Left Main Bifurcation PCI:

Merged Analysis using the Largest Real-World Left Main Database

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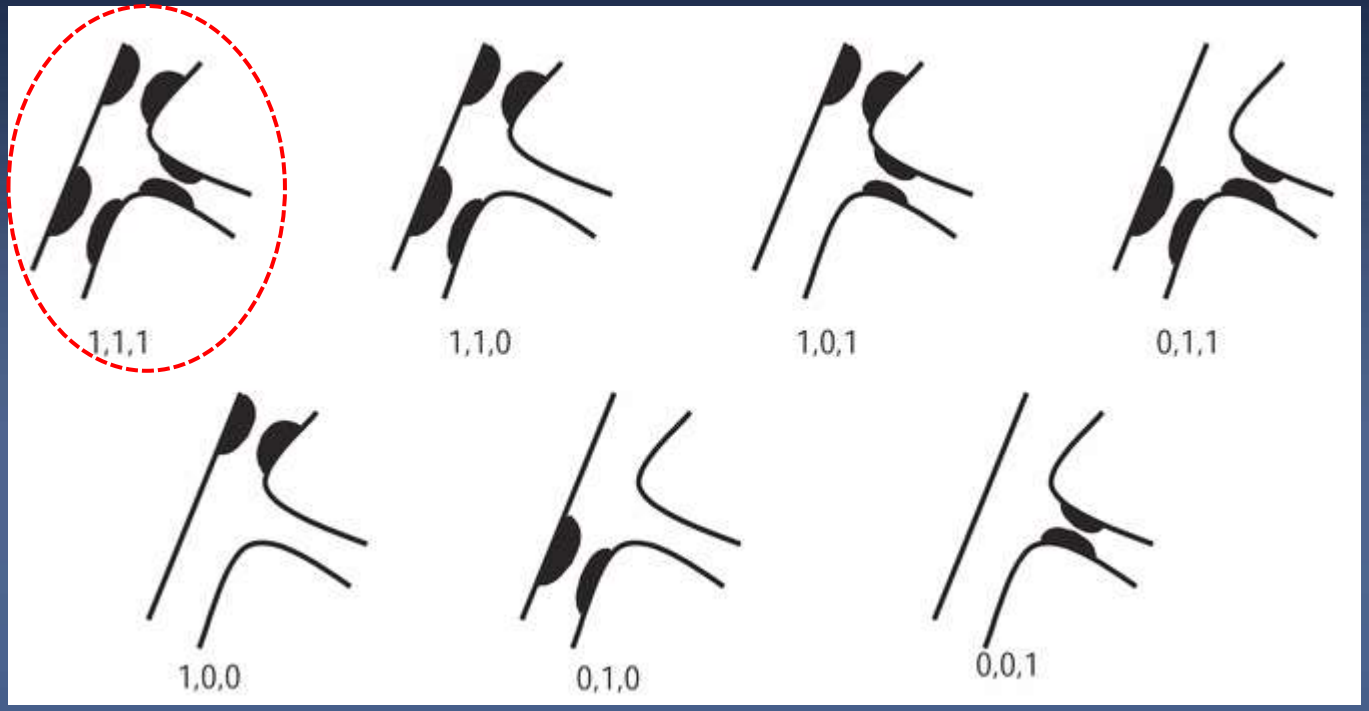
Disclosure

- Nothing to disclose

Anatomic Diversity of Bifurcation PCI

Anatomic concept;
the Medina classification

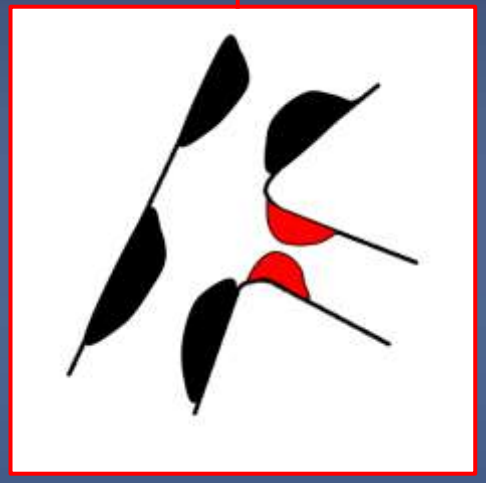


The Medina classification can provide useful information to decide bifurcation PCI strategies.

In bifurcation lesions, Medina (1.1.1) lesion is one of the most challenging lesion subsets.

