30th Two Days in Cardiology

December 11th, 2020

Cardiovascular Disease 2030: Predicting the next decade INTERVENTION

Wacin Buddhari, MD

King Chulalongkorn Memorial Hospital
Bangkok, Thailand

Disclosure

Advisory Board Member:

- AstraZeneca (dapagliflozin)
- Bayer (CAD/PAD, rivaroxaban)
- Boehringer Ingelheim (empagliflozin, dabigatran)
- Medtronic Asia Pacific (Coronary and Transcatheter Heart Valve)
- Novo Nordisk (Liraglutide)
- DKSH (Dulaglutide)

Proctor:

- Medtronic (Evolut R/Pro)

Lecture Honorarium:

- AstraZeneca
- Abbot Diagnostic
- Abbot Vascular
- Amgen
- Bayer Thai
- Berlin Pharma
- Boehringer Ingelheim
- Biopharm
- Boston Scientific
- Daiichi Sankyo
- DKSH
- Medtronic
- MSD
- Novartis
- Novo Nordisk
- Roche Diagnostics
- Sanofi
- Sandoz
- Siam
- Takeda

My Talk …

Intervention

08:00-09:00 **Cardiovascular disease 2020: Predicting the next decade Part I**

Moderator: *Khanchit Likittanasombat,MD*

- **Intervention:**

Speaker: *Wacin Buddhari,MD*

- **Arrhythmia:**

Speaker: *Charn Sriratanasathavorn,MD*

- **Imaging:**

Speaker: *Thananya Boonyasirinant,MD*

My abstract …

In the next 10 years, coronary intervention for complex left main disease, chronic total occlusion, heavily calcified and bifurcation lesions will, technically, be fine tuning, resulting in moderate improvement in clinical outcomes, mainly reducing the need for repeat intervention. For the role of PCI as revascularization strategy for the treatment of CAD (ACS or CCS), there won't be any groundbreaking clinical trials that will alter the natural course of the diseases.

Valvular intervention, on the other hand, will dominate the field, with many new devices to replace and repair all 4 heart valves. Some will get to be good enough to be at least an alternative to surgery. And in a well selected population, some will outperform surgery. Most likely, transcatheter heart valve therapy will compliment surgical treatment and a well-organized heart team is the key to proper patient's selection. Advance imaging modality might play important roles in both disease assessment and procedural assistant.

My abstract …

*In the next 10 years, **coronary intervention for complex** left main disease, chronic total occlusion, heavily calcified and bifurcation lesions will, **technically, be fine tuning**, resulting in **moderate improvement in clinical outcomes**, mainly reducing the need for repeat intervention. For the role of PCI as revascularization strategy for the treatment of CAD (ACS or CCS), **there won't be any groundbreaking clinical trials** that will **alter the natural course of the diseases**.*

***Valvular intervention**, on the other hand, **will dominate the field**, with many new devices to **replace and repair all 4 heart valves**. Some will get to be good enough to be **at least an alternative to surgery**. And in a well selected population, **some will outperform surgery**. Most likely, transcatheter heart valve therapy will **compliment surgical treatment** and a **well-organized heart team is the key** to proper patient's selection. Advance imaging modality might play important roles in both disease assessment and procedural assistant.*

14:30-15:30 **Cardiovascular disease 2030: Predicting the next decade! Part 2**

Moderator: *Smonporn Boonyaratavej Songmuang, MD*

- **Cardiac surgery:**

Speaker: *Peenuttanee Chartburus, MD*

- **Structural heart intervention:**

Speaker: *Manit Chandavimol, MD*

- **Heart failure:**

Speaker: *Pakawich Kittipaibul, MD*

Coronary Intervention

In the next 10 years, ***coronary intervention for complex*** *left main disease, chronic total occlusion, heavily calcified and bifurcation lesions will,* ***technically, be fine tuning****, resulting in* ***moderate improvement in clinical outcomes****, mainly* ***reducing the need for repeat intervention****. For the role of PCI as revascularization strategy for the treatment of CAD (ACS or CCS),* ***there won't be any groundbreaking clinical trials*** *that will* ***alter the natural course of the diseases****.*

Coronary Intervention: CCS

ISCHEMIA

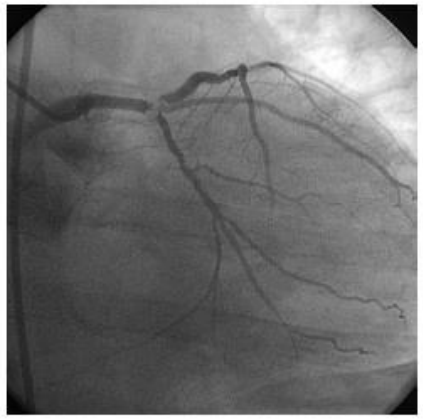
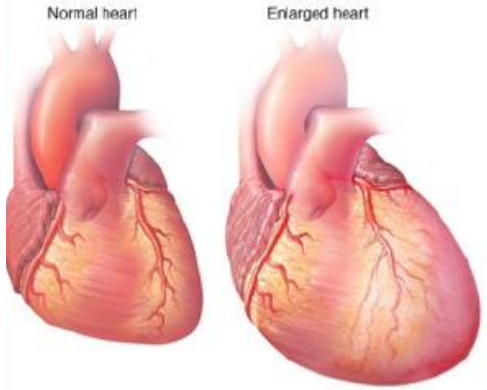
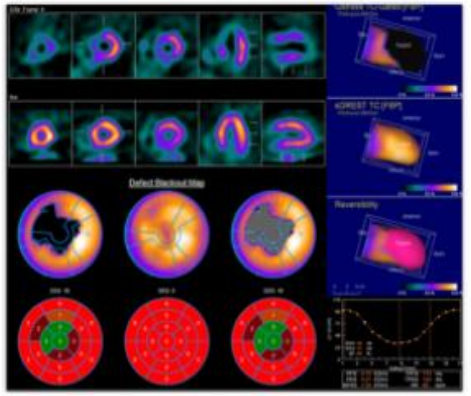
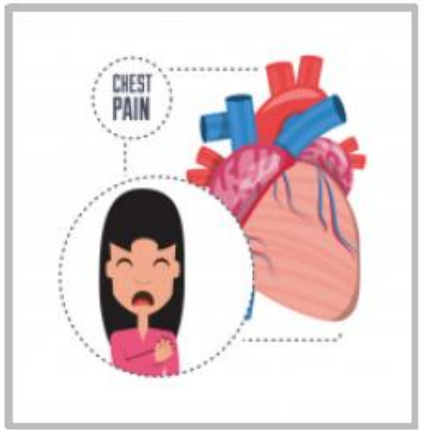
Exclusions:

- eGFR < 30
- **LM > 50% (CCTA)**
- **EF < 35%**
- Recent ACS
- CHF (NYHA III-IV)
- **Intractable angina**

Sub-analysis (patients who might benefit from invasive strategy):

- Reduced EF (but not > 35%)?
- Hx of MI or CHF?
- Severe ischemia vs Moderate ischemia?
- Complete vs incomplete revascularization?
- Other high-risk predictor(s) / algorithms

Coronary Intervention: CCS

#1	#2	#3	#4
			
Left main or proximal LAD*	LVEF <35% + 2-3 vessel disease	Large area ischemia	Symptoms despite OMT

