Enfermedad Multivasos: PCI primero? Cuando y Como.

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¨The role of coronary artery revascularization in patients with stable CAD has been shrinking with the increasing effectiveness of OMT and is largely confined to symptom control in patients' refractory to adequate medical management...¨

Preguntas para hacerse en 2024:

Sirve revascularizar en Enfermedad Isquémica Crónica? O es mejor OMT sola.?

EN CONTRA DE REVASCULARIZAR

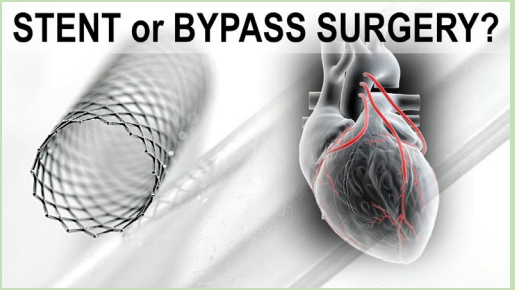
Estudios A FAVOR de OMT sola:

- Estudio ISCHEMIA -> CABG o PCI vs OMT en isquemia moderada y severa 1, 2 y 3 vasos (45% 3 vasos).
- Estudio REVIVED (LVEF< 35%) -> PCI sola vs OMT (40% 3Vasos, 60% prox LAD, 2 vasos 50%) 66% asintomaticos.
- Estudio ORBITA y COURAGE -> Solo 1 vaso. PCI vs OMT. Sintomas y distancia caminada.

A FAVOR DE REVASCULARIZAR

Estudios en CONTRA de OMT sola:

- Registro ALBERTA (APPROACH) 2020 en 3v y/o tronco -> major sobrevida y IM.
- STITCH (< 60 años, LVEF<35%). ->CABG en 3 v. viabilidad. (mas jovenes y syntax mas altos, mas angina, NYHA mas altos, sobrevida se abre a los 10 años)
- BARI y BARI-2D pre 2000 y 2009.
- FAME 2 (PCI FFR vs OMT)-> menos revasc urgente



TRONCO

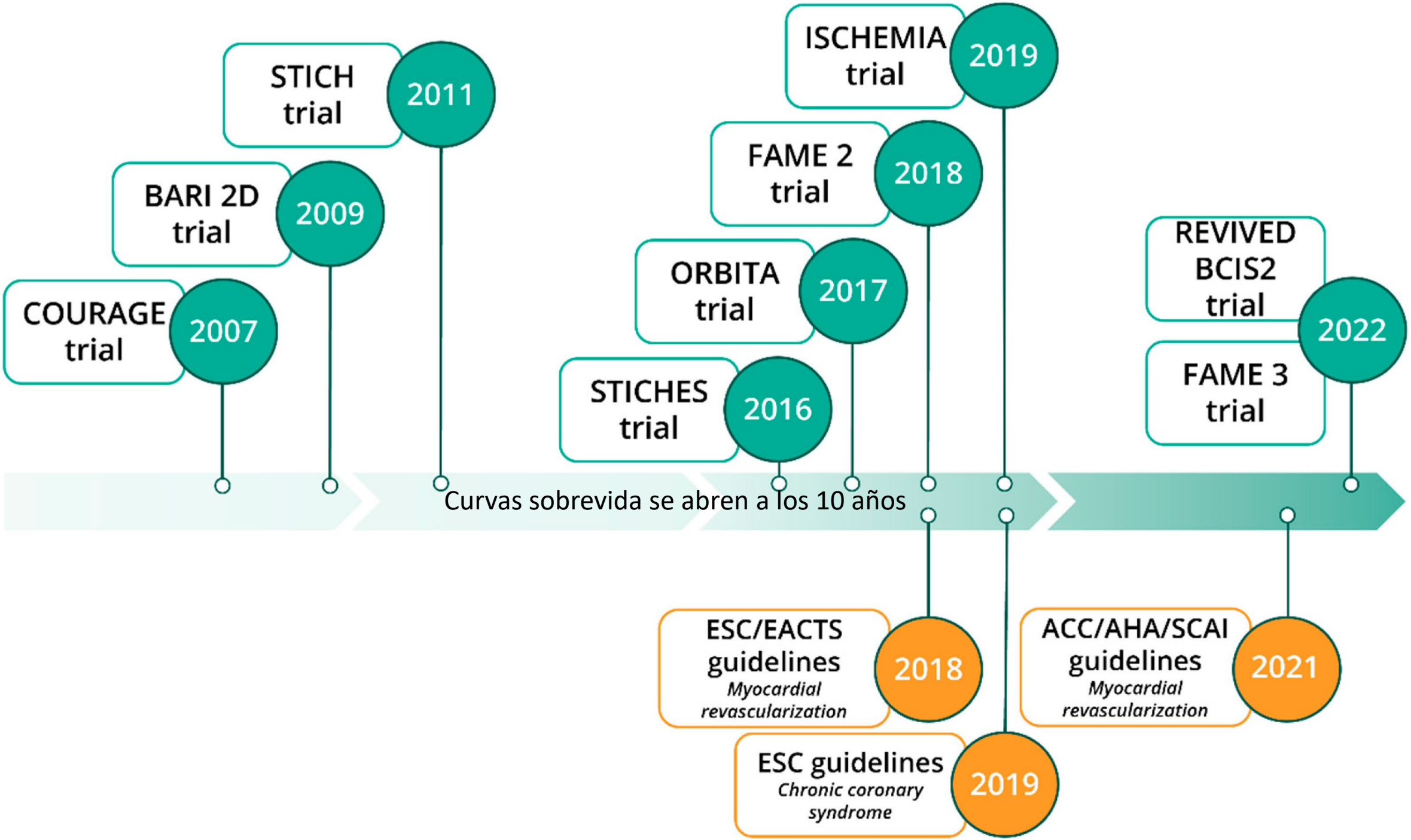

STICH trial 2011
BARI 2D trial 2009
COURAGE trial 2007
ISCHEMIA trial 2019
FAME 2 trial 2018
ORBITA trial 2017
STICHES trial 2016
REVIVED BCIS2 trial
FAME 3 trial
2022
Curvas sobrevida se abren a los 10 años
ESC/EACTS guidelines Myocardial revascularization 2018
ESC guidelines Chronic coronary syndrome 2019
ACC/AHA/SCAI guidelines Myocardial revascularization 2021

Table 1: Main Trials Comparing Revascularisation with Optimal Medical Therapy in Chronic Stable Coronary Artery Disease

STICH 2011 / 2020 ORBITA ->2023 REVIVED

	VA Cooperative Revascularisation Study[11]	ECSS[12]	CASS[13]	COURAGE[14]	BARI 2D[15]	FAME 2[16]	ISCHEMIA[18]
					STICH		
Publication year	1977	1979	1983	2007	2009	2014	2020
No. patients	568	767	780	2,287	2,368	1,220	5,279
Inclusion before cardiac catheterisation?	No	No	No	No	No	No	Yes
Severity of ischaemia required?	No	No	No	No	No	No	>10%
Contemporary medical treatment?	No	No	No	OMT 2000	OMT 2000	Yes, without emphasis on OMT	Emphasis on OMT
Contemporary revascularisation?	No, only CABG	No, only CABG	No, only CABG	No, only PCI; no DES	35% DES, 10% no stent	Yes, complete revascularisation, FFR, DES	Yes, complete revascularisation, FFR, DES
Follow-up (years)	1–5	5	5	4.6	5	2	3.2
Outcomes and results	Neutral Survival benefit in subgroup of patient with left main disease	Neutral Survival benefit in subgroup of patients	Neutral Survival benefit in subgroups of multivessel disease and LV dysfunction	Neutral Less angina in revascularisation group	Neutral Fewer CV events in CABG group	Neutral Less need for urgent revascularisation	Neutral QOL improvement in patients with severe angina

CABG = coronary artery bypass grafting; CV = cardiovascular; DES = drug eluting stents; FFR = fractional flow reserve; OMT = optimal medical therapy; PCI = percutaneous coronary intervention; QOL = quality of life.

Table 2: Evolution of Optimal Revascularisation and Medical Therapies

	Optimal Surgical Revascularisation	Optimal Percutaneous Coronary Revascularisation	Optimal Medical Therapy
1970	Venous CABG		Anticoagulants, nitrates, empirical treatments
↓	Internal mammary CABG	Balloon coronary angioplasty	Beta-blockers
↓	Myocardial protection	Bare metal stents	Aspirin
↓	Antiplatelet therapy	Antiplatelet therapy	Statins, ACEI
↓	Complete revascularisation	Drug-eluting stents	Strong rehabilitation, lifestyle interventions
↓		Radial approach	Stronger lipid-lowering therapies
↓		FFR	Targeted LDL, blood pressure, smoking, exercise, diabetes, ischaemia control
↓		Complete revascularisation	Dual antiplatelet therapy
↓		SYNTAX score to select CABG or PCI	Benchmarking targets
2020	Coronary CT	Heart team decisions	Newer secondary prevention drugs/strategies
		Use of OMT in all cases	
Coming soon			Genotyping for precision medicine

ACEI = angiotensin-converting enzyme inhibitors; CABG = coronary artery bypass grafting; FFR = fractional flow reserve; OMT = optimal medical therapy; PCI = percutaneous coronary intervention.

Estudios con resultados discordantes y confusos en los ultimos 5 años en enfermedad isquemica cronica y multivasos!...

- ISCHEMIA, REVIVED: OMT ganador.
- FISIOLOGIA coronaria en entredicho…
  - FAME 3: No alcanzo inferioridad CABG vs PCI + FFR.
  - FUTURE trial (francia): Parado prematuramente por mas eventos en el brazo de PCI + FFR
  - FLOWER trial: Mas eventos en brazo de Fisiologia en post IAM.
  - Registros en Europa con resultados negativos para FFR.

Que esta pasando…?

ENFERMEDAD MULTIVASOS

Menos chance de presentar placas < 70% vulnerables con FFR NORMAL

Mas chance de presentar placas < 70% vulnerables con FFR NORMAL

CARGA DE ENFERMEDAD CORONARIA ANATOMICA

POCOS EVENTOS ADVERSOS

SYNTAX < 22

SYNTAX 22-32

SYNTAX > 33

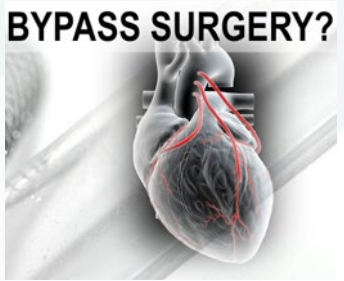
MORTALIDAD

Mejor guiar la revascularizacion fisiologicamente

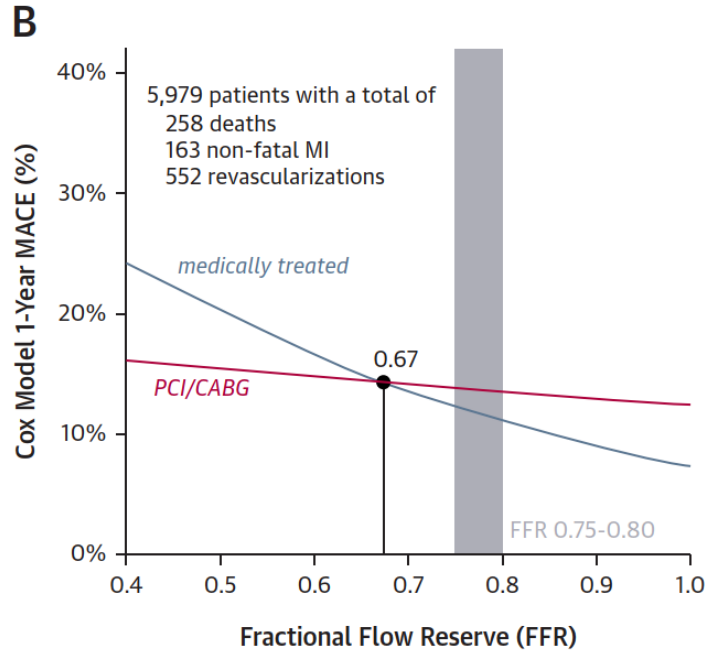
-DIABETICOS (MAS ENF DIFUSA Y DENSIDAD DE PLACAS VULNERABLES
-LESIONES CON ALTA PROFUNDIDAD DE ISQUEMIA FFR < 0.67

Mejor guiar la revascularizacion anatomicamente

EVENTOS ADVERSOS



CONCEPTOS CLAVES



- La enfermedad isquemica cronica es un ESPECTRO de enfermedad.

- Los desenlaces cardiacos mayores son dependiendientes de:
  - Carga de enfermedad aterosclerotica. 1 vaso vs. 3 vasos score de syntax > 32.
    - En pacientes con mas complejidad anatomica ⇧ chance de placas vulnerables < 70%
  - Profundidad de la isquemia en cada territorio.
    - FFR < 0.67

- La extension de la isquemia es menos importante que la extension anatomica de la enfermedad (por eso el TAC da mas correlacion que las pruebas de induccion de isquemia). Es decir: es mas importante 3 vasos > 90% que una perfusion con extension de > 10% de la masa miocardica.

- La enfermedad multivasos es Tambien un ESPECTRO de enfermedad.

SINDROMES CORONARIOS AGUDOS TIENEN UN COMPORTAMIENTO DIFERENTE:
Proceso de Inflamacion, y mayor densidad y localizacion de placas vulnerables, pronos a mas eventos.
Es una enfermedad mas LETAL.!

PROFUNIDAD DE LA ISQUEMIA

Prognostic Value of Fractional Flow Reserve

Linking Physiologic Severity to Clinical Outcomes

Nils P. Johnson, MD,[1] Gábor G. Tóth, MD,[2] Dejian Lai, PhD,[3] Hongjian Zhu, PhD,[3] Göksel Açar, MD,[4] Pierfrancesco Agostoni, MD, PhD,[5] Yolande Appelman, MD, PhD,[6] Fatih Arslan, MD, PhD,[5] Emanuele Barbato, MD, PhD,[2] Shao-Liang Chen, MD,[7] Luigi Di Serafino, MD, PhD,[8] Antonio J. Domínguez-Franco, MD,[9] Patrick Dupouy, MD,[10] Ali M. Esen, MD,[4] Özlem B. Esen, MD,[11] Michalis Hamilos, MD, PhD,[12] Kohichiro Iwasaki, MD,[13] Lisette O. Jensen, MD, PhD,[14] Manuel F. Jiménez-Navarro, MD, PhD,[9] Demosthenes G. Katritsis, MD, PhD,[15] Sinan A. Kocaman, MD,[16] Bon-Kwon Koo, MD, PhD,[17] Ramón López-Palop, MD, PhD,[18] Jeffrey D. Lorin, MD,[19] Louis H. Miller, MD,[20] Olivier Muller, MD, PhD,[21] Chang-Wook Nam, MD, PhD,[22] Niels Oud, MD,[6] Etienne Puymirat, MD, PhD,[23] Johannes Rieber, MD,[24] Gilles Rioufol, MD, PhD,[25] Josep Rodés-Cabau, MD,[26] Steven P. Sedlis, MD,[19] Yasuchika Takeishi, MD, PhD,[27] Pim A.L. Tonino, MD, PhD,[28,29] Eric Van Belle, MD, PhD,[30] Edoardo Verna, MD Gerald S. Werner, MD, PhD,[32] William F. Fearon, MD,[33] Nico H.J. Pijls, MD, PhD,[28,29] Bernard De Bruyne, MD, F K. Lance Gould, MD[1]

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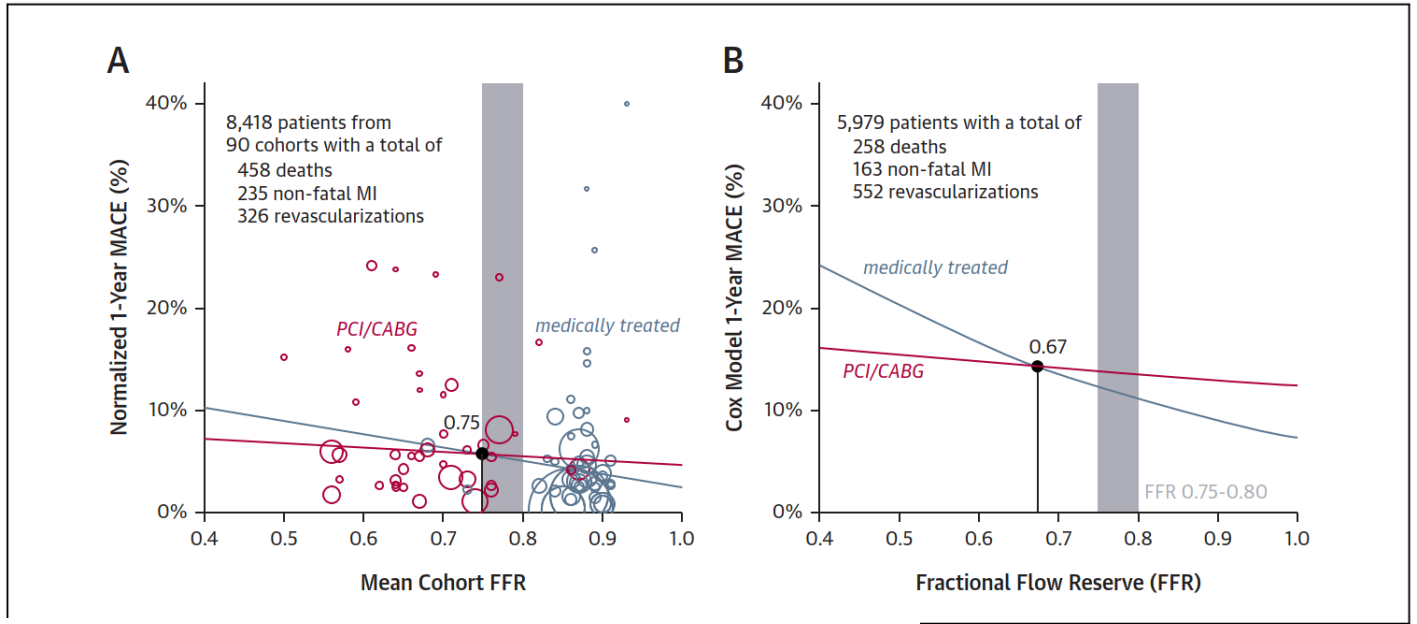
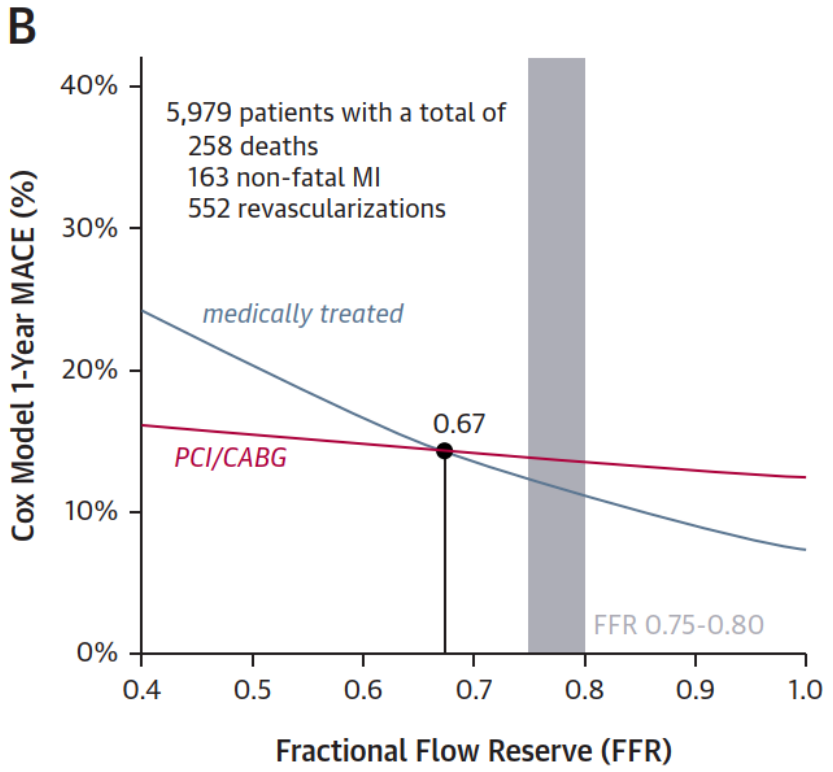
OCTOBER 21, 2014:1641–54





on for the study-level data fits the normalized 1-year rization **(red)** or medical therapy **(slate)** as a function R threshold, shown here for a univariate model with ent-level analysis. Patient-level analysis fits the CE rate as a function of individual lesion FFR. **Colored** s cross at the optimal FFR threshold, here shown for = myocardial infarction.

