

**Left Main PCI :**  
**Make it Simple !**

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**Current Status**  
**of LM PCI**

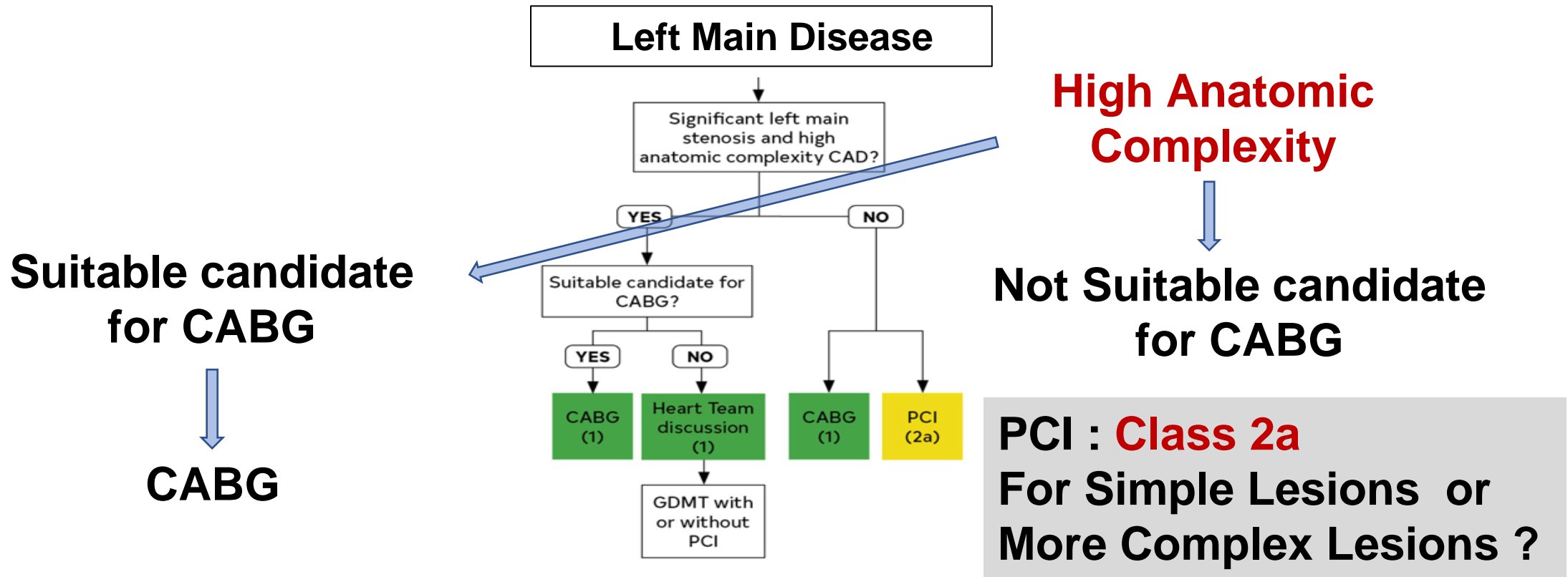
# ESC Guidelines 2018

## Elective PCI for LM Stenosis

	CABG		PCI	
Recommendation according to extent of CAD	Class	Level	Class	Level
LM disease a SYNTAX score $\leq 22$	I	A	I	A
LM disease a SYNTAX score 23 -32	I	A	IIa	A
LM disease a SYNTAX score $> 32$	I	A	III	B

Reference; SYNTAX Study, PRECOMBAT study, MAINCOMPARE registry study and Meta-Analysis. *Patrick, SW et al, NEJM. 2009 March 5;360(10), Park SJ et al, NEJM. 2011 May 5;364(18):1718-27, Levin GN et al. ACC/AHA guidelines. JACC 2011;58:44-122, Capodanno et al, JACC 2011;58:1426-32*

# 2021 ACC/AHA/SCAI, Guideline for Coronary Artery Revascularization



# ***PCI vs. CABG***

***LM Disease is  
Not Surgical Disease  
Anymore !***

## *Practical Guideline*

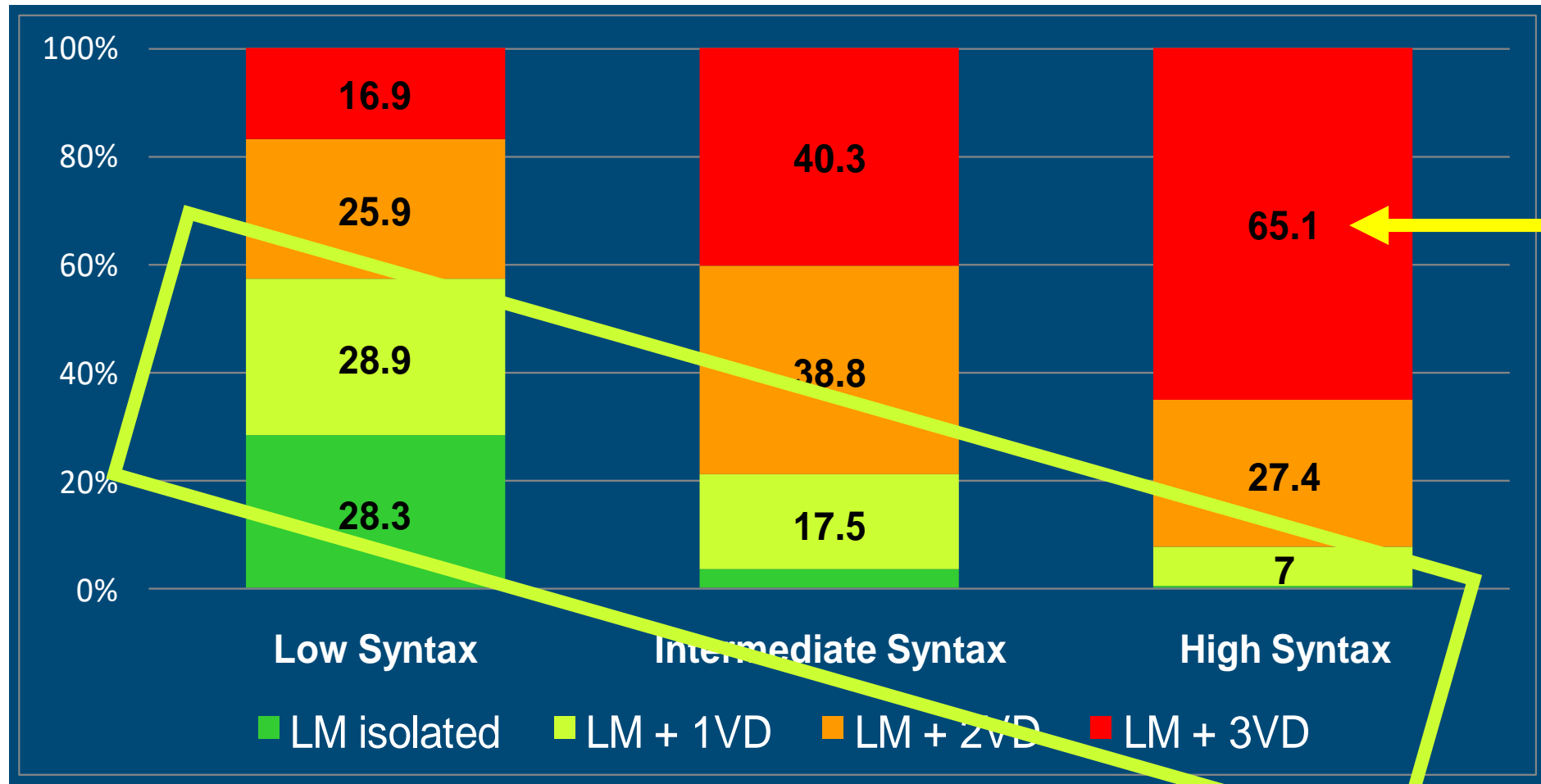
### ***PCI vs. CABG for Left Main Disease***

*If Extensive Non-LM CAD (high SYNTAX score >45)*  
*is present* **CABG** may be strongly preferred

*If Multiple Comorbidities* (prior stroke, lung disease, frailty) *are present* **PCI** may be strongly preferred.

# What Does It Mean, High Syntax Score ?

**Due to Concomitant 3VD Distribution**



**All Issues of High Syntax Score**  
**Are Mainly Related with**  
**Concomitant MultiVessel Disease**  
**Not Related with LM Disease**



*If You Look at*  
*Only Left Main Disease*

# *Left Main Disease*

- 1. Proximal,***
- 2. Big Vessel,***
- 3. Short Lesion Length,***

***If You Look at  
Only Left Main Disease  
(Maybe Syntax Score <22)***

***It Is Really Good Target for PCI !  
(Class 1a)***

# **Contemporary PCI**

## **Physiology and Image Supported Ischemia Guided PCI !**

Ahn JM, et al, AJC 2015 Oct;116(8):1163-71.

Escaned J, Banning A, Serruys PW. Eur Heart J. 2017 Nov 7;38(42):3124-3134.

Kang DY, et al. Circ Cardiovasc Interv 2021;14(10):e011011

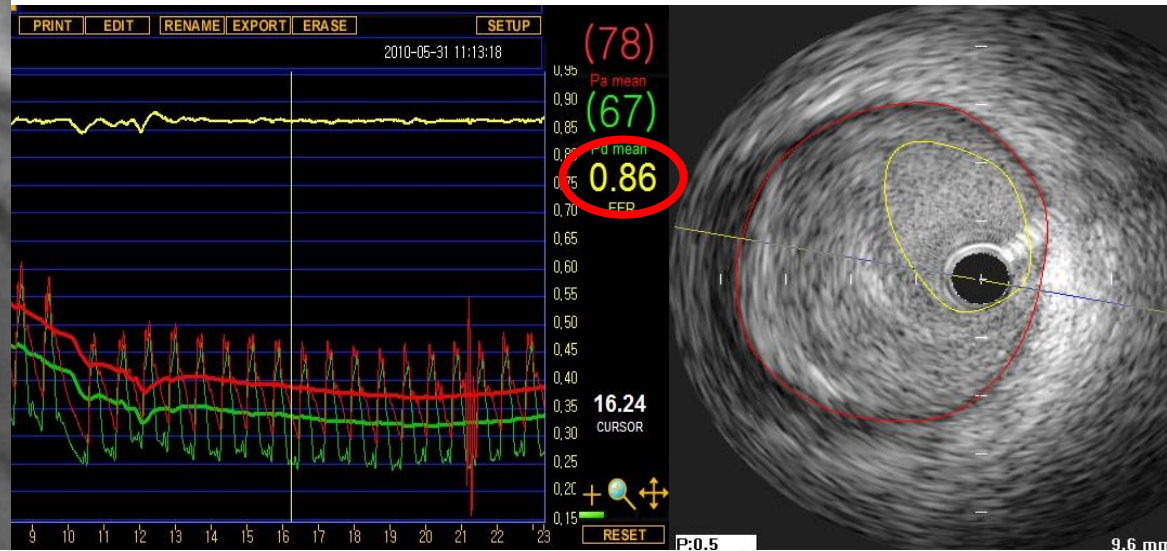
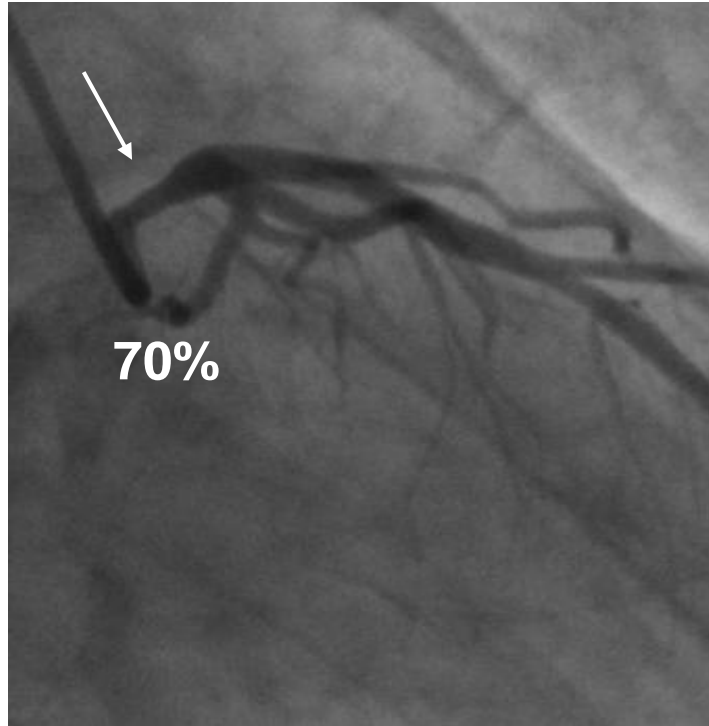
# Contemporary PCI

- *FFR Guided Decision Making,*
- *IVUS Guided Optimization !*

**Ostial or Shaft LM Disease**  
**To Treat or Not to Treat ?**

# Significant Stenosis

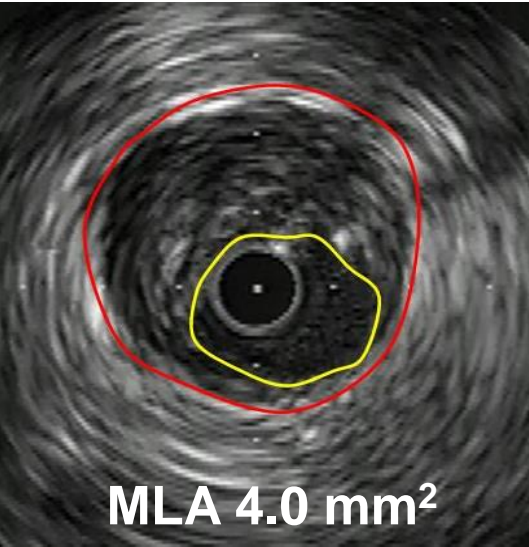
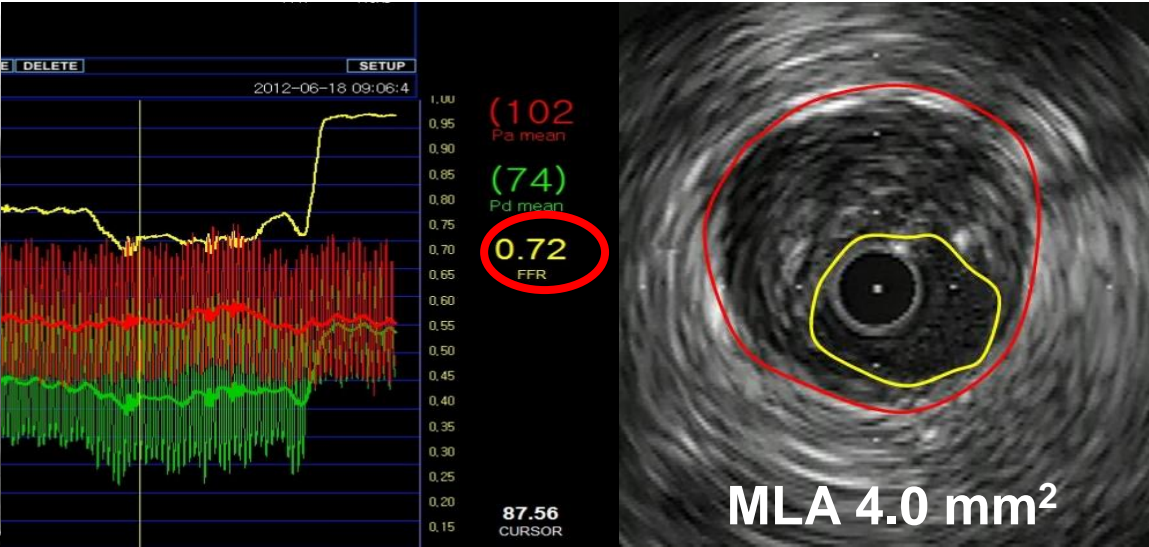
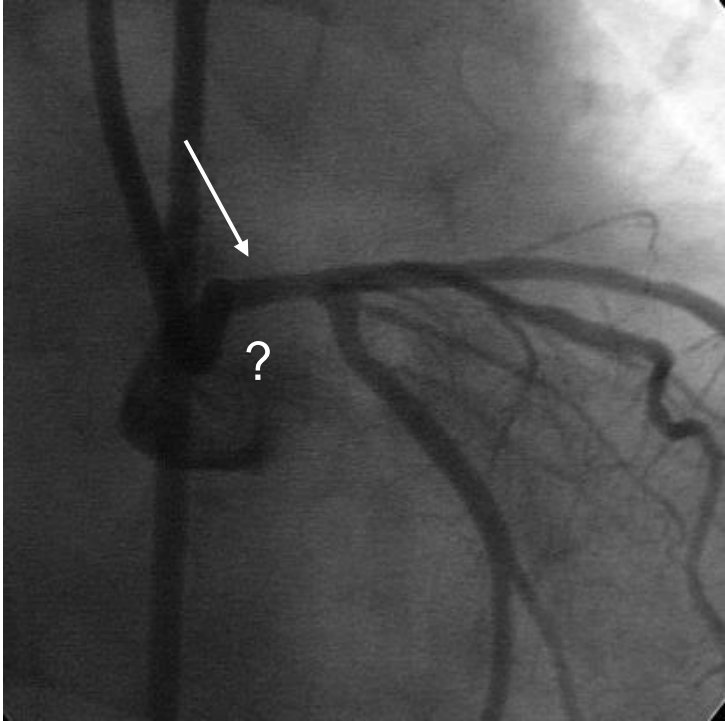
*Negative FFR 0.86*



