11° CONGRESSO NAZIONALE

CAMPUS Cuore

Quello che le Linee Guida Non Dicono

Napoli
5-6 aprile 2024

HOW TO SESSION 2
CARDIOLOGIA INTERVENTISTICA CORONARICA E VALVOLARE

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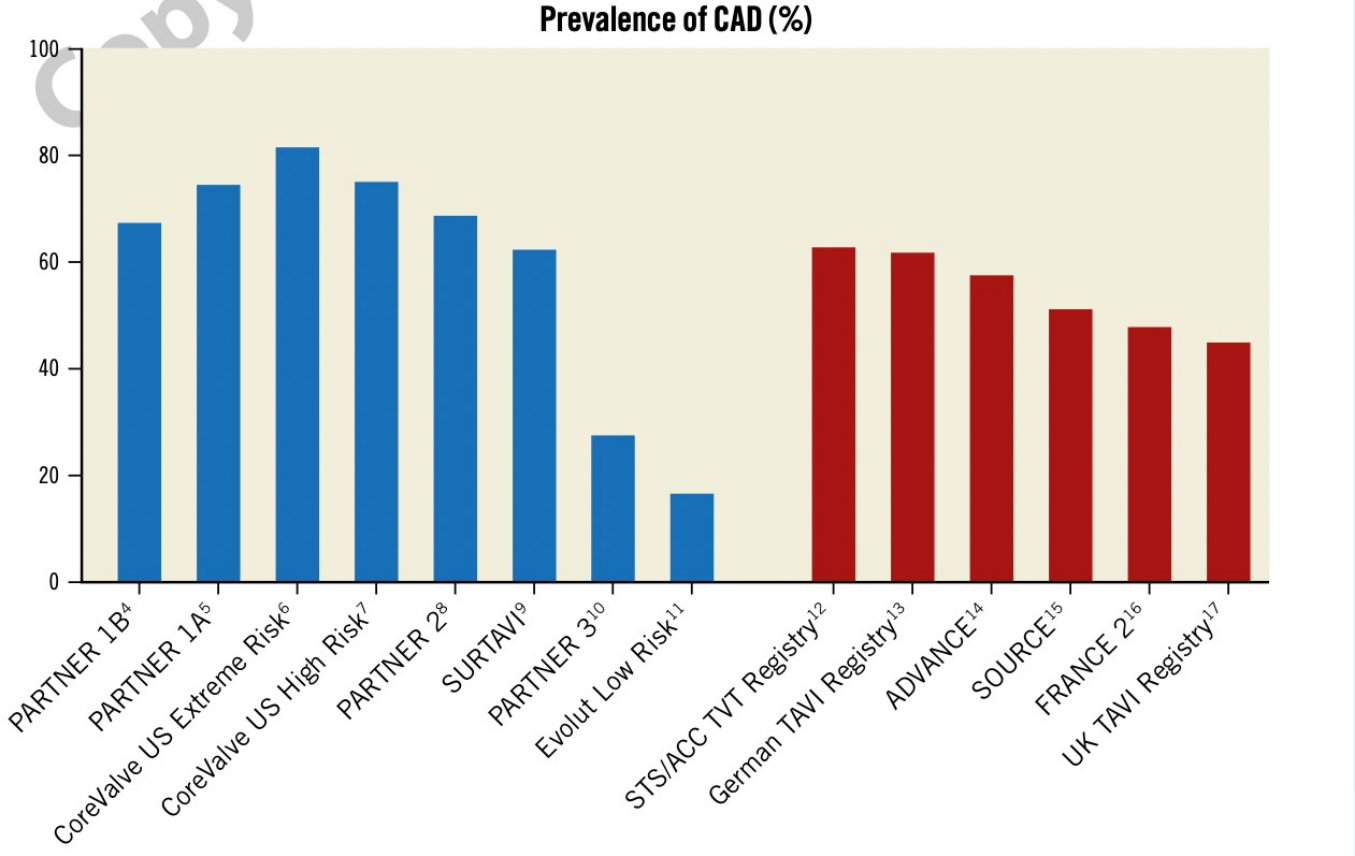
Napoli
5-6 aprile 2024

Gestione della coronaropatia nel paziente candidato a TAVI: timing ideale del trattamento

Elisabetta Moscarella, MD
Università degli Studi della Campania L. Vanvitelli
AORN Sant'Anna e San Sebastiano, Caserta

The burden CAD is significant in patients with severe AS and may impact both the procedural risk as well as the post-procedural prognosis of the patient.

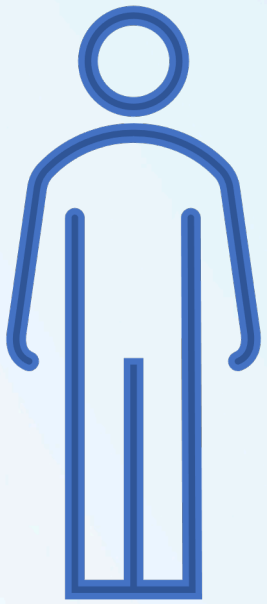


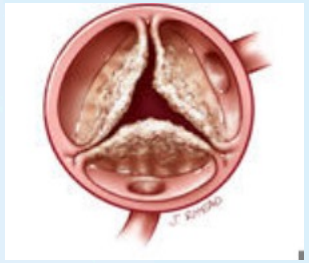
- Coronary artery disease (CAD) co-exists in up to 60% of cases
- This high prevalence can be attributed to overlapping causative factors
- CAD is an independent predictor of adverse outcomes in the surgical population and revascularisation is recommended in patients undergoing sAVR

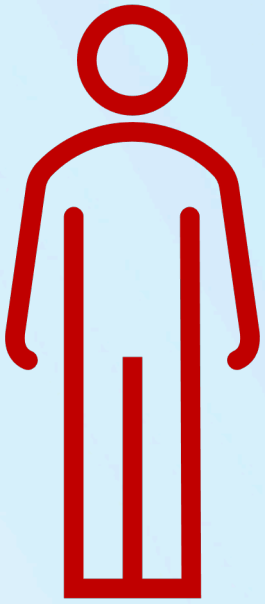
Prevalence of CAD in low-risk pts with AS is 15-20% but it goes up to 80% extreme high-risk pts

Tarantini et al, EuroIntervention 2023;19:37-52

AORTIC VALVE STENOSIS







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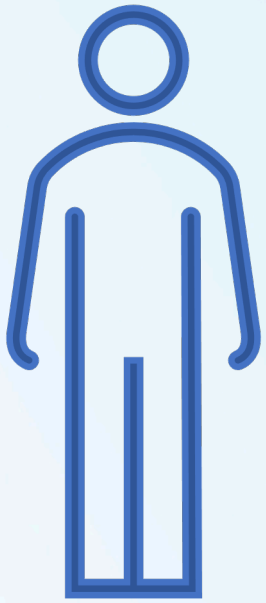

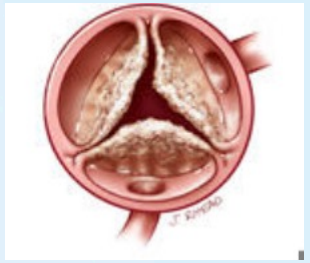

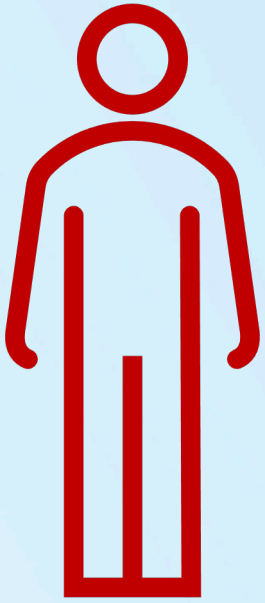

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ESC Valvular Heart Disease Guidelines

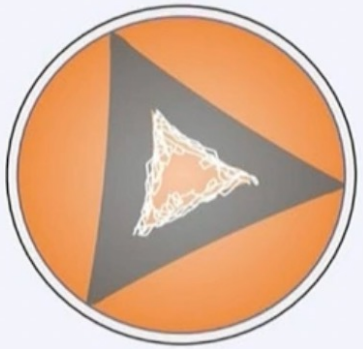
Recommendations	Class[a]	Level[b]
Diagnosis of CAD		
Coronary angiography is recommended before valve surgery in patients with severe VHD and any of the following: • History of cardiovascular disease. • Suspected myocardial ischaemia.[c] • LV systolic dysfunction. • In men >40 years of age and postmenopausal women. • One or more cardiovascular risk factors.	I	C

Vahanian et al. European Heart Journal (2022) 43, 561–632

Factors attenuating coronary blood flow in aortic stenosis

Education in Heart
Management of coronary artery disease in patients with aortic stenosis
Vitaliy Androshchuk, Tiffany Patterson, Simon R Redwood

