# Feasibility of IVUS-guided rotational atherectomy after subintimal wiring in heavy calcified lesion

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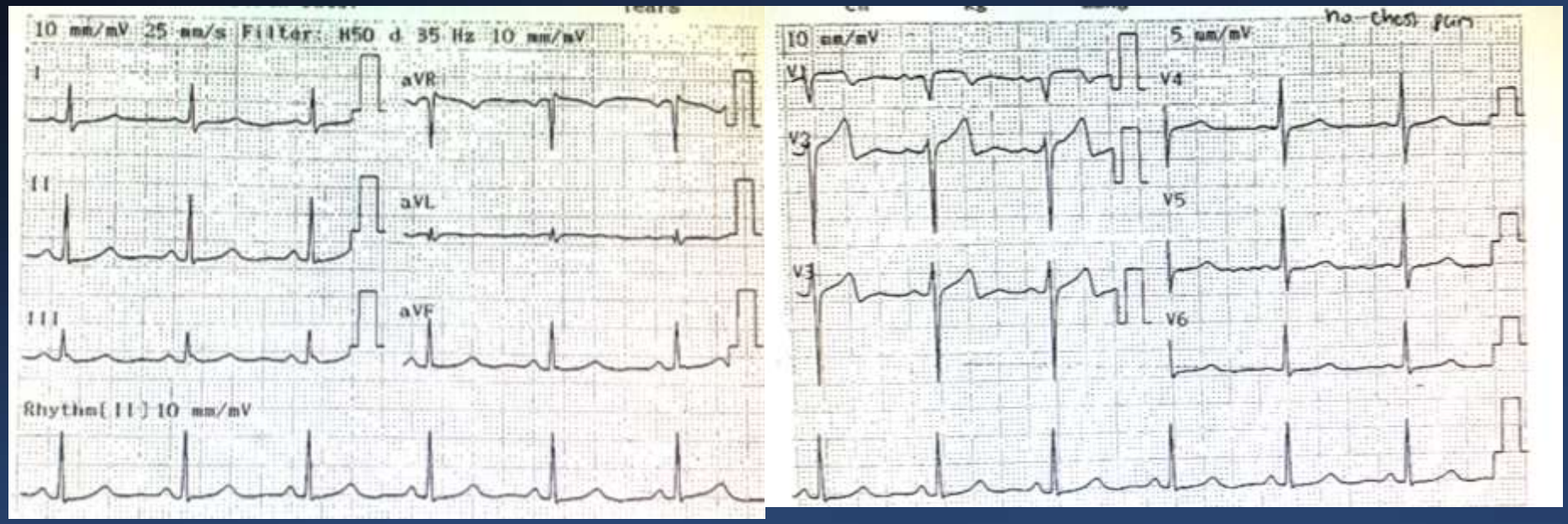
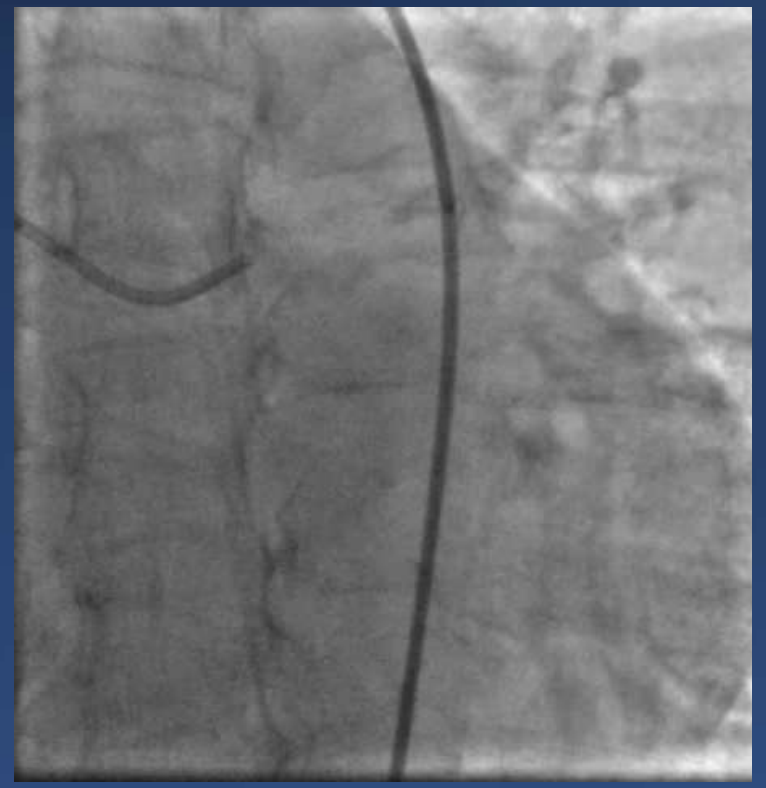
# JY , Female 58 YO




- Known case Hypertension, T2DM, CKD stage III
- She presented to primary hospital with angina at rest
- ECG showed biphasic T-wave inversion in lead V1-V3
- Cardiac troponin T 23 pg/ml
- Echo showed hypokinesia of basal to apical anterior wall, EF 61.4%

# Coronary Angiography: LCA



**Severe diffuse stenosis of proximal LAD and nearly total occlusion of mid LAD.**
**Tubular stenosis at LPD.**

# Coronary Angiography: RCA

# SYNTAX Score calculation

## SYNTAX Score I

| | |
|---|---|
| **Lesion 1** | |
| segment number(s) | |
| (segment 6): 3.5x2= | 7 |
| (segment 7): 2.5x5= | 12.5 |
| Age T.O. is unknown | 1 |
| + Bridging | 1 |
| the first segment beyond the T.O. visualized by contrast: 7 | 0 |
| + sidebranch: Yes, all sidebranches <1.5mm | 1 |
| Heavy calcification | 2 |
| *Sub total lesion 1* | *24.5* |
| **Lesion 2** | |
| (segment 13): 1.5x2= | 3 |
| *Sub total lesion 2* | *3* |
| **Lesion 3** | |
| (segment 1): 0x2= | 0 |
| *Sub total lesion 3* | *0* |
| *TOTAL:* | *27.5* |

## SYNTAX Score II

**PCI**

| | |
|---|---|
| SYNTAX Score II: | 44.4 |
| PCI 4 Year Mortality: | 21.1 % |

**CABG**

| | |
|---|---|
| SYNTAX Score II: | 19.6 |
| CABG 4 Year Mortality: | 2.9 % |

*Treatment recommendation* ⓘ*:* *CABG*

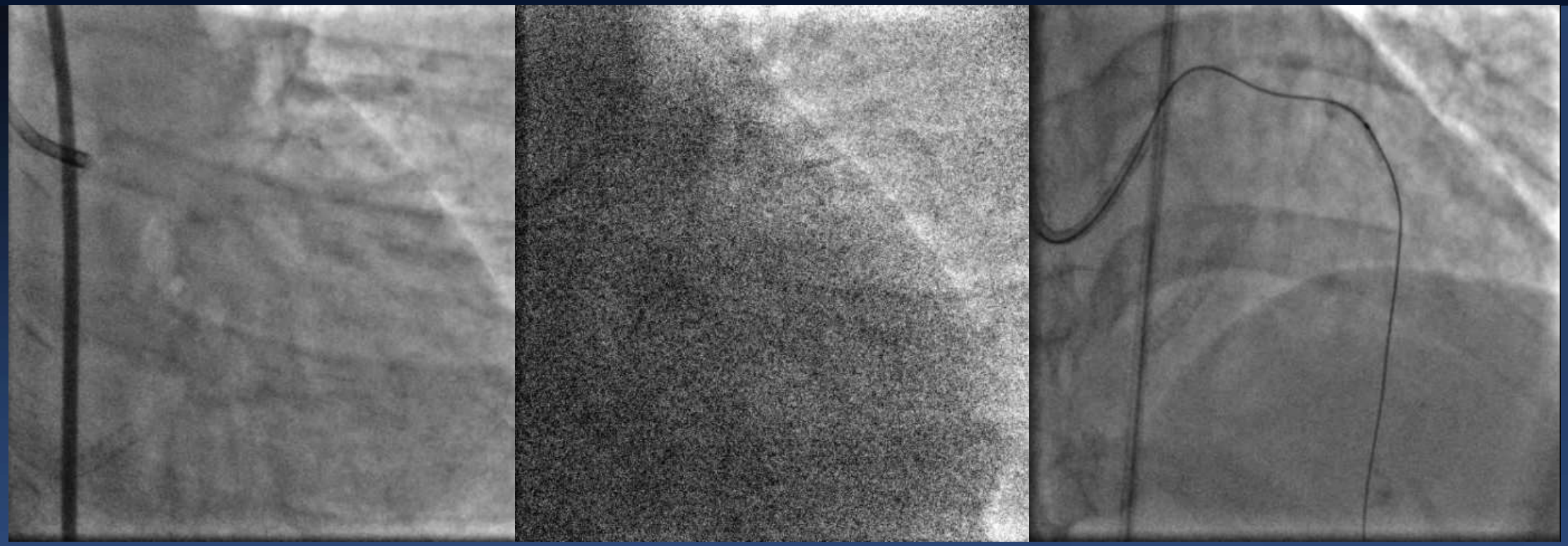
**LAD:**
**target suitability for bypass?**

**LCX:**
**can be fixed with single stent**

# PCI was performed successful at LCX but failed at CTO mid LAD

DES 3.5x26 mm (8 atm/3.50 mm)

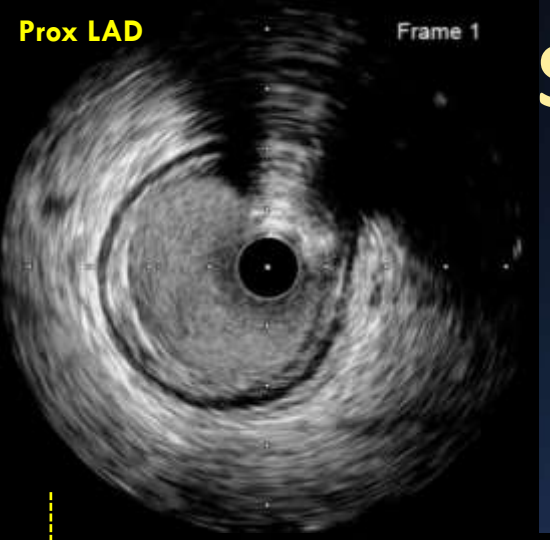
# 2nd attempt (3 weeks later)

