

Outcomes in Patients with Small Aortic Annuli Undergoing TAVR with Balloon Expandable Platform

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Disclosure of Relevant Financial Relationships

I, [Nicholas Ruggiero](#), DO NOT have any financial relationships to disclose.

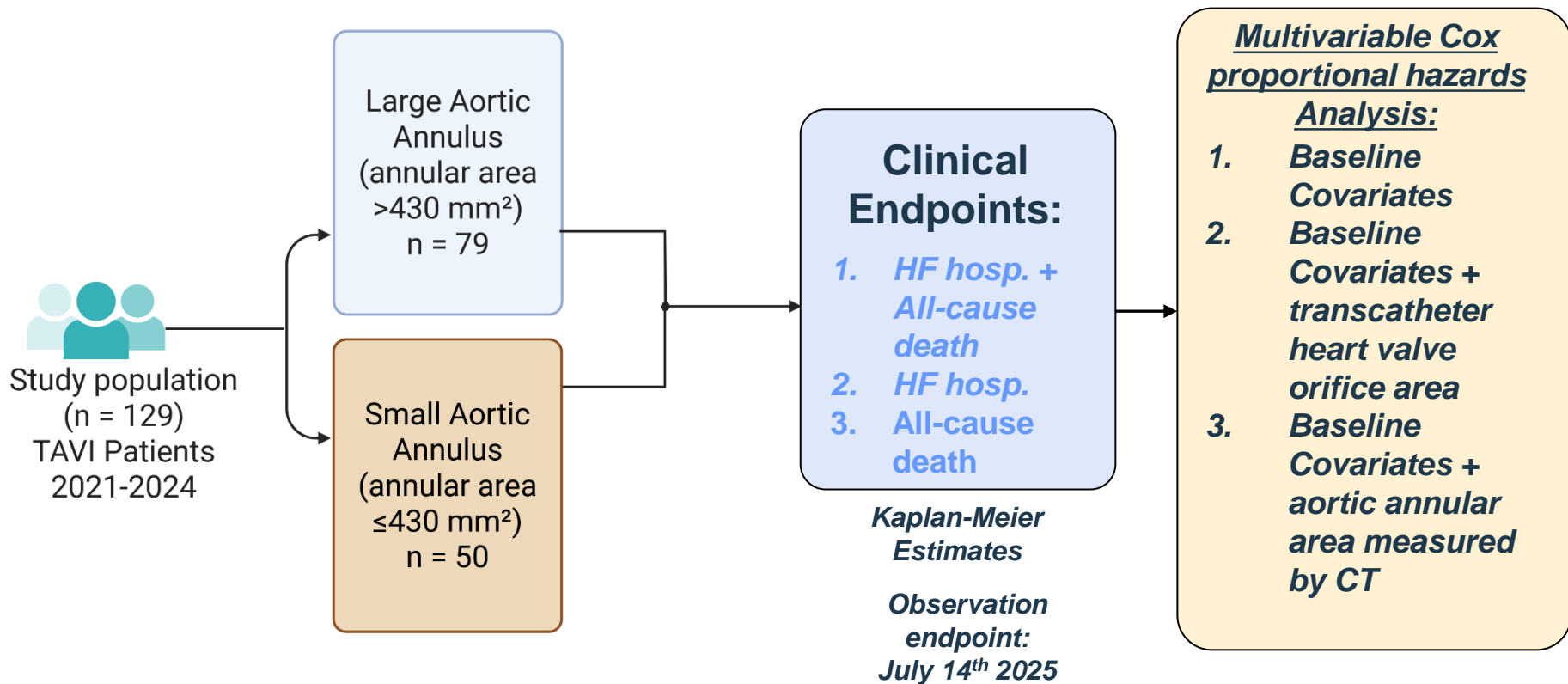
Background

- Patients with severe aortic stenosis (AS) and small aortic annuli undergoing transcatheter aortic valve implantation (TAVI) are at increased risk of patient-prosthesis mismatch (PPM), which has been associated with higher rates of heart failure hospitalizations and mortality following the procedure.
- These concerns are particularly pronounced in patients receiving balloon-expandable (BE) valves, as prior studies have demonstrated lower effective orifice areas with this platform.
- **Aim:** Determine whether small aortic annulus size is independently associated with adverse outcomes following TAVI using a balloon-expandable valve.

