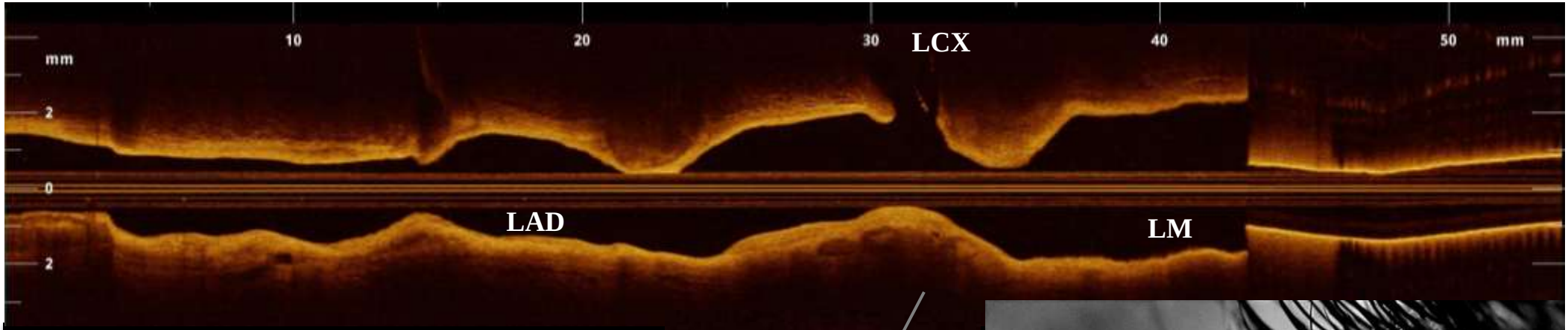
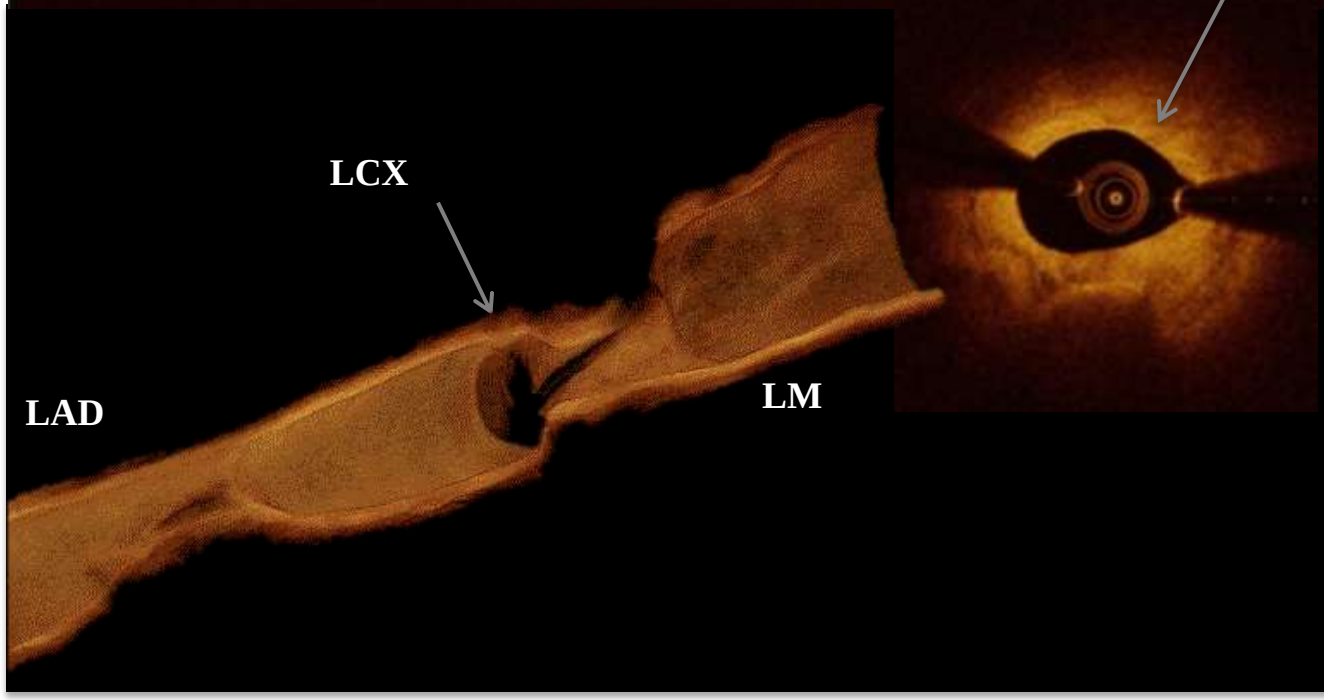
NEW FRONTIERS IN INTRACORONARY IMAGING

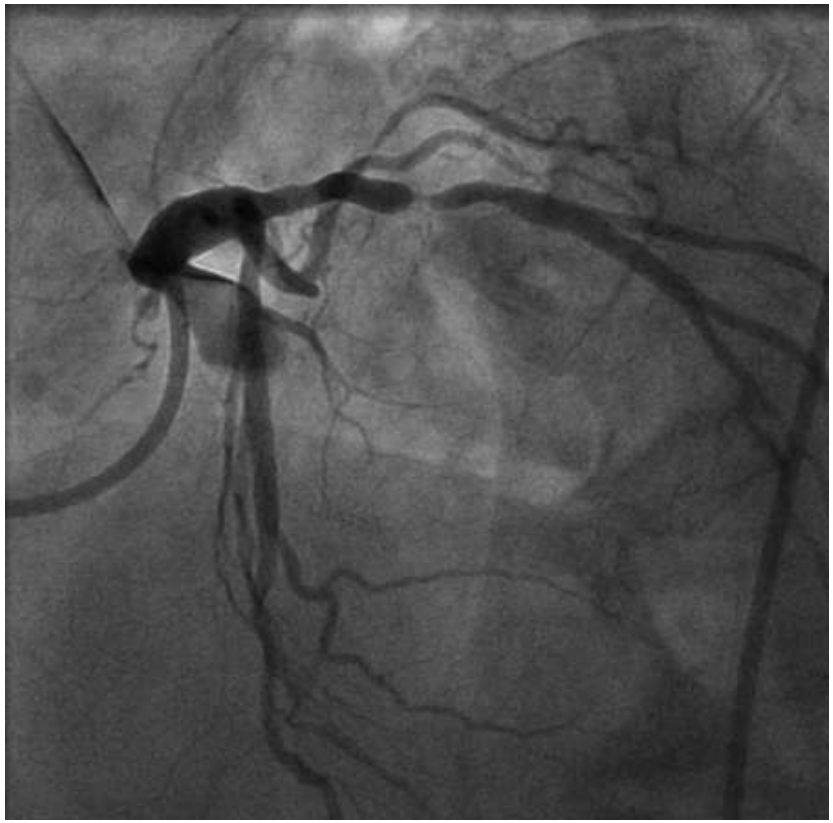
Imaging Guided PCI: Determinant of Success

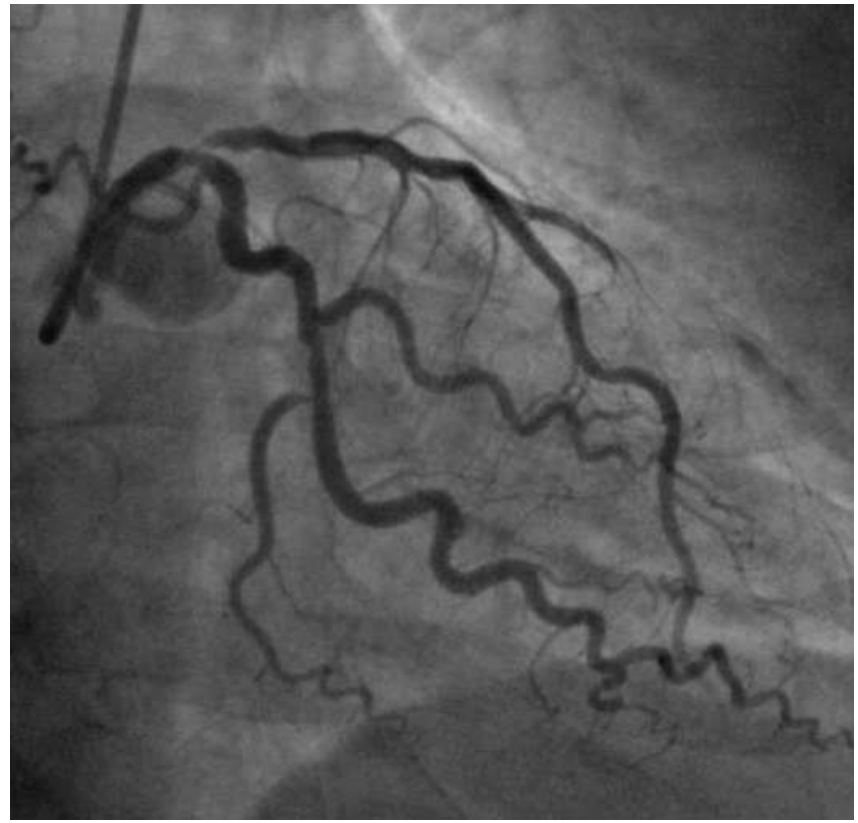




PCI was intended to provide “spot treatment”

… but patients and PCI have changed significantly overtime





Accepted Principles

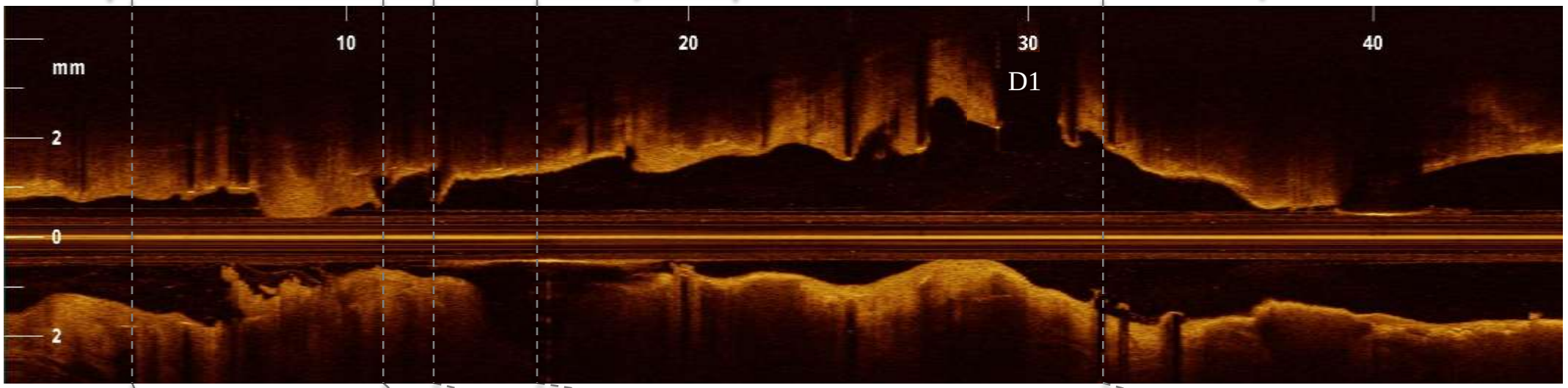
Angio is least accurate to decide and mapping stent implantation in complex setting ie: LMCA, bifurcation, ostial lesions, ACS, presence of haziness and with novel bioabsorbable vascular scaffold

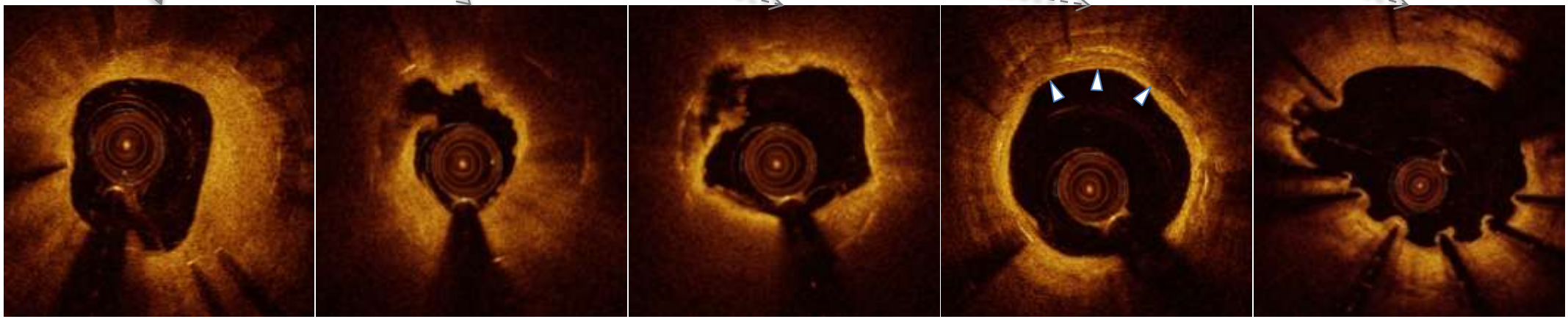
IVUS and OCT have been developed with the aim of overcoming these limitations

VLST: ruptured plaque in lipid laden neointima

SES 3.0/18mm

SES 3.5/18mm





EU Grant, 7 Framework Program

Azienda Ospedaliera Papa Giovanni XXIII Bergamo

Regione Lombardia

Target of intravascular imaging
Diagnosis, Guidance and Prognosis

- **Preprocedural Diagnosis**

  Full vessel assessment (surrogate for histology in complex lesions)

  Patient and lesion risk stratification (therapy and prognosis)

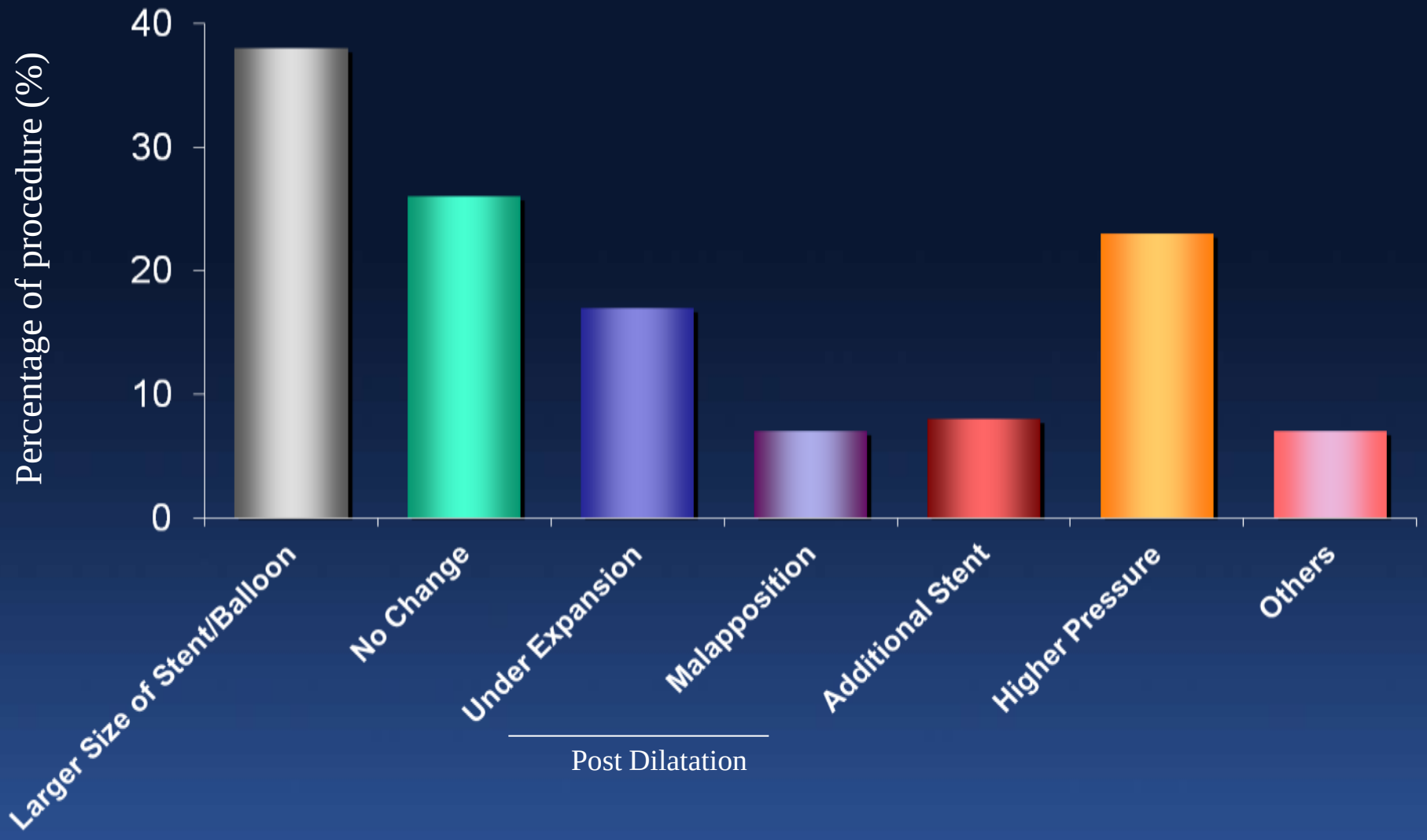
- **Procedural Guidance**

  Procedural plan (PCI mapping- stent size, lenght, landing zones)