Even in the True Bifurcation Lesion: Media (1.1.1) lesion…

Focal moderate lesion in SB

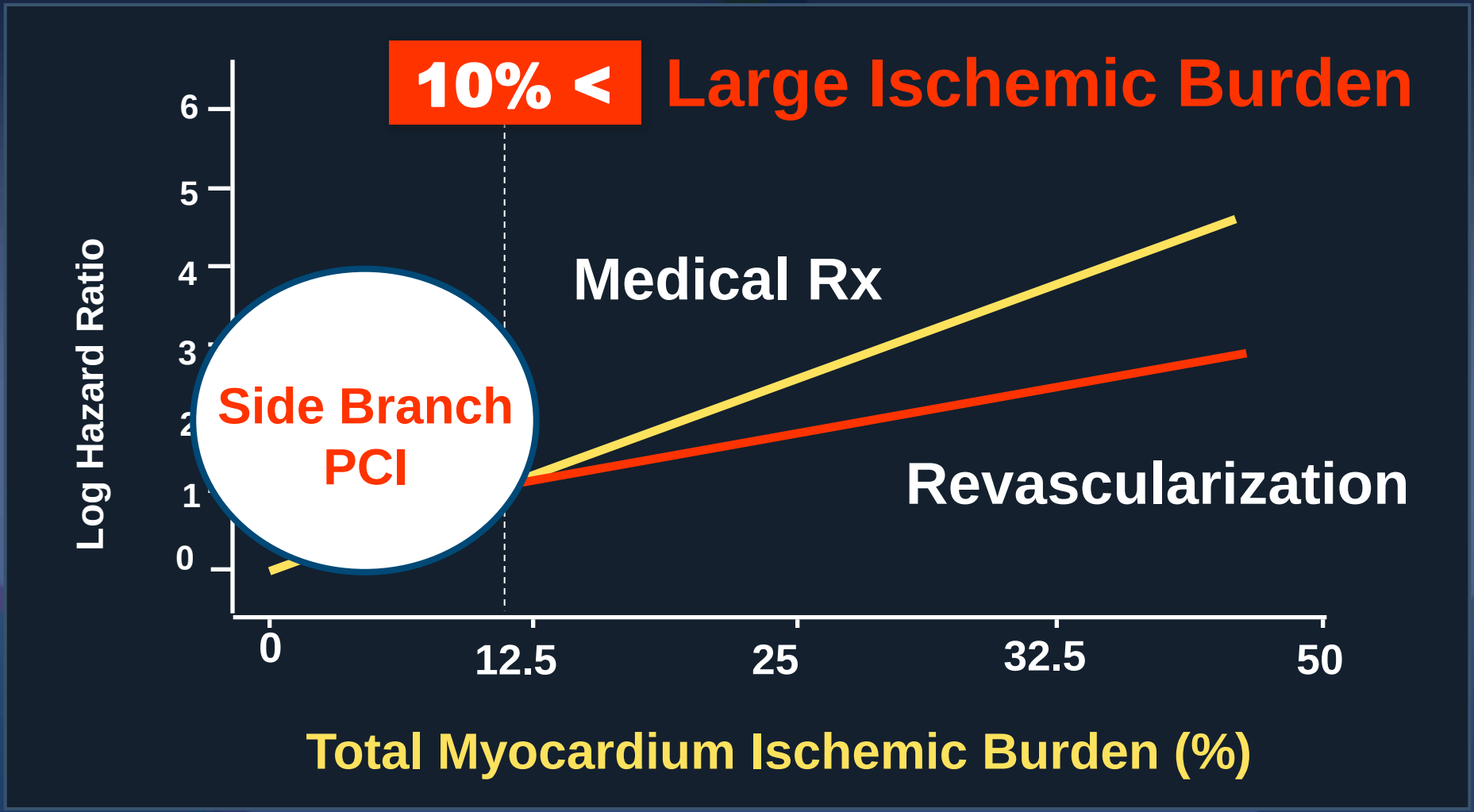


Focal severe lesion in SB

Diffuse lesion in SB

Anatomic Variability of Bifurcation Lesions: "No two bifurcations are identical"

