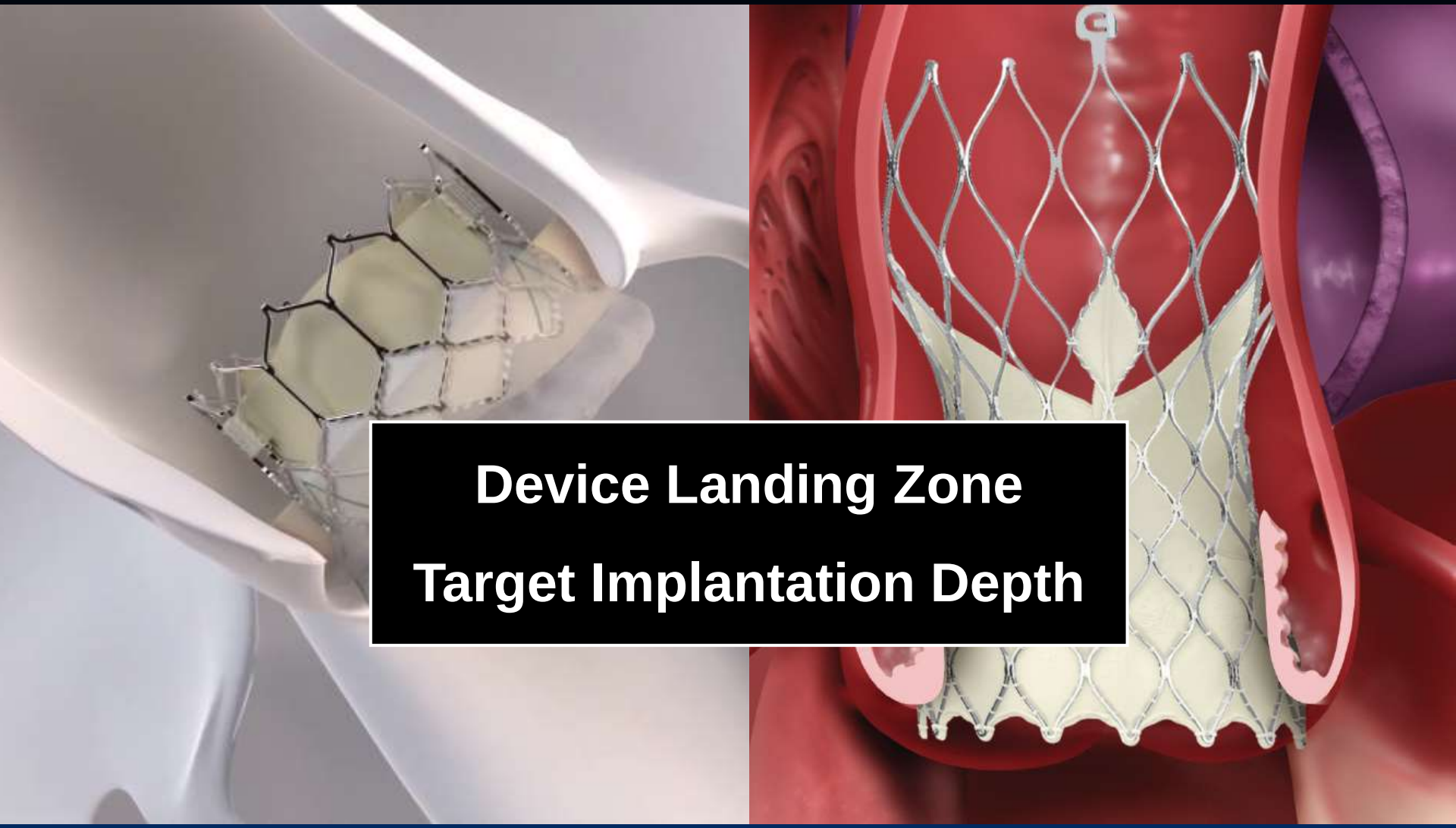
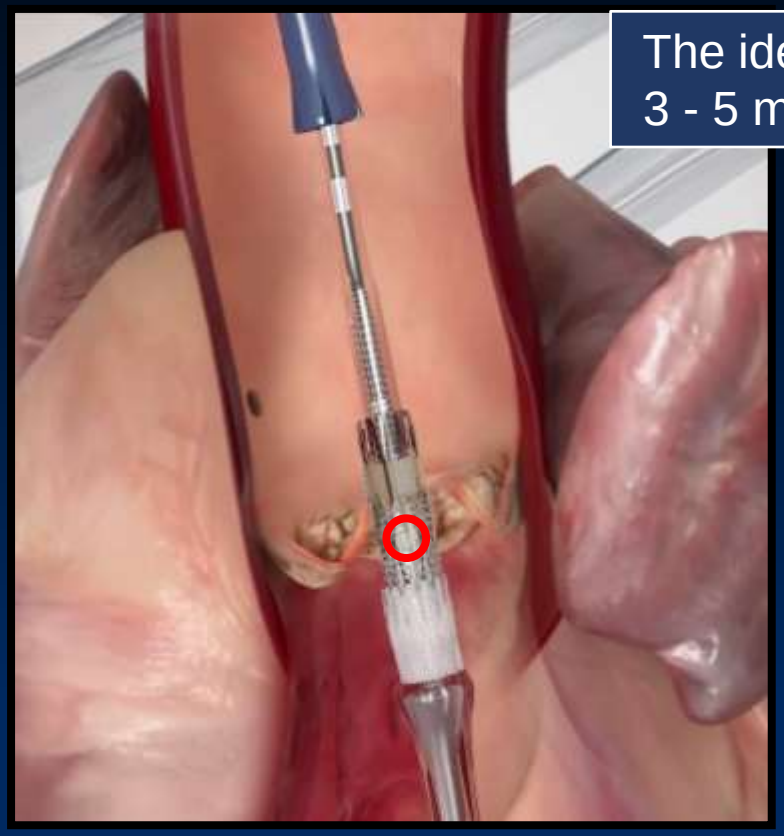
How to Optimize Sapien 3 Implantation for Future Management:

FCA (future coronary access) and Coronary Salvage

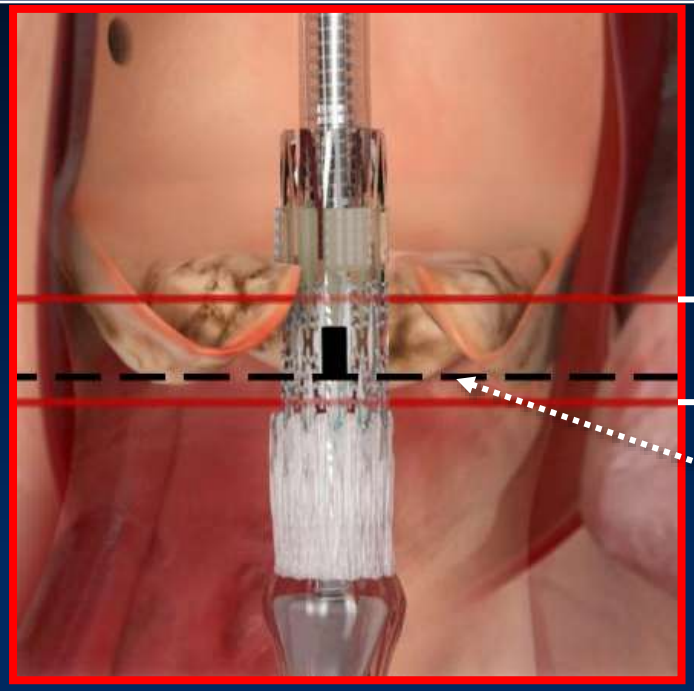
Duk-Woo Park, MD, PhD
Asan Medical Center, Seoul, Korea


Device Landing Zone
Target Implantation Depth

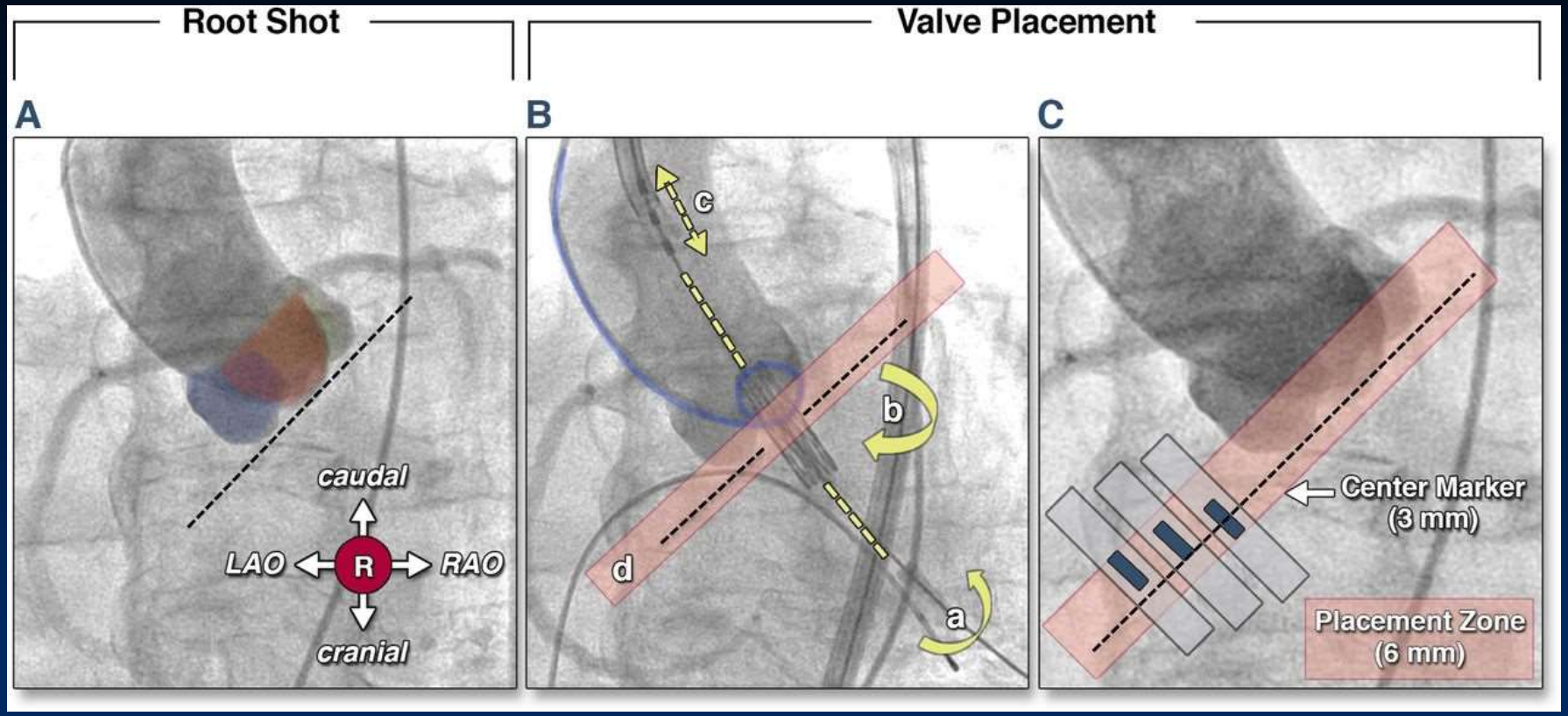
Edwards Sapien 3 Positioning



The ideal SAPIEN 3 relative position, 70/30 to 80/20
3 - 5 mm below the annulus



Optimal Sapien 3 Deployment



JACC : CARDIOVASCULAR IMAGING,, Choice of Imaging for Guiding TAVR MARCH 2015

What is the optimal position?

