Valve Morphology and Baseline Aortic Regurgitation in Bicuspid Aortic Valve

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Disclosure of Relevant Financial Relationships

I, Ken Chan, DO NOT have any financial relationships to disclose.

Background

- Aortic regurgitation (AR) in bicuspid aortic valve (BAV) patients undergoing transcatheter aortic valve implantation (TAVI) increases procedural complexity and may affect outcomes.
- The association between bicuspid aortic valve morphologies and significant AR remains uncertain.
- This study aimed to evaluate whether specific BAV phenotypes are linked to significant AR and to determine whether its presence influences outcomes after TAVI.

Yoon et al. JACC 2020;76(9):1018–1030
Michelena et al. *Eur J Cardiothorac Surg.* 2021;60(2):448–476

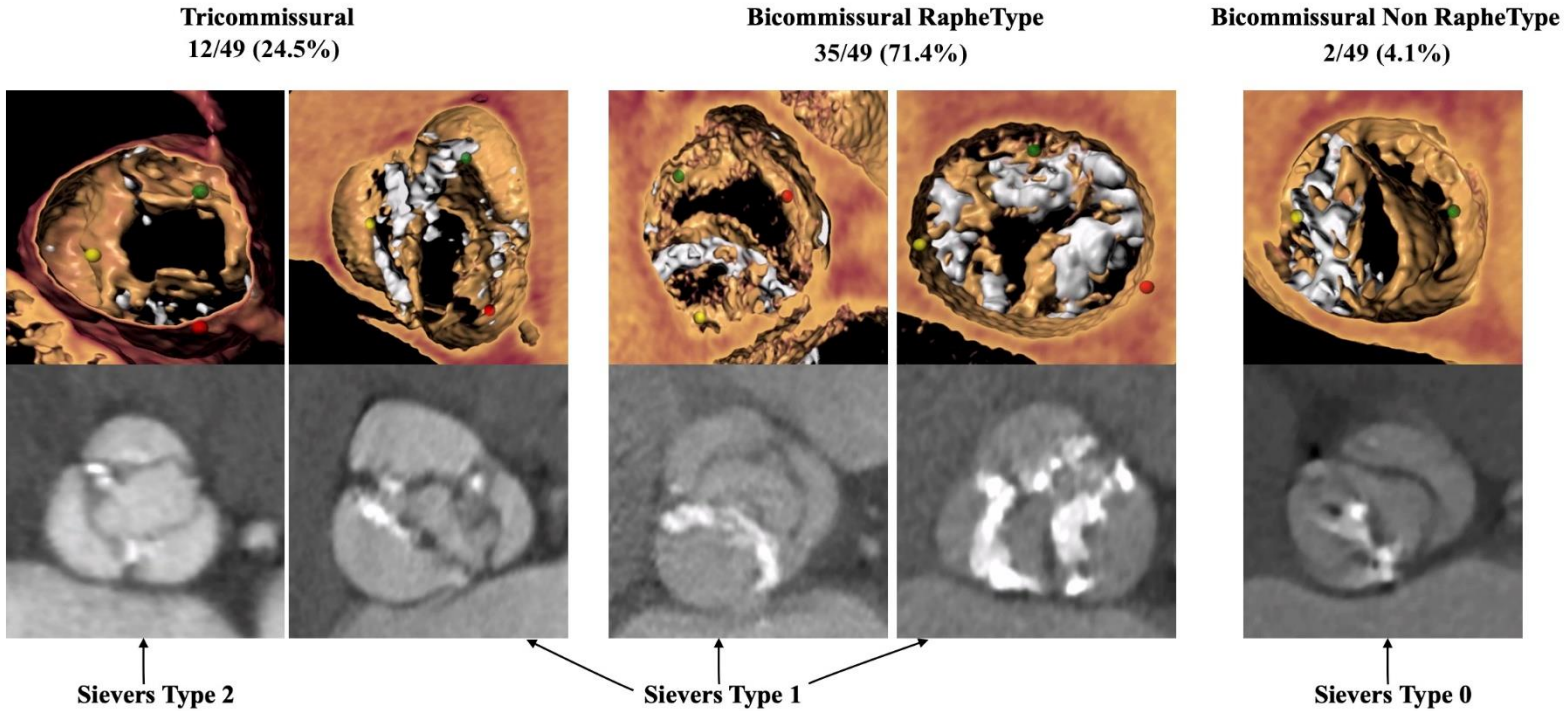
Methods

- Retrospectively single-center study (2014-2024)
- n = 329 BAV TAVR patients
- Baseline AR severity on transthoracic echocardiography assessed using American Society of Echocardiography criteria
  - Significant AR: Grade 3 & 4 (n = 49)
  - Non-significant AR: Grade 1 & 2 (n = 280)
- **Outcomes:**
  - Long term mortality
  - Stroke at 1 year
  - Rehospitalization at 1 year

Baseline Characteristics

Demographic	Non-Significant AR (n = 280)	Significant AR (n = 49)	p-value
Age (years)	72.6 ± 9.3	72.8 ± 8.9	0.835
Male (%)	54.3	65.3	0.201
BMI (kg/m²)	29.1 ± 6.5	27.2 ± 5.5	0.066
eGFR	67.7 ± 21.6	66.0 ± 23.7	0.72
Diabetes (%)	30.4	24.5	0.509
Hypertension (%)	82.9	81.6	0.997
Aortic valve calcium, median AU [IQR]	2599 [1615-4352]	2774 [1731-4884]	0.513
LV EF (Pre-Procedure, %)	56.1 ± 12.7	54.4 ± 16.7	0.617
STS (%)	4.5 ± 3.8	5.5 ± 9.5	0.973
Ascending Aorta > 40 mm (%)	32.5%	32.7%	1
Median follow up months	36.4	37.3	0.418

