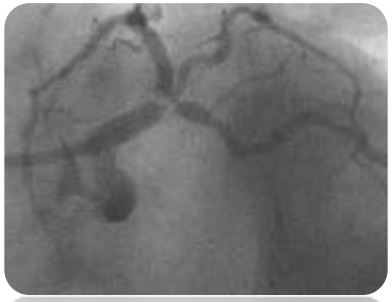
19th CARDIOVASCULAR SUMMIT
TCTAP 2014
APRIL 22-25

CIT at TCT AP 2014 : Optimization of Left Main PCI in "Real world" practice

Provisional stenting for Left Main Bifurcation : When, How and Long-Term Clinical Outcomes



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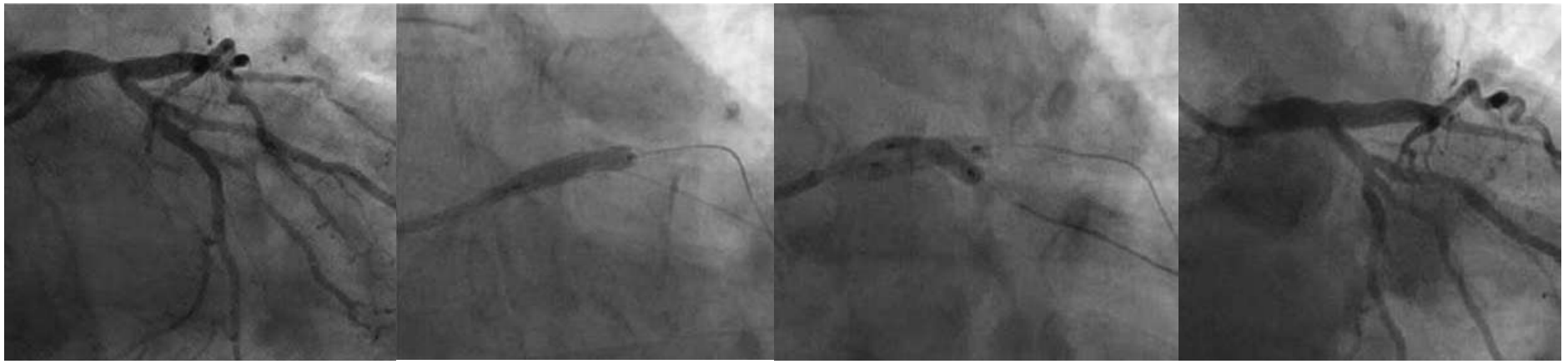
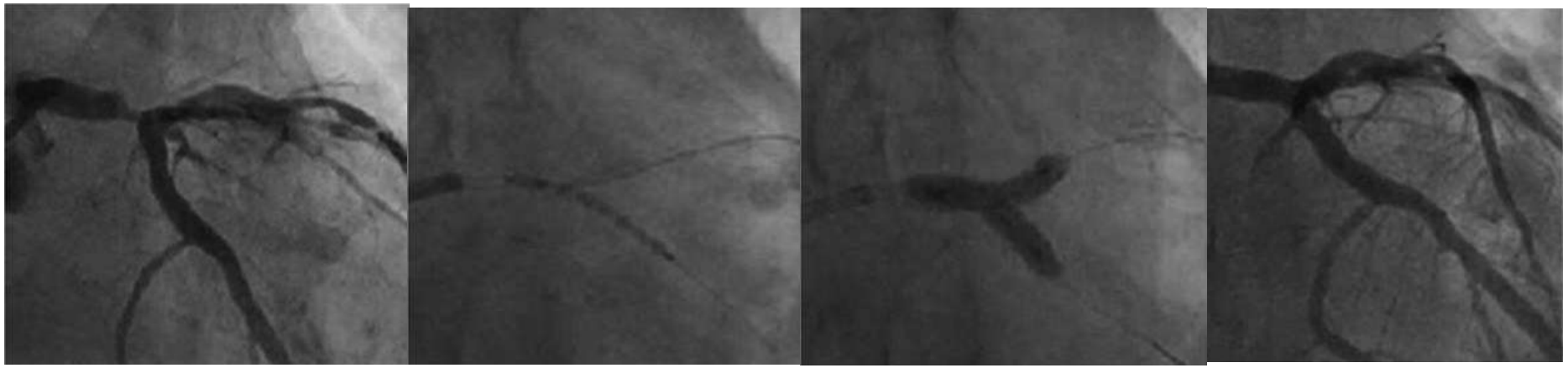
Distal LM PCI :

Single stent : « Provisional T Stenting «



Double–stent approaches (T stenting, Crush,Coulotte, V stenting …)



- No gold–standard technique has been identified ..
- It is generally accepted (as for bifurcation lesions) that single stenting , when possible , should be prefered ..

Why single stenting ?

- Simplest
- Best short and long-term results:
  - Safety
  - Less TVR
  - “Easy” TVR
- Cheapest

Provisional T-Stenting Technique:

Critical steps

1. Which one is the "main" vessel – LAD or CX?

– Where is the greatest amount of viable myocardium?
– Where is the most severe and longer lesion?

2. Is the result after kissing satisfactory?

– Accept 30% residual stenosis in general
– Accept higher degrees of residual stenosis if:
  - Normal distal flow (TIMI 3)
  - Focal lesions
  - Small distal amount of myocardium
  - Don't rely on a single angio view (such as "spider") .Liberal use of IVUS or FFR in case of doubt

Lesion Specific Approach

Single stent

- ✓ Normal ostial LCX with MEDINA 1.1.0. or 1.0.0.
- ✓ Small LCX with < 2.5 mm in diameter
- ✓ Diminutive LCX
- ✓ Normal or focal disease in distal LCX

Two stent

- ✓ Diseased LCX with MEDINA 1.1.1., 1.0.1., or 0.1.1
- ✓ Large LCX with > 2.5 mm in diameter
- ✓ Diseased left dominant coronary system
- ✓ Concomitant diffuse disease in distal LCX

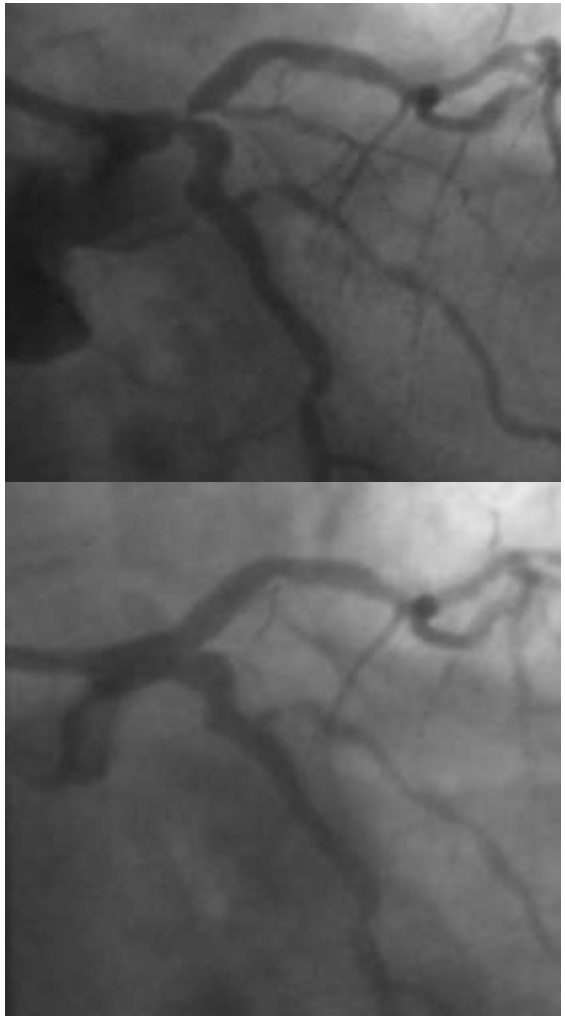
Park SJ, Kim YH. Colombo A, Issam D. Moussa et al. Textbook of Bifurcation Stenting

Favorable or Unfavorable Anatomical Features for Single-Stent Crossover Stenting in Treatment of Unprotected Left Main Coronary Artery Stenosis

Favorable	Insignificant stenosis at the ostial LCX with Medina classification 1,1,0 or 1,0,0
	Diminutive LCX with <2.5 mm in diameter; right dominant coronary system
	Wide angle with LAD
	No concomitant disease in LCX
	Focal disease in LCX
Unfavorable	Insignificant stenosis at the ostial LCX with Medina classification 1,1,1; 1,0,1; or 0,1,1
	Large size of LCX with ≥2.5 mm in diameter; left dominant coronary system
	Narrow angle with LAD
	Concomitant disease in LCX
	Diffuse disease in LCX

JS Park , J Am Heart Assoc., 2012

Single Stenting in Distal LM



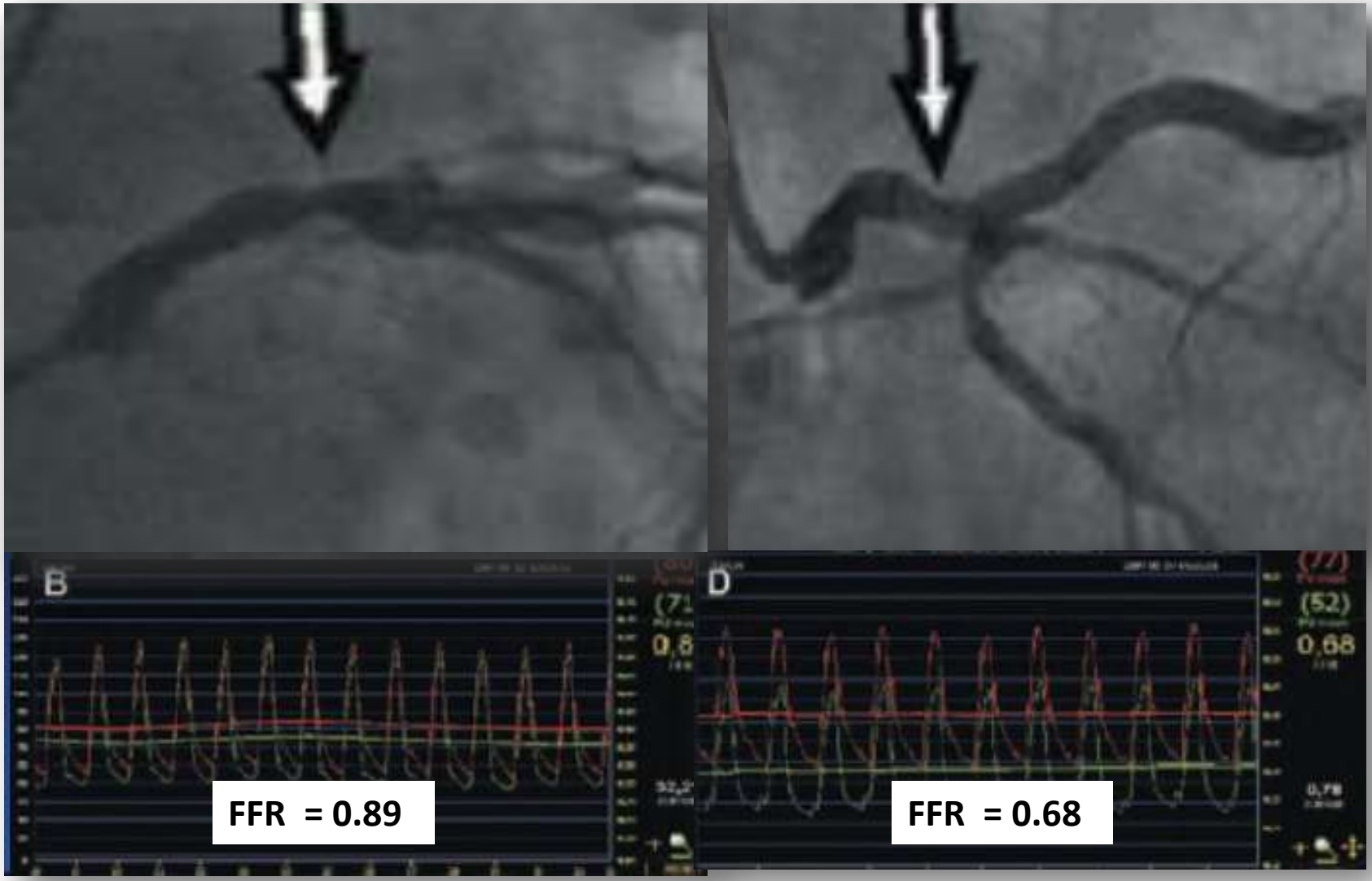
IVUS Guided :

