XVIII SOLACI Congress & SOCIME Annual Meeting

SOLACI' 2012 In partnership with TCT

México DF, 8-10 August, 2012

IVUS or FFR guided in MV disease and ACS?

Costantino R. Costantini, M.D., Ph.D., F.A.C.C.
Hospital Cardiológico Costantini
Foundaction Francisco Costantini
Curitiba - Brazil

Room Molino del Rey, August 9th, 2012,10h30 at 10h45 pmc

2012 -- Potential conflicts of interest

Speaker's name: Costantino R Costantini, M.D., Ph.D., F.A.A.C.

Learning Center intracoronary ultrasound
Sponsored by Boston Scientific without medical fees.
Donation to Francisco Costantini Foundaction

Since 2008

Year 1994!!! STENT THROMBOSIS

Colombo M.D

10 to 25%

IVUS After Low Pressure
80% STENTS UNDER EXPANDED

HIGH PRESSURE
AAS + TICLOPIDINE

SUBACUTE THROMBOSIS 0.9%

VASCULAR COMPLICATIONS

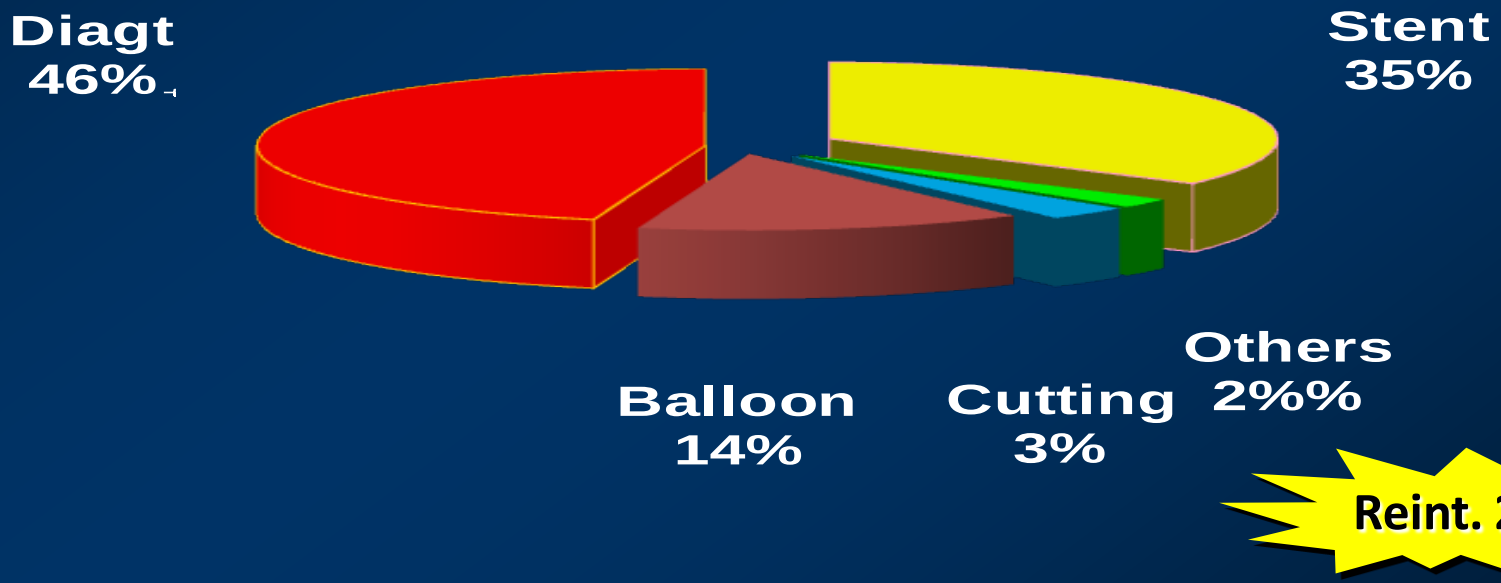
Colombo Circ. 95:91:1076

1994 - IVUS Technique Initiation
(Until – 1998 – 8.000 Evaluations)

Hospital - Foundation Costantini

IVUS 1998 -- Jan – 2012

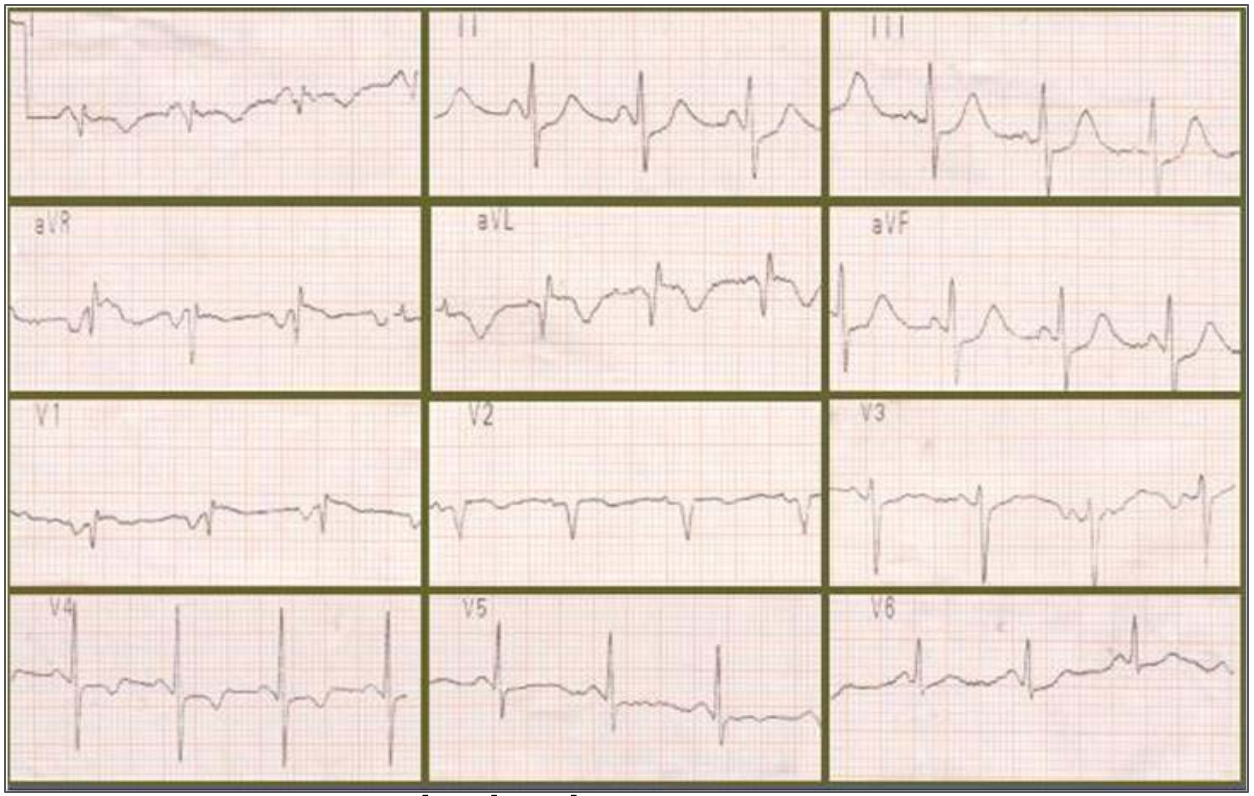
8.045 Procedures - 22.948 IVUS Evaluations



(Costantino Costantini et Cols)

Female patient, 36y.o. at 15th day after C Section (without complications), presented with opressive chest pain for 3 hours, radiated to Left Upper Limb. Chest pain intensity decreases progressively. In the following days, she presented recurrent short episodes of chest pain. She presented at our Hospital after 3 days of sympstons onset.

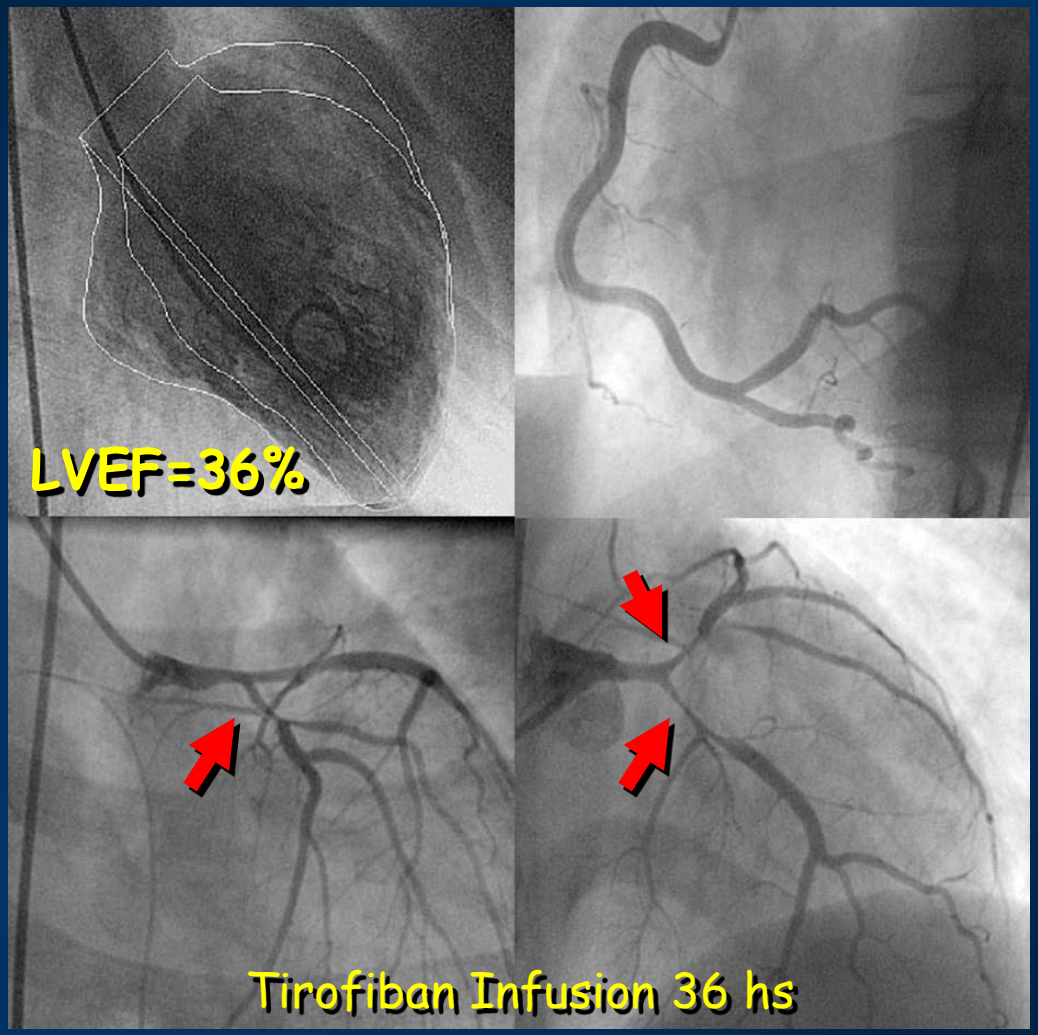
Troponin I: 91,5	Ck-mb: 103



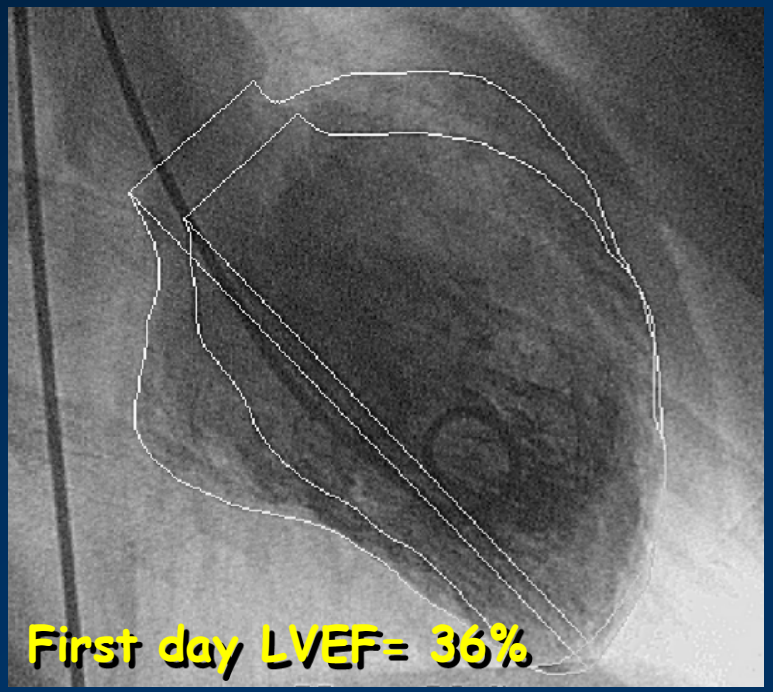
admission EKG ….

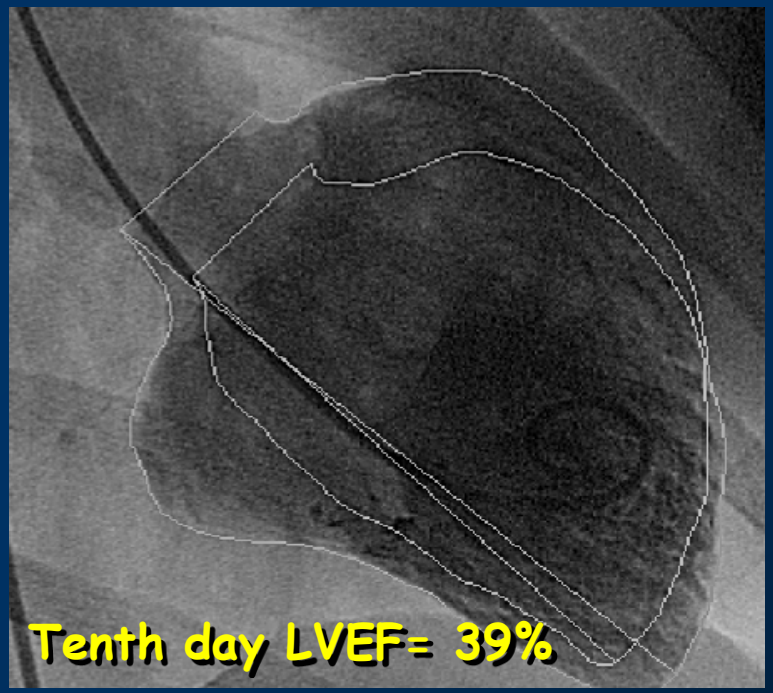
Therapeutical Options

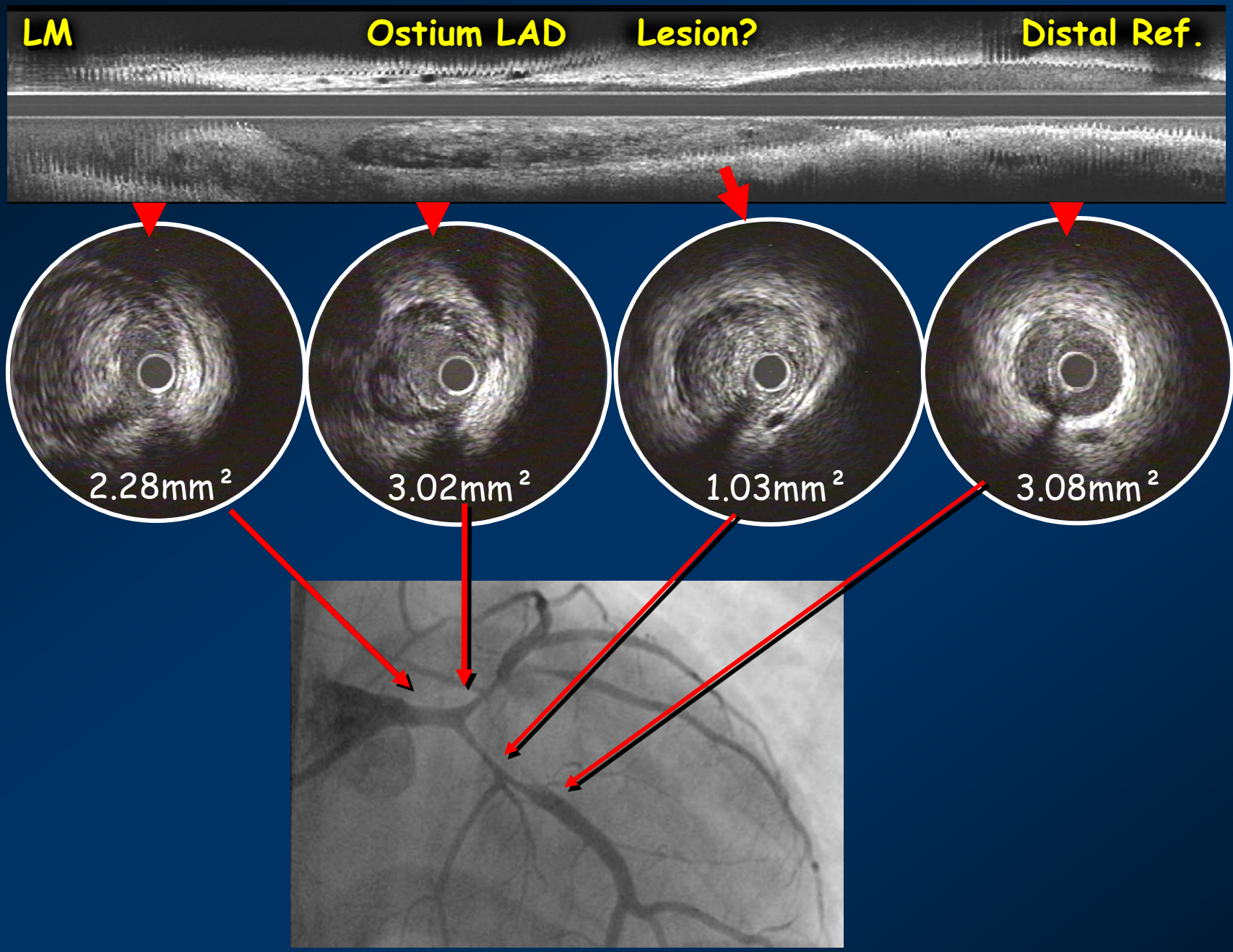
CABG, PCI or Clinical Treatment ???



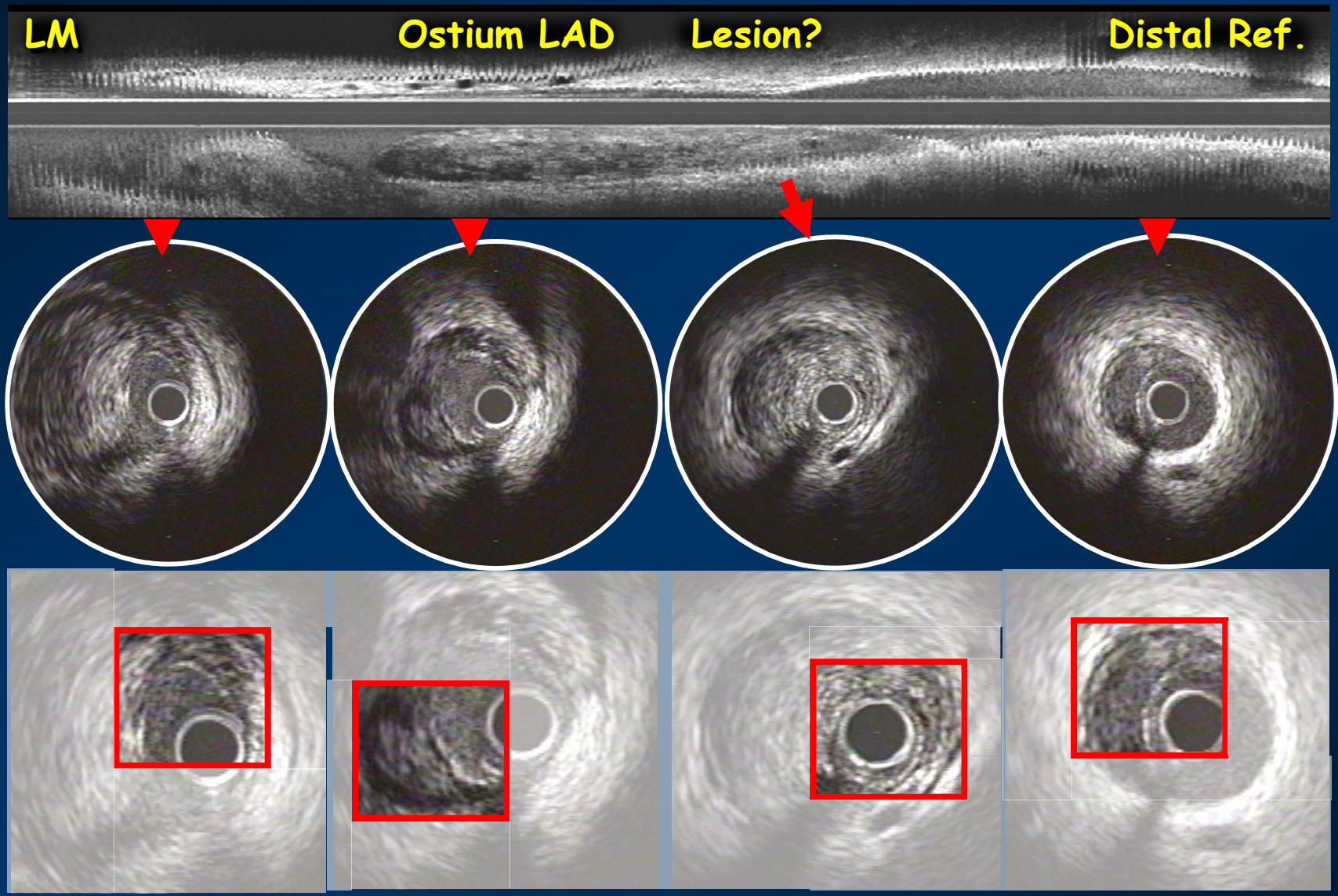
LVEF Evolution



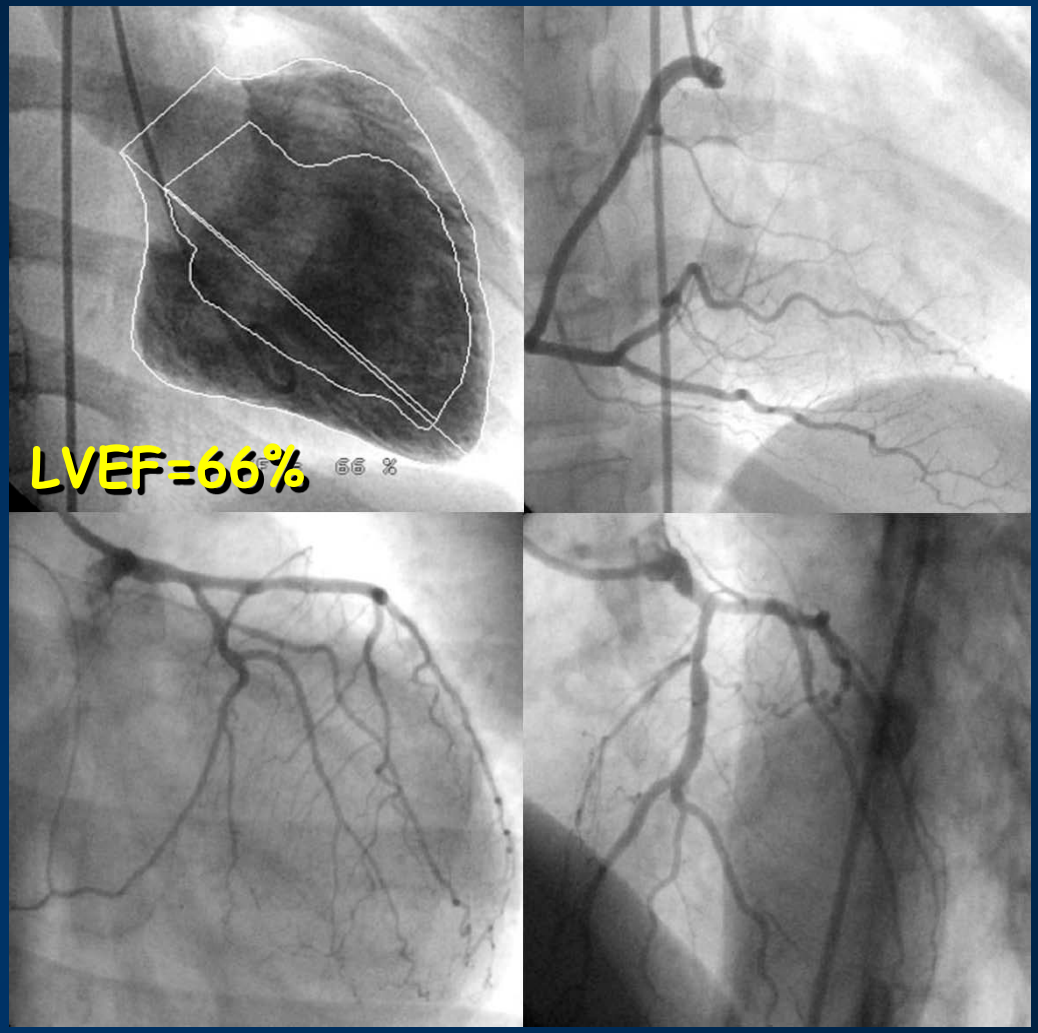


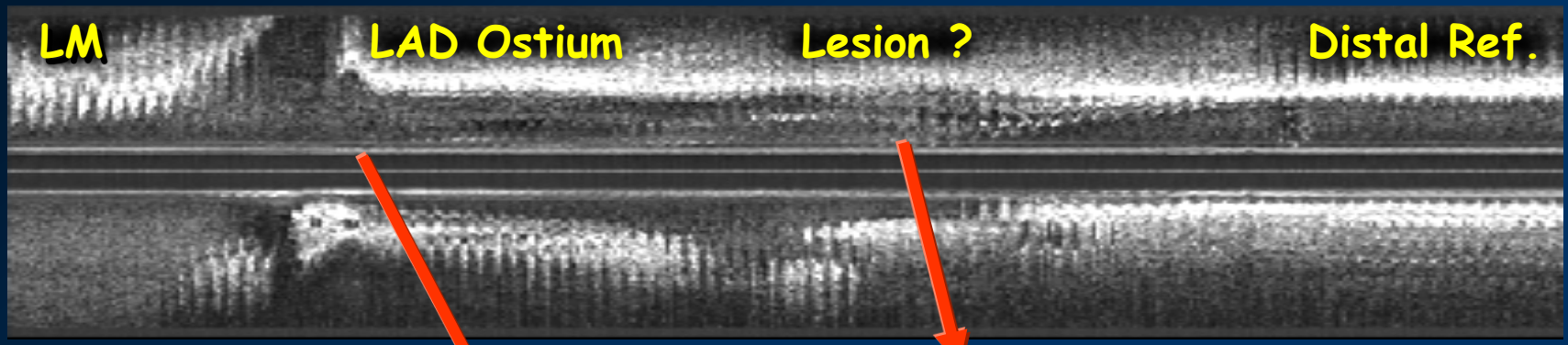

LM
Ostium LAD
Lesion?
Distal Ref.
2.28mm²
3.02mm²
1.03mm²
3.08mm²

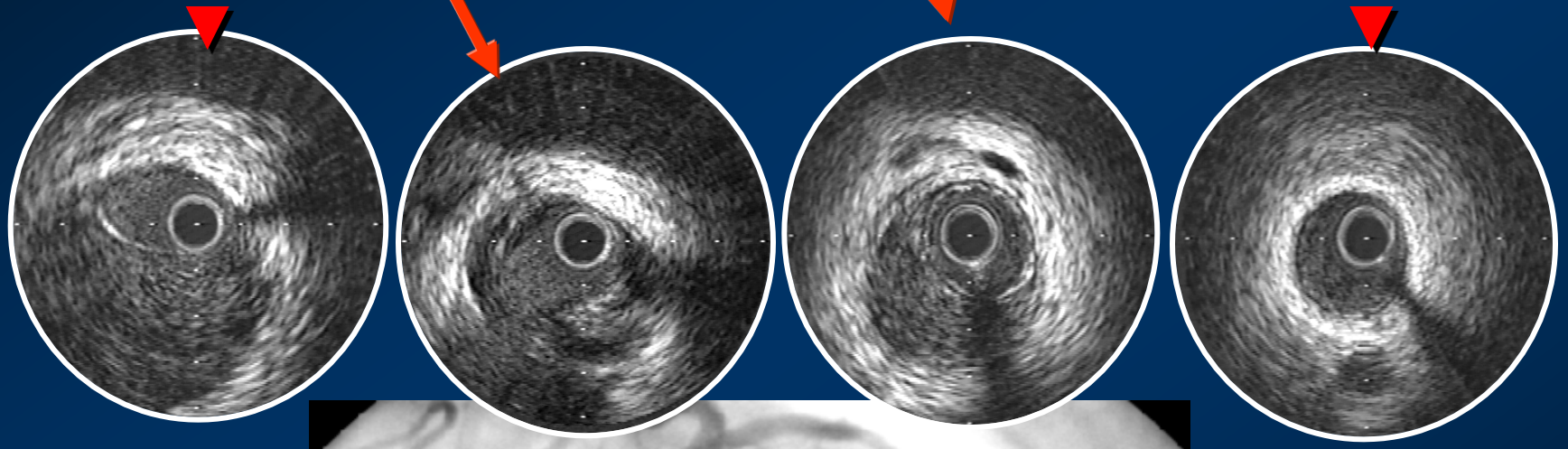
IVUS Evaluation



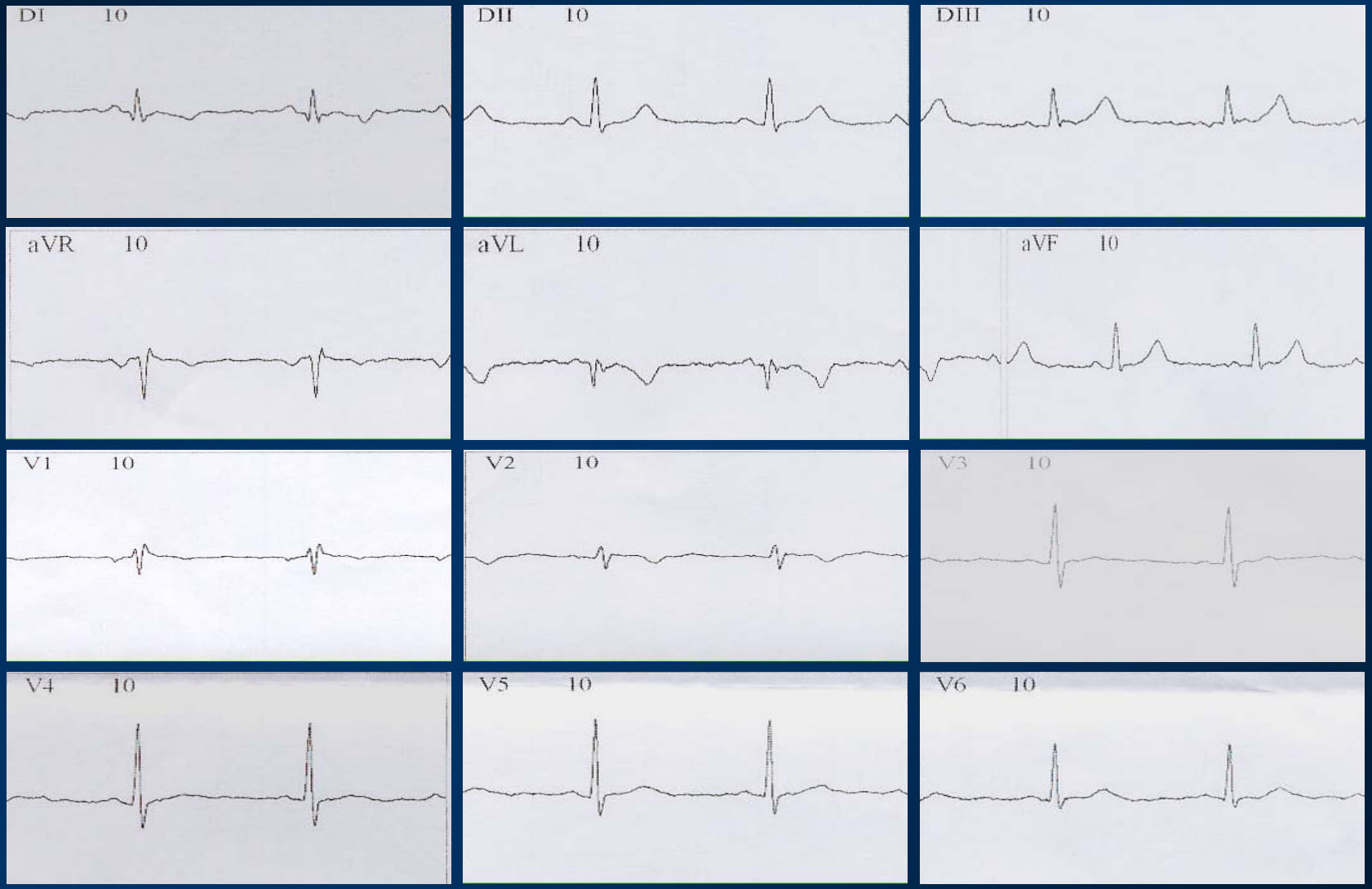
F/U @ 30 Days



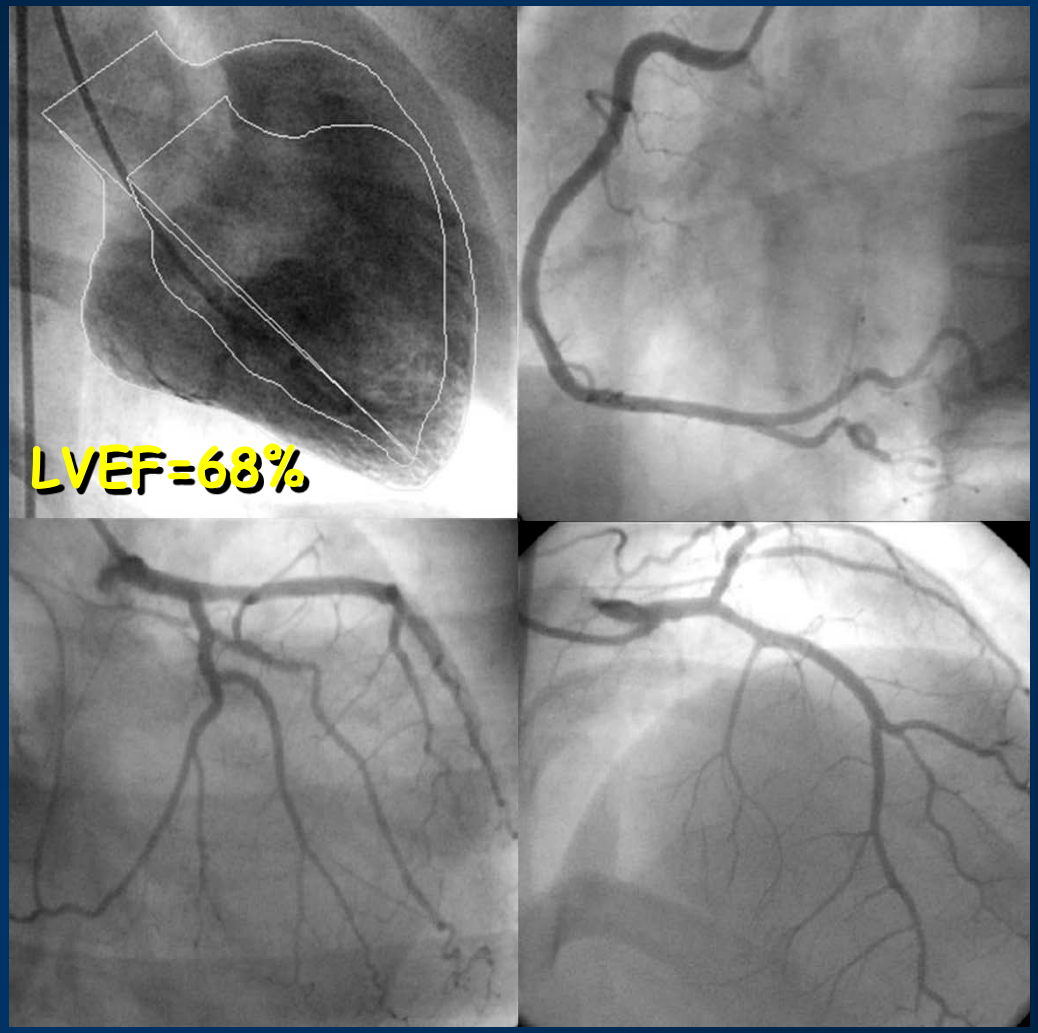

LM
LAD Ostium
Lesion ?
Distal Ref.

