

Anatomic and Operative Predictors of Aortic Expansion Following Aortic Dissection Repair

Ryaan EL-Andari, MD, Sabin J Bozso, MD, PhD, Michael C Moon, MD.

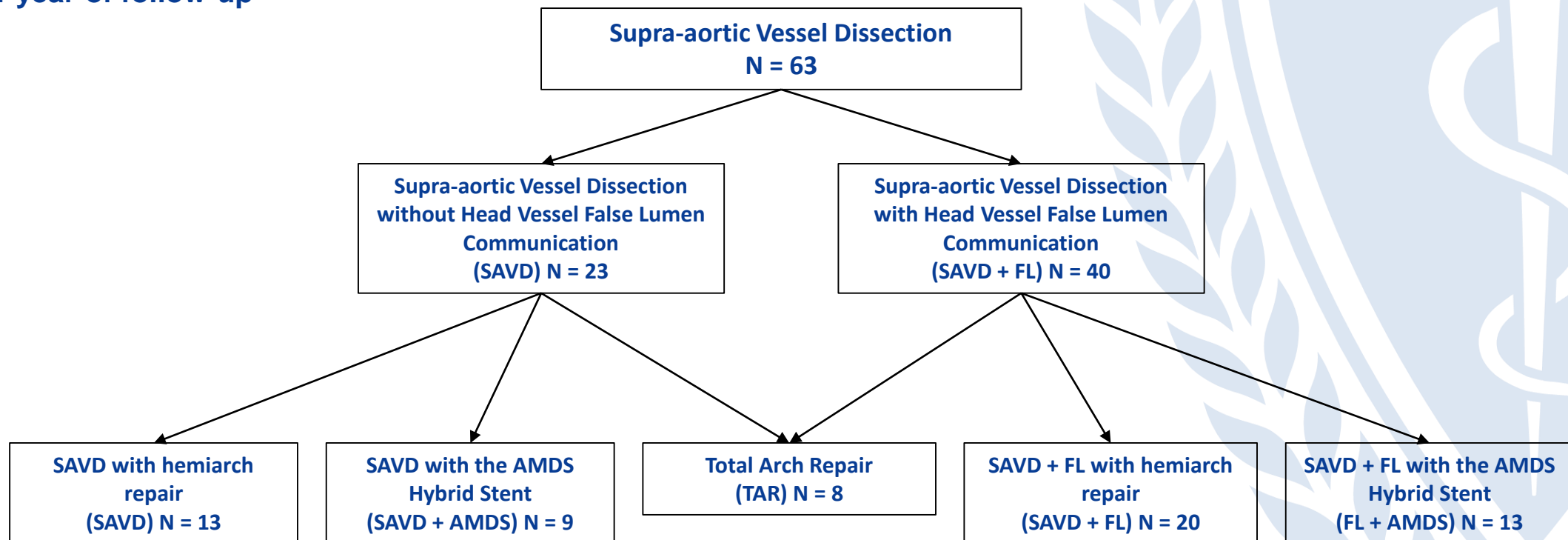
Mazankowski Alberta Heart Institute

University of Alberta

Edmonton, Alberta, Canada

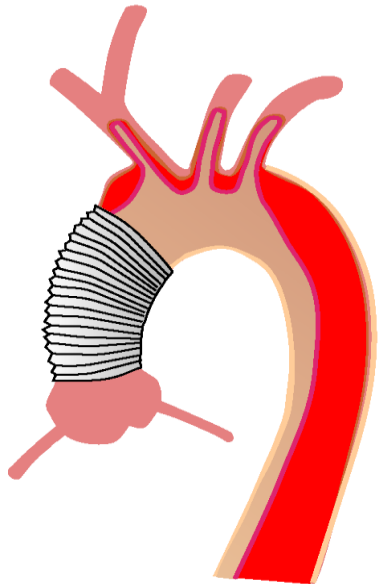
Methods

- A driving force for aortic degeneration following ATAAD repair is false lumen growth as a result of false lumen pressurization.
- Therefore, we sought to elucidate the contribution of visceral communications with the remaining false lumen to distal aortic expansion.
- We performed a retrospective study of patients who underwent ATAAD repair with dissection extending into the head vessels from 2017-2023.
- This study included 63 patients who underwent ATAAD repair at our center with supra-aortic vessel involvement and at least 1 year of follow-up



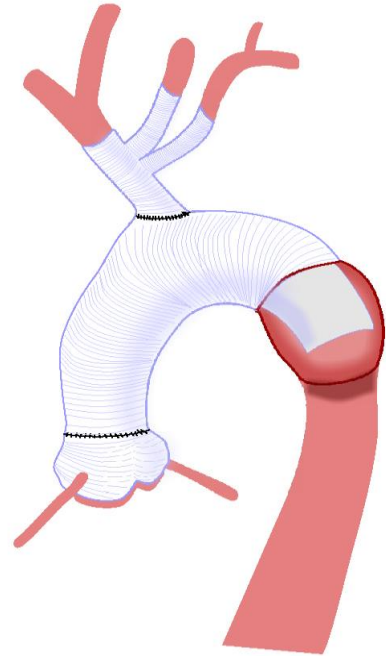
Aortic Dissection Repair Techniques

Ascending Aortic Replacement +/- Hemiarch



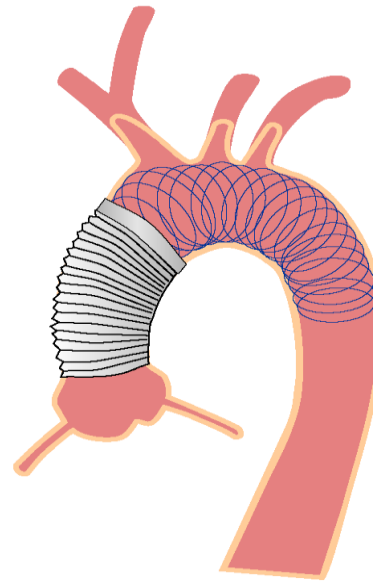
A standard ascending aortic replacement +/- hemiarch replacement will often be sufficient for treating the immediately life threatening dissection by resection of the entry tear but may leave a distal false lumen behind.