- **LCX Disease Status**
- **Stent Size Selection**
- **Cross Over to LAD or LCX**
- **Stent optimization**

FFR Guided :

- **Decision Making for further interventions on SB**

LM Disease: Visual Estimation vs FFR



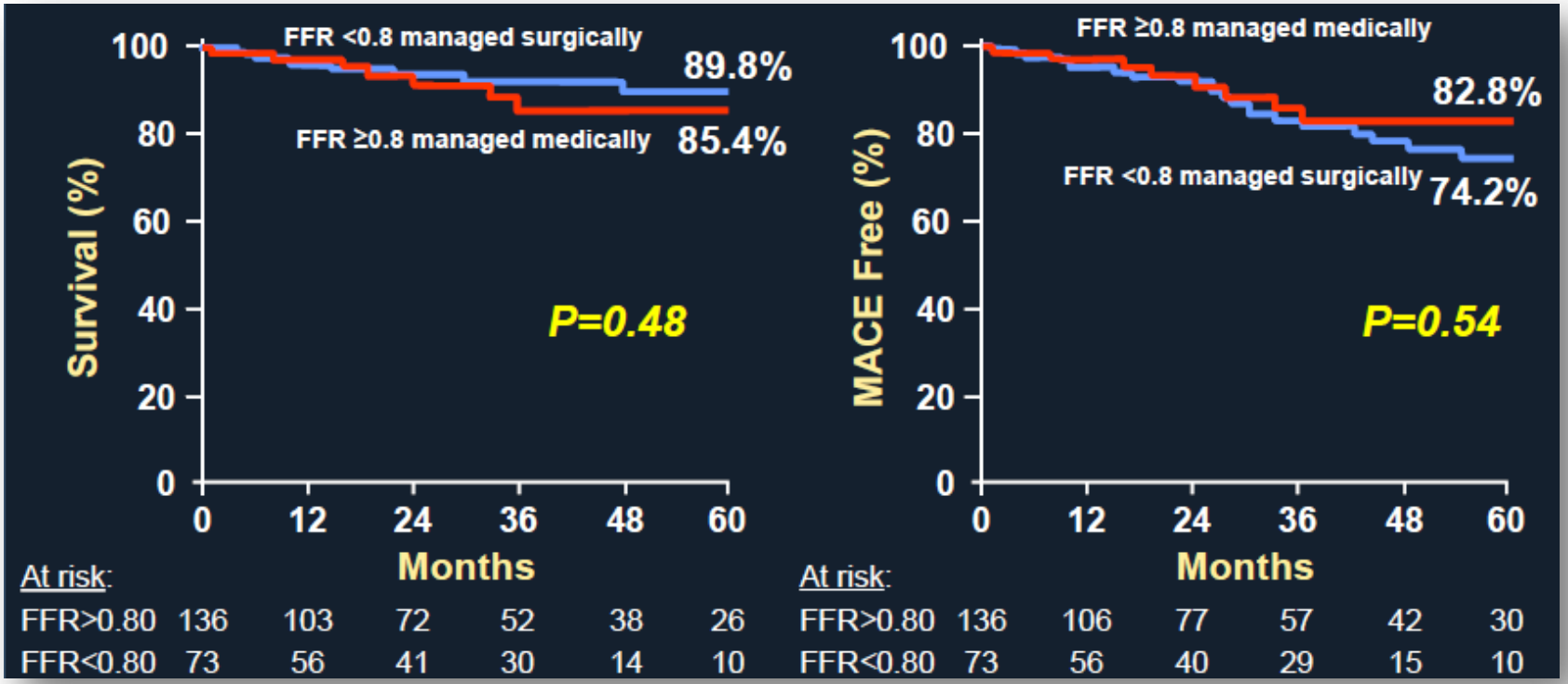
Hamilos M et al ; Circulation 2009 ;120:1505-1512

LM Disease :

FFR ≥ 0.80 Managed Medically (136 pts)

vs

FFR ≤ 0.80 Managed Surgically (73 pts)



Isolated LM Disease

5-yr Survival :

100% Med vs 75% Surg (P=0.32)

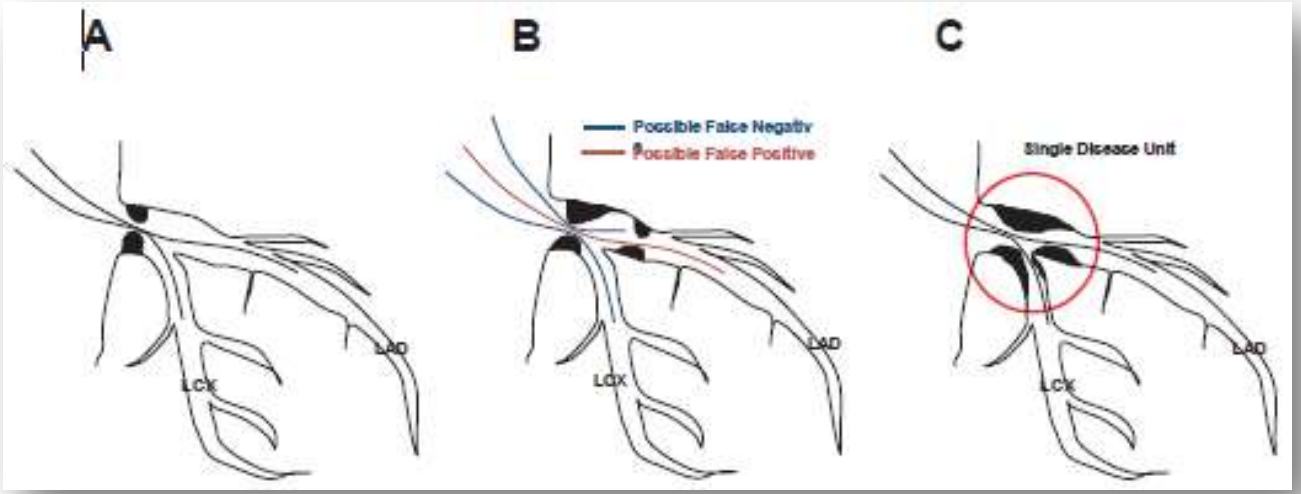
Isolated LM Disease

5-yr MACE-Free Survival :

70% Med vs 66% Surg (P=0.54)

Hamilos M et al ; Circulation 2009 ;120:1505-1512

Limitations of FFR Assessment for Angiographically Intermediate LM Disease



- **A significant lesion at prox LAD or prox LCX can mask the true significance of the left main coronary artery lesion by compromising hyperemic flow and subsequent true maximal pressure gradient across this lesion.**

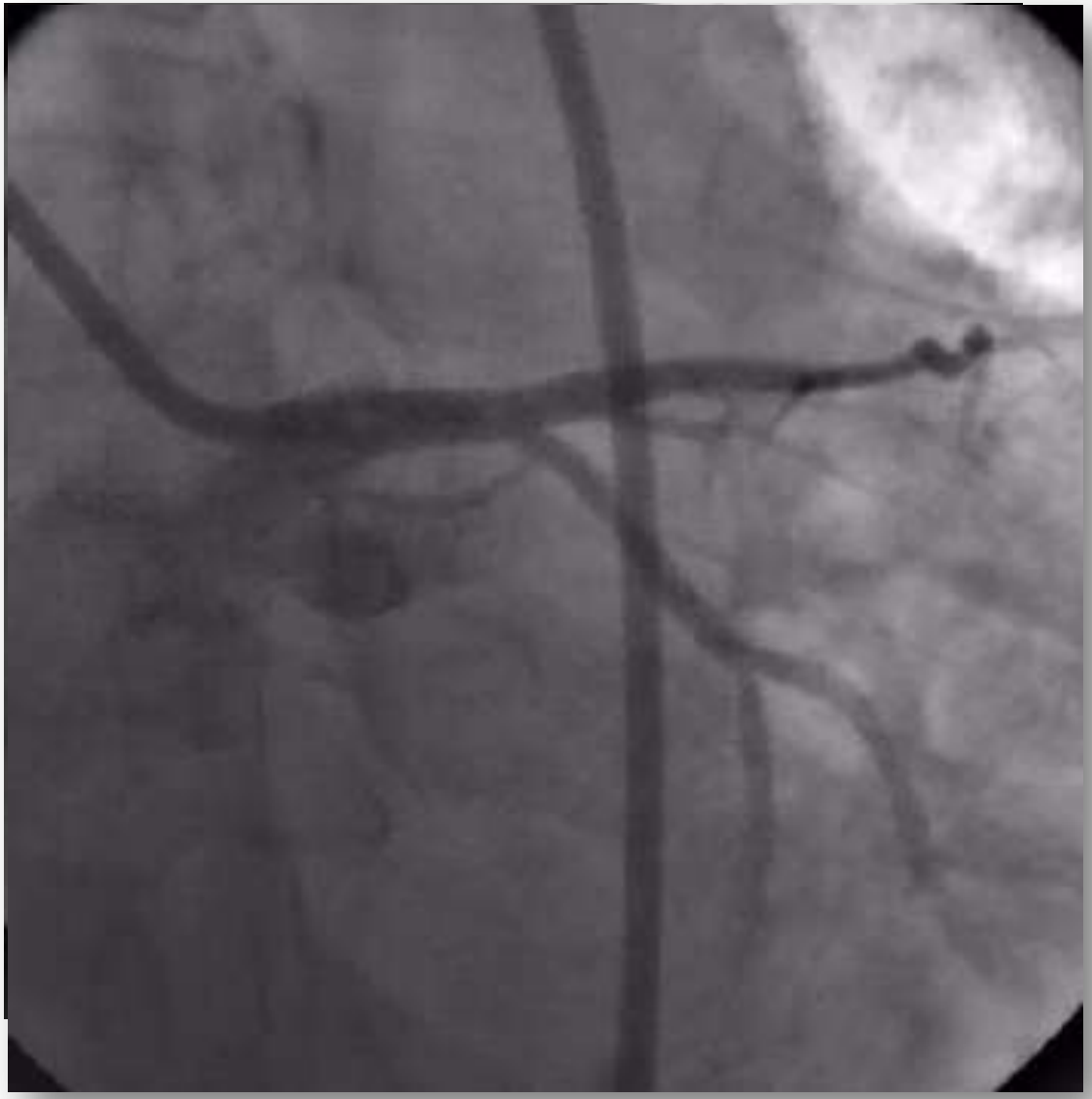
- **After treatment of the distal lesion, hyperemic blood flow through the vessel increasesn and he true fractional flow reserve (FFR) of the left main coronary artery lesion becomes apparent.**