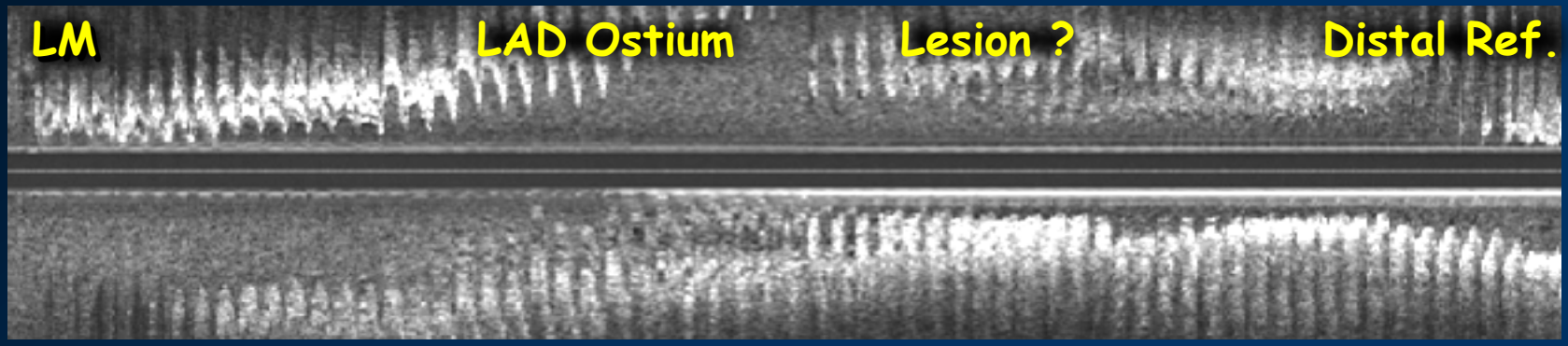


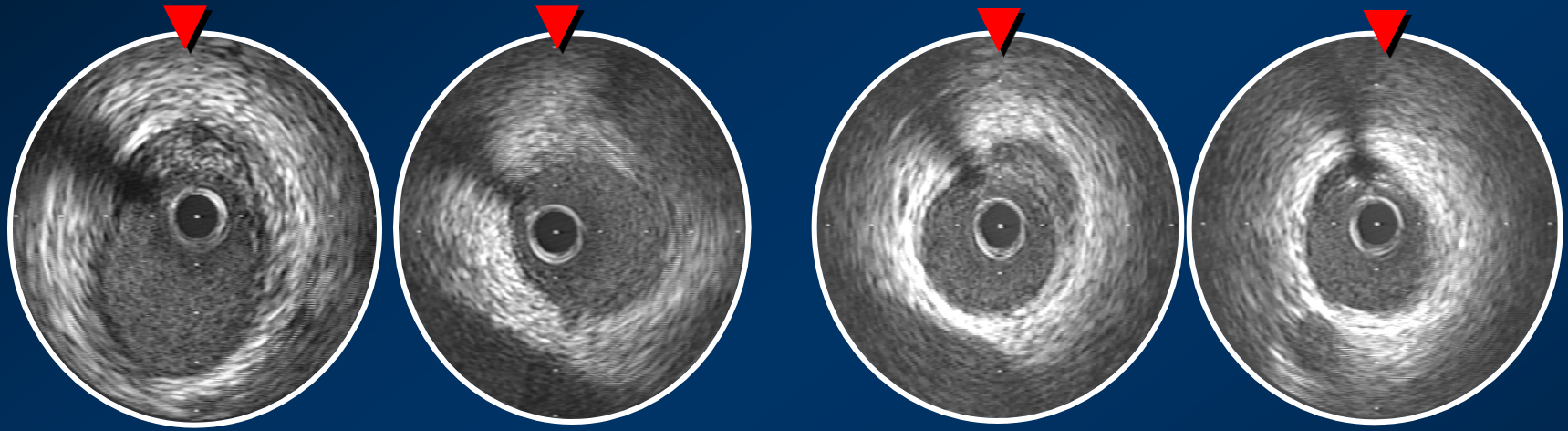
EKG @ 45 Days


DI 10
DII 10
DIII 10
aVR 10
aVL 10
aVF 10
V1 10
V2 10
V3 10
V4 10
V5 10
V6 10

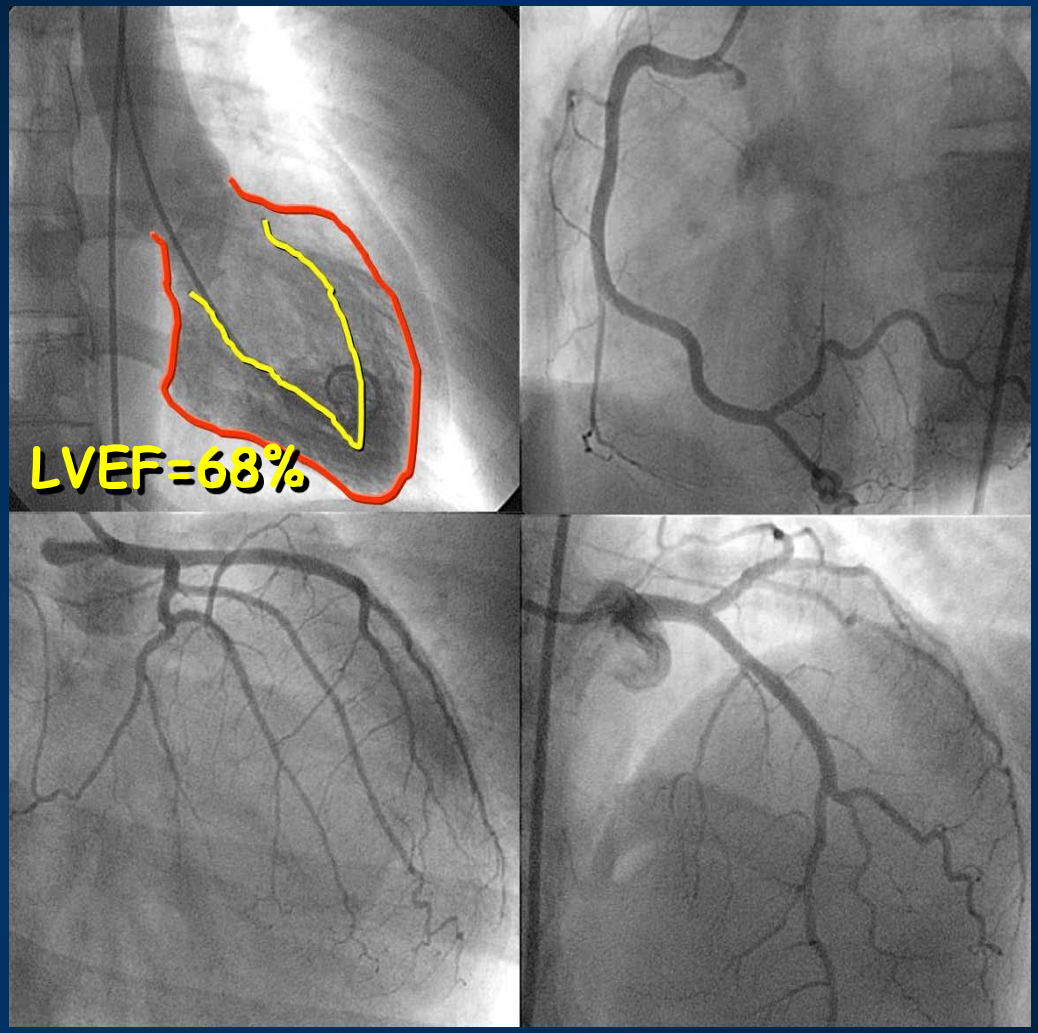
F/U @ 45 Days

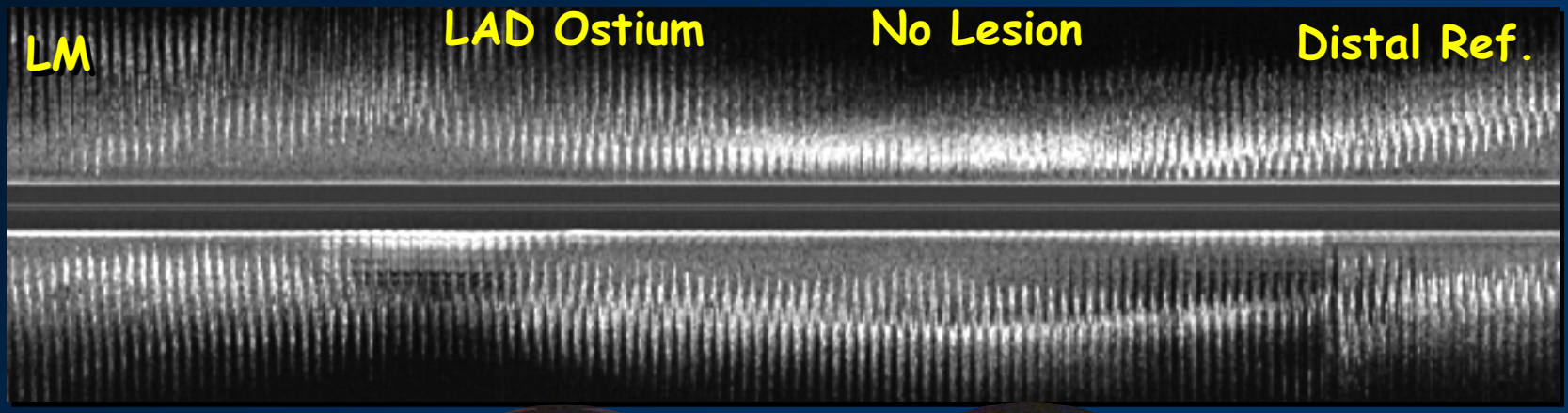


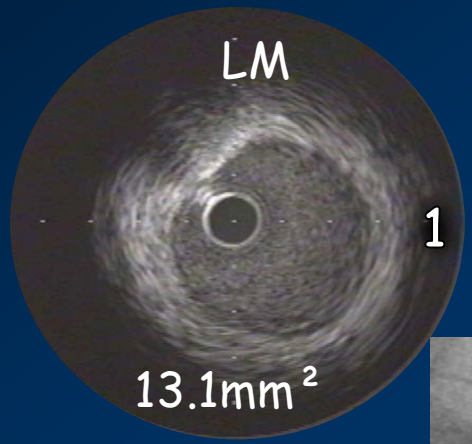

LM
LAD Ostium
Lesion ?
Distal Ref.

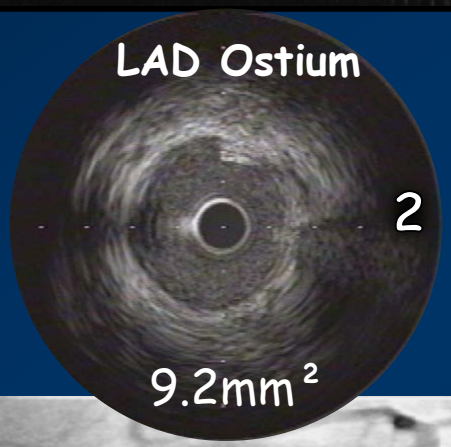


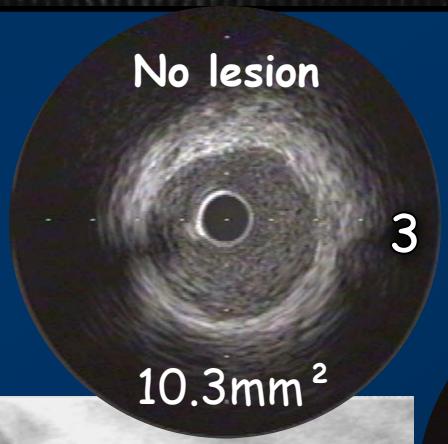
F/U @ 9 months

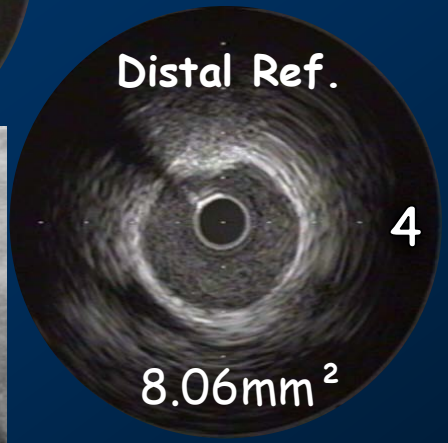


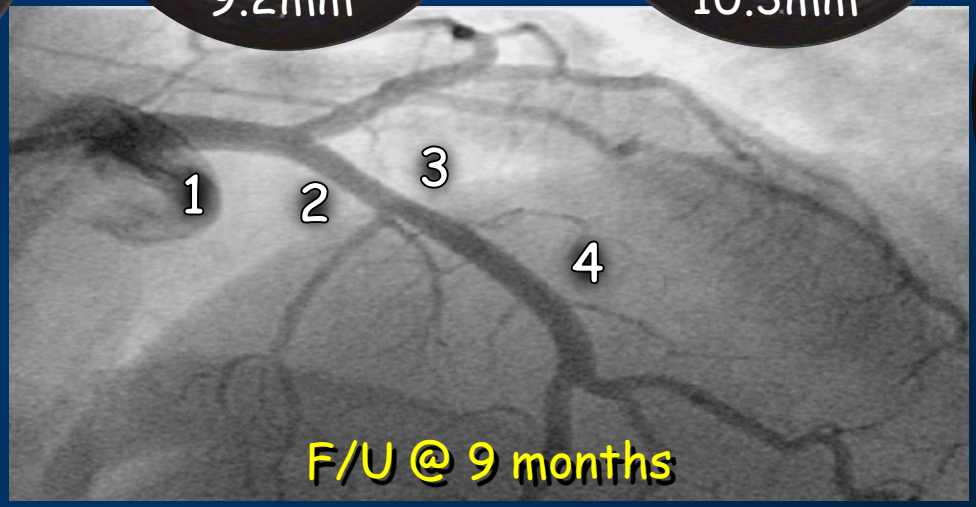










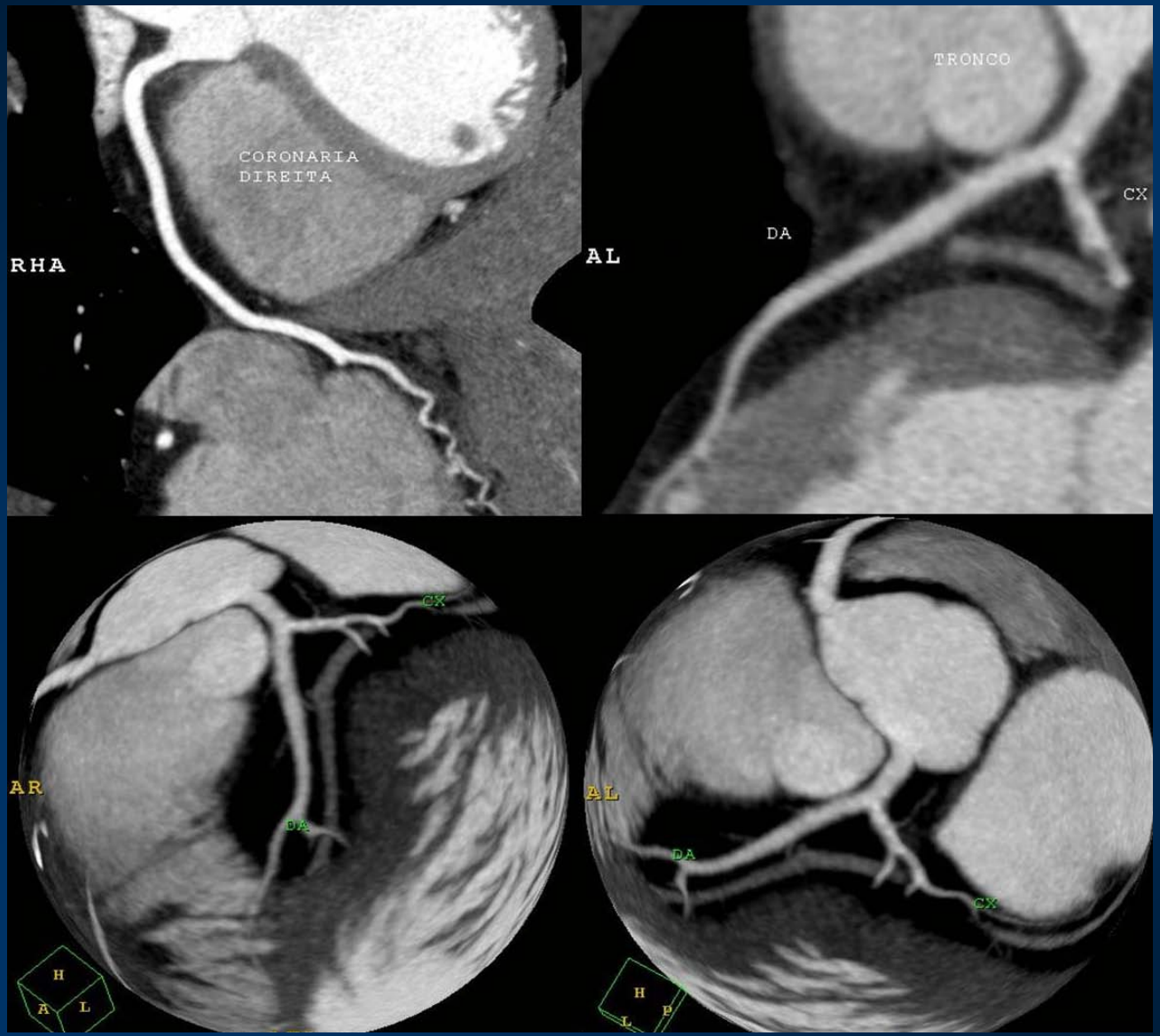


HOSPITAL CARDIOLÓGICO COSTANTINI

ACT ♀ - 36 yrs
18532 - 29Jan07

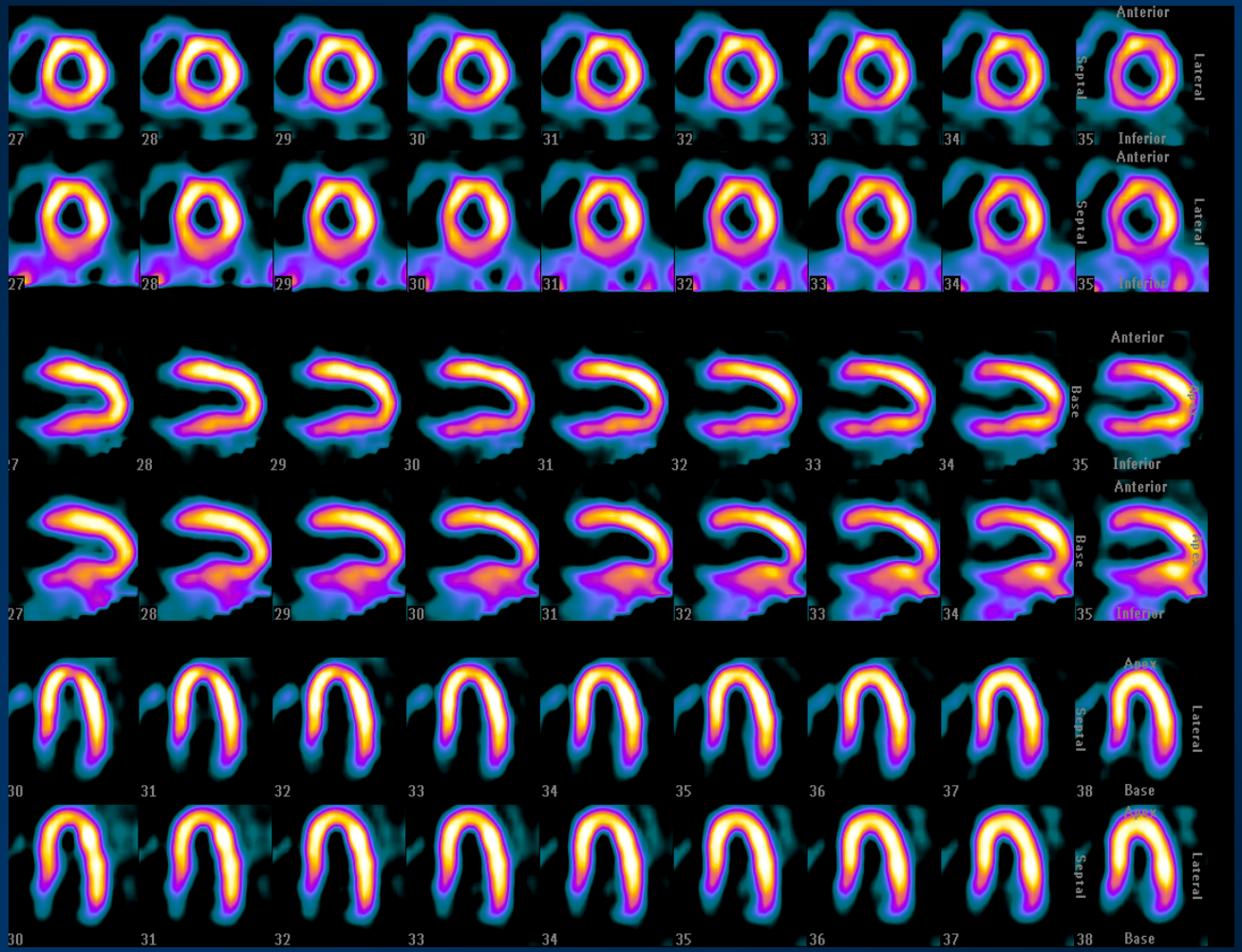
Fundação Francisco Costantini

F/U @ 24 months

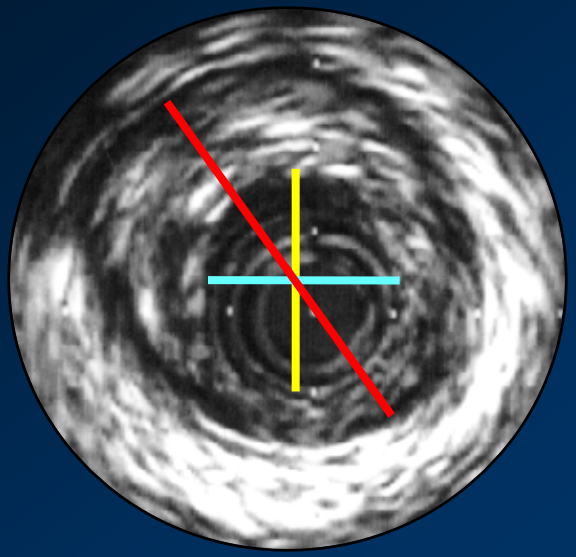


ACT ♀ - 39 yrs
27Apr09

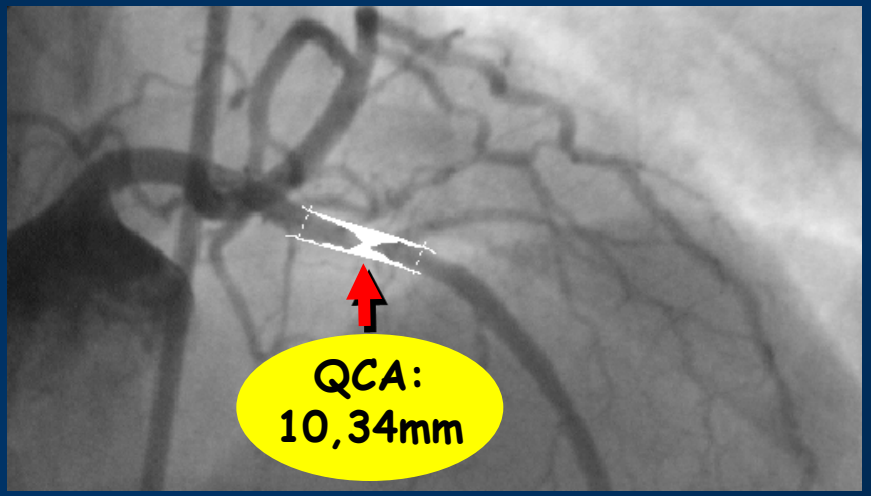
F/U @ 5 yrs


Anterior
Septal
Lateral
Inferior
Base
Apex
27
28
29
30
31
32
33
34
35
36
37
38

Plaque Extension !!!

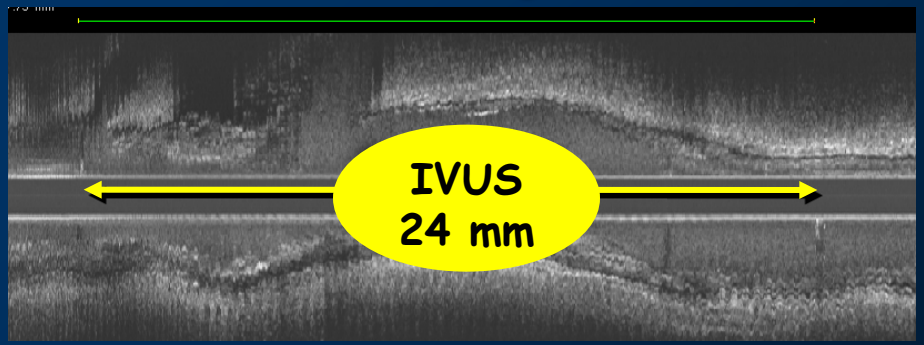


Extension by Angio !!!



Extension by IVUS !!!

- MIN DIAMETER LUMEN
- MAX DIAMETER LUMEN
- DIAMETER MID-MID

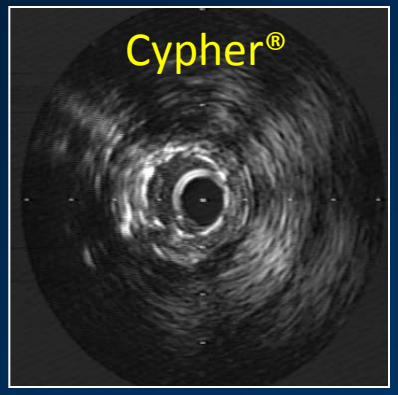


Images Hospital Cardiológico Costantini

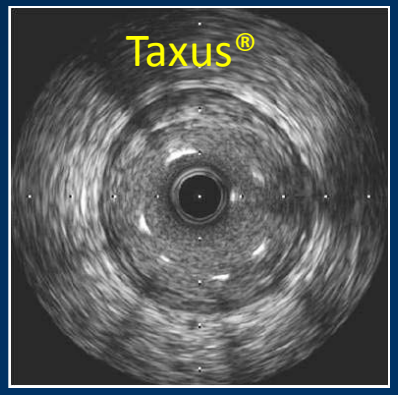
Angiography don't give information !!!

We need new stents or a better technique

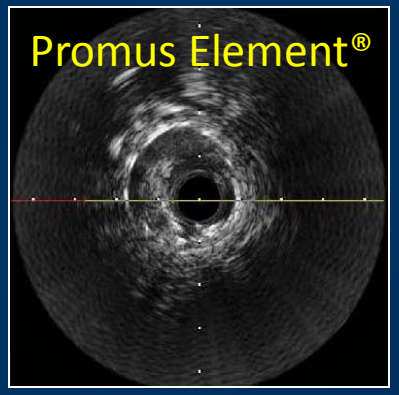
Or BOTH ?????