Valor FFR correlacionado con < MACE: 0.67

Carga anatomica de la enfermedad multivasos

Circulation
CURRENT ISSUE | ARCHIVE
RESEARCH ARTICLE | Originally Published 9 September 2021 |

Outcomes in the ISCHEMIA Trial Based on Coronary Artery Disease and Ischemia Severity

Harmony R. Reynolds, MD, Leslee J. Shaw, PhD, James K. Min, MD, Courtney B. Page, MA, Daniel S. Berman, MD, Bernard R. Chaitman, MD, Michael H. Picard, MD, ... SHOW ALL ..., and Judith S. Hochman, MD AUTHOR INFO & AFFILIATIONS

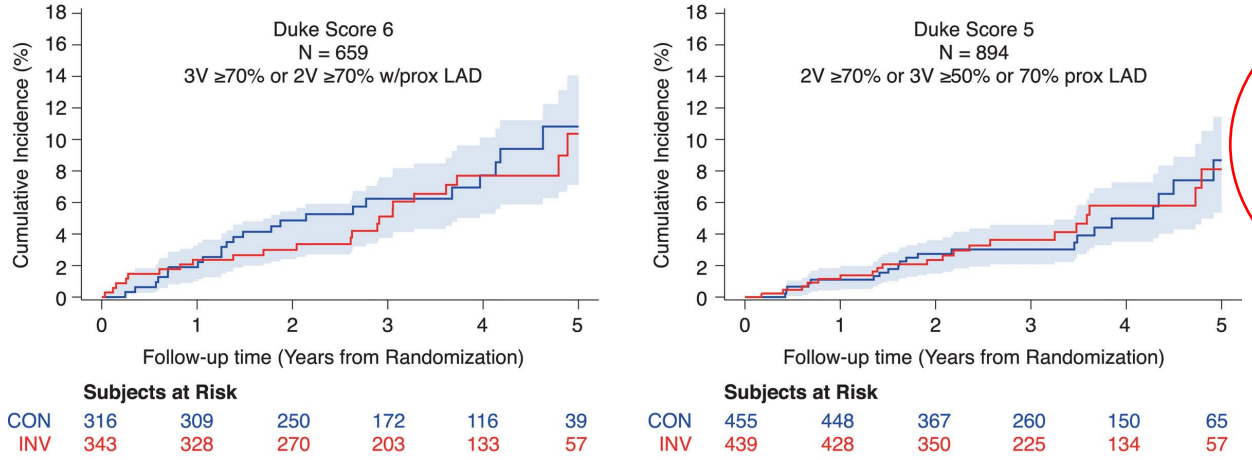
Circulation • Volume 144, Number 13 • https://doi.org/10.1161/CIRCULATIONAHA.120.049755

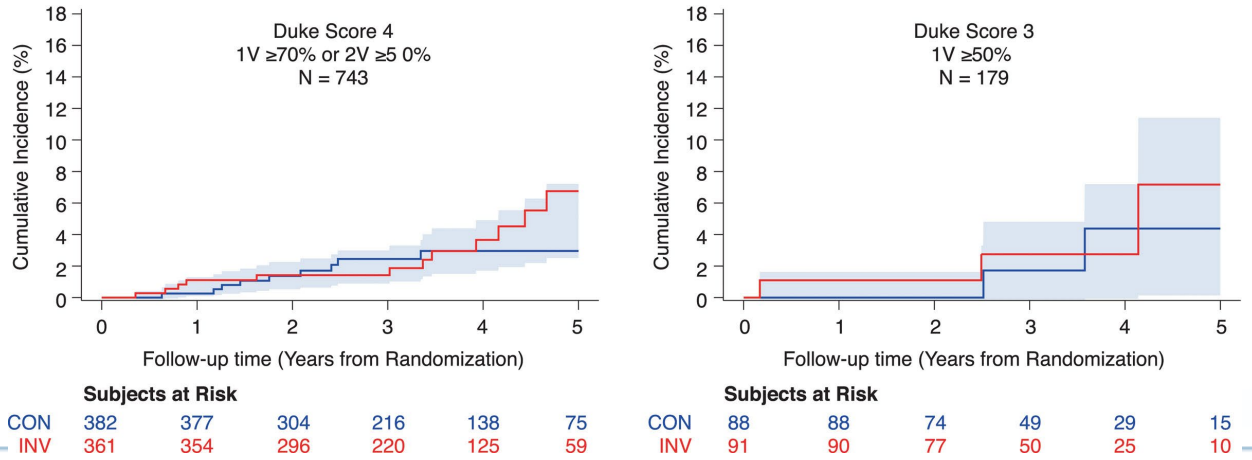
ISCHEMIA trial subanálisis según severidad por CT:

Duke score 6: Cardiovascular death was 3.7% (95% CI, 1.9 to 6.4%) in the invasive group vs. 6.7% (95% CI, 3.9 to 10.5%) in the conservative group.

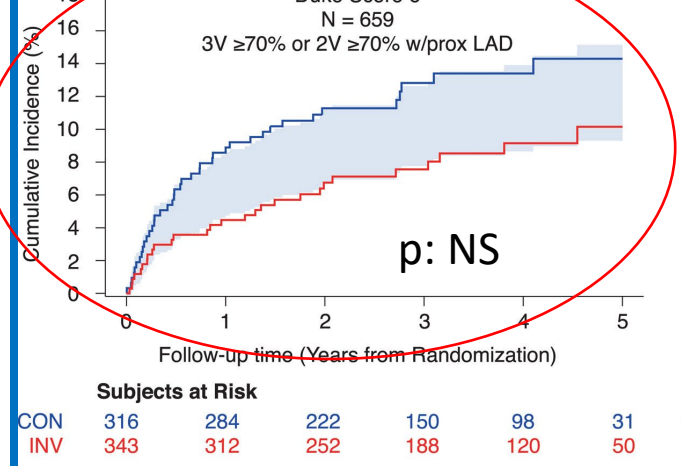
Falta poder

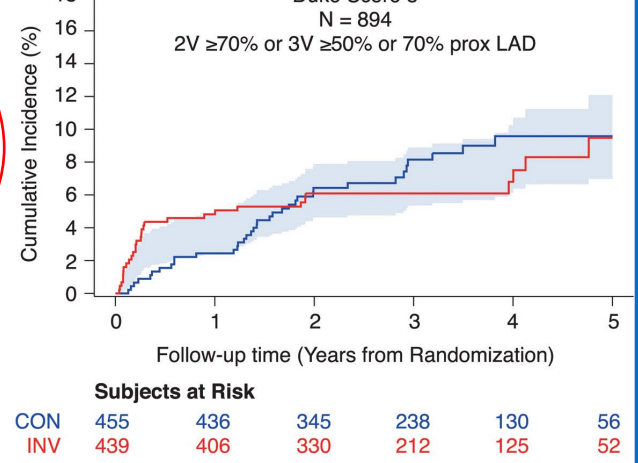
All-Cause Mortality

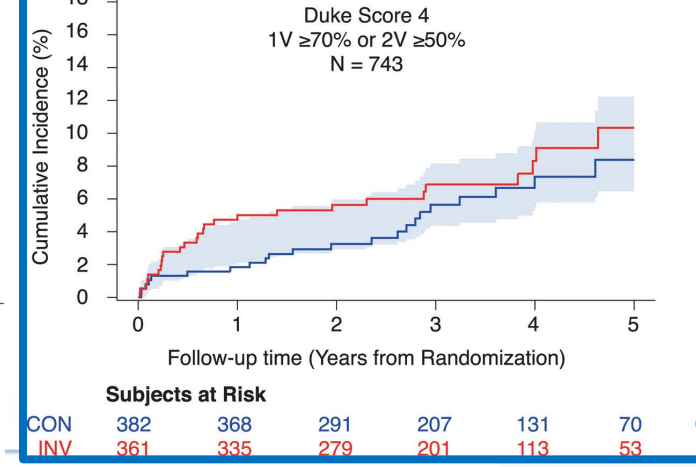


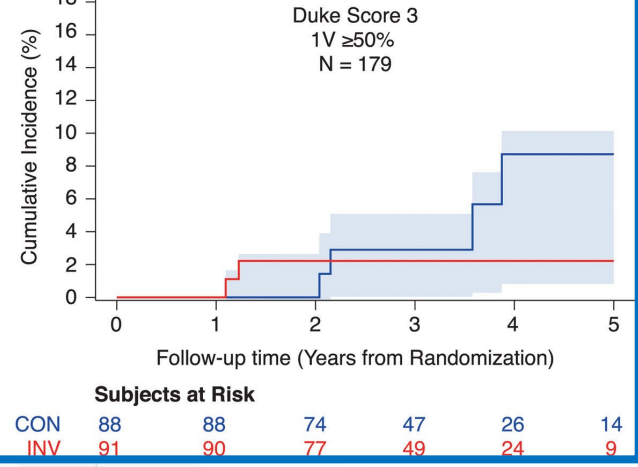


Myocardial Infarction









* Reynolds HR, Shaw LJ, Min JK, et al. Outcomes in the ISCHEMIA Trial Based on Coronary Artery Disease and Ischemia Severity in Circulation. 2022 Jun 7;145(23):e1072. doi: 10.1161/CIR.0000000000001080]

Circulation
CURRENT ISSUE | ARCHIVE
RESEARCH ARTICLE | Originally Published 9 September 2021 |
Check for updates

Outcomes in the ISCHEMIA Trial Based on Coronary Artery Disease and Ischemia Severity

Harmony R. Reynolds, MD, Leslee J. Shaw, PhD, James K. Min, MD, Courtney B. Page, MA, Daniel S. Berman, MD, Bernard R. Chaitman, MD, Michael H. Picard, MD, ... SHOW ALL ..., and Judith S. Hochman, MD AUTHOR INFO & AFFILIATIONS

Circulation • Volume 144, Number 13 • https://doi.org/10.1161/CIRCULATIONAHA.120.049755

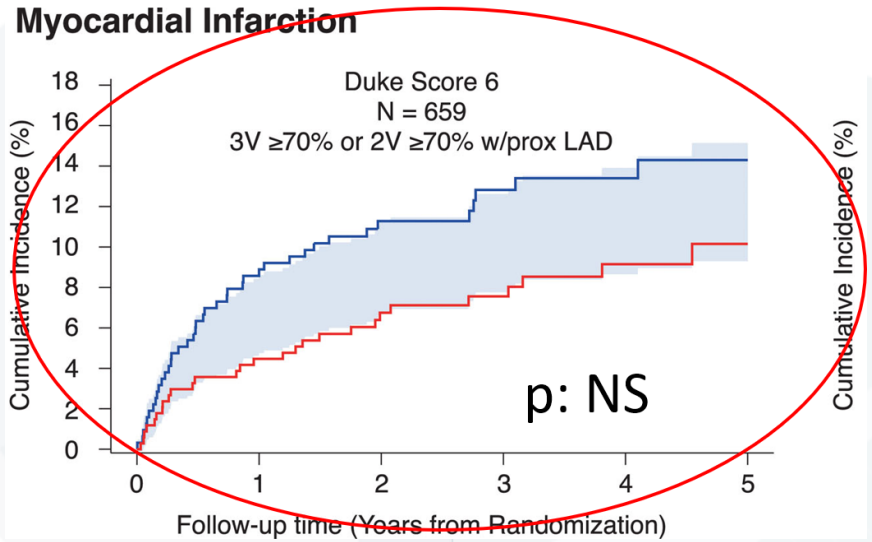
ISCHEMIA brazo OMT conservador

- Existe una tendencia NO SIGNIFICATIVA de IM y Muerte Cardiovascular mas alta en subgrupo DUKE 6 (los mas enfermos). Subanálisis-> falta PODER.!

Duke score 6: Cardiovascular death was 3.7% (95% CI, 1.9 to 6.4%) in the invasive group vs. 6.7% (95% CI, 3.9 to 10.5%) in the conservative group.

Conclusions:

Ischemia severity was not associated with increased risk after adjustment for CAD severity. More severe CAD was associated with increased risk. Invasive management did not lower all-cause mortality at 4 years in any ischemia or CAD subgroup.



1. Graduar la severidad de la isquemia no es un buen parámetro (Perfusion SPECT)
2. Evaluación anatómica de la severidad de la enfermedad coronaria de acuerdo al TAC SI (score de DUKE)

* Reynolds HR, Shaw LJ, Min JK, et al. Outcomes in the ISCHEMIA Trial Based on Coronary Artery Disease and Ischemia Severity in Circulation. 2022 Jun 7;145(23):e1072. doi: 10.1161/CIR.0000000000001080]

¨…Coronary computed tomographic angiography may be a more efficient method than ischemia testing for risk stratification and may inform decision-making for potential benefits of an invasive approach for patients with severe CAD….¨

Circulation

ORIGINAL RESEARCH ARTICLE

Survival After Invasive or Conservative Management of Stable Coronary Disease

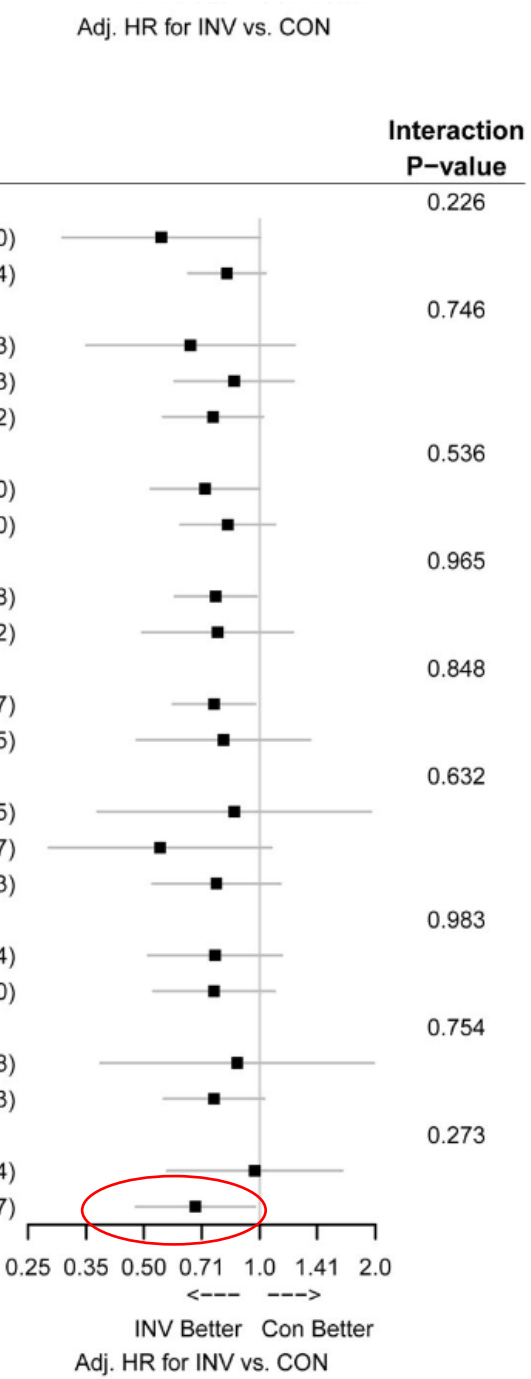
Judith S. Hochman, MD; Rebecca Anthopolos, DrPH; Harmony R. Reynolds, MD; Sripal Bangalore, MD, M
Yifan Xu, MPH; Sean M. O'Brien, PhD; Stavroula Mavromichalis, MS; Michelle Chang, MPH; Aira Contreras, MA;
Yves Rosenberg, MD, MPH; Ruth Kirby, ASN; Balram Bhargava, MD, DM; Roxy Senior, MD, DM; Ann Banfield
Shaun G. Goodman, MD, MSc; Renato D. Lopes, MD, MHS, PhD; Radosław Pracoń, MD, PhD; José Lópe
Aldo Pietro Maggioni, MD; Jonathan D. Newman, MD, MPH; Jeffrey S. Berger, MD; Mandeep S. Sidhu, MD; I
DSc; Andrea B. Troxel, ScD; Robert A. Harrington, MD; William E. Boden, MD; Gregg W. Stone, MD; Daniel B. I
John A. Spertus, MD, MPH; David J. Maron, MD; on behalf of the ISCHEMIA-EXTEND Research Group*

BACKGROUND: The ISCHEMIA trial (International Study of Comparative Health Effectiveness With Mec
Approaches) compared an initial invasive versus an initial conservative management strategy for pati
coronary disease and moderate or severe ischemia, with no major difference in most outcomes during a me
Extended follow-up for mortality is ongoing.

