

***Don't Touch Small Side Branch !***  
***Concept Changes After ISCHEMIA Study***

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# *Why PCI ?*

Patients with Stable Ischemic Heart Disease

- 1. To Improve Symptoms**
- 2. To Improve Survival**

***To Improve Symptoms ?***  
Patients with Stable Ischemic Heart Disease

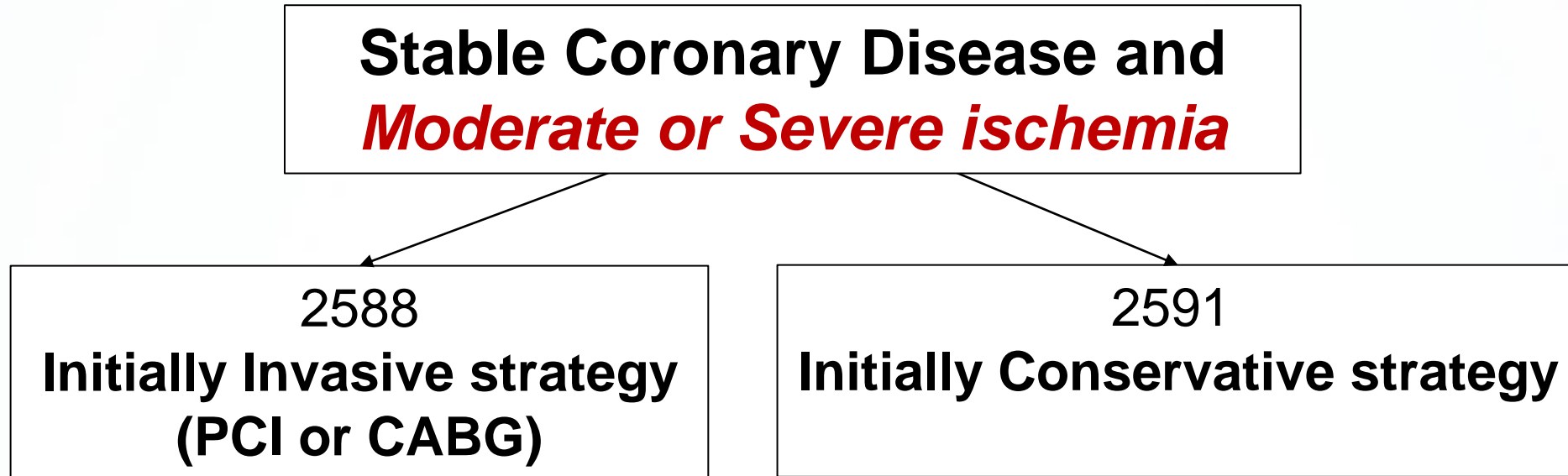
**Should Be Ischemic !**

***To Improve Survival ?***  
Patients with Stable Ischemic Heart Disease

Everybody Knew,

***“ISCHEMIA is  
The Most Impactful Study  
Since COURAGE,”***

# ISCHEMIA Study



**Primary Outcome;** Composite of death from cardiovascular causes, myocardial infarction, or hospitalization for unstable angina, heart failure, or resuscitated cardiac arrest.

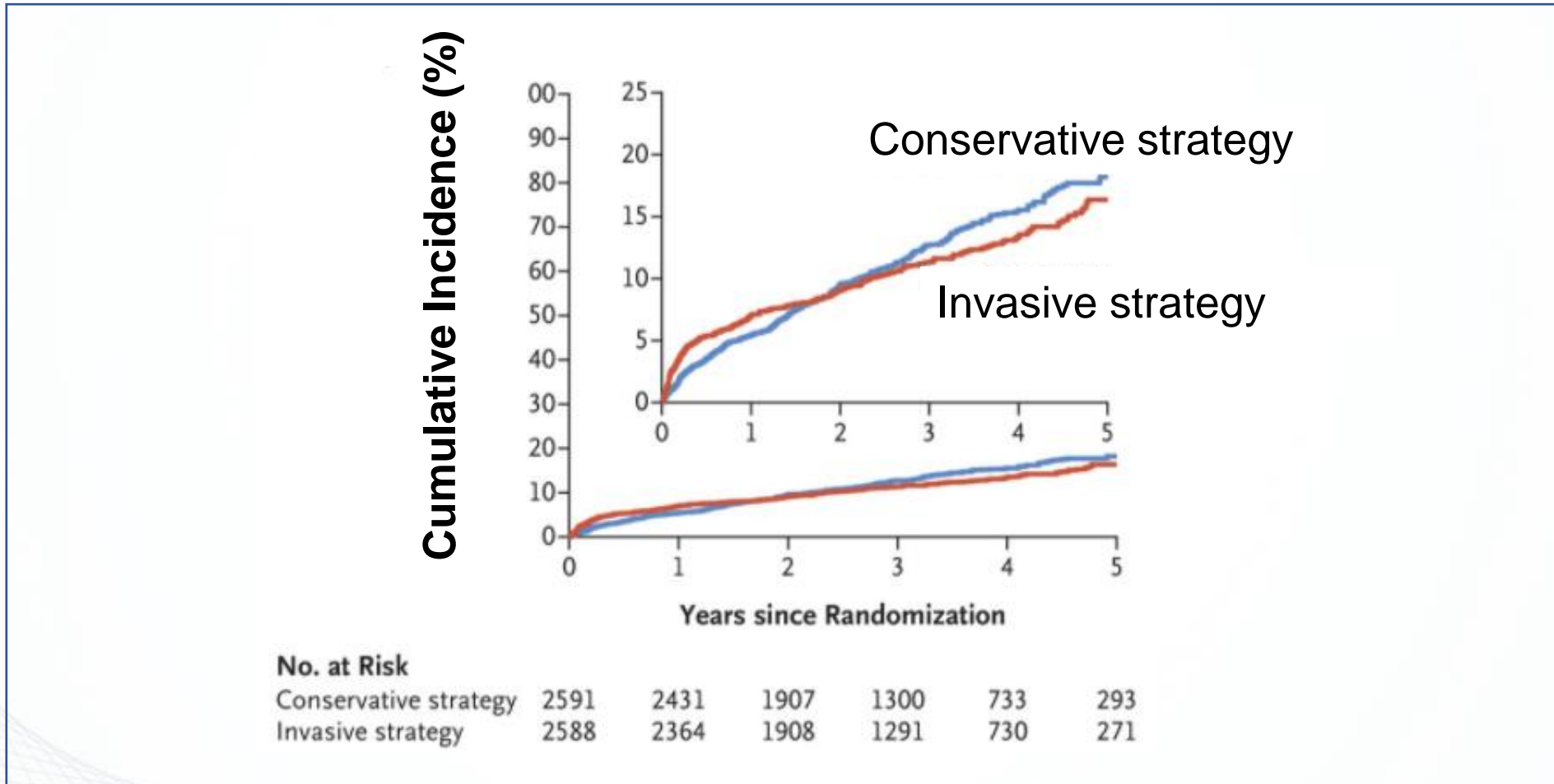
# Coronary Anatomy by CCTA ( $\geq 50\%$ stenosis)

	Total (N=5179)	INV (N=2588)	CON (N=2591)
0	0.1% (4/2986)	0.1% (2/1490)	0.1% (2/1496)
1	23.3% (697/2986)	24.2% (360/1490)	22.5% (337/1496)
2	31.4% (938/2986)	29.1% (434/1490)	33.7% (504/1496)
3	45.1% (1347/2986)	46.6% (694/1490)	43.6% (653/1496)

***Multivessel Disease >75%***

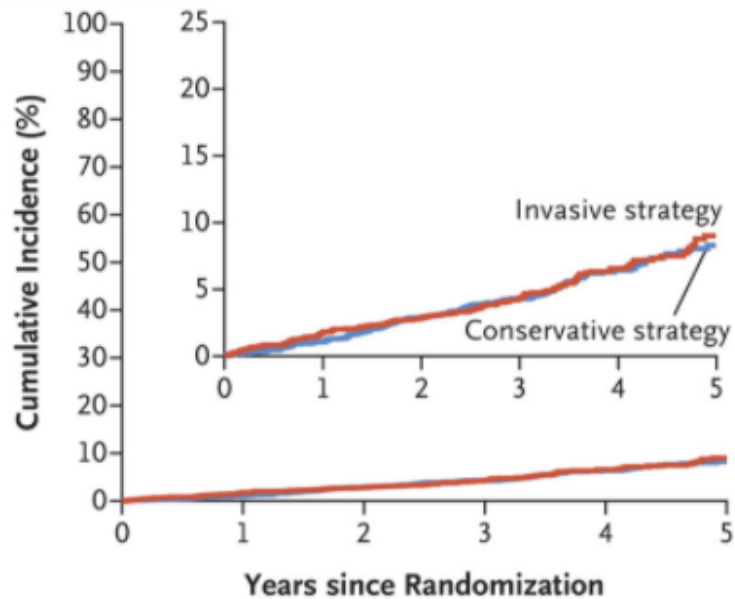
# Primary Outcomes at 3.2 yrs

Death from cardiovascular causes, Myocardial infarction, or Hospitalization for unstable angina, Heart failure, or Resuscitated cardiac arrest.





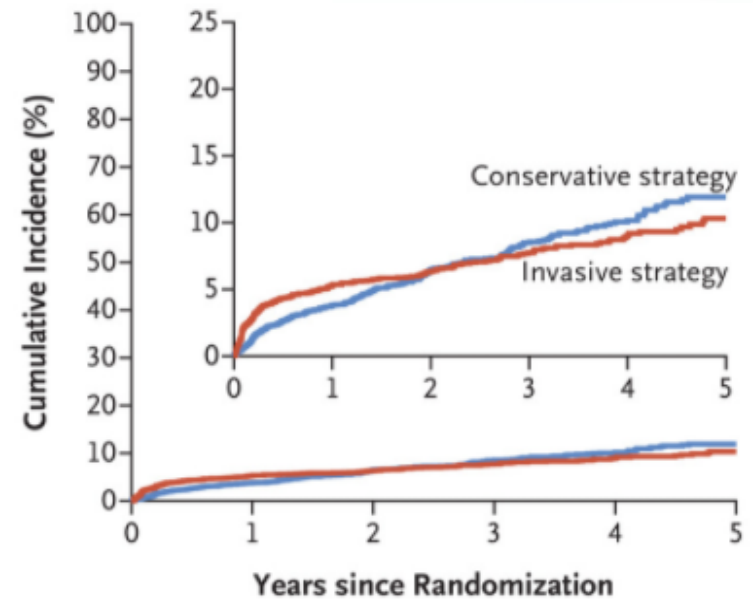
## All Death



### No. at Risk

Conservative strategy	2591	2548	2065	1445	844	349
Invasive strategy	2588	2518	2061	1431	827	317

## Myocardial Infarction

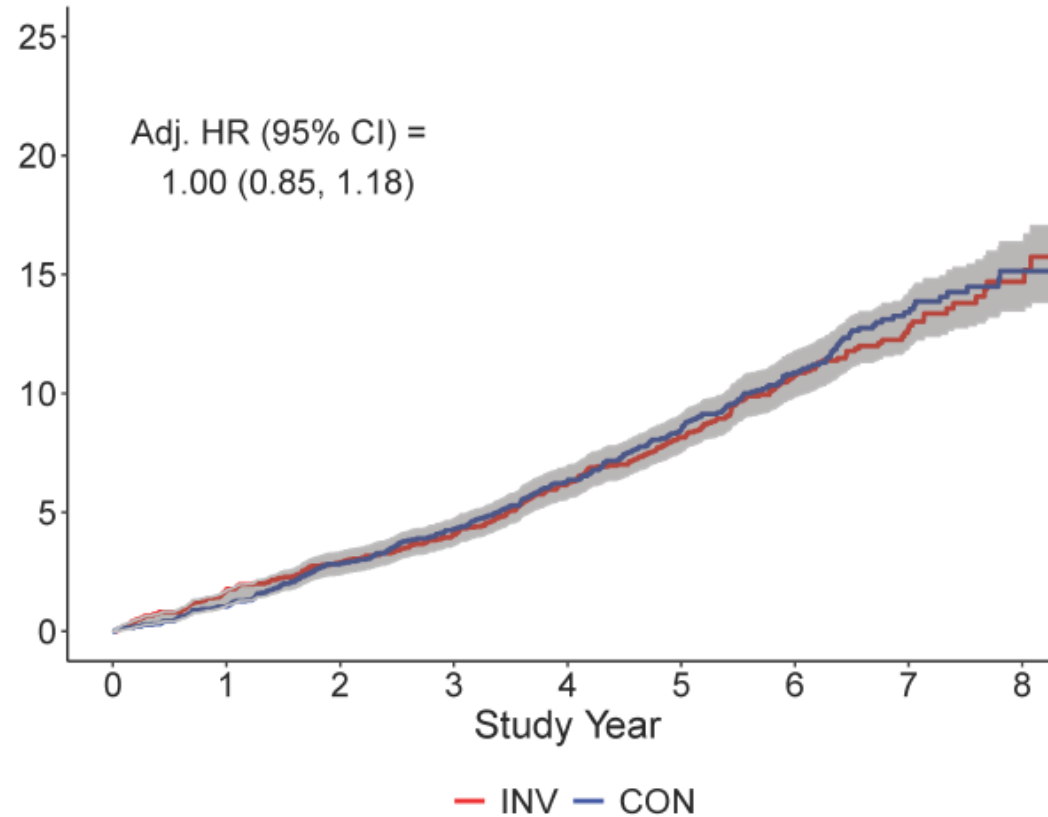


### No. at Risk

Conservative strategy	2591	2452	1931	1321	747	298
Invasive strategy	2588	2379	1931	1313	742	283