**MLA = 4.9 mm<sup>2</sup>**

# Insignificant Stenosis

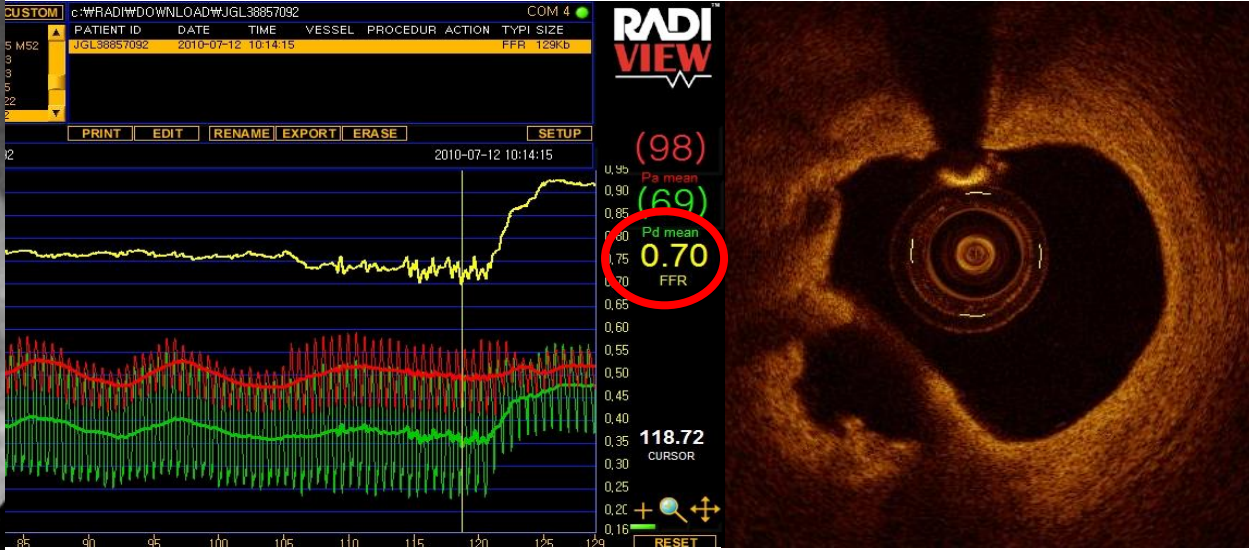
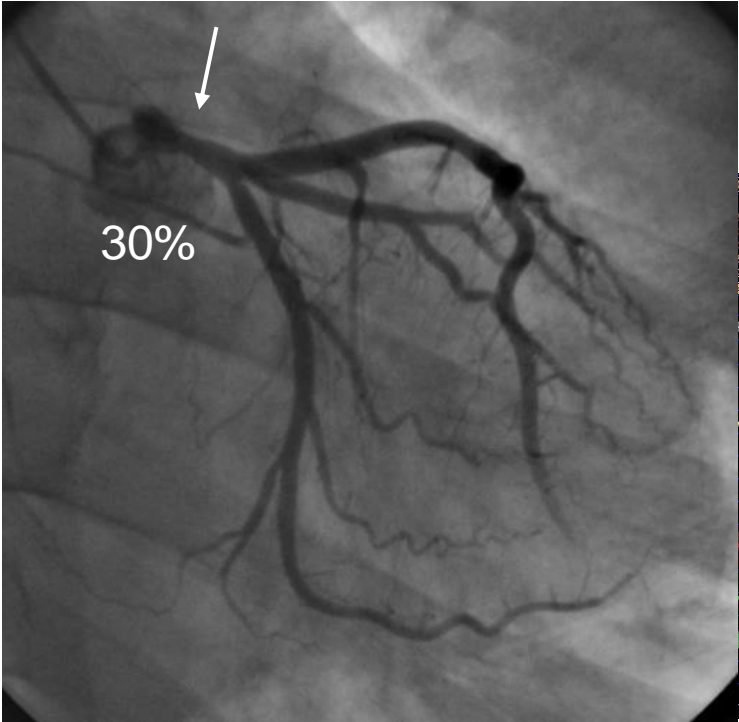
*Positive FFR 0.72*





# Insignificant Stenosis

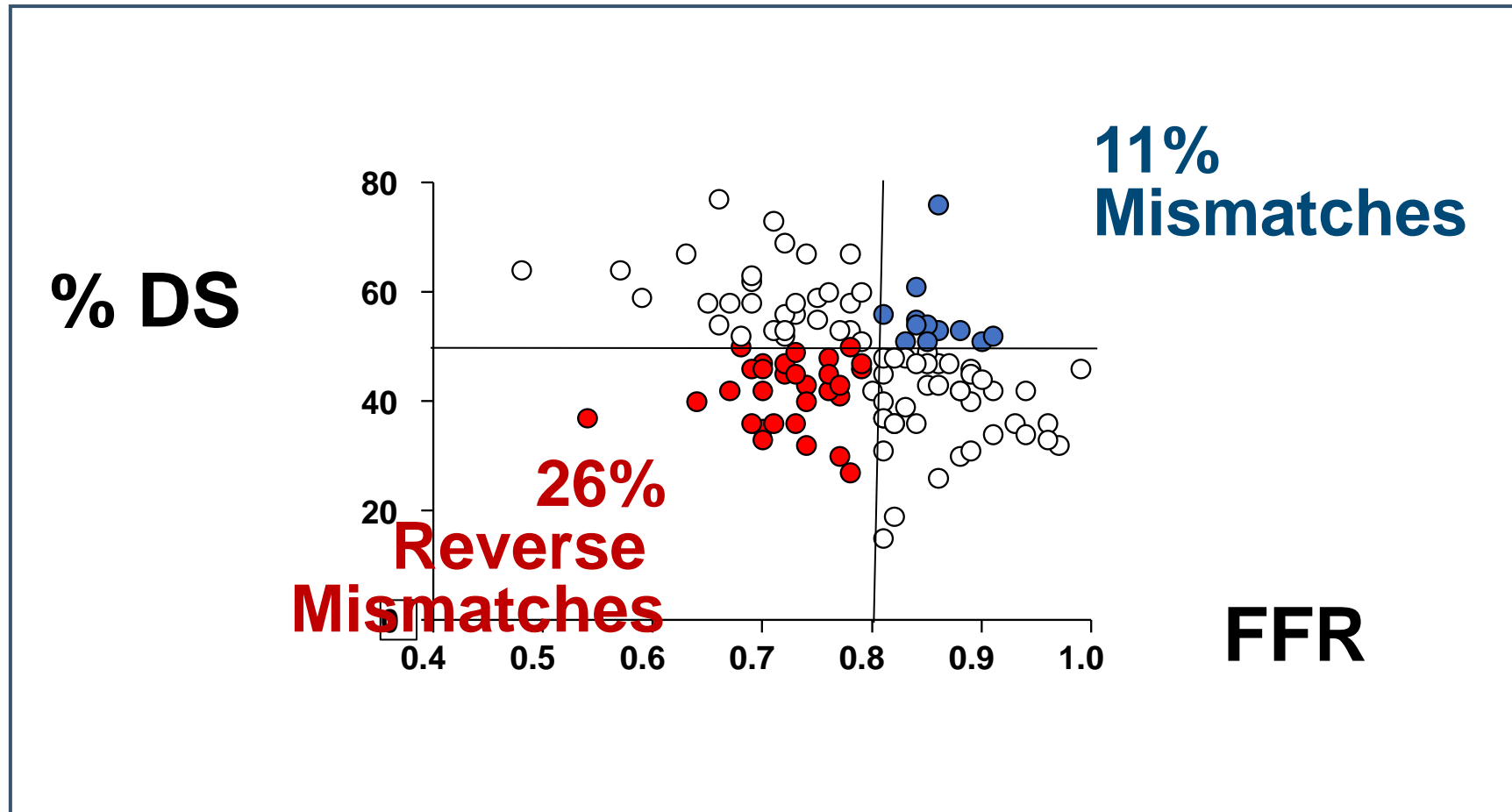
*Positive FFR 0.70*



Plaque Rupture,  
MLA 6.2mm<sup>2</sup>

# Mismatches of Intermediate LM Disease, Os/Shaft

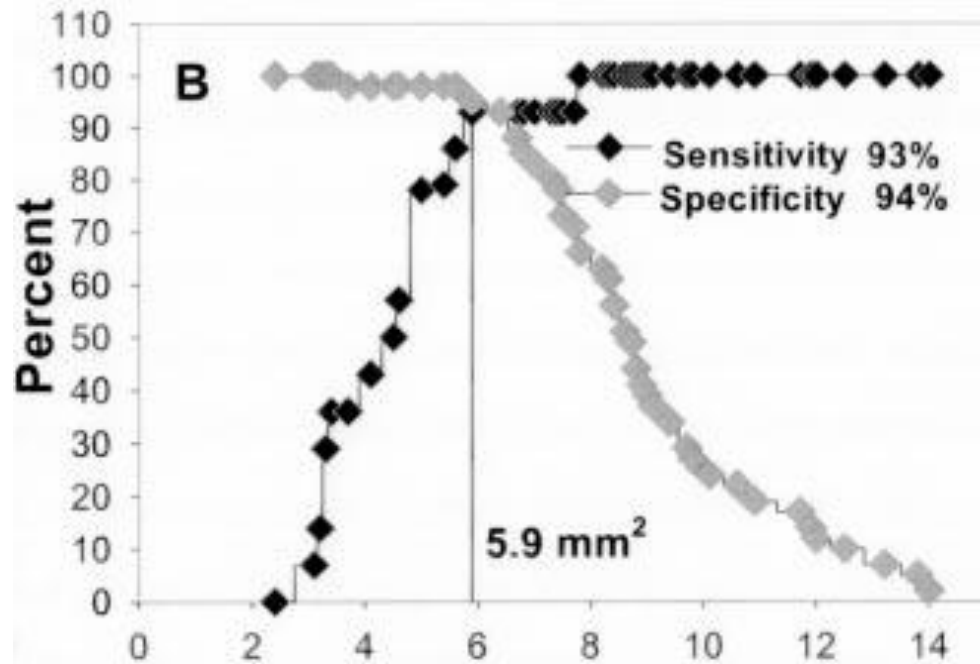
**37 %**



**FFR vs. IVUS MLA**  
**In Left Main Disease**

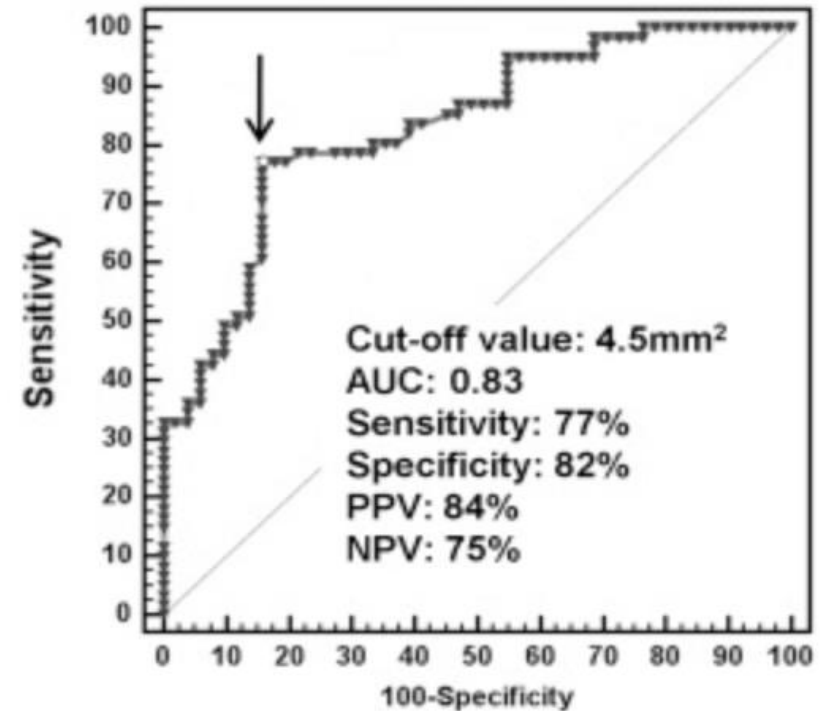
# IVUS MLA of LMCA Stenosis

FFR 0.75 Matched with  
Down stream disease



**MLA 5.9 mm<sup>2</sup>**

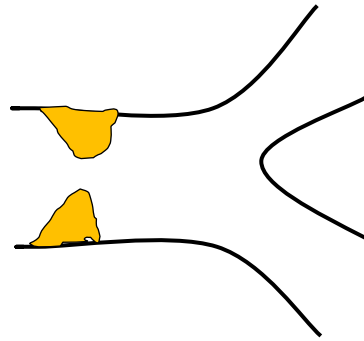
FFR 0.80 Matched with  
Ostial shaft disease



**MLA 4.5 mm<sup>2</sup>**

# How do I Implement ?

## Ostial and Shaft



**< 4.5 mm<sup>2</sup>**  
**Positive FFR**  
**(83%)**

## Down Stream Disease

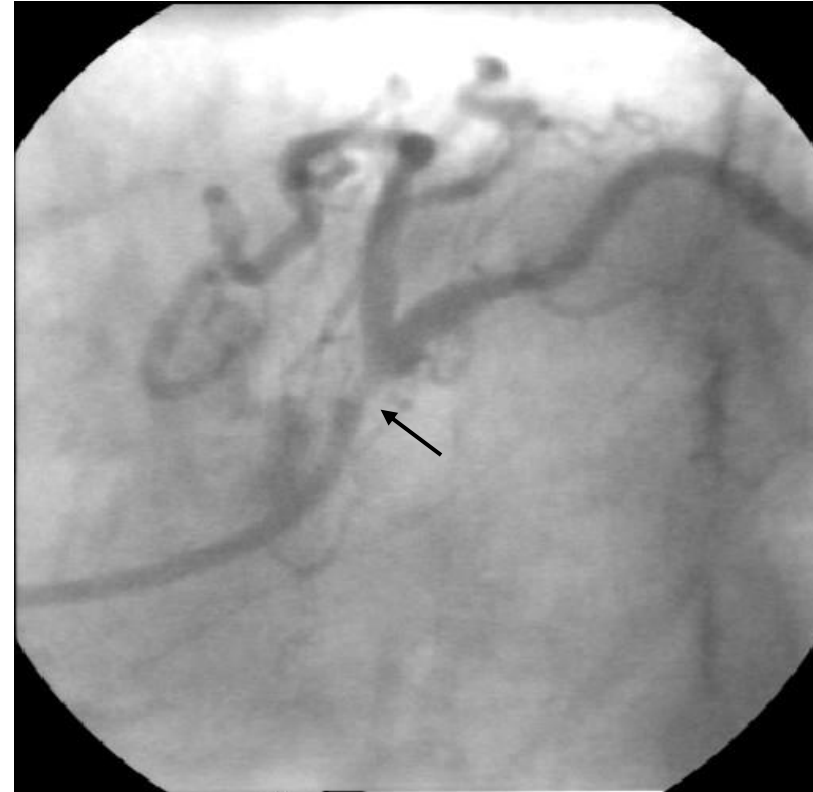
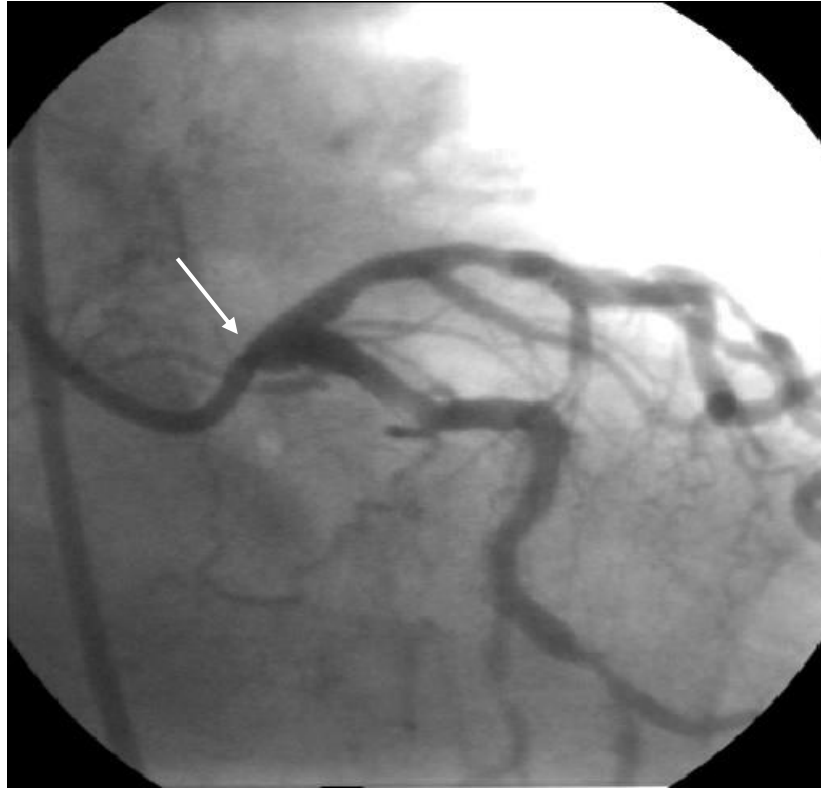
**4.5~6.0 mm<sup>2</sup>**  
**Consider FFR !**

