Non-LM Bifurcation PCI in 2023; "Don't Touch Small Side Branch"

Evolving Changes in AMC Practice

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Why PCI ?

Patients with Stable Ischemic Heart Disease

1. To Improve Symptoms

2. To Improve Survival

J Am Coll Cardiol. Dec 09, 2021. Epublished DOI: 10.1016/j.jacc.2021.09.006

To Improve Symptoms ?

Patients with Stable Ischemic Heart Disease

Should Be Ischemic !

J Am Coll Cardiol. Dec 09, 2021. Epublished DOI: 10.1016/j.jacc.2021.09.006

To Improve Survival ?

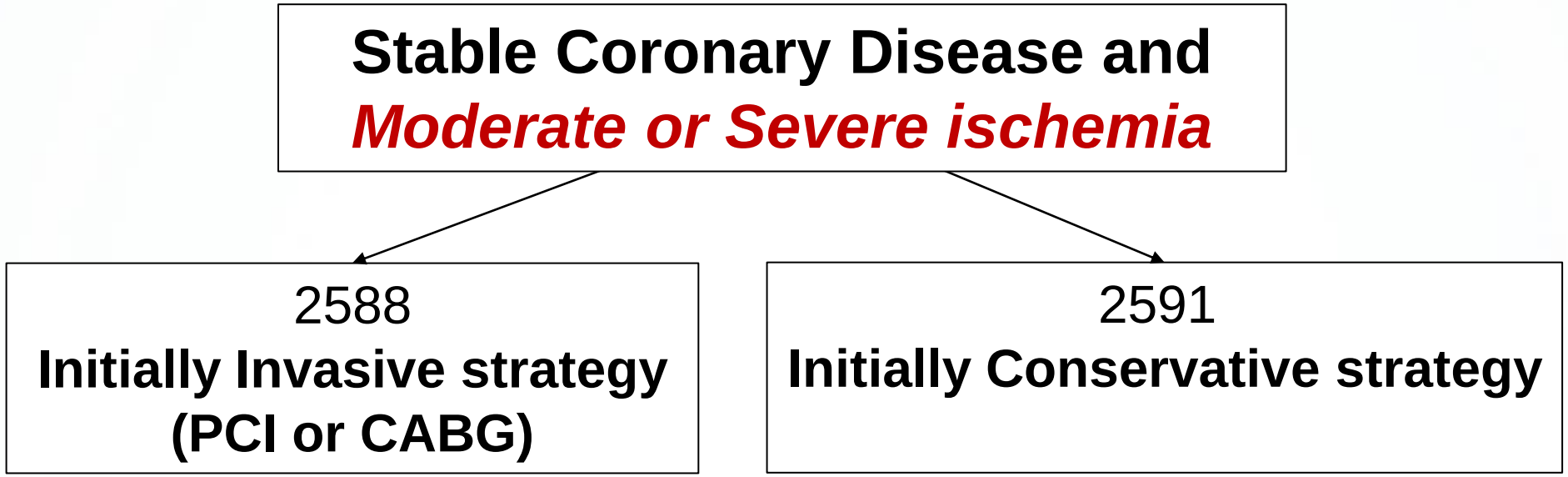
Patients with Stable Ischemic Heart Disease

J Am Coll Cardiol. Dec 09, 2021. Epublished DOI: 10.1016/j.jacc.2021.09.006

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.

David J. Maron et al, for the ISCHEMIA Research Group, N Engl J Med 2020; 382:1395-1407
https://www-nejm-org-ssl.libproxy.amc.seoul.kr/doi/10.1056/NEJMoa1915922

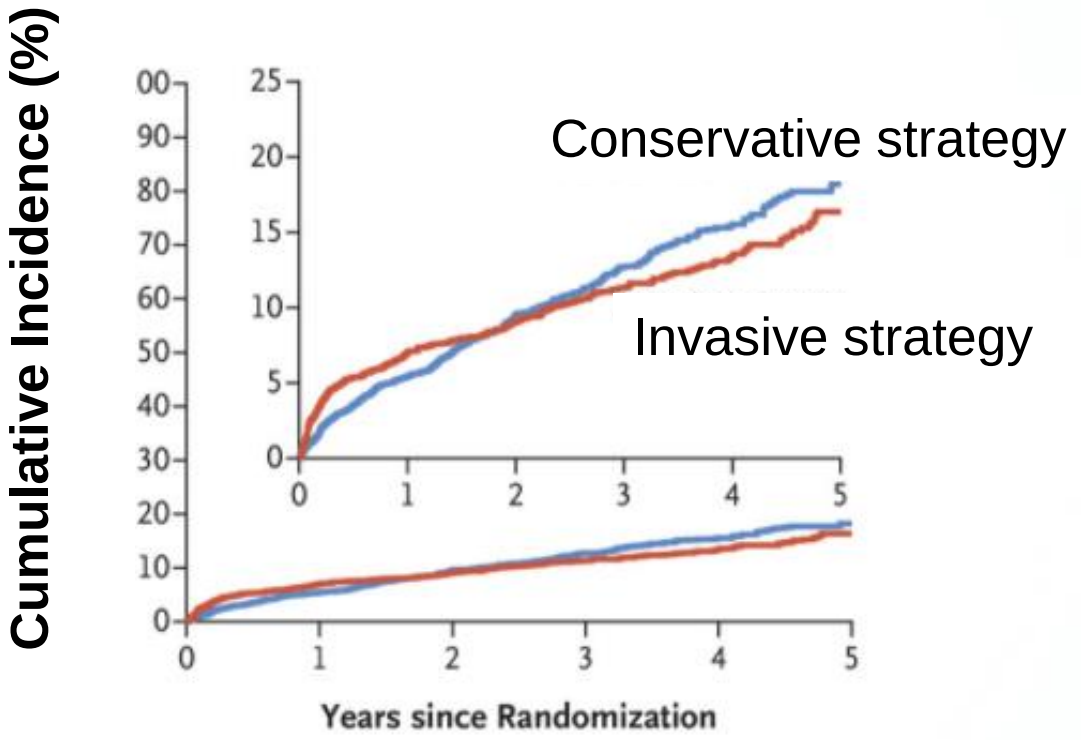
Coronary Anatomy by CCTA (≥ 50% stenosis)

	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%

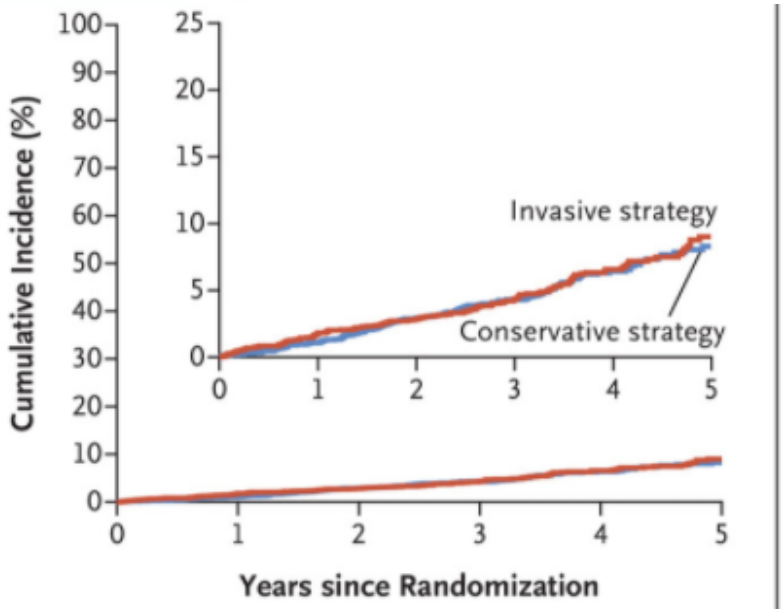
Primary Outcomes at 3.2 yrs

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



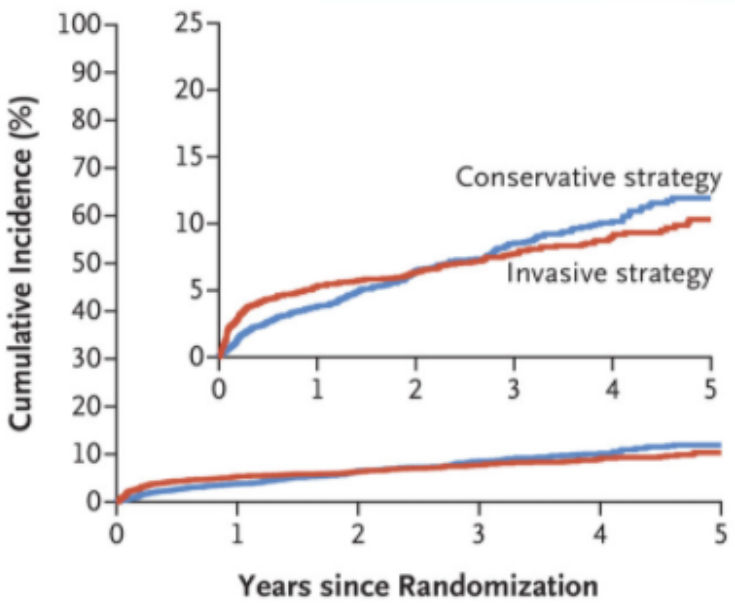
No. at Risk						
Conservative strategy	2591	2431	1907	1300	733	293
Invasive strategy	2588	2364	1908	1291	730	271