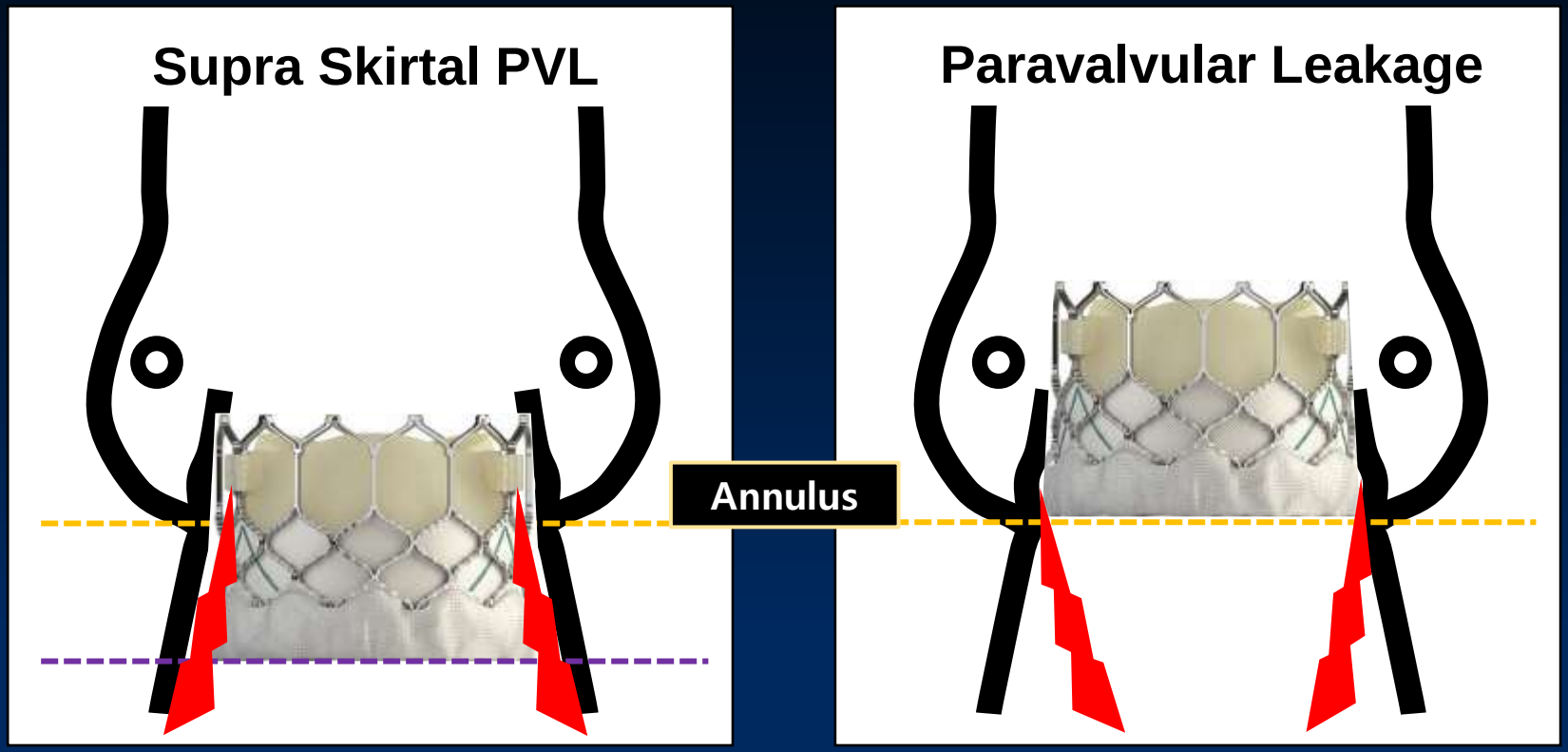
90:10

70:30

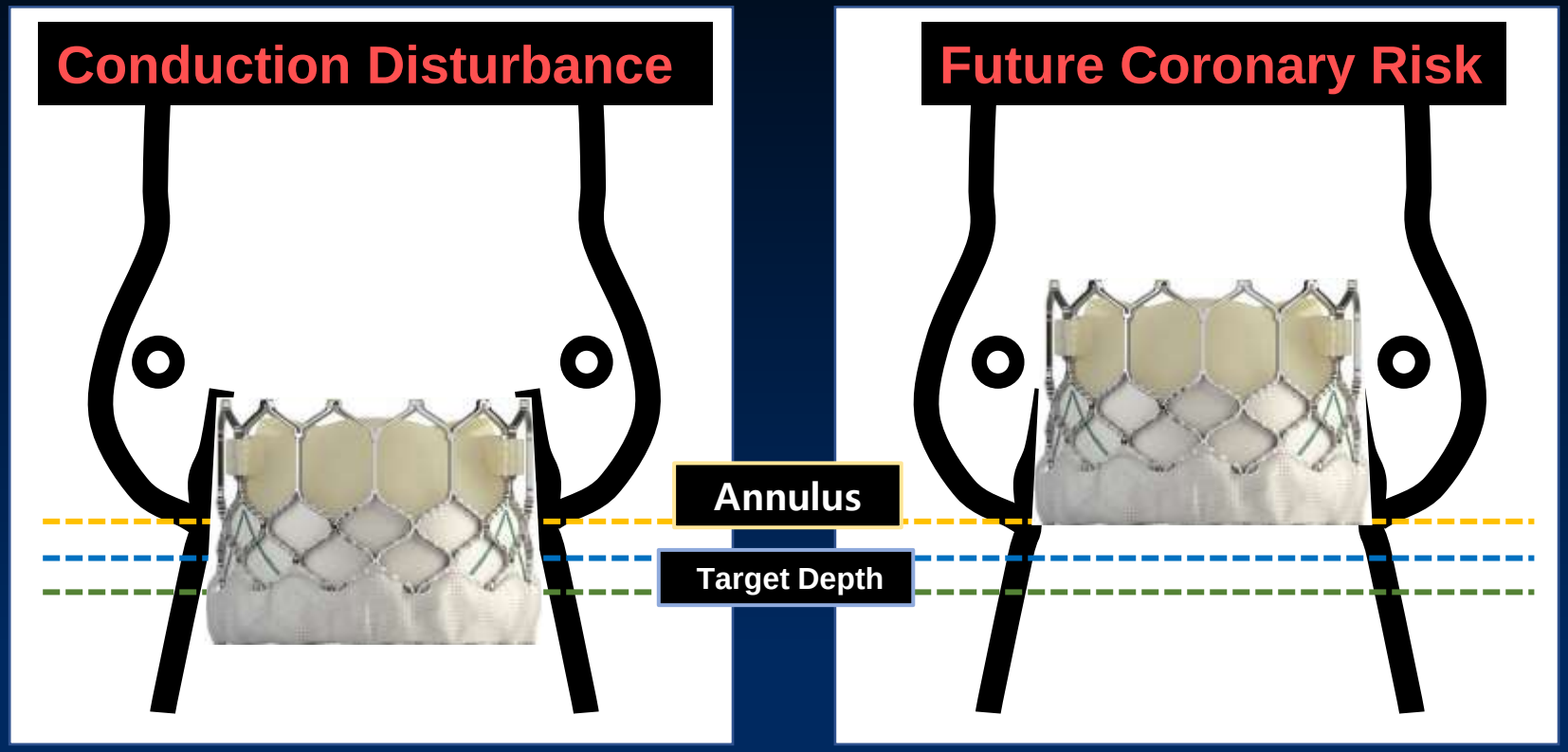
50:50

Too Low or Too High Implantation

PVL according to TAVR Valve Depth

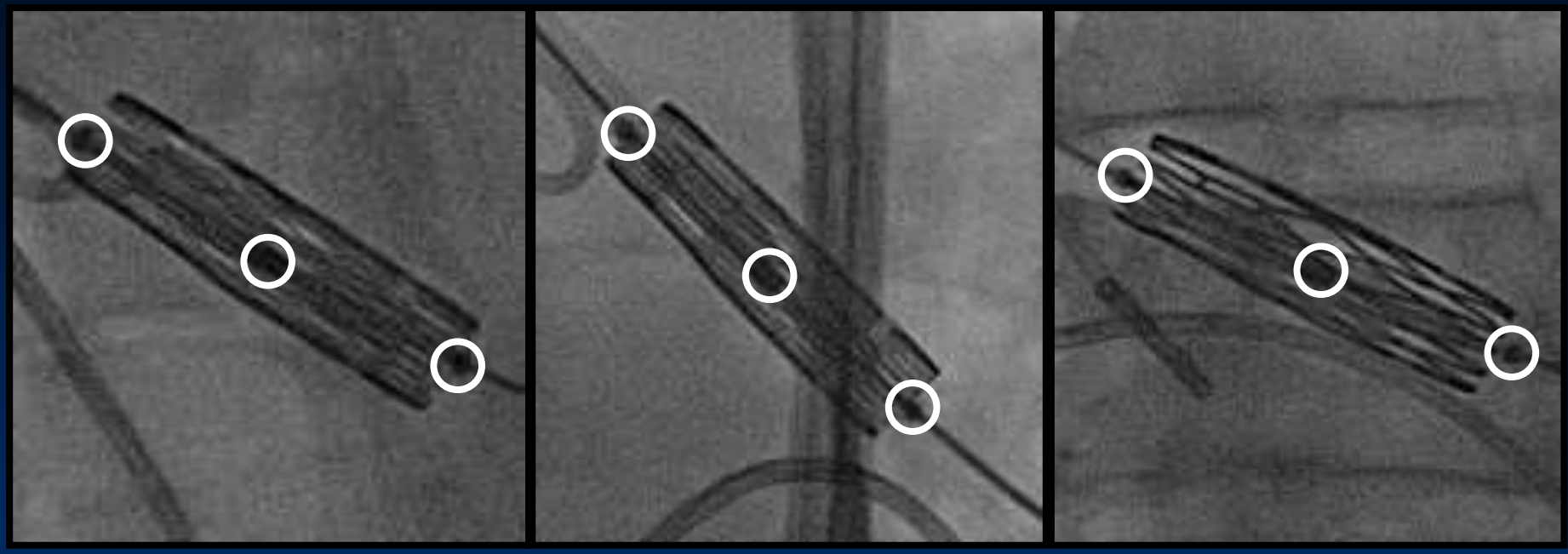


Low or High Implantation



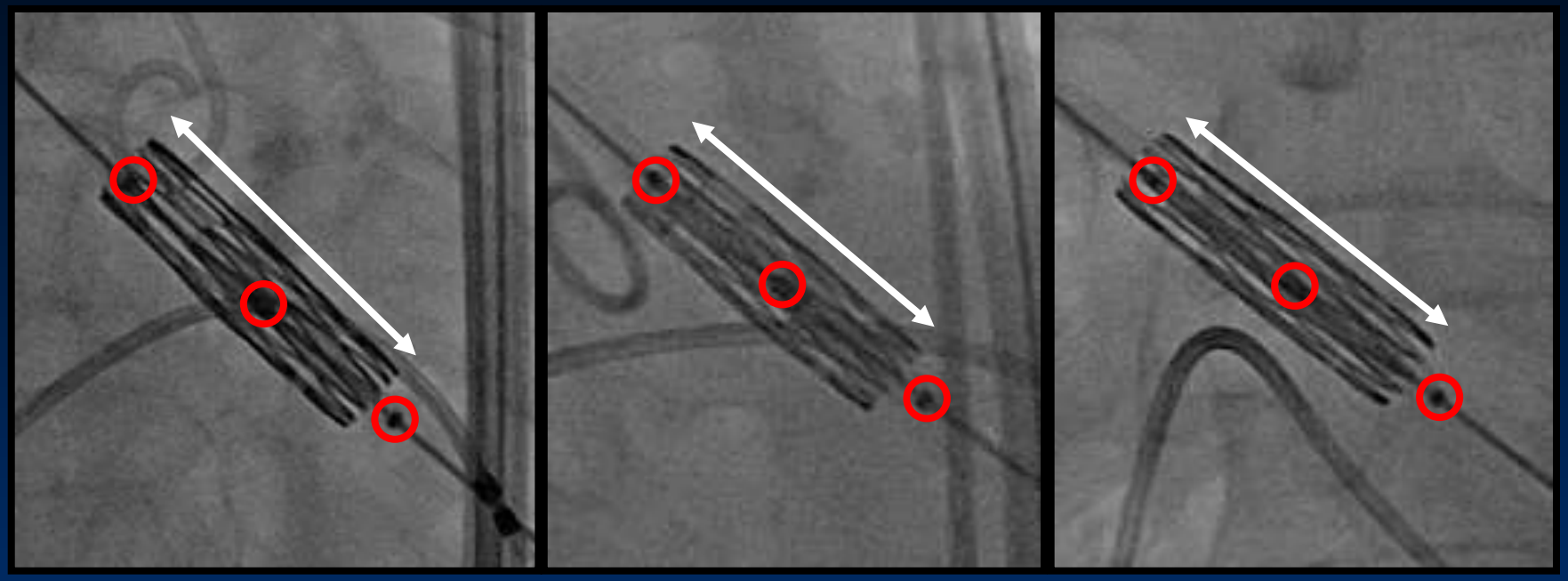
Sapien3 Valve Alignment

Valve on the balloon



Sapien3 Valve Misalignment

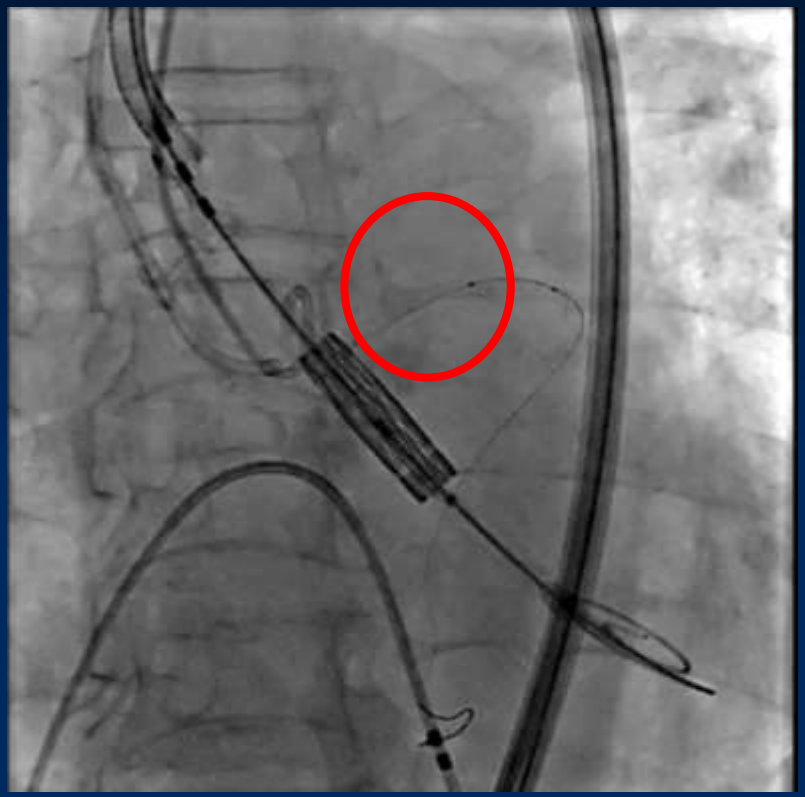
Valve dislodged on the balloon

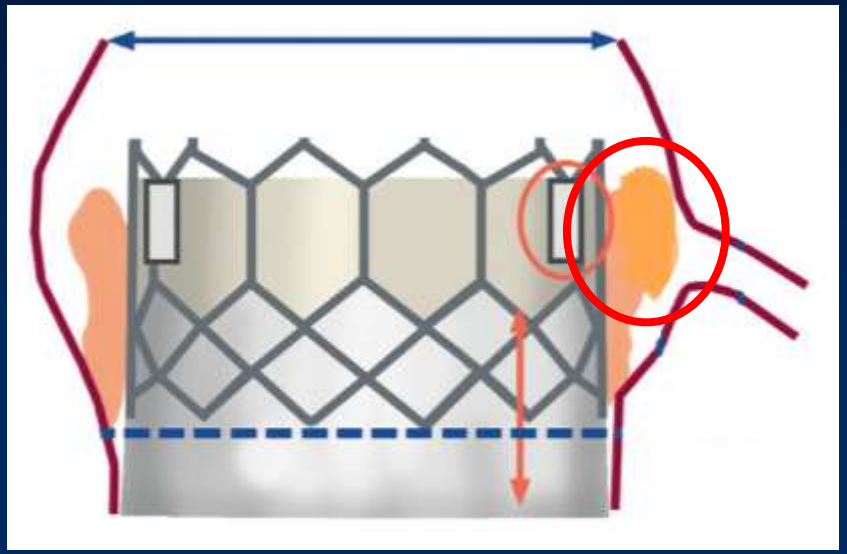


Why S3 Implantation Depth Is So Important:
Coronary Obstruction and Future Coronary Access

Mechanism Of Coronary Obstruction

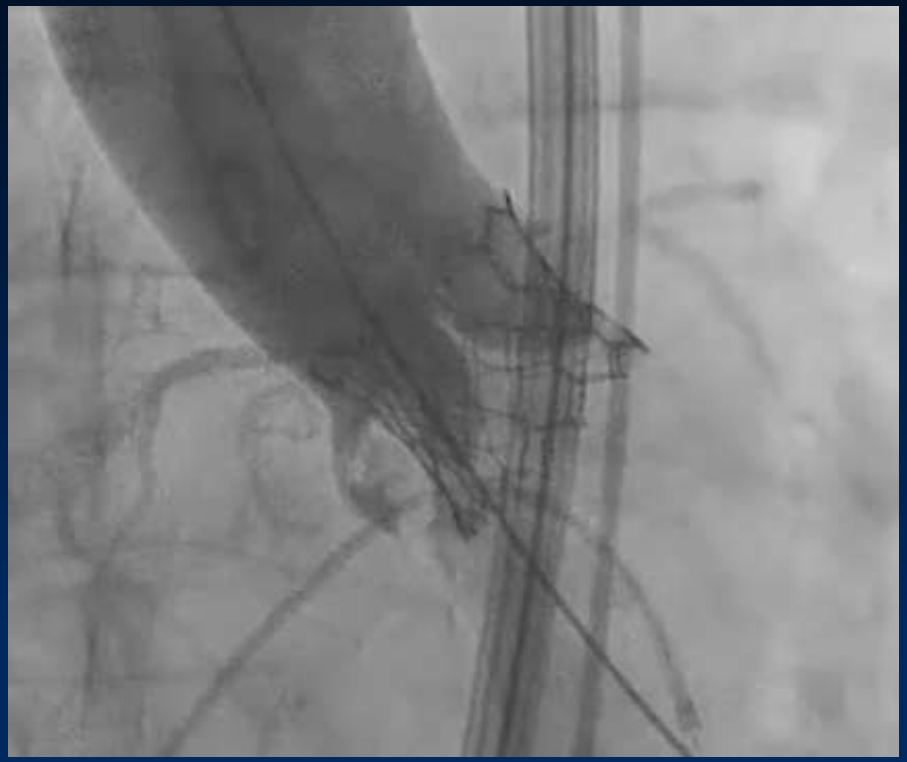
- Displacement of bulky calcified leaflet toward the coronary ostium
- Indirectly causing reduction of coronary flow by sealing off the coronary sinuses
- The most common artery affected is the left coronary artery

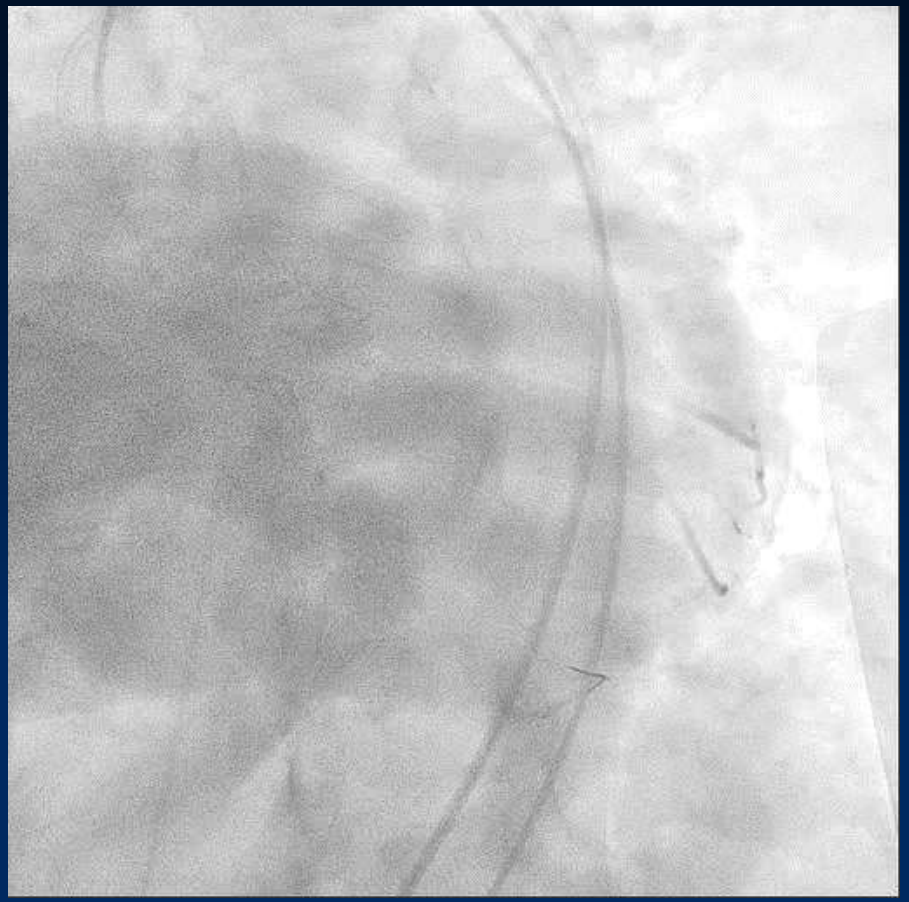




Technically Difficult after THV Deployment

Hemodynamic Instability

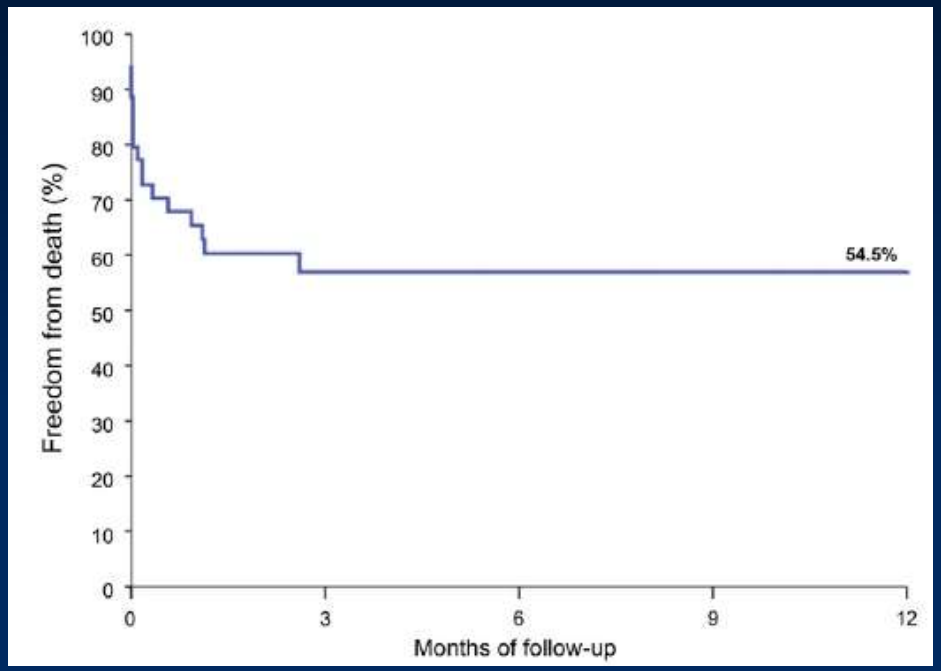




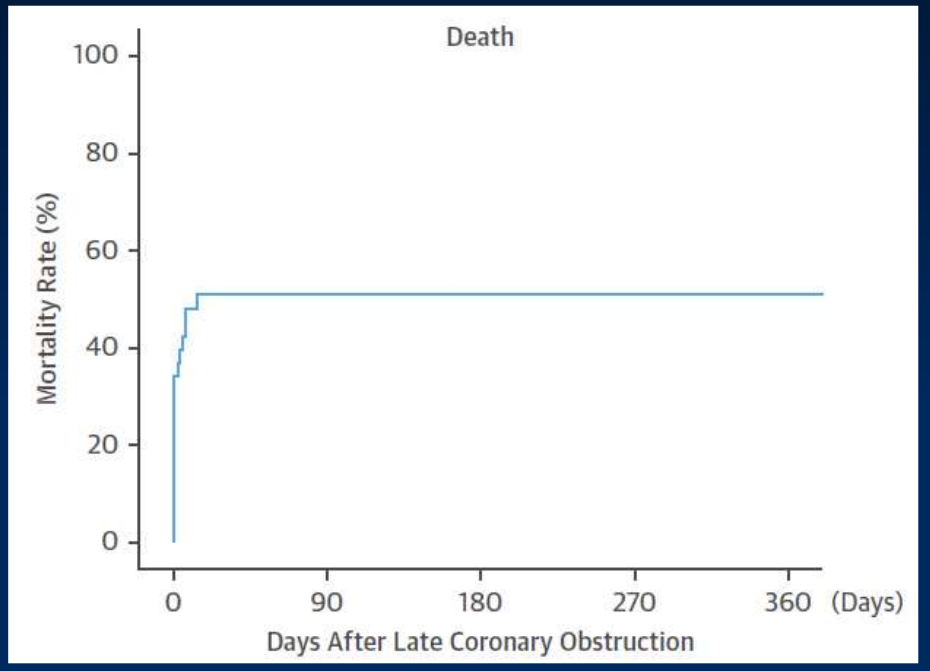
High Mortality Rate

- Large multicenter TAVR registry (6,688 patients), the incidence of coronary obstruction was 0.66%, with a 1-year mortality rate of 45.5%.

