11° CONGRESSO NAZIONALE

CAMPUS Cuore

Quello che le Linee Guida Non Dicono

Napoli
5-6 aprile 2024

HOW TO SESSION 2
CARDIOLOGIA INTERVENTISTICA CORONARICA E VALVOLARE

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TRATTAMENTO OTTIMALE DELLE STENOSI CORONARICHE IN BIFORCAZIONE: UPDATE 2024

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Definitions and Standardized Endpoints for Treatment of Coronary Bifurcations

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https://eurointervention.pcronline.com/doi/10.4244/EIJ-E-22-00018

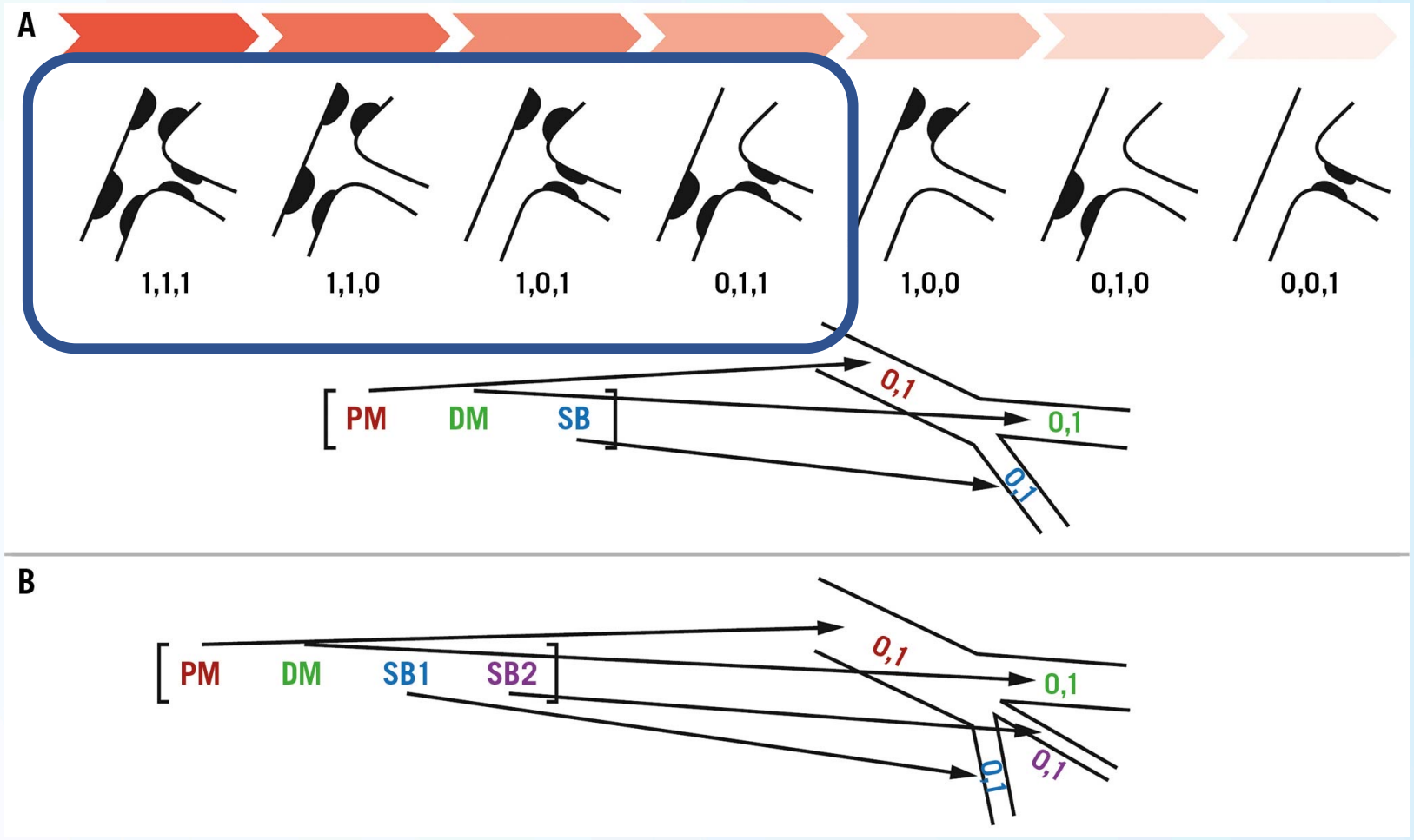
DEFINITION

A coronary artery narrowing occurring adjacent to, and/or involving the origin of a significant side branch (SB) > 2.0 mm

