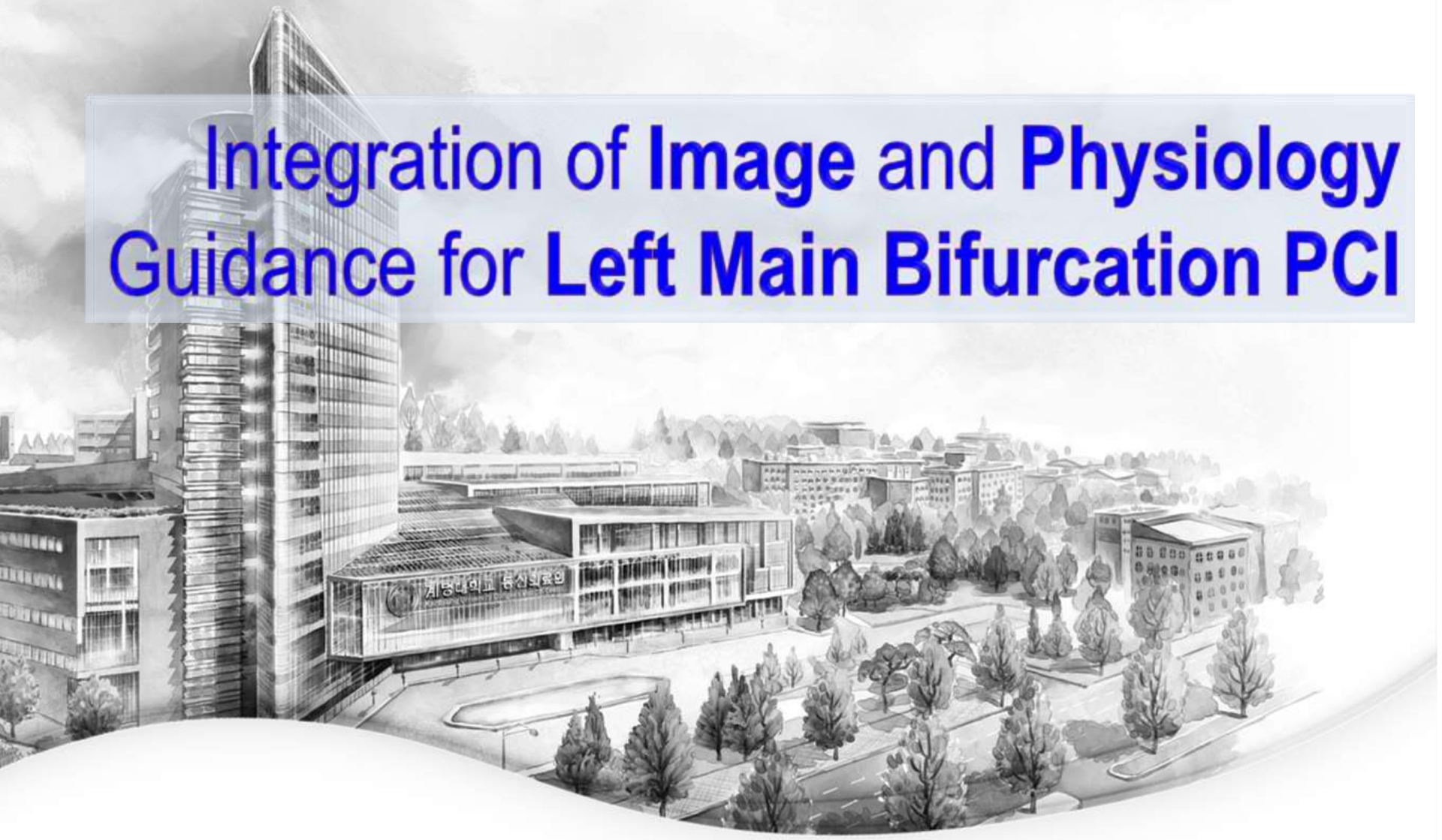
Integration of **Image** and **Physiology** Guidance for **Left Main Bifurcation PCI**



NAM, Chang-Wook MD PhD

Keimyung University Dongsan Hospital

Patient Profile

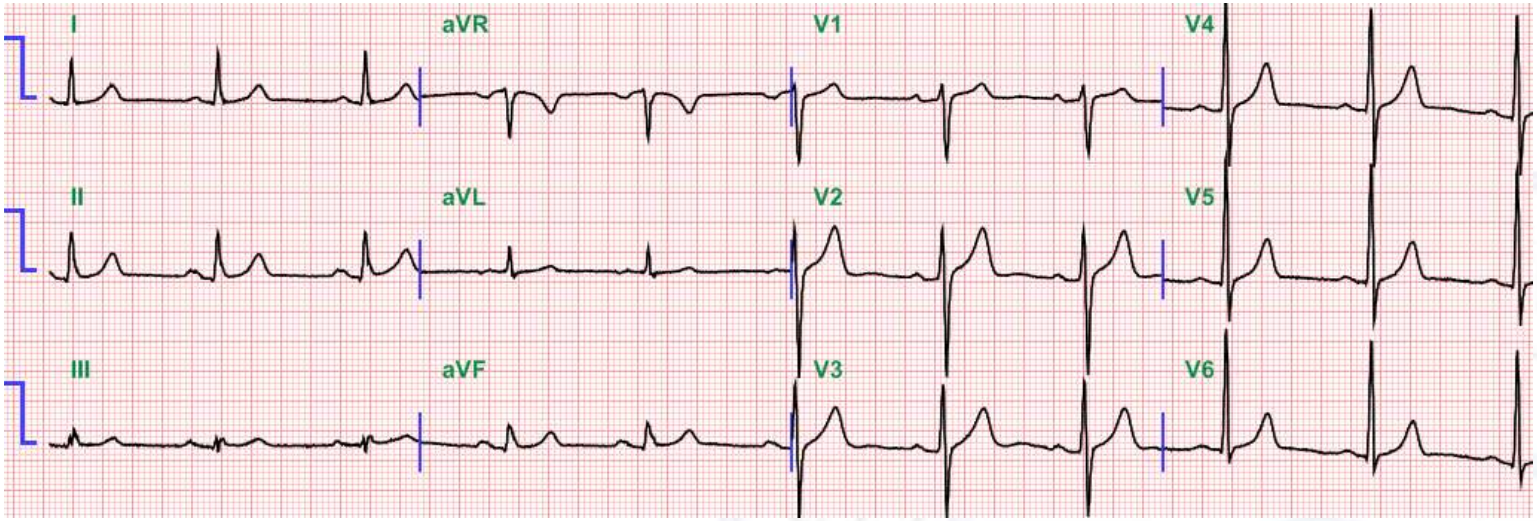
- ✓ 62 / Male
- ✓ C/C : recently redeveloped effort angina

