

TAVR: Aortic Valve in Valve

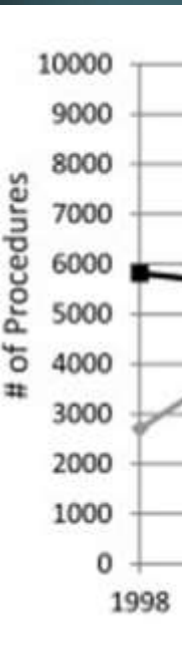
DATA & TECHNIQUE

O. Christopher Raffel
Cardiology Program, Prince Charles Hospital
Queensland, Australia.

DATA

TAVR V-in-V: DATA

- Re-do SAVR mortality 4-9% (4.7% in largest series, STS 5%)
- However, mortality increases in higher risk patients , many of whom would not be offered re-operation.



J Thor and



32

TAVR V-in-V: DATA

Original Investigation

Transcatheter Aortic Valve Implantation in Failed Bioprosthetic Surgical Valves

Danny Dvir, MD; John G. Webb, MD; Sabine Bleiziffer, MD; Miralem Pasic, MD, PhD; Ron Waksman, MD; Susheel Kodali, MD; Marco Barbanti, MD; Azeem Latib, MD; Ulrich Schaefer, MD; Josep Rodés-Cabau, MD; Hendrik Treede, MD; Nicolo Piazza, MD, PhD; David Hildick-Smith, MD; Dominique Himbert, MD; Thomas Walther, MD; Christian Hengstenberg, MD; Henrik Nissen, MD, PhD; Raffi Bekeredjian, MD; Patrizia Presbitero, MD; Enrico Ferrari, MD; Amit Segev, MD; Arend de Weger, MD; Stephan Windecker, MD; Neil E. Moat, FRCS; Massimo Napodano, MD; Manuel Wilbring, MD; Alfredo G. Cerillo, MD; Stephen Brecker, MD; Didier Tchetché, MD; Thierry Lefèvre, MD; Federico De Marco, MD; Claudia Fiorina, MD; Anna Sonia Petronio, MD; Rui C. Teles, MD; Luca Testa, MD; Jean-Claude Laborde, MD; Martin B. Leon, MD; Ran Kornowski, MD;
for the Valve-in-Valve International Data Registry Investigators

VIVID Registry: 459 patients undergoing TAVR VinV – multicentre STS 10

Transcatheter Aortic Valve Implantation Within Degenerated Aortic Surgical Bioprostheses

PARTNER 2 Valve-in-Valve Registry

365 patients. Initial & Continued access registries.
High risk >50% major M&M for redo-SAVR, STS PROM >9%

TAVR V-in-V: OUTCOMES

Outcomes	All (n = 459)
Duration of hospital stay, median (IQR), d	8 (5-12)
Thirty-day outcomes	
Death, No. (%)	
Cardiovascular death, No. (%)	
NYHA functional class, No. (%)	
I/II	
III/IV	
Major stroke, No. (%) ^a	
Death or major stroke, No. (%)	
Major vascular complication, No. (%) ^a	
One-year outcomes	
Death, No. (%)	
NYHA functional class, No. (%)	
I/II	
III/IV	26 (13.8)
AV area, mean (SD), cm ²	1.38 (0.42)
AV maximal gradient, mean (SD), mm Hg	30 (14.7)
AV mean gradient, mean (SD), mm Hg	16.9 (9.1)

At 30 days

Observed to Expected Mortality Ratio 0.3

- STS predicted Mortality: 9.1%
- Actual Mortality: 2.7%
- Actual Mortality for Continued Access Registry: 0.7%

TABLE 3 30-Day and 1-Year Clinical Outcomes

	30 Days	1 Year
Death	10 (2.7)	43 (12.4)
Cardiovascular death	9 (2.5)	31 (9.0)
NYHA functional class		
I/II	21 (5.9)	53 (15.9)
III/IV	10 (2.7)	16 (4.5)
Major stroke	5 (1.4)	5 (1.4)
Death or major stroke	5 (1.4)	5 (1.4)
Major vascular complication	27 (7.4)	28 (7.7)
Life-threatening or major bleeding	15 (4.1)	16 (4.4)
New pacemaker	27 (7.5)	31 (8.7)
	2 (0.5)	2 (0.5)
	23 (6.4)	26 (7.3)
	2 (0.5)	3 (0.8)
Life-threatening or major bleeding	76 (20.8)	84 (23.2)
New pacemaker	7 (1.9)	9 (2.6)

Values are n (%); all percentages are Kaplan-Meier estimates.

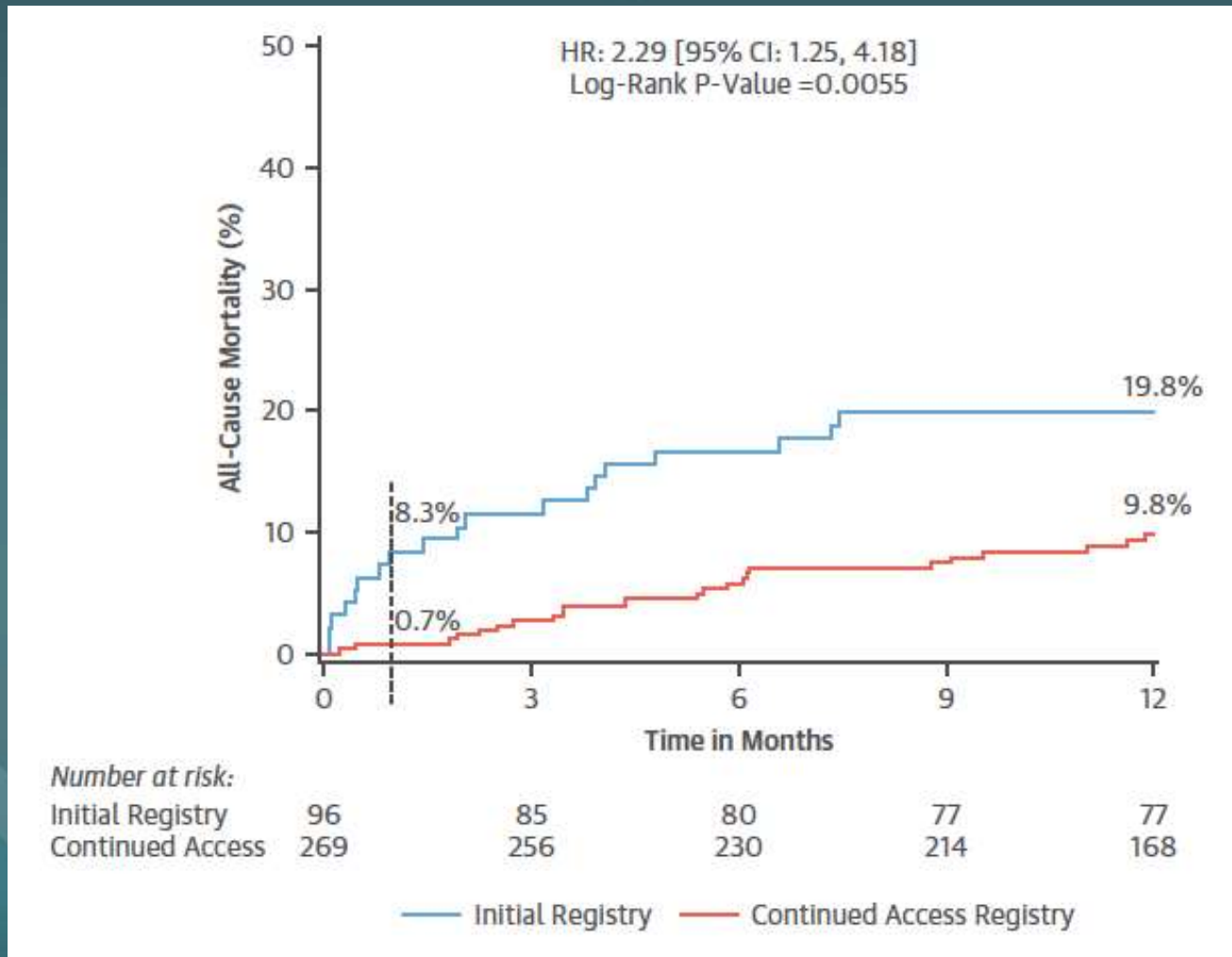
MI = myocardial infarction.

