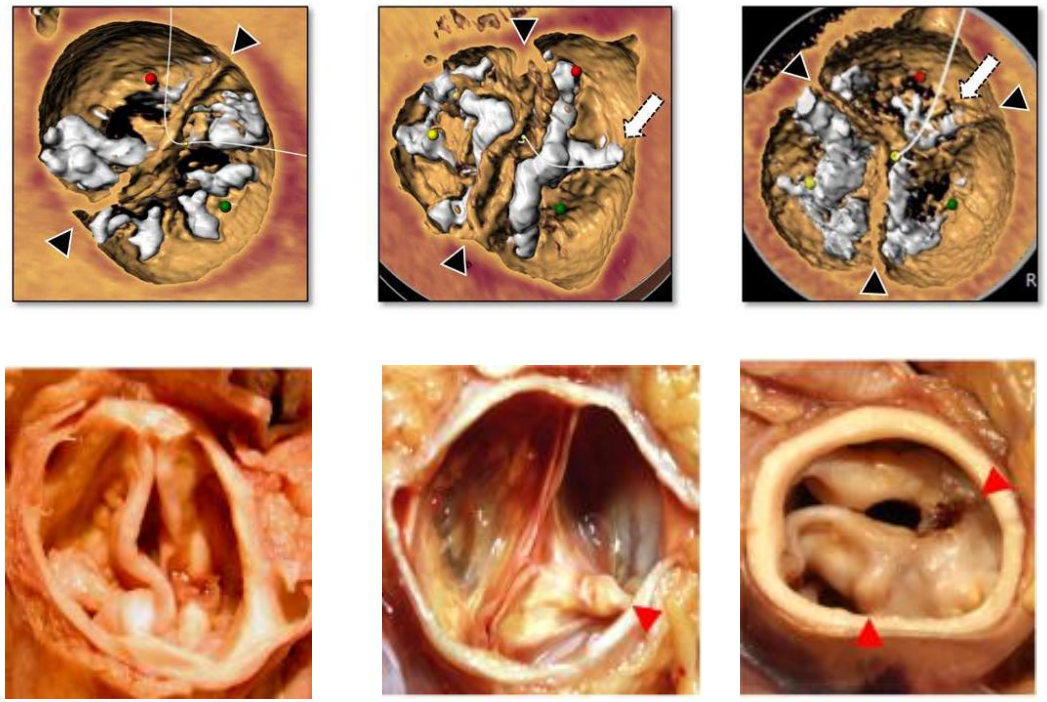
SOLACI SOCIME'25
MEXICO CITY

Update in TAVR for Bicuspid Aortic Valve Stenosis



Camilo A. Gomez, MD

Interventional Cardiology/ Structural Heart Disease
Jackson Memorial Health System
University of Miami Miller School of Medicine

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DISCLOSURE

Camilo Gomez, MD

No relevant financial relationship reported

TAVR for Bicuspid Aortic Valve Stenosis Objectives

- Review Bicuspid Aortic Valve (BAV) anatomy and challenges for TAVR
- Discuss latest clinical evidence and outcomes
- Explore future directions and ongoing trials

Bicuspid Aortic Valve (BAV) Stenosis- What we know

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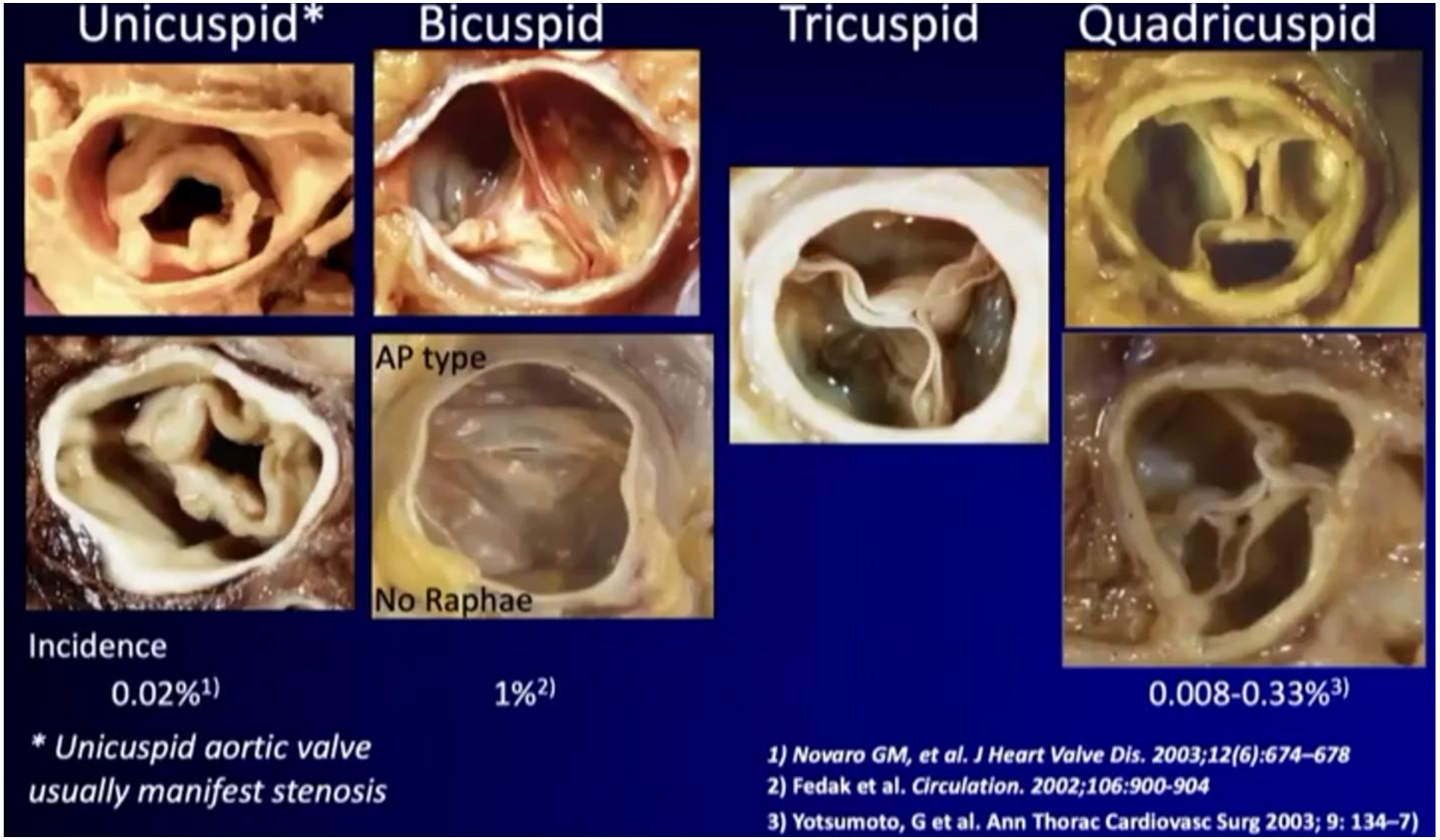
Aortic Valve



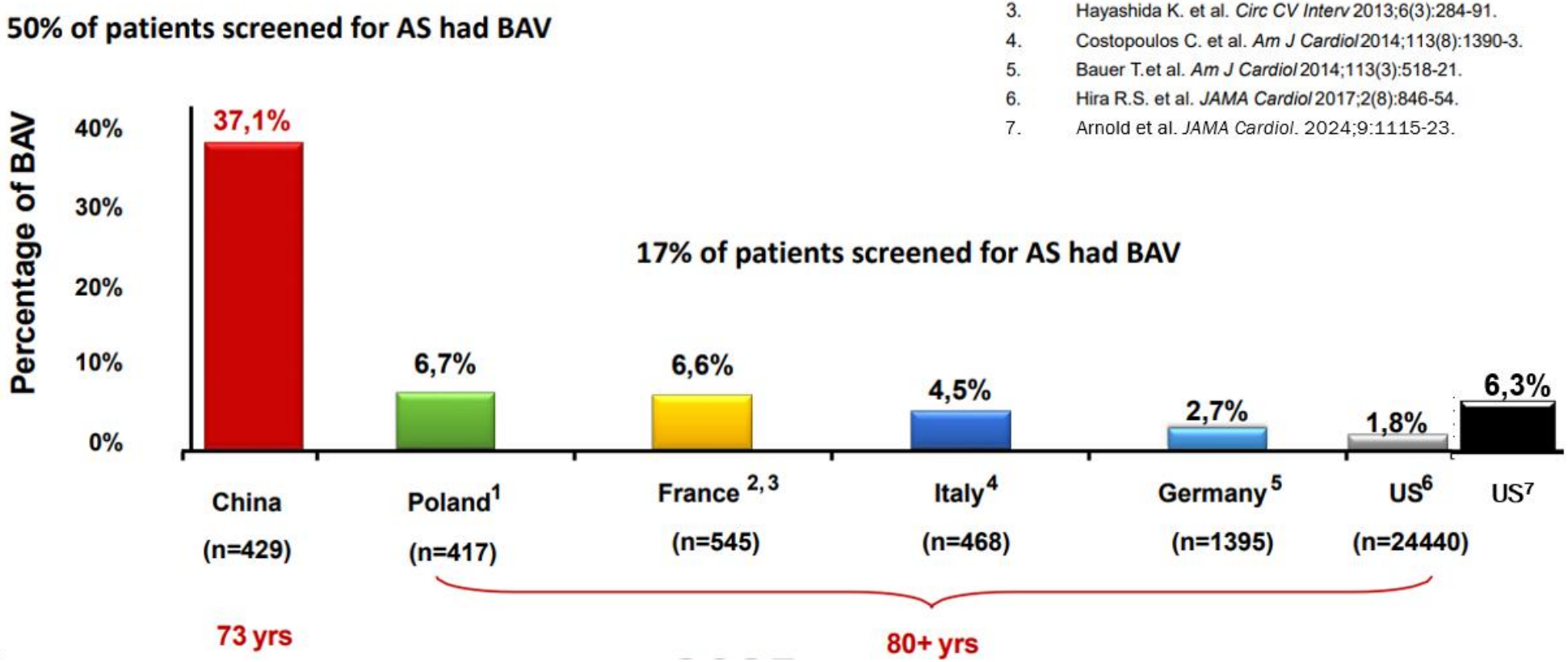
Surgically Removed Aortic Valves and their Etiology

Etiology	Mayo Clinic (1965)	University of Minnesota (1979-1983)	London (1976-1979)	Mayo Clinic (1990)	AFIP (1990-1997)	Toronto (2008)
Bicuspid	49%	49%	56%	36%	30%	32%
Post-rheumatic	33%	23%	24%	9%	13%	11%
Tricuspid degenerative	0%	28%	12%	51%	49%	64%
Unicuspid	10%	1%	0%	0%	6%	3%
Other	7%	0%	8%	2%	2%	1%

Ladich E et al. Future Cardiol 2011;7:629-642
Virmani Miami Valves 2022

Prevalence of BAV in the TAVR Population

1. Kochman J. et al. *Am J Cardiol* 2014;114(5):757-62.
2. Himbert D. et al. *Am J Cardiol* 2012;110(6):877-83.
3. Hayashida K. et al. *Circ CV Interv* 2013;6(3):284-91.
4. Costopoulos C. et al. *Am J Cardiol* 2014;113(8):1390-3.
5. Bauer T.et al. *Am J Cardiol* 2014;113(3):518-21.
6. Hira R.S. et al. *JAMA Cardiol* 2017;2(8):846-54.
7. Arnold et al. *JAMA Cardiol*. 2024;9:1115-23.



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Mao Chen. PCR. 2022
Modified June 2025
Kleiman N NY Valves 2025

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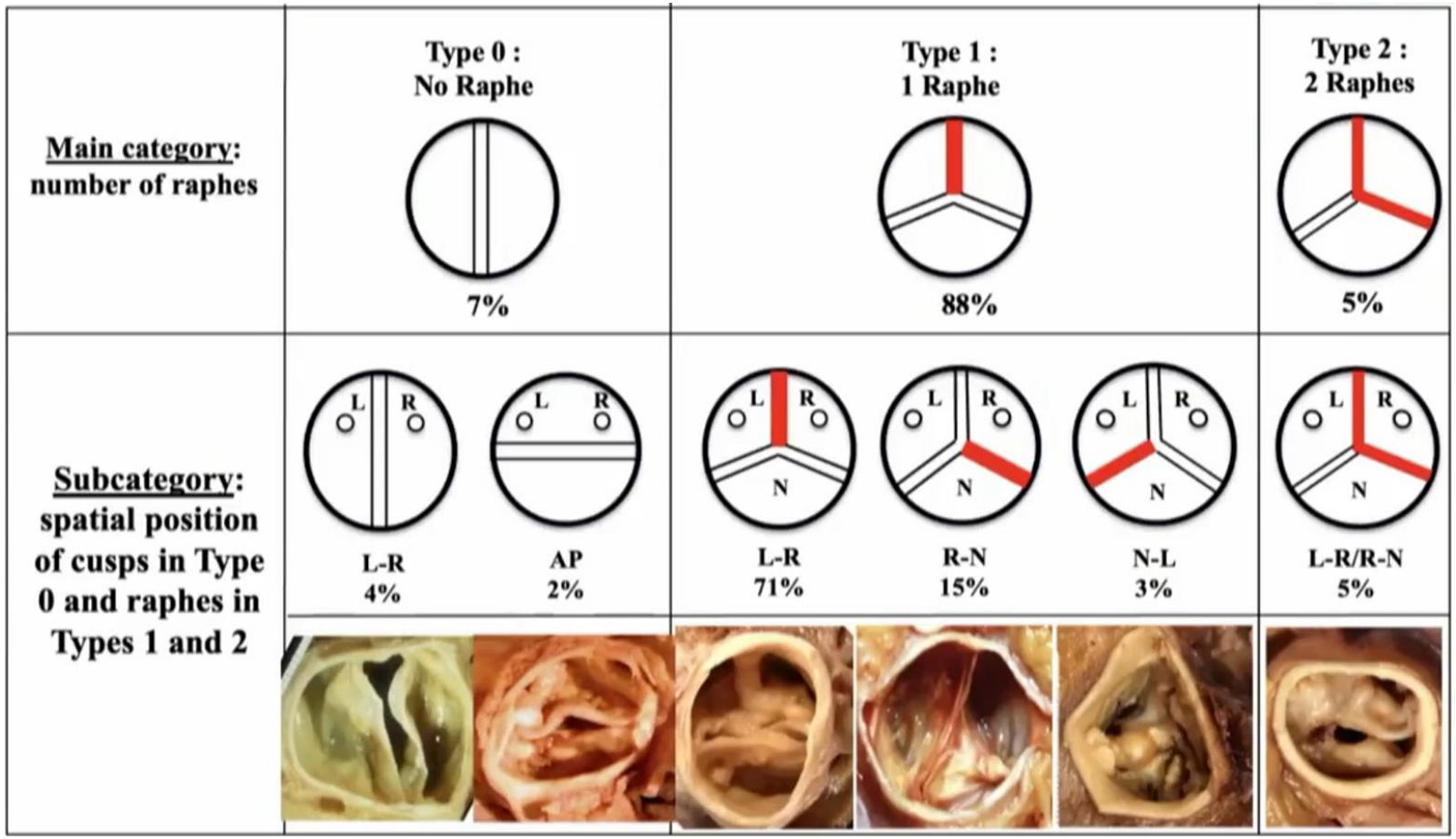
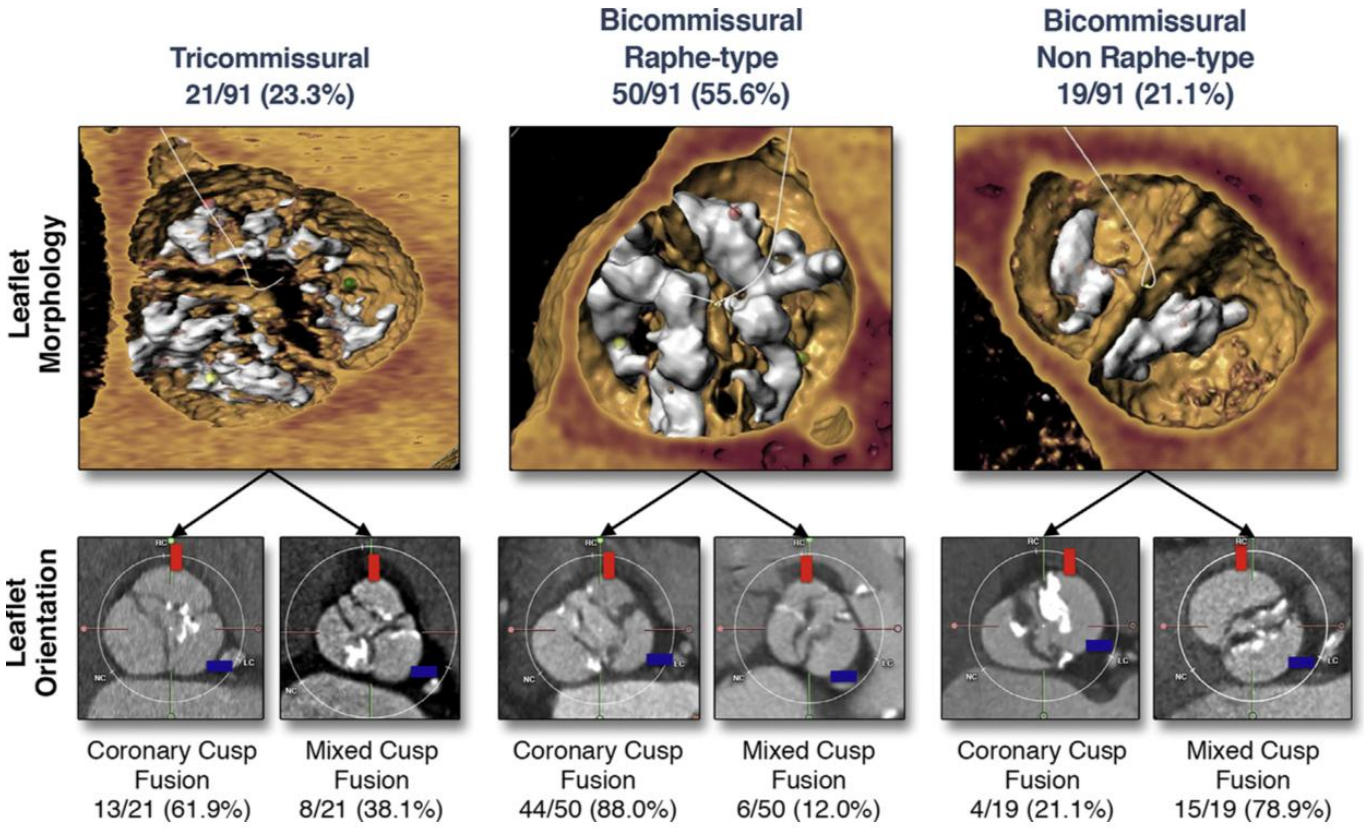
Bicuspid Aortic Valve (BAV) Anatomy - Sievers



