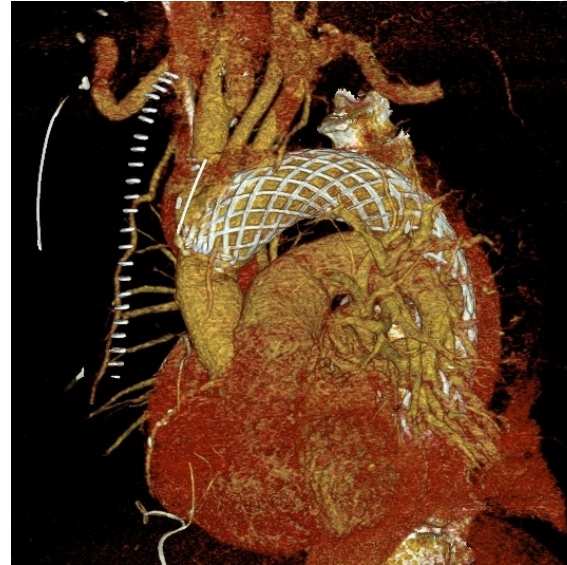
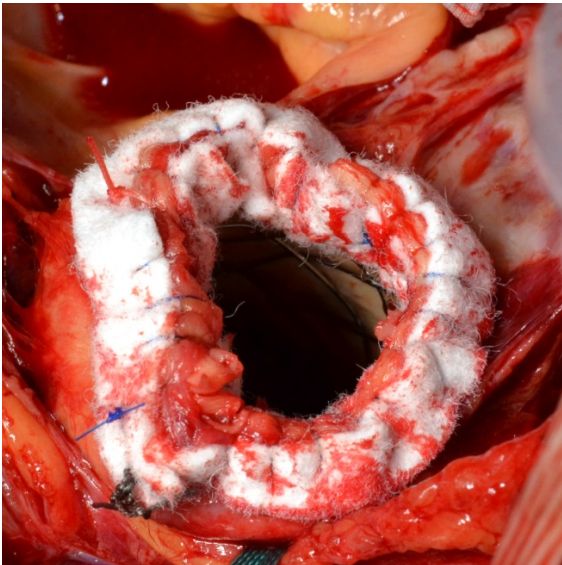


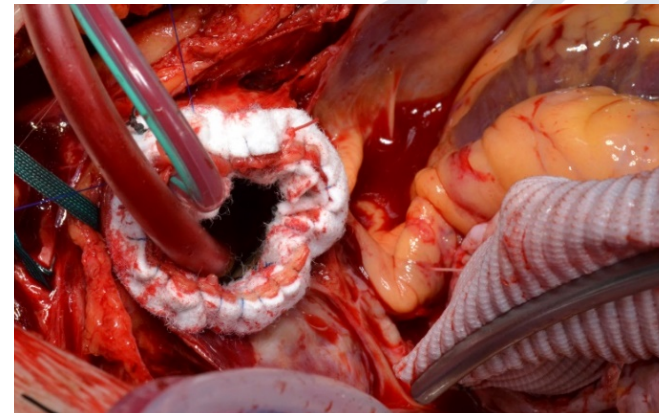
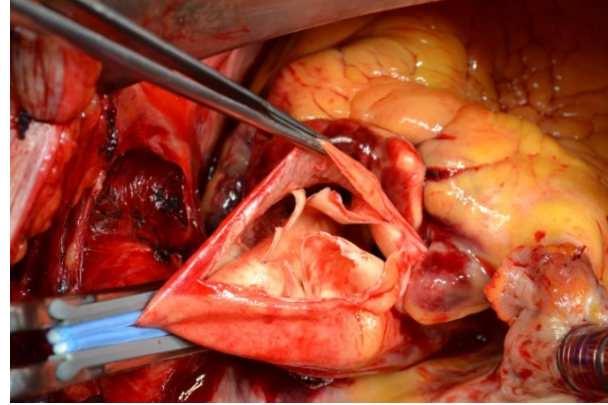
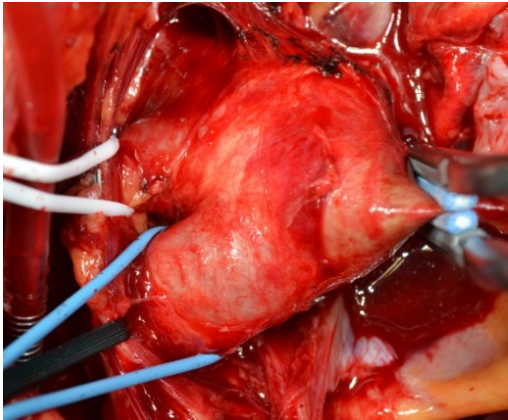
Aortic Morphopathology in Therapy Decisions Using an Uncovered Hybrid Nitinol Stent for DeBakey I Dissections

Peter L. Haldenwang, MD, Department for Cardiothoracic Surgery, University Hospital Bergmannsheil Bochum, Germany

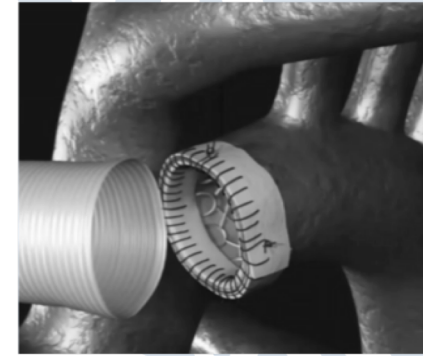
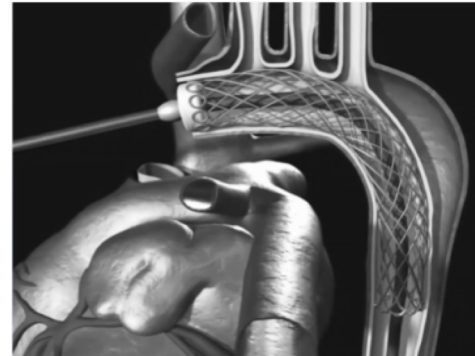
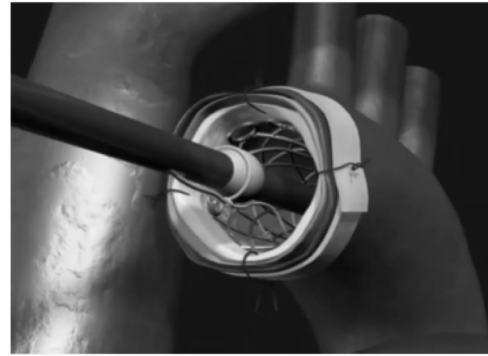
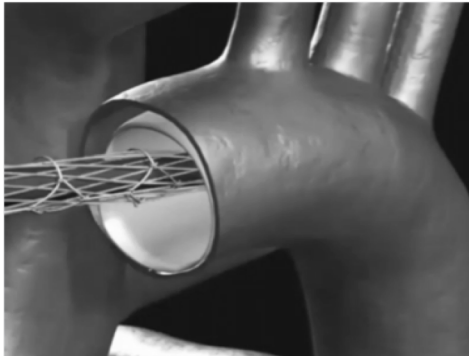