Total Arch Repair



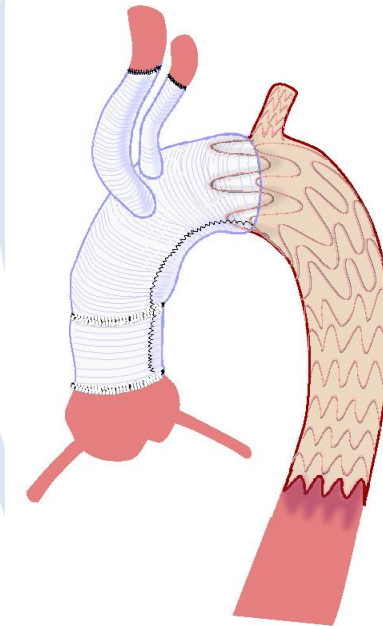
An extended arch repair allows for greater resection or exclusion of the false lumen. This will reduce the risk of distal aortic expansion and can address more extensive disease.

Hemiarch Replacement with AMDS



The AMDS Hybrid Stent (Artivion, Georgia, USA) is a partially covered aortic arch hybrid graft used as an adjunct to open surgical repair. AMDS is designed to induce arch remodeling and allows for single-stage management of dynamic malperfusion without prolonging operative time.

Zone 2 Debranching with TEVAR



An aortic arch repair allows for the future placement of a stent graft through thoracic endovascular aortic repair (TEVAR). This allows for a less extensive initial operation with the option to address distal aortic disease minimally invasively.

Baseline Demographics

Baseline Demographics	N=63 (%)
Age, years (mean)	60
Male Sex	46 (70.6)
Hypertension	45 (66.2)
Dyslipidemia	12 (17.6)
Smoking	11 (16.2)
Atrial Fibrillation	5 (7.4)
Cerebrovascular Disease	5 (7.4)
CHF	3 (4.4)
COPD	2 (2.9)
Coronary Artery Disease	2 (2.9)
Diabetes	2 (2.9)

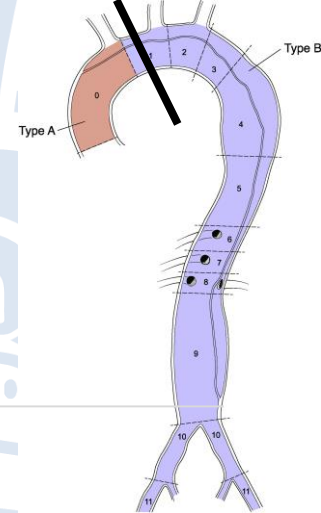
Baseline Demographics	N=63 (%)
Tamponade	5 (7.4)
Aortic Rupture	4 (6.3)
Malperfusion	
• Renal	13 (20.6)
• Extremity	9 (14.3)
• Cerebral	5 (7.4)
• Mesenteric	3 (4.4)
Peripheral Vascular Disease	2 (2.9)
BMI (Mean)	29

Operative Characteristics

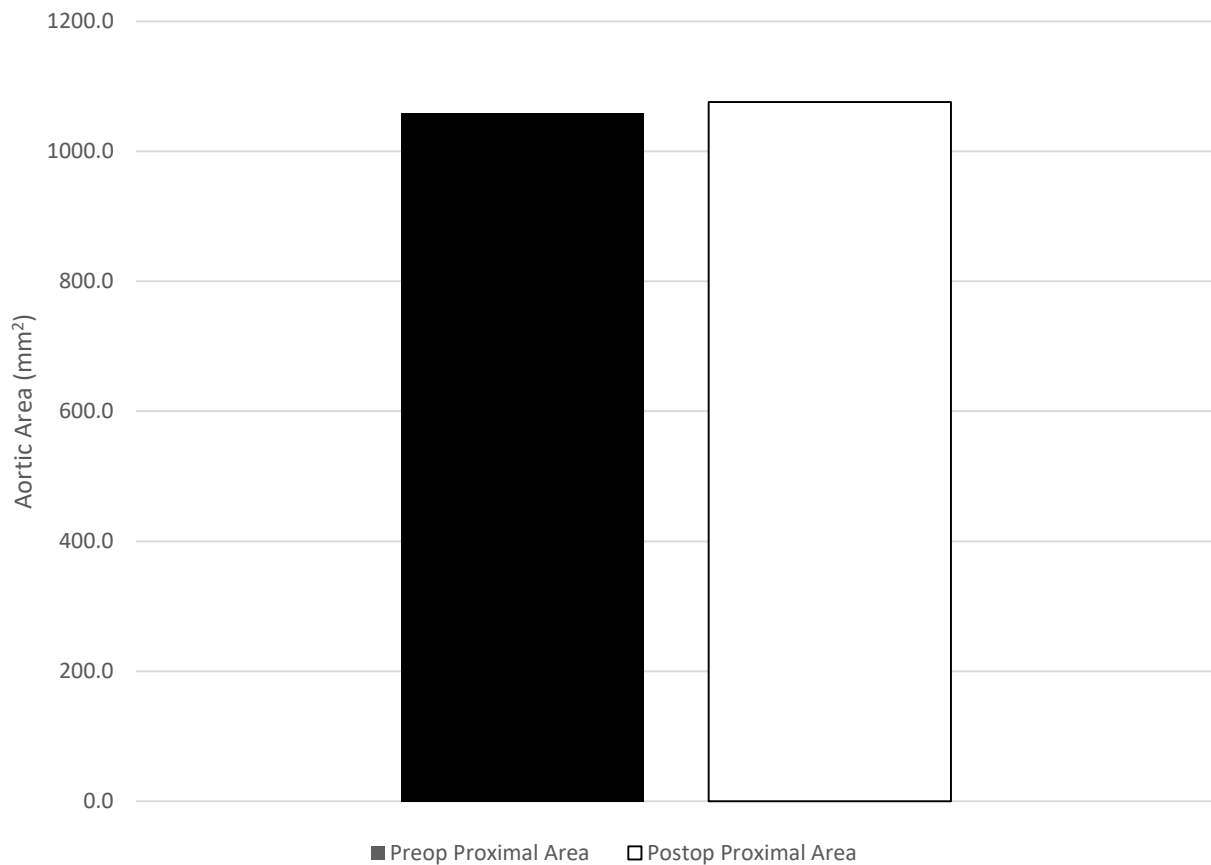
Operative Characteristics	N=63 (%)
Hemiarch	55 (87.3)
AMDS	22 (34.9)
Total Arch	8 (12.7)
Mean ICU LOS (Days)	9.5
Mean Hospital LOS (Days)	22.2
1 Year Mortality	0
5 Year Mortality	2 (3.2)
Myocardial Infarction	1 (1.6)

Postoperative Characteristics	N=63 (%)
Postoperative Atrial Fibrillation	20 (31.7)
CVA	17 (27.0)
Reoperation	13 (20.6)
Major Bleeding	6 (9.5)
Sepsis	4 (6.3)
Spinal Cord Injury	1 (1.6)
Arrhythmia	1 (1.6)
Required IABP	1 (1.6)