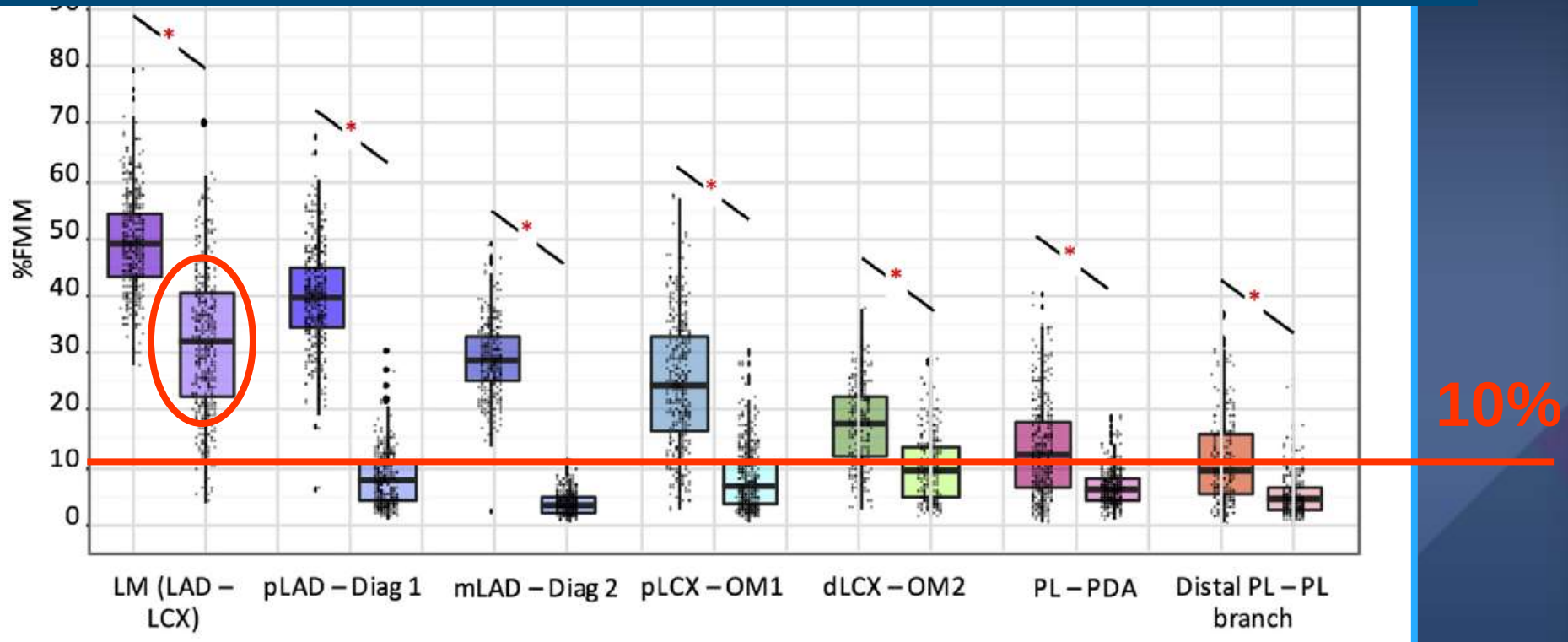
Survival Benefit
of Revascularization



Hachamovitch R, Circulation. 2003;107:2900-2906

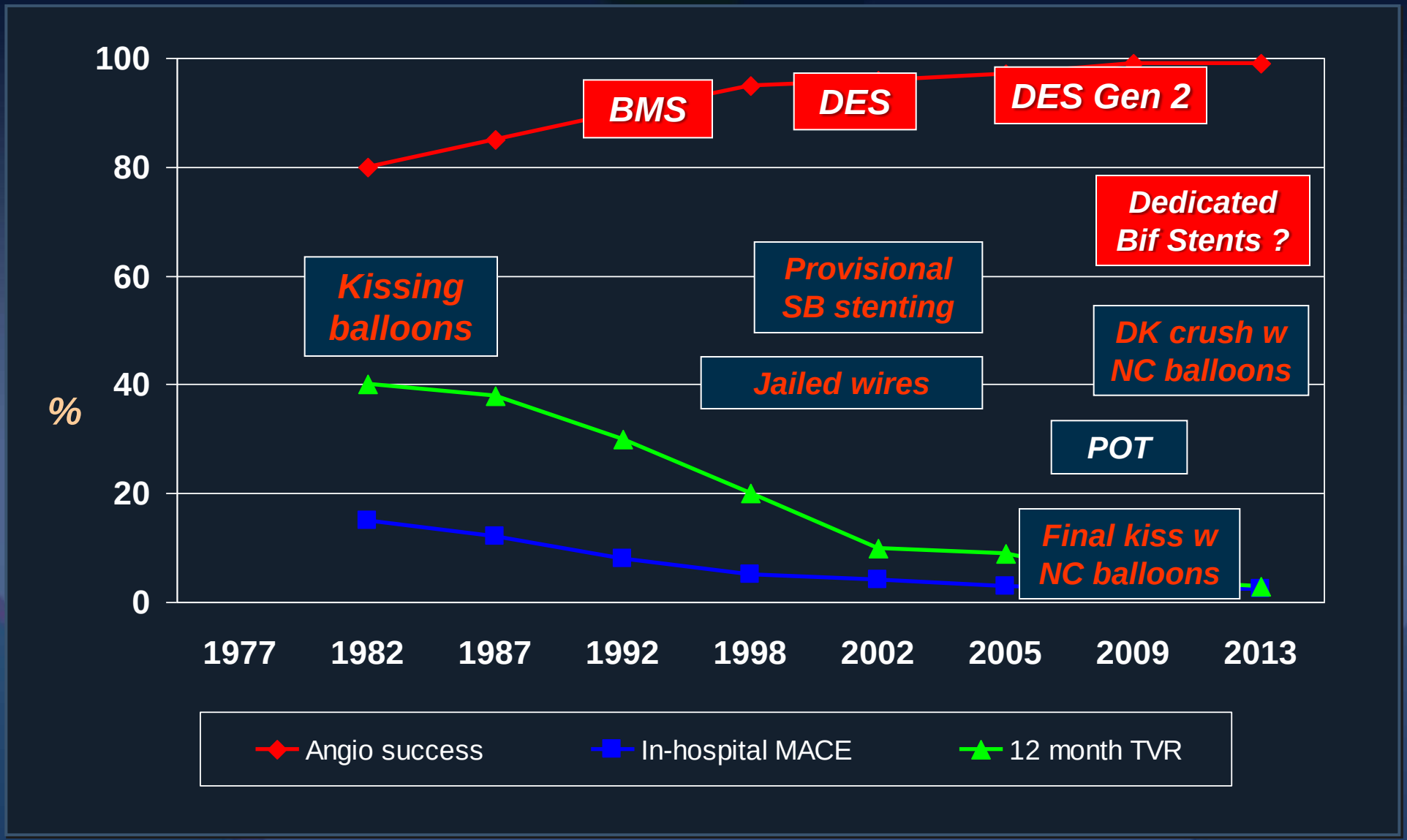
CT-FFR: Myocardial Mass >10%

LCX-Supplied Myocardial Mass >>10%: "Do Not Ignore Anymore"



Kim H.Y. et al. J Am Coll Cardiol Intv 2017;10:571–81

Evolution of Bifurcation Treatment



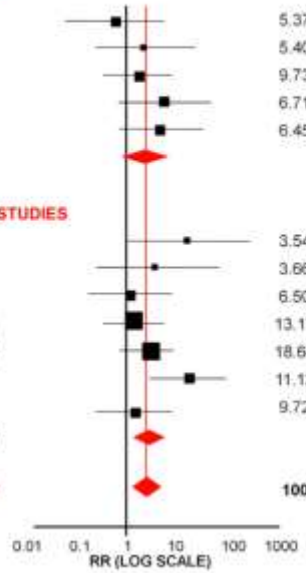
Courtesy of T. Lefevre

Meta-Analysis of 12 Major Studies, 6961 Pts

Provisional Strategy Was Usually Better !

A — DES Thrombosis

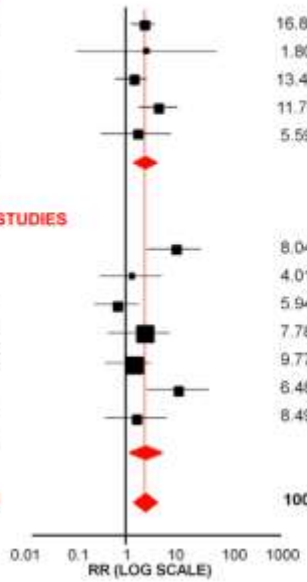
Study	Year	DDS	SDS	Weight*	RR (random) 95% CI
RANDOMIZED, CONTROLLED TRIALS					
NORDIC	2008	1/196	2/199	5.37%	0.50 (0.04–5.55)
Ferenc et al.	2008	2/101	1/101	5.40%	2.00 (0.18–21.71)
CACTUS	2009	3/177	2/173	9.73%	1.46 (0.24–8.66)
BBC-ONE	2010	5/249	1/248	6.71%	4.97 (0.58–42.31)
DK-CRUSH-II	2011	4/185	1/185	6.45%	4.00 (0.45–35.44)
META-ANALYSIS		**15/908**	**7/906**		**2.01 (0.77–5.23)**
Cochrane Q: 2.46 (p: 0.651) I²: 0%					
NONRANDOMIZED, OBSERVATIONAL STUDIES					
Ge et al.	2007	3/57	0/117	3.54%	14.24 (0.74–271.13)
Di Mario et al.	2007	4/109	0/38	3.66%	3.19 (0.17–57.92)
ARTS II	2007	1/61	4/263	6.50%	1.07 (0.12–9.47)
COBIS	2010	2/292	9/1376	13.17%	1.04 (0.22–4.82)
J-CYPHER	2011	3/263	10/1870	18.64%	2.13 (0.59–7.70)
J-PMS	2011	4/37	2/263	11.12%	14.21 (2.69–74.92)
Assali et al.	2011	2/141	3/260	9.72%	1.23 (0.21–7.27)
META-ANALYSIS		**19/960**	**27/4187**		**2.55 (1.13–5.78)**
Cochrane Q: 8.06 (p: 0.234) I²: 25.57%					
META-ANALYSIS		**34/1868**	**35/5093**	**100%**	**2.31 (1.33–4.03)**
Cochrane Q: 10.65 (p: 0.473) I²: 0%					



