Techniques to improve antegrade success
Application of IVUS guidance

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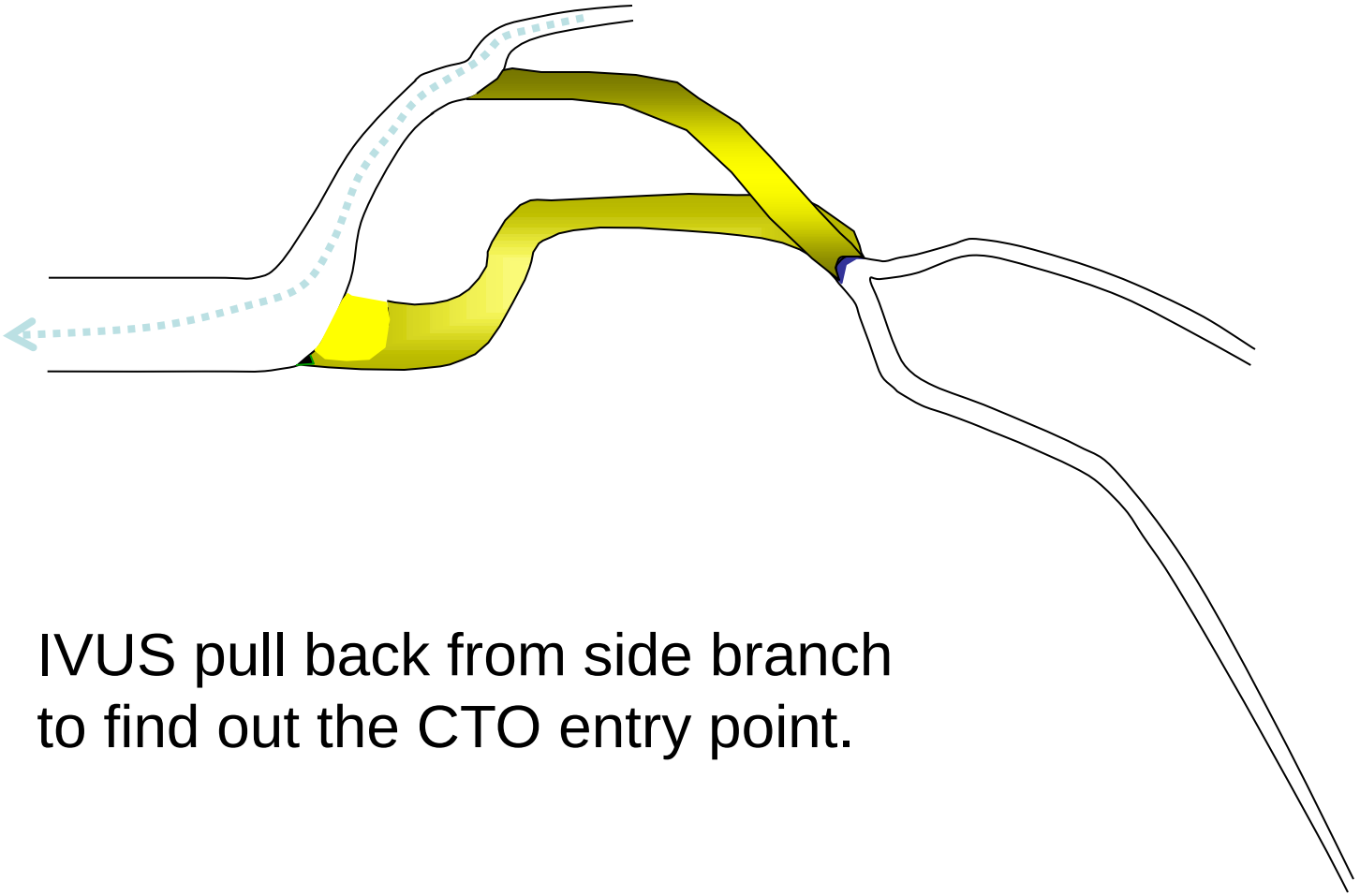
What IVUS can do in antegrade CTO intervention?

1) Find out the CTO entry point.

2) IVUS guided wiring in the CTO to control appropriate route.

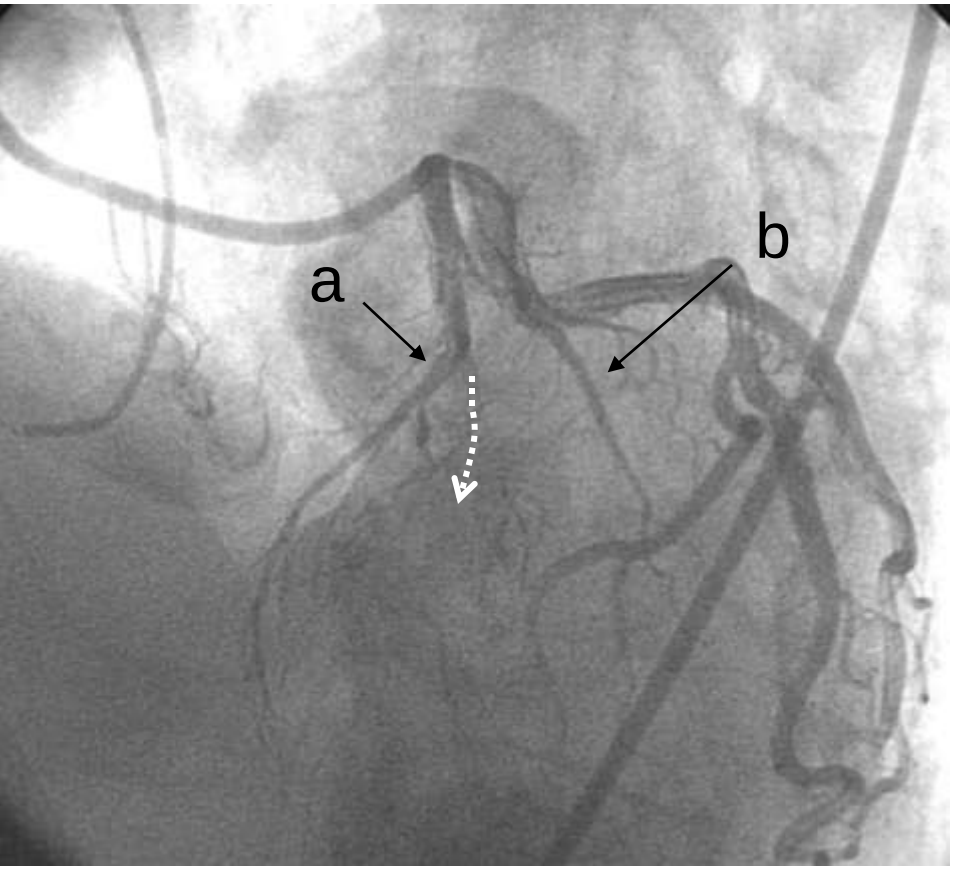
3) If you come to dead rock during procedure, confirm what's going on in the vessel and change the strategy.