Methods

- Retrospective analysis of 129 patients who underwent TAVI with a BE platform at our institution between 2021 and 2024
- Based on pre-operative CT measurements, patients were classified as having either small (annular area $\leq 430 \text{ mm}^2$, $n=50$) or large (annular area $>430 \text{ mm}^2$, $n=79$) aortic annuli.
- Post-deployment orifice areas were determined in all patients with transesophageal echocardiography (TEE) imaging.
 - Orifice areas primarily derived from continuity equation
 - For patients with no continuity equation EOA available, 3D planimetry was used ($n=12$)

Methods



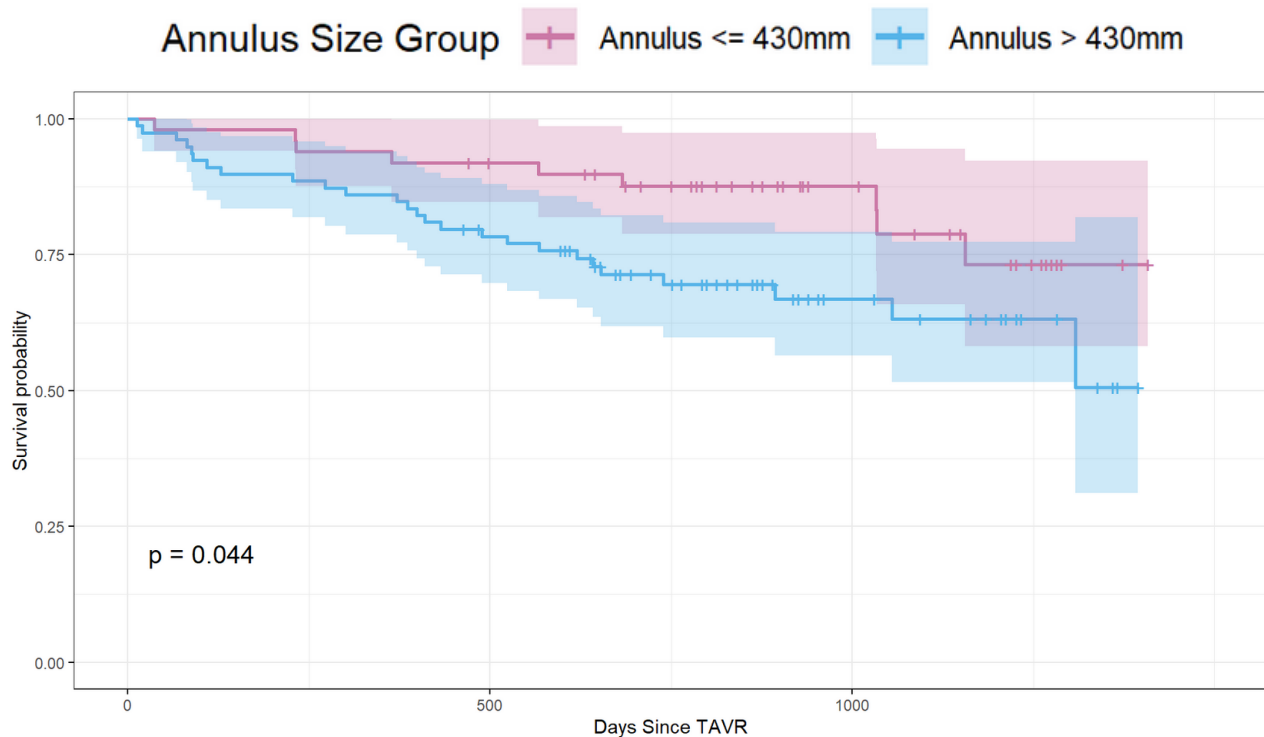
Results: Baseline Characteristics

- Patients with smaller aortic annuli were more likely to be female, have a higher EF and smaller post-deployment EOA.*