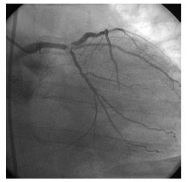
X

2018 ESC/EACTS Guidelines on myocardial revascularization

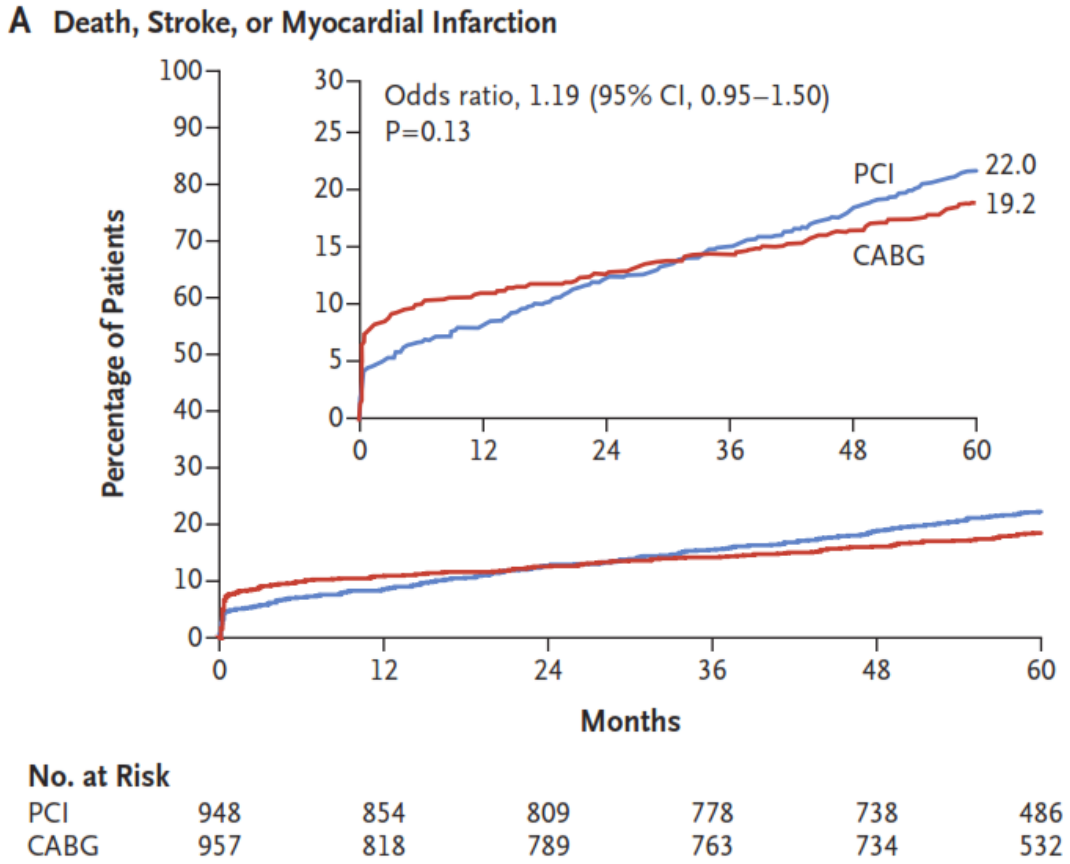
Coronary Intervention: CCS

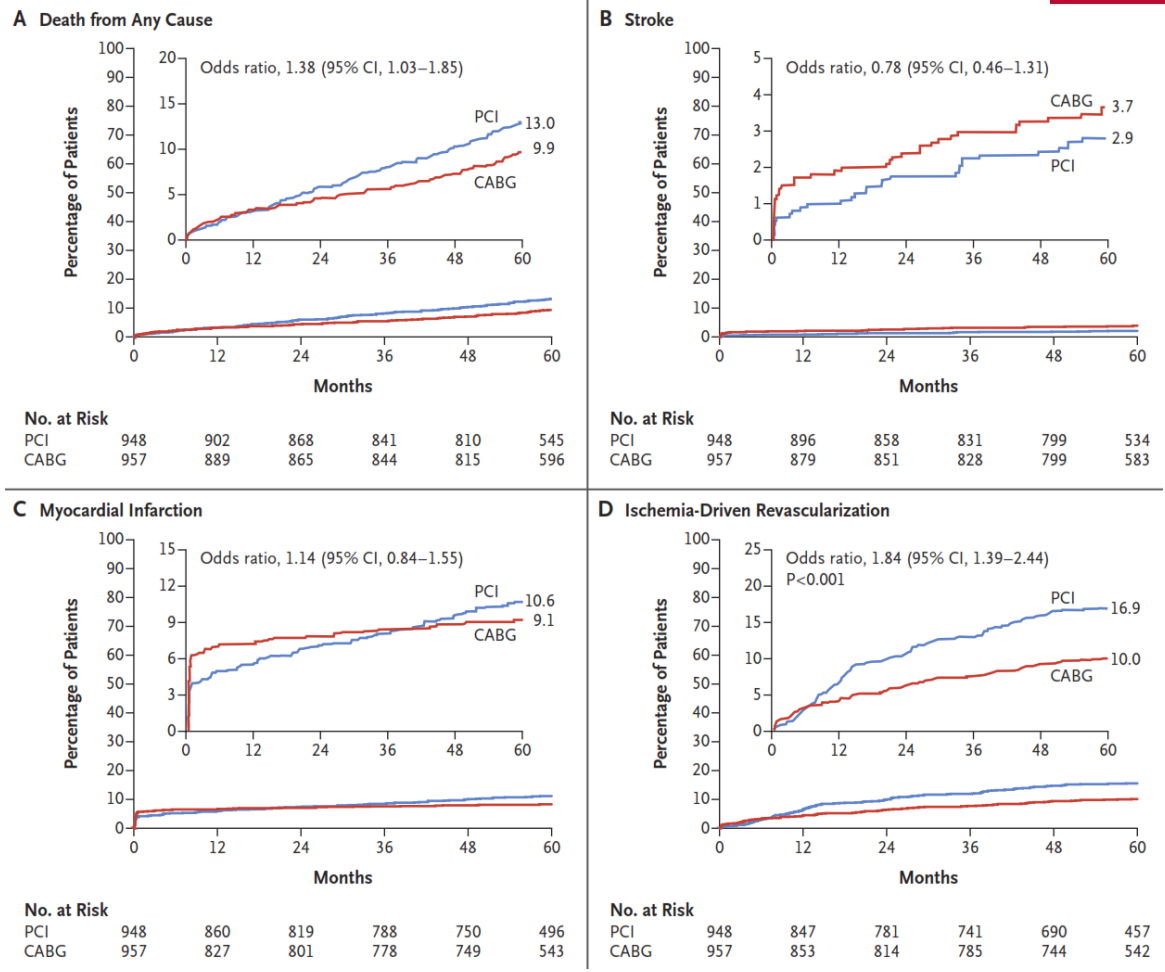
- If any of the patient/lesion type from my previous slide is able to show the benefits of PCI (revascularization), then we will need and will see …
  - Appropriate use criteria/guidelines - updated
  - Integration and advancement of multi-imaging & physiology modalities
    - CT-FFR
    - Fusion of IVUS/OCT/physiology
  - PCI tools to overcome complex lesions esp. heavily calcified lesions and CTO
  - Further stent/scaffold development → thinner, better acute performance → "leave no footprint behind" (bioresorbable)
  - Radiation / contrast reduction
  - Robotic navigation (may not see anything meaningful in the next 10 years)
  - Deep machine learning / AI → Research tools, new algorithms

Left Main PCI: EXCEL 5-Year Outcomes



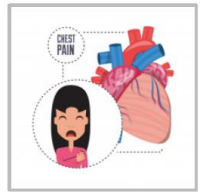
*Left main or proximal LAD**



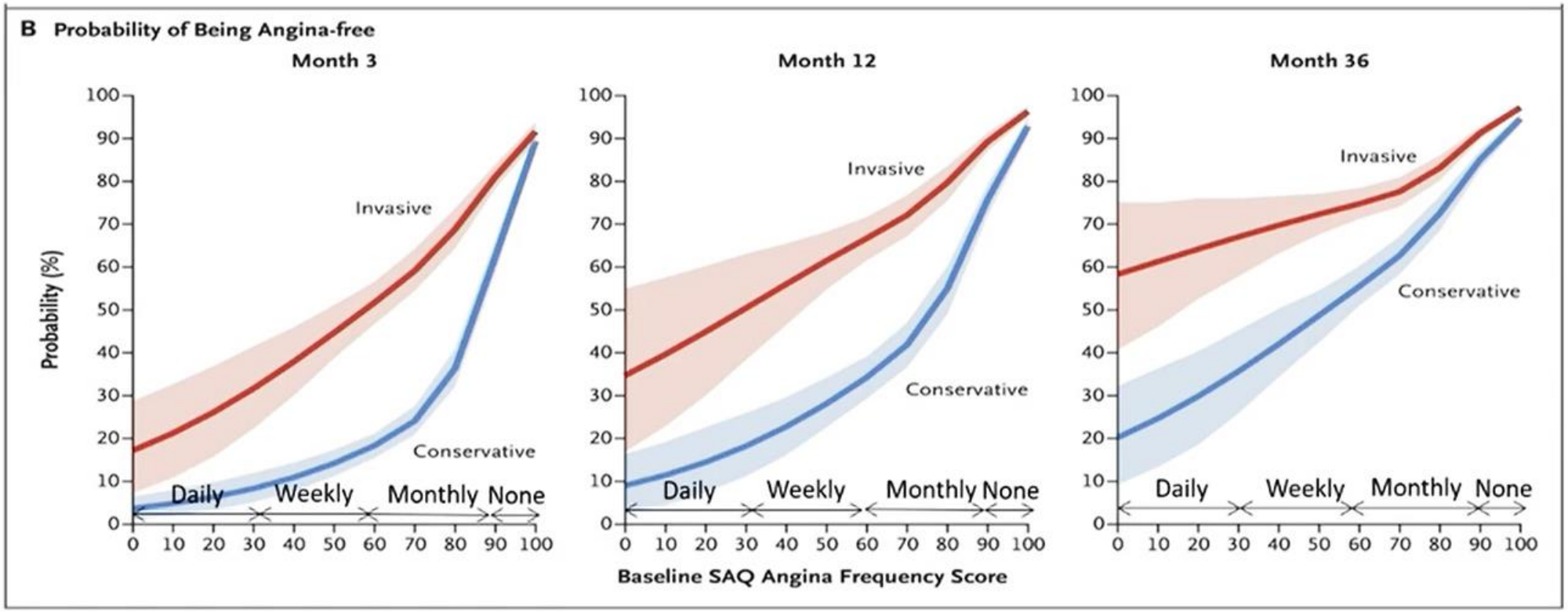


Stone GW et al. N Engl J Med 2019;381:1820-30.

