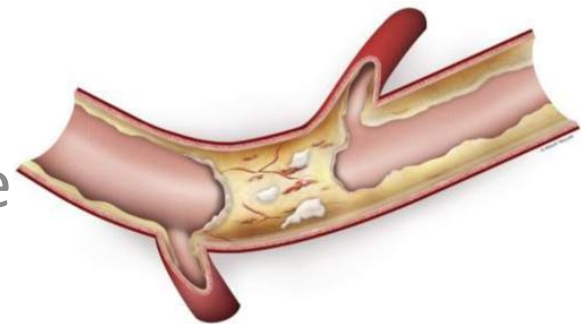




Pourquoi faire la CTO ?



Dr Nicolas LHOEST
Clinique de l'orangerie
STRASBOURG



- Améliorer la qualité de vie
- Diminution de l'angor
- Amélioration de la FE
- Diminuer la mortalité



CATHETERIZATION
&
CARDIOVASCULAR
INTERVENTIONS




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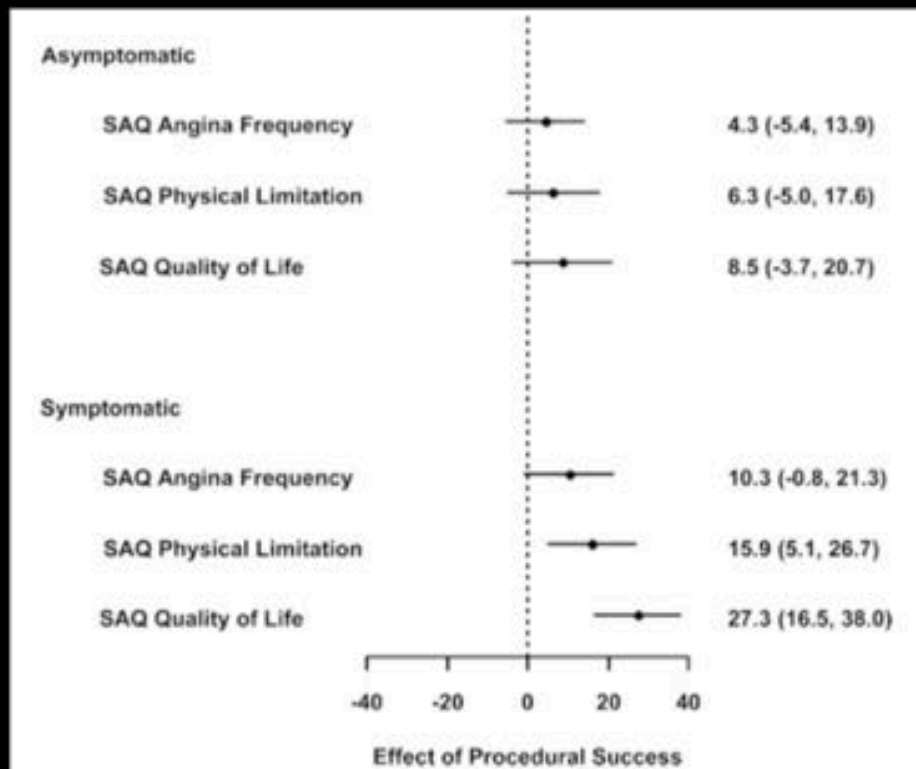
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IMPACT SUR LES SYMPTOMES



Grantham et al Circ Cardiovasc Qual Outcomes 2010;3:284

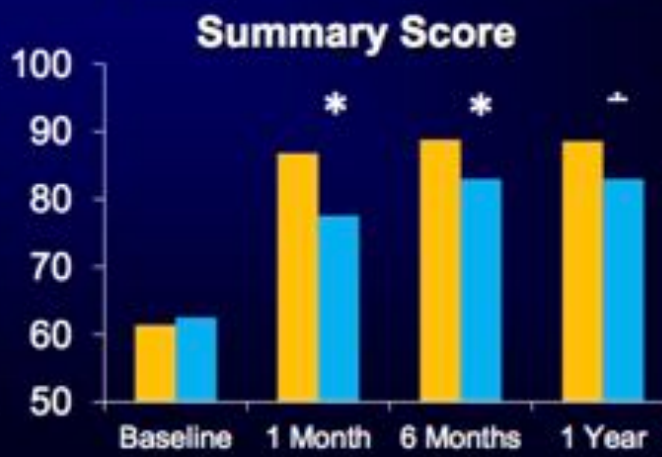
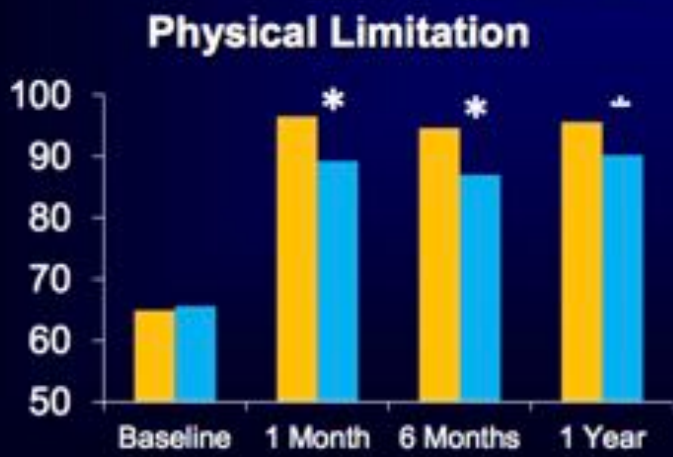
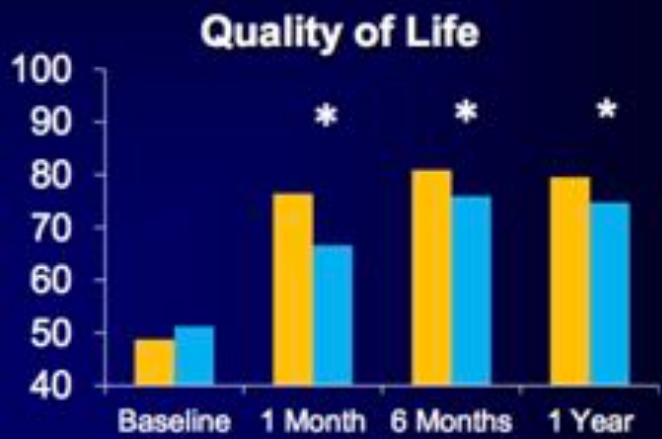
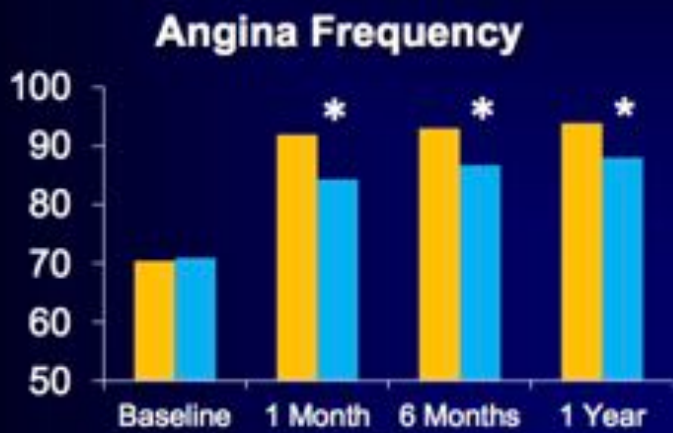
125 pts undergoing CTO PCI

