TAVI in Patients With CAD

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CONFLICTS

NONE

TAVI: For whom?

- TAVI having reached its maturity as the preferred treatment in **most pts** with **tricuspid AS** and who are **>75 years of age**

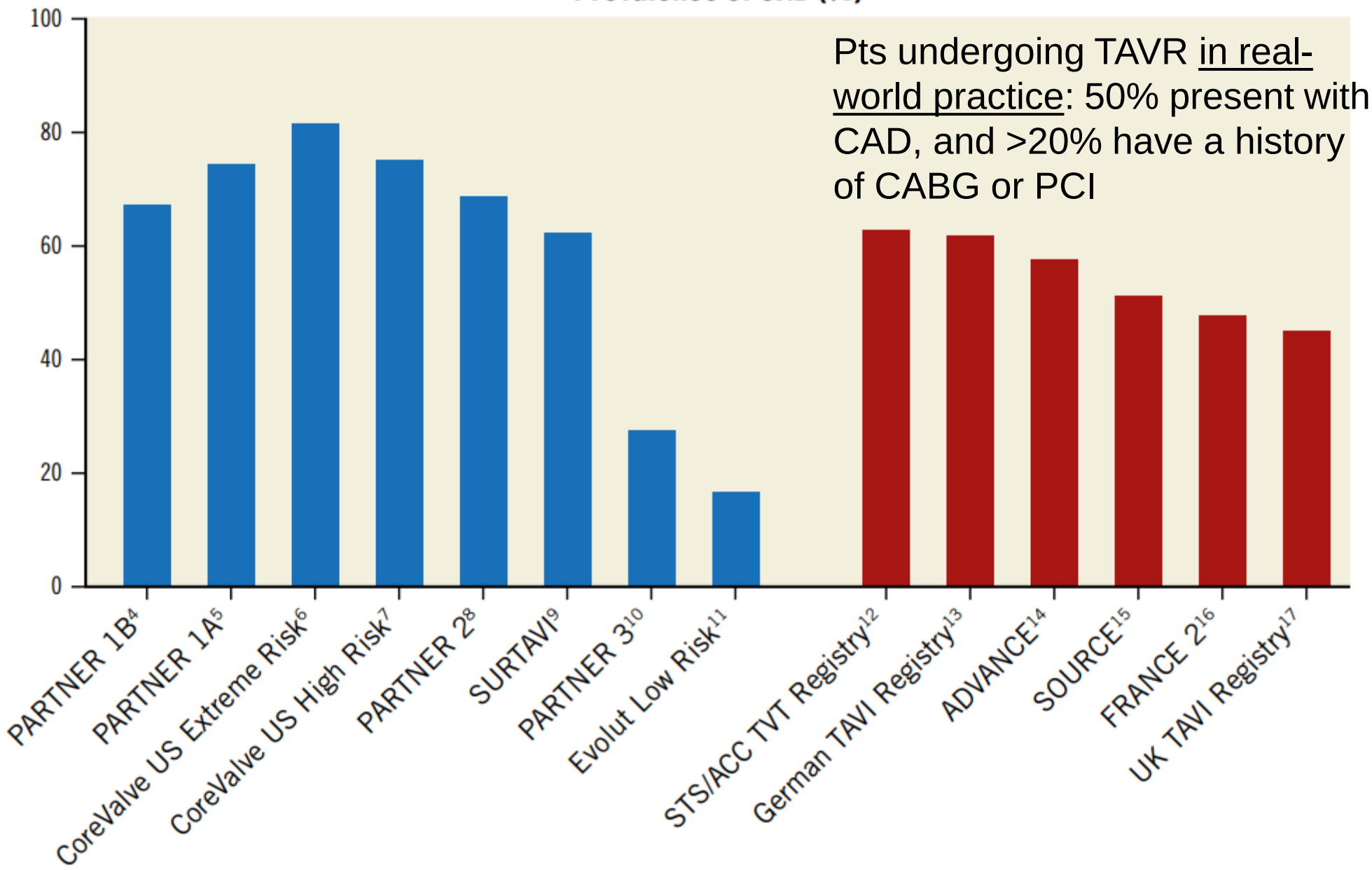
TAVI: The evidence…

- In comparison to SAVR, TAVR has been proven to be **noninferior** with regard to **mortality** and **disabling stroke** in 5 randomized trials that studied pts **across the spectrum of risk**

- *Most of these trials excluded pts requiring revascularization, for significant CAD…*

CAD in sAS Pts…

- May impact
  - Procedural risk
  - Post-procedural prognosis



Pts undergoing TAVR in real-world practice: 50% present with CAD, and >20% have a history of CABG or PCI

Diagnosis of significant CAD in sAS pts

- History, Symptoms
- Noninvasive ischemia testing (EST, DSE, SPECT, CMR)
- CTCA (emerging in LR pts)
- ICA (standard of care)
- Invasive ischemia testing (FFR, iFR)
- Invasive anatomical testing (IVUS, OCT)

Diagnosis of sCAD in sAS pts: Symptoms

- AS can cause myocardial ischemia on its own, further complicating the assessment of CAD and the need for revascularization…
- Both CAD and AS can present with dyspnea and angina, and their relative contribution to the complaints of the pt is often unclear…

Anatomic Diagnosis of sCAD in sAS pts…

- **Significant CAD (AHA & EHS):** minimal 70% reduction in diameter in a major coronary artery (50% in LM) **and/or physiologically significance** (AHA)…

ESC guidelines: ICA in sAS pts…

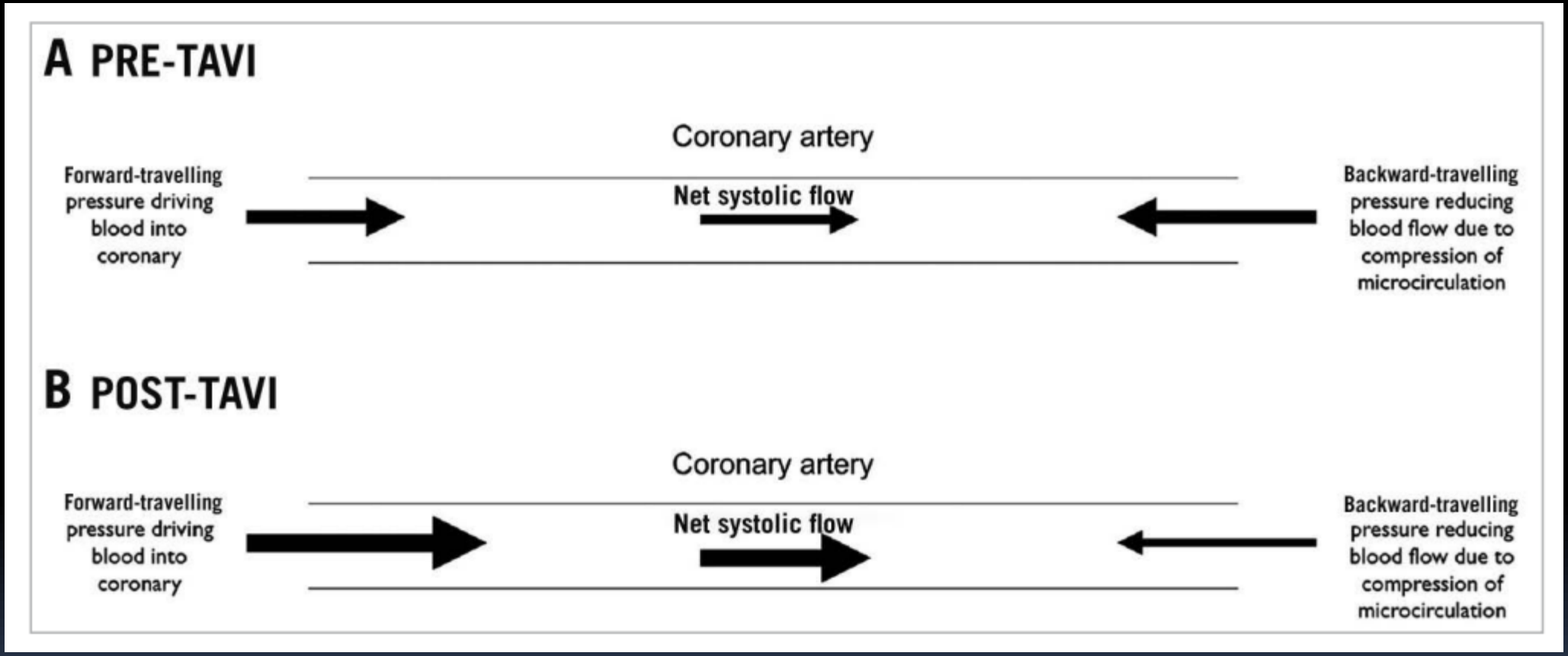
- ICA for the assessment of CAD prior to consideration of either **SAVR or TAVI** (particularly in pts with a history of CVD, with at least one CV-RF, suspected myocardial ischaemia, HFrEF, or men >40 years of age and postmenopausal women *(Class I, Level of Evidence [LoE] C)*…

Timing of ICA in TAVI candidates

- **Pre TAVI:** minimize procedure time and contrast volume, as well as to inform the Heart Team on the need for revascularisation

- Concomitant ICA at the time of TAVI may be considered in pts who are **not surgical candidates** and/or with a **low probability of significant CAD**.

