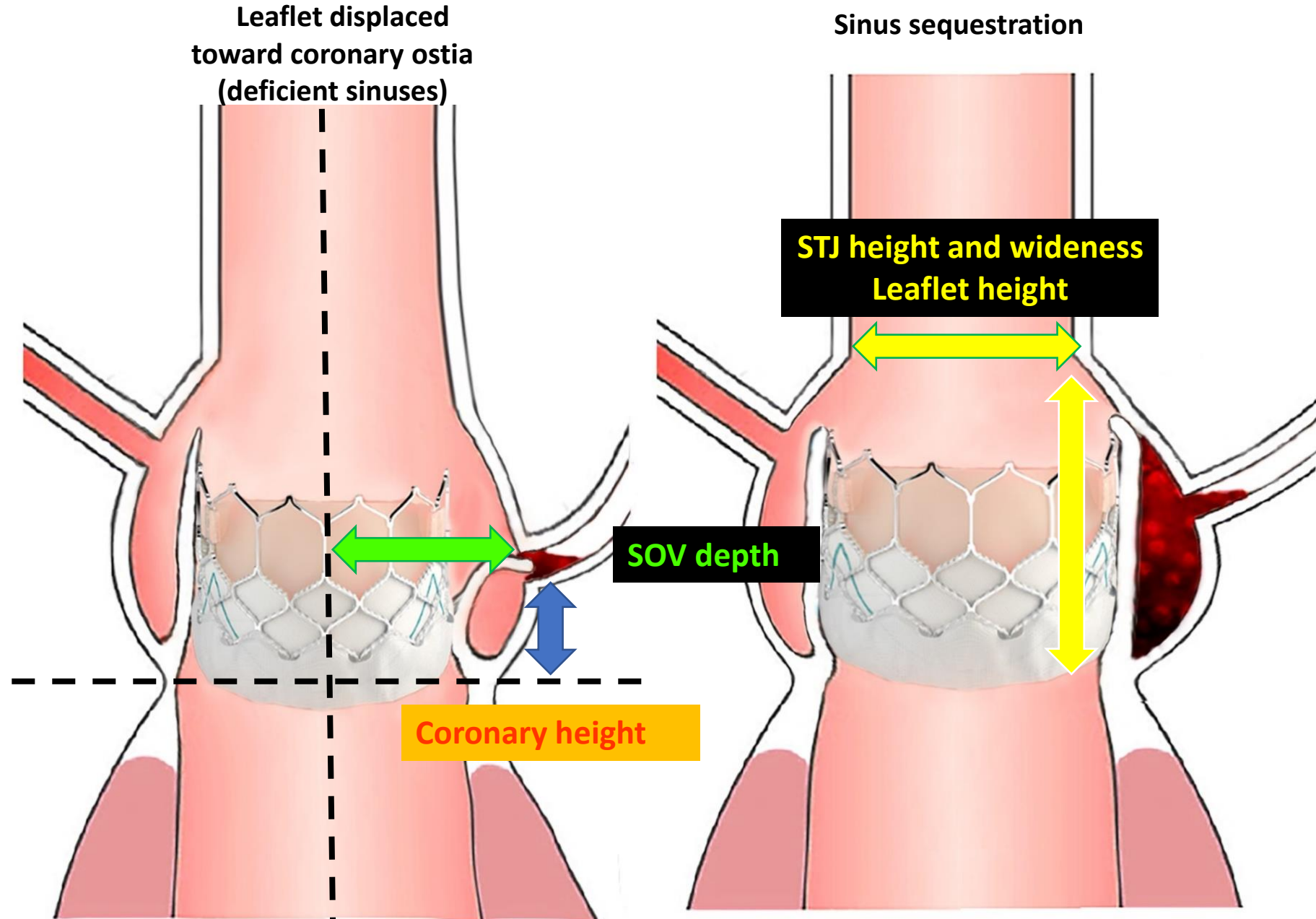


Coronary protection in patients undergoing TAVI at high risk of coronary obstruction