64 (55%) success, Seattle Angina Questionnaire at baseline and 1 month

Successful PCI reduces angina, improves physical capacity and QoL

Health Status Trajectory After CTO PCI

■ Success (N=862)
 ■ Failure (N=138)
 * p<0.05



STEMI associé à CTO = double peine

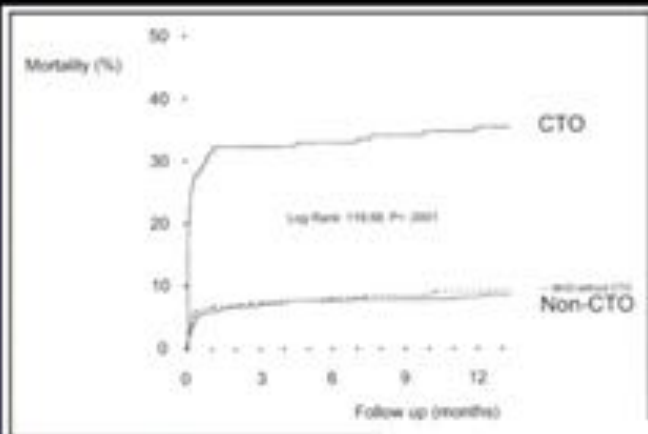
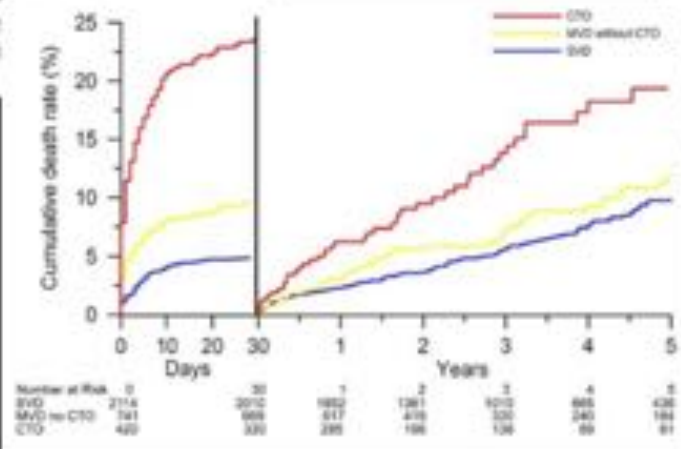


Figure 2. Mortality in 1,417 patients with percutaneous coronary intervention (log-rank [CTO] vs no CTO).

Van der Schaaf et al. *Am J Cardiol* 2006;98:1165



Classen et al. *JACC:Cardiovasc Int*, 2009;2:1128

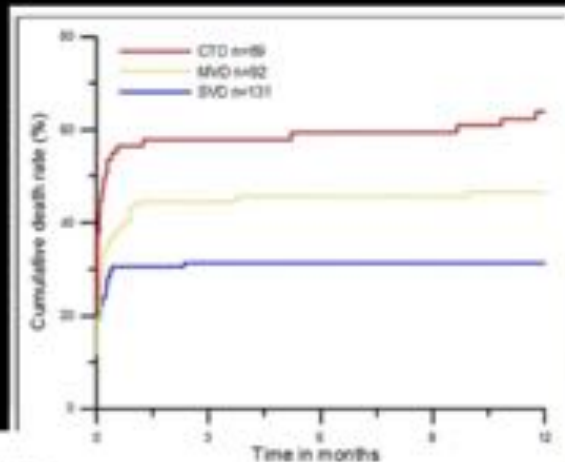
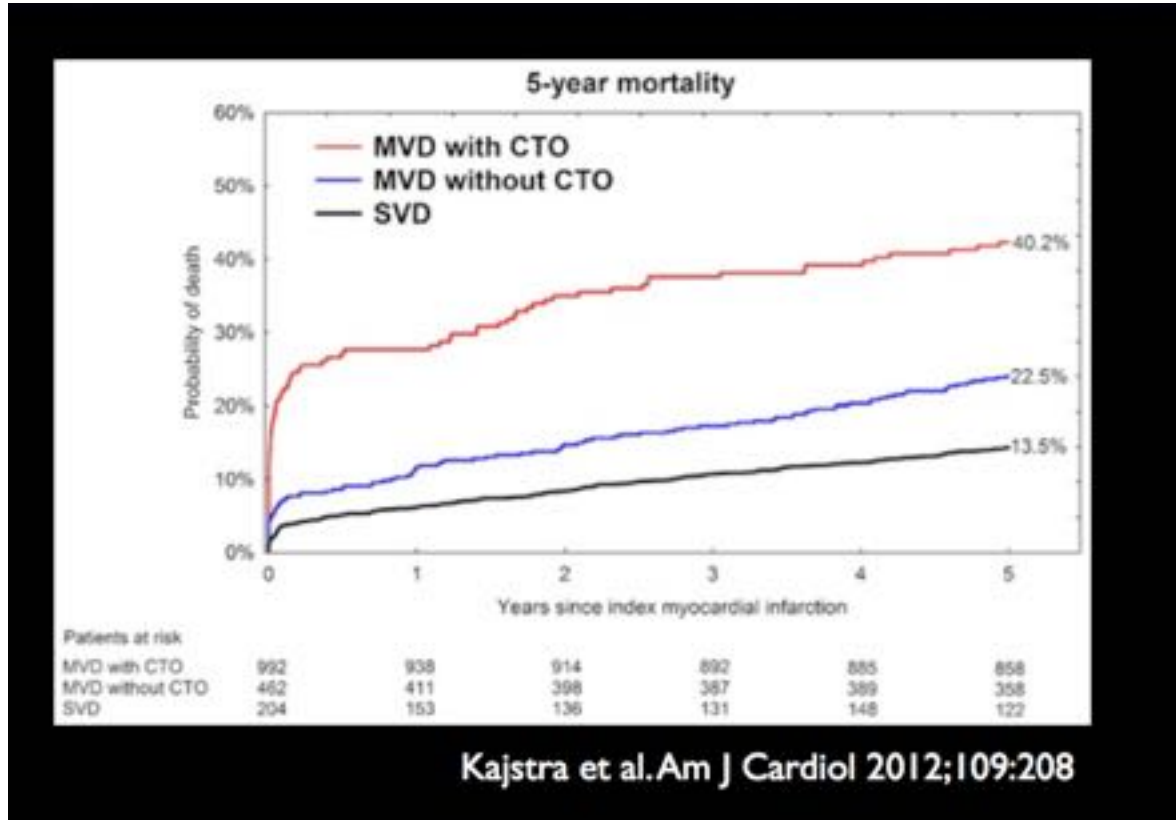


Figure 1. One-year mortality of patients treated with primary PCI for MI complicated by cardiogenic shock. Overall 3-group comparison, risk $p < 0.01$; MVD versus single-vessel disease, log-rank $p = 0.02$; versus MVD, log-rank $p = 0.03$; CTO versus single-vessel disease, risk $p < 0.01$. SVD = single-vessel disease.

Van der Schaaf et al. *Am J Cardiol* 2010;105:955

STEMI et CTO: double peine



Impact sur la mortalité

Interventional Cardiology

Effectiveness of recanalization of chronic total occlusions: A systematic review and meta-analysis

Dominique Joyal, MD, FACC,* Jonathan Afilalo, MD,* and Stéphane Rinfret, MD, SM[†] Quebec, Canada

Background Chronic total occlusion (CTO) recanalizations remain extremely challenging procedures. With improvements in technology and techniques, success rates for recanalization of CTO continue to improve. However, the clinical benefits of this practice remain unclear. The aim of the study was to determine the effectiveness of CTO recanalization on clinical outcomes.

Methods We performed a systematic review and meta-analysis of published studies comparing CTO recanalization to medical management. Data were extracted in duplicate and analyzed by a random effects model.

