Intervention of LMCA Bifurcation: Is It Different in 2016?

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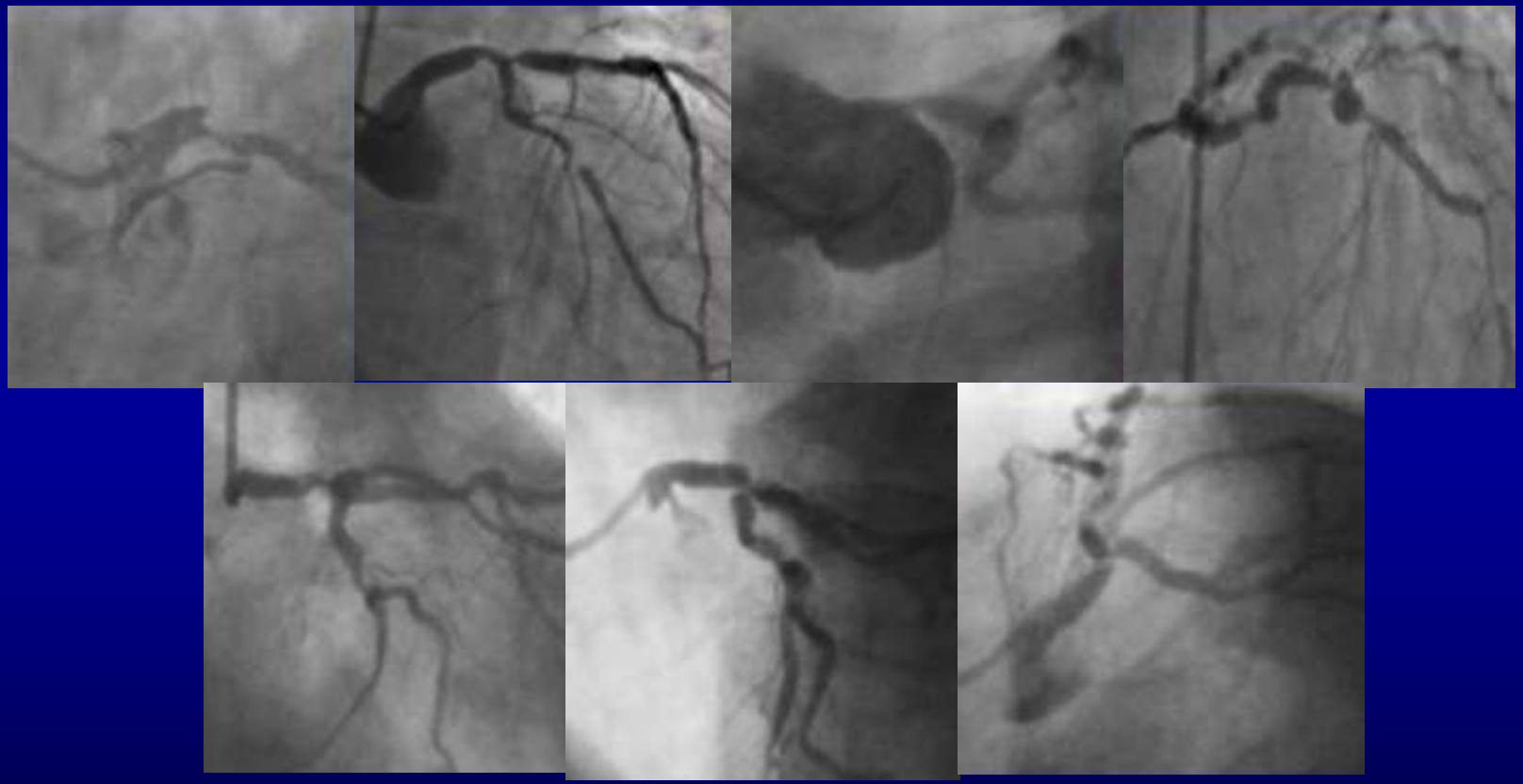
Many Sizes & Shapes



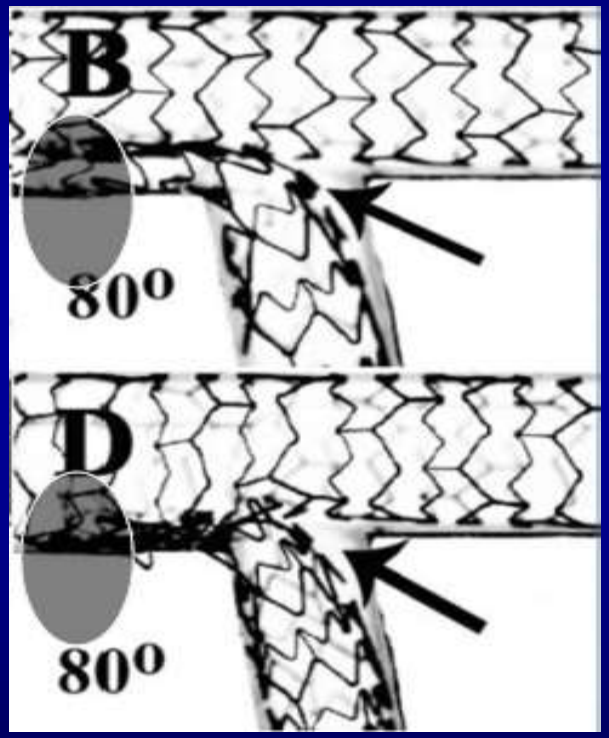
Variability of LM Bifurcation

- Represent 80% of LM lesions
- Burden of atherosclerotic lesion
- Relative involvement of the ostia of LAD or LCX
- Advanced atherosclerosis is more in the proximal LAD than LM or LCX

LM Bifurcation: An Unique Entity

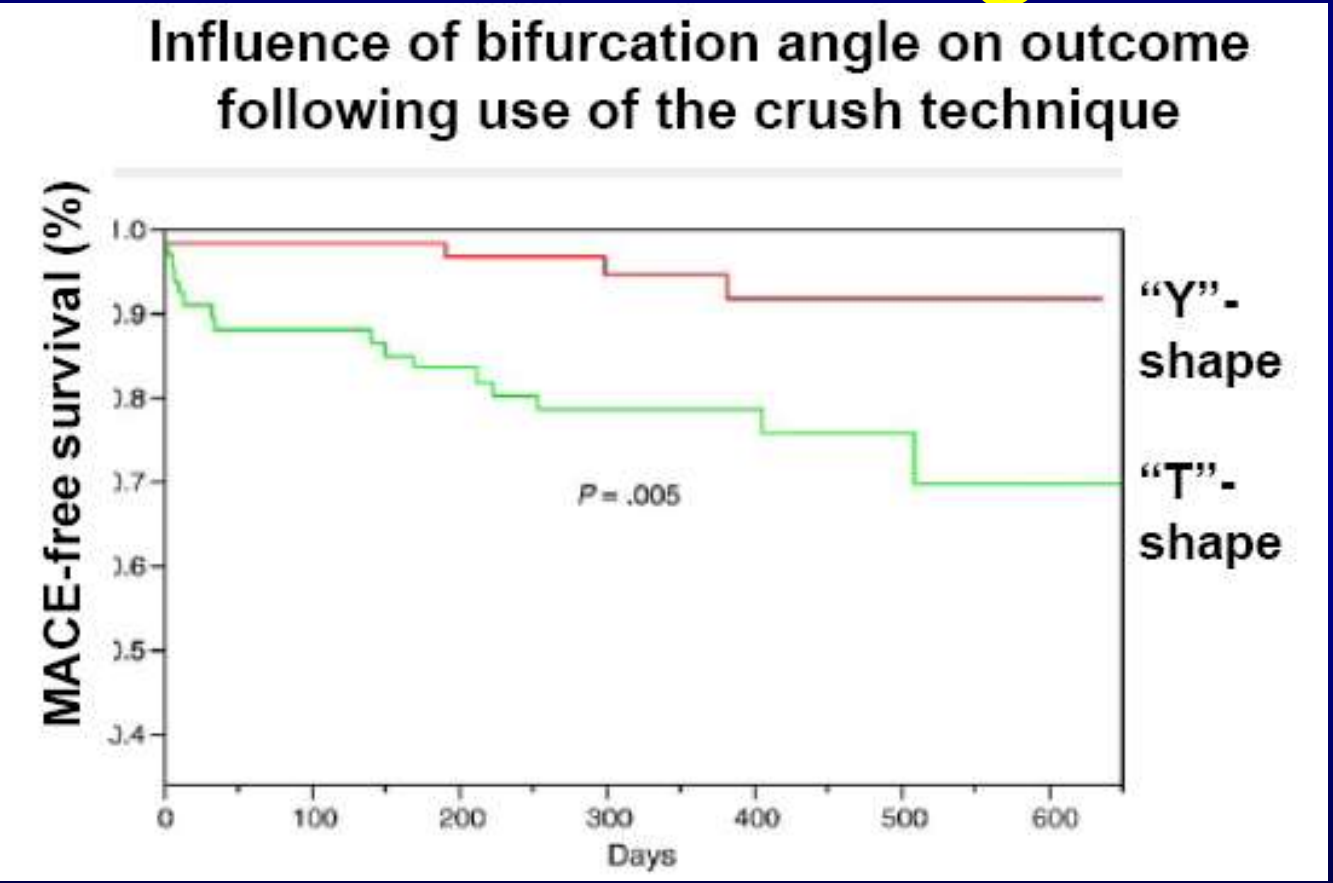
- A larger area of myocardium at jeopardy
- A large SB diameter
- SB is as important as the MB
- Wider angle of bifurcation
- Less acceptance of a sub-optimal result in the SB.
- Use of 2 stents is about 15-30% in Non-LM bifurcation, which may go up to 50% in LM bifurcation. (Colombo)

