Advanced Techniques for Side Branch Protection in Bifurcation PCI

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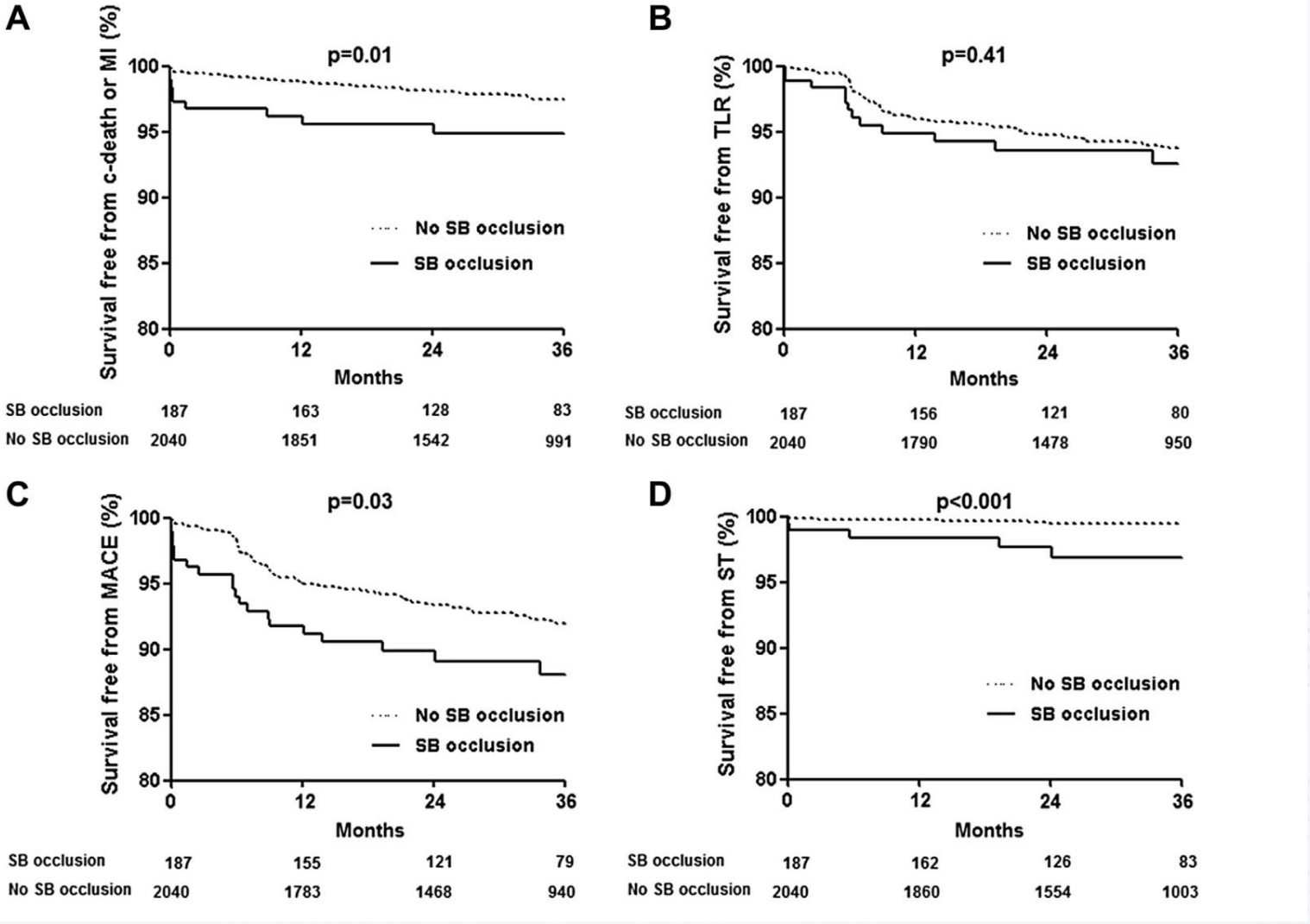
Disclosure

I have the following potential conflicts of interest to report:

Grant/Research Support: Asahi Intecc

Proctoring Fees/ Speakers Honoraria: Boston Scientific, Abbott Vascular, Medtronic, Bio-Excel, Teleflex Medical

Outcomes of Side Branch Occlusion After Main Vessel Stenting in Coronary Bifurcation Lesions (COBIS II Registry)



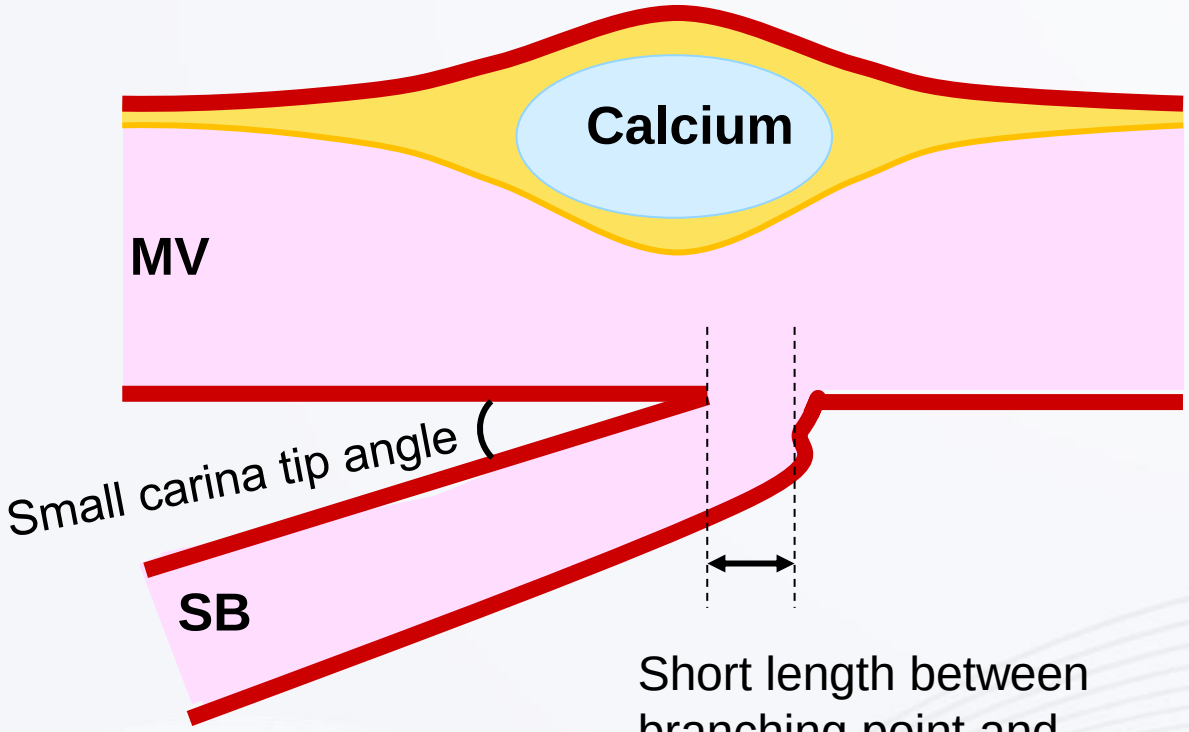
How to Assess Risk of Side Branch Loss

Risk factors:

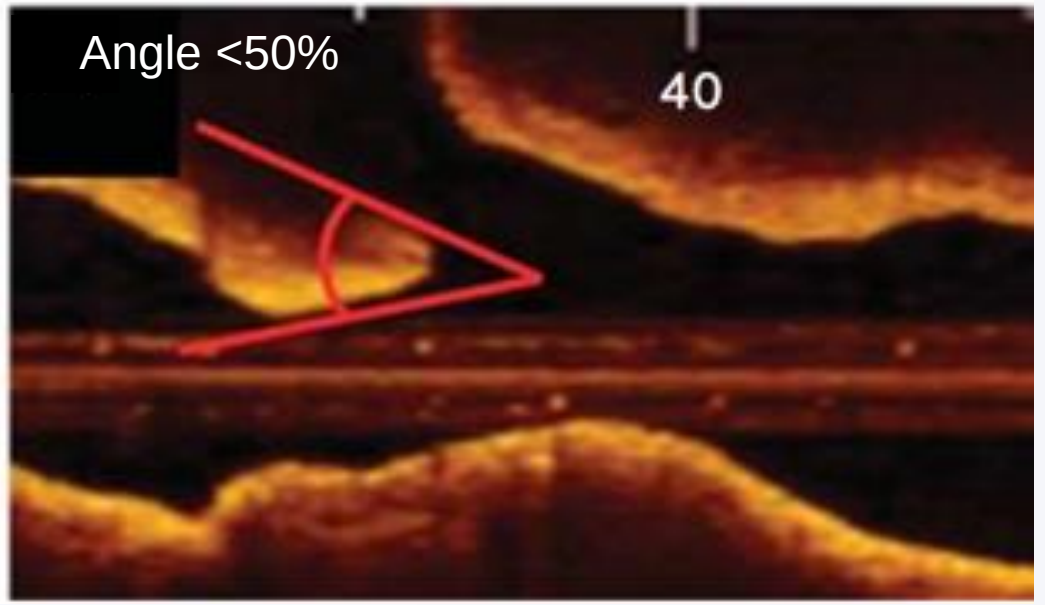
- Plaque on the same side of the SB
- Reduced TIMI flow at the SB
- Severe diameter stenosis of the bifurcation core ≥70%
- Unfavourable angle ≥ 90 degrees
- High ratio MV/SB ≥ 2
- Severe % DS at SB ≥ 90%
- Resolve score >10

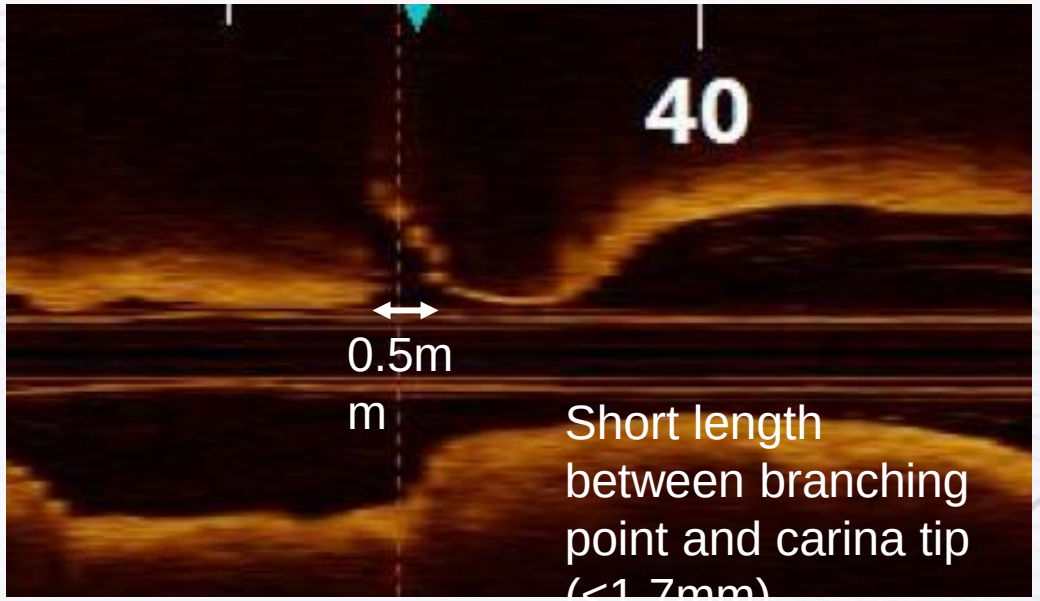
17th EBC expert consensus. EuroIntervention 2023

OCT Predicting Possible SB Complication



Short length between branching point and carina tip



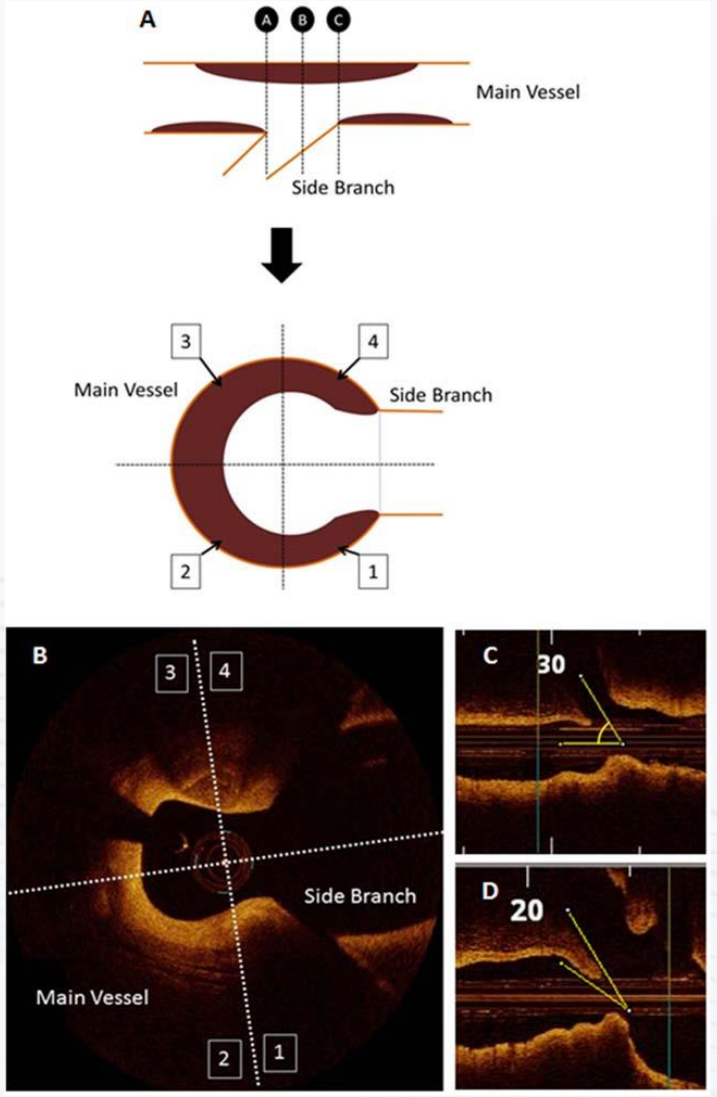


Watanabe et al. Coron Artery Dis. 2014;25:321-9.

Fujino Y et al. Int J Cardiol. 2014;176:1056-60.