Single-stent **Two-stent**

C — Myocardial Infarction

Study	Year	DDS	SDS	Weight*	RR (random) 95% CI
RANDOMIZED, CONTROLLED TRIALS					
NORDIC	2008	39/196	20/199	16.86%	1.97 (1.19–3.26)
Ferenc et al.	2008	2/101	1/101	1.80%	2.00 (0.18–21.71)
CACTUS	2009	19/177	15/173	13.48%	1.28 (0.65–2.35)
BBC-ONE	2010	28/249	9/248	11.76%	3.09 (1.49–6.43)
DK-CRUSH-II	2011	6/185	4/185	5.59%	1.50 (0.43–5.22)
META-ANALYSIS		**94/908**	**49/906**		**1.88 (1.35–2.62)**
Cochrane Q: 3.59 (p: 0.453) I²: 0%					
NONRANDOMIZED, OBSERVATIONAL STUDIES					
Ge et al.	2007	13/57	5/117	8.04%	5.33 (1.99–14.24)
Di Mario et al.	2007	7/109	2/38	4.01%	1.22 (0.26–5.62)
ARTS II	2007	3/61	16/263	5.94%	0.80 (0.24–2.68)
COBIS	2010	5/292	15/1376	7.78%	1.57 (0.57–4.28)
J-CYPHER	2011	6/263	39/1870	9.77%	1.09 (0.46–2.55)
J-PMS	2011	5/37	6/263	6.48%	5.92 (1.90–18.44)
Assali et al.	2011	7/141	10/260	8.49%	1.29 (0.50–3.32)
META-ANALYSIS		**43/960**	**93/4187**		**1.85 (1.03–3.32)**
Cochrane Q: 12.79 (p: 0.041) I²: 53.11%					
META-ANALYSIS		**140/1727**	**142/5093**	**100%**	**1.86 (1.34–2.60)**
Cochrane Q: 16.34 (p: 0.129) I²: 32.69%					

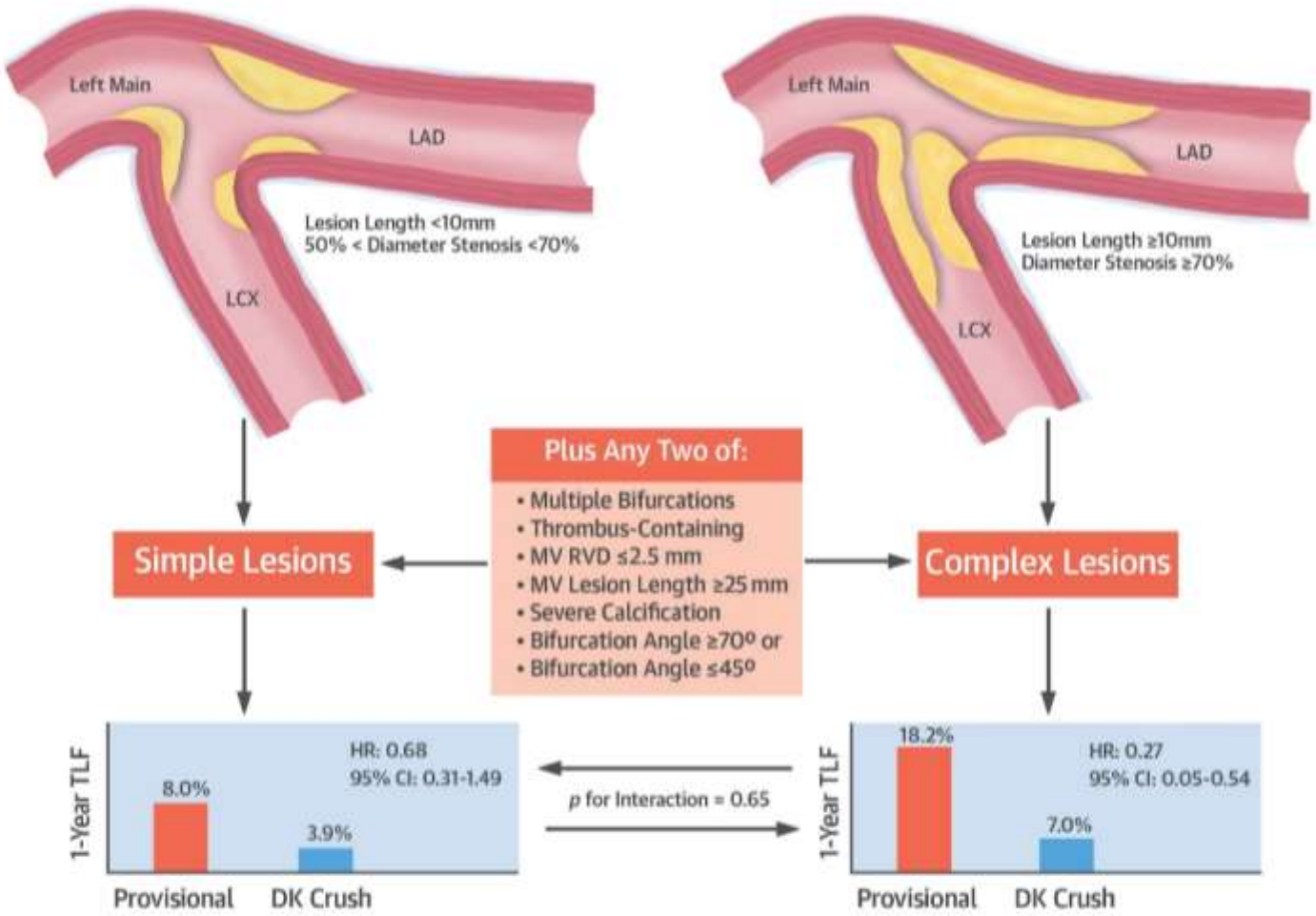


Single-stent **Two-stent**

Zimarino et al. J Am Coll Cardiol Intv 2013;6:687–95

Better Strategy for Distal LM bifurcation?

DKCRUSH-V Trial



Chen, S.-L. et al. J Am Coll Cardiol. 2017;70(21):2605-17.