Background

Hybrid Aortic Arch Repair using the Asyrus Medical Dissection Stent (AMDS)



Clamping of the aortic arch → Ascending aorta replacement → HCA+SCP: Arch inspection + AMDS



PROS:

- safe ascending aorta therapy
- timesaving stabilization of the aortic wall
- no distal anastomotic endoleak (DANE)
- “off-the-shelf” device in different sizes

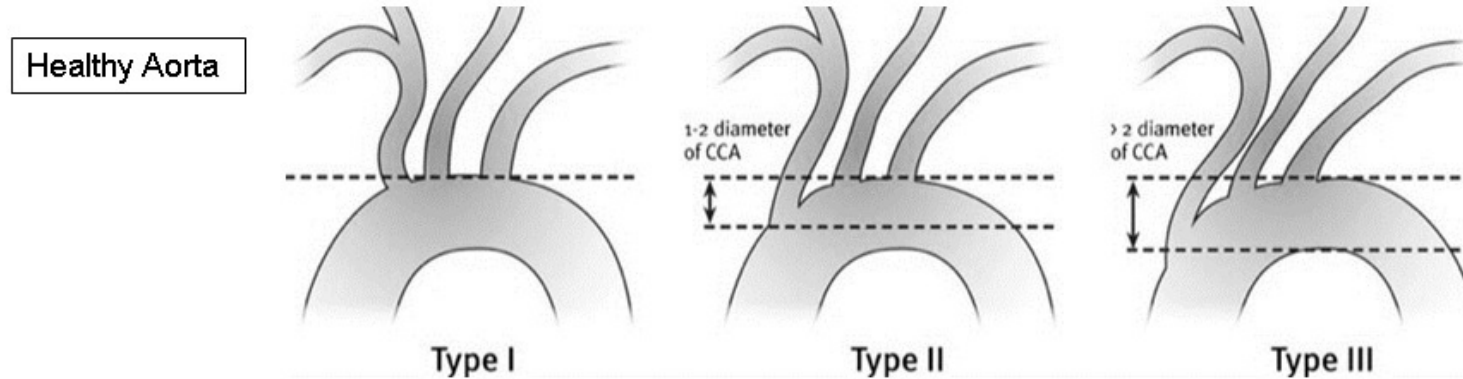
CONS:

- different stages of aortic remodeling despite proper use and stent sizing
- redo surgery / TEVAR is difficult

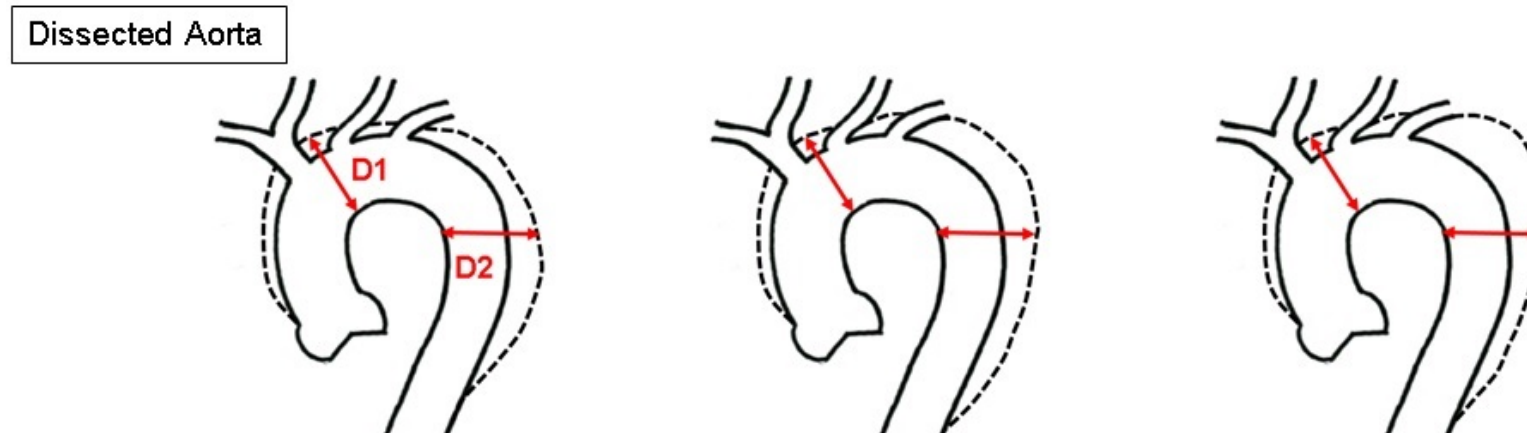
Aim of the study

Does the morphopathology of the aortic arch influence the aortic remodeling?