1) Find out the CTO entry point

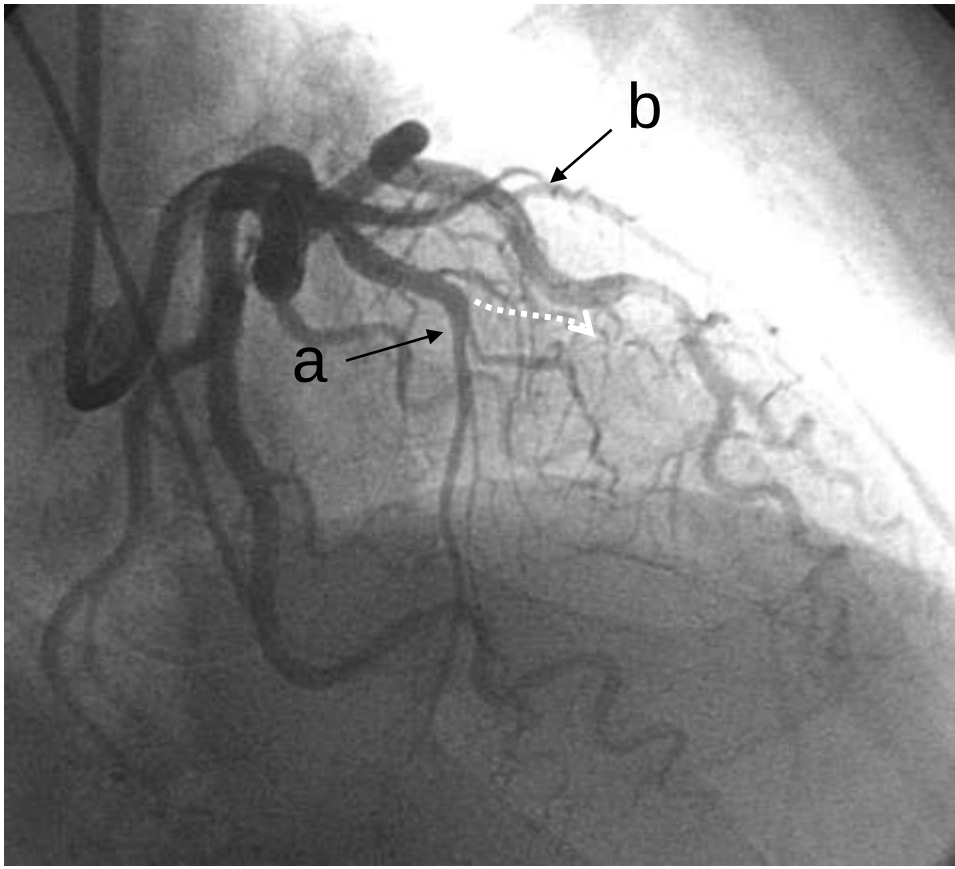


IVUS pull back from side branch
to find out the CTO entry point.