  Procedural assessment (Expansion, Dissection, Malapposition)

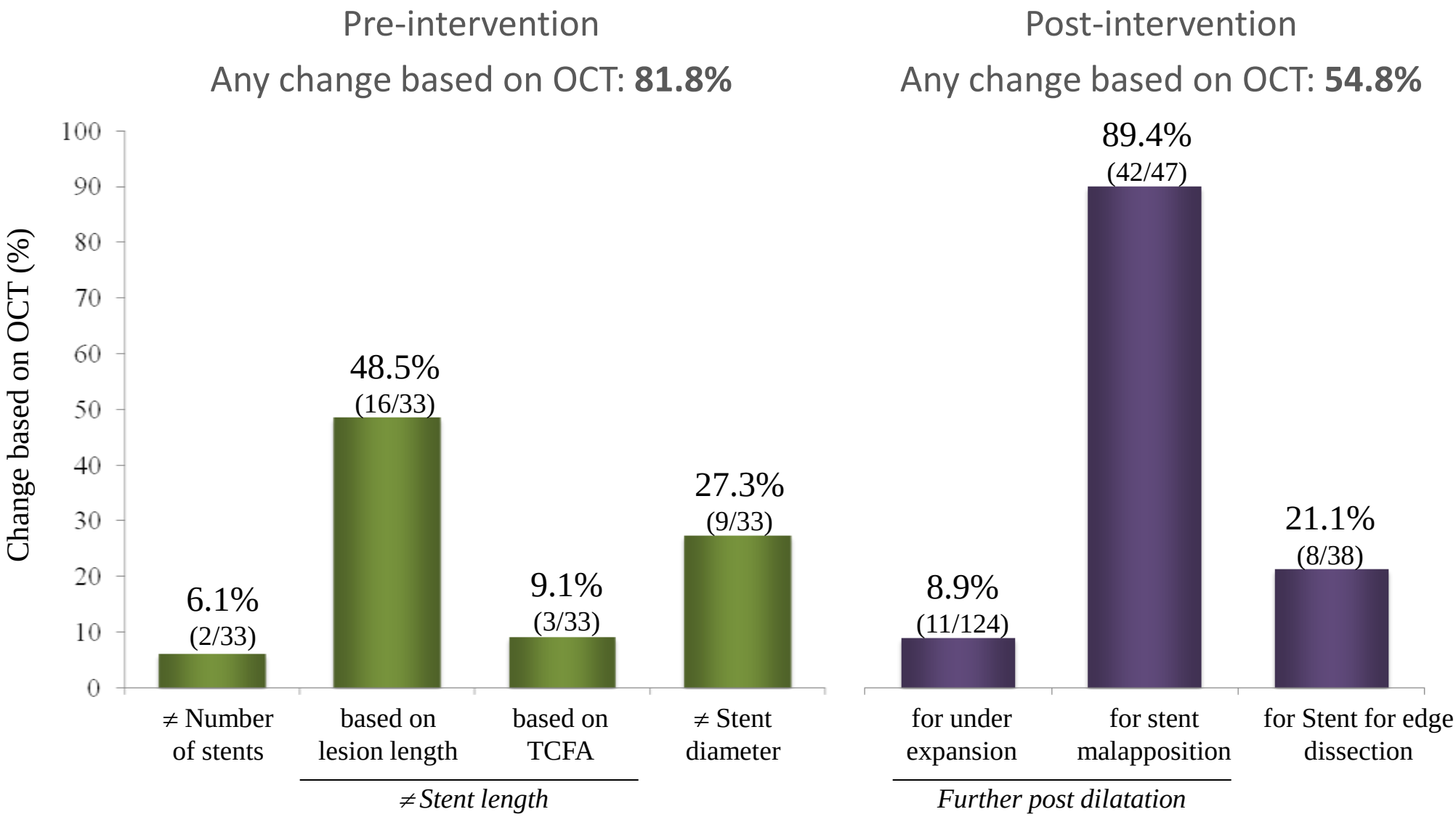
  Late procedural assessment : Stent Coverage, Neoatherosclerosis, Acquired Malapposition, Fracture (risk of stent failure)

How IVUS changed the procedure?



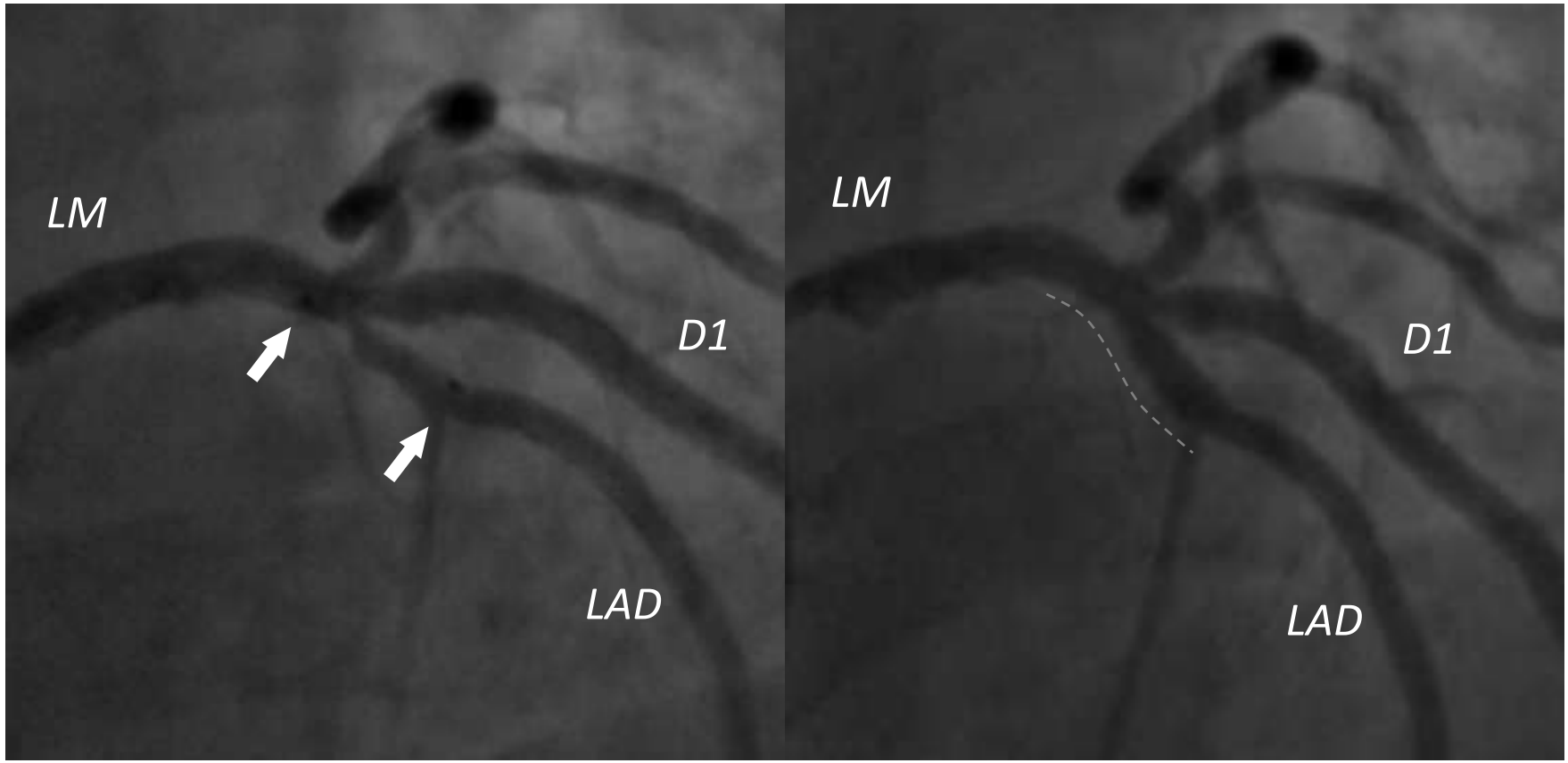
Witzenbickler, ***ADAPT-DES Circulation 2013, Nov 26***

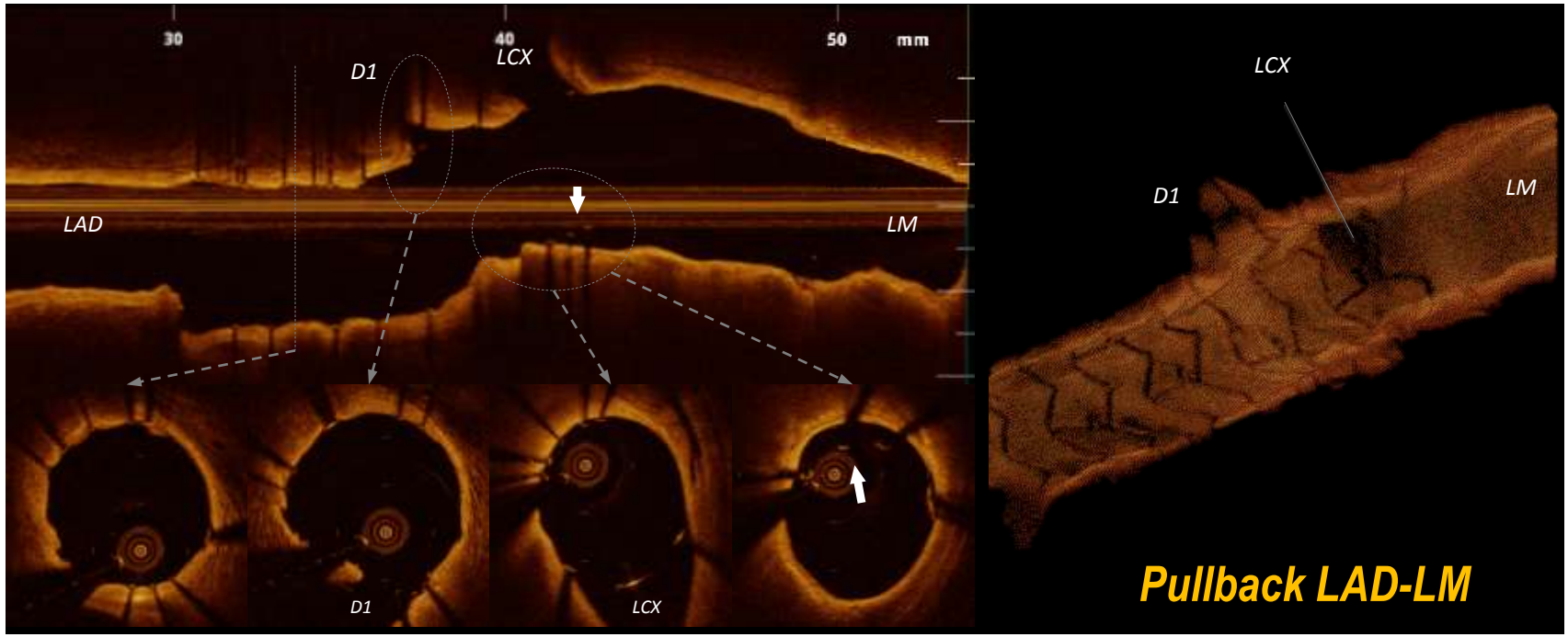
Impact of OCT on PCI management

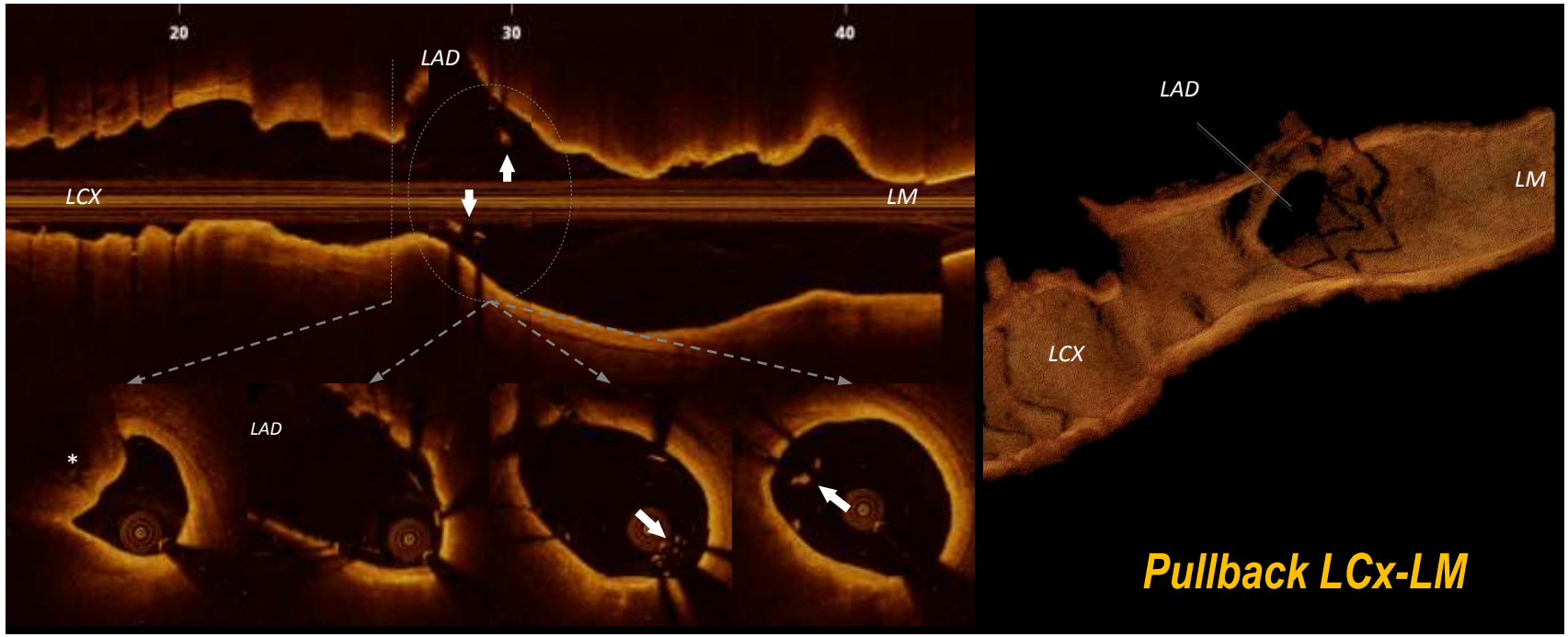


Stefano GT, et al. Int J Cardiovasc Imaging. Published online: October 2012: DOI 10.1007/s10554-012-0135-0

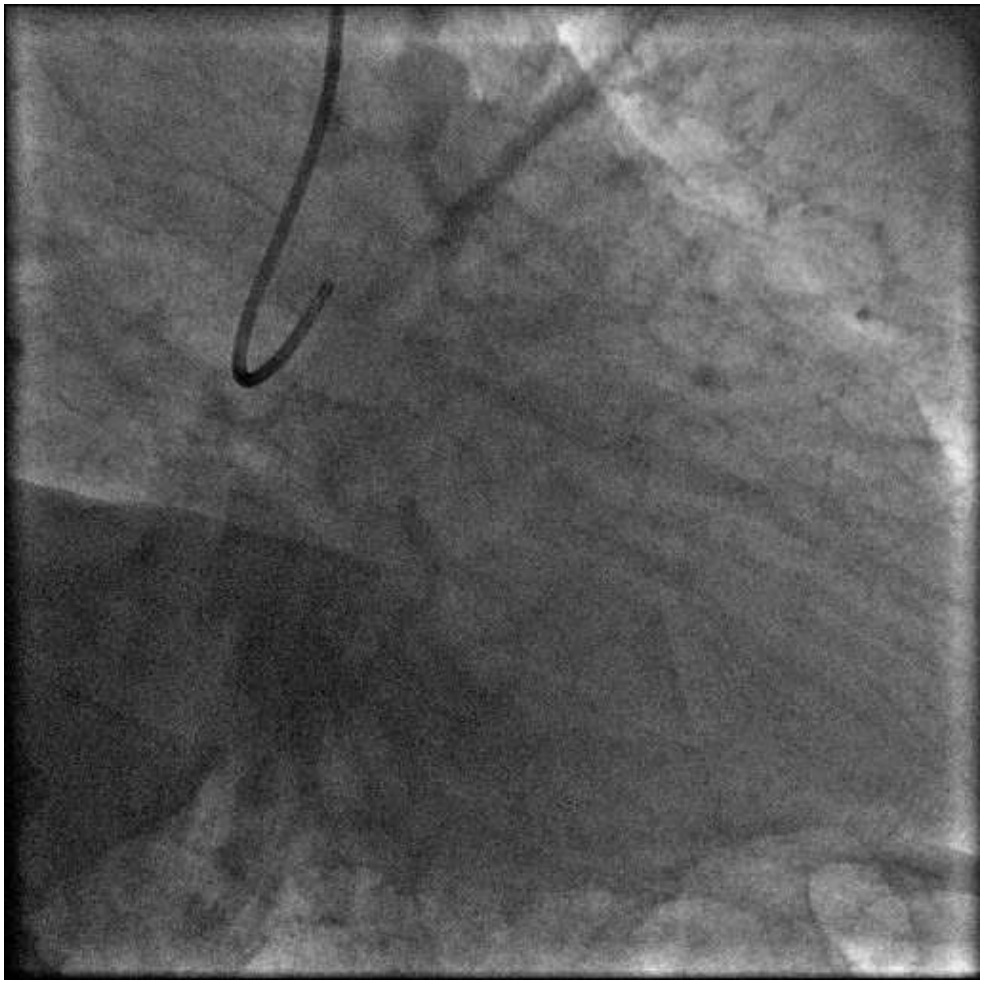
Should Complex Lesions to be Imaged and When?

