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Simple and Complex Bifurcation Lesions: New Criteria for Treatment Strategy Selection

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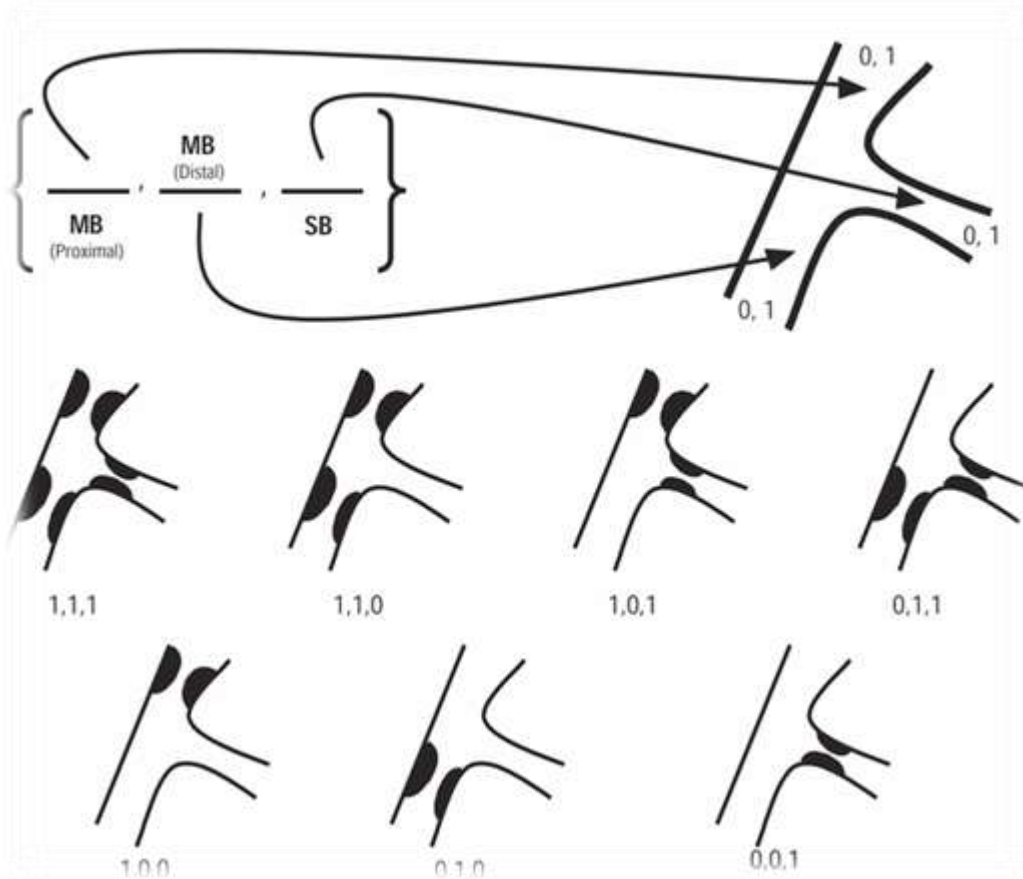
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Medina Classification for Bifurcation Lesions



Is it sufficient to guide appropriately bifurcation interventions ?

No , because :

- lack of lesions features
- Lesion length
- Angle
- Calcification/tortuosity

What is important in Bifurcation Interventions ?

- Lesions location: LMd, non-LMd
- SB sizes: cut-off diameter=2.5 mm
- SB lesion length: cut-off 10mm
- Bif. Angle: inconsistent solutions
- Myocardium at jeopardy of risk: SB size?
- Predictors of SB closure after MV stenting
(*tortuosity, SB angle, calcification, thrombus..*)

Medina Classification for Bifurcation Lesions

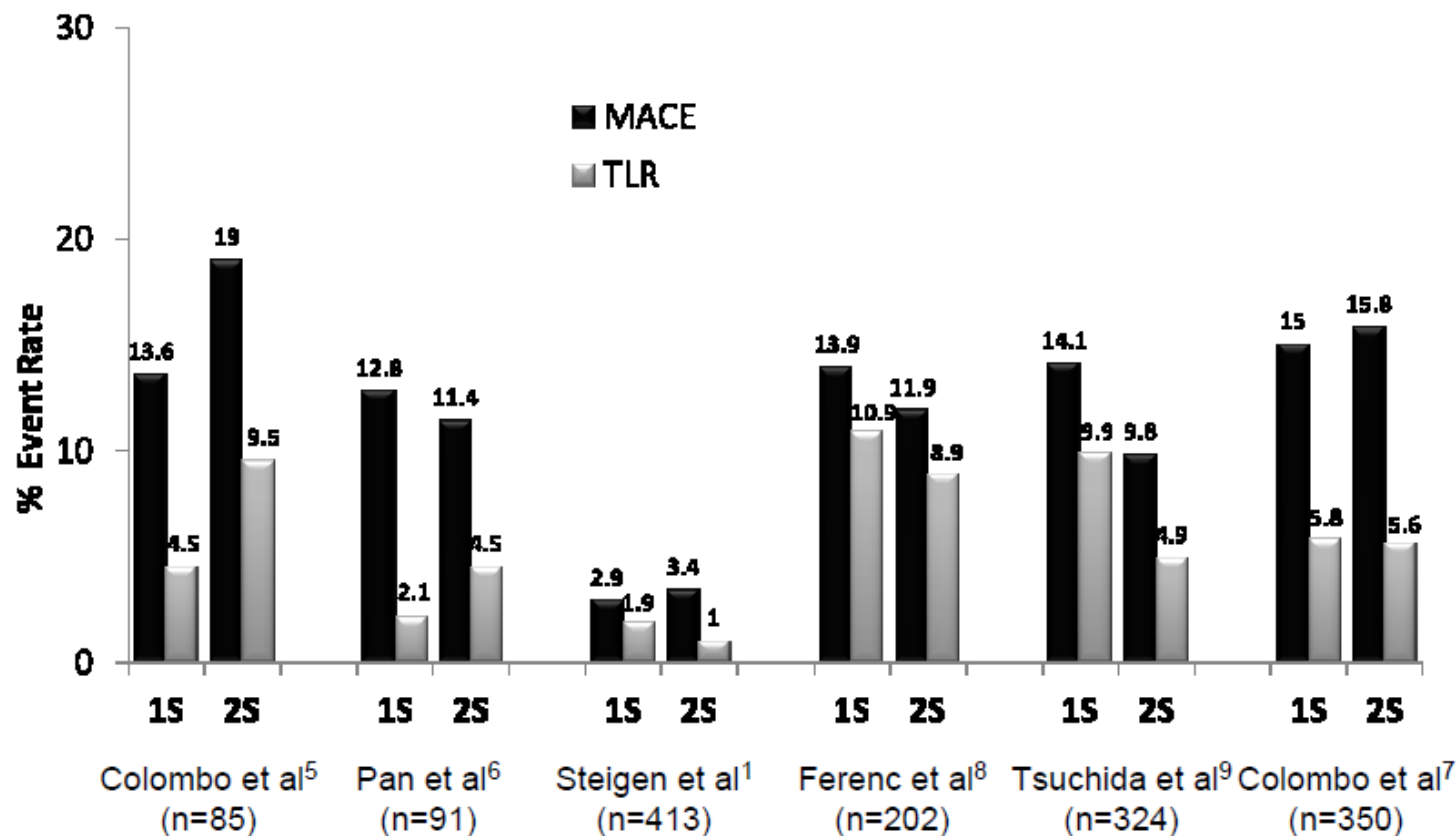
Debates on Bifurcation Interventions:

- ☐ *Provisional Stenting ; Two stent approaches* or Just Keep It Open ?
- ☐ Two Stents : What is the best approach ?

Can Medina Classification guide us appropriately ?

***Insights from clinical trials on Bifurcation
Inttreventions***

1 DES vs 2 DES strategies for treating Bifurcation lesions in randomized clinical trials



1DES (1S) vs. 2DES (2S) strategy in treating coronary bifurcations

- **(p = not significant for all comparisons between 1S and 2S in all 5 trials).**
- **MACE, major adverse cardiac events; TLR, target lesion revascularization**

Insight analysis into RCTs

	AMI	CTO	SB-dia	SB-length	SB-DS
NORDIC-I	No	No	2.0mm	5mm	40%
NORDIC-II	No	No	2.5mm	6mm	42%
NORDIC III	No	No	2.5mm	6mm	44%
NORDIC IV	No	No	2.9 mm	8mm	40%
CACTUS	No	No	2.5mm	5mm	62%
BBC ONE	No	No	2.25mm	5mm	40%

Simple Bifurcation ..

What is making the difference ?



Insight analysis into RCTs

	AMI	CTO	SB-dia	SB-length	SB-DS
NORDIC-I	No	No	2.0mm	5mm	40%
NORDIC-II	No	No	2.5mm	6mm	42%
NORDIC III	No	No	2.5mm	6mm	44%
NORDIC IV	No	No	2.9 mm	8mm	40%
CACTUS	No	No	2.5mm	5mm	62%
BBC ONE	No	No	2.25mm	5mm	40%
DKCRUSH-II	Yes	Yes	2.5mm	11mm	65%
DKCRUSH-III	Yes	Yes	>2.5mm	17mm	64%