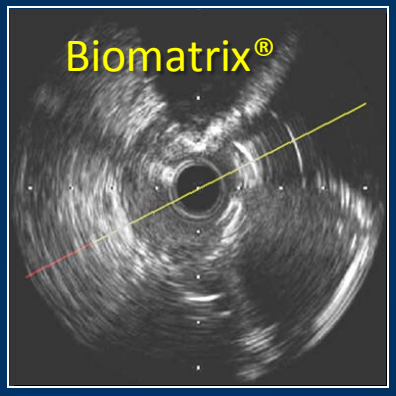
Underexpansion

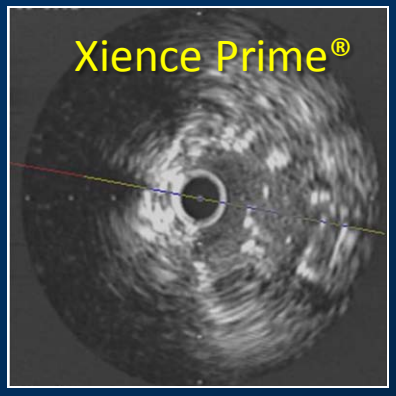


Mallaposition



Invagination





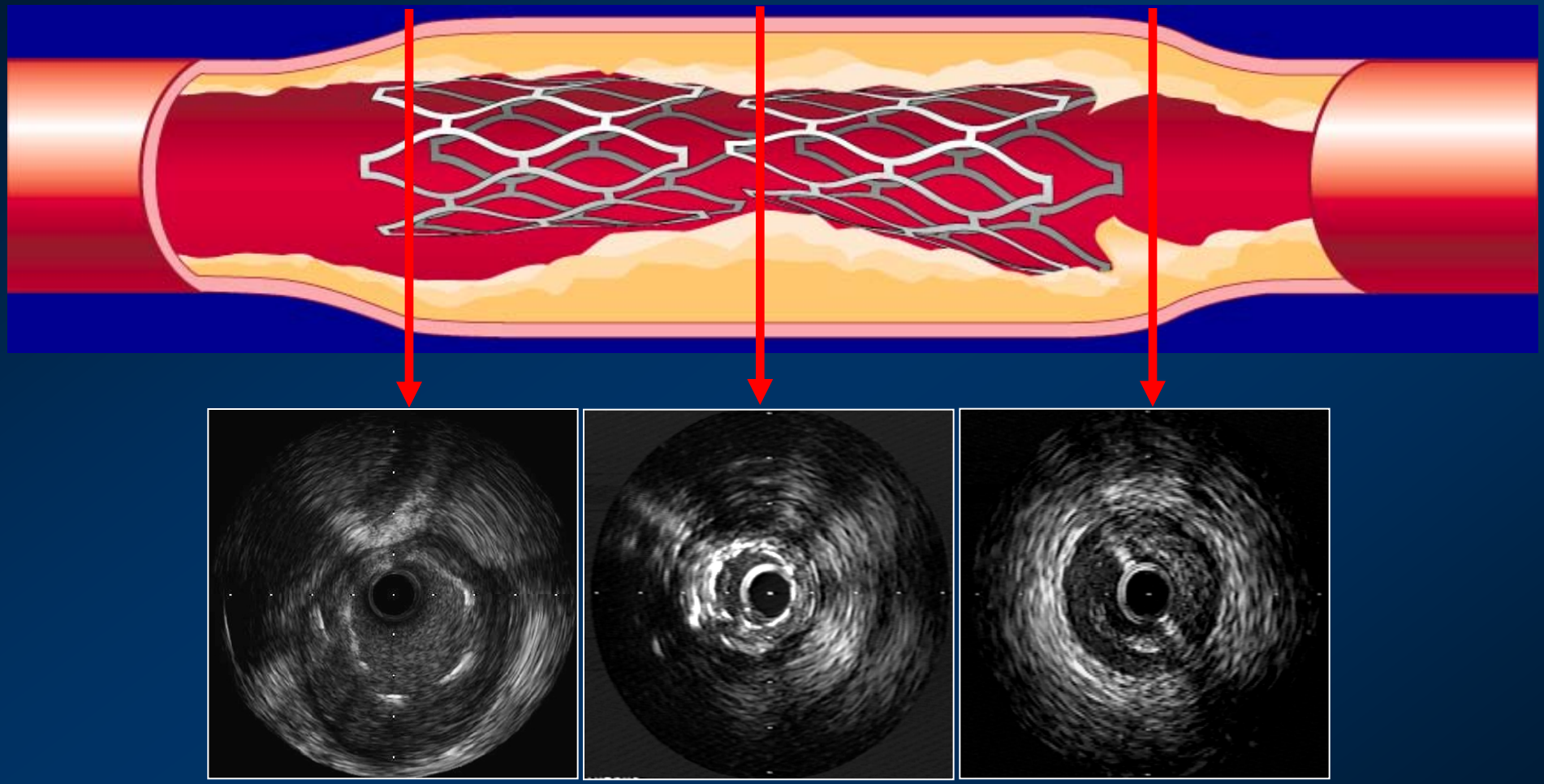
Reint. 27%

Strut Protusion in Bifurcation

Images Hospital Cardiológico Costantini

Angiography don't give information !!!

Potential Mechanical Reasons for ISR or Thrombosis in BMS/DES



Incomplete Apposition

Underexpansion

Edge Trauma

Imagens Hospital Costantini

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Angiography don't give information !!!

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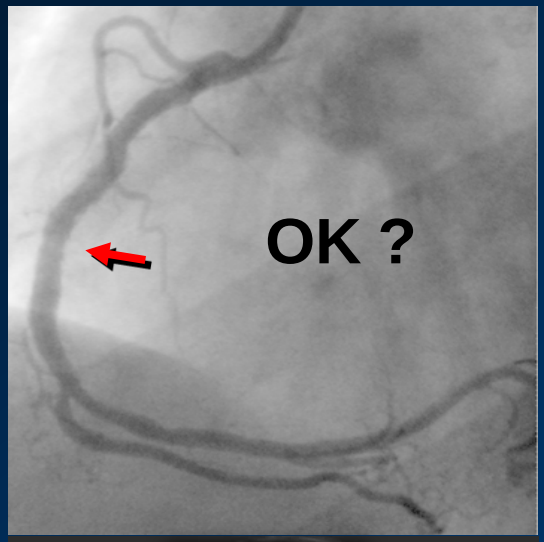
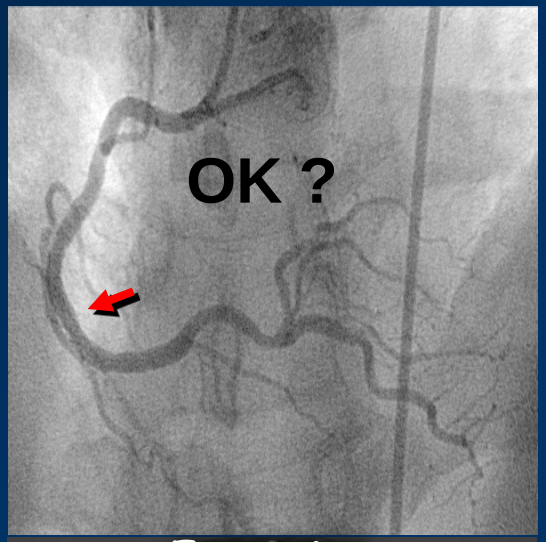
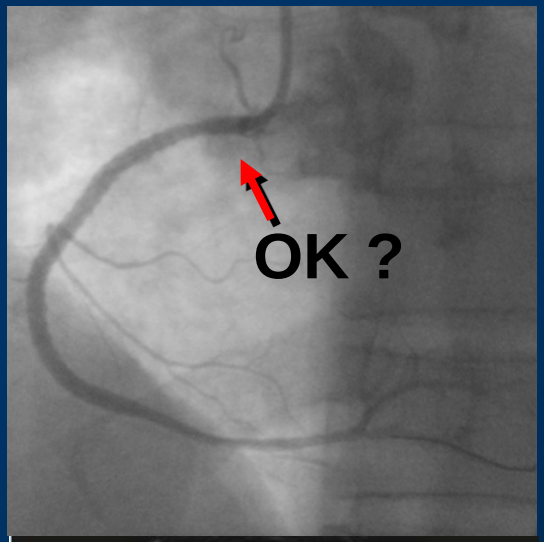
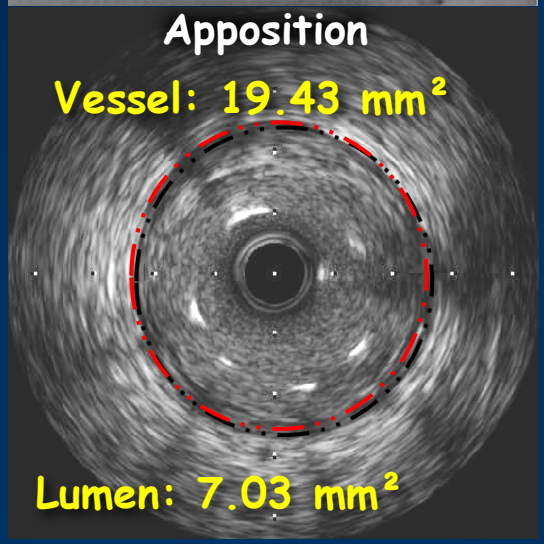
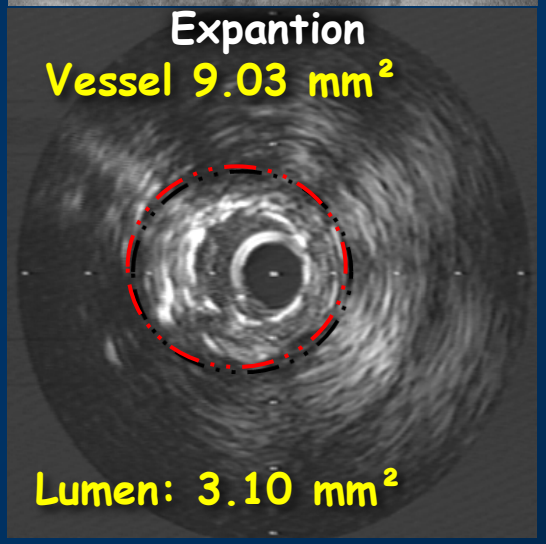
Assessment of Stent Implantation !!!

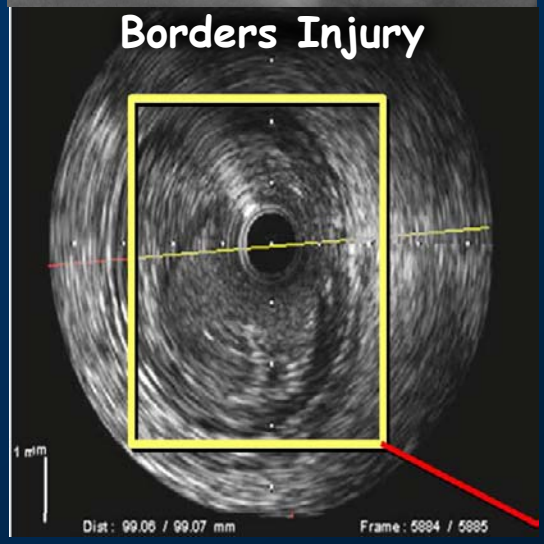












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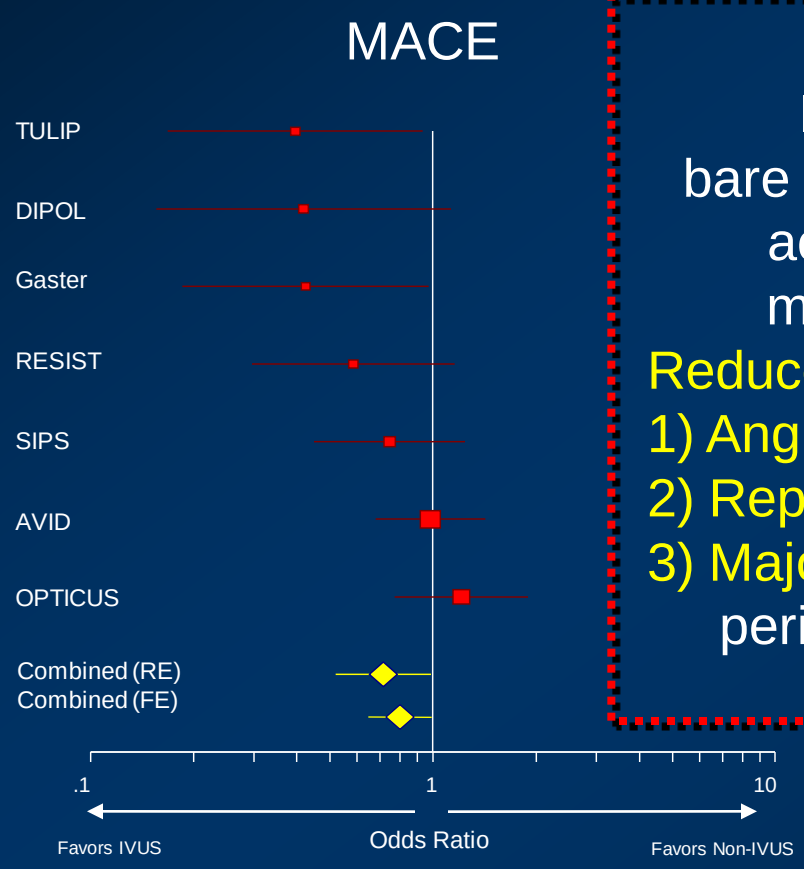
Angiography don't give information !!!

Fundação Francisco Costantini

Meta-Analysis of Randomized Studies Comparing Intravascular Ultrasound Versus Angiographic Guidance of Percutaneous Coronary Intervention in Pre–Drug-Eluting Stent Era



In conclusion, IVUS guidance for bare metal stent implantation improved the acute procedural results (angiographic minimum lumen diameter) and thereby

Reduced:

1) Angiographic restenosis
2) Repeat revascularization
3) Major adverse cardiac events, a follow-up period of 6 months to 2,5 years.

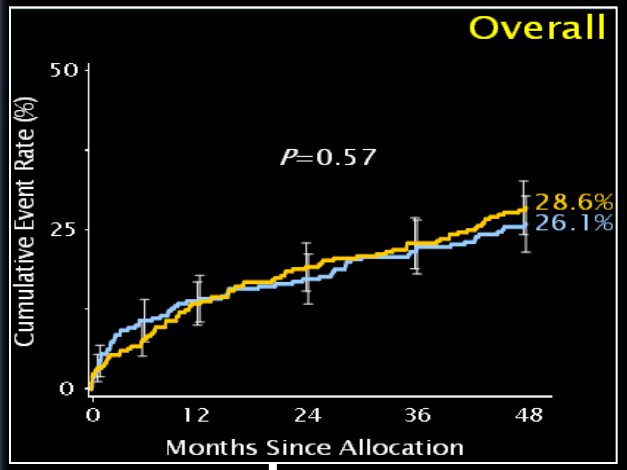
Am J Cardiol 2011;107:374 –382

Angiography don't give information !!!

SYNTAX Score MACCE !!!! 4 Years !!!!

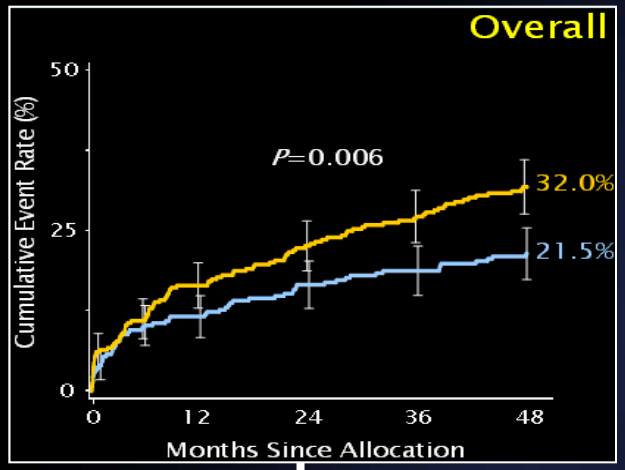
3 Vessel disease

SYNTAX Score 0-22



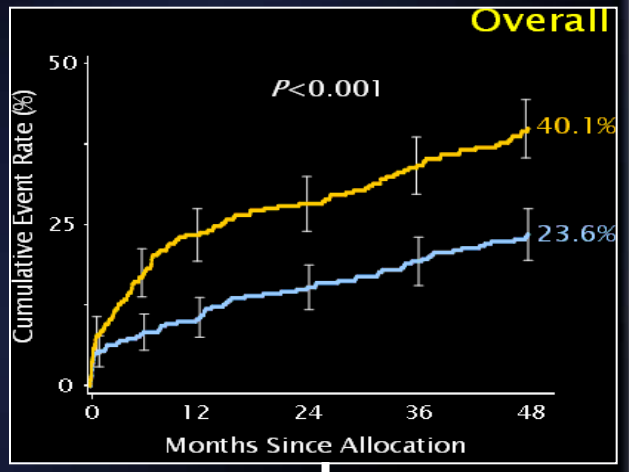
PCI

SYNTAX Score 23-32



CABG

SYNTAX Score ≥ 33



CABG

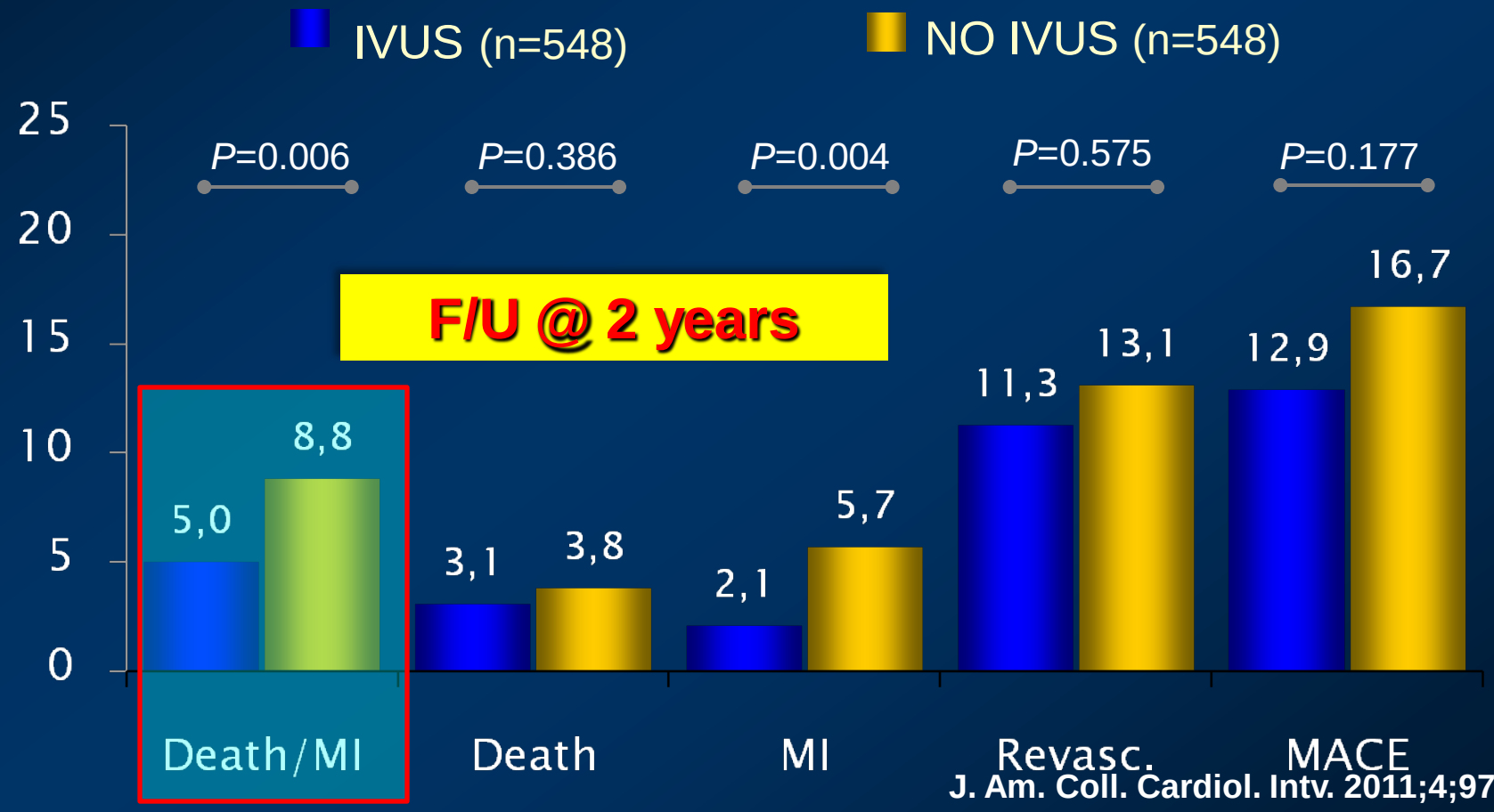
< 10% with IVUS ?????

CABG TAXUS

Presented P. Serryus TEAM 2011, Adapted C. Costantini SBHCI 2011

Impact of Intravascular Ultrasound Imaging on Early and Late Clinical Outcomes Following Percutaneous Coronary Intervention With Drug-Eluting Stents

(George D. Dangas, MD – 2011)



J. Am. Coll. Cardiol. Intv. 2011;4;974-981

Angiography don't give information !!!

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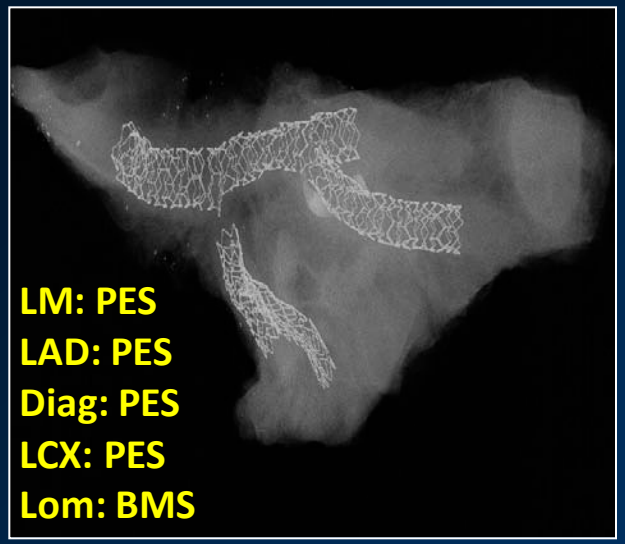
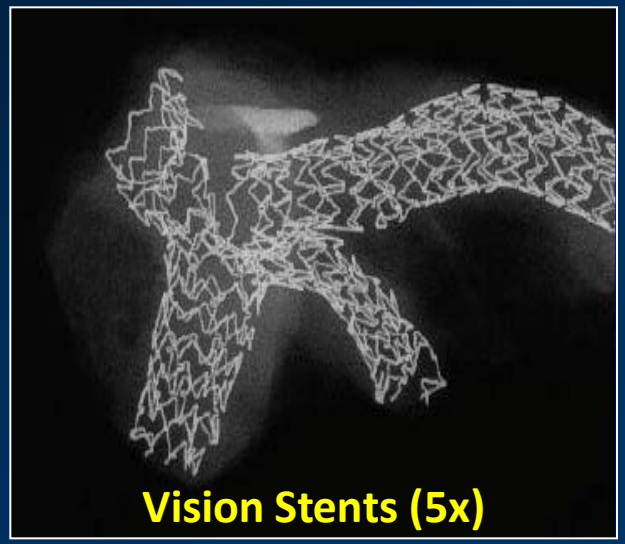
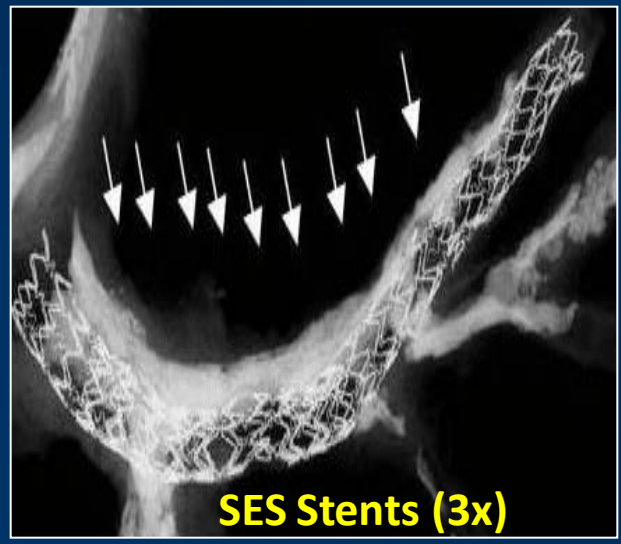






Vorpahl M, Virmani R. presented ACC 2010

!!!!! 1995 !!!!!

Who Was Thrombogenic: The Stent or the Doctor?

Patrick W. Serruys, MD, PhD; Carlo Di Mario, MD, PhD

Patrick Serruys. Circulation. 1995;91:1891-1893

IVUS Predictors of BMS
Thrombosis & Restenosis

	Thrombosis	Restenosis
Small MSA or underexpansion	• Cheneau et al. Circulation 2003;108:43-7	• Kasaoka et al. J Am Coll Cardiol 1998;32:1630-5 • Castagna et al. AHJ 2001;142:970-4 • de Feyter et al. Circulation 1999;100:1777-83 • Sonoda et al. J Am Coll Cardiol 2004;43:1959-63 • Morino et al. Am J Cardiol 2001;88:301-3 • Ziada et al. Am Heart J 2001;141:823-31 • Doi et al. JACC Cardiovasc Interv. 2009;2:1269-75
Edge problems (geographic miss, secondary lesions, large plaque burden, dissections, etc)	• Cheneau et al. Circulation 2003;108:43-7	• Sakurai et al. Am J Cardiol 2005; 96:1251-3 • Liu et al, Am J Cardiol, 2009;103:501-6
Stent length		• Kasaoka et al. J Am Coll Cardiol 1998;32:1630-5 • de Feyter et al. Circulation 1999;100:1777-83

Oral presentation, TCT 2011 • G. Mintz

HOSPITAL CARDIOLÓGICO COSTANTINI

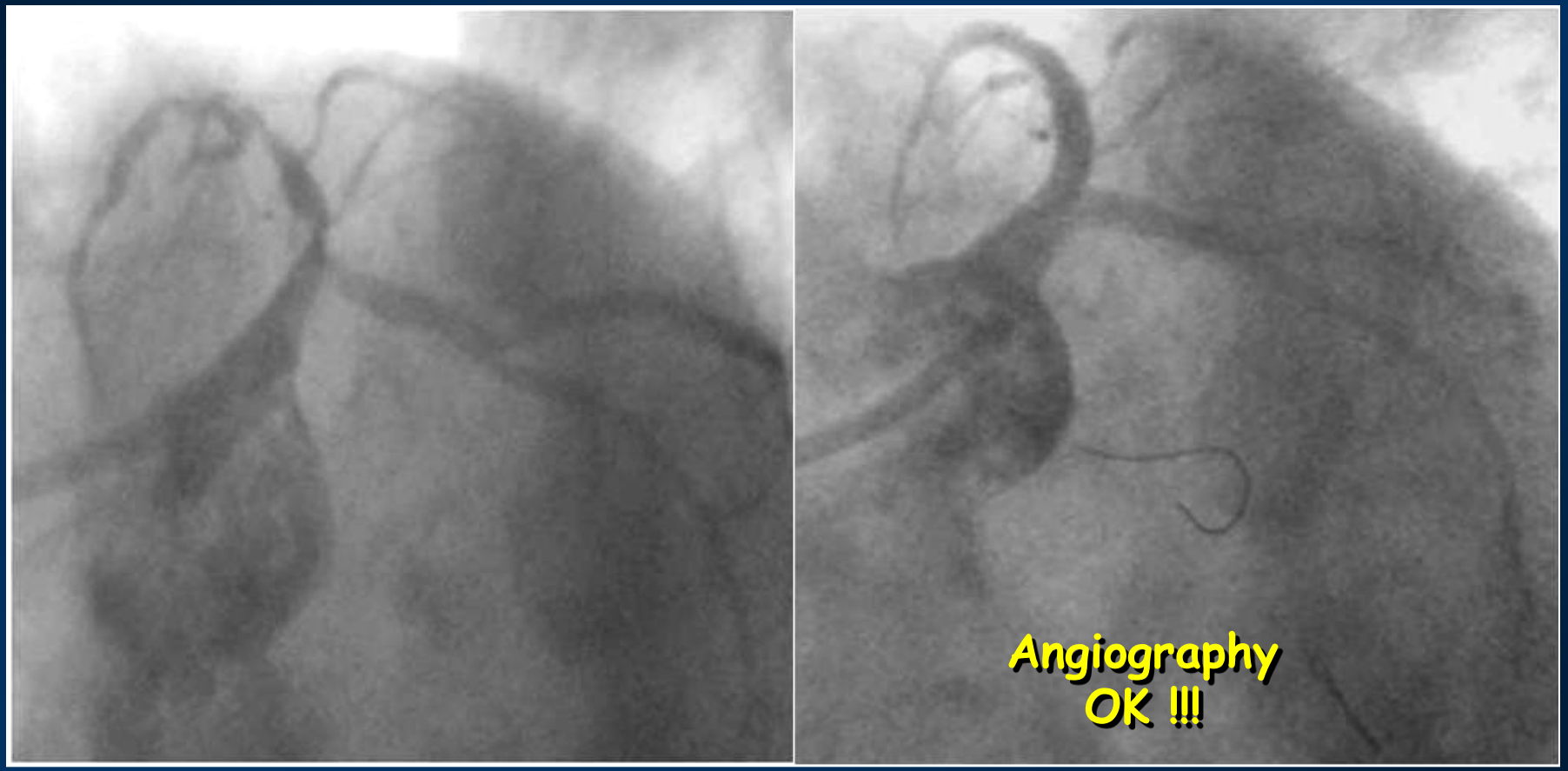
Angiography don't give information !!!

Fundação Francisco Costantini

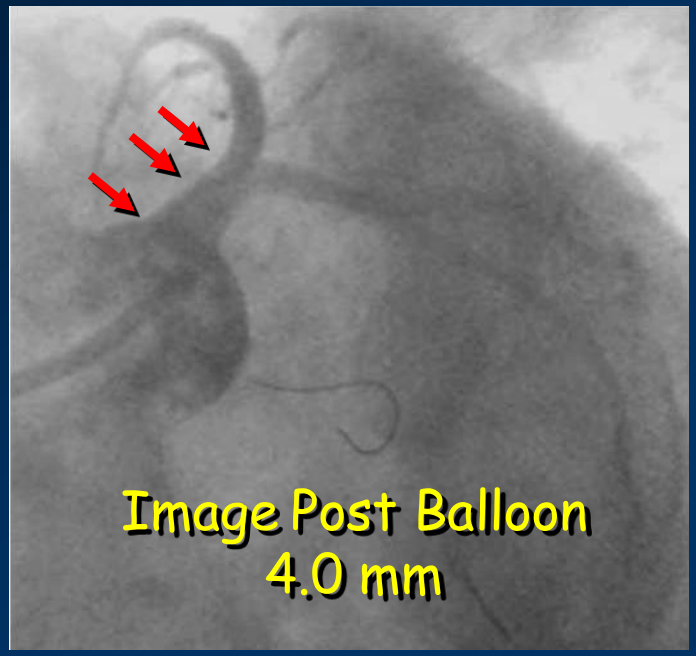
Plaque Diameter !!!