Case Example of LAD CTO

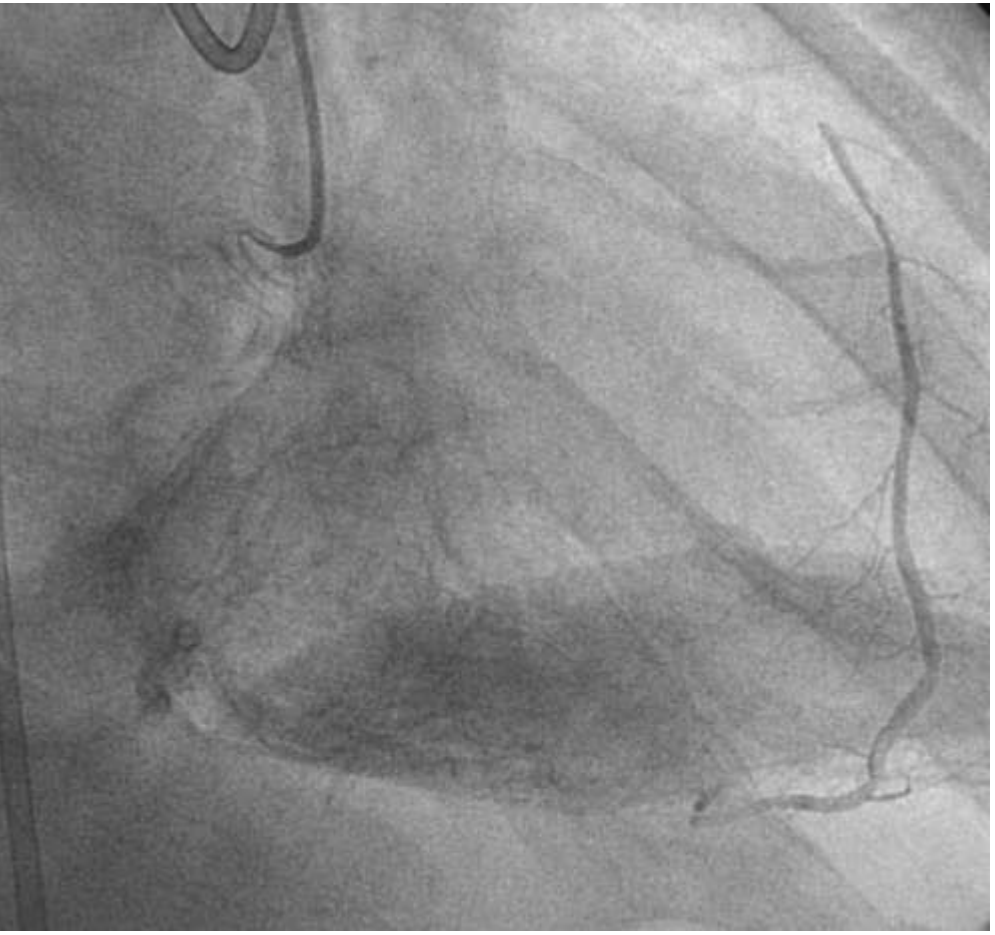


LAO cranial



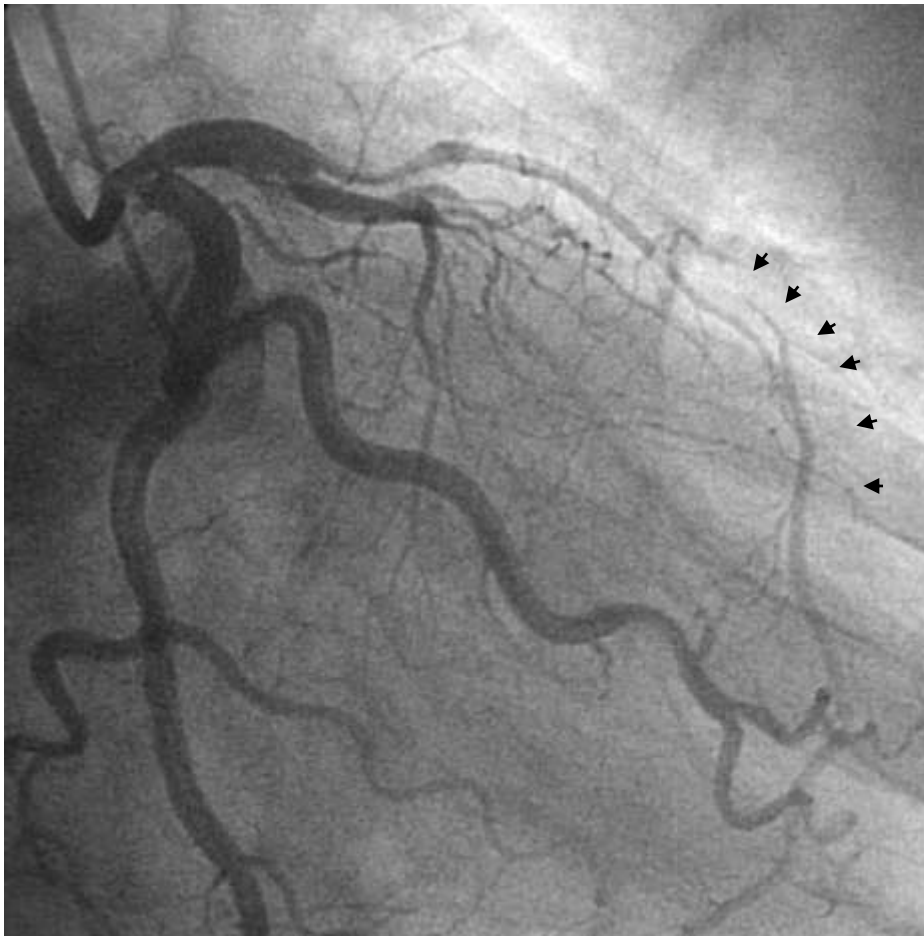
RAO cranial

Collateral flow to the LAD



RAO

