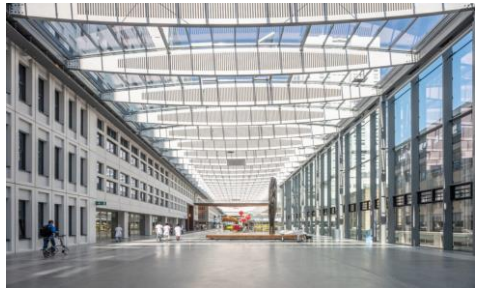

Keynote Spotlight on TAVR2023

A Paradigm Shift to Valve-in-Valve: 1st, 2nd, and more Valves

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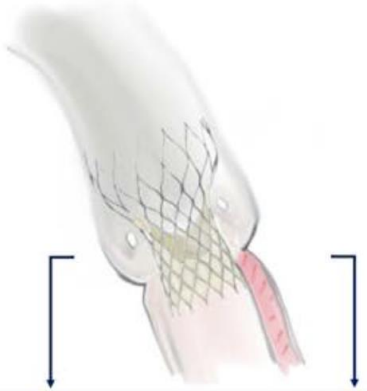
University Medical Center Rotterdam

Conflict of Interest

- **Research Grant Support: Abbott, Boston Scientific, Edwards Lifesciences, Medtronic, PulseCath, Daiichi Sankyo , Teleflex, Siemens, Pie Medical**
- **Consultancy: Abbott, Boston Scientific, Medtronic, PulseCath, Daiichi Sankyo , Amgen, Teleflex, Abiomed, Pie Medical, Anteris, JenaValve, Materialise**

Lifetime Management Considerations

1st procedure	TAVR		SAVR		Ross	
						
2nd procedure	TAVR	TAVR explant + SAVR	TAVR	Redo SAVR	TAVR	Redo SAVR
	Minimally invasive procedure	Possible 3rd procedure	Wide experience with TAVR-in-SAVR Easy Coronary reaccess after SAVR Surgery at young age	Possible 3rd procedure	Minimally invasive procedure Possible 3rd procedure	Complex procedure
	Risk of coronary obstruction Difficult coronary reaccess Few options for 3rd procedure	Poor experience with TAVR explant Possible concomitant aortic repair	Few options for 3rd procedure	Higher operative risk	Possible need for two valves intervention	

TAV-in-TAV-in-TAV unchartered territory

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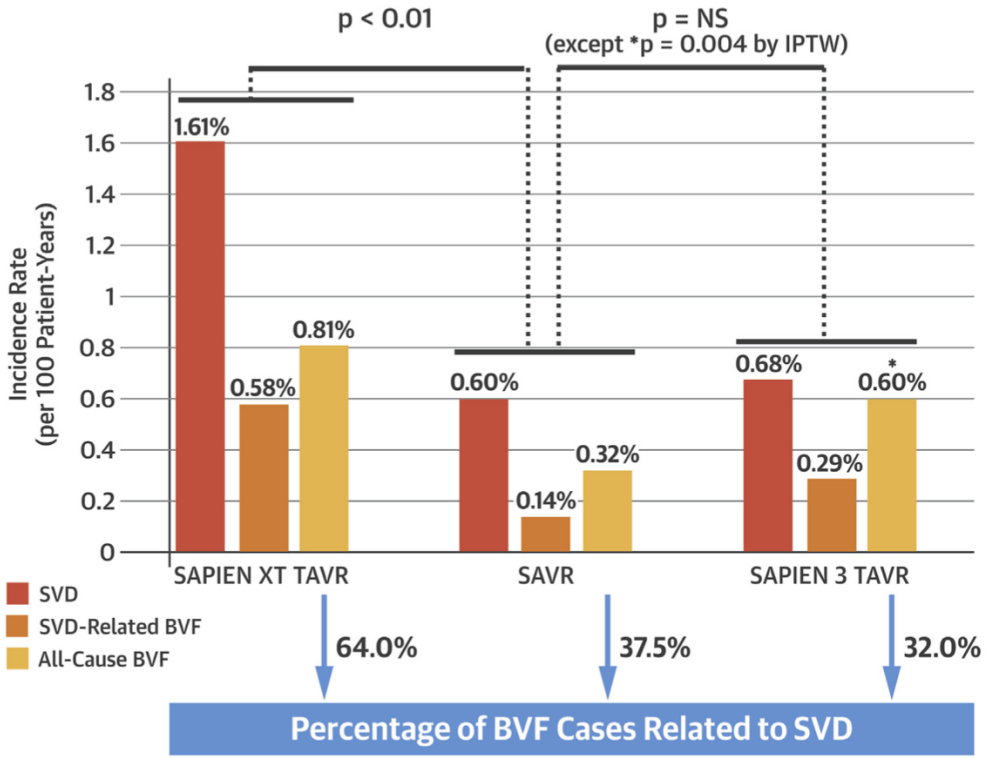
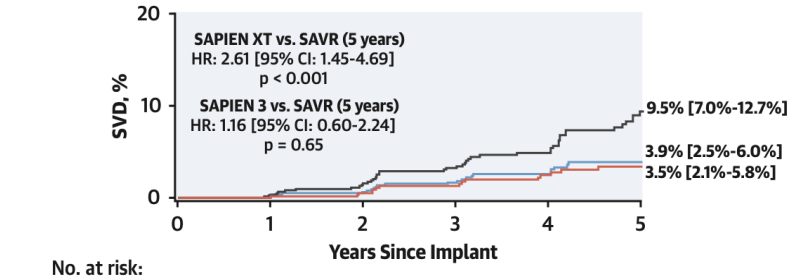
Russo et al. Circ CVI 2022;15:915-927

Durability & Need for Revalving

Durability Preview

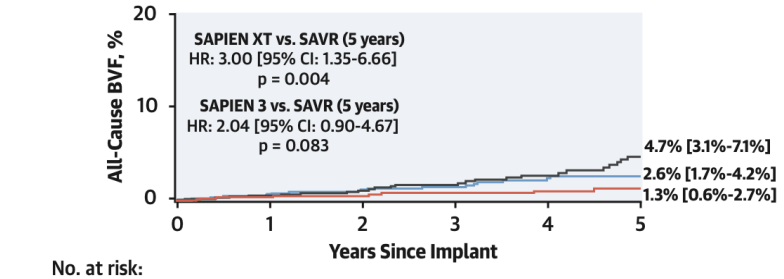
SAPIEN XT platform – PARTNER II





No. at risk:

SAVR	664	625	538	449	346	265
SAPIEN XT	774	733	622	505	368	297
SAPIEN 3	891	827	705	581	412	283



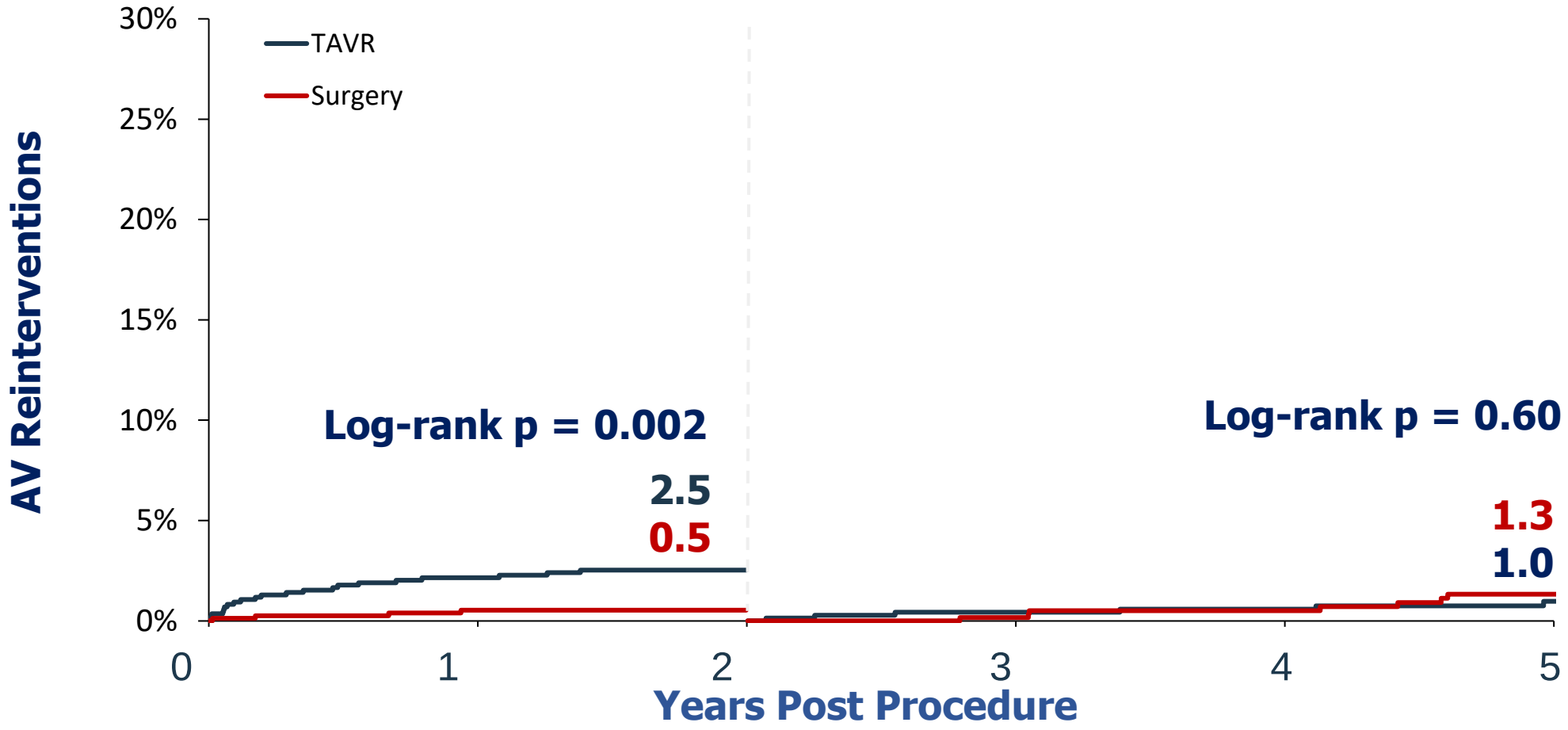
No. at risk:

SAVR	936	762	643	536	423	321
SAPIEN XT	974	813	689	556	406	326
SAPIEN 3	1,069	909	764	628	451	312

➢ **THV Platform may matter in terms of durability**

Pibarot et al. JACC 2020;76:1830-43

SURTAVI - Self expanding THV 2-Year Landmark Reinterventions



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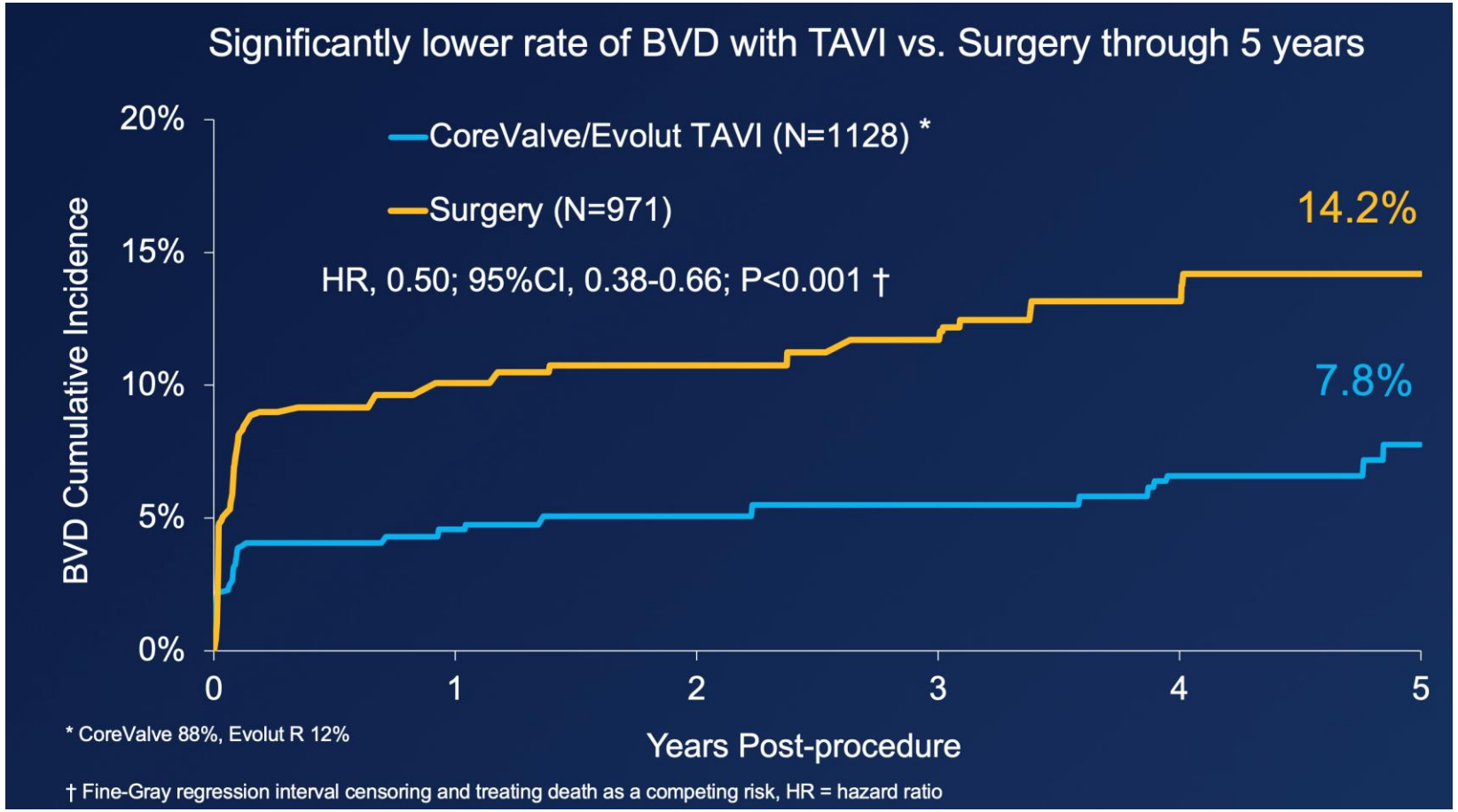
Bioprosthetic Valve Dysfunction