ISCHEMIA Trial – Quality of Life Outcomes

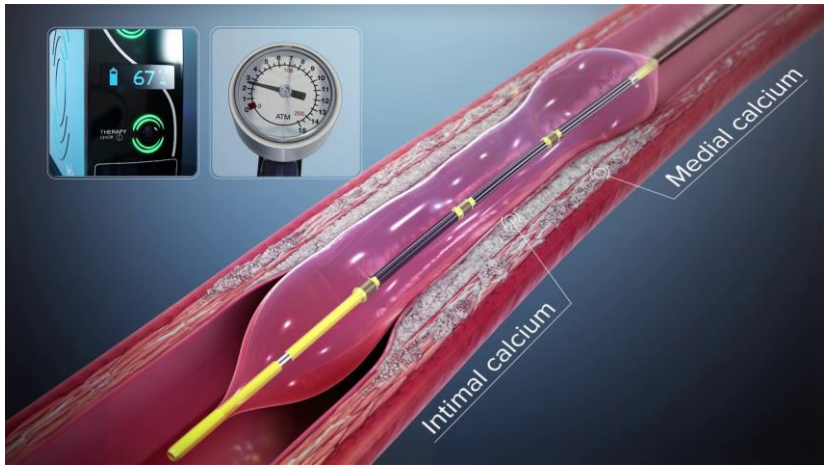


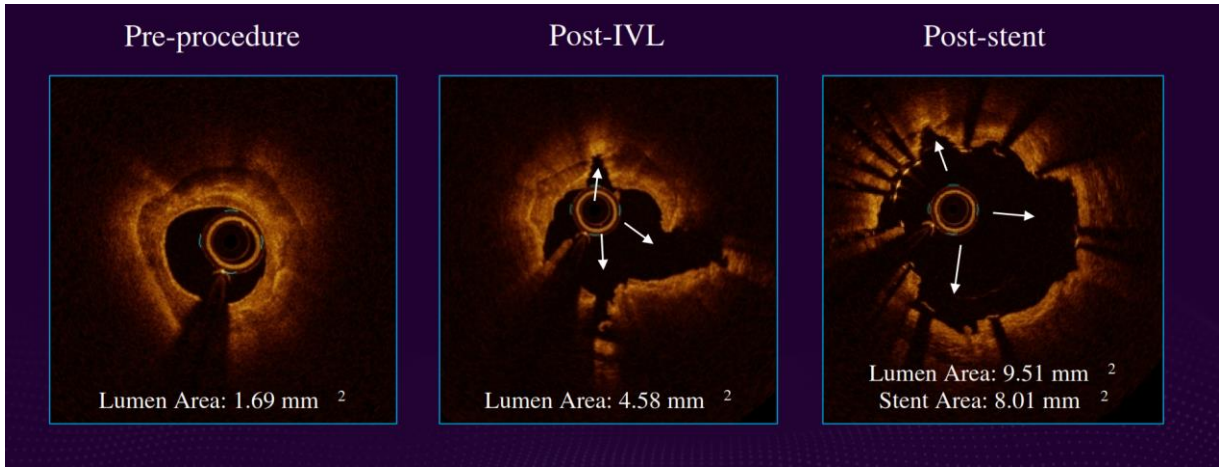
Symptoms despite OMT



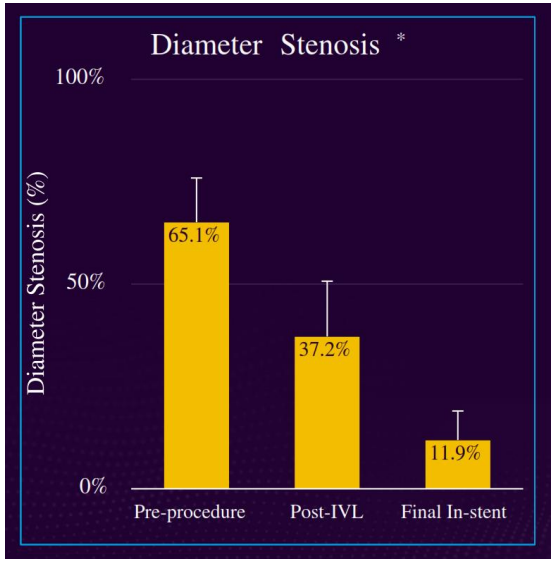
Spertus JA et al NEJM 2020

Shockwave Intravascular Lithotripsy (IVL)





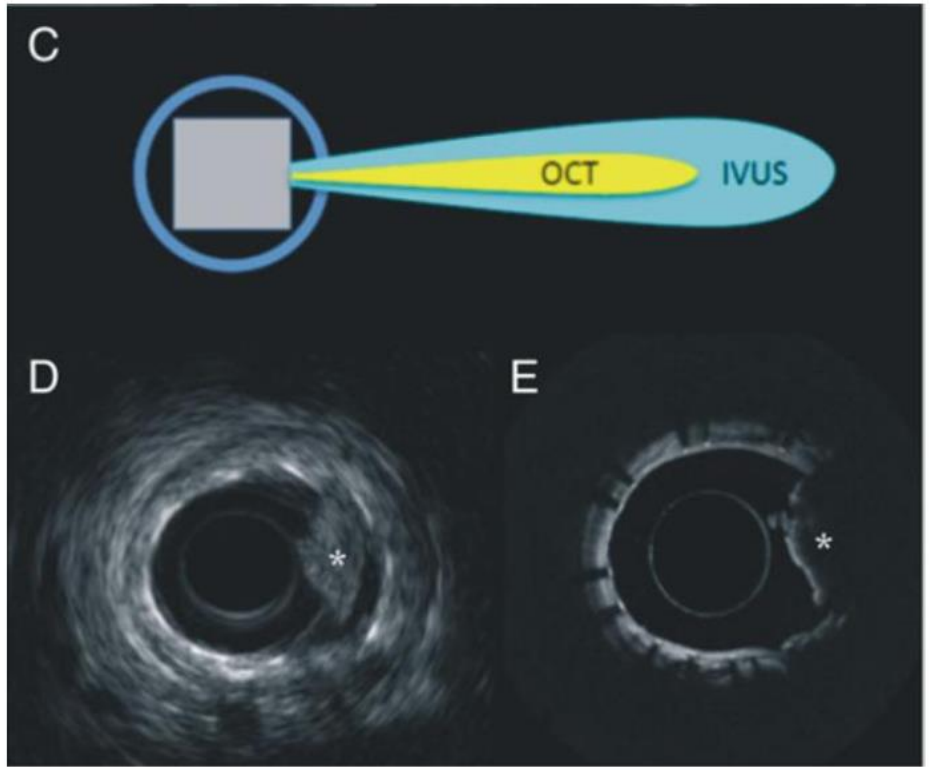
DISRUPT CAD III



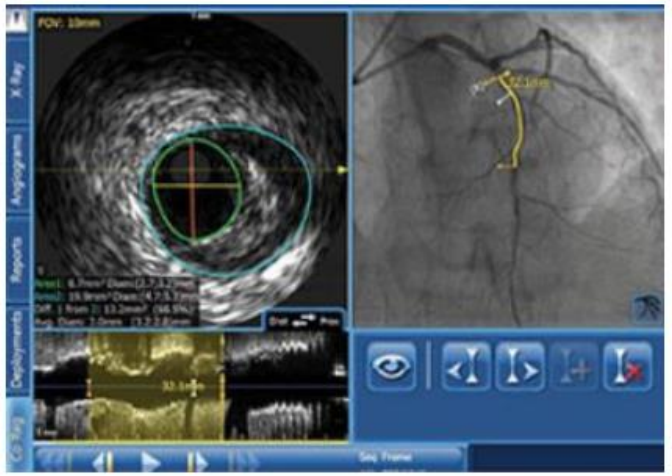
Core Lab Analysis	Immediately Post-IVL	Final Post-stent
Any serious angiographic complication	2.6%	0.5%
Severe dissection (Type D-F)	2.1%	0.3%
Perforation	0.0%	0.3%
Abrupt closure	0.0%	0.3%
Slow flow	0.6%	0.0%
No-reflow	0.0%	0.0%

https://doi.org/10.1016/j.jacc.2020.09.603

Better Imaging and Imaging Fusion



IVUS and OCT Hybrid imaging



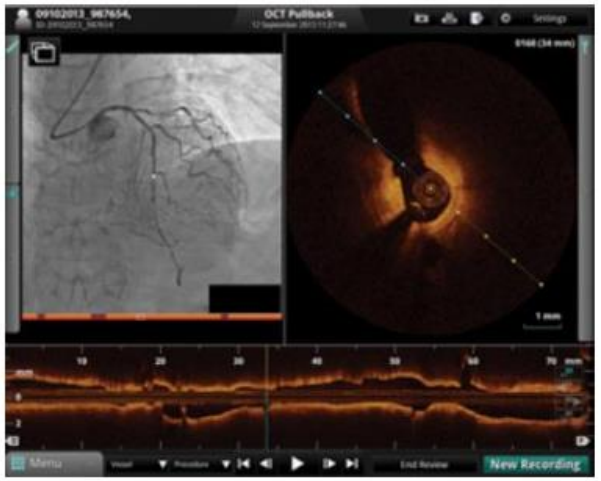


Image Fusion co-registration

- Co-registration of modalities (intravascularimaging/physiology with angiography) are becoming standard and online
- Integration and Image fusion to simplify and improve guidance in complex PCIs, Structural interventions (TEE-Angio)