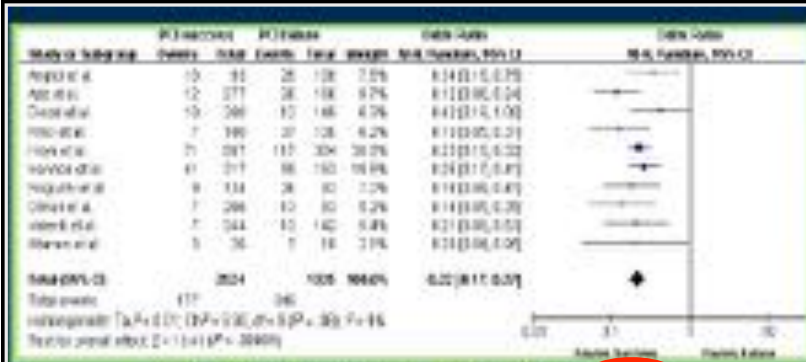
Results We did not identify any randomized controlled trials or observational studies comparing CTO recanalization to a planned medical management. We did identify 13 observational studies comparing outcomes after successful vs failed CTO recanalization attempt. These studies encompassed 7,288 patients observed over a weighted average follow-up of 6 years. There were 721 (14.3%) deaths of 5,056 patients after successful CTO recanalization compared to 390 deaths (17.5%) of 2,232 patients after failed CTO recanalization [odds ratio (OR) 0.56, 95% CI 0.43-0.72]. Successful recanalization was associated with a significant reduction in subsequent coronary artery bypass graft surgery (CABG) [OR 0.22, 95% CI 0.17-0.27] but not in myocardial infarction [OR 0.74, 95% CI 0.44-1.25] or major adverse cardiac events [OR 0.81, 95% CI 0.55-1.21]. In the 6 studies that reported angina status, successful recanalization was associated with a significant reduction in residual/recurrent angina [OR 0.45, 95% CI 0.30-0.67].

Conclusions In highly selected patients considered for CTO recanalization, successful attempts appear to be associated with an improvement in mortality and with a reduction for the need for CABG as compared to failed recanalization. However, given the observational nature of the reviewed evidence, randomized clinical trials are needed to confirm these findings. [Am Heart J 2010;160:179-87.]

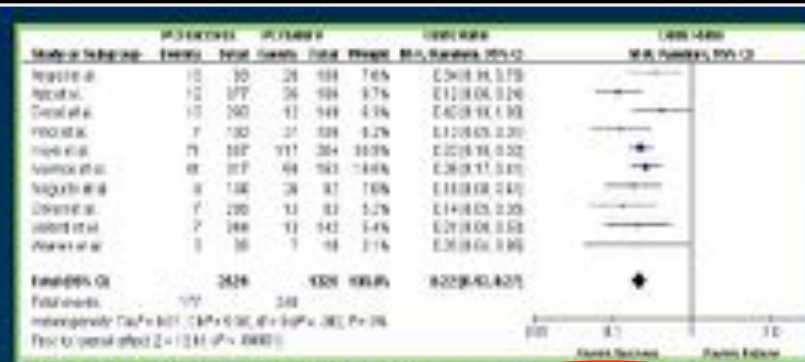


Am Heart J. 2010 Jul;160(1):179-87. doi: 10.1016/j.ahj.2010.04.015. Review.

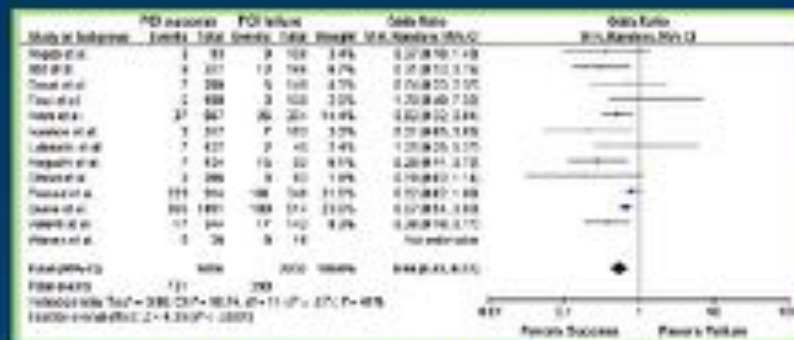
Impact sur la mortalité



Effect of Successful CTO PCI on **angina**



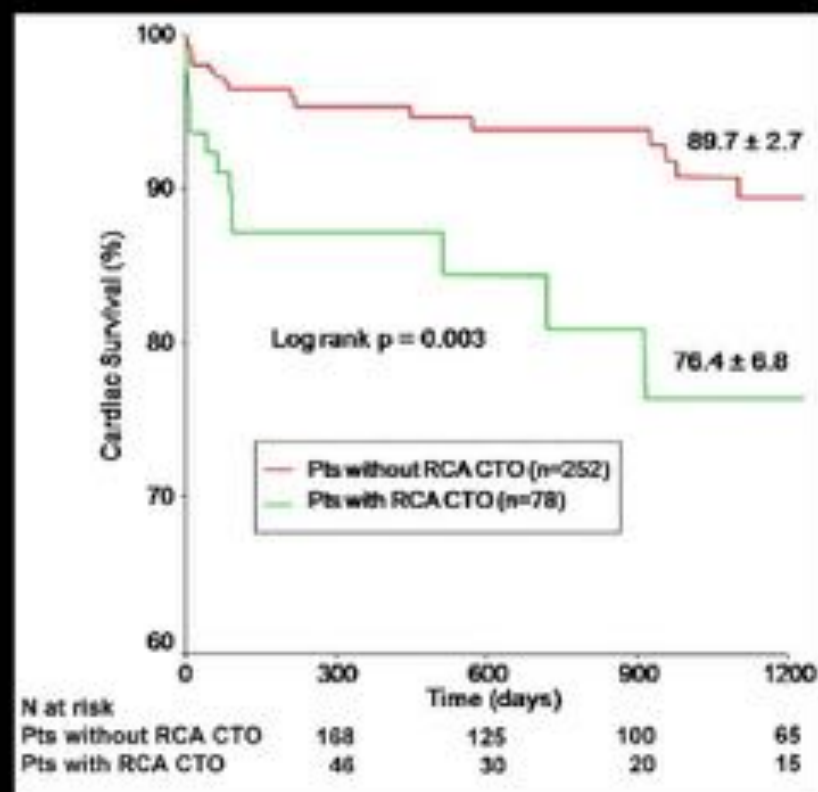
Effect of Successful CTO PCI on **subsequent CABG**



Effect of Successful CTO PCI on Mortality

Impact sur la survie CTO CD

Outcome	Patients With ULM and No Residual CTO-RCA (n=522)	Patients With ULM and Residual CTO-RCA (n=46)	P Value
All-cause death (absolute number)	68	15	0.003
1-y, % (n=538)	23.8±0.8	4.3±3.0	
3-y, % (n=477)	7.8±1.2	17.6±5.7	
5-y, % (n=157)	15.1±1.9	30.7±7.3	
Cardiac-death (absolute number)	30	11	<0.001
1-y, % (n=538)	2.3±0.7	4.3±3.0	
3-y, % (n=477)	4.1±0.9	17.6±5.7	
5-y, % (n=157)	6.6±1.2	22.7±6.4	
TLR (absolute number)	120	5	0.048
1-y, % (n=456)	17.0±1.7	4.4±3.1	
3-y, % (n=382)	21.7±1.8	7.2±4.0	
5-y, % (n=123)	24.6±2.1	11.4±5.6	
3-y MI	2.0±0.1	4.4±3.1	0.709
3-y cardiac-death+MI, %	4.7±0.9	17.6±5.7	<0.001
3-y MACE, % (cardiac-death+MI+TLR)	24.2±1.9	24.2±6.4	0.878





