CABG vs. DES Implantation for Left Main or MVD A Meta-analysis of Individual Patient Data

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CABG vs. PCI

Before DES Era

Long-term mortality is similar after CABG and PCI in most patient with multivessel CAD. CABG may be a better option for patients with diabetes because of a lower mortality.

DES Era

	Death/MI	Stroke	TVR
PRECOMBAT	No difference	No difference	
SYNTAX			
FREEDOM			
BEST	No difference	No difference	

Individual trials are not large enough to resolve the uncertainties on optimal treatment for these diseases.

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Why Individual Patient Data Analysis?

- Most RCTs have limited power to assess the clinical equipoise between CABG & PCI with DES regarding hard outcomes.
- Pooling of patient-level data from RCTs increases the statistical power and allows time-to-event analysis, and its separate effects among specific subgroups.



Database Pooling

• We combined the database from the BEST (n=880, EES), PRECOMBAT (n=600, SES) and SYNTAX (n=1800, PES) trials.

Variables:

Demographics (age, sex, body weight, height), revascularization strategies, Clinical history (CKD, previous MI, previous stroke, PAD, previous PCI), Risk factors (diabetes, hypercholesterolemia, hypertension, smoking), Angiographic & echocardiographic findings (number of diseased vessels, LM, proximal LAD, syntax score, EuroScore, LV dysfunction), Medications (aspirin, P2Y₁₂ blockers, statins, ACEI/ARBs, β-blockers, CCBs), Clinical outcomes (Death, cardiac death, MI, stroke, repeat revascularization)



Database Pooling

- The pooled database was checked for completeness & consistency by investigators at the AMC.
- Unless specified, previously reported definitions from each study were used for variables.



Study Outcomes

- Primary Outcome:

 A composite of all-cause death, MI,
 or stroke over all available follow-up.
- Secondary Outcomes:
 Death from any causes, cardiac death, MI, stroke, any coronary revascularization, a composite of death or MI



Statistical Analysis

- All analyses were performed according to the intention-to-treat principle.
- The stratified cox proportional hazards models was used to analyze the impact of revascularization strategy on clinical outcomes and to determine whether merging of the data from 3 trials would influence the primary outcome. A likelihood-ratio test was performed to assess the homogeneity of the data and the assumption of homogeneity was not violated (P=0.17).
- Analyses were performed by an independent statistician who was unaware of the treatment assignments. All reported P values are 2 sided, and values of P<0.05 were considered to indicate statistical significance.</p>



Baseline Characteristics

	CABG (n=1639)	PCI (n=1641)
Age (years)	64.5±9.7	64.2±9.7
Men	1264 (77.1%)	1222 (74.5%)
Current smoking	368 (22.5%)	344 (21.0%)
Diabetes	532 (32.5%)	534 (32.5%)
Stable CAD	987 (60.2%)	1030 (62.8%)
Previous MI	349 (21.4%)	323 (19.8%)
Previous stroke	76 (4.6%)	72 (4.4%)
LM	649 (39.6%)	657 (40.0%)
MVD	991 (60.5%)	984 (60.0%)
SYNTAX score	27.3±10.7	26.7±10.3
Follow-up (years)	4.4±1.4	4.4±1.3



Medications at Discharge & Follow-Up

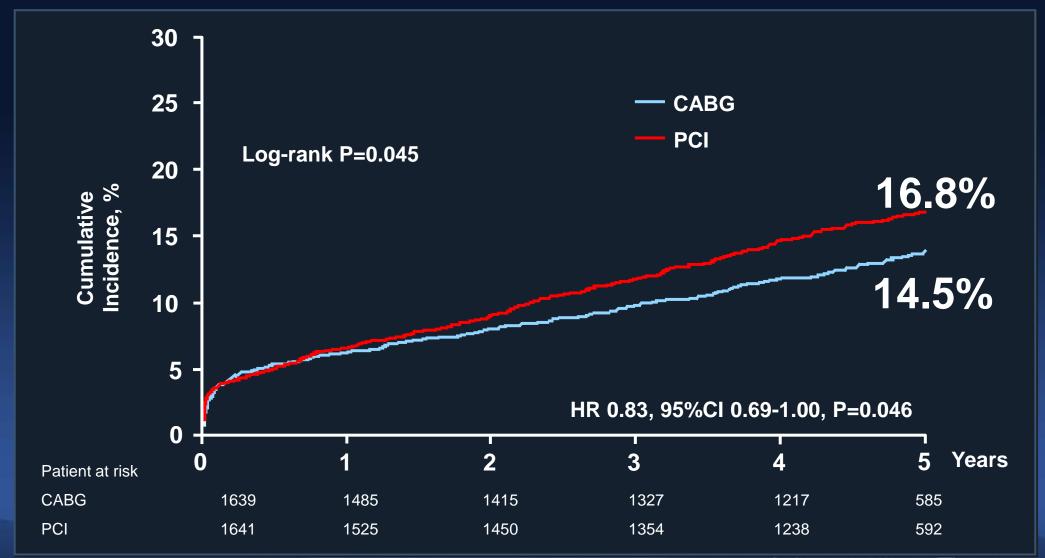
	CABG	PCI	P value
	(N=1639)	(N=1641)	
Aspirin			
At discharge	1487(92.6)	1583(97.0)	< 0.001
1 year after randomization	1376(88.7)	1462(92.6)	< 0.001
5 year after randomization	999(81.6)	1082(85.5)	0.013
P2Y ₁₂ inhibitors			
At discharge	837(52.1)	1583(97.0)	< 0.001
1 year after randomization	648(41.8)	1245(78.8)	< 0.001
5 year after randomization	317(25.9)	570(45.1)	< 0.001
Statins			
At discharge	1233(76.8)	1356(83.1)	< 0.001
1 year after randomization	1262(81.4)	1334(84.5)	0.010
5 year after randomization	902(73.7)	963(76.1)	0.152

