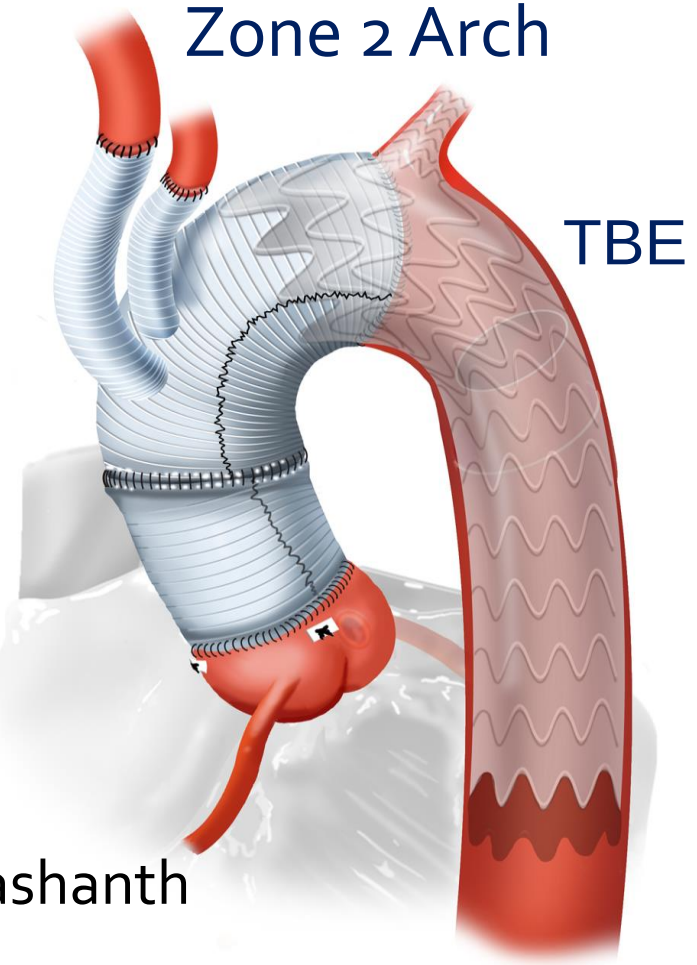
Are the Availability of New Aortic Devices Going to Change our Index Operation for Acute Type A (Debakey I) Dissection?:

STS/EACTS LatAm Cartagena 2018



Zone 2 Arch With Sequential Branched LSA Graft TEVAR

A More Definitive Solution for Acute Debakey I Dissection?

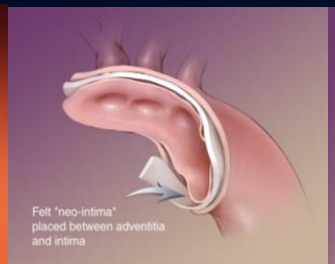
Joseph E. Bavaria, Wilson Szeto, Prashanth Vallabhajosyula, **Nimesh Desai**

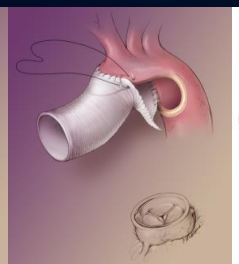
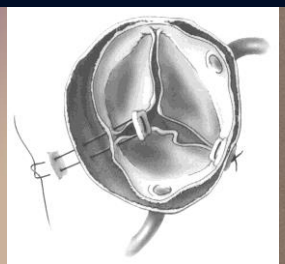
Cardiovascular Surgery
University of Pennsylvania, Philadelphia

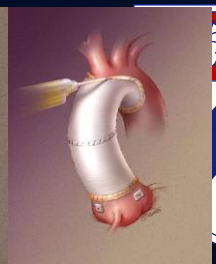
Penn Medicine

Acute Type A Dissection: Design of an Operation

Cause of death	Treatment
Acute CHF due to AI	Aortic valve resuspension
Coronary malperfusion	Aortic root repair
Cerebral malperfusion	Arch replacement
Free Ascending rupture	Asc aortic replacement



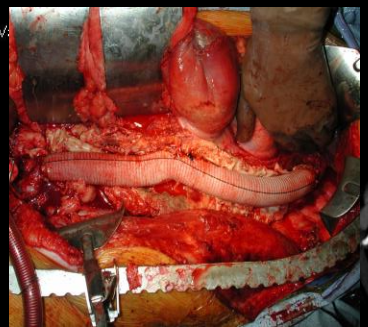
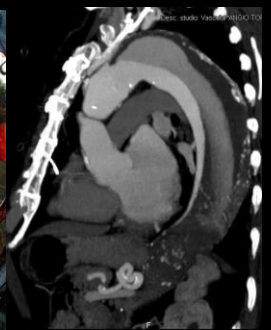





CSTCVS, China, October 2018:

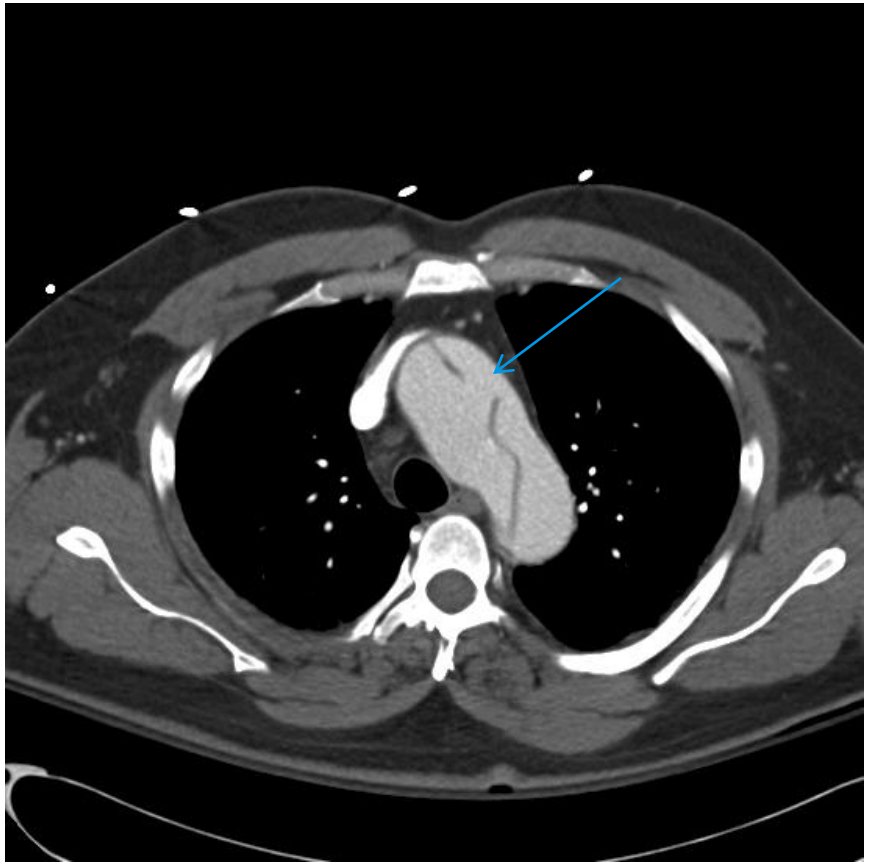
Management of the Aortic Arch during Type A Dissection

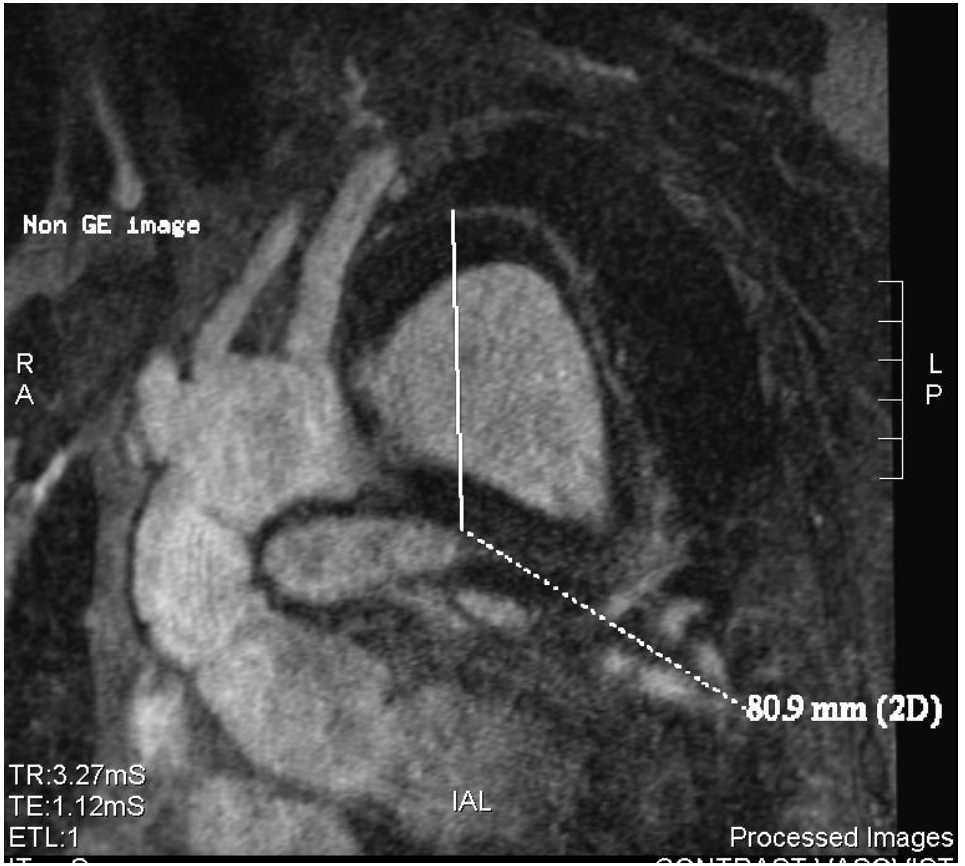
Do we have a Problem with the Downstream Aorta??

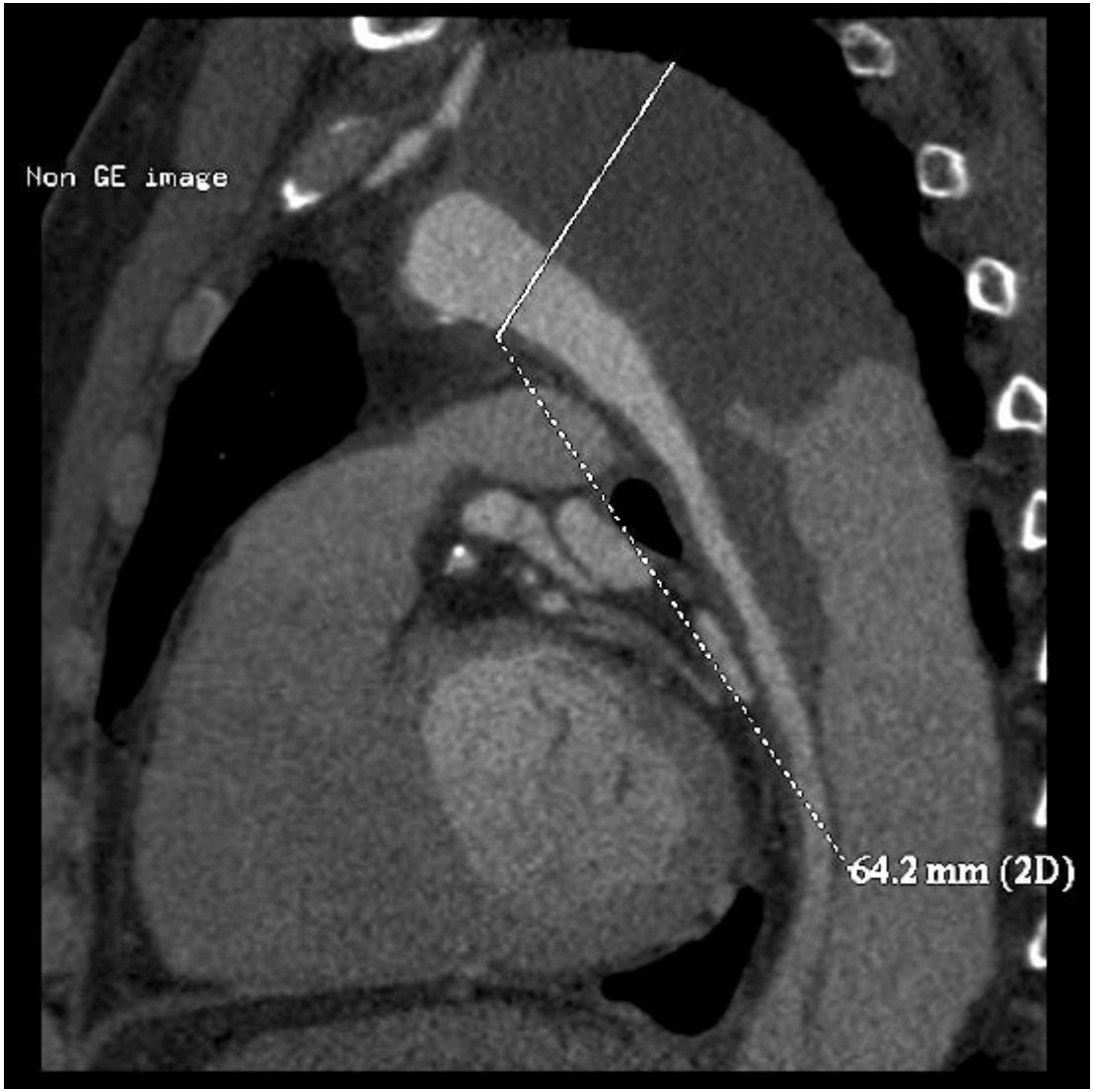

Late Outcome after “Various” Classic Debakey Type 1 Repair

Late Complications: Aneurysmal Dilation of the Dissected Aorta (8.0 cm)

