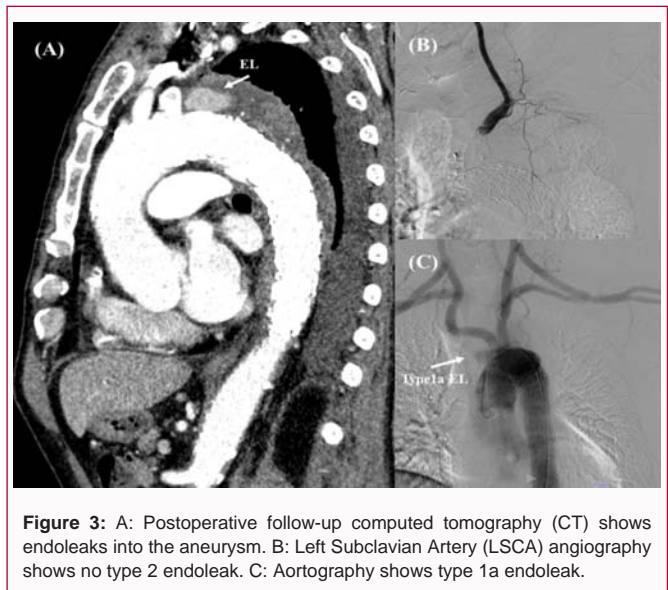
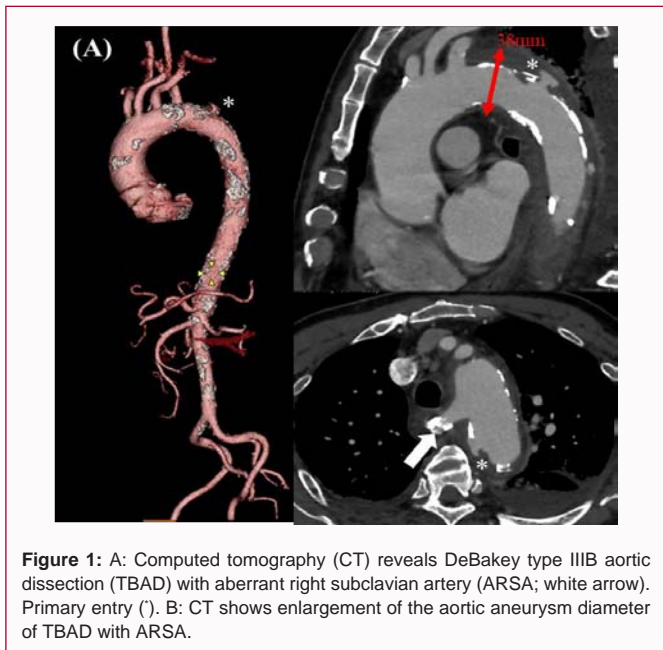
Accepted Date: 03 Sep 2021

Published Date: 14 Sep 2021

Citation:

Yamana F, Sakamoto T, Kawasumi R, Shirakawa Y, Masai T. Hybrid Repair of Type B Aortic Dissection with Aberrant Right Subclavian Artery. *World J Surg Surgical Res.* 2021; 4: 1337.

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aorta, patent flow to the grafted vessels, and no endoleak (Figure 2).

However, on the postoperative day 7, CT showed type 1a or 2 endoleak into the aneurysm. Subsequent angiography confirmed type 1a endoleak into the aneurysm (Figure 3). As his post-rehabilitation ADL improved and his condition allowed him to tolerate open surgery, an additional procedure for the endoleak was planned. Total debranching was performed *via* an off-pump median sternotomy approach. Proximal bypass inflow was created into the native aorta with an ascending aorta side clamp. Anastomoses to the bilateral CCAs were performed using branched Dacron grafts (14 mm × 7 mm × 7 mm) without cerebral perfusion. A cTAG SG (34 mm × 150 mm) was deployed just distal to the graft inflow via the femoral approach (Figure 4A). The postoperative course was uneventful. CT demonstrated complete aneurysm exclusion without endoleak (Figure 4B). Follow-up CT at six months postoperatively showed a reduction in the size of the aneurysm.

Discussion

To the best of our knowledge, only 23 cases (11%) of the coexistence of TBAD and ARSA have so far been reported [4]. In some cases, only TEVAR or TEVAR with the chimney technique was used [5]. When an arch vessel's orifice is proximal to the TBAD

primary entry tear, a hybrid procedure with extra-anatomic bypass and TEVAR is an attractive option to treat TBAD with ARSA.

Only three cases of aortic dissections with ARSA treated by endovascular therapy have been reported. In two cases, the primary entry tear occurred just distal to the aberrant vessel. These were managed with TEVAR distal to the vessel, thus obliterating the initial flap at the entry while preserving all branches, in a manner analogous to standard type B dissections [2].

In TEVAR for type B dissection, the guiding principle is device selection to prevent excessive oversizing and landing in the normal healthy aortic wall [6]. We chose a 34-mm SG size as the proximal SG for the native aorta, measuring 31 mm in diameter, to prevent retrograde aortic dissection and rupture. The 37-mm SG size was too large for native proximal diameter, and the proximal landing position was accurate; thus, total debranching bypass and zone 0 TEVAR were needed to avoid type 1 endoleak and ensure treatment success.

Conclusion

Hybrid surgery for TBAD with ARSA is safe and reliable for complex aortic arch vessels; however, accurate proximal SG size selection is important.

References

1. Felson B, Cohen S, Courter SR, McGuire J. Anomalous right subclavian artery. *Radiology*. 1950;54(3):340-9.
2. Guzman ED, Eagleton MJ. Aortic dissection in the presence of an aberrant right subclavian artery. *Ann Vasc Surg*. 2012;26(6):860.e13-18.
3. Samura M, Zempo N, Ikeda Y, Kaneda Y, Suzuki K, Tsuboi H, et al. Chimney technique for aortic dissection involving an aberrant right subclavian artery. *Ann Thorac Surg*. 2014;97(1):315-7.
4. Ding D, Luo S, Liu Y, Huang W, Jiang M, Li J, et al. Outcomes of hybrid procedure for type B aortic dissection with an aberrant right subclavian artery. *J Vasc Surg*. 2018;67(3):704-11.
5. Zhou M, Bai X, Ding Y, Wang Y, Lin C, Yan D, et al. Morphology and outcomes of total endovascular treatment of type B aortic dissection with aberrant right subclavian artery. *Eur J Vasc Endovasc Surg*. 2017;54(6):722-8.
6. Pantaleo A, Jafrancesco G, Buia F, Leone A, Lovato L, Russo V, et al. Distal stent graft-induced new entry: An emerging complication of endovascular treatment in aortic dissection. *Ann Thorac Surg*. 2016;102(2):527-32.