Aortic Valve Stenosis



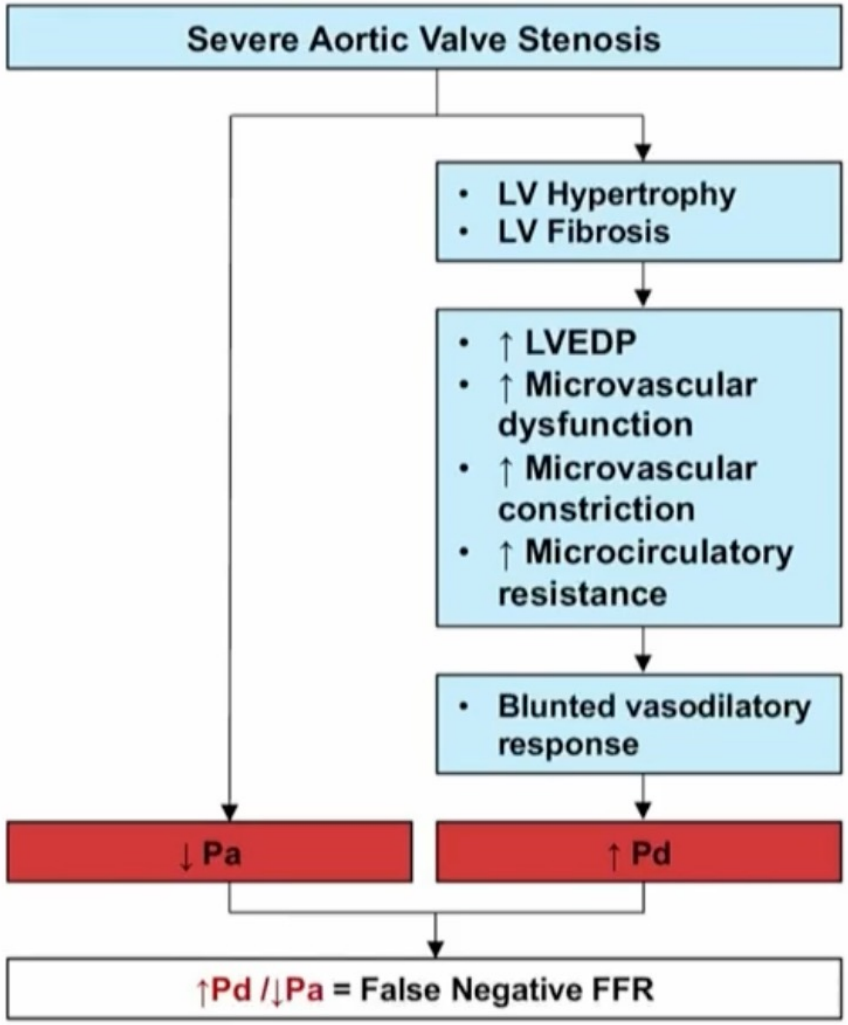
Flow Input:
- Attenuated/delayed peak systolic arterial pressure
- Lower mean arterial pressure and pulse pressure
- Attenuated/delayed dominant systolic forward compression wave

Flow output:
- Left ventricular hypertrophy
- Increased resting dominant diastolic backward expansion wave
- Reduced microcirculatory resistance at rest
- Lower coronary microvasculature density

Coronary arteries:
- Vasoactive substance upregulation increases blood flow
- Endothelial dysfunction impairs hyperaemic responses
- Reduced diastolic coronary perfusion

Vitaliy Androshchuk et al. Heart 2023;109:322-329

Effects of severe aortic stenosis on FFR measurement



Education in Heart

Management of coronary artery disease in patients with aortic stenosis

Vitaliy Androshchuk, Tiffany Patterson, Simon R Redwood

- ❑No formal validation
- ❑Hamper maximal hyperaemia in pts with SAS
- ❑"Tandem stenosis effect"
- ❑Concerns about the administration of vasodilators in pts with SAS
- ❑Also iFR has never been validated in patients with SAS

Vitaliy Androshchuk et al. Heart 2023;109:322-329

Ongoing RCTs in management of CAD in TAVI patients

Education in Heart

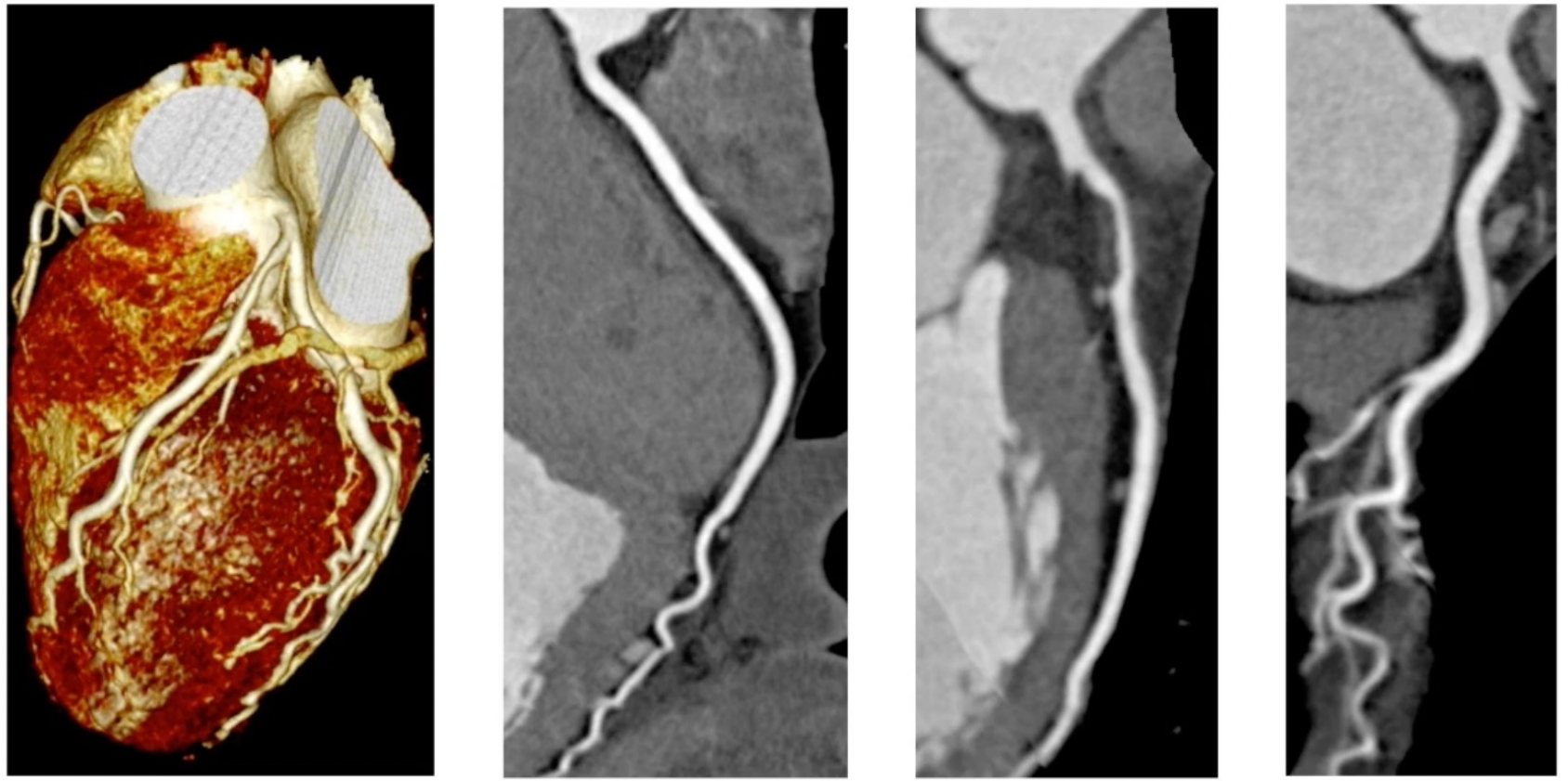
Table 3 Ongoing randomised controlled trials on the management of coronary disease in TAVI recipients

Study	Identifier	Randomisation strategy	Primary endpoint
NOTION-3	NCT03058627	TAVI alone vs TAVI with FFR-guided complete revascularisation.	Number of patients experiencing all-cause mortality, myocardial infarction or urgent PCI at 1 year.
FAITAVI	NCT03360591	Angiographically guided PCI (coronary stenosis ≥50% by visual assessment in vessels ≥2.5 mm) vs physiologically guided PCI (lesions with FFR values ≤0.80 only).	Composite of all-cause death, myocardial infarction, stroke, major bleeding and need for target vessel revascularisation as adjudicated by the clinical event committee at 1 year.
TCW	NCT03424941	FFR-guided PCI and TAVI vs CABG and SAVR.	Composite of all-cause mortality, myocardial infarction, disabling stroke, unscheduled clinically driven target vessel revascularisation, valve reintervention, and life-threatening or disabling bleeding at 1 year.
TAVI-PCI	NCT04310046	PCI (any suitable lesion with iFR ≤0.89 or >90% diameter stenosis in a coronary artery ≥2.5 mm) within 1–45 days before TAVI vs within 1–45 days after TAVI.	Composite of all-cause death, non-fatal myocardial infarction, ischaemia-driven revascularisation, rehospitalisation, and life-threatening/disabling or major bleeding at 1 year.

CABG, coronary artery bypass grafting; FAITAVI, Functional Assessment in TAVI; FFR, fractional flow reserve; iFR, instantaneous wave-free ratio; NOTION-3, Revascularisation in Patients Undergoing Transcatheter Aortic Valve Implantation; PCI, percutaneous coronary intervention; SAVR, surgical aortic valve replacement; TAVI, transcatheter aortic valve implantation; TAVI-PCI, Optimal Timing of Transcatheter Aortic Valve Implantation and Percutaneous Coronary Intervention; TCW, Transcatheter Valve and Vessels trial.