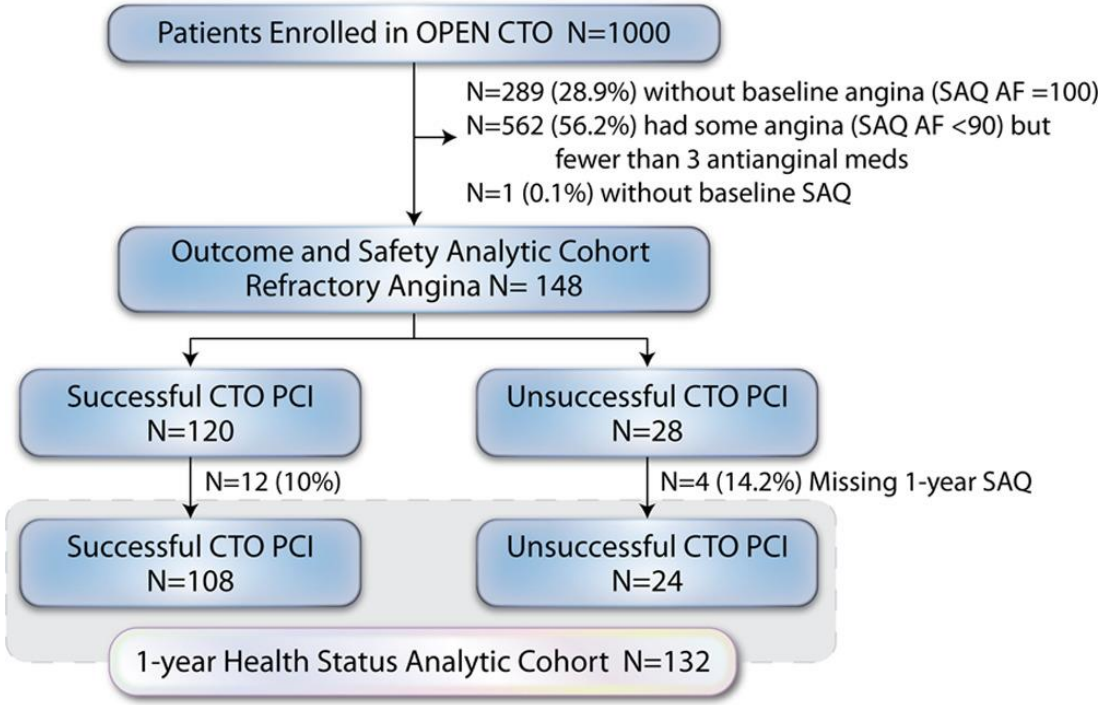
Robotic PCI

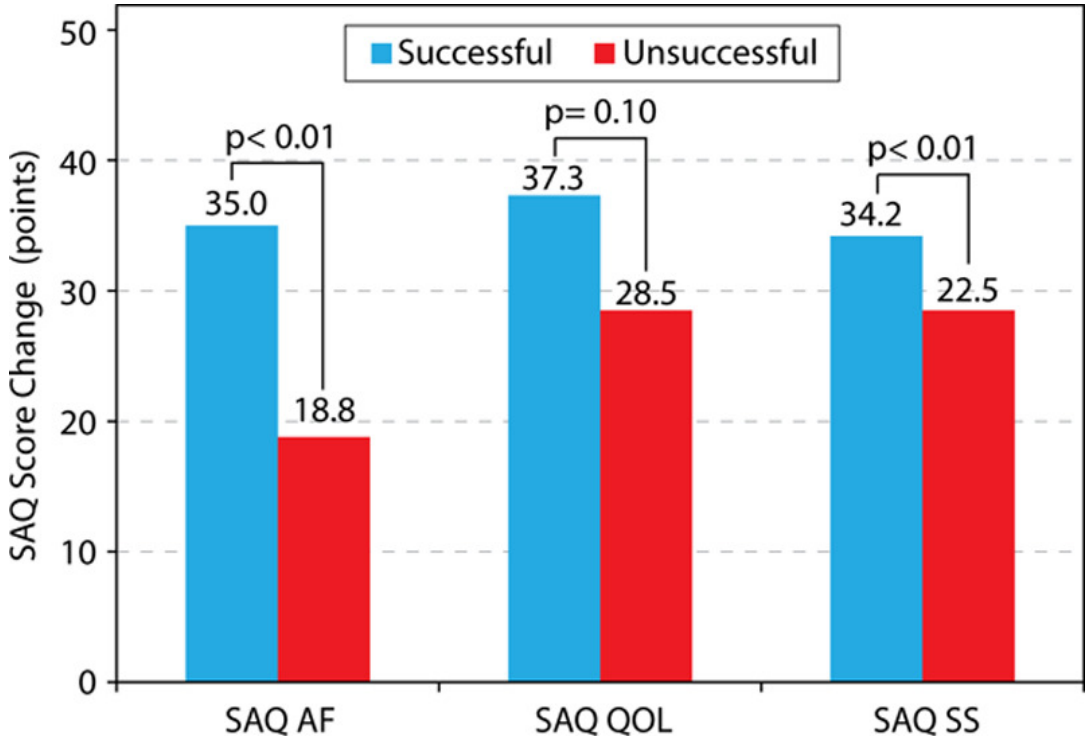
- Reduce radiation exposure
- Avoid health hazard from wearing lead apron

Chronic Total Occlusion (CTO)

- Current devices & techniques allow high rate of success in CTO recanalization in experts' hands, and the use of imaging optimization improves long-term outcomes
- Still lack of definitive hard outcomes improvement from CTO intervention
- Symptom improvement and QOL (when compared with medical treatment) seems to favor CTO PCI

