

# Improving Aortic Remodeling in Dissection: Factors for Success with Thoracic Endovascular Repair and Bare Metal Stent Extension

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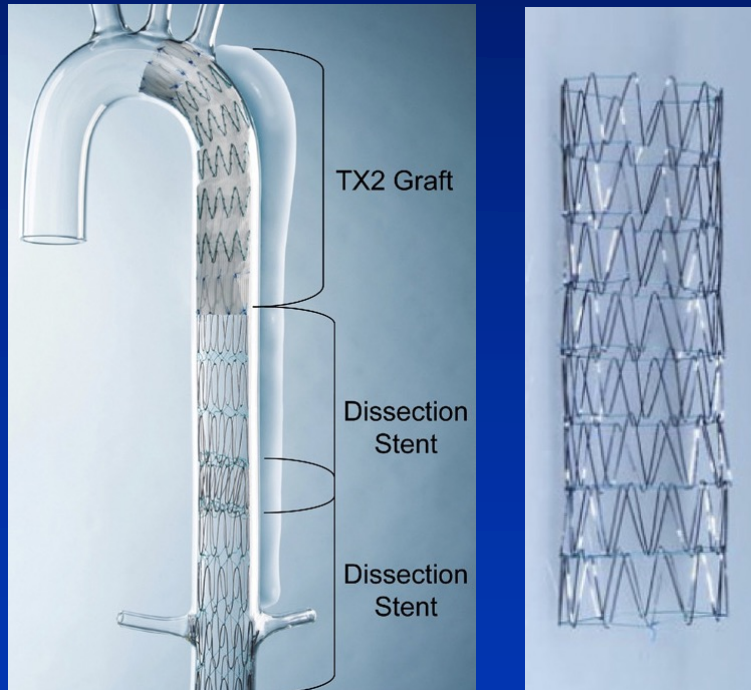
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# Objective

## Provisional ExTension To Induce COMplete Attachment (PETTICOAT)

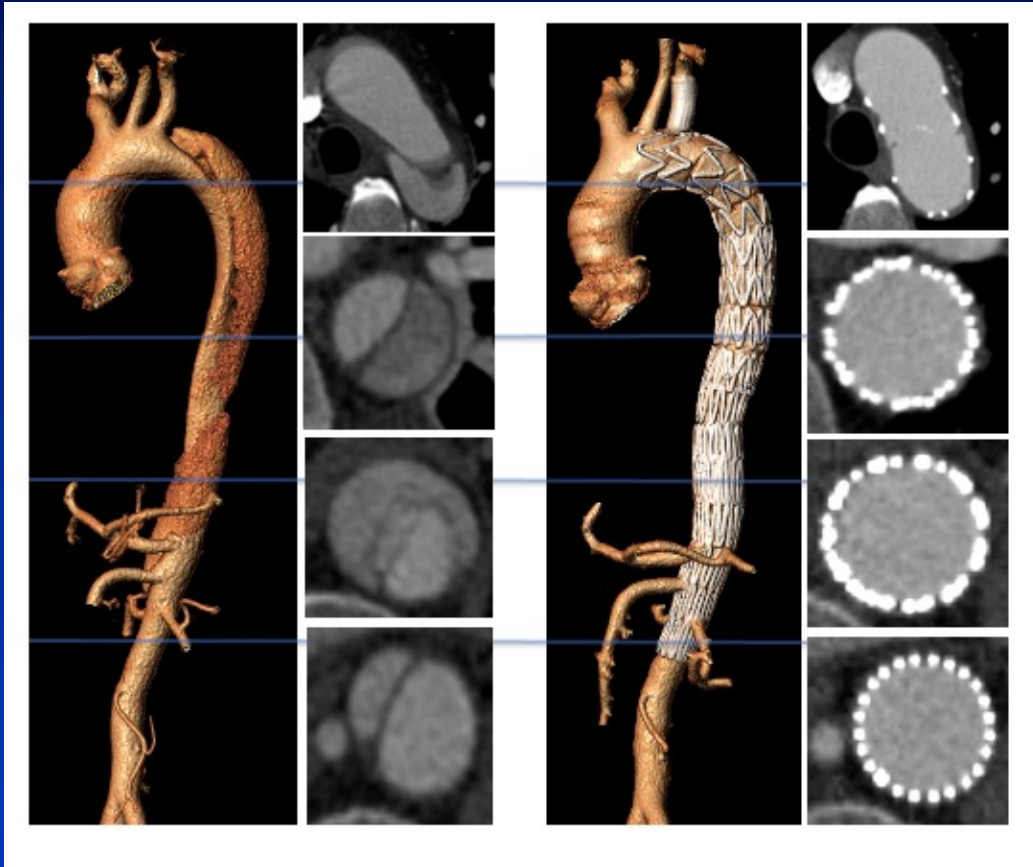


PETTICOAT involves placing bare metal stents to offer structural support and radial force in the downstream aorta, aiming to improve aortic remodeling.

