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# **One stent cross over technique for a complex distal left main bifurcation: assessing the LCX ostium TCTAP 2013**

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Massy , FR**



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**I have no conflict of interest to disclose**

## 70 y.o. male

### **Risk Factors**

Diabetes mellitus  
Hypertension,

### **Presentation**

Stable angina (CCS 2)

### **Clinical Data**

Height: 164 cm, Weight: 70 kg (BMI: 26)  
Creatinine clearance 50ml/min

### **Coronary Data**

Stenosis of distal LM (Medina 1-0-0) 50% in Mid LAD  
70% in OM; RCA normal

# LM,LAD1,Cx1 1,0,0

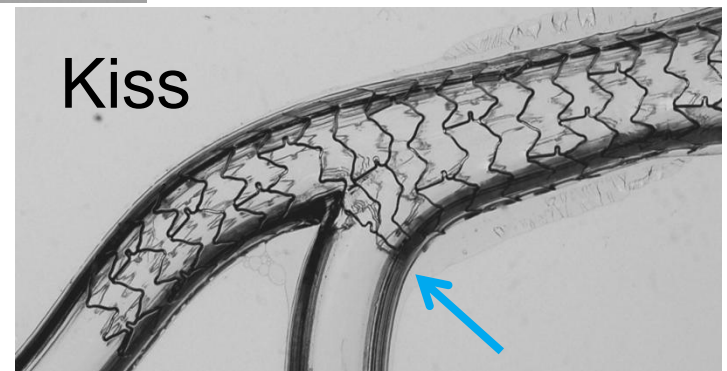
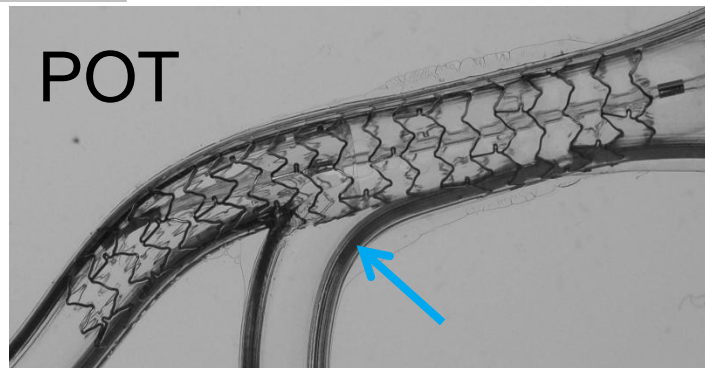
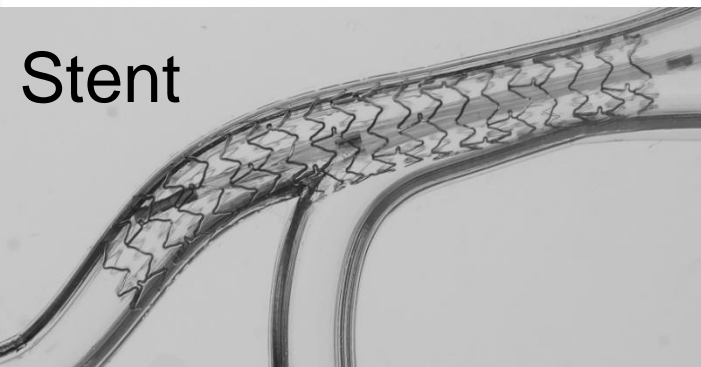




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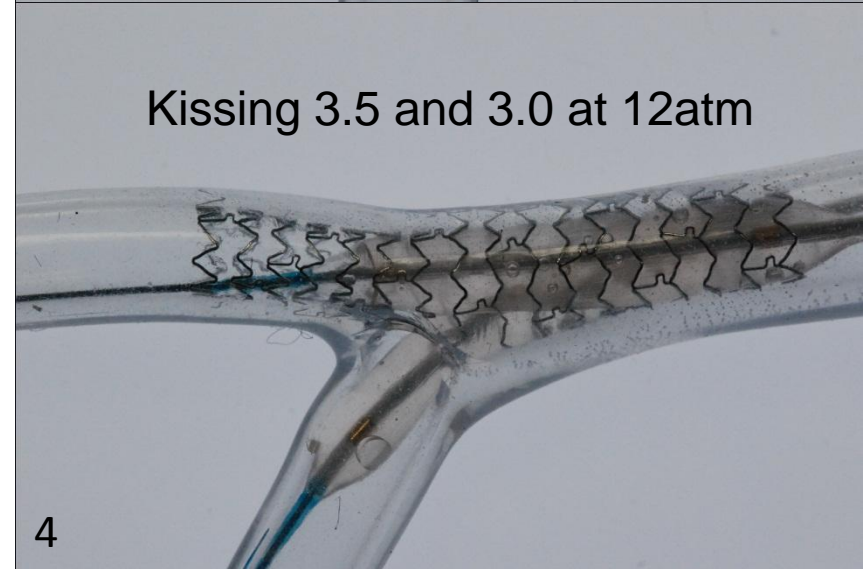
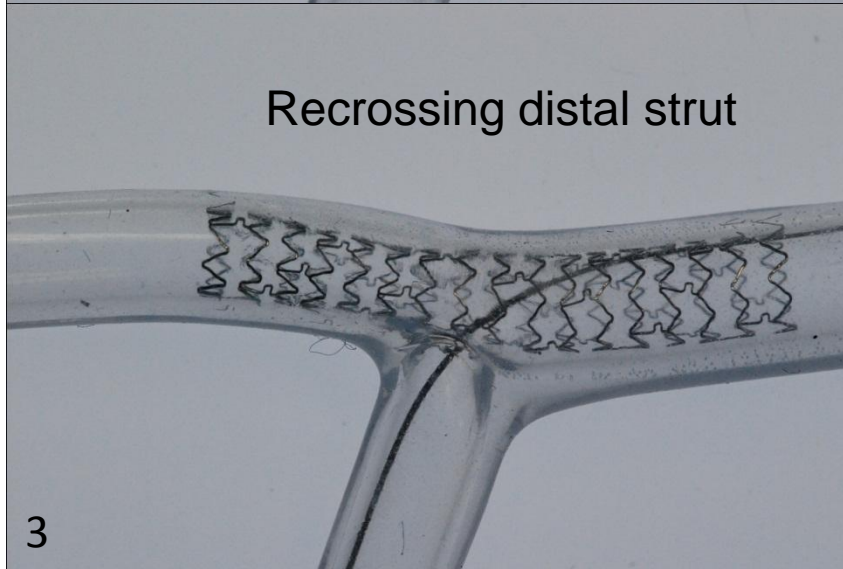
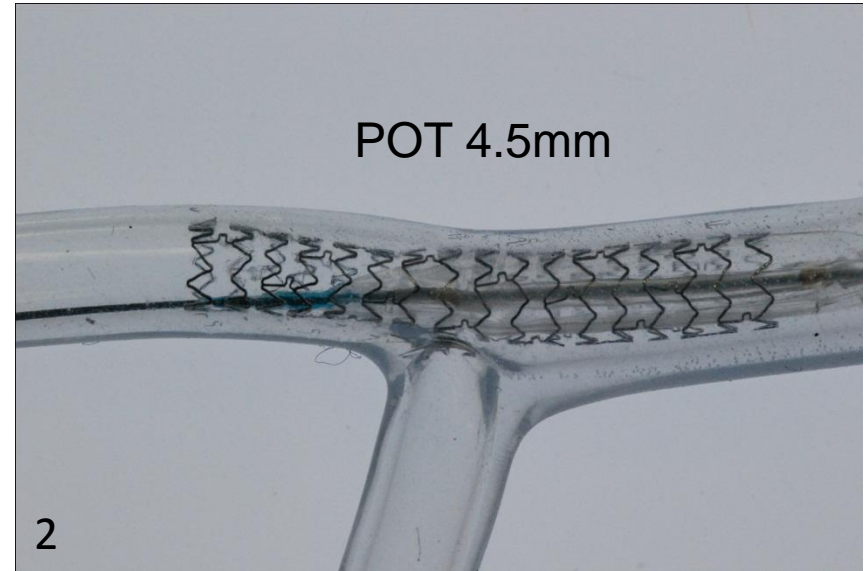
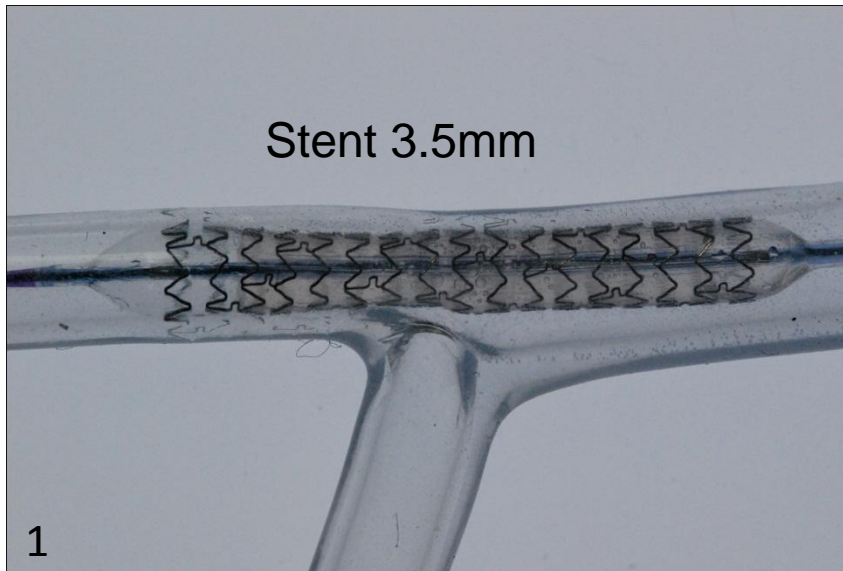
# What do we do at ICPS?

# Distal LM PCI

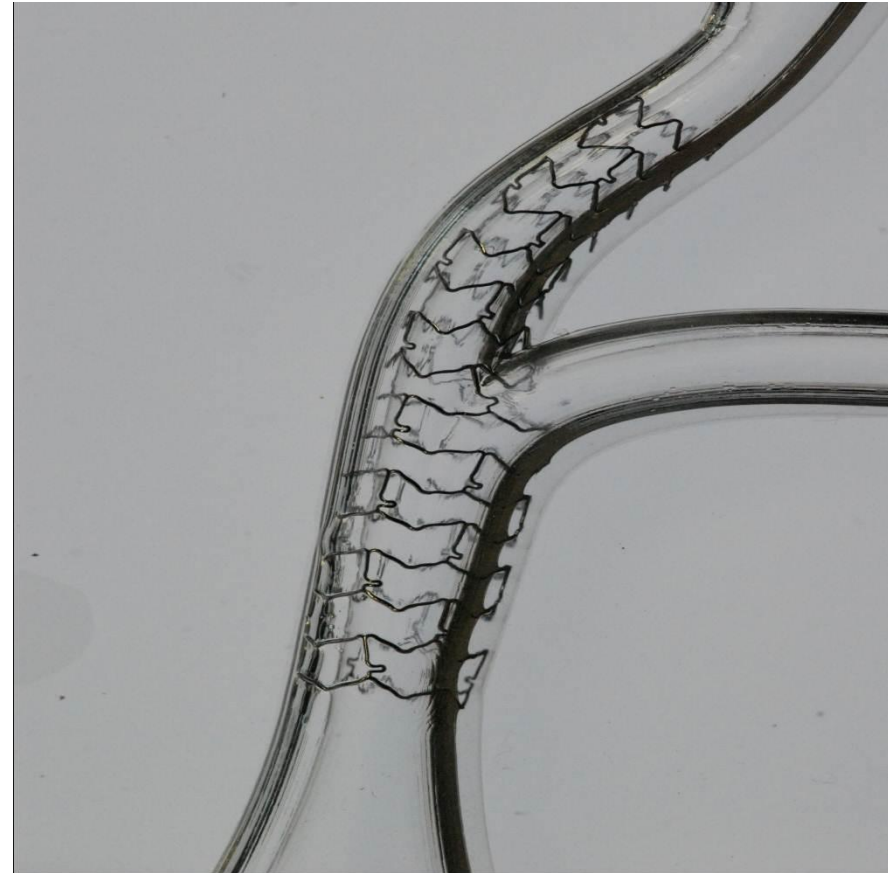
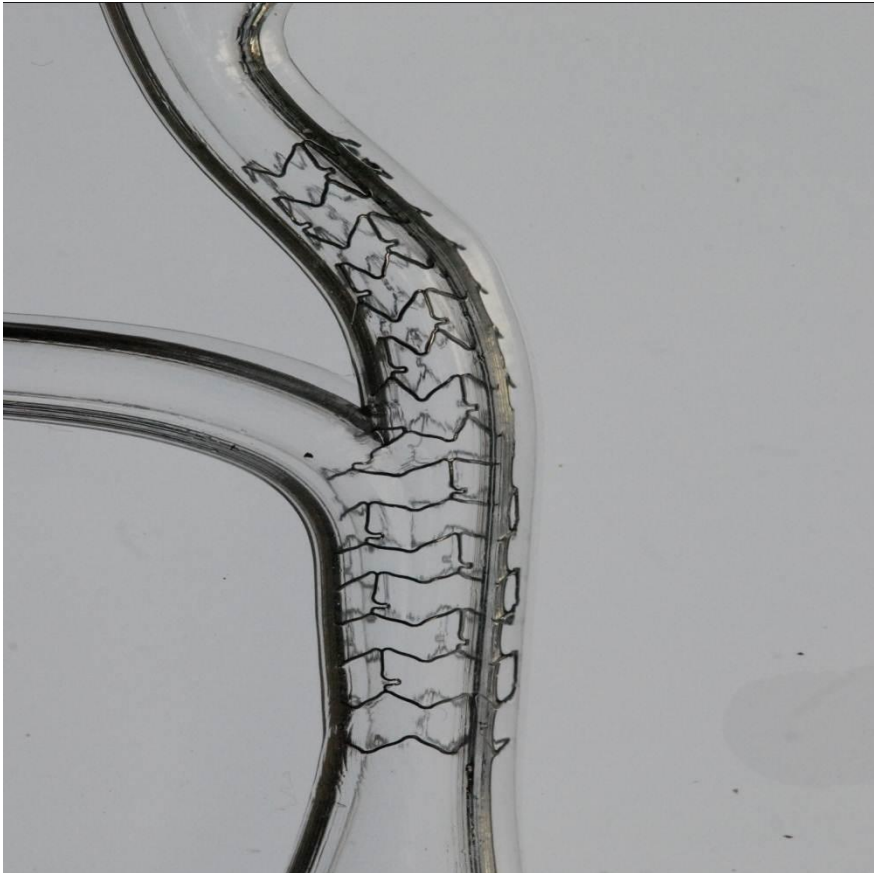




# Protocol (Xience Prime)



# XIENCE Prime 3.5 mm



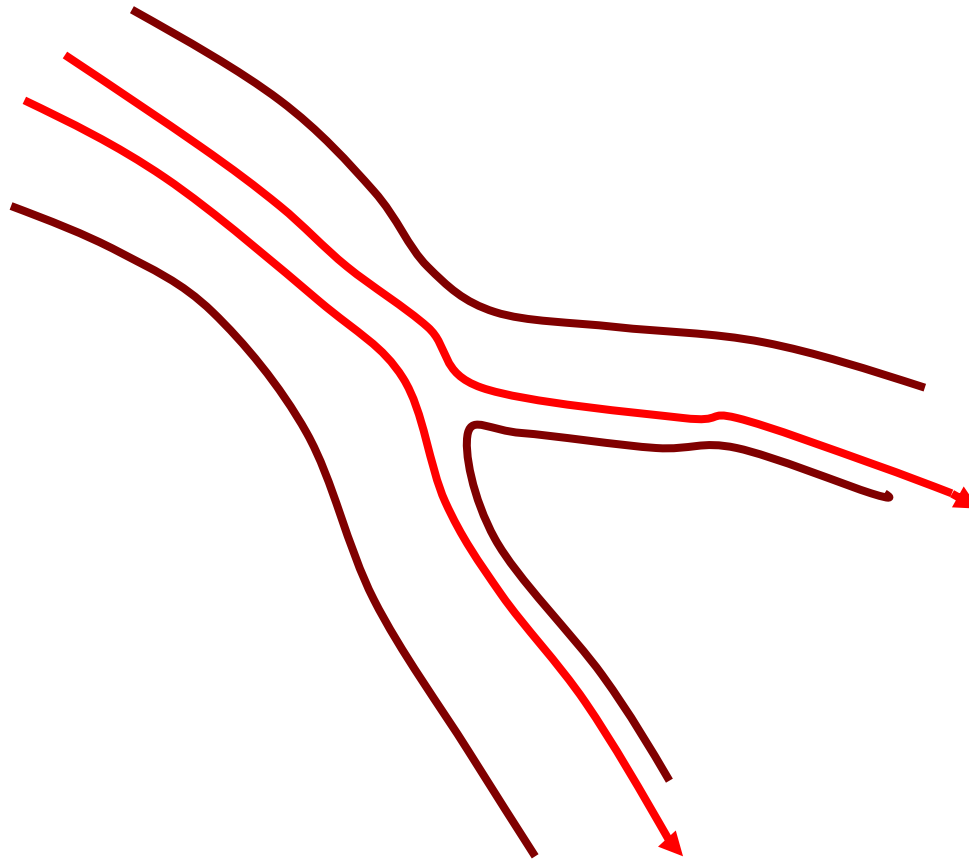




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**Why, always provisional, POT, Kiss  
And second stent only if bad dissection or  
positive FFR?**

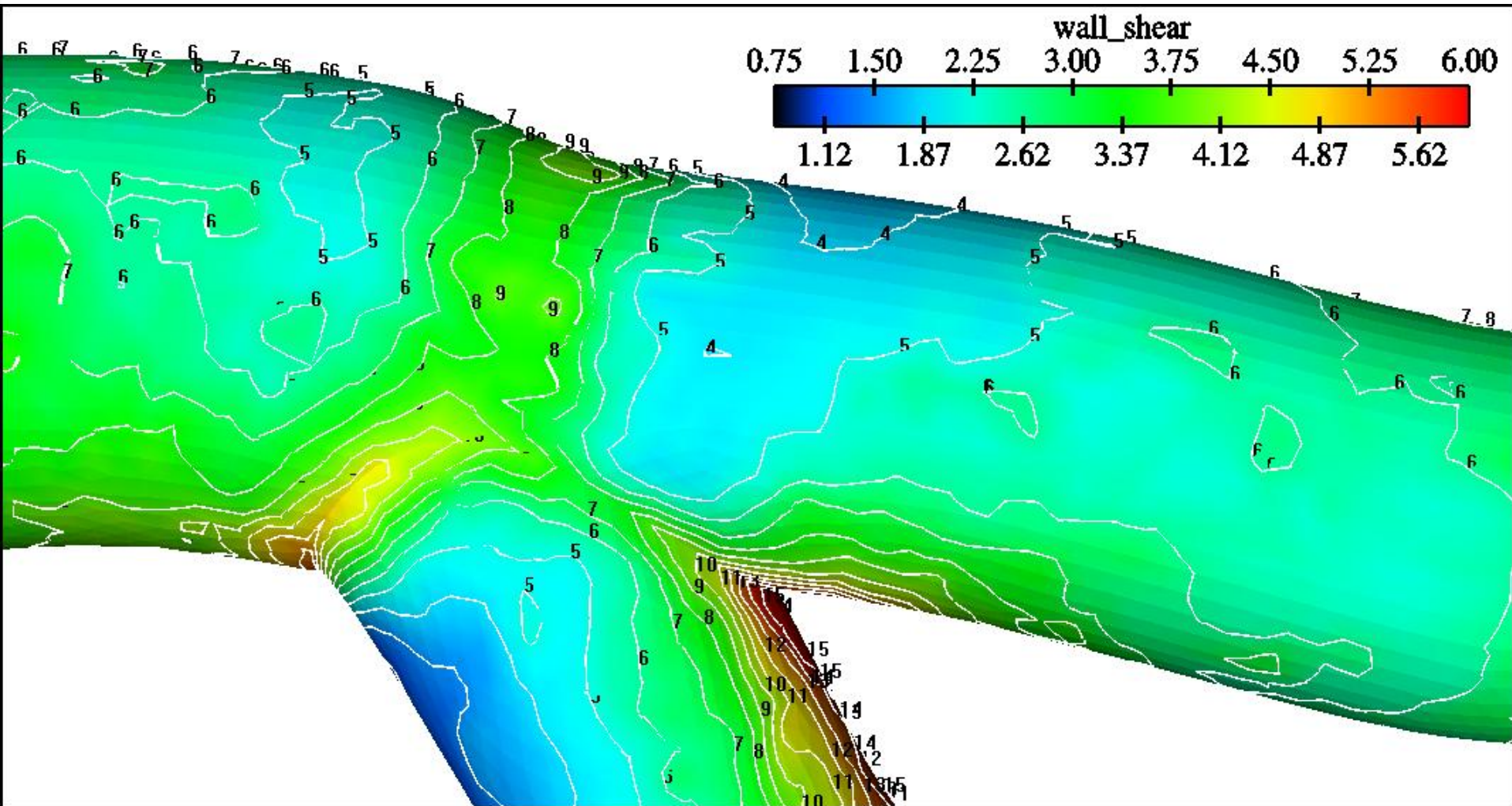
# Flow Patterns and Spatial Distribution of Atherosclerotic Lesions in Human Coronary Arteries



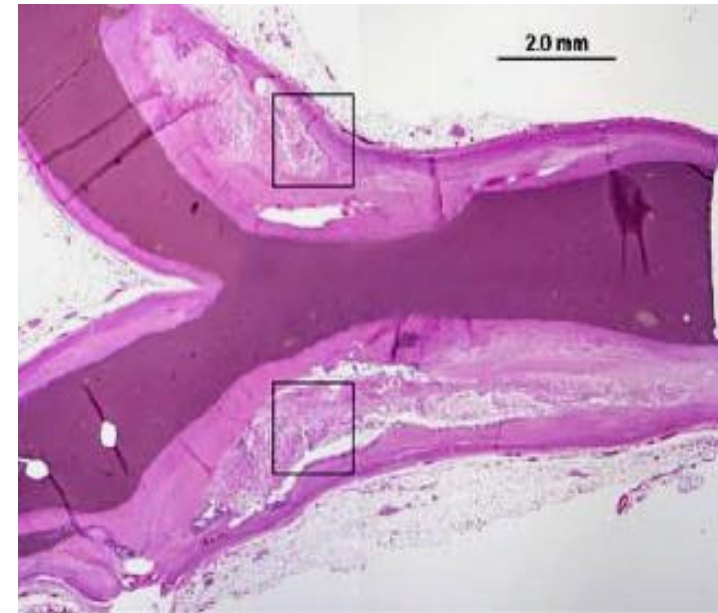
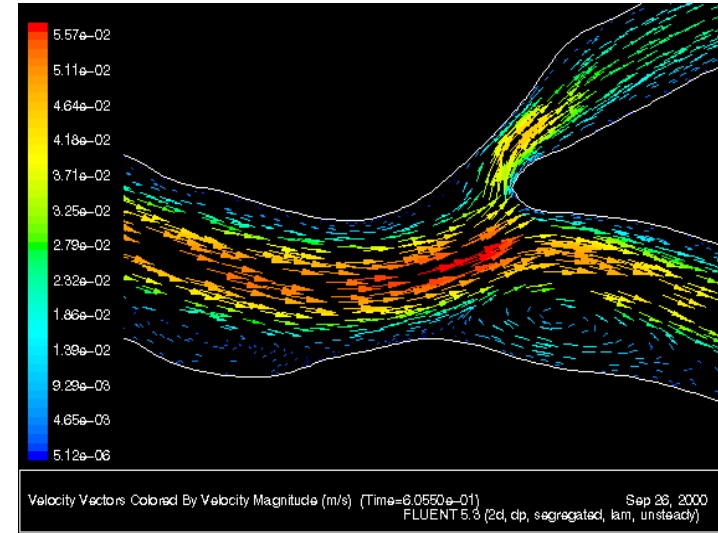
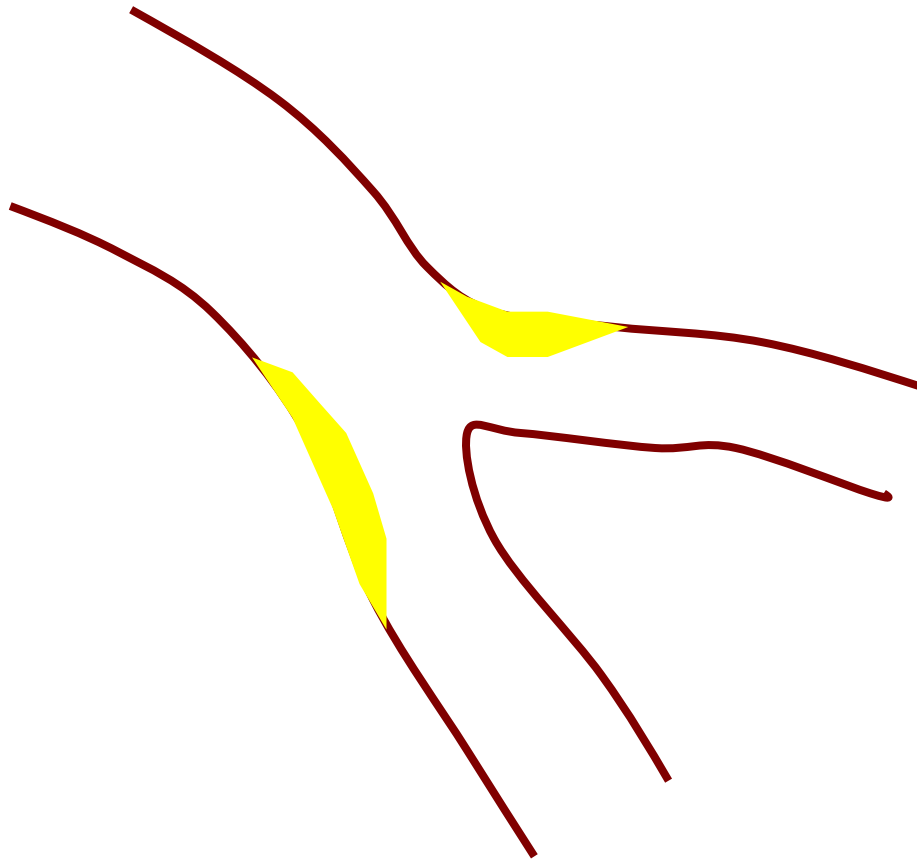
**High wall shear stress =  
antiatherogenic**



# LM bifurcation

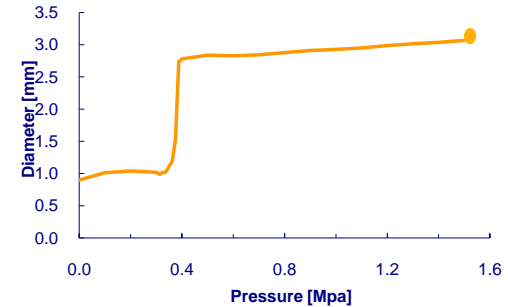
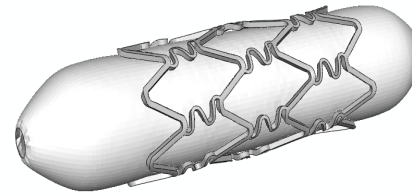
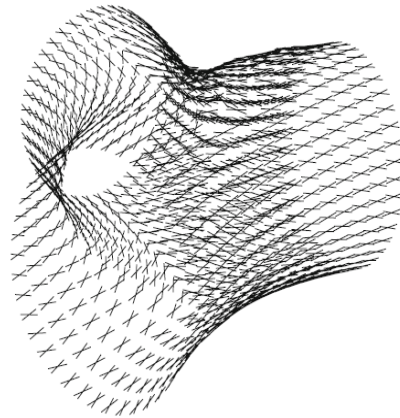
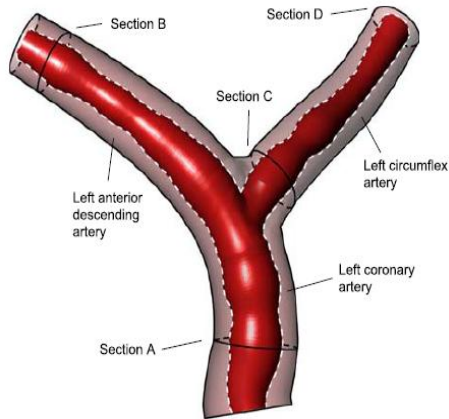