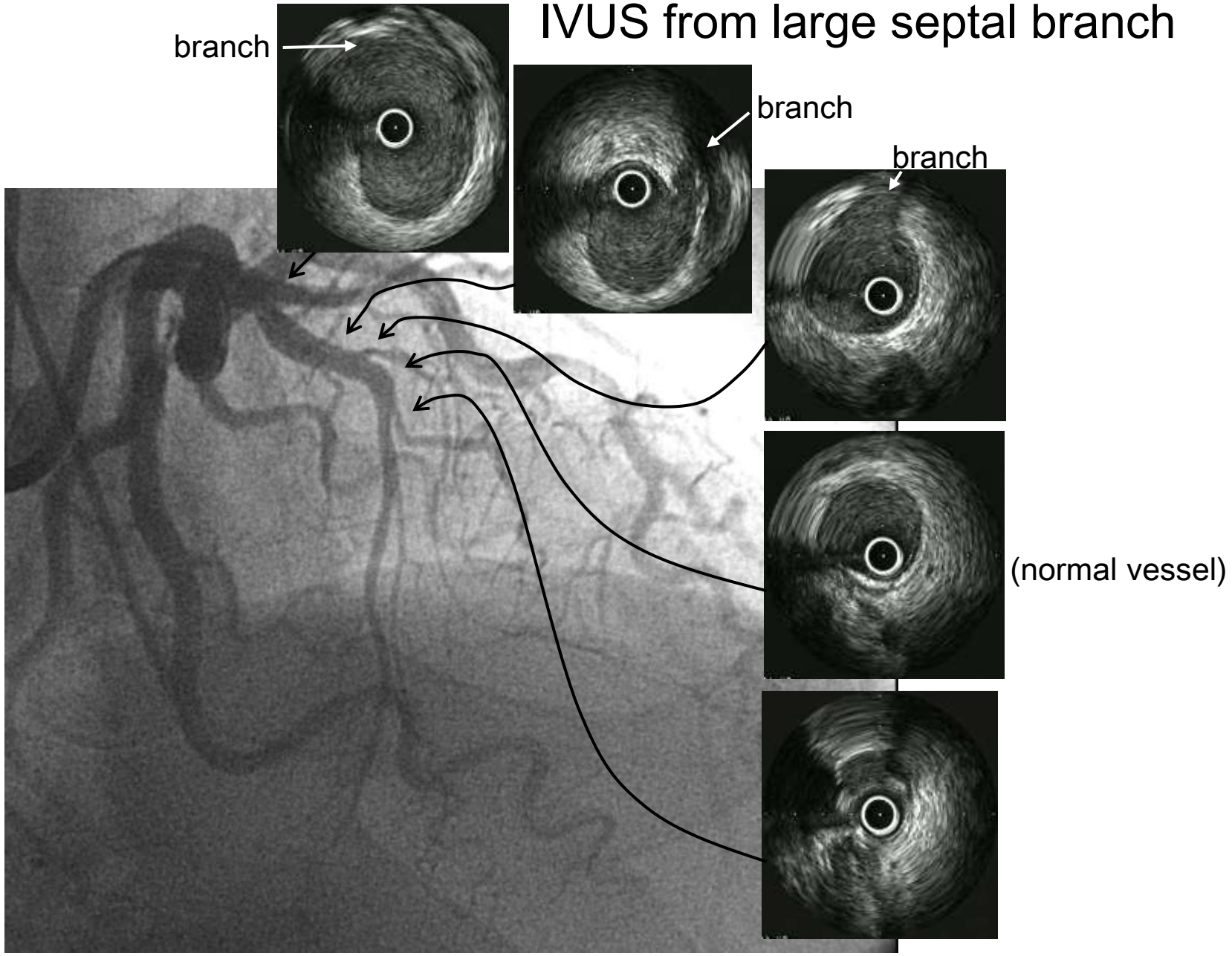
Bilateral projection



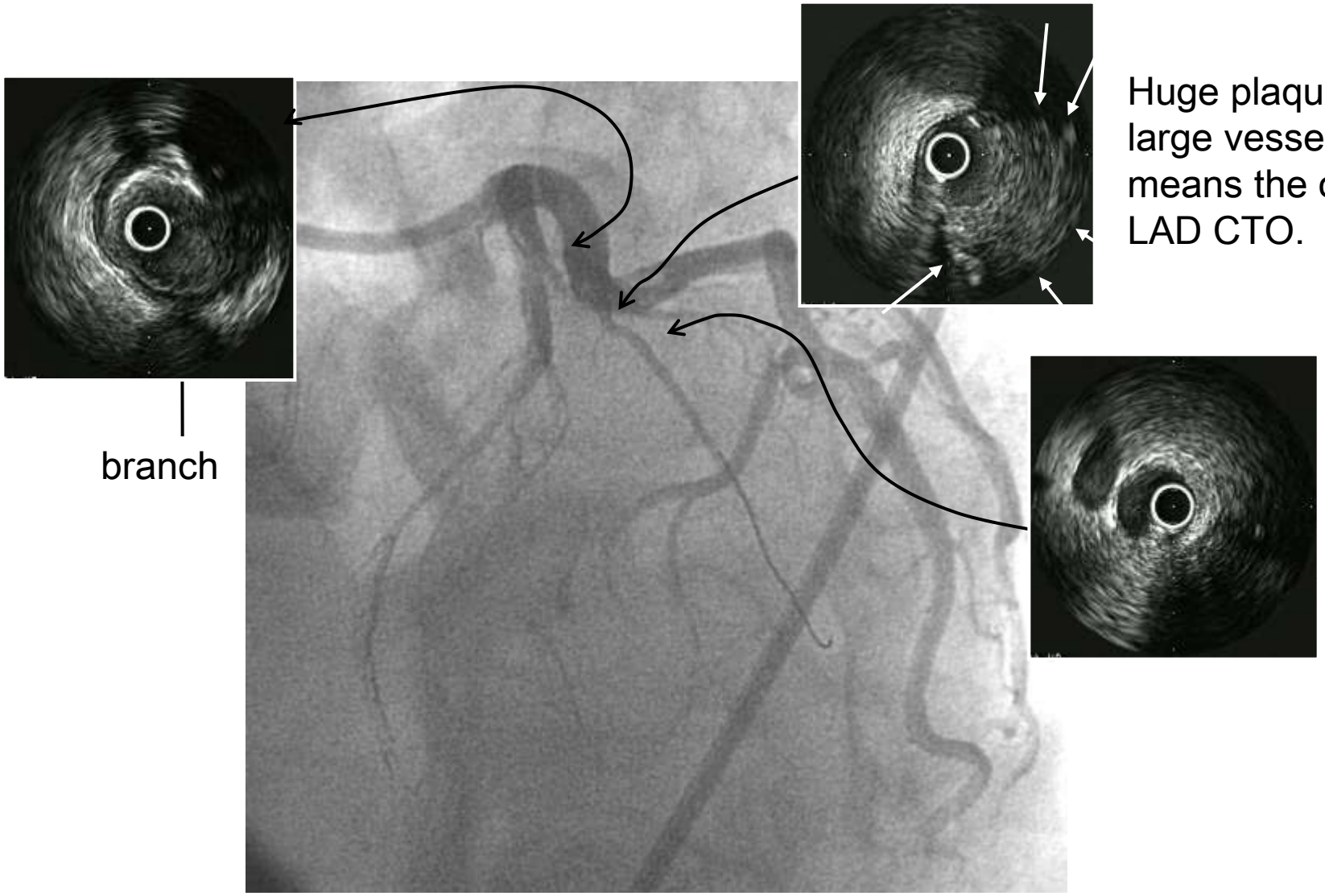
RAO caudal

Arrows indicate distal LAD filled from RCA

IVUS from large septal branch



