Complex PCI: Left Main and Bifurcation

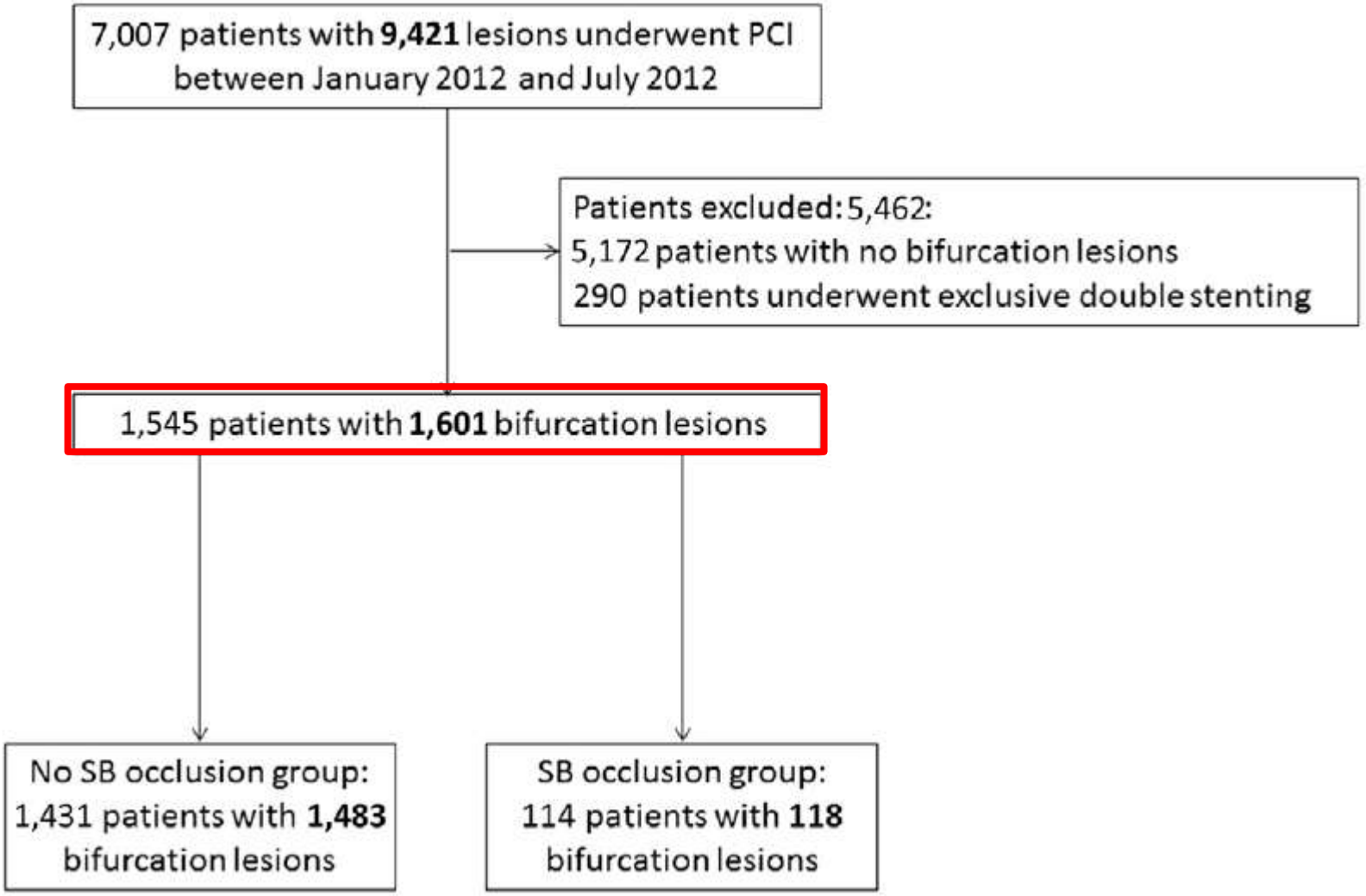
New data from RCT and registry

Y. Louvard, ICPS, Massy, Générale de Santé-Ramsay, France

TCTAP 2016, Seoul, Korea

Predictors of SB occlusion after cross-over stenting ?

An Angiographic Tool for Risk Prediction of Side Branch Occlusion in Coronary Bifurcation Intervention: The RESOLVE Score System



Dou, J Am Coll Cardiol Intv 2015;8:39–46

An Angiographic Tool for Risk Prediction of Side Branch Occlusion in Coronary Bifurcation Intervention: The RESOLVE Score System

Scores Attributed to Each Variable

Risk Factor	Level	Point
Plaque distribution	At the opposite side of SB	0
	At the same side of SB	1
MV TIMI flow grade before stenting	TIMI 3	0
	TIMI 2	6
	TIMI 1	11
	TIMI 0	17
Pre-procedural diameter stenosis of bifurcation core (%)	<50	0
	50-<70	2
	≥70	3
Bifurcation angle (°)	<70	0
	70-<90	4
	≥90	6
Diameter ratio between MV/SB	<1.0	0
	1.0-<1.5	2
	1.5-<2.0	6
	≥2.0	9
Diameter stenosis of SB before MV stenting (%)	<50	0
	50-<70	4
	70-<90	6
	≥90	7

Dou, J Am Coll Cardiol Intv 2015;8:39–46

- Acute bifurcation angle = carena shift no occlusion (Vassiliev)

- Carena shift ≠ SB stenosis (Koo)

- Plaque shift from proximal main is a factor of occlusion (Hahn)

- Angle not a predictor of SB occlusion (Hahn)

- Wide bifurcation angle = predictor of occlusion (plaque shifting, no carena shift)(Dou)

1 vs 2 stents for bifurcation stenting when the SB is big and the SB stenosis is long ?

EBC

The Nordic-Baltic PCI Study Group

Randomized comparison of provisional side branch stenting versus a two-stent strategy for treatment of true coronary bifurcation lesions involving a large side branch.

Two-year results in the Nordic-Baltic Bifurcation Study IV

Indulis Kumsars, **Niels R. Holm**, Matti Niemelä, Andrejs Erglis, Kari Kervinen, Evald H. Christiansen, Michael Maeng, Andis Dombrovskis, Vytautas Abraitis, Aleksandras Kibarskis, Terje K. Steigen, Thor Trovik, Gustavs Latkovskis, Dace Sondore, Inga Narbute, Christian Juhl Terkelsen, Markku Eskola, Hannu Romppanen, Lisette Okkels Jensen, Mika Laine, Tuija Vasankari, Pål Gunnes, Lasse Hebsgaard, Ole Frobert, Fredrik Calais, Jens Aaroe, Juha Hartikainen, Svend Eggert Jensen, Jan Ravkilde, Thomas Engstrøm, Leif Thuesen, Jens F. Lassen

For the Nordic-Baltic PCI Study Group

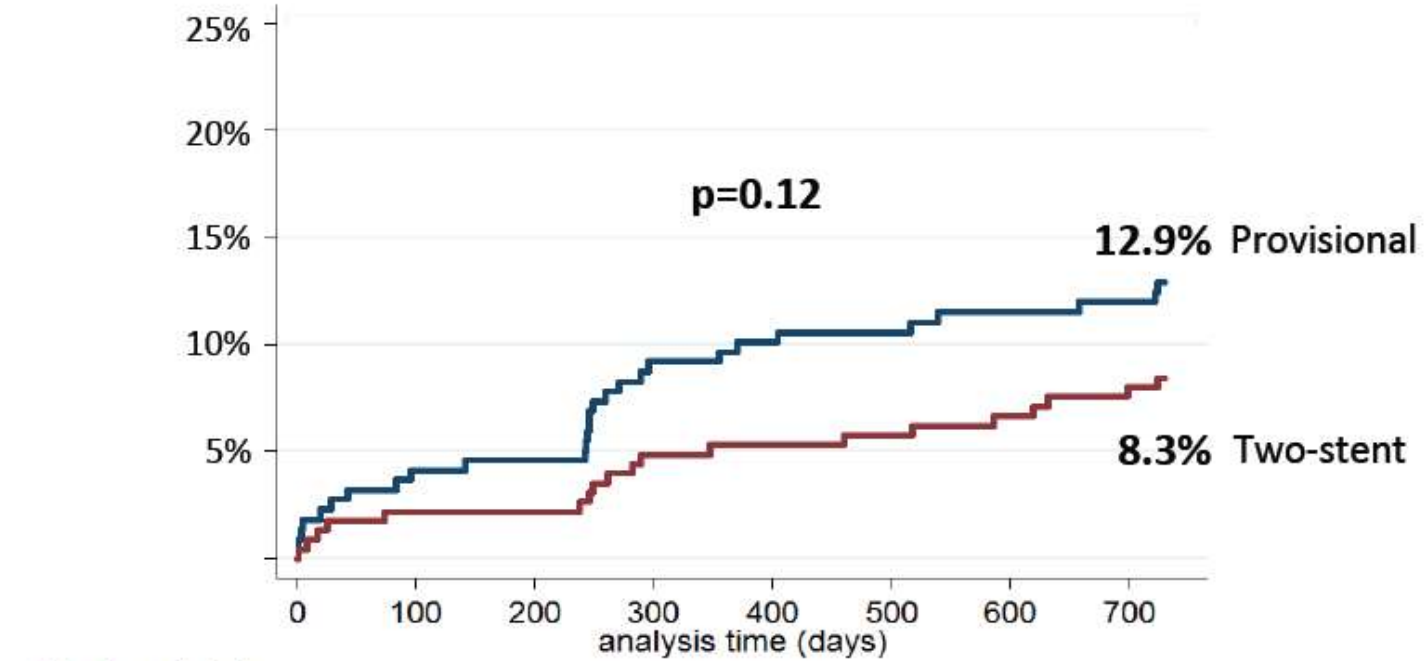
XI European Bifurcation Club meeting - Athens, Greece - 25th & 26th September 2015

niels.holm@clin.au.dk

EBC

Nordic-Baltic Bifurcation Study IV

Two-year MACE



Number at risk								
Two-stent tech.	228	221	221	214	212	211	209	206
Provisional tech.	218	209	208	196	194	192	189	187

