

Who is the bad apple?

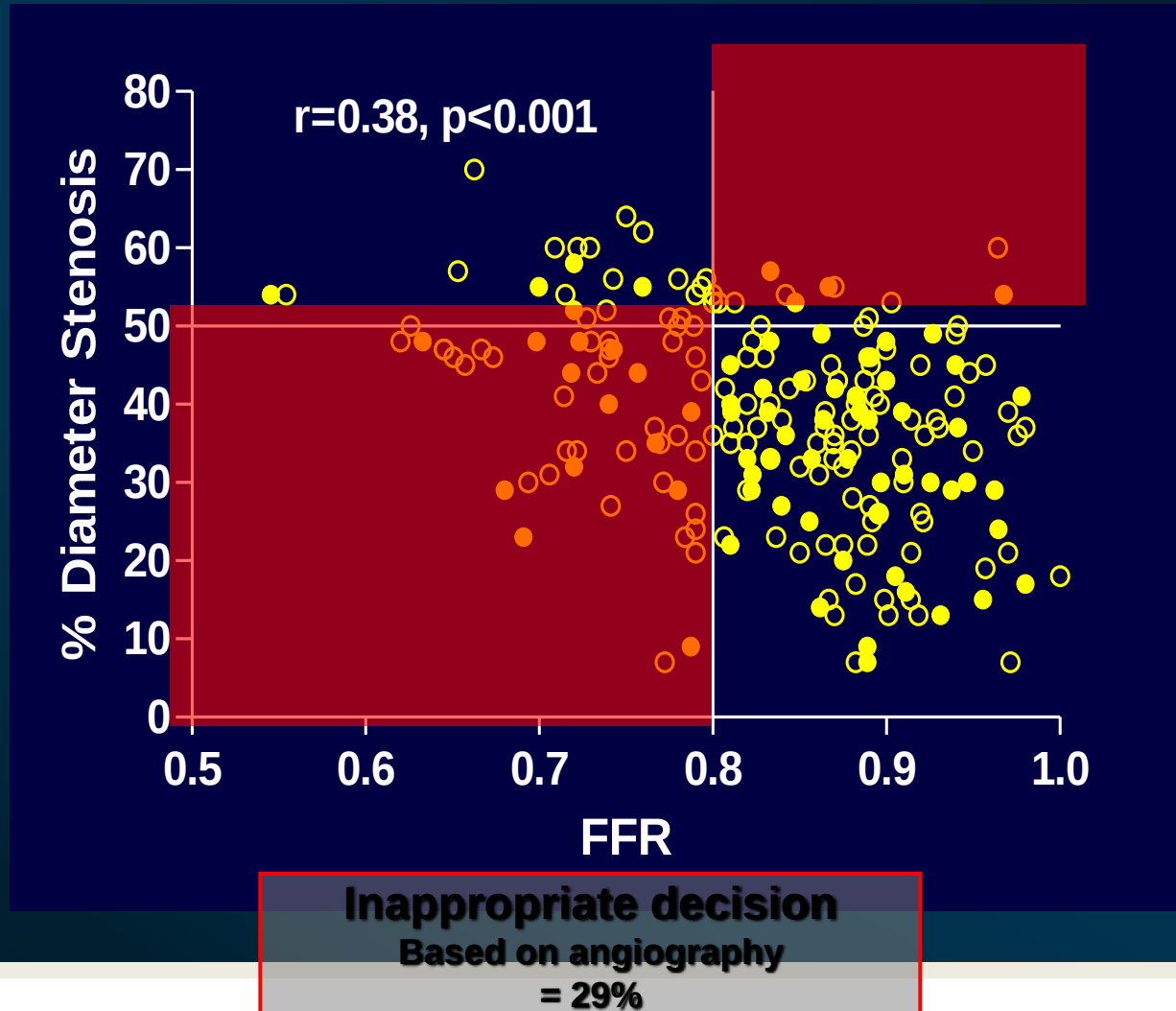


Taitung Mackay Memorial Hospital
Director of CV department
Kuang-Te Wang

Introduction

- 1. Angiogram is not confident to PCI treatment.***
- 2. the condition of plaque (eccentric, length, stenosis, surface roughness, vessel remodeling) should interfere with perfusion of coronary artery.***
- 3. CSA by IVUS should not be the guide of PCI, there are many variations in many studies.***
- 4. FFR could determine the physical function of vessel and improved MACE in real world.***

Correlation of FFR with % QCA Diameter Stenosis left main coronary artery



CASE 1

- 57 male patient
- DVD post PCI for LAD-P and LCX-P-M 6 yrs ago and stable since then
- Angina attached in recent 3-4 months
- TXT : positive
- Medical treatment failed
- DM, HTN, Dyslipidemia, PUD controlled well

76585840, 76585840, 1956/8/20, M

Run 1 - Frame 1 / 83

15 fps

Mackay Memorial Hospital Tai-Tung Branch

35.5kV, mAs, 280mA, 556s

Zoom 121%



RAO :32.0°
Caudal:33.8°

L 119
W 148

76585840, 76585840, 1956/8/20, M

Run 2 - Frame 1 / 83

15 fps

Mackay Memorial Hospital Tai-Tung Branch

31.8kV, mAs, 293mA, 541s

Zoom 121%



LAO 41.3°
Cranial 15.5°

L 119
W 134

下午 04:41
2012/7/1

LAD 59.6°
Caudal 20.6°



下午 05:25
2012/7/12

RAD -2.2°
Cranial28.3°
76585840, 76585840, 19568/20, M
Run 1 - Frame 1/22

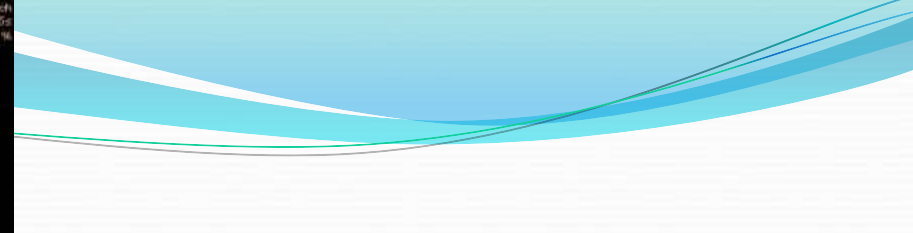
L 110
W 140
12 fps

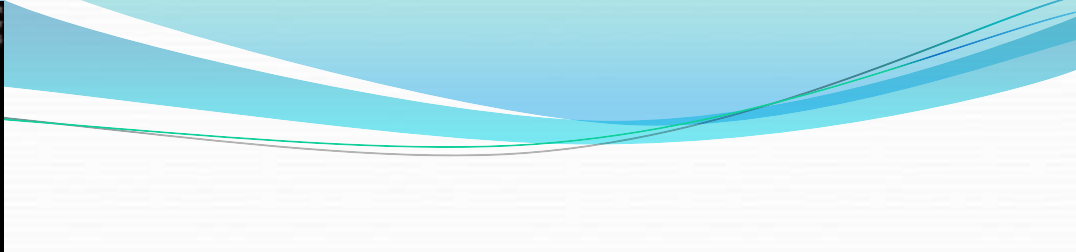
下午 05:27
2012/7/12
Medway Memorial Hospital Tai Lung Branch
DQ, DRV, mAs, 200mA, 140s
Zoom 121%

RAD -2.2°
Cranial28.3°

L 110
W 140

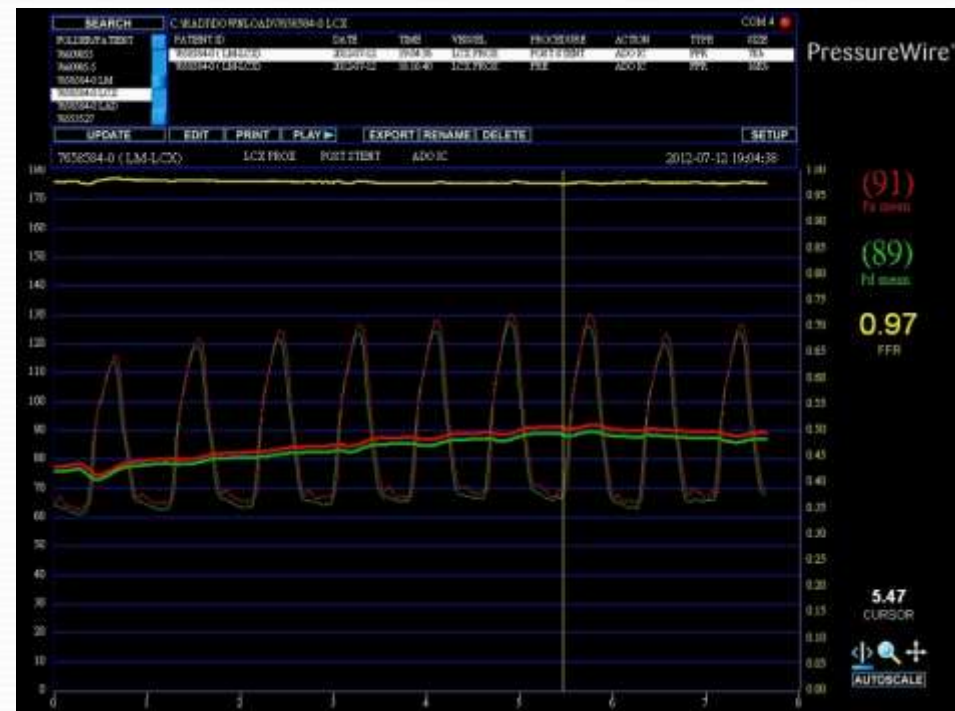
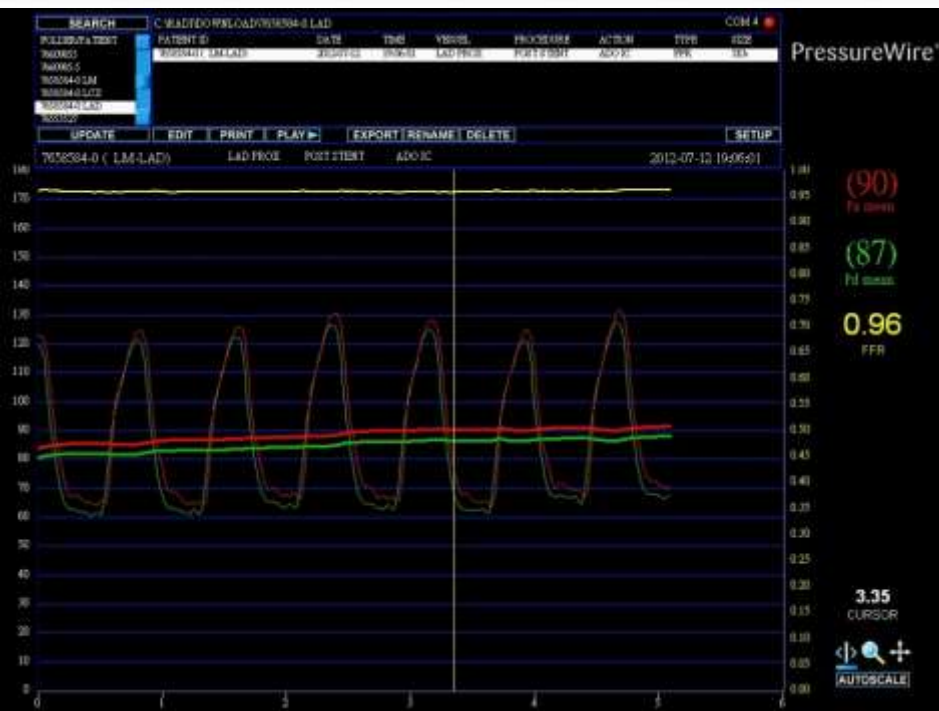
下午 05:28
2012/7/12





PressureWire®

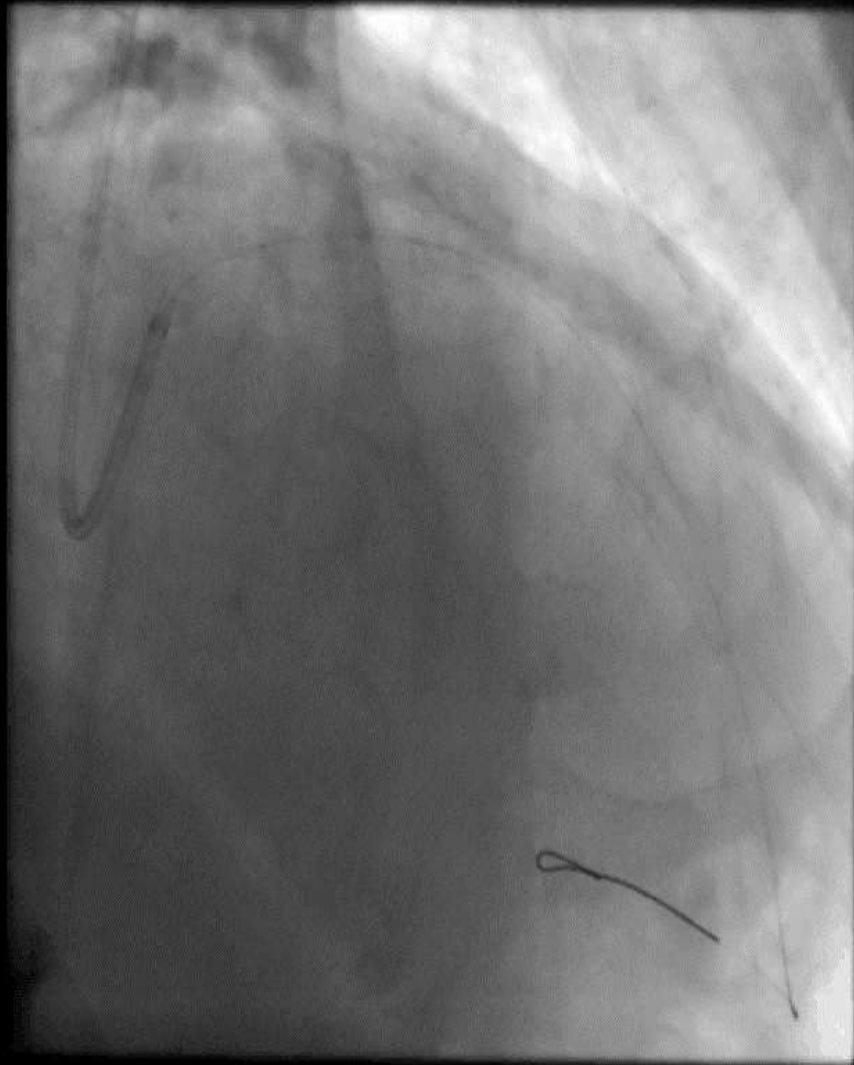
Final FFR



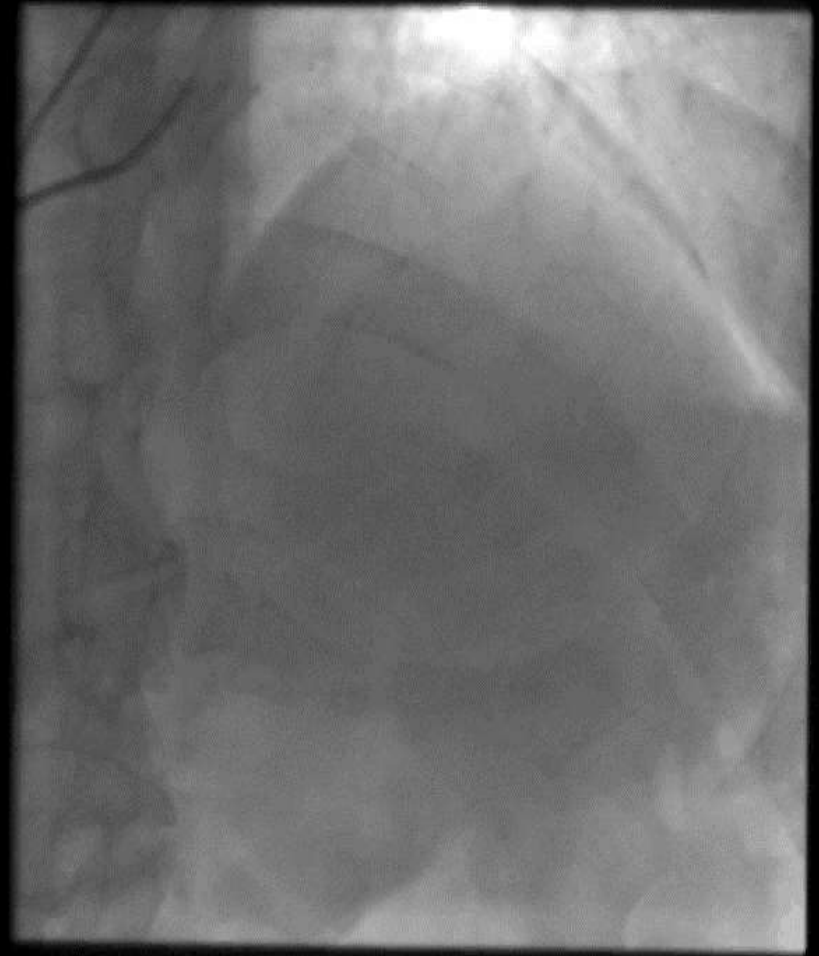
Case 2

- Age: 72 y/o
- Gender: male
- PH: hypertension, hyperlipidemia, GB stone s/p OP
- AMI, SVD, LAD(M) 99% s/p primary PCI with BMS on 2012-09-13
- Repeated CAG on 2012-10-23 due to refractory angina.