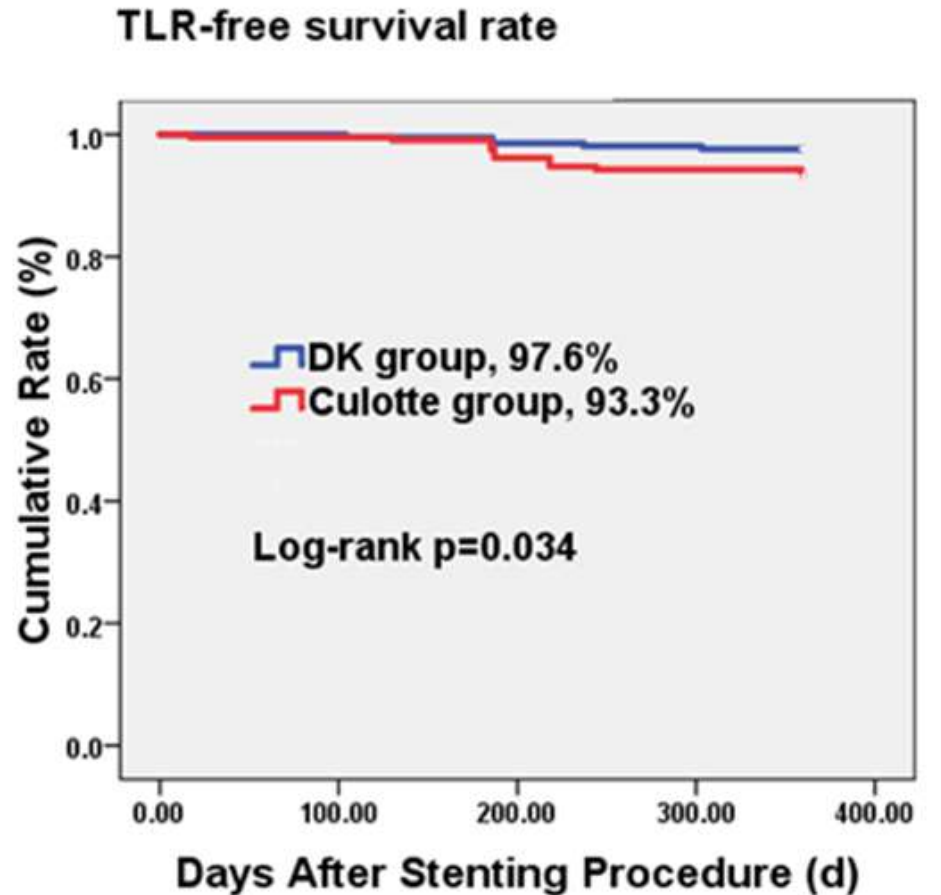
DKCRUSH-III

N= 419 pts with true bifurcation

210 DK Crush

Vs

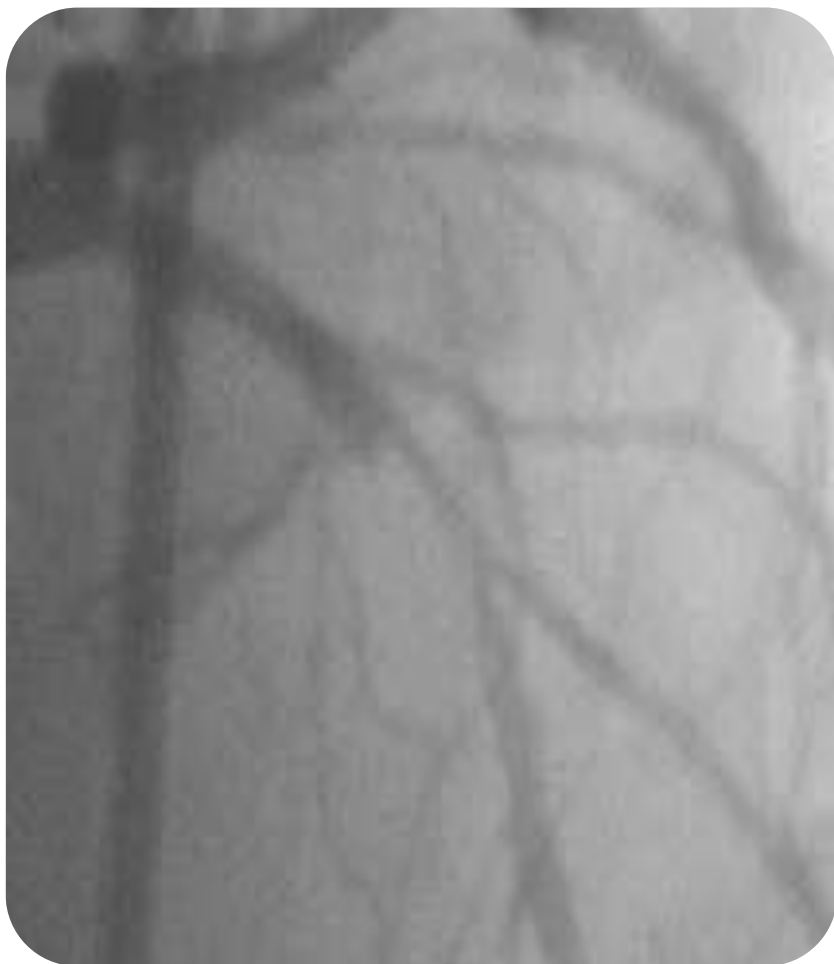
209 Culotte





Both are Medina 1,1,1 lesions : Is it enough to define both lesions ?

Medina 1,1, 1 - SB > 2.5 mm

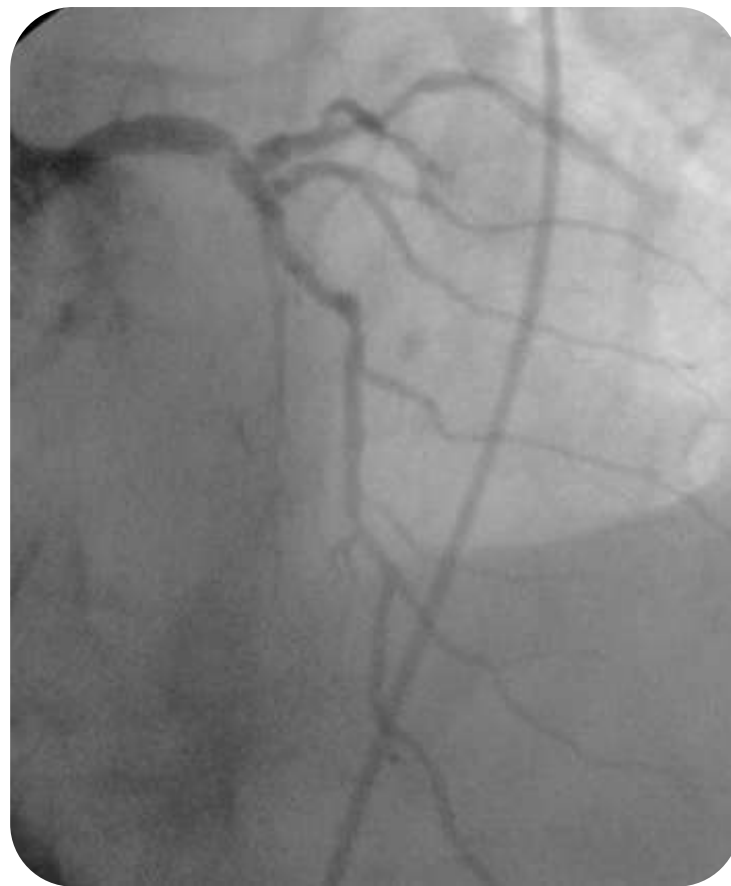


Both are Medina 1,1,1 but with different SB disease : can be included in the same study ?

Medina 1,1,1



Complex anatomy , long lesion on SB...



Simple anatomy , focal lesions

Different approach and clinical outcome ?

Medina ?



Complex anatomy with severe tortuosity and calcification : ?

Definition Study

Major Criteria

- 1. For LMd: SB-DS $\geq 70\%$, SB lesion ≥ 10 mm**
- 2. For Non-LMd: SB-DS $\geq 90\%$, SB lesion ≥ 10 mm**