Chronic Total Occlusion (CTO): QOL Changes



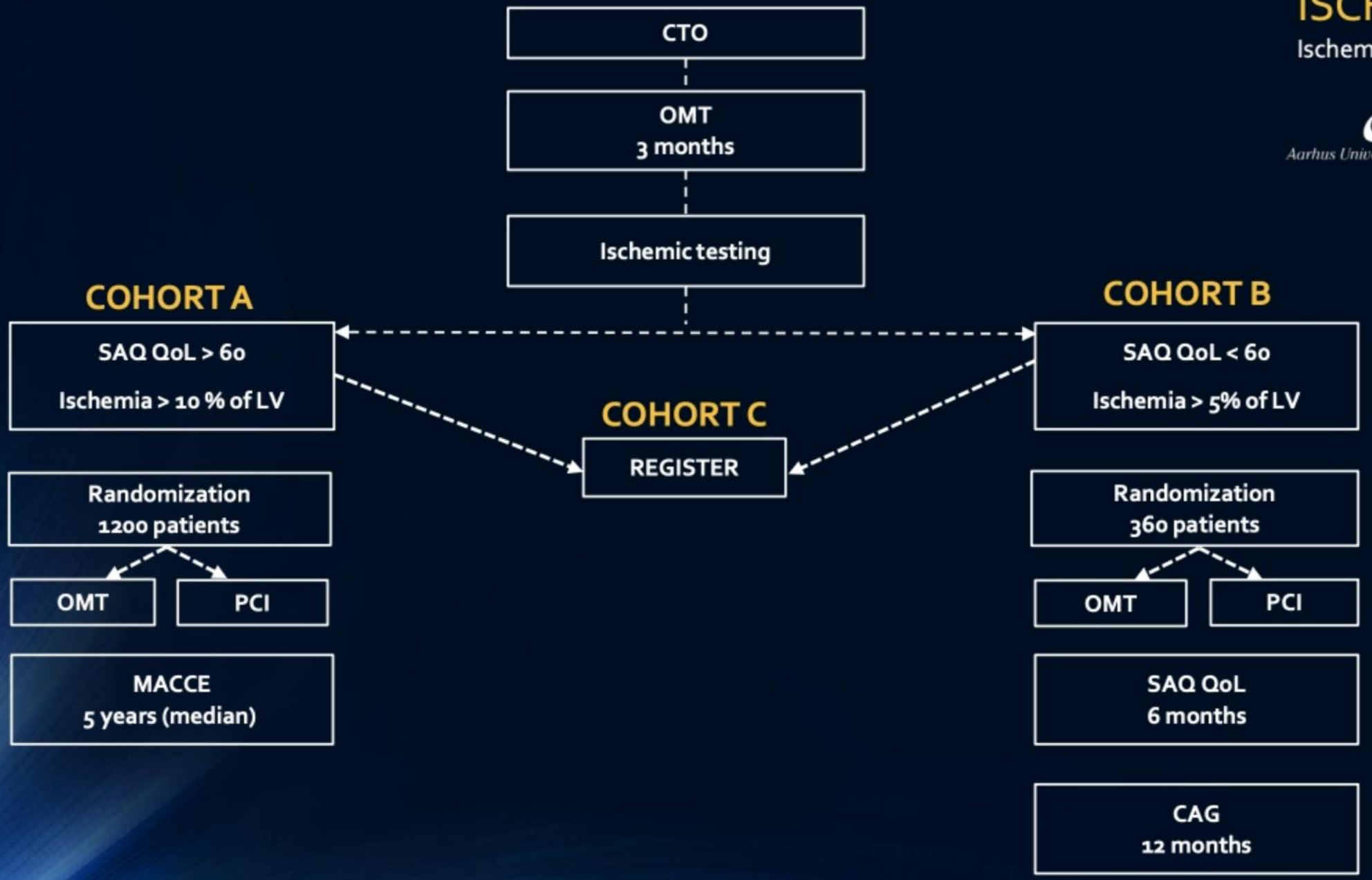


Hirai T et al. Circ Cardiovasc Interv 2019 Mar;12(3):e007558

ISCHEMIACTO

Ischemia-cto@clin.au.dk

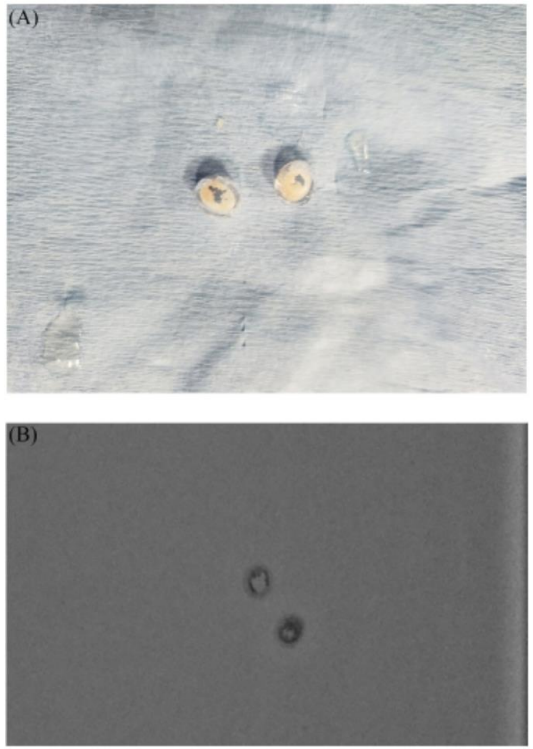
Aarhus University Hospital



Clinical Trials ID NCT03563417

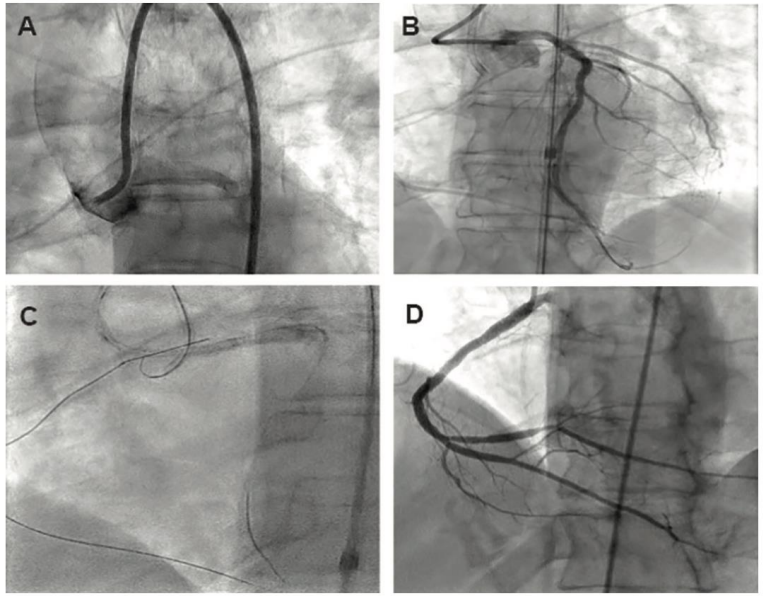
Chronic Total Occlusion (CTO)

"Super Glue"



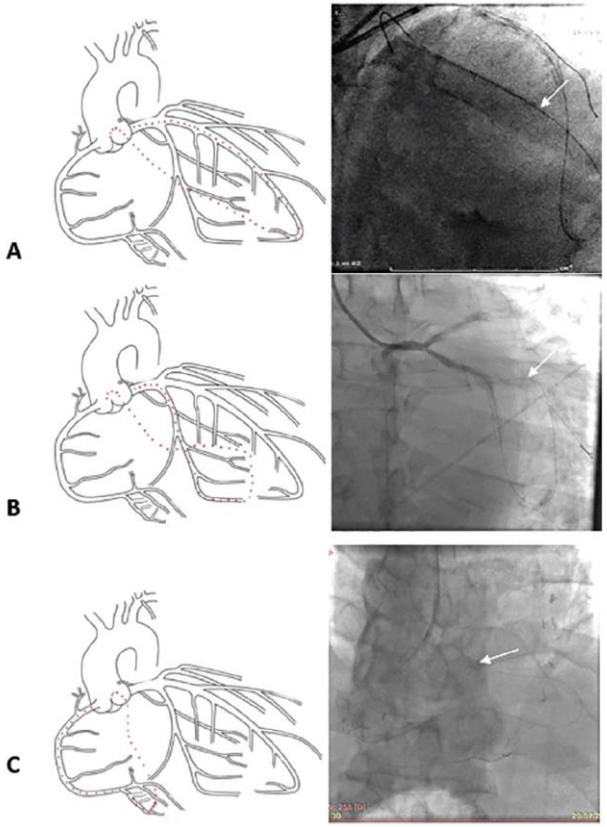
Rafeedheen R et al. Catheter Cardiovasc Interv 2020 May 1;95(6):1136-1140

Electrocautery–Facilitated Crossing (ECFC)



Neupane S et al. J INVASIVE CARDIOL 2020;32(2):55-57

Deep Wire Crossing Technique



Khelimskii D et al. J INVASIVE CARDIOL 2019;31(12):E362-E368.

Coronary Intervention: ACS

- Primary PCI in STEMI, and urgent PCI in very high and high-risk NSTE-ACS proved to be highly beneficial in reducing CV death, MI and recurrent ischemia

- Excellent outcomes achieved largely with current generation equipment/DES

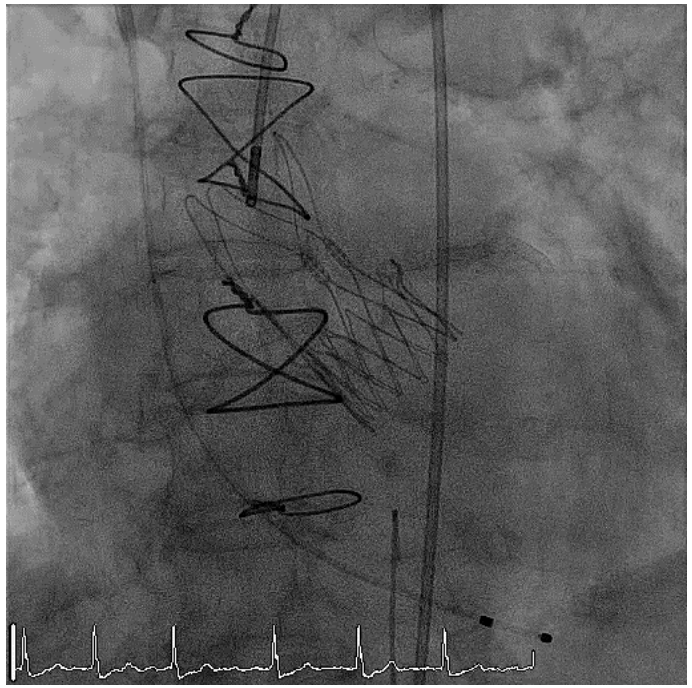
- The only limitations perhaps are:
  - Outcomes depends on “time to treatment” (STEMI)
  - Large clot burden
  - Reperfusion injury, no reflow
  - Profound hemodynamic instability requiring mechanical support