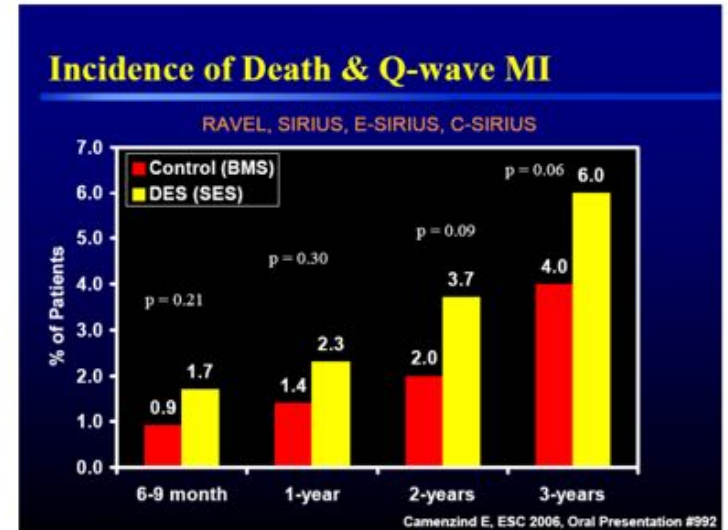
ACC 18/03/2017

DECISION-CTO

Optimal Medical Therapy With or Without Stenting For Coronary Chronic Total Occlusion

Dr Seung-jung park
seoul, corée

“Black Sunday” (ESC, 3 Sept 2006)



DECISION-CTO

**Optimal Medical Therapy With or Without
Stenting For Coronary Chronic Total Occlusion**

**DR SEUNG-JUNG PARK
SEOUL, CORÉE**

Design

- **DESIGN:** a prospective, open-label, randomized trial
- **OBJECTIVE:** To compare the outcomes of OMT alone with PCI coupled with OMT in patients with CTO.
- **PRINCIPAL INVESTIGATOR**
Seung-Jung Park, MD, PhD,
Asan Medical Center, Seoul, Korea

Clinicaltrials.gov, Identifier: NCT01075051

Critères d'inclusion majeur

- Silent ischemia, stable angina, or ACS
- **De novo** CTO located in a proximal to mid epicardial coronary artery with a reference diameter of ≥ 2.5 mm
- CTO was defined as a coronary artery obstruction with TIMI flow grade 0 of at least three months' duration based on patient history.

Critères d'exclusion

- CTO located in
 - Distal coronary artery
 - 3 different vessel CTOs in any location
 - 2 proximal CTOs in separate coronary artery
 - left main segment
 - In-stent restenosis
 - Graft vessel
- LVEF < 30%
- Severe comorbidity

Procédures

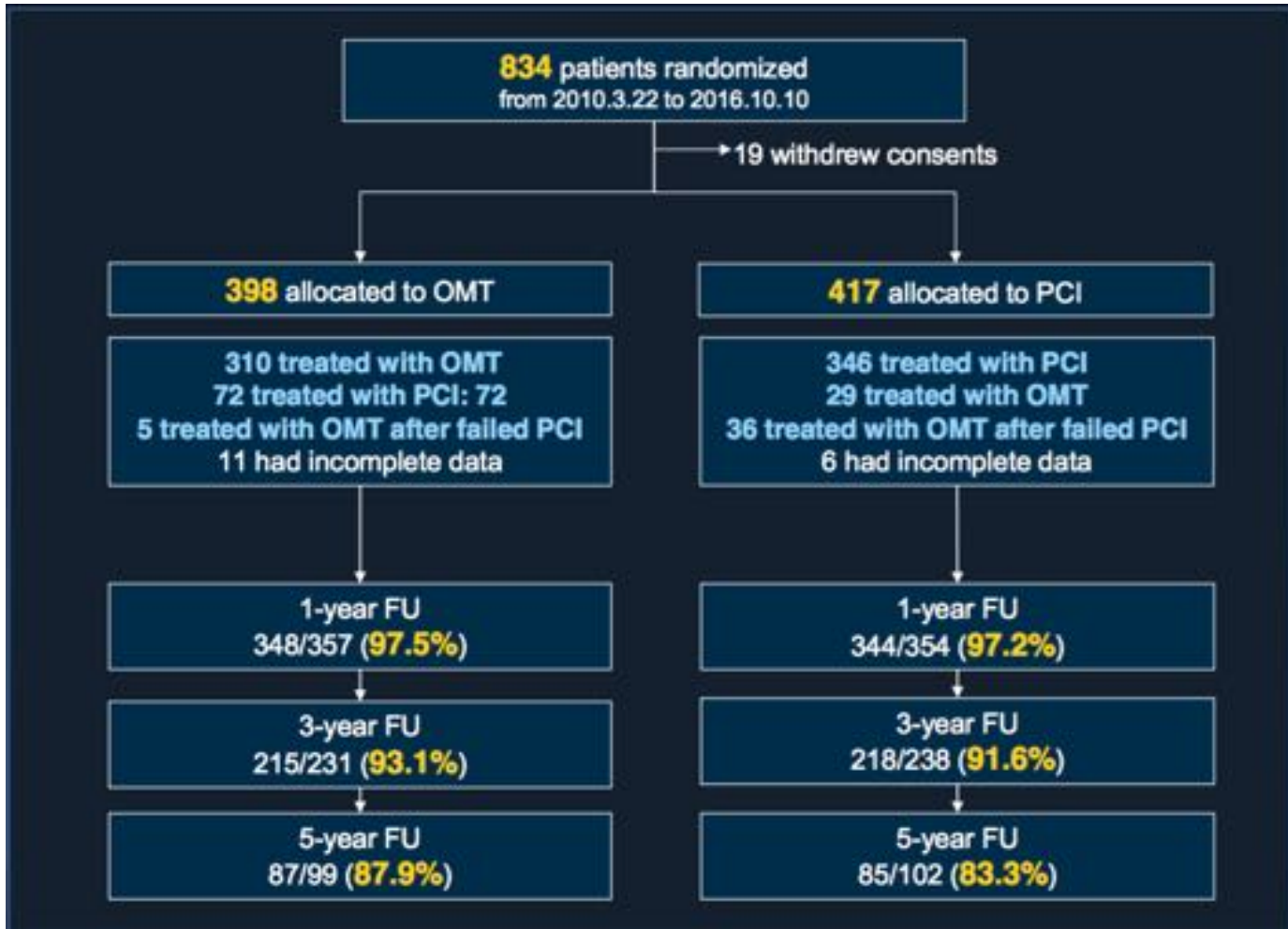
- Patients who were assigned to PCIs underwent CTO-PCI using DES within 30 days after randomization using standard procedures.
- In cases of failed CTO-PCI, additional attempts were allowed within 30 days after the index procedure.
- The use of specialized devices or techniques, and the choice of drug-eluting stent type were left to the operator's discretion.
- Revascularization for all significant non-CTO lesions within a vessel diameter of ≥ 2.5 mm for patients with multi-vessel coronary artery disease was recommended.
- Patients were prescribed guideline derived optimal medical treatment including aspirin, P2Y12 receptor inhibitors (>12months in case of PCI), beta-blocker, CCB, nitrate, ACEi/ARB, and statin.
- Blood pressure and diabetic control, smoking cessation, weight control, and regular exercise were recommended.