MACE: cardiac death, non-procedural myocardial infarction, target lesion revascularization and definite stent thrombosis

The Nordic-Baltic PCI Study Group

niels.holm@clin.au.dk

The European Bifurcation Coronary study: a randomised comparison of provisional T-stenting versus a systematic TWO stent strategy in large calibre true bifurcations

David Hildick-Smith, Goran Stankovic, Manuel Pan, Philippe Brunel, Didier Carrie, Michael Maeng, Mark Spence, Keith Oldroyd, Alaide Chieffo, Thomas Hovasse, Andreas Baumbach, Jens Lassen, Thierry Lefevre and Yves Louvard *on behalf of the EBC TWO trial investigators*

The EBC two trial is an investigator-initiated trial made possible by unrestricted grants by Terumo Europe and Pie Medical

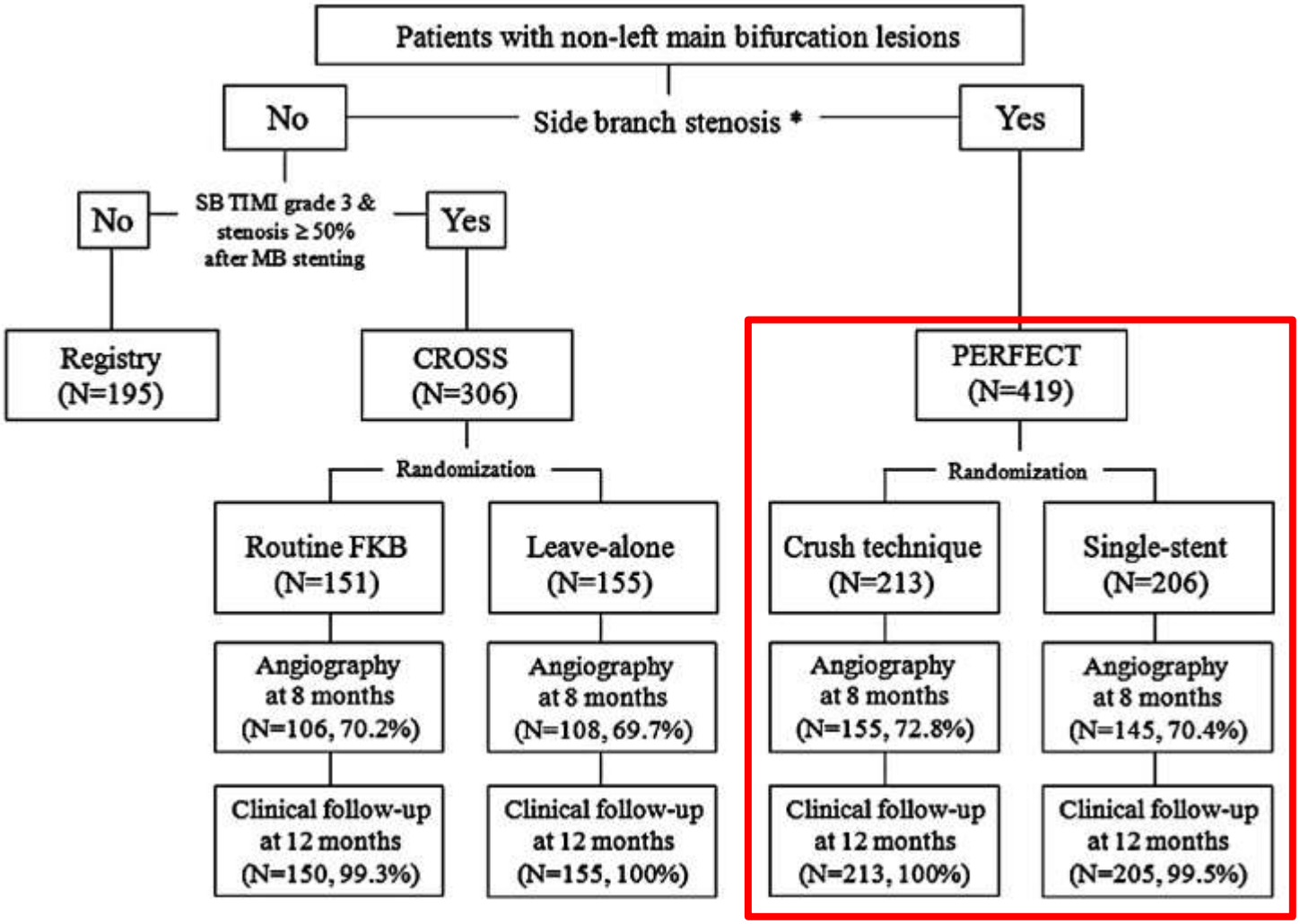
euro PCR 2015

PRIMARY ENDPOINT

	Provisional T (n=103)	Culotte (n=97)
Death, MI, TVR at 12 months	**8 (8%)**	**10 (10%)**
Death	**2 (2%)**	**1 (1%)**
Myocardial infarction	**5 (5%)**	**10 (10%)**
NSTEMI	5	9
STEMI	0	1
<48H	4	10
TVR	**3 (3%)**	**1 (1%)**
Stent thrombosis	**1 (1%)**	**3 (3%)**
Definite / Probable	1	2
Possible	0	1

16% double stenting in Provisional

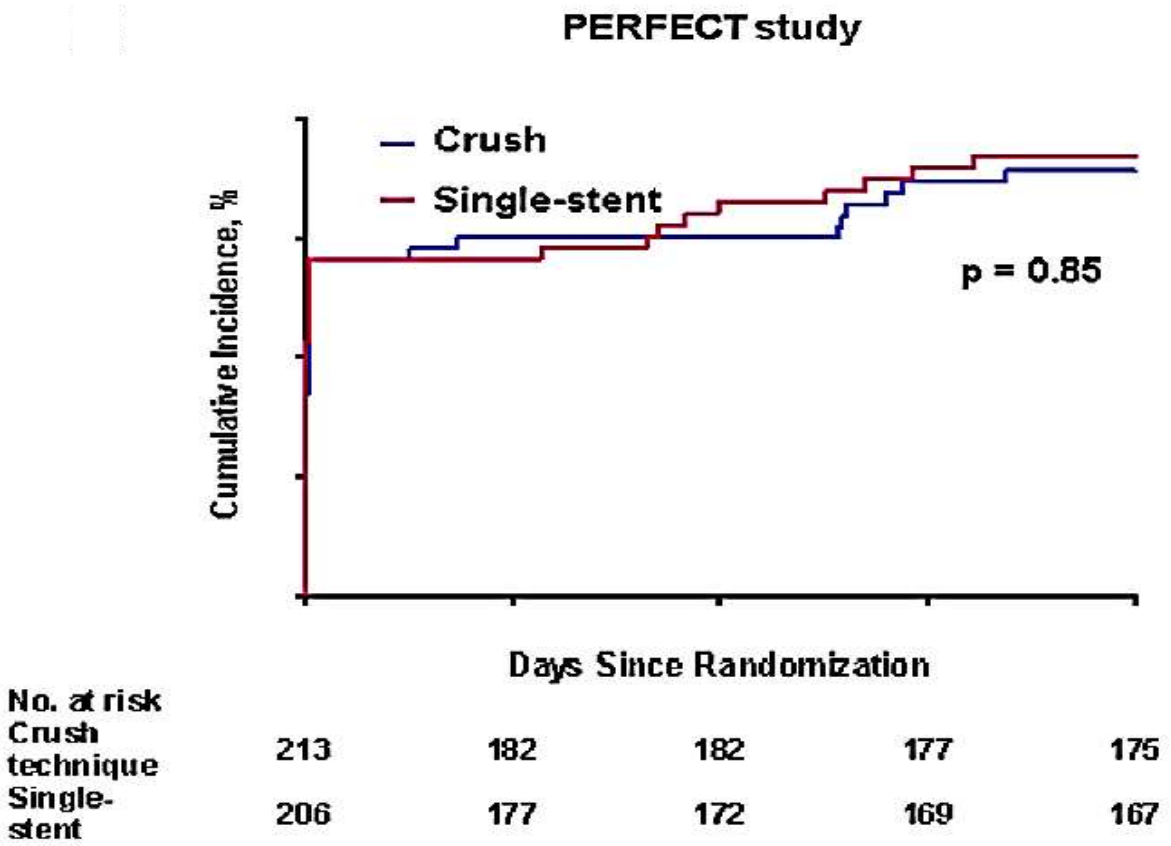
Randomized Comparisons Between Different Stenting Approaches for Bifurcation Coronary Lesions With or Without Side Branch Stenosis



Kim YH, J Am Coll Cardiol Intv 2015;8:550–60

Randomized Comparisons Between Different Stenting Approaches for Bifurcation Coronary Lesions With or Without Side Branch Stenosis