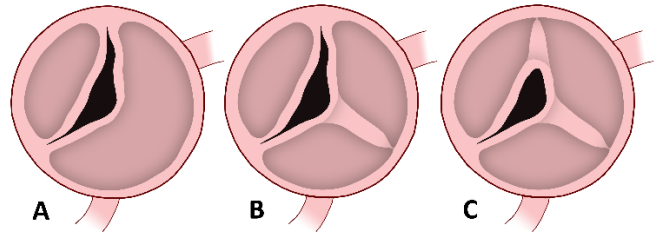
Sievers HH et al. J Thoracic Cardiovasc Surg. 2007

CT Derived Classification

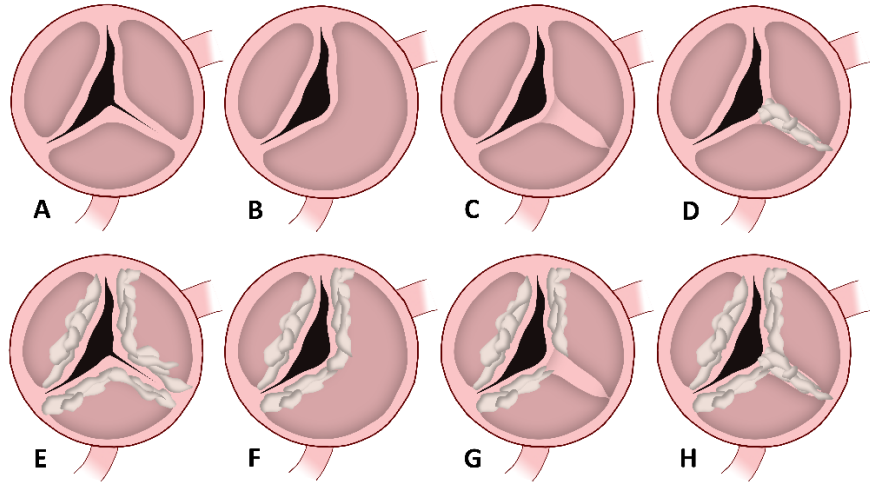


Jilaihawi et al (computed tomography [CT]-derived) classification

I. Sievers classification



II. TAVR-directed bicuspid aortic valve CT classification



N Van Mieghem. Mastering Structural Heart Disease 2023

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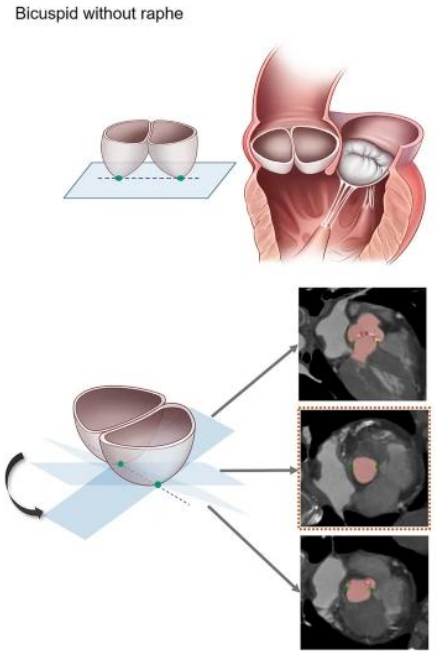
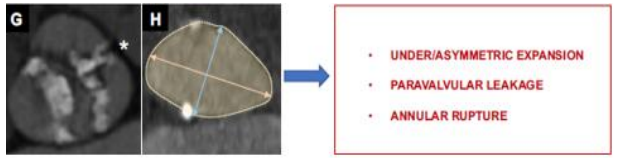
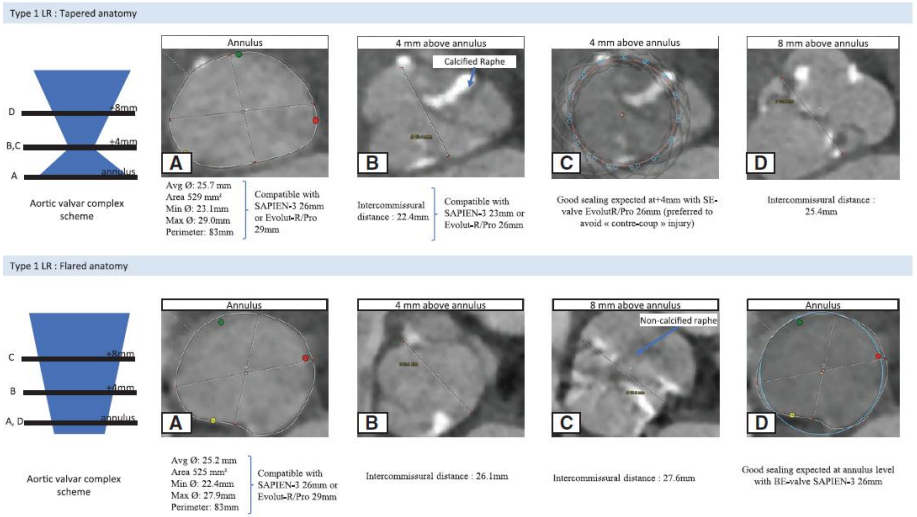
TAVR Challenges in BAV Anatomy

- 1. Dimensions of the AV complex (Larger)
  - Annulus Area 521±21 mm² vs 463±20 mm²
  - Ascending Aorta 36.7±5.4 mm² vs 30.4±3.4 mm²





- 2. Geometry
  - In general circular at the annulus
  - Supra-annular = Elliptical
  - AV complex shape (annulus to leaflets) = Nontubular (flared or tapered) in 2/3 of patients

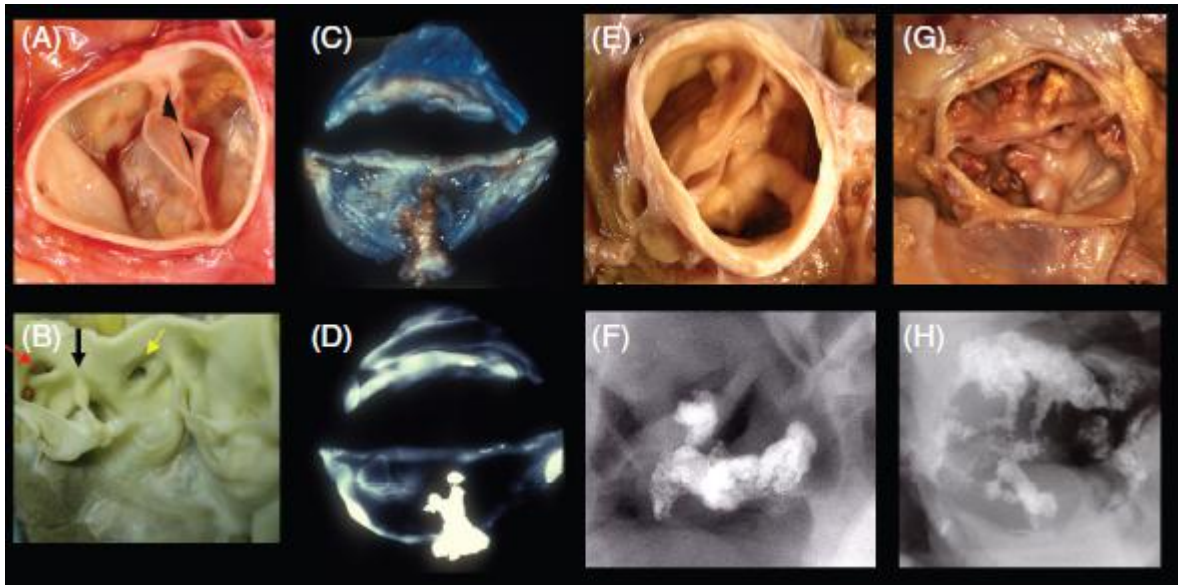


Vincent Circulation 2021

Choe Jci Rep 2021

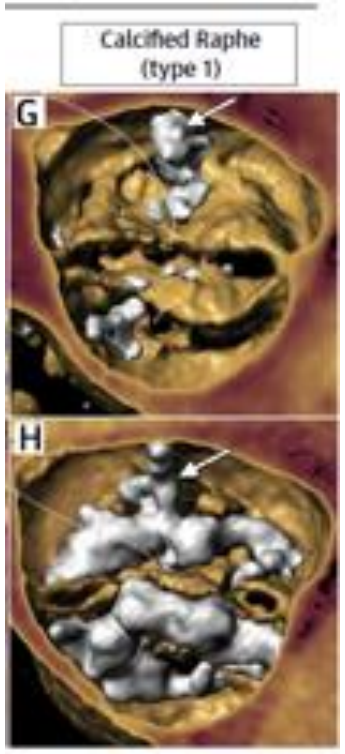
TAVR Challenges in BAV Anatomy

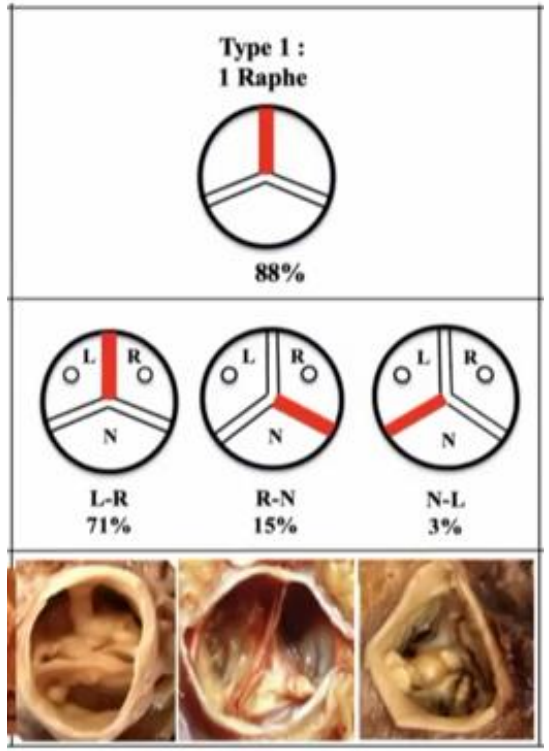
- 3. Heavily Calcification



Y Sato, R Virmani CV Path Institute
Mastering Structural Heart Disease 2023

- 4. Calcified raphe
  - Plus Asymmetrical morphology AV complex
  - May prevent optimal expansion of THV
  - L-R Cusp → Conduction disturbances (Compression force contralateral stent frame towards NC)





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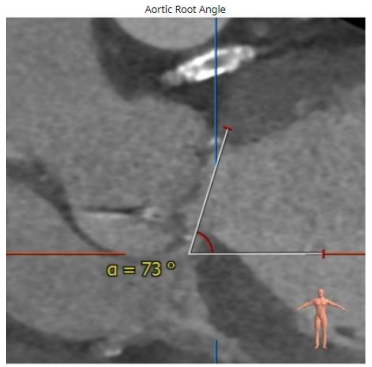
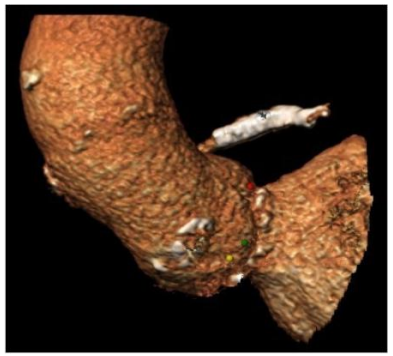
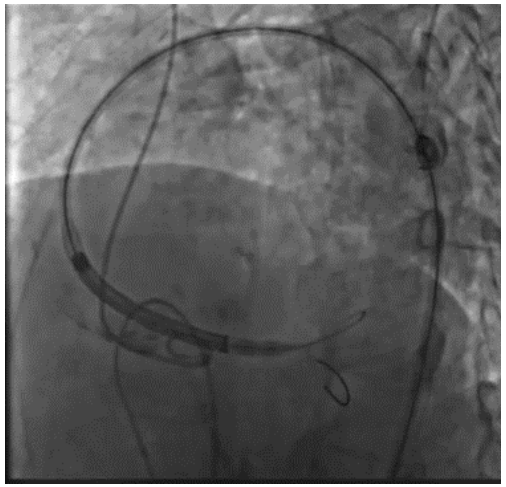
TAVR Challenges in BAV Anatomy

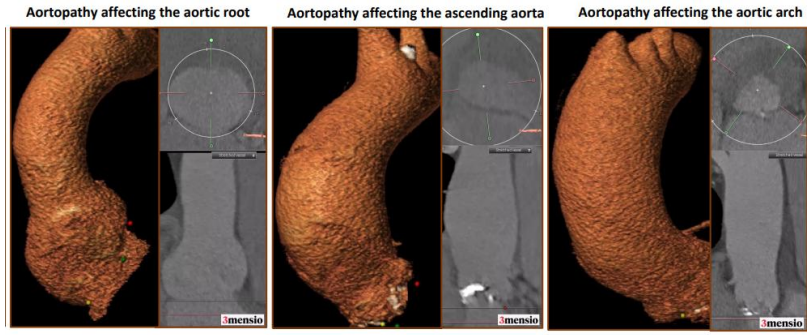
- 5. Horizontal Aorta
  - Difficulties crossing and positioning of the THV within a vertical annulus.