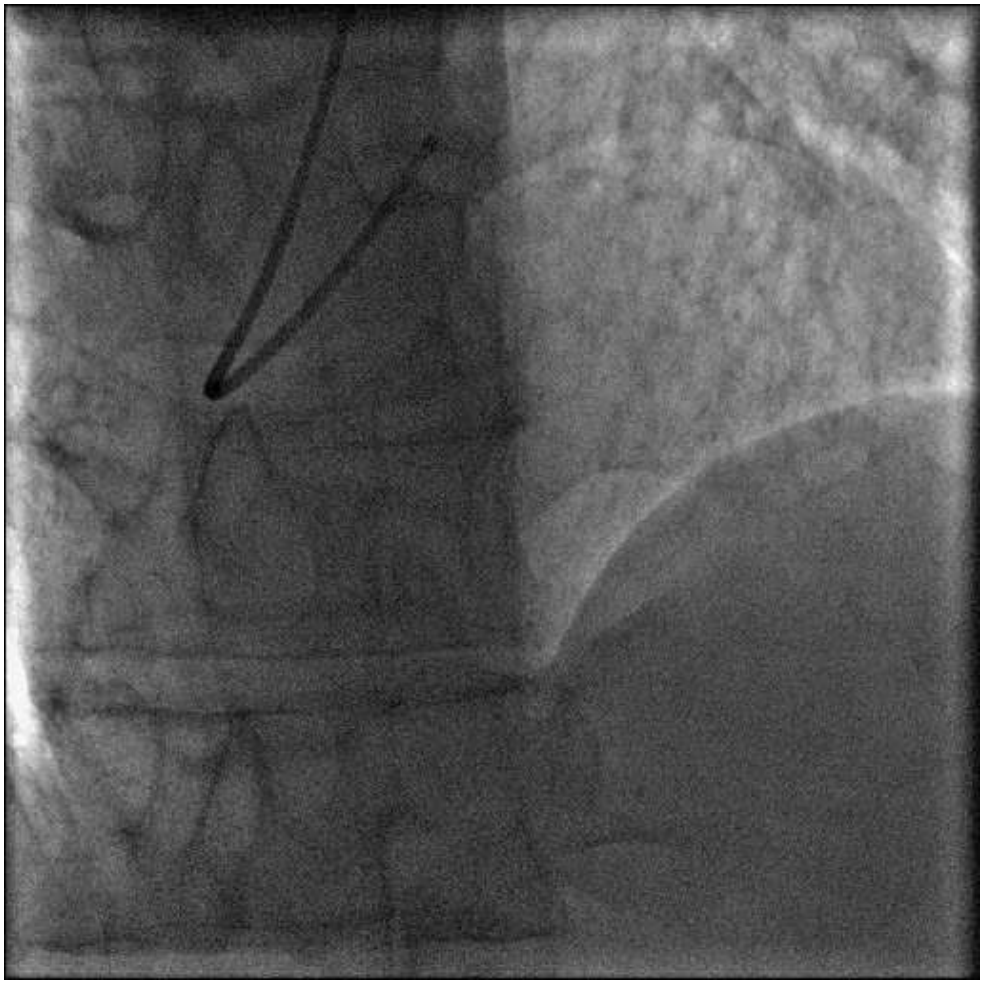



30
40
50
mm
D1
LCX
LAD
LM
D1
LCX
LCX
D1
LM
Pullback LAD-LM


20
30
40
LAD
LCX
LM
LAD
*
LAD
LM
LCX
Pullback LCx-LM

Should Complex Lesions be Imaged ?

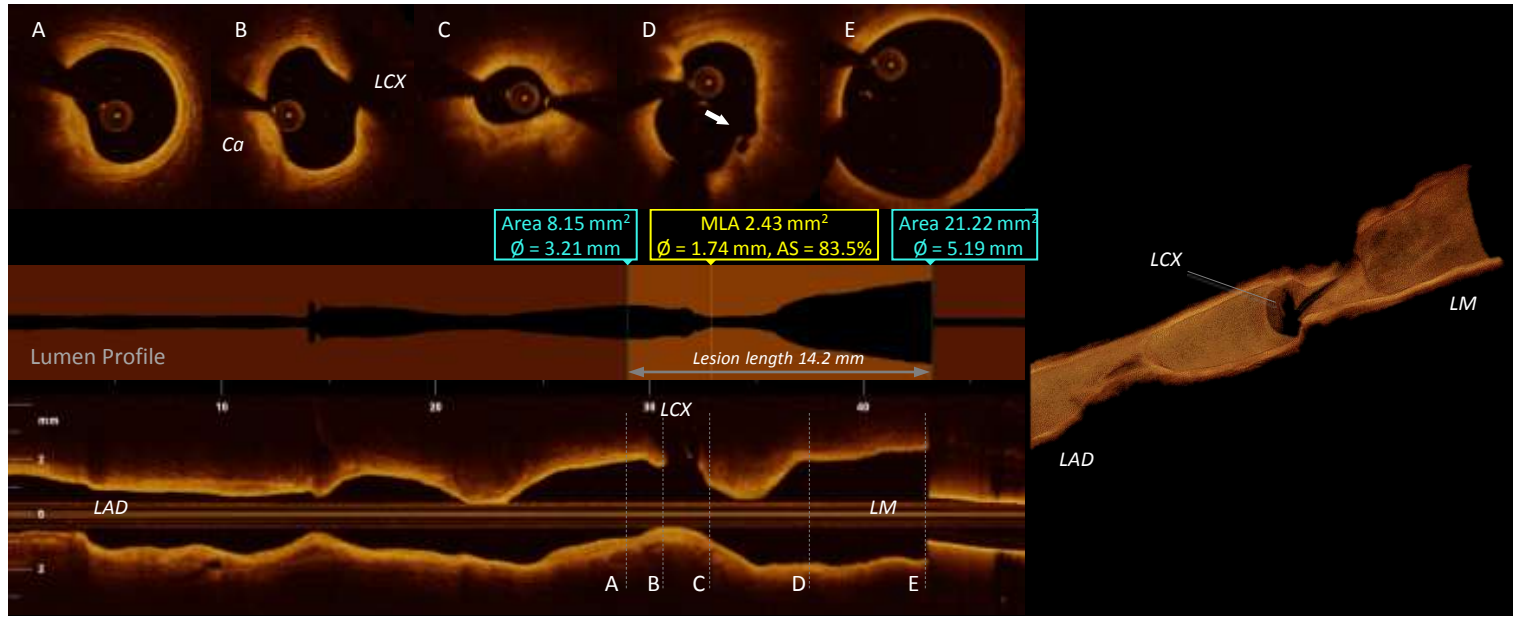




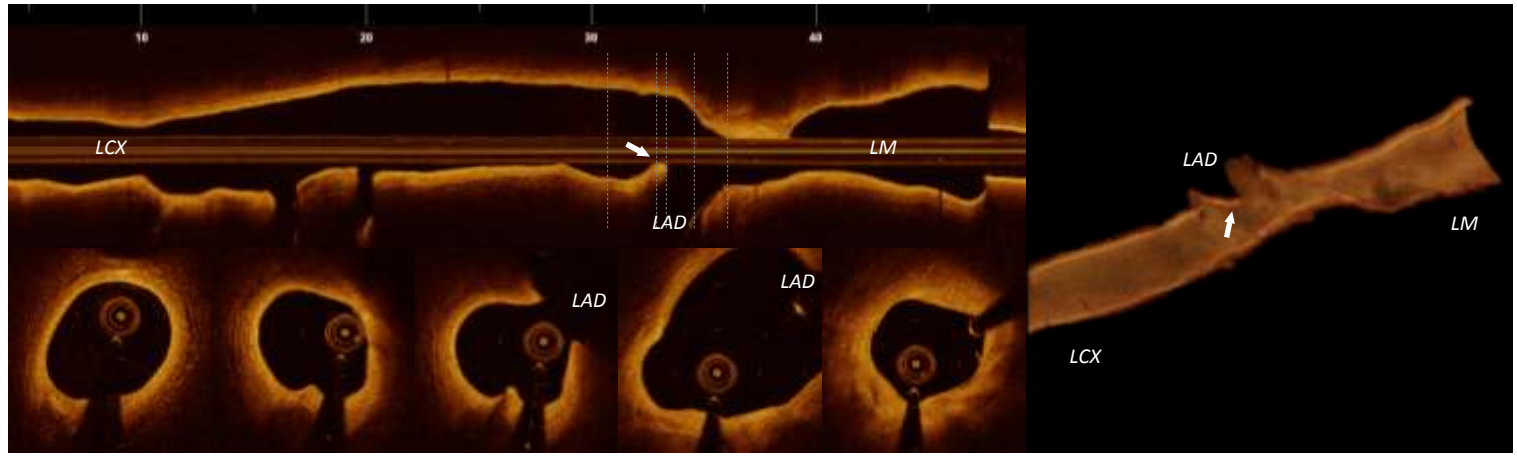
UPLM Distal: Pre-procedure Assessment

Extension of disease | **Involvement of carina** | **Landing zones**

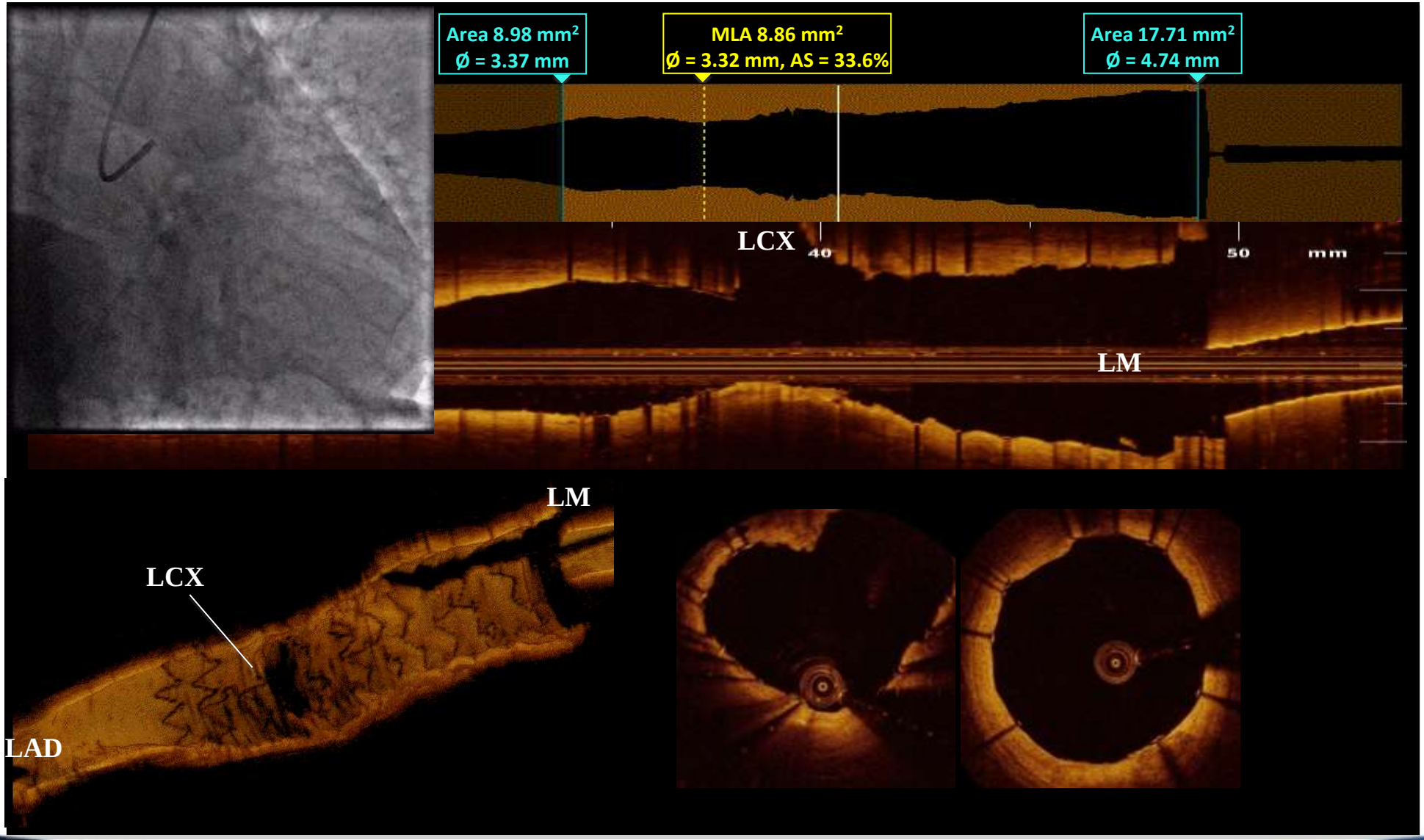
LAD



LCX

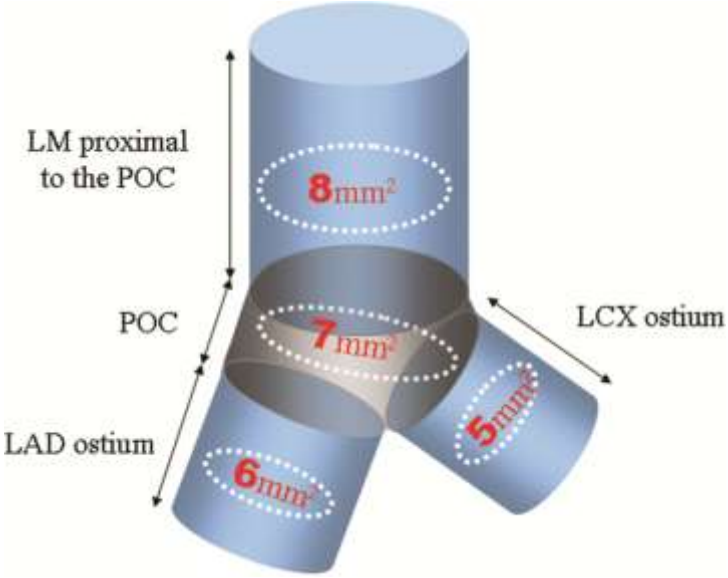


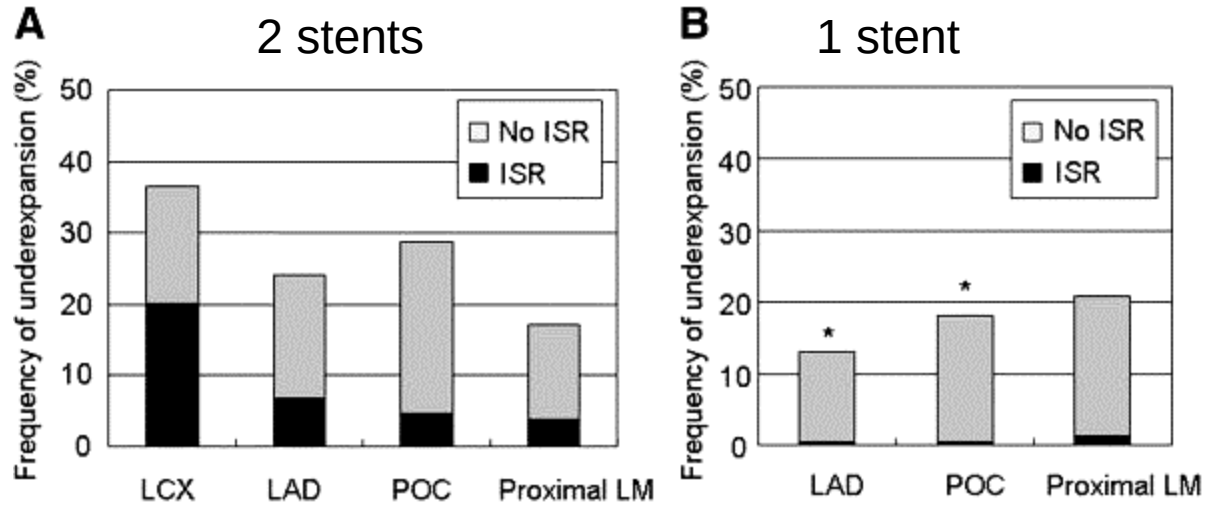
Strut apposition, MCSA, no dissection, wide MLCA at LCx ostium

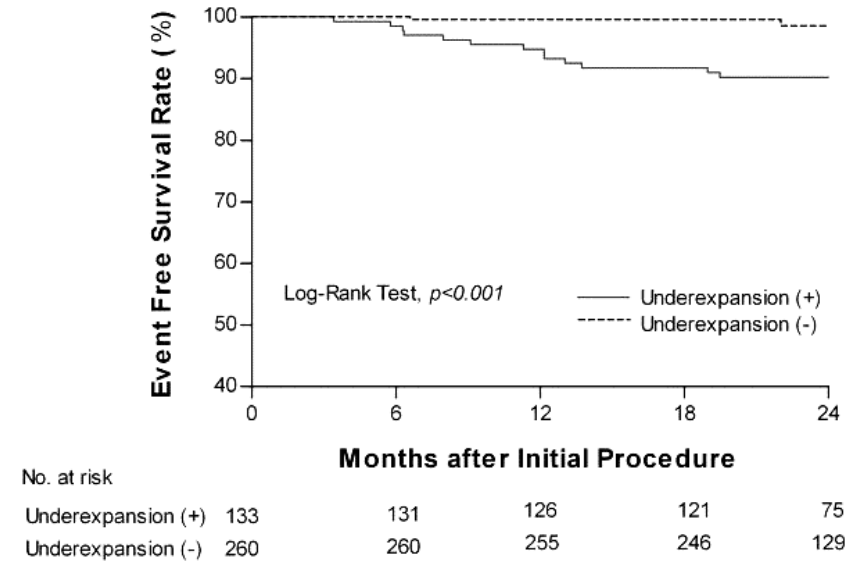


IVUS stent area and impact on restenosis

In Unprotected LMCA: 403 pts, SES







Kang S, et al. Circ Cardiov Interv 2011;4:562-9.