# All Death at 5.7 yrs

Cumulative Death Rates  
of Death (%)



**Identical**

# ISCHEMIA study

**No Survival and Ischemic Event Benefit of Invasive Strategy, as Compared With Conservative Strategy for the Patients with Moderate or Severe Ischemia.**

Judith S. Hochman et al, AHA, 2022, 10.1161/CIRCULATIONAHA.122.062714

David J. Maron et al, for the ISCHEMIA Research Group, N Engl J Med 2020; 382:1395-1407

# ISCHEMIA study

**Optimal Medical Therapy Is Good Enough  
for Majority Patients of Stable Coronary Disease**

Judith S. Hochman et al, AHA, 2022, 10.1161/CIRCULATIONAHA.122.062714

David J. Maron et al, for the ISCHEMIA Research Group, N Engl J Med 2020; 382:1395-1407

# ***Improved Survival***

## Patients with Stable Ischemic Heart Disease

- 1. Left Main Disease**
- 2. Multi Vessel Disease (<50% EF),  
CABG (1, 2a)**
- 3. Multi Vessel Disease (>50% EF),  
Any Revascularization (2b)**
- 4. Diabetic 3 Vessel Disease,  
CABG (1a)**

***What Is The Main Issue  
In Bifurcation PCI ?***

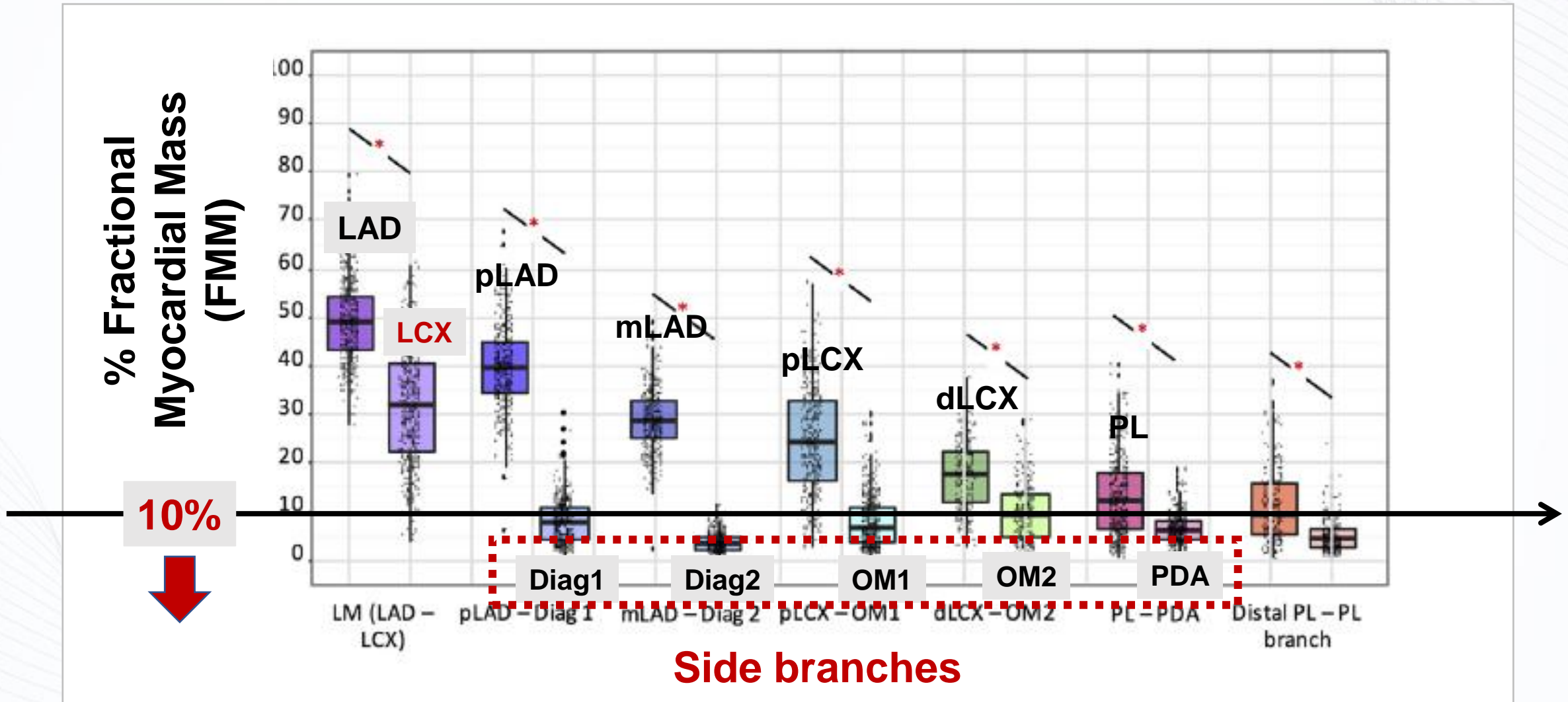
***Small Ischemic Burden*  
of Side Branches**

**Real Size ?**  
***of Side Branches***

**% Fractional Myocardial Mass  
(FMM)**

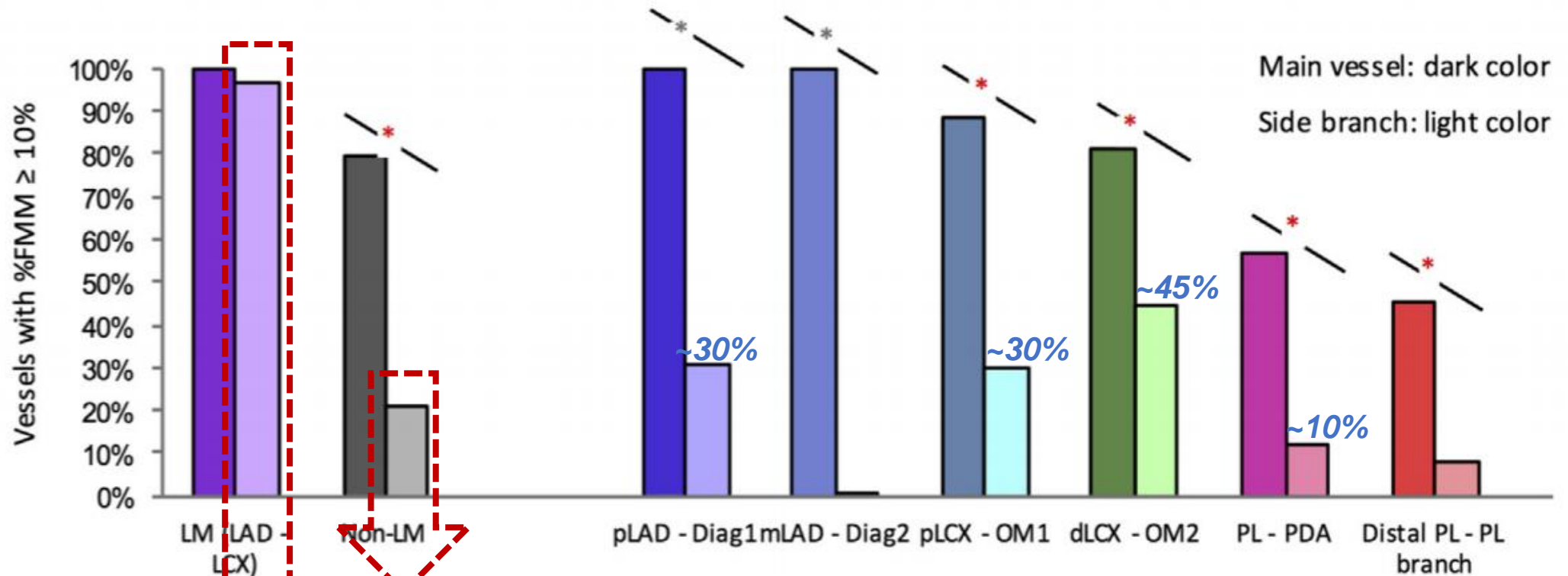
# Main vs. Side branches

## Myocardial territory





# Frequency of Supplying %FMM >10%



**Only 20% of Non-LM Side Branch**

**>90% of LM Side Branch (LCX)**

# ***Non-LM Bifurcation PCI*** ***Concept First !***

***80% of Side Branches in Non-LM  
Bifurcation Has Small Ischemic Burden.  
( $< 10\%$  of Fractional Myocardial Mass)***