Pre Intervention

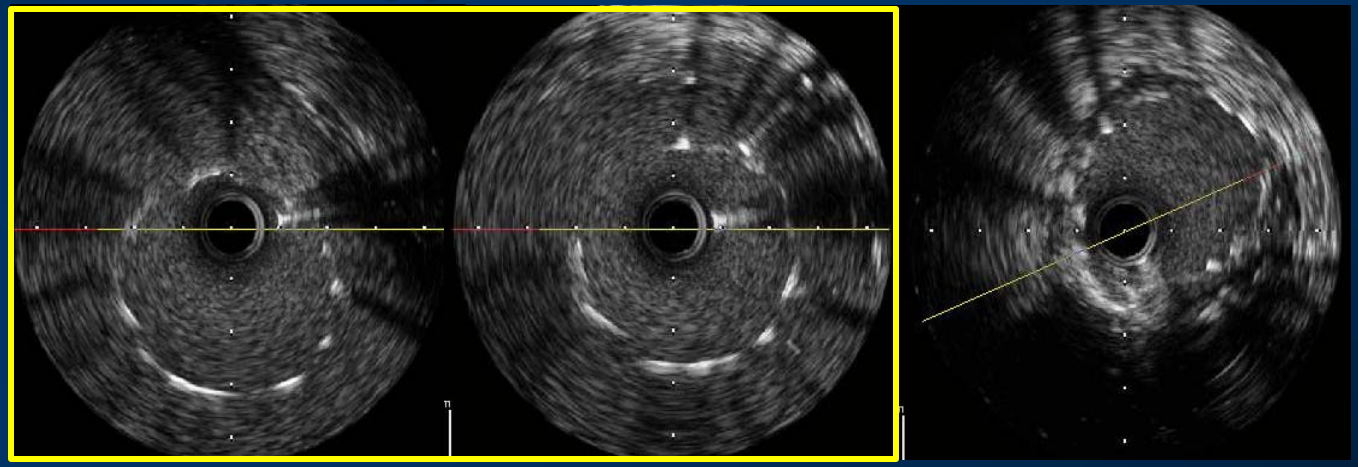
Image Post Stents



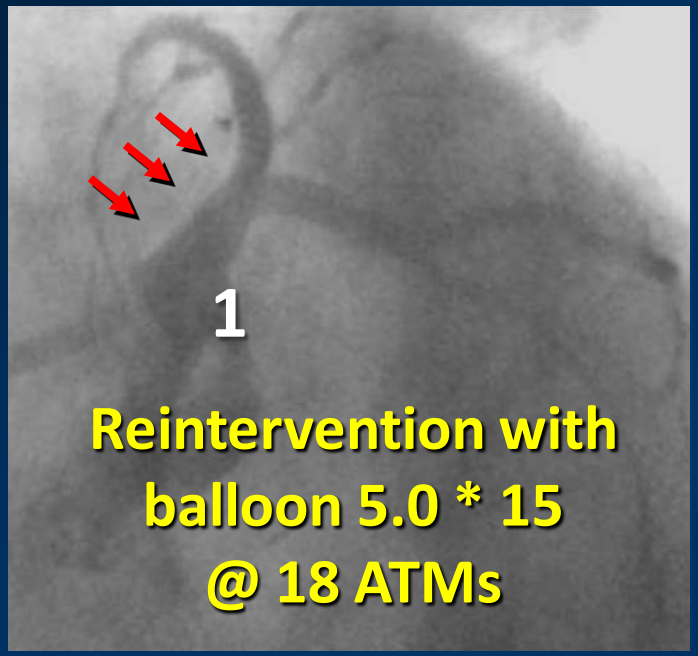
1- Taxus 3.5 * 32
2- Taxus 3.5 * 8
3- Taxus 3.0 * 32



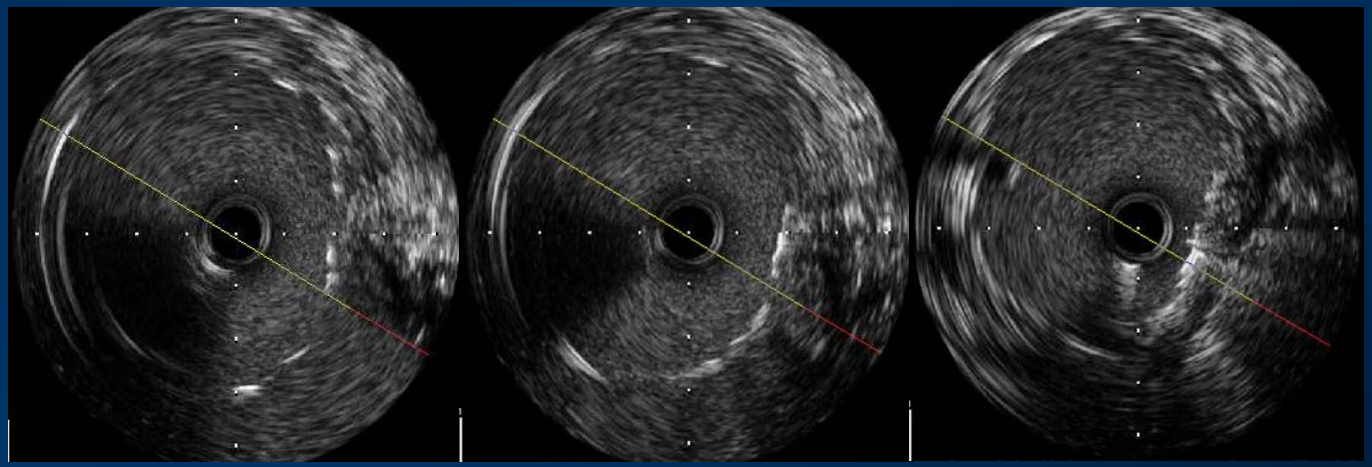
Malapposition

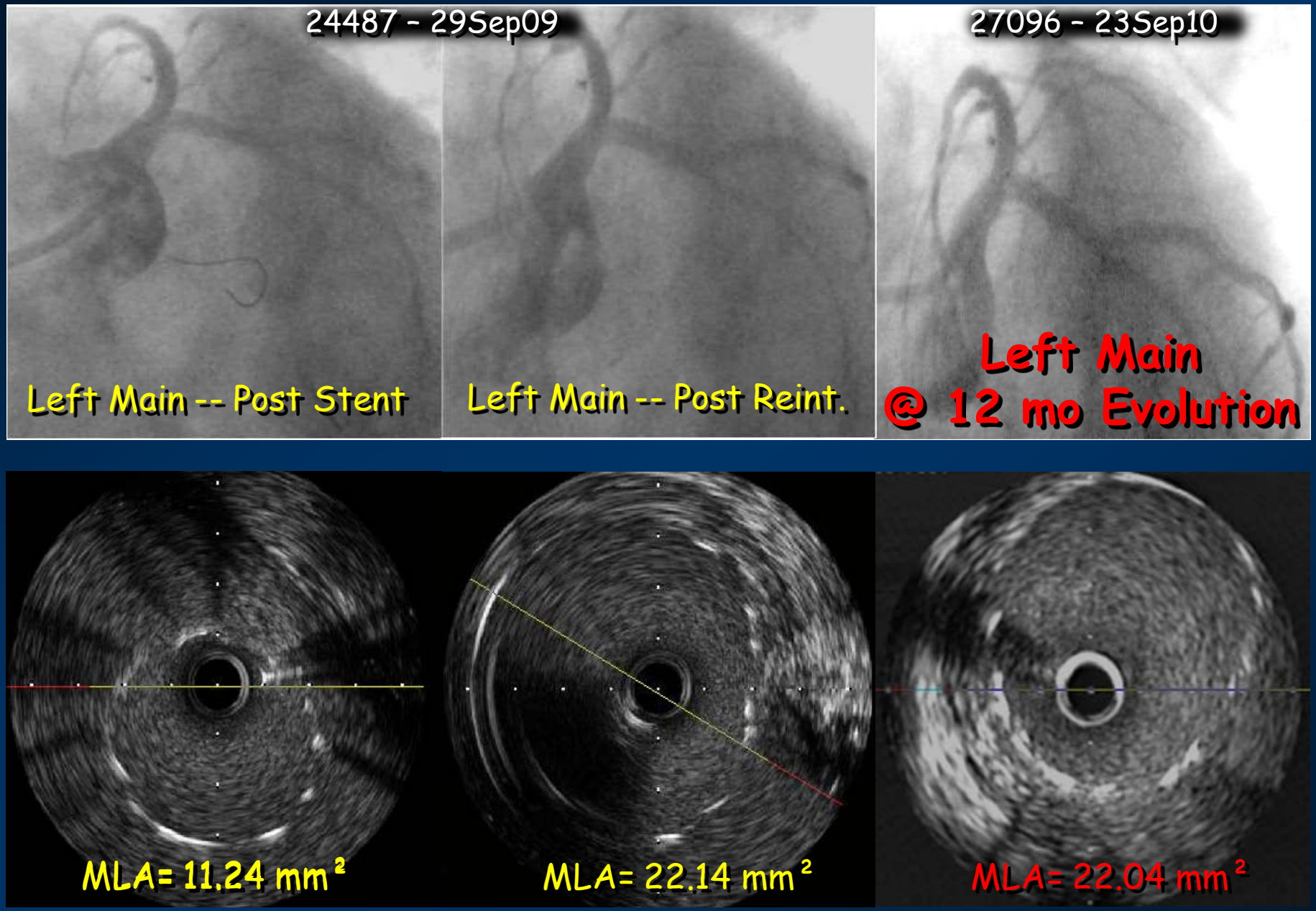


1- Ballon 5.0 *
15 at 18 ATM



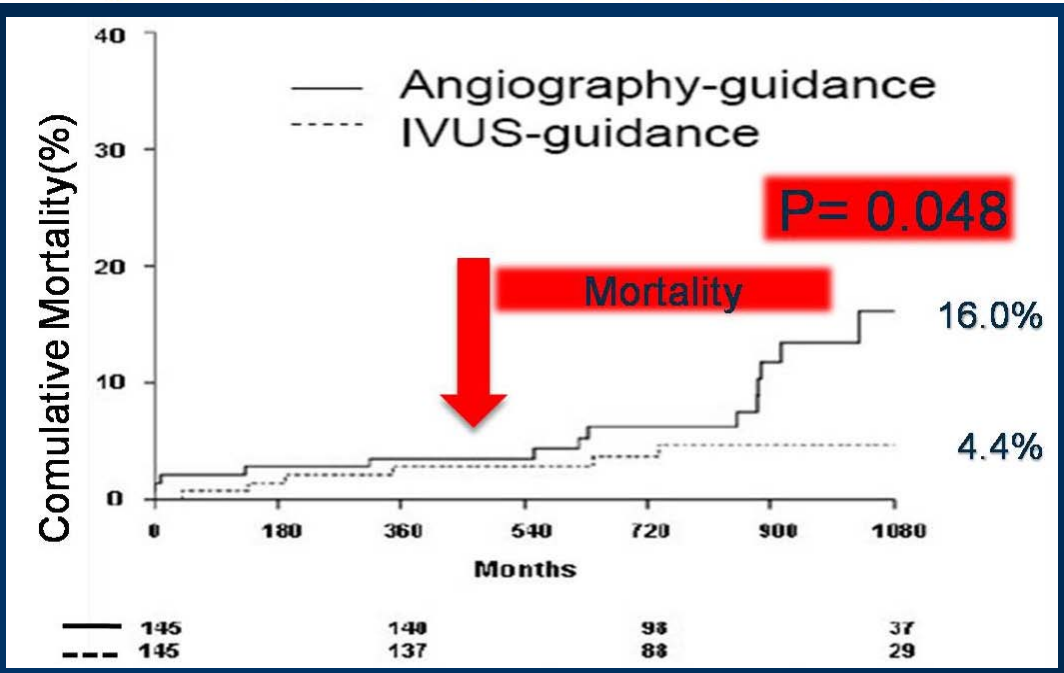
IVUS Post Reintervention




24487 - 29Sep09
27096 - 23Sep10
Left Main -- Post Stent
Left Main -- Post Reint.
Left Main
@ 12 mo Evolution
MLA= 11.24 mm²
MLA= 22.14 mm²
MLA= 22.04 mm²

Impact of Intravascular Ultrasound Guidance on Long-Term Mortality in Stenting for Unprotected Left Main Coronary Artery Stenosis

Seung-Jung Park, MD, PhD*; Young-Hak Kim, MD, PhD*; Duk-Woo Park, MD, PhD; Seung-Whan Lee, MD, PhD; Won-Jang Kim, MD, PhD; Jon Suh, MD; Sung-Cheol Yun, PhD; Cheol Whan Lee, MD, PhD; Myeong-Ki Hong, MD, PhD; Jae-Hwan Lee, MD, PhD; Seong-Wook Park, MD, PhD; for the MAIN-COMPARE Investigators

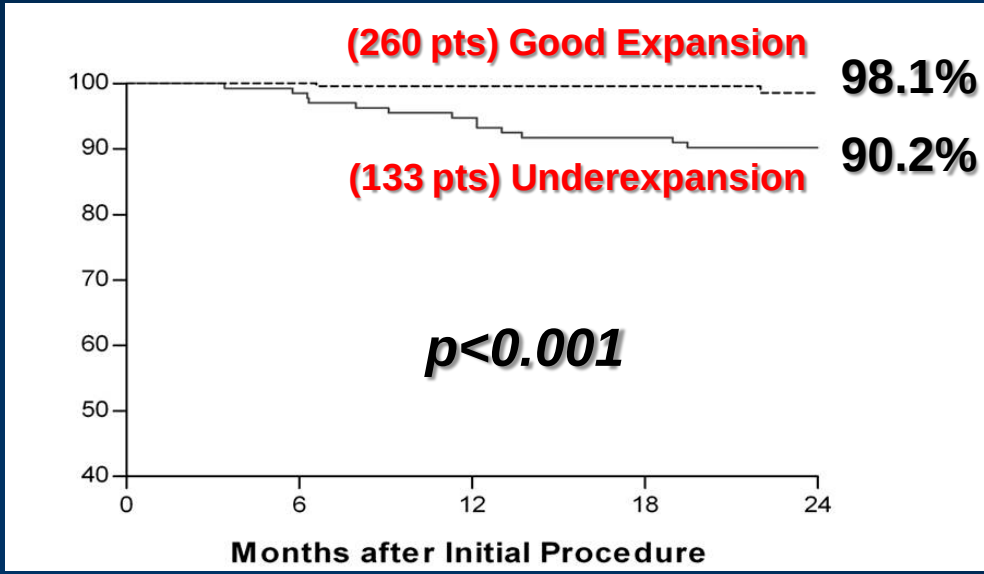


Conclusions: PCI IN Left main IVUS guidance, reduce the long-term mortality rate for unprotected left main coronary artery stenosis when compared with conventional angiography guidance.

Park SJ et al, Circ Cardiovasc Intervent. 2009;2:167-177

Comprehensive Intravascular Ultrasound Assessment of Stent Area and Its Impact on Restenosis and Adverse Cardiac Events in 403 Patients With Unprotected Left Main Disease

UnderExpansion Mortality Predictor !!!!



Conclusion

A smaller IVUS-MSA within any one of these segments was responsible for a higher rate of angiographic ISR and clinical MACE. Correcting underexpansion with these optimal IVUS criteria using IVUS guidance during LM stenting procedures may reduce cardiac events after DES treatment for unprotected LM disease.

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

IVUS Recomendations

Ultra-Som Intracoronário na Cardiologia Intervencionista	Recomendação	Nível de Evidência
Avaliação de estenose coronária de grau moderado (50-70% do porcentual de estenose) à cinecoronariografia*	IIa	B
Monitoração rotineira da intervenção coronária percutânea com implante de stents coronários	IIa	A
Avaliação da presença de doença arterial coronária em pacientes submetidos a transplante cardíaco	IIb	C

Table 33 Recommendations for specific percutaneous coronary intervention devices and pharmacotherapy

	Class[a]	Level[b]	Ref.[c]
IVUS-guided stent implantation may be considered for unprotected left main PCI.	IIb	C	—

Recommendation	COR	LOE
IVUS for the assessment of angiographically indeterminate left main CAD	IIa	B
IVUS to determine the mechanism of stent restenosis	IIa	C
IVUS for the assessment of non-left main angiographically intermediate stenoses	IIb	B
IVUS for guidance of coronary stent implantation	IIb	B
IVUS to determine the mechanism of stent thrombosis	IIb	C

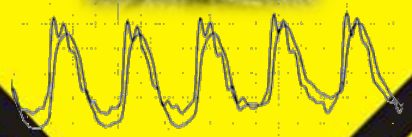
2008 Arq Bras Cardiol 2008;91
European Heart Journal (2010) 31, 2501–2555
2011 ACCF/AHA/SCAI Guideline for PCI and Coronary Revascularization

Fractional Flow Reserve

The Wave of The Moment.....

!!ATENÇÃO!!

QCA
82 %



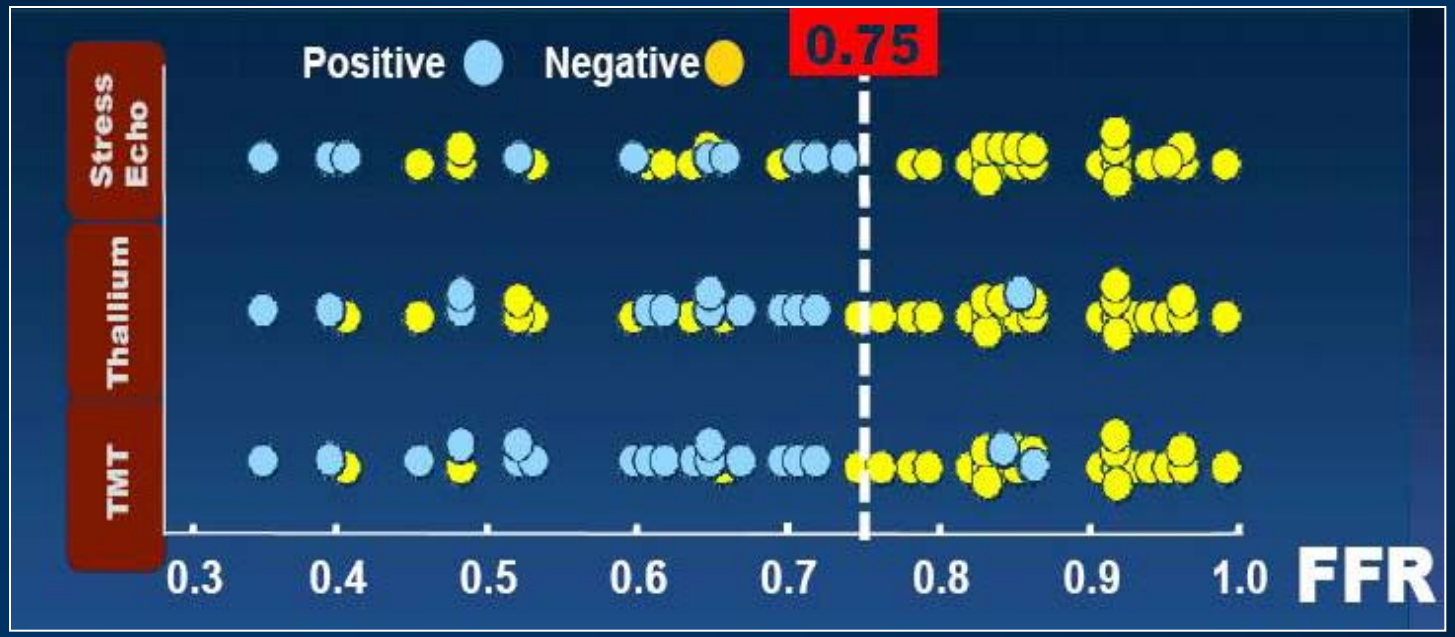
0,95

FFR A FRENTE

First Validation of FFR

45 patients !!!!!!

Comparison with 3 non-invasive functional studies



- N = 45 patients
- Sensitivity 88%, Specificity 100%, PPV 100%, NPV 88%

N Engl J Med 1996;334:1703-8

First Validation of FFR
45 patients !!!!!!

1996

MEASUREMENT OF FRACTIONAL FLOW RESERVE TO ASSESS THE FUNCTIONAL SEVERITY OF CORONARY-ARTERY STENOSES

NICO H.J. PIJLS, M.D., PH.D., BERNARD DE BRUYNE, M.D., KATHINKA PEELS, M.D., PEPIJN H. VAN DER VOORT, M.D., HANS J.R.M. BONNIER, M.D., PH.D., JOZEF BARTUNEK, M.D., AND JACQUES J. KOOLEN, M.D., PH.D.

N Engl J Med 1996;334:1703-8

First Validation of FFR (45 patients !!!!!!)

Table 1. Characteristics of the Patients, Results of Noninvasive Tests, and Quantitative Angiographic Measurements.*

Chest pain of uncertain origen

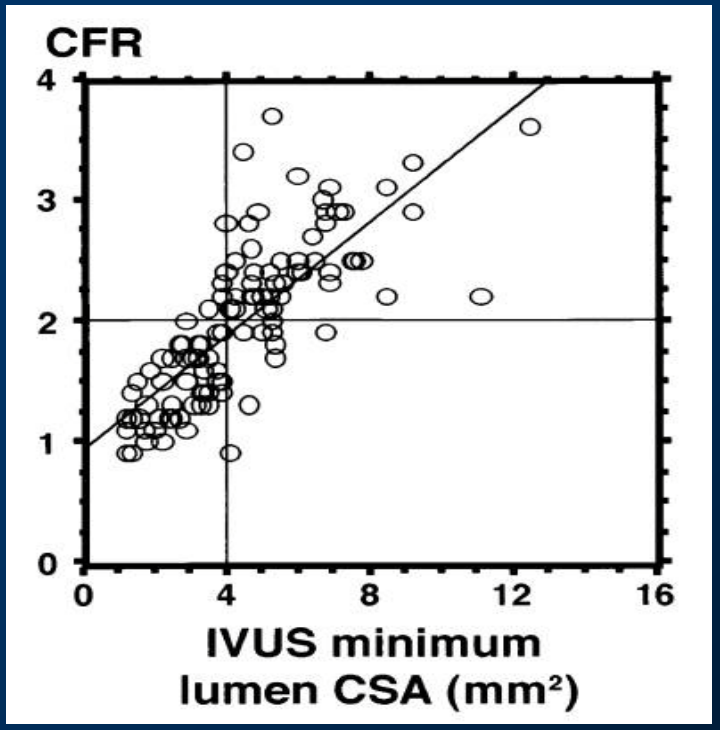
VARIABLE	STUDY GROUP	
	FFR ≥0.75 (N = 24)	FFR <0.75 (N = 21)
		PTCA or CABG
Reference diameter (mm)	3.31±0.67	3.10±0.63
Percent stenosis	44 ± 9	41 ± 8
Minimal luminal diameter (mm)	1.94±0.47	1.78±0.41
Exercise test and thallium scanning		
Positive exercise tests (no.)	2	16
Positive thallium scans (no.)	1	12
Stress echocardiography		
Positive tests (no.)	0	10

N Engl J Med 1996;334:1703-8

Clinical, Intravascular Ultrasound, and Quantitative Angiographic Determinants of the Coronary Flow Reserve Before and After Percutaneous Transluminal Coronary Angioplasty

TABLE II Univariate Angiographic Correlates of Coronary Flow Reserve in All 112 Observations

	Mean ± SD	r	p Value
Left ventricular ejection fraction (%)	52 ± 9	0.261	0.0696
Lesion length (mm)	8.1 ± 4.9	0.239	0.0339
Proximal reference (mm)	3.11 ± 0.54	0.344	0.0008
Distal reference (mm)	2.77 ± 0.47	0.275	0.0061
Minimum lumen diameter (mm)	1.75 ± 0.70	0.572	<0.0001
Diameter stenosis (%)	40 ± 22	0.467	<0.0001



Intravascular ultrasound versus Doppler velocimetric correlations: In the present study, an IVUS minimum lumen CSA of 4.0 mm² predicted a CFR of 2.0 with a diagnostic accuracy of 89%.

Abizaid , Am J Cardiol 1998;82:423–428

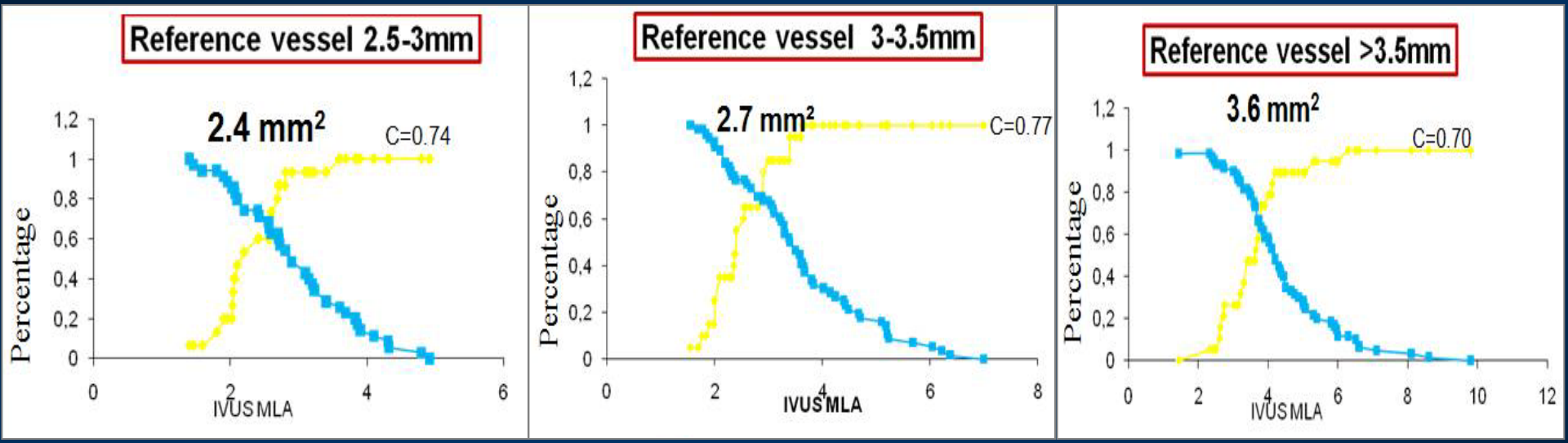
IVUS
Validation Criteria for INTERVENTION
?????????

	Comparasion	Threshold
Abizaid, et al. (AJC 1998)	CRF	**MLA < 4.0 mm²**
Nishioka, et al. (JACC1999)	SPECT	**MLA < 4.0 mm²**
Takagi, et al. (Circ 1999)	FFR	**MLA < 3.0 mm²**
Briguori, et al. (AJC 2001)	FFR	**MLA < 4.0 mm²**

Correlation between fractional flow reserve and intravascular ultrasound lumen area in intermediate coronary artery stenosis

Itsik Ben-Dor, MD; Rebecca Torguson, MPH; Michael A. Gaglia, Jr., MD, MSc; Manuel A. Gonzalez, MD, MPH; Gabriel Maluenda, MD; Anh B. Bui, MD; Zhenyi Xue, MS; Lowell F. Satler, MD; William O. Suddath, MD; Joseph Lindsay, MD; Augusto D. Pichard, MD; Ron Waksman*, MD

92 PATIENS- STENOSIS 40—70% 2011



Methods

From July 2007 to October 2009, 92 intermediate lesions in major epicardial coronary vessels of 84 patients were studied consecutively by QCA, IVUS, and FFR during diagnostic coronary angiography. Intermediate coronary stenosis was defined as a stenosis of 40-70% by QCA.

Ben-Dor et al. Eurointervension 2011 7:225-33

New IVUS MLA
matched with FFR <0.80

201 Patiens with LESION 30—75%

2.4 mm²

Kang SJ, Park SJ, Circ Cardiovasc Interv. 2011;4: 65-71

CardioVascular Research Foundation

UNIVERSITY OF ULSAN COLLEGE MEDICINE

ASAN Medical Center

ment preintervention; all 201 patients were included in the current analysis. All patients were 35 to 85 years of age and had at least 1 target vessel with a mild to intermediate de novo lesion (30% to 75% of diameter stenosis on visual estimation). Exclusion criteria were

May 1997 to February 1998

28 PACIENTES
LESÃO < 70%

Angiografia(QCA)
% ESTENOSE 64%
DLM 1,7 ± 0,3
D. REF 3,15 ± 0.5

Adenosine
IC

IVUS
% ESTENOSE 60%
DLM 2,2 ± 0,4
D. REF 3,48 ± 0.48

? **?**

FFR > 0.75
71,5%

?

PROVA FUNCIONAL +
71,4%

28.5% **Wrong Decision** **71.4%**

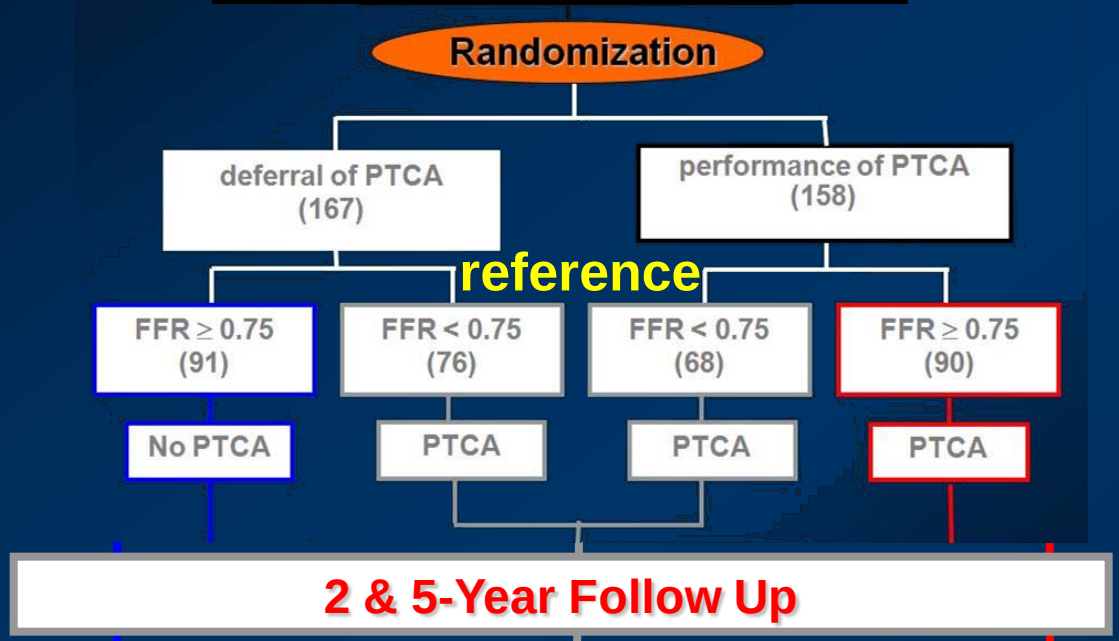
C. Costantinl. SOLACI 1998

Patients scheduled for PCI
Without Proof of Ischemia
(n= 325)

CINE ??????

DEFER

DEFER



	DEFER Group	REFERENCE Group	PERFORM Group
2yr	Deadh/MI (2.2%)	Deadh/MI (9.4 %)	Deadh/MI (4.4 %)
5yr	Deadh/MI (3.3%)	Deadh/MI (15.7 %)	Deadh/MI (7.9 %)

Pijls et al. J am Coll Cardiol 2007;49:2105-11

The *DEFER* Study

TABLE 2. Angiographic Data and FFR Results

	FFR ≥0.75		FFR <0.75:
	Deferral Group (n=91)	Performance Group (n=90)	Reference Group (n=144)
Target coronary artery, %			
Left anterior descending	52	48	51
Right	23	24	38*
Left circumflex	25	28	12*
Baseline severity of CAD, %			
Single-vessel disease	65	68	74
Two-vessel disease	27	29	22
Three-vessel disease	8	3	4
FFR by adenosine			
Intravenously (n=188)	0.87±0.06	0.86±0.07	0.56±0.16*
Intracoronary (n=137)	0.86±0.07	0.88±0.07	0.58±0.16*
Angiography at baseline			
Reference diameter, mm	3.00±0.64	2.94±0.57	2.97±0.58
Percent stenosis	**48 ± 9**	**48 ± 10**	**52 ± 12**
Minimal lumen diameter, mm	1.55±0.37	1.50±0.36	1.28±0.39*

Circulation 2001, 103:2928-2934

FAME

Angiographic characteristic

Characteristic	Angiography Group (N=496)	FFR Group (N=509)
Angiographic Findings		
Indicated lesions per patient — no.§	2.7±0.9	2.8±1.0
Extent of occlusion — no. of lesions/total no. (%)		
50–70% narrowing	550/1350 (40.7)	624/1414 (44.1)
71–90% narrowing	553/1350 (41.0)	530/1414 (37.5)
91–99% narrowing	207/1350 (15.3)	202/1414 (14.3)
Total occlusion	40/1350 (3.0)	58/1414 (4.1)
Patients with total occlusion — no. (%)	37 (7.5)	54 (10.6)
Quantitative coronary analysis		
Extent of stenosis — %	61.2±16.6	60.4±17.6
Minimal luminal diameter — mm	1.0±0.4	1.0±0.5
Reference diameter — mm	2.5±0.6	2.5±0.7
Lesion length — mm	12.6±6.9	12.5±6.5
SYNTAX score¶	14.5±8.8	14.5±8.6
EQ-5D score‖	64.7±19.2	66.5±18.3

98% DES

N Engl J Med 2009;360:213-24.

