IMAGING & PHYSIOLOGY SUMMIT 2013

Imaging Workshop I : OCT

Case-Based Learning from Experts

Friday, Dec 7, 2013
2:45pm - 3:00pm
Sheraton Grande Walkerhill, Seoul, Korea

Clinical Outcome of OCT-detected Vulnerable Plaque

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Disclosure Statement of Financial Interest

Within the past 12 months, I or my spouse/partner have had a financial interest/arrangement or affiliation with the organization(s) listed below.

Affiliation/Financial Relationship	Company
• Grant/Research Support	• St. Jude Medical, Terumo, Abbott Vascular
• Consulting Fees/Honoraria	• St. Jude Medical, Terumo
• Major Stock Shareholder/Equity	• No
• Royalty Income	• No
• Ownership/Founder	• No
• Intellectual Property Rights	• No
• Other Financial Benefit	• No

Case: 74 yo, M

Clinical diagnosis

Stable AP

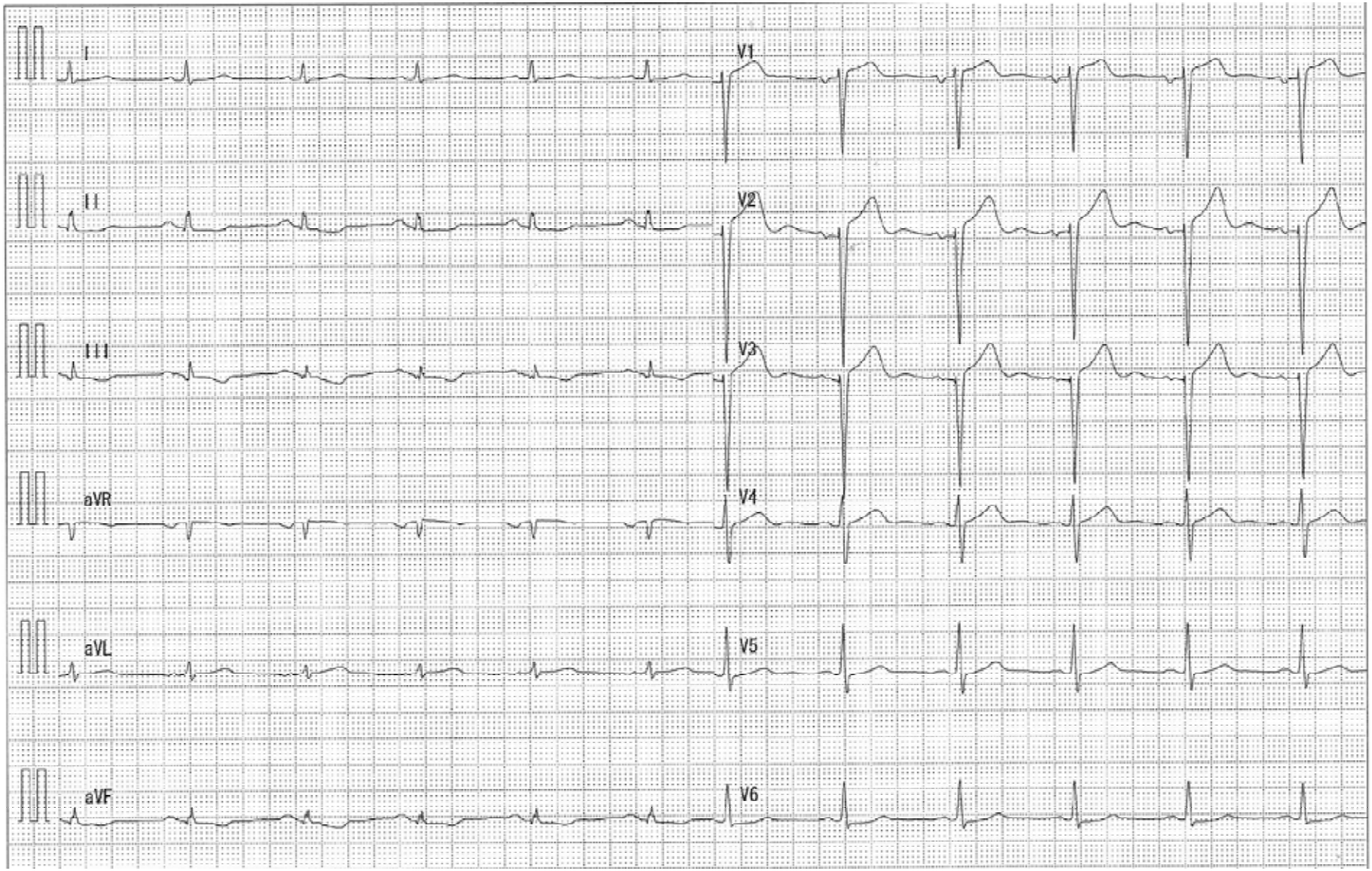
Clinical history and test results prior to catheterization

1998, AMI-anteroseptal
PCI to prox LAD (Palmatz-Schatz stent 4.0 x 15mm)
2011, Effort chest pain
CT angiography, Stent occlusion

Coronary risk factors

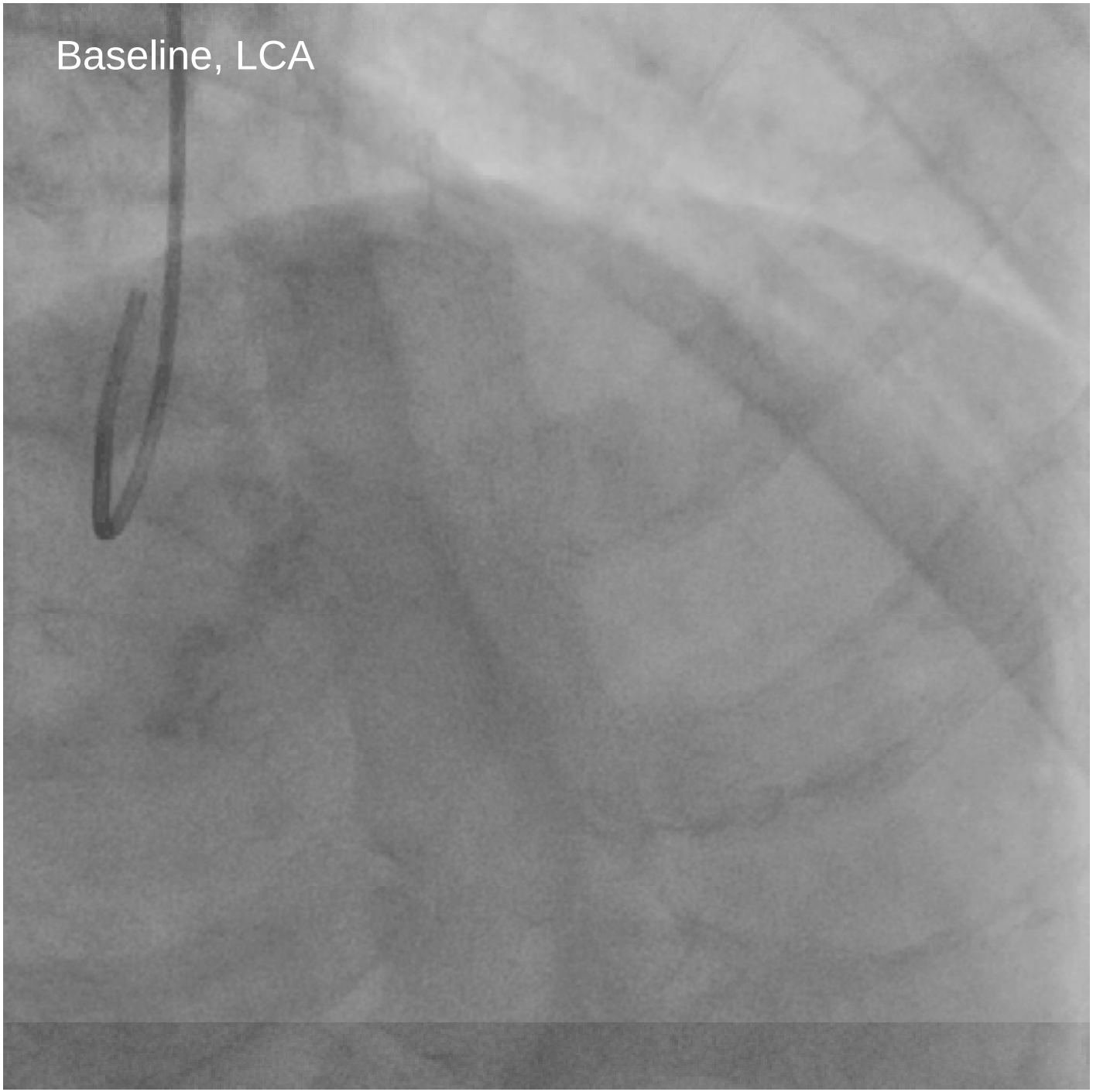
HT (-), DLP (+), DM (+), Obesity (-), Current smoker (+)