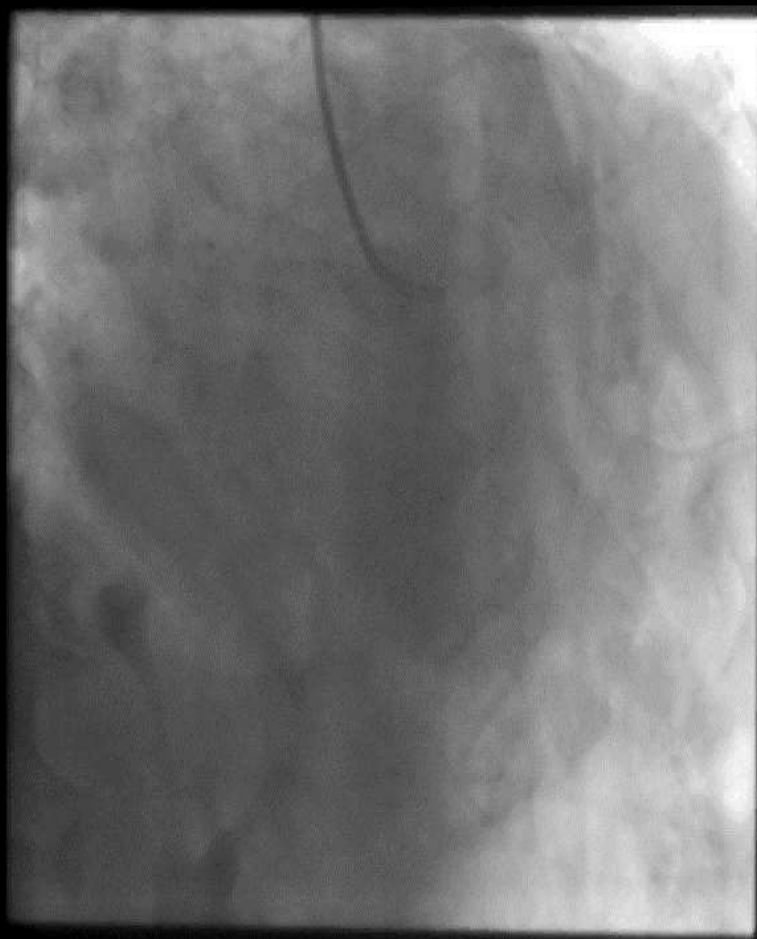
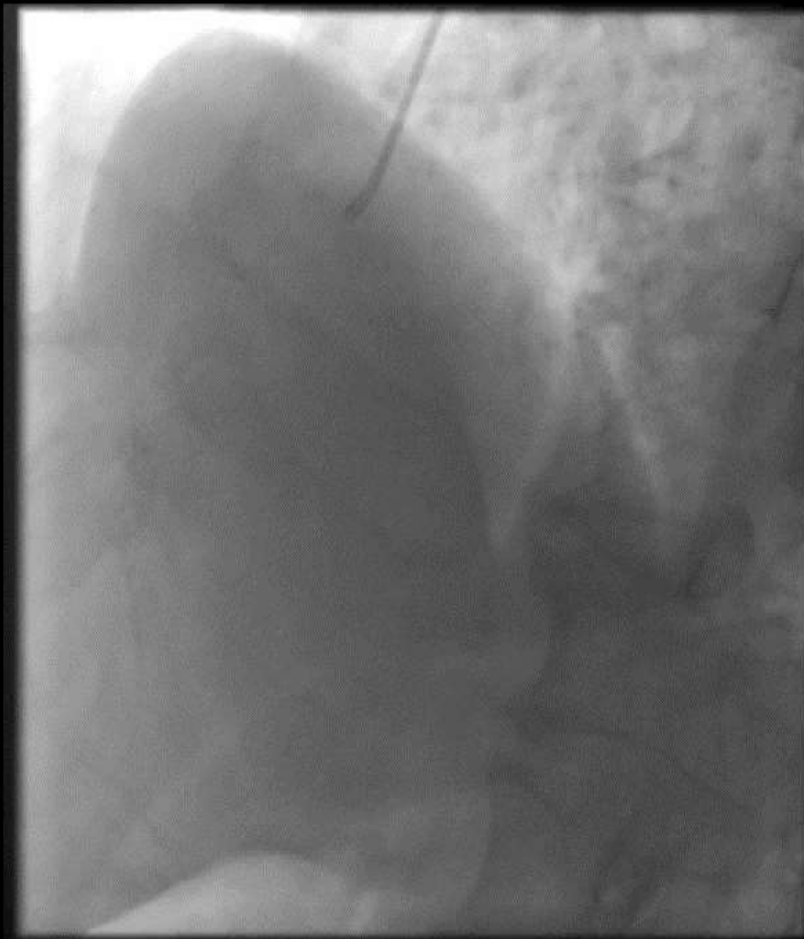
AMI final angiogram



Followed angiogram 1 month later



RCA



What's the culprit lesion?

- LAD(M->D)?
 - LCX(M)?
 - Left main?
 - Not CAD related angina?
-
- How to evaluate? Refer to center for thallium scan? IVUS or FFR?

Check FFR at LCX(D) and LAD(D)

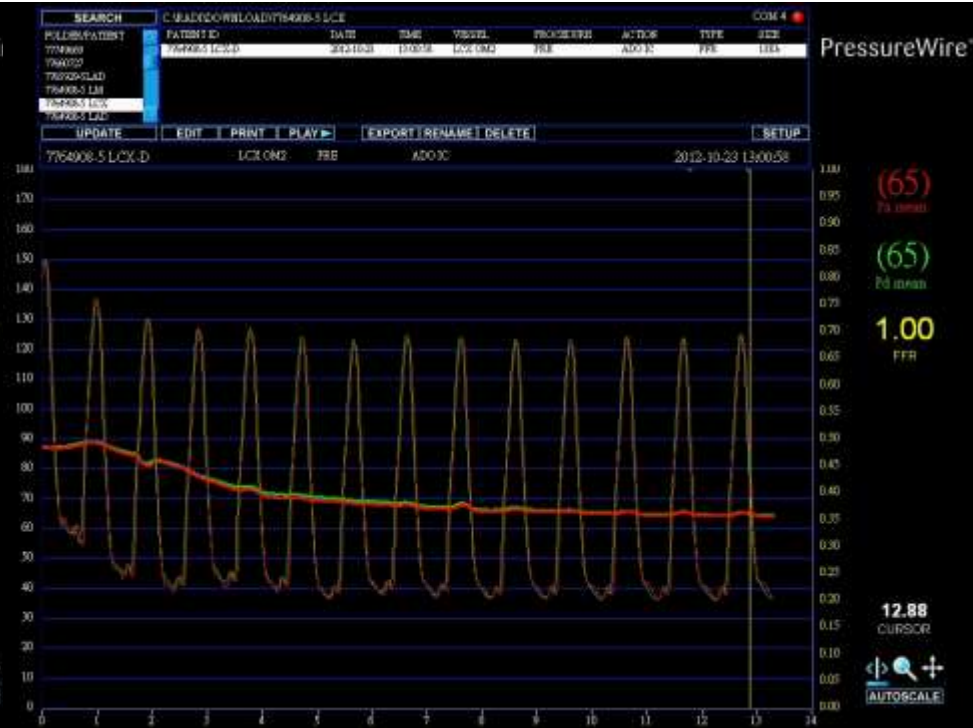
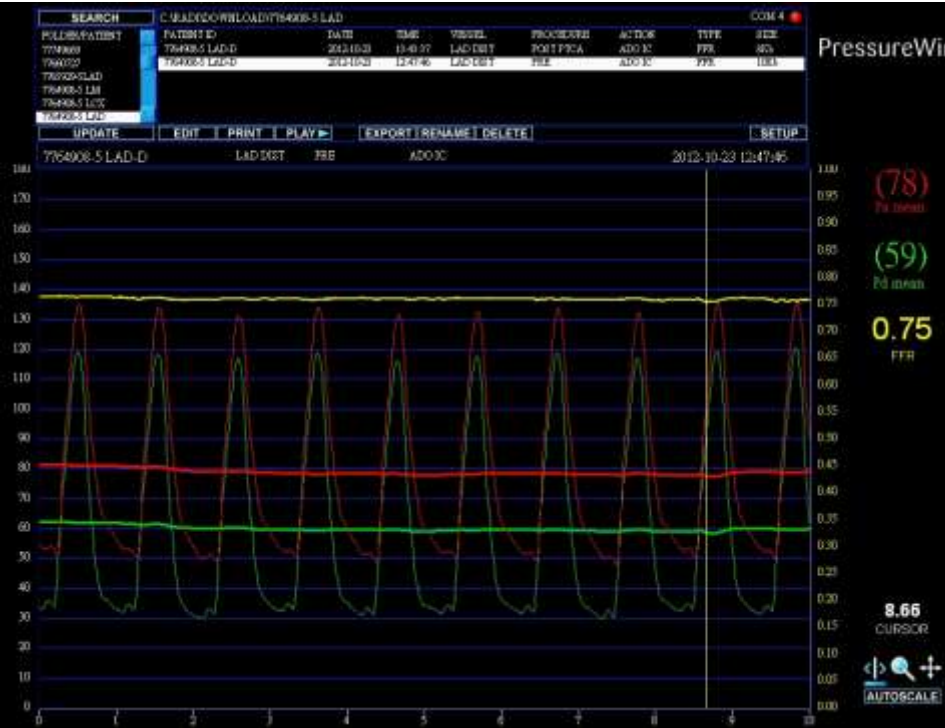


Adenosine 240 ug
Intracoronary bolus

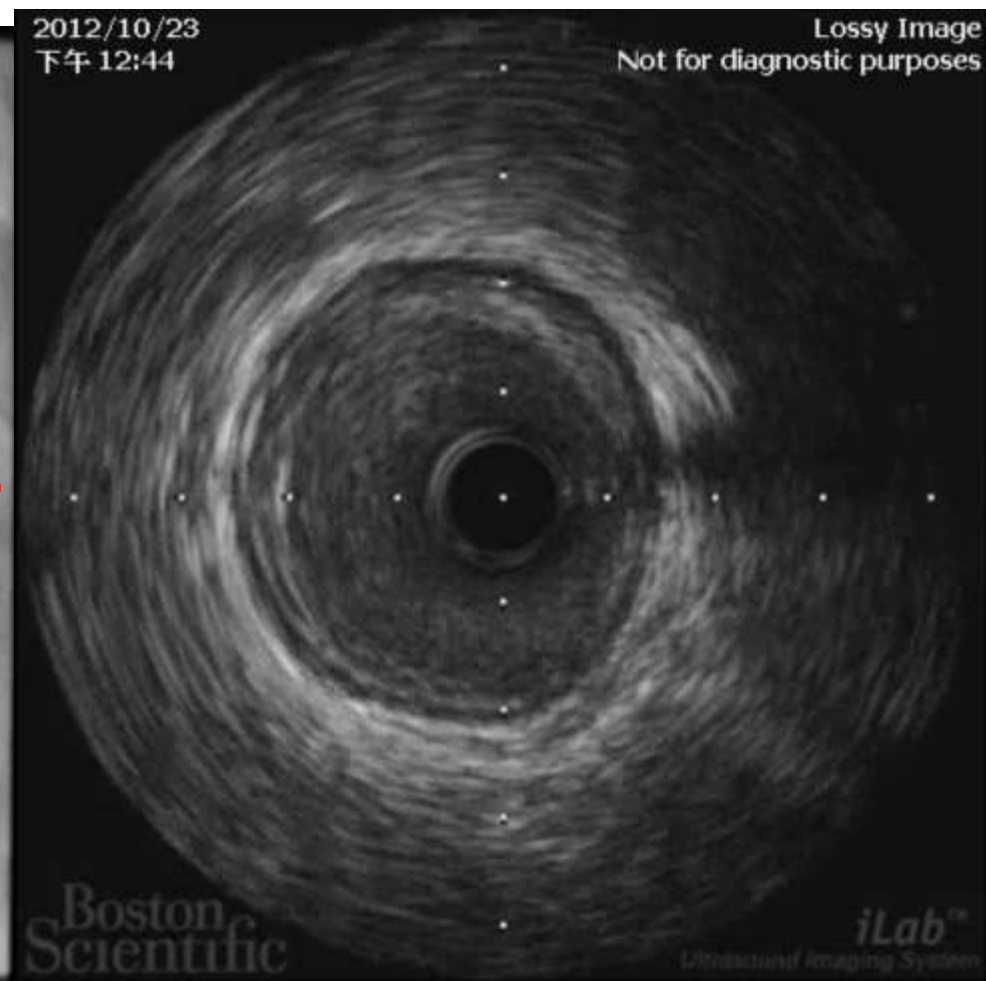
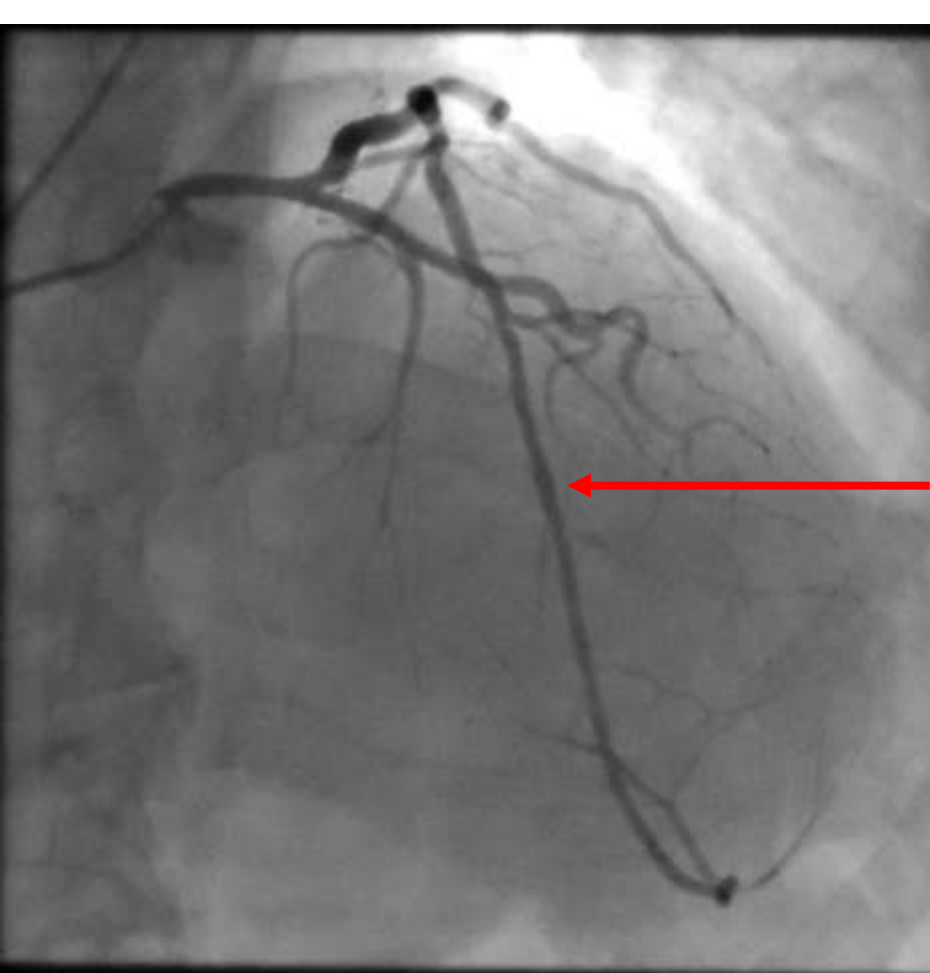
FFR result adenosine 240ug intracoronary bolus