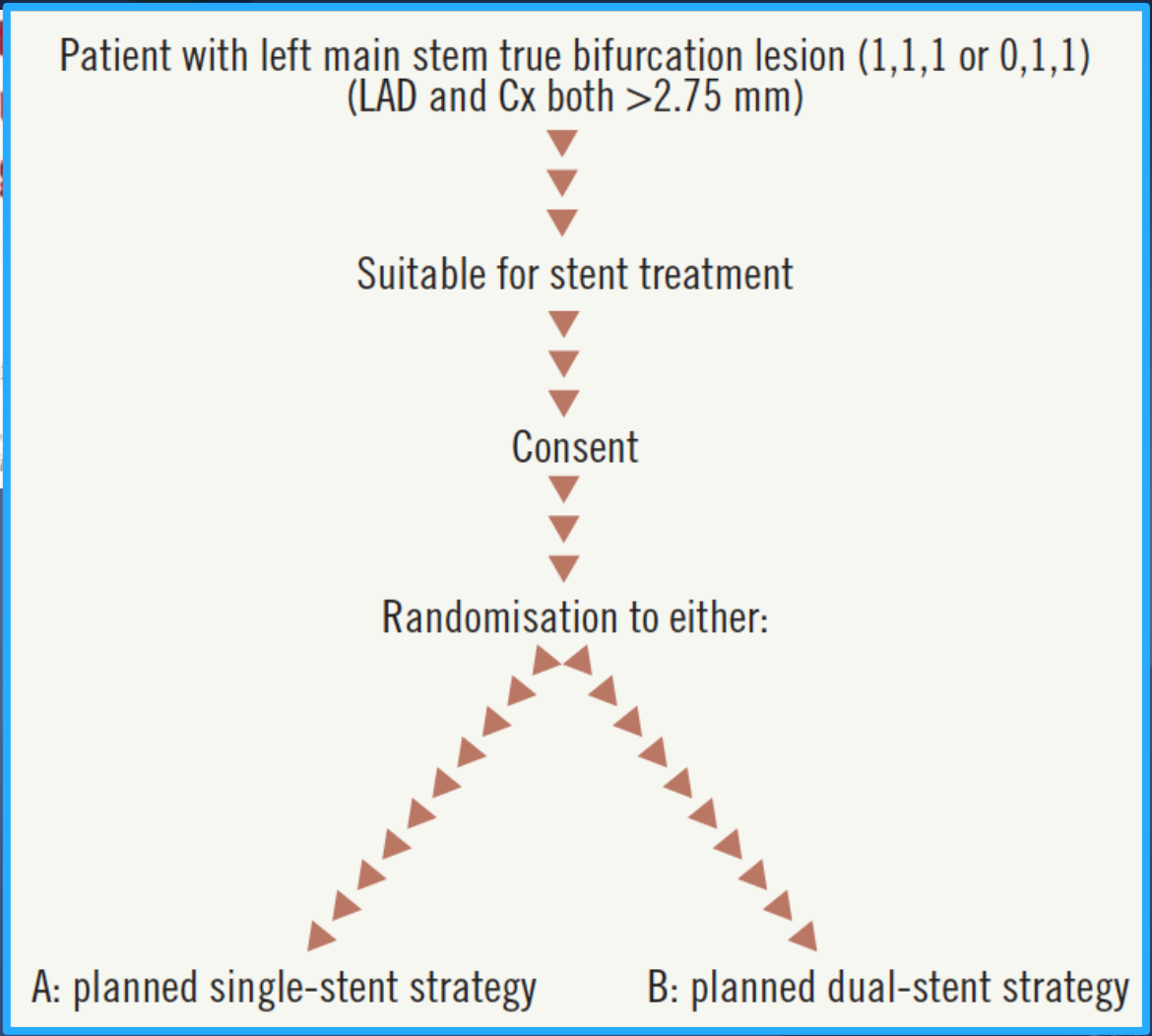
Better Strategy for Distal LM bifurcation?

EBC-MAIN Trial

The European Bifurcation Club Left Main St
rationale and design of an international, m
randomised comparison of two stent strate
treatment of left main coronary bifurcation

Alaide Chieffo[1*], MD; David Hildick-Smith[2], MD; on behalf o

1. Interventional Cardiology Unit, San Raffaele Scientific Institute, Milan,
Brighton and Sussex University Hospitals NHS Trust, Brighton, United K



Chieffo A. al, Eurointervention 2016;12:47-52

Real-World Data Is Still Lacking…

Left Main Bifurcation PCI:

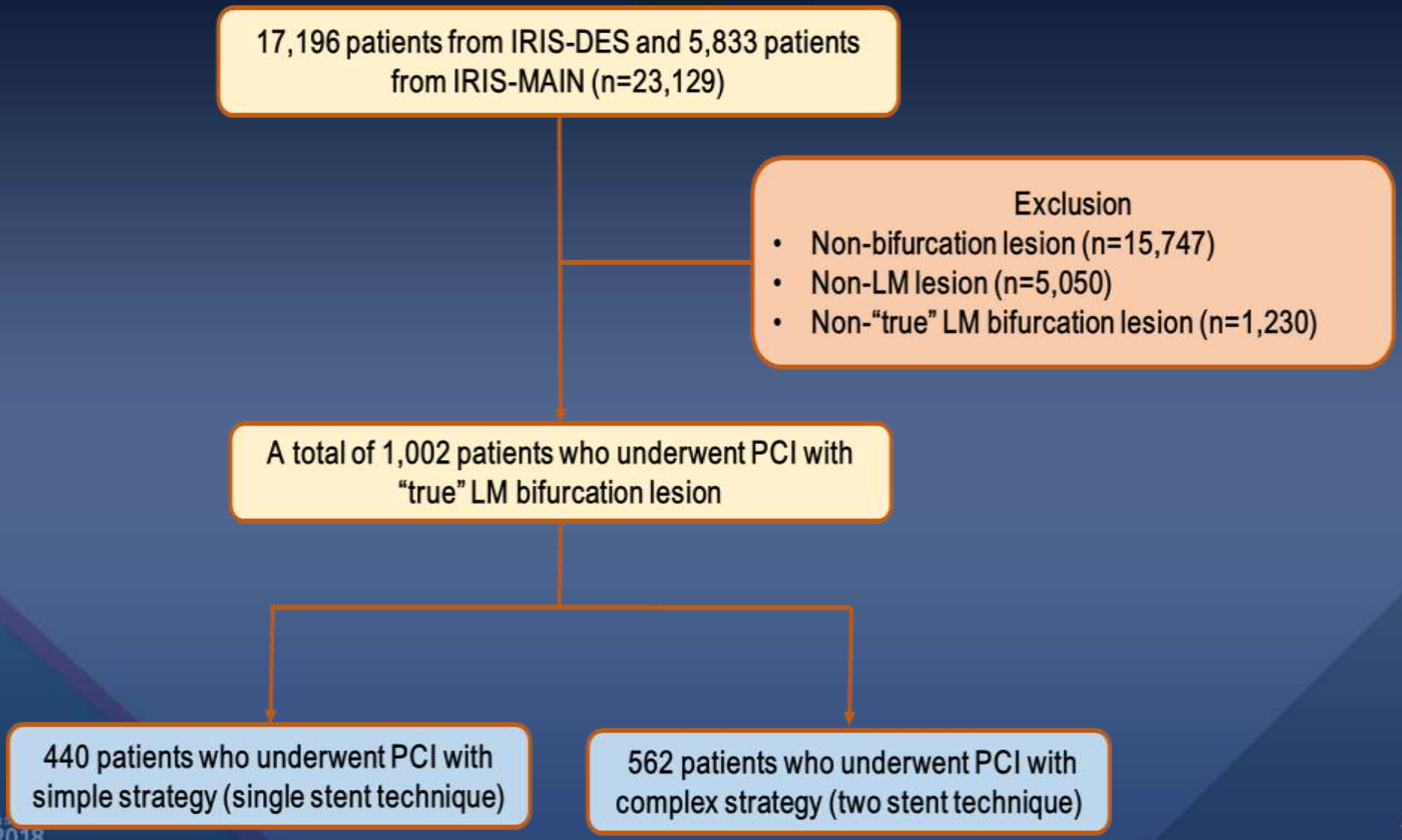
Merged Analysis using the Largest Real-World Left Main Database

Population and Inclusion Criteria

- The study population were pooled from two large-scaled, independent, multicenter, observational studies of the **IRIS-MAIN** and **IRIS-DES** registry.