- Coronary obstruction complication associated with high incidence of myocardial infarction, cardiogenic shock



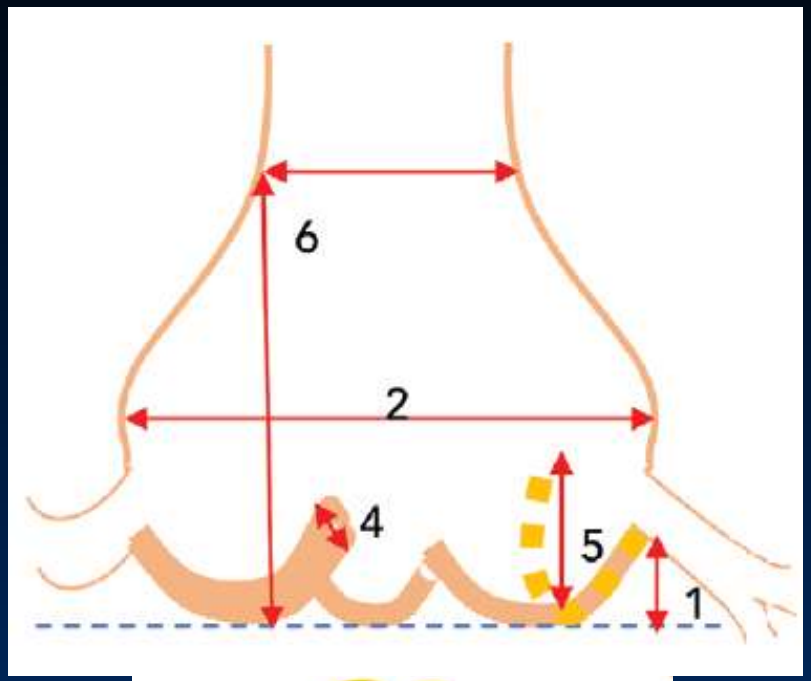
Ribeiro HB et al. JACC 2013

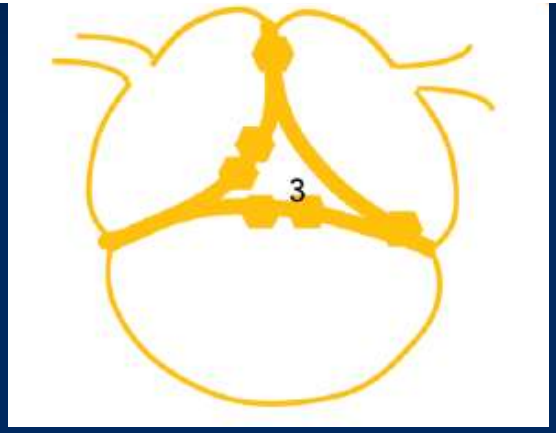


Jabbour, R.J. et al. J Am Coll Cardiol. 2018

Risk Factors for Coronary Obstruction

Anatomic Factor





1. Coronary Height ≤ 12 ㎜
2. Sinus of Valsalva ≤ 30 ㎜
3. Leaflet Calcification
4. Leaflet Thickness
5. Length of the Leaflet
6. ST Junction Height

Liesbeth Rosseel, Interv Cardiol. 2020 Apr

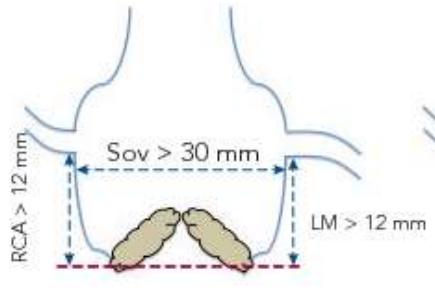
Low Risk

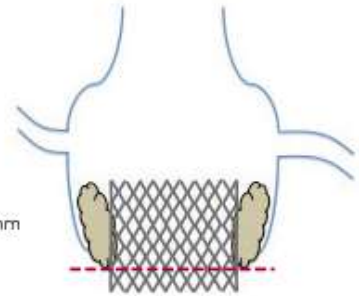
High Risk

A

Wide sinuses of Valsalva

High coronary ostium height

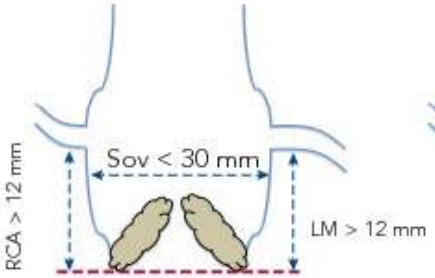


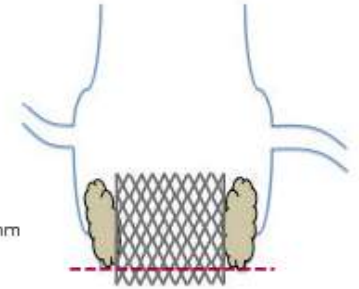


B

Shallow sinuses of Valsalva

High coronary ostium height

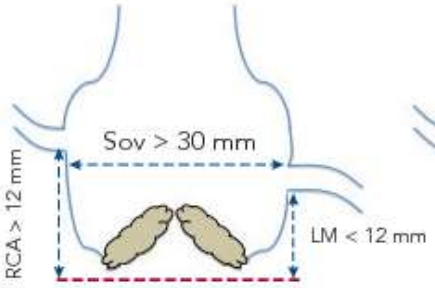


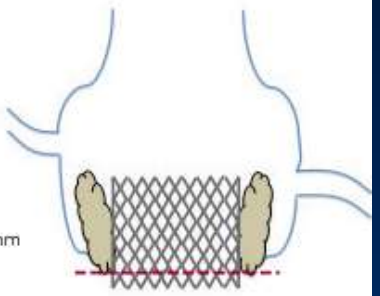


C

Wide sinuses of Valsalva

Low coronary ostium height

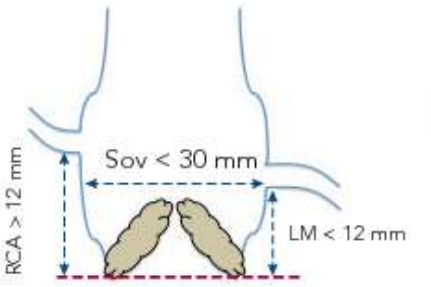


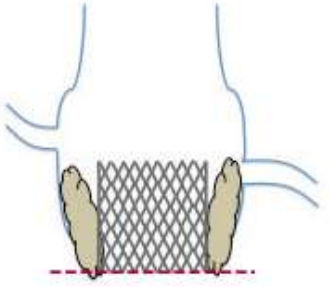


D

Shallow sinuses of Valsalva

Low coronary ostium height



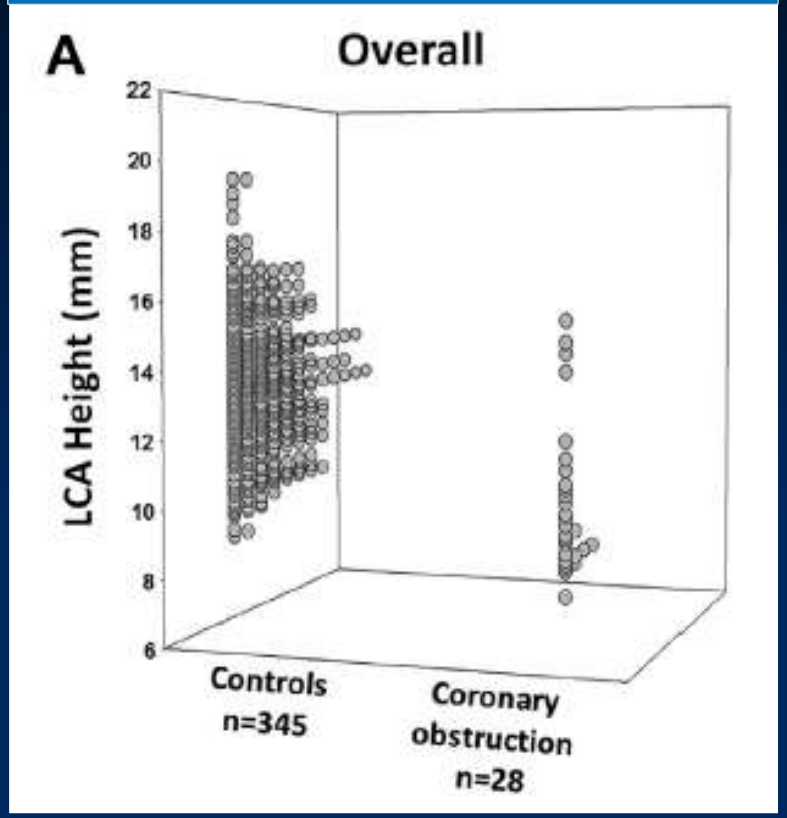


Predictive Factors, Management, and Clinical Outcomes of Coronary Obstruction Following Transcatheter Aortic Valve Implantation

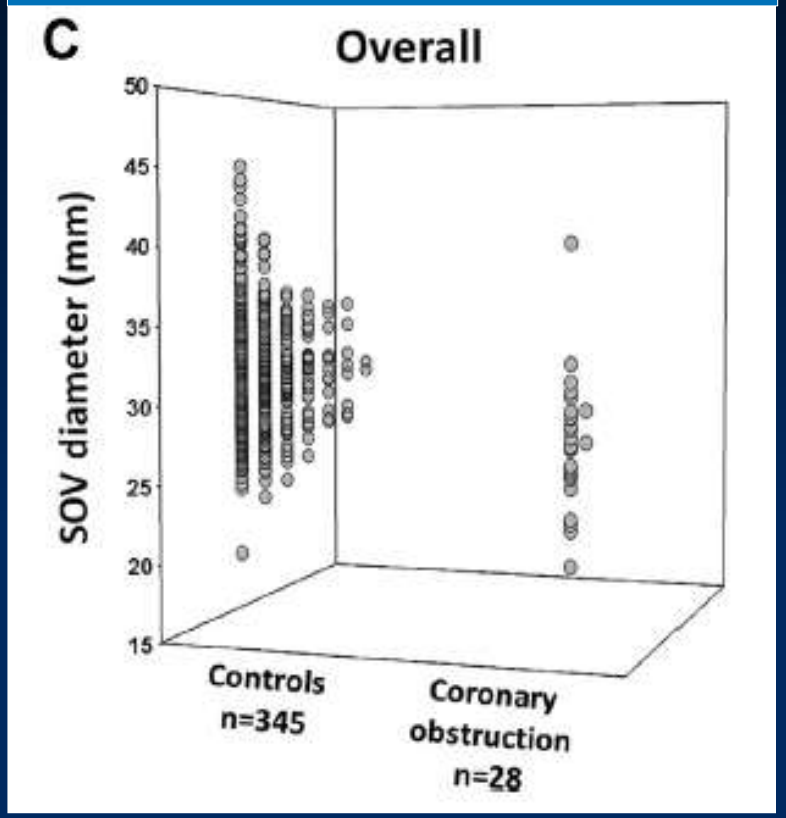
Insights From a Large Multicenter Registry

Prosthesis size, mm	
23	25 (56.8)
26	15 (34.1)
29	3 (6.8)
31	1 (2.3)

LCA Height ≤ 12mm



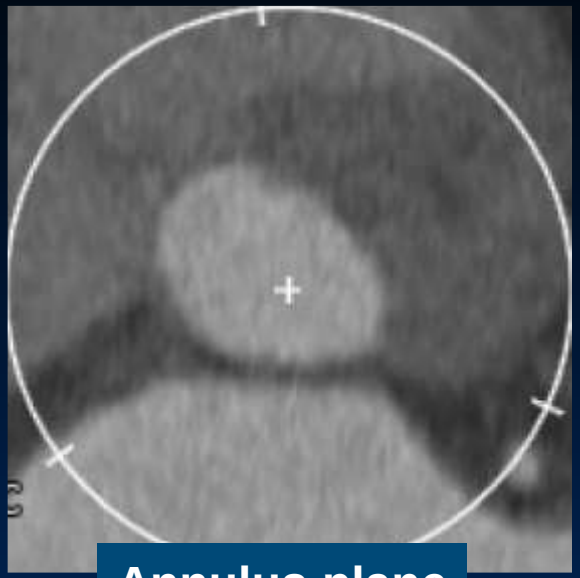
SOV Diameter ≤ 30mm



Ribeiro HB et al. JACC 2013

Low LCA & Small SOV ≠ High Risk

2019-08-22 AMC TAVR Case



Annulus plane

Sinus of Valsalva

Aortic Annulus parameters	
Annulus mean diameter	18.6 mm
Annulus area	260 mm²
Annulus driven diameter	18.2 mm
SOV / Annulus Area Ratio	2.02

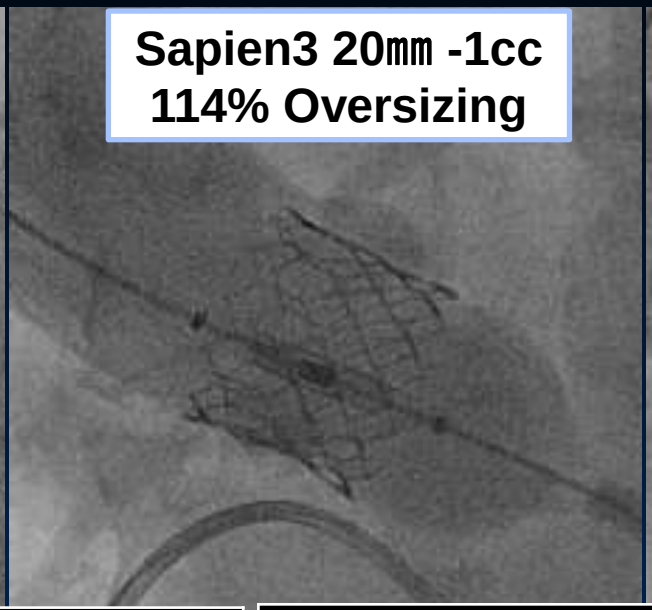
Sinus of Valsalva	
Area	525 mm²
NCC diameter	25.9 mm
LCC diameter	25.4 mm
RCC diameter	25.7 mm

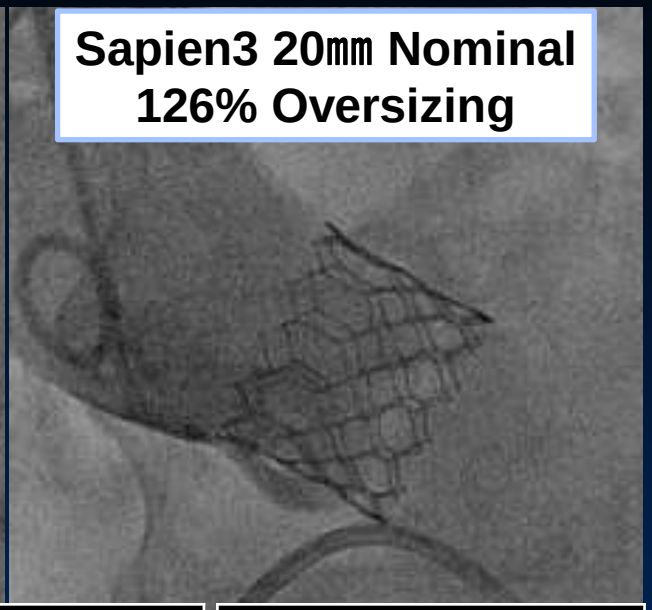
Coronary Height	
LCA	9.5 mm
RCA	14.1 mm

Mean SOV / Annulus Area Ratio **1.86 ± 0.32**
AMC (n=700)

Sinus / Annulus Ratio is Important

2019-08-22 AMC TAVR Case





Aortic Annulus parameters	
Annulus mean diameter	18.6 ㎜
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SOV / Annulus Area Ratio	2.02

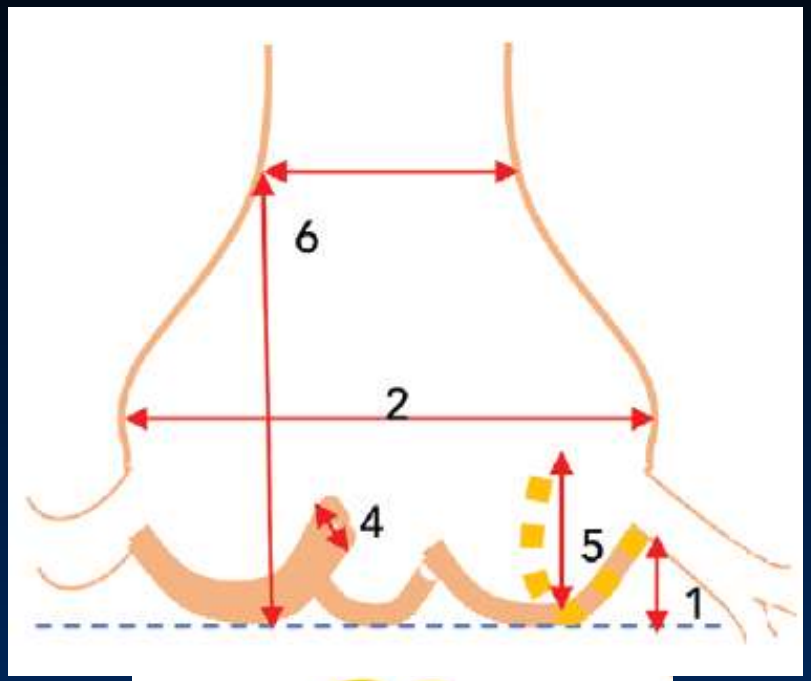
Sinus of Valsalva	
Area	525 ㎟
NCC diameter	25.9 ㎜
LCC diameter	25.4 ㎜
RCC diameter	25.7 ㎜

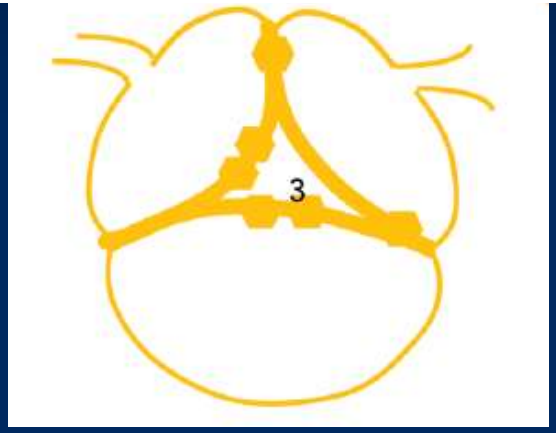
Coronary Height	
LCA	9.5 ㎜
RCA	14.1 ㎜

Mean SOV / Annulus Area Ratio 1.86 ± 0.32
AMC (n=700)