"True" bifurcation lesions, involving a significant (≥ 50%) diameter stenosis (% DS) both in the main vessel (MV) and SB (MEDINA 1,1,1; 1,0,1; or 0,1,1), and "non-true" lesions in all other case

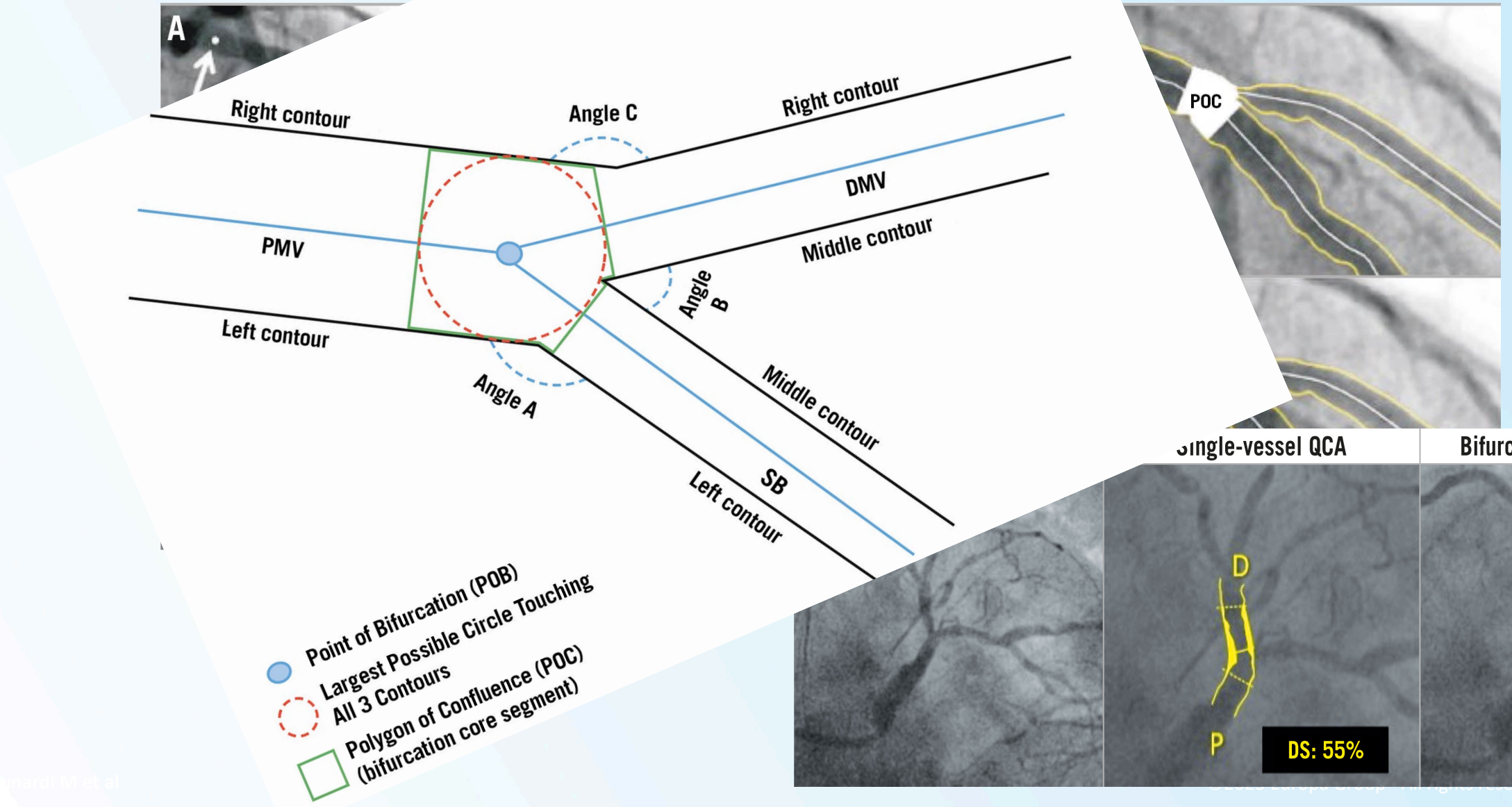
The question is: when a SB is significant ?