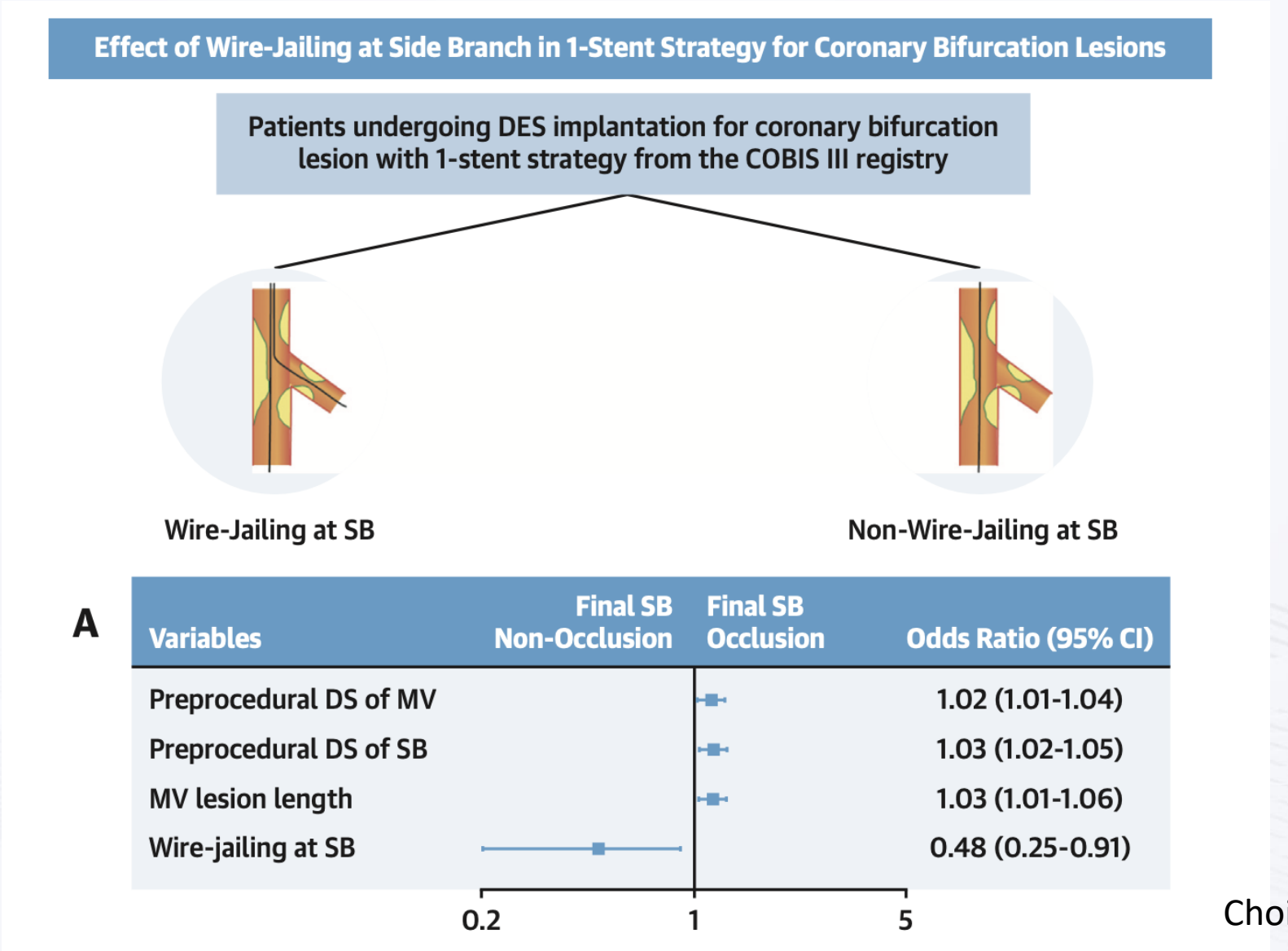
Greater lipid arc and contralateral plaque predict SB compromise

- Lipid rich plaques
- Greater lipid arcs (>180°)
- Contralateral lipid plaque
- Spotty calcification (calcified plaque <4 mm in length with calcification arc less than 90°)



Kini A et al. Catheter Cardiovasc Interv 2017;89:259–268

Effect of Wire Jailing at SB in 1-Stent Strategy for Bifurcation Lesions (COBIS III Registry)



Choi,et al. JACC CV Int 2022

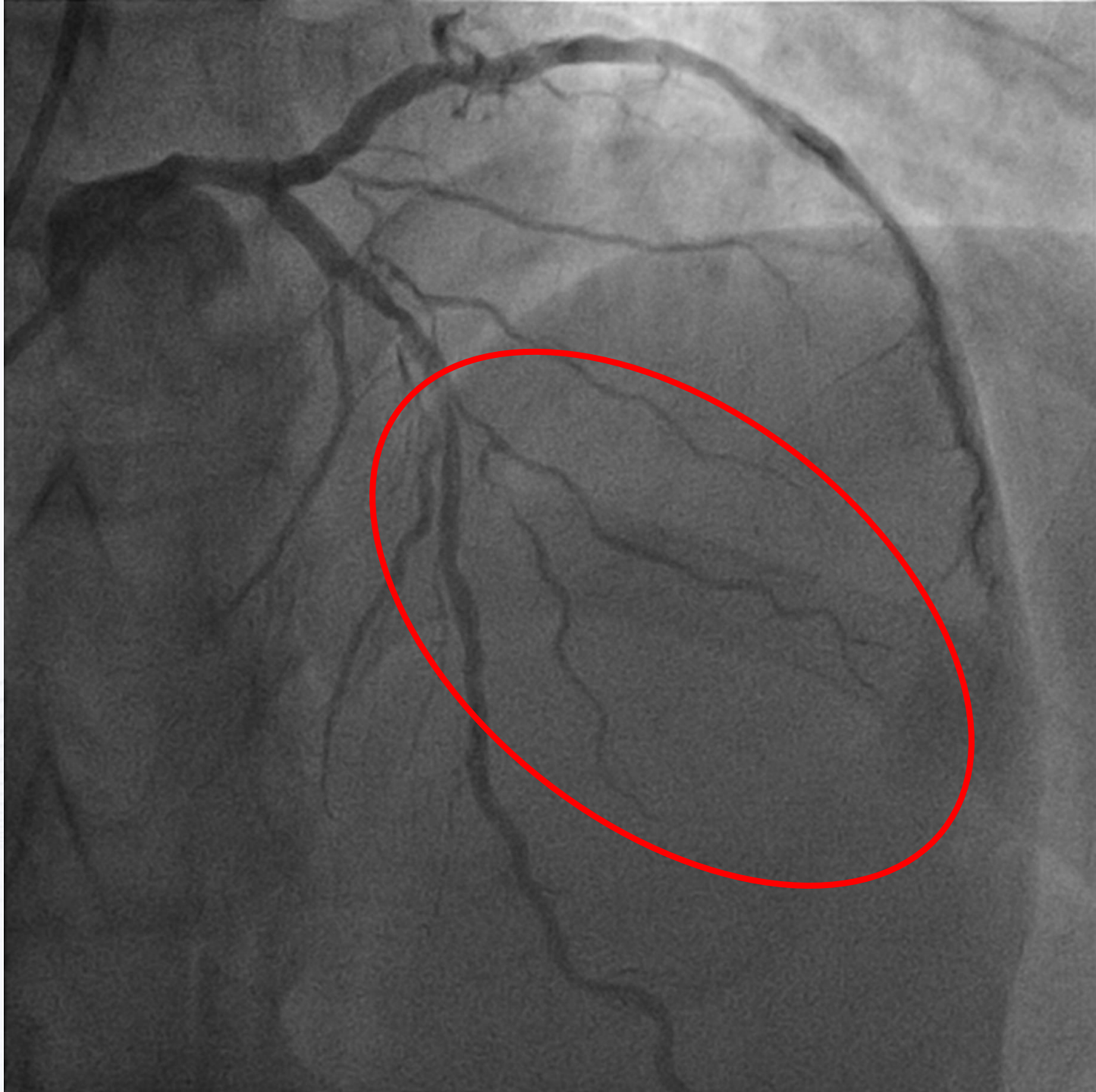
Case: OC

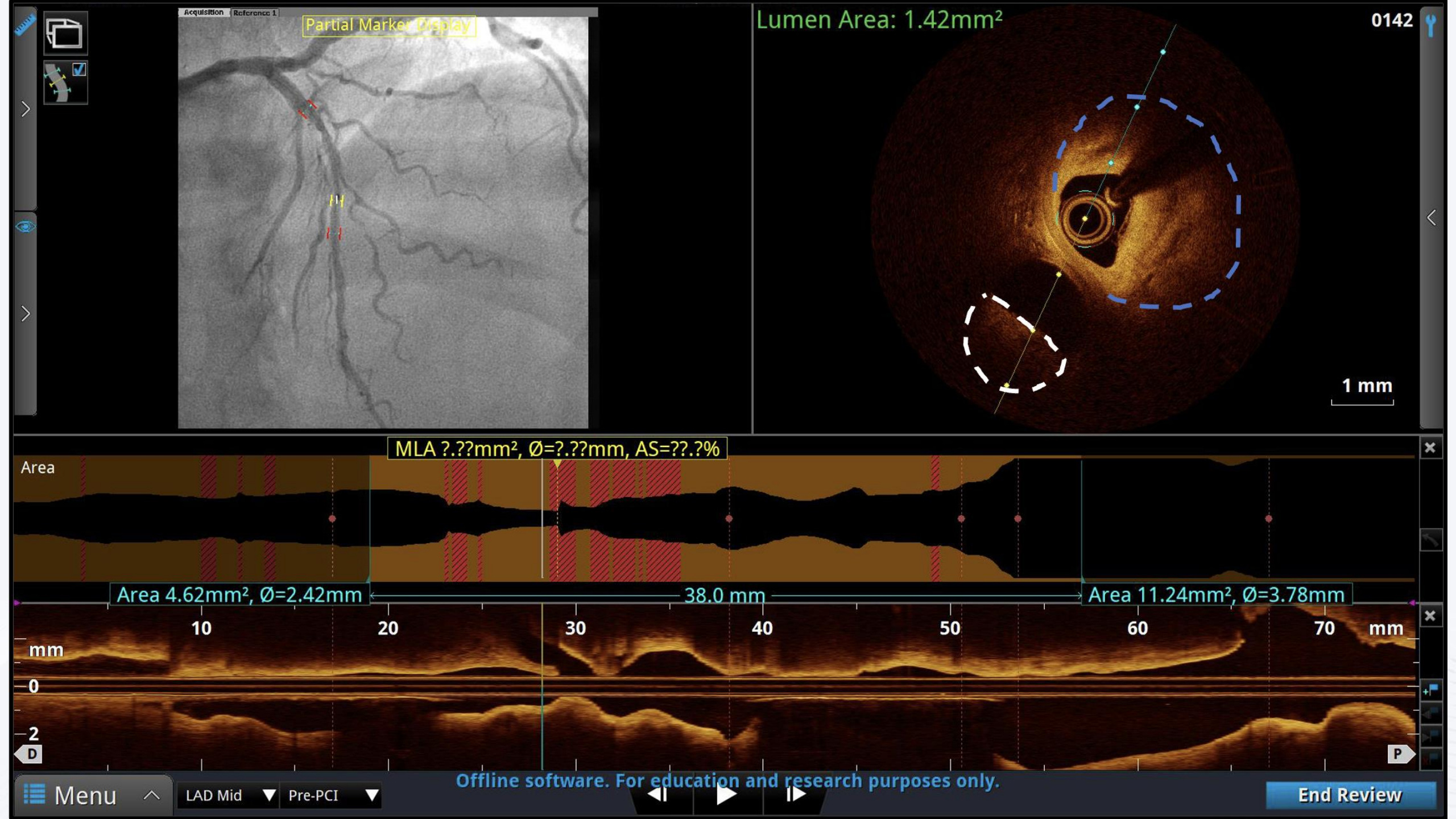
Planned PCI to LAD

Previous presentation with IMI and VF arrest

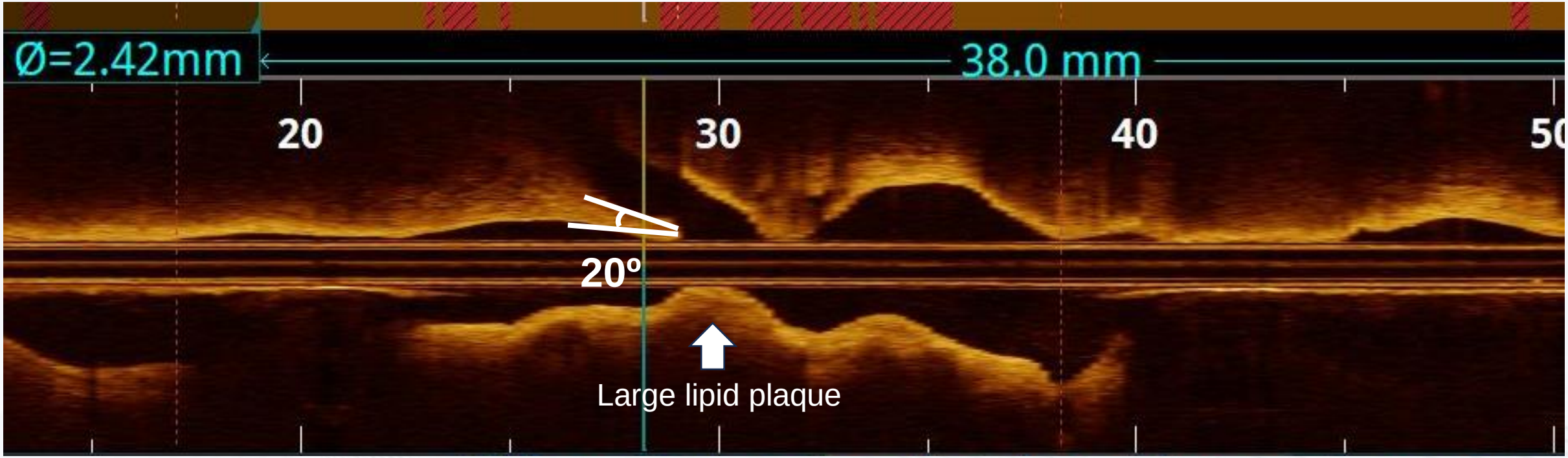
Previous PCI to the RCA and Cx

RFR in LAD 0.83




Acquisition
Reference 1
Partial Marker Display
Lumen Area: 1.42mm²
0142
1 mm
MLA ?.??mm², Ø=?.??mm, AS=??.?%
Area
Area 4.62mm², Ø=2.42mm
38.0 mm
Area 11.24mm², Ø=3.78mm
10
20
30
40
50
60
70
mm
mm
0
2
D
P
Menu
LAD Mid
Pre-PCI
Offline software. For education and research purposes only.
End Review