  SA (2007.07.04) : LCXd 100%, RCAd 70%

  → DES 4.0x15mm on RCAd
- ✓ P/Hx : HTN, 30 yrs

  BPH, 2 yrs

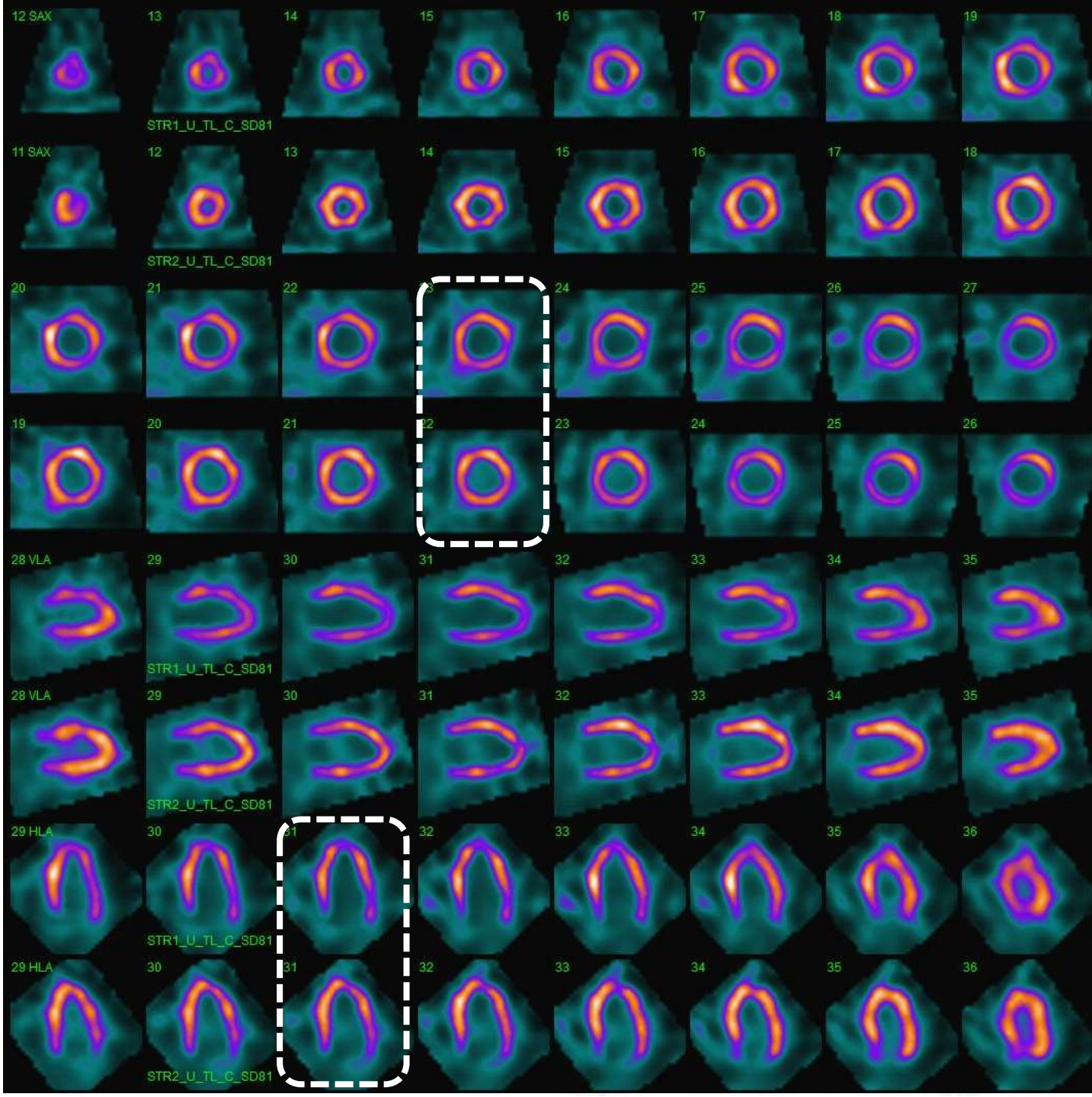
  CGN CKD, 1yr


I
aVR
V1
V4
II
aVL
V2
V5
III
aVF
V3
V6


L

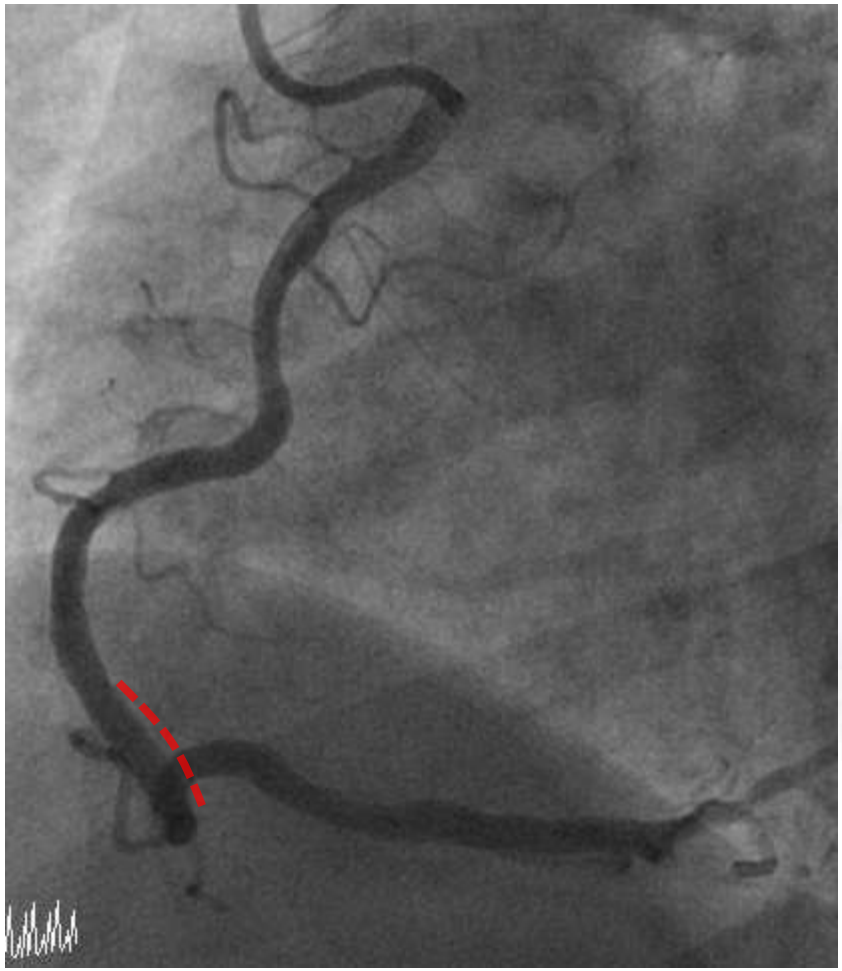

2017