Bifurcation Angle



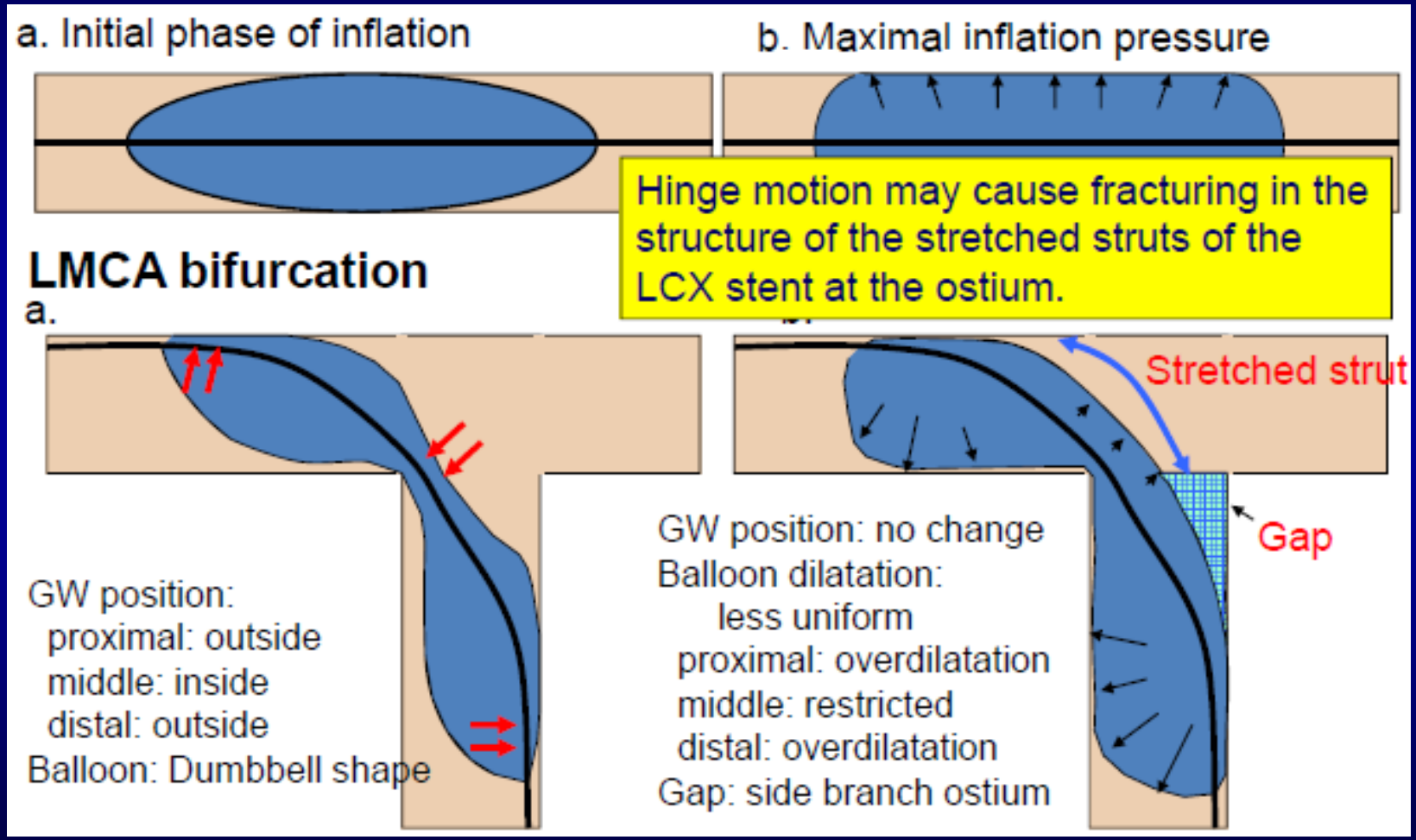
- Average LM/LCX angle is >90° & LAD/D1 angle is <60°
- Metal fatigue with acute angle predisposes to strut fracture
- Areas of low shear stress promote restenosis

Crush Stenting: Influence of Bifurcation Angle



Dzavic et al AHJ 2008

Problem of Stenting From LM to LCx



Murasato. Bench testing of coronaruy bifurcation stenting

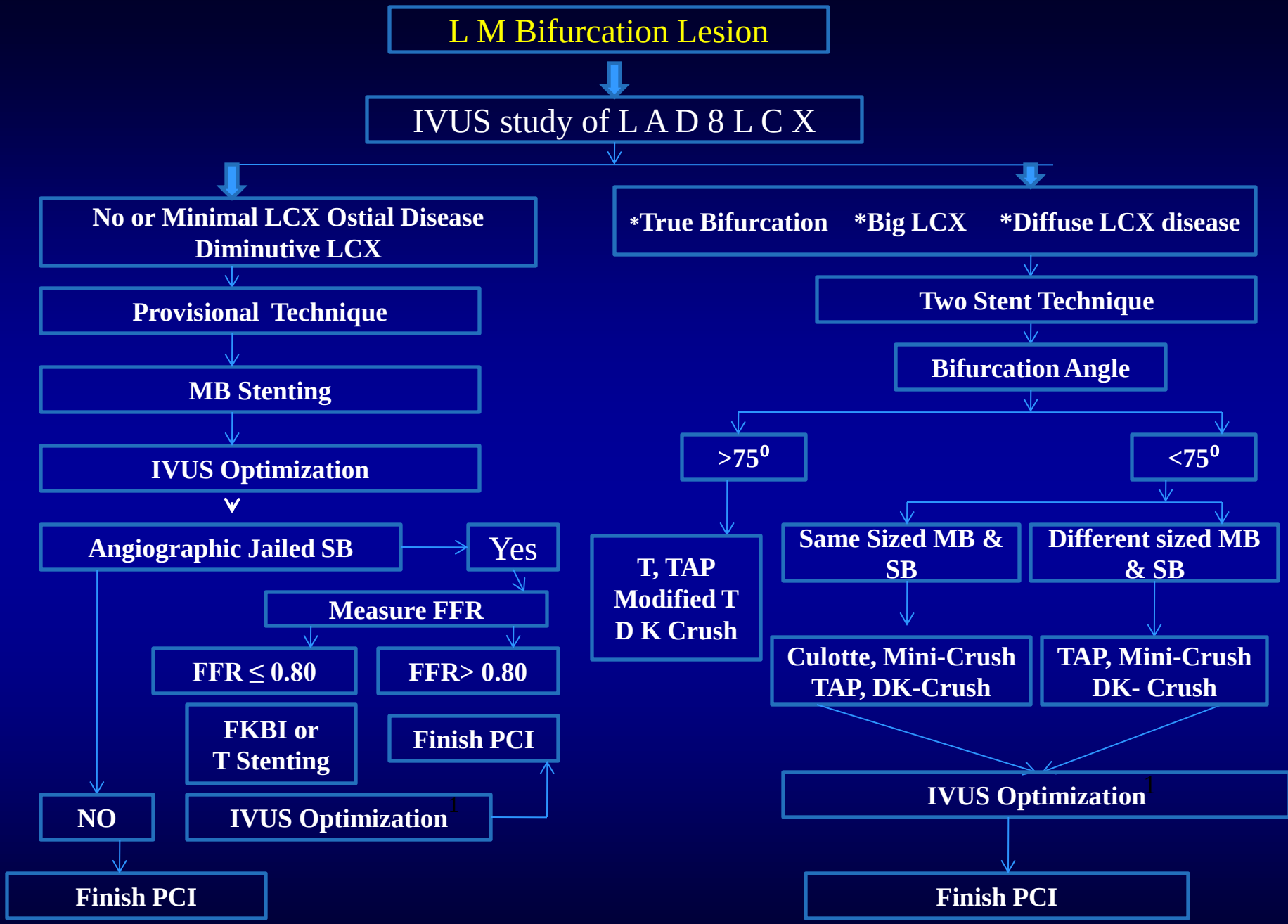
Selecting the Strategy

- ***The LCX is one of the key elements for strategy of LM bifurcation PCI***
  - **Size**
  - **Area of jeopardized myocardium**
  - **Ostial location of plaque**
  - **Diffusion of atheroma**
  - **Bifurcation angle**

Which Stent Technique?

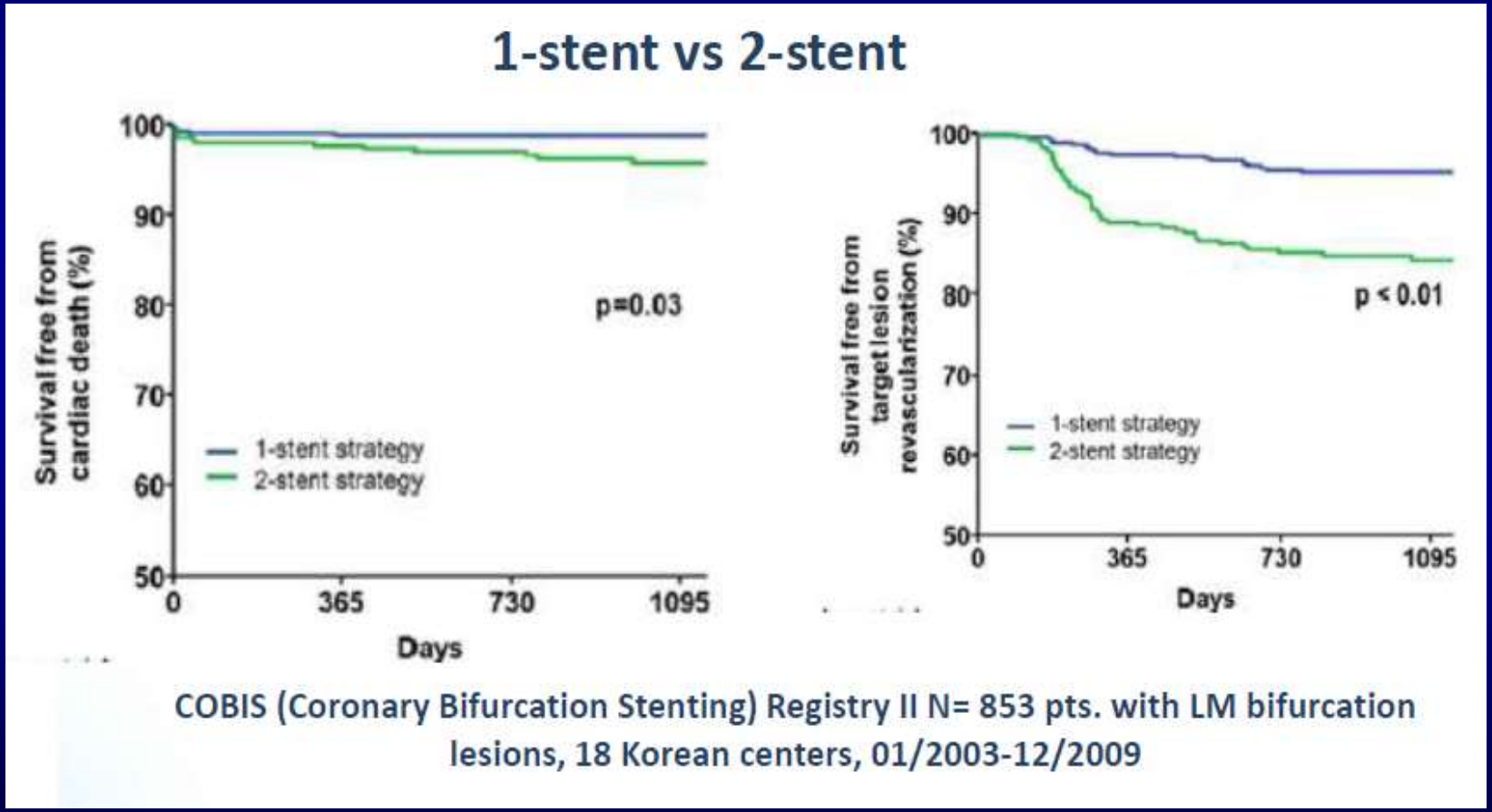
- Patient's clinical status
- Anatomical characteristics
- Operator expertize