Aortic Remodeling Entire Cohort

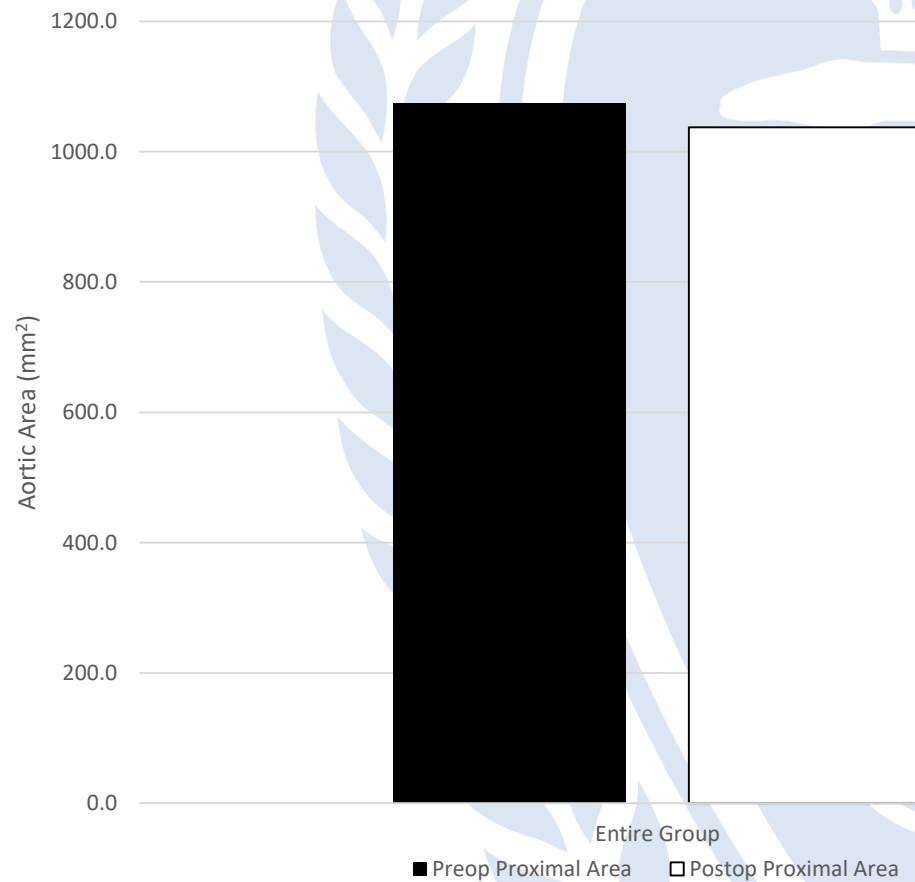


Proximal Aortic Size Postoperative Time 1



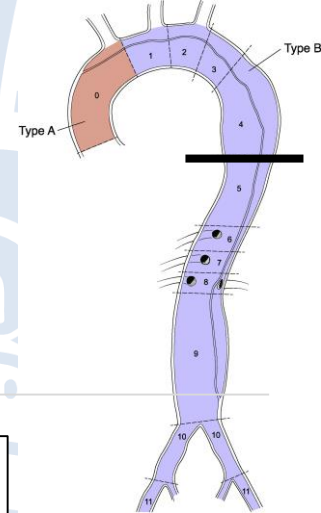
(Mean follow up time 5.0 months, n=48)

Proximal Aortic Area Postoperative Time 2

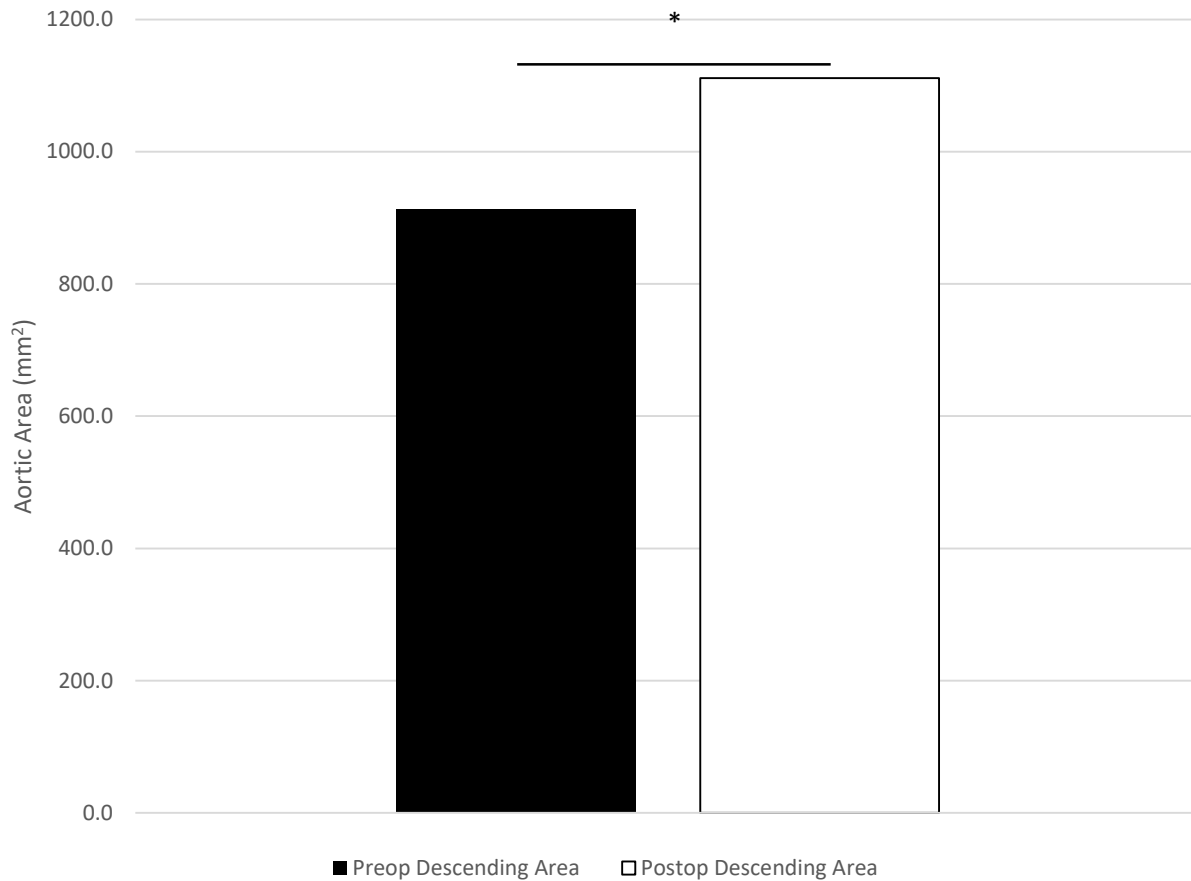


(Mean follow up time 19.0 months, n=55)

