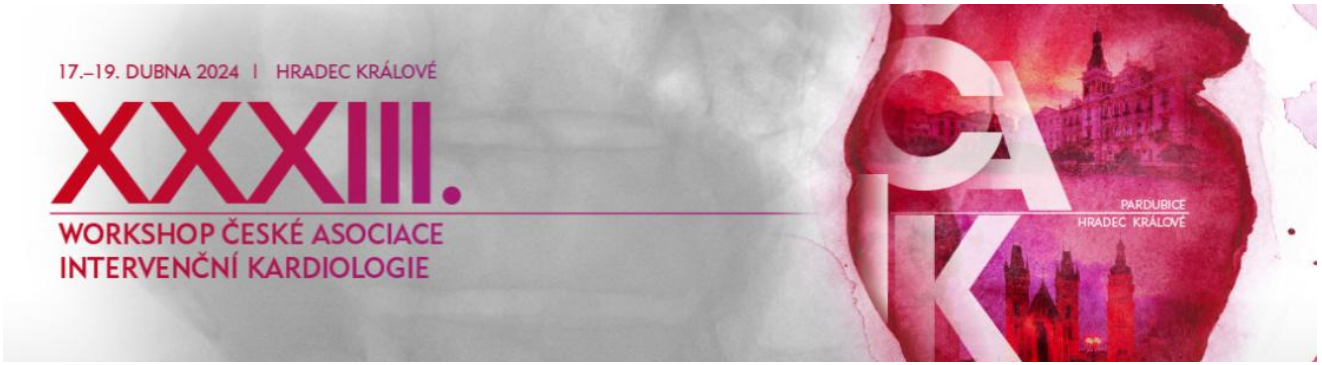
TAVI a specifické situace



Michael Želízko

Klinika kardiologie IKEM, Praha

TAVI + coronary disease

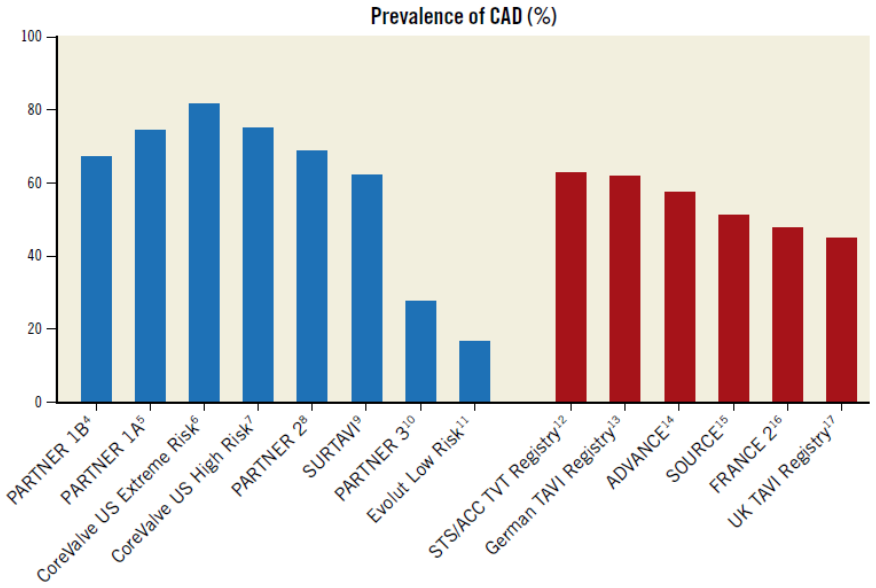
TAVI + coronary disease

Prevalence of aortic stenosis

- 0,2% in 50-59 y
- 1,3% in 60-69 y
- 3,9% in 70-79 y
- 9,8% in 80-89y

Prevalence of coronary disease

- 50% in TAVI pts
- 60% in SAVR pts

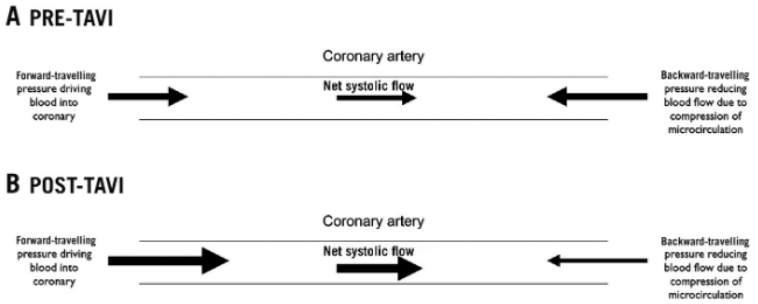


Management of coronary artery disease in patients undergoing transcatheter aortic valve implantation. A clinical consensus statement from the European Association of Percutaneous Cardiovascular Interventions in collaboration with the ESC Working Group on Cardiovascular Surgery

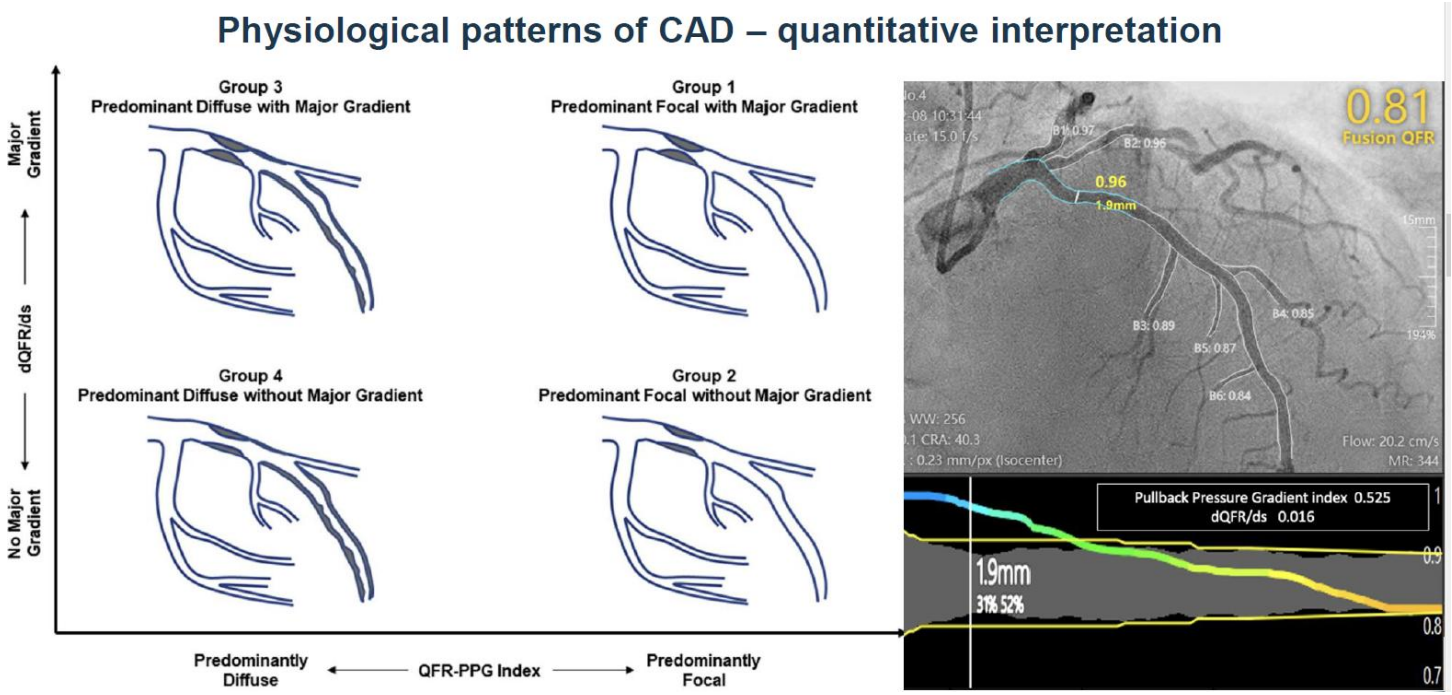
Giuseppe Tarantini[1]*, MD, PhD; Gilbert Tang[2], MD, MSc, MBA; Luca Nai Fovino[1], MD, PhD;

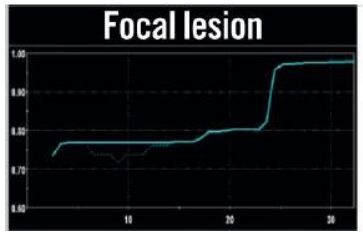
EuroIntervention 2023;19:37-52 published online ahead of print February 2023

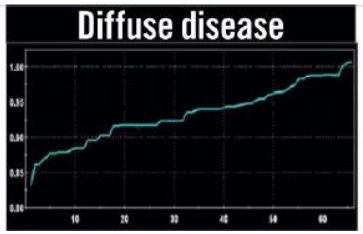
Diagnostic evaluation of CAD: ICA, MSCT, FFR/DPR,…

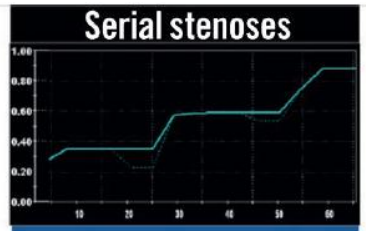


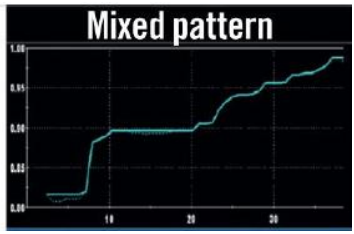
- ***Diffuse CAD without major gradients*** *is the prevalent pattern of disease in patients with SAS undergoing TAVI*
- *FFR- and, particularly iFR, have significant changes between pre- and post-TAVI*
- ***FFR decrease after TAVI*** *correlated with a higher local disease severity (major drops), while* ***iFR changes*** *gave* ***more unpredictable results***
- *Caution should be paid in deferring vessels with FFR values in the "gray-zone", when a major drop is present*











PCI Prior to TAVI		PCI Combined with TAVI		PCI After TAVI	
Pro	Con	Pro	Con	Pro	Con
Simplified coronary access with no prosthetic valve in place	DAPT required after PCI may impact post-TAVI bleeding	Decreases the risk of mortality while waiting for TAVR	Increased dye load (contrast nephropathy), longer procedure time	Treating severe AS first may improve myocardial perfusion, decreasing need for PCI	Potential access issues, valve struts interfering with coronary cannulation
Less risk of hemodynamic instability and ischemia during TAVI	Risks of performing PCI in the presence of severe AS	Reduction of vascular complications by needing one access site			Catheter manipulation could move the valve
Minimize contrast load by giving it at 2 separate times		Less risk of hemodynamic instability and ischemia during TAVI			Higher risk of hemodynamic instability and ischemia during TAVI

TAVI and coronary disease – consensus points:

- ICA = gold standard, CT in young/low risk, FFR/iFR ???
- NO benefit of routine PCI vs NO PCI before TAVI in terms of MACE up to 1 y (in stable CAD pts, mostly asymptomatic – ACTIVATION trial)
  - **PCI in proximal ≥ 70% (IIa/C i pro SAVR)**
  - Nonobstructive lesions (<70% or < 50% for LM) : watch and wait
- Timing of PCI (before-concomitant-after TAVI) is individual
  - **Elective PCI (ad hoc with ICA) before TAVI is safe even in complex lesions**
  - More acute kidney injury for concomitant procedures
  - Failure to asscess coronary cannulation (esp. Evolut platform) up to 18%
  - Elective PCI post TAVI – prefer low-frameTHV
  - Pts young, with moderate CAD, redo-TAVI – prefer low frame THV or aim for commisural alignment

EuroIntervention
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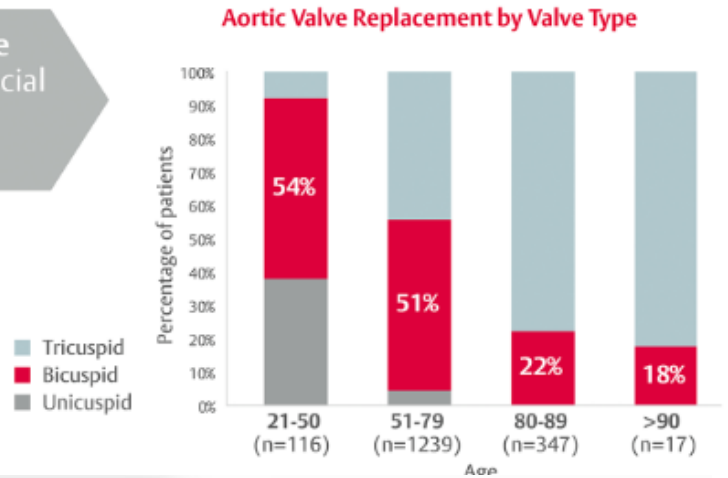
XXXIII.
WORKSHOP ČESKÉ ASOCIACE
INTERVENČNÍ KARDIOLOGIE

