

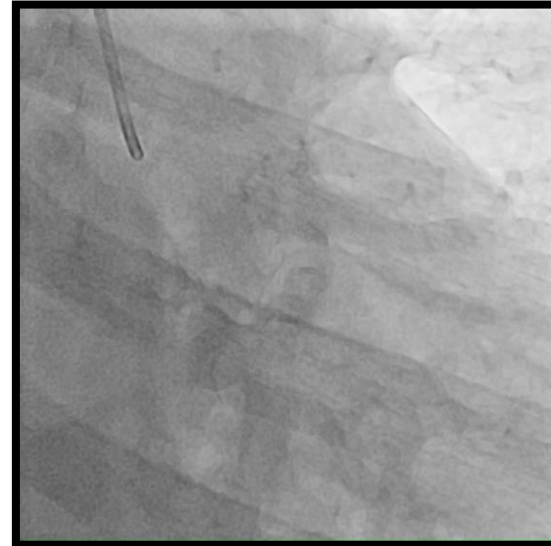
Debate I : Proximal LAD CTO With Nice Collaterals

Not To Treat

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40 YO/F, EF= 55%, minimal effort chest pain



Can Opening CTO Save the Life?

Can Opening CTO Save the Life?

Success vs. Failure

Study	No. of Patients	Success	Duration of Follow-up, y	Mortality, %		
				PCI Success	PCI Failure	<i>P</i>
Mid America Heart Institute ⁵⁸	2007	1491 (74.4%)	10	26.6	35.0	0.001
British Columbia Cardiac Registry ⁵⁹	1458	1118 (76.7%)	1	10.0	19.0	<0.001
TOAST-GISE ²²	369	286 (77.5%)	6	1.1	3.6	0.13

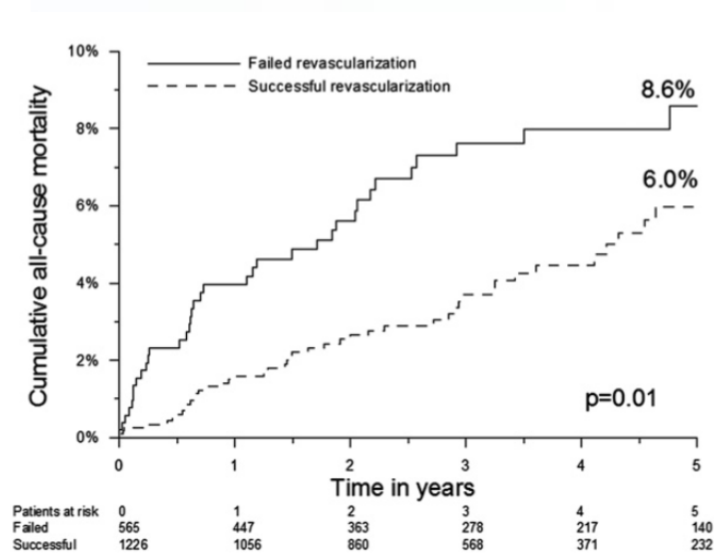
J Am Coll Cardiol. 2001;38:409 – 414

Circulation. 2001;104:II-415. Abstract

J Am Coll Cardiol. 2003;41:1672–1678

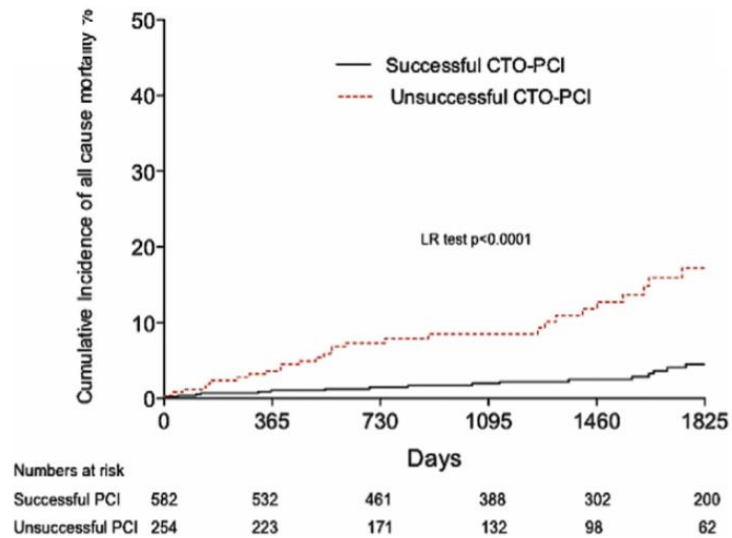
Can Opening CTO Save the Life?