- N = 2099
  - ✓ TAVI 1128
  - ✓ SAVR 971
- Age 80.9 years
- Male 55%
- STS 5.2



Yabukov et al. Presented @ CRT 2023, Washington

Bioprosthetic Valve Dysfunction

	CoreValve/Evolut TAVI (N=1128)	Surgery (N=971)	HR (95% CI)	P value
BVD, %	7.8	14.2	0.50 (0.38, 0.66)	<0.001
SVD	2.2	4.4	0.46 (0.27, 0.78)	0.004
NSVD *	4.3	8.8	0.48 (0.33, 0.68)	<0.001
Severe PPM (30-day/discharge)	3.7	11.8	0.29 (0.19, 0.43) †	<0.001
Severe PVL	1.2	0.2	5.51 (1.24, 24.41)	0.02
Thrombosis	0.3	0.2	1.26 (0.21, 7.62)	0.80
Endocarditis	1.1	1.3	0.85 (0.38, 1.88)	0.68

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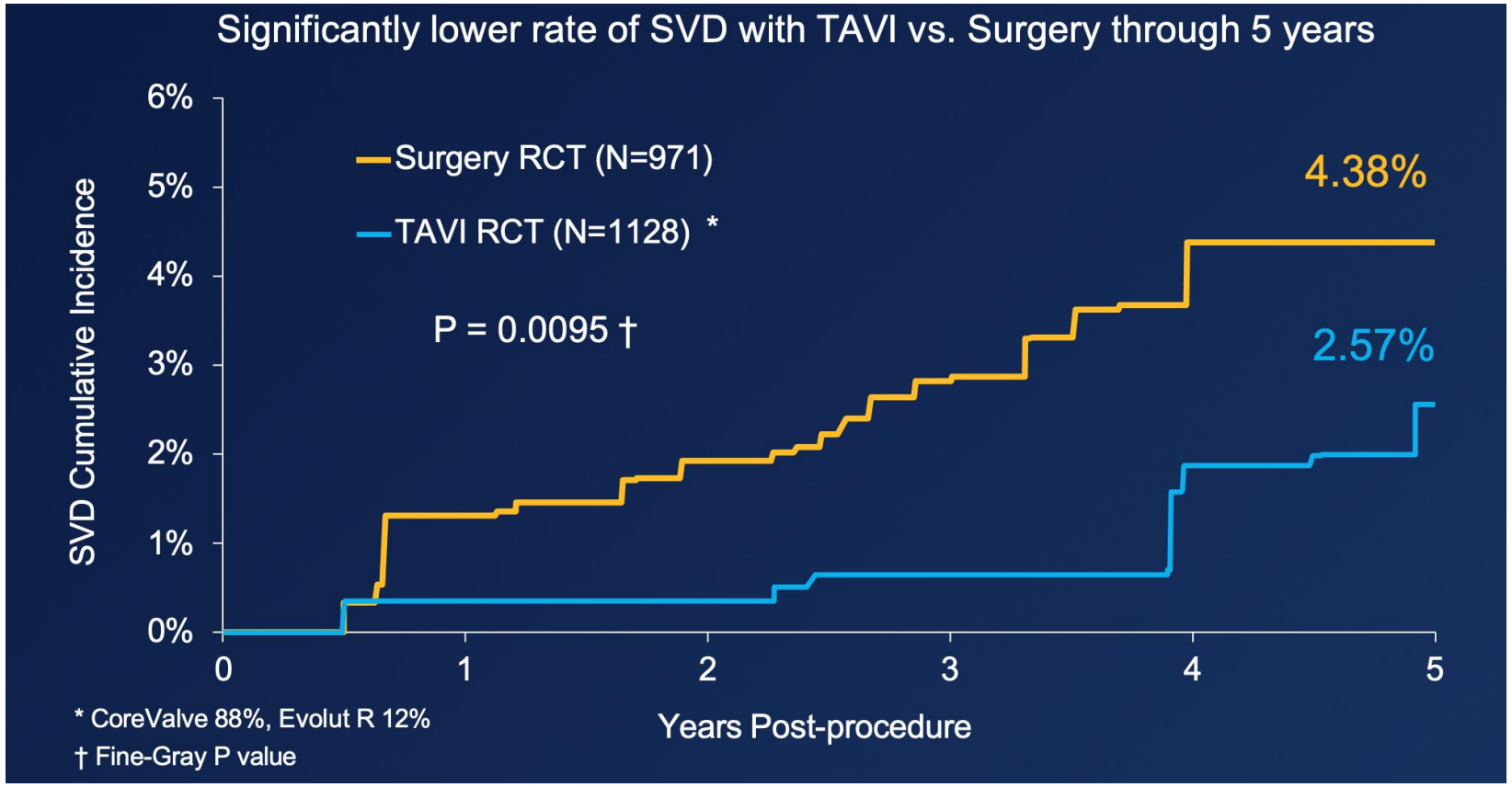
Yabukov et al. Presented @ CRT 2023, Washington