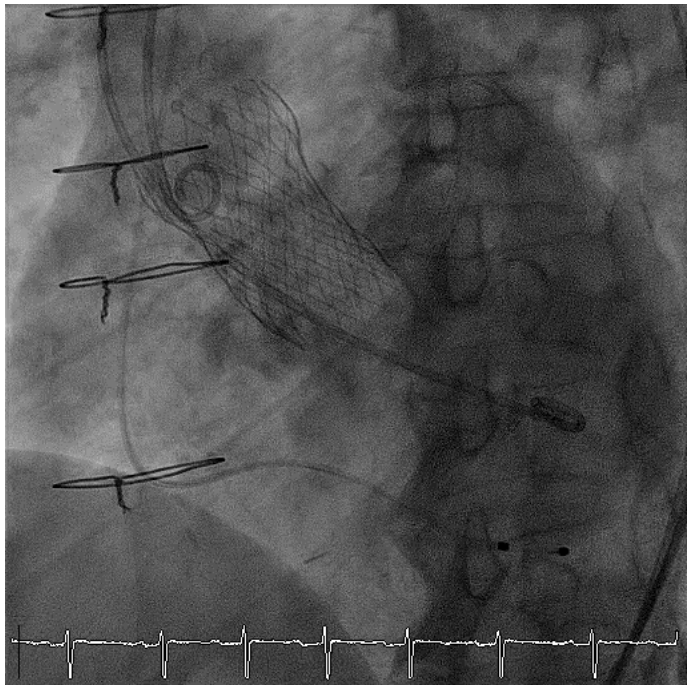
Areas for future development

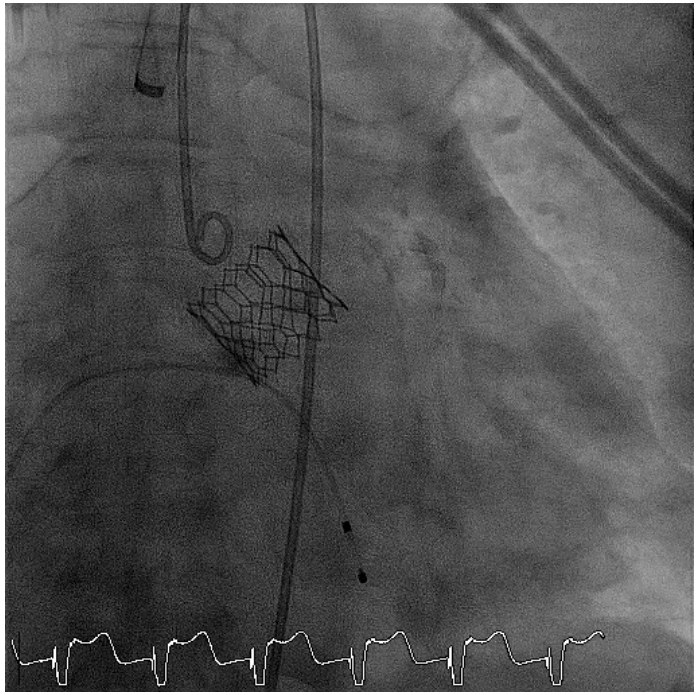
Structural & Valve Intervention

- ***Valvular intervention**, on the other hand, **will dominate the field**, with many new devices to **replace and repair all 4 heart valves**. Some will get to be good enough to be **at least an alternative to surgery**. And in a well selected population, **some will outperform surgery**. Most likely, transcatheter heart valve therapy will **compliment surgical treatment** and a **well-organized heart team is the key** to proper patient's selection. Advance imaging modality might play important roles in both disease assessment and procedural assistant.*