Fearon WF, 8th Annual CTO Summit and Left Main Interventions Course, 2011**.**

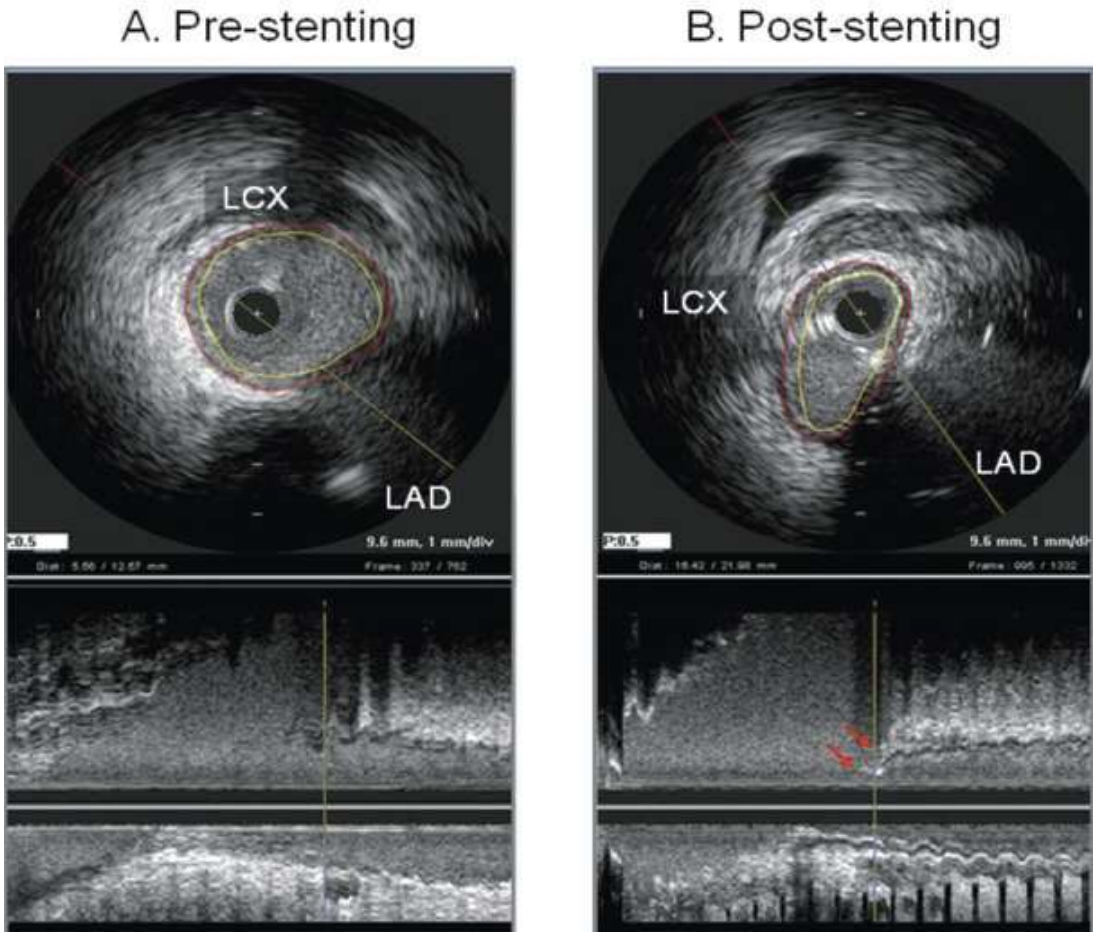
Puri *et al.,* **J A C C Cardio vasc Interv 2012 : 6 9 7 – 7 0 7**

Park S et al. J Am Heart Assoc 2012;

LM Distal Bifurcation Lesion
Minimal Disease on LCX



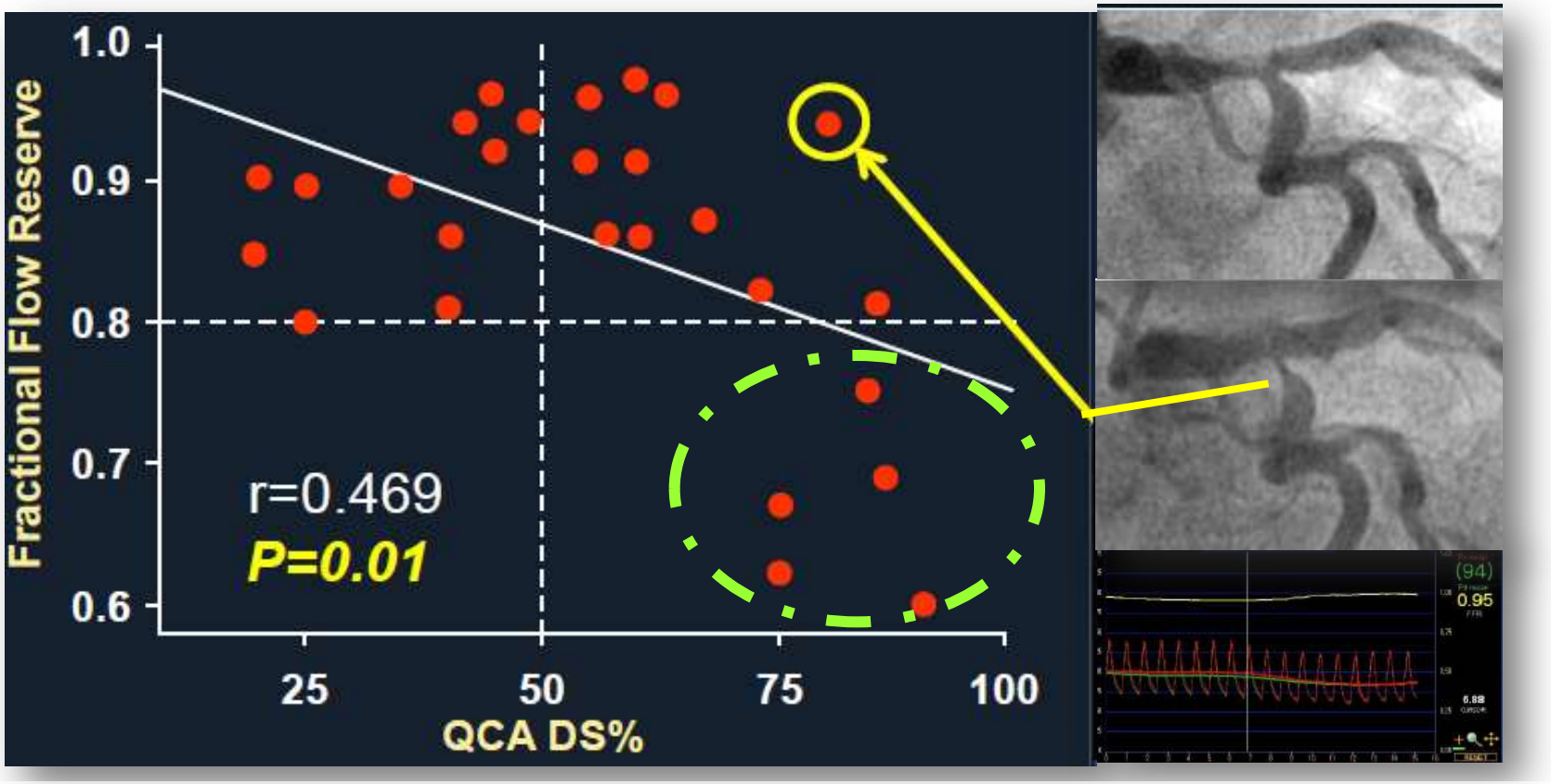
Single stenting



Geometric changes in left main coronary artery bifurcation after main-branch stenting. (carina shift)

Kang et al. Circ Cardiovasc Interv. 2011;4:355–361

FFR of Jailed LCX After Stenting from LM to LAD (Pts = 29)



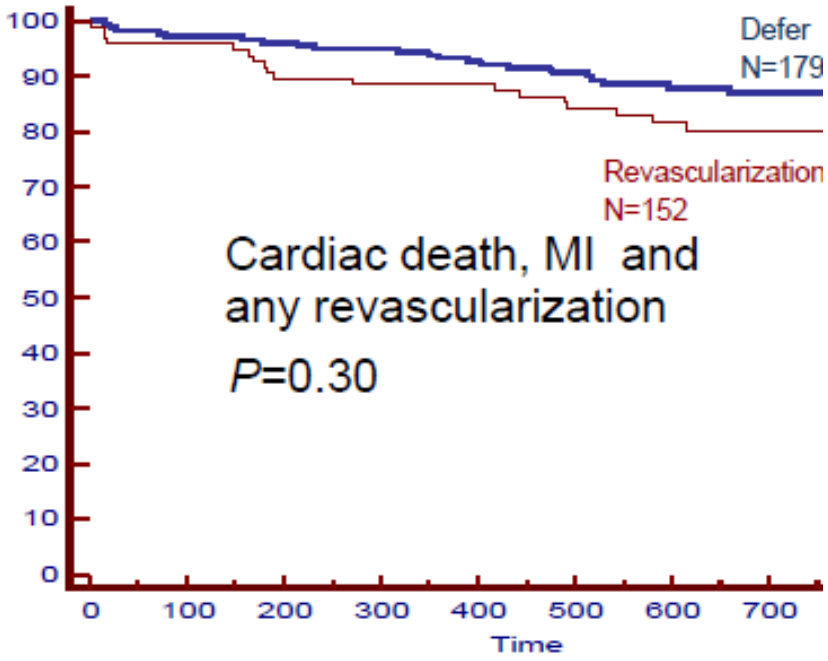
Ostial LCX % stenosis by QCA :

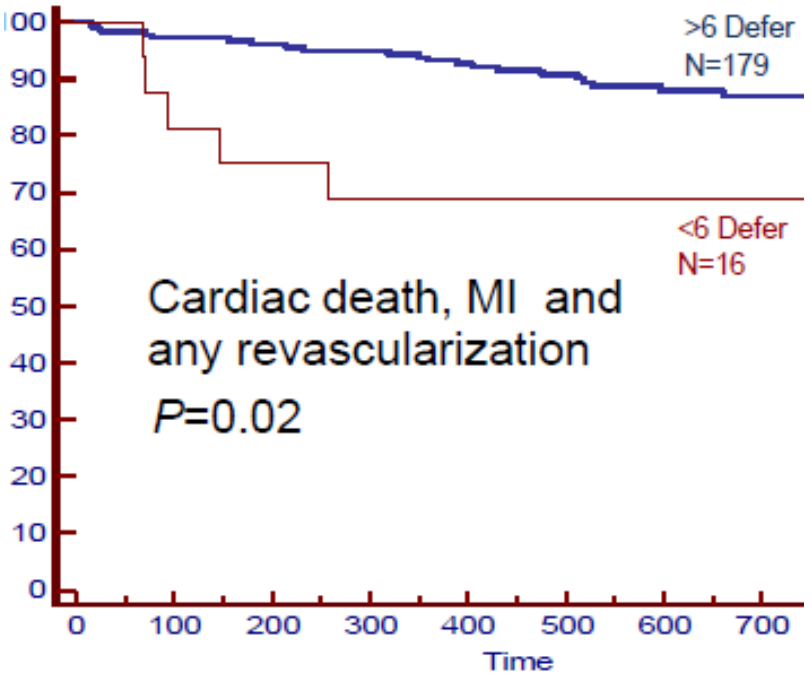
Pre LM-LAD Stenting : 30 ±15% Post: 56 ±21 % in 17 pts (60%)

FFR < 0.80 in 5 pts (17%)