# Low wall shear stress and atheroma in bifurcation

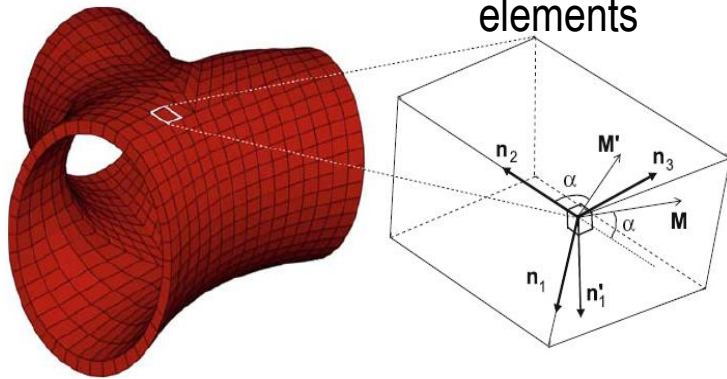




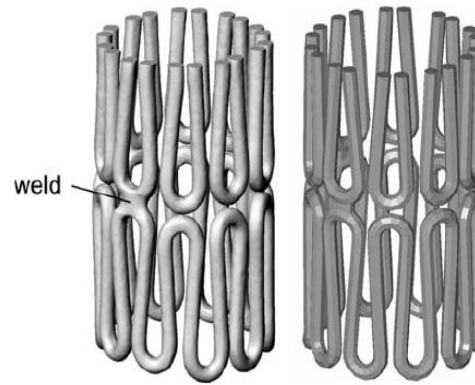
# A Novel Simulation Strategy for Stent Insertion and Deployment in Curved Coronary Bifurcations



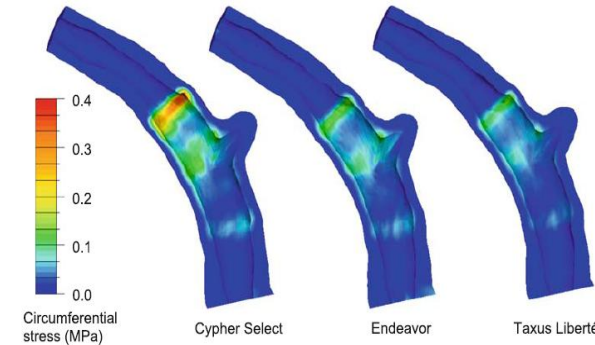
Rotational angiography Mean fiber directions for finite elements



Finite elements: hexahedral discretization



Endeavour micro CT and model

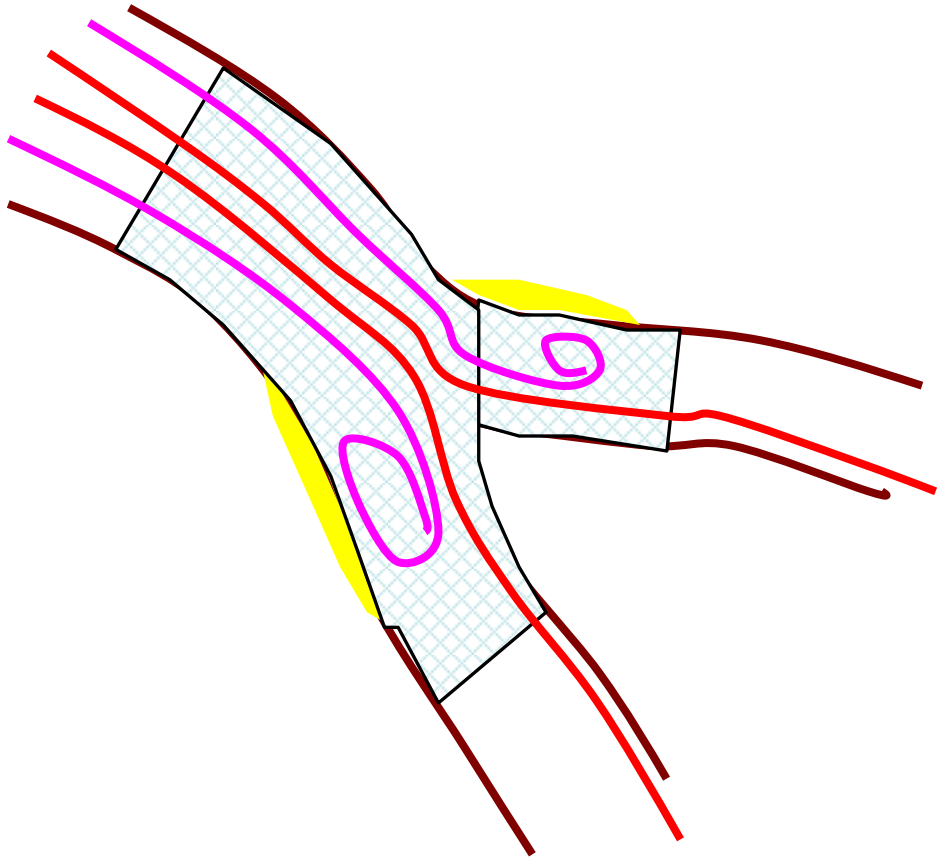


Circumferential stress

# LM,LAD1,Cx1 1,0,0



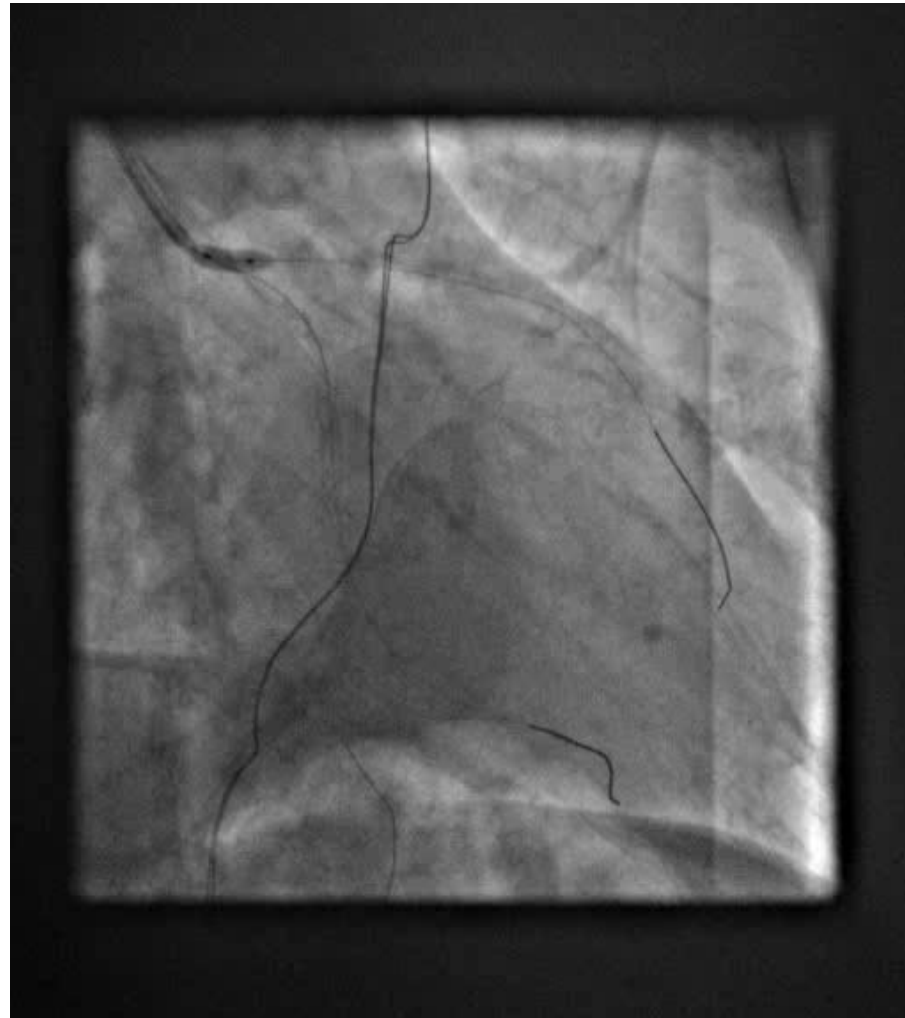
# Restoration of initial flow (+ stent turbulences)



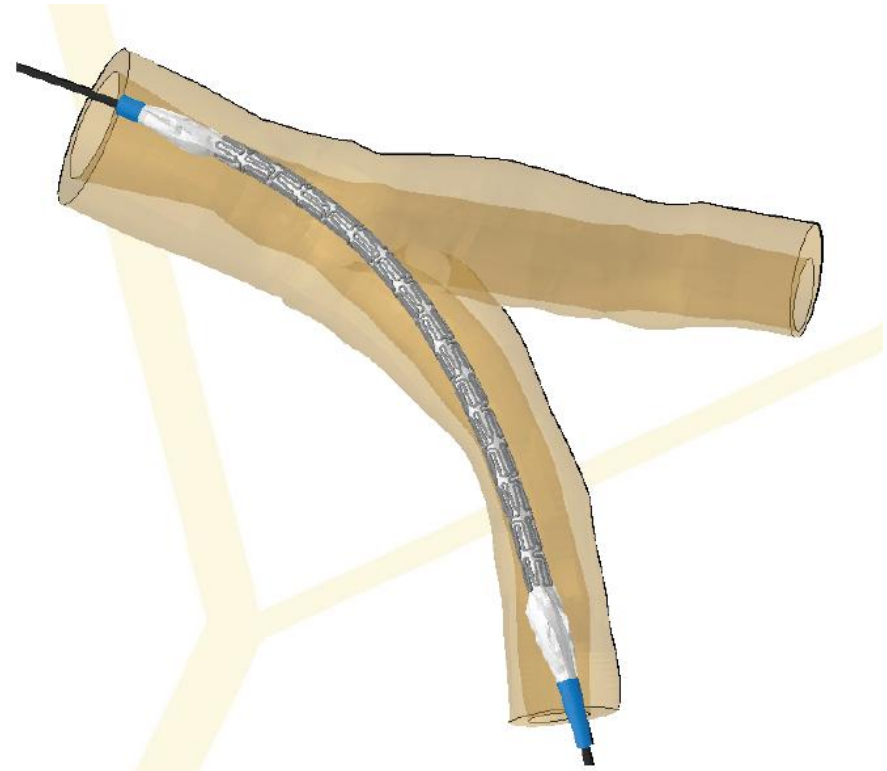
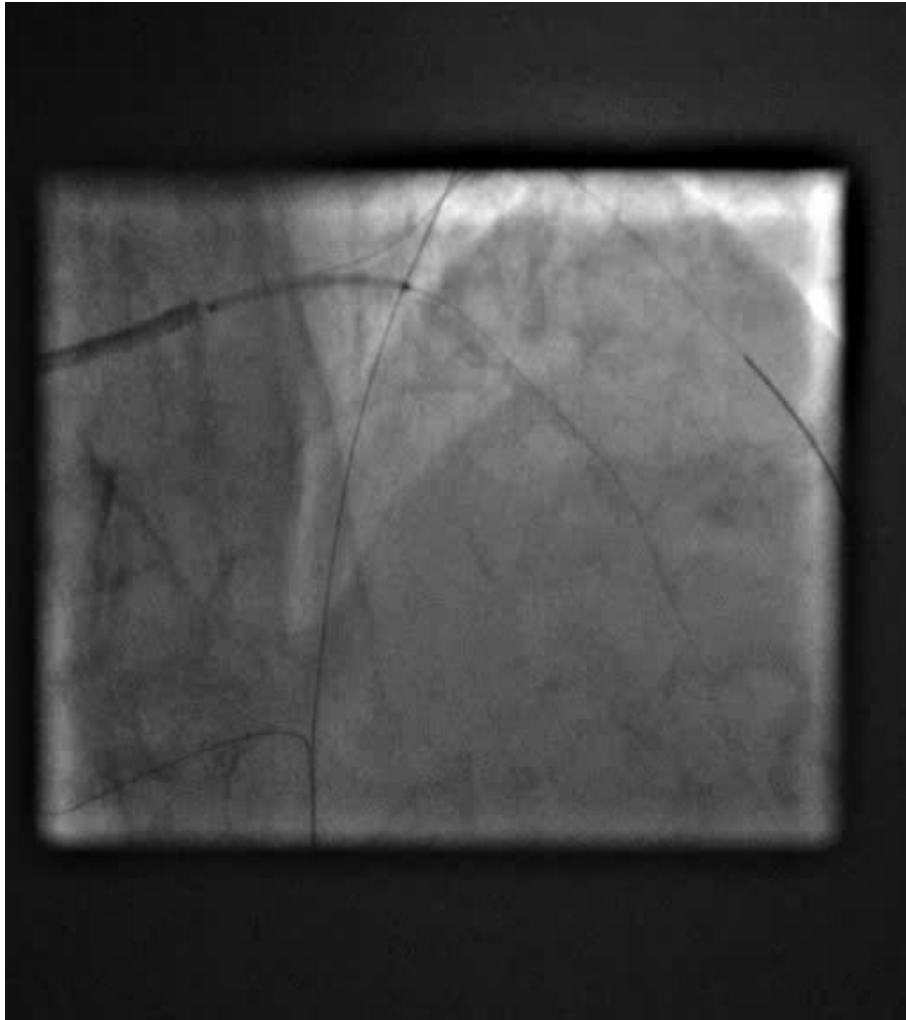
WSS < 0.5 Pa =  
risk of restenosis

**Flow mediated NIH and neo-atheroma**

## LM Predilatation (3 mm)



# LM stenting: LM to LAD, 3.5X23 Xience Prime



From J. Wentzel, P. Mortier

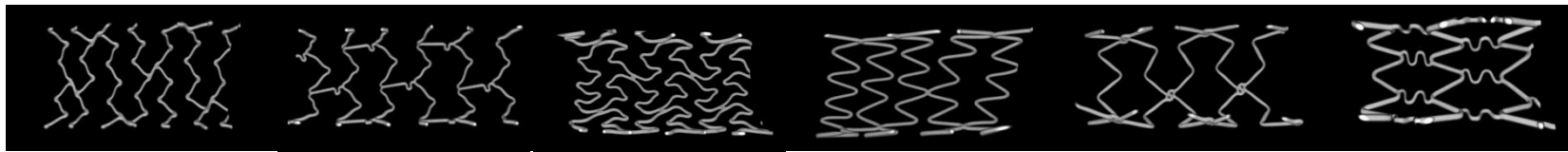




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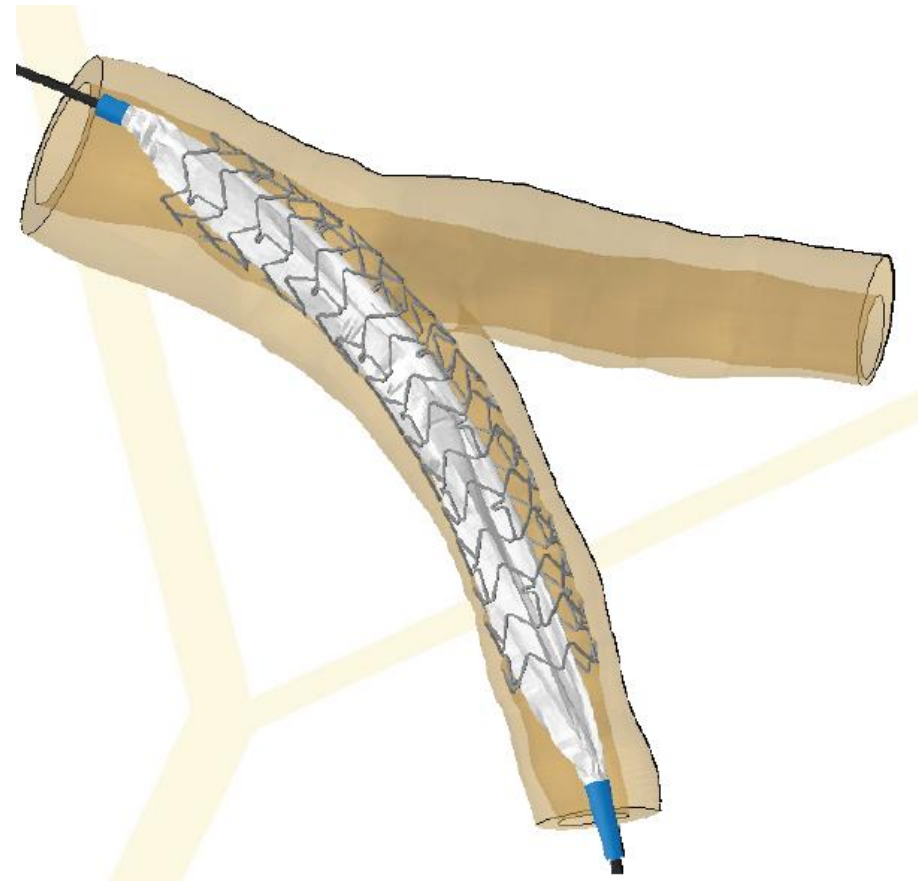
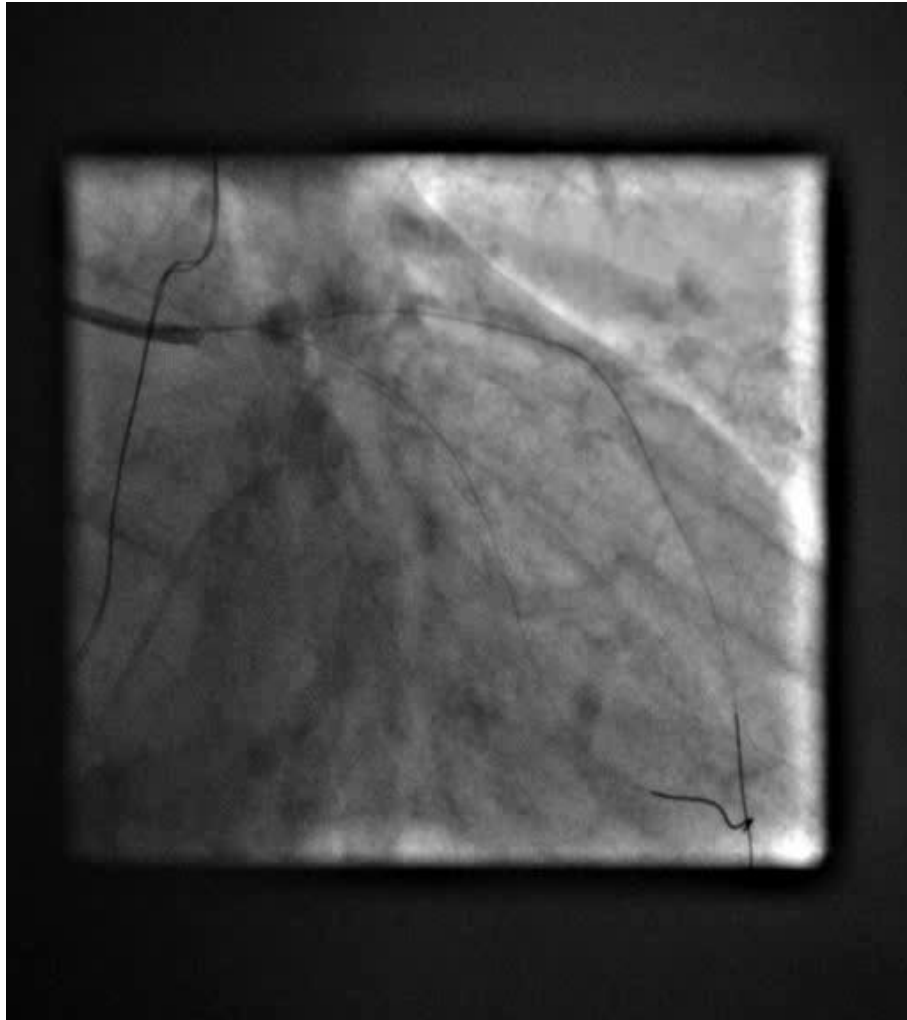
**Why, even when prox LAD look smaller we  
always use à 3.5mm stent?**

# Maximal Expansion Capacity and Workhorse Designs



	Element	Xience V	Taxus	Integrity	Biomatrix	Cypher
2.25	Very Small workhorse. <i>max exp: 2.75mm</i>	Medium Workhorse (6 crowns , 3 cells) <i>max. expansion: to 3.5mm</i>	Small workhorse (2 cells) <i>max expansion: 3.5mm</i>	Small workhorse (7crowns, 2 cells*) <i>max expansion: 3.2mm</i> <i>*1.5 cell in Resolute</i>	Medium workhorse (6 crowns, 2 cells) <i>max expansion: 3.5mm</i>	Medium workhorse (6 cells) <i>max expansion: 3.75mm</i>
2.50	Small workhorse (8 crowns, 2 cells) <i>max expansion : 3.5mm</i>					
2.75	<i>max expansion : 3.5mm</i>					
3.00	Medium Workhorse (8 crowns, 2 cells) <i>max expansion : 4.25mm</i>	Large workhorse: (9 crowns , 3 cells) <i>max expansion : 4.5mm</i>	Medium Workhorse (3 cells) <i>max expansion: 4.25mm</i>	Medium workhorse (10 crowns, 2 cells) <i>max expansion : 4.4mm</i>	Large workhorse (9 crowns, 3 cells) <i>max expansion: 4.5mm</i>	Large workhorse (7 cells) <i>max expansion: 4.75mm</i>
3.50	<i>max expansion : 4.25mm</i>		Large workhorse (3 cells) <i>max expansion: 4.5mm</i>			
4.00	Large workhorse (10 crowns, 2 cells) <i>max expansion: 5.75mm</i>					
4.50	<i>5.75mm</i>					
5.00						

# LM post stenting

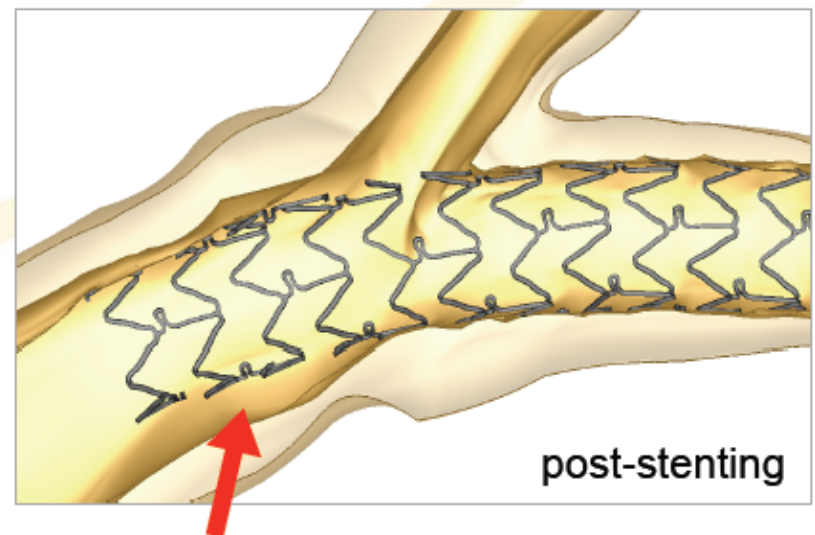
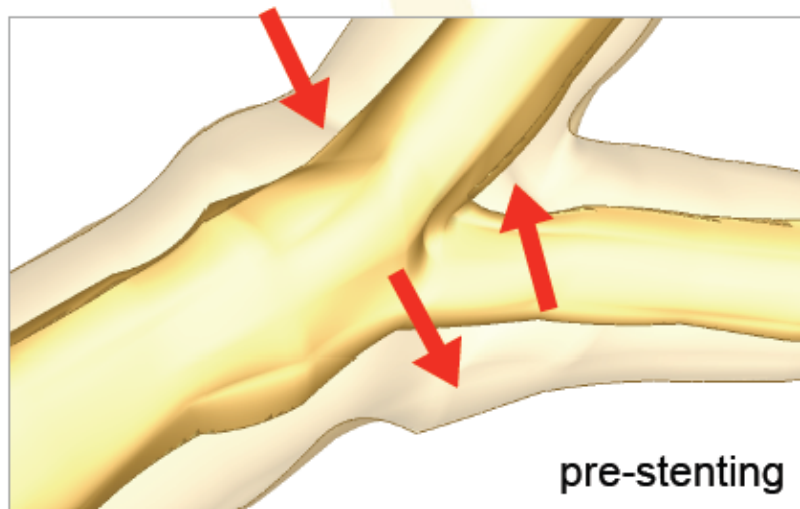


# Stent deployment

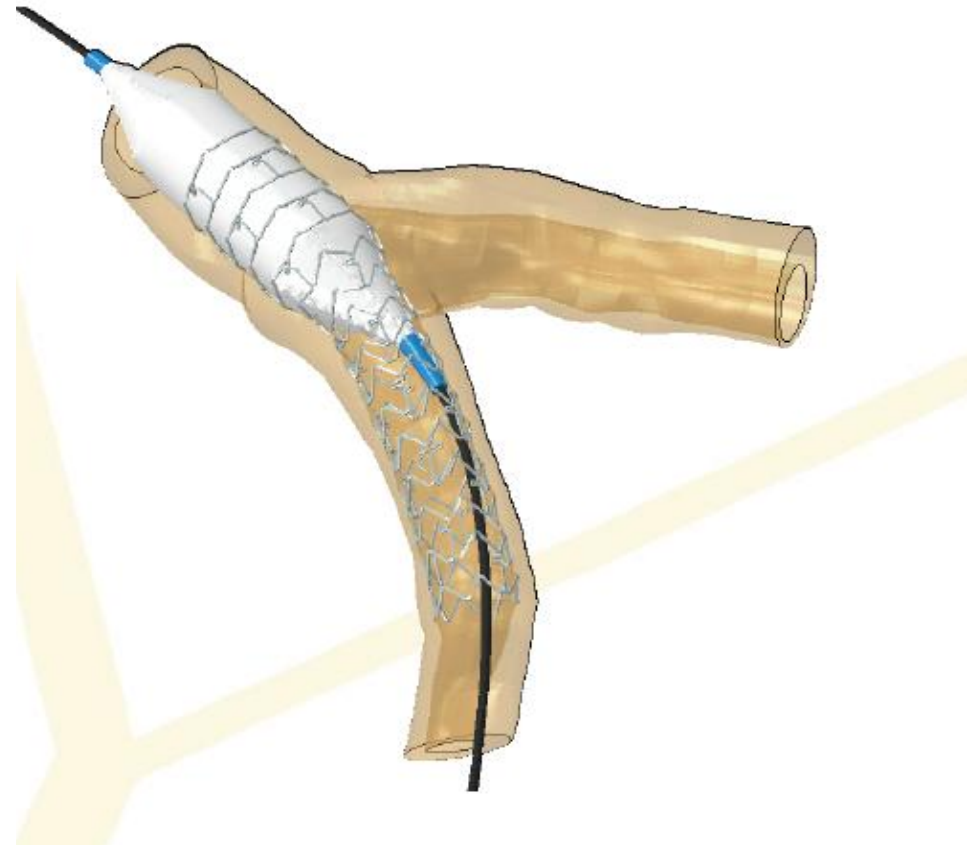
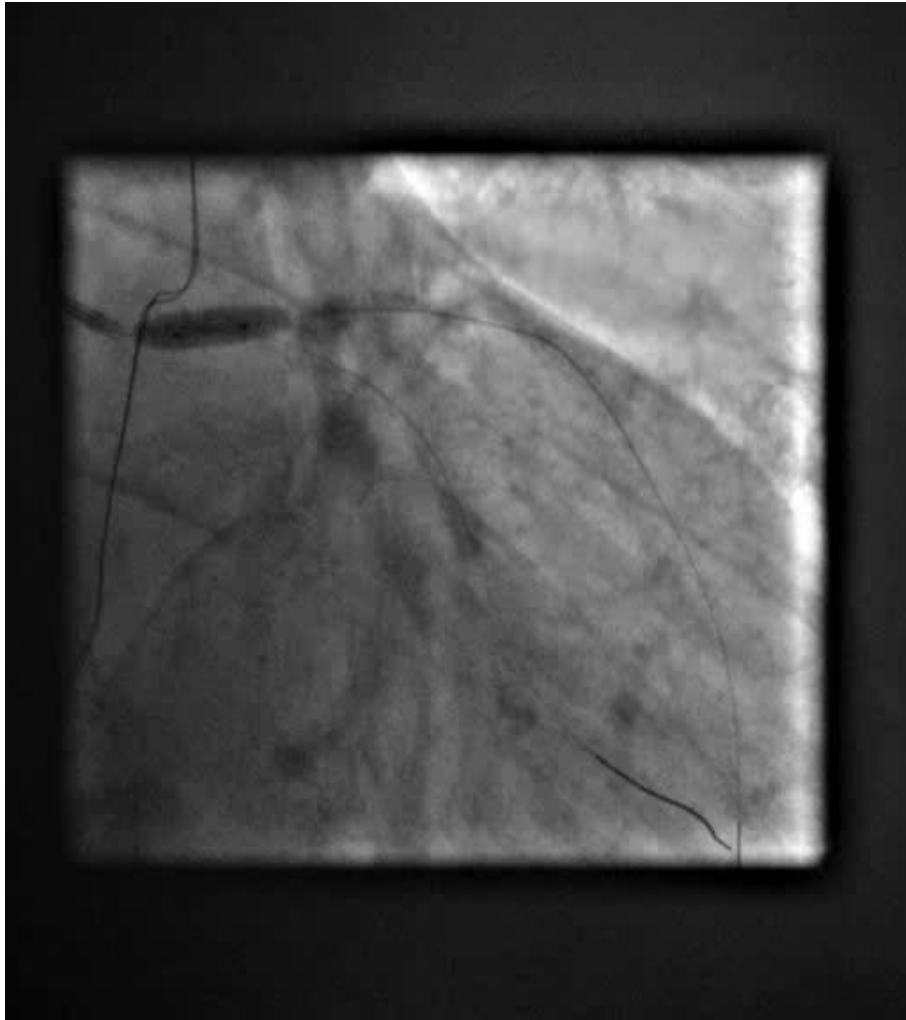
Simulated stent deployment significantly enlarges the diameter of the LAD.