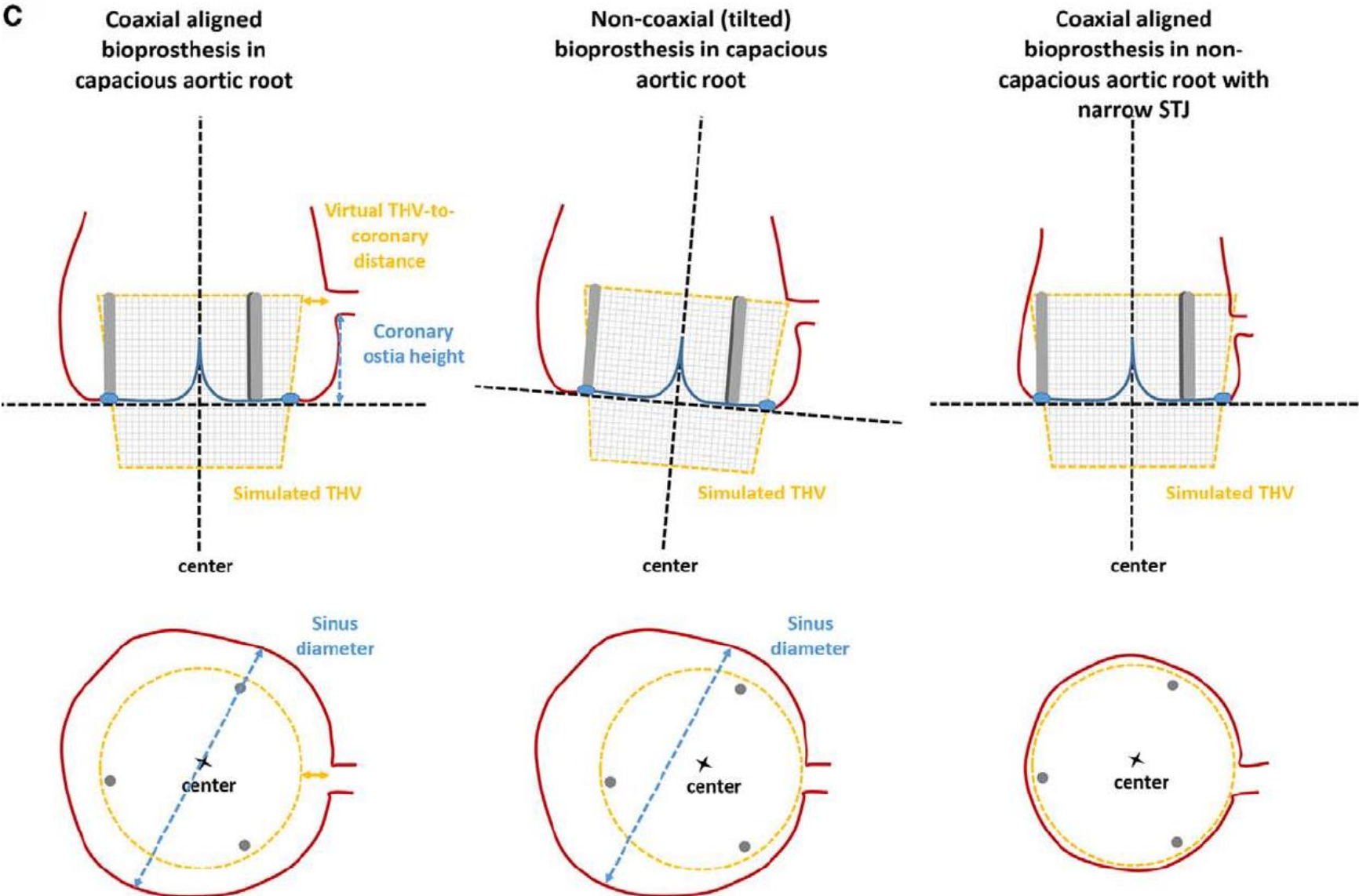
Tullio Palmerini

**Alma Mater Studiorum, University of Bologna
Italy**

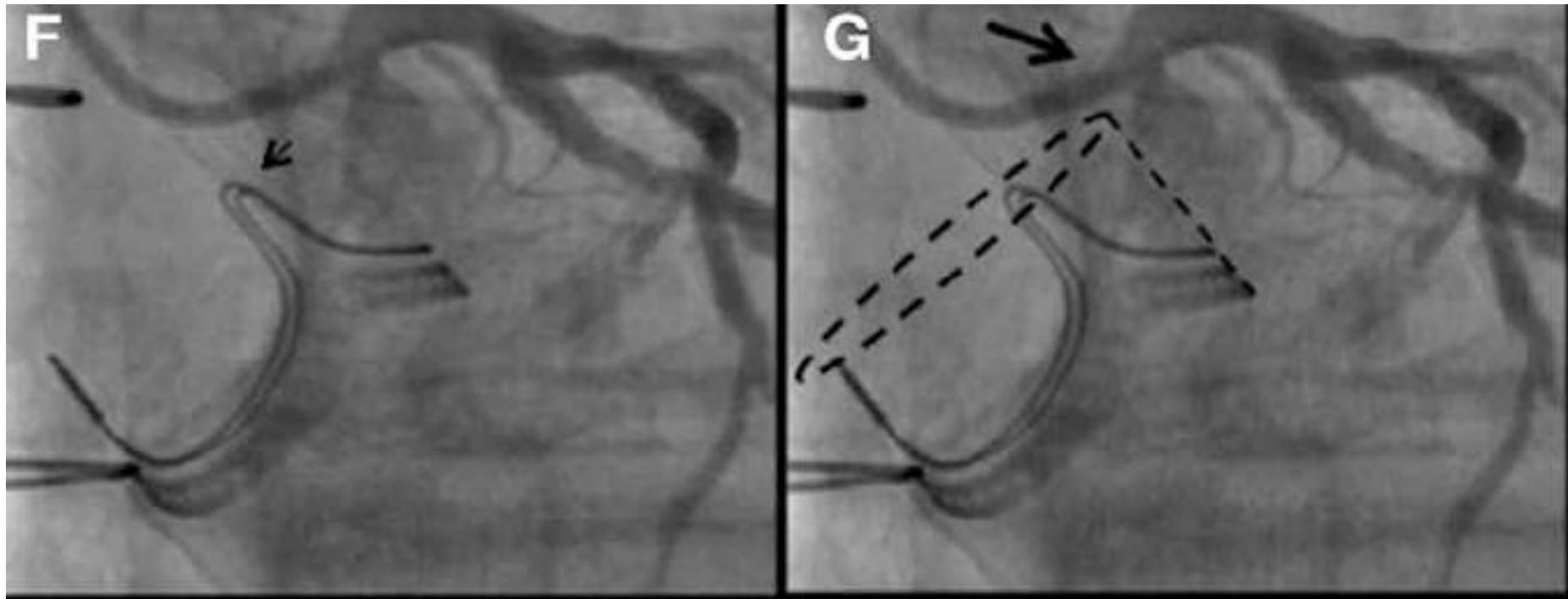
Mechanisms of coronary obstruction



Mechanics of acute coronary obstruction in VIV

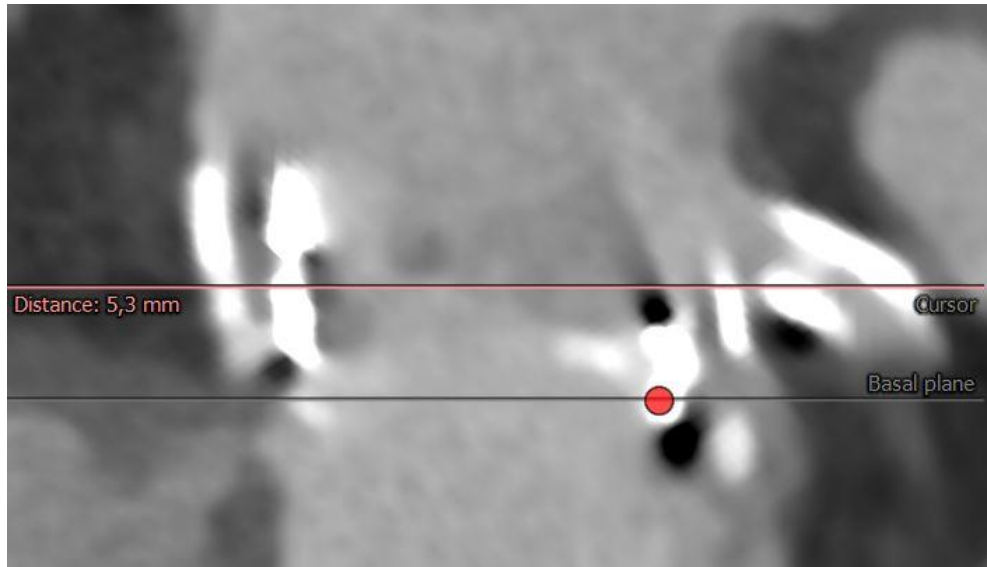


Projection perpendicular to the valve and the coronary ostia: 1:2 technique

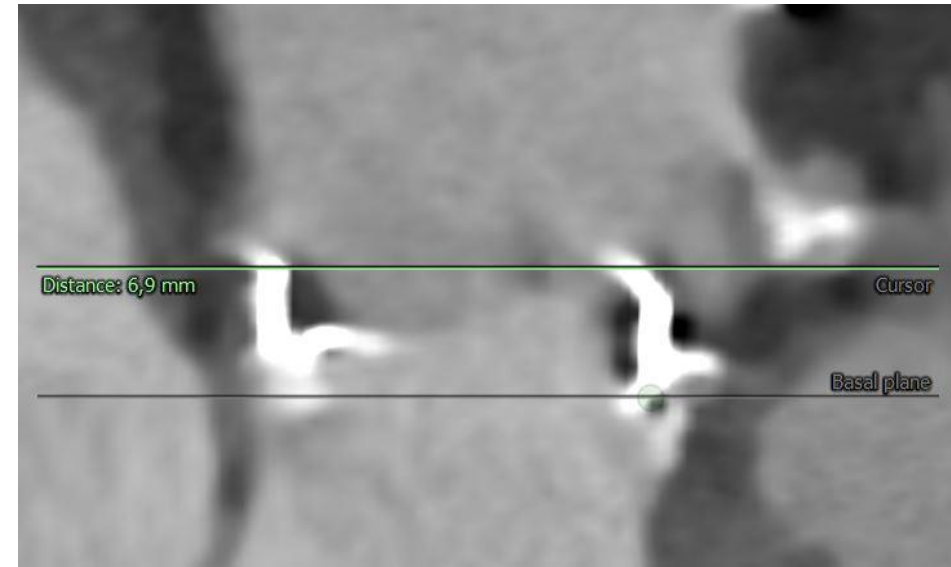


- **Female, 84y.o**
- **2009: SAVR (Magna 23)**
- **June 2020: CHF. AVA= 0,4 cm with severe AR**
- **Plan: TAVI VIV with Sapien Ultra 23 mm**