LAD distal: **0.75**

LCX distal: **1.00**

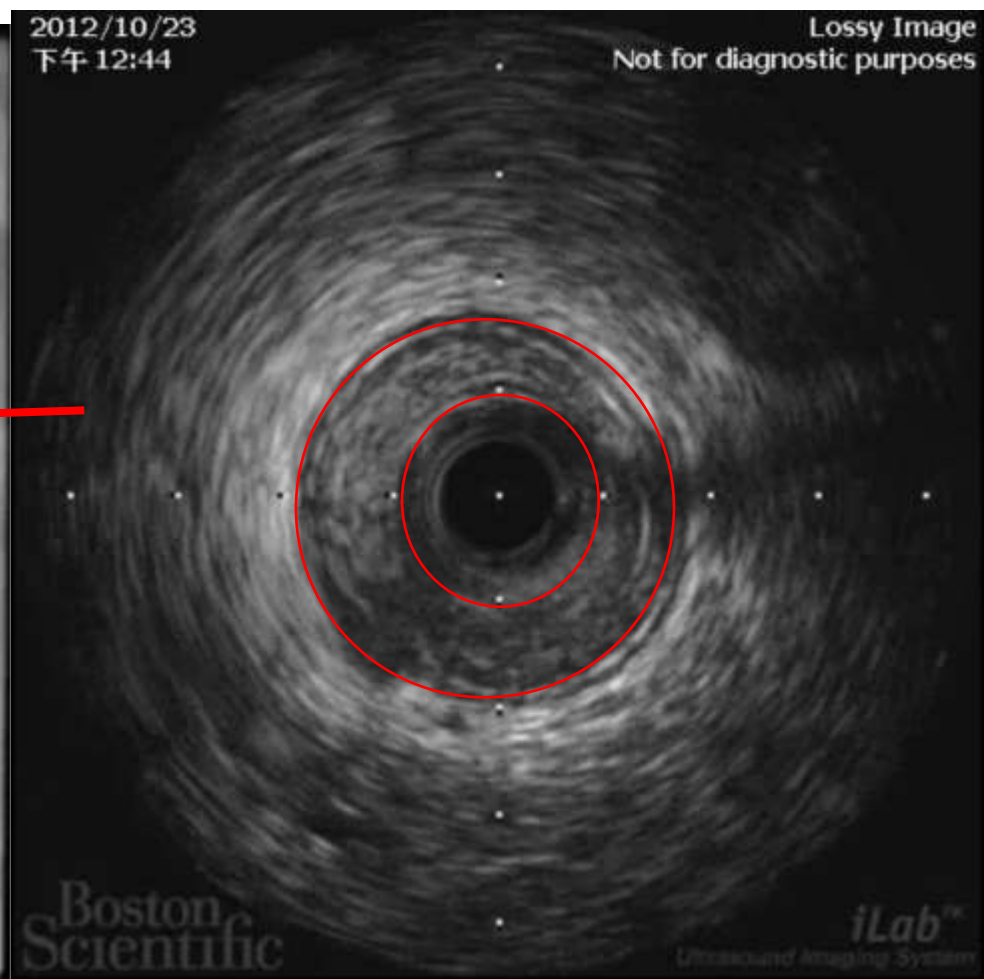
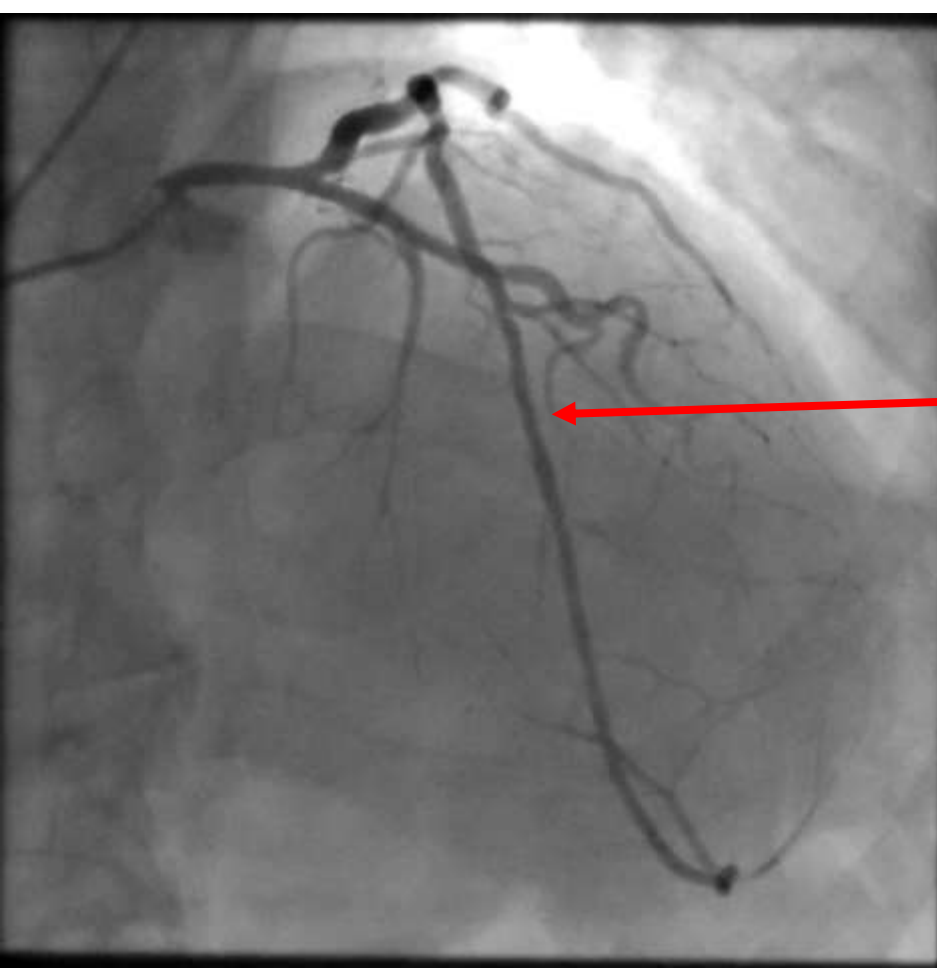


Check IVUS at LAD

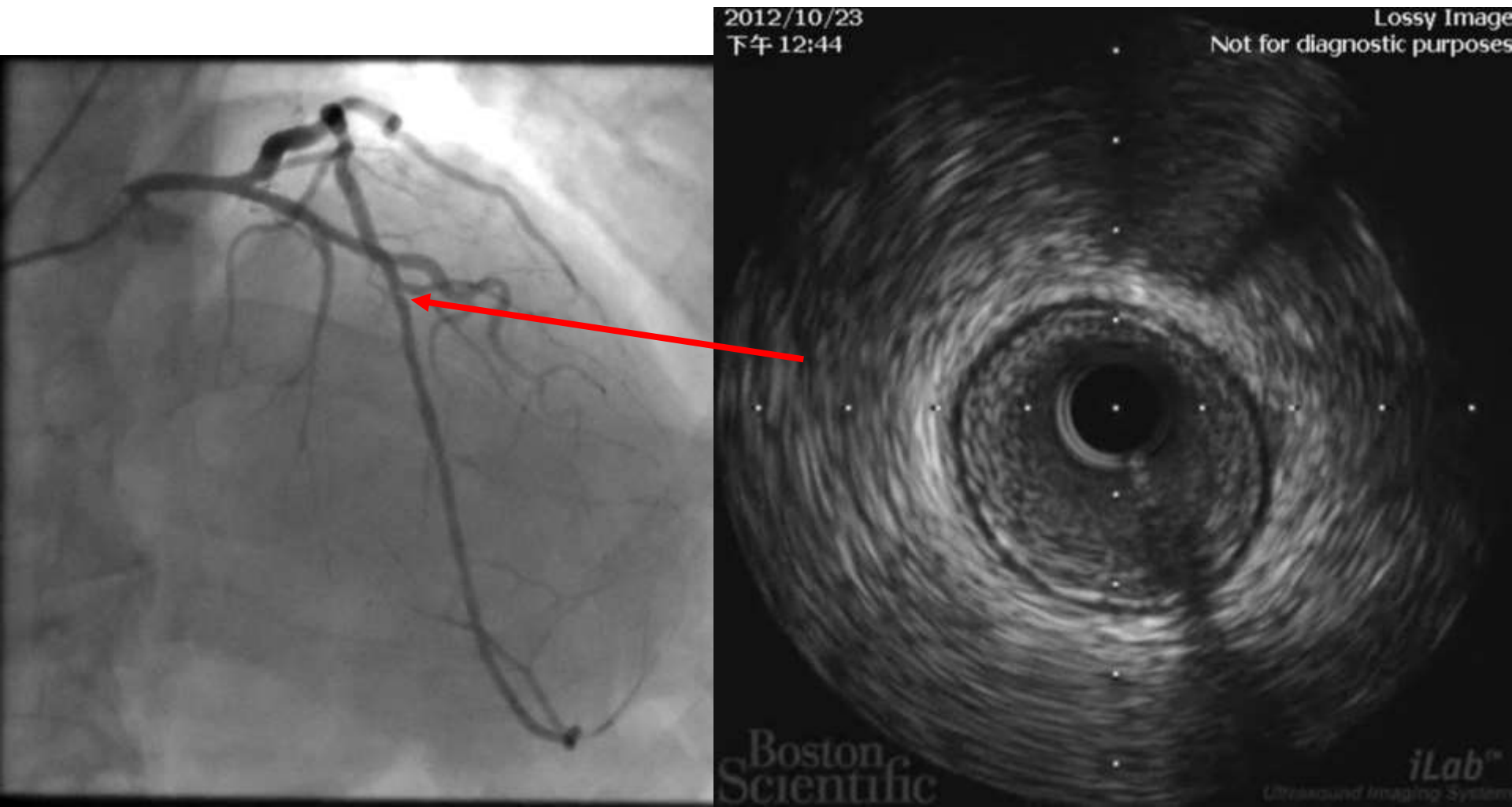


IVUS at LAM(M) lesion

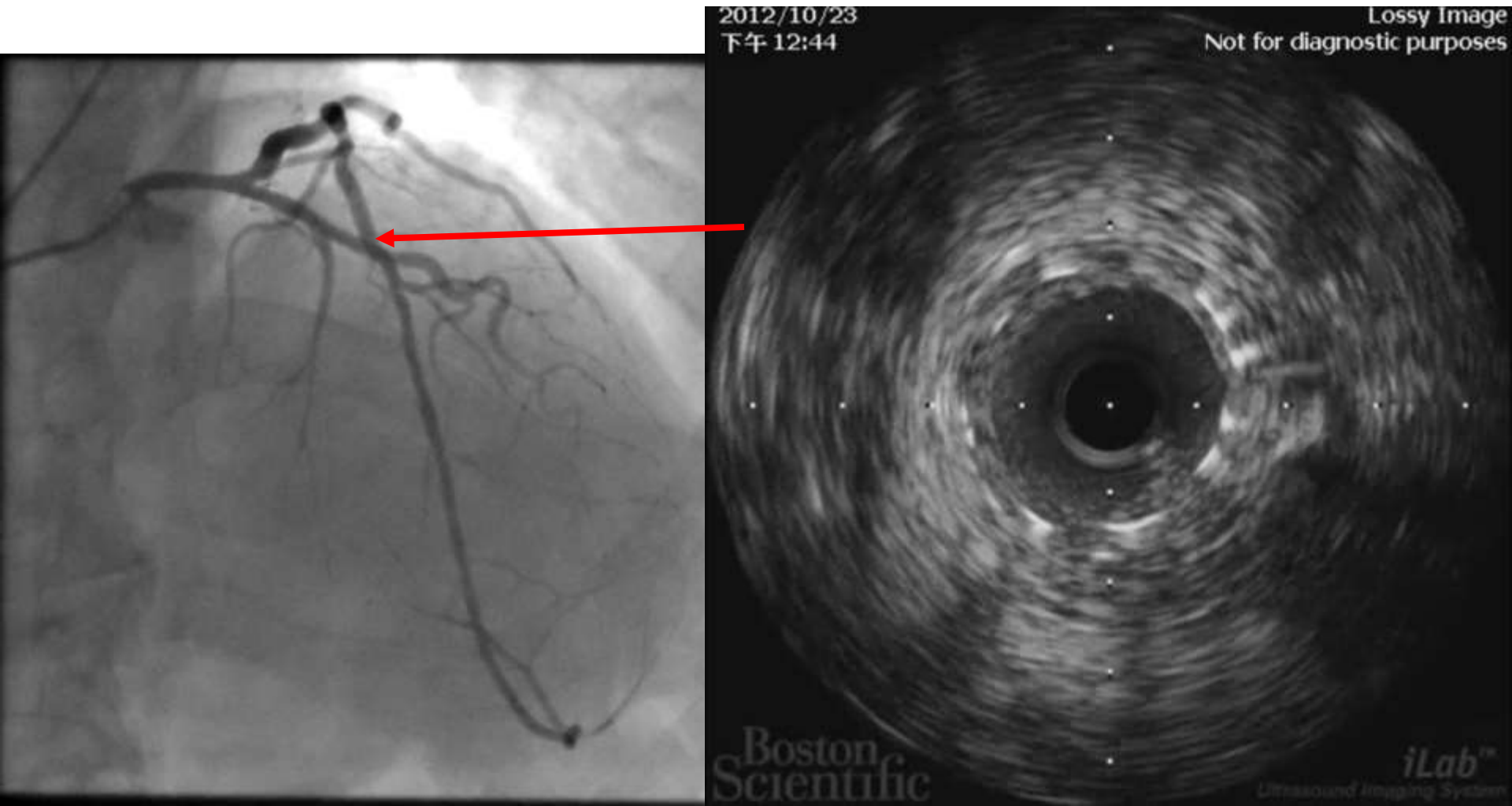
Cross section area: 2.92mm^2
Area stenosis 66%