B

CARDIOVASCULAR MORTALITY

Subgroup	No. Participants (%)	Adj. HR (95% CI)	Interaction P–value
Met ischemia eligibility criteria, according to core laboratory			0.226
No	707 (14)	0.56 (0.31, 1.00)	
Yes	4398 (86)	0.82 (0.65, 1.04)	
Degree of baseline ischemia			0.746
None or mild	606 (12)	0.66 (0.35, 1.23)	
Moderate	1702 (33)	0.86 (0.60, 1.23)	
Severe	2797 (55)	0.76 (0.56, 1.02)	
Diabetes			0.536
No	3015 (58)	0.72 (0.52, 1.00)	
Yes	2164 (42)	0.83 (0.62, 1.10)	
New or more frequent angina within the past 3 months			0.965
No	3812 (74)	0.77 (0.60, 0.98)	
Yes	1355 (26)	0.78 (0.50, 1.22)	
Guideline–directed medical therapy at baseline			0.848
No	3944 (80)	0.76 (0.59, 0.97)	
Yes	968 (20)	0.81 (0.48, 1.35)	
CAD severity based on 50% stenosis			0.632
One vessel	697 (23)	0.86 (0.38, 1.95)	
Two vessel	938 (31)	0.55 (0.28, 1.07)	
Three or more vessels	1347 (45)	0.77 (0.53, 1.13)	
Stenosis of the proximal LAD coronary artery (50%)			0.983
No	1990 (53)	0.77 (0.51, 1.14)	
Yes	1749 (47)	0.76 (0.53, 1.10)	
Multivessel disease (50%)			0.754
No	711 (21)	0.87 (0.39, 1.98)	
Yes	2679 (79)	0.76 (0.56, 1.03)	
Multivessel disease (70%)			0.273
No	1518 (50)	0.97 (0.57, 1.64)	
Yes	1529 (50)	0.68 (0.48, 0.97)	



C

Percutaneous coronary intervention versus coronary artery bypass grafting in patients with three-vessel or left main coronary artery disease: 10-year follow-up of the multicentre randomised controlled SYNTAX trial

*Daniel J F M Thuijs, A Pieter Kappetein, Patrick W Serruys, Friedrich-Wilhelm Mohr, Marie-Claude Morice, Michael J Mack, David R Holmes Jr, Nick Curzen, Piroze Davierwala, Thilo Noack, Milan Milojevic, Keith D Dawkins, Bruno R da Costa, Peter Jüni, Stuart J Head, for the SYNTAX Extended Survival Investigators**

	PCI group	CABG group	HR (95% CI)	$p_{interaction}$
Type of coronary disease				
Left main coronary artery disease	93/357	98/348	0·90 (0·68–1·20)	0·019
Three-vessel disease*	151/546	113/549	1·41 (1·10–1·80)	
Medically treated diabetes				
Yes	79/231	71/221	1·10 (0·80–1·52)	0·66
No	165/672	140/676	1·20 (0·96–1·51)	
Coronary disease complexity				
SYNTAX score ≤22	66/299	53/275	1·13 (0·79–1·62)	0·30†
SYNTAX score 23–32	78/310	71/300	1·06 (0·77–1·47)	
SYNTAX score ≥33	98/290	82/315	1·41 (1·05–1·89)	

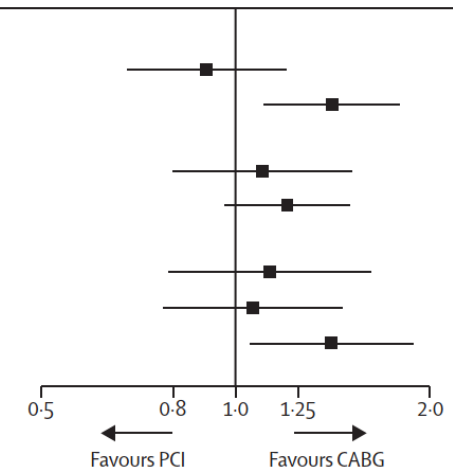
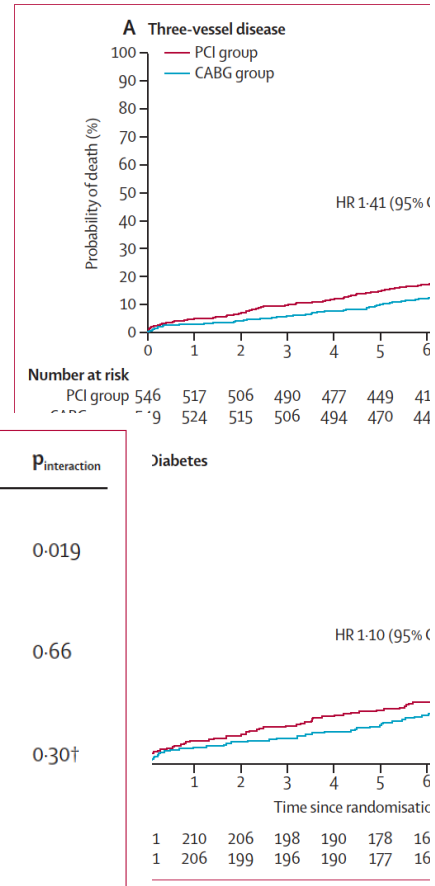


***Figure 4*: Forest plot of prespecified subgroup analyses of 10-year all-cause death (intention-to-treat population)**
All-cause death after PCI versus CABG at 10-year follow-up in prespecified unadjusted subgroup analyses according to baseline characteristics. Because the widths of 95% CIs were not adjusted for multiple comparisons, these intervals should not be used for inference about between-group differences. CABG=coronary artery bypass grafting. HR=hazard ratio. PCI=percutaneous coronary intervention. *Patients with coronary artery disease involving all three vessels in the absence of left main coronary artery disease. †p value for trend of log HRs across SYNTAX score tertiles for subgroup analysis according to lesion complexity.



ier curves for prespecified subgroup a
l-cause death in PCI versus CABG up to 1
ase (B), with diabetes (C), and without d
lue for interaction for diabetes versus no
be used for inference about between-gr

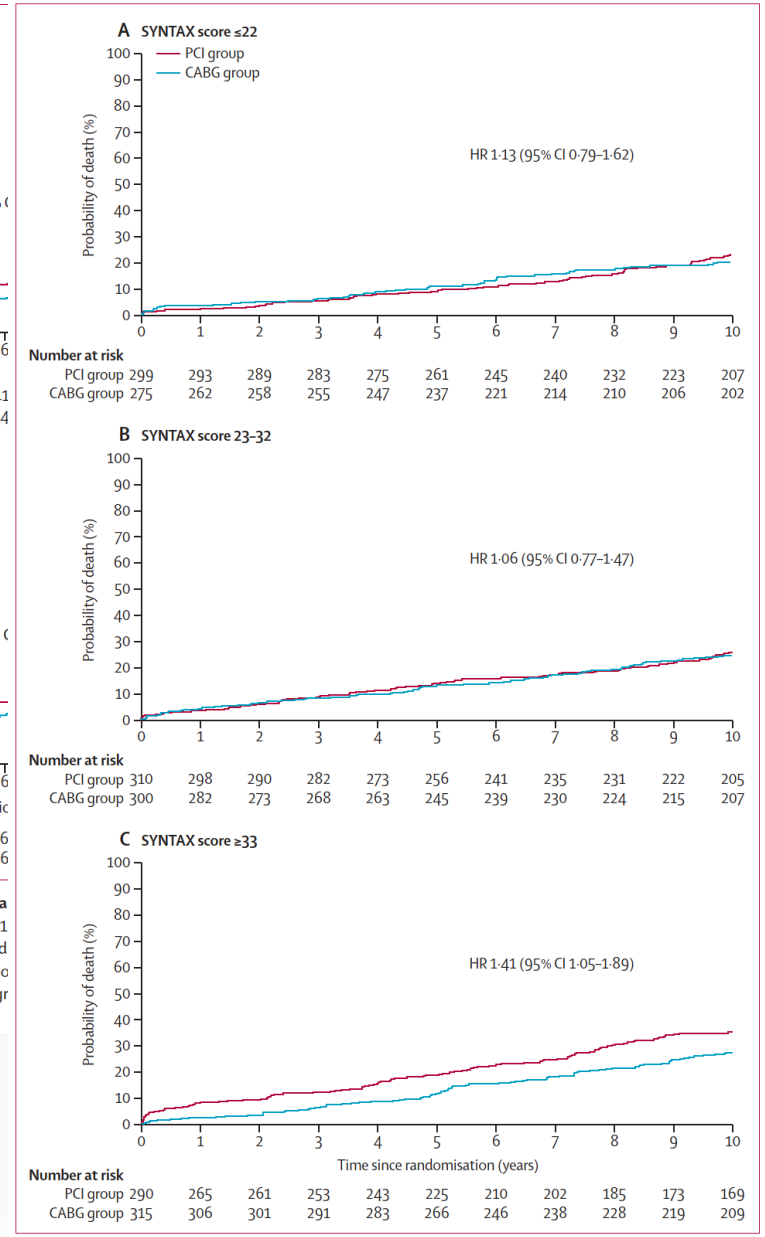


***Figure 5*: Kaplan-Meier curves for 10-year all-cause death in prespecified SYNTAX score tertile subgroups (intention-to-treat population)**
The probability of all-cause death in PCI versus CABG up to 10 years of follow-up in prespecified subgroups of patients with low SYNTAX scores (≤22; A), intermediate SYNTAX scores (23–32; B), and high SYNTAX scores (≥33; C). p value for trend was 0·30. SYNTAX scores were reported according to core laboratory analysed data. Because the widths of 95% CIs were not adjusted for multiple comparisons, these intervals should not be used for inference about between-group differences. CABG=coronary artery bypass grafting. HR=hazard ratio. PCI=percutaneous coronary intervention.

Interpretation At 10 years, no significant difference existed in all-cause death between PCI using first-generation paclitaxel-eluting stents and CABG. However, CABG provided a significant survival benefit in patients with three-vessel disease, but not in patients with left main coronary artery disease.

www.thelancet.com **Published online September 2, 2019 http://dx.doi.org/10.1016/S0140-**

Revascularizacion Anatomica vs Funcional…

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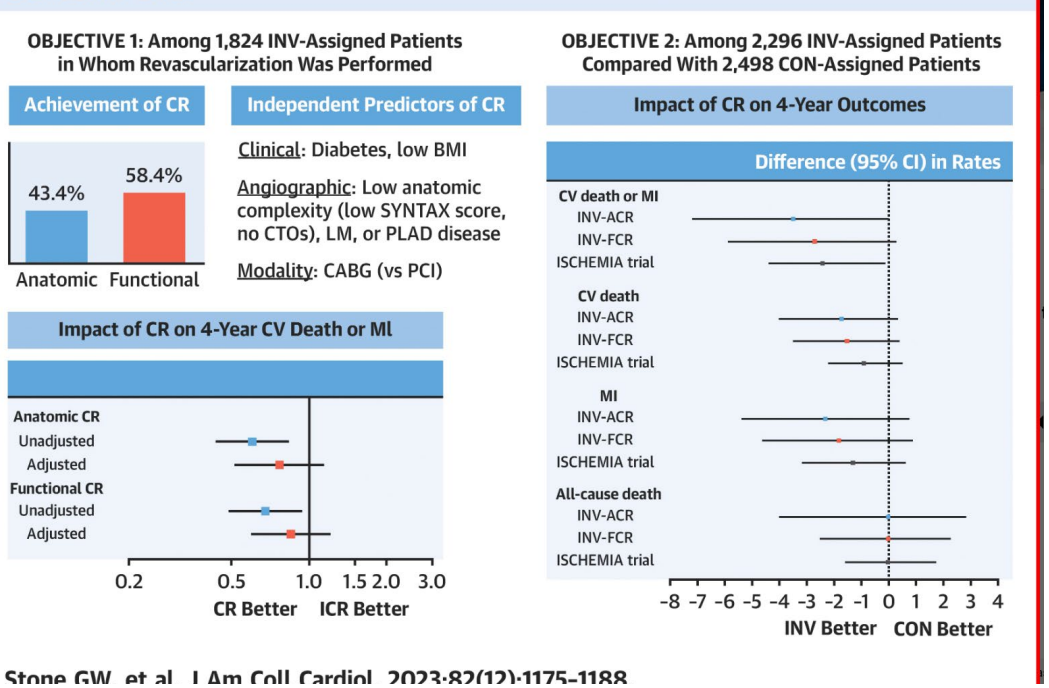
ORIGINAL INVESTIGATIONS

Impact of Complete Revascularization in the ISCHEMIA Trial

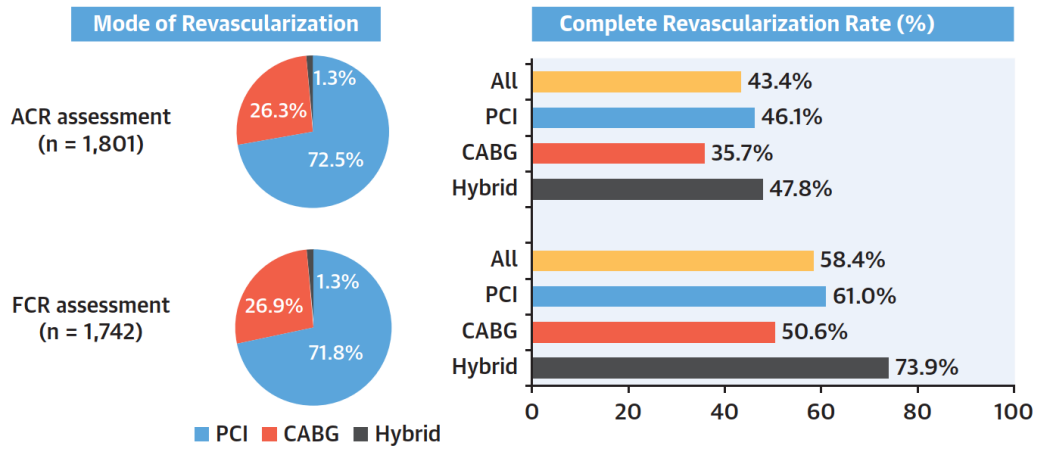
Gregg W. Stone, MD,[a] Ziad A. Ali, MD, DPHIL,[b,c] Sean M. O'Brien, PHD,[d] Grace Rhodes, MS,[d] Philippe Genereux, MD,[e]

CENTRAL ILLUSTRATION: Impact of Complete Revascularization in the ISCHEMIA trial



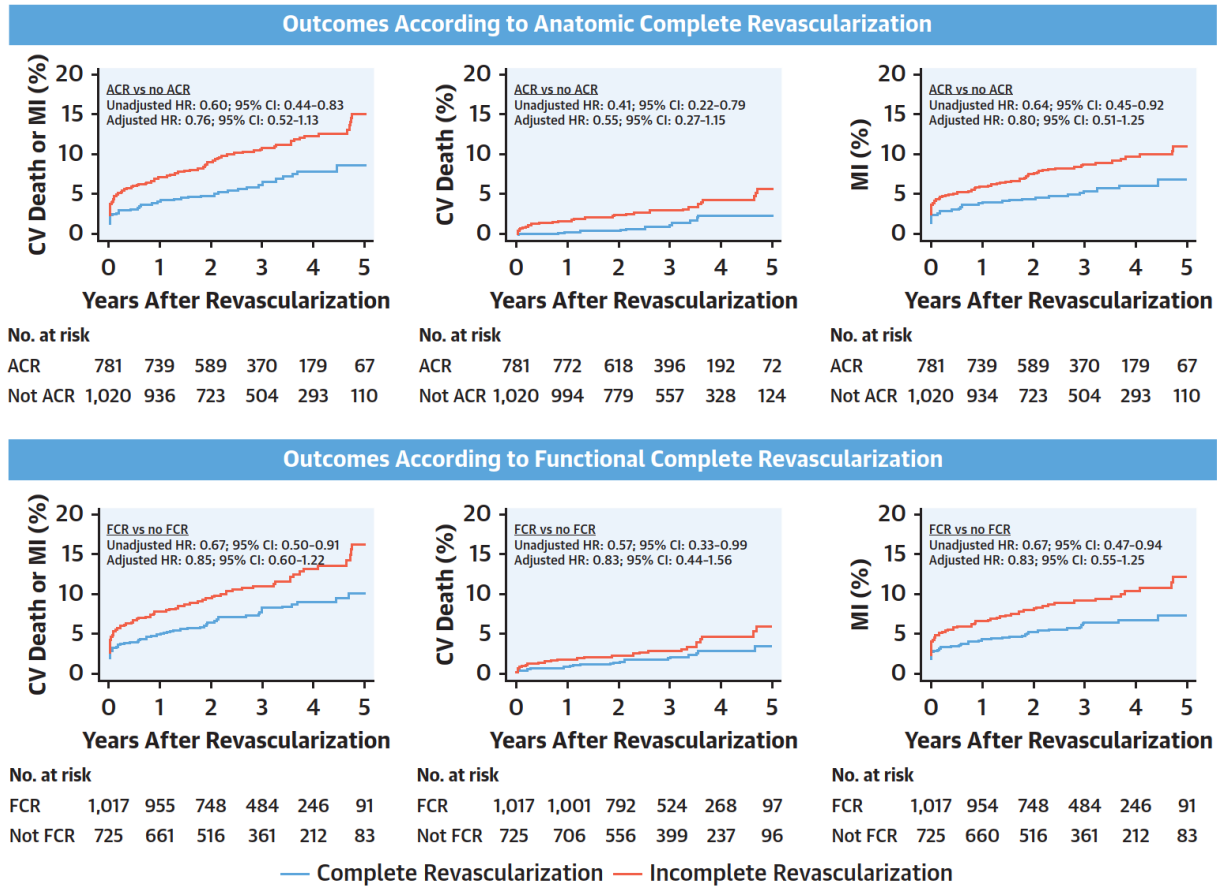
Stone GW, et al. J Am Coll Cardiol 2023;82(12):1175–1188

FIGURE 2 Mode and Completeness of Revascularization in Revascularized Invasive Treatment Strategy Patients



(Left) The type of first revascularization procedure performed in 1,824 patients assigned to an invasive management strategy in whom revascularization was completed within 6 months after randomization. **(Right)** Rates of anatomic complete revascularization **(top)** and functional complete revascularization **(bottom)** achieved in all patients and by revascularization modality. PCI was performed in approximately three-quarters of patients. In these unadjusted analyses, complete revascularization was achieved more frequently with PCI than coronary artery bypass grafting. Abbreviations as in Figure 1.

FIGURE 3 Relationship Between Complete Revascularization and Outcomes With Invasive Management



The NEW ENGLAND JOURNAL of MEDICINE

ORIGINAL ARTICLE

Fractional Flow Reserve–Guided PCI as Compared with Coronary Bypass Surgery

W.F. Fearon, F.M. Zimmermann, B. De Bruyne, Z. Piroth, A.H.M. van Straten, L. Szekely, G. Davidavičius, G. Kalinauskas, S. Mansour, R. Kharbanda, N. Östlund-Papadogeorgos, A. Aminian, K.G. Oldroyd, N. Al-Attar, N. Jagic, J.-H.E. Dambrink, P. Kala, O. Angerås, P. MacCarthy, O. Wendler, F. Casselman, N. Witt, K. Mavromatis, S.E.S. Miner, J. Sarma, T. Engstrøm, E.H. Christiansen, P.A.L. Tonino, M.J. Reardon, D. Lu, V.Y. Ding, Y. Kobayashi, M.A. Hlatky, K.W. Mahaffey, M. Desai, Y.J. Woo, A.C. Yeung, and N.H.J. Pijls, for the FAME 3 Investigators*

ABSTRACT

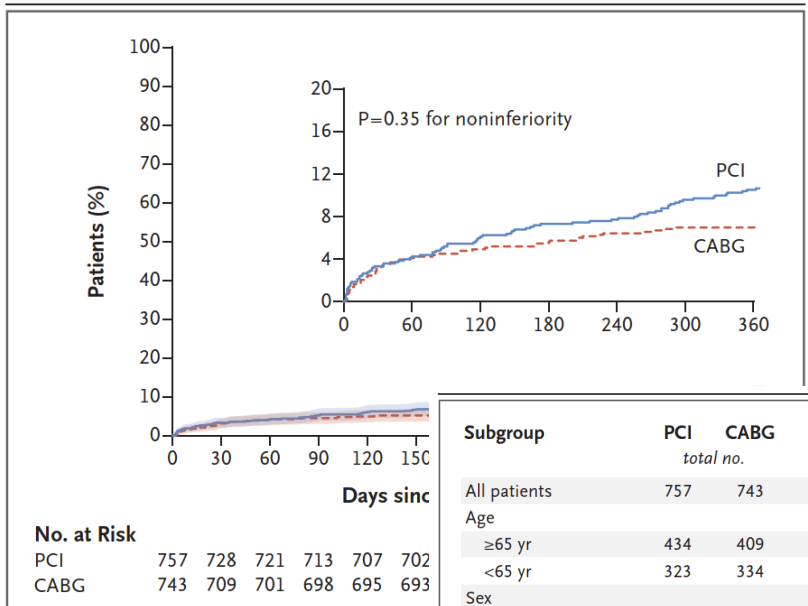


Figure 1. Kaplan–Meier Curves for the P

The primary end point was the occurren cardiac or cerebrovascular event, define dial infarction, stroke, or repeat revascul data on an enlarged y axis. CABG denot and PCI percutaneous coronary interver

PCI guiada con FFR vs CABG

Probablemente hubiese sido major guiar la revascularizacion anatomicamente

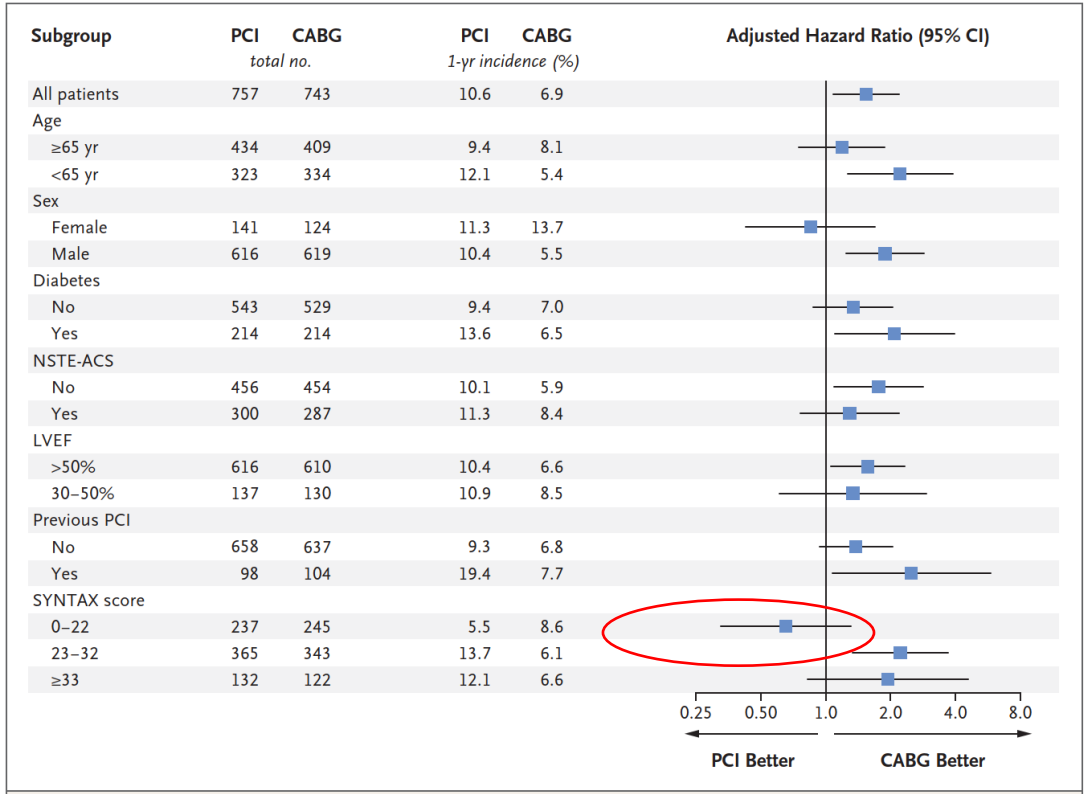


Figure 2. Subgroup Analyses of the Primary End Point.