Lossy Compressed (Derived)
12/21/2017 3:44:07 PM
0dB / M
Cardiac / ADU
73 bp

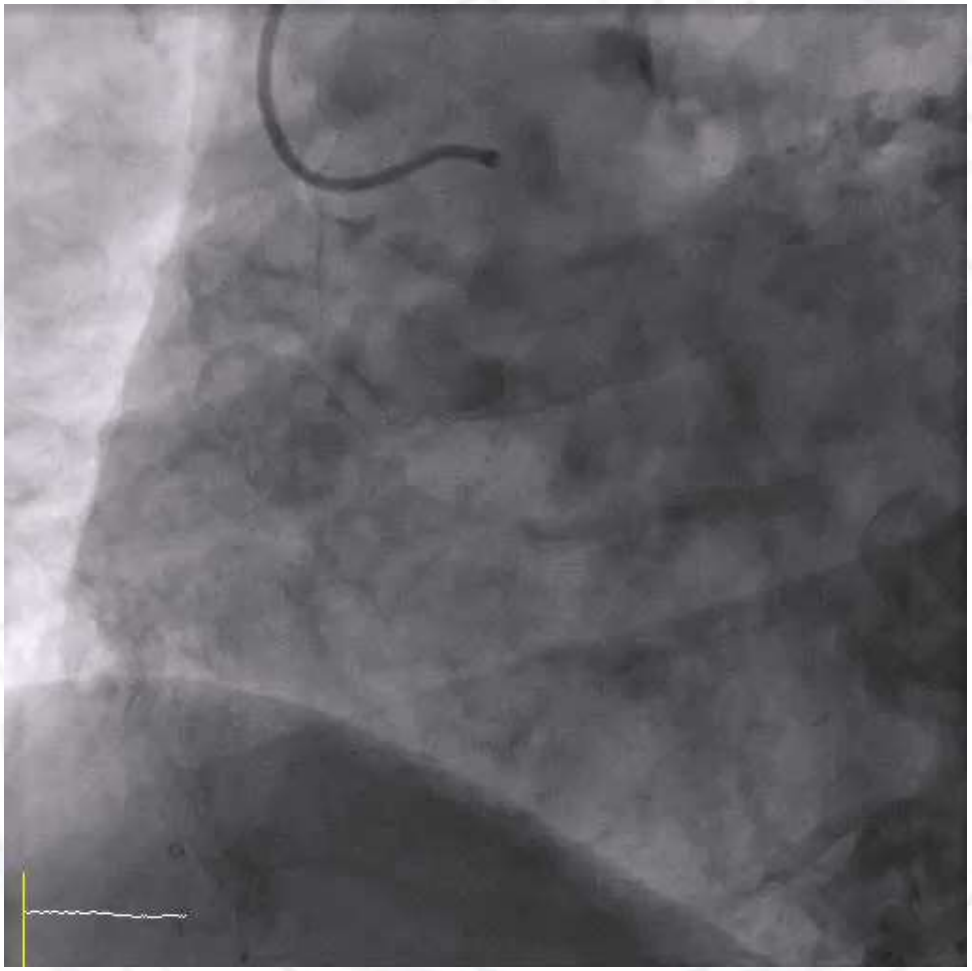
SPECT



Keimyung University, Korea

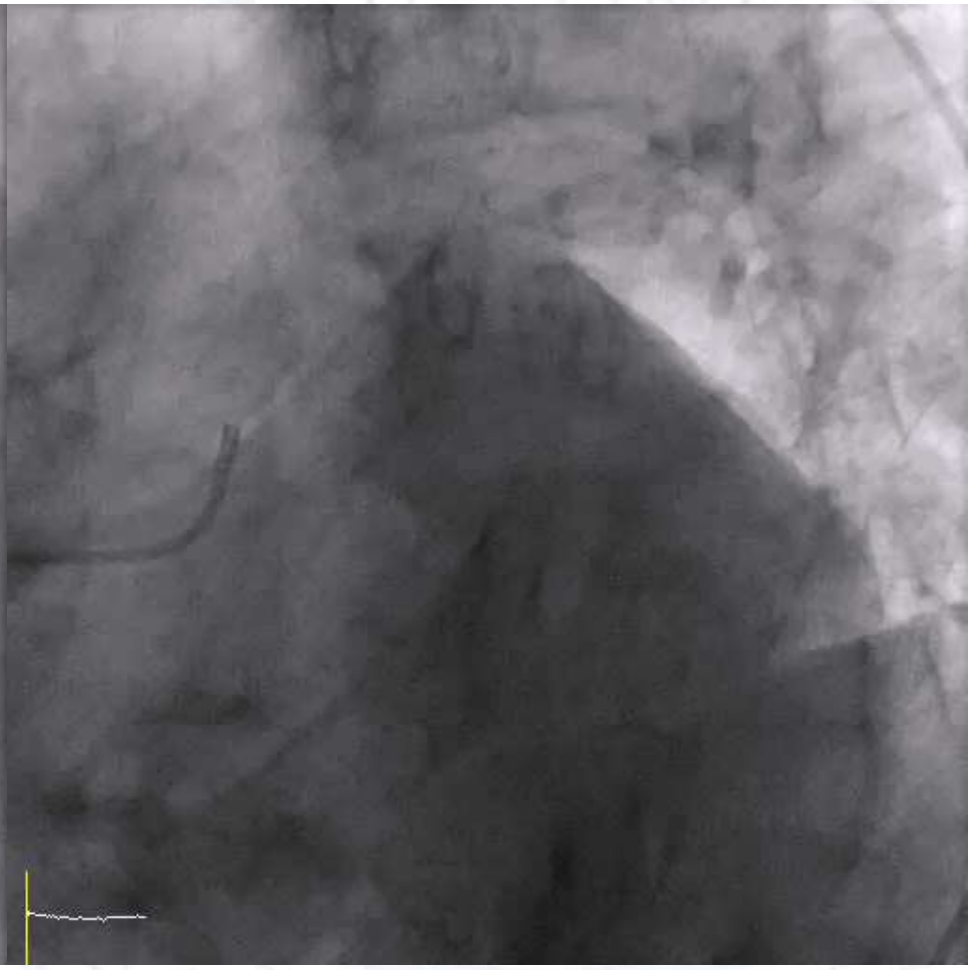
CAG



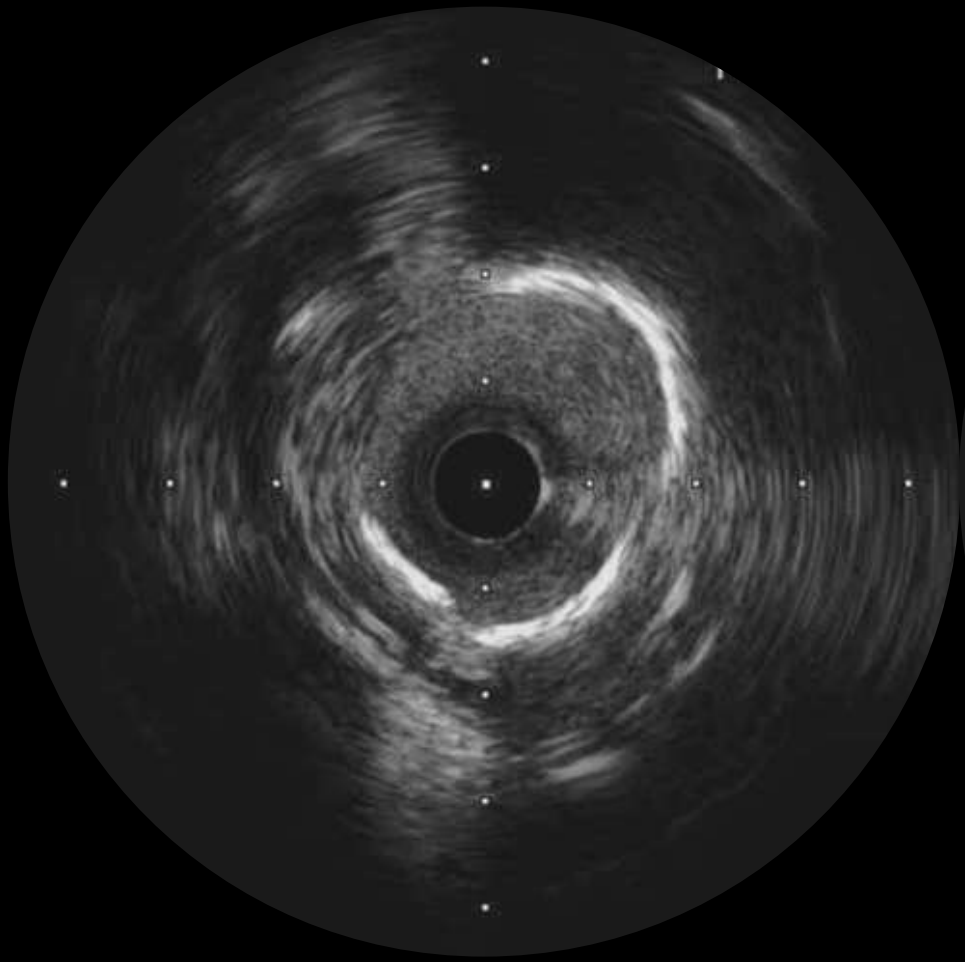


2007. 7. 4.