1. Distal LM bifurcation stenosis >50% with ischemic symptom or positive stress test
2. Medina type **1,1,1** or **0,1,1**
3. LAD and LCX diameter both > 2.5mm

Study Population



Study Endpoints

Primary Endpoint

- Target-vessel failure
  : a composite of cardiac death, target-vessel MI, or clinically-indicated target-vessel revascularization (TVR)

Secondary Endpoints

- death (cardiac or non-cardiac), MI (Q-waver or Non-Q-wave), repeat revascularization (TVR or non-TVR), and stent thrombosis.

Statistics

- Student t-test for continuous variables.
- Fisher-exact for categorical variables.
- Cumulative incidence rates of primary and secondary clinical outcomes were estimated by the Kaplan–Meier method and tested by the log-rank statistic.
- **Propensity-score (PS) analysis using inverse-probability-of-treatment weighting(IPTW) and PS matching** were used to estimate the risk of the statin group compared with the simple strategy.

Baseline Clinical Characteristics

Characteristic	Unadjusted Data			IPTW-Adjusted		
	1-stent (*n* = 440)	2-stent (*n* = 562)	*P*	1-stent (*n* = 440)	2-stent (*n* = 562)	*P*
Age, year	64.4 ± 10.5	64.4 ± 9.8	0.97	64.5 ± 10.6	64.6 ± 9.9	0.93
Male sex, n (%)	340 (77.3)	438 (77.9)	0.86	339 (77.1)	434 (77.2)	0.96
Body mass index, kg/m^2	24.2 ± 3.0	24.7 ± 2.9	0.01	24.5 ± 3.1	24.5 ± 2.9	0.88
Hypertension	280 (63.6)	361 (64.2)	0.89	281 (64.0)	361 (64.1)	0.96
Diabetes mellitus	172 (39.1)	198 (35.2)	0.23	163 (37.0)	209 (37.1)	0.96
Current smoking	123 (28.0)	135 (24.0)	0.18	112 (25.4)	144 (25.5)	0.95
Hyperlipidemia	64 (14.5)	53 (9.4)	0.02	52 (11.9)	67 (11.8)	0.98
Previous MI	29 (6.6)	50 (8.9)	0.22	33 (7.6)	44 (7.8)	0.90
Previous PCI	77 (17.5)	121 (21.5)	0.13	87 (19.8)	111 (19.7)	0.97
Previous stroke	35 (8.0)	42 (7.5)	0.86	33 (7.4)	43 (7.6)	0.91
Previous heart failure	17 (3.9)	10 (1.8)	0.07	12 (2.6)	14 (2.5)	0.93

Baseline Clinical Characteristics

Characteristic	Unadjusted Data			IPTW-Adjusted		
	1-stent (*n* = 440)	2-stent (*n* = 562)	*P*	1-stent (*n* = 440)	2-stent (*n* = 562)	*P*
Chronic renal failure	11 (2.5)	20 (3.6)	0.43	19 (4.3)	25 (4.5)	0.85
Clinical presentation			0.06			0.47
Stable angina	206 (46.8)	274 (48.8)		219 (49.8)	268 (47.7)	
Unstable angina	145 (33.0)	206 (36.7)		142 (32.3)	202 (35.9)	
MI	89 (20.2)	82 (14.6)		79 (18.0)	92 (16.4)	
EF Mean, %	58.8 ± 10.5	59.6 ± 9.8	0.28	59.3 ±10.2	59.2 ± 10.1	0.94
Discharge medications						
Aspirin	427 (97.0)	557 (99.1)	0.03	432 (98.2)	552 (98.2)	0.99
ADP receptor antagonist	420 (95.5)	542 (96.4)	0.52	422 (96.0)	540 (96.0)	0.99
β-blocker	248 (56.4)	312 (55.5)	0.83	245 (55.6)	313 (55.6)	0.99
Calcium channel blocker	212 (48.2)	268 (47.7)	0.92	209 (47.6)	268 (47.7)	0.98
ACE inhibitor or ARB	204 (46.4)	254 (45.2)	0.76	197 (44.9)	252 (44.8)	0.97
Statin	167 (38.0)	221 (39.3)	0.70	170 (38.7)	217 (38.6)	0.97

Angiographic and Procedural Characteristics

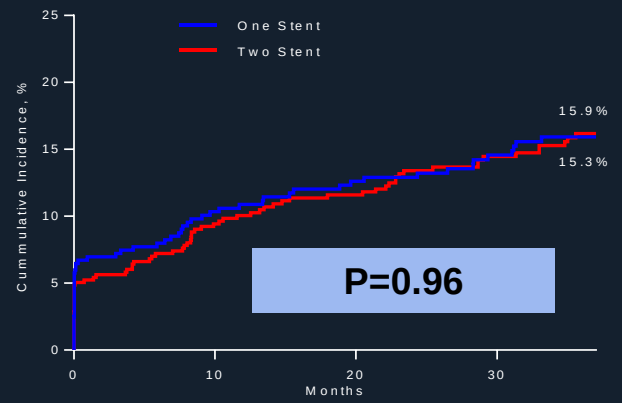
Characteristic	Unadjusted Data 1-stent (*n* = 440)	Unadjusted Data 2-stent (*n* = 562)	Unadjusted Data *P*	IPTW-Adjusted 1-stent (*n* = 440)	IPTW-Adjusted 2-stent (*n* = 562)	IPTW-Adjusted *P*
Disease extent			0.46			0.98
2-vessel disease	327 (74.3)	430 (76.5)		333 (75.8)	426 (75.7)	
3-vessel disease	113 (25.7)	132 (23.5)		107 (24.2)	136 (24.3)	
Medina			0.99			0.79
1.1.1	412 (93.6)	525 (93.4)		411 (93.6)	524 (93.1)	
0.1.1	28 (6.4)	37 (6.6)		29 (6.4)	42 (6.9)	
Use of IVUS	323 (73.4)	432 (76.9)	0.23	329 (74.8)	422 (75.0)	0.95