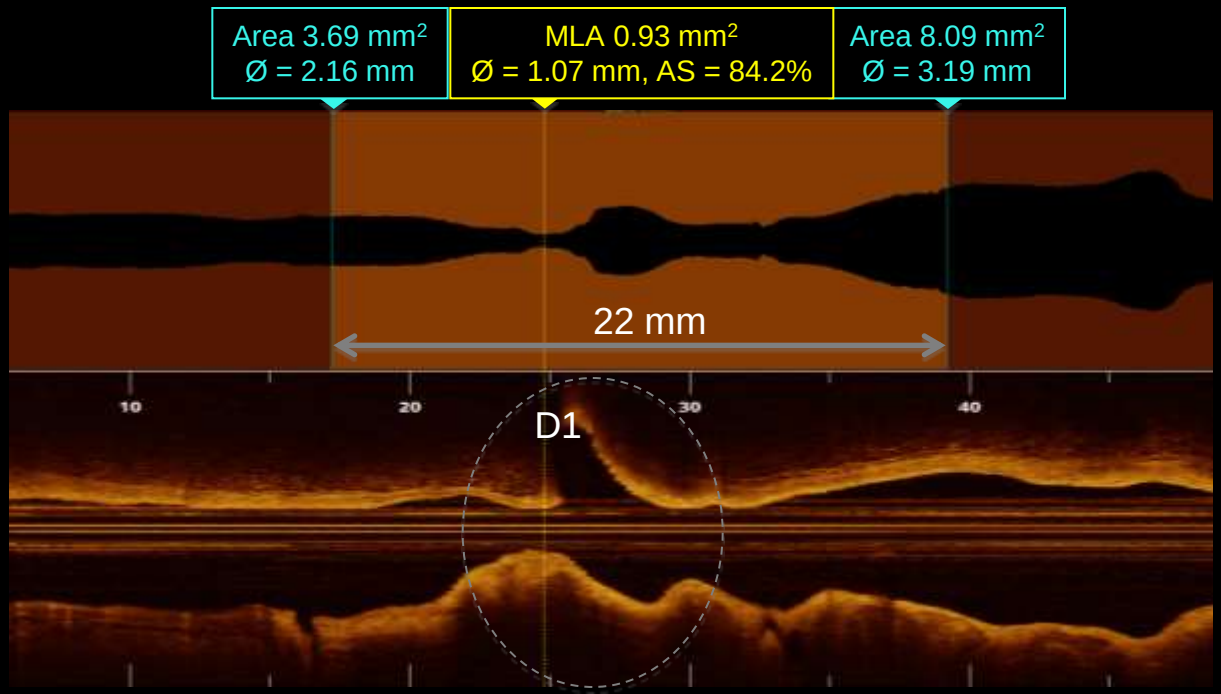
FD-OCT assessment of ULMCA

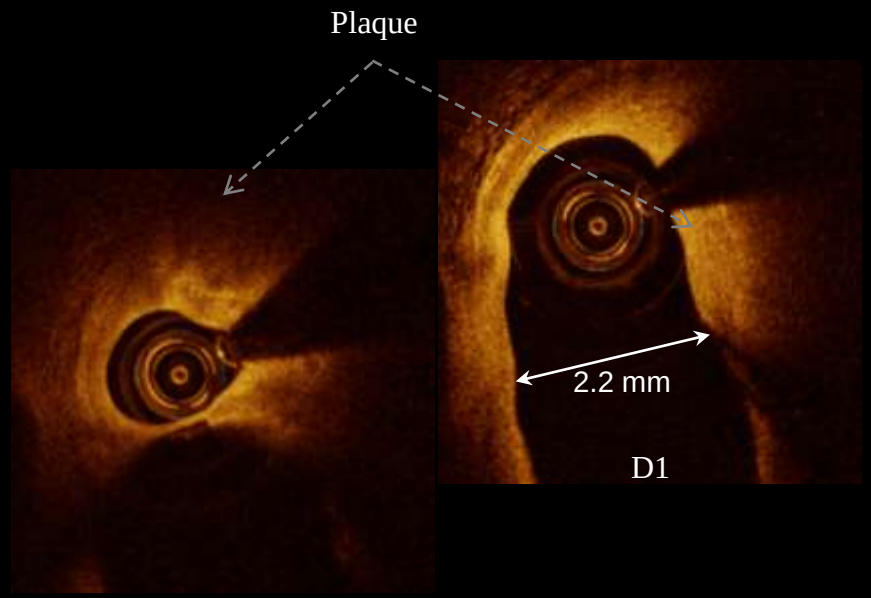
A comparison with IVUS

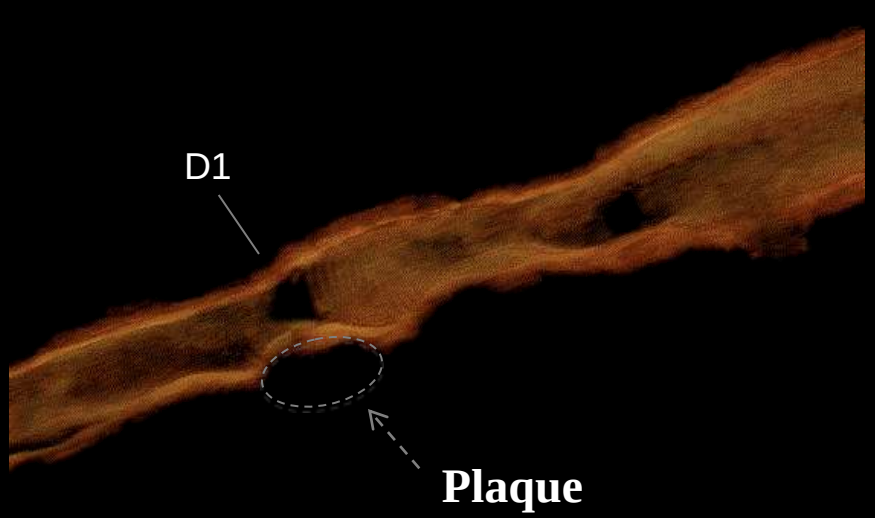
	IVUS	FD-OCT	*P*
Pre-PCI			
Min Lumen area, mm^2	3.46 ± 1.66	2.94 ± 1.77	0.002
Intraluminal thrombus, %	0.0	9.4	0.081
Post-PCI			
Stent completeness			
Proximal completeness, %	90.9%	18.2	<0.001
Proximal completeness without ULM ostial, %	100	100	NA
Distal completeness, %	100	100	NA
Min Lumen area, mm^2	7.21 ± 2.23	7.18 ± 2.15	0.875
Malapposition area, mm^2	0.12 ± 0.36	0.43 ± 0.51	<0.001
Distal edge dissection, %	6.1	30.3	0.01

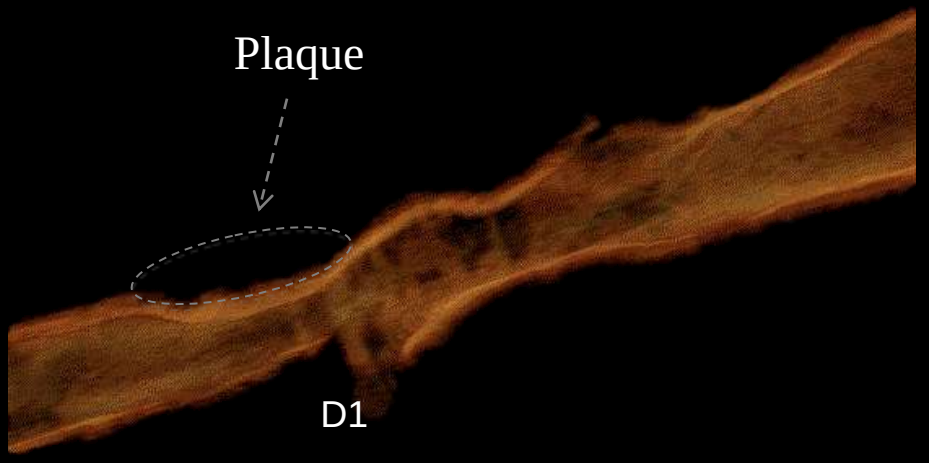
Y. Fujino et al Catheterization and Cardiovascular Interventions
16 MAR 2013 DOI: 10.1002/ccd.24843

LAD-D1: Plaque on the opposite wall to the SB & Carina spared



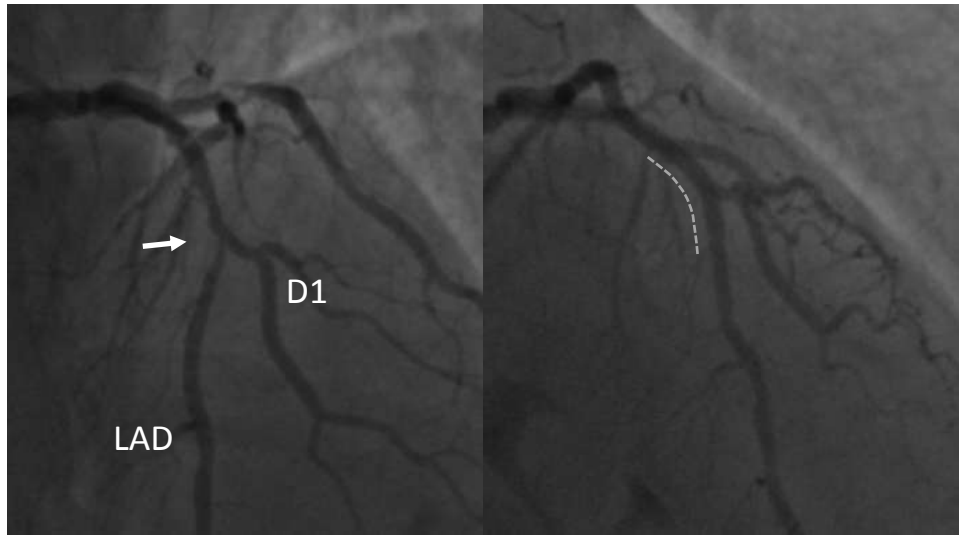


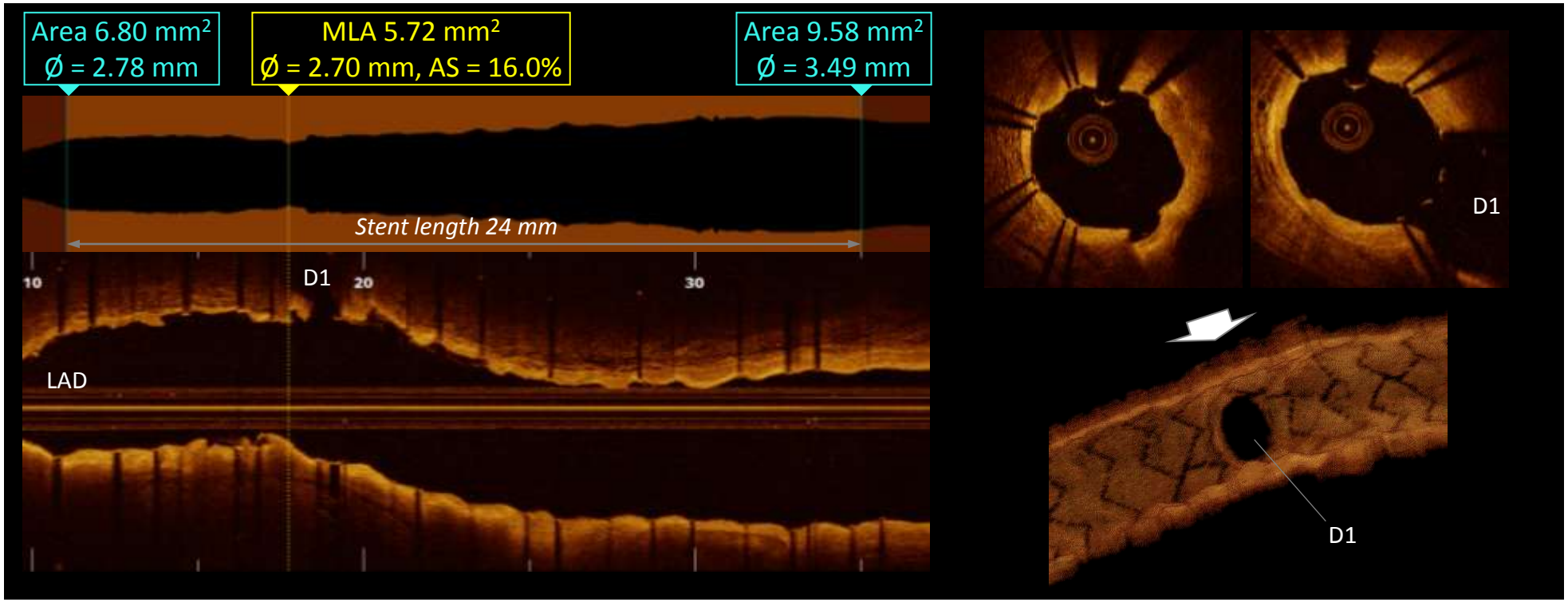




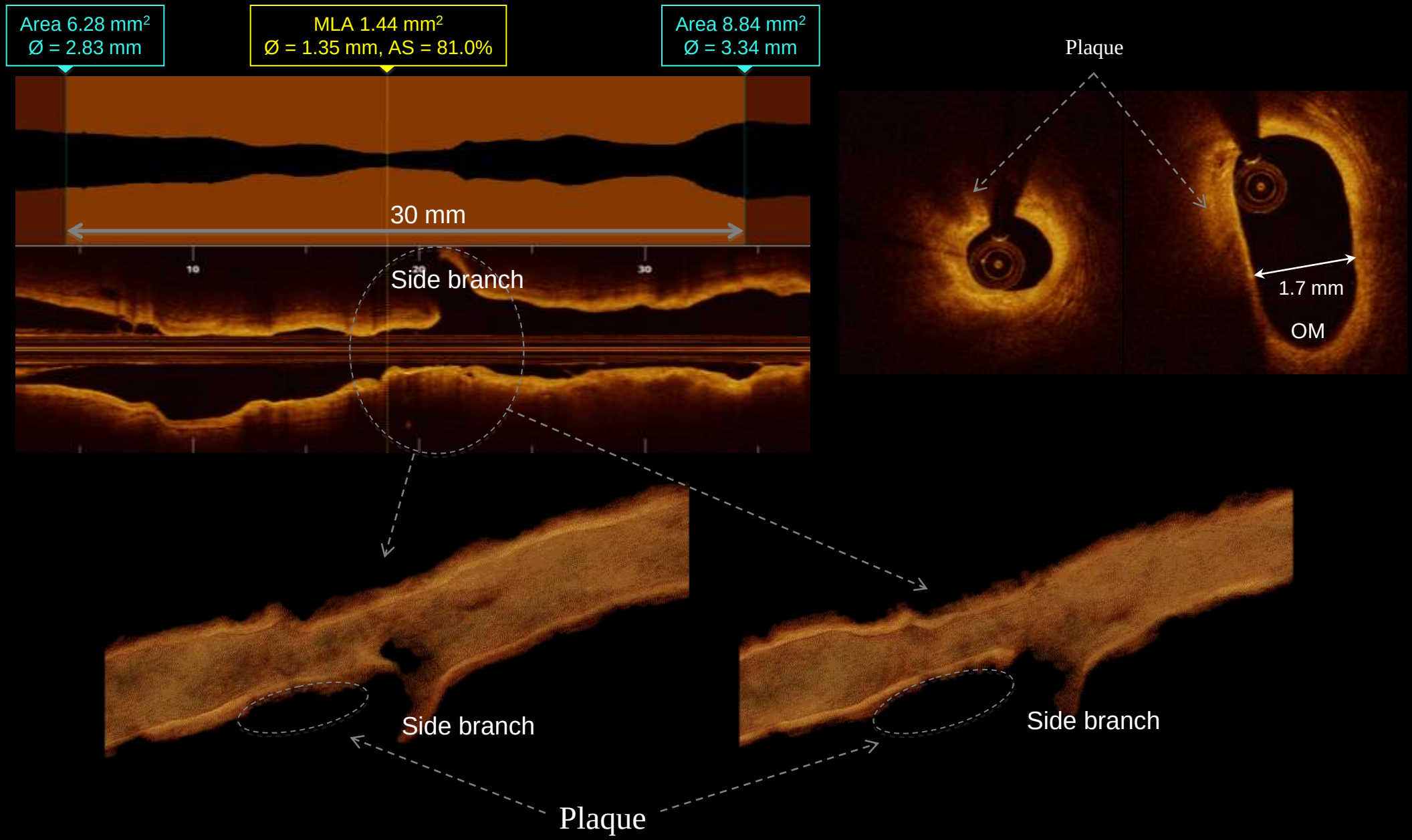
Provisional stenting on LAD

No wire protection → Provisional stenting → EES 3.0x24 mm → NC balloon 3.25 mm postdil