All Death



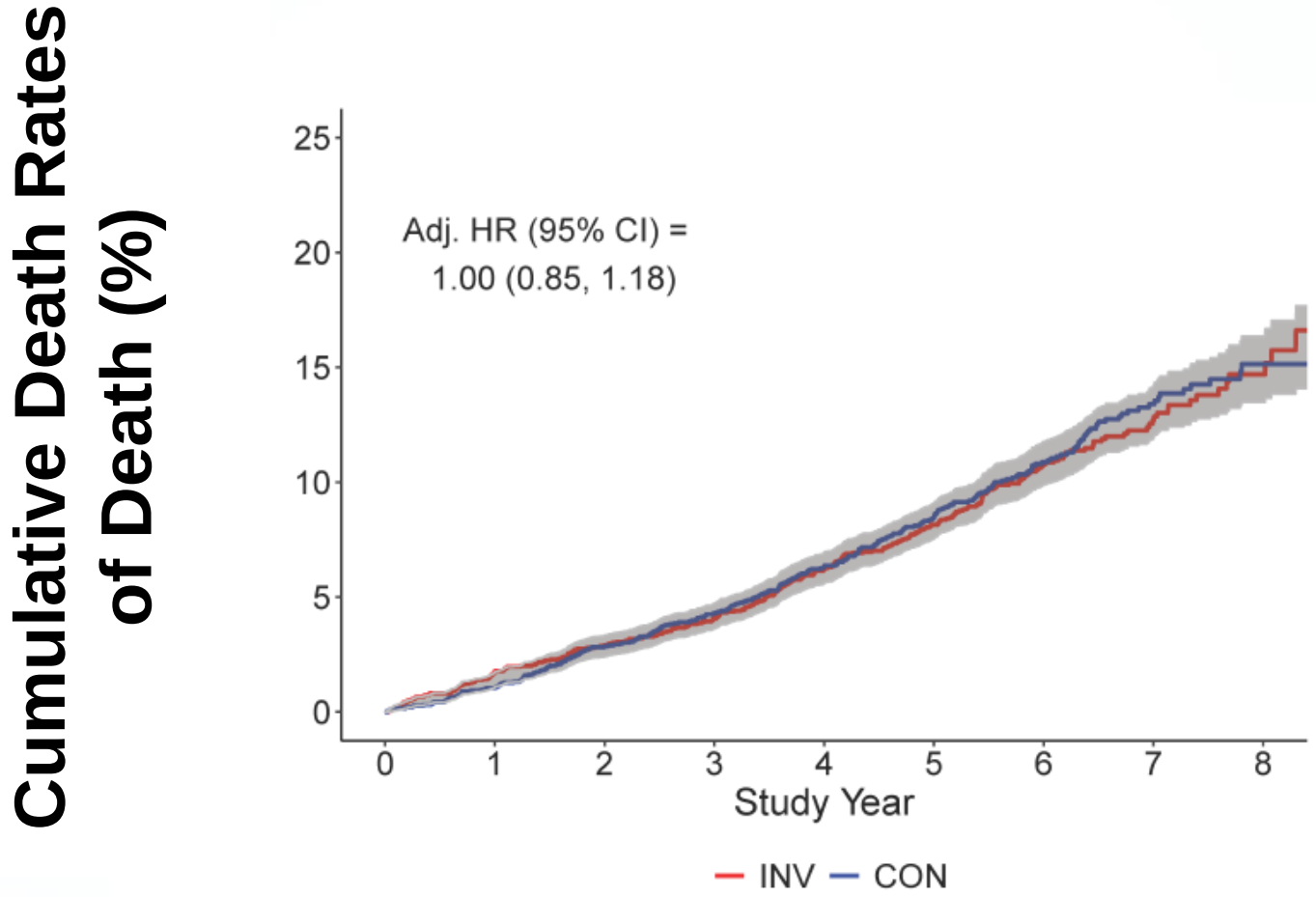
No. at Risk						
Conservative strategy	2591	2548	2065	1445	844	349
Invasive strategy	2588	2518	2061	1431	827	317

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



Identical

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

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)

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

What Is The Main Issue In Bifurcation PCI ?

Small Ischemic Burden

of Side Branches

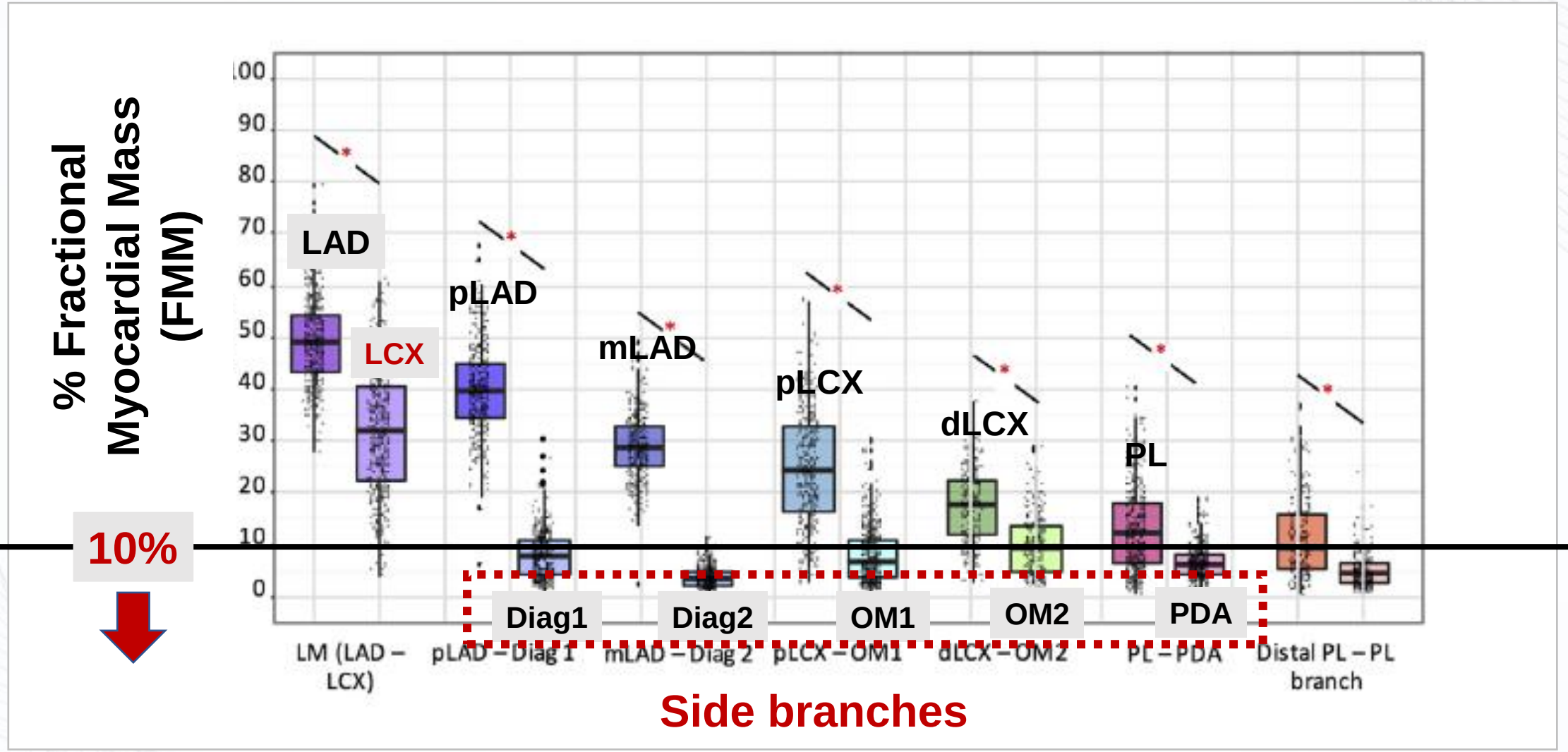
Real Size ?

of Side Branches

% Fractional Myocardial Mass (FMM)