Risk Factors for Coronary Obstruction

Anatomic Factor

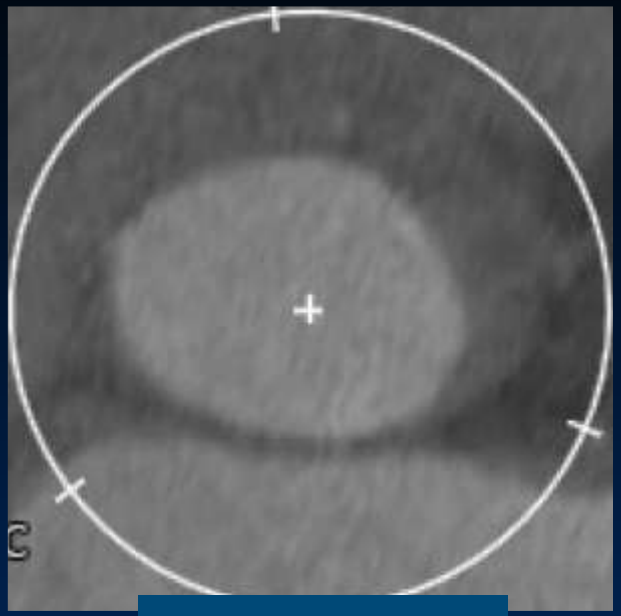




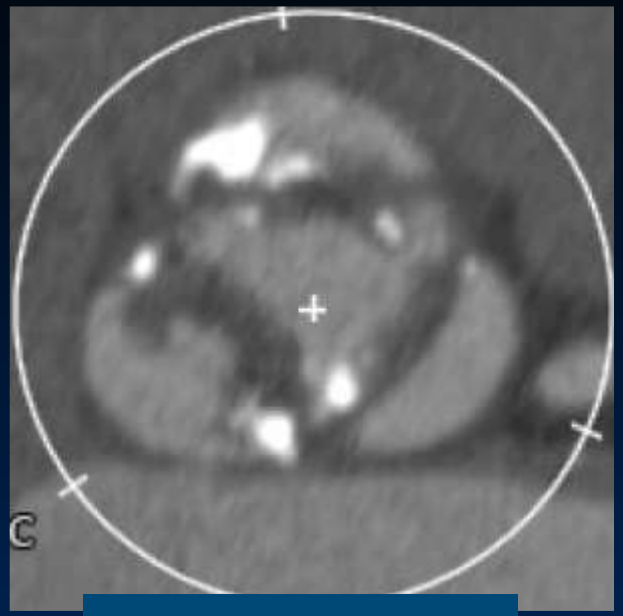
1. Coronary Height ≤ 12 ㎜
2. Narrow Sinus of Valsalva
   SOV / Annulus Ratio (Relation)
3. Leaflet Calcification
4. Leaflet Thickness
5. Length of the Leaflet
6. ST Junction Height

Liesbeth Rosseel, Interv Cardiol. 2020 Apr

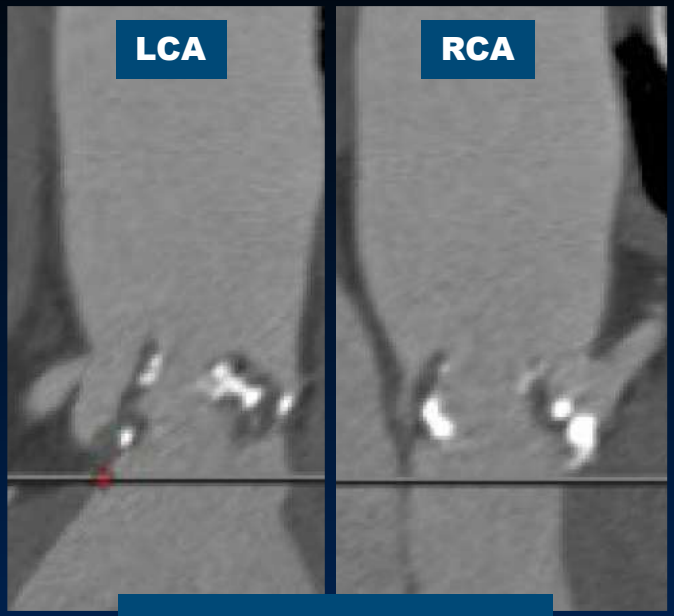
Leaflet Length of Native Valve



Annulus plane



Sinus of Valsalva



Coronary Height

Annulus Size	
Annulus mean diameter	26.4㎜
Annulus area	534㎟
SOV / Annulus Area Ratio	1.84

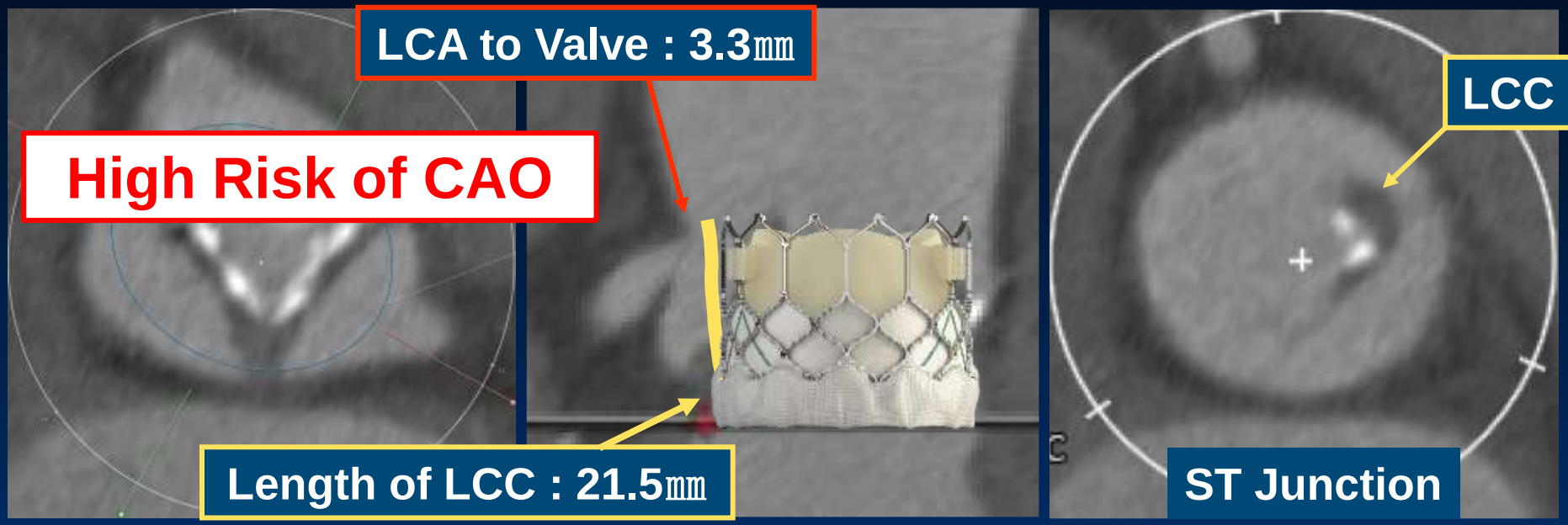
Sinus of Valsalva	
NCC	37.8㎜
LCC	35.5㎜
RCC	34.2㎜

Coronary Height	
LCA	15.3㎜
RCA	15.9㎜

Mean SOV / Annulus Area Ratio **1.86 ± 0.32**
AMC (n=700)

Leaflet Length of Native Valve

Sapien3 29㎜
Virtual Valve: 110% Oversizing



Sinus of Valsalva	
NCC	37.8㎜
LCC	35.5㎜
RCC	34.2㎜

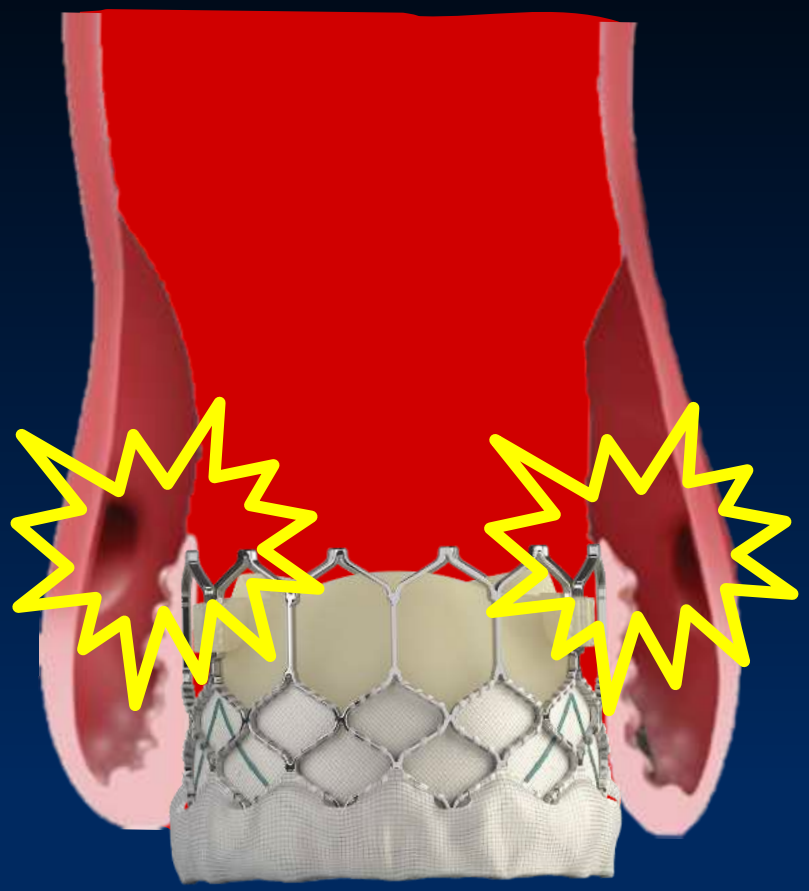
Coronary Height	
LCA	15.3 mm

Risk Factor of Coronary Obstruction
Device & Pre-procedure Plan

- Transcatheter Heart Valve(THV) Design
- THV Skirt Height
- THV Commissural Post
- THV Implanted Depth
- THV Oversizing

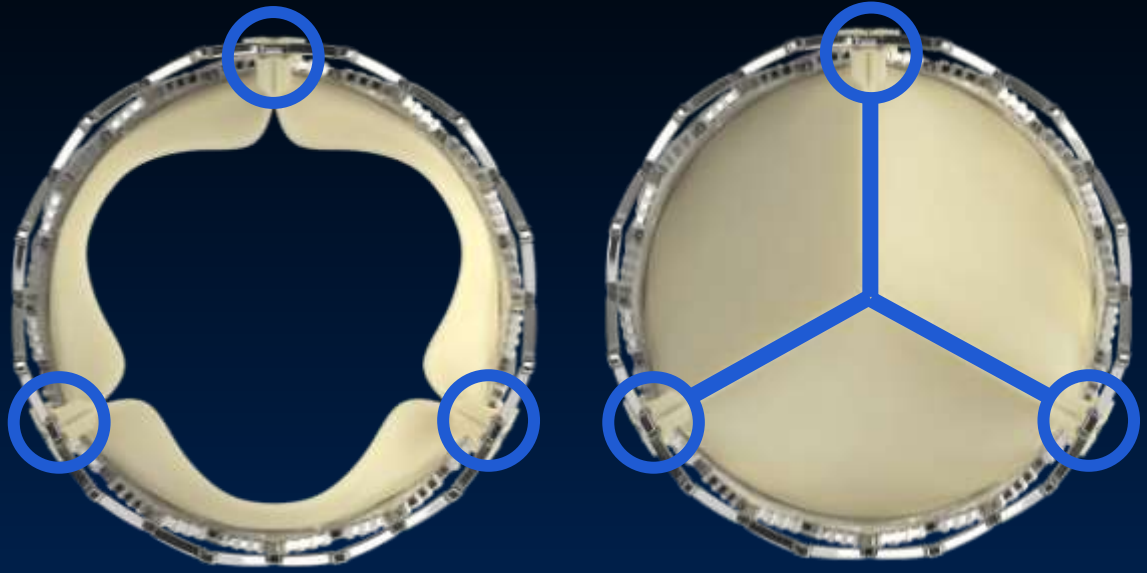
THV Valve Design

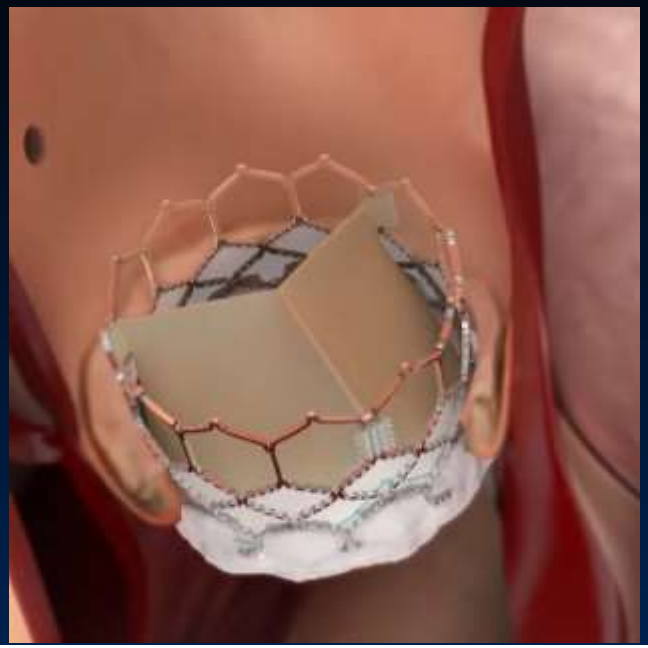
Medtronic Evolut R / Pro
Self-expandable Valve

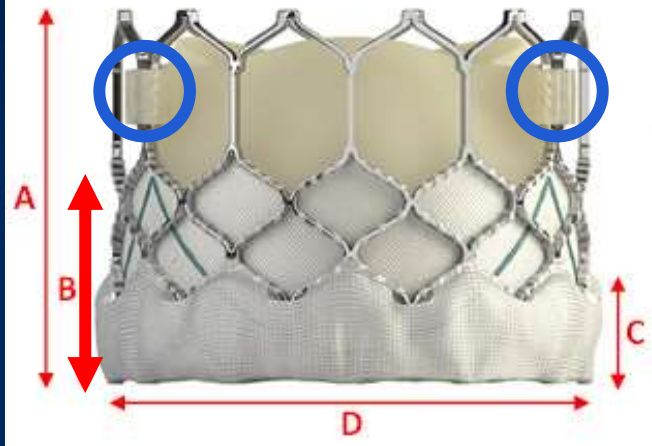


Edwards Sapien 3
Balloon-expandable Valve

Edwards Sapien 3 Valve

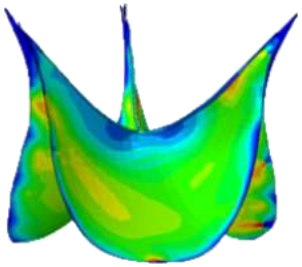


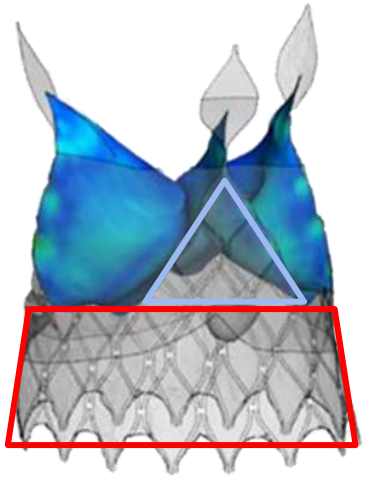


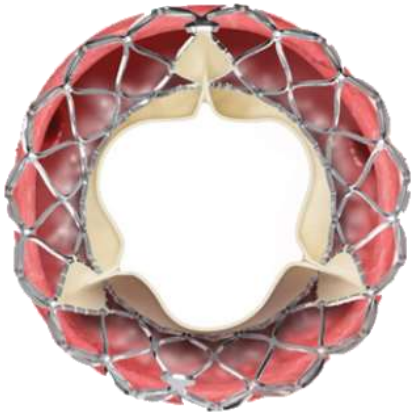


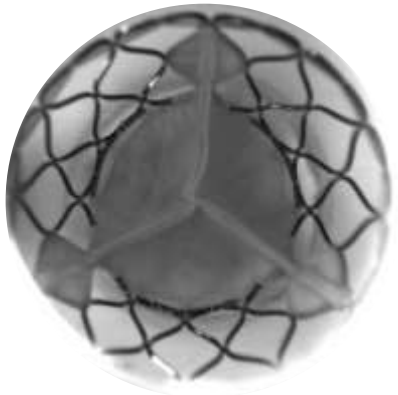
	20 mm	23 mm	26 mm	29 mm
A. Frame Height	15.5 mm	18.0 mm	20.0 mm	22.5 mm
B. Inner Skirt Height	7.9 mm	9.3 mm	10.2 mm	11.6 mm
C. Outer Skirt Height	5.2 mm	6.6 mm	7.0 mm	8.1 mm