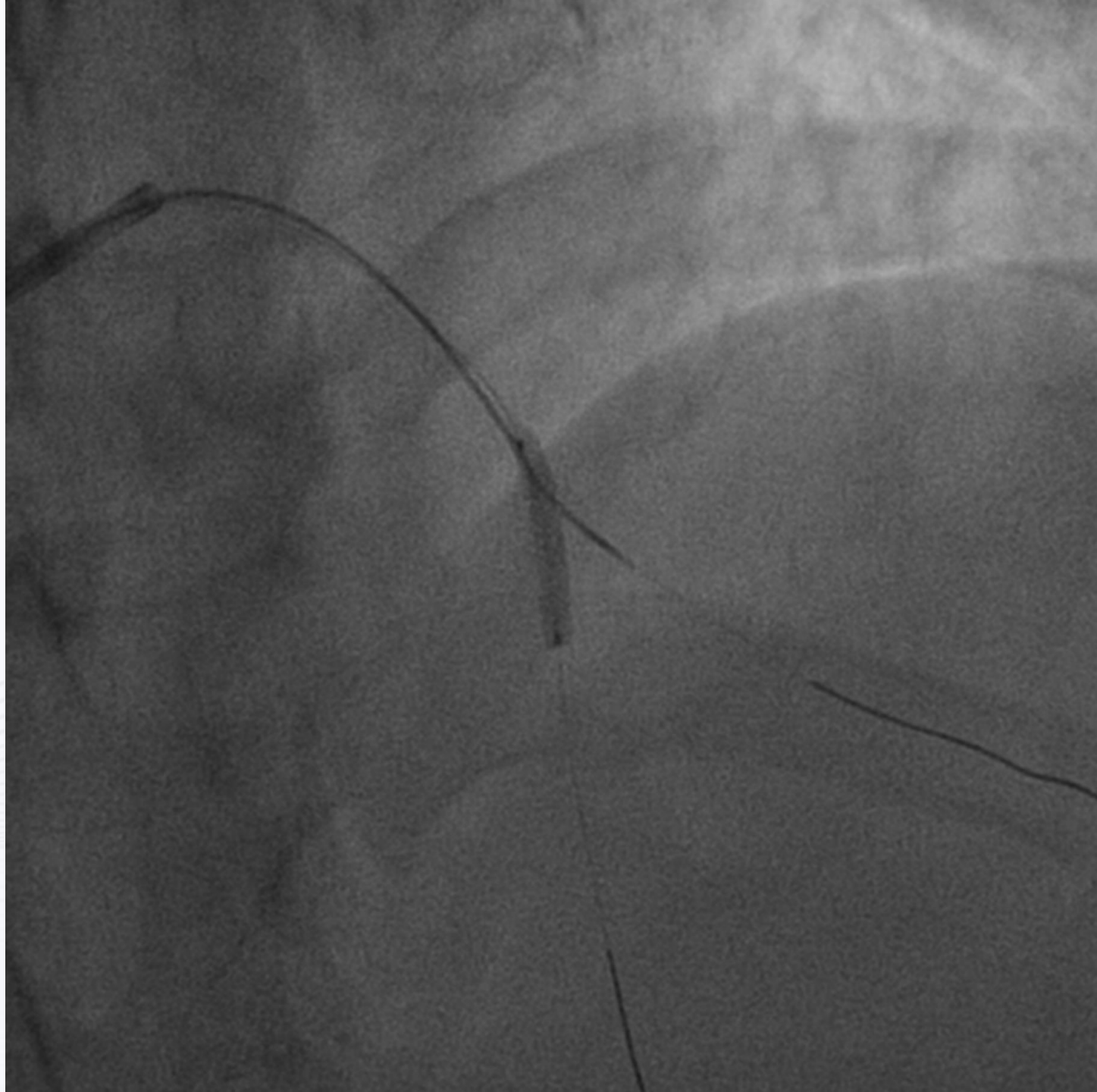
Narrow Carina tip angle



Case: OC

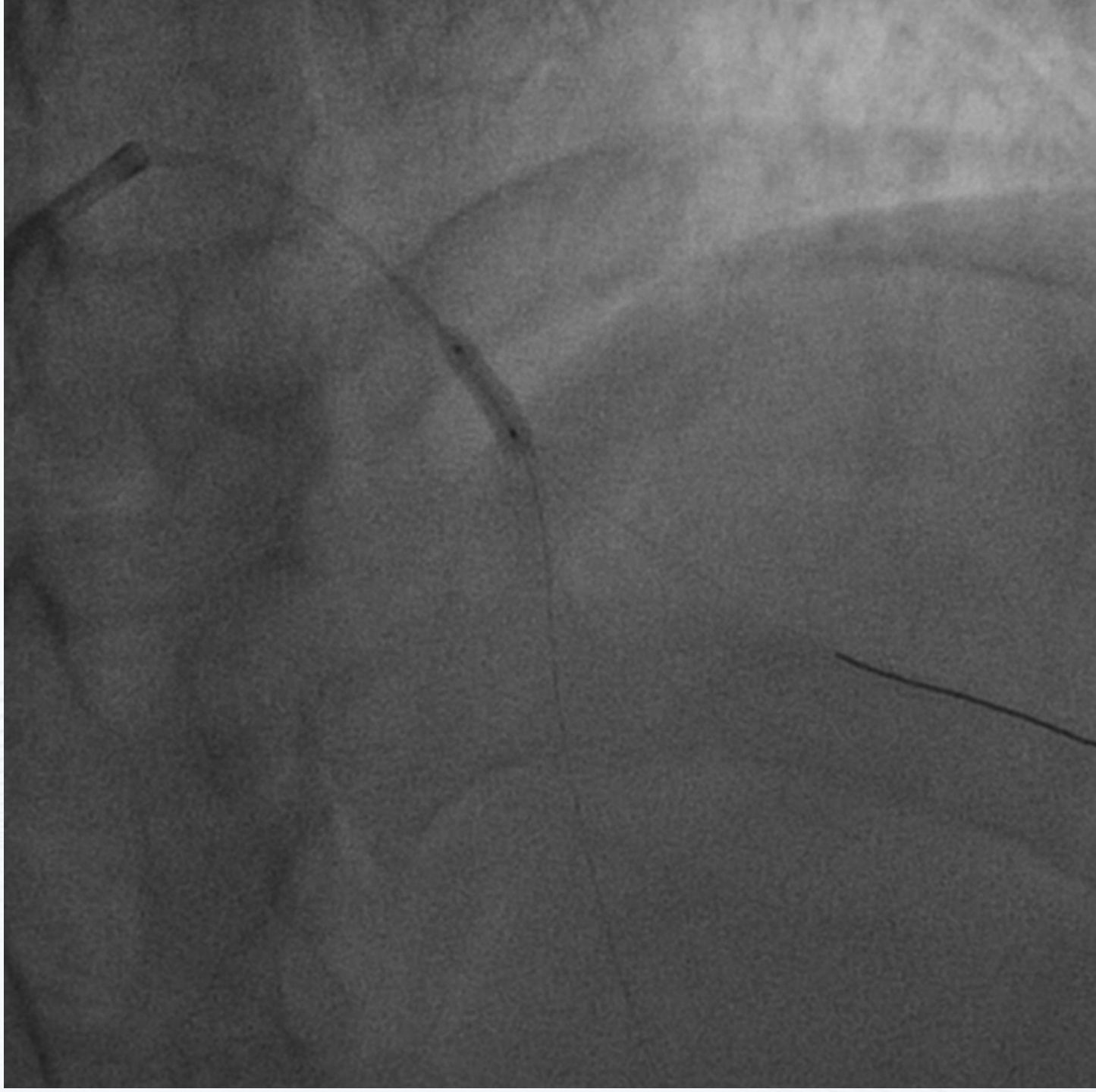
Retained microcatheter

Stenting of the LAD with a



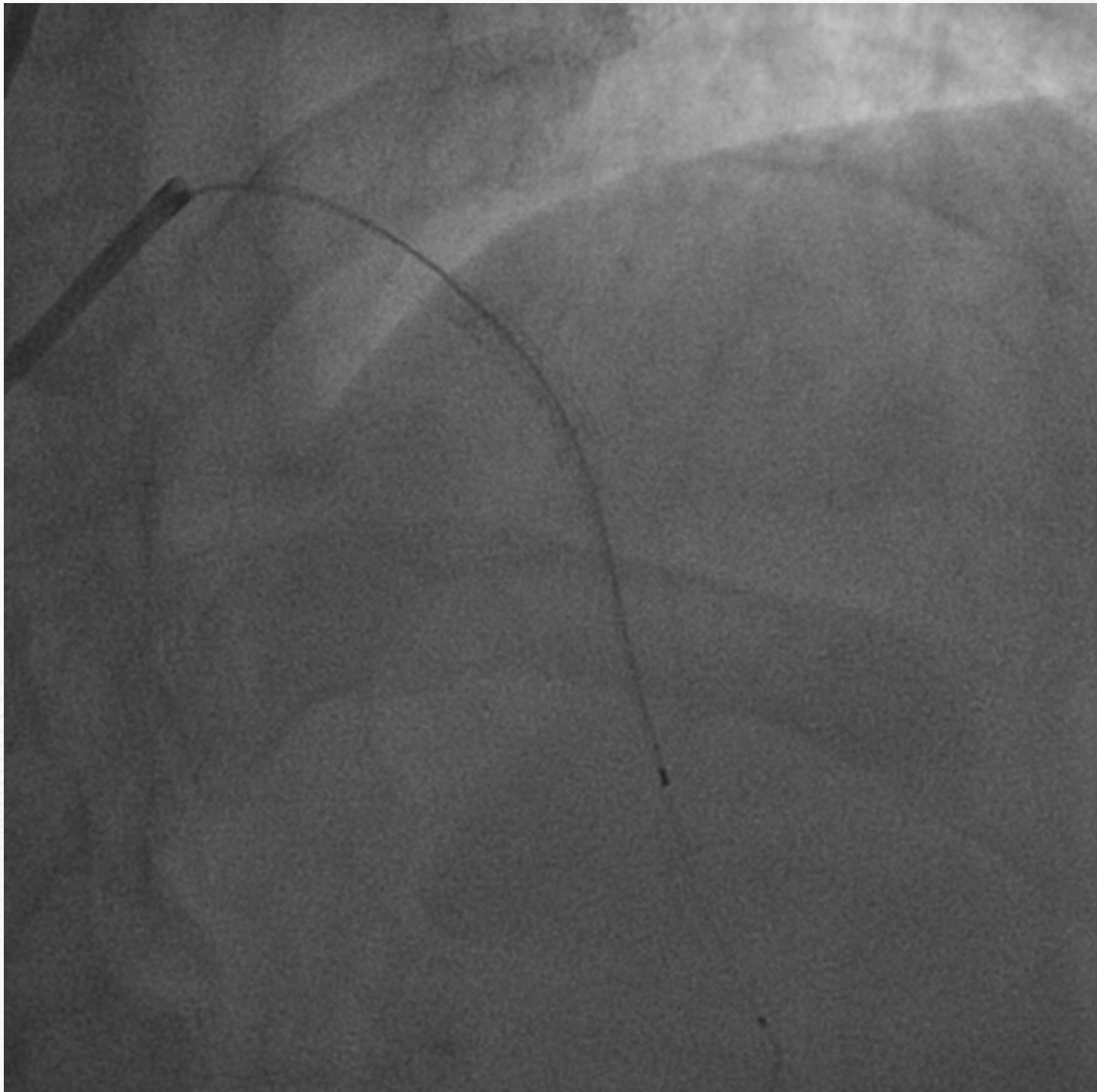
Case: OC

POT following removal of microcatheter



Case: OC

Final result



Side Branch Protection and Rescue Techniques

TECHNIQUE	WHEN TO APPLY	DESCRIPTION
Jailed wire	Before MV stenting	Wire placement in the SB
Jailed balloon protection	Before MV stenting	Small-diameter balloon placed in the SB and kept uninflated during MV stent deployment
Jailed microcatheter (including jailed Corsair)	Before MV stenting	Microcatheter placed in the SB and kept uninflated during MV stent deployment
Inflated jailed balloon protection (including modified jailed balloon and balloon-stent kissing)	Before MV stenting	Small-diameter balloon (with different degrees of protrusion in the MV) placed in the SB and kept inflated during MV stent deployment
Semi-inflated jailed balloon protection	Before MV stenting	Small-diameter balloon placed in the SB and inflated at low atmospheres during MV stent deployment
Rescue balloon jailing	After MV stenting, in the case of SB occlusion (or jailed wire entrapment)	Small-diameter balloon advancement and inflation over the jailed wire
Rescue microcatheter jailing	After MV stenting, in the case of SB occlusion (or jailed wire entrapment)	High-penetration microcatheter advancement over the jailed wire