Multinational CTO Registry



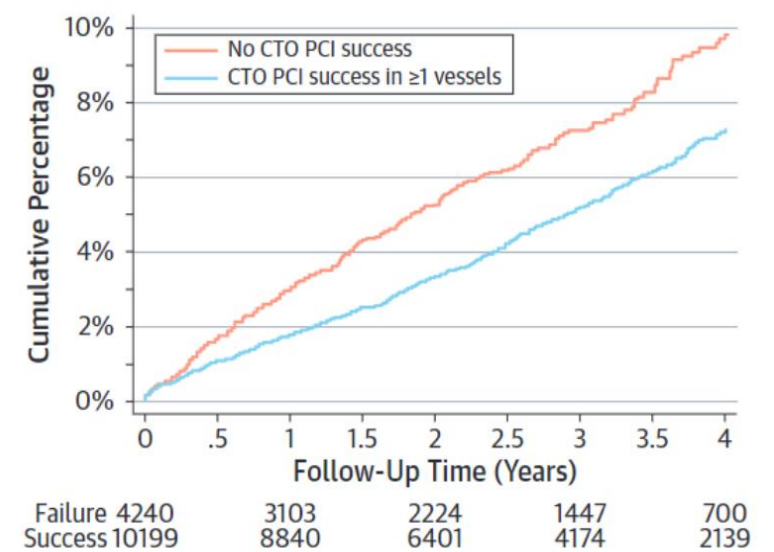
J Am Coll Cardiol Interv 2011;4:952–61

Single Center CTO Registry



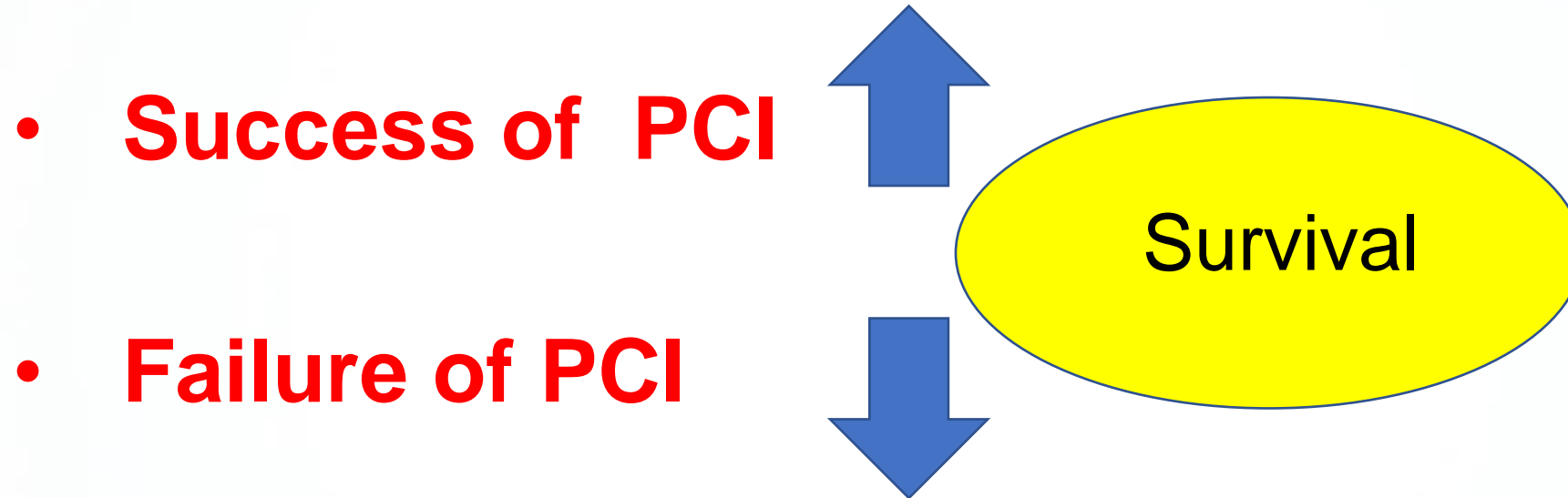
J Am Coll Cardiol Interv 2012;5:380 – 8

U.K. Central Cardiac Audit Database



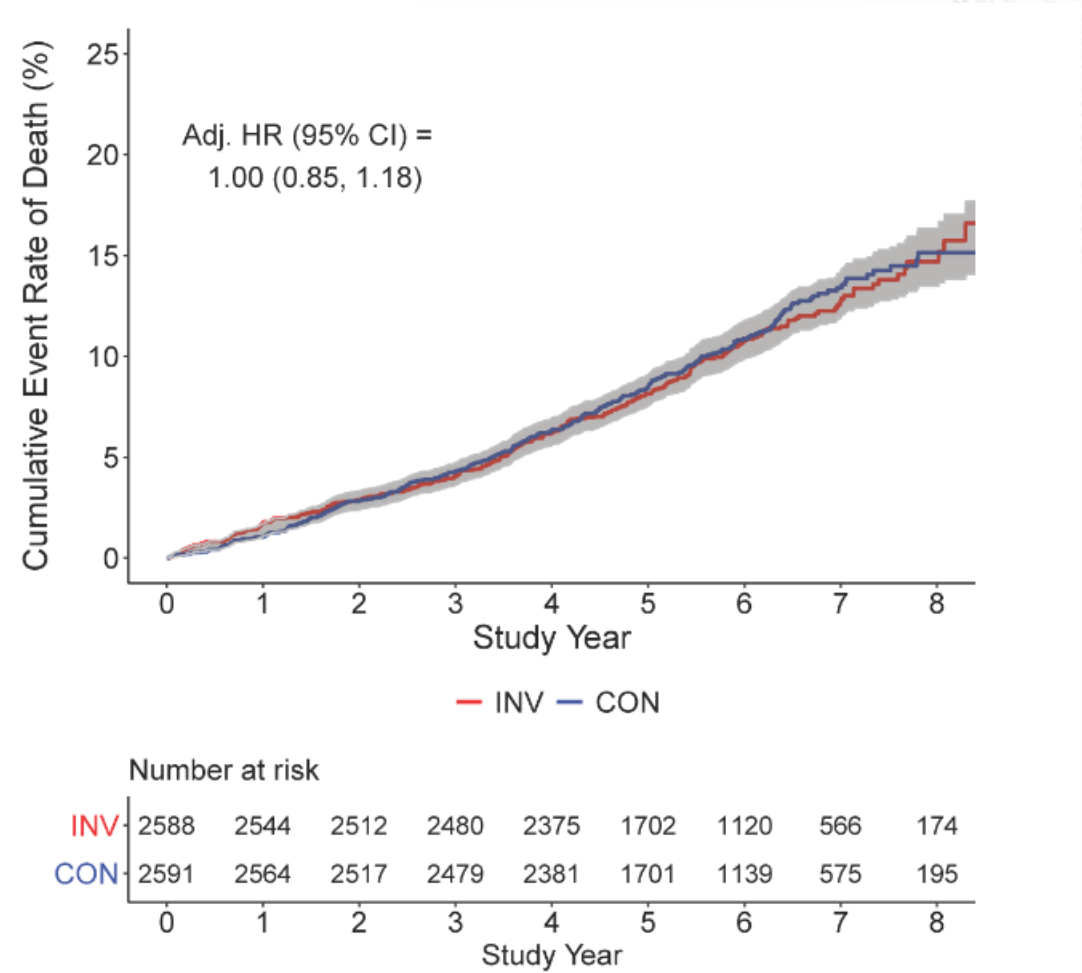
J Am Coll Cardiol 2014;64:235–43

Can Opening CTO Save the Life?



ISCHEMIA-EXTEND Follow-up Study

All Cause Mortality



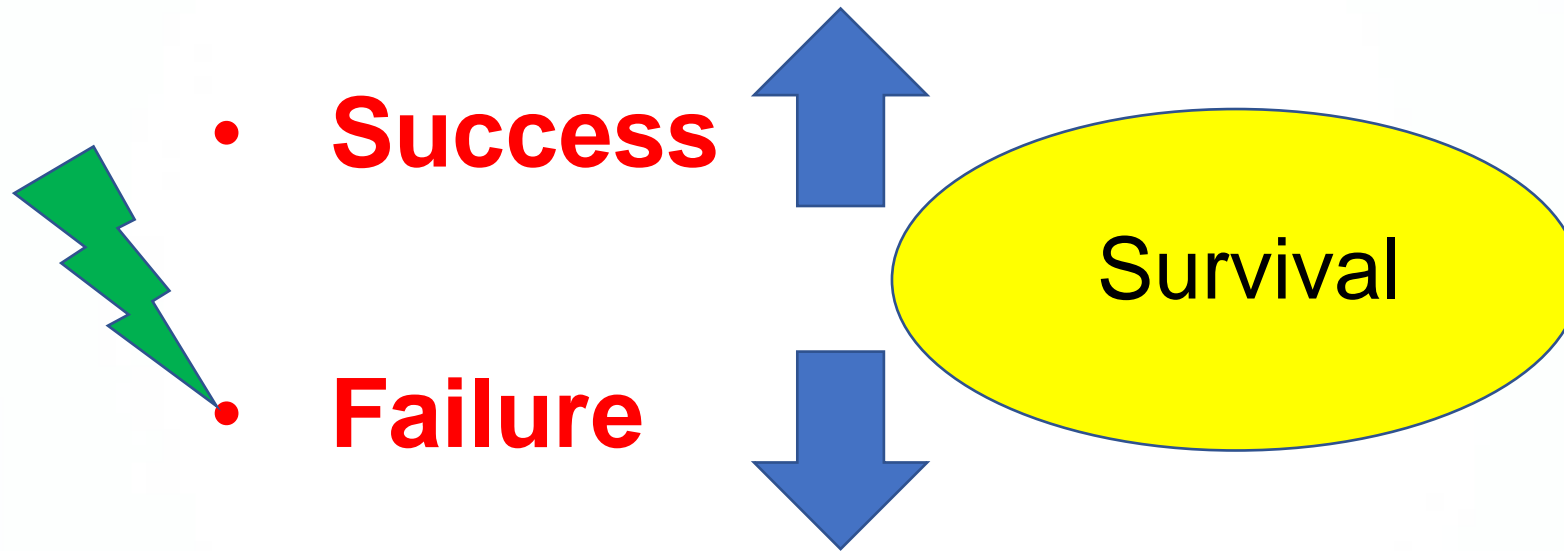
CTOs are inherently **STABLE**

Because these vessels are already occluded, there is no rush to treat them, and medical therapy / other options can be explored

