

# Contemporary outcomes in patients undergoing repair for acute DeBakey type I aortic dissection with a focus on distal aortic remodeling

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# Background

- Aortic dissection (AD) is an acute event characterized by an intimomedial tear with the formation of a false lumen inside the aortic wall.
- Traditional repair of acute dissections includes open-heart surgery with complete resection of the intimal tear, accompanied by replacement of the ascending aorta.

# Objective

- In this study, we sought to determine whether a more aggressive surgical approach for acute type I AD results in improved distal aortic remodeling.

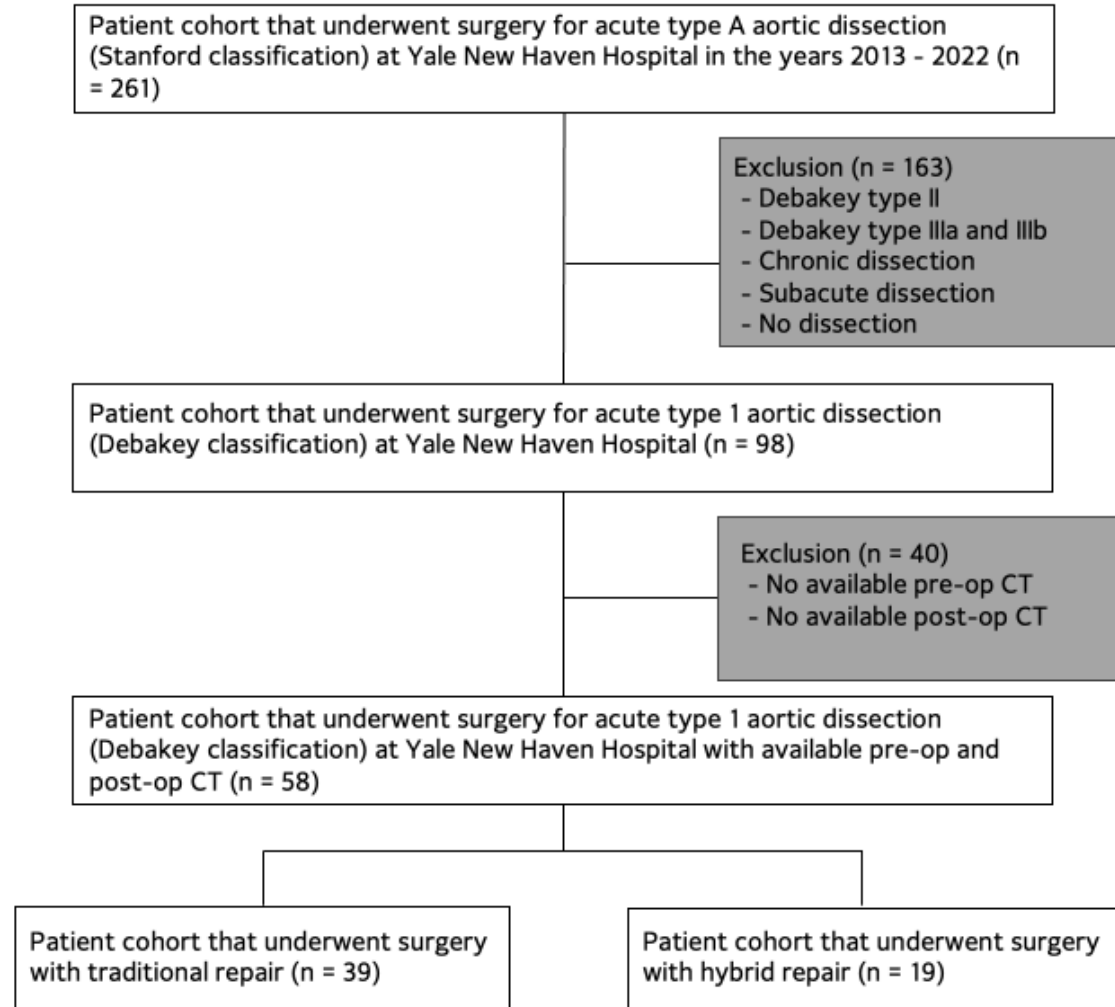
# Methods

- Our cohort consisted of patients who underwent surgery for acute type I AD between the years 2013 and 2022.
- We conducted retrospective chart review of health records and reviewed cross sectional scans at three distinct anatomical locations: aortic zone 3, at the pulmonary artery bifurcation, and at the aortic hiatus.