Final result more important than technique used


L M Bifurcation Lesion
IVUS study of L A D 8 L C X
No or Minimal LCX Ostial Disease
Diminutive LCX
Provisional Technique
MB Stenting
IVUS Optimization
Angiographic Jailed SB
Yes
Measure FFR
FFR ≤ 0.80
FFR> 0.80
FKBI or
T Stenting
Finish PCI
NO
IVUS Optimization
Finish PCI
*True Bifurcation *Big LCX *Diffuse LCX disease
Two Stent Technique
Bifurcation Angle
>75⁰
<75⁰
T, TAP
Modified T
D K Crush
Same Sized MB &
SB
Different sized MB
& SB
Culotte, Mini-Crush
TAP, DK-Crush
TAP, Mini-Crush
DK- Crush
IVUS Optimization
Finish PCI

Majority of LM Bifurcation can be Treated with Provisional Approach

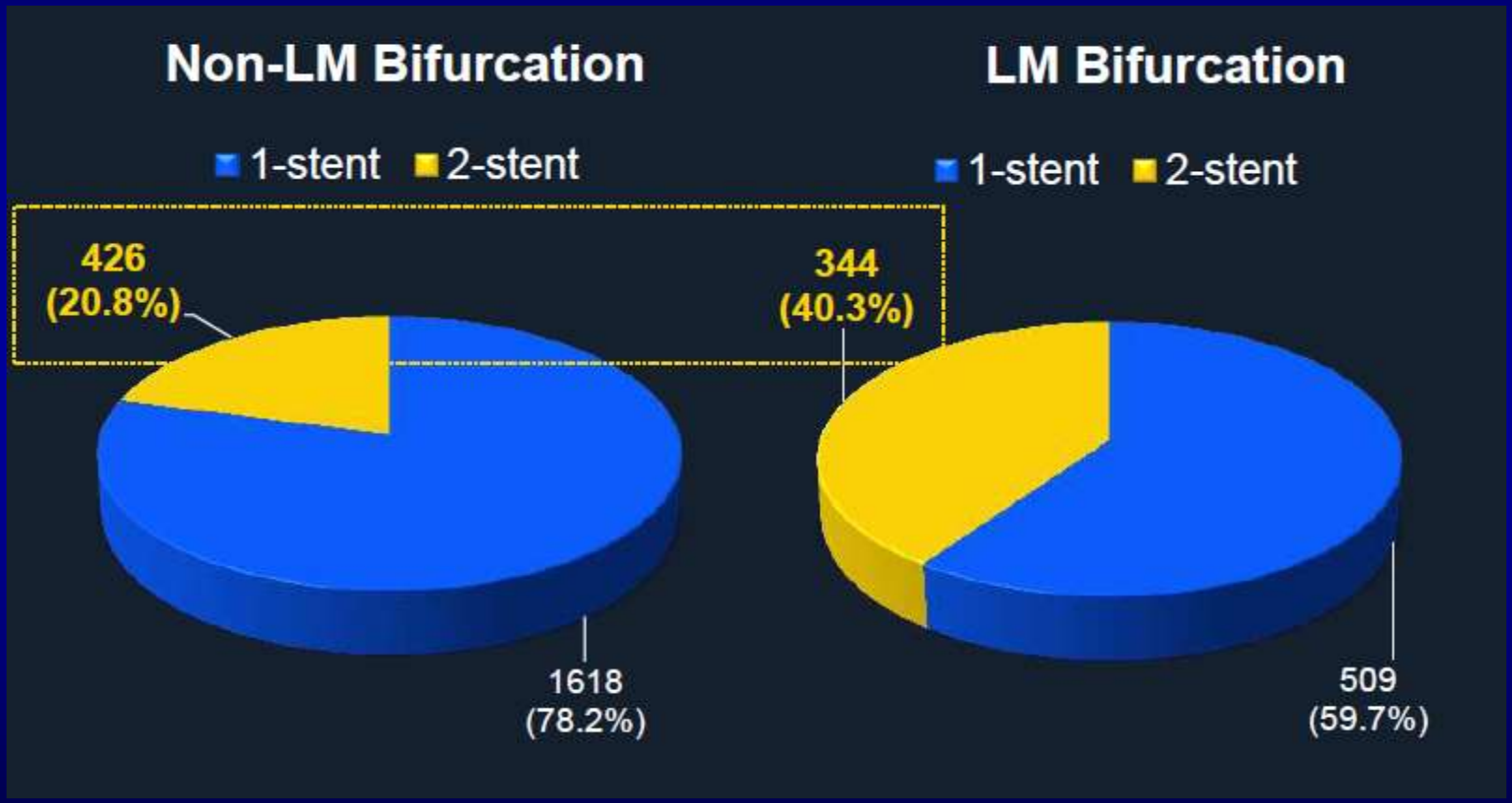
LM Bifurcation



COBIS (Coronary Bifurcation Stenting) Registry II N= 853 pts. with LM bifurcation lesions, 18 Korean centers, 01/2003-12/2009

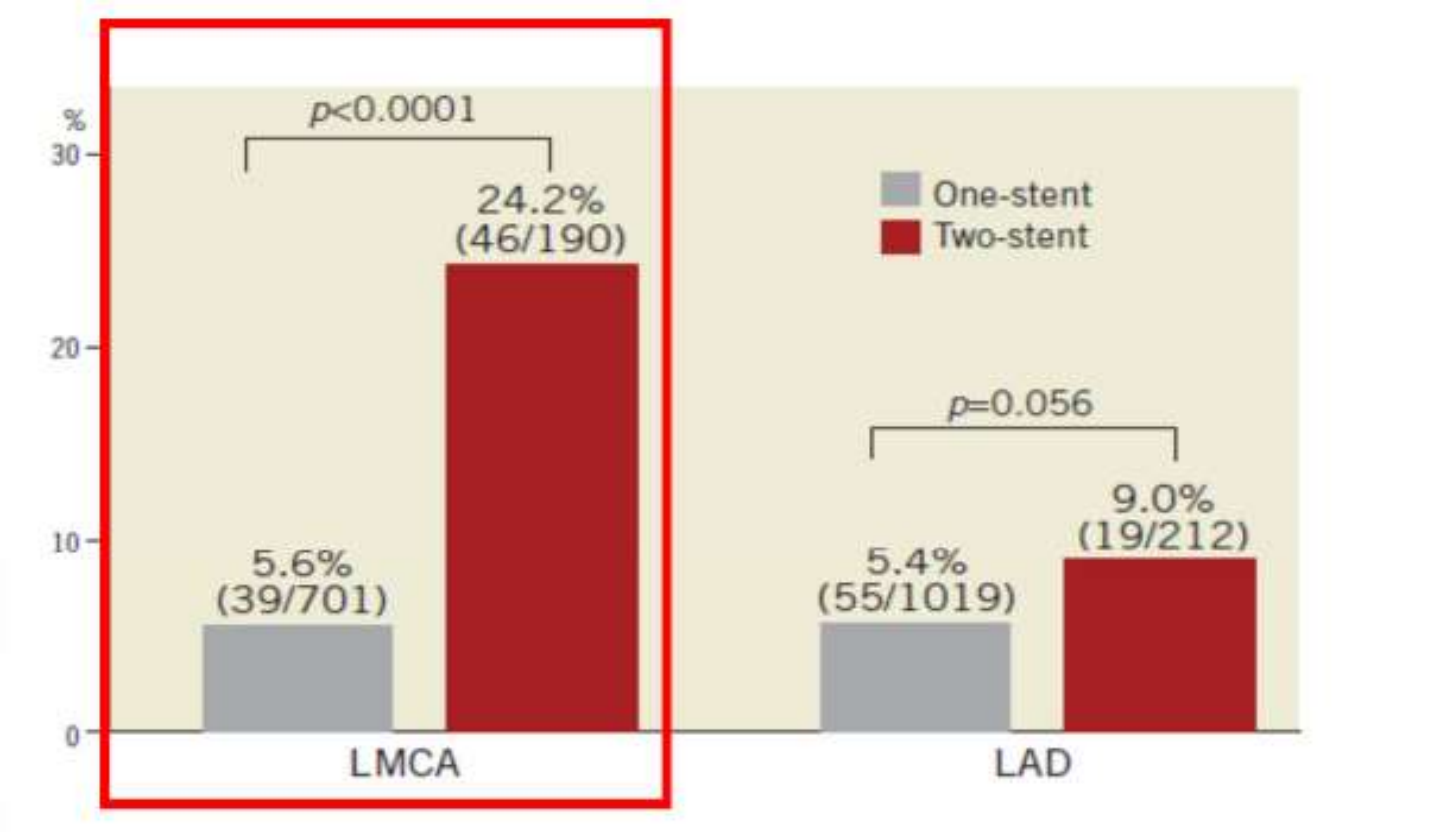
Song et al JACC Intv 2014

Frequent Use of 2-Stent for LM than non-LM in Korean Registry



Song YB et al. Am Coll Cardiol Intv 2014;7:255

TLR

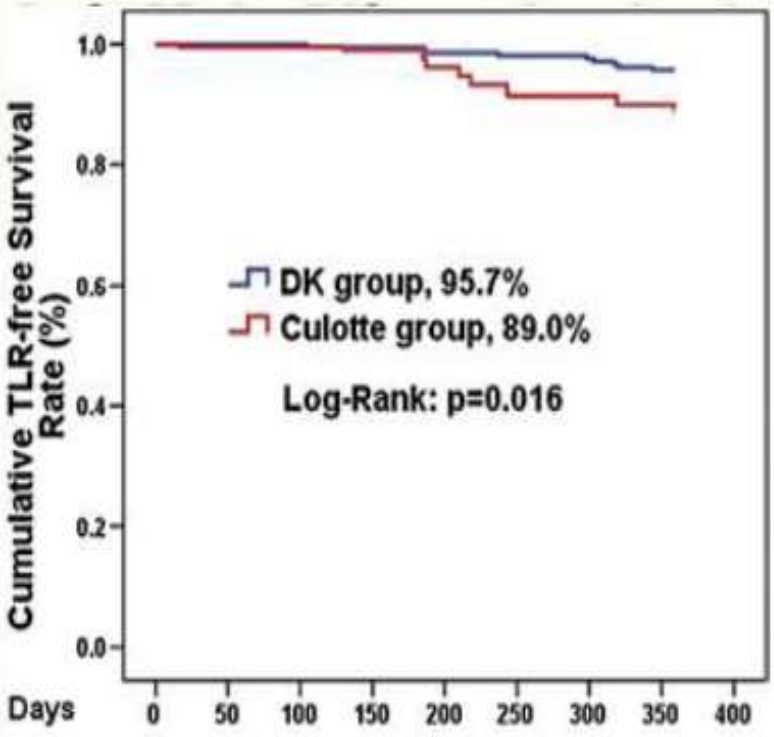


Toyofuku et al, J-Cypher Registry, Eurointervention 2011

Comparison of Double Kissing Crush Versus Culotte Stenting for Unprotected Distal Left Main Bifurcation Lesions