# ***Non-LM Bifurcation PCI*** ***Concept First !***

***Clinical Outcomes of Non-LM  
Bifurcation PCI Are Clearly Related  
with Main Branch Stenting Status.***

# **Simplify Bifurcation PCI !**

1. **Treat, Large Side Branch (>2.5mm)**
2. **Not Treat, Small Side Branch**

***Large Side Branch  
with True Bifurcation Disease***

**Upfront 2 Stent Technique !  
in Any Bifurcation Disease  
(LM or Non-LM)**

***Small Side Branch  
(80% of Real World)***

**Survival Benefit ?  
Ischemic Symptoms  
with GDMT ?**

**No !**

**I Don't Believe it !**

# ***Small Side Branch PCI***

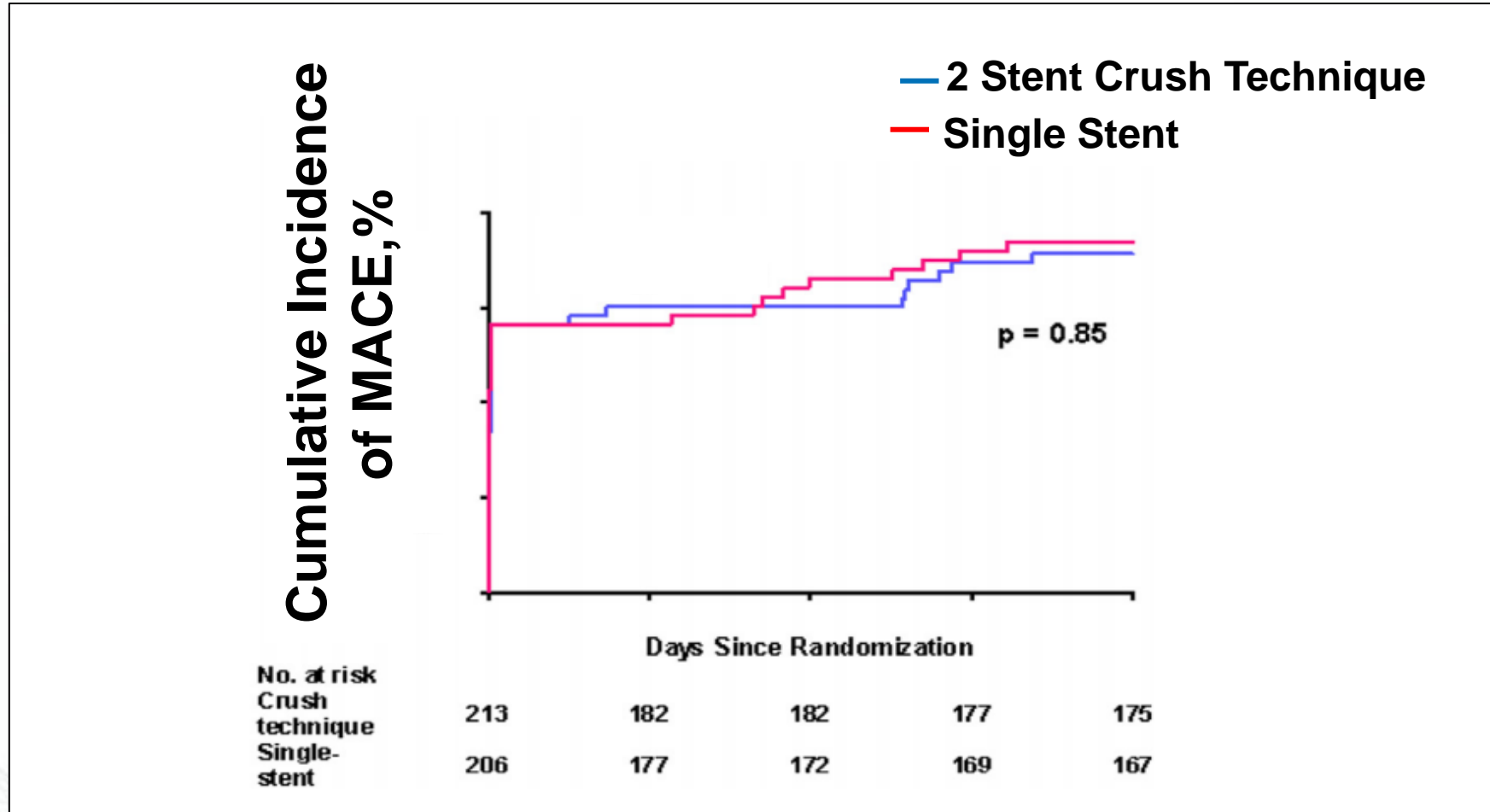
***Don't Touch !***

# Upfront 2 Stents

*Two Stent Is Good Enough !*

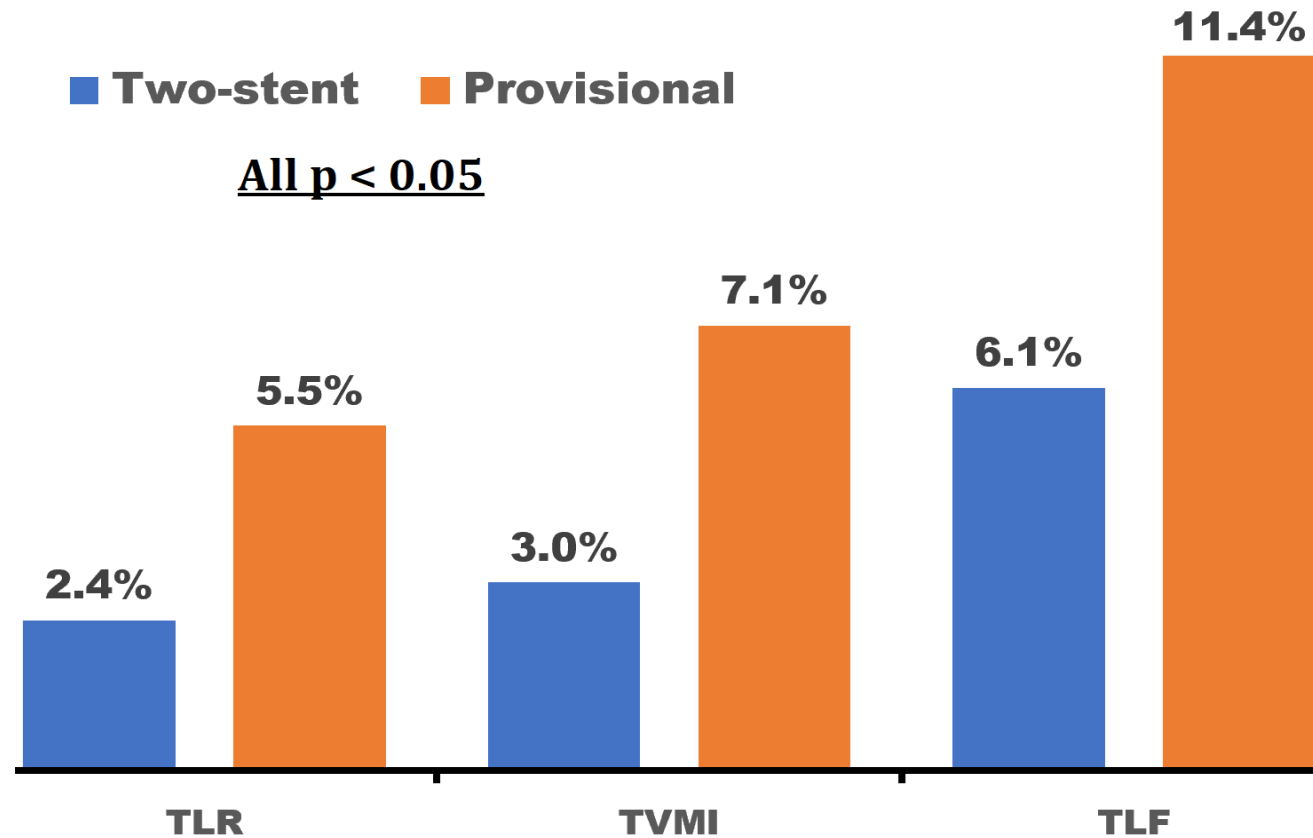


# 1 or 2 Stent Technique Are Both Good !



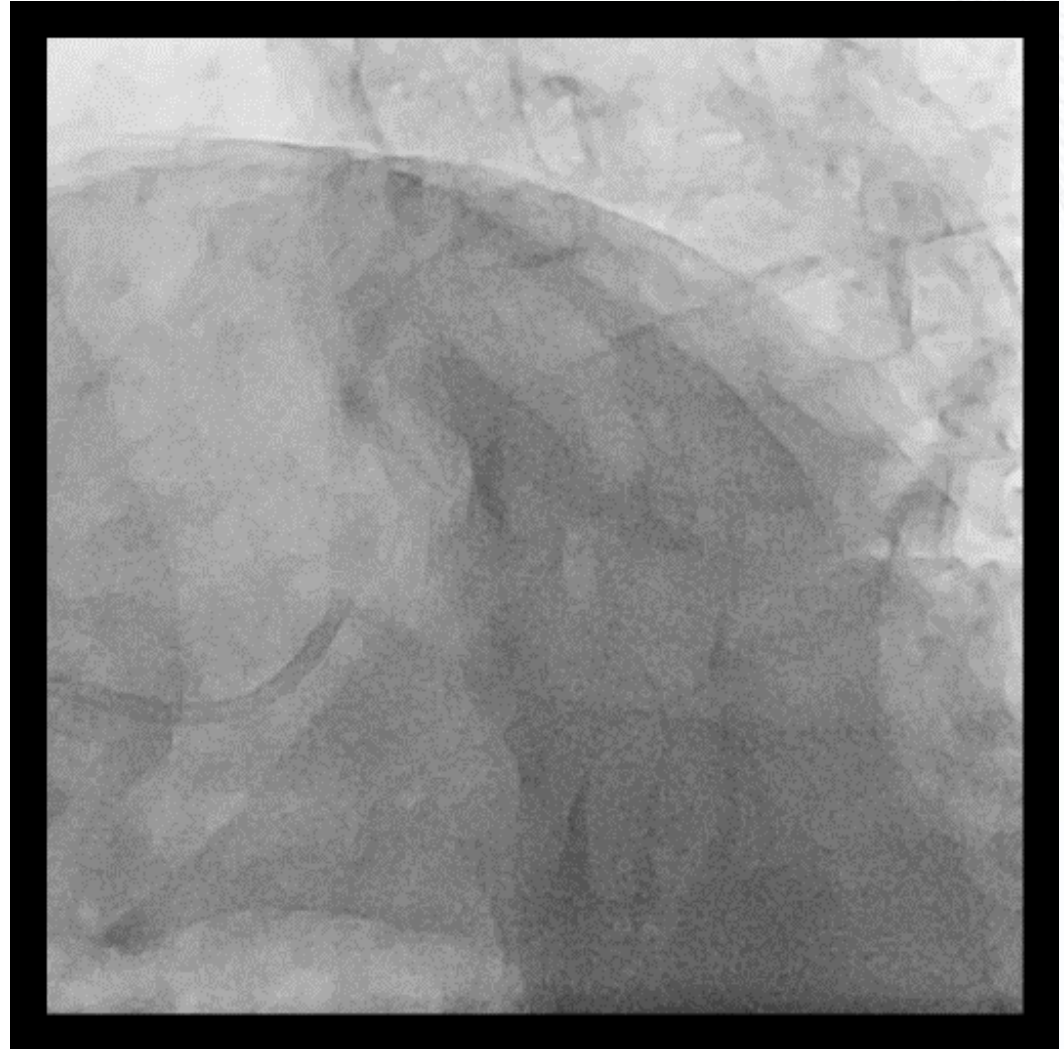
# 2 Stent Is Better than Provisional 1 Stent

For All Complex Bifurcations (RVD>2.5mm)

