

# Impact of Transcatheter Aortic Valve Replacement on Acceleration/Ejection Time Ratio and Predictors of Its Pre-Procedural Elevation

*Cleveland Clinic Foundation*

Neha Sangani; Judah Rajendran, MD; Tamari Lomaia, MD; Besir Besir, MD; Shivabalan Kathavarayam Ramu, MD; Habib Layoun, MD; Alexander Egoavil; Rishi Puri, MD; Grant Reed, MD; Amar Krishnaswamy, MD; Samir Kapadia, MD

*Presented by Judah Rajendran, MD on behalf of Neha Sangani*



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# **Disclosure of Relevant Financial Relationships**

We, [Neha Sangani \(Author\)](#)/ [Judah Rajendran \(Presenter\)](#) DO NOT have any financial relationships to disclose.

# Background

- Aortic valve acceleration/ejection time ratio (AV AT/ET)  $\geq 0.35$  is associated with severe aortic stenosis (AS).
- In Transcatheter Aortic Valve Replacement (TAVR) patients, the associations of elevated AT/ET with other echocardiographic variables and the procedure's impact on this ratio remain unclear.

# Objectives

- To evaluate the impact of transcatheter aortic valve replacement (TAVR) on AV AT/ET ratio.
- To identify predictors of pre-procedural AV AT/ET elevation.

# Methods

- Retrospective cohort of 1,607 patients undergoing TAVR at Cleveland Clinic (2016–2020).
- Patients categorized by pre-TAVR AV AT/ET  $\geq 0.35$  (n=490) or  $\leq 0.35$  (n=1117).
- T-tests and chi-squared tests to assess baseline characteristics; paired t-test to assess impact of TAVR on AT/ET; linear regression to assess predictive value of AT/ET

# Baseline Characteristics

Variable	AT/ET>=0.35 n=490	AT/ET<0.35 N=1117	P-value
Age	78±9	79±8	0.24
Female	216(44.1%)	467(41.8%)	0.41
Male	274(55.9%)	650(58.2%)	
BMI	29.5±7	28.8±6	0.1
White race	456(93.1%)	1024(91.7%)	
Black race	17(3.5%)	46(4.1%)	0.63
Other	17(3.5%)	47(4.2%)	
Medical History			
Heart failure	304(72%)	118(28%)	0.08
Pacemaker or ICD	84(17.1%)	131(11.7%)	<b>0.004</b>
Pacemaker	78(15.9%)	121(10.8%)	<b>0.005</b>
ICD	22(4.5%)	32(2.8%)	0.09
MV surgery	12(2.4%)	21(1.9%)	0.45
CAD	254(51.8%)	592(53%)	0.7
PCI	131(26.7%)	349(31.2%)	0.08
CABG	125(25.5%)	306(27.4%)	0.46
Known left main disease	46(9.4%)	111(9.9%)	0.78

# Baseline Characteristics

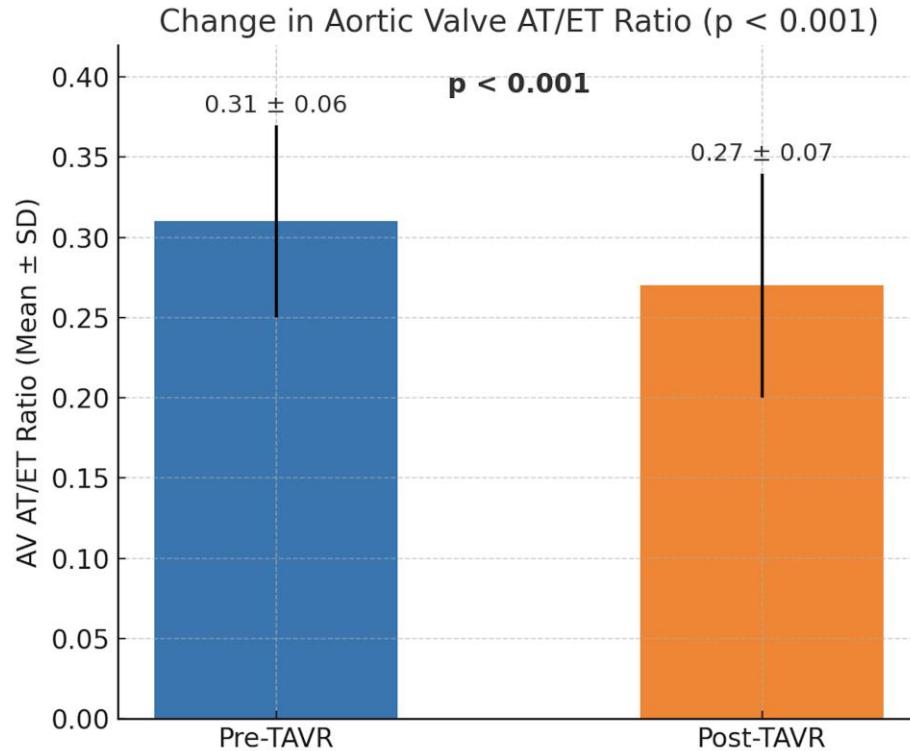
Variable	AT/ET>=0.35 n=490	AT/ET<0.35 N=1117	P-value
Myocardial infarction	107(21.8%)	248(22.2%)	0.89
Stroke	60(12.2%)	131(11.7%)	0.8
Transient ischemic attack	52(10.6%)	113(10.1%)	0.78
Carotid disease	99(20.2%)	289(25.9%)	0.01
PAD	324(66.1%)	726(65%)	0.69
Diabetes	183(37.3%)	421(37.7%)	0.91
Current/Recent Smoker	23(4.7%)	49(4.4%)	0.79
Current dialysis	18(3.7%)	38(3.4%)	0.76
Chronic lung disease	214(43.7%)	470(42.1%)	0.58
Atrial fibrillation or flutter	212(43.3%)	465(41.6%)	0.54
Native bicuspid aortic valve	36(7.3%)	62(5.6%)	0.17
Severe AS	306(78.9%)	82(21.1%)	<b>0.002</b>
STS risk score	6.1±4	5.9±4	0.32