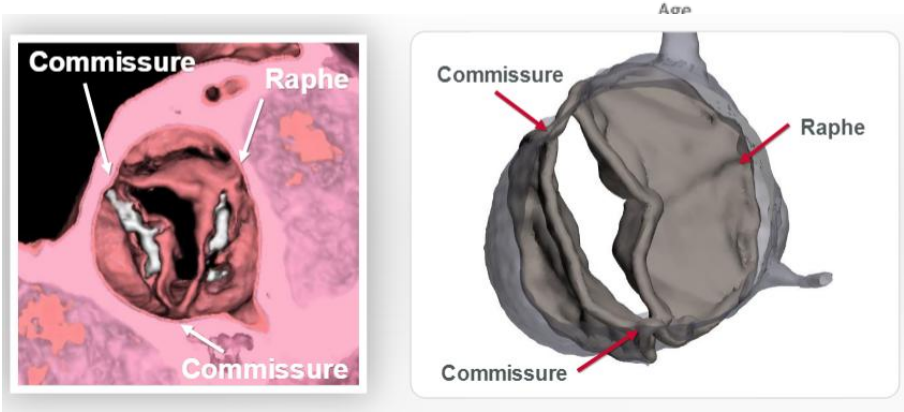
Bicuspid

BAV

Congenital bicuspid aortic valve disease is more prevalent in younger patients requiring AVR[3]

Careful **lifetime planning** is crucial for bicuspid patients

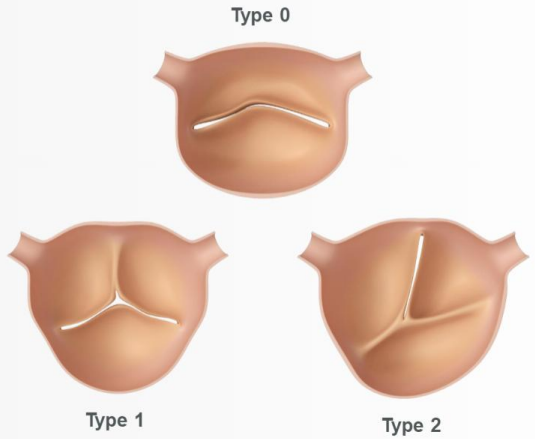




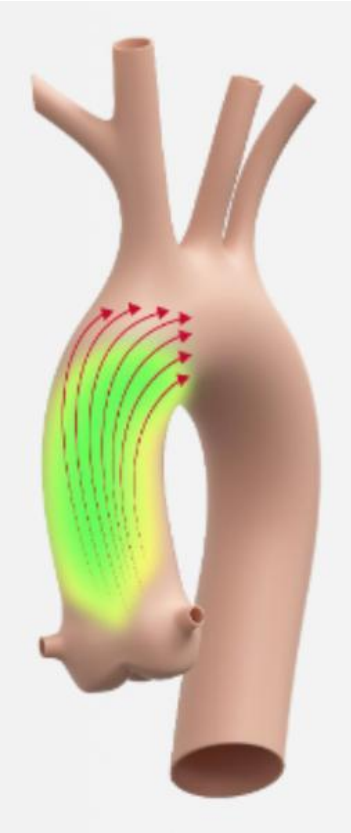
Epidemiology of Bicuspid Aortic Valve Disease

- Most frequent congenital heart disease, occurring in 1 to 2% of the population[1]
- BAV can be inherited, with 6.4% in first-degree relatives of individuals with the condition[2]
- Prevalence of bicuspid aortic valves is uniform across the world[2]
- 10% of patients undergoing TAVR have a bicuspid aortic valve[1]

- Sievers et al provide a systematic classification of BAV
- Classifies three types of bicuspid valve morphologies:
  - Type 0 (no raphe)
  - Type 1 (one raphe)
  - Type 2 (two raphes)

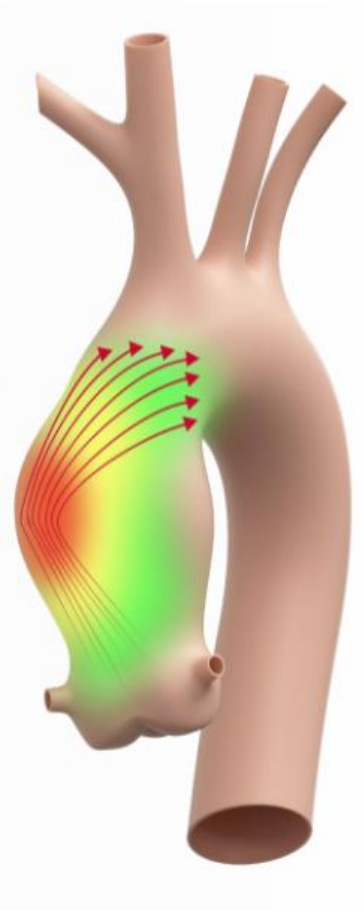


BAV + aortopathy = SAVR

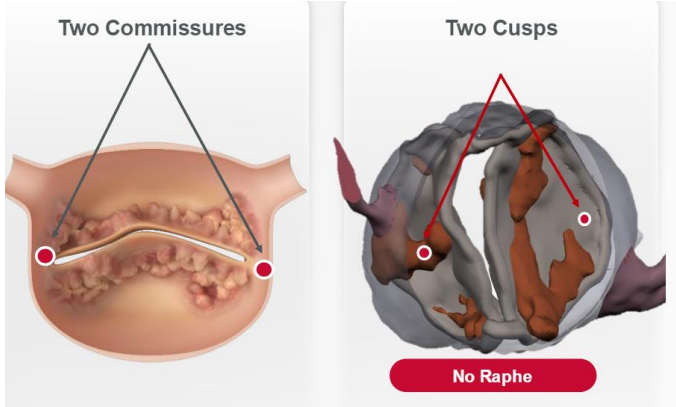


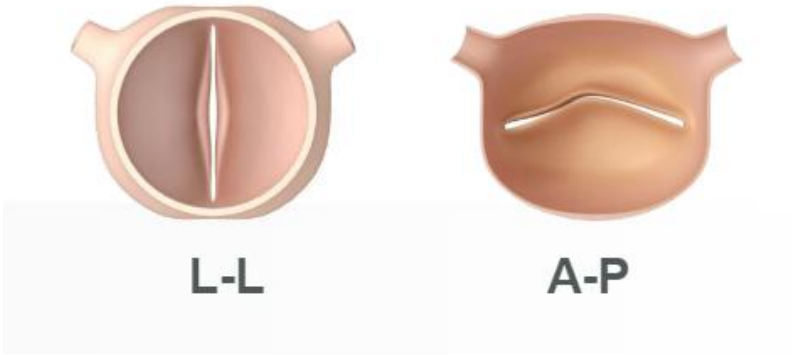
Bicuspid Aortic Valve characteristics

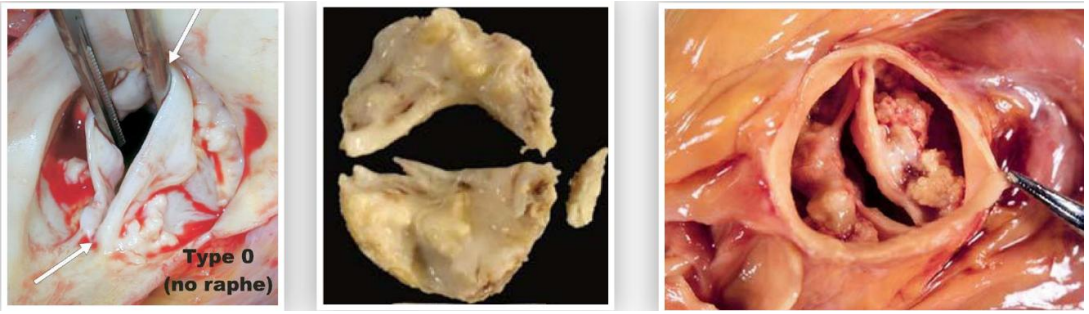
- Aortopathy manifested as dilatation of the thoracic aorta occurs in 40-70% of BAV patients dependent on population studied and definition of dilation[1]
- 2020 ACC/AHA recommends surgical replacement of the ascending aorta is indicated in patients with a BAV if the diameter of the aortic sinuses or ascending aorta is ≥55mm[2]
- 2021 ESC/EACTS guidelines include the indication for surgery when aortic diameter is ≥ 50mm and additional risk factors or coarctation are present[3]



Type 0 BAV



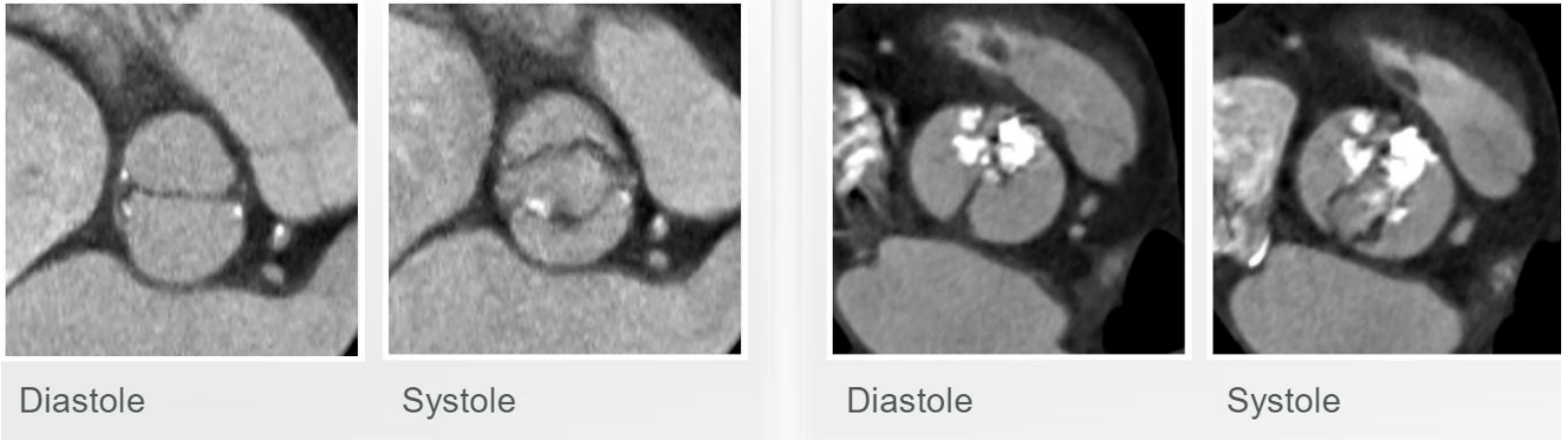




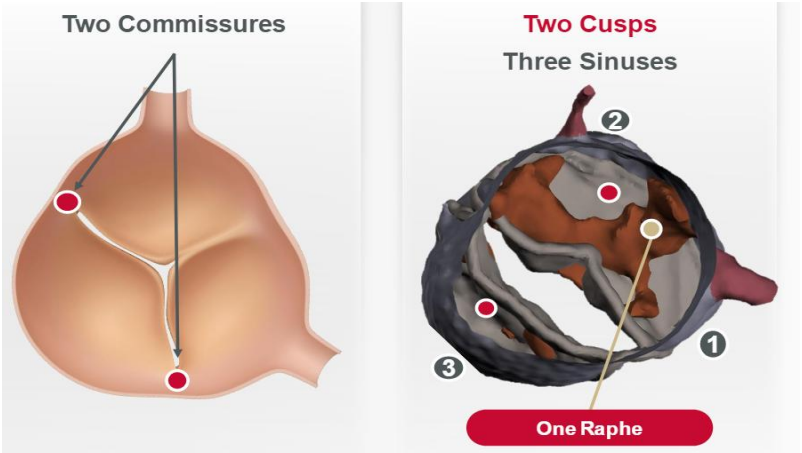
Cca 10% BAV = type 0

Supraannular sealing

Undersizing

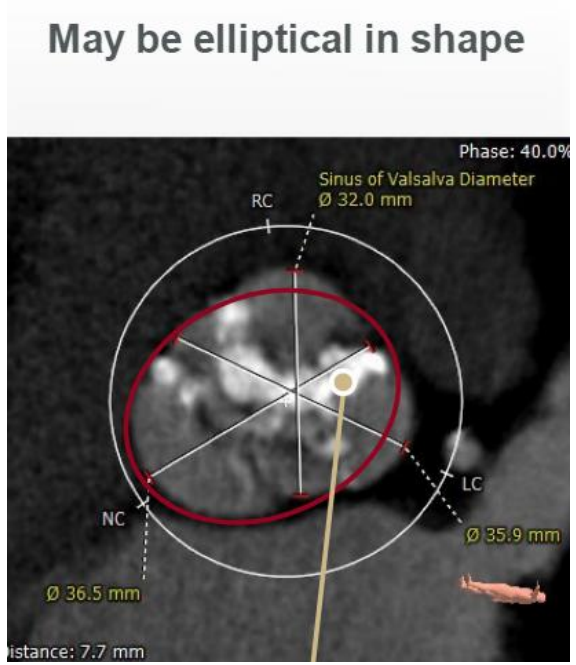


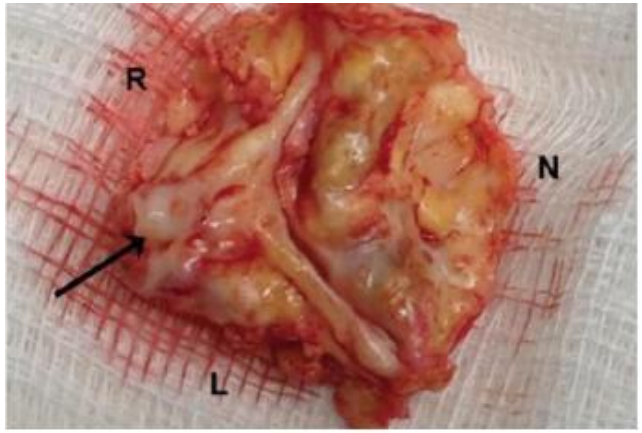
Type 1 BAV

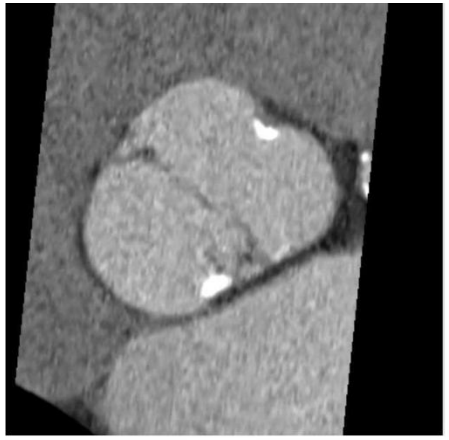


- 2 cusps are conjoined with 1 raphe
- Most common type of BAV ~ 89%

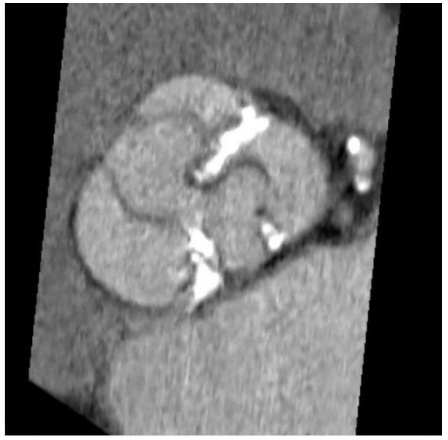
	European	Asian
LCC & RCC fusion	80.1%	72.0%
RCC & NCC fusion	16.0%	21.2%
LCC & NCC fusion	3.3%	6.5%