CAD Functional Assessment…



Management of CAD in pts undergoing SAVR …

CAD in **SAVR** populations

- Pts with CAD and AS have worse clinical outcomes after **SAVR**
- Omitting revascularization in these pts is an independent predictor for early mortality…

2020 ACC/AHA Guideline for the Management of Patients With Valvular Heart Disease

A Report of the American College of Cardiology/American Heart Association Joint Committee on Clinical Practice Guidelines

2a	C-LD	3. In patients with significant AS and significant CAD (luminal reduction >70% diameter, fractional flow reserve <0.8, instantaneous wave-free ratio <0.89) consisting of complex bifurcation left main and/or multivessel CAD with a SYNTAX (Synergy Between Percutaneous Coronary Intervention With Taxus and Cardiac Surgery) score >33, SAVR and CABG are reasonable and preferred over TAVI and PCI.[3,4]

2021 ESC/EACTS Guidelines for the management of valvular heart disease

Recommendations	Class	Level
Indications for myocardial revascularization		
CABG is recommended in patients with a primary indication for aortic/mitral/tricuspid valve surgery and coronary artery diameter stenosis ≥70%.*,**	I	C
CABG should be considered in patients with a primary indication for aortic/mitral/tricuspid valve surgery and coronary artery diameter stenosis ≥50–70%.	IIa	C

** Stenosis ≥50% can be considered for left main stenosis.*

*** FFR ≤0.8 is a useful cut-off indicating the need for an intervention in patients with mitral or tricuspid diseases, but has not been validated in patients with aortic stenosis.*

2021 ESC/EACTS Guidelines for the management of valvular heart disease
(European Heart Journal; 2021 – doi: 10.1093/eurheartj/ehab395; European Journal of Cardio-Thoracic Surgery; 2021 – doi: 10.1093/ejcts/ezab389)

EACTS Revascularization Guidelines

- In pts undergoing SAVR, revascularisation of proximal significant CAD should be pursued (LoE C).
- More extensive revascularisation usually performed with SAVR (avoid future sternotomy).
  - Mortality risk of SAVR+CABG higher than SAVR alone.
  - Robust evidence for a definitive recommendation about indication and completeness of revascularisation is lacking also for the surgical approach.

Management of CAD in pts undergoing TAVI …

According to Anatomy & Clinical Presentation

- Significant
  - Symptomatic (ACS/CCS @ angina)
  - Asymptomatic CCS ➔ Needs Tx?
- Non-Significant ➔ May Progress…

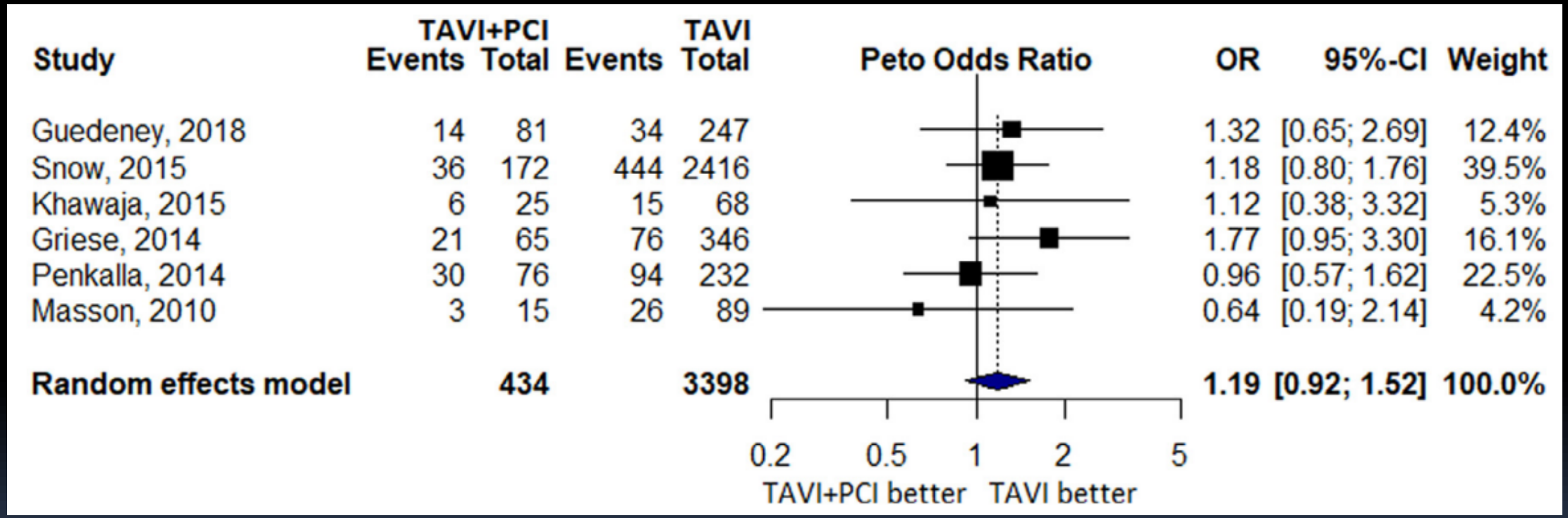
According to Surgical Risk & Clinical Presentation …

- **High surgical risk pts**
- **Asymptomatic CAD:** TAVI @ PCI, or TAVI without revasc? Role of FFR/iFR?
  - **TAVI @ PCI:** Timing of PCI? Complete revasc?
- **Lower surgical risk pts**
- TAVI @ PCI or SAVR @ CABG?

Question Arising …

- **High surgical risk pts**
- **Asymptomatic CAD:** TAVI @ PCI, or TAVI without revasc? Role of FFR/iFR?
  - **TAVI @ PCI:** Timing of PCI? Complete revasc?
- **Lower surgical risk pts**
- TAVI @ PCI or SAVR @ CABG?

Meta-Analysis Comparing Outcomes in Patients Undergoing Transcatheter Aortic Valve Implantation With Versus Without Percutaneous Coronary Intervention



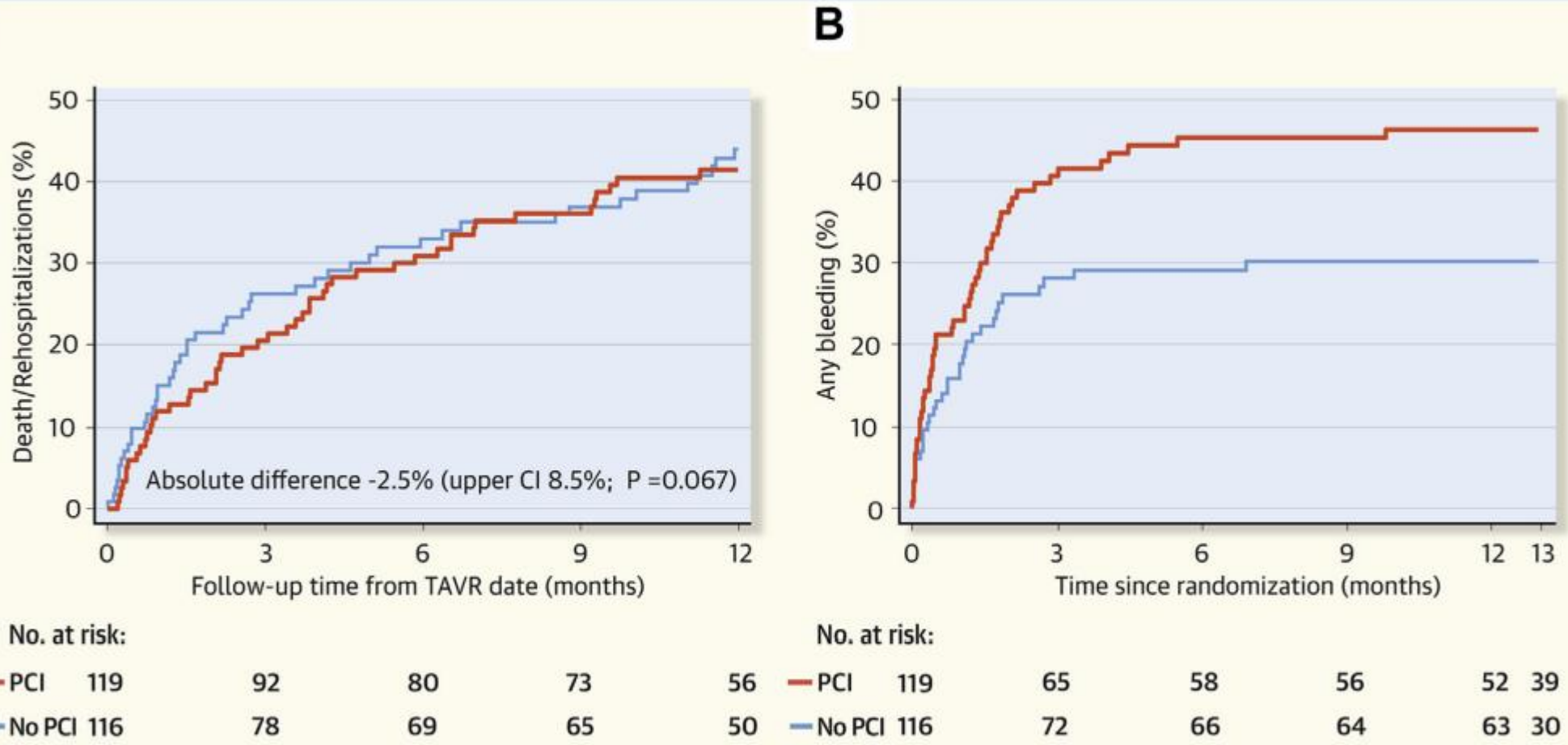
1-year all-cause mortality in pts with TAVI and PCI versus TAVI Alone