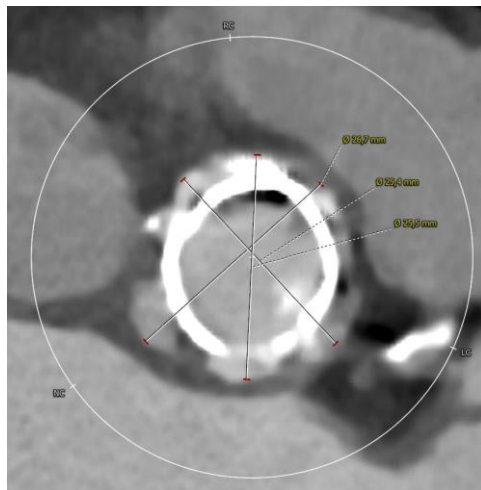
Left coronary



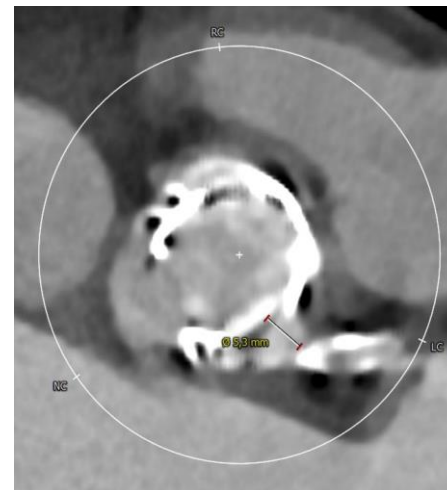
Right coronary



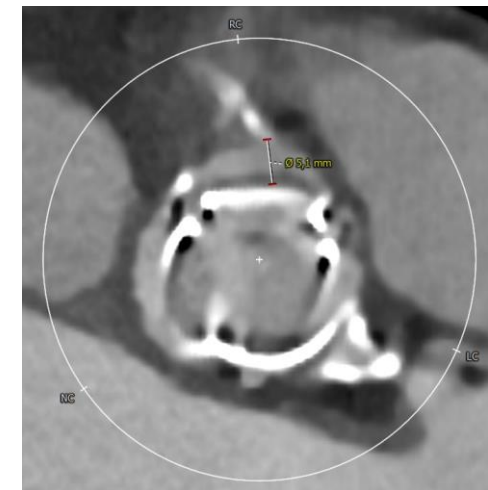
Sinuses: 25 mm



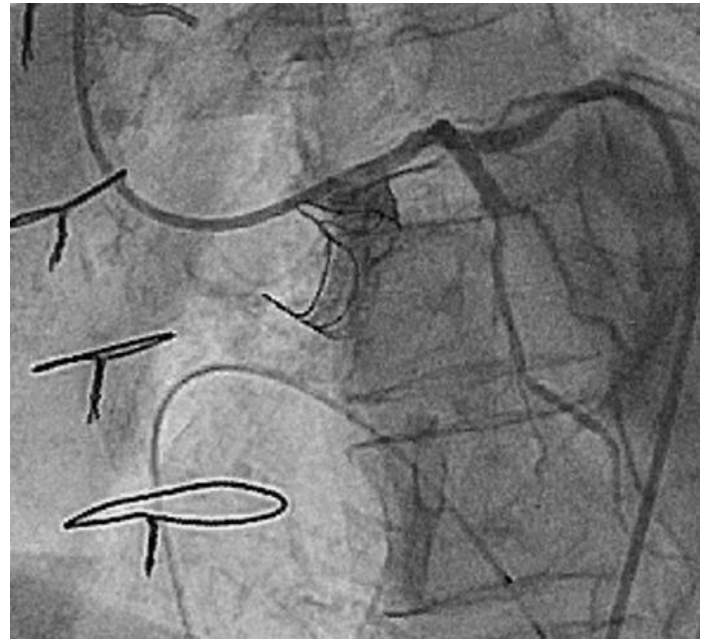
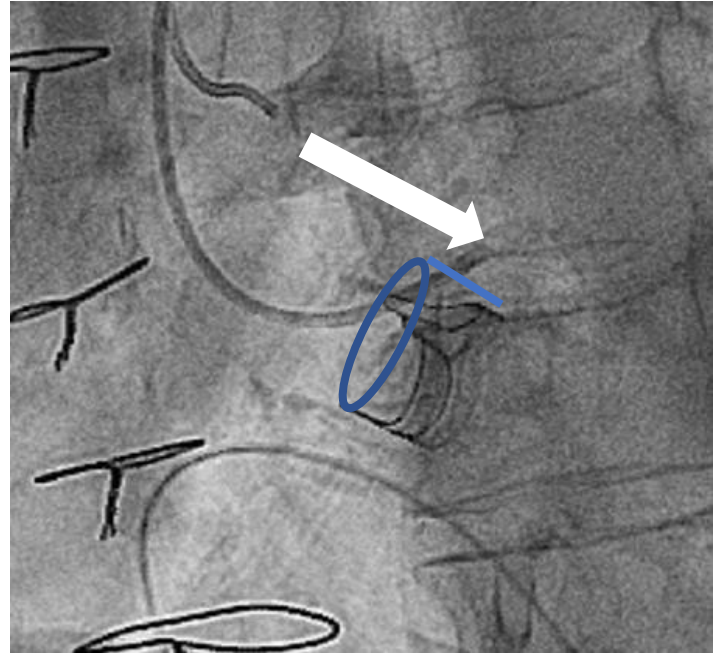
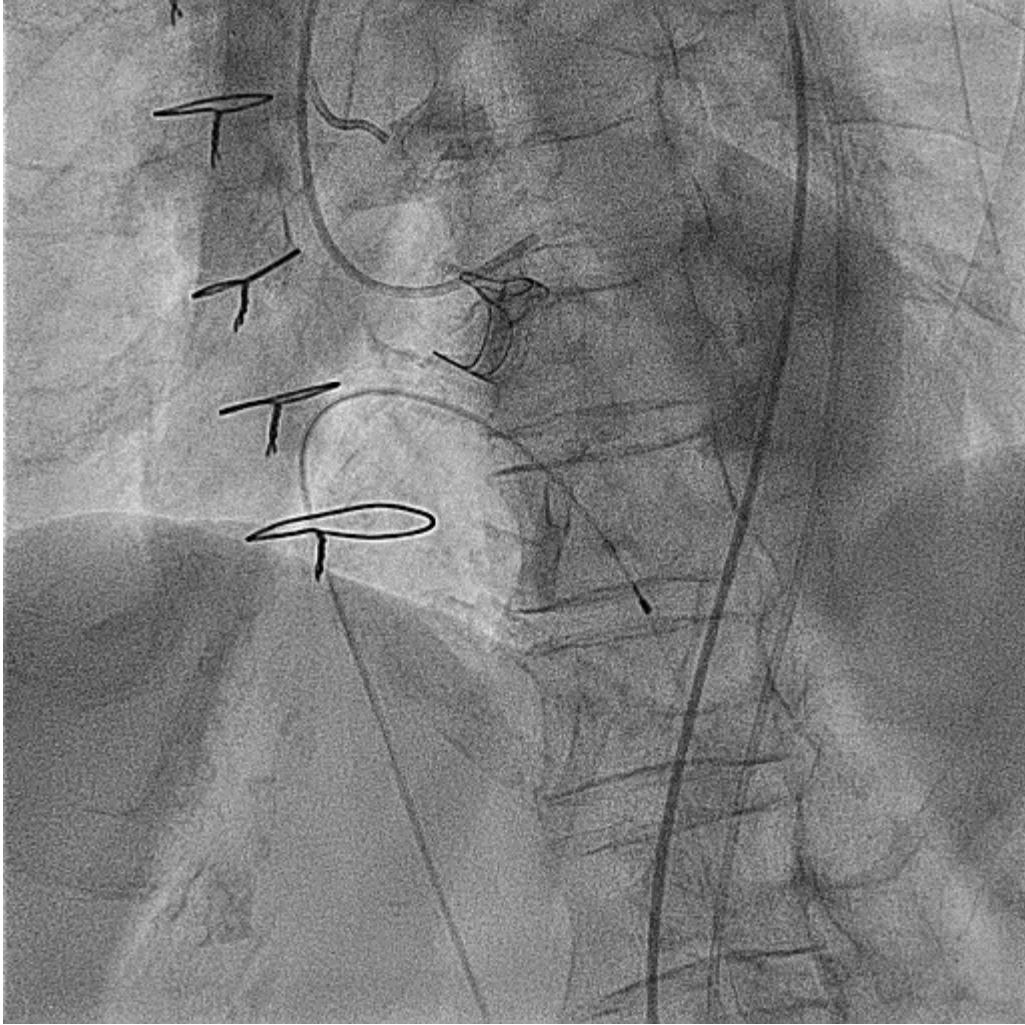
VTC Left Cor: 4.3 mm