Diastole



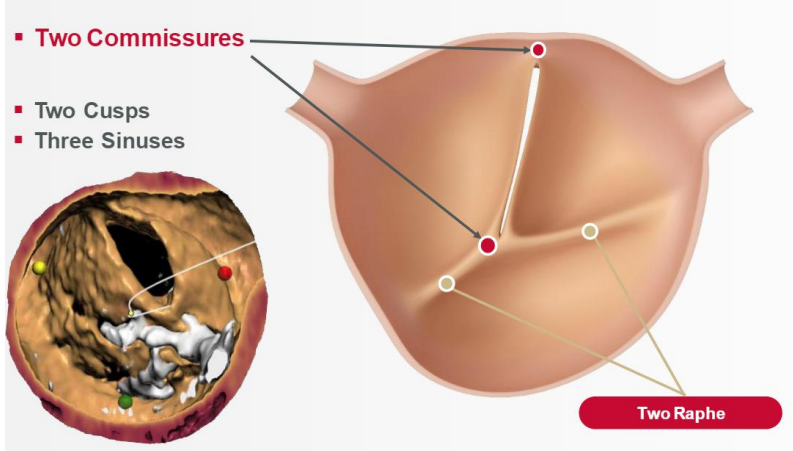
Systole

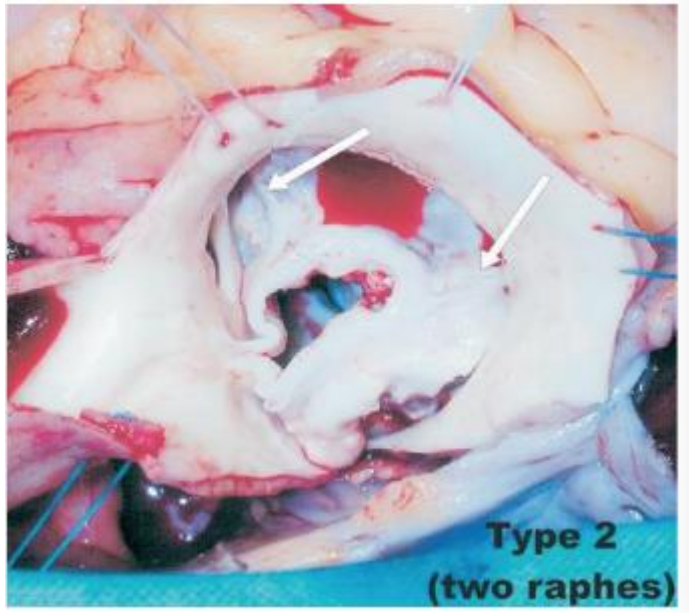
<u>Calcified raphe</u>

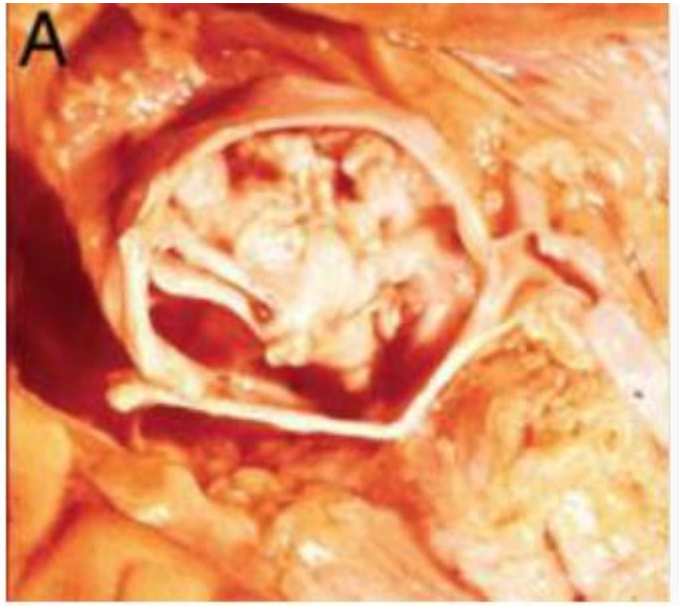
- High radial strenght
- Elipticity or „under-deployment“= shorter lifetime

Type 2 BAV

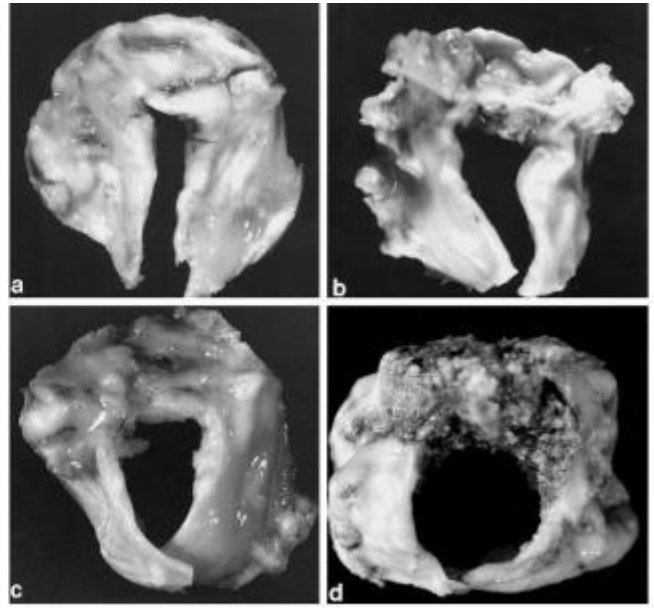
1-5% BAV





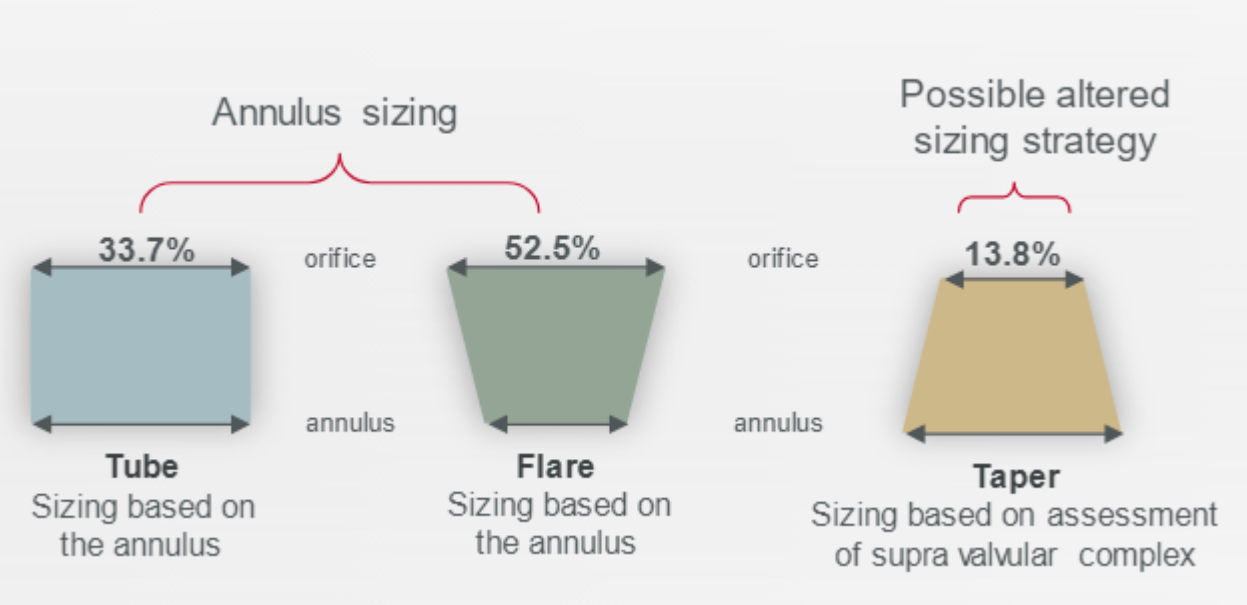


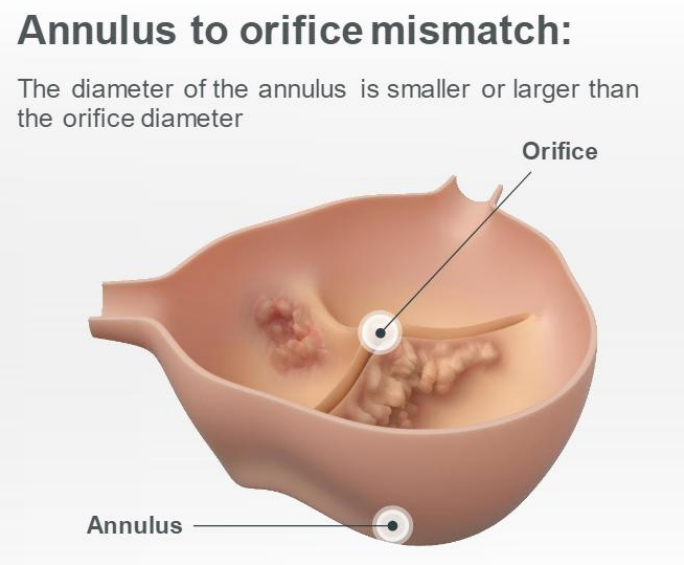
(Bax et al., 2014, p. 2631)

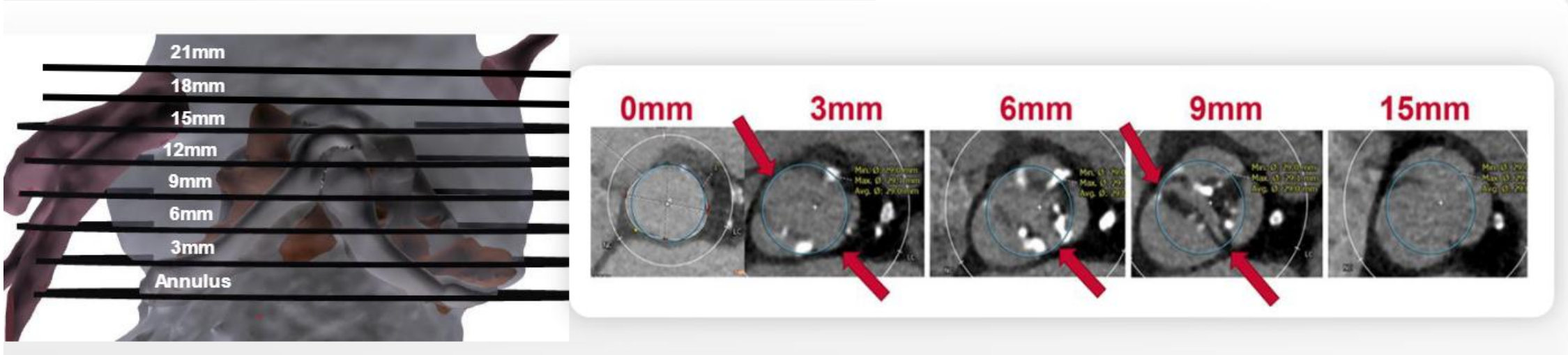


(Roberts & Ko, 2005, p. 921)