Lateef et al AJC 2019

CAD in TAVI populations: Observational studies

- **CAD:** None, Partial (severe/complex lesions) or Negative prognostic effect on short term outcomes after TAVI...
- Two large meta-analyses on this topic
  - CAD did not affect 30-day outcomes after TAVI, but significant negative effect of CAD on survival one year after the procedure
  - CAD did not impact on 30-day or one year mortality after TAVI **(except in pts @ SS >22)**
- CAD: simply a marker of atherosclerosis burden and other co-morbidities or an independent risk factor for worse outcomes after TAVI?

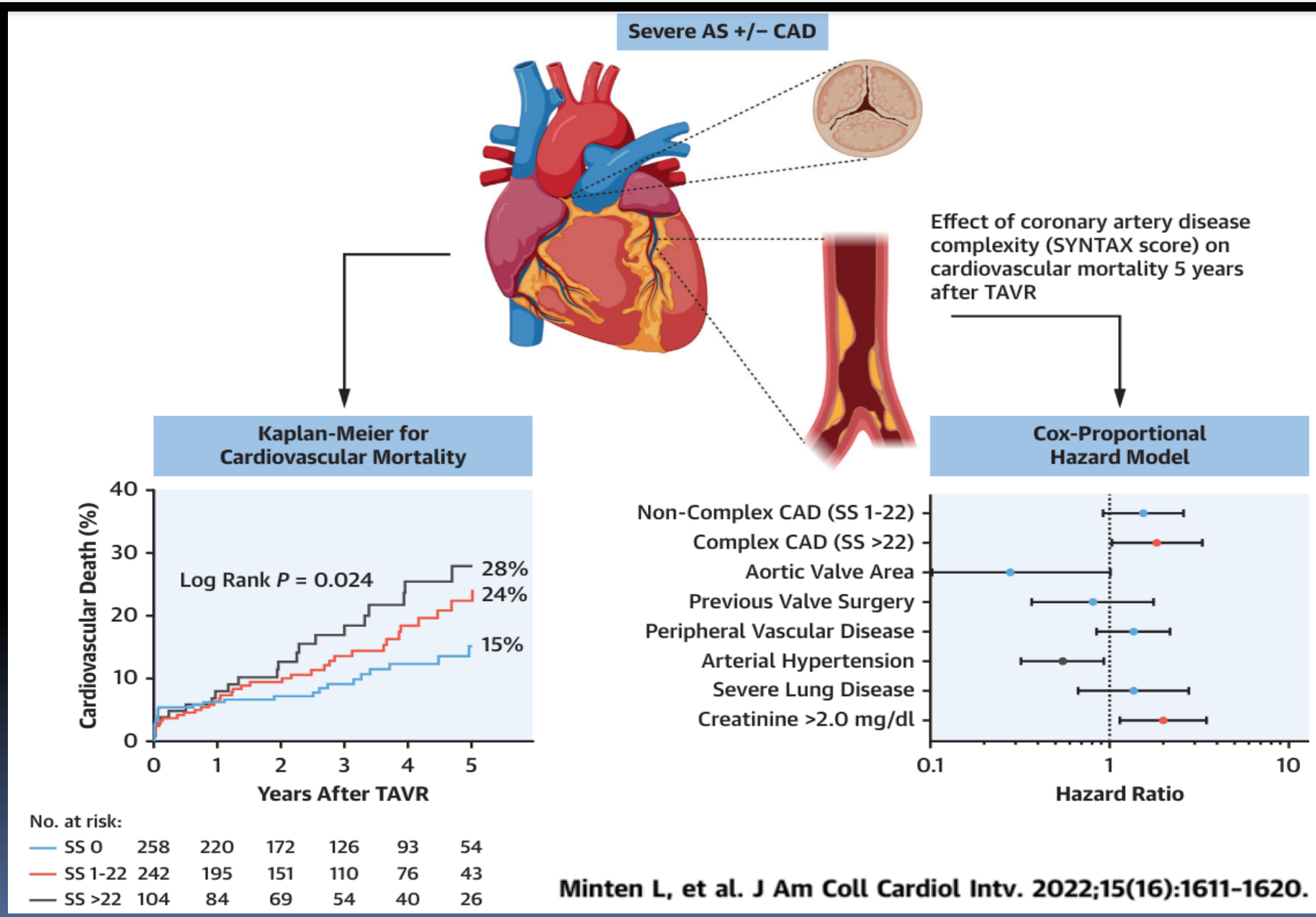
ACTIVATION Trial of PCI Before TAVR



69% completely asymptomatic and > 2/3 SVD…

Patterson, T. et al. J Am Coll Cardiol Intv. 2021;14(18):1965-1974.

CENTRAL ILLUSTRATION The Effect of CAD Complexity and Revascularization With PCI on Cardiovascular Mortality 5 Years After TAVR



Minten L, et al. J Am Coll Cardiol Intv. 2022;15(16):1611-1620.

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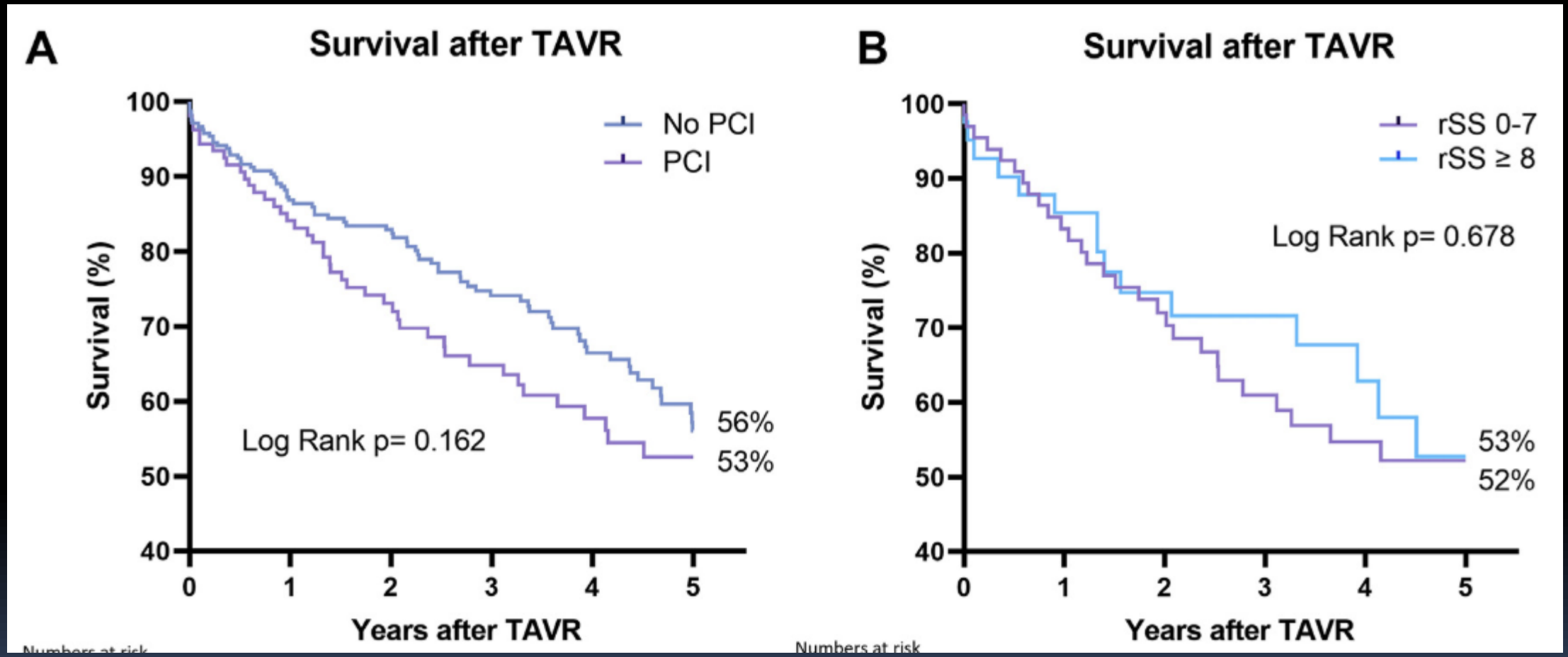