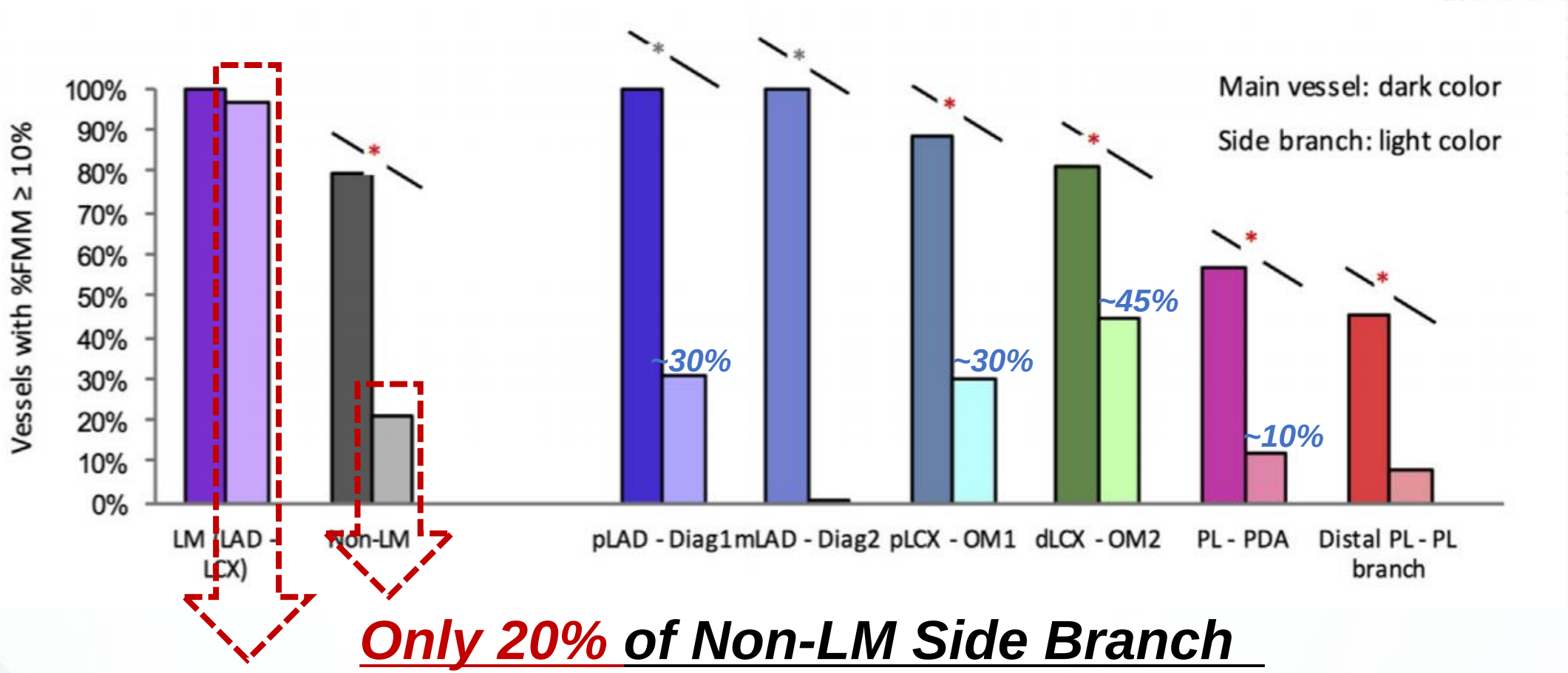
Main vs. Side branches

Myocardial territory



Kim HY, et al. JACC Intv 2017;10:571–81

Frequency of ***Supplying %FMM >10%***



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

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

Kim HY, et al. JACC Intv 2017;10:571–81

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 ? **No !**

Ischemic Symptoms with GDMT ? **I Don't Believe it !**

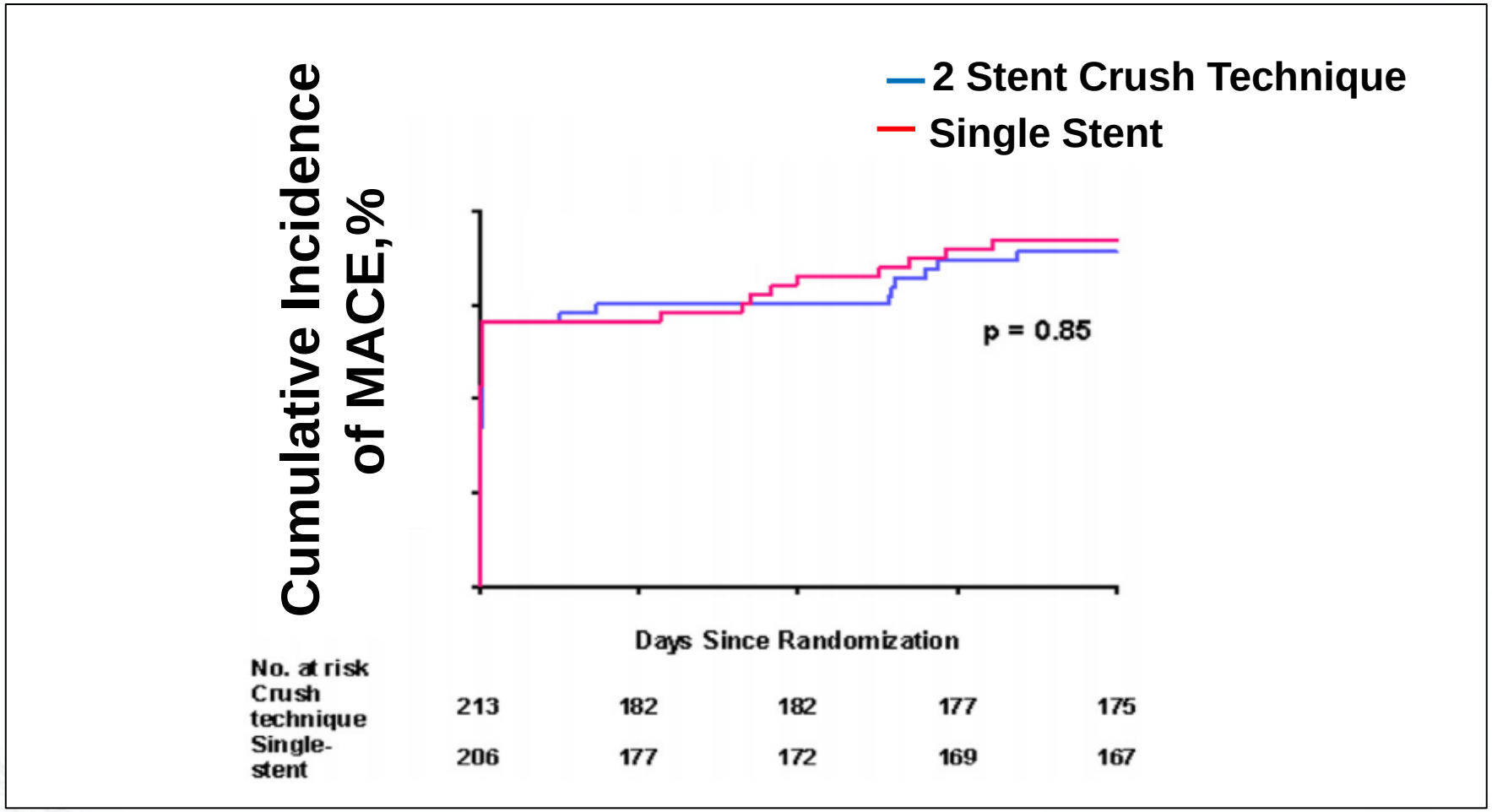
Small Side Branch PCI

Don’t Touch !

Upfront 2 Stents
For Large Side Branch

Is Good Enough !

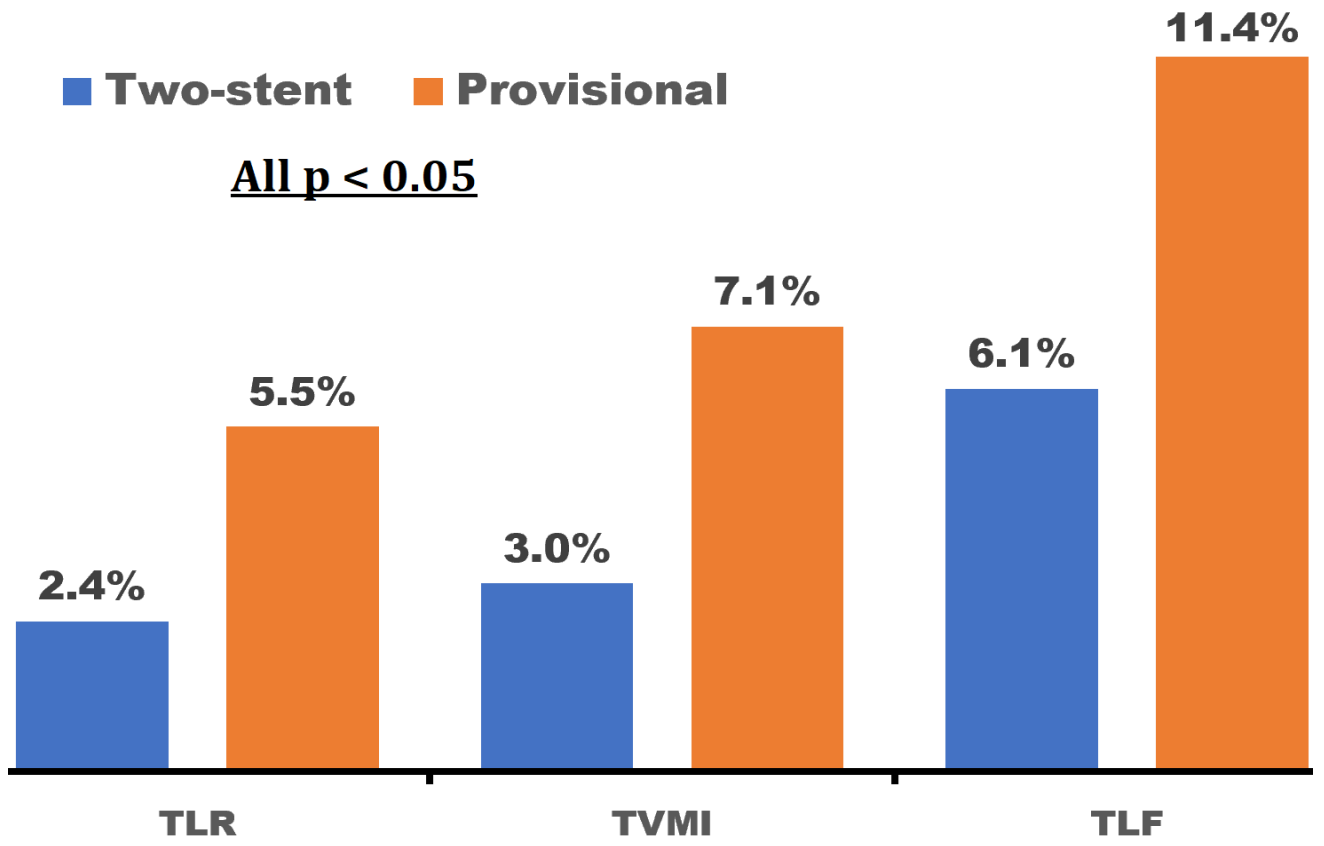
1 or 2 Stent Technique Are Both Good !



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

2 Stent Is Better than Provisional 1 Stent

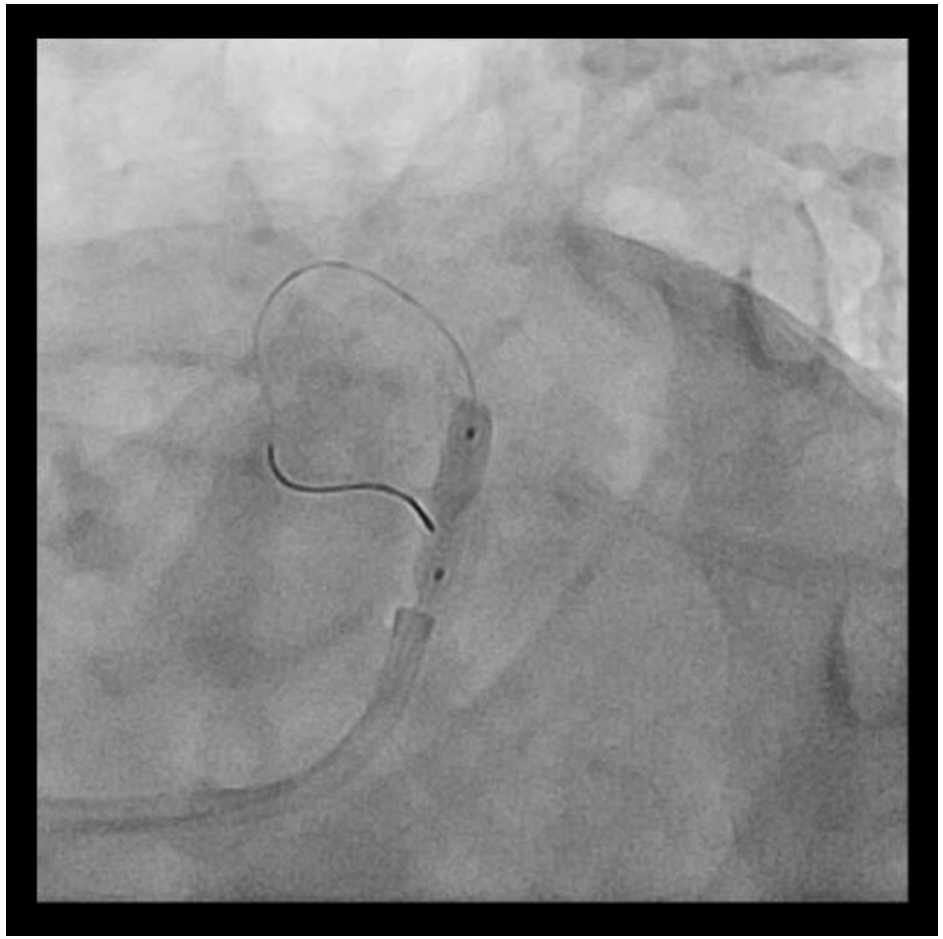
For All Complex Bifurcations (RVD>2.5mm)