- Shorter membranous septum length => Conduction disorders
- 6. Coronaries
  - Coronary anomalies (L dominance, separate ostia)
  - Coronary ostia close proximity to the commissure (But coronary high is similar or higher than TAV)
- 7. Concomitant Aortopathy
  - Cannot be addressed by TAVR



Makkar Euro PCR 2024

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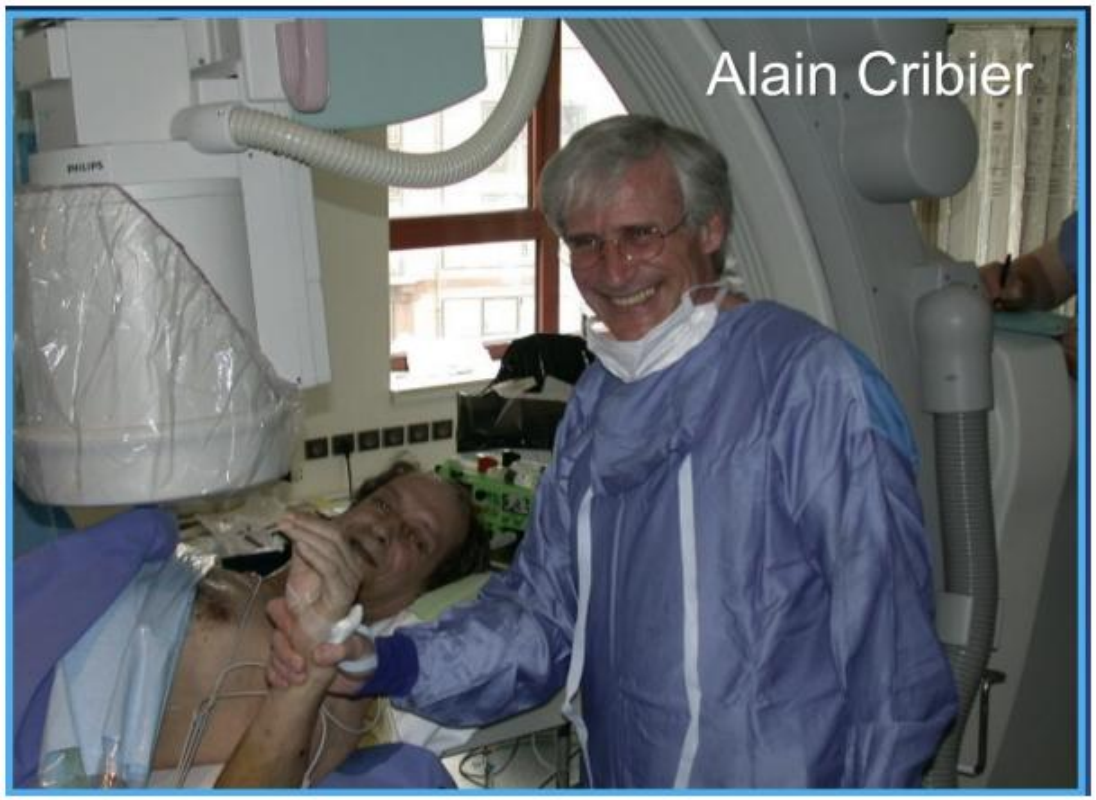
Clinical Evidence and Outcomes

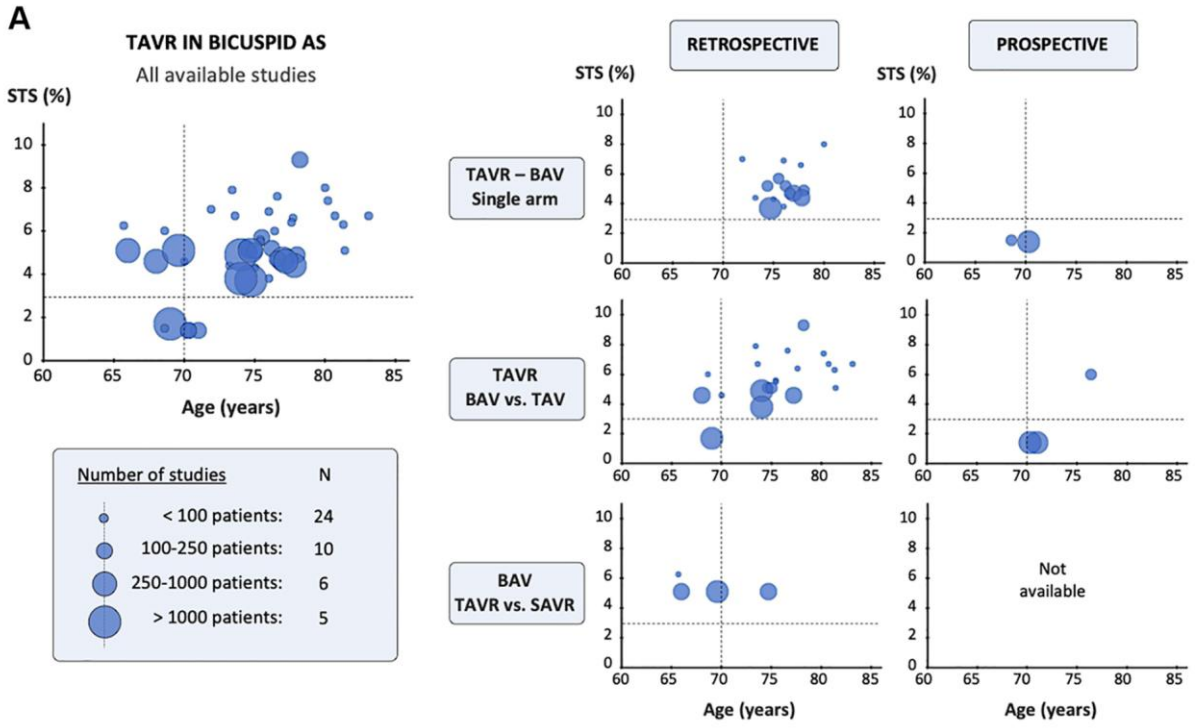
First-in-man TAVR was performed in a Bicuspid Aortic Valve – April 16, 2002

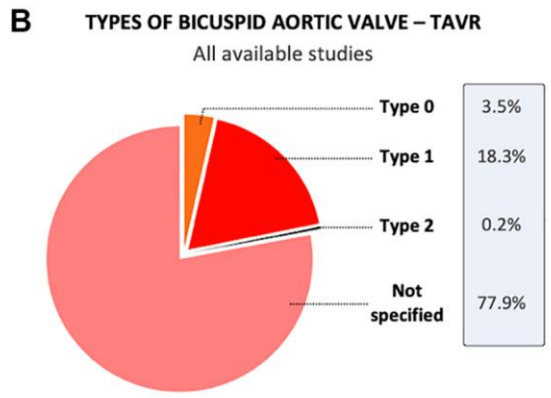


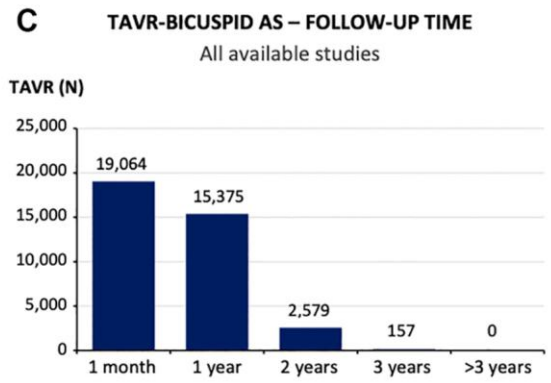
57 yo man in cardiogenic shock, AVA 0.6, EF 15%

Current Evidence on TAVR on Bicuspid AS

- No large prospective studies
- No RCTs – **BAV excluded from all pivotal RCTs**
- No long term follow up
- Bicuspid morphology type rarely examined







Nuyens et al. JACC CVI 2023;16:1682-87

TAVR in Bicuspid Aortic Valve – *Recent Data*

Study / Registry	N	Population	Key Findings	Implications
Evolut Low-Risk BAV Substudy	150	Low-risk BAV	30d mortality 0.7%, stroke 1.4%, PVL 0%, pacemaker 14%	**Excellent short-term safety** in selected BAV
LRT Bicuspid Trial	61	Low-risk BAV	30d mortality 1.6%, stroke 0%, PVL 3.3%, pacemaker 11.5%	Safe and feasible in selected BAV with favorable anatomy
STS/ACC TVT Registry (2023)	>20,000	All-risk BAV	**Comparable mortality to tricuspid**; ↓ PVL with newer valves, ↑ PPI	Outcomes improving with **experience and newer devices**
TriNetX Registry (2024)	~12,000	Matched TAVR vs SAVR in BAV	TAVR associated with **2x ↑ mortality** and **↑ HF** over ~2 years	Suggests **SAVR superiority** in BAV for long-term outcomes
NOTION-2 (2024) RCT	~90 (26% BAV)	Low-risk ≤75 yrs	**Higher event rate** 14.3% events with TAVR vs 3.9% SAVR (HR ~3.8, p=0.07)	Trend toward worse outcomes with TAVR in BAV; **not statistically significant**
Meta-analysis – Yu et al. (2023)	14,000+	BAV vs tricuspid TAVR	No mortality/stroke difference; ↑ **PPI**, ↑ **AKI** in BAV	Acceptable short-term safety, but procedural risks slightly higher
Meta-analysis – Zhou et al. (2023)	>200,000	Pooled BAV data	**↑ 30d mortality** (OR 1.23), **↑ stroke** (OR 1.39), **↓ mortality with new-gen valves**	**New-generation devices** improve outcomes, but risk persists
Medicare Data (2018–2022)	11,289	BAV patients	**Lower in-hospital mortality** with TAVR; but **worse long-term mortality/stroke**	Early advantage, but **long-term caution** in younger BAV patients
Low-risk cohort study (2024)	N/A	Matched BAV vs SAVR	No difference in composite (death/stroke/readmission**); better hemodynamics** with TAVR	Suggest **TAVR is viable** in **carefully selected low-risk BAV**
Durability Study (2023)	~5-year FU	BAV vs tricuspid TAVR	**No significant difference** in structural valve deterioration or valve failure	TAVR in BAV may have **acceptable mid-term durability**

Comparative data on TAVR vs SAVR in BAV: A tale of two (STS and TVT) registries

RICHARD E. CLARK MEMORIAL PAPER FOR ADULT CARDIAC SURGERY

Benchmarking Outcomes of Surgical Aortic Valve Replacement in Patients With Bicuspid Aortic Valves

Check for updates

Sameer A. Hirji, MD, MPH,[1] Zachary Wegermann, MD,[2] Sreekanth Vemulapalli, MD,[2] Paige Newell, MD,[1] Maria Grau-Sepulveda, MD,[2] Sean O'Brien, PhD,[2] Vinod H. Thourani, MD,[3] Vinay Badhwar, MD,[4] and Tsuyoshi Kaneko, MD[5]

Age (mean)	70 years
STS Score (mean)	1.28 %
NYHA Class III/IV	18.8 %
30-day Mortality	1.3 %
30-day Stroke	1.2 %
1-year Mortality	3.2 %

Permanent pacemaker	5.8%
New-onset atrial fibrillation	36.6 %
Acute Renal Failure	1.1 %
Reoperation for bleeding or redo valve	3.4%

JAMA | Original Investigation

Association Between Transcatheter Aortic Valve Replacement for Bicuspid vs Tricuspid Aortic Stenosis and Mortality or Stroke Among Patients at Low Surgical Risk

Raj R. Makkar, MD; Sung-Han Yoon, MD; Tarun Chakravarty, MD; Samir R. Kapadia, MD; Amar Krishnaswamy, MD; Pinak B. Shah, MD; Tsuyoshi Kaneko, MD; Eric R. Skipper, MD; Michael Rinaldi, MD; Vasilis Babaliaros, MD; Sreekanth Vemulapalli, MD; Alfredo Trento, MD; Wen Cheng, MD; Susheel Kodali, MD; Michael J. Mack, MD; Martin B. Leon, MD; Vinod H. Thourani, MD

Age (mean)	69
STS Score (mean)	1.7
NYHA Class III/IV	55.1 %
30-day Mortality	0.9 %
30-day Stroke	1.4 %
1-year Mortality	4.6 %

Permanent pacemaker	6.2%
New-onset atrial fibrillation	1.0%
New Dialysis Requirement	0.1 %
Need for second valve	0.1%

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Modified from R Makkar, Euro PCR 2024

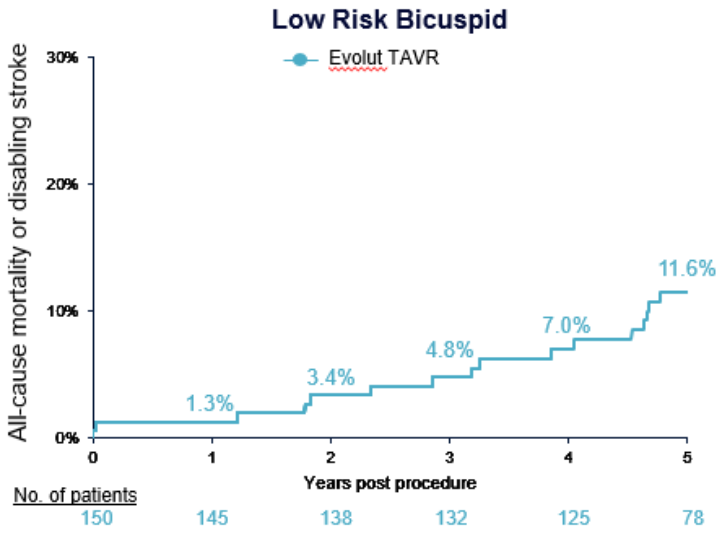
Evolut Low Risk Bicuspid Study- 5 Year Results