Vitaliy Androshchuk et al. Heart 2023;109:322-329

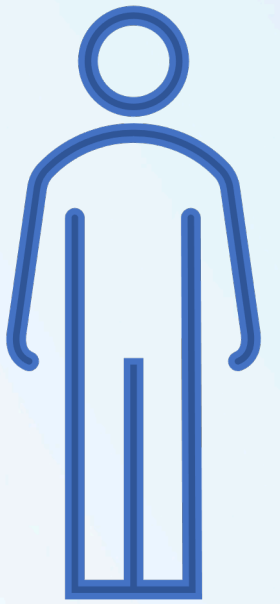
NON-INVASIVE CAD ASSESSMENT

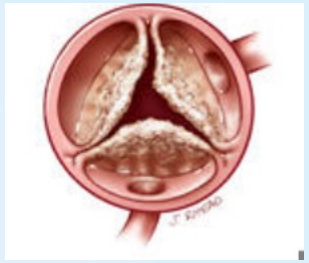


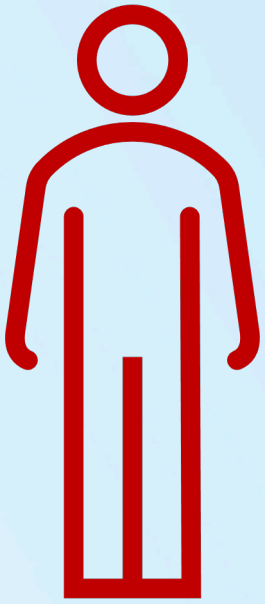
V:

CTCA might be considered in patients with a low pre-test probability of CAD and in whom reasonable image quality is expected.

AORTIC VALVE STENOSIS







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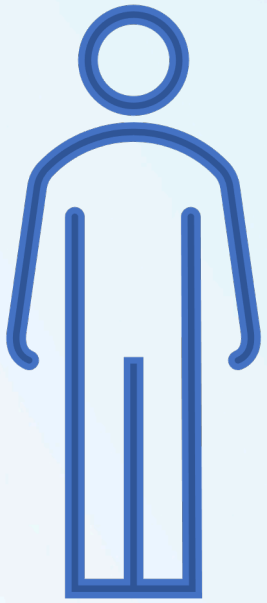

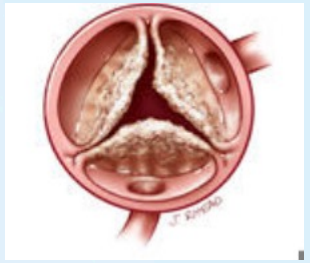

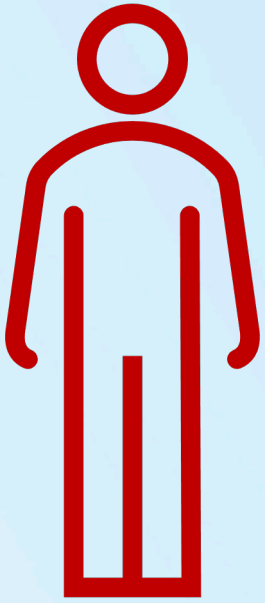

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V:

What is the **best timing** for PCI in AS patients?

Should we mimic the surgical approach?

2018 ECG guidelines myocardial Revasc

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

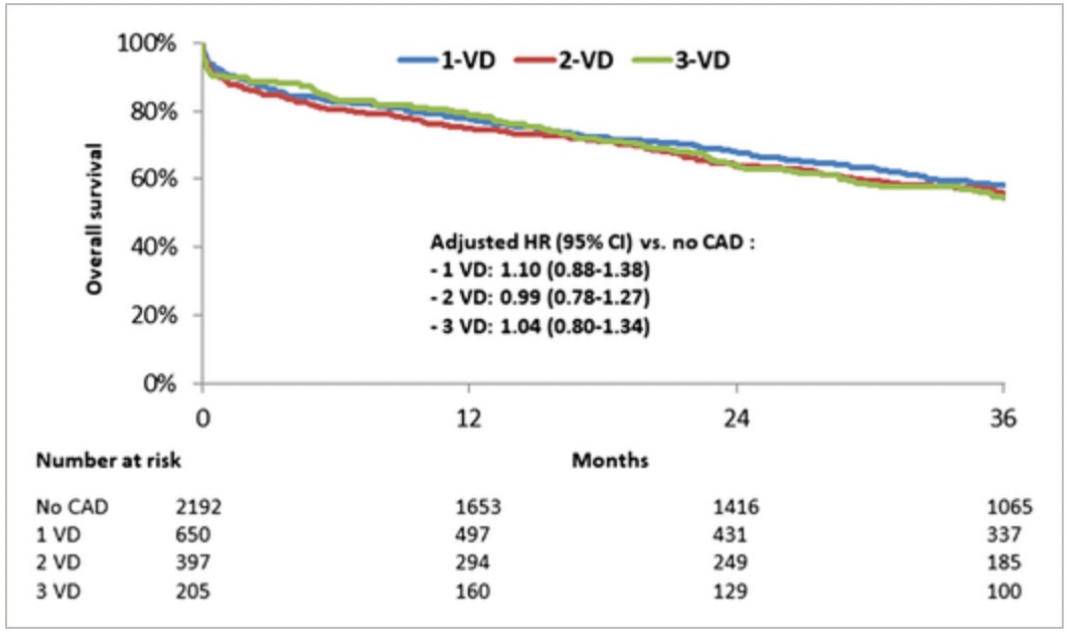
2023 EAPCI Consensus Document CAD & TAVI

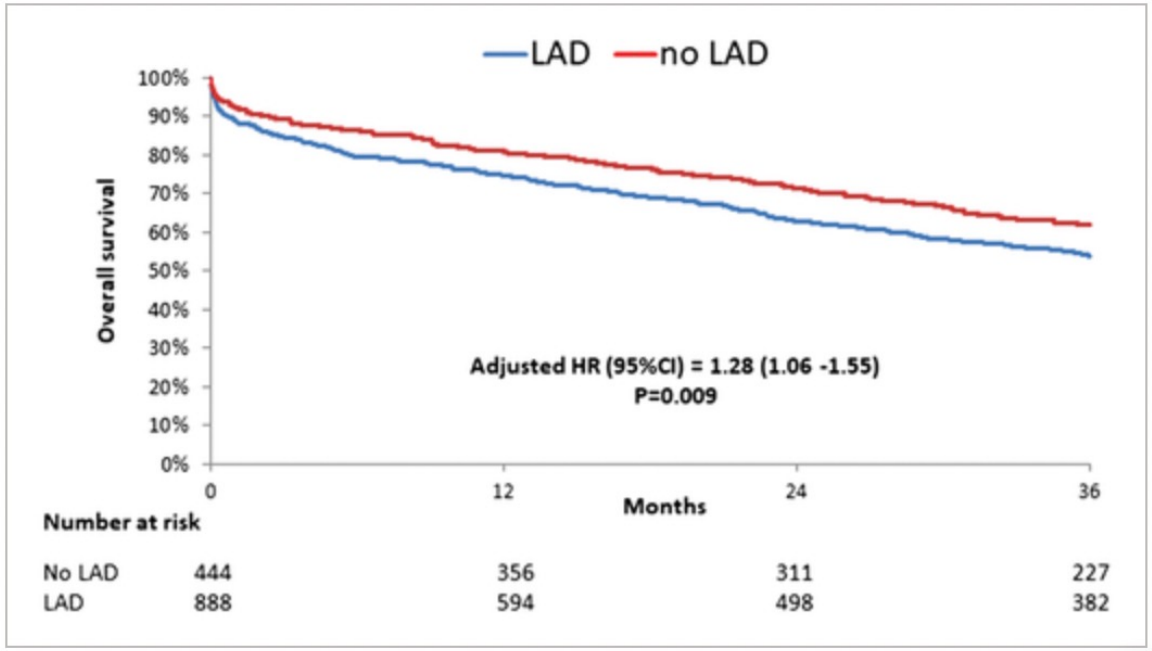
Consensus points:

1) PCI before TAVI should be performed in patients with severe CAD (i.e., coronary artery diameter stenosis >70%, >50% for the left main) only in proximal segments, particularly if presenting with an acute coronary syndrome, symptoms of angina pectoris or subocclusive lesions (i.e., >90% diameter stenosis).

FRANCE 2 registry

French registry including all consecutive TAVR performed between 2010 and 2012
4201 patients were enrolled. CAD reported in 1252 patients (30%).



