HYBRID VS. PCI WHICH IS BETTER FOR MULTIVESSEL CAD?

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March 6, 2026

DISCLOSURES

- Advisory Boards
  - Abbott, Boston Scientific, Cardionet, Edwards Lifesciences, 3ive LABS
- Research
  - Abbott, AtriCure, Boston Scientific, Edwards Lifesciences, Medtronic, 3ive LABS
- Speaker
  - Abbott, Edwards Lifesciences

GOALS

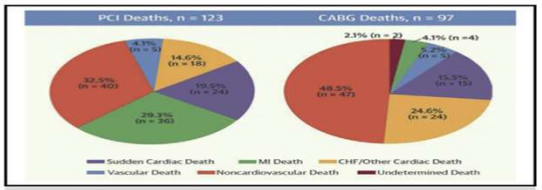
- CABG vs. PCI for Multivessel CAD
- CABG vs. Hybrid for Multivessel CAD
- Hybrid vs. PCI for Multivessel CAD
- Ascension Saint Thomas Robotic Assisted Hybrid Experience

Why surgery won the SYNTAX trial and why it matters

Michael Mack, MD, Heike Baumgarten, MD, and Bruce Lytle, MD

ABSTRACT

The Synergy Between Percutaneous Coronary Intervention With Taxus and Cardiac Surgery (SYNTAX) trial cause of death analysis shows that cardiac death due to myocardial infarction is 10 times higher with percutaneous coronary intervention than coronary artery bypass grafting in the higher-risk patients. There was a clear advantage for surgery in the prevention of death in both the intermediate and high SYNTAX score groups with 3-vessel disease and in the high SYNTAX score group with left main disease, and that incremental advantage is statistically significant and widening with time, which should be transparently communicated to patients. (J Thorac Cardiovasc Surg 2016;152:1237-40)



Causes of deaths in the SYNTAX randomized cohort: PCI and CABG comparison.

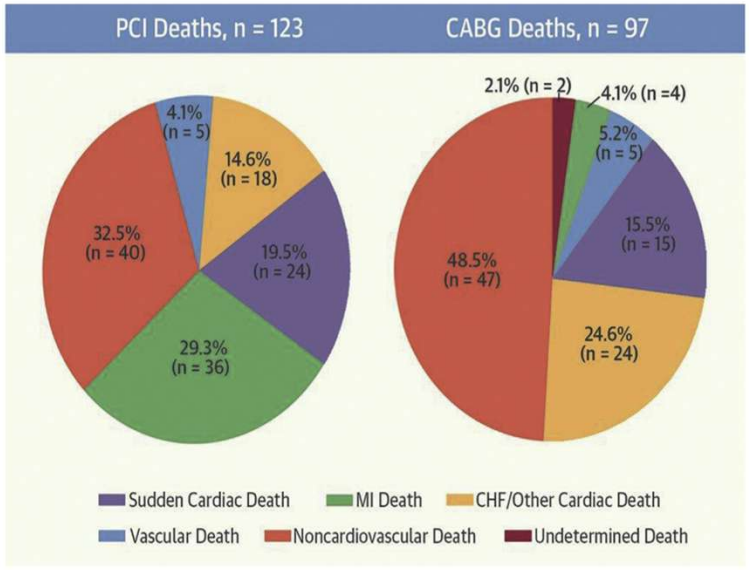
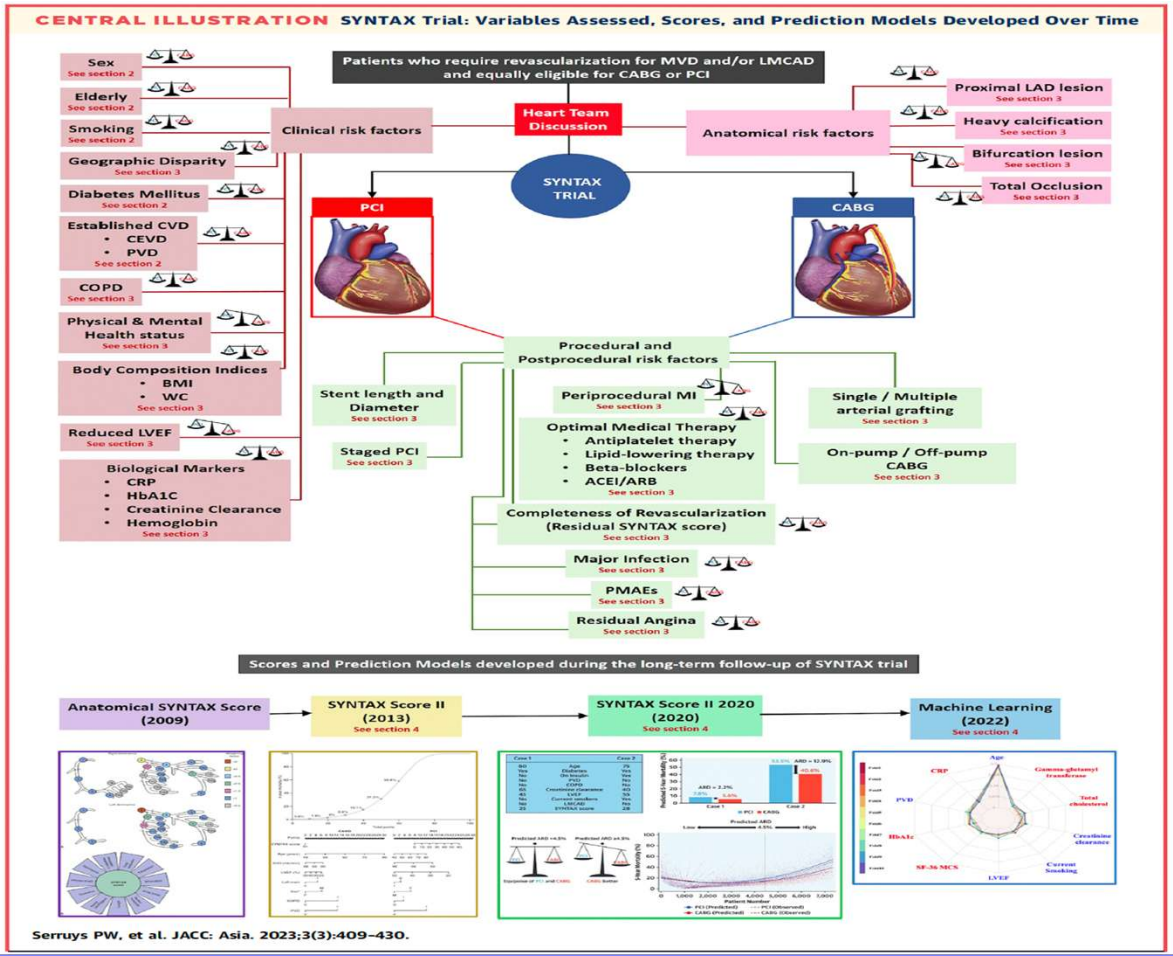


FIGURE 1. Causes of deaths in the SYNTAX randomized cohort: Percutaneous coronary intervention (*PCI*) and coronary artery bypass grafting (*CABG*) comparison. *MI*, Myocardial infarction; *CHF*, congestive heart failure.

Mortality predictors In patients with intermediate and high CAD complexity (Syntax>22):

- PCI Instead of CABG Group
- Incomplete Revascularization
- High residual PCI Disease
- Optimal Post-Procedure Medical Therapy



STATE-OF-THE-ART REVIEW

10 Years of SYNTAX

Closing an Era of Clinical Research After Identifying New Outcome Determinants

Patrick W. Serruys, MD, PhD,[a,*] Pruthvi C. Revaiah, MD,[a,*] Kai Ninomiya, MD,[a] Shinichiro Masuda, MD,[a] Nozomi Kotoku, MD, PhD,[a] Shigetaka Kageyama, MD,[a] Yoshinobu Onuma, MD, PhD,[a] Marie Angele Morel, BSc.,[a] Scot Garg, MD, PhD,[b] Ted Feldman, MD,[c] Arie Pieter Kappetein, MD, PhD,[d] David R. Holmes, Jr, MD,[e] Michael J. Mack, MD, PhD,[f] Friedrich-Wilhelm Mohr, MD, PhD[g]