Results 1 Year FAME

	*ANGIO-group N=496	*FFR-group N=509		
Events at 1 year, No (%)				
MACE	(18.3)	(13.2)		
MI	(8.7)	(5.7)		
Death	(3.0)	(1.8)		
CABG or repeat PCI	(9.5)	(6.5)		

*FAME study: Adverse Events at 1 year ; NEJM 2009;360:213-24
**RAVEL Study N Engl J Med 2002;346:1773-80
*** HCC TAXUS: Adverse Events at 1 year

Results 1 Year
*FAME vs. **Ravel

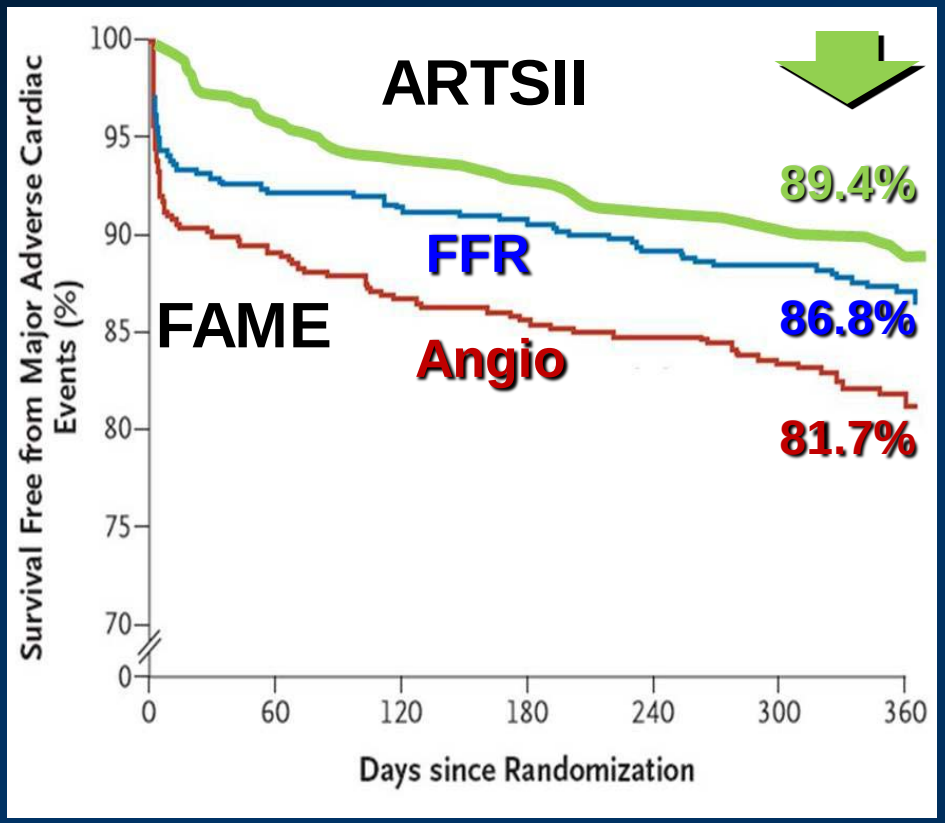
	*ANGIO-group N=496	*FFR-group N=509	**Ravel Cypher N= 120	
Events at 1 year, No (%)				
MACE	(18.3)	(13.2)	(5.8)	
MI	(8.7)	(5.7)	(3.3)	
Death	(3.0)	(1.8)	(1.7)	
CABG or repeat PCI	(9.5)	(6.5)	(0.8) CABG	

*FAME study: Adverse Events at 1 year ; NEJM 2009;360:213-24
**RAVEL Study N Engl J Med 2002;346:1773-80
*** HCC TAXUS: Adverse Events at 1 year

MACCE 1 Year Follow Up

FAME (SX Score 14.5) and ARTSII PCI (SX score 20.7)

ARTSII PCI FAME FFR FAME ANGIO



	ARTSII PCI	FAME FFR	FAME Angio
Death	1.0	1.8	3.0
MI	1.2	5.7	8.7
Revas	8.5	6.5	9.5
MAC(C)E	10.4	13.2	18.3

Oral presentation Serruys; CIT, Beijing, 2009– Adapted Costantini SOLACI 2012

Results 1 Year
*FAME vs. **Ravel vs. *** HCC Taxus

	*ANGIO-group N=496	*FFR-group N=509	**Ravel Cypher N= 120	*** HCC TAXUS N= 411
Events at 1 year, No (%)				**Real World**
MACE	**(18.3)**	**(13.2)**	**(5.8)**	**(5.3)**
MI	**(8.7)**	**(5.7)**	**(3.3)**	**(0.2)**
Death	**(3.0)**	**(1.8)**	**(1.7)**	**(1.3)**
CABG or repeat PCI	**(9.5)**	**(6.5)**	**(0.8) CABG**	**(3.5)**

*FAME study: Adverse Events at 1 year ; NEJM 2009;360:213-24
**RAVEL Study N Engl J Med 2002;346:1773-80
*** HCC TAXUS: Adverse Events at 1 year

Fractional Flow Reserve Guidelines

Table 33 Recommendations for specific percutaneous coronary intervention devices and pharmacotherapy

	Class[a]	Level[b]	Ref.[c]
FFR-guided PCI is recommended for detection of ischaemia-related lesion(s) when objective evidence of vessel-related ischaemia is not available.	I	A	15, 28

Recommendation	COR	LOE
FFR to assess angiographic intermediate coronary lesions and to guide revascularization decisions in patients with SIHD	IIa	A

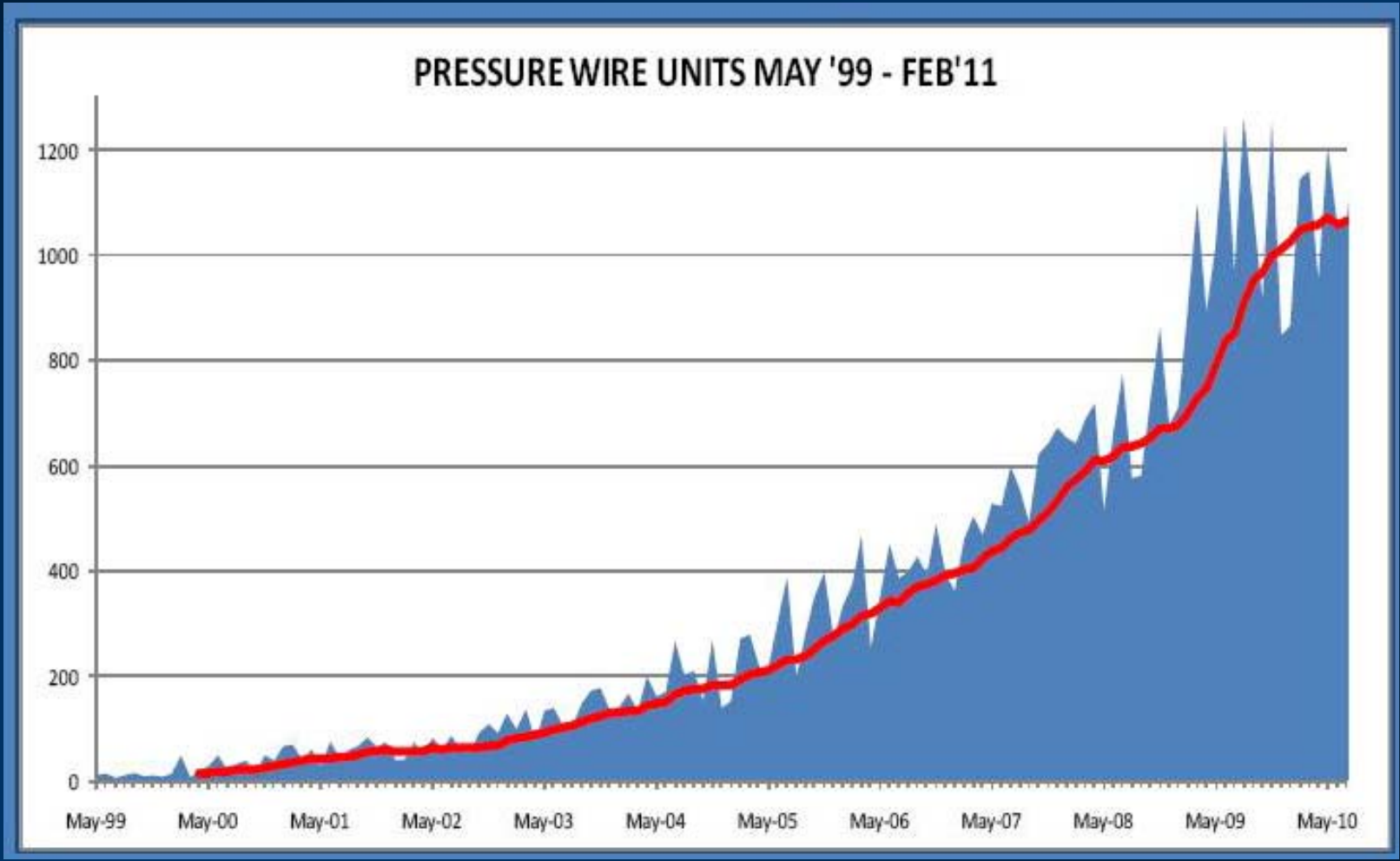
Tabela 15. Medida de pressão intracoronária e reserva fracionada de fluxo do miocárdio

	Recomendação	Nível de evidência
Alternativa à realização de teste não-invasivo de isquemia (inviável ou inconclusivo) para determinar a necessidade de ICP	IIa	B
Avaliação de estenose moderada (50%-70%)	IIa	B
Monitoração rotineira da ICP com stents coronários	IIb	B

2008 Arq Bras Cardiol 2008;91
European Heart Journal (2010) 31, 2501–2555
2011 ACCF/AHA/SCAI Guideline for PCI and Coronary Revascularization

Industry data – FFR Growth 1999-2010

Pressure Wire Units 2010 = 14,500 (16% of all PCI)

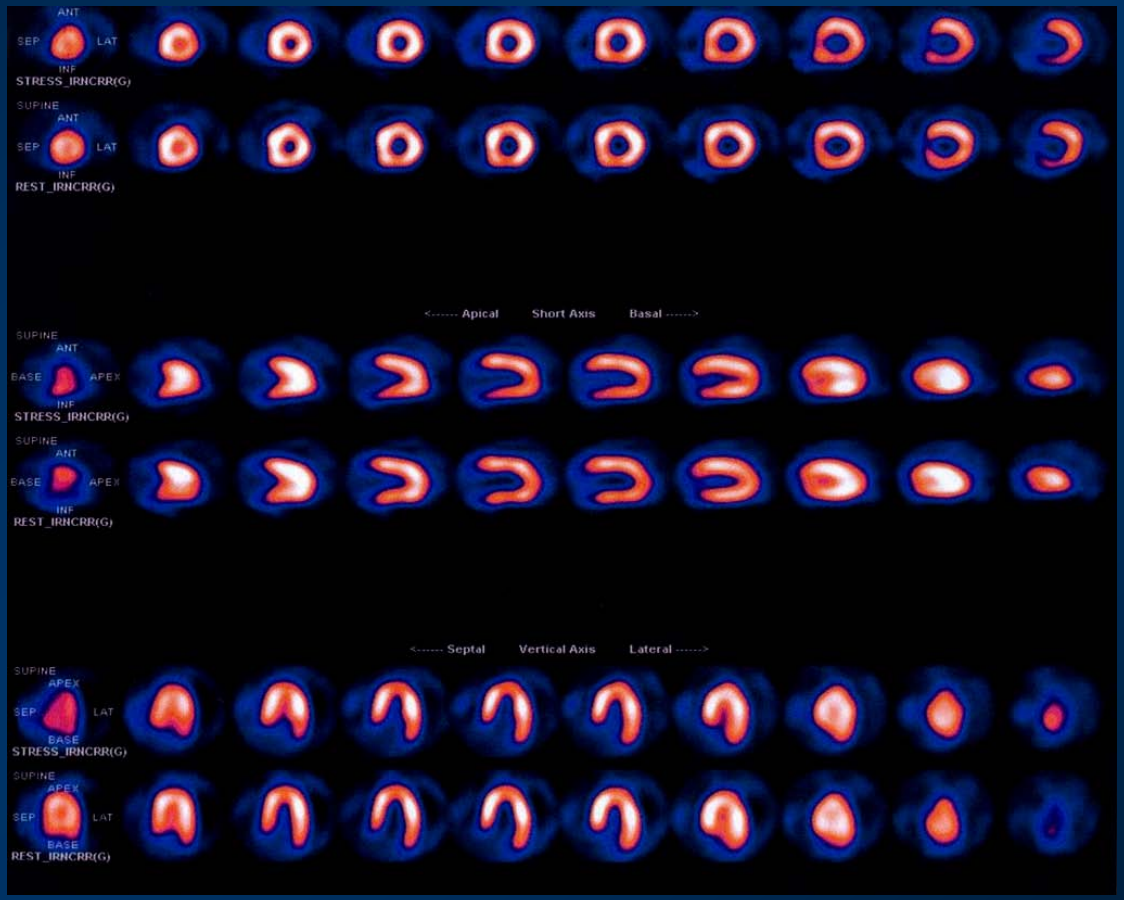


Carlo Di Mario NY 17/06/2011

Progressive fatigue-- chest pain-- and dyspnea from large to medium effort

- ✓ **Hypertension,dyslipidemia, ex, smoking, sedentary**

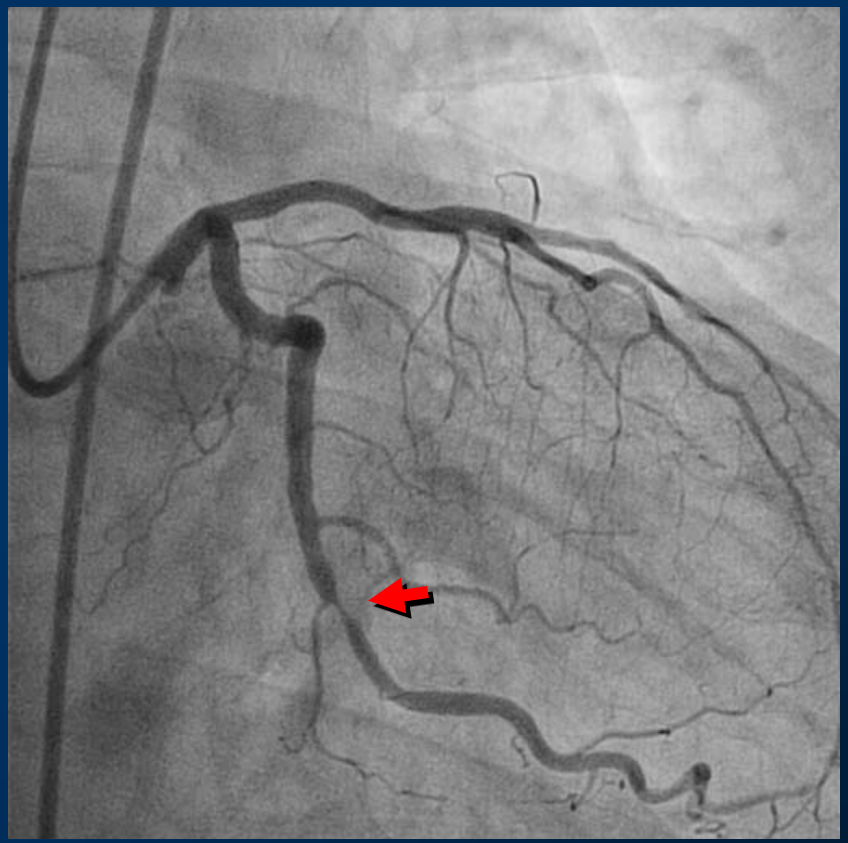
Normal Pefusion and Stress Test



Angiogram

RCA

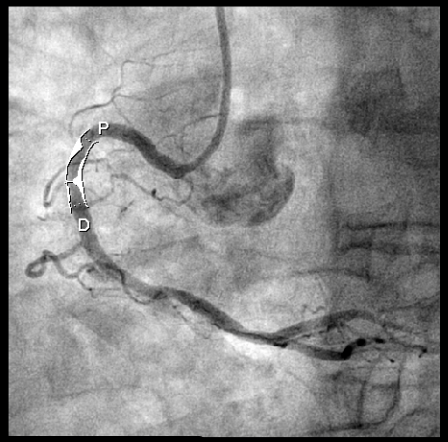
LCx

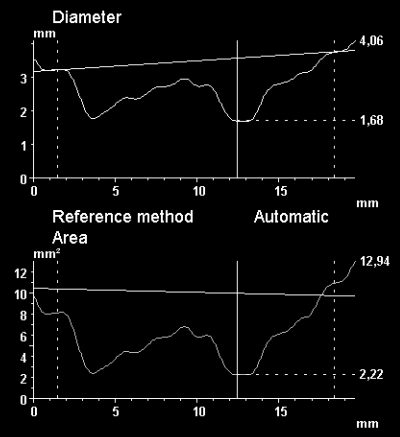


QCA

RCA

Automatic Reference Obstruction Analysis





Sex	30716C1652 Male
Birthdate	14/4/1934
Accession Number	A201203021553085
Physician	Dr. Costantino R. F. C...
Hospital	Hospital Cardiologico ...
Exam date	-
Series - Frame	1 / 1
Rot / Ang	36,40 ; -8,50 °
Segment Name	
Study	
Intervention	
Cal factor	0,1981 mm/pix
Cal object	6,00 French Catheter

Stenosis	(%)
%Diameter	53
%Area(circ)	78

Obstruction Segment

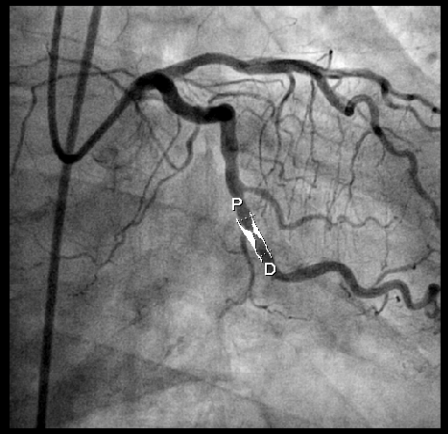
	Diameter (mm)	Area(circ) (mm²)
Lesion	1,68	2,22
Ref	3,56	9,93
Mean	2,58	5,44

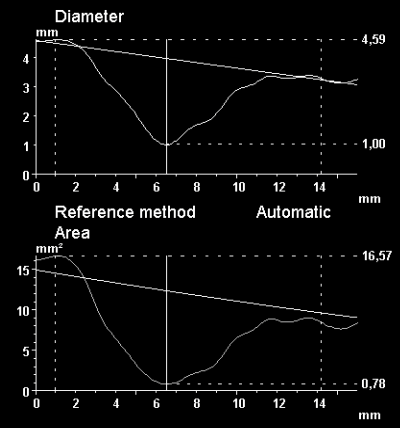
Pos prox	1,49 mm
Obstruction Length	16,88 mm
Plaque A	14,06 mm²
Plaque Symmetry	0,65

78%

LCx

Automatic Reference Obstruction Analysis





Birthdate	30716C1652 Male 14/4/1934
Accession Number	A201203021553085
Physician	Dr. Costantino R. F. C...
Hospital	Hospital Cardiologico ...
Exam date	-
Series - Frame	1 / 1
Rot / Ang	-18,50 ; -7,70 °
Segment Name	
Study	
Intervention	
Cal factor	0,2595 mm/pix
Cal object	7,00 French Catheter

Stenosis	(%)
%Diameter	75
%Area(circ)	94

Obstruction Segment

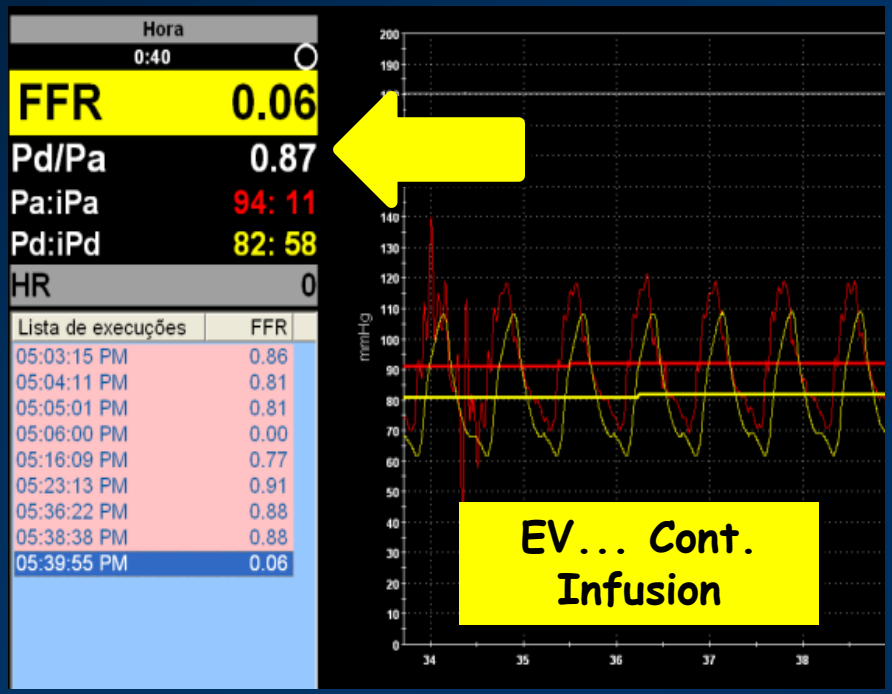
	Diameter (mm)	Area(circ) (mm²)
Lesion	1,00	0,78
Ref	3,99	12,53
Mean	2,80	6,99

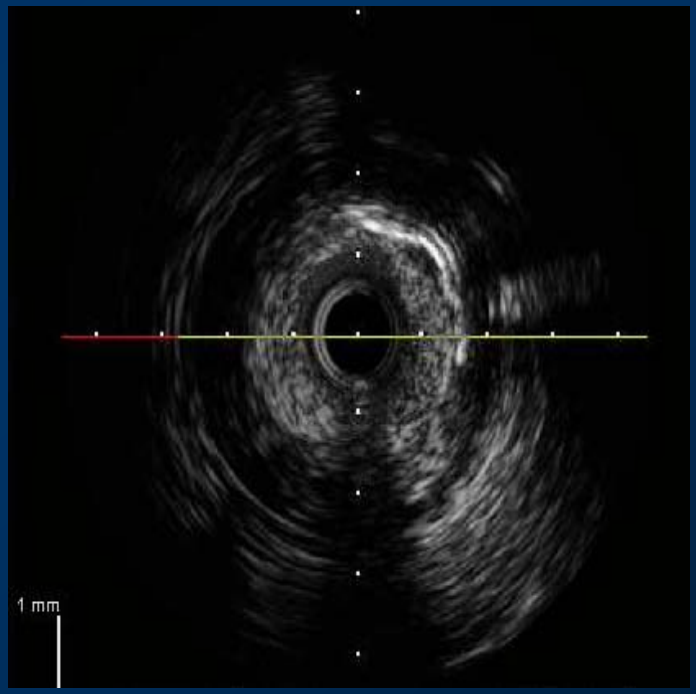
Pos prox	0,96 mm
Obstruction Length	13,23 mm
Plaque A	14,56 mm²
Plaque Symmetry	0,55

94%

IVUS & FFR

RCA



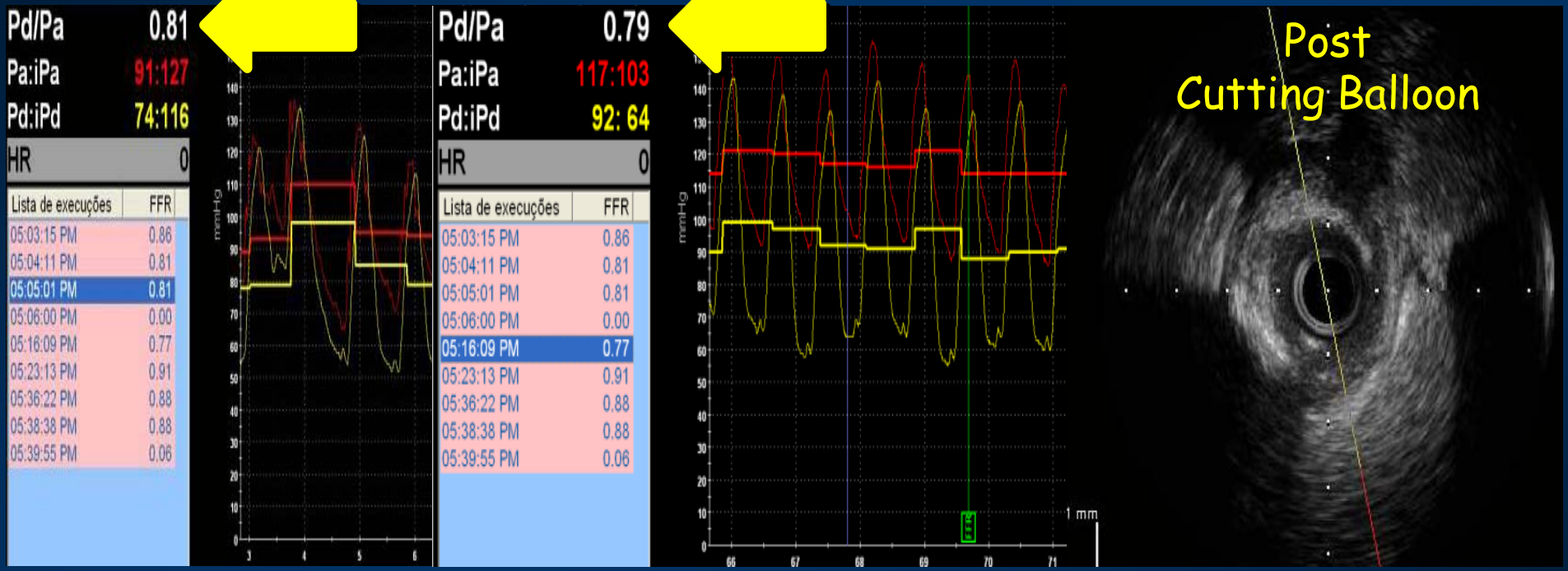


FFR:0.87

2.56 mm²

IVUS & FFR

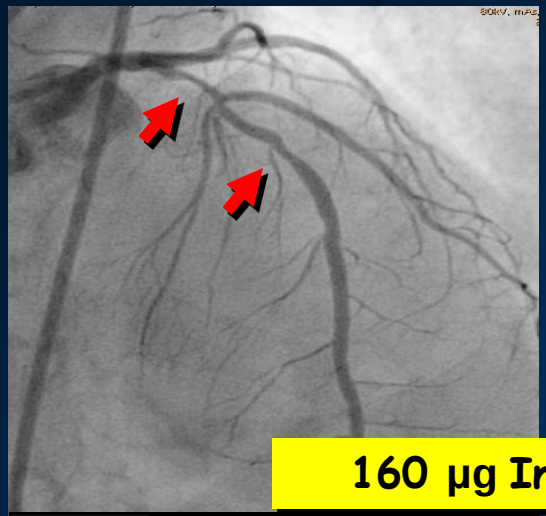
LCx

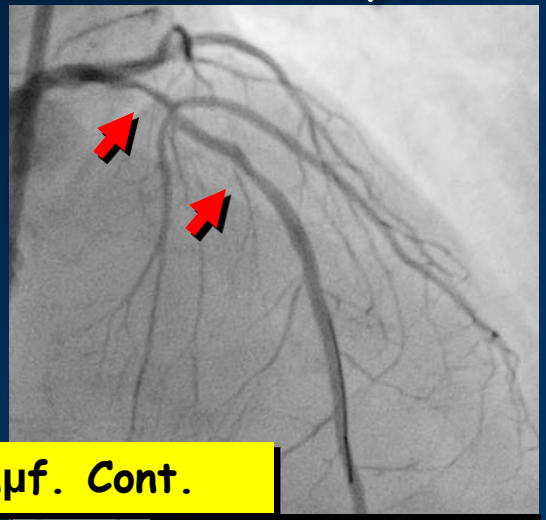


FFR:0.81 EV
FFR:0.79 with Contrast

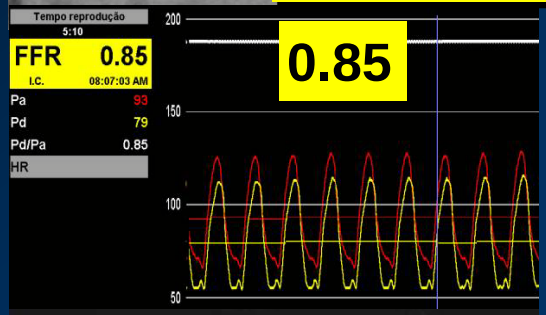
3.15 mm²

29566 - 16Sep11 → 29597 - 21Sep11

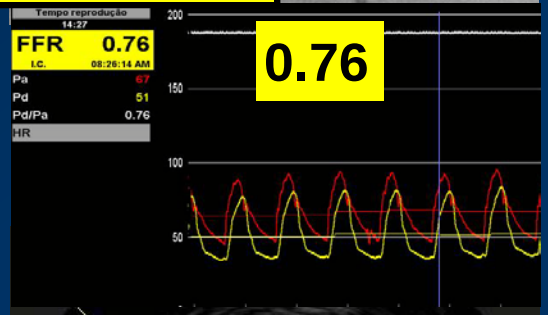




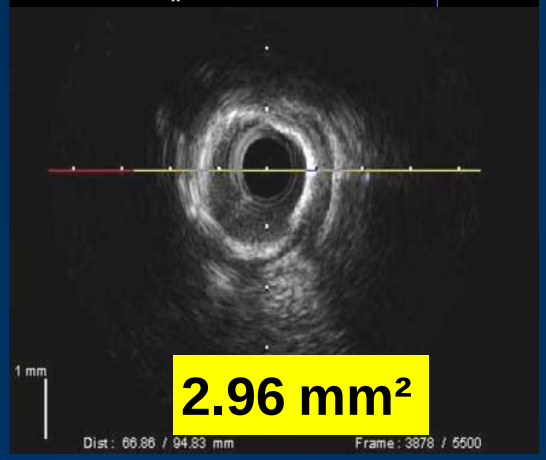
160 µg Inµf. Cont.