Percentages are based on the number of non-missing values.

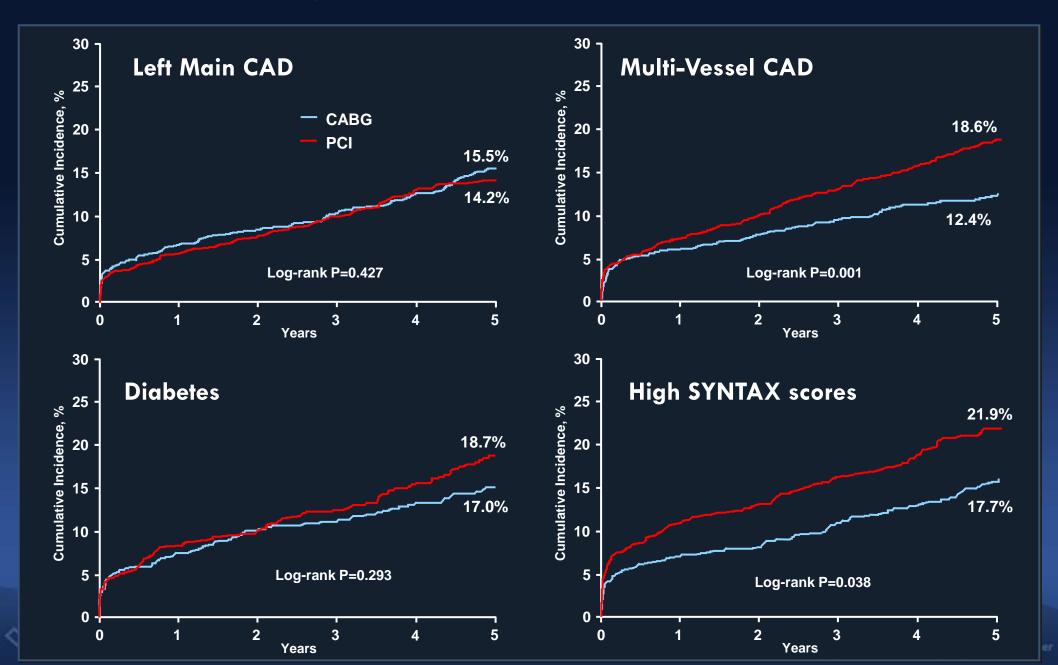




Primary Outcome: Death, MI or Stroke



Primary Outcome in Major Subgroups

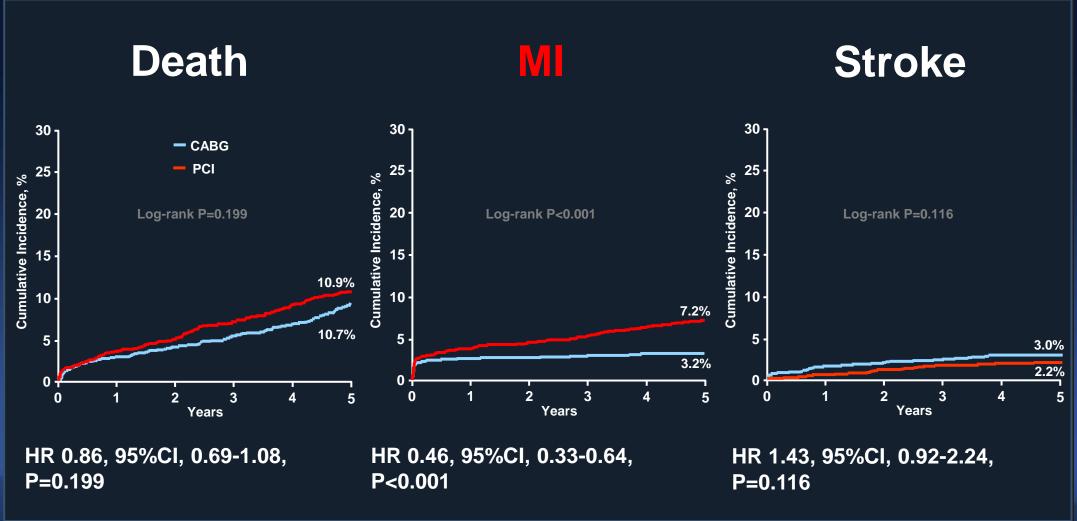


Primary Outcome: Subgroup Analysis

Subgroup	Primary CABG	Endpoint PCI			P value	P value for Interaction
		nl n (%)				
Overall	213/1639 (13.0)	262/1641 (16.1)	=	0.83 (0.68-0.99)	0.039	
Age						0.553
≥65 yr	154/898 (17.1)	179/864 (20.7)	-	0.85 (0.68-1.05)	0.127	
<65 yr	58/741 (80)	83/777 (10.7)	-	0.75 (0.54-1.05)	0.089	
Sex						0.883
Male	161/1264 (12.7)	192/1222 (15.7)	-	0.82 (0.67-1.01)	0.067	
Female	52/375 (13.9)	70/149 (16.7)		0.85 (0.59-1.21)	0.369	
Diabetes						0.817
Yes	78/352 (14.7)	94/534 (17.6)	-	0.85 (0.63-1.15)	0.287	
No	135/1107 (12.2)	168/1107 (15.2)		0.81 (0.65-1.02)	0.075	
ACS						0.421
Yes	89/652 (13.7)	113/630 (17.9)	-	0.76 (0.57-1.00)	0.048	
No	124/987 (12.6)	149/1011 (14.7)	+	0.88 (0.69-1.12)	0.288	
Ejection fraction						0.827
≥40%	141/1225 (11.5)	160/1202 (13.3)	+	0.86 (0.70-1.10)	0.247	
<40%	16/66 (24.2)	19/68 (27.9)		0.92 (0.47-1.78)	0.795	
Left main disease						0.009
Yes	98/648 (15.1)	92/657 (14.0)	 	1.12 (0.84-1.49)	0.427	
No	115/991 (11.6)	170/984 (17.3)	=	0.68 (0.53-0.86)	0.001	
