

B-1

Female sex and clinical outcomes in elective proximal thoracic aortic surgery – A Swedish population-based cohort study

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Objective:

To investigate the association between female sex and 30-day mortality and postoperative complications in patients undergoing elective proximal thoracic aortic surgery in Sweden.

Methods

In a nationwide populationbased cohortstudy, all patients who underwent elective proximal thoracic aortic surgery in Sweden between 2016 and 2020 were included. The primary outcome was 30-day mortality. Secondary outcome included a combined endpoint of complications: 30-day all-cause mortality, postoperative new onset dialysis, perioperative stroke or a prolonged postoperative ventilation (>48 hours). Logistic regression and propensity score matching were used to estimate the association between female sex and primary and secondary outcomes adjusted for baseline differences.

Results:

2000 patients (29% women) were analyzed. The crude 30-day all-cause mortality rate was higher in women compared to men (3.1 vs 1.4%, $p < 0.001$). Women were older at time of surgery compared to men (65.6 vs. 60.2 years, $p < 0.001$), had more comorbidities and a larger maximum indexed aortic diameter (cm/m body height) at time of surgery (3.4 ± 0.56 vs. 3.0 ± 0.48 , $p < 0.001$). The adjusted risk for 30-day mortality between men and women was not significant (OR 1.41 (0.70-2.83)), neither was the composite secondary endpoint (OR 0.89 (0.62-1.27)).

Conclusion:

Women who underwent proximal thoracic aortic surgery had a twofold increased unadjusted 30-day mortality risk, but this risk was attenuated and not significant when age and comorbidities was taken into consideration.

B-2

Aortic root replacement with a stentless xenograft (Freestyle) in Iceland – indications and outcome

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Background

Aortic root replacement is a complex procedure where the Freestyle stentless xenograft is an alternative to the more conventional Bentall-procedure which uses mechanical or stented bioprosthesis sewn into a Dacron -graft. We examined early and late outcomes of Freestyle porcine bioprosthesis as a full aortic root replacement in a whole-nation cohort, focusing on indications and surgical outcomes.

Materials and methods

This retrospective analysis included 44 consecutive Freestyle aortic root replacements performed at Landspítali in Iceland from 1998-2008. Primary outcomes were 30 day and long-term survival, with a median follow-up of 98 months. Secondary outcomes included early postoperative complications.

Results

There was a median of three cases per year. The most common indication was ascending aortic aneurysm (70%), followed by Type-A aortic dissection (9%) and small aortic annulus (9%). Average age was 62 years and 65% were male. Median EuroSCORE-II was 10% (range 3%-71%), cardiopulmonary bypass time 234 minutes and cross-clamp time 157 minutes. Postoperative length of stay was 12 days median and 30-day mortality 14% (n=6). At follow-up, the 1-year and 5-year survival rates were 81% and 74%, respectively. For those surviving 30 days, 5-year survival was 86%. The most common complications were postoperative atrial fibrillation (51%) and perioperative myocardial infarction (14%). One patient required reoperation, due to endocarditis following urosepsis.

Conclusions

Freestyle aortic root replacements can be performed on high-risk patients, but these are complex procedures where complication rates and 30-day mortality are higher than for conventional AVR procedures. However, for 30-day survivors, 5-year survival is good and reoperations rare.

B-3

Radio-opaque Marker Added to Freestyle Root Bioprosthesis Facilitates Subsequent TAVR

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Background:

Traditional therapy for degenerated bioprosthetic valve has been reoperation, which typically occurs within 10-15 years. Valve-in-valve transcatheter aortic valve replacement (TAVR) has demonstrated high rates of early success and is emerging as the preferred therapy for failed bioprosthetic valves. Most prosthetic valves have intrinsic radio-opaque properties allowing visualization on fluoroscopy. The Freestyle® root bioprosthesis is a stentless device that does not have any radio-opaque material. This creates challenges in subsequent imaging as the annulus level of the prosthesis can be difficult to visualize.

Materials and Methods:

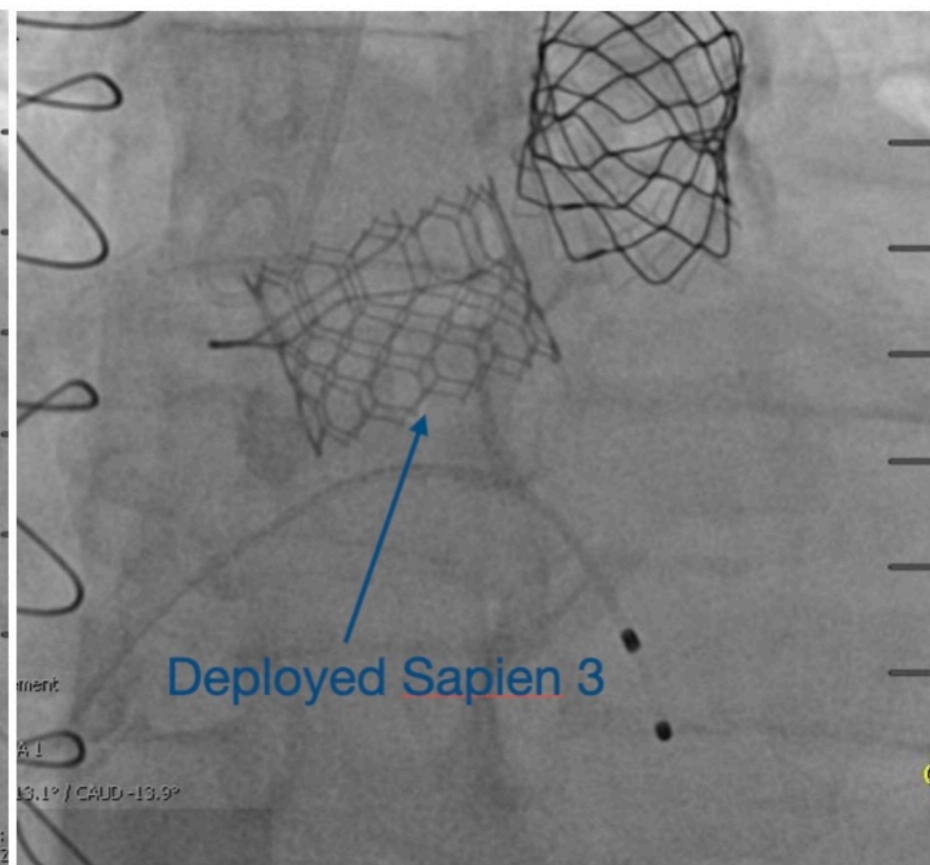
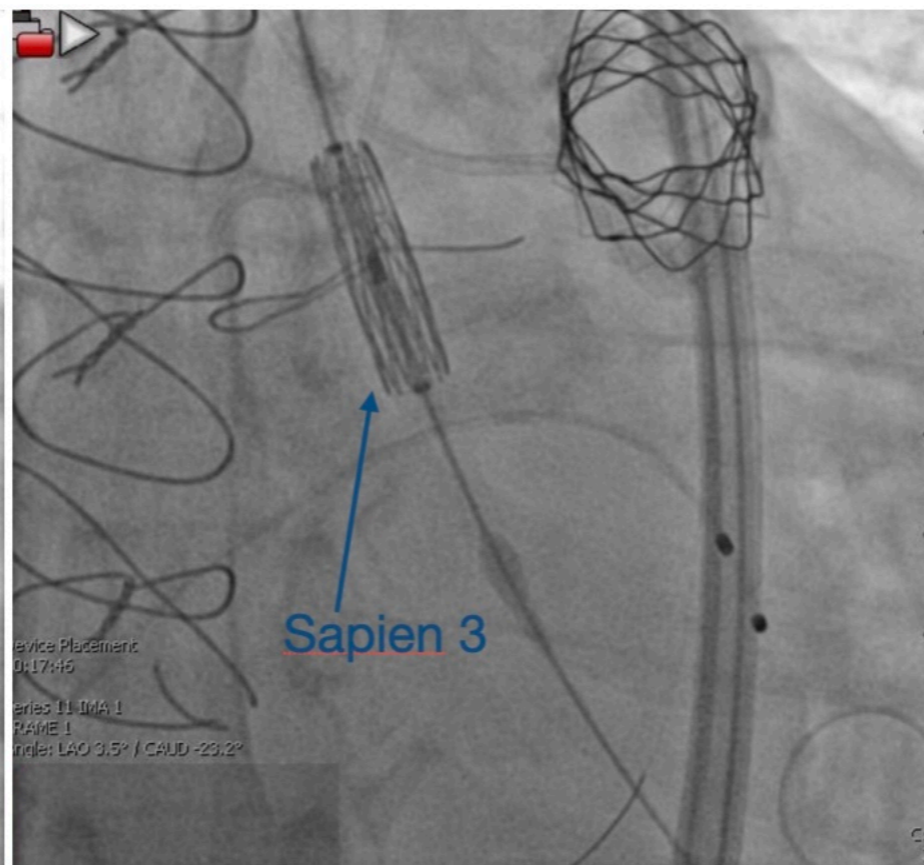
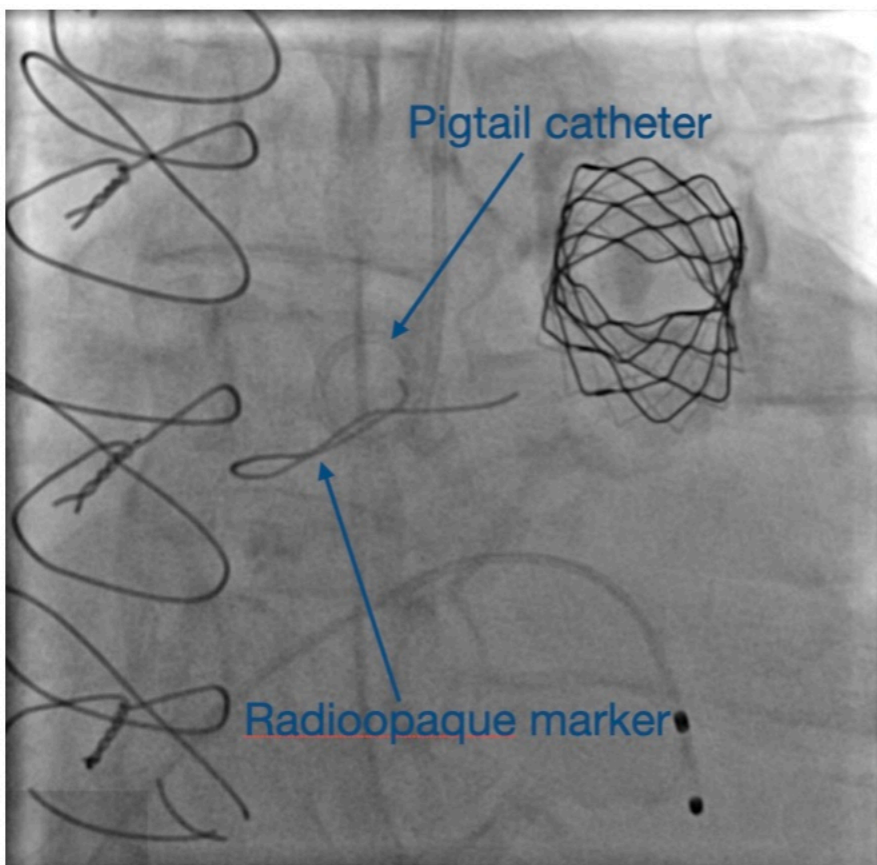
A 54-year-old male with 3 prior cardiac operations presented with heart failure symptoms secondary to prosthetic aortic valve degeneration and insufficiency. At his last operation, he underwent Freestyle® aortic root replacement. Understanding that future intervention was likely, a radio-opaque strip was taken from a RayTec sponge and applied circumferentially around the Freestyle® bioprosthesis in the suture line at the level of the annulus.