Objectifs primaires

At 3 year, a composite of

- Death from any cause
- Myocardial infarction
 - Periprocedural MI: CK-MB > 5 times UNL
 - Spontaneous MI: any cardiac enzyme elevation
- Stroke
- Any repeat revascularization

Design



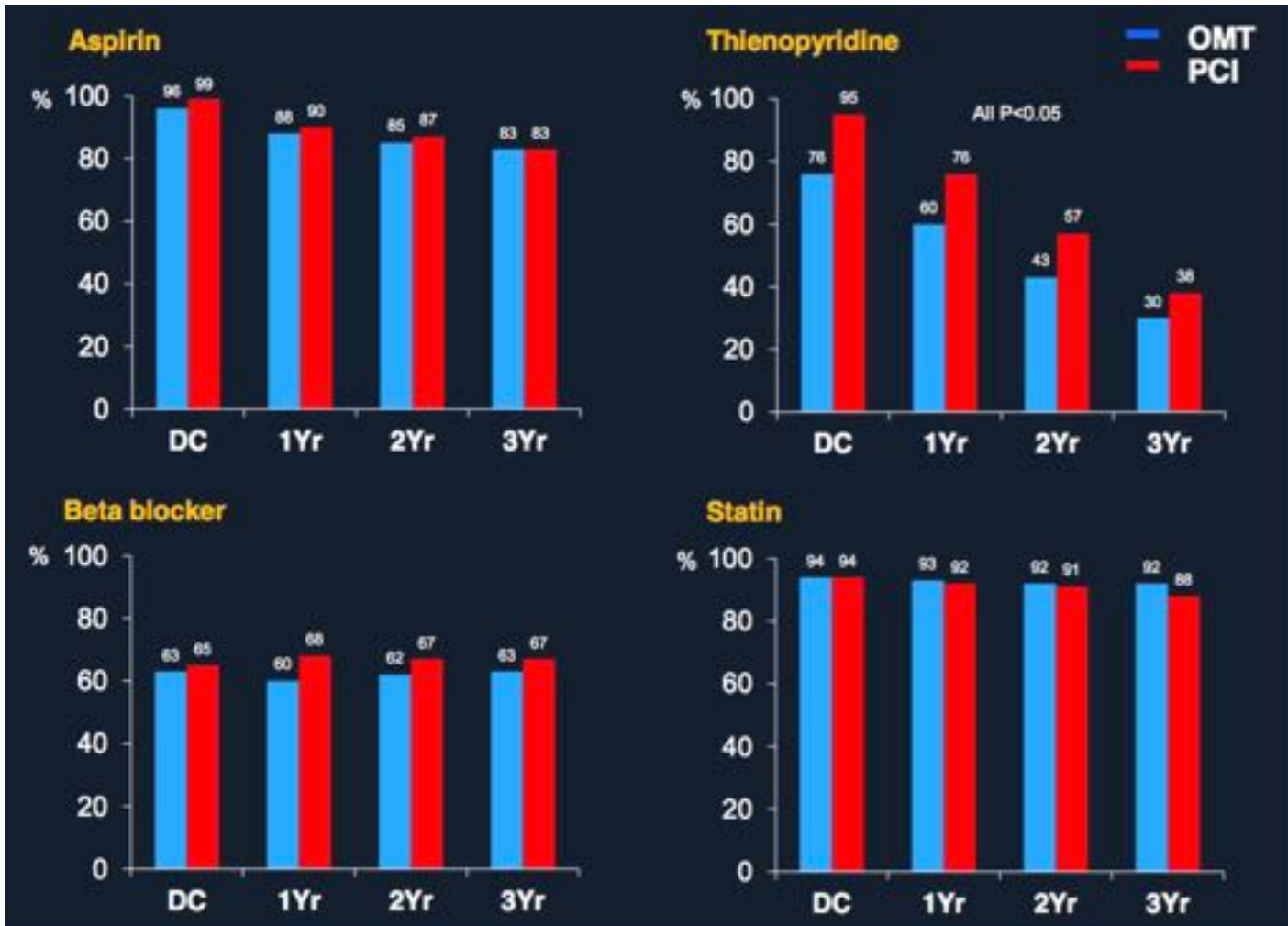
	OMT (N=398)	PCI (N=417)	P value
Age (years)	62.9±9.9	62.2±10.2	0.35
Male sex	315 (81.4%)	342 (83.2%)	0.50
BMI, kg/m ²	25.4±3.3	25.6±3.6	0.66
Hypertension	235 (60.7%)	261 (63.5%)	0.50
Diabetes mellitus	133 (34.4%)	132 (32.1%)	
Hypercholesterolemia	215 (55.6%)	248 (60.3%)	0.17
Current smoker	102 (26.4%)	125 (30.4%)	0.20
Previous PCI	74 (19.1%)	62 (15.1%)	0.13
Previous MI	34 (8.8%)	45 (10.9%)	0.31
Previous CABG	5 (1.3%)	4 (1.0%)	0.75
Chronic renal failure	5 (1.3%)	6 (1.5%)	0.84
LVEF, %	57.2±9.4%	57.2±9.8%	0.95

	OMT (N=398)	PCI (N=417)	P value
Clinical presentation			0.58
Stable angina	290 (74.9%)	297 (72.3%)	
Unstable angina	75 (19.4%)	84 (20.4%)	
AMI	22 (5.7%)	30 (7.3%)	
Location of CTO			0.71
LAD	161 (41.6%)	183 (44.5%)	
LCX	42 (10.9%)	40 (10.2%)	
RCA	184 (47.5%)	186 (45.3%)	
Multivessel disease	286 (73.9%)	301 (73.3%)	0.76
SYNTAX score	21.0±9.5	21.2±9.1	0.79
J-CTO score	2.3±1.2	2.2±1.2	0.23

Attempted PCI**N=459**

CTO PCI success	418 (91.1%)
Retrograde approach	113 (24.6%)
Lesion passaged wire	
Low penetration force wire	117/418 (28.0%)
Intermediate to high penetration force wire	301/418 (72.0%)
CTO technique	
Single wire technique only	309/418 (73.9%)
Parallel wire technique	72/418 (17.2%)
IVUS-guided wiring	25/418 (6.0%)
CART technique	55/418 (13.2%)
Additional back-up support	
Corsair	91/418 (21.8%)
Microcatheter other than Corsair	230/418 (55.0%)
Over-the-wire balloon	6/418 (1.4%)