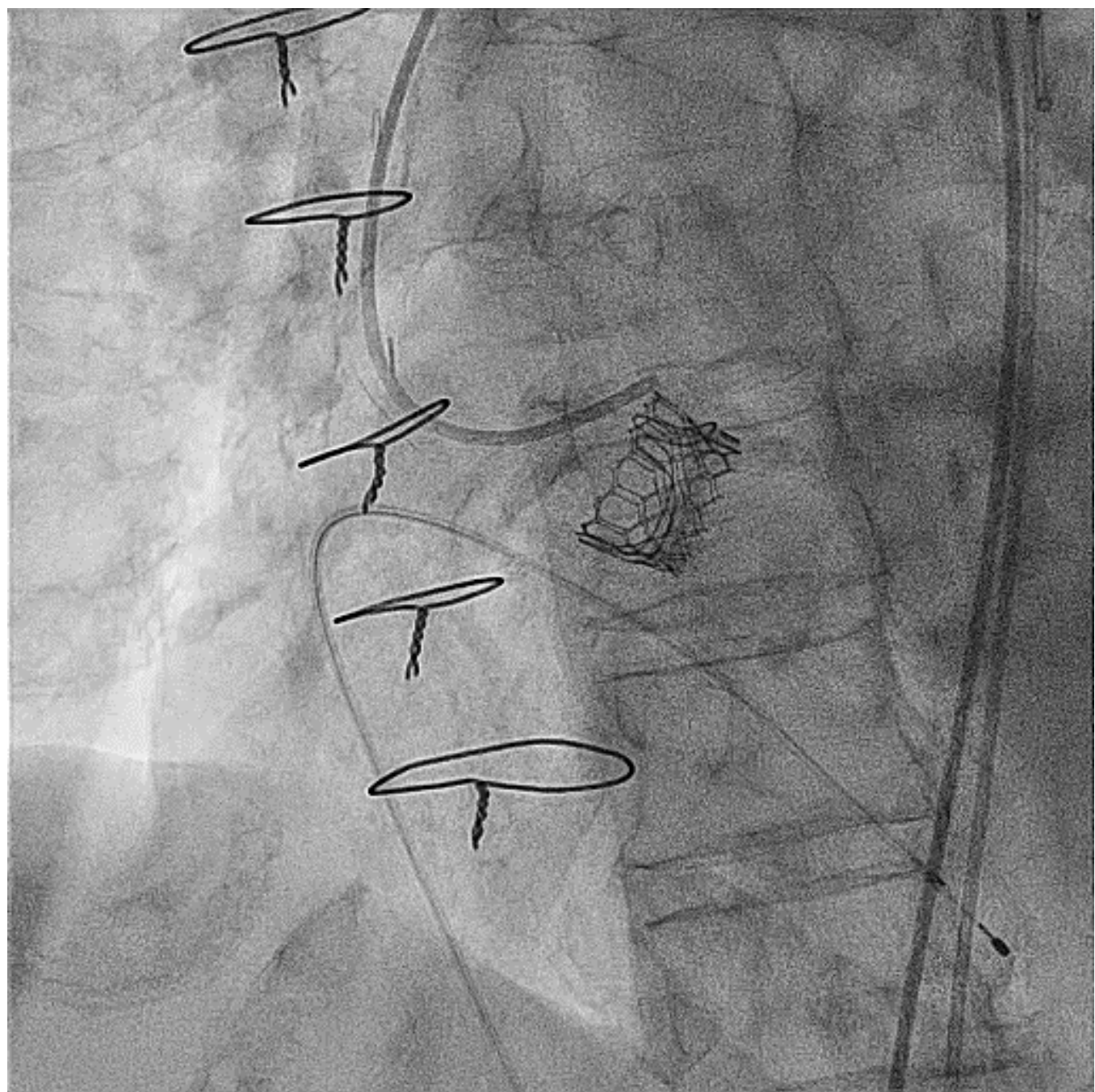


VTC CDx: 5.1 mm



Magna 21



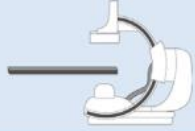


Procedural coronary obstruction

- Height of coronary ostium
- SOV dimension (< 30 mm)
- STJ height and dimension
- Extreme oversizing
- Valve in valve (Mitroflow, Trifecta, Stentless)
- Severe AV calcification with large left cusp calcium nodule (especially bicuspid valve)
- Post-dilatation
- VTH

Risk of Coronary Obstruction from TAVR, N=1441

Native AS Patients
100%



Angiographic obstruction after TAVR
n = 60

No obstruction after TAVR
n = 1,381

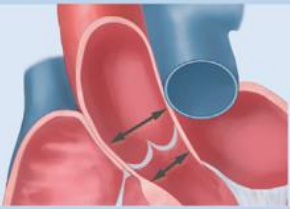
In-hospital death



Obstruction
26.7%

No obstruction
0.7%

Anatomical comparison



Annulus dimensions, coronary height, SoV and residual SoV width, STJ height and width

→ All smaller in the obstruction cohort ($P < 0.001$)

Novel Prediction Model Developed

Propensity matching

Age, sex, and annulus area

Obstruction

n = 60

No obstruction

n = 60

Optimal thresholds established

Model: Obstruction IF

Cusp height > coronary height

and
VTC \leq 4mm

or
Culprit leaflet calcium volume > 600mm³

Model validation and performance

Left

AUC 0.93
(Sens 0.93; Spec 0.84)

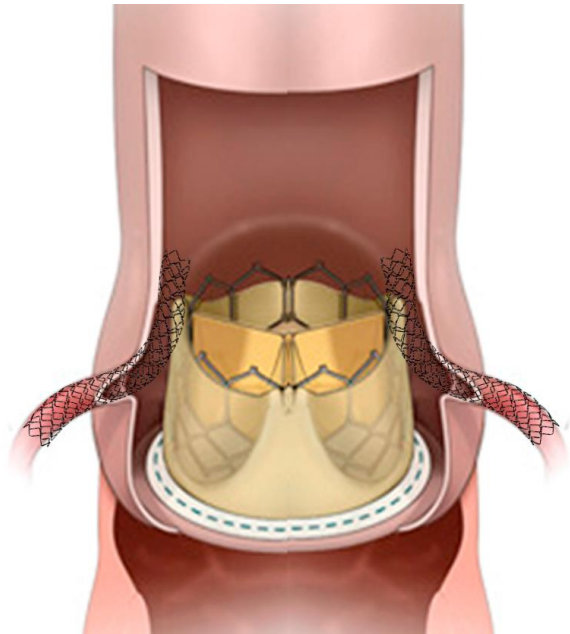
Right

AUC 0.94
(Sens 0.92; Spec 0.96)