Results:

Given the three prior sternotomies, TAVR was selected as the method of repair. This procedure was facilitated by the prior addition of the radio-opaque marker during the previous aortic root replacement as seen on angiography (Figure 1).

Conclusions:

This addition of a radio-opaque marker at the level of a Freestyle® root allows for precise delivery of a valve-in-valve TAVR. This technique is both easy and inexpensive to incorporate at the index root replacement and greatly facilitates subsequent TAVR.



B-4

Novel Left Atrial Appendage Ligation Technique in Patients Undergoing Surgical Ablation for Atrial Fibrillation

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Background:

Atrial fibrillation (AF) is an increasing clinical concern worldwide. One adverse outcome of AF is thrombus formation within the left atrial appendage (LAA). Various techniques have been described to exclude the LAA and reduce the risk of stroke. We report a novel, inexpensive technique of LAA ligation during concomitant surgical ablation.

Materials and methods:

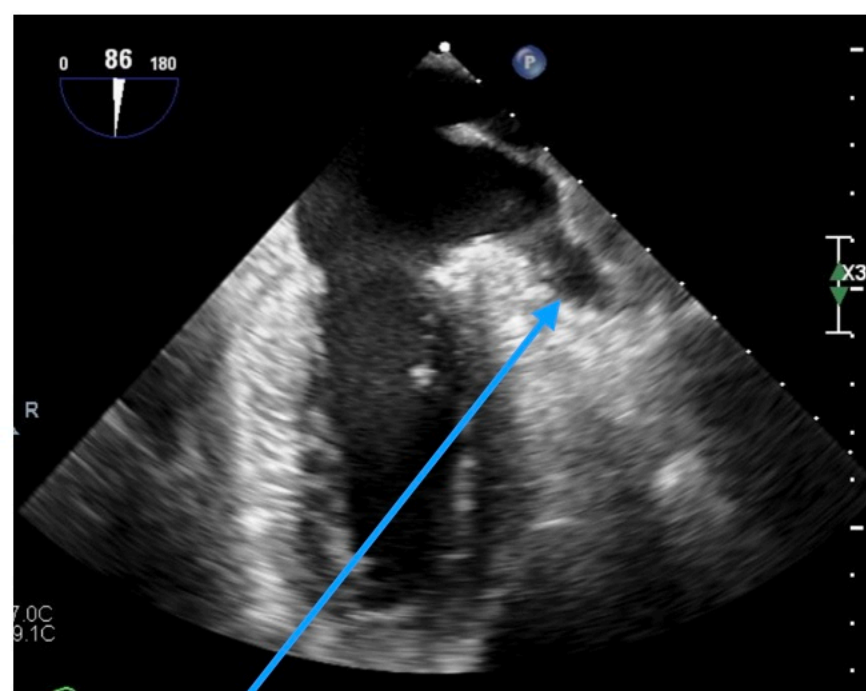
The LAA was ligated during concomitant surgical ablation utilizing a modified clinch knot technique with 2 silastic loops, securing both knots with a large hemoclip. This method occludes the LAA atraumatically at its base. Intraoperative transesophageal echocardiography (TEE) was used to confirm occlusion of the LAA. Transesophageal echocardiography (TEE) or computed tomography angiography (CTA) was used to assess long-term status of the LAA.

Results:

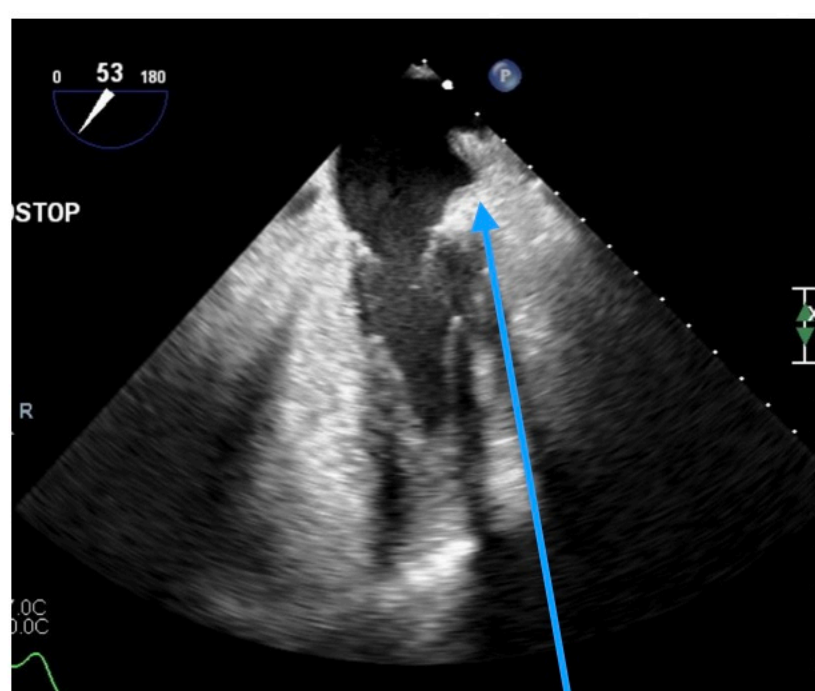
67 patients underwent ligation of the LAA during concomitant surgical ablation. Late imaging showed 83% of patients had complete obliteration of LAA (Figure 1). 17% had a small residual stump with an average measurement of 1cm x 2cm. No patient had thrombus formation or flow into the LAA and there was no evidence of ligation loop failure or migration.