Aortic Remodeling Entire Cohort

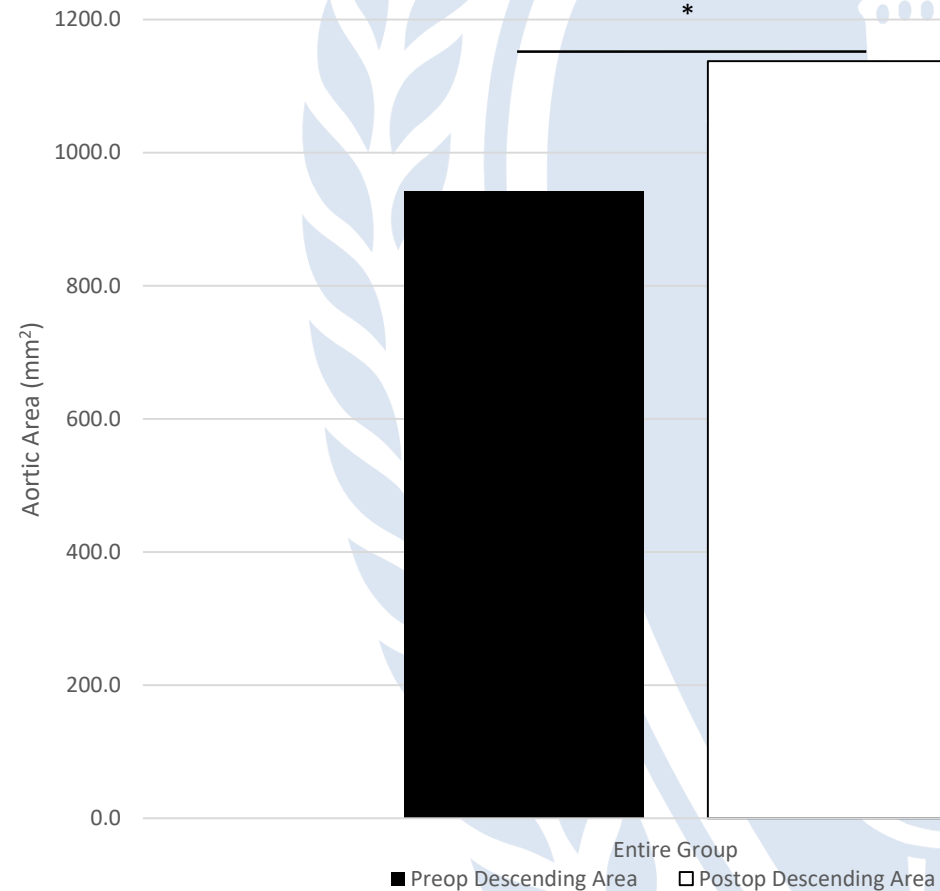


Distal Aortic Area Postoperative Time 1

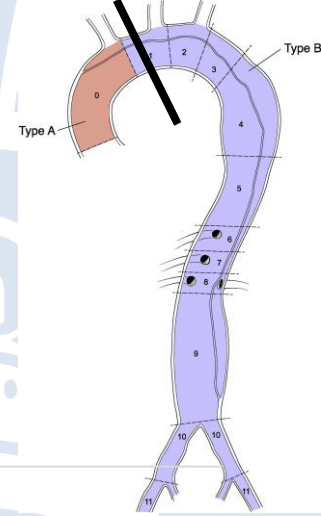


(Mean follow up time 5.2 months, n=53)

Distal Aortic Area Postoperative Time 2

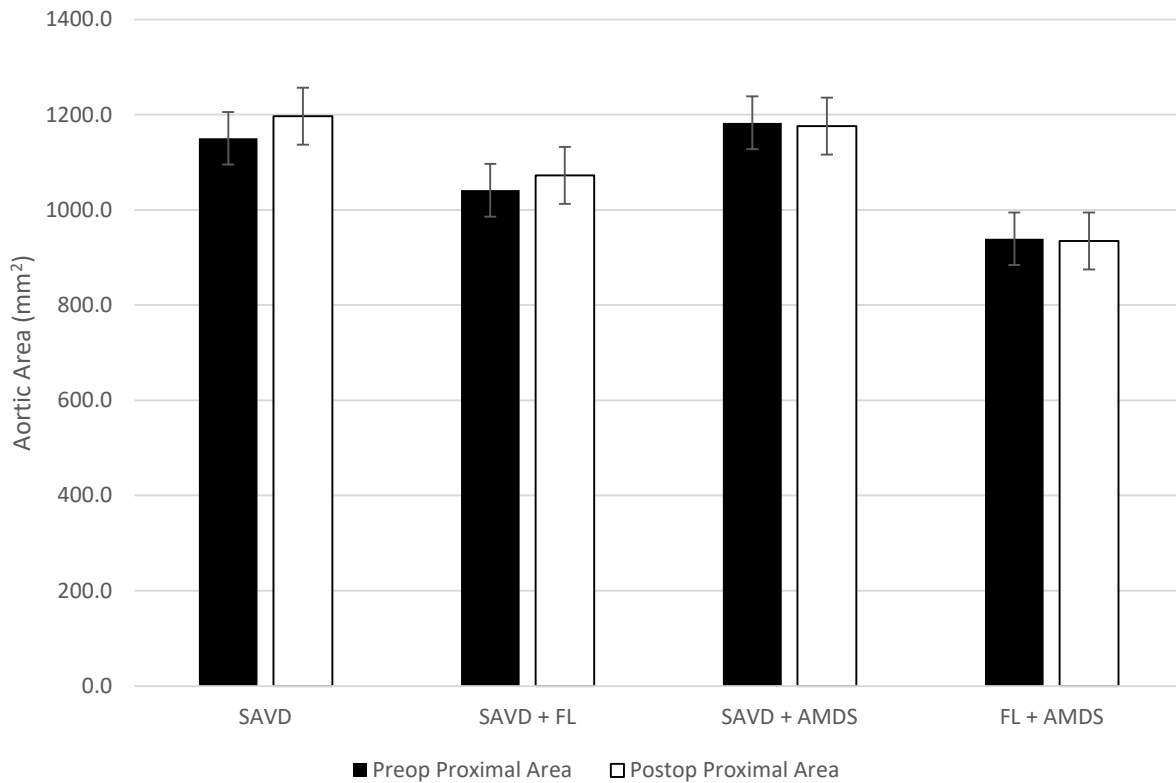


(Mean follow up time 18.7 months, n=63)



