

INTRODUCTION

- Severe aortic stenosis leads to increased left atrial pressures and postcapillary pulmonary hypertension (PH).
- Many TAVR patients additionally have precapillary PH, which is difficult to identify when postcapillary PH is present and is associated with worse outcomes.
- Chest CT**, routinely used for TAVR planning, allows measurement of the **pulmonary artery (PA) diameter** indexed to the **aortic (Ao) diameter**.
- The **PA/Ao diameter ratio** is a known non-invasive marker of precapillary PH severity.
- The **KCCQ** is a validated patient-reported measure of symptoms and functional status in heart failure and is routinely collected in TAVR patients.
- Prior work (Boxhammer et al.) identified **PA/Ao ≥ 0.80** as a predictor of mortality and correlated with mPAP.
- Hypothesis:** A PA/Ao ratio ≥ 0.8 is associated with worse KCCQ scores at baseline, 30 days, and 1 year after TAVR, and with less improvement compared to PA/Ao < 0.8 .

METHODS

- Single-center retrospective cohort** of 433 patients undergoing elective transfemoral TAVR (Oct 2012–Dec 2023).
- Baseline clinical data and outcomes extracted from the medical record.
- PA/Ao ratio measured on **axial CT at the level of the PA bifurcation**.
- Patients categorized into **PA/Ao ≥ 0.8 vs < 0.8** based on established cutoffs.
- Groups compared using **t-tests, Mann–Whitney U, and chi-square tests** ($p < 0.05$).



RESULTS

	All n=433	PA/Ao < 0.80	PA/Ao ≥ 0.80	p-Value
Age	79.36 $\pm$ 8.66	79.86 $\pm$ 8.24	78.90 $\pm$ 9.00	0.25
Male (%)	252 (58.20)	134 (66.18)	118 (52.44)	0.008
BSA	1.90 $\pm$ 0.24	1.89 $\pm$ 0.25	1.90 $\pm$ 0.23	0.52
Echo Data				
LVEF median (IQR)	60 (50,65)	60 (55,65)	60 (50,65)	0.32
Vmax M/s	3.95 $\pm$ 0.79	3.97 $\pm$ 0.82	3.93 $\pm$ 0.76	0.56
AV Mean Gradient mmHg	38.65 $\pm$ 13.84	38.62 $\pm$ 13.77	38.67 $\pm$ 13.91	0.97
AVA cm2	0.76 $\pm$ 0.20	0.75 $\pm$ 0.20	0.76 $\pm$ 0.20	0.72
Aorta Diameter (cm)	34.77 $\pm$ 4.40	35.86 $\pm$ 4.67	33.77 $\pm$ 3.88	< 0.001
CT Data				
PA Diameter	27.71 $\pm$ 4.42	24.94 $\pm$ 3.24	30.24 $\pm$ 3.79	< 0.001
PA/Ao	0.80 $\pm$ 0.13	0.70 $\pm$ 0.07	0.90 $\pm$ 0.08	< 0.001
KCCQ Baseline	60.45 $\pm$ 25.19	65.59 $\pm$ 24.13	55.73 $\pm$ 25.22	< 0.001
KCCQ 30-Days	78.68 $\pm$ 21.25	81.14 $\pm$ 19.03	76.44 $\pm$ 22.88	0.02
KCCQ 1-year	81.88 $\pm$ 19.95	84.41 $\pm$ 19.95	79.24 $\pm$ 21.63	0.05
Delta 30 n=235	18.24 $\pm$ 26.03	15.55 $\pm$ 23.38	20.70 $\pm$ 28.01	0.04
Delta 1-year n=235	14.32 $\pm$ 29.71	14.94 $\pm$ 27.36	13.63 $\pm$ 33.04	0.75
RHC Data	N = 223			
CVP	8.34 $\pm$ 5.35	8.32 $\pm$ 5.74	8.35 $\pm$ 4.98	0.96
sPAP	41.21 $\pm$ 12.59	36.45 $\pm$ 10.78	45.34 $\pm$ 12.59	< 0.001
dPAP	16.74 $\pm$ 7.28	14.83 $\pm$ 6.98	18.38 $\pm$ 7.14	< 0.001
mPAP	26.97 $\pm$ 9.37	23.73 $\pm$ 8.18	29.78 $\pm$ 9.43	< 0.001
PCWP	16.50 $\pm$ 8.07	15.18 $\pm$ 7.92	17.71 $\pm$ 8.00	0.02
Stroke Volume (ml)	71.09 $\pm$ 21.15	70.44 $\pm$ 16.49	71.68 $\pm$ 24.62	0.70
CI	2.51 $\pm$ 0.76	2.44 $\pm$ 0.64	2.57 $\pm$ 0.84	0.21
CVP/PCWP	0.49 $\pm$ 0.25	0.52 $\pm$ 0.29	0.45 $\pm$ 0.19	0.04
PAPi	4.48 $\pm$ 4.17	4.04 $\pm$ 3.84	4.80 $\pm$ 4.39	0.19
PAES	0.63 $\pm$ 0.27	0.56 $\pm$ 0.24	0.70 $\pm$ 0.28	0.001
PVR	2.48 $\pm$ 1.50	2.18 $\pm$ 1.30	2.75 $\pm$ 1.60	0.008
TPG	10.77 $\pm$ 5.83	9.18 $\pm$ 4.40	12.22 $\pm$ 6.55	< 0.001