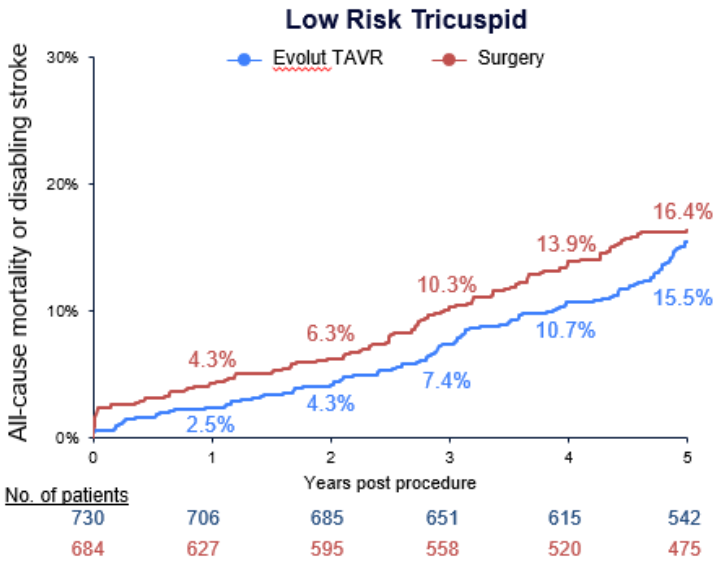
- 222 Patients screened
  - Bicuspid valve and AVA <1.0 cm^2 or gradient > 40 mm
  - STS PROM < 3.0
  - Potentially suitable for TAVR

150 Enrolled

60 Excluded
- 17 Had tricuspid valve
- 15 Annular dimension
- 5 STS risk > Low
- 5 Ascending aorta > 45 mm
- 4 SOV diameter
- 2 LVOT calcification
- 5 Other non-anatomic

All-cause mortality or disabling stroke



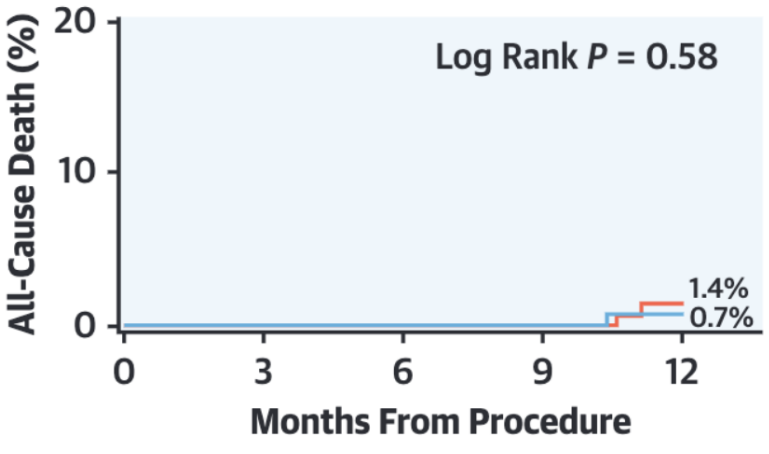


Forrest JK, et al. JAMA Cardiol, 2021

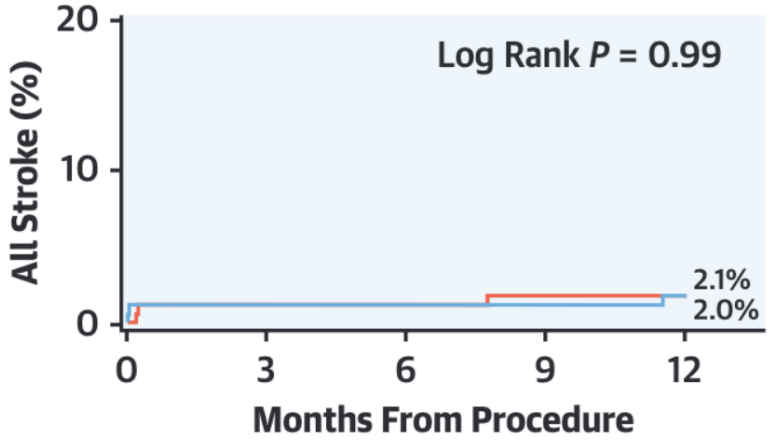
The PARTNER 3 Bicuspid Registry for Transcatheter Aortic Valve Replacement in Low-Surgical-Risk Patients

Tricuspid vs. Bicuspid TAVR comparison in 148 PM pairs from PARTNER 3 trial and PARTNER 3 BAV Registry

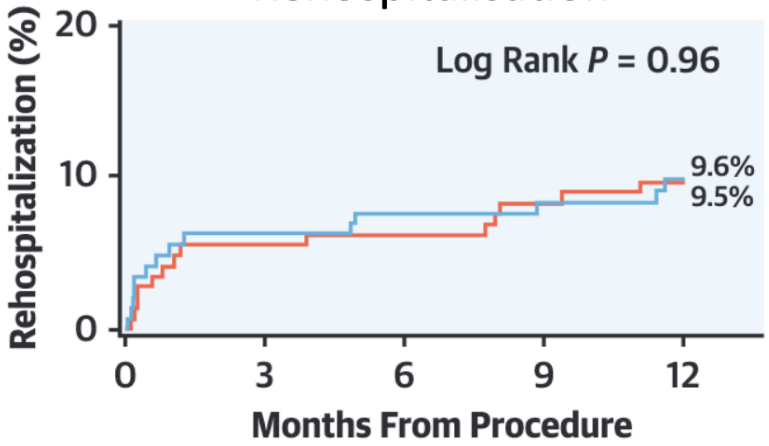
All-Cause Death



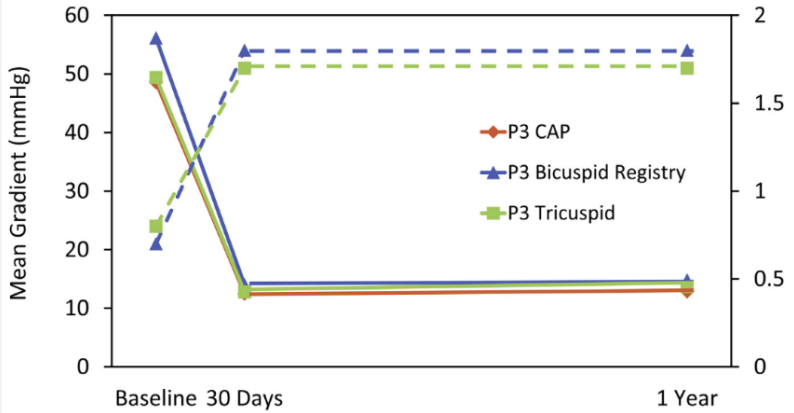
All Stroke



Rehospitalisation

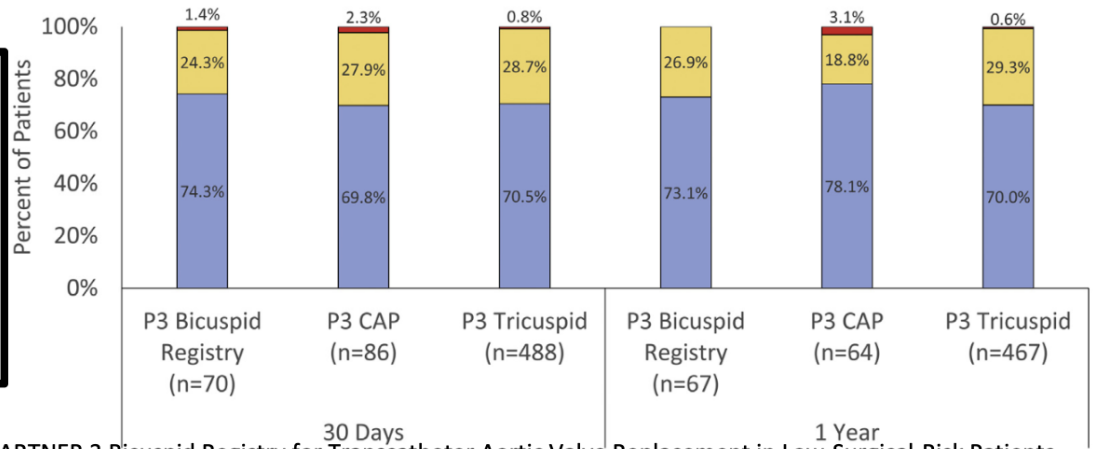


Haemodynamics



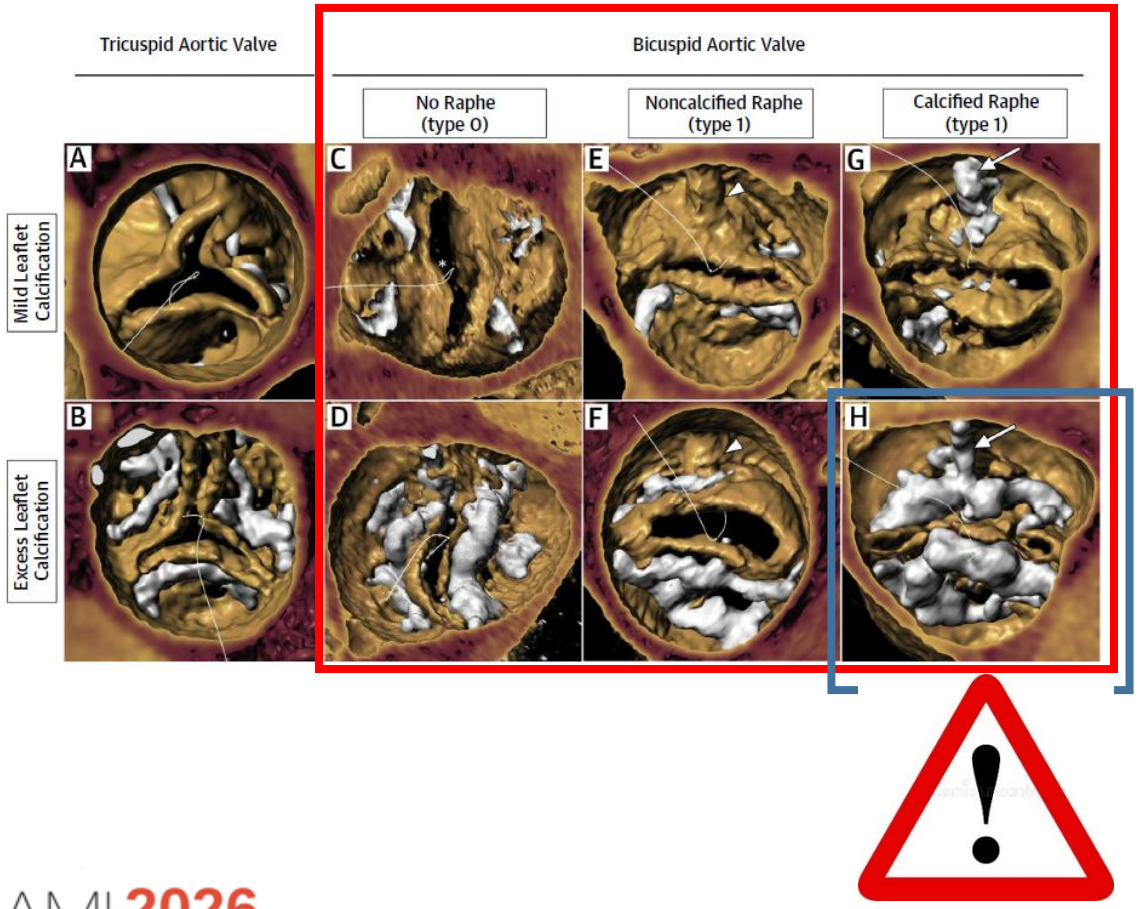
- Comparable TTE gradients at 1 year
- Numerically higher rates >mild PVL in unmatched CAP

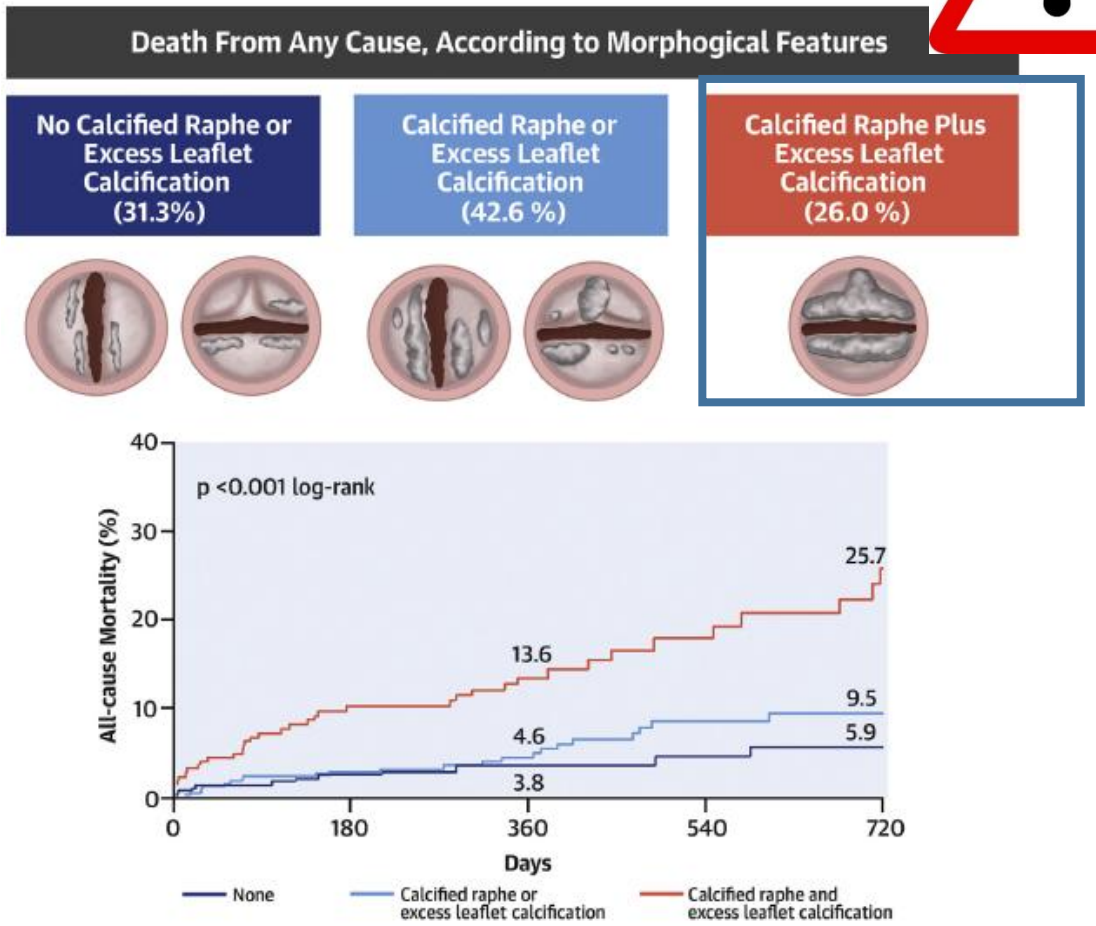
Paravalvular Leak



Mathew R. Williams, et al The PARTNER 3 Bicuspid Registry for Transcatheter Aortic Valve Replacement in Low-Surgical-Risk Patients
JACC: Cardiovascular Interventions, Volume 15, Issue 5, 14 March 2022, Pages 523-532