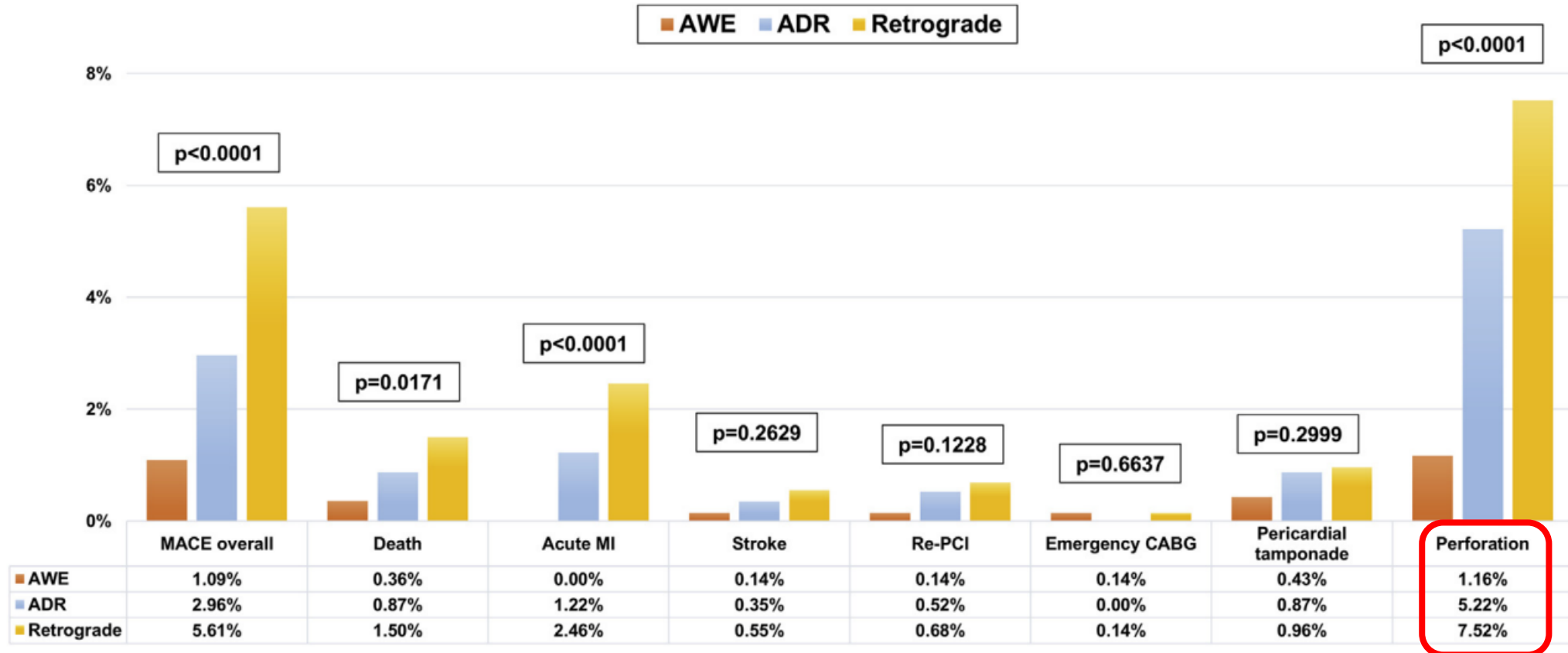
Courtesy of Ajay J. Kirtane

<https://doi.org/10.1161/CIRCULATIONAHA.122.062714>Circulation. 2022;0

Can Opening CTO Save the Life?



PROGRESS CTO Registry: In-Hospital Complications



J Am Coll Cardiol Intv 2018;11:1325–35

Contemporary Series of CTO-PCI

Authors	Acronym	Study Period	Centers	Cases	Technical Success	Procedural Success	Overall MACE	Death	Acute MI	Stroke	TVR	Tamponade
Konstantinidis et al ⁸⁹	EURO-CTO registry	2008–2015	53	17 626	85%	–	0.6%	0.2%	–	–	–	0.4%
Habara et al ⁸⁸	Japanese Retrograde Summit Registry	2012–2013	56	3229	–	88%	0.5%	0.2%	0.1%	0.1%	–	0.3%
Tajti et al ⁶⁰	PROGRESS-CTO	2012–2017	20	3055	87%	85%	3.0%	0.3%	0.7%	0.1%	0.2%	0.5%
Suzuki et al ³¹	Japanese CTO-PCI Expert Registry	2014–2015	41	2846	90%	89%	<2%	0.2%	1.2%	0.2%	0.2%	0.4%
Maeremans et al ⁶¹	RECHARGE	2014–2015	17	1253	89%	86%	2.6%	0.2%	0.2%	2.2%	0.1%	1.3%
Wilson et al ⁶²	UK Hybrid	2012–2014	7	1156	90%	—	1.6%	0.0%	0.8%	0.4%	0.0%	0.7%
Sapontis et al ³	OPEN-CTO	2013–2017	12	1000	86%	85%	7.0%	0.9%	2.6%	0.0%	0.1%	–

14.5% of patients experienced at least 1 complication from OPEN CTO registry
(Salisbury et al, JACC CV Intv 2019)

Emmanouil S. Brilakis, CTO-PCI A Global Expert Consensus Document, Circulation 2019

EDITORIAL COMMENT

Thousand Registries Are Not Worth a Randomized Trial

Also True for Chronic Total Occlusions?*

Carlo Di Mario, MD, PhD,^{a,b} Carlotta Sorini Dini, MD,^a Gerald S. Werner, MD, PhD^c