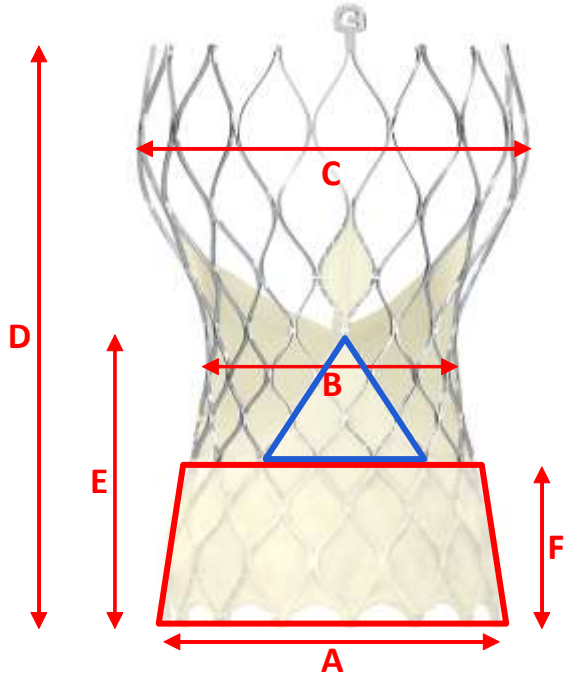
Medtronic Core Evoult - R & Pro









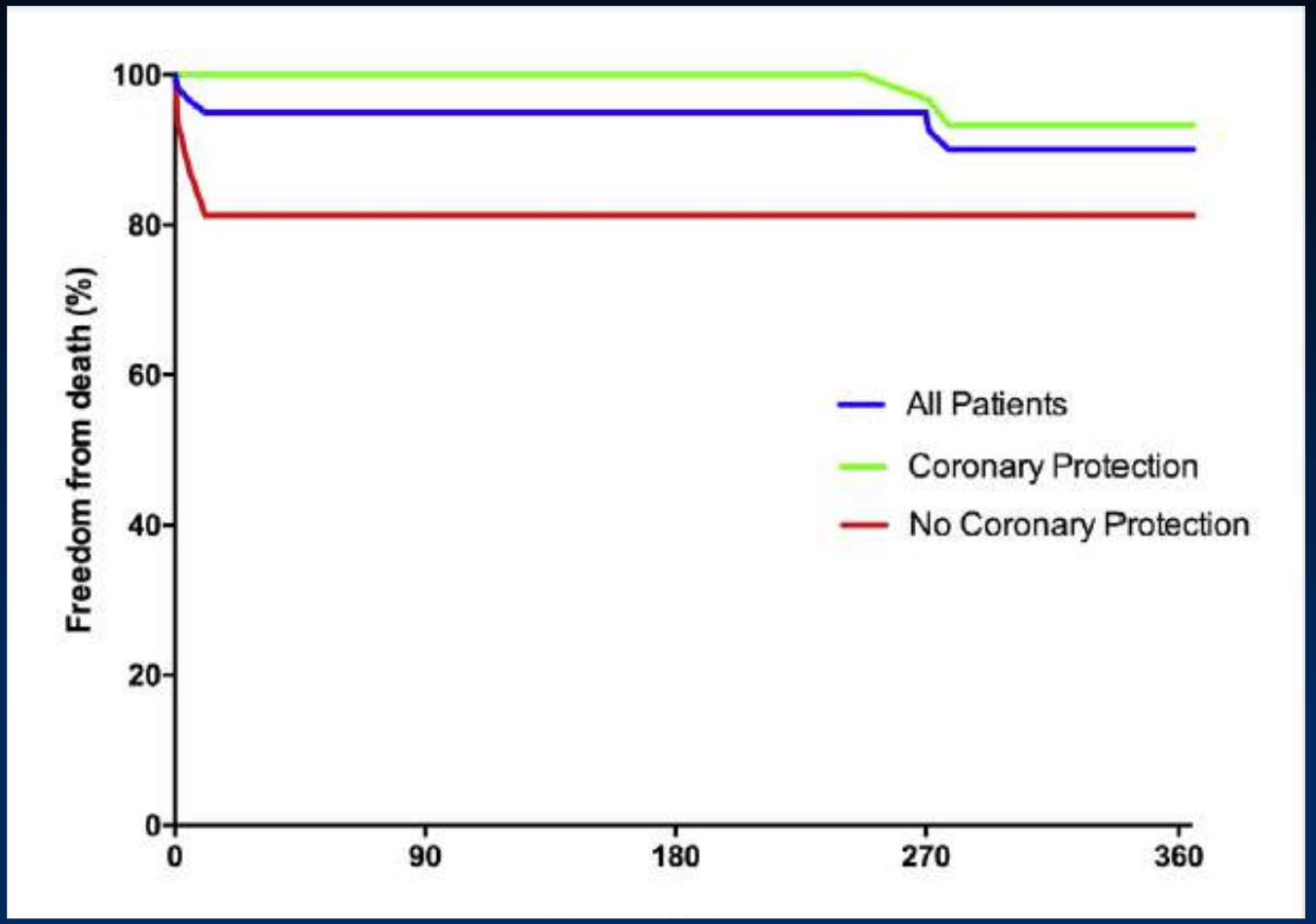


	23 mm R / PRO	26 mm R / PRO	29 mm R / PRO	34 mm R
A. Inflow Diameter	23 mm	26 mm	29 mm	34 mm
B. Waist Diameter	20 mm	22 mm	23 mm	24 mm
C. Outflow Diameter	34 mm	32 mm	34 mm	38 mm
D. Frame Height	45 mm	45 mm	45 mm	46 mm
E. Commissure Height	26 mm	26 mm	26 mm	26 mm
F. Outer Skirt Height	13 mm	13 mm	13 mm	14 mm

Managing the Risk of Coronary Occlusion During TAVR

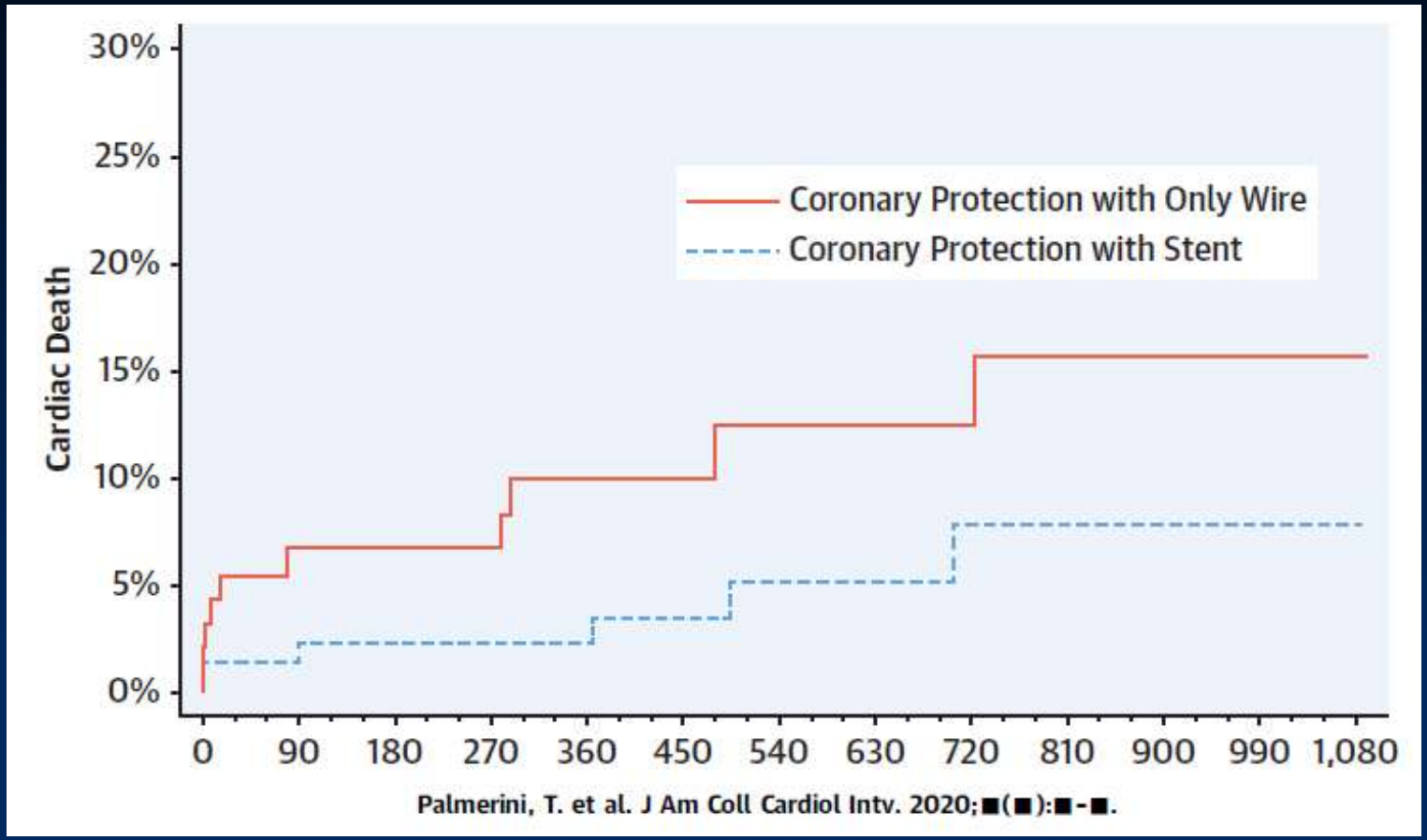
Prevention is the Best Treatment

Upfront Coronary Artery Protection



Mercanti, F. et al. J Am Coll Cardiol Intv. 2020;13(6):751–61.