LAD and D1 bifurcation

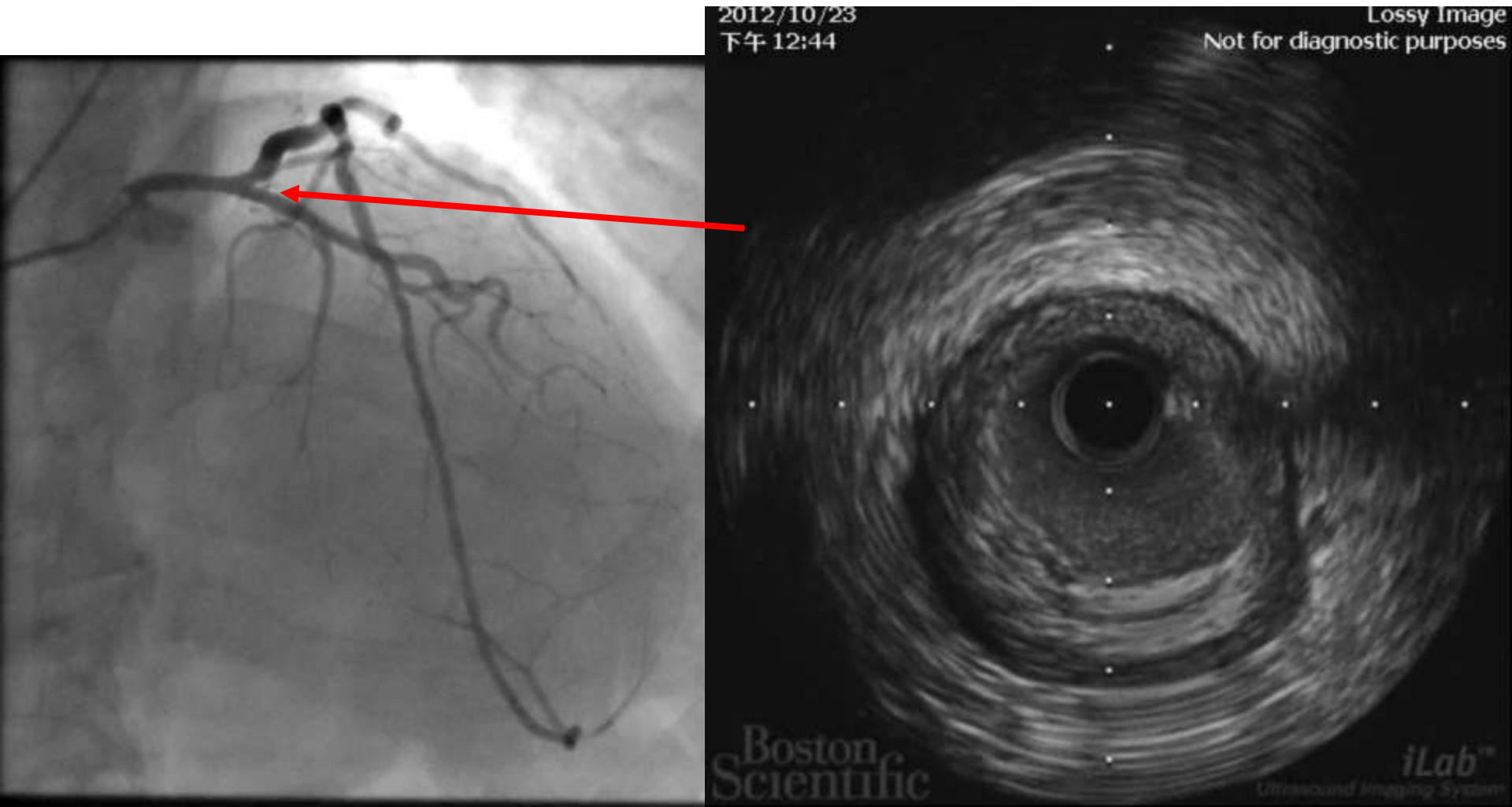


In previous stent

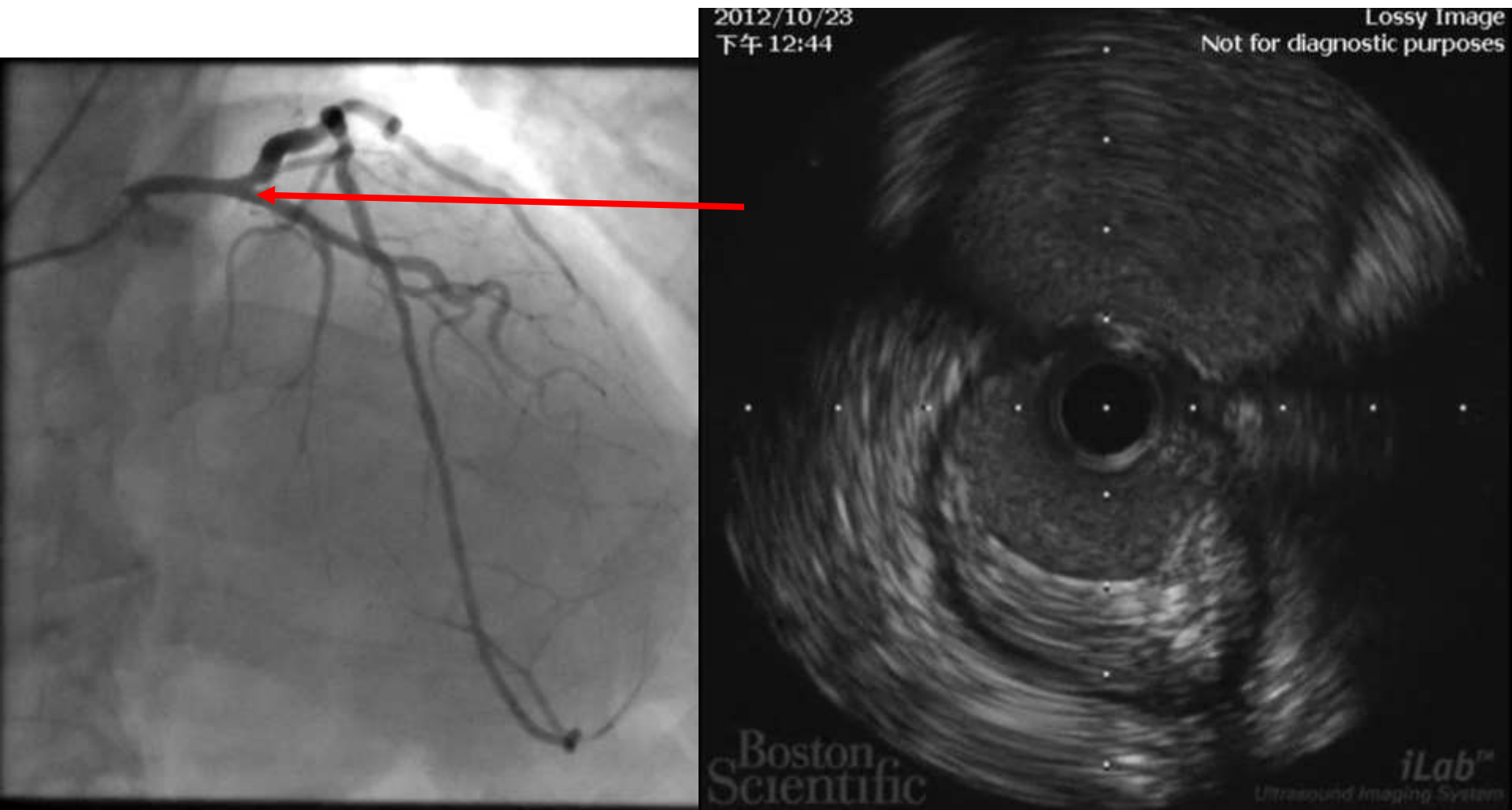


LAD(P) proximal to the stent

Cross section area about 5.57mm²

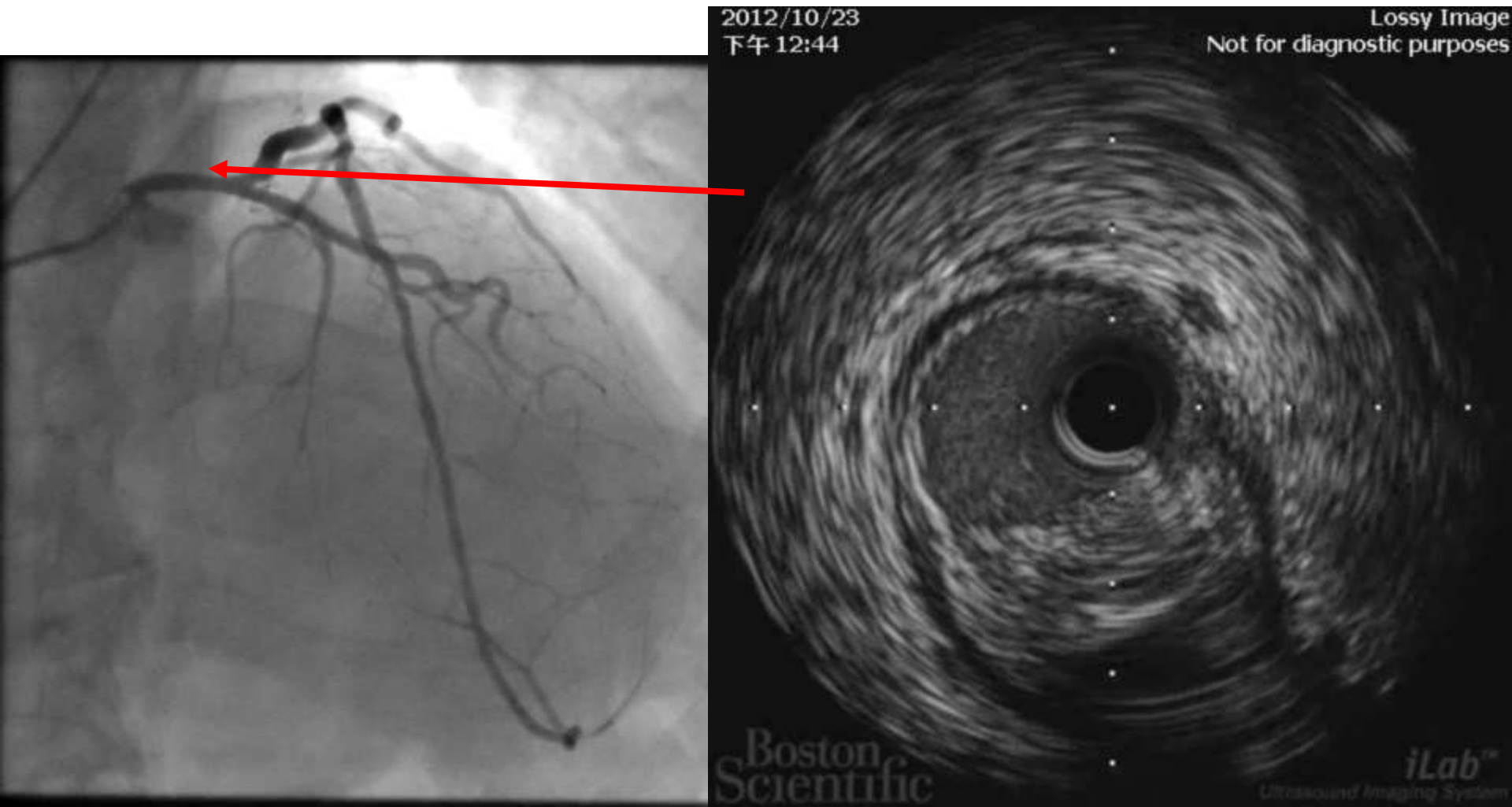


LM bifurcation



Left main eccentric plaque

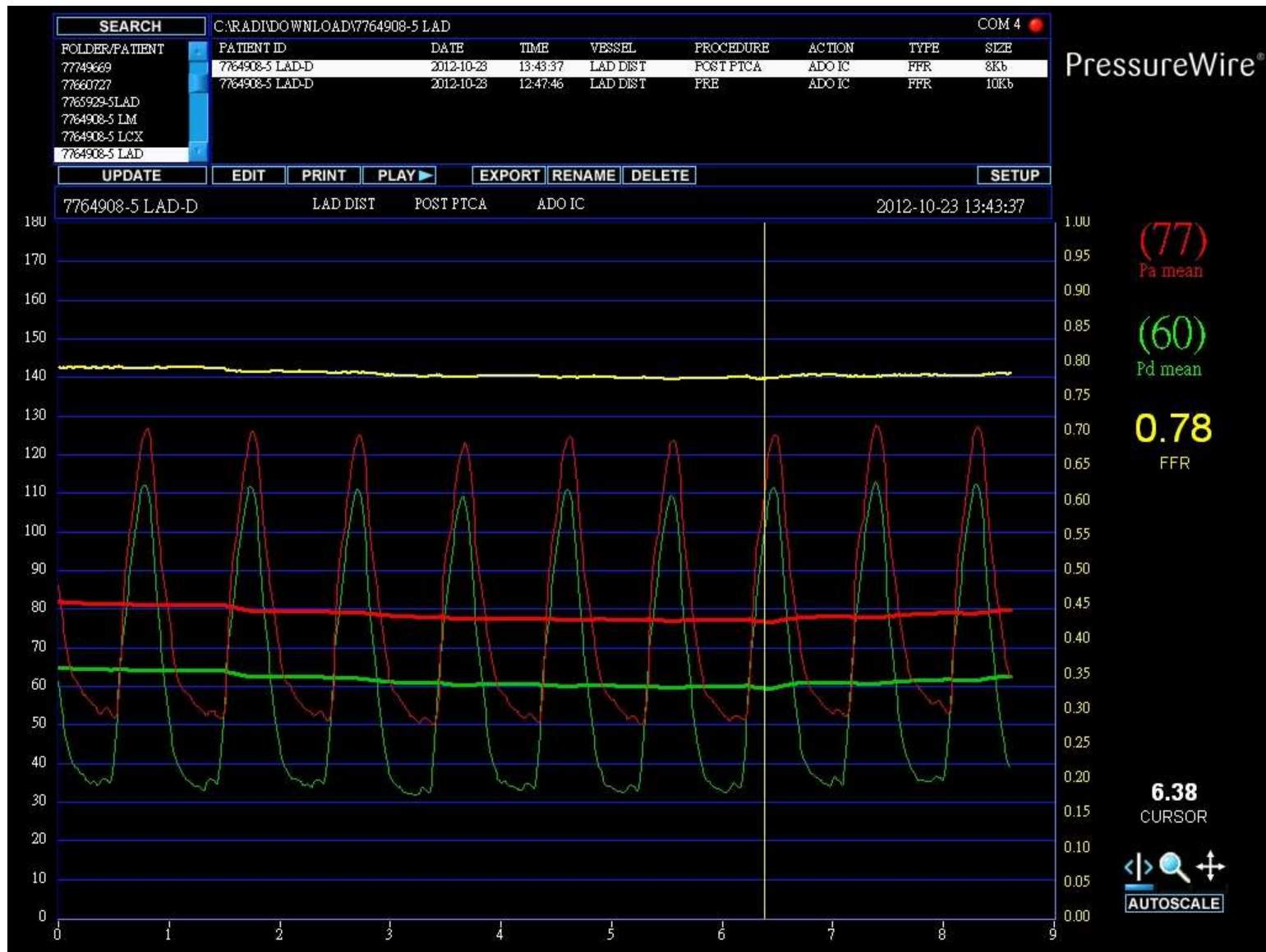
LM cross section area: 5.08mm²



What's the next step?

- According FFR, we supposed the culprit lesion was distal to the left main bifurcation.
- PCI to the lesion distal to the previous stent by IVUS guided.

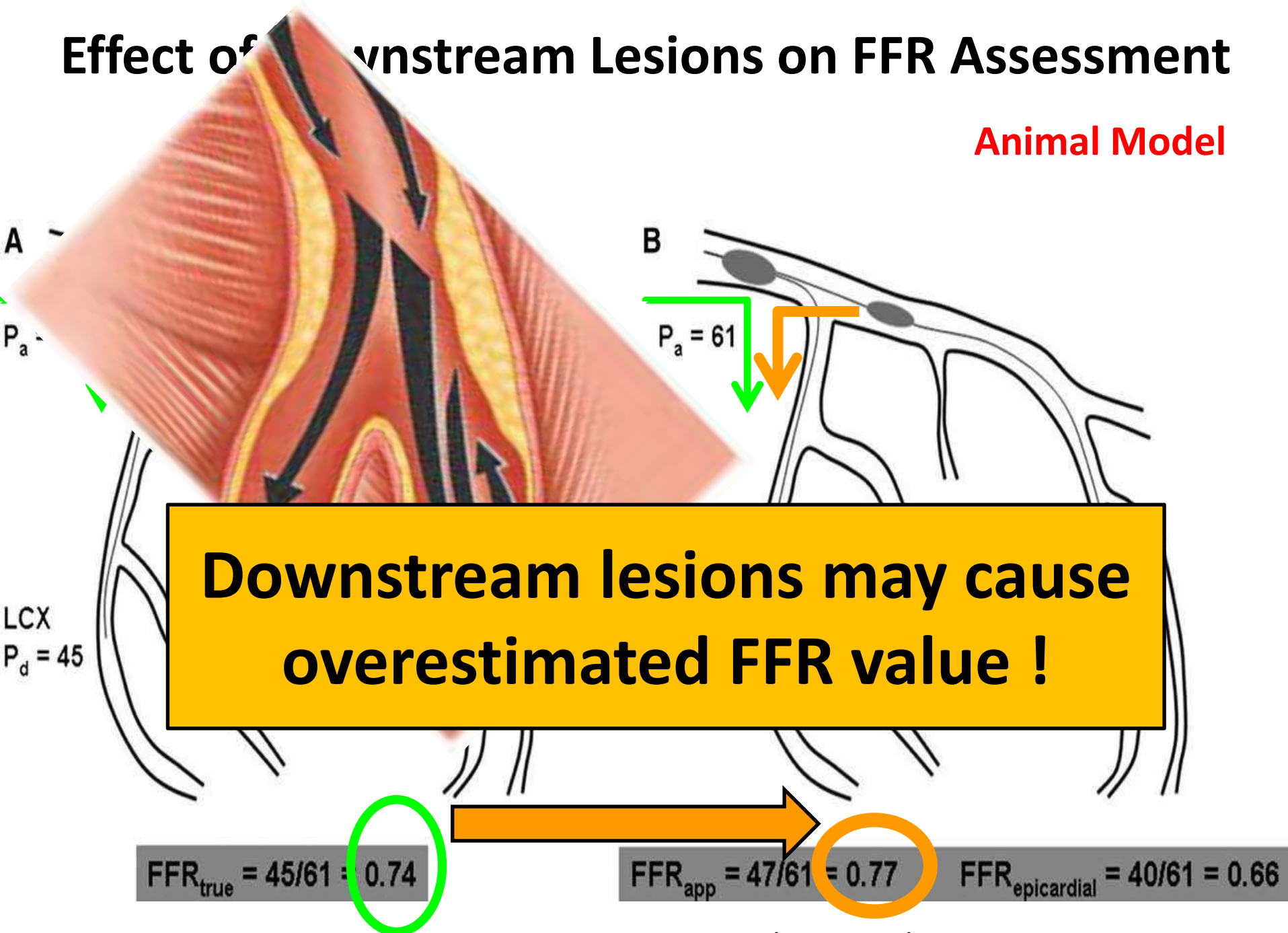
Repeat FFR at LAD distal



- Why was the FFR still less than 0.8 after treated the distal segment of LAD? (Only improved from 0.75 to 0.78)
- Does the left main to LAD-P be the culprit lesion?
 - The FFR at left main to the LCX was 1.0