**> 6.0 mm<sup>2</sup>**  
**Negative FFR**  
**(94%)**

**Ostial or Shaft LM Disease**

**How to Treat ?**

**67/M, Stable angina**  
Ostial LM disease



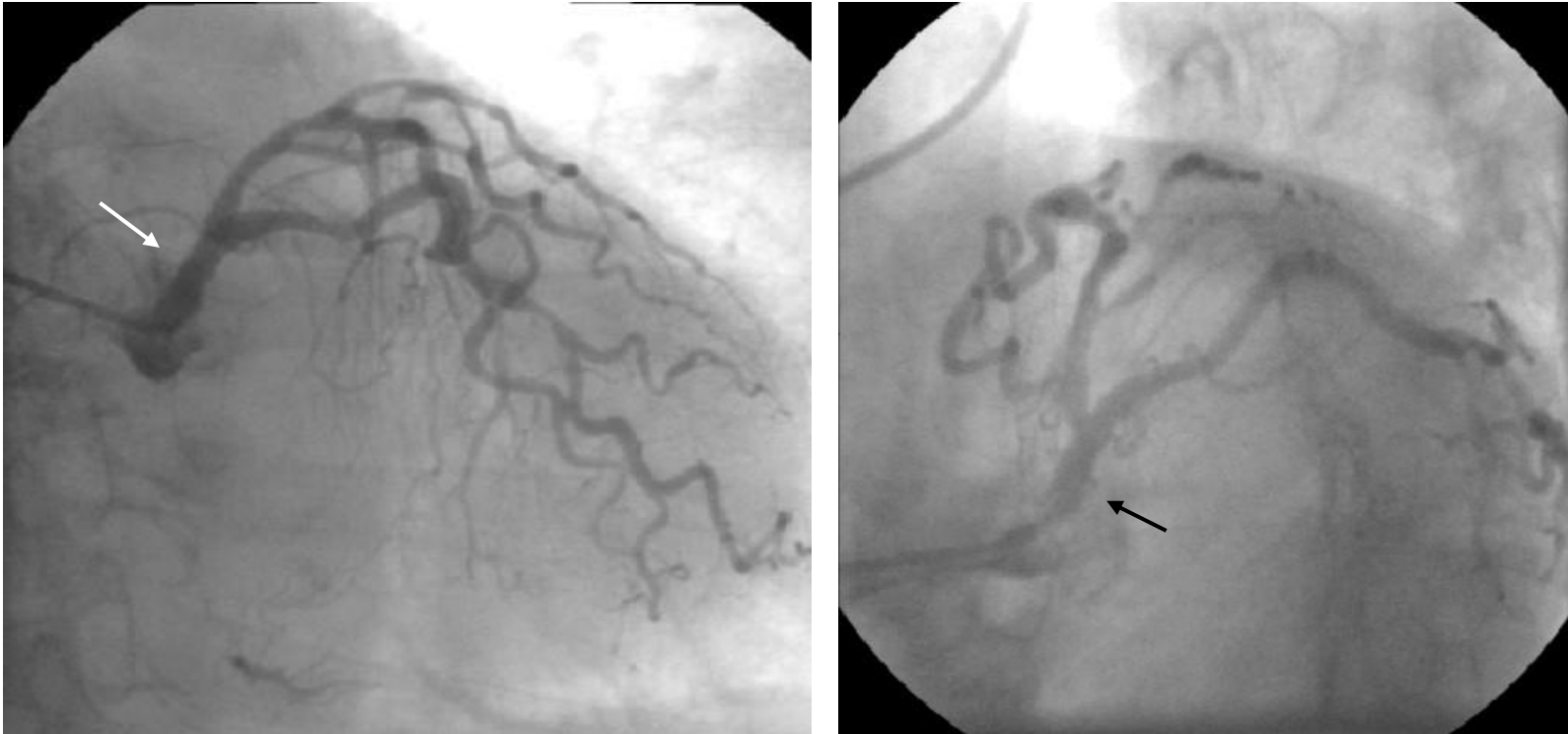
***Just Stent it !***



***It takes 5 minutes !***



# Angiographic follow-up at 2 Year



***Perfect !***

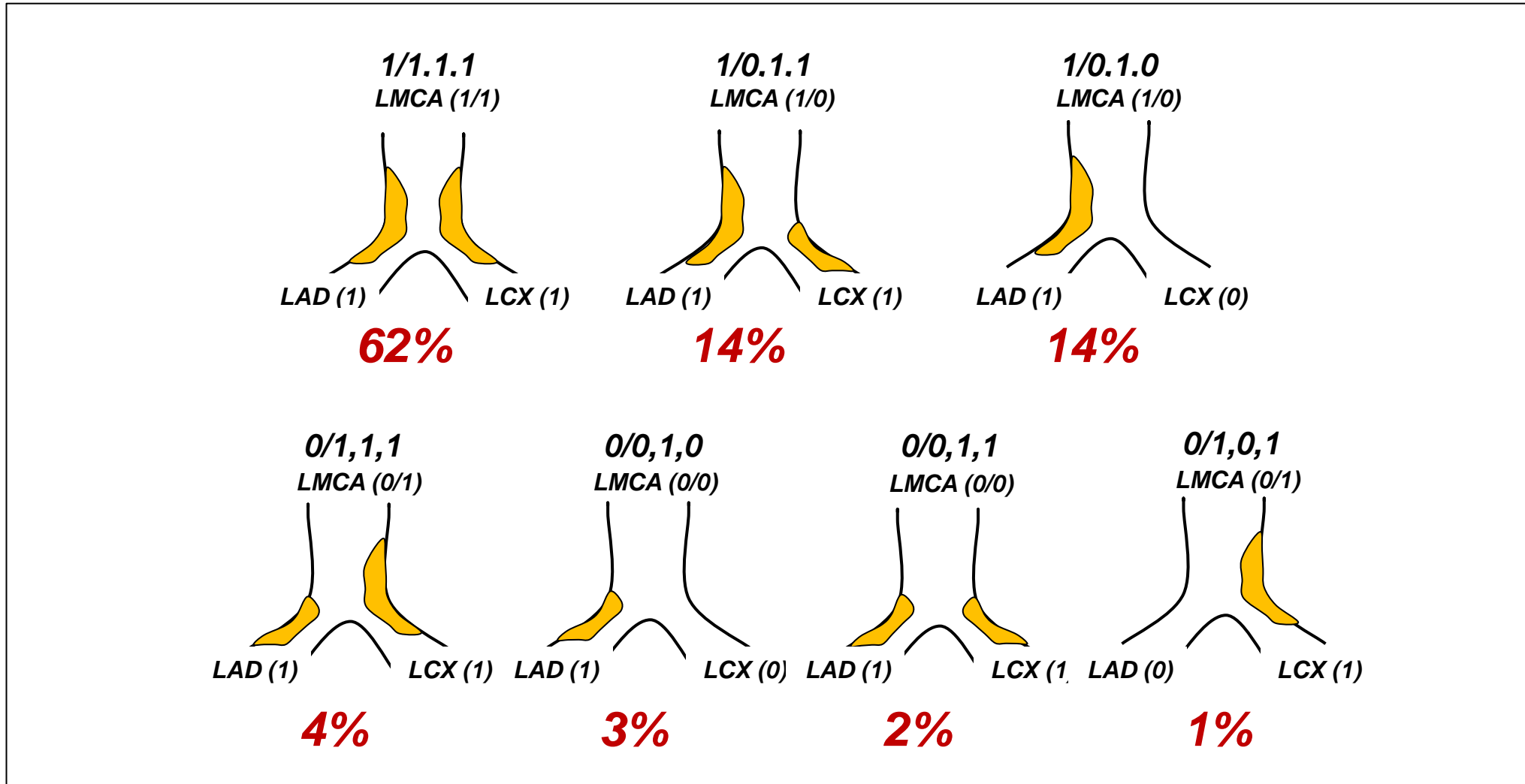
# ***Bifurcation LM Disease***

# LM Bifurcation PCI

**1 Stent, *Normal or Diminutive LCX,***  
Small LCX with < 2.5 mm in diameter,

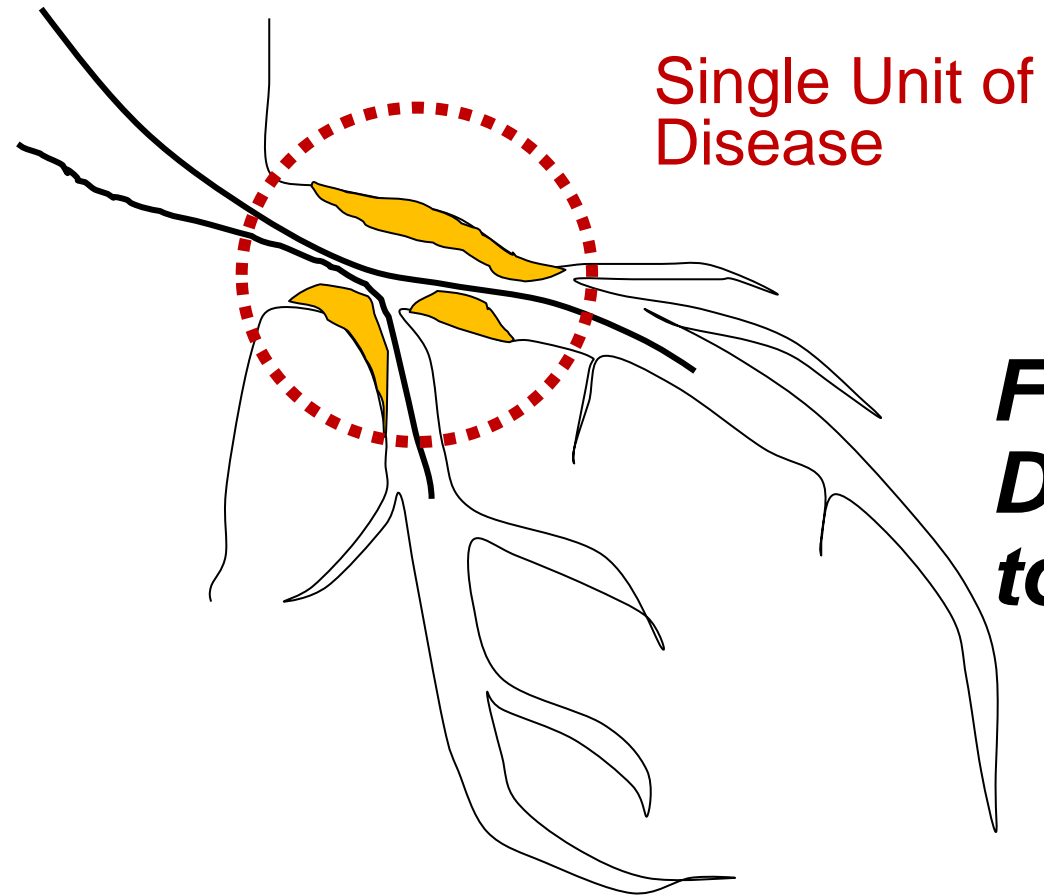
**2 Stent, *True Bifurcation Disease (Medina 1.1.1)***  
***in Large LCX (>2.5 mm),***

# 90% of Plaques LM Bifurcation Are Not Isolated, Extends from LM to LAD or LCX



# *FFR for LM Bifurcation*

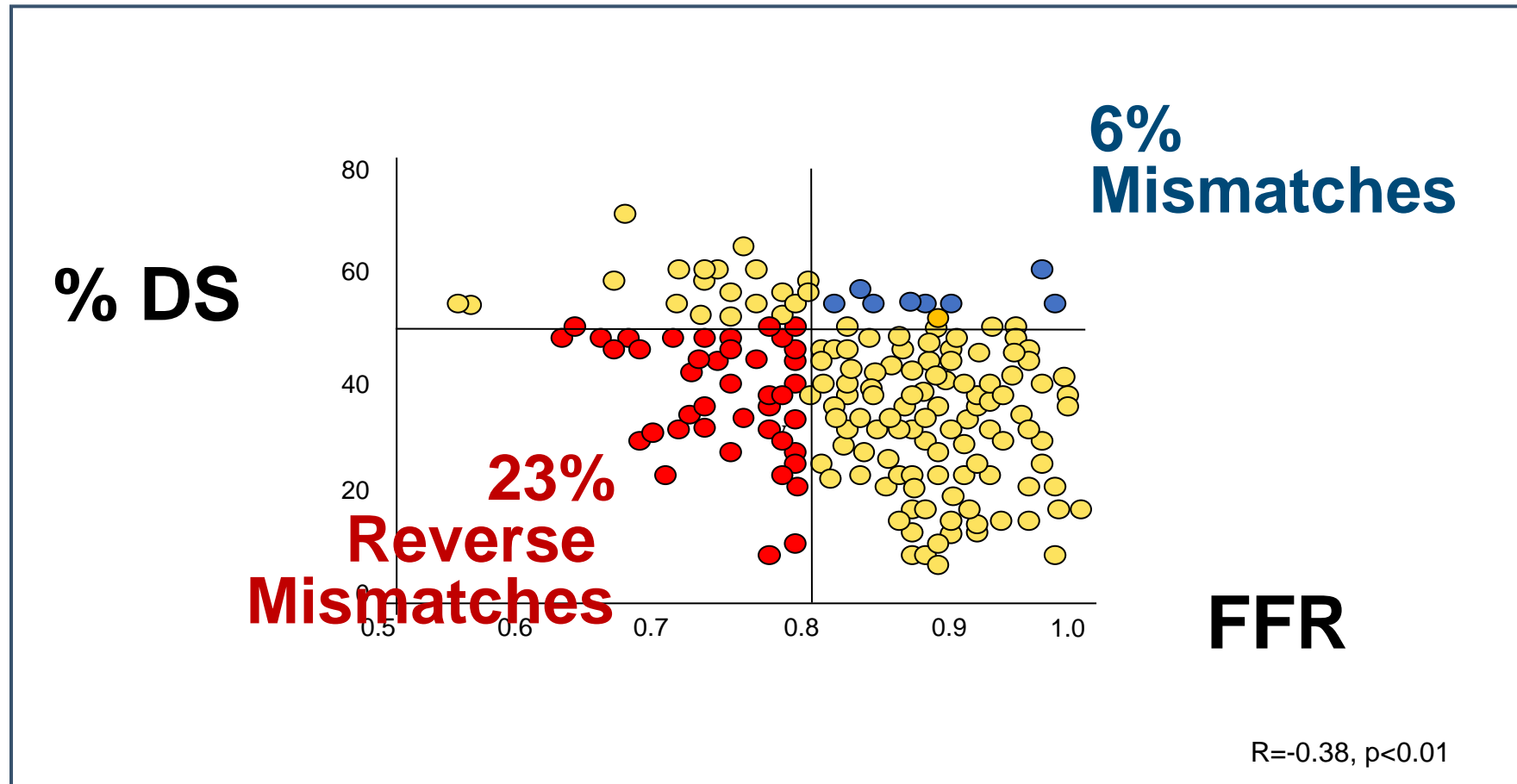
*If Transducer Placed Beyond Bifurcation  
in both LAD and LCX,*