By visual estimation

Minor Criteria

Minor 1: \geq Moderate calcification

Minor 2: Multiple lesions

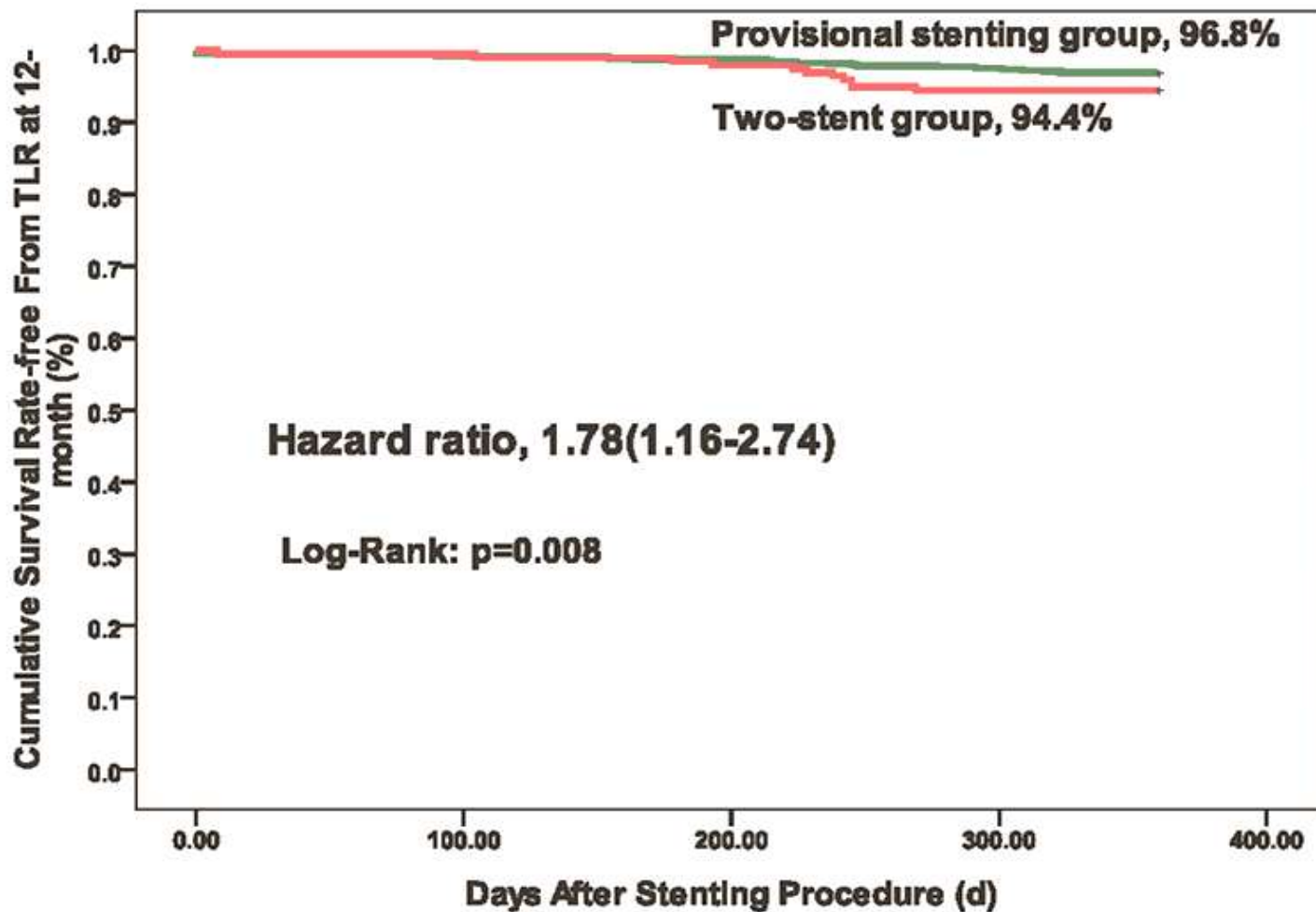
Minor 3: LVEF < 30%

Minor 4: eGFR < 30 ml/min/1.73 m²

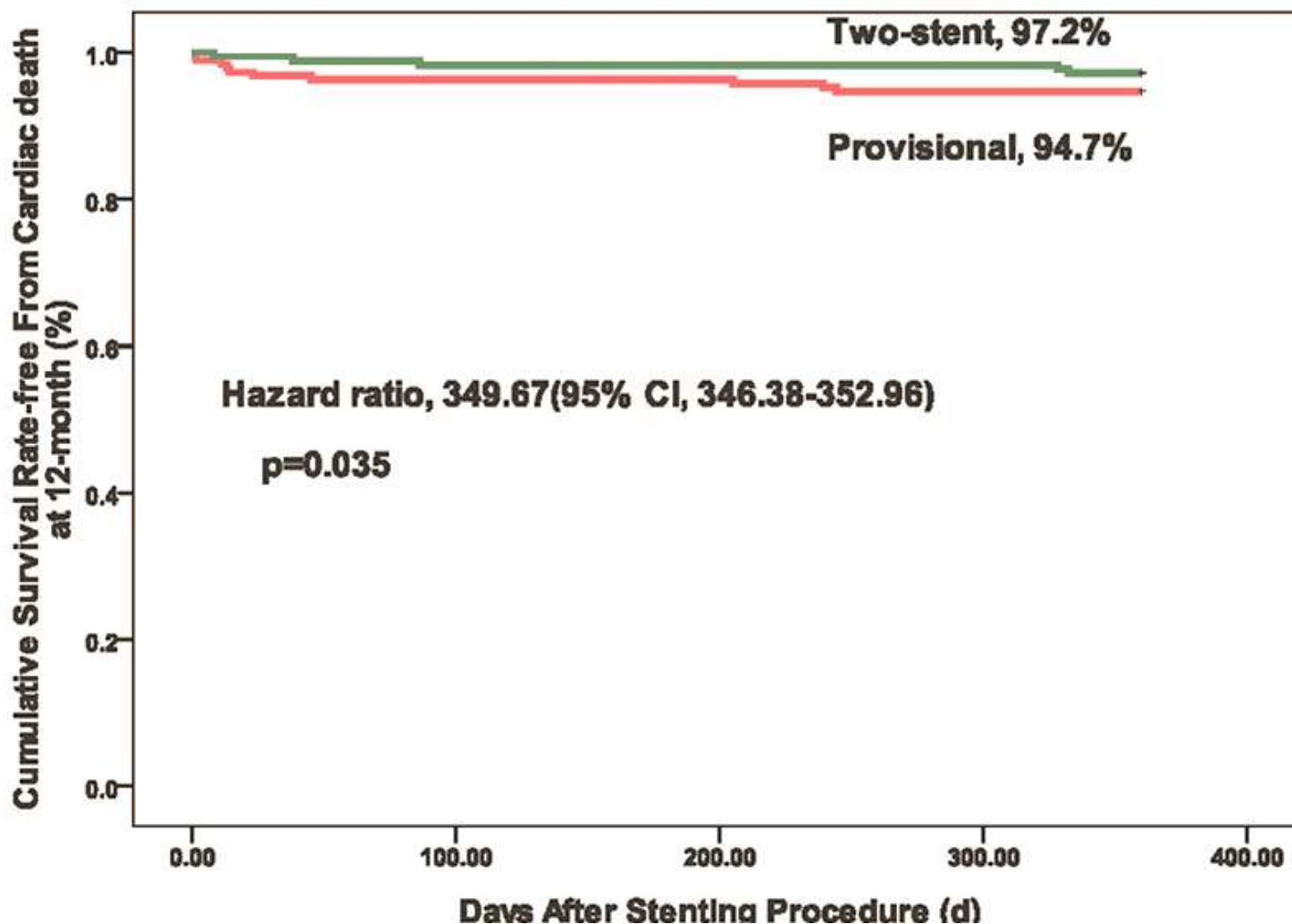
Minor 5: Thrombus-containing lesions

Minor 6: MV lesion length \geq 25 mm

TLR-Free Survival at 12 months between Provisional stenting and two stents in patients with simple bifurcation



One Year Death-Free Survival between Provisional stenting and two stents in patients with Complex Bifurcation



BL Complexity Score

Keeping the Medina system to define bifurcation lesion Morphology :

And assigning different scores according to the BL lesion characteristics:

MV = is always the same as a fixed value (MV can provide maximum 2 point to the score)

If no significant disease (also by FFR) = 0

If significant disease = 1

(Independently from lesion length , calcification ...)