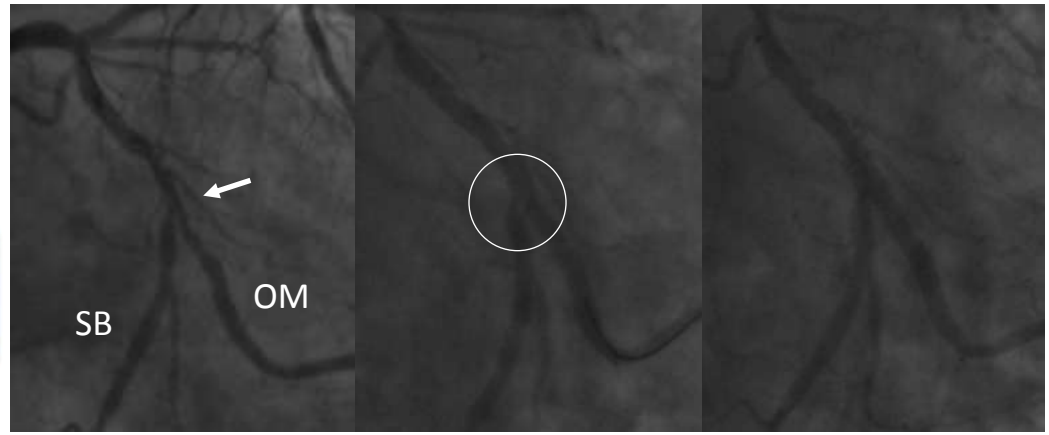


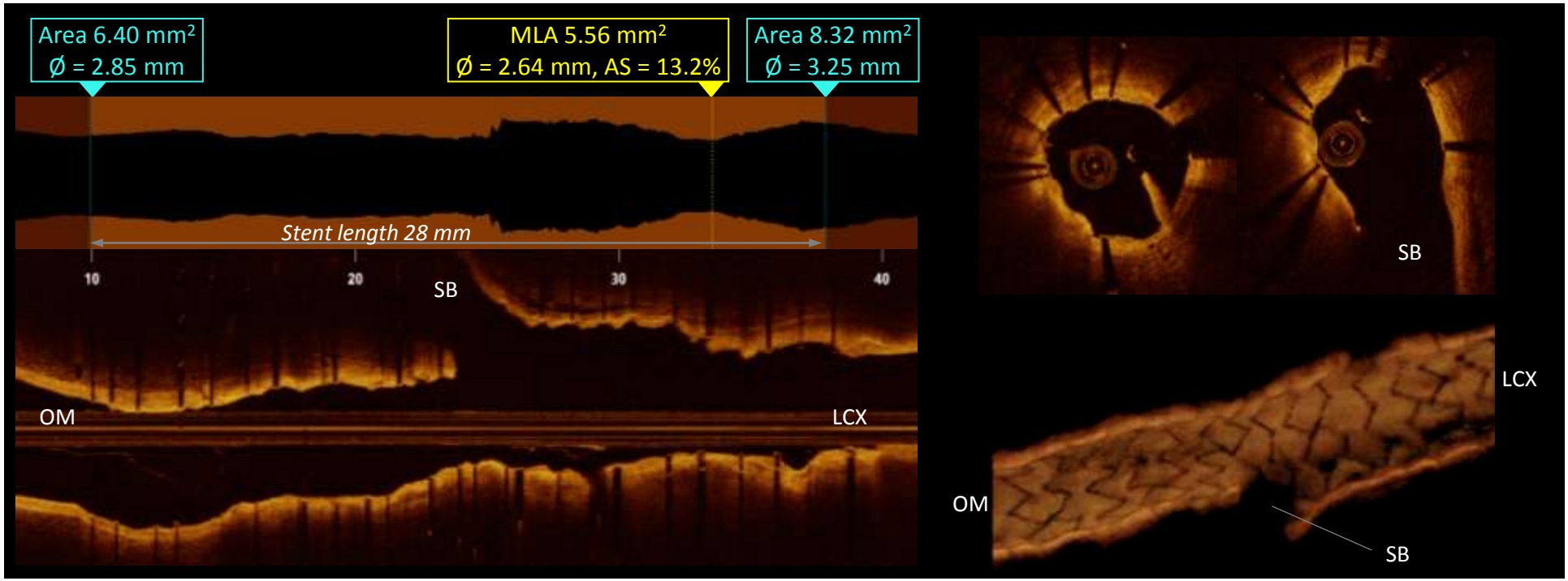
LCx-M1: Plaque even on the same side of the SB. Carina involved



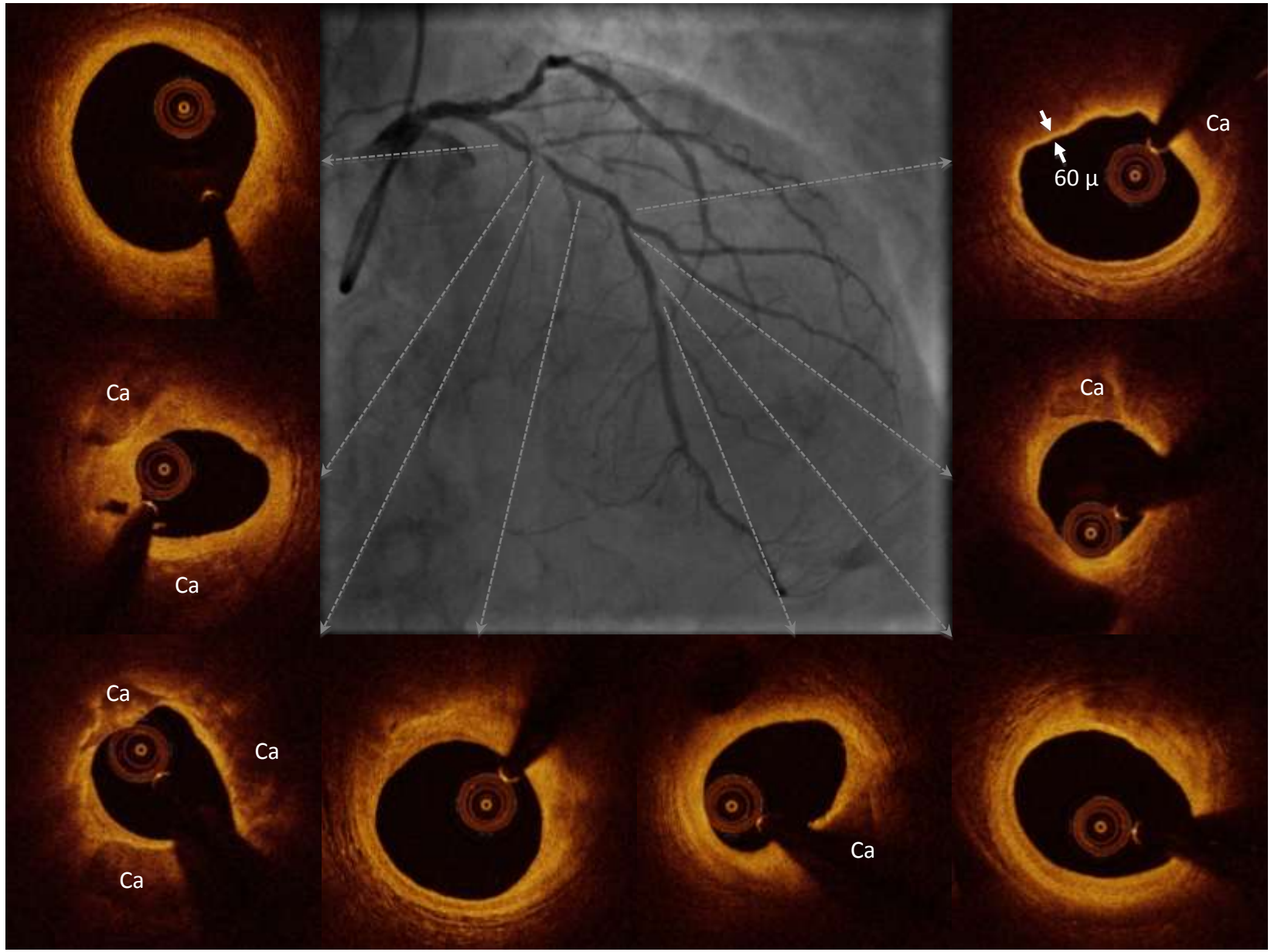
Provisional stenting on LCX

Wire protection → Provisional stenting → EES 3.0x28 mm → Kissing balloon → Carina shift

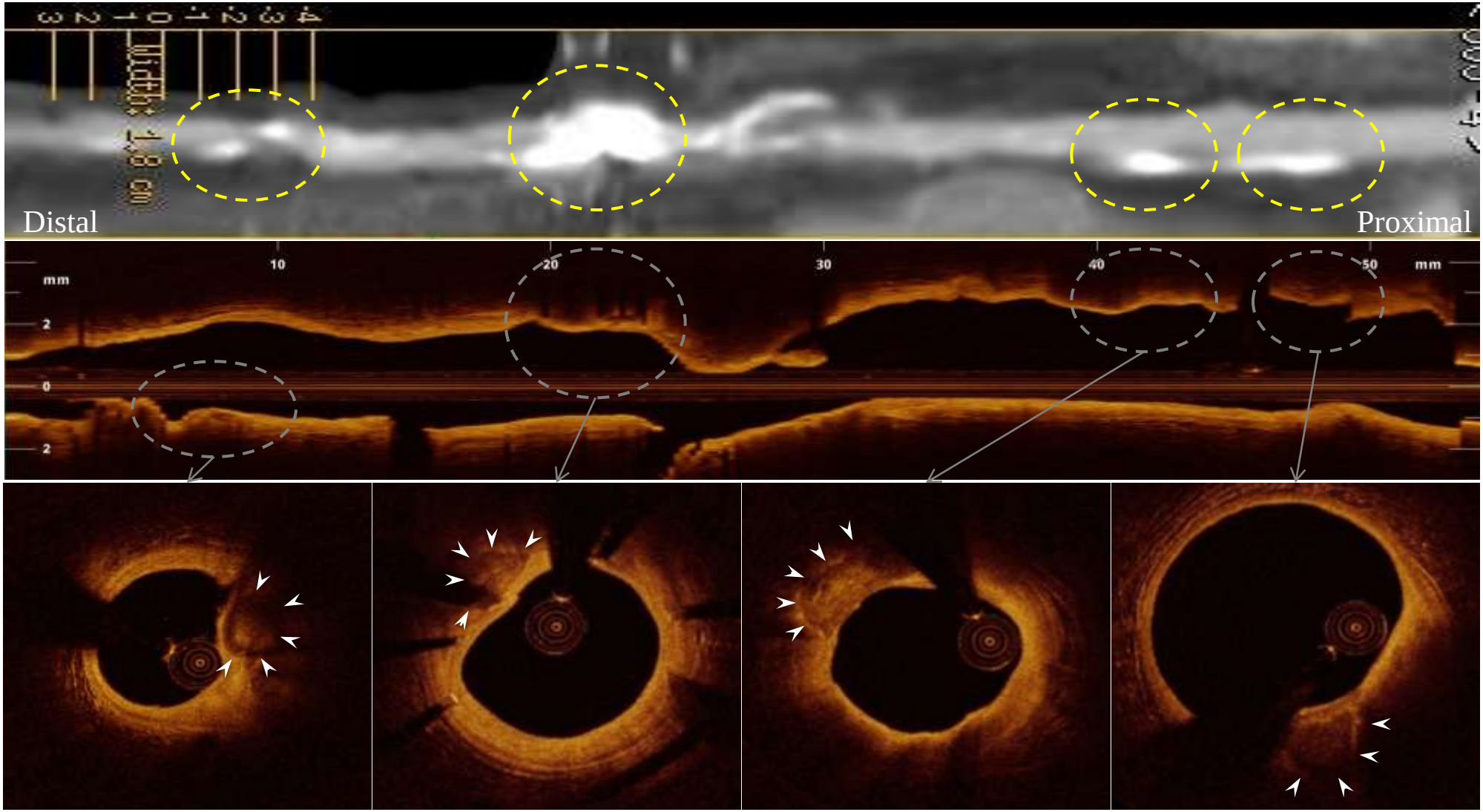




Different lesions across the target vessel



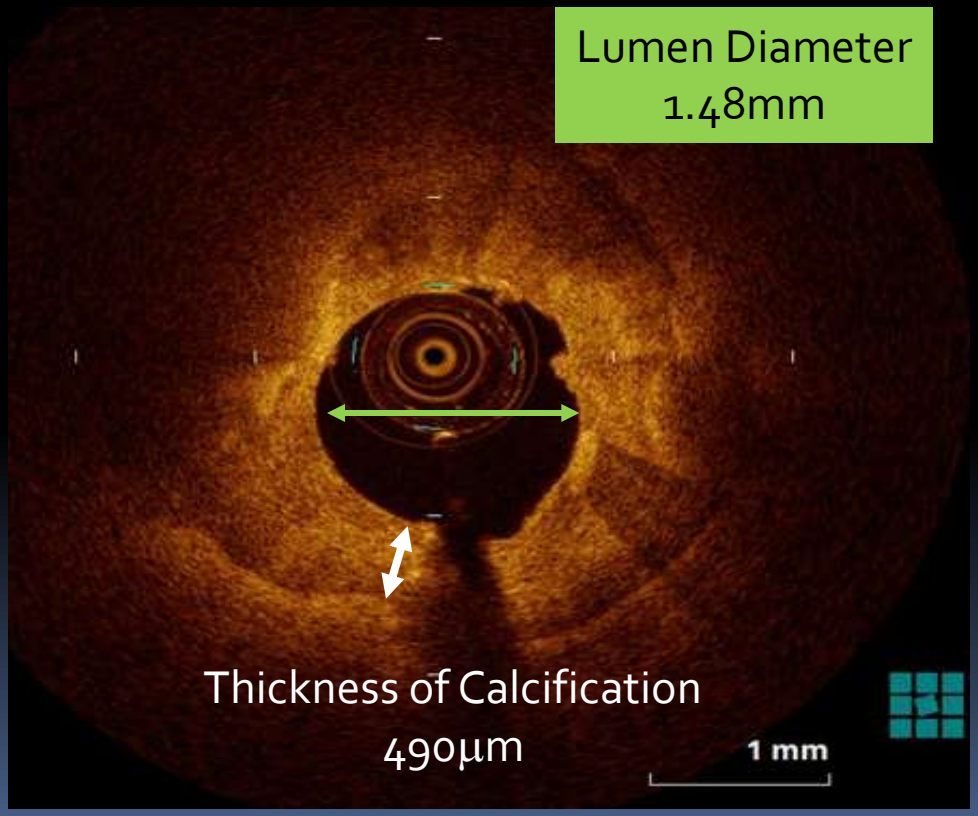
Extremely Precise to Detect Calcium



OCT Guided PCI in Calcified Lesions

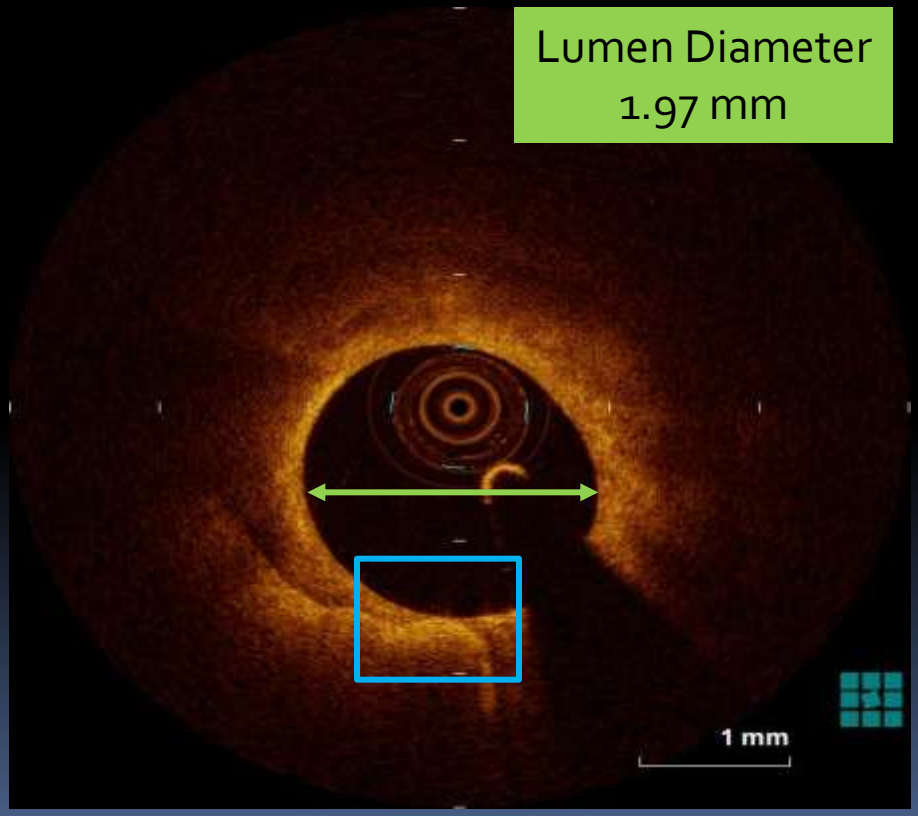
Residual Circumferential Heavy Calcification after 1.5 mm burr Rotational Atherectomy