Effect of Downstream Lesions on FFR Assessment

Animal Model



Case 3 LM bifucation

Lossy Compression - not intended for diagnosis



LCX

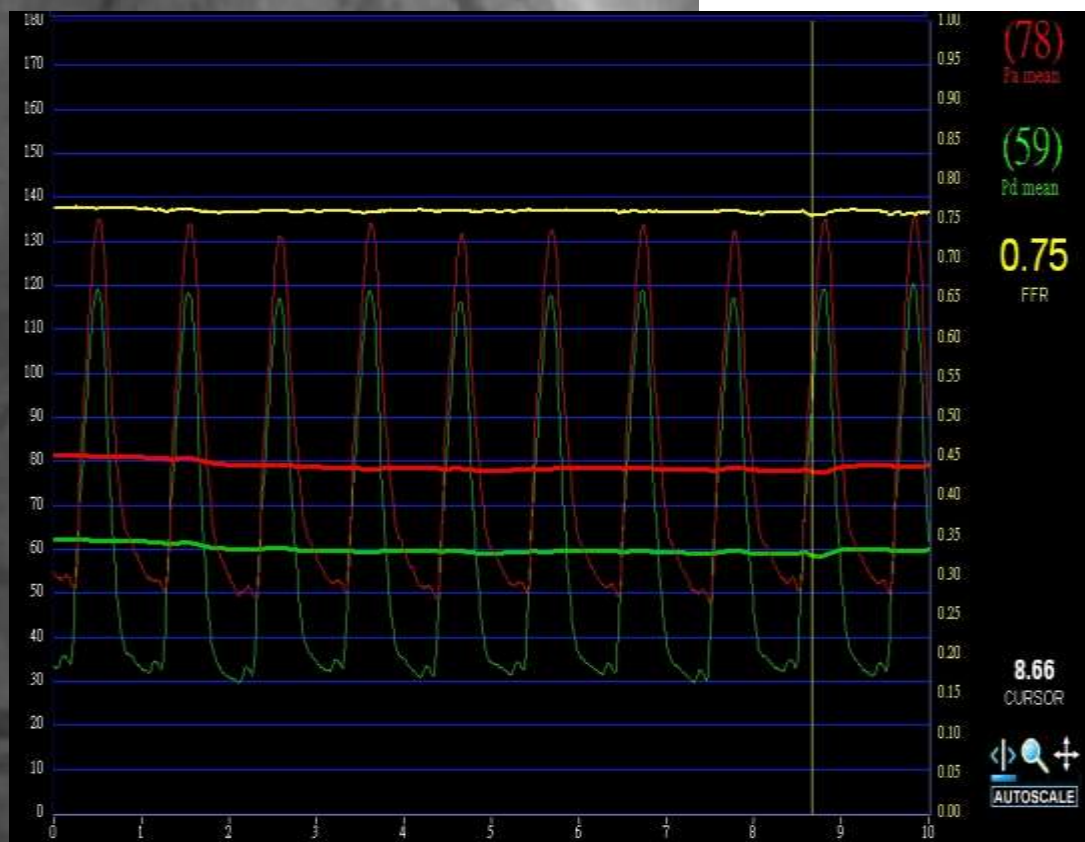
MLA: 5.46mm²

LM

MLA: 4.78mm²

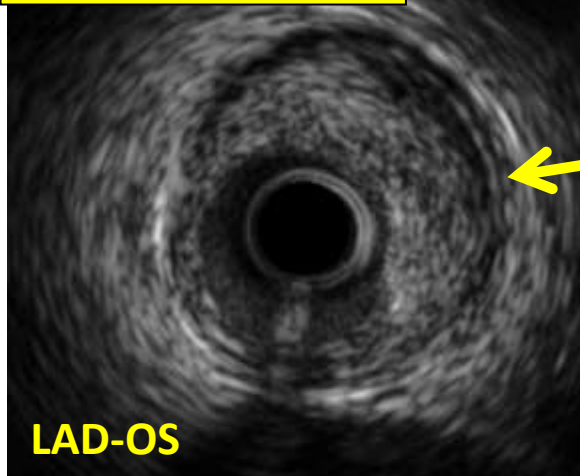
LCX-OS

LCX

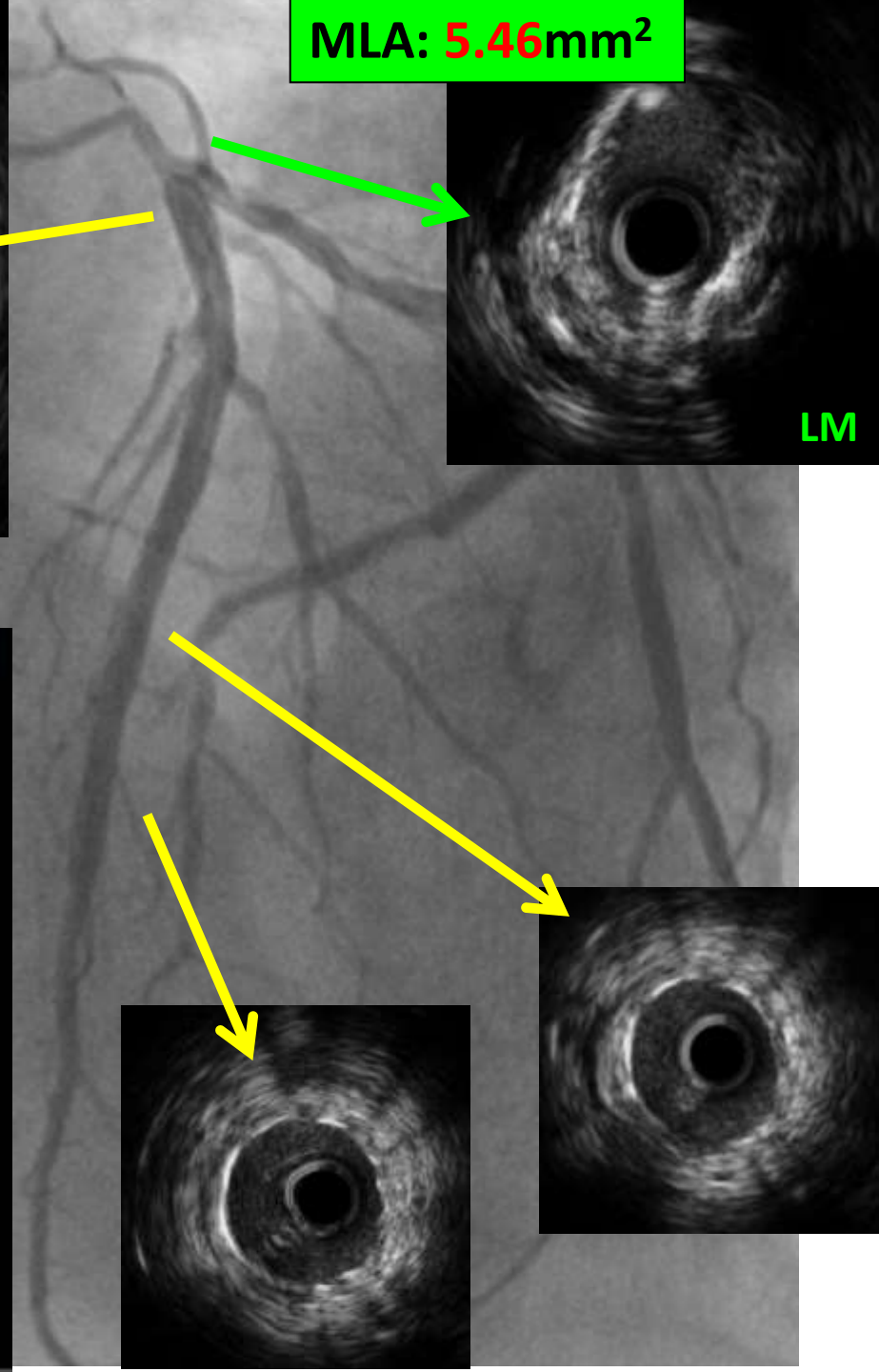
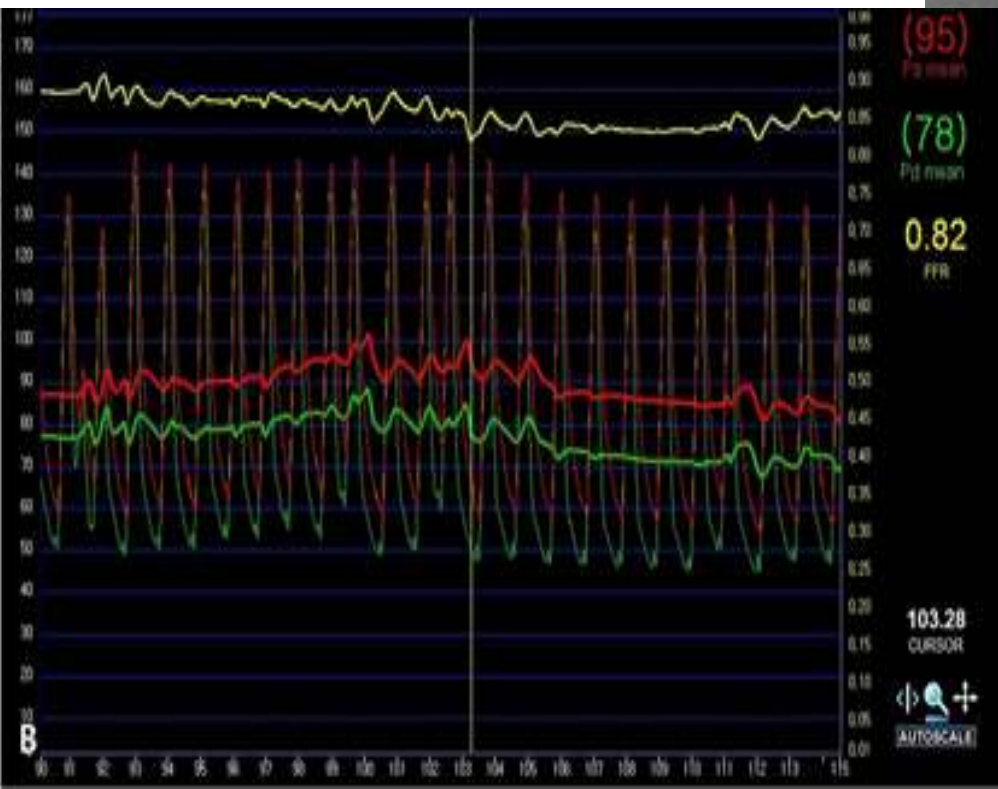
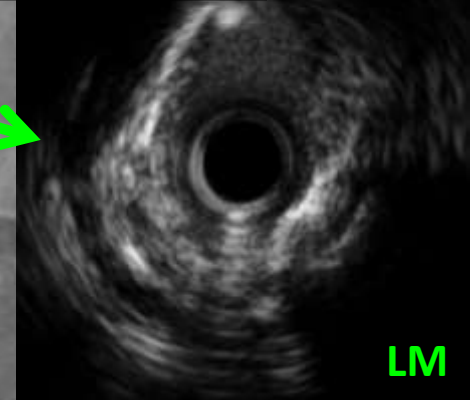


LAD

MLA: 4.95mm²

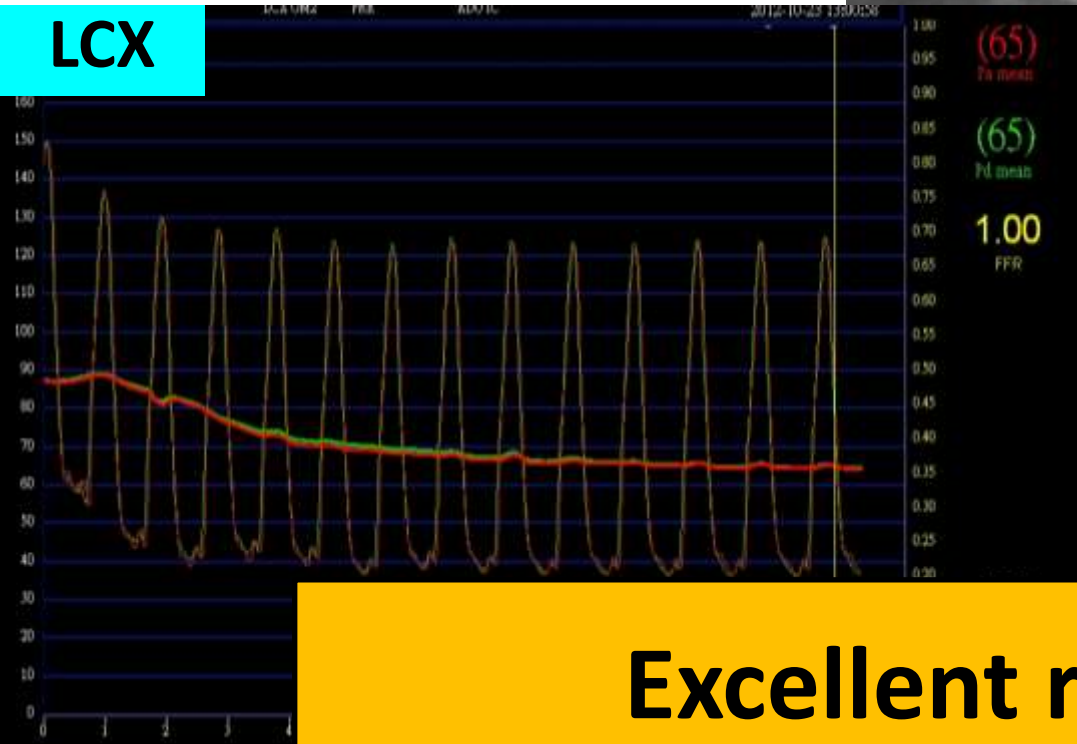


MLA: 5.46mm²



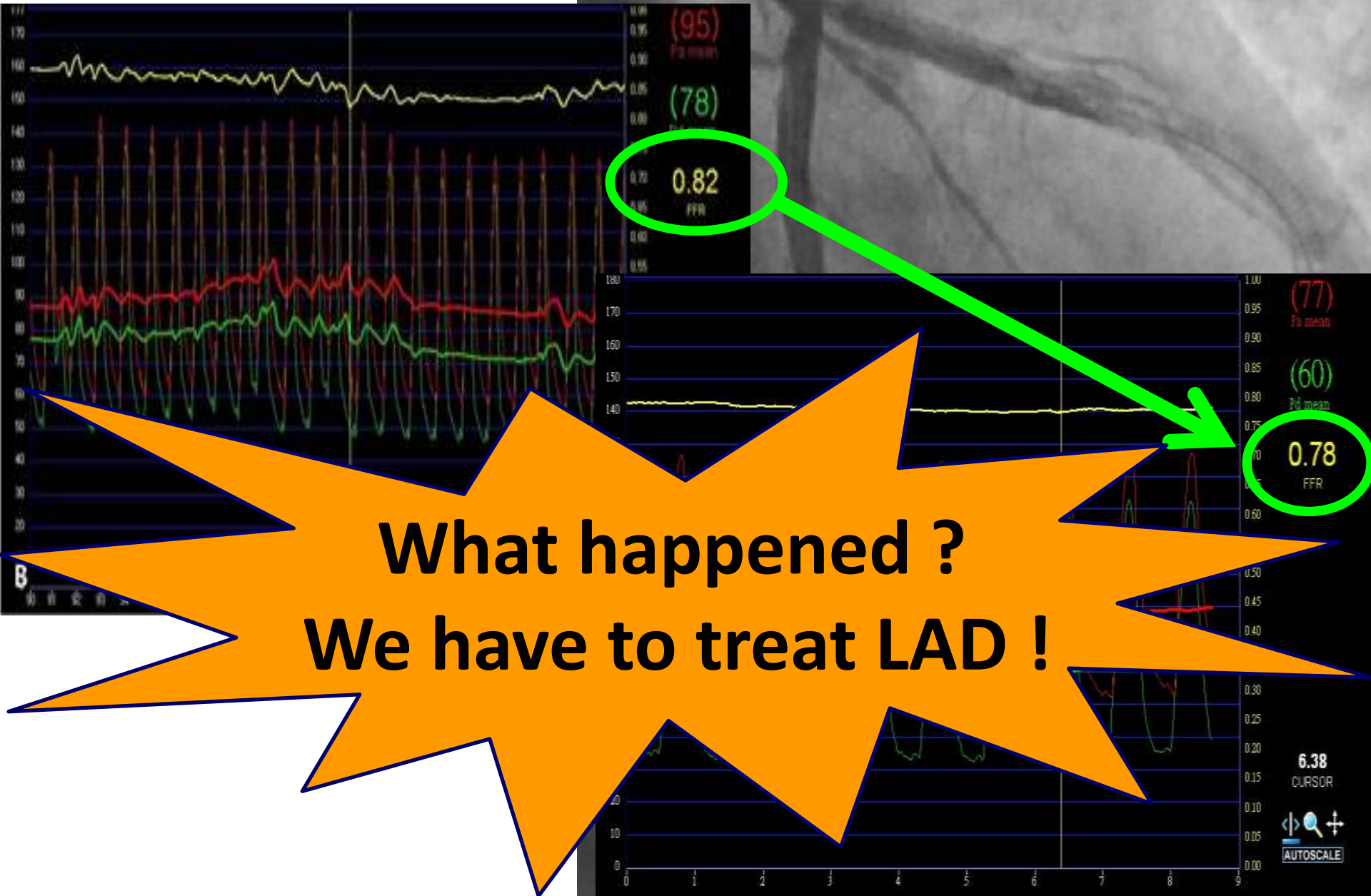
Recheck FFR

LCX



Excellent result !
Shell we close the procedure ?

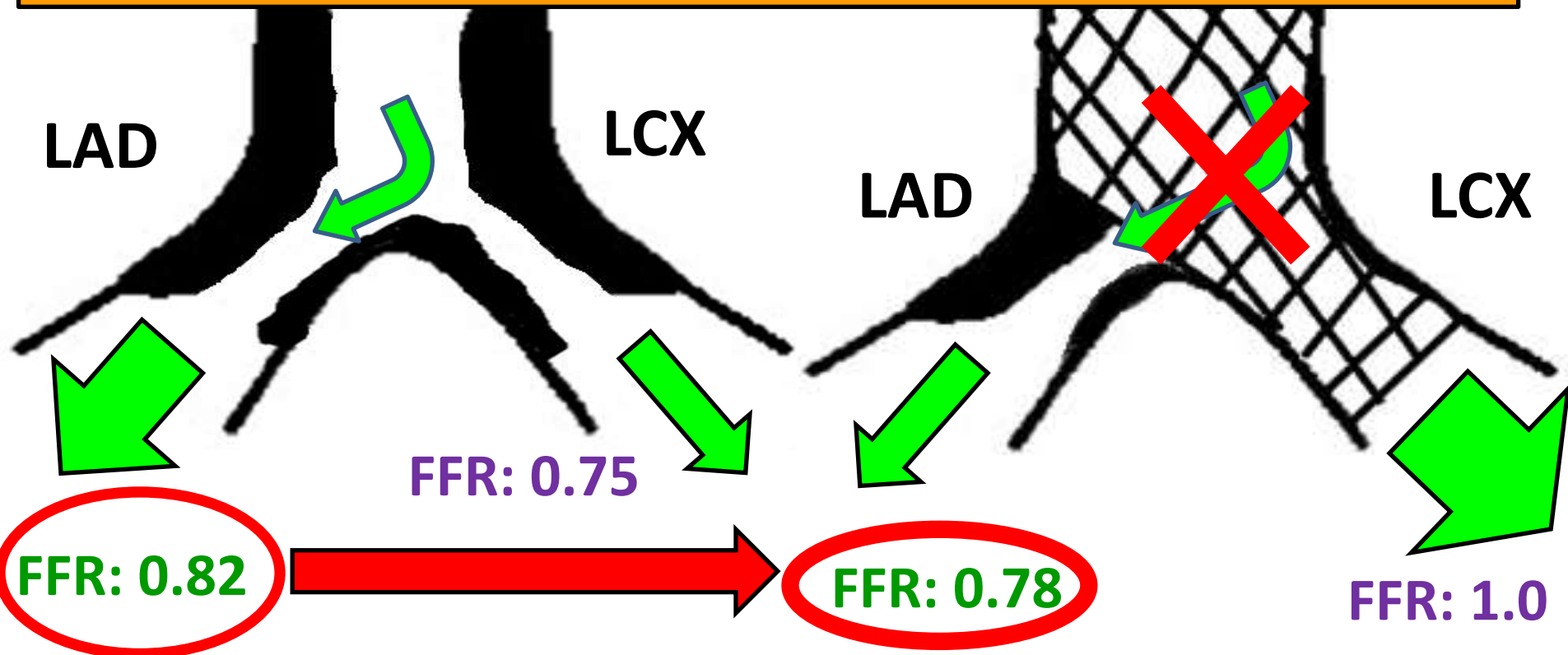
Recheck LAD FFR



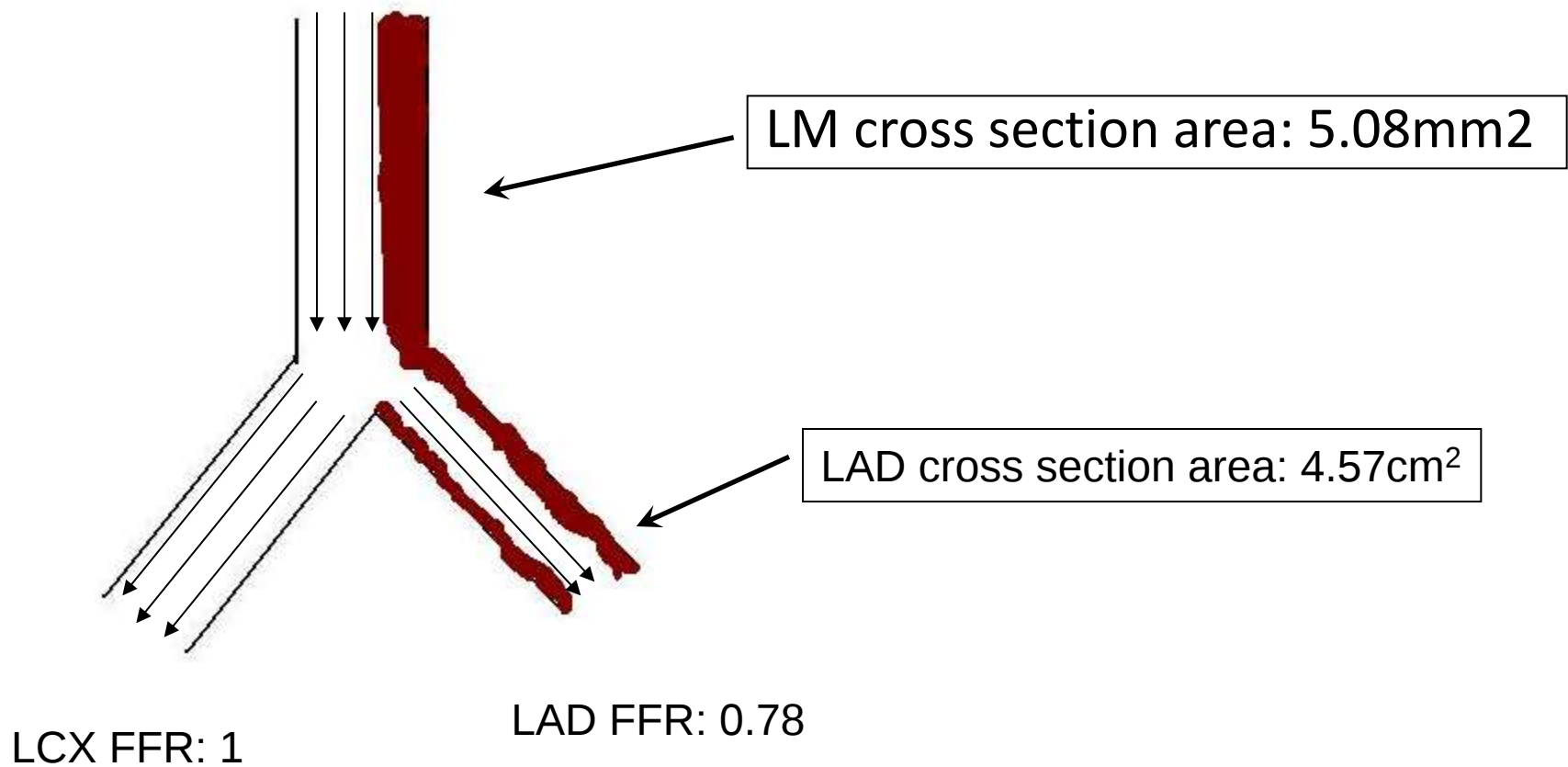
Before LCX stent

After LCX stent

FFR: this is a true bifurcation lesion
We need TWO-stent strategy !