Coronary Protection with Stent
Better than Only Wire

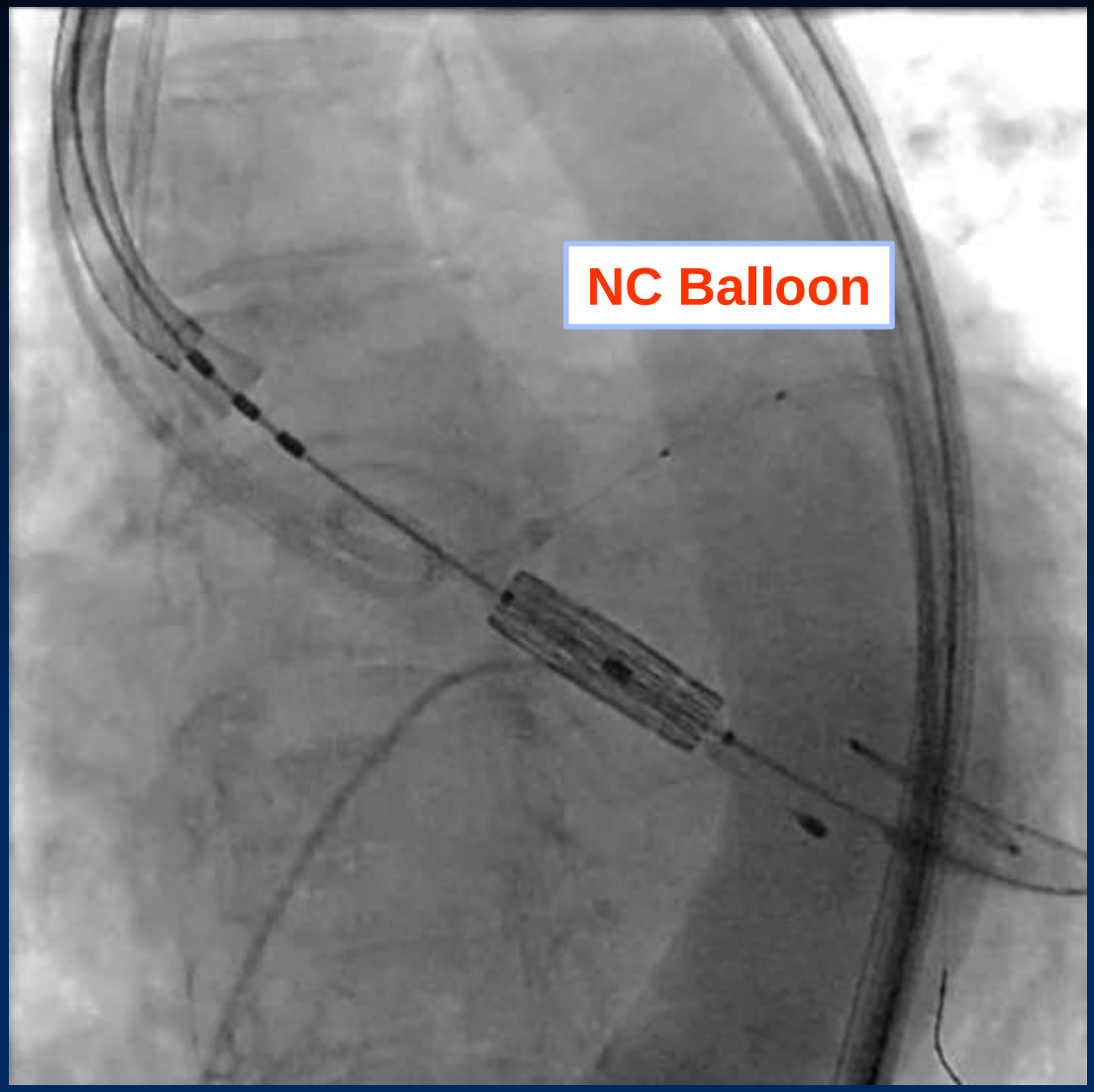


Chimney Stenting for Coronary Protection

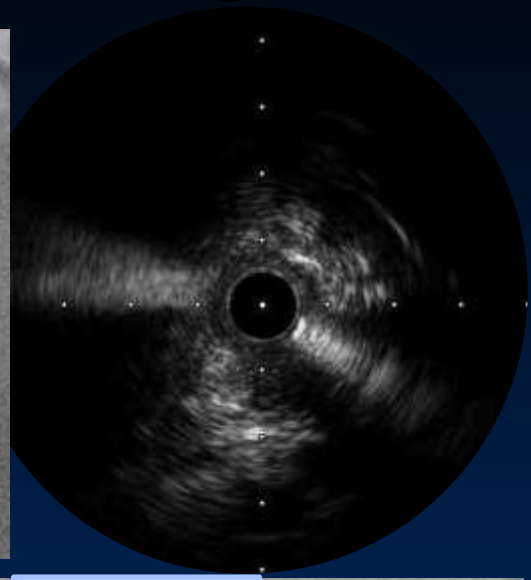
Easy to Perform

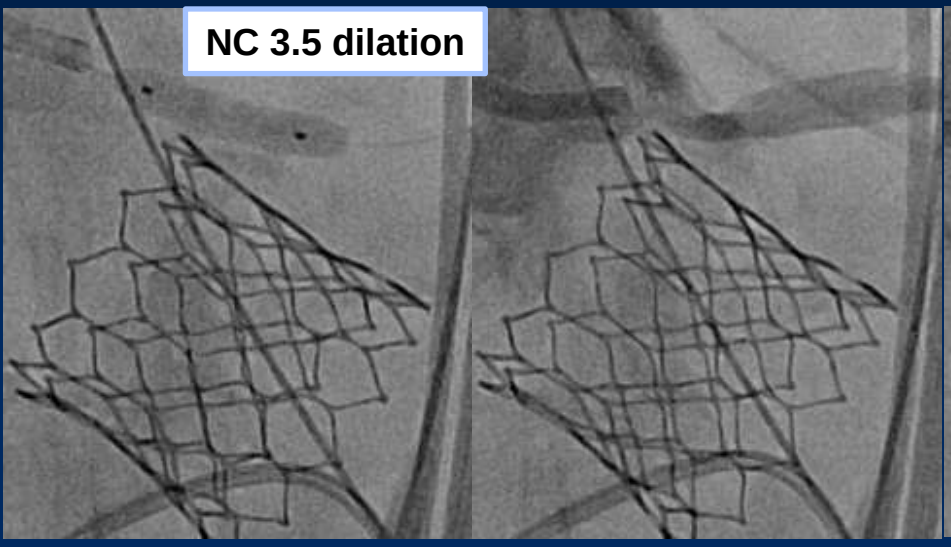
Provisional Strategy Chimney Stenting

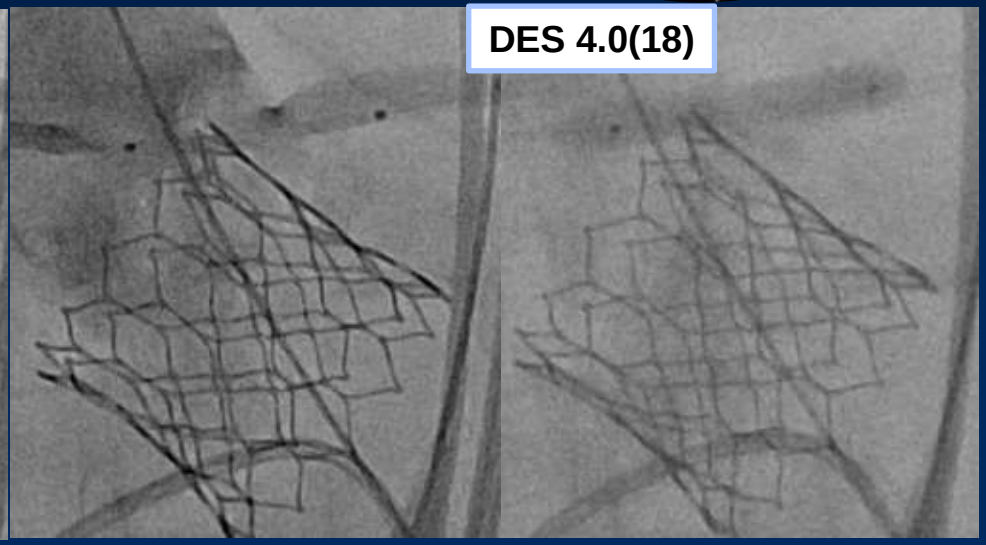
Coronary Protection with NC Balloon



Coronary Obstruction : AMC Case I
Provisional Strategy Chimney Stenting

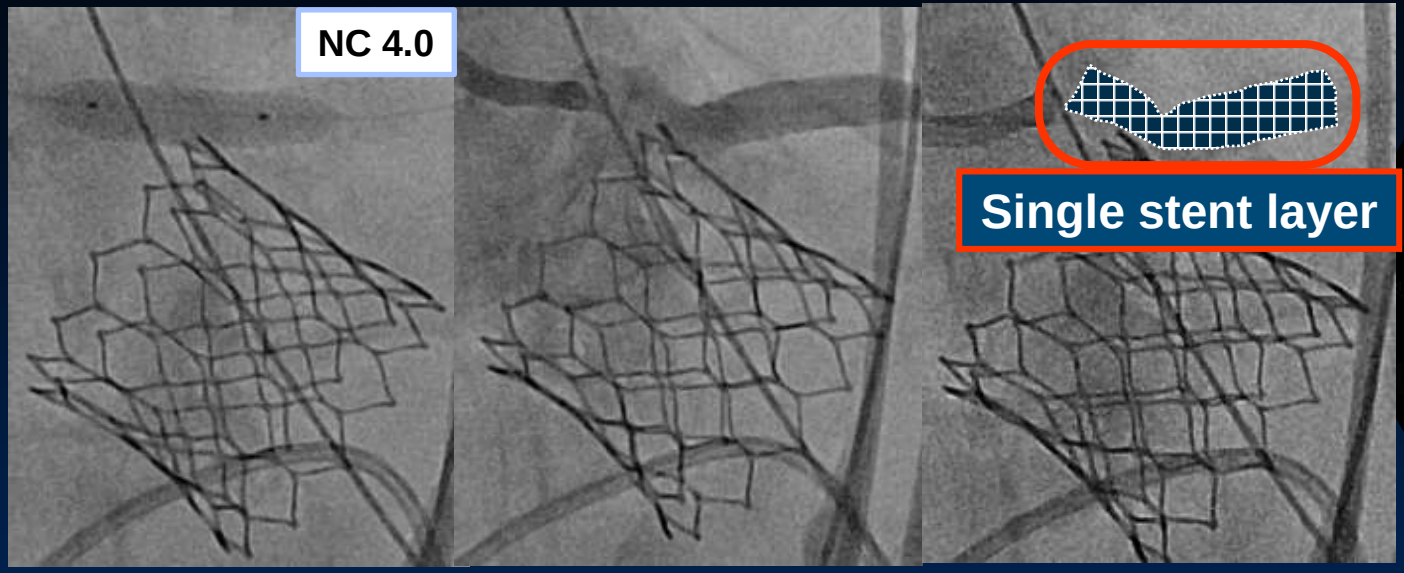


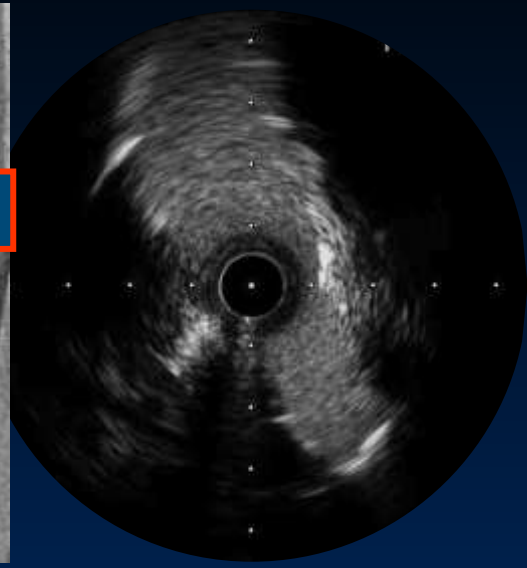


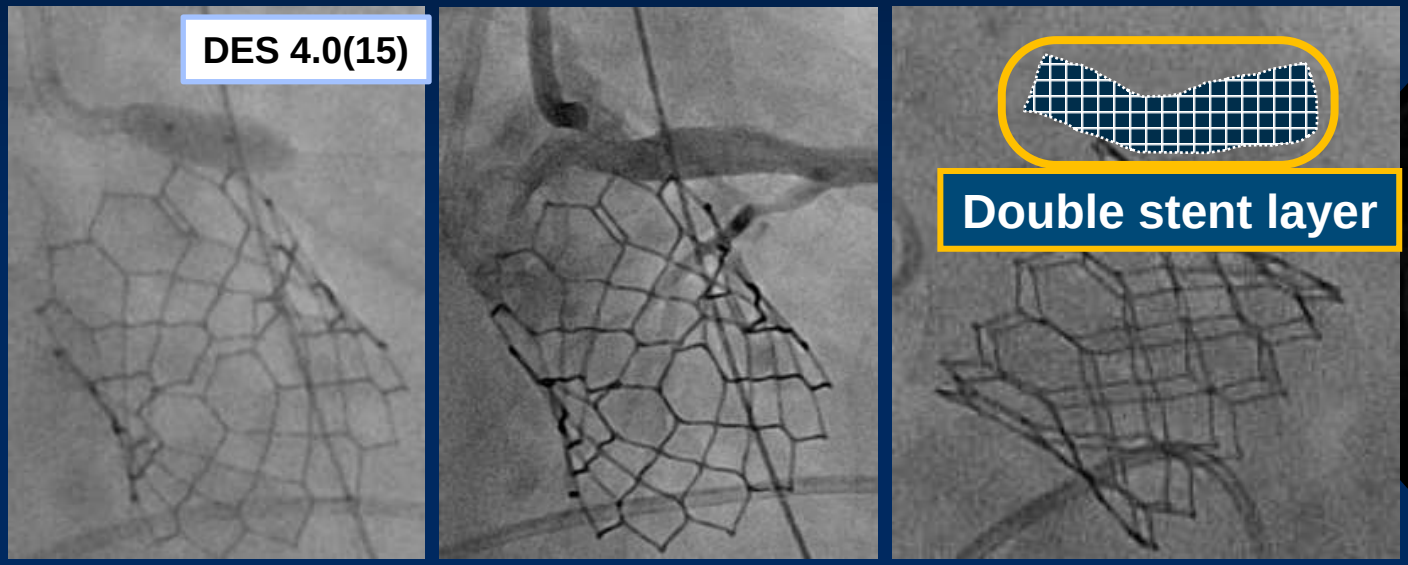


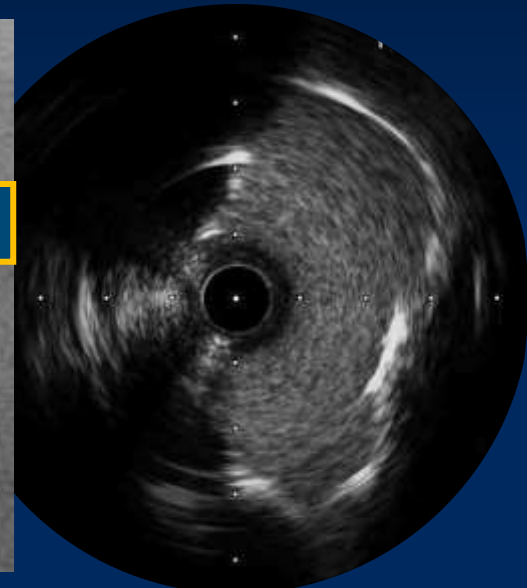
Coronary Obstruction : AMC Case I

Provisional Strategy Chimney Stenting









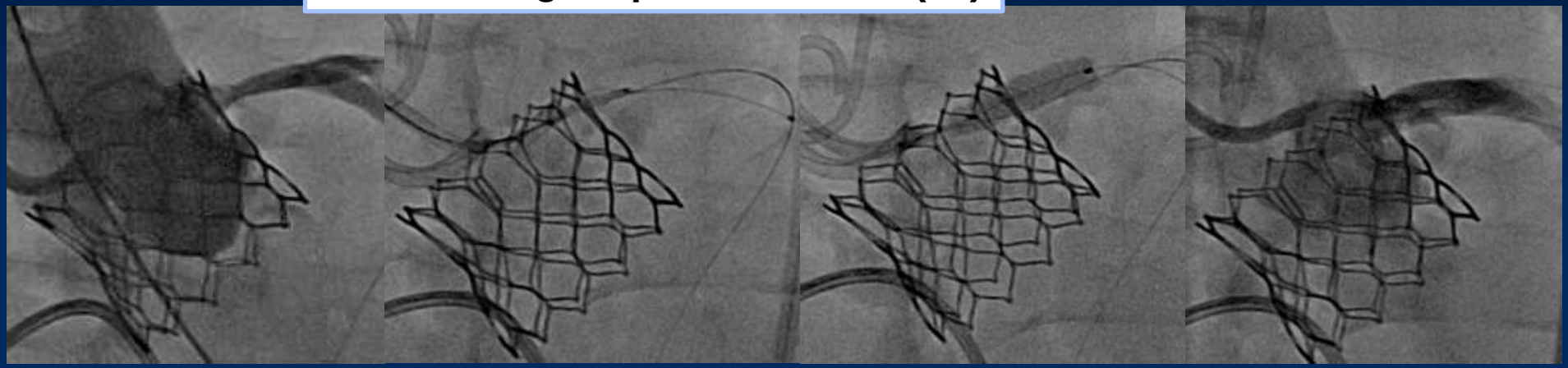
Limitation of Chimney Technique

- Compression of coronary stent by the THV
- Higher Risk of Stent Thrombosis
- Need for lifelong DAPT
- Unfavorable Coronary Reaccess (Extremely Challenging)
- Potential Disadvantage : Stent Jailing, Dislodged Stent

Coronary Obstruction : AMC Case II

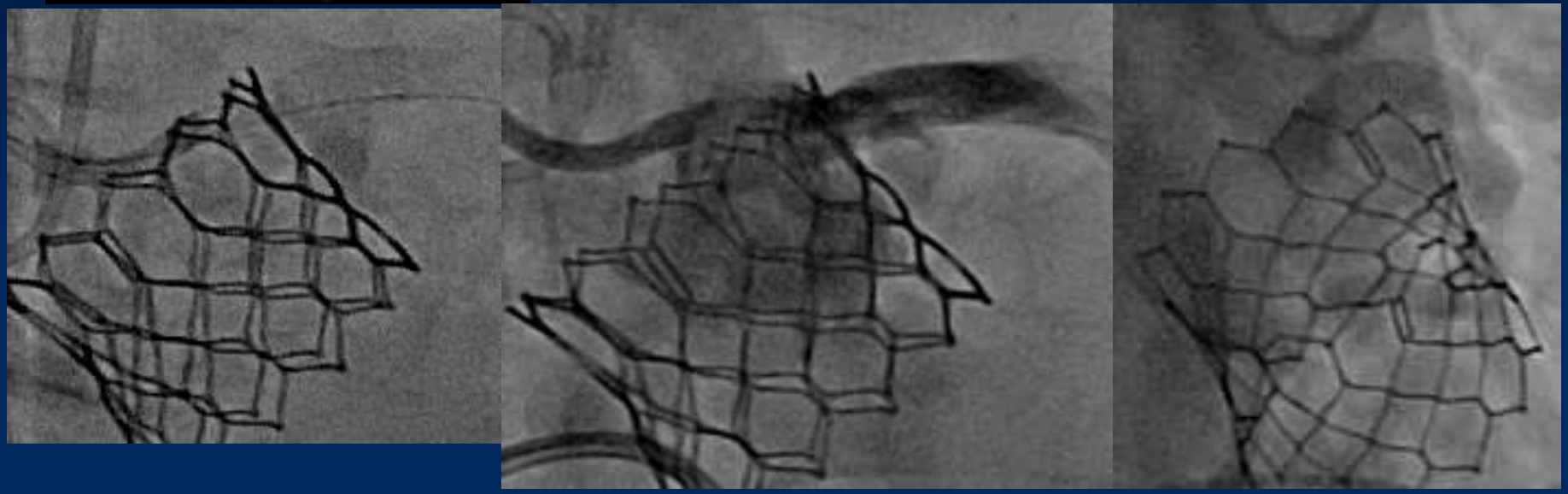
Stent through top cell

Stent through top cell : DES 4.0(15)



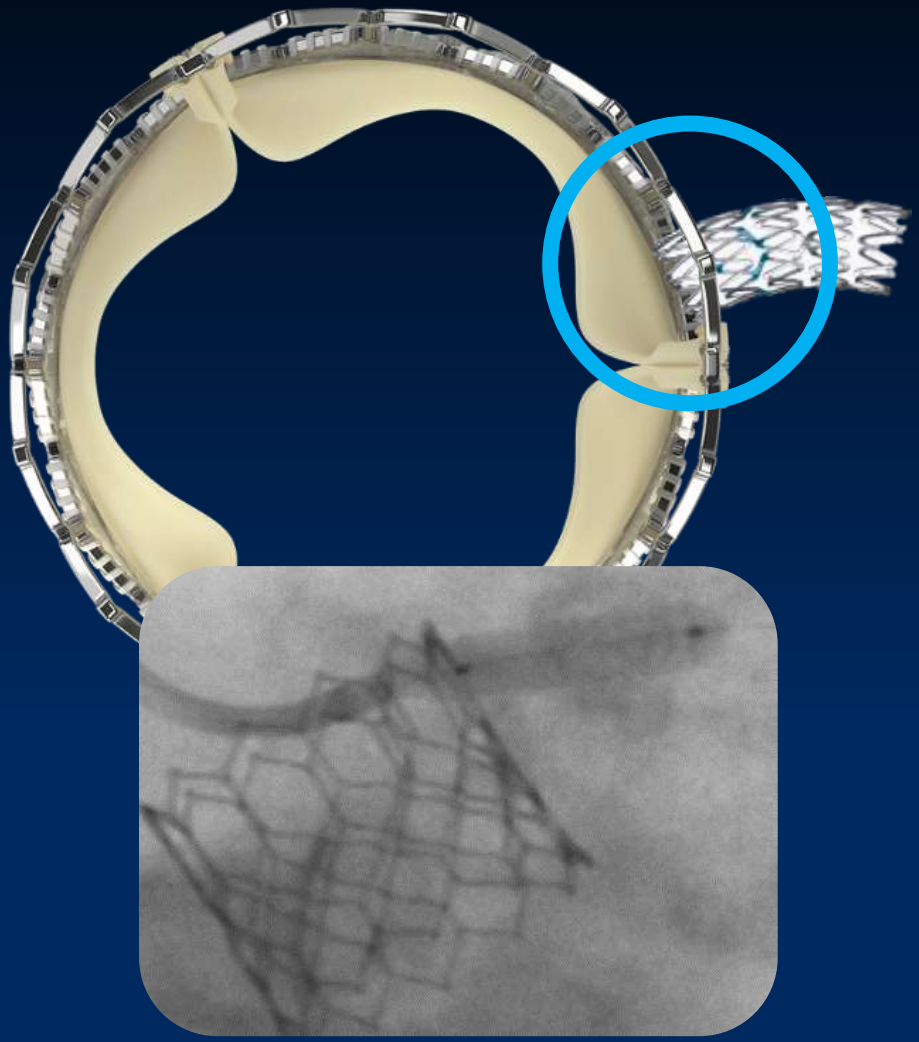
Coronary Obstruction : Case II

Stent through top cell



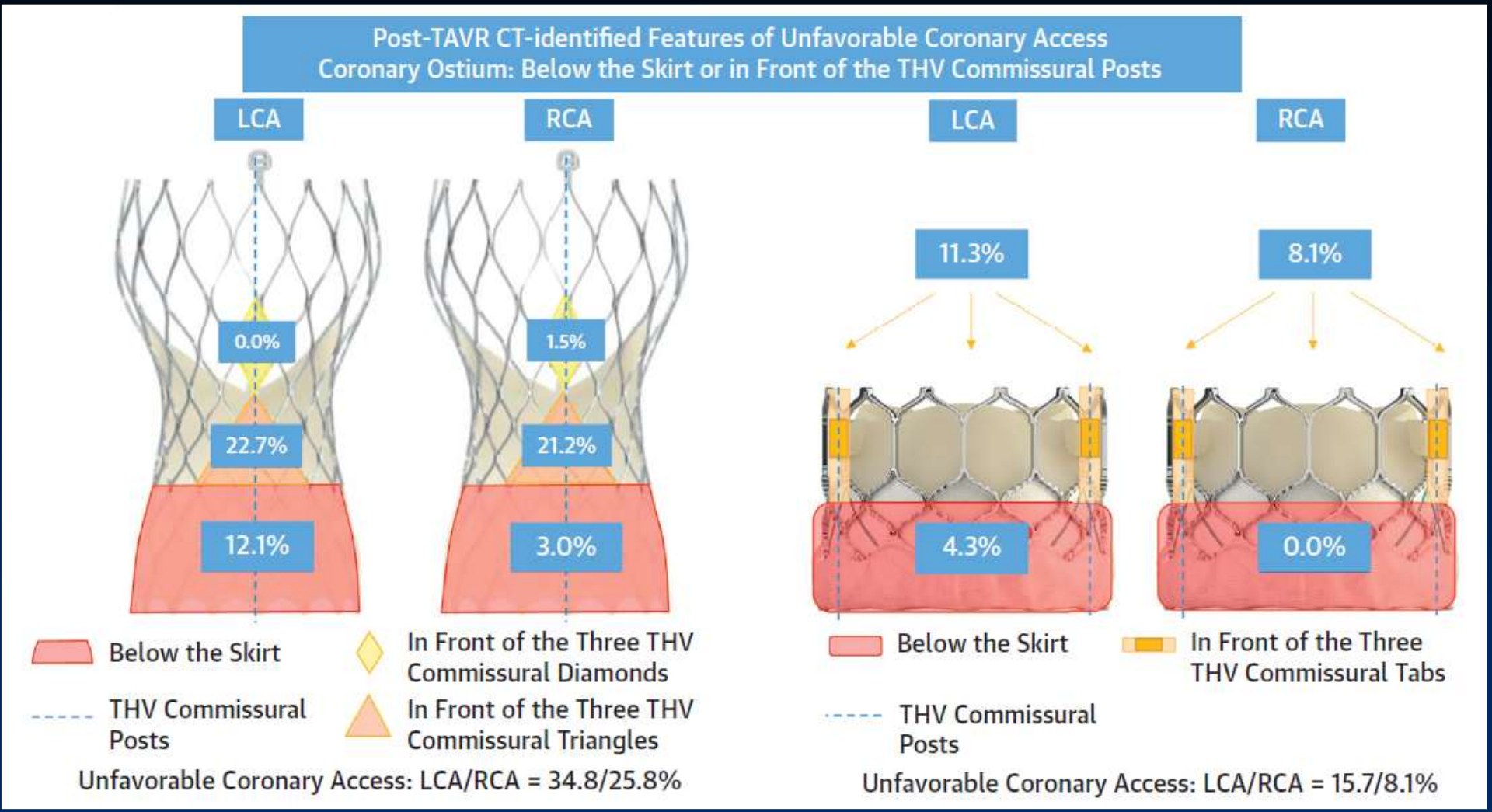
Minimal Protrusion T Stenting

Stent through top cell



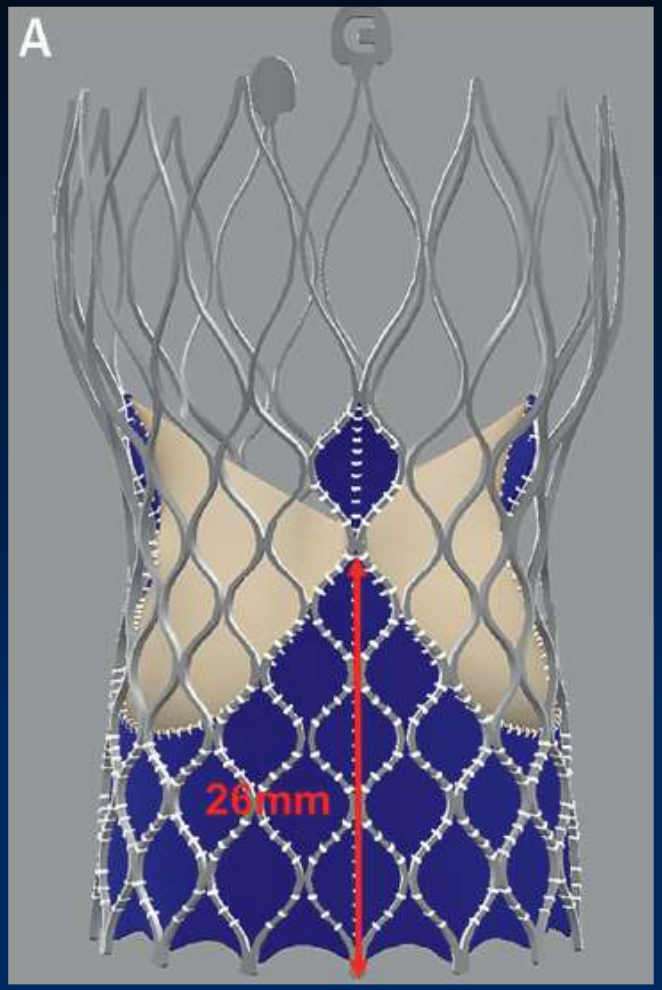
Unfavorable Interaction
THV Leaflet Damage

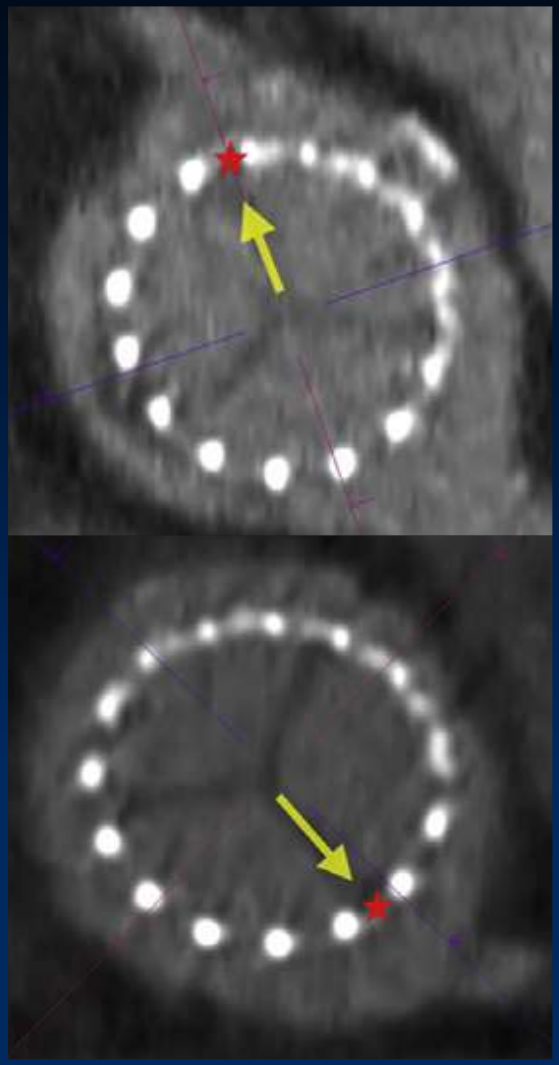
CT-Identified Features of Unfavorable Coronary Access After TAVR