Potential Difficulty for Stent Expansion



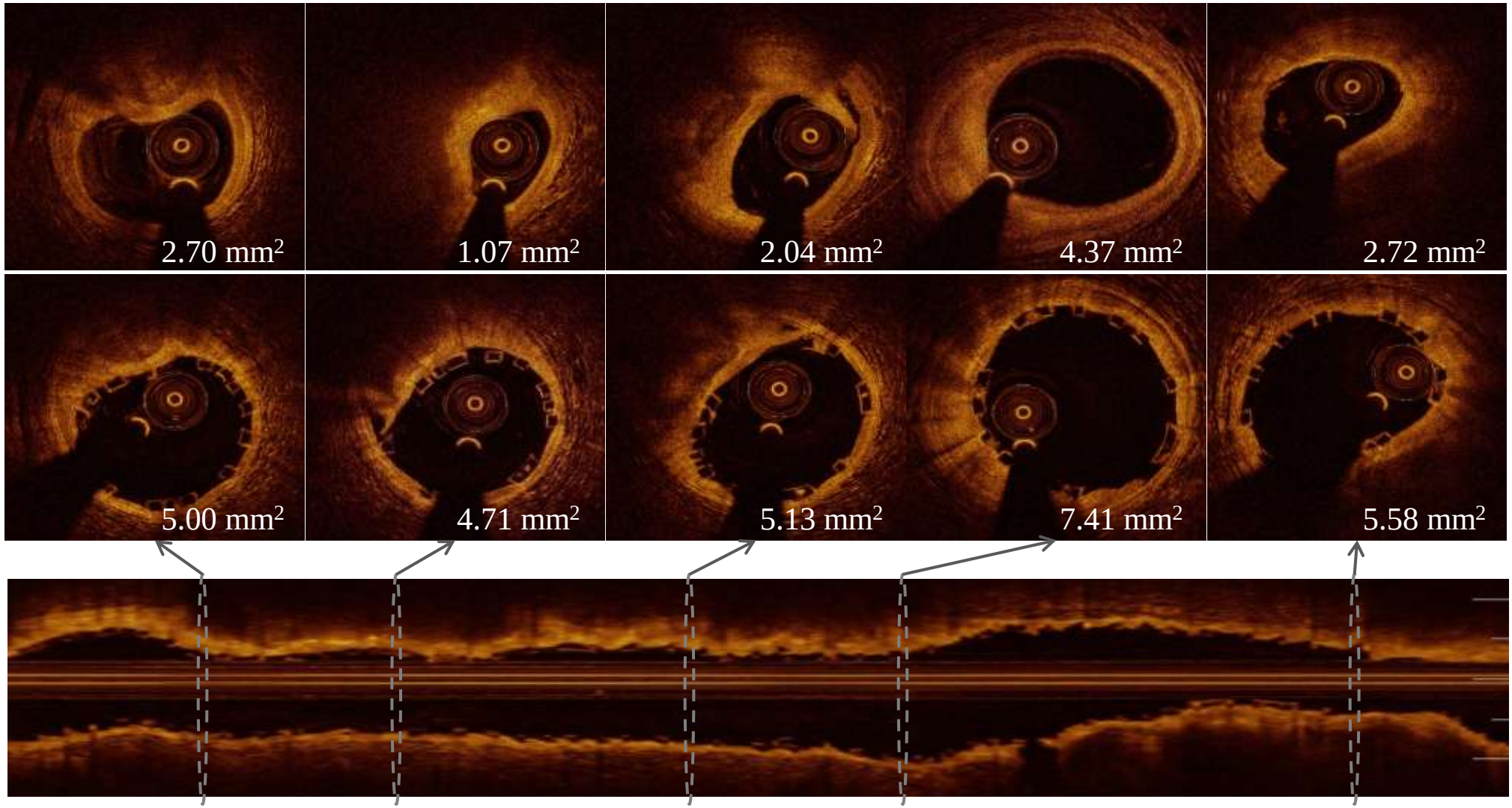
Additional Rotational Atherectomy With larger burr (2.0mm)

1. Successful Disruption of Calcium Ring
2. Dilated at nominal pressure



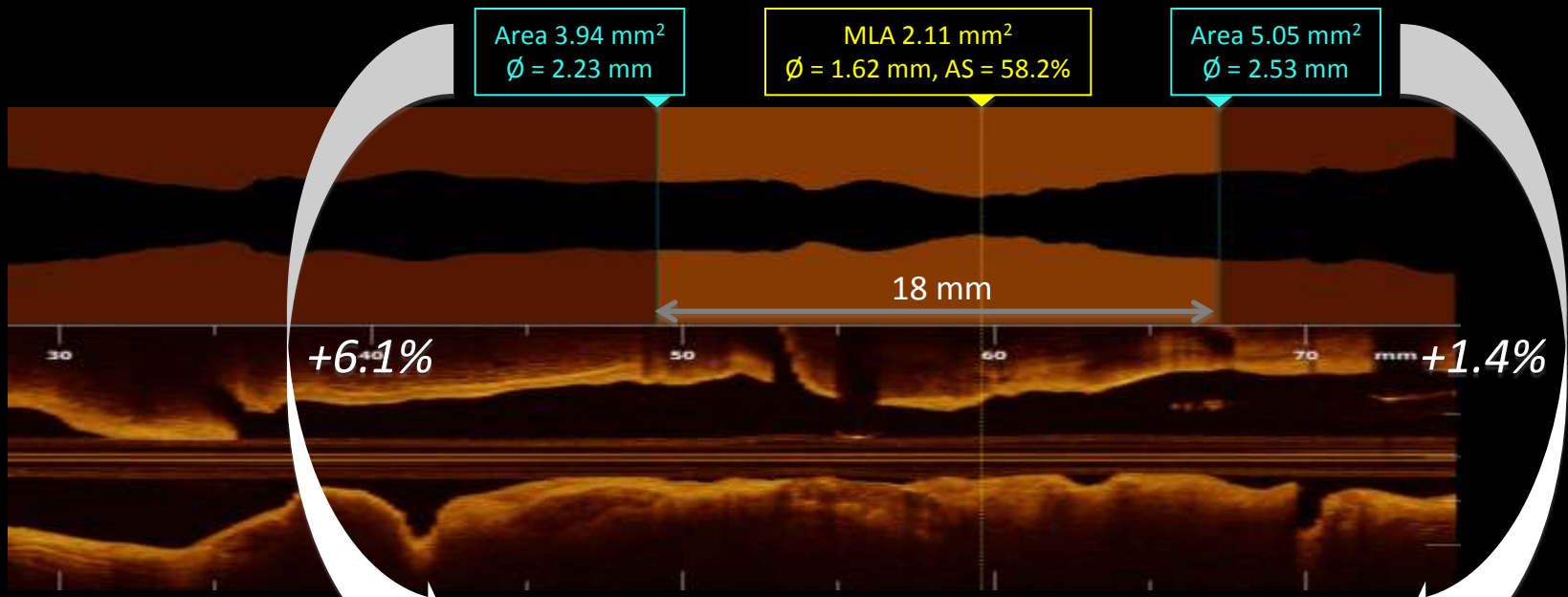
Courtesy Prof. Uemura University of Nara, ACC 2014