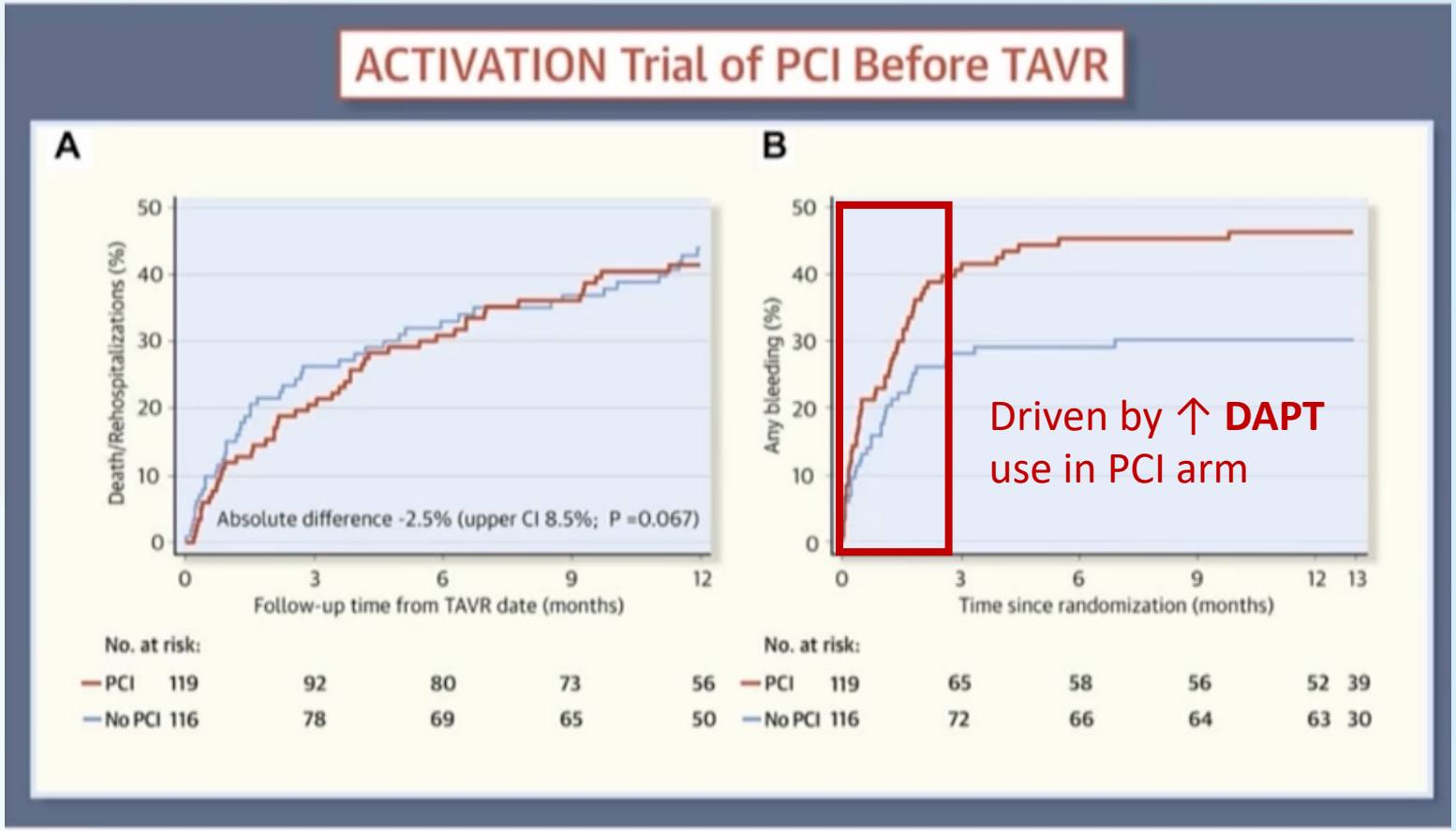


Only **significant lesions of LAD** were assocated with increased 3-year mortality but neither the **presence** nor the **extent** of CAD was associated with mortality at 3 years.

Puymirat et al. Clin Cardiol. 2017

- 17 Centers, 235 patients
- Severe AS + CAD with CCS Class ≤ 2 Angina
- PCI vs No PCI pre TAVR

ACTIVATION Trial of PCI Before TAVR

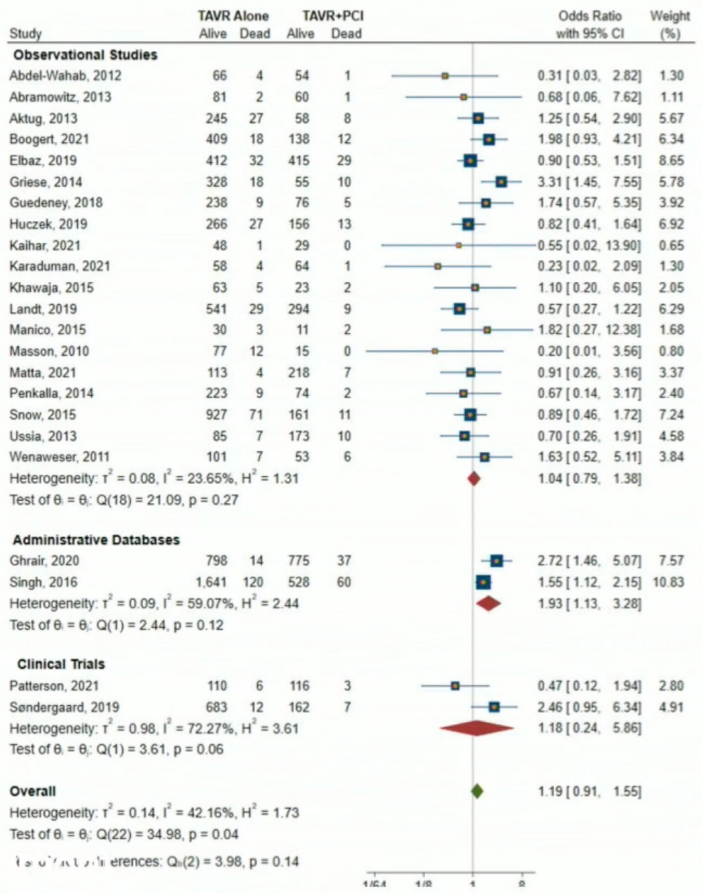


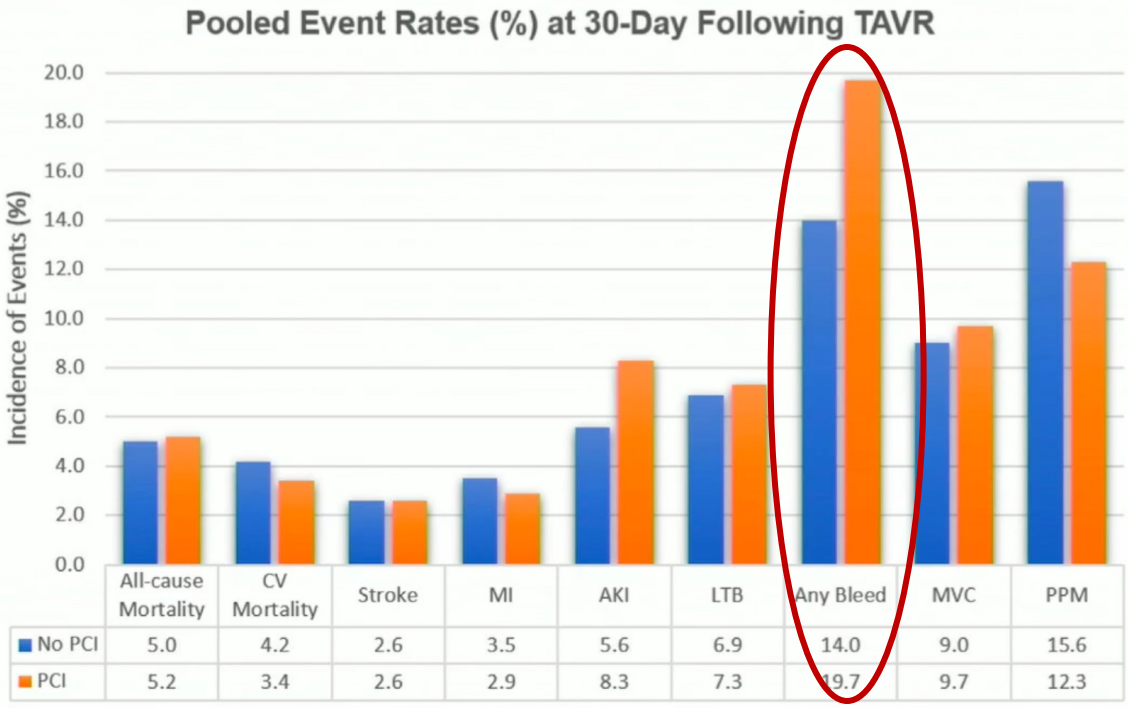
Patterson, T. et al. J Am Coll Cardiol Intv. 2021;14(18):1965-1974.

At 1 year, the primary composite endpoint (all-cause death or rehospitalization at 1 year) occurred in 48 (41.5%) of the PCI arm and 47 (44.0%) of the no-PCI arm.