Conclusions:

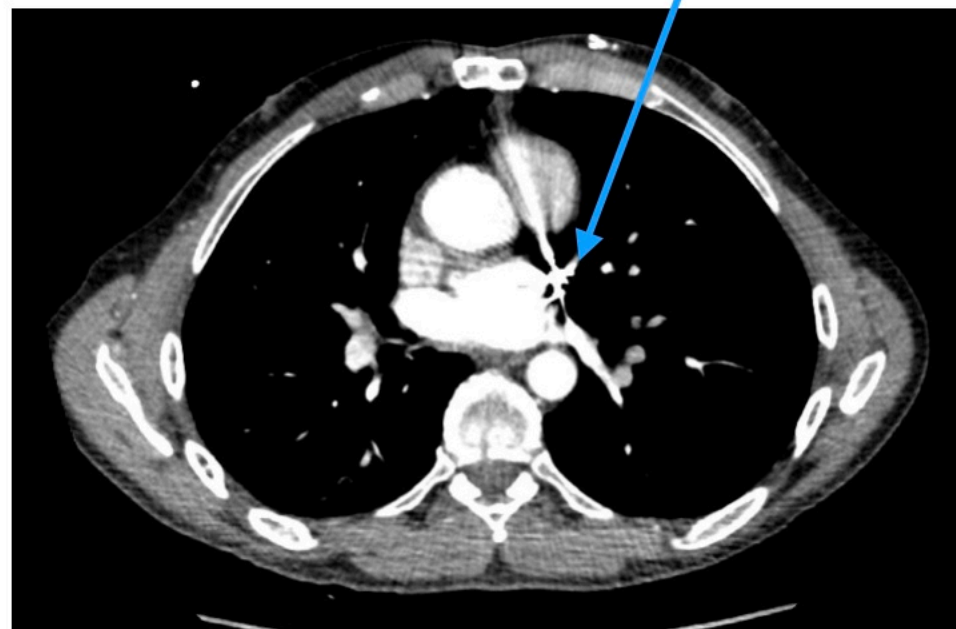
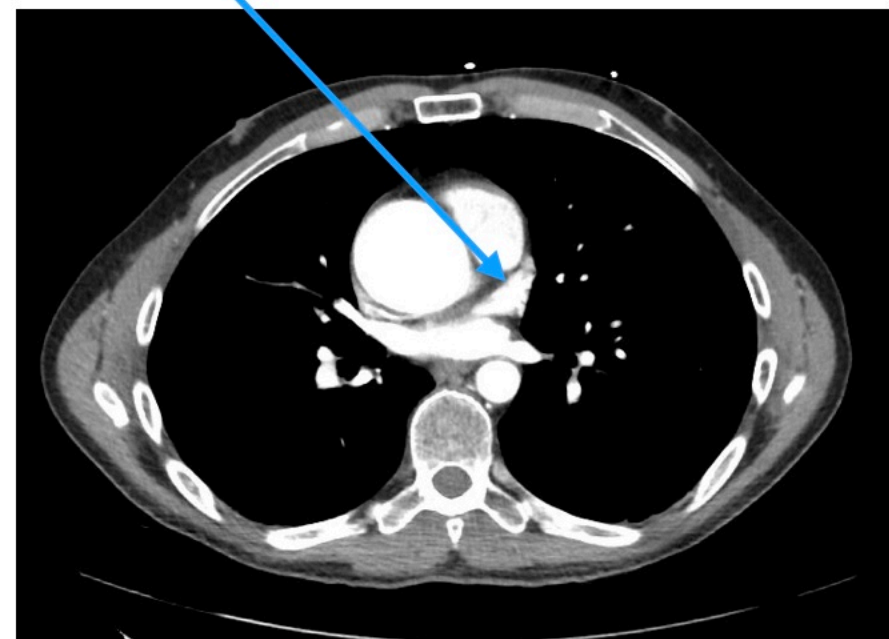
This technique yields good long-term outcomes for occlusion of the LAA. The clinch knot is rapid, reproducible, and inexpensive. The operative method is simpler than LAA excision and is more cost-effective compared to currently available external clip-type devices. This technique is best-suited for narrow and elongated LAA anatomy to ensure complete occlusion at the base.



LAA before ligation



LAA after ligation



B-5

Hybrid Aortic Arch Reconstruction with Thoracic Branched Endograft (TBE)

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Background

Traditional surgical treatment of patients with aortic arch and proximal descending thoracic aortic disease includes open arch and descending reconstruction. Recent advancements in hybrid aortic repair combine modified open arch operations with endovascular stenting (TEVAR). The GORE® thoracic branched endograft (TBE) facilitates these hybrid operations by providing a reproducible, secure platform for the distal arch and proximal descending thoracic aorta.