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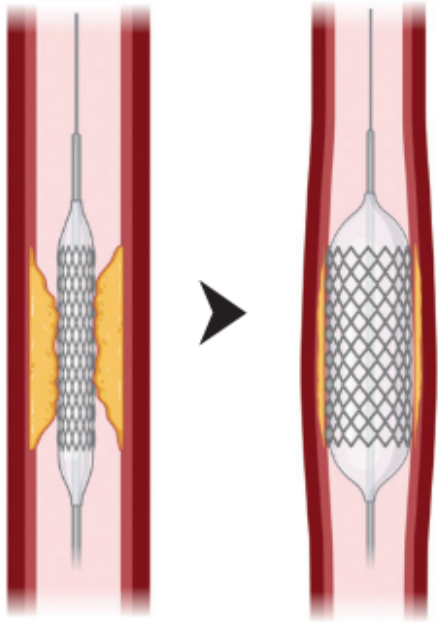
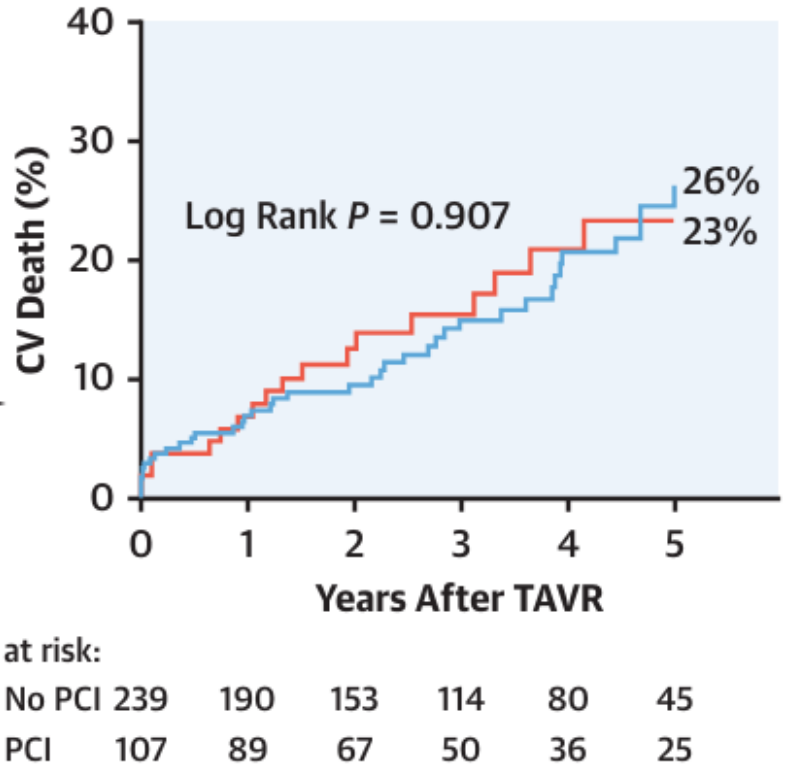
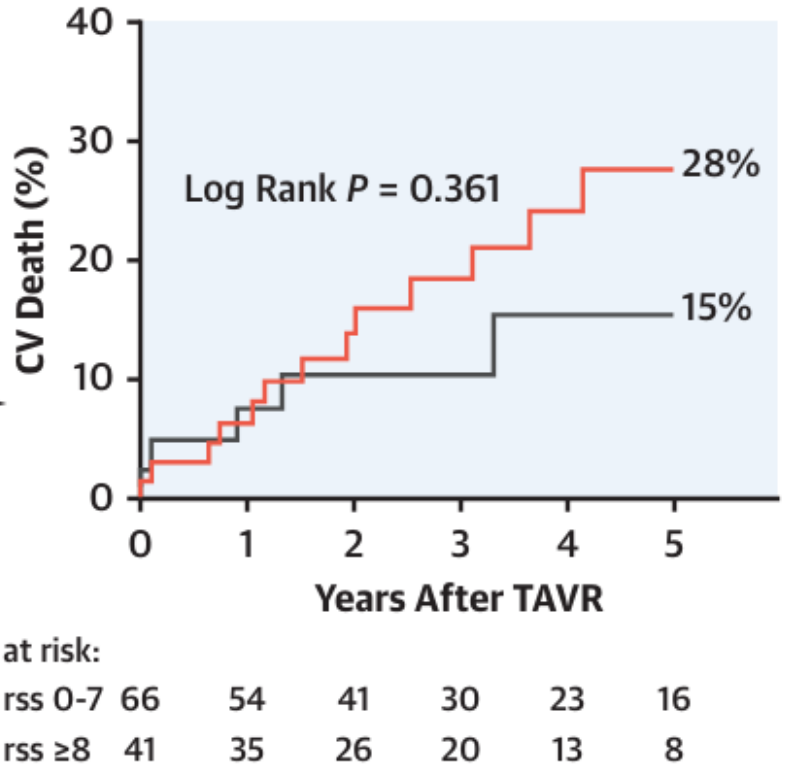






Minten L, et al. J Am Coll Cardiol Intv. 2022;15(16):1611-1620.

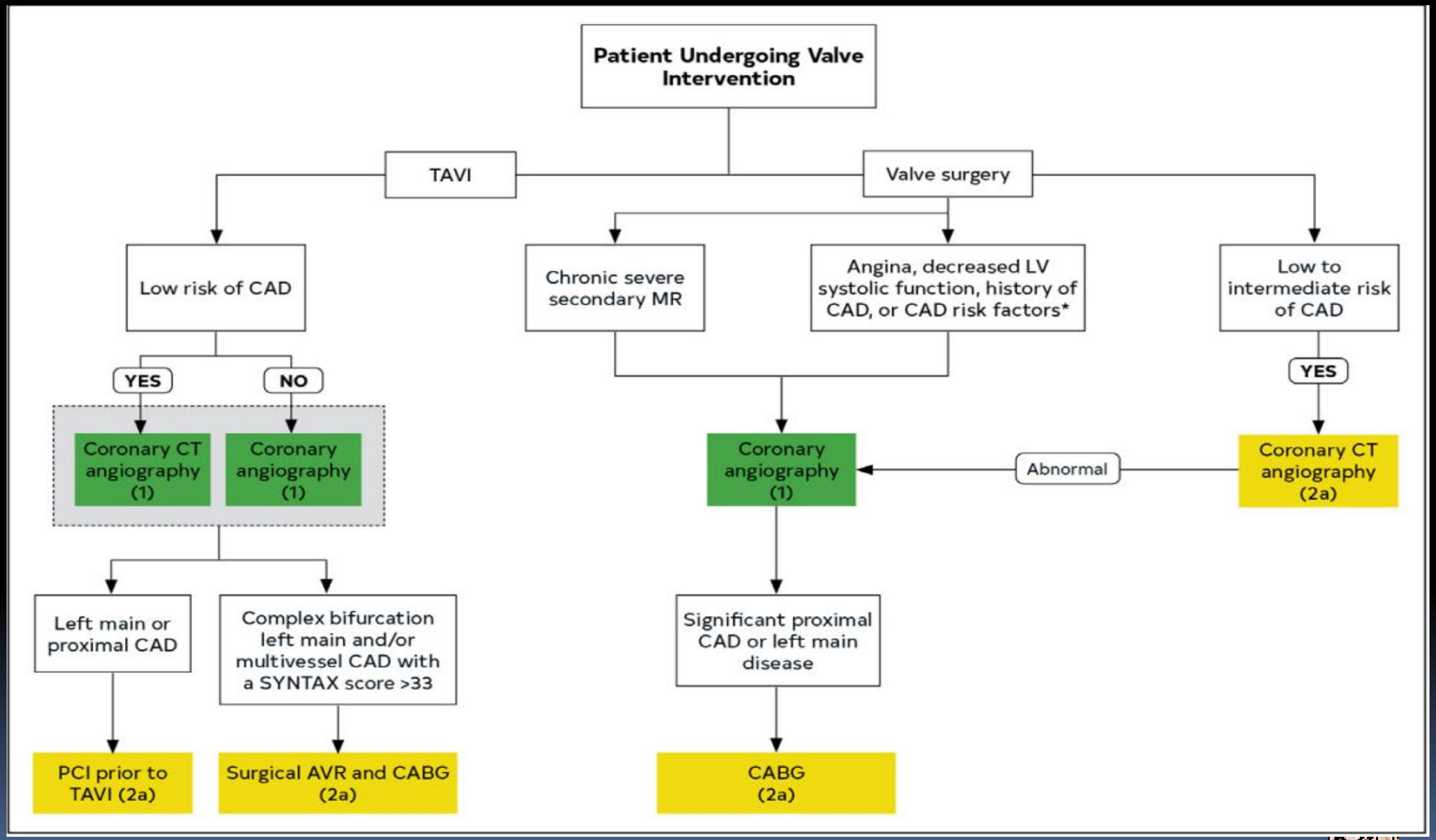
2021 ESC/EACTS Guidelines for the management of valvular heart disease