A serious malapposition can be observed in the LM. Therefore, performing a proximal optimisation (POT) seems recommended before inserting an additional guidewire.

This top view shows a reduction of LCX diameter (circular => elliptic). This is due to a combination of carina shift AND a movement of the lateral wall.



# POT technique: 1 stent = 2 diameters 4.5 short balloon



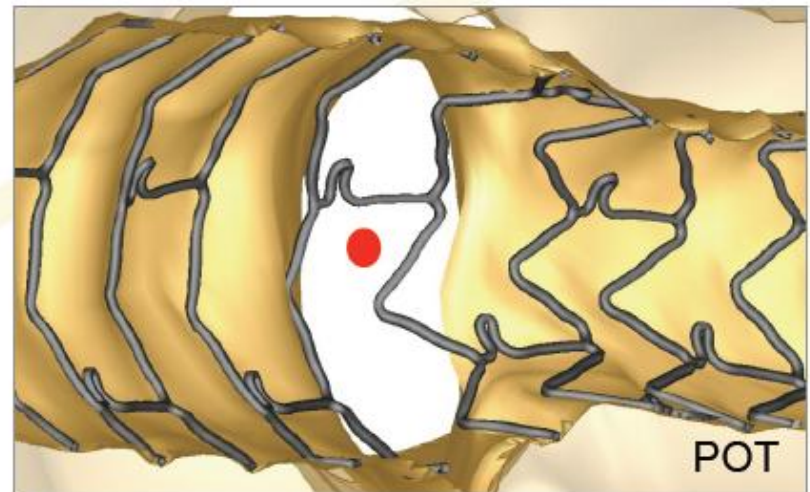
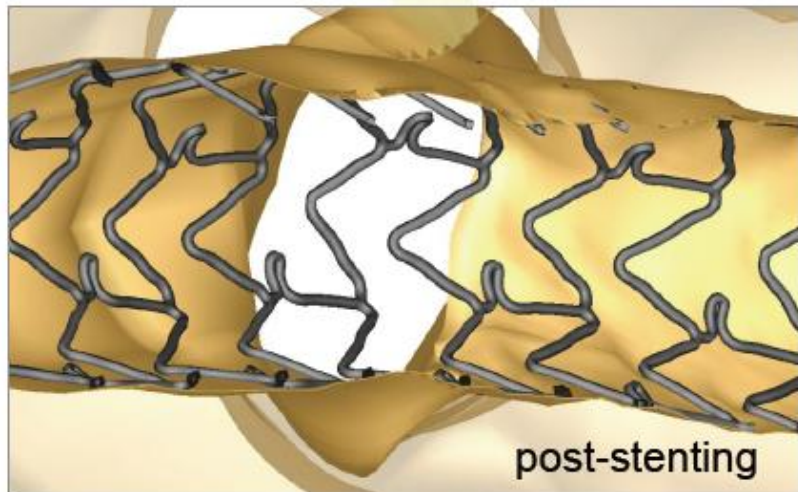


# Proximal optimisation technique (POT)

Proximal optimisation seems to reduce the number of cells covering the side branch ostium

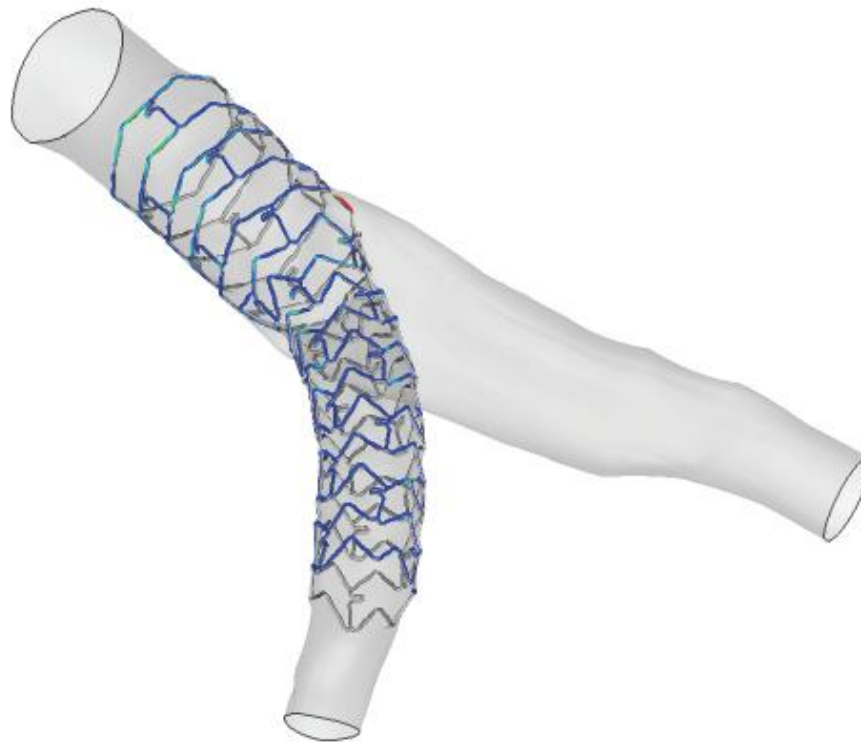
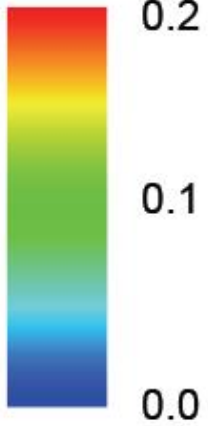
It also enlarges these cells, possibly facilitating side branch access

The location where the guidewire goes into the side branch is indicated with the red circle



# Strut apposition analysis

**Strut-artery  
distance [mm]**

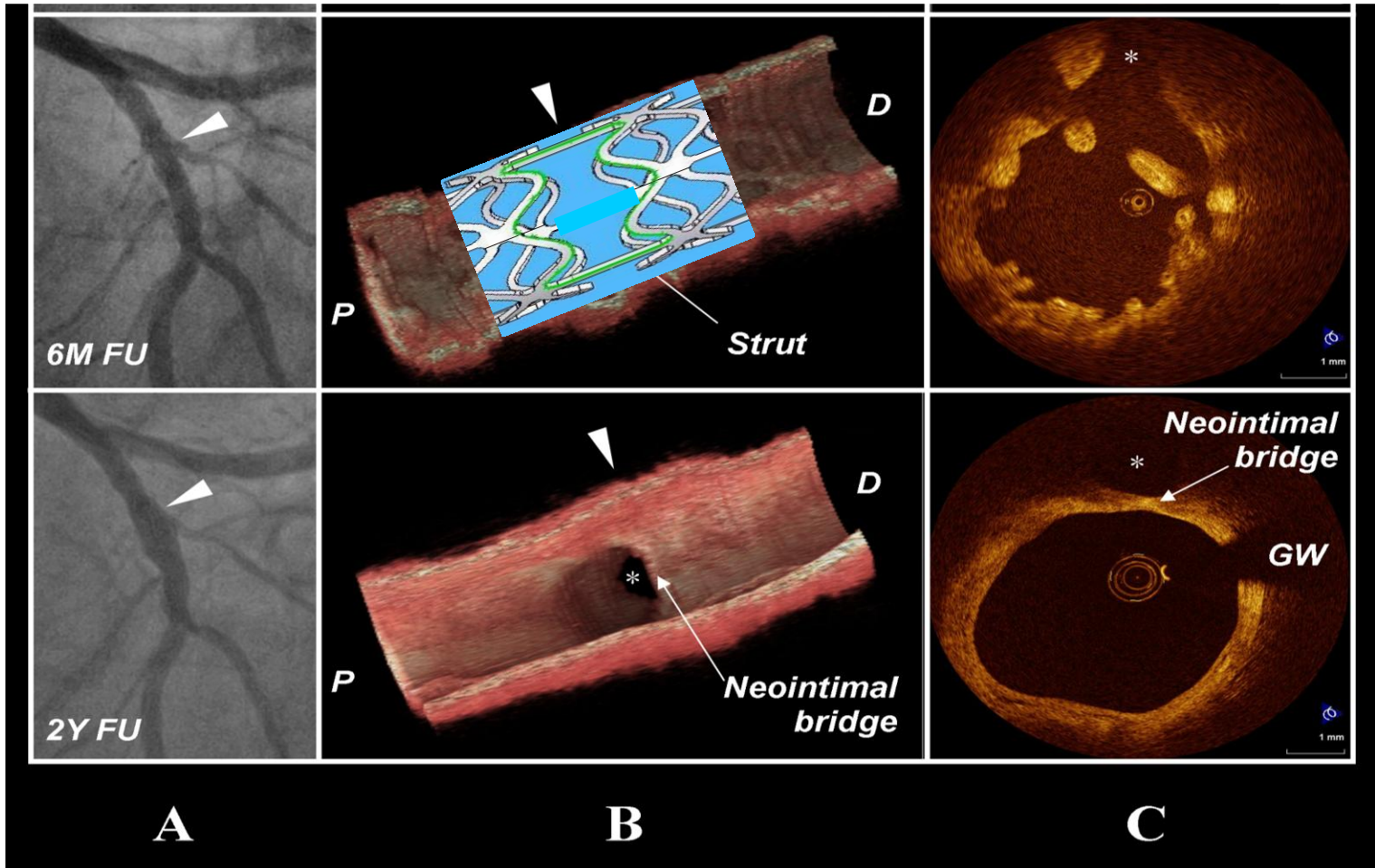




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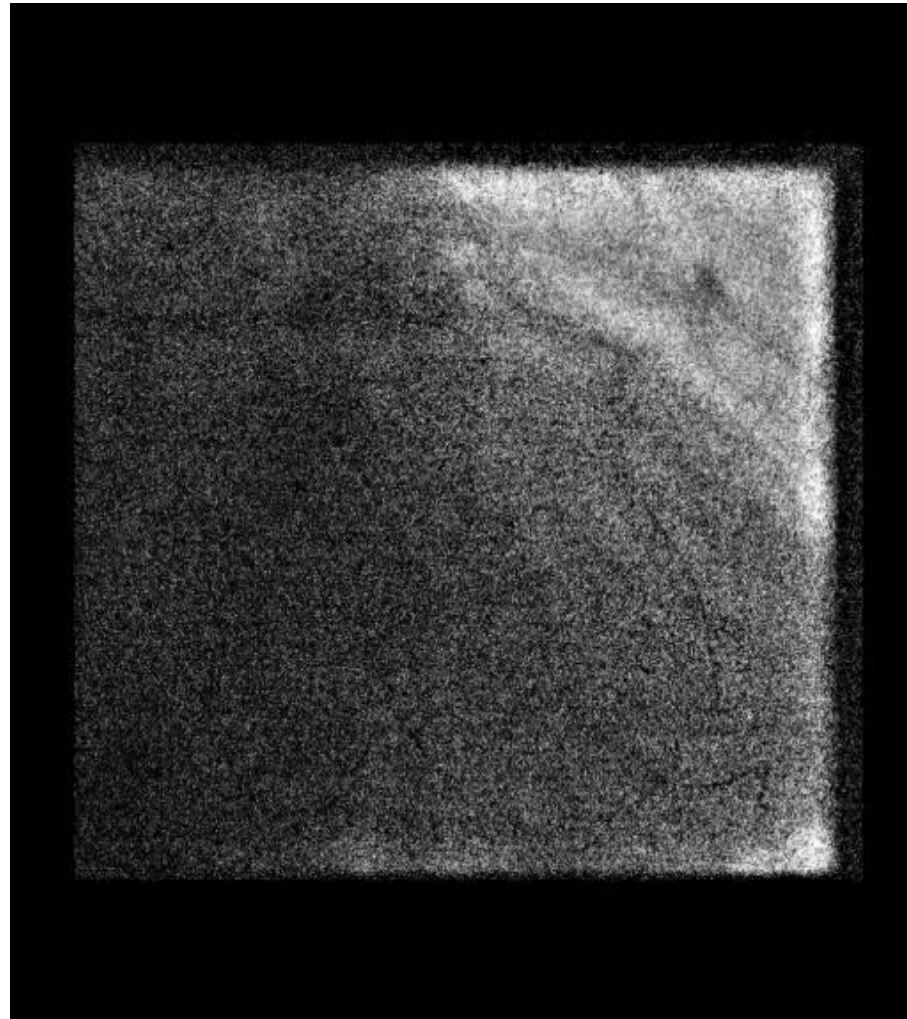
**Why, even when results seems optimal  
We always Kiss?  
To give acces to the Circ if needed in the  
future**

# Bioresorption at jailed side branch is real



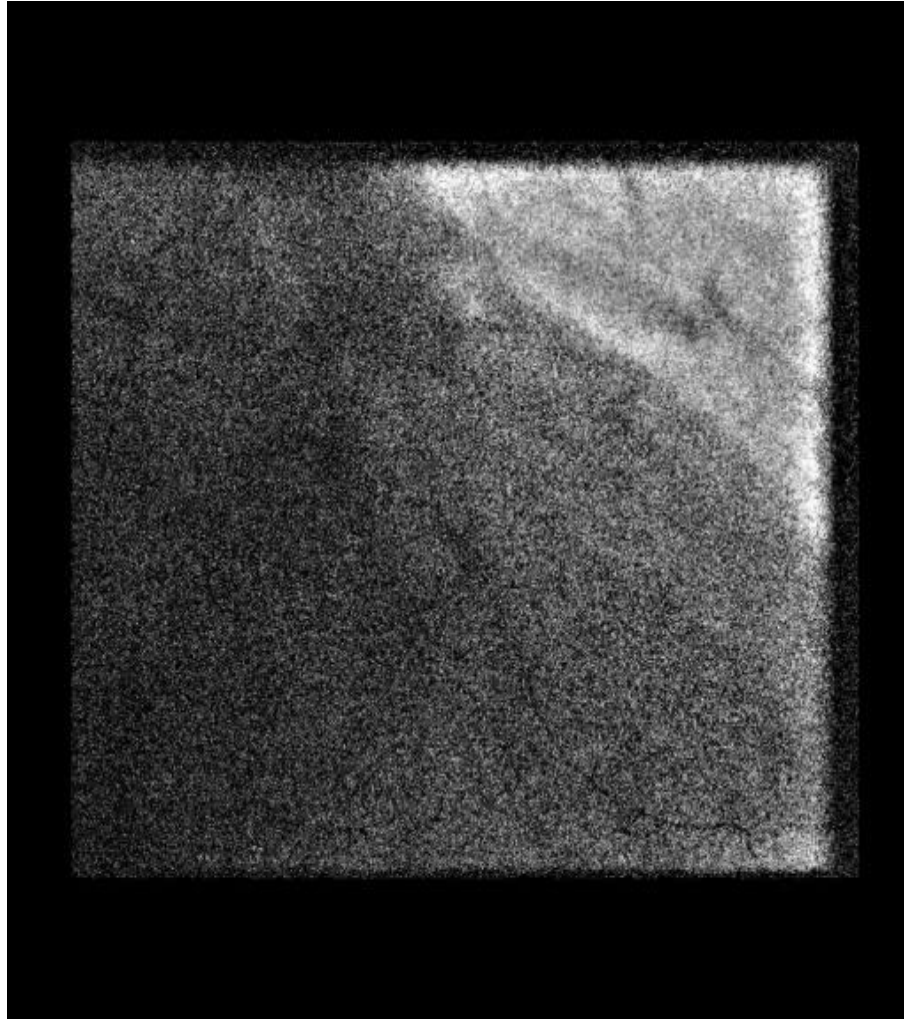


# Wire exchange: LAD wire in Cx

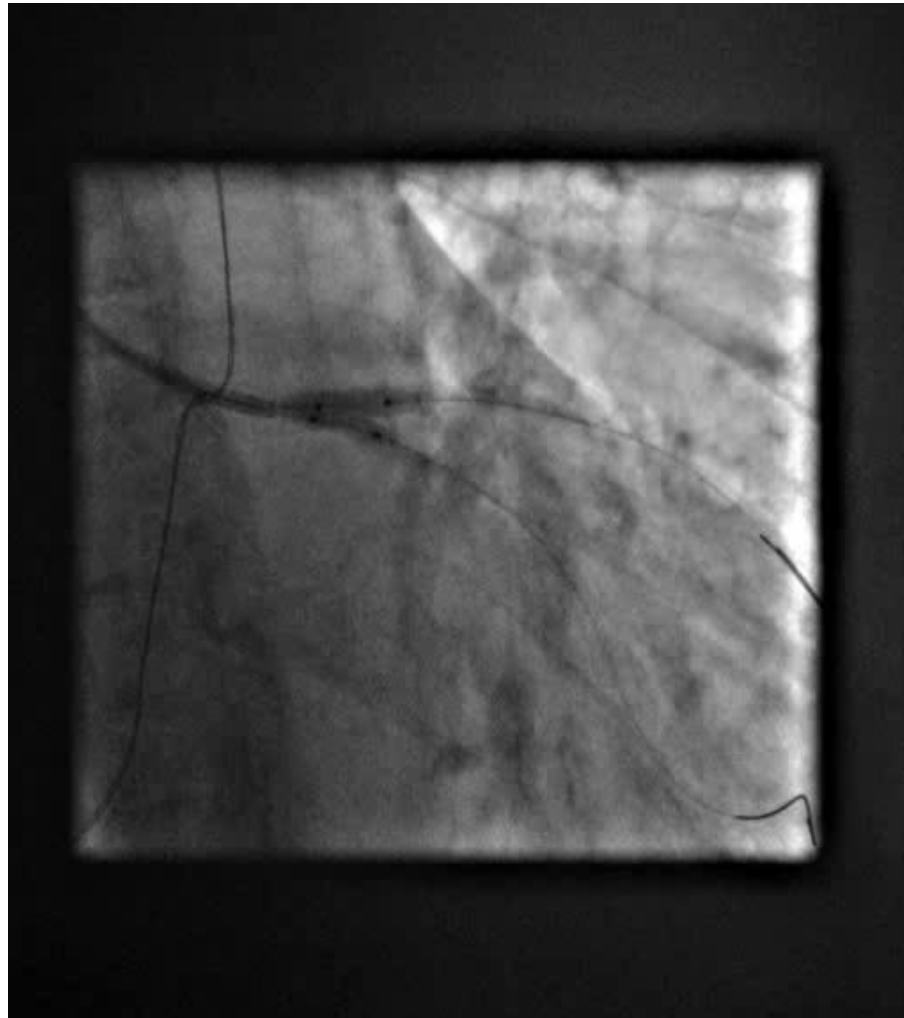




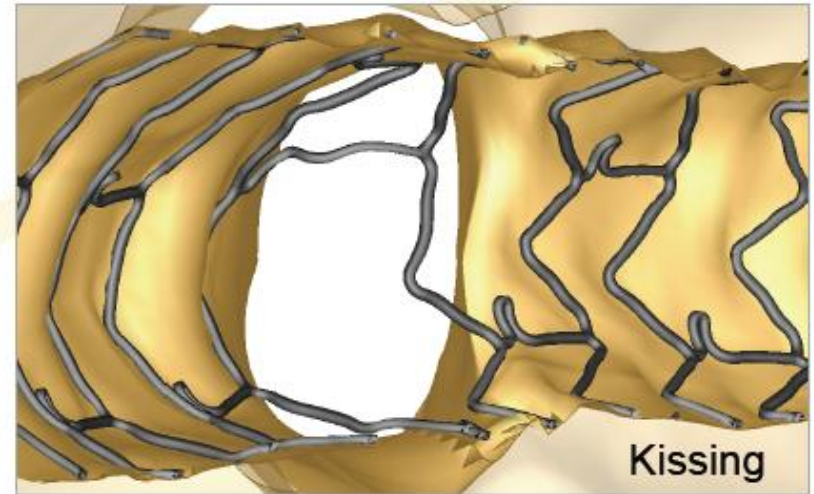
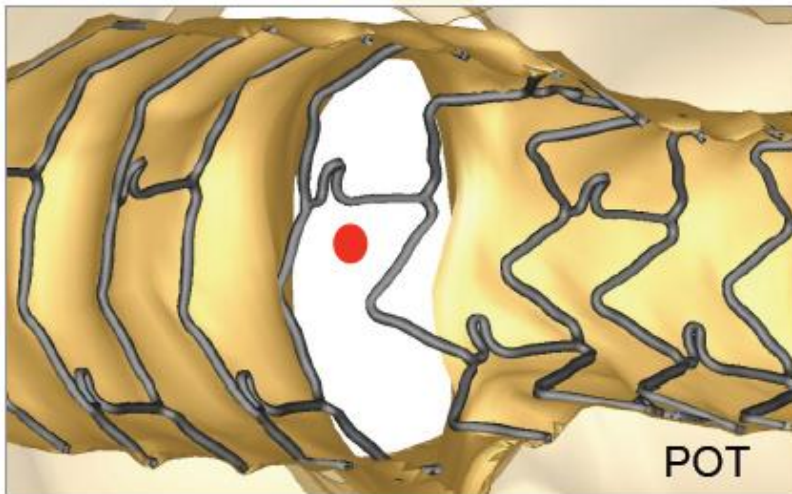
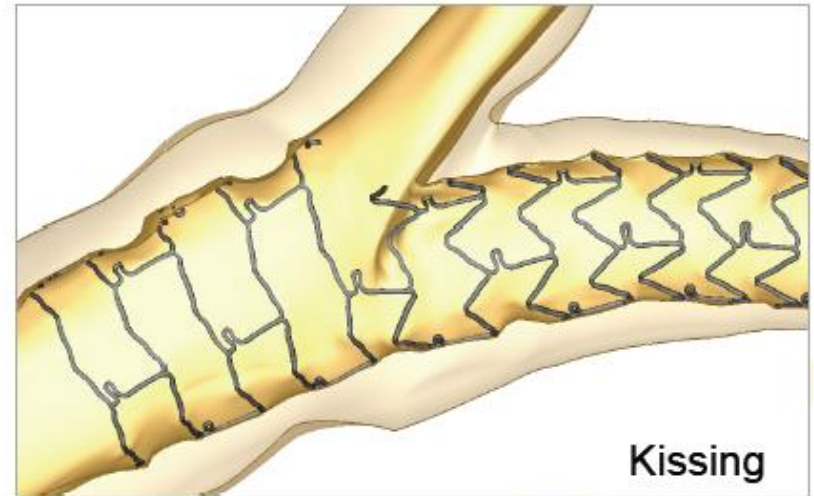
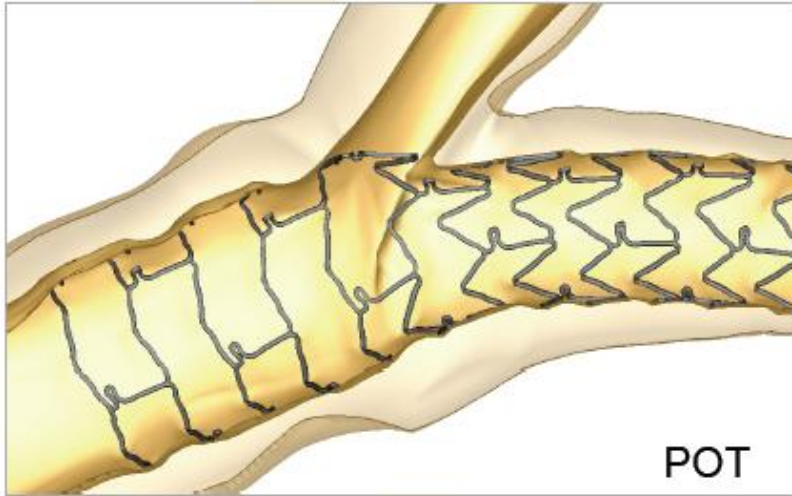
## Wire exchange: Cx wire in LAD