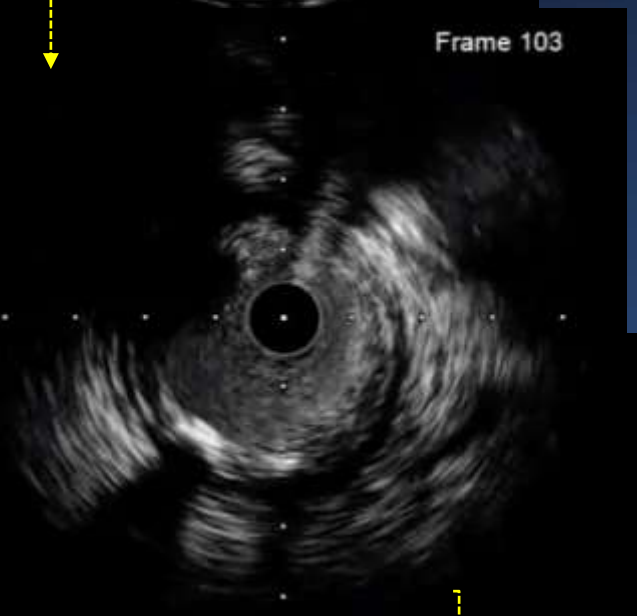


- Guiding catheter: EBU 3.5/7 Fr → Failure to engage, change to EBU 3.0/6Fr *(last item in our cath lab)*
- Guidewire: *Fielder FC* + Finecross → Failure to pass proximal LAD due to the wire went through previous dis section flap that occurred from the prior procedure
- Change GW to *Fielder XT-A* + Finecross → wire pass through the lesion but balloon still stuck at mid LAD
- Change GW to *SION Blue wire* to get a better support but the balloon could not pass the lesion

# At that time, the flow to LAD had already compromised from dissection flap

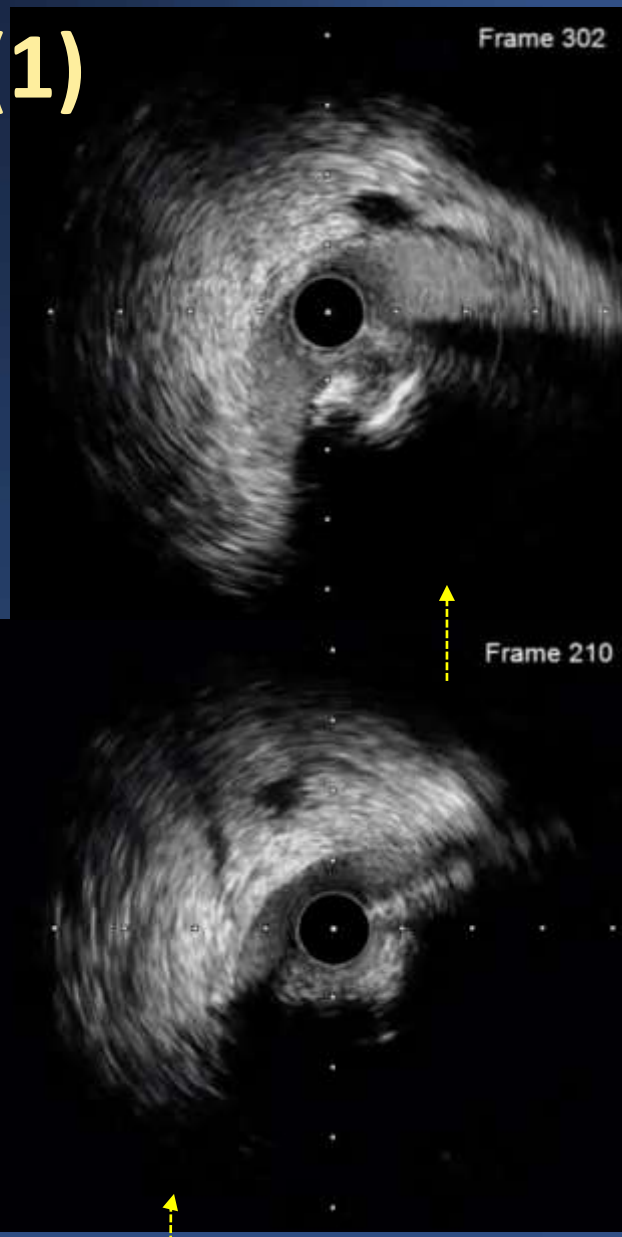
# Subintimal wiring at proximal LAD (1)



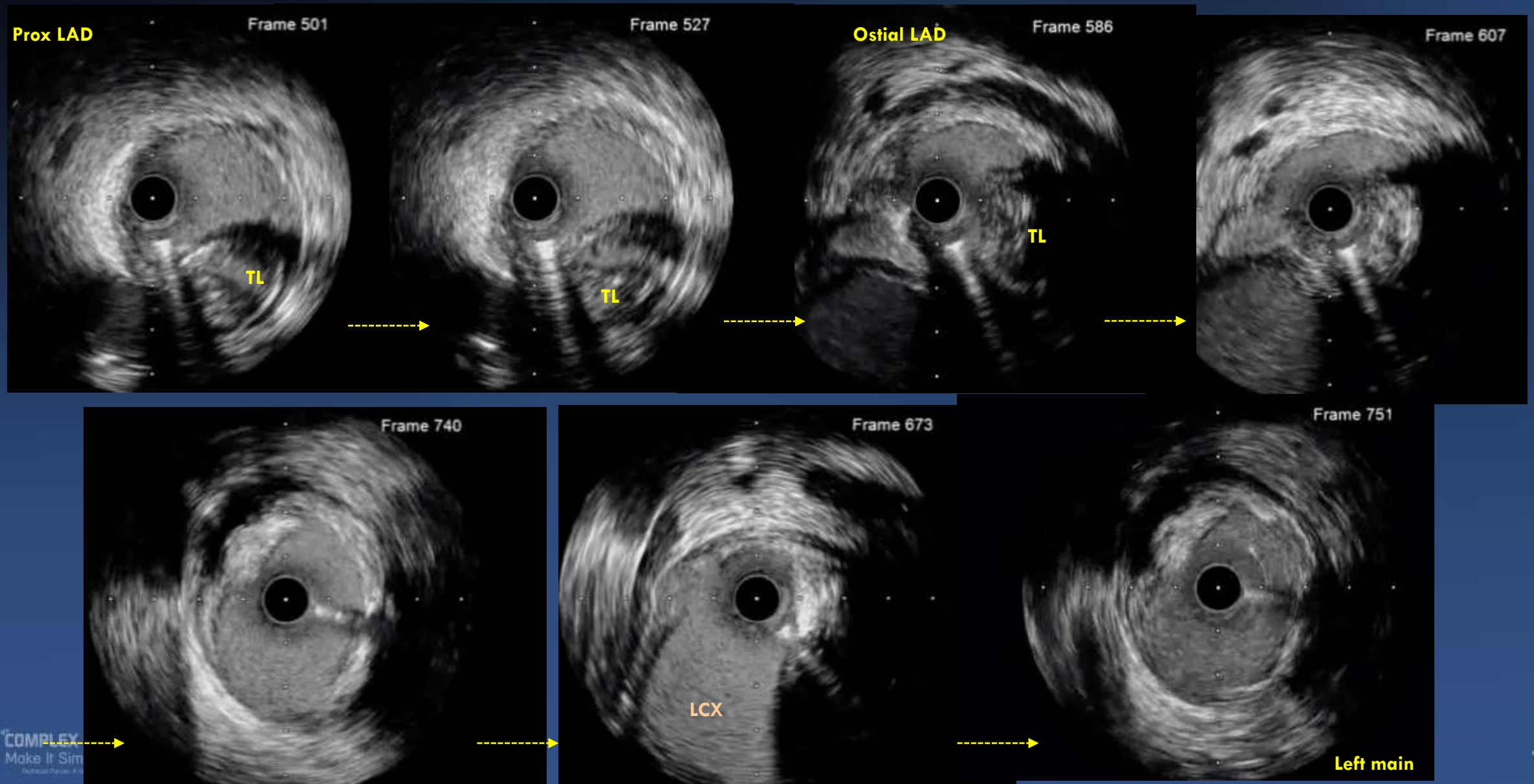









# Subintimal wiring at proximal LAD (2)



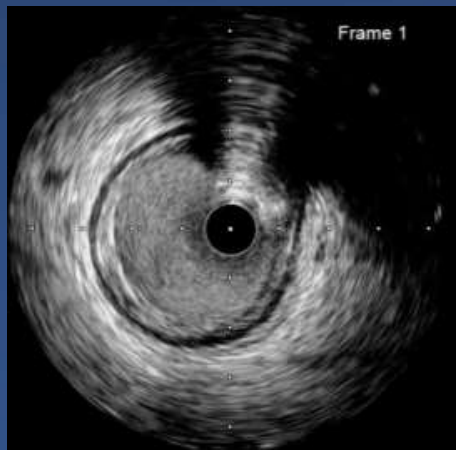
# How would you further manage this case?