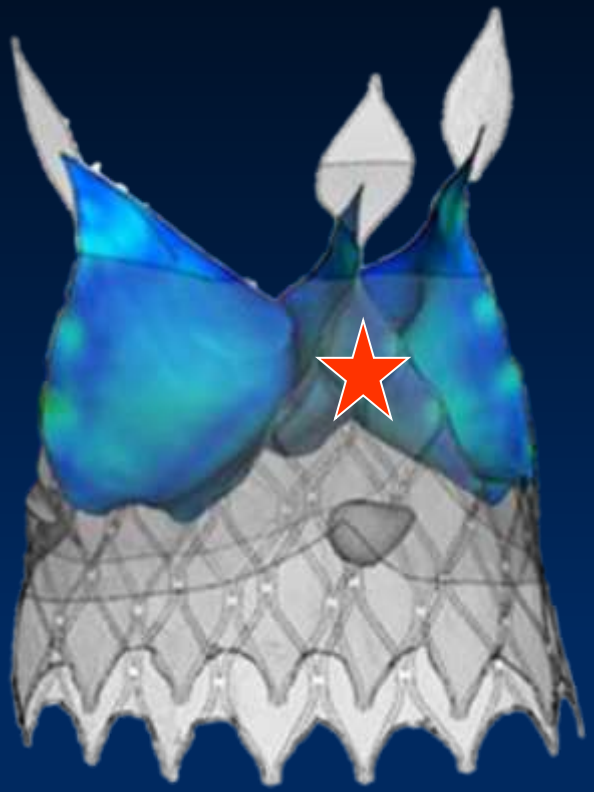


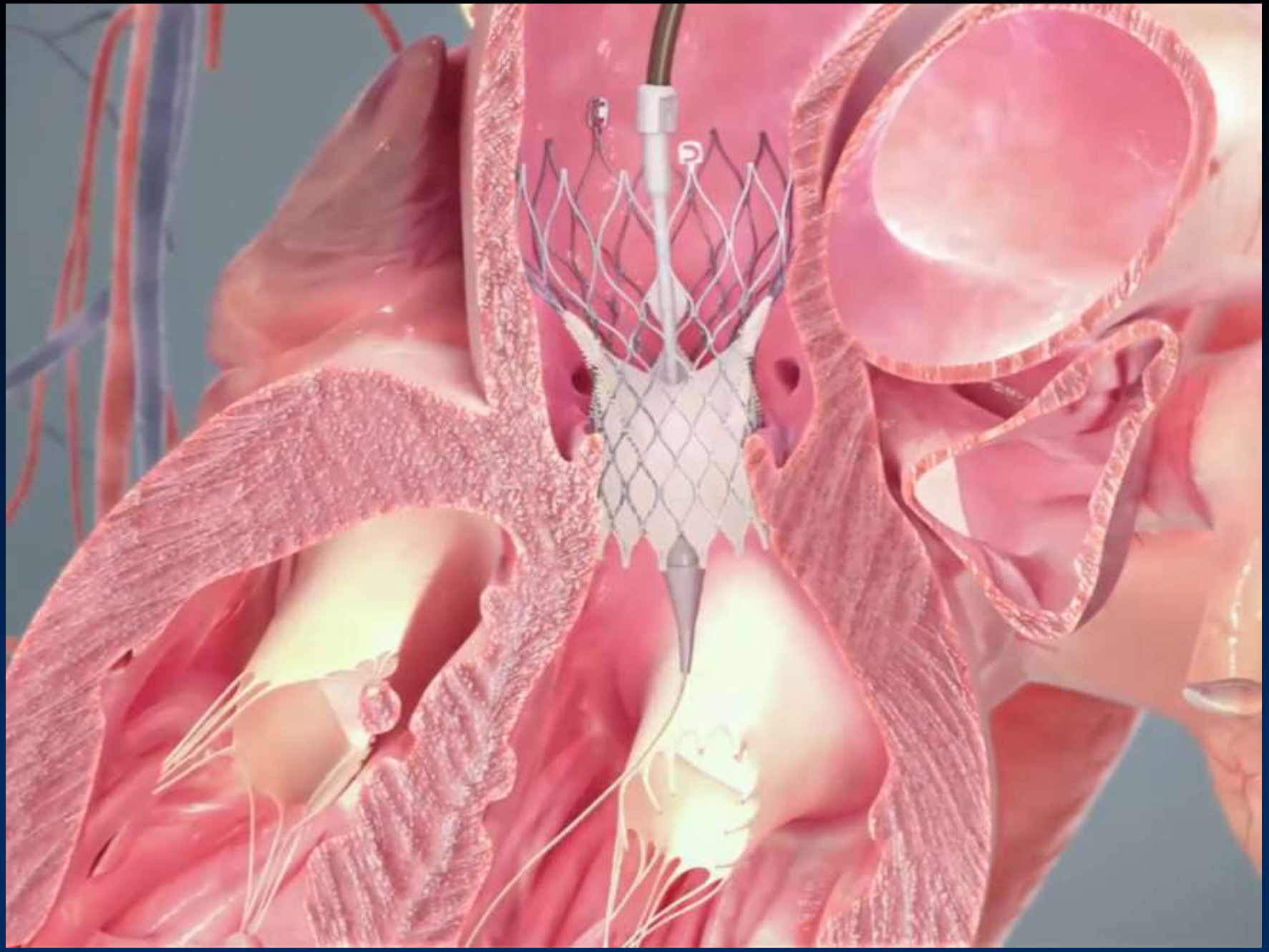
Ochiai, T. et al. J Am Coll Cardiol Intv. 2020;13(6):693–705.

Coronary access depend on Location of Commissural Post



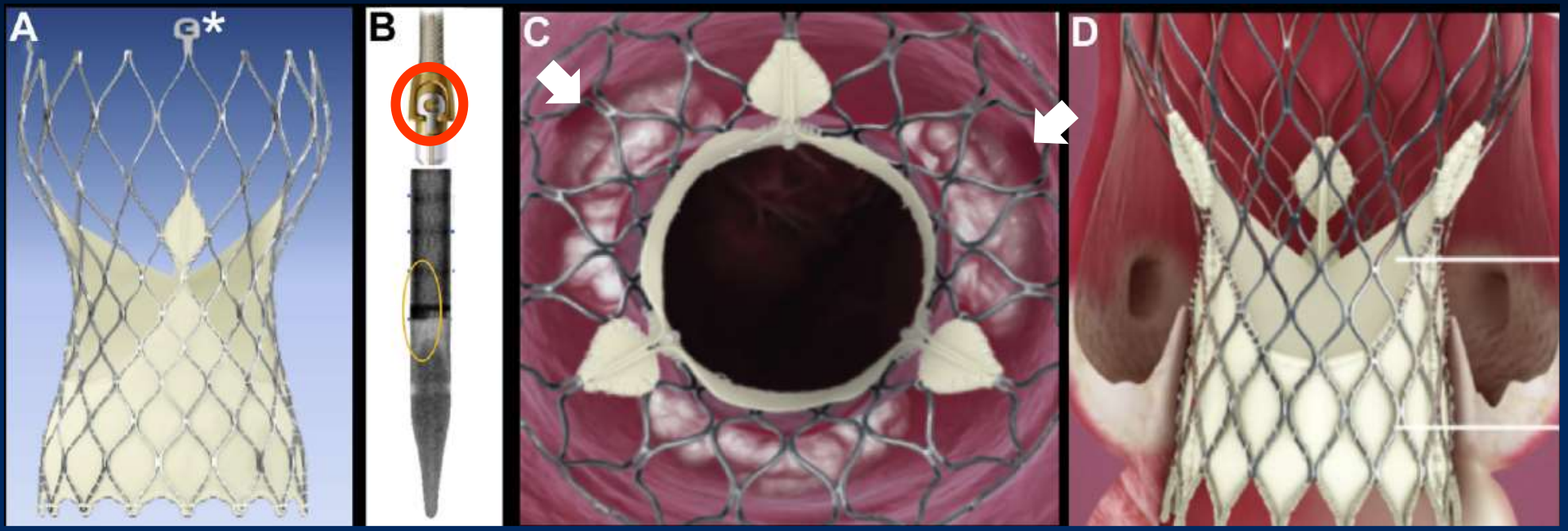






Hat-Marker Orientation to Minimize Neo-Commissural Overlap With Coronaries During CoreValve Evolut Transcatheter Aortic Valve Replacement

Enrico Fabris, MD, PhD,[a] Giancarlo Vitrella, MD,[a] Serena Rakar, MD,[a] Andrea Perkan, MD,[a] Francesco Bedogni, MD,[b] Gianfranco Sinagra, MD[a]



Fabris et al. JACC : INT, 2020 Hat-Marker Orientation During CoreValve Evolut Deployment

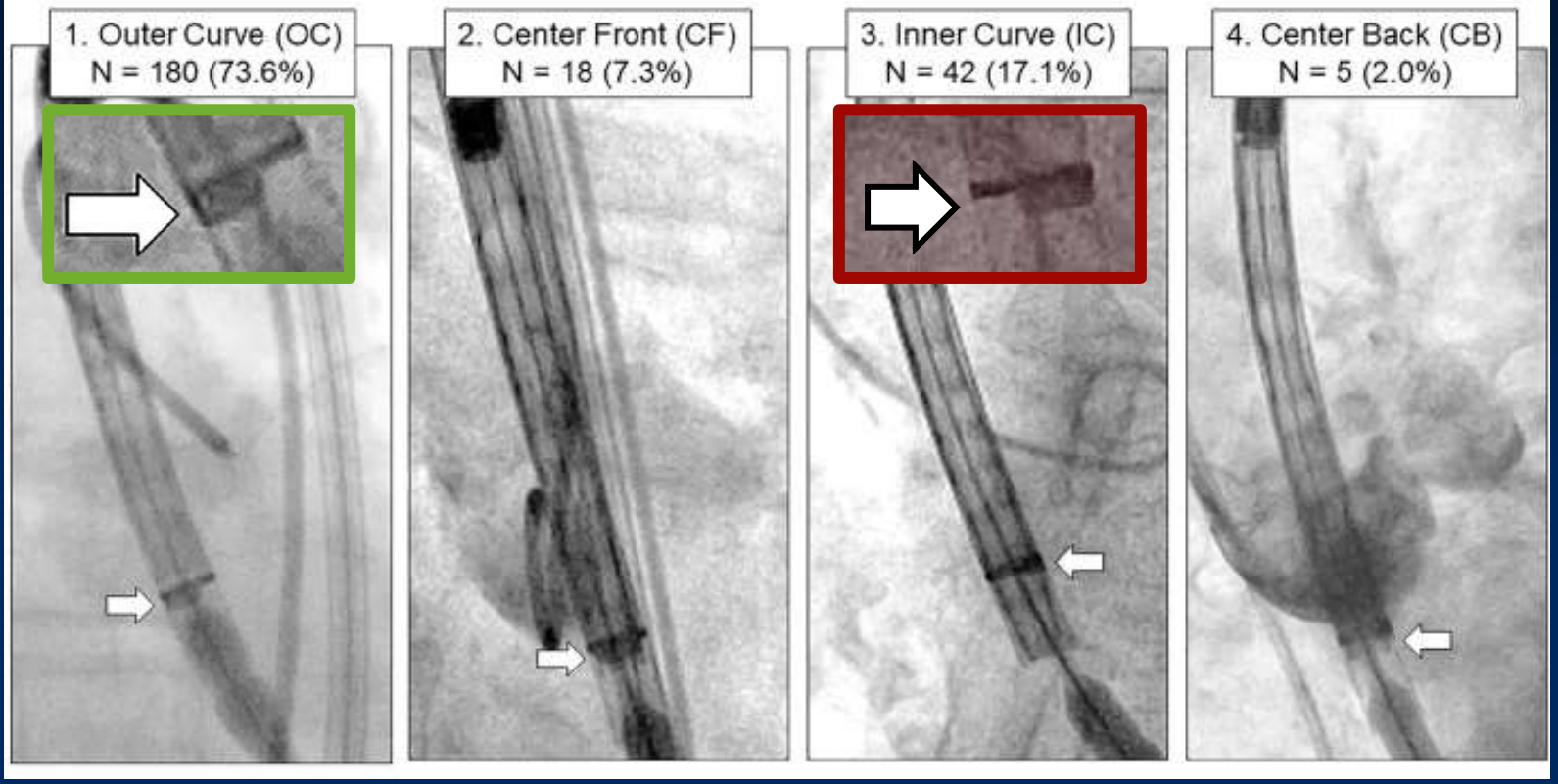
Alignment of Transcatheter Aortic-Valve Neo-Commissures (ALIGN TAVR)

Impact on Final Valve Orientation and Coronary Artery Overlap

Gilbert H.L. Tang, MD, MSc, MBA,[a] Syed Zaid, MD,[b] Andreas Fuchs, MD, PhD,[c] Tsuyoshi Yamabe, MD,[d]

Evolut-R : 245 patients

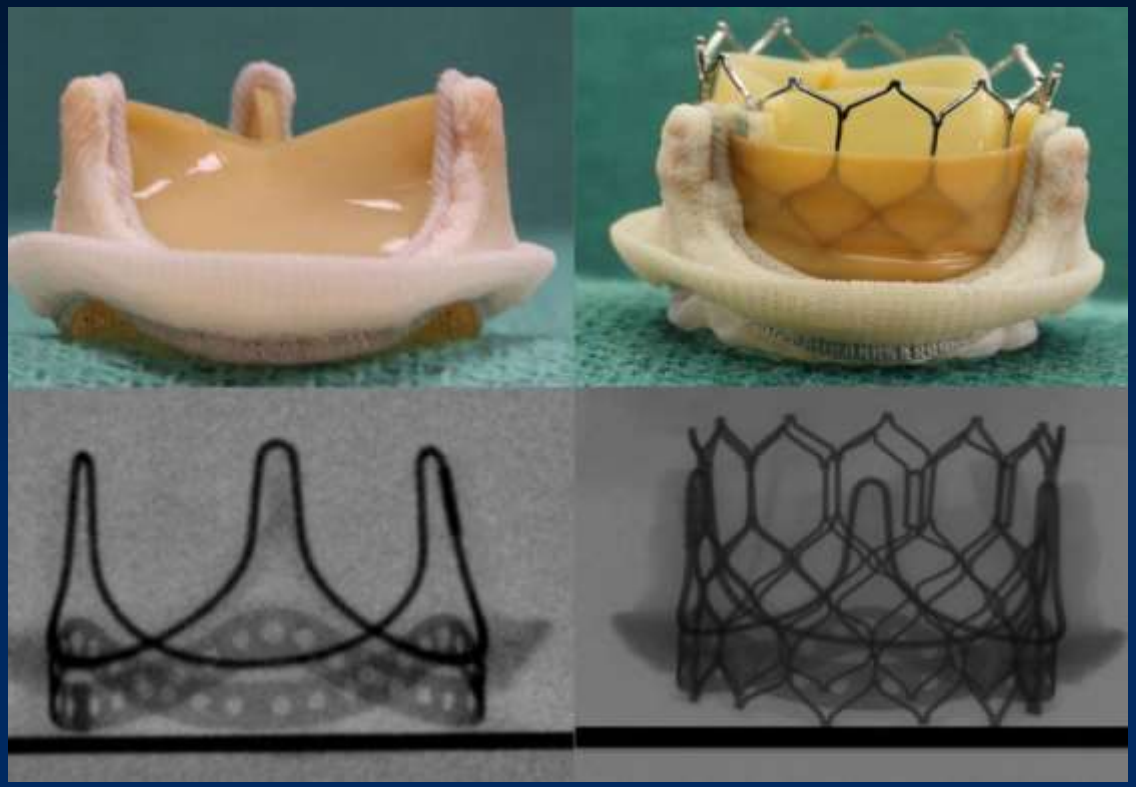
Evolut Capsule "Hat" Orientation at Initial Deployment



Coronary Obstruction : ViV

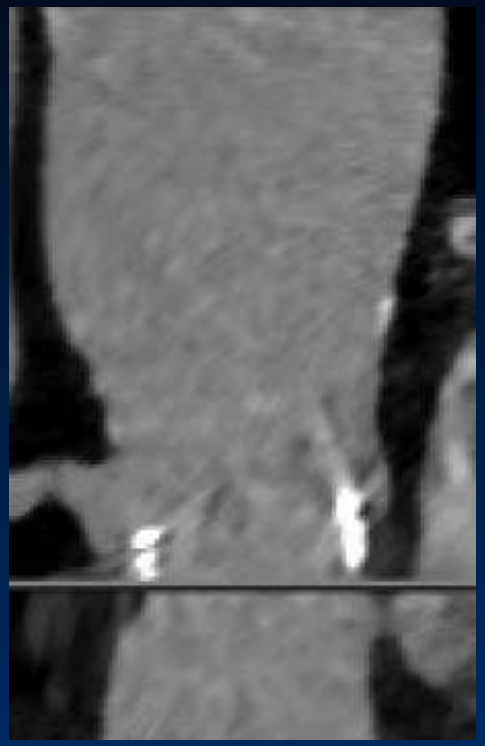
VIV for CE Perimount 19 mm

- Compatible with Sapien 3 20 mm, Evolut R not recommended
- S3 15% (2.6mm) below the lowest visible margin of the surgical valve stent