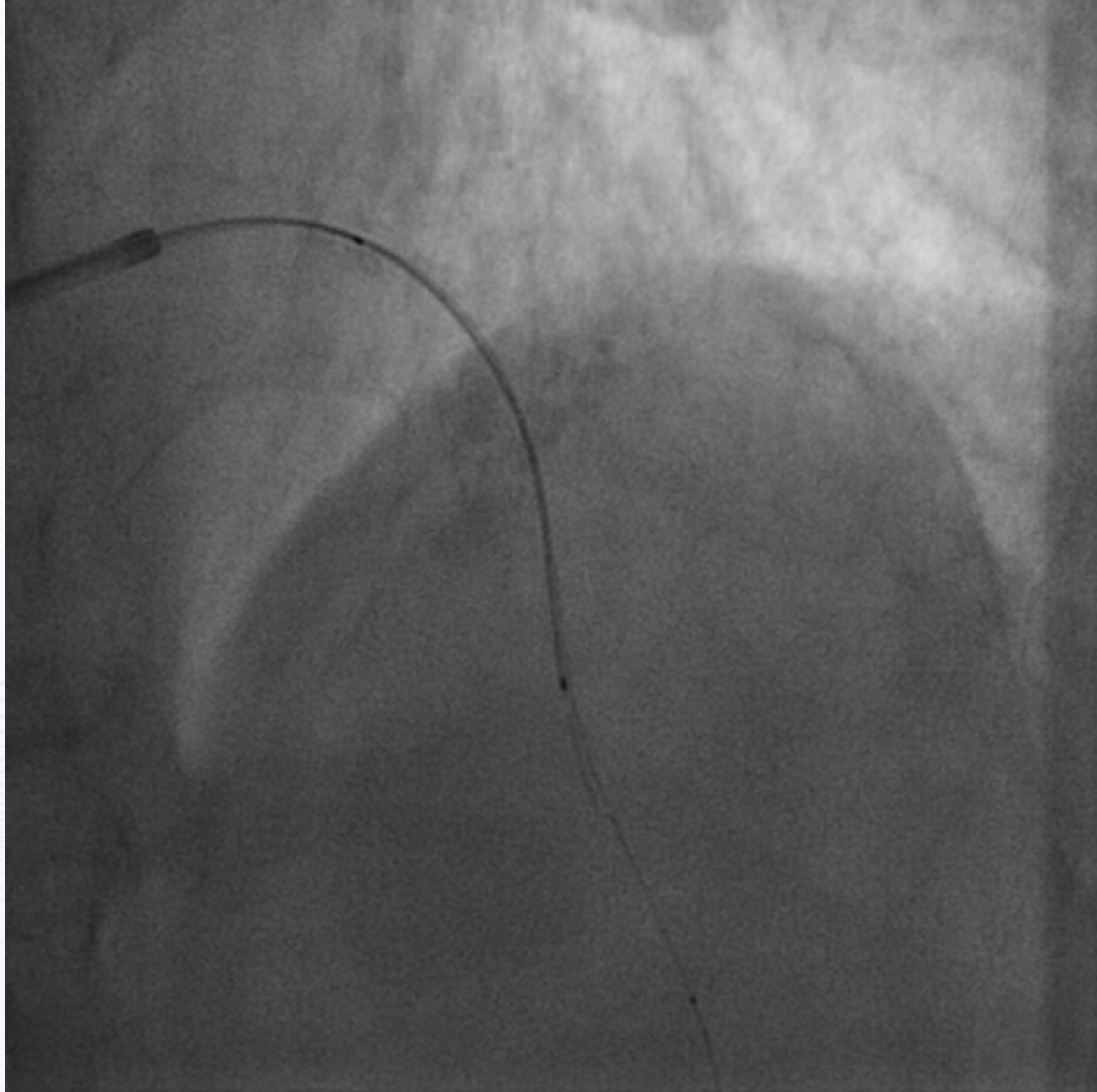
MV: main vessel; SB: side branch

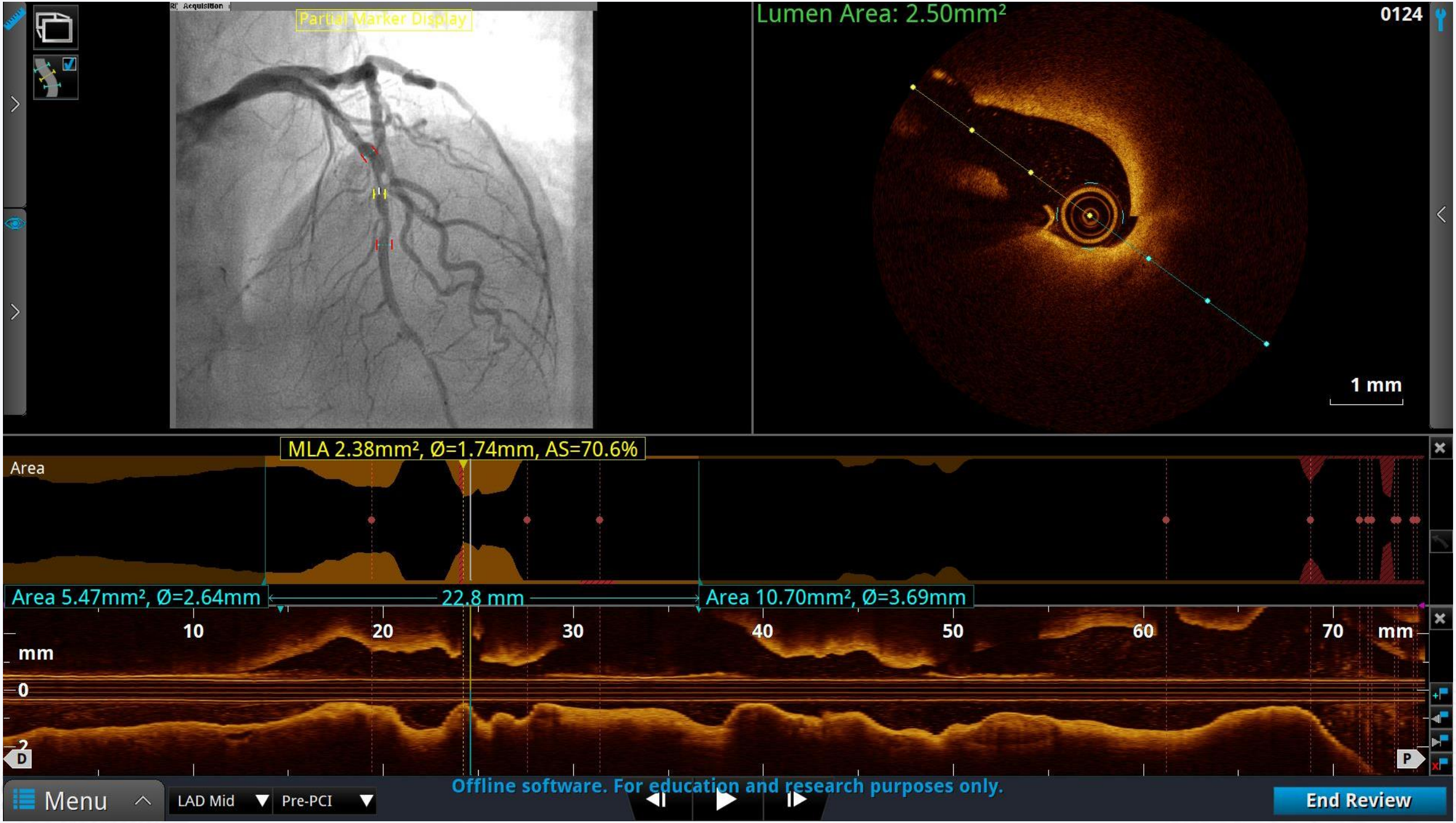
17th EBC expert consensus. EuroIntervention 2023

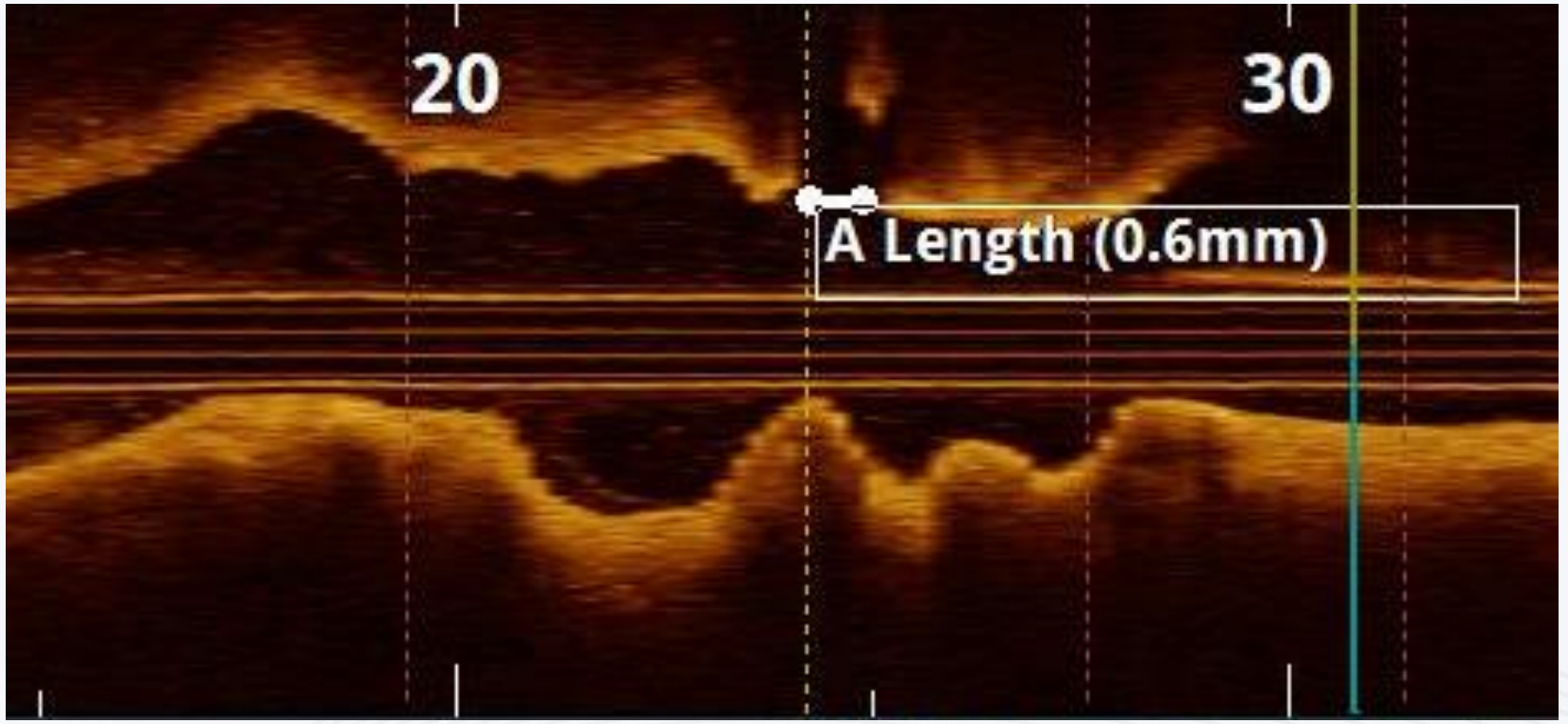
WELLINGTON CARDIOLOGY

Case: MHR

OCT following predilation with a 2.0 mm balloon

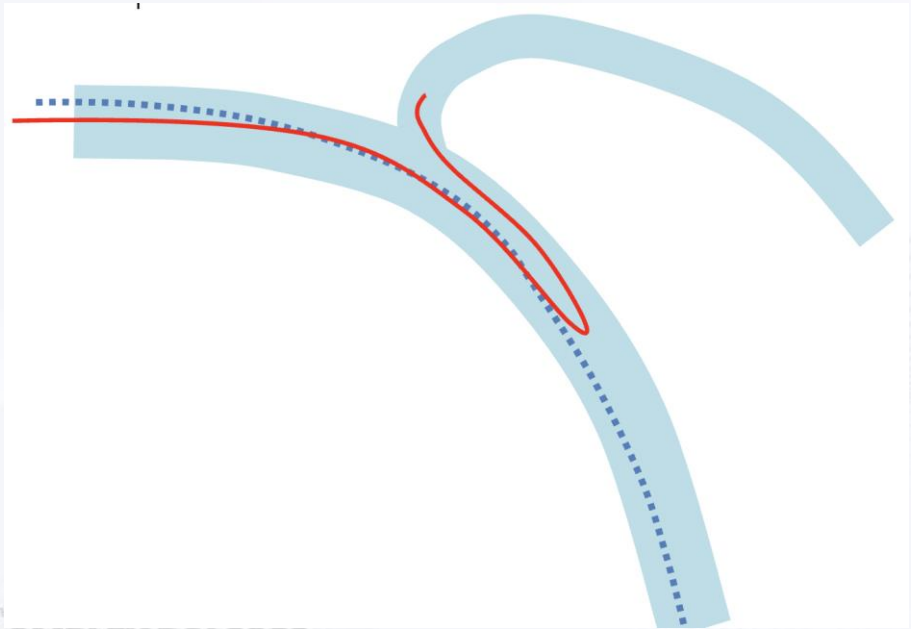


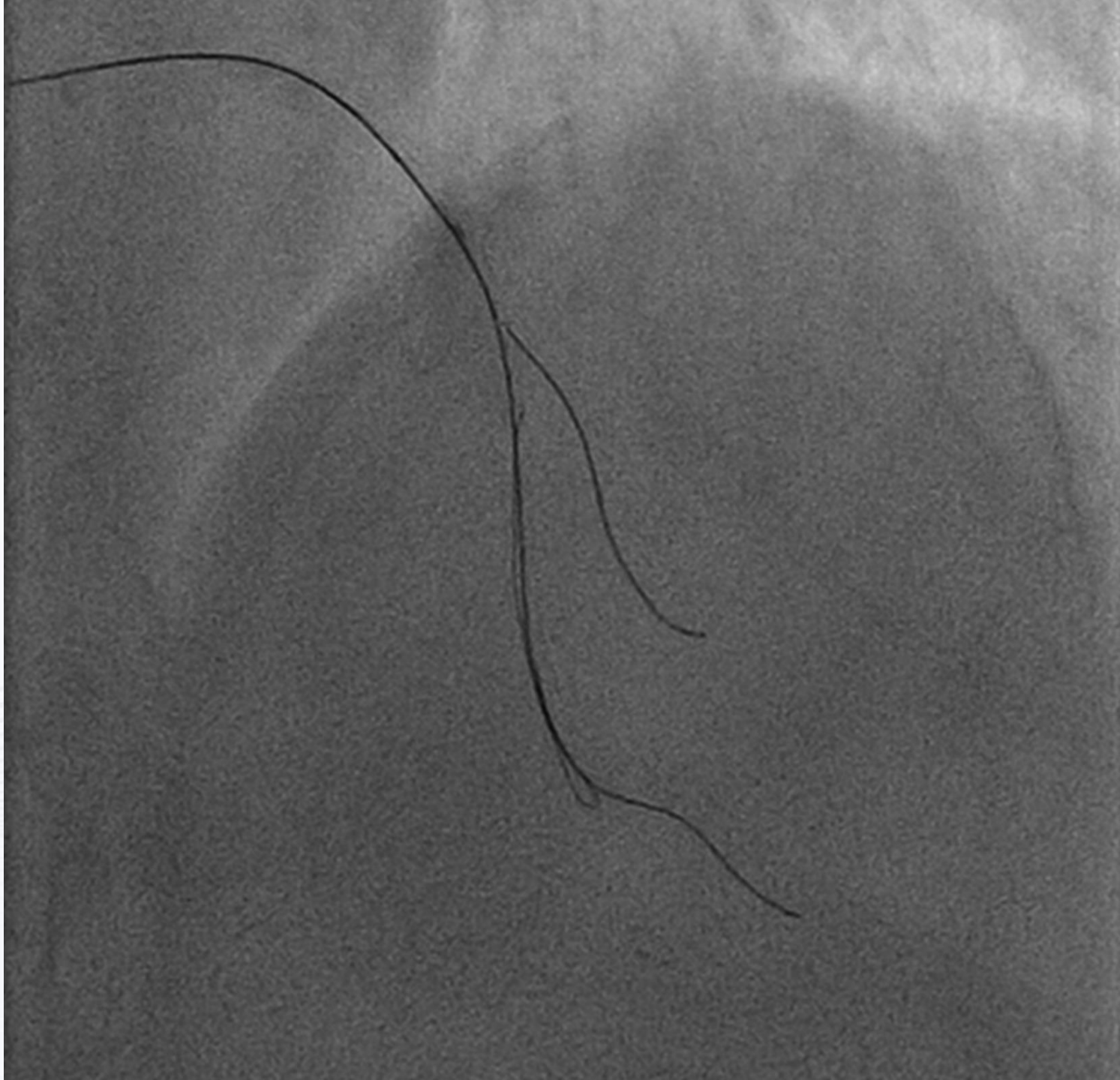

Acquisition
Partial Marker Display
Lumen Area: 2.50mm²
0124
1 mm
MLA 2.38mm², Ø=1.74mm, AS=70.6%
Area
Area 5.47mm², Ø=2.64mm
22.8 mm
Area 10.70mm², Ø=3.69mm
10
20
30
40
50
60
70
mm
mm
0
2
D
P
Offline software. For education and research purposes only.
Menu
LAD Mid
Pre-PCI
End Review