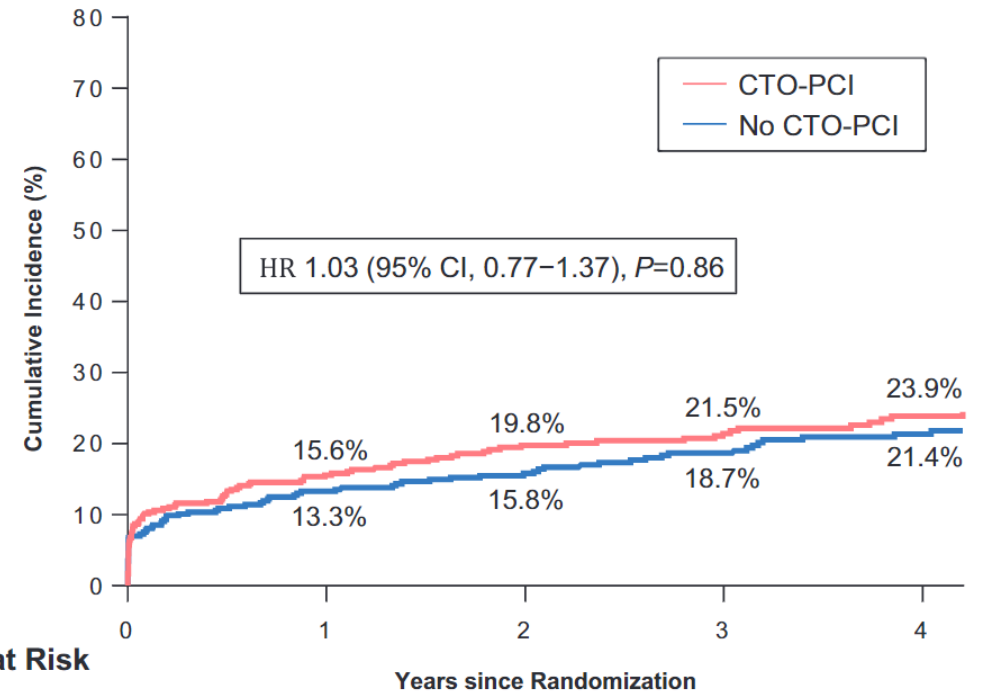
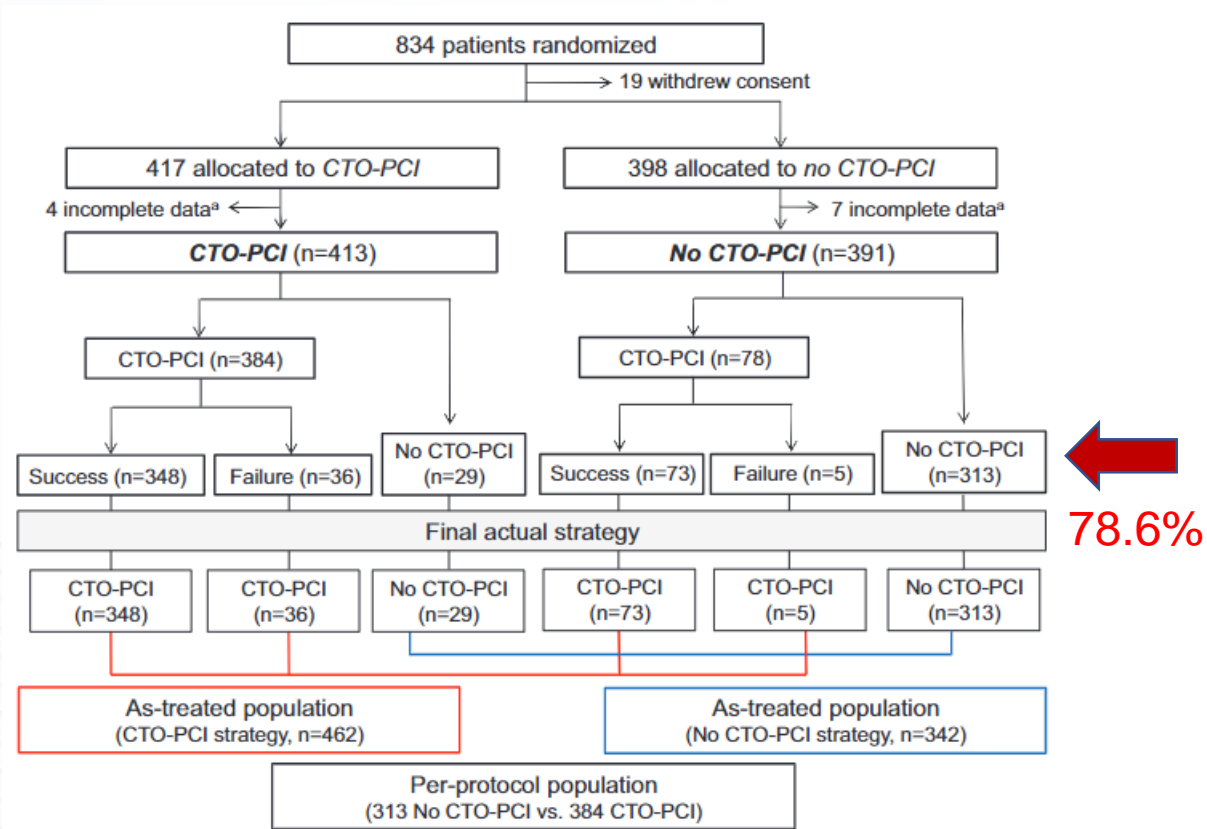
The generally accepted principle is that registries complement the information provided by randomized trials, but only the rigor of the randomization process can eliminate the confounding factors, including the placebo effect, so frequent after interventional treatments, and ensure that true differences are present between conventional and novel therapies. Frequently, the large and significant differences observed in randomized trials lose some of their shine when applied to all-comers groups including suboptimal candidates for the tested therapies.

complications than in this registry, DECISION CTO showed no difference in quality of life (QoL). In the OPEN-CTO (Outcomes, Patient Health Status, and Efficiency IN in Chronic Total Occlusion Hybrid

SEE PAGE 1523

Procedures) registry (5) in this issue of *JACC: Cardiovascular Interventions*, the stunning 90% technical success and 85% procedural success reported by the investigators are trimmed to 86% and 81%, respectively, by the core lab reviewing all angiograms. This is still a remarkable performance considering the

DECISION-CTO Trial



	No. at Risk				
	0	1	2	3	4
CTO-PCI	417	330	269	222	161
No CTO-PCI	398	325	288	230	170