- ✓ **Relevance of a SB**
- ✓ **Acute technical/procedural success**
- ✓ **Long-term clinical outcomes**



Definitions and Standardized Endpoints for Treatment of Coronary Bifurcations

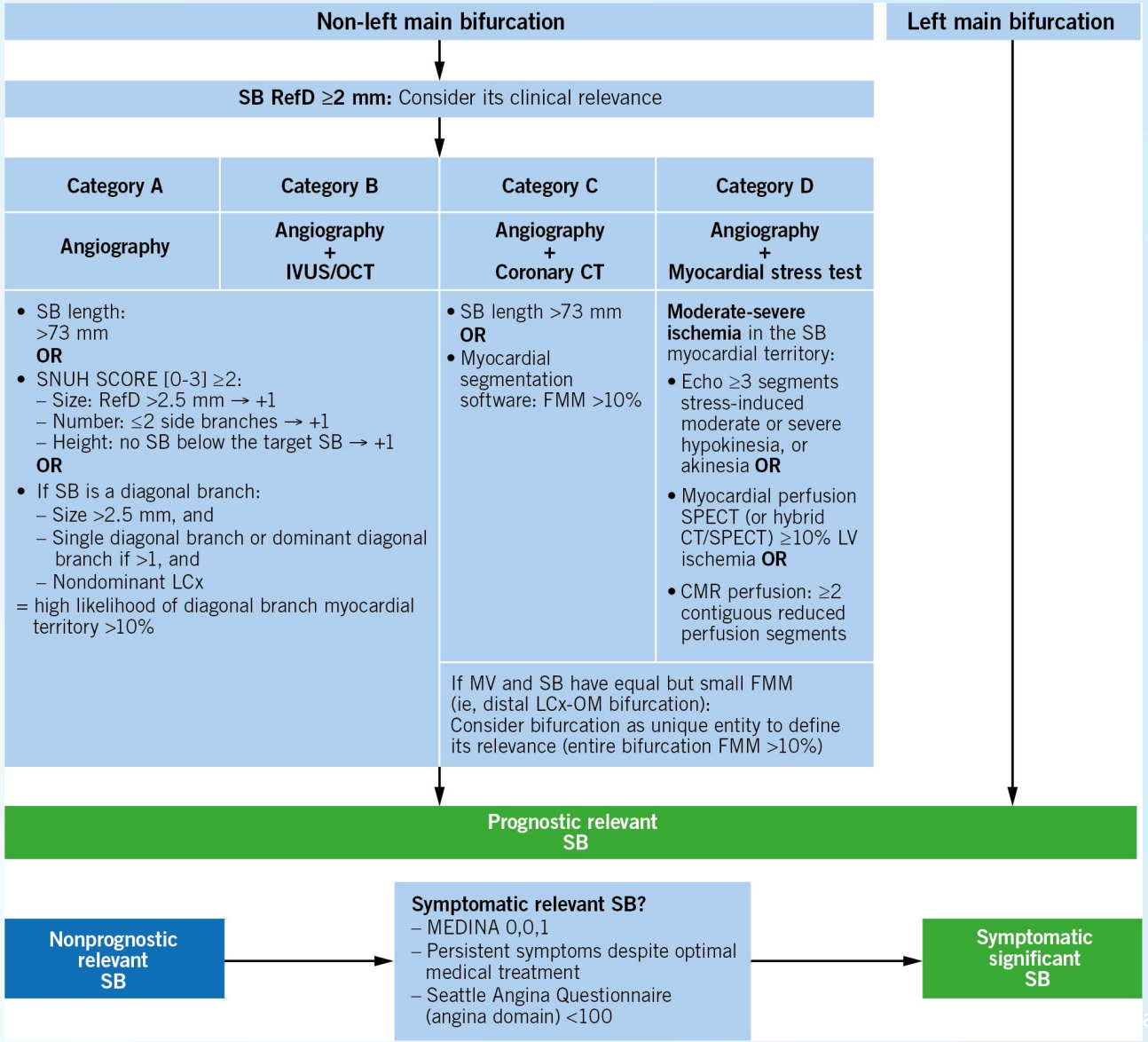
MEDINA CLASSIFICATION


A
Right contour
Angle C
Right contour
DMV
PMV
Middle contour
Angle B
Left contour
Angle A
Middle contour
SB
Left contour
Point of Bifurcation (POB)
Largest Possible Circle Touching All 3 Contours
Polygon of Confluence (POC) (bifurcation core segment)
POC
Single-vessel QCA
Bifurcation dedicated QCA
D
P
DS: 55%
M
S
P
DS: 48%