Lesion Types may impact on BVS results

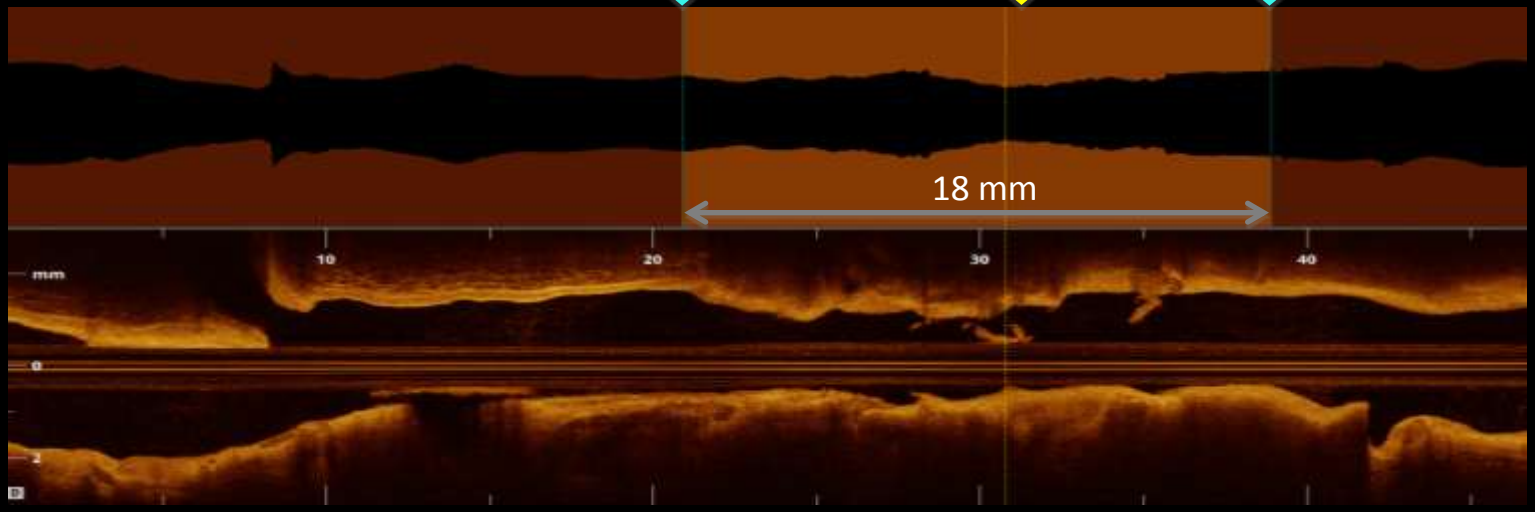


Lesion Preparation for BVS

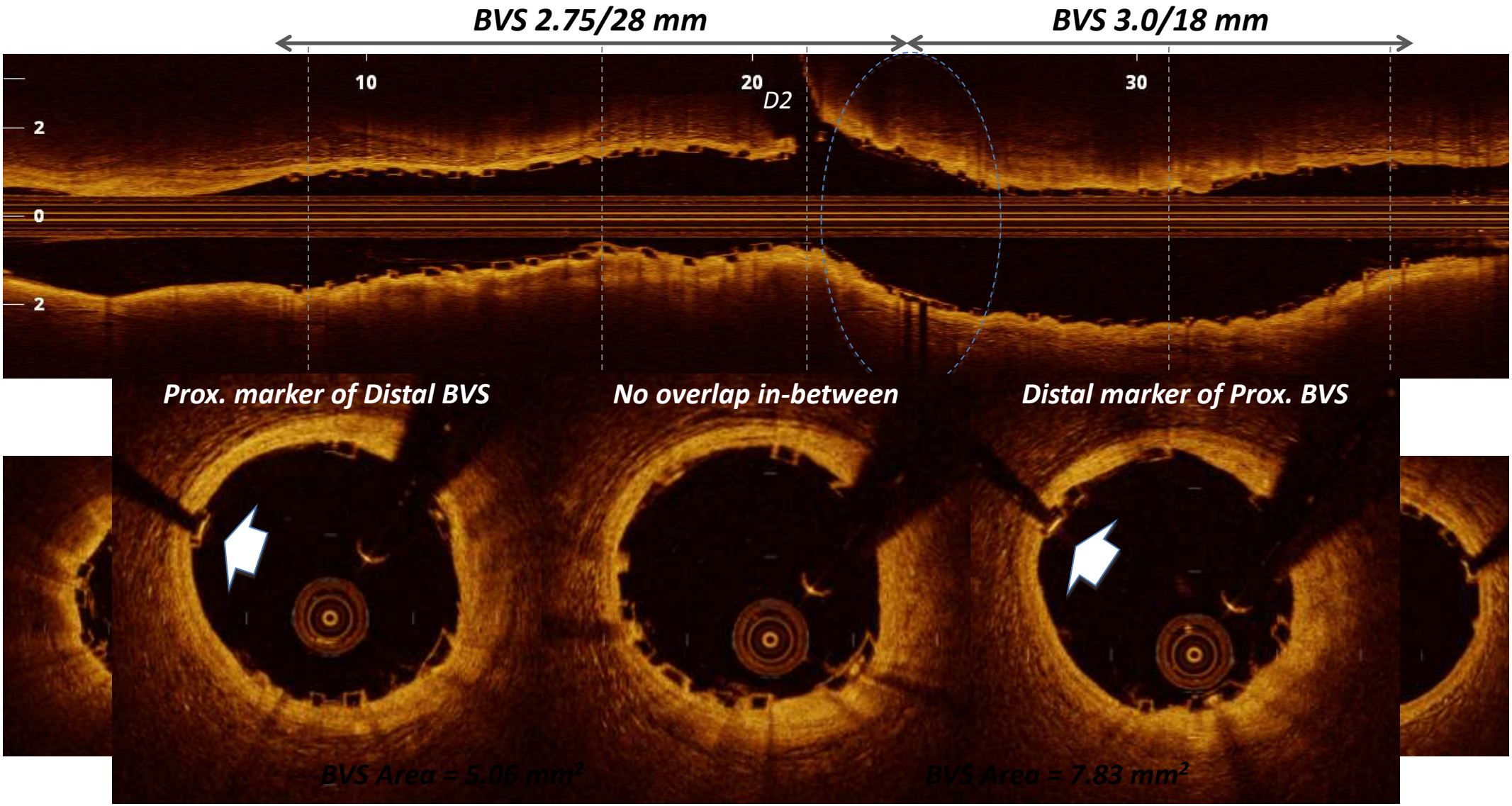
Post Ø 2.5x12 mm
Compliant balloon



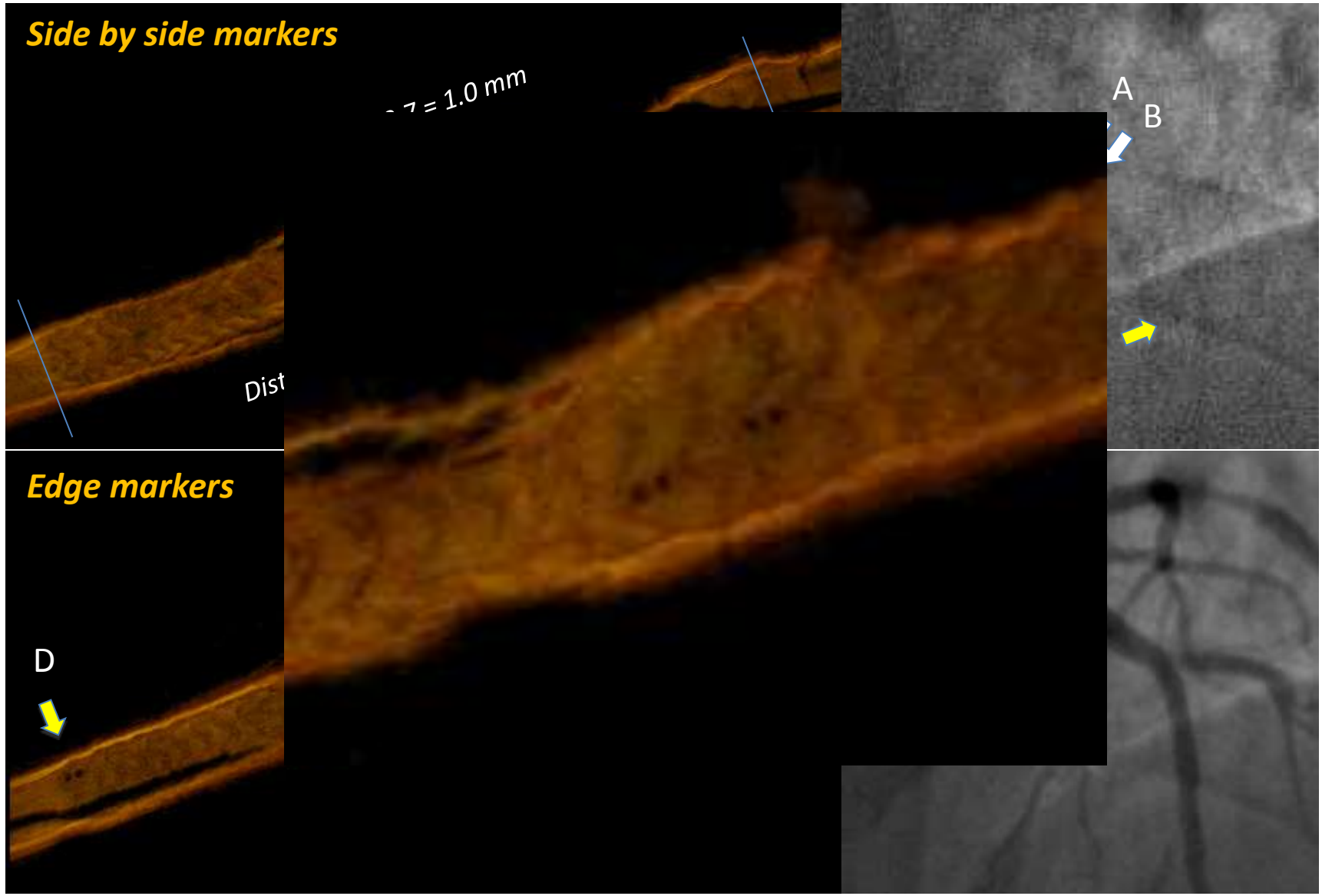
Post Ø 3.0x12 mm
Non-compliant balloon



Fully apposed plastic boxes

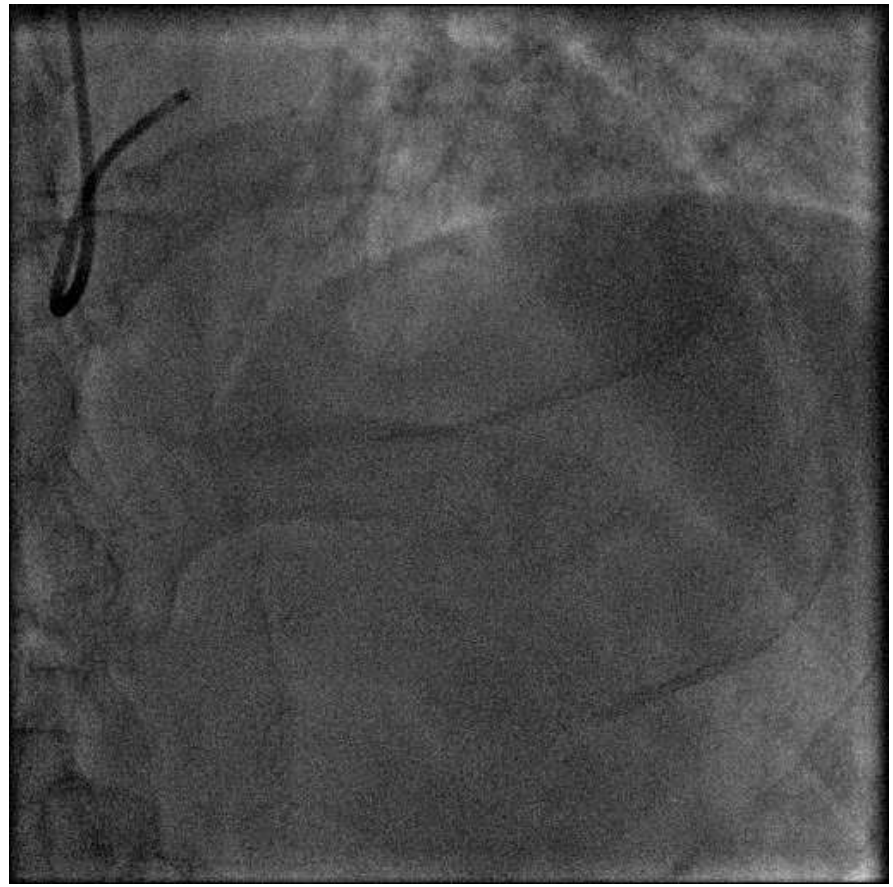


Perfect BVS placement side by side, no overlap



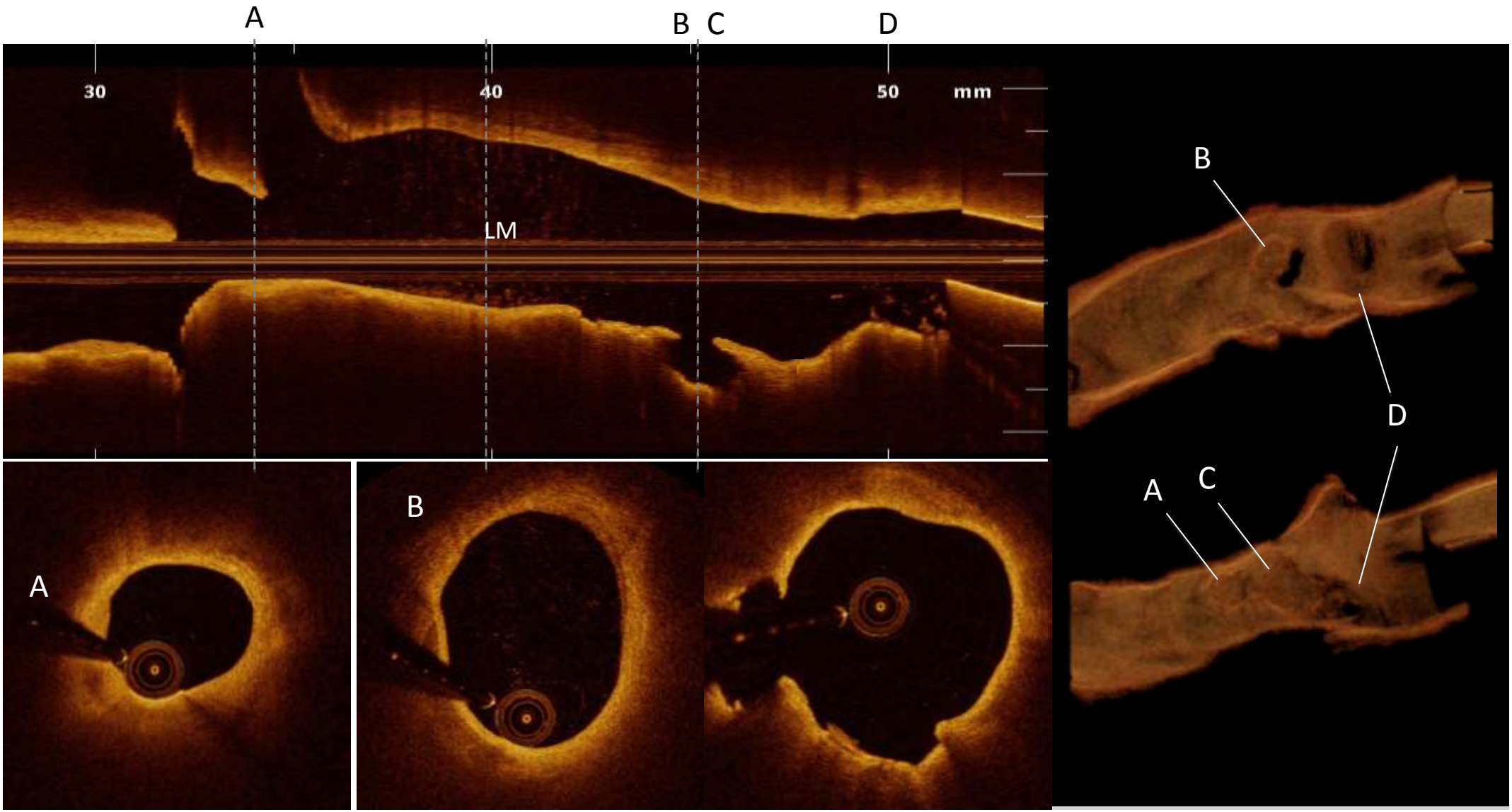
** Distance from BVS edge to marker: Proximal site 0.3 mm, distal site 0.7 mm*