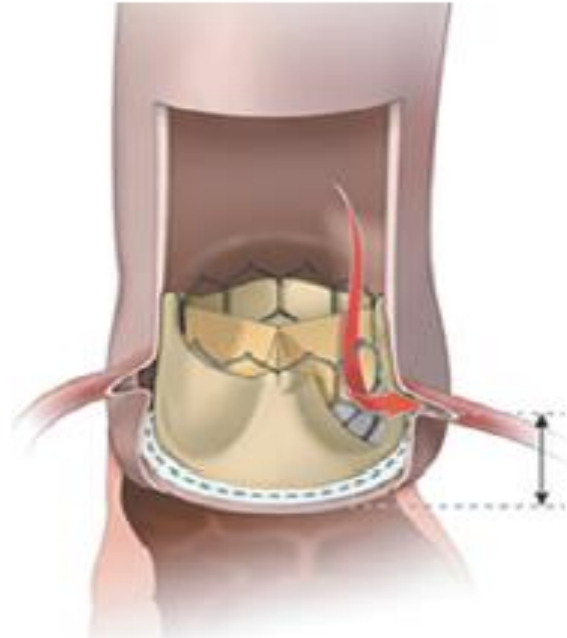
Khan et al; JACC Int 2023

Methods to protect coronary artery

CHIMNEY STENTING



BASILICA

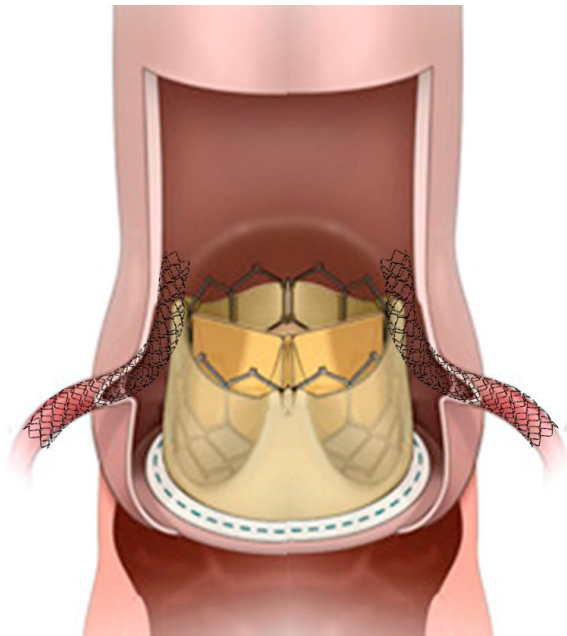


LEAFLET SPLITTING

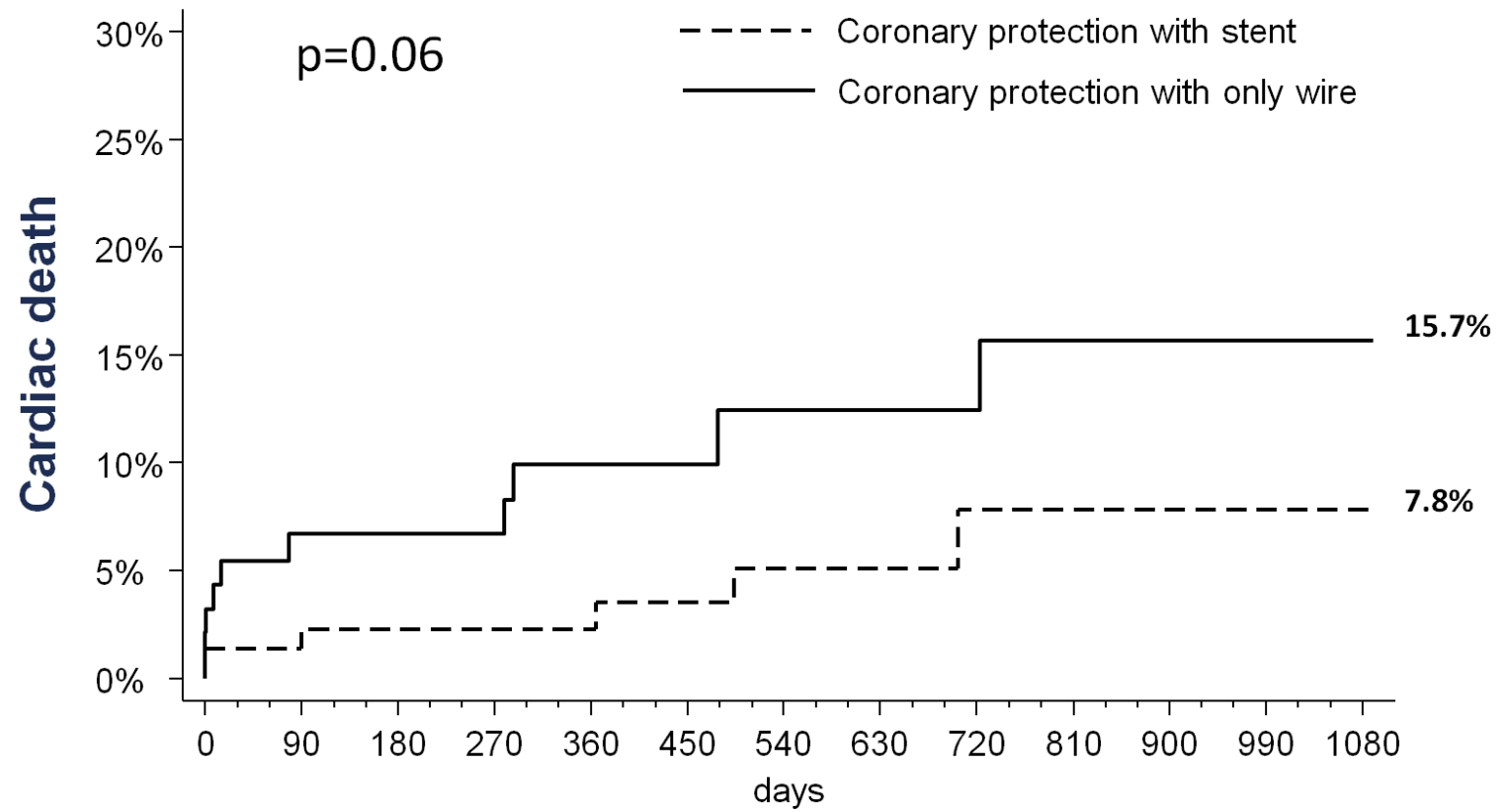


Coronary Protection to Prevent Coronary Obstruction During Transcatheter Aortic Valve Replacement

Multicenter, international, observational study with 19 centers and fup at 3 yrs



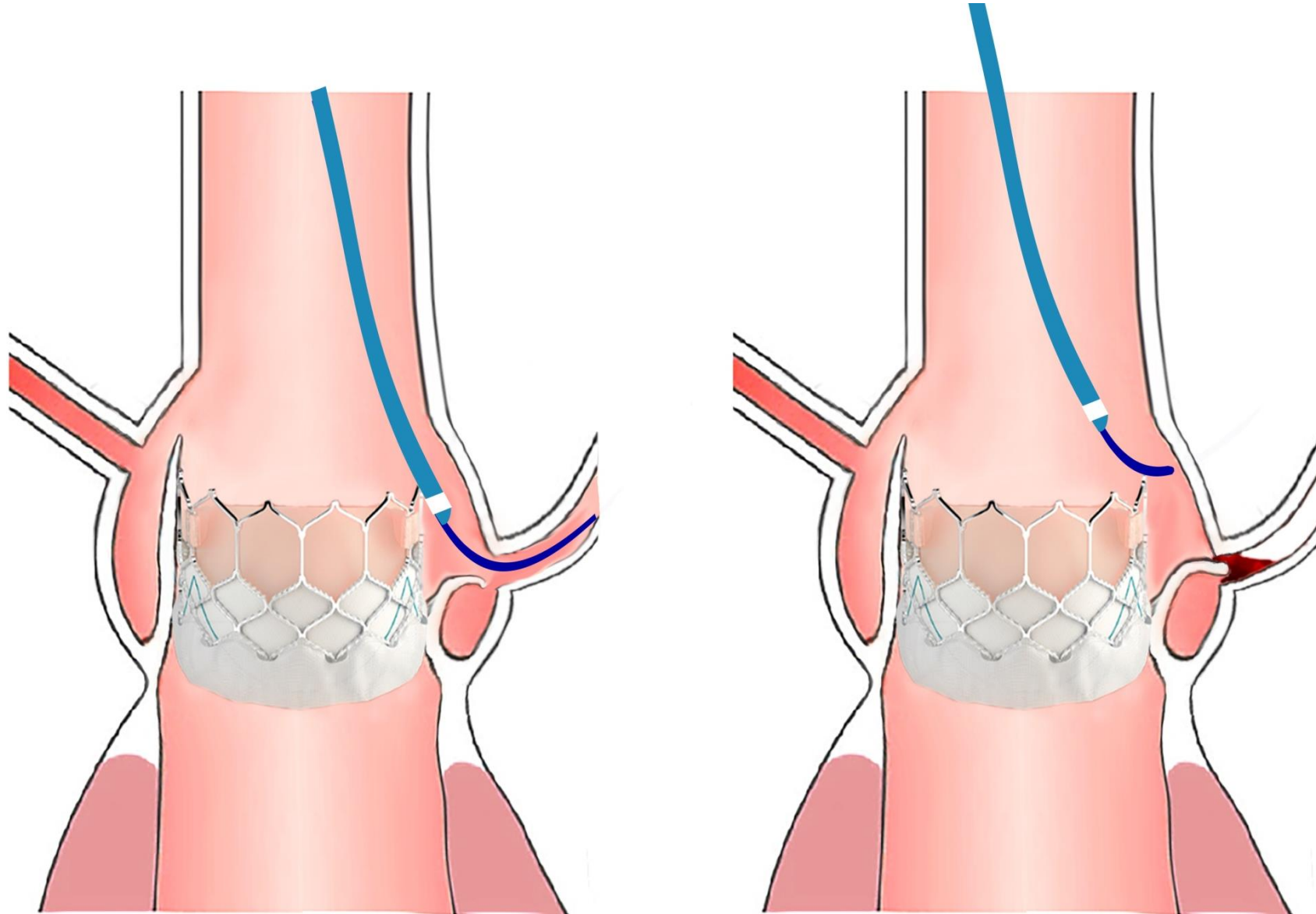
**236 cases of coronary protection
143 with stent eventually implanted
93 protected with wire only**