Types of Aortic Arches Following Morphologic Criteria



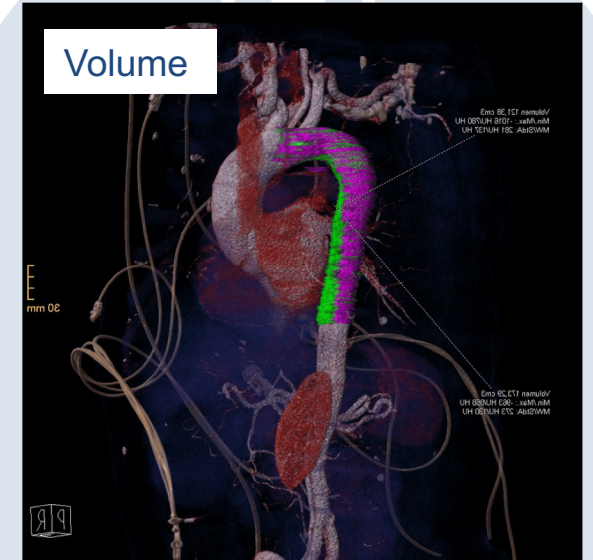
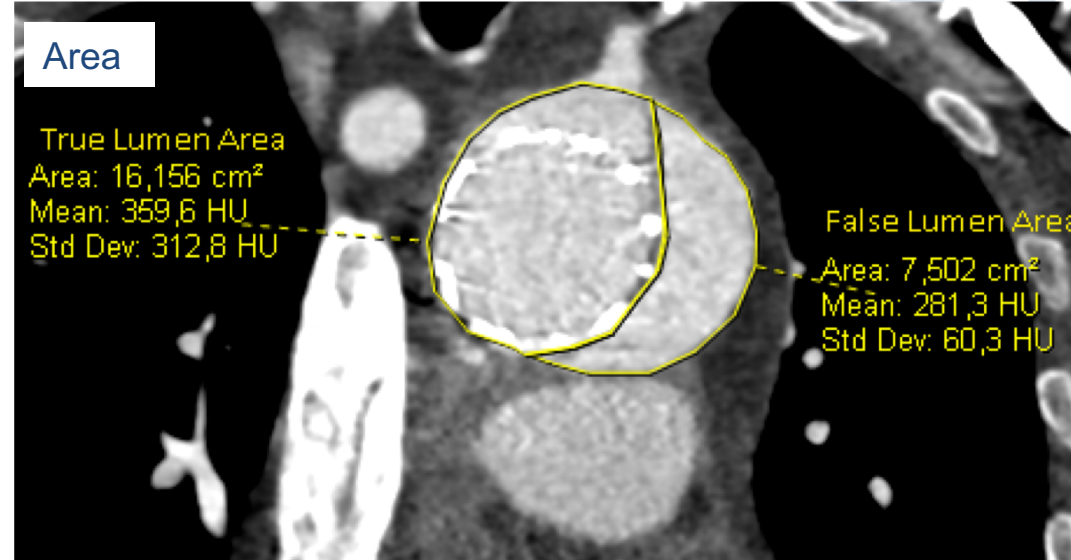
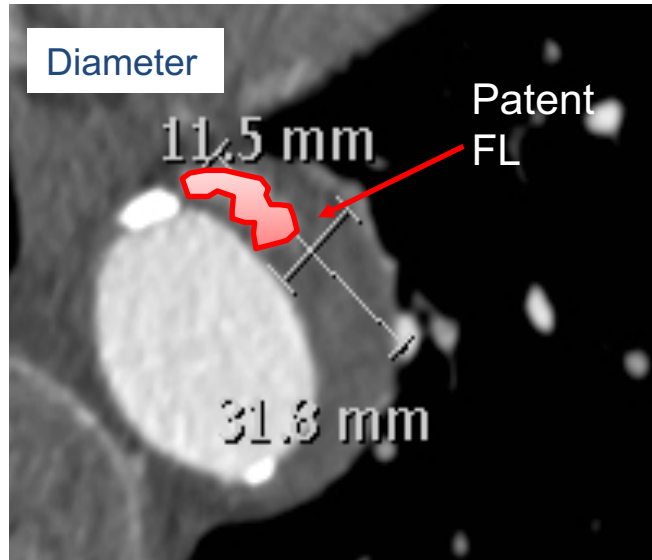
Definition Criteria: Ratio between the LCCA-diameter and the distance from the horizontal line through the top of the arch to the horizontal line through the orifice of the innominate artery



Although D1 (aortic diameter between innominate artery and LCCA) and D2 (aortic diameter at the level of the pulmonary bifurcation) are the same, the morphopathology of the dissected arches is different

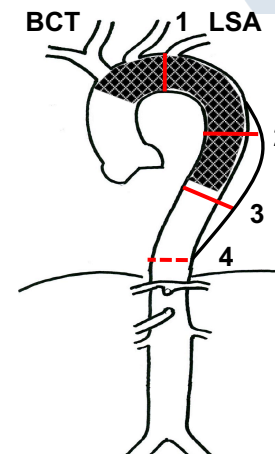
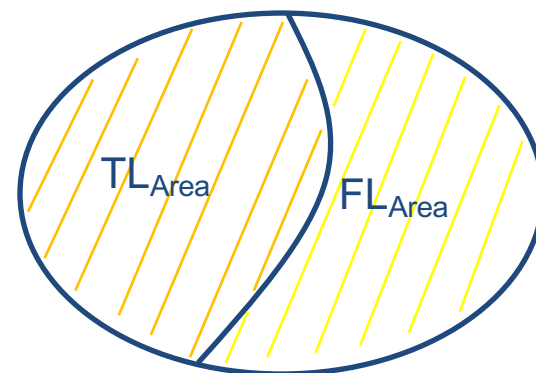
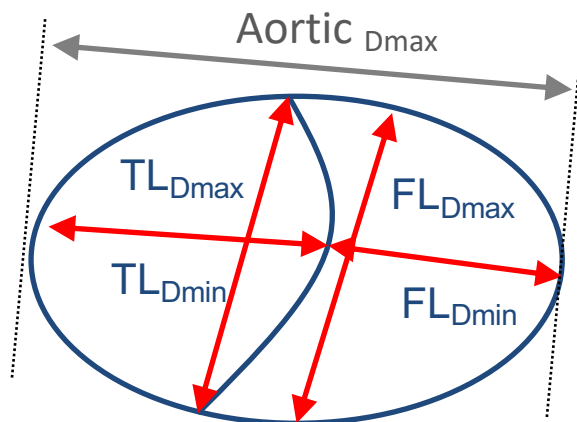
Aim of the study

What is the ideal measurement to quantify the aortic remodeling?