Médicaments au follow up



Noninferiority Test for Primary End Point at 3-Year

ITT Population

Estimated 3-year Event Rate OMT: 19.6% PCI: 20.6%

Prespecified non-inferiority margin: 0.7

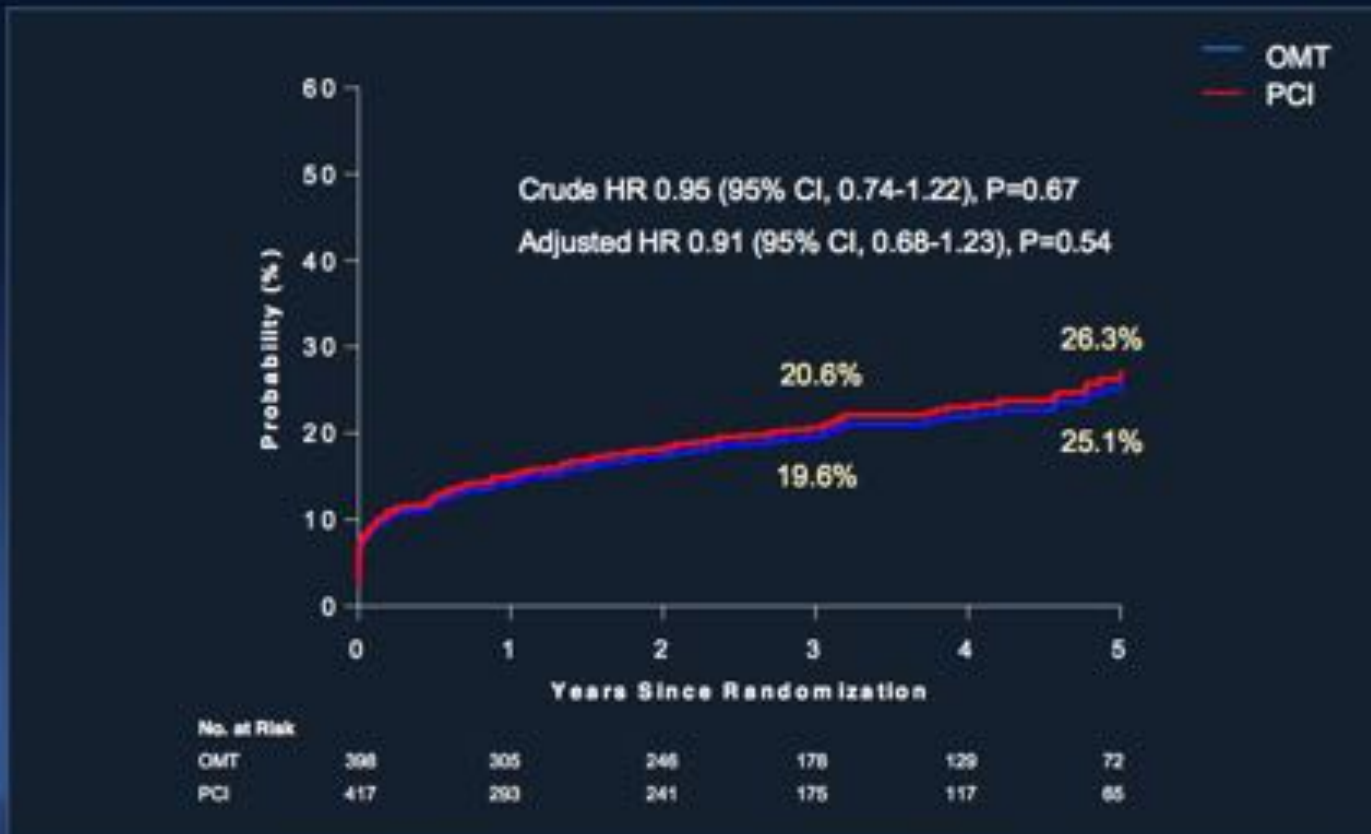


Event Rate Ratio of 3-year MACE rate (PCI/OMT)

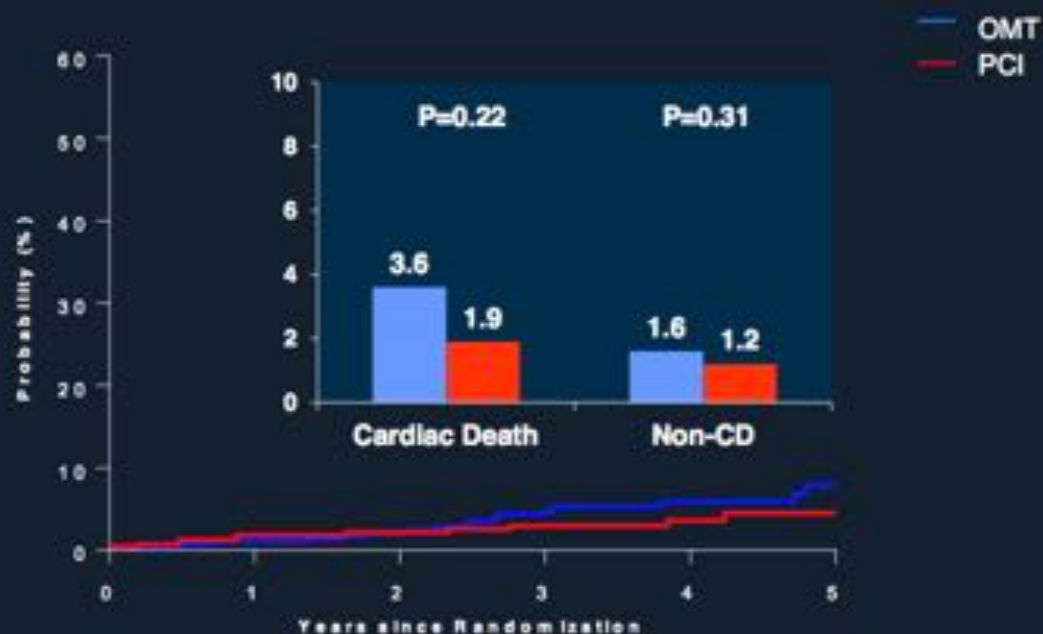
Lower 1-sided 97.5% CI

Primary End Point

(Death, MI, Stroke, Any Repeat Revascularization)



Death from any cause



No. at Risk

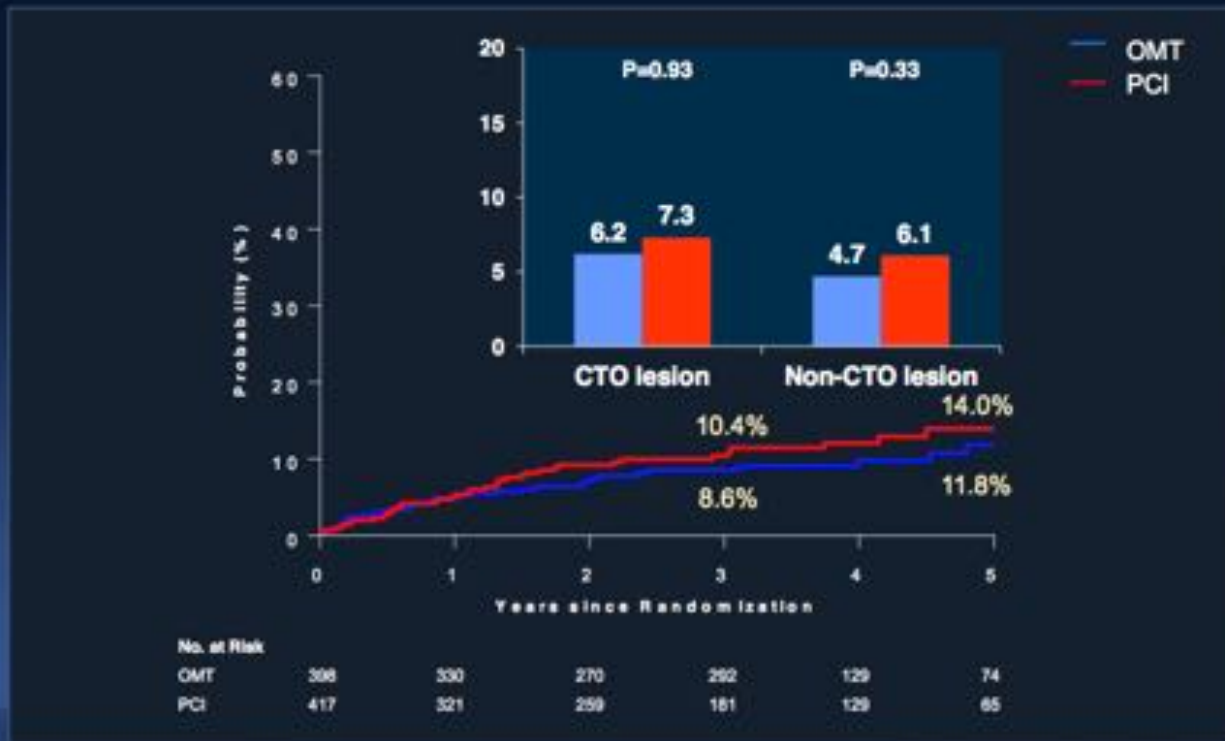
OMT	398	344	285	207	140	81
PCI	417	337	285	202	142	74