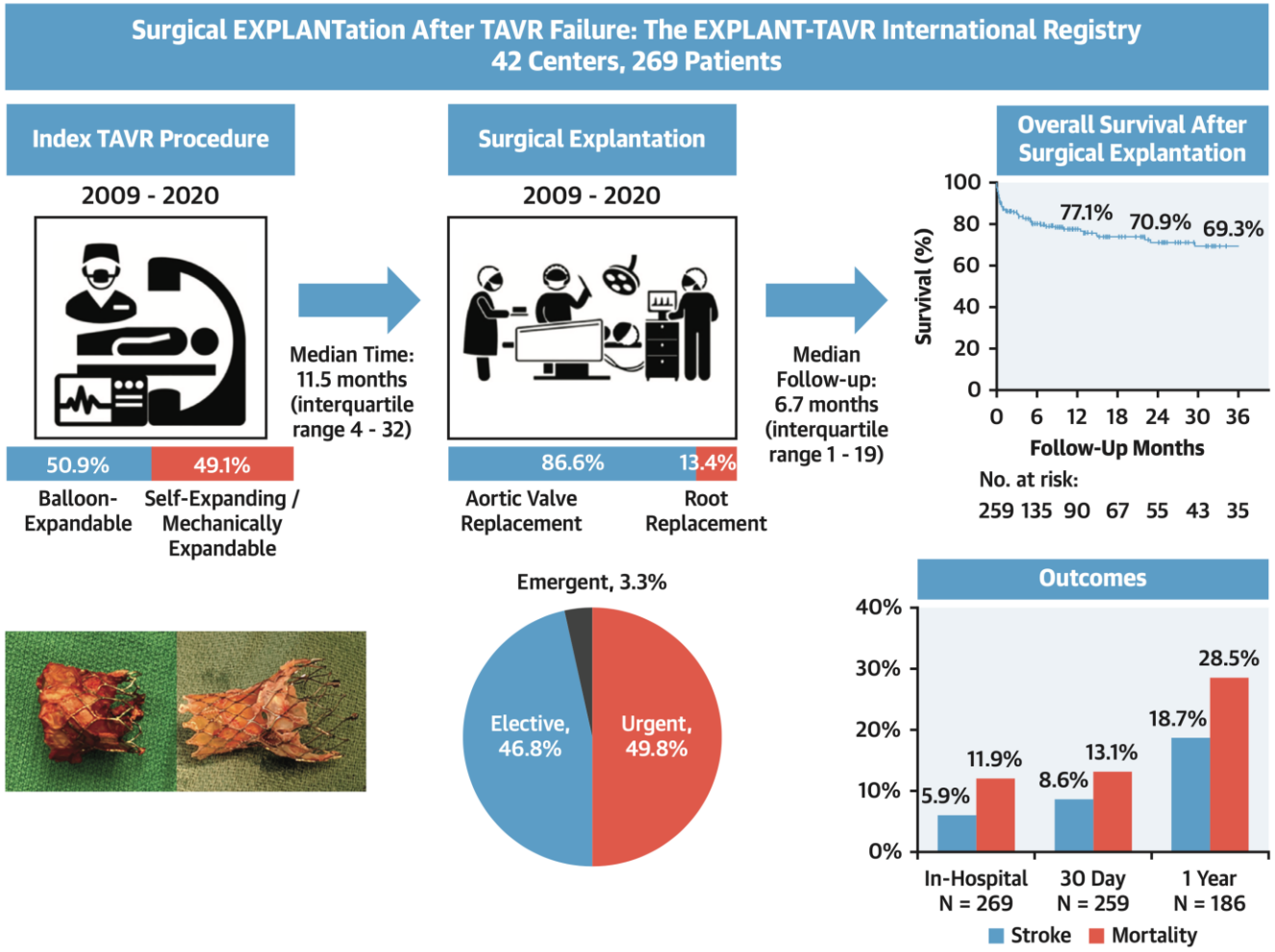
Structural Valve Degeneration

- N = 2099
  - ✓ TAVI 1128
  - ✓ SAVR 971
- Age 80.9 years
- Male 55%
- STS 5.2



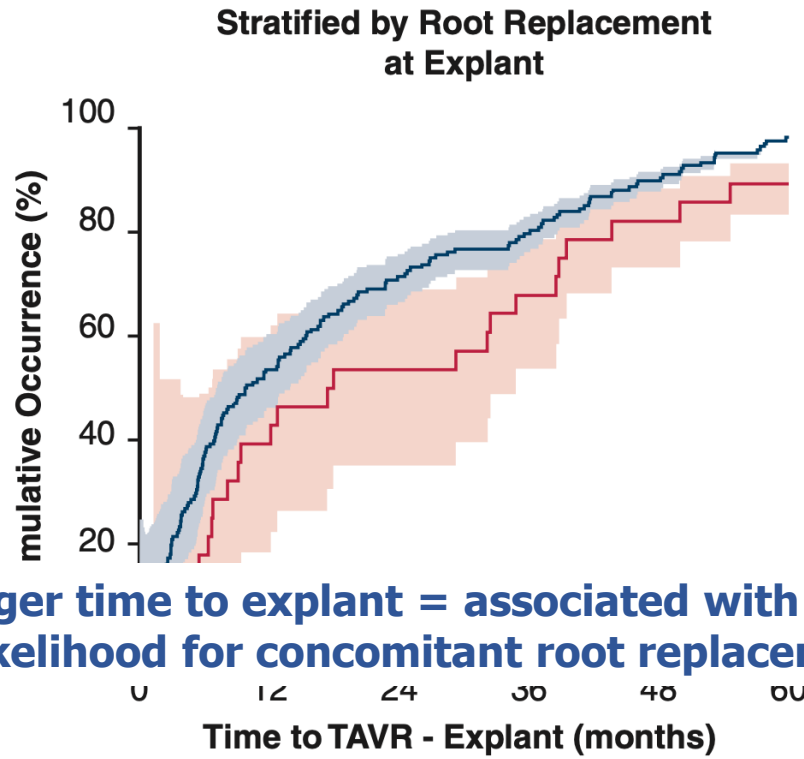
Failing Transcatheter Heart Valve

EXPLANT TAVR Registry



Bapat et al. JACC CVI 2021;14:1978-91

EXPLANT TAVR Registry – Time to explant



Longer time to explant = associated with higher likelihood for concomitant root replacement

	AVR	Root Replacement	*P* value
Median Interval (months)	9.9 (IQR: 3.9 – 27.0)	17.6 (IQR: 6.8 – 39.0)	.047

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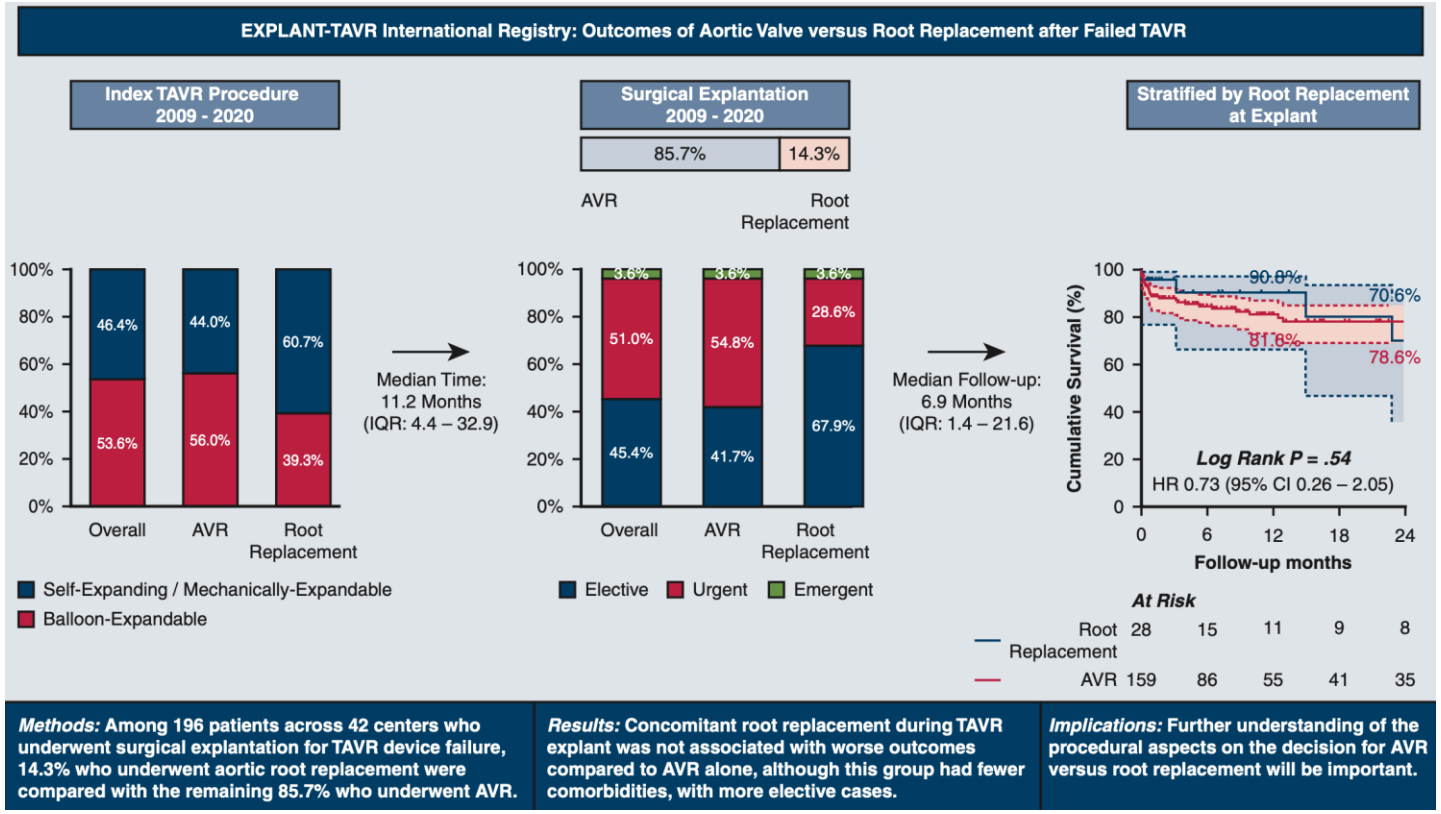
Vitanova et al. Journal of Toracic and Cardiovascular Surgery 2022;1-13, in press