Methods

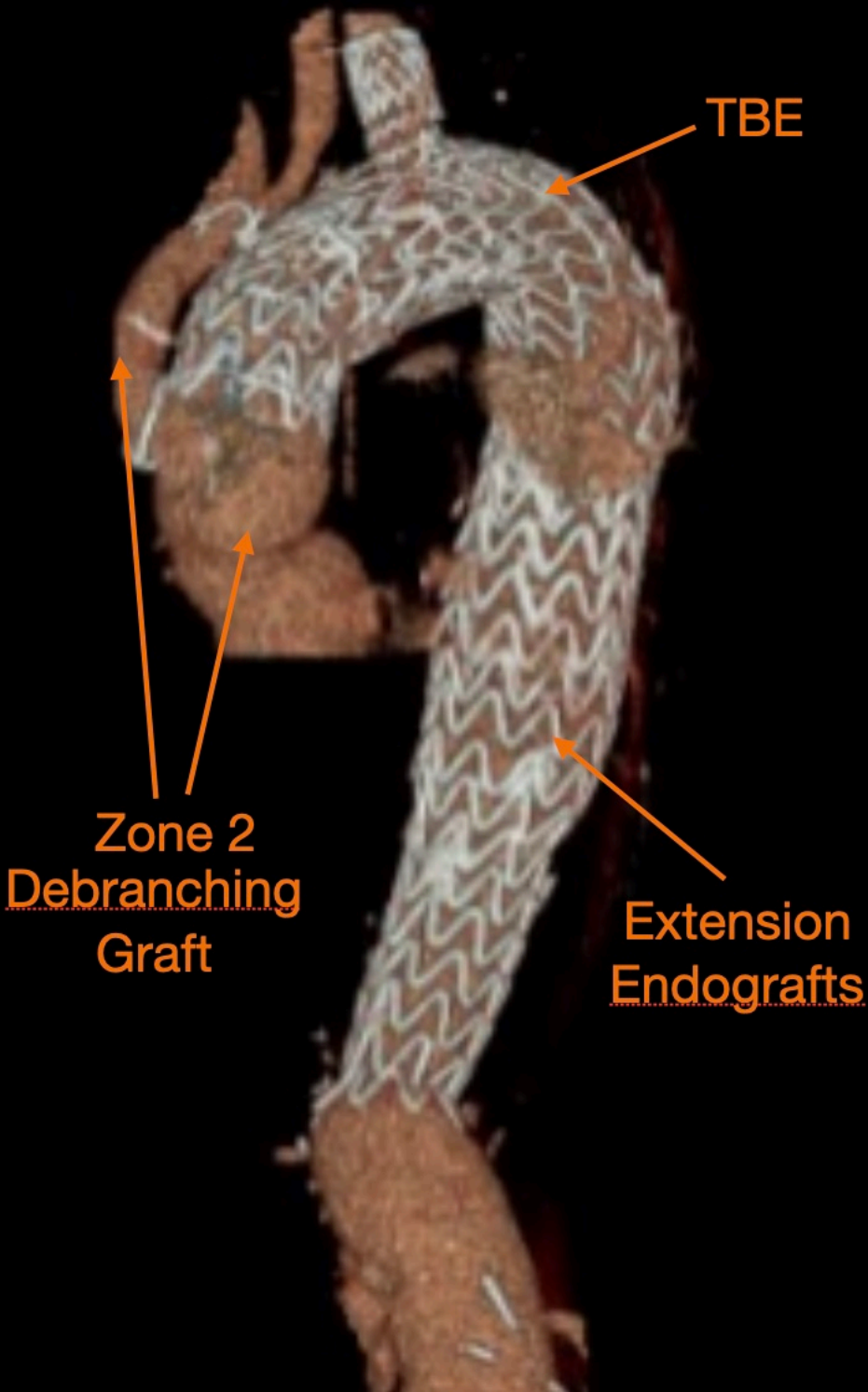
Ten patients with arch and descending thoracic aortic disease underwent initial reconstruction with either open arch reconstruction to zone 2 (4 patients) or aortic arch debranching (6 patients) with 2-vessel reimplantation. Subsequent completion of endovascular repair was then performed using a TBE with side portal into the left subclavian artery.

Results

All patients survived both procedures. 2 patients received a TBE and 1 additional TEVAR component; 3 patients had 2 additional TEVAR components, and 5 patients had 3 additional TEVAR components. No patient sustained stroke or spinal cord injury. One patient had a prolonged spinal headache. Follow-up CT angiography was performed in all patients prior to discharge and showed no endoleak (Figure 1). One patient developed late endoleak from the left subclavian artery requiring extension of the side portal stents.

Conclusions

This study demonstrates that hybrid open zone 2 proximal arch reconstruction or arch debranching combined with completion TEVAR are safe and effective strategies for treatment of arch and proximal descending aortic disease. Thoracic branched endografting (TBE) expands the surgical options for these patients and provides a stable platform for both proximal and distal extension endografting.



TBE

Zone 2
Debranching
Graft

Extension
Endografts

B-6

Concomitant Valve-Sparing Root Replacement and Chest Wall Reconstruction for Patients with Heritable Thoracic Aortic Disease

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Background

Patients with heritable thoracic aortic disease may have combined aortic root dilation and chest wall deformities. The typical approach for these patients is two separate operations in a staged fashion. We report the results of single-stage, combined valve-sparing aortic root replacement (VSRR) and chest wall reconstruction in patients with connective tissue disorders.