***FFR Works for  
Decision Making  
to Treat or Not !***

# **Mismatches of Intermediate LM Disease, with Downstream Disease**

**29 %**



# ***LM Bifurcation PCI***

## ***How to Treat***

- 1. Lesion Specific**  
**Provisional One stent**
- 2. Upfront Two stents**

# ***LM Bifurcation PCI***

***IVUS Guided***

***Lesion Specific Approach***

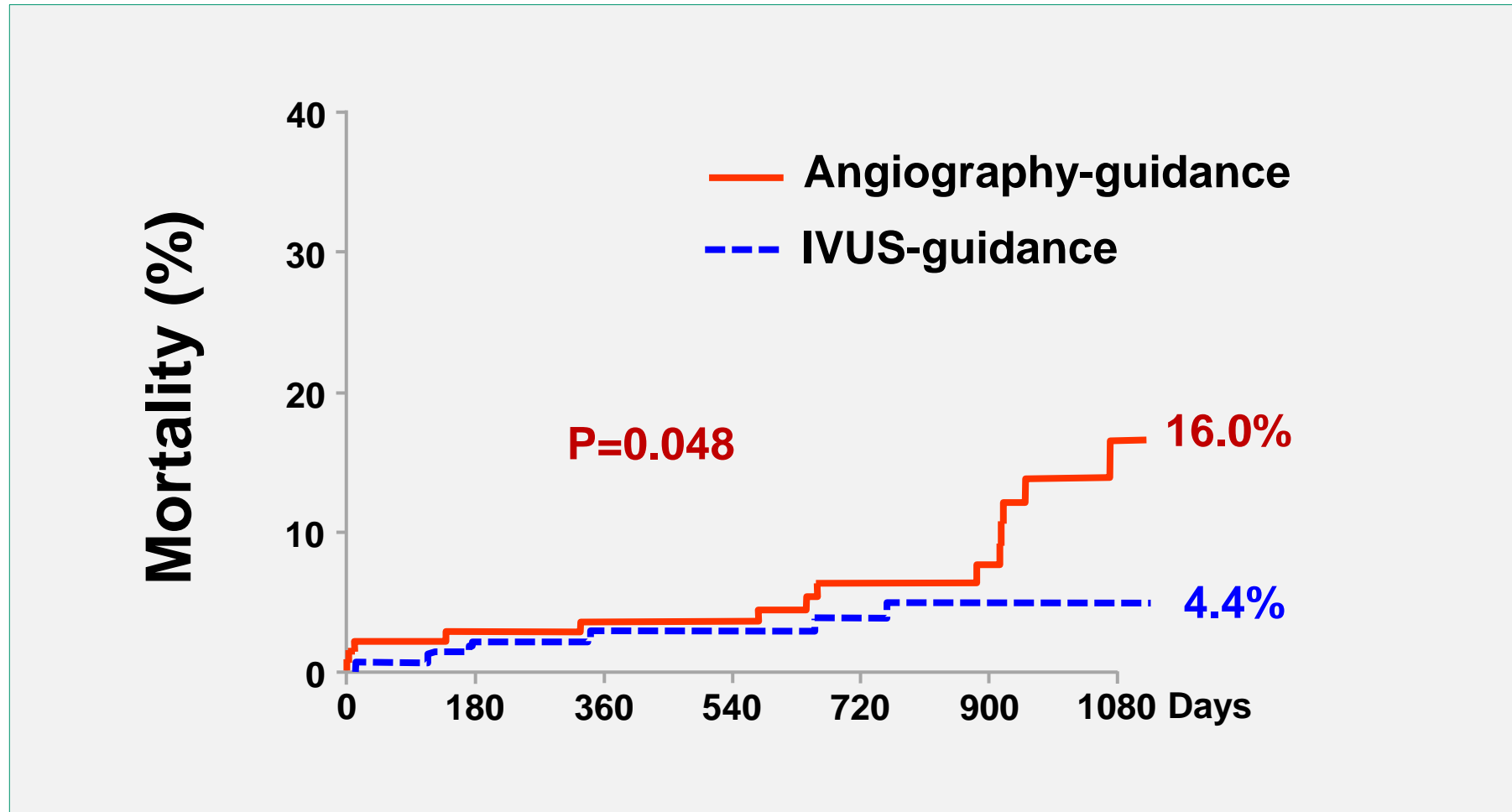
***Strongly Recommend IVUS !***



## ***Insight from IVUS study***

- **Ostial lesion assessment**
- **Reference VD (degree of remodeling)**
- **Lesion length (proximal distal stent landing)**
- **Intermediate lesion evaluation**
- **Plaque characterization**
- **Procedure optimization**

# *IVUS Guidance Saves Lives !*



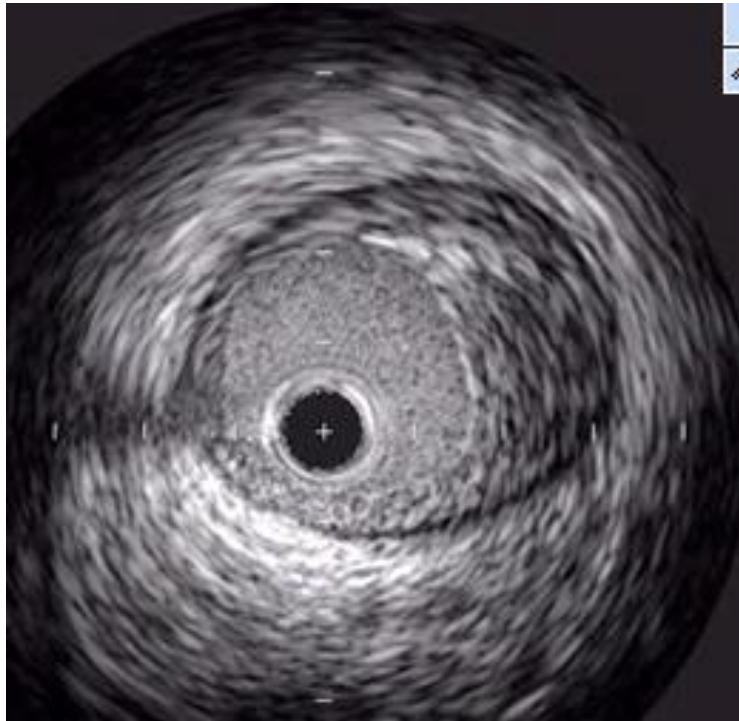
**1 Stent Cross Over**  
***Based on IVUS***

72/M, Unstable angina,

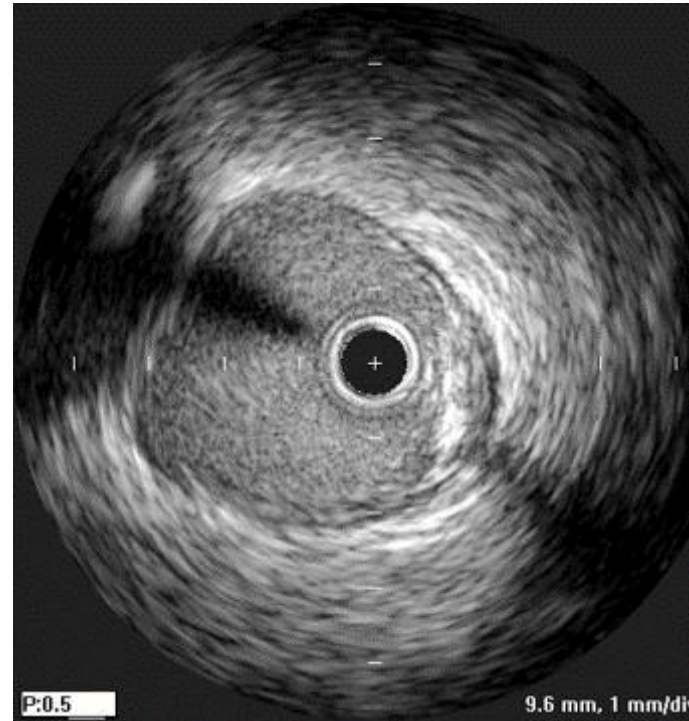


***True Bifurcation Disease ?***

# IVUS

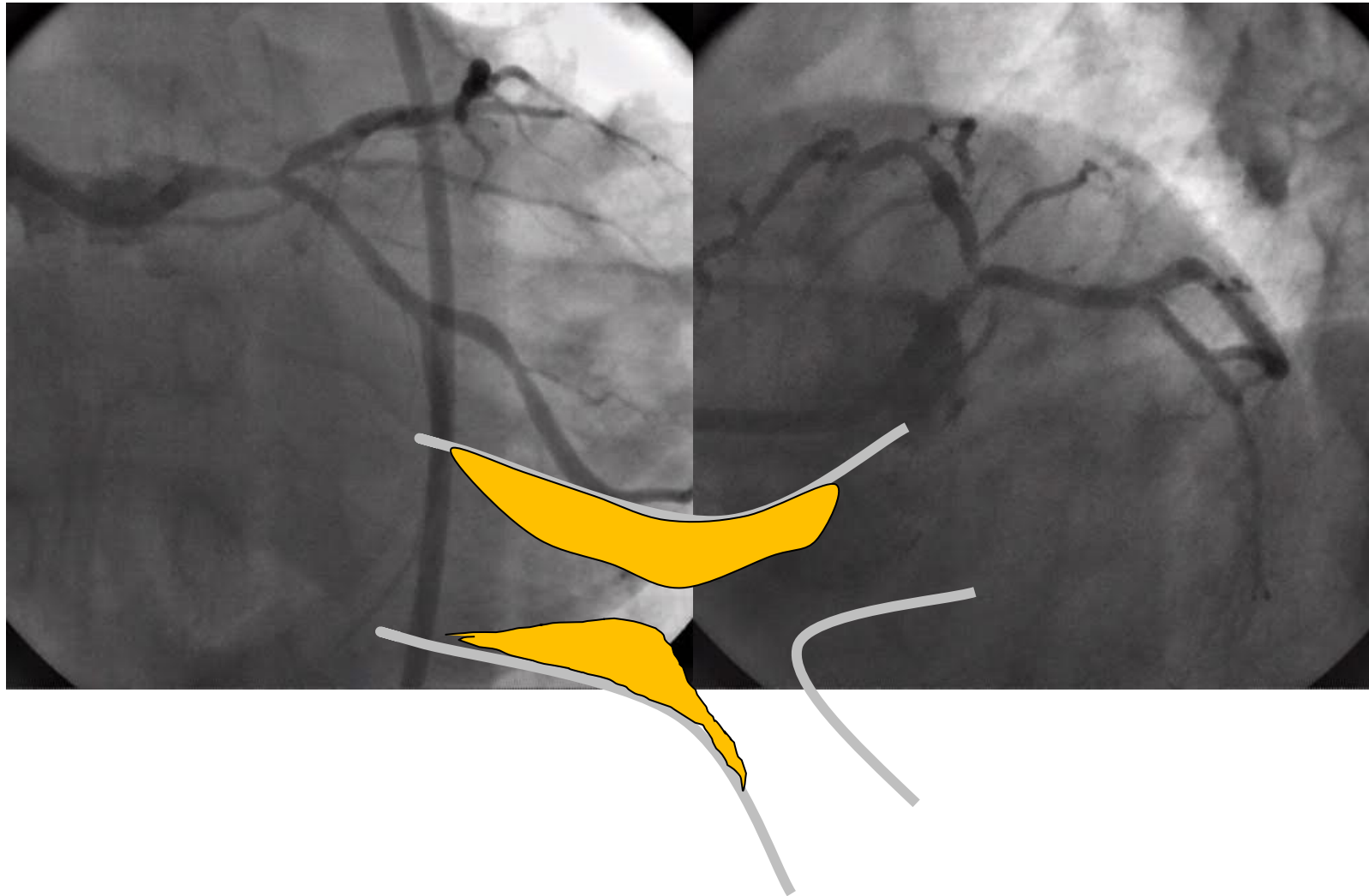


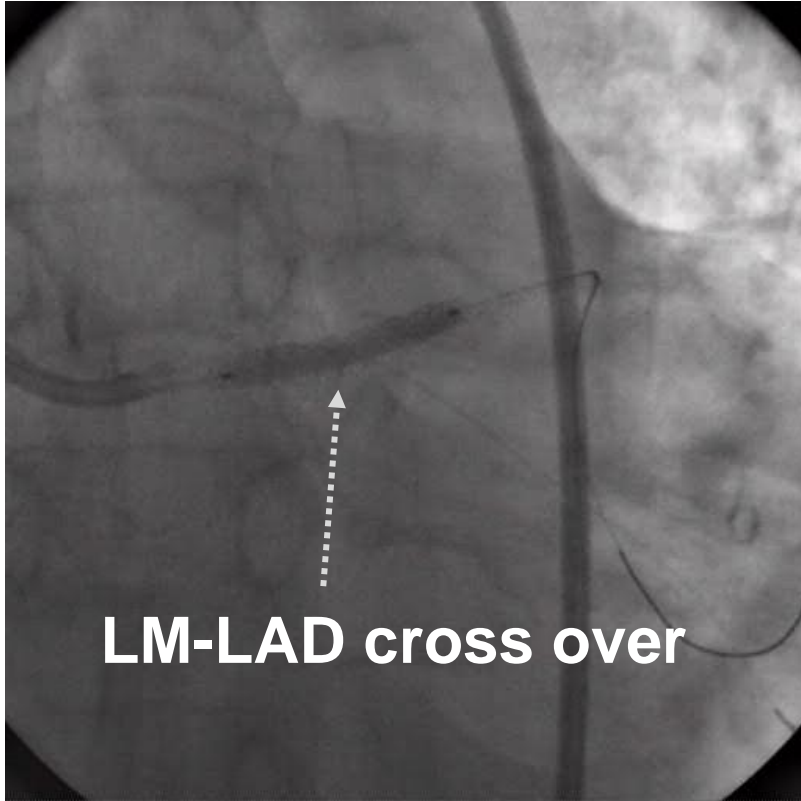
LAD Ostium



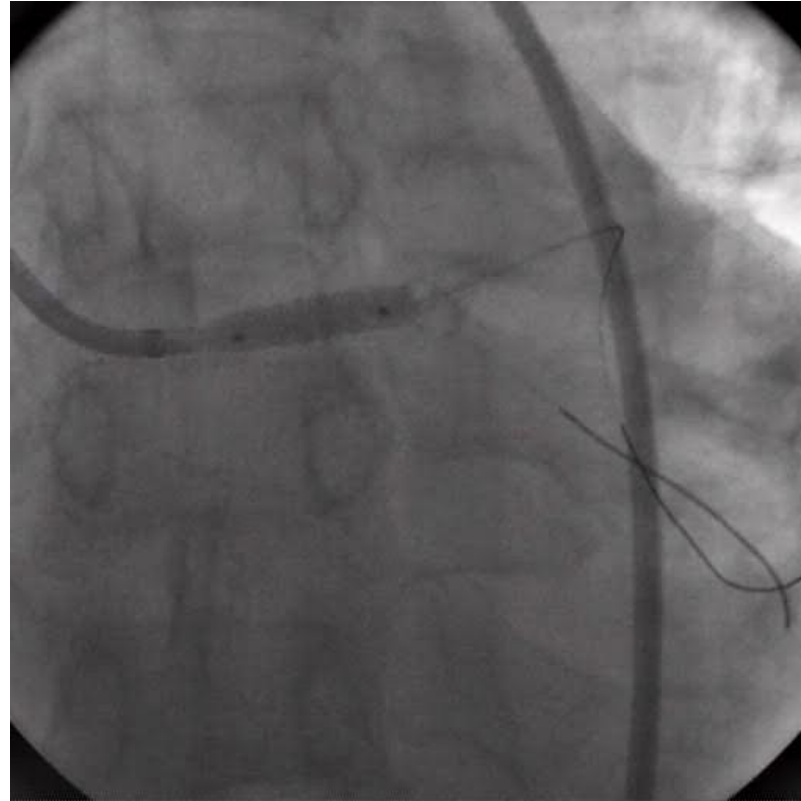
LCX Ostium,  
Minimal Plaque

72/M, Unstable angina,





DES 3.5 × 23 mm



Additional high pressure  
Inflation with 4.0 mm  
non-compliant balloon

**Angiographic Result Is Perfect !**



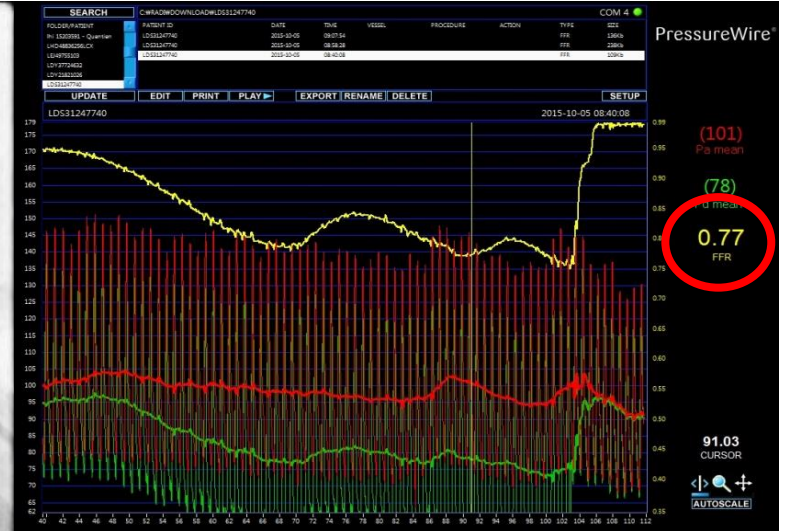
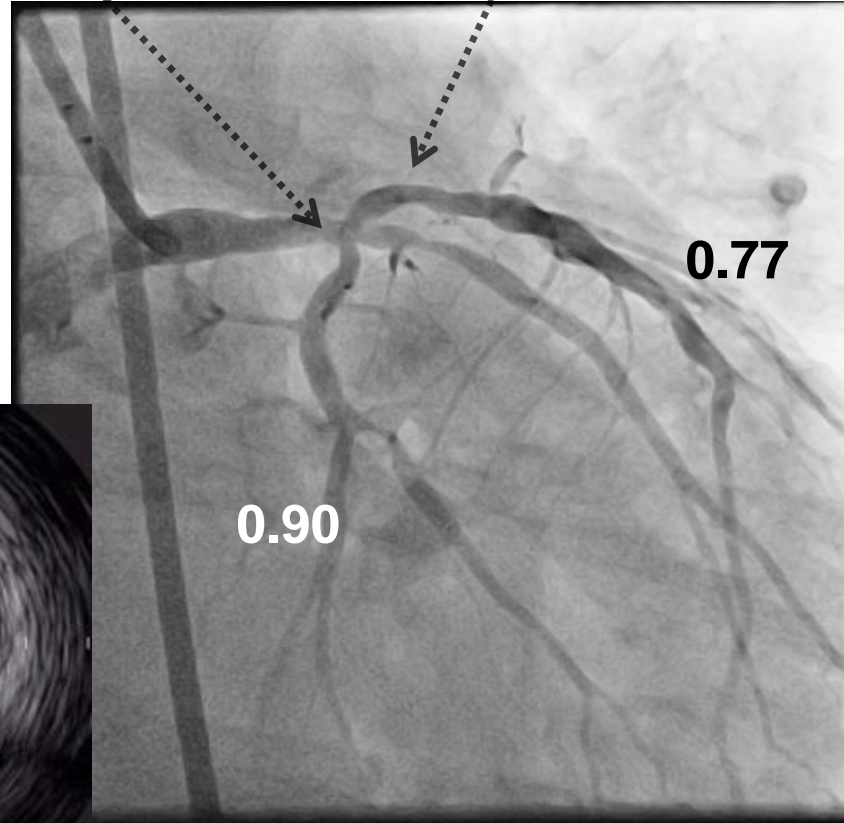
No significant compromise of LCX ostium.