# Methods – Endpoints

- Patients were stratified into hybrid and traditional repair groups. Aortic remodeling was defined by aortic growth rate, true lumen diameter (TLD), and total aortic diameter (TAD) to TLD ratio difference.
- Double oblique multiplanar reconstruction of CT images was used to measure the aortic changes following surgery.

# Results - Inclusion Criteria



# Results – Aortic growth rate

Aortic growth rate at three different levels

Variable	Traditional repair, N = 39 <sup>1</sup>	Hybrid repair, N = 19 <sup>1</sup>	p- value	q- value <sup>2</sup>
Aortic growth rate - Zone 3	0.11 (0.05, 0.28)	0.03 (-0.19, 0.27)	0.2 <sup>3</sup>	0.3
Aortic growth rate - Pulmonary artery	0.12 (0.03, 0.61)	-0.15 (-0.31, 0.27)	0.016 <sup>4</sup>	0.047
Aortic growth rate - Aortic hiatus	0.11 (0.05, 0.38)	0.46 (-0.13, 0.93)	0.4 <sup>4</sup>	0.4

<sup>1</sup> Median (IQR)

<sup>2</sup> False discovery rate correction for multiple testing

<sup>3</sup> Wilcoxon rank sum exact test

<sup>4</sup> Wilcoxon rank sum test

# Results – Changes in true lumen diameter

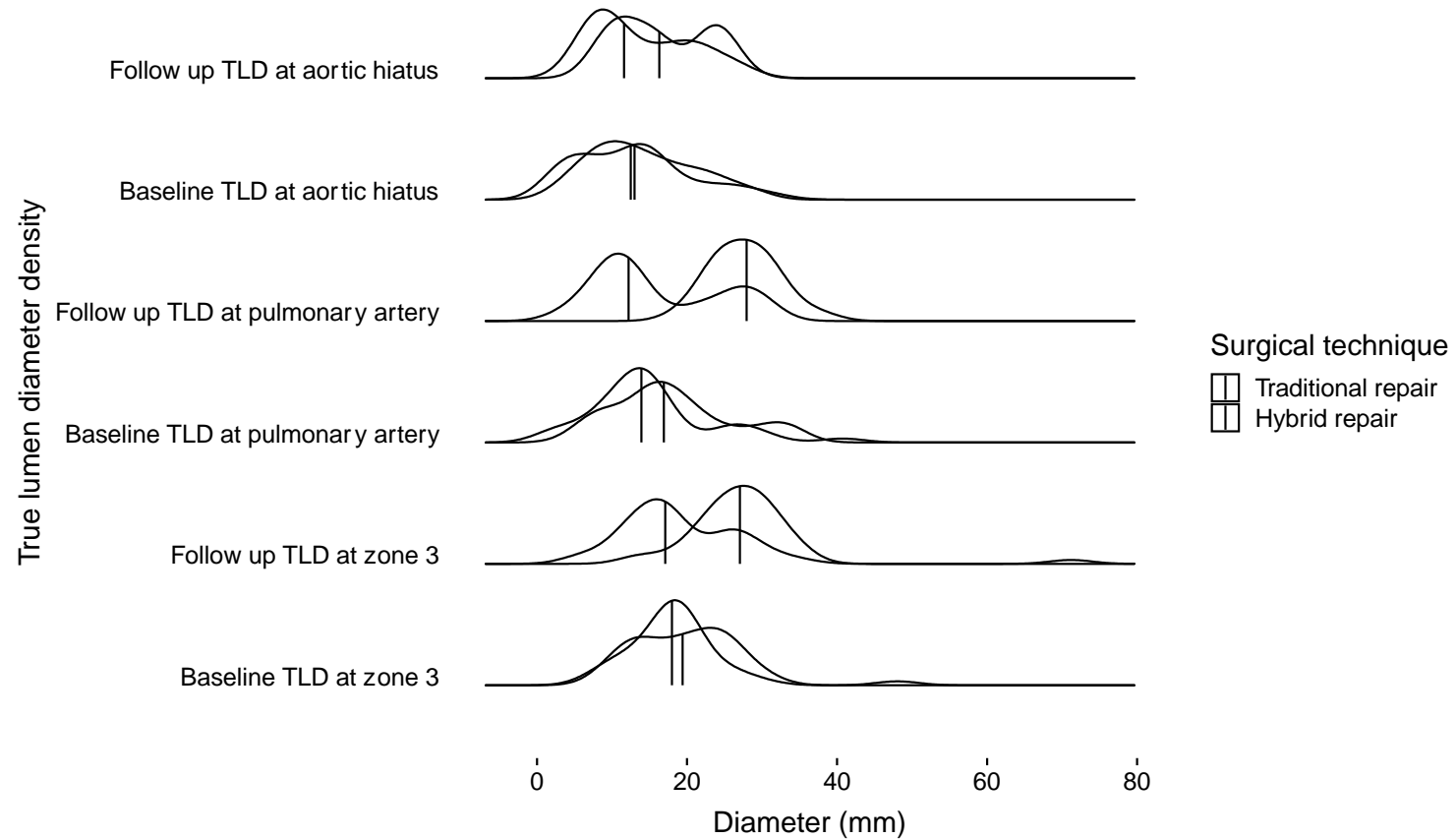


Figure – True lumen diameter density of each repair group at baseline and follow up

# Results – TAD/TLD ratio difference

Variable	TAD/TLD difference		p-value	q-value <sup>2</sup>
	Traditional repair, N = 39 <sup>1</sup>	Hybrid repair, N = 19 <sup>1</sup>		
<b>TAD/TDL difference - Zone 3</b>	0.12 (-0.34, 0.87)	-0.42 (-0.93, -0.14)	<0.001 <sup>3</sup>	0.003
<b>TAD/TDL difference - Pulmonary artery</b>	0.13 (-0.86, 1.46)	-0.79 (-1.62, 0.00)	0.007 <sup>3</sup>	0.010
<b>TAD/TDL difference - Aortic hiatus</b>	0.00 (-1.72, 0.75)	0.00 (-0.87, 0.60)	0.8 <sup>3</sup>	0.8

<sup>1</sup> Median (IQR)

<sup>2</sup> False discovery rate correction for multiple testing

<sup>3</sup> Wilcoxon rank sum test