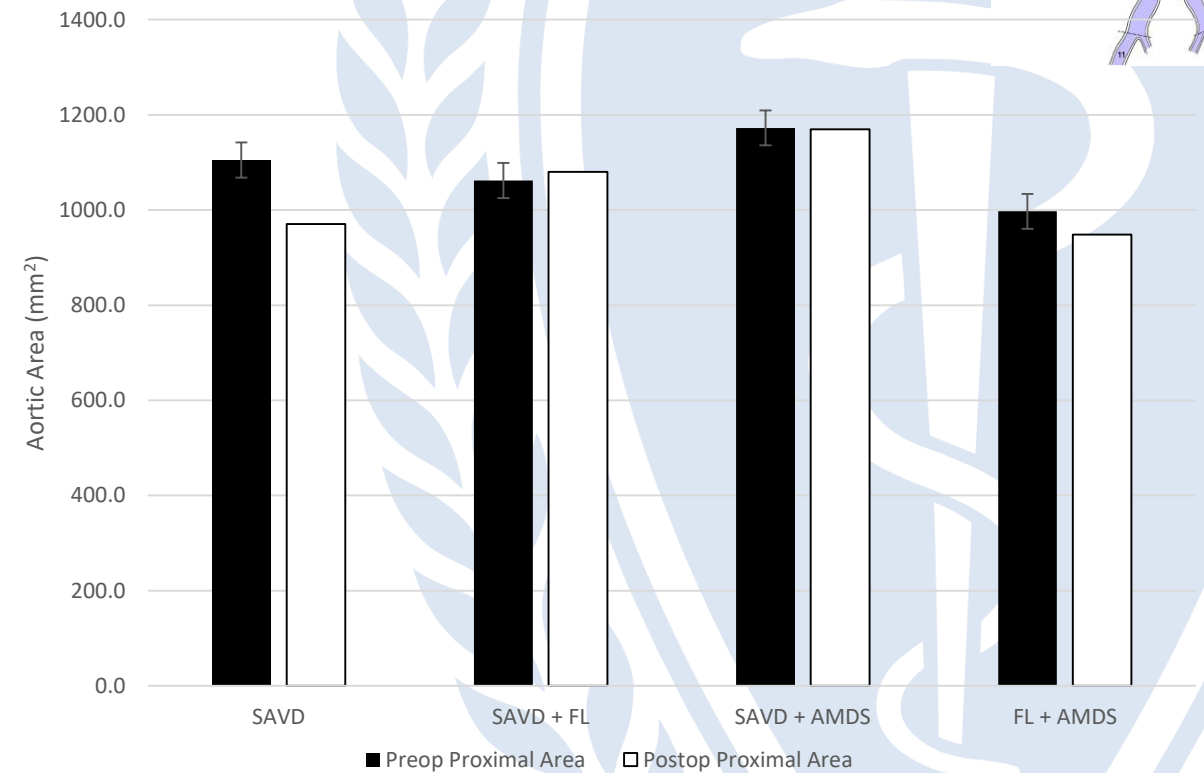
Aortic Remodeling Based on Repair Extent and False Lumen Communication

Proximal Aortic Area Postoperative Time 1

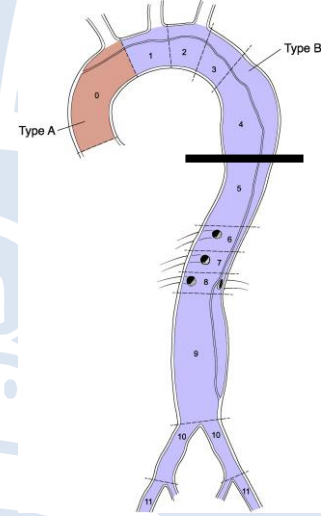


(Mean follow up time SAVD 5.8 months n=11, SAVD + FL 4.8 months n=18, SAVD + AMDS 5.3 months n=7, FL + AMDS 4.9 months n=11)