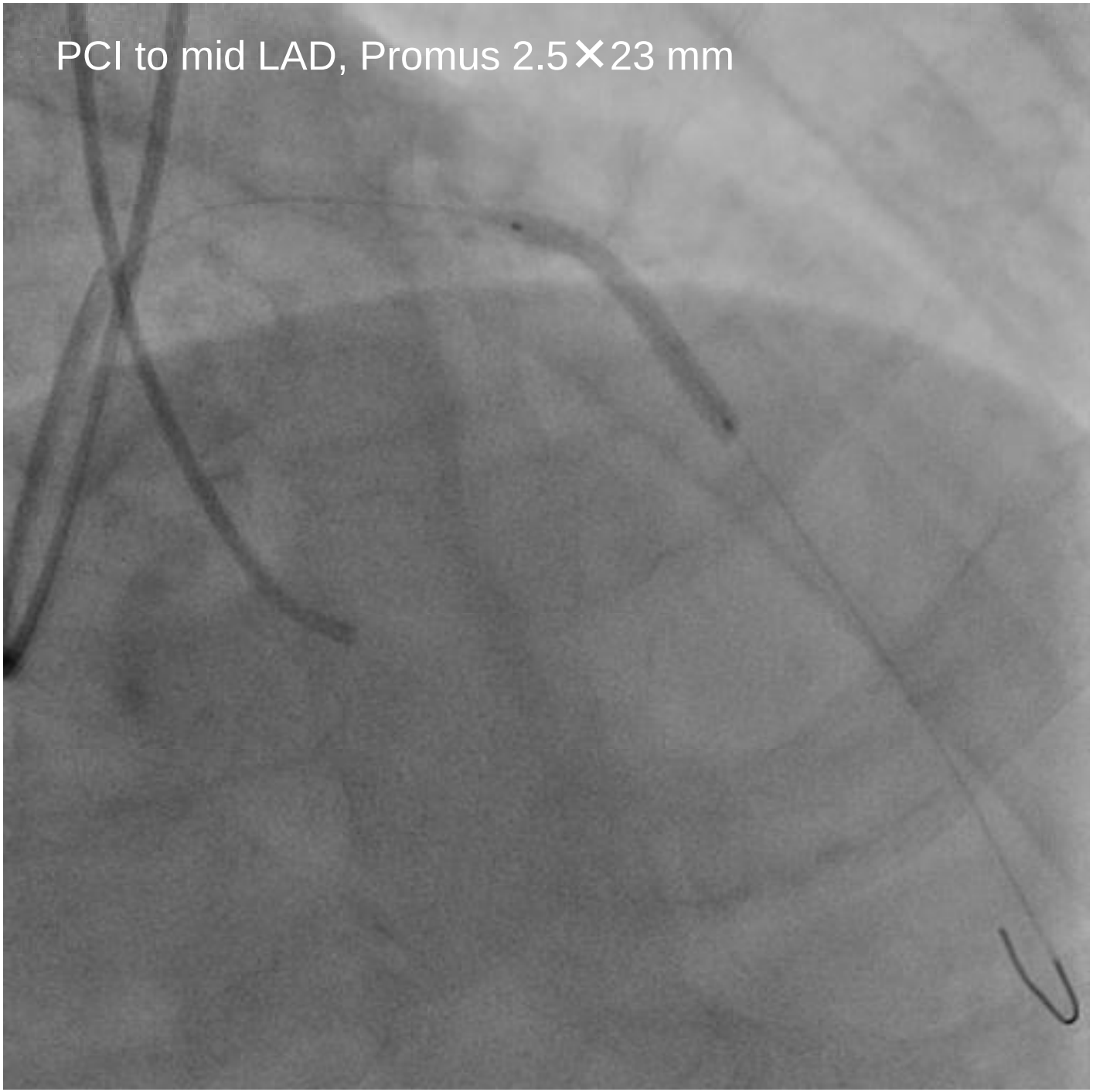
Electrocardiography

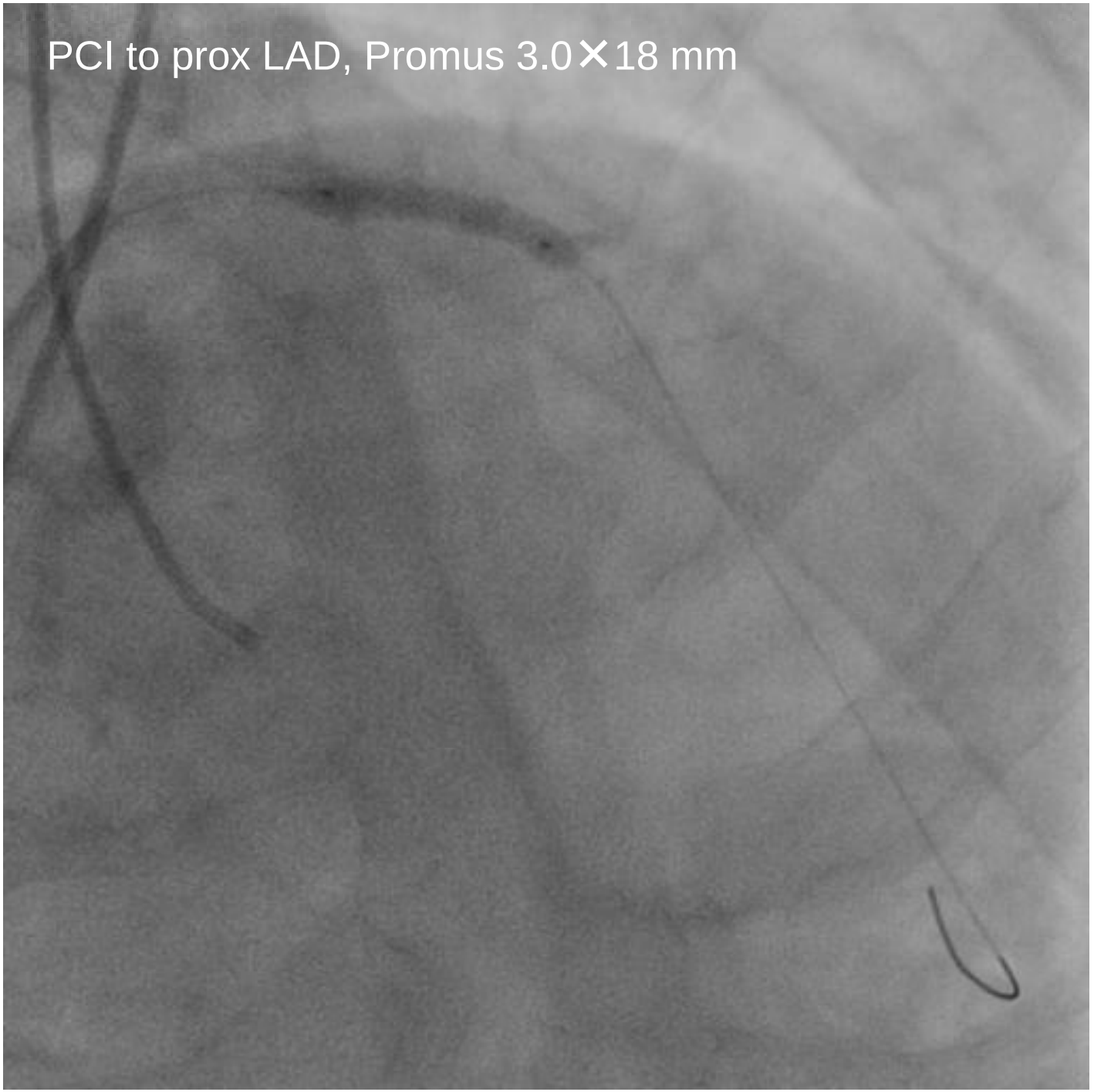


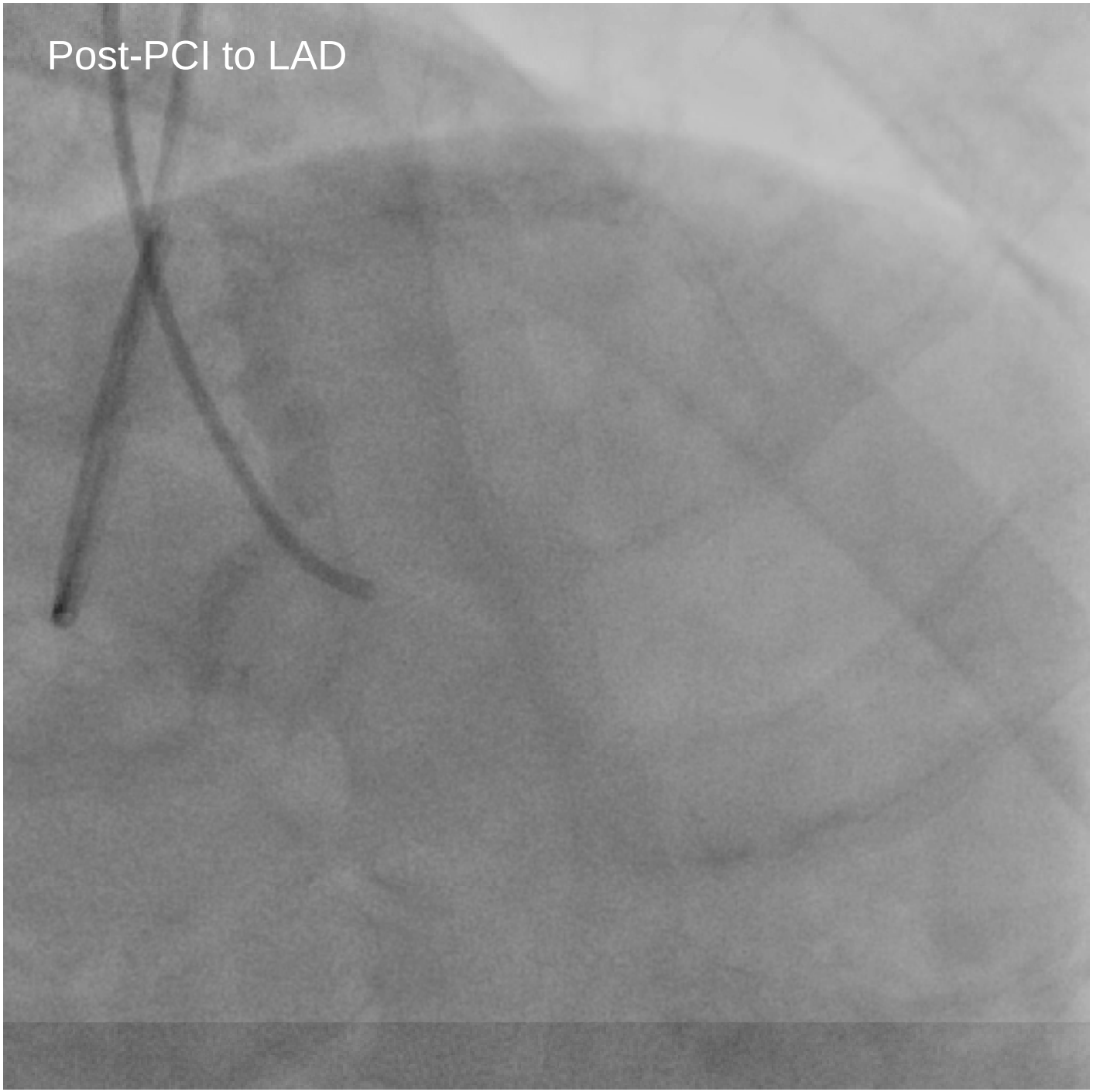
Laboratory data

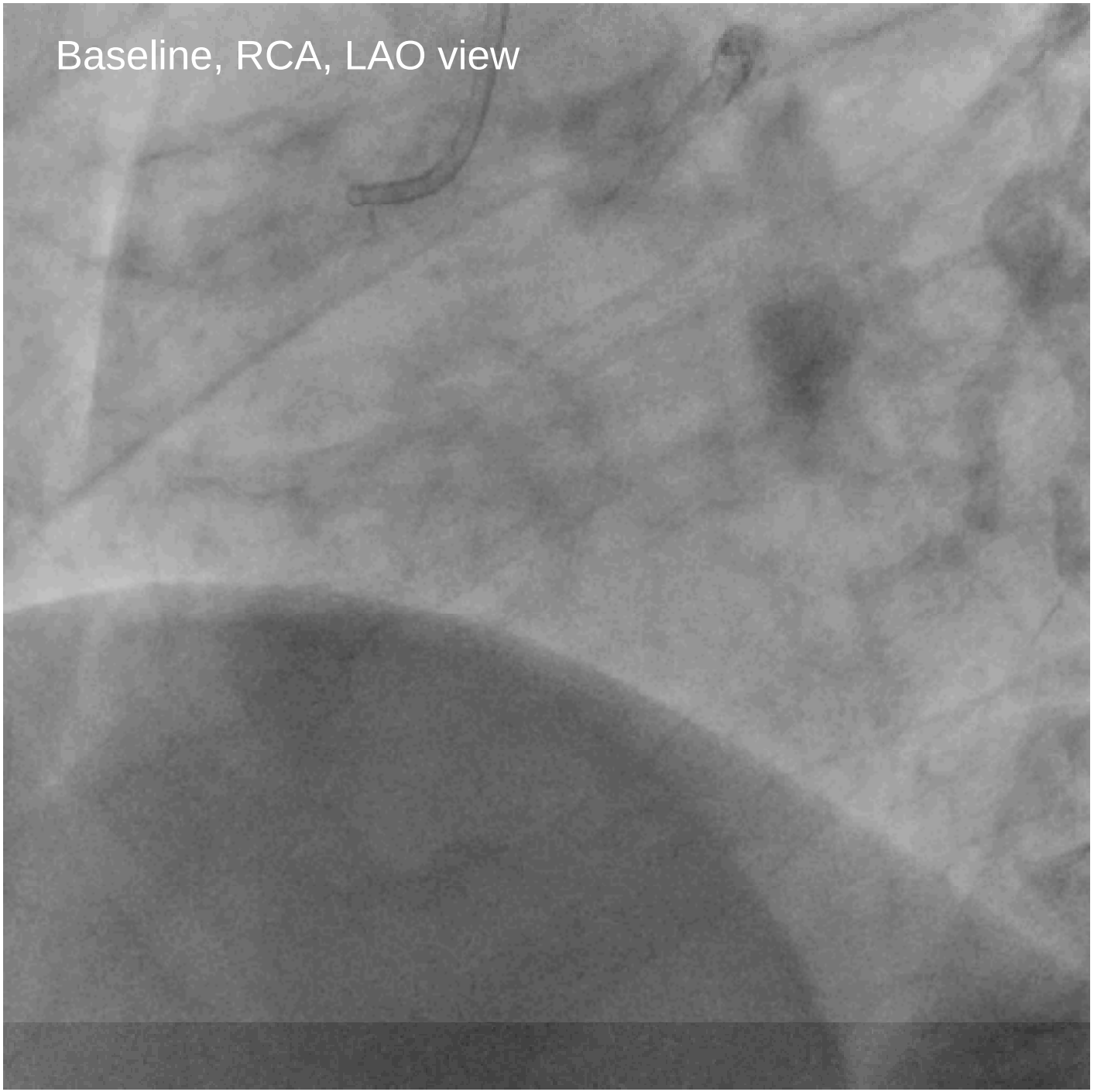
WBC	7920	/mm^3	Na	149	mEq/l
RBC	372	/mm^3	K	4.7	mEq/l
Hb	12.0	g/dl	BUN	18	mg/dl
Ht	37.9	%	Cr	1.24	mg/dl
Plt	20.1x10^4	/mm^3	UA	4.6	mg/dl
			TP	6.4	g/dl
Troponin	(-)		T.Chol	147	mg/dl
CK	145	U/l	HDL	44	mg/dl
AST	18	U/l	LDL	86	mg/dl
ALT	11	U/l	FBS	124	mg/dl
CRP	0.64	mg/dl	HbA1c	6.8	%