Nam CW et al , Korean Circ J 2011;41: 304-307

Left Main Lesion Assessment
Angiography versus IVUS

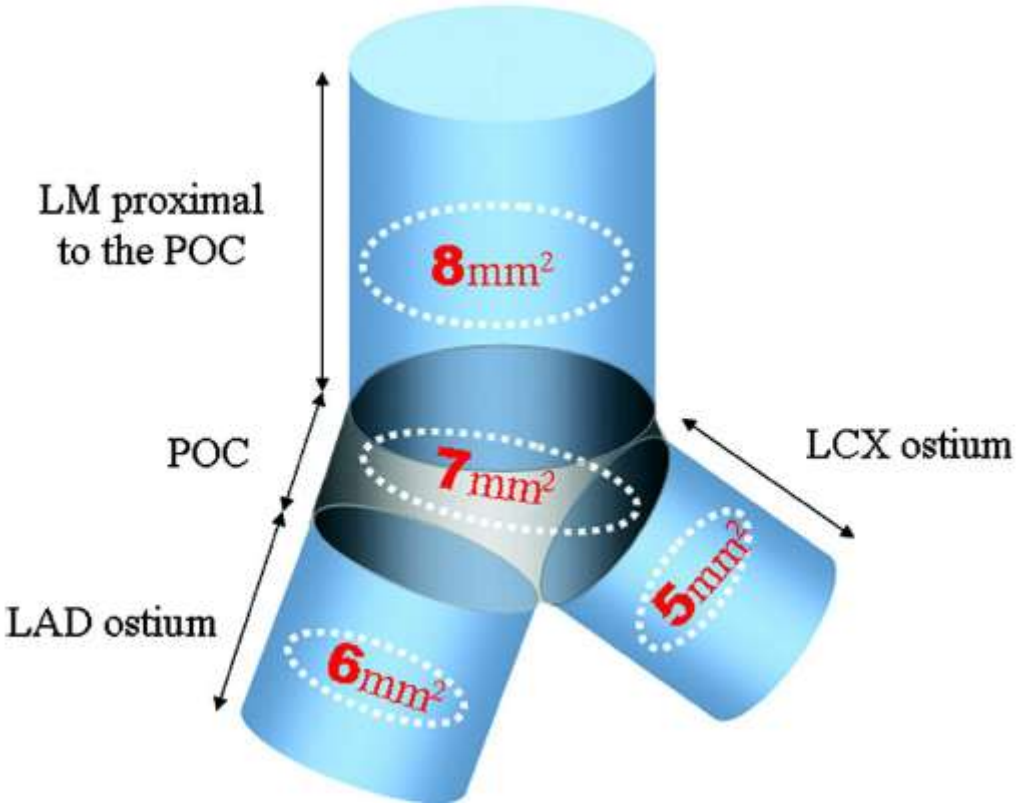


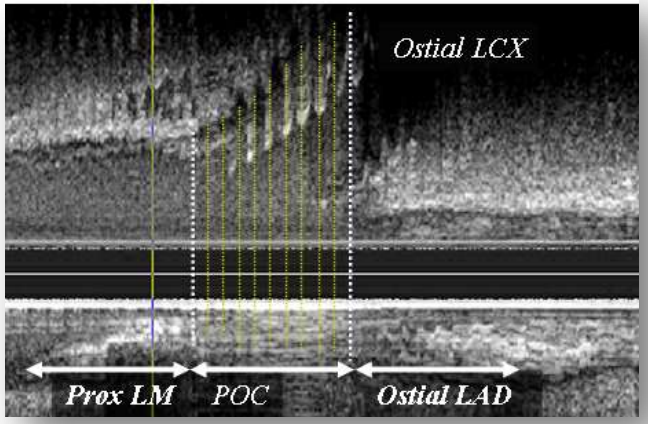


From a clinical perspective, MLA ≥ 6 mm2 is a safe value for deferring revascularization of the LMCA

LITRO Investigators. J Am Coll Cardiol 2011;58:351-8

Minimal stent area threshold values for the prediction of angiographic in-stent restenosis

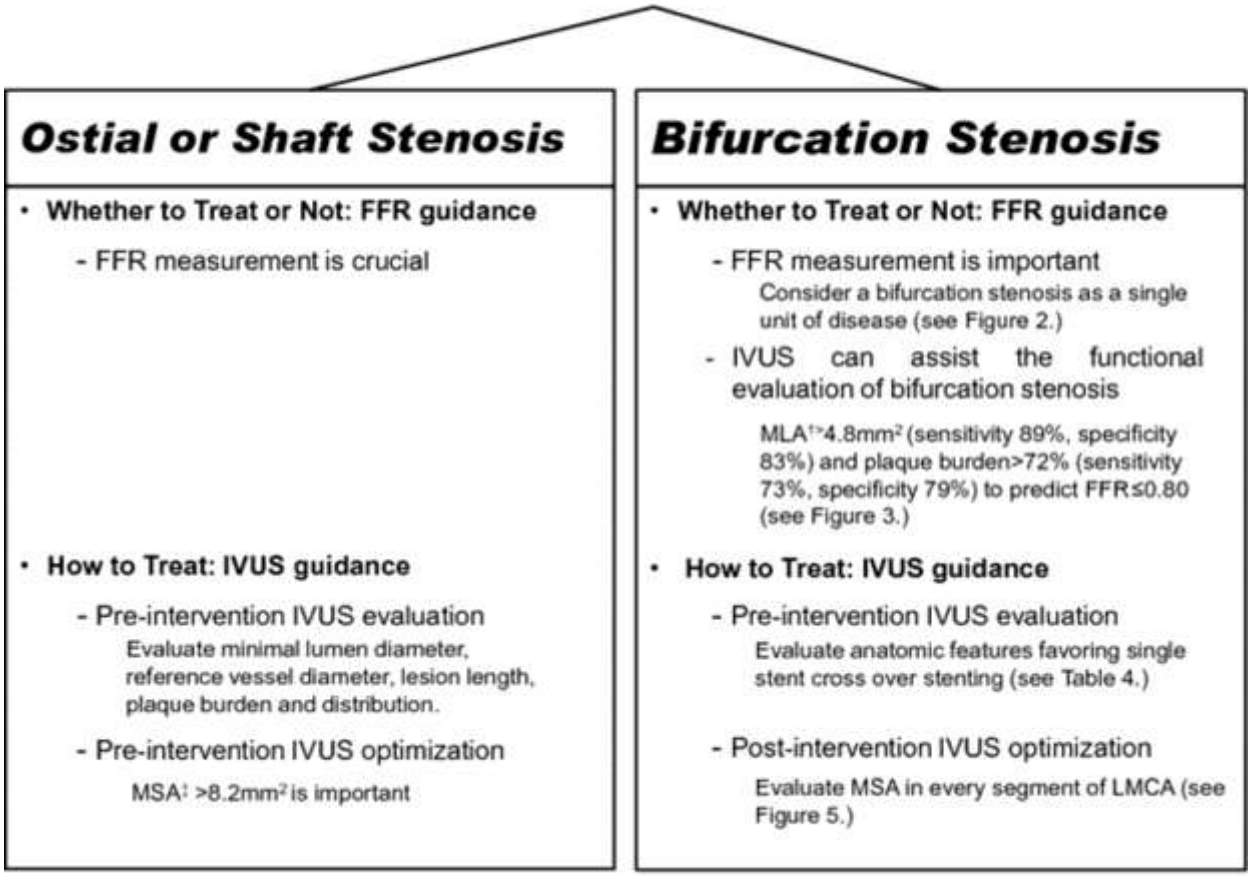




Optimal stent deployment in distal LM

Kang S et al. Circ Cardiovasc Interv 2011;4:562-569

Integrated use of FFR and IVUS in left main stenting.



Park S et al. J Am Heart Assoc 2012;

Comparison of Simple and Complex Stenting Techniques in the Treatment of Unprotected Left Main Coronary Artery Bifurcation Stenosis

Young-Hak Kim, MD, PhD, Seong-Wook Park, MD, PhD, Myeong-Ki Hong, MD, PhD, Duk-Woo Park, MD, Kyoung-Min Park, MD, Bong-Ki Lee, MD, Jong-Min Song, MD, PhD, Ki-Hoon Han, MD, PhD, Cheol Whan Lee, MD, PhD, Duk-Hyun Kang, MD, PhD, Jae-Kwan Song, MD, PhD, Jae-Joong Kim, MD, PhD, and Seung-Jung Park, MD, PhD*

Quantitative angiographic analysis results

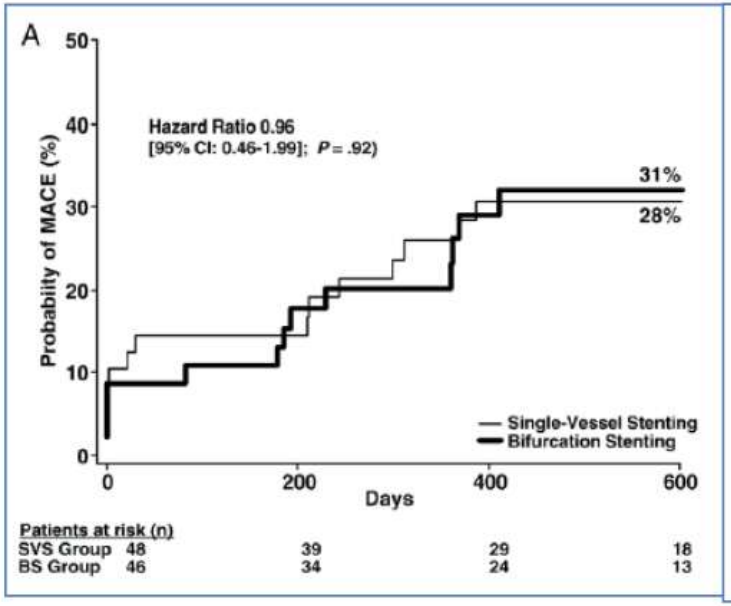
Variable	Simple Group (n = 69)	Complex Group (n = 49)	p Value
Patients with follow-up angiogram	57 (85.1%)	41 (83.7%)	0.837
Acute gain (mm)	−0.04 ± 0.66	1.26 ± 0.60	<0.001
Late loss (mm)	0.20 ± 0.59	0.69 ± 0.72	<0.001
Restenosis	3 (5.3%)	7 (17.7%)	0.089
Overall restenosis	3 (5.3%)	10 (24.4%)	0.024

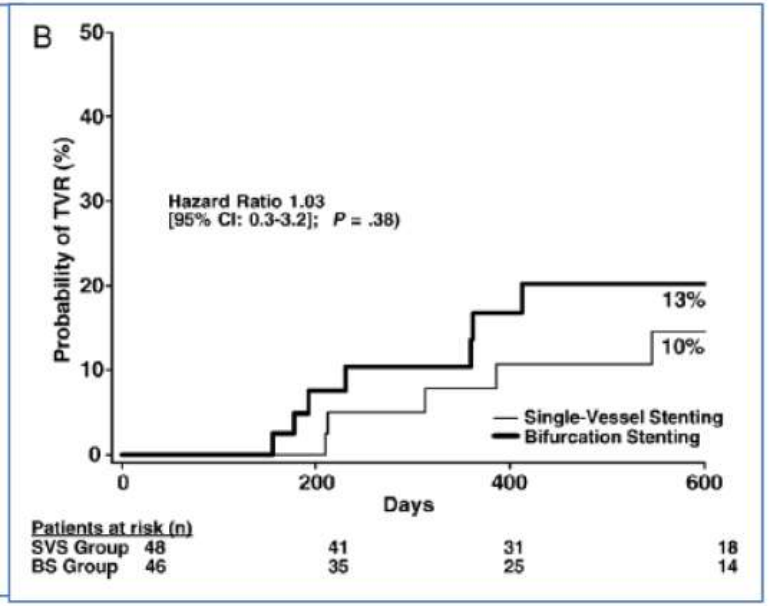
Kim HK. Am J Cardiol 2006;97:1597-1601

Rotterdam's RESEARCH and T-SEARCH Registries:

similar MACE and TVR rates

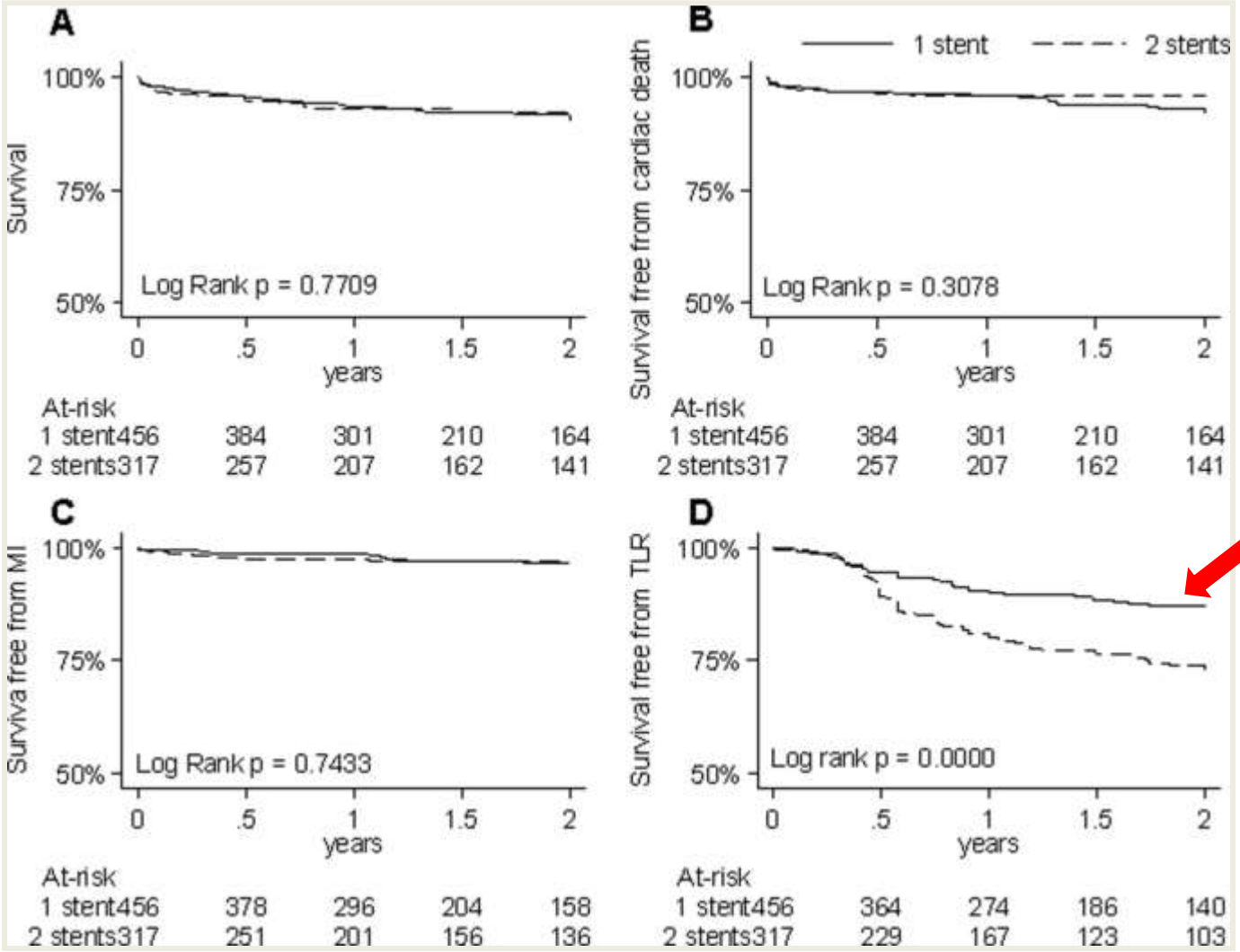
Left main- n = 94 (single stenting: 48; two-stents : 46)





Valgimigli M. Am Heart J 2006;152(5):896-802

Independent predictors of 2-year MACE in patients with bifurcations versus those with ostial and midshaft lesions.

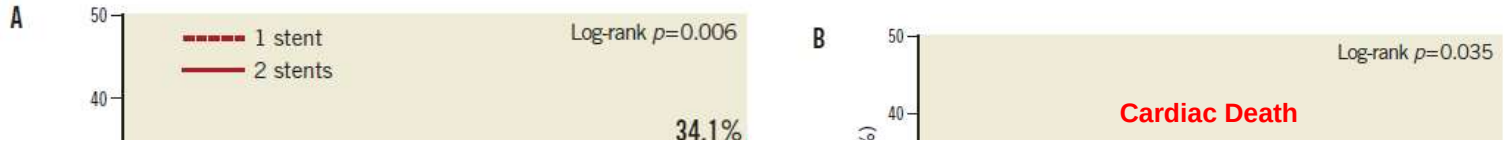


Palmerini T et al , Circ Cardiovasc Interv 2008;1;185-192

1stent vs 2 stents

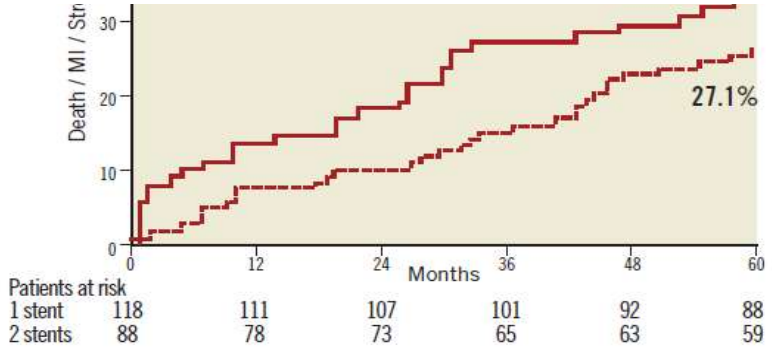
French Left Main Taxus Registry : Five-Year Outcomes

D. Mylotte et al , EuroIntervention, 2012 (ahead of publication)

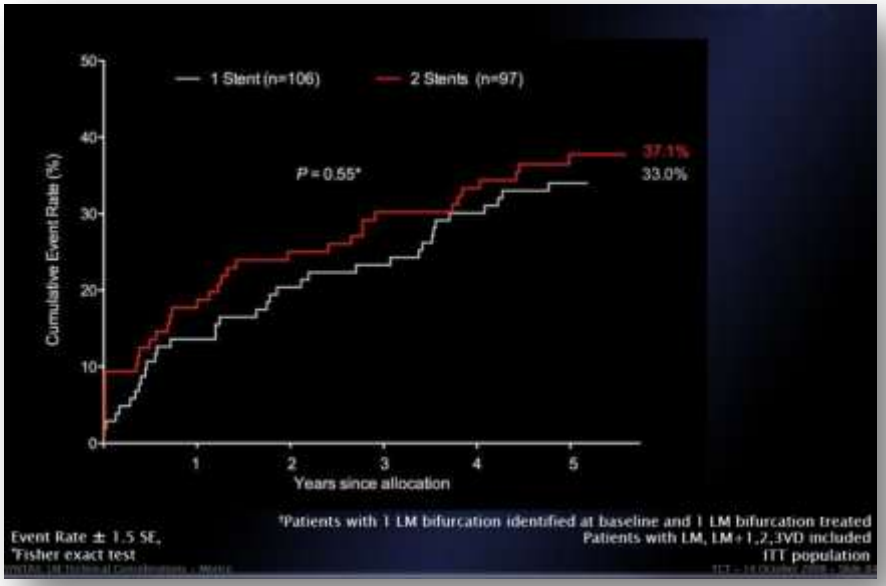


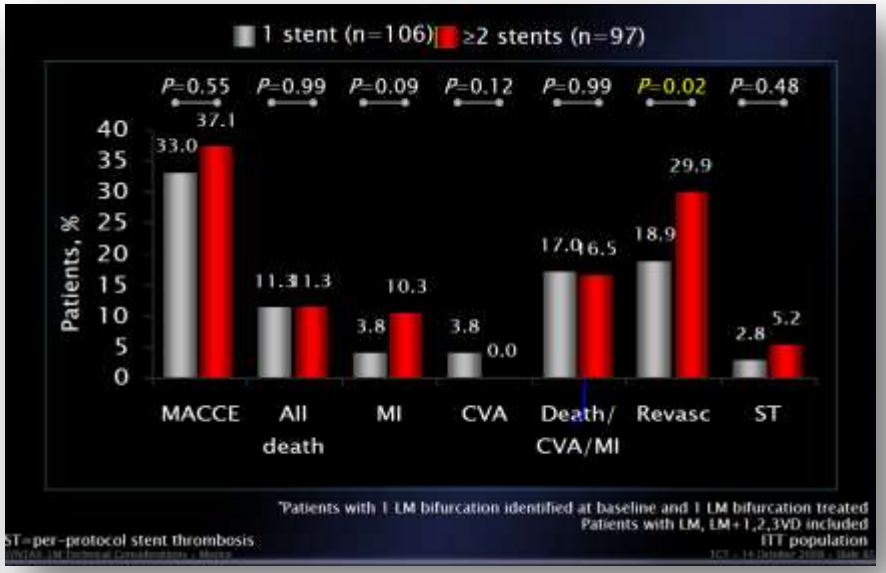
- **Single Stenting Cross Over is Clearly Better than two stent s in LM Bifurcation**

- **This approach can be performed in nearly 65% of patients with Distal Lm Disease**



MACCE LM Distal PCI Bifurcations: 1 vs 2 stents





SYNTAX

MAIN COMPARE

Multivariate Predictors of In-Stent Restenosis

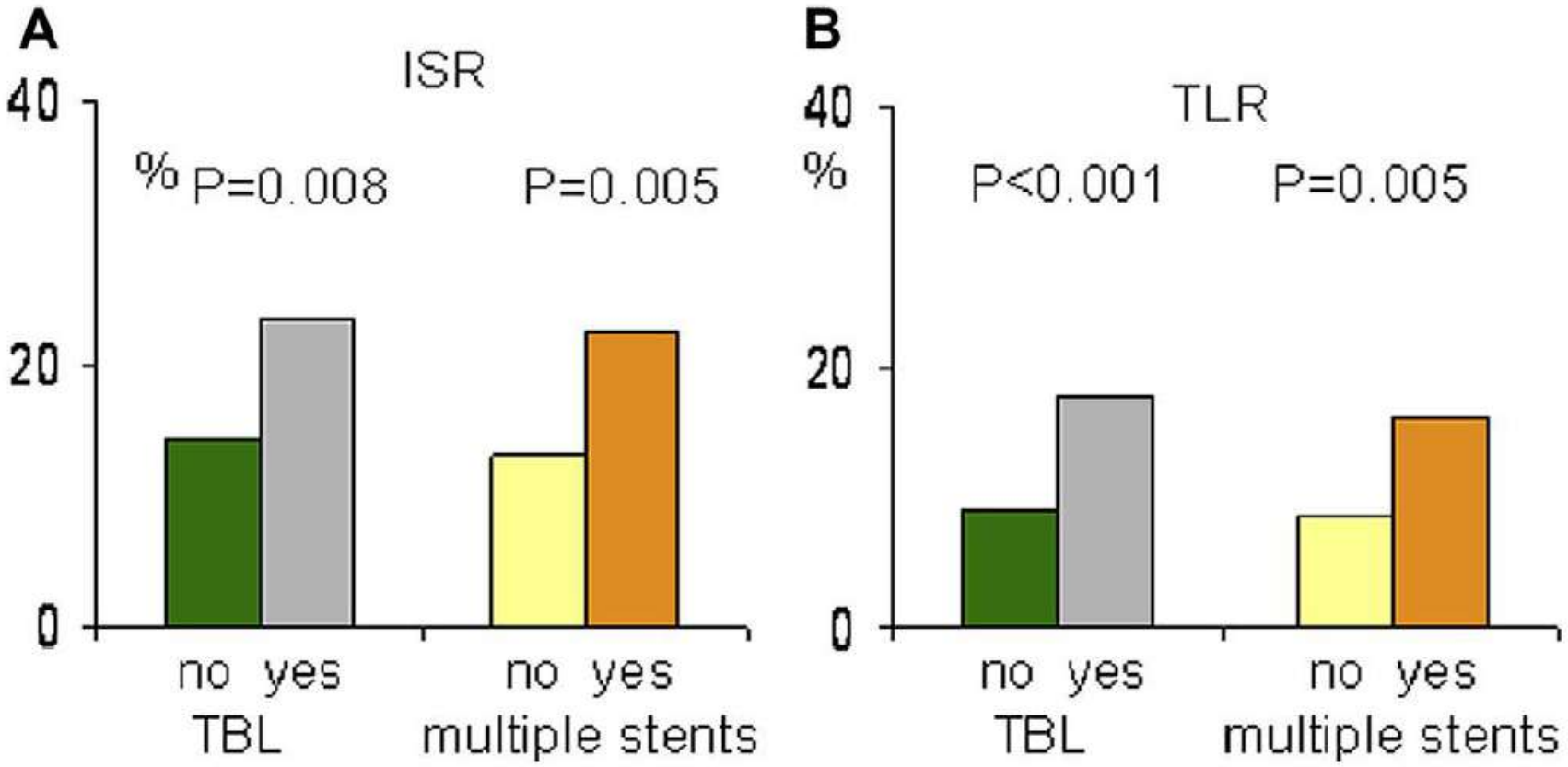
Variable	HR, 95% CI	*P* Value
Male	0.41 (0.24-0.69)	0.007
Restenotic lesion	4.59 (2.40-8.77)	<0.001
Bifurcation involvement	2.56 (1.27–5.19)	0.009
Complex stenting with 2 stents in bifurcation lesion	2.50 (1.28–4.76)	0.007
Total number of stents	4.76 (2.94–7.67)	<0.001