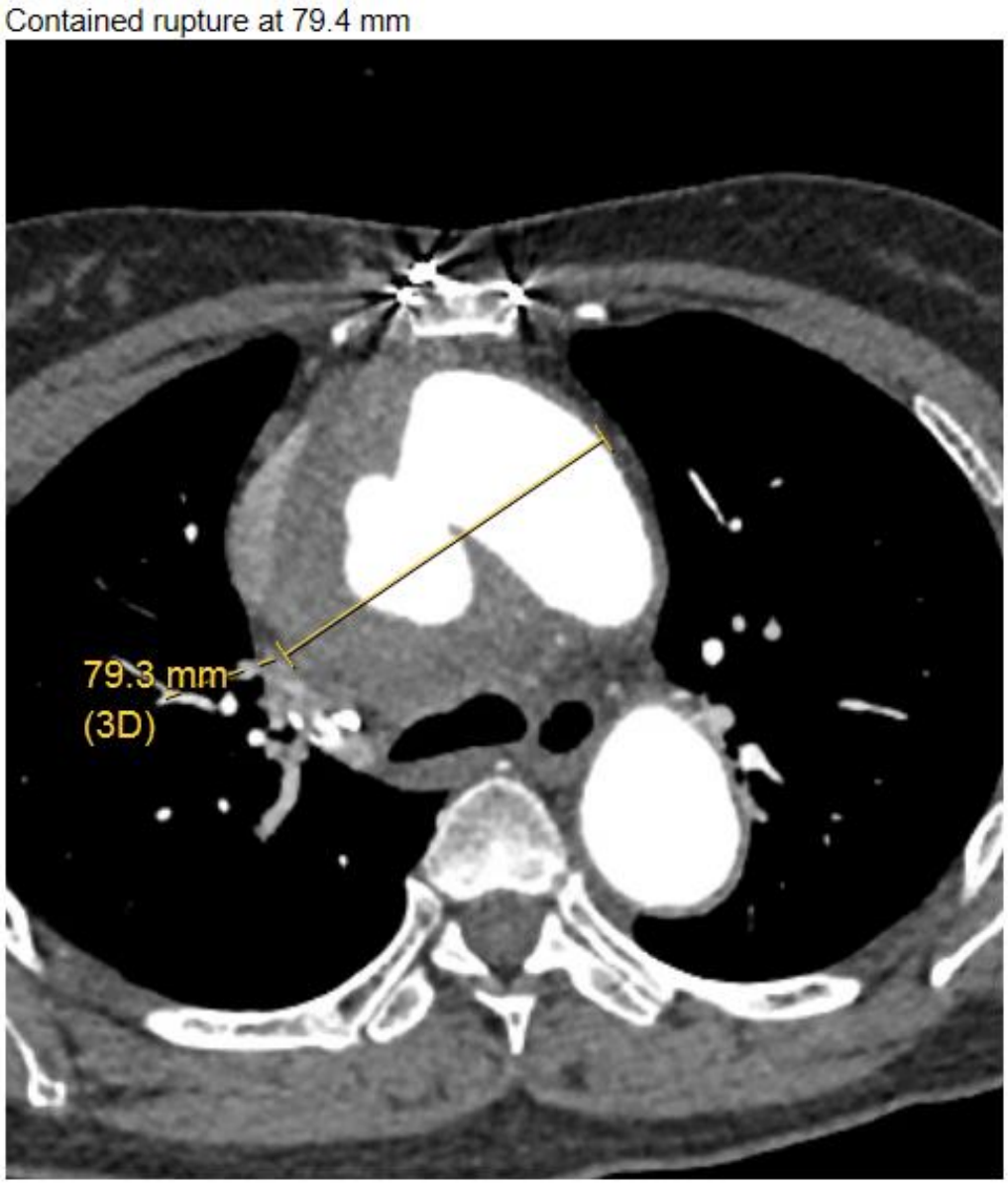




40 y.o male 1 year post Type A repair (6.4 cm)

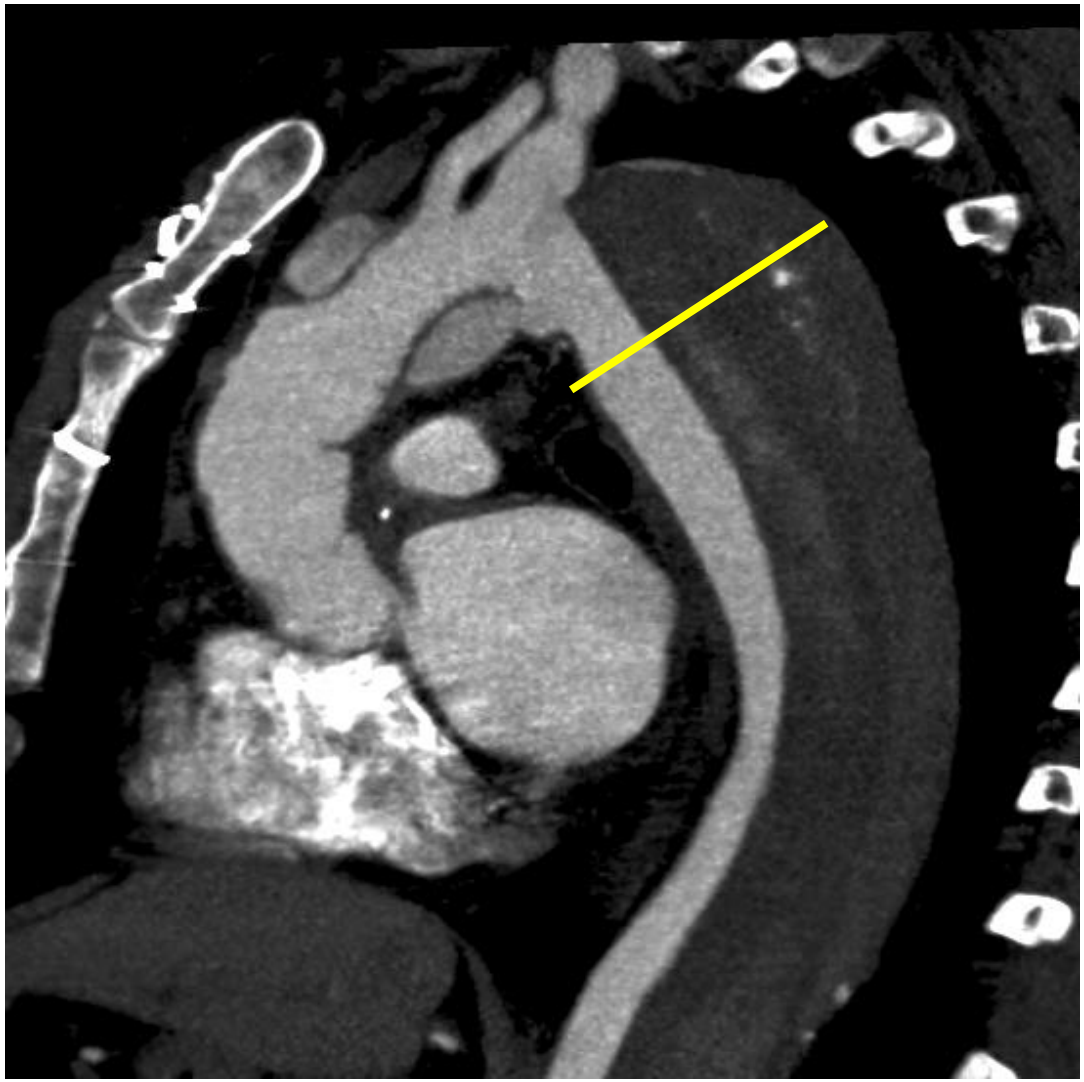


CTA 2 years S/P Type A Repair



7.9 cm

68y.o male 10 years post type A repair (7.3 cm)



Aortic Enlargement and Late Reoperation After Repair of Acute Type A Aortic Dissection

Andreas Zierer, MD, Rochus K. Voeller, MD, Karen E. Hill, BS,
Nicholas T. Kouchoukos, MD, Ralph J. Damiano, Jr, MD, and Marc R. Moon, MD

Divisio
Barnes

The fate of the distal aorta after repair of acute type A aortic dissection

James C. Hal
David Spielvo

Supplem
able on

Fate of the Residual Distal and Proximal Aorta After Acute Type A Dissection Repair Using a Contemporary Surgical Reconstruction Algorithm

Evolution of Aortic Dissection After Surgical Repair

Rossella Fattori, MD, Letizia Bacchi-Reggiani, MSc, Paola Bertaccini, MD,
Gabriella Napoli, MD, Francesca Fusco, MD, Massimo Longo, MD,
Angelo Pierangeli, MD, and Giampaolo Gavelli, MD

Patients after aortic dissection repair still have long-term unfavorable prognosis and need careful monitoring. The purpose of this study was to analyze the evolution of aortic dissection after surgical repair in correlation to anatomic changes emerging from systematic magnetic resonance imaging (MRI) follow-up. Between January 1992 and June 1998, 70 patients underwent surgery for type A aortic dissection. Fifty-eight patients were discharged from the hospital (17% operative mortality) and were followed by serial MRI for 12 to 90 months after surgery. In all, 436 postoperative MRI examinations were analyzed. In 13 patients (22.5%) no residual intimal flap was identified, whereas 45 patients (77.5%) presented with distal dissection, with a partial thrombosis of the false lumen in 24. The yearly aortic growth rate was maximum in the descending aortic segment (0.37 ± 0.43 cm) and was significantly higher in the absence of thrombus in the false lumen (0.56 ± 0.57 cm) ($p < 0.05$). There were 4 sudden deaths, with documented aortic rupture in 2. Sixteen patients underwent reoperation for expanding aortic diameter. In all but 1 patient, a residual dissection was present (in 13 without any thrombosis of the false lumen). Close MRI follow-up in patients after dissection surgical repair can identify the progression of aortic pathology, providing effective prevention of aortic rupture and timely reoperation. Thrombosis of the false lumen appears to be a protective factor against aortic dilation. ©2000 by Excerpta Medica, Inc.

(Am J Cardiol 2000;86:868–872)

From the Departments of Cardiothoracic

approximately tw

ic False Dissection

ID, Euisuk Chung, MD,
MD, PhD

Bundang Hospital, Bundang,
Medicine,

ore. Dilatation occurred more fre-
aorta and in patients with patent
, larger aortic diameter, Marfan
ge, and male sex. Meanwhile,
alse lumen occurred in 36 patients
ge occurred in 23 of 24 patients
bosed and narrow false lumens in

ostoperative characteristics of false
for predicting both dilation and
how not only a high incidence of
descending aortic dilatation after repair of acute type I dissection, but also shrinkage of thoracic false lumen in some patients. These findings can be used as control data for determining the benefit of more extensive or new surgical approaches.

(Ann Thorac Surg 2009;87:103–8)

Changes were analyzed separately in the thoracic and abdominal segments.

Results. In early CT, thoracic false lumen was patent in 85 patients (69.7%), and abdominal false lumen was patent in 111 patients (91.0%). Among these, the false lumen remained patent after a mean interval of 33.6 months in 69 patients (81.1%) and 105 patients (94.6%),

Do we have a problem with the distal aorta after repair of acute type A dissection? ….

YES

Especially if we use a **COMPOSITE** of **Index Operation Failure**: 1. Aortic Death; 2. Reoperation; 3. Aneurysm > 6.0 cm.

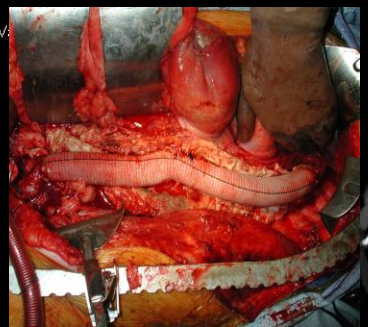
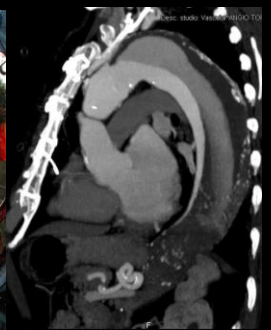
Failure at 3 years after Aggressive Hemi-Arch due to Proximal DTA fenestrations

Cartagena, Columbia 2018

STS/EACTS LatAm 2018:

Management of the Aortic Arch during Type A Dissection

So… how should we handle the ARCH??

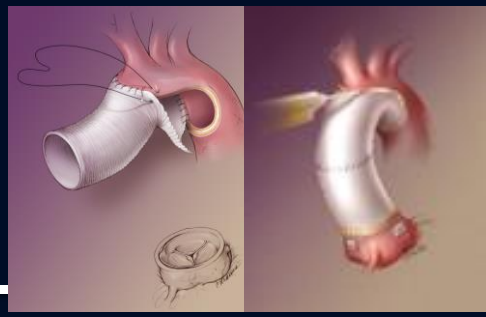

Eliminating Distal (Residual) Dissection after Type A

What may be the Future Solutions?

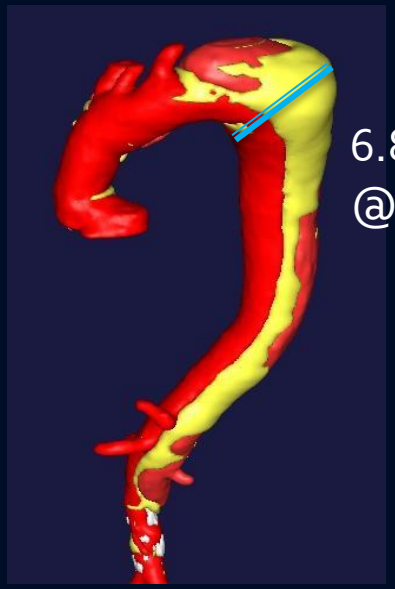
Penn Medicine

So how should we handle the ARCH?