Stable Angina: Severe stenosis vs risky plaques

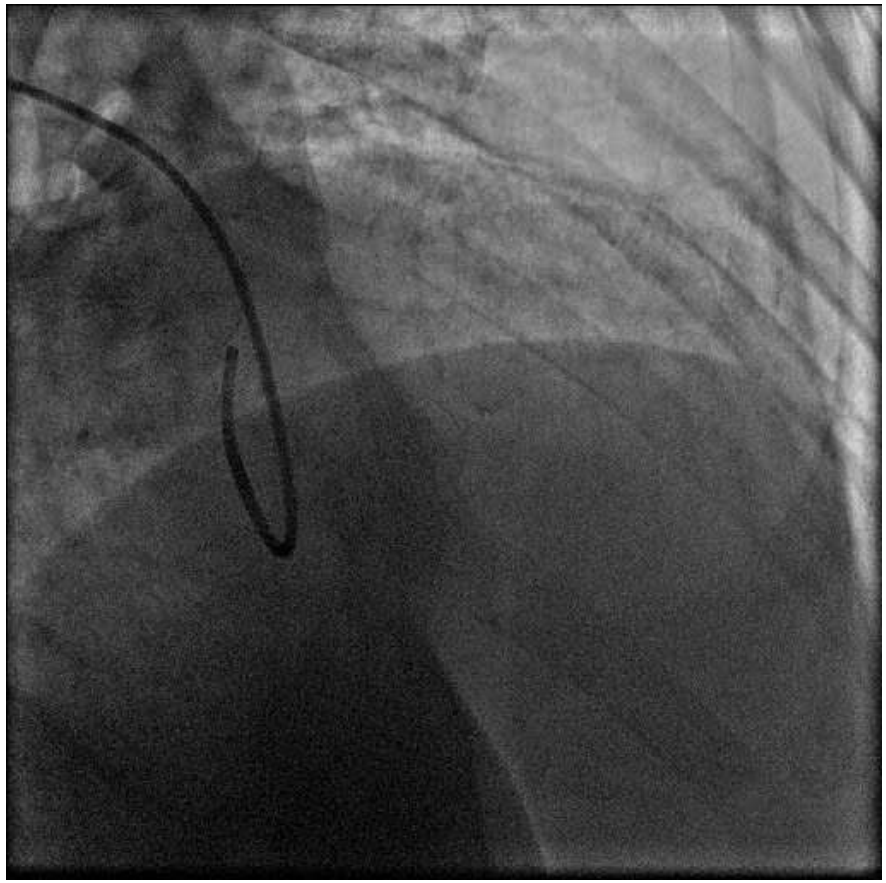


asia PCR Singapore Live 2014

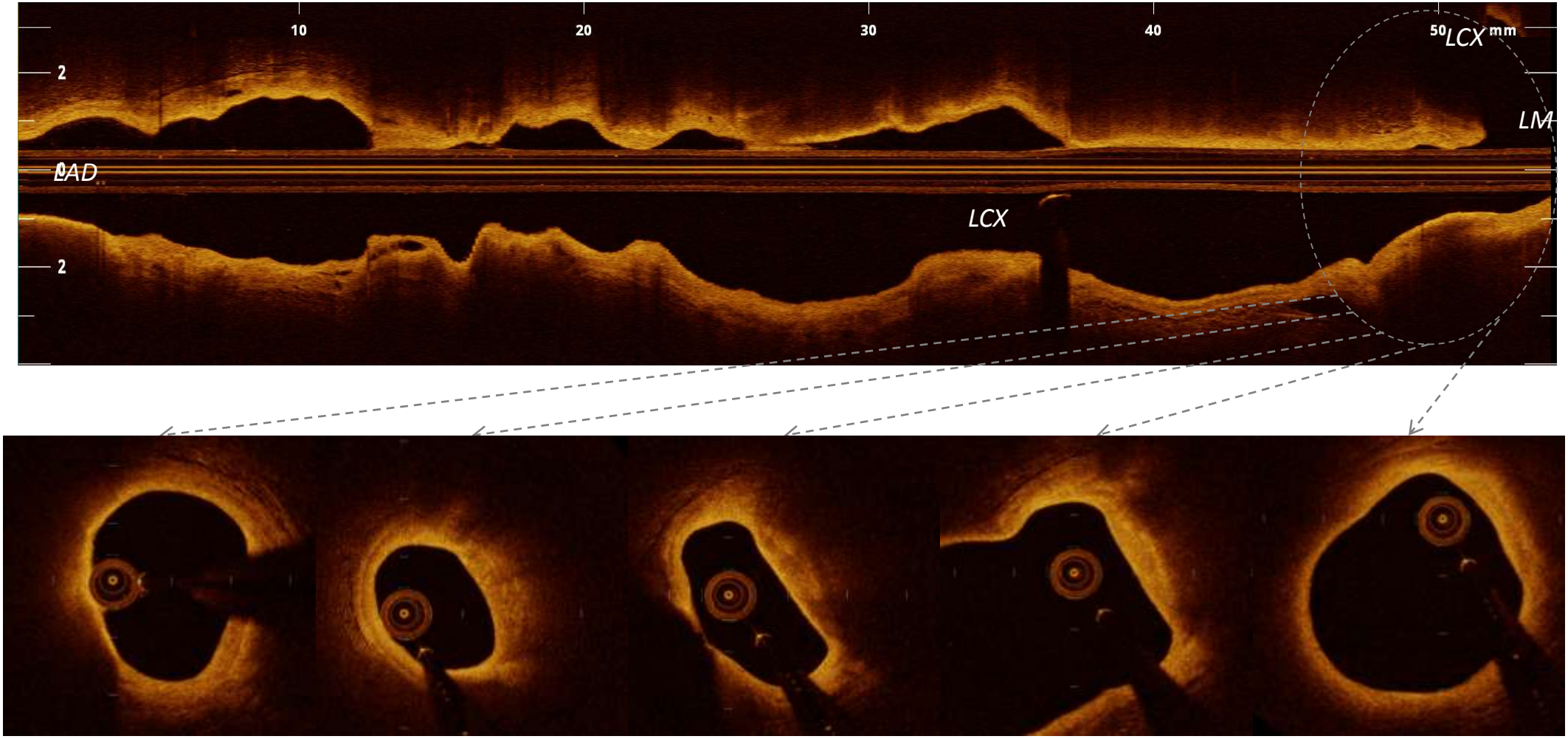
Asymptomatic Multiple Rupture



52 y.o. NSTEMI, multiple risk factors

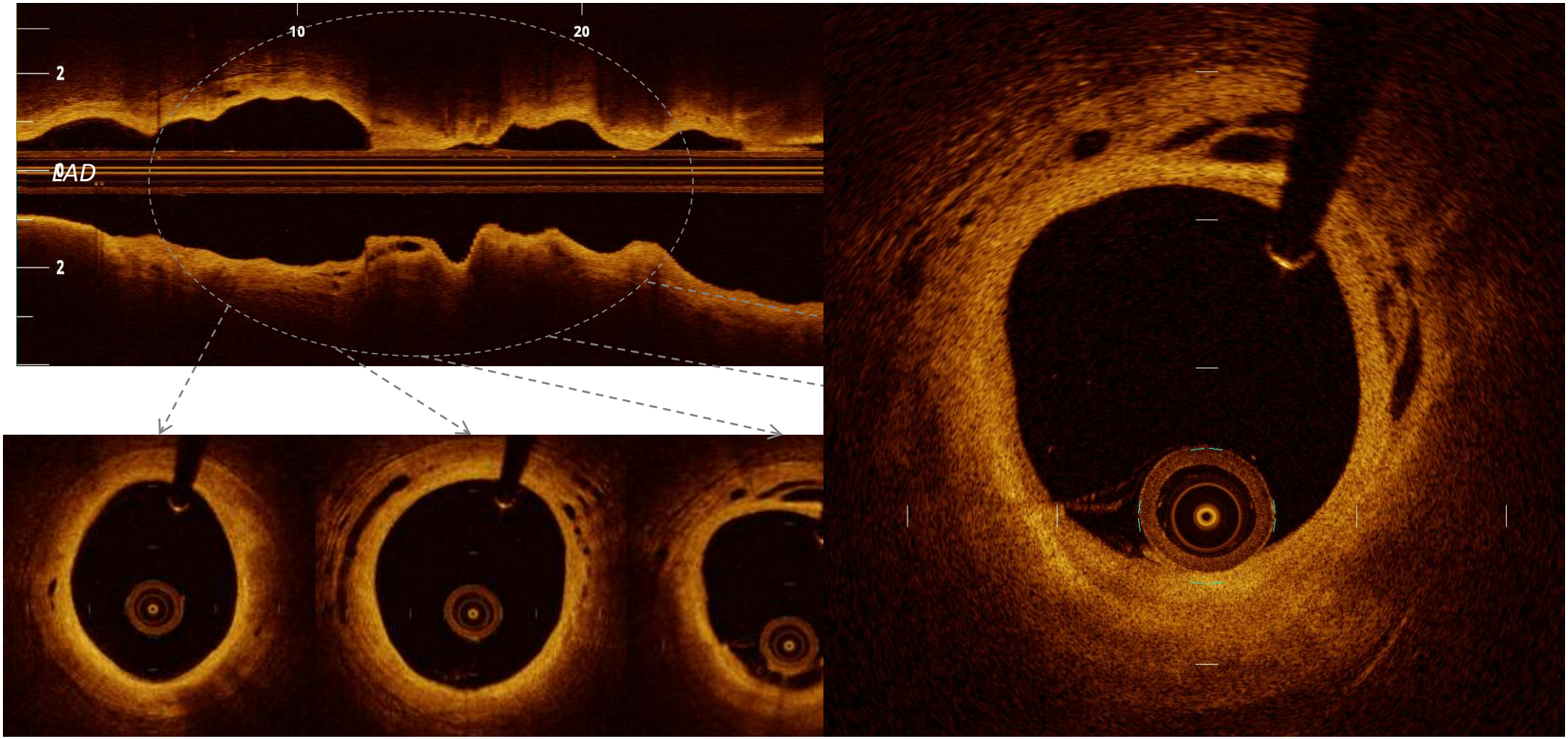


Ostial LAD Lesion: severe but stable in characteristics



Courtesy Keinichi Komukai, MD

Mid LAD Lesion: Mild but with enhanced vascularization

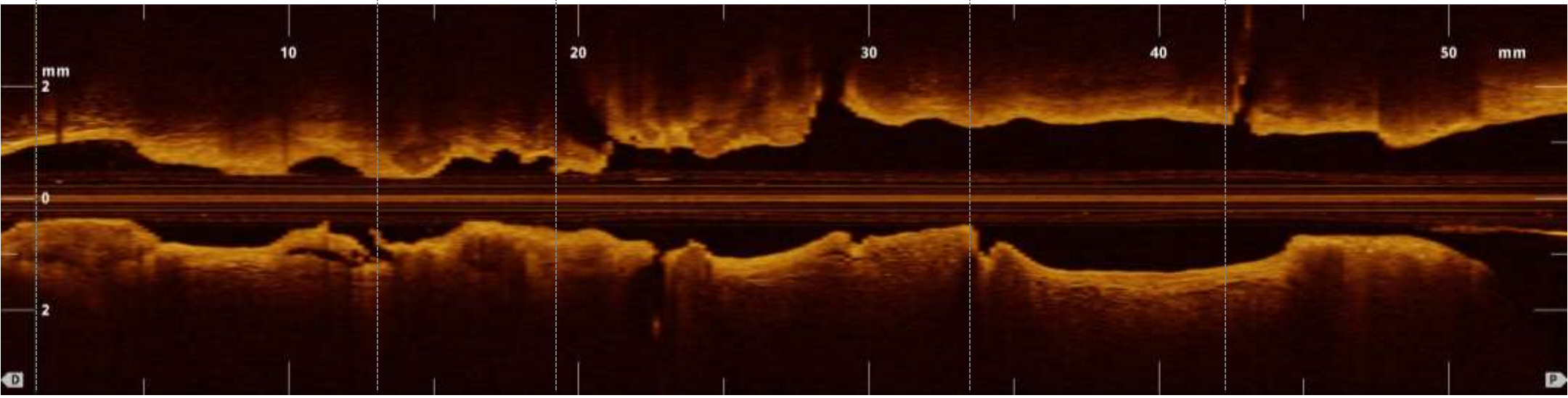


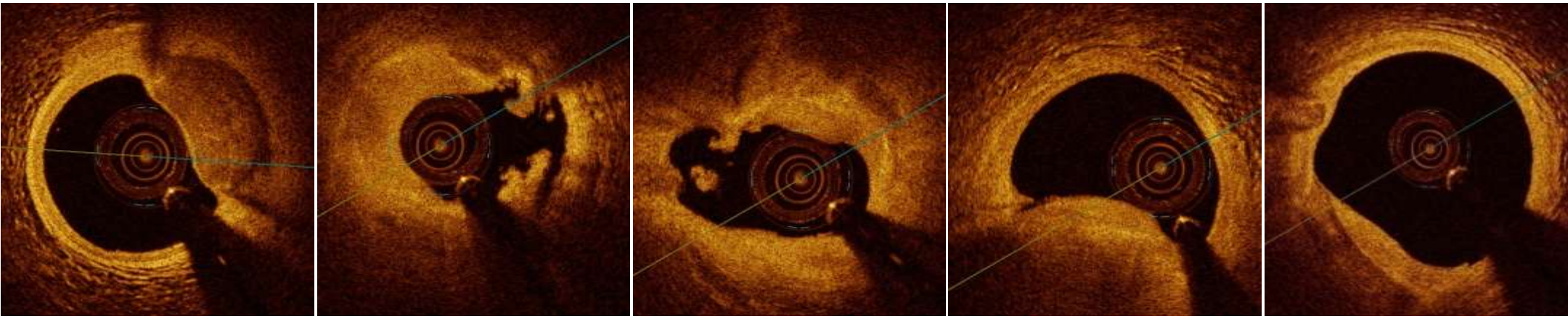
Courtesy Keinichi Komukai, MD

Overall Risk Stratification

Anterior STEMI, 53 yrs

Less Plaque Burden in Young Women…!!

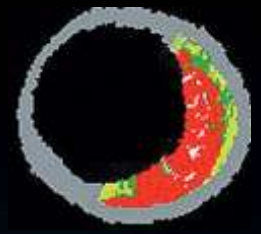


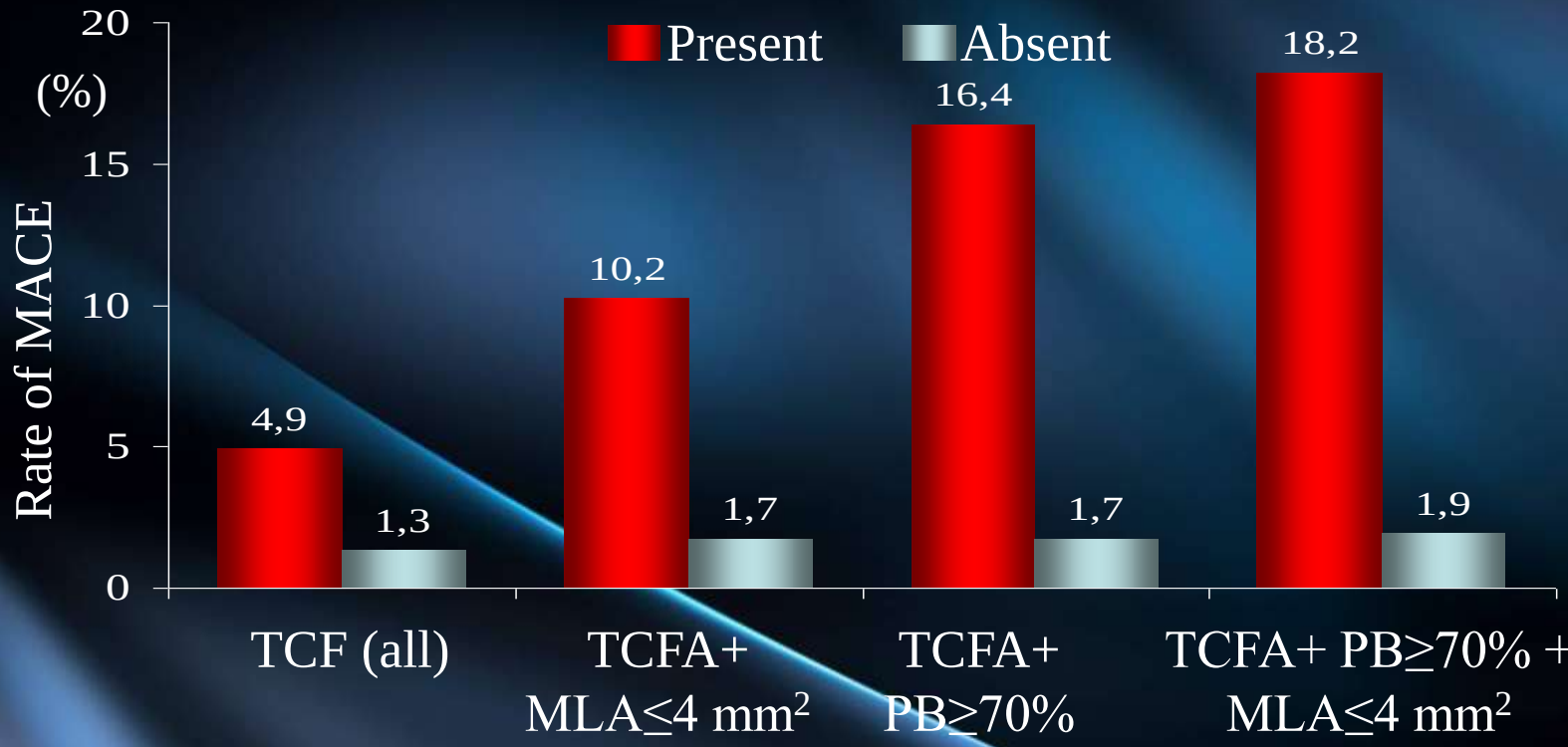


OCTAVIA

G. Guagliumi, Ospedale Papa Giovanni XXIII

FACT # 5 Plaque Characteristics Determines the Outcome



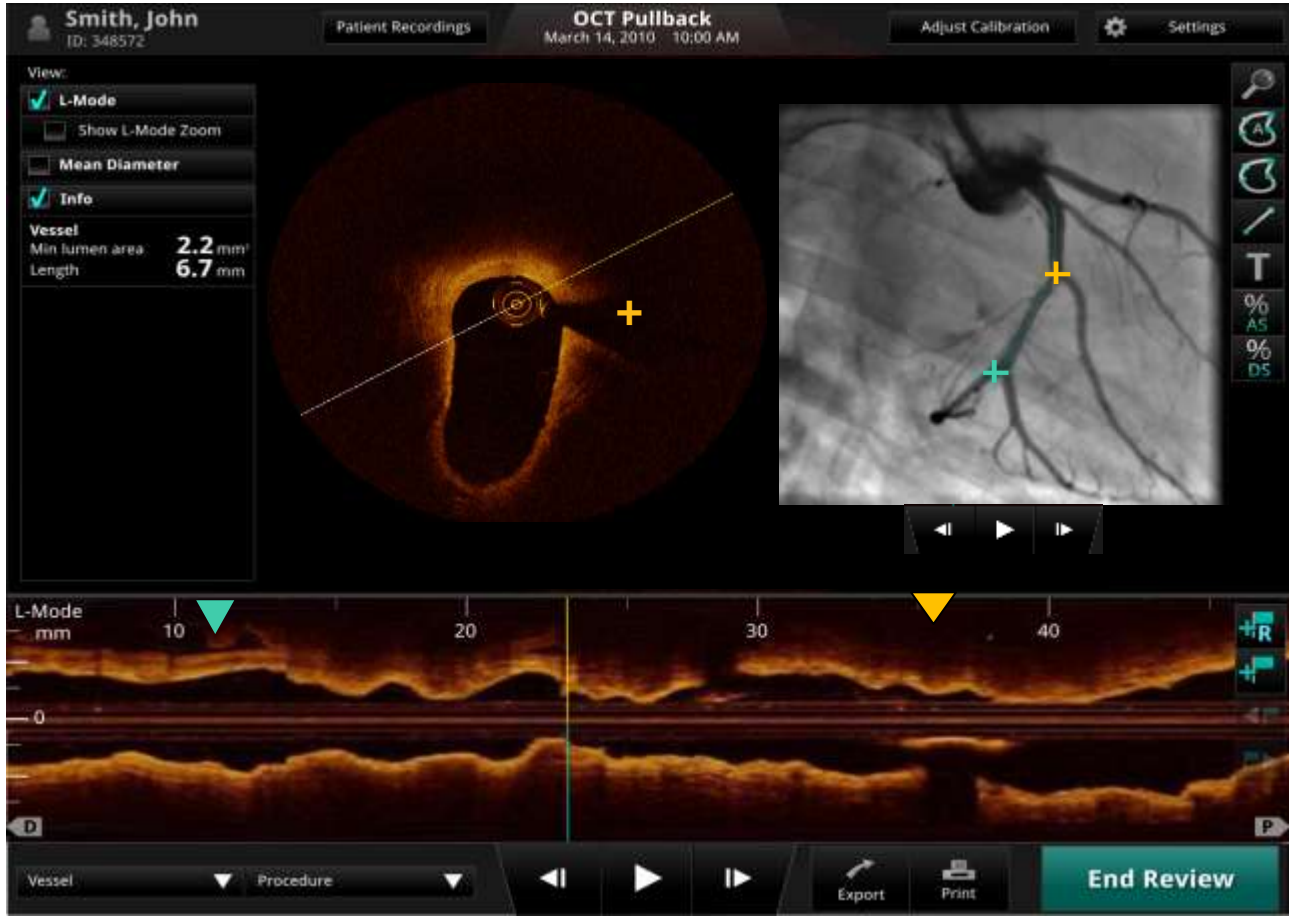


Lesion HR (95% CI)	3.9 (2.3-6.8)	6.6 (3.4-12.5)	10.8 (5.6-21)	11.1 (4.4-27.8)
P	<0.001	<0.001	<0.001	<0.001
Prevalence	46.7	15.9	10.1	4.2

G.W. Stone et al NEJM l 2011;364:226

These techniques are not only diagnostic tools. They can be used <u>also to plan and optimize</u> PCI results

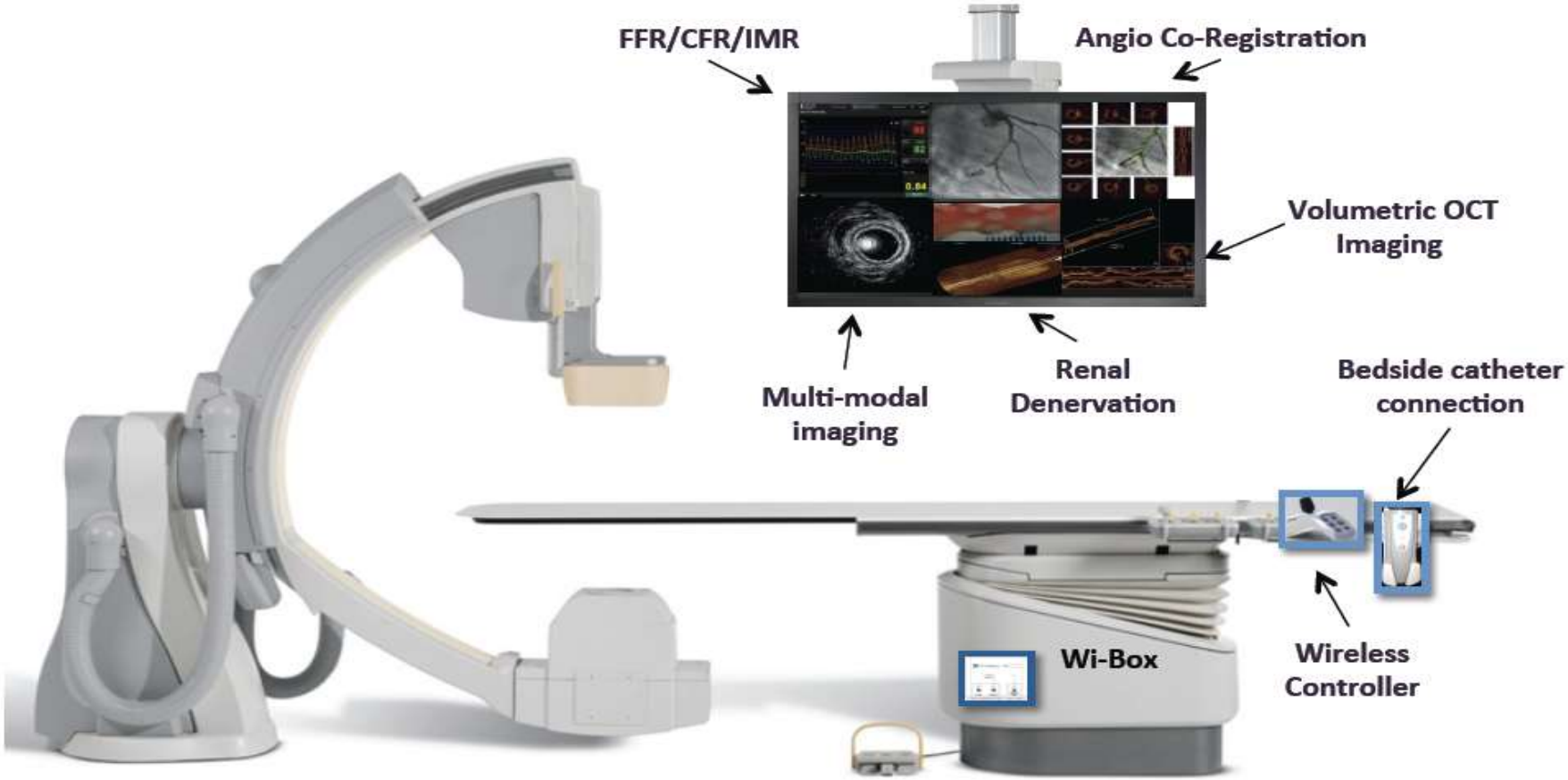
- Real-time coregistration of OCT and angiography image with single click



Proximal marker corresponds to current OCT frame

Distal markers corresponds to bookmarked frames

Integrated System



Adjunctive technologies are available tableside at the Interventional Cardiologist's fingertips

Slide courtesy of St. Jude Medical