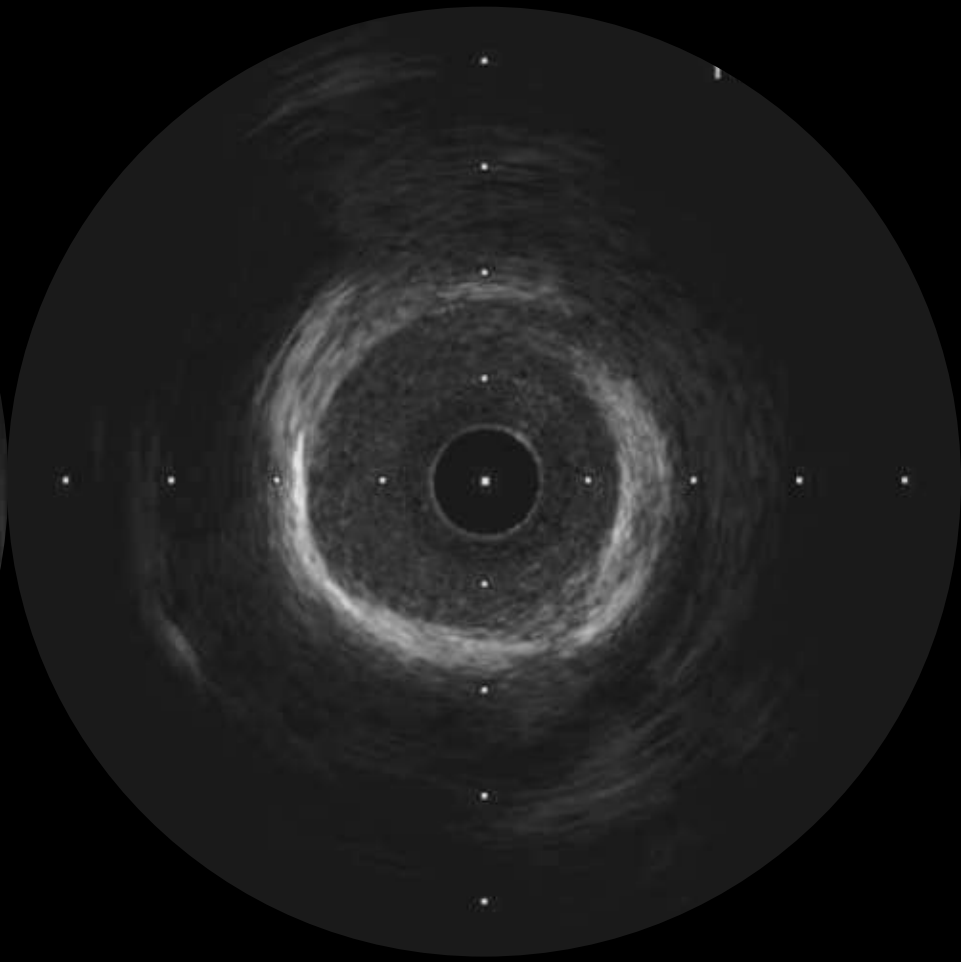
CAG



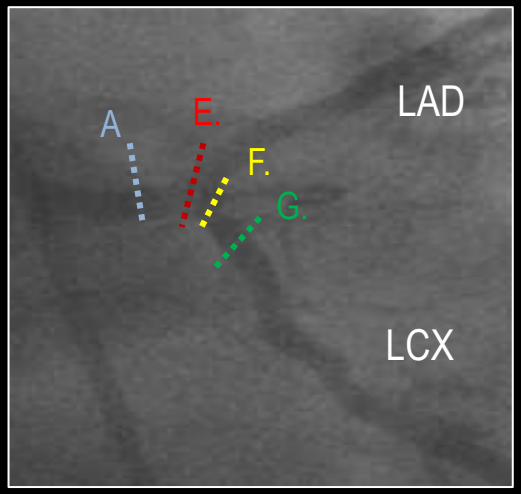
IVUS from LCX to LM

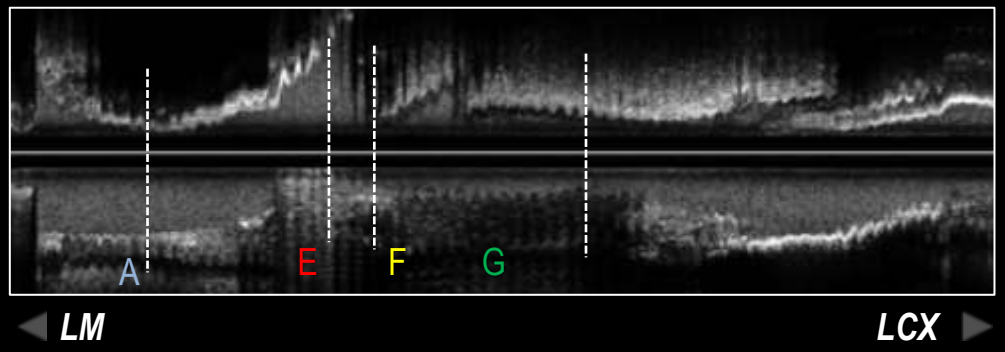


IVUS from LAD to LM

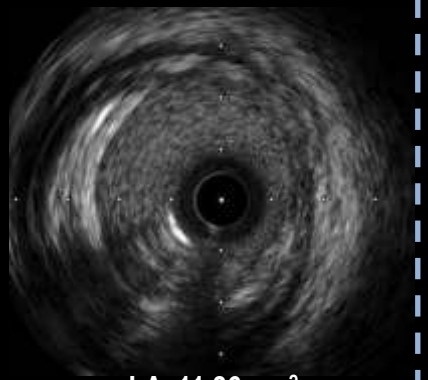


IVUS from LCX to LM



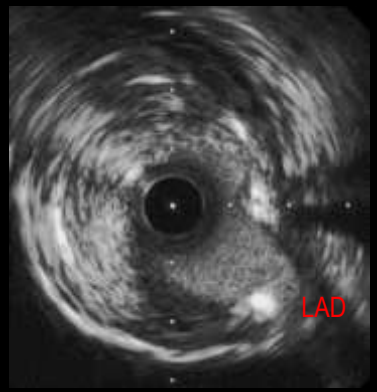


A. Proximal Ref.



LA 11.86mm²
Min D. 3.59mm
Max D. 4.15mm

E. POC

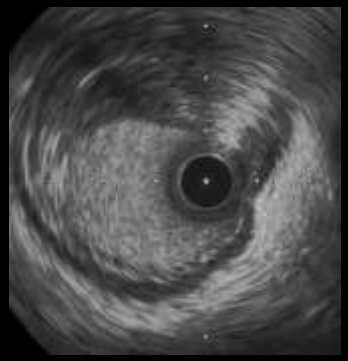


LA 3.91mm²
Min D. 1.53mm
Max D. 3.06mm

F. MLA

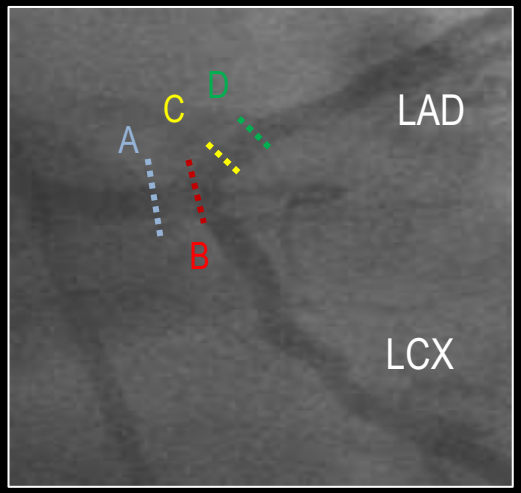
LA 4.51mm²
Min D. 2.18mm
Max D. 3.68mm

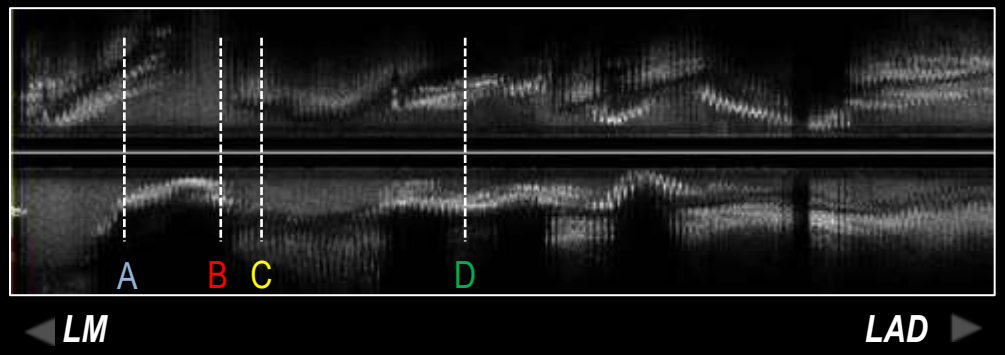
G. Distal Ref.



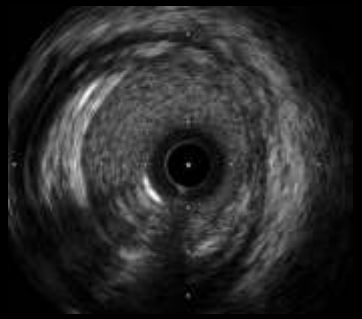
LA 5.92m²
Min D. 2.89mm
Max D. 3.25mm

IVUS from LAD to LM





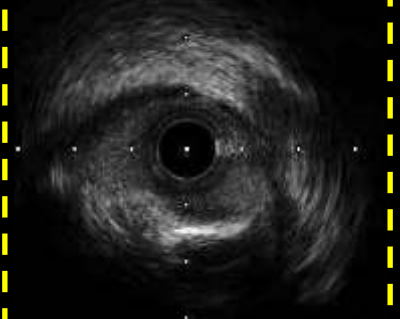
A. Proximal Ref.



LA 11.86mm²
Min D. 3.59mm
Max D. 4.15mm

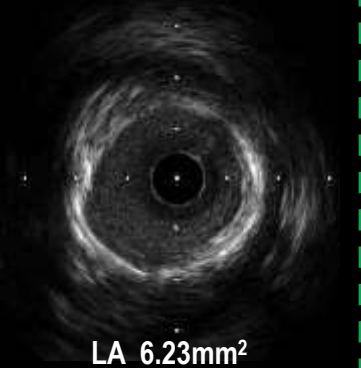
B. POC

C. MLA



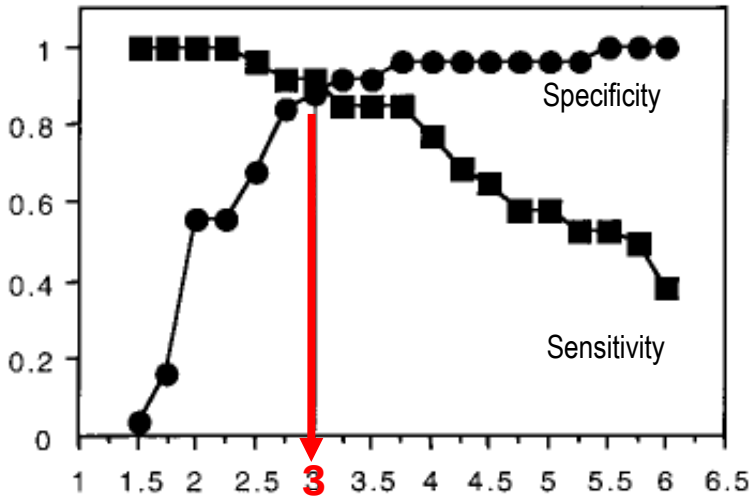
LA 4.19mm²
Min D. 1.73mm
Max D. 3.01mm

D. Distal Ref.

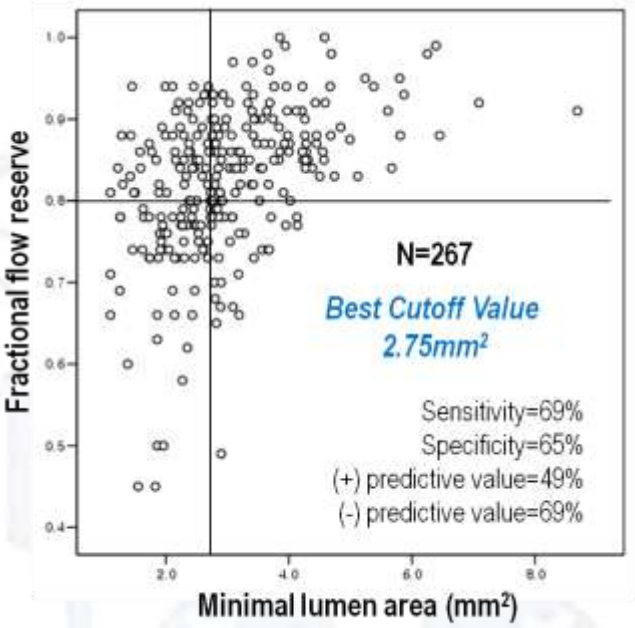


LA 6.23mm²
Min D. 2.76mm
Max D. 3.30mm

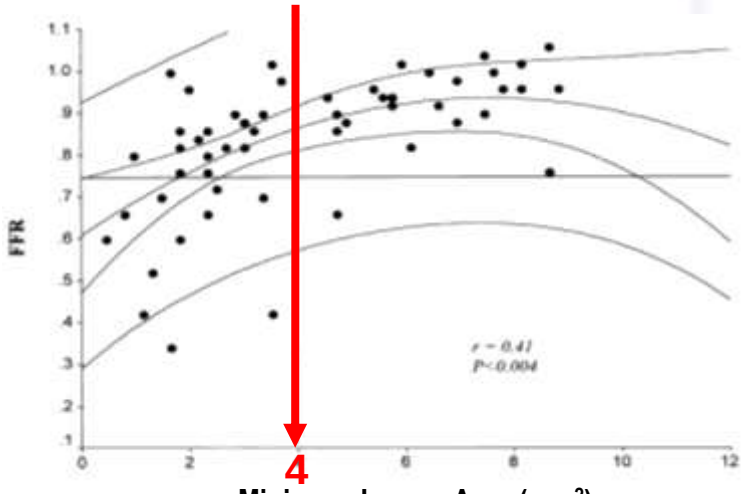
IVUS criteria for Presence of ischemia in nonLM lesions