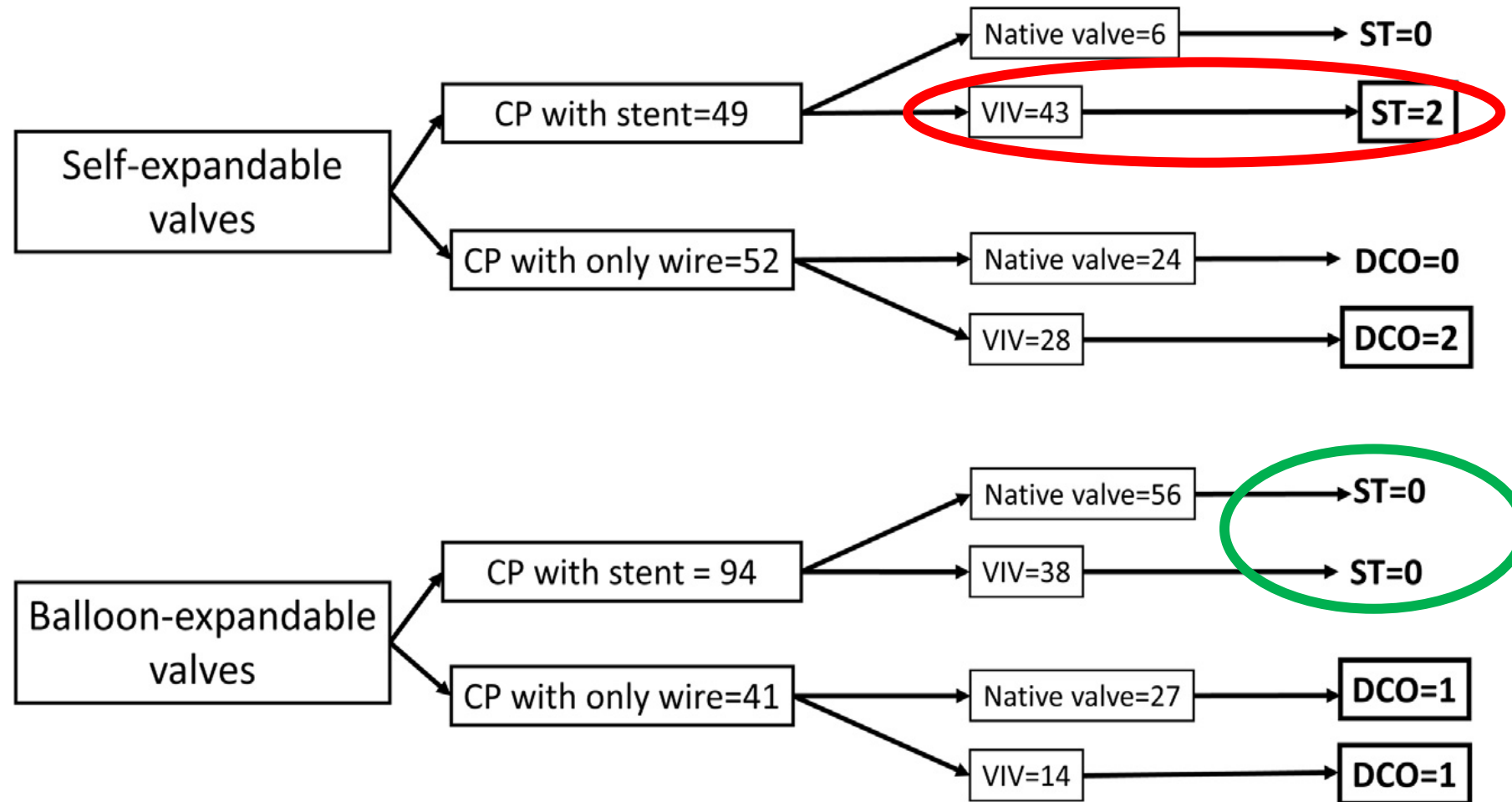
Number at risk

| | | | | | | | | | | | | | |
|-----------|-----|-----|-----|----|----|----|----|----|----|----|----|----|----|
| Only wire | 93 | 75 | 64 | 58 | 45 | 36 | 31 | 30 | 27 | 20 | 18 | 15 | 13 |
| Stent | 143 | 112 | 106 | 91 | 79 | 62 | 54 | 43 | 33 | 25 | 17 | 16 | 13 |

Definite stent thrombosis, sudden death and delayed occlusion stratified by the strategy of coronary protection



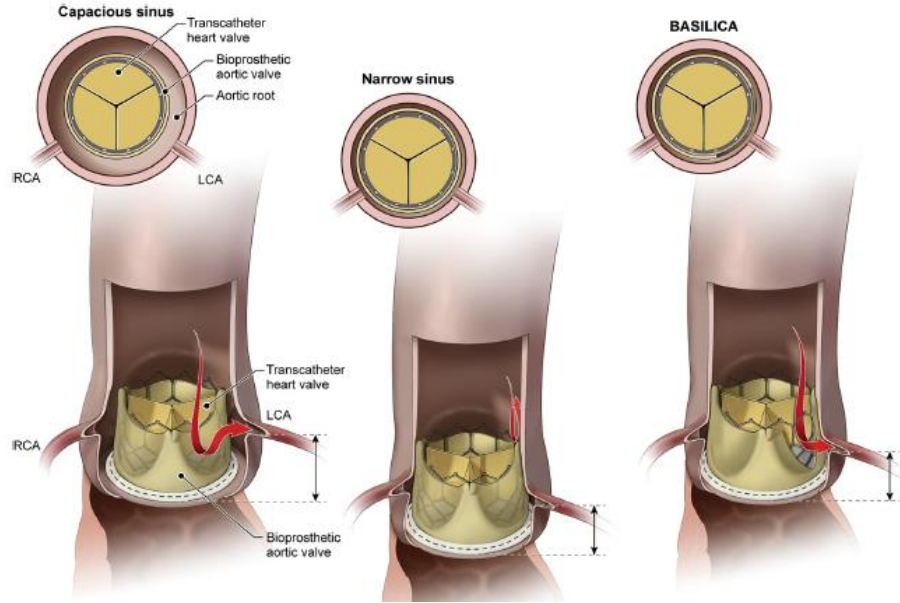
Outcomes stratified by the type of valves