IVUS from the diagonal

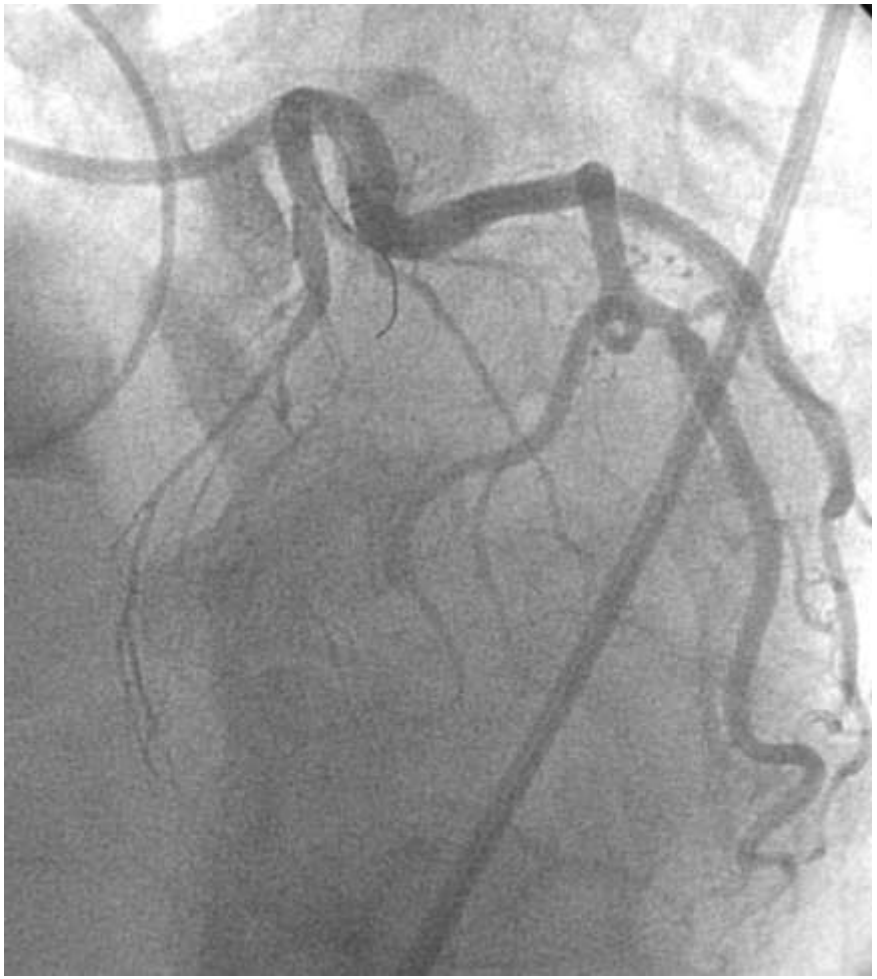


branch

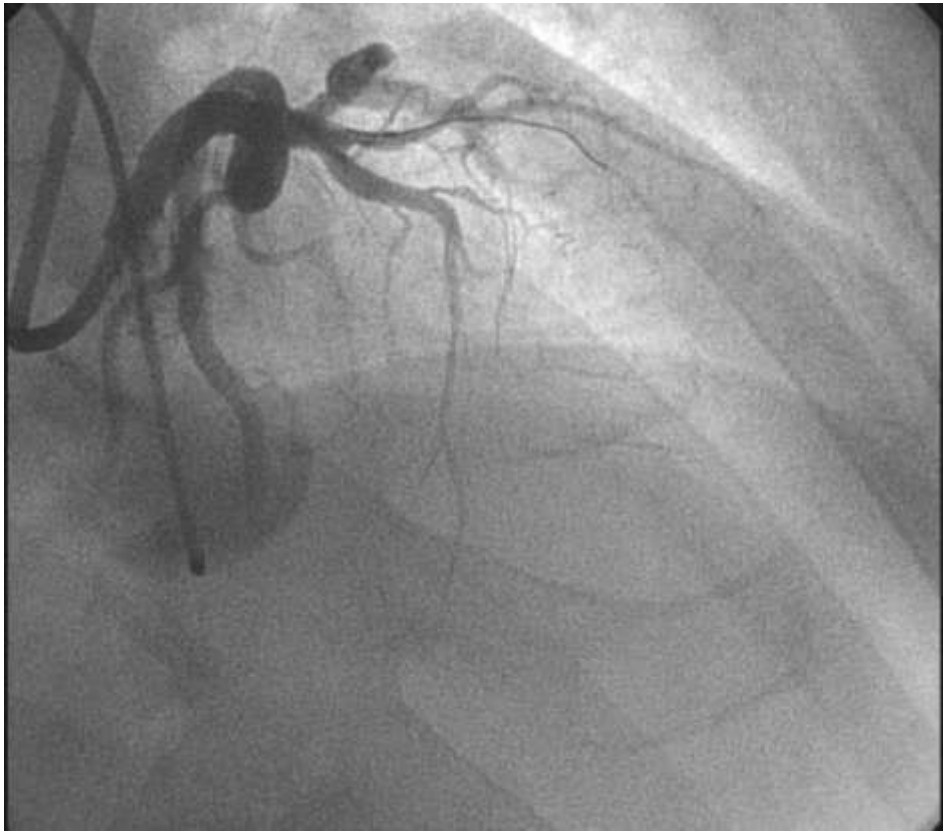
Huge plaque in a large vessel that means the ostial of LAD CTO.