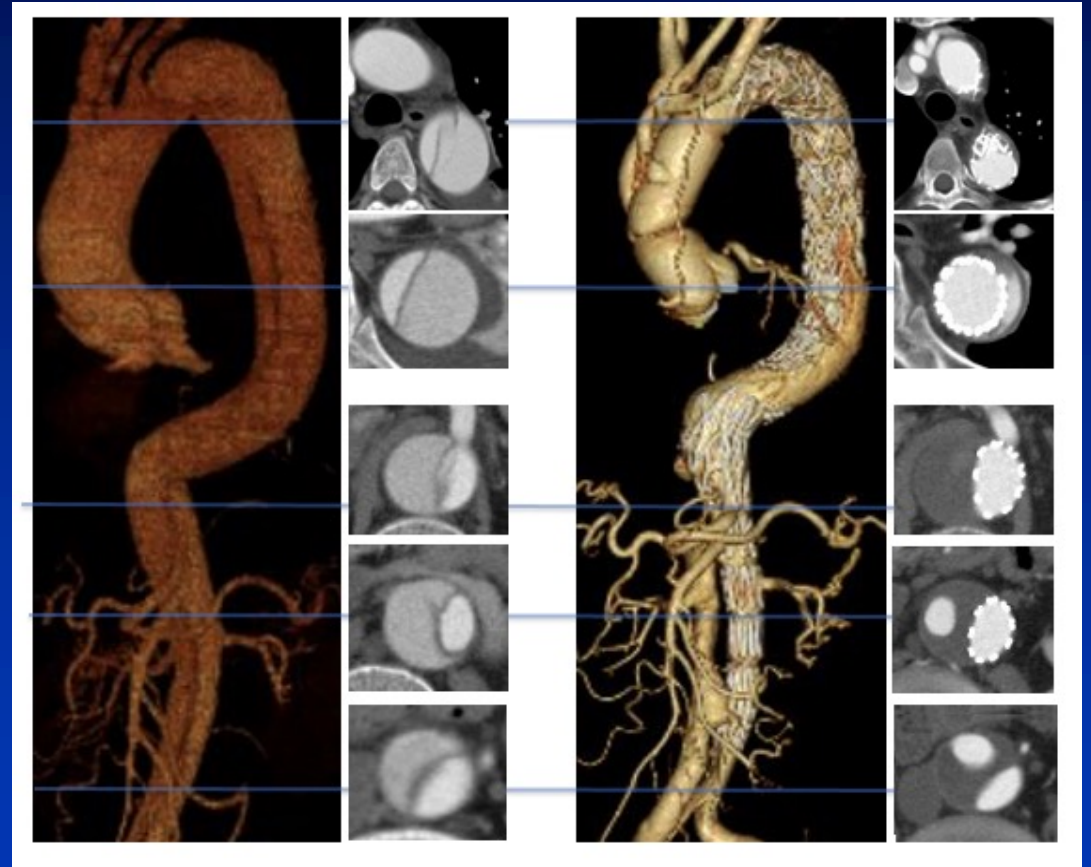
Our observations reveal divergent outcomes in downstream aorta remodeling, with some cases exhibiting commendable changes and others displaying suboptimal alterations.

# Objective

Favorable remodeling



Unfavorable remodeling



The primary objective was to enhance predictability and consistency in aortic dissection therapy by identifying patient-related variables impacting remodeling outcomes.

# Method

Retrospective review of 299 patients who had TEVAR for both Type B aortic dissections and residual Type B dissections from 2011-2023

Without PETTICOAT (n=199)

PETTICOAT (n=100)

EL from proximal side (n=10)  
(type1a:2, type2:6, type3:2)  
Follow up no more than 3 months (n=12)  
No examination n=1

PETTICOAT (n=77)

Full PETTICOAT (n=60)

Favorable  
Remodeling  
(n=37)

Unfavorable  
Remodeling  
(n=23)

A retrospective analysis of 60 consecutive patients who underwent full PETTICOAT for complicated aortic dissections was conducted.

A multivariate logistic regression model identified predictors of favorable aortic remodeling.