Baseline, LCA

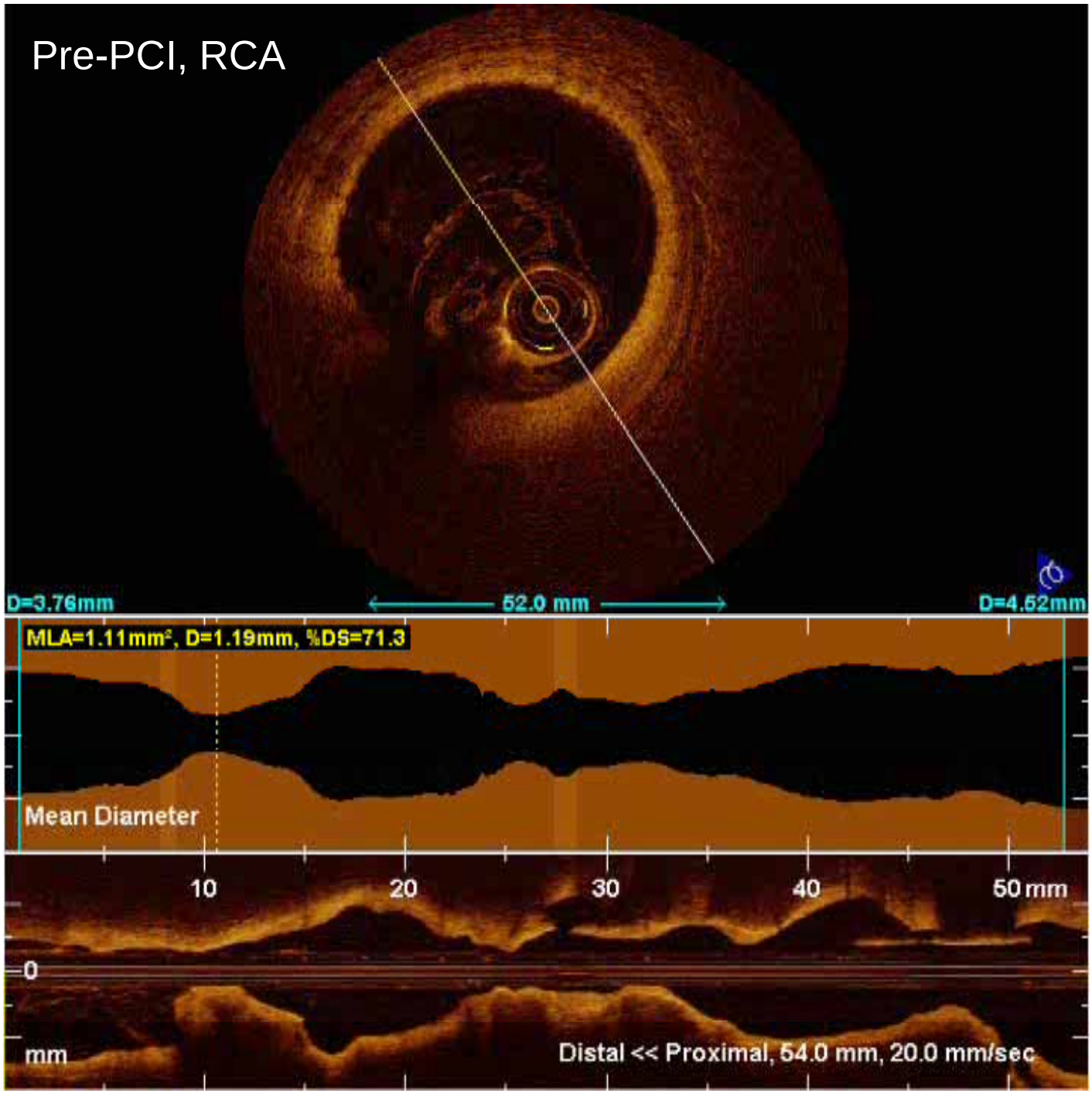

PCI to mid LAD, Promus 2.5✕23 mm

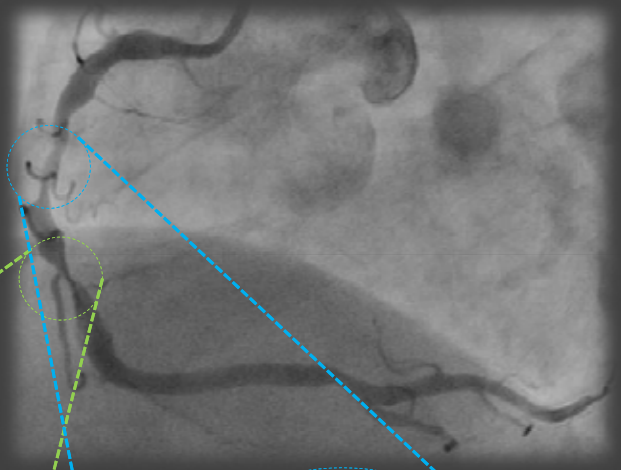

PCI to prox LAD, Promus 3.0✕18 mm


Post-PCI to LAD


Baseline, RCA, LAO view

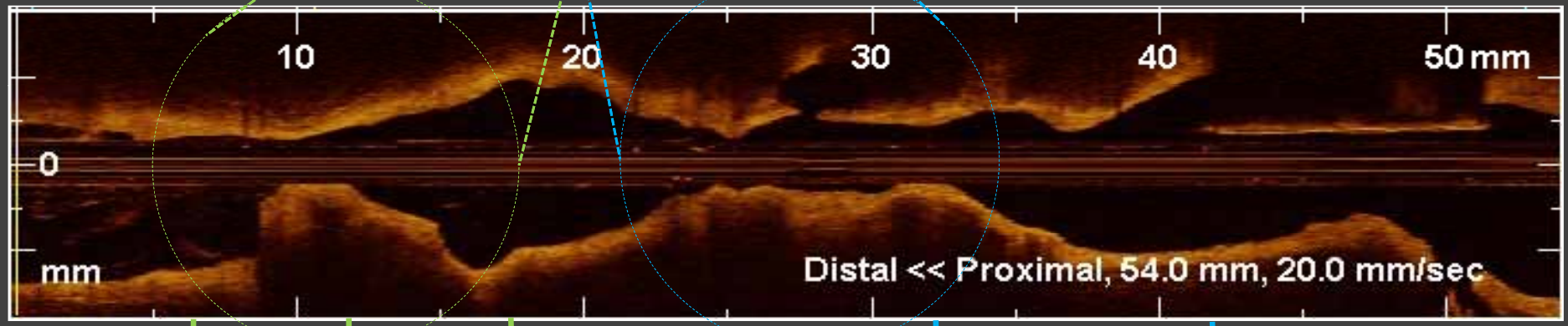

Baseline, RCA, RAO view

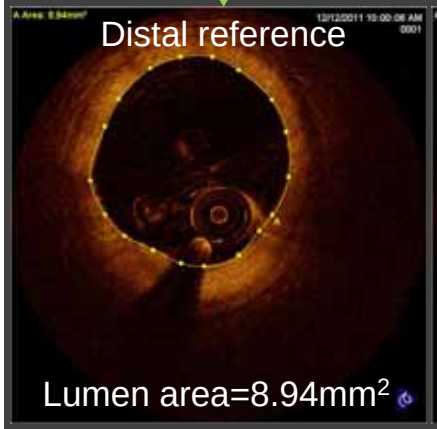

Pre-PCI, RCA
D=3.76mm
52.0 mm
D=4.62mm
MLA=1.11mm², D=1.19mm, %DS=71.3
Mean Diameter
10
20
30
40
50 mm
0
mm
Distal << Proximal, 54.0 mm, 20.0 mm/sec