Independent predictor of 3-year cardiac mortality

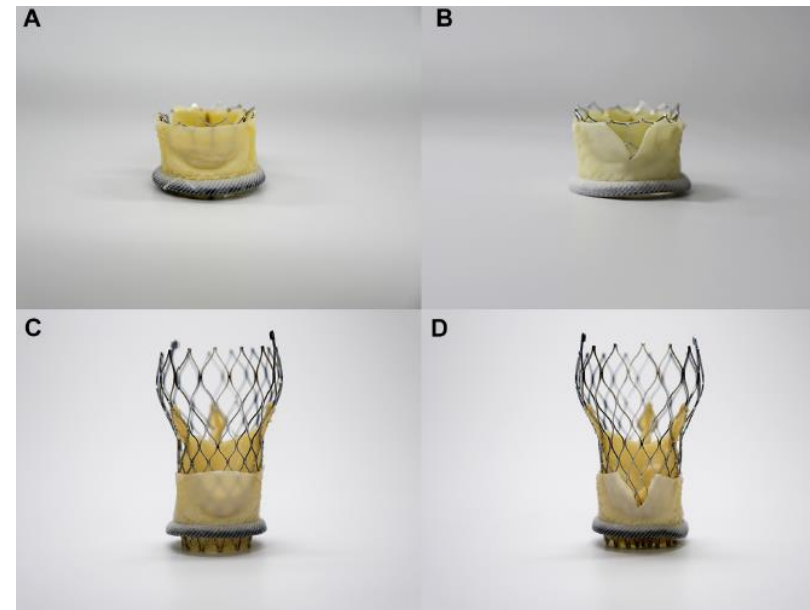
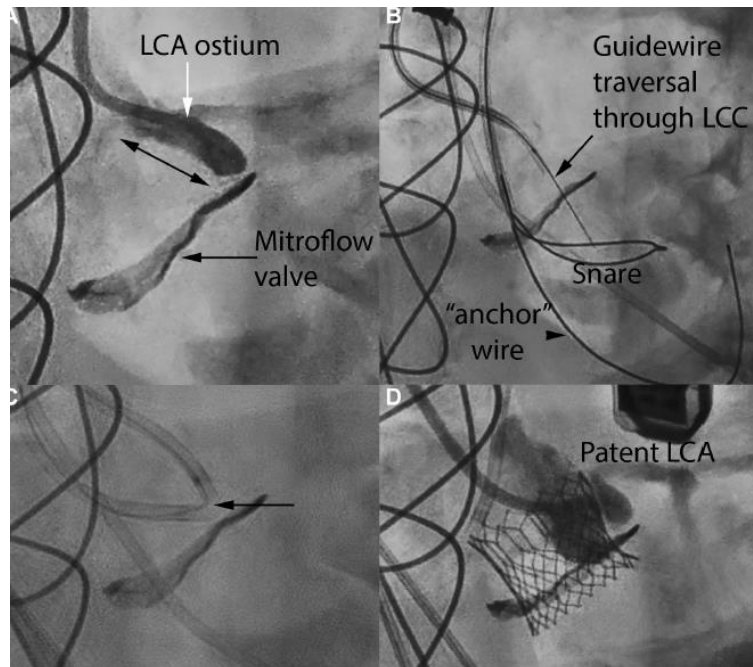
| Variable | HR (95% confidence intervals) | P value |
|--|-------------------------------------|---------|
| Stent vs wire protection | 0.42 (0.13-1.28) | 0.12 |
| Prior myocardial infarction | 1.37 (0.28-6.63) | 0.68 |
| NYHA class III/IV | 3.75 (0.48-29.18) | 0.20 |
| Chronic kidney disease | 1.80 (0.63-5.29) | 0.26 |
| Coronary artery disease | 0.70 (0.26-2.26) | 0.63 |
| Left ventricular ejection fraction | 0.99 (0.95-1.04) | 0.90 |
| Self expandable vs balloon expandable valves | 3.97 (1.20-13.13) | 0.02 |

BASILICA TECHNIQUE



Laceration of the right or left leaflet (or both) using an electrified guidewire

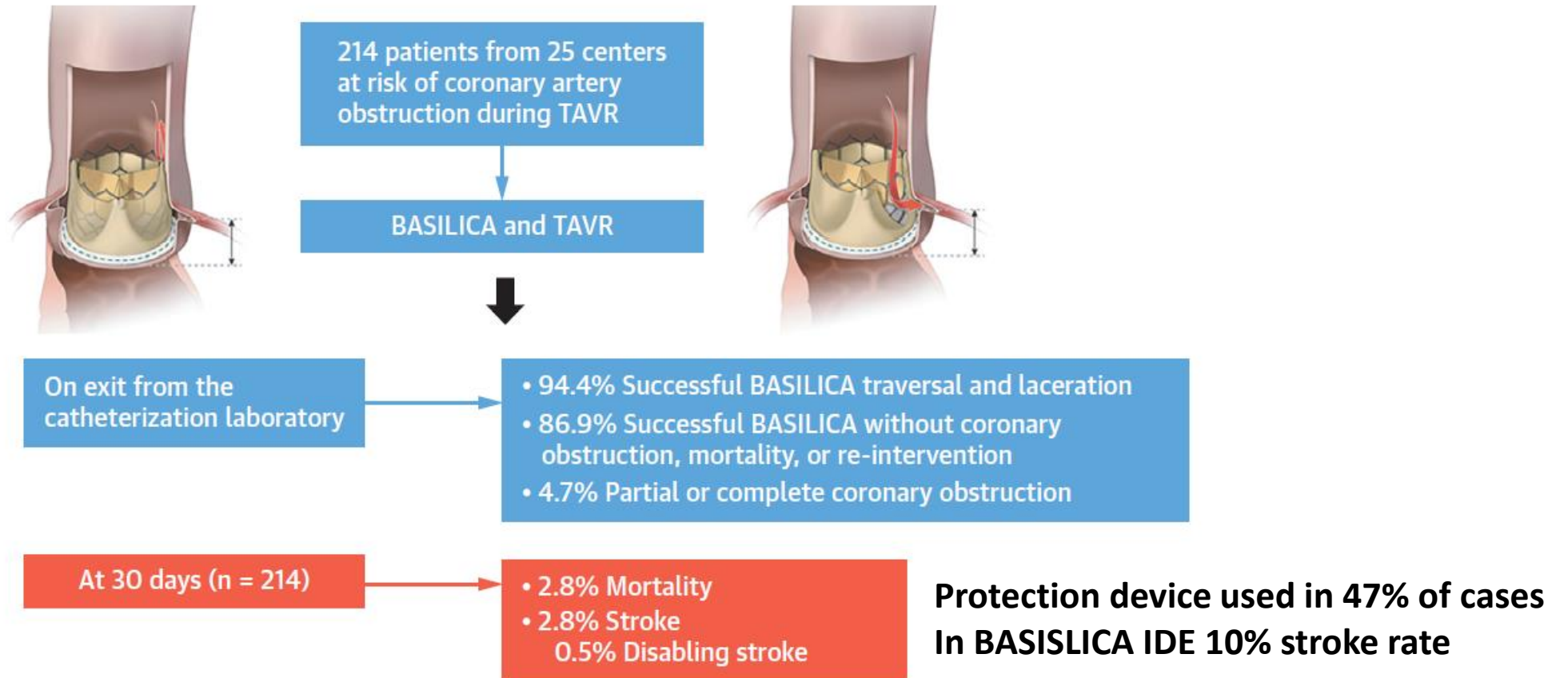
The lacerated leaflet splays after TAVI to allow blood flow across it