Variable	Overall Cohort n=129	Annular Area $\leq 430 \text{ mm}^2$ n=50	Annulus $>430 \text{ mm}^2$ n=79	p-value
Age (years)	79.2 \pm 7.0	79.8 \pm 7.1	78.8 \pm 6.9	0.4
BMI (kg/m ²)	29.3 \pm 6.8	29.2 \pm 7.5	29.4 \pm 6.4	0.5
Male, n (%)	73 (57)	15 (30)	58 (73)	<0.001
CKD, n (%)	55 (43)	25 (50)	30 (38)	0.2
Diabetes, n (%)	60 (47)	26 (52)	34 (43)	0.3
PAD, n (%)	30 (23)	8 (16)	22 (28)	0.12
Prior Stroke, n (%)	17 (13)	10 (20)	7 (8.9)	0.068
Baseline EF (%)	59 \pm 13	64 \pm 12	56 \pm 13	<0.001
Bicuspid Aortic Valve, n (%)	6 (4.7)	2 (4.0)	4 (5.1)	>0.9
>Mild Paravalvular AR, n (%)	13 (10)	2 (4.0)	11 (14)	0.068
EOA (cm ²)	2.3 (0.5)	2.0 (0.3)	2.5 (0.4)	<0.001

All data presented as mean \pm SD or n (%). Categorical variables compared with Chi-squared test or Fisher's exact test where appropriate. Continuous variables compared with Wilcoxon rank sum test.

Results: Kaplan Meier Analysis for Combined Endpoint of All-cause Death or HF Hospitalization



Annulus $\leq 430\text{ mm}^2$ n=50	Annulus $> 430\text{ mm}^2$ n=79	Log-Rank p-value
73%	51%	0.044

Average Follow-up time (Median)
Annulus $\leq 430\text{ mm}^2$: 916 days
Annulus $> 430\text{ mm}^2$: 739 days