Angiographic and Procedural Characteristics

Characteristic	Unadjusted Data			IPTW-Adjusted		
	1-stent (*n* = 440)	2-stent (*n* = 562)	*P*	1-stent (*n* = 440)	2-stent (*n* = 562)	*P*
DES type			0.47			0.93
1st-generation						
SES	94 (21.4)	151 (26.9)		107 (24.4)	139 (24.7)	
PES	5 (1.1)	5 (0.9)		5 (1.2)	4 (0.8)	
2nd-generation						
CoCr-EES	118 (26.8)	147 (26.2)		112 (25.4)	151 (26.9)	
PtCr-EES	82 (18.6)	105 (18.7)		80 (18.1)	107 (19.0)	
PC-ZES	73 (16.6)	81 (14.4)		70 (15.8)	83 (14.8)	
Re-ZES	28 (6.4)	21 (3.7)		27 (6.0)	25 (4.4)	
BES	32 (7.3)	36 (6.4)		30 (6.9)	37 (6.7)	
Others	8 (1.8)	16 (2.8)		10 (2.1)	15 (2.7)	

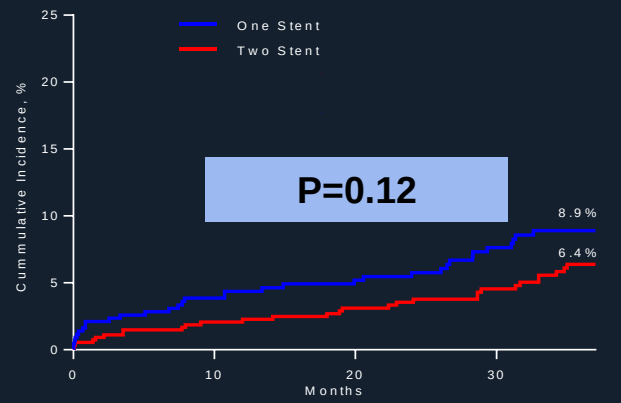
Unadjusted 3-Year Event Rate of Clinical Outcome

TVF



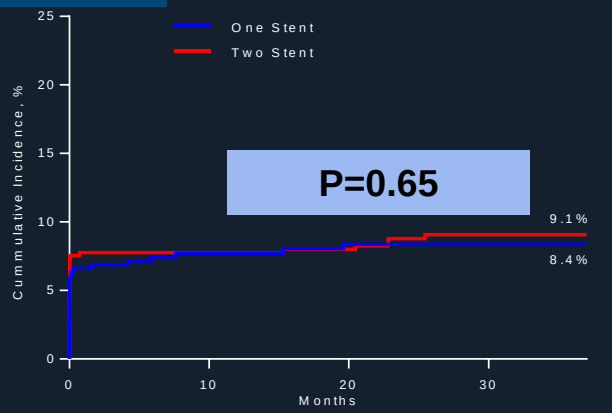
No. at Risk					
One Stent	440	336	301	255	219
Two Stetn	562	445	397	320	266

Death



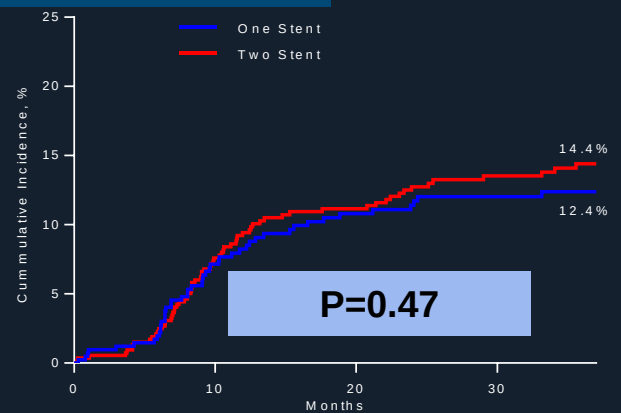
No. at Risk					
One Stent	440	376	345	295	258
Two Stetn	562	503	454	376	318

MI



No. at Risk					
One Stent	440	316	288	248	214
Two Stetn	562	412	369	298	246

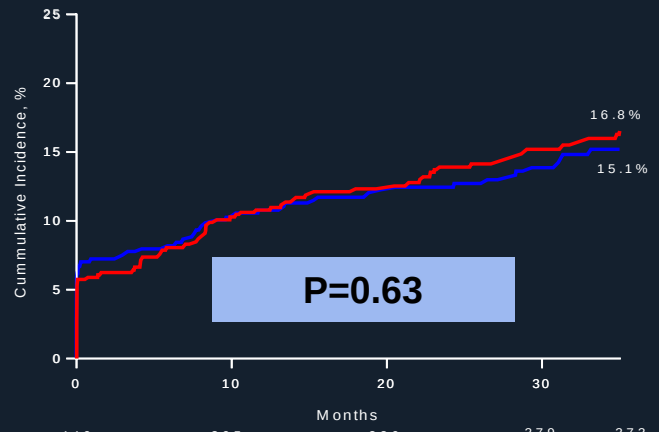
Revascularization



No. at Risk					
One Stent	440	351	308	257	221
Two Stetn	562	464	402	321	264

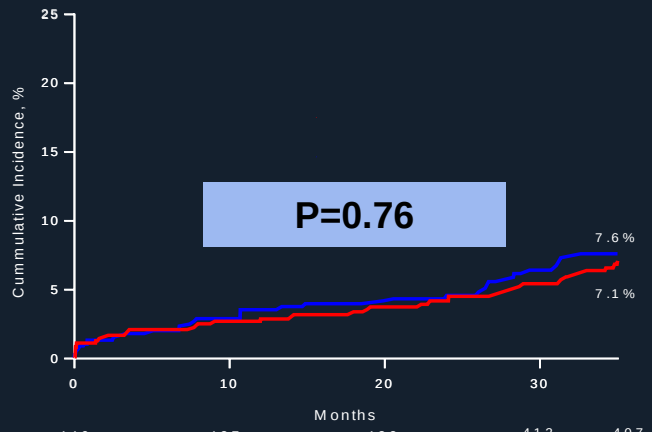
IPTW-Adjusted Outcomes

TVF



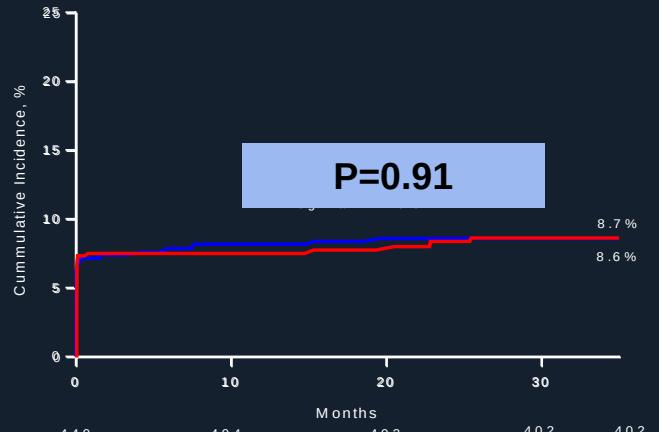
No. at Risk					
One Stent	440	395	386	379	373
Two Stent	562	504	493	476	467