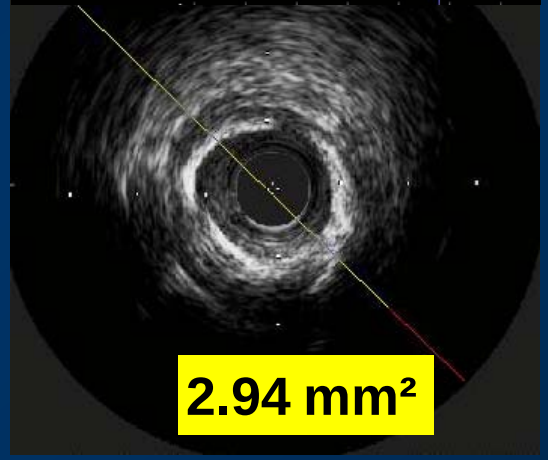
0.85



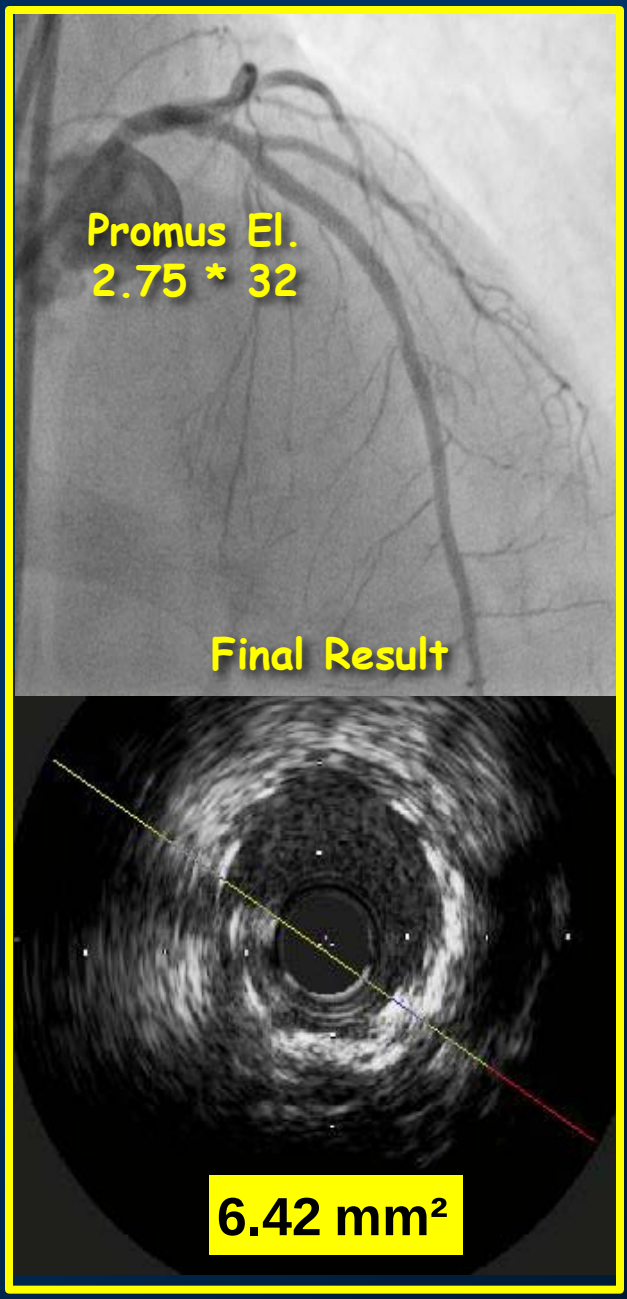
0.76



2.96 mm²



2.94 mm²



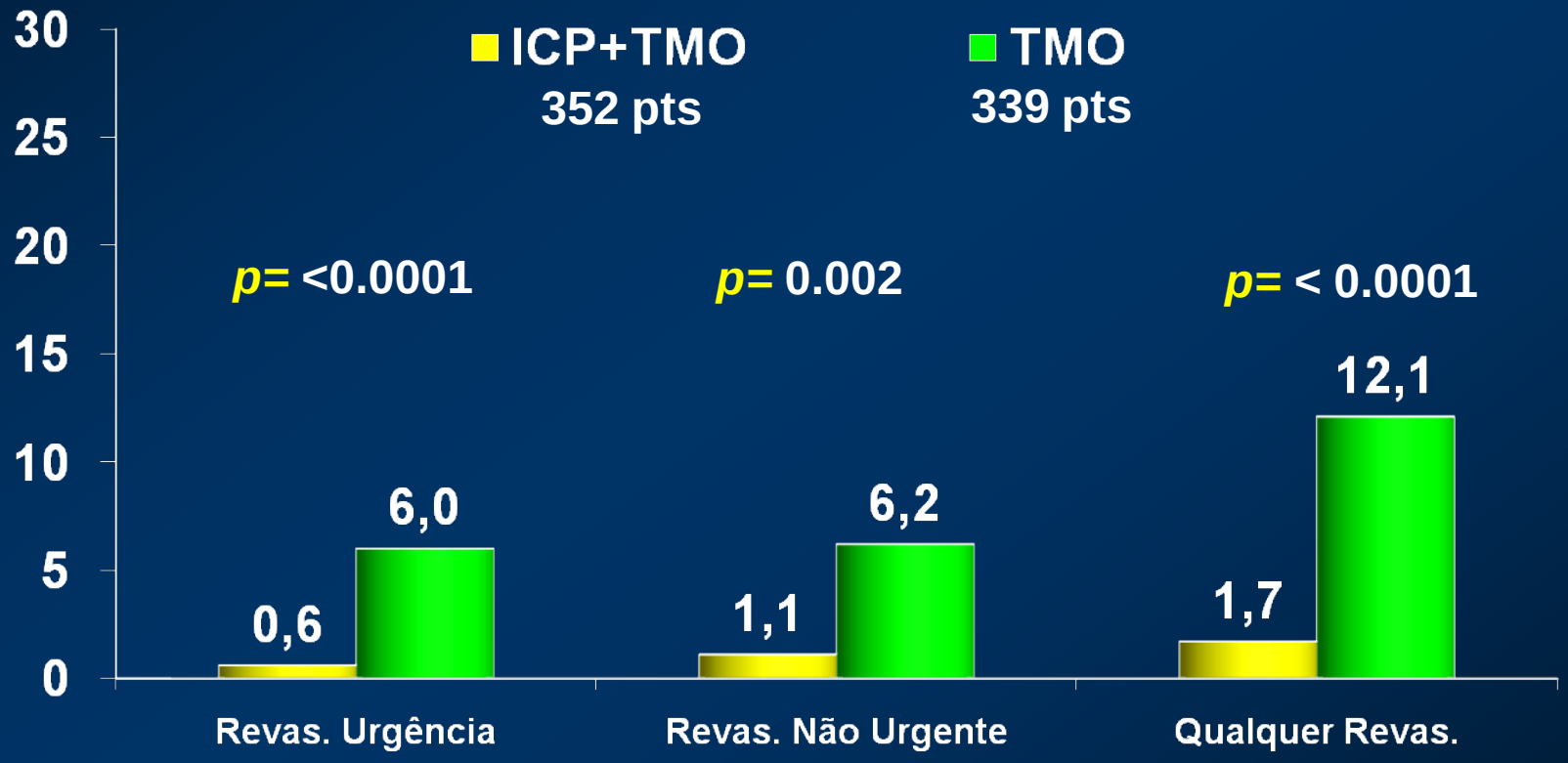
6.42 mm²

RFD ♀ - 68 Yrs

Taxas de Revascularização dentre os pacientes Randomizados para ICP+TMO e TMO Sozinha

FAME II

!!!!45% lesion <70*



Oral presentation; Bernard De Bruyne, PCR 2012

CLINICAL RESEARCH

Fractional Flow Reserve in Unstable Angina and Non–ST-Segment Elevation Myocardial Infarction

Experience From the FAME (Fractional flow reserve versus Angiography for Multivessel Evaluation) Study

??? Significant lesions within the FFR-guided groups (61.8% vs. 63.5%)

Results Of 1,005 patients, 328 had UA or NSTEMI. There was no evidence for heterogeneity among the subgroups for any of the outcome variables (all p values >0.05). Using FFR to guide PCI resulted in similar risk reductions of major adverse cardiac events and its components in patients with UA or NSTEMI, compared with patients with SA (absolute risk reduction of 5.1% vs. 3.7%, respectively, p = 0.92). In patients with UA or NSTEMI, the number of stents was reduced without increase in hospital stay or procedure time and with less contrast use, in similarity to stable patients.

Conclusions The benefit of using FFR to guide PCI in multivessel disease does not differ between patients with UA or NSTEMI, compared with patients with SA. (J Am Coll Cardiol Intv 2011;4: 1183–9) © 2011 by the American College of Cardiology Foundation

J Am Coll Cardiol Intv. 2011;4(11):1183-1189

FFR in ACS

FAME Trial: Substudy ACS vs. HCC

Patients Characteristics

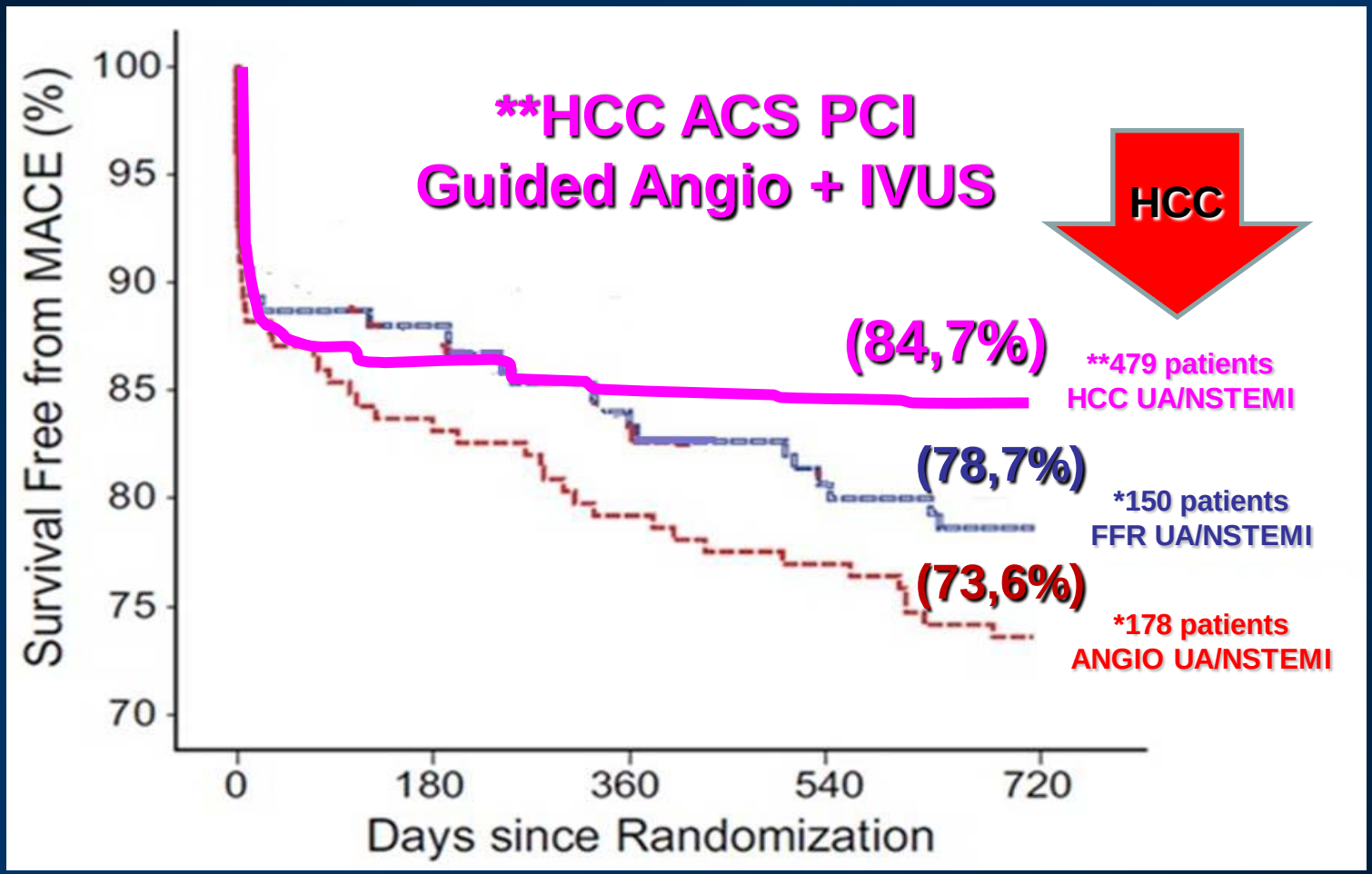
	*ANGIO-group N= 178	*FFR-group N=150	*** HCC ACS N = 479
Lesions	61,8 %	63,5%	≥ 70 %
Lesion Type	Syntax 13.9 ± 7.6	Syntax 15.6 ± 9.1	B1, B2,C 80 %
IVUS	0	0	75 %
Stent per Patient	2.9 ± 1.1	1.9 ± 1.5	1.6 ± 1.4

*FAME Substudy: J Am Coll Cardiol Intv. 2011;4(11):1183-1189

***HCC ACS Registry: MACE at 2 years

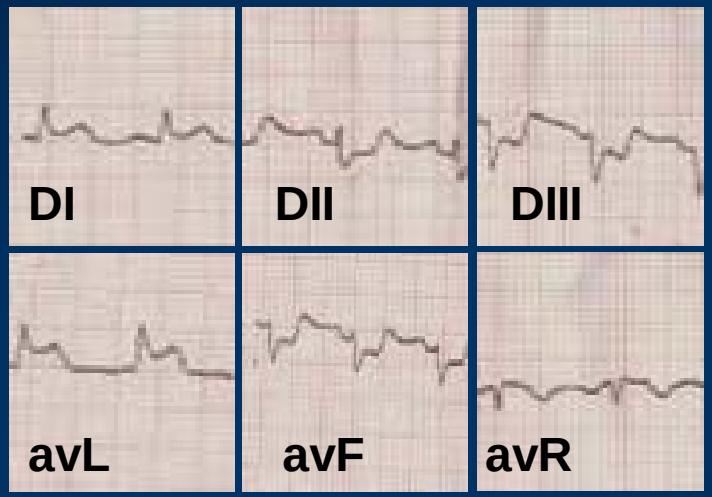
*FAME Trial: Substudy ACS vs. **HCC

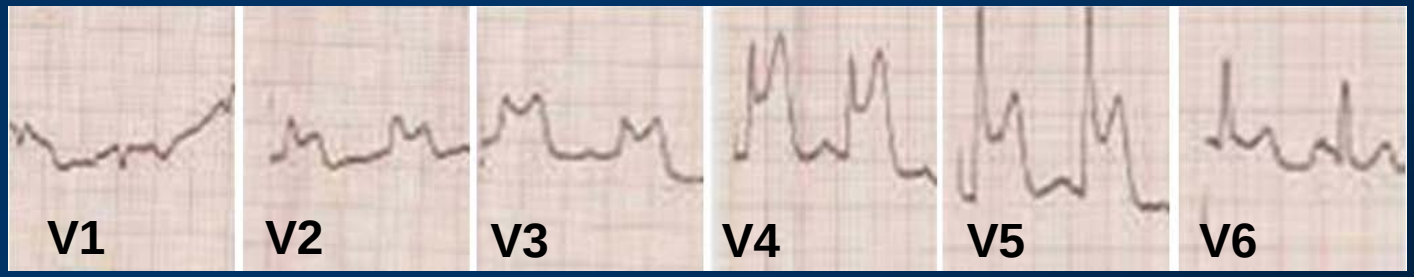
Two Years Evolution Patients Without Events



Adapted Costantini SOLACI 2012 *FAME Substudy: J Am Coll Cardiol Intv. 2011;4(11):1183-1189
**HCC ACS Registry: MACE at 2 years

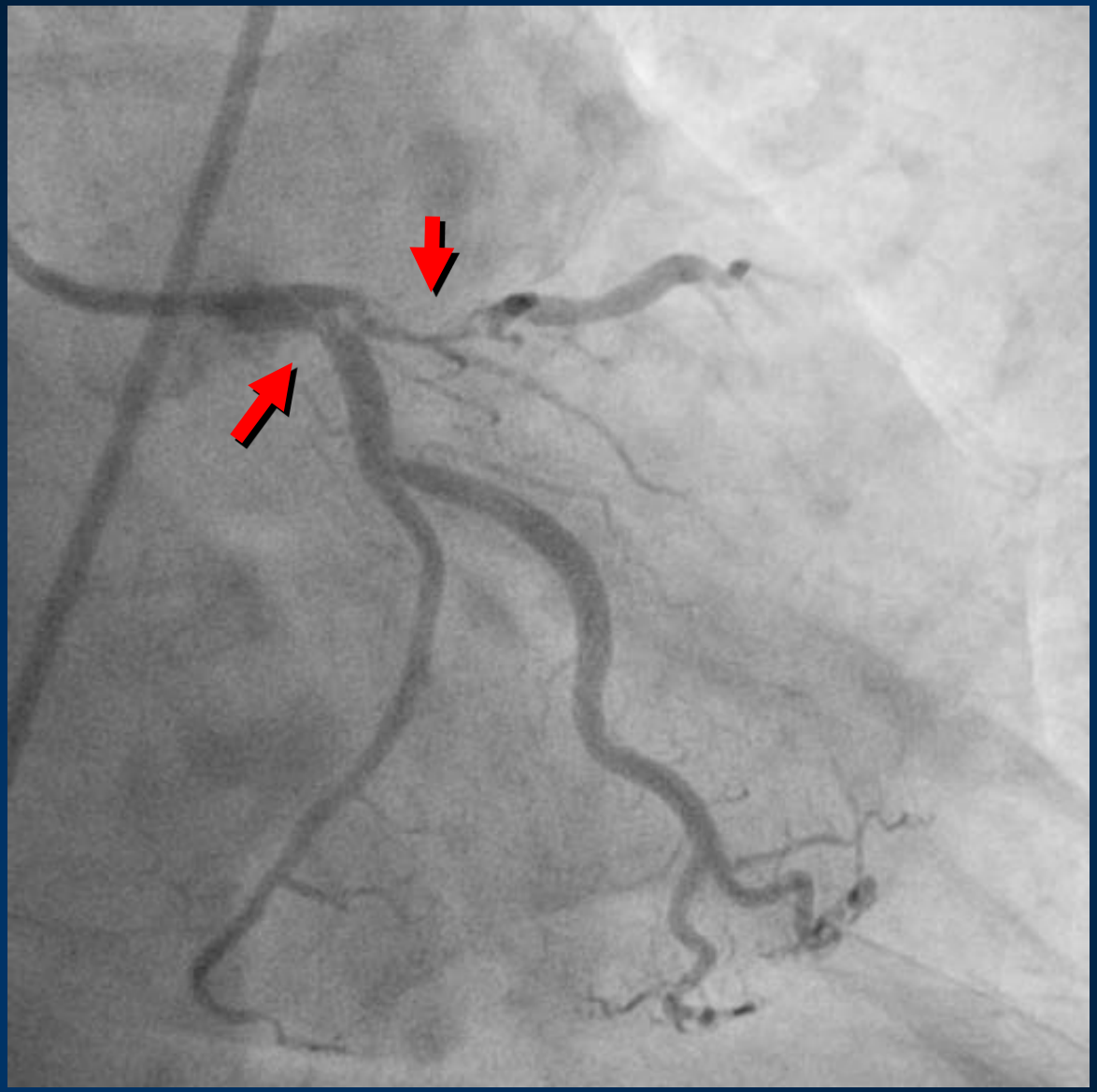
ECG Ambulance, Anterior Wall AMI 40 min on set



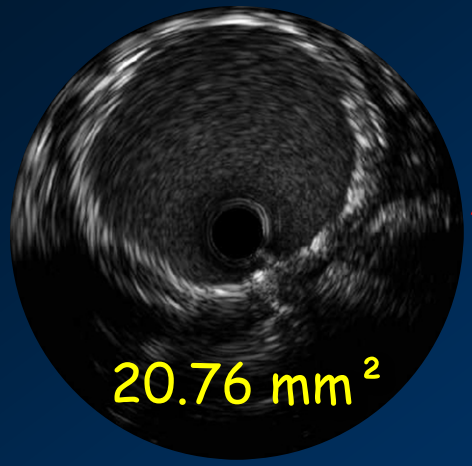


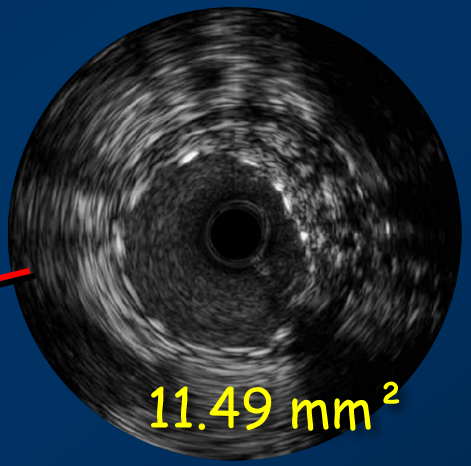
(CARDIAC SURGEON in the FAMILY)

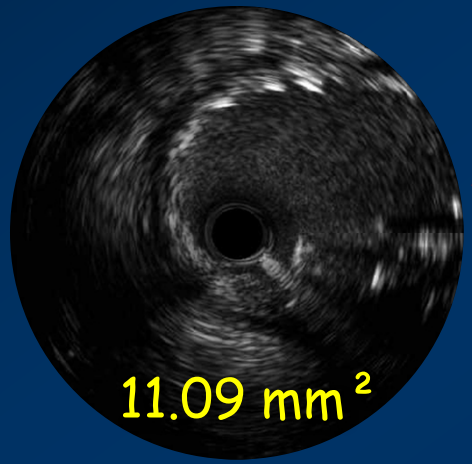
LM > LAD / LCx

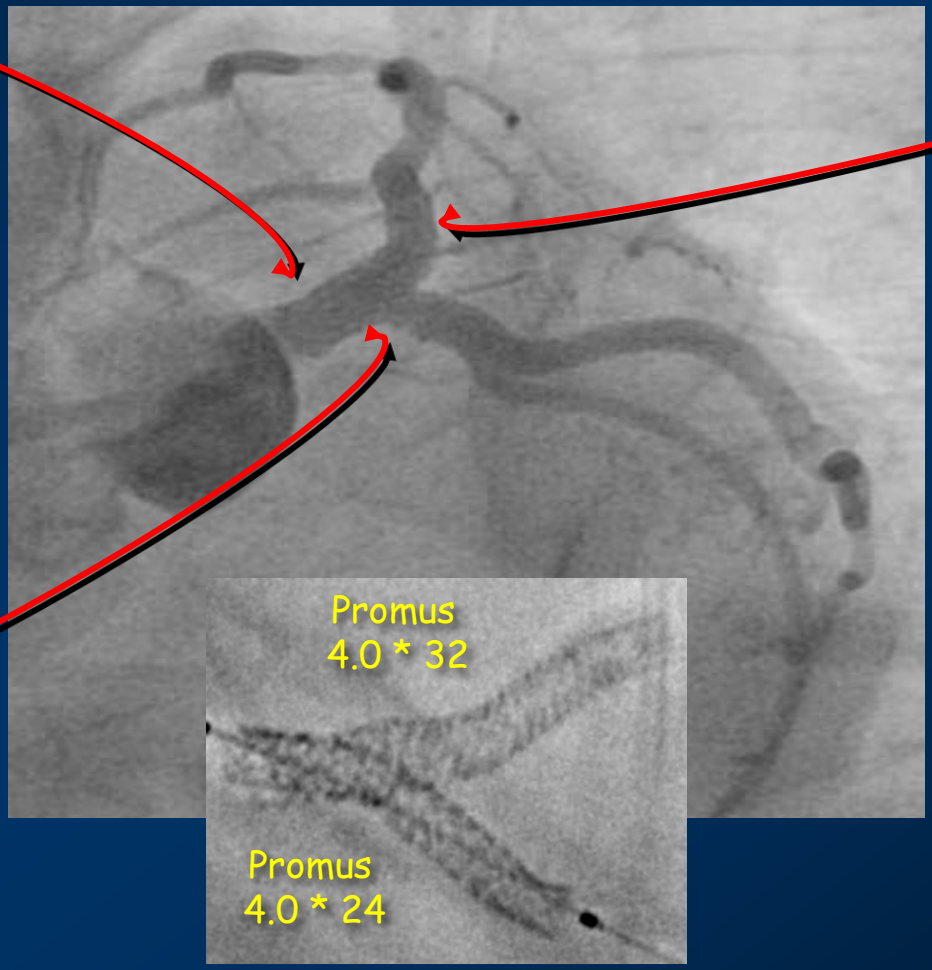


Final Result



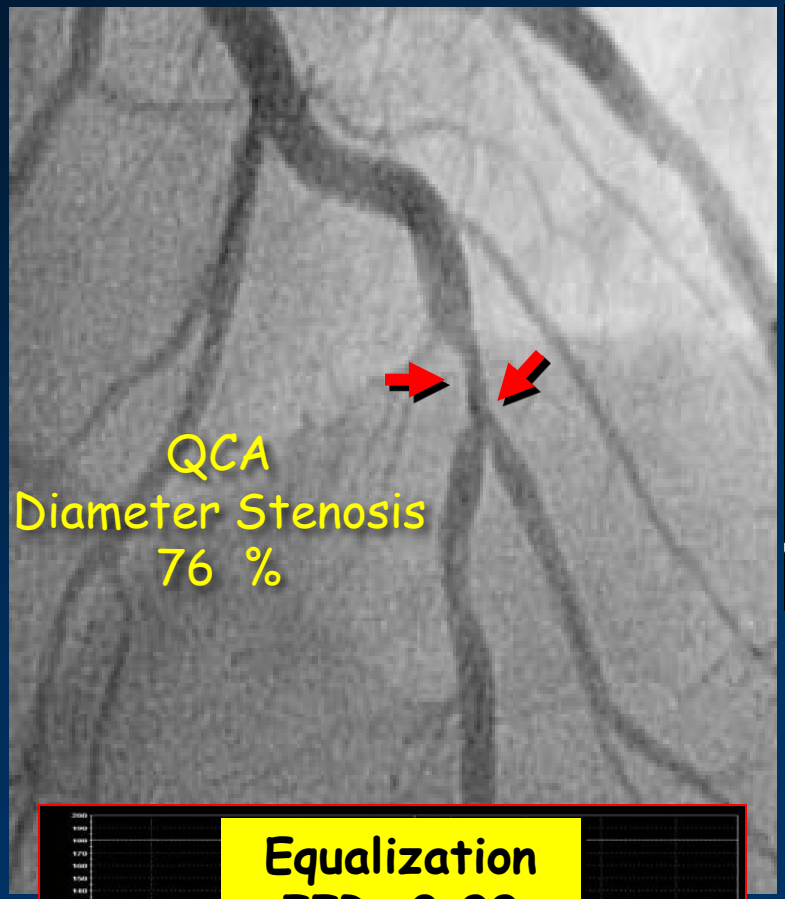


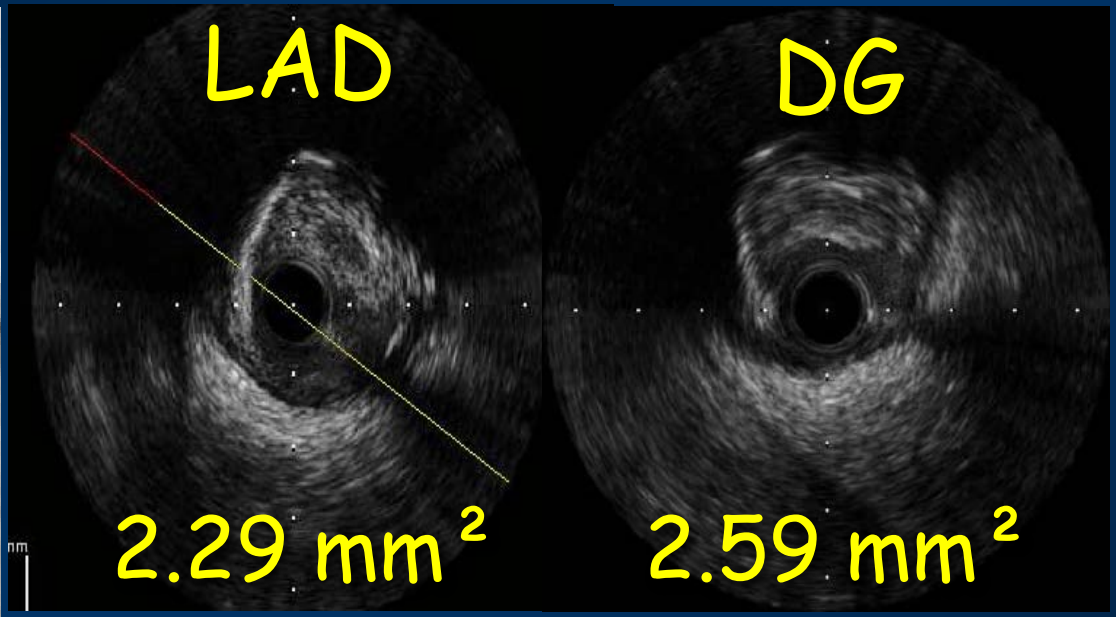


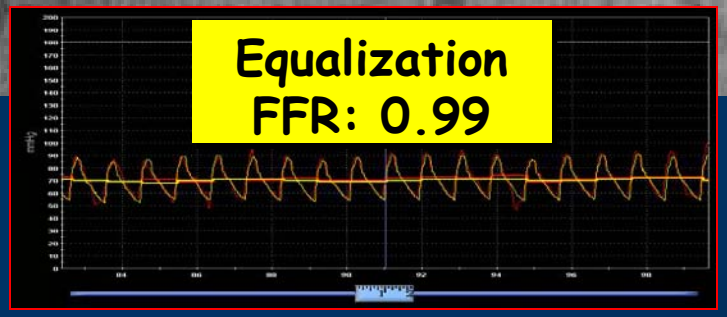


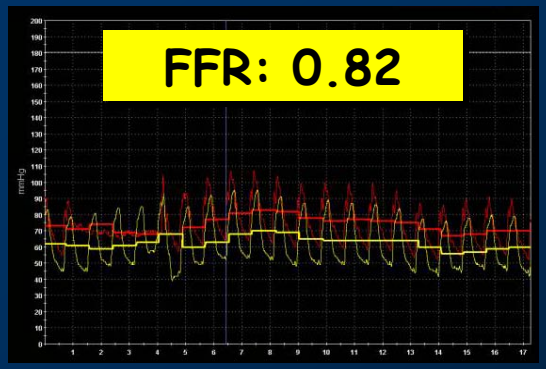
FFR Vs. IVUS Vs. ???

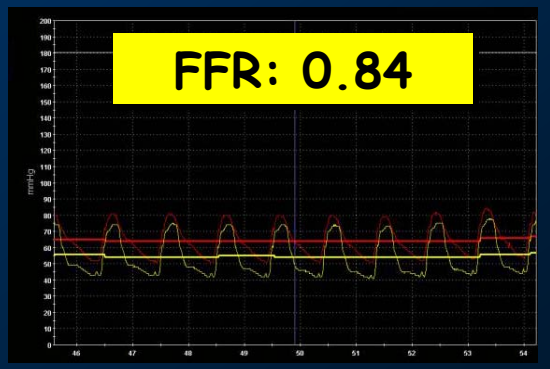
Continuous Intravenous Infusion 180 µg/kg/min