TAVR V-in-V: DATA

	No. of Events	Total	Hazard Ratio (95% CI)		P Value
Overall mortality					
Surgical valve label size					
≤21 mm	28	133	2.04 (1.14-3.67)		.02
>21 mm	34	315			
Type of valve failure					
Stenosis	34	181	3.07 (1.33-7.08)		.008
Regurgitation	12	139			
Transapical access					
Yes	34	171	2.25 (1.26-4.02)		.006
No	30	288			
STS score (per 1% increment) ^a			1.01 (1.00-1.01)		<.001

VIVID Registry. Dvir D et al. JAMA. 2014;312(2)

TAVR V-in-V: LEARNING CURVE



TAVR V-in-V: QOL, Functional status

B. Changes in function and quality of life

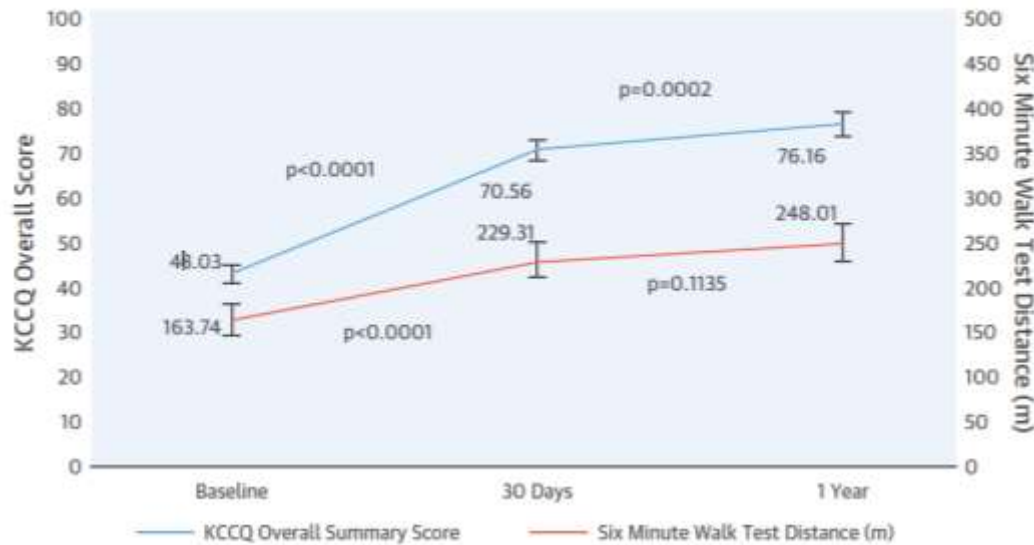
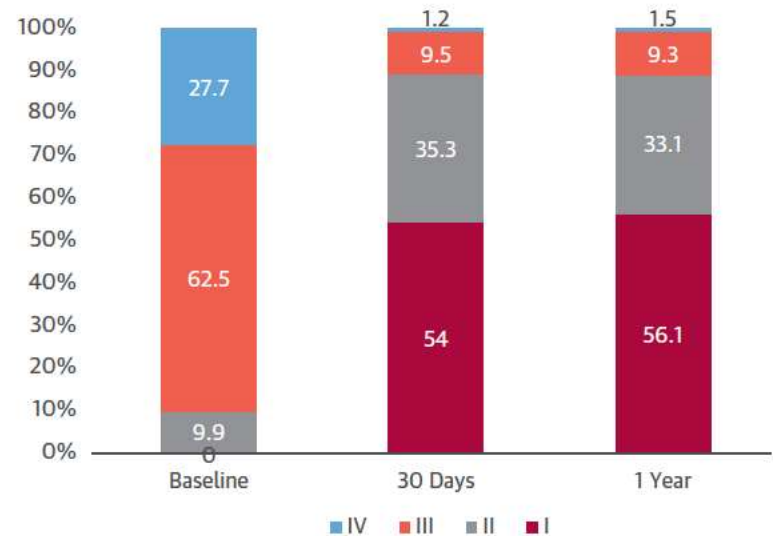


FIGURE 4 NYHA Functional Class



At baseline, >90% of patients were in NYHA functional class III or IV. By 30 days and extending to 1 year, more than one-half were in class I and another one-third were in class II. NYHA = New York Heart Association.

PARTNER 2 V in V Registry. Webb, J.G. et al. J Am Coll Cardiol. 2017;69(18):2253–62.

TABLE 4 Echocardiographic Outcomes

	Baseline (n = 353)	1 Year (n = 232)	Difference (1 Year–Baseline)	p Value*
EOA, cm ²	0.93 (0.89–0.98)	1.16 (1.11–1.21)	0.23	<0.0001
EOA index, cm/m ²	0.49 (0.47–0.51)	0.60 (0.57–0.63)	0.11	<0.0001
Mean gradient, mm Hg	35.0 (33.7–36.2)	17.6 (16.2–19.1)	–17.4	<0.0001
LVEF, %	50.6 (49.0–52.1)	54.2 (52.3–56.1)	3.6	<0.0001
LV stroke volume index, ml/m ²	41.1 ± 12.0	34.8 ± 9.9	–6.3	<0.0001
LV mass index, g/m ²	135.7 (131.9–139.5)	117.6 (113.3–121.8)	–18.1	<0.0001
Total AR				
None	29/247 (11.7)	67/106 (63.2)		
Trace	46/247 (18.6)	32/106 (30.2)		
Mild	64/247 (25.9)	5/106 (4.7)	NA	NA
Moderate	67/247 (27.1)	2/106 (1.9)		
Severe	41/247 (16.6)	0 (0.0)		
Paravalvular AR				
None	NA	72/105 (68.6)		
Trace	NA	27/105 (25.7)		
Mild	NA	5/105 (4.8)	NA	NA
Moderate	NA	1/105 (1.0)		
Severe	NA	0 (0.0)		
Moderate or severe MR	84/241 (34.9)	13/102 (12.7)	NA	NA
Moderate or severe TR	75/236 (31.8)	22/104 (21.2)	NA	NA

Values are median (interquartile range), mean ± SD or n/N (%). *Change over time.