*Compared with simple cross-over stenting of distal bifurcation lesions

Lee et al. JACC Intervent 2011

Impact of Bifurcation Lesion and Number of Stents on Outcomes: ISAR LEFT Main

607 pts undergoing ULMCA PCI
39% with true bifurcation lesions



Tiroch et al, JACC CV Intv 2014

Catheter Cardiovasc Interv. 2013 Nov 1;82(5):757-64. doi: 10.1002/ccd.24988. Epub 2013 Jun 14.

Single-stent crossover technique from distal unprotected left main coronary artery to the left circumflex artery.

Naganuma T[1], Chieffo A, Basavarajaiah S, Takagi K, Costopoulos C, Latib A, Carlino M, Montorfano M, Bernelli C, Nakamura S, Colombo A.

Abstract

OBJECTIVES:

To report the clinical outcomes of single-stenting from distal unprotected left main coronary artery (LMCA) to the left circumflex artery (LCx).

BACKGROUND:

Percutaneous coronary intervention of distal LMCA is usually performed by stenting into the left anterior descending artery (LAD). In some cases, stenting from LMCA to LCx alone is performed.

METHODS:

Between April 2002 and April 2011, single-stenting with drug-eluting stents for distal unprotected LMCA disease was performed in 584 patients. Thirty-one patients underwent LMCA-LCx stenting, who were compared with the remaining 553 LMCA-LAD stented patients.

RESULTS:

At 3-year follow-up, there were no significant differences between LMCA-LCx and LMCA-LAD stenting groups in major adverse cardiac events (24.1% vs. 19.6%; P = 0.540), cardiac death, and myocardial infarction. A trend toward higher target lesion revascularization (TLR) in the LMCA-LCx stenting group was noted. This was significant when the stented branch was only considered (18.2% vs. 3.0%; P < 0.001). In both TLR subgroups, LCx ostium was frequently involved (83.3% in LMCA-LCx vs. 66.2% in LMCA-LAD TLR subgroups; P = 0.39). The LAD ostium was more frequently involved in LMCA-LCx TLR subgroup (83.3% vs. 21.0%; P < 0.001). On the multivariable Cox regression analysis, LMCA-LCx stenting was an independent predictor of TLR for restenosis at the ostium of the stented branch (HR 6.49; 95% CI 2.27-18.53; P < 0.001).

CONCLUSIONS:

TLR rate at the LCx ostium is high irrespective of LMCA-LCx or LMCA-LAD stenting. The former also seems to be associated with high TLR at the LAD ostium. It may therefore be important to evaluate alternative strategies for treating distal LMCA disease that extends into the LCx but not LAD.

Short and long term outcome in patients with left main disease treated with provisional stent approach. A retrospective observational study.

Marco Di Cuia, MD a, Claudio Moretti, MD a , Pierluigi Omedè, MD a , Fabrizio D'Ascenzo, MD a , Filippo Sciuto, MD a, Chiara Colaci, MD a, Virginia De Simone, MD a, Maurizio Bertaina, MD a, Ilaria Vilardi, MD a, Giuseppe Biondi Zoccai, MD , Imad Sheiban, MD a

Accepted for Pubblic in J CM , 2014

ABSTRACT.

Aims: Percutaneous treatment of unprotected distal left main (UDLM) remains a challenging procedure for most interventional cardiologists, with different possible strategies.

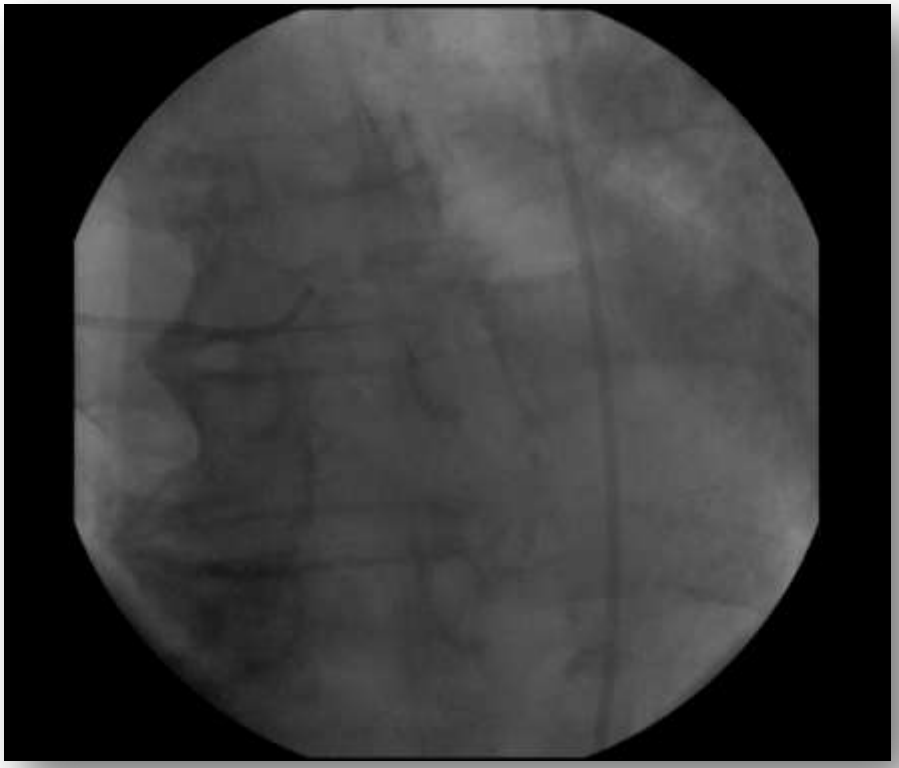
Methods: From January 2005 to December 2010, 175 patients with isolated UDLM were treated at our centre with provisional technique. We compared patients who underwent LM-CX stenting with those who underwent LM-LAD stenting. The primary end-point was the long-term rate of major adverse cardiac events (MACE, i.e. the composite of death, myocardial infarction, repeated revascularization).

Results: 44 (26%) underwent LM-CX stenting and 131 (74%) LM-LAD stenting. The rate of MACE did not differ after 30 days (10.15% in the LM-LAD group vs 9.52% in the other; p=0.85), while after a follow up of a mean of 26 with 12, 38 months I quartile and III quartile respectively, it was higher although not significant in the LM-LAD group (40% in the LM-LAD group versus 26.2% in the LM-CX group p=0.09), mainly driven from more frequent revascularization (25.7% vs 11.9%;p=0.10). The ULM TLR rate wasn't statistically significant (6.2% vs 0.0%; p=0.2).

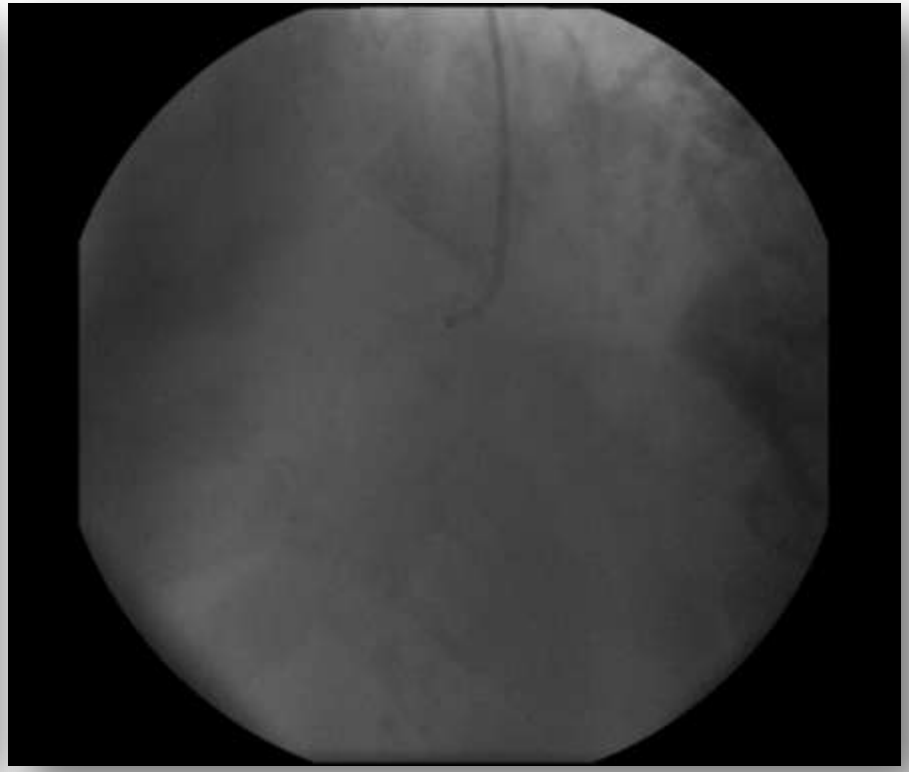
Conclusions: Provisional distal left main bifurcation single stent treatment is a safe and effective therapeutic option, without differences in short and long-term outcome relatively to stenting to LAD or to circumflex.