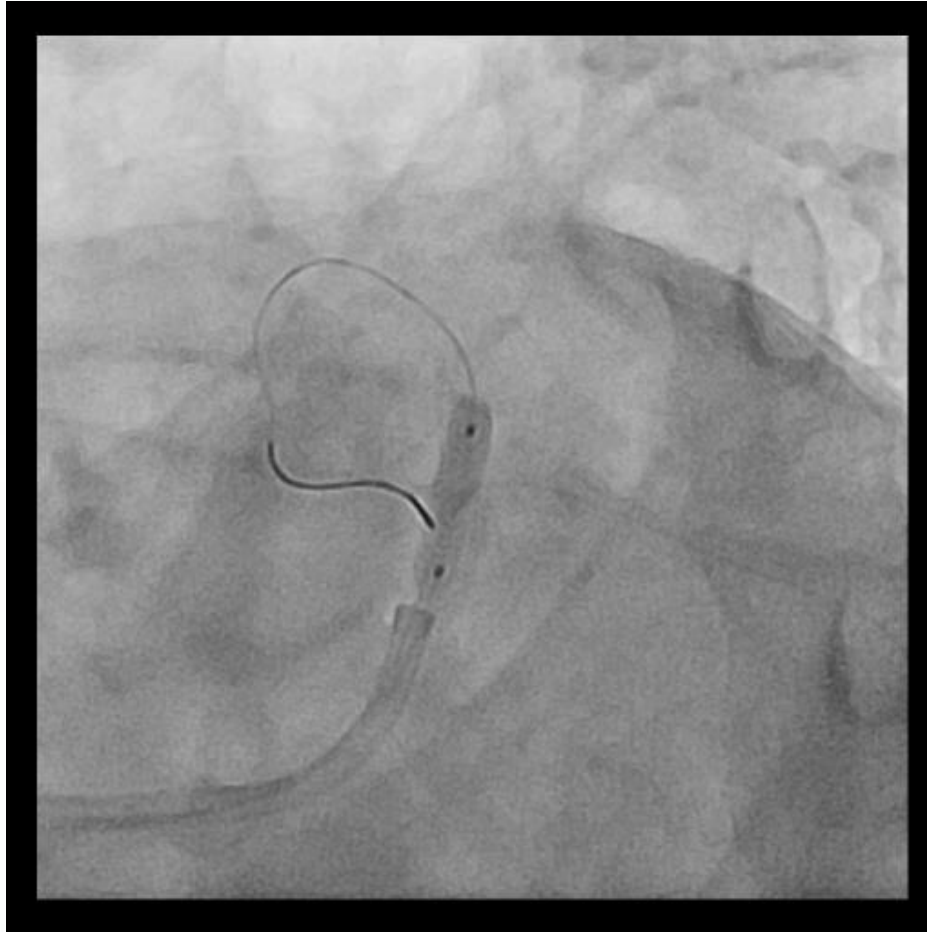


Zhang, et al. Eur H J 2020, Definition II Randomized Study

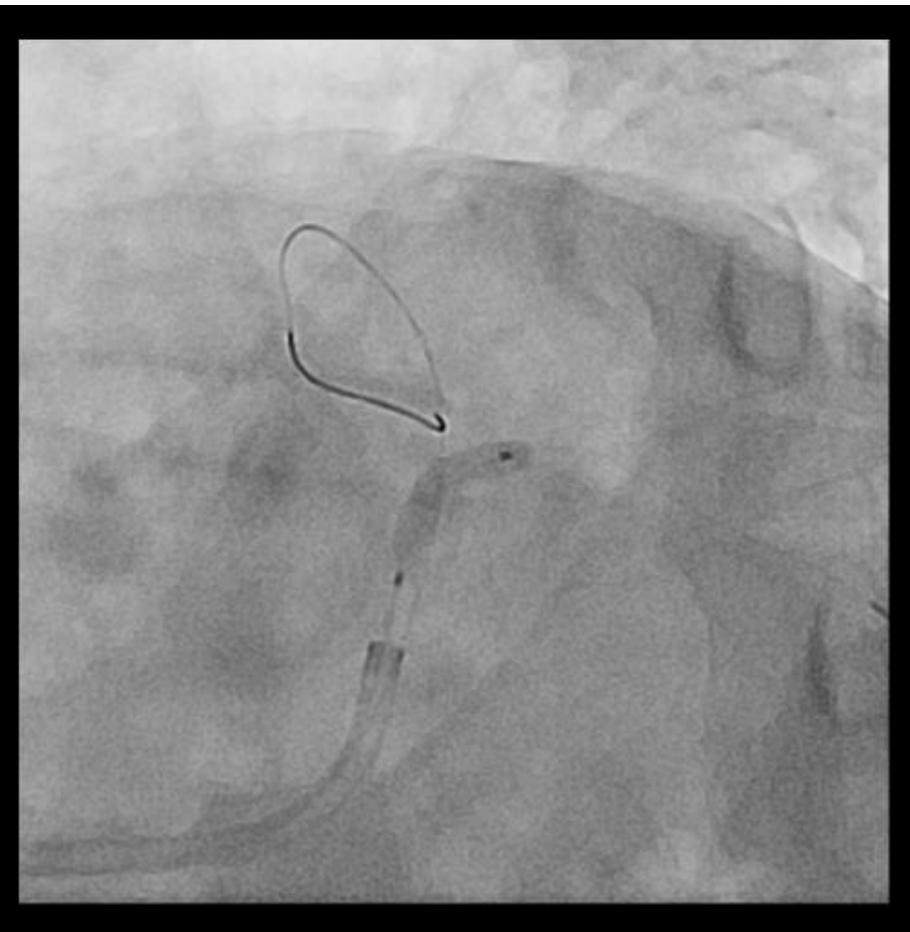
# Calcific LM Bifurcation Disease



# Pre-Lesion Modification

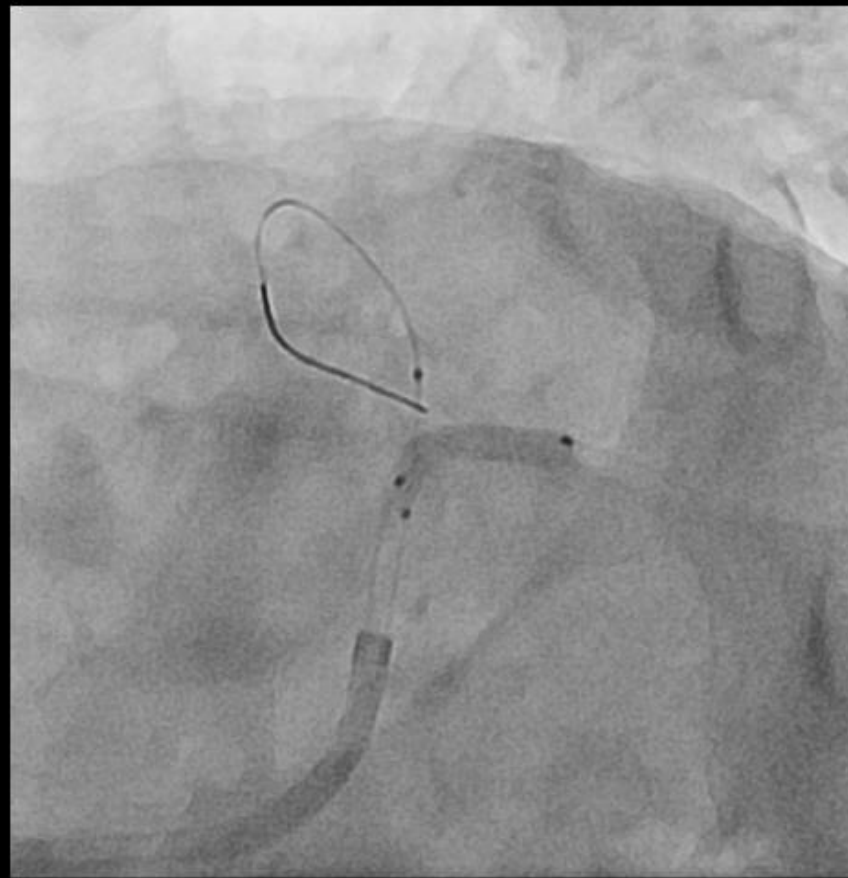


**LAD : NC 3.5 (15) upto 24 atm**



**LCX : NC 3.0 (15) upto 22 atm**

# Side Branch Stenting and Balloon Crushing



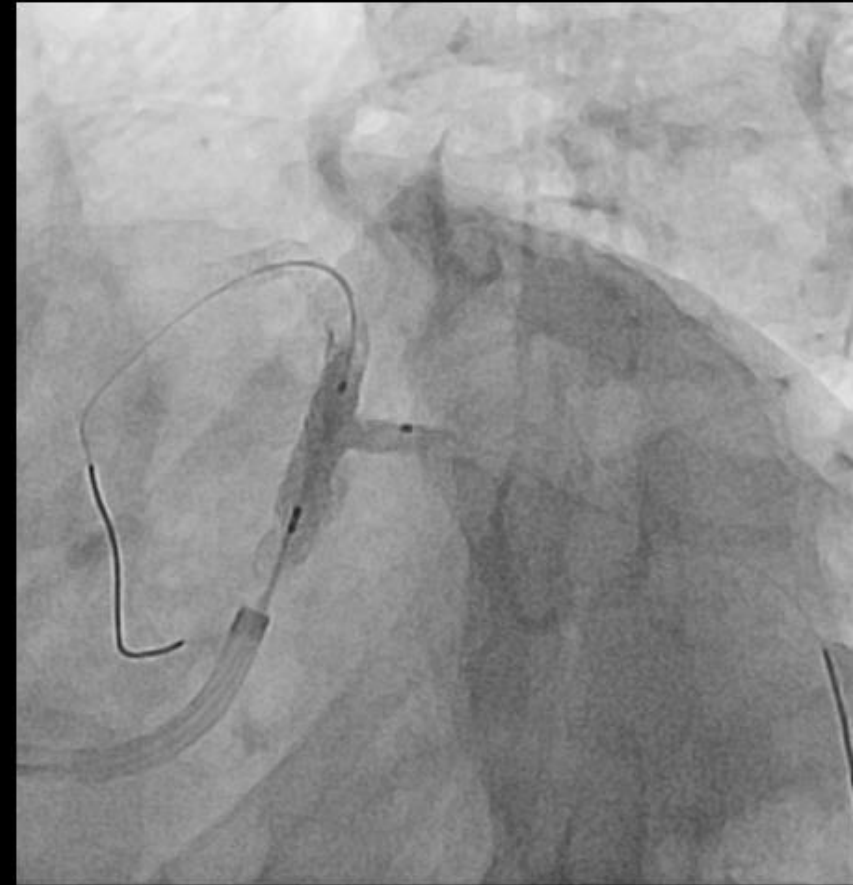
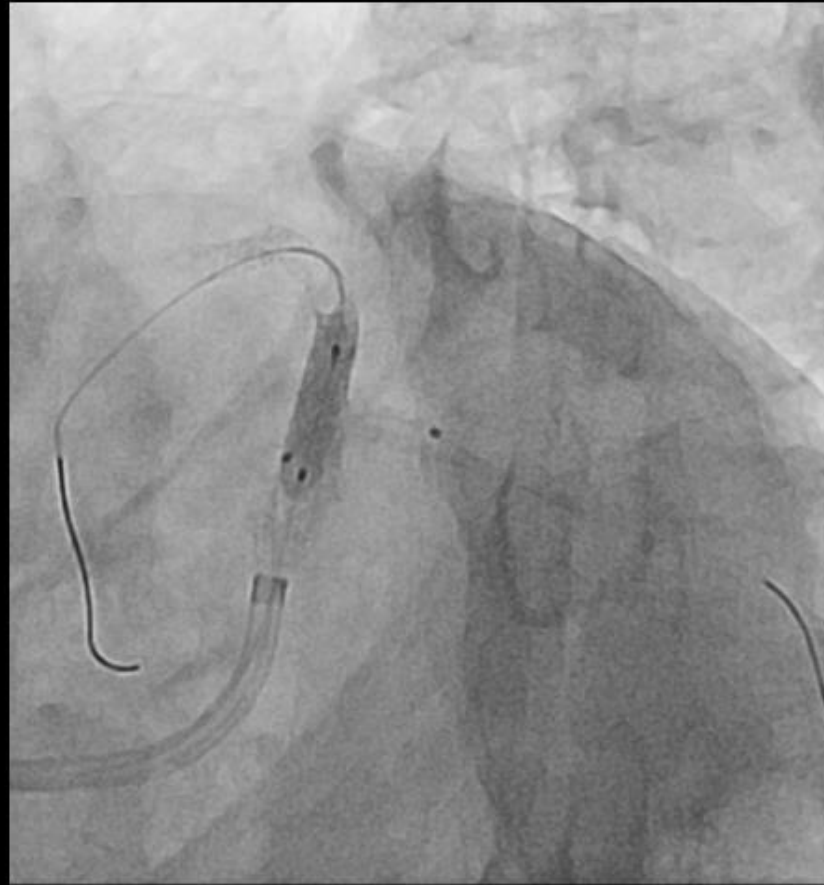
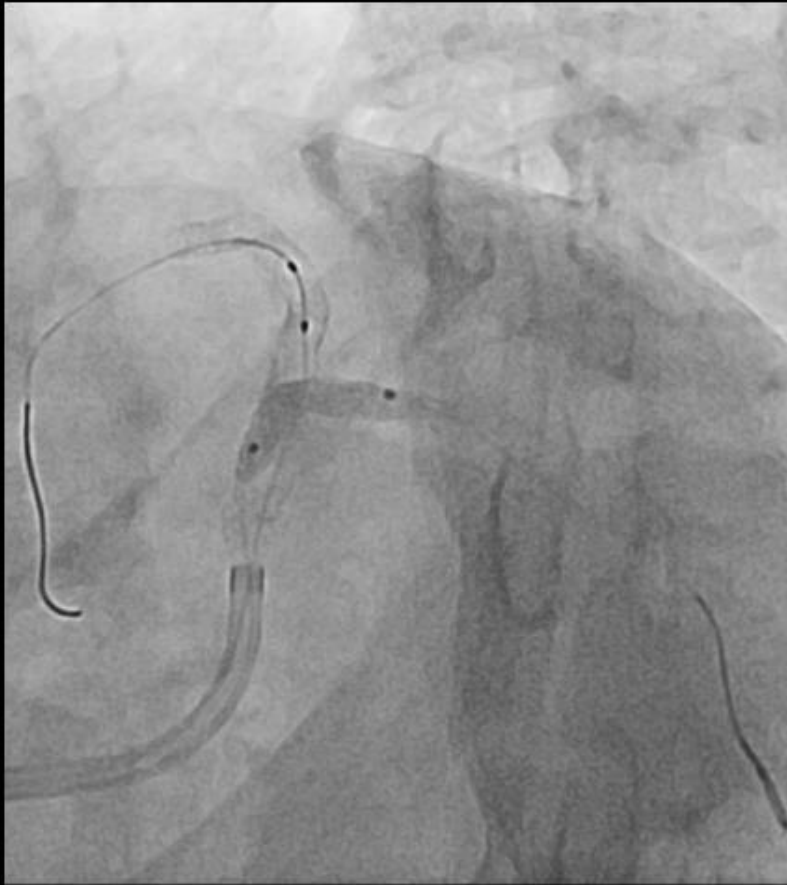
LCX : Xience 2.75 \* 15 at 14 atm (2.9)