AR = aortic regurgitation; CI = confidence interval; EOA = effective orifice area; LV = left ventricular; LVEF = left ventricular ejection fraction; MR = mitral regurgitation; NA = not applicable; TR = tricuspid regurgitation.

PARTNER 2 V in V Registry. Webb, J.G. et al. J Am Coll Cardiol. 2017;69(18):2253–62.

2017 ESC/EACTS Guidelines for VHD

Bioprosthetic failure		
Reoperation is recommended in symptomatic patients with a significant increase in transprosthetic gradient (after exclusion of valve thrombosis) or severe regurgitation.	I	C
Reoperation should be considered in asymptomatic patients with significant prosthetic dysfunction if reoperation is at low risk.	IIa	C
Transcatheter valve-in-valve implantation in the aortic position should be considered by the Heart Team depending on the risk of reoperation and the type and size of prosthesis.	IIa	C

TECHNIQUE

TAVR V-in-V: TECHNIQUE

- Patient selection – MDT valve work-up and discussion
- Workup is similar to TAVR and should include CT-TAVI
- Procedure planning
 - as careful as native TAVR
 - special consideration for SHV, THV & aortic root interaction

Bio-Prosthetic Valve
(SHV)

Native Anatomy

- Optimal size
- Optimal stable position
- No PVL
- Good haemodynamics
- No coronary obstruction

TAVR Valv
(THV type)

ViV Aortic

Supported by NIHR-BRC, Guys and St. Thomas'
Hospital & KCL

PCR

Developed by Mr. Vinayak (Vinnie) Bapat in
conjunction with the technology company UBQO
Limited

www.ubqo.com/viv

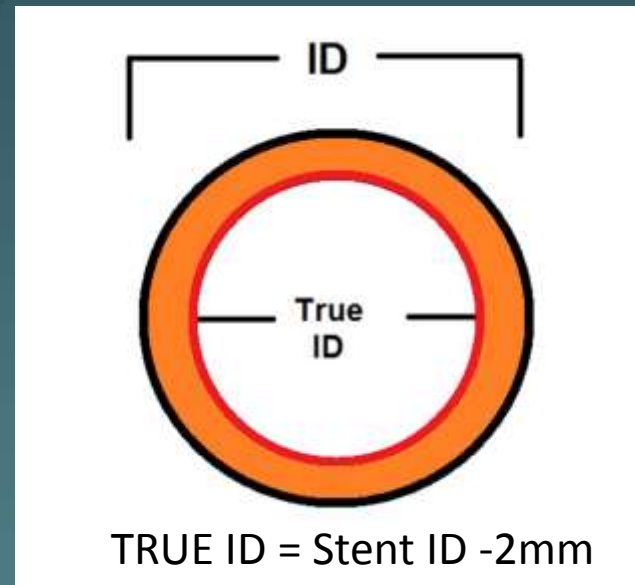
THE SURGICAL VALVE

- Stented or Stentless
- Type of leaflets – and leaflet mounting
- Supra annular or a valve
- Position of Sewing
- Fluoroscopic visibility
- Implantation method

- True Internal Diameter
- Neo-annulus (sewing ring)
 - Position of neo-annulus on
 - Fluoroscopic copy for optimal
 - Placement
 - Risk of coronary
 - Position
- Help choose appropriate THV

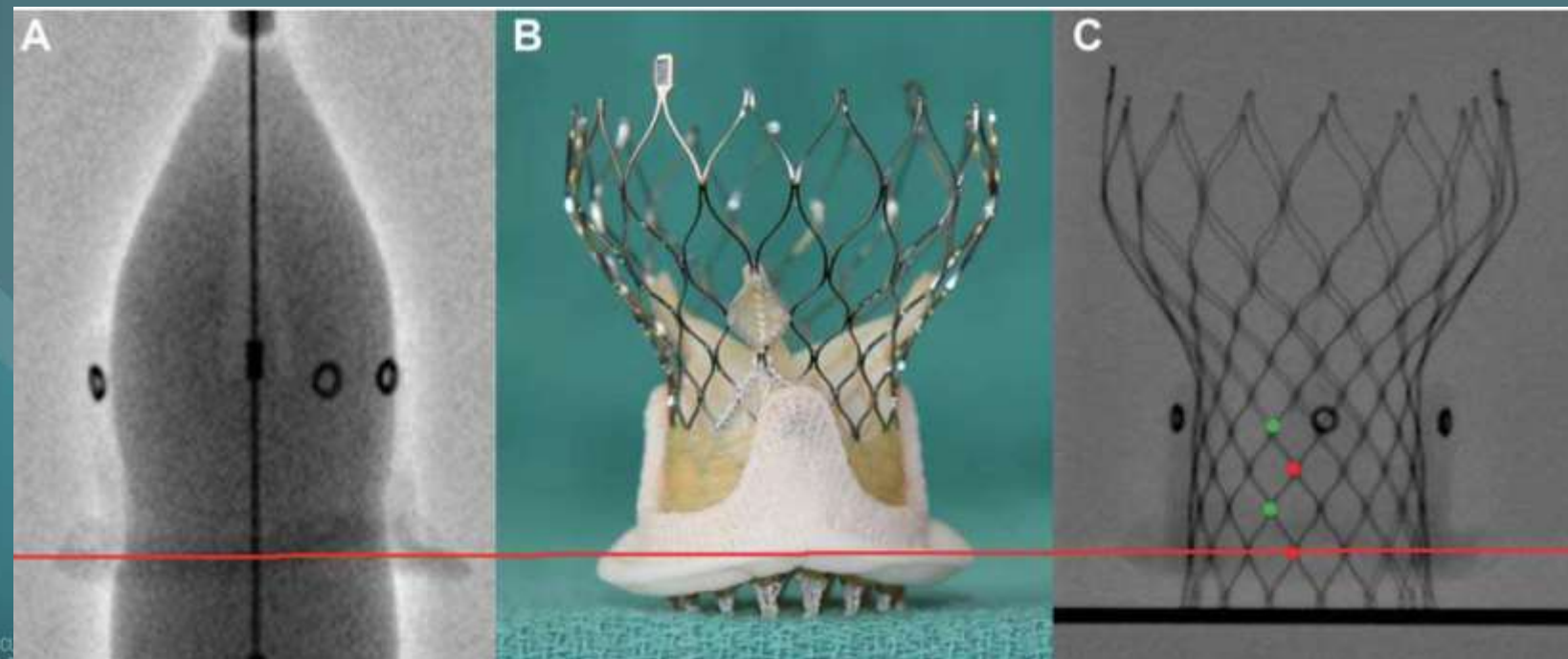
- Internal Diameter
- Fluoroscopic Image
- Neo-annulus
- Interaction with native anatomy