PCI should be considered in patients with a primary indication to undergo TAVI and coronary artery diameter stenosis >70% in proximal segments.	IIa	C

2020 ACC/AHA Guideline for the Management of Patients With Valvular Heart Disease

A Report of the American College of Cardiology/American Heart Association Joint Committee on Clinical Practice Guidelines

2a	C-LD	2. In patients undergoing TAVI with significant left main or proximal CAD with or without angina, revascularization by PCI before TAVI is reasonable.[1,2]

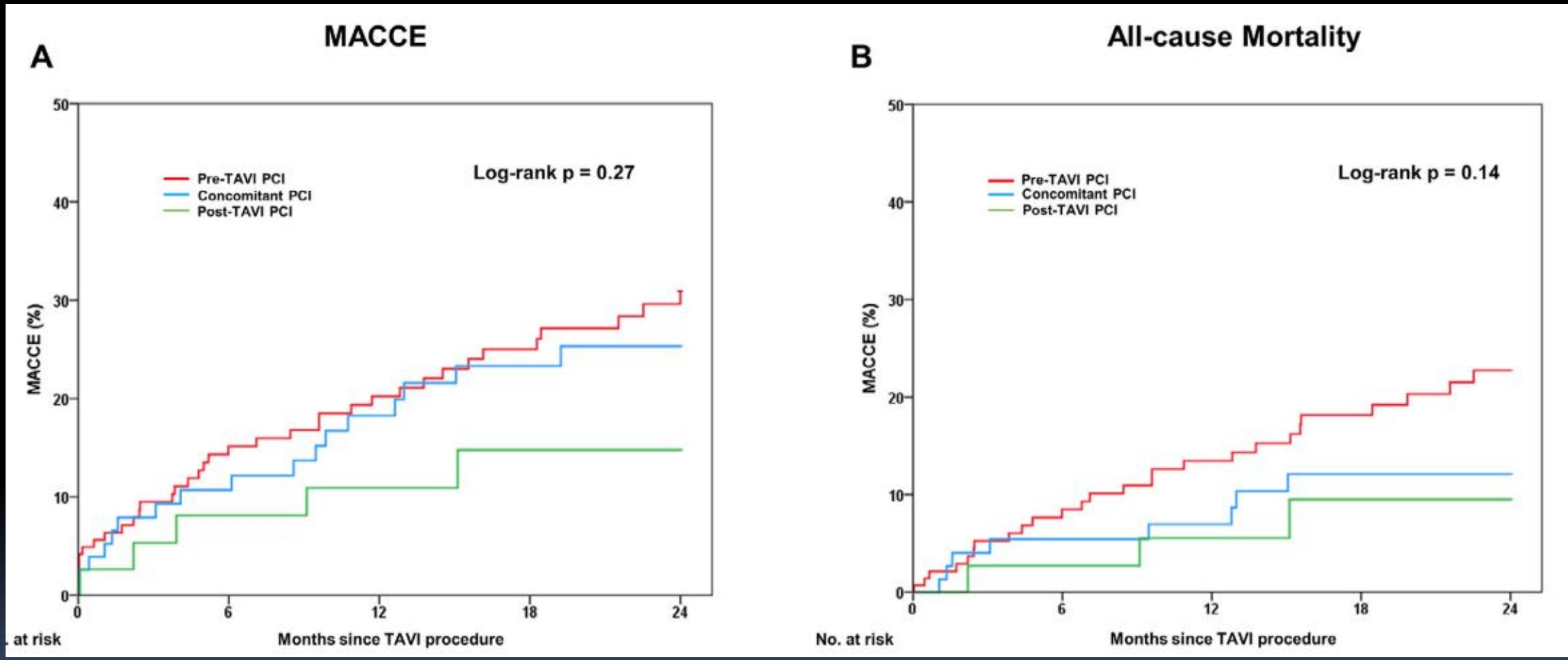

Patient Undergoing Valve Intervention
TAVI
Valve surgery
Low risk of CAD
Chronic severe secondary MR
Angina, decreased LV systolic function, history of CAD, or CAD risk factors*
Low to intermediate risk of CAD
YES
NO
YES
Coronary CT angiography (1)
Coronary angiography (1)
Coronary angiography (1)
Abnormal
Coronary CT angiography (2a)
Left main or proximal CAD
Complex bifurcation left main and/or multivessel CAD with a SYNTAX score >33
Significant proximal CAD or left main disease
PCI prior to TAVI (2a)
Surgical AVR and CABG (2a)
CABG (2a)

Timing of PCI in pts undergoing TAVI …

Staged vs Concomitant PCI in SURTAVI std

- 59.4% staged vs. 40.6% concomitantly
- Median duration between PCI and TAVR 6 days
- Baseline characteristics balanced
- Similar mean index hospital stay (7±5 days) and ICU stay (53±54 vs. 52±33 hours)
- More contrast used in **staged PCI** and more AKI (11.8% vs. 2.0%; *P*=0.04)
- Other 30-day clinical outcomes similar

Timing and Outcomes of Percutaneous Coronary Intervention in Patients Who Underwent Transcatheter Aortic Valve Implantation



Ochiai et al AJC 2020

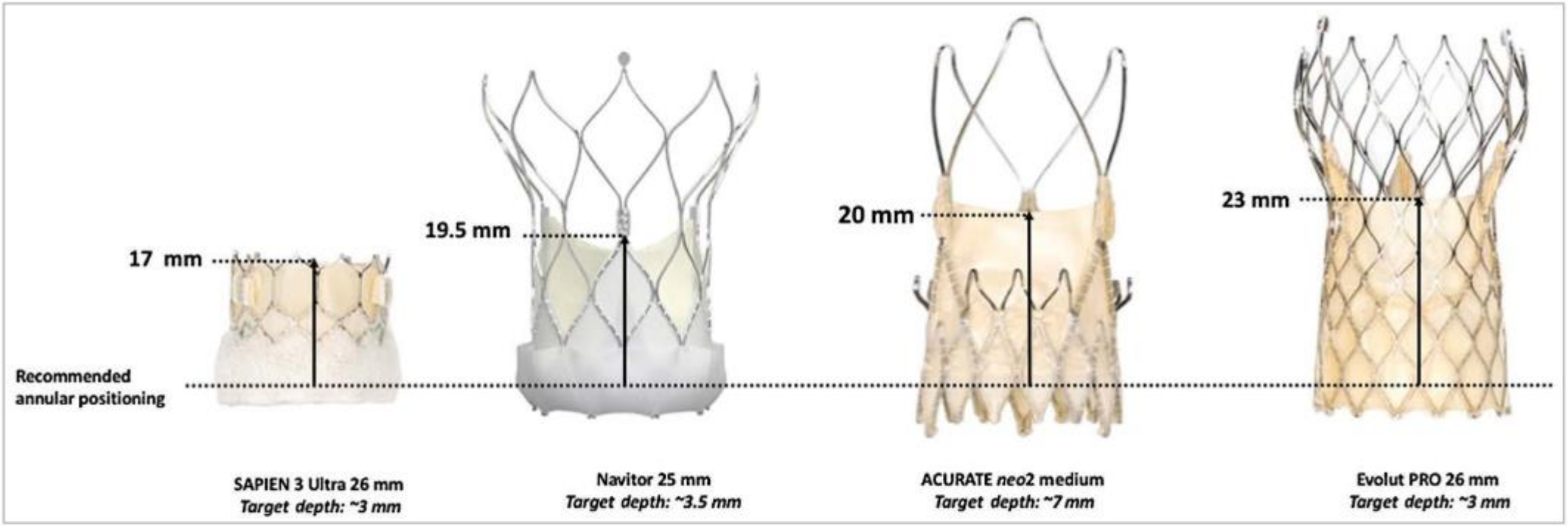
Consensus

- PCI (and timing) in pts scheduled for TAVI should be based on
  - Pt characteristics, (angina, CAD severity, lesion location and complexity}
  - Type of implanted THV
- The evidence base is limited but, in general
  - **Does not support routine PCI** prior to TAVI in **asymptomatic** lesions
  - Suggests that when PCI is performed, **a separate staged procedure prior to TAVI is preferable**…

Consensus

- **PCI before TAVI:** sCAD (i.e., stenosis >70%, >50% LM) only in proximal segments, particularly if presenting with an ACS, angina or subocclusive lesions (i.e., >90%).
- If PCI is planned **after TAVI**, the THV choice (i.e., low-frame versus high-frame) and **implantation technique** (i.e., commissural alignment) should be aimed at preserving easy coronary access.