Impact of Bicuspid *Phenotype*

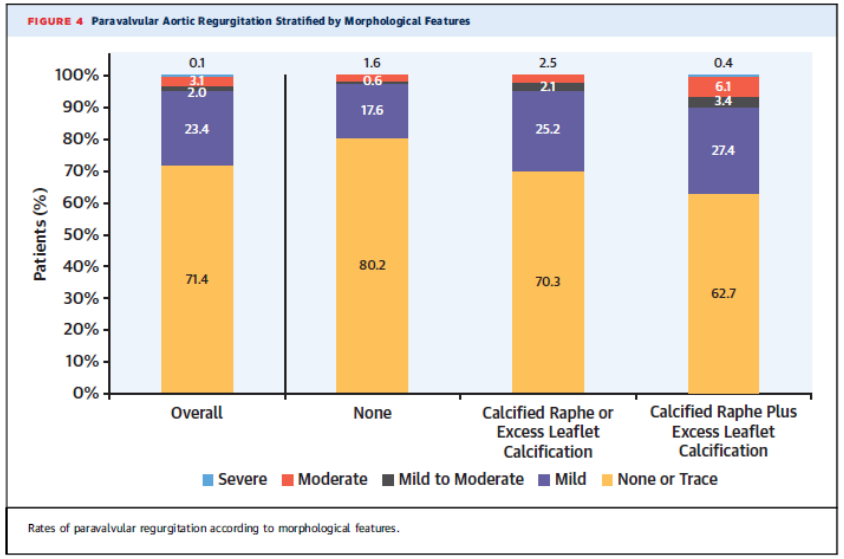




Yoon et al JACC 2020

Impact of Bicuspid Phenotype

PVL

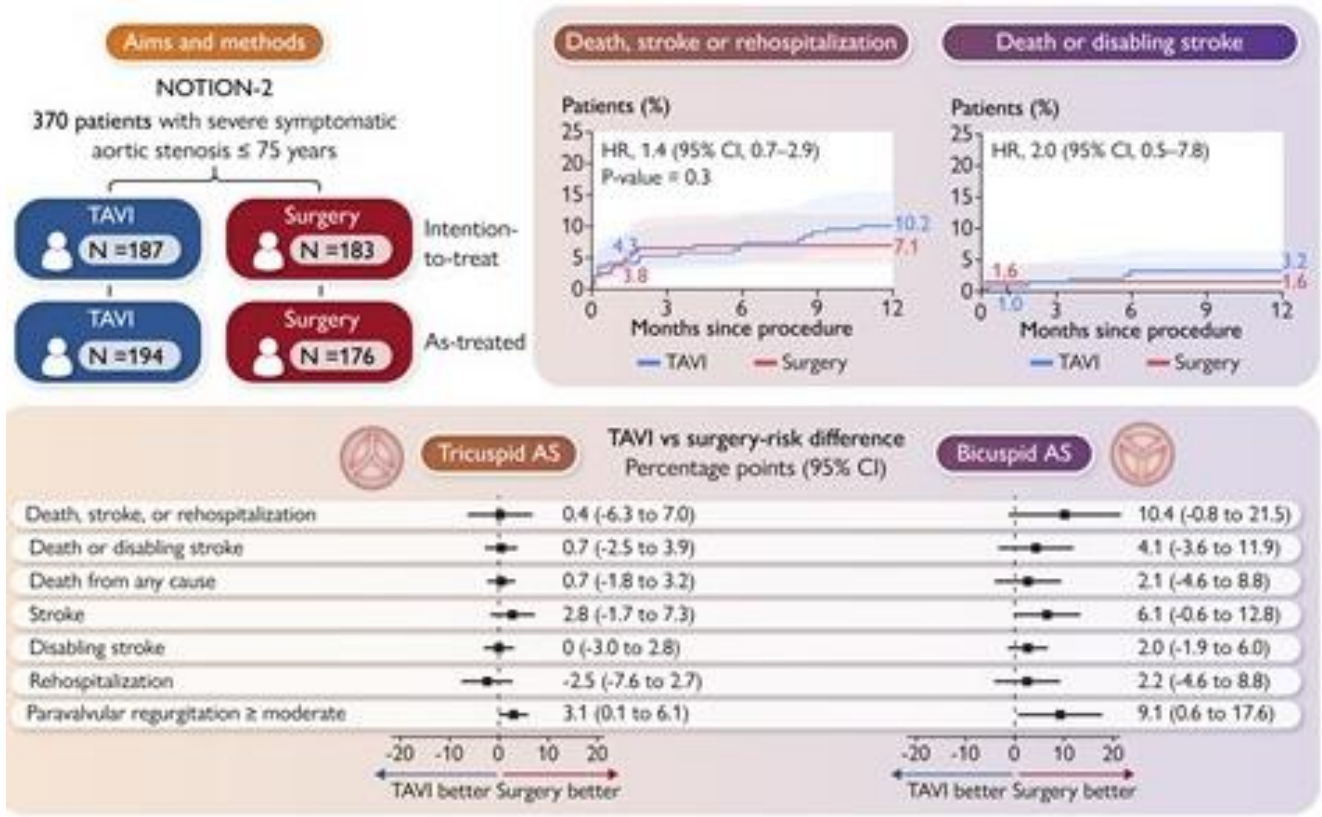


		Morphological Features		
	Overall (N = 1,034)	None (n = 324)	Calcified Raphe or Excess Leaflet Calc (n = 441)	Calcified Raphe Plus Excess Leaflet Calc (n = 269)	p Value
Procedural outcomes					
Conversion to surgery	9 (0.9)	1 (0.3)	2 (0.5)	6 (2.2)	0.028
Coronary obstruction	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	–
Aortic root injury	18 (1.7)	3 (0.9)	3 (0.7)	12 (4.5)	<0.001
Implantation of second valve	14 (1.4)	4 (1.2)	3 (0.7)	7 (2.6)	0.10
Echocardiographic findings					
Aortic valve gradient, mm Hg	10.6 ± 5.0	10.8 ± 5.4	10.4 ± 4.3	10.9 ± 5.6	0.37
Effective orifice area, cm^2	1.7 ± 0.5	1.7 ± 0.4	1.7 ± 0.5	1.8 ± 0.5	0.053
LVEF, %	56.3 ± 14.0	59.0 ± 13.3	55.3 ± 14.1	54.5 ± 14.4	<0.001
Paravalvular regurgitation ≥mild*	291 (28.6)	63 (19.8)	130 (29.7)	98 (37.3)	<0.001
Paravalvular regurgitation ≥moderate*	33 (3.2)	5 (1.6)	11 (2.5)	17 (6.5)	0.002
Clinical outcomes					
Death at 30 days					
From any cause	21 (2.0)	5 (1.5)	5 (1.1)	11 (4.1)	0.016
From cardiac cause	17 (1.6)	4 (1.2)	3 (0.7)	10 (3.7)	0.009
Death at 1 yr					
From any cause	55 (6.7)	10 (3.8)	16 (4.6)	29 (13.6)	<0.001
From cardiac cause	33 (3.9)	6 (2.2)	6 (2.7)	21 (9.6)	<0.001
Death at 2 yrs					
From any cause	74 (12.5)	12 (5.9)	24 (9.5)	38 (25.7)	<0.001
From cardiac cause	40 (5.9)	6 (2.2)	9 (3.6)	25 (14.4)	<0.001
Stroke	28 (2.7)	9 (2.8)	12 (2.7)	7 (2.6)	>0.99
Major vascular complication	34 (3.3)	8 (2.5)	12 (2.7)	14 (5.2)	0.12
Bleeding (life-threatening or major)	37 (3.6)	10 (3.1)	14 (3.2)	13 (4.9)	0.46
Acute kidney injury (stage 2 or 3)	20 (1.9)	7 (2.2)	6 (1.4)	7 (2.6)	0.43
Composite endpoint	86 (8.3)	20 (6.2)	28 (6.3)	38 (14.1)	<0.001
Aortic valve reintervention	5 (0.7)	2 (0.9)	2 (0.6)	1 (0.4)	0.91
New permanent pacemaker†	118 (12.2)	31 (10.3)	50 (11.9)	37 (15.1)	0.23

Yoon et al JACC 2020

Notion 2 Trial

- Low –risk pts randomized TAVR vs SAVR. ≤75 years of age with tricuspid or bicuspid AS
- N = 370 patients, median STS 1.1%
- Overall primary endpoint (death, stroke, HFH) @ 1 year: TAVI 10.2% vs. SAVR 7.1%, p = 0.3
- TAVR ⬇ risk of major bleeding & new-onset atrial fibrillation and ⬆ risk of non-disabling stroke, PPI& > mild PVL



Jorgensen et al. EHJ 2024;45:3804-14
Courtesy Van Mieghem N. Miami Valves 2025

Notion 2 Trial- *Bicuspid Cohort*

Characteristic	TAVI (N = 49)	Surgery (N = 51)
Age – years	69.7±3.6	70.0±3.4
Male sex – no. (%)	27 (55.1)	29 (56.9)
STS-PROM score – %†	1.0 (0.8–1.3)	1.1 (0.8–1.5)
Coronary artery disease – no. (%)^	6 (6.1)	1 (2.0)
Previous myocardial infarction – no. (%)	1 (2.0)	1 (2.0)

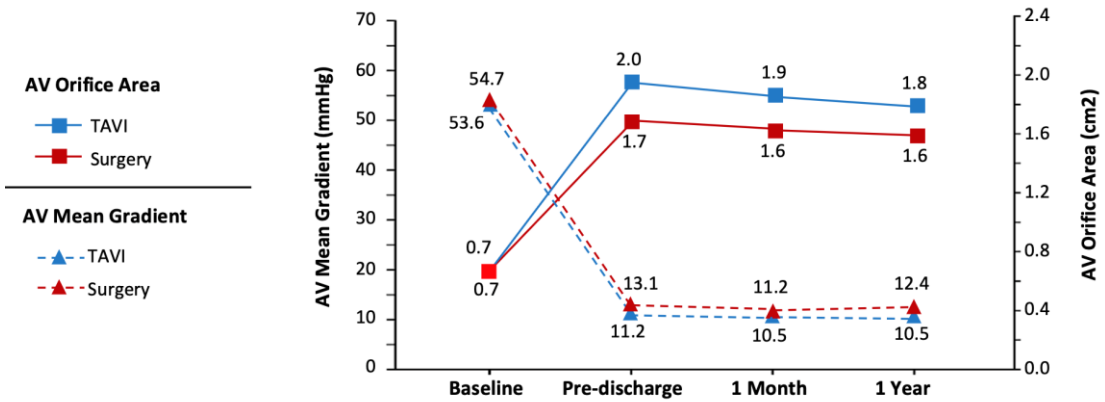
Characteristic	TAVI (N = 49)
Implanted transcatheter aortic bioprosthesis – no. (%)	
Evolut R/Pro(+)	27 (55.1)
SAPIEN 3 (Ultra)	13 (26.5)
Portico/Navitor	3 (6.1)
ACURATE neo(2)	3 (6.1)
Lotus	2 (4.1)
Myval	1 (2.0)

- **Tricuspid Cohort**
  - **⇧ Age 71.5**
  - **⇧ Male sex 65%**
  - **⇧ STS PROM 1.2%**
  - **⇧ CAD 14%**
  - **⇩ Systolic annular area < 500 mm2**

Jorgensen et al. EHJ 2024;45:3804-14
Courtesy Van Mieghem N. Miami Valves 2025

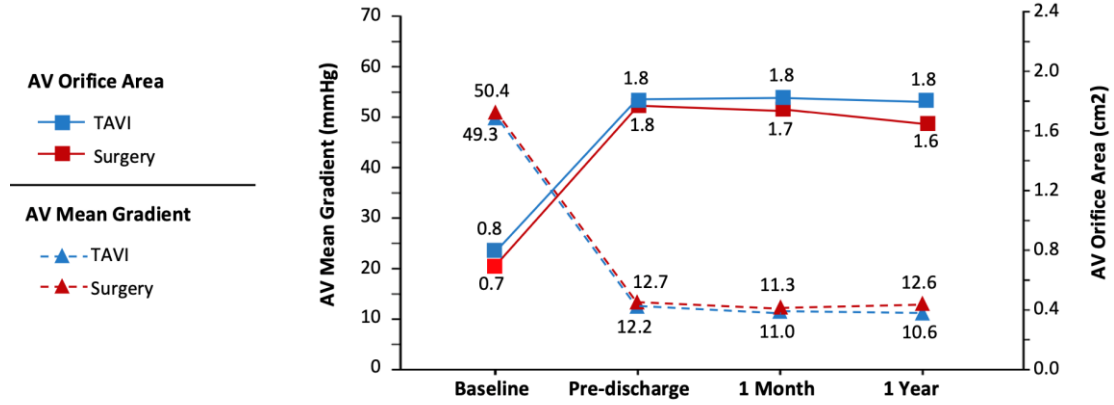
Notion 2 Trial- *Valve Performance*

Bicuspid Cohort



No. of Patients with Echocardiographic data				
AV mean gradient				
TAVI	48	42	44	45
Surgery	50	36	46	46
AV orifice area				
TAVI	48	27	35	43
Surgery	50	27	45	43

Tricuspid Cohort



No. of Patients with Echocardiographic data				
AV mean gradient				
TAVI	136	117	120	127
Surgery	126	116	118	120
AV orifice area				
TAVI	137	97	111	121
Surgery	128	83	99	107

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Jorgensen et al. EHJ 2024;45:3804-14
Courtesy Van Mieghem N. Miami Valves 2025

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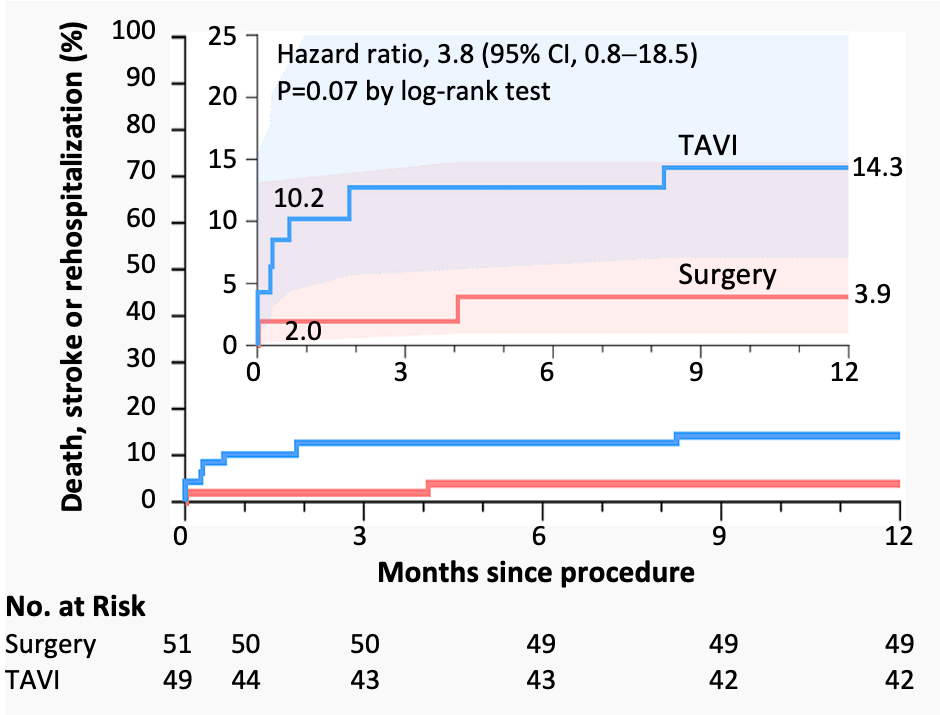
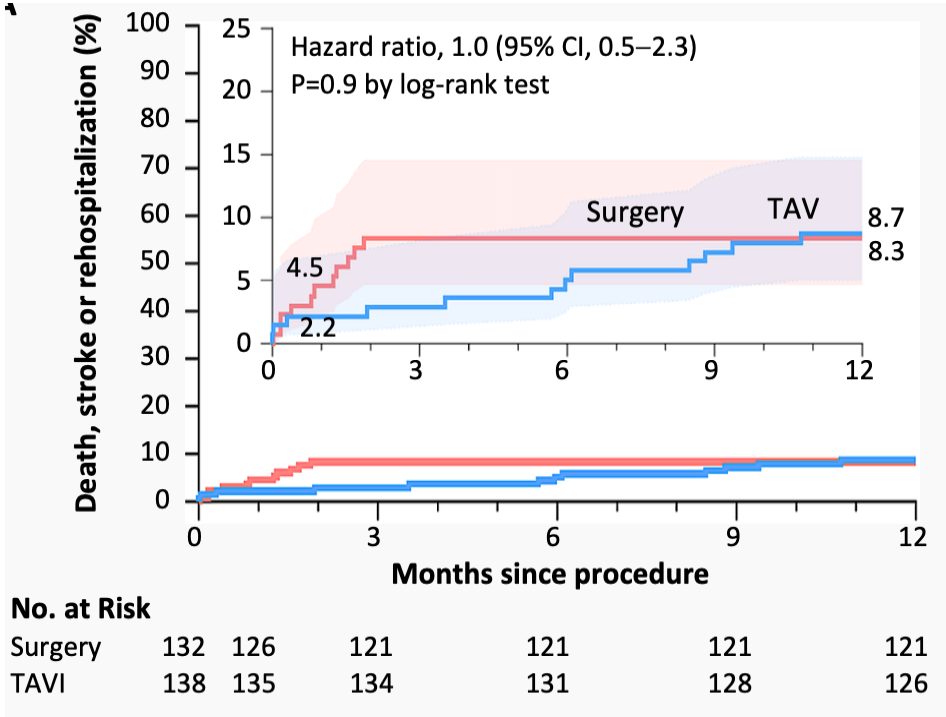
Notion 2 Trial- *Primary Endpoint*