Multiplanar Reformation (MPR) → centerline measurements in orthogonal planes

3D Reconstructions



$$\text{FL-Index} = \frac{\text{FL vol}}{\text{FL vol} + \text{TL vol}}$$

Methods

Inclusion Criteria:

n = 20 patients DeBakey I AD treated with AMDS (04/2021 - 03/2023)
Types of aortic arches were assessed

Primary Endpoint:

Aortic remodeling (6 month FU) in relation to the aortic arch type?

Secondary Endpoints:

Stroke / spinal cord ischemia / mortality

Preoperative Data:

Parameter		AMDS (n = 20)
Age (years)		59.1 ± 12.2
EuroSCORE II		20.4 ± 11.2
GERAADA Score		17.8 ± 7.1
Pathologic Neurology (pre-OP)	somnolent	3 (15%)
	intubated / coma	1 (5%)
	manifest stroke	3 (15%)
Arch Type	▪ Type I	10 (50 %)
	▪ Type II	3 (15 %)
	▪ Type III	6 (30 %)
T (Type) E (Entry) M (Malperfusion)	A, E1, M0	11 (55%)
	A, E1, M2	7 (35%)
	A, E2, M2 (post_TEVAR)	1 (5 %)
	non-A-non B, E3, M0	1 (5%)

Results

Intraoperative Data:

Parameter		AMDS (n = 20)
Arterial cannulation (n, %)	Art. axillaris	18 (90 %)
	Art. femoralis	1 (5 %)
	Aorta	1 (5 %)
▪ Bentall (n, %)		8 (40 %)
▪ Supracoronary Ascending Replacement		10 (55 %)
▪ David-OP(n, %)		1 (5 %)
Cardiopulmonary Bypass Time (min)		240 ± 65
Hypothermic Circulatory Arrest Time (min)		56 ± 16
Selective Cerebral Perfusion Time (min)		53 ± 17
Lactat Peak (mmol/l, SD)		5.6 ± 2.4
Ventilation Time (days)		3.6 ± 5.2

Secondary Endpoints:

Parameter	AMDS (n = 20)
30-day Mortality (n, %)	0
Reversible Neuropathology (n, %)	4 (20 %)
Permanent Stroke (n, %)	1 (5 %)
Spinal Cord Ischemia (n, %)	1 (5 %)
Malperfusion (n,%)	0

Results

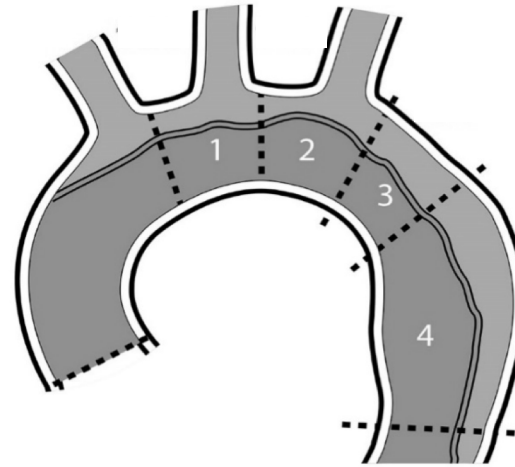
Primary Endpoint: Aortic remodeling in the 6 month follow-up (n = 19)

Aortic Level	Remodeling	FL-Index
Zone Z0	12 (63 %)	0.23
Zone Z1	13 (68 %)	0.21
Zone Z2	12 (63 %)	0.21
Zone Z3	11 (58 %)	0.23
Zone Z4	9 (47%)	0.29

Arch Type	100 % Remodeling
Type I (n = 10)	8 (80 %) Z0-Z3
Type II (n = 3)	2 (67 %) Z0-Z3
Type III (n = 6)	1* (17 %)

* Previous TEVAR

Localization	Follow-up
AMDS_Complete FL-thromb	9 (47%)
AMDS_Partial FL-thromb	5 (26%)
Distal_AMDS_FL-thromb	8 (42%)



8 out of 10 type I arches had complete remodeling in Z0-Z3;

- the 9th (Patient 5) had a undersized prosthesis
- the 10th (Patient 17) had false indication (chronic dissection)

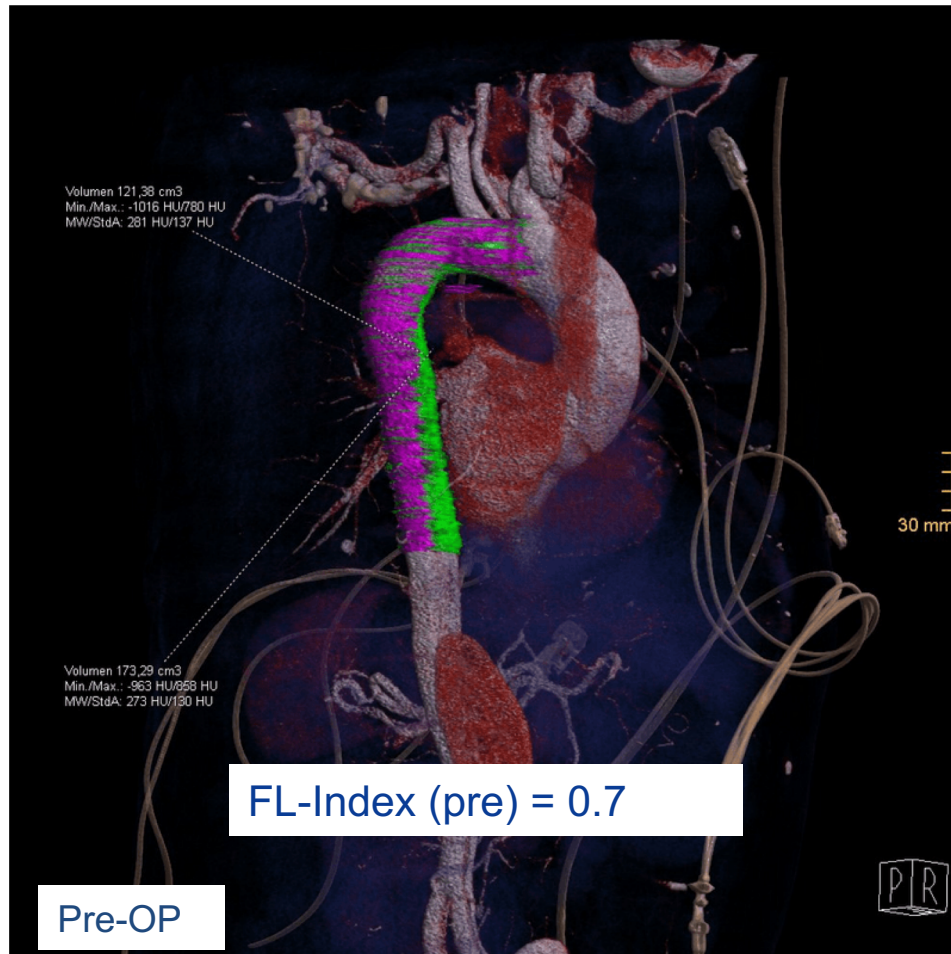
5 out of 6 type III arches had no remodeling in Z3/Z4