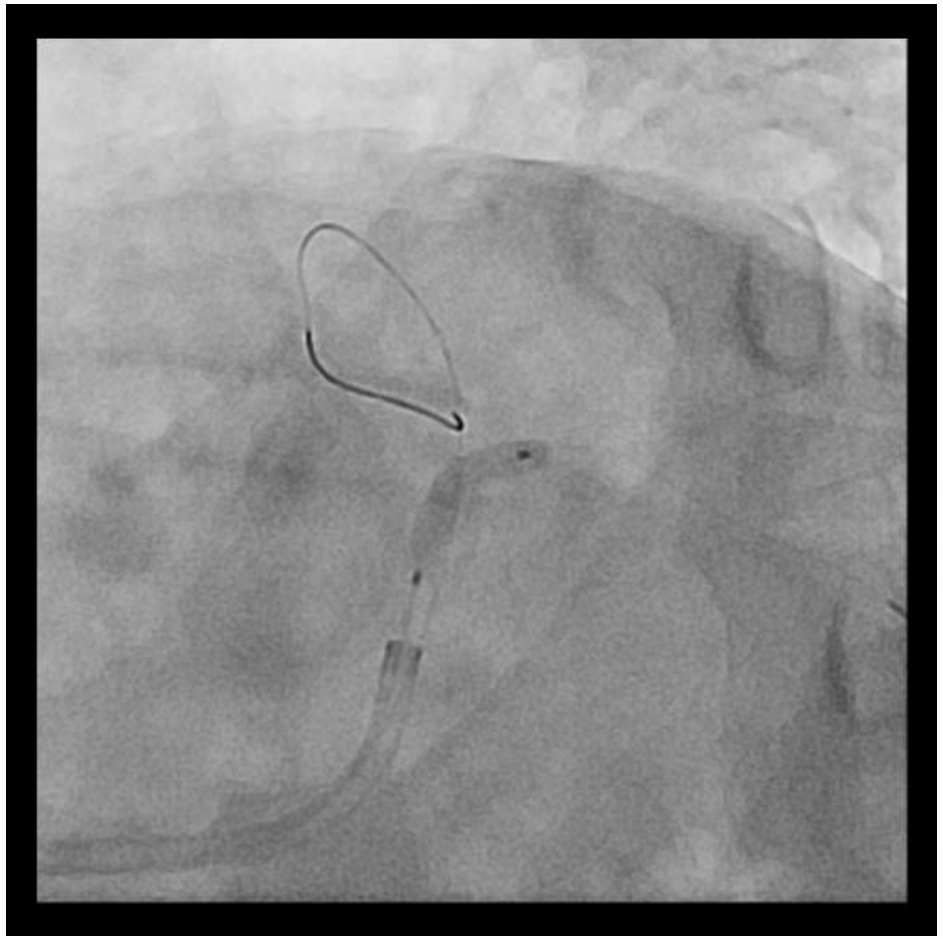
Zhang, et al. Eur H J 2020, Definition II Randomized Study

Large LCX in LM Bifurcation

Pre-Lesion Modification

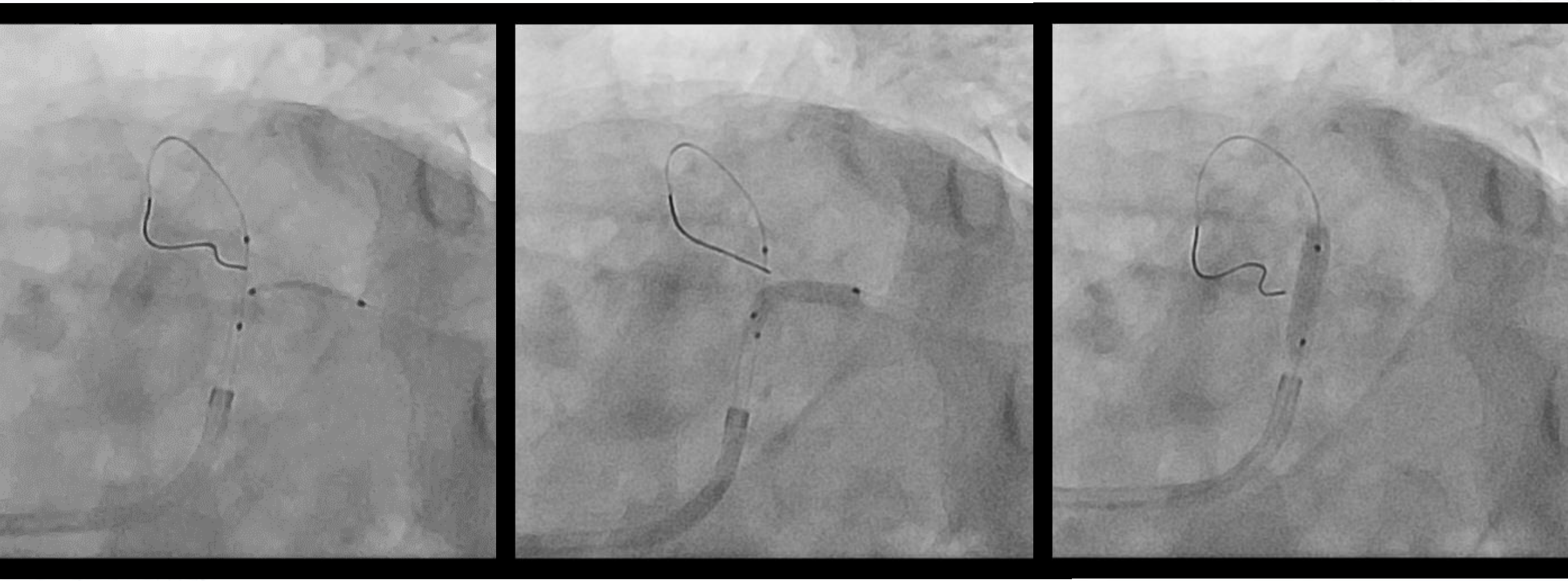


LAD : NC 3.5 (15) upto 24 atm



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

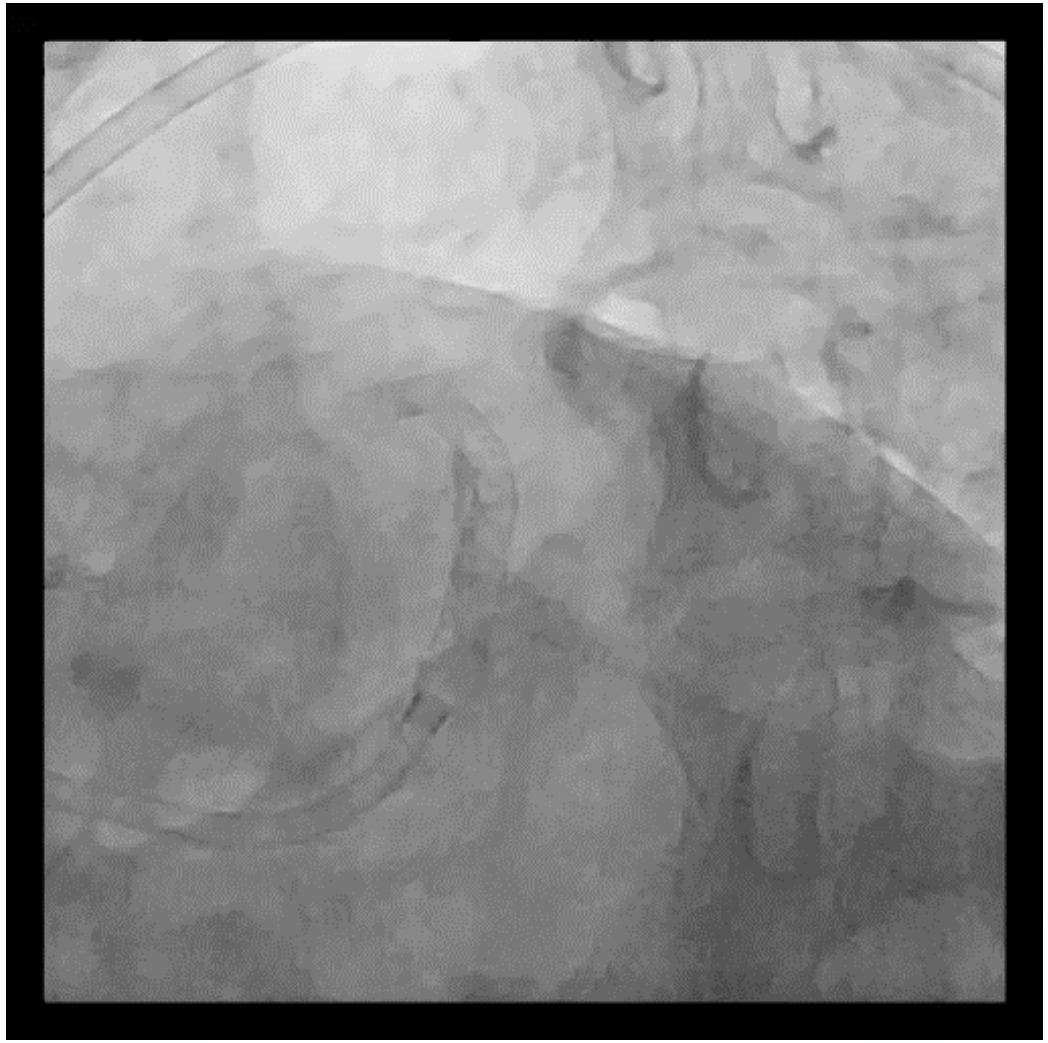
LM-pLAD : Xience 3.5 * 28 at 12 atm (3.5)