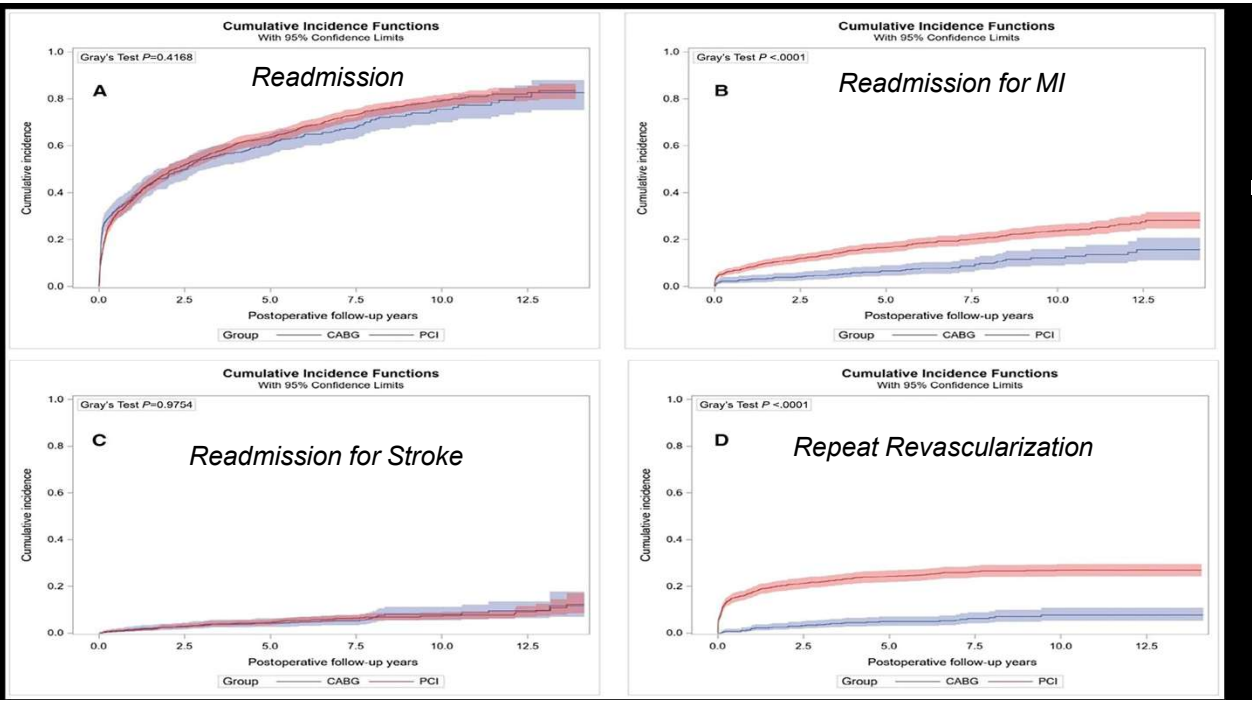
JACC: Asia 2023;3:409–430

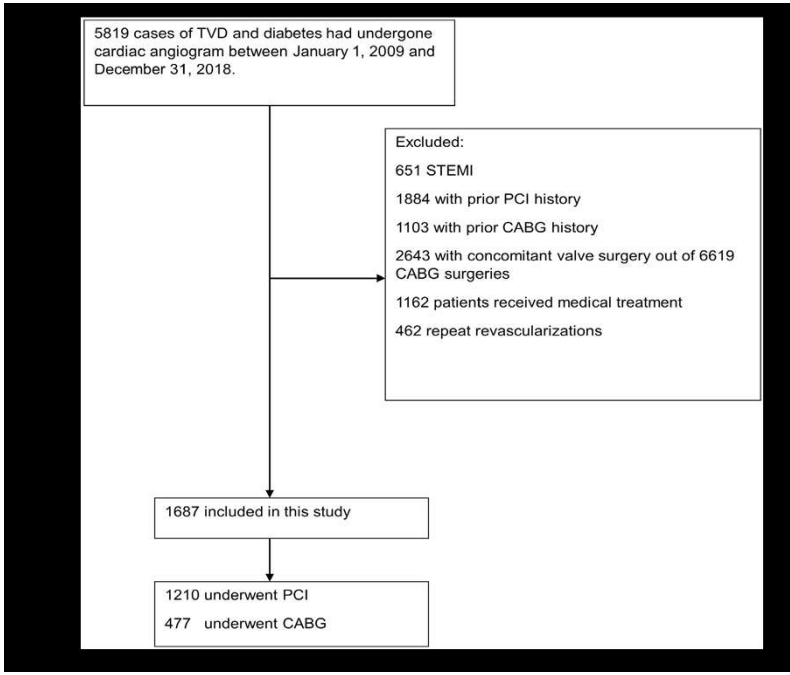
ORIGINAL RESEARCH

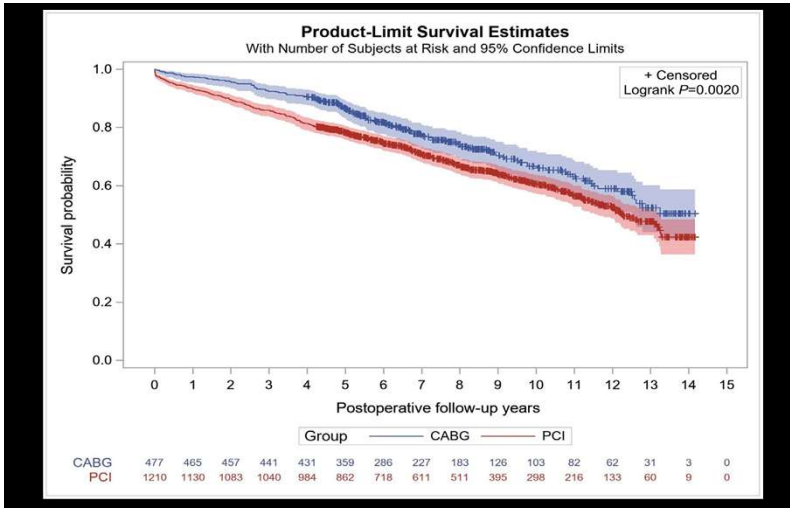
Percutaneous Coronary Intervention Versus Coronary Artery Bypass Grafting in Patients With 3-Vessel Coronary Artery Disease and Diabetes

J Am Heart Assoc. 2025

Ryaan EL-Andari, MD; Nicholas Fialka, MD; Jimmy Kang, MD; Yongzhe Hong, MD, PhD; Padma Kaul, PhD; Finlay A. McAlister, MD, MSc; William Kent, MD, MSc; Jeevan Nagendran, MD, PhD; Jayan Nagendran, MD, PhD







American Heart Journal Plus:
Cardiology Research and Practice
journal homepage: www.sciencedirect.com/journal/american-heart-journal-plus-cardiology-research-and-practice

Research Paper

Ten-year outcomes of coronary artery bypass grafting versus percutaneous coronary intervention in patients with three-vessel disease and heart failure

Jimmy Kang [a], Ryaan El-Andari [a], Nicholas Fialka [a], Yongzhe Hong [a], Michael S. McMurtry [b], Jeevan Nagendran [a,*], Jayan Nagendran [a]

[a] Division of Cardiac Surgery, Department of Surgery, Canada
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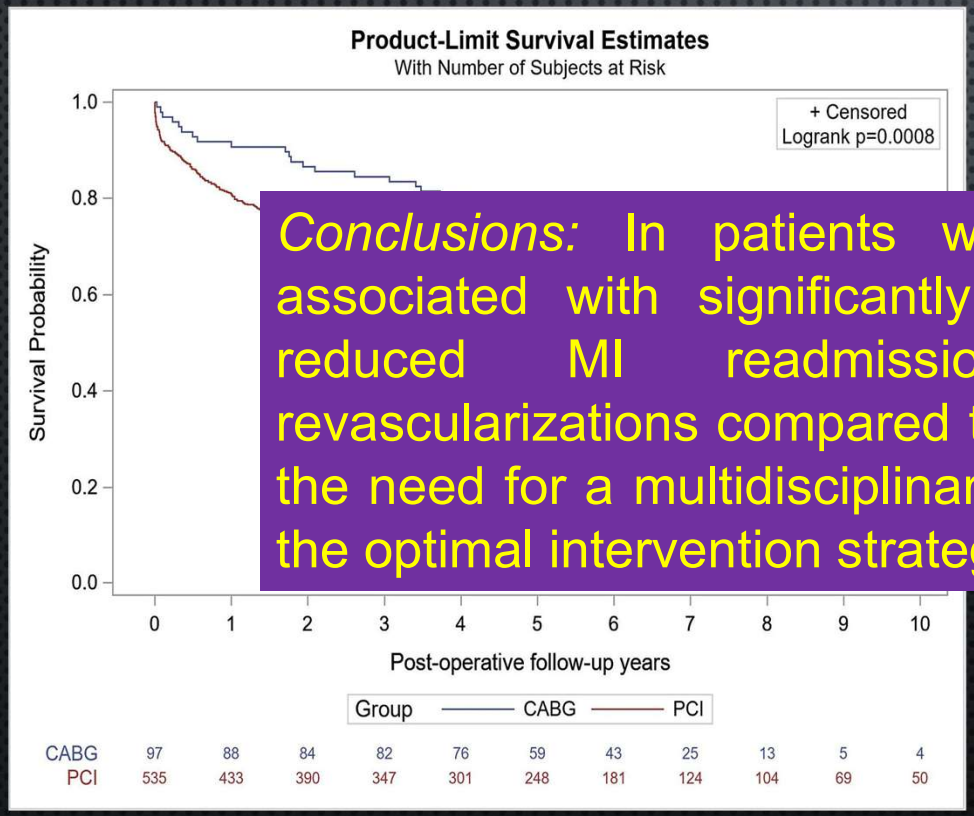
American Heart Journal Plus: Cardiology Research and Practice 60 (2025)



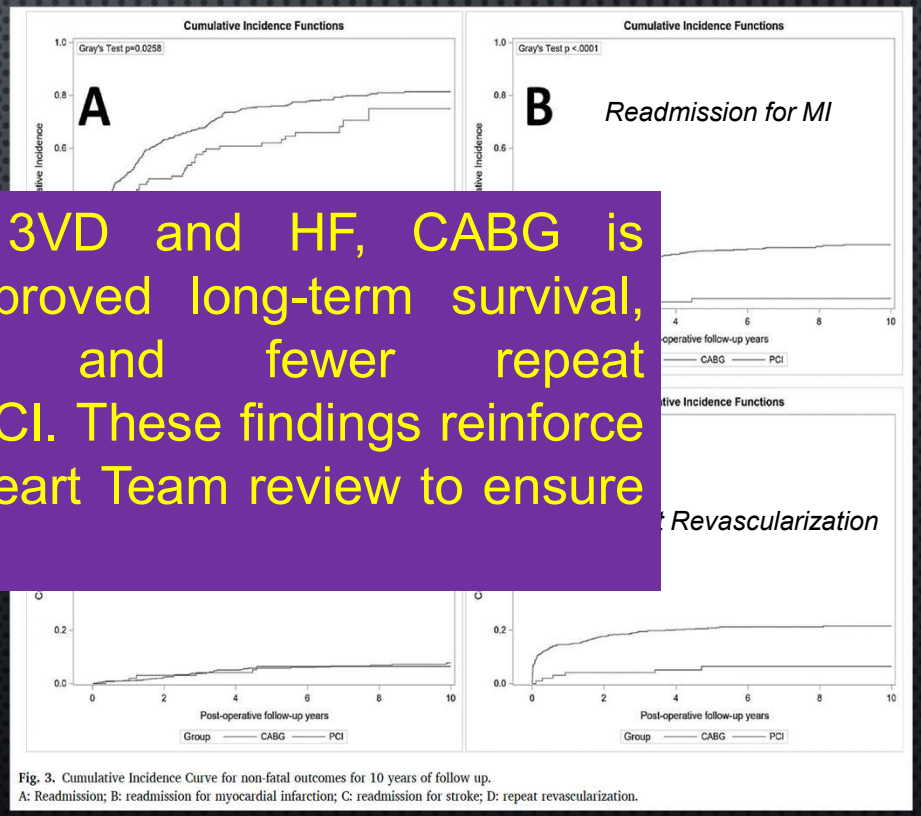
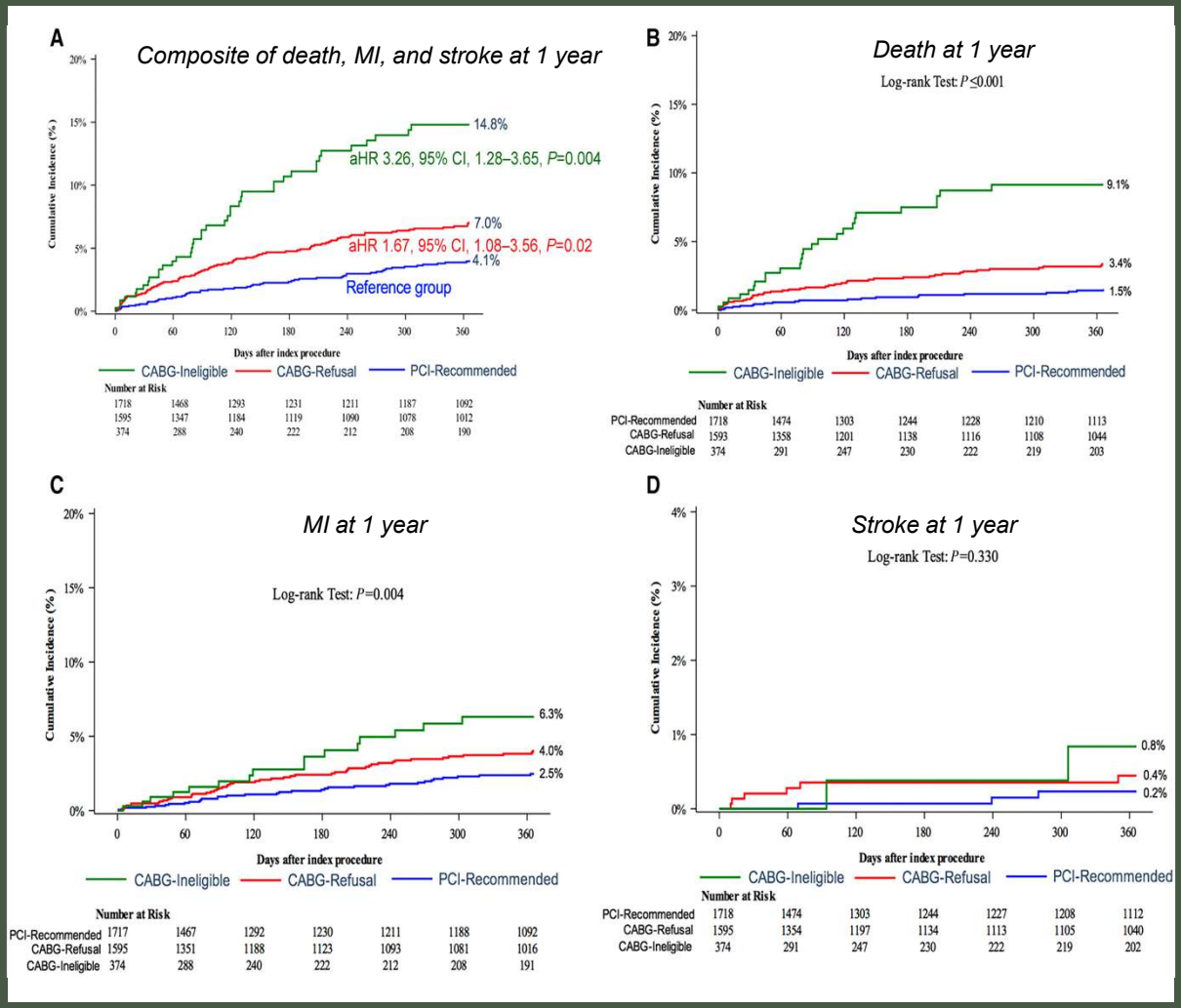
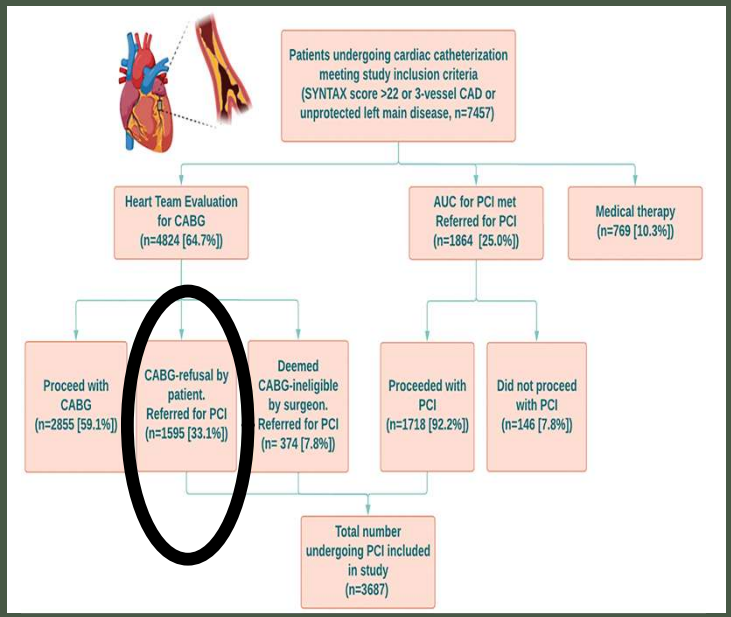