EXPLANT TAVR Registry – Need for root replacement



- **THV design determines explant surgery technique**
- **Different interaction with the surrounding structures**
  - ✓ **Standard aortotomy more feasible with BEV**
  - ✓ **Higher aortotomy with taller stent frame in SEV**
- **Removal of the prosthesis may require**
  - ✓ **Blunt dissections from aorta, mitral valve and conduction tissue**
  - ✓ **Crimping the stent frame**
- **root replacement = more with SEV vs. BEV**
  - ✓ **(18.7% vs 10.5%; P 1/4 .11)**

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Vitanova et al. Journal of Toracic and Cardiovascular Surgery 2022;1-13, in press

Explant SAVR vs. Redo TAVI for failing THV

- **EXPLANTORREDOTAVR Registry**
- **Time window 2009 – 2022**
- **N = 396**
  - **Explant surgery n = 181**
  - **Redo TAVI n = 215**
- **THV failure excluding endocarditis**
  - **SVD**
  - **Non-SVD**
  - **THV thrombosis**
  - **Delayed THV migration**
- **Exclusion**
  - **Endocarditis**
  - **Bail-out interventions during index admission**

	Overall (N = 396)	Redo-TAVR (n = 215)	TAVR-Explant (n = 181)	*P* Value
Age, y	75.5 ± 9.3	78.6 ± 8.4	72.1 ± 9	<0.001
Female	162 (40.9)	95 (44.2)	67 (37)	0.15
Frailty	106 (34.3)	53 (36.3)	53 (32.5)	0.55
Pulmonary hypertension	95 (25.5)	47 (23.2)	48 (28.2)	0.28
Chronic kidney disease	152 (40.6)	76 (37.4)	76 (44.4)	0.17
Dialysis-dependent	29 (7.6)	16 (7.9)	13 (7.3)	1.00
Chronic obstructive pulmonary disease	94 (24.7)	48 (23.6)	46 (26)	0.63
Hostile chest or chest deformity	45 (13)	24 (14)	21 (12.1)	0.63
Calcified aorta	61 (16.2)	50 (24.5)	11 (6.4)	<0.001
Left ventricular ejection fraction, %	51.8 ± 13	52.7 ± 12.4	50.9 ± 13.6	0.21
Prior permanent pacemaker/ICD	82 (21.5)	41 (20.2)	41 (23)	0.53
Prior PCI	63 (17.4)	10 (5.4)	53 (29.6)	<0.001
BSA	1.9 ± 0.3	1.9 ± 0.4	2 ± 0.3	0.017
NYHA functional class at initial TAVR				0.003
1	9 (2.7)	2 (1.2)	7 (4.1)	
2	73 (22.0)	29 (17.9)	44 (25.9)	
3	197 (59.3)	112 (69.1)	85 (50.0)	
4	53 (16.0)	19 (11.7)	34 (20.0)	
Previous cardiac surgery	135 (38.4)	47 (27.2)	88 (49.2)	<0.001
STS PROM, %	3.2 (2.2-5.1)	3.5 (2.3-5.8)	3.1 (2.1-4.9)	0.11
Heart team risk stratification				<0.001
Low	36 (14.3)	8 (7)	28 (20.6)	
Intermediate	91 (36.3)	34 (29.6)	57 (41.9)	
High	104 (41.4)	61 (53)	43 (31.6)	
Extreme	20 (8)	12 (10.4)	8 (5.9)	

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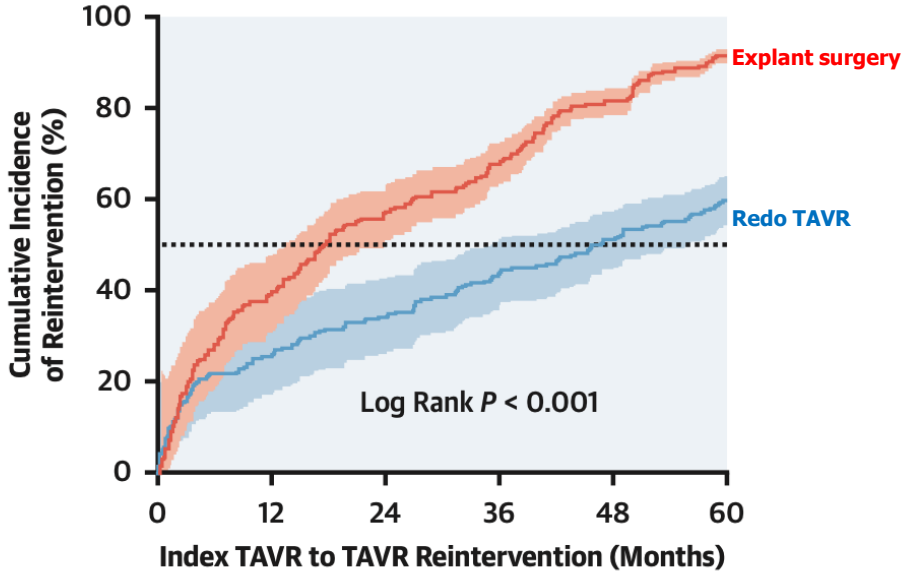
Tang et al. JACC CVI 2023;16:927-41

Explant SAVR vs. Redo TAVI - Etiopathogenesis

Mechanism of TAVR Failure

	Redo TAVR	TAVR Explant	*P* Value
SVD	63.7%	51.9%	0.023
PVL	32.8%	28.7%	0.44
PPM	0.5%	17.1%	<0.001
THV Thrombosis	3.9%	1.7%	0.23
THV Migration	0.5%	3.3%	0.055

Time to TAVR Reintervention



	Redo TAVR	TAVR Explant	*P* Value
Median Interval (months)	45.7 (IQR: 10.6-75.6)	17.6 (IQR: 5.0-40.7)	<0.001

Tang et al. JACC CVI 2023;16:927-41

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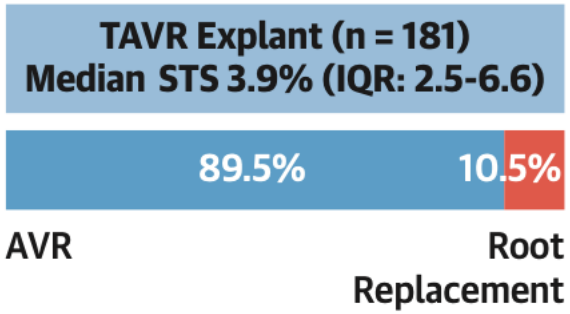
Explant SAVR vs. Redo TAVI – Explant Surgery



Cardiopulmonary bypass time, min	146 (106-202)
Aortic cross-clamp time, min	104 (73-149)
Aortic valve replacement	162 (89.5)
Mechanical	23 (14.2)
Tissue	139 (85.8)
Root replacement	19 (10.5)
Mechanical	2 (10.5)
Tissue	17 (89.5)
Concomitant procedure(s)[a]	101 (55.8)
Ascending aortic replacement	11 (6.1)
CABG	32 (17.7)
Mitral valve surgery	37 (20.4)
Tricuspid valve surgery	5 (2.8)
Mitral/tricuspid valve surgery	42 (23.2)
Root repair	3 (1.7)
Root enlargement	30 (16.6)
Ascending aortic graft size	28 (26-30)