Sequential High Pressure and Final Kissing

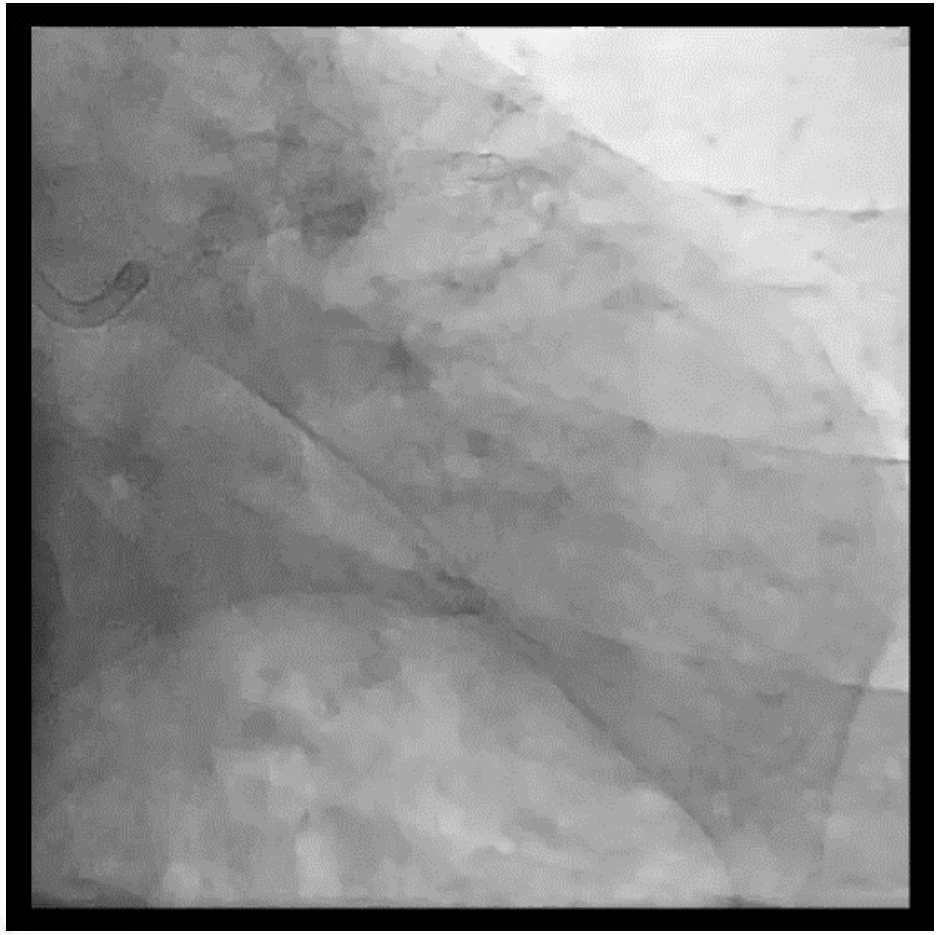
NC 3.0 (15) upto 22 atm

NC 3.5 (15) upto 24 atm

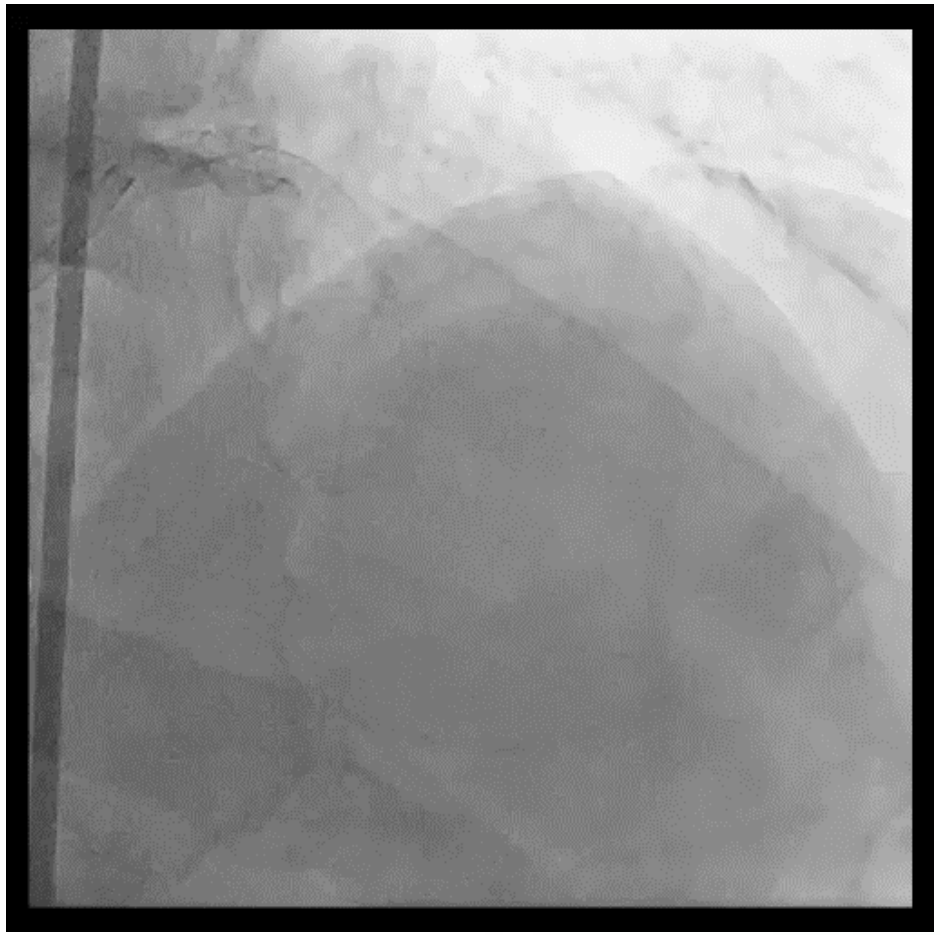
Final angiography



Final angiography

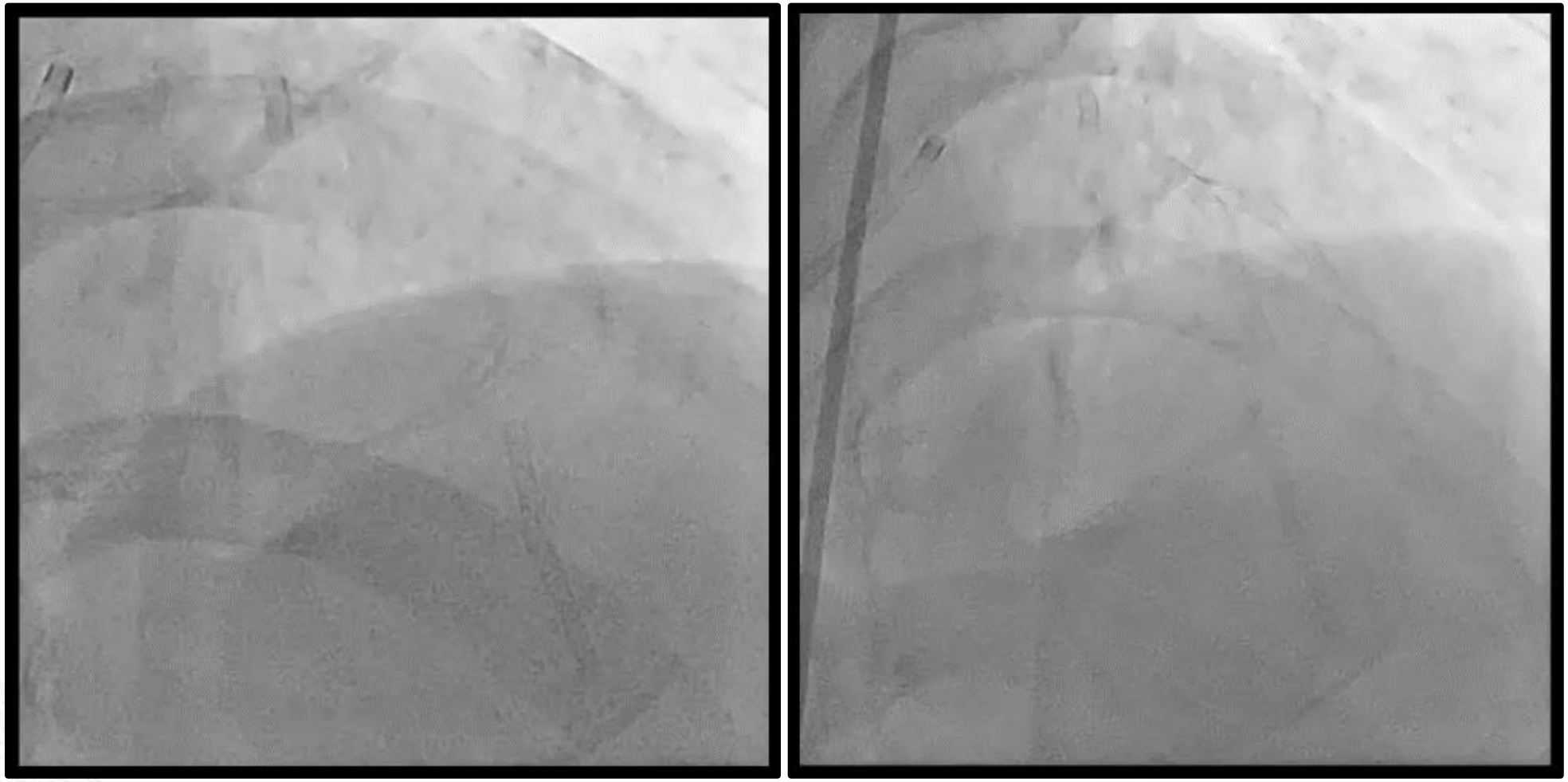


AP CAUDAL



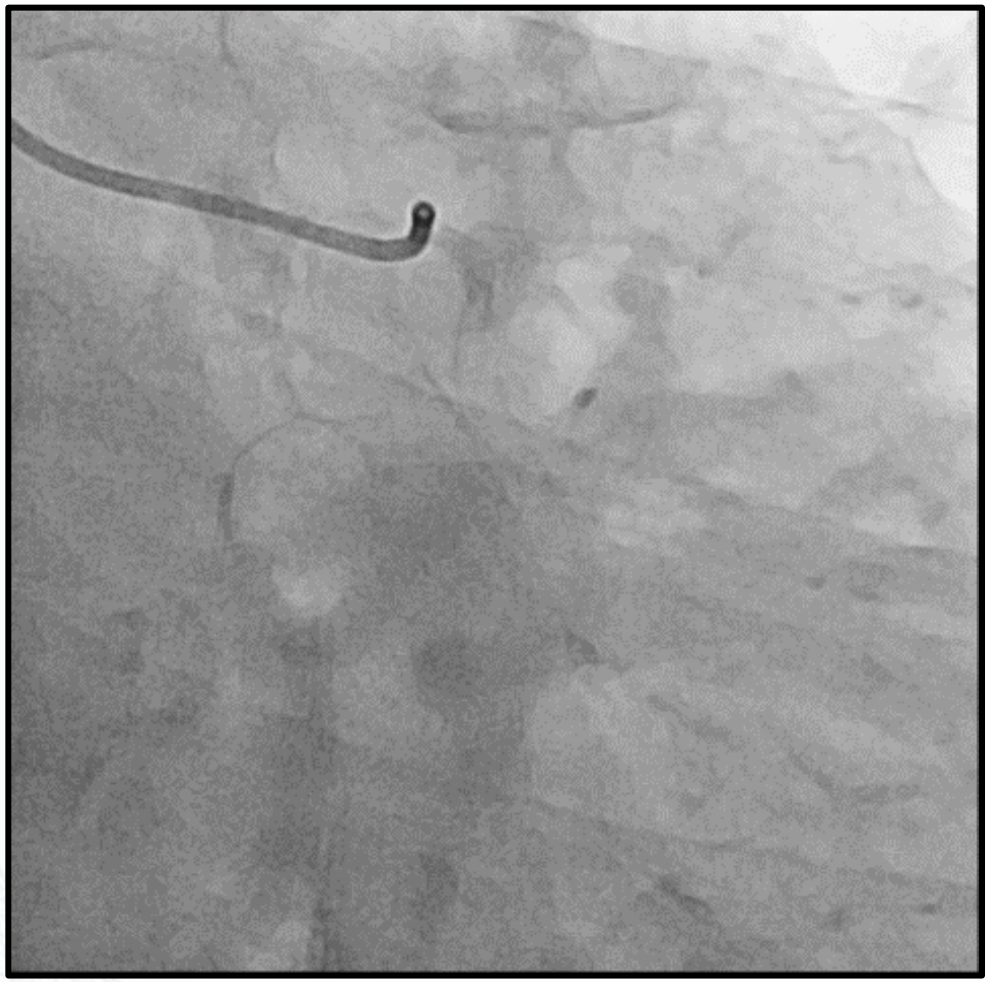
AP CRANIAL

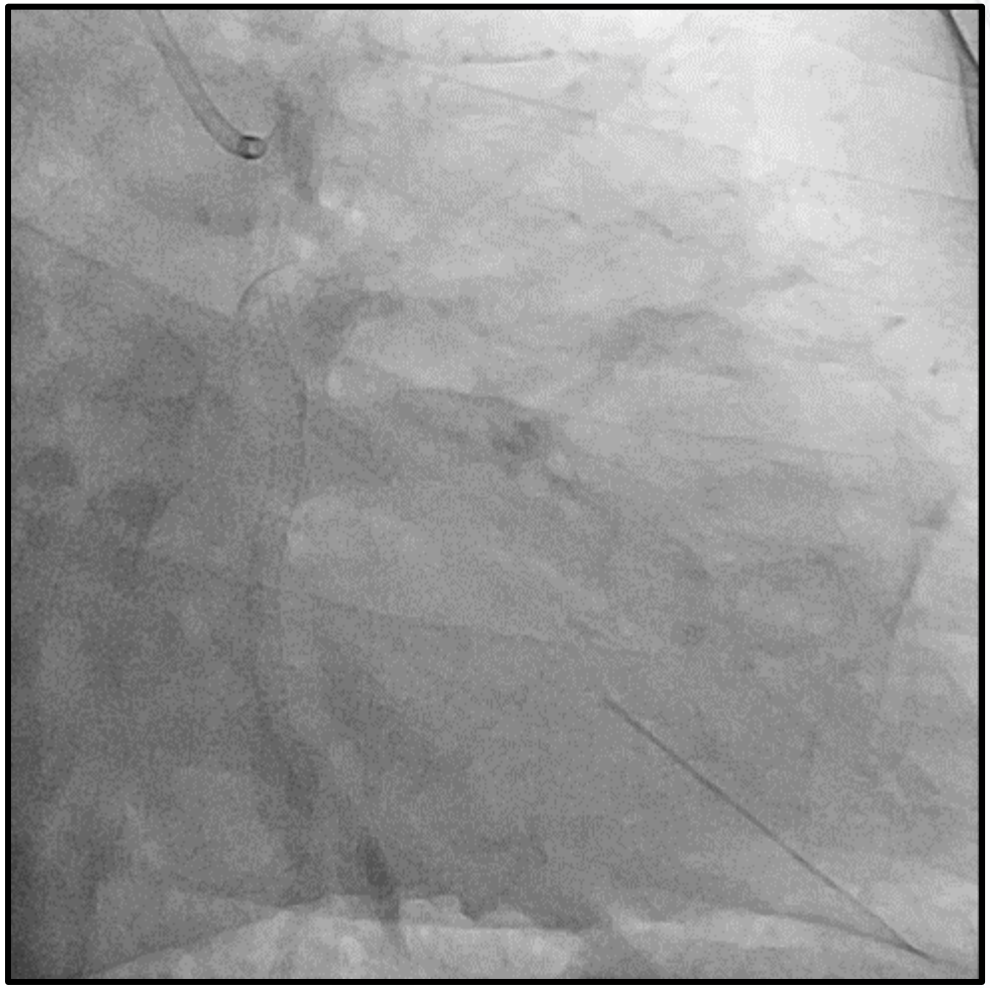
Upfront 2-stenting for LAD & Diagonal