Fig. 3. Cumulative Incidence Curve for non-fatal outcomes for 10 years of follow up.
A: Readmission; B: readmission for myocardial infarction; C: readmission for stroke; D: repeat revascularization.

Conclusions: In patients with 3VD and HF, CABG is associated with significantly improved long-term survival, reduced MI readmissions, and fewer repeat revascularizations compared to PCI. These findings reinforce the need for a multidisciplinary Heart Team review to ensure the optimal intervention strategy





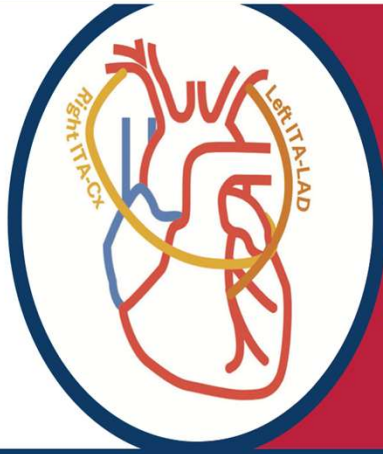
Outcomes Following Percutaneous Coronary Intervention in Patients With Multivessel Disease Who Were Recommended for But Declined Coronary Artery Bypass Graft Surgery

Anoop N. Koshy, MBBS, PhD; Gregg W. Stone, MD; Samantha Sartori, PhD; Vishal Dhulipala, MD; Gennaro Giustino, MD; Alessandro Spirito, MD; Serdar Farhan, MD; Kenneth F. Smith, MPH; Yihan Feng, MS; Manish Vinayak, MD; Negar Salehi, MD; Richard Tanner, MD; Amit Hooda, MD; Parasuram Krishnamoorthy, MD; Joseph M. Sweeny, MD; Sahil Khera, MD, MPH; George Dangas, MD, PhD; Farzan Filsoufi, MD; Roxana Mehran, MD; Annapoorna S. Kini, MD; Valentin Fuster, MD, PhD; Samin K. Sharma, MD

J Am Heart Assoc. 2024;

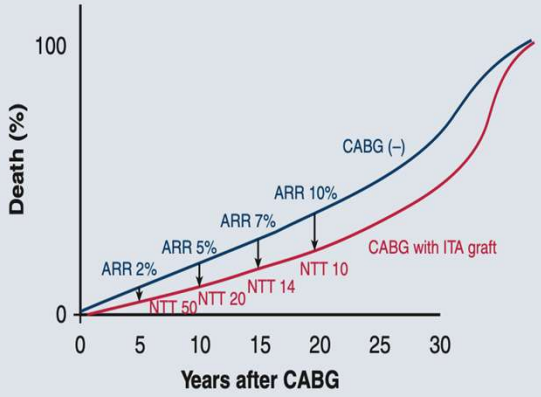
The Magnitude of the Survival Benefit of Internal Thoracic Artery Grafting

Landmark trials have shown that CABG has a protective effect on all-cause mortality.
[Level of Evidence A] (FREEDOM trial, STICH trial, SYNTAX trial, EXCEL trial)

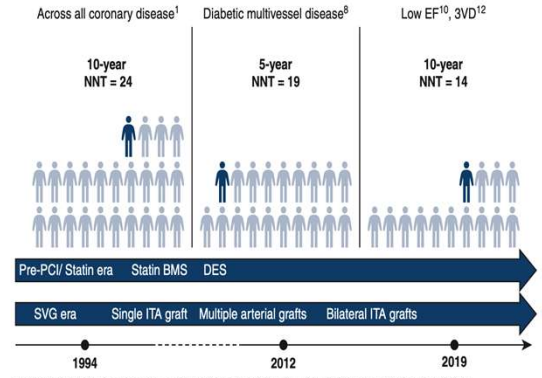


Good patency of ITA grafts is constant and unchanged over 20 years.

Head et al.'s pooled analysis reported that
CABG for across all coronary artery disease
(2-vessel disease, 3-vessel disease, and left main trunk disease) reduced 5-year all-cause mortality by 2%, which corresponds to a 5-year NNT of 50 (= 100/2).



The magnitude of the survival benefit of CABG with ITA grafts increases over decades.



1. Yusuf and colleagues meta-analysis, 8. FREEDOM trial, 10. STICH trial, 12. SYNTAX trial

FIGURE 1. Number needed to treat (*NNT*) of coronary artery bypass grafting (CABG) to prevent 1 death across landmark trials in patients with coronary artery disease.[1,7,9,11] The coronary artery diseases for which CABG has a significant prognostic effect are diabetic multivessel disease, low ejection fraction (*EF*), and 3-vessel disease (*3VD*). Despite advances in drug therapies such as statins and percutaneous coronary intervention (*PCI*) devices (bare-metal stents [*BMS*], drug-eluting stents [*DES*]), the magnitude of the survival benefit of CABG using the internal thoracic artery (*ITA*) compared with the era of SVG is greater at 10 years. This might be in part because of the more recent use of multiple arterial grafting and bilateral ITA grafting in CABG. *SVG*, Saphenous vein graft; *FREEDOM*, Future Revascularization Evaluation in Patients with Diabetes Mellitus: Optimal Management of Multivessel Disease; *STICH*, Surgical Treatment for Ischemic Heart Failure; *SYNTAX*, SYNergy between percutaneous coronary intervention with TAXus and cardiac surgery.

The magnitude of the survival benefit of internal thoracic artery grafting: Absolute risk reduction

Takayuki Ohno, MD, PhD

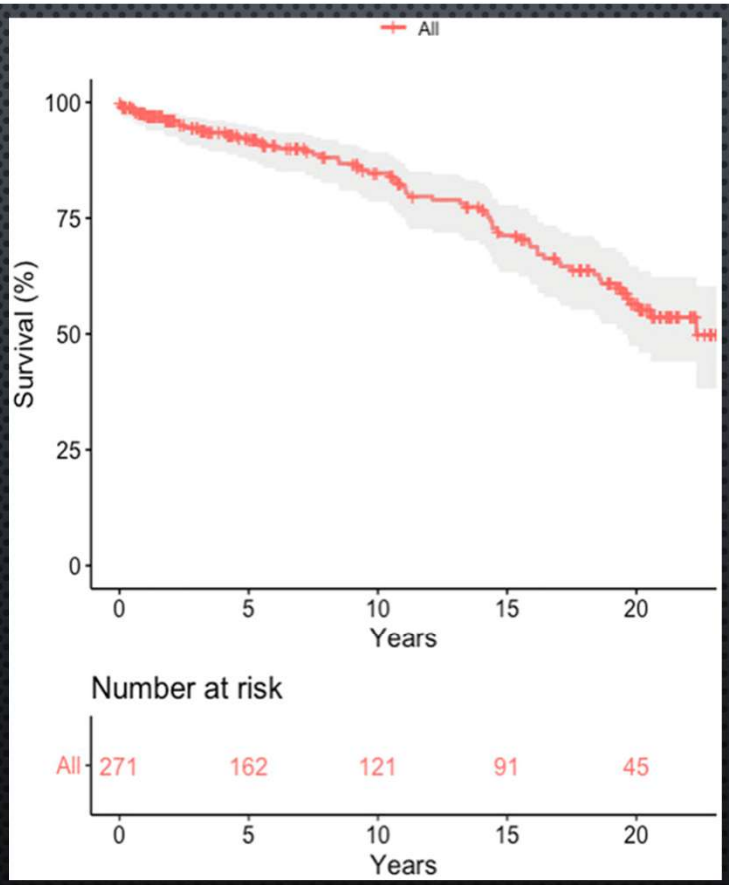
JTCVS Open Volume 9, Number C, March 2022

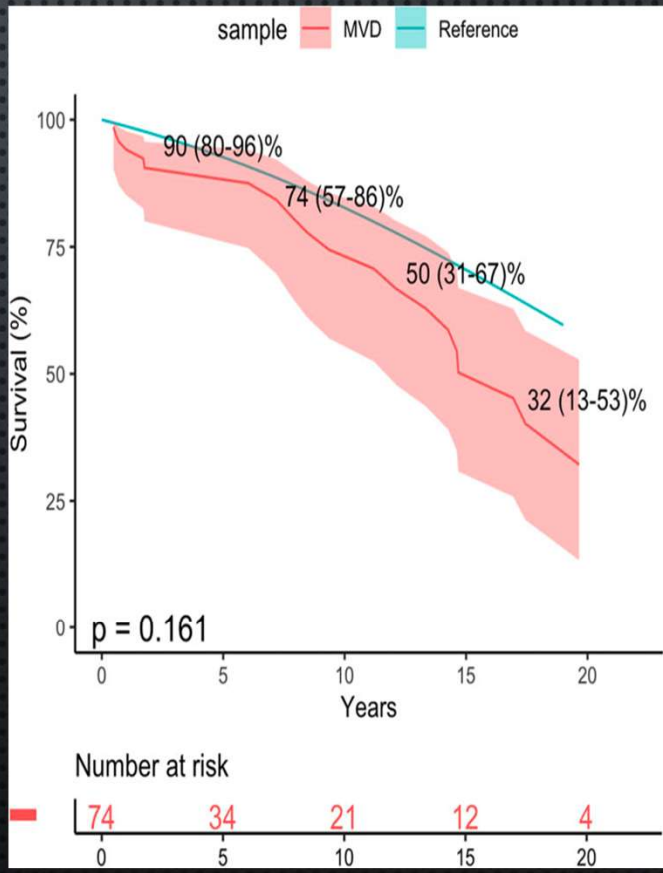
LIMA to LAD grafting returns patient survival to age-matched population: 20-year outcomes of MIDCAB surgery

Lucy Manuel [a,*], Laura S. Fong[b], Kim Betts[c], Levi Bassin[a,b] and Hugh Wolfenden[b]