MACE in the PERFECT Studies



Kim YH, J Am Coll Cardiol Intv 2015;8:550–60

1 vs 2 stents for bifurcation stenting: long term outcome

BBC ONE, Nordic-Baltic Bifurcation I

Long term all-cause mortality in treatment of coronary bifurcation lesion

Pooled Analysis of
The BBC ONE Study and The Nordic Bifurcation Study I

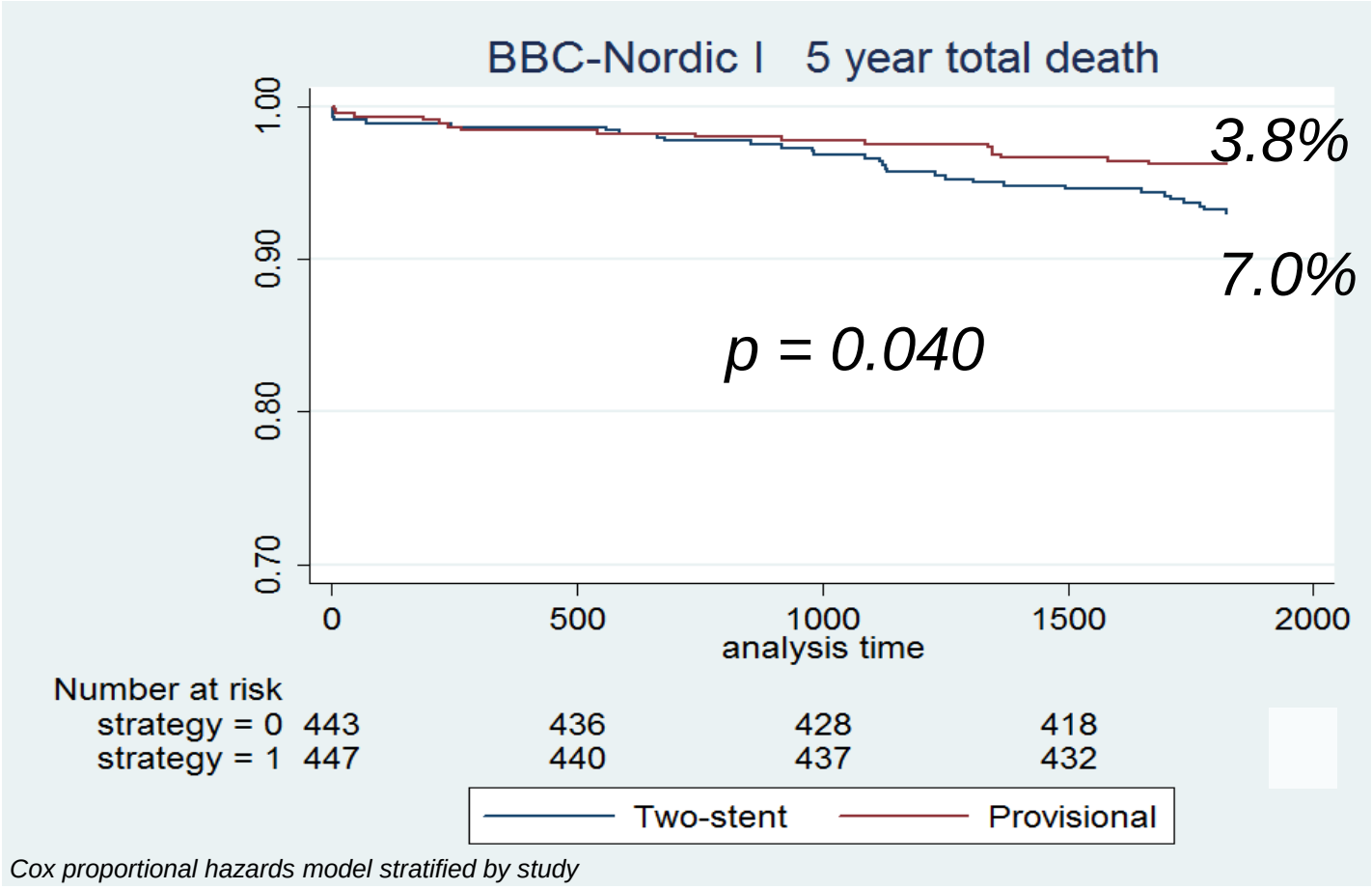
Miles Behan, Niels R. Holm, Adam de Belder, Matti Niemela, Nick Curzen, Kari Kervinen, Andrejs Erglis, Indulis Kumsars, Keith G. Oldroyd, Paal Gunnes, Rodney H. Stables, Michael Maeng, Terje K. Steigen, Lisette Okkels Jensen, Leif Thuesen, Jens F. Lassen, David Hildick-Smith

On behalf on the
British Bifurcation Coronary and Nordic PCI Study Groups

9-Month Trial Endpoints

	Simple (n=457)	Complex (n=456)	P value
Composite (death/MI/TVR) n (%)	46 (10.1)	79 (17.3)	0.001
All cause death n (%)	5 (1.0)	5 (1.0)	0.99
MI total n (%)	22 (4.8)	56 (12.3)	<0.001
-Periprocedural MI n (%)	16 (3.5)	45 (9.9)	<0.001
-Subsequent MI n (%)	6 (1.3)	11 (2.4)	0.22
TVR total n (%)	26 (5.7)	33 (7.2)	0.34
-TVR PCI n (%)	24 (5.3)	20 (4.4)	0.54
-TVR CABG n (%)	2 (0.4)	13 (2.9)	0.004
ST n (%)	3 (0.7)	6 (1.3)	0.31

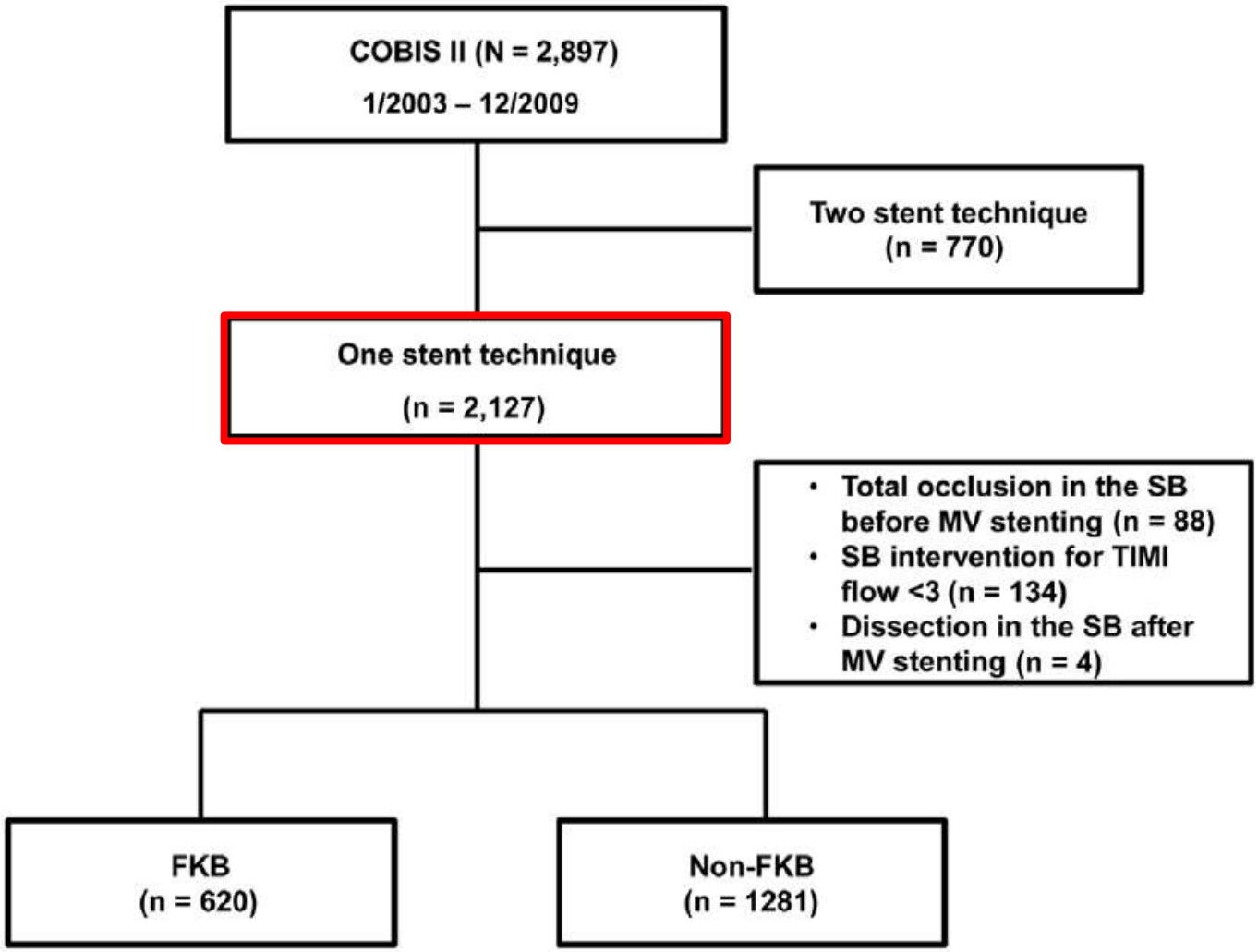
BBC-Nordic: 5-year total death



Cox proportional hazards model stratified by study

Kissing or not after single stenting ?

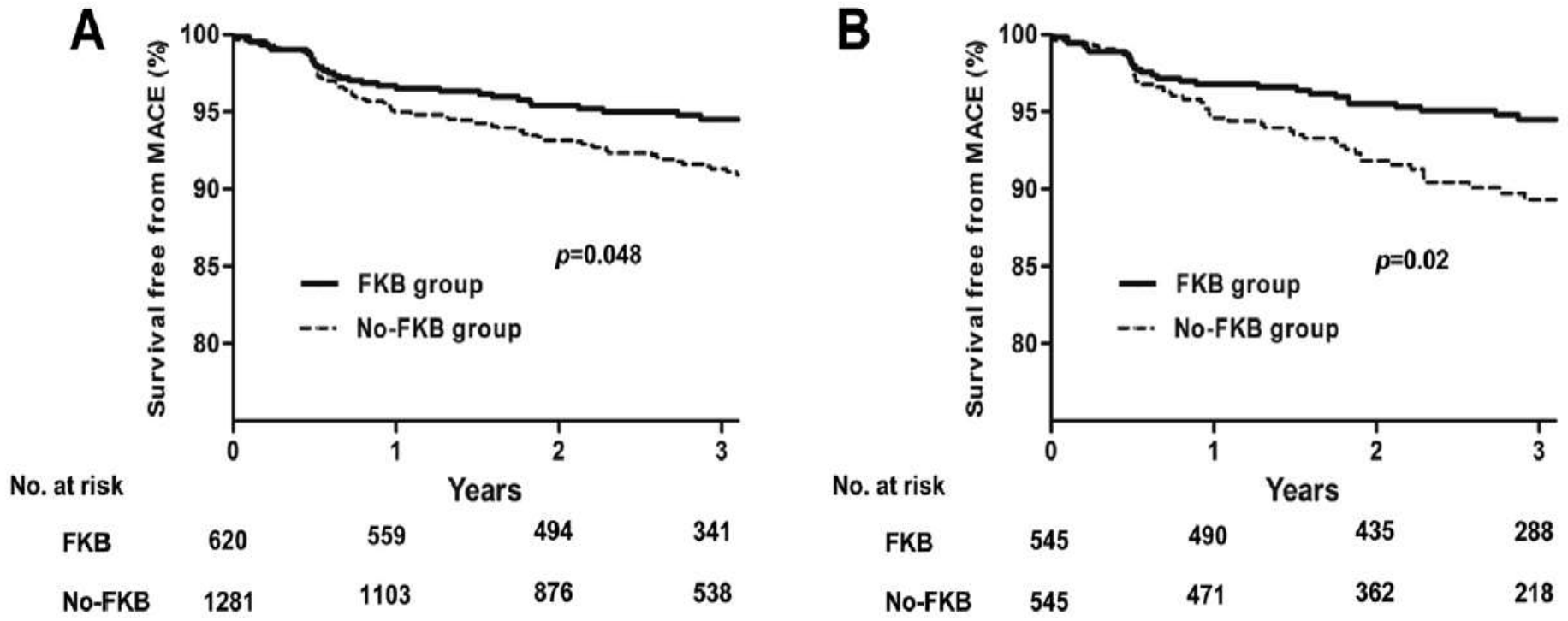
Long-term Clinical outcomes of final KB in coronary bifurcation lesions treated with the 1-stent : results from the COBIS II registry