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



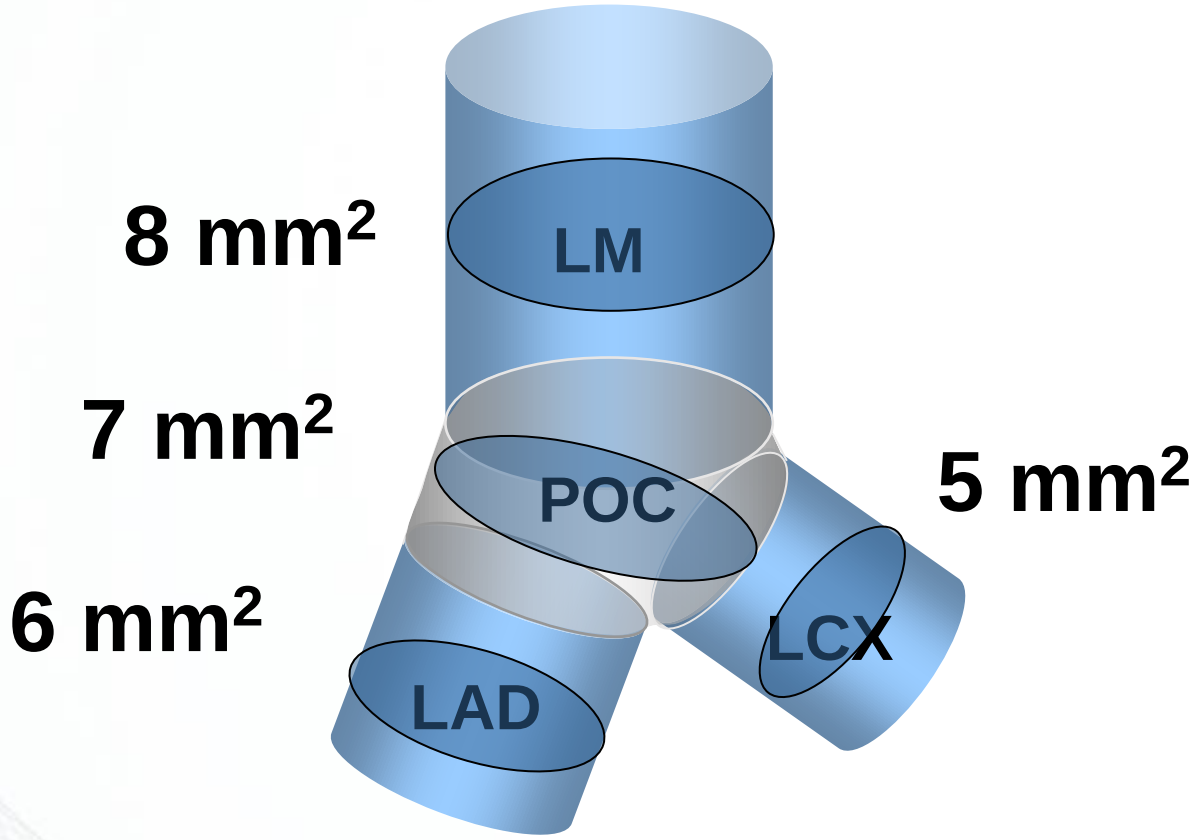


Upfront 2 Stents

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%

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

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

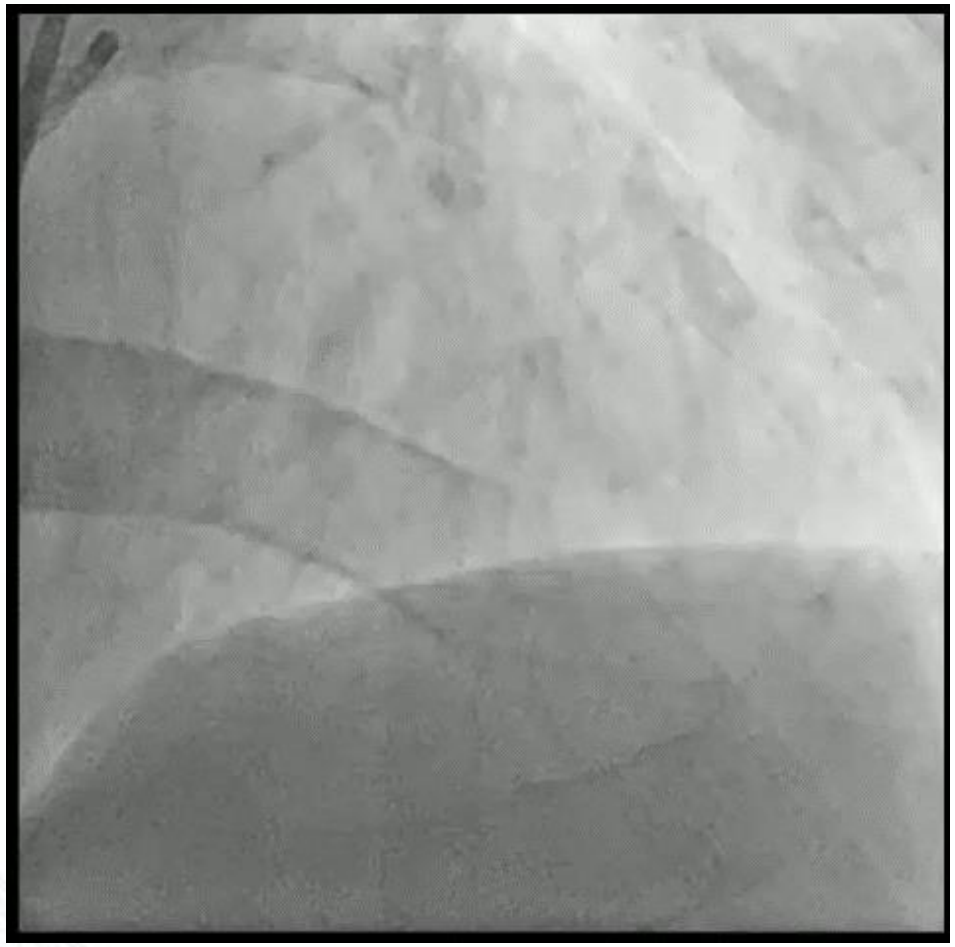
1. ***Stent Area >5.0 mm^2***
2. ***Stented Length <50 mm***