TRUE INTERNAL DIAMETER

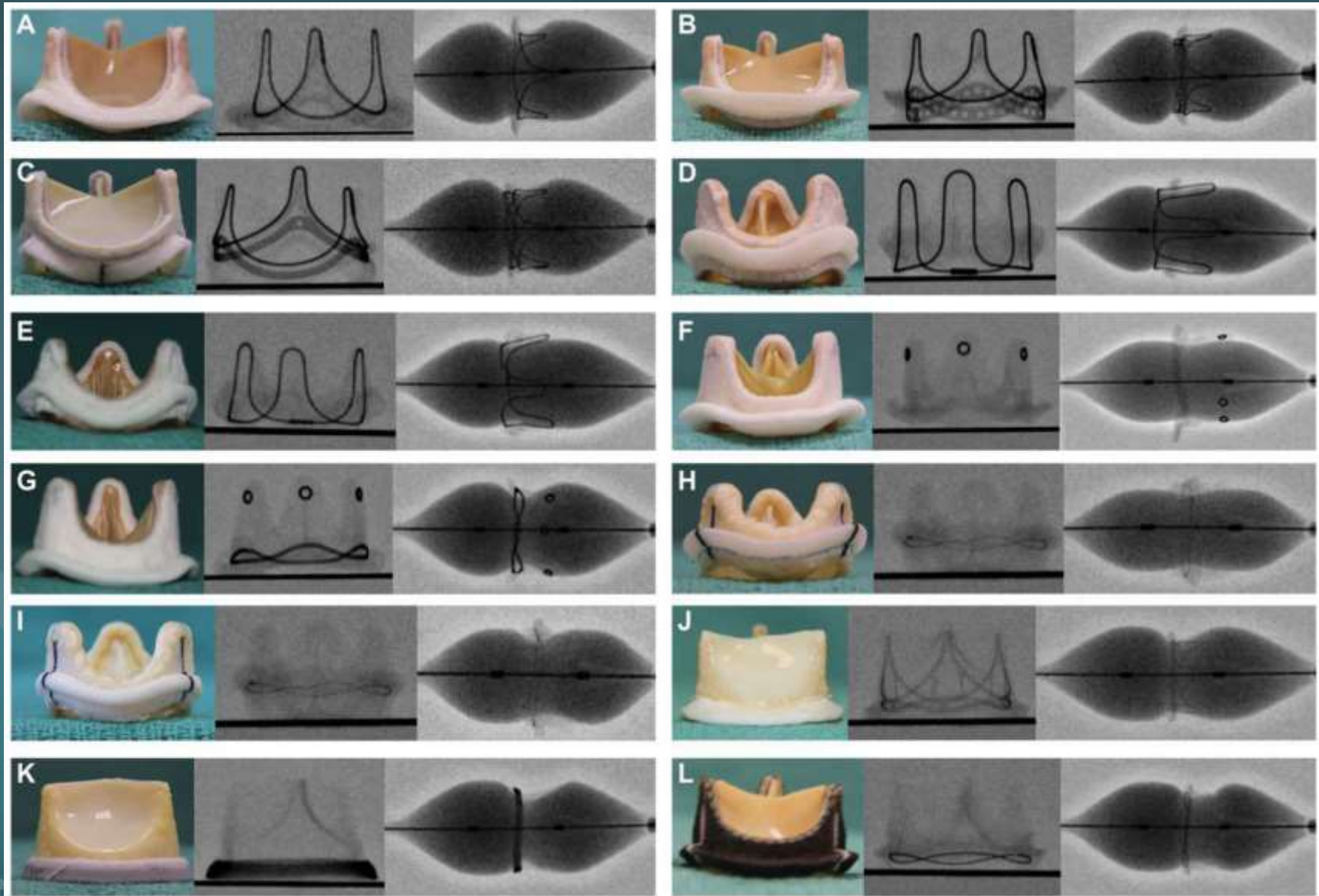


CE Stented Porcine: size 27
Stent ID -25
True ID -23
Sapien-26 rather than 29

FLUROSCOPIC IMAGE & NEO-ANNULUS

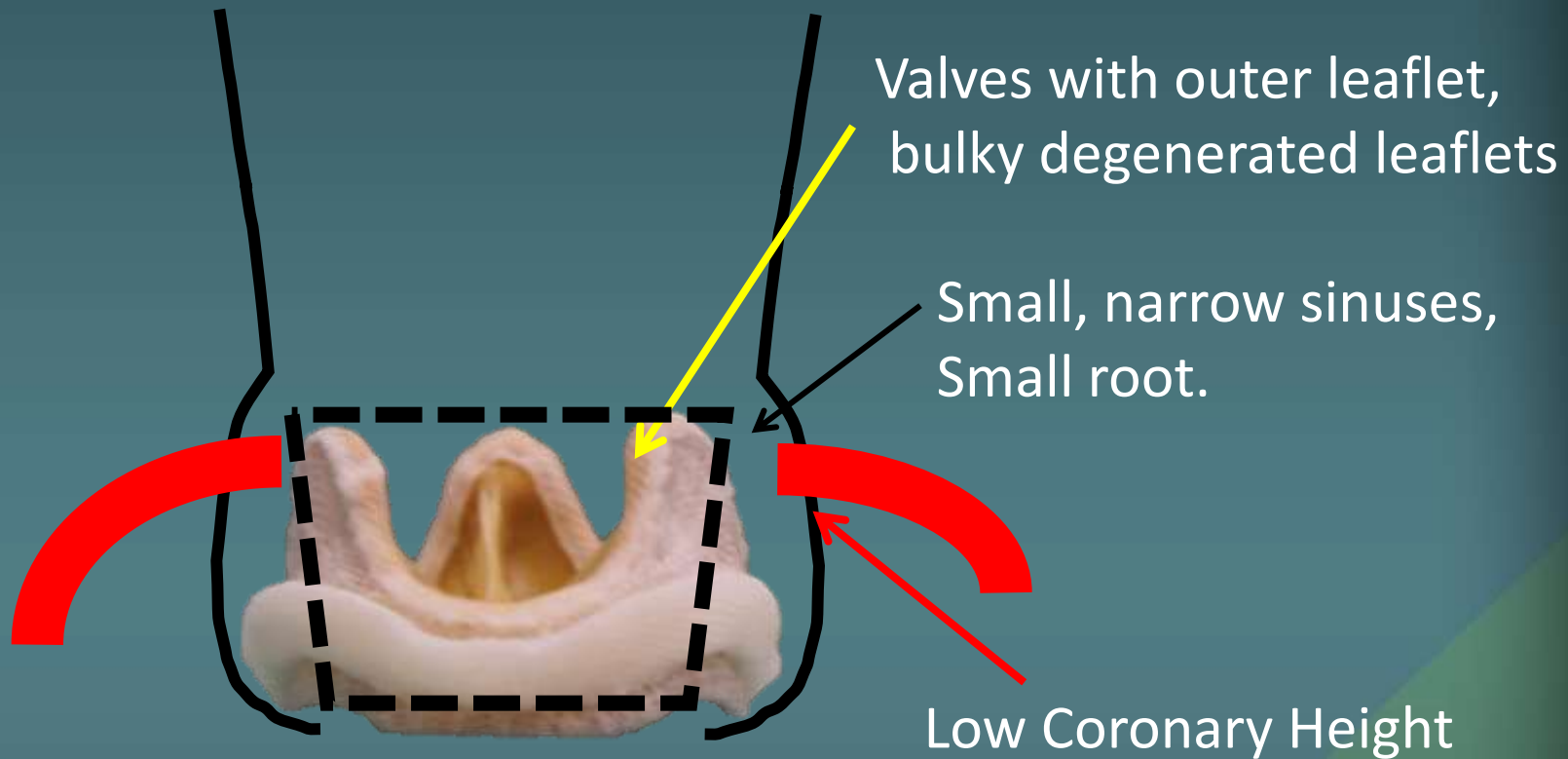


FLUROSCOPIC IMAGE & NEO-ANNULUS



NATIVE ANATOMY

RISK OF CORONARY OBSTRUCTION



- Risk of coronary obstruction
- Coronary protection needed
- Stability of valve deployment
- Choice of THV

CASE:

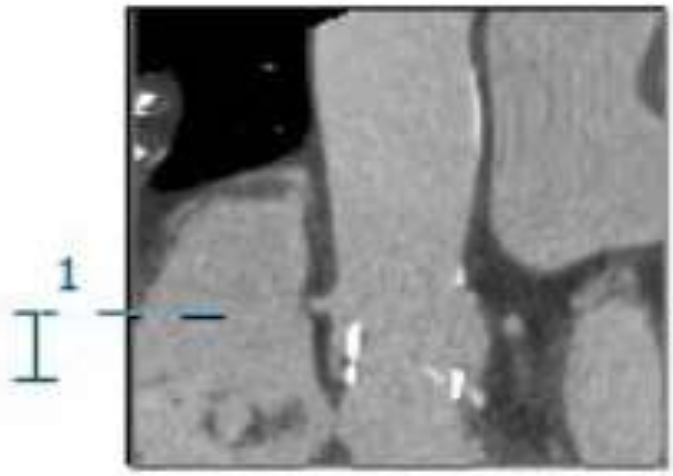
- 90 yr old female
- Independent, cognitively excellent.