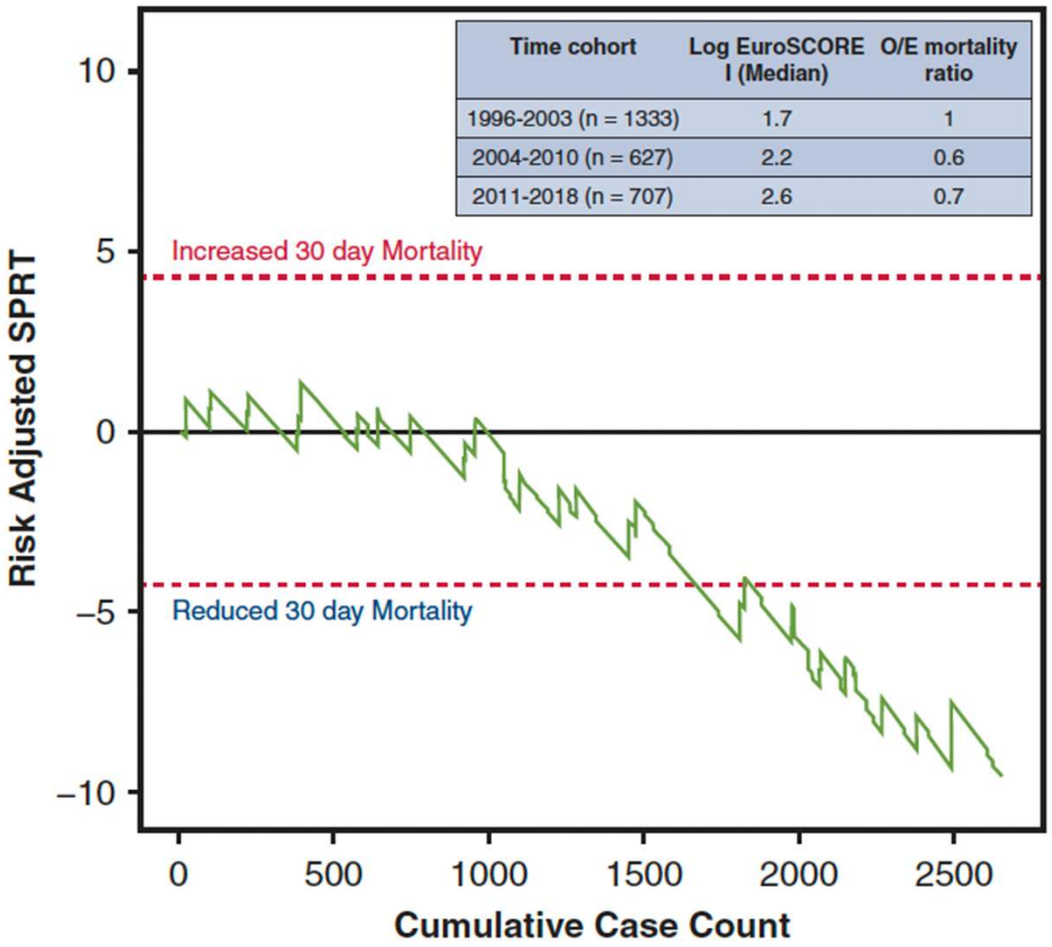
Table 1: Characteristics of patients undergoing minimally invasive direct coronary artery bypass grafting ($n = 271$)

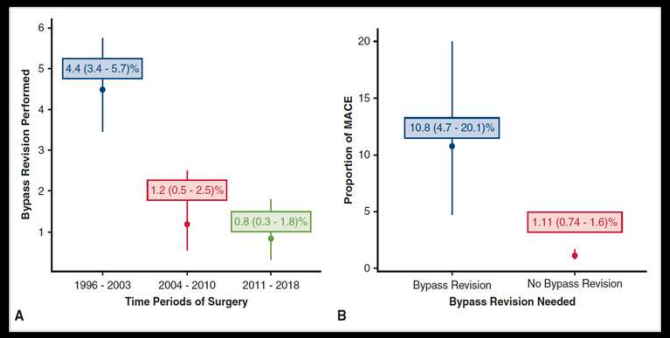
Patient demographics, *n* (%)	
Male	226 (83.4)
Mean age	60.31 ± 11.07
Angina functional class	
1	38 (14.0)
2	127 (46.9)
3	93 (34.3)
4	13 (4.8)
Indication for surgery	
Stable angina/positive exercise stress test	219 (80.8)
Non-ST elevation myocardial infarction	52 (19.2)
Previous percutaneous coronary intervention	56 (20.7)
Previous cardiac surgery	3 (1.1)
Diabetes	25 (9.2)
Smoking status	
Never	79 (10.7)
Current	42 (15.5)
Ex-smoker	19 (7.0)
Family history	58 (21.4)
Hypertension	69 (25.5)
Dyslipidaemia	104 (38.4)
Body mass index >30	14 (5.2)
Previous cerebrovascular accident/transient ischaemic attack	4 (1.5)
Number of vessel disease	
1	196 (72.3)
2	59 (21.8)
3	16 (5.9)
Distal anastomoses	
Left anterior descending only	251 (92.6)
Diagonal only	1 (0.4)
Left anterior descending and diagonal	19 (7.0)
Hybrid procedure	27 (10.0)
Left circumflex	16 (5.9)
Left circumflex + right coronary artery	4 (1.5)
Right coronary artery	7 (2.6)
Robotic procedure	22 (8.1)
Conversion to sternotomy	5 (1.8)
30-Day reoperation for bleeding	3 (1.1)
30-Day reoperation for re-grafting	2 (0.7)
30-Day mortality	1 (0.4)
Mean length of follow-up	9.82 ± 8.08yrs





Interactive CardioVascular and Thoracic Surgery 2022, 35(4)





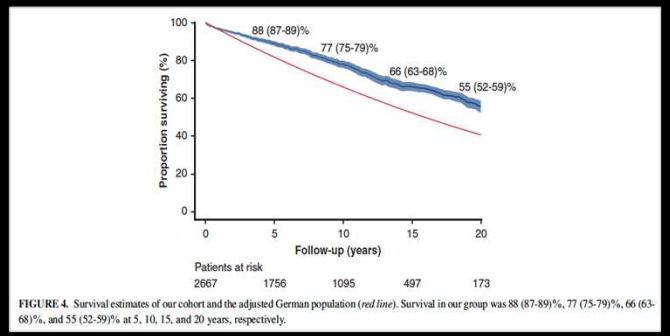


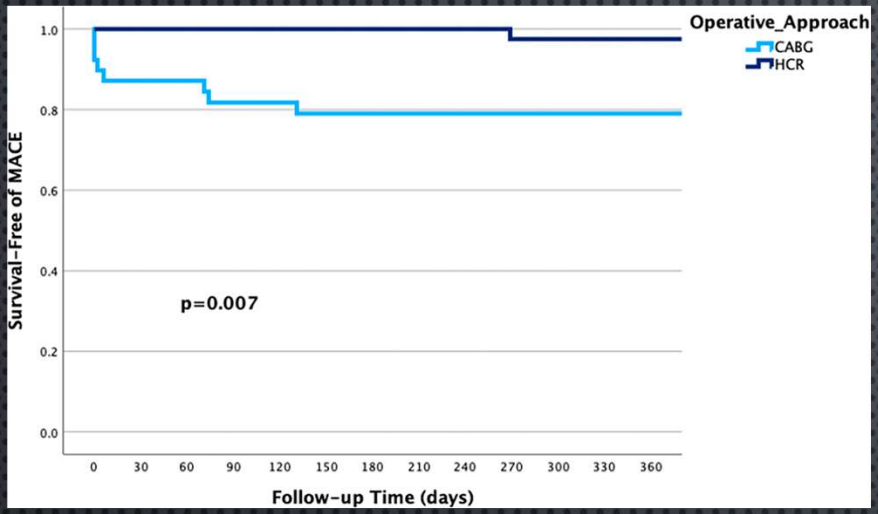
FIGURE 4. Survival estimates of our cohort and the adjusted German population (*red line*). Survival in our group was 88 (87-89)%, 77 (75-79)%, 66 (63-68)%, and 55 (52-59)% at 5, 10, 15, and 20 years, respectively.

Twenty-year outcomes of minimally invasive direct coronary artery bypass surgery: The Leipzig experience

Check for updates

Piroze M. Davierwala, MD,[a] Alexander Verevkin, MD,[a] Laura Bergien, MD,[a] Konstantin von Aspern, MD,[a] Salil V. Deo, MD,[b] Martin Misfeld, MD, PhD,[a] David Holzhey, MD, PhD,[a] and Michael A. Borger, MD, PhD[a]

J Thorac Cardiovasc Surg 2023;165:115-27



Hybrid coronary revascularization versus traditional coronary artery bypass grafting for left main coronary artery disease

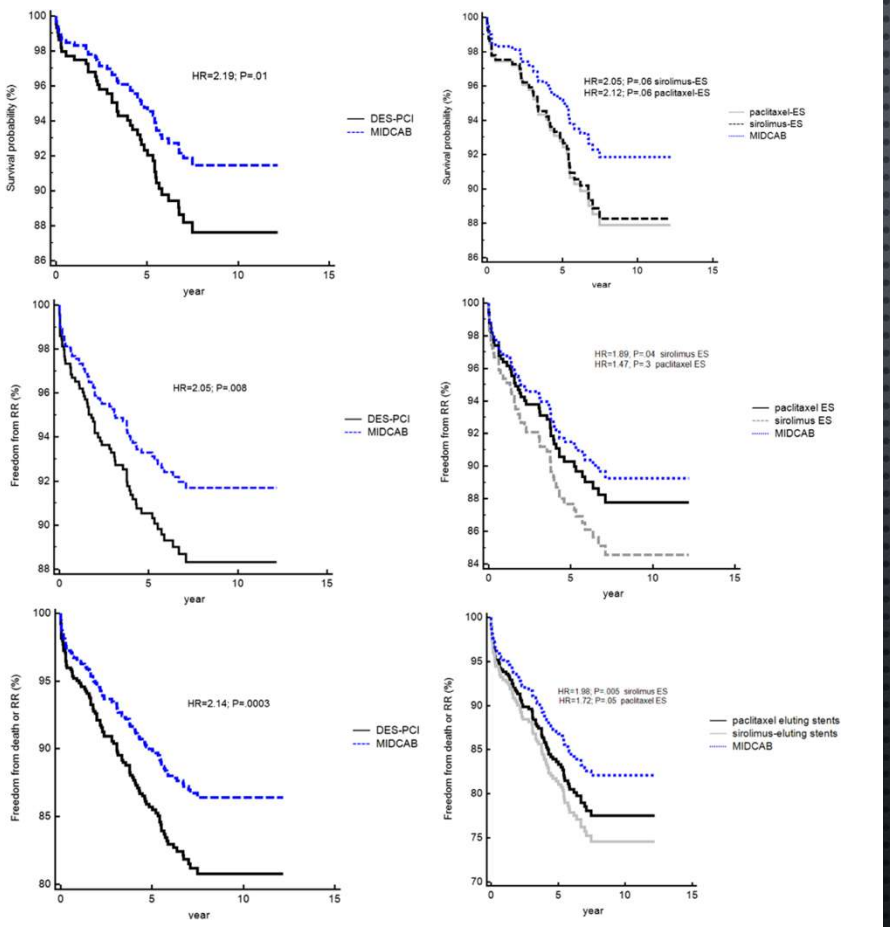
Elsa Hebbo [a], Madeleine Barker [a], Daniel A. Gold [a], Malika Elhage Hassan [a], Mariem Sawan [a], Tanveer Rab [a], William J. Nicholson [a], Michael E. Halkos [b], Wissam A. Jaber [a], Pratik B. Sandesara [a,*]

[a] Emory Clinical Cardiovascular Research Institute, Division of Cardiology, Department of Medicine, Emory University School of Medicine, Atlanta, GA, USA
[b] Division of Cardiothoracic Surgery, Emory University, Atlanta, GA, USA

Cardiovascular Revascularization Medicine 81 (2025) 11–15

Table 2
Primary and secondary outcomes.