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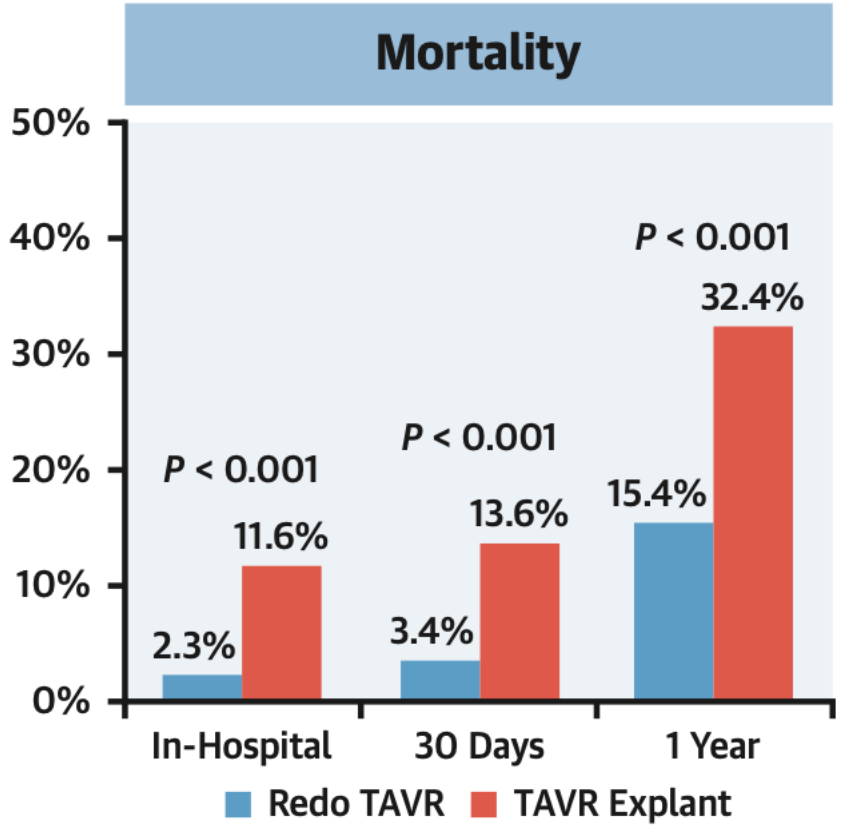
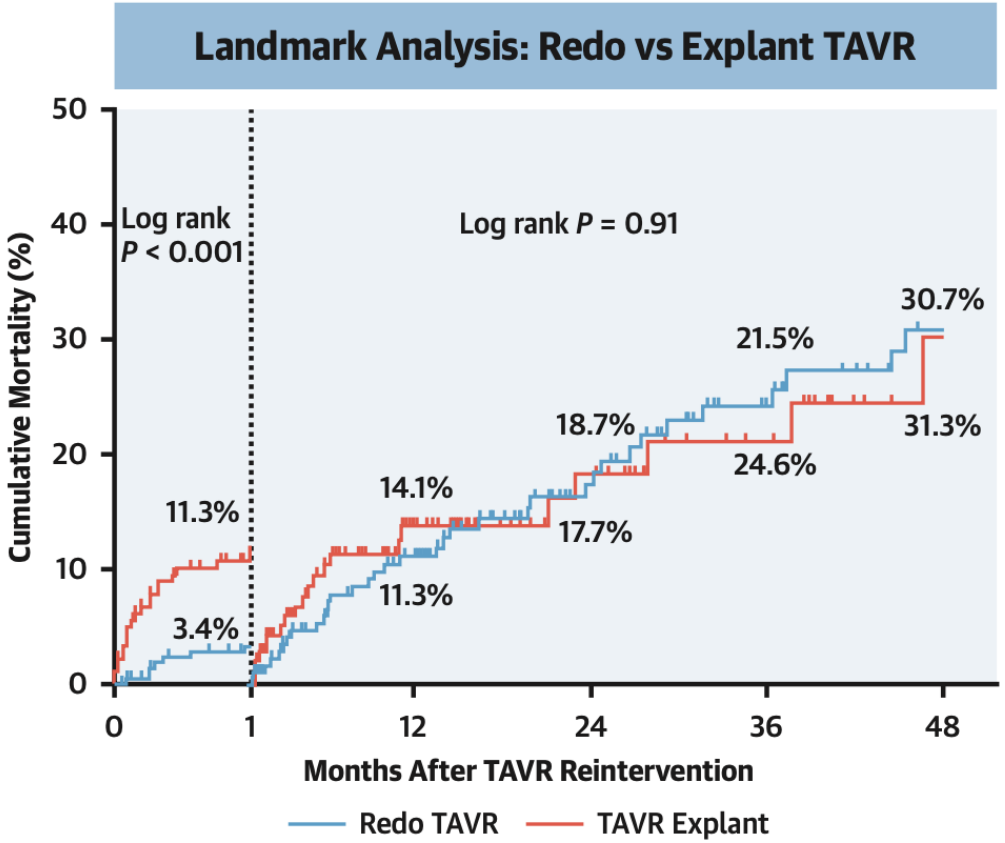
Explant SAVR vs. Redo TAVI – Outcome