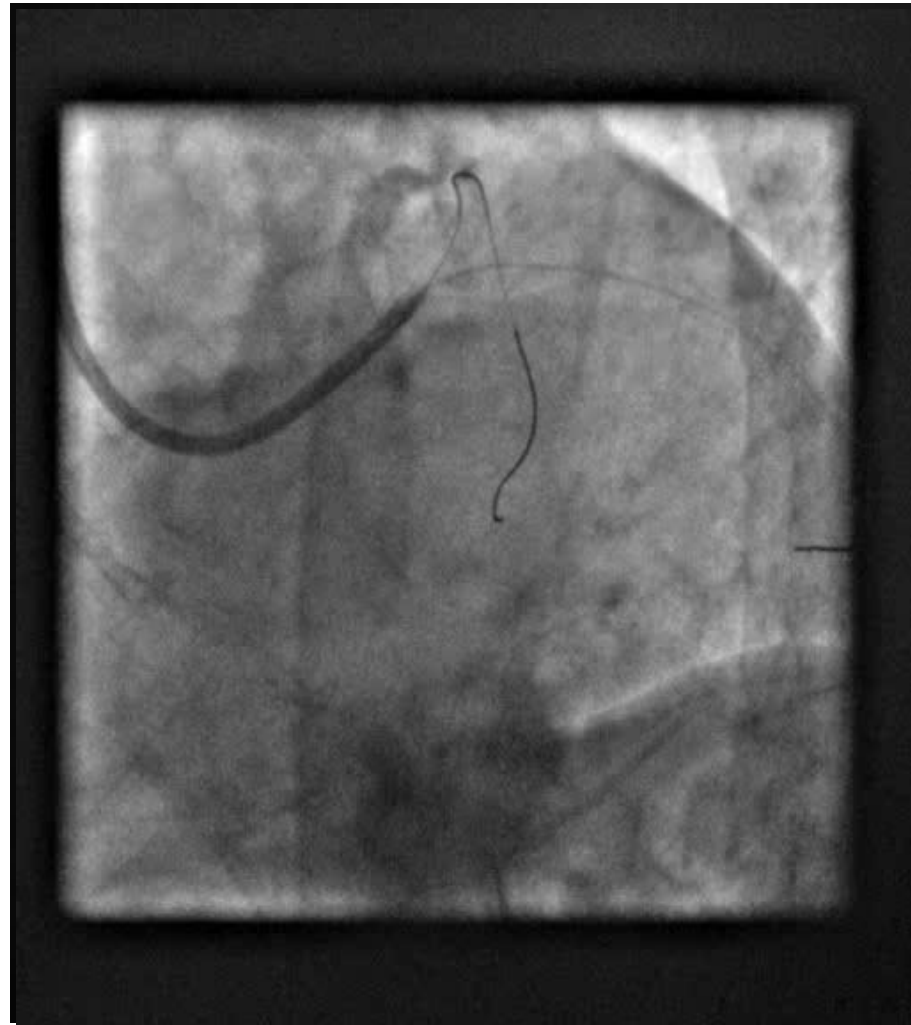
# Kissing balloon inflation (Hiryu NC 3,5X10, 3X10) just the nose in the CX



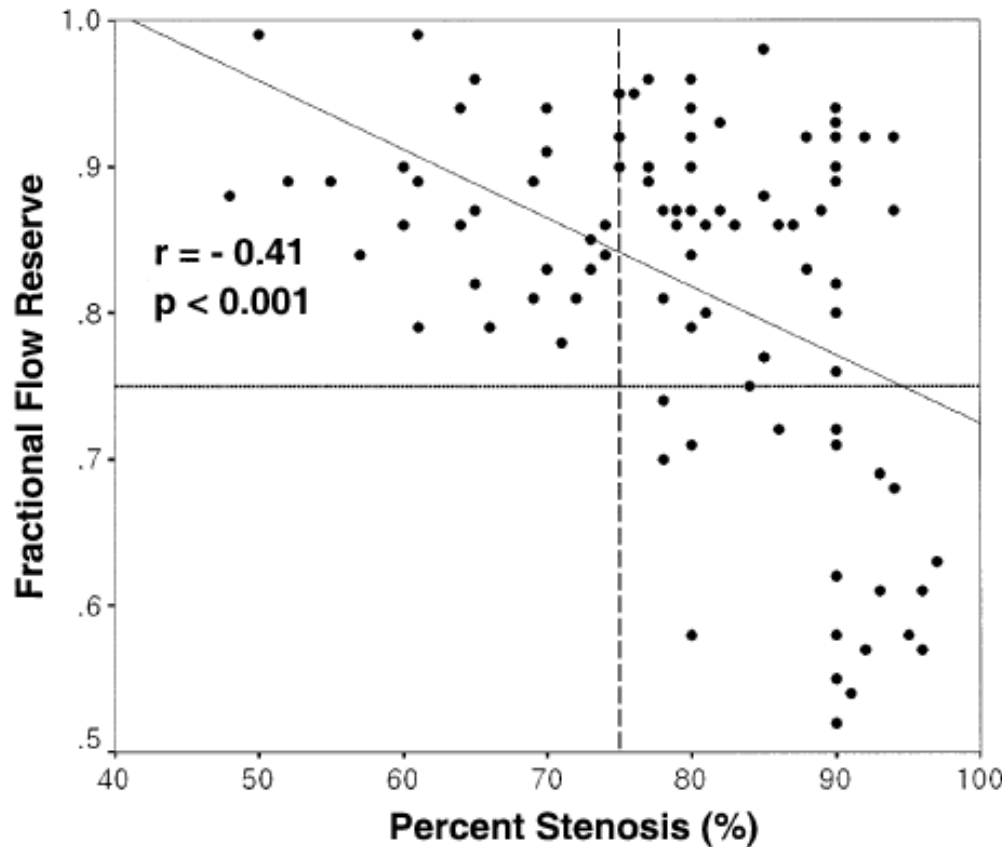
# Final kissing inflation



# Post Kissing balloon inflation



# Correlation Between FFR and % Stenosis (QCA) in Jailed SB



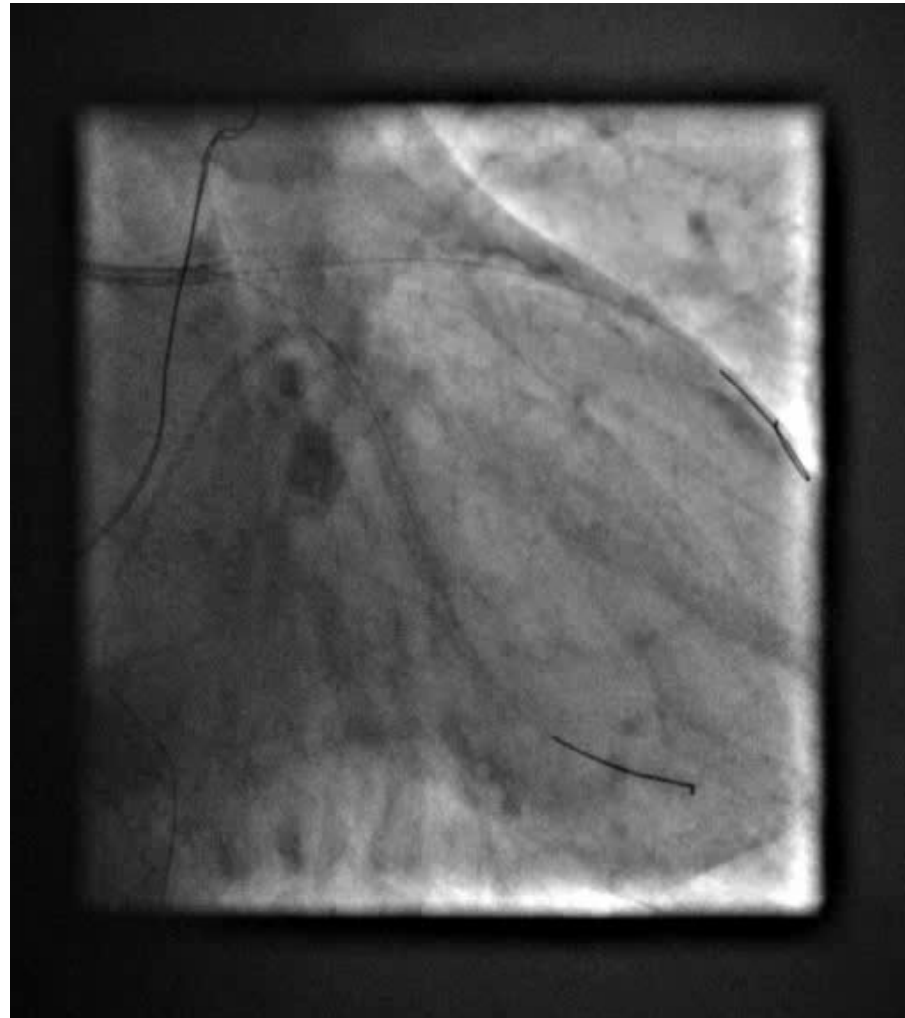
No lesion with <75% stenosis had FFR<0.75.

**Among 73 lesions with  $\geq 75\%$  stenosis, only 20 lesions were functionally significant.**

*Koo BK et al J Am Coll Cardiol  
2005;46:633–7)*



# Post Kissing balloon inflation, FFR mesurment: 0.90

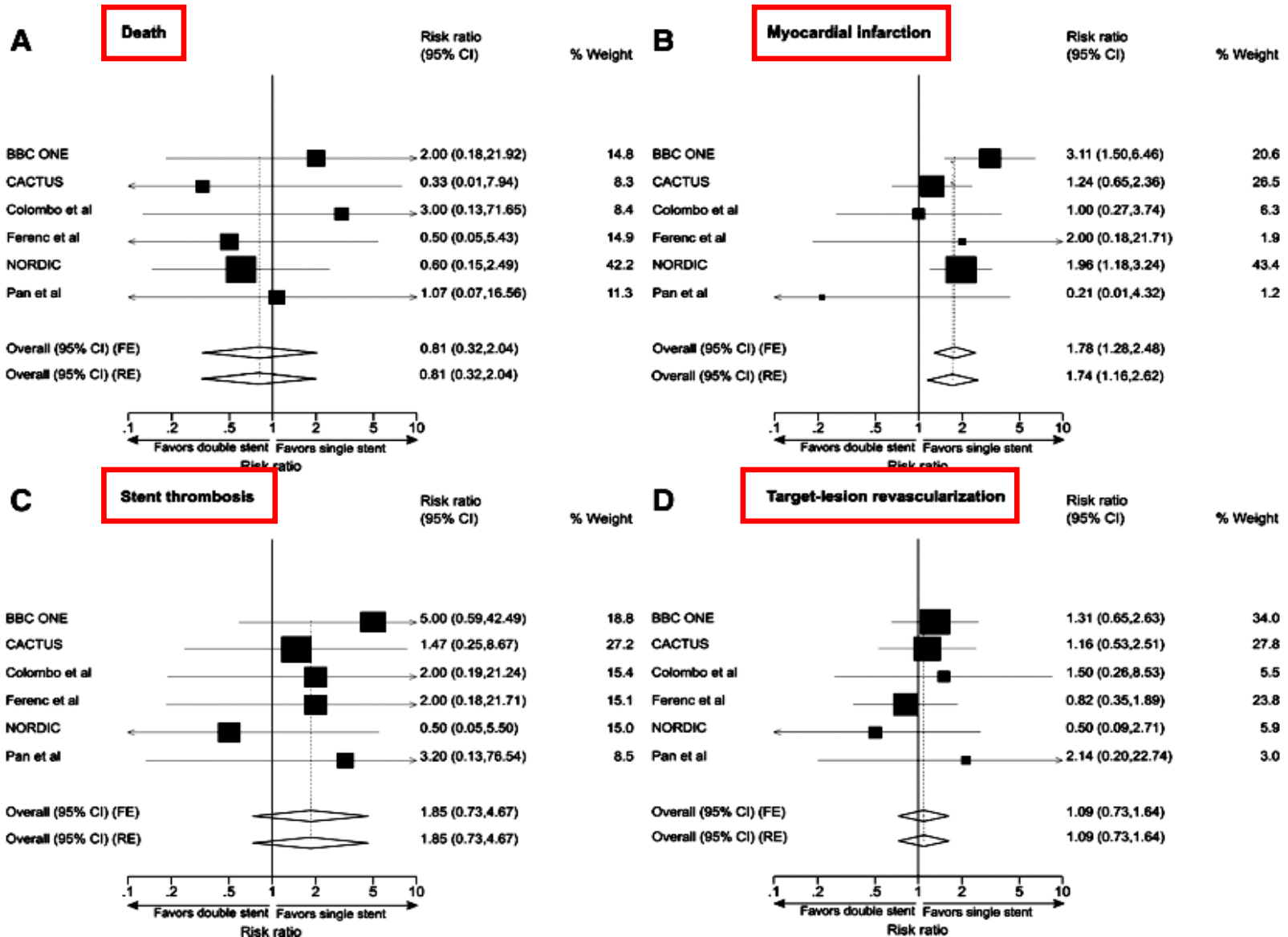




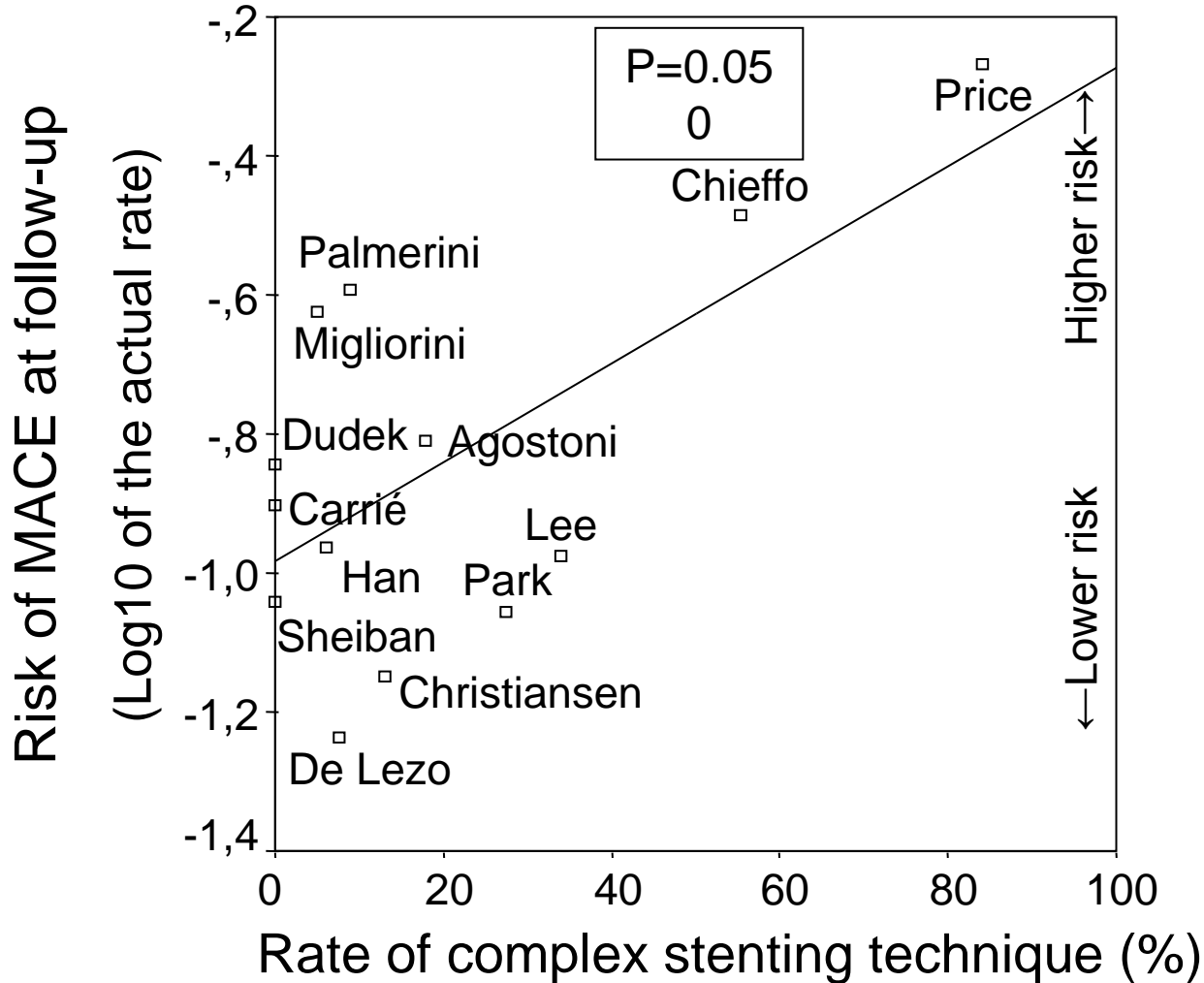
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# Why 1 stent as often as possible?

# Double vs Single Stenting for (non LM) Coronary Bifurcation



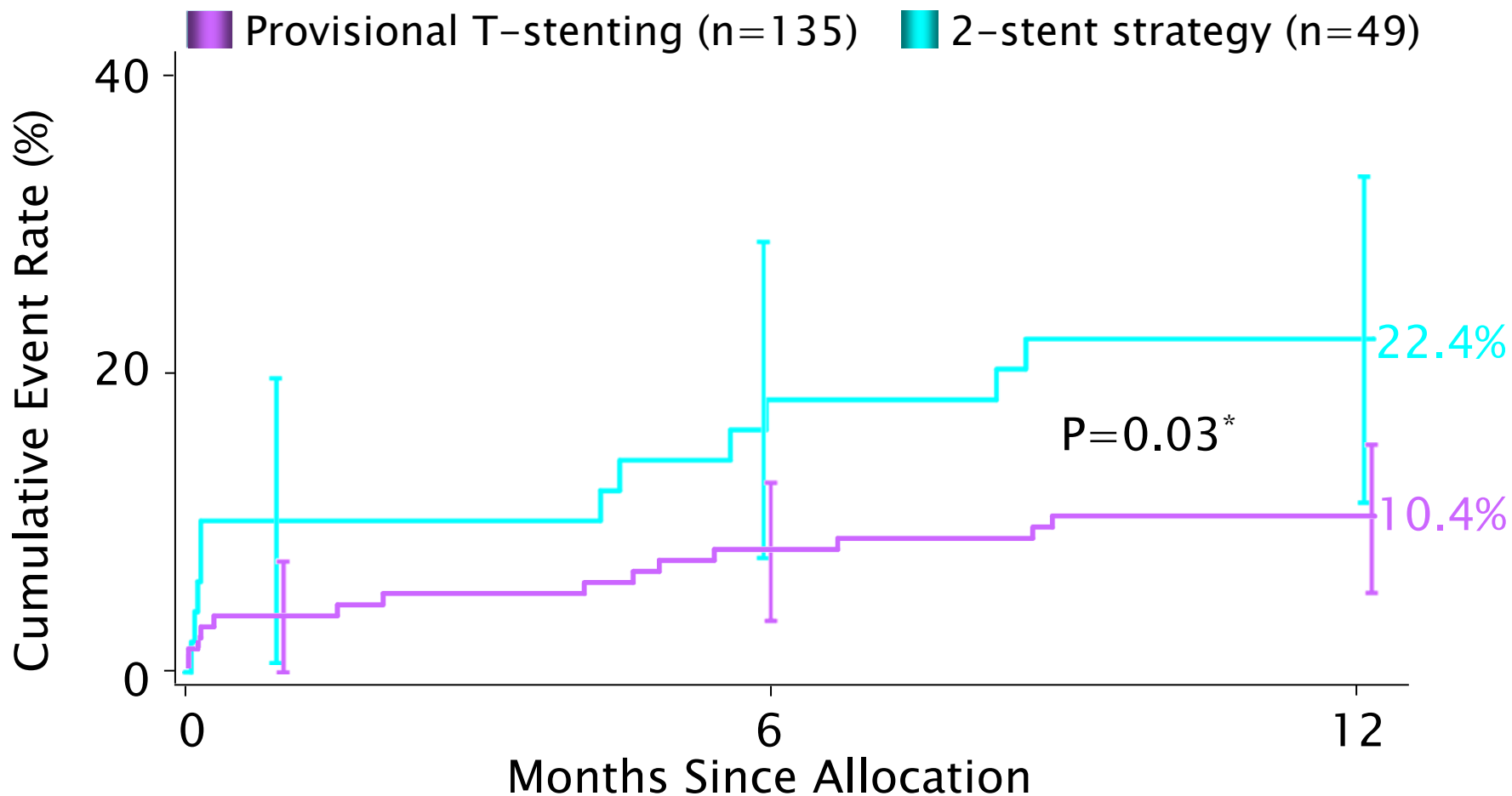
# A metaanalysis on 1274 patients with DES for ULM disease: Stenting technique and MACE rate



**Patients treated with 2 stents are significantly more likely to have MACE**

# SYNTAX, MACCE to 12 Months

## LM PCI Subset



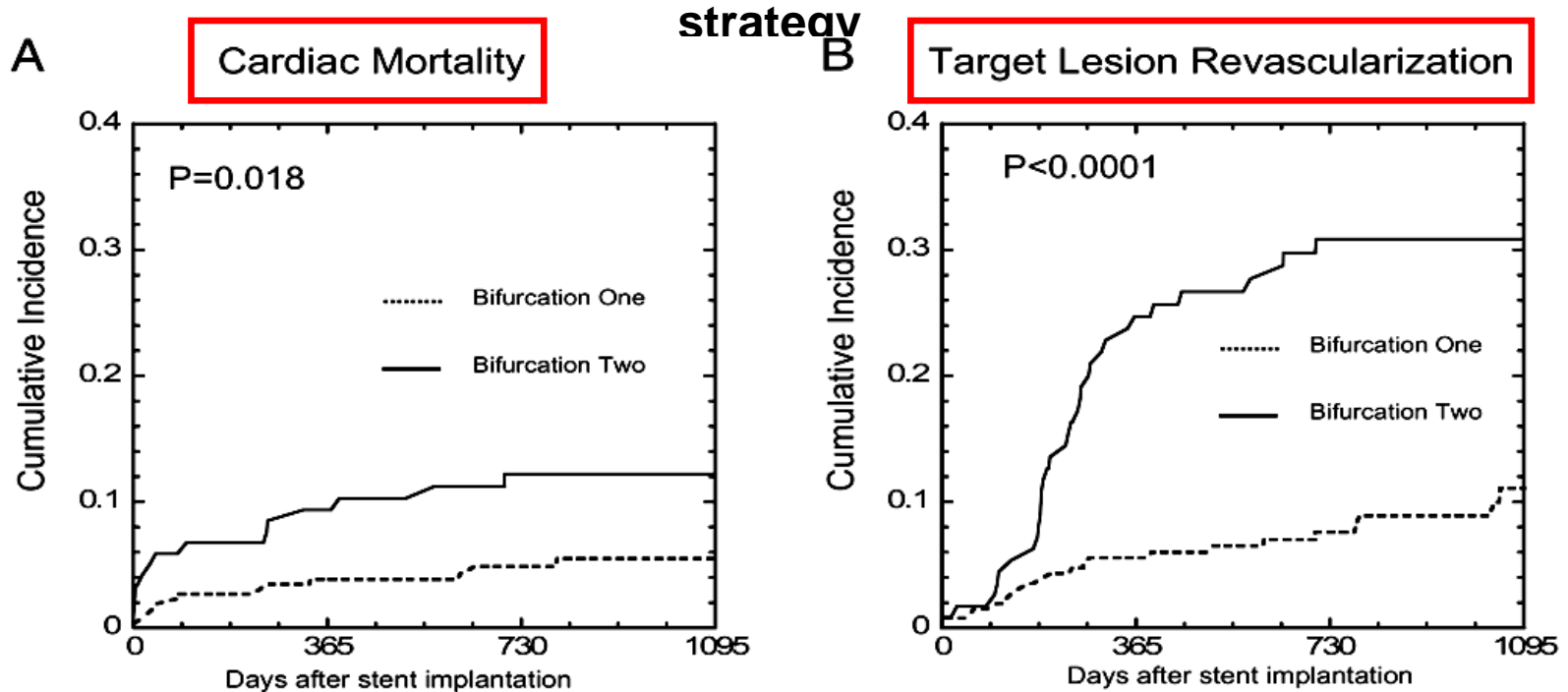
Event Rate  $\pm$  1.5 SE, \*Fisher exact test

ITT population



# 3Y Outcomes After SES Implantation for ULM Coronary Artery Disease: Insights From the j-Cypher Registry

Cardiac death and TLR in pts treated for ULMCA / distal bifurcation stenting



Day	0	365	730	1095
<b>Bifurcation One</b>				
Incidence (%)		3.9	4.9	5.5
No. at risk	261	242	180	86
<b>Bifurcation Two</b>				
Incidence (%)		9.4	12.2	12.2
No. at risk	119	105	86	52

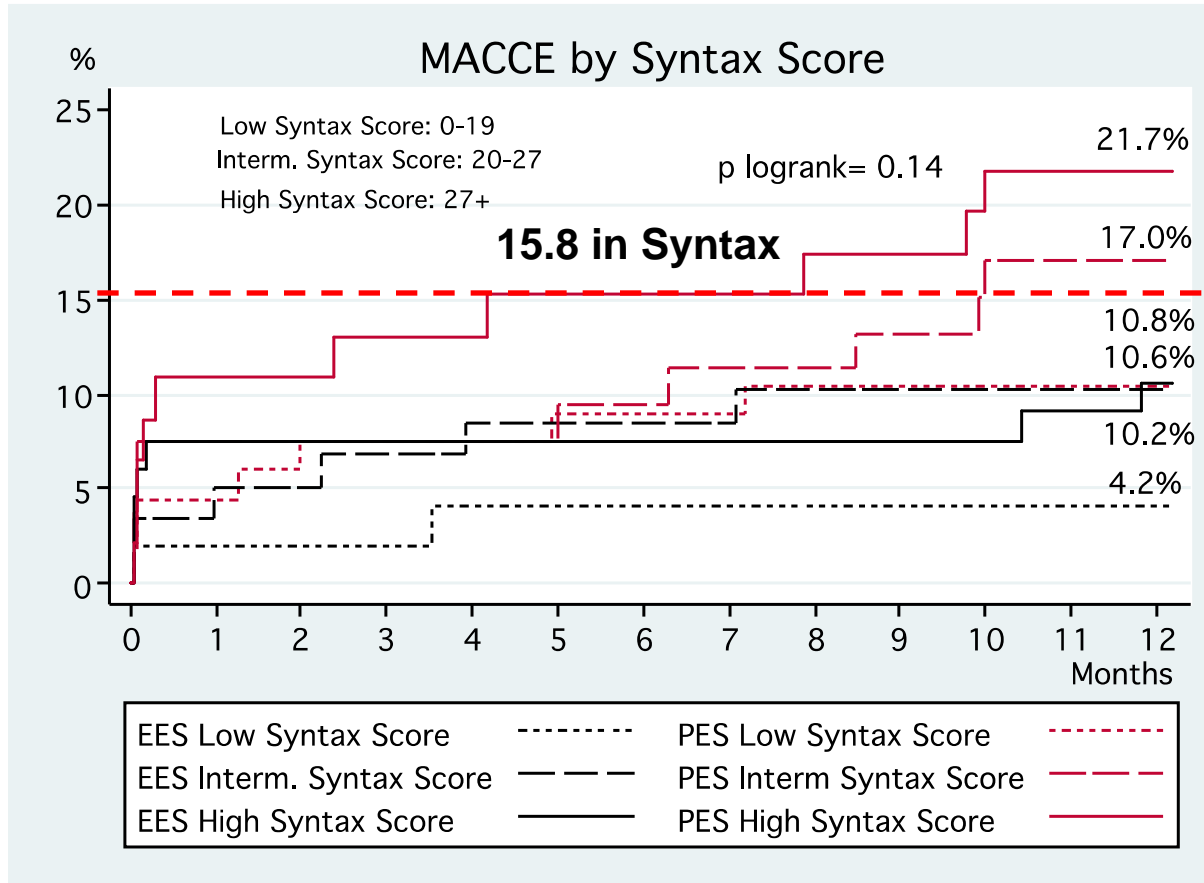
Day	0	365	730	1095
<b>Bifurcation One</b>				
Incidence (%)		5.6	7.6	11.1
No. at risk	261	229	161	76
<b>Bifurcation Two</b>				
Incidence (%)		24.6	30.9	30.9
No. at risk	119	81	62	37

