Application of Thoraflex Frozen Elephant Trunk Hybrid Prosthesis for Pseudoaneurysm Development after Treatment of Type A Aortic Dissection with Novel Bare Metal Dissection Stent

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Introduction

- Acute type A aortic dissection (ATAAD) is a life-threatening condition associated with significant morbidity and mortality, particularly when complicated by organ malperfusion.
- The Ascyrus Medical Dissection Stent (AMDS; Artivion, Inc) is a novel bare metal stent that can be directly inserted into the true lumen of the aortic arch and descending thoracic aorta during hemiarch replacement for the treatment of ATAAD
- While trial results have been promising, literature is lacking on how to approach this device during reoperations, as removal may be difficult.
- The purpose of this report is to illustrate a successful technique for resolving arch degeneration after AMDS insertion using a Thoraflex (Terumo Aortic) hybrid prosthesis **(figure 1a, b)**.

Patient Presentation

- **Prior History:**
  - The patient is a 59-year-old male with a past medical history of HTN, type 2 diabetes and former tobacco use who previously presented with ATAAD with tear in the ascending aorta and associated renal malperfusion, treated with hemiarch replacement and AMDS.
- **Current Presentation:**
  - He re-presented 3 months later with expressive aphasia, and imaging revealed multiple new pseudoaneurysms in the aortic arch with possible adjacent arch tear, along with continued perfusion of the false lumen and associated aneurysmal growth (**figure 2**).
  - Discussion was held between cardiothoracic and vascular surgery, and decision was made for multi-step treatment.
- **Initial vascular surgical management:**
- The patient was first taken to the operating room for left carotid-subclavian bypass.

Disclosures

- NDD is a consultant for Gore Medical, Terumo Aortic, and Edwards Lifesciences.
- No other relevant financial disclosures.

Pre-Operative Images

Figure 1. The Ascyrus Medical Dissection Stent (a) and Thoraflex (b) devices.

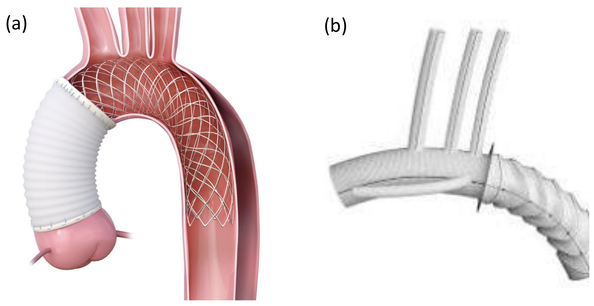
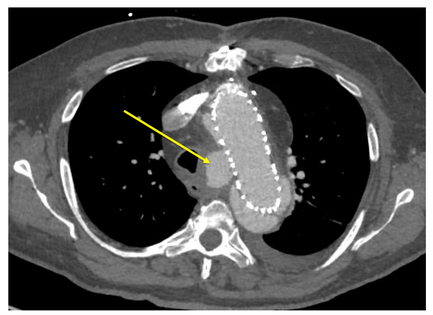


Figure 2. Pre-operative CTA demonstrating large pseudoaneurysm (yellow arrow).



Intra-Operative Images

Figure 4. Intra-operative sewing of thoraflex cuff to previous dacron rim with AMDS device inside (yellow arrow).

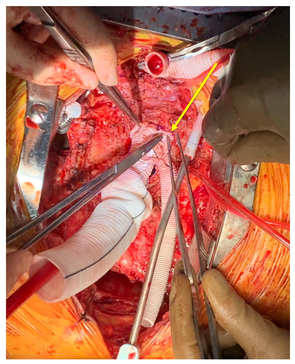
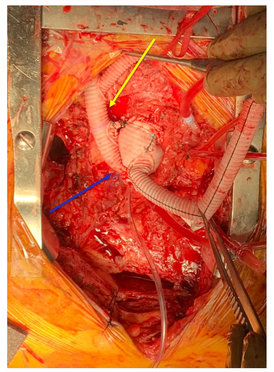


Figure 5. Trifurcated graft to innominate and left common carotid arteries (yellow arrow) anastomosed to the ascending aortic graft (blue arrow).



Post-Operative Images

Figure 5. Post-operative CTA demonstrating residual pseudoaneurysm filling on delayed phase (yellow arrow).

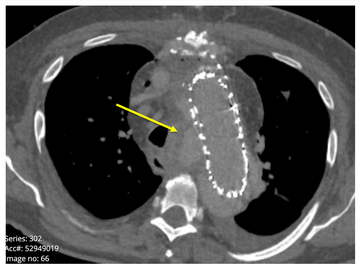


Figure 6. Post-TEVAR extension CTA demonstrating resolution of aneurysm filling.

Surgical Management

- **Aortic Arch Management:**
  - Four days later, total arch replacement was performed.
  - This was executed by transecting the prior hemiarch dacron graft and deploying the frozen elephant trunk component of the Thoraflex device distally into the AMDS device as a form of "re-lining", thus obviating the need for stent removal and the potential for distal aortic injury.
  - The cuff of the Thoraflex was then sewed to the remaining rim of the dacron graft connected to the AMDS device (**figure 3**)
  - Subsequently, the proximal end of the Thoraflex was sewn to the prior ascending graft
  - The innominate and left subclavian arteries were individually anastomosed to a trifurcated debranching dacron graft, which was then connected proximally to the ascending aortic graft (**figure 4)**.
- **Patient Outcome:**
  - Post-operatively, the patient suffered from hemorrhagic transformation of known left MCA infarct, but otherwise remained at his neurologic baseline with improvement of expressive aphasia.
  - Post-operative CT angiogram demonstrated decreased opacification of the pseudoaneurysm, although present on delayed phase images (**figure 5)**.
  - Thus, TEVAR extension was performed to reduce retrograde filling.
  - He was discharged home on POD23.
  - Follow-up imaging demonstrated successfully decreased pseudoaneurysm contrast opacification (**figure 6).**

Conclusions

- This case highlights the successful deployment of a Thoraflex prosthesis into a previously placed AMDS device as a "bailout" for the treatment of progressive complex arch pathology.
- As the portfolio of advanced aortic technologies continues to expand, so must the ability to identify potential device failures, along with techniques to safely resolve them.