Results From a Multicenter, Randomized, Prospective DKCRUSH-III Study

TVR-Free Survival Rate at 12 Months



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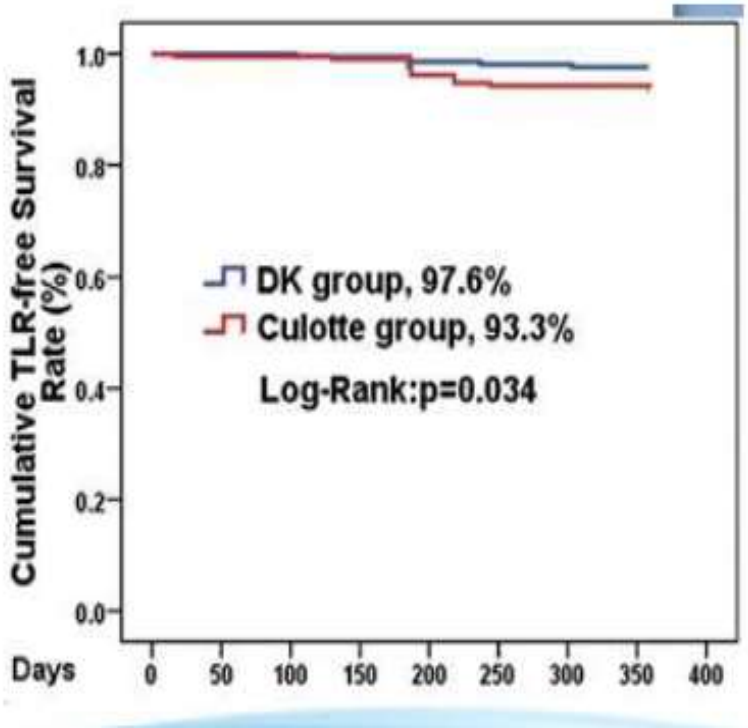
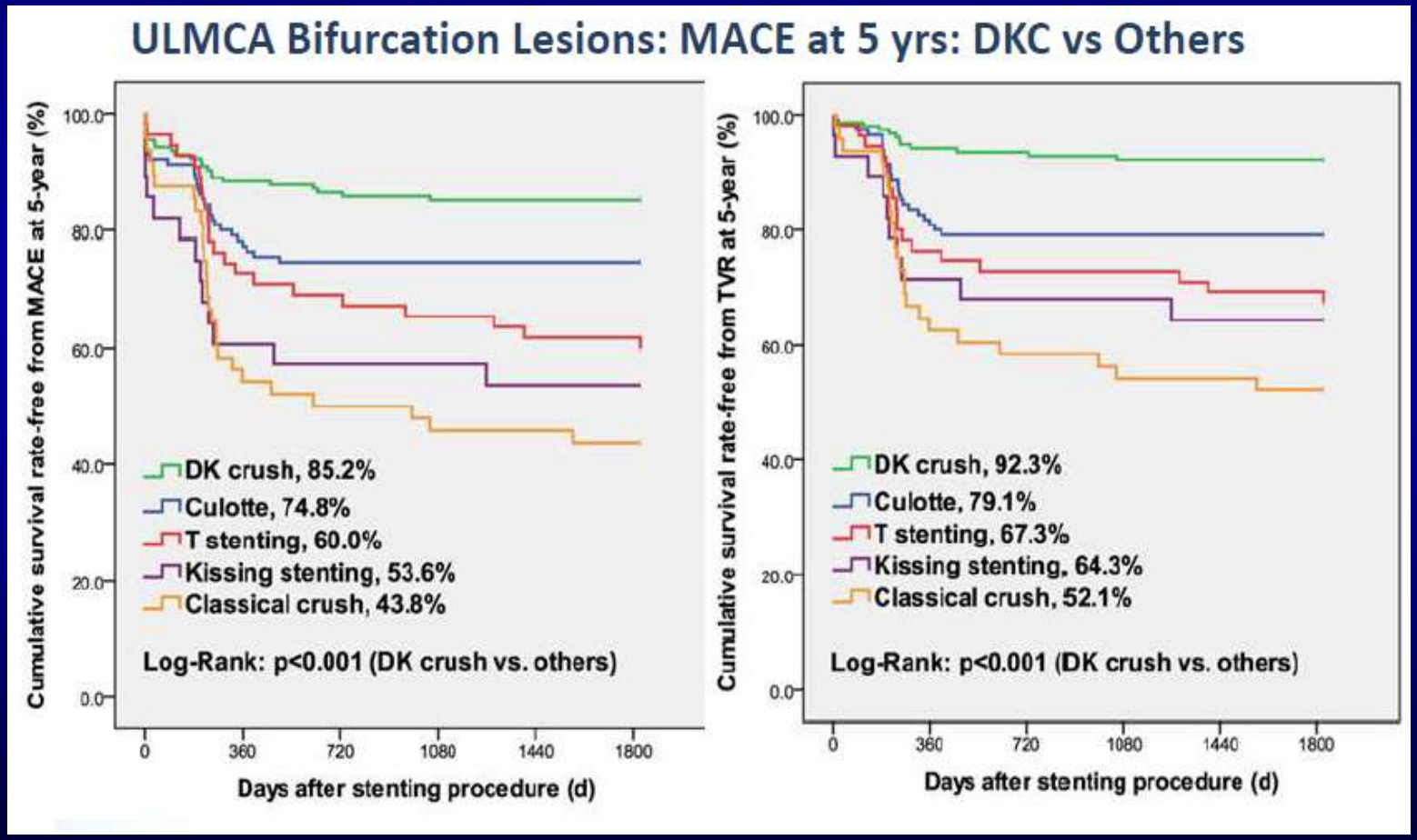
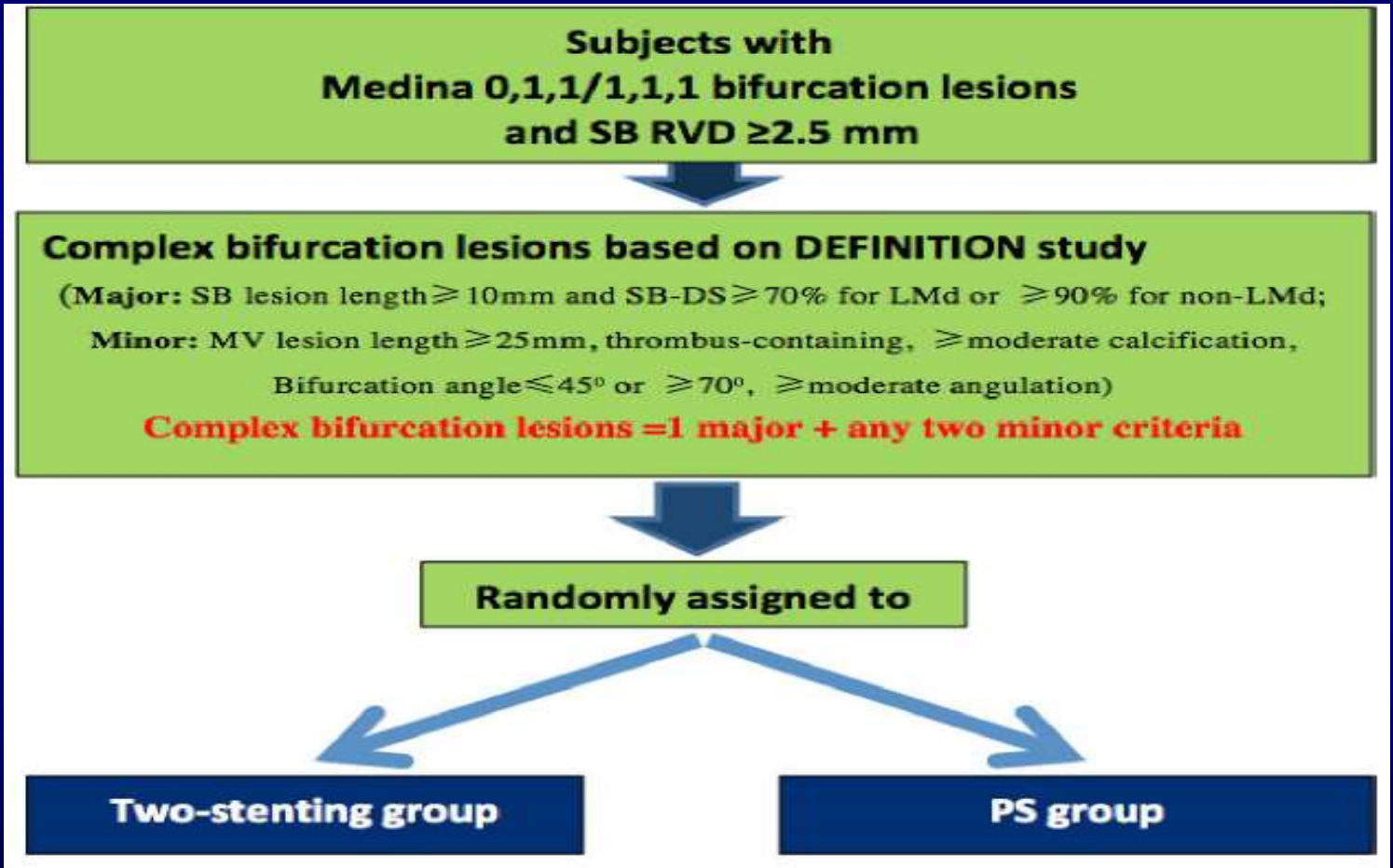