Results: Multivariable Cox Proportional Hazards Model for Combined Endpoint

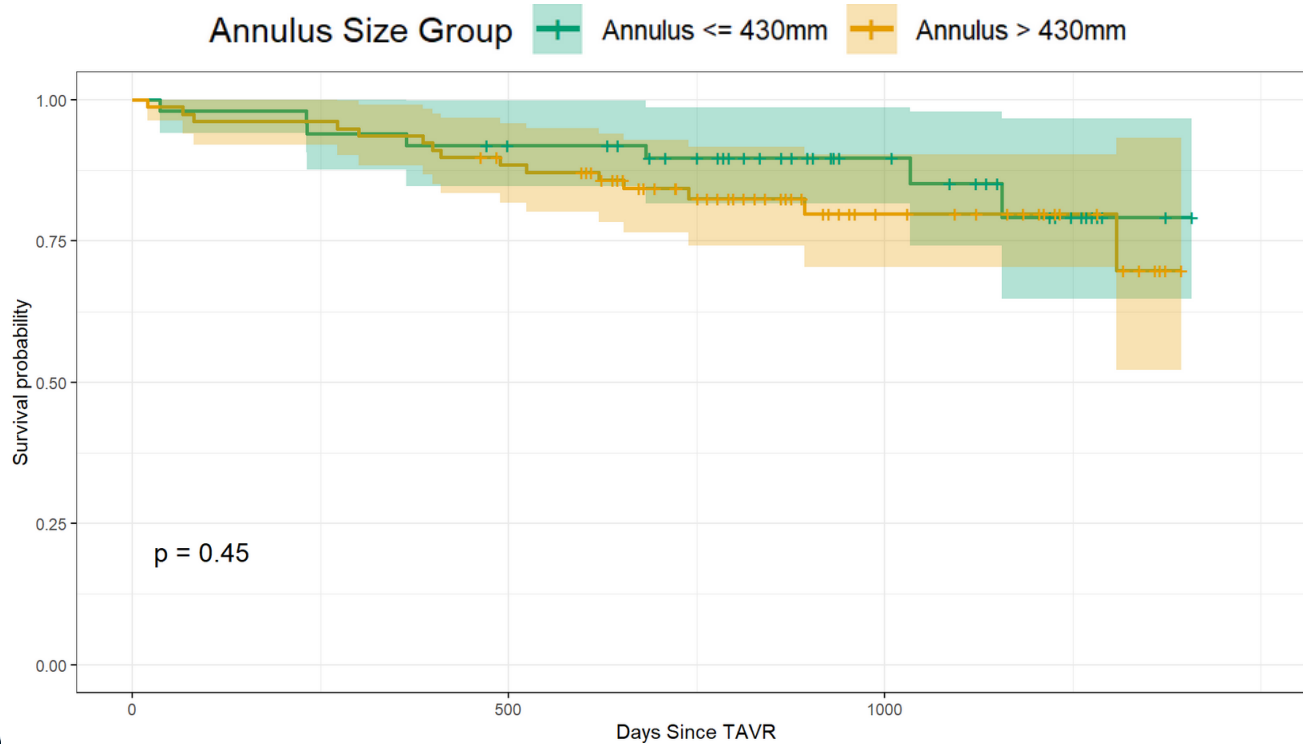
Model 3

Characteristic	HR	95% CI	p-value
Annulus Size	1.00	1.00, 1.01	0.2
Age	1.02	0.97, 1.08	0.4
Male	1.23	0.54, 2.77	0.6
DM	1.61	0.75, 3.46	0.2
CKD	1.62	0.73, 3.60	0.2
Stroke	0.84	0.28, 2.52	0.8
BMI	0.98	0.93, 1.04	0.6
Baseline EF	0.97	0.95, 1.00	0.050
Bicuspid Aortic Valve	0.41	0.05, 3.20	0.4
Paravalvular Aortic Regurgitation	1.51	0.50, 4.59	0.5
Abbreviations: CI = Confidence Interval, HR = Hazard Ratio			

In all three Multivariable Cox Proportional Hazards Models:

- Baseline EF was a significant predictor of the combined endpoint
- EOA and annular area were not significant predictors