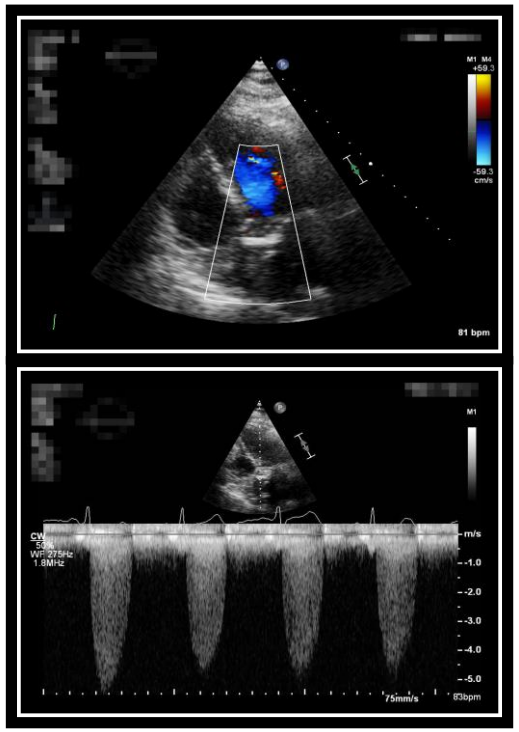


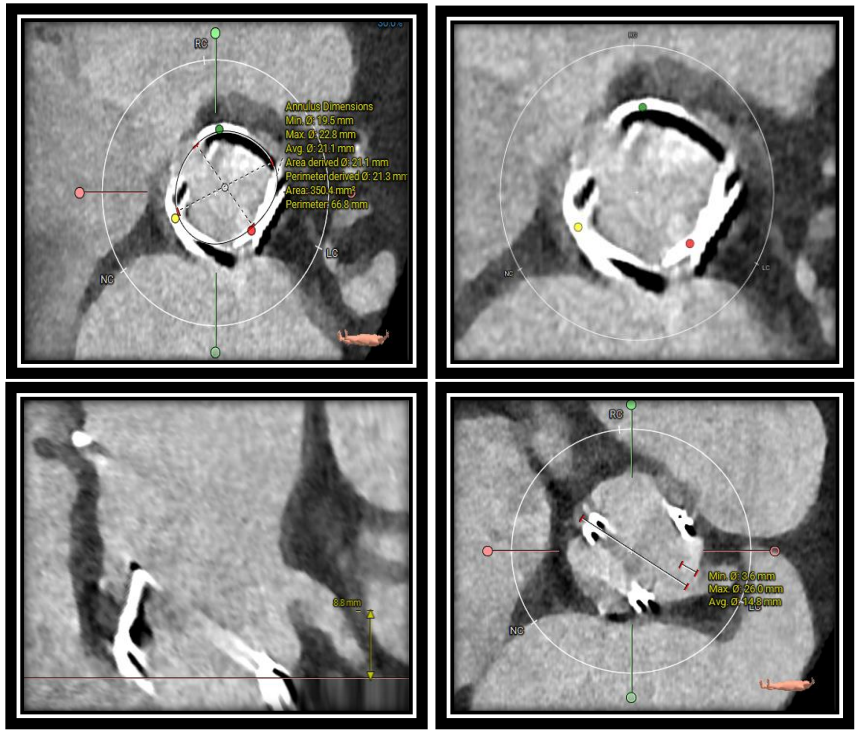
Tang et al. JACC CVI 2023;16:927-41

Advanced MSCT Planning & Simulation

Example – Advanced Planning in failing surgical valve

- 73-years old female
  - Relevant Cardiac History: Surgical AVR 2014 (Perimount Bioprosthesis 23mm)
  - History presenting complaint: NYHA 2, CCS 2 + syncope
  - Pre-procedural planning





MATERIALISE CT DERIVED ANATOMY APPRECIATION

Perimount Valve overview

Evolut in Perimount

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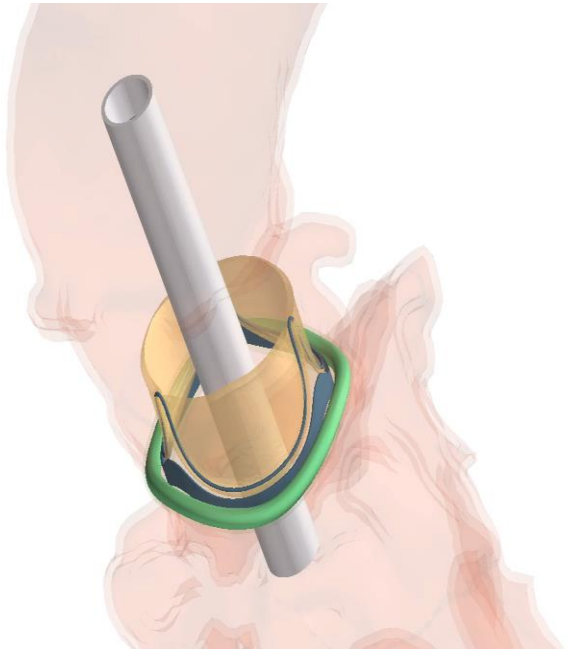
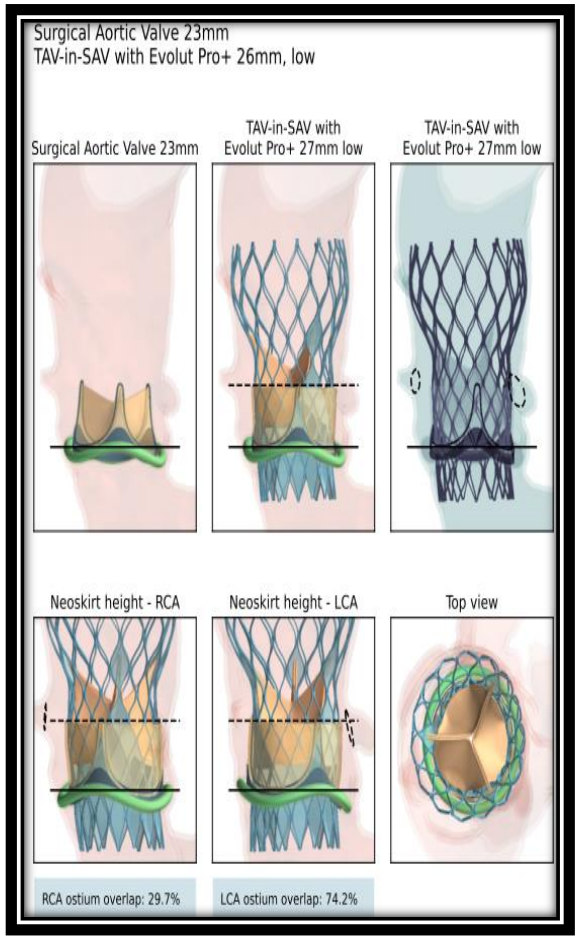
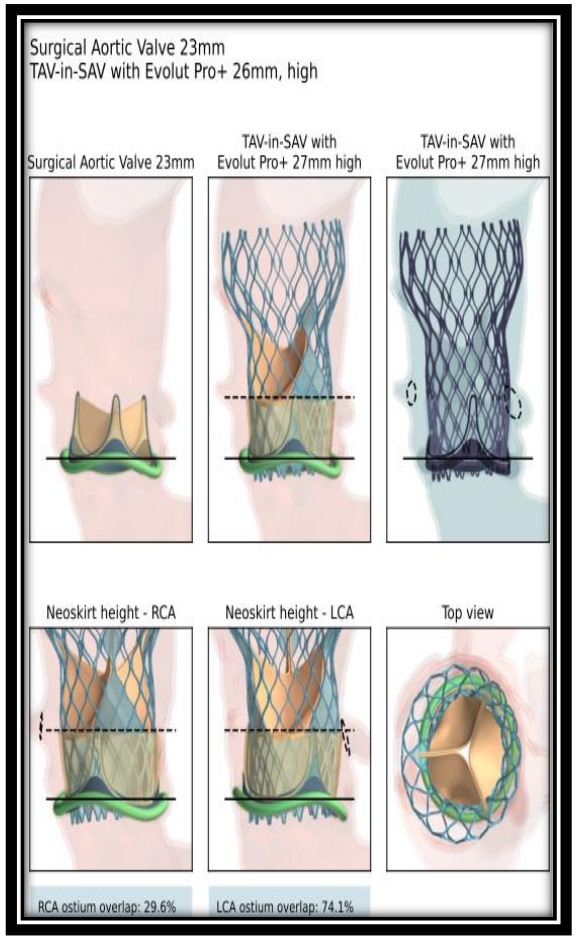
FEOPS CT DERIVED SIMULATION EVOLUT IMPLANTATION