Sizing: „circle method“



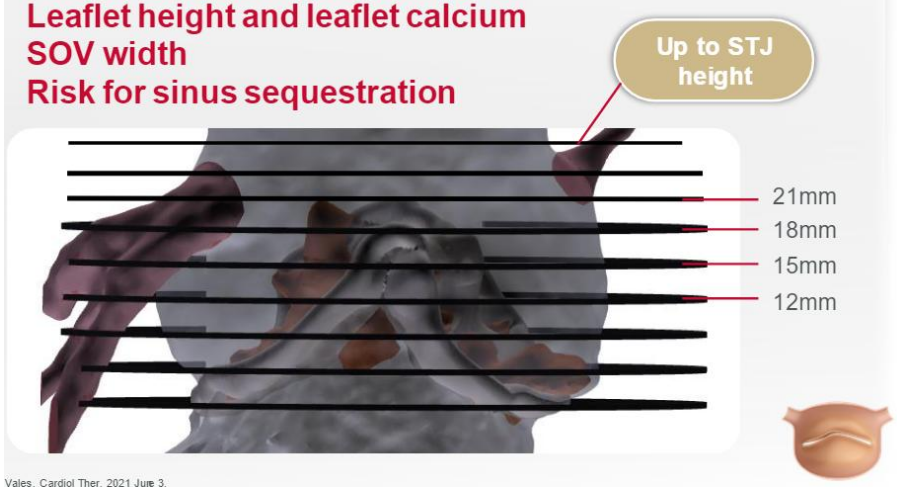




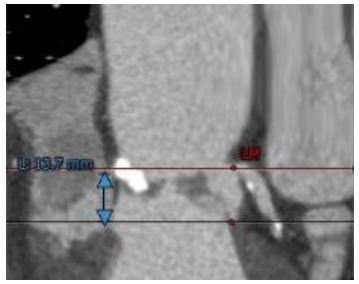
Sizing: complex anatomy of bicuspid valve and aortic root

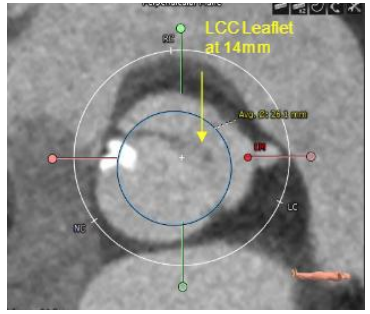
Circles at 12 – to STJ height
Simulate the relation of deployed valve to the
Left Main Artery (LM) and Right Coronary Artery (RCA)

And can identify:
Leaflet height and leaflet calcium
SOV width
Risk for sinus sequestration

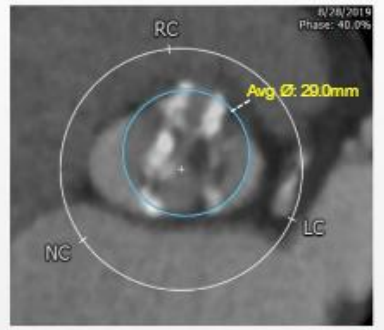


Vales. Cardiol Ther. 2021 June 3.

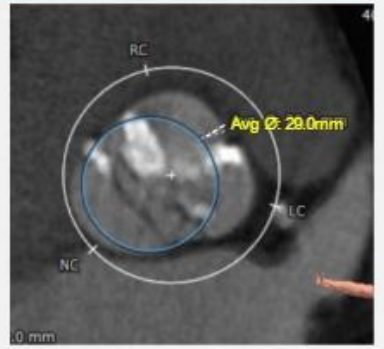




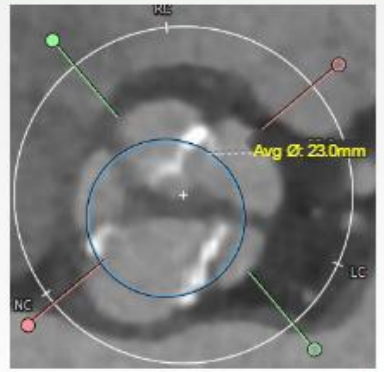
1. **The circle is too large** it extends beyond the commissures, with a potential risk of commissure rupture



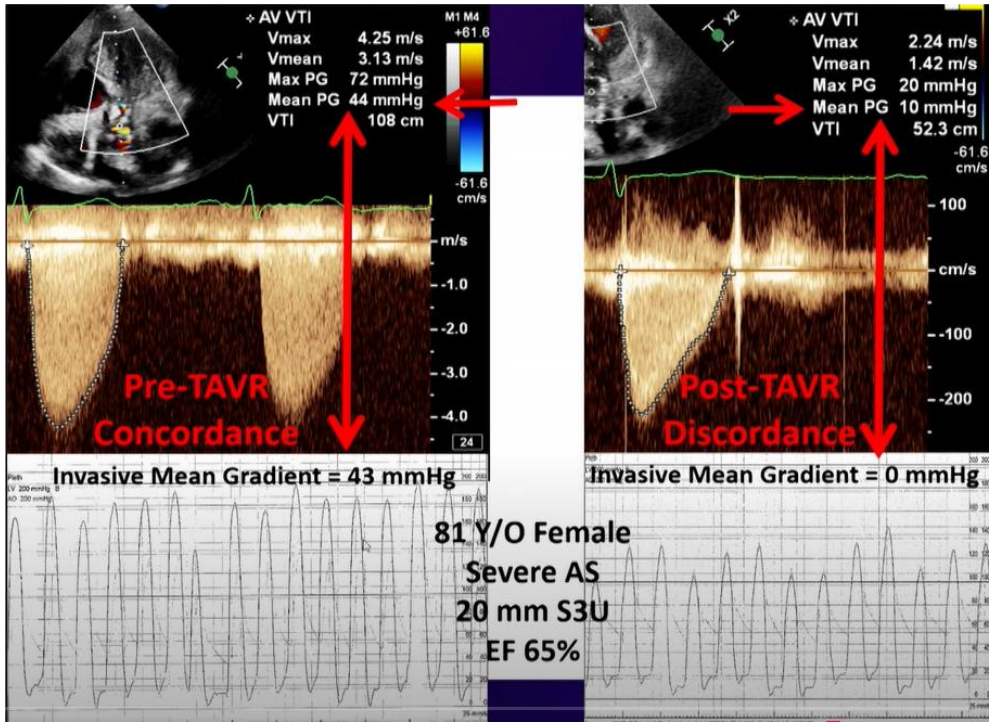
2. **If the circle is large enough to touch the commissures**, then sealing is expected



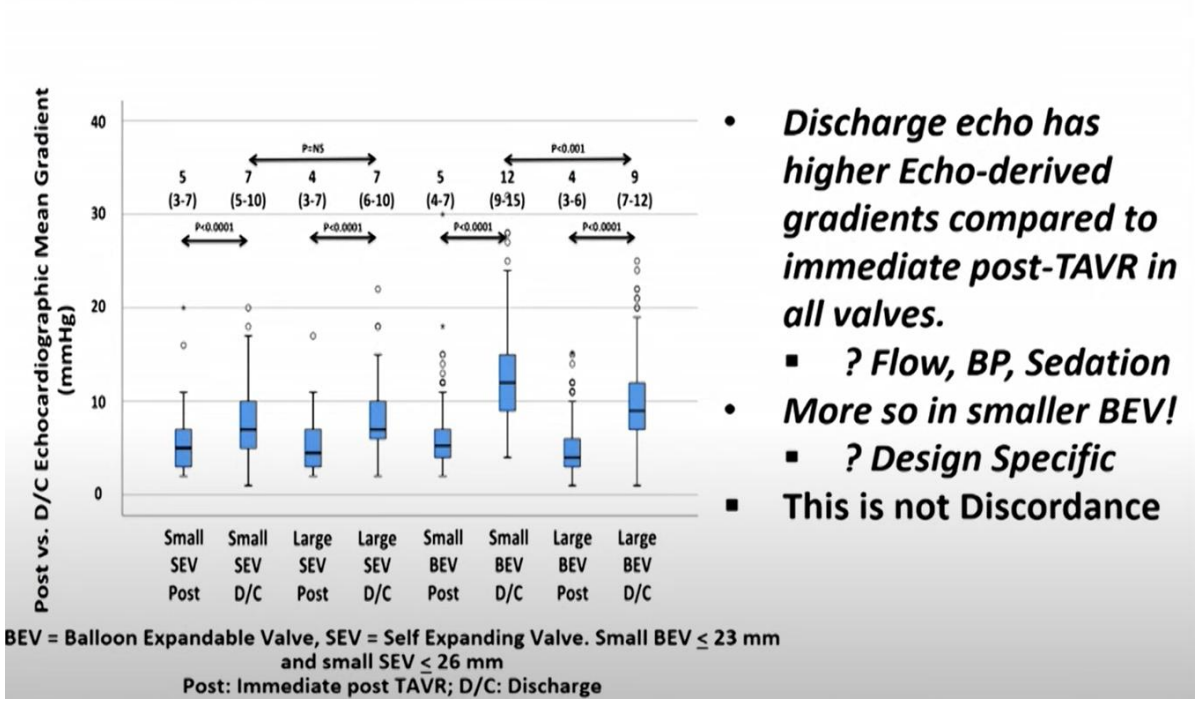
3. **If the circle is undersized**, and does not touch the commissures, there is a risk of paravalvular leak (PVL) or valve embolization



Small annuli and residual gradient

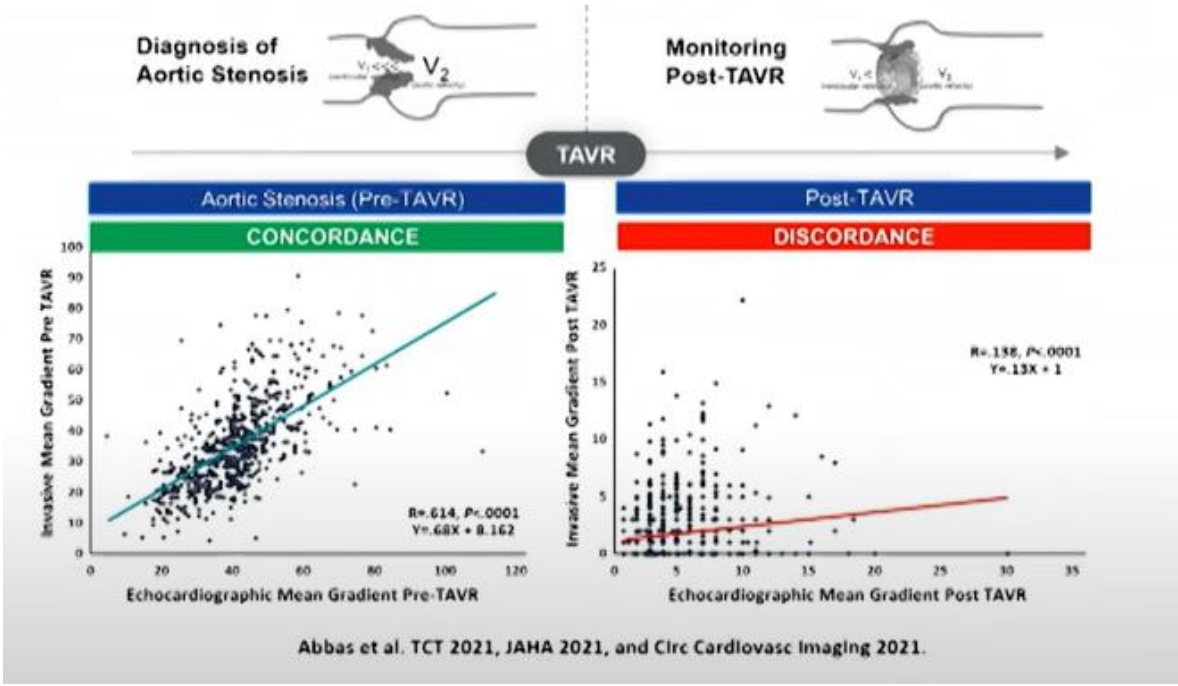


Small annuli, residual gradient



- *Discharge echo has higher Echo-derived gradients compared to immediate post-TAVR in all valves.*
  - *? Flow, BP, Sedation*
- *More so in smaller BEV!*
  - *? Design Specific*
- This is not Discordance

BEV = Balloon Expandable Valve, SEV = Self Expanding Valve. Small BEV ≤ 23 mm and small SEV ≤ 26 mm
Post: Immediate post TAVR; D/C: Discharge