**1 Stent Cross Over**  
***Based on IVUS and FFR***

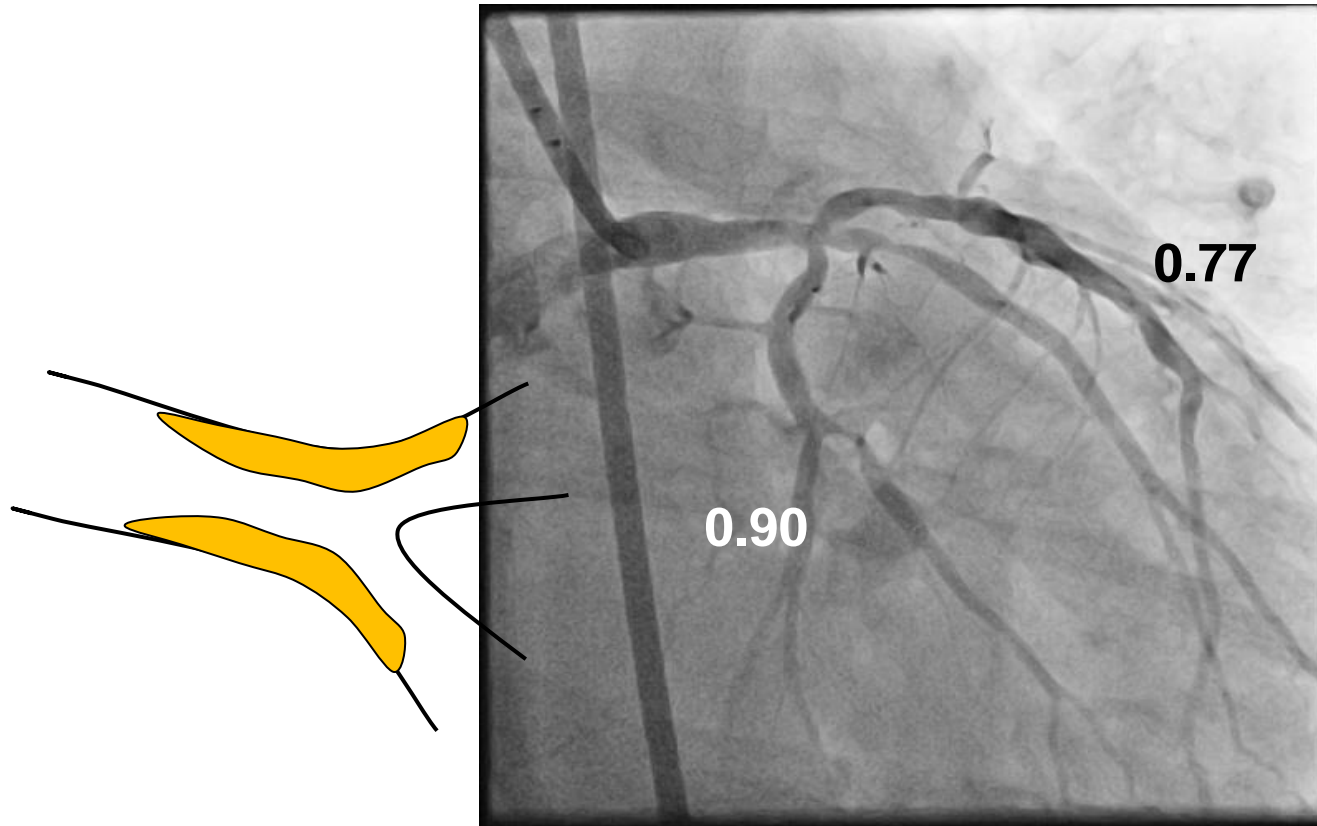
LM Distal  
MLA 5.3 mm<sup>2</sup>

pLAD, MLA 3.2 mm<sup>2</sup>  
FFR 0.77

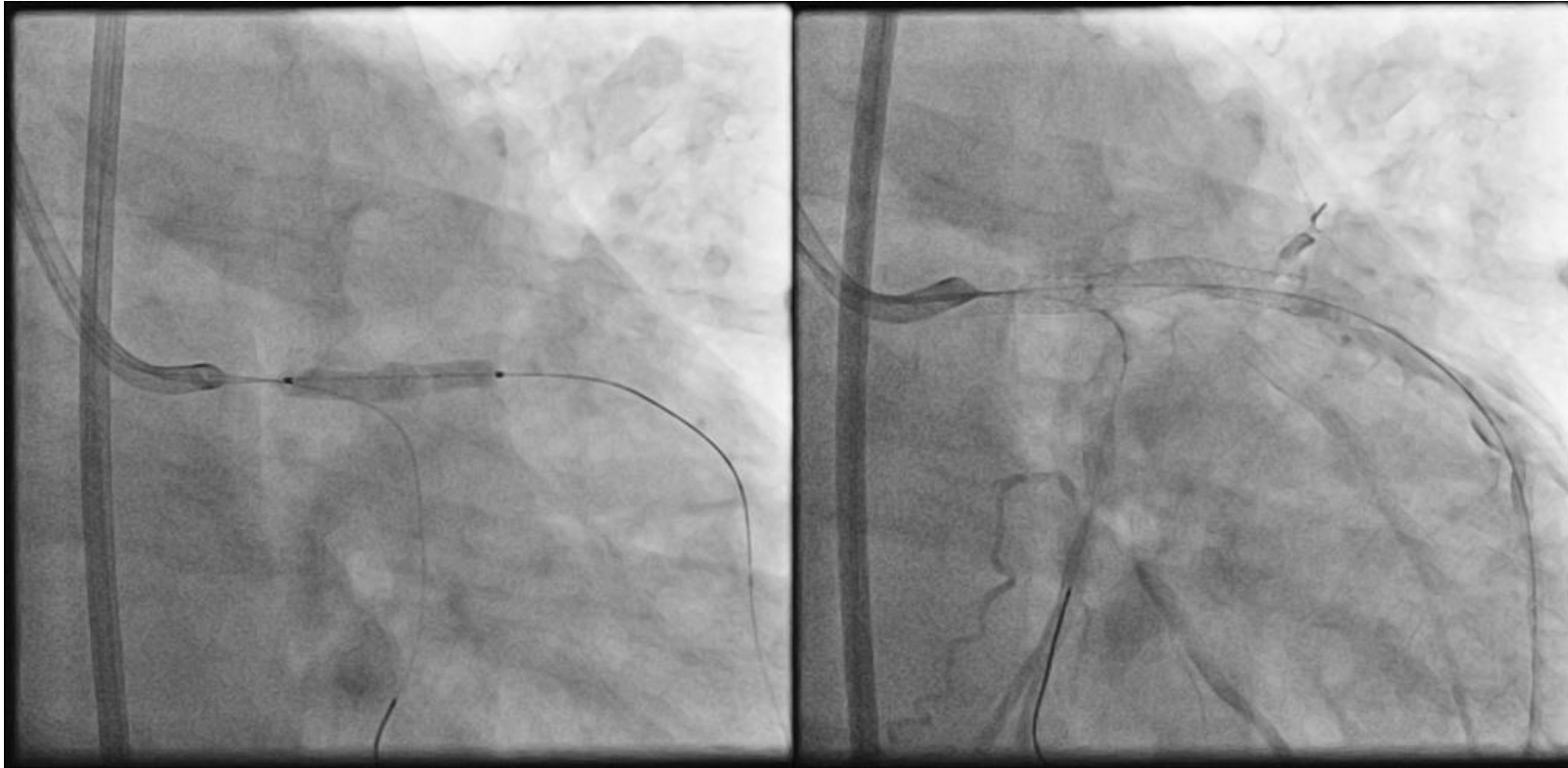


pLCX, MLA 3.3 mm<sup>2</sup>  
FFR 0.90

# How to Treat?

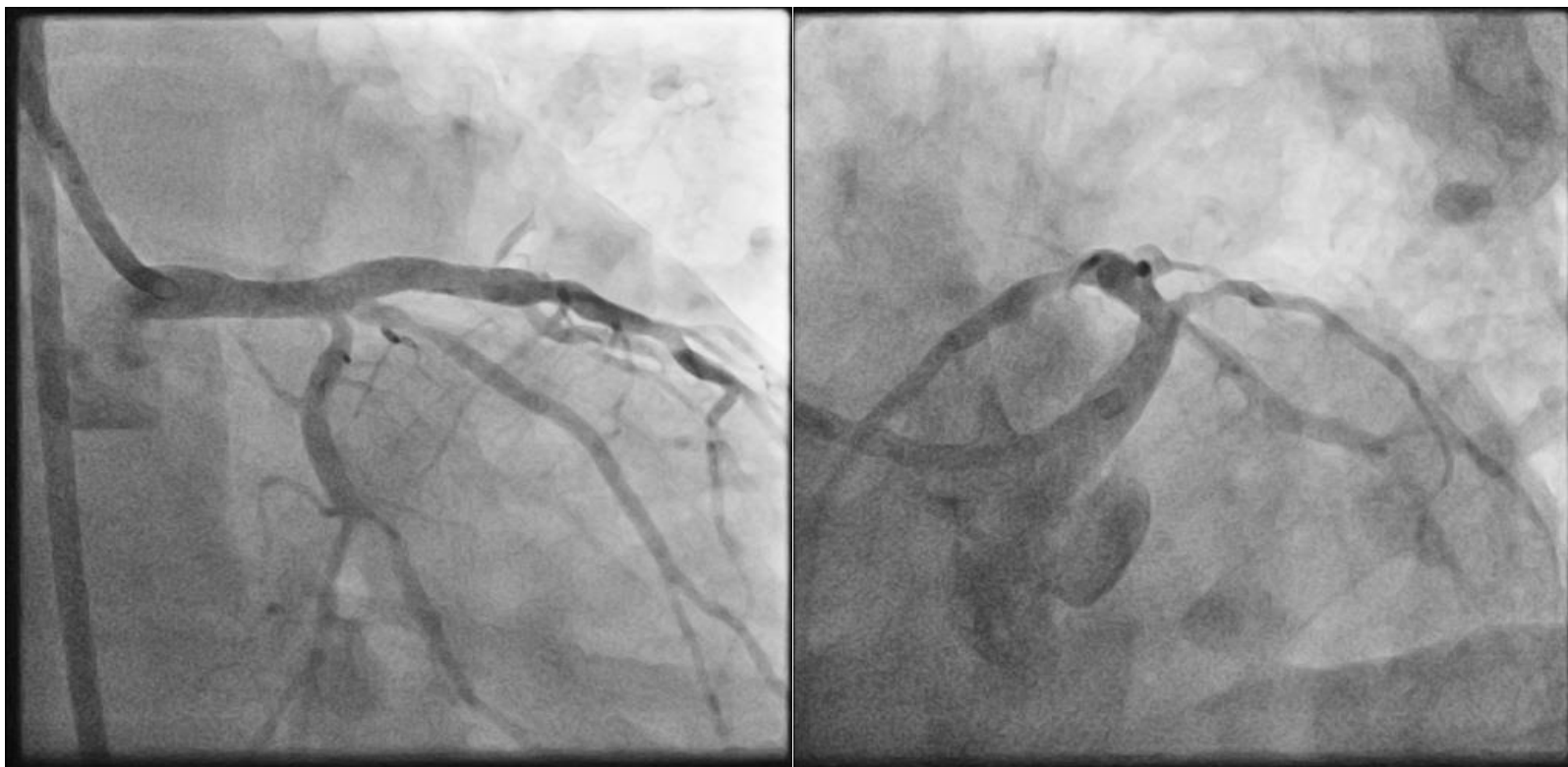


# 1 Stent Crossover

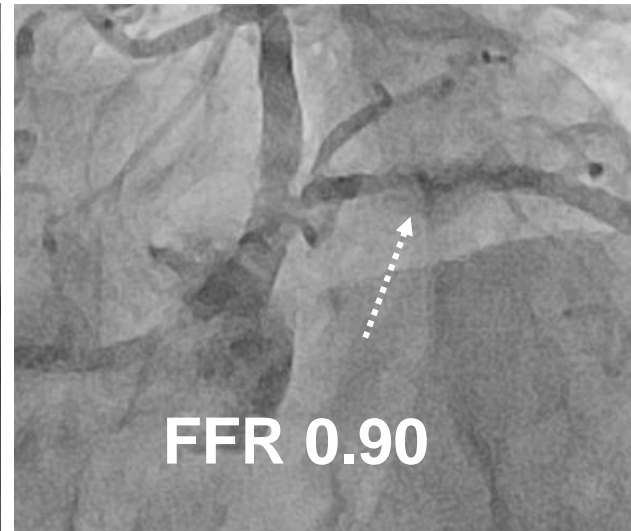
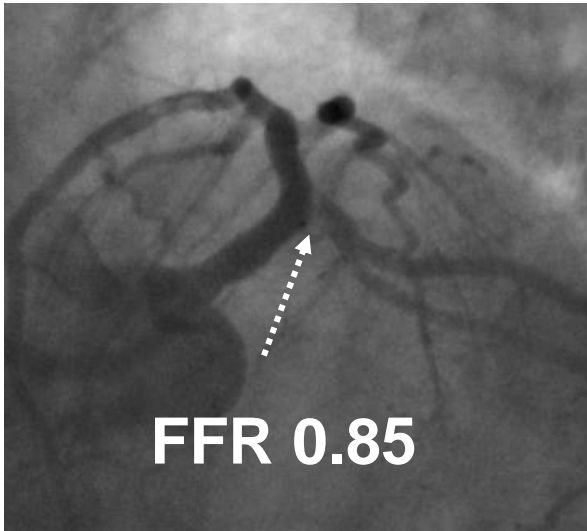
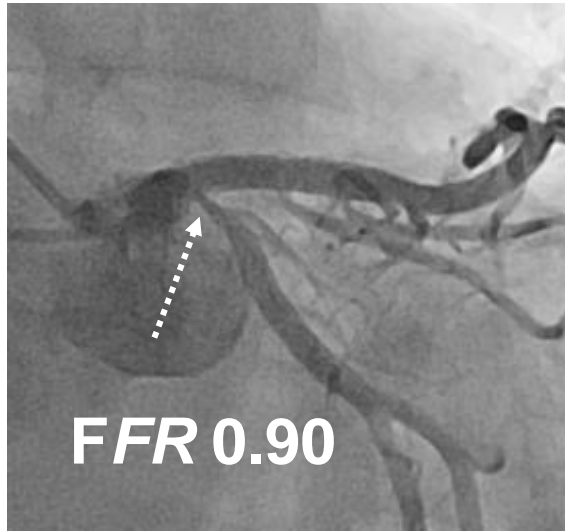