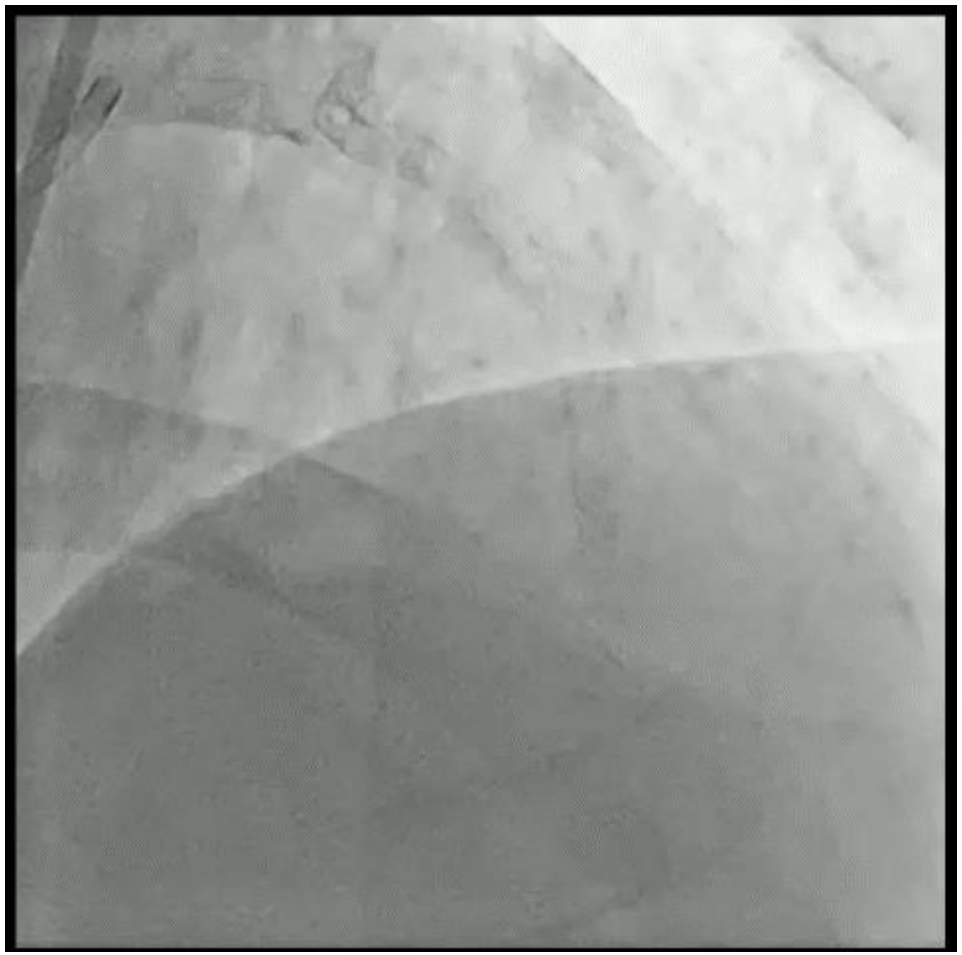
Restenosis Rate < 2%

Hong MK, Eur Heart J, 2006:27:1305

M/64, Stable Angina

LAD Crossover with TIMI 3 Flow of Diagonal Branch

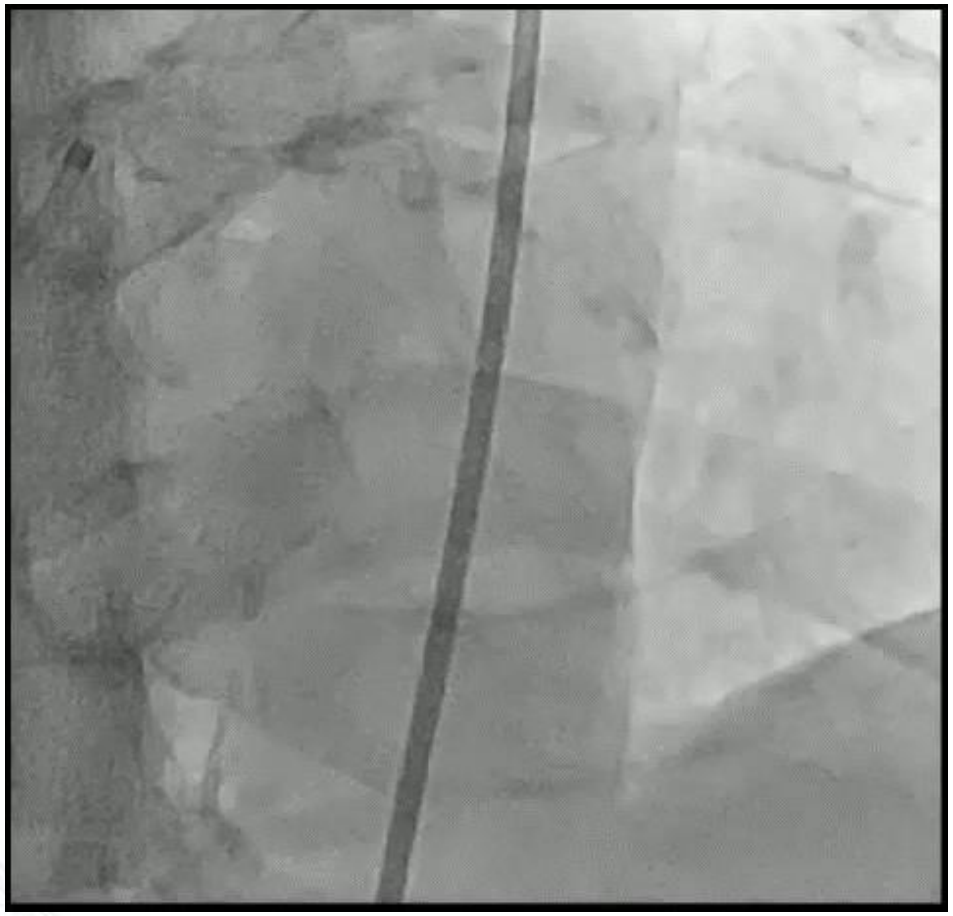


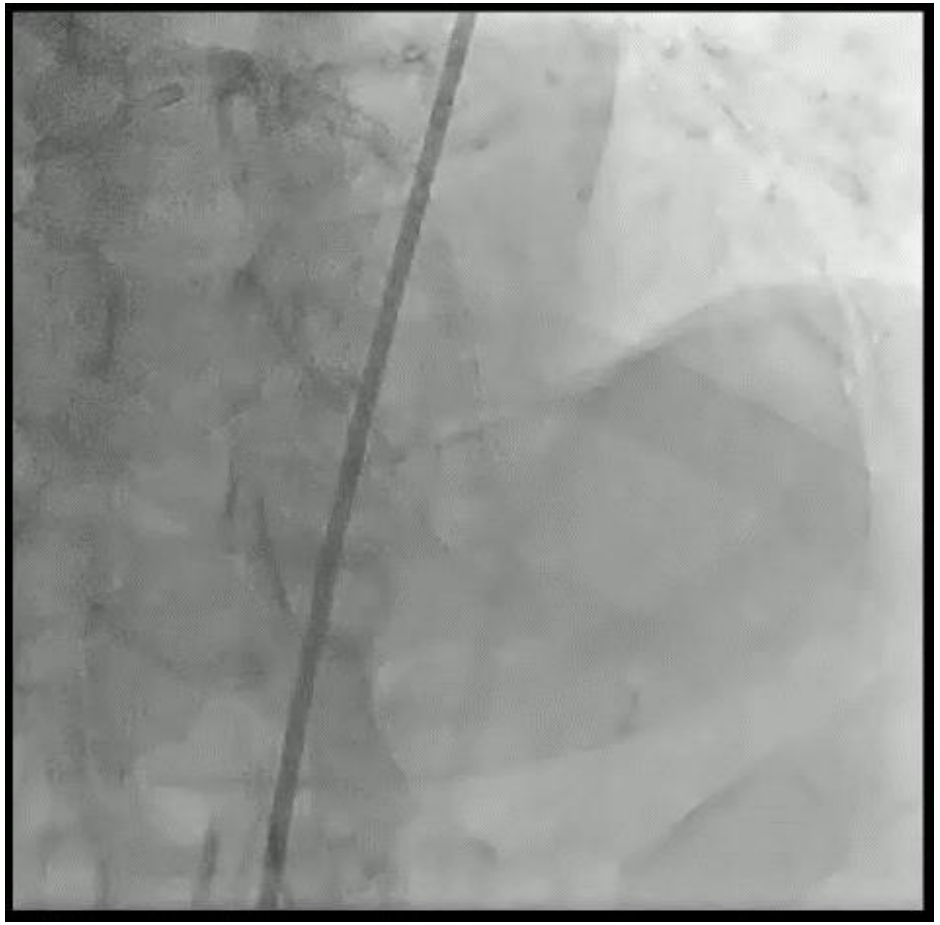


LAD: Xience 3.0 * 48mm at 14 atm (3.0~3.7)