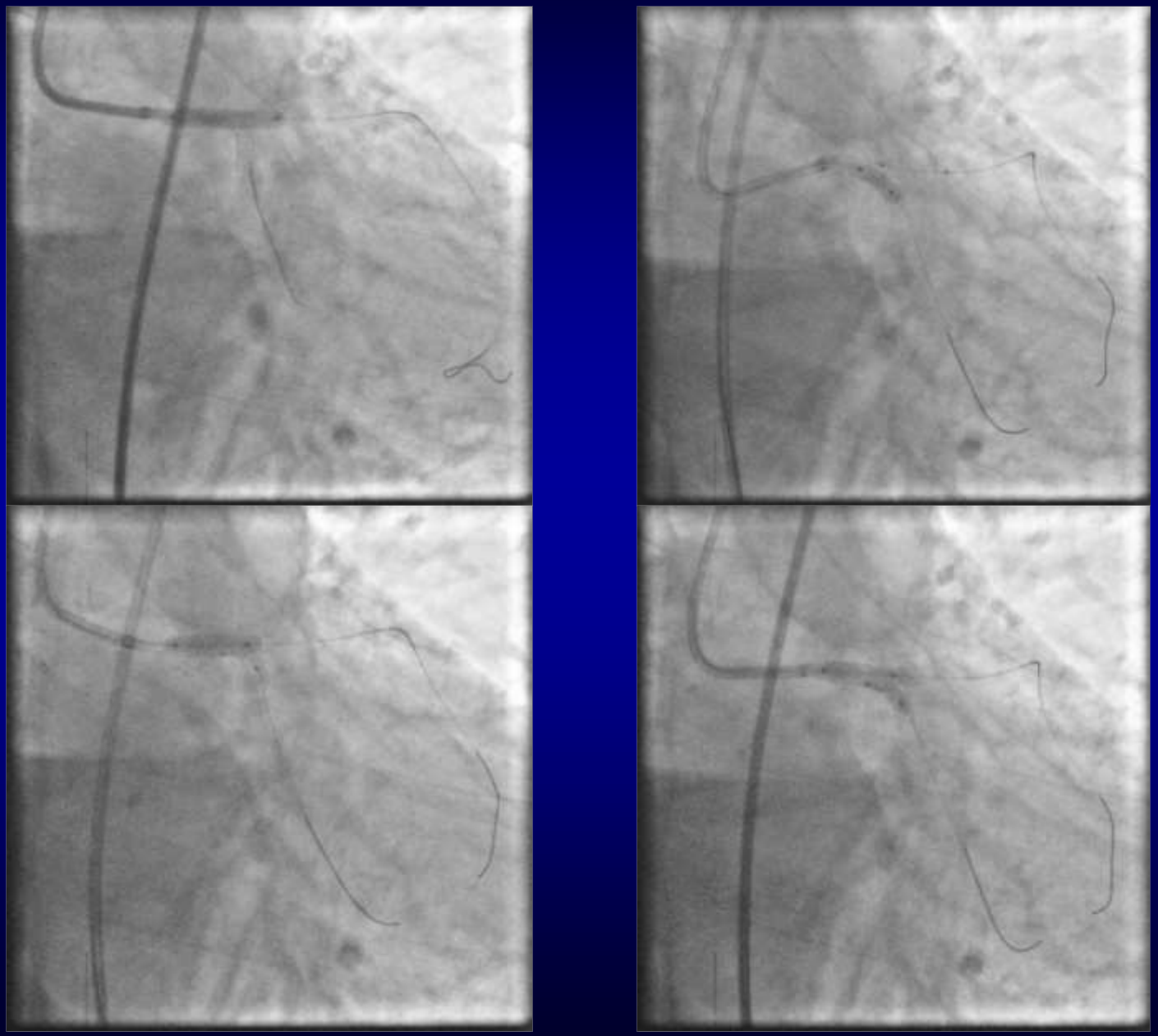
MACE at 5 Years

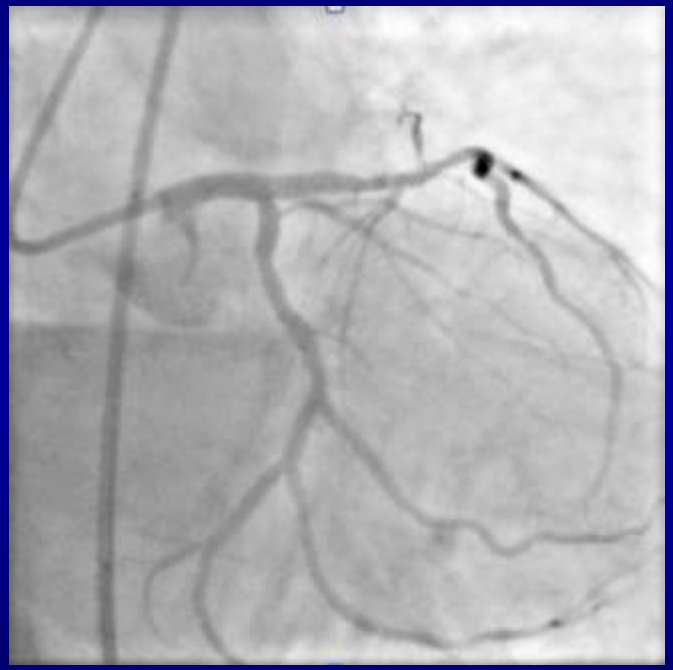


Definition 2



DK Crush





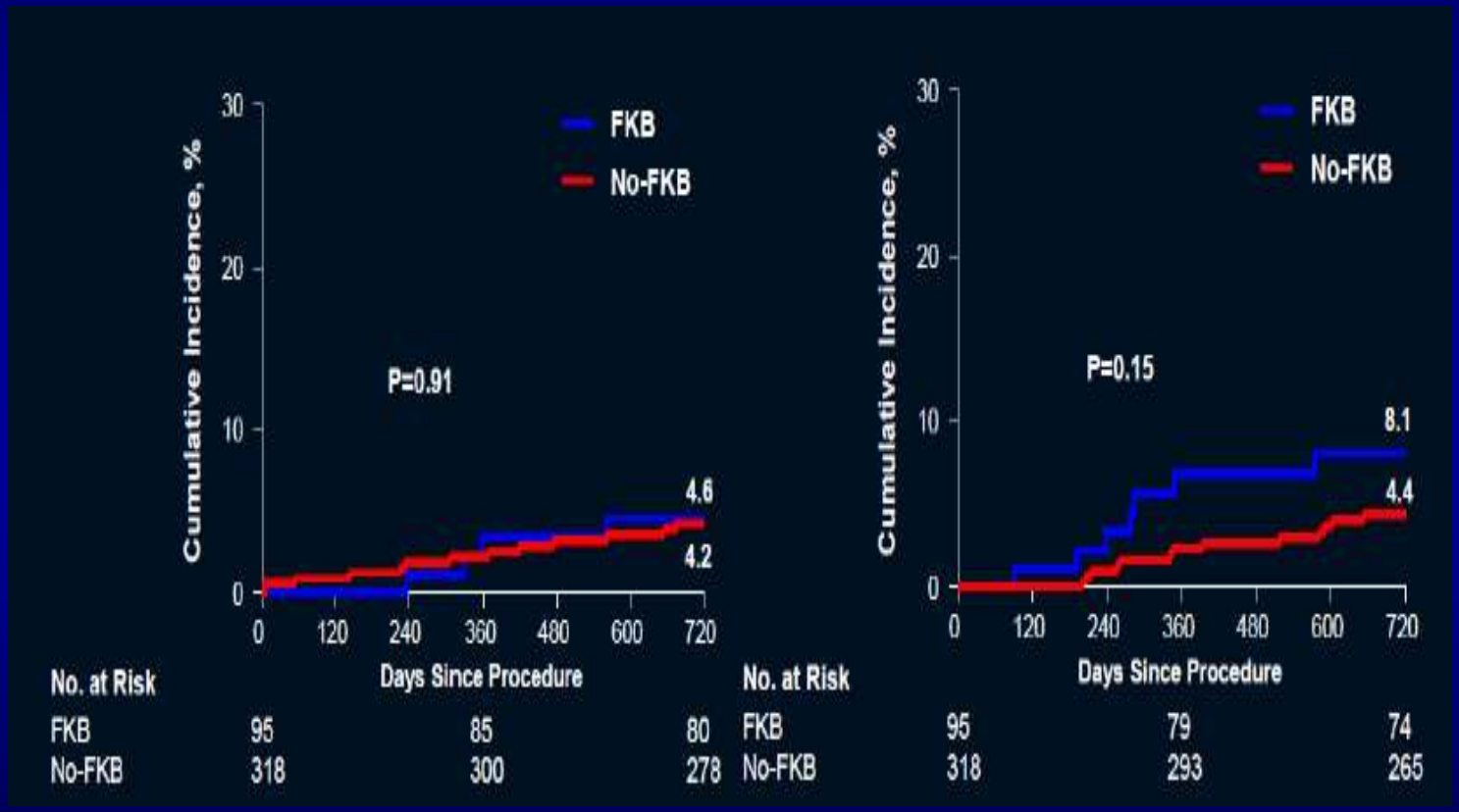
POT

- Stent diameter according to the distal MB
- POT needs to be done before additional guidewire insertion
- Short NC balloon sized to LM and positioned just up to ostium of LAD
- Better stent apposition
- It also facilitating SB access (distal recrossing)

FKBI in Singl Stent Technique?

- Final kissing is not always good, leave it alone is better
- If TIMI flow < III
- FFR< 0.80

Leave it vs Routine FKBI



AMC Data

FKBI & Carina

LM’s branches are large vessels

2 stents Technique is indicated to preserve the size of the vessels

If we implant only one sent, as the Carina is not affected by atherosclerotic lesions

- … it will move towards the opposite side

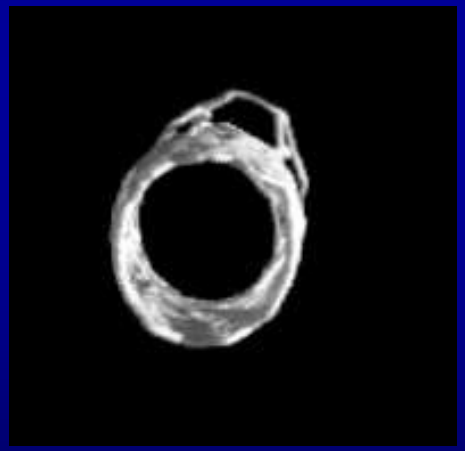
FKBI & Carina After 2 Stents

After the 2nd stent implantation the first stent is compressed.
Again, after this the Carina moves toward the opposite side.