Bicuspid Cohort



Tricuspid Cohort

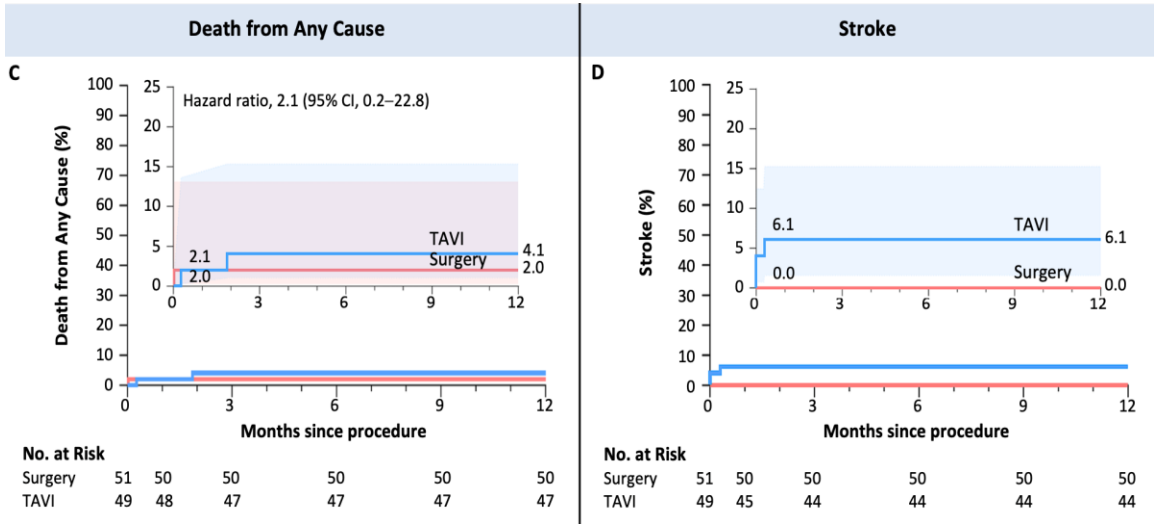


Event rate highest in bicuspid TAVR cohort & lowest in bicuspid SAVR cohort

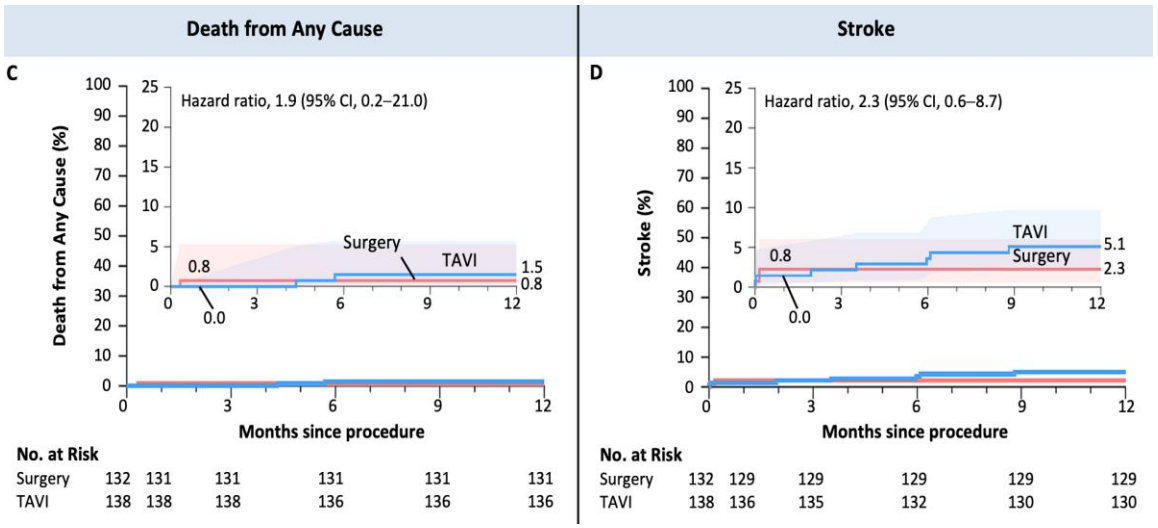
Jorgensen et al. EHJ 2024;45:3804-14
Courtesy Van Mieghem N. Miami Valves 2025

Notion 2 Trial- *Death and Stroke*

Bicuspid Cohort



Tricuspid Cohort



More strokes with TAVR

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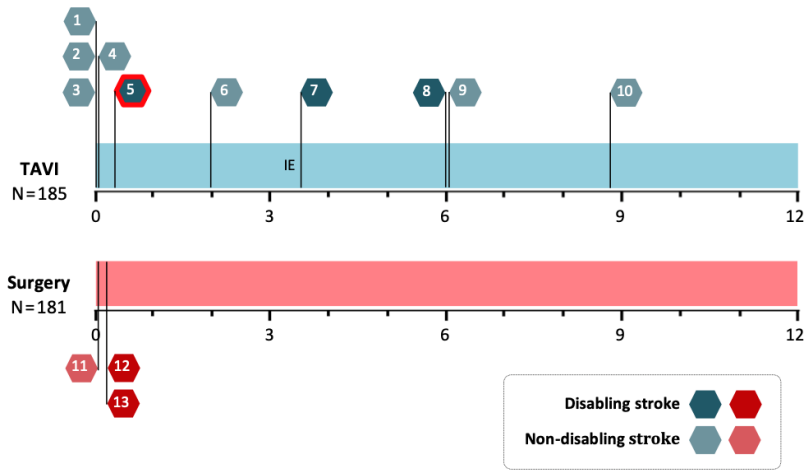
Notion 2 Trial- *Stroke Events in Perspective*



Case	Native AV	AFib	Bio-prosthesis	CEP used	Stroke type & disability	Stroke timing	Imaging verified	Symptom resolution	Anti-thrombotics
TAVI									
1	Tricuspid	Baseline	Portico	No	Ischemic, Non-disabling	Day 0	Retino+	Yes	DOAC
2	Bicuspid, type 1 R-L	Baseline	Evolut	No	Ischemic, Non-disabling	Day 0	MR+	Partial	DOAC
3	Bicuspid, type 1 R-L	No	Evolut	No	Ischemic, Non-disabling	Day 0	MR+	No	SAPT
4	Tricuspid	No	Sapien	No	Ischemic, Non-disabling	Day 1	CT+	Yes	SAPT
5	Bicuspid, type 1 R-L	No	Sapien	No	Haemorrhagic Disabling	Day 9	CT+	Partial	DAPT
6	Tricuspid	No	Acurate	Yes	Ischemic, Non-disabling	Day 59	MR+	Yes	SAPT
7	Tricuspid	No	Acurate	No	Ischemic (IE), Disabling	Day 107	MR+	Died	DOAC SAPT
8	Tricuspid	No	Sapien	No	Ischemic, Disabling	Day 181	MR+	Partial	SAPT
9	Tricuspid	No	Acurate	Yes	Ischemic, Non-disabling	Day 185	CT+	Yes	DAPT
10	Tricuspid	Baseline	Portico	No	Ischemic, Non-disabling	Day 268	MR+	Yes	DOAC SAPT
Surgery									
11	Tricuspid	No	Inspiris	-	Ischemic, Non-disabling	Day 1	CT+	Yes	SAPT
12	Tricuspid	Baseline	Trifecta	-	Ischemic, Disabling	Day 5	MR+	Partial	DOAC SAPT
13	Tricuspid	No	Magna Ease	-	Ischemic, Disabling	Day 5	CT+	Died	SAPT

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Procedural Considerations for TAVR in BAV

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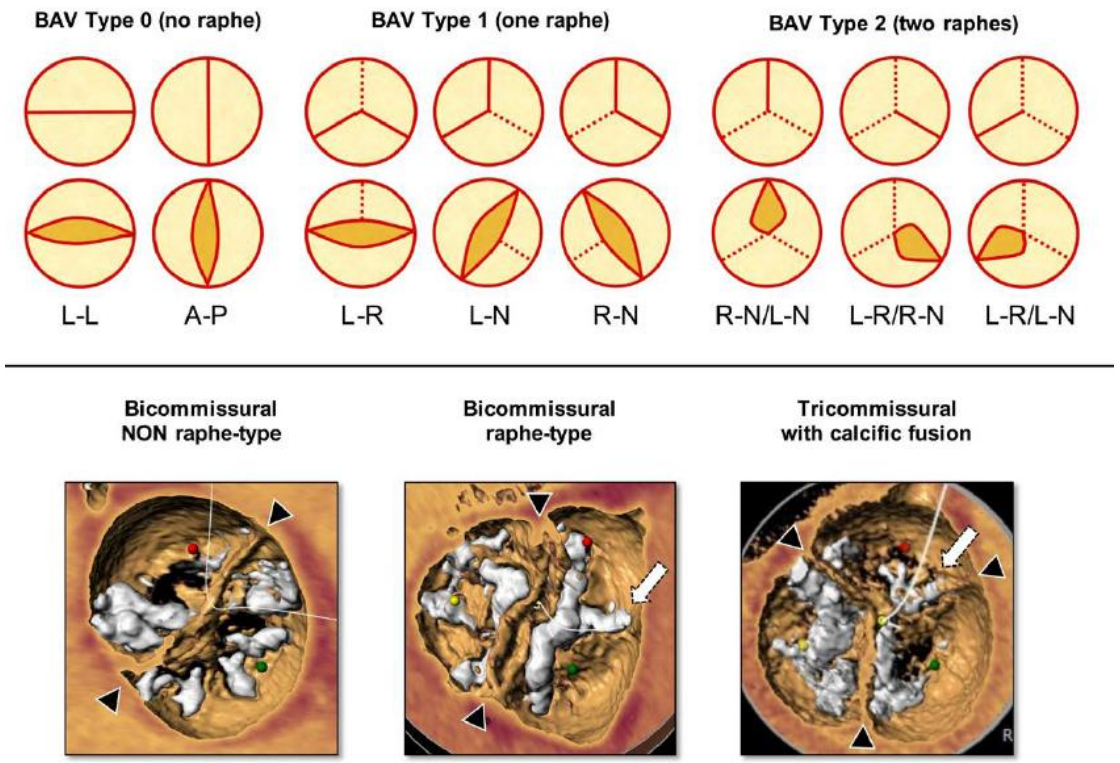
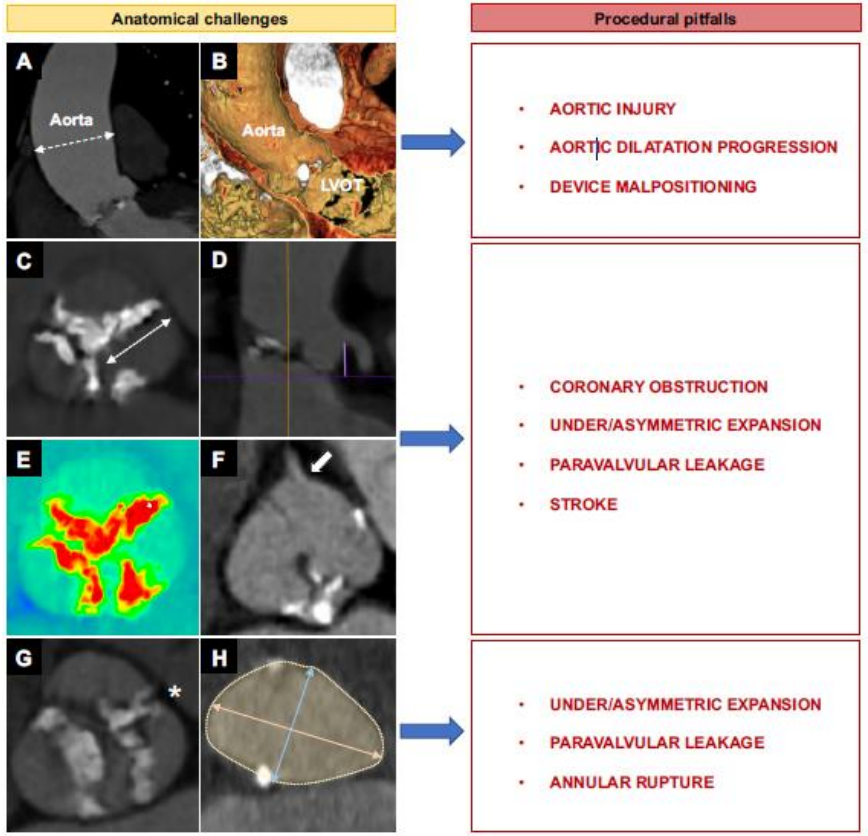
Patient selection and procedural planning are critical !