Outcomes	CABG (n = 59)	HCR (n = 59)	p-Value*
MACE at discharge	4 (6.8 %)	0 (0.0 %)	0.06
MACE at 30 days	6 (10.2 %)	0 (0.0 %)	0.014
MACE at 6 months	8 (17 %)	0 (0.0 %)	0.002
MACE at 1 year	8 (20.5 %)	2 (2.4 %)	0.010
Mortality at discharge	0 (0.0 %)	0 (0.0 %)	
Mortality at 30 days	1 (1.7 %)	0 (0.0 %)	0.50
Mortality at 6 months	1 (2.2 %)	0 (0.0 %)	0.48
Mortality at 1 year	1 (2.6 %)	0 (0.0 %)	0.48
MI at discharge	2 (3.4 %)	0 (0.0 %)	0.25
MI at 30 days	3 (5.1 %)	0 (0.0 %)	0.12
MI at 6 months	3 (6.7 %)	0 (0.0 %)	0.11
MI at 1 year	3 (8.1 %)	0 (0.0 %)	0.10
Revascularization at discharge	2 (3.4 %)	0 (0.0 %)	0.25
Revascularization at 30 days	3 (5.1 %)	0 (0.0 %)	0.12
Revascularization at 6 months	5 (10.9 %)	0 (0.0 %)	0.024
Revascularization at 1 year	5 (13.2 %)	1 (2.4 %)	0.08
Stroke at discharge	1 (1.7 %)	0 (0.0 %)	0.50
Stroke at 30 days	2 (3.4 %)	0 (0.0 %)	0.25
Stroke at 6 months	2 (4.3 %)	0 (0.0 %)	0.23
Stroke at 1 year	2 (5.3 %)	0 (0.0 %)	0.22
Readmission at 30 days	11 (19.0 %)	7 (11.9 %)	0.21
Readmission at 6 months	16 (34.8 %)	9 (17.6 %)	0.045
Readmission at 1 year	18 (43.9 %)	11 (25 %)	0.050
Cardiac readmission at 30 days	3 (5.2 %)	2 (3.4 %)	0.50
Cardiac readmission at 6 months	5 (11.4 %)	2(4.1 %)	0.11
Cardiac readmission at 1 year	5 (13.9 %)	4 (9.5 %)	0.36
Periprocedural mechanical assist device	10 (16.9 %)	1 (1.7 %)	0.002
Intra-operative blood transfusion	11 (19 %)	1 (1.7 %)	0.002
Post-operative events	30 (50.8 %)	19 (32.2 %)	0.031
Length of stay	7.6 ± 7.7	4.1 ± 1.2	<0.001



Minimally invasive direct coronary artery bypass improves late survival compared with drug-eluting stents in isolated proximal left anterior descending artery disease: A 10-year follow-up, single-center, propensity score analysis

Umberto Benedetto, MD, PhD,[a] Shahzad G. Raja, MRCS, FRCS(C-Th),[a] Rafik F. B. Soliman, MD, FRCS(C-Th),[a] Alberto Albanese, MD,[a] Anand Jothidasan, MRCS,[a] Charles D. Ilsley, MD,[b] and Mohamed Amrani, MD, PhD, FECTS,[a] on behalf of the Harefield Cardiac Outcomes Research Group

(J Thorac Cardiovasc Surg 2014;148:1316-22)

Results: MIDCAB and DES-PCI presented with comparable 30-day mortality (2 of 303 [0.6%] vs 1 of 303 [0.3%]; P . 1.0). At 10 years, DES-PCI was associated with a 2.19-fold increased risk of late death a 2.0-fold increased risk of repeat revascularization and a 2.14-fold increased risk of the composite of death and repeat revascularization.

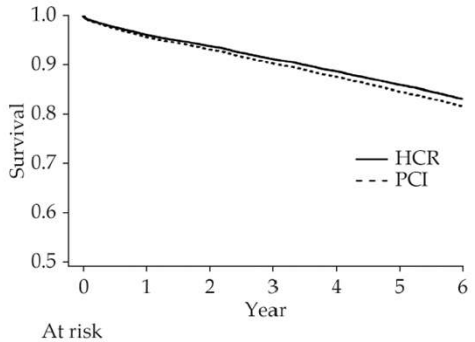
Journal of Geriatric Cardiology | JGC
RESEARCH ARTICLE
J Geriatr Cardiol 2021; 18(3): 159–167

Hybrid coronary revascularization *vs.* percutaneous coronary interventions for multivessel coronary artery disease

Edward L. Hannan[1,✉], Yi-Feng WU[1], Kimberly Cozzens[1], Jacqueline Tamis-Holland[2], Frederick S.K. Ling[3], Alice K. Jacobs[4], Ferdinand J. Venditti[5], Peter B. Berger[6], Gary Walford[7], Spencer B. King, III[8]

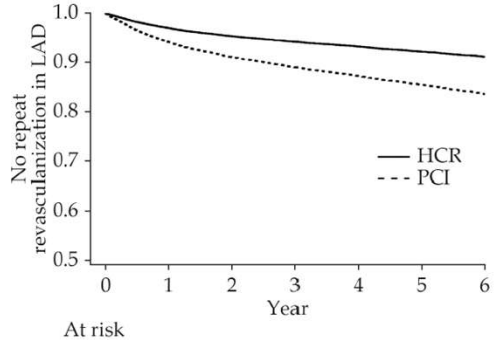
1. University at Albany, State University of New York, Albany, NY, USA; 2. Mount Sinai St. Luke's Hospital, New York, NY, USA; 3. University of Rochester Medical Center, Rochester, NY, USA; 4. Boston Medical Center, Boston, MA, USA; 5. Albany Medical Center, Albany, NY, USA; 6. Unaffiliated; 7. Johns Hopkins Medical Center; 8. Emory Health System, Atlanta, GA, USA

METHODS This cohort study used data from New York's cardiac surgery and PCI registries in 2010–2016 to examine mortality and repeat revascularization rates for patients with multivessel coronary artery disease who underwent HCR and PCI. Cox proportional hazards methods were used to reduce selection bias. Patients were followed for a median of four years.



At risk							
HCR	335	330	272	215	158	117	80
PCI	27,557	26,328	22,272	18,195	14,497	10,925	7,759

Figure 1 Survival curve for HCR *vs.* PCI. HCR: hybrid coronary revascularization; PCI: percutaneous coronary intervention.



At risk							
HCR	335	302	240	182	133	96	60
PCI	27,557	23,388	18,442	14,314	10,882	7,773	5,243

Figure 2 Repeat Revascularization in LAD Artery for HCR *vs.* PCI. HCR: hybrid coronary revascularization; LAD: left anterior descending; PCI: percutaneous coronary intervention.

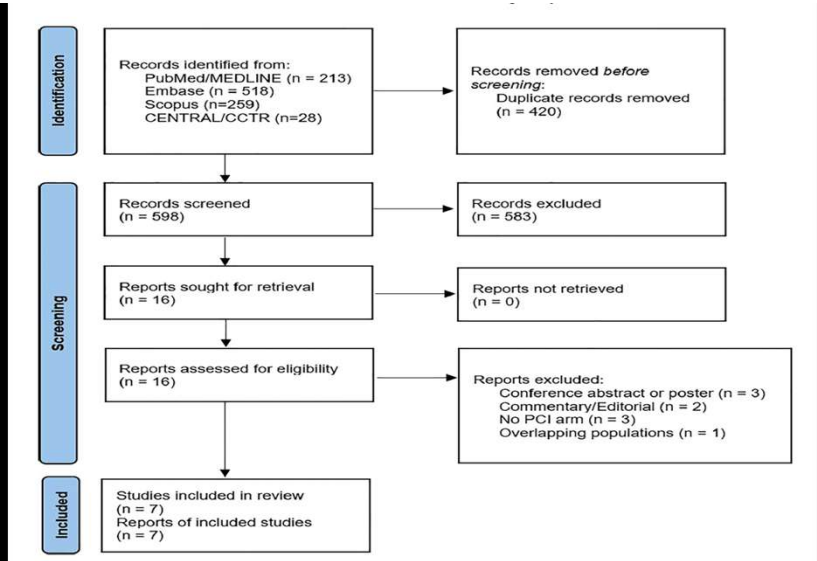


Fig. 1. Flow diagram of studies included in data search.

Hybrid coronary revascularization versus percutaneous coronary intervention: A systematic review and meta-analysis

Jef Van den Eynde [a,b,*], Michel Pompeu Sá [c,d], Senne De Groote [a], Andrea Amabile [e], Serge Sicouri [d], Basel Ramlawi [c,d], Gianluca Torregrossa [c], Wouter Oosterlinck [a]

[a] Department of Cardiovascular Diseases, University Hospitals Leuven & Department of Cardiovascular Sciences, KU Leuven, Leuven, Belgium
[b] Helen B. Taussig Heart Center, The Johns Hopkins Hospital and School of Medicine, Baltimore, USA
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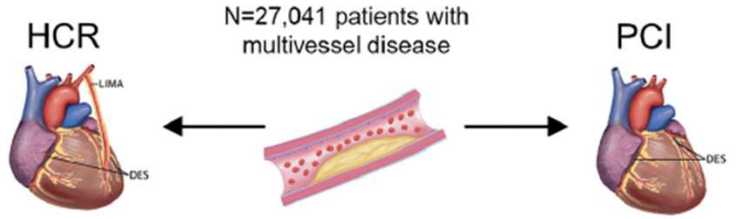
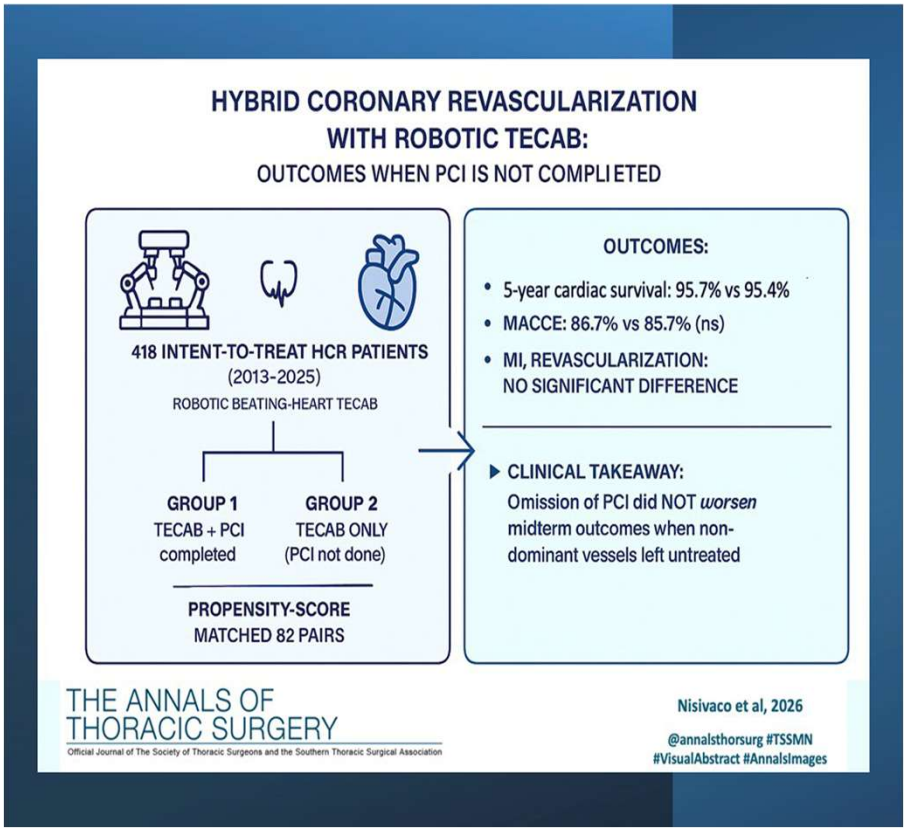
IJC Heart & Vasculature 37 (2021) 100916

Hybrid Coronary Revascularization versus Percutaneous Coronary Intervention: A Systematic Review and Meta-Analysis



30-day mortality, myocardial infarction, target vessel revascularization, or stroke	No difference
Myocardial infarction at follow-up	Favors HCR OR 0.40, 95% CI 0.20-0.80
Target vessel revascularization at follow-up	Favors HCR OR 0.49, 95% CI 0.37-0.64
Mortality and stroke at follow-up	No difference

Fig. 4. Summary of the main findings of the meta-analysis. The 30-day risk of mortality, myocardial infarction, target vessel revascularization, or stroke were not different between HCR and PCI. However, There was a lower risk of myocardial infarction and target vessel revascularization during the follow-up for HCR in comparison with PCI. CI, confidence interval; HCR, hybrid coronary revascularization; OR, odds ratio; PCI, percutaneous coronary intervention.