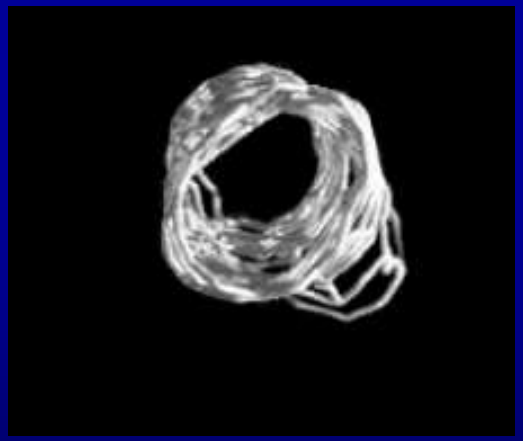
Then, a FKBI is performed, and both branches keep the same size

Effect of FKBI

Minimal overlap &
Proximal large balloon



Long overlap



Optimal Kissing

- Balloon size according to distal reference
- Short and non-compliant balloon
- Short overlap
- SB first then simultaneous
- At least 20-30 seconds
- Final POT

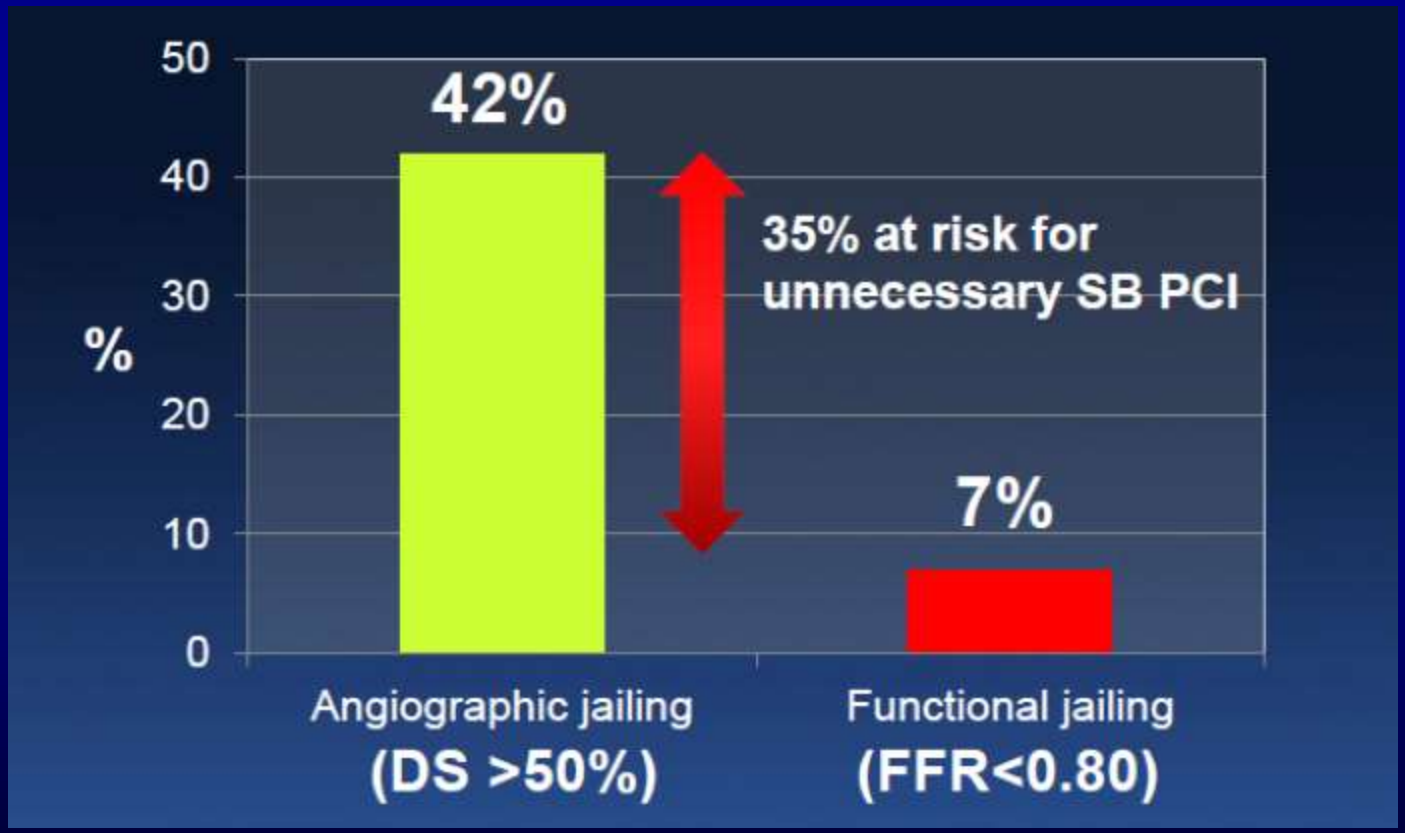
FFR with Concomitant LAD and LCx Disease

- If downstream stenosis becomes more severe, FFR LM apparently rises.
- A lesion with a downstream FFR of 0.60 is overestimates the FFR of true LM.

Daneils, et al. J Am Coll Cardiol Intv 2012;5:1021–5

LM Bifurcation Treated with Single Stent: Anatomy vs. FFR

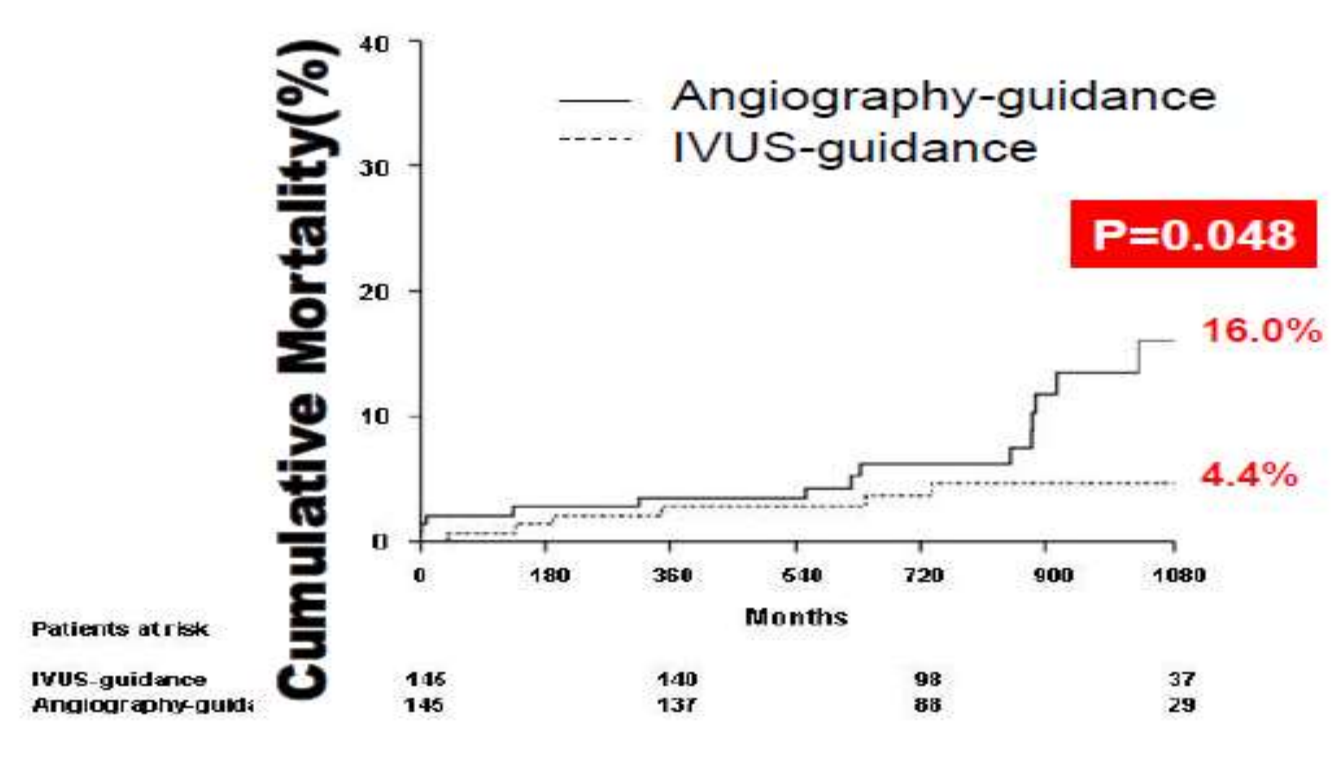
Functionally Significant LCX Jailing after stent crossover



Kang SJ, CCI. 2014;83(4):545-52

Why IVUS

IVUS guidance saves life



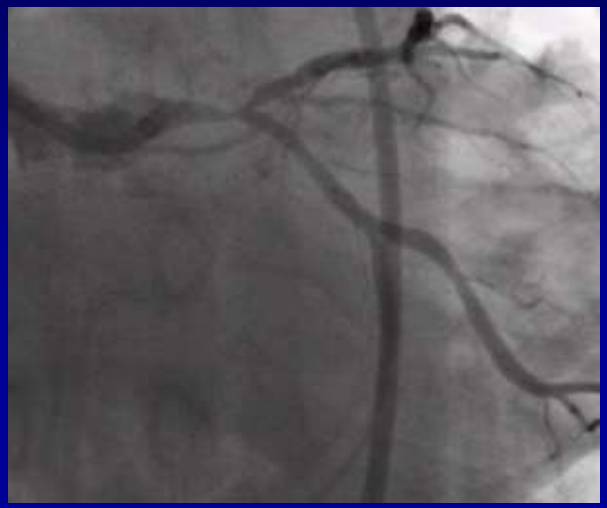
Park SJ etal, Circulation cardivasc Interv 2009

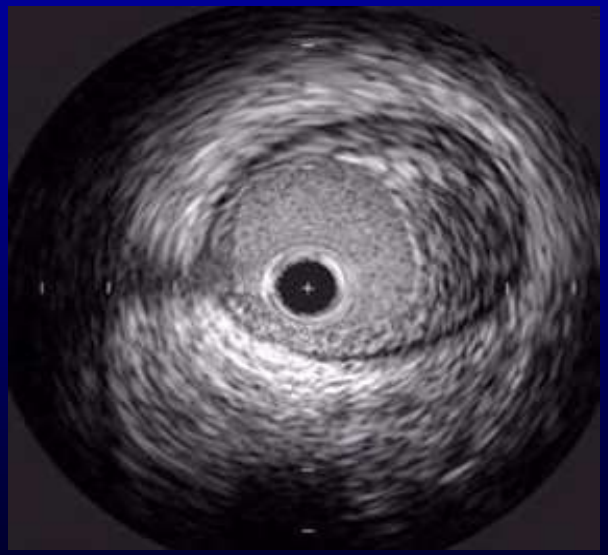
Single Stent Cross-Over

- IVUS Guidance on LCX disease status, stent size selection, stent optimization.