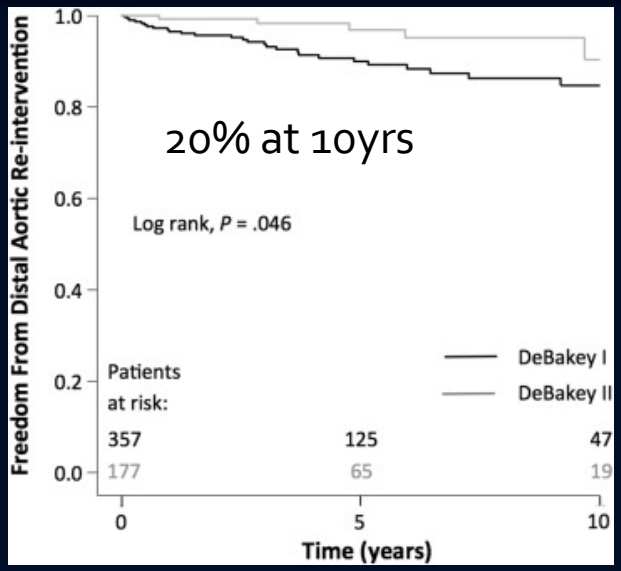
1. *Standard Hemi-Arch*

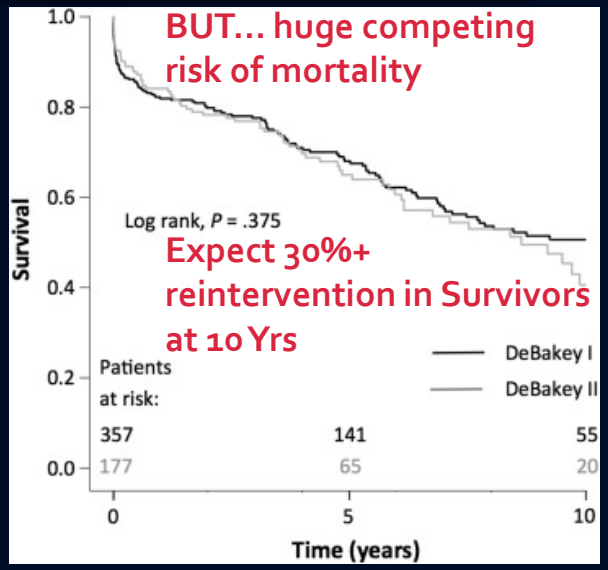


- Straightforward, anyone can do it
- Short circ arrest - No need for complex ACP approaches
- May have residual Malperfusion
- **Significant risk of late attrition from distal aortic disease**



6.8 cm
@ 3 yrs

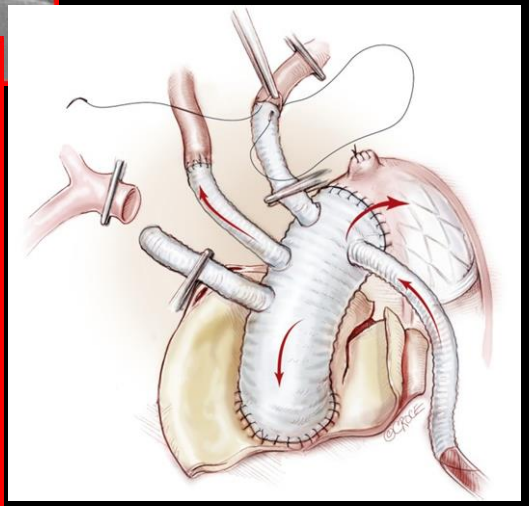




Rylski, Bavaria, Desai et al: Ann Thor Surg 2014

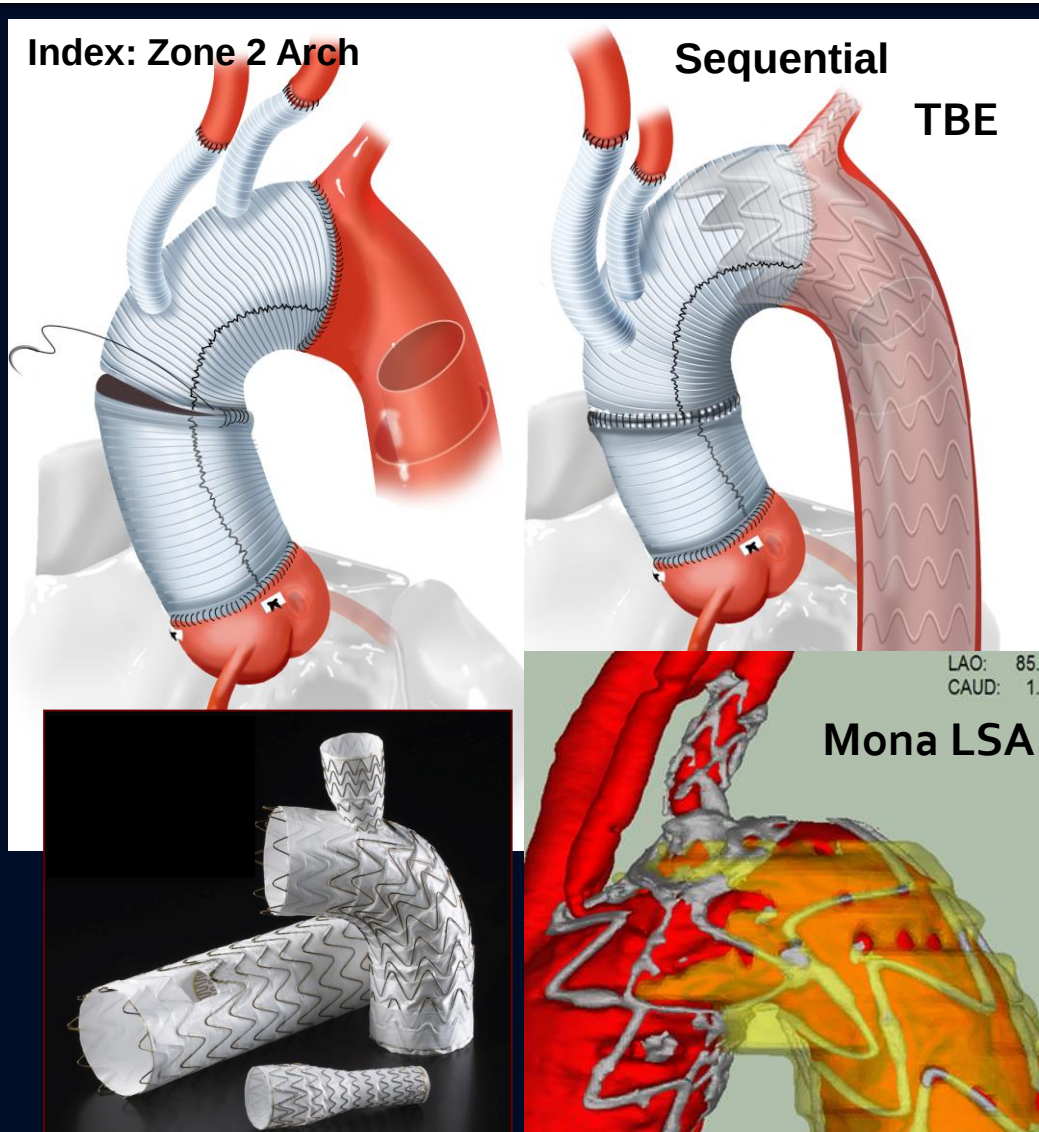
3. Technical: Conventional Total Arch with Frozen Elephant Trunk:

Standard Zone 3 Arch FET



So how should we handle the ARCH?
Or … *ZONE 2 Arch with Sequential Branched TEVAR completion*

- Advantages
  - Simpler Distal Anastomosis at Index operation
  - Can address most complex arch tears and eliminate flap in proximal head vessels
  - Shorter ACP times than Total Z3 FET
  - Definitive TEVAR options in future
  - Avoids TEVAR when not needed; 20 - 35% of time
  - Less risk of Recurrent larnygeal nerve injury (important!)

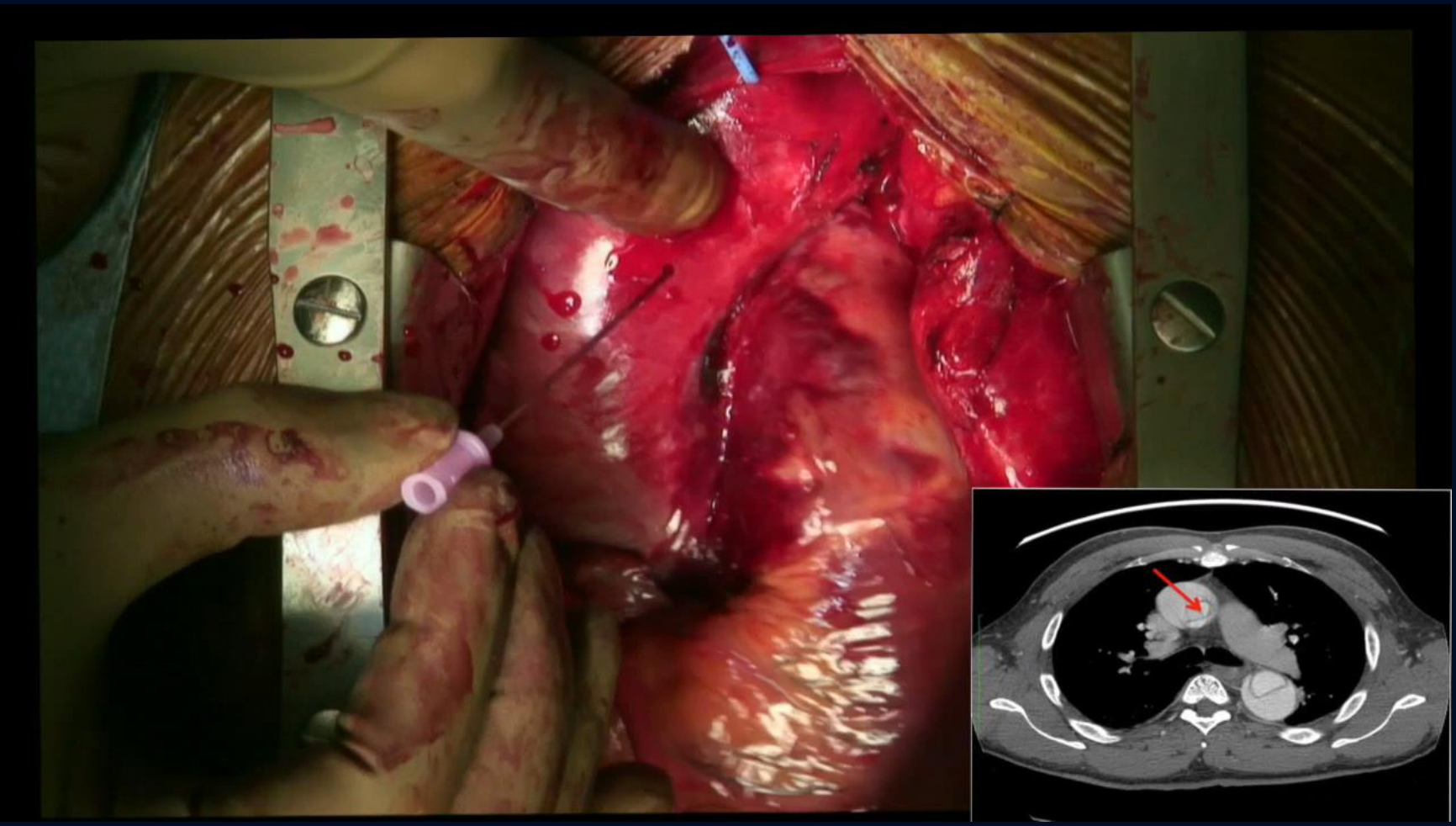


Desai, Bavaria (First presented) STS 2015; AATS 2016; Full Series STS TEVAR 2016; EACTS 2017

Complex Acute Type A Dissection:

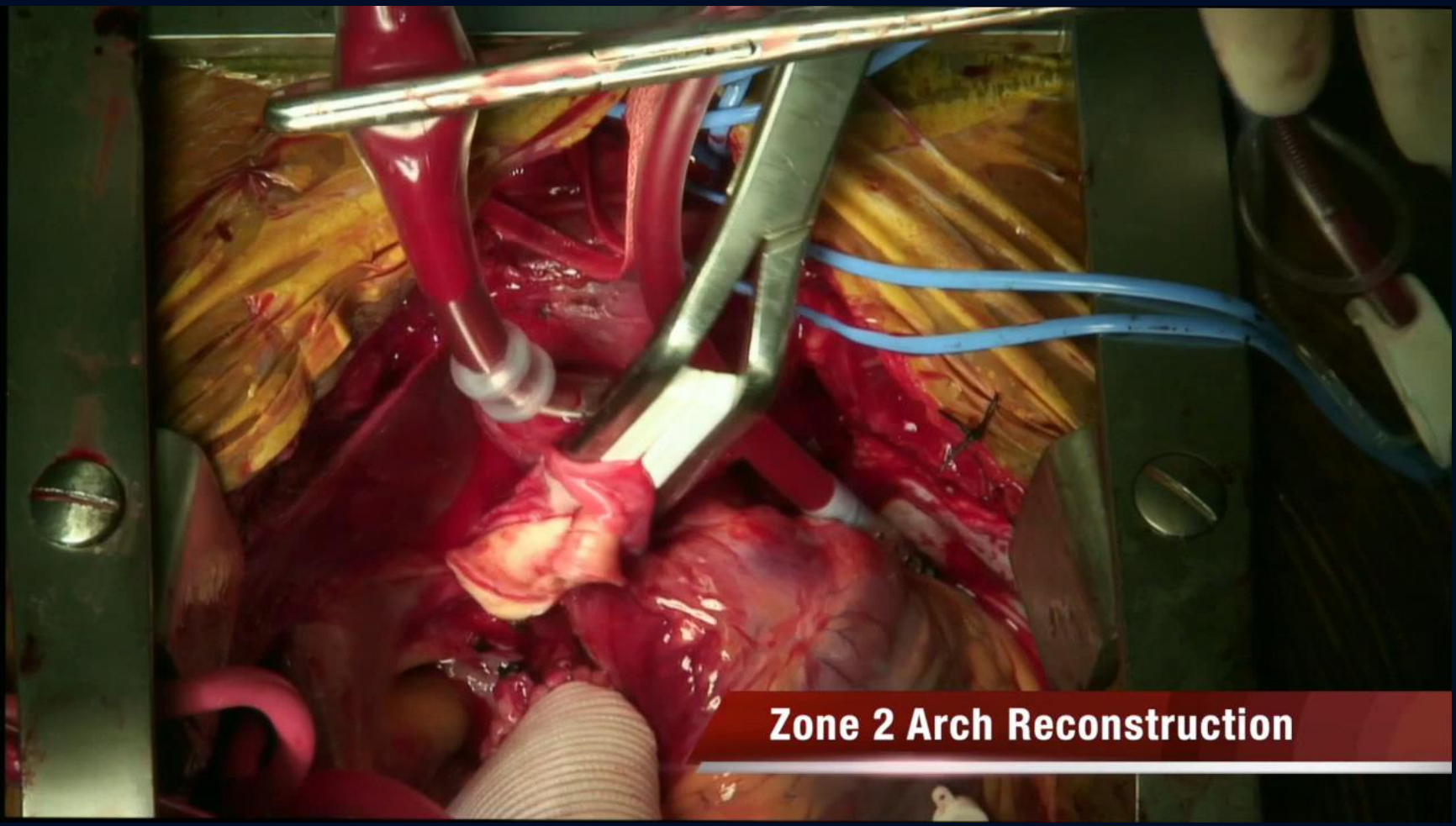
Very severe arch dissection, distal tear