Lee SW, Lee PH, Ahn JM, Park SJ et al Circulation. 2019;139:1674–1683

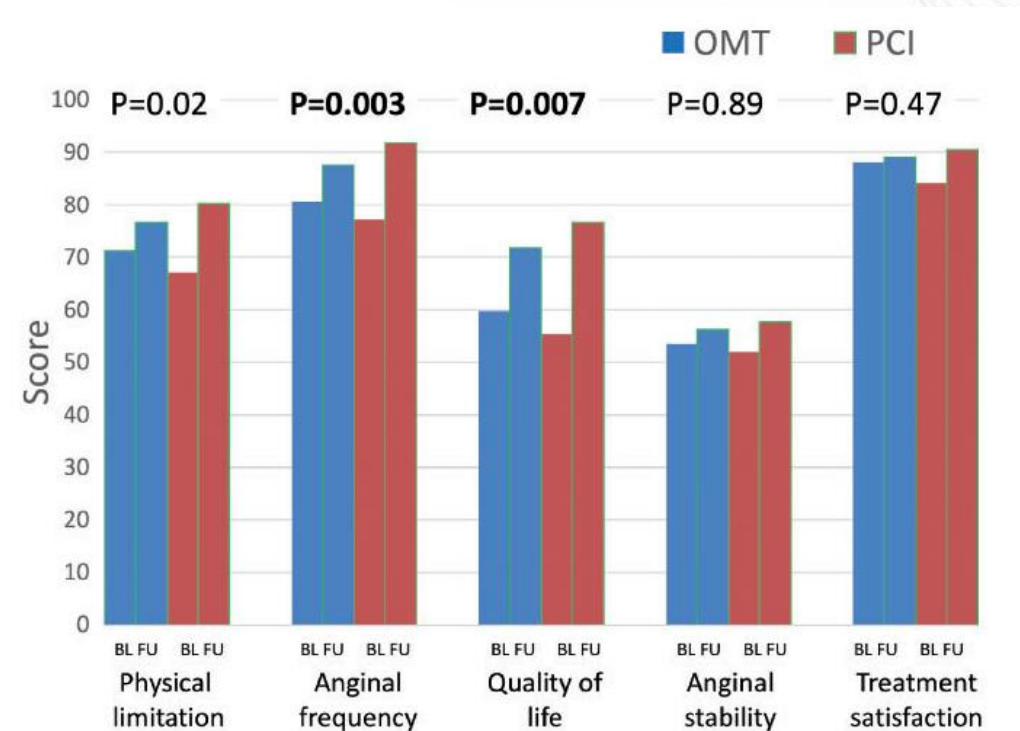
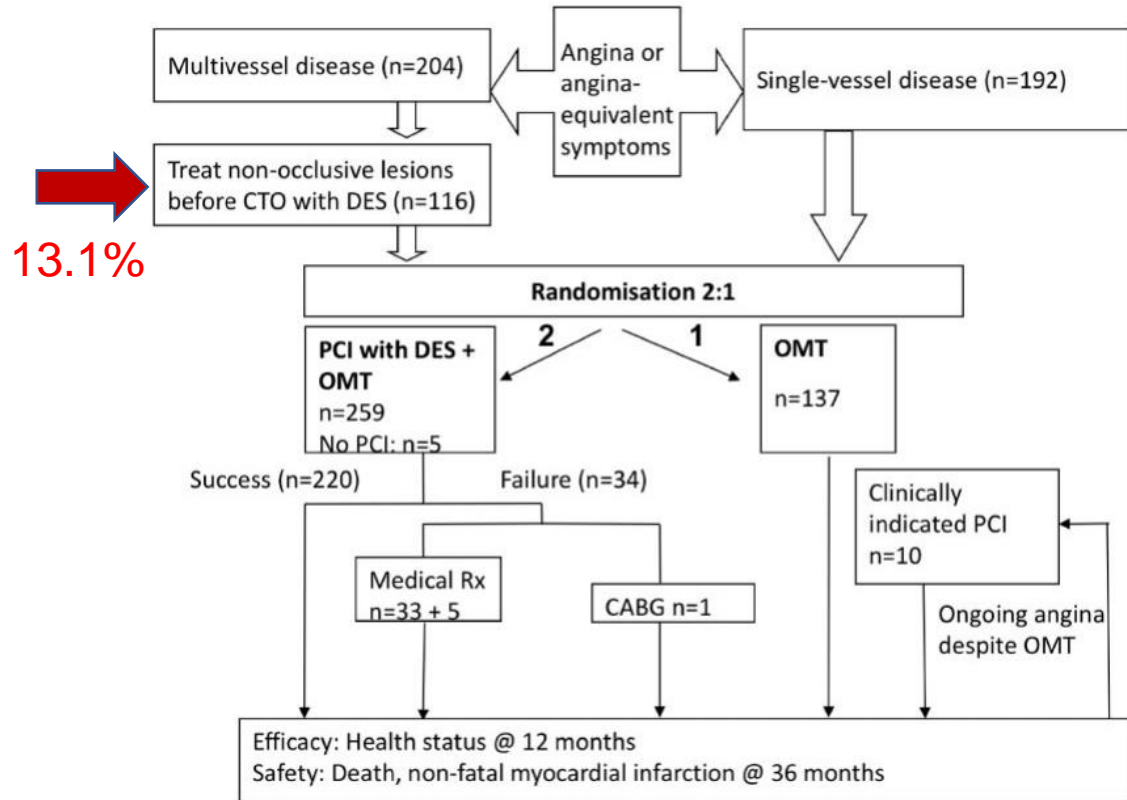
DECISION-CTO Trial

	CTO-PCI (n=417)	No CTO-PCI (n=398)	Crude HR (95% CI)	P Value
Primary end point: death, MI, stroke, or any revascularization	93 (22.3)	89 (22.4)*	1.03 (0.77–1.37)	0.86
Secondary end points				
Death	15 (3.6)	21 (5.3)	0.70 (0.36–1.37)	0.30
Cardiac cause	8 (1.9)	14 (3.5)	0.56 (0.24–1.34)	0.19
Noncardiac cause	7 (1.7)	7 (1.8)	0.99 (0.35–2.82)	0.99
Myocardial infarction	47 (11.3)	34 (8.5)	1.39 (0.90–2.15)	0.14
Periprocedural MI	41 (9.8)	30 (7.5)	1.37 (0.816–2.18)	0.19
Spontaneous MI	7 (1.7)	7 (1.8)	0.88 (0.30–2.57)	0.82
Stroke	6 (1.4)	10 (2.5)	0.61 (0.23–1.65)	0.33
Any revascularization	46 (11.0)	42 (10.6)	1.14 (0.75–1.73)	0.55
CTO vessel	33 (7.9)	30 (7.5)	1.13 (0.69–1.84)	0.63
Non-CTO vessel	29 (7.0)	23 (5.8)	1.34 (0.77–2.31)	0.30
Death, MI, or stroke	66 (15.8)	61 (15.3)	1.07 (0.75–1.51)	0.72
Cardiac death, MI, stroke, or any revascularization	86 (20.6)	82 (20.6)	1.02 (0.76–1.39)	0.88
Death, spontaneous MI, stroke, or any revascularization	64 (15.3)	69 (17.3)	0.91 (0.65–1.30)	0.59

Lee SW, Lee PH, Ahn JM, Park SJ et al Circulation. 2019;139:1674–1683

EURO-CTO Trial

The change in health status assessed by SAQ between baseline and 12 months



EURO-CTO Trial

36 Months FU

	OMT (N=137)	PCI (N=259)	P value
Safety events	4 (2.9)	13 (5.0)	0.32
Cardiovascular death	2 (1.5)	7 (2.7)	0.42
Non-fatal MI	2 (1.5)	6 (2.3)	0.56
Ischemia-driven revascularization	25 (18.2)	19 (7.3)	0.0035
Cerebrovascular event	1 (0.7)	5 (1.9)	0.27
Stent thrombosis	0	1 (0.4)	
All cause death	3 (2.2)	14 (5.4)	0.14