INDICATIONS FOR TREATMENT OF CORONARY BIFURCATIONS

- ✓ In CCS with angiographically intermediate stenosis (%DS <70), documenting ischemia is recommended via noninvasive stress testing or invasive functional assessment (with SB assessment limited to MEDINA 0,0,1 lesions)

- ✓ In ACS cases, revascularization is guided by the detection of plaque disruption and/or thrombus at the site of the bifurcation, plus physiology

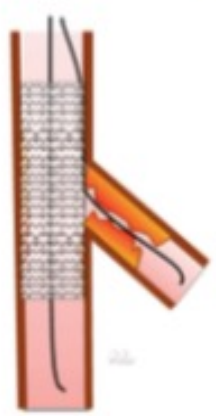


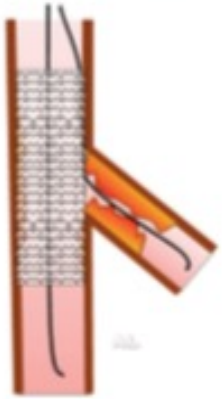
	M Main prox. first	A Main Across side first (provisional)	D Double prox. lumen	S Side branch first
1st stent	PM stenting	MB cross-over stenting		SB ostial stenting
Ballooning	Skirt (K)	POT; Side-branch dilation; Kissing (S PS PK PSP PKP)		S K; Balloon SB crush
2nd-3rd stent, (and further ballooning)	Extended skirt (K)	T; TAP; Culotte (K KP)	V/SKS	Intentional T stenting; PK PKP; Step/DK crush
Dedicated Device	Axxess	Bioss LIM, Xposition Stentys, Nile SIR		Capella Side-Guard

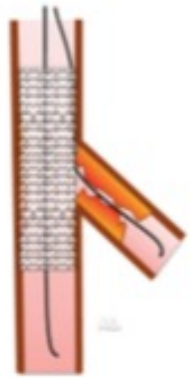
Inverted		Inverted A Across distal main first (Inverted provisional)		DM Distal Main first
1st stent		MB to SB stenting		DM ostial stenting
Ballooning		POT; Kissing (PS PK PSP PKP)		S K; Balloon DM crush
2nd stent, (and further ballooning)		Inverted T; Inverted TAP; Inverted Culotte (K KP)		PK PKP; Inverted Intentional T stenting; Inverted Step/DK crush
Dedicated Device		Tryton		

Bifurcation Stenting- Bailout Options

Provisional requiring a 2nd stent







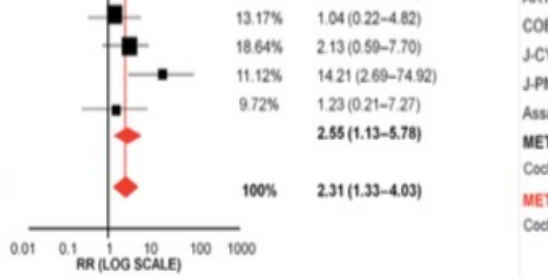
	TAP	Reverse Crush	Culotte
Advantages	Easy to perform No recrossing	Complete coverage of ostium Any anatomy	Complete coverage of ostium
Disadvantages	Struts protruding into MB	Recrossing into SB 3 layers of struts	More difficult rewiring Of both branches Double stent layer

Meta Analysis of 12 Major Studies, 6961 Patients (5 RCTs and 7 observational studies)

DES Thrombosis

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%					

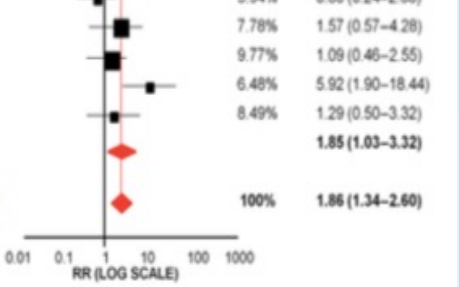


Single-stent Two-stent

Myocardial Infarction

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

1. Wire both branches
2. Dilate MB if needed
3. Stent MB and leave wire in the SB
4. Post-dilatation of MB with jailed wire in SB

Bifurcation Stenting

Keep it simple, but open!