Direct Ascending Cannulation

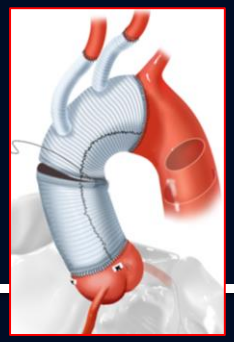


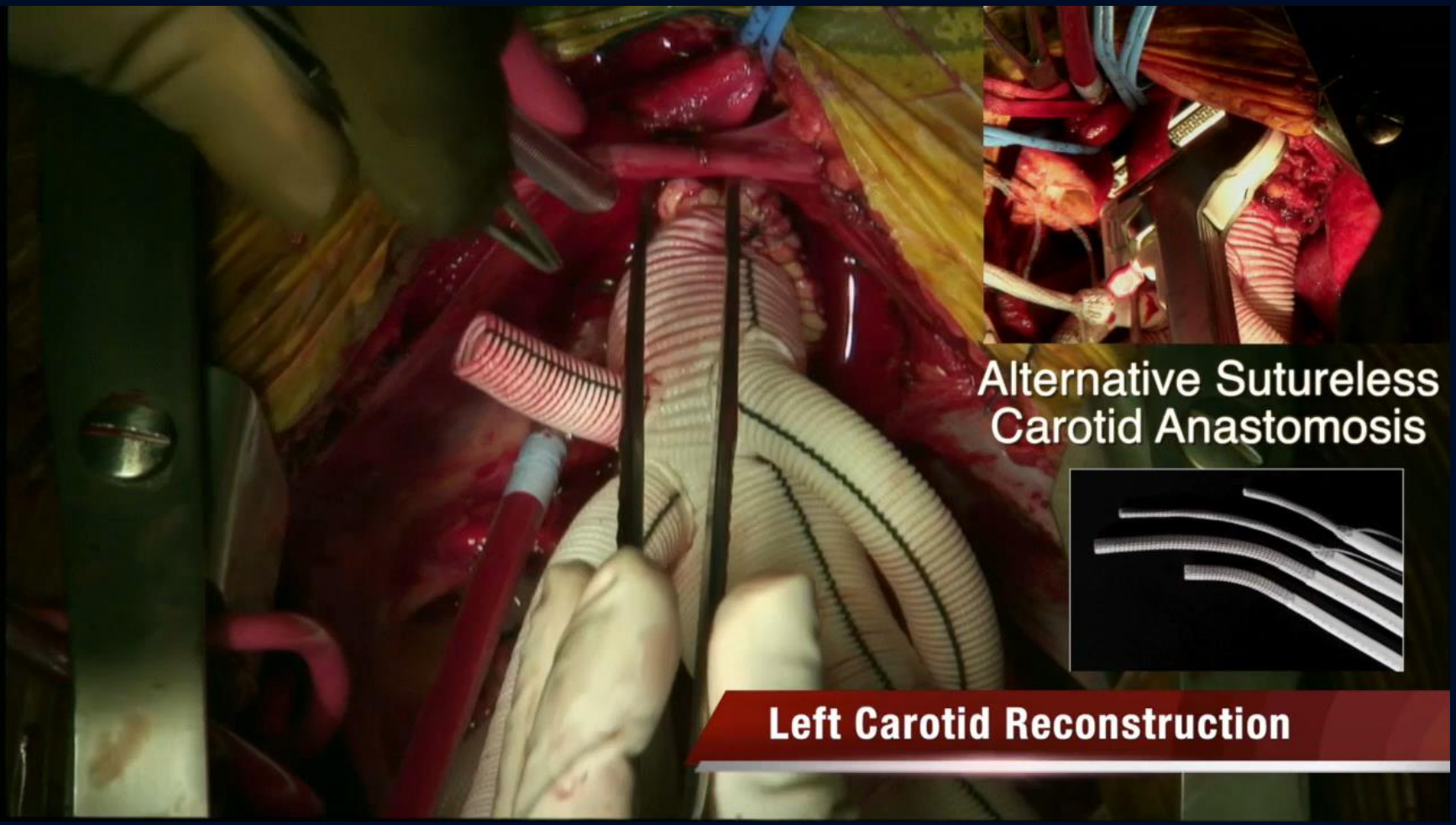
Root Repair – NeoMedia Technique

Zone 2 Arch: setup and distal



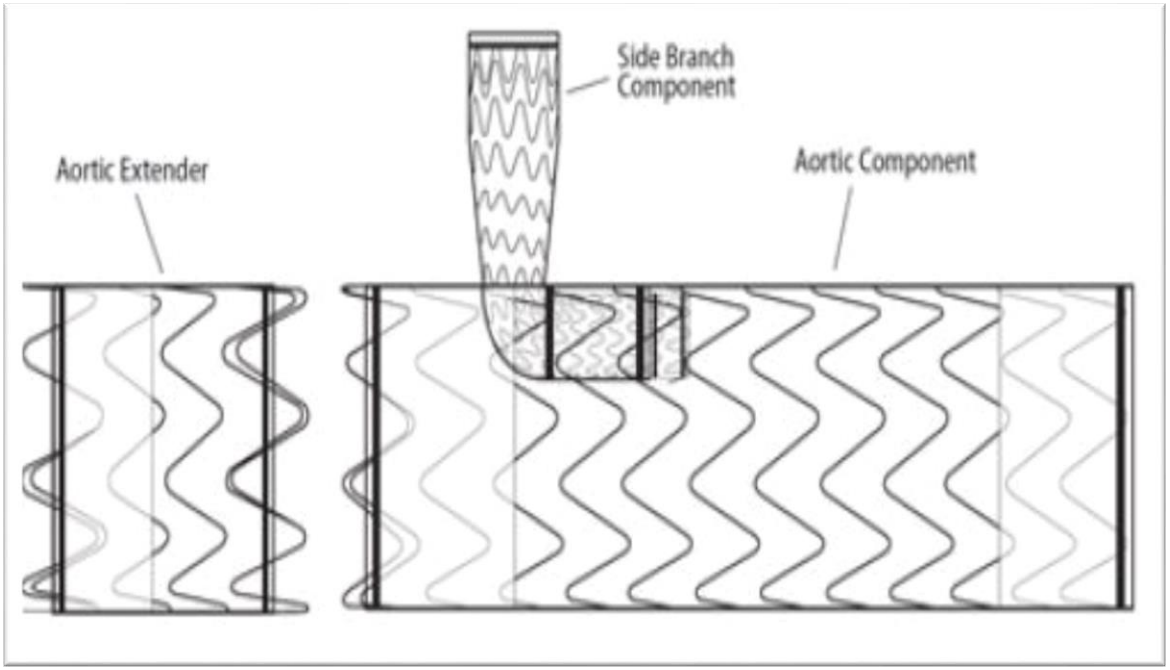
Zone 2 Arch: Completion

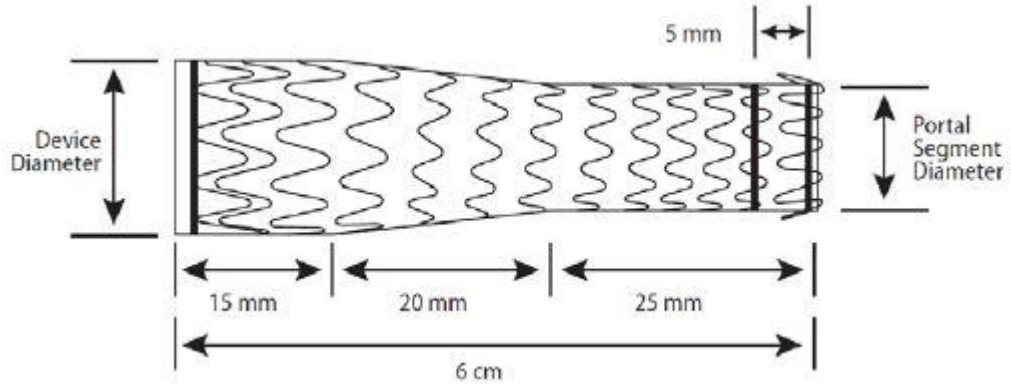




Sequential (2-6 weeks after Index procedure) = Arch branched graft TEVAR

GORE® Branched TAG® Device (TBE Device)





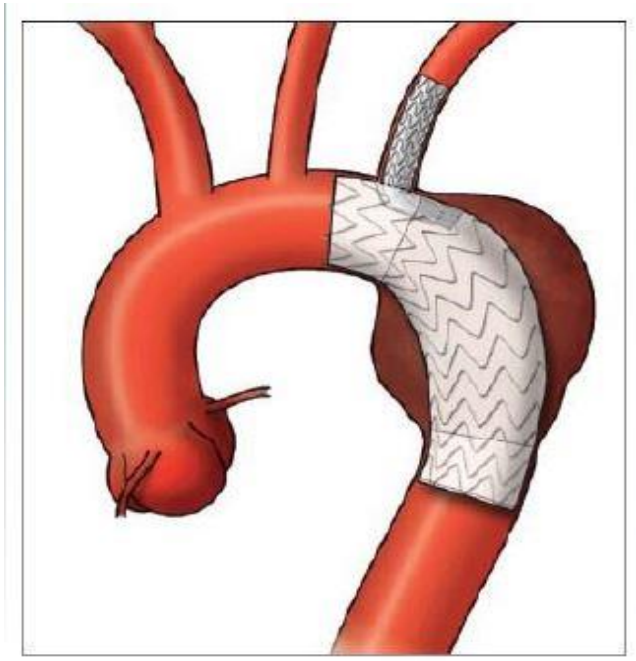
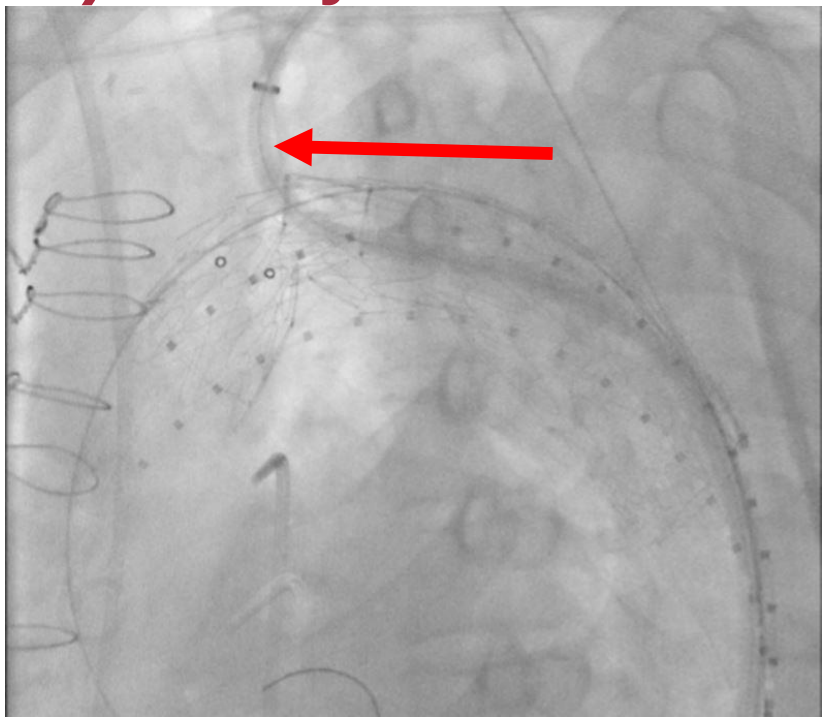


Figure 2. The GORE TAG Thoracic Branch Endoprosthesis placed in Zone 2 of the thoracic aorta.

