

# Five-year Echocardiographic Outcomes From The PARTNER 3 Low-risk Randomized Trial



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Philippe Pibarot, DVM, PhD**  
on behalf of the PARTNER 3 Trial Investigators



# Disclosures: Rebecca Hahn, MD

## TCT 2023 · San Francisco, CA · Oct. 23-26

Within the past 36 months, I or my spouse/partner has had a financial interest/arrangement or affiliation with the organization(s) listed below.

<b>Financial Relationship</b>	<b>Company</b>
• Institutional Research Support	None
• Consulting Fees	None
• Speaker	Abbott Structural, Boston Scientific, Edwards Lifescience, Medtronic, Philips Healthcare
• Other	Echo Core Lab for Edwards Lifescience Trials (no direct compensation)



# Background

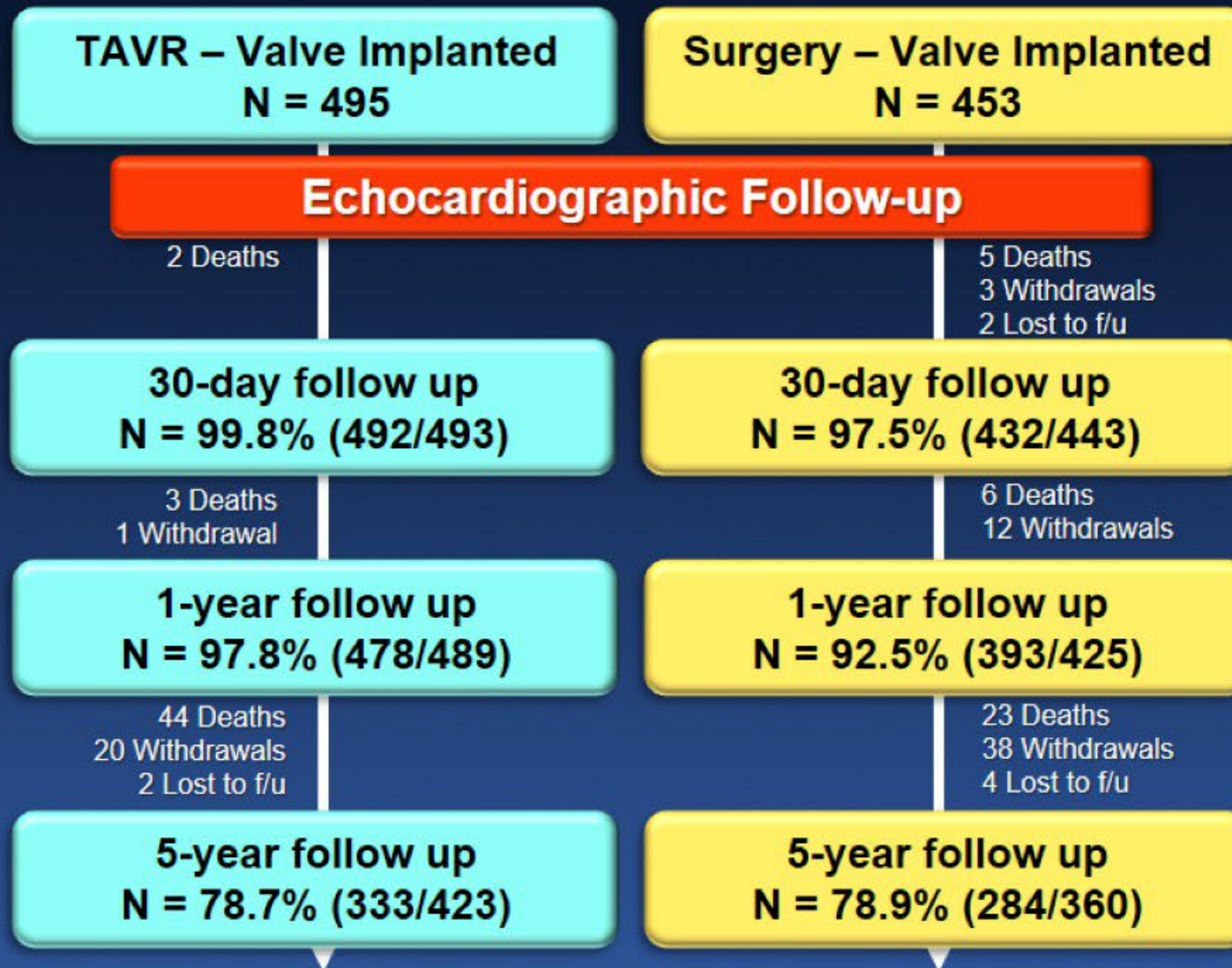
- The PARTNER 3 trial compared TAVR with the SAPIEN 3 valve to surgery in patients with severe, symptomatic aortic stenosis who were at low surgical risk.
- At 1 year, post-AVR **valvulo-arterial impedance (Zva)** and **reduced tricuspid annular plane systolic excursion (TAPSE)** were associated with a higher rate of the composite primary endpoint of death, stroke, or rehospitalization;
  - Post-AVR  $\geq$  moderate PVR, severe PPM, or high residual gradient were not associated with a higher rate of the composite primary endpoint.

# Purpose

- To compare echocardiographic findings in low-risk patients with severe aortic stenosis following TAVR or surgery at 5 years
- To examine any associations between 30-day echocardiographic parameters in the PARTNER 3 trial and clinical outcomes at 5 years



# Echo Follow-up to 5 Years



**78.8% of patients available for echocardiography analysis at 5 years**

# Baseline Echo Characteristics

% or mean  $\pm$  SD

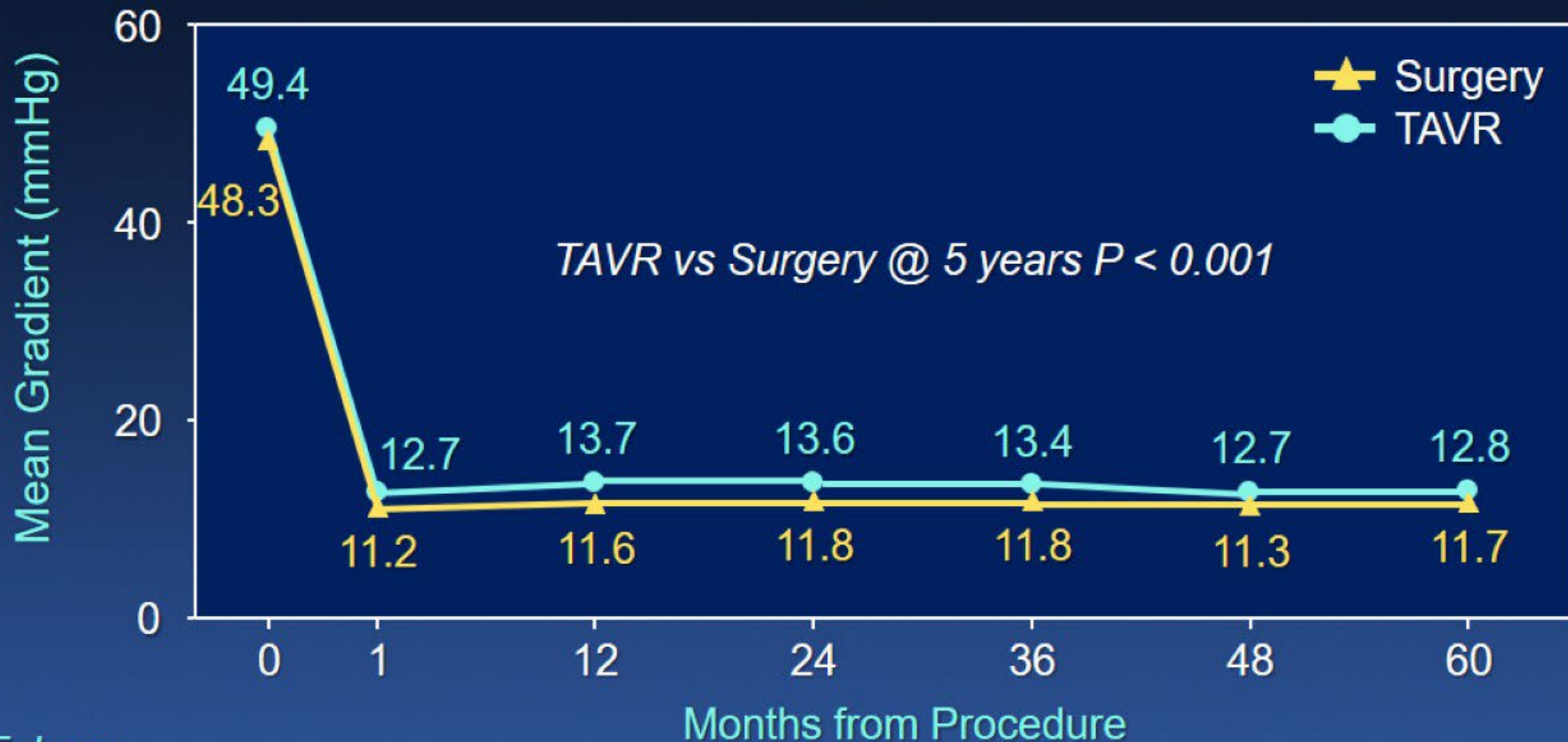
Key Echo Characteristics	TAVR (N=496)	Surgery (N=454)	Key Echo Characteristics	TAVR (N=496)	Surgery (N=454)
Mean gradient (mmHg)	49.4 $\pm$ 0.6	48.3 $\pm$ 0.6	LV Mass Index (g/m <sup>2</sup> )	104.6 $\pm$ 1.2	101.5 $\pm$ 1.2
AVA (cm <sup>2</sup> )	0.77 $\pm$ 0.01	0.77 $\pm$ 0.01	LVEF < 50%	4.7%	4.8%
DVI	0.19 $\pm$ 0.002	0.20 $\pm$ 0.002	SVI < 35 mL/m <sup>2</sup> (low flow)	23.4%	27.1%
$\geq$ Moderate AR	3.9%	2.5%	TAPSE < 1.6 cm	10.2%	8.1%
$\geq$ Moderate MR	1.3%	3.2%	PASP $\geq$ 35 mmHg*	43.4%	55.2%
$\geq$ Moderate TR	1.7%	2.3%	TAPSE/PASP < 0.50	26.3%	29.3%