BL Complexity Score

SB : is the main determinant for complexity :

0 = no lesion

1 = focal significant (FFR) lesion (<10 mm)

4 = extended significant (FFR) disease (≥ 10 mm)

Calcification = 1

C = calcification and should be added only referring to SB .

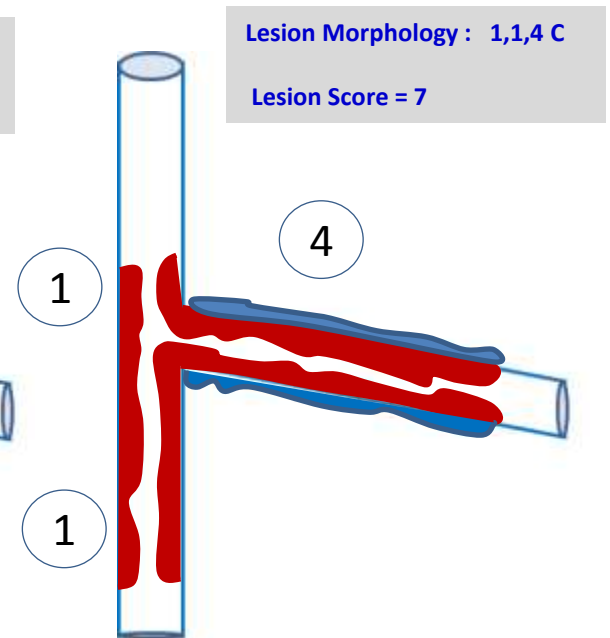
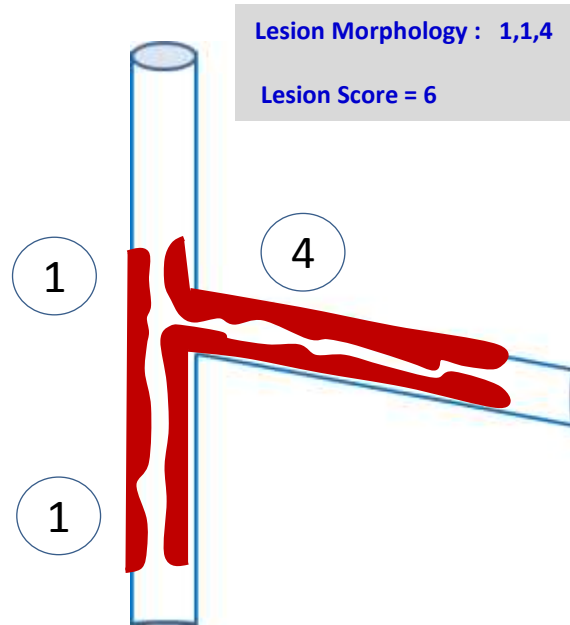
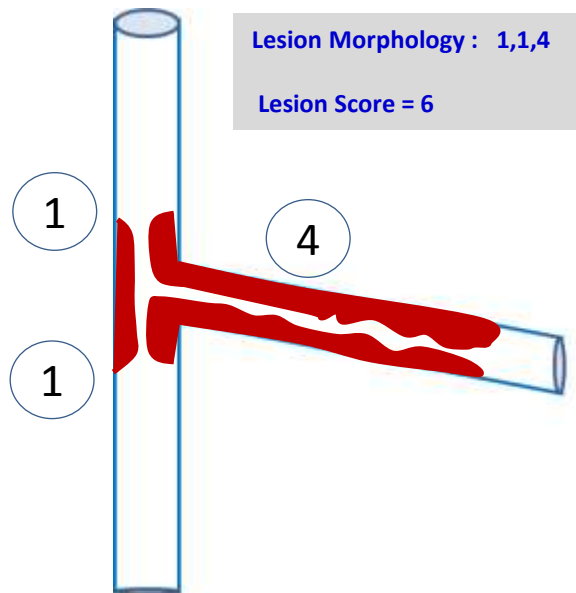
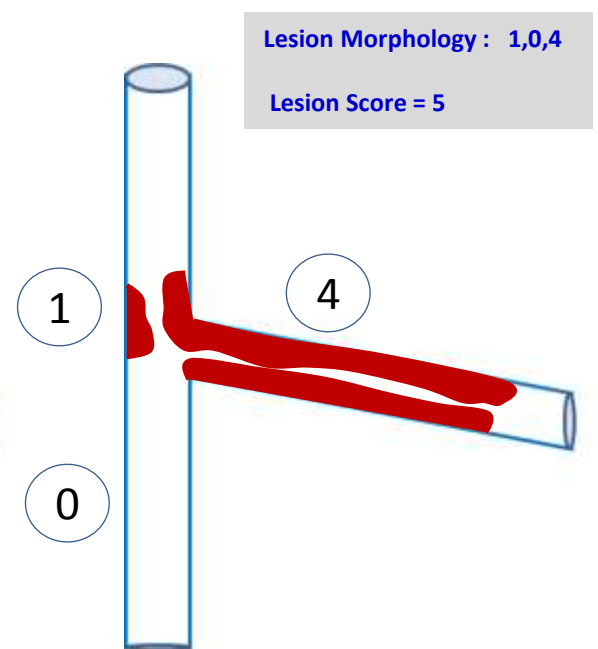
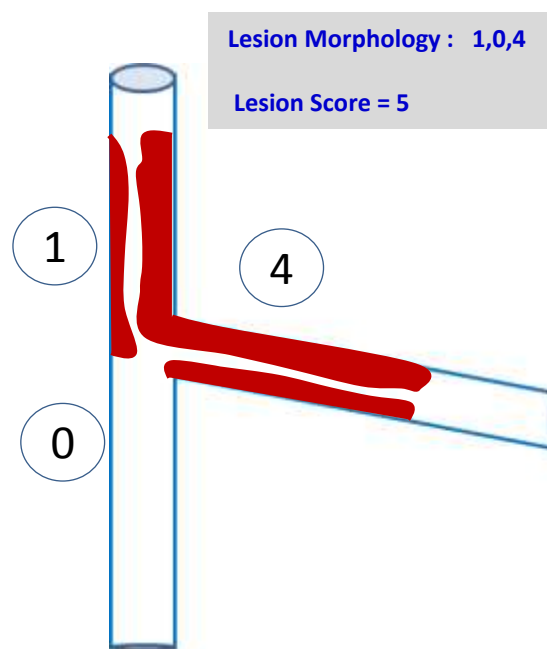
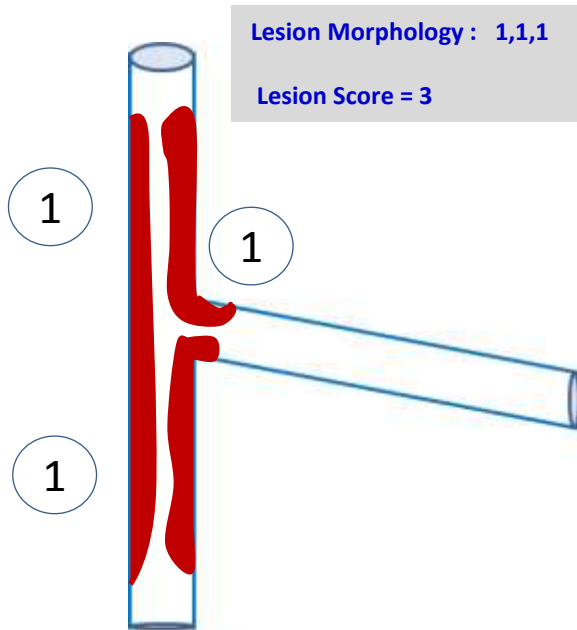
BL Complexity Score