Proximal Aortic Area Postoperative Time 2

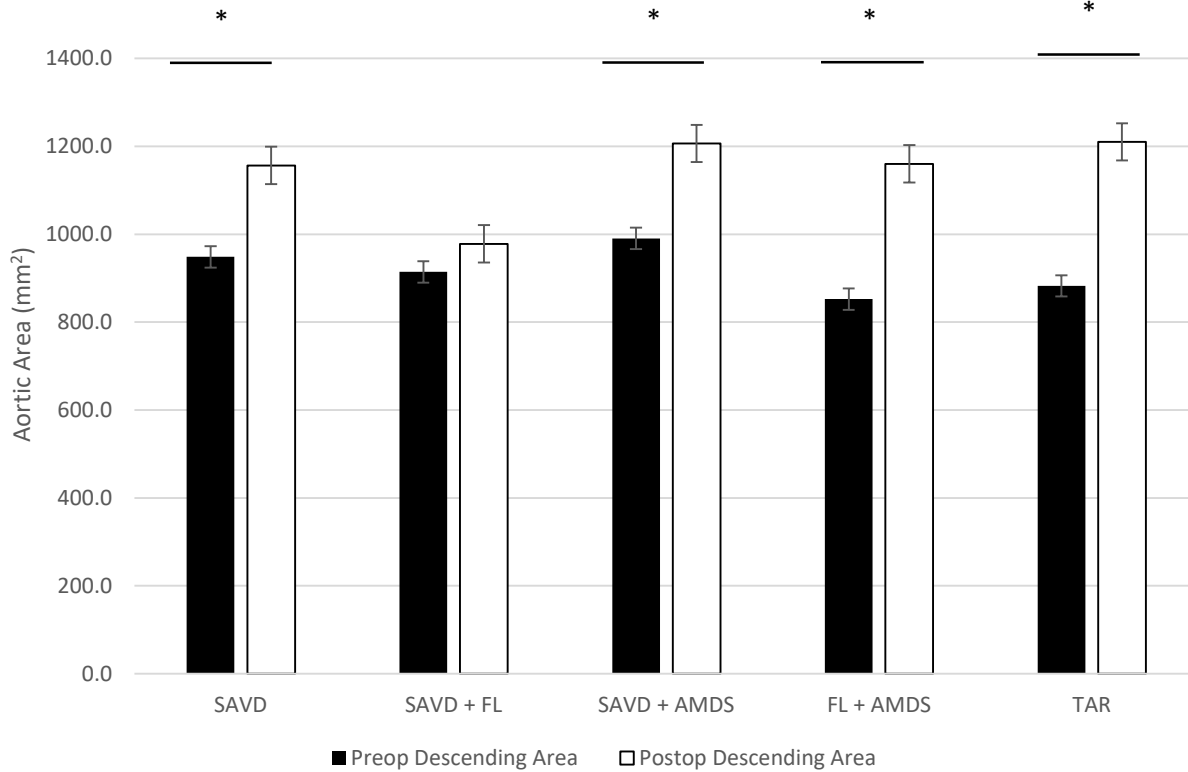


(Mean follow up time SAVD 23.2 months n=13, SAVD + FL 18.2 months n=20, SAVD + AMDS 19 months n=9, FL + AMDS 16.2 months n=13)



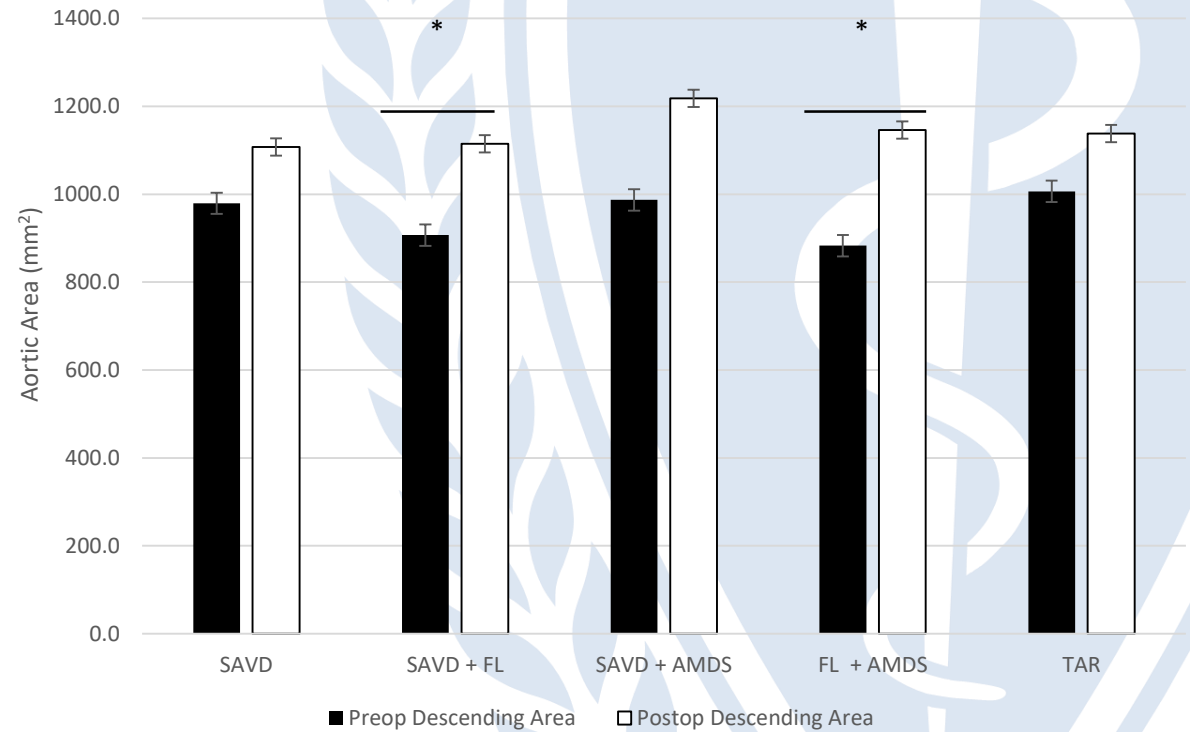
Aortic Remodeling Based on Repair Extent and False Lumen Communication

Distal Aortic Area Postoperative Time 1



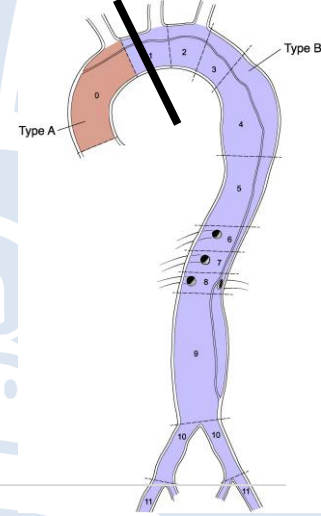
(Mean follow up time SAVD 5.4 months n=12, FL 4.8 months n=18, SAVD + AMDS 5.3 months n=7, FL + AMDS 4.9 n=11, TAR 6 months n=5)