- Rewiring to the true lumen YES NO
- Non-dilatable lesion at mid LAD GO ON GIVE UP

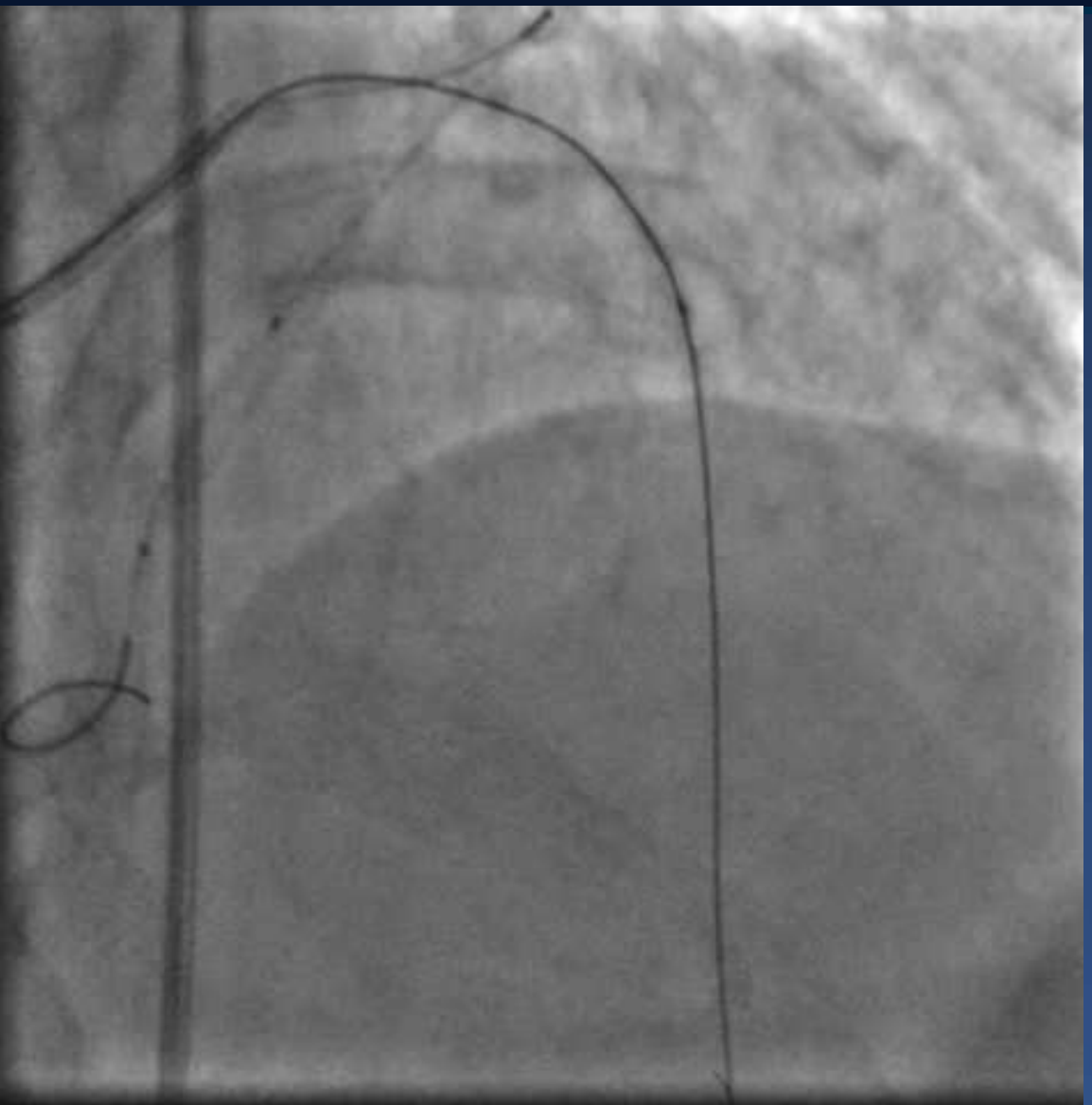
# How would you further manage this case?

- Rewiring to the true lumen YES NO
  - ? Patency of true lumen after pre-dilation with 2.5 mm balloon…distortion of the true lumen might have occurred
  - IVUS guidance rewiring with 6 Fr system is not possible and EBU 3.0/7Fr was not available at that time.
  - ? Puncture LFA and rewiring with IVUS guided from previous GC
  - Short distance of subintimal wiring, just stent?
- Non-dilatable lesion at mid LAD GO ON GIVE UP
  - ? Safety of rotational atherectomy in lesion with proximal dissection
  - If no rota, how could the balloon pass the lesion?

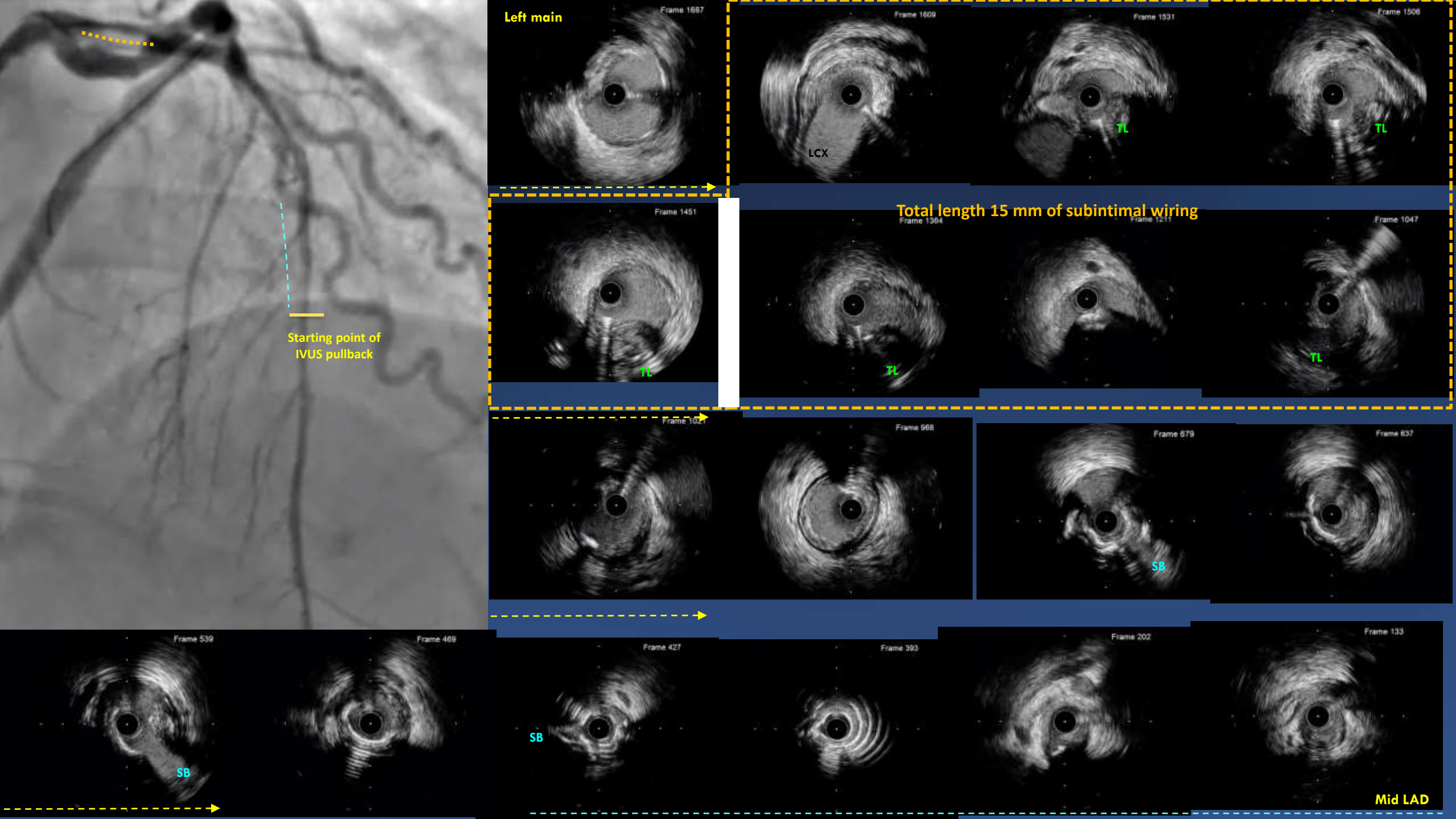
***Maybe.. we start rota at the most normal part that marked by the position of IVUS***



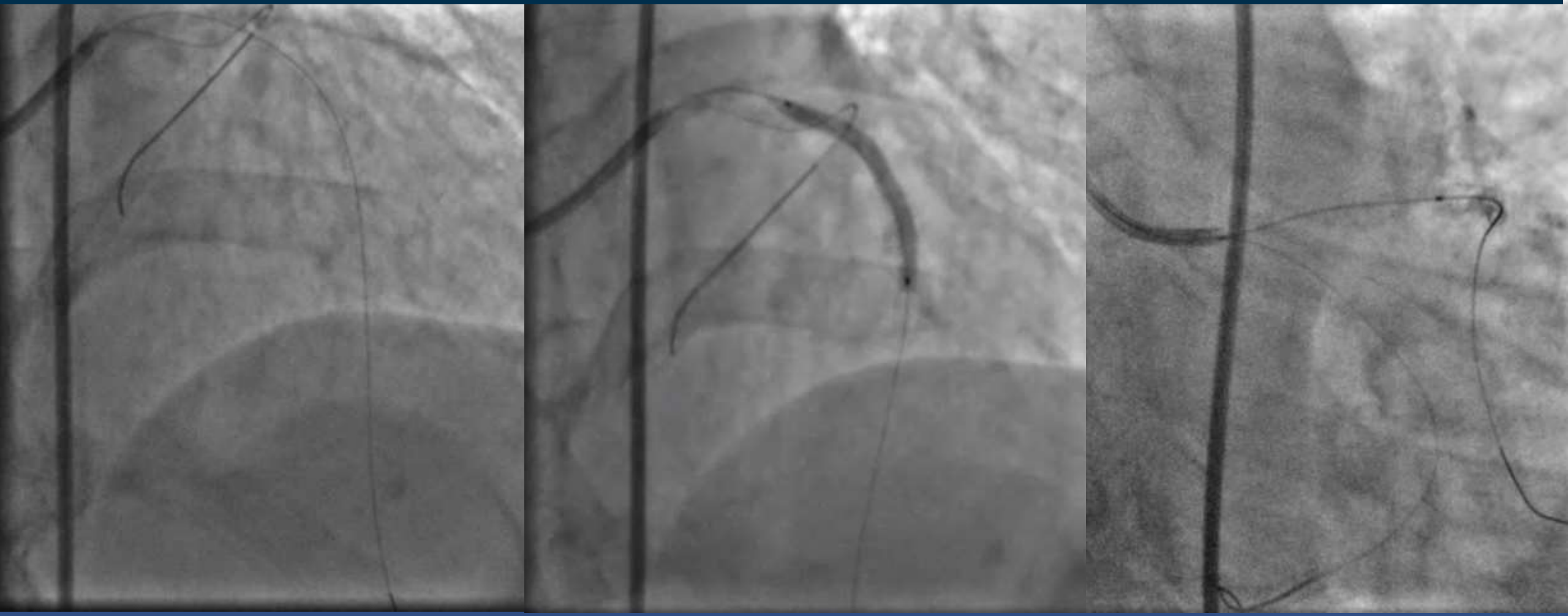
# OK, we chose rota but….