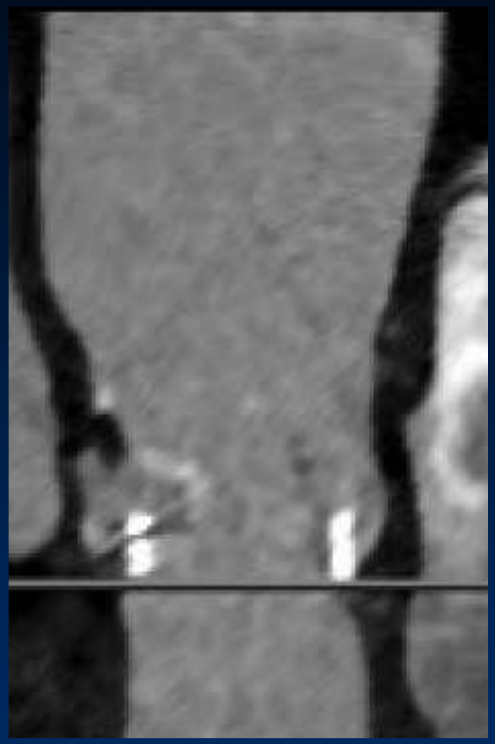


Coronary Obstruction : ViV

LCA

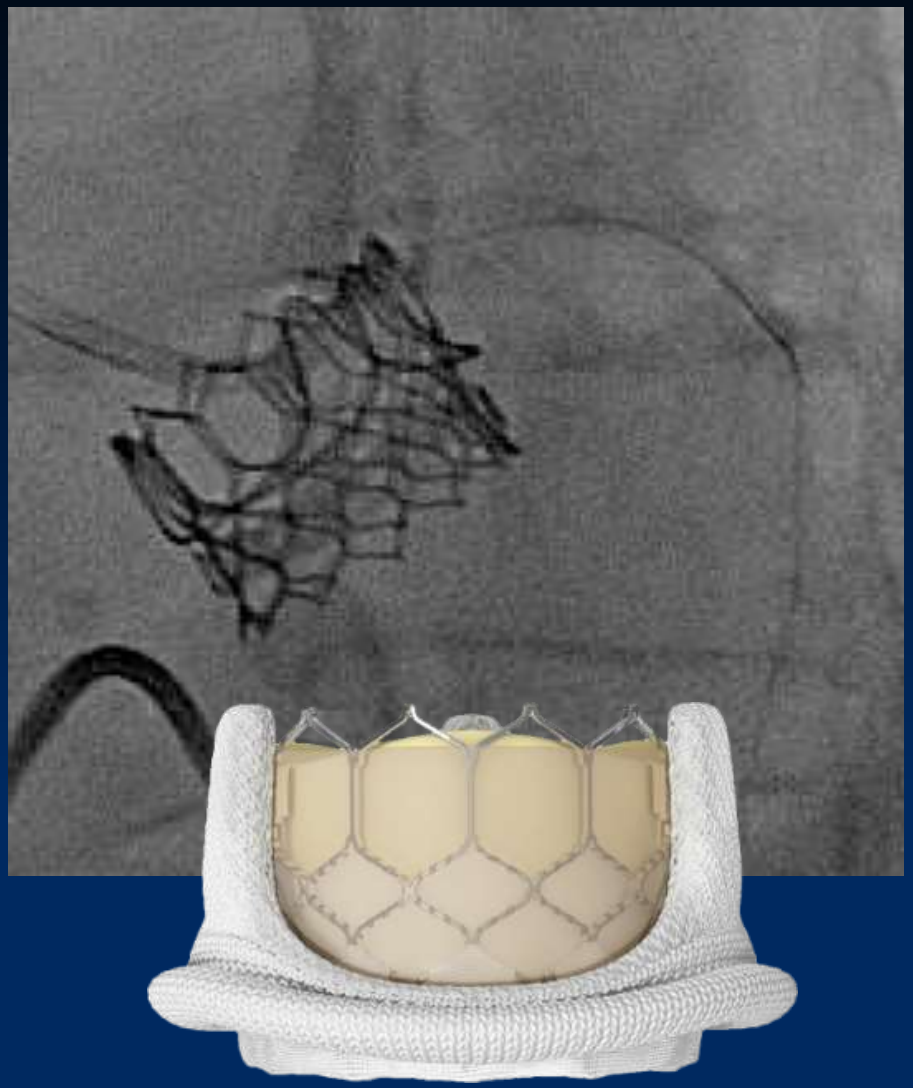


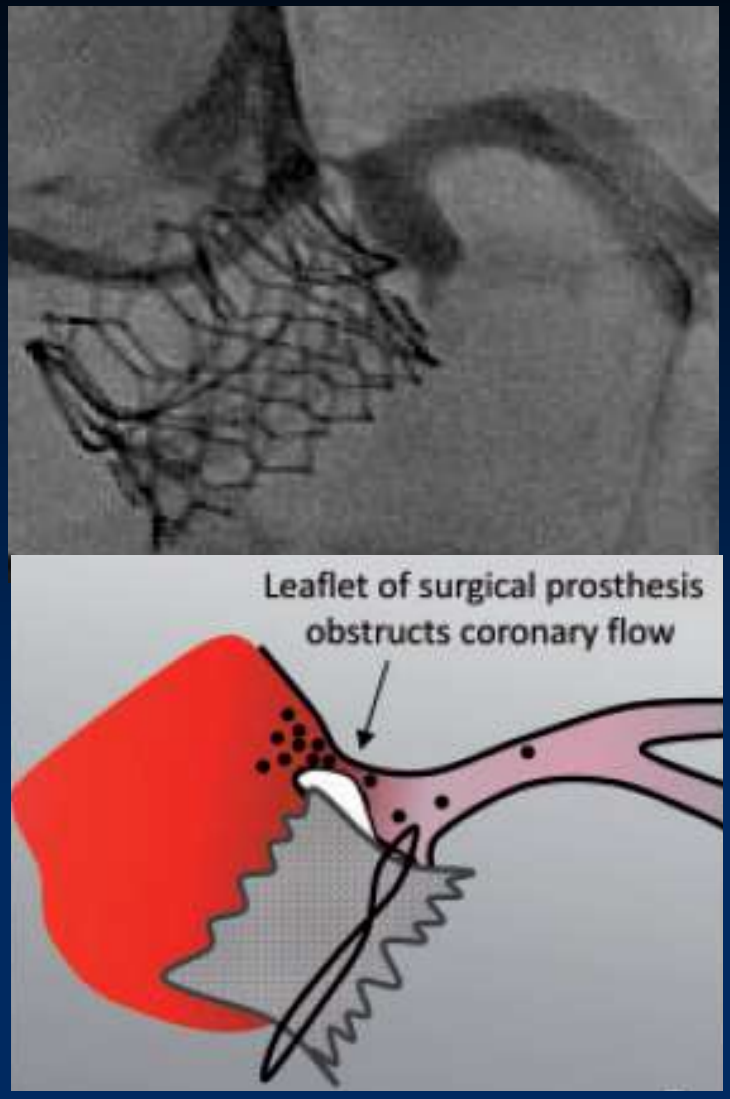
RCA



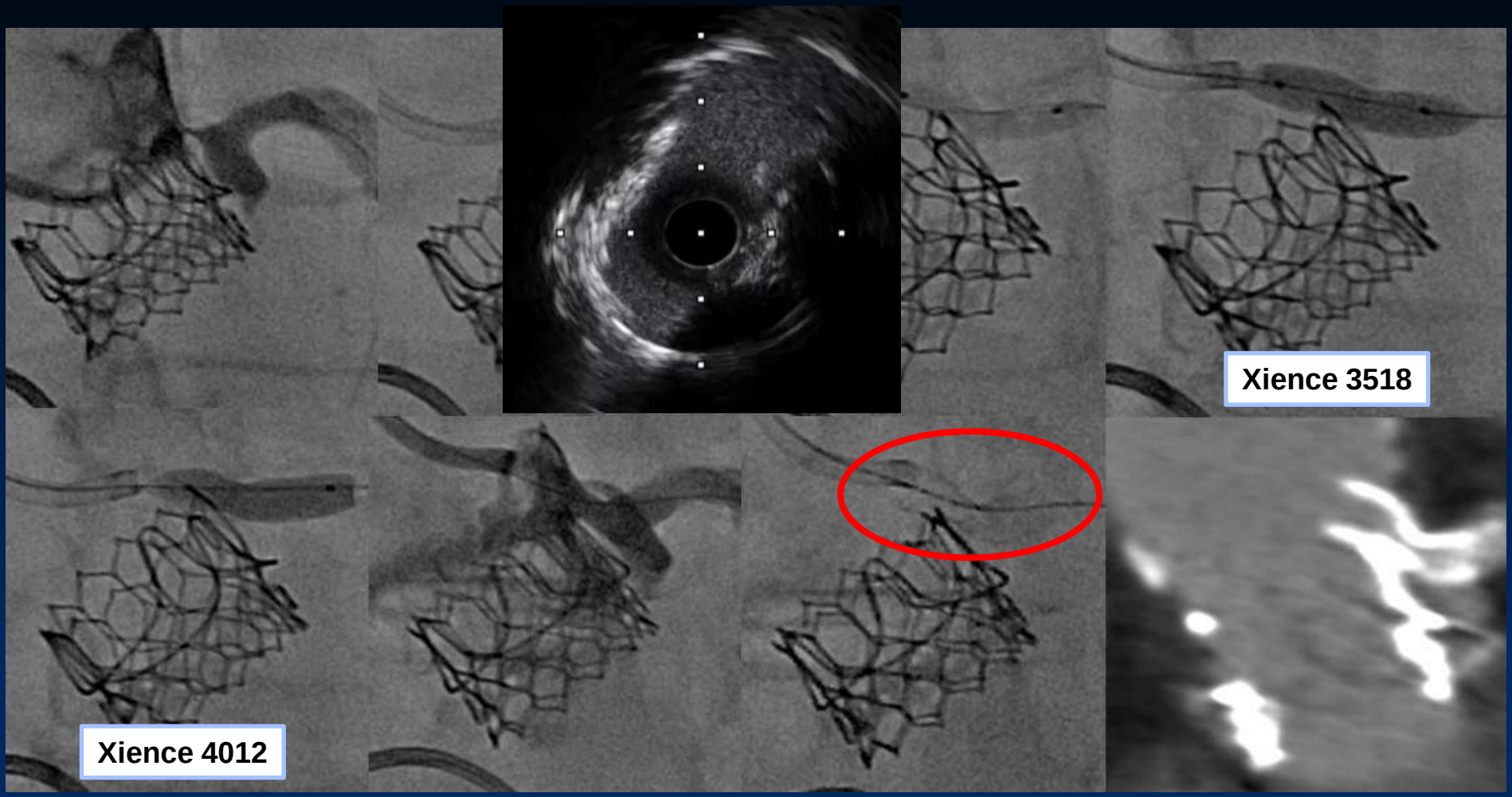
Coronary Height	
LCA	6.8 mm
RCA	8.8 mm

Leaflets of surgical prosthesis obstructs coronary flow

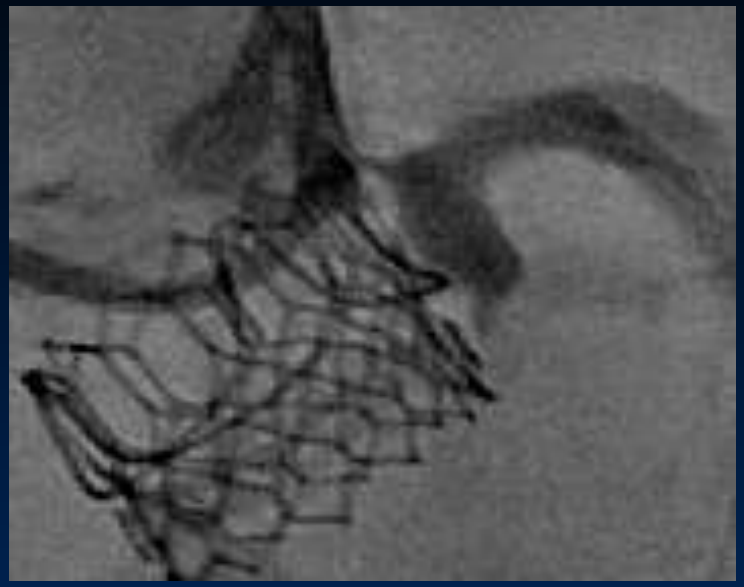


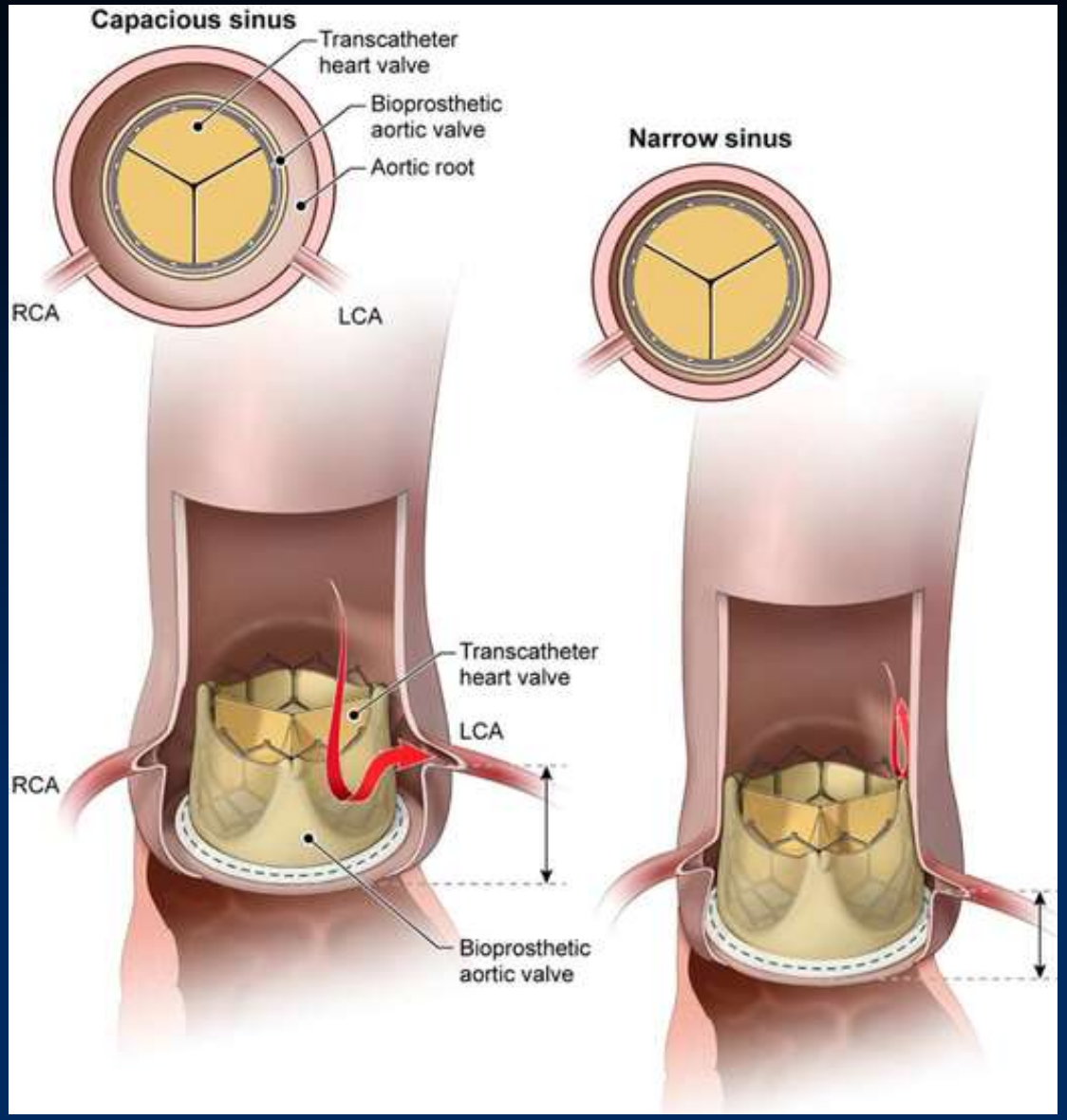


Coronary Obstruction : ViV

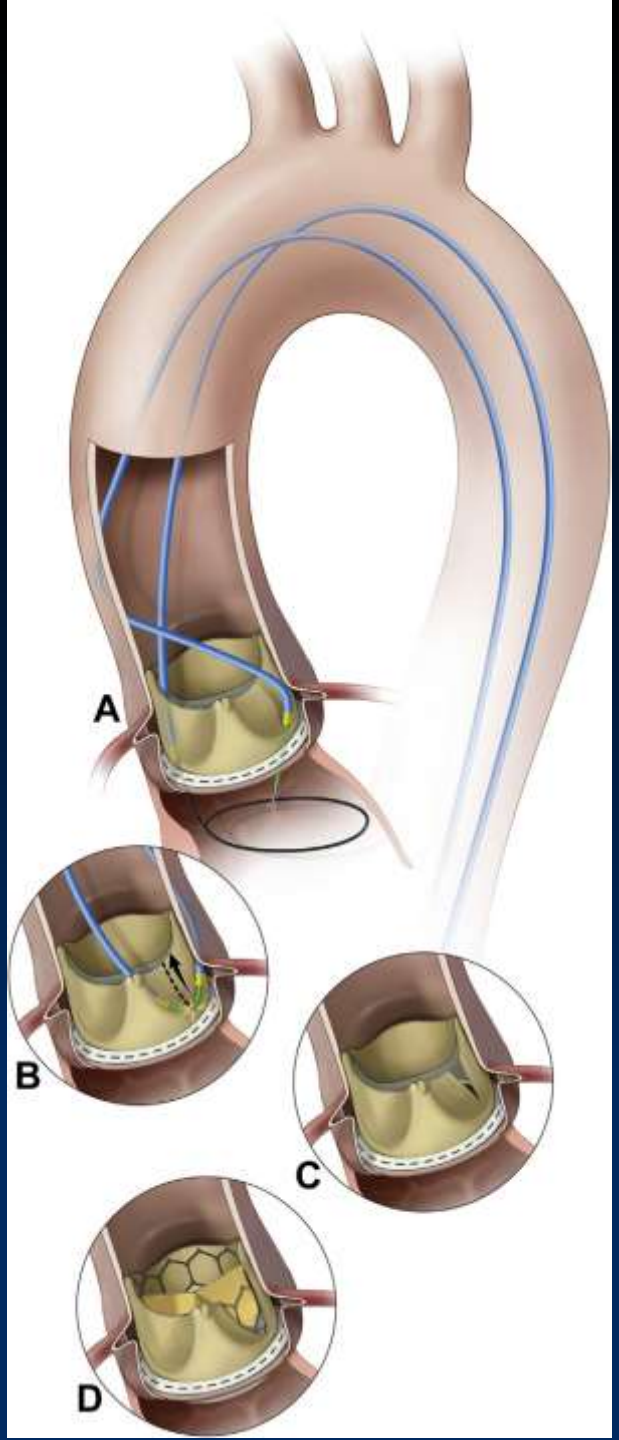


Leaflet Laceration





BASILICA : Bioprosthetic Aortic Scallop Intentional Laceration to prevent Iatrogenic Coronary Artery obstruction



Technically Challenging

Summary:
How To Optimize S3 Implantation for future coronary access

- Coronary height should be also considered to decide target implantation depth.
- Upfront coronary protection(pre-emptive coronary protection) should be consideration in patients at high risk for CAO.
- Chimney stenting during TAVR is an important bailout technique for the treatment of acute CAO, but long-term performance remains unclear.
- If stented, minimal stent protrusion may facilitate reaccess and reduce the risk of stent thrombosis and compression.
- BASILICA is to lacerate aortic leaflets that otherwise threaten to obstruct a coronary artery during TAVR.