LAO cranial

The wire picked up entry point accurately

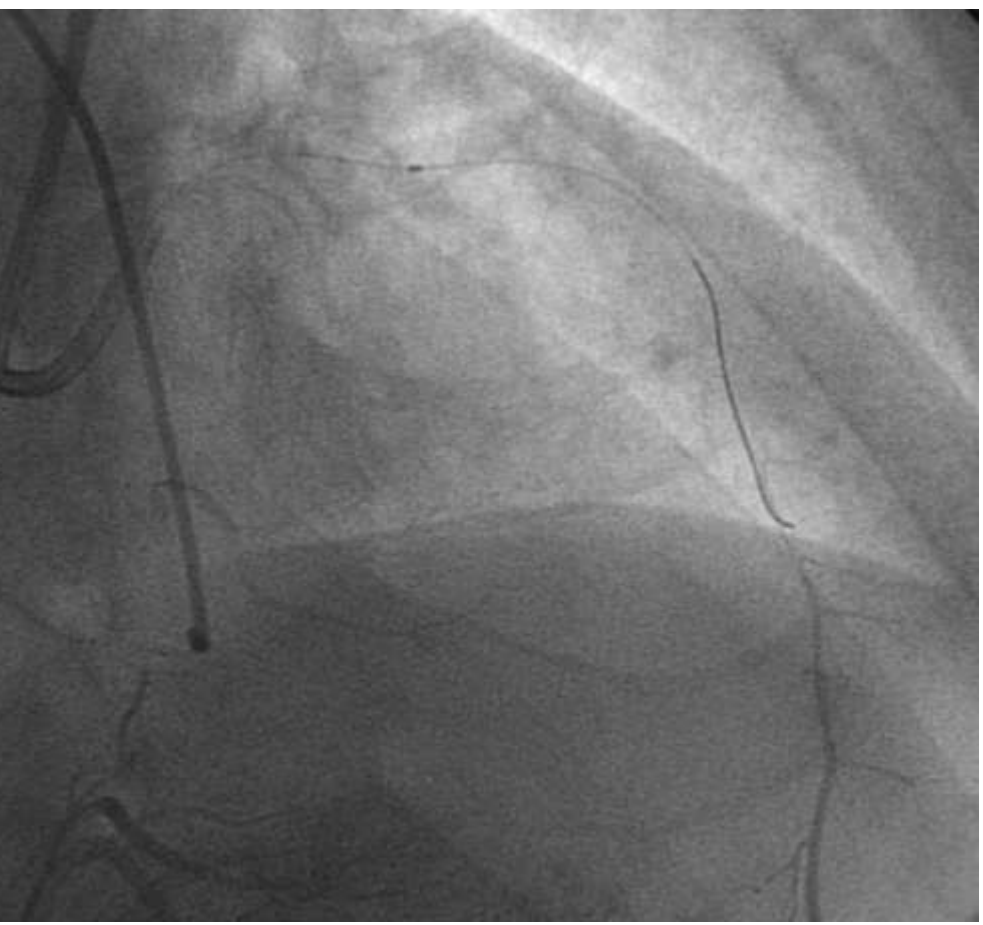


LAO cranial

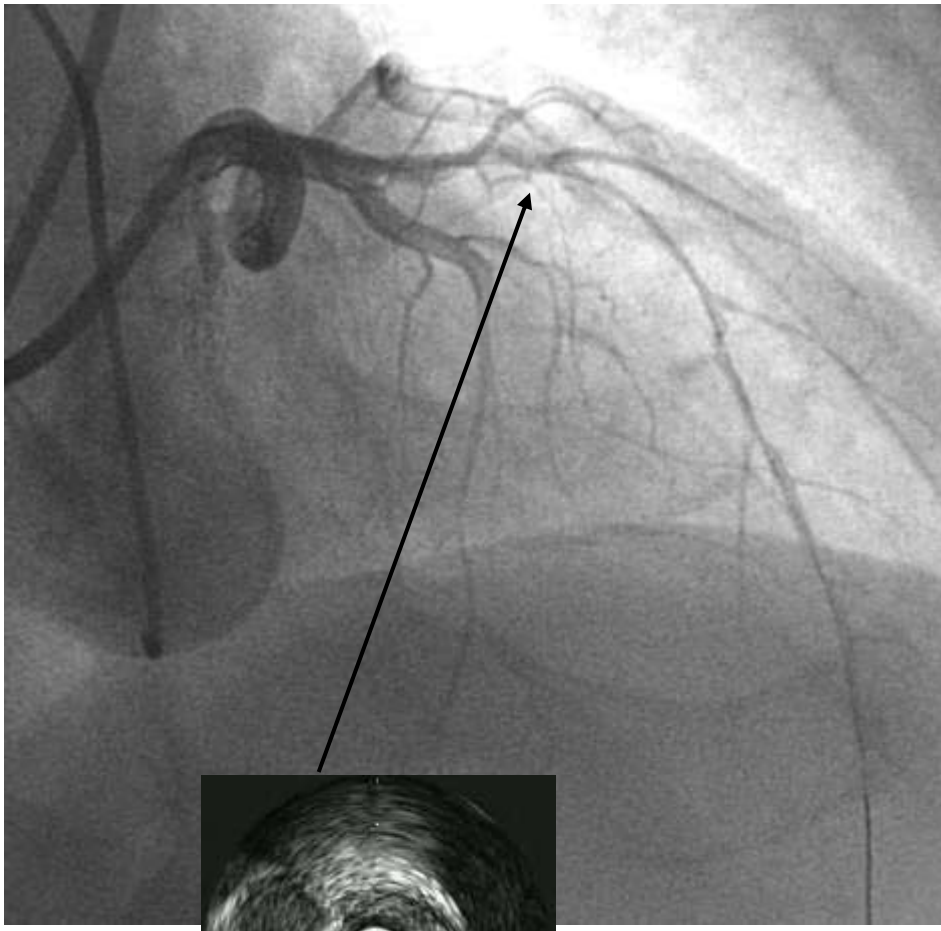


RAO cranial

The wire crossed the distal true lumen

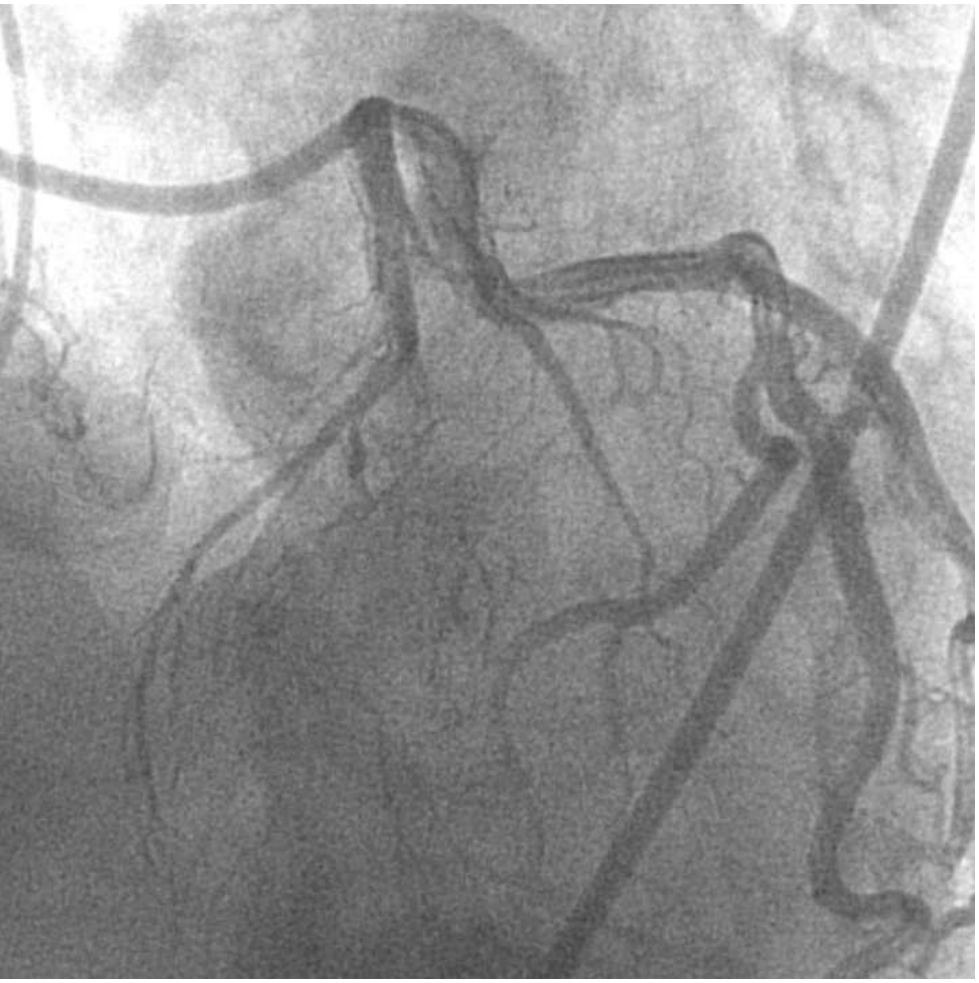


RAO cranial



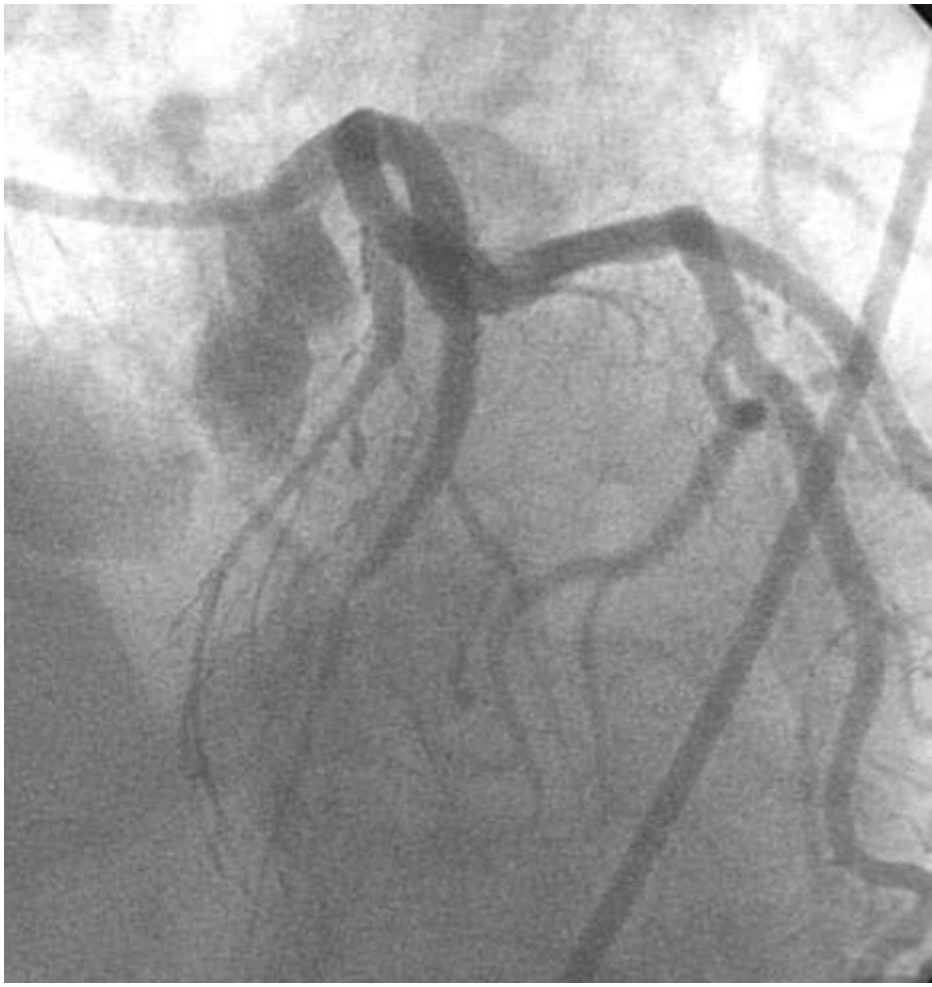
Successful recanalization of LAD CTO

Pre PCI



LAO cranial

Post Stenting



LAO cranial

1) Find out the CTO entry point

1. Find out CTO entrance by IVUS from side branch. If the side branch is too small to deliver the IVUS, dilate with a 1.5mm balloon to create the room.
2. IVUS marking method confirm entry point by fluoro. You can remove the IVUS. If you keep the IVUS in the vessel, guide wire manipulation is spoiled.
3. After you penetrate the CTO entrance, repeat IVUS should be recommended to confirm the wire is truly into the plaque or not.

2) IVUS guided wireing in the CTO to control appropriate route.