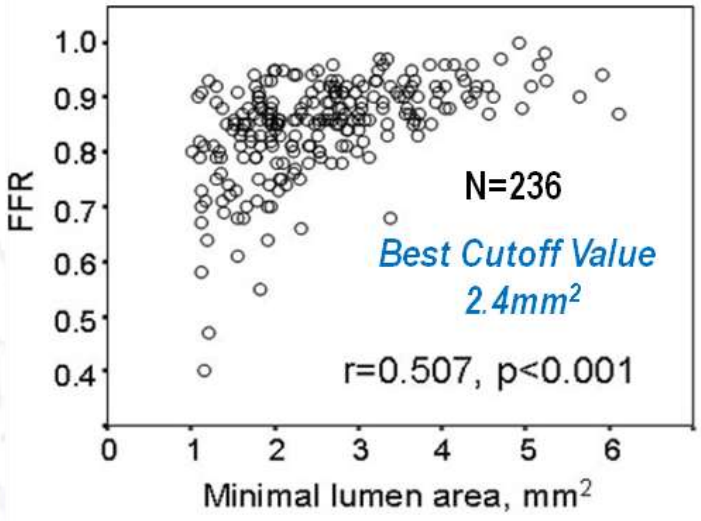
Takagi, et al. Circulation 1999



Koo BK, et al. JACC Intv 2011



Briguori, et al. AJC 2001

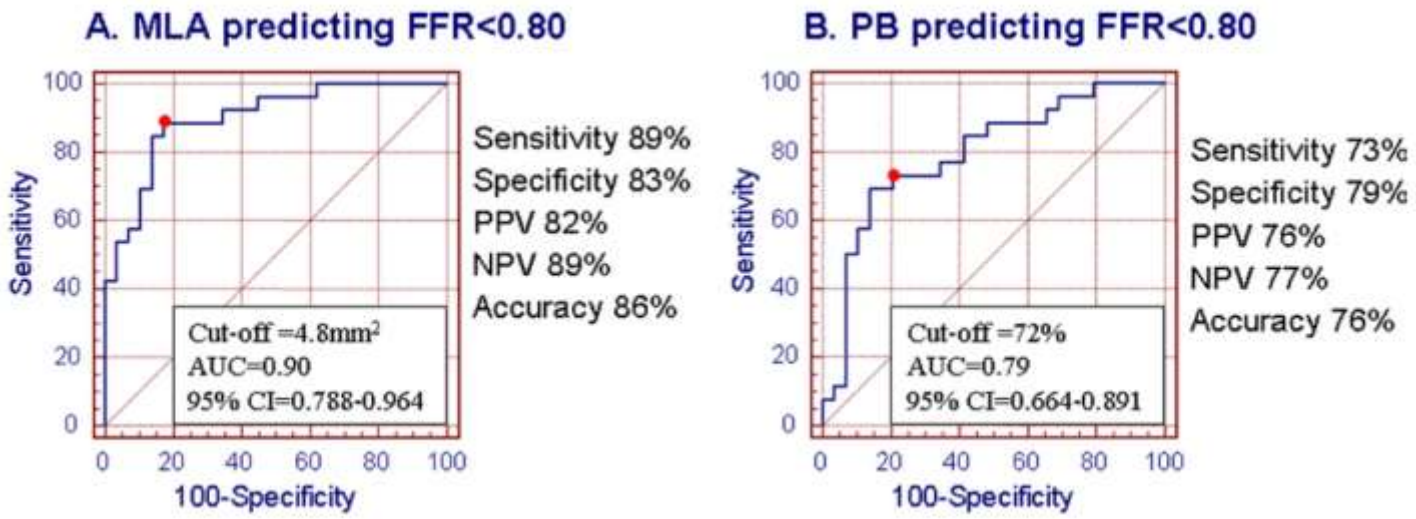


Kang SJ, et al., Circ CVI, 2011

IVUS criteria for Presence of ischemia in LM lesions

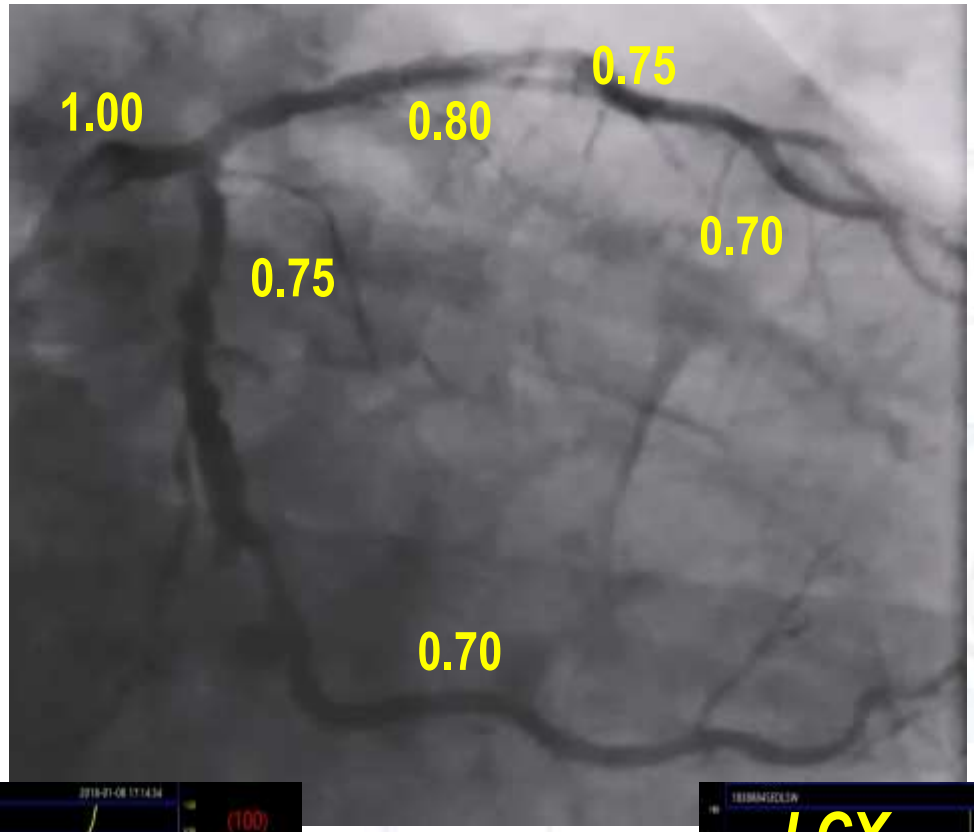
First Author (Ref. #)	N	FU (Months)	Outcome	IVUS Criterion for Significance	Comment
Abizaid et al. (36)	122	12	MACE	MLD	No specific cutoff suggested. LMCA MLD >3 mm portends incremental risk, also determined by comorbidities and coronary artery disease in other territories
Ricciardi et al. (37)	107	29	MACE	MLA	No specific cutoff suggested. MLA was a predictor of cardiac events
Legutko et al.*	44	44	Ischemia	MLD, MLA	MLA <8 mm^2 and MLD <2.8 mm correlated with FFR ≤0.75 and ischemia on 99Tc-Mibi-Spect
Jasti et al. (24)	51	11	Ischemia	MLD, MLA	MLA ≤5.9 mm^2 and MLD ≤2.8 mm. FFR of ≤0.75 used as gold-standard reference
Fassa et al. (39)	214	40	MACE	MLA	MLA <7.5 mm^2
de la Torre Hernandez et al. (40)	354	24	MACE	MLA	MLA <6 mm^2
Kang et al. (38)	55	NA	Functional	FFR	IVUS-derived MLA of <4.8 mm^2 correlated with FFR <0.80