Discussion





- Maybe the eccentric plaque at the left main with LAD downstream lesion make the different flow to the LAD and LCX.
- We decided to make a model for this situation.....

Discussion

- Simulate the lesion at LM and LAD(P) by plastic tube and clay



Left main



LAD proximal

Discussion

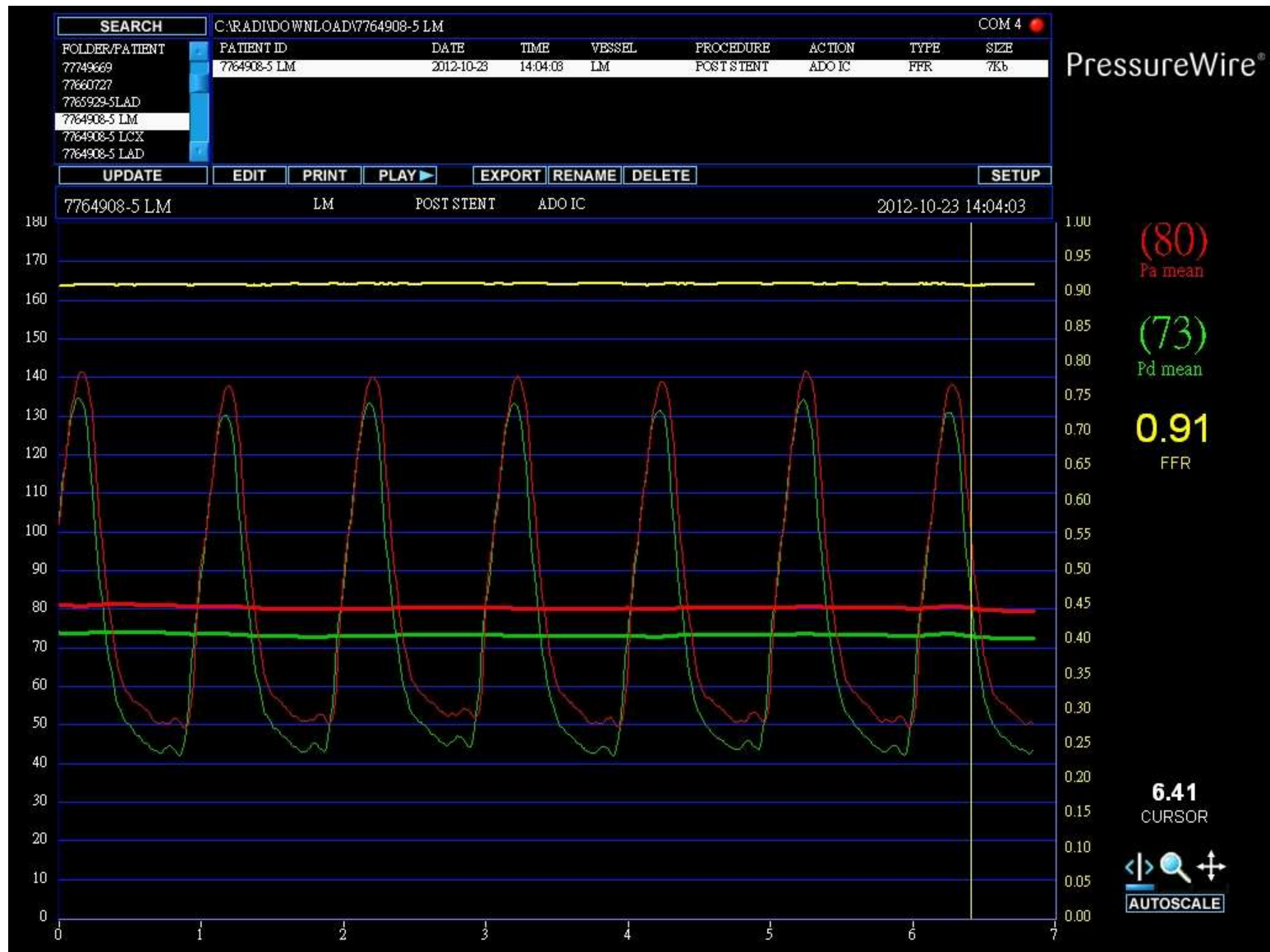
This is my hand



Final angiogram

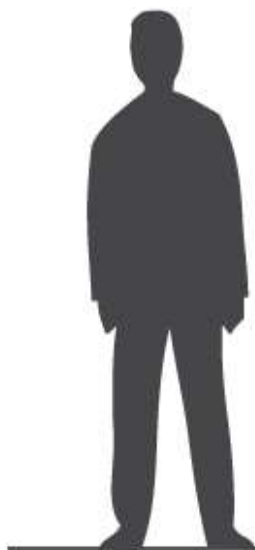


Repeat FFR at LAD distal

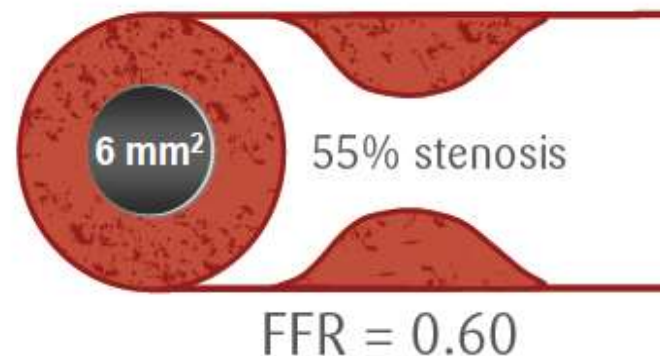


Take home message

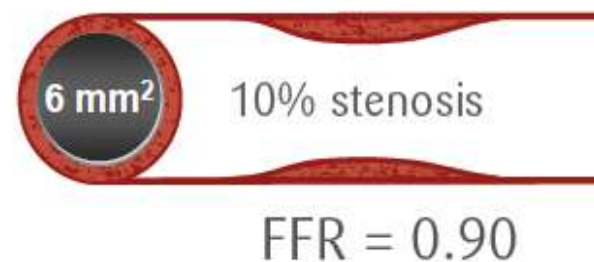
- 1. It's hard to precisely evaluate physical severity just MLA; FFR is still the GOLD STANDARD !
- 2. Downstream (FFR measurement)
- 3. Routine check for decision making
- 4. Orifice lesion (be careful!)



6 MM² TOO SMALL?



6 MM² SUFFICIENT?



Lessons from this case

- 1. It's hard to precisely evaluate physical severity just $\overline{\text{MLA}}$; FFR is still the GOLD STANDARD !
- **2. Downstream lesions does affect the FFR measurement. (Esp important in LM)**
- 3. Routine check FFR before & after PCI is essential for decision making in bifurcation lesions. IV form pressure tracing could get the culprit lesion by pressure gradient.
- 4. Orifice lesion of LM may affect the value of FFR, be careful!

Lessons from this case

- 1. It's hard to precisely evaluate physical severity just MLA; FFR is still the GOLD STANDARD !
- 2. Downstream coronary disease does affect the FFR measurement in LM lesion.
- 3. Routine check FFR before & after side branch PCI is essential for decision making in bifurcation lesions. IV form vasodilator agent for pressure tracing could get the culprit lesion by pressure gradient.
- 4. Orifice lesion of LM may affect the value of FFR, be careful!

Lessons from this case

- 1. It's hard to precisely evaluate physical severity just MLA; FFR is still the GOLD STANDARD !
- 2. Downstream coronary disease does affect the FFR measurement in LM lesion.
- 3. *Routine check FFR before & after side branch PCI is essential for decision making in bifurcation lesions.*
- **4.** Orifice lesion of LM may affect the value of FFR, be careful the tips when checking.

Who is the bad apple?

Let FFR tell you; before & after the procedure!



**Thanks for your
attention !**



TAIWAN TRANSCATHETER THERAPEUTICS

**LIVE COURSE
JAN 07-08, 2017**

NTUH International
Convention Center,
Taipei, Taiwan

**63 y/o man with progressive effort
angina in the recent month**

Patient Profile

- Progressive angina (CCS class III~IV) under optimal medical therapy.
- CAD risk factor: age, current smoker, Hyperlipidemia.
- Arrange stress test the next week.

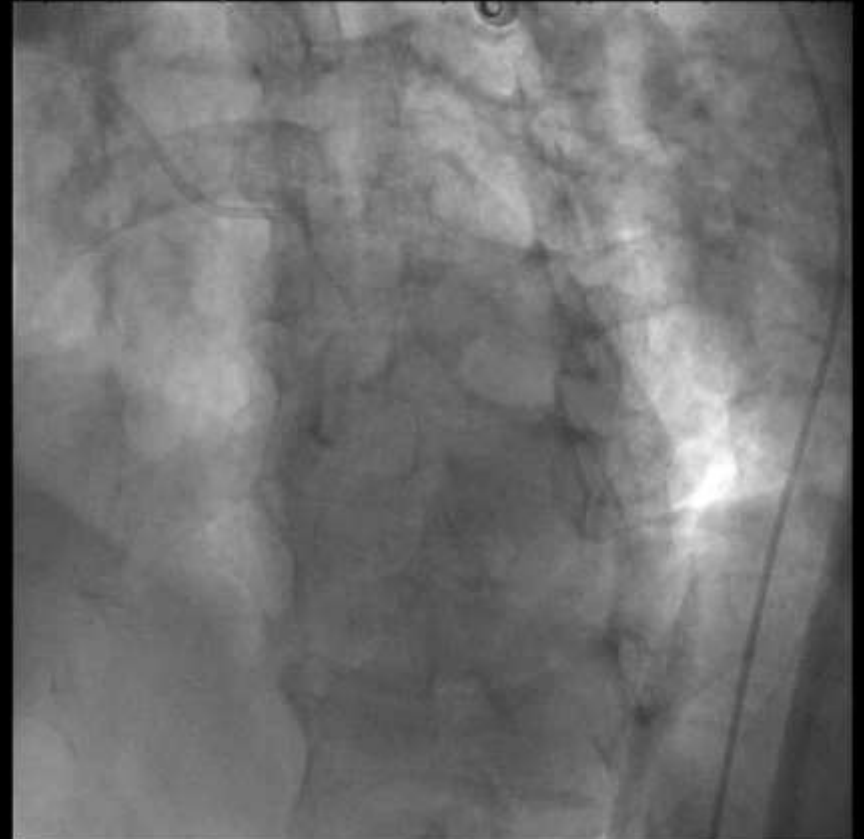
However, he cannot tolerate stress test due to severe angina !

CAG

Lossy Compression - not intended for diagnosis



Lossy Compression - not intended for diagnosis



LM bifurcation lesion ?

Leser Compression - not intended for diagnosis



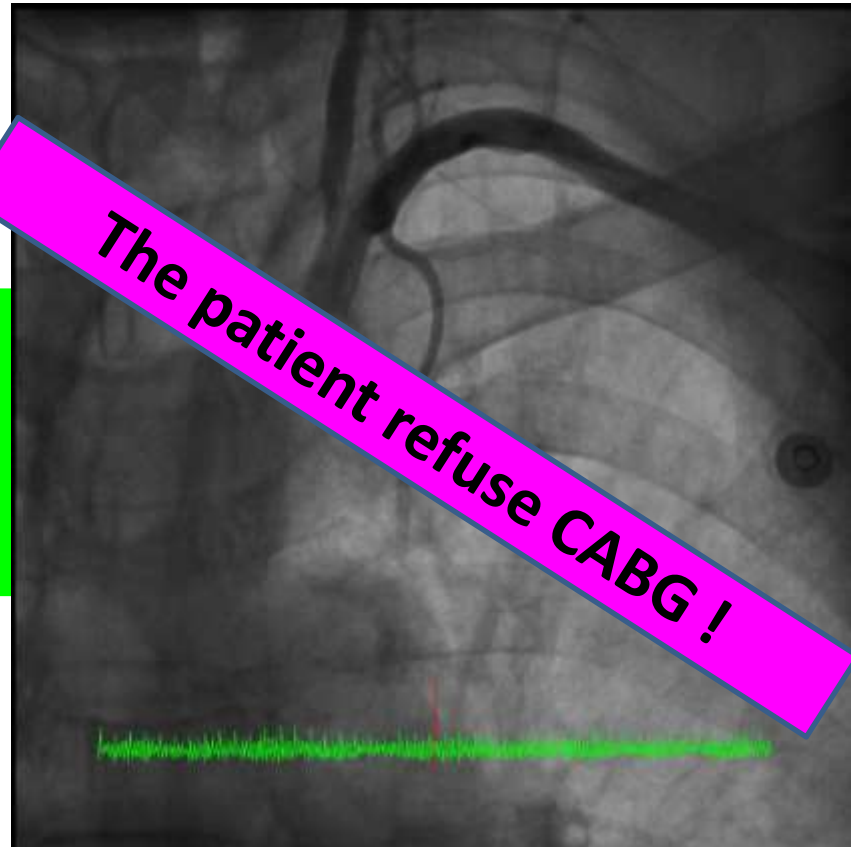
What's would you do ?

Medical therapy already failed !

CABG ?

PCI? But How?

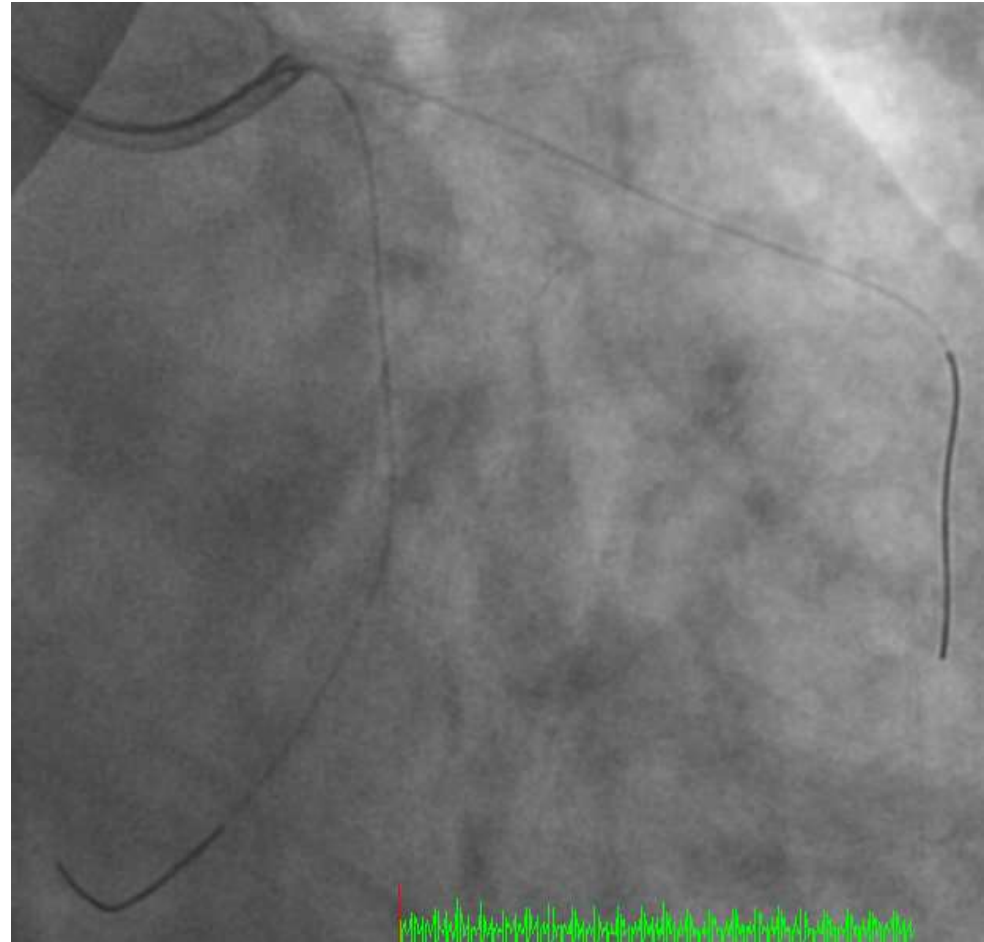
1. Only the 3 critical lesions?
2. To treat or not to treat the LM?
3. LM with or without LAD/LCX ?