Materials and Methods

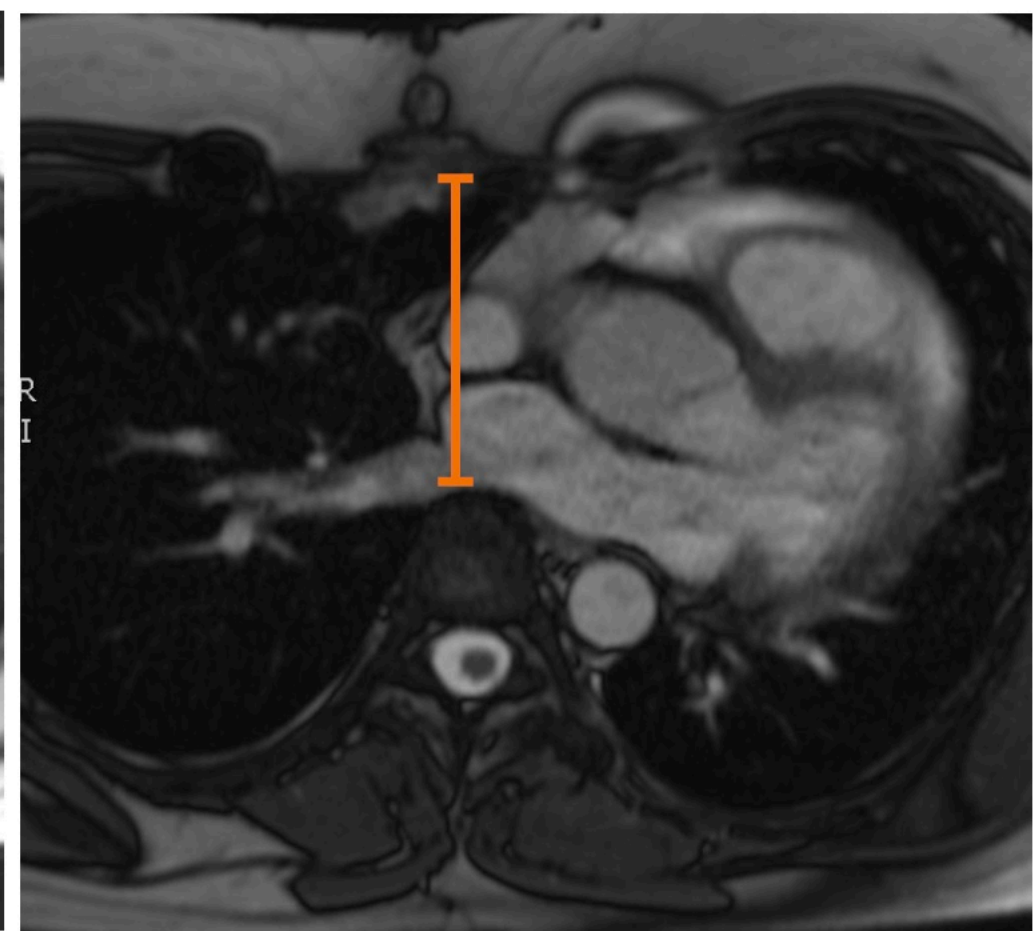
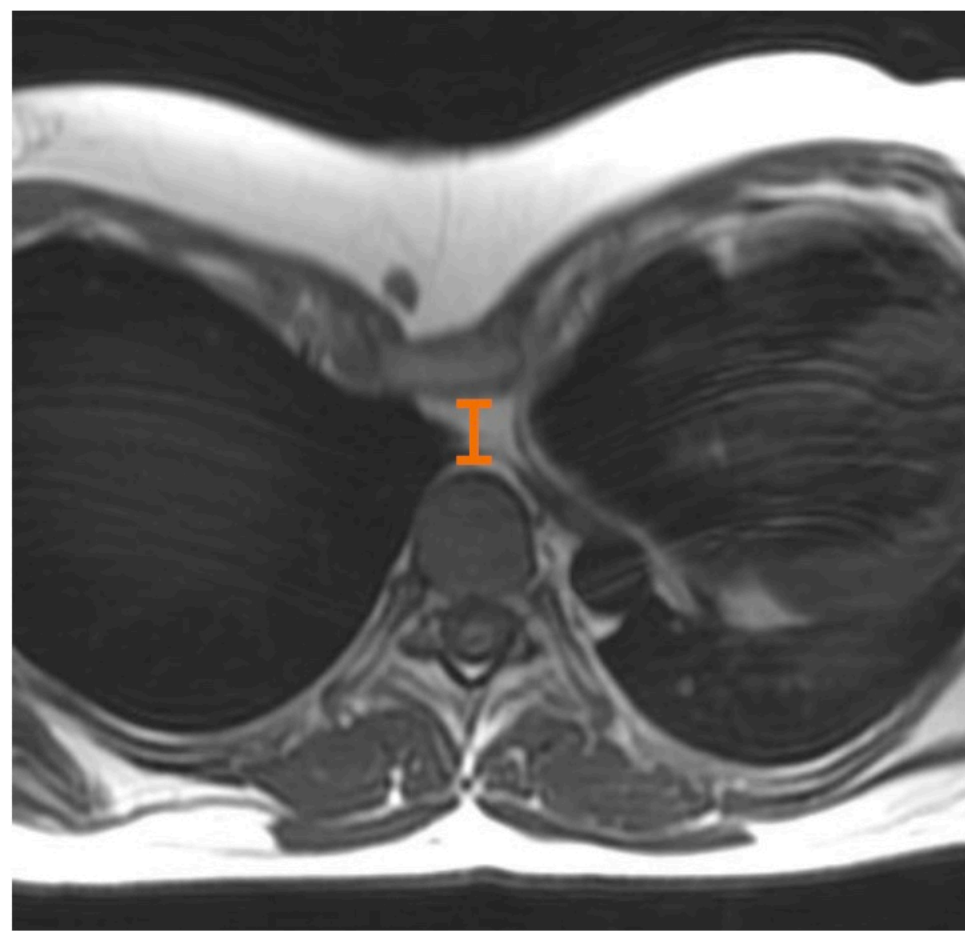
Five patients underwent VSRR and chest wall reconstruction over a fifteen-year period. Patients with pectus excavatum underwent sternal eversion technique whereas patients with pectus carinatum underwent sternal contouring. Clinical follow-up and repeat imaging were performed at a mean of 7 years (range 1 month to 13 years) to assess physical condition, valvular function, and chest wall stability.