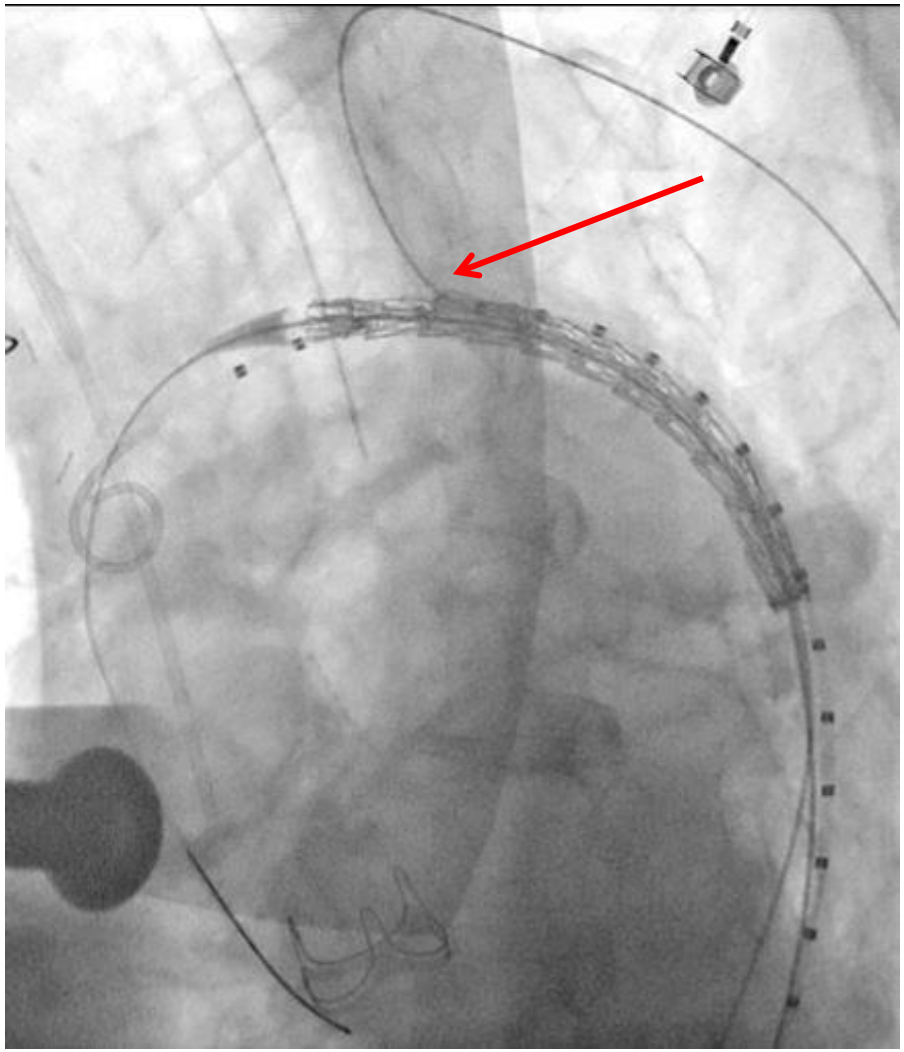
Zone 2 TBE (12 mm Portal) in “Residual” Type A Dissection (Downstream Aorta) 10 days

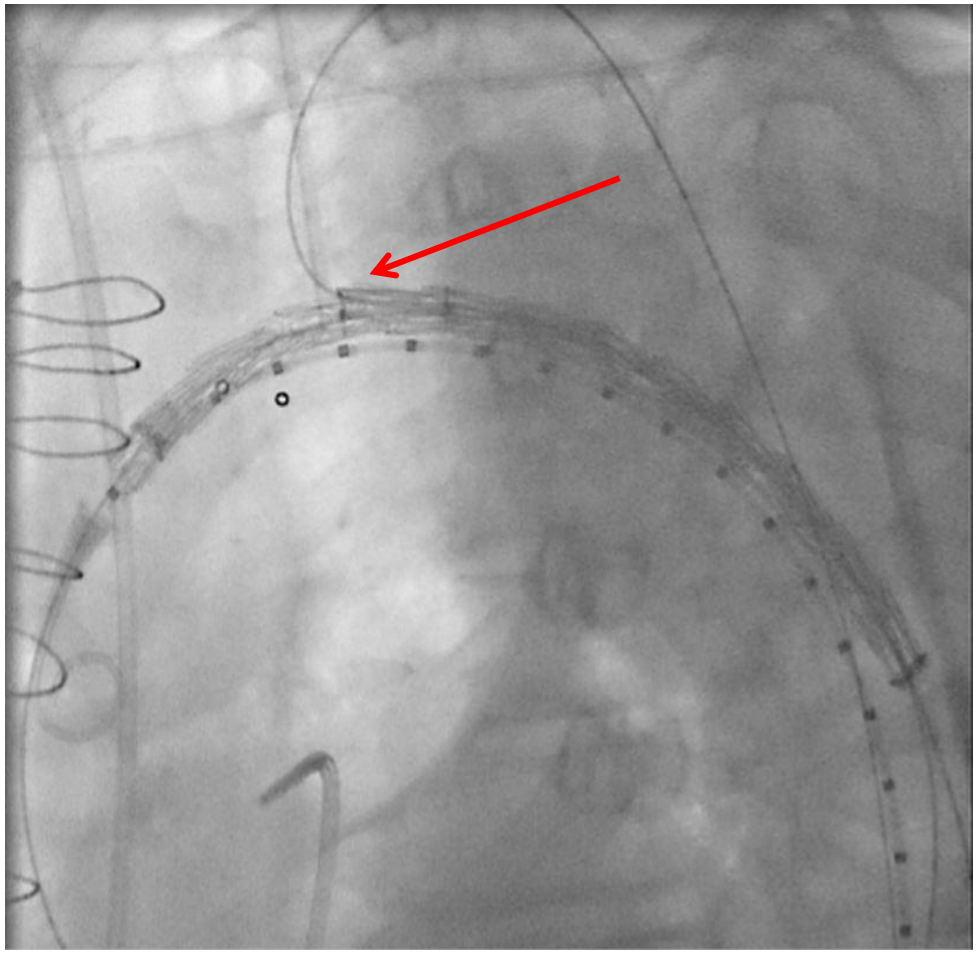
3 cm Dacron LZ previously constructed with Zone 2 Arch (10 days earlier)



Side branch sheath positioned in LSA
Note nice horizontal access

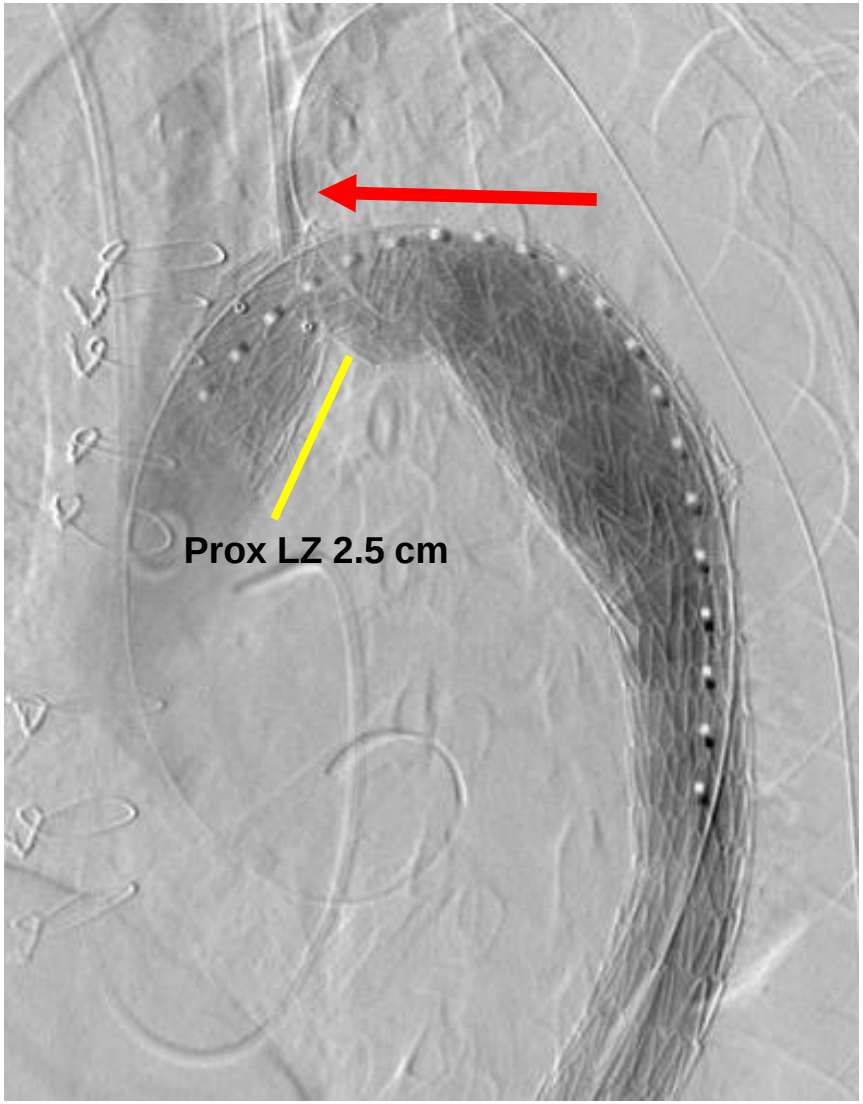
Zone 2 TBE after Type A with "Zone 2 Arch" Repair (10 days post op) FDA E/C Arm Emergency/Compassion





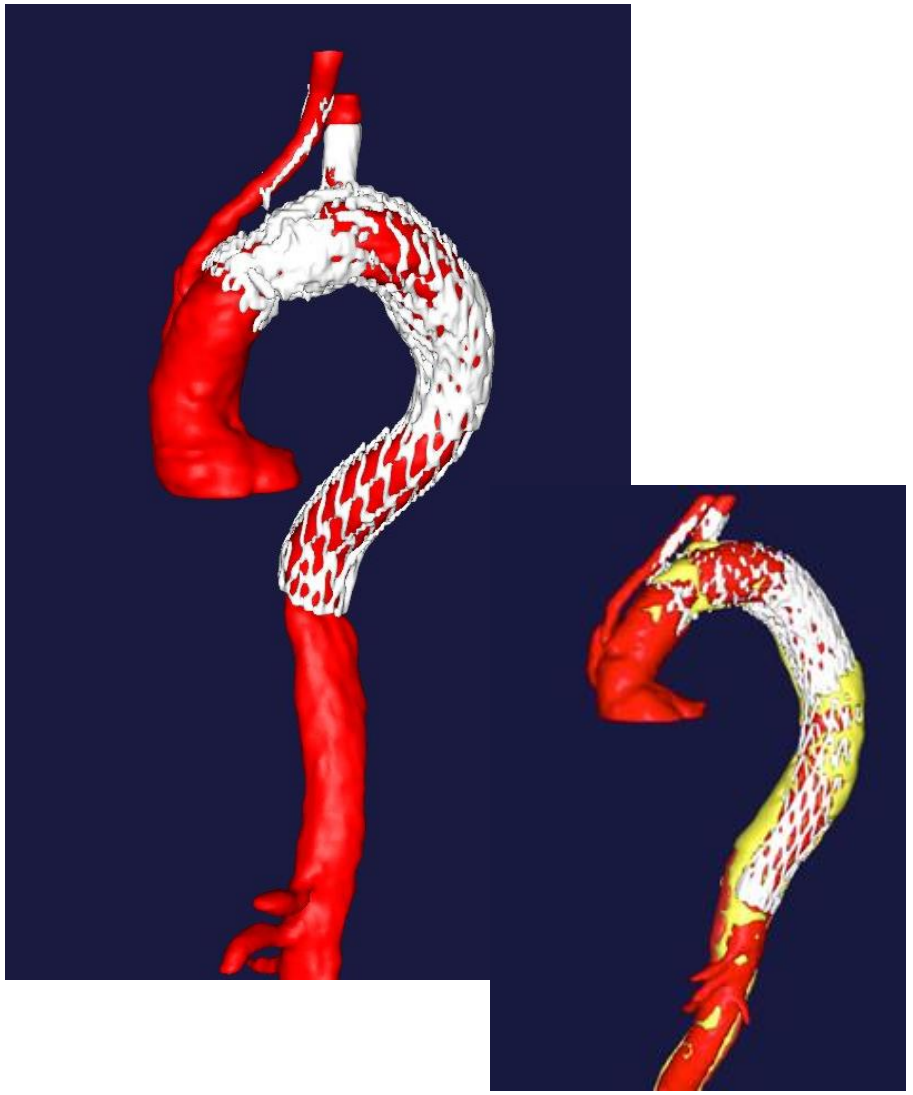
Note Wire position to AVOID Wire wrap

Zone 2 TBE Dissection (12 mm LSA Portal)



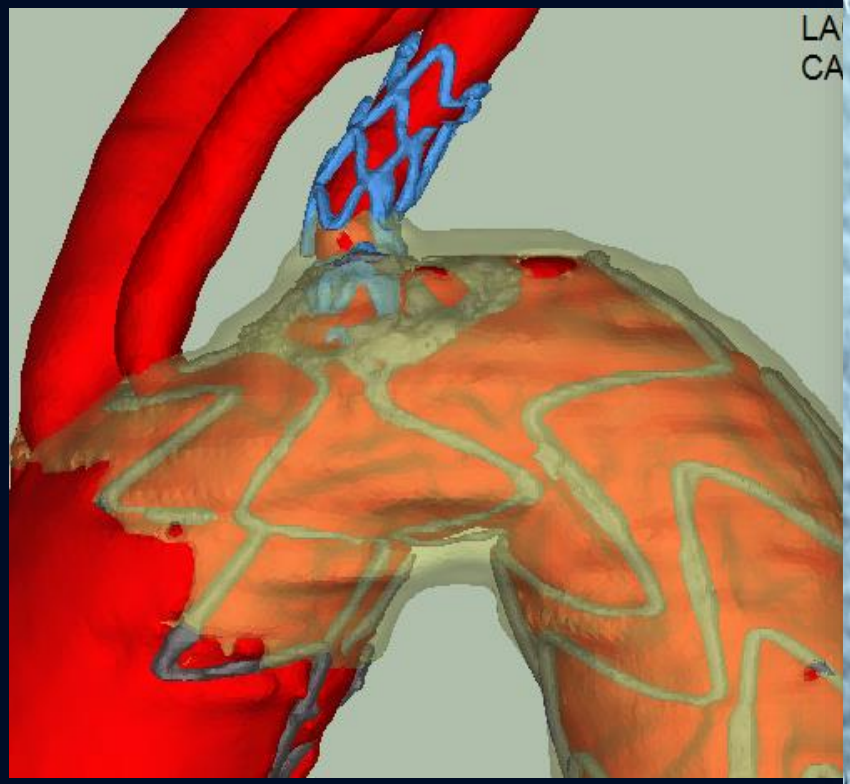
Side Branch deployed in Left Subclavian Artery