BAV Types associated with significant AR

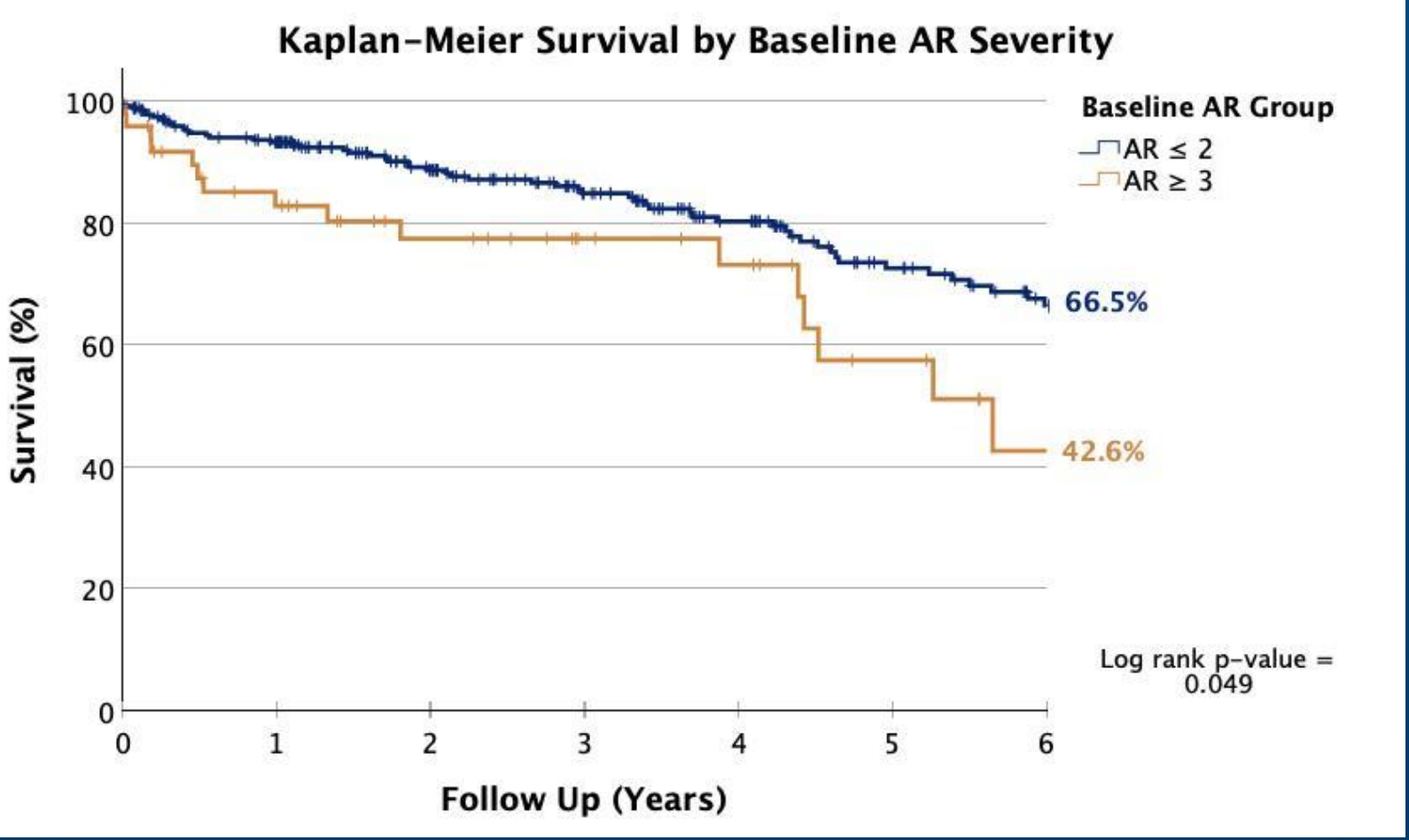


Results

- **Independent predictors of Increased AR severity in BAV:**
  - **Tricommissural > Bicommissural with raphe > Bicommissural with no raphe (Sievers type 0)**
    - **Sievers Type 0 BAV:** HR 0.34 (95% CI: 0.17-0.67, p = 0.002)
    - **Bicommissural raphe vs non-raphe:** HR 2.27 (95% CI: 1.03-4.99, p = 0.043)
    - **Tricommissural vs Bicommissural non raphe:** HR 3.10 (95% CI: 1.26-7.62, p = 0.014)
  - **Lower BMI (per unit):** HR 0.95 (95% CI: 0.92-0.99, p = 0.009)

Outcomes

	AR ≥3 (n = 49)	AR <3 (n = 280)	*P* Value
1-year mortality	8 (16.3%)	18 (6.4%)	**0.571**
KM estimated all-cause mortality over 6 years	57.4%	33.5%	**0.049**
Stroke (1-year)	3 (6.1%)	12 (4.3%)	0.476
Rehospitalization (1-year)	15 (30.6%)	68 (24.3%)	0.374


Kaplan-Meier Survival by Baseline AR Severity
Survival (%)
100
80
60
40
20
0
0
1
2
3
4
5
6
Follow Up (Years)
Baseline AR Group
AR ≤ 2
AR ≥ 3
66.5%
42.6%
Log rank p-value = 0.049

Discussion

- In our cohort, the presence of raphe was associated with significant AR in patients with BAV stenosis
- Bicommissural BAV with raphe and tricommissural variants likely generate eccentric leaflet stress and asynchronous closure, predisposing to regurgitation
- Bicommissural non-raphe, as known as Sievers type 0 valves, may preserve coaptation even after calcification of the leaflets starts causing stenosis

Jilaihawi et al. JACC Cardiovasc Imaging. 2016;9:817-824
Kang et al. *J Thorac Cardiovasc Surg.* 2013;146:1166-1172

Conclusion

- The absence of raphe in BAV stenosis is associated with less significant AR.
- The presence of significant AR at baseline is associated with higher mortality in patients undergoing TAVI.
- Valve morphology assessment with cardiac computed tomography could identify BAV patients for intensified surveillance or earlier intervention, given the significant survival difference shown in this study.

Acknowledgement

- Thank you to the UTHealth Houston and Memorial Hermann Hospital Structural Heart Team
- Dr Abhijeet Dhoble, Dr Xena Moore, Dr Muhammad Khan