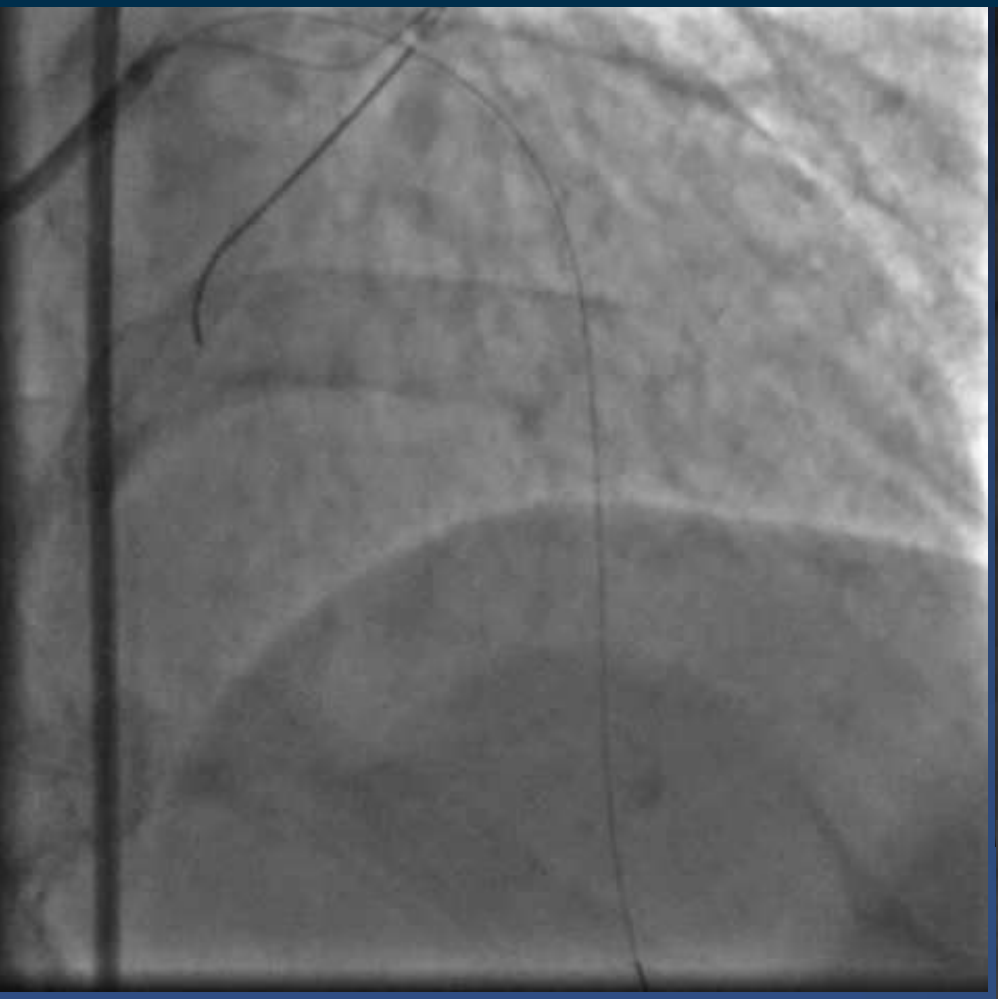
- We could not manipulate rota wire through the **mid LAD lesion due to heavy calcification**.
- The wire was changed to ***Fielder XT-A*** with Tornus.
- To get support to push tornus, balloon 3.0x20 mm was anchored in previous implanted LCX stent.
- Finally, tornus pass the lesion and rota extrasupport wire was placed at distal LAD.
- **Rotaburr 1.25 mm**
  - 160,000 x 10 sec and 8 sec, then the microcatheter could pass the lesion

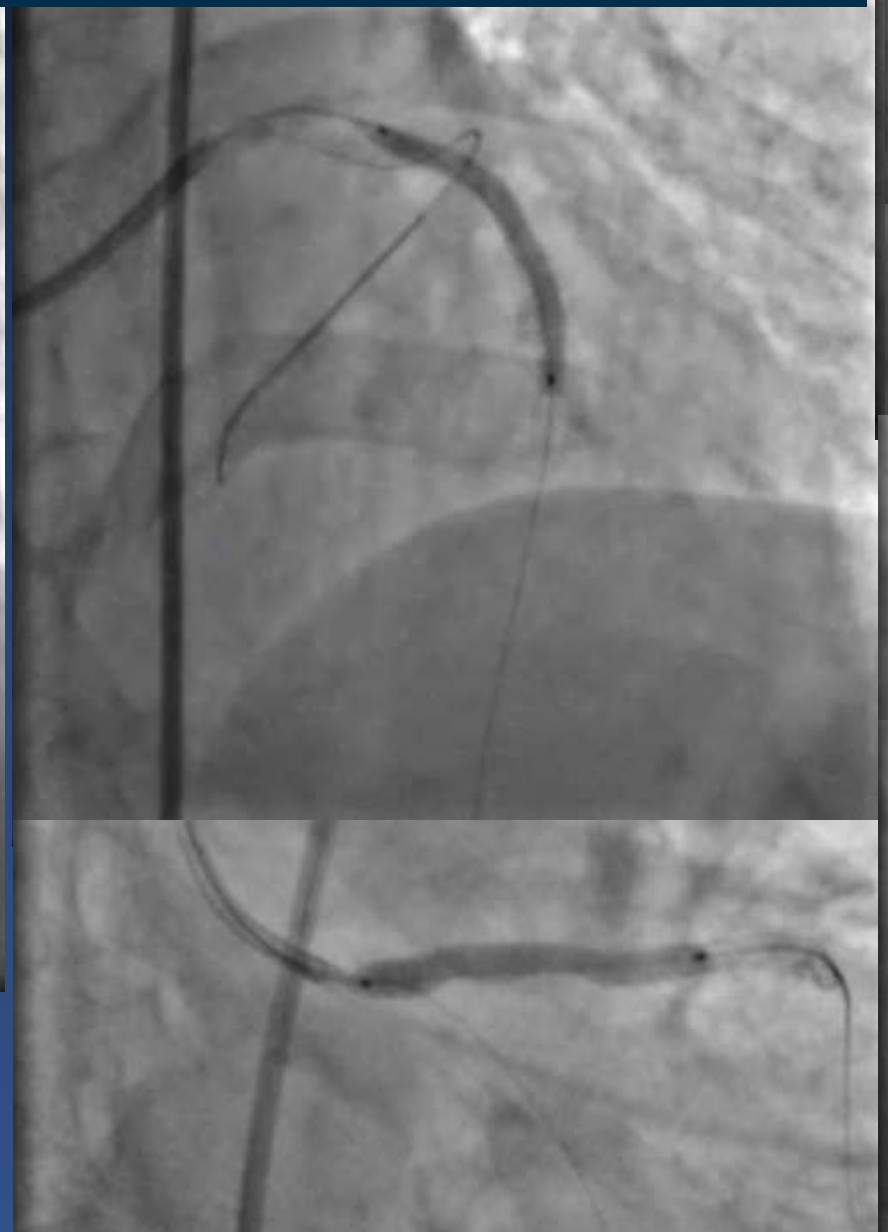

Left main
Frame 1687
Frame 1609
Frame 1531
Frame 1506
LCX
TL
TL
Starting point of
IVUS pullback
Total length 15 mm of subintimal wiring
Frame 1451
Frame 1364
Frame 1211
Frame 1047
TL
TL
TL
Frame 1021
Frame 988
Frame 679
Frame 637
SB
Frame 539
Frame 469
Frame 427
Frame 393
Frame 202
Frame 133
SB
Mid LAD

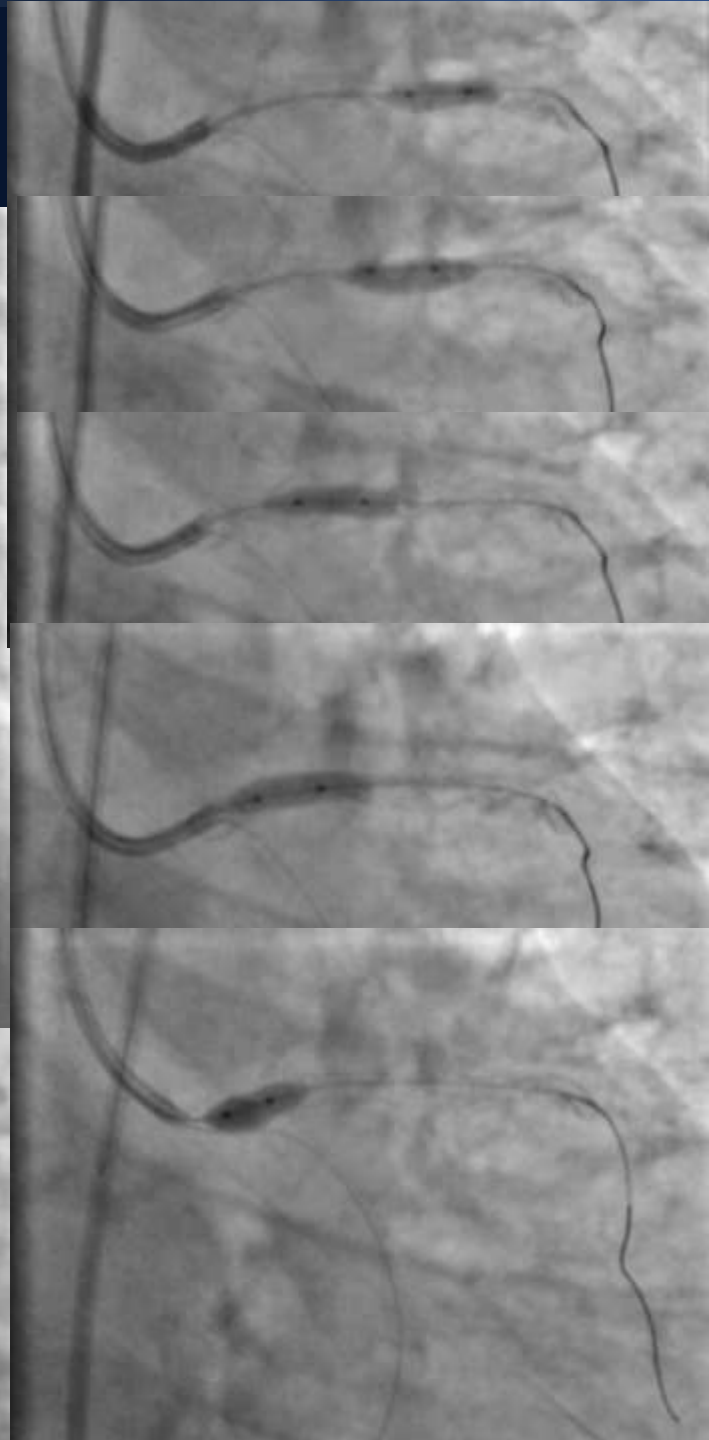
# DES 2.5x30 mm (8 atm/2.50 mm, 16 atm/2.77 mm)