TAVI

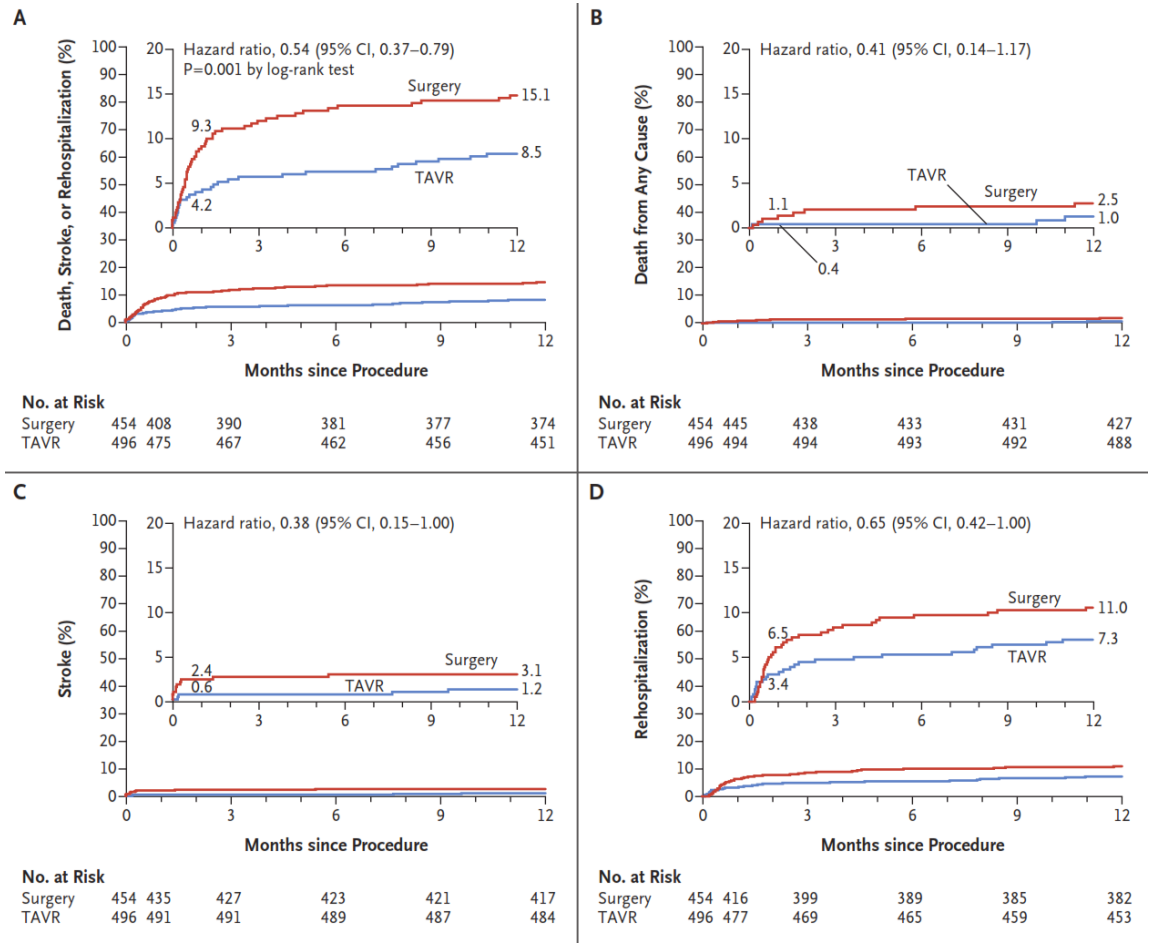






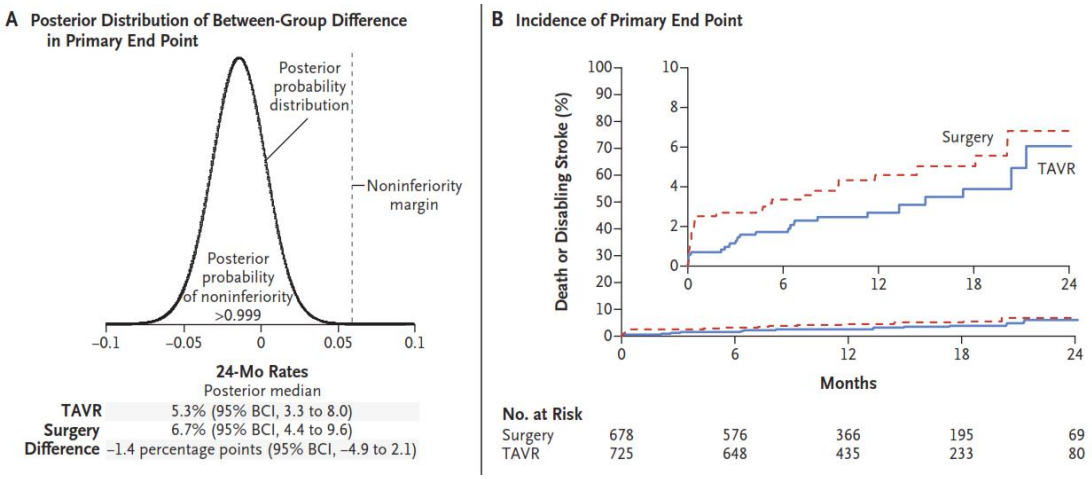
TAVI: Low Risk Trials

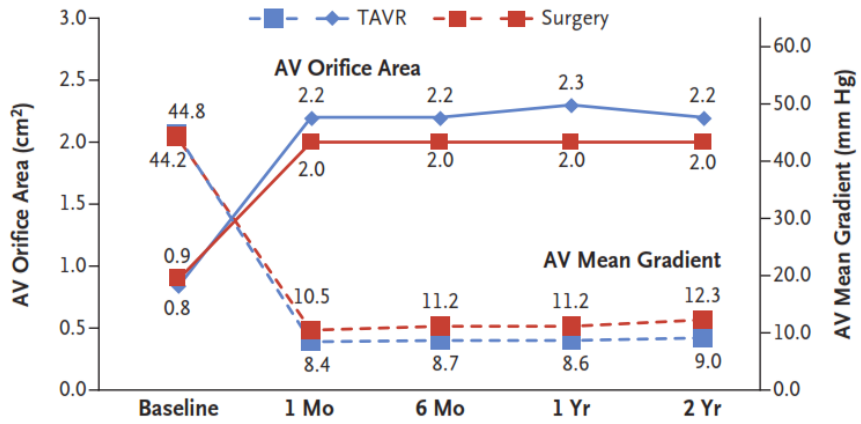
PARTNER 3



Mack MJ et al. N Engl J Med 2019;380:1695-705

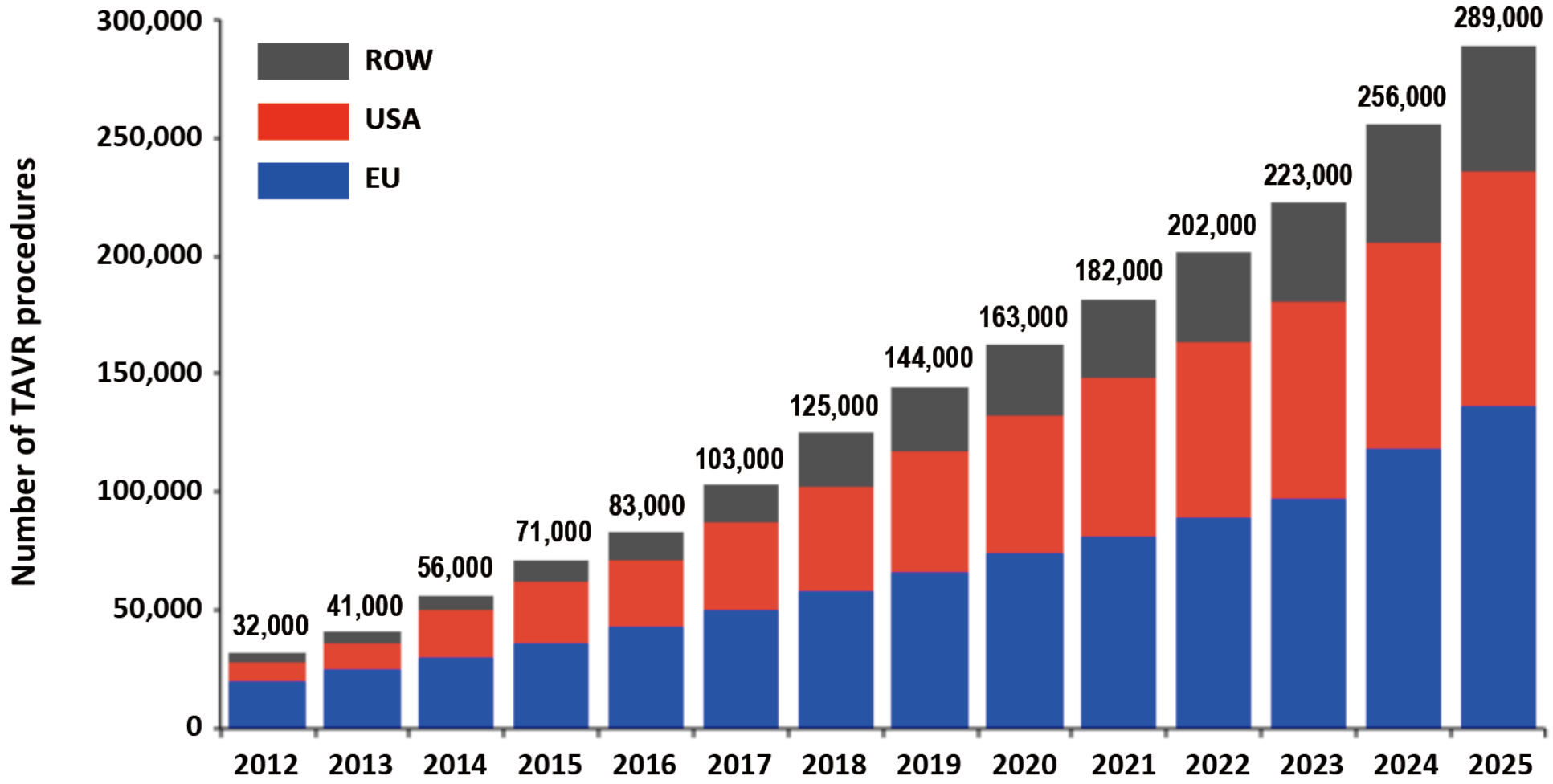
EVOLUT Low Risk





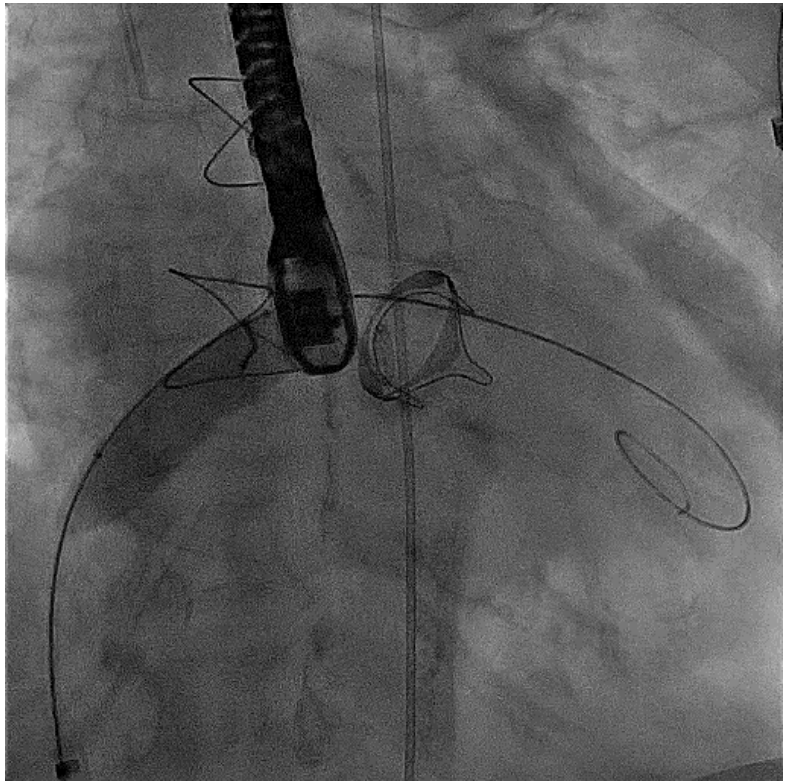
Poppma JJ et al. N Engl J Med 2019;380:1706-15.