$$\Delta \frac{TAD}{TLD} = \frac{TAD_{mean \text{ at follow-up}}}{TLD_{mean \text{ at follow-up}}} - \frac{TAD_{baseline}}{TLD_{baseline}}$$



# Discussion

- Our study show that at the level of the pulmonary artery the aortic diameter regressed each month in the hybrid repair group, while an apparent expansion of the aorta was evident in the traditional repair group.
- Additionally, we showed that postoperatively there was a significant difference in the true lumen size at zone 3 and the pulmonary artery, with the hybrid group showing a much bigger expansion of the true lumen
- Finally, our novel use of the TAD/TLD ratio difference revealed a negative ratio difference at zone 3 and the pulmonary artery therefore indicating a positive remodelling trajectory.

# Limitations

- This was a single-center observational study with a retrospective design.
- Our study sample was small which limits the generalizability of the study due to selection bias
- The follow-up period was not uniform, and the surgeries were not done by a single surgeon, moreover, the image analysis was performed by an untrained individual, all of which could increase the possibility of data distortion.

## Conclusions

- Hybrid repair has been suggested to induce favorable remodeling profile in patients with type I AD.
- Our study showed that an aggressive hybrid repair led to less aortic growth rate, increased true lumen size, and decreased TAD/TLD ratio difference indicating positive aortic remodeling.

## Next steps

- Further steps should be taken to investigate the relationship between hybrid repair and aortic remodeling.
- A prospective study design is preferable, encompassing scheduled follow-ups and the evaluation of computed tomography angiography (CTA) images by trained radiologists.

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