20
30
A Length (0.6mm)

Case: MHR

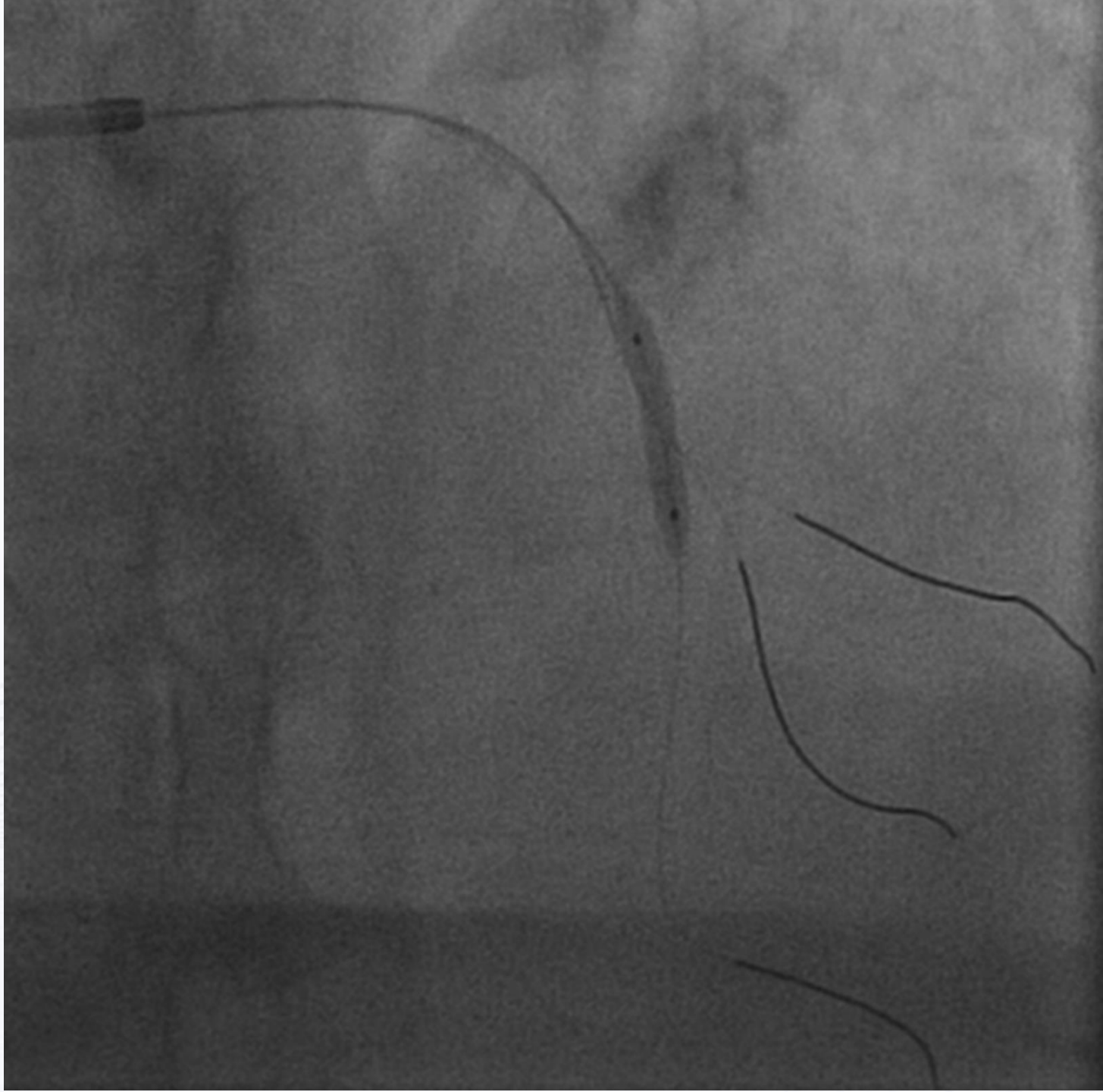
Reverse wiring using XT-R





Case: MHR

Pre-dilation with a 2.5 mm balloon



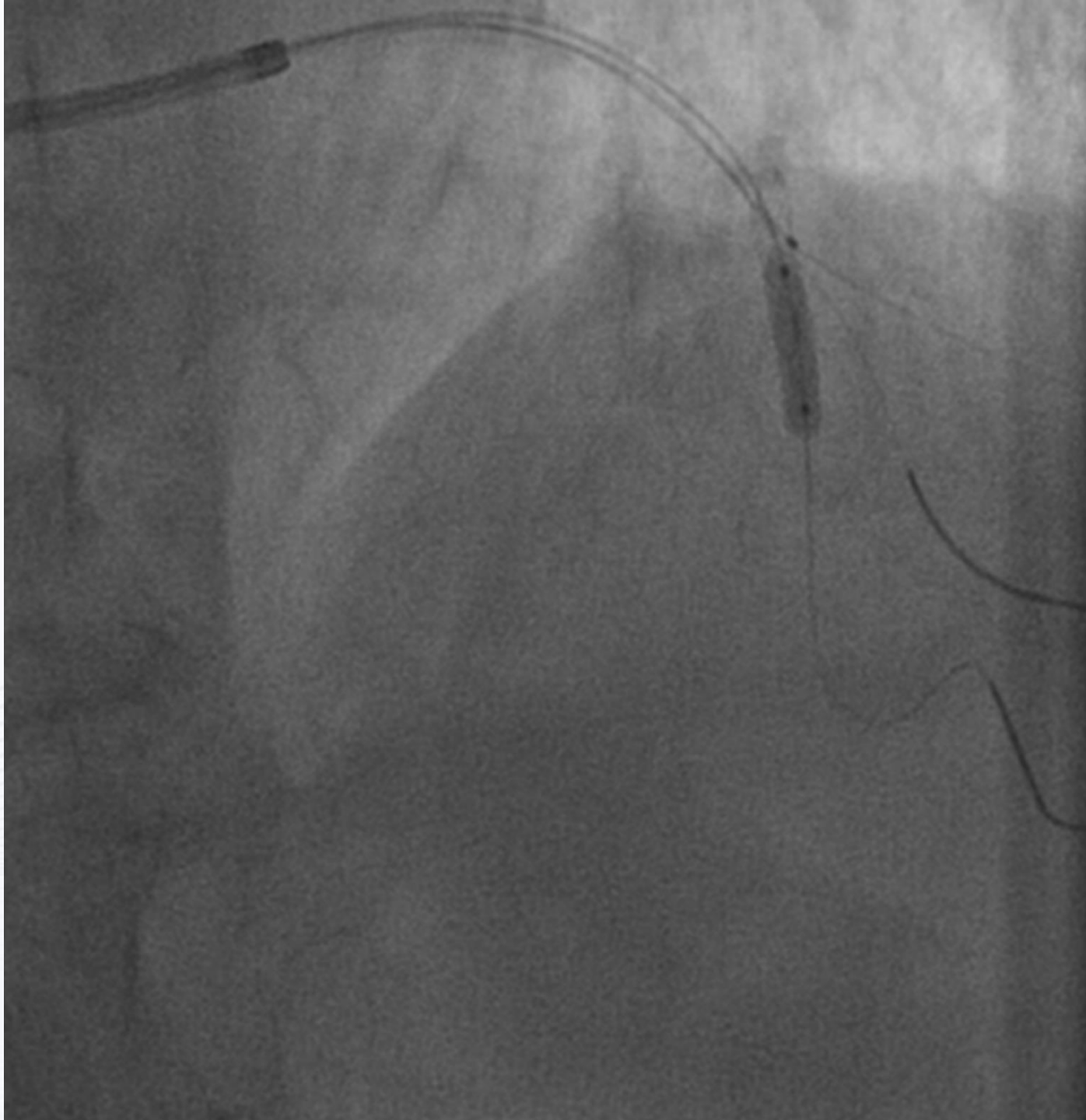
Case: MHR

3.0 x 24 MM stent with jailed

1.5 x 15 mm balloon

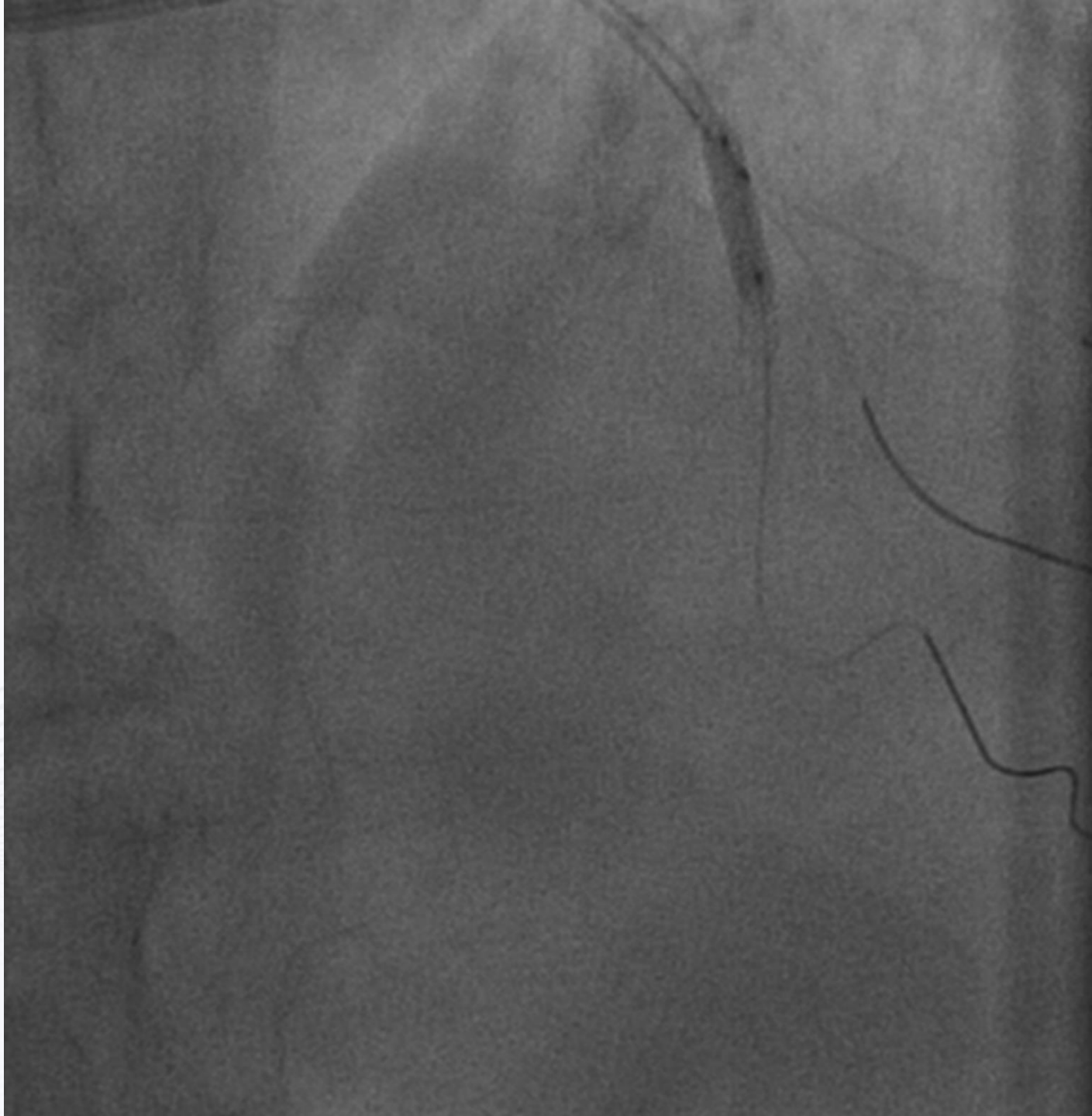
Case: MHR

Post dilation with a 3.0 mm NC distally



Case: MHR

Post dilation across SB with jailed balloon in place with 3.0 mm NC balloon

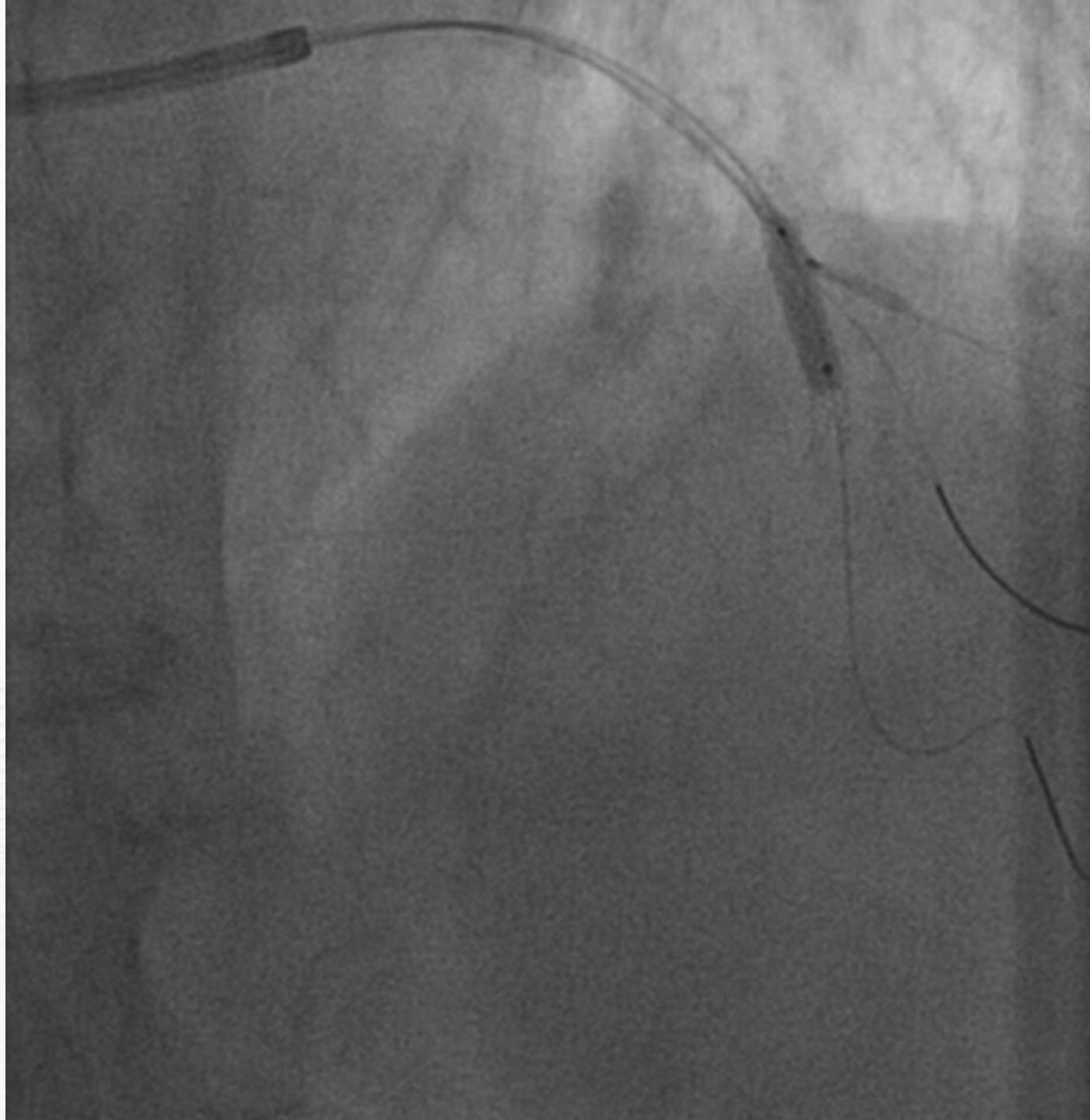


Case: MHR

External kiss

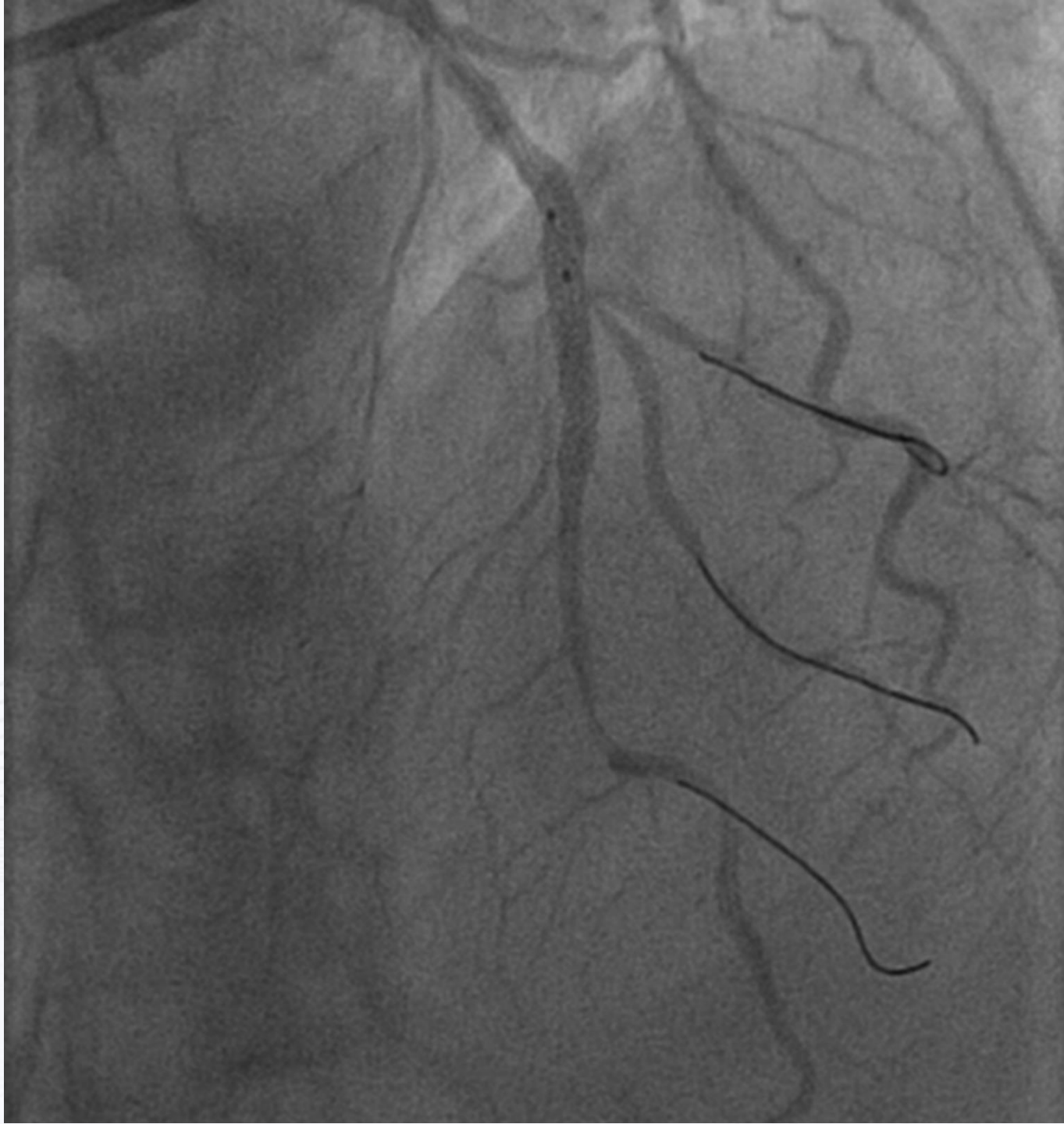
3.O mm balloon in stent

1.5 mm balloon in diagonal outside of the stent



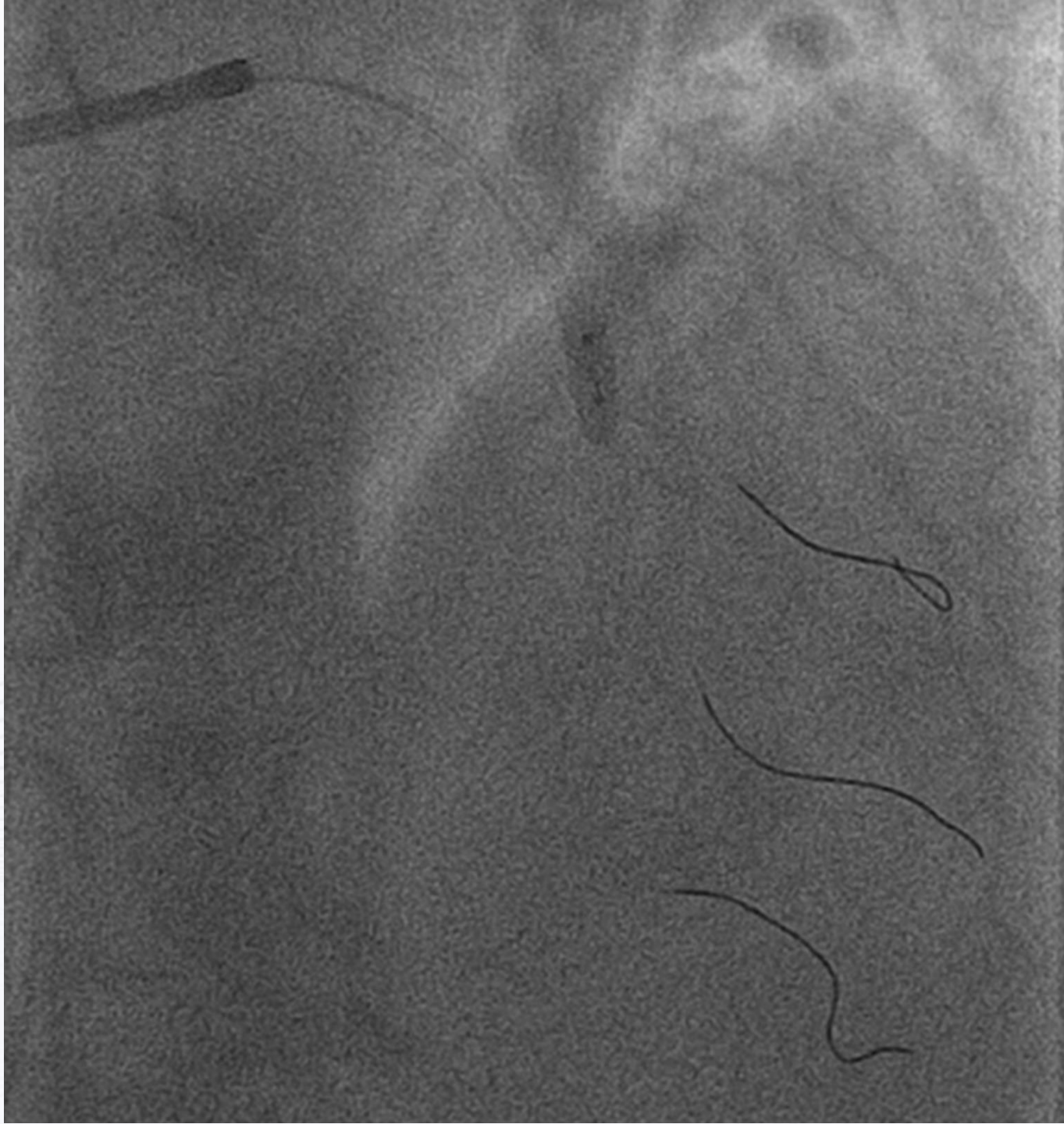
Case: MHR

Positioning of a 4.0 x 6 mm NC balloon for POT



Case: MHR

POT with a 4.0 x 6 mm NC balloon