The Synergy between Percutaneous Coronary Intervention with Taxus and Cardiac Surgery (SYNTAX) score is an angiography-based score evaluating the severity of coronary artery disease; lower scores indicate less complexity of coronary artery disease and predict a better outcome with PCI (the lowest score is 0, and there is no upper limit). Scores were calculated by the core laboratory. CI denotes confidence interval, LVEF left ventricular ejection fraction, and NSTE-ACS non–ST-segment elevation acute coronary syndrome.

CONCLUSIONS

In patients with three-vessel coronary artery disease, FFR-guided PCI was not found to be noninferior to CABG with respect to the incidence of a composite of death, myocardial infarction, stroke, or repeat revascularization at 1 year. (Funded by Medtronic and Abbott Vascular; FAME 3 ClinicalTrials.gov number, NCT02100722.)

Mortality after coronary artery bypass grafting versus percutaneous coronary intervention with stenting for coronary artery disease: a pooled analysis of individual patient data

Stuart J Head, Milan Milojevic, Joost Daemen, Jung-Min Ahn, Eric Boersma, Evald H Christiansen, Michael J Domanski, Michael E Farkouh, Marcus Flather, Valentin Fuster, Mark A Hlatky, Niels R Holm, Whady A Hueb, Masoor Kamalesh, Young-Hak Kim, Timo Mäkikallio, Friedrich W Mohr, Grigorios Papageorgiou, Seung-Jung Park, Alfredo E Rodriguez, Joseph F Sabik 3rd, Rodney H Stables, Gregg W Stone, Patrick W Serruys, Arie Pieter Kappetein

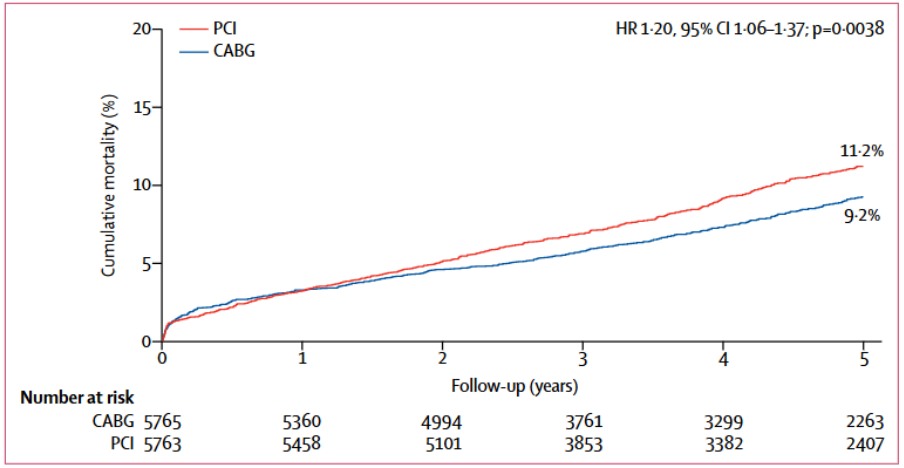


Figure 1: **Mortality after CABG versus after PCI during 5 years' follow-up**
Kaplan-Meier estimates are from the overall pooled patient population. PCI=percutaneous coronary intervention. CABG=coronary artery bypass grafting. HR=hazard ratio.

	PCI	CABG	HR (95% CI)	p value	$p_{interaction}$
Sex					
Male	387/4380 (10·7%)	318/4394 (8·8%)	1·20 (1·03–1·39)	0·0181	0·82
Female	152/1373 (12·7%)	119/1371 (10·6%)	1·23 (0·97–1·57)	0·0854	
Age at baseline (years)					
<65	200/2971 (8·0%)	160/2940 (6·4%)	1·23 (1·00–1·51)	0·0534	0·98
≥65	339/2782 (14·8%)	277/2825 (12·5%)	1·19 (1·02–1·40)	0·0284	
Body-mass index (kg/m²)					
<30	373/3958 (11·2%)	304/3953 (9·4%)	1·20 (1·04–1·40)	0·0156	0·43
≥30	148/1548 (12·1%)	106/1558 (8·6%)	1·35 (1·05–1·73)	0·0179	
Hypertension					
Yes	391/3880 (12·2%)	332/3913 (10·6%)	1·16 (1·00–1·34)	0·0527	0·25
No	145/1859 (9·1%)	103/1835 (6·6%)	1·37 (1·06–1·76)	0·0144	
Hypercholesterolaemia					
Yes	364/3982 (11·0%)	288/3862 (9·1%)	1·19 (1·02–1·39)	0·0272	0·76
No	173/1744 (11·6%)	148/1873 (9·5%)	1·24 (1·00–1·55)	0·0527	
Diabetes					
Yes	278/2215 (15·7%)	185/2171 (10·7%)	1·44 (1·20–1·74)	0·0001	0·0077
No	261/3538 (8·7%)	252/3594 (8·4%)	1·02 (0·86–1·21)	0·81	
Peripheral vascular disease					
Yes	75/424 (20·7%)	58/440 (16·0%)	1·35 (0·96–1·90)	0·0869	0·66
No	428/4734 (10·6%)	346/4724 (8·7%)	1·21 (1·05–1·39)	0·0094	
Previous myocardial infarction					
Yes	183/1438 (14·2%)	146/1417 (11·6%)	1·21 (0·97–1·50)	0·0852	0·97
No	318/3700 (10·2%)	257/3739 (8·4%)	1·22 (1·03–1·44)	0·0180	
Left-ventricular ejection fraction					
≥50%	356/4447 (9·6%)	311/4597 (8·3%)	1·14 (0·98–1·32)	0·0974	0·65
30–49%	132/807 (19·3%)	95/779 (15·1%)	1·41 (1·08–1·84)	0·0122	
<30%	18/49 (57·3%)	16/54 (34·4%)	1·25 (0·64–2·46)	0·52	
SYNTAX score					
0–22	105/1533 (8·8%)	100/1585 (8·1%)	1·02 (0·77–1·34)	0·91	0·21
23–32	163/1677 (12·4%)	122/1545 (10·9%)	1·20 (0·94–1·51)	0·14	
≥33	117/871 (16·5%)	83/927 (11·6%)	1·52 (1·15–2·02)	0·0029	

Figure 2: **Mortality after CABG versus after PCI during 5 years' follow-up, by subgroup**
Kaplan-Meier estimates are from the overall pooled patient population. PCI=percutaneous coronary intervention. CABG=coronary artery bypass grafting. HR=hazard ratio. SYNTAX=Synergy between PCI with Taxus and Cardiac Surgery.

Interpretation CABG had a mortality benefit over PCI in patients with multivessel disease, particularly those with diabetes and higher coronary complexity. No benefit for CABG over PCI was seen in patients with left main disease. Longer follow-up is needed to better define mortality differences between the revascularisation strategies.

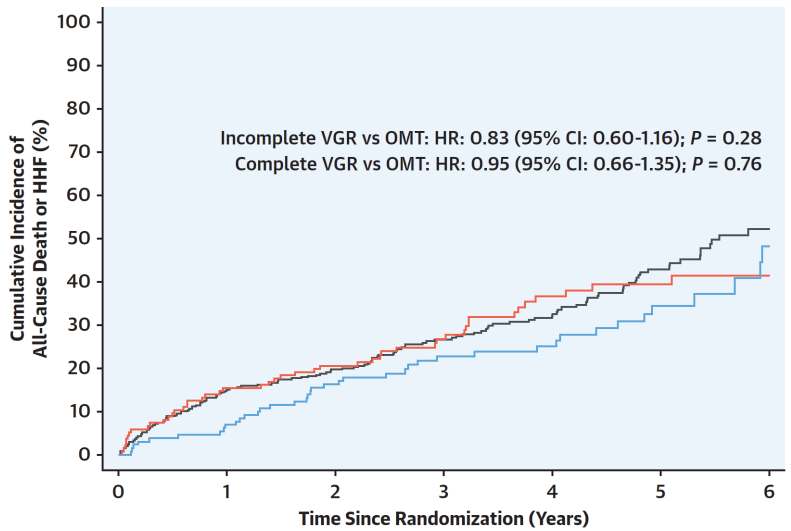
Multivasos y LVEF < 35 %: Estudio REVIVED

JOURNAL OF THE AMERICAN COLLEGE OF CARDIOLOGY VOL. 84, NO. 4, 2024

Impact of Anatomical and Viability-Guided Completeness of Revascularization on Clinical Outcomes in Ischemic Cardiomyopathy

Saad M. Ezad, MBBCH,[a,*] Margaret McEntegart, PHD,[b,c,*] Matthew Dodd, MS,[d] Matthaios Didagelos, MD,[b] Novalia Sidik, PHD,[b] Matthew Li Kam Wa, MBBS,[a] Holly P. Morgan, MBBCH,[a] Antonis Pavlidis, PHD,[e] Roshan Weerackody, PHD,[f] Simon J. Walsh, MD,[g] James C. Spratt, MD,[h] Julian Strange, MD,[i] Peter Ludman, MD,[j] Amedeo Chiribiri, PHD,[e,k] Tim Clayton, MS,[d] Mark C. Petrie, MD,[l] Peter O'Kane, MD,[m] Divaka Perera, MD,[a,e] the REVIVED-BCIS2 Investigators

FIGURE 3 Viability-Guided Completeness of Revascularization vs OMT



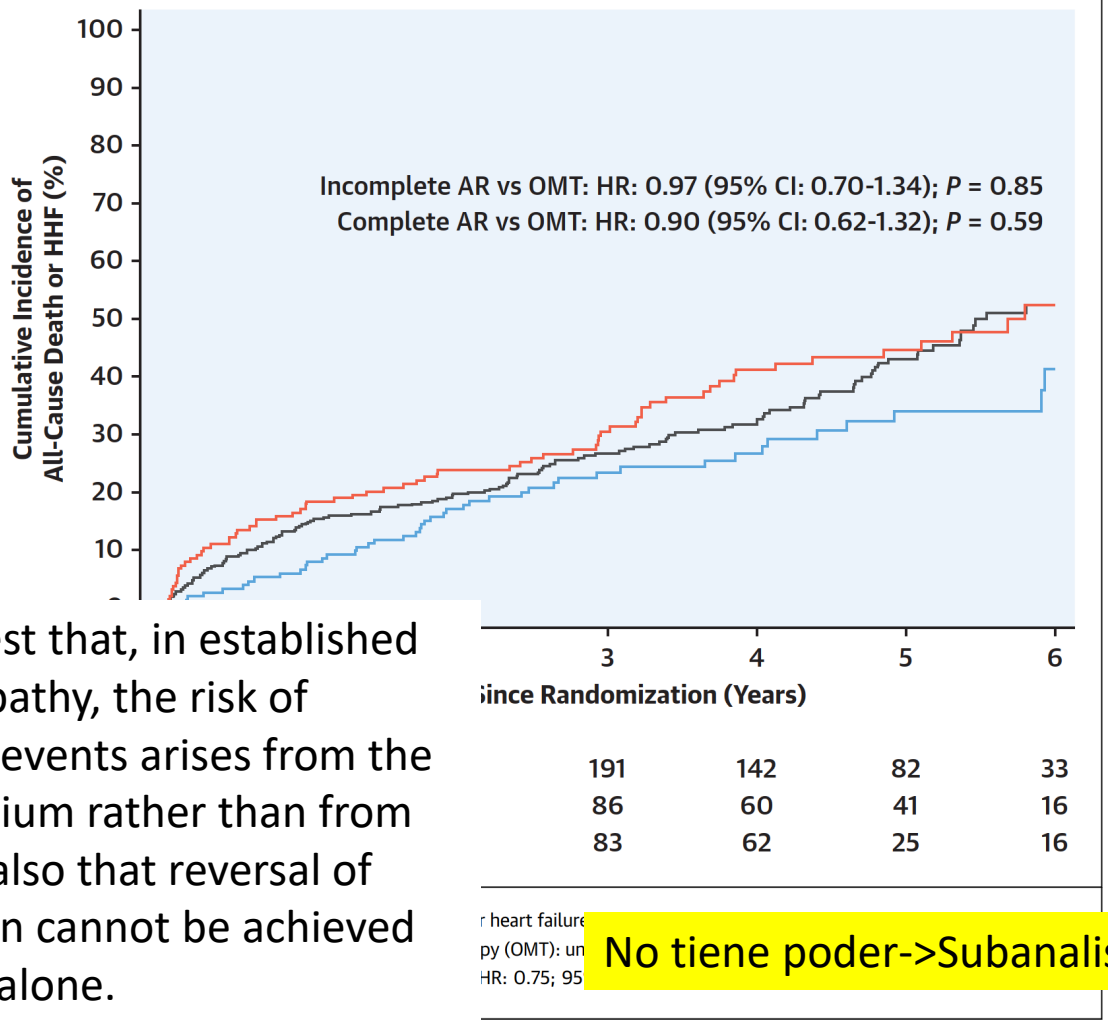
Kaplan-Meier plot of the primary outcome (death or hospitalization for heart failure [HHF]). The presented HRs for comparisons are adjusted. Incomplete viability-guided revascularization (VGR) vs optimal medical therapy (OMT): unadjusted HR: 0.93; 95% CI: 0.67-1.30; $P = 0.68$. Complete viability-guided revascularization vs optimal medical therapy: unadjusted HR: 0.80; 95% CI: 0.56-1.13; $P = 0.20$.

Subestudio REVIVED 2024

66% asintomaticos.

FIGURE 2 Anatomical Completeness of Revascularization vs OMT

Syntax score 22



These findings suggest that, in established ischemic cardiomyopathy, the risk of subsequent adverse events arises from the state of the myocardium rather than from plaque rupture and also that reversal of advanced hibernation cannot be achieved by revascularization alone.

No tiene poder->Subanalisis

Subestudio REVIVED 2023

La VIABILIDAD en entredicho!

(ya lo habíamos intuido desde el estudio STICH)

SCAR burden en CMR: Nuevo jugador

JAMA Cardiology | Original Investigation

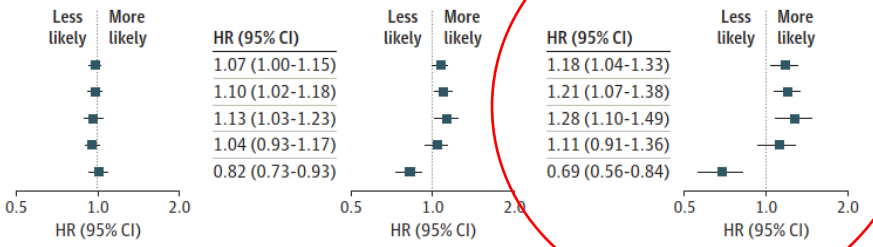
Viability and Outcomes With Revascularization or Medical Therapy in Ischemic Ventricular Dysfunction
A Prespecified Secondary Analysis of the REVIVED-BCIS2 Trial

Divaka Perera, MA, MD; Matthew Ryan, PhD; Holly P. Morgan, MBBCh; John P. Greenwood, PhD; Mark C. Petrie, MD; Matthew Dodd, MSc; Roshan Weerackody, PhD; Peter D. O'Kane, MD; Pier Giorgio Masci, PhD; Muhummad Sohaib Nazir, PhD; Alexandros Papachristidis, PhD; Navtej Chahal, PhD; Rajdeep Khattar, MD; Saad M. Ezad, MBBCh; Stam Kapetanakis, PhD; Lana J. Dixon, MD; Kalpa De Silva, PhD; Adam K. McDiarmid, MD; Michael S. Marber, PhD; Theresa McDonagh, MD; Gerry P. McCann, MD; Tim C. Clayton, MSc; Roxy Senior, MD; Amedeo Chiribiri, PhD; for the REVIVED-BCIS2 Investigators

CONCLUSIONS AND RELEVANCE This study found that viability testing does not identify patients with ischemic cardiomyopathy who benefit from PCI. The extent of nonviable myocardium, but not the extent of viable myocardium, is associated with event-free survival and likelihood of improvement of left ventricular function.

Figure 3. Association Between Viability Characteristics and Trial Outcomes

Outcomes	A Viable myocardium HR (95% CI)	B Nonviable myocardium HR (95% CI)	C Scar HR (95% CI)
Primary outcome	0.98 (0.93-1.04)	1.07 (1.00-1.15)	1.18 (1.04-1.33)
All-cause death	0.98 (0.92-1.04)	1.10 (1.02-1.18)	1.21 (1.07-1.38)
Cardiovascular death	0.97 (0.91-1.04)	1.13 (1.03-1.23)	1.28 (1.10-1.49)
Hospitalization for heart failure	0.96 (0.88-1.05)	1.04 (0.93-1.17)	1.11 (0.91-1.36)
Improved left ventricular function	1.01 (0.93-1.11)	0.82 (0.73-0.93)	0.69 (0.56-0.84)



Forest plot of the hazard ratio (HR) (for clinical outcomes) or odds ratio (for improvement in left ventricular function) for the primary and secondary outcomes according to the extent of viable myocardium, extent of nonviable myocardium, and scar burden. Data relate to the whole trial population. Ratios are expressed per 10% absolute increase in the characteristic relative to overall left ventricular mass. The values relating to this graph are reported in eTable 5 in Supplement 2.
HR indicates hazard ratio.

Lack of benefit from PCI may have been due to less extensive CAD, fewer patients, and shorter follow-up.

Que hemos aprendido…?

1. OMT ha mejorado cantidades en el tiempo.
2. En isquemia Crónica Estable, el impacto de la revascularización es en los SINTOMAS, NO en el pronostico (No mortalidad, No IAM etc).
3. Probablemente el impacto en sobrevida real de la revascularización (CABG) sea en Syntax score elevados (> 32).
4. La Viabilidad cada ves mas esta en entredicho. (parece ser que es mejor el SCAR burden… REVIVED substudy).
5. TAC para definir anatomía esta cada vez mas en boga.
6. CMR en pacientes con falla (LVEF <35%) cobra mas importancia (SCAR BURDEN).

Cuando revascularizar.?

- Ojo con pacientes multivasos: Individualizar el paciente. Grado y extensión anatómica de la enfermedad coronaria, síntomas, etc.
- Angina a pesar de OMT.
- Jovenes
- Tronco Izquierdo

Con cual modalidad..?