STABLE MOSTLY SINGLE VESSEL CAD (UNPROTECTED LM EXCLUDED)
HIGH USE OF BMS
LOWER THAN-PLANNED SAMPLE SIZE

TAVR with Prior/Concomitant PCI vs Without PCI: Meta-Analysis





	All-cause Mortality	CV Mortality	Stroke	MI	AKI	LTB	Any Bleed	MVC	PPM
No PCI	5.0	4.2	2.6	3.5	5.6	6.9	14.0	9.0	15.6
PCI	5.2	3.4	2.6	2.9	8.3	7.3	19.7	9.7	12.3

24 Studies
12,182 Patients

Altibi AM et al. Curr Probl Cardiol 2022;47:101339

ESC European Society of Cardiology

European Heart Journal (2024) **00**, 1–11
https://doi.org/10.1093/eurheartj/ehae019

CLINICAL RESEARCH
Valvular heart disease

Impact of untreated chronic obstructive coronary artery disease on outcomes after transcatheter aortic valve replacement

Ian Persits [1], Habib Layoun[2], Nicholas P. Kondoleon[1], Nikolaos Spilias[2], Osamah Badwan[1], Joseph Sipko[1], James J. Yun[2], Ankur Kalra [3], Iryna Dykun [4], Larisa G. Tereshchenko[2,5], Amar Krishnaswamy[2], Grant W. Reed[2], Samir R. Kapadia[2], and Rishi Puri [2]*

[1]Department of Internal Medicine, Cleveland Clinic, Cleveland, OH, USA; [2]Department of Cardiovascular Medicine, Heart, Vascular, and Thoracic Institute, Cleveland Clinic, 9500 Euclid Avenue, Cleveland, OH 44195, USA; [3]Franciscan Health, Lafayette, IN, USA; [4]Department of Cardiology and Vascular Medicine, West German Heart and Vascular Center, University Hospital Essen, Essen, Germany; and [5]Department of Quantitative Health Sciences, Lerner Research Institute, Cleveland Clinic, Cleveland, OH, USA

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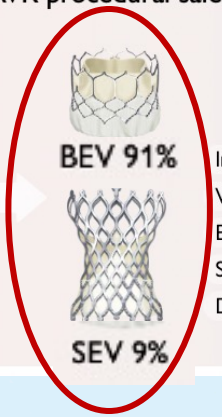
A

TAVR procedural safety with obstructive CAD

Definition of CAD Risk/Severity

Non-obstructive	All lesions in LAD, LCx and RCA <70%, LM <50%
Intermediate	LCX or RCA or non-prox LAD ≥70%
High	LCX and LAD ≥70% or RCA and either LAD or LCX ≥70% or prox LAD ≥70% or 50%≤ LM <70%
Extreme	Triple vessel disease (all lesions ≥70%) or LM ≥70%



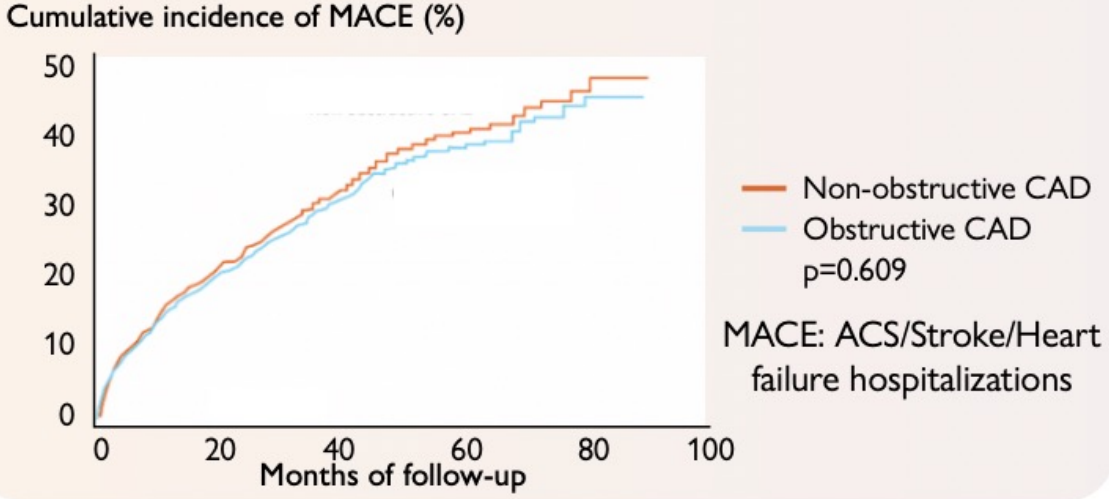
1911 included for analysis

	Non-obstructive CAD:1432	Intermediate CAD:116	High CAD:199	Extreme CAD:199
Intra-aortic balloon pump	0.1%	0.0%	0.0%	0.0%
Ventricular arrhythmia requiring shock	0.1%	0.0%	0.0%	0.0%
ECMO	0.1%	0.0%	0.0%	0.6%
Shock	0.0%	0.0%	0.0%	0.6%
Death	0.4%	0.0%	0.5%	0.6%

Overall procedural complications: p=0.60 (across groups)