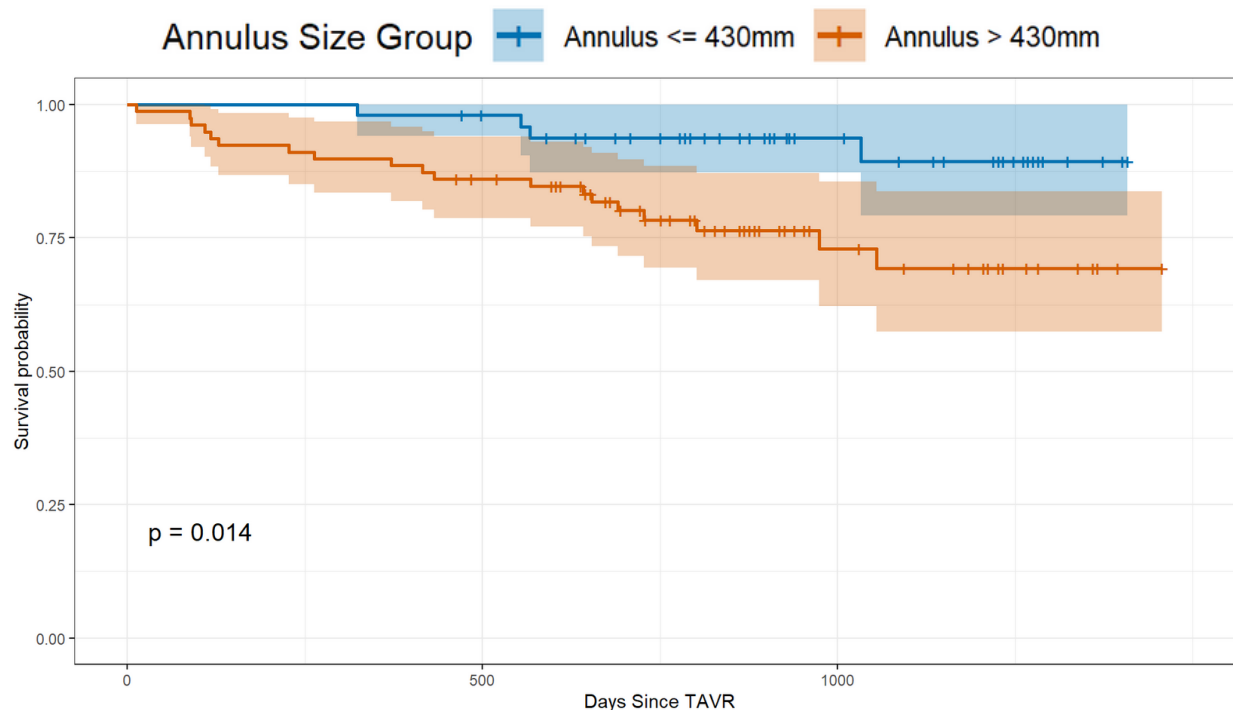
Results: Kaplan Meier Analysis for Endpoint of HF Hospitalization alone



Annulus $\leq 430\text{ mm}^2$ n=50	Annulus $> 430\text{ mm}^2$ n=79	Log-Rank p-value
79%	70%	0.45

Average Follow-up time (Median)
Annulus $\leq 430\text{ mm}^2$: 916 days
Annulus $> 430\text{ mm}^2$: 827 days

Results: Kaplan Meier Analysis for Endpoint of All-cause Death



Annulus $\leq 430\text{ mm}^2$ n=50	Annulus $> 430\text{ mm}^2$ n=79	Log-Rank p-value
89%	69%	0.014

Average Follow-up time (Median)

Annulus $\leq 430\text{ mm}^2$: 930 days

Annulus $> 430\text{ mm}^2$: 802 days

Results: Multivariable Cox Proportional Hazards Model for All-Cause Death Endpoint

Model 3

Characteristic	HR	95% CI	p-value
Annulus Size	1.00	1.00, 1.01	0.10
Age	1.08	1.01, 1.15	0.027
Male	1.87	0.63, 5.59	0.3
DM	1.86	0.69, 5.02	0.2
CKD	1.61	0.57, 4.51	0.4
Stroke	0.23	0.03, 1.96	0.2
BMI	0.94	0.86, 1.03	0.2
Baseline EF	0.95	0.92, 0.98	0.002
Bicuspid Aortic Valve	0.60	0.06, 5.48	0.6
Paravalvular Aortic Regurgitation	1.99	0.51, 7.78	0.3
Abbreviations: CI = Confidence Interval, HR = Hazard Ratio			

In all three Multivariable Cox Proportional Hazards Models:

- Age and baseline EF were significant predictors of All-cause death
- EOA and annular area were not significant predictors

Conclusion

- In patients undergoing TAVI with a BE platform, **larger** aortic annular areas were associated with worse clinical outcomes
- In multivariable analysis, the association between annulus area and clinical outcomes did not persist; in contrast, EF and age were both significant predictors of our endpoints
- The presence of large annular areas in some patients undergoing TAVI may be indicative of lower baseline EF or dilated left ventricles
- Our findings highlight the importance of baseline EF and age as key predictors of outcomes after TAVI