- Cuales CABG:?
  - Multivasos y Syntax > 32
  - Diabeticos independiente del SYNTAX score.
  - Left Main con Syntax > 32.
- Cuales PCI:?
  - Syntax bajos < 22 con FFR muy bajos.
  - Left Main ostial y midshaft.
  - Left Main distal pero con syntax < 22. * IVUS presente, experticia en la técnica. CABG previo. Salvo algunas excepciones.
- Cuales Heart Team?:
  - Syntax Intermedios en Left Main.
  - Multivasos con Syntax Intermedio.
  - Pacientes con ALTO riesgo Qx (rechazados). (OMT vs PCI).

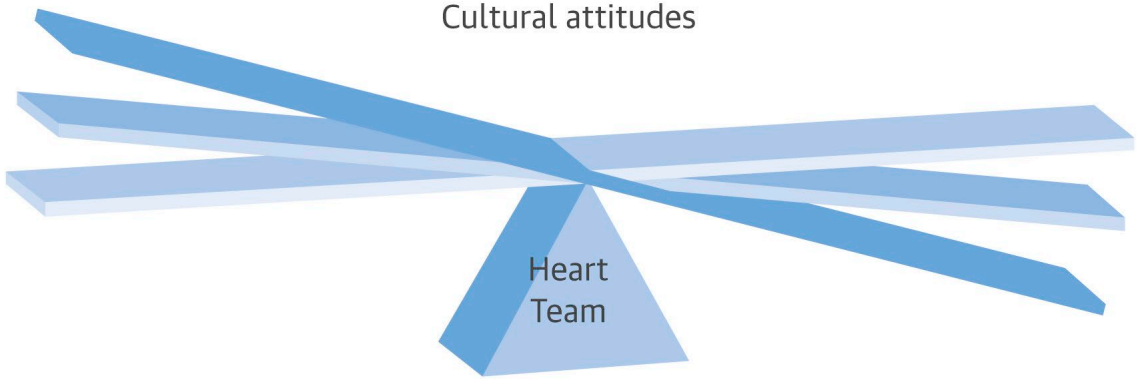
LM: Mas alta TVR y mas alta tasa de IM espontaneos
pero igual mortalidad

Usar calculadora score SYNTAX 2020

Equivalent anatomical revascularization
Revascularization guidelines
Resource availability
Operator skill
Patient's wishes
Socio-economic status
Cultural attitudes

FAVORS CABG

Higher anatomical complexity
Lower operative (CABG) risk
Stable patient
Younger age
Reduced kidney function
Lower LVEF
Good life expectancy
Preserved FEV1
Concomitant valvular heart disease*
Diabetic status†



Lower anatomical complexity
Higher operative (CABG) risk
Unstable patient
Older age
Preserved kidney function
Preserved LVEF
Reduced life expectancy
Reduced FEV1
Left main disease
Patient frailty

FAVORS PCI

Cardiac Surgeon
Clinical Cardiologist
Interventional Cardiologist
Other medical/ surgical specialty
Nurse/social worker

JOURNAL OF THE AMERICAN COLLEGE OF CARDIOLOGY

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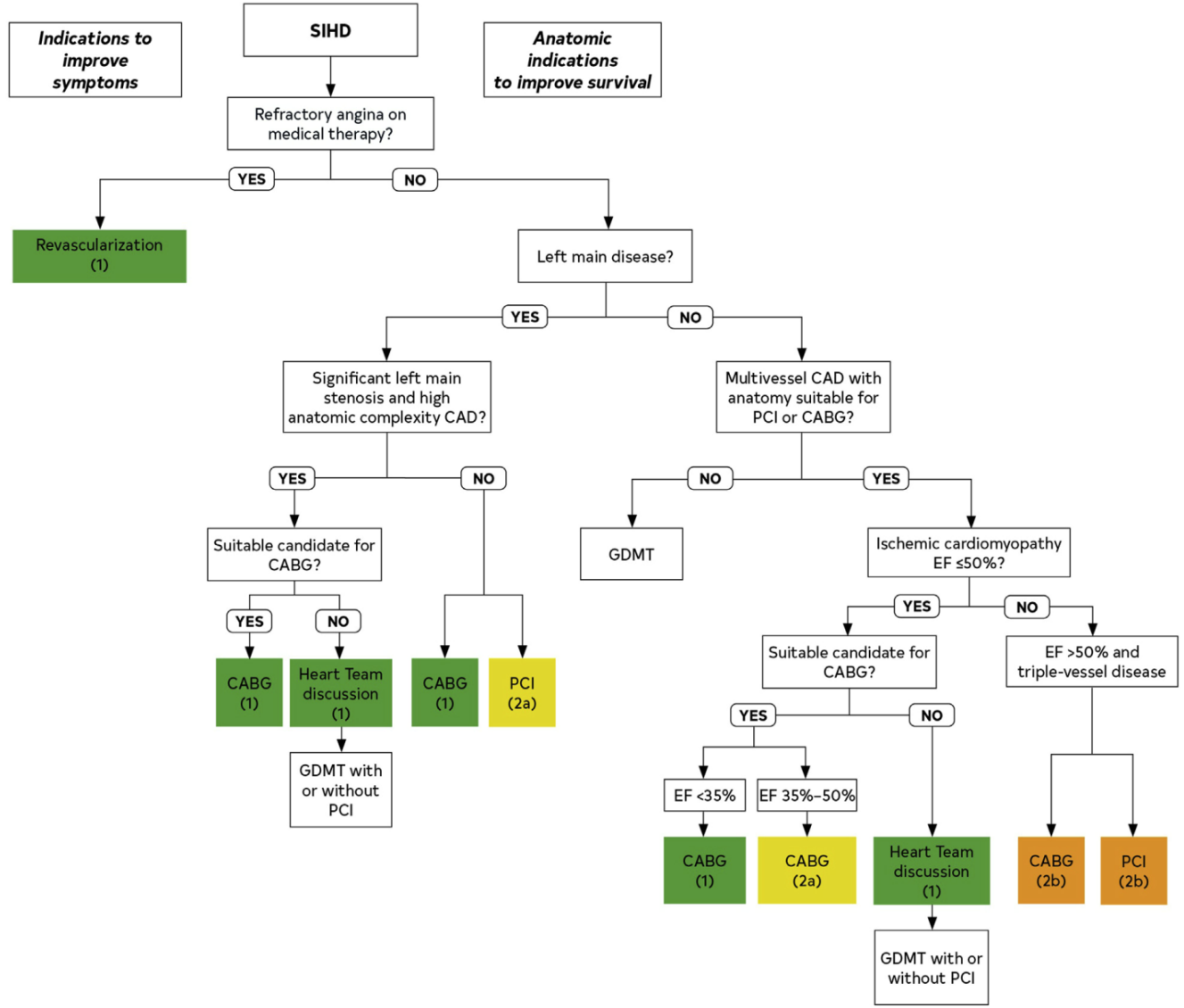
CLINICAL PRACTICE GUIDELINE: FULL TEXT

2021 ACC/AHA/SCAI Guideline for Coronary Artery Revascularization

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

FIGURE 6 Revascularization in Patients With SIHD



Colors correspond to Table 2. CABG indicates coronary artery bypass graft; CAD, coronary artery disease; EF, ejection fraction; GDMT, guideline-directed medical therapy; PCI, percutaneous coronary intervention; and SIHD, stable ischemic heart disease. This algorithm summarizes the recommendations in this guideline for the care of patients with stable CAD. It is not meant to encompass every patient scenario or situation, and clinicians are encouraged to use a Heart Team approach when care decisions are unclear and to see the accompanying supportive text for each recommendation. Additionally, in situations that lack sufficient data to make formal recommendations for care, please see Section 17, "Unanswered Questions and Future Directions."

Gracias

Recommendations for Revascularization: PCI Versus CABG

Referenced studies that support the recommendations are summarized in the Online Data Supplement.

COR	LOE	RECOMMENDATIONS
		Patients With CCD
1	B-R	1. In patients with CCD who require revascularization for significant left main involvement associated with high-complexity CAD, CABG is recommended in preference to PCI to improve survival.*[1,2]
2a	B-R	2. In patients with CCD who require revascularization for multivessel CAD with complex and diffuse CAD (eg, SYNTAX score >33), it is reasonable to choose CABG over PCI to improve survival.*[1,3-6]
		Patients With CCD at High Surgical Risk
2a	B-NR	3. In patients with CCD who are appropriate for revascularization but poor candidates for surgery, it is reasonable to choose PCI over CABG to improve symptoms and reduce MACE.[7-9]
		Patients With CCD and Diabetes
1	A	4. In patients with CCD, diabetes, and multivessel CAD with involvement of the left anterior descending artery who are appropriate candidates for CABG, CABG (with a left internal mammary artery to the left anterior descending artery) is recommended in preference to PCI to reduce mortality and repeat re-vascularizations.*[5,10-17]
2b	B-R	5. In patients with CCD and diabetes who have left main stenosis and low- or intermediate-complexity CAD (eg, SYNTAX score ≤33), PCI may be considered as an alternative to CABG to reduce MACE.*[10,18]

*Modified from the 2021 ACC/AHA/SCAI Guideline for Coronary Artery Revascularization.[19]

Recommendations for Revascularization
Referenced studies that support the recommendations are summarized in the Online Data Supplement.

COR	LOE	RECOMMENDATIONS
		Goals of Revascularization
1	A	1. In patients with CCD and lifestyle-limiting angina despite GDMT and with significant coronary artery stenoses amenable to revascularization, revascularization is recommended to improve symptoms.*[1-7]
1	B-R	2. In patients with CCD who have significant left main disease or multivessel disease with severe LV dysfunction (LVEF ≤ 35%), CABG in addition to medical therapy is recommended over medical therapy alone to improve survival.*[8-11]
Cost Value Statement: Intermediate Value	B-NR	3. In patients with CCD and multivessel disease with severe LV dysfunction, CABG added to optimal medical therapy is of intermediate economic value compared with medical therapy alone.[12]
2a	B-R	4. In patients with CCD and multivessel CAD appropriate for either CABG or PCI, revascularization in addition to GDMT is reasonable to lower the risk of cardiovascular events such as spontaneous MI, unplanned urgent revascularizations, or cardiac death.*[13-20]
2a	B-NR	5. In selected patients with CCD and significant left main stenosis for whom PCI can provide equivalent revascularization to that possible with CABG, PCI is reasonable to improve survival.*[21]
		Decision-Making for Revascularization
1	A	6. In patients with CCD who have angina or an anginal equivalent, no previous evaluation for ischemia, and angiographically intermediate stenoses, the use of FFR or other proven nonhyperemic pressure ratios (eg, iFR) is recommended before proceeding with PCI.*[2,22,23]
Cost Value Statement: High Value	B-NR	7. In patients with CCD undergoing coronary angiography without previous stress testing, the use of invasive FFR to evaluate angiographically intermediate coronary stenoses before proceeding with PCI is a high economic value intervention.[24,25]
1	B-NR	8. In patients with CCD with complex 3-vessel disease or for whom the optimal treatment strategy is unclear, a Heart Team approach that includes representatives from interventional cardiology and cardiac surgery is recommended to improve patient outcomes.*[26-29]

*Modified from the 2021 ACC/AHA/SCAI Guideline for Coronary Artery Revascularization.[30]

Complete Revascularization and Angina-Related Health Status in the ISCHEMIA Trial

FREE ACCESS

Original Investigation

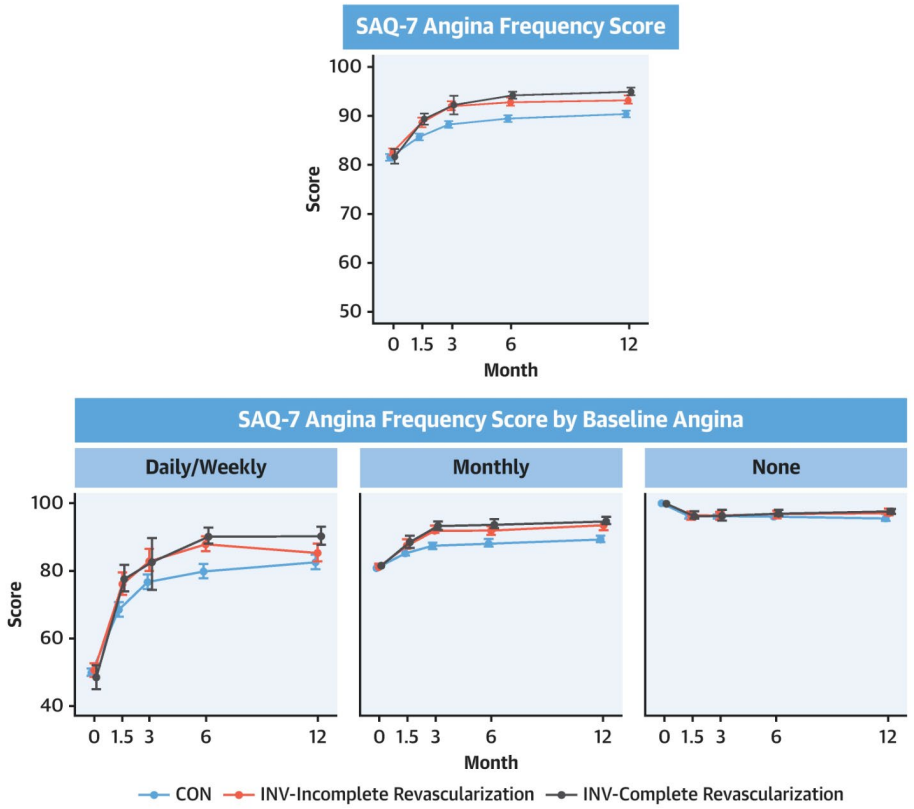
Kreton Mavromatis, Philip G. Jones, Ziad A. Ali, Gregg W. Stone, Grace M. Rhodes, Sripal Bangalore, Sean O'Brien, Philippe Genereux, Jennifer Horst, Ovidiu Dressler, Shaun Goodman, Karen Alexander, Anoop Mathew, ... SEE ALL AUTHORS

JACC. 2023 Jul, 82 (4) 295–313

Topic(s): Percutaneous Coronary Intervention, Ischemic Heart Disease

Editorial Comment: The Interplay of Complete Revascularization and Angina: More Is More?*

CENTRAL ILLUSTRATION: Health Status Associated With Complete and Incomplete Revascularization in the ISCHEMIA Trial



Mavromatis K, et al. J Am Coll Cardiol. 2023;82(4):295-313.

REVIVED vs ISCHEMIA trials

- ISCHEMIA tiene mucho mas poder, mas pacientes (5000 vs 700).
- En REVIVED pacientes con CABG no fueron incluidos (los syntax mas severos no se incluyeron y se enviaron a CABG ??).
- REVIVED: 60% de los pacientes NO tenían angina. Pacientes muy sintomáticos fueron excluidos en ambos grupos.
- Ambos estudios la enfermedad de 3 vasos severa no tuvo buen numero de pacientes.
- En ISCHEMIA menos de la mitad tuvieron revascularización completa anatómica.

Probablemente en el futuro…

- Decidamos de acuerdo al perfil de alto riesgo del paciente con:
  - "Scar burden" en pacientes LVEF < 35%
  - Severidad de DUKE por TAC (>6)
  - Mala respuesta al OMT.
  - Pacientes < 60 años.
  - Pacientes con Tronco.
  - Revascularización COMPLETA incide en desenlaces en enfermedad isquémica crónica estable? Sabemos que en SCA es cierto (COMPLETE trial) pero no lo sabemos en Crónicos estables.

Escenarios por resolver en futuros estudios:

- Mas proporción de pacientes multivasos.
  - Mas severos (syntax intermedios y altos)
- Left main -> OMT vs CABG vs PCI.
- Pacientes < 60 años -> OMT vs CABG vs PCI.
- Determinar quienes se benefician mas..? OMT vs CABG vs PCI.
  - Scar Burden ? En LVEF < 35%
  - DUKE > 6 ? En LVEF > 35%
- Revascularización COMPLETA incide en desenlaces en enfermedad isquémica crónica estable? Sabemos que en SCA es cierto (COMPLETE trial) pero no lo sabemos en Crónicos estables.

- Enfermedad multivasos de baja complejidad anatómica (syntax < 22) esta mas cerca la CABG y la PCI a OMT en cuanto a Sobrevida (todas las alternativas comparables)…. Que es donde brilla la PCI.
- Sabemos de los estudios SYNTAX 10 años que los syntax intermedios y bajos PCI vs CABG tienen igual Sobrevida.
- Probablemente el impacto en sobrevida real de la revascularización (CABG) sea en Syntax score elevados (> 32).

JOURNAL OF THE AMERICAN COLLEGE OF CARDIOLOGY VOL. 78, NO. 12, 2021

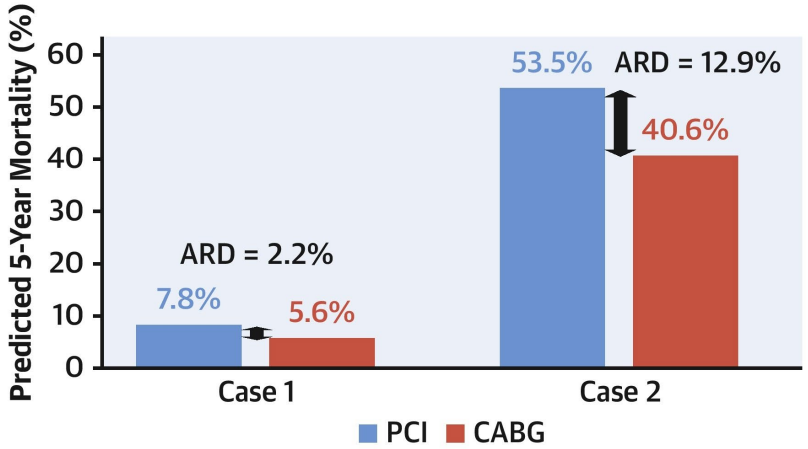
PUBLISHED BY ELSEVIER

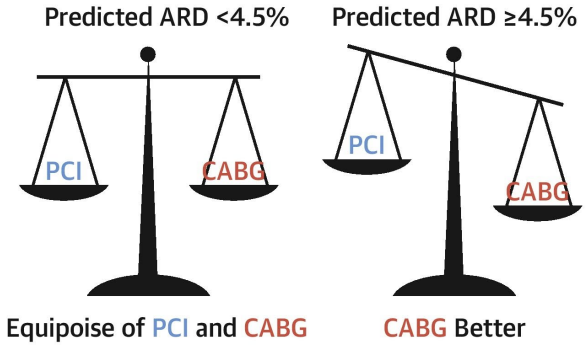
External Validation of the SYNTAX Score II 2020

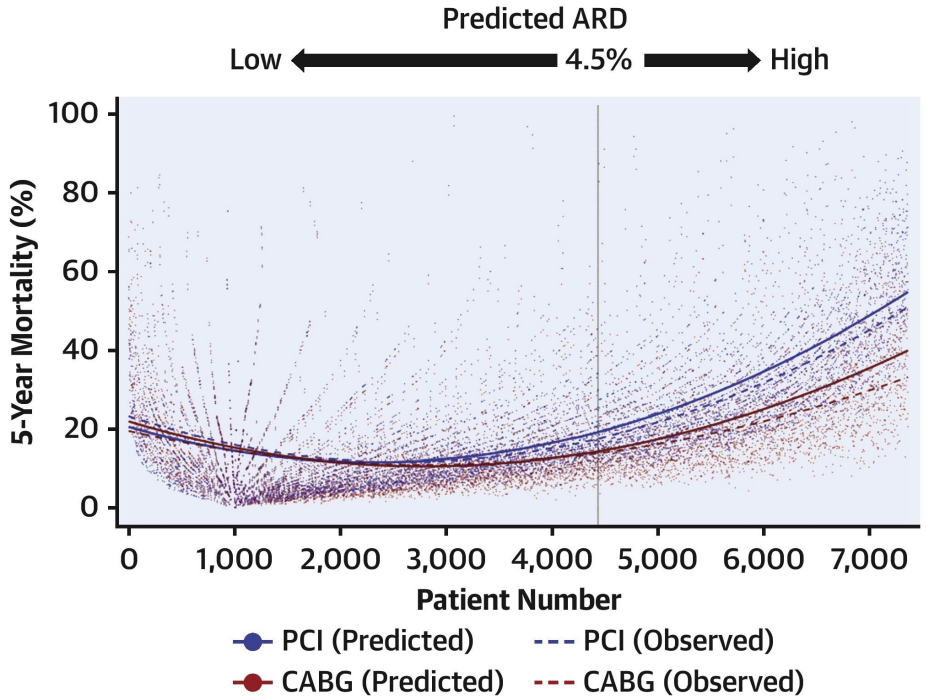
Hironori Hara, MD,[a,b,c] Hiroki Shiomi, MD,[d] David van Klaveren, PhD,[e,f] David M. Kent, MD, MS,[f] Ewout W. Steyerberg, PhD,[g] Scot Garg, MD, PhD,[h] Yoshinobu Onuma, MD, PhD,[b] Takeshi Kimura, MD,[d] Patrick W. Serruys, MD, PhD[b,i]