\* $P < 0.05$



# Valve Hemodynamics

## Mean Gradient

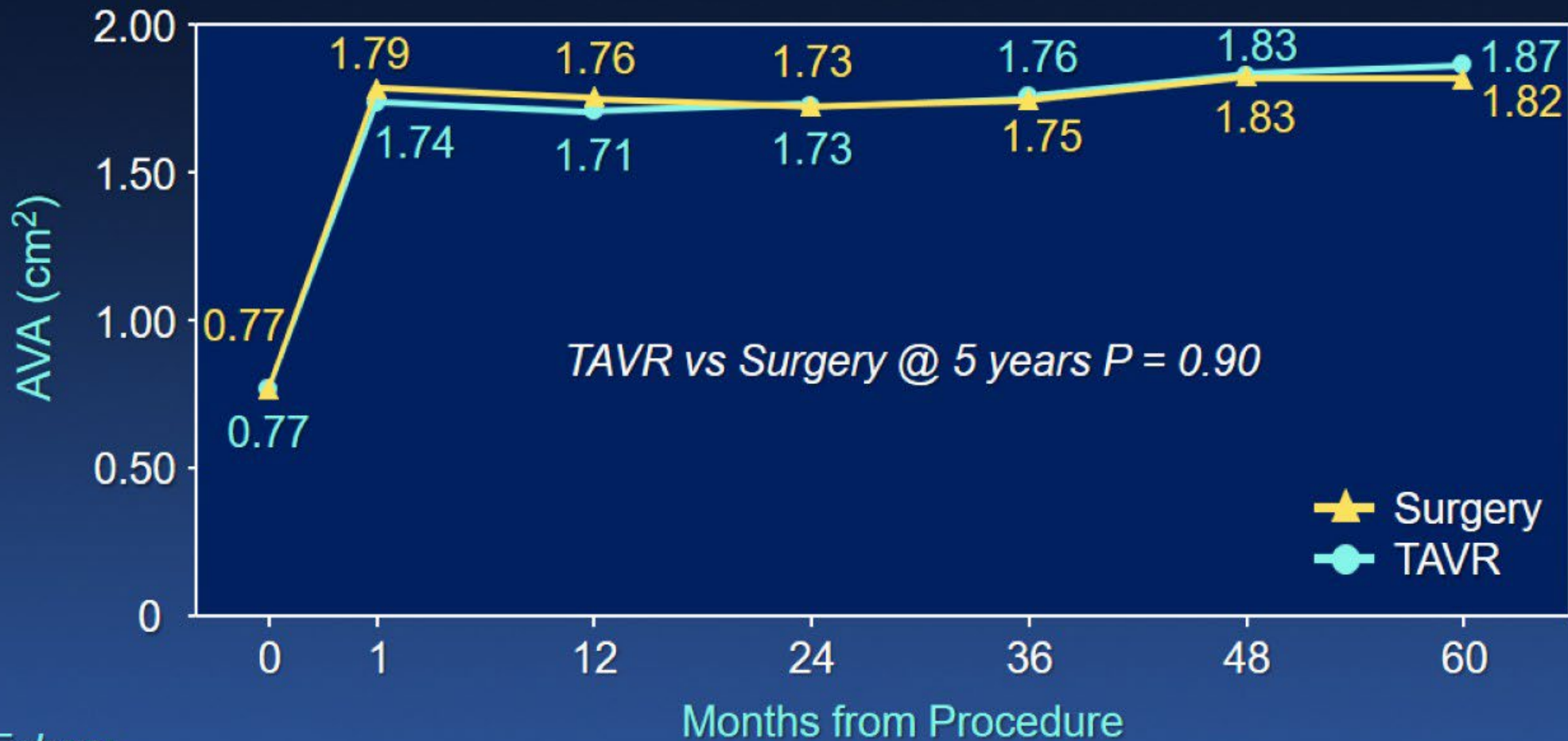


No. of Echos:

TAVR	483	492	474	437	372	348	329
Surgery	442	432	391	360	304	305	282

# Valve Hemodynamics

## Aortic Valve Area

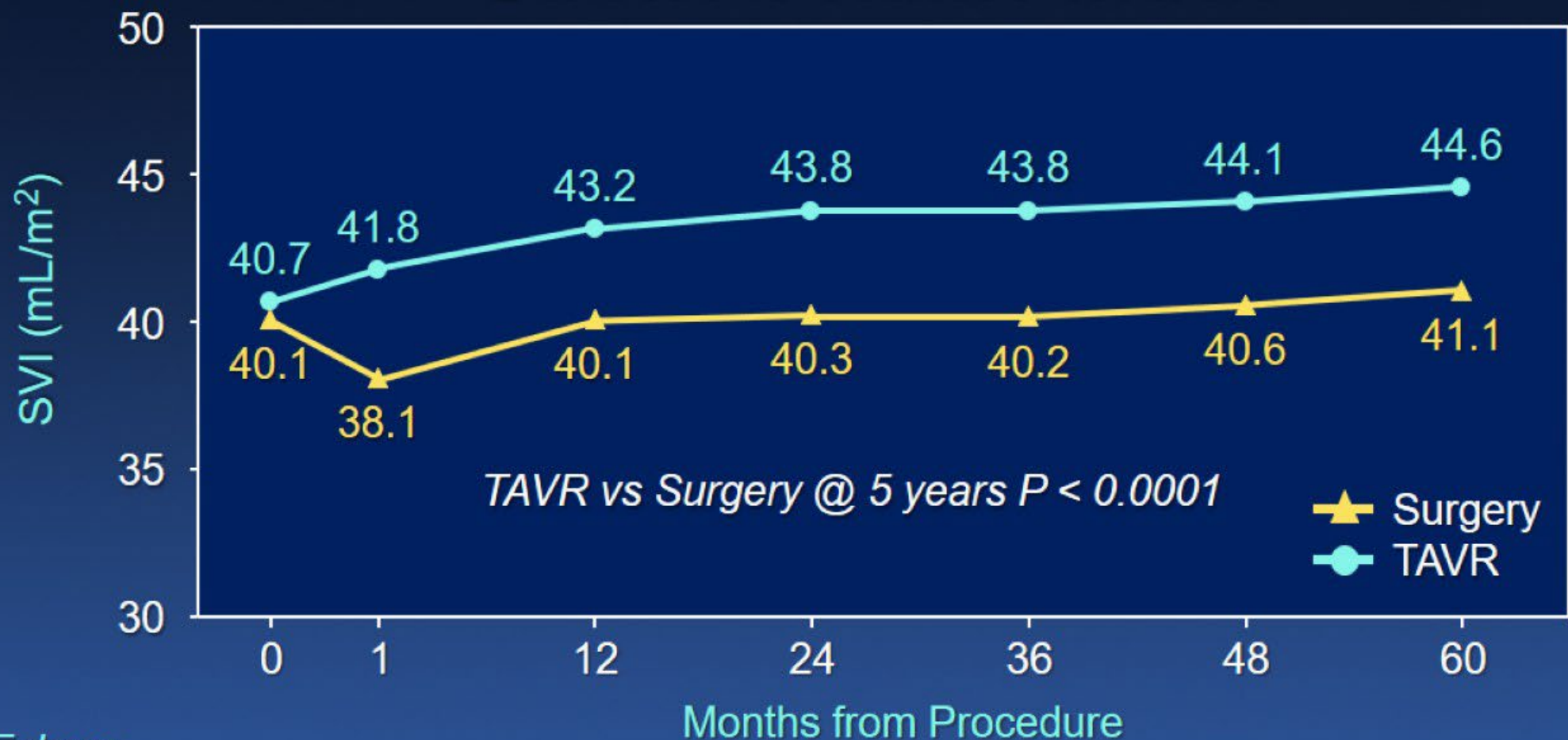


No. of Echos:

TAVR	458	482	450	416	347	334	320
Surgery	424	415	371	342	289	295	275



# Left-ventricular Function Stroke Volume Index

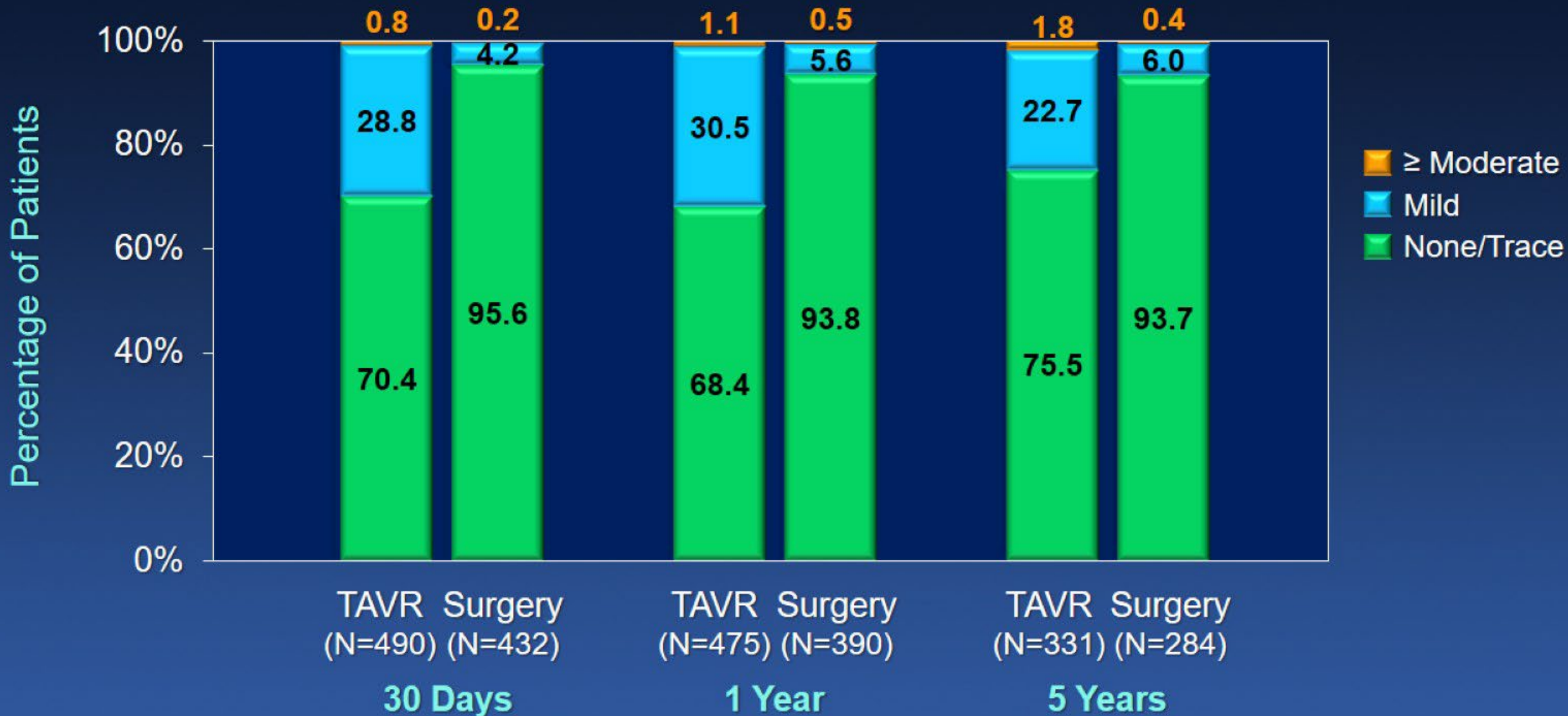


No. of Echos:

TAVR	458	482	455	421	355	336	322
Surgery	424	418	374	347	293	296	276

# Total Aortic Regurgitation

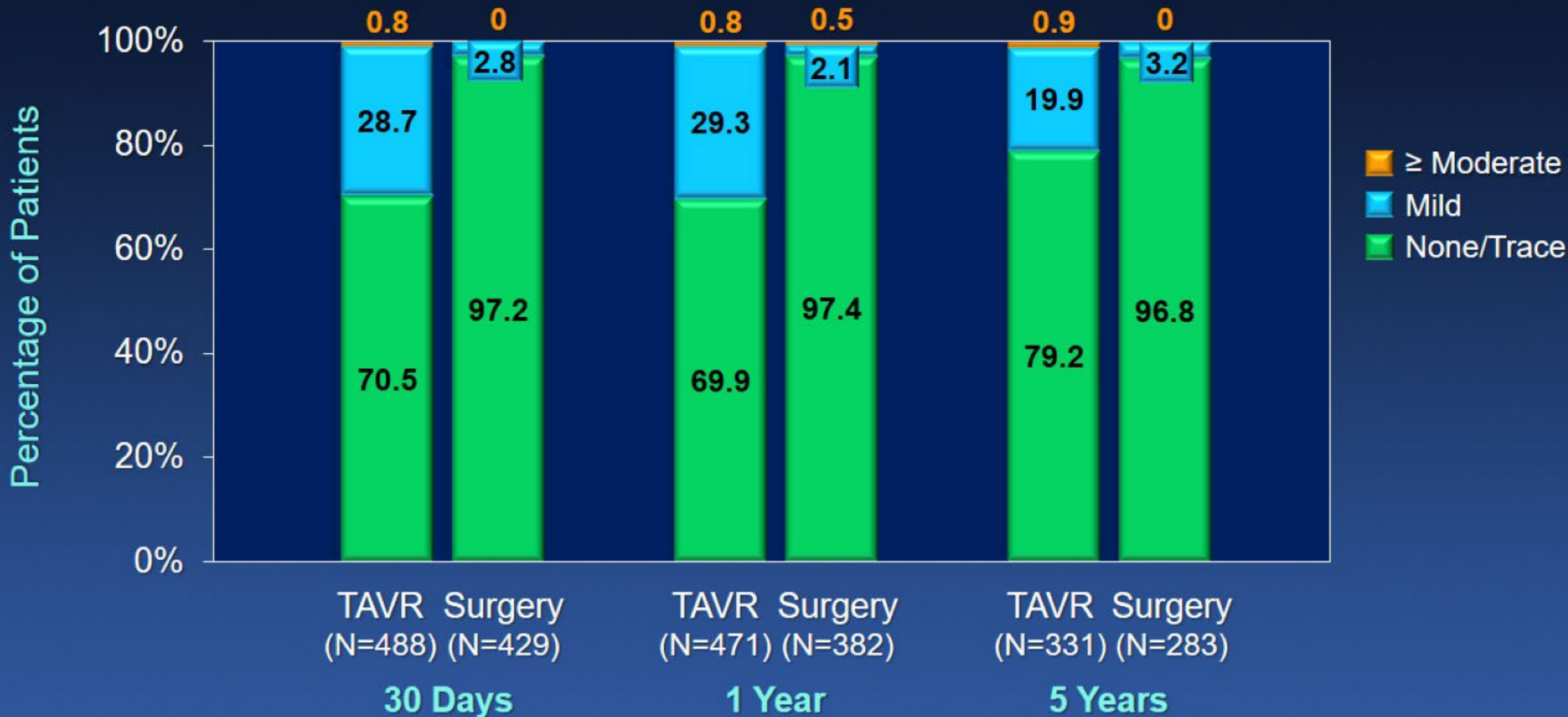
*≥ mild P < 0.001 at all time points*





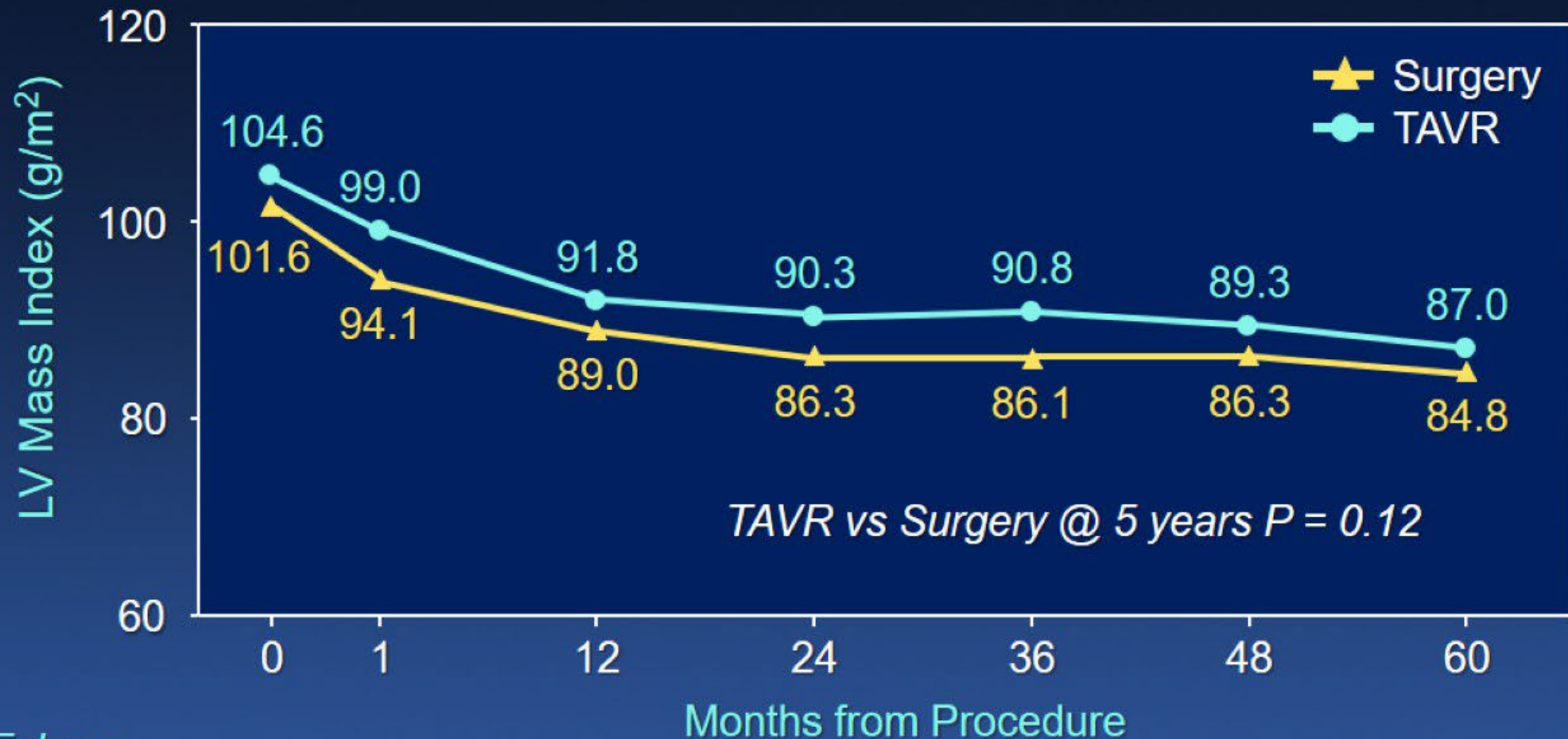
# Paravalvular Regurgitation

*≥ mild P < 0.001 at all time points*



# Left-ventricular Function

## LV Mass Index



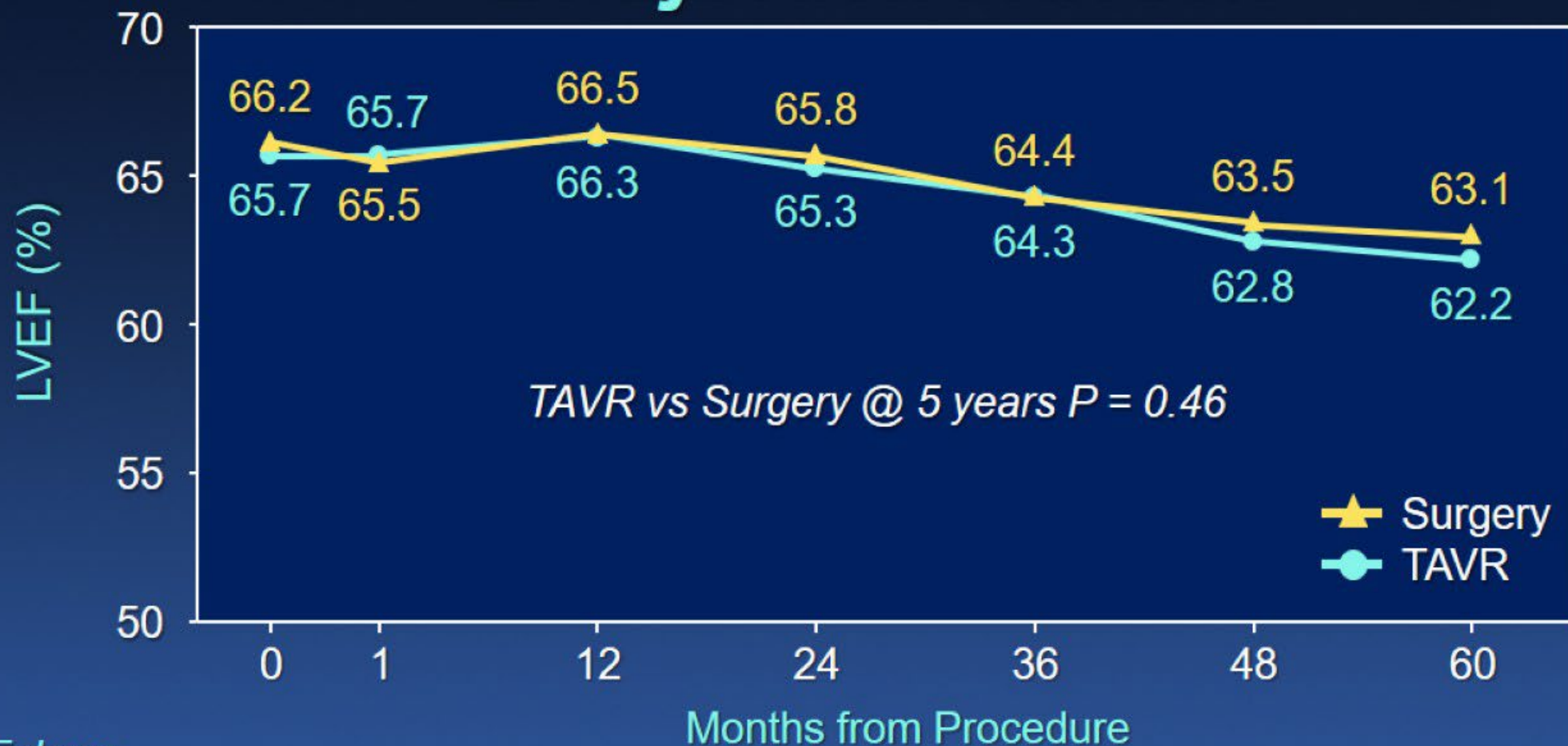
No. of Echos:

TAVR	475	478	467	429	374	353	330
Surgery	435	407	383	356	305	302	280



# Left-ventricular Function

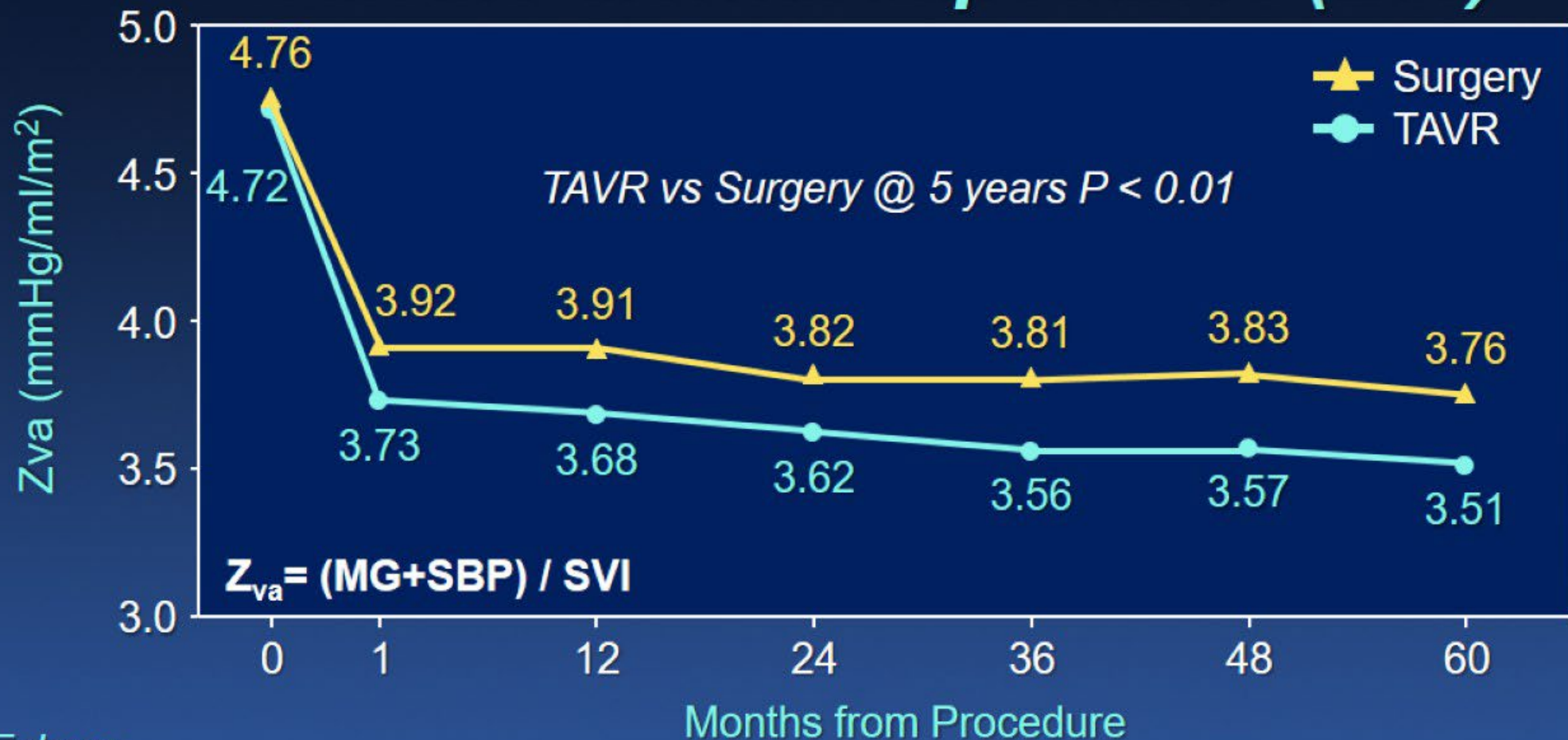
## LV Ejection Fraction



No. of Echos:

TAVR	471	479	454	412	363	341	313
Surgery	435	408	366	344	293	290	275

# Left-ventricular Function Valvulo-arterial Impedance (Zva)

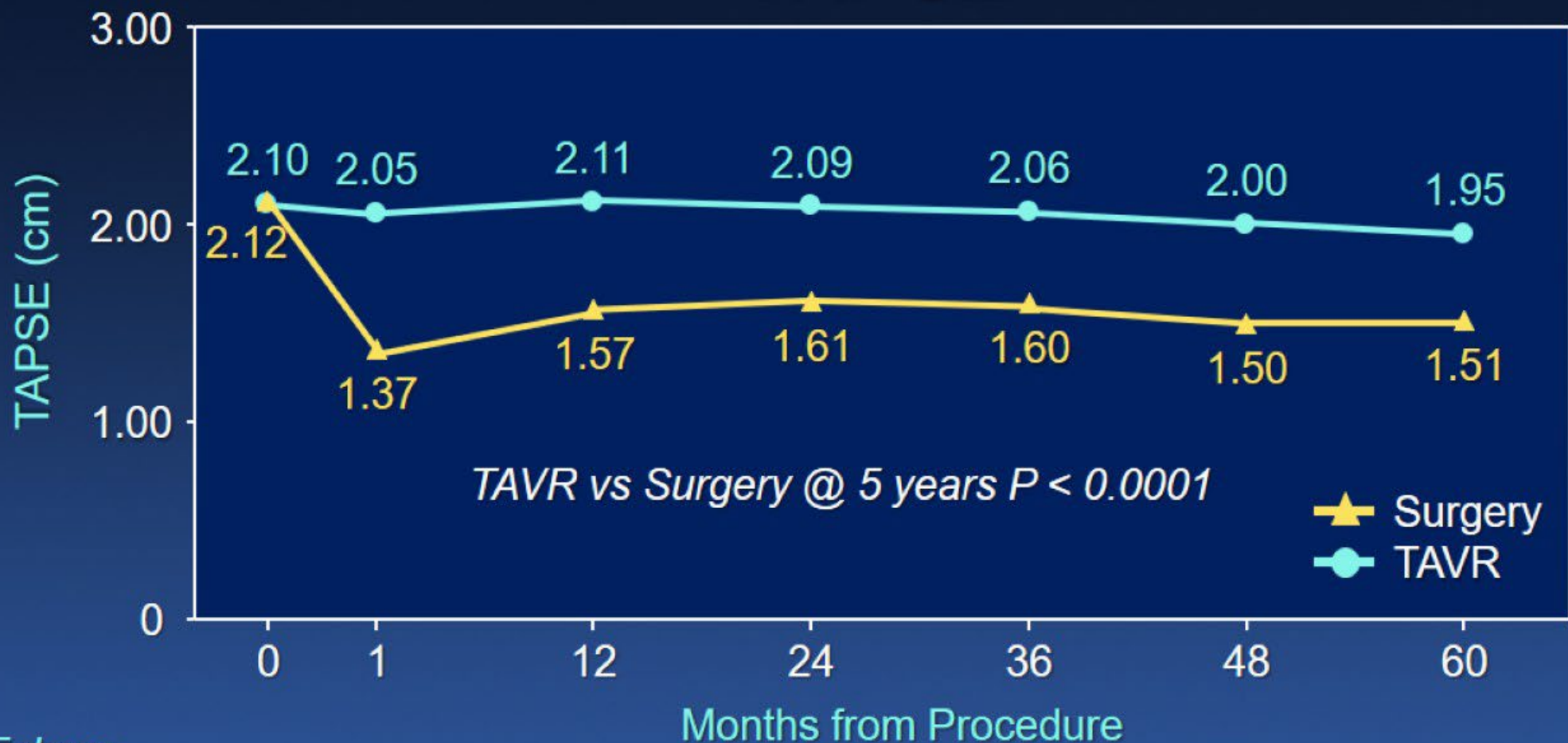


No. of Echos:

TAVR	458	482	452	418	342	323	314
Surgery	424	418	373	341	285	287	264



# Right-ventricular Function TAPSE

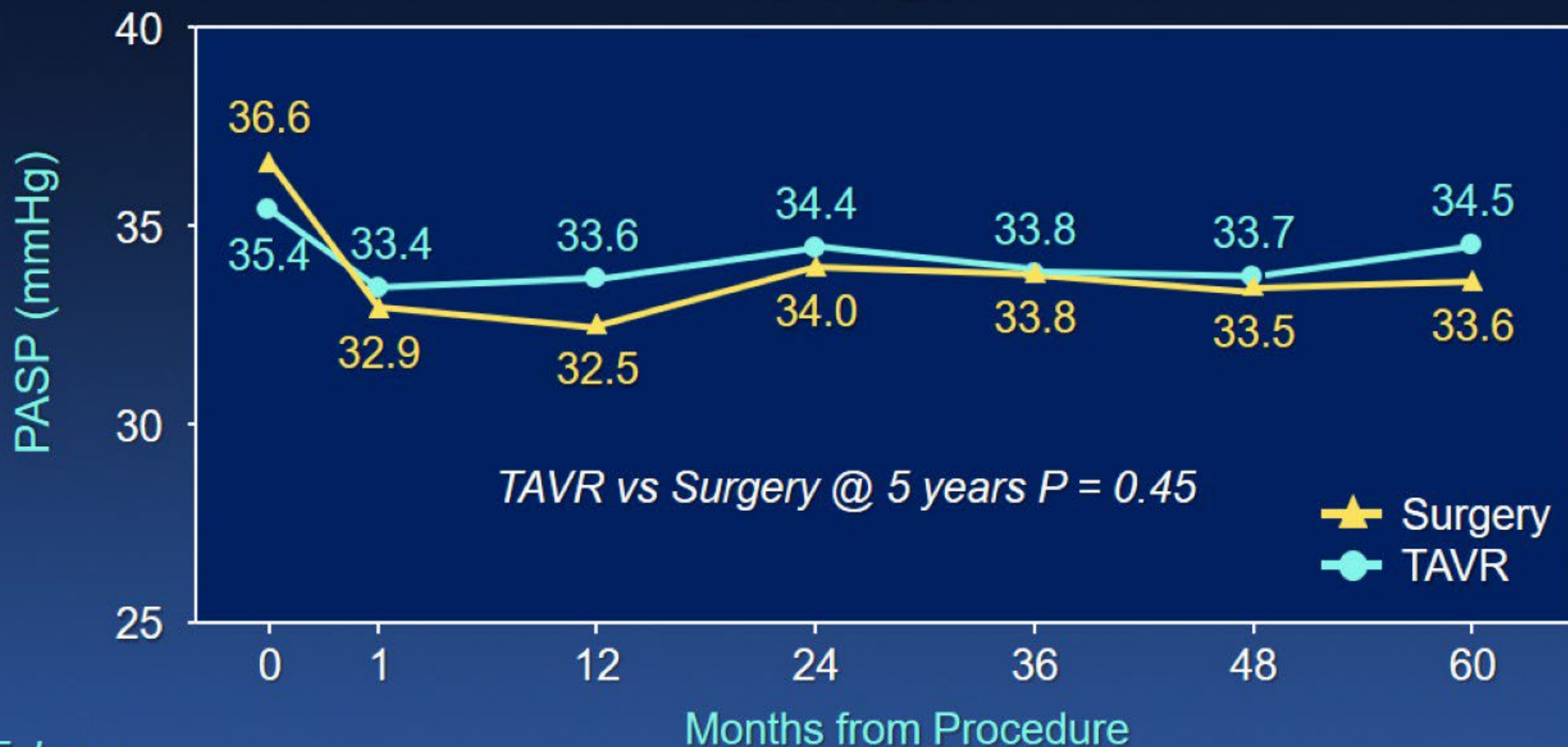


No. of Echos:

TAVR	460	477	451	418	364	338	320
Surgery	420	395	362	336	289	288	272

# Right-ventricular Function

## PASP



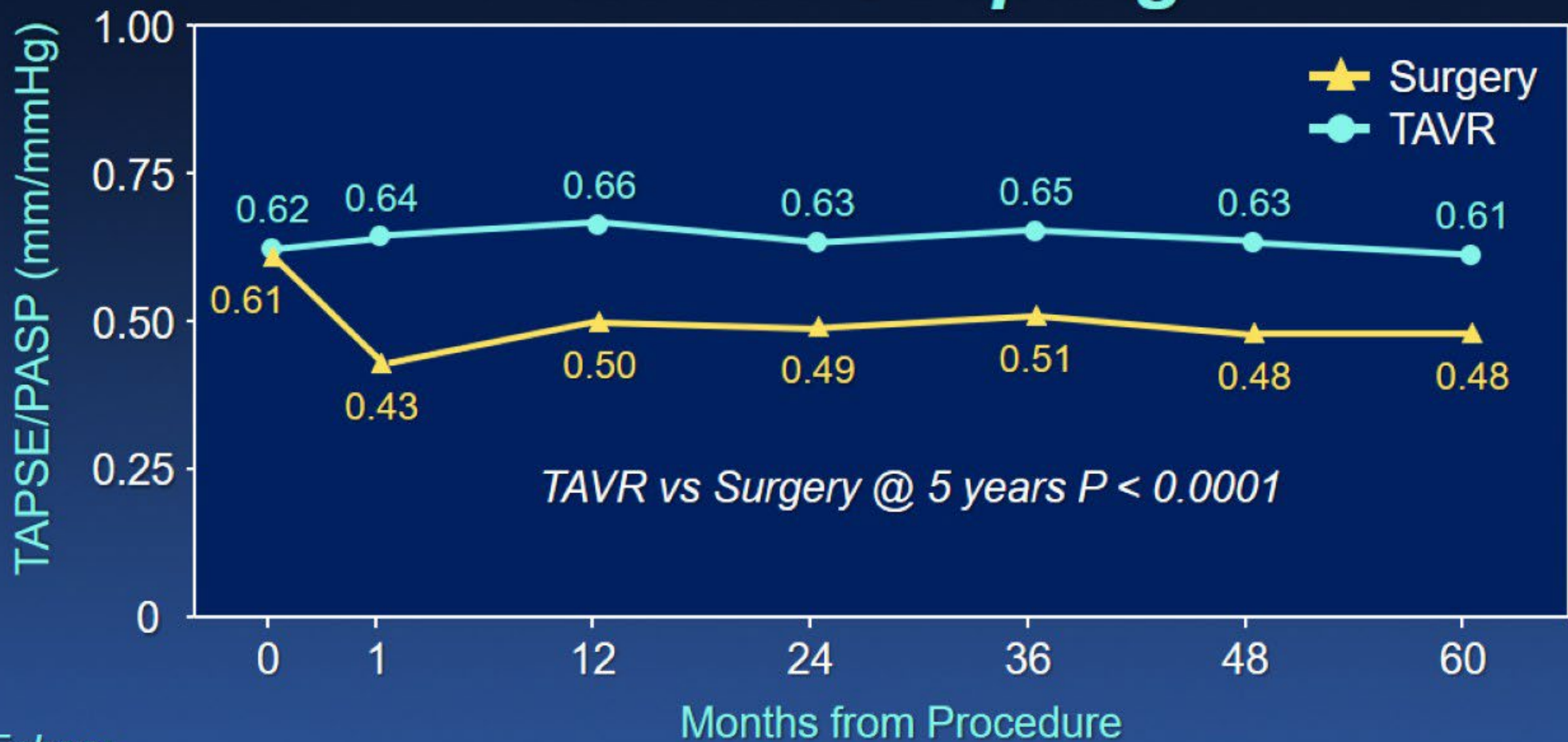
No. of Echos:

TAVR	318	328	333	293	276	275	261
Surgery	281	310	306	287	256	253	236



# Right-ventricular Function

## RV-PA Coupling

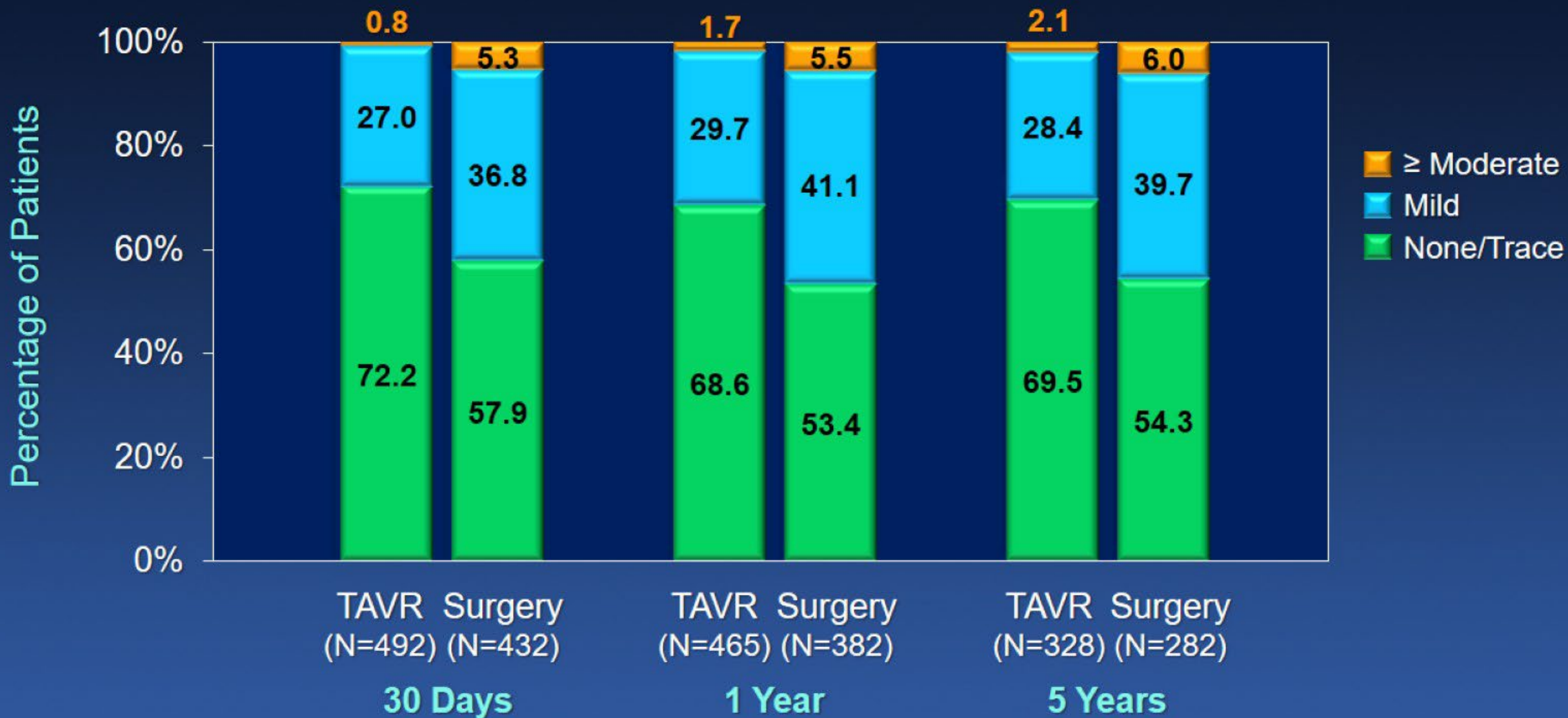


No. of Echos:

TAVR	300	316	314	283	266	262	254
Surgery	270	288	286	266	244	241	230

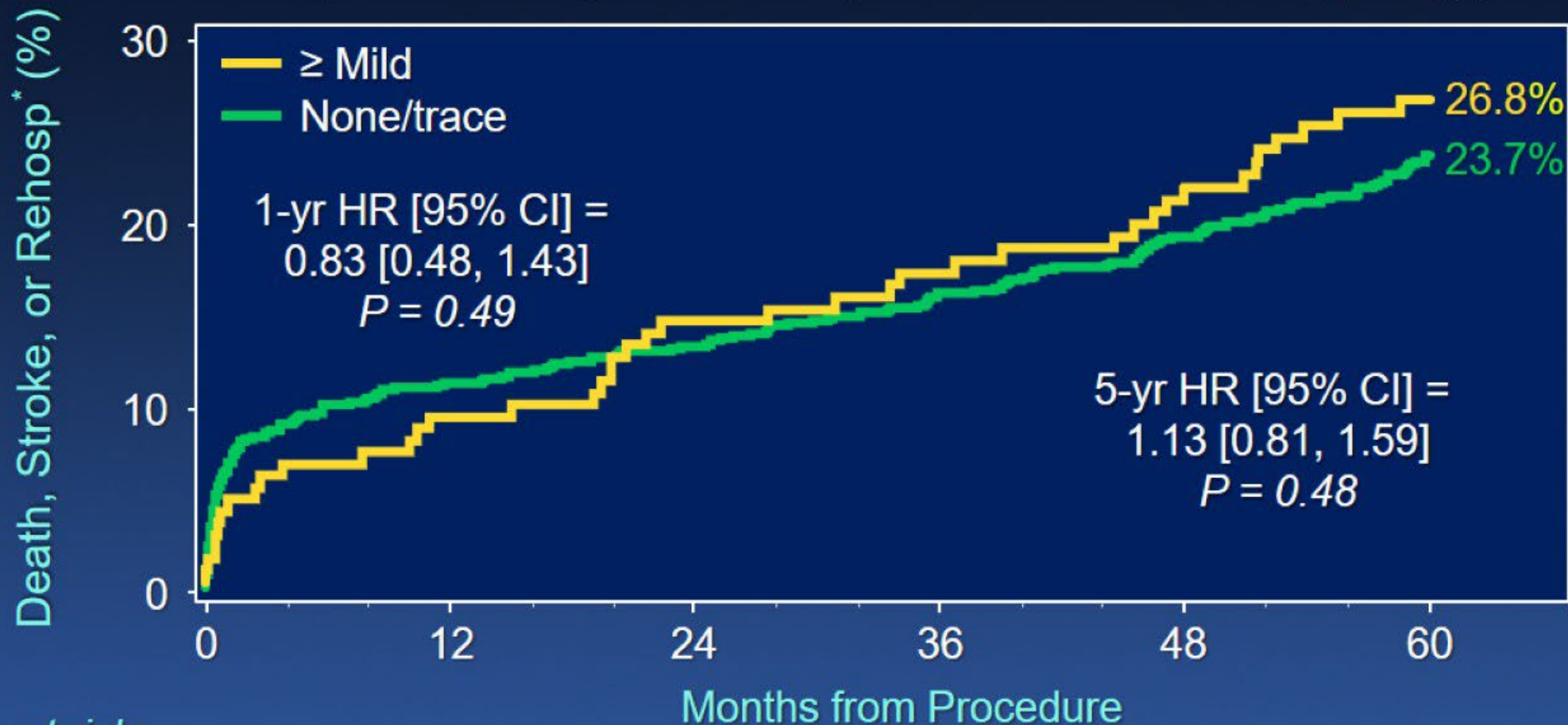
# Tricuspid Regurgitation

*≥ mild P < 0.01 at all time points*





# Composite Primary Endpoint By 30-day PVR (TAVR + Surgery)

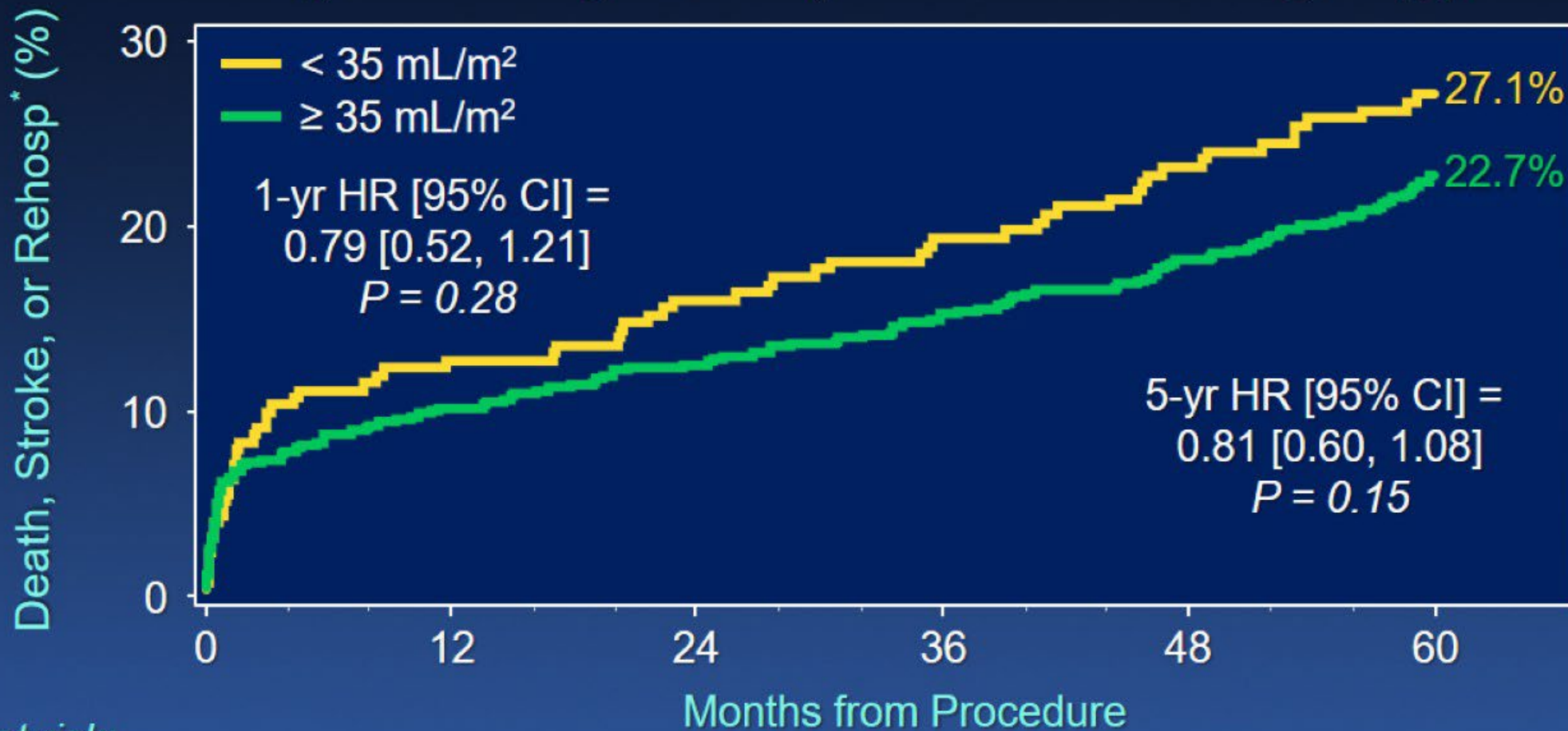


Number at risk:

	0	12	24	36	48	60
$\geq$ Mild	762	671	640	608	573	518
None/trace	156	141	132	126	119	104

<sup>\*</sup>Rehos<sup>\*</sup> defined as valve-, procedure-, or HF-related

# Composite Primary Endpoint By 30-day SVI (TAVR + Surgery)



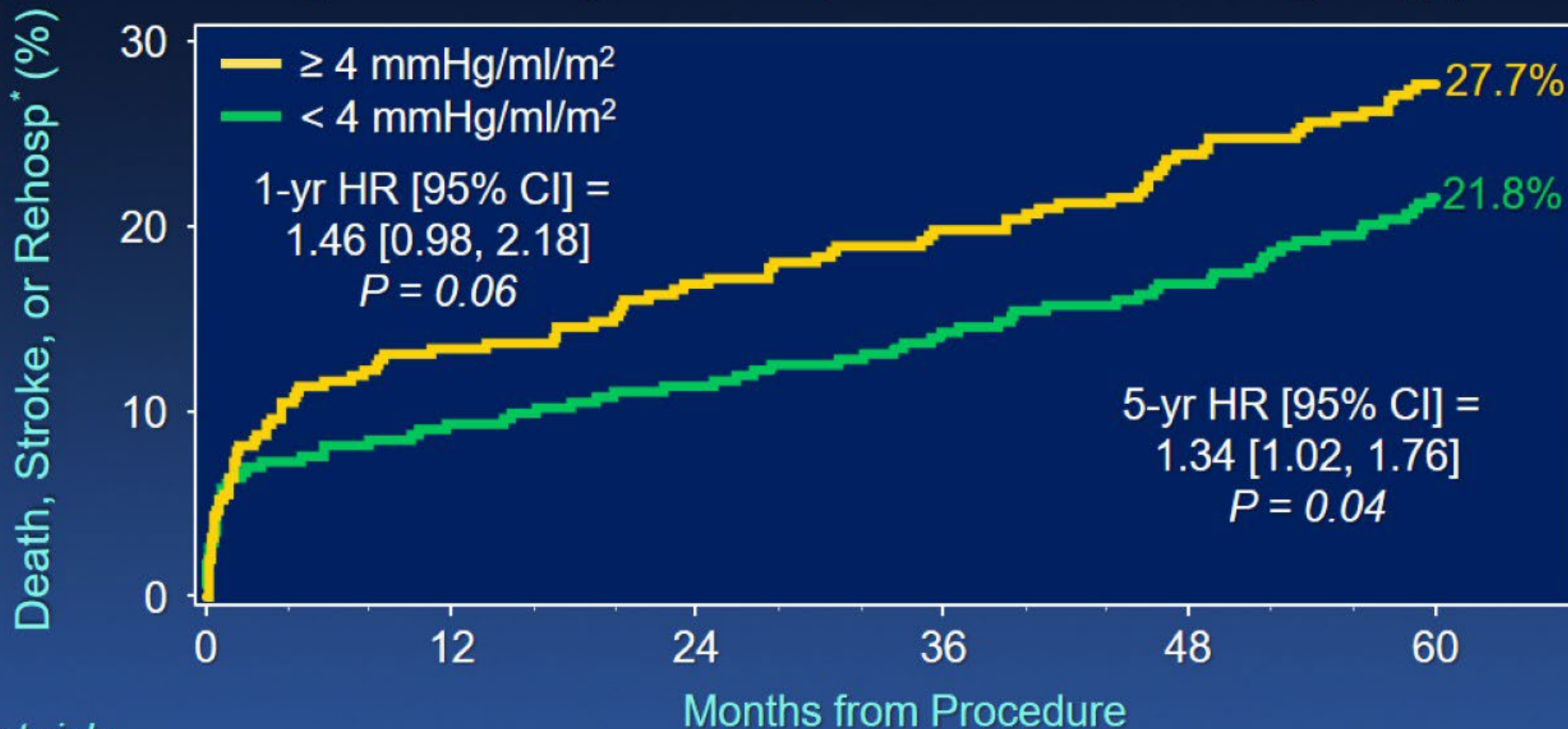
*Number at risk:*

SVI < 35 mL/m <sup>2</sup>	252	218	203	192	180	161
SVI ≥ 35 mL/m <sup>2</sup>	649	581	556	530	502	453