CW Yu, J Am Coll Cardiol Intv 2015;8:1297–307

Long-term Clinical outcomes of final KB in coronary bifurcation lesions treated with the 1-stent: results from the COBIS II registry

Unadjusted Kaplan-Meier Curves in FKB Versus Non-FKB Groups



(A) Kaplan-Meier curves for MACE in FKB versus non-FKB groups in **all patients**. (B) Kaplan-Meier curves for MACE in FKB versus non-FKB groups in **propensity-matched populations**.

CW Yu, J Am Coll Cardiol Intv 2015;8:1297–307

Long-term Clinical outcomes of final KB in coronary bifurcation lesions treated with the 1-stent: results from the COBIS II registry

Clinical Outcomes in FKB Group Compared With Non-FKB Group in Propensity-Matched Population During FU Period

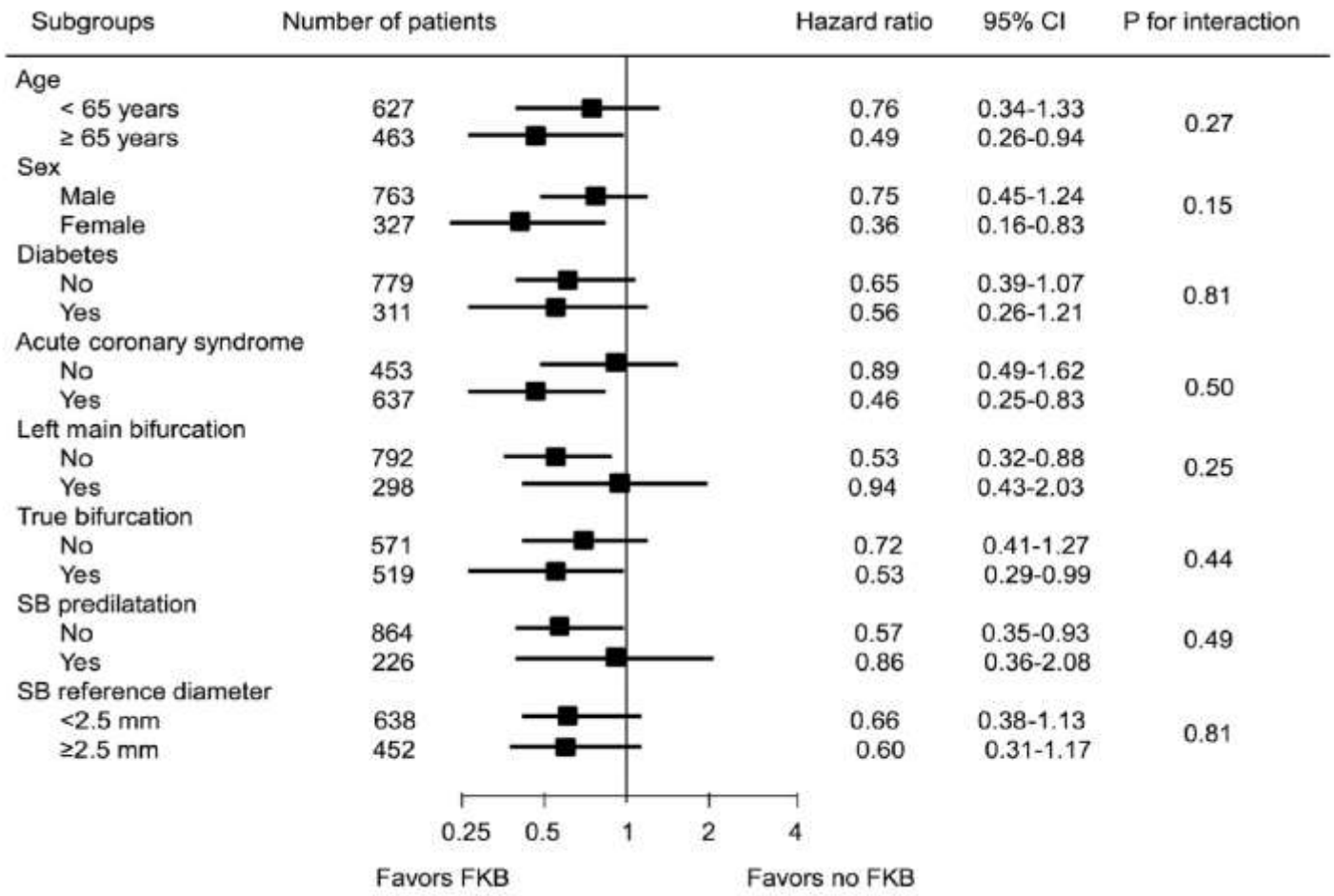
	FKB (n = 545)	Non-FKB (n = 545)	Unadjusted HR (95% CI)	p Value	Adjusted HR* (95% CI)	p Value
All-cause death	17 (3.1)	20 (3.7)	0.67 (0.30-1.48)	0.32	0.68 (0.28-1.63)	0.39
Cardiac death	3 (0.6)	8 (1.5)	0.43 (0.11-1.66)	0.22	0.50 (0.11-2.29)	0.37
MI	4 (0.7)	5 (0.9)	0.50 (0.09-2.73)	0.42	0.18 (0.01-20.36)	0.48
Stent thrombosis†	3 (0.6)	4 (0.7)	0.72 (0.16-3.23)	0.67	0.77 (0.17-3.45)	0.73
Target lesion revascularization	32 (5.9)	43 (7.9)	0.53 (0.30-0.94)	0.03	0.51 (0.28-0.91)	0.02
Main vessel	31 (5.7)	40 (7.3)	0.53 (0.30-0.96)	0.04	0.51 (0.28-0.93)	0.03
Side branch	12 (2.2)	18 (3.3)	0.57 (0.24-1.36)	0.21	0.57 (0.24-1.37)	0.21
Both vessels	23 (4.2)	38 (7.0)	0.47 (0.25-0.88)	0.02	0.47 (0.25-0.90)	0.02
MACE‡	37 (6.8)	53 (9.7)	0.54 (0.32-0.89)	0.02	0.50 (0.30-0.85)	0.01

*Adjusted covariates include hypertension, history of coronary artery bypass graft, and distal RD of SB.

CW Yu, J Am Coll Cardiol Intv 2015;8:1297–307

Long-term Clinical outcomes of final KB in coronary bifurcation lesions treated with the 1-stent technique: results from the COBIS II registry

Comparative Unadjusted HR of MACE for Subgroups in Propensity-Matching Population