# LM-LAD Stent Implantation



LM-pLAD : Xience 3.5 \* 28 at 12 atm (3.5)

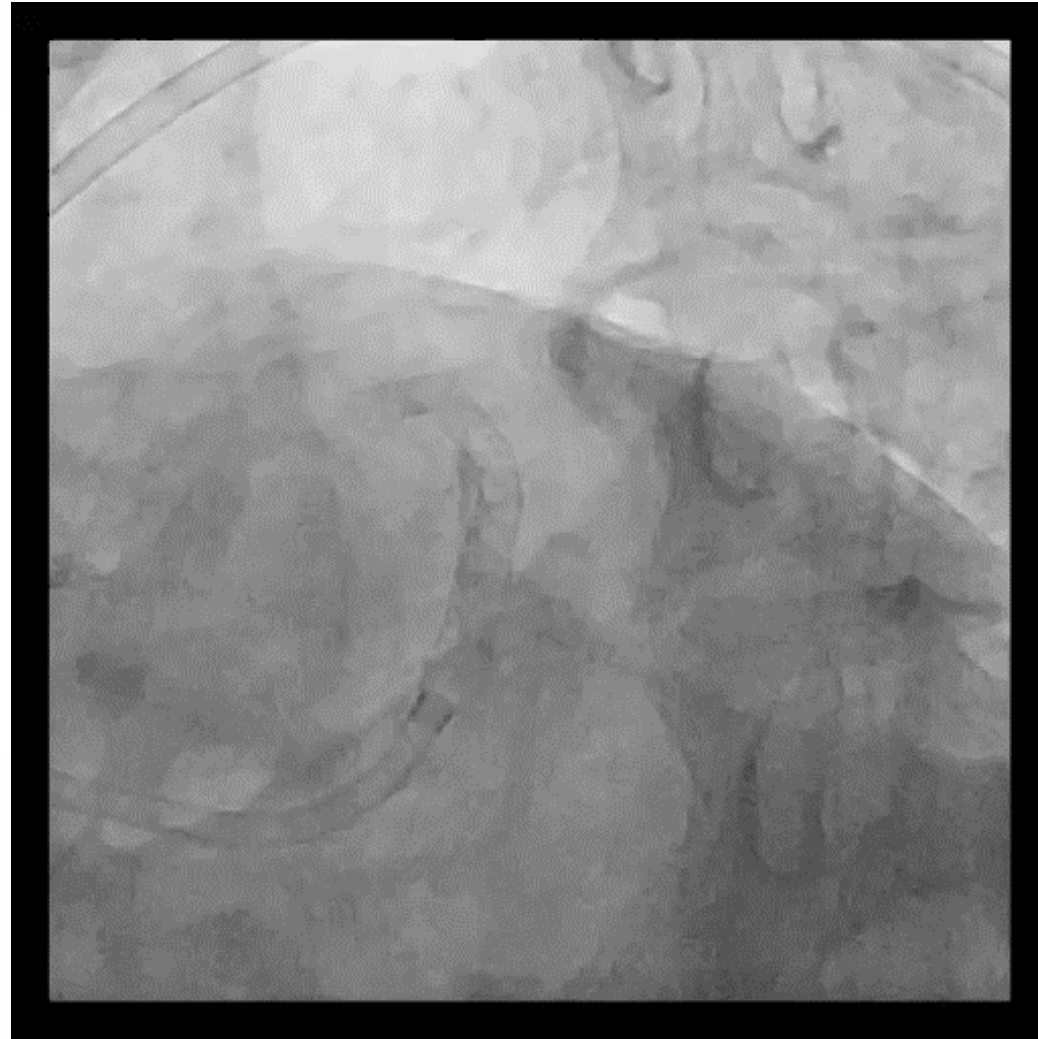
# Sequential High Pressure and Final Kissing



NC 3.0 (15) upto 22 atm

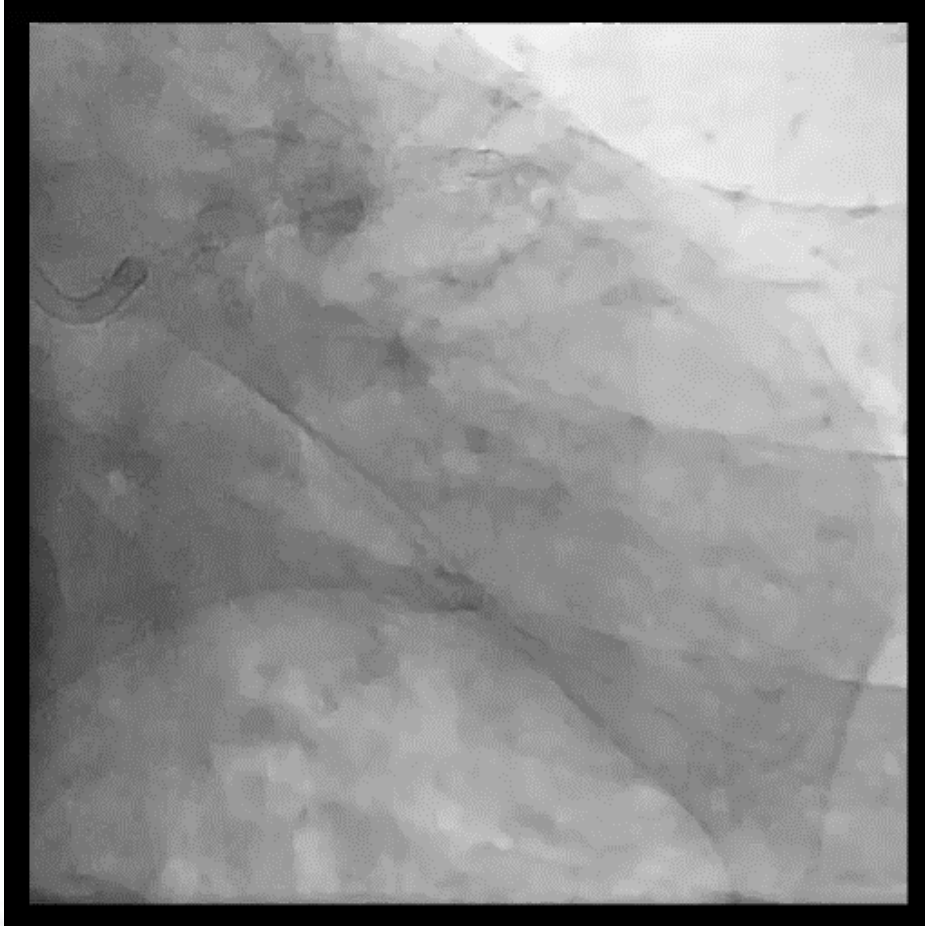
NC 3.5 (15) upto 24 atm

# Final angiography

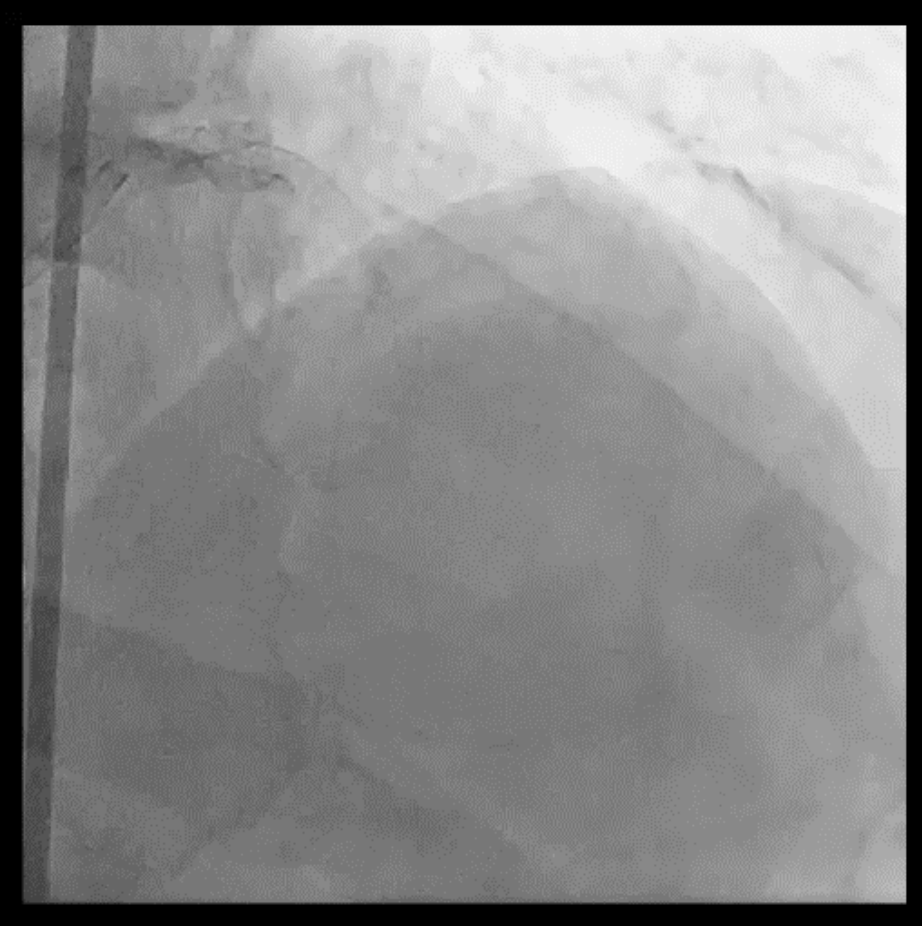




# Final angiography

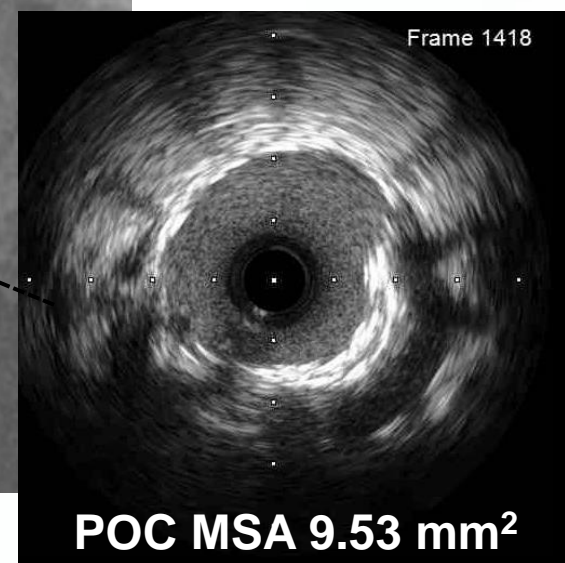
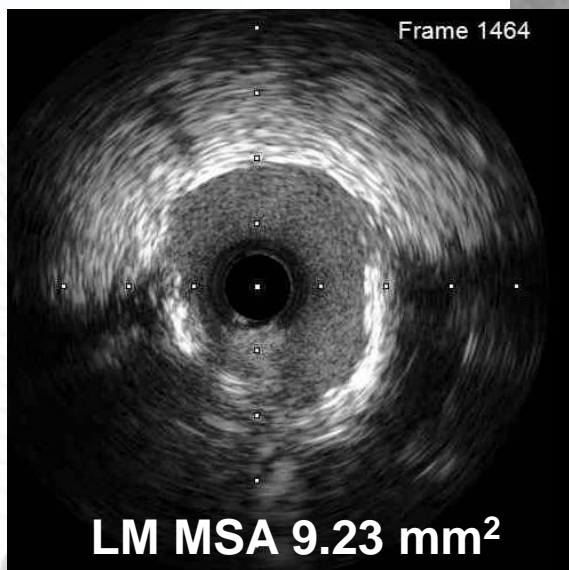
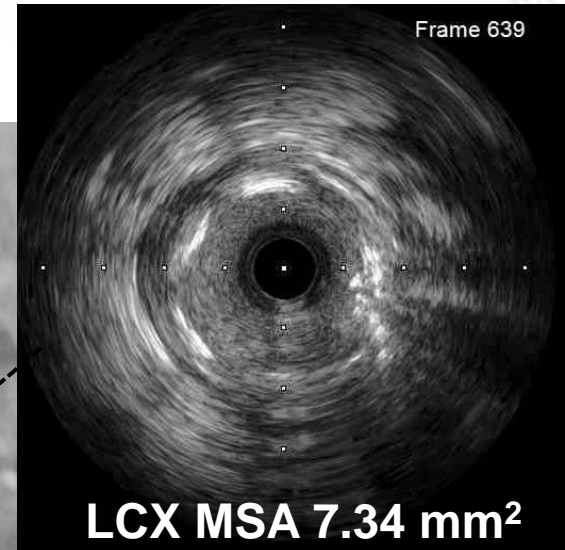