BAV Morphology Evaluation – *Identification of High Risk Anatomical Features*





Tarantini – Circulation 2021

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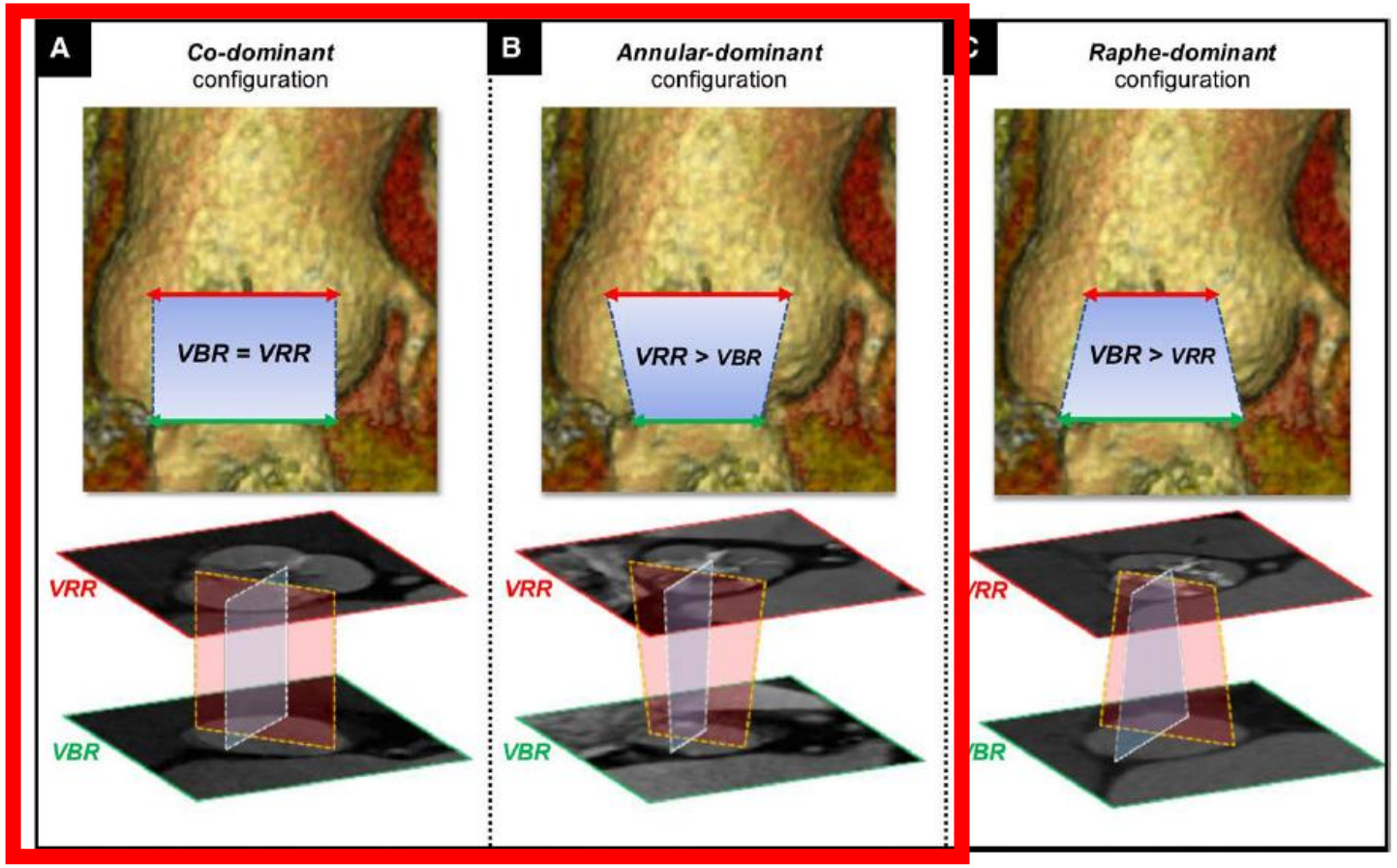
Prosthesis *Size Selection*

- Question 1: Is the intercommisural area the most constraining region?
- Question 2: Do we need to adjust sizing algorithms in this setting?



Tube
Sizing base on the annulus

Flare
Sizing base on the annulus

Taper
Sizing base on the ICD

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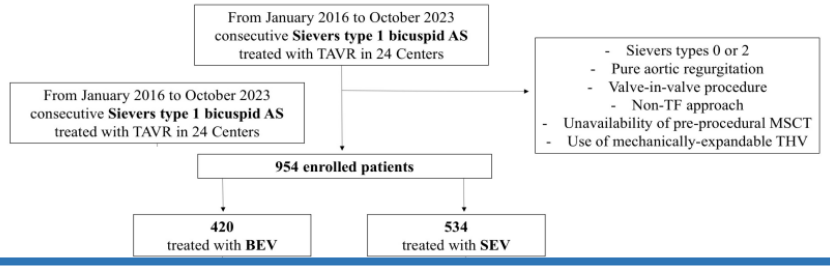
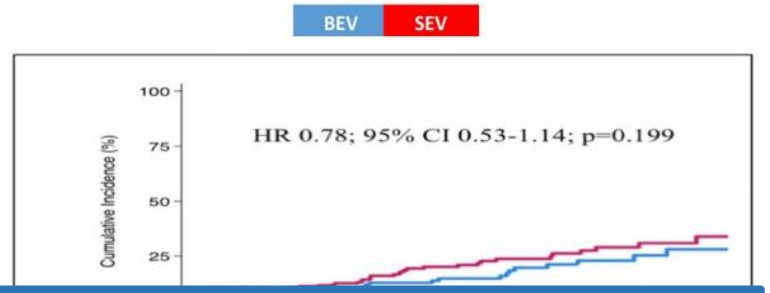
Prosthesis *Type Selection*

AD-HOC registry

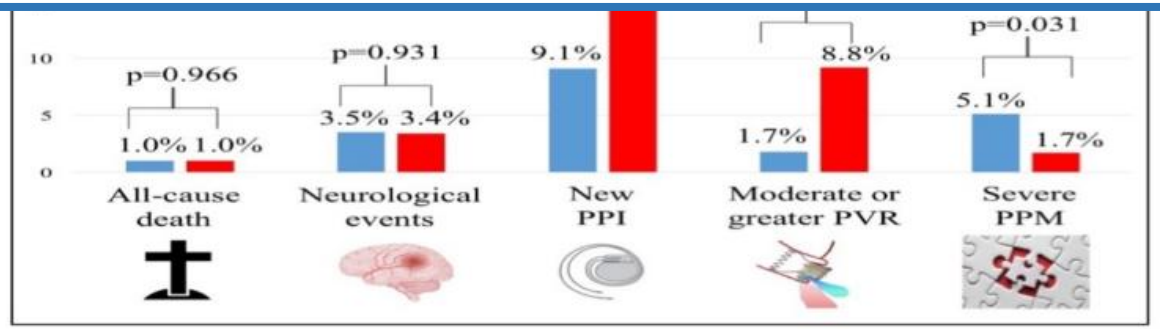


Composite of death, stroke or HF hospitalization



Median FU: 1.3 year
BEV vs. SEV
15.7% vs 20.3%

A definitive recommendation of THF cannot be formulated !

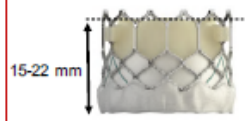


BEV ↓ *PPI and moderate-or-greater PVR*

SEV ↓ *severe PPM*

A Buono et al. EuroPCR 2024

Balloon-expandable – SAPIEN 3 THV

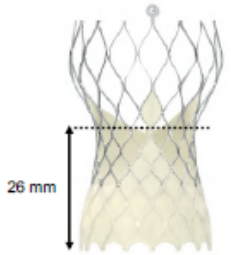


- SEALING SKIRT
- HIGH RADIAL STRENGHT
- LOW PROFILE
- OPEN CELL DESIGN
- STEERING FLEX CATHETER

→

- ↓ PVL [4,5,19,20,21,25]
- ↓ PRE/POST-DILATATION [5,20]
- ↑↓ PPMI [4,5,19,20,21,25]
- ↑↓ STROKE [21,25]
- ↑↓ HIGHER GRADIENTS* [20]
- ↑ AORTIC INJURY [9,20]

Self-expandable – EVOLUT R/PRO THV

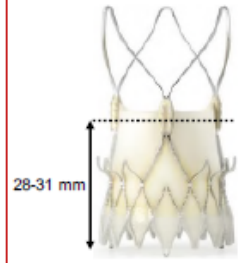


- SEALING SKIRT (EVOLUT PRO)
- HIGH PROFILE
- MORE CLOSED CELL DESIGN
- RECAPTURABLE/REPOSITIONABLE
- HIGH LVOT INTERACTION

→

- LOWER GRADIENTS [20,22,23]
- ↓ AORTIC INJURY [20,23]
- ACCURATE POSITIONING
- ↑↓ PPMI [20,22,23]
- ↑↓ PVL [20,22,23]
- ↑↓ STROKE [20,22,23]

Self-expandable – ACURATE NEO THV



- HIGH PROFILE
- STABILIZATION ARCHES
- OPEN CELL DESIGN
- LOW LVOT INTERACTION

→

- LOWER GRADIENTS [29]
- ↓ AORTIC INJURY [29]
- ↓ PPMI [29]
- ↑↓ PVL [29]
- ↑↓ CORONARY OBSTRUCTION [29]
- ↑ STROKE [29]

Patient Tailored Approach!

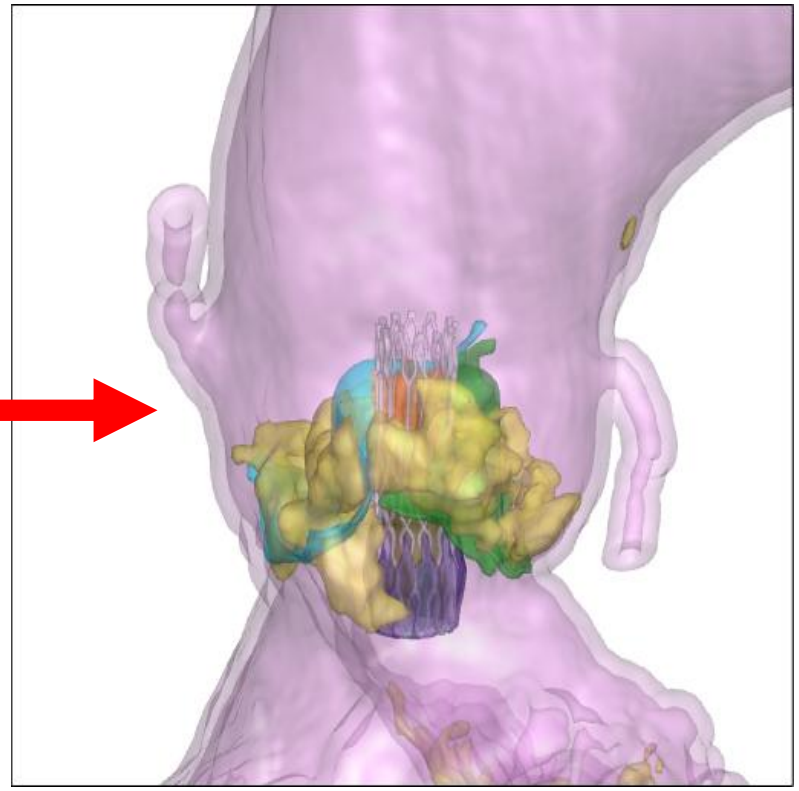
DASI Simulations

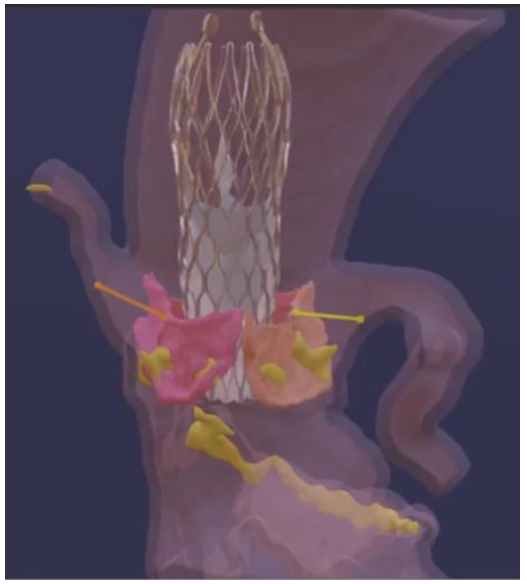
Simulations and AI-Driven Prediction Based Algorithms

Reduced Order Model (ROM)

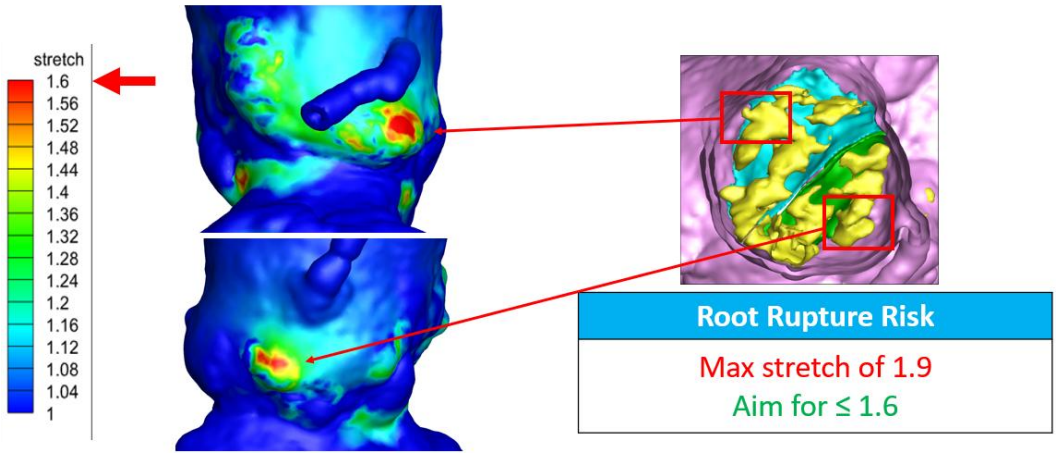
Predicts:

1. Frame expansion
2. Displacement of surrounding tissues





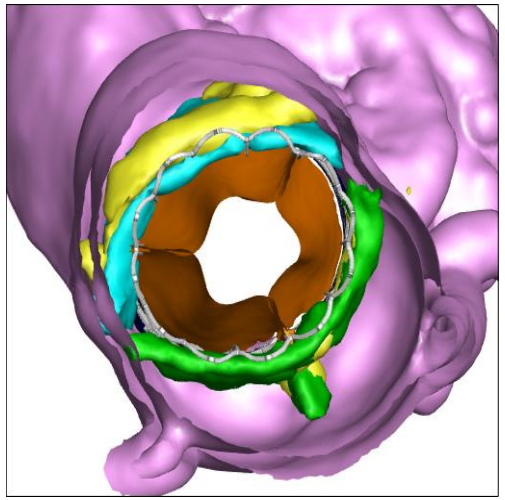
Root Rupture Risk



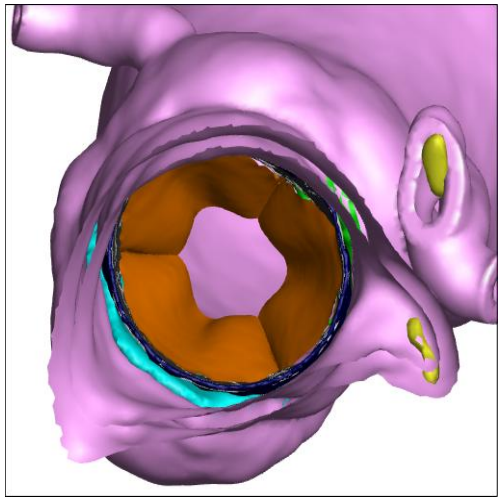
Root Rupture Risk
Max stretch of 1.9 Aim for ≤ 1.6

Jilaihawi NY Valves 2025

PVL Risk



Aortic View



Ventricular View

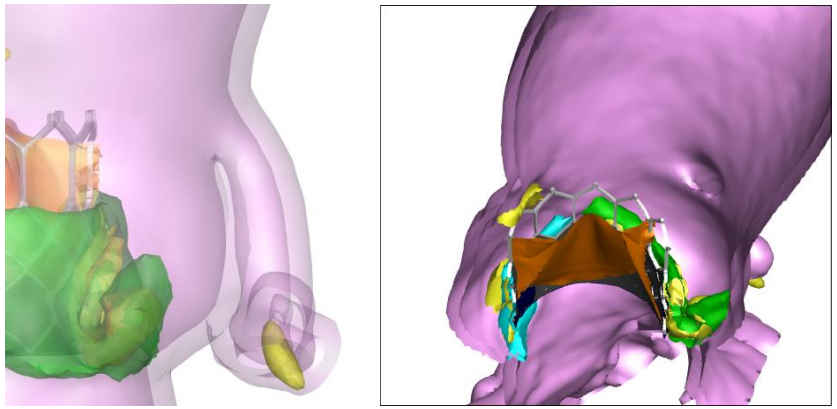
Paravalvular Leak Risk*
No Gap

Coronary Obstruction Risk

Left Coronary Ostium Diameter	
Diameter (d) =	3.3 mm
Distance from leaflet to coronary	
DLC =	10.2 mm
Coronary Obstruction Risk Index*	
DLC/d =	3.1

Coronary Obstruction Risk Index Cut-off*
- DLC/d < 0.7, high likelihood for Coronary Obstruction
- DLC/d>0.7, low likelihood for Coronary Obstruction

*Heitkemper M, Hatoum H, AzimianA et al. Modeling Risk of Coronary Obstruction During Transcatheter Aortic Valve Replacement. J Thorac Cardiovasc Surg2020;159:829-838 e3.