<sup>\*</sup>Rehos<sup>p</sup> defined as valve-, procedure-, or HF-related



# Composite Primary Endpoint By 30-day Zva (TAVR + Surgery)



Number at risk:

	0	12	24	36	48	60
Zva < 4	576	520	502	478	454	407
Zva ≥ 4	325	279	257	244	228	207

\*Rehosp defined as valve-, procedure-, or HF-related

# Additional Endpoints of Interest

## By 30-day Zva (TAVR + Surgery)

Endpoint of Interest	KM Rate at 5 Years		HR [95% CI]	P value
	Zva < 4 mmHg/ml/m <sup>2</sup>	Zva ≥ 4 mmHg/ml/m <sup>2</sup>		
All-cause Death	7.7%	9.9%	1.31 [0.82, 2.09]	0.26
CV Death	4.1%	5.7%	1.41 [0.75, 2.66]	0.28
Stroke	6.1%	5.5%	0.93 [0.52, 1.67]	0.81
Rehospitalization*	12.5%	19.9%	1.67 [1.19, 2.36]	0.003

\*Rehosp defined as valve-, procedure-, or HF-related



# Additional Endpoints of Interest

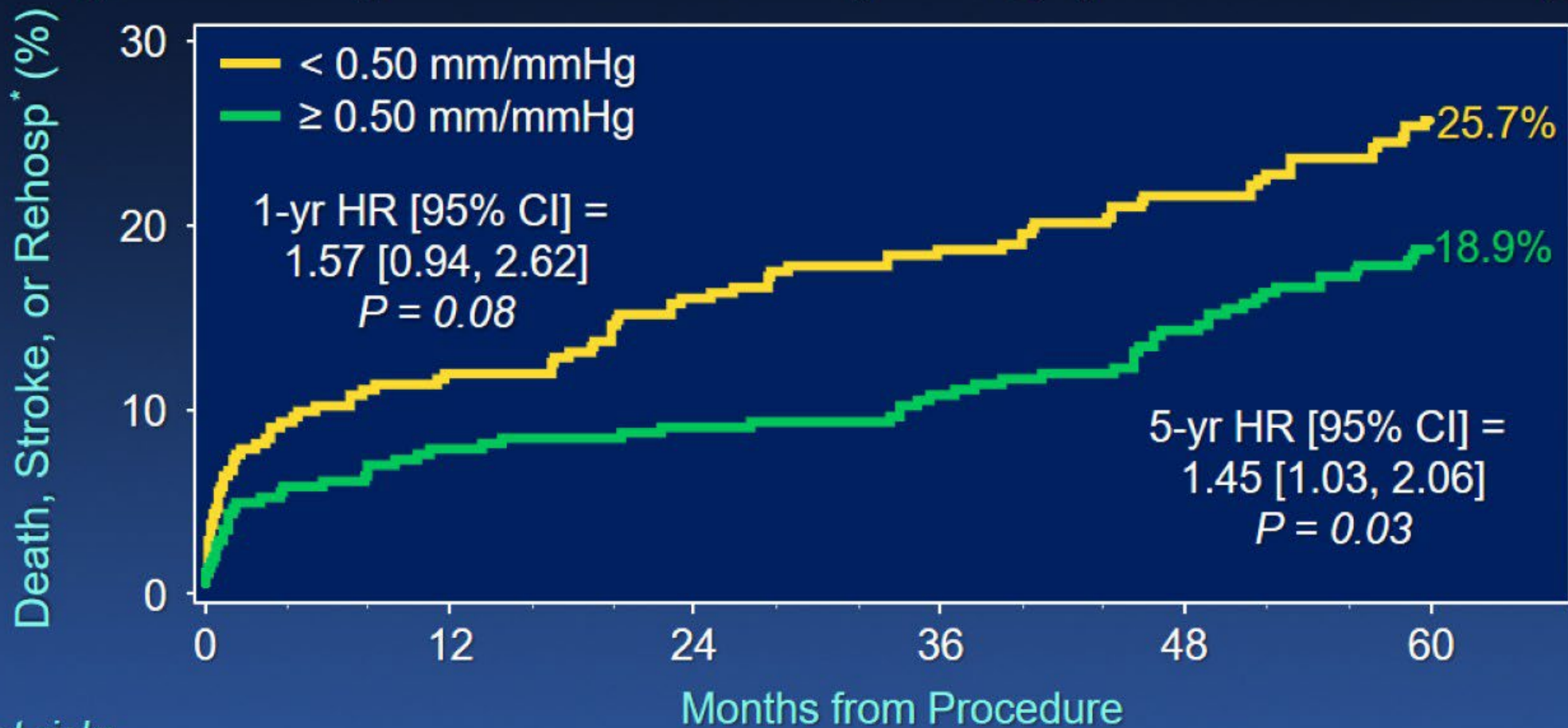
## By 30-day Zva (TAVR + Surgery)

Endpoint of Interest	KM Rate at 5 Years		HR [95% CI]	P value
	Zva < 4 mmHg/ml/m <sup>2</sup>	Zva ≥ 4 mmHg/ml/m <sup>2</sup>		
All-cause Death	7.7%	9.9%	1.31 [0.82, 2.09]	0.26
CV Death	4.1%	5.7%	1.41 [0.75, 2.66]	0.28
Stroke	6.1%	5.5%	0.93 [0.52, 1.67]	0.81
<b>Rehospitalization*</b>	<b>12.5%</b>	<b>19.9%</b>	<b>1.67 [1.19, 2.36]</b>	<b>0.003</b>

\*Rehosp defined as valve-, procedure-, or HF-related

# Composite Primary Endpoint

## By 30-day RV-PA Coupling (TAVR + Surgery)



Number at risk:

T/P ≥ 0.50	316	289	282	274	259	229
T/P < 0.50	289	253	230	216	204	187

\*Rehos<sup>\*</sup> defined as valve-, procedure-, or HF-related





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# Additional Endpoints of Interest

## By 30-day RV-PA Coupling (TAVR + Surgery)

Endpoint of Interest	KM Rate at 5 Years		HR [95% CI]	P value
	T/P $\geq$ 0.50 mm/mmHg	T/P $<$ 0.50 mm/mmHg		
All-cause Death	5.6%	9.0%	1.67 [0.90, 3.11]	0.10
CV Death	2.4%	6.8%	3.03 [1.26, 7.25]	0.01
Stroke	3.7%	7.8%	2.24 [1.08, 4.64]	0.03
Rehospitalization*	11.7%	15.7%	1.38 [0.88, 2.15]	0.15

\*Rehosp defined as valve-, procedure-, or HF-related

# Additional Endpoints of Interest

## By 30-day RV-PA Coupling (TAVR + Surgery)

Endpoint of Interest	KM Rate at 5 Years		HR [95% CI]	P value
	T/P ≥ 0.50 mm/mmHg	T/P < 0.50 mm/mmHg		
All-cause Death	5.6%	9.0%	1.67 [0.90, 3.11]	0.10
<b>CV Death</b>	<b>2.4%</b>	<b>6.8%</b>	<b>3.03 [1.26, 7.25]</b>	<b>0.01</b>
<b>Stroke</b>	<b>3.7%</b>	<b>7.8%</b>	<b>2.24 [1.08, 4.64]</b>	<b>0.03</b>
Rehospitalization*	11.7%	15.7%	1.38 [0.88, 2.15]	0.15



# Conclusions

- Following TAVR with the SAPIEN 3, there was sustained improvement in mean transaortic gradient and aortic valve area to 5 years, which was similar to surgery
- At 5 years there was no significant difference in LV remodeling between TAVR and surgery; however, the surgical cohort had significantly lower TAPSE and RV-PA coupling, with greater incidence of  $\geq$ mild TR
- There was a significant association between the composite primary outcomes and Zva, driven by rehospitalization
- There was a significant association between the composite primary outcomes and RV-PA coupling, driven mainly by CV death and stroke



# Clinical Implications

- Despite the similar hemodynamic benefit of TAVR and surgery in patients with symptomatic, severe AS, there is a significant reduction in longitudinal RV function and RV-PA coupling following surgery
- In patients treated with TAVR or surgery, post-intervention valvulo-arterial impedance and RV-PA coupling are associated with worse 5-year outcomes
- Parameters of Ventricular/Valvular/Arterial coupling, such as  $Z_{va}$  or TAPSE/PASP, should be considered as key endpoints to compare different types of AVR in future RCTs, and should be considered in clinical practice to enhance risk stratification and therapeutic decision making



# See you at the Deep-Dive Sessions!

- |                |                                                                                     |
|----------------|-------------------------------------------------------------------------------------|
| <b>3:30pm</b>  | <b>Perspectives on Mortality in the PARTNER 3 5-Year Study</b><br>Vinod H. Thourani |
| <b>3:45pm</b>  | <b>Important Secondary Endpoints from the PARTNER 3 5-Year Study</b><br>Raj Makkar  |
| <b>4:00 pm</b> | <b>An Echo Deep Dive of the PARTNER 3 5-Year Study</b><br>Philippe Pibarot          |
| <b>4:15 pm</b> | <b>Importance of Patient Reported Outcomes</b><br>David J. Cohen                    |