	N (n= 433)	OR	95% CI		p-Value
30-Day KCCQ (Composite)			Lower	Upper	
Very Poor (0-24)	10	8.37	1.05	66.60	0.04
Poor (25-49)	35	1.22	0.61	2.44	0.58
Fair (50-74)	104	1.31	0.85	203	0.22
Good (>75)	284	0.48	0.31	0.73	0.0006
Delta 30					
Large Decline (≤ -25)	18	1.84	0.68	4.99	0.23
Moderate Decline (-24 to -17)	11	0.50	0.15	1.75	0.28
Mild Decline (-16 to -5)	44	1.09	0.58	2.03	0.79
No Change (-4 to 4)	69	0.33	0.19	0.58	0.0001
Mild Improvement (5-9)	37	1.20	0.61	2.34	0.60
Moderate Improvement (10-21)	80	1.19	0.72	1.94	0.48
Large Improvement (≥ 22)	174	1.42	0.97	2.09	0.07

KEY FINDINGS

- Patients with **PA/Ao ≥ 0.8** had **significantly lower KCCQ scores** pre-TAVR, at 30 days, and at 1 year.
- PA/Ao ≥ 0.8 showed a **greater improvement** in KCCQ at 30 days
 - Δ KCCQ: **20.7 $\pm$ 28.01 vs 15.55 $\pm$ 23.38, $p = 0.04$**
- Despite greater improvement, the PA/Ao ≥ 0.8 group was more likely to report:
 - “Very poor” quality of life** at 30 days (OR 8.37; 95% CI 1.05–66.60; $p = 0.04$)
 - Less likely to report “Good” quality of life** (OR 0.48; 95% CI 0.31–0.73; $p < 0.01$)
- PA/Ao < 0.8 was more likely to show **“no change”** in KCCQ scores.
- The two groups differed significantly in right heart catheterization variables, including **sPAP, dPAP, mPAP, PCWP, PAES, PVR, and TPG**.

DISCUSSION

- PA/Ao ≥ 0.8** is associated with **worse KCCQ scores** at baseline, 30 days, and 1 year, suggesting greater symptom burden and worse quality of life.
- Although PA/Ao ≥ 0.8 patients showed **larger early improvement**, their absolute KCCQ scores remained worse at both 30 days and 1 year.
- PA/Ao ≥ 0.8 correlated with **higher right-sided pressures**, consistent with prior studies.
- Findings support PA/Ao ratio as a **valuable non-invasive surrogate** for right heart hemodynamics and a potential predictor of post-TAVR outcomes.

REFERENCES

- Boxhammer et al. CT-measured PA/Ao ratio predicts pulmonary hypertension in severe aortic valve stenosis. Clin Res Cardiol. 2023;112(10):1394-1416.
- Stogios et al. Challenges in standardizing patient-reported outcomes using the KCCQ. Eur J Heart Fail. 2021;23(2):205-207.