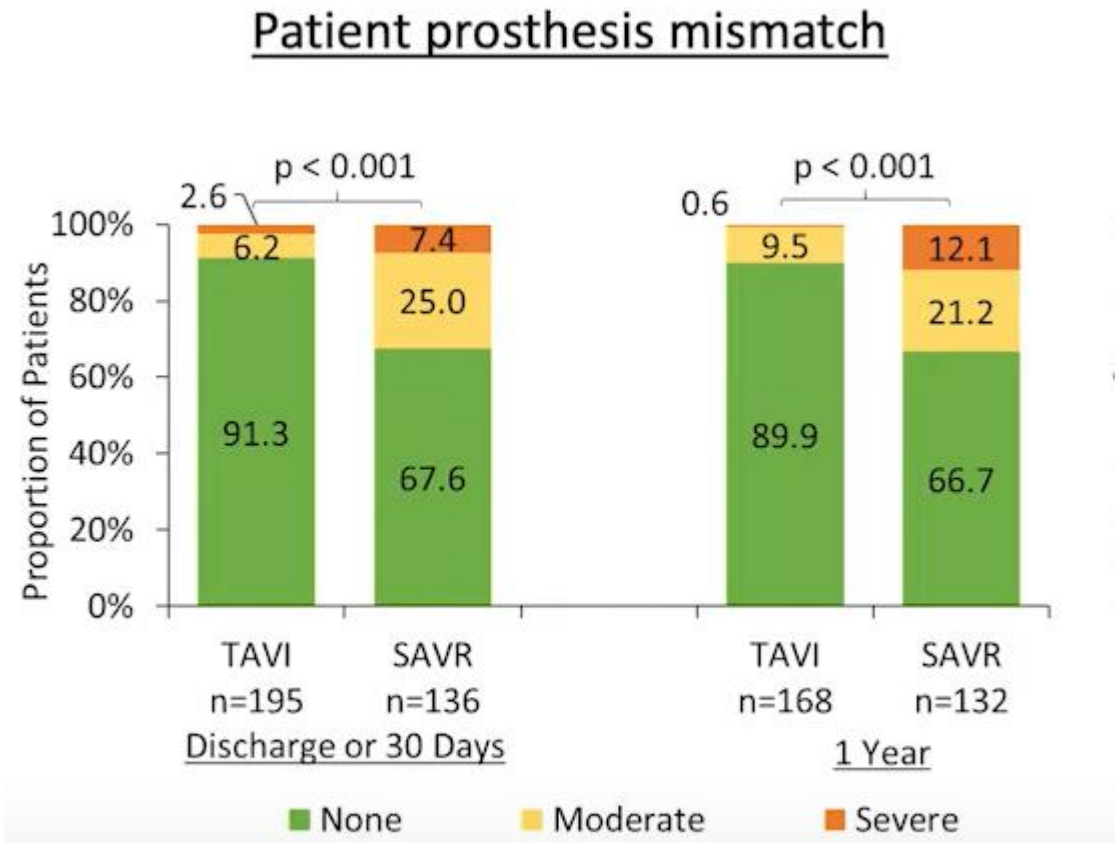


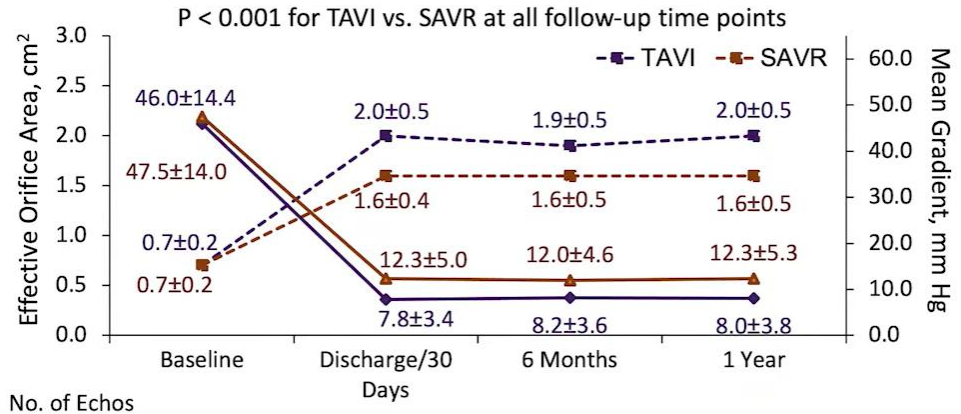
Abbas et al. TCT 2021, JAHA 2021, and Circ Cardiovasc Imaging 2021.

DISCORDANCE TAVR:
prospective multicenter study:
ECHO vs CATH gradients
long term follow-up

Small annuli in woman

Surtavi and Evolut Low Risk trials: TAVI vs SAVR





No. of Echos				
TAVI EOA	195	195	178	168
SAVR EOA	175	136	140	132
TAVI AVG	217	212	194	194
SAVR AVG	188	177	164	155

Conclusions

Self-expanding, supra-annular TAVI compared to SAVR in women with small aortic annuli at intermediate or low risk resulted in:

- Better clinical results at 1 year (fewer hospitalizations)
- Better haemodynamic performance at 1 year;
  - Significantly greater EOA and DVI
  - Lower mean gradients
  - Less moderate and severe PPM

Five-Year Outcomes of Balloon Versus Self-Expanding TAVI in Patients With Small Annuli

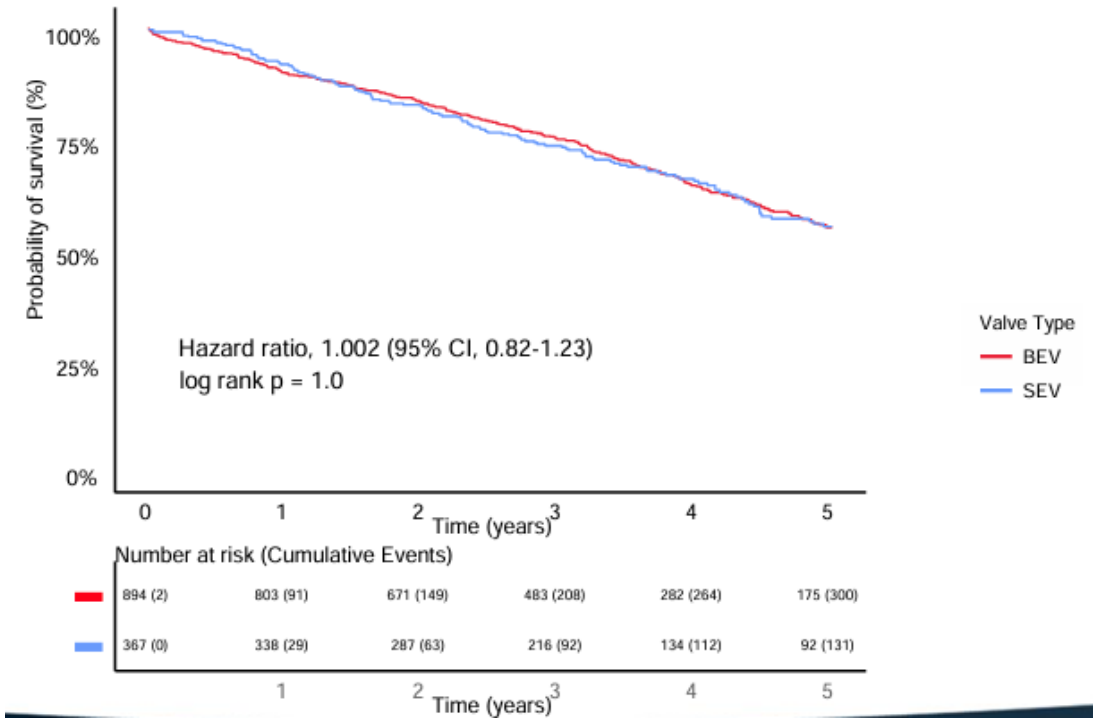
- This is a retrospective analysis of all patients who underwent TAVI with small valves at the Baylor Scott and White Healthcare System, in Texas, USA between 2012 and 2021.
  - Baylor Scott & White -The Heart Hospital - Plano
  - Baylor Heart and Vascular Hospital - Dallas
  - Baylor Scott & White – All Saints, Fort Worth
  - Baylor Scott & White - Round Rock
  - Baylor Scott & White – Temple
  - Baylor Scott & White – College Station
- Approved by the BS&W IRB and ethics committee

S3-20,23 mm
Evolut 23 mm

n= 1261

Results

Kaplan Meier, 5-year survival rate

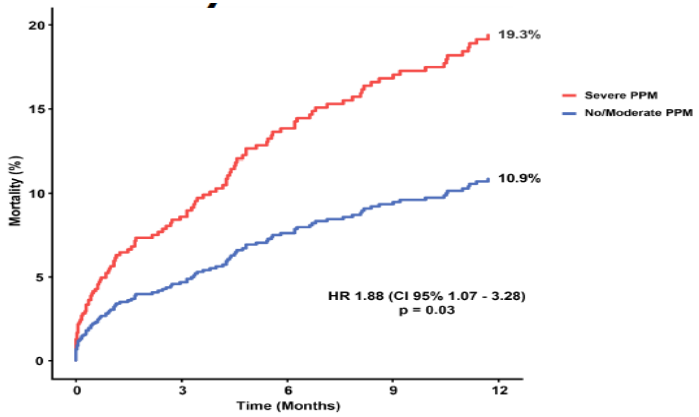


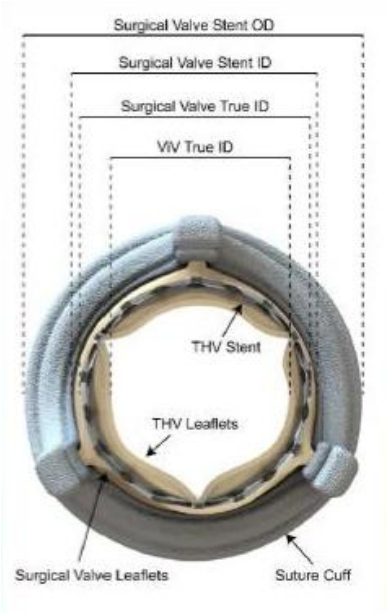
Valve-in-valve

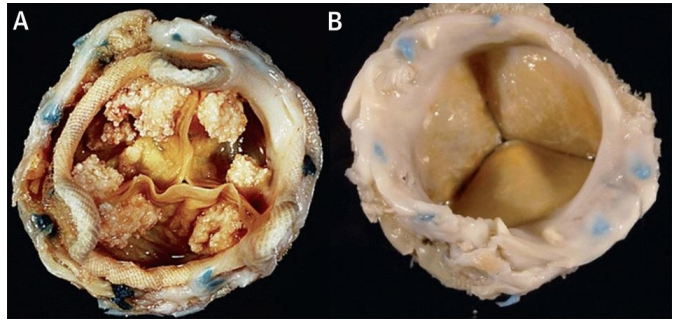
TAVI ViV

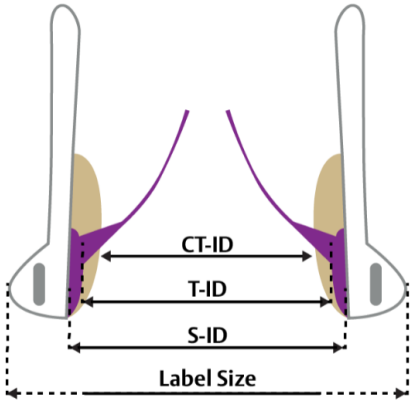
Valve sizing and risk of PPM

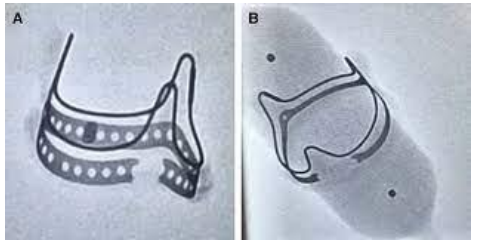
Risk of coronary ostia obstruction











Risc of patient-prosthesis missmatch:

- **Surgical labeled size < 23 mm**
- **TAVI ID < 20 mm**
- PPM = residual mean gradient ≥ 20 mmHg
- PPM = iEOA < 0,65 cm^2/m^2
- *mild PPM = iEOA < 0,85 cm^2/m^2*

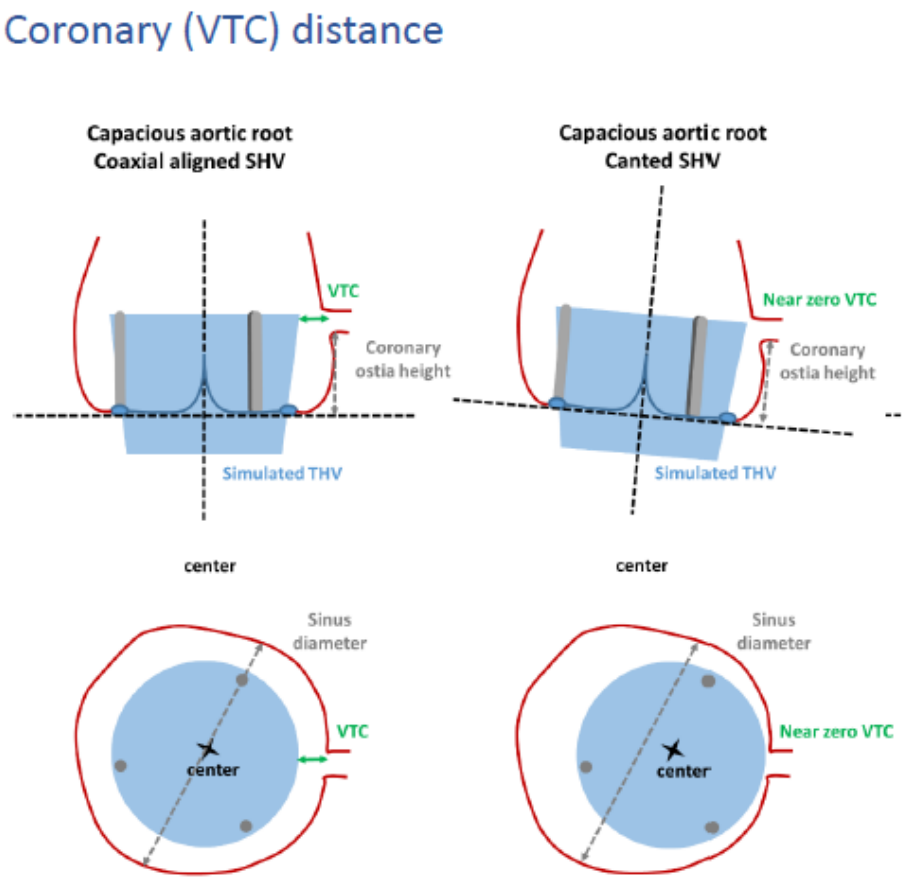
How to predict coronary ostia obstruction ?