We decided to choose PCI

Check IVUS to help decision making

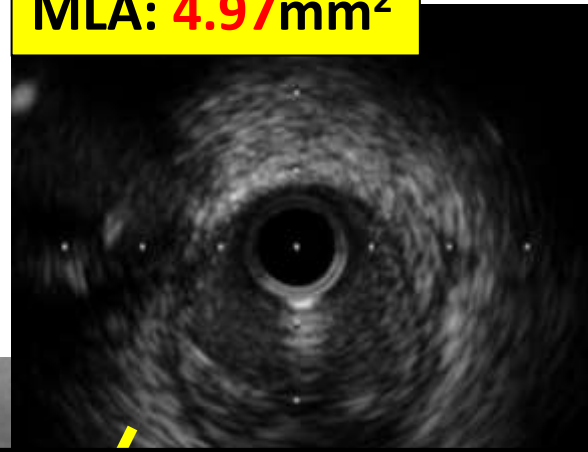
- 6Fr EBU 3.5
- Runthrough EF in LAD
- Sion blue in LCX



LM bifurcation

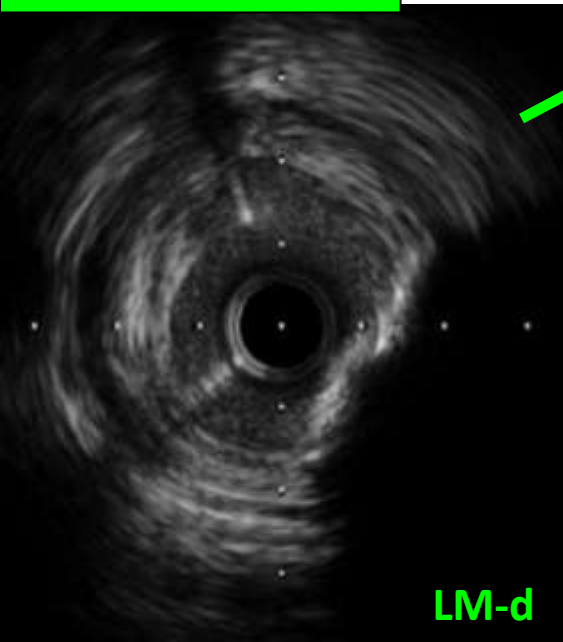
Medina 1,1,1 lesion

MLA: 4.97mm²



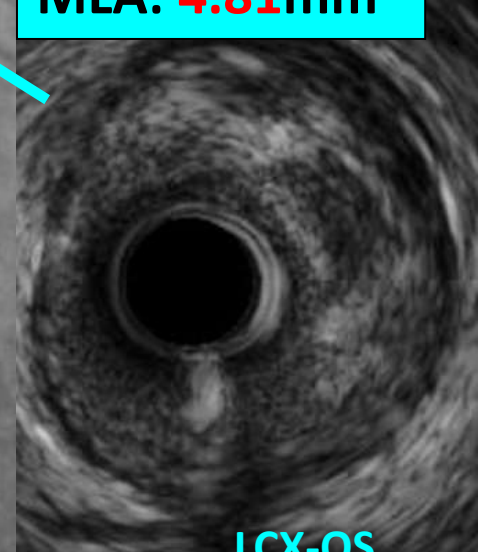
All of the MLA > 4.8 mm²!!!

MLA: 5.48mm²



LM-d

MLA: 4.81mm²

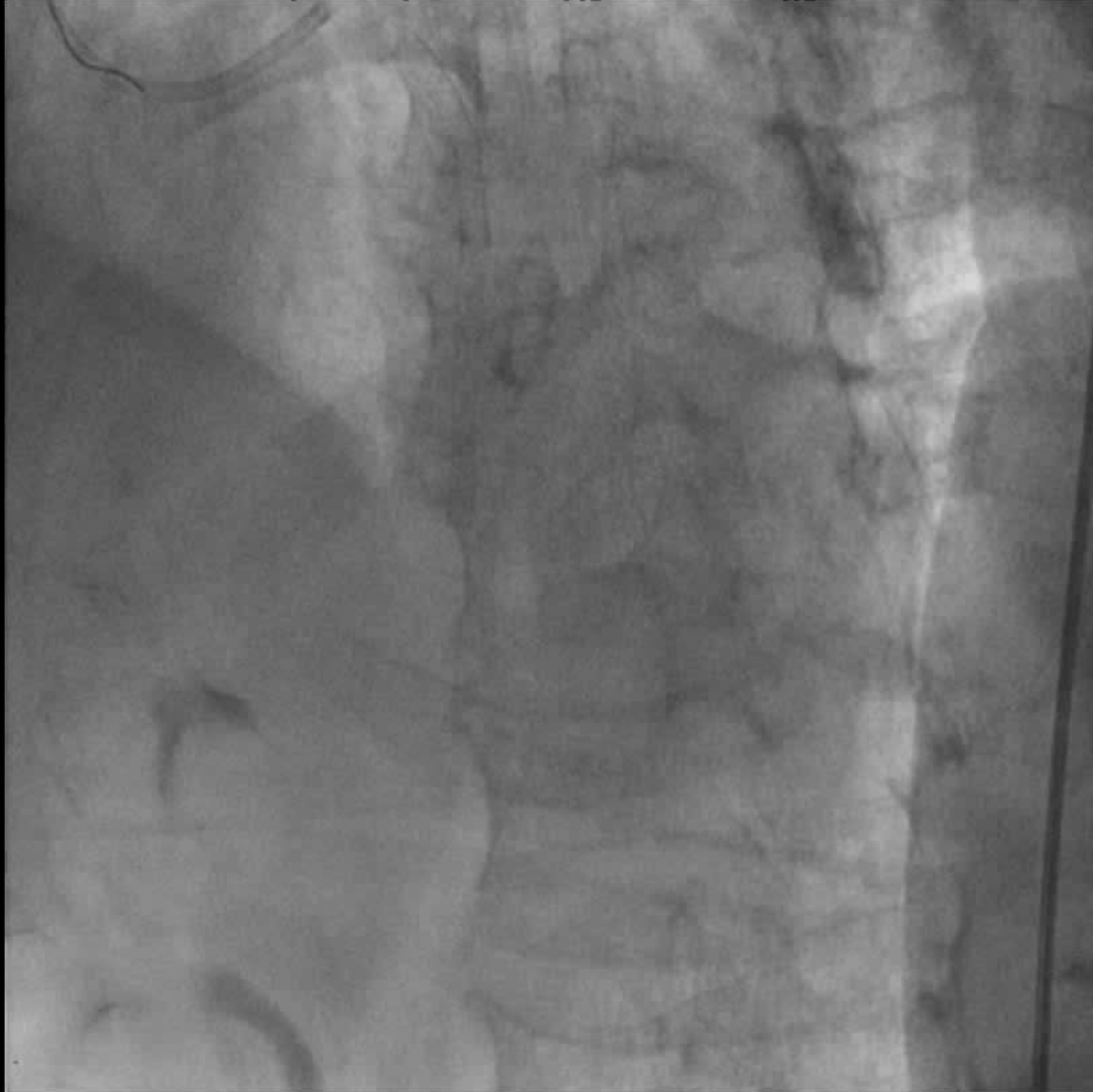


LCX-OS

DES 2.75x26 mm in LCX; 2DES 3.0x38, 3.5x30 mm in LAD

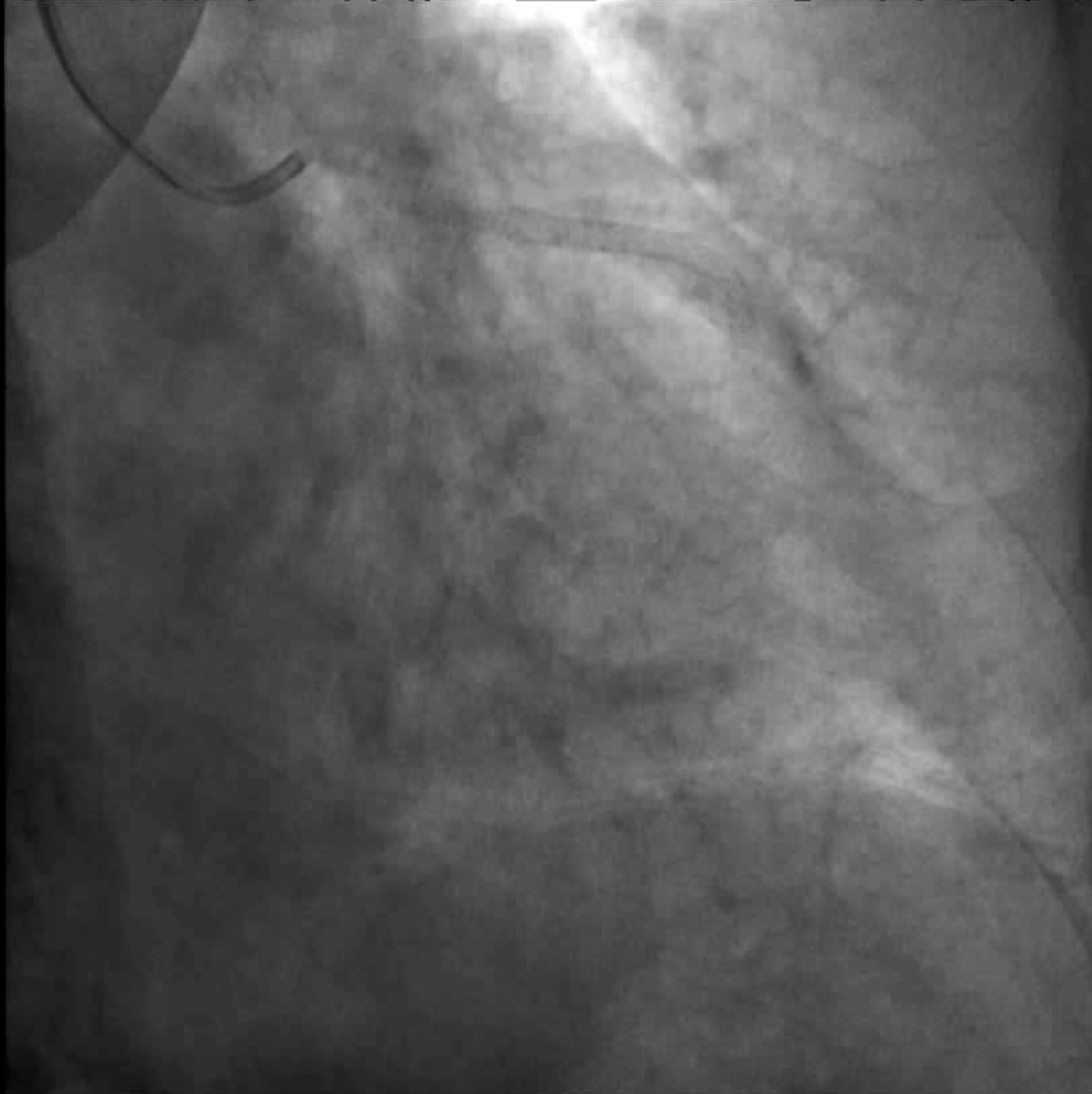
CAG after IVUS recheck

Lossy Compression - not intended for diagnosis



Final CAG

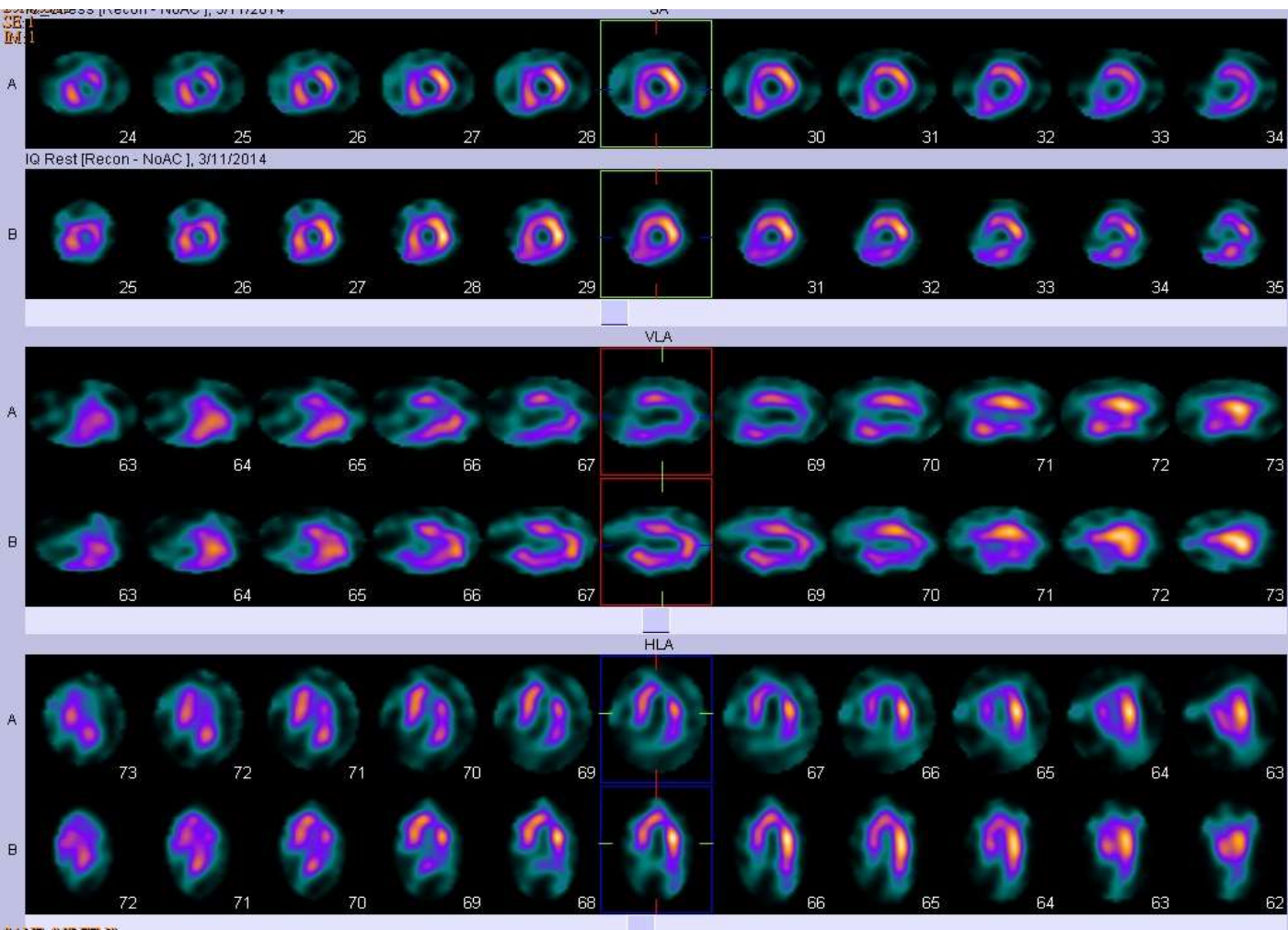
Lossy Compression - not intended for diagnosis



3 months later...

Partial improvement of angina (CCS class II~III) ...

Perfusion scan (+) in apical & lateral wall



RCA & LCA were almost the same



Who is the bad apple?

LM to LAD ?

OR LM to

OR B

FFR is the gold standard !
But we'll still need IVUS for PCI

perfusion scan?

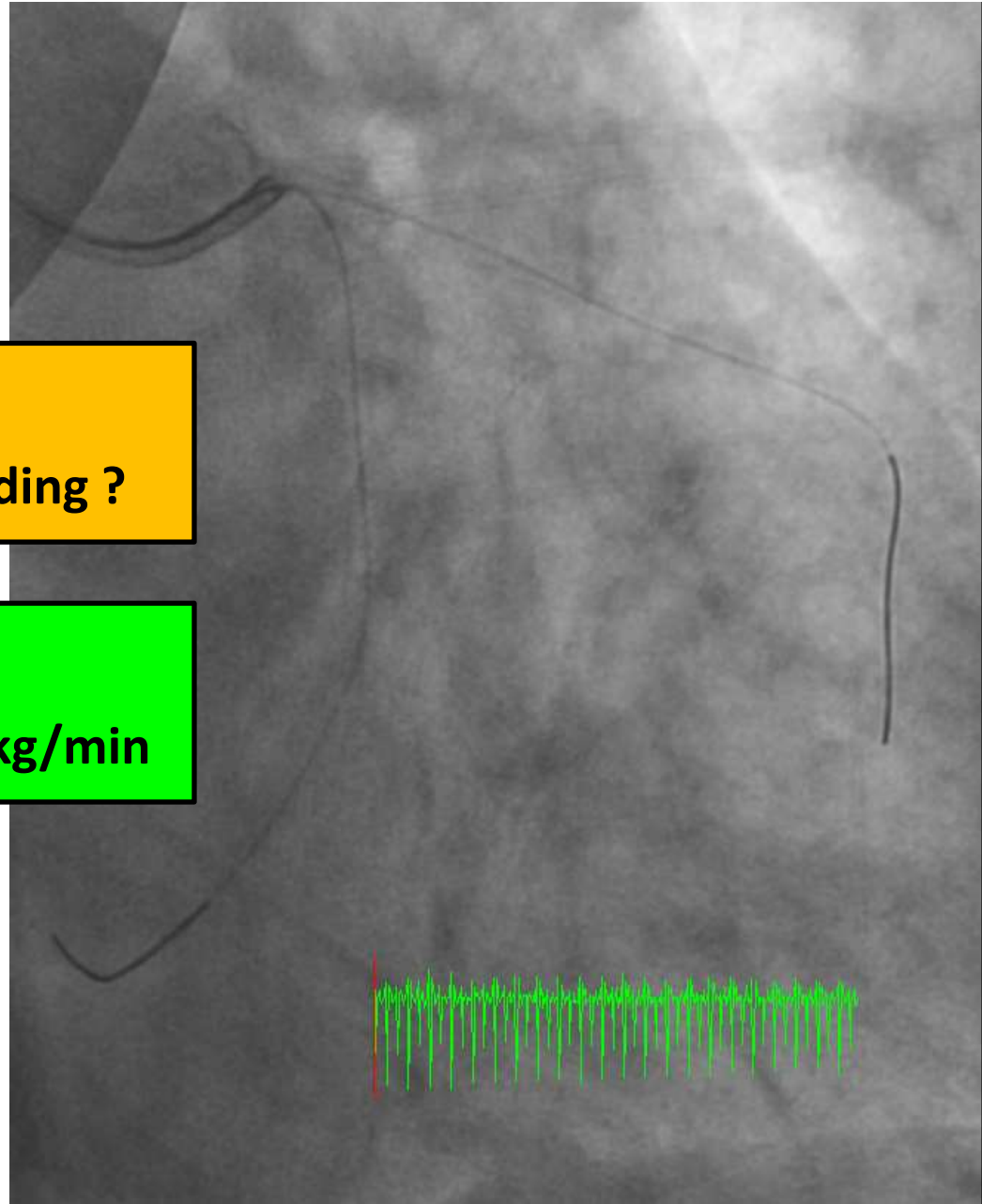
- 6Fr BL 3.5 with side hole
- Runthrough EF in LAD
- Sion blue in LCX

Check IVUS & MLA

Trauma due to previous PCI guiding ?