CENTRAL ILLUSTRATION: Treatment Recommendation According to the Predicted Absolute Risk Difference for 5-Year Mortality

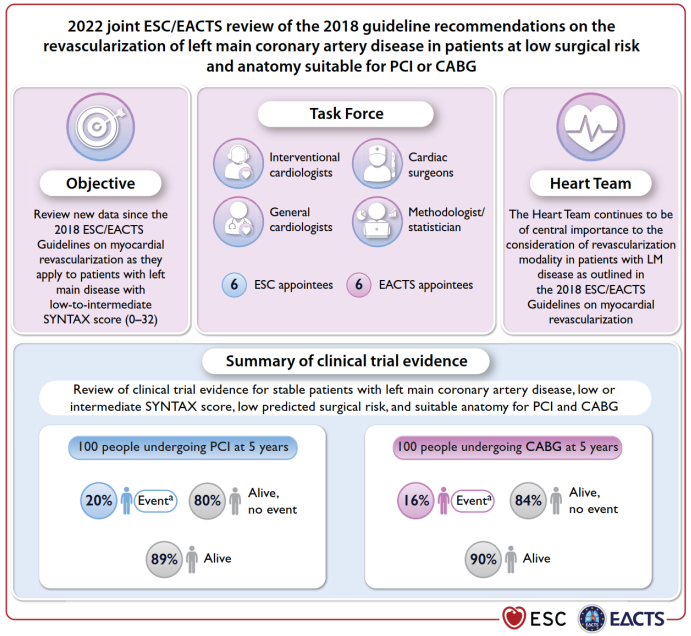
Case 1		Case 2
60	Age	75
Yes	Diabetes	Yes
No	On Insulin	Yes
No	PVD	No
No	COPD	No
65	Creatinine clearance	40
45	LVEF	55
No	Current smokers	Yes
No	LMCAD	No
25	SYNTAX score	28

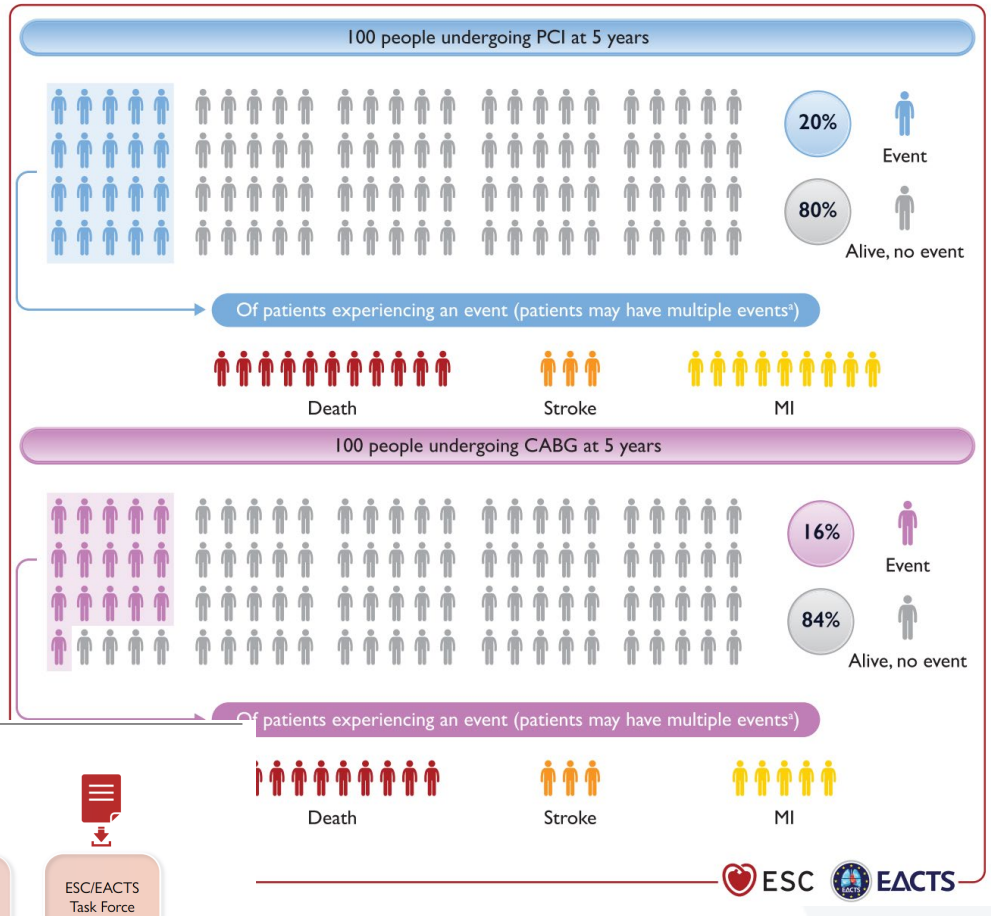


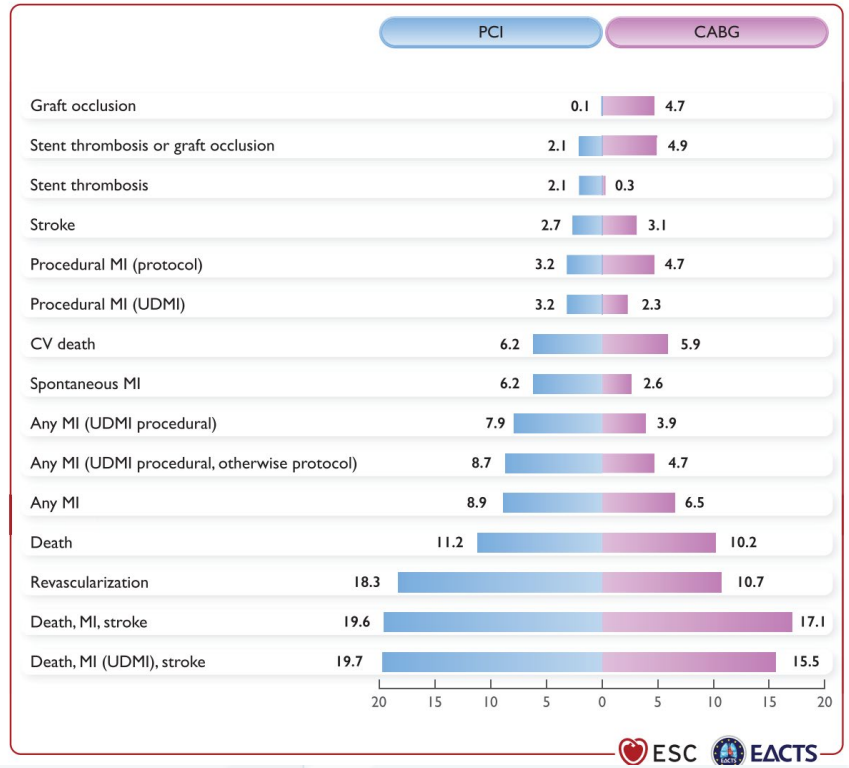


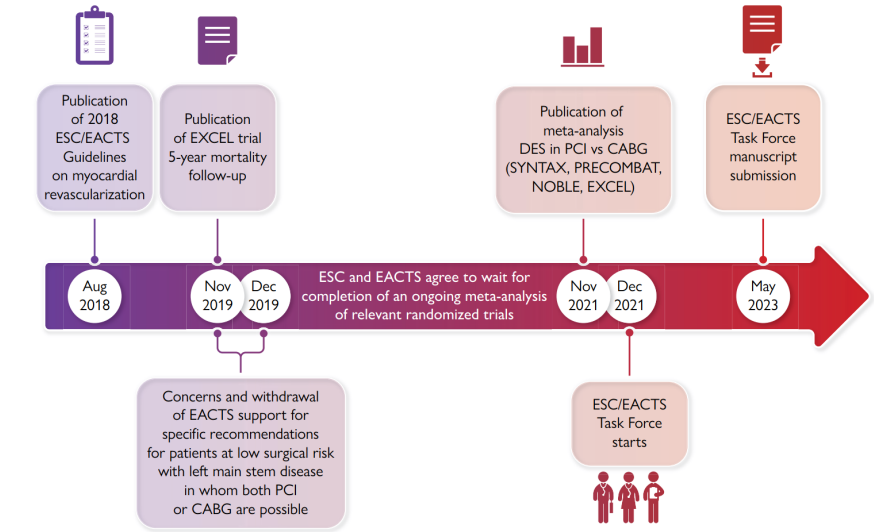


Hara, H. et al. J Am Coll Cardiol. 2021;78(12):1227–1238.









CABG, coronary artery bypass grafting; DES, drug-eluting stent; EACTS, European Association for Cardio-Thoracic Surgery; ESC, European Society of Cardiology; EXCEL, Evaluation of XIENCE vs. Coronary Artery Bypass Surgery for Effectiveness of Left Main Revascularization trial; NOBLE, Nordic–Baltic–British left main revascularisation study; PCI, percutaneous coronary intervention; PRECOMBAT, Bypass Surgery Versus Angioplasty Using Sirolimus Eluting Stent in Patients With Left Main Coronary Artery Disease trial; SYNTAX, Synergy Between Percutaneous Coronary Intervention with TAXUS and Cardiac Surgery trial.

Table 1: Suggested recommendation for type of revascularization in stable patients with left main disease, coronary anatomy suitable for both procedures and low predicted surgical mortality

Recommendation	CABG		PCI	
	Class[a]	Level[b]	Class[a]	Level[b]
Left main disease with low or intermediate SYNTAX score (0–32).	**I**	**A**	**IIa**	**A**

Percutaneous coronary intervention or coronary artery bypass graft surgery for left main coronary artery disease: A meta-analysis of randomized trials

Toshiki Kuno, MD, PhD,[a] Hiroki Ueyama, MD,[a] Sunil V. Rao, MD,[b] Mauricio G. Cohen, MD,[c] Jacqueline E. Tamis-Holland, MD,[d] Craig Thompson, MD,[e] Hisato Takagi, MD, PhD,[f] and Sripal Bangalore, MD, MHA[e]
New York, NY; Durham, NC; Miami, FL; and Sbizuoka, Japan

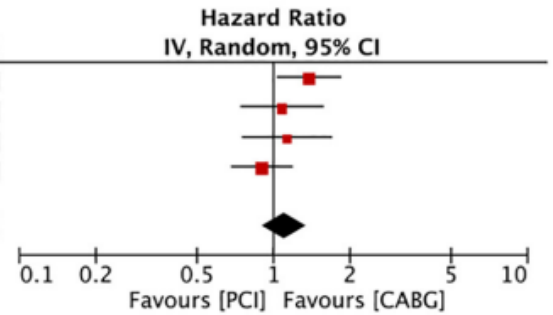
We aimed to investigate long-term (≥5 years) outcomes of percutaneous coronary intervention (PCI) versus coronary artery bypass grafting (CABG) for left main coronary artery disease (LMCAD) using a meta-analysis from updated published randomized trials. Our data showed that the risk of all-cause death as well as cardiovascular death, myocardial infarction, and stroke was similar between PCI and CABG, whereas PCI had significantly higher rates of repeat revascularization compared to CABG. Decisions for PCI versus CABG for LMCAD should be based on weighing the upfront morbidity and mortality risk of CABG with late risk of repeat revascularization with PCI and taking into consideration patient preference. (Am Heart J 2020;227:9-10.)

Figure 1

A

Study or Subgroup	log[Hazard Ratio]	SE	Weight	Hazard Ratio IV, Random, 95% CI
EXCEL	0.3221	0.1493	29.6%	1.38 [1.03, 1.85]
NOBLE	0.077	0.1929	20.7%	1.08 [0.74, 1.58]
PRECOMBAT	0.1222	0.2091	18.3%	1.13 [0.75, 1.70]
SYNTAX	−0.1054	0.143	31.3%	0.90 [0.68, 1.19]
Total (95% CI)			**100.0%**	**1.11 [0.91, 1.35]**

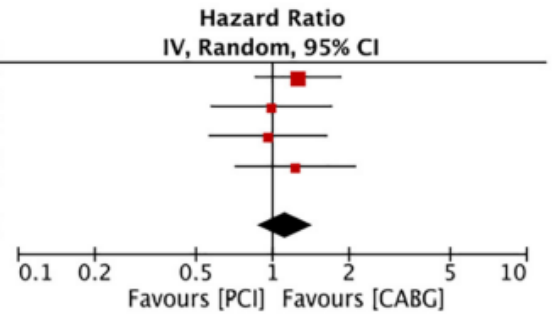
Heterogeneity: $Tau^2 = 0.01$; $Chi^2 = 4.30$, df = 3 (P = 0.23); $I^2 = 30\%$
Test for overall effect: Z = 0.99 (P = 0.32)



B

Study or Subgroup	log[Hazard Ratio]	SE	Weight	Hazard Ratio IV, Random, 95% CI
EXCEL	0.2311	0.2008	39.2%	1.26 [0.85, 1.87]
NOBLE	−0.0101	0.2817	19.9%	0.99 [0.57, 1.72]
PRECOMBAT	−0.0408	0.275	20.9%	0.96 [0.56, 1.65]
SYNTAX	0.207	0.2804	20.1%	1.23 [0.71, 2.13]
Total (95% CI)			**100.0%**	**1.13 [0.88, 1.44]**

Heterogeneity: $Tau^2 = 0.00$; $Chi^2 = 0.96$, df = 3 (P = 0.81); $I^2 = 0\%$
Test for overall effect: Z = 0.97 (P = 0.33)



Outcomes with PCI versus CABG for LMCAD (random effect model): (**A**) all-cause death and (**B**) cardiovascular death.

Percutaneous coronary intervention with drug-eluting stents versus coronary artery bypass grafting in left main coronary artery disease: an individual patient data meta-analysis

Marc S Sabatine, Brian A Bergmark*, Sab*
Duk-Woo Park, Evald H Christiansen, Niels

	Pooled (n=4394)	PCI (n=2197)	CABG (n=2197)
Demographics			
Age, years	66 (59–73)	66 (59–73)	66 (59–72)
Age ≥65 years	2496 (56·8%)	1223 (55·7%)	1273 (57·9%)
Sex			
Female	1023 (23·3%)	514 (23·4%)	509 (23·2%)
Male	3371 (76·7%)	1683 (76·6%)	1688 (76·8%)
Region			
North or South America	938 (21·3%)	469 (21·3%)	469 (21·3%)
Europe	2826 (64·3%)	1415 (64·4%)	1411 (64·2%)
Asia-Pacific	630 (14·3%)	313 (14·2%)	317 (14·4%)
Race or ethnicity			
White	2372/3206 (74·0%)	1184/1601 (74·0%)	1188/1605 (74·0%)
Black	73/3206 (2·3%)	40/1601 (2·5%)	33/1605 (2·1%)
Asian	651/3206 (20·3%)	326/1601 (20·4%)	325/1605 (20·2%)
Hispanic	44/3206 (1·4%)	18/1601 (1·1%)	26/1605 (1·6%)
Other or unknown	66/3206 (2·1%)	33/1601 (2·1%)	33/1605 (2·1%)
Clinical factors			
Dyslipidaemia	3073/4386 (70·1%)	1570/2195 (71·5%)	1503/2191 (68·6%)
Hypertension	2954/4391 (67·3%)	1491/2195 (67·9%)	1463/2196 (66·6%)
Diabetes	1104/4393 (25·1%)	563/2197 (25·6%)	541/2196 (24·6%)
Current smoker	969/4362 (22·2%)	484/2183 (22·2%)	485/2179 (22·3%)
eGFR <60 mL/min per 1·73 m^2	531/3099 (17·1%)	268/1561 (17·2%)	263/1538 (17·1%)
Previous myocardial infarction	551/3185 (17·3%)	283/1590 (17·8%)	268/1595 (16·8%)
Previous PCI	641/4388 (14·6%)	330/2193 (15·0%)	311/2195 (14·2%)
ACS at presentation	1466/4393 (33·4%)	725/2197 (33·0%)	741/2196 (33·7%)
Myocardial infarction ≤7 days before randomisation	328/2573 (12·7%)	168/1290 (13·0%)	160/1283 (12·5%)
LVEF <50%	499/4061 (12·3%)	241/1988 (12·1%)	258/2073 (12·4%)
EuroSCORE*	3·0 (1·0–4·0); n=2481	3·0 (1·0–4·0); n=1246	3·0 (2·0–4·0); n=1235
Coronary anatomy			
SYNTAX score†	25·0 (18·0–31·0); n=4358	25·0 (19·0–31·0); n=2187	24·0 (18·0–31·0); n=2171
SYNTAX score group			
≤22	1778/4358 (40·8%)	864/2187 (39·5%)	914/2171 (42·1%)
23–32	1627/4358 (37·3%)	858/2187 (39·2%)	769/2171 (35·4%)
≥33	953/4358 (21·9%)	465/2187 (21·3%)	488/2171 (22·5%)
Diseased vessels			
Left main only	705/4354 (16·2%)	359/2185 (16·4%)	346/2169 (16·0%)
Left main plus 1 vessel	1367/4354 (31·4%)	694/2185 (31·8%)	673/2169 (31·0%)
Left main plus 2 vessels	1375/4354 (31·6%)	684/2185 (31·3%)	691/2169 (31·9%)
Left main plus ≥3 vessels	905/4354 (20·8%)	446/2185 (20·4%)	459/2169 (21·2%)
Left main bifurcation lesion	3187/4309 (74·0%)	1638/2167 (75·6%)	1549/2142 (72·3%)

(Table 1 continues on next page)

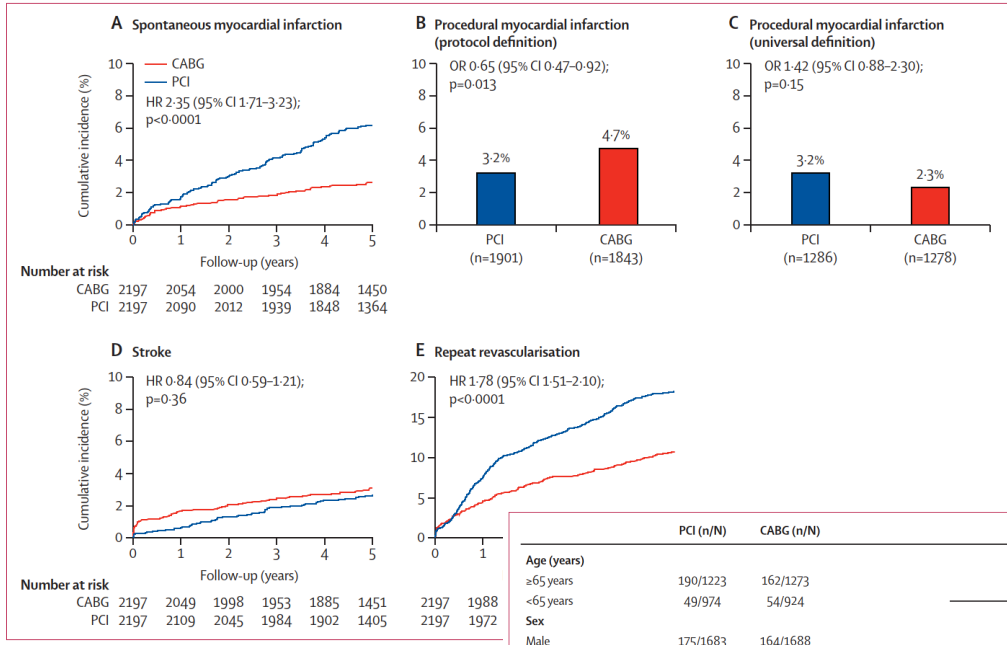


Figure 2: **Cumulative incidence of key clinical outcomes**
Cumulative incidence of spontaneous myocardial infarction (A), protocol-defined
myocardial infarction using data from EXCEL and SYNTAX only (C), stroke (D), and
treated with PCI versus CABG. CABG=coronary artery bypass grafting. HR=hazard r

