

Hybrid Repair for a Descending Thoracic Aortic Coarctation and Aneurysm with an Aberrant Right Subclavian Artery: Saving the Vertebral Artery

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Introduction

- Thoracic aortic aneurysms in the setting of an aberrant right subclavian artery pose unique anatomic challenges for repair.
- Hybrid repairs involving cervical debranching and thoracic endovascular aortic repair (TEVAR) have gained traction for such complex cases.
- This case highlights an unexpected complication following cervical debranching that threatened left vertebral artery and its management.

Patient Presentation

- Patient is a 58-year-old male with PMH of **aberrant right subclavian artery (asymptomatic)**, bicuspid aortic valve (AV) with **5.0 cm aortic root aneurysm**, history of aortic coarctation with remote history of patch repair, and **5.8 cm descending thoracic aortic aneurysm (DTA)**, and contrast allergy.
- His aneurysms now meet size criteria for repair.

Initial stages of repair performed:

1. Left carotid-to-subclavian artery (CSA) bypass
2. Aortic root and zone 2 arch replacement, aorta-to-right axillary artery bypass

Now presenting for:

Zone 2 TEVAR with bilateral subclavian artery (SCA) embolization

Pre-operative Imaging

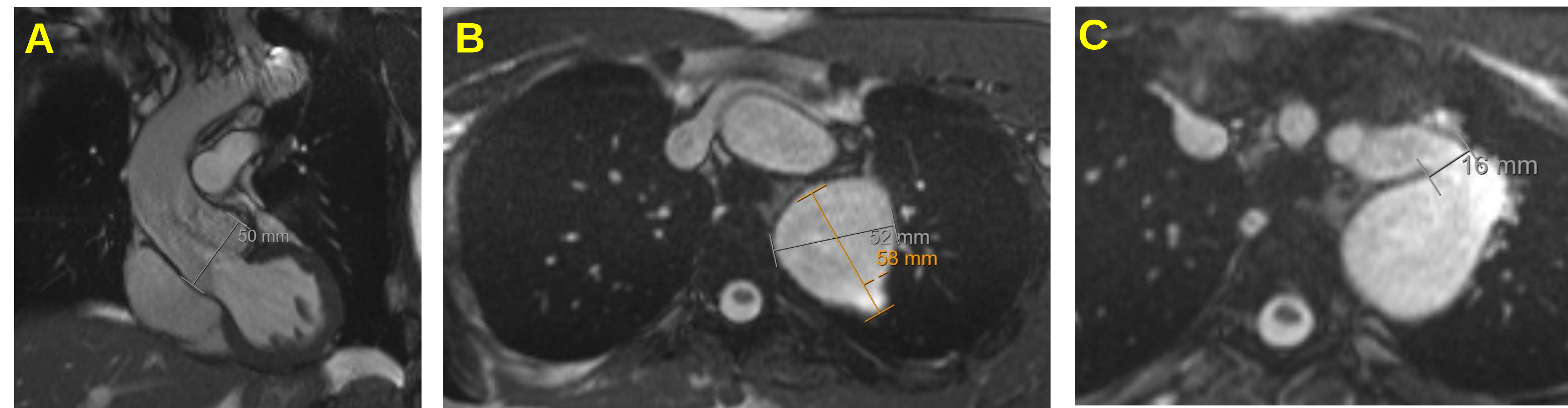


Figure 1. Pre-operative magnetic resonance angiography (MRA) showing (A) 5.0 cm aortic root aneurysm, (B) 5.8 cm descending thoracic aortic aneurysm (DTA), and (C) aortic coarctation.