Hybrid Revascularization with Robotic Totally Endoscopic Coronary Bypass and Stents: What are the outcomes when the stent doesn't happen?

Running head: Robotic Hybrid when PCI is not Completed

Sarah Nisivaco MD[1], Hiroto Kitahara MD[1], Sandeep Nathan MD[1], Husam H Balkhy MD[1]

[1]University of Chicago Medicine, Department of Cardiothoracic Surgery, Chicago, IL, USA

INVITED EXPERT REVIEWS

The Current State of Hybrid Coronary Revascularization

Robin Willard, MD,[1] Joshua Scheinerman, MD,[2] Stevan Pupovac, MD,[3] and Nirav C. Patel, MD[1]

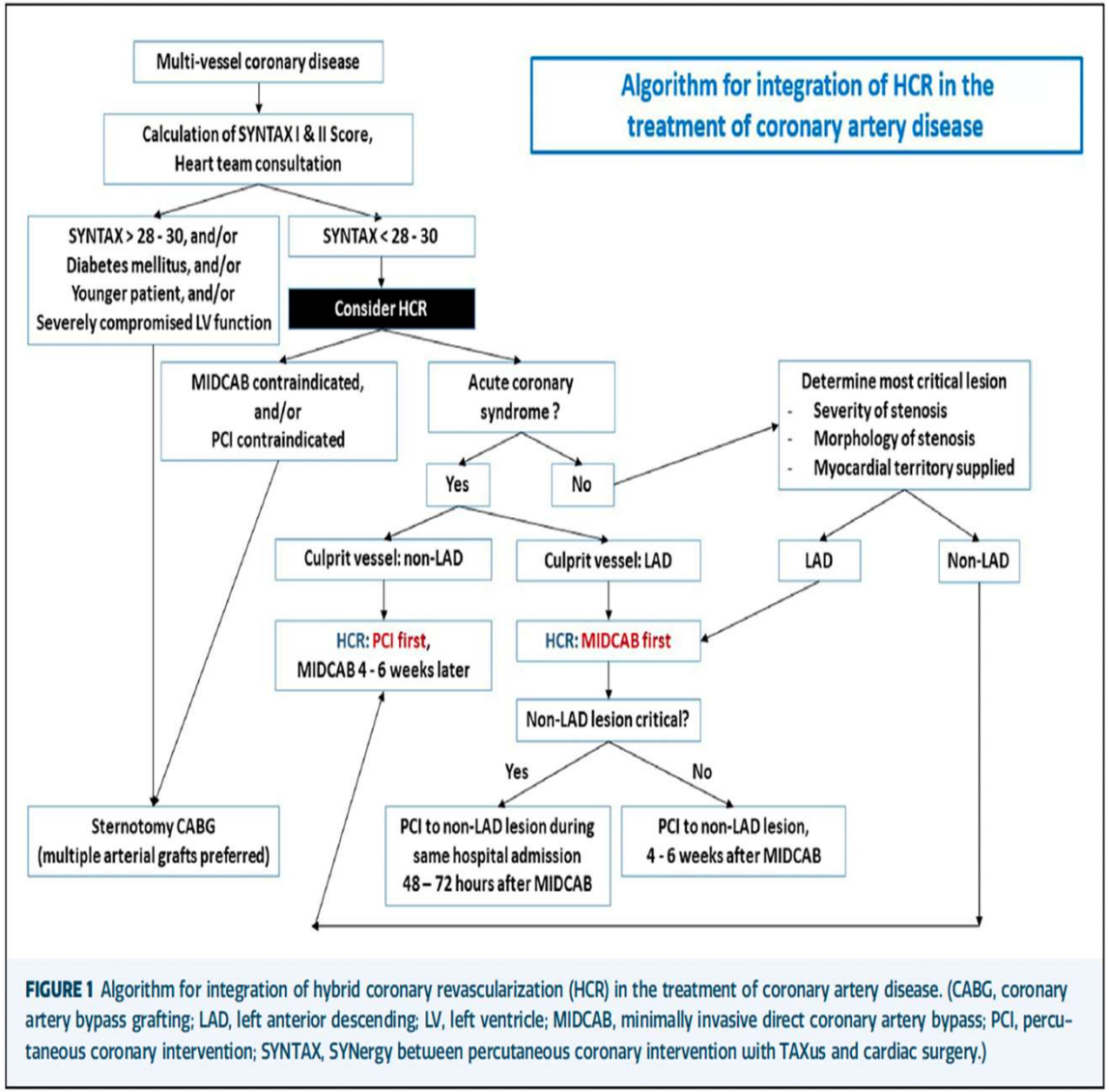
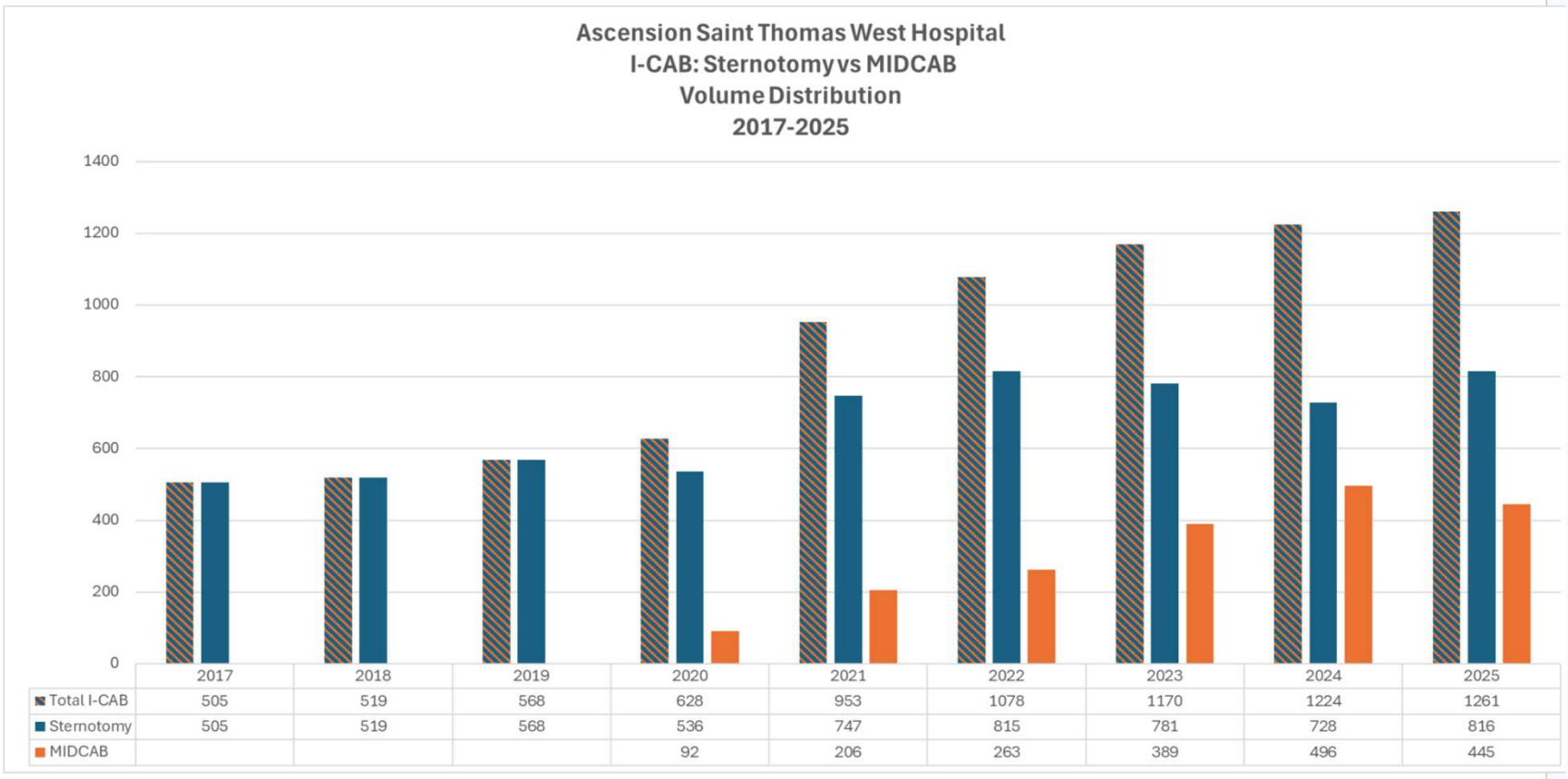


FIGURE 1 Algorithm for integration of hybrid coronary revascularization (HCR) in the treatment of coronary artery disease. (CABG, coronary artery bypass grafting; LAD, left anterior descending; LV, left ventricle; MIDCAB, minimally invasive direct coronary artery bypass; PCI, percutaneous coronary intervention; SYNTAX, SYNergy between percutaneous coronary intervention with TAXus and cardiac surgery.)

St Thomas West—Isolated CABG Volumes



	2017	2018	2019	2020	2021	2022	2023	2024	2025
Total I-CAB	505	519	568	628	953	1078	1170	1224	1261
Sternotomy	505	519	568	536	747	815	781	728	816
MIDCAB				92	206	263	389	496	445

Learning curve | Distribution

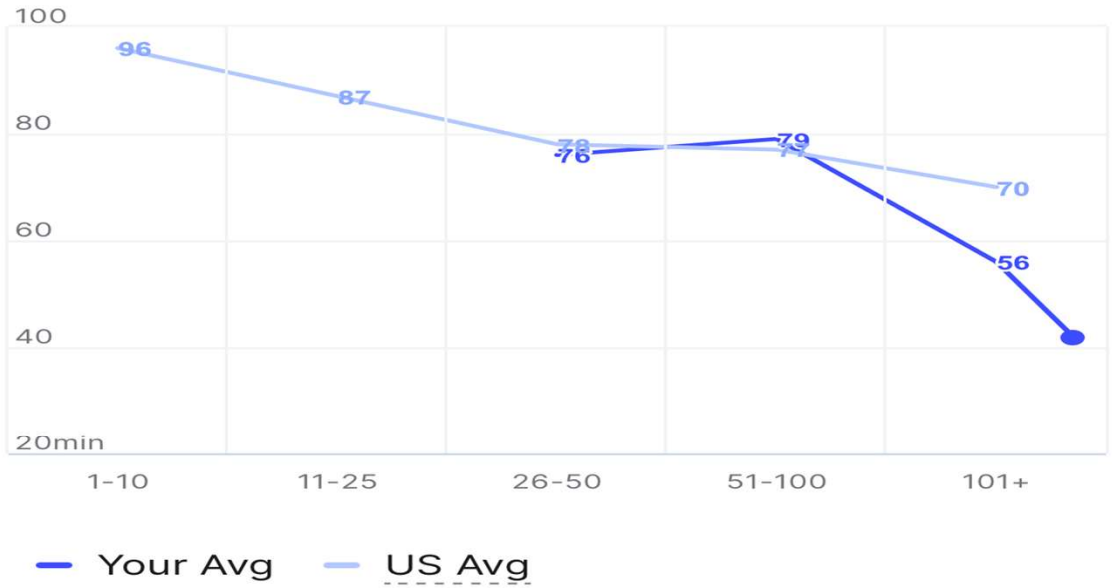
925
Total cases

57min
Average time

42min >
Your last case

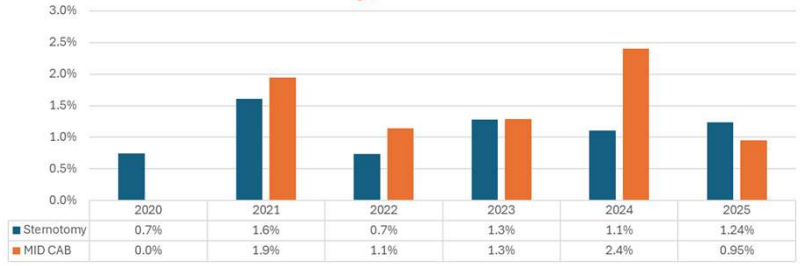
Console time

All cases >



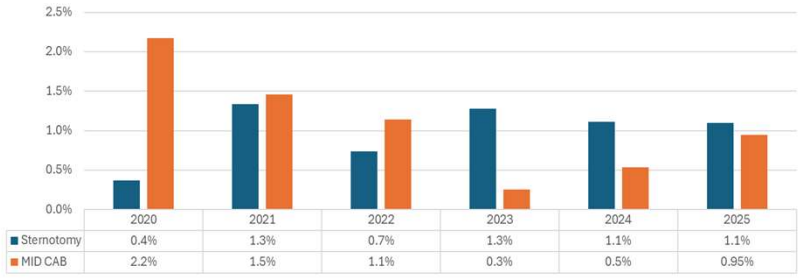
Ascension Saint Thomas West
30 Day Mortality - Observed
Sternotomy vs MIDCAB
2020 - 2025