# DES 3.5x30 mm followed by POT with NC 4.0x8 mm



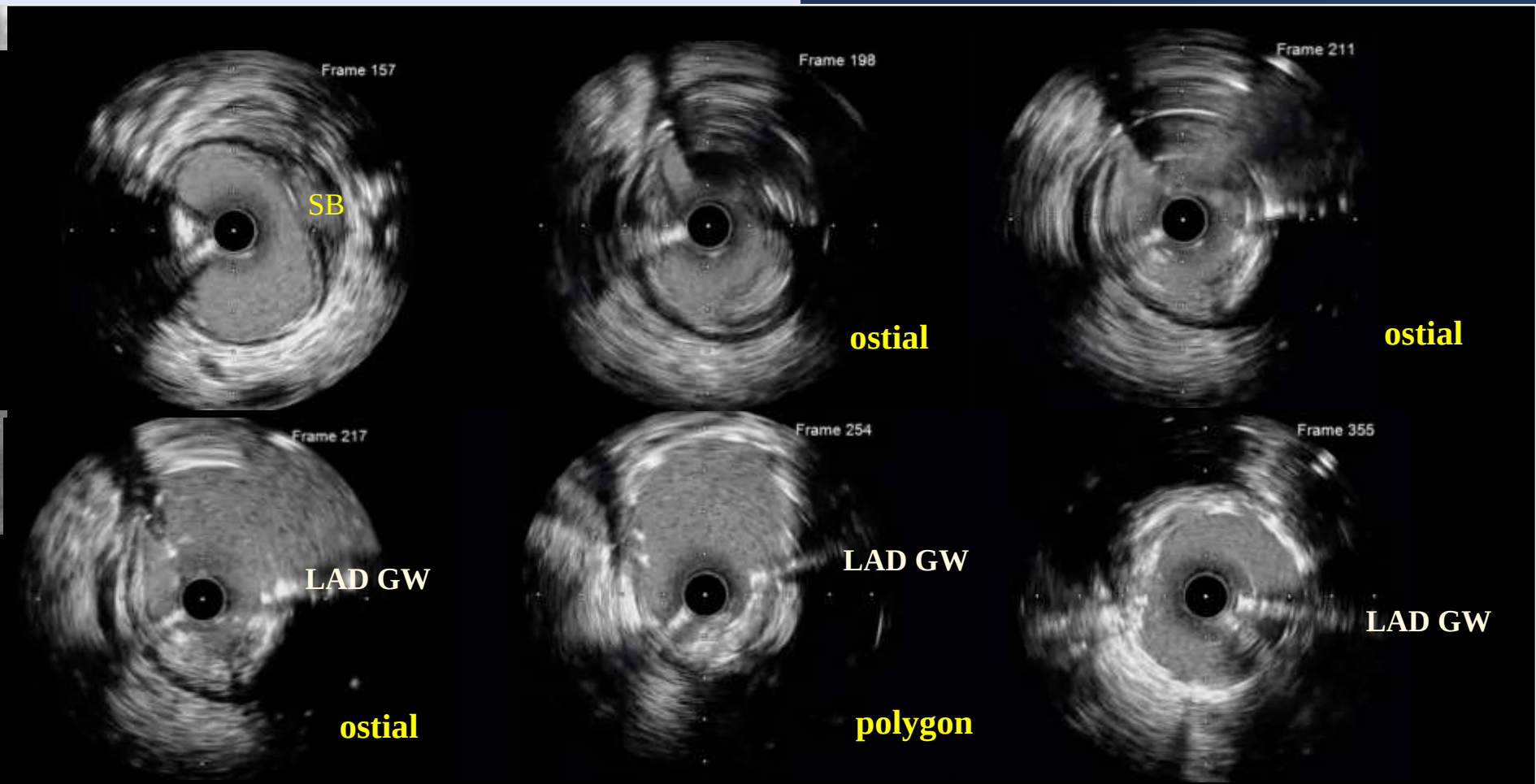




DES: 8 atm/3.50 mm,
post dilation 16 atm/3.88 mm
NC: 14 atm/4.10 mm

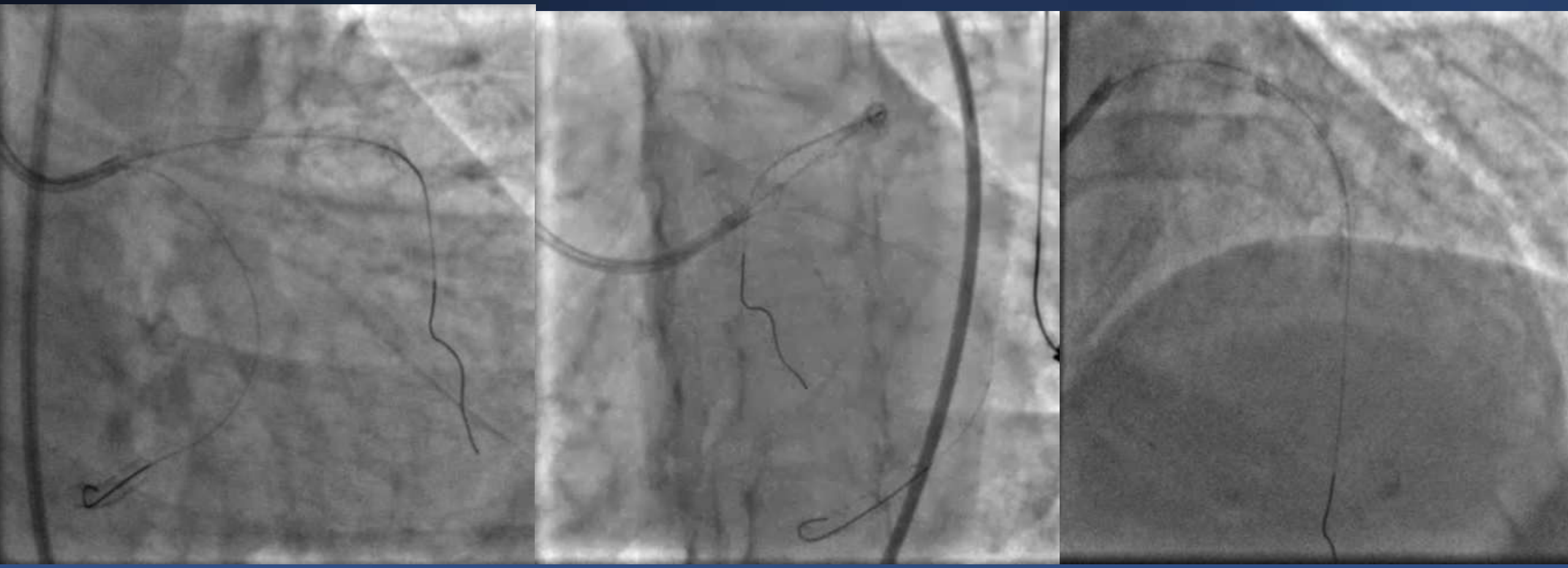
# Who want to fix ostial LCX?