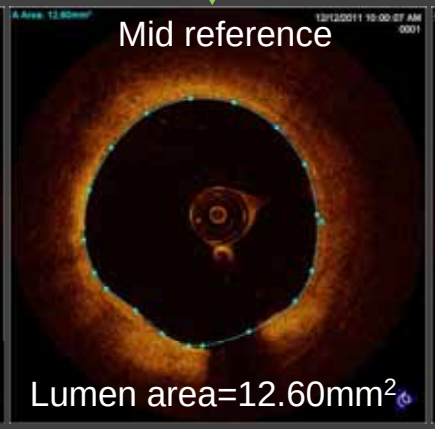


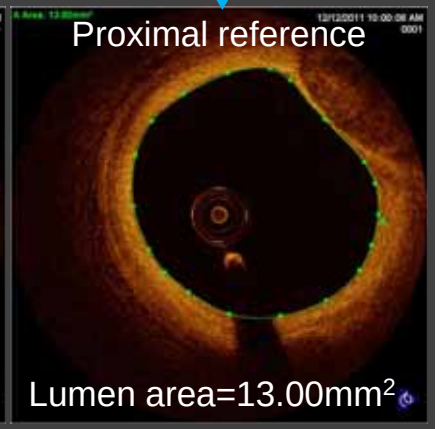
Distal lesion

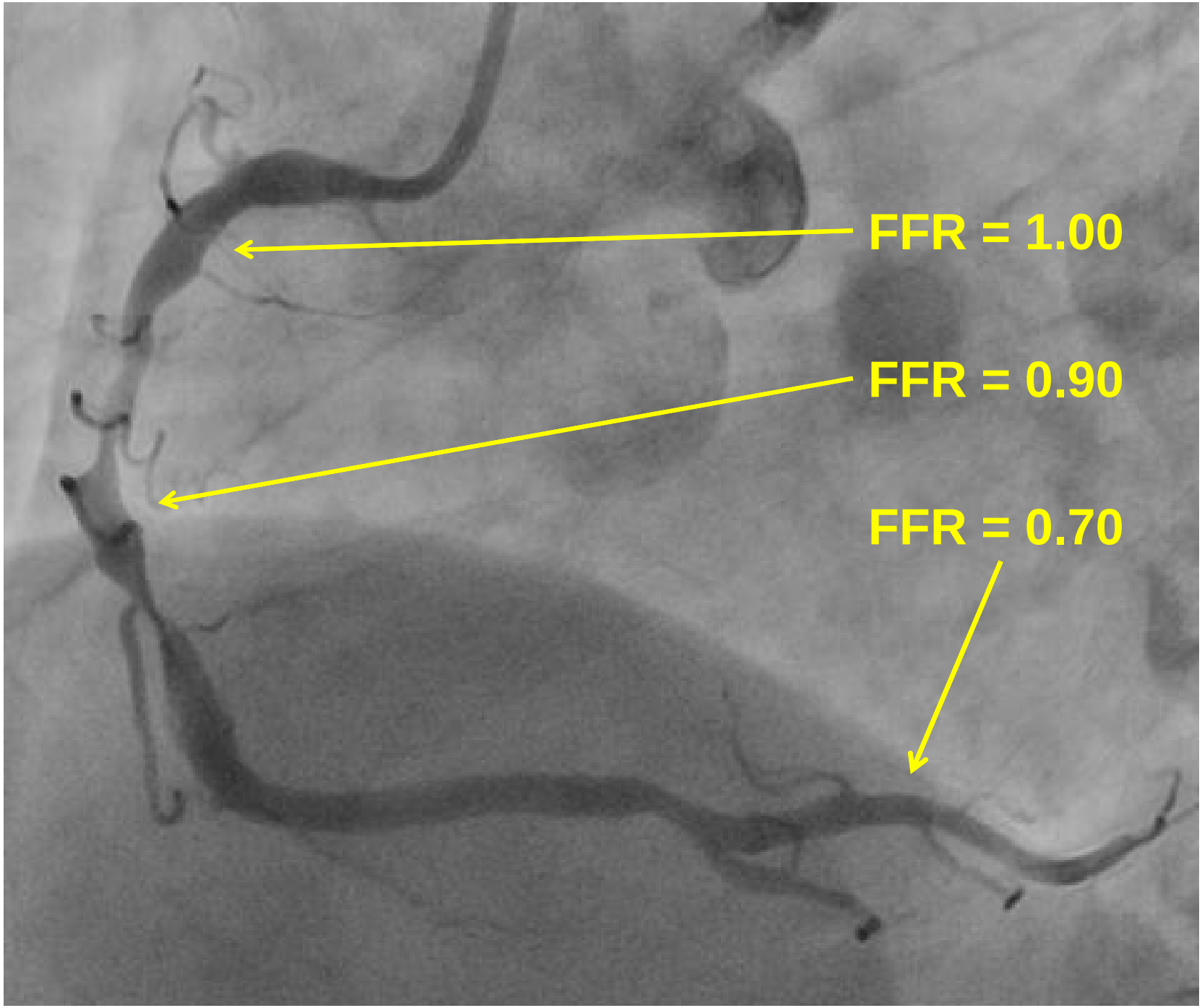
Proximal lesion

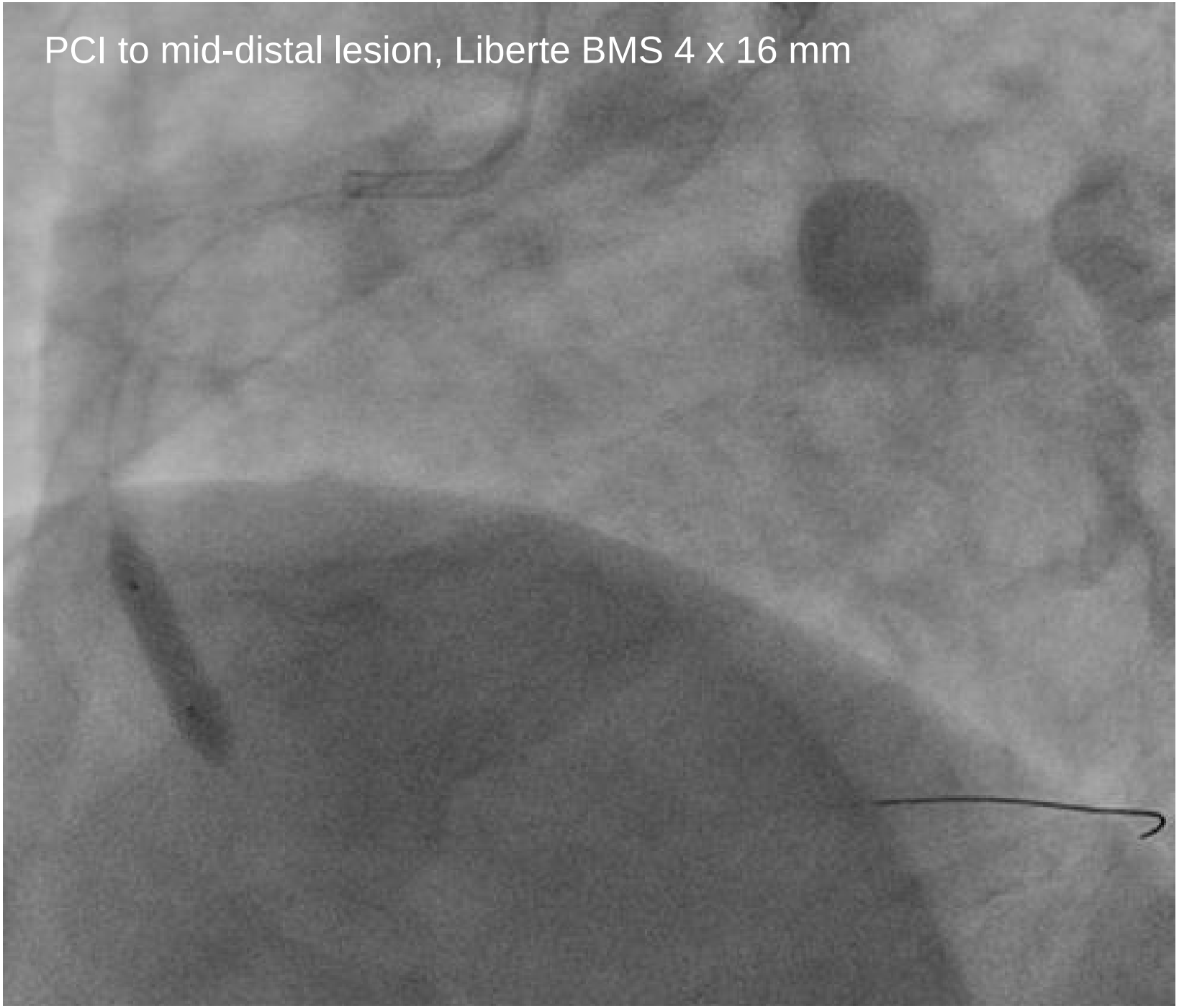


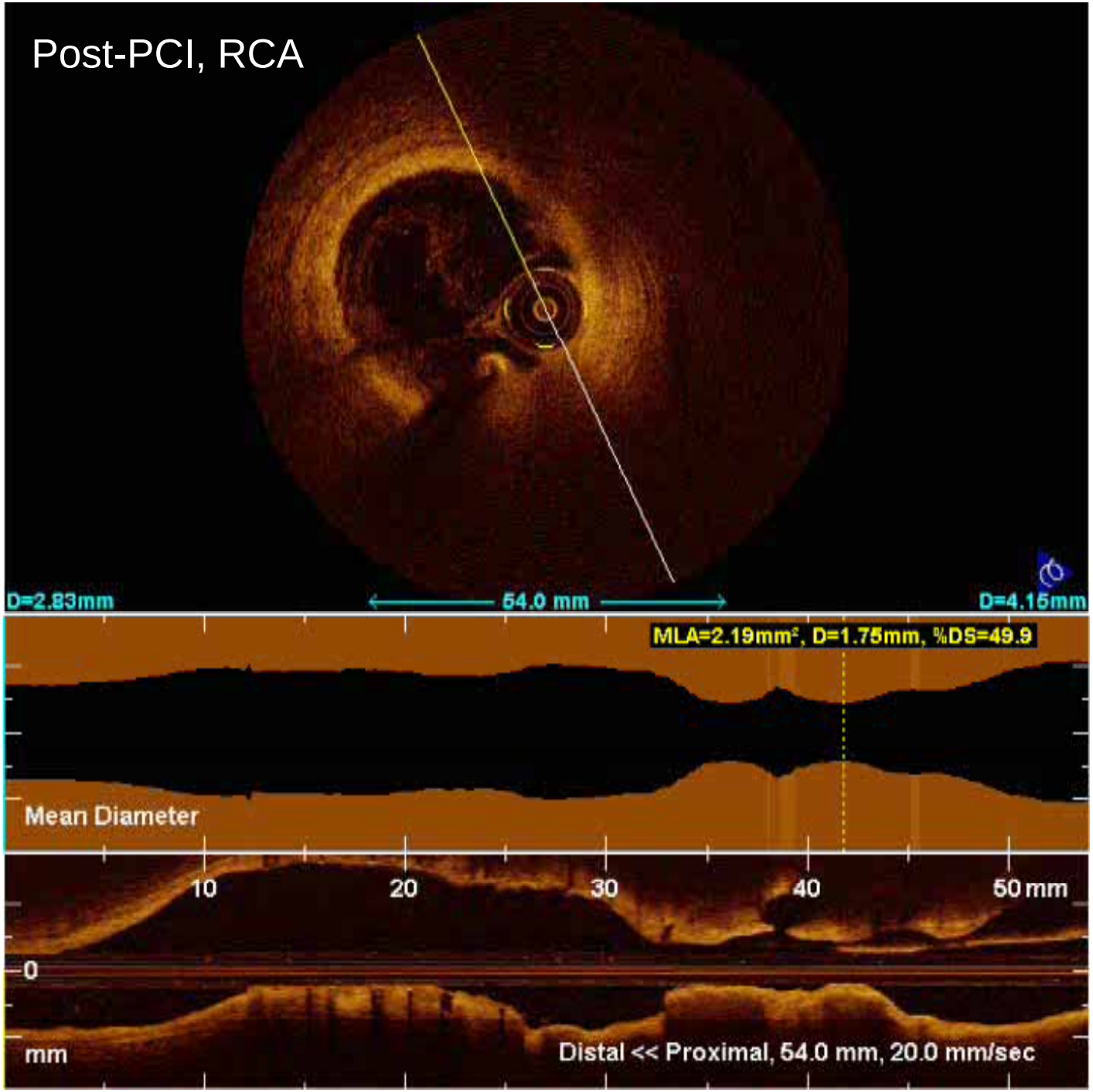






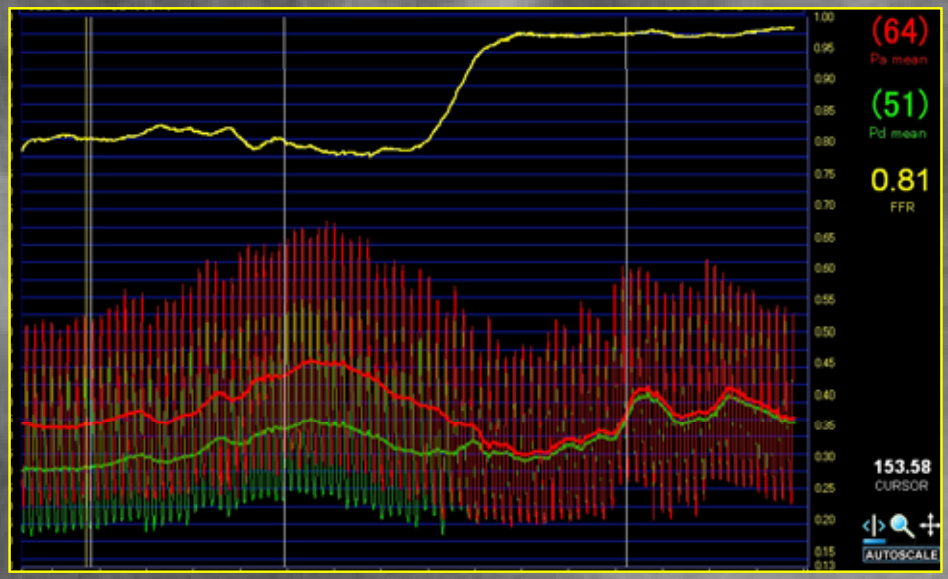

FFR = 1.00
FFR = 0.90
FFR = 0.70


PCI to mid-distal lesion, Liberte BMS 4 x 16 mm

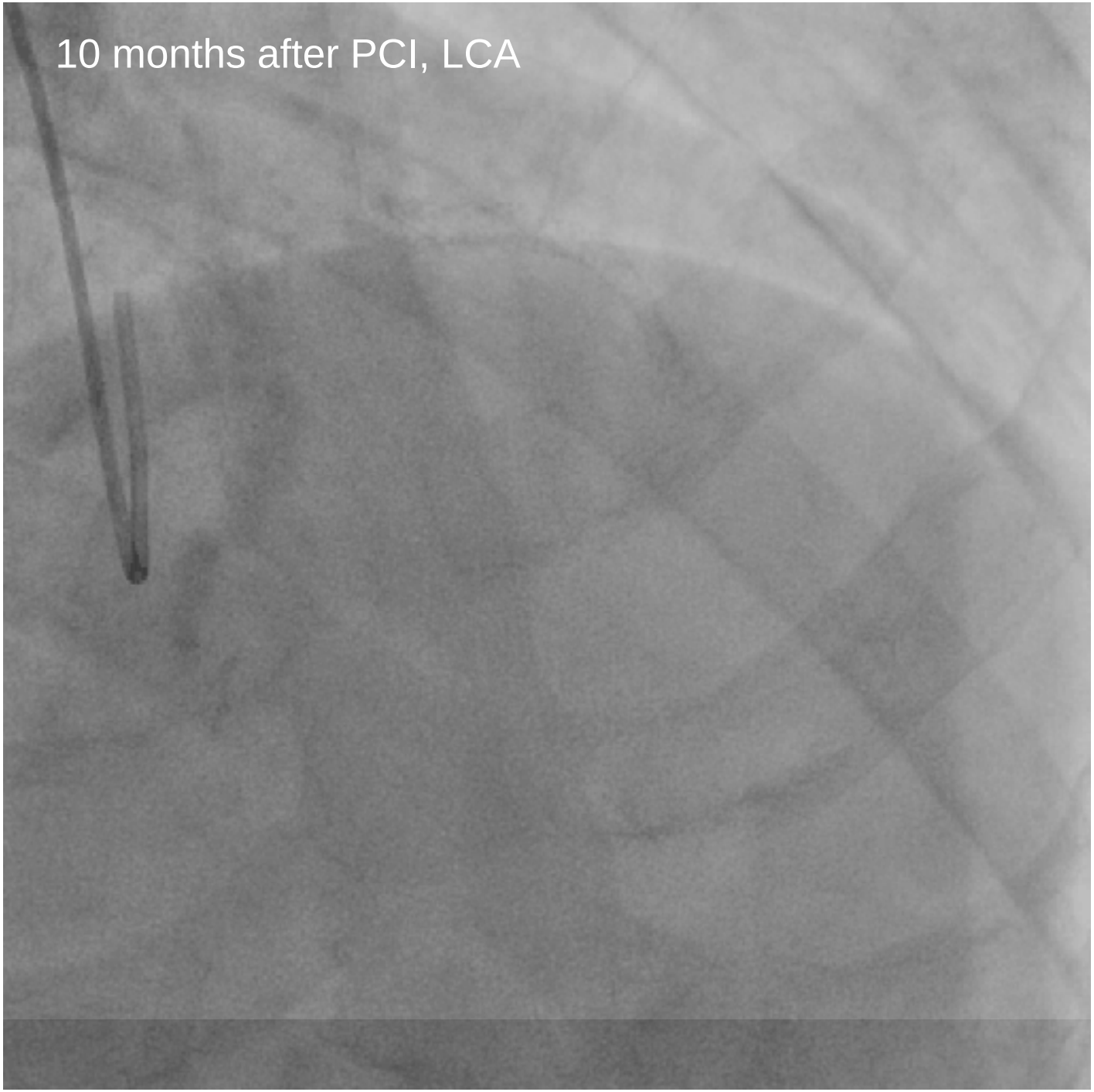

Post-PCI, RCA
D=2.83mm
54.0 mm
D=4.15mm
MLA=2.19mm², D=1.75mm, %DS=49.9
Mean Diameter
10
20
30
40
50 mm
0
mm
Distal << Proximal, 54.0 mm, 20.0 mm/sec