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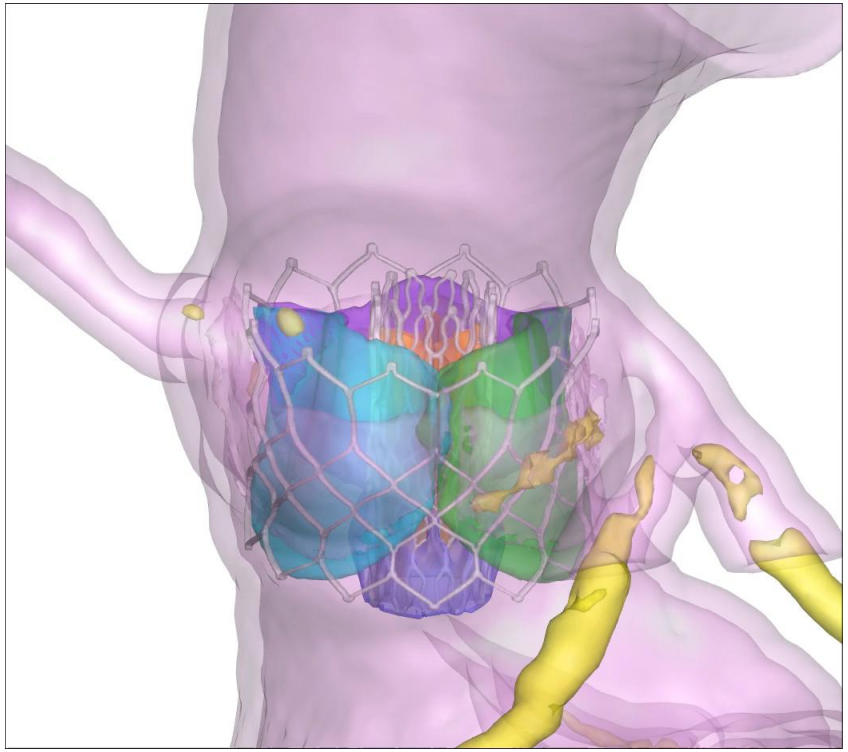
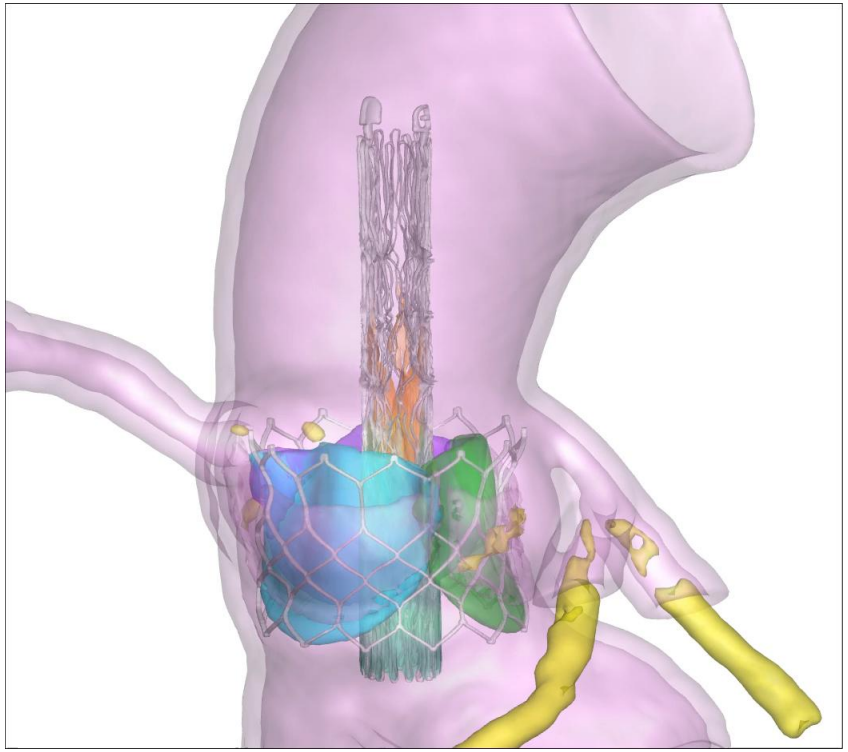
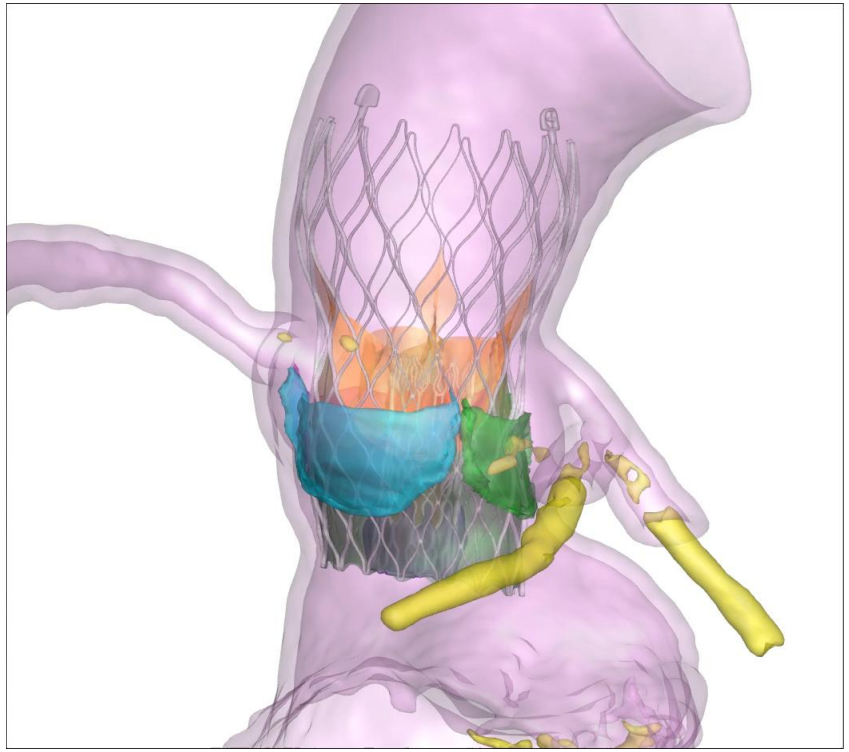
Lifetime Management







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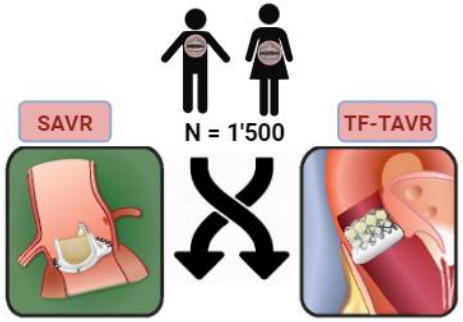
Dasi LP, ARCH 2023

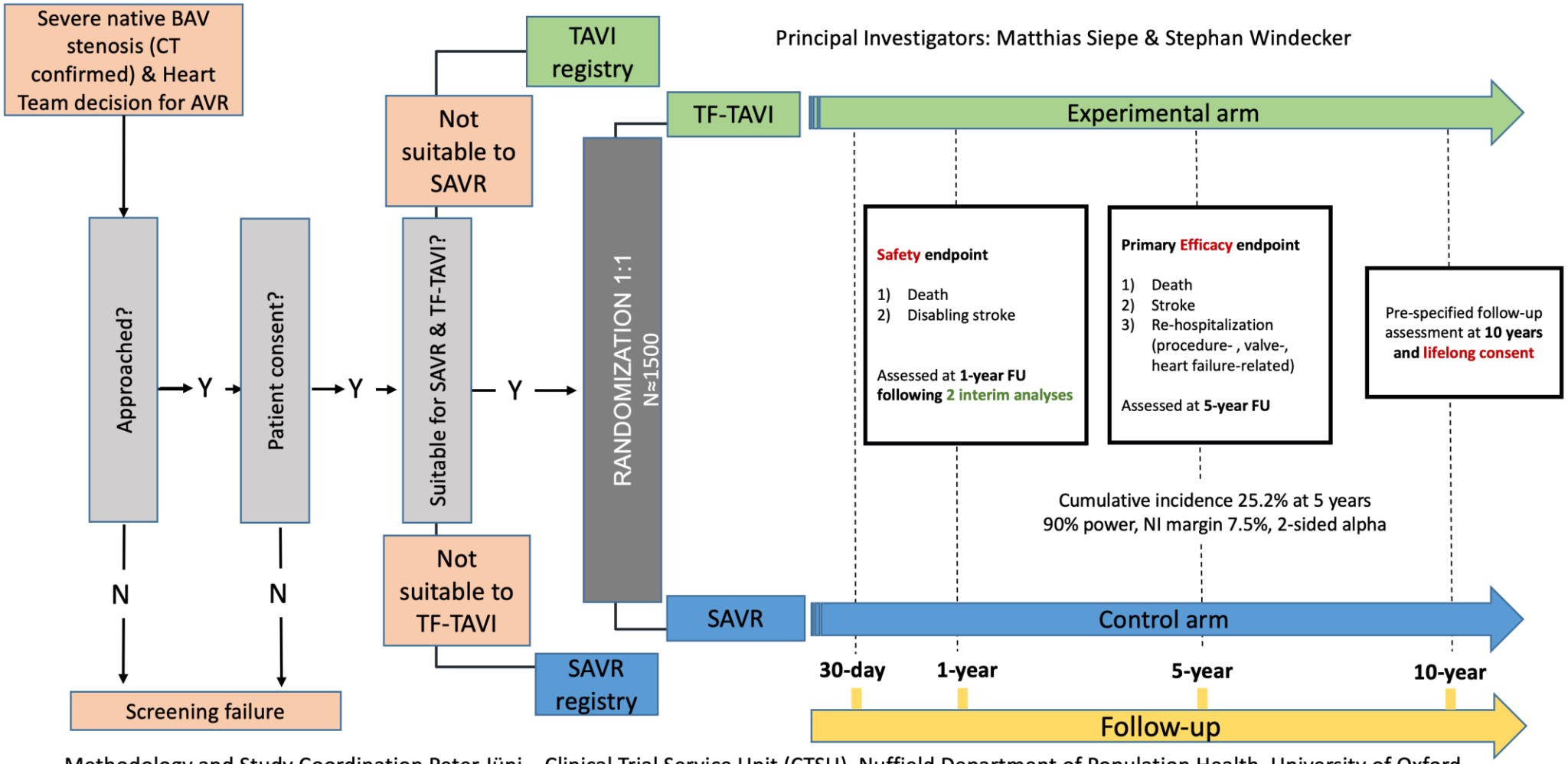
What comes next ?

NAVIGATE BICUSPID – INVESTIGATOR INITIATED TRIAL

International, multi-center trial to evaluate the effectiveness and safety of transcatheter aortic valve intervention (TAVI) compared with surgical aortic valve replacement (SAVR) in patients with severe bicuspid aortic valve stenosis



NAVIGATE BICUSPID – INVESTIGATOR INITIATED TRIAL



Methodology and Study Coordination Peter Jüni – Clinical Trial Service Unit (CTSU), Nuffield Department of Population Health, University of Oxford

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BELIEVERS trial

Patients with severe Bicuspid Aortic Valve stenosis > 50 years old

TAVR and SAVR risk determined by committee

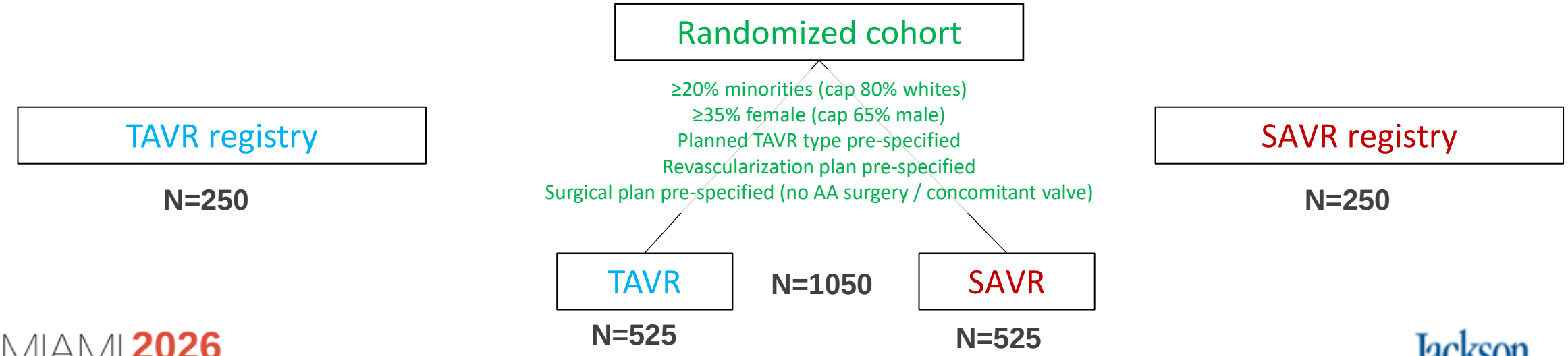
Permissibility of randomization will determined by the committee
based on perceived equipoise, taking into account risk assessments

If risk assessment deemed too disparate, registry still permitted

Key exclusions for randomization:

Concomitant non coronary cardiovascular disease requiring cardiac surgery; SYNTAX≥32; AoMAX≥45mm*

(May still enter registries)



Conclusions

- BAV stenosis represent a complex anatomic scenario
- Unique challenges for TAVR
- Patient selection and preprocedural imaging are critical
- Advances in preprocedural imaging, AI simulations and devices will continue to improve outcomes.
- Lifetime management
- Need of RCT on
  - BAV vs TAV
  - BEV vs SEV
  - TAVR vs SAVR

Gracias !

Jackson HEALTH SYSTEM
Miracles made daily.

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