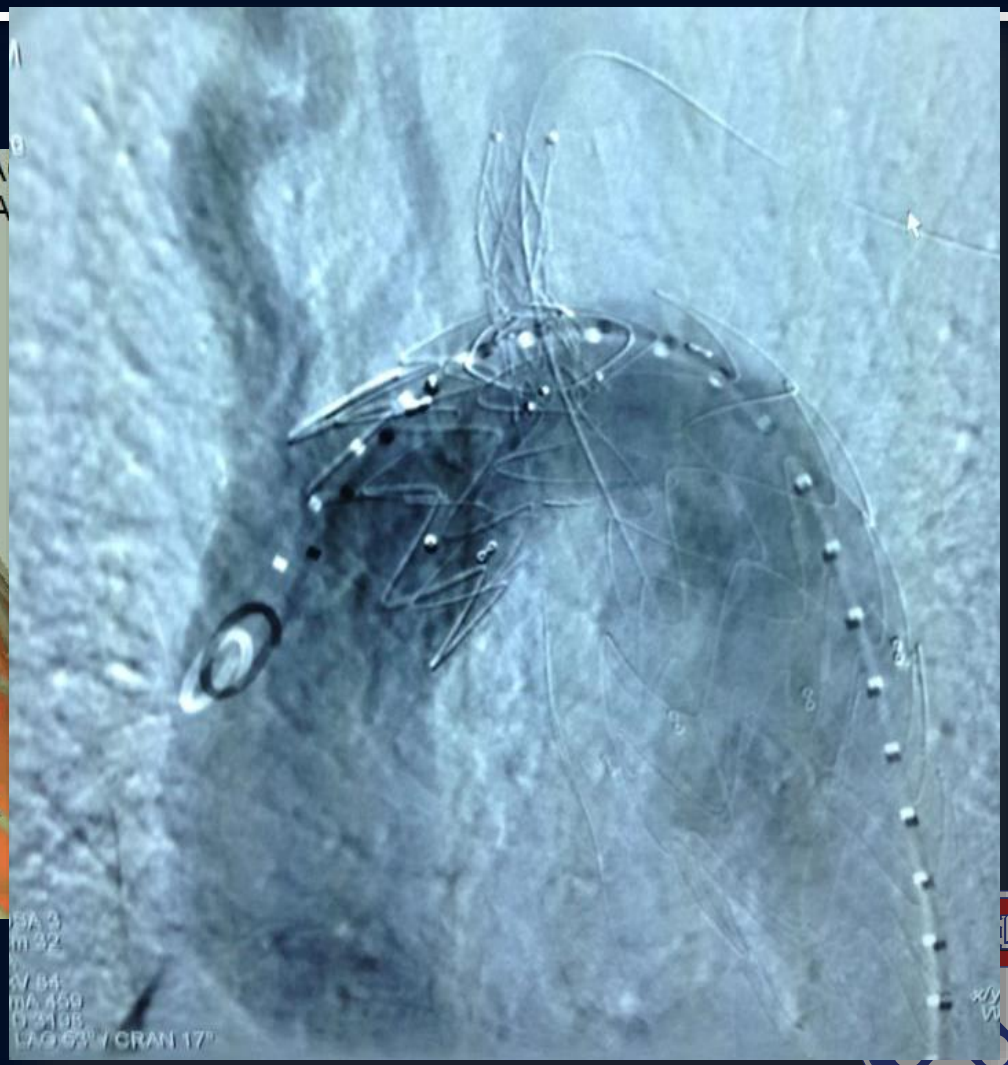
Zone 2 Treatment (Final)



TBE after Zone 2 arch repair (two cases)

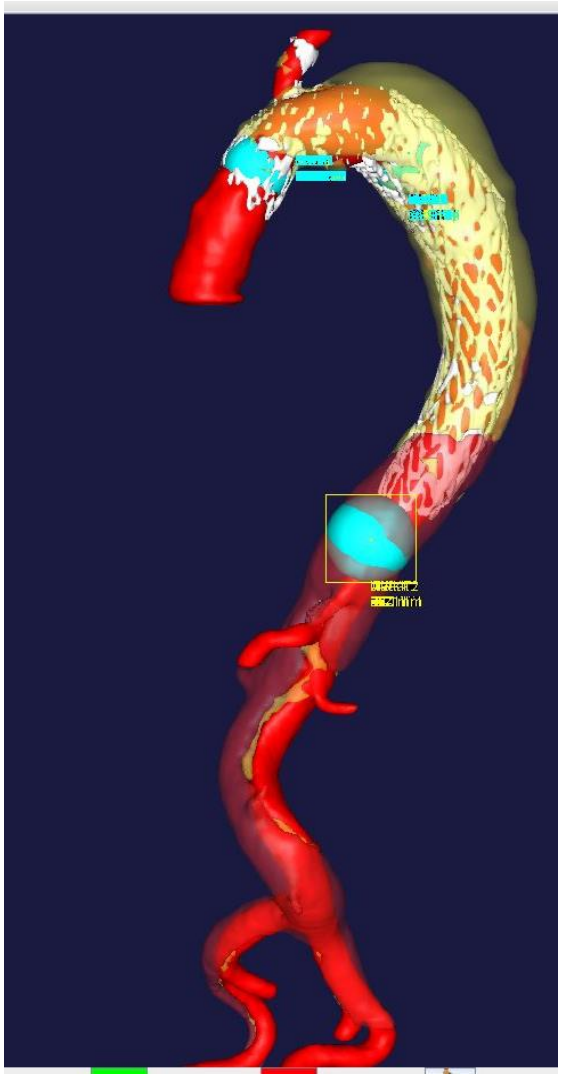
Concept could equally apply to: Medtronic Mona LSA Arch Branched graft (…. And New Zone 1/0 Solutions!!)



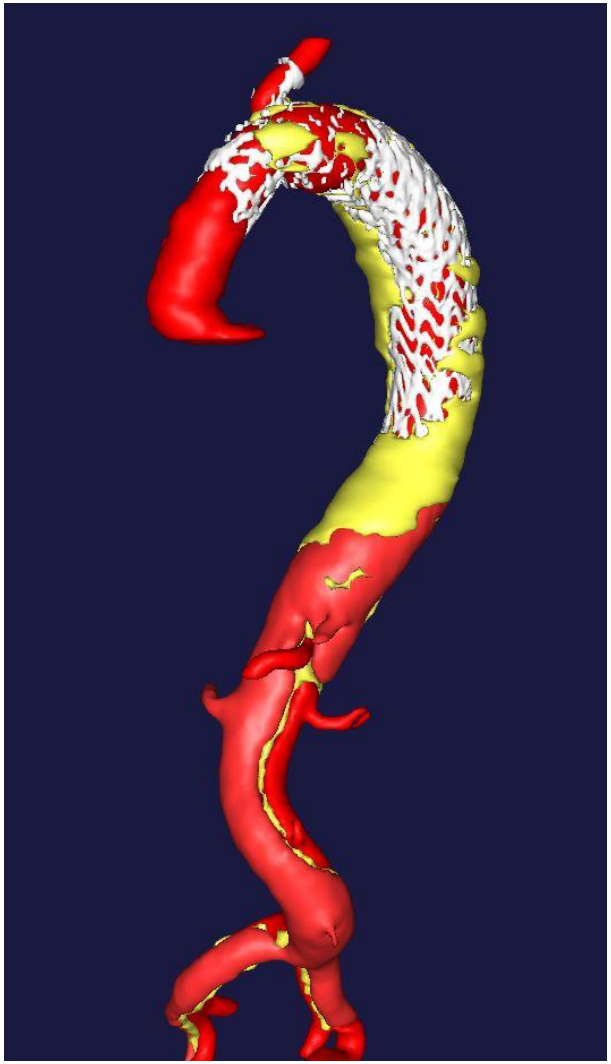


Zone 2 Arch Reconstruction + TBE TEVAR

Pre-op



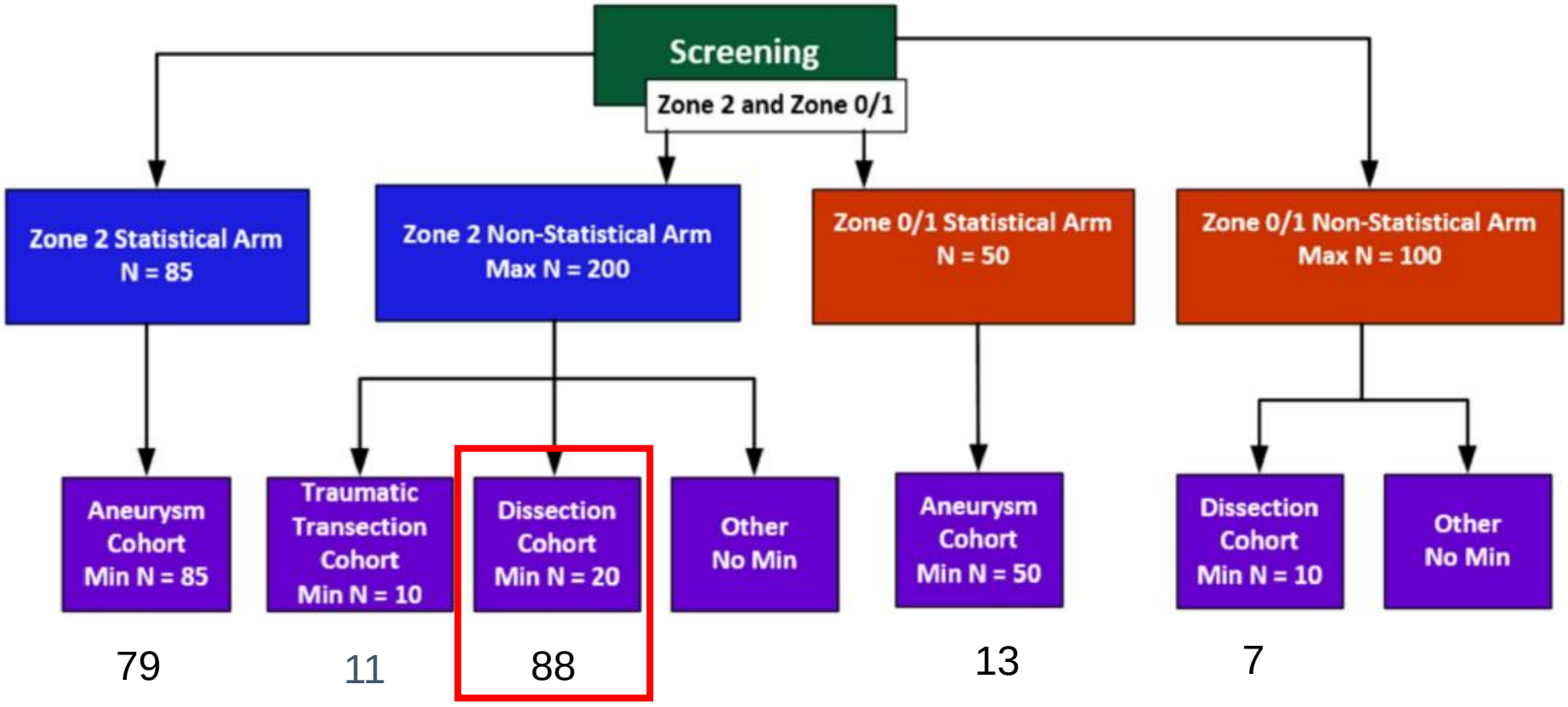
30 Days Post op



12 Months Post op

Excellent Result

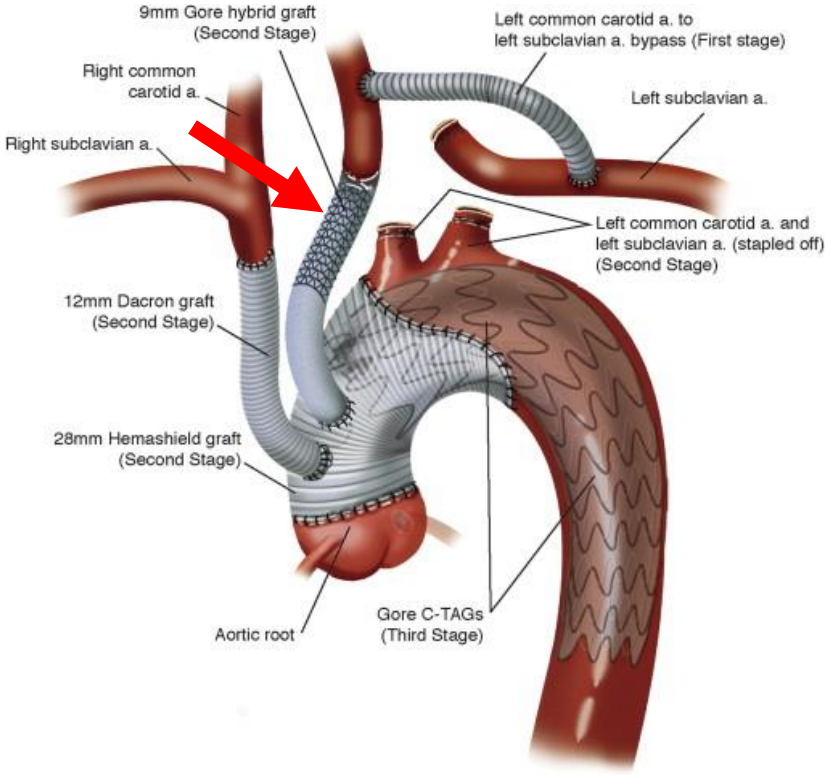
Single Arch Branch TEVAR: U.S. FDA TBE **Pivotal** Clinical Trial Design (12 and 8 mm Portals)



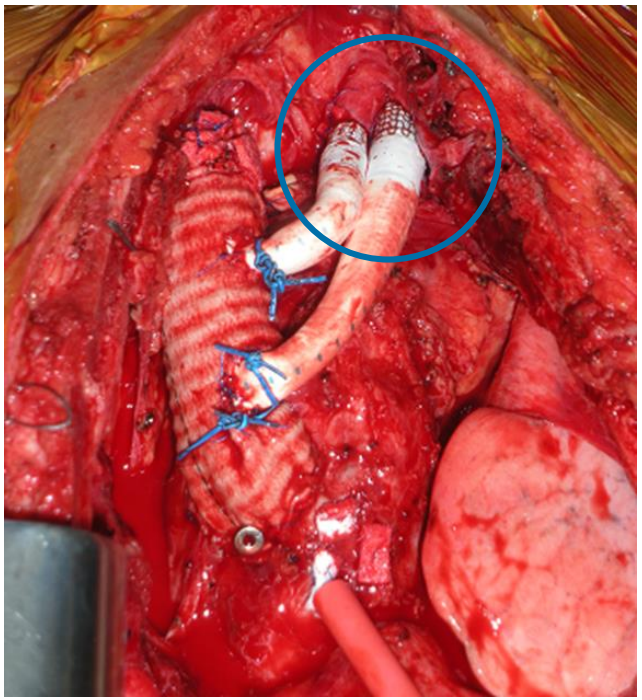
Other New Technology

Rapid Supra-Aortic Arch Vessel Anastomosis

Using the Gore "Hybrid" Prostheses (90 seconds and better!!)