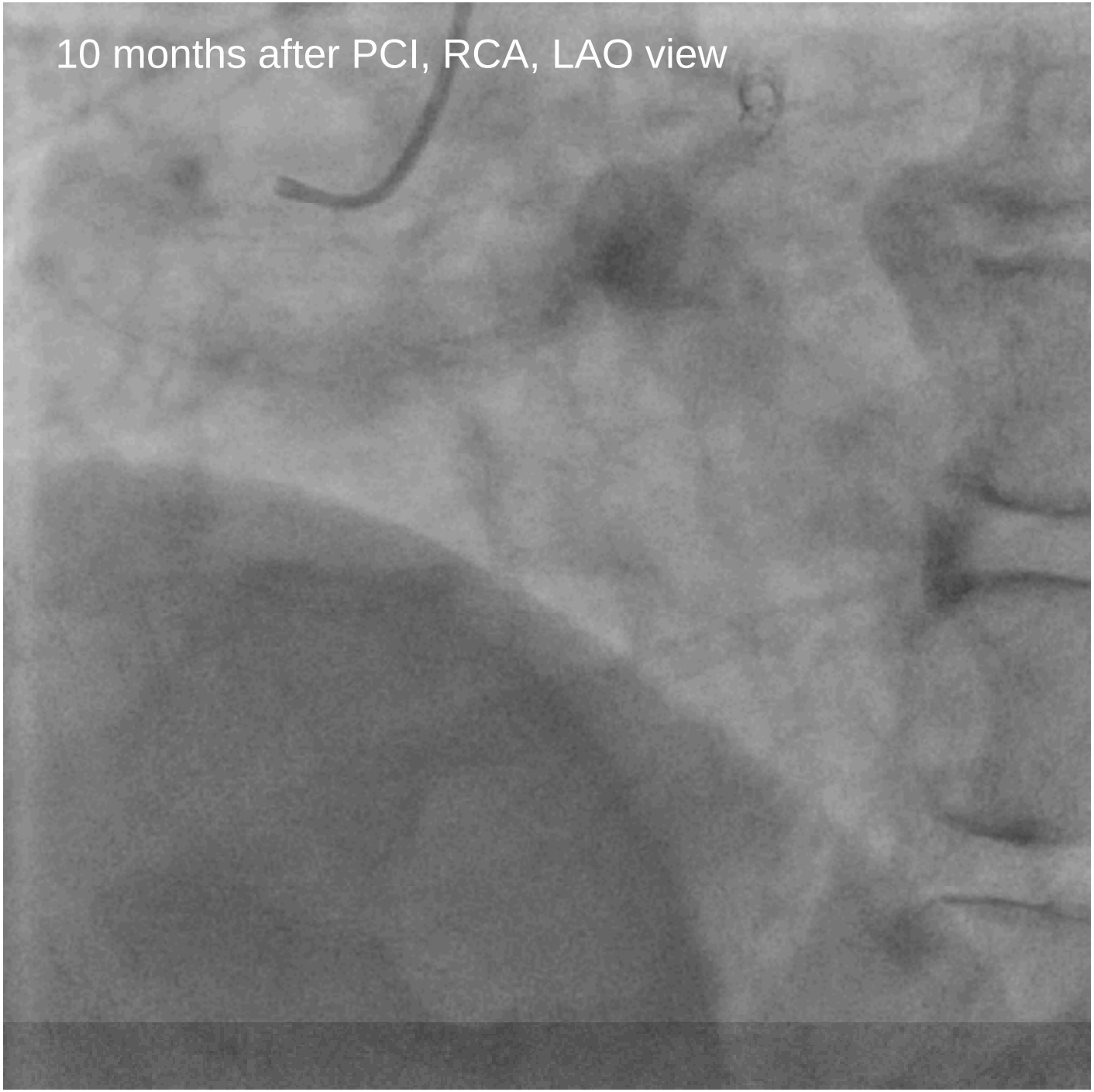
FFR at post-PCI to mid-distal lesion

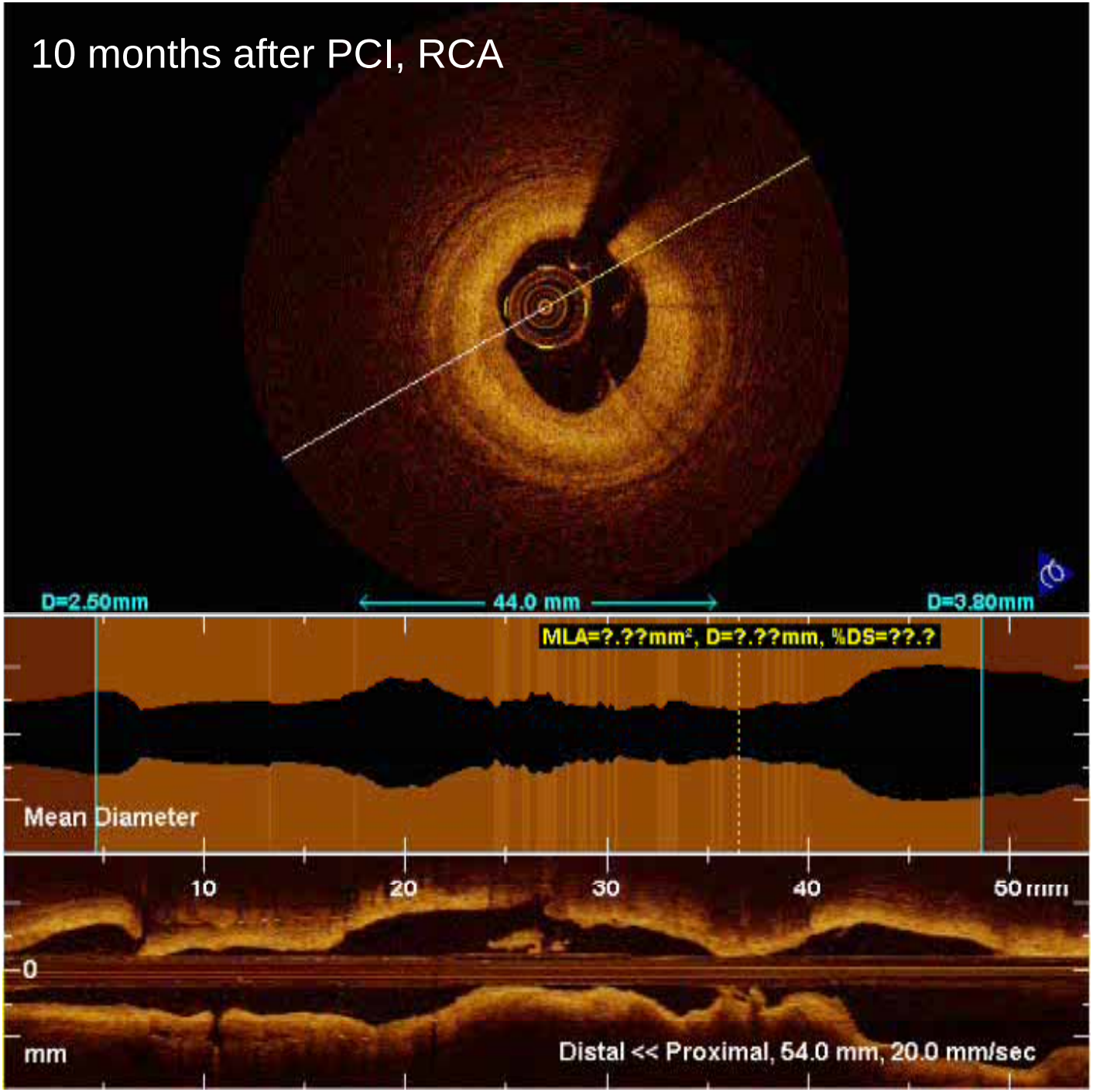
FFR = 0.81

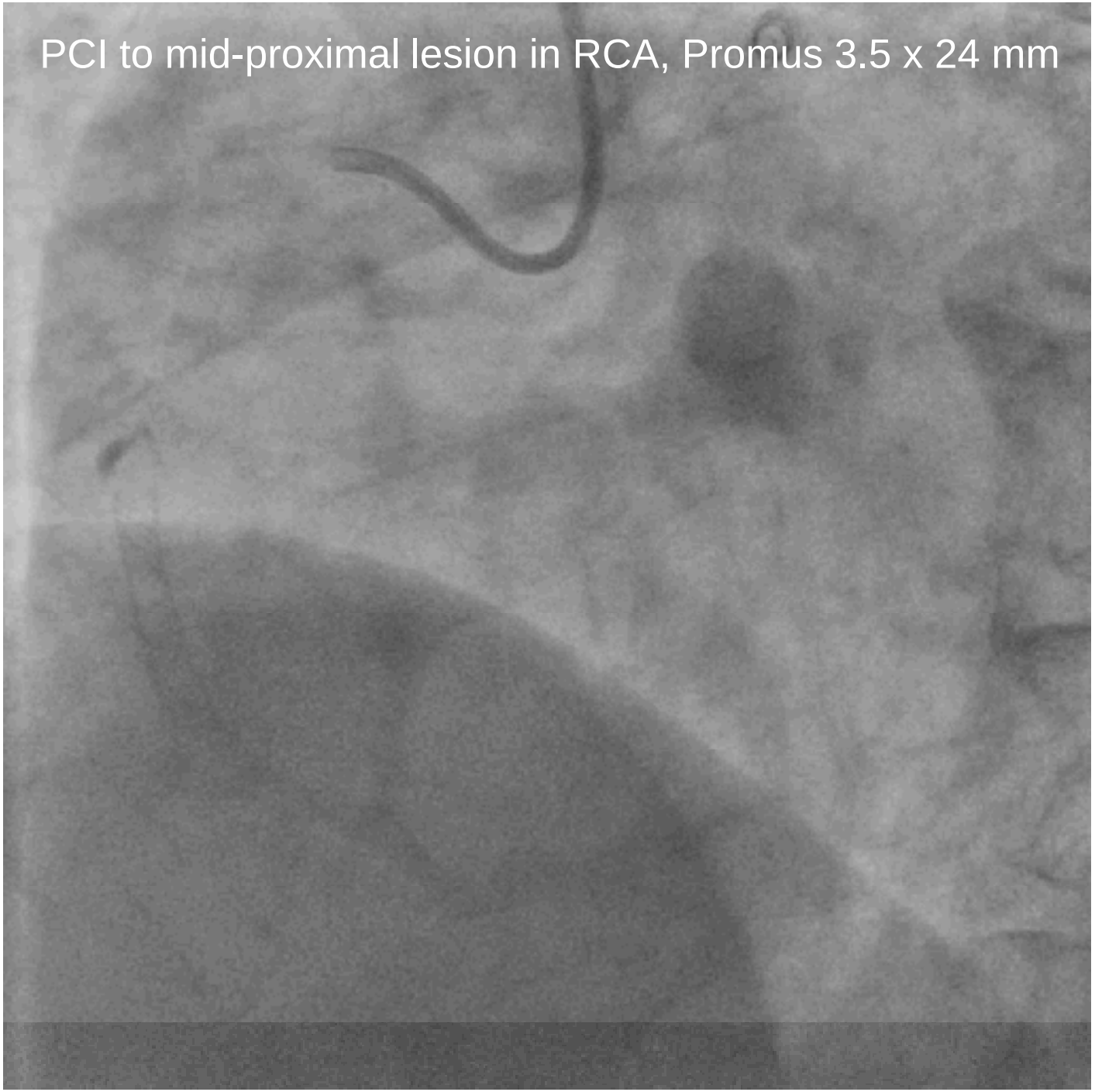


10 months later

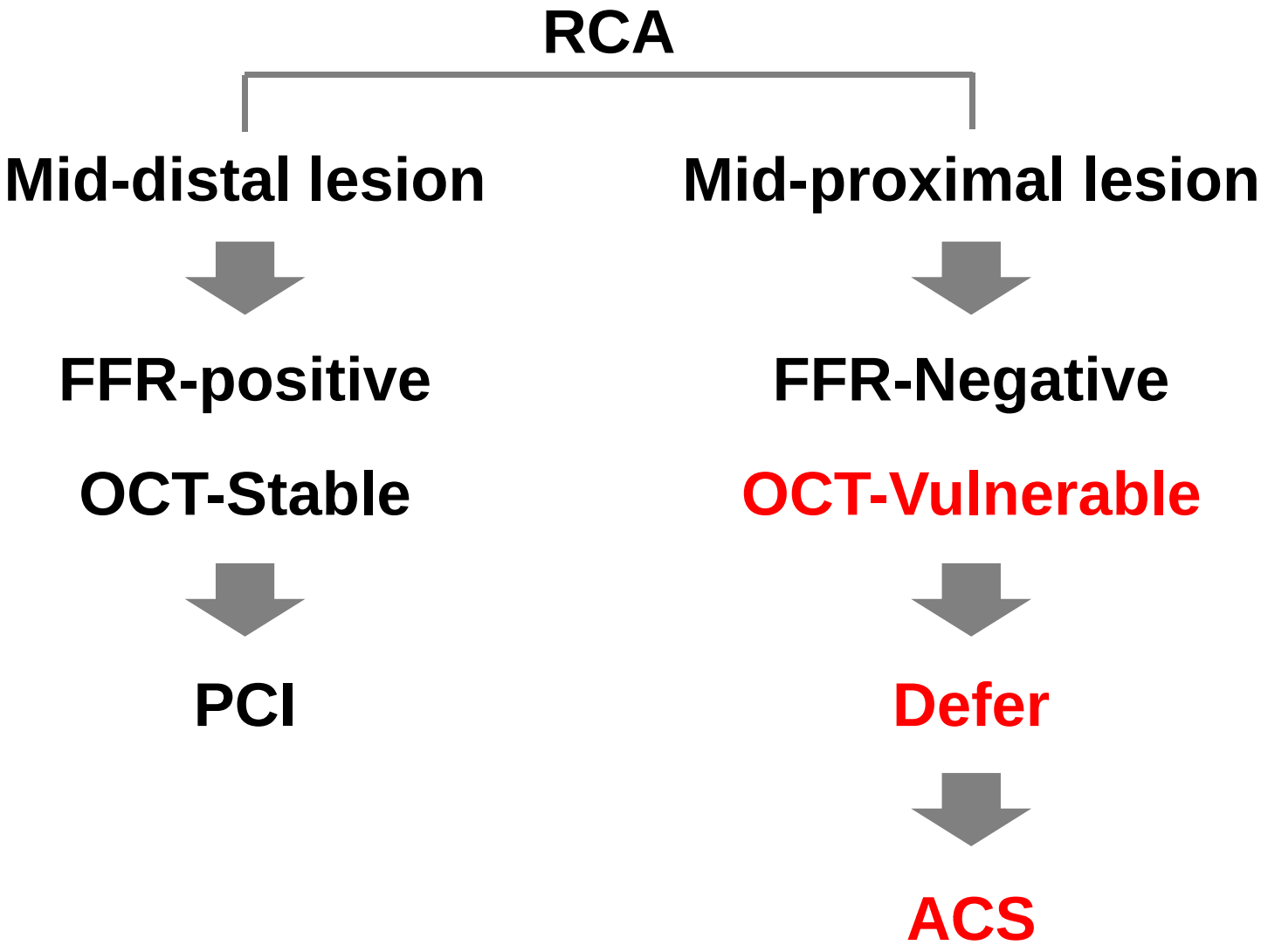

10 months after PCI, LCA


10 months after PCI, RCA, LAO view

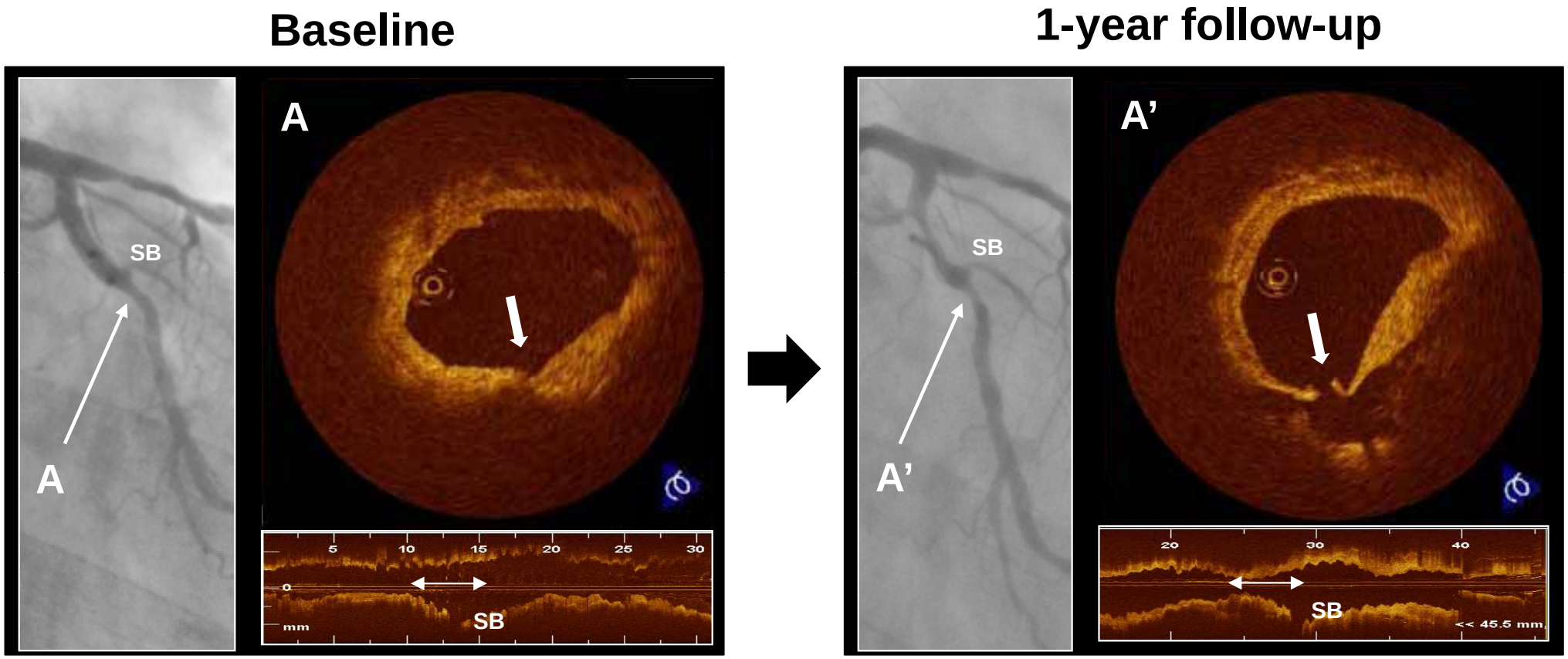

10 months after PCI, RCA
D=2.50mm
44.0 mm
D=3.80mm
MLA=?.??mm², D=?.??mm, %DS=??.?
Mean Diameter
10
20
30
40
50 mm
0
mm
Distal << Proximal, 54.0 mm, 20.0 mm/sec


PCI to mid-proximal lesion in RCA, Promus 3.5 x 24 mm

Summary

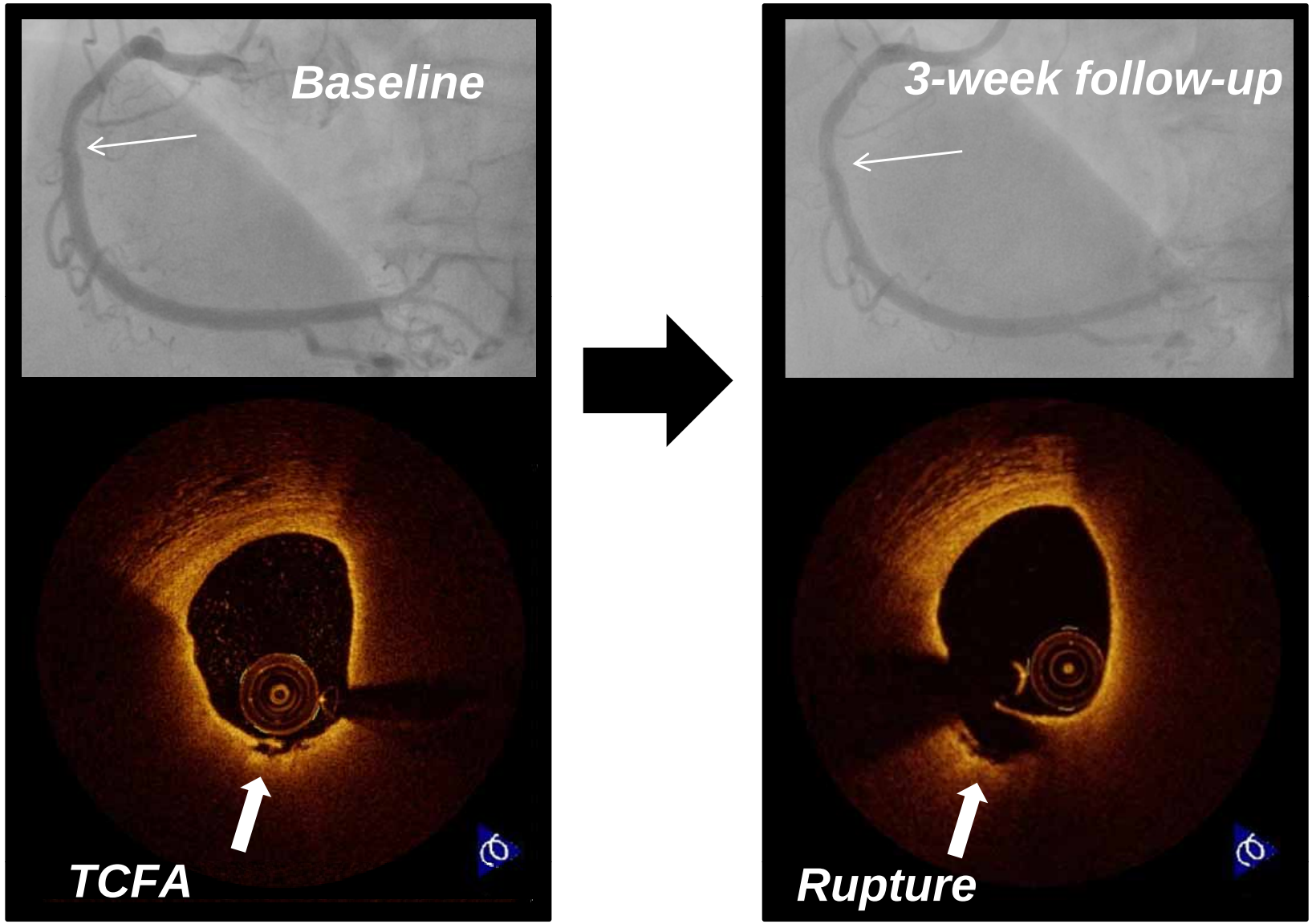

RCA
Mid-distal lesion
Mid-proximal lesion
FFR-positive
FFR-Negative
OCT-Stable
OCT-Vulnerable
PCI
Defer
ACS