TCT 2019

EXPLORE: MRI-Assessed LVEF at 4 months

280 STEMI pts with CTO randomized: CTO PCI (**73% success**) vs. no CTO PCI

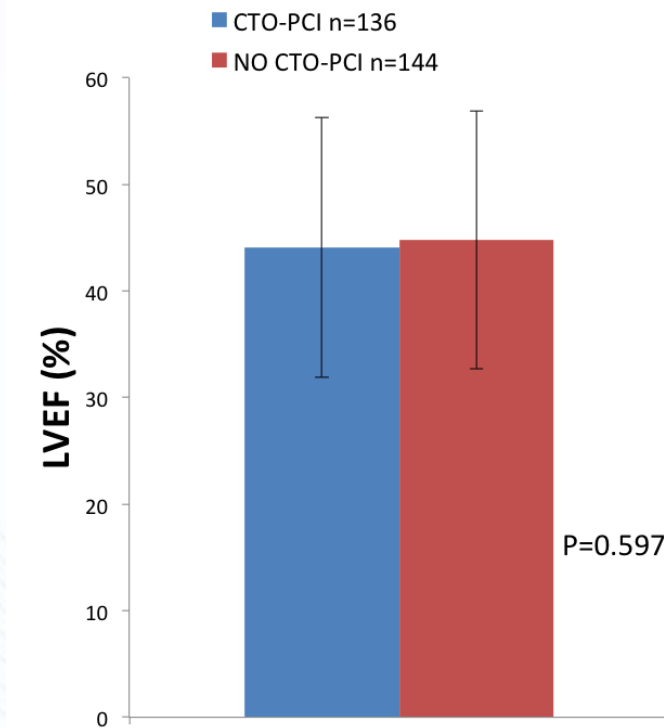


TABLE 4 Adjudicated Clinical Outcomes From Randomization to 4-Month Follow-Up

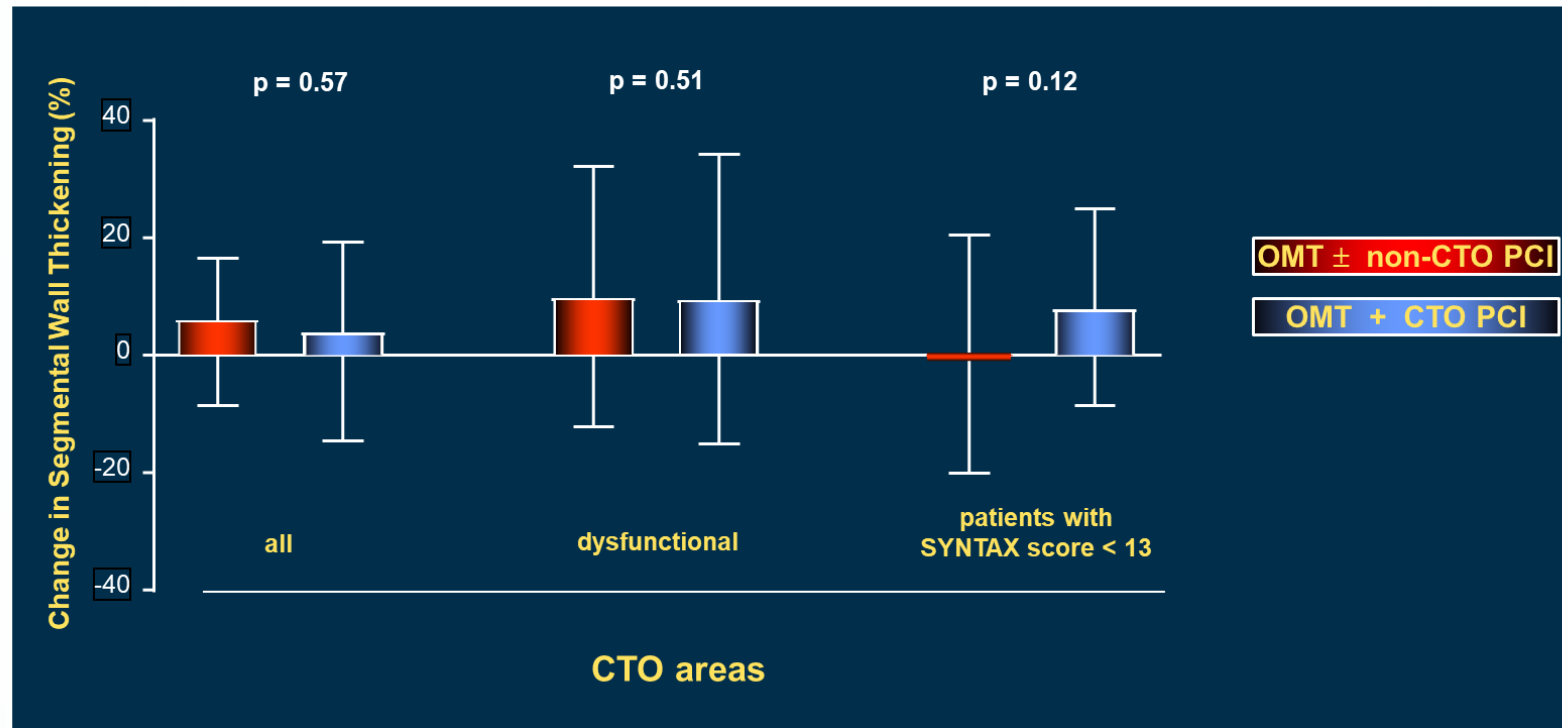
	CTO PCI (n = 148)	No CTO PCI (n = 154)	p Value
Major adverse cardiac events			
Cardiac death	4 (2.7)	0 (0.0)	0.056
Myocardial infarction	5 (3.4)	3 (1.9)	0.49
Periprocedural*	4 (2.7)	1 (0.6)	—
Spontaneous or recurrent	2 (1.4)	2 (1.3)	—
CABG operation	—	1 (0.6)	—
MACE	8 (5.4)	4 (2.6)	0.25