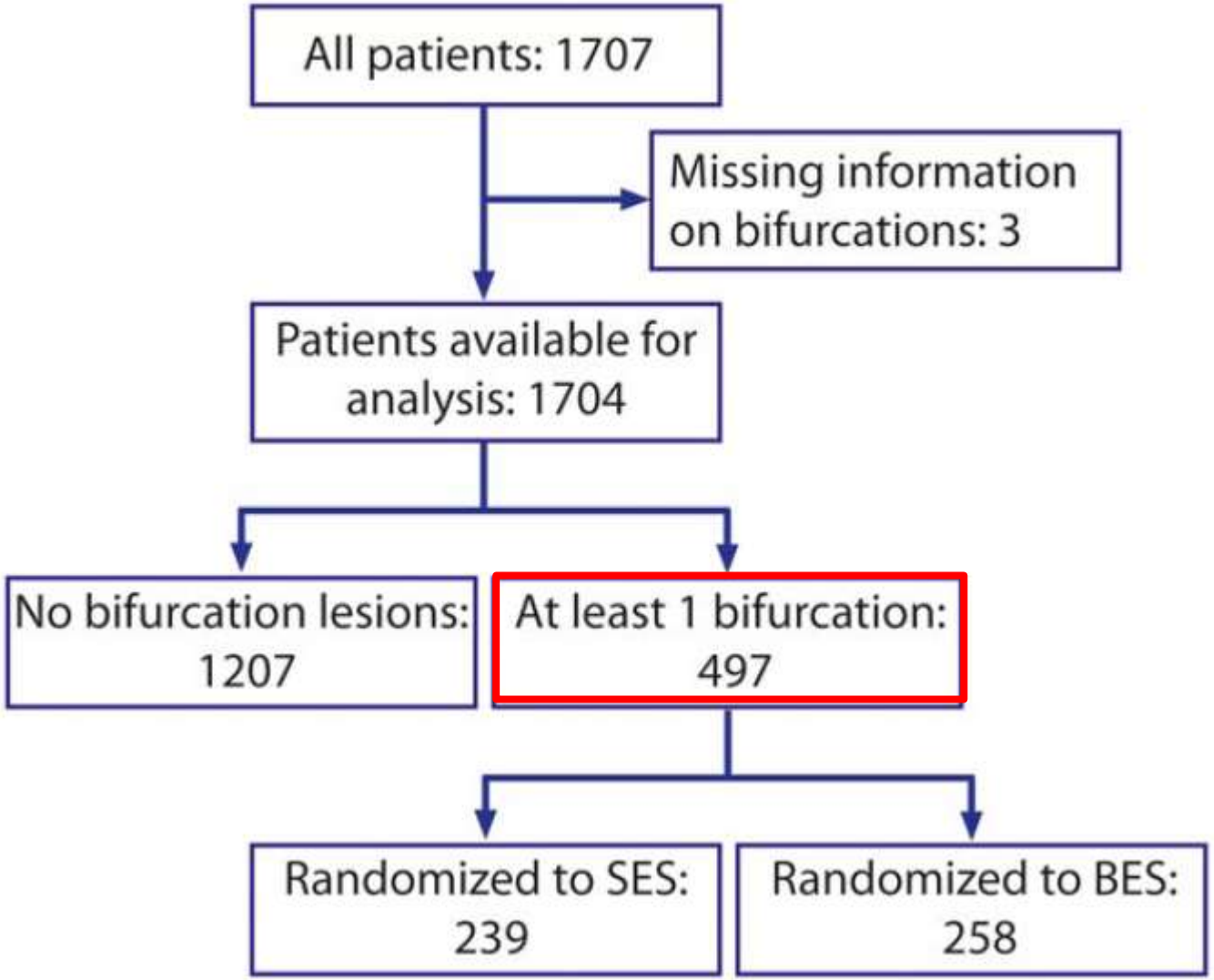


no significant interactions between the use of FKB and MACE among various subgroups in propensity-matching populations.

CW Yu, J Am Coll Cardiol Intv 2015;8:1297–307

2nd 3rd generation stents ?

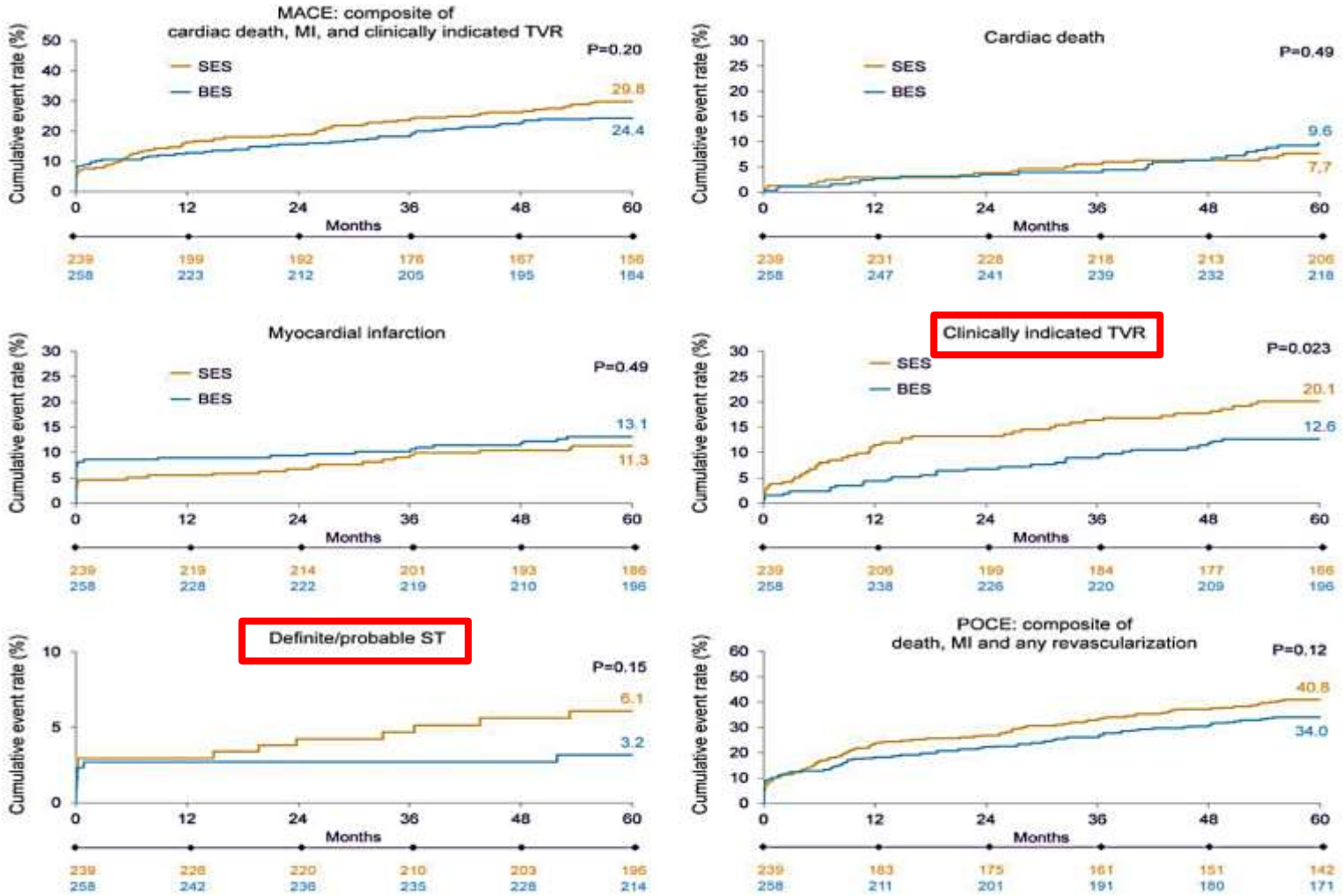
1st vs 2nd generation DES for treatment of bifurcations: 5-year FU of the LEADERS all-comers randomized trial



Grundeken CCI 00:00–00 (2015)

1st vs 2nd generation DES for treatment of bifurcations: 5-year FU of the LEADERS all-comers randomized trial

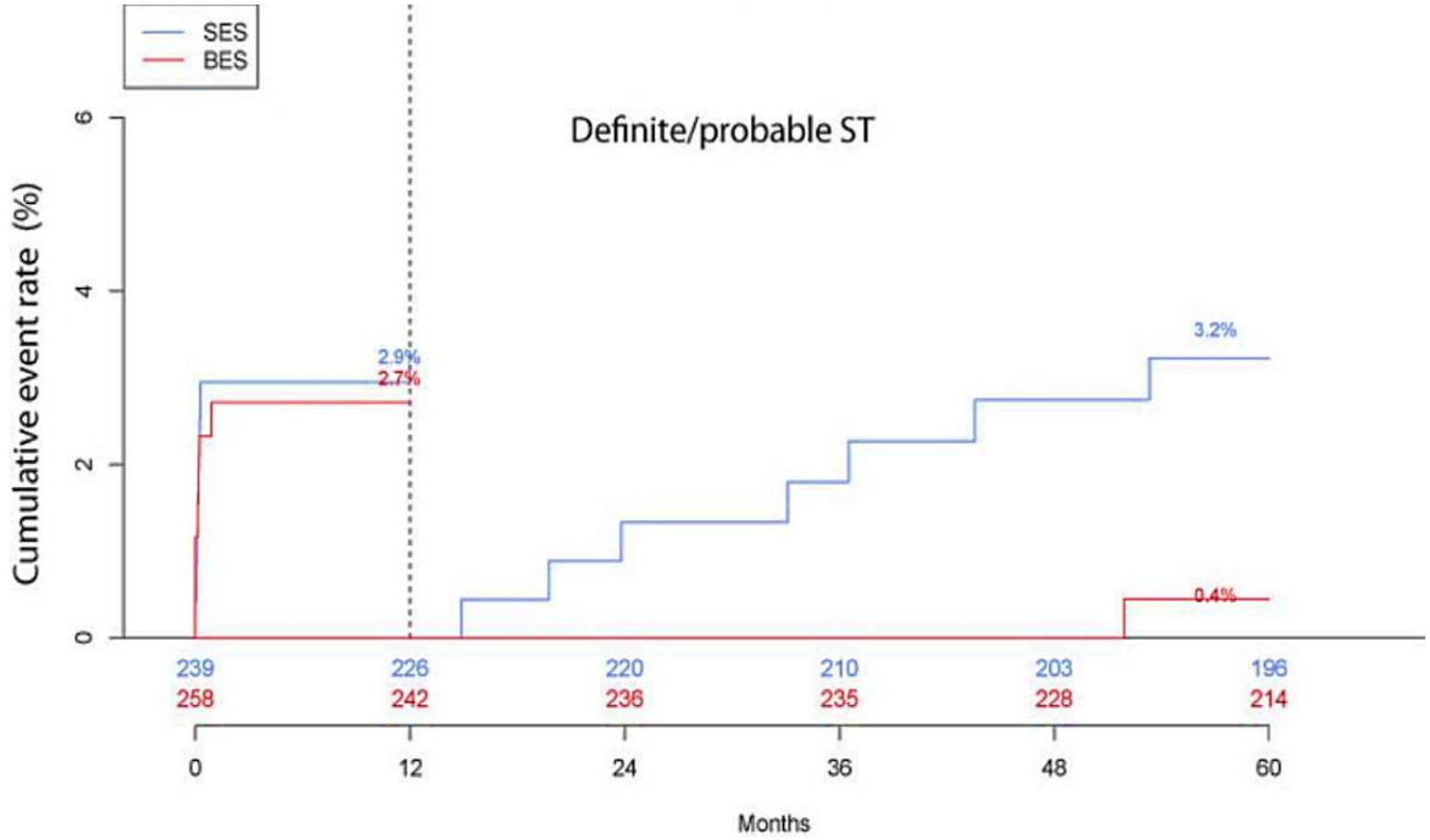
Cumulative event rates of patients with at least one bifurcation treated with SES and BES



Grundeken CCI 00:00–00 (2015)