Link between OCT-TCFA and rupture

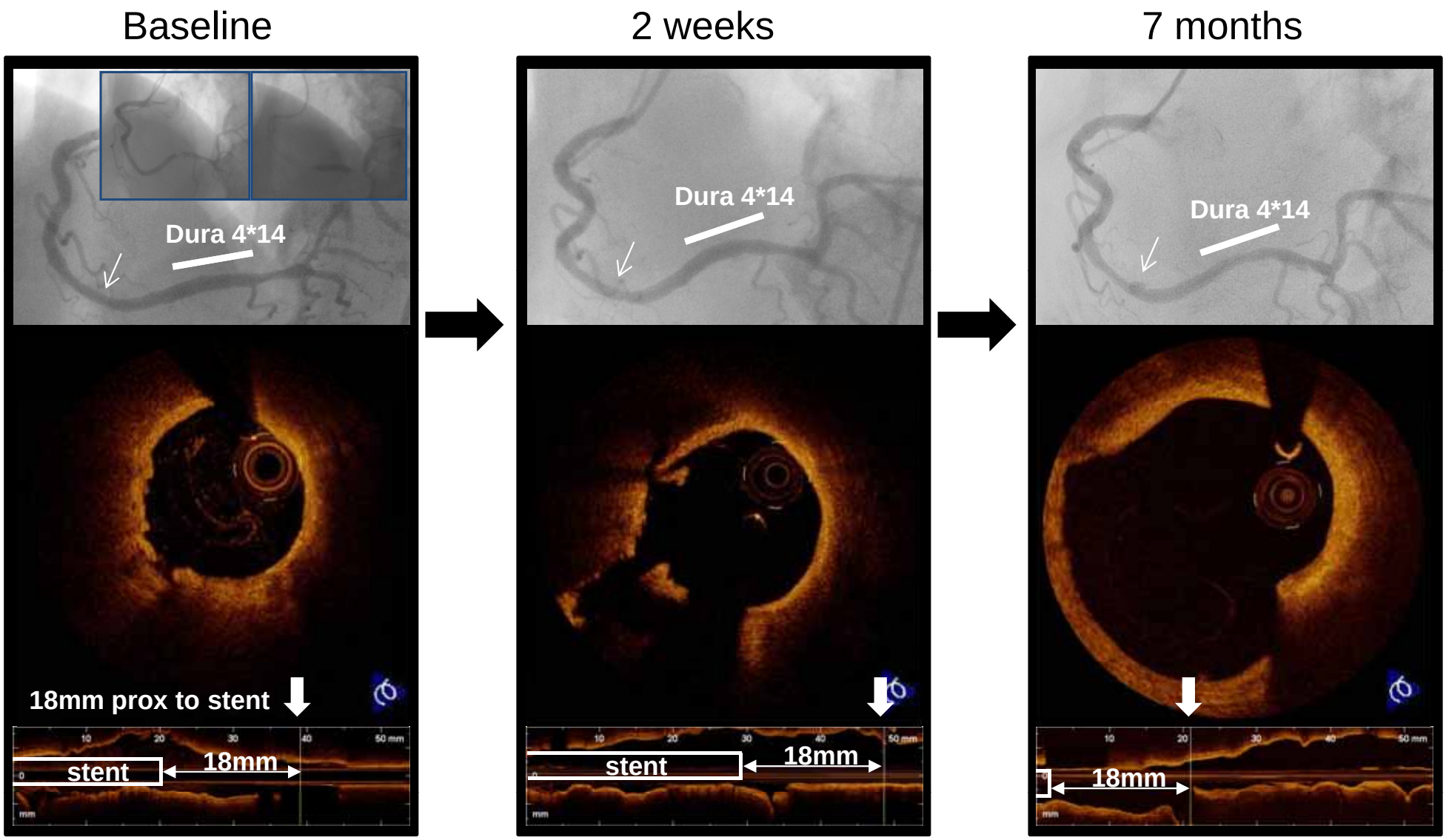


Serial OCT examination revealed that thin-cap fibroatheroma was ruptured during the follow-up period. The corresponding OCT images were identified by the distances from small side branch. Angiography showed lumen narrowing at the rupture site.

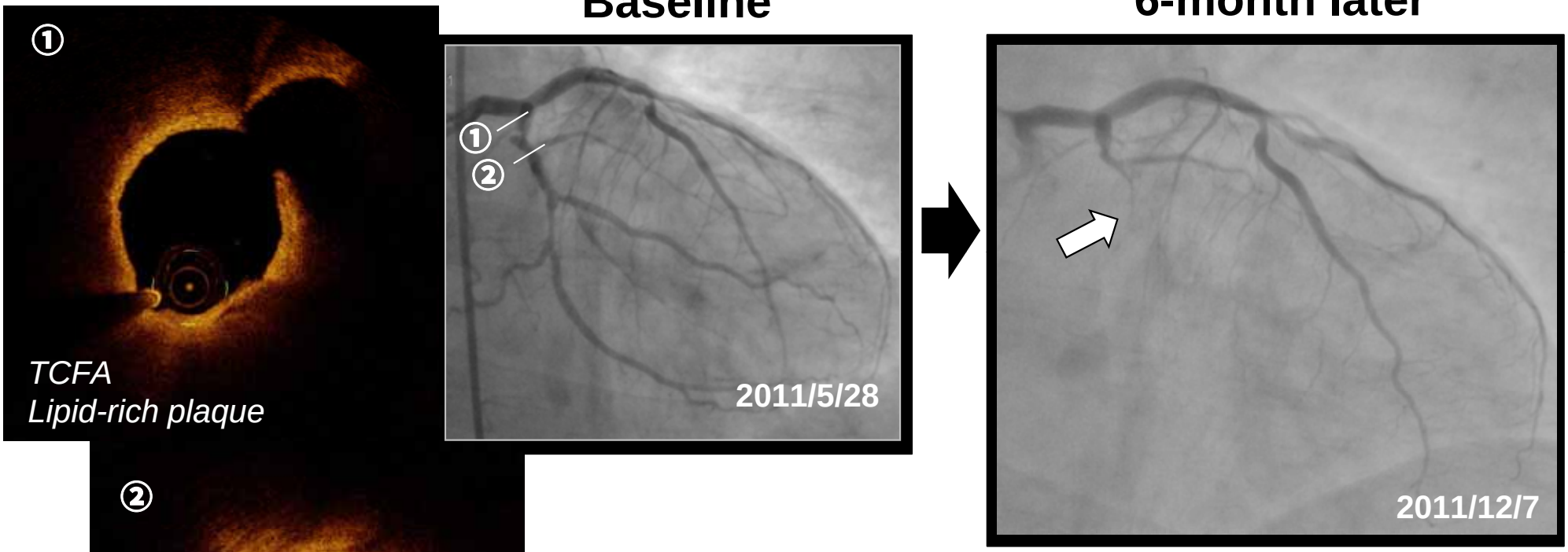
Link between OCT-TCFA and rupture



Natural history of fibrous-cap disruption

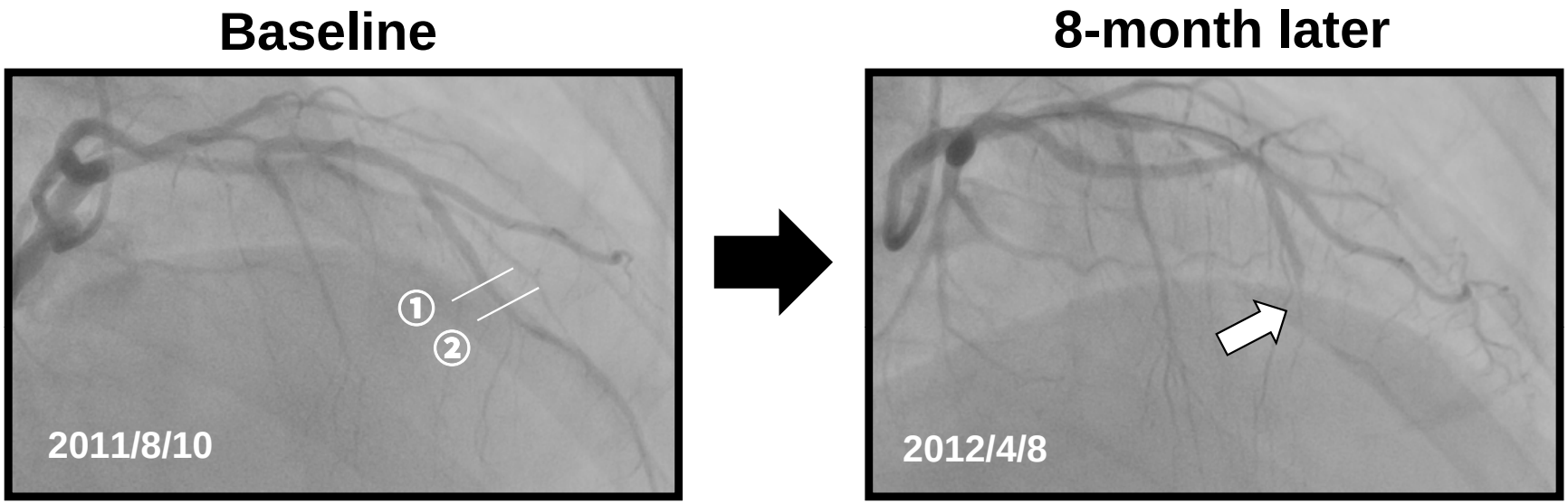


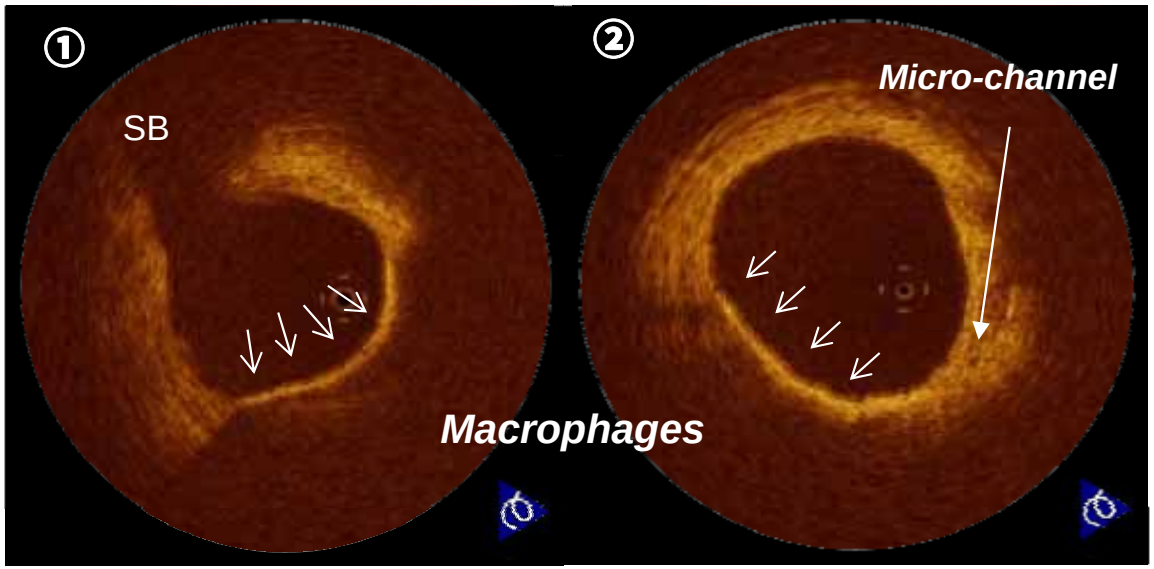
Precursor lesion of coronary occlusion



A 63-year-old man underwent catheter examination. At baseline, OCT showed TCFA and macrophage infiltration in proximal LCX lesion. Six-month later, this patient had ACS and angiography showed coronary occlusion in proximal LCX.

Natural history of the coronary lesion with macrophage infiltration





Case: 58-year-old male
At baseline, OCT showed macrophage infiltration and microchannel in mid LAD lesion. Eight-month later, this patient had ACS, and angiography showed coronary occlusion in mid LAD.

12 lesions assessed by OCT before plaque rupture

	1st OCT (Baseline)					2nd OCT (Follow-up)	
Case	Vessels	TCFA	Fibrous-cap thickness (μm)	Lipid-arc (°)	Macro phages	Duration (M)	Clinical presentation
1	RCA	+	60	360	-	7	subclinical
2	LCX	+	60	360	+	11	subclinical
3	RCA	-	140	210	+	8	subclinical
4	LCX	+	50	330	+	7	UAP
5	LCX	-	110	270	-	3	AMI
6	LAD	+	40	270	+	8	UAP
7	RCA	+	50	170	+	9	subclinical
8	RCA	+	40	210	+	10	subclinical
9	RCA	-	80	150	-	9	subclinical
10	RCA	+	40	340	+	1	subclinical
11	RCA	-	100	360	-	27	AMI
12	RCA	+	60	360	+	10	ACS