Khan et al; JACC int 2018

Preventing Coronary Obstruction During Transcatheter Aortic Valve Replacement

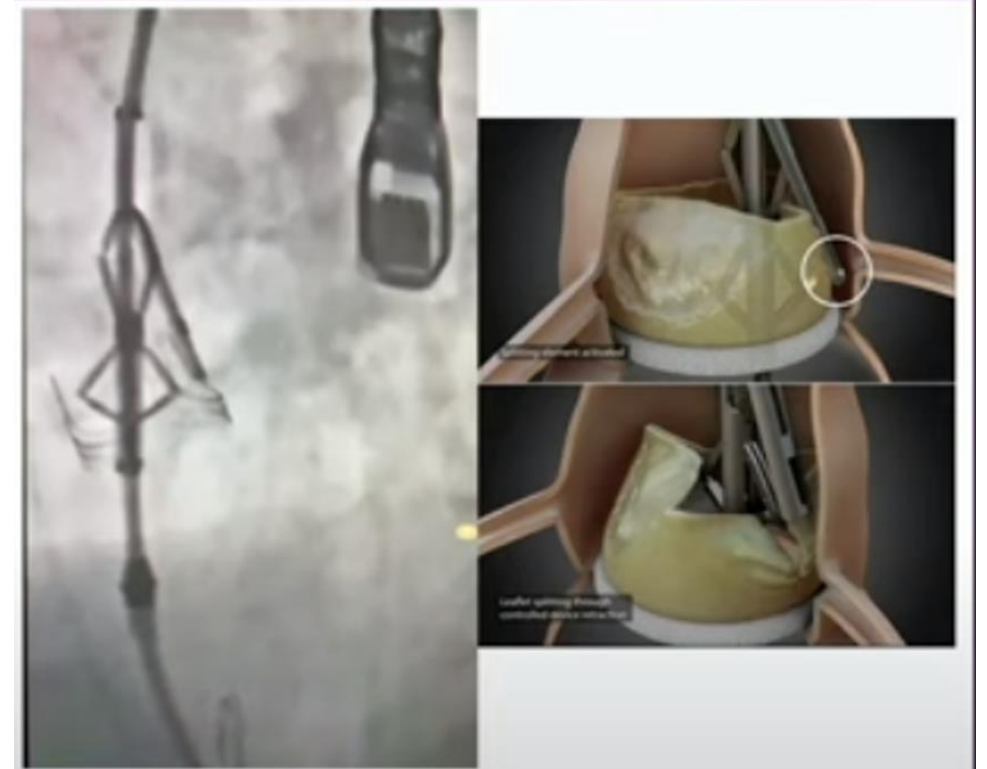
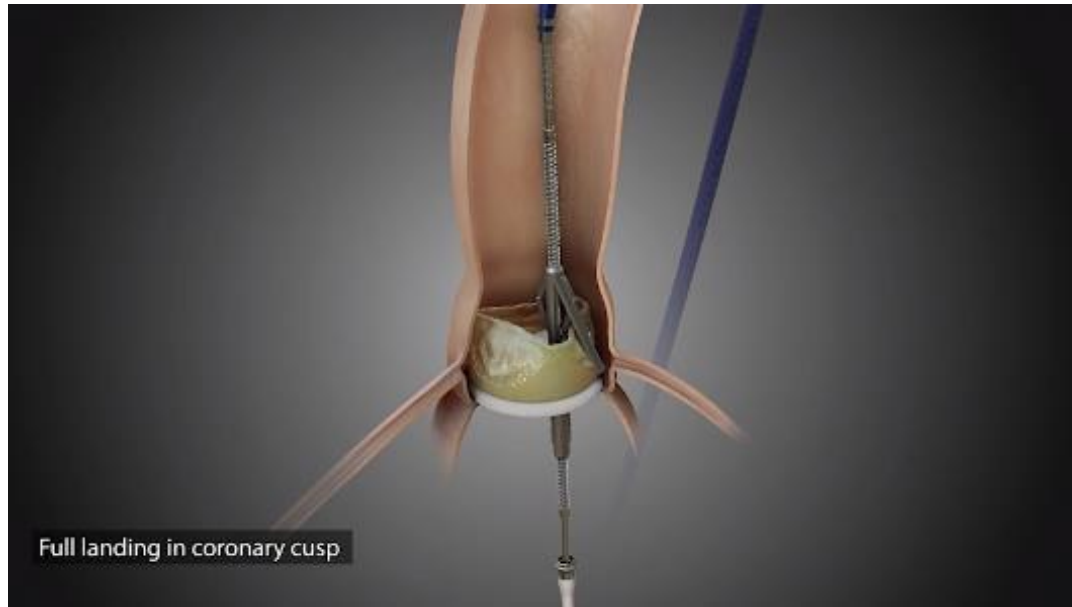
Results From the Multicenter International BASILICA Registry



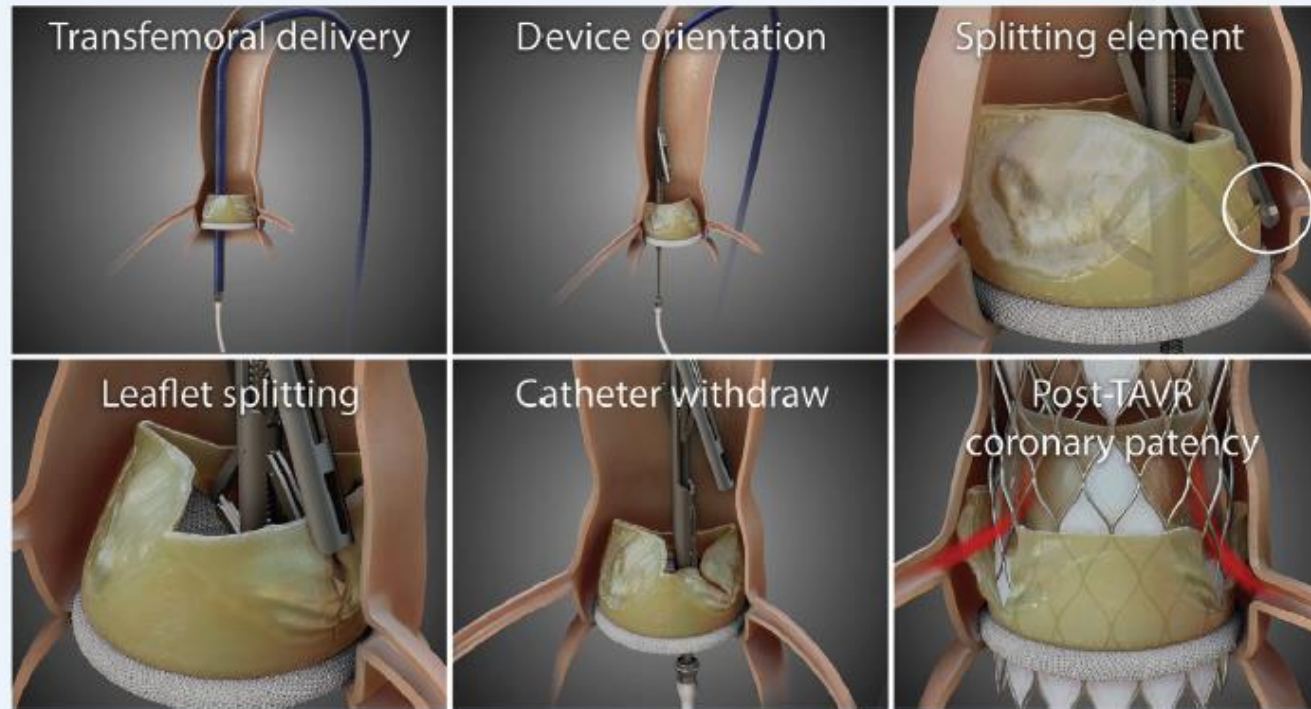
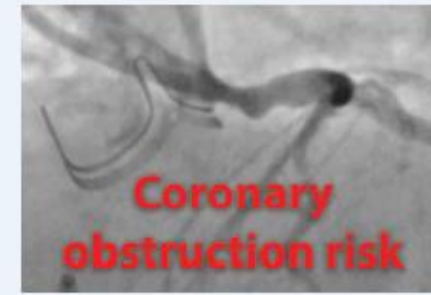
First-in-Human Dedicated Leaflet Splitting Device for Prevention of Coronary Obstruction in Transcatheter Aortic Valve Replacement

The ShortCut device

Handle, delivery system, distal unit



- First-in-human dedicated leaflet splitting device in TAVR
- 8 patients (11 leaflets) with coronary obstruction risk
 - 5 left coronary risk
 - 3 left plus right coronary risk
- No coronary obstruction occurred during TAVR
- No adverse neurologic events



Conclusions

- Iatrogenic coronary obstruction during TAVR is associated with high rates of mortality and morbidity
- Coronary height, SOV dimension, leaflet height, STJ height and wideness, VIV, post-dilation and VTH are risk factors for coronary occlusion
- Chimney stenting, BASILICA and the ShortCut device have been proven to be effective in preventing coronary obstruction