P.M . , 78 yrs Male

January 7, 2013 : NSTEMI , admitted with persistent chest pain and SBP 90 mmHg



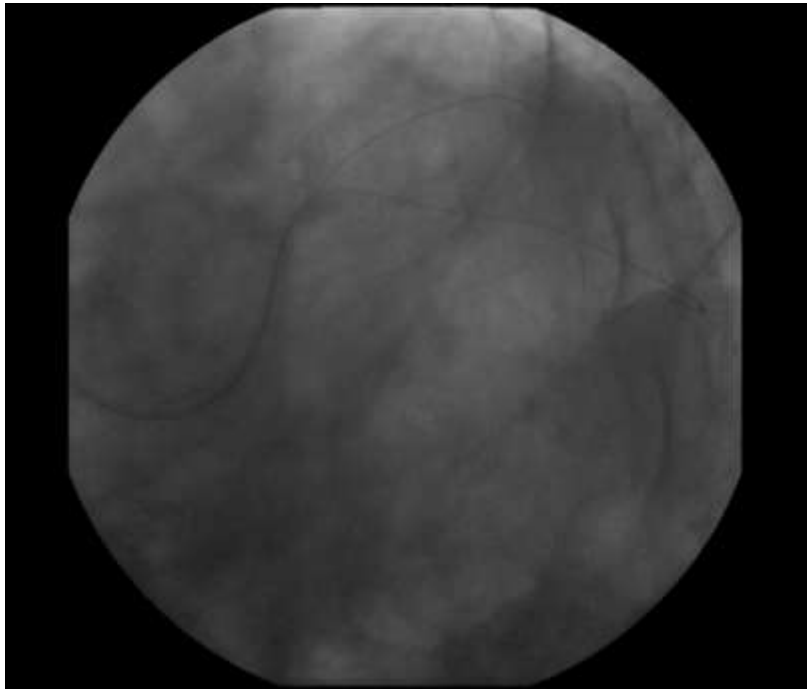
Ostial and Shaft LM severely diseased and calcified + Prox LAD Disease



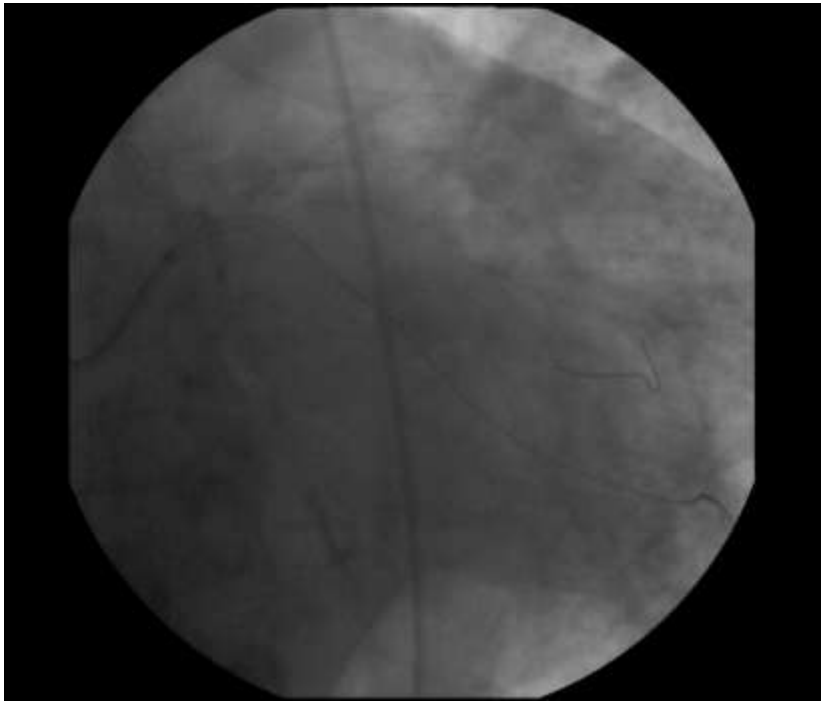
RCA : Normal

P.M . , 78 yrs Male

January 7, 2013 : NSTEMI , admitted with persistent chest pain and SBP 90 mmHg



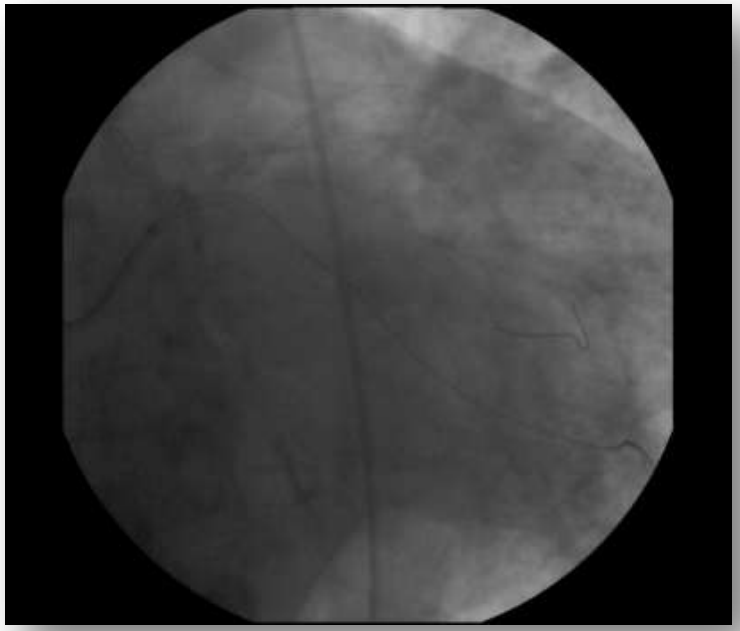
Wiring all branches

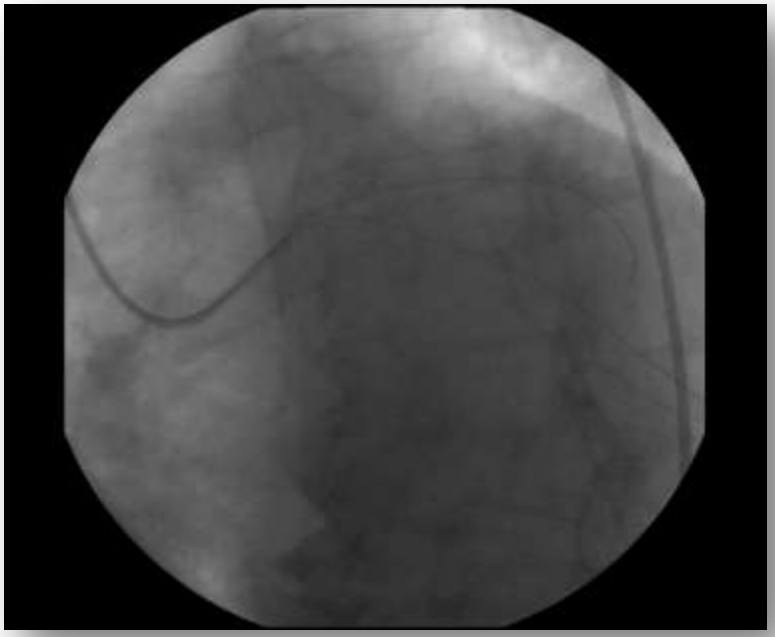


Predilatation with NC Balloon

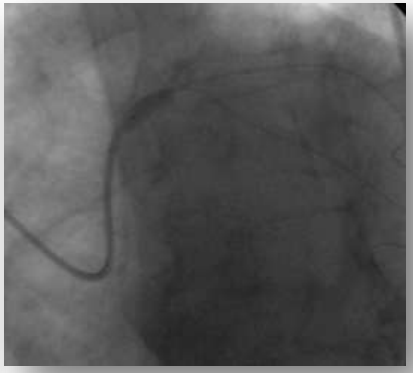
P.M . , 78 yrs Male

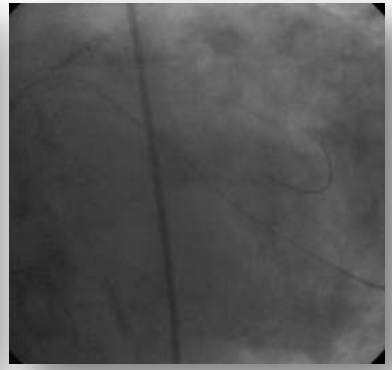
January 7, 2013 : NSTEMI , admitted with persistent chest pain and SBP 90 mmHg

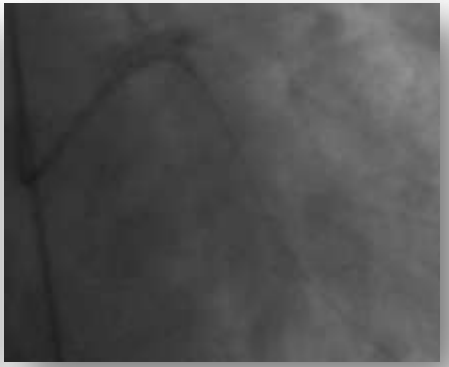




Predil. LM , prox LAD - Stenting Prox LAD and LM - Post-Dil and FKB

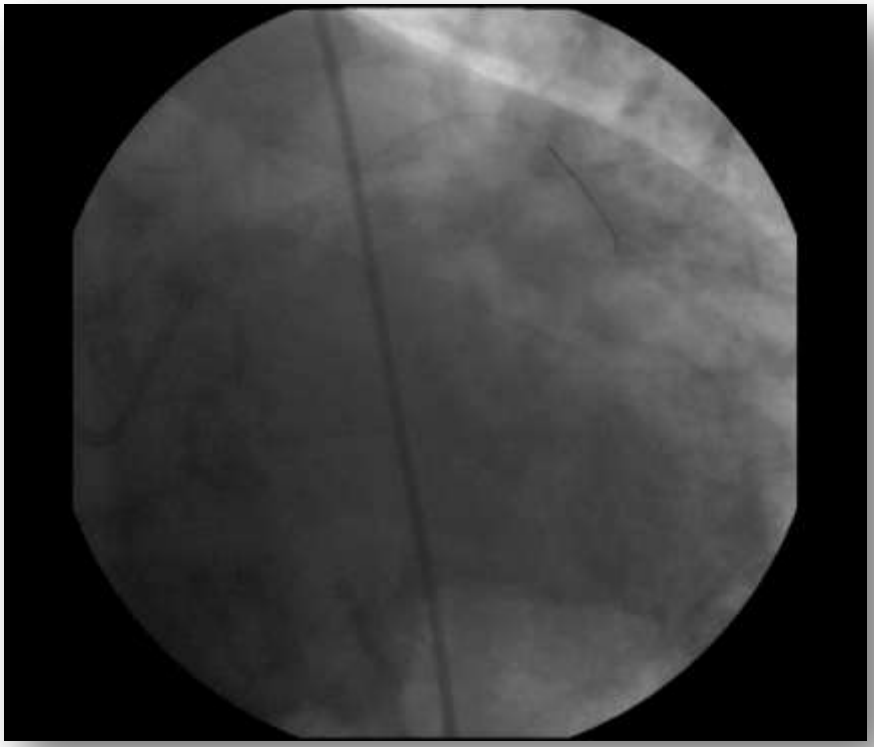






P.M . , 78 yrs Male

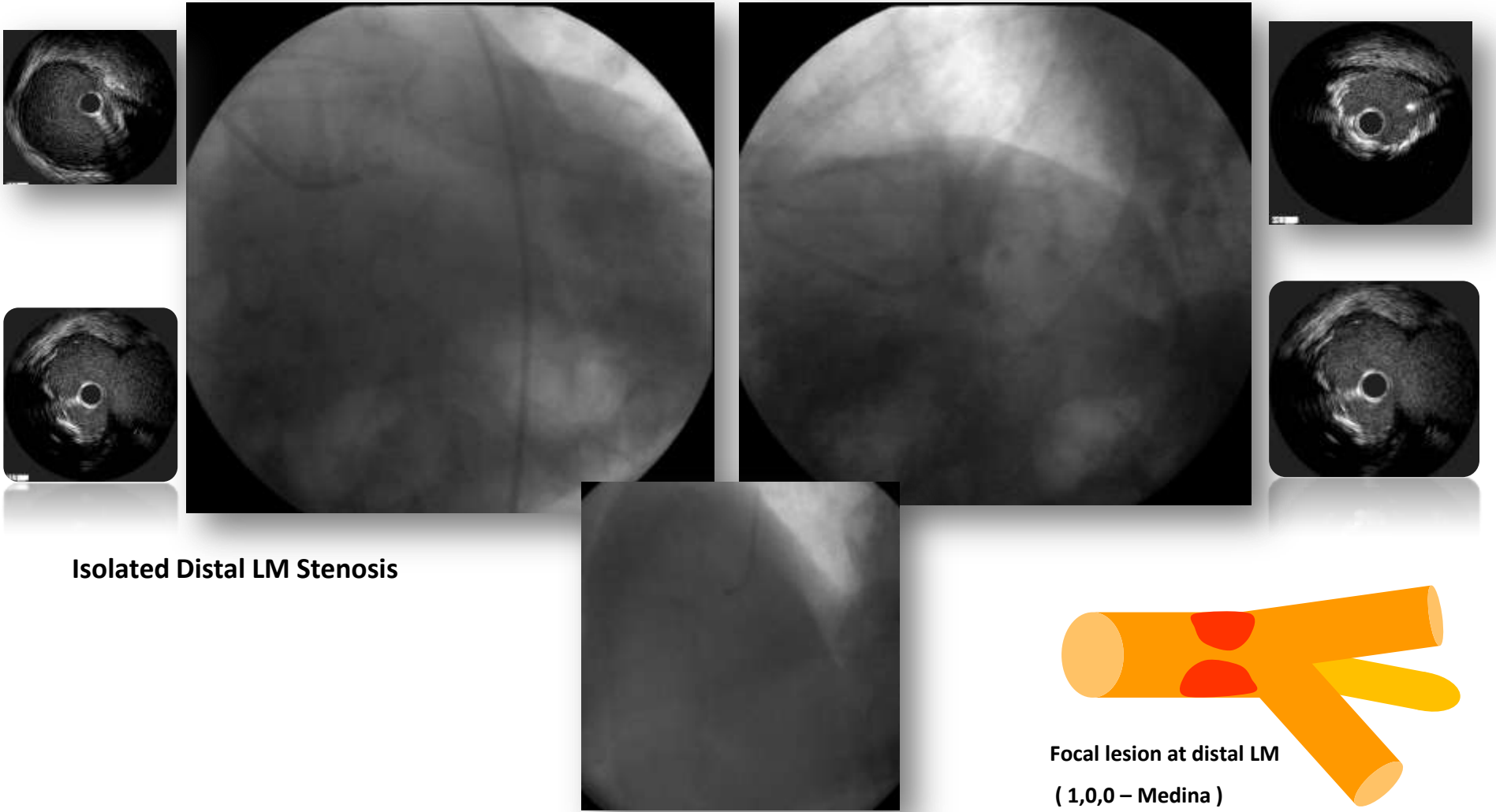
January 7, 2013 : NSTEMI , adimitted with persistent chest pain and SBP 90 mmHg