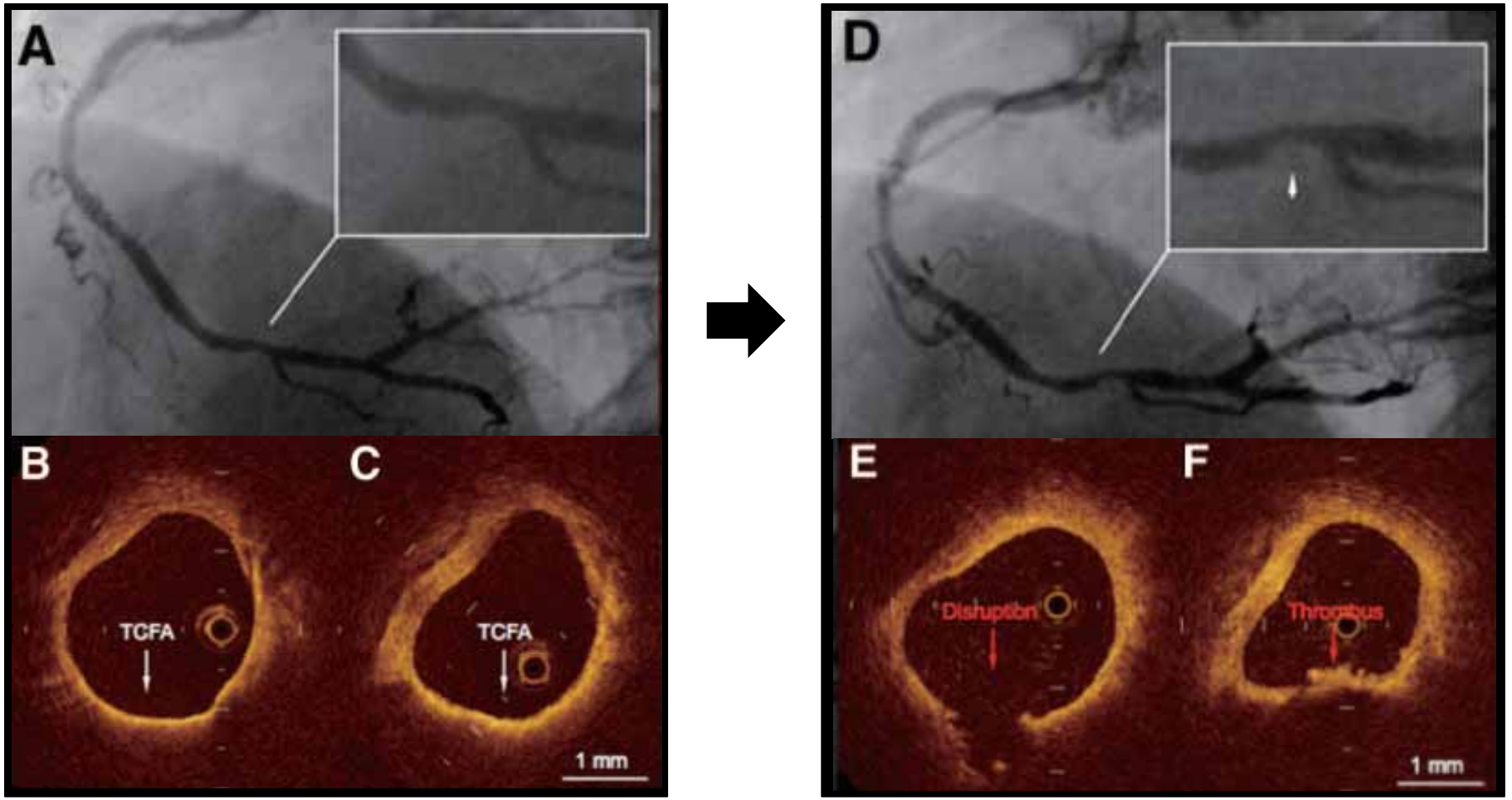
Conclusion

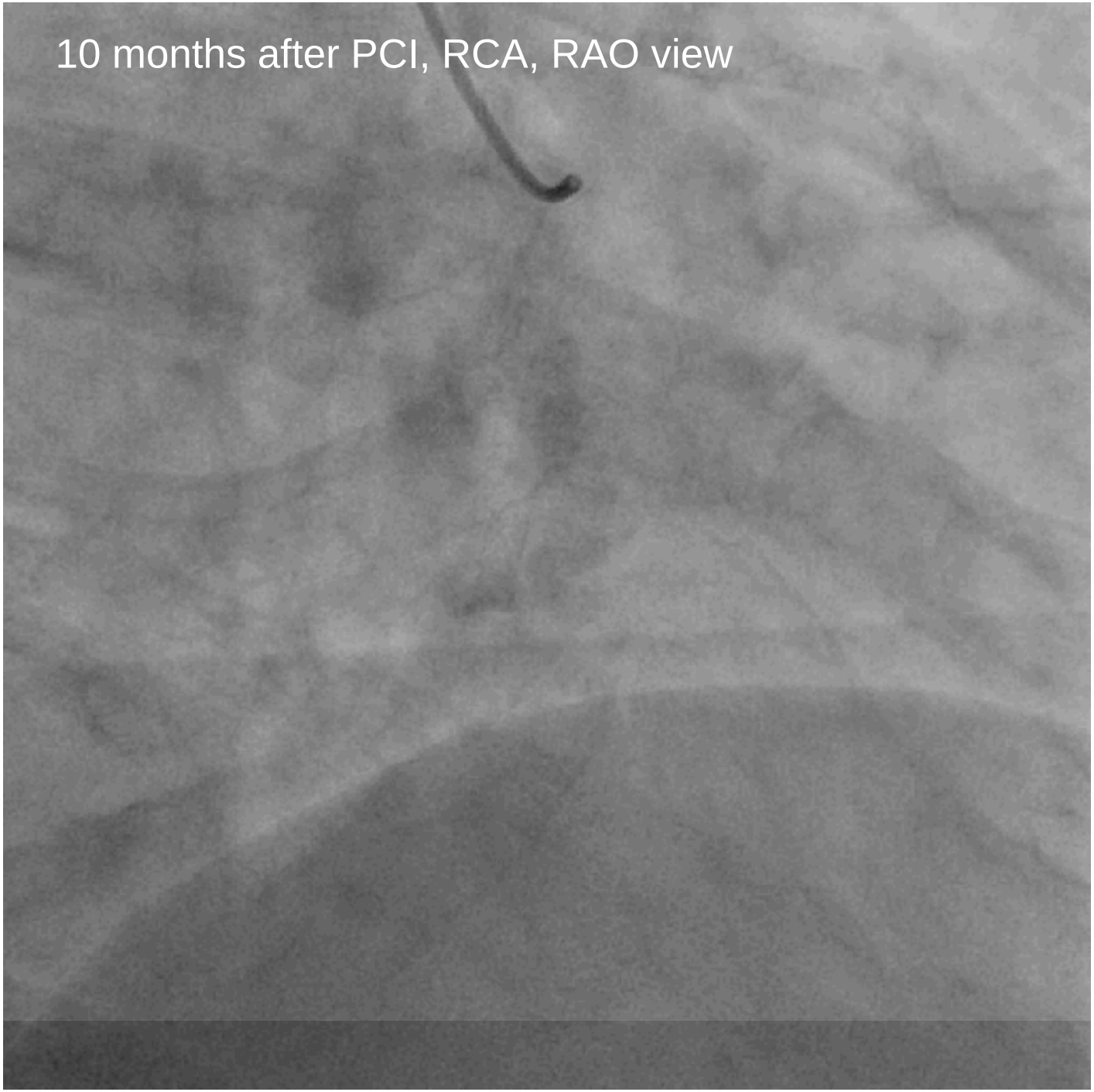
- OCT has a potential to identify thrombosis-prone vulnerable plaques in vivo.
- Whether OCT will have an established clinical role in vulnerable plaque detection must depend on the outcomes of future prospective natural history studies.
- Precise identification of vulnerable plaque could change our approach to the treatment of coronary atherosclerotic disease and contribute to the prevention of ACS.

Thanks for your attention !

Link between OCT-TCFA and rupture

Baseline **9-month follow-up**




10 months after PCI, RCA, RAO view

Discussion

Intravascular imaging	FFR: functionally significant	FFR: functionally non-significant
stable plaque	intervention	defer
vulnerable plaque	intervention	???

Conclusion

FFRに基づいてdeferした不安定病変が慢性期に進行した症例を経験した。

病変が不安定プラークの場合には安全にdeferできるFFRの基準が安定プラークの場合と異なる可能性が示唆された。

第23回 日本心血管画像動態学会

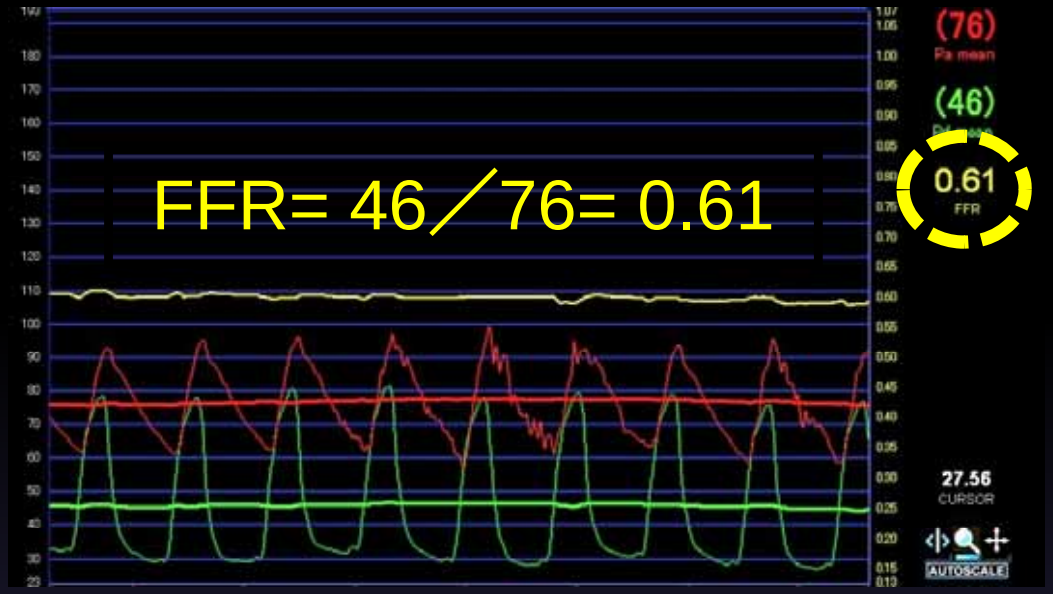
不安定プラーク病変を FFRでdeferした症例の結末

和歌山県立医科大学
循環器内科

塩野 泰紹, 久保 隆史, 和田 輝明, 高畑 昌弘, 寺口 郁子
西口 毅, 太田 慎吾, 里神 慶亮, 尾崎 雄一, 折居 誠,
嶋村 邦宏, 石橋 耕平, 山野 貴司, 谷本 貴志, 猪野 靖
山口 智由, 平田 久美子, 今西 敏雄, 赤阪 隆史

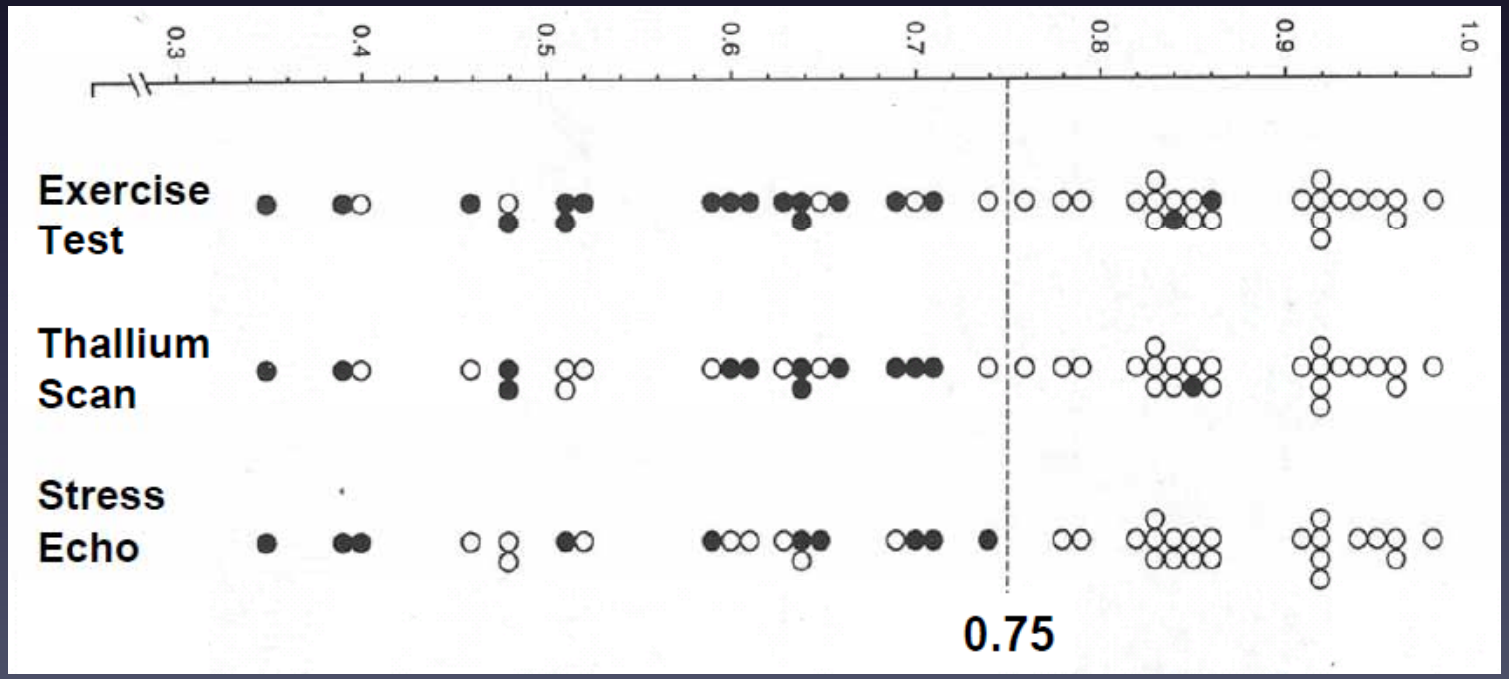
WAKAYAMA MEDICAL UNIVERSITY

Fractional flow reserve



Sensitivity：88%
Specificity：100%

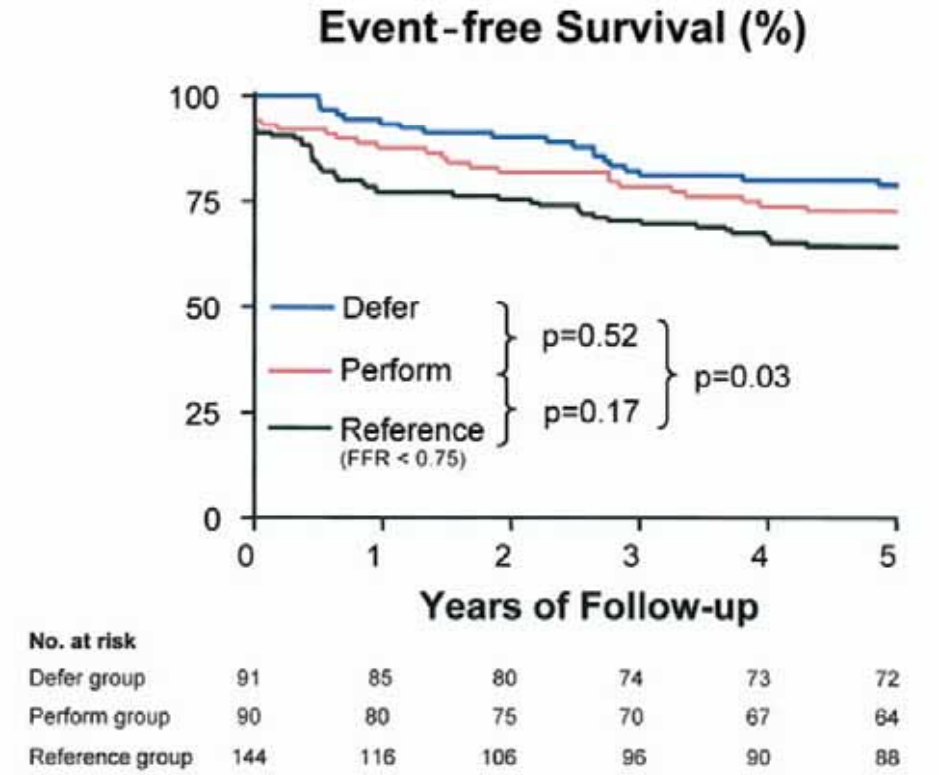
Positive predictive value：100%
Negative predictive value：88%
Accuracy：93%

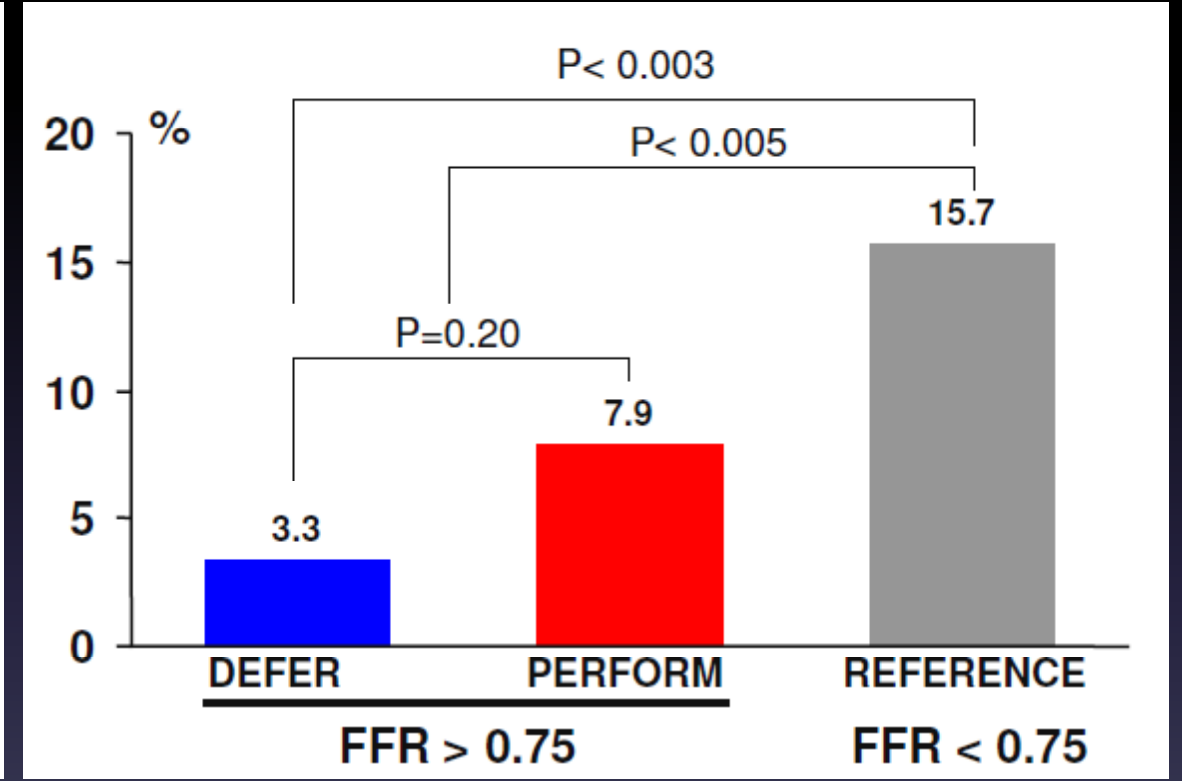


Pijls NHJ et al. N Engl J Med 1996;334:1703-8.