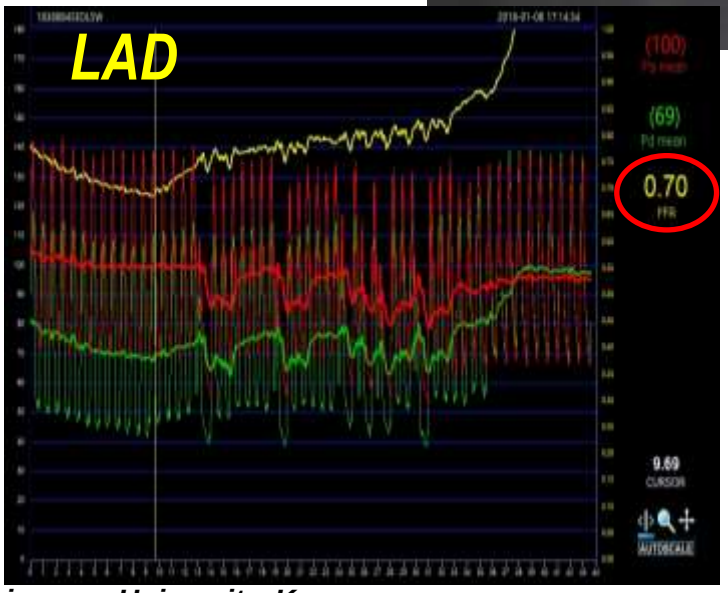
Puri, et al. JACC intervention 2012

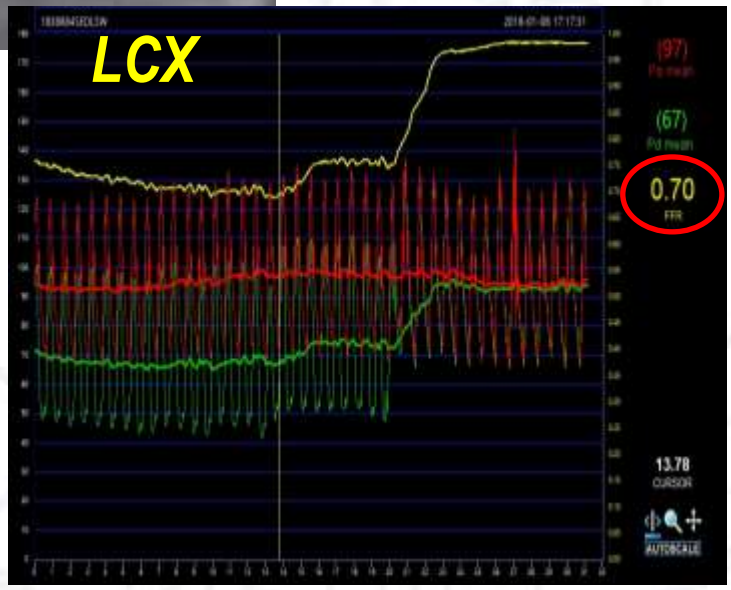


Kang SJ, et al. JACC intervention 2011

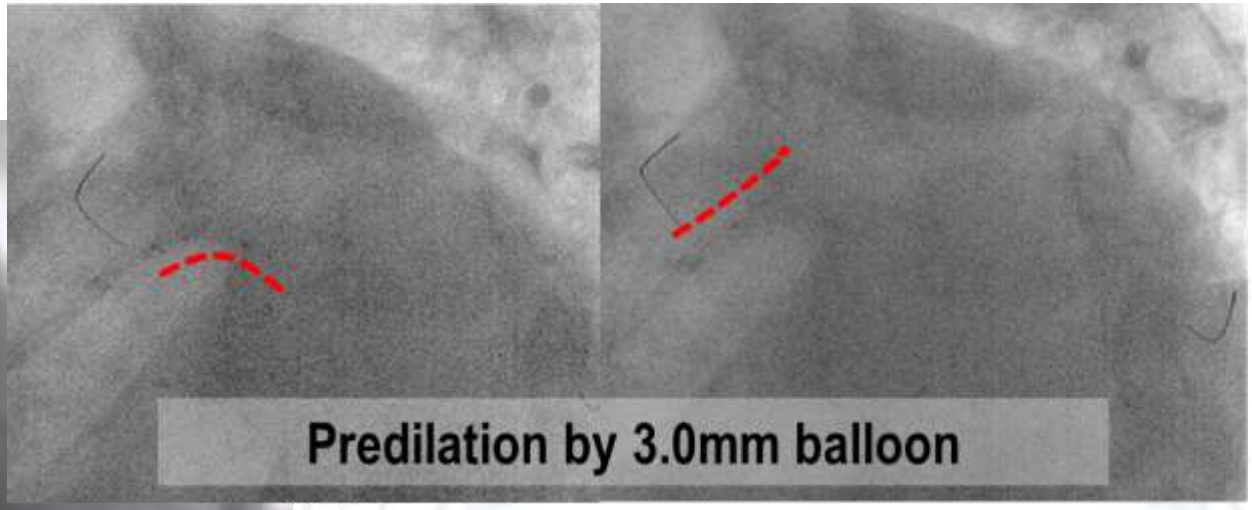
FFR

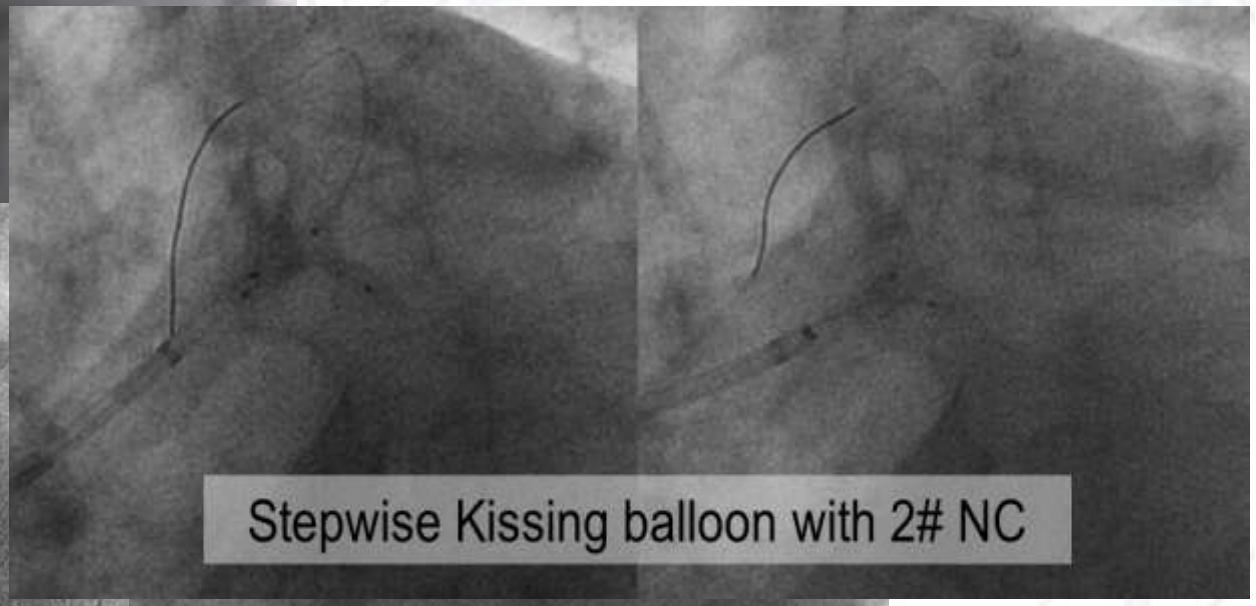

1.00
0.80
0.75
0.70
0.75
0.70

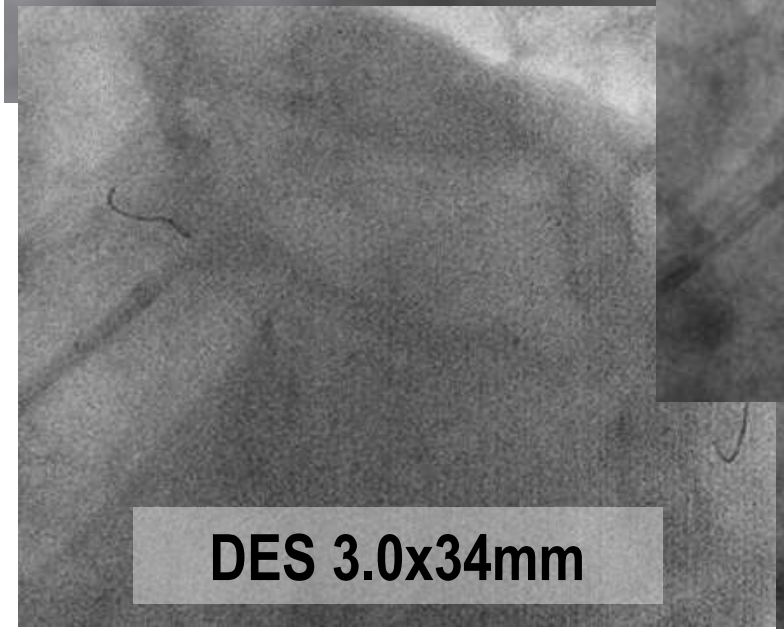

LAD
(100)
(69)
0.70
FFR
9.69
CURSOR
AUTOSCALE

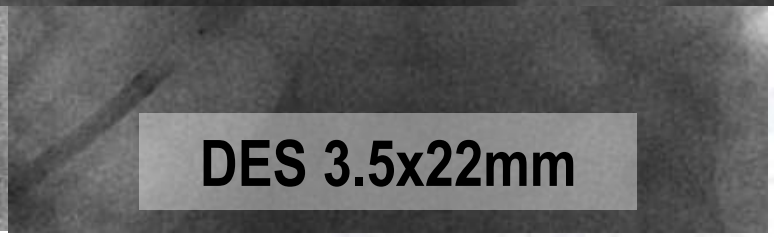

LCX
(97)
(67)
0.70
FFR
13.78
CURSOR
AUTOSCALE

PCI

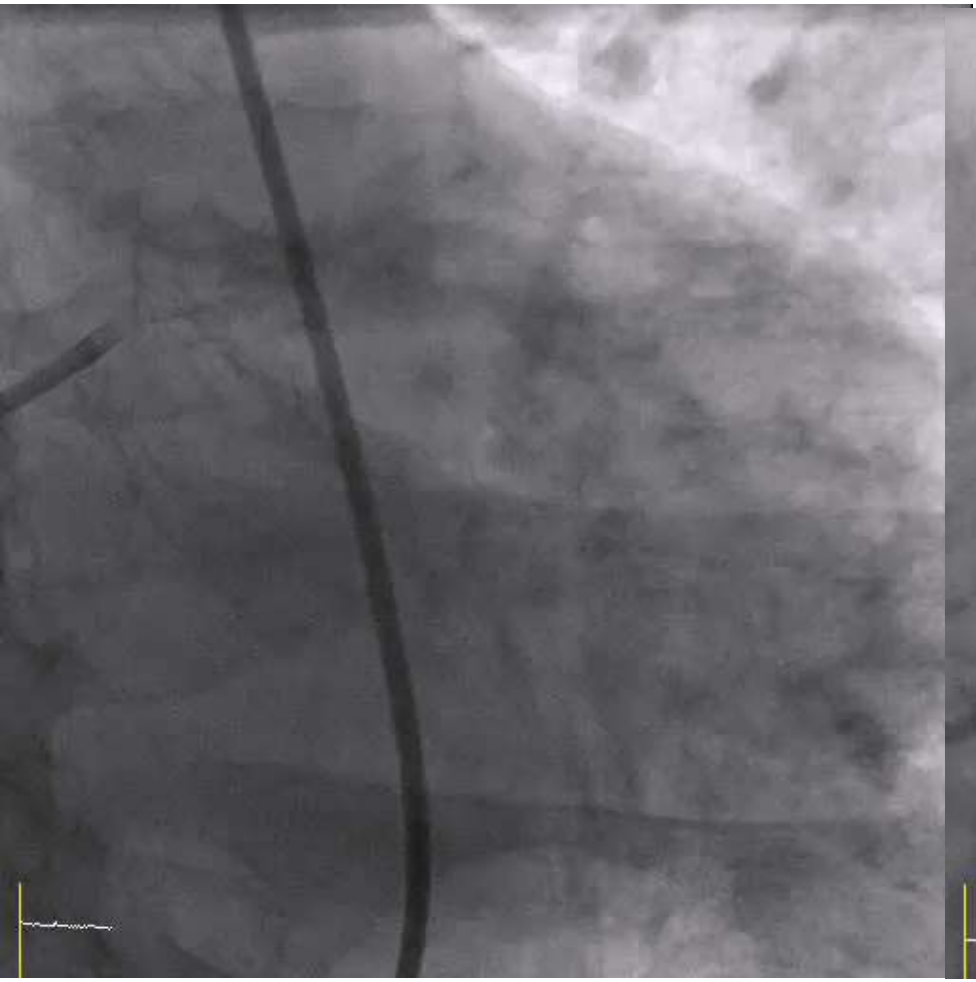

Predilation by 3.0mm balloon

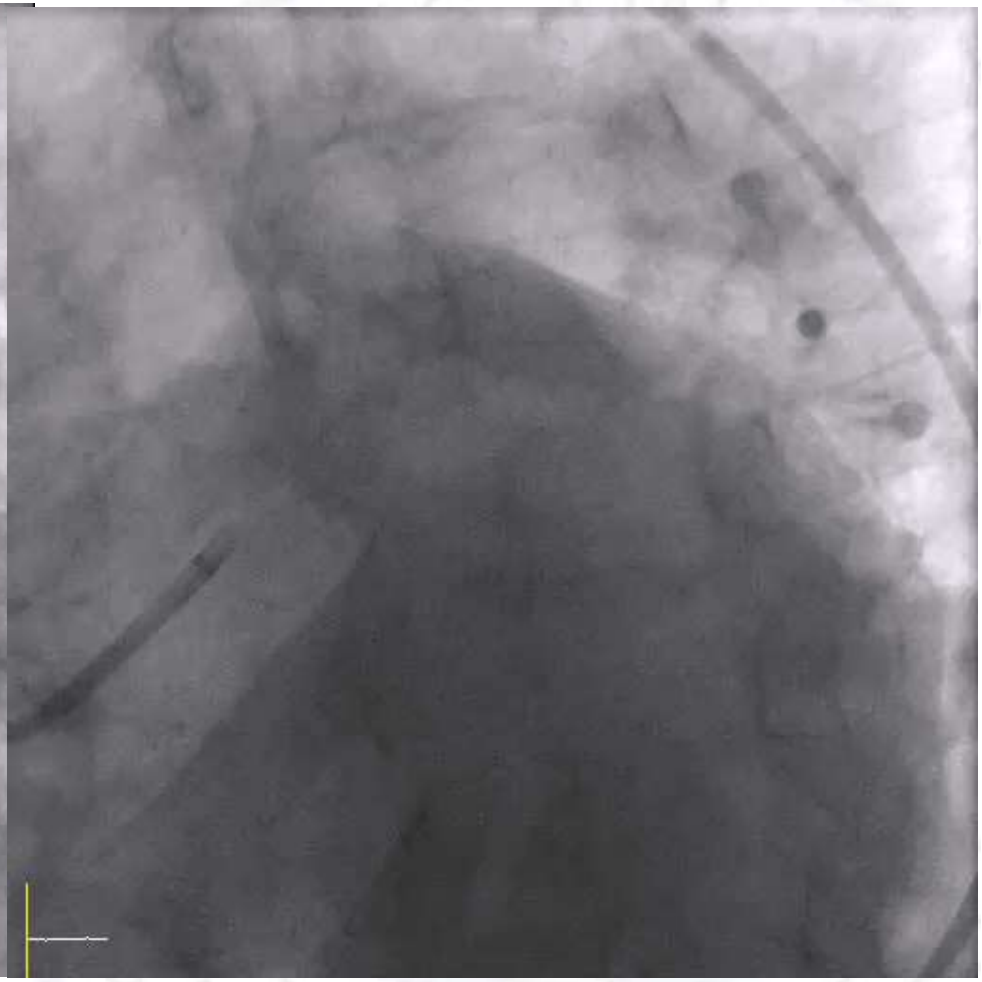

Stepwise Kissing balloon with 2# NC


DES 3.0x34mm


DES 3.5x22mm

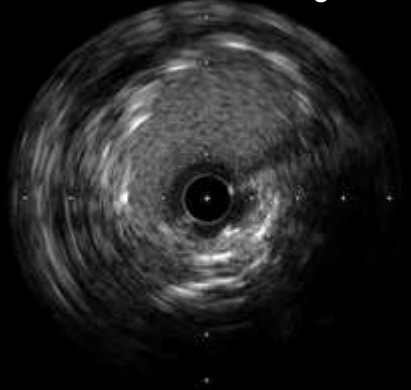
Final CAG after PCI





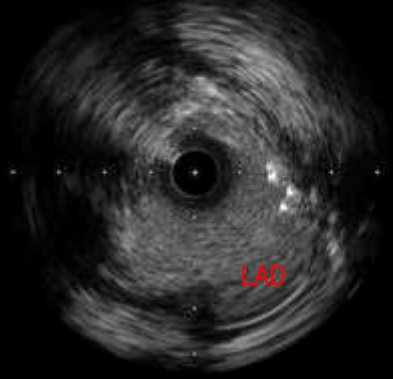
Final IVUS Findings LCX

A. Prox. Stent edge