Results

At most recent follow-up, four patients had no or trace aortic insufficiency and one had mild aortic sufficiency. No patient had enlargement of the aortic root or other area of the aorta. All patients had stable and cosmetically satisfactory chest wall contour with a mean Haller index of 2.35 (range 1.9 to 3.2). All patients were asymptomatic with no activity limitations. No patient has required reintervention for valvular, aortic, or chest wall progression. Compared to preoperative MRI, postoperative MRI chest wall contours were markedly improved (Figure 1).

Conclusions

Our concomitant, single-stage approach demonstrates excellent results for simultaneous correction of both aortic root pathology and chest wall deformity in patients with heritable thoracic aortic disease. This combined approach eliminates multiple hospitalizations, treats both aortic root dilation and chest wall deformity, and has durable results.



Hybrid Staged Repair of Hypoplastic Aortic Arch and Recurrent Coarctation of the Aorta

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Background

A 56-year-old male with 2 prior operations for coarctation presented with worsening exertional dyspnea and discordant arm and leg blood pressures. Computed tomography angiography (CTA) revealed a hypoplastic aortic arch, residual coarctation and calcified ascending-descending prosthetic bypass graft. Cardiac catheterization revealed a 30mm gradient across the hypoplastic native transverse arch as well as moderate stenosis of the ascending-descending bypass graft.

Materials and Methods

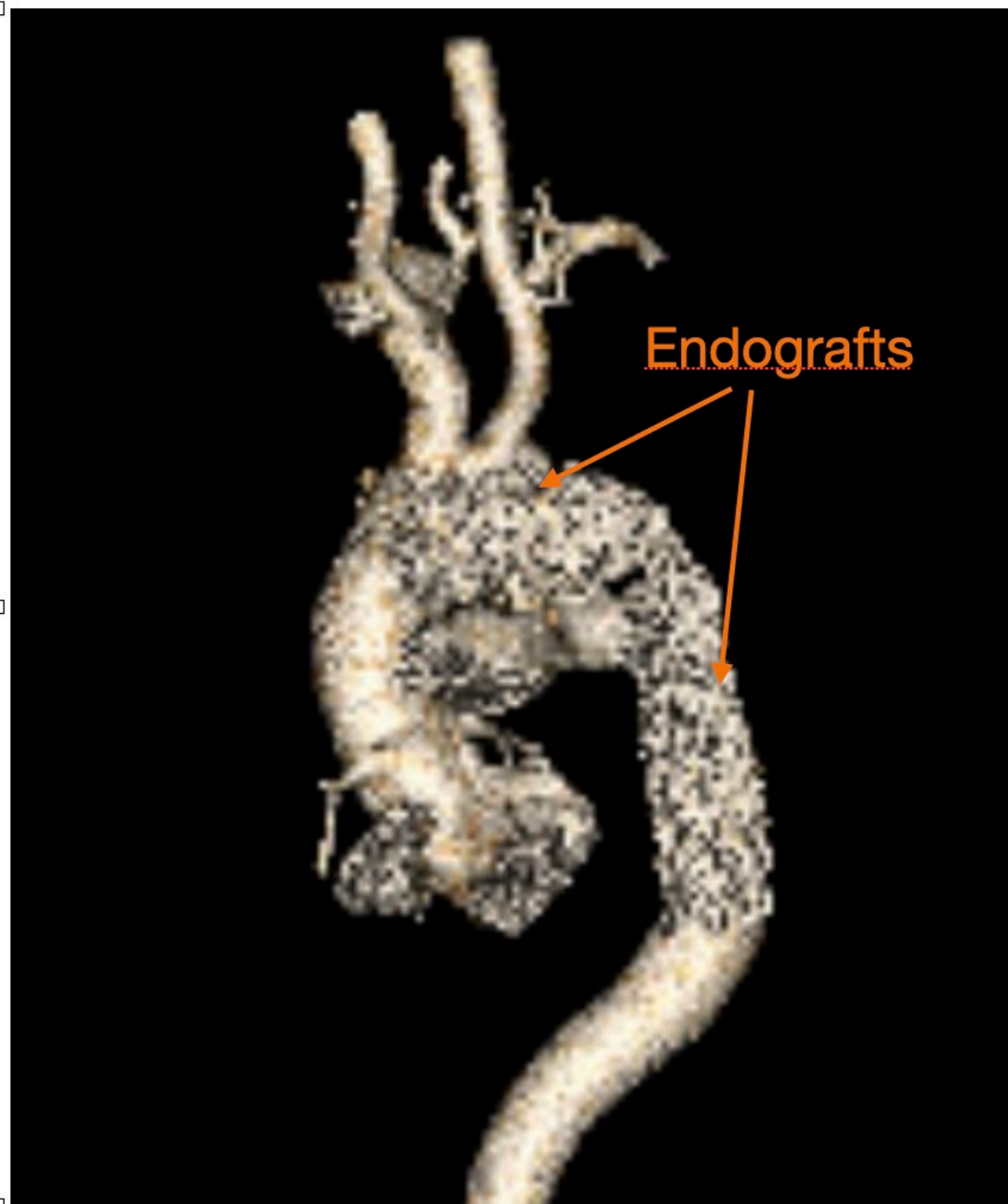
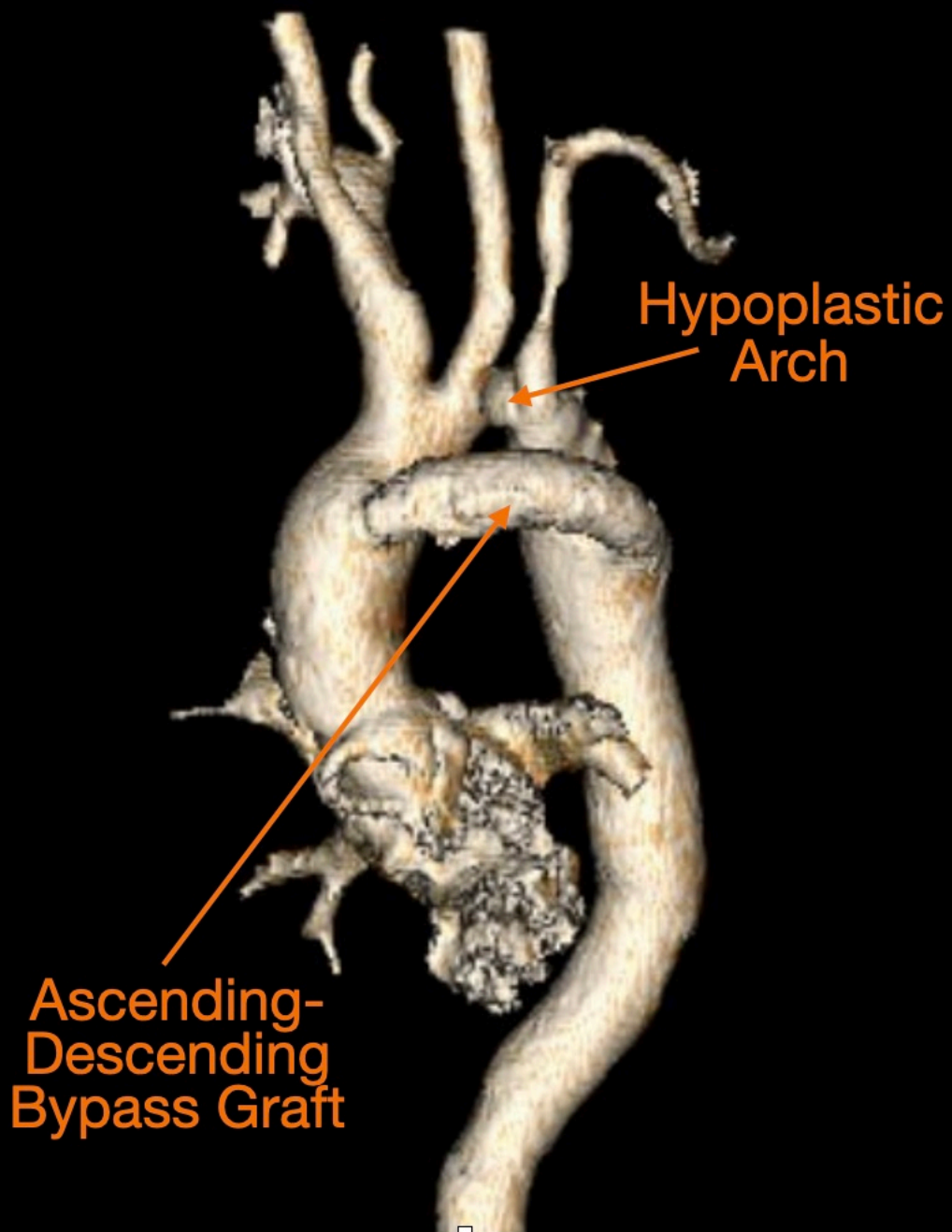
A staged surgical approach was utilized beginning with left subclavian-to-carotid transposition through a neck incision. Second-stage sternotomy was performed and under circulatory arrest, the prior ascending-descending bypass graft was excised and a 34x150mm GORE TAG® endograft was deployed over a wire under direct vision into the descending aorta. The proximal end of the endograft was sewn directly to the ascending aorta. The native hypoplastic arch was ligated with an umbilical tape and a second endograft was deployed beyond the first endograft for complete seal.