# Baseline and procedure characteristics

Parameter	Favorable Remodeling (N=37)	Unfavorable Remodeling (N=23)	p Value
Age	58.2±9.6	52.0±8.5	<b>0.012</b>
Male gender	26(70.3%)	20(87.0%)	0.137
Body mass index	23.9±3.1	23.8±4.3	0.979
Hypertension	35(94.6%)	23(100%)	0.376
Diabetes mellitus	3(8.1%)	2(8.7%)	0.642
Smoking	15(40.5%)	11(47.8%)	0.387
Chronic kidney disease	15(40.5%)	5(21.7%)	0.133
Creatinine	0.90±0.27	0.90±0.31	0.979
eGFR	73.7±24.6	67.5±26.0	0.357
Marfan syndrome	0(0%)	0(0%)	N/A
Indication for TEVAR			
Dilatation	14(37.8%)	14(60.9%)	0.082
Malperfusion	12(32.4%)	2(8.7%)	<b>0.035</b>
Preemptive	11(29.7%)	6(26.1%)	0.761
Duration from onset to TEVAR (days)	63.8±49.3	147.8±357.3	0.162
Emergent case	6(16.2%)	0(0%)	<b>0.046</b>
Dissection acuity			
Acute 2w>	10(27.0%)	2(8.7%)	0.078
Subacute 2w<, 3M>	17(45.9%)	14(60.9%)	0.261
Chronic 3M<	10(27.0%)	7(30.4%)	0.776
Stanford type A(residual B)	19(51.4%)	16(69.6%)	0.164
Stanford type B	18(48.6%)	7(30.4%)	0.164

Parameter	Favorable Remodeling (N=37)	Unfavorable Remodeling (N=23)	p Value
Preoperative medication			
Coumadine	1(2.7%)	0(0%)	0.617
Aspirin	4(10.8%)	2(8.7%)	0.58
ARB	18(48.6%)	7(30.4%)	0.164
Preoperative CT findings			
Visceral arteries arising from false lumen	2.1±1.1	2.1±1.2	0.9
Both (right and left) iliac arteries dissection	16(43.2%)	11(47.8%)	0.729
Area of true lumen at abdominal aorta	151.1±63.2	159.1±79.1	0.667
Area of aortic lumen at abdominal aorta	362.4±111.2	418.1±91.8	<b>0.049</b>
Over sizing at the distal end of stent graft	36(97.3%)	19(82.6%)	0.066

# Result

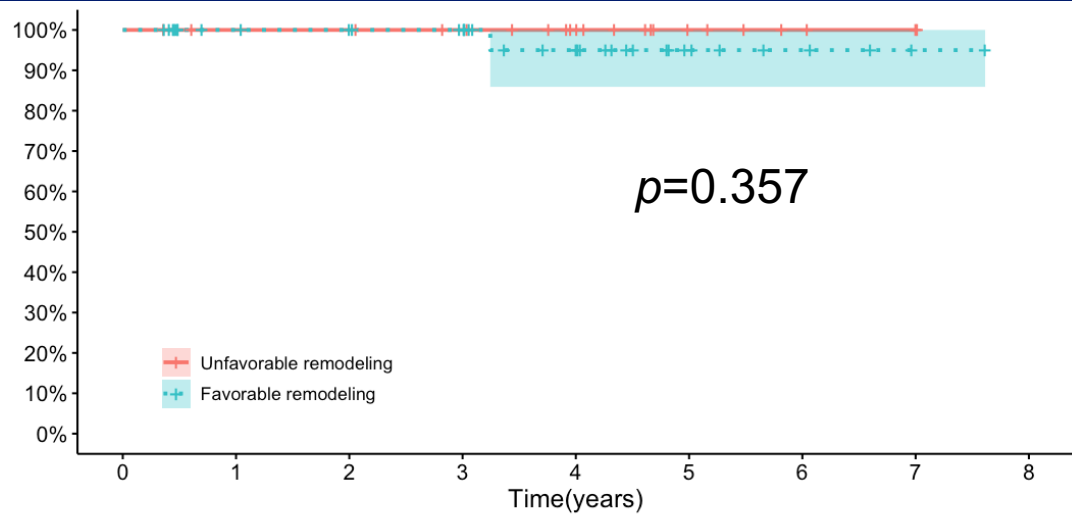
Parameter	Favorable Remodeling (N=37)	Unfavorable Remodeling (N=23)	p Value
<b>Early outcomes</b>			
<b>Stroke</b>	0(0%)	0(0%)	N/A
<b>Mesenteric ischemia requiring bowel resection</b>	0(0%)	0(0%)	N/A
<b>Retrograde type A</b>	1(2.7%)	0(0%)	0.596
<b>Spinal cord ischemia</b>	0(0%)	0(0%)	N/A
<b>30 day mortality</b>	0(0%)	0(0%)	N/A
<b>1 year mortality</b>	0(0%)	0(0%)	N/A

# Result

Parameter	Favorable Remodeling (N=37)	Unfavorable Remodeling (N=23)	p Value
<b>Late outcomes</b>			
<b>False lumen and visceral intervention</b>	4(10.8%)	0(0%)	0.288
<b>Open surgical intervention</b>	1(2.7%)	0(0%)	0.596
<b>Aortic reintervention</b>	3(8.1%)	1(4.3%)	0.502
<b>Aortic related death</b>	1(2.7%)	0(0%)	0.596
<b>All cause death</b>	1(2.7%)	0(0%)	0.596
<b>Downstream Aortic Event</b>			
<b>Downstream Aortic related death</b>	0(0%)	0(0%)	N/A
<b>Reintervention to Downstream Aorta</b>	1(2.7%)	1(4.3%)	1.000
<b>Distal Stent Induce New Entry</b>	3(8.1%)	6(26.1%)	0.065