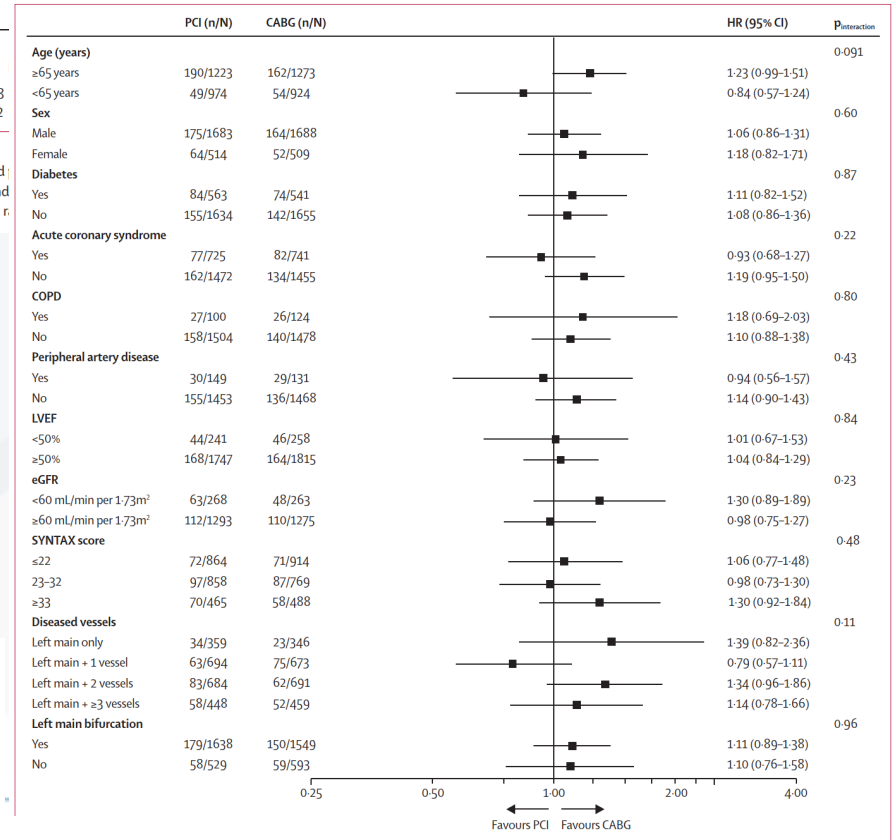
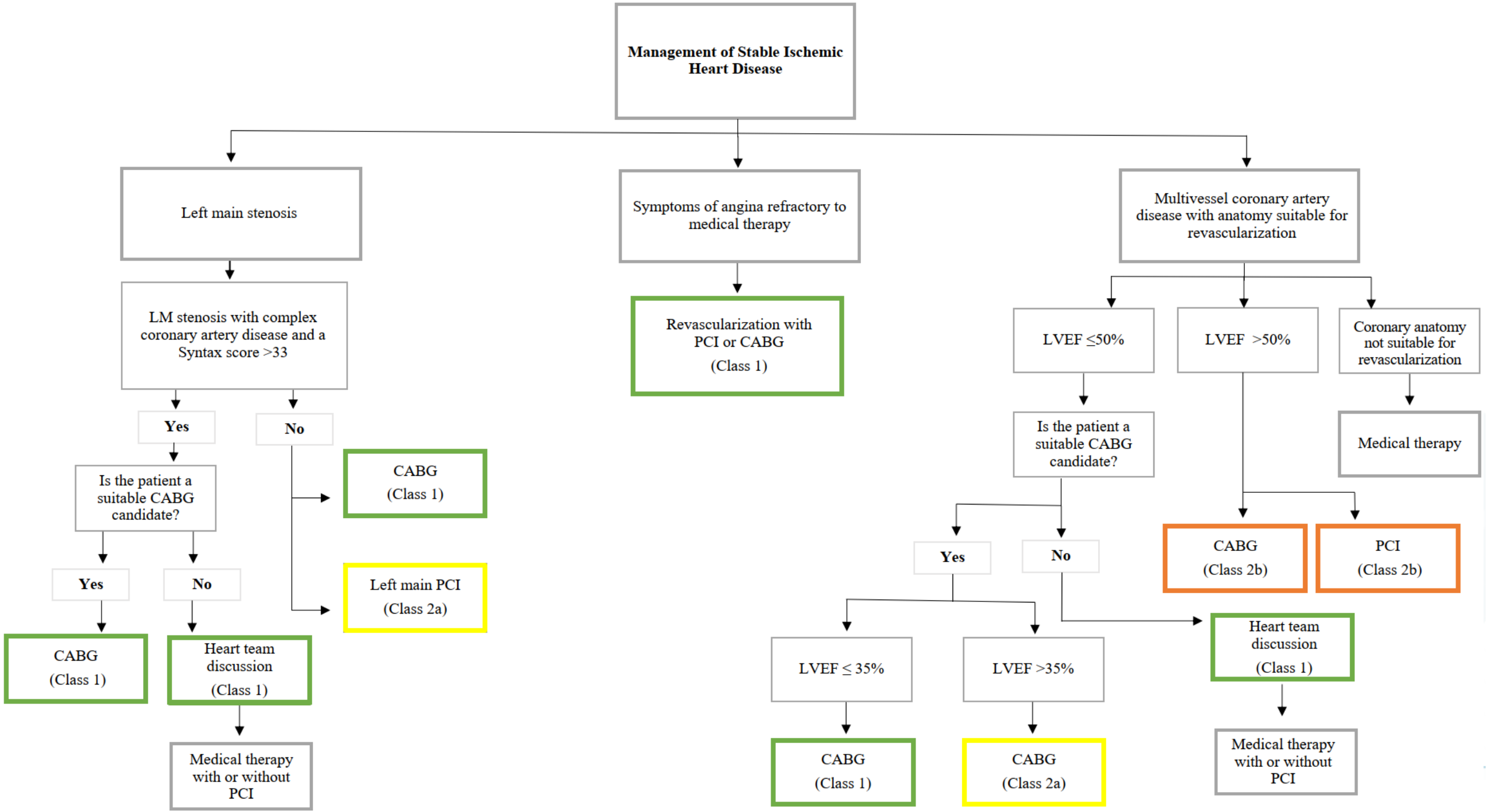


Figure 3: **5-year all-cause deaths in key subgroups**
CABG=coronary artery bypass grafting. COPD=chronic obstructive pulmonary disease. eGFR=estimated glomerular filtration rate (calculated using the Chronic Kidney Disease Epidemiology Collaboration formula). HR=hazard ratio. LVEF=left ventricular ejection fraction. PCI=percutaneous coronary intervention.

Interpretation Among patients with left main coronary artery disease and, largely, low or intermediate coronary anatomical complexity, there was no statistically significant difference in 5-year all-cause death between PCI and CABG, although a Bayesian approach suggested a difference probably exists (more likely than not <0·2% per year) favouring CABG. There were trade-offs in terms of the risk of myocardial infarction, stroke, and revascularisation. A heart team approach to communicate expected outcome differences might be useful treatment decision.


Management of Stable Ischemic Heart Disease
Left main stenosis
LM stenosis with complex coronary artery disease and a Syntax score >33
Yes
No
Is the patient a suitable CABG candidate?
Yes
No
CABG (Class 1)
Heart team discussion (Class 1)
Medical therapy with or without PCI
CABG (Class 1)
Left main PCI (Class 2a)
Symptoms of angina refractory to medical therapy
Revascularization with PCI or CABG (Class 1)
Multivessel coronary artery disease with anatomy suitable for revascularization
LVEF ≤50%
LVEF >50%
Coronary anatomy not suitable for revascularization
Is the patient a suitable CABG candidate?
Medical therapy
Yes
No
LVEF ≤ 35%
LVEF >35%
CABG (Class 1)
CABG (Class 2a)
CABG (Class 2b)
PCI (Class 2b)
Heart team discussion (Class 1)
Medical therapy with or without PCI

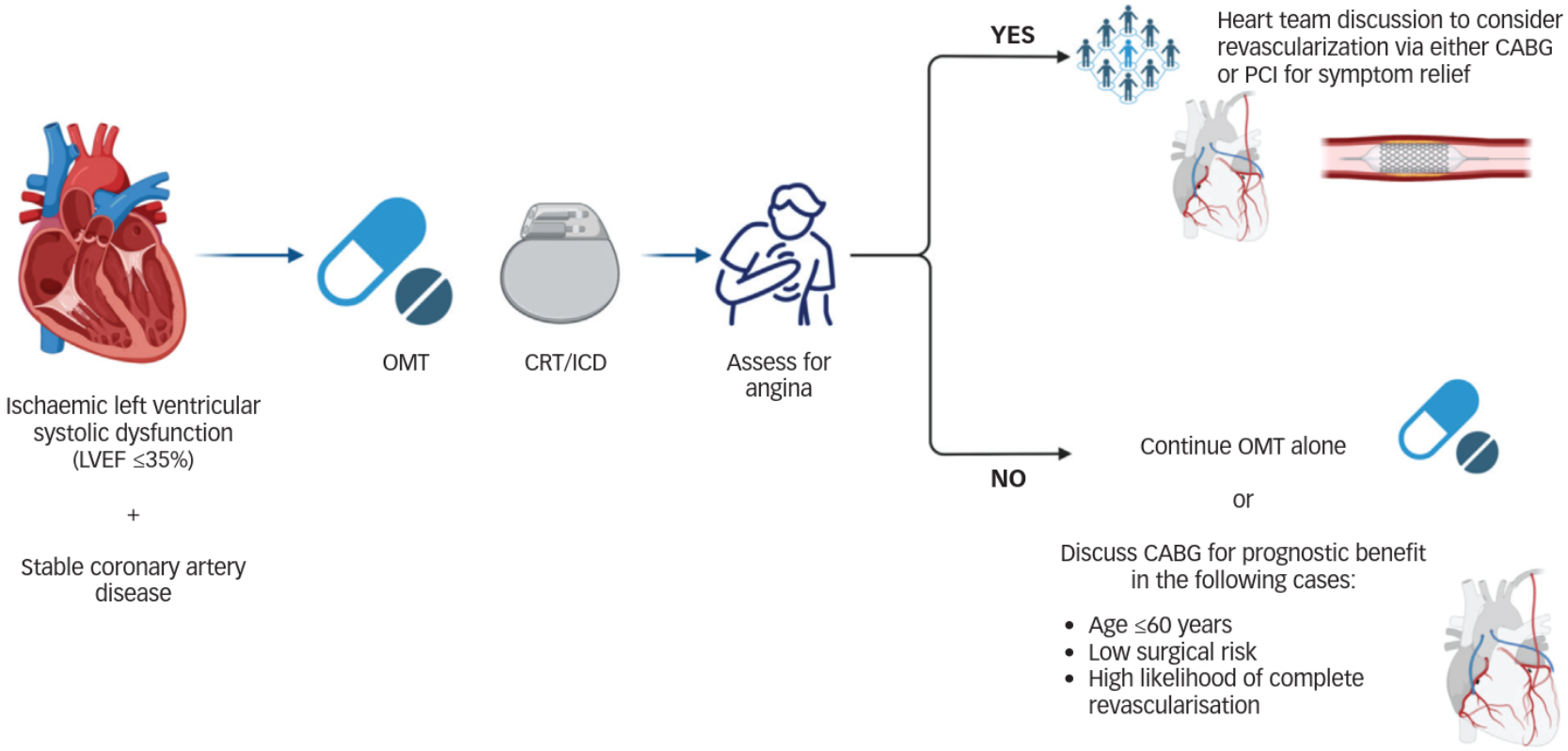
This shared decision with the patient has been framed by the clinical intent of revascularization (survival benefit versus symptom management), cardiovascular risk modifiers (eg, ejection fraction and diabetes mellitus status), and the severity of coronary atherosclerosis.

CABG: Left ventricular ejection fraction (LVEF) ≤35%, Left main (LM) disease, diabetes mellitus (DM), or refractory angina despite optimal medical therapy (OMT)

REVIVED-BCIS2 Multivessel PCI and LVEF < 35%
Among patients with LV systolic dysfunction and extensive CAD, multivessel PCI did not improve all-cause mortality or LV systolic function

STITCHES VS REVIVED:

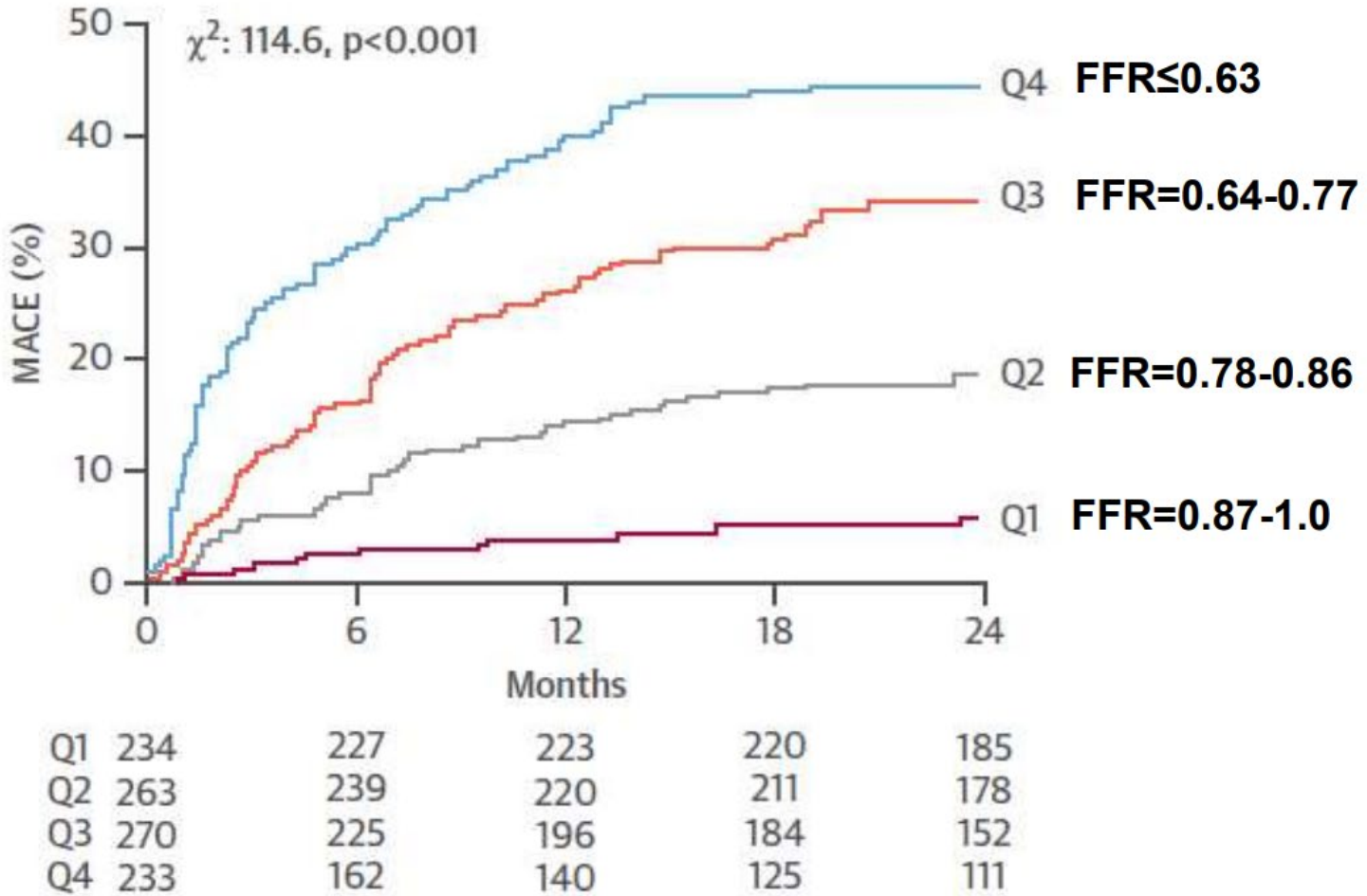
- Pacientes Jovenes
- Se benefician menos los > 60 años??
- CABG mejor…??
- SCAR BURDEN (menos scara, mejor pronostico)
- Viabilidad en entredicho.


Ischaemic left ventricular systolic dysfunction (LVEF ≤35%)
+
Stable coronary artery disease
OMT
CRT/ICD
Assess for angina
YES
Heart team discussion to consider revascularization via either CABG or PCI for symptom relief
NO
Continue OMT alone
or
Discuss CABG for prognostic benefit in the following cases:
• Age ≤60 years
• Low surgical risk
• High likelihood of complete revascularisation

- Guidelines provide a Class I indication for revascularization with CABG for patients with high risk left main (LM) CAD and multivessel CAD associated with diabetes or LVEF < 35%

Relationship between FFR and MACE

1,029 lesions from 607 medically treated patients in FAME 2



Barbato, et al. J Am Coll Cardiol 2016;68:2247-55.

Relationship between FFR and MACE

1,029 lesions from 607 medically treated patients in FAME 2

Quartile	n (%)	HR (95% CI)	p Value
MACE			
Q1 (0.87-1.00)	14 (5.4)	Ref.	–
Q2 (0.78-0.86)	50 (19.2)	3.44 (1.90-6.23)	<0.001
Q3 (0.64-0.77)	91 (35.0)	6.71 (3.82-11.78)	<0.001
Q4 (≤0.63)	105 (40.4)	9.84 (5.63-17.20)	<0.001
Death or MI			
Q1 (0.87-1.00)	6 (14.0)	Ref.	–
Q2 (0.78-0.86)	8 (18.6)	1.20 (0.41-3.45)	0.74
Q3 (0.64-0.77)	17 (39.5)	2.52 (0.99-6.39)	0.05
Q4 (≤0.63)	12 (27.9)	2.04 (0.76-5.43)	0.15
Urgent revascularization			
Q1 (0.87-1.00)	2 (2.9)	Ref.	–
Q2 (0.78-0.86)	8 (11.4)	3.61 (0.77-16.99)	0.10
Q3 (0.64-0.77)	31 (44.3)	14.29 (3.42-59.73)	<0.001
Q4 (≤0.63)	29 (41.4)	15.56 (3.71-65.20)	<0.001

Barbato, et al. J Am Coll Cardiol 2016;68:2247-55.