Results

The patient tolerated both procedures without difficulty and had complete resolution of symptoms. Follow up blood pressures were symmetric, consistent with no aortic flow obstruction. Compared to preoperative CTA, postoperative CTA showed no evidence of endoleak and excellent anatomic contours (Figure 1).

Conclusions

This novel hybrid approach is useful for repair of hypoplastic arch and recurrent coarctation. Open deployment of the endograft into the descending aorta allows for precise implantation. The endograft can be directly attached to the native ascending aorta, similar to a standard surgical graft.



B-8

When Everything Possible Goes Wrong – Complex Treatment of an Aortic Dissection Patient Over the Course of Six Years

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OBJECTIVE: We present a very complex treatment course in a patient after Stanford type A dissection involving complicated primary surgery and very challenging further management including a wide spectrum of complications.

RESULTS: Patient underwent an acute Bio-Bentall with hemi-arch replacement plus triple CABG because of dissected non-restorable coronary ostia in 2017 for extensive Stanford type A aortic dissection at the age of 57. Patient was discharged home uneventfully. Unfortunately, after three years he developed a prosthetic valve endocarditis. At a MDT meeting repeat surgery was denied because of high surgical risk. He underwent altogether 6.5 months of treatment with i/v Vancomycin, infection was eradicated but severe aortic insufficiency developed caused by leaflet destruction. At this stage successful transfemoral valve in valve implantation of Edwards Sapien 3 was performed. Only a half year later patient returned with complaints of severe and progressing heart failure and chest pain, a CT scan showed a large pseudoaneurysm next to the LAD graft (caused by partial dehiscence of the proximal anastomosis), which was the only remaining functioning coronary graft. An emergency surgery was performed involving full arch replacement with FET and bicarotid bypass plus restoration of the grafts to LAD and RCA. Patient tolerated this complex surgery well and at a 3-month follow-up visit a recovery of LV EF till 40% was observed.

CONCLUSIONS: This case report demonstrates a very challenging aortic dissection patient suffering from disastrous complications which successfully have been managed by the full engagement of heart team resources.