- the 6. had previous a TEVAR

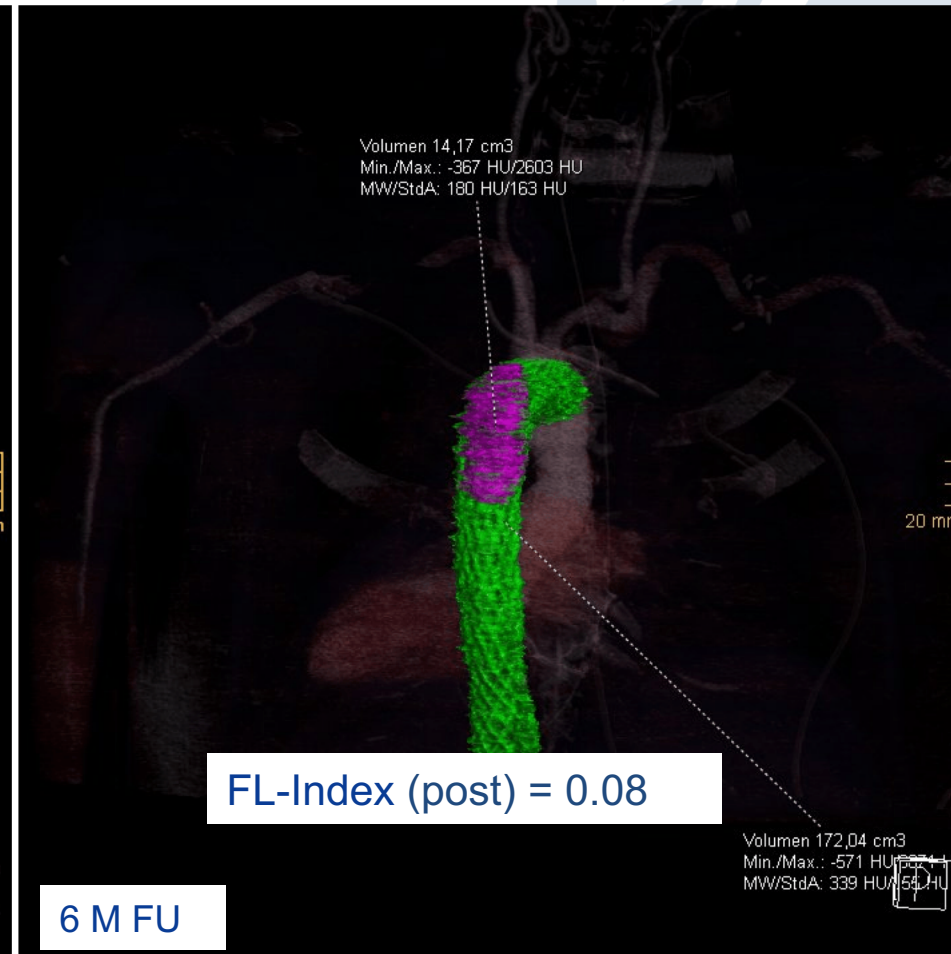
Results

Type I Arch Patient Example of a successful aortic remodeling (88% FL occlusion)

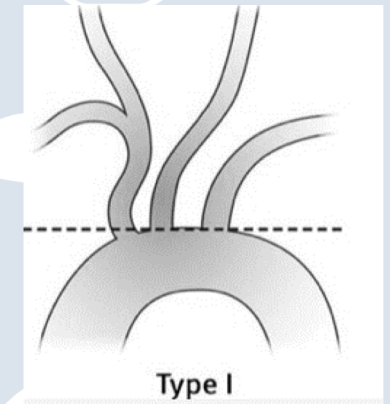
Volumetric Measurement:



Patent False Lumen: 121 cm³
Total Arch + Ao. Desc.: 173 cm³



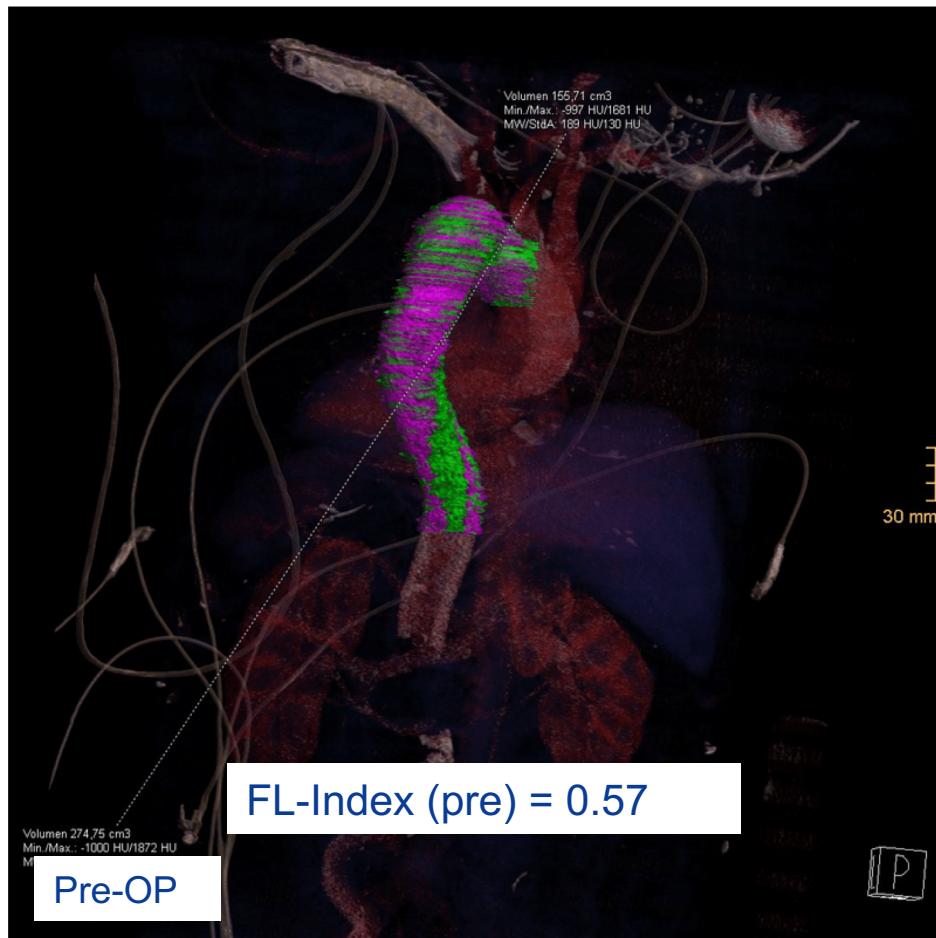
Patent False Lumen: 14 cm³
Total Arch + Ao. Desc.: 173 cm³



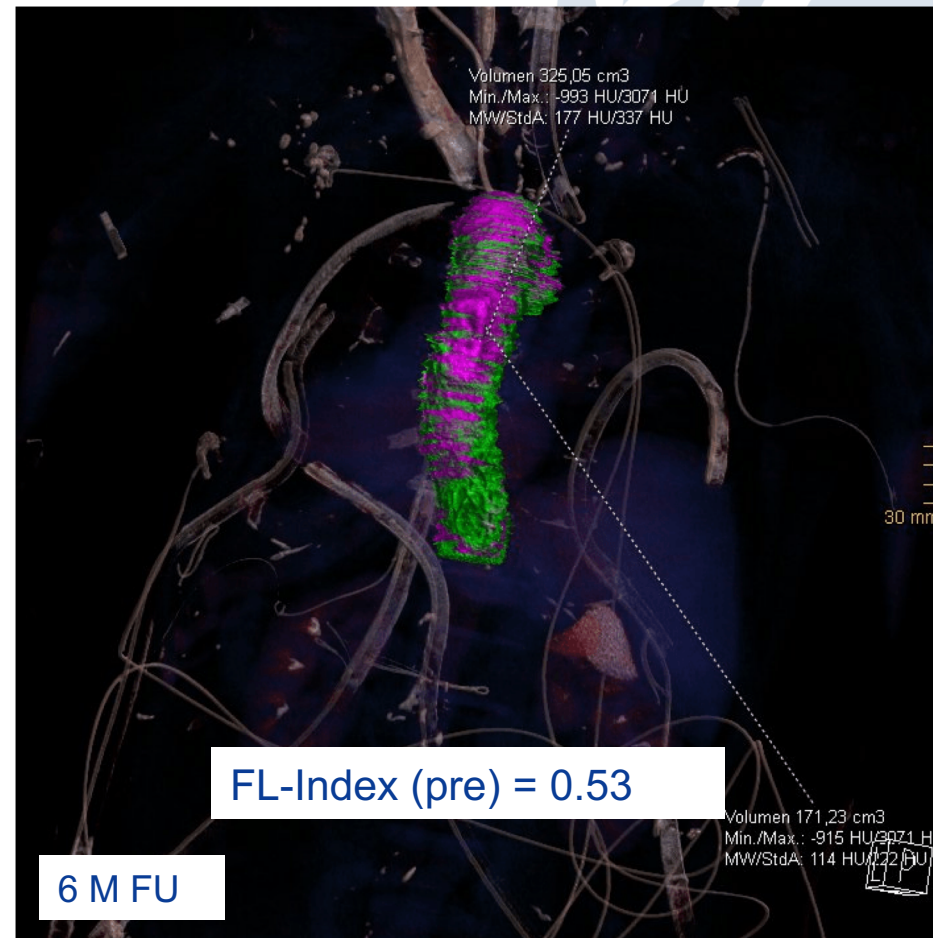
Results

Type III Arch Patient Example of a failed aortic remodeling

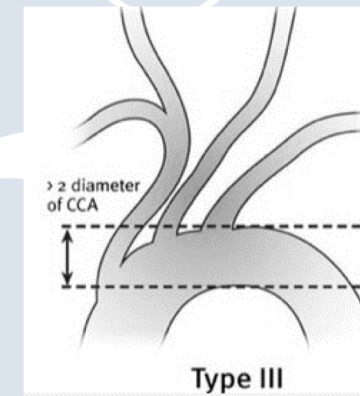
Volumetric Measurement:



Patent False Lumen: 156 cm³
Total Arch + Ao. Desc.: 275 cm³



Patent False Lumen: 171 cm³
Total Arch + Ao. Desc.: 325 cm³

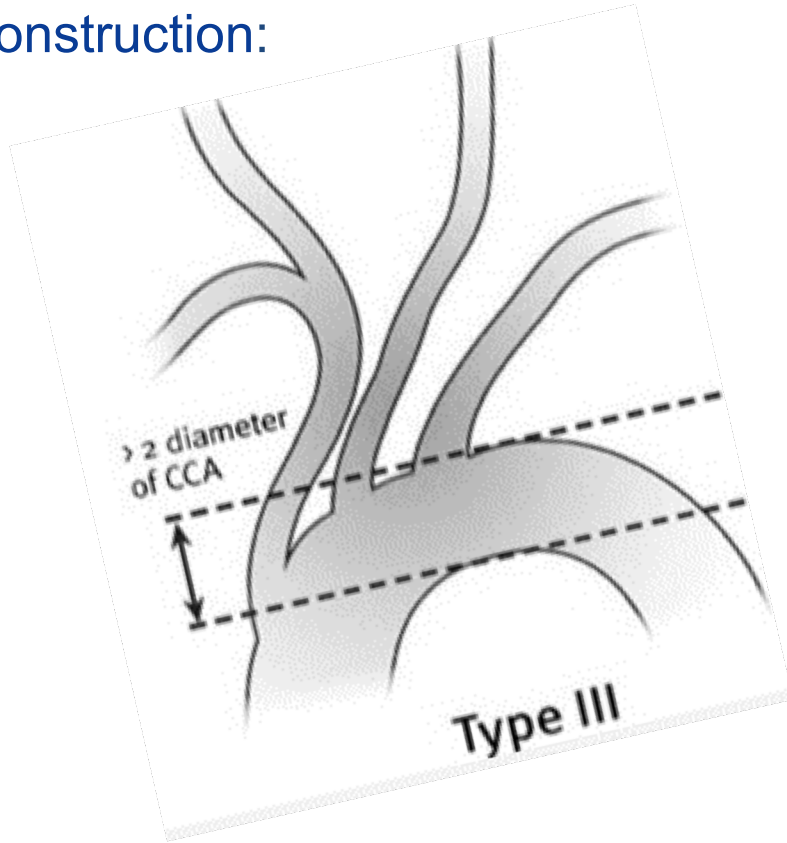


Results

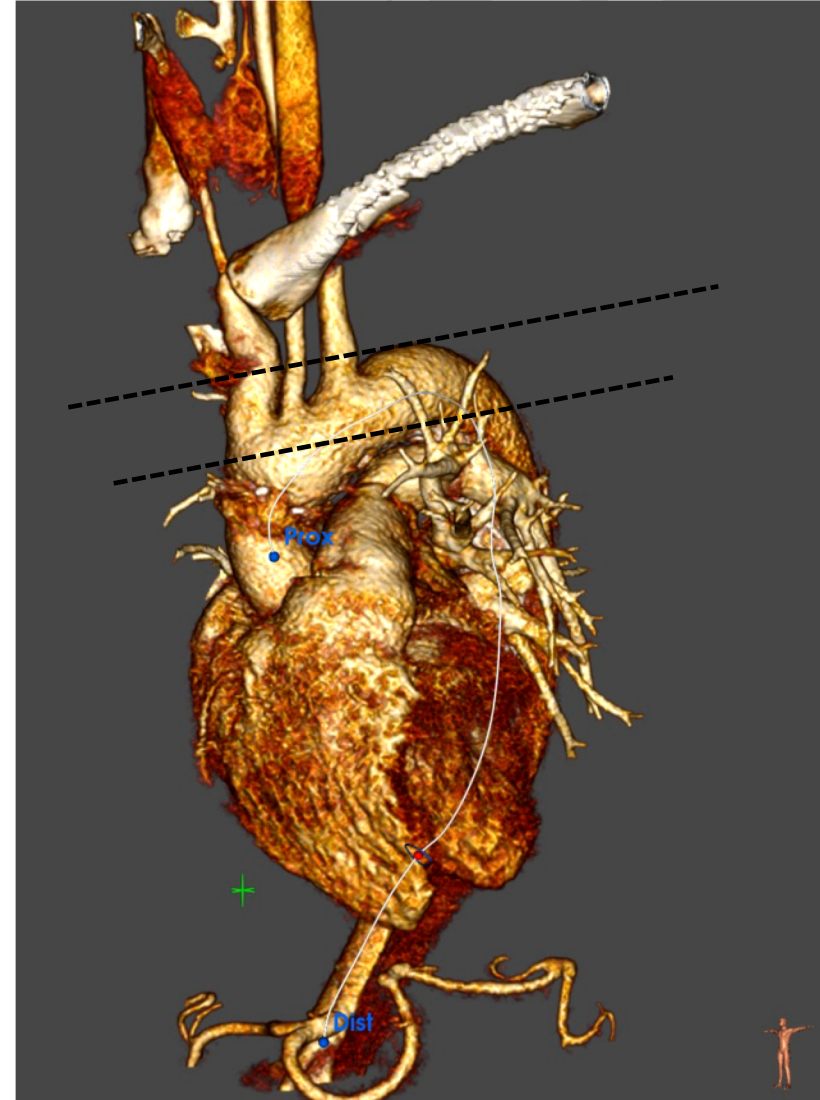
Type III Arch Patient

Example of a failed aortic remodeling

3D Reconstruction:



Ratio of the LCCA-diameter to the distance between the horizontal line through the top of the arch and the horizontal line through the orifice of the innominate artery