REVASC: Change in Segmental Wall Thickening at 6 Mo

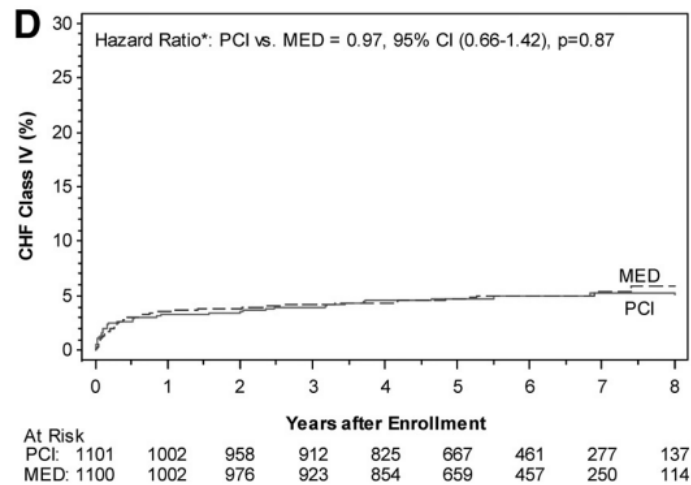
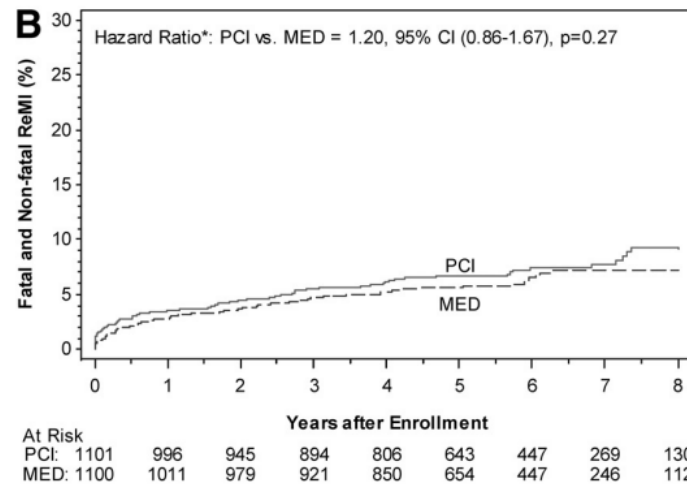
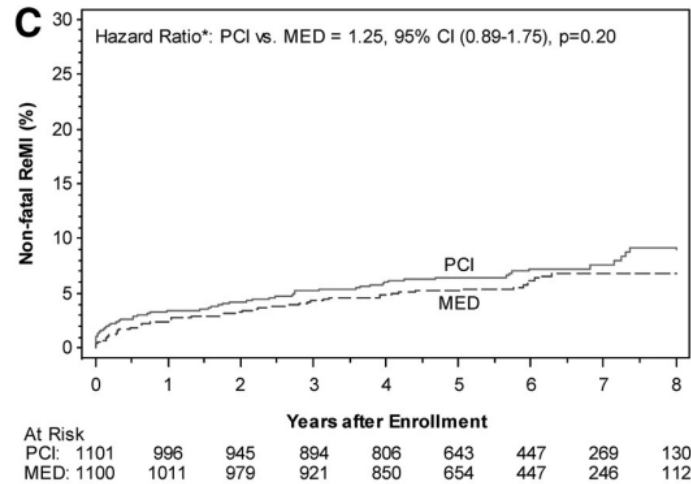
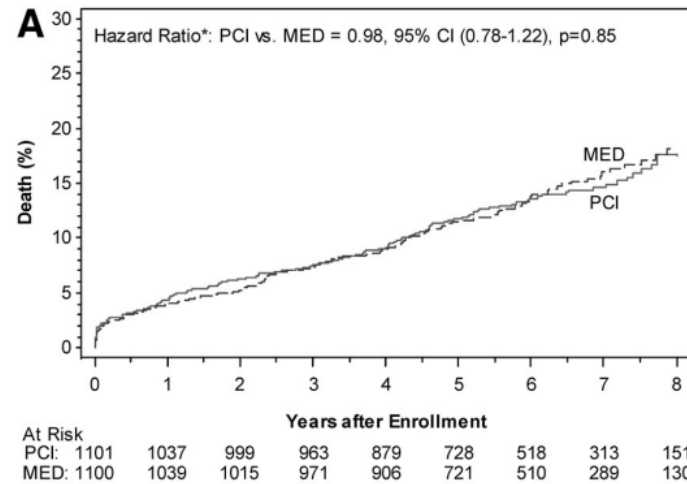
205 CTO patients randomized to CTO PCI vs. no CTO PCI
(no CTO PCI group included 60% non-CTO PCI)

Mean EF 54.7% vs. 59.6%

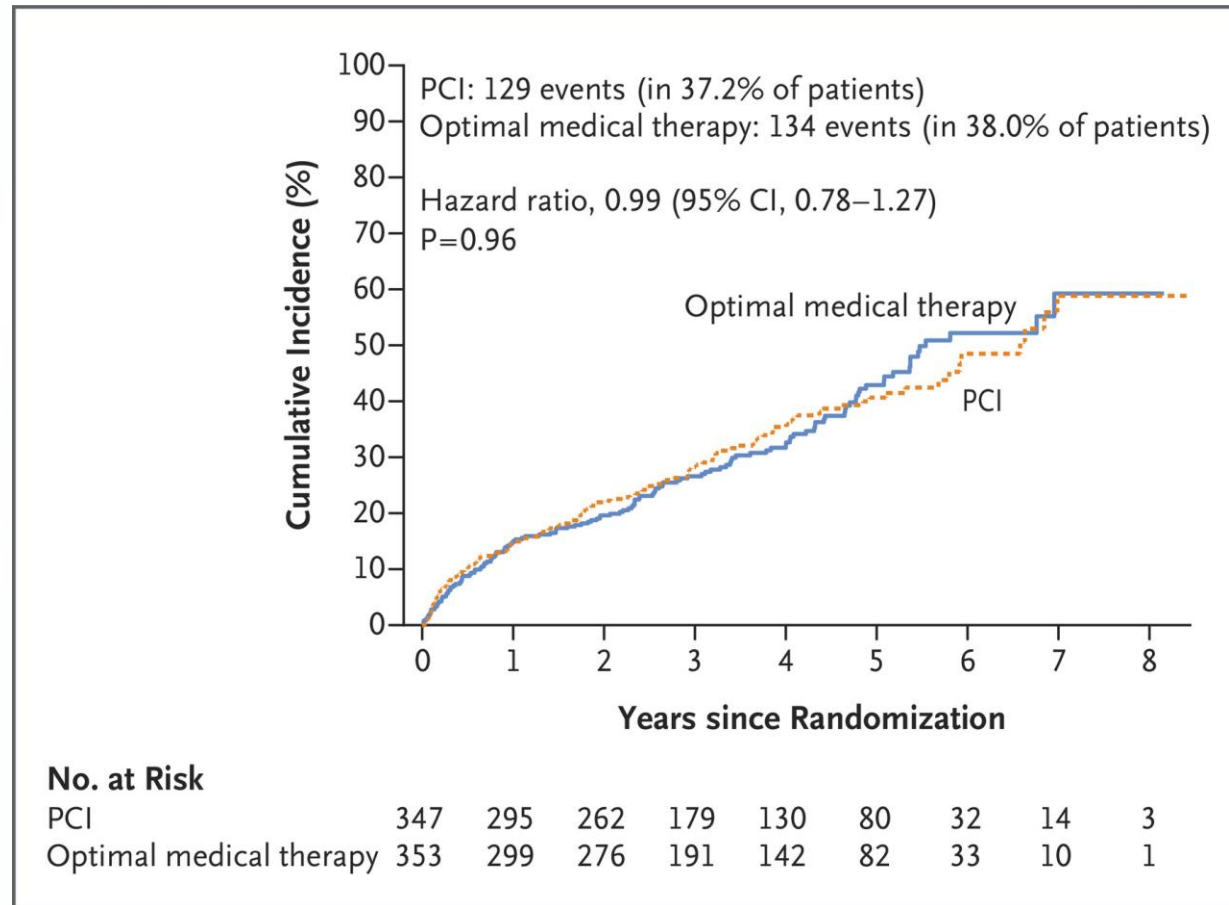
Baseline SYNTAX Score 14 vs. 16; rSS 2 vs. 11



OAT Trial: PCI vs. OMT for IRA TO >24 hours



REVIVED-BCIS2: PCI vs. OMT in iCMP



N Engl J Med 2022; 387:1351-1360

Treatment of CTO

COR	LOE	Recommendation
2b	B-R	In patients with suitable anatomy who have refractory angina on medical therapy, after treatment of non-CTO lesions, the benefit of PCI of a CTO to improve symptoms is uncertain .