- Perimount 21mm AVR 2004. Always had some element of patient prosthesis mismatch.
- Severe Bio-prosthetic AVR stenosis with NYHA III symptoms.
- Age, relative frailty, co-morbidities, Euro-score 47%, Euroscore II 19.7%, STS Mor 5.3%, STS M&M 25.7%
- TAVI –work up. Good transfemoral access.

Bio-Prosthetic Valve
(SHV)

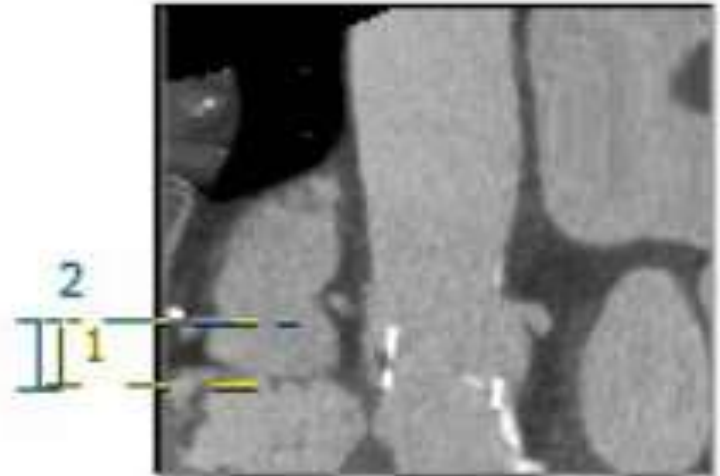
Native Anatomy

- Optimal stable position
- No PVL
- Good haemodynamics
- No coronary obstruction

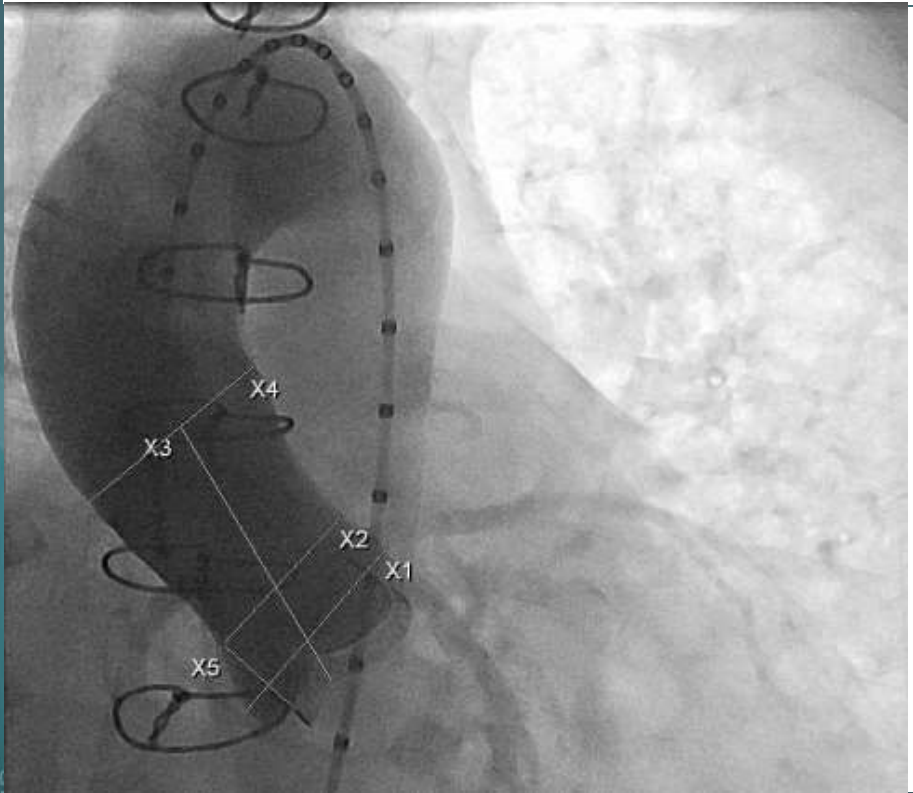
TAVR VinV
(THV type)