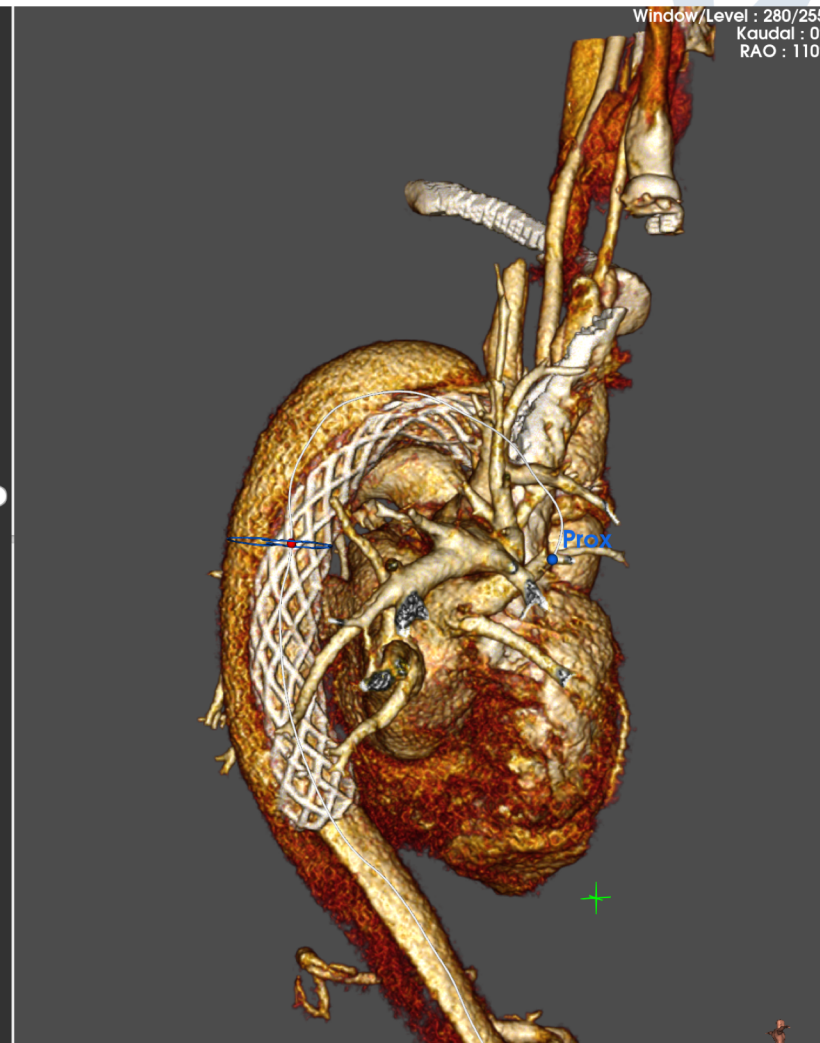
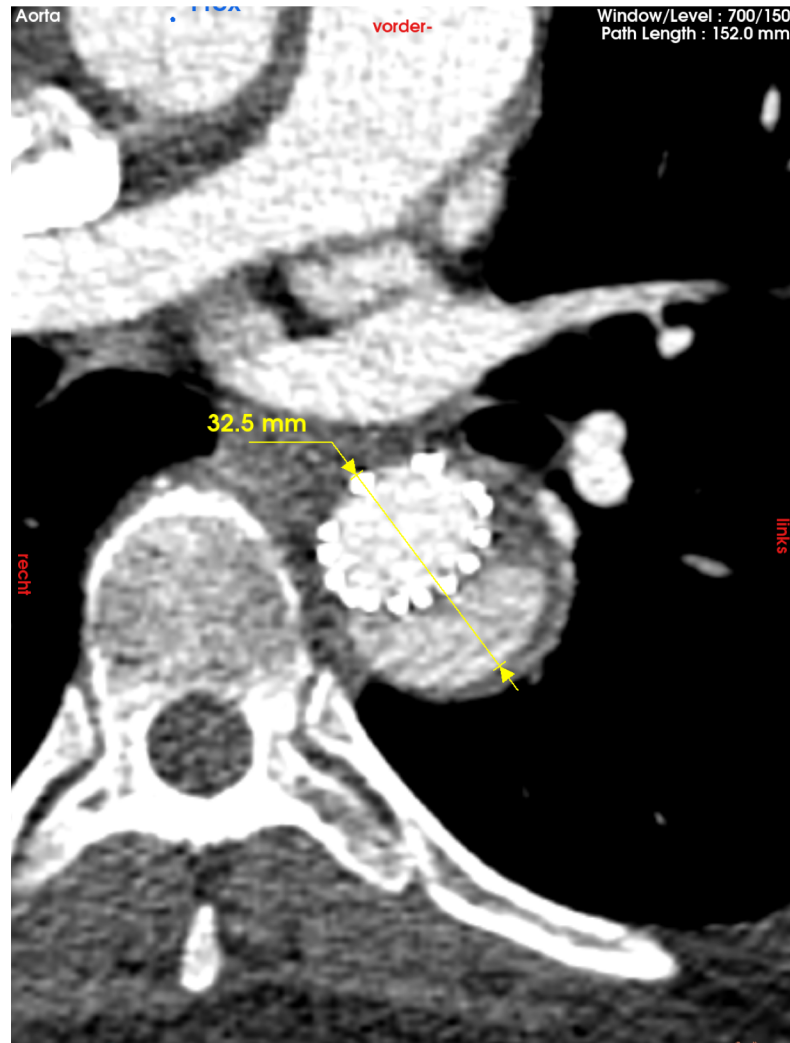


Results

Type III Arch Patient

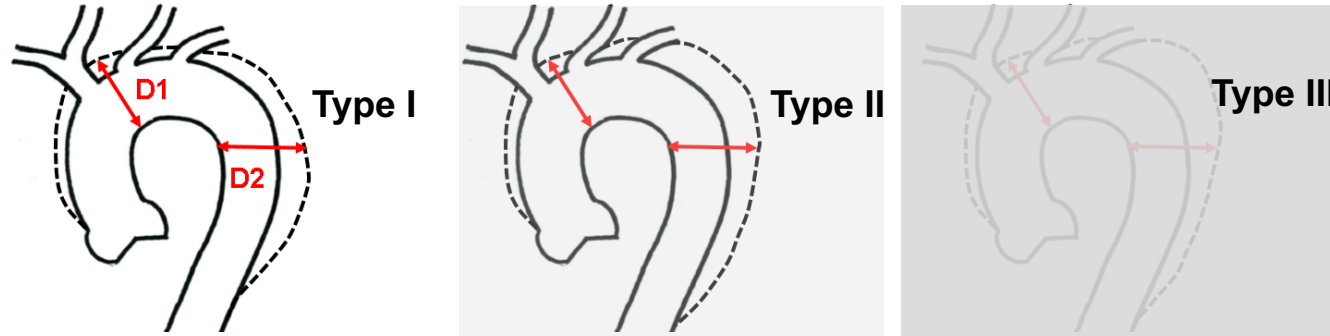
Example of a failed aortic remodeling

3D Reconstruction:



Conclusions

- Aortic morphopathology influences the aortic remodeling following AMDS
- D1 and D2 measurement alone does not predict the long-term outcome



- Type I arches may result in a 80 - 100 % remodeling, with zonal differences:
 - Z0 - Z3 safe
 - Z4 depending on the dissection extent
- Type II arches may result with a >70 % remodeling
- Type III dissected arches are not best treated with AMDS