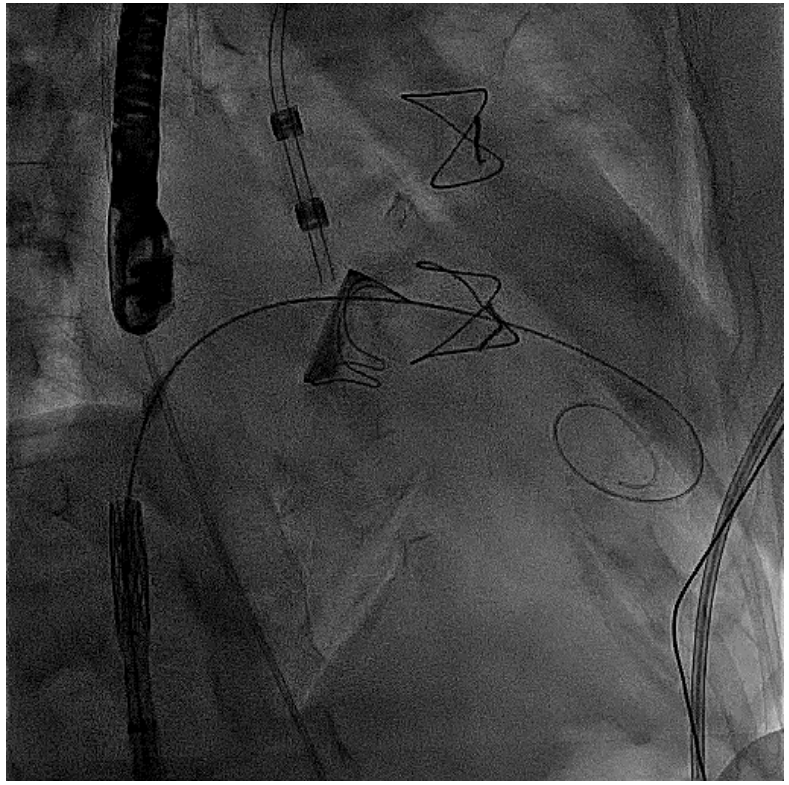
Estimated TAVR volume worldwide

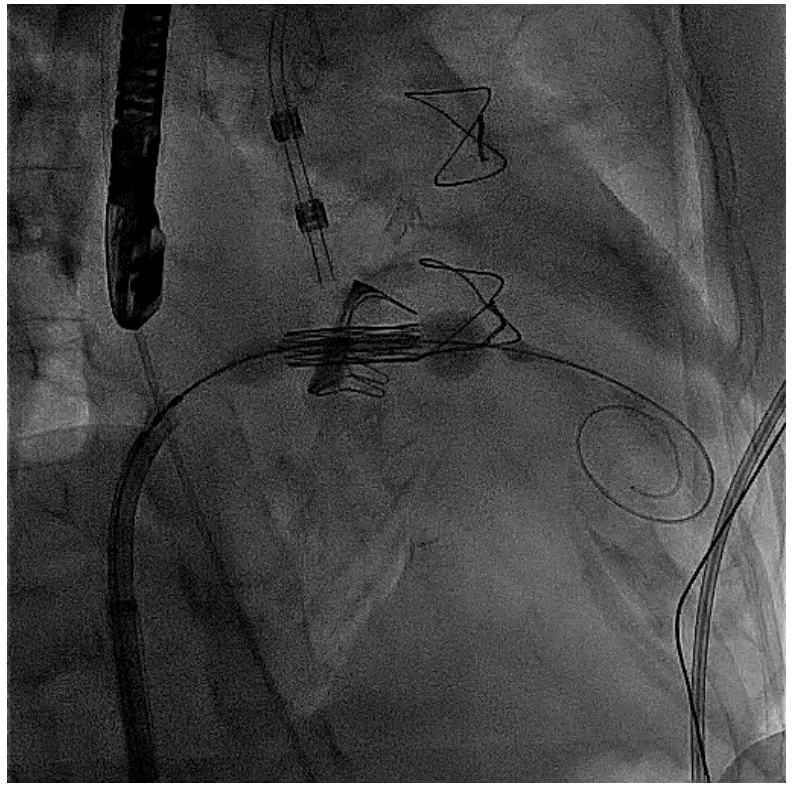


Sigitas Cesna et al. Eur J Cardiothorac Surg 2017;51:644-52.

TMVR

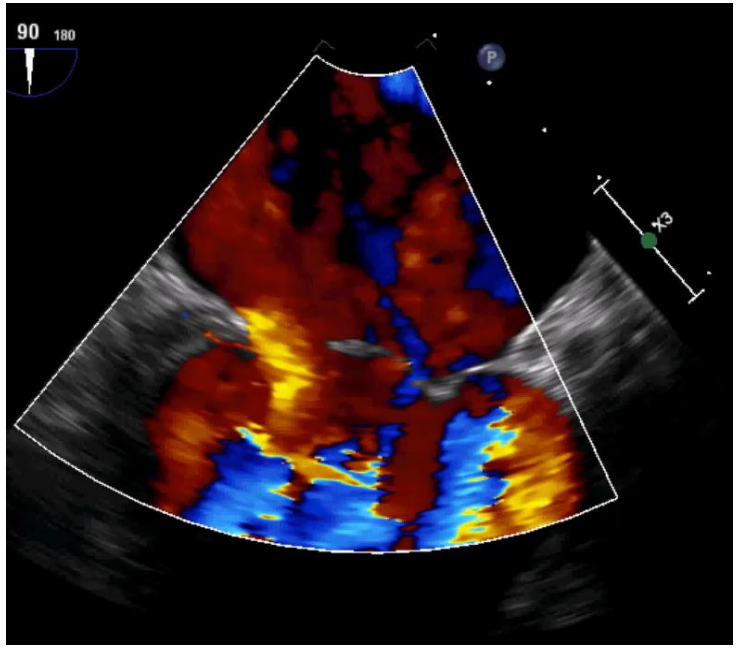




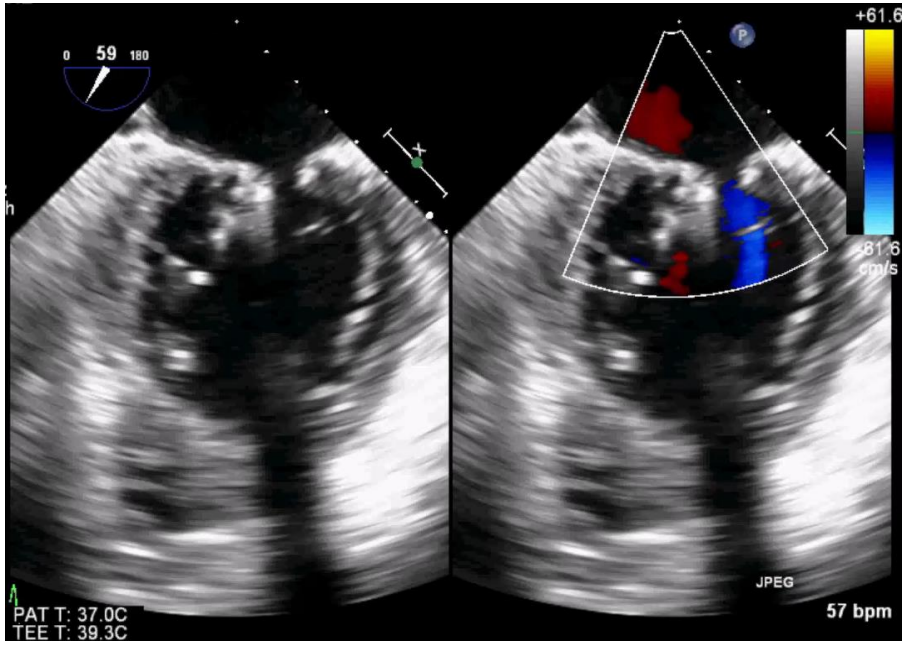


MitraClip

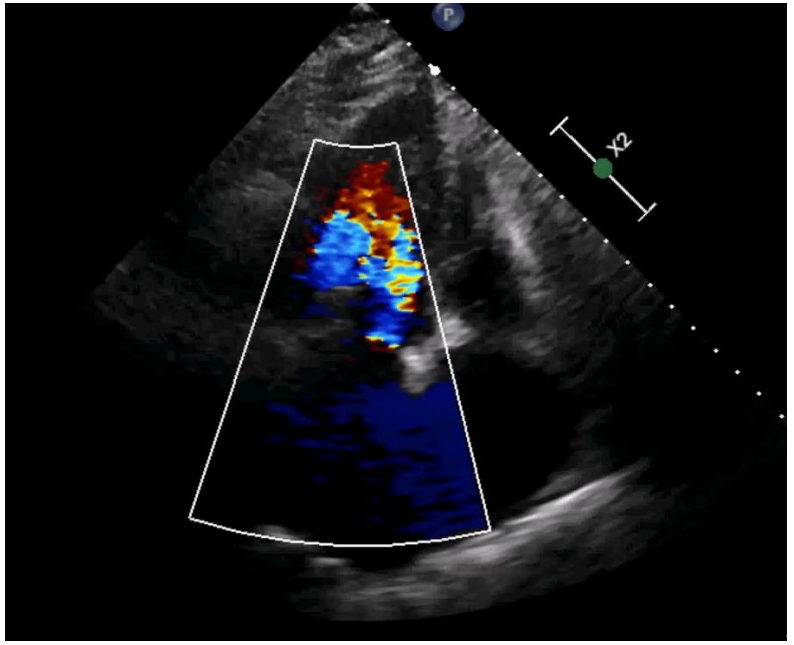
Pre-

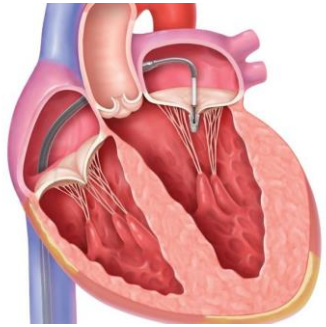


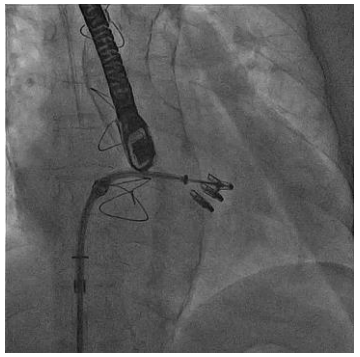
Post-



4 years later







Conclusions: Predicting the next decade of "intervention"

- PCI will have limited roles in CCS
- PCI in CCS with LM and/or poor LV function → needs to be tested
- There will always be new tools, in order to perfecting results of PCI in complex anatomies: CTO, heavily calcified lesion, LM, bifurcation, small & diffusely diseases, BUT there won't be many, and the improvement will be modest
- Adjunctive tools to facilitate PCI procedure will continue to have advancement: imaging modalities, x-ray equipment, AI
- PCI in ACS will continue to be the mainstream of treatment and area of advancement will be: an attempt to speed up time to treatment, improve adjunctive pharmacotherapy and perhaps new devices to handle large clot burden

Conclusions: Predicting the next decade of "intervention"

- Major expansion will be in the field of **structural and valvular heart interventions**. All **4 valves** will be able to be **repaired or replace** with **transcatheter** treatments. They will become at least **surgical alternatives**, or in many **appropriate patient** population, **"new standard of care"**, **complimentary** to surgical treatment. And this will be carried on, supervised and directed by a strong **"heart team"**