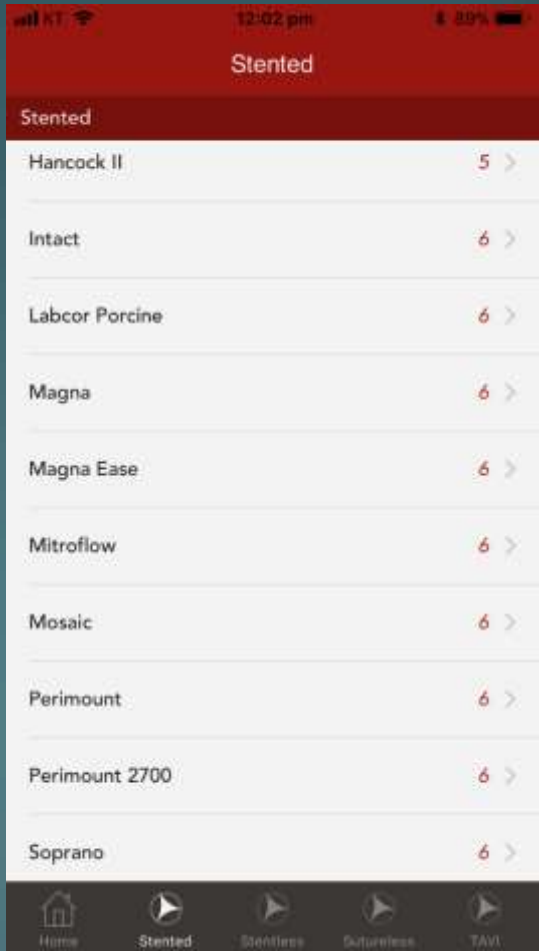
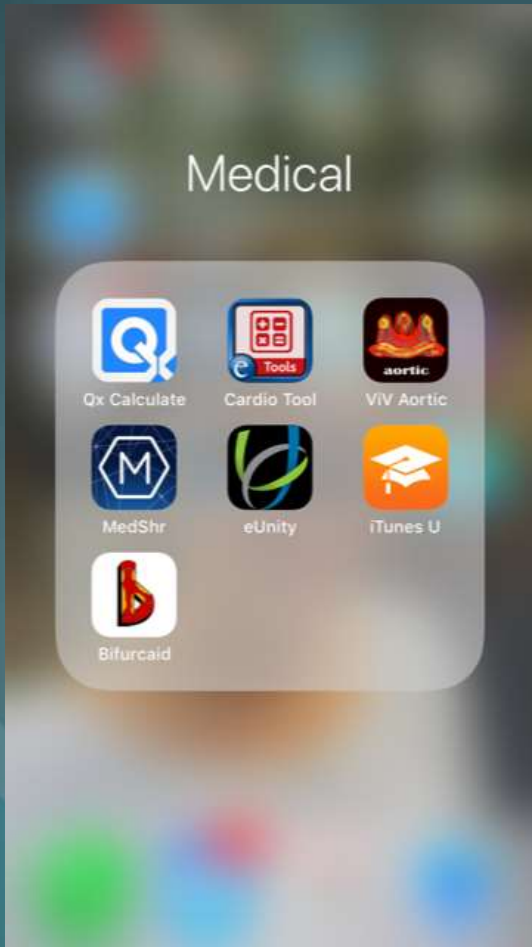


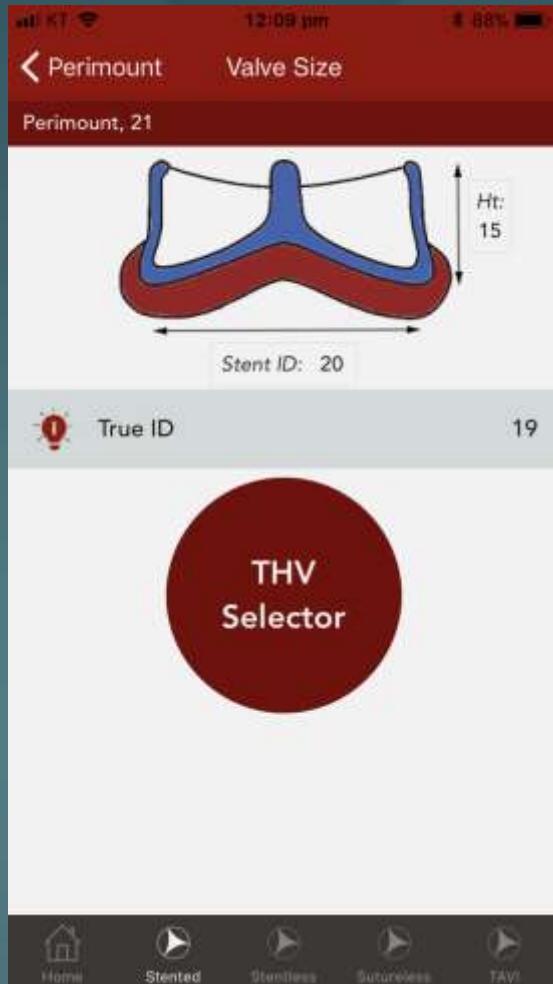
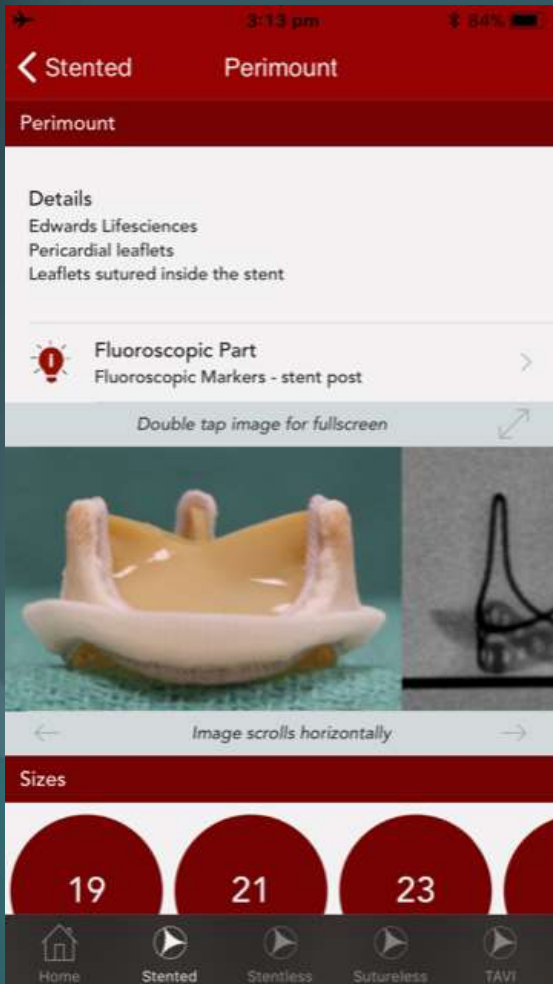
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12:09 pm 88%

TAVI Choices CoreValve Ideal Placement

Perimount

CoreValve Ideal Placement
 If recommendation is two sizes, choose the valves size depending on size of sinus of valsalva. Place Corevalve in line with the lowest visible margin of the surgical valve stent