## POST




Pullback from LCX after deployed LM/prox LAD stent

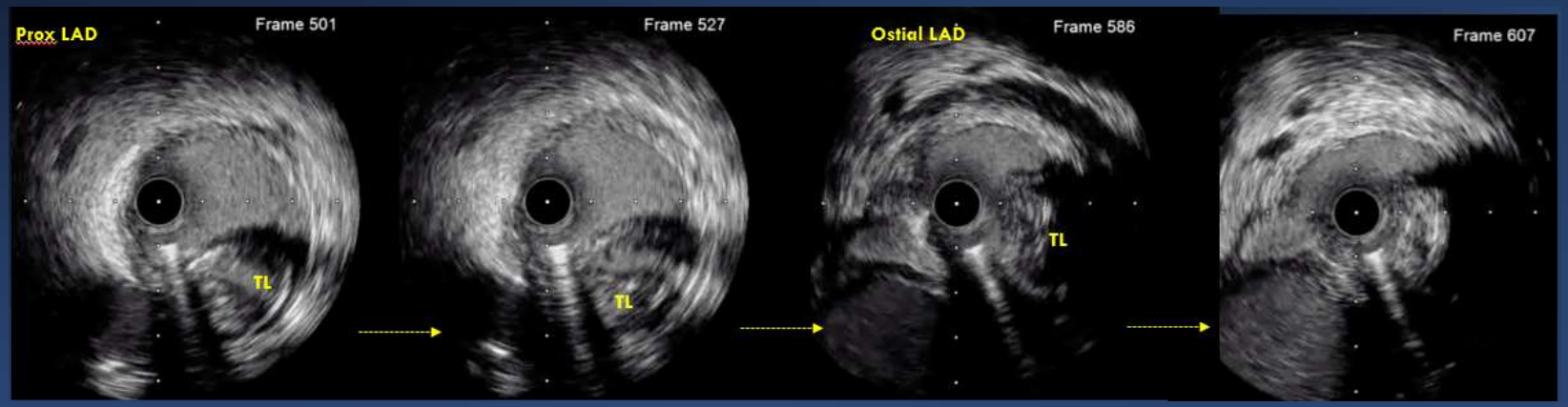
# Final results



Mid LAD: myocardial bridging

# Conclusion

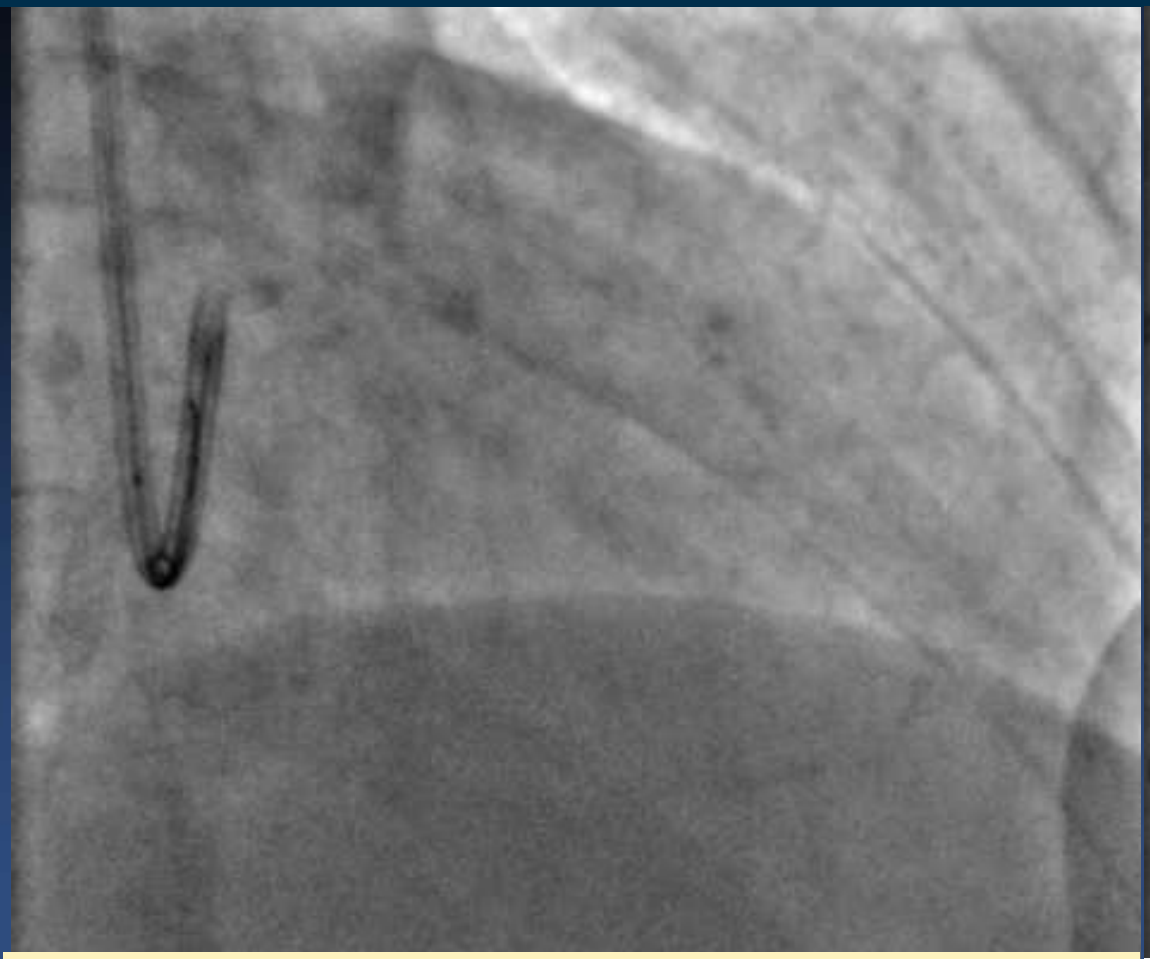
- IC imaging is the adjunctive tool that help operator to understand the situation.



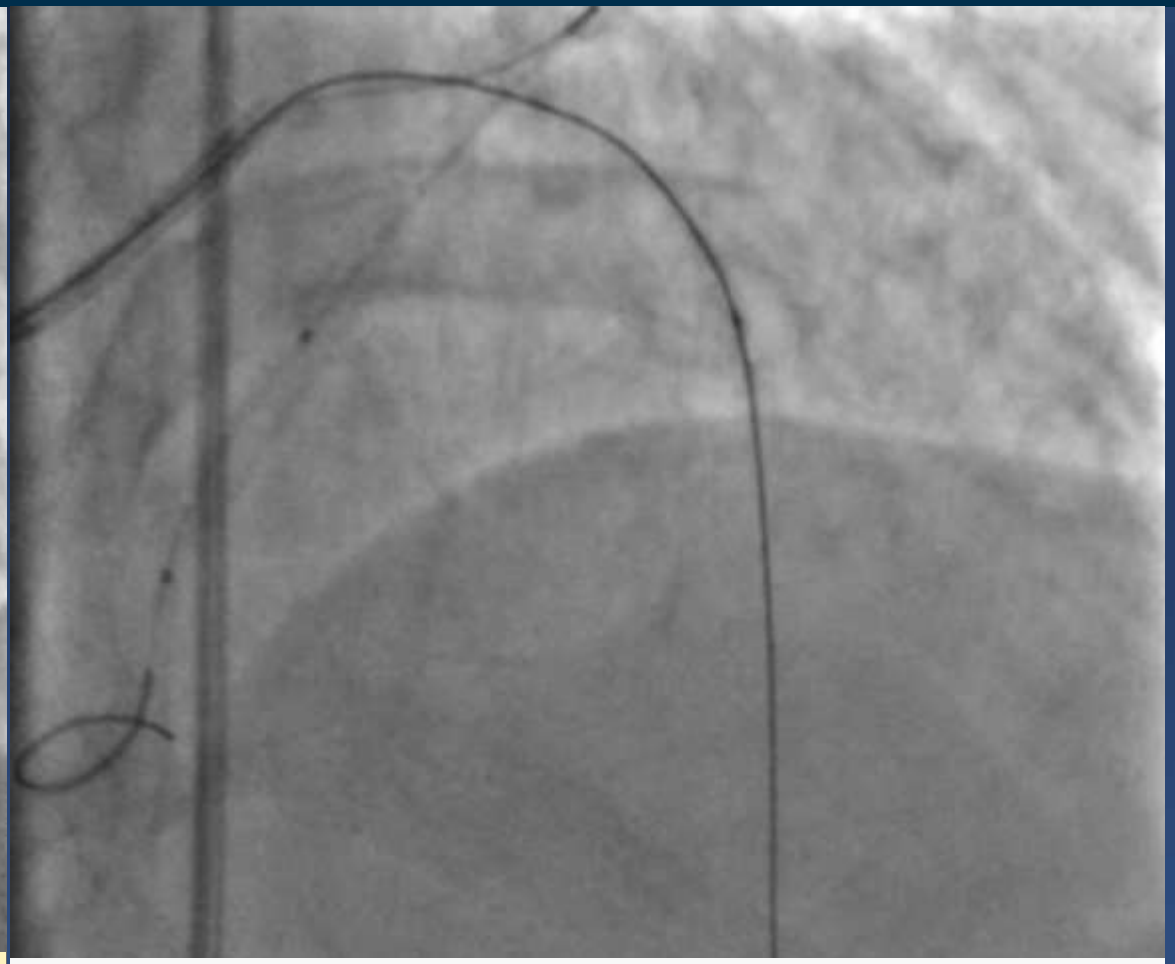

- Rotational atherectomy in dissection should be judge case by case
- If possible we should aim to stent in true lumen but the short segme nt of subintimal stenting in CTO might have comparable results to the TL from some reports.

# Coronary Angiography: LCA

# How would you deal with this non-dilatable lesion?



Rotational atherectomy?
- Dissection flap begin at the proximal LAD, high risk of perforation
- Dissection flap compromise the flow



Anchoring balloon in previous LCX stent?
- Gain a better support from balloon anchoring
- Due to dissection flap at proximal LAD, no chance to use rotational atherectomy anymore

# How would you further manage this case?

- Rewiring to the true lumen YES NO
  - ? Patency of true lumen after pre-dilation with 2.5 SC balloon
  - IVUS guidance rewiring with 6 Fr system is not possible and EBU 3 .0/7Fr was not available at that time
  - ? Puncture LFA and rewiring
  - Short distance of subintimal wiring, can we omit ?
- Non-dilatable lesion at mid LAD GO ON GIVE UP
  - ? Role of rotational atherectomy
  - If no rota, how could the balloon pass the lesion?

Catheter Cardiovasc Interv. 2019 Feb 15;93(3):E120-E129. doi: 10.1002/ccd.27861. Epub 2018 Oct 22.

# Clinical and angiographic outcomes of true vs. false lumen stenting of coronary chronic total occlusions: Insights from intravascular ultrasound.

Sabbah M[1,2], Tada T[2], Kadota K[2], Kubo S[2], Otsuru S[2], Hasegawa D[2], Habara S[2], Tanaka H[2], Fuku Y[2], Goto T[2].

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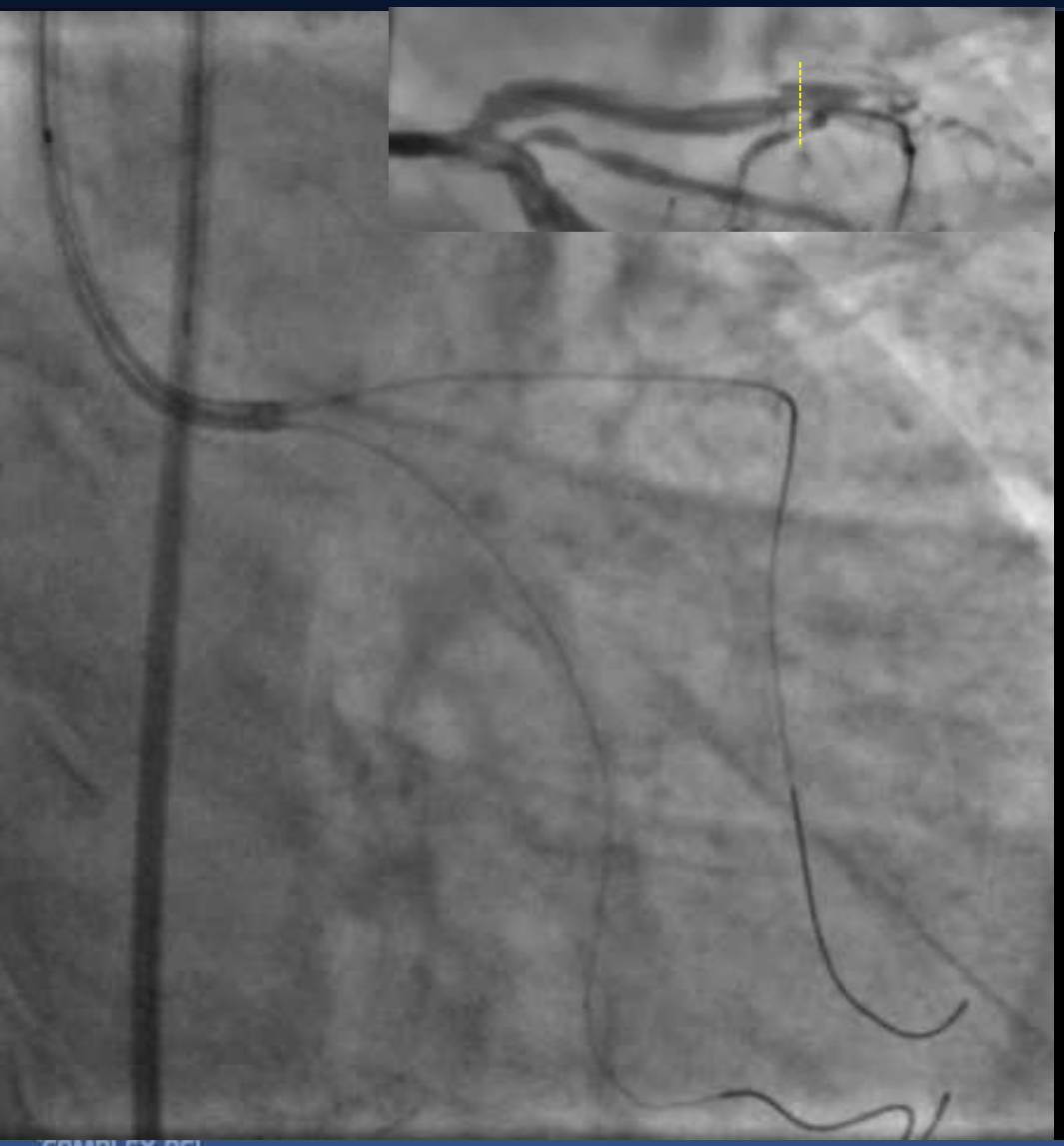
## Abstract