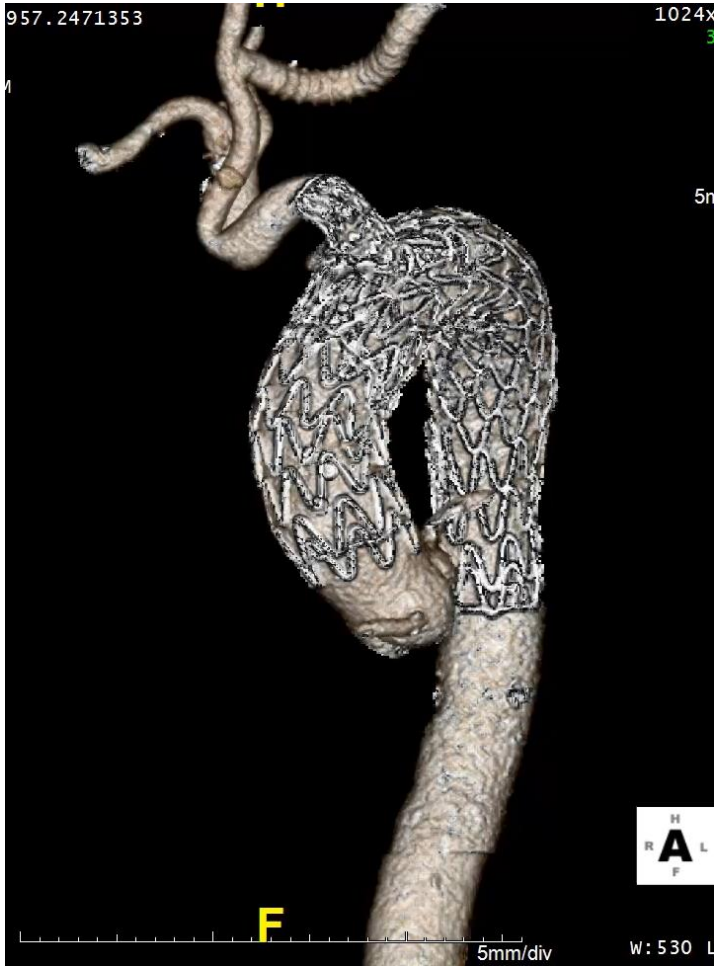


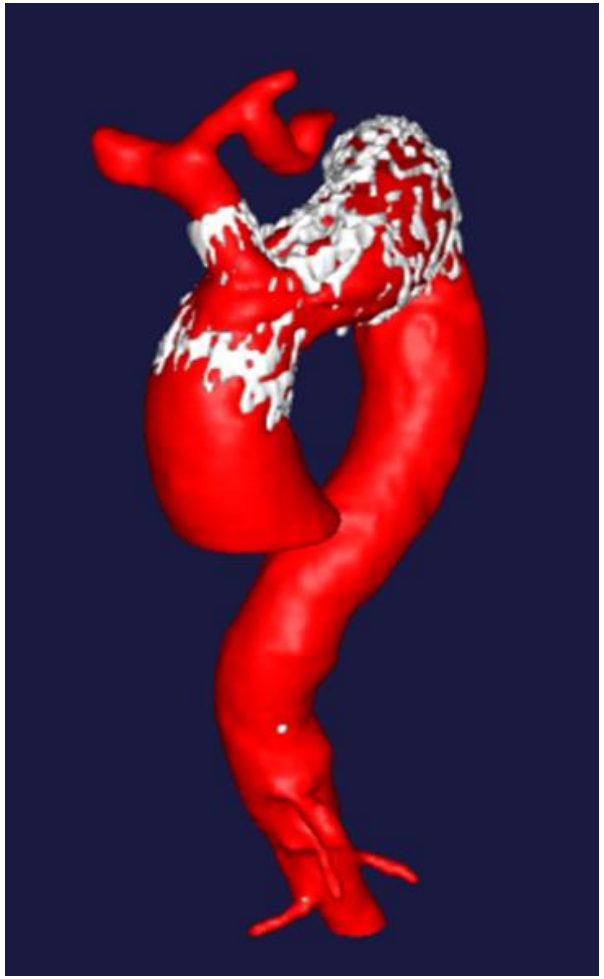
Courtesy of Jim Williams, Peoria IL



MM. Levack , JE. Bavaria , RC. Gorman , JH. Gorman III , LP. Ryan. The Annals of Thoracic Surgery Volume 95, Issue 6 2013 e163 - e165.

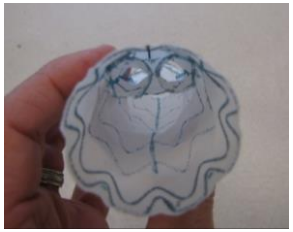
Endovascular Arch Repair?
Zone 0 Single Branch Device

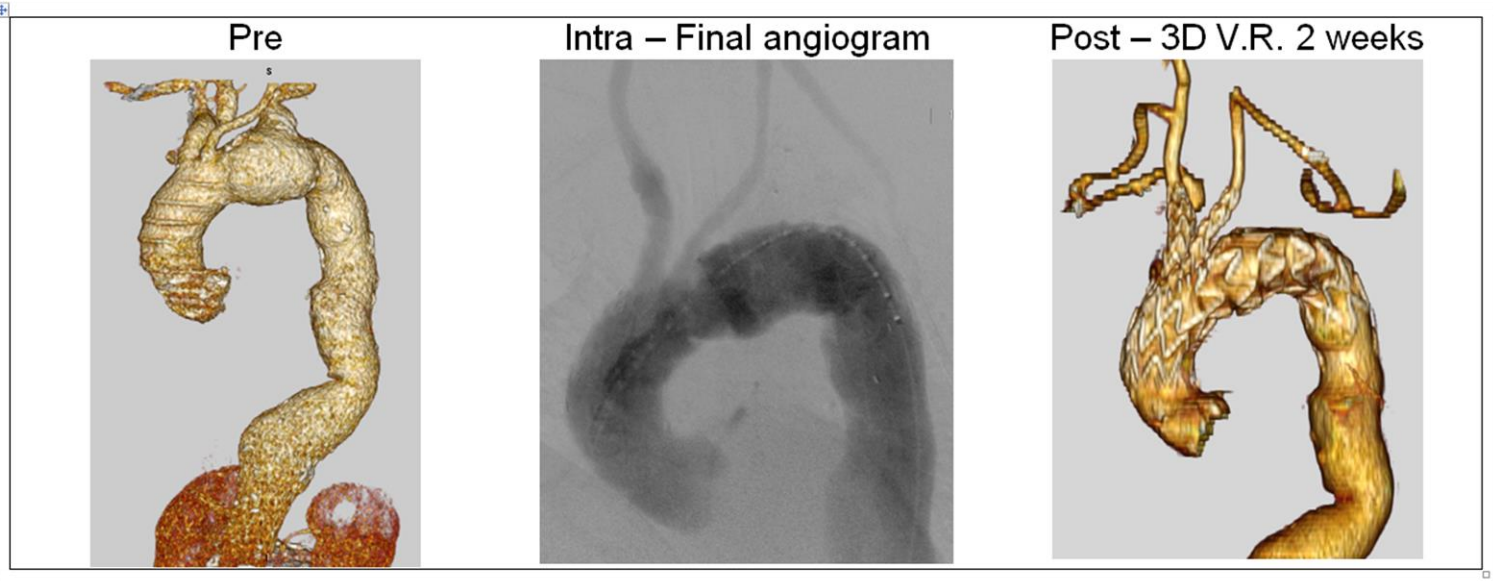




Cook and Bolton Relay:

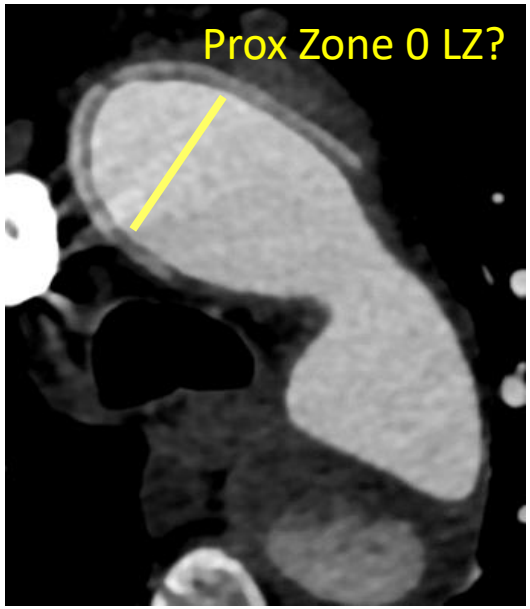
Fenestrated Arch Grafts;
2 Branch Device(s)



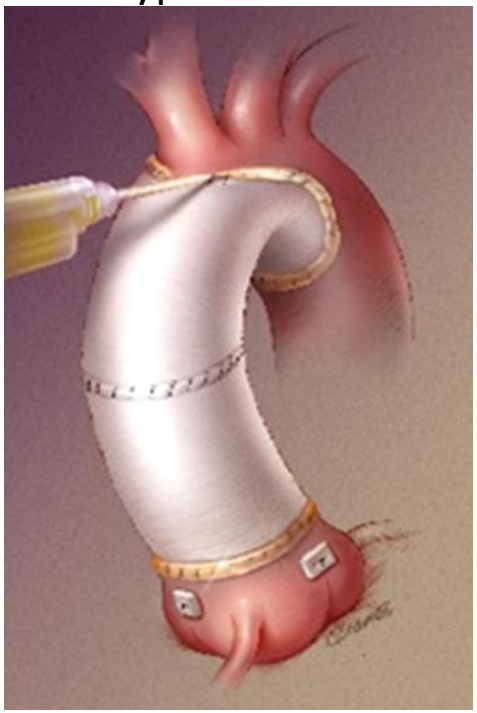


Cook Arch Graft

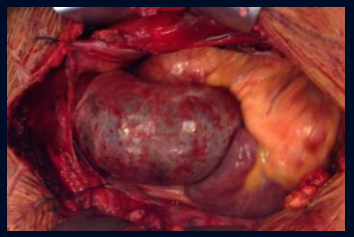
Dual Branch Arch Endograft docked into a Hemi-Arch?