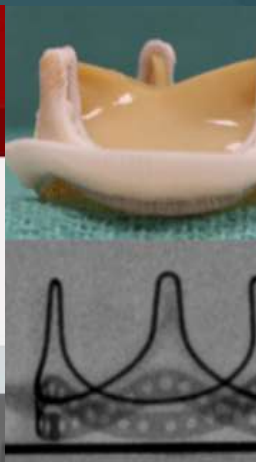
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Image scrolls horizontally

Video Guidance

Play Video

Home Stented Stentless Sutureless TAVI



12:11 pm 88%

Done 0:03 -0:08

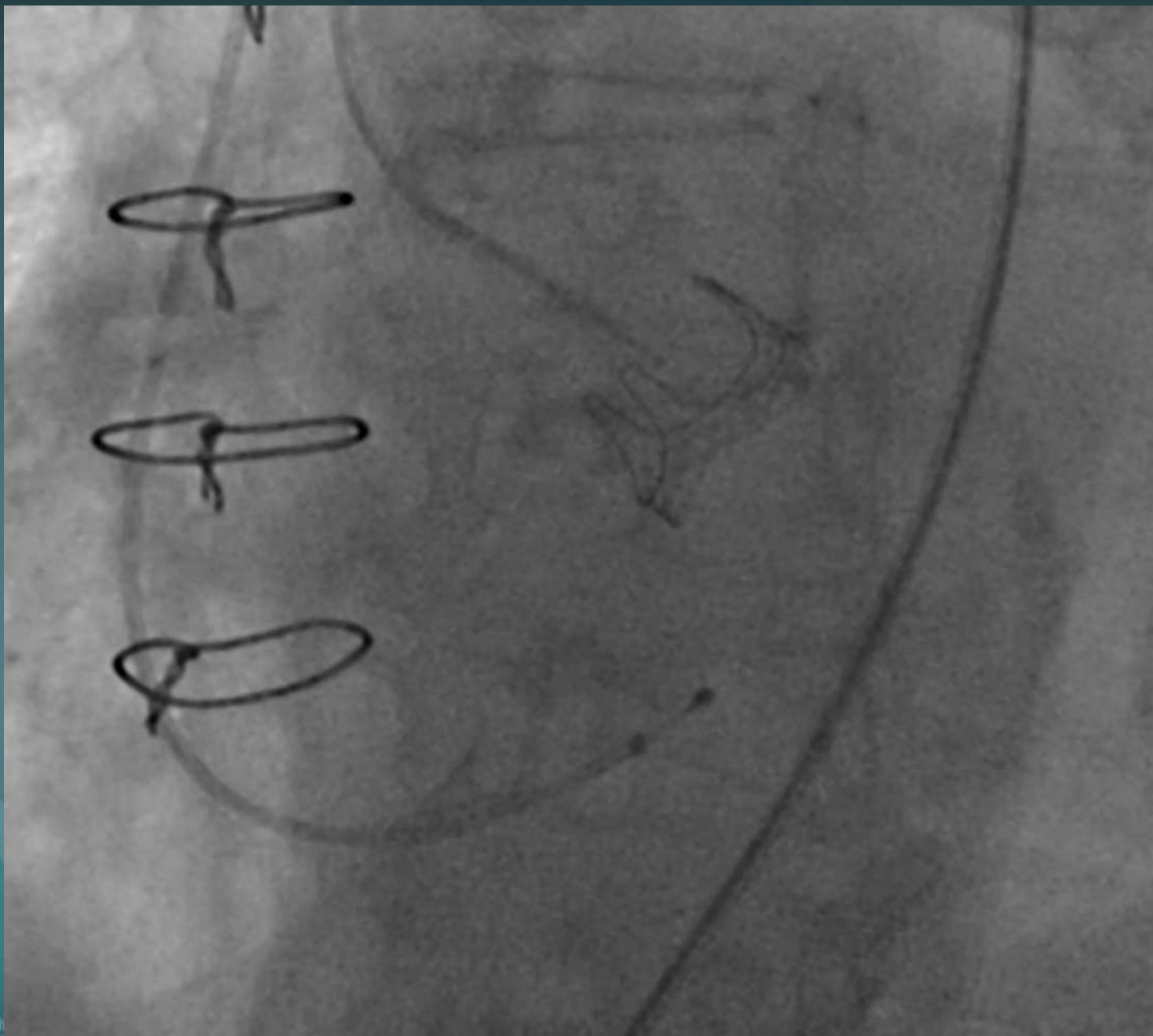
12:10 pm 88%

12:10 pm 88%

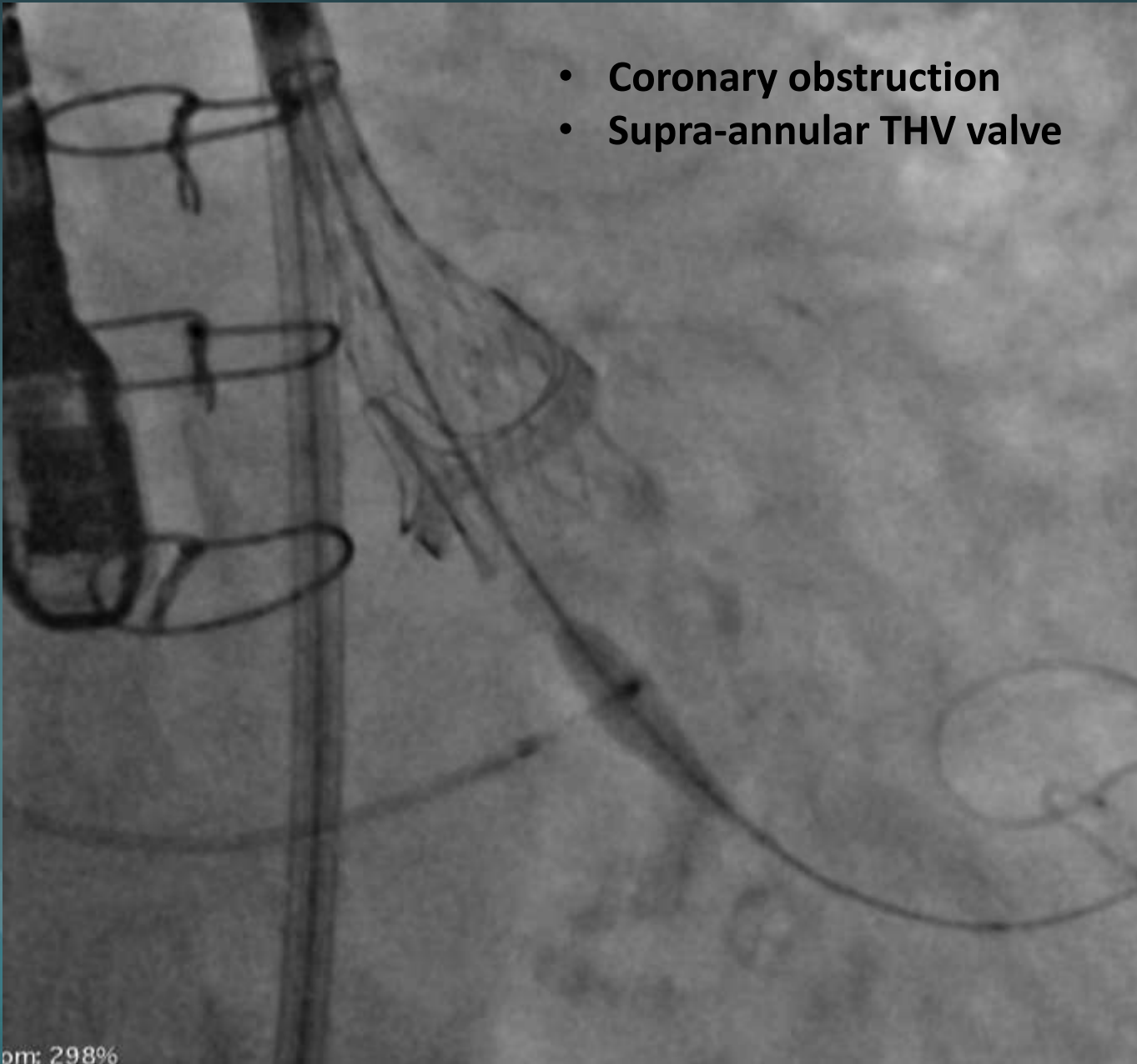


EVOLUT R – PRO

	Valve Size	Aortic Annulus Measurements		Sinus of Valsalva Diameter	Sinus of Valsalva Height
		Diameter	Perimeter		
Evolut™ PRO and Evolut™ R Valves	23 mm	17 ⁺ /18 mm–20 mm	53.4 ⁺ /56.5 mm–62.8 mm	≥ 25 mm	≥ 15 mm
	26 mm	20 mm–23 mm	62.8 mm–72.3 mm	≥ 27 mm	≥ 15 mm
	29 mm	23 mm–26 mm	72.3 mm–81.7 mm	≥ 29 mm	≥ 15 mm
Evolut™ R Valve	34 mm	26 mm–30 mm	81.7 mm–94.2 mm	≥ 31 mm	≥ 16 mm