When total score ≤ 4 BL is defined as Simple BL
When total score > 4 BL is defined as Complex BL

Defining Lesion Morphology :

1,1,3 C = complex bifurcation with calcified SB
Total score = 6

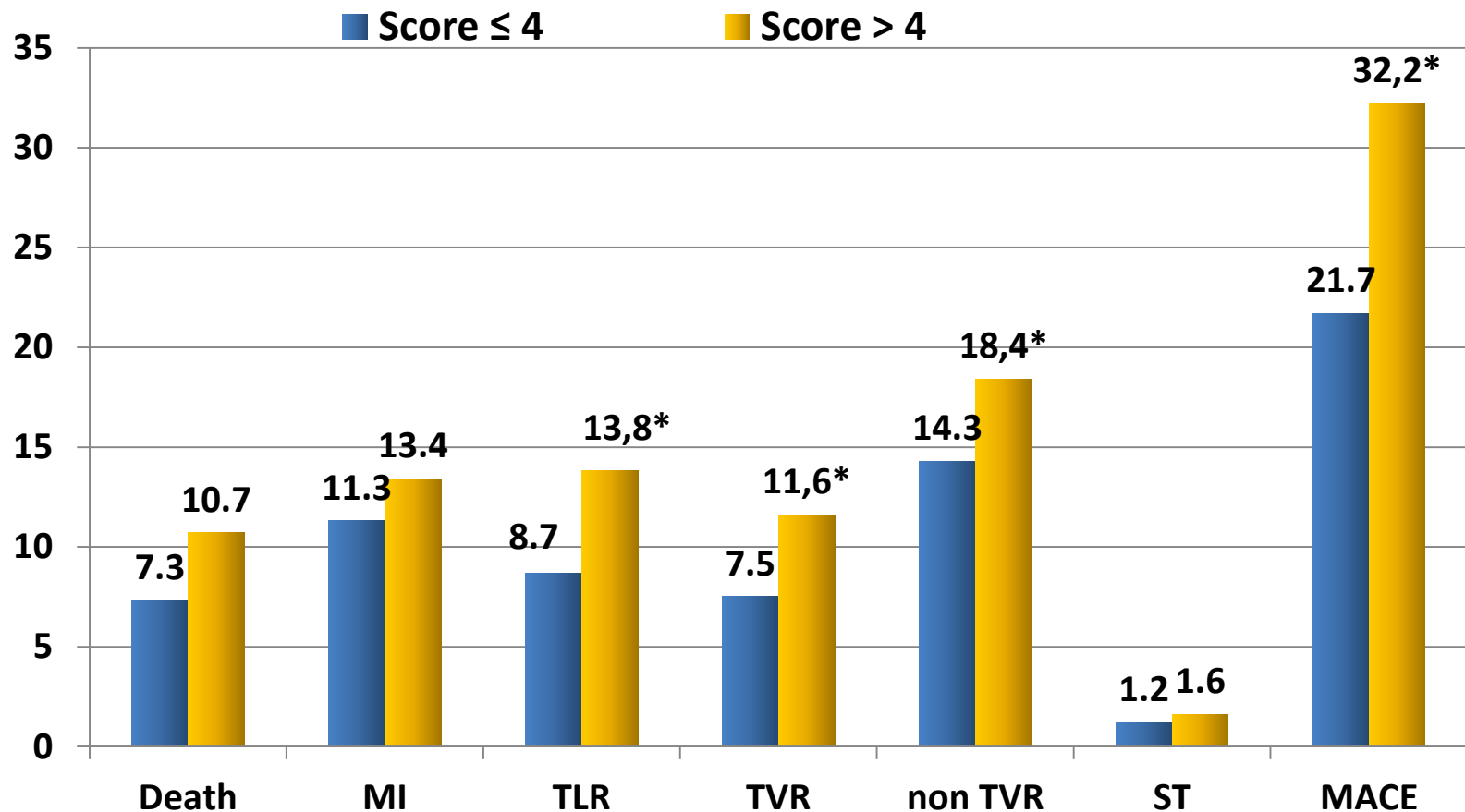
0,1,1 = simple bifurcation with no calcification on SB
Total Score = 2