# Result

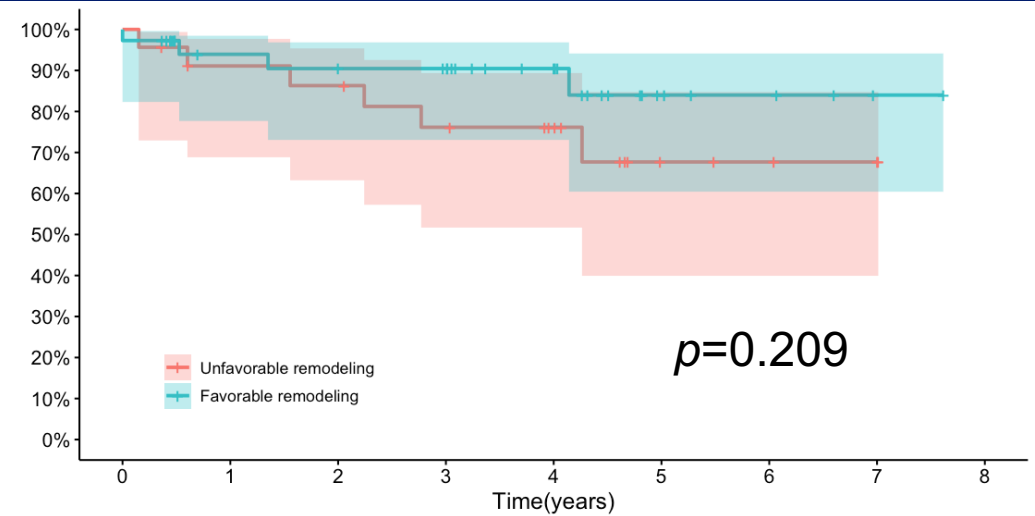
## Freedom from Aortic-related Death



Number at risk: n (%)

Unfavorable remodeling	23 (100)	21 (91)	21 (91)	19 (83)	13 (57)	6 (26)	3 (13)	2 (9)	0 (0)
Favorable remodeling	37 (100)	29 (78)	27 (73)	25 (68)	17 (46)	7 (19)	4 (11)	1 (3)	0 (0)
	0	1	2	3	4	5	6	7	8

## Downstream Aortic Event Free



Number at risk: n (%)

Unfavorable remodeling	23 (100)	19 (83)	18 (78)	15 (65)	11 (48)	4 (17)	3 (13)	2 (9)	0 (0)
Favorable remodeling	37 (100)	27 (73)	25 (68)	24 (65)	17 (46)	6 (16)	4 (11)	1 (3)	0 (0)
	0	1	2	3	4	5	6	7	8



# Result

## Multivariate Fixed Effects of Factors on Favorable Remodeling

Parameter	HR (95% CI)	p Value
acute(<2w)	5.41 (0.71 - 41.04)	0.103
elderly(>60y)	9.02 (1.80 - 45.09)	<b>0.007</b>
stent over sizing at down stream aorta (>75% of aortic lumen)	12.72 (1.12 - 145.18)	<b>0.041</b>
preoperative area of aortic lumen <450mm <sup>2</sup>	5.74 (1.13 - 29.11)	<b>0.035</b>
ARB	6.55 (1.44 - 29.79)	<b>0.015</b>

# Discussion

Older patients exhibit superior remodeling, possibly due to age-related aortic structural changes.

Stent graft sizing debates persist, evolving from <10% to up to 20% oversizing in diameter of the true lumen, with a 46mm bare stent now accepted.

Terminal aorta diameter pre-intervention proves a significant predictor, with <450 mm<sup>2</sup> (a diameter of approximately 24mm) as a meaningful cutoff.

ARB therapy shows promise, slowing aortic growth.

Distal reentry's significance varies in our series, potentially due to the bare metal stent's role. Acute cases trend toward better aortic remodeling.

# Conclusion

The PETTICOAT concept proves highly effective in the management of complex aortic dissections, prioritizing favorable aortic remodeling.

Predictors for favorable remodeling, including age, stent graft sizing, aortic diameter, and ARB therapy, offer insights for optimizing patient selection.

This approach improves survival outcomes, mitigates risks associated with untreated aortic segments, and provides a minimally invasive solution for aortic dissections.

Despite some outcome variations, the technique holds promise for addressing the challenges of aortic dissections, with the potential for further refinement in patient selection and technique application.