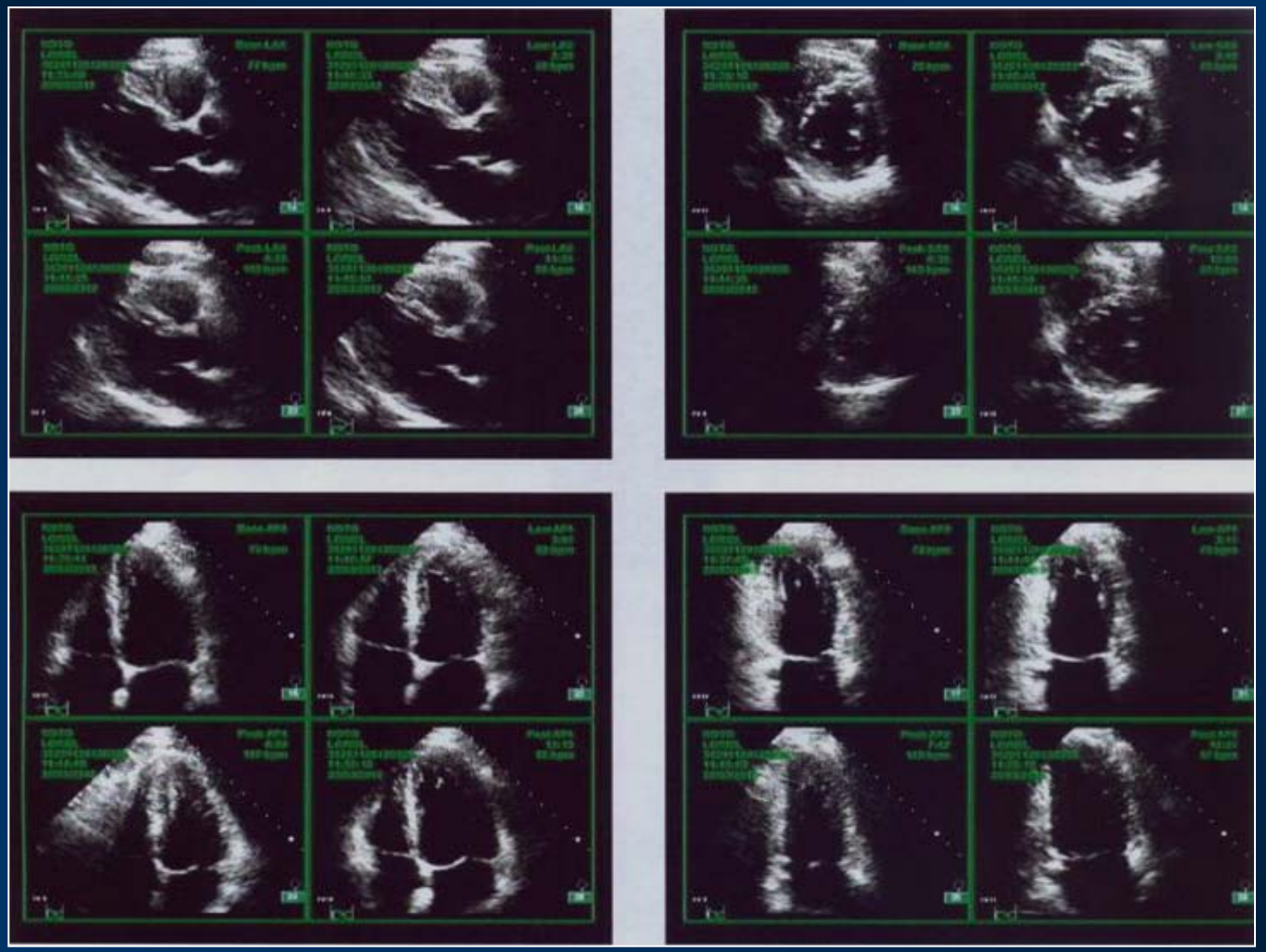




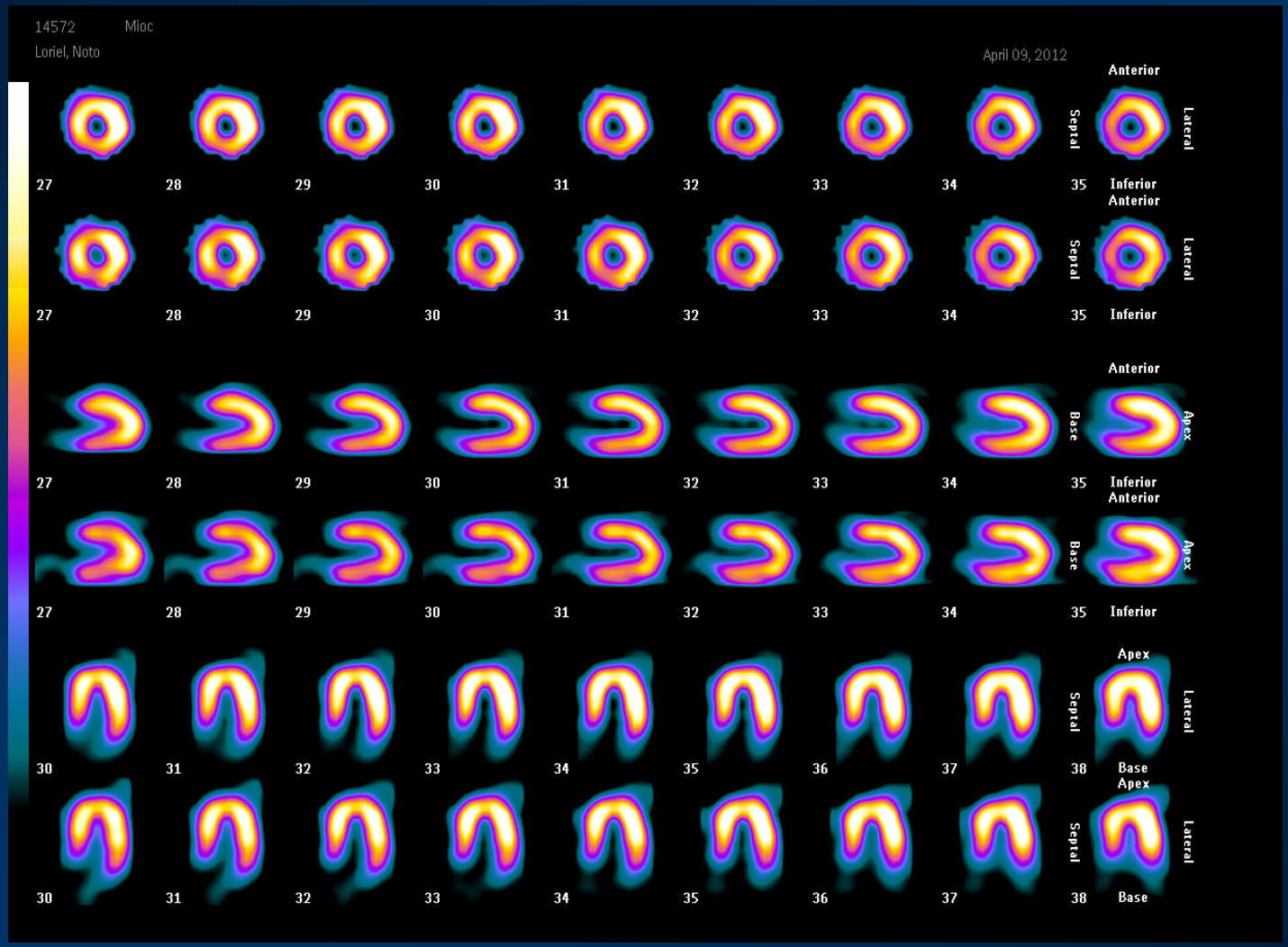




Dobutamine Echo Stress; Normal
After 3 months

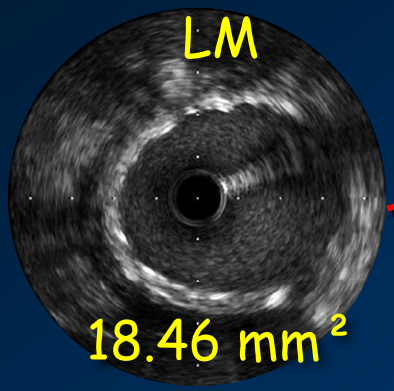


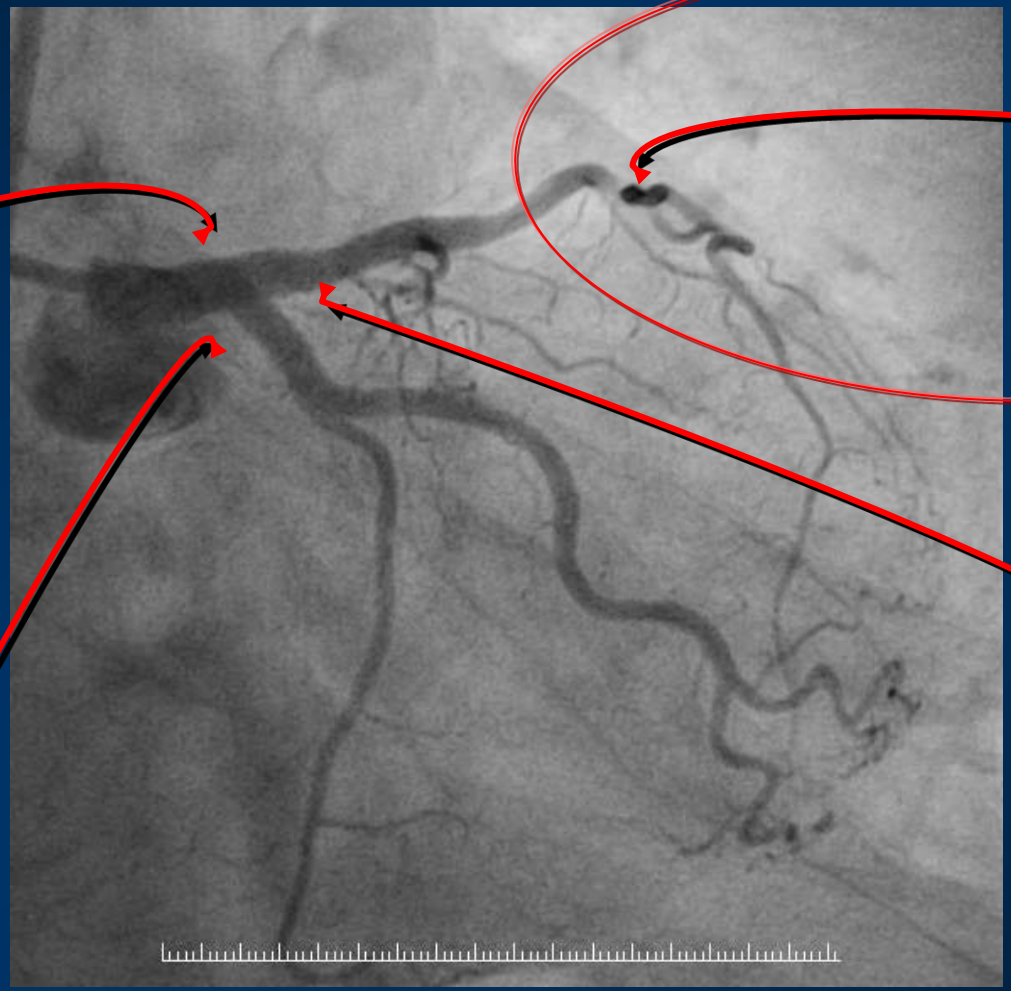
Thallium Spect; Normal
After 3 months

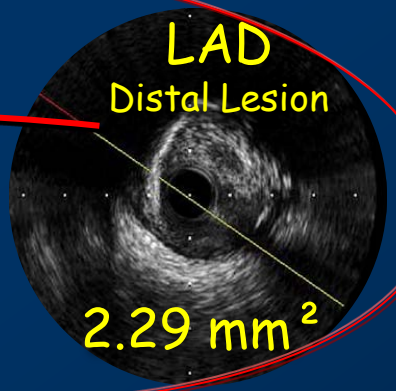


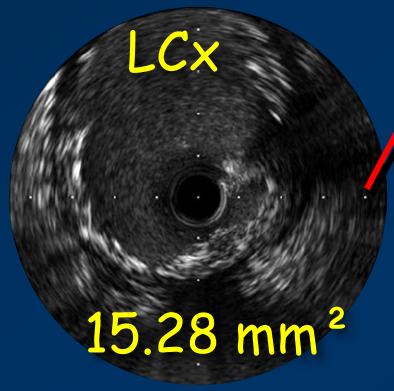
Follow up @ 7 months

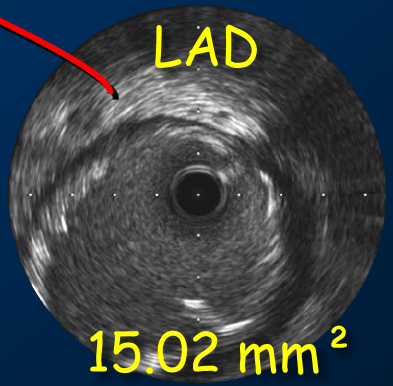
ANGIO and IVUS Evaluation



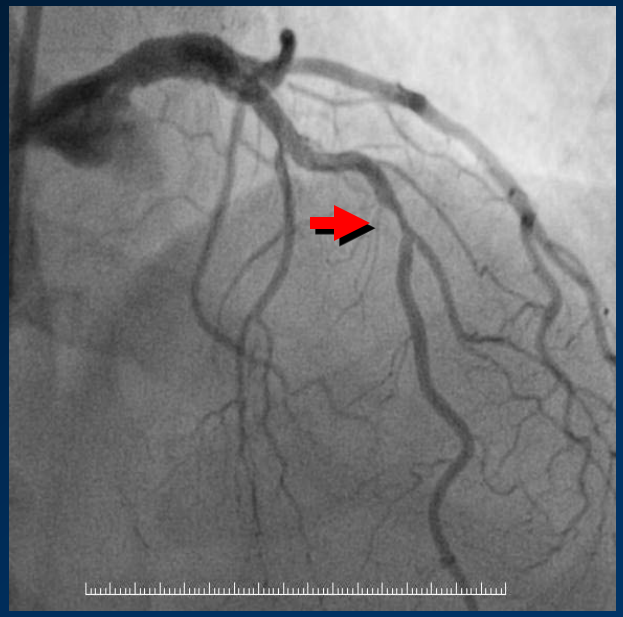


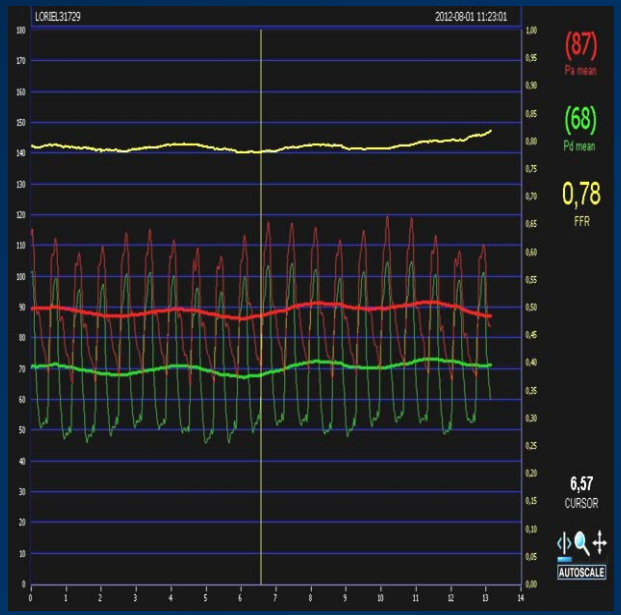


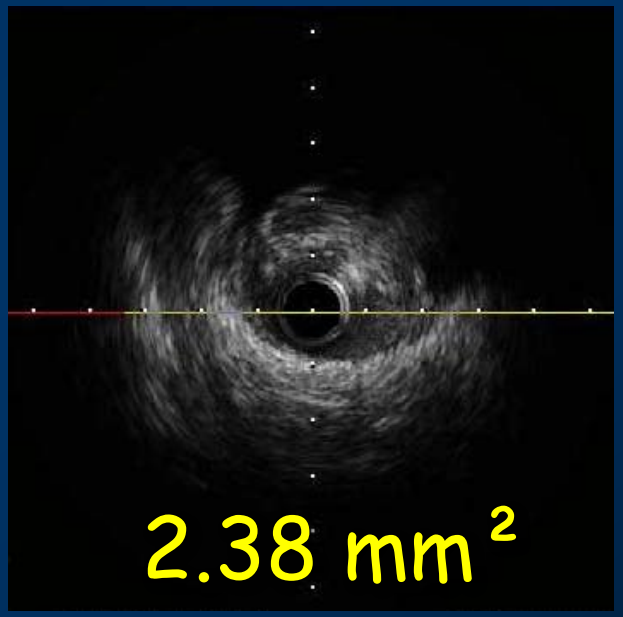




Second Evaluation FFR 0.78

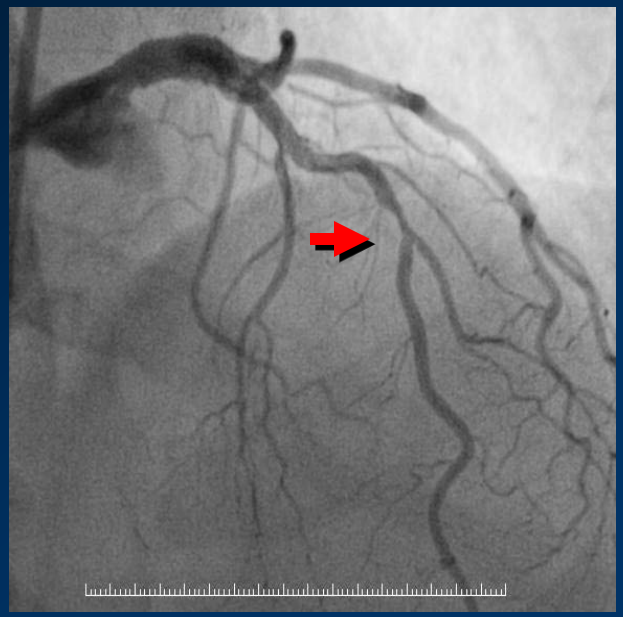


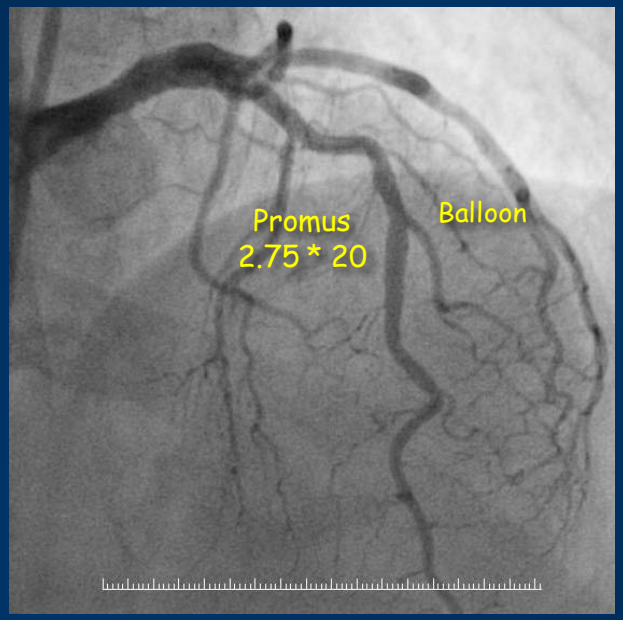


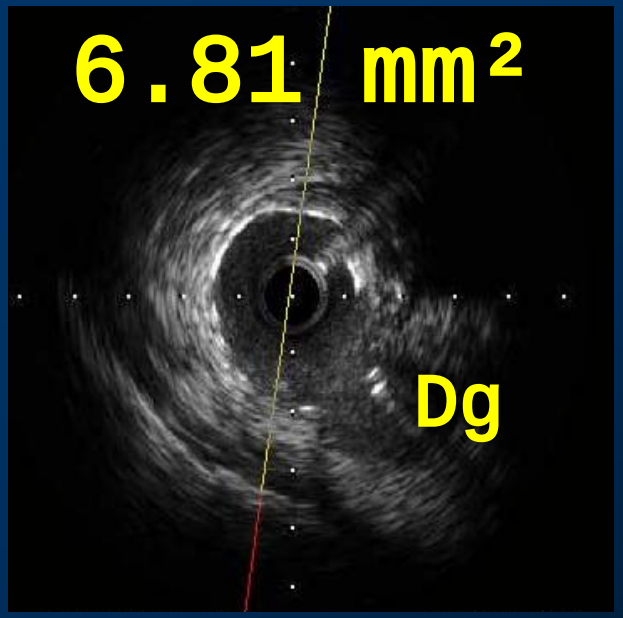


FFR was measured with a coronary pressure guidewire (Radi Medical Systems) at maximal hyperemia induced by intravenous adenosine, which was administered at a rate of 140 µg per kilogram of body weight per minute through IV.

Second Stage
LAD / DG





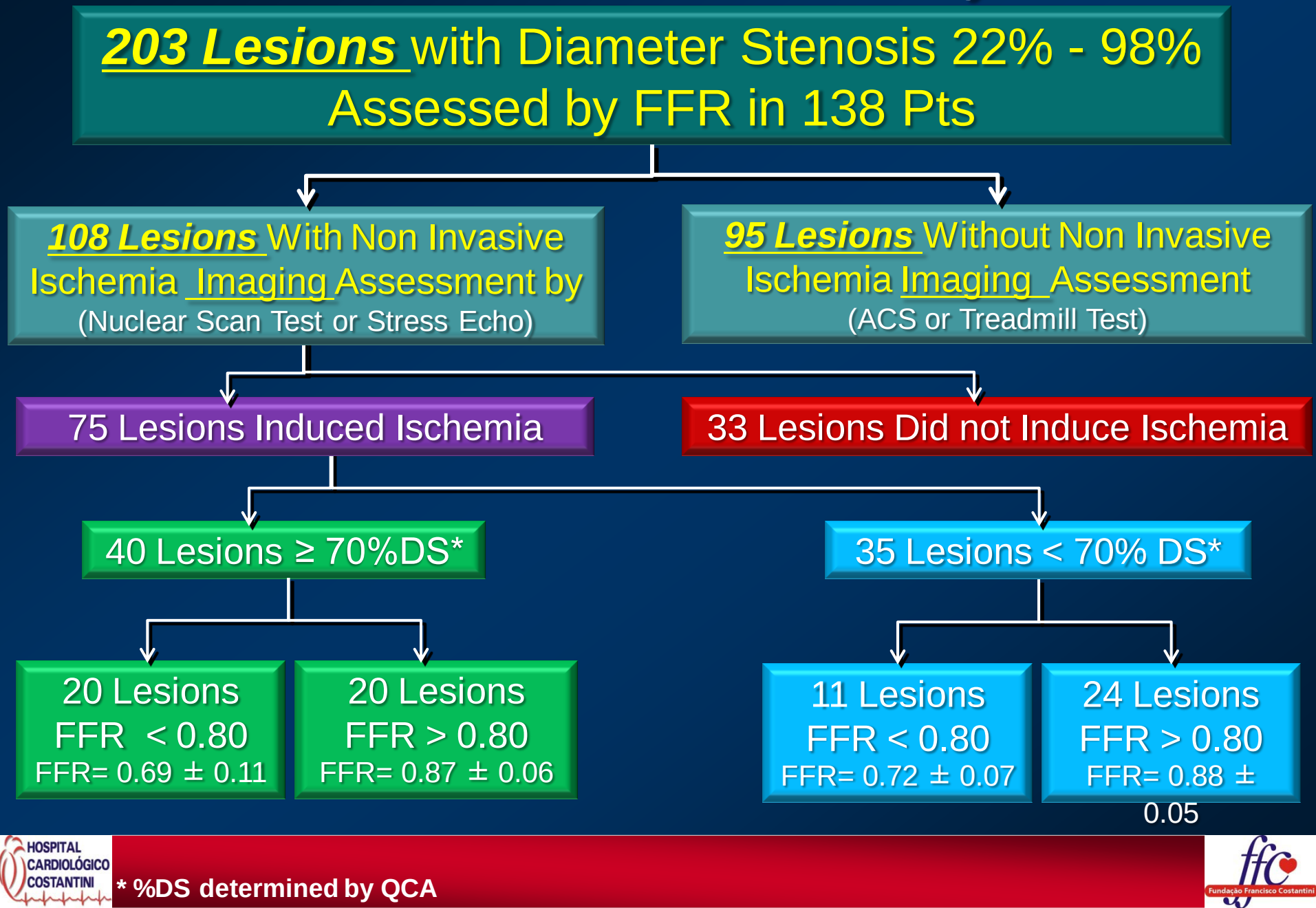


Pre

Post

IVUS

FFR HCC -- Pilot Study



HOSPITAL CARDIOLÓGICO COSTANTINI

*** %DS determined by QCA**

Fundação Francisco Costantini

Final Message I

Patients that will undergone a percutaneous procedure should be assessed:

Clinicaly, Functionaly and Angiograficaly.
IVUS if possible is very importante
And.....

Final Message II

FFR

Acording our preliminary results FFR is not Necessary!!!

And is NECESSARY to do new randomized study

Muito Obrigado

Arquivo pessoal: C. Costantini

Muito Obrigado

Arquivo pessoal: C. Costantini

12 Cardio Interv 2012

th INTERNATIONAL INTERVENTIONAL CARDIOLOGY SYMPOSIUM

30 Nov - 01 Dec 2012 **Curitiba.PR.Brazil**

Conferences, discussions, round tables and live cases.

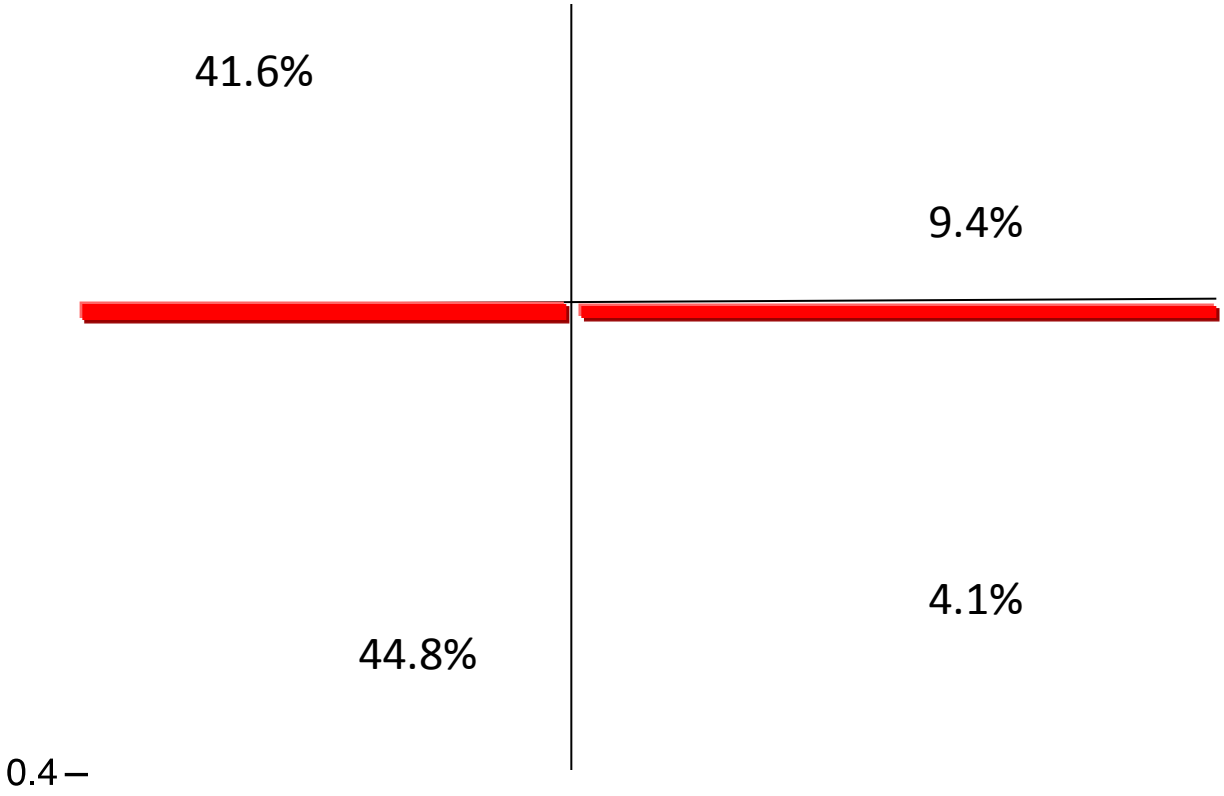
Organization

ffc Fundação Francisco Costantini

Suport

HOSPITAL CARDIOLÓGICO COSTANTINI

Correlation between FFR and IVUS MLA in in 108 Lesions Assessed with Non Invasive Functional Tests



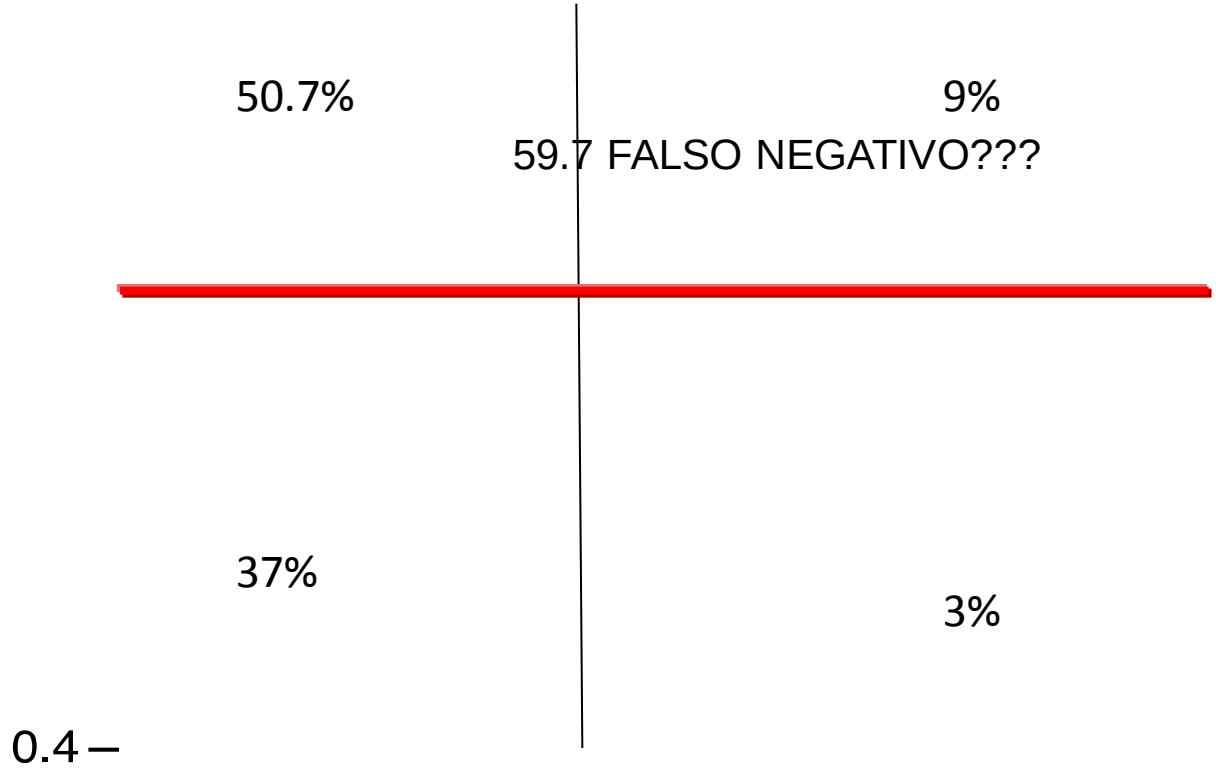
HOSPITAL CARDIOLÓGICO COSTANTINI

*** Angiographic Severity defined as >70%DS**

Fundação Francisco Costantini

Angiographic Severity defined as >70%DS

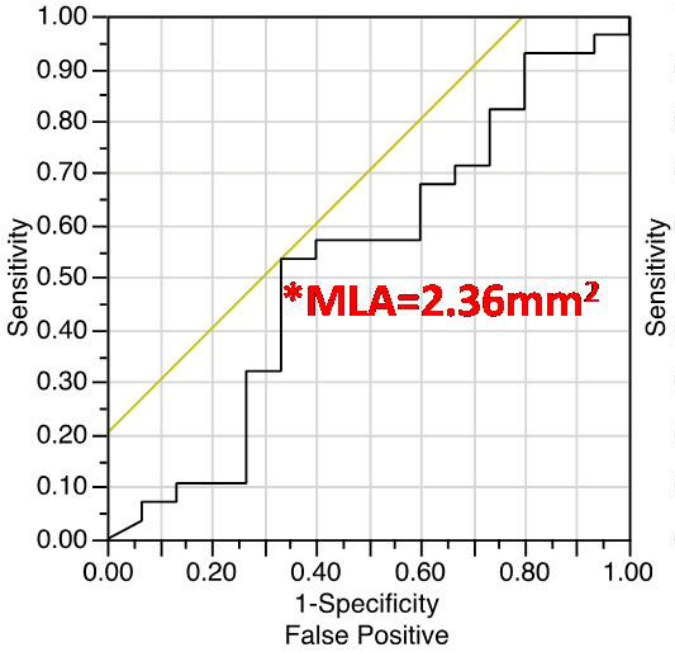
Correlation between FFR and IVUS MLA in 75 Ischemia Inducible Lesions



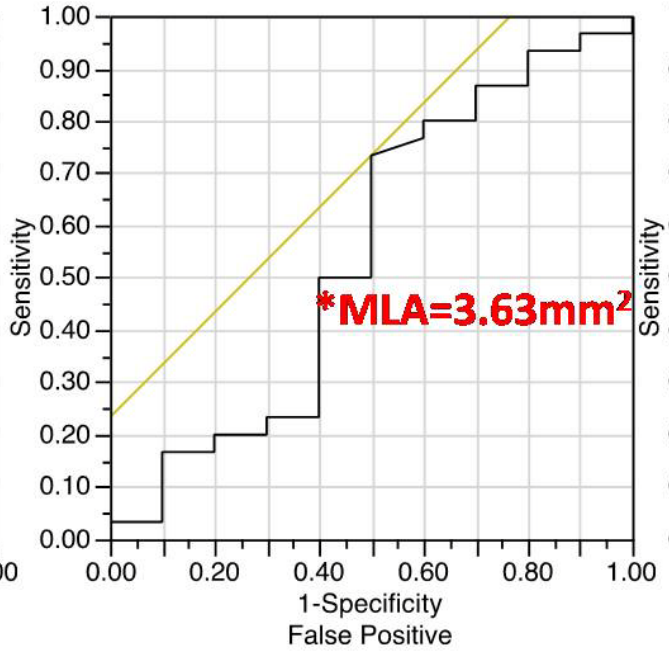
ROC for Prediction of IVUS MLA detecting Ischemia in 108 Lesions Assessed with Non Invasive Functional Test

Vessel Size

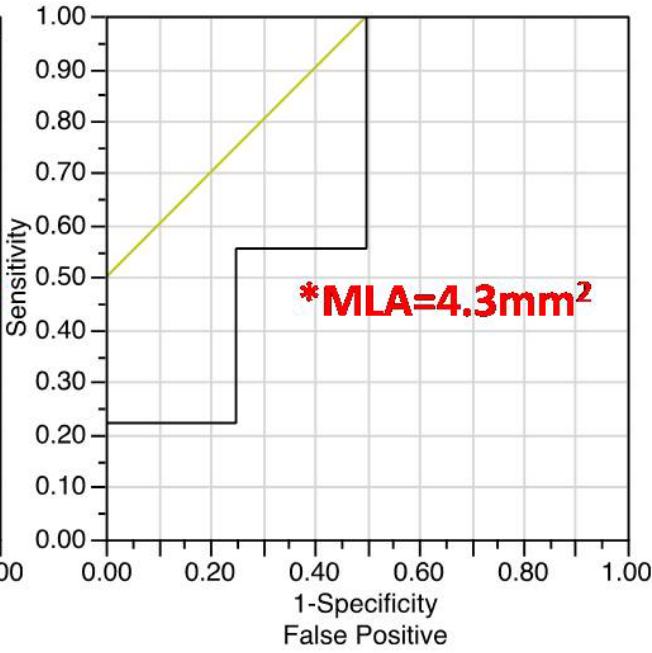
≤2.5mm



>2.5mm ≤3.5mm



> 3.5mm

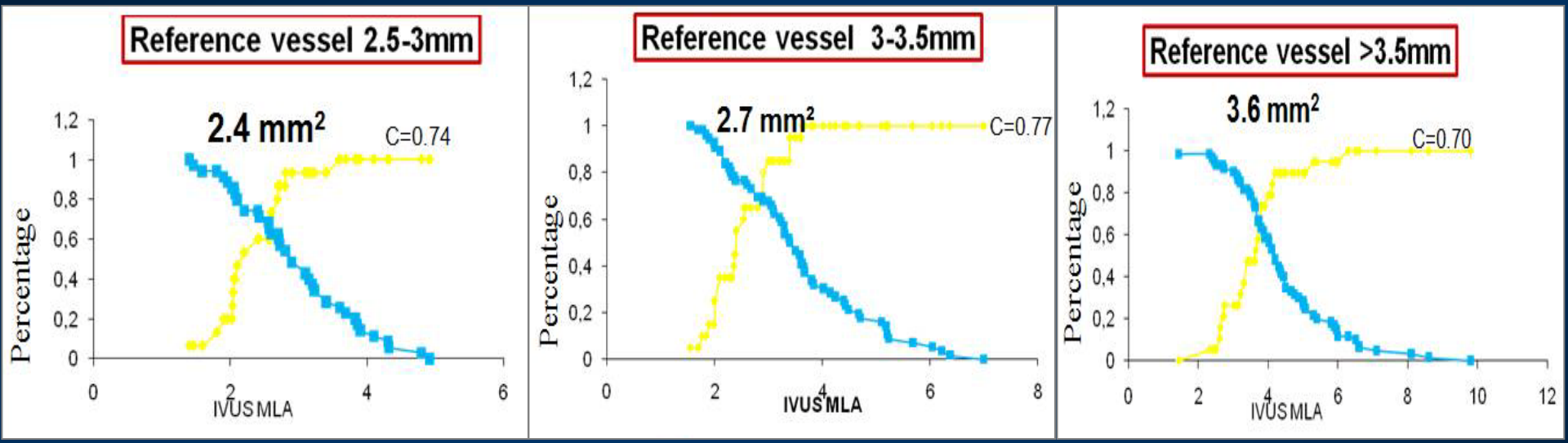


HCC Registry FFR

* Angiographic Severity defined as >70%DS

Correlation between fractional flow reserve and intravascular ultrasound lumen area in intermediate coronary artery stenosis

Itsik Ben-Dor, MD; Rebecca Torguson, MPH; Michael A. Gaglia, Jr., MD, MSc; Manuel A. Gonzalez, MD, MPH; Gabriel Maluenda, MD; Anh B. Bui, MD; Zhenyi Xue, MS; Lowell F. Satler, MD; William O. Suddath, MD; Joseph Lindsay, MD; Augusto D. Pichard, MD; Ron Waksman*, MD



Methods

From July 2007 to October 2009, 92 intermediate lesions in major epicardial coronary vessels of 84 patients were studied consecutively by QCA, IVUS, and FFR during diagnostic coronary angiography. Intermediate coronary stenosis was defined as a stenosis of 40-70% by QCA.