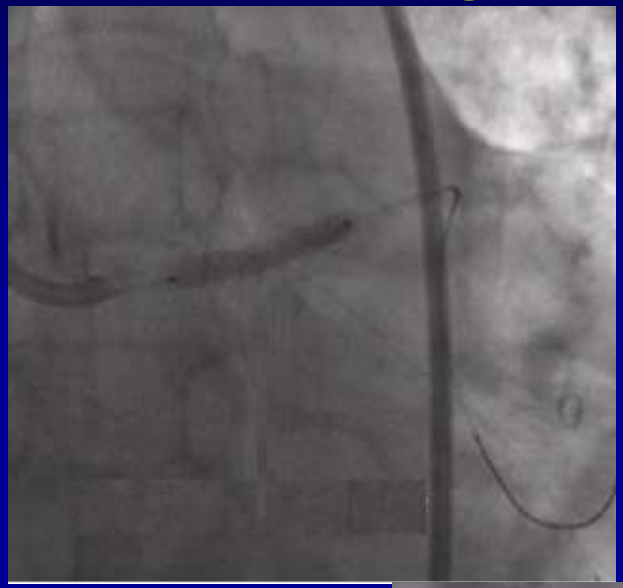
- FFR Guided decision for further treatment of the SB.

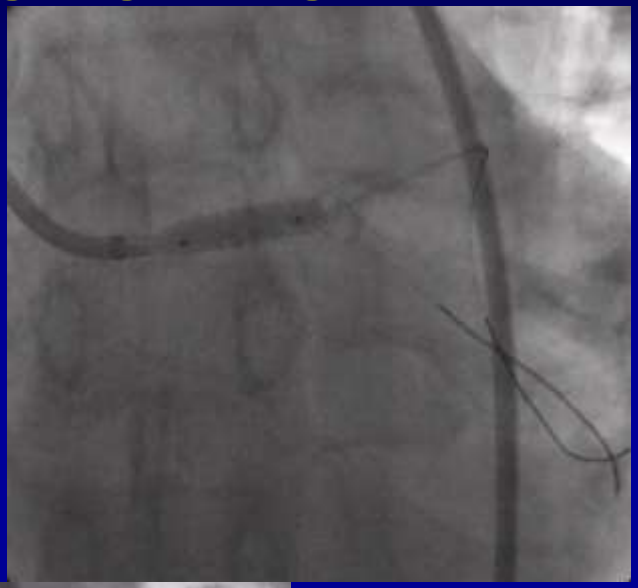
LM Bifurcation with Insignificant LCX Disease

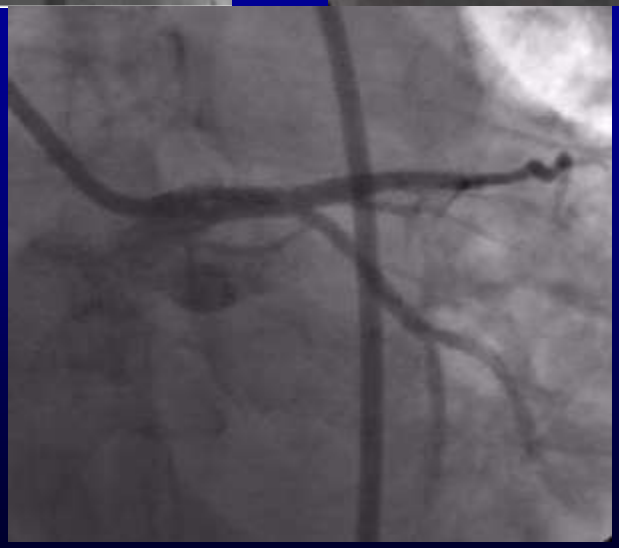




LCX Not Treated as FFR is Non Ischemic

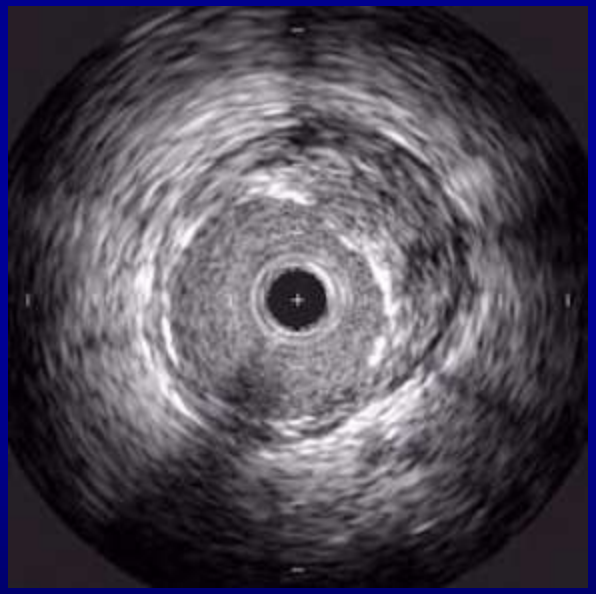




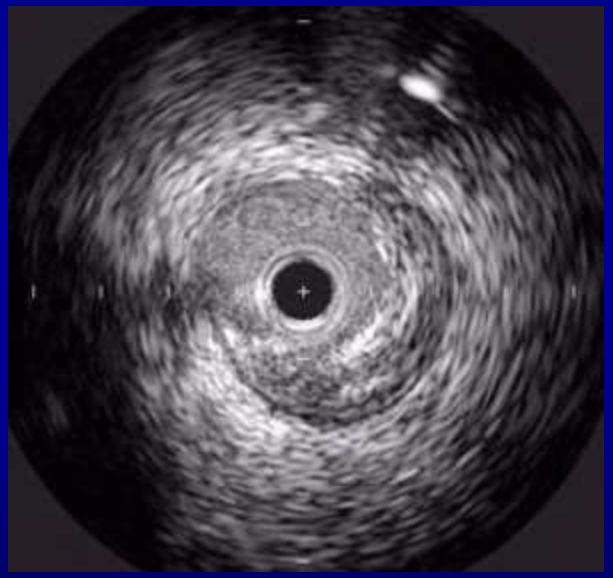


Post Stenting IVUS

LAD

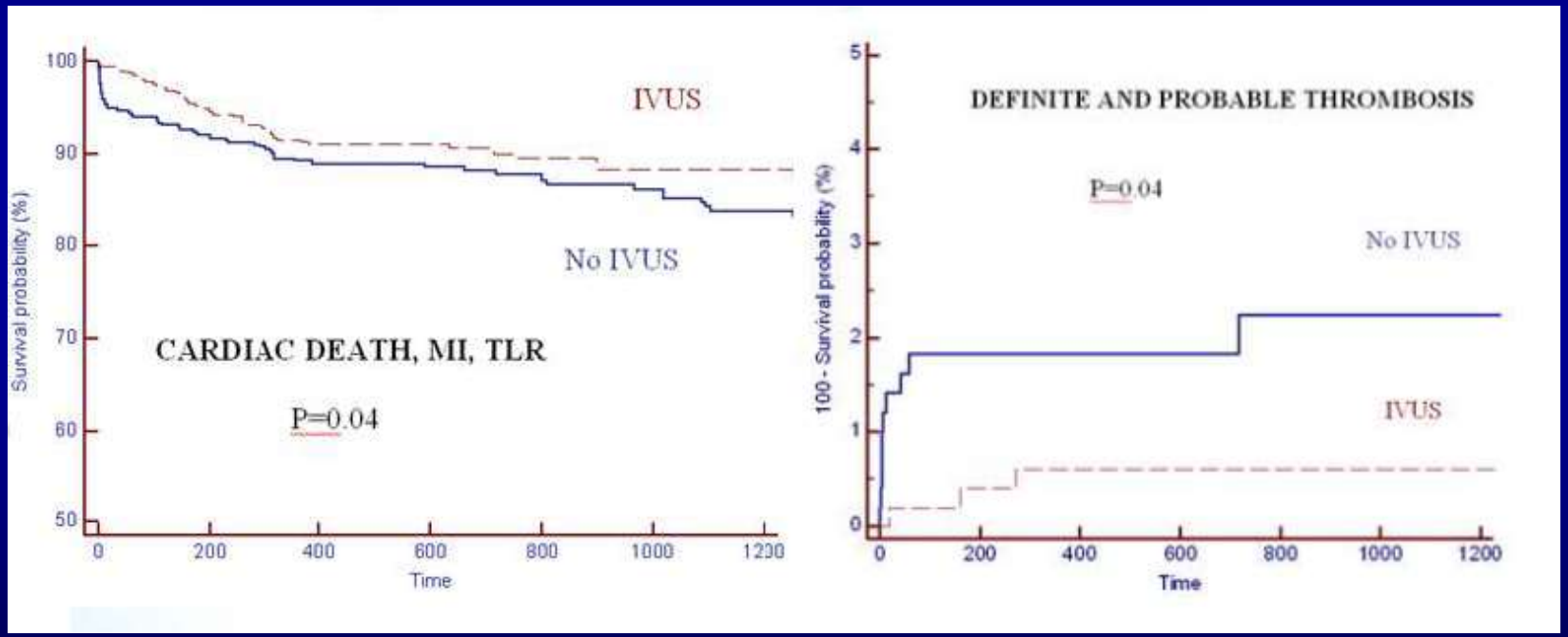


LCX



Clinical Impact of Intravascular Ultrasound Guidance in Drug-Eluting Stent Implantation for Unprotected Left Main Coronary Disease

Pooled Analysis at the Patient-Level of 4 Registries



De la Torre Hernandez et al. JACC Intv 2014;7:244-254

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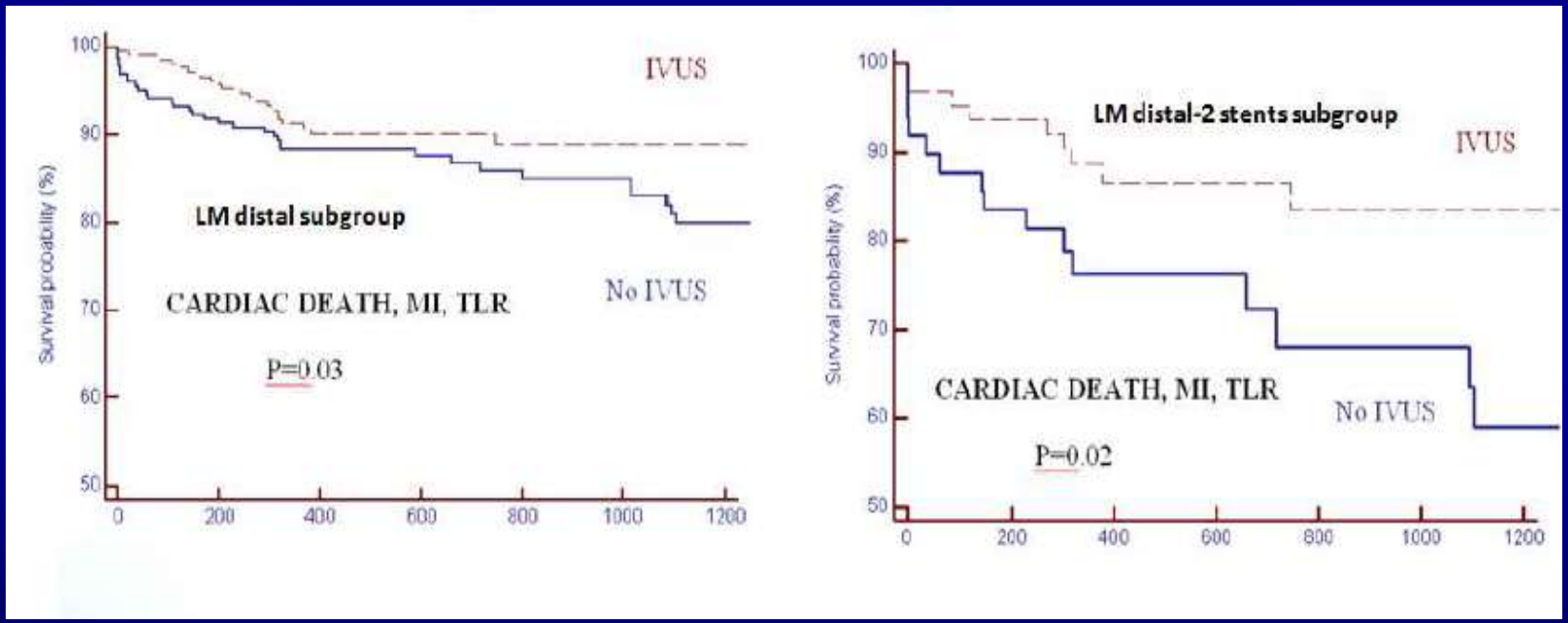