# Final



# Left main Taxus/Xience French Registry

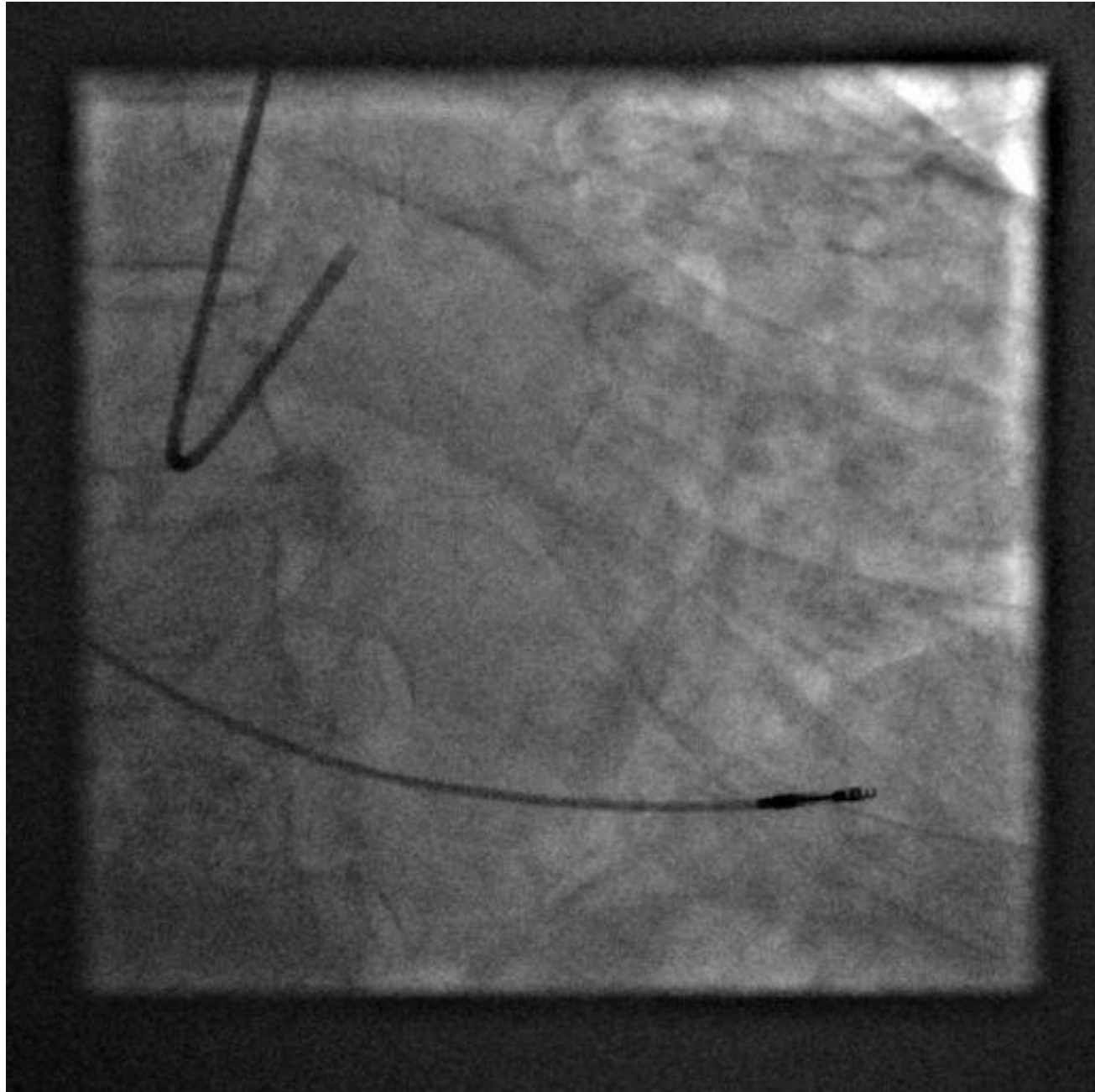
MACCE (Death + MI + clinically-driven TLR + CABG + Stroke)



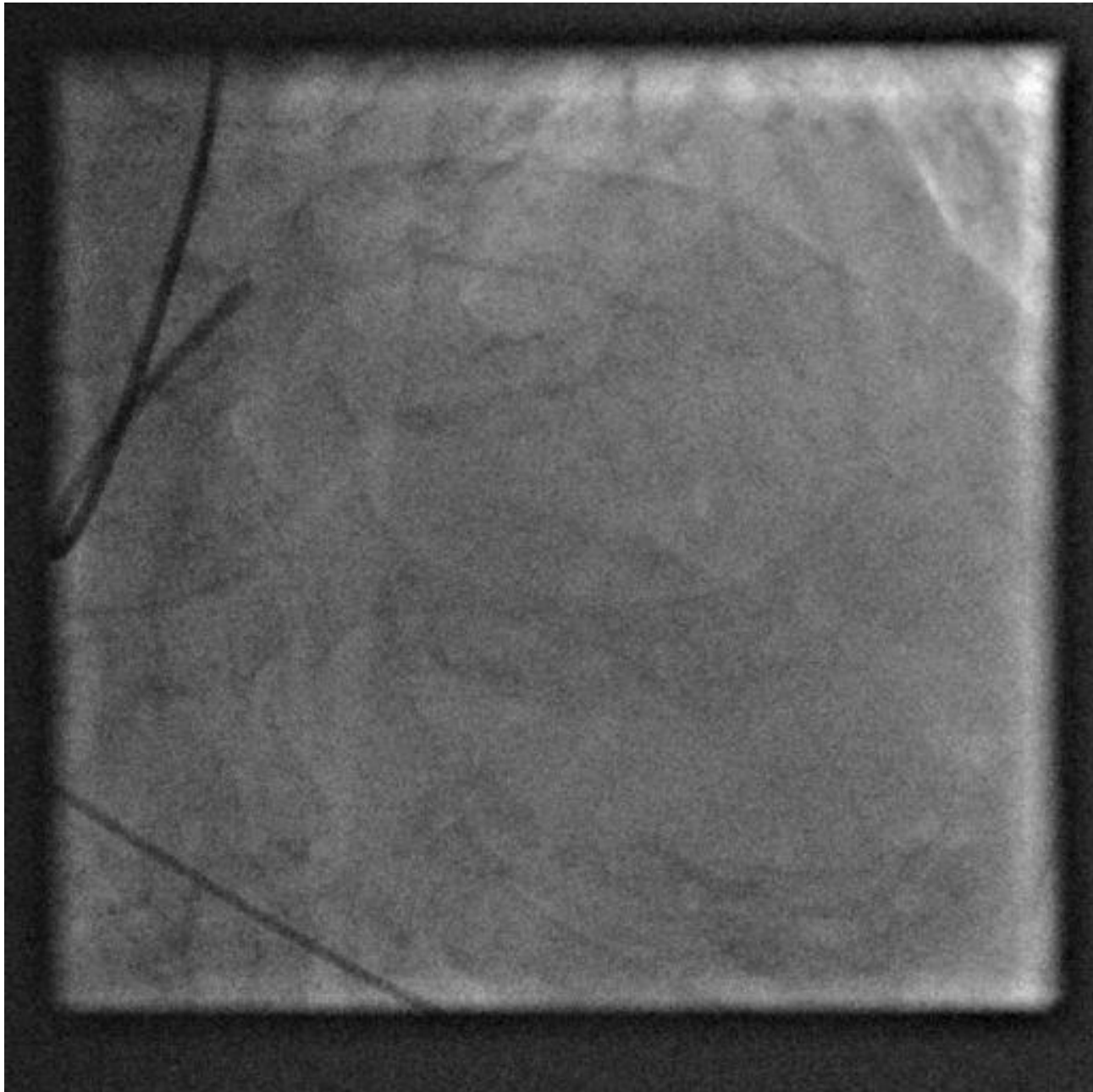
## Case

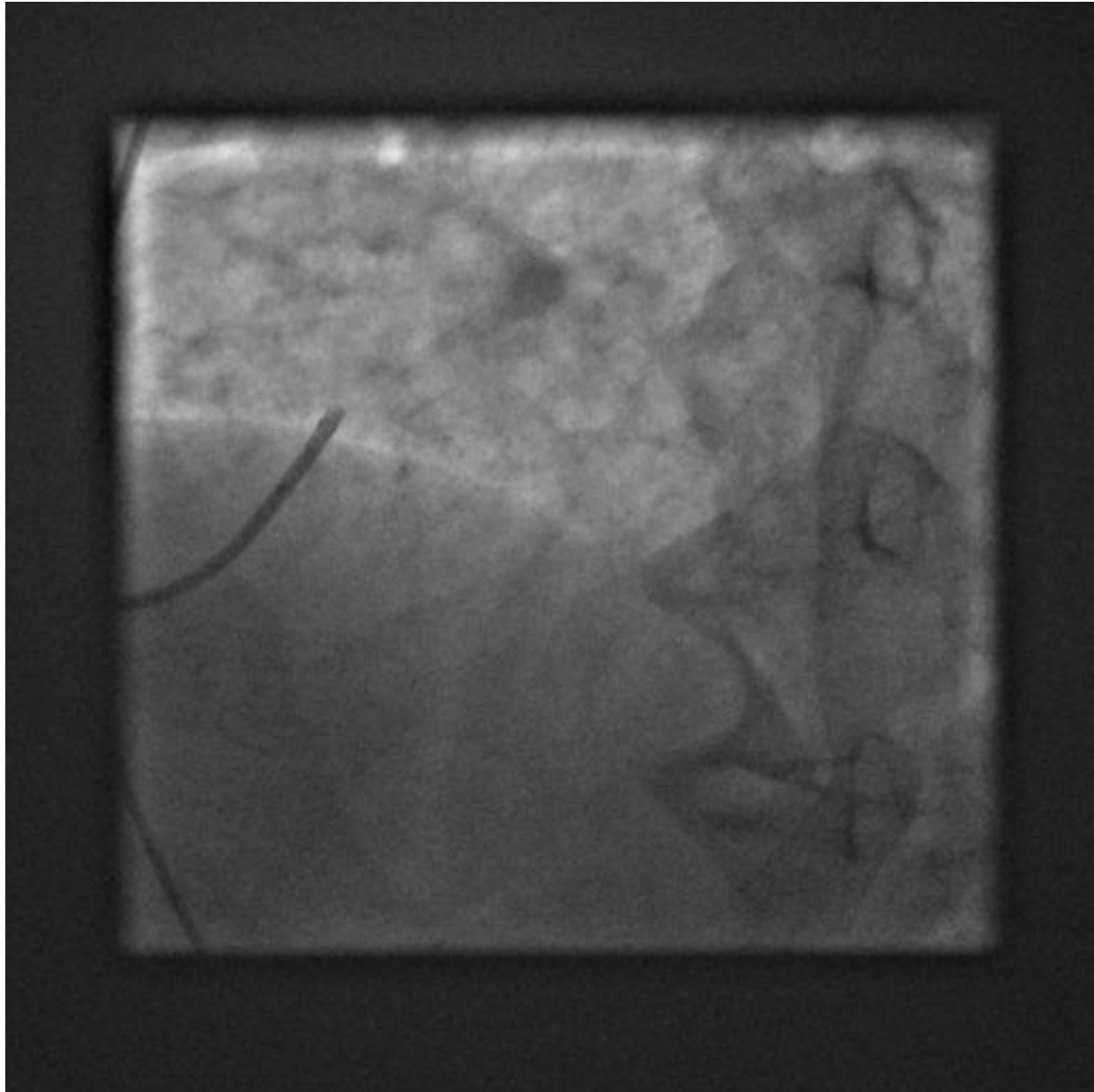
- **76 y.o. male**
  - BMI 25
- **Presentation Hx**
  - Class II angina
  - NYHA II
- **Cardiovascular Risk Factors**
  - Hypertension
  - Dyslipidemia
- **Cardiovascular Hx**
  - Nil
- **Medical Hx**
  - Nil
- **Laboratory Results**
  - Creatinine Clearance 90
- **Dobutamine Stress Echocardiography**
  - Anterior apical and inferobasal wall hypokinesis

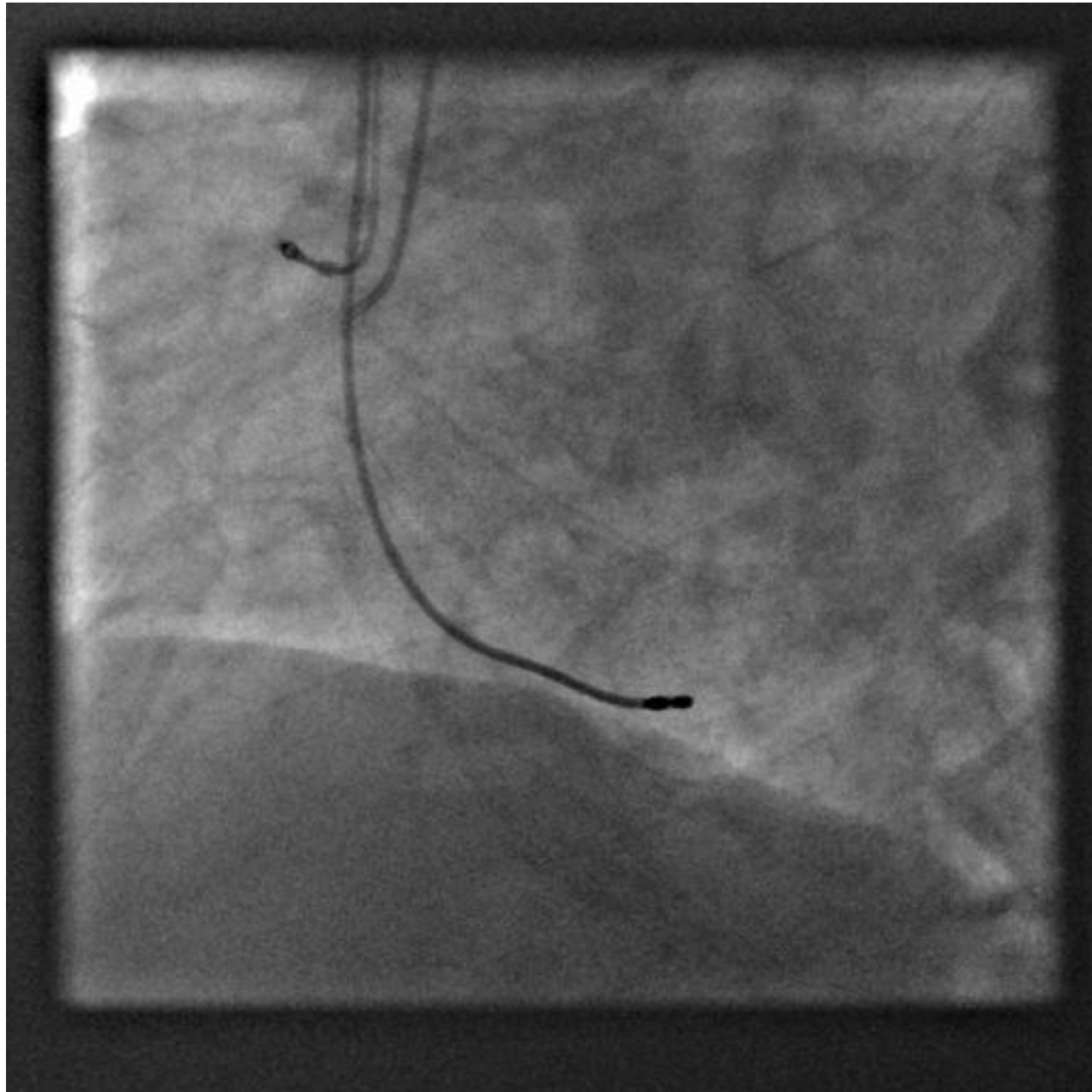
**Coronary Angiogram planned**







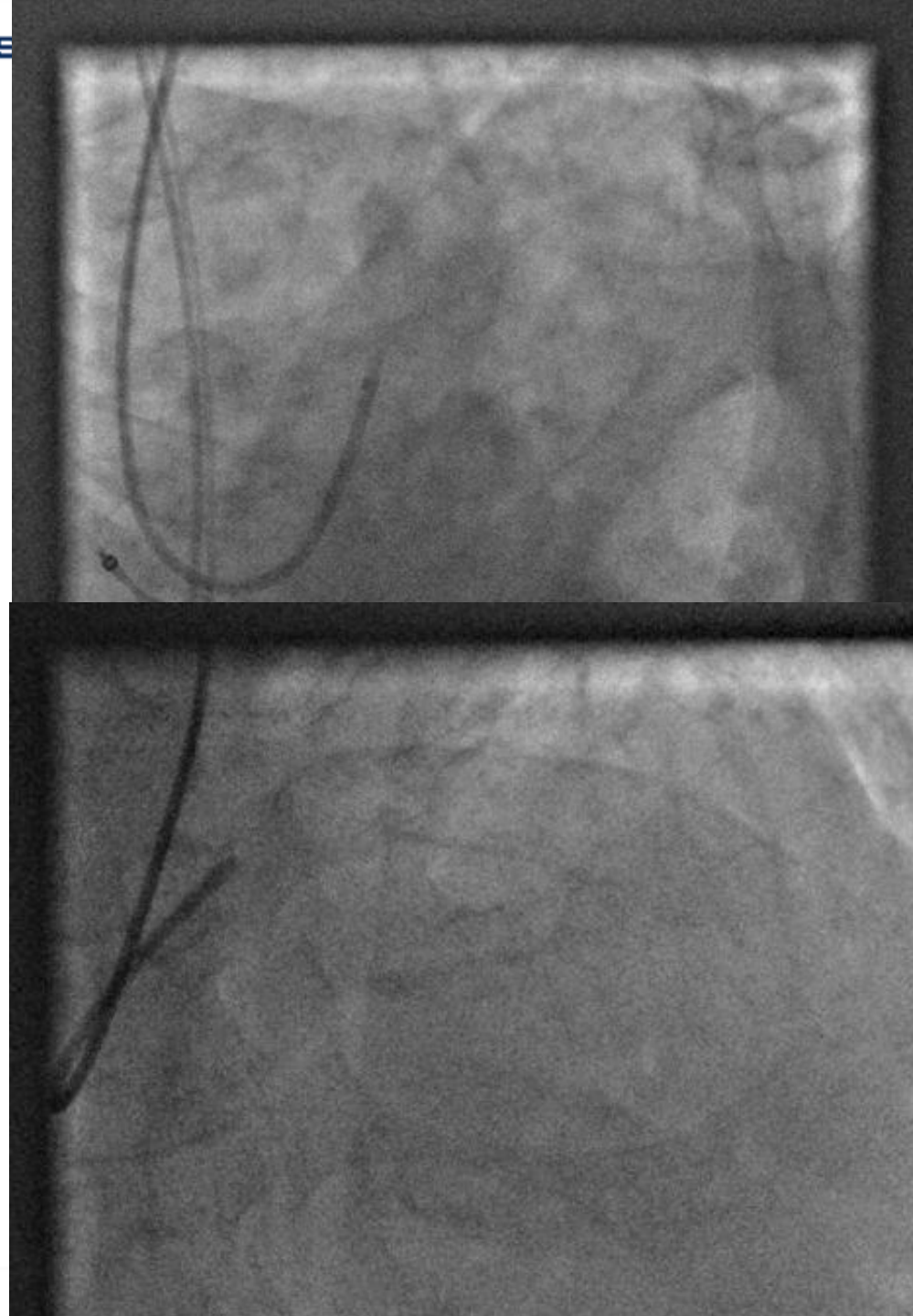




- Distal LM Bifurcation  
Medina 1.1.0
- Proximal Cx stenosis
- Proximal RCA CTO
- AV fistula  
– LCA-Pulm. Artery