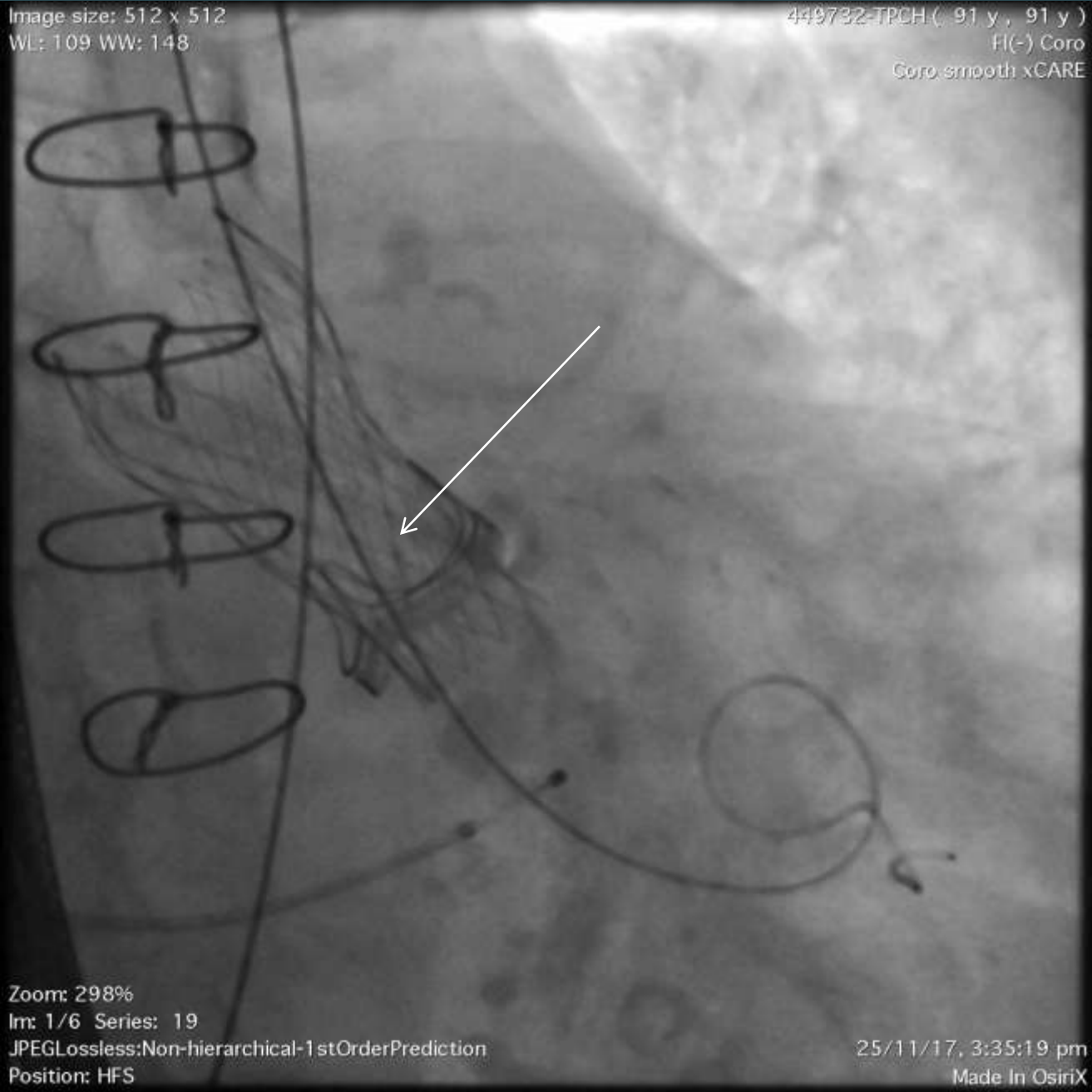
- **Coronary obstruction**
- **Supra-annular THV valve**



om: 298%

Image size: 512 x 512
WL: 109 WW: 148

449732-TPCH (91 y , 91 y)
Fl(-) Coro
Coro smooth xCARE



Zoom: 298%
Im: 1/6 Series: 19
JPEGLossless:Non-hierarchical-1stOrderPrediction
Position: HFS

25/11/17, 3:35:19 pm
Made In OsiriX

CONFIRMATION of HEMODYNAMIC RESULT



CONCLUSIONS:

- Increasing incidence of Bio-prosthetic AVR failure
- TAVR *in vivo* is the treatment of choice for high-surgical risk patients (- intermediate)
- Implant the largest possible device (if $\leq 23\text{mm}$ group consider a supra annular THV).
- Consideration to the interaction of SHV, patient anatomy and THV for individual patient important
- Use the App!

THANK YOU