XIENCE Alpine  
4.0mm x 30mm

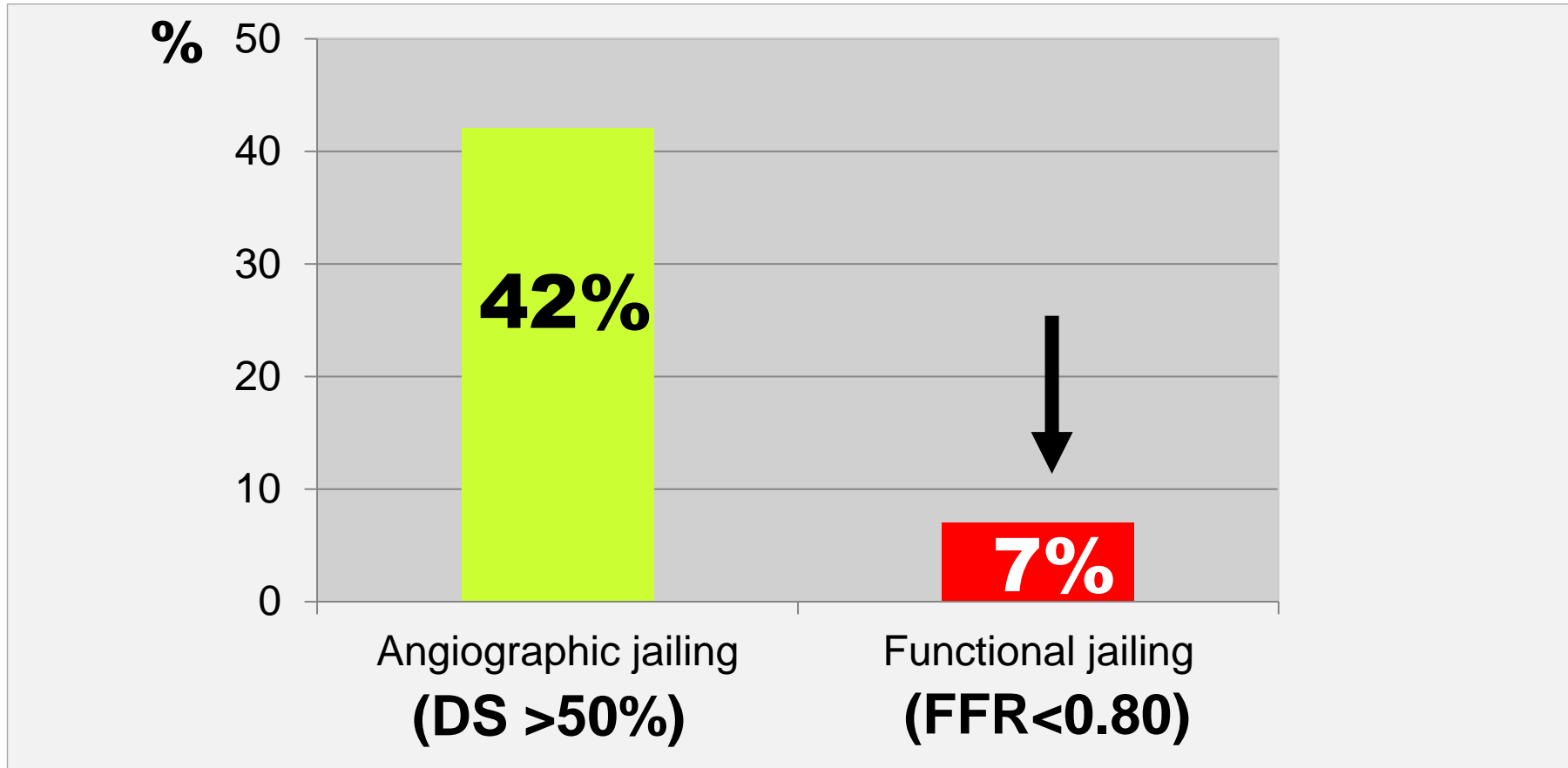
# Final Angiogram



*Many Mismatches Between  
Morphologic LCX Jailing and FFR*

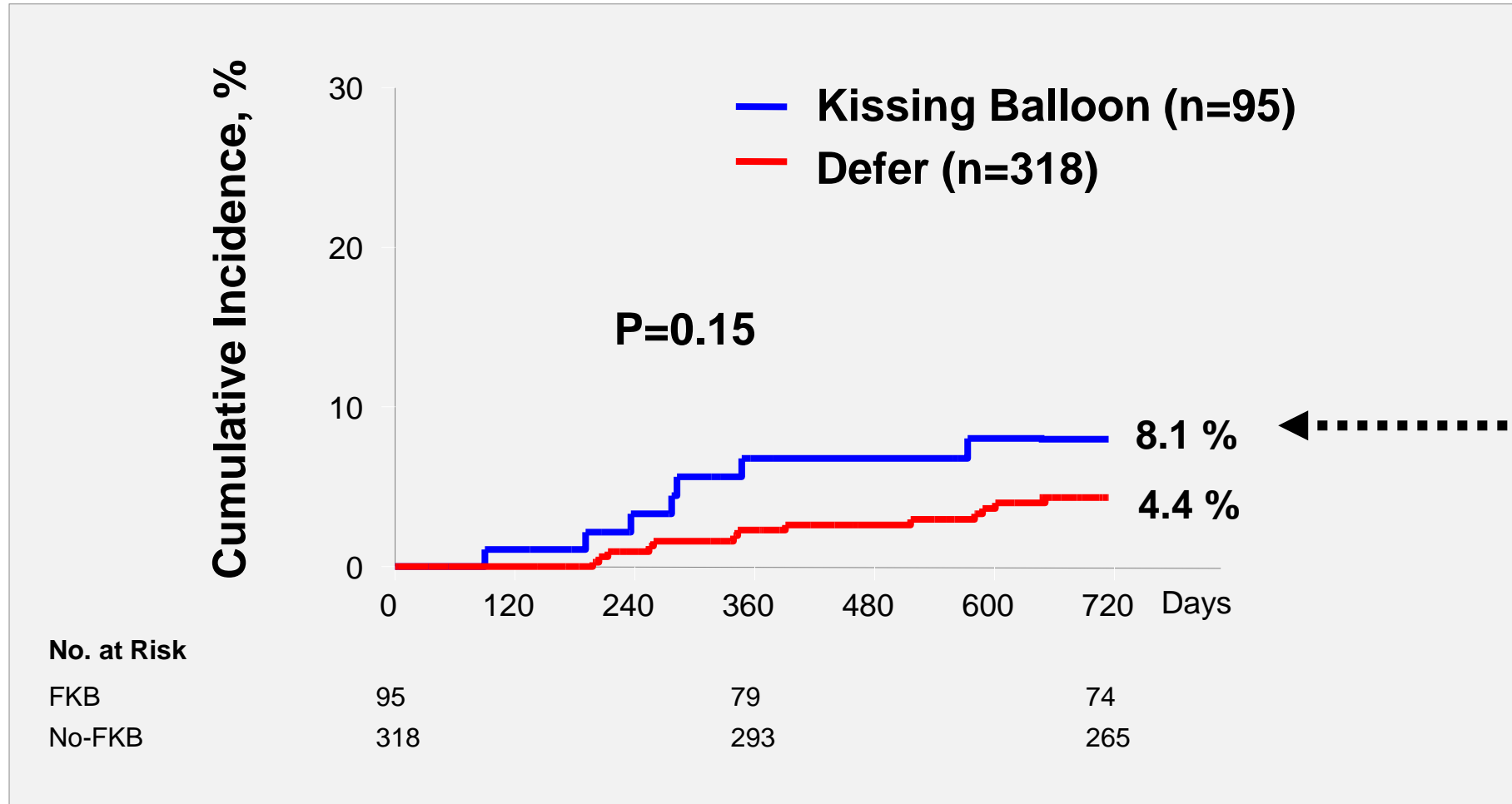


# Functionally Significant LCX Jailing Is Only 7%



# TLR at 2 Years

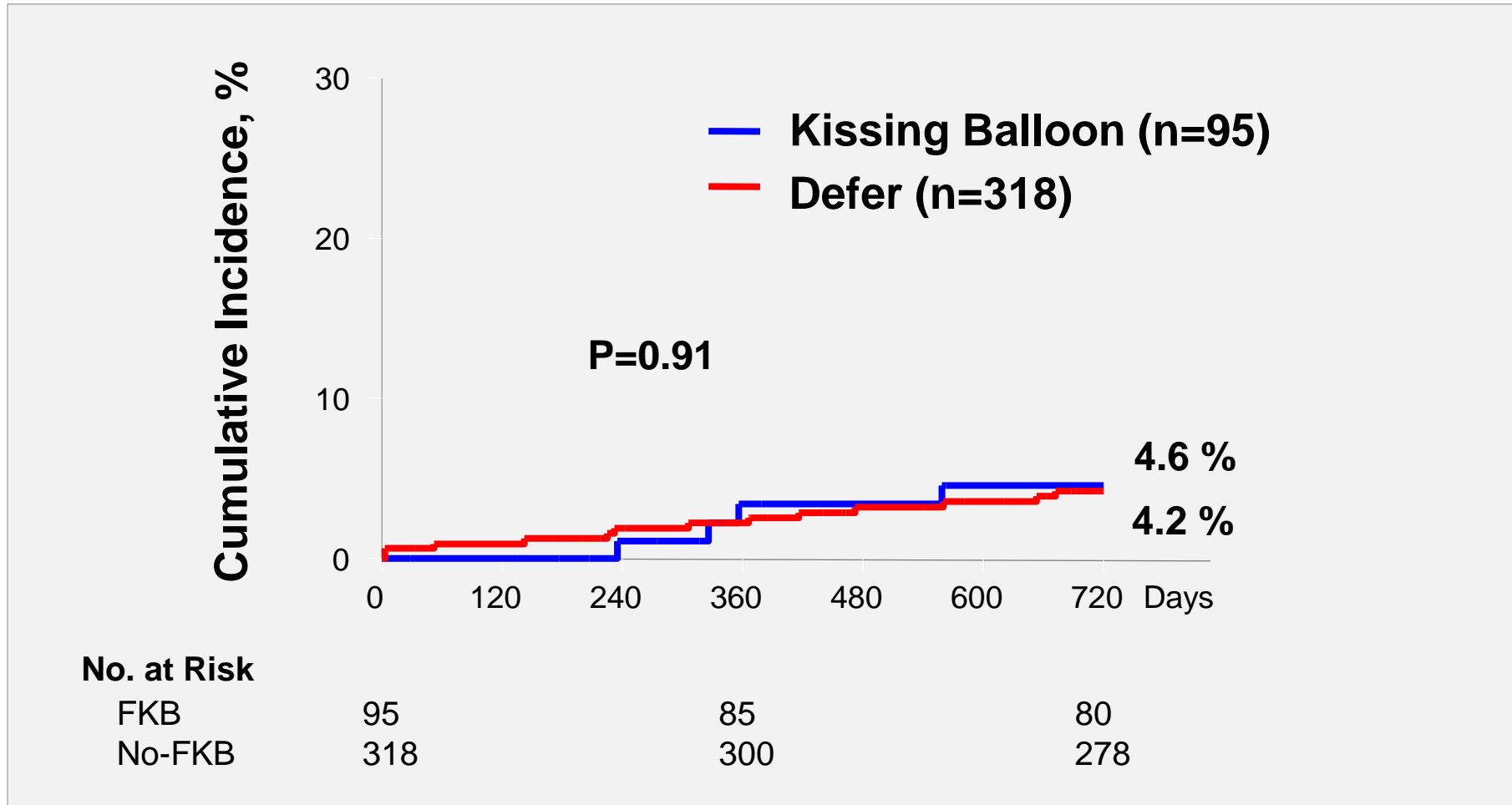
*If You Do Touch, May Increase TLR ?*



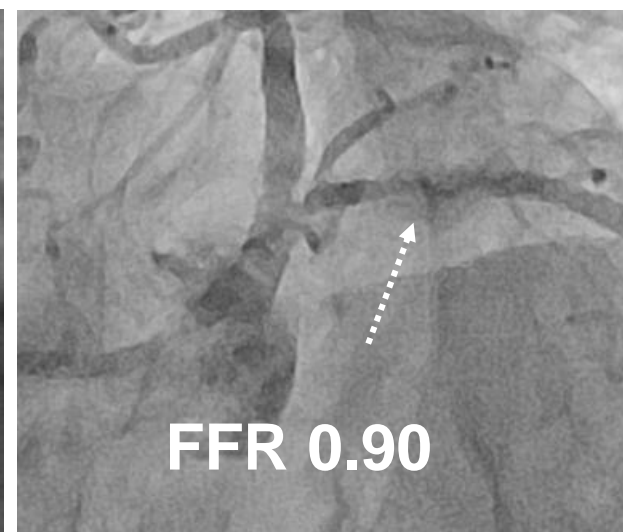
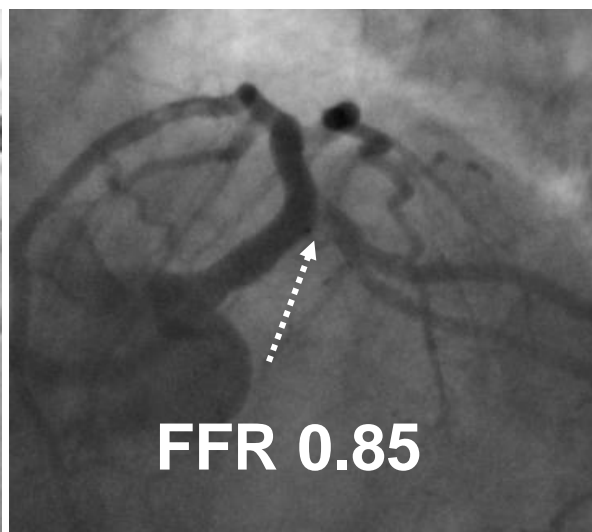
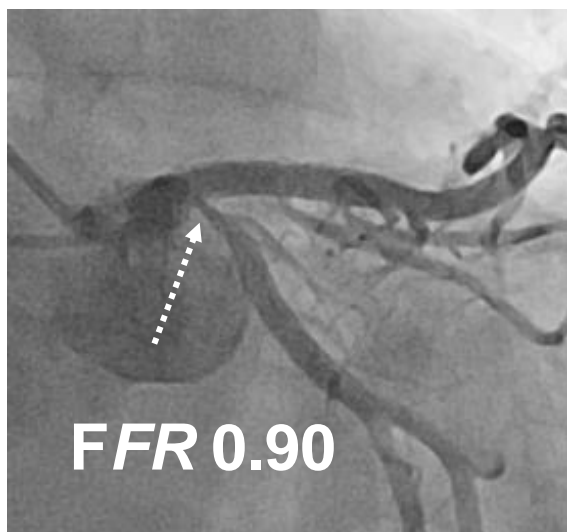