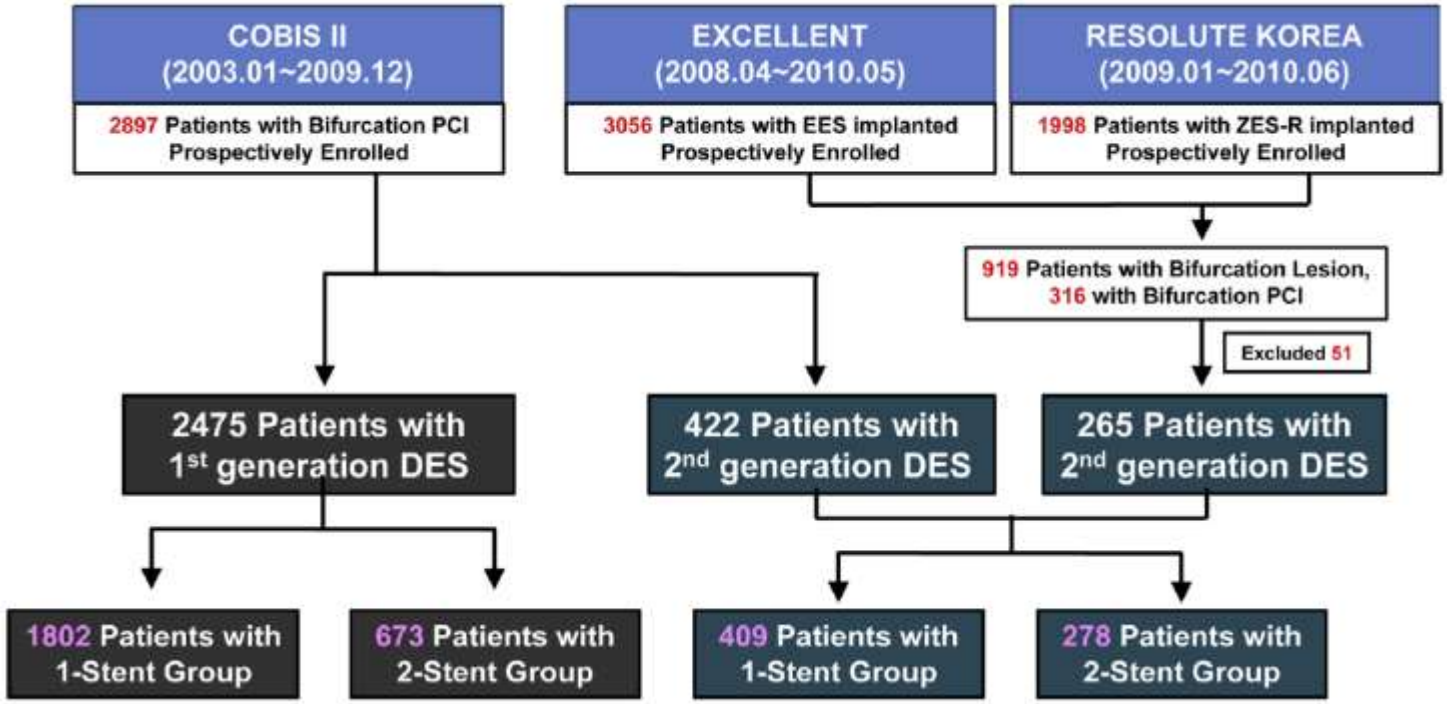
1st vs 2nd generation DES for treatment of bifurcations: 5-year FU of the LEADERS all-comers randomized trial

Event rates beyond 1 year of patients with at least one bifurcation treated with SES vs BES



Grundeken CCI 00:00–00 (2015)

1st - and 2nd -Generation DES in Coronary Bifurcation Lesions: Patient-Level Analysis of the Korean Bifurcation Pooled Cohorts



Clinical outcome analysis (Total N = 3,162)

Primary Analysis Endpoint	Stent-oriented composite outcome	Target Lesion Failure (Composite of Cardiac death, Target vessel MI, TLR)
Major Secondary Analysis Endpoint	Patient-oriented composite outcome	Composite of Any death, Any revascularization, Any MI, CVA

Lee, J Am Coll Cardiol Intv2015;8:1318–31

1st - and 2nd -Generation DES in Coronary Bifurcation Lesions: Patient-Level Analysis of the Korean Bifurcation Pooled Cohorts

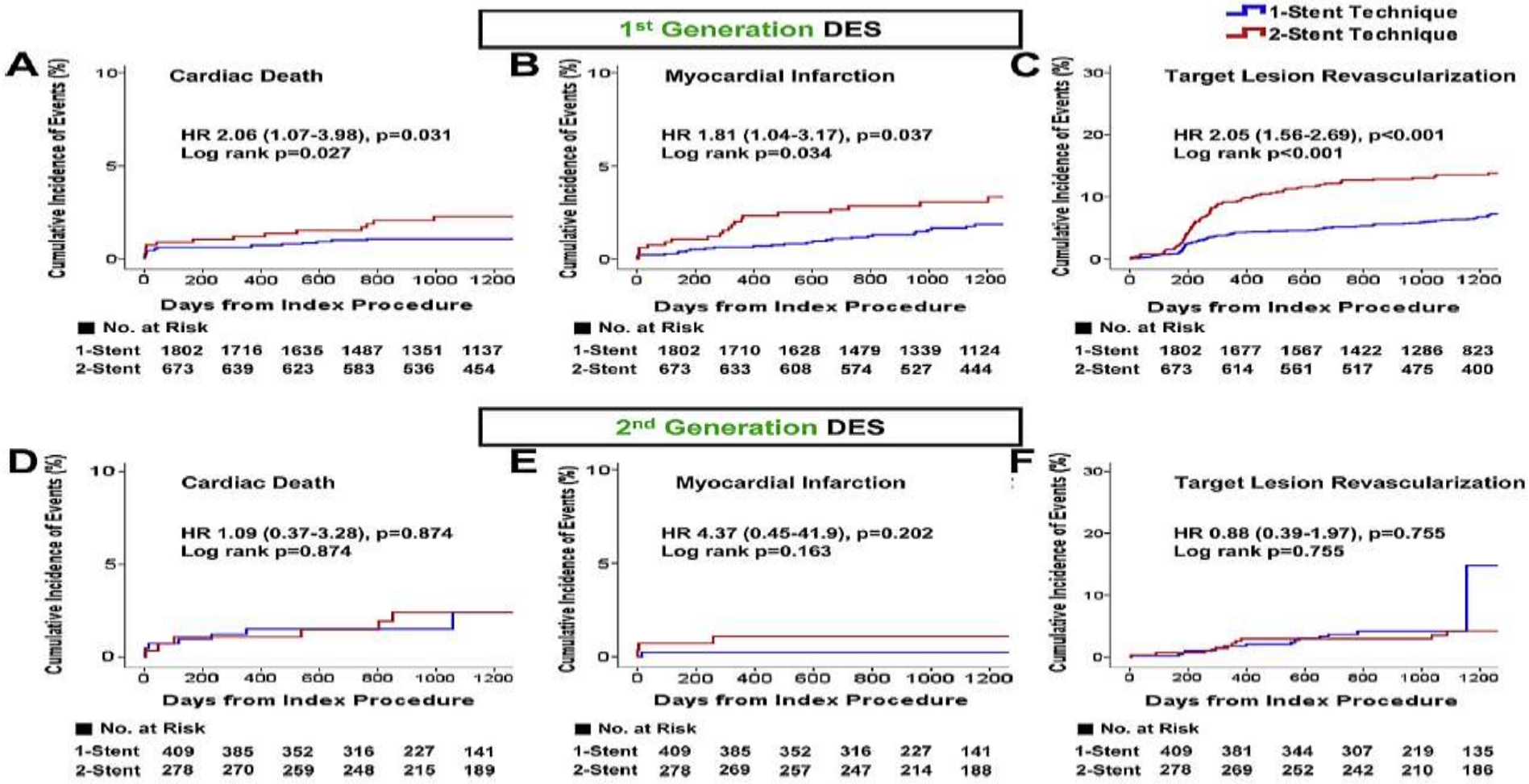
Angiographic and Procedural Characteristics

	First-Generation DES (n = 2,475)			Second-Generation DES (n = 687)		
	1-Stent (n = 1,802)	2-Stent (n = 673)	p Value	1-Stent (n = 409)	2-Stent (n = 278)	p Value
Stent type			<0.001			<0.001
SES	992 (55.0)	422 (62.7)		–	–	
PES	614 (34.1)	208 (30.9)		–	–	
ZES-Splint	194 (10.8)	41 (6.1)		–	–	
EES	–	–		356 (87.0)	120 (43.2)	
ZES-Resolute	–	–		53 (13.0)	158 (56.8)	
Others	2 (0.1)	2 (0.3)		–	–	
Stenting techniques						NA
1-stent technique	1,802 (100.0)	–		409 (100.0)	–	
2-stent technique	–	673 (100.0)		–	278 (100.0)	
T-stenting or TAP	–	245 (36.4)		–	147 (52.9)	
Crush	–	323 (48.0)		–	98 (35.2)	
Kissing or V-stenting	–	87 (12.9)		–	14 (5.0)	
Culottes	–	15 (2.2)		–	16 (5.8)	
Others	–	3 (0.4)		–	3 (1.1)	

Lee, J Am Coll Cardiol Intv2015;8:1318–31

1st - and 2nd -Generation DES in Coronary Bifurcation Lesions: Patient-Level Analysis of the Korean Bifurcation Pooled Cohorts