**AP CAUDAL**

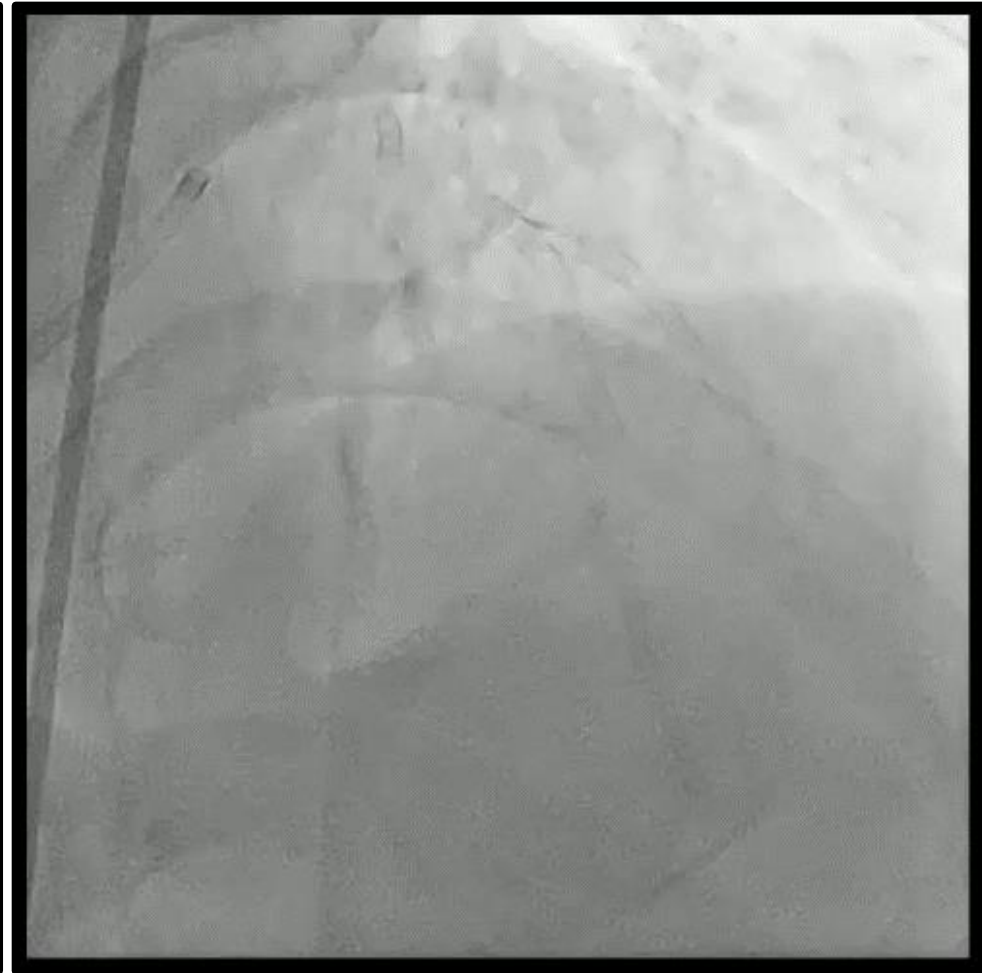
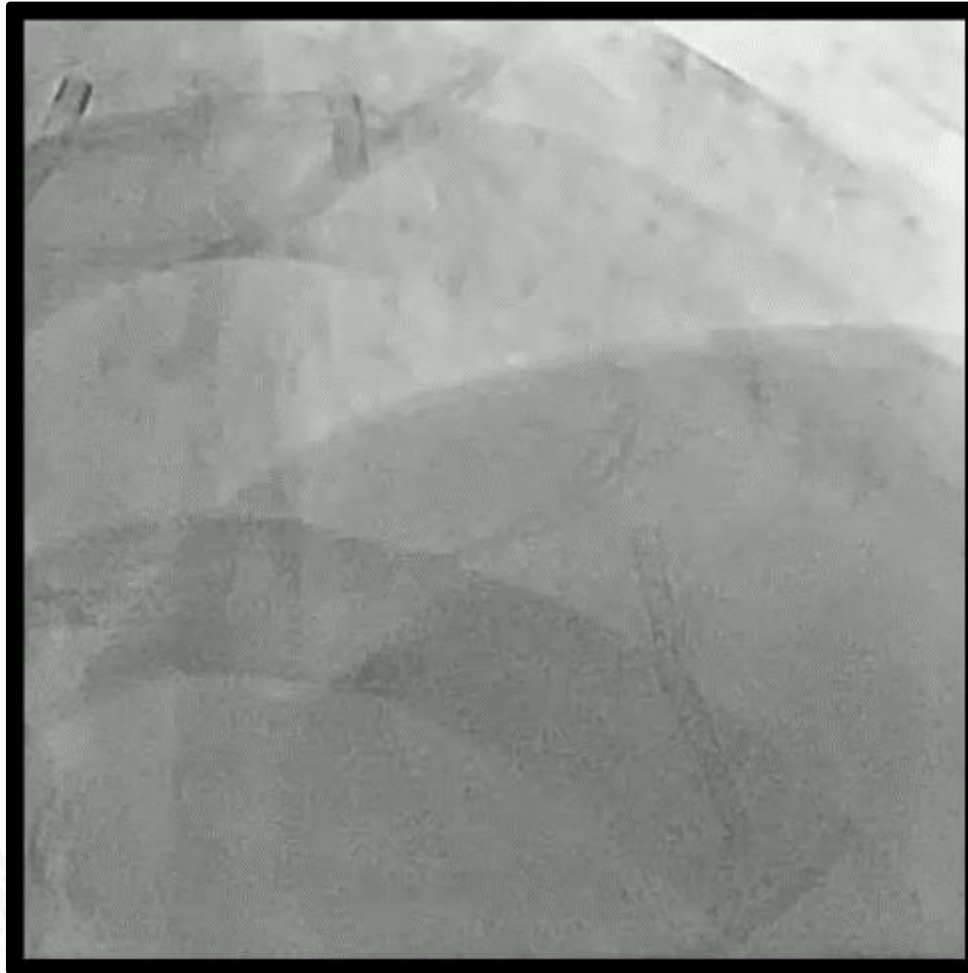


**AP CRANIAL**

# Final IVUS



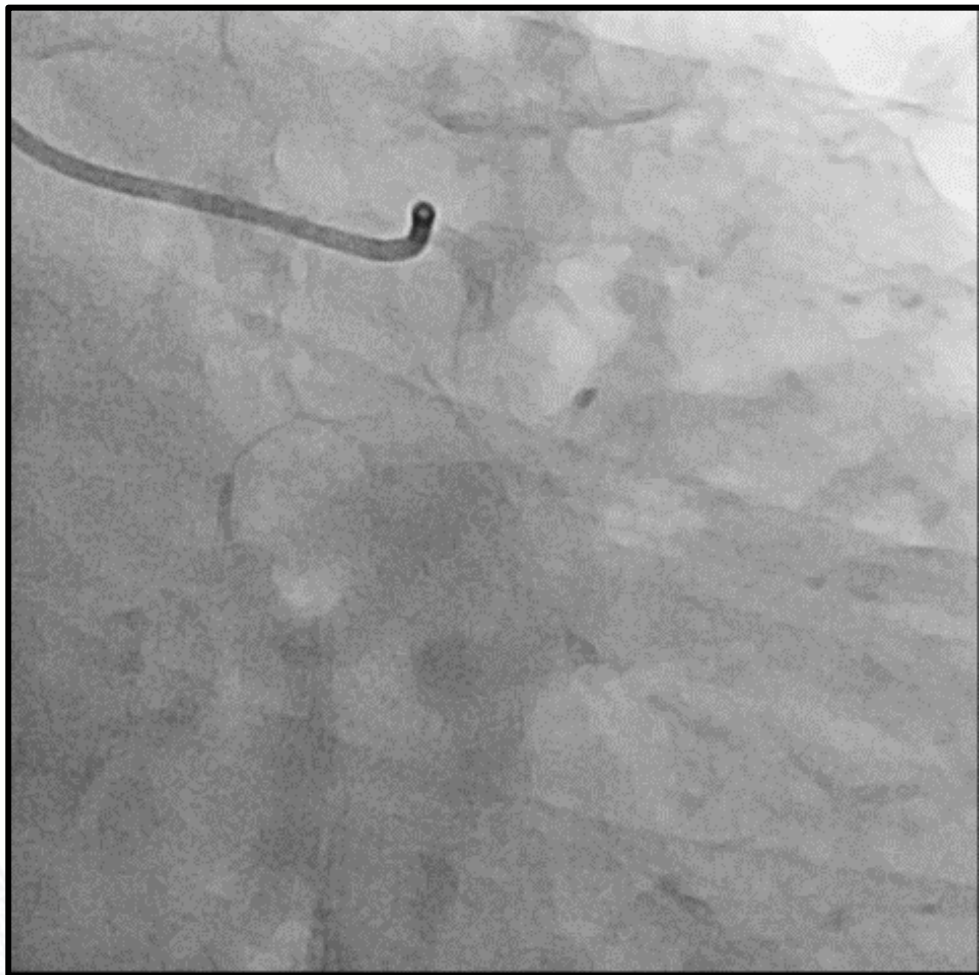
# ***Upfront 2-stenting for LAD & Diagonal***



LAD: Xience 3.5 \* 32mm at 14 atm (3.7)

D1: Xience 2.5\* 28 mm at 18 atm(2.75)

# ***Upfront 2-stenting for LCX & OM***



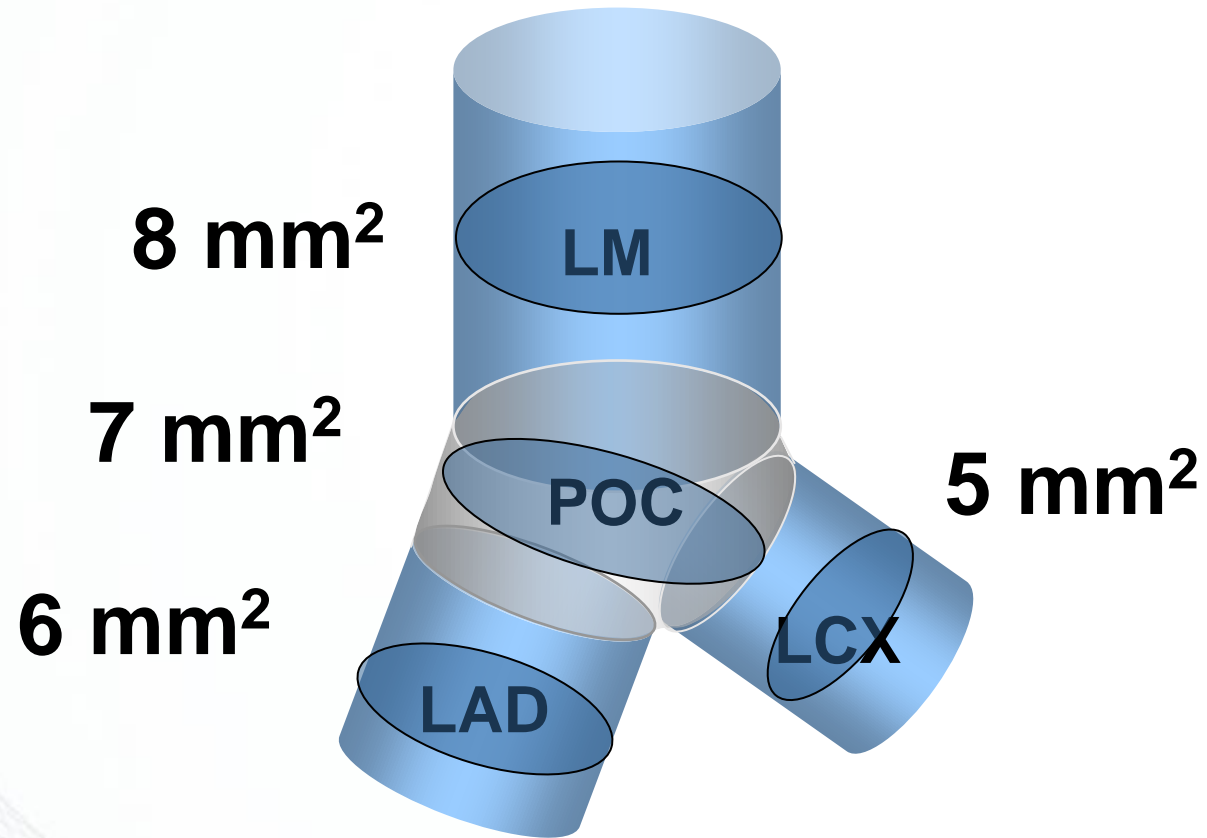
# Upfront 2 Stents

1. Large Side Branch (>2.5mm)  
Is Worthy of Treatment.
2. We Can Avoid Risk of SB closure.
3. Clinical Outcomes of 2 Stents Are Good.