Myocardial Infarction

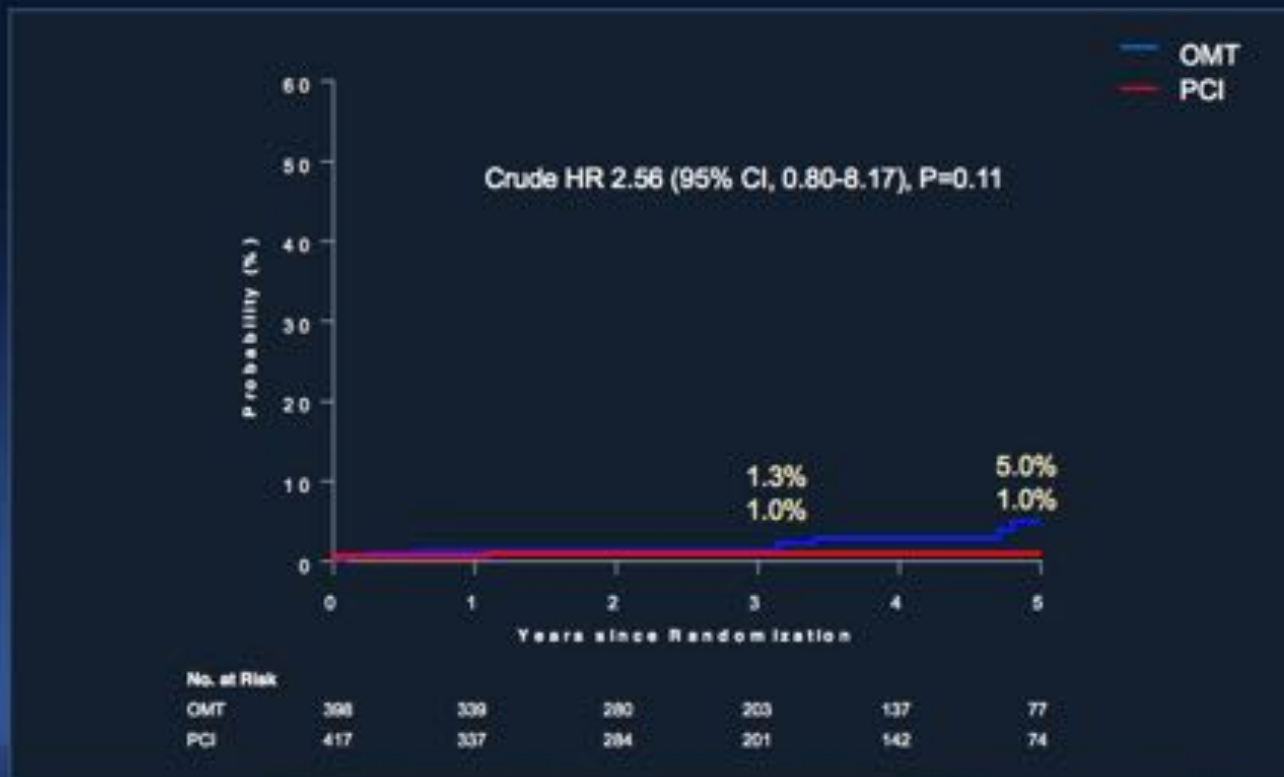


ITT Population

Repeat Revascularization



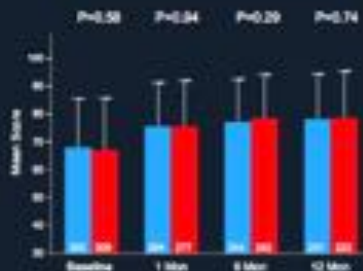
Stroke



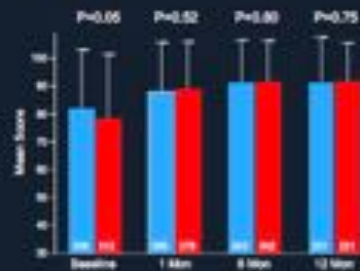
Quality of Life Measures Over Time

ITT Population

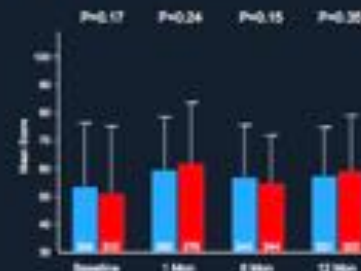
(A) EQ-5D Visual Analogue Scale



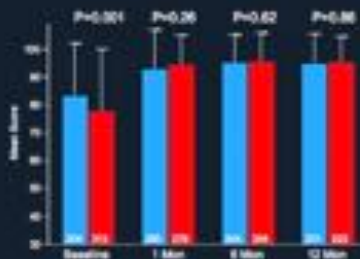
(B) SAQ, Physical Limitation



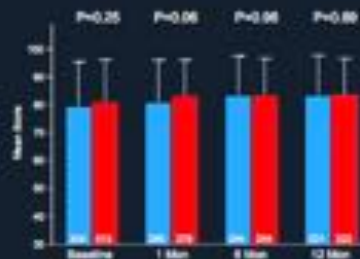
(C) SAQ, Angina Stability



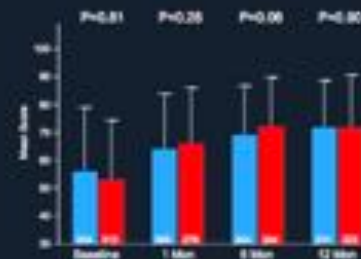
(D) SAQ, Angina Frequency



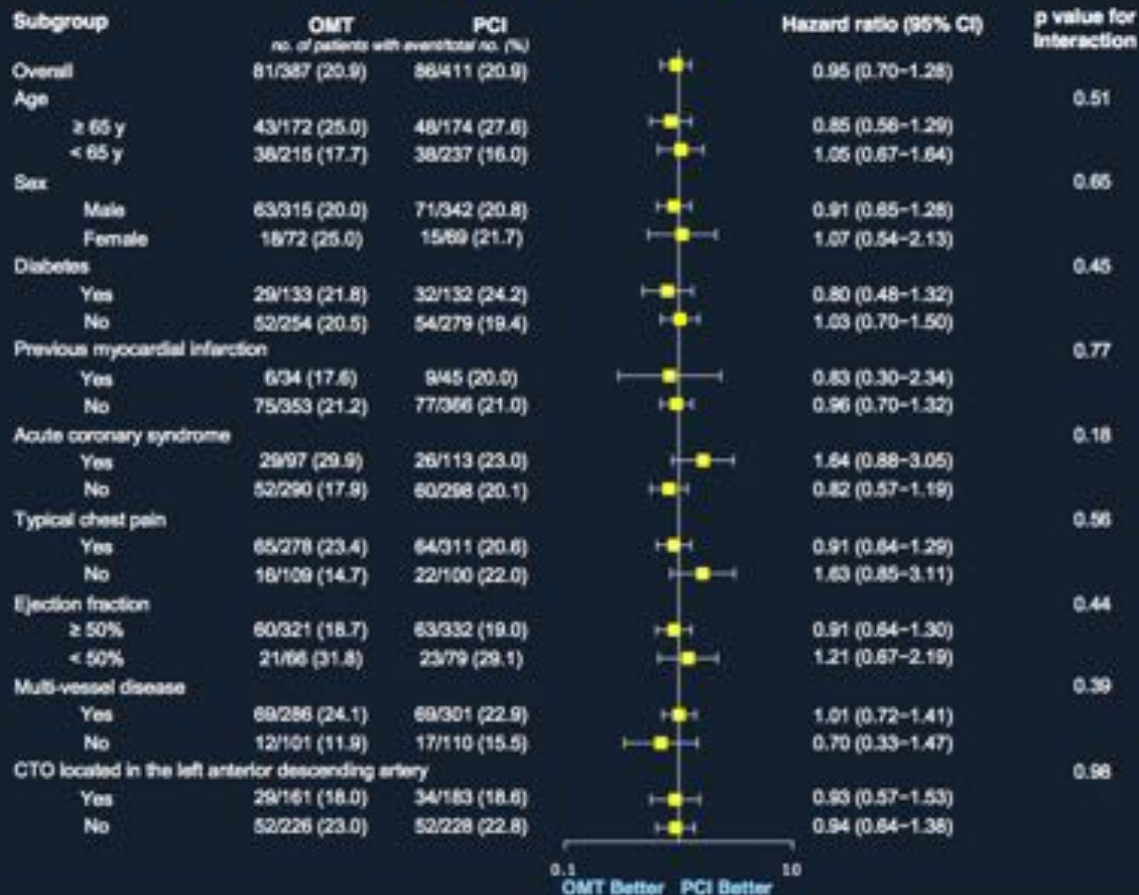
(E) SAQ, Treatment Satisfaction



(F) SAQ, Quality of Life



Subgroup Analysis



- Résultats surprenant.
- Pourquoi ces résultats contre disant ceux des autres études précédentes