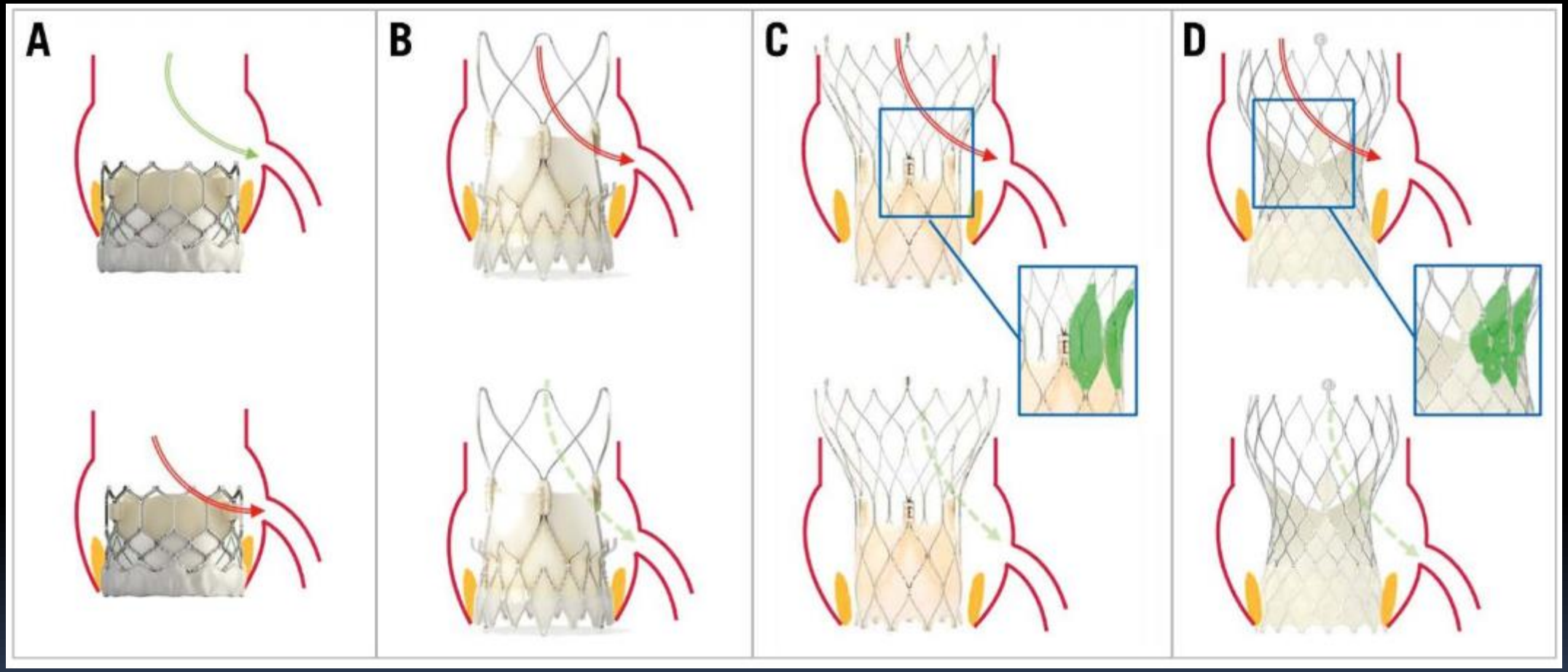
Which THV ?



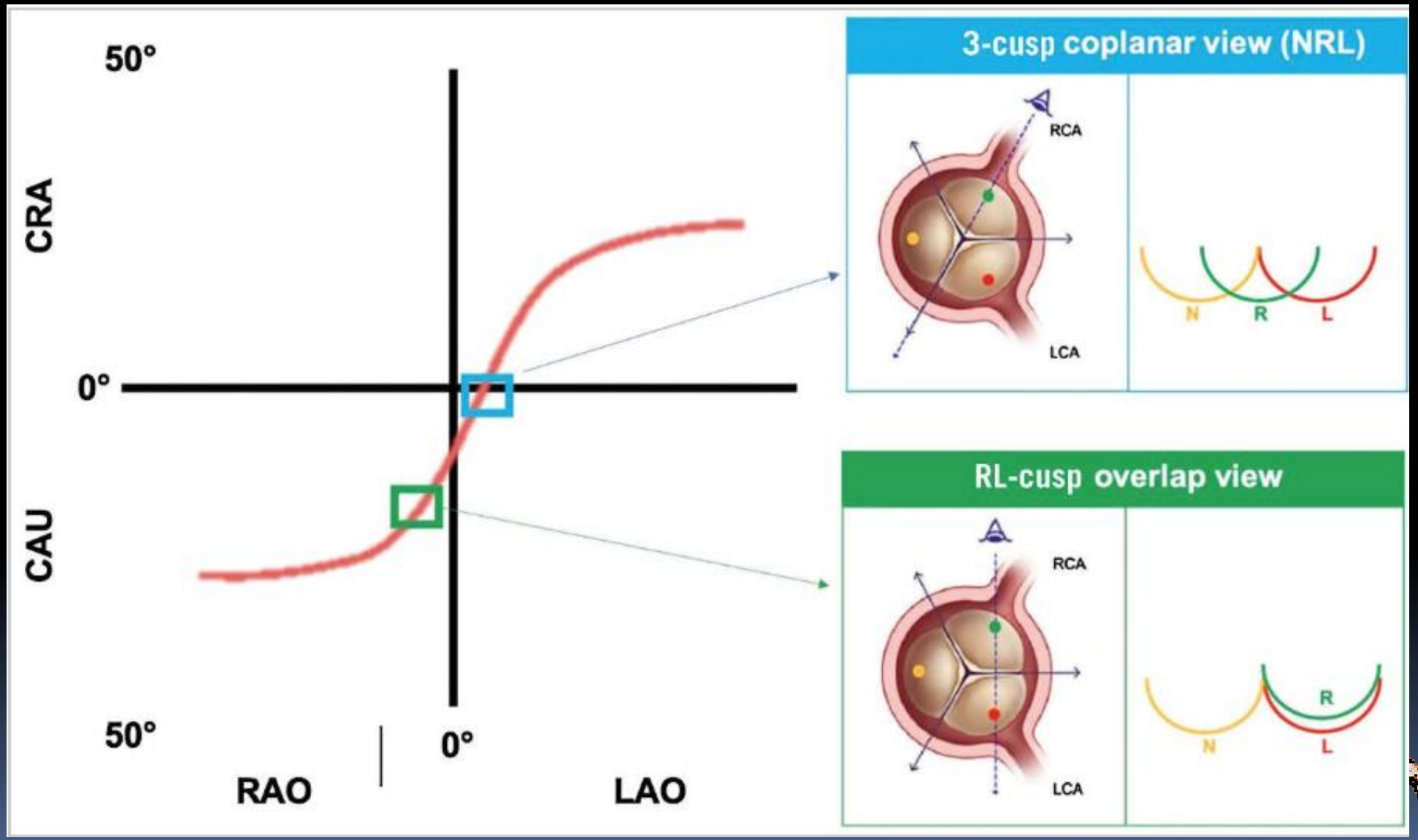
THV leaflet height with respect to recommended annular positioning. THV: transcatheter heart valve

THV leaflet height with respect to the recommended annular positioning, which is lowest for the SAPIEN 3/Ultra and highest for the Evolut R/Pro THVs

Which THV ?



COMMISSURAL ALIGNMENT



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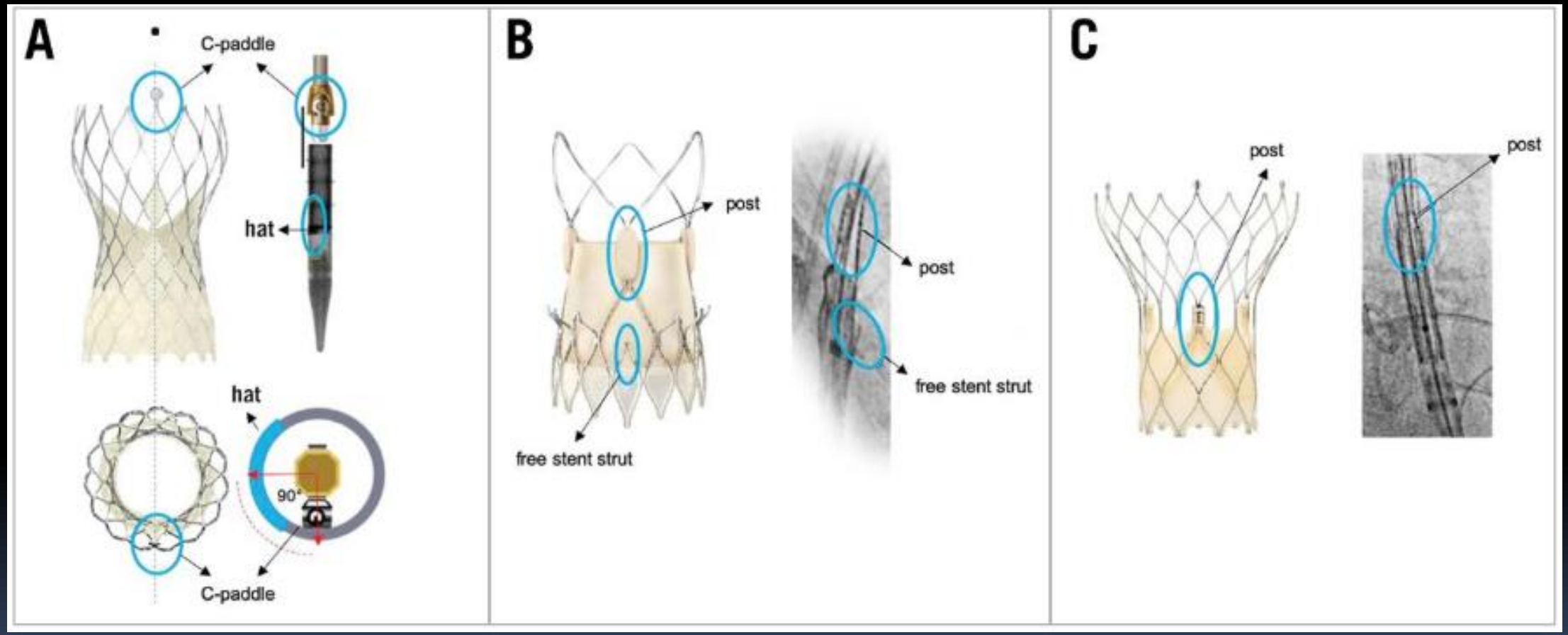