SYNTAX Score and Long-Term Outcomes: The BARI-2D Trial

FREE ACCESS

Original Investigation

Fumiaki Ikeno, Maria Mori Brooks, Kaori Nakagawa, Min-Kyu Kim, Hideaki Kaneda, Yoshiaki Mitsutake, Helen A. Vlachos, Leonard Schwartz, Robert L. Frye, Sheryl F. Kelsey, Katsuhisa Waseda, Mark A. Hlatky, and and the BARI-2D Study Group

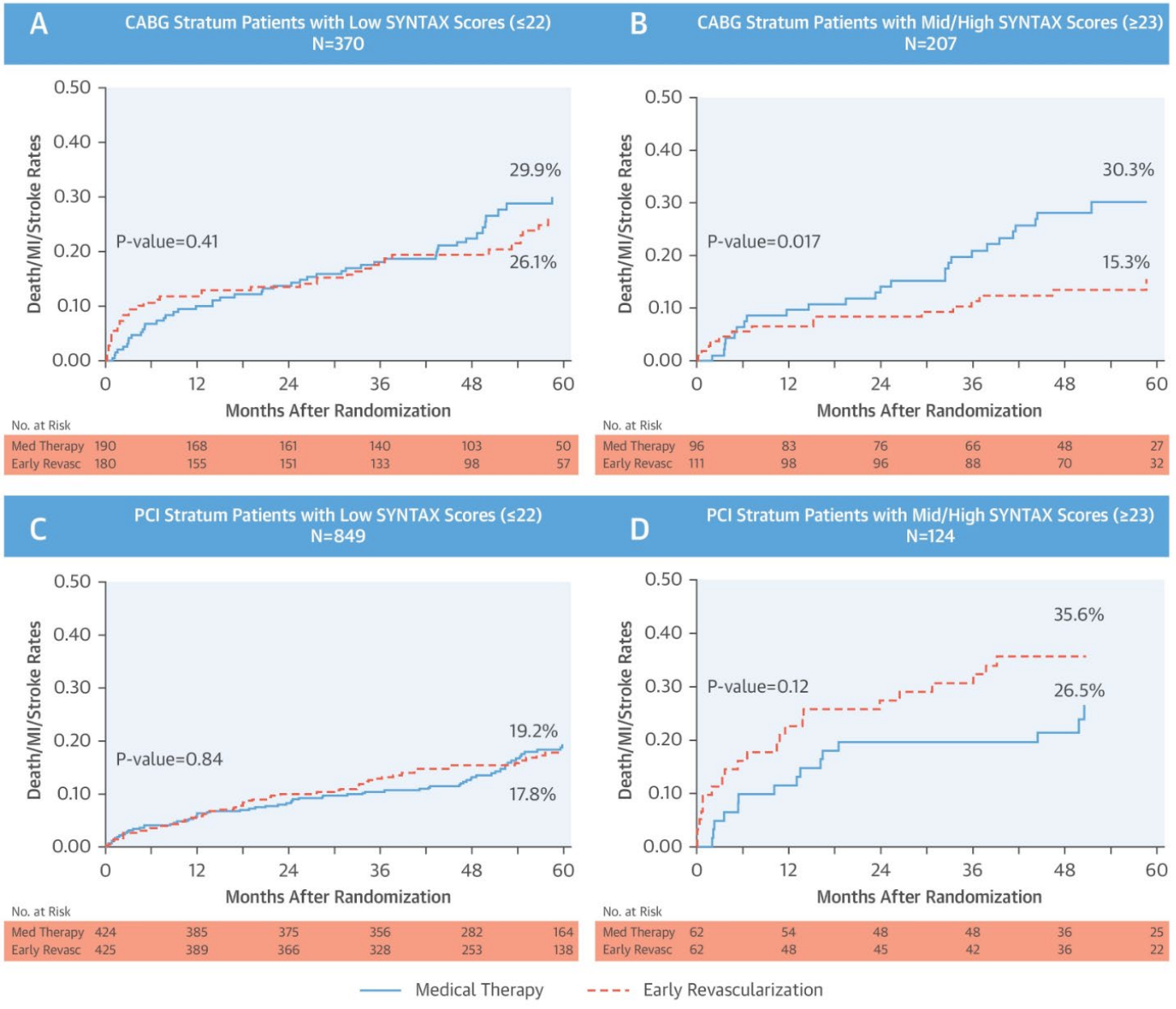
JACC. 2017 Jan, 69 (4) 395–403

Topic(s): Coronary, Peripheral & Structural Interventions

Editorial Comment: Cherry-Picking Historical Data to Legitimize Contemporary Practice: Should Diabetic Status Influence Decision-Making in Complex CAD?*

Conclusions:
Among patients with diabetes and stable ischemic heart disease, higher SYNTAX scores predict higher rates of major cardiovascular events and were associated with more favorable outcomes of revascularization compared with medical therapy among patients suitable for CABG. (Bypass Angioplasty Revascularization Investigation in Type 2 Diabetes; NCT00006305)

CENTRAL ILLUSTRATION: 5-Year Major Cardiovascular Event-Free Survival



Ikeno, F. et al. J Am Coll Cardiol. 2017;69(4):395-403.

Clinical outcomes of state-of-the-art percutaneous coronary revascularisation in patients with three-vessel disease: two-year follow-up of the SYNTAX II study

Patrick W. Serruys[1,2]*, MD, PhD; Norihiro Kogame[3], MD; Yuki Katagiri[3], MD; Rodrigo Modolo[3], MD; Pawel E. Buszman[4,5], MD, PhD; Andres Iniguez[6], MD, PhD; Javier Goicolea[7], MD, PhD; David Hildick-Smith[8], MD; Andrzej Ochala[5], MD, PhD; Dariusz Dudek[9], MD, PhD; Jan J. Piek[3], MD, PhD; Joanna J. Wykrzykowska[3], MD, PhD; Javier Escaned[10], MD, PhD; Adrian P. Banning[11], MBBS, MD; Vasim Farooq[12], MBChB, PhD; Yoshinobu Onuma[2], MD, PhD

1. Imperial College London, London, United Kingdom; 2. Thoraxcenter, Erasmus Medical Center, Rotterdam, the Netherlands; 3. Department of Cardiology, Amsterdam University Medical Center, Amsterdam, the Netherlands; 4. Center for Cardiovascular Research and Development, American Heart of Poland, Katowice, Poland; 5. Medical University of Silesia, Katowice, Poland; 6. Department of Cardiology, Hospital Meixoeiro, Pontevedra, Spain; 7. Department of Cardiology, Hospital Puerta de Hierro, Madrid, Spain; 8. Brighton & Sussex University Hospitals NHS Trust, Brighton, United Kingdom; 9. Institute of Cardiology, Jagiellonian University, Krakow, Poland; 10. Hospital Clinico San Carlos IDISSC and Universidad Complutense de Madrid, Madrid, Spain; 11. Department of Cardiology, John Radcliffe Hospital, Oxford, United Kingdom; 12. The Newcastle upon Tyne Hospitals NHS Foundation Trust, Freeman Hospital, Newcastle upon Tyne, United Kingdom

P.W. Serruys and N. Kogame contributed equally to this work.

GUEST EDITOR: Alec Vahanian, MD, PhD; *Department of Cardiology, Hôpital Bichat-Claude Bernard, and University Paris VII, Paris, France.*

This paper also includes supplementary data published online at: https://eurointervention.pcronline.com/doi/10.4244/EIJ-D-18-00980

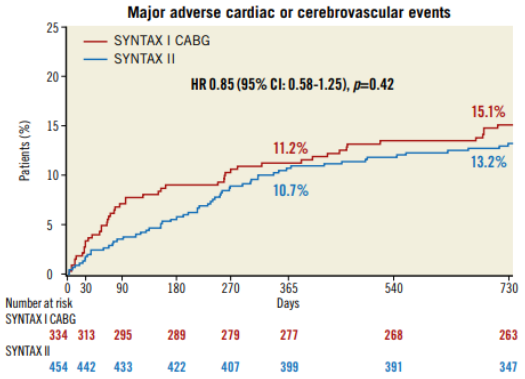


Figure 4. *Two-year major adverse cardiac or cerebrovascular events among the study patients, compared with the SYNTAX-I CABG cohort. Kaplan-Meier curves are shown for SYNTAX II (blue) and SYNTAX-I CABG (red) for the exploratory composite endpoint of major adverse cardiac or cerebrovascular events (MACCE). MACCE was defined as all-cause death, any stroke, MI, or revascularisation.*

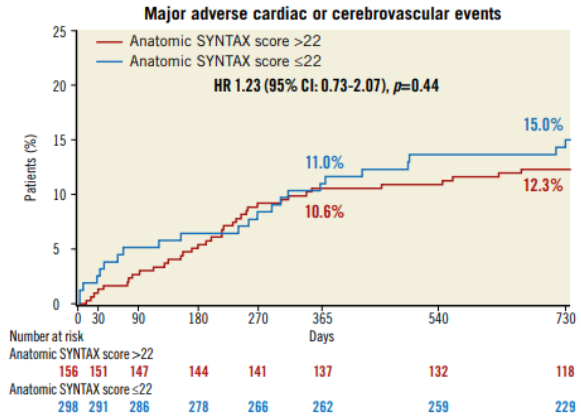


Figure 2. *Kaplan-Meier cumulative incidence for major adverse cardiac or cerebrovascular events in SYNTAX II patients stratified by anatomic SYNTAX score ≤22 (blue) and >22 (red).*

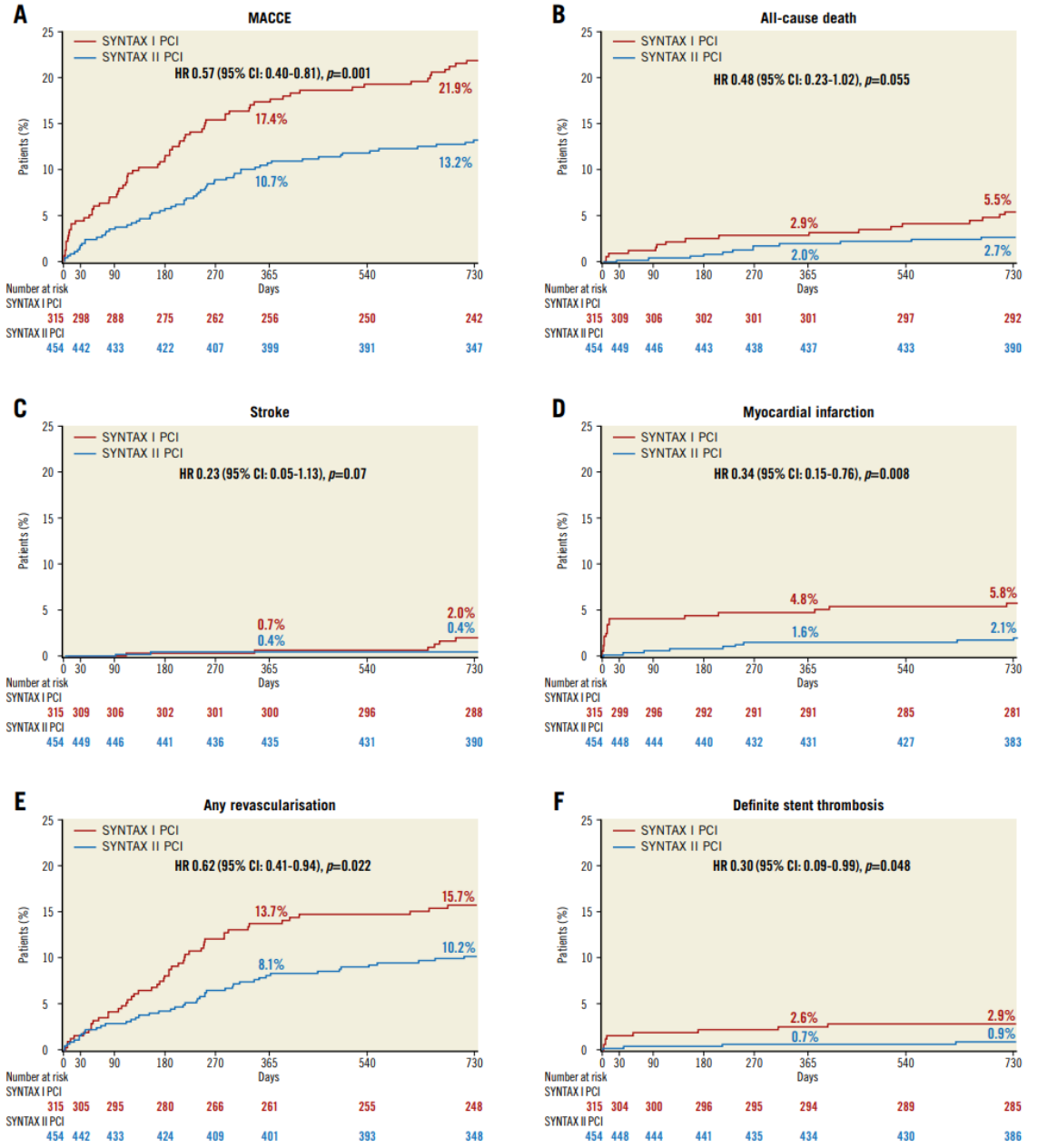


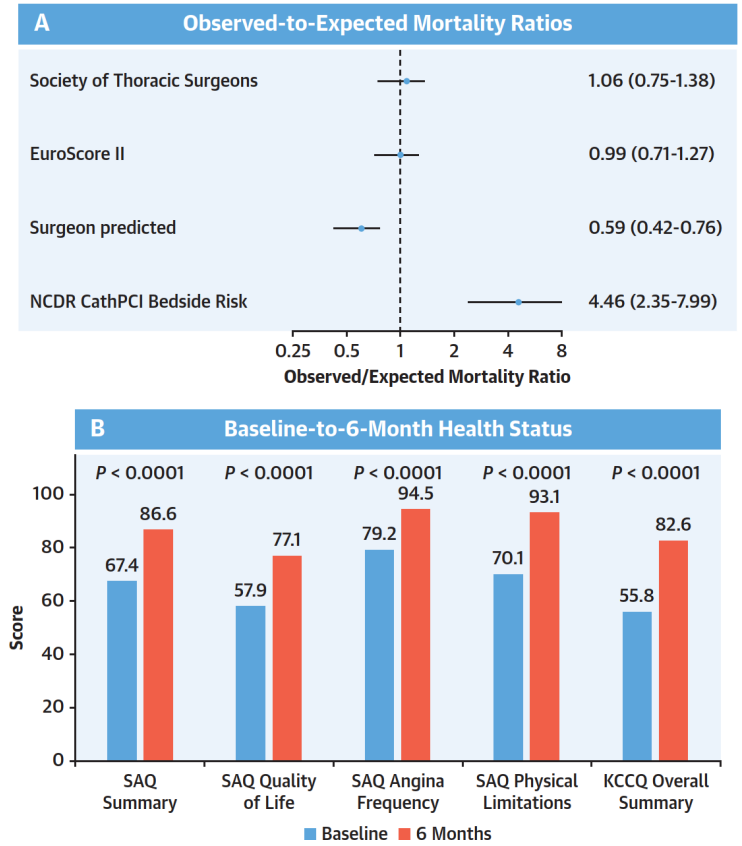
Figure 1. *Two-year clinical outcomes among the study patients, compared with the SYNTAX-I PCI cohort. Kaplan-Meier curves are shown for SYNTAX II (blue) and SYNTAX-I PCI (red) for the composite endpoint of major adverse cardiac or cerebrovascular events (MACCE) (A), all-cause death (B), stroke (C), any myocardial infarction (D), any revascularisation (E), and definite stent thrombosis (F). MACCE was defined as all-cause death, any stroke, MI, or revascularisation.*

Outcomes of Medical Therapy Plus PCI for Multivessel or Left Main CAD Ineligible for Surgery

Adam C. Salisbury, MD, MSc,[a,b] J. Aaron Grantham, MD,[a,b] W. Morris
Keith B. Allen, MD,[a,b] Ajay J. Kirtane, MD, SM,[d] Michael Argenziano
Kamal Khabbaz, MD,[e] John Lasala, MD,[f] Puja Kachroo, MD,[f] Dimitri
William L. Lombardi, MD,[g] Karen Nugent, RRT,[a] Ziad Ali, MD,[d] Kens
David E. Kandzari, MD,[c] on behalf of the OPTIMUM Investigators

CENTRAL ILLUSTRATION Study Overview and Main Results

PCI Outcomes and Mortality Risk Scores for Surgically Ineligible Patients With Left Main or Multivessel CAD (N = 726)



Salisbury AC, et al. J Am Coll Cardiol Intv. 2023;16(3):261-273.

(A) Observed over expected mortality ratios using The Society of Thoracic Surgeons 30-day mort System for Cardiac Operative Risk Evaluation) II 30-day mortality risk score, the evaluating cardiac bypass surgery, and the in-hospital mortality estimated by the National Cardiovascular Data Regi Values are HR (95% CI). **(B)** Mean health status scores at baseline and 6-month follow-up. Analysis for both baseline and 6-month health status assessments. **Error bars** represent 95% CIs. KCCQ = tionnaire; SAQ = Seattle Angina Questionnaire.

TABLE 2 Angiographic and Procedural Characteristics (N = 726)

Baseline coronary anatomy	
Number of vessels diseased	
Mean ± SD	4.2 ± 1.5
Median (IQR)	4.0 (3.0-5.0)
Baseline SYNTAX score	32.4 ± 12.2
Baseline SYNTAX score category	
Low	149 (21.8)
Intermediate	224 (32.8)
High	309 (45.3)
Severe left main stenosis	205 (28.3)
Severe left anterior descending stenosis	666 (92.0)
Severe right coronary stenosis	549 (75.8)
Severe circumflex stenosis	481 (66.4)
Any severely calcified lesion	597 (82.5)
Any bifurcation lesion	580 (80.2)
Number of bifurcation lesions	1.4 ± 1.1
Any chronic total occlusion	412 (56.9)
Number of chronic total occlusions	1.6 ± 0.8
J-CTO score	1.4 ± 0.8
Any lesion ≥20 mm	561 (78.5)
Operator-reported indications for PCI	
Symptom relief	289 (39.8)
Ischemia reduction	99 (13.6)
Treatment of cardiomyopathy	121 (24.1)
Acute coronary syndrome	197 (27.1)
Avoidance of transplant	2 (0.3)
Ventricular arrhythmia	1 (0.1)
Other or unknown	17 (2.3)

Continued in the next column

TABLE 2 Continued

Post-PCI coronary anatomy	
SYNTAX score	15.0 ± 11.7
Low	510 (75.7)
Intermediate	101 (15.0)
High	63 (9.3)
SYNTAX score ≤8 points	231 (34.3)
SYNTAX score = 0 points	77 (11.4)
PCI treatment	
Radial access	273 (37.6)
Number vessels treated	
Mean ± SD	2.9 ± 1.4
Median (IQR)	3.0 (2.0-4.0)
Number of DES implanted	
Mean ± SD	3.2 ± 1.9
Median (IQR)	3.0 (2.0-4.0)
Number of BMS	
Mean ± SD	0.1 ± 0.4
Median (IQR)	0.0 (0.0-0.0)
Left main treated	277 (38.2)
Left anterior descending treated	538 (74.1)
Left circumflex treated	369 (50.8)
Right coronary artery treated	254 (35.0)
Any atherectomy	232 (32.0)
Any bifurcation treated	245 (33.7)
Any chronic total occlusion attempted	147 (20.3)
Chronic total occlusion PCI success	118 (80.3)
Any cutting balloon used	143 (19.7)
Any intravascular ultrasound	442 (61.0)
Any optical coherence tomography	30 (4.1)
Any FFR or iFR	29 (4.0)
Any postdilation	672 (94.4)
Max stent pressure	17.3 ± 3.6
Hemodynamic support (inclusive of all procedures)	194 (26.7)
Tandem Heart	3 (1.5)
Extracorporeal membrane oxygenation	3 (1.5)
Impella CP	125 (64.4)
Impella 2.5	18 (9.3)
Intra-aortic balloon pump	56 (28.9)
Impella RP	1 (0.1)

Values are mean ± SD, median (IQR), or n (%). Proportions for core lab variables reflect a denominator of patients with complete core lab analysis.

BMS = bare-metal stent(s); DES = drug-eluting stent(s); FFR = fractional flow reserve; iFR = instantaneous wave-free ratio; J-CTO = Multicenter Registry of CTO of Japan; PCI = percutaneous coronary intervention; SYNTAX = Synergy between Percutaneous Coronary Intervention with the Taxus and Cardiac Surgery.

CONCLUSIONS Patients ineligible for CABG who undergo PCI have complex clinical profiles and high disease burden. Following PCI, short-term mortality is considerably lower than surgeons' estimates, similar to surgical risk model predictions but is over 4-fold higher than estimated by the NCDR CathPCI model. Patients' health status improved significantly through 6 months. (J Am Coll Cardiol Intv 2023;16:261-273) © 2023 by the American College of Cardiology Foundation.