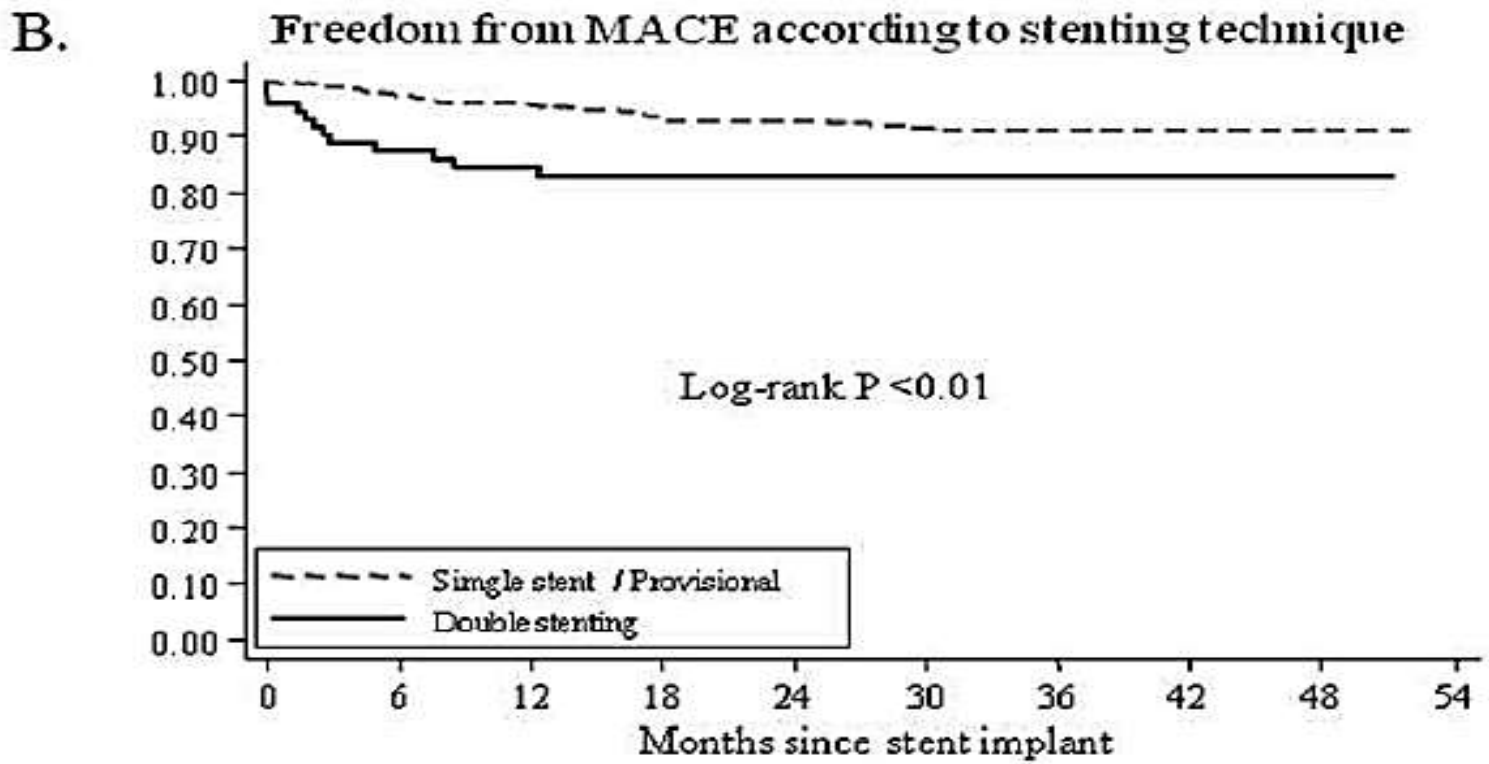
(A to C) Individual components of target lesion failure in 1st -generation DES. (D to F) Individual components of target lesion failure in 2nd generation DES



Lee, J Am Coll Cardiol Intv2015;8:1318–31

Prospective Multicentre Clinical Performance Evaluation of 2nd - 3rd Generation ZES to Treat Patients With Bifurcated Coronary Lesions

MACE-free survival according to implantation of a single or double stent



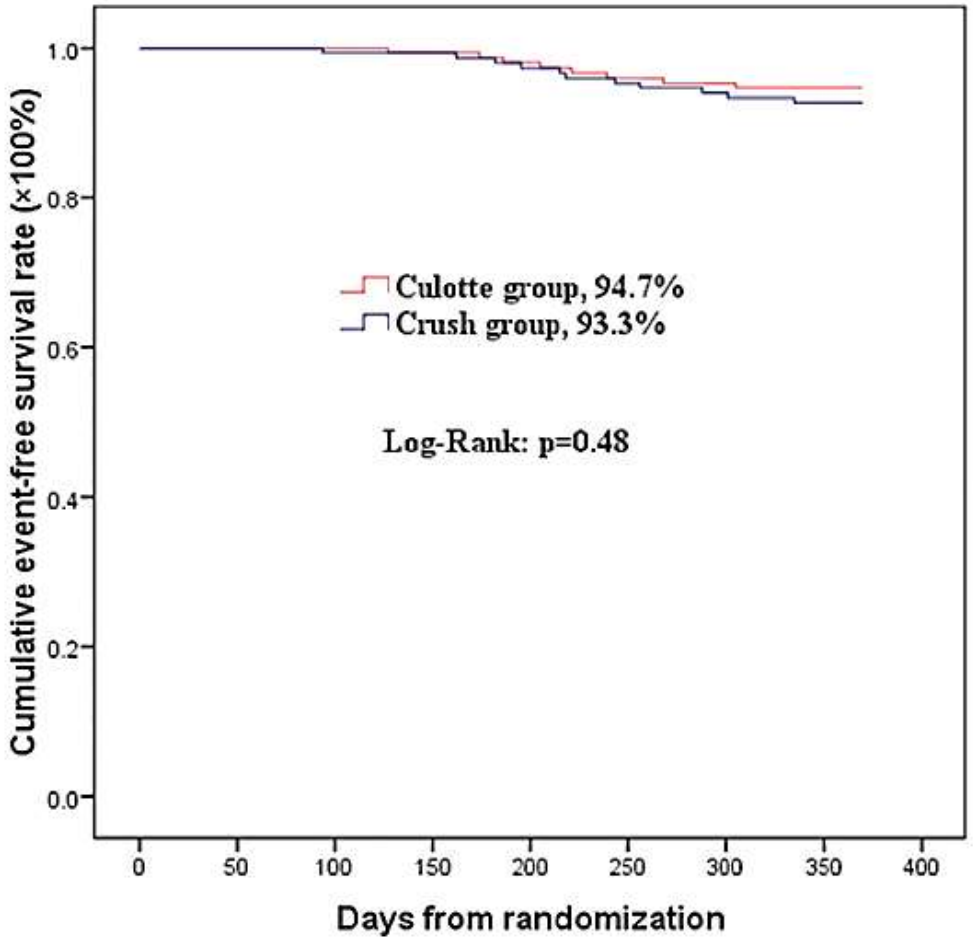
Burzotta, CCI 87:15–22 (2016)

Does the technique still matter for bifurcation stenting with 2nd and 3rd generation DES: YES !

Which double stenting technique ?

Randomized Comparison of the Crush Versus the Culotte Stenting for Coronary Artery Bifurcation Lesions

Major adverse cardiac event-free survival rate at 12 months



Original Colombo crush

Original Chevalier culotte (main first)

Zheng Chin Med J 2016;129:505-10

Randomized Comparison of the Crush Versus the Culotte Stenting for Coronary Artery Bifurcation Lesions

Individual endpoints after 12 months in crush group and culotte group

Items	Crush group (n = 150)	Culotte group (n = 150)	P
Total death, n (%)	2 (1.3)	1 (0.7)	0.624
Cardiac death, n (%)	2 (1.3)	1 (0.7)	0.624
Myocardial infarction, n (%)	7 (4.7)	3 (2.0)	0.335
Stent thrombosis, n (%)	4 (2.7)	2 (1.3)	0.684
Target lesion revascularization, n (%)	8 (5.3)	6 (4.0)	0.584
Target vessel revascularization, n (%)	9 (6.0)	7 (4.7)	0.607
Index lesion restenosis, n (%)	19 (12.7)	9 (6.0)	0.047

Original Colombo crush

Original Chevalier culotte (main first)