Death



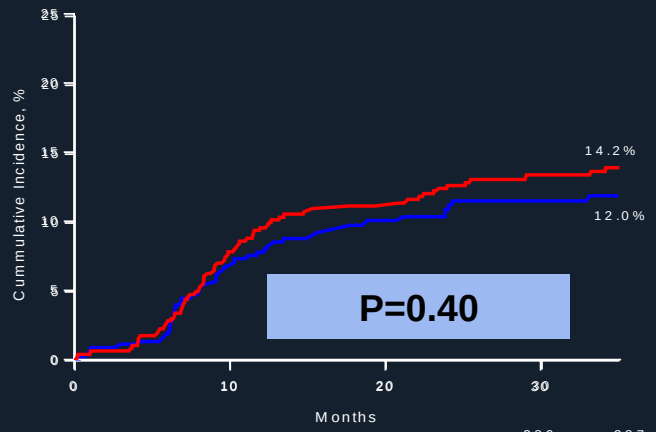
No. at Risk					
One Stent	440	427	422	412	407
Two Stent	562	547	541	531	522

MI



No. at Risk					
One Stent	440	404	402	402	402
Two Stent	562	519	518	513	513

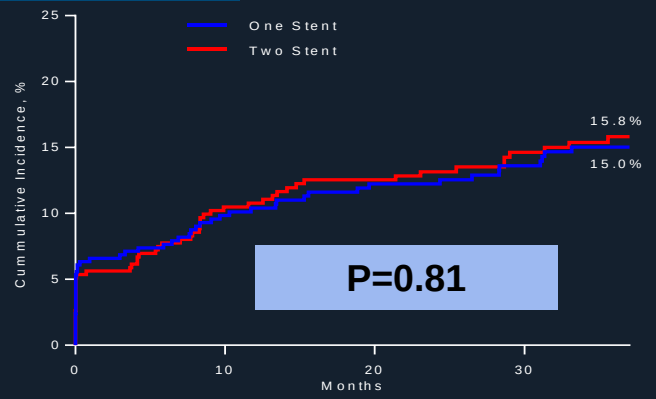
Revascularization



No. at Risk					
One Stent	440	410	395	389	387
Two Stent	562	518	500	487	482

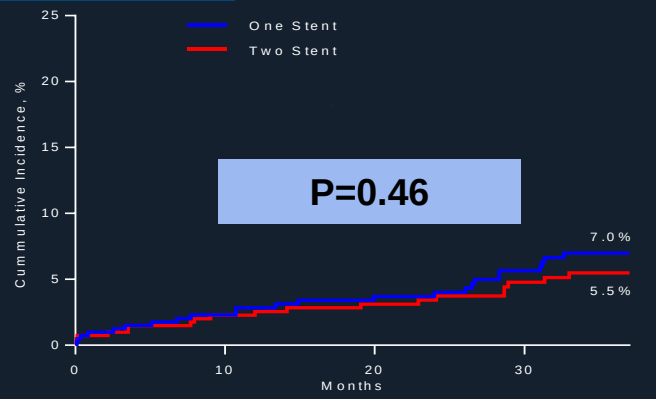
PS Matching-Adjusted Outcome

TVF



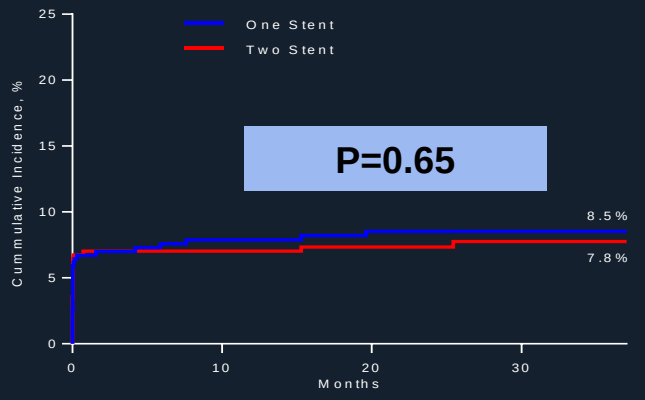
No. at Risk					
One Stent	417	323	289	246	211
Two Stetn	417	325	290	231	189

Death



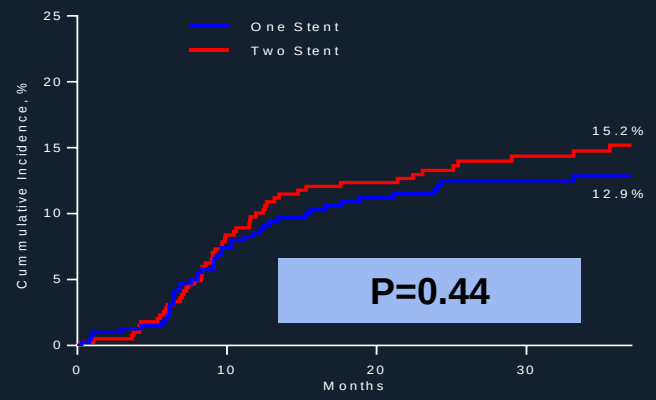
No. at Risk					
One Stent	417	363	332	286	250
Two Stetn	417	374	336	272	226

MI



No. at Risk					
One Stent	417	305	277	240	207
Two Stetn	417	311	279	224	182

Revascularization



No. at Risk					
One Stent	417	338	295	248	216
Two Stetn	417	342	293	230	189

Conclusion in Merged Analysis of Large-Sized Real-World Database

1 vs. 2 Stents for Distal True Left Main Lesions

- Our large observational registry demonstrated that one and two stent strategies do not differ statistically in clinical outcomes in distal true left main bifurcation lesions.
- Optimal stenting strategy for complex distal left main disease is still debating and supporting evidences are also lacking.
- Further large-sized, well-designed RCTs (ie, EBC-MAIN) are required to define optimal treatment strategies for significant distal left main disease.