Distal Aortic Area Postoperative Time 2

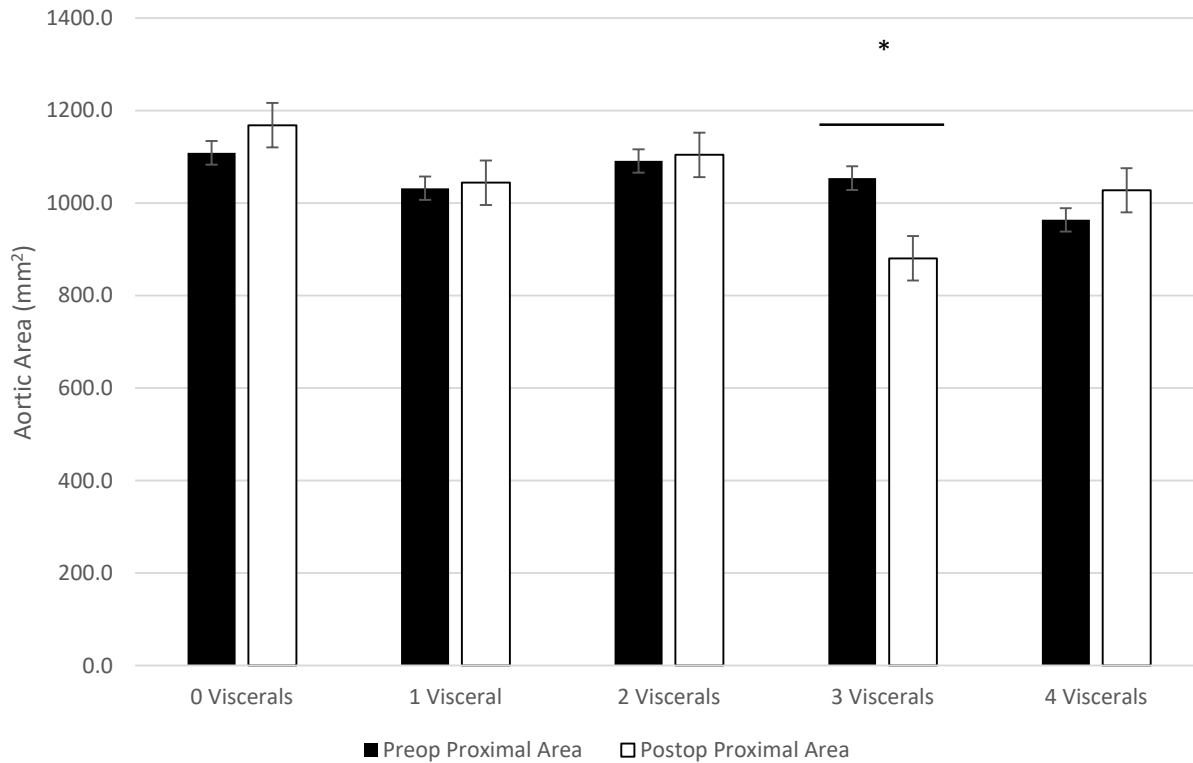


(Mean follow up time SAVD 23.2 months n=13, FL 18.2 months n=20, SAVD + AMDS 19 months n=9, FL + AMDS 16.2 months n=13, and TAR 16.6 months n=8)

Aortic Remodeling Based on Visceral False Lumen Communication

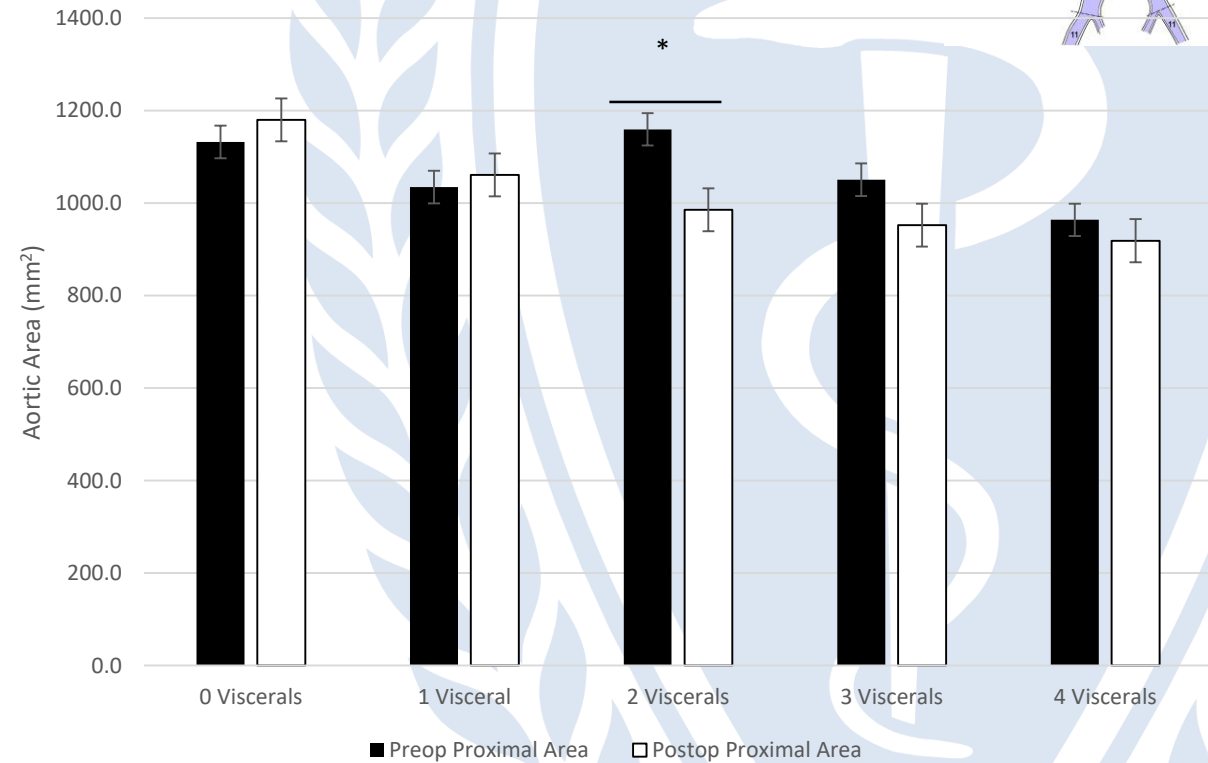


Proximal Aortic Measurements Time 1

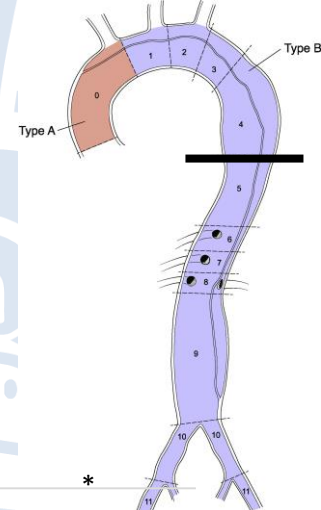


(Mean follow up time 0 Viscerals 4.8 months n=14, 1 Visceral 5.8 months n=10, 2 Viscerals 4.1 months n=11, 3 Viscerals 5.4 months n=7, 4 Viscerals 5.7 months n=3)