DEFER study

Cardiac Death and Acute MI after 5 Years





Pijls NH, et al. J Am Coll Cardiol. 2007;49:2105-11.

Vulnerable plaque

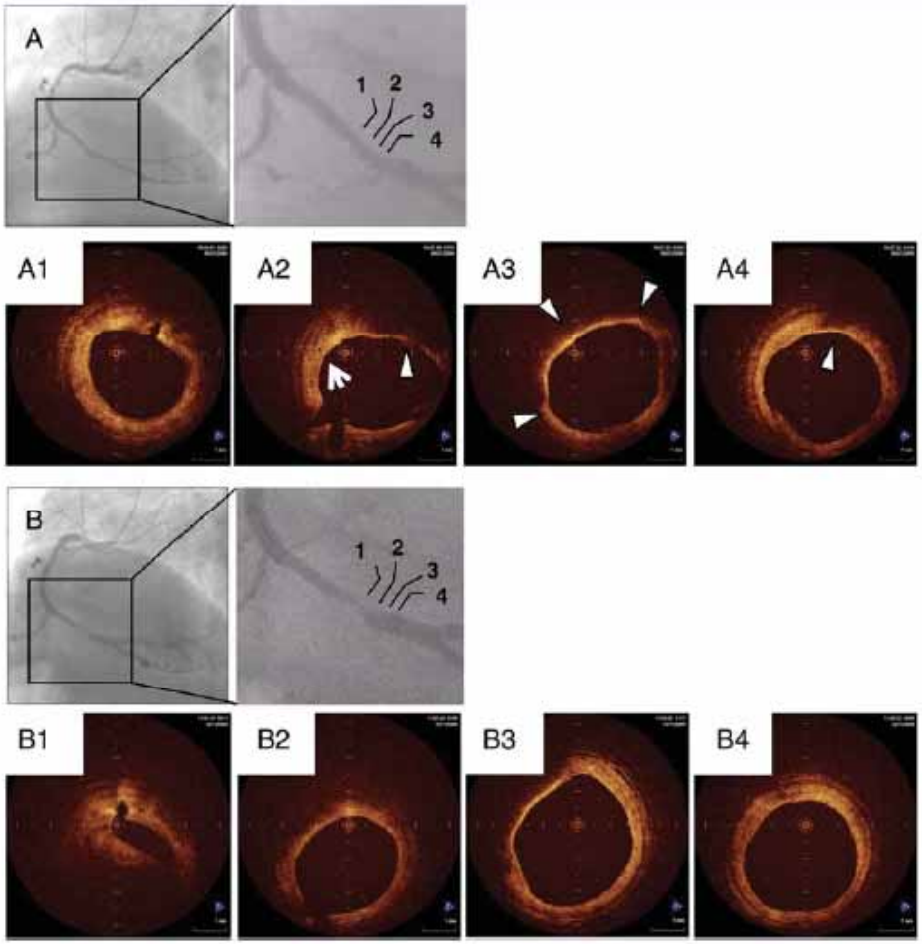
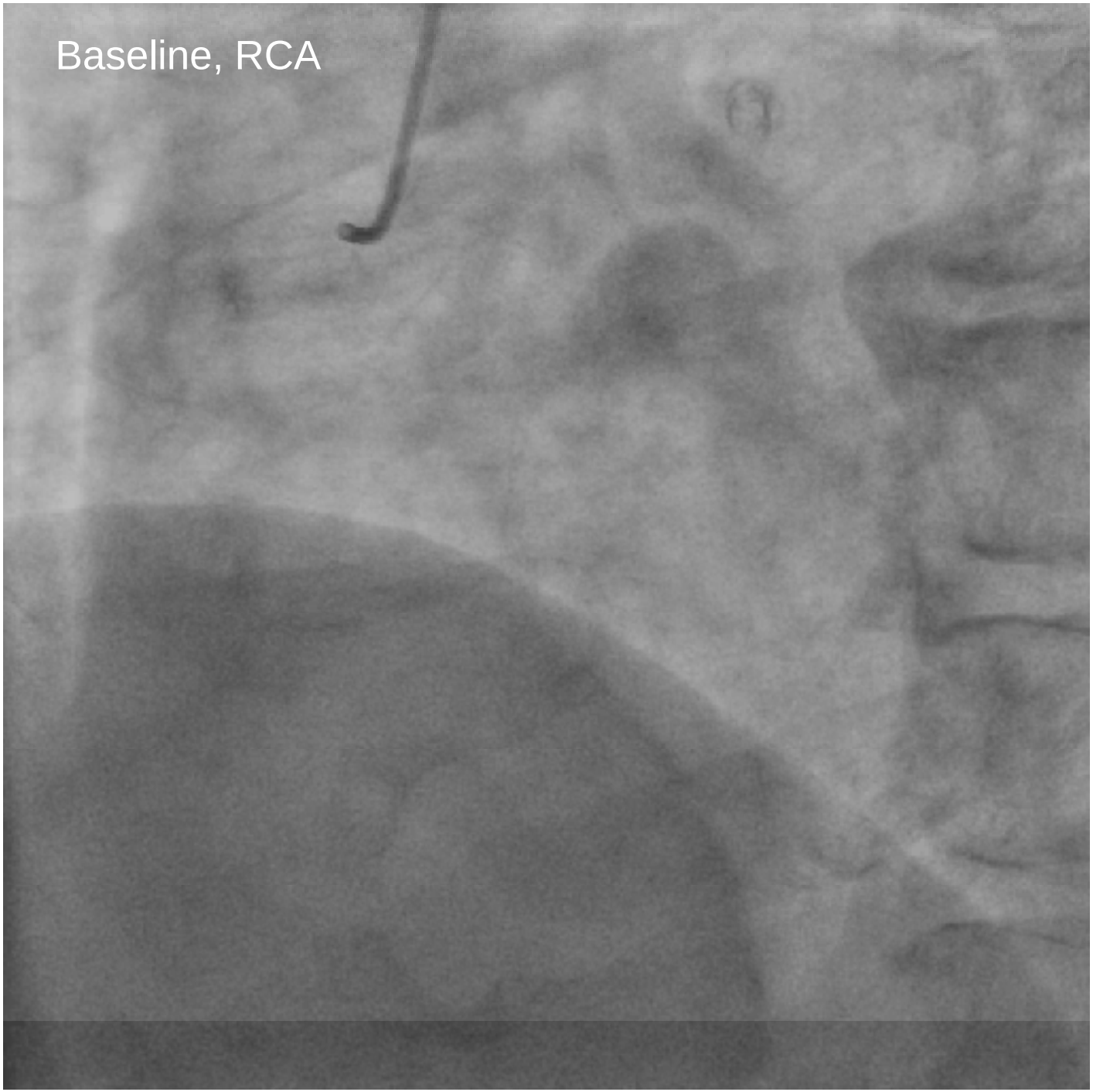


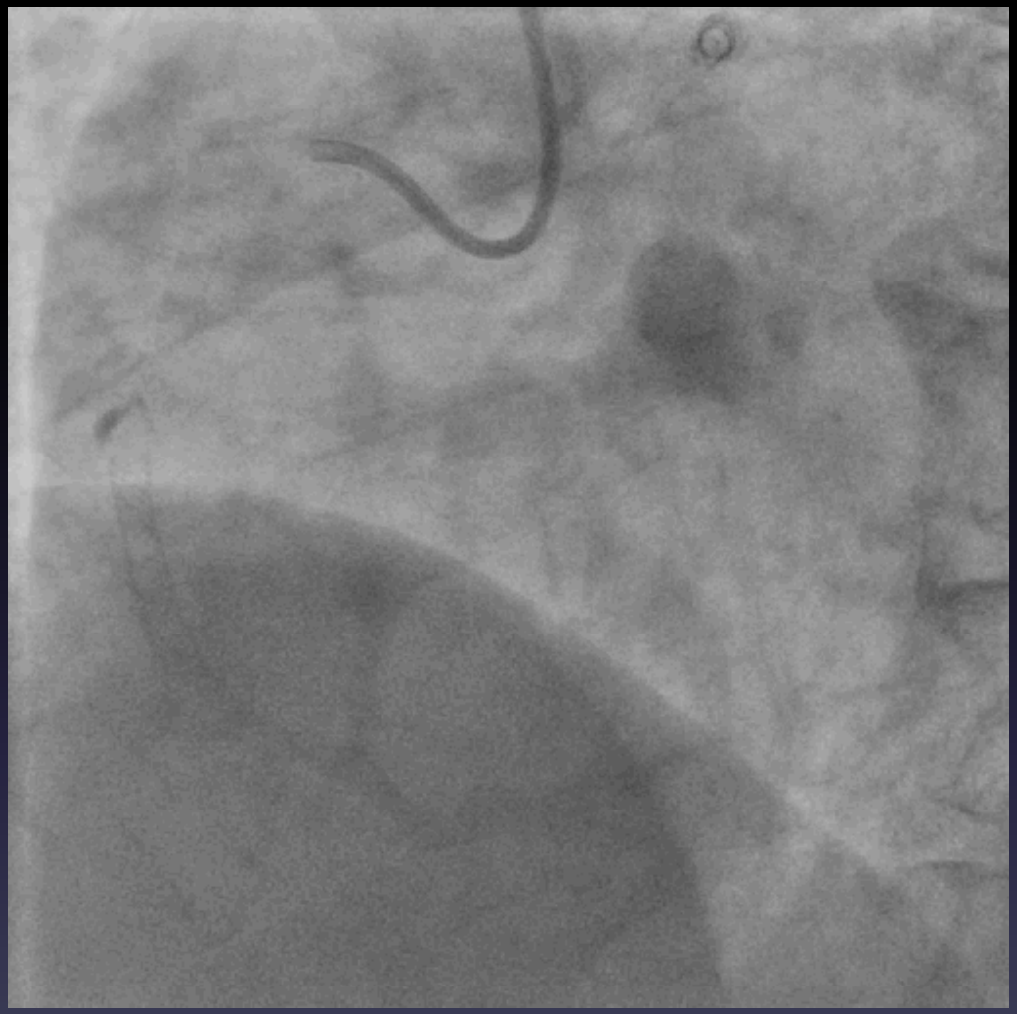
Figure 2 Angiographic and optical coherence tomographic images of representative case. (*A*) Right coronary artery at baseline angiography. (*A1–A4*) Optical coherence tomography images obtained from locations marked in (*A*) angiographic image. (*A2*) Arrowhead shows thin fibrous cap. Arrow shows microchannel in the plaque. (*A3*) Arrowheads indicate a large lipid pool. (*A4*) Arrowhead shows macrophage image. (*B*) Right coronary artery at the time of second angiography. (*B1–B4*) Optical coherence tomography images obtained from locations marked in (*B*) angiographic image.

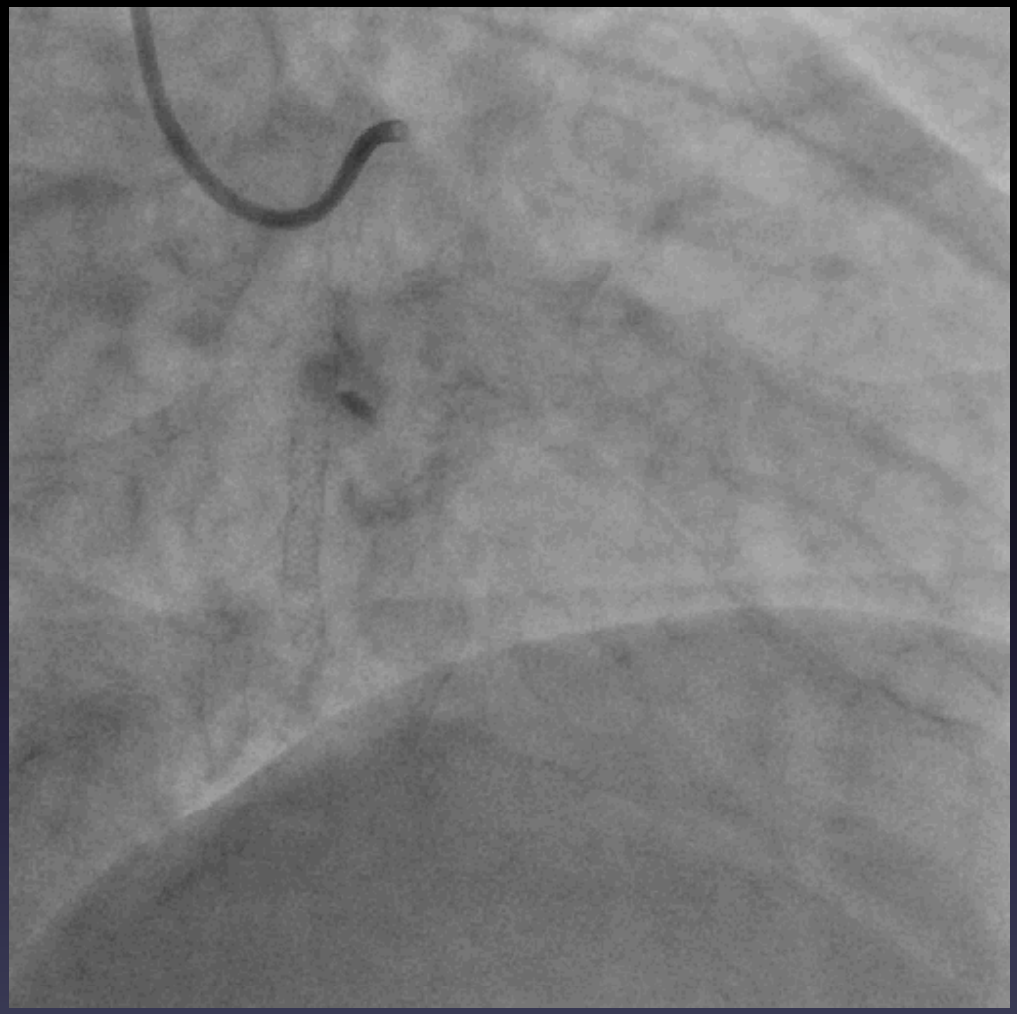
Vulnerable plaque (thincap fibroatheroma: TCFA / microchannel)
⇒ rapid progression

Uemura S, et al. Eur Heart J. 2012;33:78-85.


Baseline, RCA

Post PCI angiography : 10 months follow up





Promus Element 3.5×24mm, Xience Prime 3.5×23mm