Zhang JJ, Ye F, Xu K, et al. Eur Heart J 2020;Jun 26 (DEFINITION 2)

Kim YH, Park SJ, et al. JACC Interv. 2015 April 20;8(4):550-60 (CROSS)

# ***Predictor for Good Clinical Outcomes Is Effective Stent Area of LM PCI***



***Restenosis Rate < 5%,  
TLR < 2%***

***Predictor for Good Clinical Outcomes  
Is Effective Stent Area of Any PCI***

- 1. Stent Area  $>5.0 \text{ mm}^2$***
- 2. Stented Length  $<50 \text{ mm}$***

***Restenosis Rate  $< 2\%$***

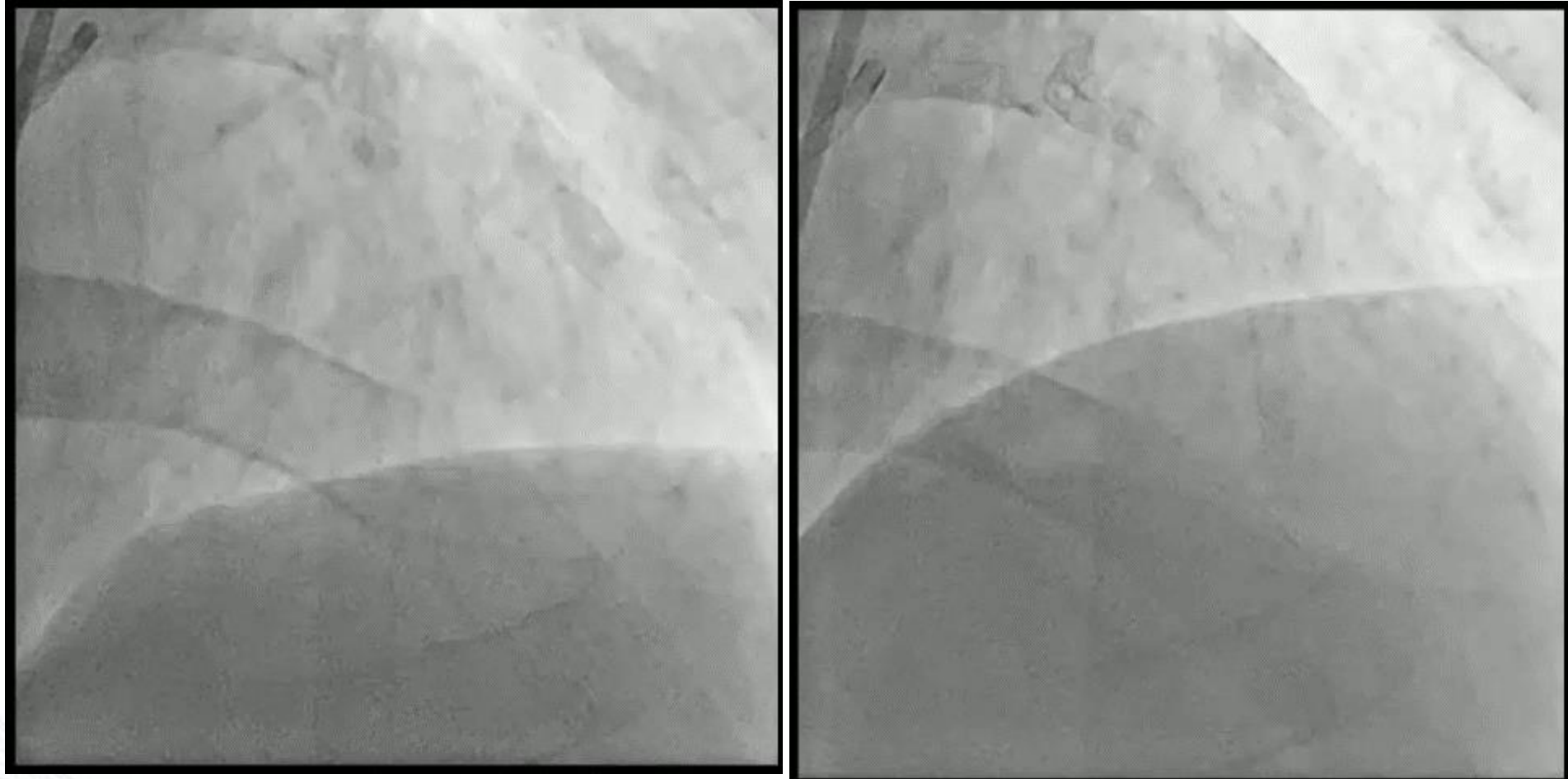
# ***Small Side Branch PCI ?***

***Don't Touch !  
Leave it Alone !***



M/64, Stable Angina

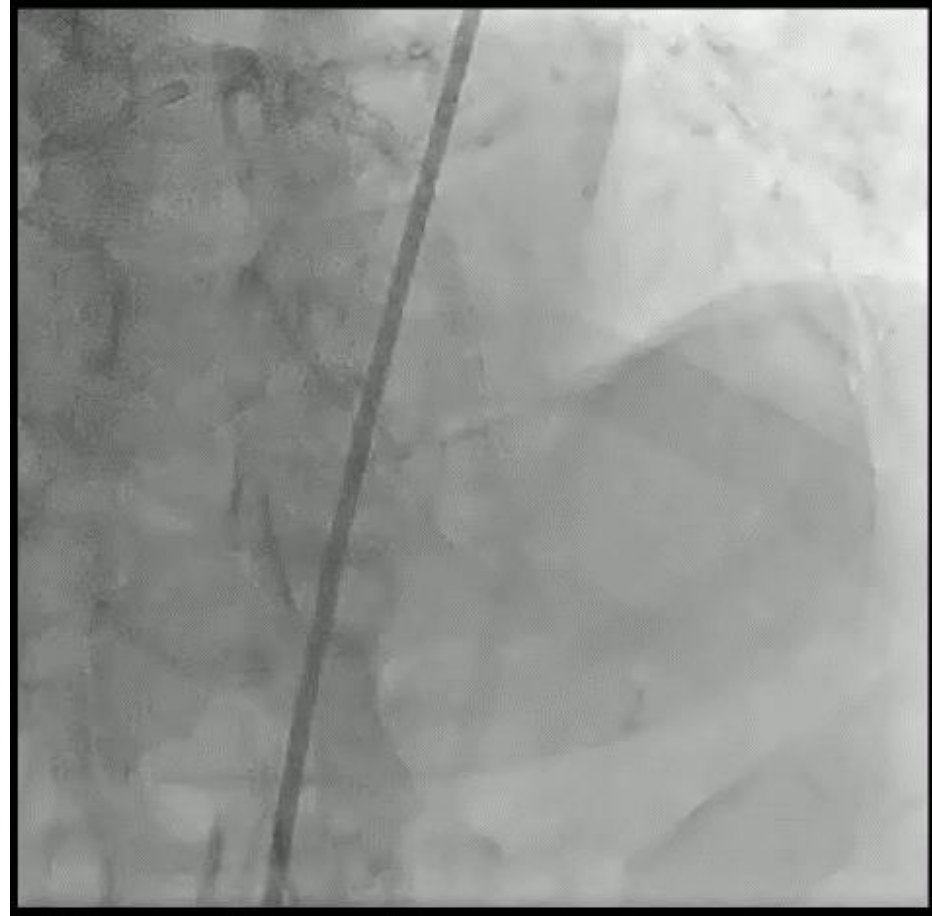
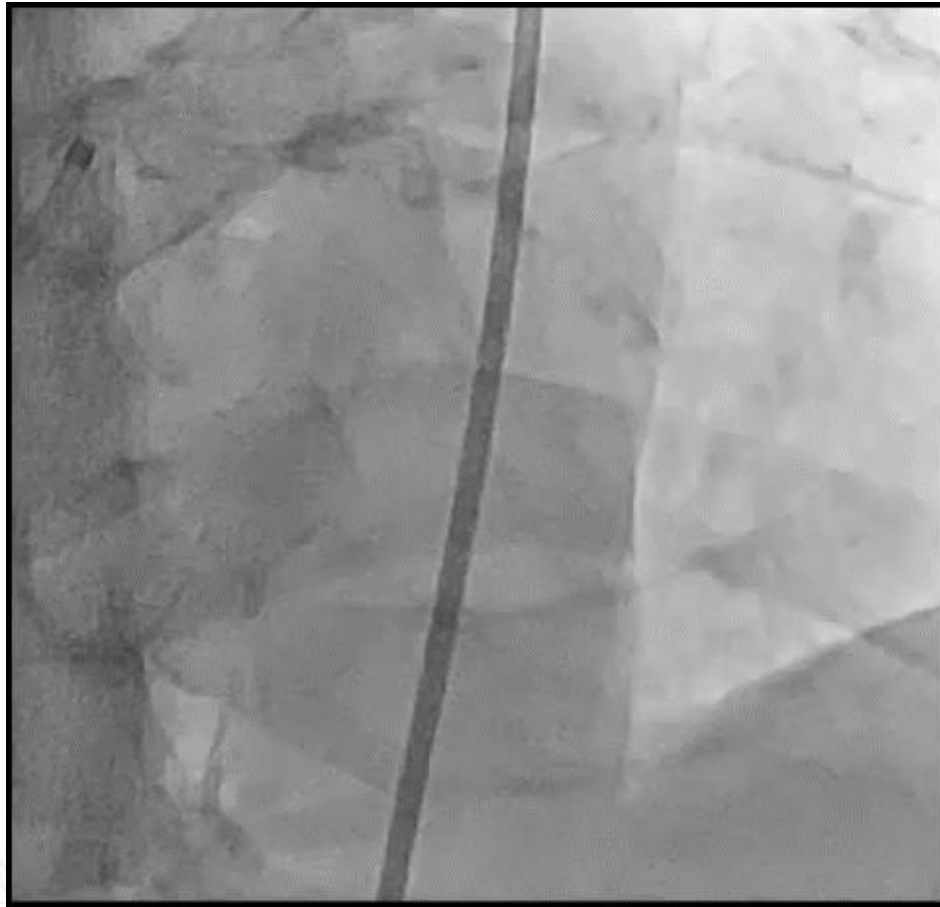
**LAD Crossover with TIMI 3 Flow of Diagonal Branch**



LAD: Xience 3.0 \* 48mm at 14 atm (3.0~3.7)