	OMT (N=398)	PCI (N=417)	P value
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SYNTAX score	21.0±9.5	21.2±9.1	0.79
J-CTO score	2.3±1.2	2.2±1.2	0.23
Number of total stents	2.0±1.4	2.4±1.3	<0.001
Total stent length, mm	53.6±39.4	71.2±40.5	<0.001

0,4 stent en plus dans le groupe CTO !!!!!

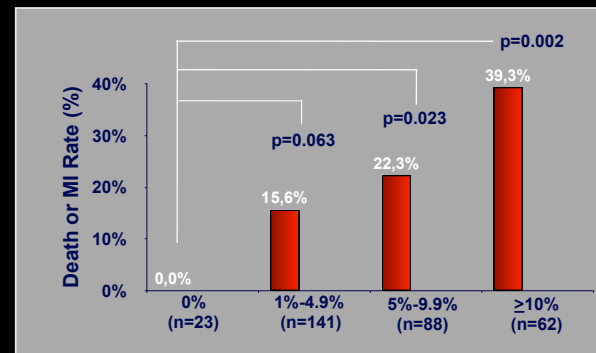
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Conclusions

- Bien sélectionné nos patients:
 - Patients symptomatiques
 - Ischémie > 10 %
 - Dilater les artères ischémiantes
- Proctoring
- Eviter les complications

L'ischémie myocardique

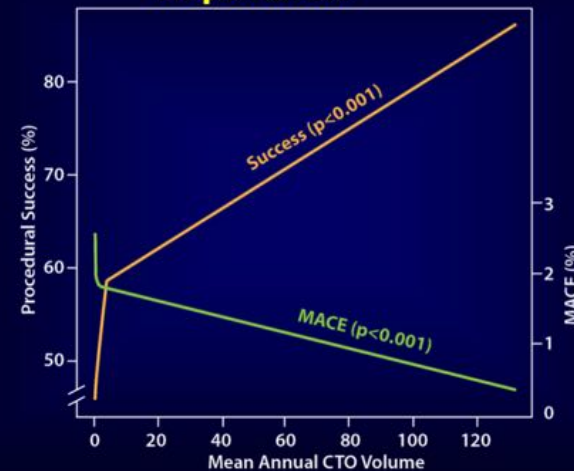


Shaw et al. Circulation 2008;117:1283

Courage Nuclear substudy

314 (2287) pts had pre and post randomization MPI
Risk of death/MI stratified by ischaemic burden
PCI reduced ischaemia > OMT

Consent In Context of Operator Experience



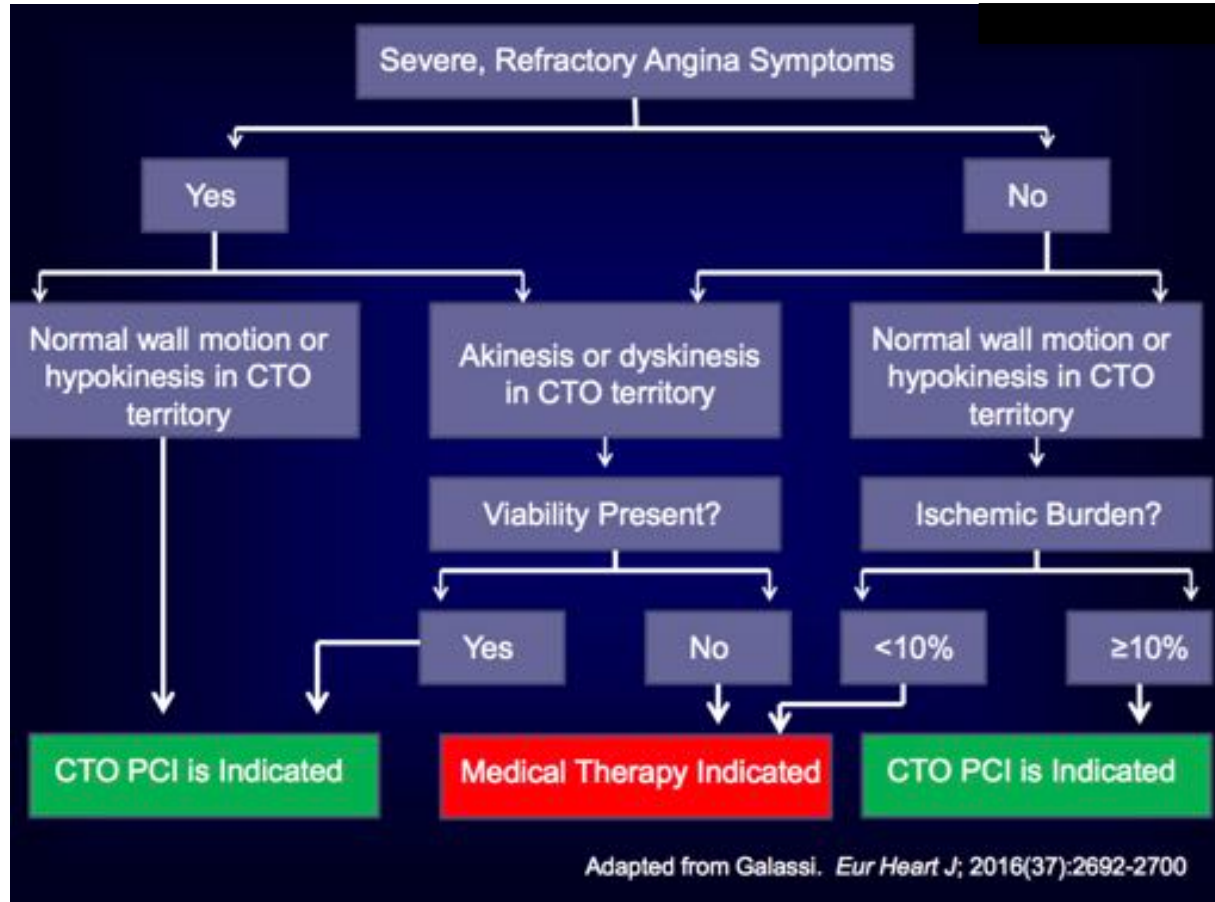
Brilakis et al. J Am Coll Cardiol Interv 2015;8:245

In MVD, the CTO often subtends the most important territory of ischemia, but operators chase other vessels

- 25% of PCI patients with CTO and a positive stress test get PCI **in a non-CTO vessel not corresponding to the area of ischemia!!**
- Do not let your personal technical limitations influence your ability to offer the best patient-centered care.



Conclusions



Adapted from Galassi. *Eur Heart J*; 2016(37):2692-2700