Missing Q2 2024



	2020	2021	2022	2023	2024	2025
Sternotomy	0.7%	1.6%	0.7%	1.3%	1.1%	1.24%
MID CAB	0.0%	1.9%	1.1%	1.3%	2.4%	0.95%

Ascension Saint Thomas West
Post-OP Stroke
Sternotomy vs MIDCAB
2020 - 2025



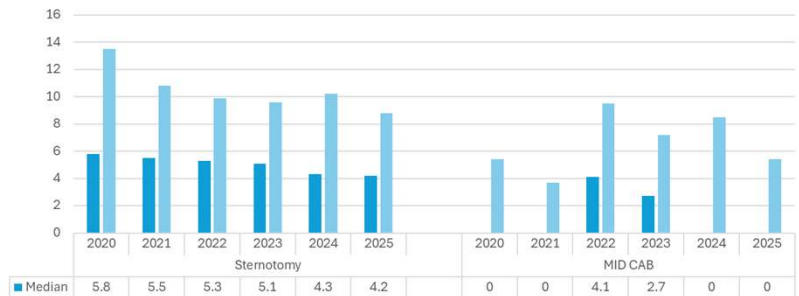
	2020	2021	2022	2023	2024	2025
Sternotomy	0.4%	1.3%	0.7%	1.3%	1.1%	1.1%
MID CAB	2.2%	1.5%	1.1%	0.3%	0.5%	0.95%

Ascension Saint Thomas West
Intra Op Blood Products
Sternotomy vs MIDCAB
2020 - 2025

Missing Q2 2024

	2020	2021	2022	2023	2024	2025
Sternotomy	10.3%	12.0%	8.7%	8.6%	11.1%	11.91%
MID CAB	2.1%	0.0%	2.4%	1.5%	2.1%	1.89%

Ascension Saint Thomas West
Total Vent Hours
Sternotomy vs MIDCAB
2020-2025



	2020	2021	2022	2023	2024	2025	2020	2021	2022	2023	2024	2025
	Sternotomy						MID CAB					
Median	5.8	5.5	5.3	5.1	4.3	4.2	0	0	4.1	2.7	0	0
Mean	13.5	10.8	9.9	9.6	10.2	8.79	5.4	3.7	9.5	7.2	8.5	5.43

SINGLE-CENTER RETROSPECTIVE REVIEW OF PATIENTS UNDERGOING ROBOTIC MINIMALLY INVASIVE DIRECT CORONARY ARTERY BYPASS AS A CARDIAC REOPERATION

- **RESULTS:**

- AMONG THE 1,627 PATIENTS WHO UNDERWENT ROBOTIC MIDCAB, 39 WERE IDENTIFIED AS CARDIAC REOPERATIONS (2.4%). THE COHORT HAD A MEAN AGE OF 66 YEARS AND WAS PREDOMINANTLY MALE (28/39, 71.8%) AND WHITE (36/39, 92.3%). THERE WERE NO PERIOPERATIVE MORTALITIES AND ONLY ONE READMISSION (2.6%). THE MEAN POSTOPERATIVE LOS WAS 6 DAYS, WITH MEAN ICU AND VENTILATION DURATIONS OF 65.5 HOURS AND 9.4 HOURS, RESPECTIVELY. FIVE PATIENTS (12.8%) REQUIRED INTRAOPERATIVE OR POSTOPERATIVE BLOOD PRODUCTS, AND TWO (5.1%) UNDERWENT REOPERATION FOR BLEEDING OR TAMPONADE. THERE WERE NO INSTANCES OF POSTOPERATIVE STROKE, CARDIAC ARREST, OR SEPSIS.

Baseline Characteristics	
Age	66 ± 11
Male	28 (71.8%)
White	36 (92.3%)
Black	1 (2.6%)
Race/Ethnicity Not Reported	2 (5.1%)
BMI (kg/m²)	30.8 ± 5.9
Diabetes	21 (53.8%)
Hypertension	38 (97.4%)
Dialysis	0 (0%)
Liver Disease	1 (2.6%)
Chronic Lung Disease	17 (43.6%)
Current or Former Smoker	23 (59.0%)
Peripheral Artery Disease	9 (23.1%)
Cerebrovascular Disease	11 (28.2%)
Prior CVA	7 (17.9%)
Prior Myocardial Infarction	20 (51.3%)
Atrial Fibrillation	6 (15.4%)
Ejection Fraction <30%	5 (12.8%)
Multivessel Disease	35 (89.7%)

Prior Cardiac Procedures	
CABG	24
AVR	4
AVR + CABG	1
AVR + MVR	1
AVR + CABG + Myectomy	1
Bentall + CABG	1
Bentall	1
Ascending Aorta Dissection Repair	1
ASD Repair	1
PDA Repair	1
VSD Repair	1
Maze	1
Myectomy	1
Myxoma Excision	1
Heart Transplant	1

Operative Variables	
First Cardiac Reoperation	37
Second Cardiac Reoperation*	2
LITA-only	31
RITA-only	7
Bilateral ITA	1
1 Graft Performed	34
2 Grafts Performed	5
Conversion to Sternotomy	0
OR Time (hours)	4.7 ± 0.9

Short-Term Outcomes	
Mortality (30-day)	0 (0%)
Readmission (30-day)	1 (2.6%)
Postoperative LOS (days)	6 ± 5
Total ICU Hours	65.5 ± 83.5
Total Vent Hours	9.4 ± 37.3
ICU Readmission	2 (5.1%)
Discharged Home	39 (100%)
Discharged to Rehabilitation or SNF	0 (0%)
Surgical Site Complications (30-day)	1 (2.6%)

Complications at Index Hospitalization	
Stroke	0 (0%)
Cardiac Arrest	0 (0%)
Renal Failure	0 (0%)
Sepsis	0 (0%)
Reoperation for Bleeding/Tamponade	2 (5.1%)
Reoperation for Other Causes	0 (0%)
Prolonged Ventilation	1 (2.6%)
Pneumonia	2 (5.1%)
Pneumothorax Requiring Intervention	0 (0%)
Pleural Effusion Requiring Drainage	3 (7.7%)
Blood Use During/After Procedure	5 (12.8%)
New Atrial Fibrillation**	5 (12.8%)
Deep Vein Thrombosis	1 (2.6%)
Other Vascular Complications	0 (0%)
Gastrointestinal Event	0 (0%)

MIDCAB + TAVR Cases (n = 39)

Baseline Characteristics:

Age (mean)	78
Males	28
STS-PROM, % (mean)*	9.4
STS-PROM, % (range)	2.2–53.6
Same Hospitalization, Concomitant Procedures	17
Same Hopsitalization, Separate Procedures	6
Staged Hospitalizations	16

*STS-PROM = Society of Thoracic Surgeons Predicted Risk of Operative Mortality; calculated using AVR + CABG as planned surgery; reference PROM = 1.63%

**For staged hospitalizations, hospital LOS was calculated as a sum of both visits

30-Day Outcomes & Complications:

Mean Hospital LOS (days) **	12
Mean ICU LOS (hours)	94
ICU Readmissions	0
Hospital Readmissions	3
Mortality (# deceased)	1
Prolonged Ventilation	6
New Dialysis	1
New Atrial Fibrillation	12
New Pacemaker	2
Sepsis	0
Stroke	2
Vascular Complications	2

CONCLUSIONS

- CABG improves survival in patients with moderate/high Syntax Score with MVCAD when compared to PCI
- LIMA to the LAD best we have to offer
- 1/3 of patients with MVCAD refused to have CABG despite understanding the benefits of CABG over PCI.
- Hybrid revascularization (LIMA-LAD +/- PCI) is a good option for some patients with MVCAD
- Hybrid Revascularization has been associated with shorter hospitalizations, less blood transfusions, faster recovery when compared to sternotomy CABG.
- Further data on the patient population that best benefit from Hybrid revascularization is still to be determined

THANK YOU!!

QUESTIONS?

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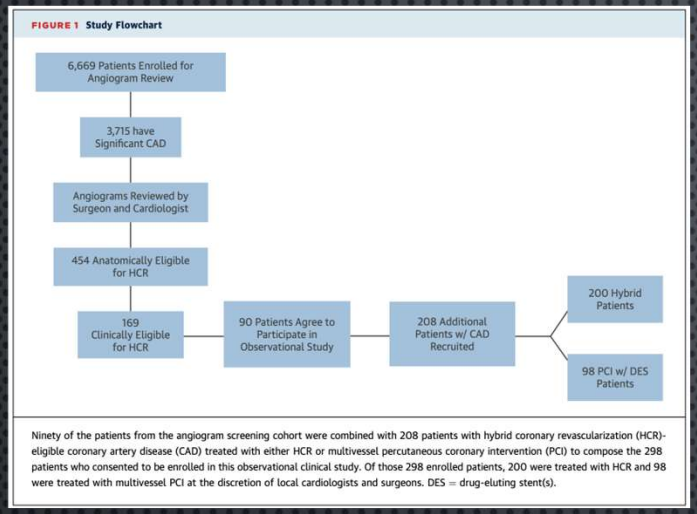
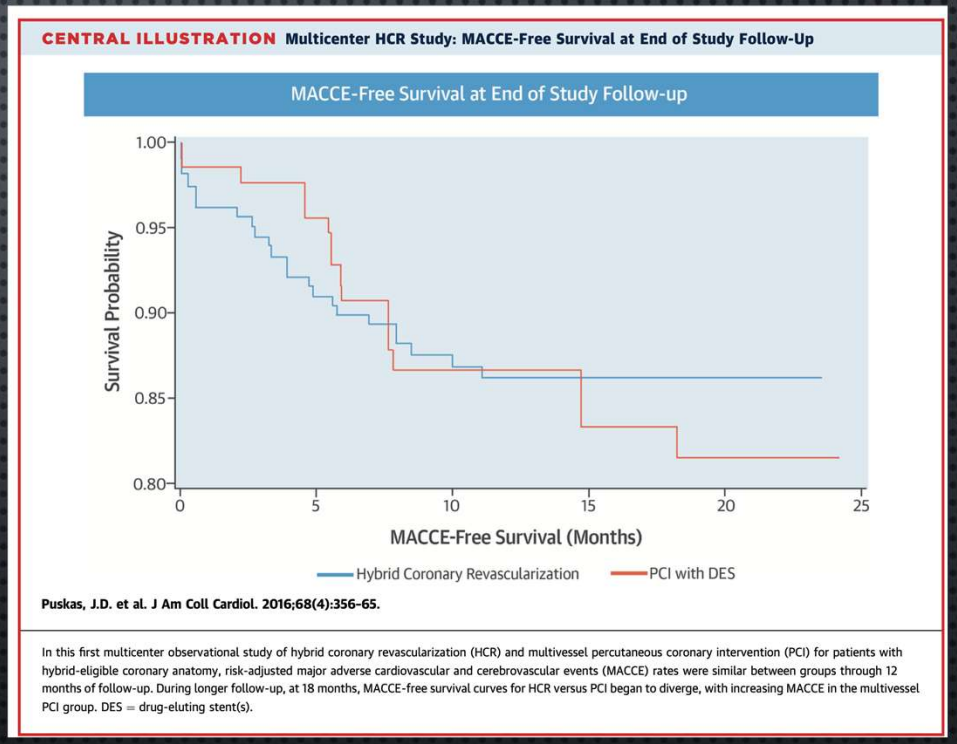