Complete Revasc in pts undergoing TAVI …

Complete Revasc?

- At present, there are no randomised studies comparing complete vs. incomplete revascularisation in pts with stable CAD undergoing TAVI. Thus, no recommendations can be made…
- A Heart Team-based decision of the most appropriate revascularisation strategy for TAVI pts should be aimed for in all cases.

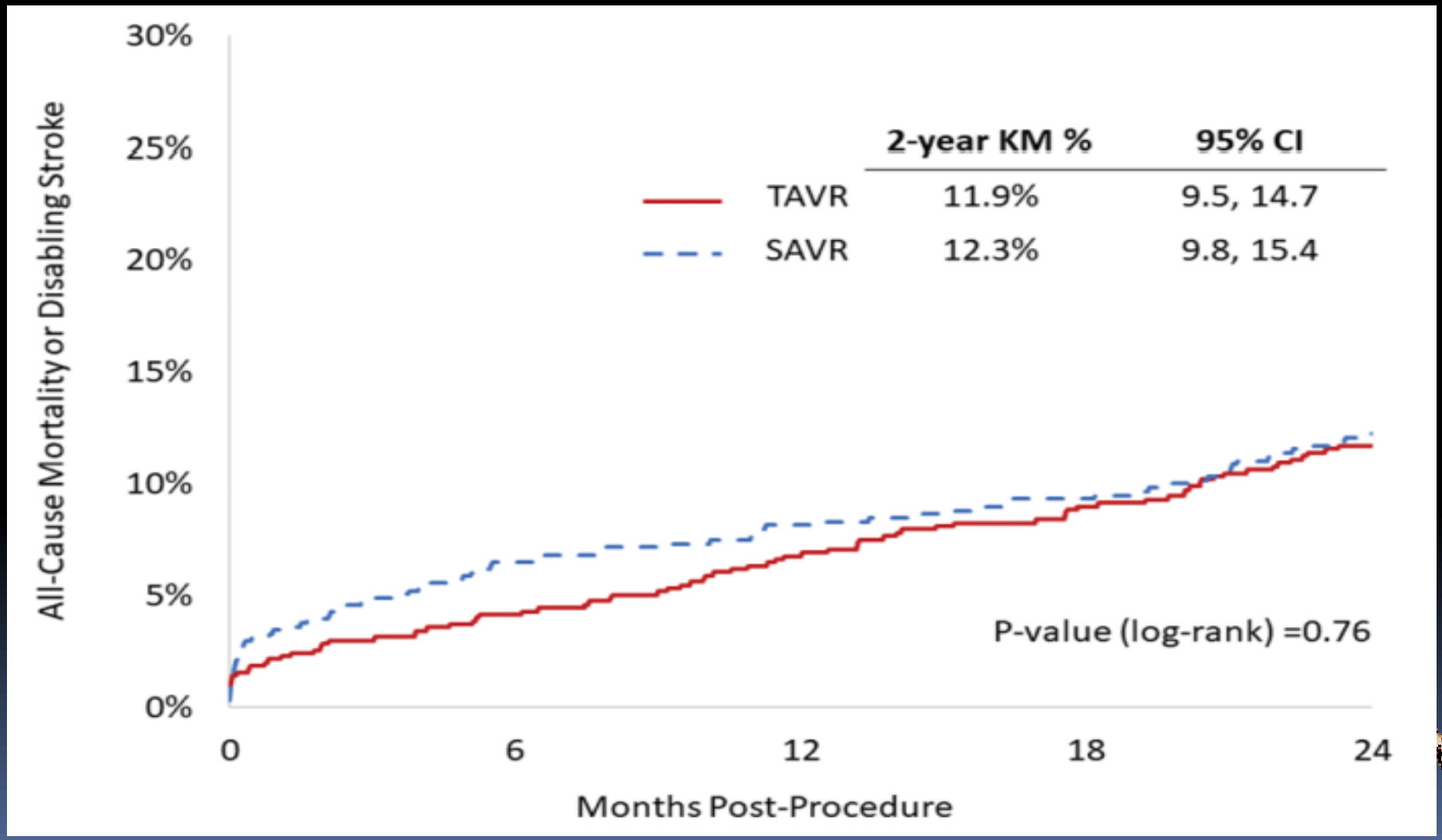
Overview…

- **High surgical risk pts**
- TAVI @ PCI, or TAVI without revasc?
- TAVI @ PCI: Timing of PCI? Complete revasc?

- **Lower surgical risk pts**
- TAVI @ PCI or SAVR @ CABG?

Comparison of a Complete Percutaneous Versus Surgical Approach to Aortic Valve Replacement and Revascularization in Patients at Intermediate Surgical Risk

Results From the Randomized SURTAVI Trial



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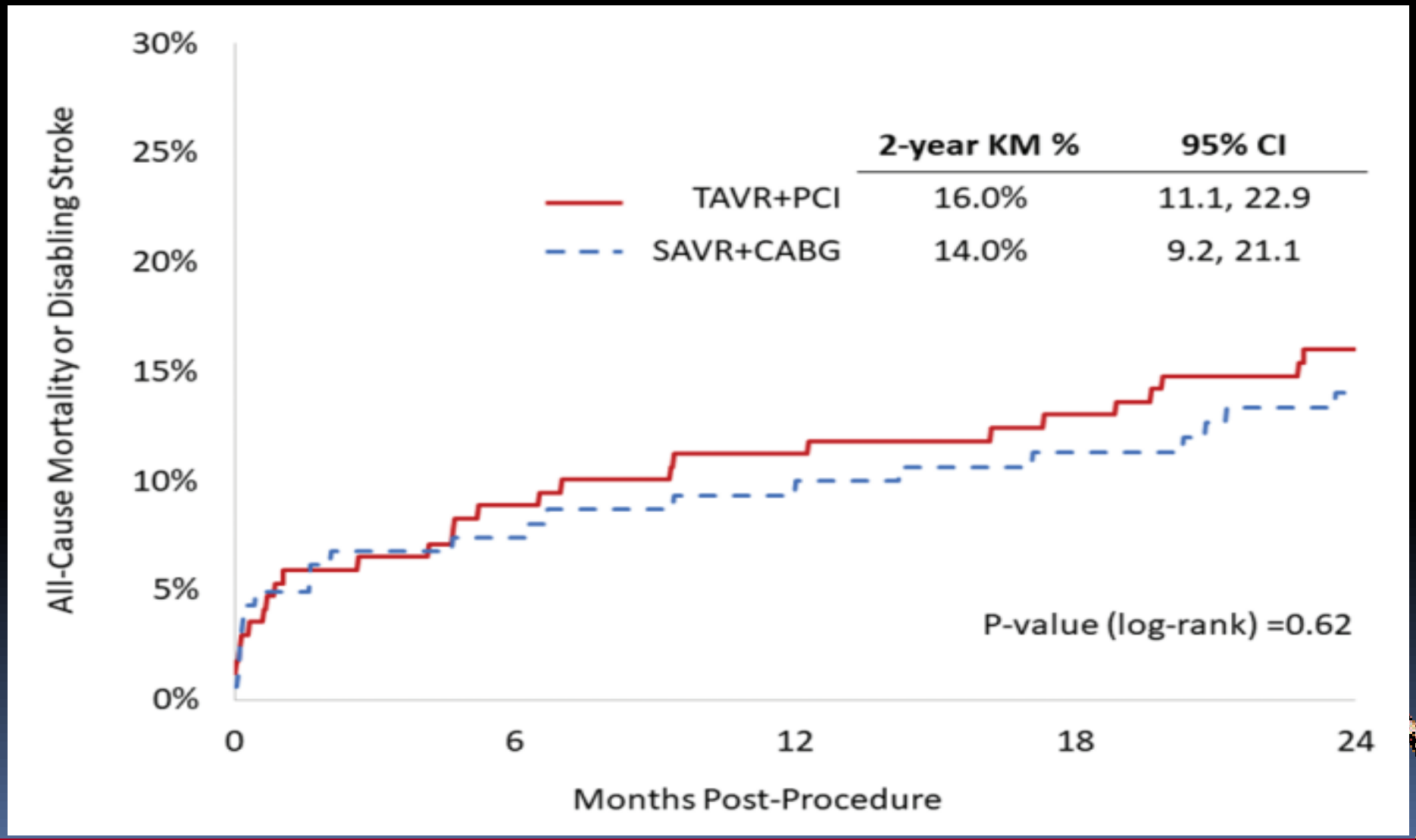
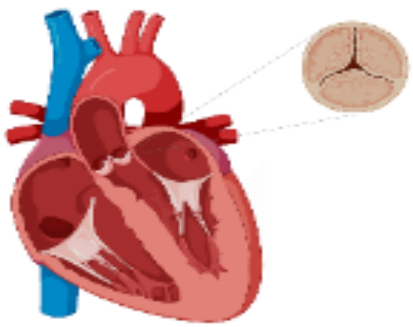