Final Result

T.F , 65 yrs Male

February 12, 2012 : Angina CCS III , positive stress test at low load- Adimitted for elective coronary angiography



Isolated Distal LM Stenosis

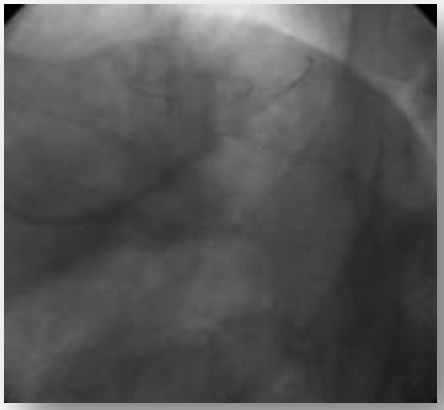
.. with normal RCA

Focal lesion at distal LM

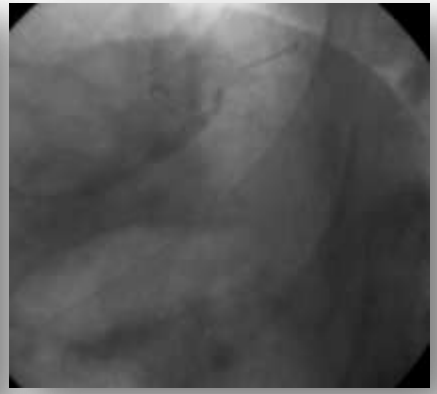
(1,0,0 – Medina)

T.F , 65 yrs Male

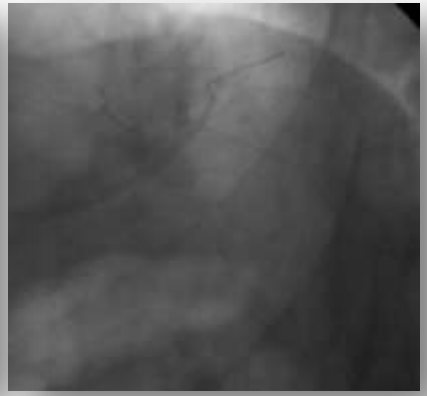
February 12, 2012： Angina CCS III , positive stress test at low load- Adimitted for elective coronary angiography

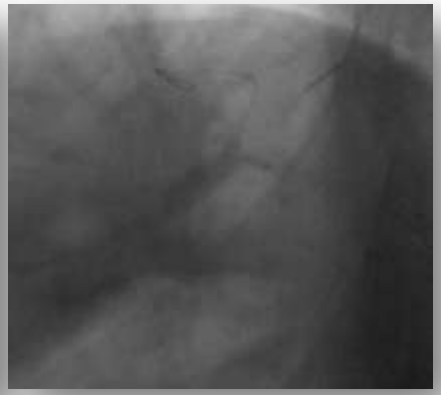


Wires in all branches

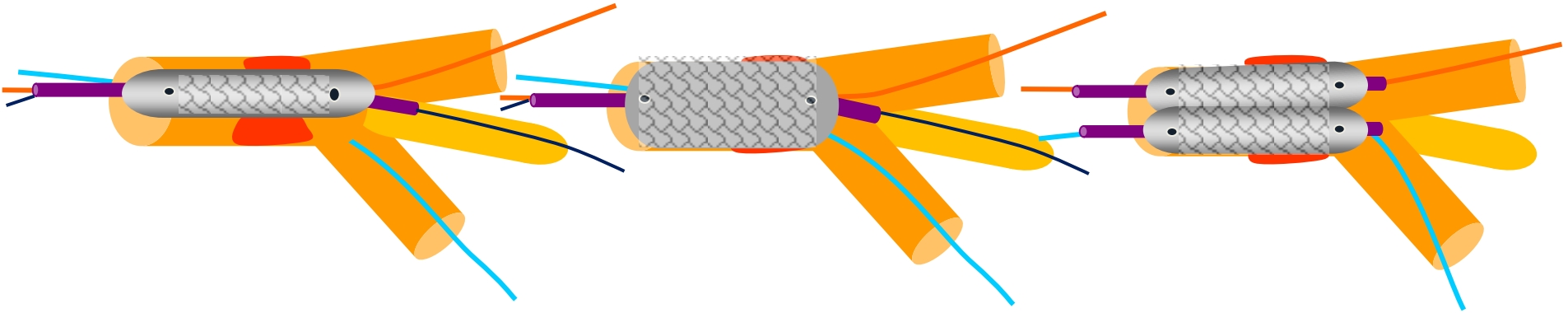


Predilat. with balloon on Ramus wire



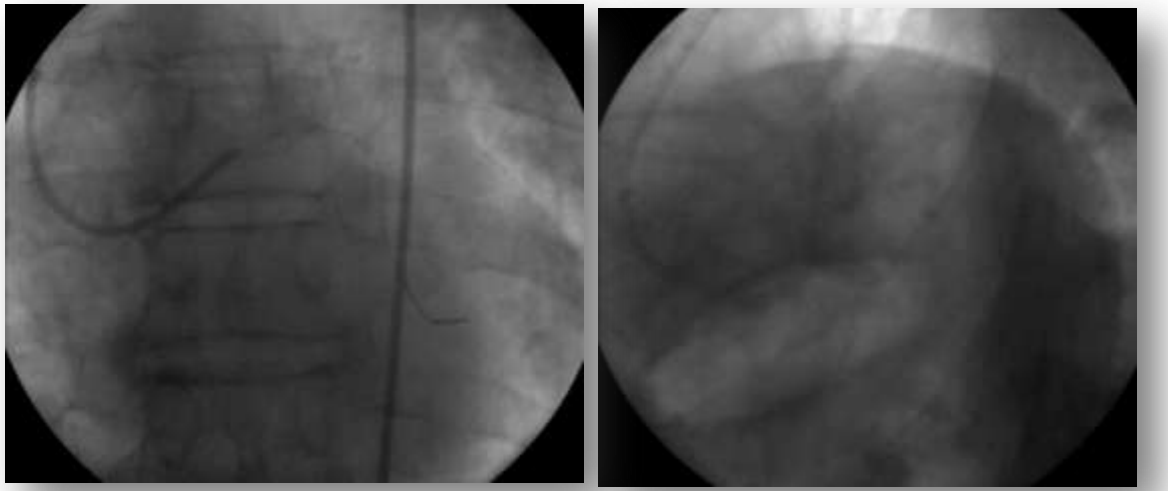


Exchange wires to LAD and LCX : FKB (only the distal tip of balloons are outside on the stent)

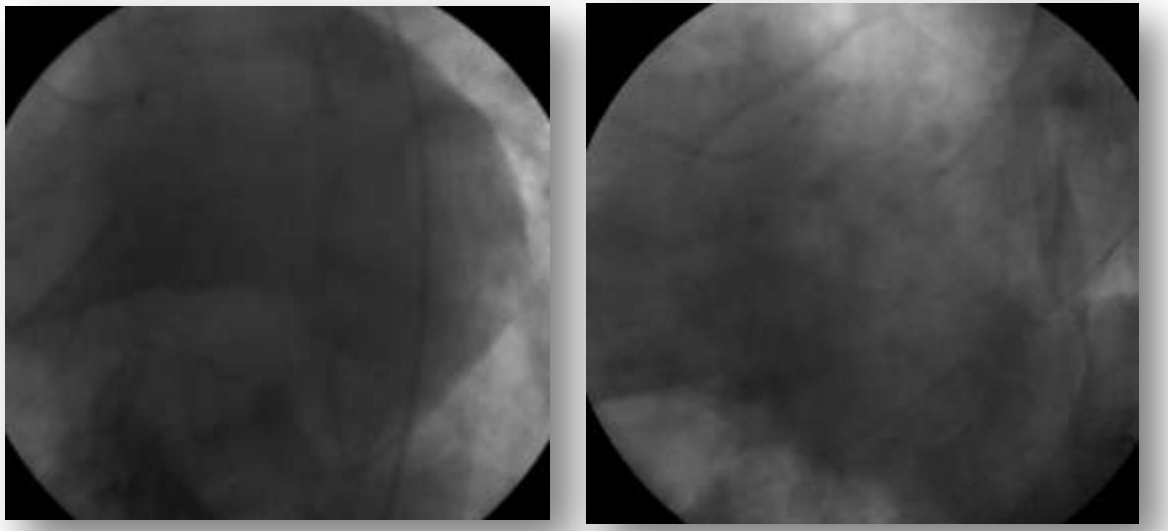


T.F , 65 yrs Male

February 12, 2012 : Angina CCS III , positive stress test at low load- Admitted for elective coronary angiography

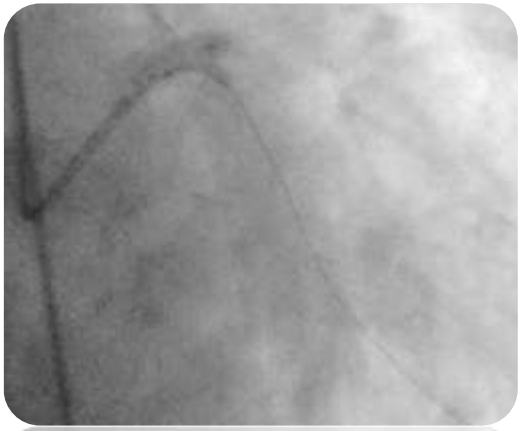


Final Angiographic Result



12-month Angiographic FU

Final Kissing ?



- If TIMI flow < III
- FFR < 0.80

Provisional T stenting for distal Left Main at 10 yrs …

N. M , female, 69 yrs

2004: Baseline

2004: Final Result

2014: 10-year angiographic FU

Final Remarks

- **Good rules to obtain optimal results with LM stenting:**
  - **Use DES: safe and effective**
  - **Use provisional T-stenting strategy**
- **Conservative strategy regarding the selected side branch**
- **Consider stenting across LAD if this increases the chances of ending up with only one stent…**
- **Provisional T-Stenting represents a safe and effective strategy for the percutaneous treatment of left main lesions with DES .**

Thank you for your attention