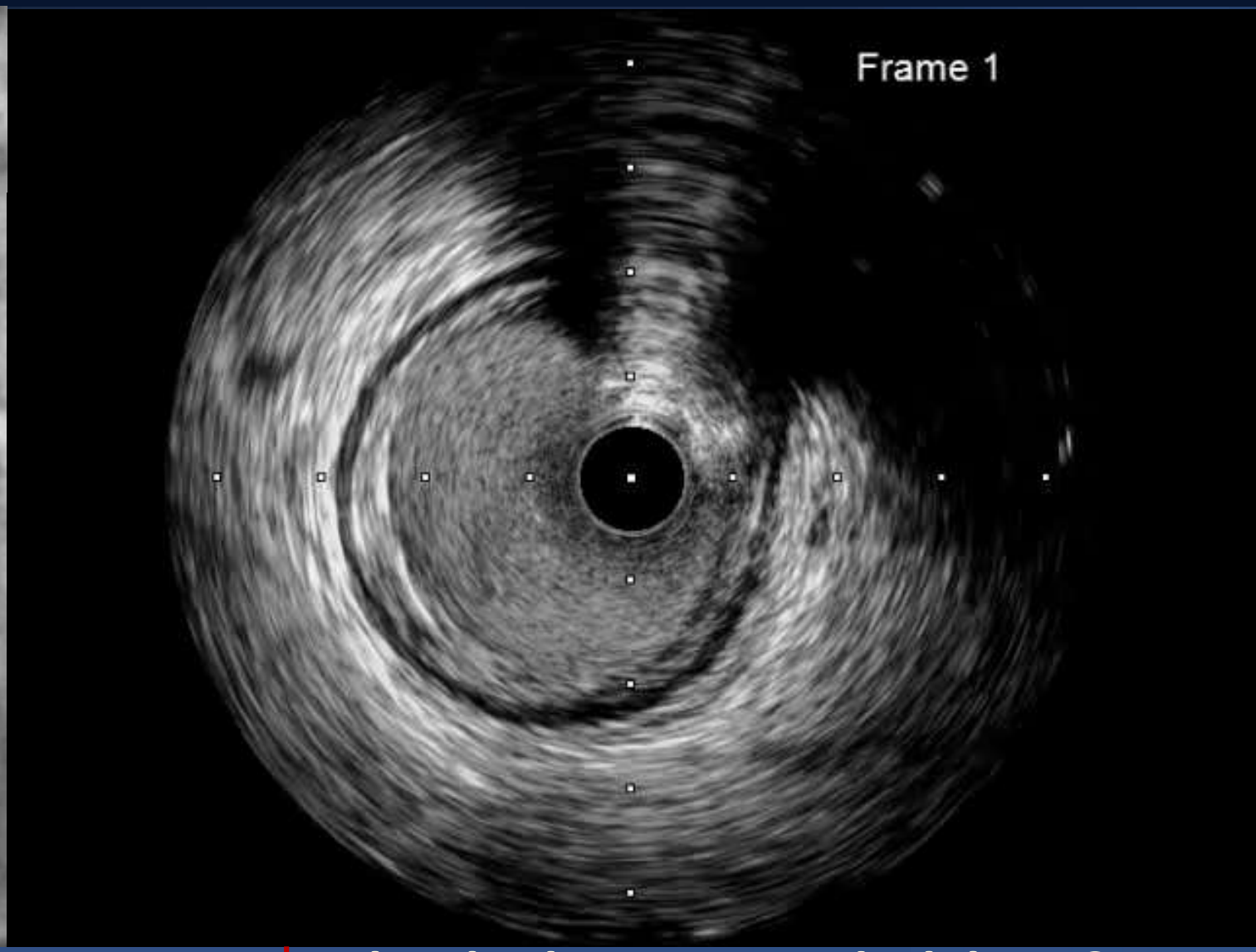
**OBJECTIVES:** The clinical implications of subintimal stenting (SS) of the recanalized chronic total occlusion (CTO) segment have not been characterized. We evaluated the in-hospital and the long-term clinical and angiographic outcomes of drug-eluting stents (DESs) deployed in true vs. false lumen of successfully recanalized CTO.

**METHODS AND RESULTS:** Two independent reviewers analyzed the intravascular ultrasound (IVUS) images of 173 successfully recanalized CTO lesions (157 patients), between August 2011 and October 2012. After successful guidewire (GW) crossing, lesions were classified according to IVUS evaluation into two groups: (1) true lumen (TL) stenting group and (2) SS group; and compared with regards to in-hospital and long-term clinical outcomes. In 154 lesions, DESs were deployed in the TL; and in 19 (11%) lesions, DESs were deployed in the subintimal space (95% confidence interval: 6.3-15.6%). False GW tracking in the SS group resulted in increased rates of IVUS-detected dissection flaps (84% vs. 42.6%, $P \leq 0.001$), intramural hematoma (32 vs. 11%, $P = 0.01$), and minor perforations 6/19 (31.6% vs. 8.4%, $P = 0.002$). At 1-year follow-up, both groups had similar cumulative rates of binary restenosis and target lesion revascularization ($P = 0.73$ and $P = 0.97$, respectively). Six patients (4.6%, 6/129 patients) in the TL group and none in the subintimal group died at 1 year.

**CONCLUSIONS:** Acknowledging some limitations, our observations may suggest that, subintimal stent deployment in a recanalized CTO segments, using second generation DES and IVUS guidance, might have a comparable success rate and long-term angiographic and clinical outcomes as TL stenting.