**Syntax score: 30**

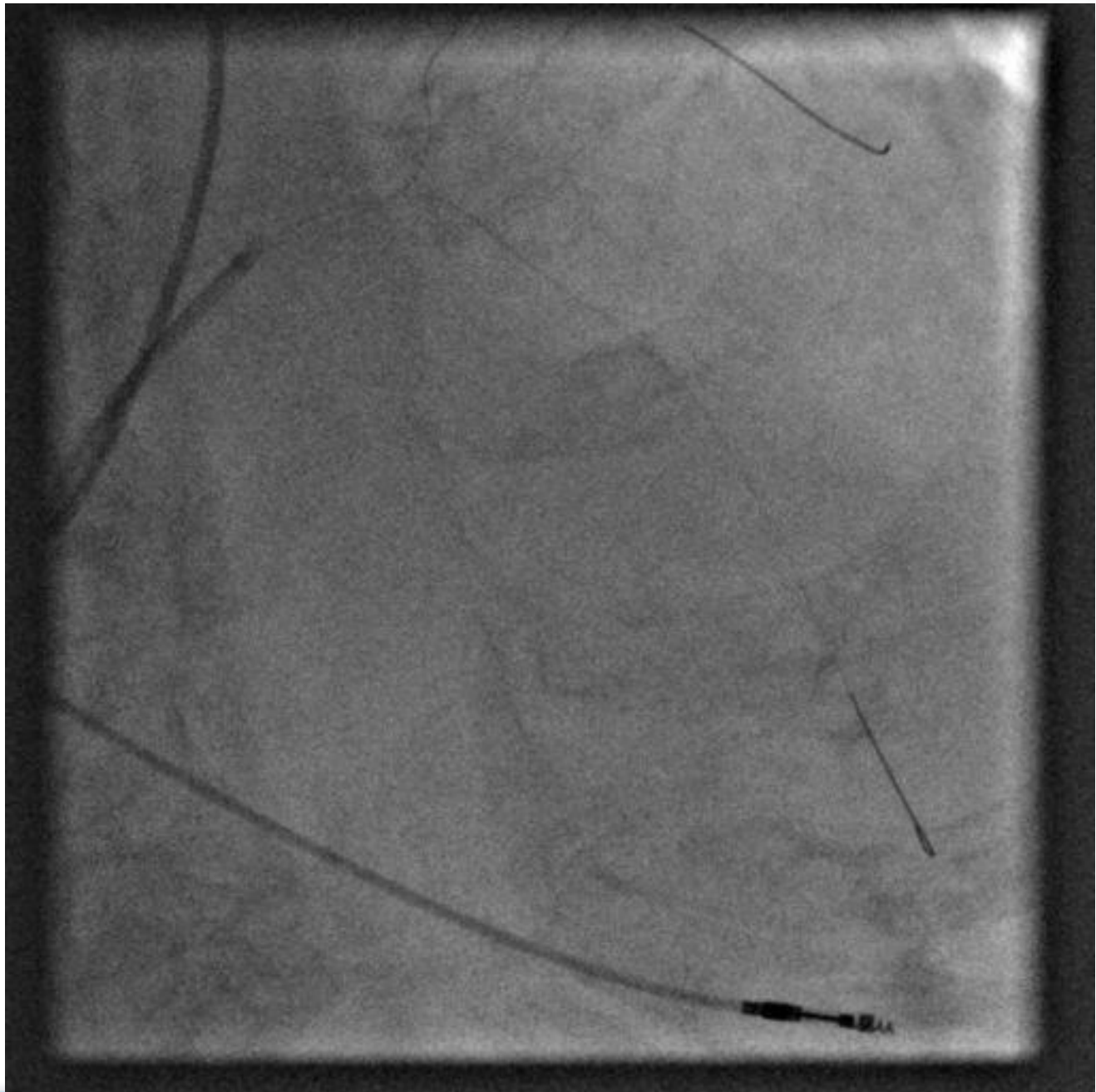
**STRATEGY???**

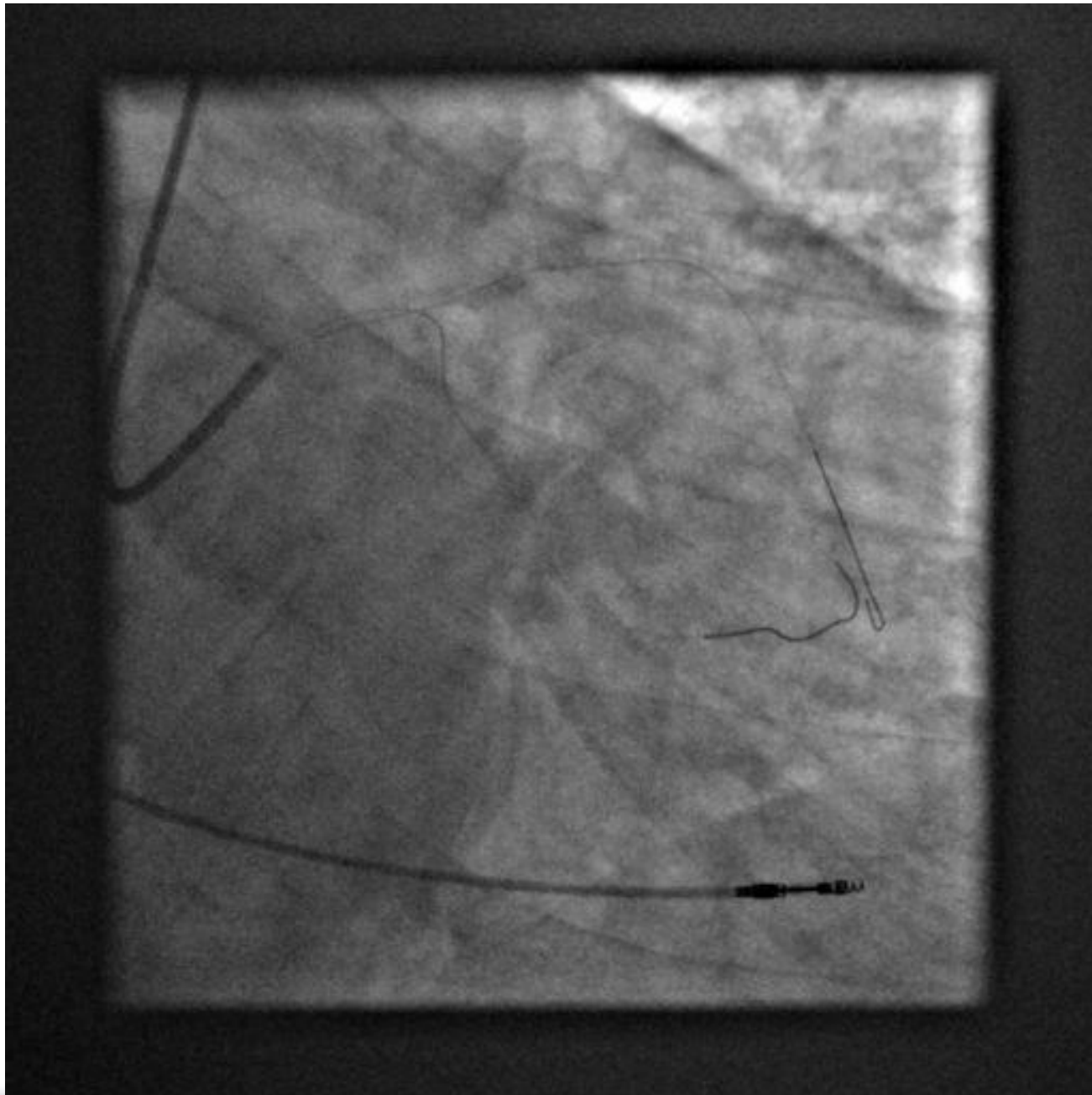




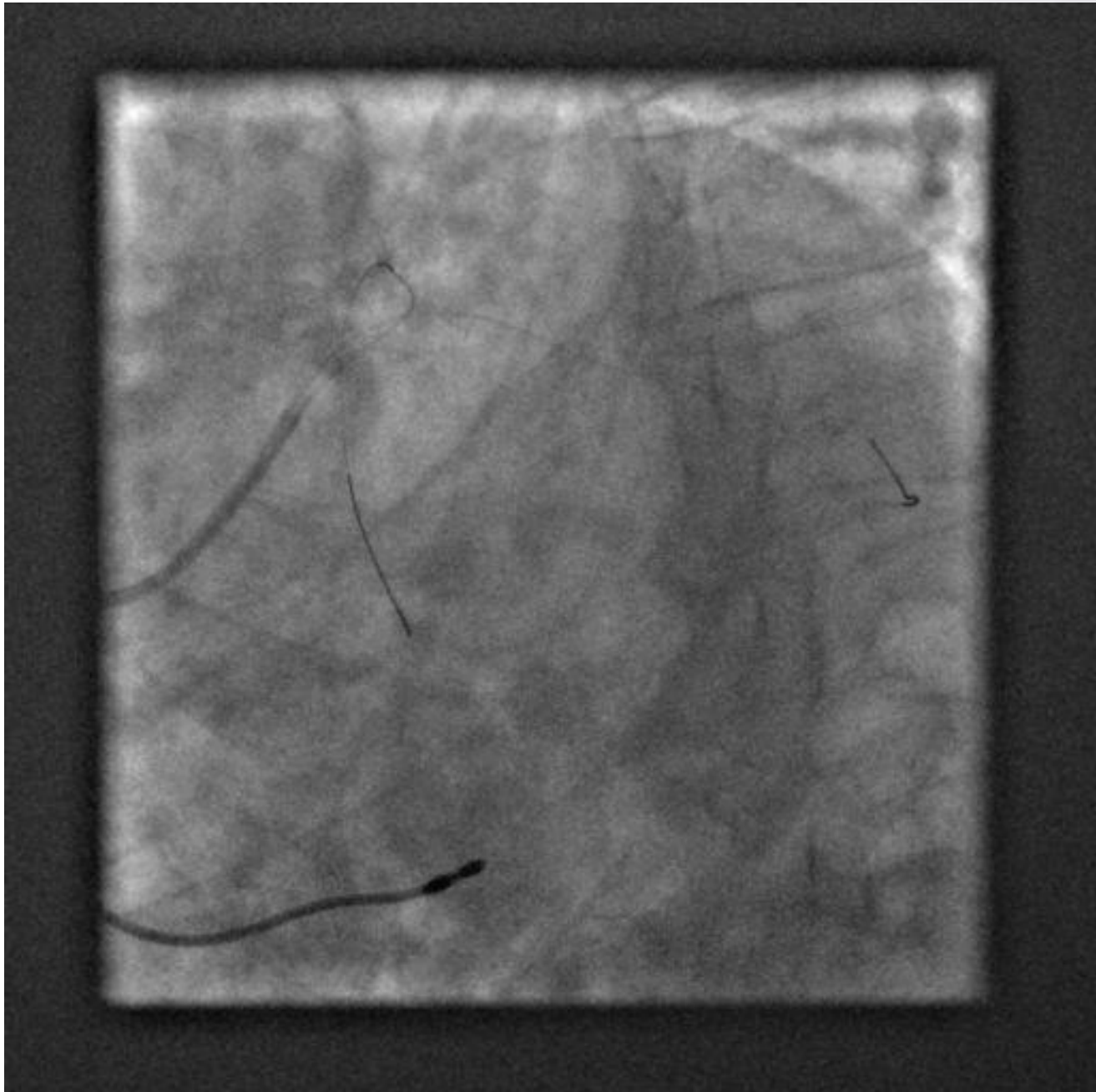
Runthrough  
NS floppy x2

EBU 4.0  
6F

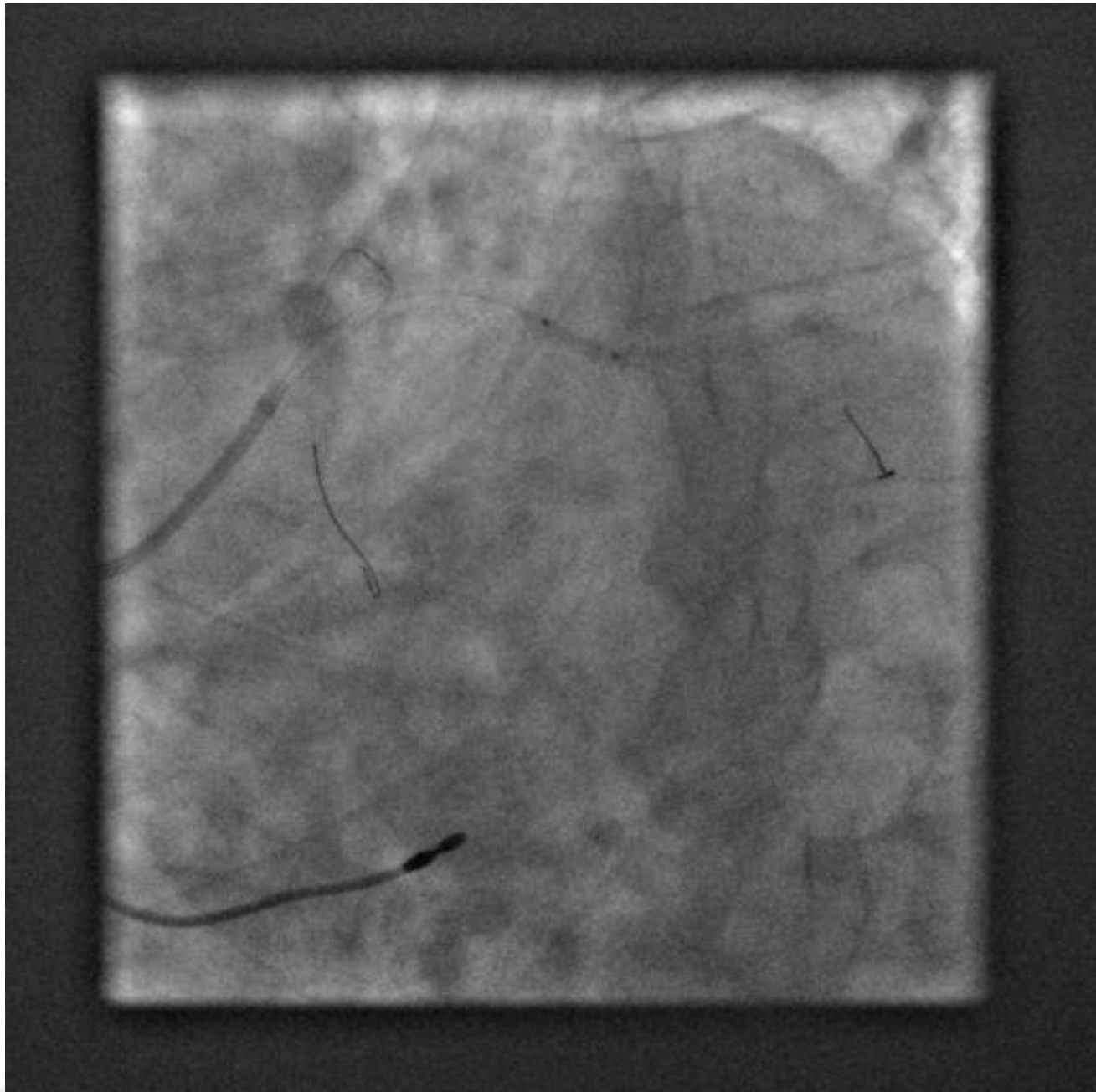




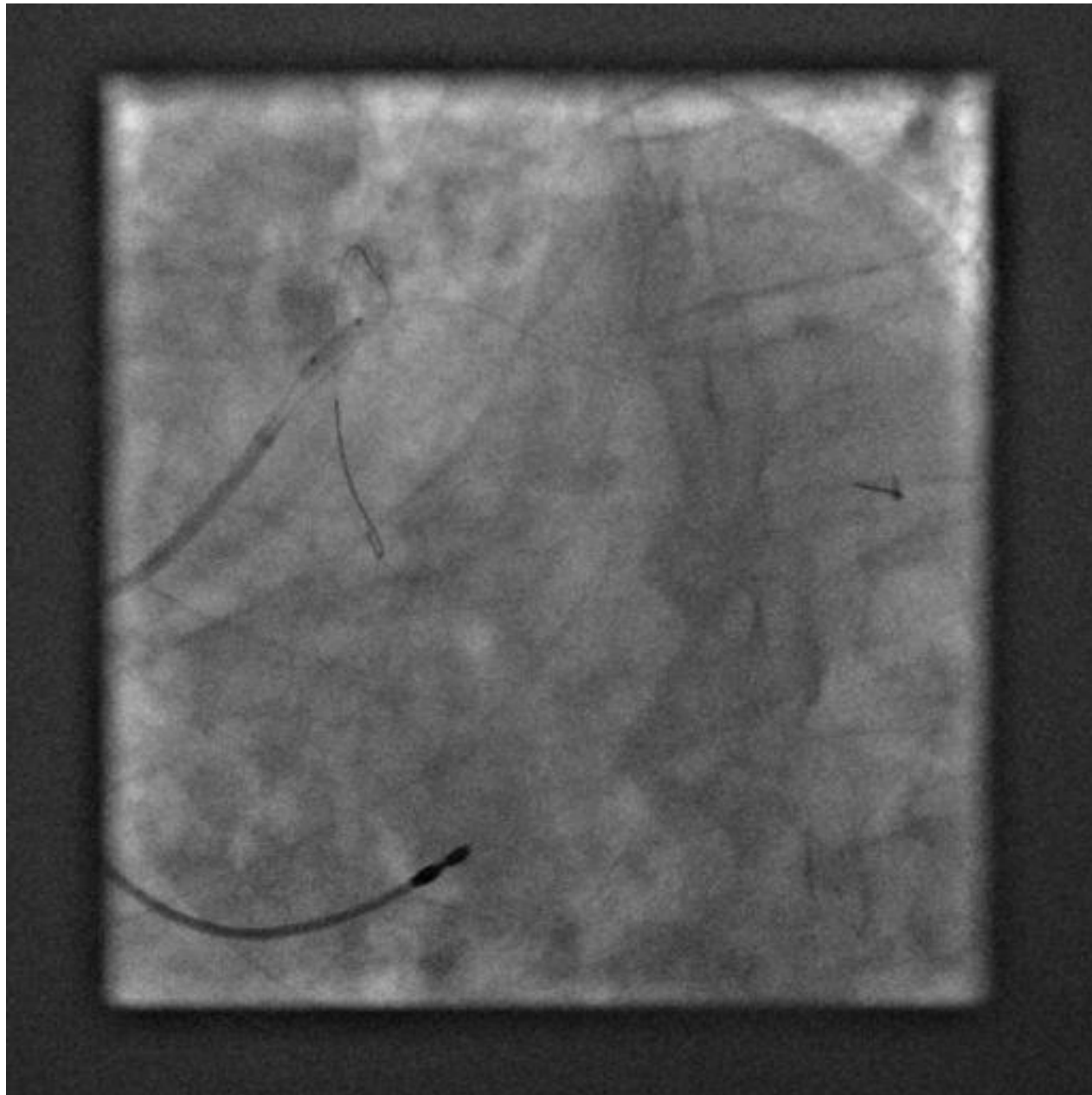




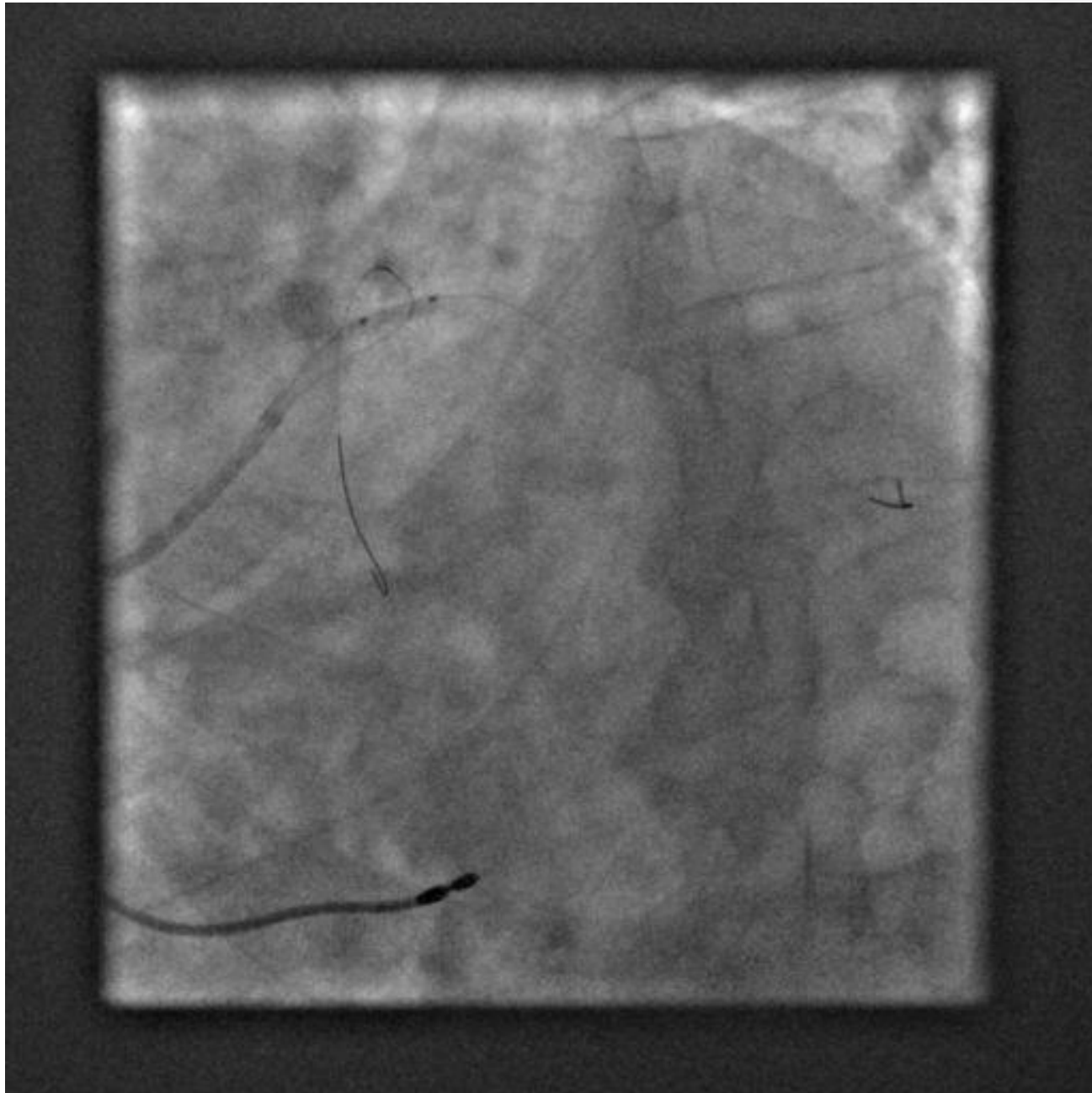
# Predilatation



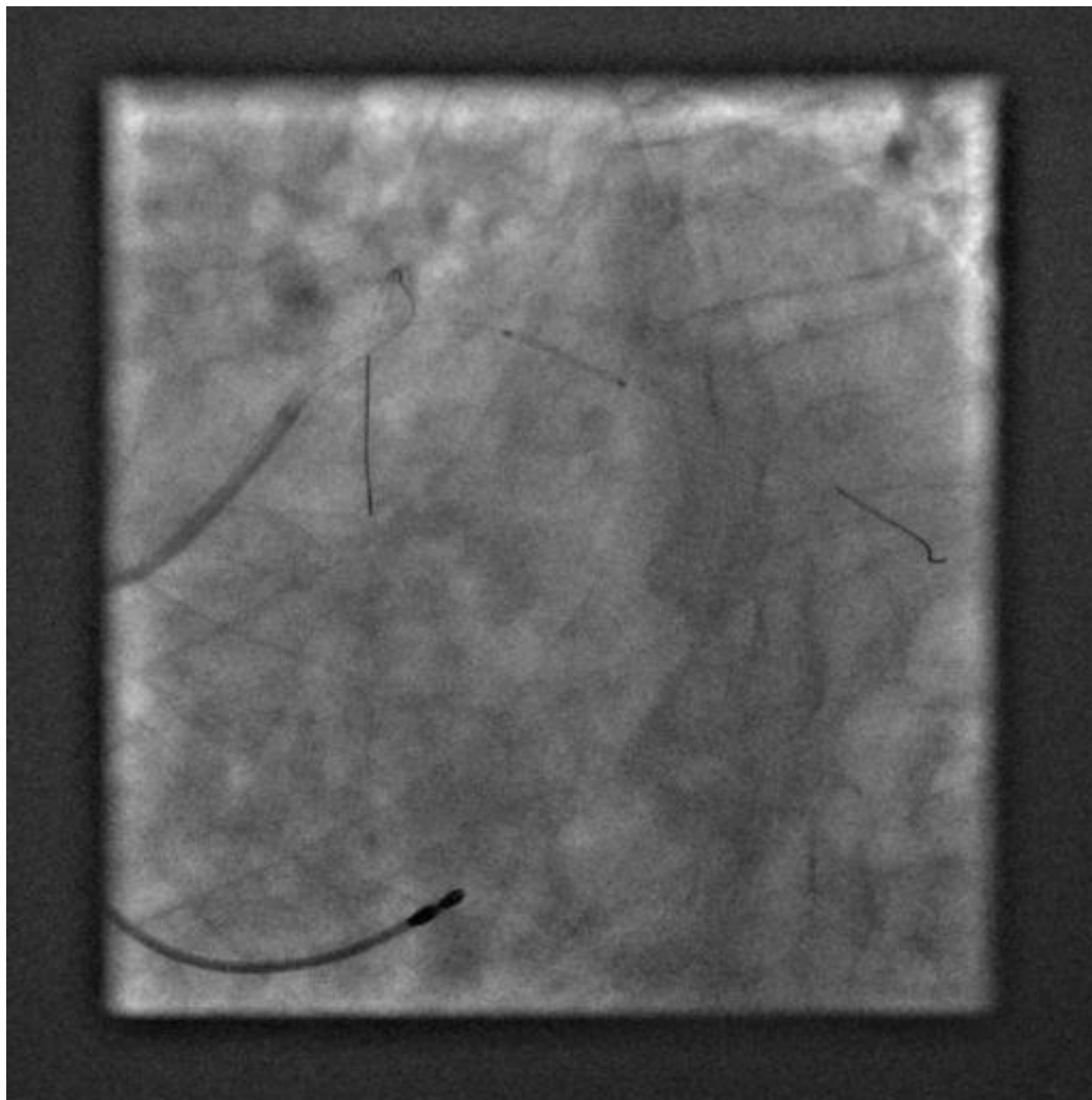
# Predilatation



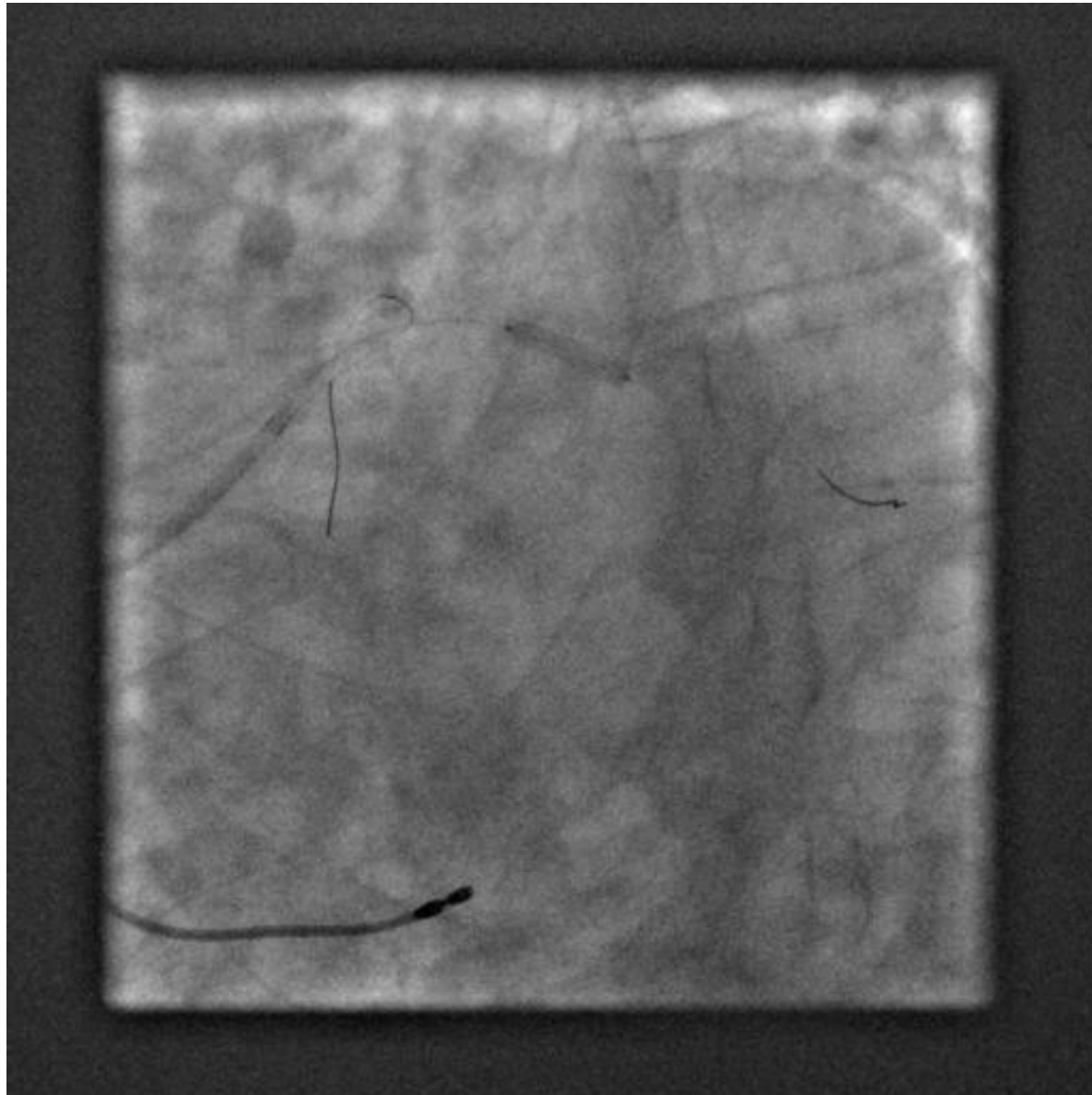
# Predilatation



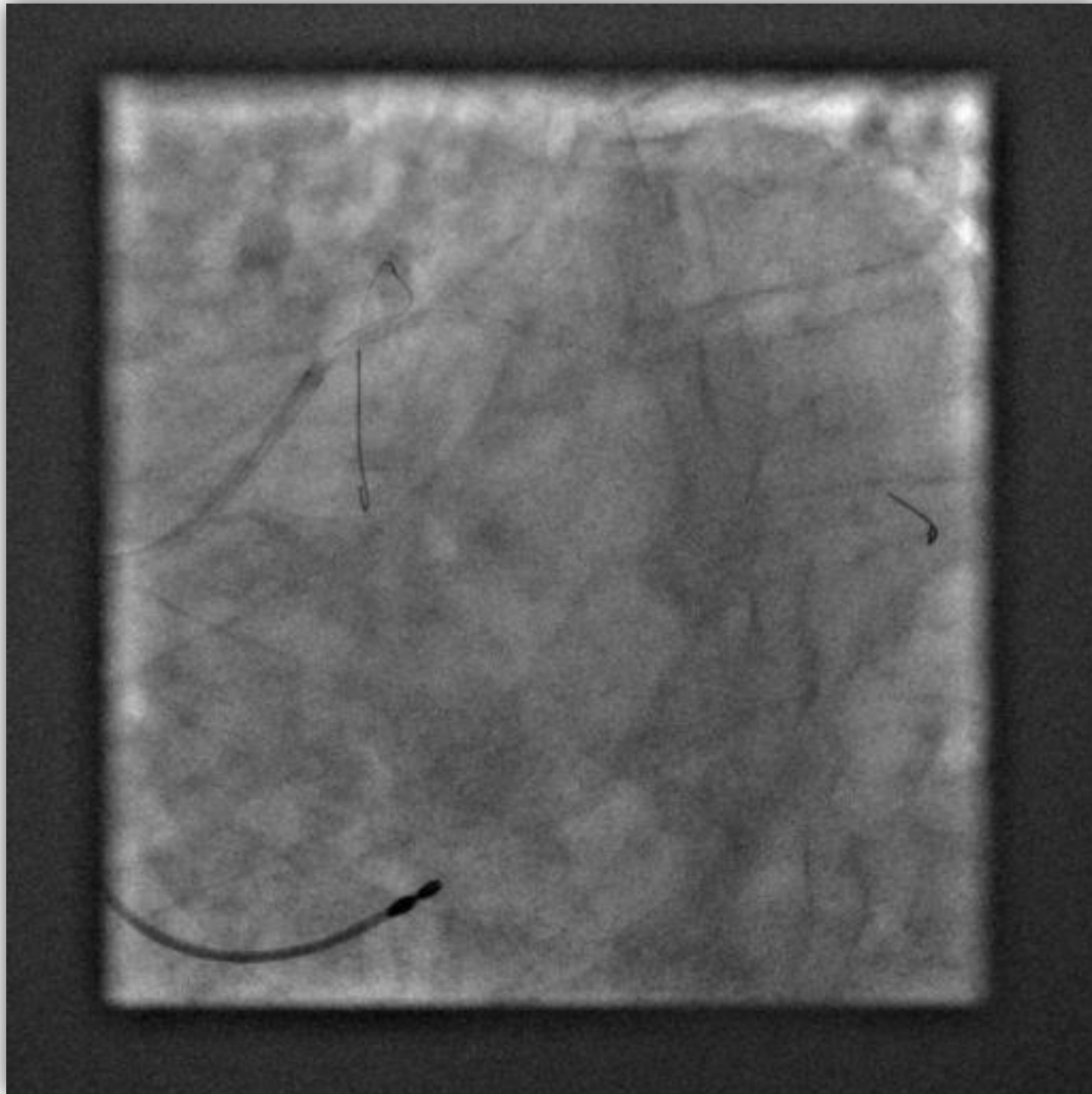
Cx:  
Xience Prime  
2.5 x 15mm

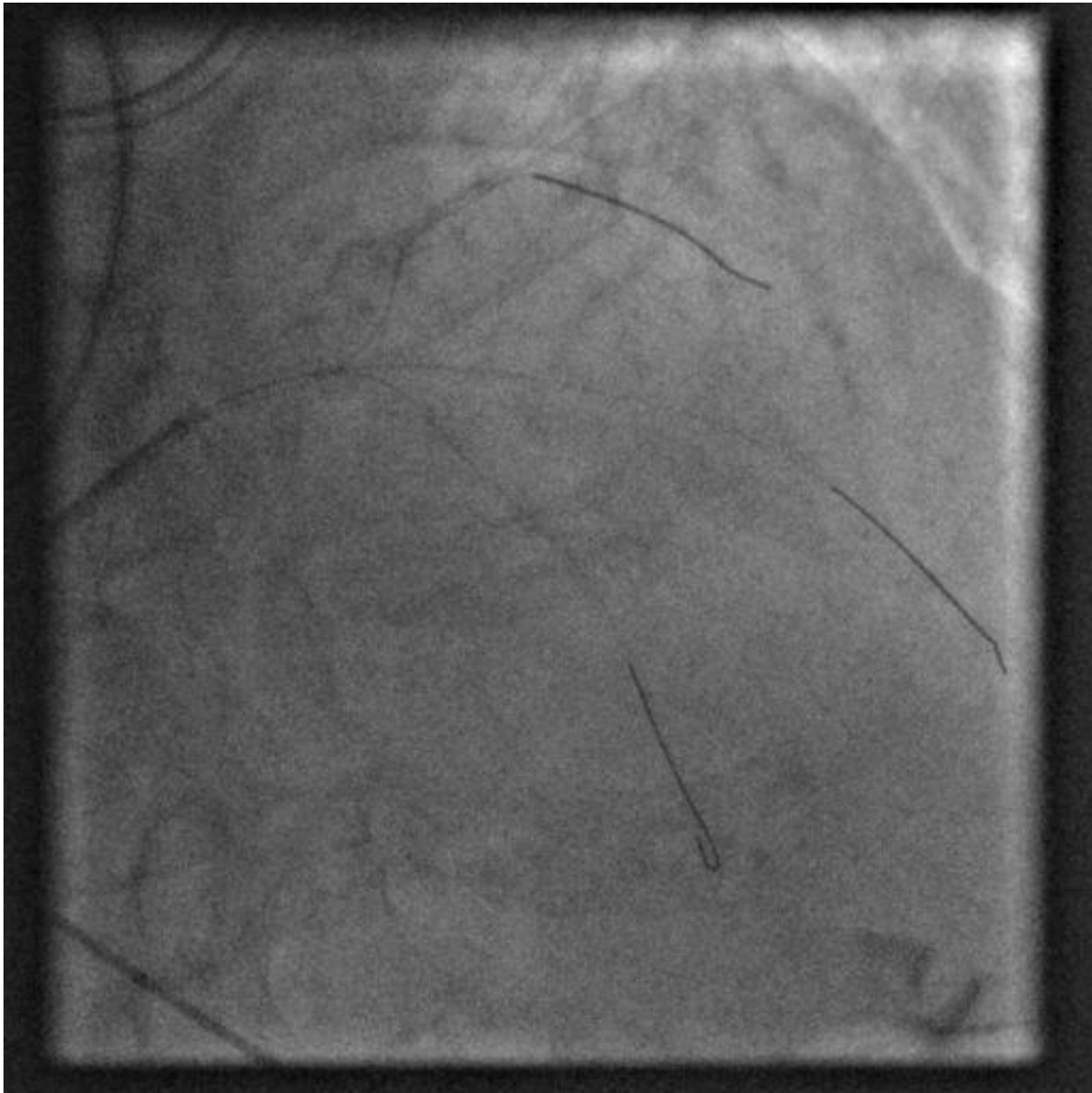








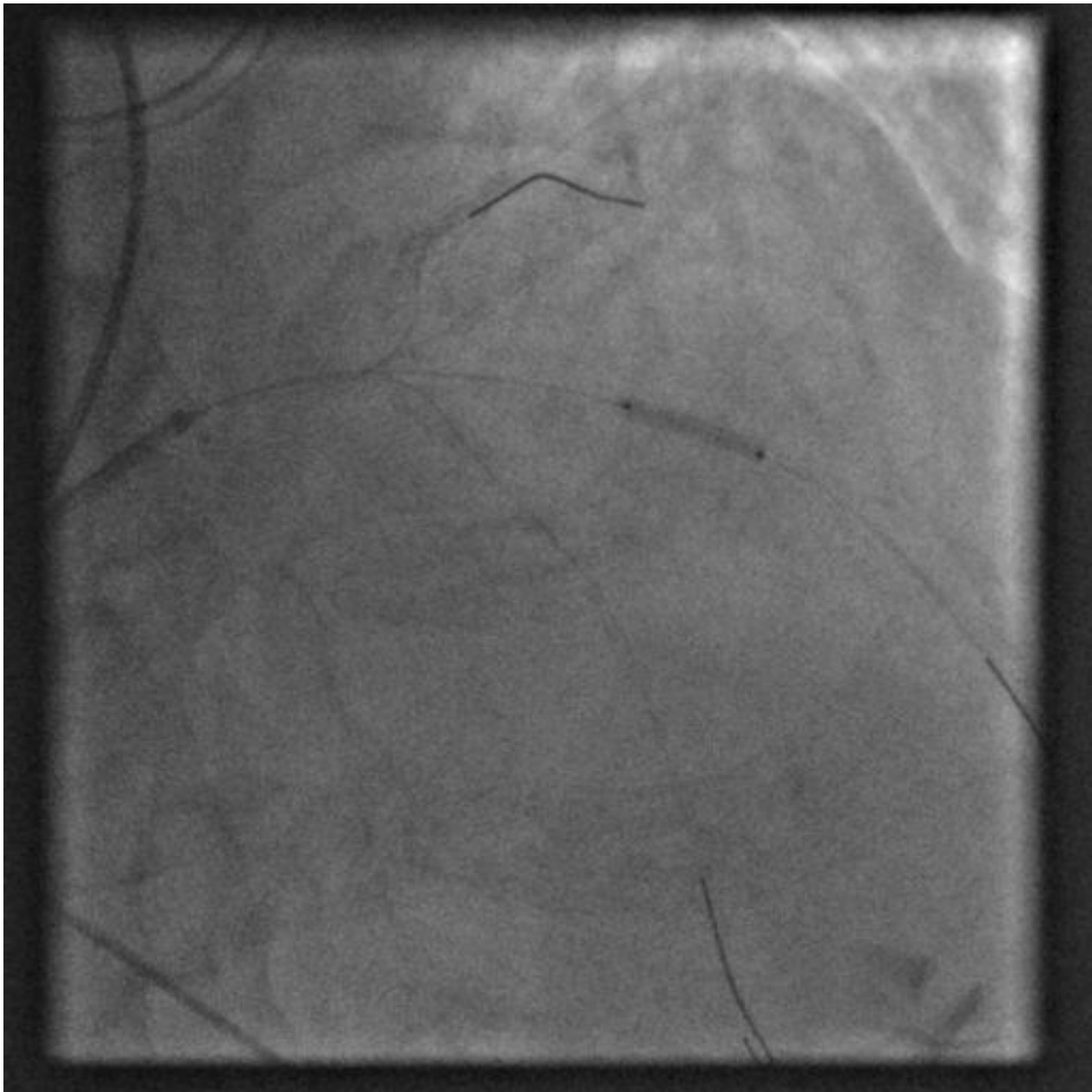




Intermediate:  
Xience  
2.25 x 15

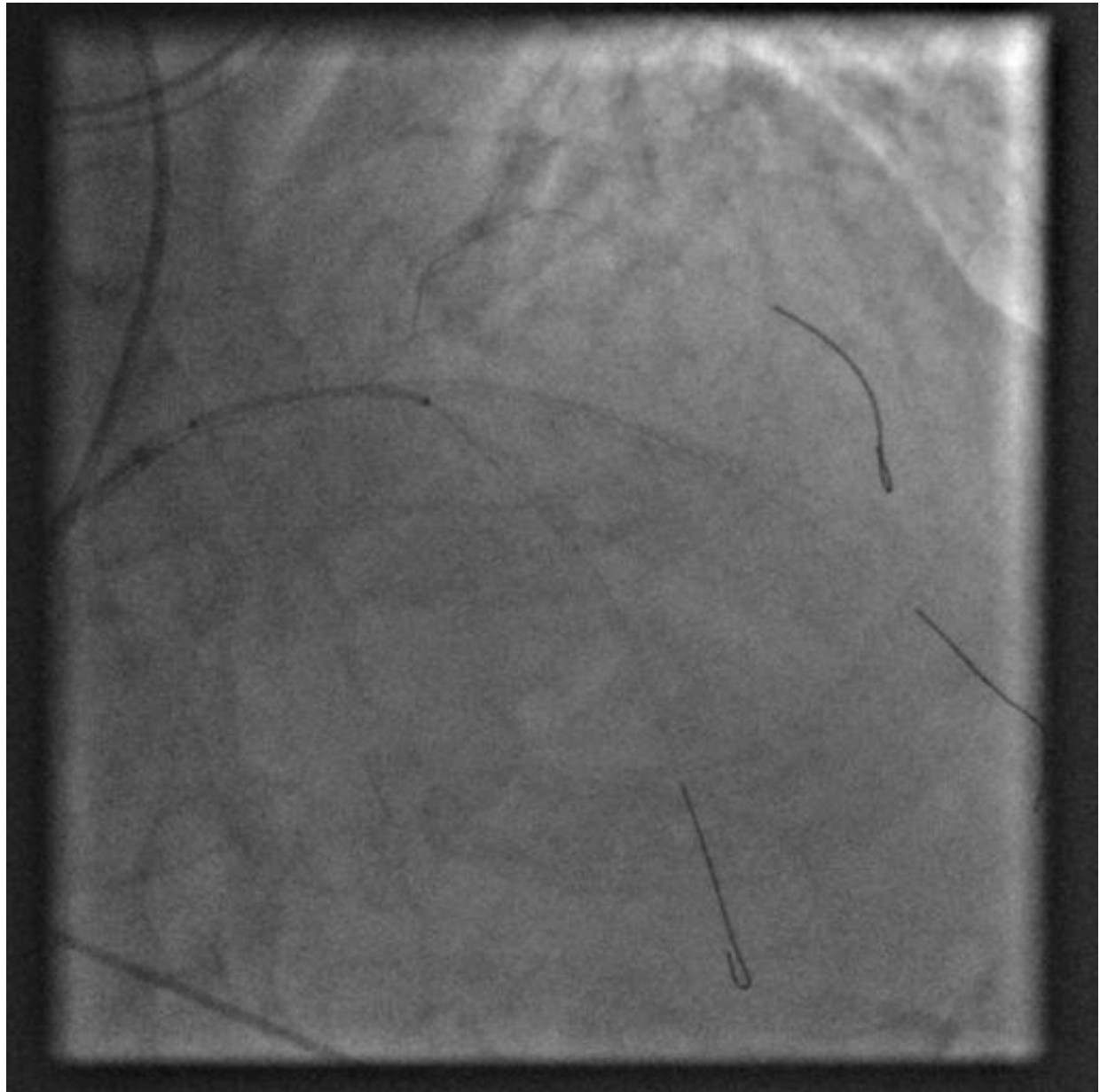