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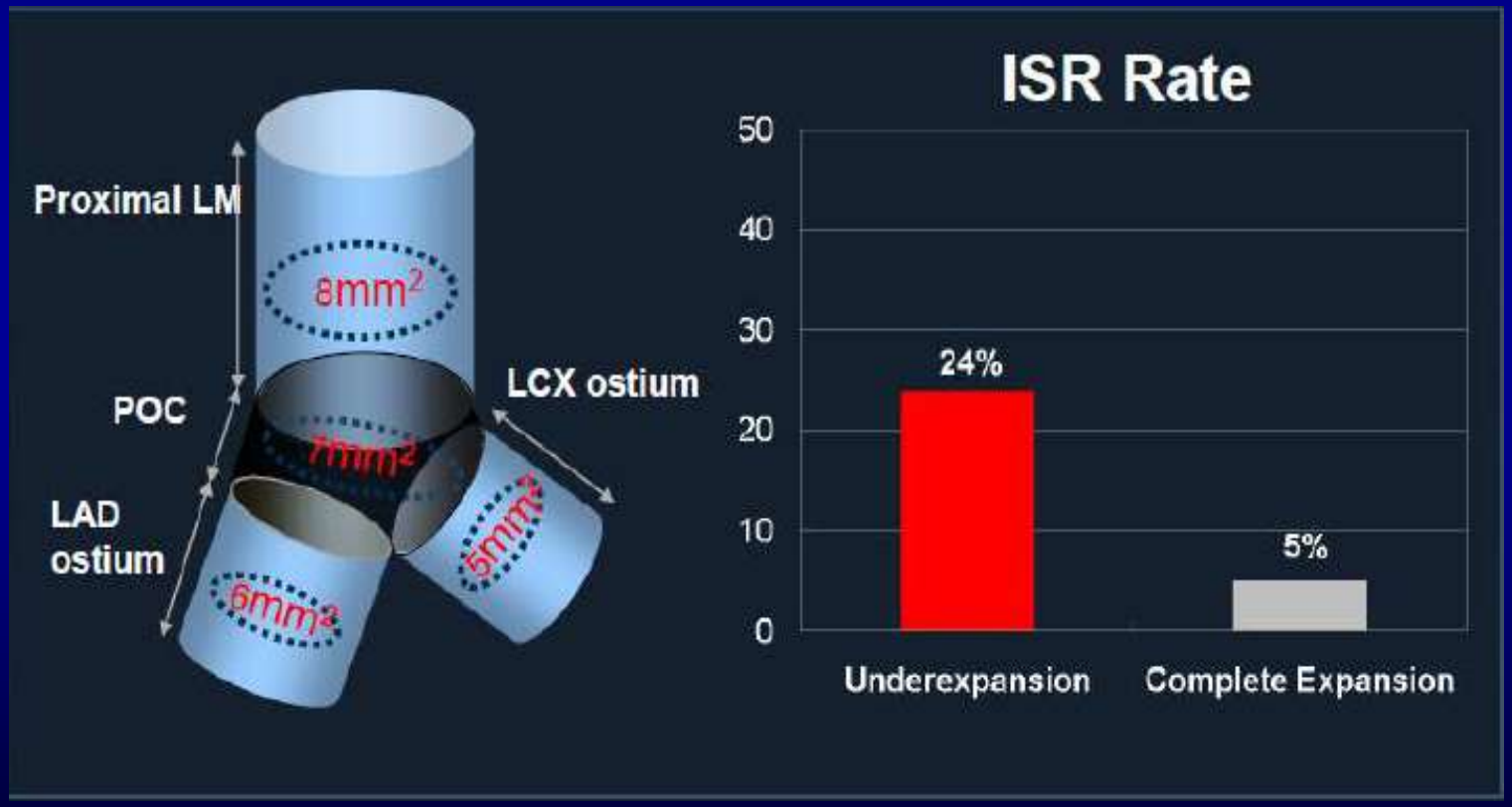
Impact of IVUS Guidance

Criteria for stent underexpansion at the distal LM bifurcation

Smaller MLA predicts restenosis

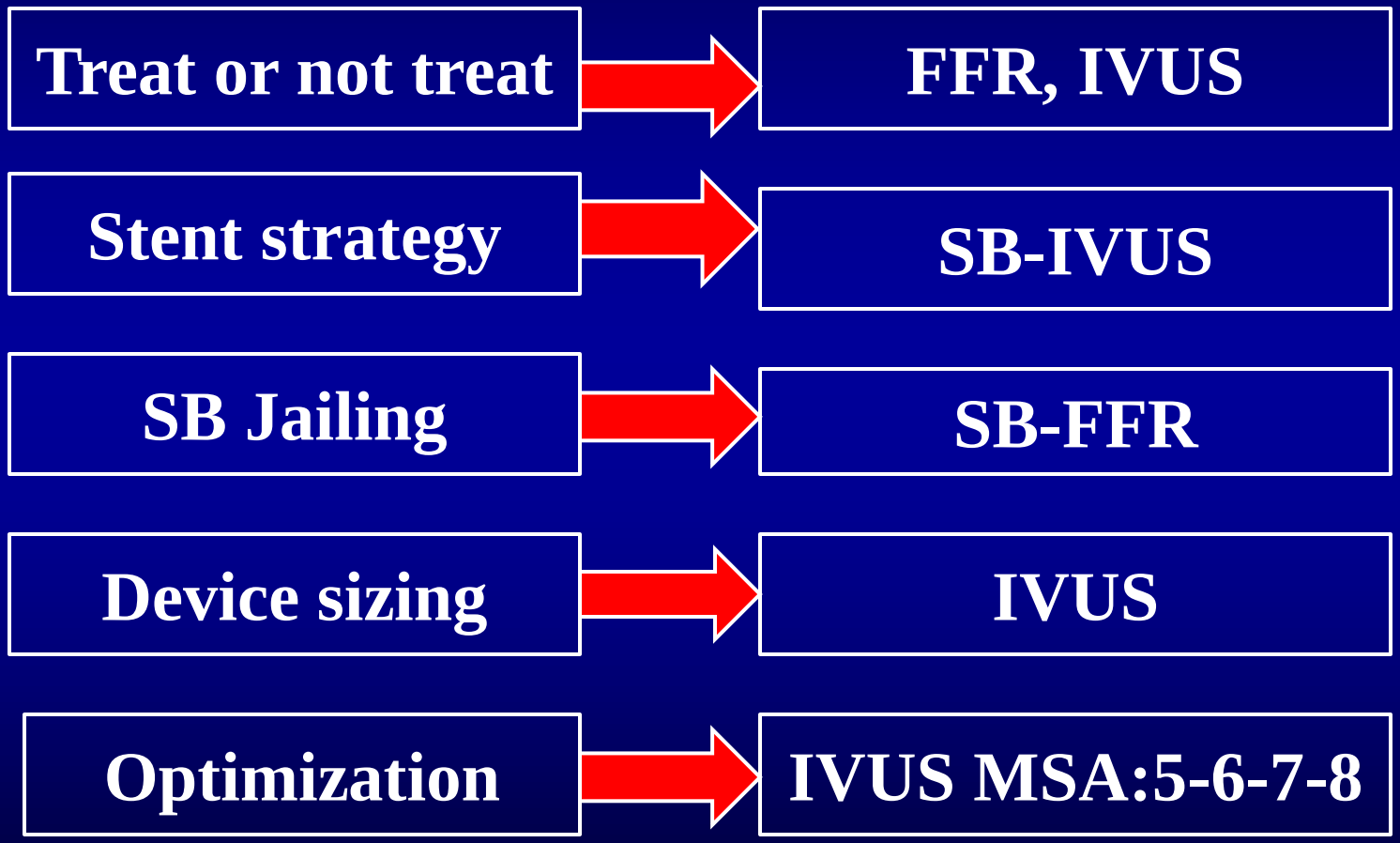


Kang et al. Circ Cardiovasc Interv 2011 2011;4:1168-74

Lesion Preparation

- LM lesions
  - More calcified
  - More fibrous
  - Greater angulation
- Thoughtful approach and good lesion preparation by CB, ROTA, scoring balloon is critically important for success

Decision Steps



BVS in LM Bifurcation

- The largest BVS available is 3.5mm which has dilatation limit of 4.0mm and too small for many LM.
- Dilatation of struts into LCX, with >2.5mm balloon may result in scaffold disruption.
- When LCX is larger than 2.5 mm and needs treatment at the ostium, BVS on the LM may not be ideal.

BVS in LM Bifurcation

- Provisional stenting is recommended, with mini FKBI (snuggle) if necessary.
- T or TAP stenting with a metal DES in the LCX is preferable in case of crossover.
- Two-BVS T-stent technique can be performed in a high-angle bifurcation.

Dzavik, V. and A. Colombo ."The absorb bioresorbable vascular scaffold in coronary bifurcations: insights from bench testing." JACC Cardiovasc Interv 2014**7: 81-88.**

My Final Thoughts in 2016

- Increased frequency of PCI in LM bifurcation
- Provisional stenting would be the default strategy
- Frequent use of 2-stent technique (up to 50%)
- DK Crush seems to be better 2 stent technique.
- Integrated use of FFR & IVUS.
- Emerging role of BVS? (more data needed)
- The suboptimal performance of 2 stents with wide bifurcation angle demands the need for dedicated bifurcation stent (dedicated BVS?)

THANK YOU