Post Type A Dissection

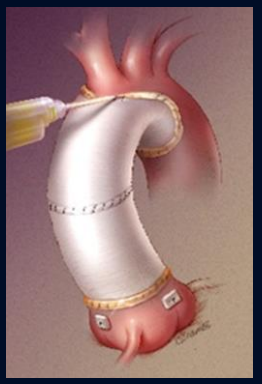


Univ of Penn: Terumo Aortic Bolton FDA EFS Trial

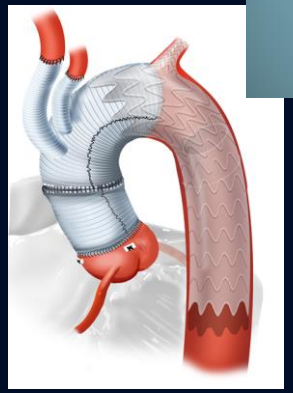


Conclusions on Management of the Arch in Acute DeBakey I Dissection 21st Century

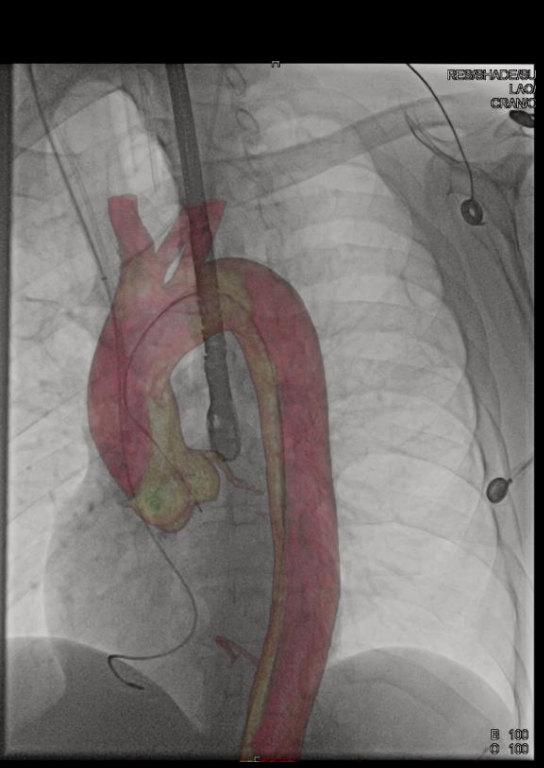
- There are Multiple Ways to manage the ARCH in an Acute Type A Dissection

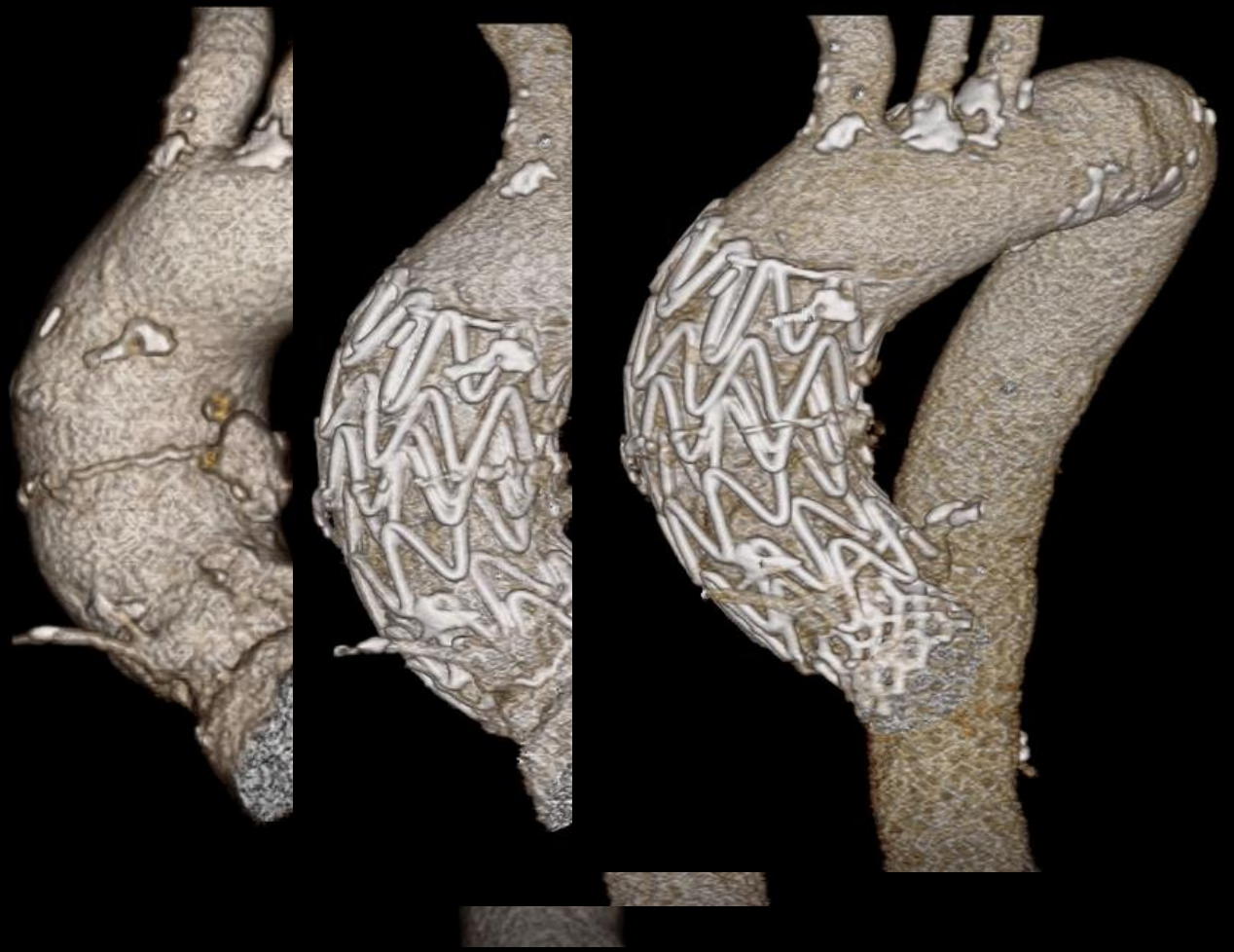


- My Prediction on the future based on our data, our increased sophistication, and the available technology:
  - In Patients with < 10-15 years life expectancy (>65) ….. Use Classic Hemi-Arch
  - In Patients with an arch tear or distal Malperfusion ……. FET
  - In patients < 65 and stable …….. Zone 2 Arch with possible (60%) SEQUENTIAL Arch branch TEVAR…. Or Zone 1/0



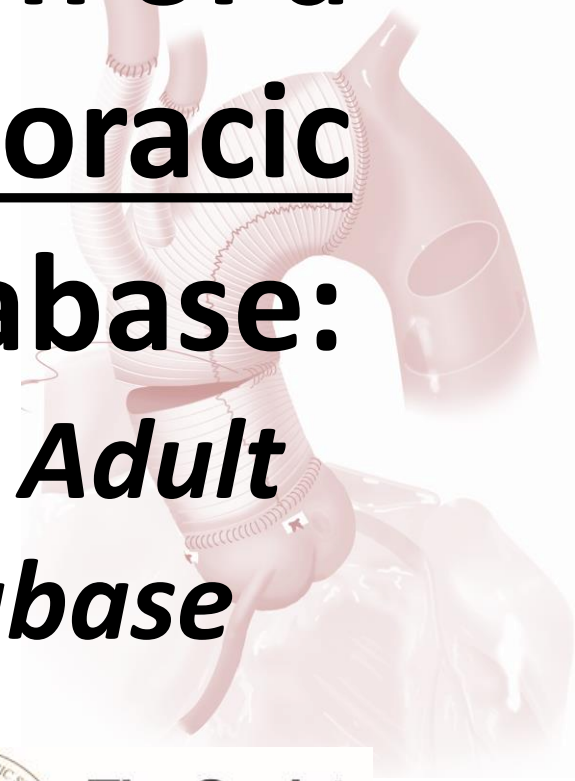
Type A EFS Trial – Ascending Stent Graft





Availability/Creation of a Newly Designed Thoracic Aortic Surgery Database:

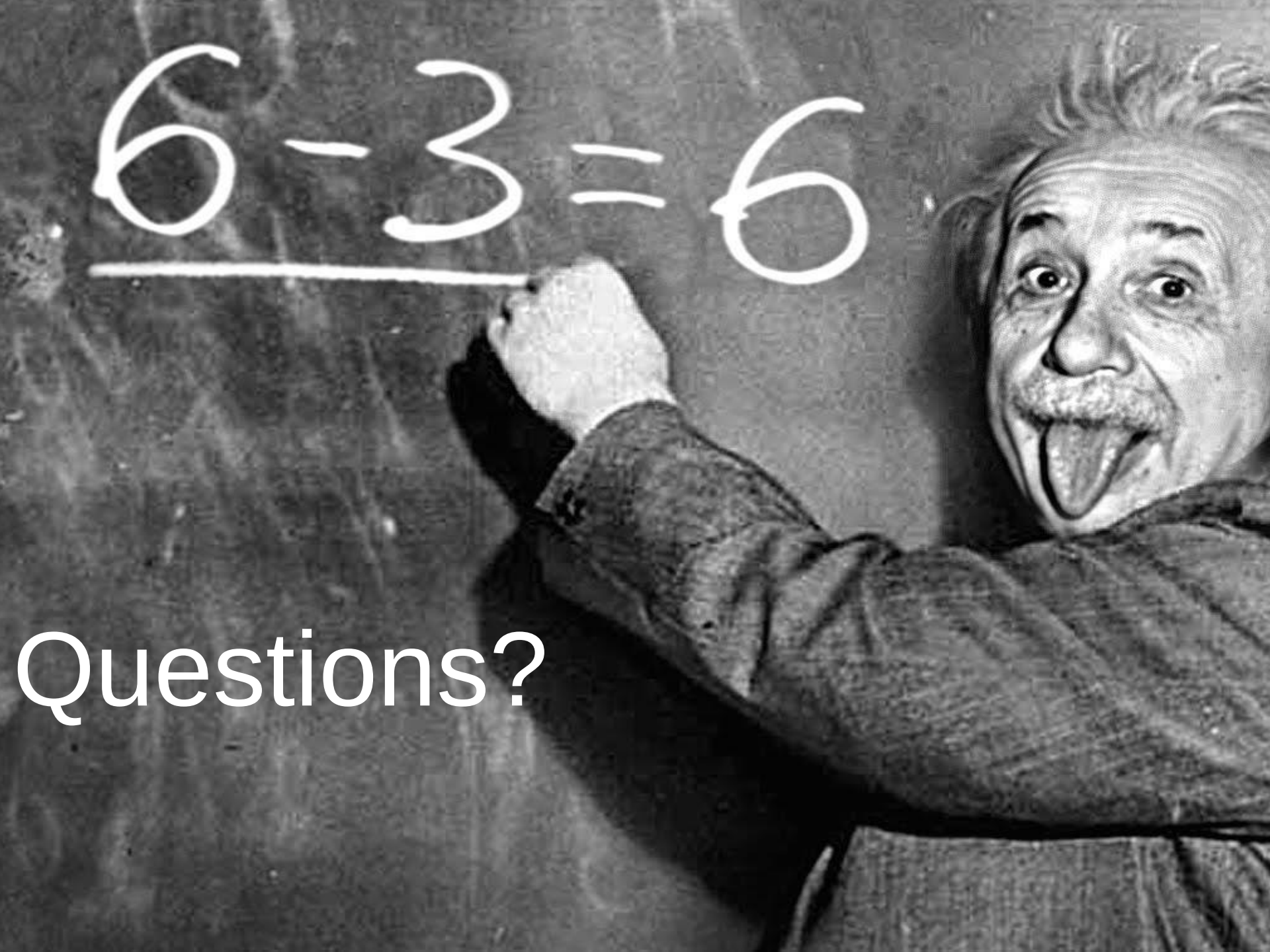
A Report from the STS Adult Cardiac Surgery Database



STS National Database™
Using data to drive quality

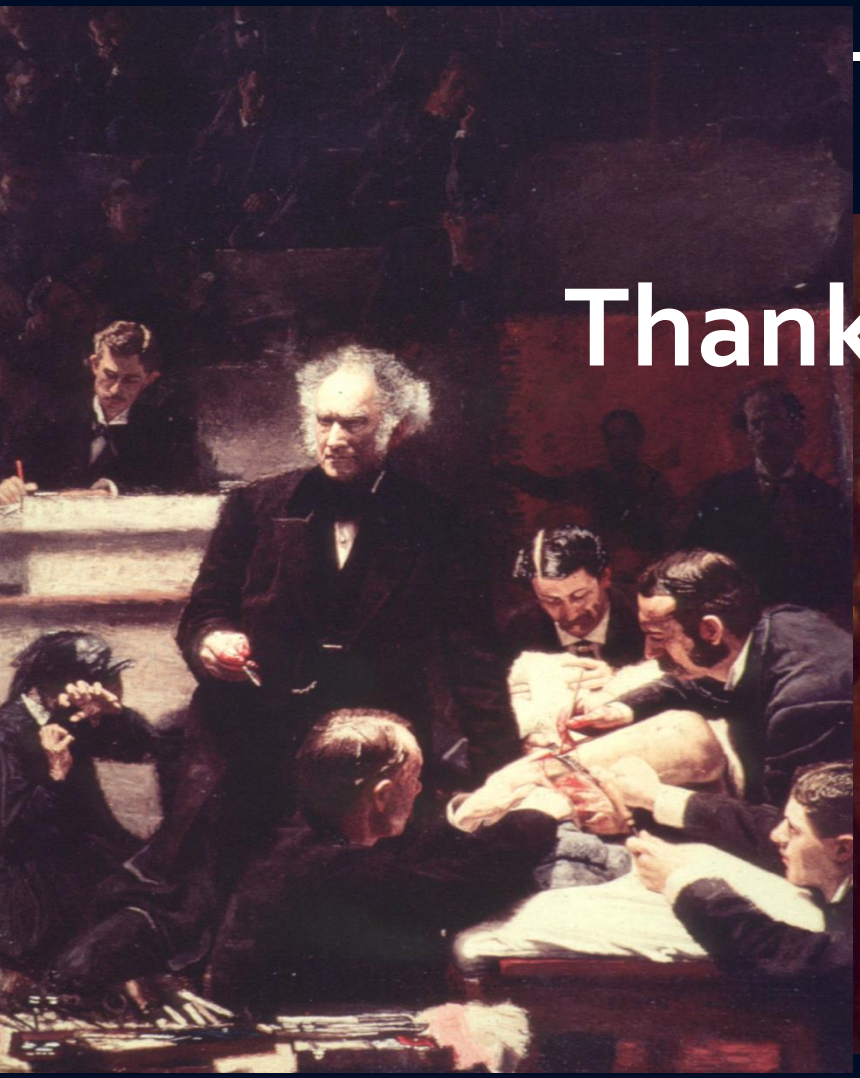
The Society of Thoracic Surgeons

Nimesh Desai; Edward Chen (Co-Chairs); A Estrera; B Leshnower; E Roselli; M Fischbein; C Hughes; H Patel, J Appoo; B Reece; J Bavaria; et al; on Behalf of the STS Aortic Surgery Task Force (First reported at the Jan. 2017 STS Annual Mtg Houston)



Questions?

Thomas Eakins: Gross Clinic (1878@JEFF) and Agnew Clinic (1888@PENN)



Thank You

Great Progress in 10 years!