Height and type of prosthesis
(Mitroflow, Trifecta)

STJ height („risc“ plane, VTA)

SOV width (VTC)

Canted surgical valve

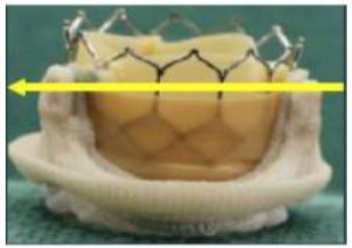


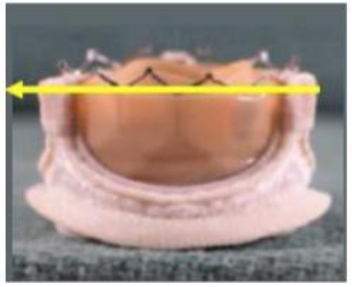
VTC!

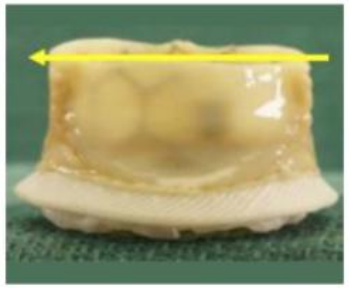
Cut-off 3-4 mm

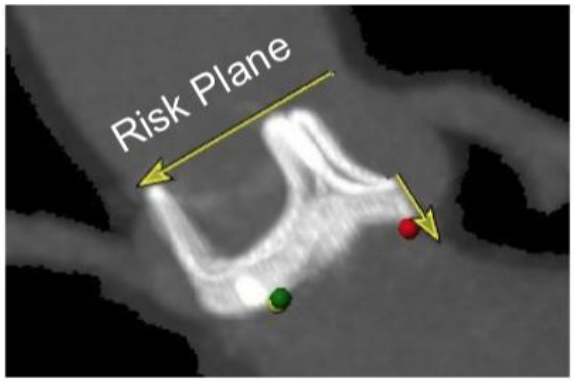
Blanke, 2016

Risk plane and coronary ostia obstruction







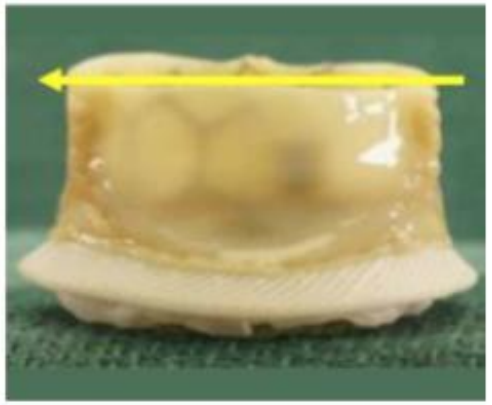


Risk Plane is the level where the THV is implanted, and the leaflets of the index bioprosthesis are tilted up, creating a covered cage as high as the commissural posts.

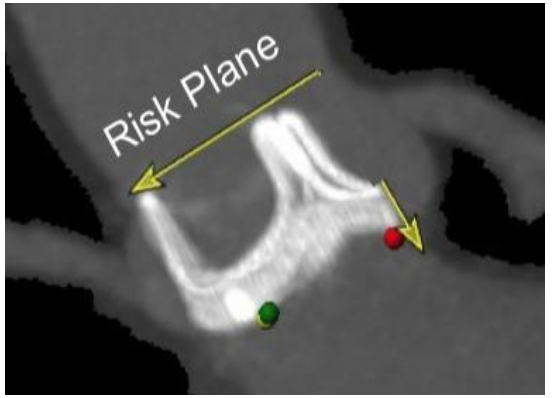
Identifying the Risk Plane for index bioprosthetic valve may help to determine the risk for coronary occlusion.

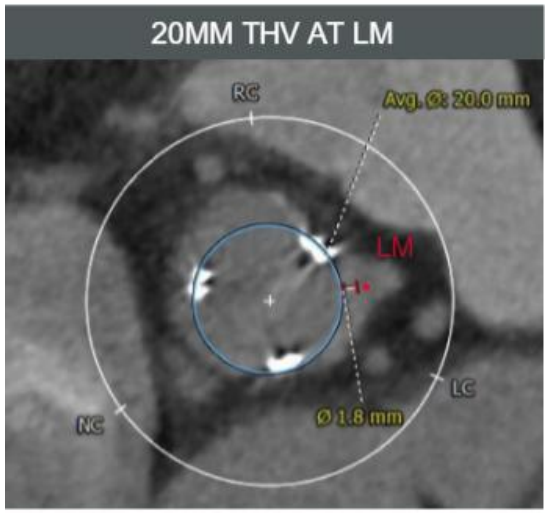
Risk of coronary ostia obstruction – measure Valve to Coronary distance (VTC)

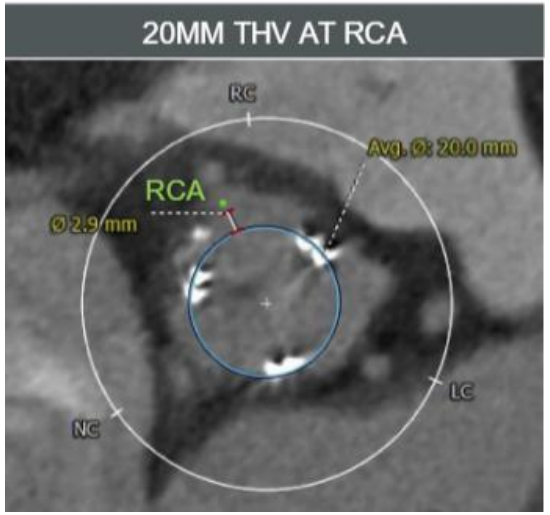
- Procedure planning should include assessment for the risk of coronary occlusion. The presence of a narrow aortic root, low sinotubular junction and supra-annular placement may have a higher incidence of coronary obstruction[1]
- Coronary height is frequently reduced in patients post Surgical Aortic Valve Replacement (SAVR) as surgical bioprosthesis are often implanted in a supra-annular position[2]
- Measure the distance from the circle to the coronary ostia
- If the distance from the projected circle to coronary ostia is <3mm there is a high risk for coronary occlusion. At 3-6mm intermediate risk for coronary occlusion



Yellow arrow denotes the location of the bioprosthetic valve Risk Plane

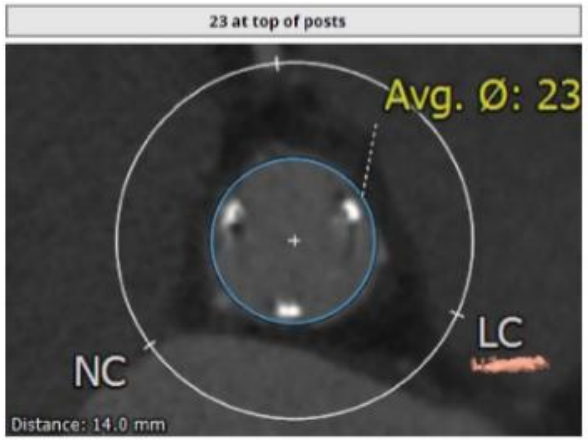




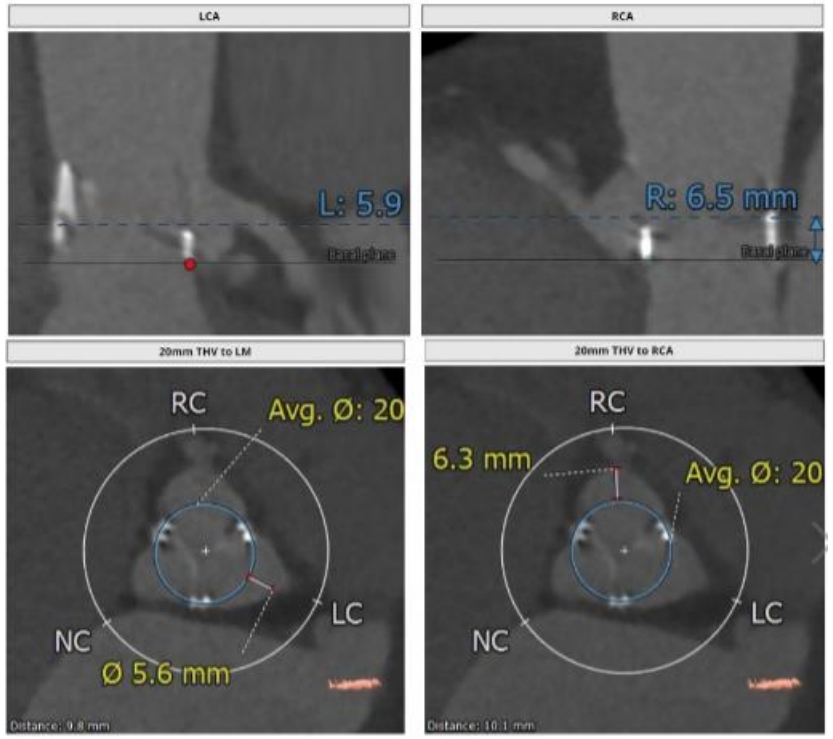


Risk for sinus of Valsvalva sequestration – measure valve to aorta distance (VTA)

- Risk of coronary obstruction due to sinus sequestration if:
  - the commissure/risk plane level is above the STJ
  - the distance between projected circle and STJ is <2.0mm at the top of the bioprosthetic posts



Note the projected circle is in contact with the STJ at the level of the top of bioprosthetic posts. This VTA is < 2.0mm and at risk for sinus sequestration.




17.–19. DUBNA 2024 | HRADEC KRÁLOVÉ
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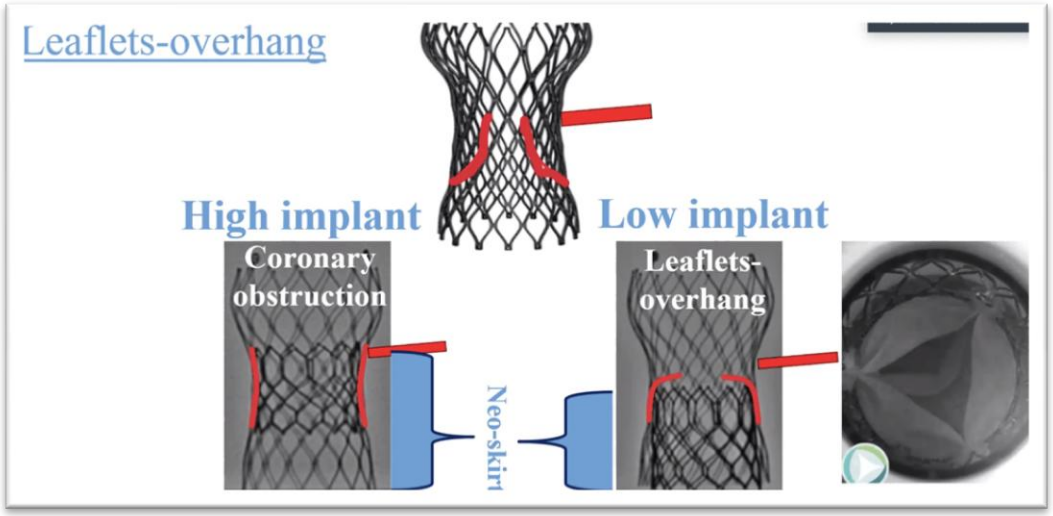
INTERVENČNÍ KARDIOLOGIE