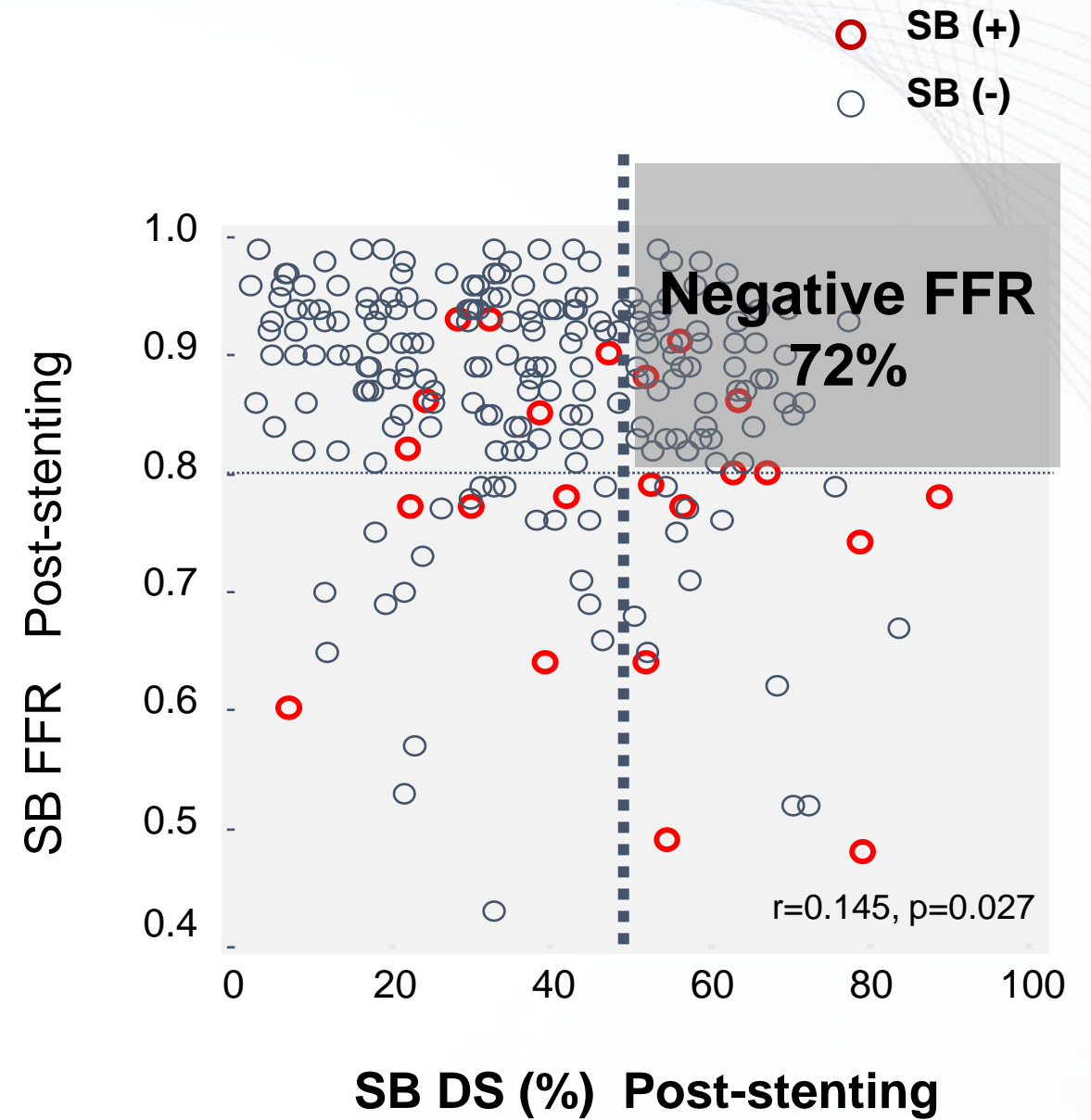
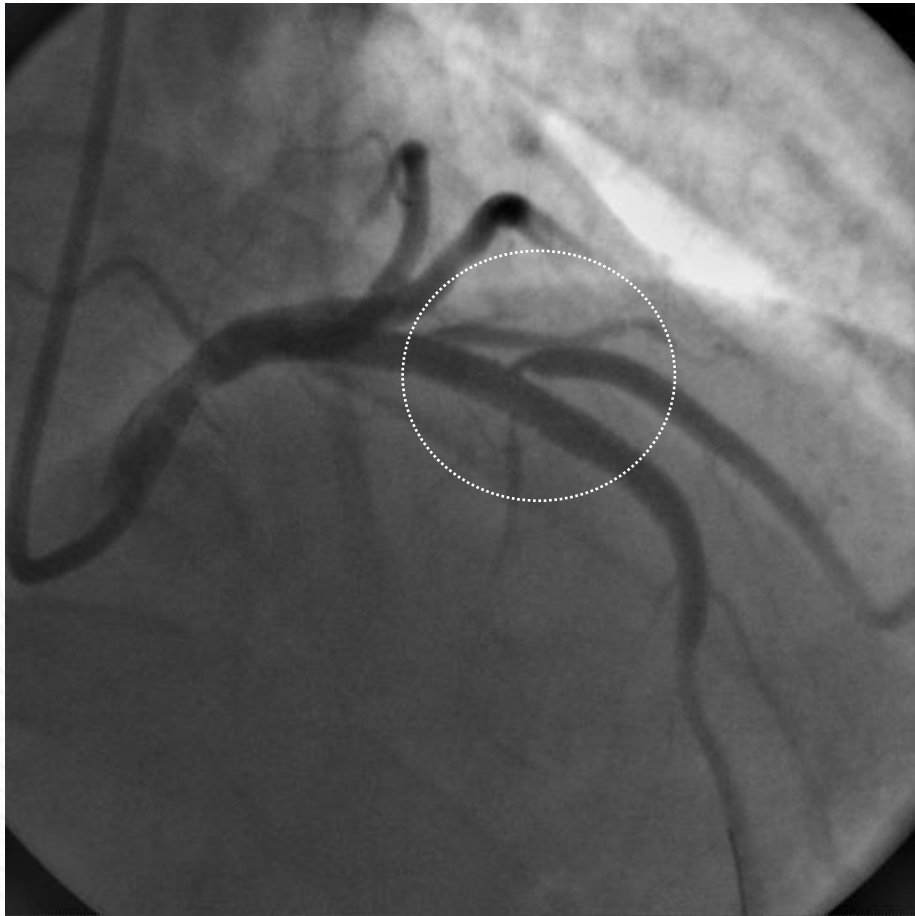
M/78, Stable Angina

**LAD Crossover with Jailing Diagonal Branch**



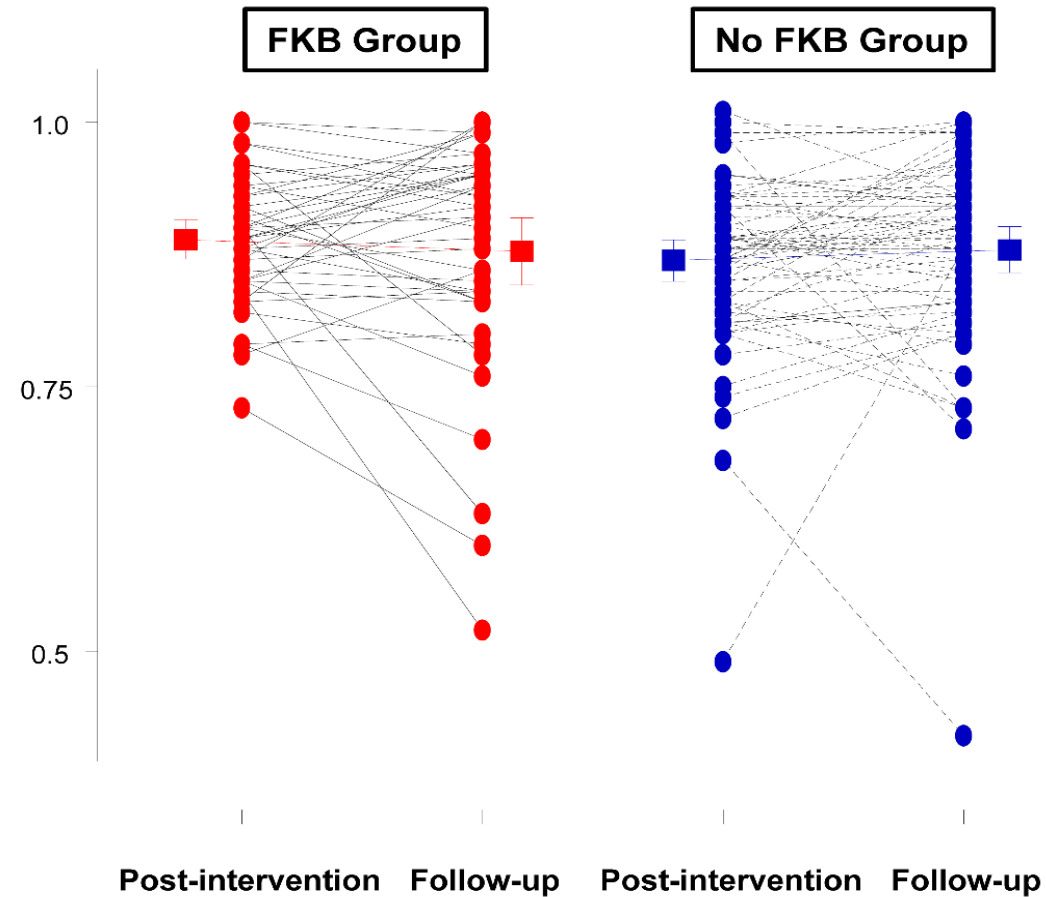
**LAD: Xience 2.75 \* 8mm at 14 atm  
3.0 \* 32mm at 18atm (2.9~3.5)**

# Asymptomatic Jailing Side Branch



# Kissing Balloon Inflation **Can Not Make An Any Difference!**

**Serial FFR follow-up  
in Jailed Side Branch**



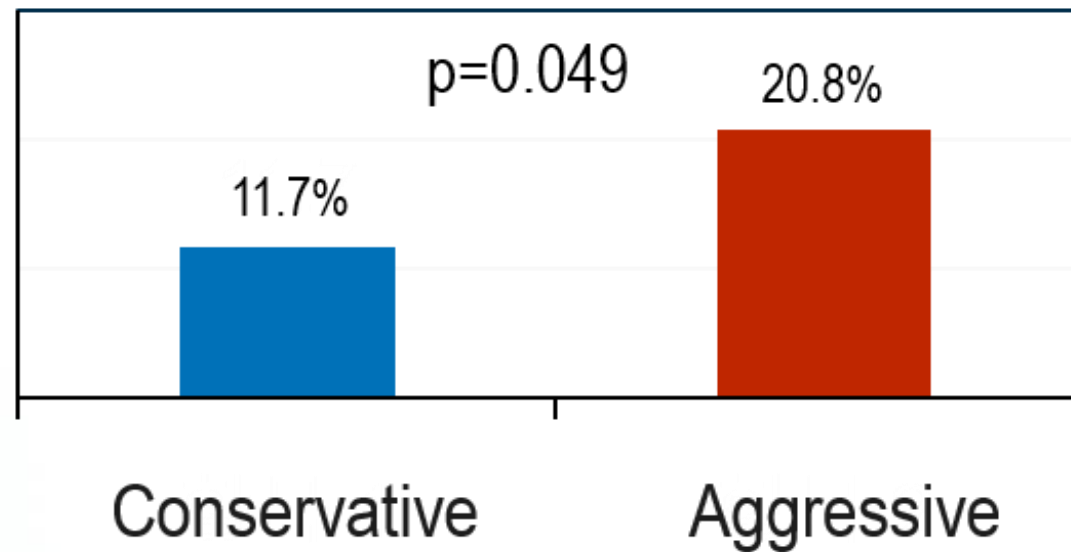
# Higher Main Branch Restenosis Rate In Routine Kissing Balloon

Restenosis Rate(%)	<i>Routine Kissing</i>	<i>Conservative Leave alone</i>	
Proxima Main Vessel	<b>7.5</b>	<b>0.9</b>	<i>P=0.018</i>
Distal Main Vessel	<b>7.5</b>	<b>2.8</b>	<i>P=0.50</i>
Side Branch	<b>2.9</b>	<b>5.6</b>	<i>P=0.11</i>

Kim YH, Park SJ, et al. JACC Interv. 2015 April 20;8(4):550-60, CROSS and PERFECT studies

# Higher Target Vessel Failure In Aggressive Treatment of Side Branch

Target vessel failure at 3 years



# *My Rule* *for Bifurcation PCI*

**Treat !**

***Symptomatic,***

***Large Side Branch (>2.5 mm),***

***Upfront 2 stents Would Be Good.***

# *My Rule* *for Bifurcation PCI*

***Don't Touch !***

***Any Small Side Branch (<2.5mm),  
If No Symptoms, Jailed or Not After Main  
Stenting Crossover, *Medical Therapy Is  
Enough !****



# **My Rule** **for Bifurcation PCI**

***Just In Cases of Symptomatic  
Compromized Small Side Branch, Just  
Balloon Dilation (with/without DEB) Would  
Be Enough!***

# **Small Side Branches**

**No Symptoms,  
No Survival Benefit,**

***Why Would You Do  
Further Treatment ?***

**Please Don't Touch !**