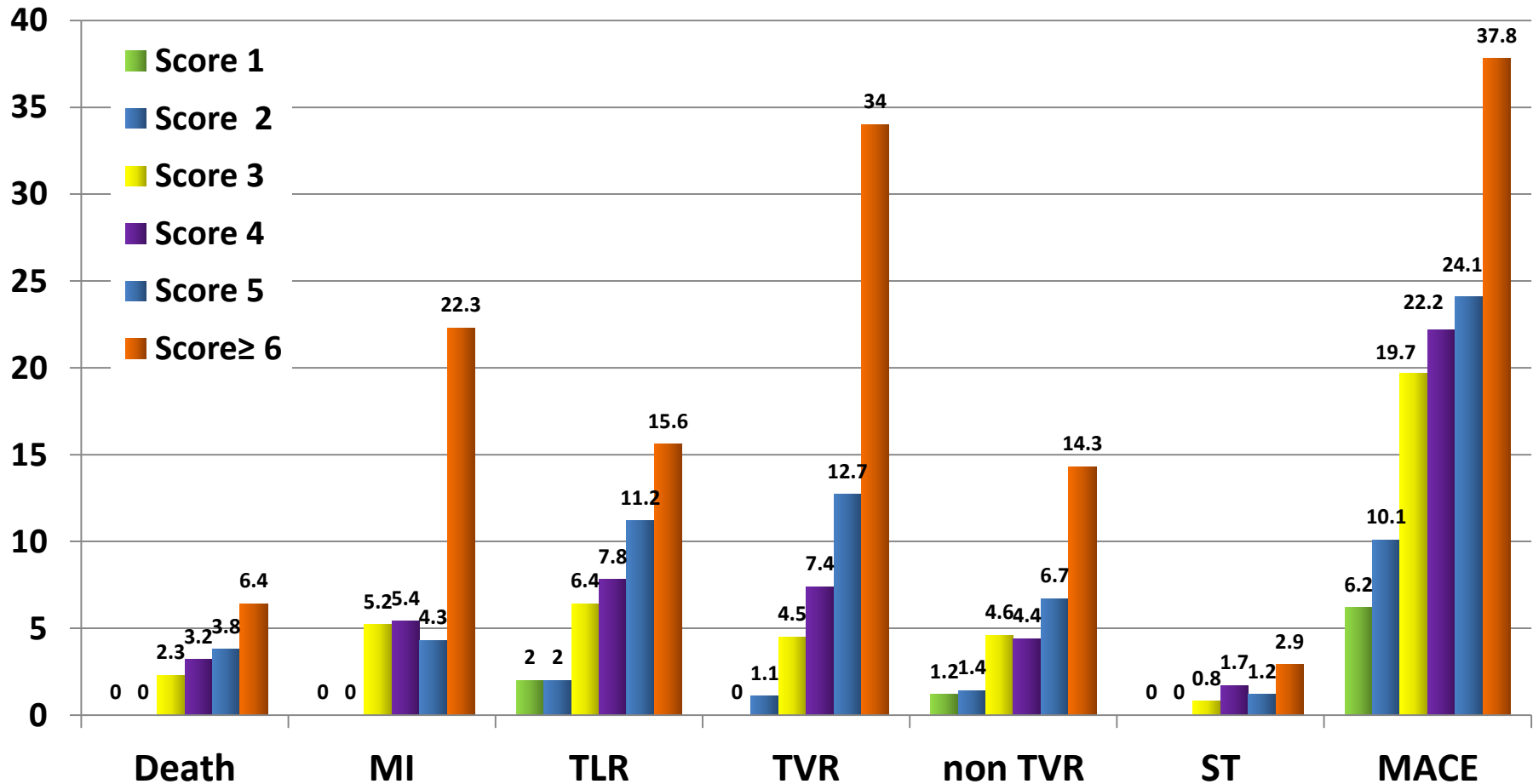
Baseline features according to Score

	Score ≤ 4 (248;70%)	Score > 4 (106;30%)	P
Age (years)	67.4 \pm 5.6	69.4 \pm 3.4	0.45
Female gender	92 (37.4)	36 (33.9)	0.54
Hypertension	197 (79.4)	87 (82.4)	0.45
Hyperlipidemia	179 (72.3)	66 (62.5)	0.21
Diabetes mellitus	69 (28.1)	32 (30.1)	0.42
Previous myocardial infarction	86 (34.5)	42 (39.4)	0.67
Smoking habit	94 (37.3)	36 (34.7)	0.41
Acute coronary syndrome			0.12
- Unstable angina	92 (37.3)	35 (33.3)	
- NSTEMI	32 (12.8)	15 (13.9)	
- STEMI	52 (21.1)	15 (13.9)	

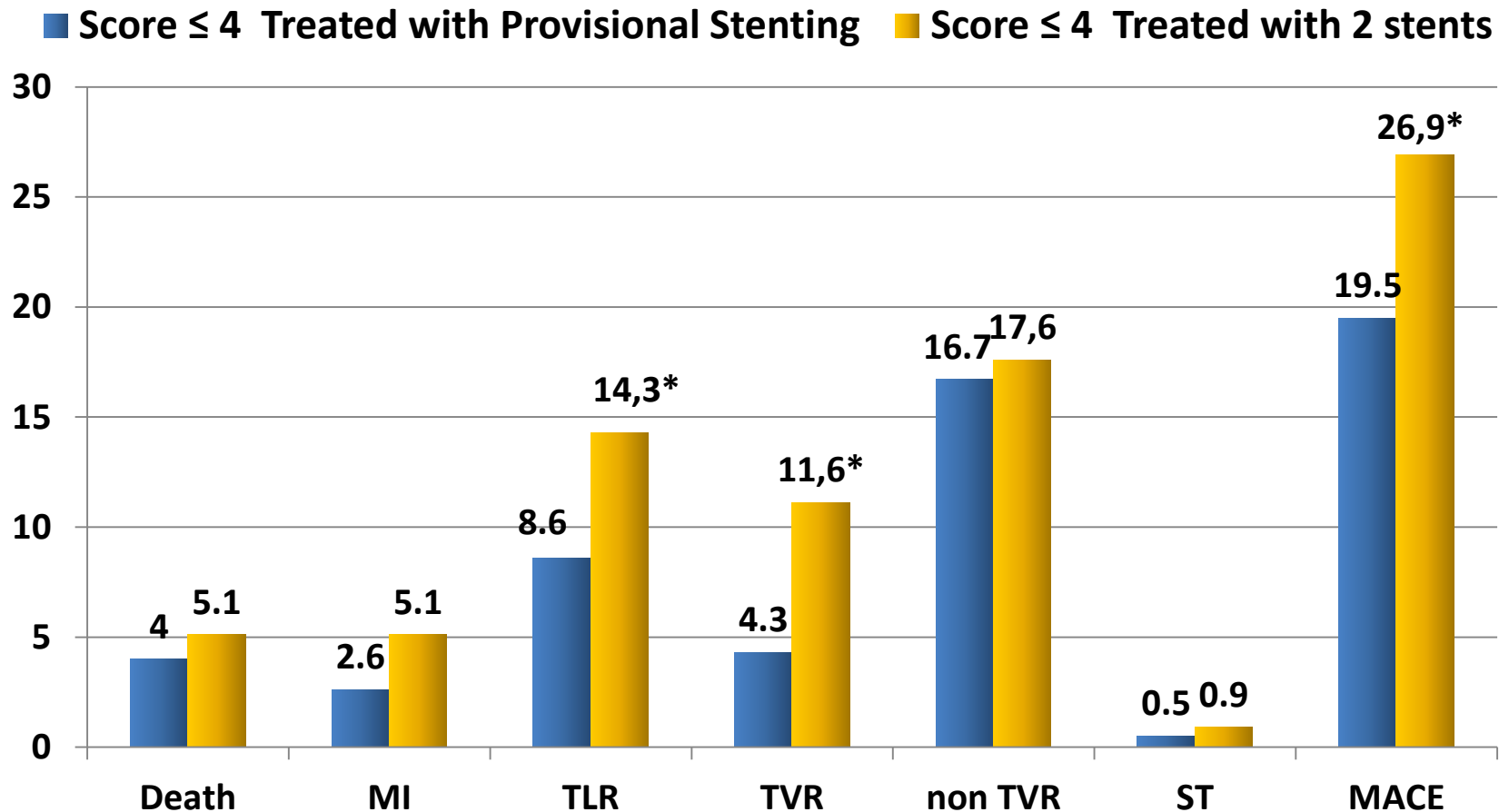
3-year Follow Up according to Score in patients with Distal Left Main Bifurcation