Hybrid Coronary Revascularization for the Treatment of Multivessel Coronary Artery Disease

A Multicenter Observational Study

John D. Puskas, MD,[a,b] Michael E. Halkos, MD,[c] Joseph J. DeRose, MD,[d] Emilia Bagiella, PhD,[e] Marissa A. Miller, DMV, MPH,[f] Jessica Overbey, MS,[e] Johannes Bonatti, MD,[g] V.S. Srinivas, MD,[d] Mark Vesely, MD,[h] Francis Sutter, MD,[i] Janine Lynch, MPH,[j] Katherine Kirkwood, MS,[e] Timothy A. Shapiro, MD,[i] Konstantinos D. Boudoulas, MD,[j] Juan Crestanello, MD,[j] Thomas Gehrig, MD,[k] Peter Smith, MD,[k] Michael Ragosta, MD,[l] Steven J. Hoff, MD,[m] David Zhao, MD,[n] Annetine C. Gelijns, PhD,[e] Wilson Y. Szeto, MD,[o] Giora Weisz, MD,[p] Michael Argenziano, MD,[p] Thomas Vassiliades, MD,[c,q] Henry Liberman, MD,[c] William Matthai, MD,[o] Deborah D. Ascheim, MD[a,e]



Puskas, J.D. et al. J Am Coll Cardiol. 2016;68(4):356–65

MIDCAB + TEER Cases (n = 10)

Baseline Characteristics:

Age (mean)	74
Males	5
STS-PROM, % (mean) *	17.2
STS-PROM, % (range)	5.9–32.2
Same Hospitalization, Concomitant Procedures	2
Same Hopsitalization, Separate Procedures	5
Staged Hospitalizations	3

*STS-PROM = Society of Thoracic Surgeons Predicted Risk of Operative Mortality; calculated using MVR + CABG as planned surgery; reference PROM = 1.19%

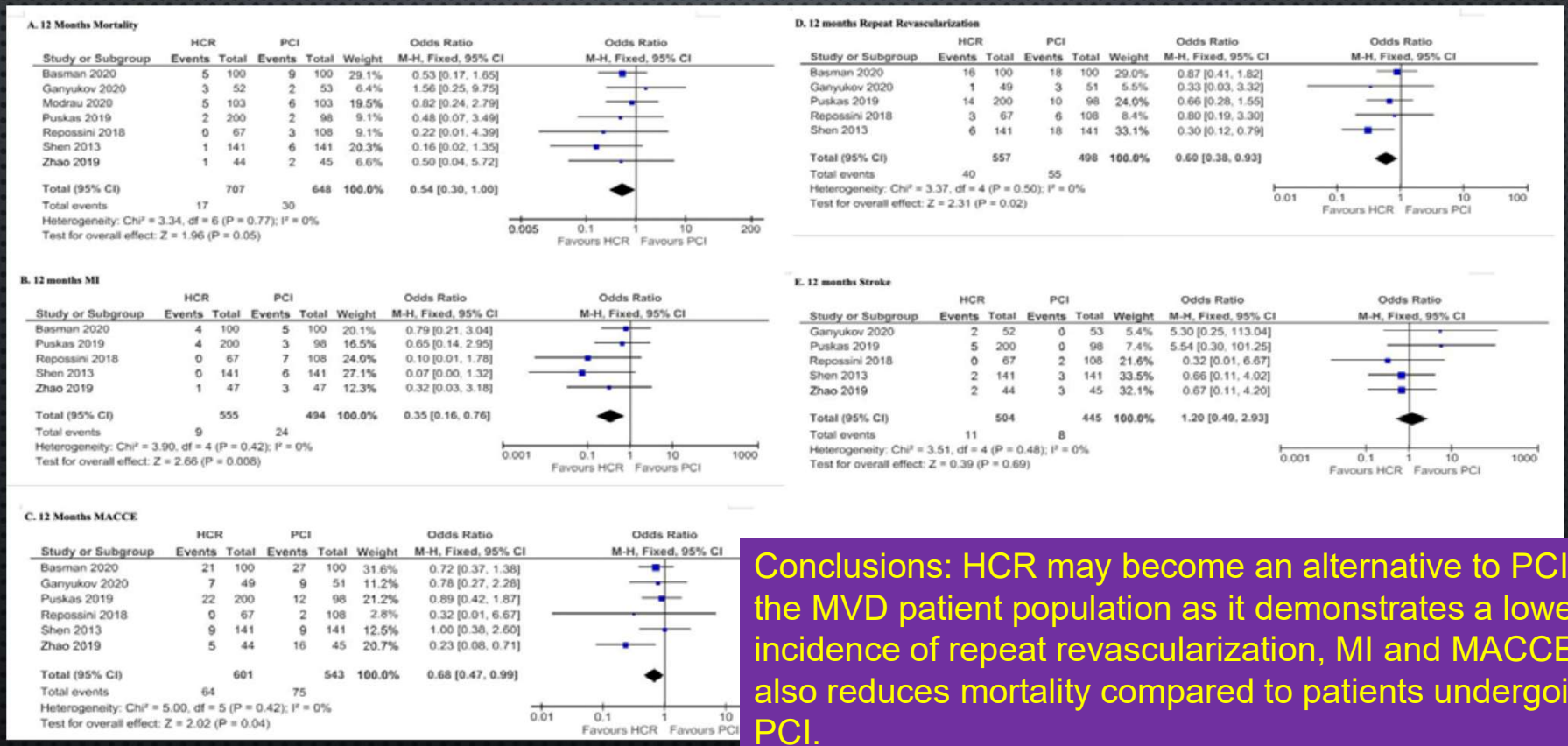
**For staged hospitalizations, hospital LOS was calculated as a sum of both visits

30-Day Outcomes & Complications:

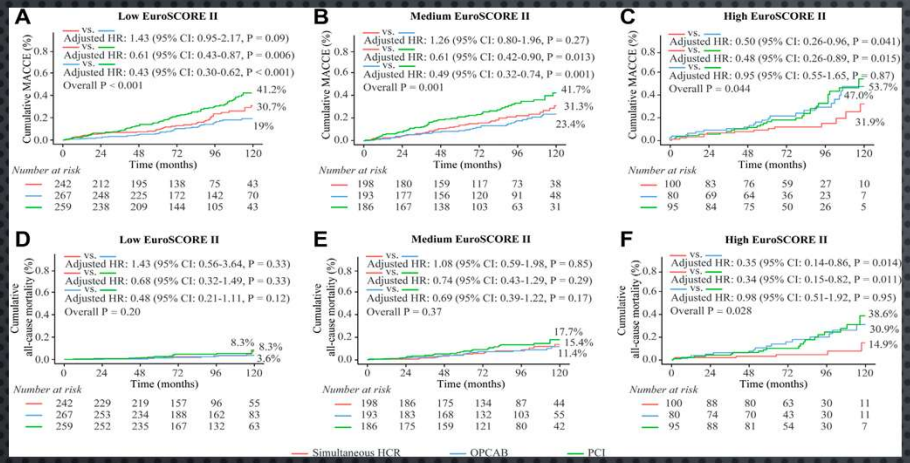
Mean Hospital LOS (days)**	15
Mean ICU LOS (hours)	131
ICU Readmissions	0
Hospital Readmissions	2
Mortality (# deceased)	1
Prolonged Ventilation	1
New Dialysis	0
New Atrial Fibrillation	3
New Pacemaker	0
Sepsis	0
Stroke	0
Vascular Complications	0

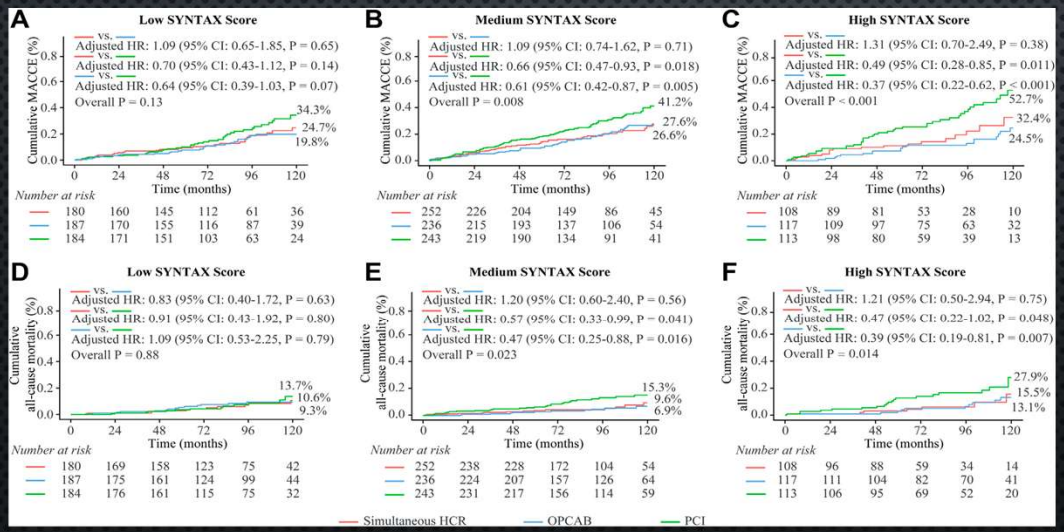
C-76 | Longterm Outcomes of Hybrid Coronary Revascularization vs Percutaneous Coronary Intervention in Multivessel Disease Patient Population: A Systematic Review and Meta-analysis

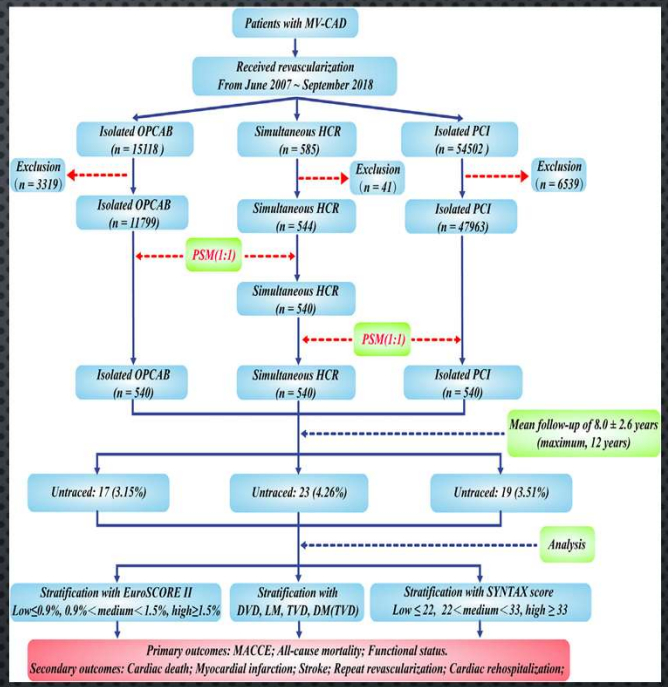
Abstracts / Journal of the Society for Cardiovascular Angiography & Interventions 4 (2025)



Conclusions: HCR may become an alternative to PCI for the MVD patient population as it demonstrates a lower incidence of repeat revascularization, MI and MACCE and also reduces mortality compared to patients undergoing PCI.







Simultaneous Hybrid Coronary Revascularization vs Conventional Strategies for Multivessel Coronary Artery Disease

A 10-Year Follow-Up

Tong Ding, MD, PhD,[a,b,*] Xin Yuan, MD, PhD,[a,b,*] Kai Chen, MD, PhD,[a,b] Liuzhong Shen, MD,[a,b] Changdong Guan, MSc,[a,c] Feng Lv, MD,[a,b] Hui Xiong, MD,[a,b] Bo Xu, MBSS,[a,c] Yongjian Wu, MD,[a,d] Shengshou Hu, MD[a,b]

Learning curve | Distribution

925 Total cases

57min Average time

42min Your last case >

Console time

All cases >