M/78, Stable Angina

LAD Crossover with Jailing Diagonal Branch

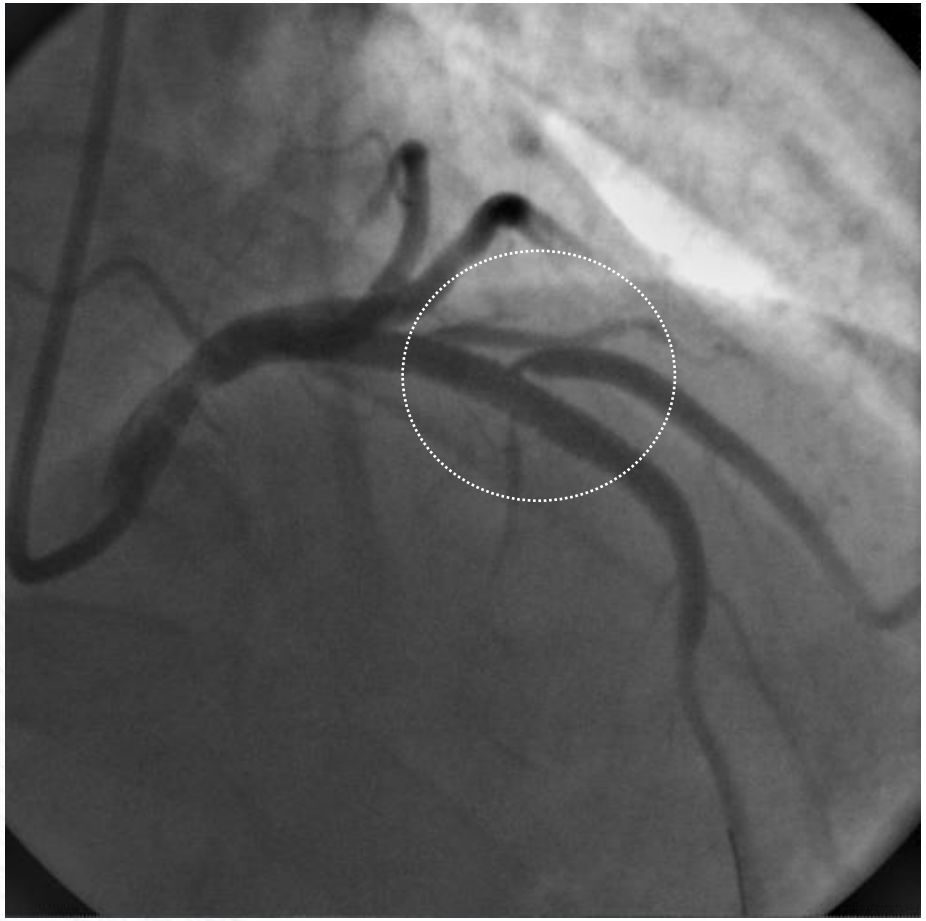


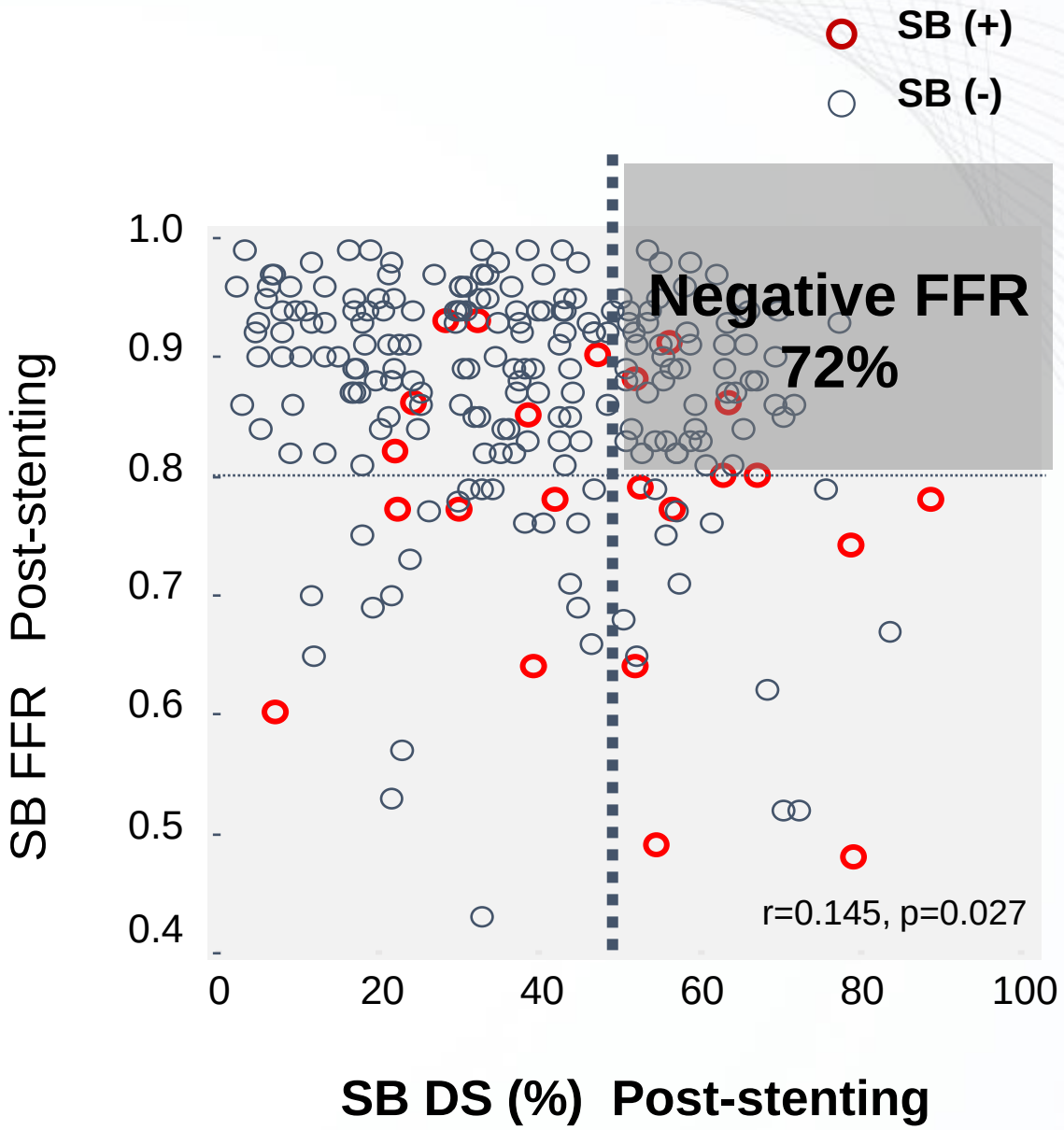


LAD: Xience 2.75 * 8mm at 14 atm
3.0 * 32mm at 18atm (2.9~3.5)

Asymptomatic

Jailing Side Branch

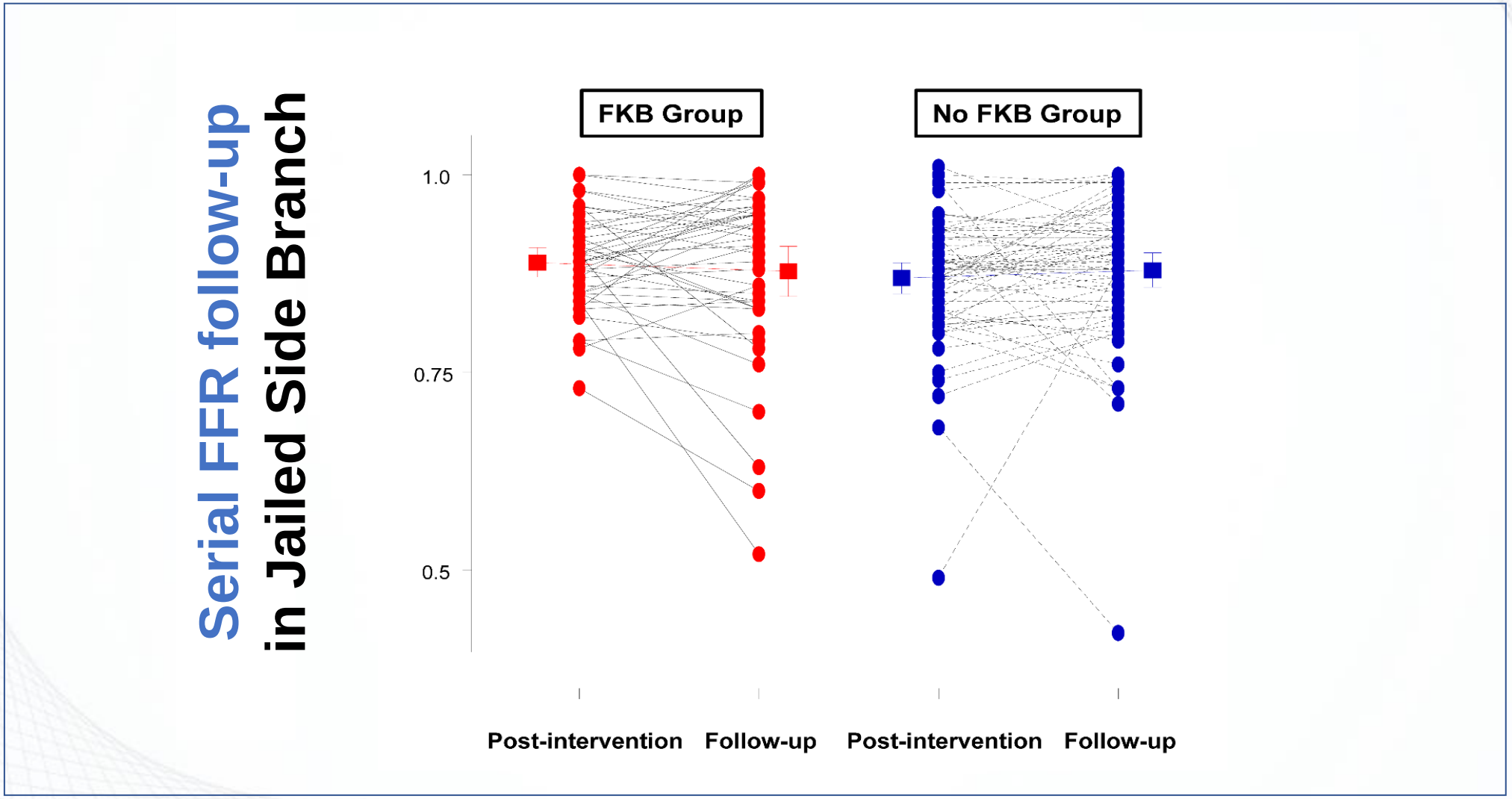




Ahn JM et al, JACC Cardiovasc Interv. 2011 Feb;5(2):155-61

Kissing Balloon Inflation

Can Not Make An Any Difference!



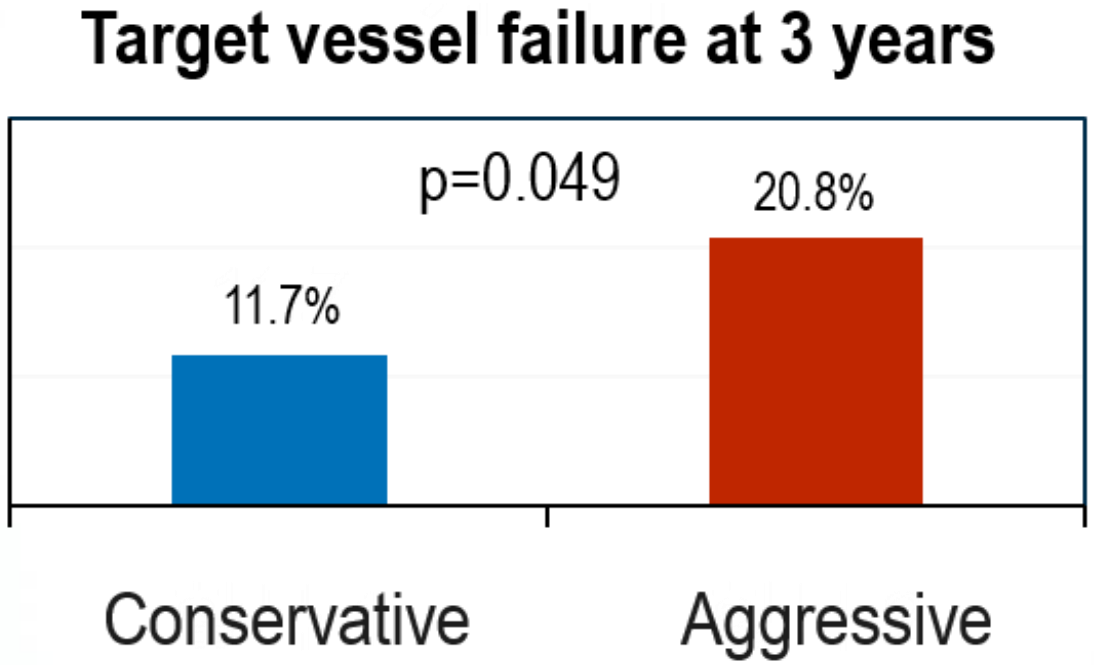
Lee JM, Koo BK, et al. Eurointervention 2015, SNUH registry and Nordic-Baltic bifurcation study

Higher Main Branch Restenosis Rate
In Routine Kissing Balloon

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

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 Brach



Gwon HC, et al. JACC interv 2016

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!

Non-LM Bifurcation PCI

No Symptoms,

No Survival Benefit,

Why Would You Do Further Treatment ?

Please Don’t Touch !