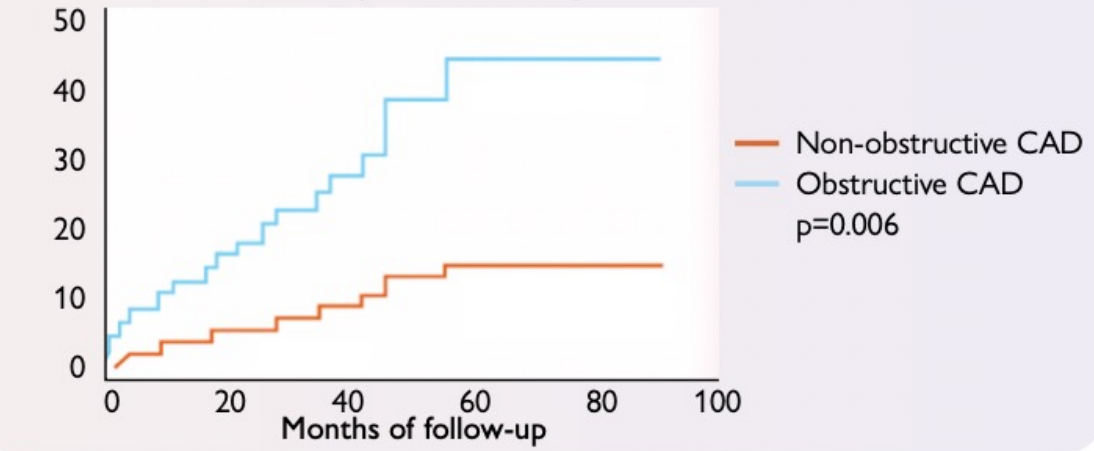
B

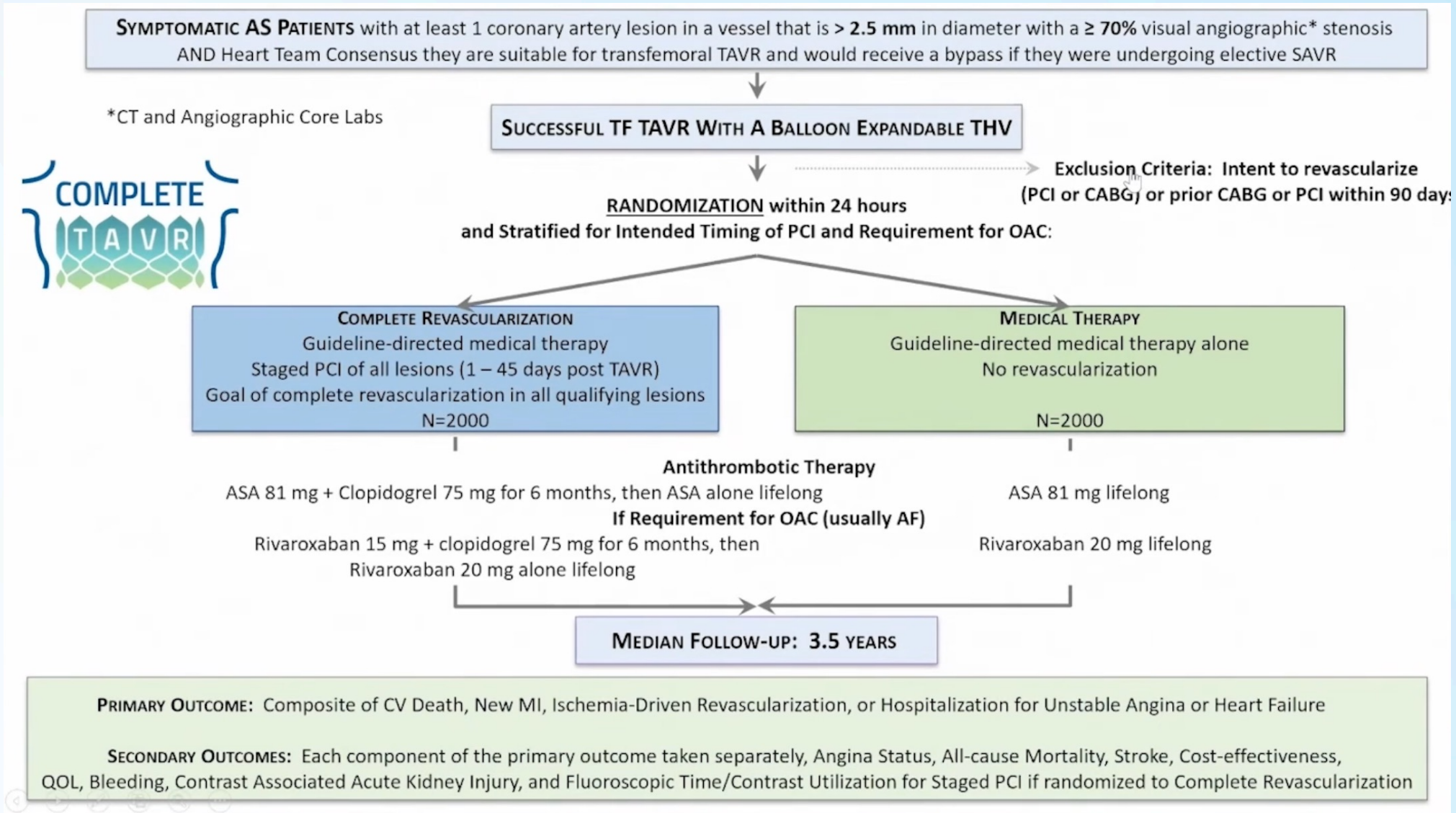
Cumulative incidence of MACE



C

Cumulative incidence of unplanned coronary revascularization




SYMPTOMATIC AS PATIENTS with at least 1 coronary artery lesion in a vessel that is > 2.5 mm in diameter with a ≥ 70% visual angiographic* stenosis
AND Heart Team Consensus they are suitable for transfemoral TAVR and would receive a bypass if they were undergoing elective SAVR
*CT and Angiographic Core Labs
SUCCESSFUL TF TAVR WITH A BALLOON EXPANDABLE THV
Exclusion Criteria: Intent to revascularize
(PCI or CABG) or prior CABG or PCI within 90 days
COMPLETE TAVR
RANDOMIZATION within 24 hours
and Stratified for Intended Timing of PCI and Requirement for OAC:
COMPLETE REVASCULARIZATION
Guideline-directed medical therapy
Staged PCI of all lesions (1 – 45 days post TAVR)
Goal of complete revascularization in all qualifying lesions
N=2000
MEDICAL THERAPY
Guideline-directed medical therapy alone
No revascularization
N=2000
Antithrombotic Therapy
ASA 81 mg + Clopidogrel 75 mg for 6 months, then ASA alone lifelong
ASA 81 mg lifelong
If Requirement for OAC (usually AF)
Rivaroxaban 15 mg + clopidogrel 75 mg for 6 months, then
Rivaroxaban 20 mg alone lifelong
Rivaroxaban 20 mg lifelong
MEDIAN FOLLOW-UP: 3.5 YEARS
PRIMARY OUTCOME: Composite of CV Death, New MI, Ischemia-Driven Revascularization, or Hospitalization for Unstable Angina or Heart Failure
SECONDARY OUTCOMES: Each component of the primary outcome taken separately, Angina Status, All-cause Mortality, Stroke, Cost-effectiveness, QOL, Bleeding, Contrast Associated Acute Kidney Injury, and Fluoroscopic Time/Contrast Utilization for Staged PCI if randomized to Complete Revascularization

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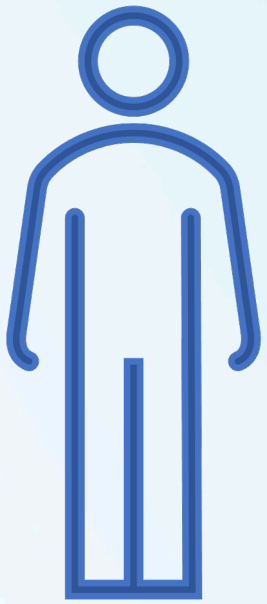

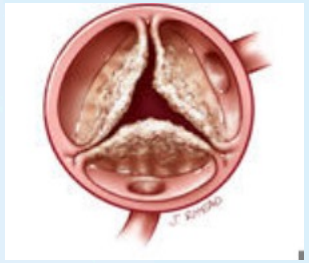

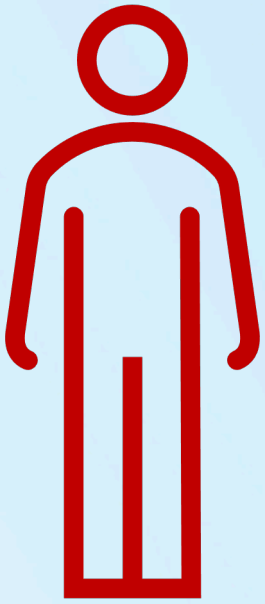

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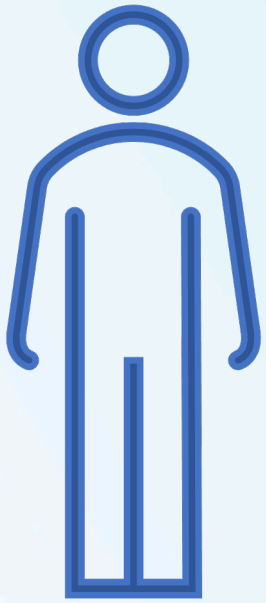

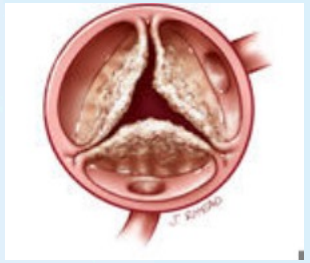

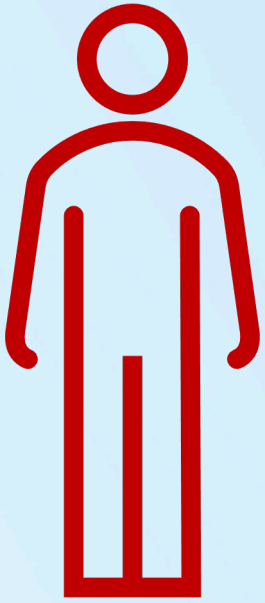

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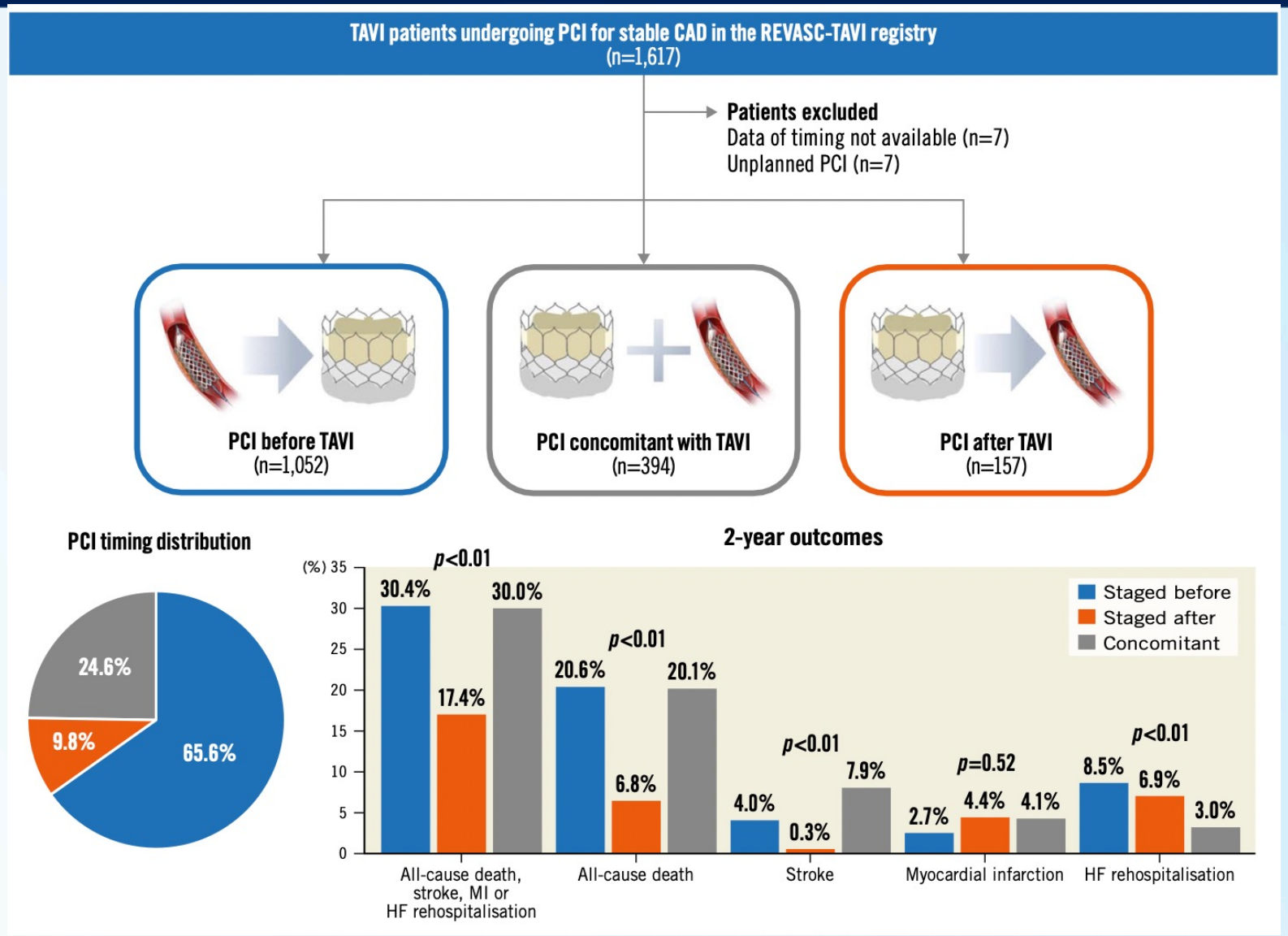
Advantages and disadvantages of different PCI timing in patients undergoing TAVI.