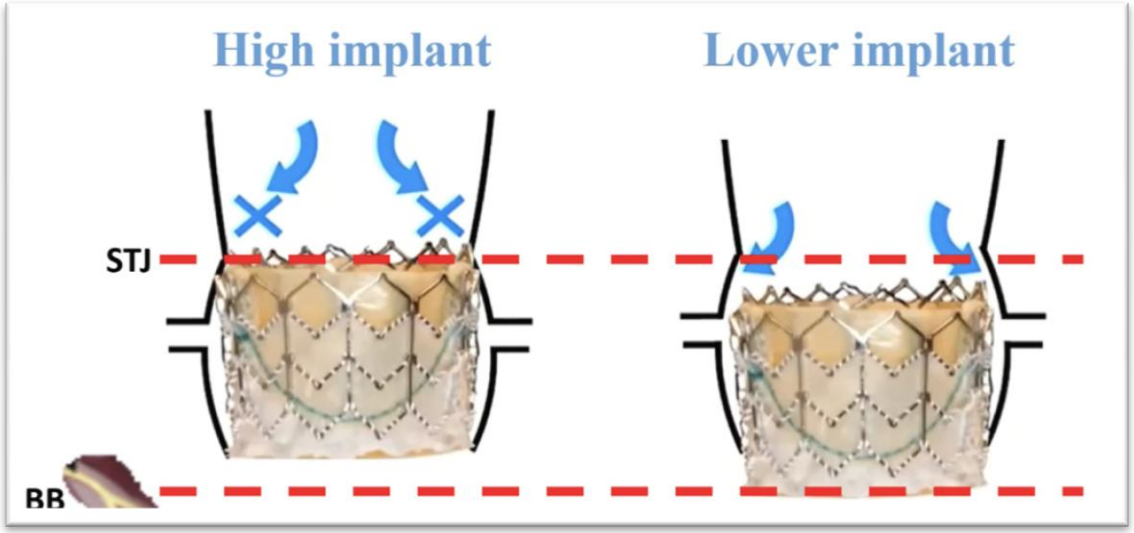
THV in THV

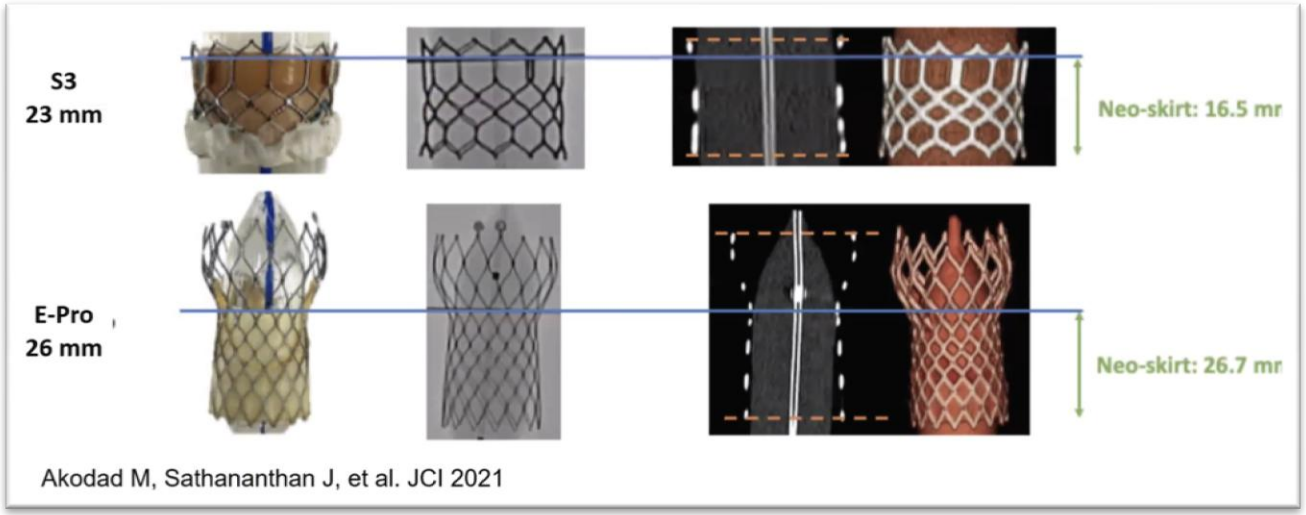
THV – in – THV

Leaflets ovehang

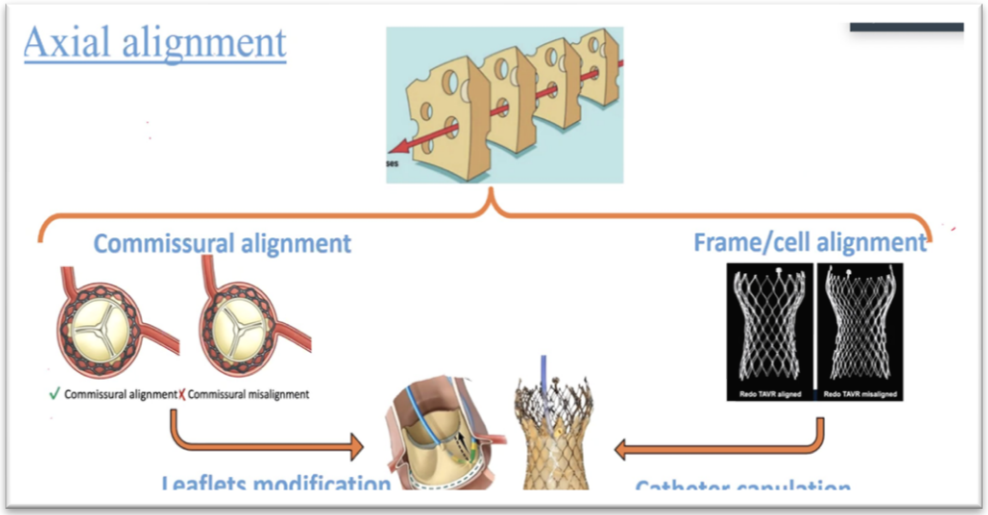


sinus sequestration





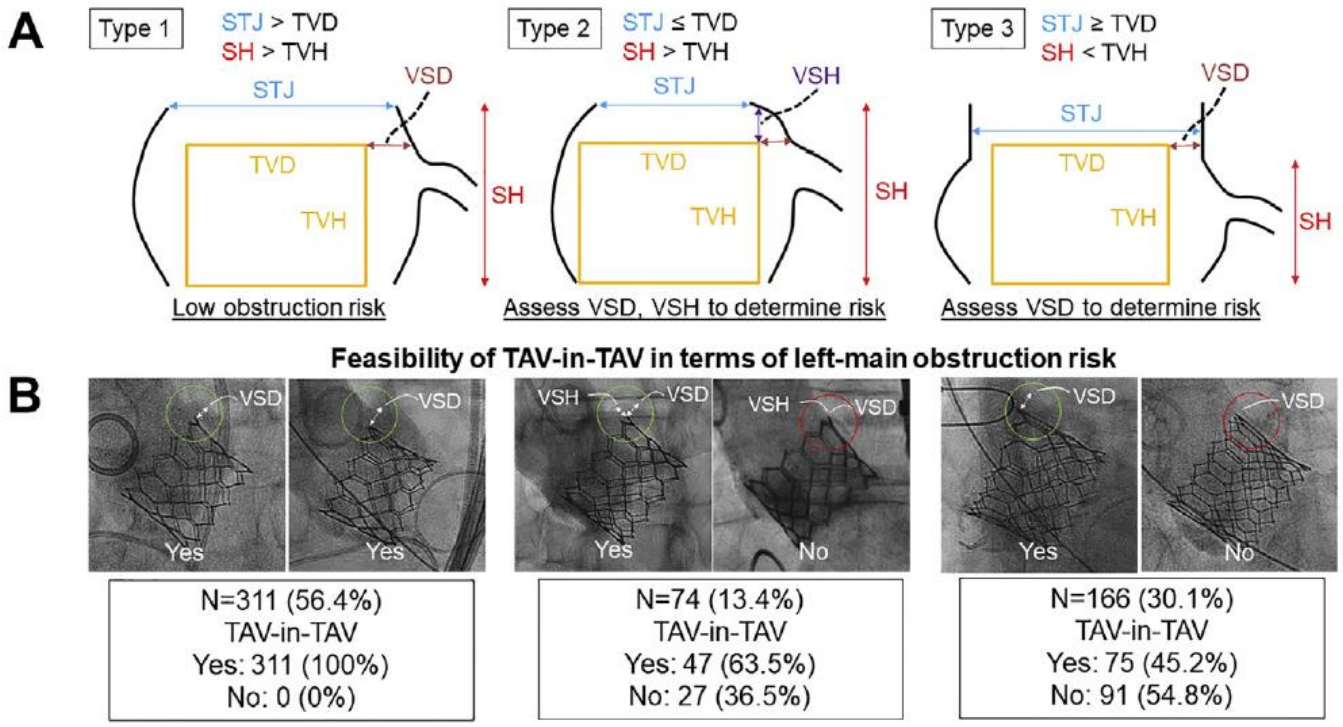
Neo-skirt + coronary obstruction



Commisural alignment

THV-in-THV (TAVI in TAVI)

20% risc of LMCA obstruction (Sapien)

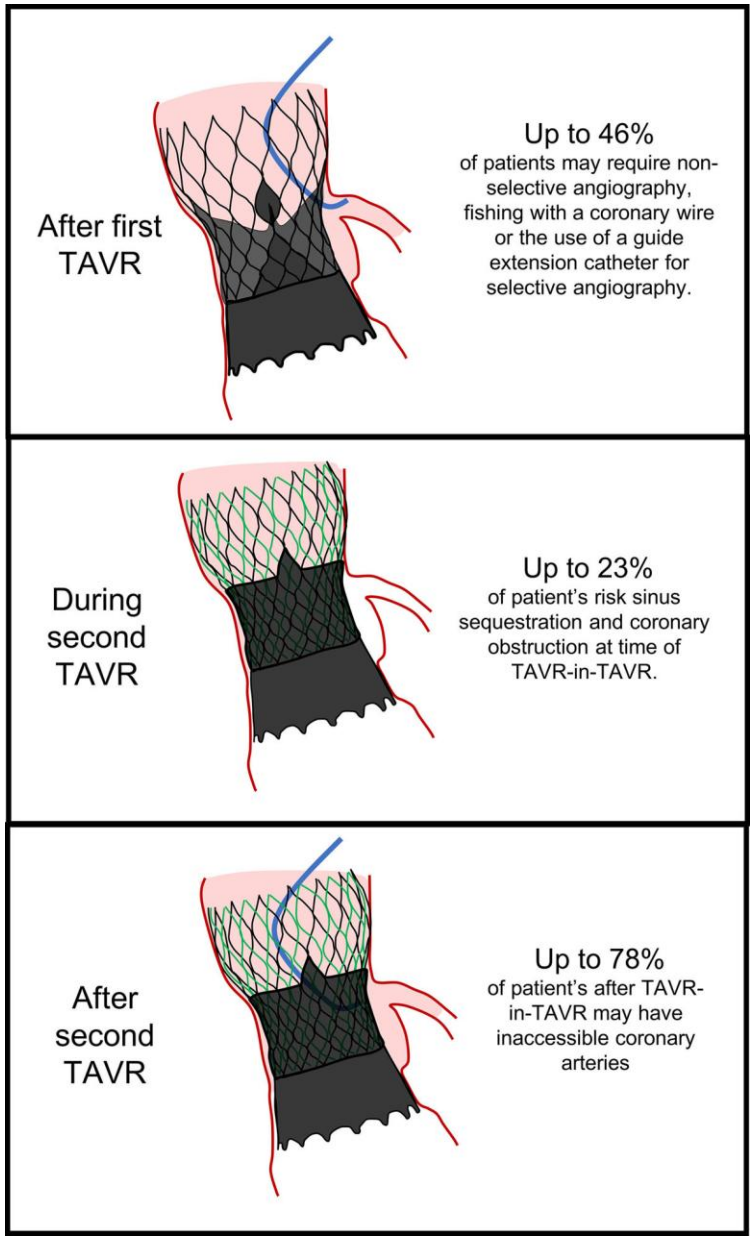


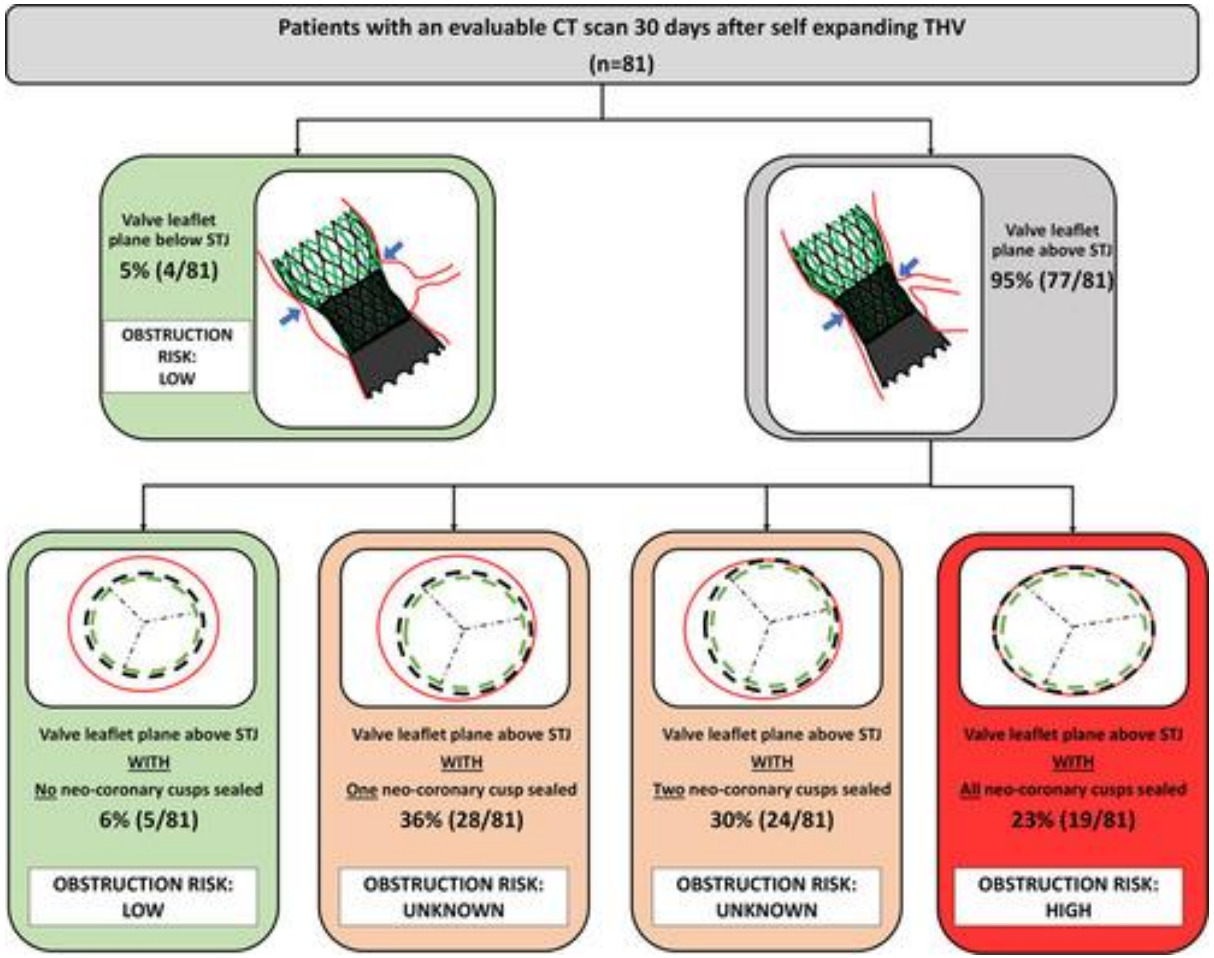
30-day outcomes for aortic THV-in-THV in high-risk or greater patients	TVT registry[1] (n=116)
All-cause Mortality	5.3%
Cardiac Mortality	2.6%
All Stroke	0.0%
Moderate/severe PVL	4.2%
AV gradient mean (mmHg)	15.4
Device Success	98.3%
Permanent Pacemaker Implantation	7.9%
Major vascular complications	0.0%
Device thrombosis	0.9%