# LAD flow improved and IVUS was ready

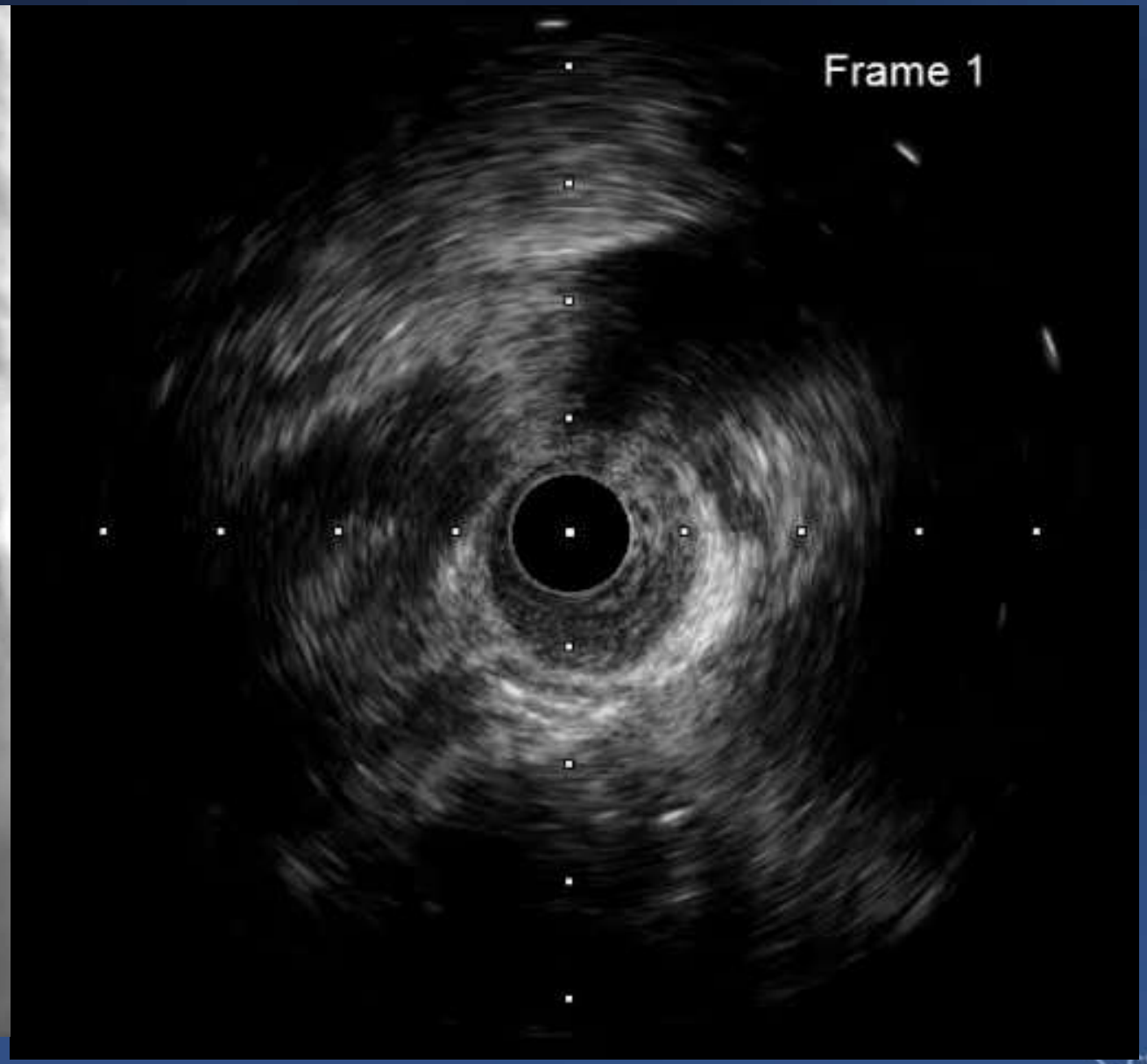






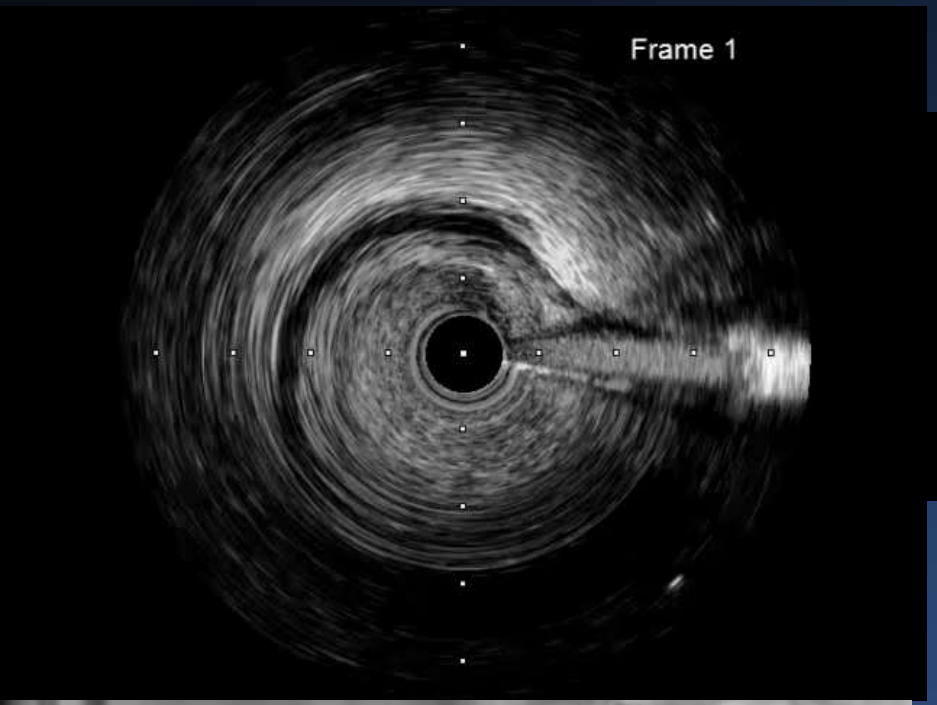

Why the lumen was dark here?


Starting point of
IVUS pullback

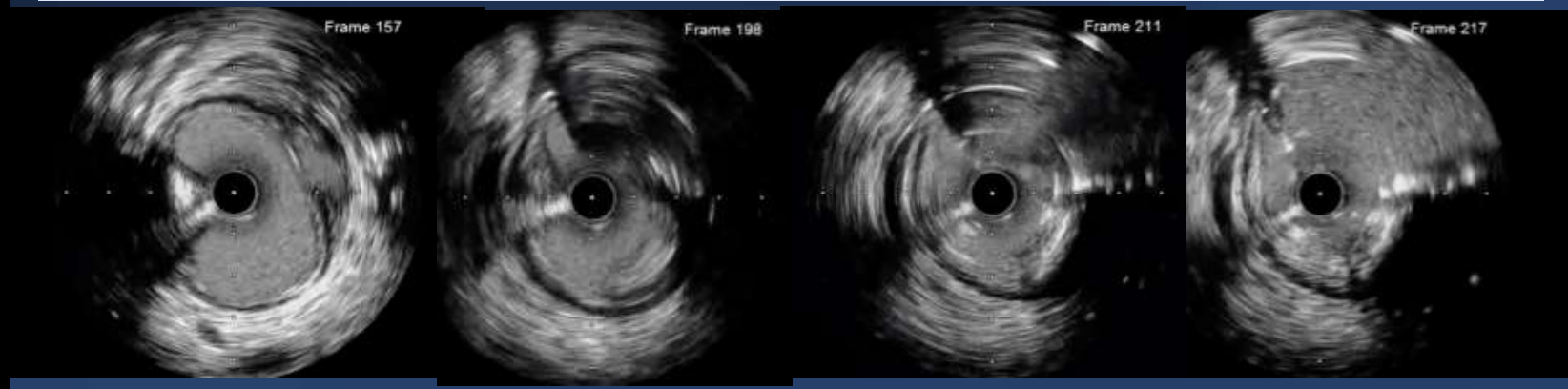

Frame 1

# Sequential dilation distal LAD with 2.0x20 mm

# Pullback from LCX after deployed LM/prox LAD stent

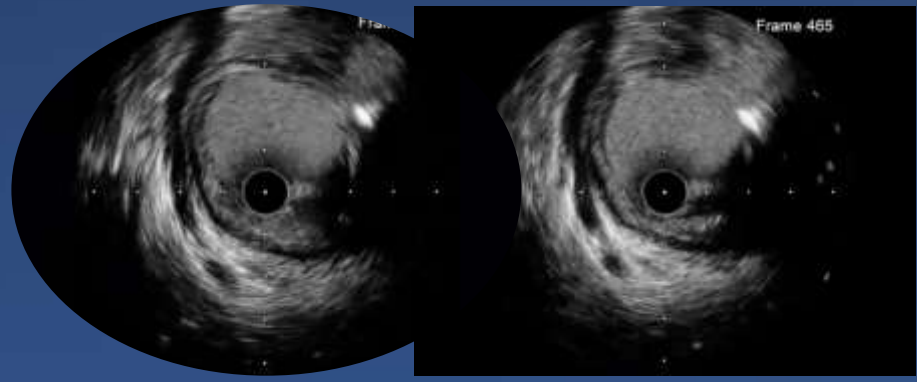



## Post stent LCX pullback



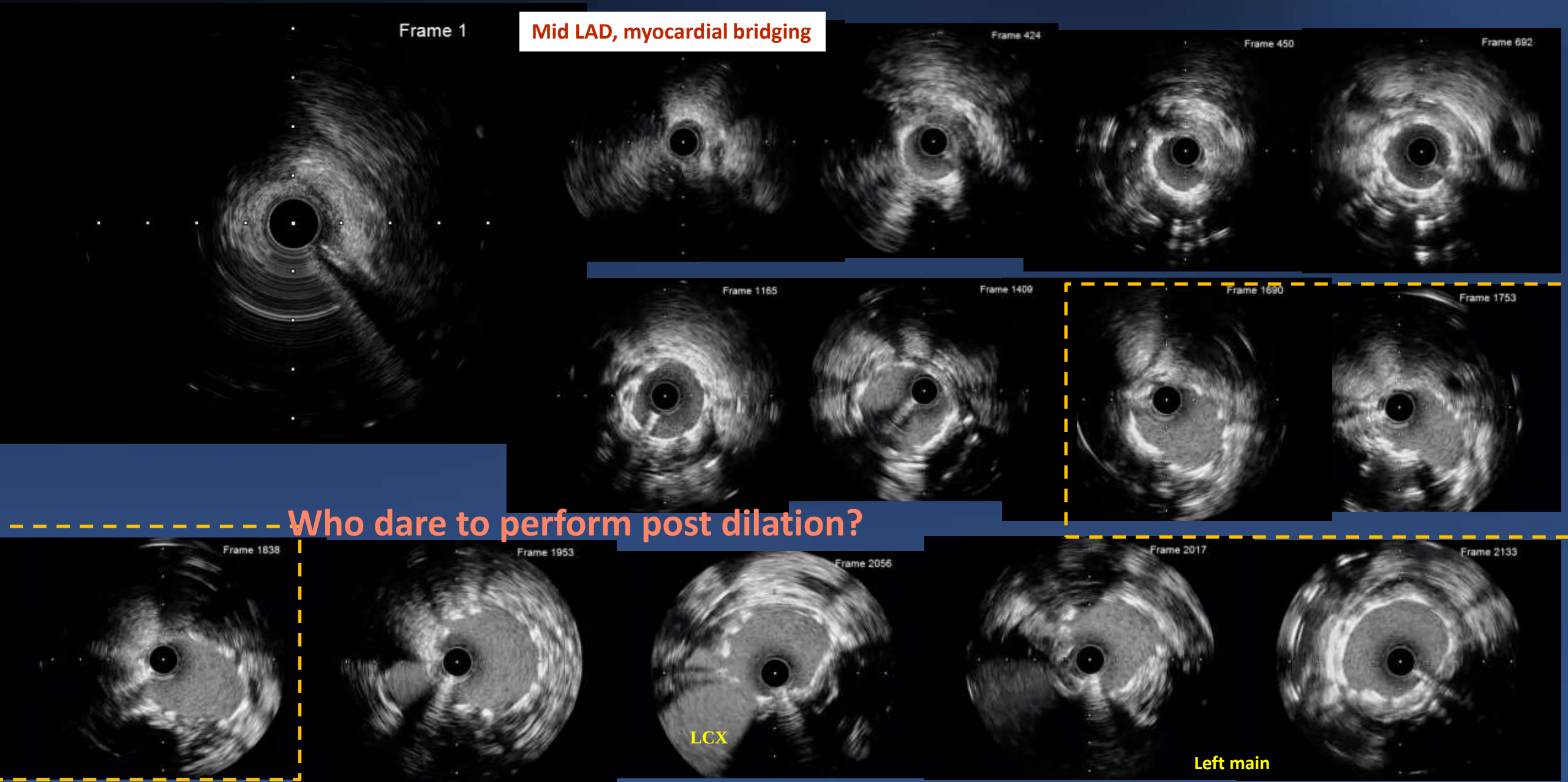

Ostial LCX

## Pre stent LCX pullback


CVRF

# Pullback from mid LAD after POT



# Pullback from LCX before deployed LM/prox LAD stent