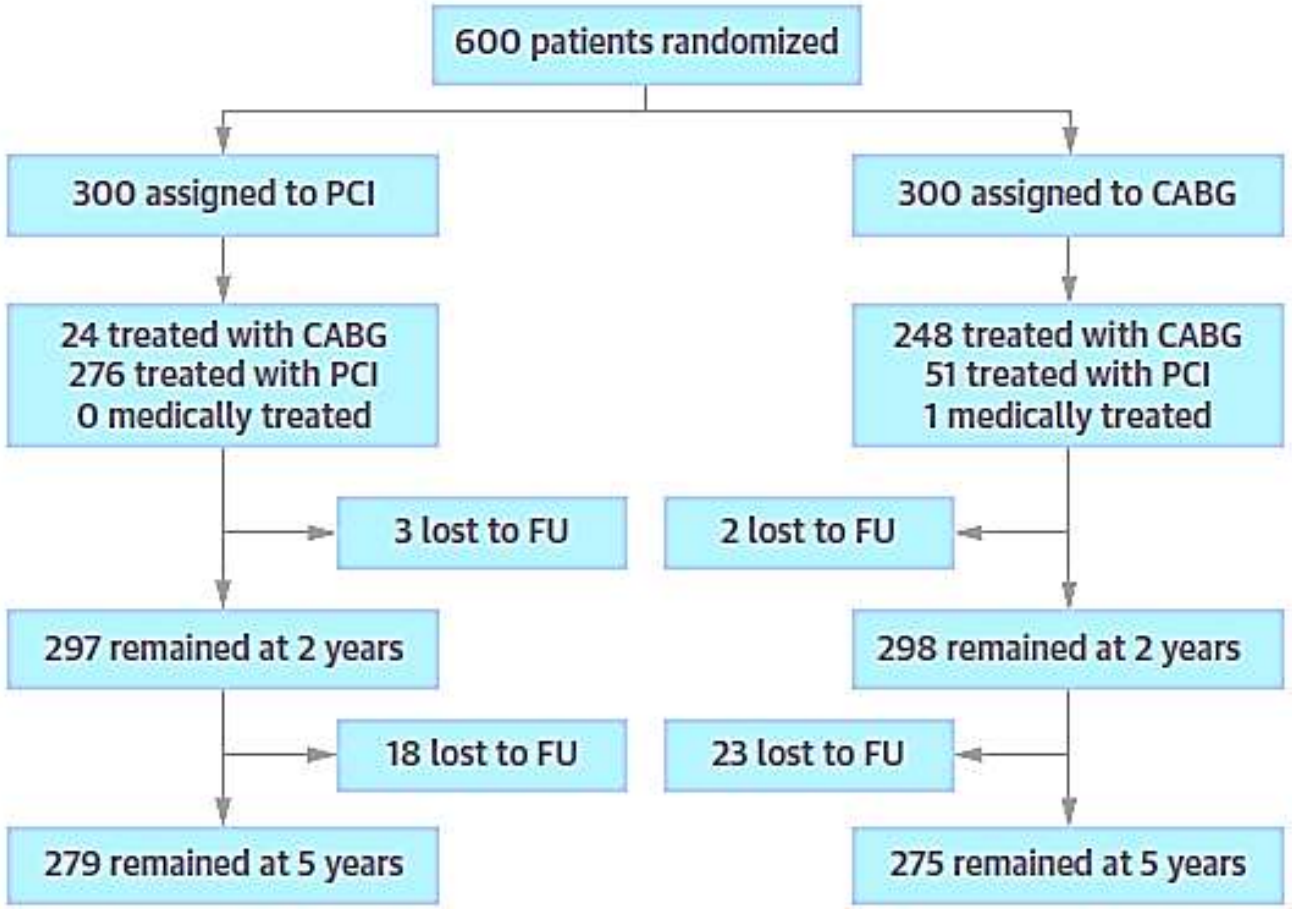
Zheng Chin Med J 2016;129:505-10

EBC

DK crush (Chen) > Culotte (Nordic 2) > Classic crush (Zheng) ?

LM: CABG or Stent ?

Randomized Trial of Stents vs Bypass Surgery for LMCA Disease: 5-Year Outcomes of the PRECOMBAT Study

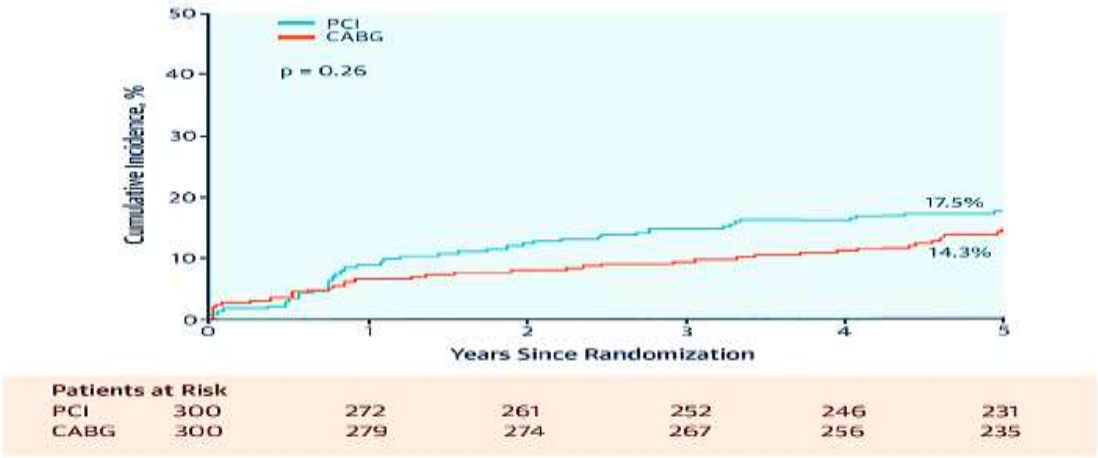


Ahn, J Am Coll Cardiol 2015;65:2198–206

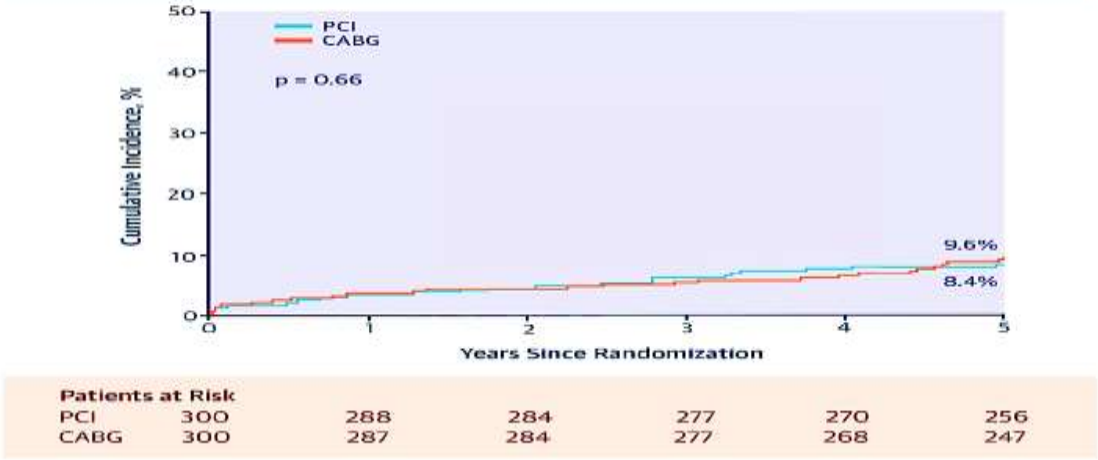
Randomized Trial of Stents vs Bypass Surgery for LMCA Disease: 5-Year Outcomes of the PRECOMBAT Study

Stenting vs CABG for Left Main Stenosis: Cumulative Event Curves of the Primary Endpoint and the Major Secondary Endpoint at the 5-Year FU

Composite of death from any cause,MI, stroke, or ischemia-driven TVR



Composite of death of any cause, MI, or stroke

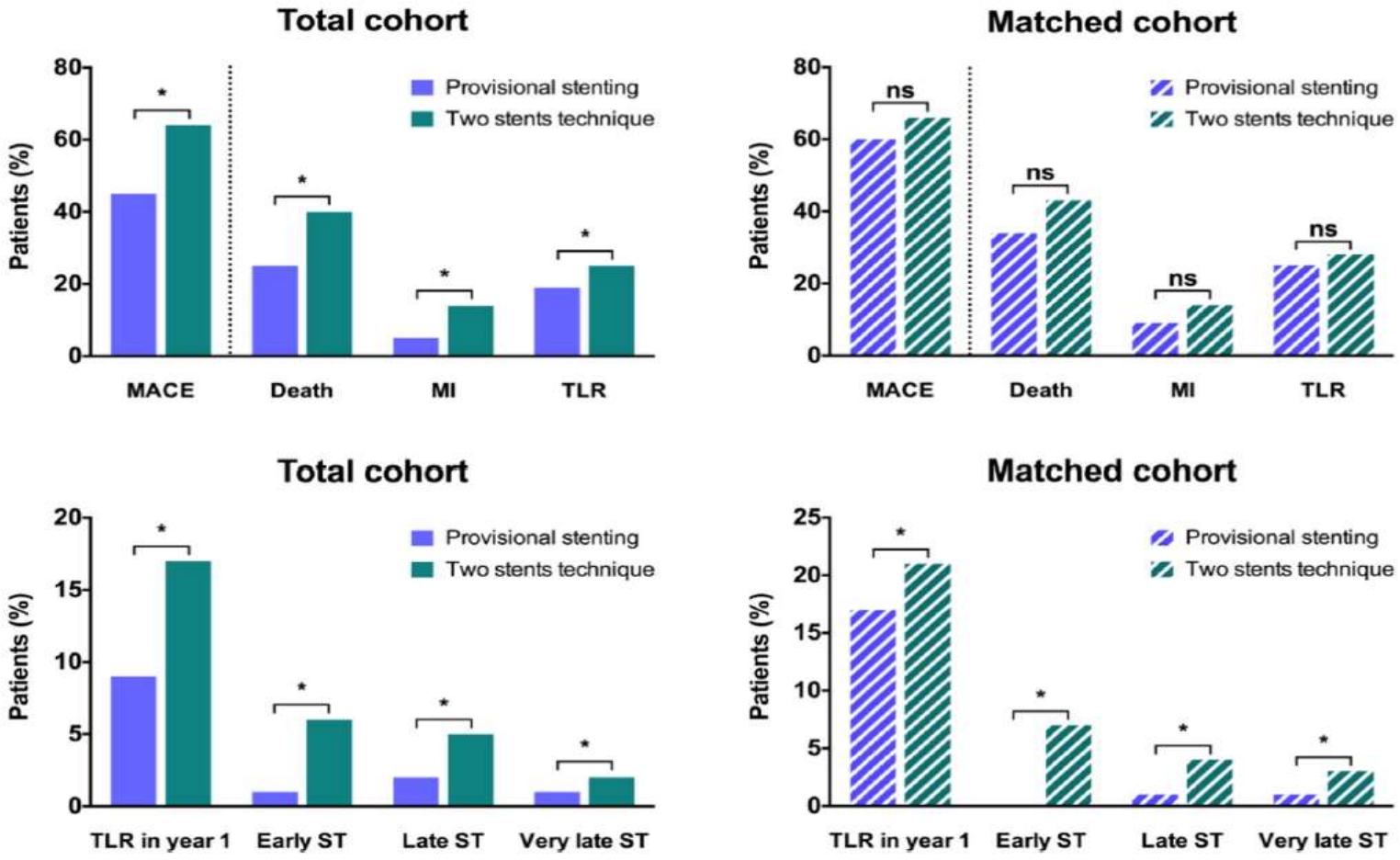


Ahn, J Am Coll Cardiol 2015;65:2198–206

waiting for EXCEL and NOBLE

Provisional vs. two-stent technique for ULM CAD after 10 years FU: A propensity matched analysis

Provisional vs. 2 stent technique after 10 year and 1 year FU before and after propensity score matching (n= 285)



* p < 0.05

D'Ascenzo International Journal of Cardiology 211 (2016) 37–42

waiting for **EBC main** (1 vs 2 stents for distal LM stenting)