	PCI before TAVI?	PCI + TAVI?	PCI after TAVI?
Advantages	- Easier coronary access (especially for self-expanding THV with a supra-annular leaflet position) - Lower risk of ischaemia-induced haemodynamic instability (i.e., during rapid pacing) - Reduced contrast use compared with concomitant PCI and TAVI	- Use of the same arterial access - Lower cost - Free coronary access	- More reliable FFR/iFR of intermediate lesions - Lower risk of haemodynamic instability during complex PCI (i.e., with rotational atherectomy and impaired LV function) - Reduced contrast use compared with concomitant PCI and TAVI
Disadvantages	- Less reliable FFR/iFR assessments of borderline lesions - Higher risk of haemodynamic instability due to AS	- Larger amount of contrast and higher risk of AKI - Prolonged procedure - Need for DAPT at the time of TAVI, hence increased bleeding risk	- More challenging and potentially compromised coronary access - Less stability and support of the coronary guiding catheter - Potential THV dislodgement

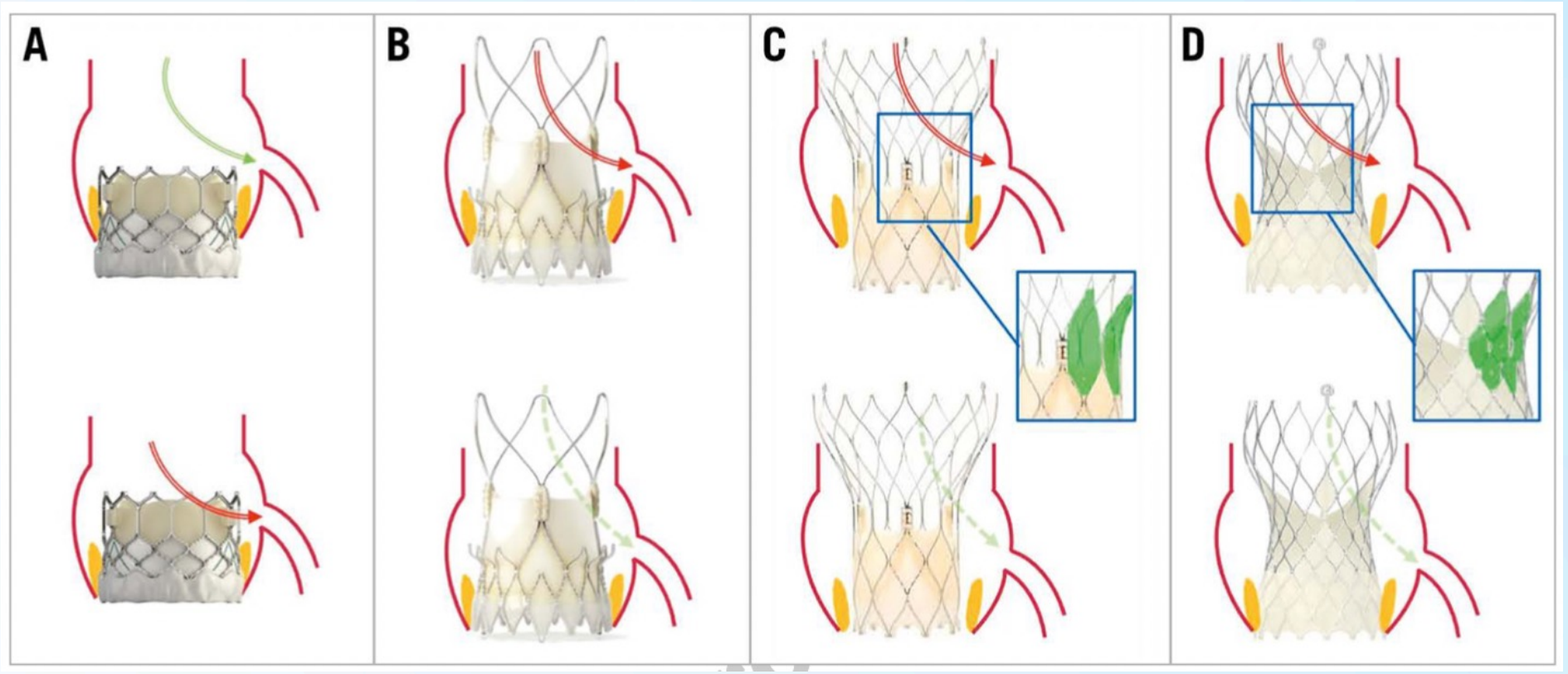
Tarantini et al, EuroIntervention 2023;19:37-52

REVASC-TAVI REGISTRY



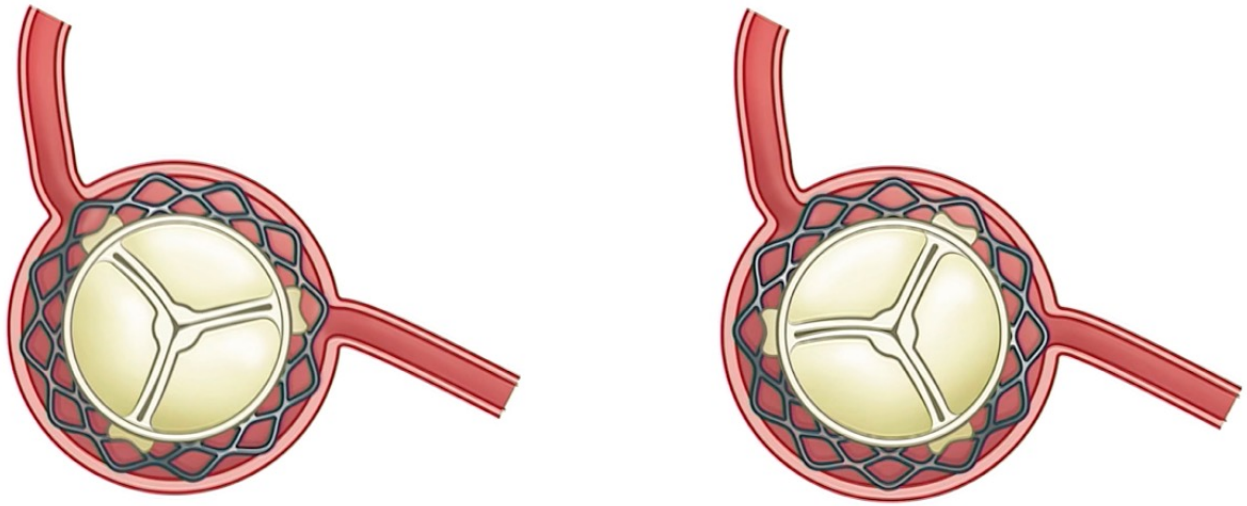
Rheude T. et al., EuroIntervention. 2023

Coronary Access according to THV design and Implantation depth



Tarantini et al, EuroIntervention 2023;19:37-52

Commissural alignment

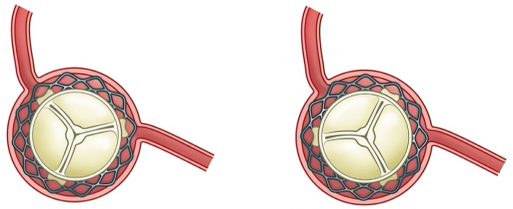


X Commissural misalignment

✓ Commissural alignment

Sondergaard et De Backer. EuroIntervention. 2018; 14:147-9

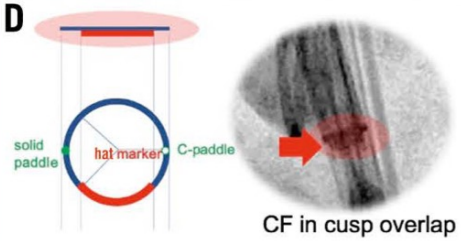
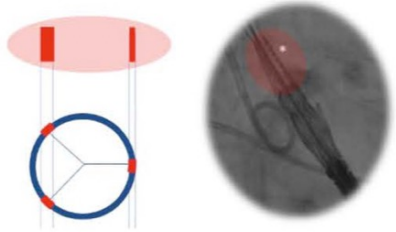
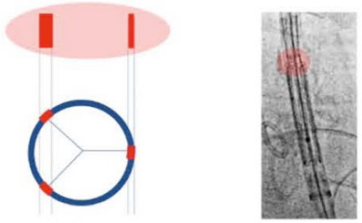
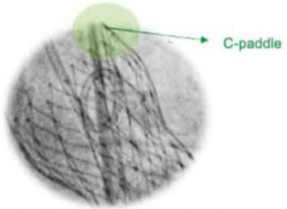
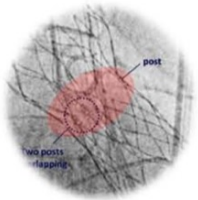
Commissural alignment



X Commissural misalignment

✓ Commissural alignment

Sondergaard et De Backer. EuroIntervention. 2018; 14:147-9

	CoreValve platform	ACURATE *neo* platform	Portico platform
STEP 1 – DELIVERY INSERTION	A  Start with flush port at 3 o'clock away from the operator.	B  Start with flush port at 6 o'clock.	C  Start with flush port at 12 o'clock.
STEP 2 – CRIMPED VIEW	D  Starting with the hat marker in the OC position when crossing the aortic arch in the LAO view, the hat marker must be in the CF position when checking the LR cusp overlap view.	E  In the RL cusp overlap view, one thin marker corresponding to one single post and one protruding free stent strut on the right of the screen. A thicker line corresponding to the 2 other overlapped posts is visible on the left.	F  In the RL cusp overlap view, one thin marker corresponding to one single post on the right of the screen. A thicker line corresponding to the 2 overlapped posts is visible on the left.
STEP 3 – EXPANDED VIEW	G  In the RL cusp overlap view, the C-paddle is on the right of the screen. The other solid paddle is in front of it, on the left.	H  In the RL cusp overlap view, one isolated post is aligned in profile at the right of the screen, the other 2 posts are closed together on the left.	I  In the RL cusp overlap view, one isolated post is aligned in profile at the right of the screen, the other 2 posts are closed together on the left.