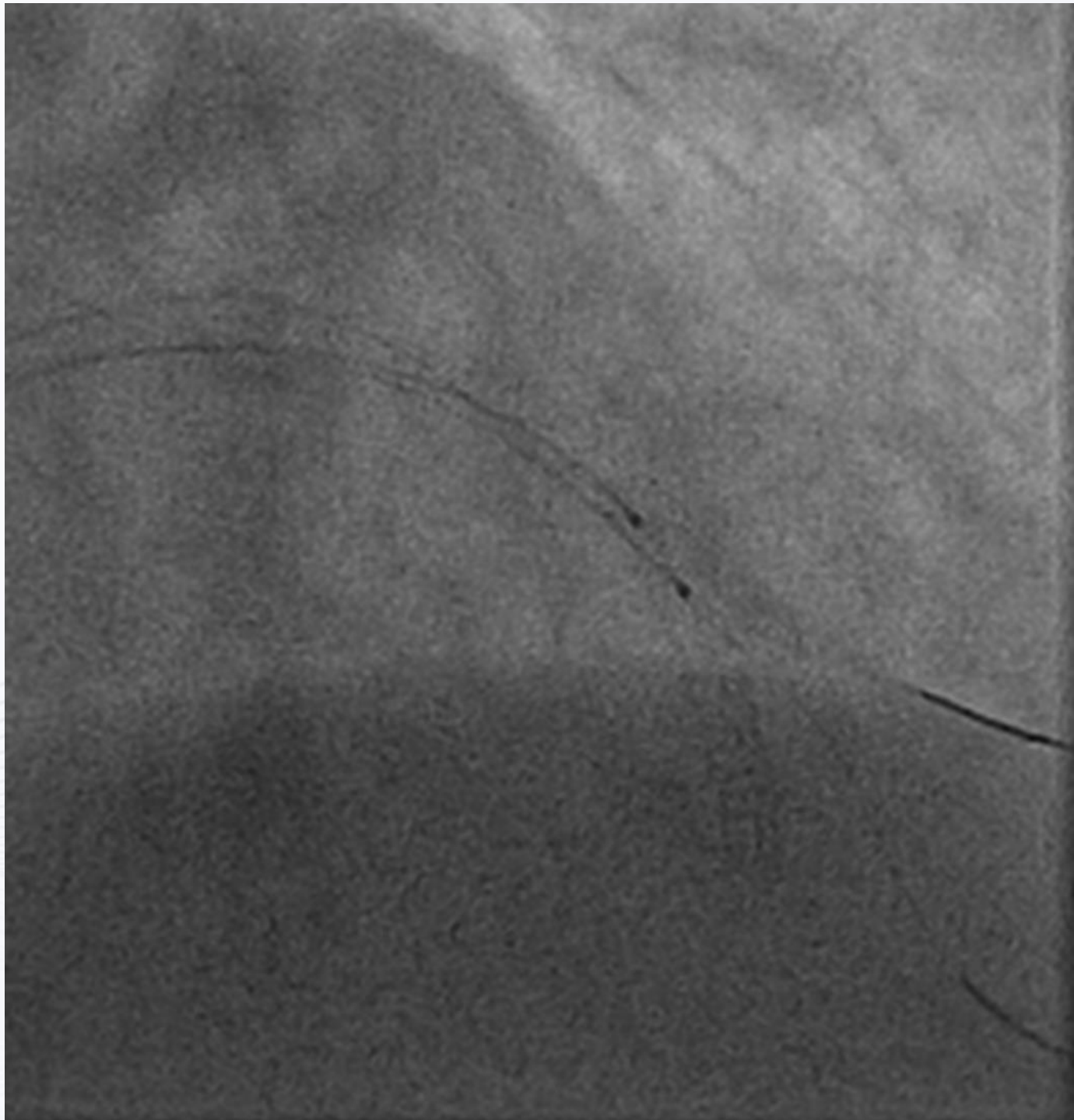


Case: MHR

Loss of diagonal branch following POT

Case: MHR

Rescue balloon (1.5 mm) placement



Case: MHR

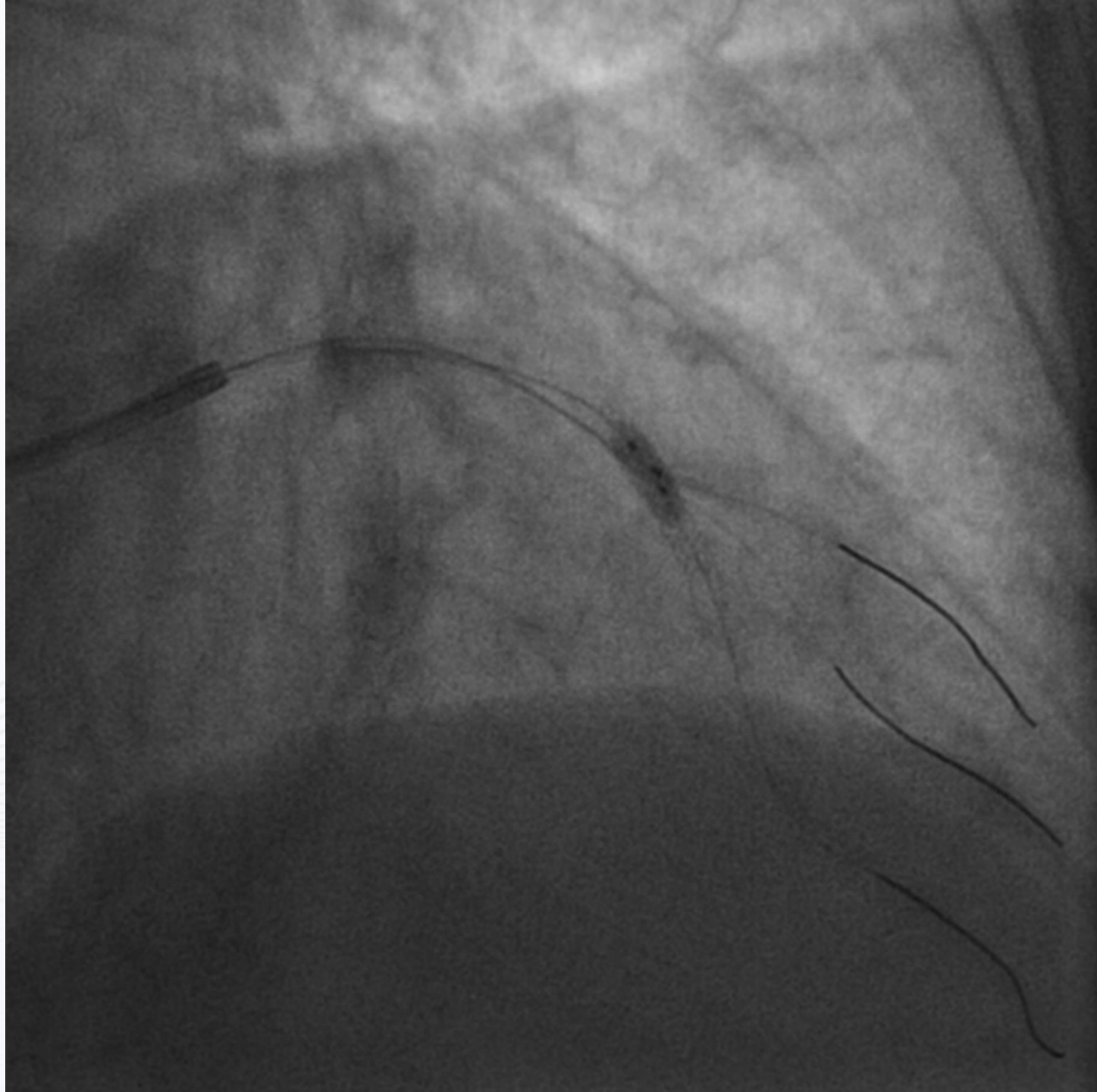
Rescue balloon (1.5 mm) inflation

Case: MHR

Rescue external kiss

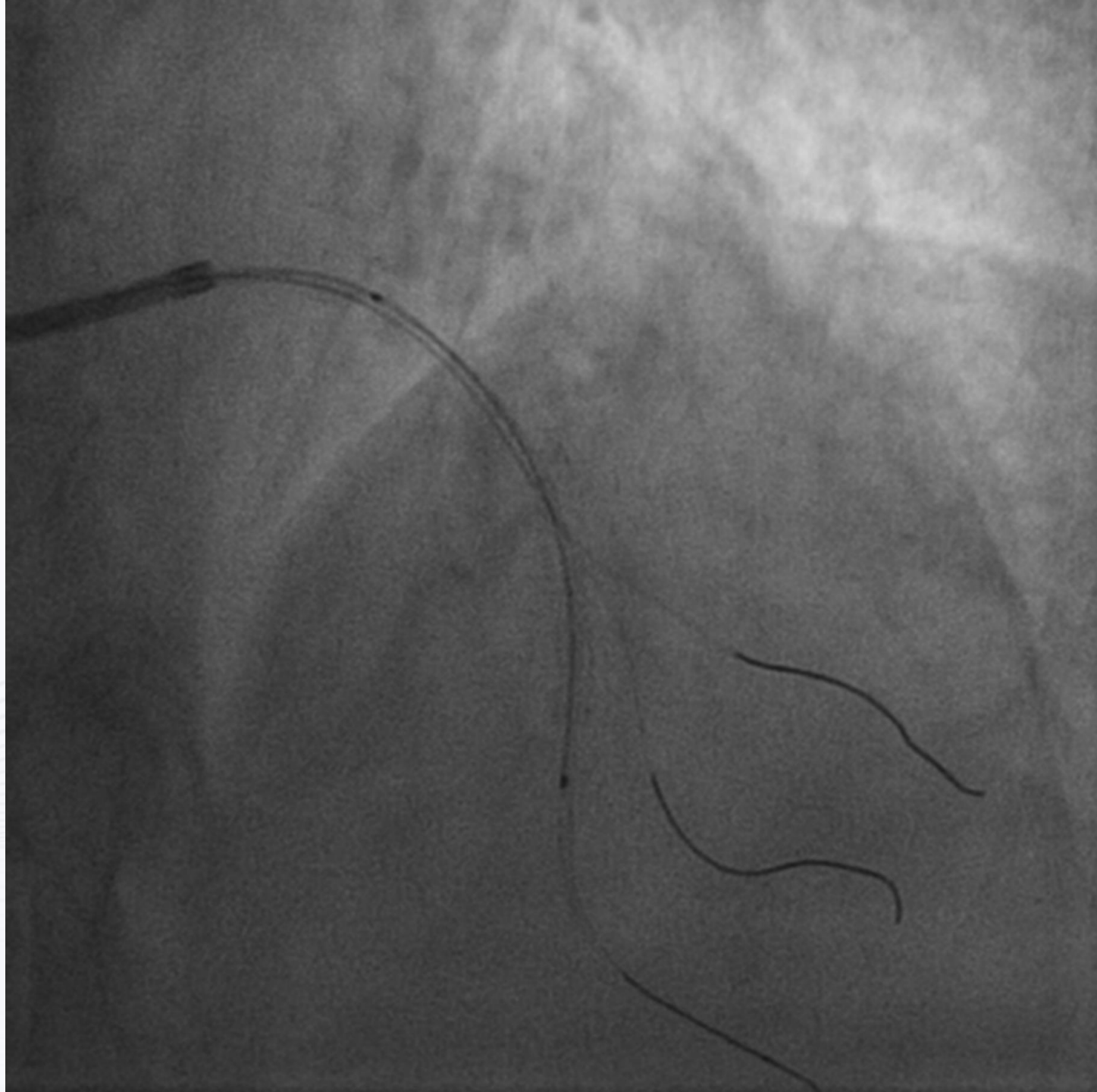
3.0 mm NC balloon in MB

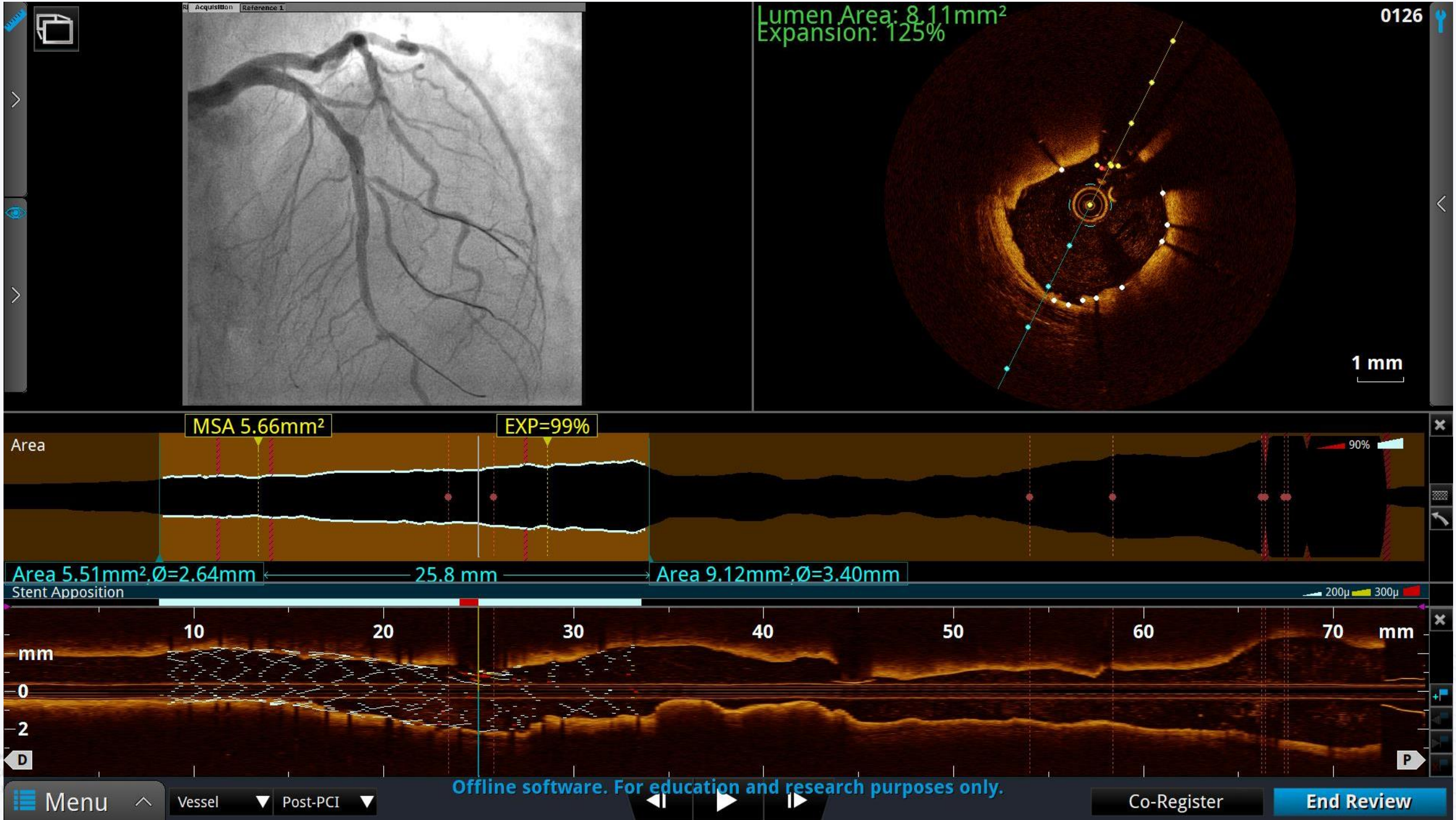
1.5 mm balloon in SB

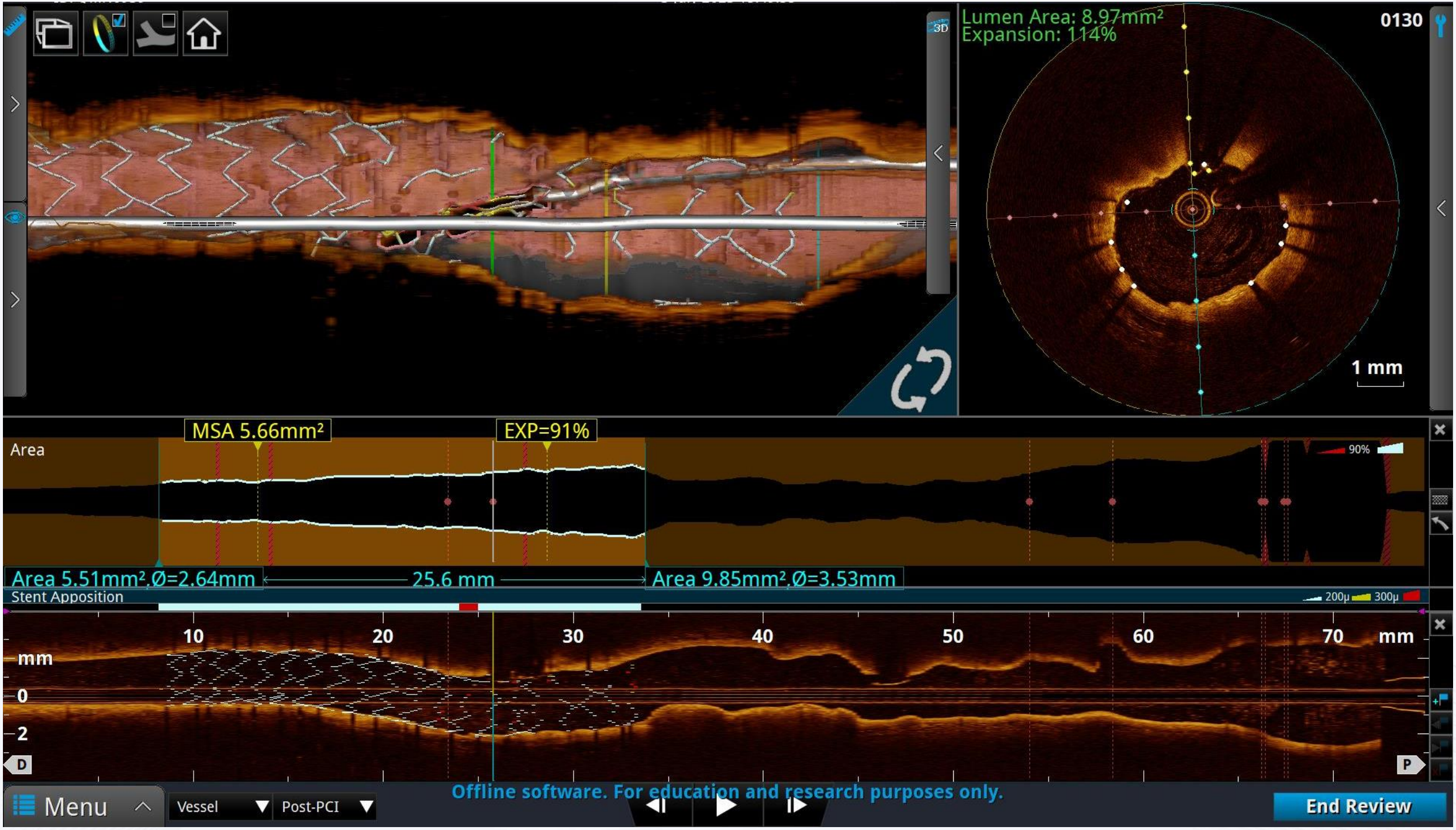


Case: MHR

Repeat OCT

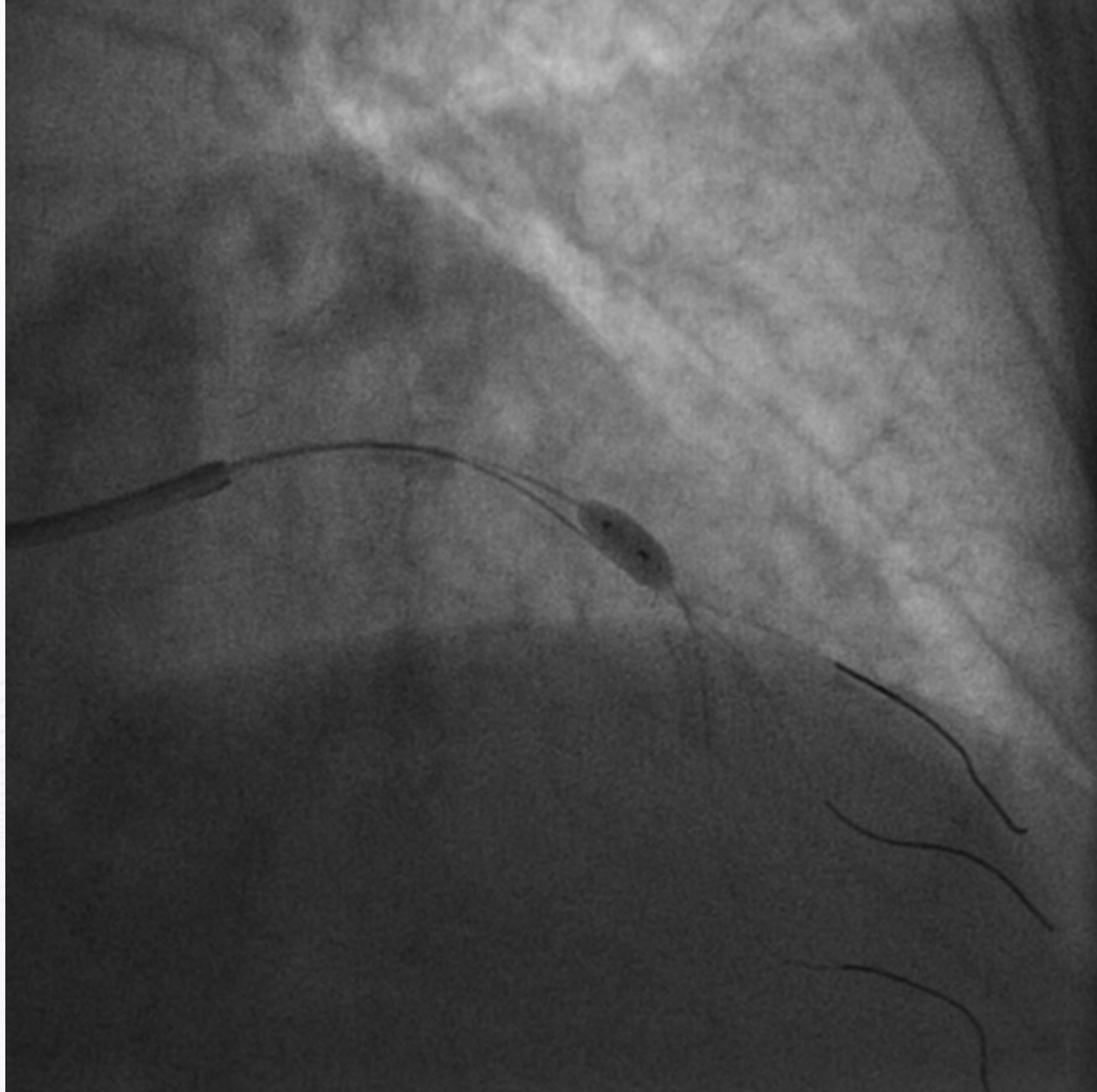


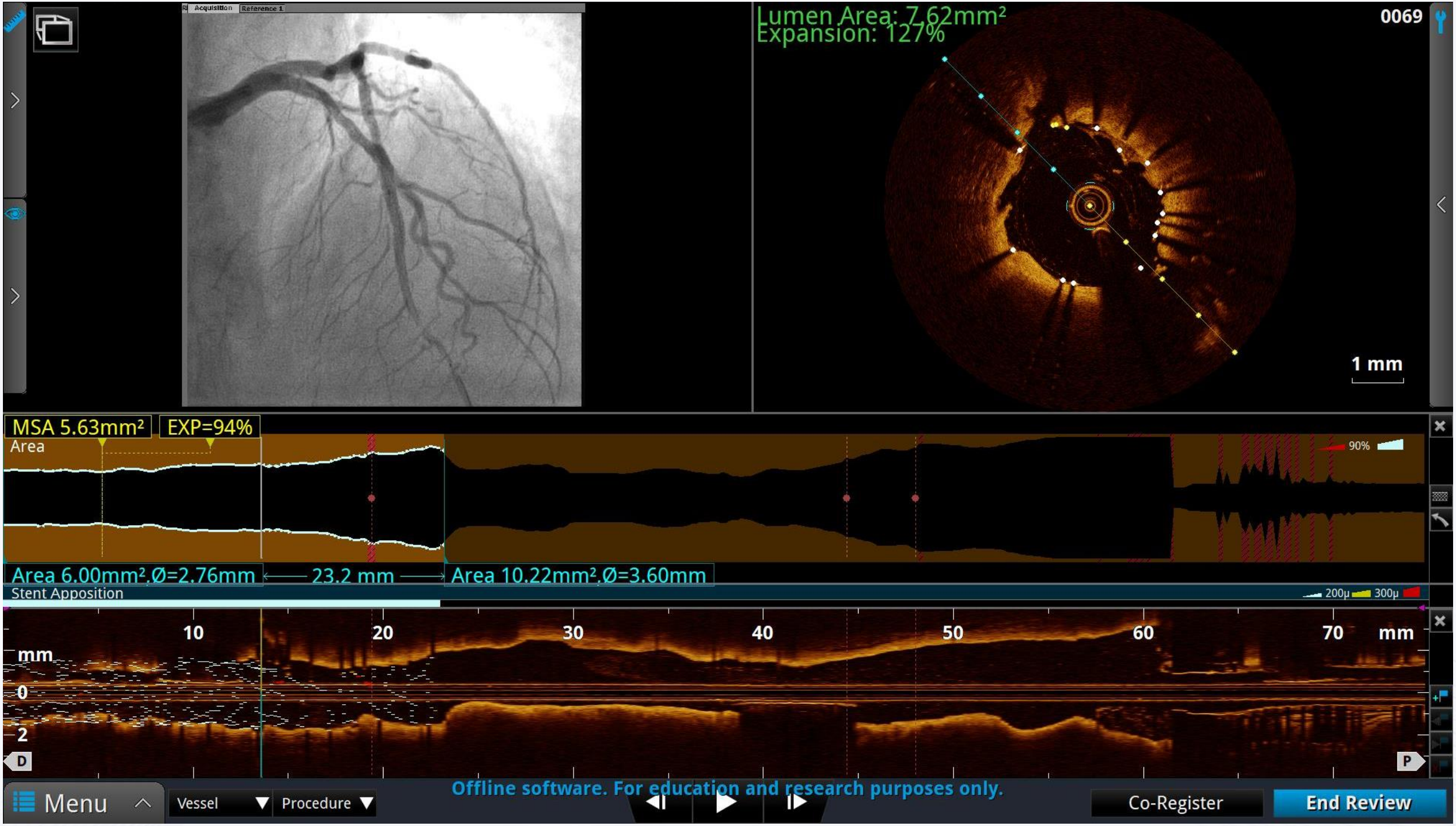

Acquisition
Reference 1
Lumen Area: 8.11mm²
Expansion: 125%
0126
1 mm
MSA 5.66mm²
EXP=99%
Area
90%
Area 5.51mm², Ø=2.64mm
25.8 mm
Area 9.12mm², Ø=3.40mm
Stent Apposition
200µ
300µ
10
20
30
40
50
60
70
mm
mm
0
2
D
P
Offline software. For education and research purposes only.