Provisional stenting is *a treatment philosophy* rather than *a technique*

Approach bifurcations in a stepwise manner:

- ✓ ***Add layers of complexity as necessary***
- ✓ ***Stop when you have a good result***
- ✓ ***End up with two stents only when necessary***

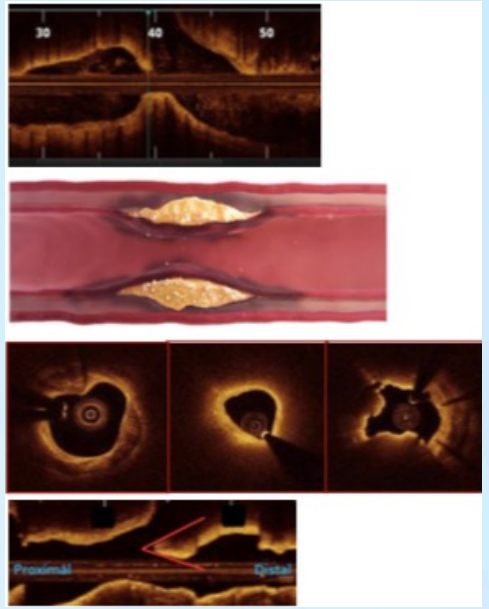
PERIPROCEDURAL MYOCARDIAL INFARCTION

- ✓ Myocardial infarction (MI) may occur in the periprocedural period
- ✓ Accordingly, in bifurcation studies, a PMI is defined by either an absolute **rise ≥35** upper limit of normal (ULN) threshold for type T hs-cTn plus clinical evidence of MI or an absolute cTn **rise ≥70** ULN as a stand-alone criterion within 48 hours of the PCI or coronary artery bypass graft (CABG)
- ✓ Such criteria reflect the SCAI definition, except for the use of hs-cTn have been calculated based on the SCAI CK-MB cutoff values (≥5 ULN and ≥10 ULN, respectively)

ROLE OF IMAGING IN BIFURCATION PCI

Pre-procedure: Optimal selection of devices and PCI strategy

- ✓ **Measurement of dimensions for lumen and vessel in MV and SB**
- ✓ **Assessment of atherosclerotic plaque morphology, burden, longitudinal distribution, calcification and negative remodeling**
- ✓ **Detection of angiographically silent disease**
- ✓ **Assessment of the risk of SB compromise**



Post-PCI: Optimization of the procedure

- ✓ **Stent apposition**
- ✓ **Stent expansion**
- ✓ **Full lesion coverage by the stent**
- ✓ **Stent edge dissection**
- ✓ **Plaque prolapse inside stent**
- ✓ **SB residual stenosis and dissection**
- ✓ **Optimal GW recrossing before SB dilation and subsequent adequate clearance of jailing struts after SB dilation.**