pLAD involvement	, ,	, ,		, ,		0.332
Yes	134/1006 (13.3)	153/1012 (15.1)		0.89 (0.70-1.12)	0.304	
No	79/625 (12.6)	109/623 (17.5)	-	0.74 (0.56-0.99)	0.045	
Era of DES	,	, ,		,		0.800
new DES	42/442 (9.5)	52/438		0.79 (0.53-1.19)	0.265	
Previous DES	171/1197 (14.3)	210/1203 (17.5)		0.84 (0.69-1.03)	0.087	
SYNTAX score		,				0.455
Score ≥33	71/462 (15.4)	88/413 (21.3)	-	0.72 (0.53-0.98)	0.039	
Score 23-32	74/574 (12.9)	97/599 (16.2)		0.81 (0.60-1.10)	0.179	
Score ≤22	66/57 (11.6)	77/613 (12.6)	•	0.95 (0.68-1.32)	0.763	
EuroSCORE						0.791
≥6	74/306 (24.2)	91/292 (31.2)		0.79 (0.58-1.08)	0.136	
<6	139/1333 (10.4)	171/1349 (12.7)		0.83 (0.67-1.04)	0.111	
Trial						0.499
SYNTAX	143/897 (15.9)	185/903 (20.5)		0.80 (0.65-1.00)	0.047	
PRECOMBAT	28/300 (9.3)	25/300 (8.3)	+	1.13 (0.66-1.94)	0.661	
BEST	42/442 (9.5)	52/48\38 (11.9)		0.79 (0.53-1.19)	0.265	

0.1 CABG better 10 PCI better

Secondary Outcomes: Individual Components of Primary Outcome



Conclusions

- CABG, as compared to PCI with DES, significantly reduced the risk of all-cause death, MI, or stroke in patients with left main or multivessel CAD.
- The benefit of CABG was particularly pronounced in patients with multivessel CAD, but not in those with left main CAD.