# Death or MI at 2 Years

***No Difference !***



## *Don't Touch!*



*We Can Avoid Unnecessary Procedures.*

**Upfront 2 Stents**  
**for True Bifurcation**

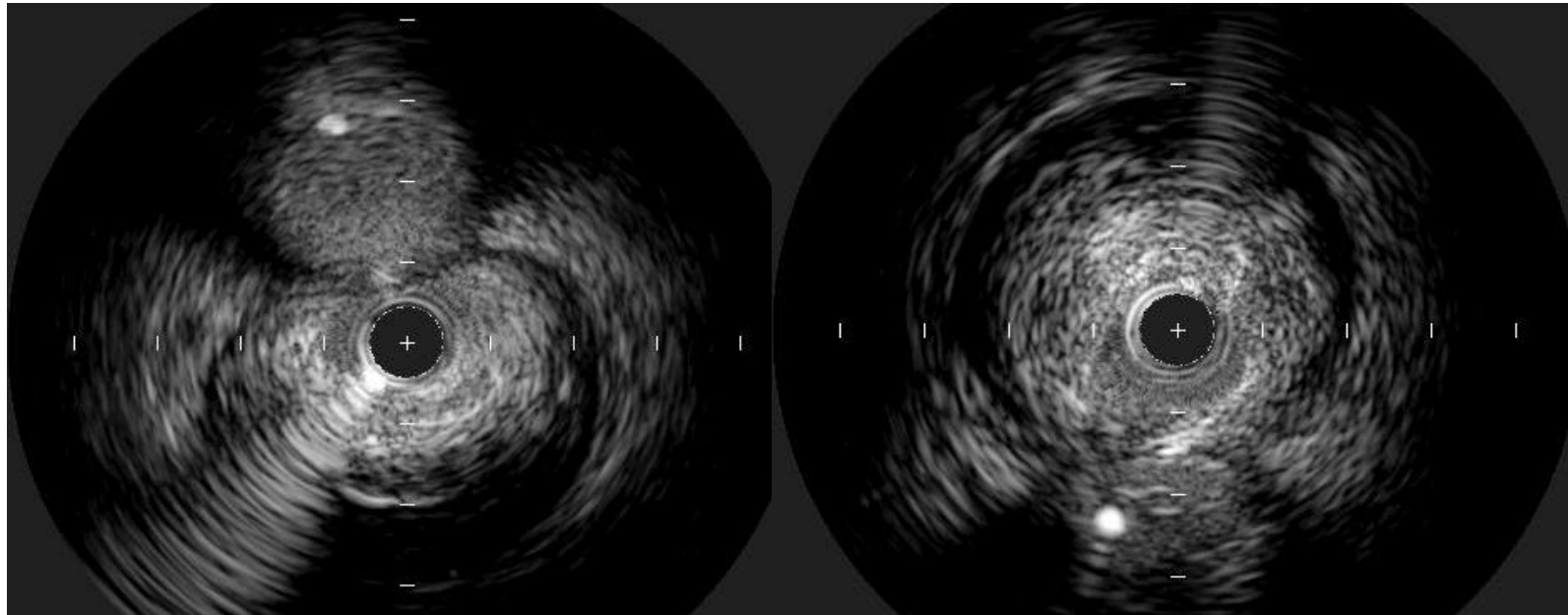
**70/M, Unstable angina**

*True Bifurcation Lesion (Medina 1,1,1)*



# IVUS

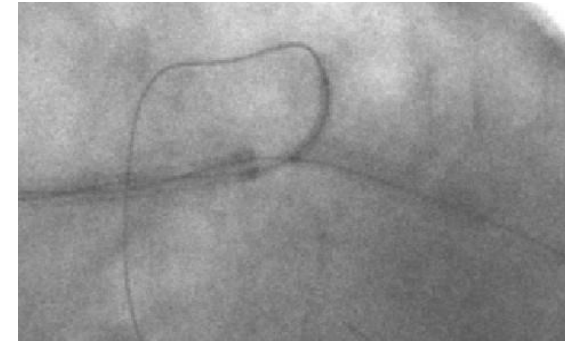
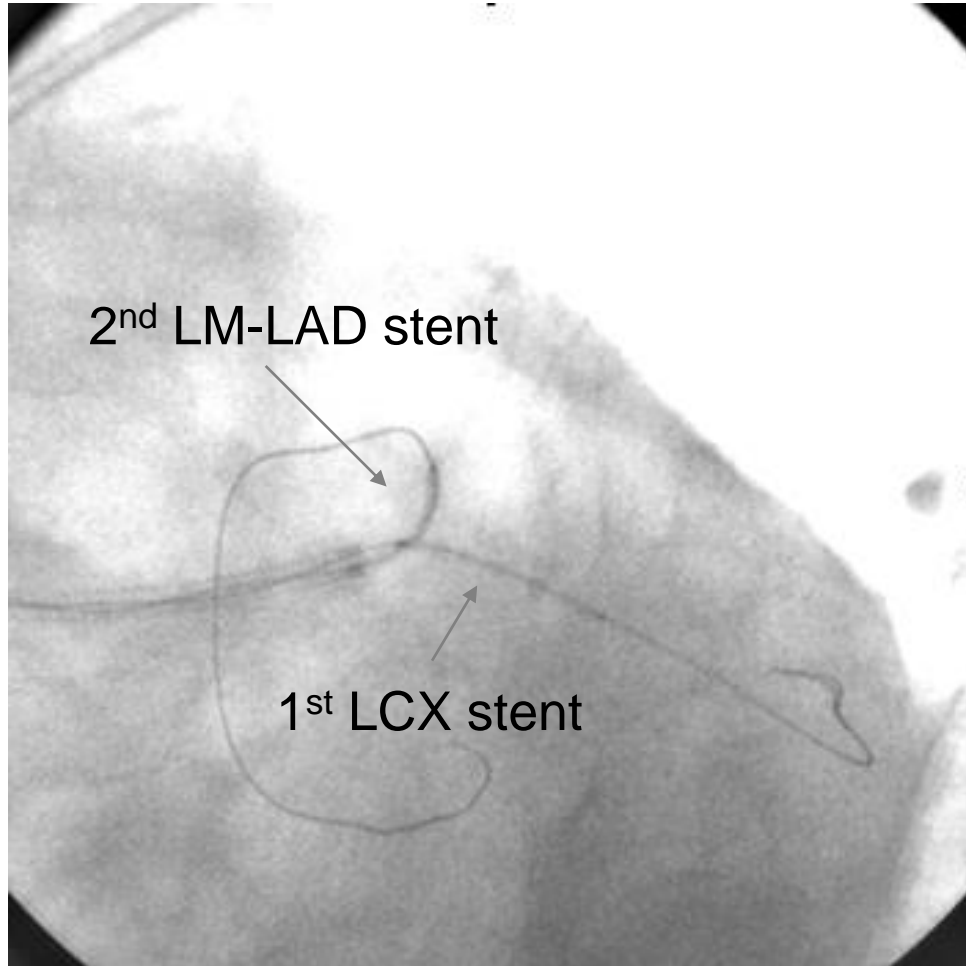
## *True Bifurcation Disease (Medina 1,1,1)*



LAD Ostium

LCX Ostium

# Mini-Crushing !

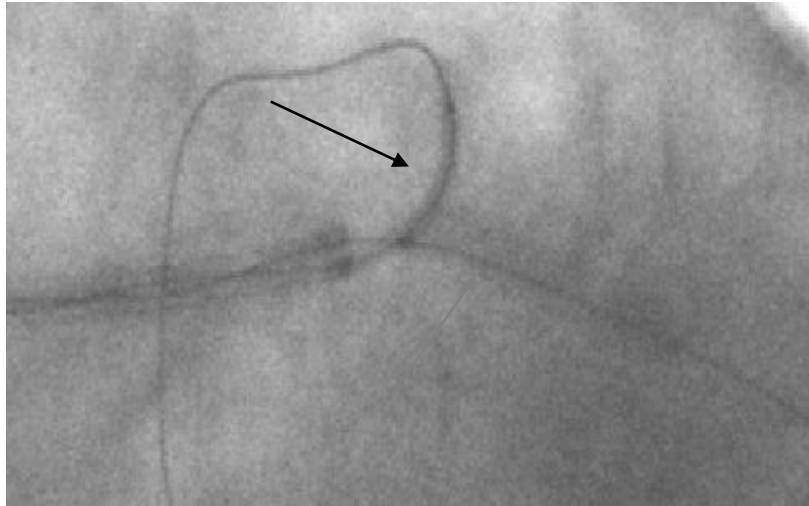


LCX Stenting first  
with DES 3.5x18mm

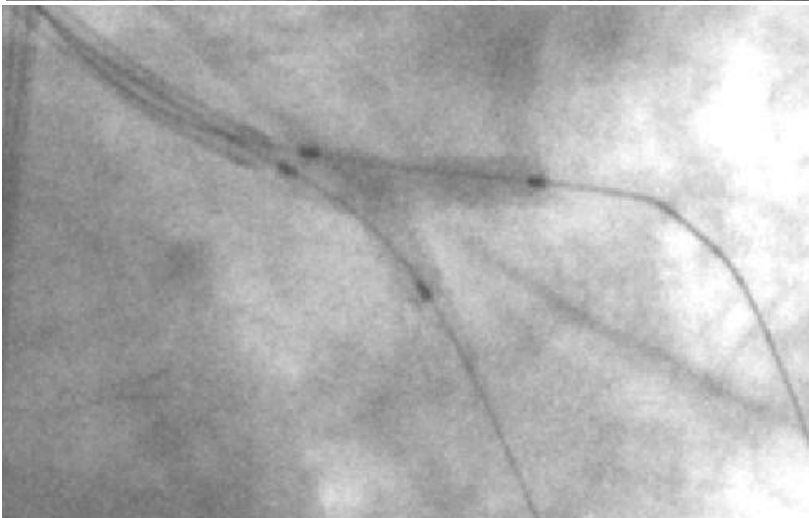


2<sup>nd</sup> LM-LAD stenting  
with DES 3.5x18mm

# Mini-Crushing !



Sequential  
High pressure inflation  
in Both LCX and LAD



Final kissing balloon  
inflation with moderate  
pressure.

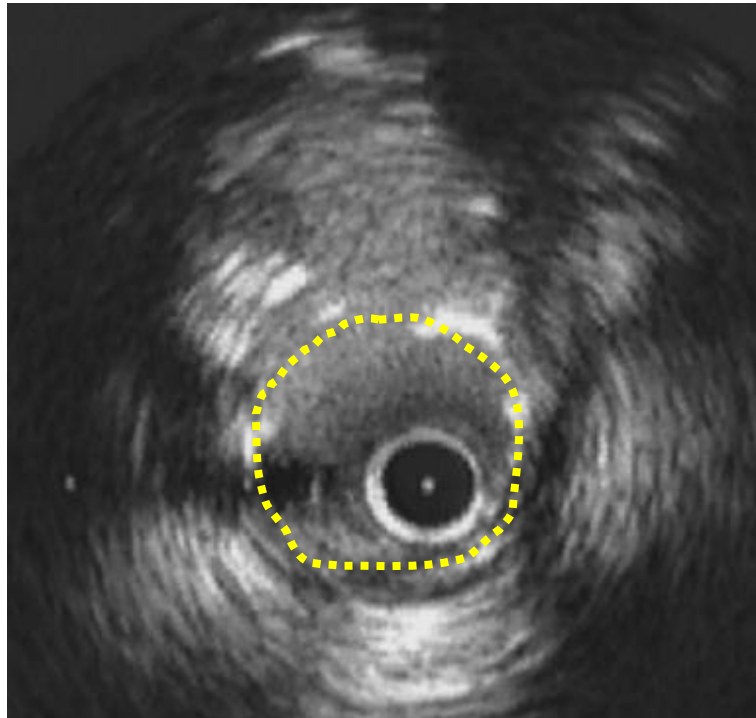
# Final Angiography



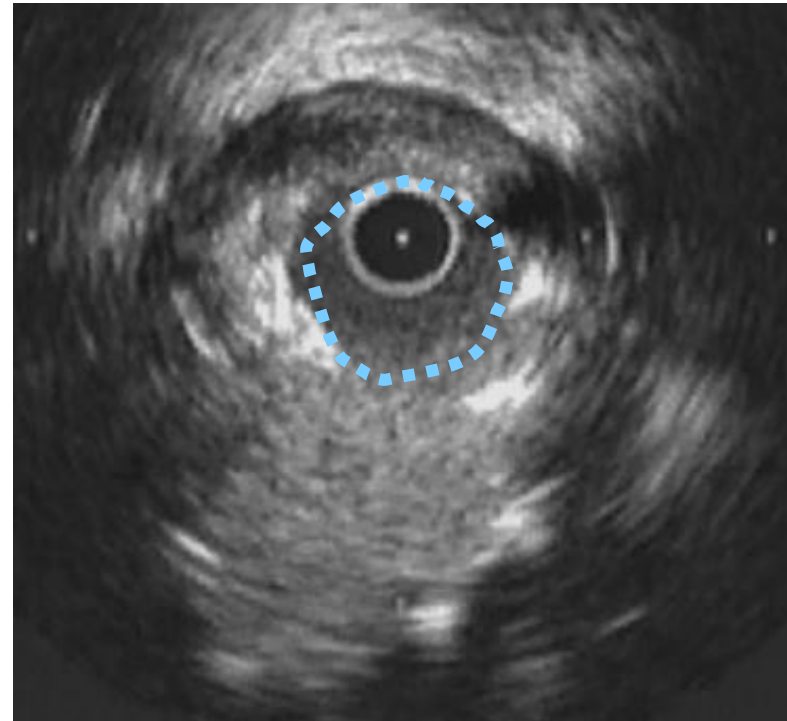


# Final IVUS

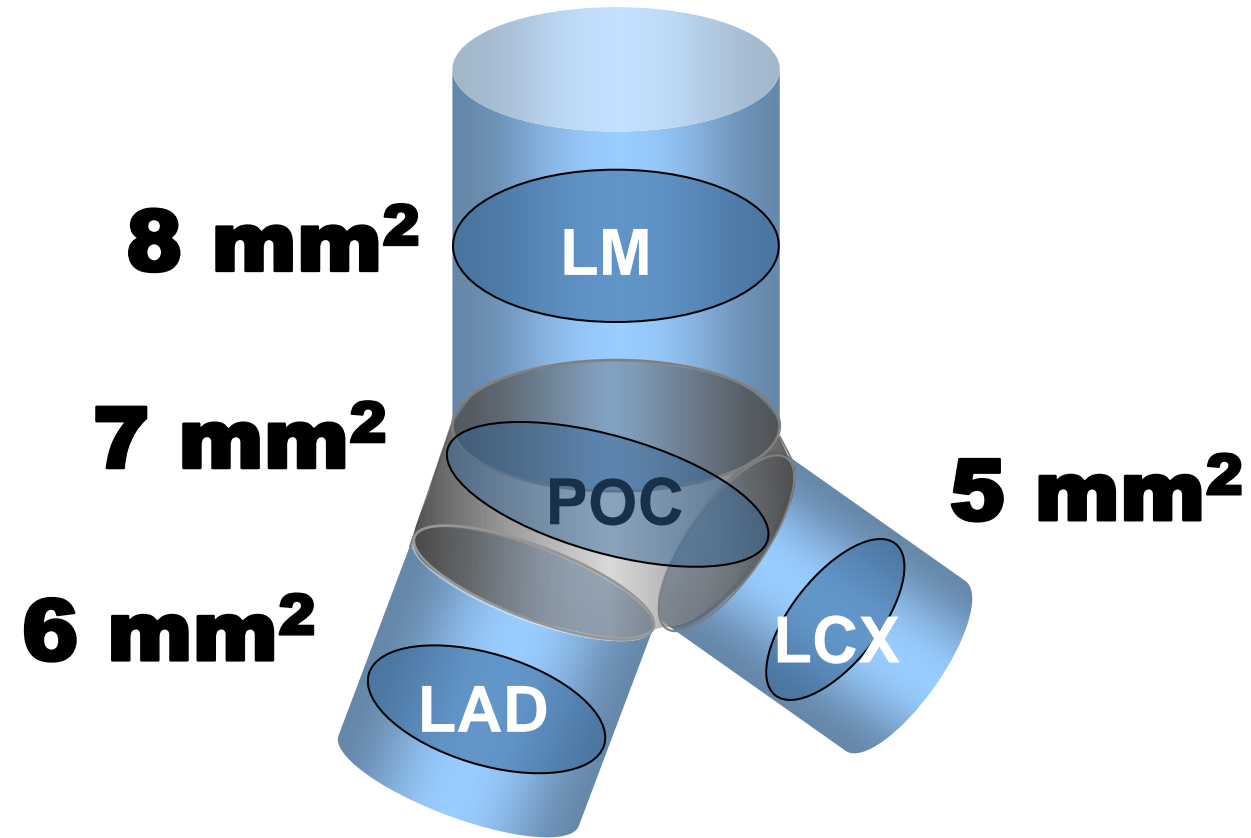
LAD Stent CSA :  
8.8 mm<sup>2</sup>



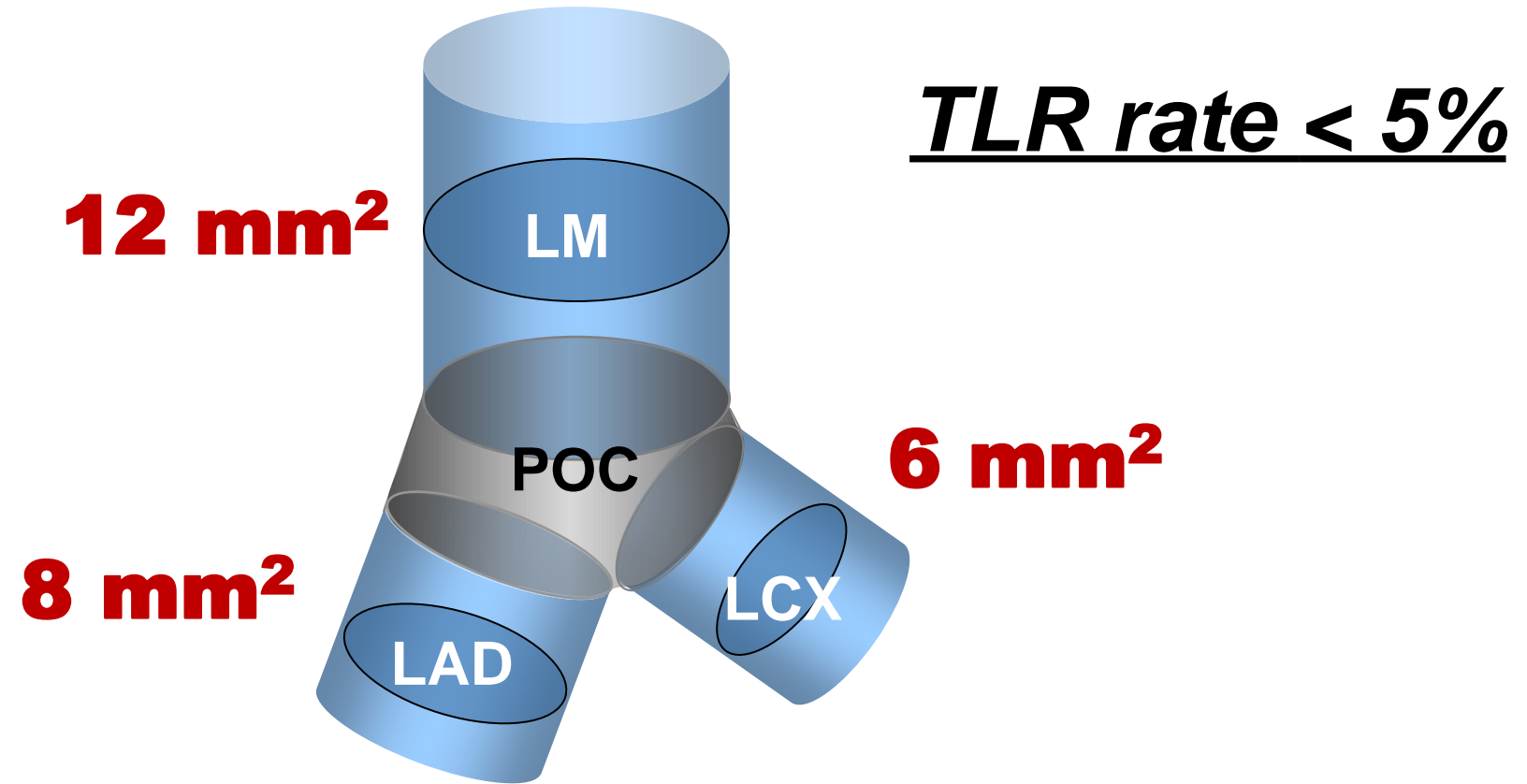
LCX Stent CSA :  
5.1 mm<sup>2</sup>



# *Post-Stenting Minimal Stent Area, According to 9 Month Restenosis Rate*



# Post-Stenting Minimal Stent Area, According to 5 Year MACE Rate



**Upfront 2 Stent Strategies**  
**for True LM Bifurcation Disease**

***Whatever You Used Any 2 Stents Technique,***  
**The Only Important Predictor for Good Clinical Outcomes**  
**Is Post-Stenting Minimal Stent Area (MSA)!**

Ahn JM, et al, Preliminary Data from IRIS LM Registry, 2022  
Zhang JJ, Ye F, Xu K, et al. Eur Heart J 2020;Jun 26 (DEFINITION 2)  
Cheol Hyun Lee, et al. Catheter Cardiovasc Interv. 2021;97:776–785.