Proximal Aortic Measurements Time 2

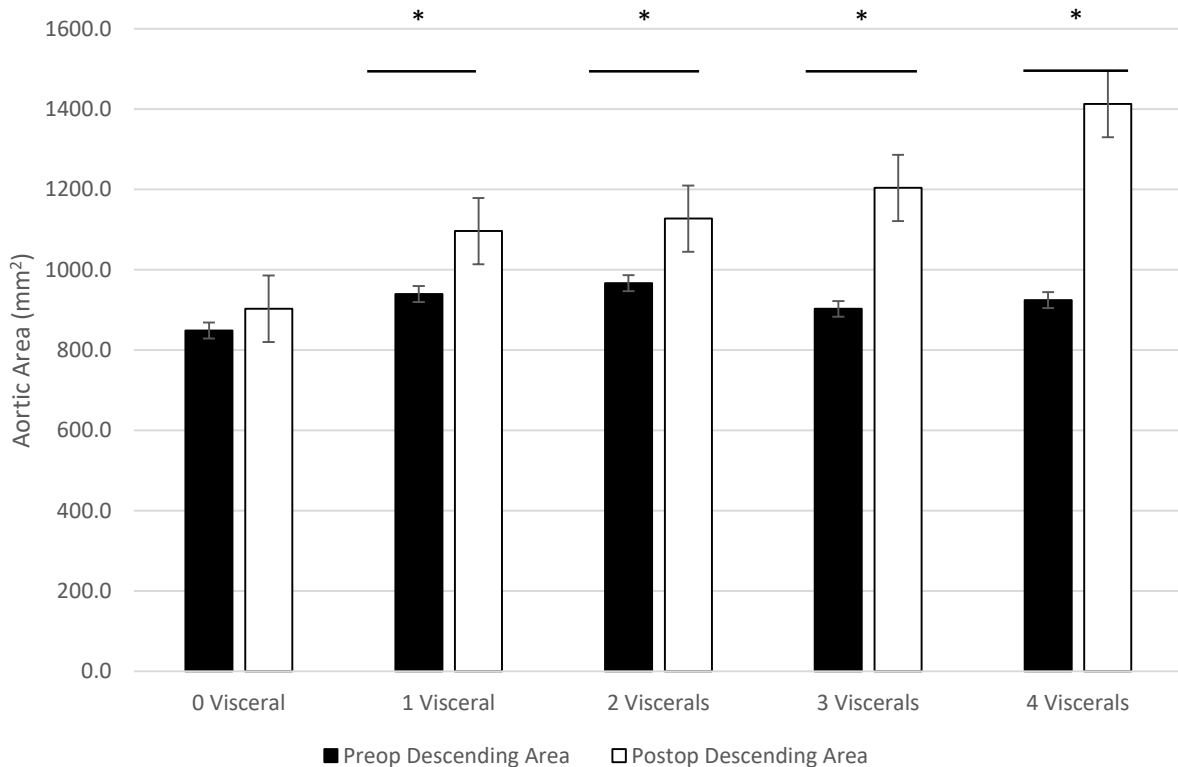


(Mean follow up time 0 Viscerals 17.4 months n=13, 1 Visceral 15.7 months n=13, 2 Viscerals 26.2 months n=13, 3 Viscerals 16.1 months n=9, 4 Viscerals 21.7 months n=3)



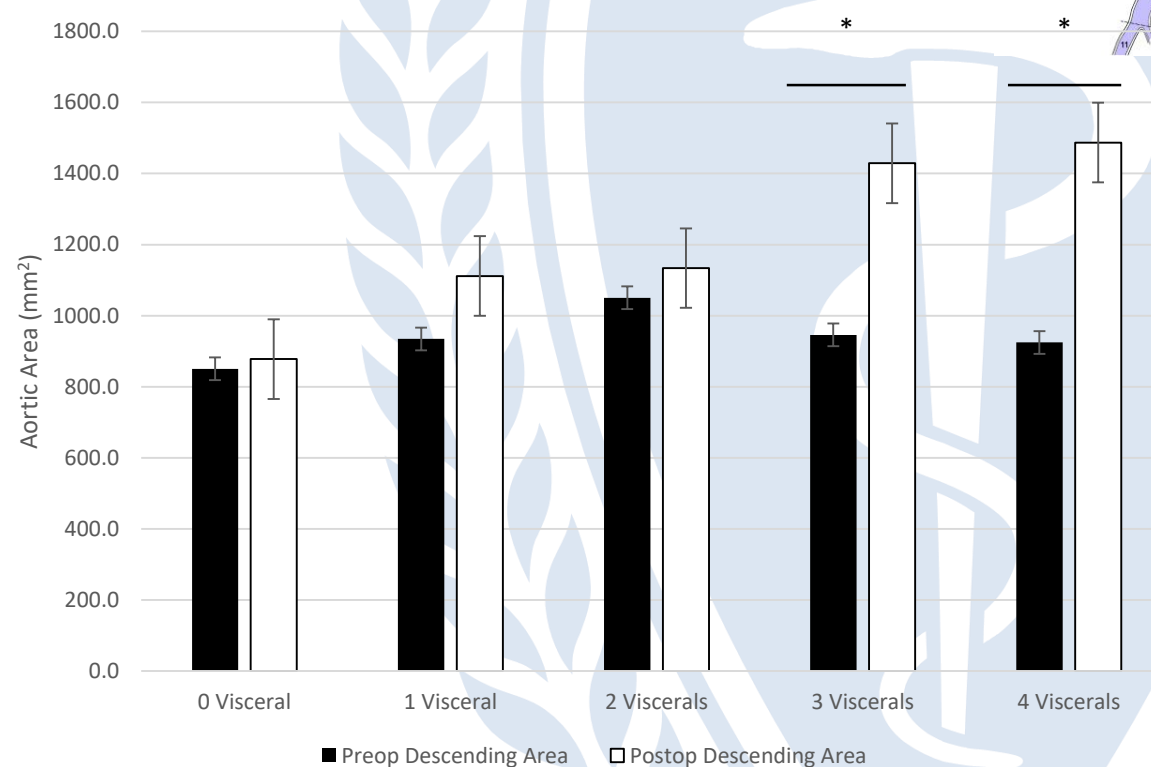
Aortic Remodeling Based on Visceral False Lumen Communication

Distal Aortic Measurements Time 1



(Mean follow up time 0 Viscerals 4.9 months n=15, 1 Visceral 5.8 months n=10, 2 Viscerals 4.1 months n=11, 3 Viscerals 5.8 months n=9, 4 Viscerals 5.8 months n=4)

Distal Aortic Measurements Time 2



(Mean follow up time 0 Viscerals 18.7 months n=17, 1 Visceral 15.6 months n=14, 2 Viscerals 25.9 months n=14, 3 Viscerals 16.4 months n=11, 4 Viscerals 19.3 months n=4)

Discussion

- **The entire cohort of patients experienced aortic growth at the level of the tracheal bifurcation following ATAAD repair.**
- **The type of extended arch repair (AMDS vs TAR) did not seem to be associated with aortic growth.**
- **A total arch replacement eliminates the potential for head vessel communications to contribute to aortic growth. Thus, all growth of the remaining aorta must be a result of communications distally.**
- **This same pathophysiology applied to patients undergoing hemiarch repair with AMDS implantation.**
- **When examining growth based on visceral communications, patients with more visceral communications tended to have more distal aortic dilation at later follow up.**