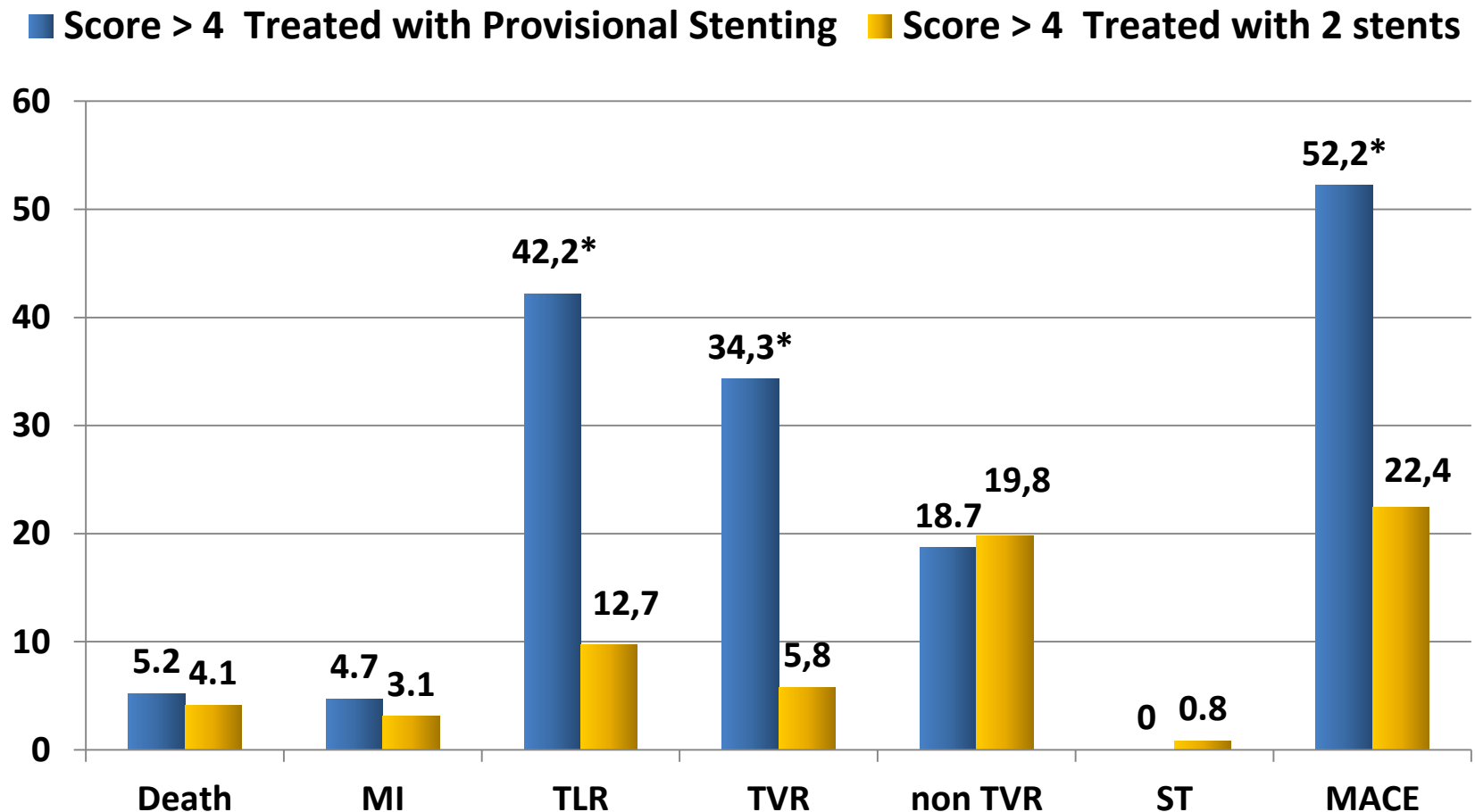
3-Year Follow Up according to Score in all Patients



Clinical Events in patient with Simple Bifurcation Lesions (Score \leq 4) according to treatment strategy



Clinical Events in patient with Complex Bifurcation Lesion (Score > 4) according to Treatment Strategy



Conclusions

- **Medina classification for bifurcation lesions is a good tool for the a simple and generic definition of bifurcation lesion , but does not provide suffiecient details about the characteristics of the bifurcation lesion and therefore it can not guide for the appropriate intervention**
- **Clinical outcome can be significantly different using the same approach in the same Medina type of bifurcation lesion but with different characteristics**
- **The Debate on one or two stents for the treatment of bifurcation lesions is exceeded . Identification of simple or complex bifurcation can allow more appropraite strategy as intention to treat (simple for simple and complex for complex) .**