# Echocardiographic Variables

Variable	AT/ET>=0.35	AT/ET<0.35	P-value
Blood Pressure	132±22	139±24	<b>&lt;0.001</b>
LVEF	52.8±14	57.3±11	<b>&lt;0.001</b>
AV Mean Gradient	41.9±16	40.1±14	0.12
AV Peak Gradient	3.2±1.5	3.6±1	0.38
AV VTI	0.96±0.2	0.97±0.2	0.96
LVOT VTI	0.2±0.05	0.2±0.05	<b>&lt;0.001</b>
AV area	0.7±0.1	0.76±0.2	<b>&lt;0.001</b>
LA Volume	89.4±33	84.3±32	<b>0.03</b>
LA diameter	4.4±0.7	4.3±0.8	0.18
LVMI	113±34	106±31	<b>0.002</b>
LV end-diastolic volume	107±50	101±39	0.12
LV end-systolic volume	52±41	45±28	<b>0.01</b>
LVOT diameter	2±0.1	2±0.1	0.96
LVOT maximum velocity	0.8±0.2	0.9±0.1	<b>&lt;0.001</b>
LVOT stroke volume	67±19	72±18	<b>&lt;0.001</b>
SVI	34±10	37±9	<b>&lt;0.001</b>
LVMI	113.8±34	106.1±31	0.002

# Results – Impact of TAVR

- Mean AV AT/ET decreased significantly within 3 months following TAVR:
  - From 0.31 to 0.27 ( $p < 0.001$ )

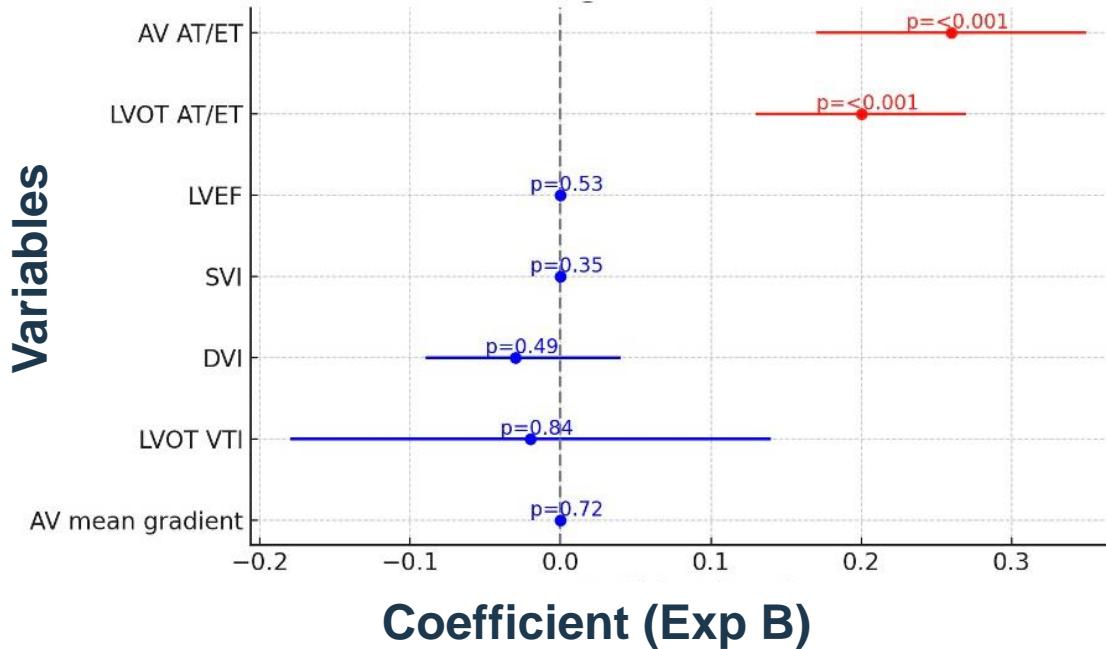


# Results – Predictive Value

- Proportional reduction: higher pre-TAVR AV AT/ET predicted higher post-TAVR ( $p < 0.001$ ).
- No correlation with post-TAVR AV mean gradient ( $p = 0.72$ ).

# Results – Predictive Value cont.

*Prediction of Post-TAVR Echocardiographic Variables  
from Baseline AT/ET*



# Clinical Implications

- Pre-TAVR AV AT/ET can be useful to identify patients who may be at a high-risk of having higher AT/ET ratio post TAVR.
- Since post TAVR AT/ET ratio predict clinical outcomes, future studies are needed to identify possible procedural modifications that may help to mitigate higher post procedural AT/ET ratio.
- Integration of AT/ET ratio into pre and post procedural risk stratification algorithms may be helpful for better characterization of hemodynamics for AS patients before and after AVR.

# Limitations

- Single center retrospective analysis
- Multivariable analysis to understand independent determinants of pre TAVR AT/ET ratio needs to be completed (on going research)
- Clinical implications and determinants of persistently higher AT/ET ratio after TAVR compared to pre TAVR AT/ET ratio is also not presented in this analysis but is being actively investigated

# Conclusions

- Elevated pre-TAVR AV AT/ET associated with smaller AVA, lower BP, lower LVEF and predicts higher post-TAVR AV and LVOT AT/ET
- TAVR significantly reduces AV AT/ET ratio.
- Post TAVR AT /ET ratio correlates with post TAVR At/ET ratio