Severe Aortic Stenosis and Coronary Artery Disease



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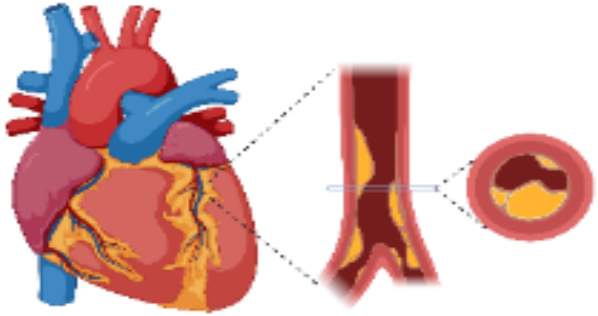
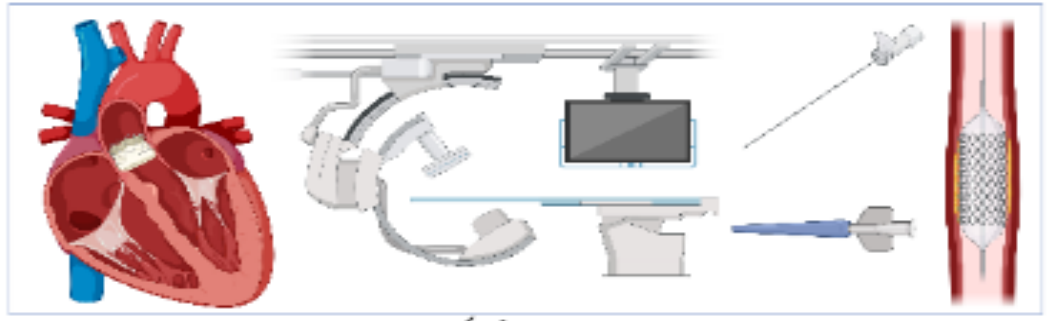


Surgical AVR +/- CABG

TAVI +/- PCI



Effect of CAD on outcomes

-Presence of CAD increases early and late mortality in AS

Role of CABG on top of SAVR

-Combined surgery has higher unadjusted mortality risk, driven by underlying CAD (vs patients without CAD)

-Whenever CAD is significant, combined surgery results in reduced early and late mortality (vs single AVR)

Effect of CAD on outcomes

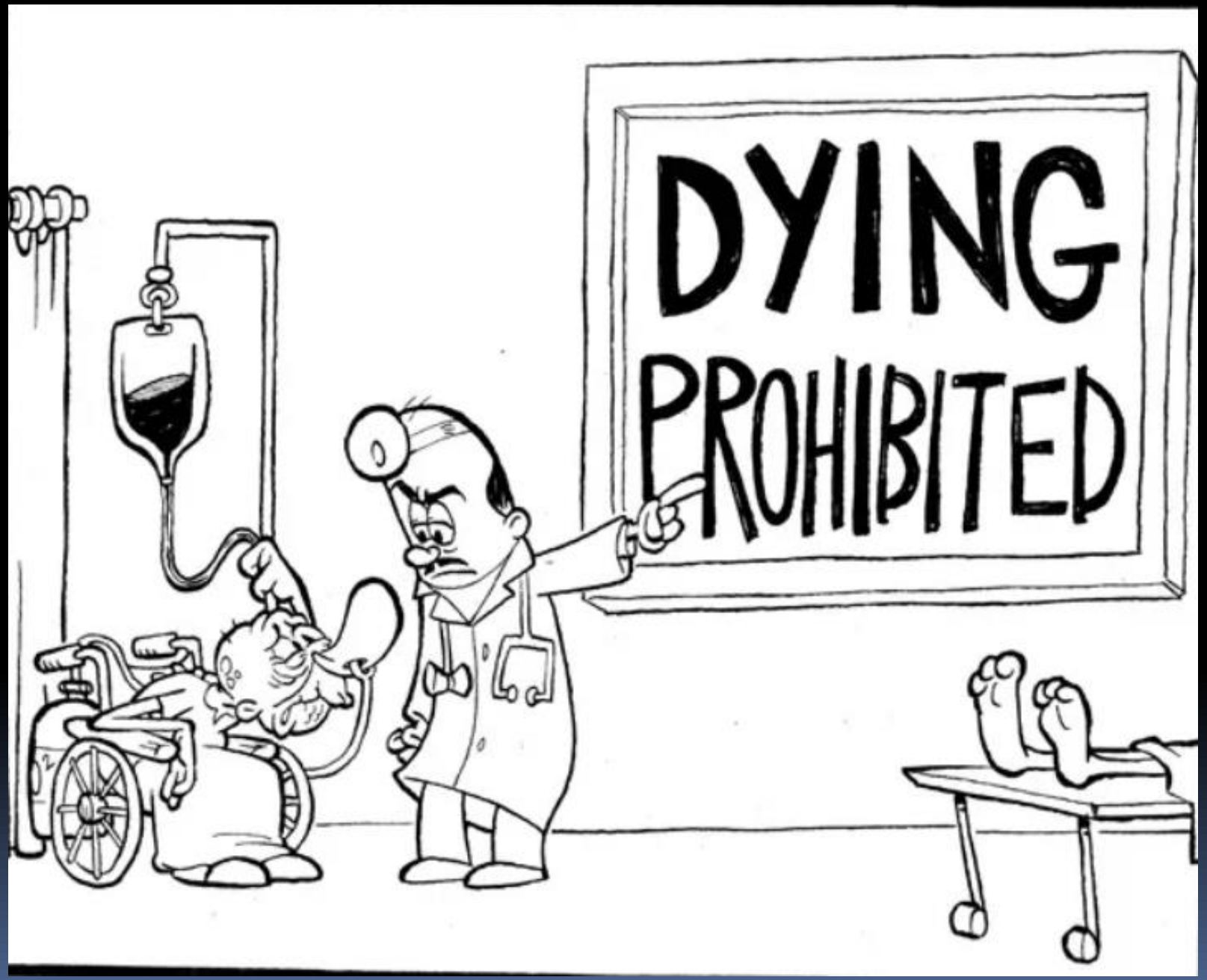
-Presence of CAD increases mortality after 1y, especially when complex (SS >22)

Role of PCI on top of TAVI

-Unselective PCI has no benefit over medical treatment on hard clinical endpoints, but carries more bleeds

-Incomplete revascularization in complex CAD may be unfavourable, pointing towards importance of PCI in lesion subset

-Tools to select appropriate PCI are of critical importance and under investigation


DYING
PROHIBITED

ICA in TAVI Candidates

- Current standard of care in the assessment of CAD
- Allows for assessment of lesion severity and PCI
- Timing of ICA?
- VHD guidelines recommend ICA
  - Prior to consideration of either SAVR or TAVI – (pts with a history of CVD, with at least one CV risk factor, suspected myocardial ischaemia, LV systolic dysfunction, or men >40 years of age and postmenopausal women). (Class I, Level of Evidence [LoE] C)
- CTCA not ideal for elderly pts (calcium)

Assessing CAD severity in sAS: Stress tests vs CTCA

- Stress testing: Low specificity and safety concerns
- **CTCA:** High sensitivity (89–99%) and NPV (90–96%) compared with ICA, low specificity (37–91%) and PPV (59–87%)
  - CTCA may reduce ICAs performed by up to 37%
- **CTCA-derived FFR:** Diagnostic accuracy of 77% compared to invasive FFR
- ***CTCA for low probability (younger), asymptomatic pts…***