Lower mortality with use of intravascular imaging to guide uLMS PCI

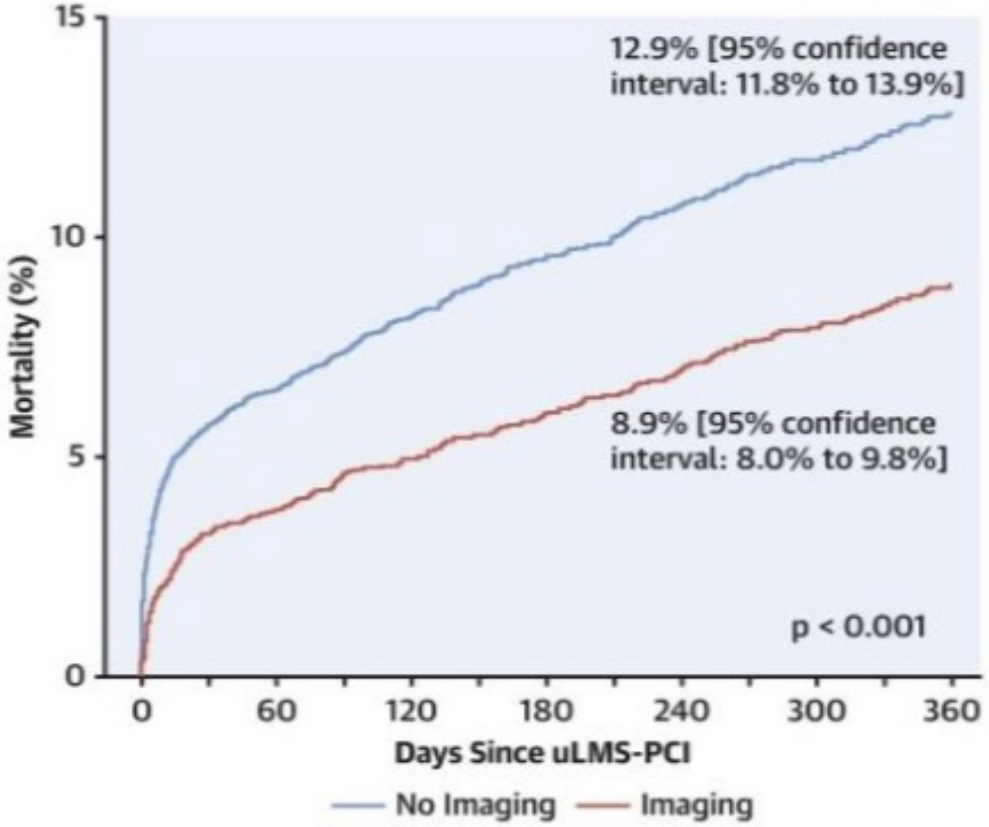


TABLE 5 Adjusted Clinical Outcomes by Imaging Status for uLMS PCI

	OR for Imaging vs. No Imaging	95% CI	p Value
Coronary perforation	0.920	0.590-1.420	0.689
Coronary dissection	0.820	0.690-0.980	0.028
Major side branch loss	0.810	0.540-1.200	0.282
Slow flow	0.510	0.330-0.770	0.001
Any coronary complication	0.780	0.670-0.910	0.001
Acute kidney failure	1.050	0.530-2.080	0.888
In-hospital death	0.390	0.290-0.510	<0.001
In-hospital MACCE	0.470	0.380-0.590	<0.001
In-hospital major bleed	0.890	0.590-1.340	0.565
Mortality at 30 days	0.540	0.430-0.680	<0.001
Mortality at 12 months	0.660	0.570-0.770	<0.001

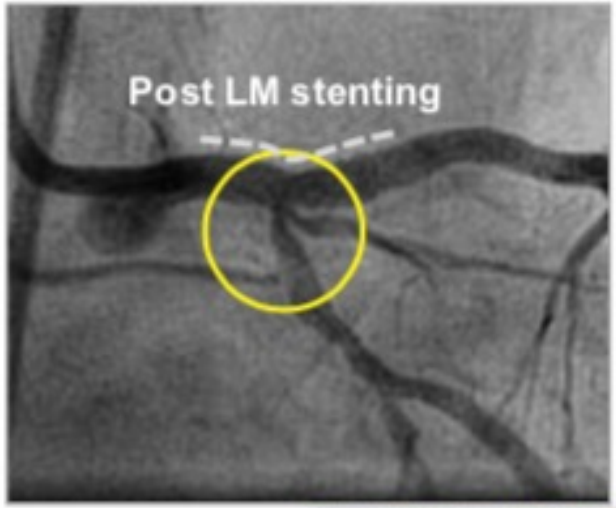
British Cardiovascular Intervention Society Database

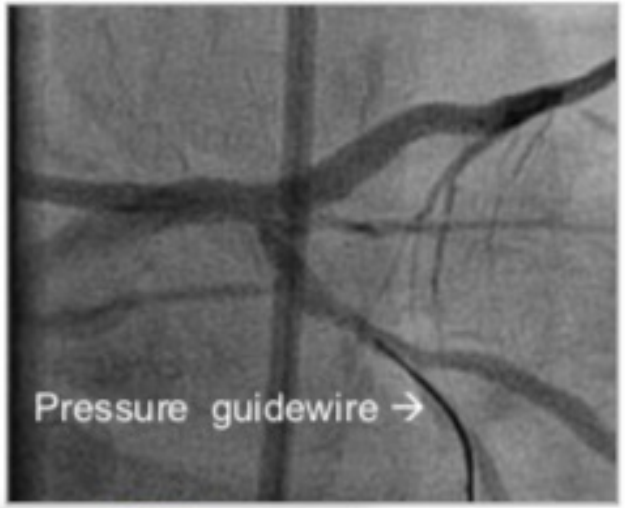
USE OF CORONARY PHYSIOLOGY: WHY FIX WHAT ISN'T BROKEN?