Tarantini et al, EuroIntervention 2023;19:37-52

CENTRAL ILLUSTRATION: Coronary Access Following TAVR

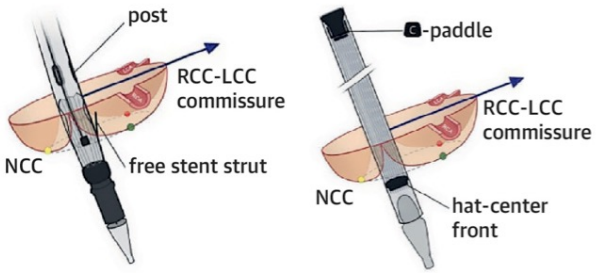
Coronary Cannulation Following TAVR Using Self-Expanding Devices With or Without Patient-Specific Commissural Alignment

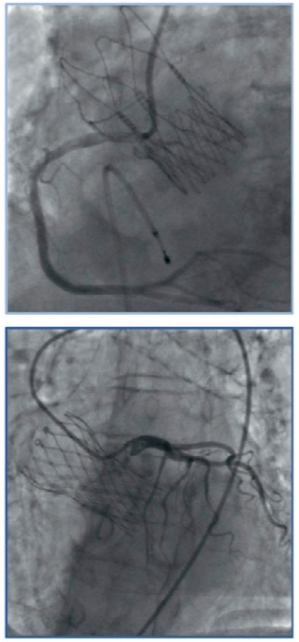
REACCESS-1 Evolut/ACURATE substudy (n = 195)

Random commissural alignment

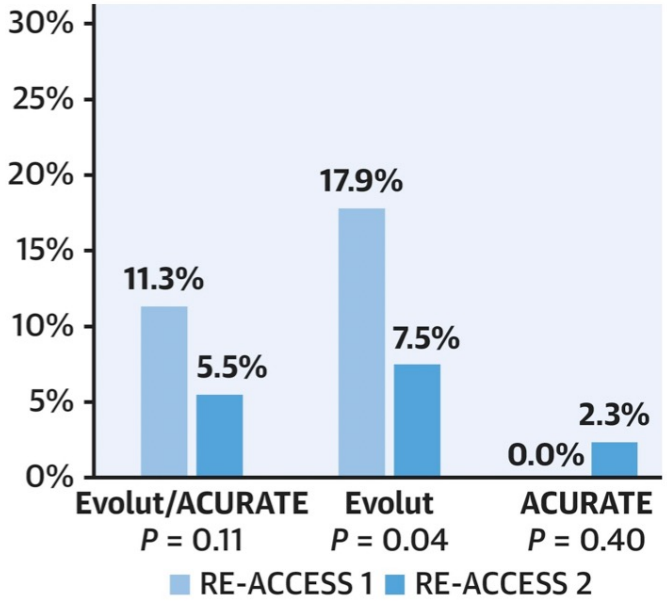
REACCESS-2 Evolut/ACURATE study (n = 127)

Patient-specific commissural alignment





Unsuccessful Coronary Cannulation Following TAVR

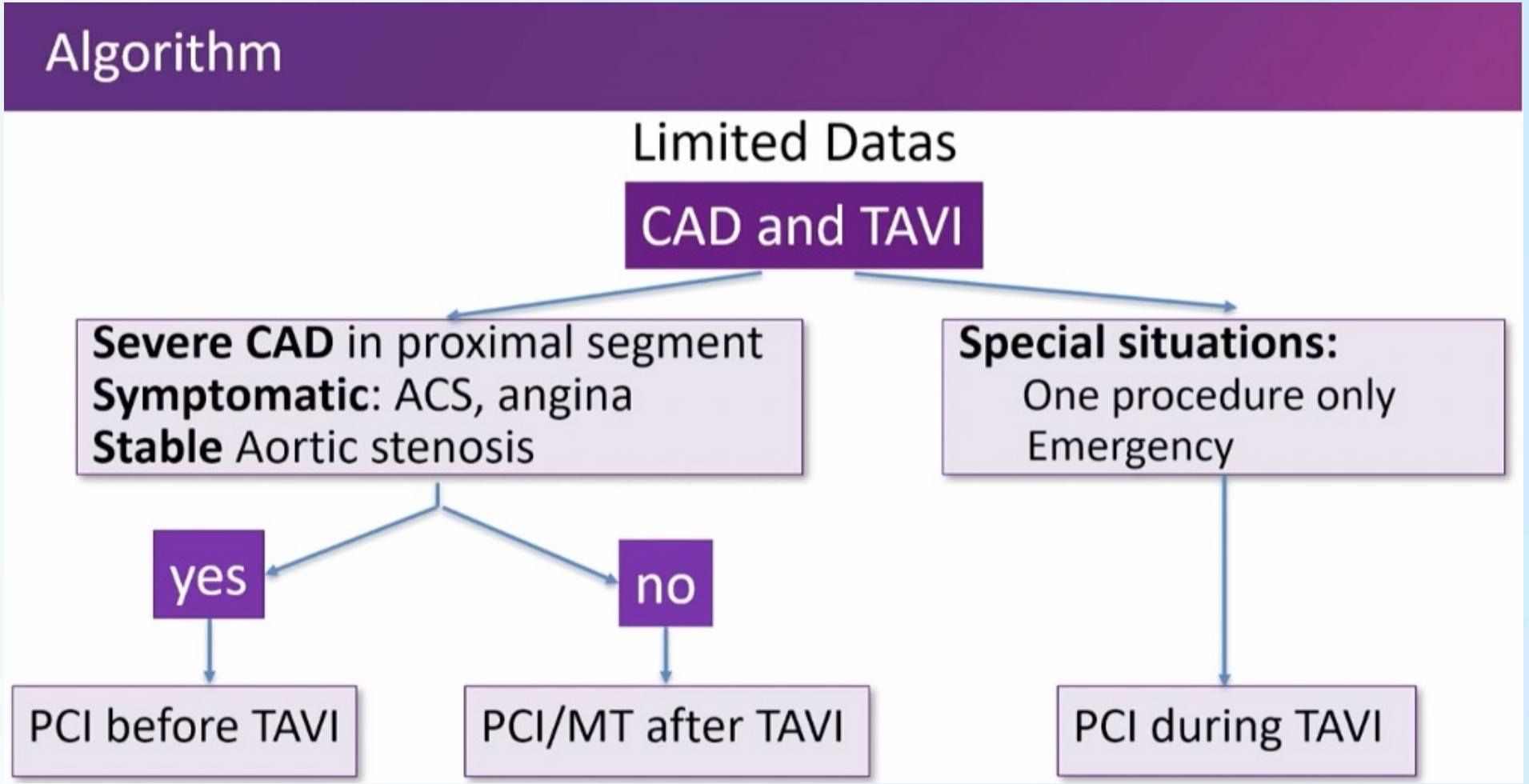


- Unsuccessful coronary cannulation with patient-specific commissural alignment occurred in 5.5% of cases.
- Failed cannulation occurred more frequently for the RCA and with Evolut valves.

Costa G, et al. J Am Coll Cardiol Intv. 2024;17(6):727-737.

CONCLUSIONS

- **CAD is common** in patients with severe AS planned for TAVI
- **Invasive coronary angiography** is recommended when CAD is suspected
- **Coronary CT** could be considered in patients with low pre-test probability of CAD
- Current evidence **does not support routine PCI** before TAVI in the presence of AS and minimal angina
- The **timing of PCI** should be based on clinical presentation, the patient's anatomical characteristics and coronary lesion complexity.
- 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.


Algorithm
Limited Datas
CAD and TAVI
Severe CAD in proximal segment
Symptomatic: ACS, angina
Stable Aortic stenosis
Special situations:
One procedure only
Emergency
yes
no
PCI before TAVI
PCI/MT after TAVI
PCI during TAVI

11° CONGRESSO NAZIONALE

CAMPUS Cuore

Quello che le Linee Guida Non Dicono

Napoli
5-6 aprile 2024

GRAZIE DELL'ATTENZIONE

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