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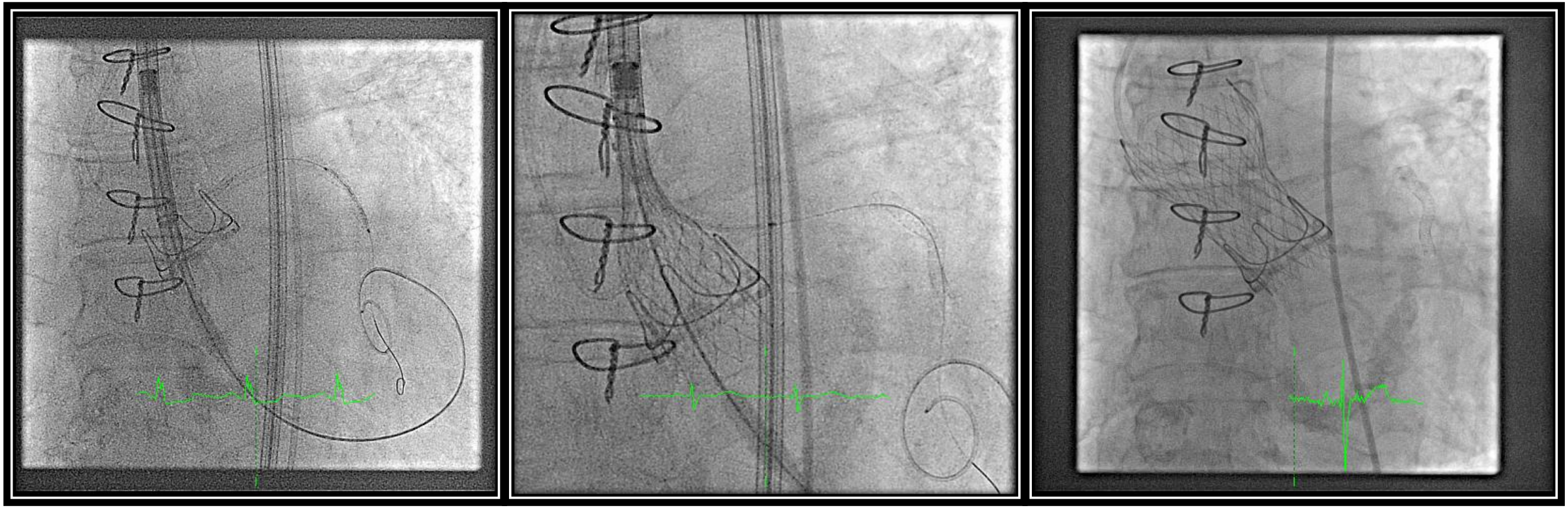
PROCEDURE – EVOLUT TAVI + CHIMNEY



AR index 33.3, PG 3mmHg, MG 5mmHg

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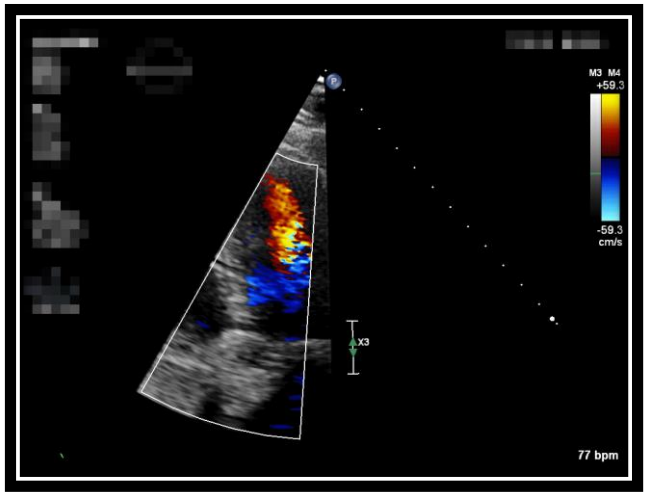
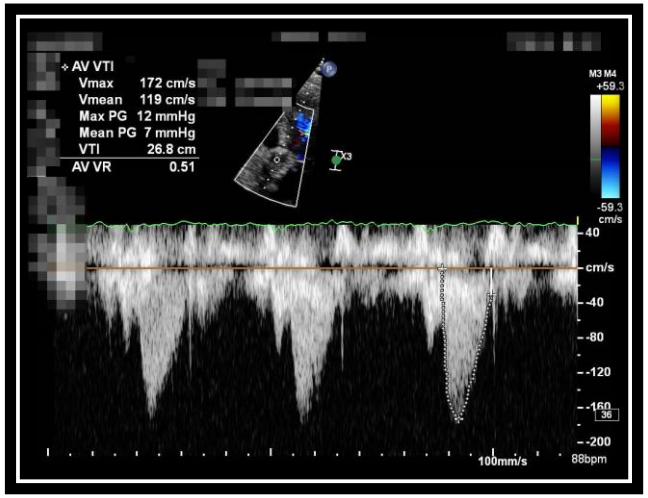
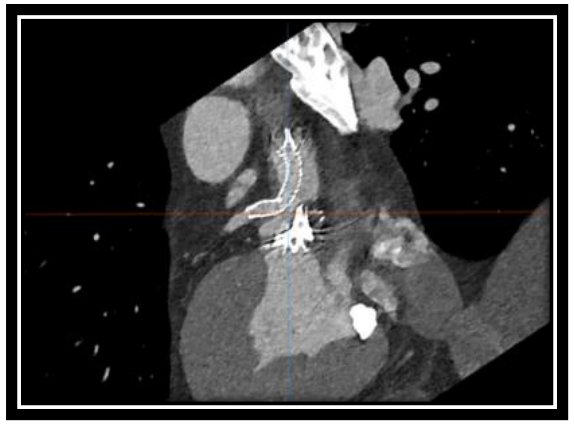
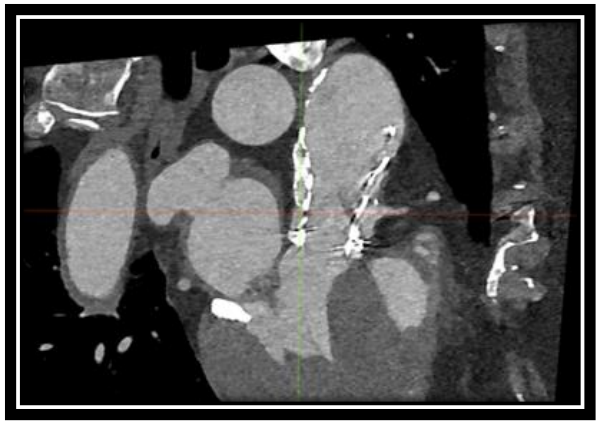
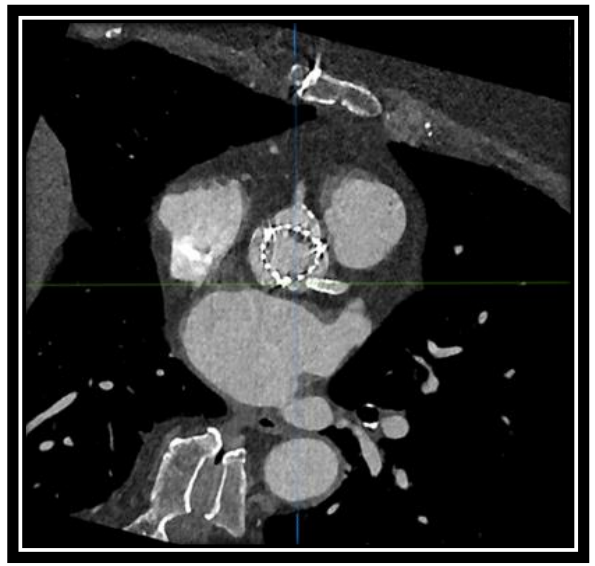
FINAL RESULT











Takeaways

- No comprehensive data on valve durability for TAVI vs. SAVR ⇨ requires 10-year FU
- Durability **cannot** be an argument in favor of SAVR
  - ✓ EVOLUT bioprosthetic valve performance = superior to SAVR @ 5 years
- Design matters – *not all SAVR & TAVI platforms are created equal*
- Lifetime management decisions ≠evidence based
  - ✓ TAVI or SAVR first?
  - ✓ *TAV*-in-TAV ⇔ *TAV*-in-SAV ⇔ *SAV* post TAV
  - ✓ *TAV*-in-TAV-in-TAV ⇔ *SAV* post TAV-in-TAV
- ✓ Value of advanced imaging planning

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