# Left Main PCI **2023**

## ***Make it Simple !***

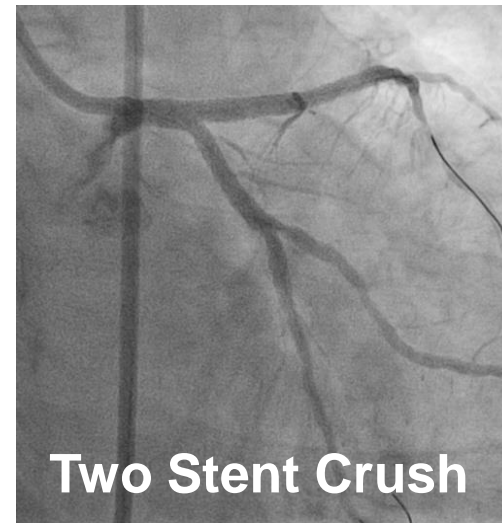
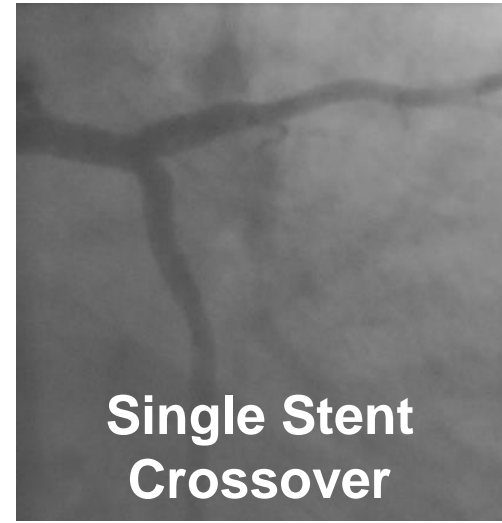
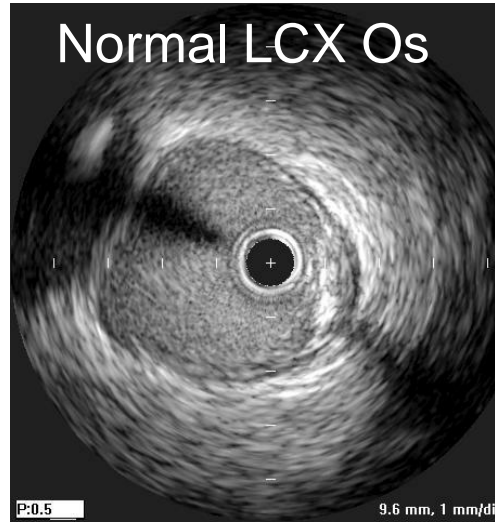
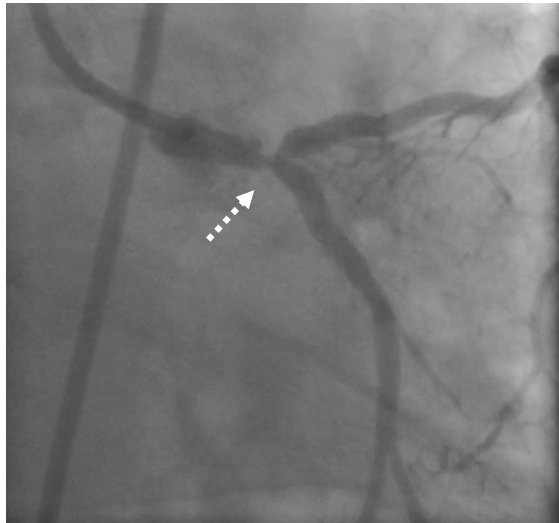
- 1. *Evolving Concept ; Imaging and Physiology*  
***Guided PCI Can Improve Clinical Outcomes.*****
- 2. *Evolving Technique ; Upfront 2 stents for True*  
***Bifurcation LM Disease Is Safe and Good !*****

***Role of IVUS***

***One or Two stents ?***

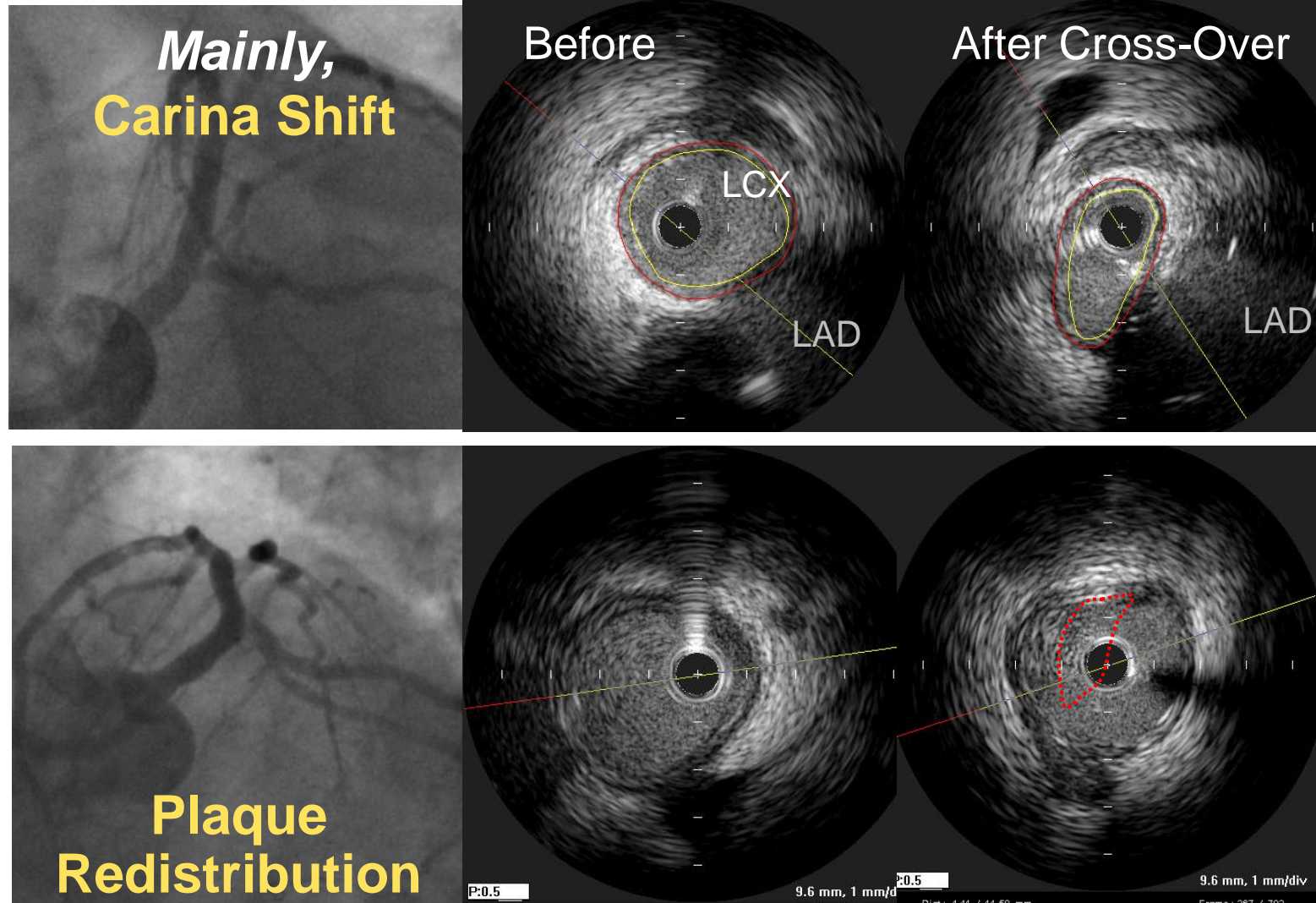
# 1 or 2 Stents

According to *LCX Disease Status by IVUS*





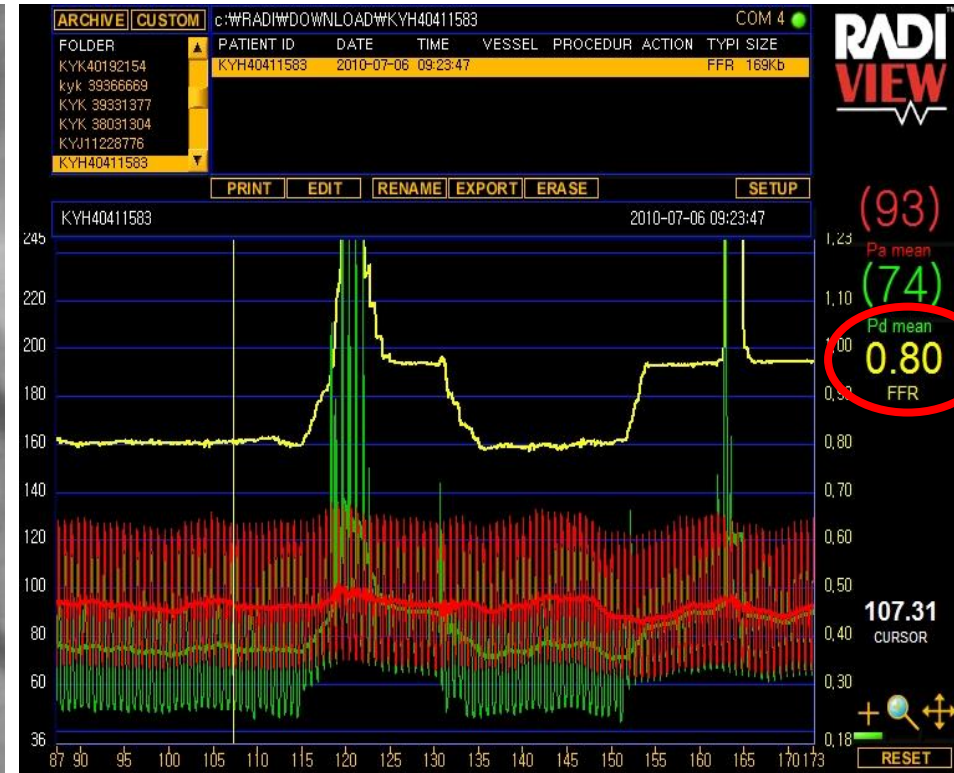
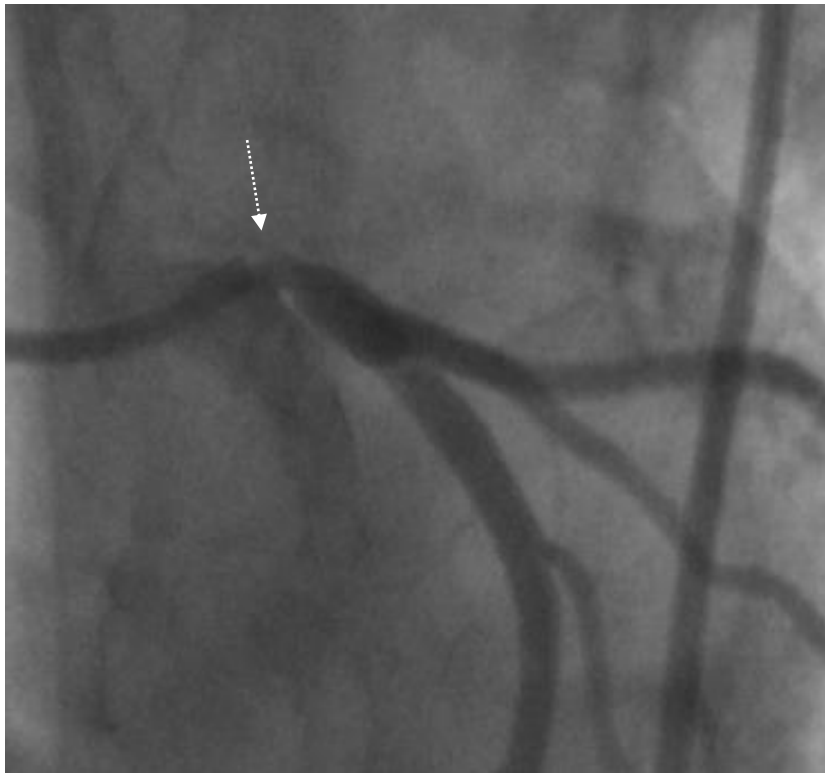
# Mechanism of LCX Jailing After Stent Cross-Over



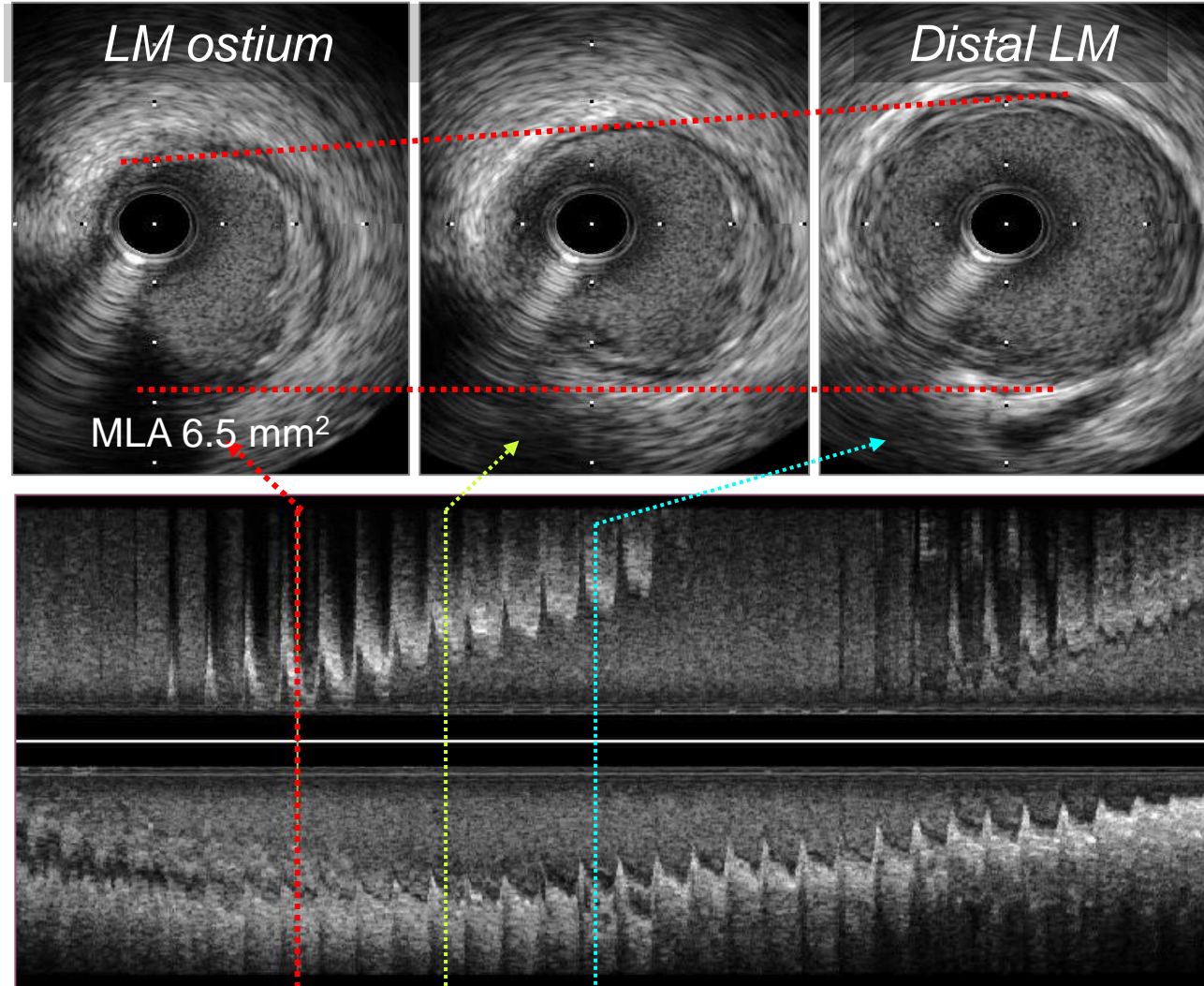


# Mismatch

Significant Stenosis,  
*FFR 0.80*



# *Negative Remodeling, No Disease at All*



**FFR 0.80,  
MLA 6.5 mm<sup>2</sup>**

**Do you  
Want to Treat ?**