Check FFR

Continues IV adenosine 140 ug/kg/min



The IVUS told us...

- **Good news**
 - The LAD & LCX Stents still remains well.
- **Bad news**
 - Plaque extended from LM to LAD & LCX

- **The FFR told us...**

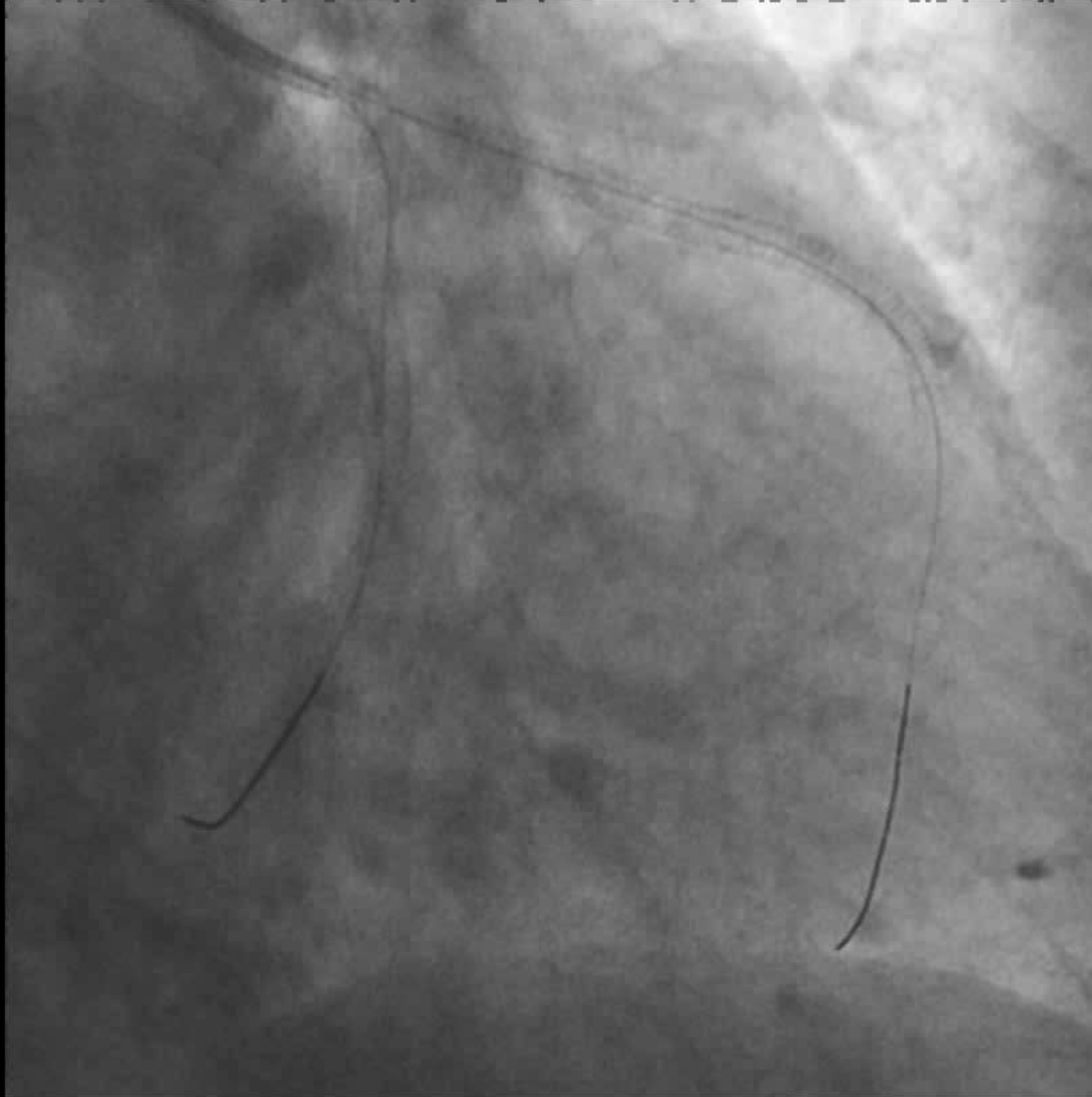
LAD FFR > 0.8 → Observation first

LCX FFR < 0.8 → LCX might be the bad apple!

ONE stent strategy for this bifurcation lesion !

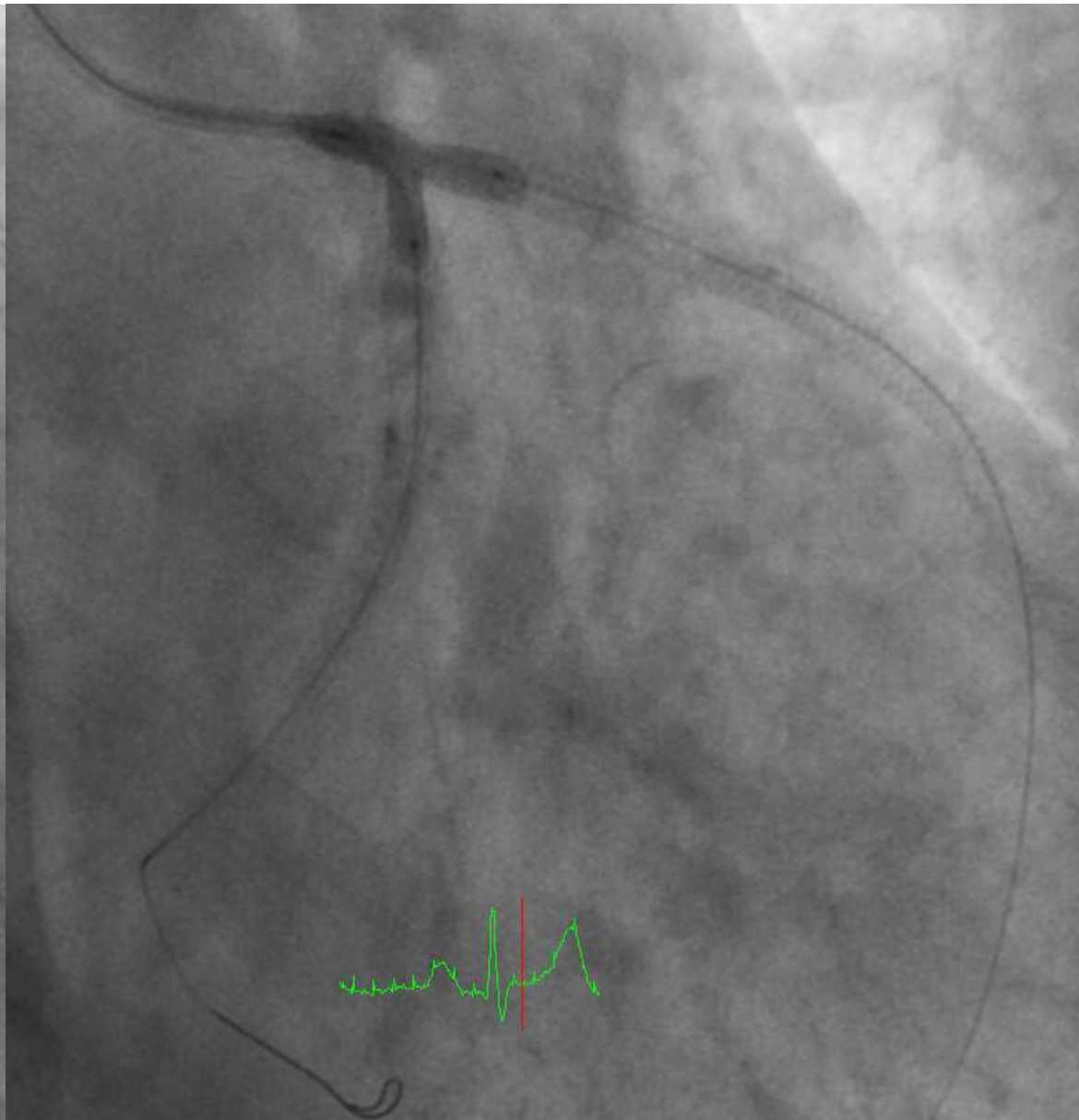
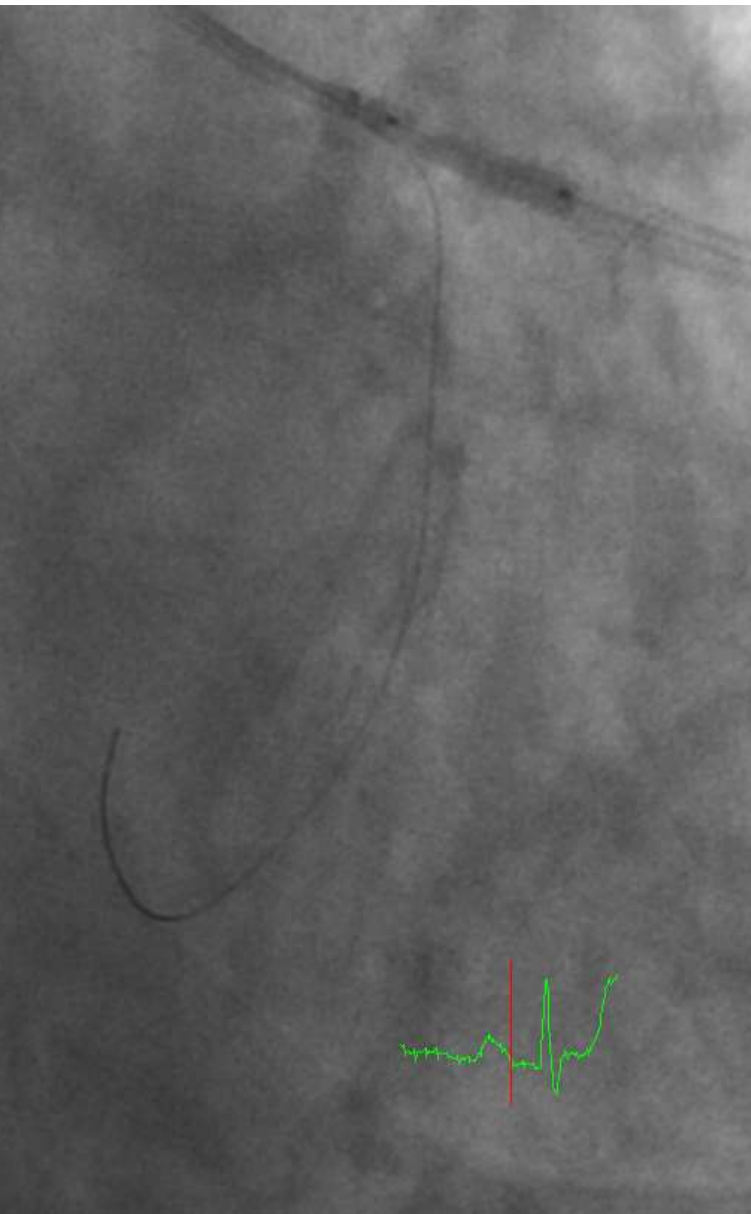
DES: LM - LCX 3.0*34mm

Lossy Compression - not intended for diagnosis

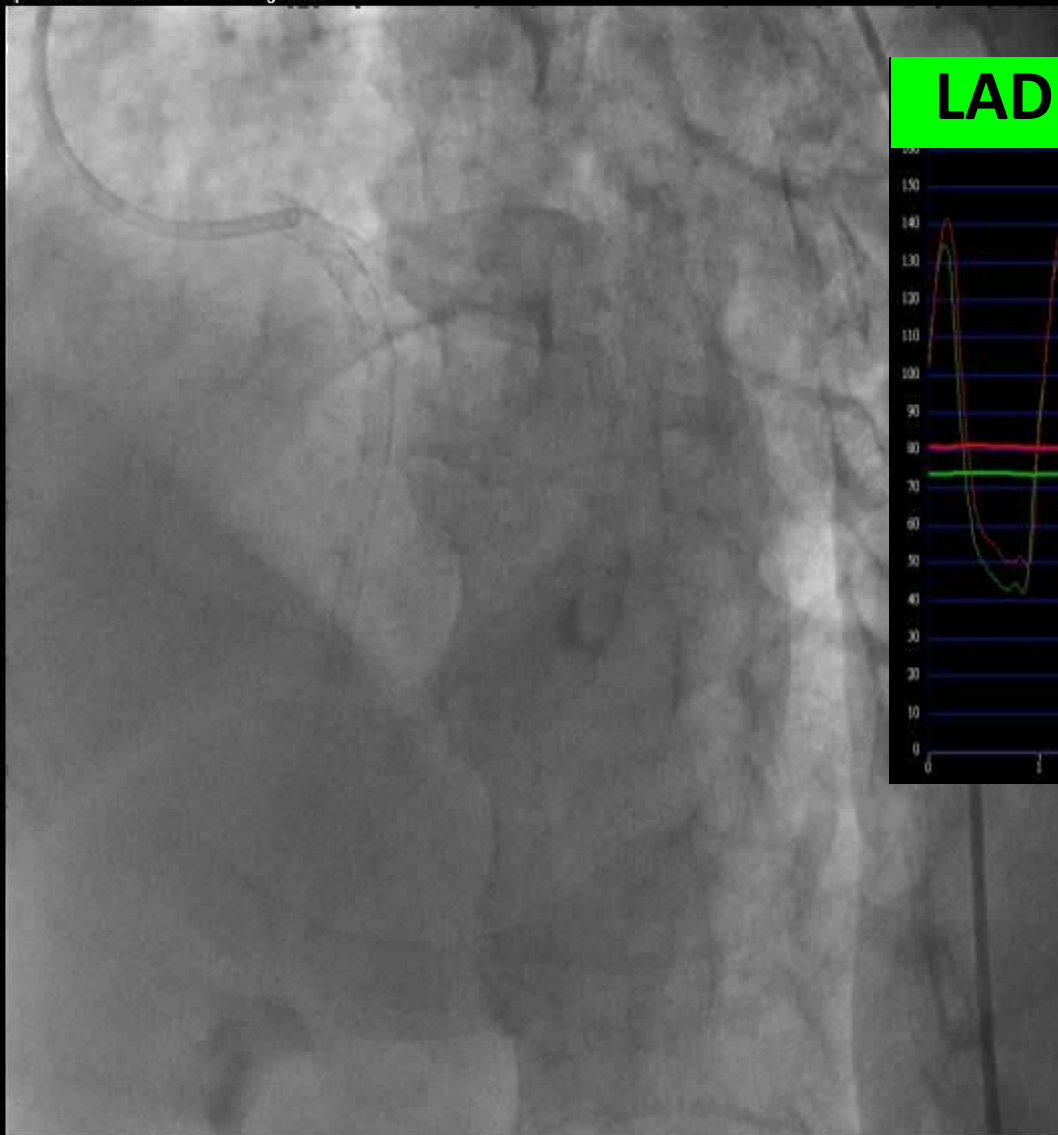


Culotte stenting + POT

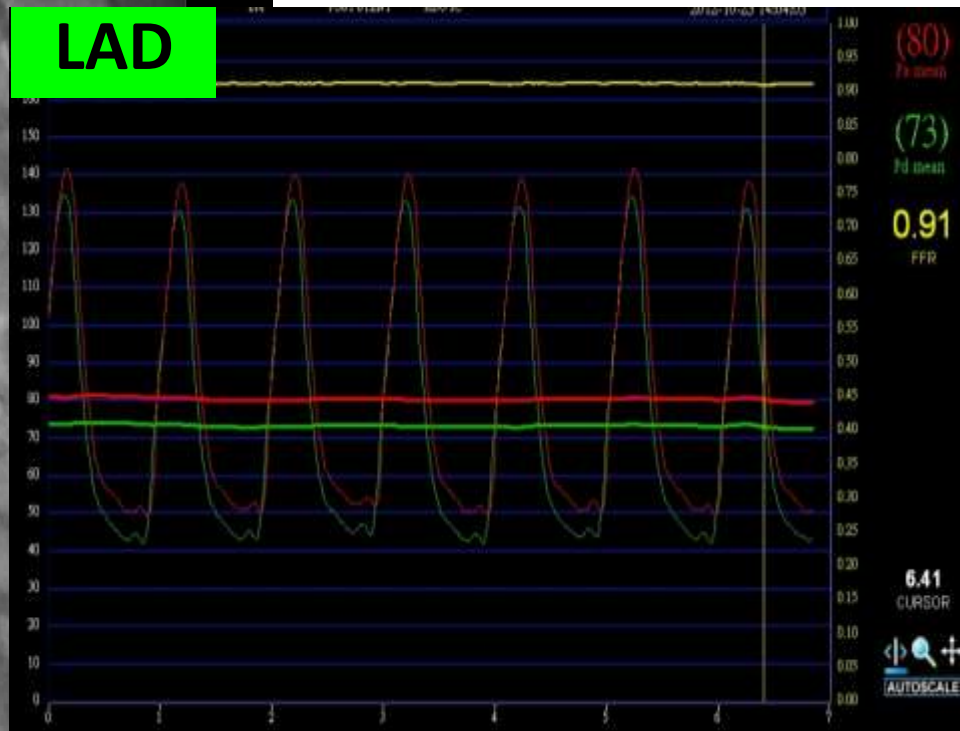
LCX 3.0*34mm & LAD 3.5*18mm



Lossy Compression - not intended for diagnosis



LAD



Final

Lossy Compression - not intended for diagnosis