Tang, JACC 2019

THV-in-THV (TAVI in TAVI)

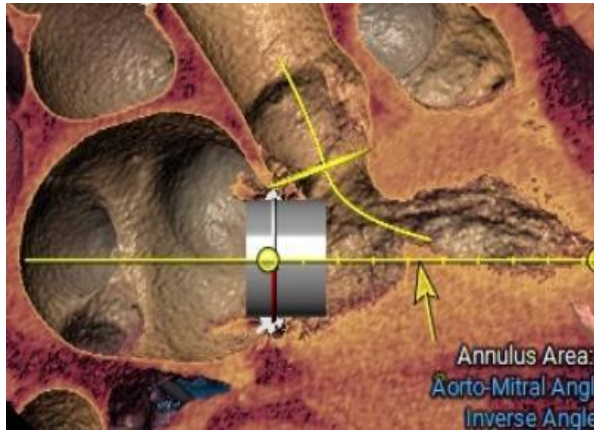
20-50% risc of LMCA obstruction (Evolut)
leaflet ovehang

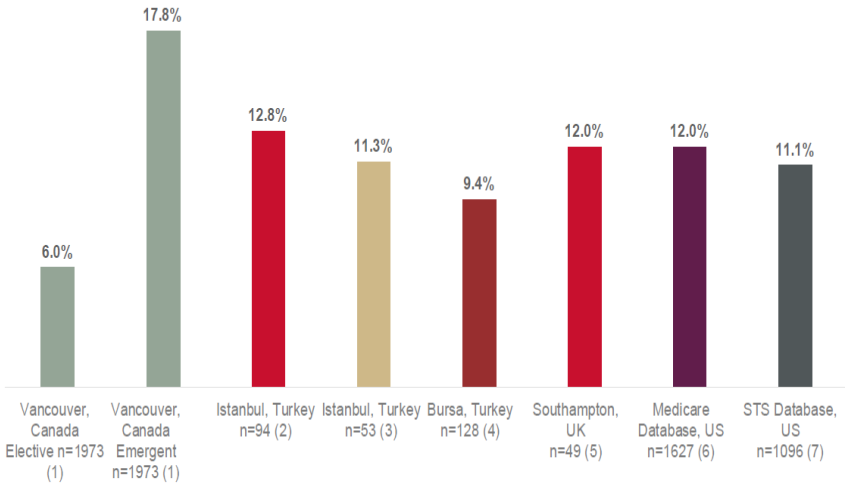




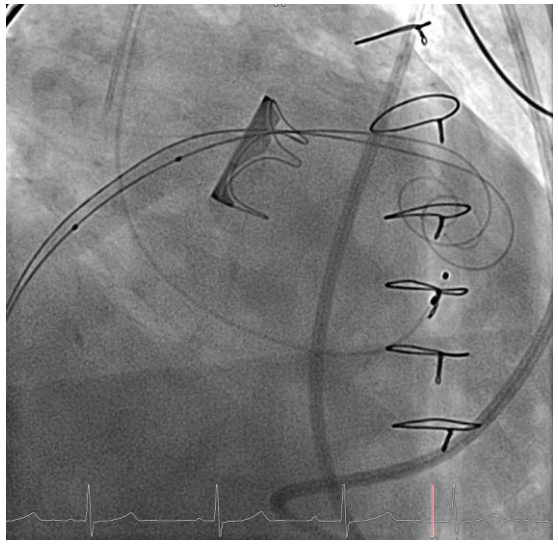
Brian, Circulation 2020

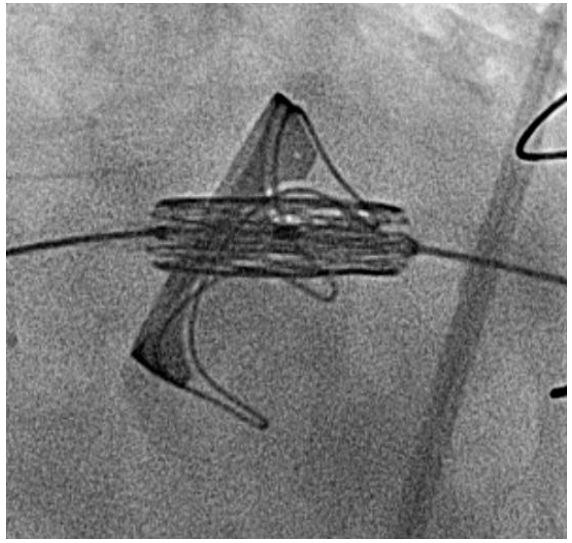
TMVI – transseptal mitral valve-in-valve implantation

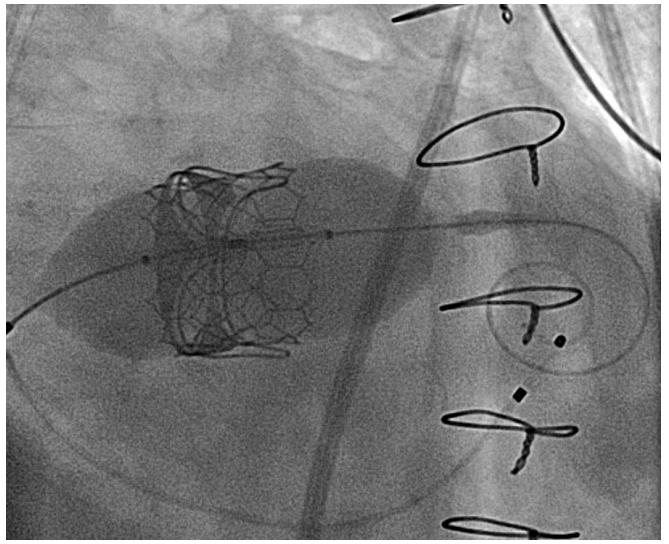


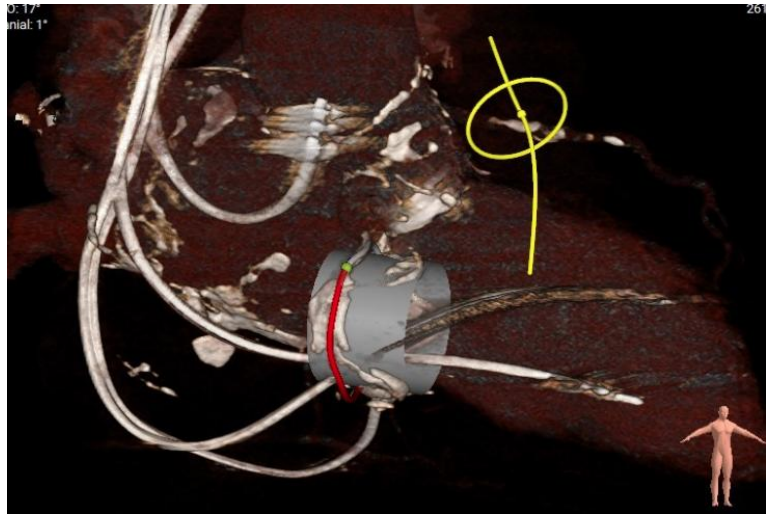


Transseptal mitral surgical ViV (n=1326)[1]	30 Days	1 Year
All-cause mortality	5%	15.8%
Cardiovascular mortality	2.1%	3.7%
Stroke	1.1%	3.3%
Mitral valve reintervention	0.4%	0.8%
New pacemaker	1.4%	2%
Device thrombosis	0.2%	0.3%
Mean MVG (mmHg)	7.4 (±2.75)	7.0 (±2.94)

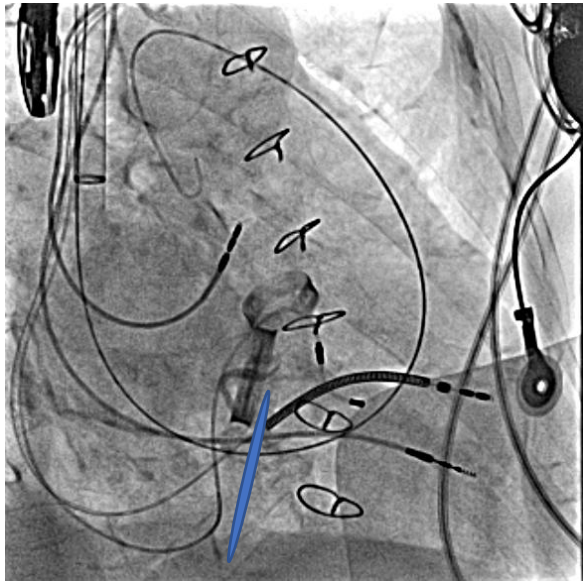


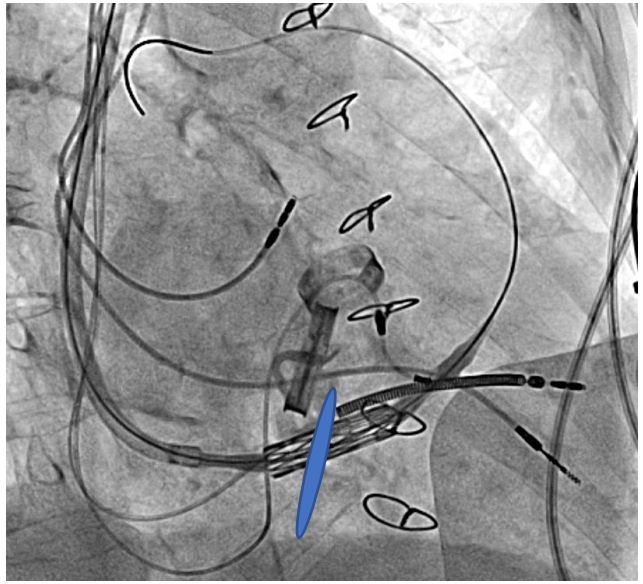


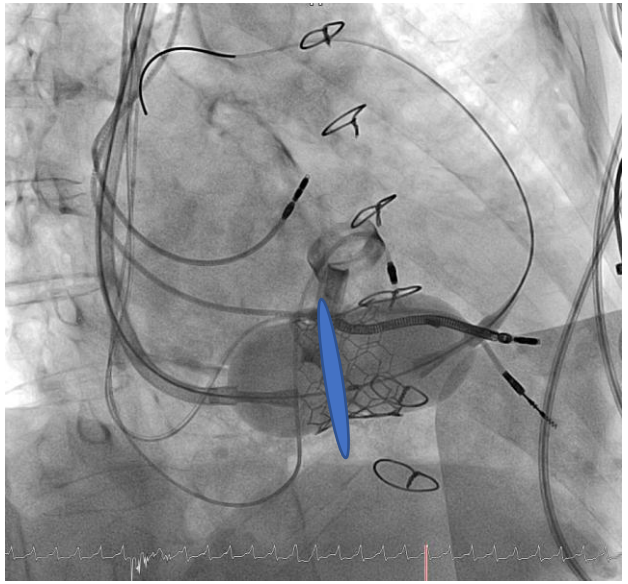


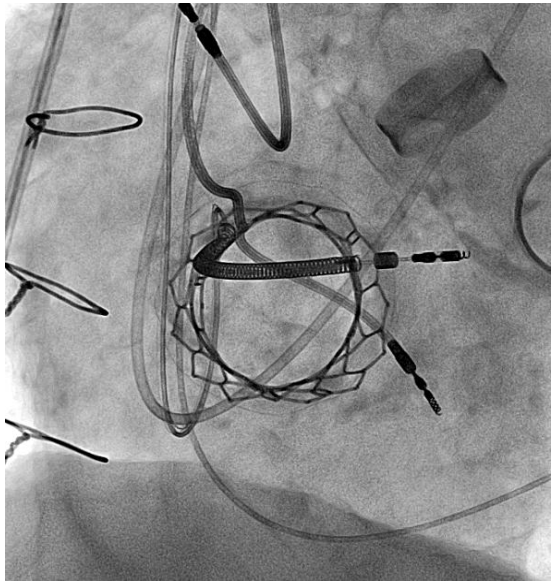


TTVI – transjugular tricuspid valve-in-valve implantattion









Transjugular Sheath 21F

2x Lunderquist into PA

ES 29 mm + 4 ccm + pace 150/min


"Nurse, get on the internet, go to SURGERY.COM, scroll down and click on the 'Are you totally lost?' icon."