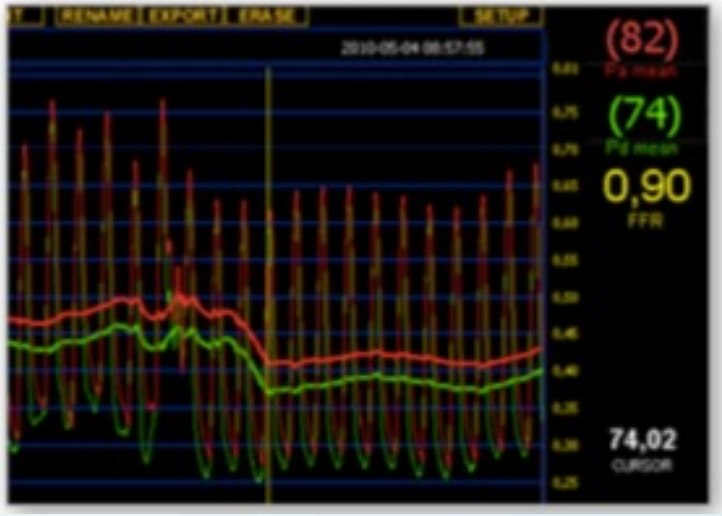

STATE-OF-THE-ART REVIEW

Physiological Approach for Coronary Artery Bifurcation Disease

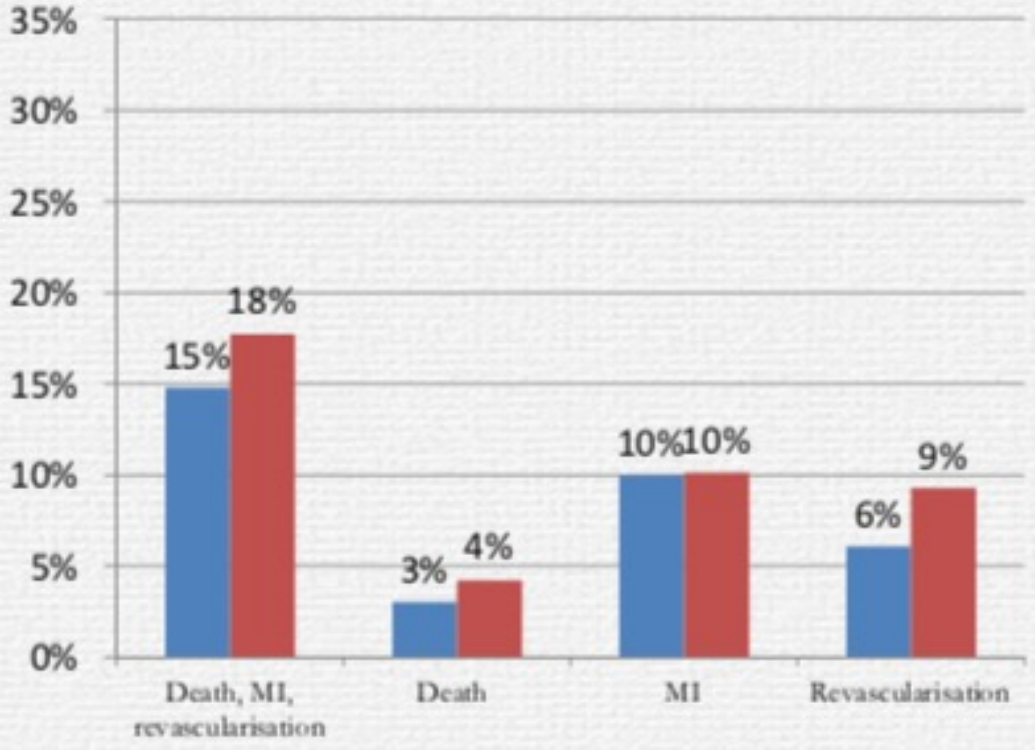
Position Statement by Korean, Japanese, and European Bifurcation Clubs