Menu
Vessel
Post-PCI
Co-Register
End Review


Lumen Area: 8.97mm²
Expansion: 114%
0130
1 mm
MSA 5.66mm²
EXP=91%
Area
90%
Area 5.51mm², Ø=2.64mm
25.6 mm
Area 9.85mm², Ø=3.53mm
Stent Apposition
200µ
300µ
10
20
30
40
50
60
70
mm
mm
0
2
D
P
Menu
Vessel
Post-PCI
Offline software. For education and research purposes only.
End Review

Case: MHR

Re POT with 4.0 x 6mm NC




Acquisition
Reference 1
Lumen Area: 7.62mm²
Expansion: 127%
0069
1 mm
MSA 5.63mm²
EXP=94%
Area
90%
Area 6.00mm²,Ø=2.76mm
23.2 mm
Area 10.22mm²,Ø=3.60mm
Stent Apposition
200µ
300µ
10
20
30
40
50
60
70
mm
mm
0
2
D
P
Menu
Vessel
Procedure
Offline software. For education and research purposes only.
Co-Register
End Review

Case: MHR

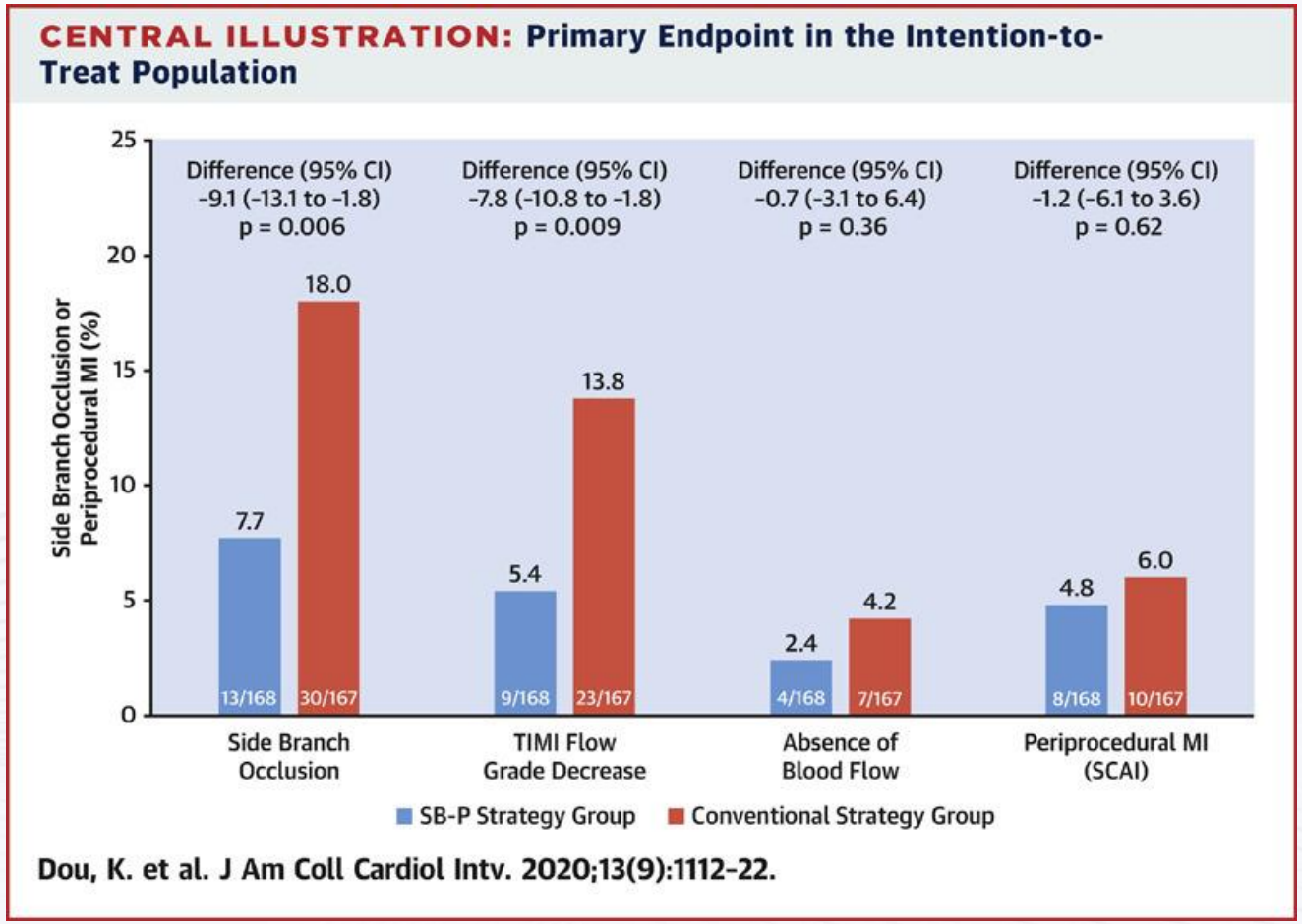
Final angiogram

Case: MHR

Final angiogram

Active SB-P Versus Conventional Approach to the Protection of High-Risk Side Branches: The CIT-RESOLVE Trial

- Randomized 335 patients to active SB protection versus a conventional strategy
- Active: elective 2-stent for large SBs and jailed balloon for small SBs
- Conventional: provisional for large SBs and jailed wire for small SBs
- Differences driven mainly by the small SB subgroup (jailed balloon vs. jailed wire)



Conclusions

- Provisional stenting is the mainstay of bifurcation PCI
- However, SB occlusion can occur and is an important cause of MACE
- Use of angiographic and intracoronary imaging criteria can predict the risk of side branch closure
- Advanced protection techniques are helpful in reducing acute side branch closure
- Long term outcomes of these techniques are unknown