Intermediate:  
Xience  
2.25 x 15



LM + Ostial LAD

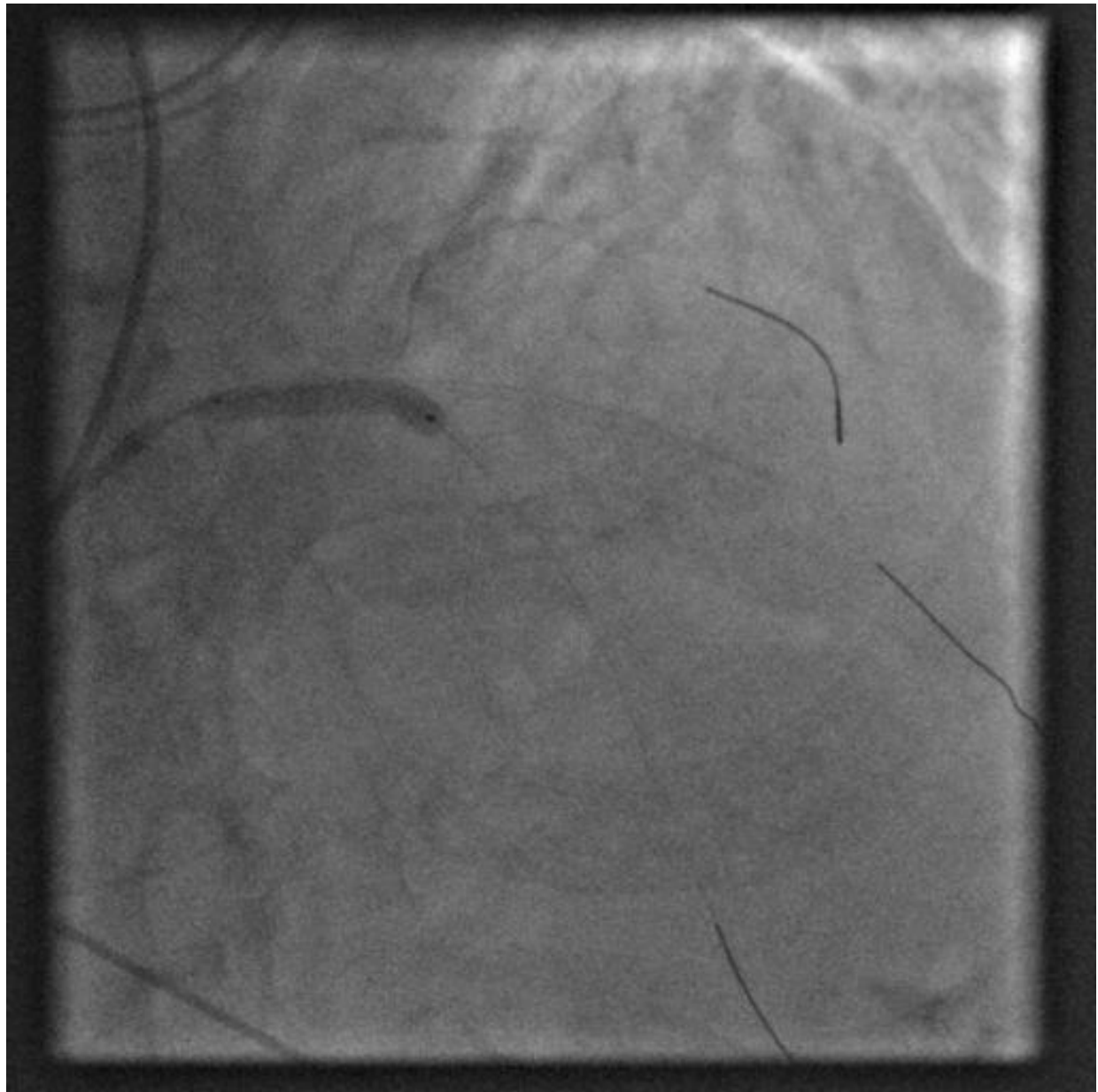
Xience Prime:  
3.5 x 28mm





LM + Ostial LAD

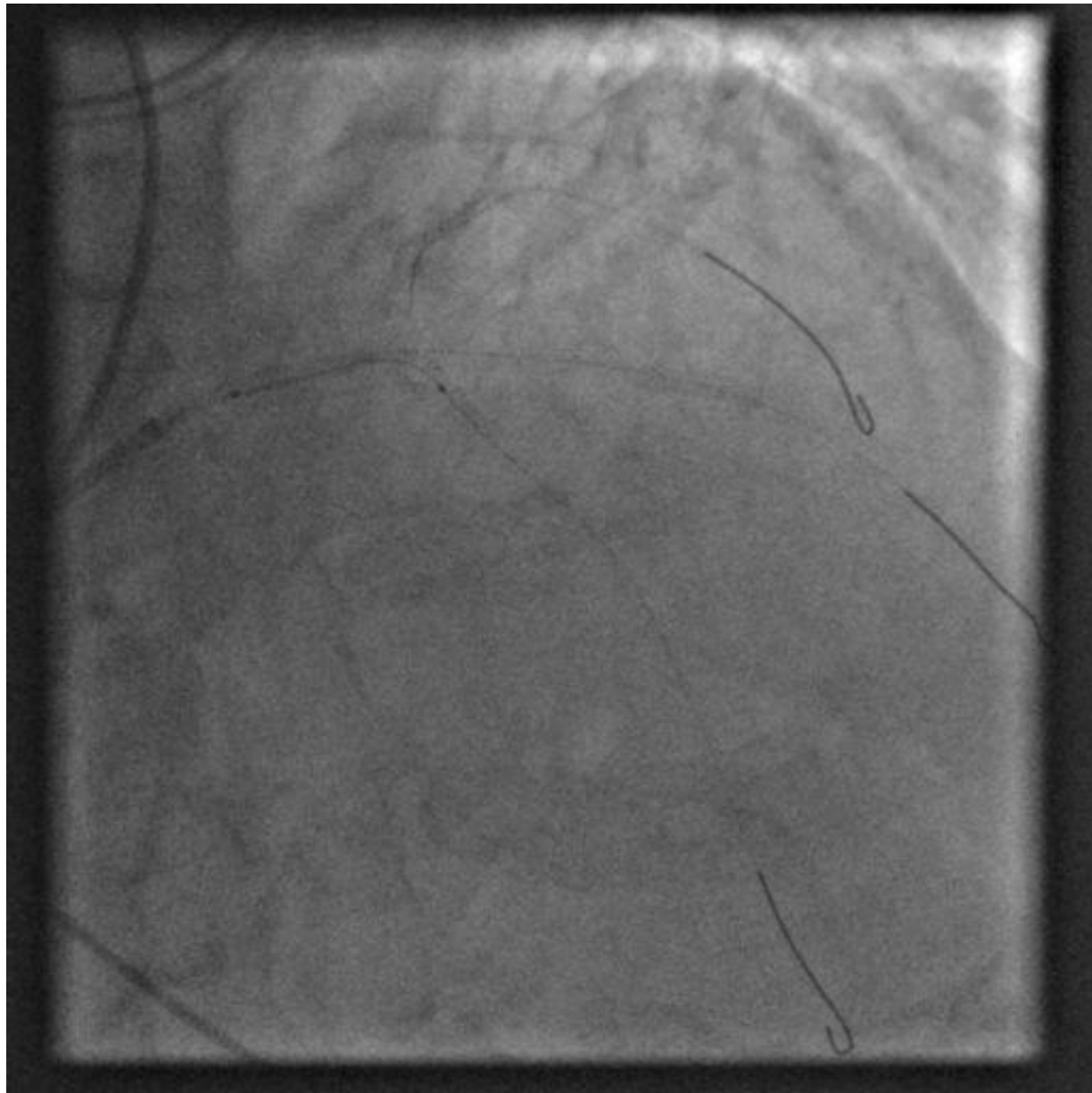
Xience Prime:  
3.5 x 28mm  
x 12atm



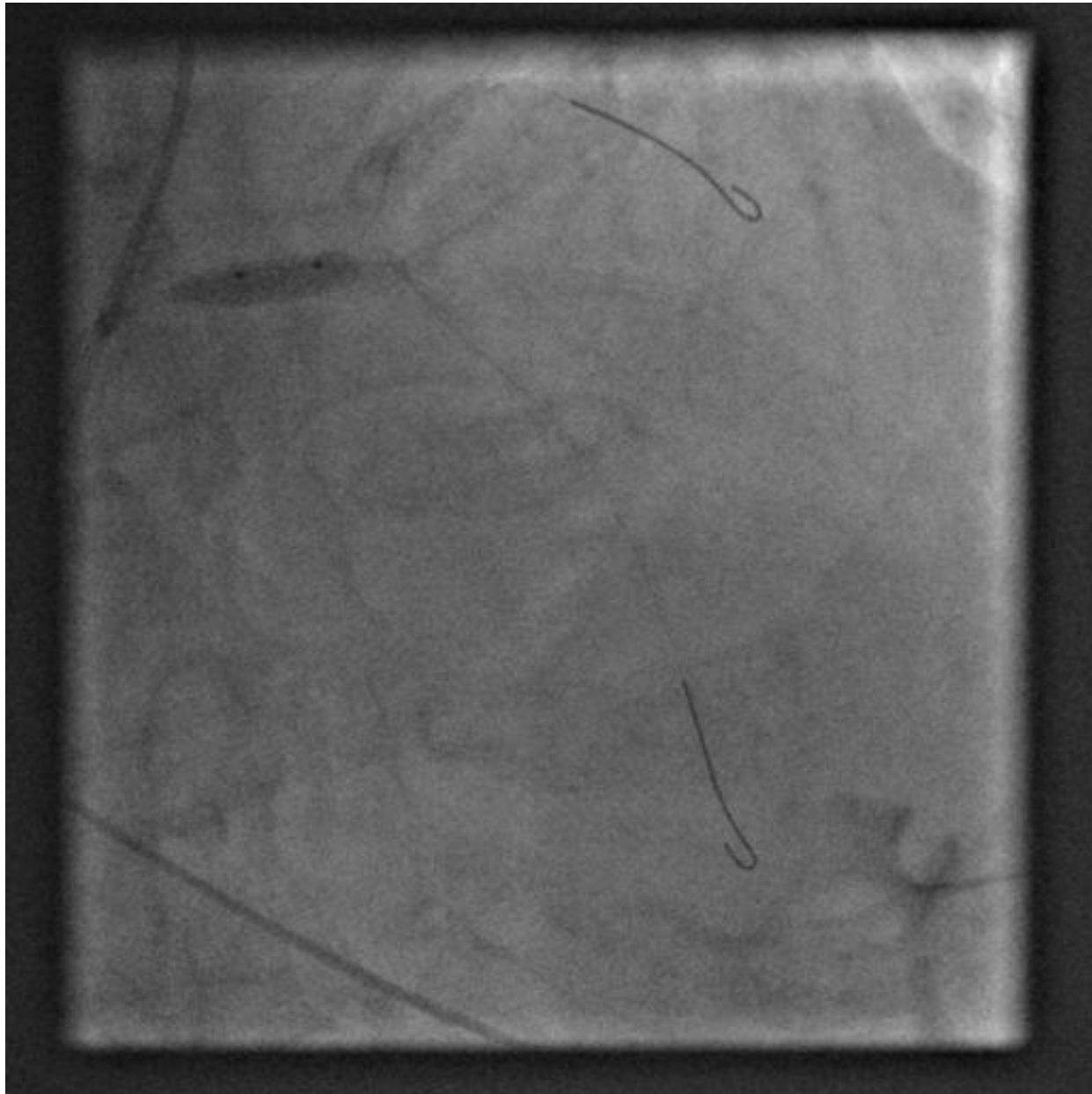


LM + Ostial LAD

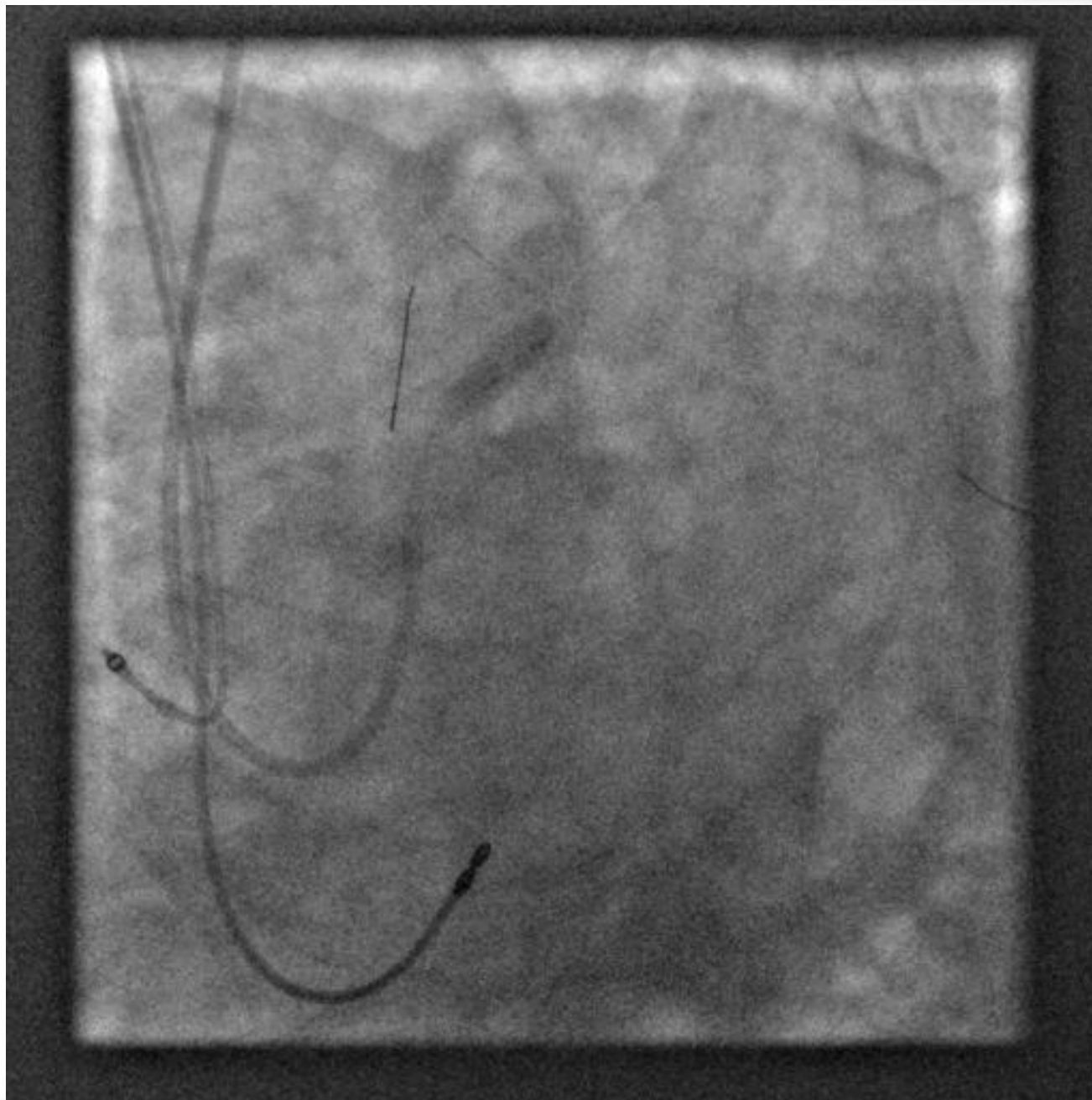
Xience Prime:  
3.5 x 28mm



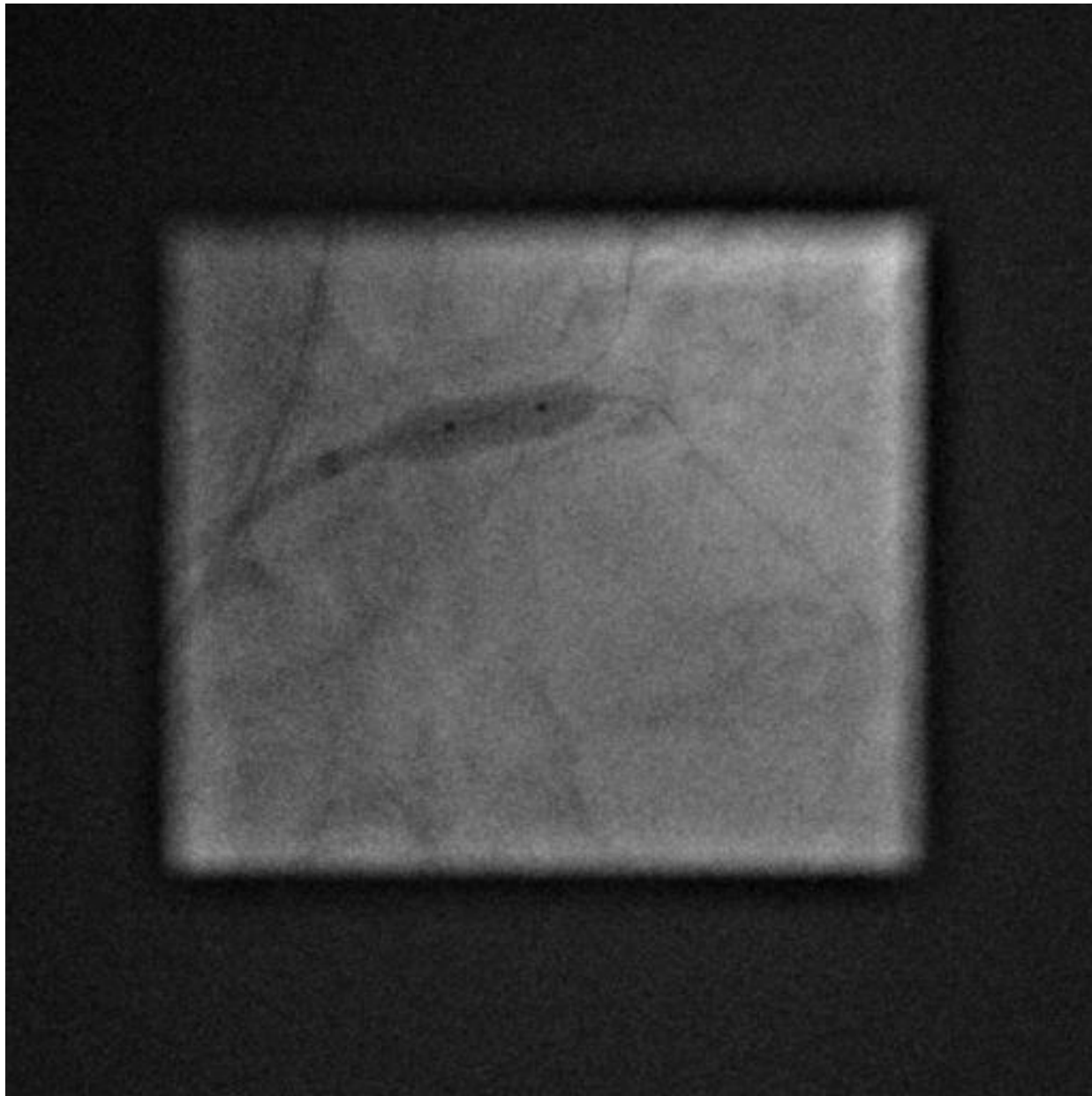
POT  
Hiryu  
5.0 x 10mm  
x 10atm



POT  
Hiryu  
5.0 x 10mm  
x 10atm

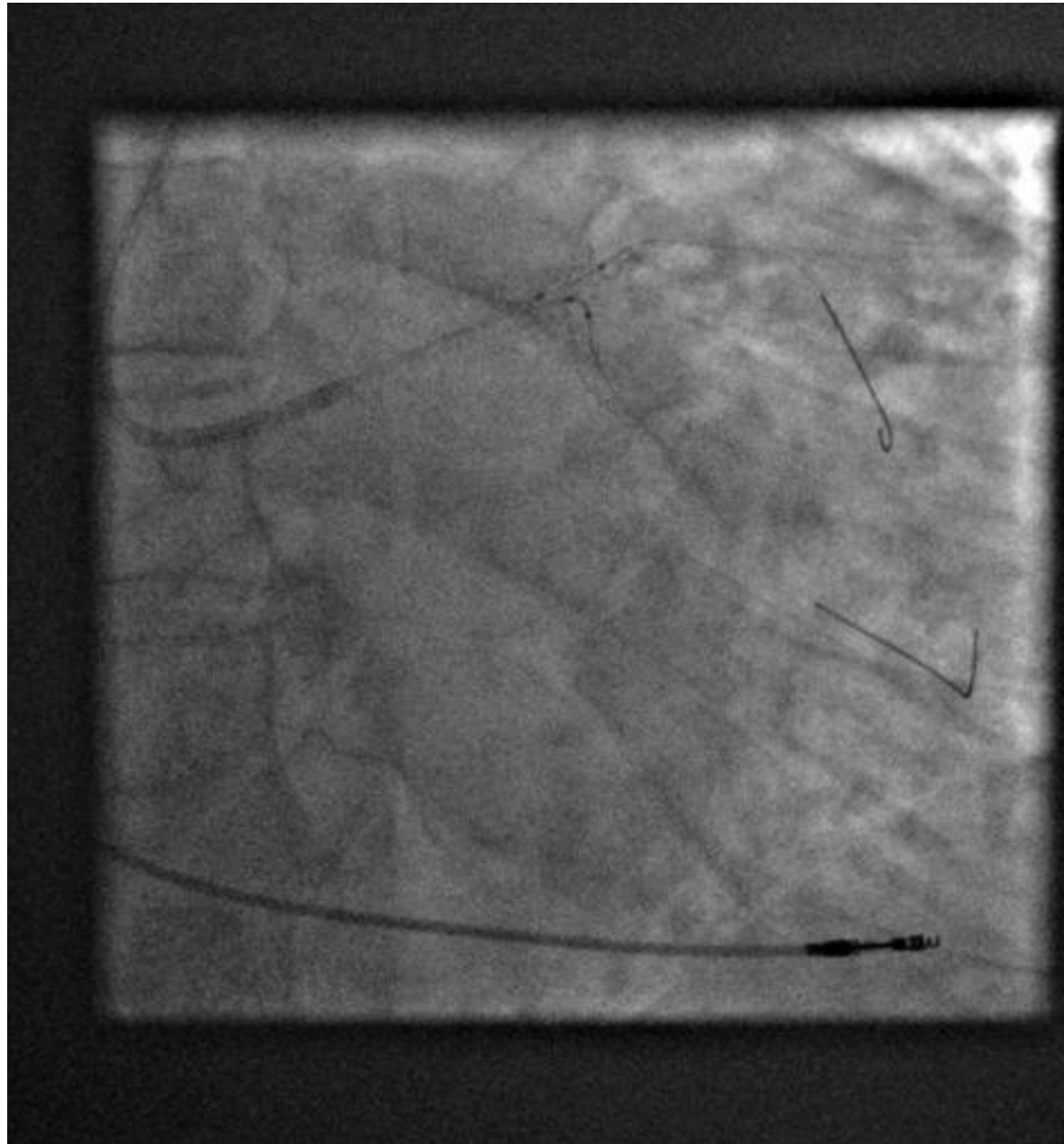


POT  
Hiryu  
5.0 x 10mm  
x 10atm



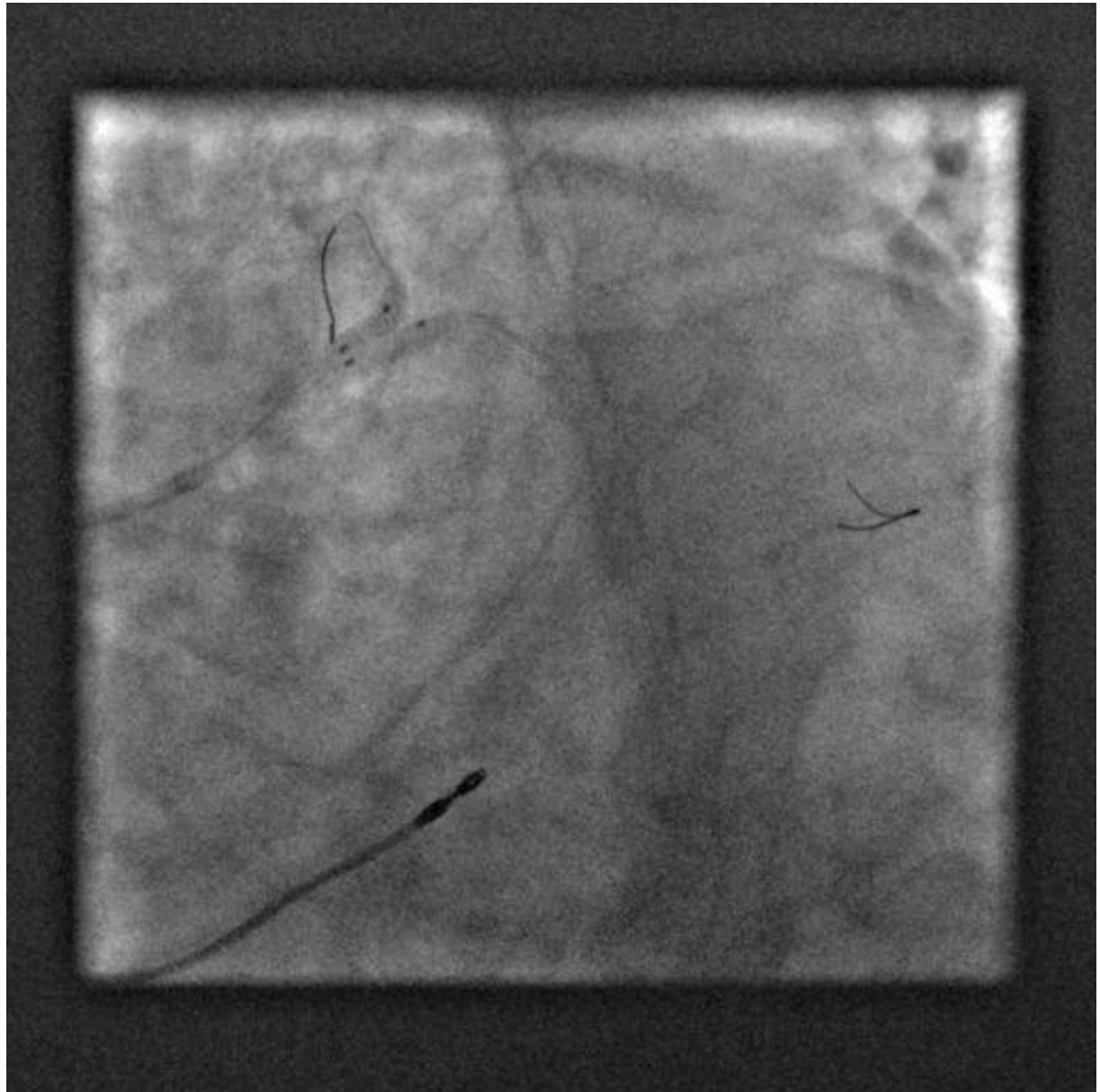


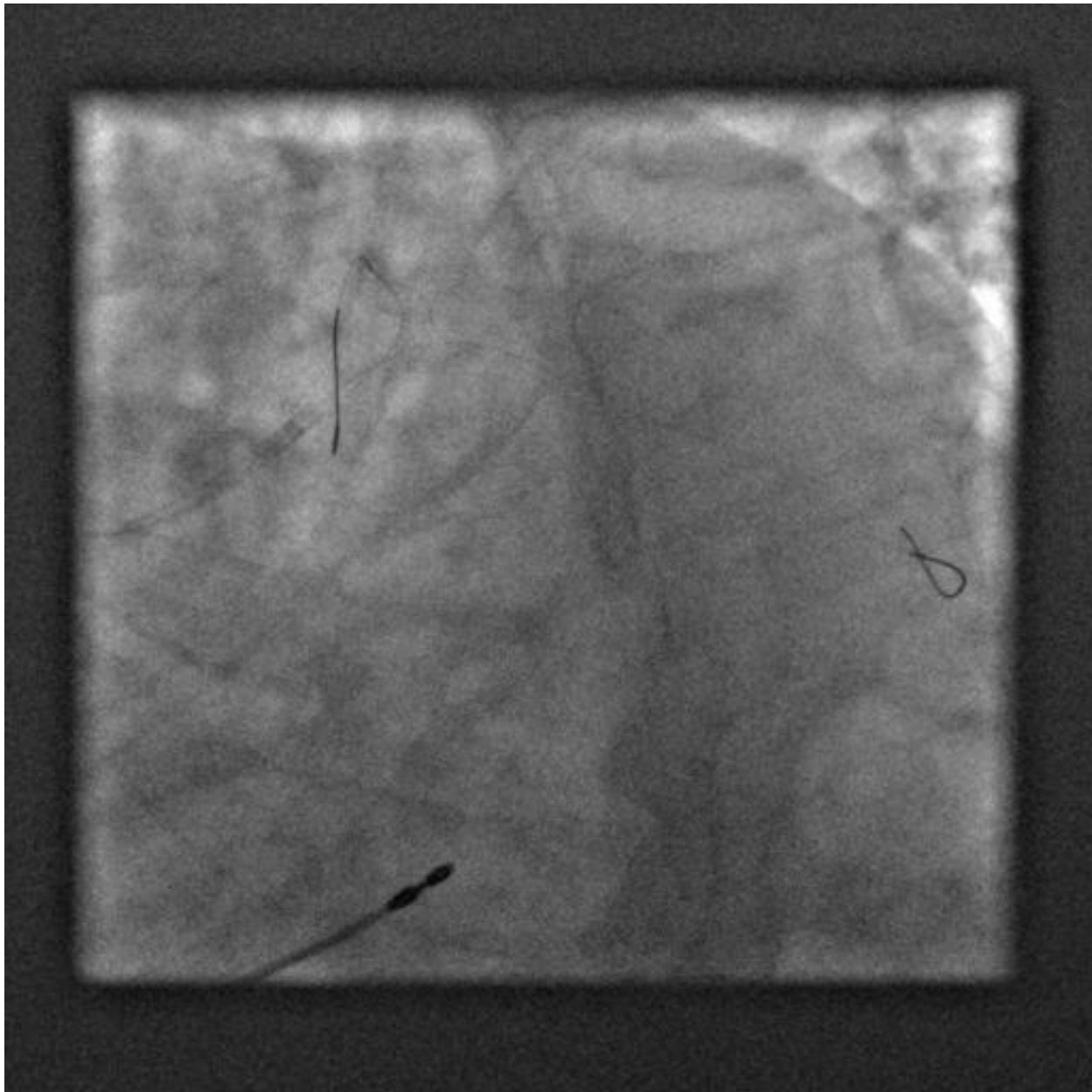
Kissing  
Balloon  
Angioplasty  
LAD - Hiryu 3.5 x 10mm  