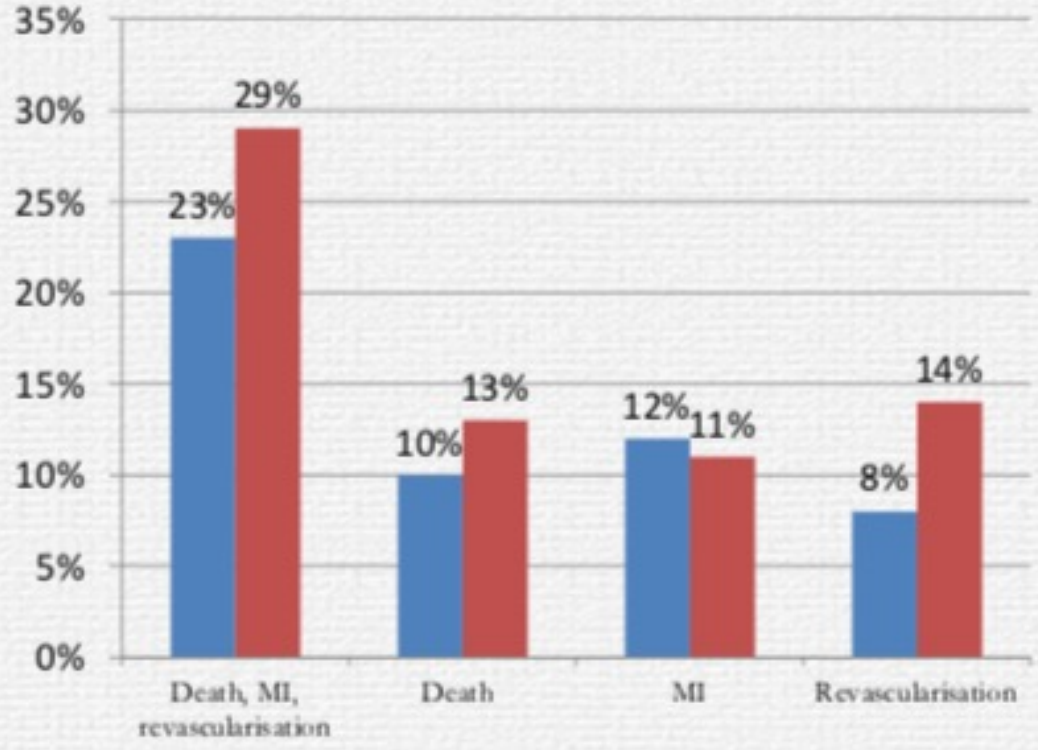






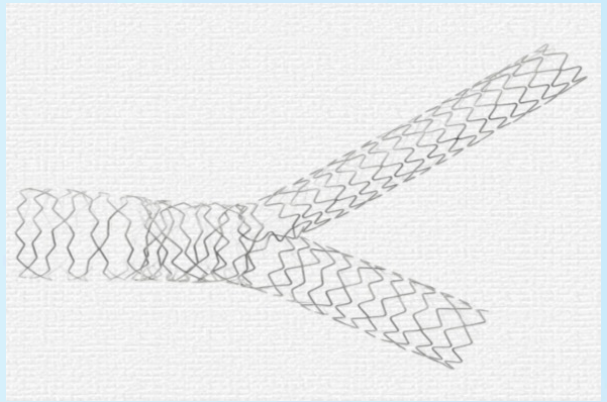
EBC MAIN results 1yr : 3yrs





EBC MAIN

- ✓ Resolute Onyx was selected as the study device for its broad size matrix
- ✓ 4.5 mm and 5.0 mm diameters expand to 6.0 mm
- ✓ Sustained radial strength and structural integrity with overexpansion



- ✓ Capacity to adapt to tapered vessel diameters
- ✓ Good outcomes at 3 years with bifurcation left main stem PCI
- ✓ No difference in 3-yr primary endpoint (death/MI/TLR) between groups
- ✓ Almost twice as much TLR in the systematic dual stent group
- ✓ Only 20% of patients in provisional group required a second stent
- ✓ It is not necessary to decide the number of stents before you start

HYBRID DEB

Patients included in this study will receive PCI using provisional approach (implantation of drug-eluting stent (DES) in the main branch).
Patients with an unsatisfactory result of the SB after provisional PCI (≥ 70% residual stenosis and/or diminished flow < TIMI III will be randomized in a 1:1 ratio to receive the Hybrid DEB approach or the two-stent strategy

CONCLUSIONS

- ✓ Stent technique should depend on individual anatomical characteristics and the operator's skill and experience
- ✓ Stepwise provisional is logical, reproducible, and versatile and remains the strategy of choice for most bifurcations
- ✓ Elective two-stent strategies may be considered for important SB with complex/extensive stenosis, difficult SB access or high risk of SB compromise; for operators with appropriate experience, DK-Crush is a valuable option for complex LM bifurcation lesions
- ✓ Use of imaging and physiology strongly encouraged to decide the appropriate stenting strategy and optimize the result of PCI