Ben-Dor et al. Eurointervension 2011 7:225-33

Conclusion (1)

IVUS Information

1. Plaque Characteristics
2. Plaque Extension
3. Vessel Size
4. Optimize Stent Implantation

Conclusion (2)

FFR Interpretation (I)

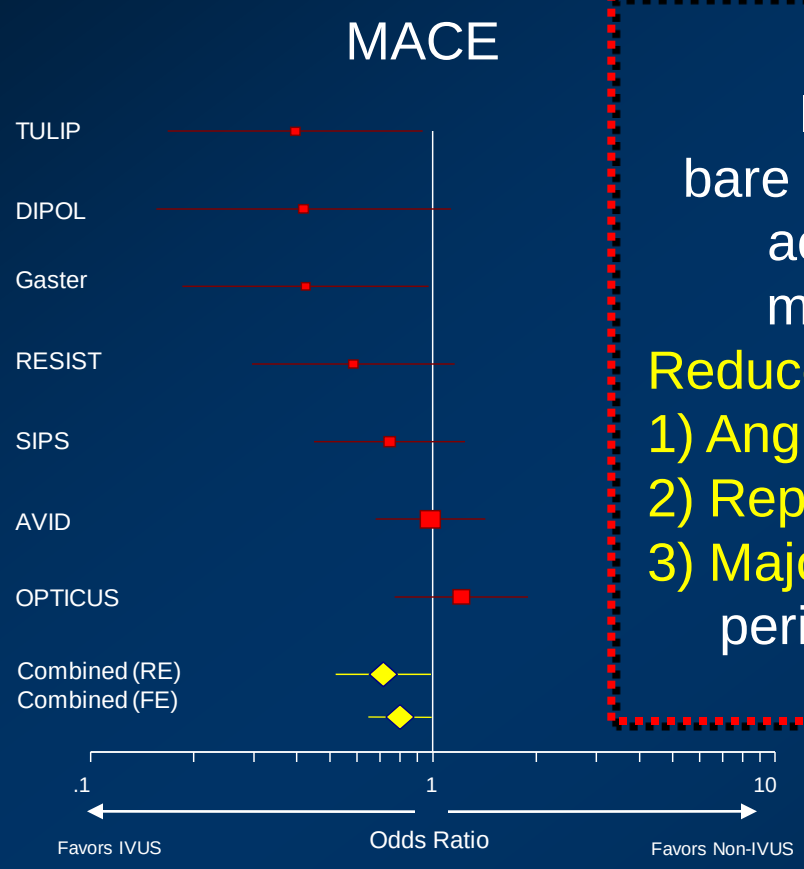
1. Guide the Treatment in the CathLab in lesions from 0 a 99%

FFR Interpretation (II)

1. Has ↓ correlation with angiography however it is Class Ia.(European Heart Journal (2010) 31, 2501–2555)

Who is not using FFR can't indicate a PCI.

Meta-Analysis of Randomized Studies Comparing Intravascular Ultrasound Versus Angiographic Guidance of Percutaneous Coronary Intervention in Pre–Drug-Eluting Stent Era



In conclusion, IVUS guidance for bare metal stent implantation improved the acute procedural results (angiographic minimum lumen diameter) and thereby

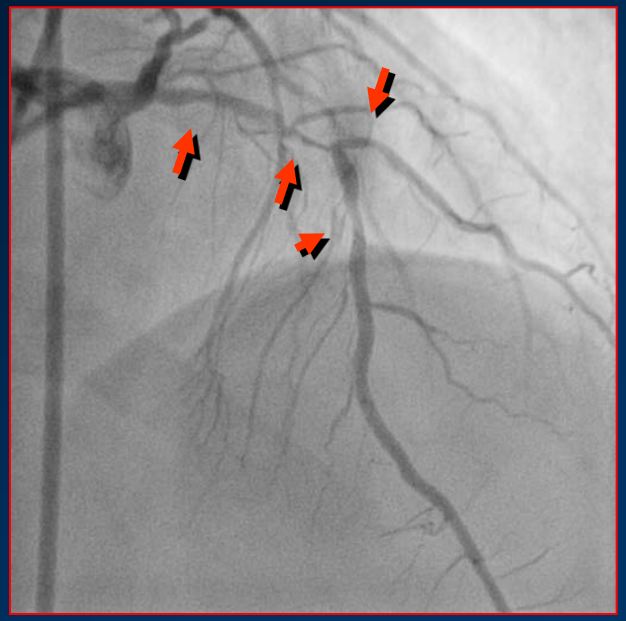
Reduced:

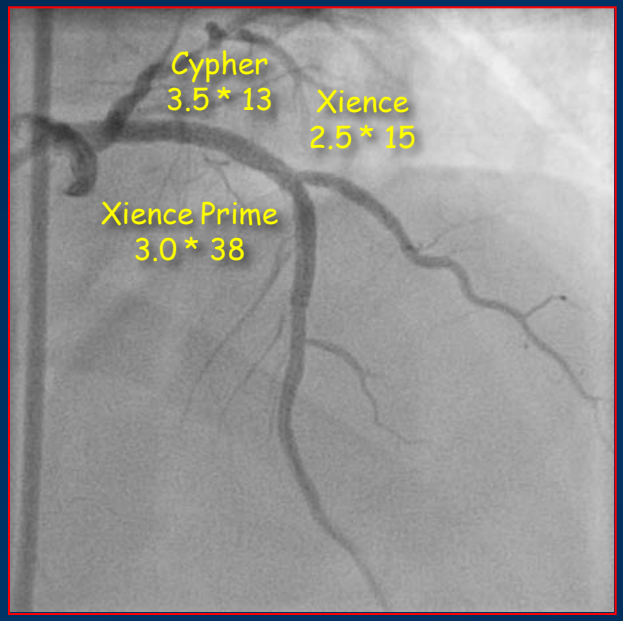
1) Angiographic restenosis
2) Repeat revascularization
3) Major adverse cardiac events, a follow-up period of 6 months to 2,5 years.

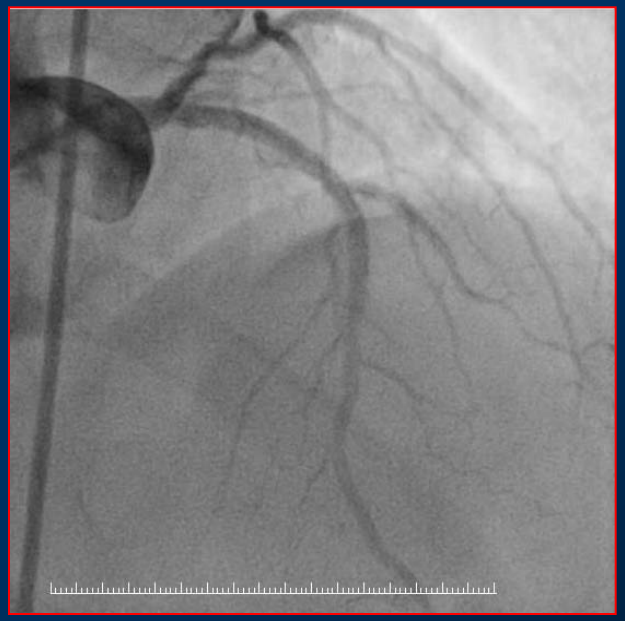
Am J Cardiol 2011;107:374 –382

Angiography don't give information !!!

LAD Pre, Post & FU







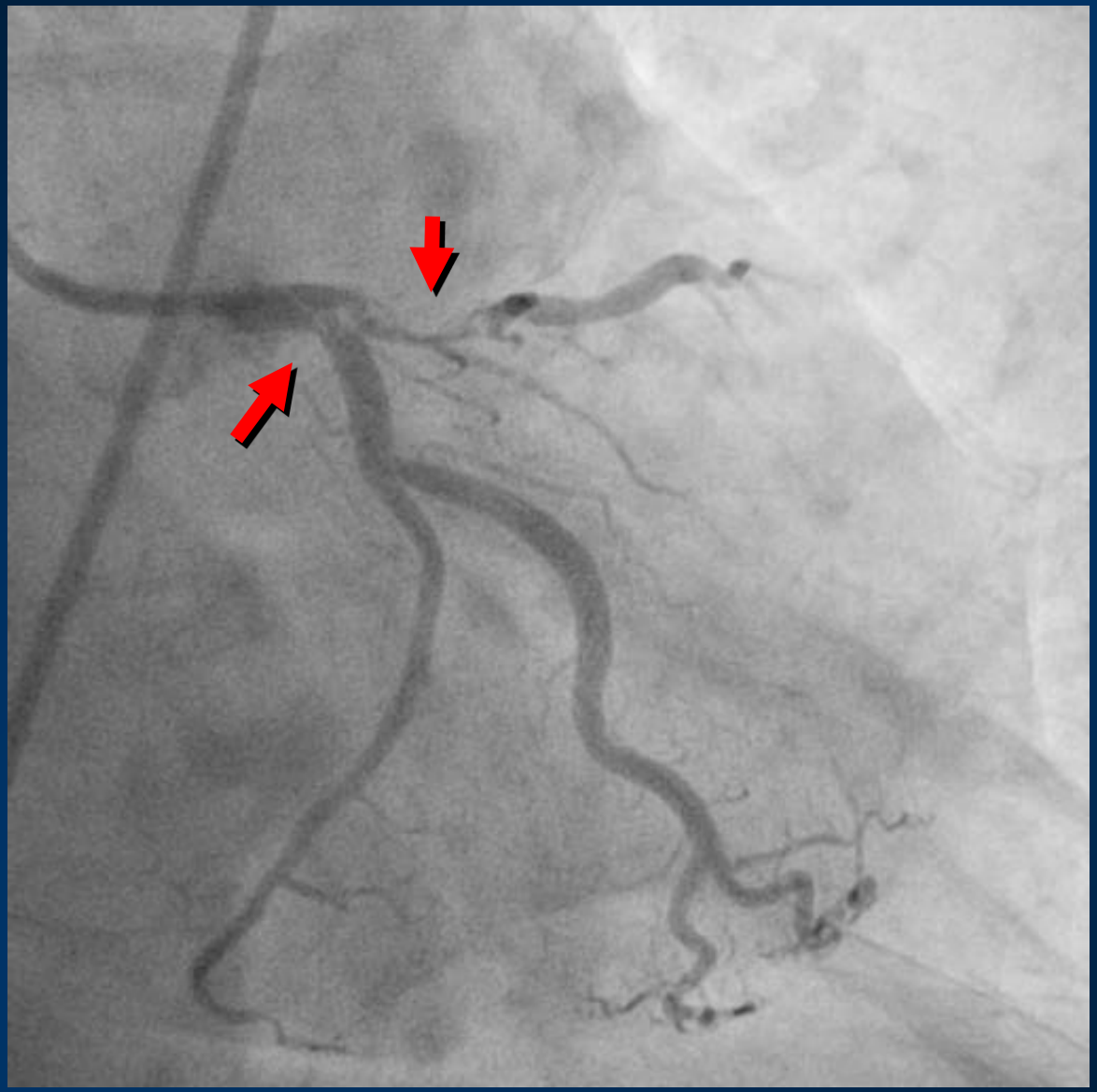
Pre **Post** **FU 11 mo**

Results 1 Year
*FAME vs. **Ravel

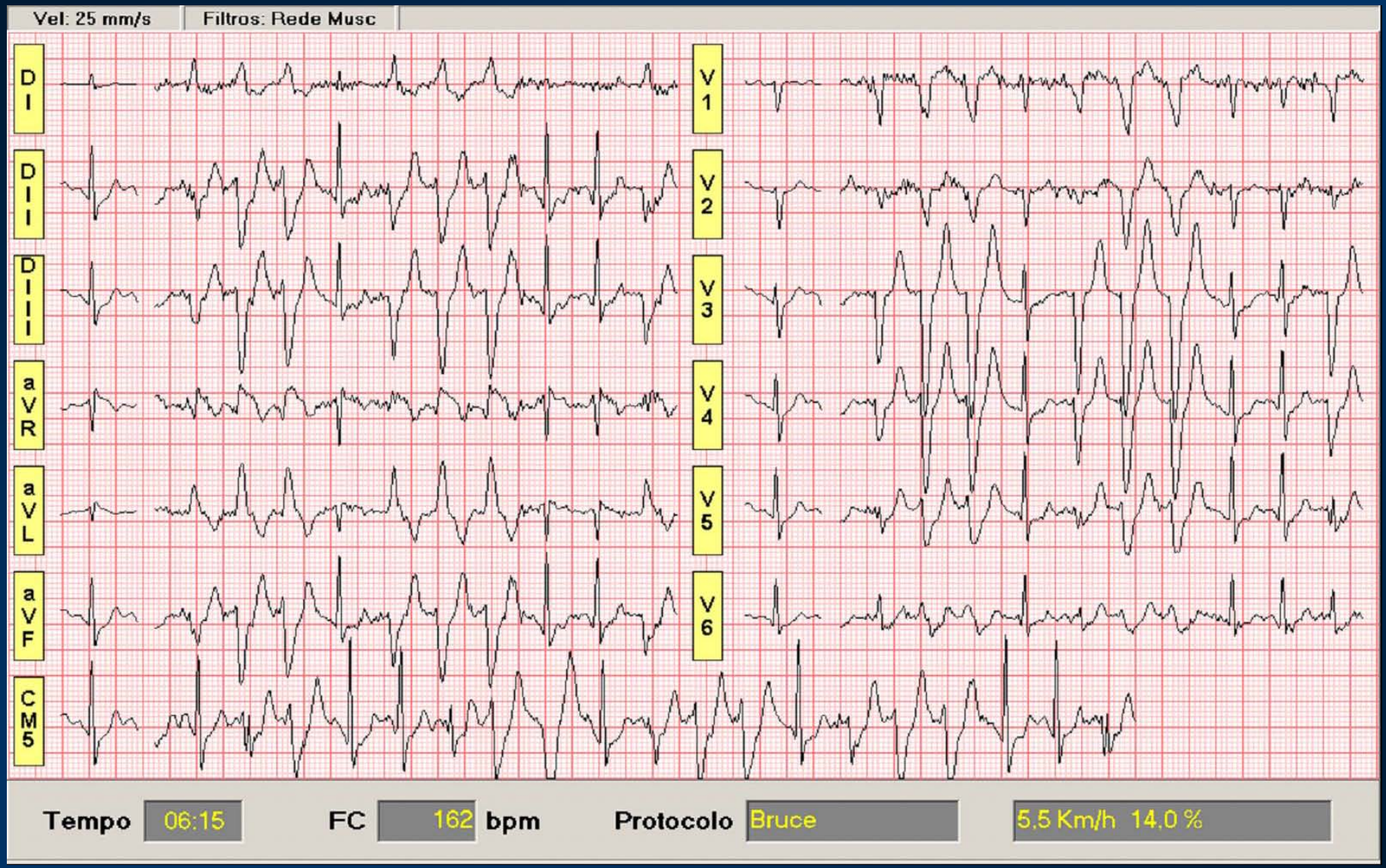
	*ANGIO-group N=496	*FFR-group N=509	**Ravel Cypher N= 120
Events at 1 year, No (%)			
MACE	(18.3)	(13.2)	(5.8)
MI	(8.7)	(5.7)	(3.3)
Death	(3.0)	(1.8)	(1.7)
CABG or repeat PCI	(9.5)	(6.5)	(0.8) CABG

*FAME study: Adverse Events at 1 year ; NEJM 2009;360:213-24
**RAVEL Study N Engl J Med 2002;346:1773-80

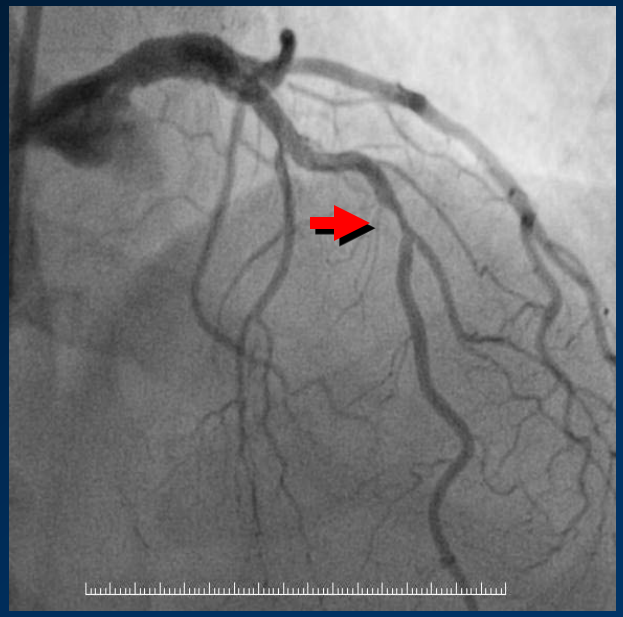
LM > LAD / LCx

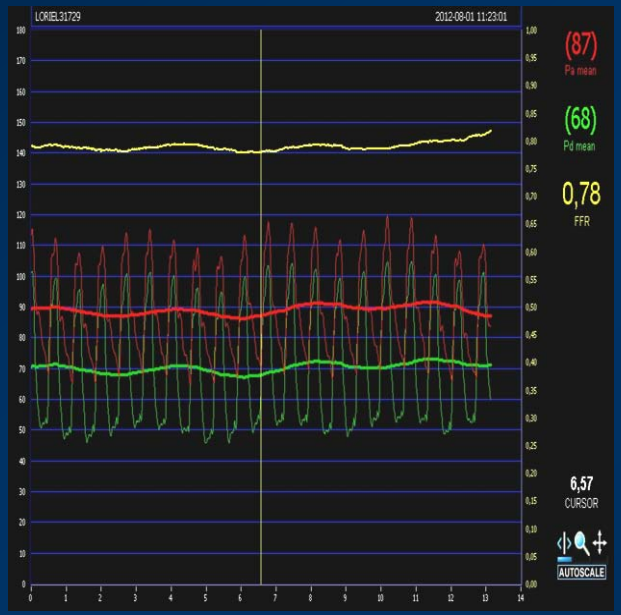


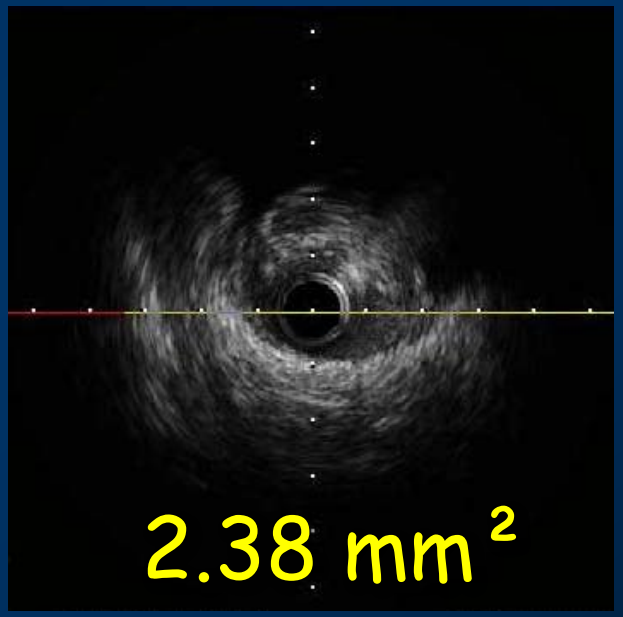
TMT After 3 months



Second Evaluation FFR 0.78







FFR was measured with a coronary pressure guidewire (Radi Medical Systems) at maximal hyperemia induced by intravenous adenosine, which was administered at a rate of 140 µg per kilogram of body weight per minute through IV.

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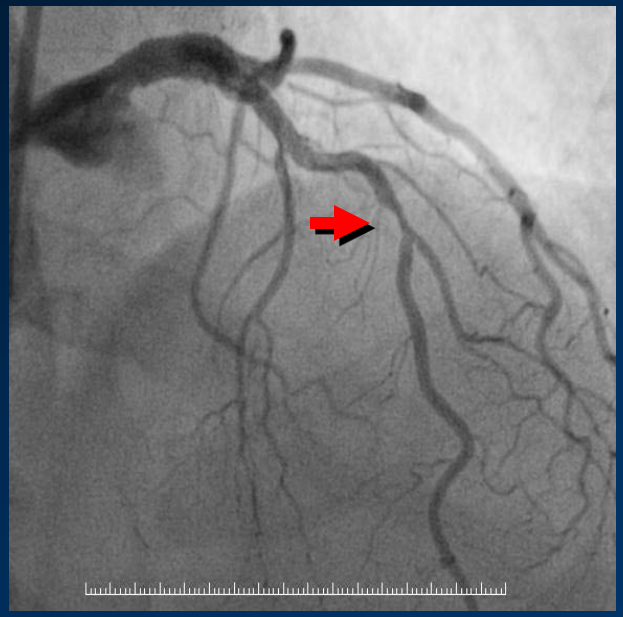

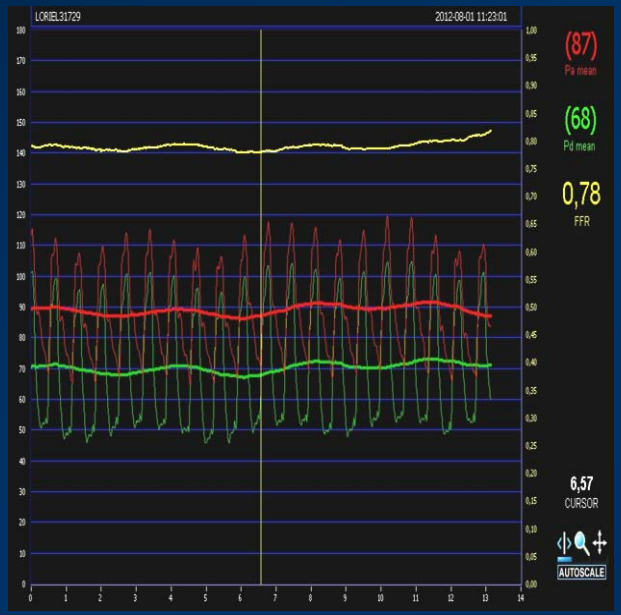

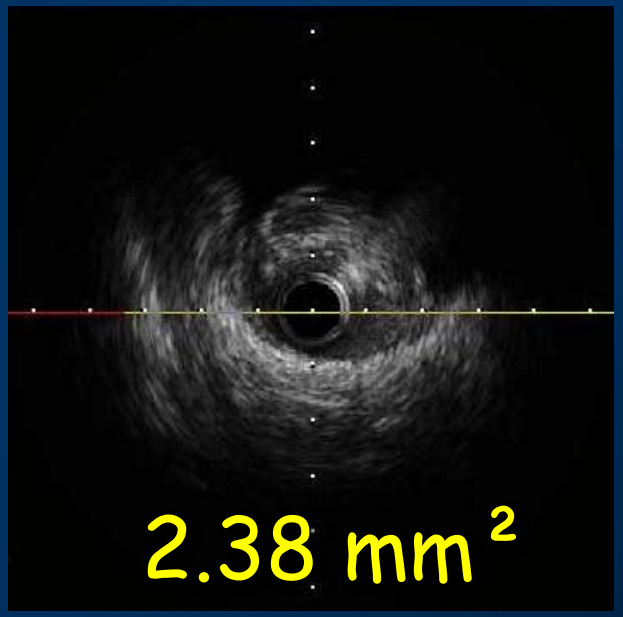

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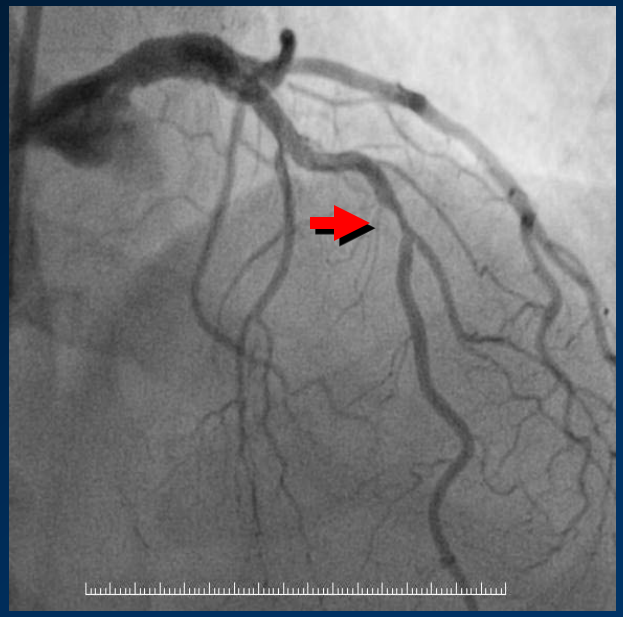

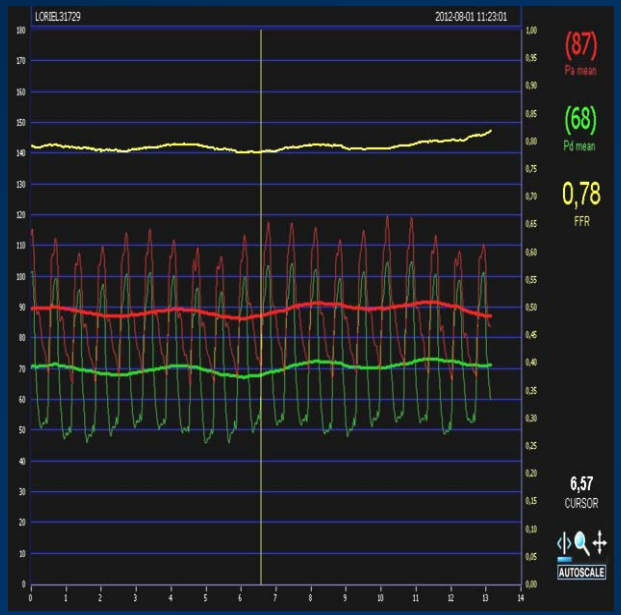

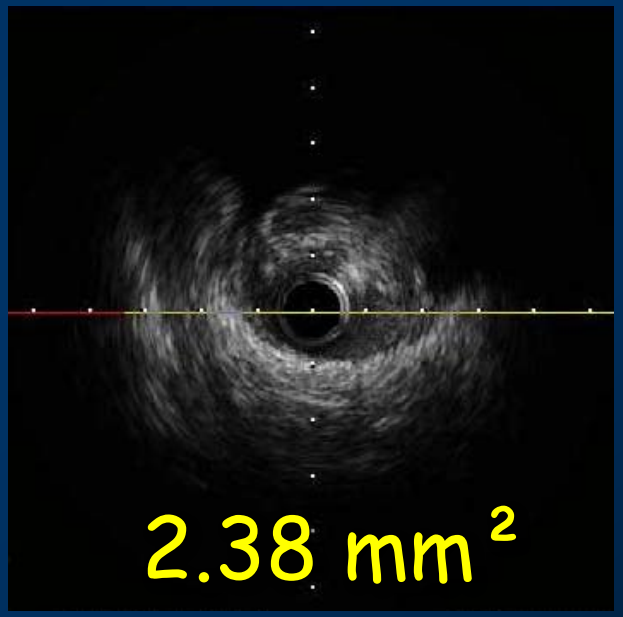

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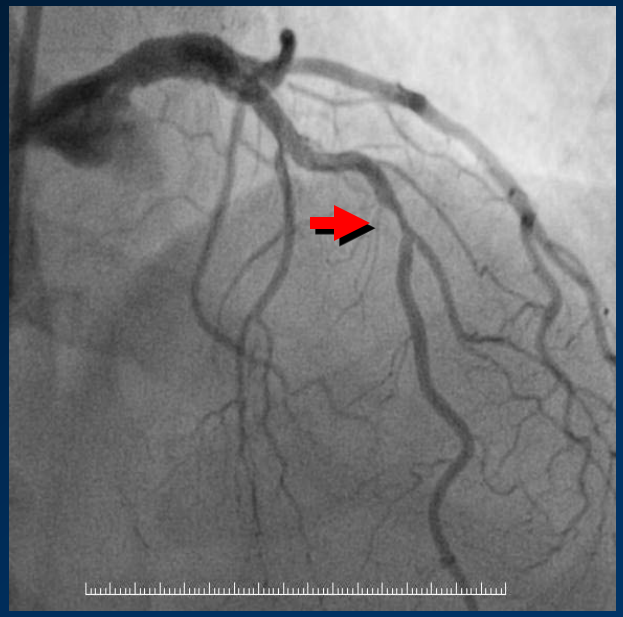

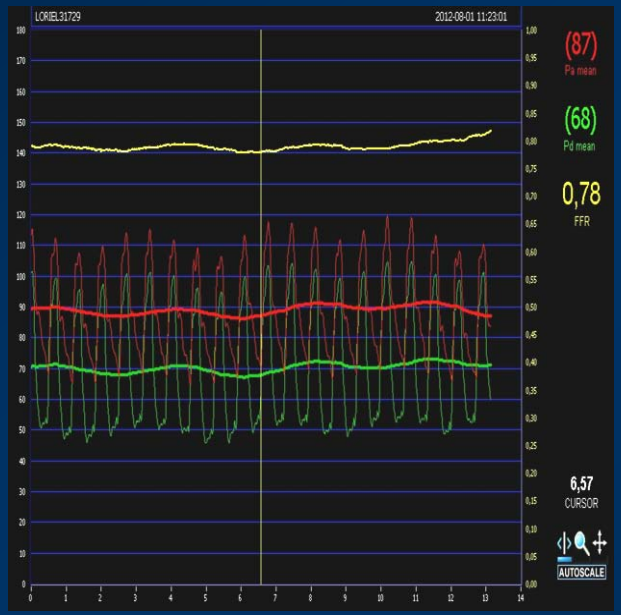

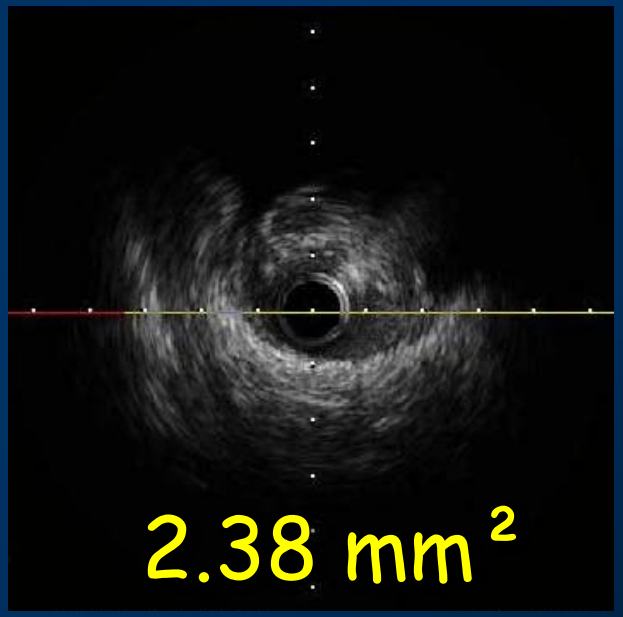

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