Cx - Hiryu 3.5 x 10mm

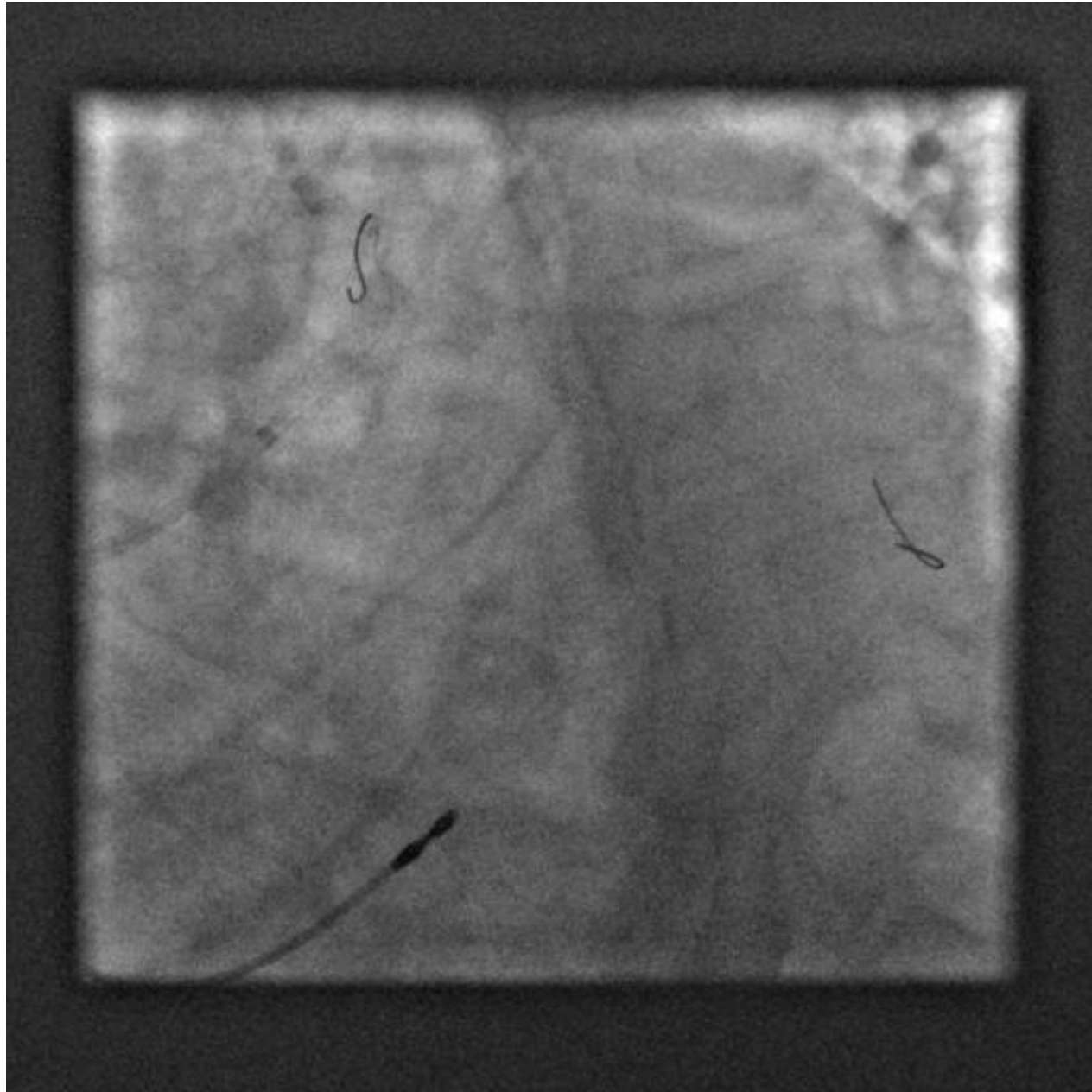




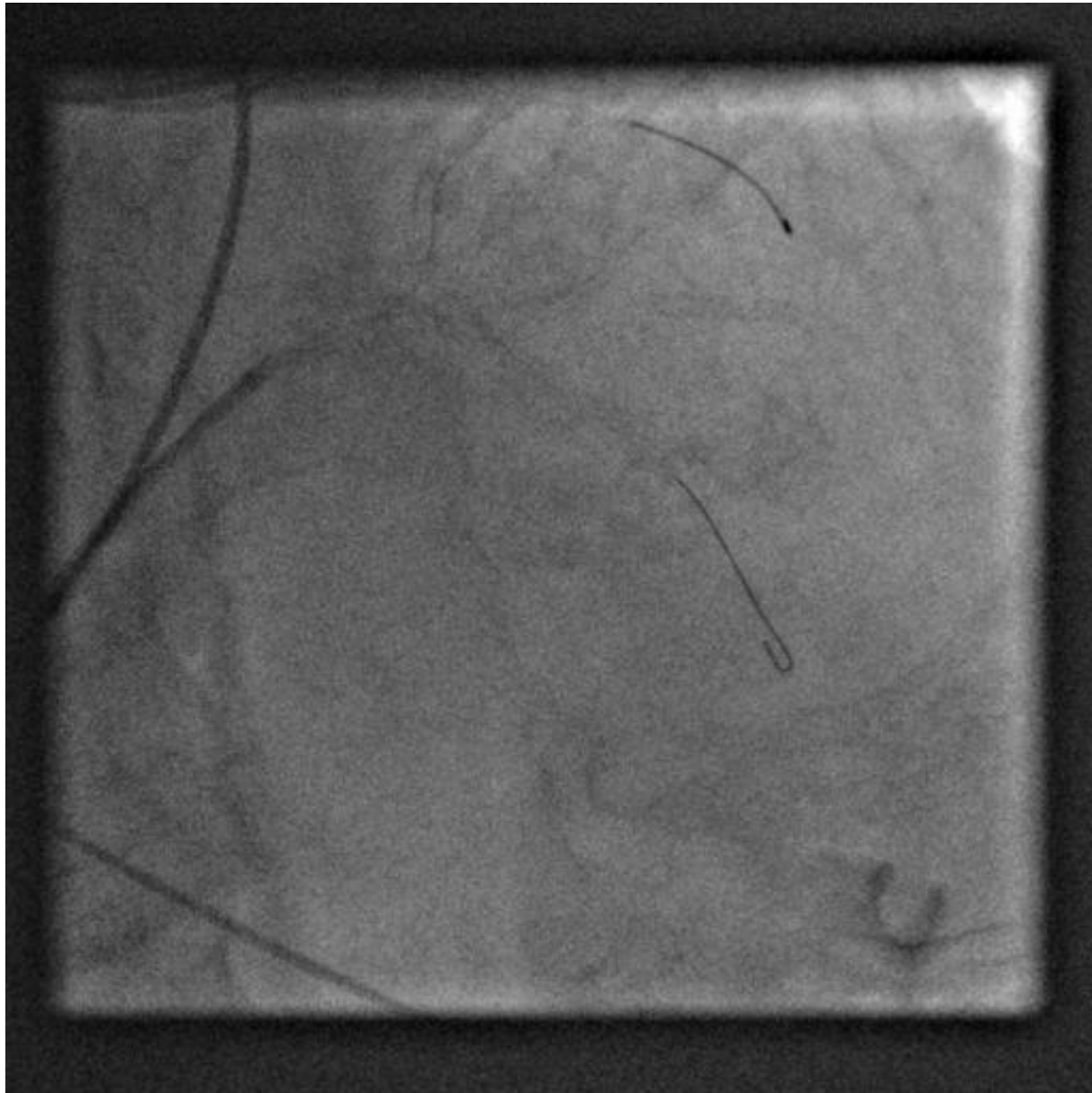
Kissing  
Balloon  
Angioplasty  
LAD - Hiryu 3.5 x 10mm  
x 10atm  
Cx - Hiryu 3.5 x 10mm  
x 10atm







# Final Result





1 month later  
PCI of CTO

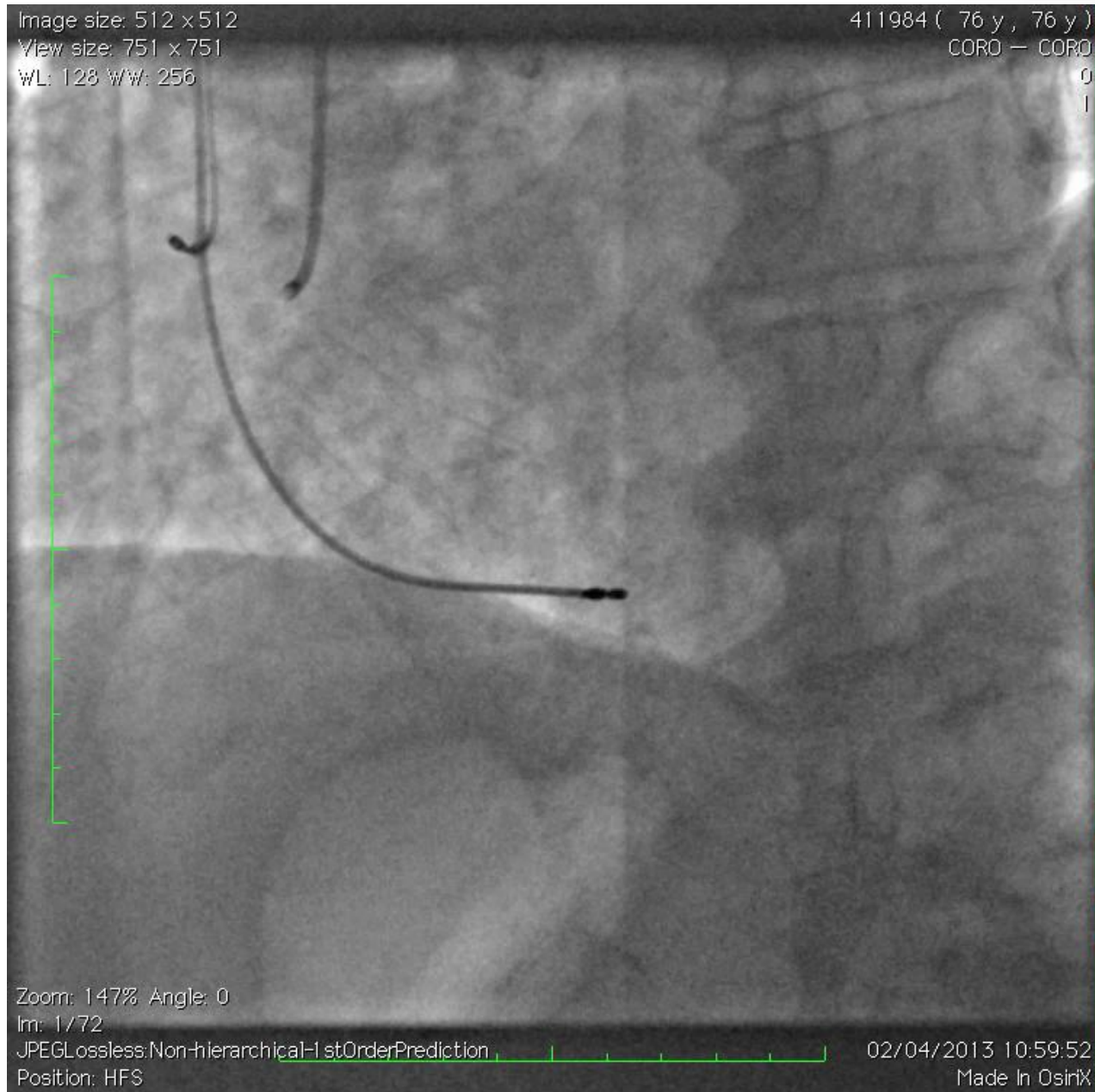




Image size: 512 x 512

View size: 751 x 751

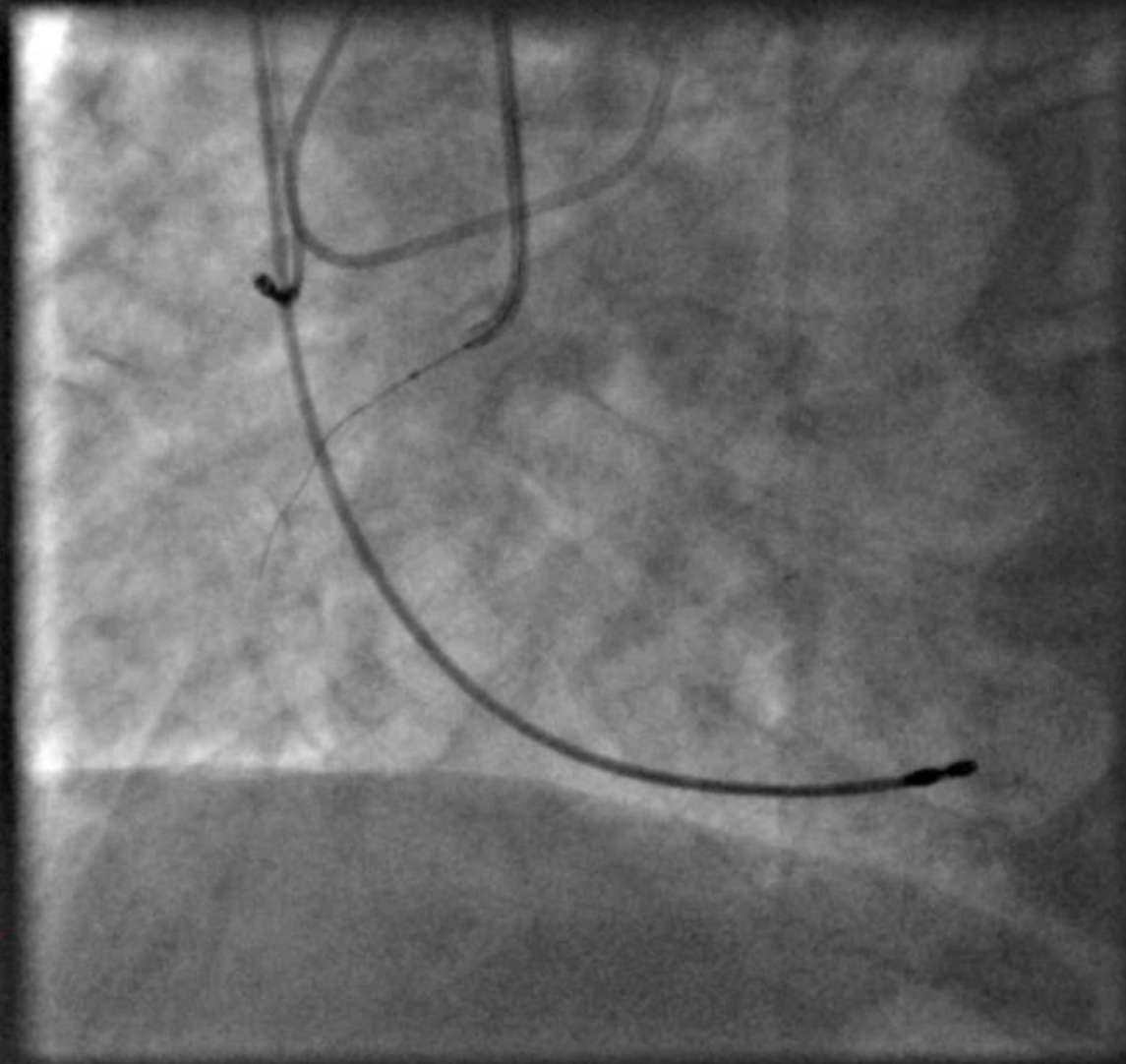
WL: 128 WW: 256

411984 ( 76 y , 76 y )

CORO — CORO

0

1



Zoom: 147% Angle: 0

Im: 1/110

JPEGLossless:Non-hierarchical-1stOrderPrediction,

02/04/2013 11:22:49

Position: HFS

Made In OsiriX

Image size: 512 x 512  
View size: 751 x 751  
WL: 128 WW: 256

411984 ( 76 y , 76 y )  
CORO - CORO  
0  
1

# Final Result