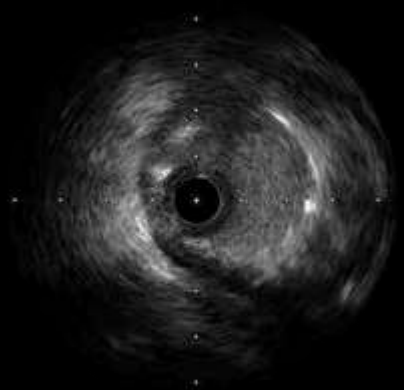
SA 13.4mm²
LA 14.8mm²
VA 34.5mm²

B. POC



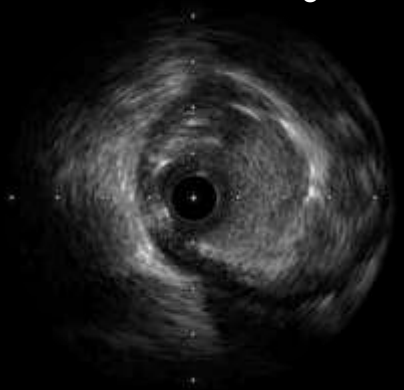
LA 11.9mm²

C. MSA

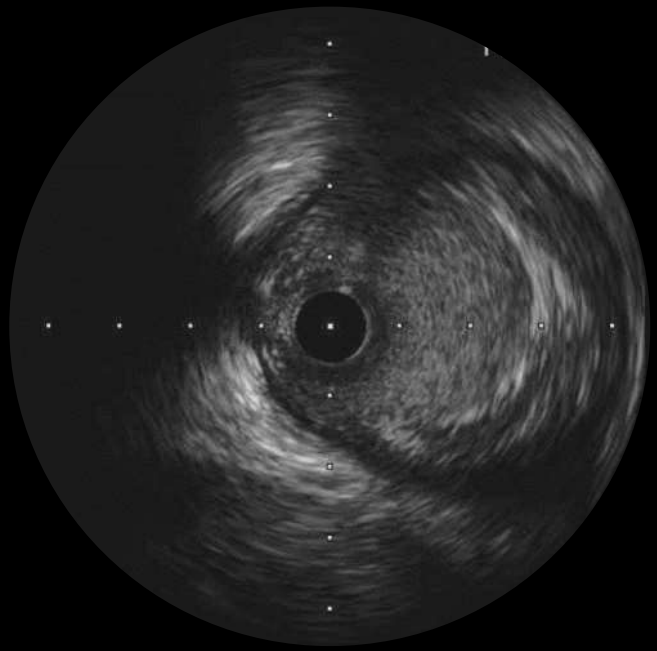


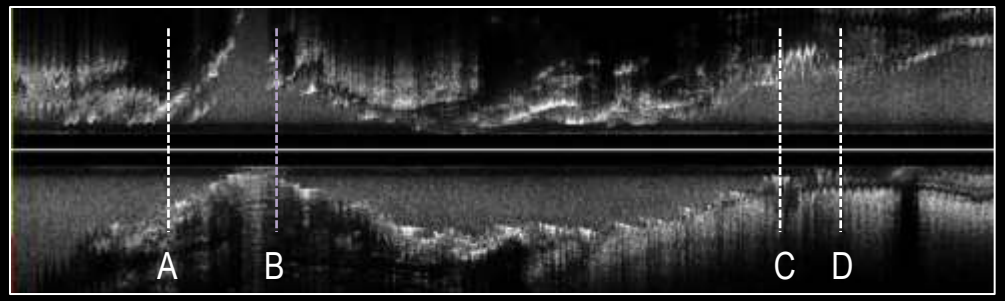
MSA 7.7mm²
LA 8.0mm²
VA 21.0mm²

D. Dist. Stent edge



SA 7.9mm²
LA 8.1mm²
VA 21.3mm²



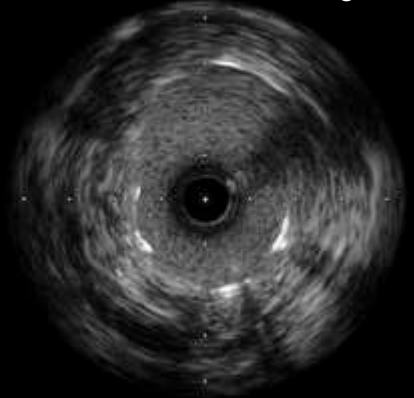


proximal ⟷ *distal*

Stent length 35.88mm (Onyx 3.0*34)

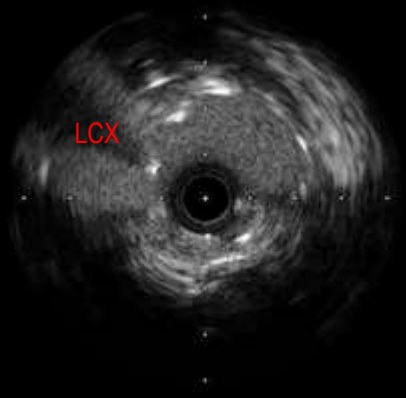
Final IVUS Findings LAD

A. Prox. Stent edge



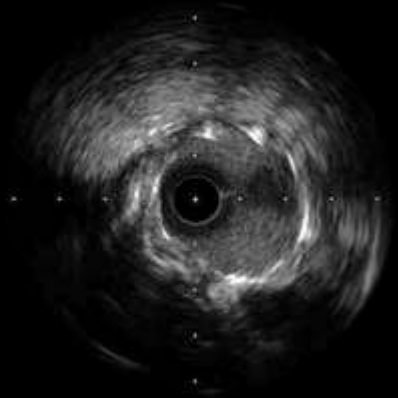
SA 13.3mm²
LA 13.8mm²
VA 30.8mm²

B. POC



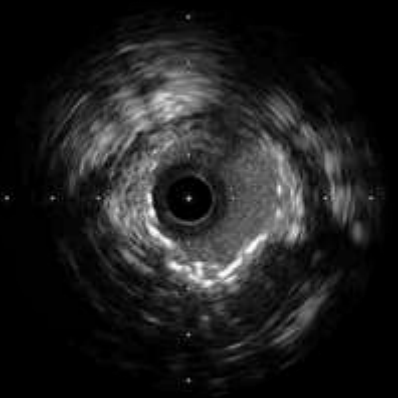
POC LA 12.92mm²
LAD SA 8.25mm²

C. Proximal LAD

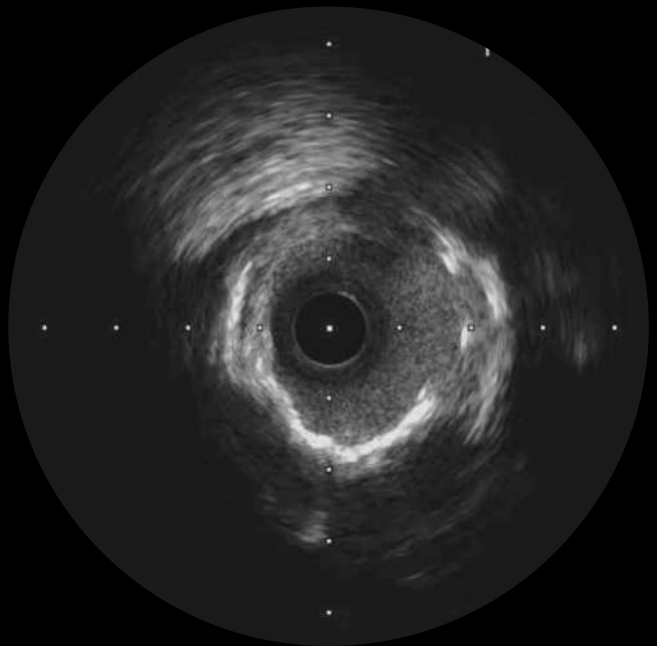


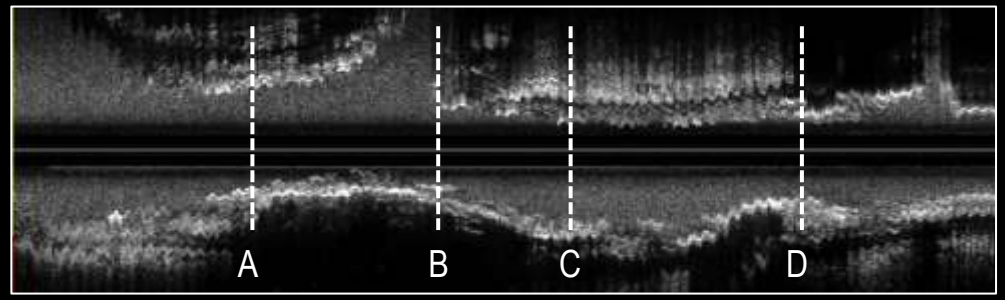
SA 7.25mm²
LA 7.47mm²
VA 20.57mm²

D. MSA



MSA 6.31mm²
LA 6.64mm²
VA 21.90mm²





proximal ⟷ *distal*

Stent length 20.93mm (Onyx 3.5*22)

Summary of Case

- Angiographic **intermediate lesions** of **LM bifurcation**
- **IVUS :** LM to LAD MLA 4.19mm^2 / LM to LCX MLA 3.91mm^2
- **FFR :** Significant decreased crossing distal LM to LAD/LCX
- **Technique :** Culotte technique
- **Post stent optimization** confirmed by IVUS

Take Home Message

- Although IVUS play a **crucial role in the treatment of LM** lesion, it also has **limitations** in the measurement of bifurcation lesion by the difference of angle of blood vessels. **Functional evaluation with FFR** can help those situations.

- **Intravascular imaging** modality can be useful to **confirm the result of complex PCI**, especially in **2 stents technique for LM bifurcation** lesion.