Operative Imaging

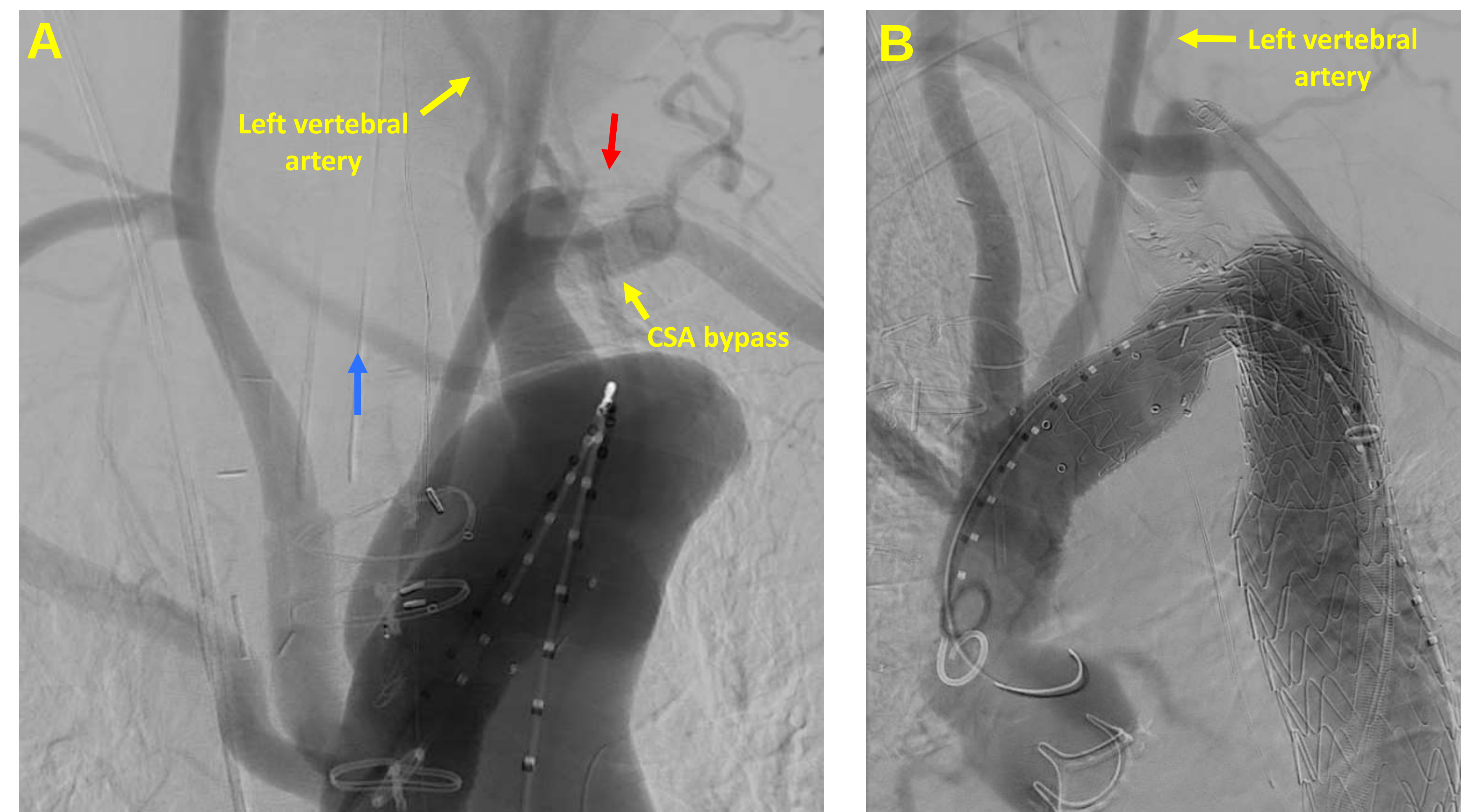


Figure 2. Intra-operative aortograms. (A) Initial aortogram showing arch anatomy. The red arrow denotes the left subclavian artery (SCA) occlusion just proximal to the left carotid-subclavian artery (CSA) bypass, leaving left vertebral artery perfusion dependent on antegrade left SCA flow. The blue arrow denotes the aberrant right subclavian artery (B) Completion aortogram showing zone 2 TEVAR, left SCA stent, and bilateral SCA embolization with Amplatzer plugs. Retrograde perfusion to the left vertebral artery is intact.

Operative Course

Access:

- Obtained bilateral CFA access, right brachial artery access.
- No left brachial artery was found (prior surgery there as a child).

Initial aortogram:

- Native left SCA had occluded just proximal to anastomosis of left CSA bypass.
- This threatened retrograde left vertebral artery perfusion following left SCA coverage/embolization.

Left SCA occlusion:

- We were unable to cross antegrade from CFA access.
- We opted to perform a left axillary cutdown, crossed the lesion retrograde, and treated it with a 6 x 19 mm VBX stent (Gore).

TEVAR:

Zone 2 TEVAR was deployed to exclude

- **Proximal:** Gore cTAG 31 x 15 mm, covering the left and right SCA origins
- **Distal:** Gore cTAG 40 x 15 mm, landing proximal to celiac artery origin
- We then performed balloon angioplasty of the aortic coarctation with 16 mm ZMED balloon and 18 mm Atlas balloons.

Bilateral SCA embolization

- Left SCA was embolized with 22 mm Amplatzer vascular plug (Abbott).
- Aberrant right SCA was embolized with 2 x 12 mm Amplatzer vascular plugs (Abbott).

Patient was discharged uneventfully on POD6.

Conclusion

This case demonstrates a successful 3-stage, hybrid repair for aortic coarctation, aortic root and thoracic aortic aneurysms with aberrant anatomy. We encountered an unexpected complication following cervical debranching. Prompt recognition allowed successful preservation of left vertebral artery perfusion.