“Enthusiasm for treating these lesions was fueled by retrospective data suggesting improved outcomes for those patients who underwent successful recanalization compared with those who had failed. However, RCTs have not demonstrated improved function and have been equivocal with regard to symptoms.”

CLASS 2b (WEAK) Benefit ≥ Risk

Suggested phrases for writing recommendations:

- May/might be reasonable
- May/might be considered
- Usefulness/effectiveness is unknown/unclear/uncertain or not well-established

LEVEL B-R

(Randomized)

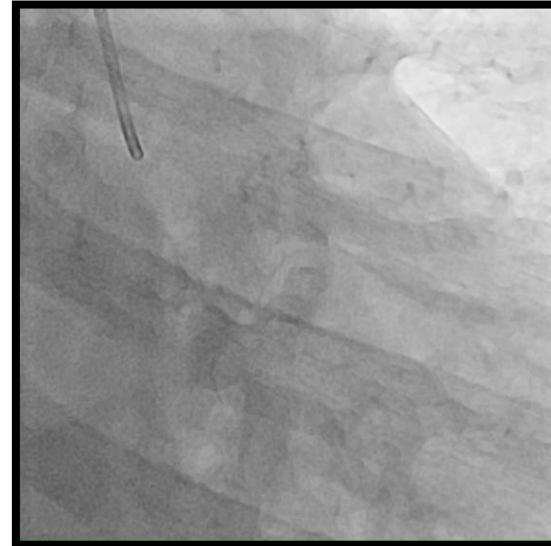
- Moderate-quality evidence‡ from 1 or more RCTs
- Meta-analyses of moderate-quality RCTs

- EUROCTO and DECISION CTO
- EXPLORE and REVASC

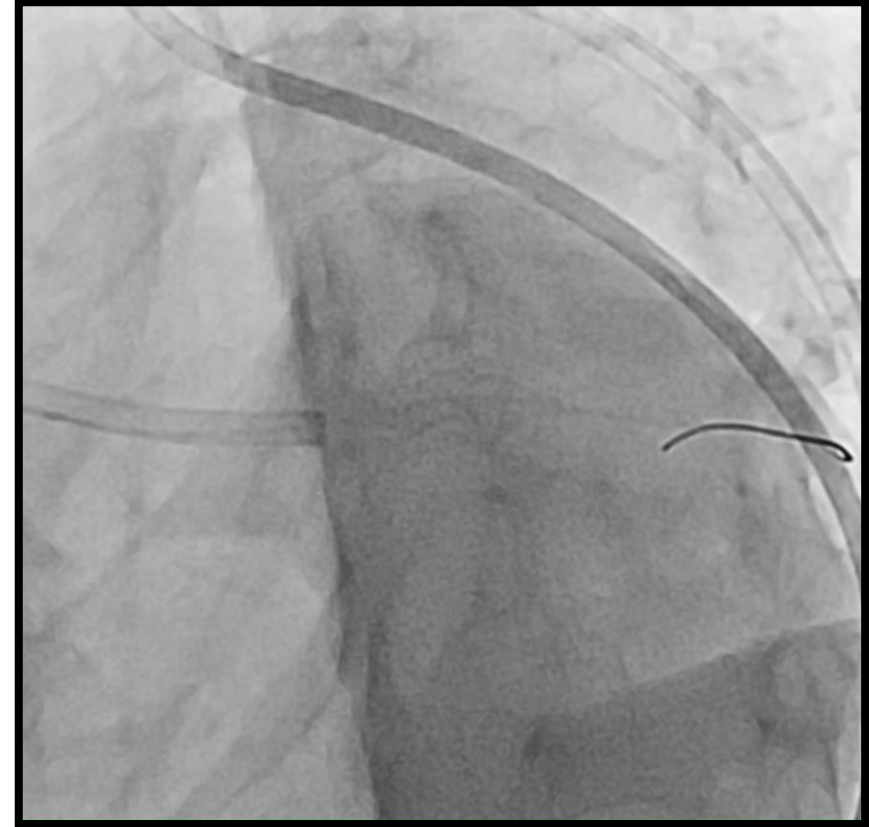
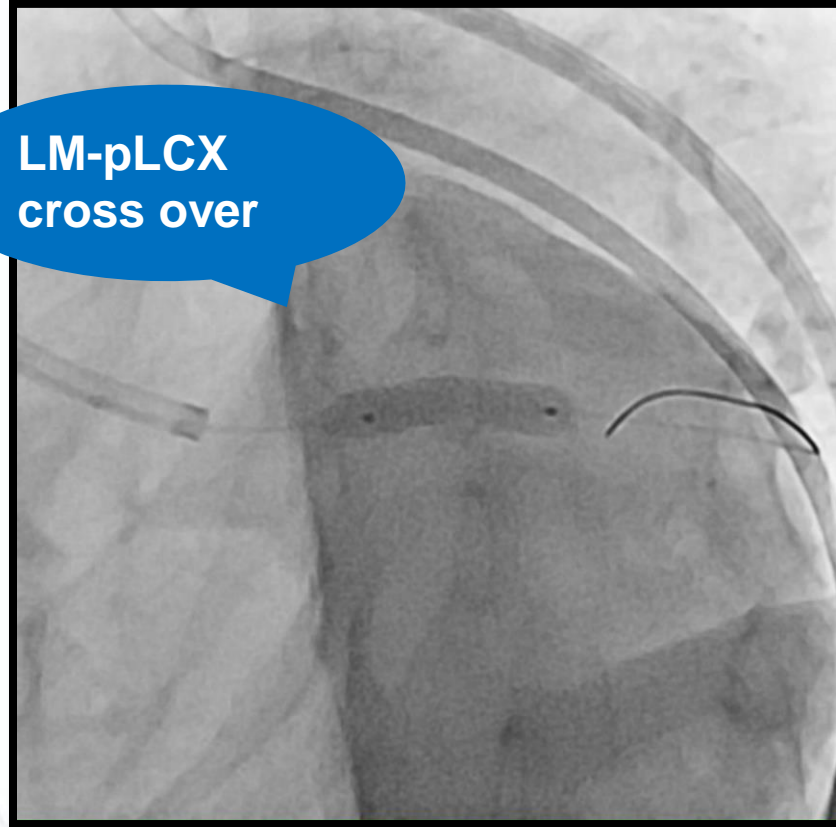
My Thought

- The data in favor of CTO PCI are for symptom relief. The CTO PCI was not associated with the improvement of survival or clinical outcomes.
- The non-CTO, ischemia producing significant stenosis would be more relevant and safer target for symptom relief.

40 YO/F, EF= 55%, minimal effort chest pain



40 YO/F, EF= 55%, minimal effort chest pain



Sustained angina even after LM-LCX PCI -> MIDCAB

Fortunately, patient is doing very well without angina.

62 years old male patient was admitted for sAP



62 years old male patient was admitted for sAP



62 years old male patient was admitted for sAP



dRCA PCI