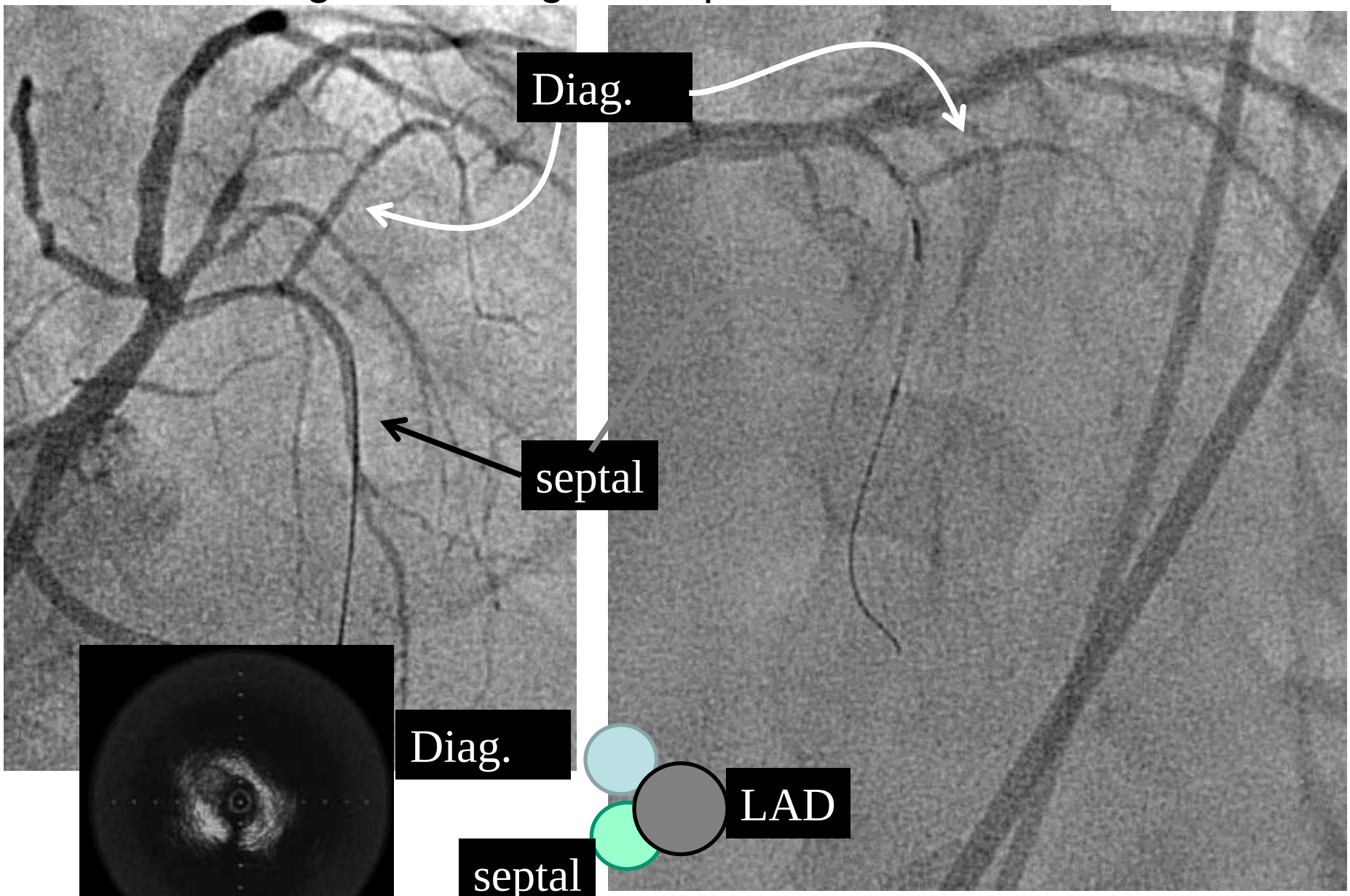
LAD-CTO

LAD CTO by RAO cranial view

IVUS pull back from septal

IVUS image is looking down proximal to distal

LAO cranial



TERMO Inrafocus

After penetration, repeat IVUS from side branch

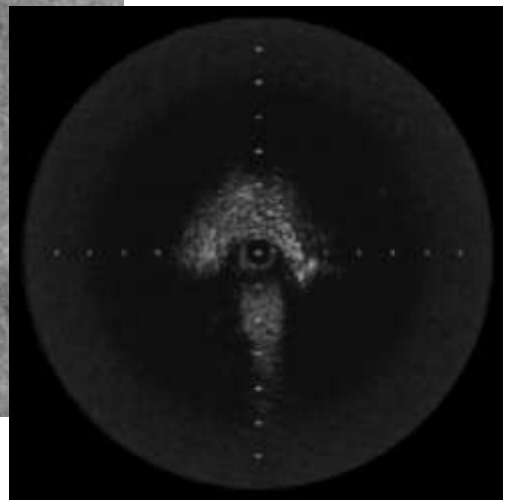
Diag.

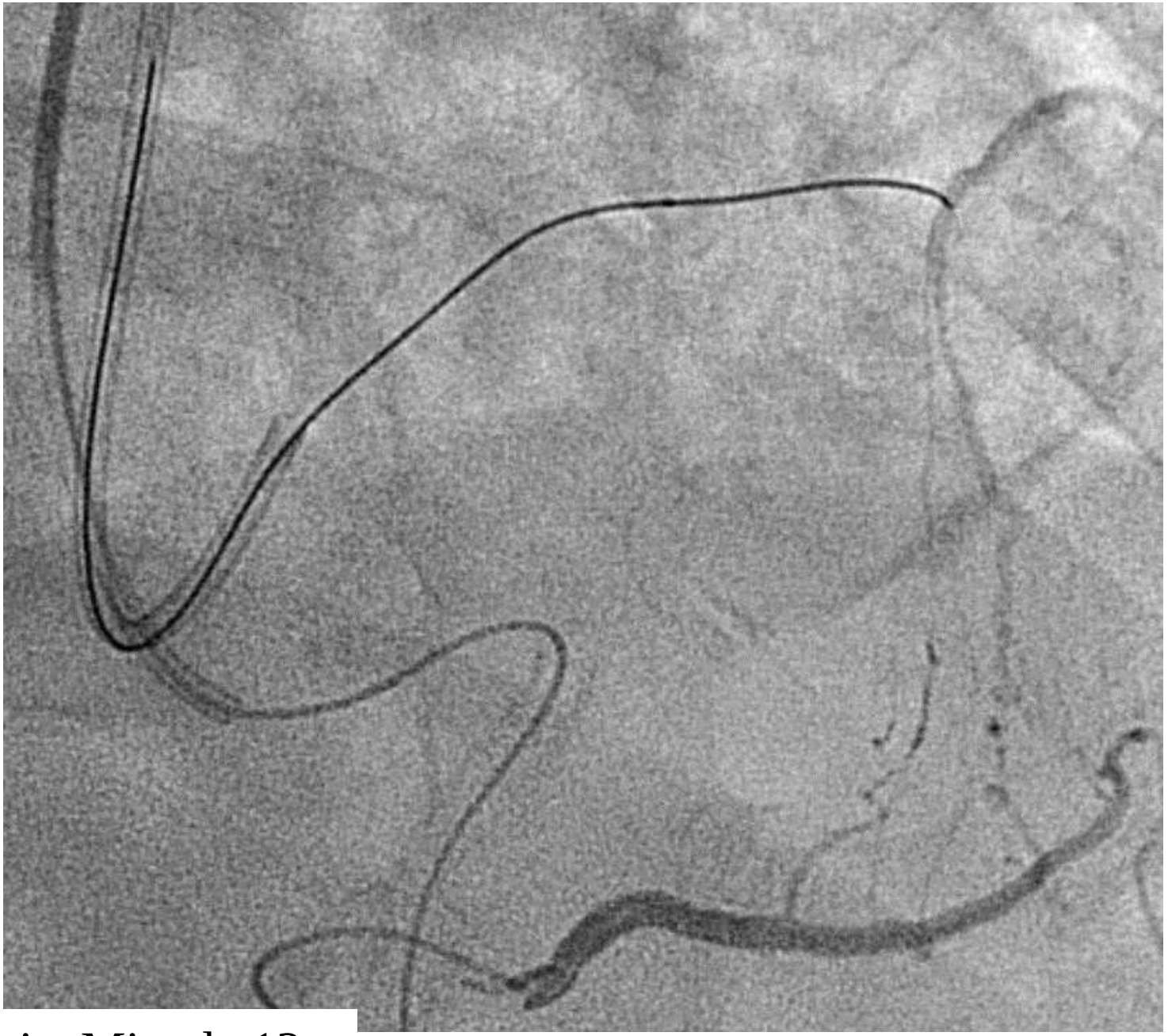
Choice floppy

Q4.0 SH

Miracle 12g

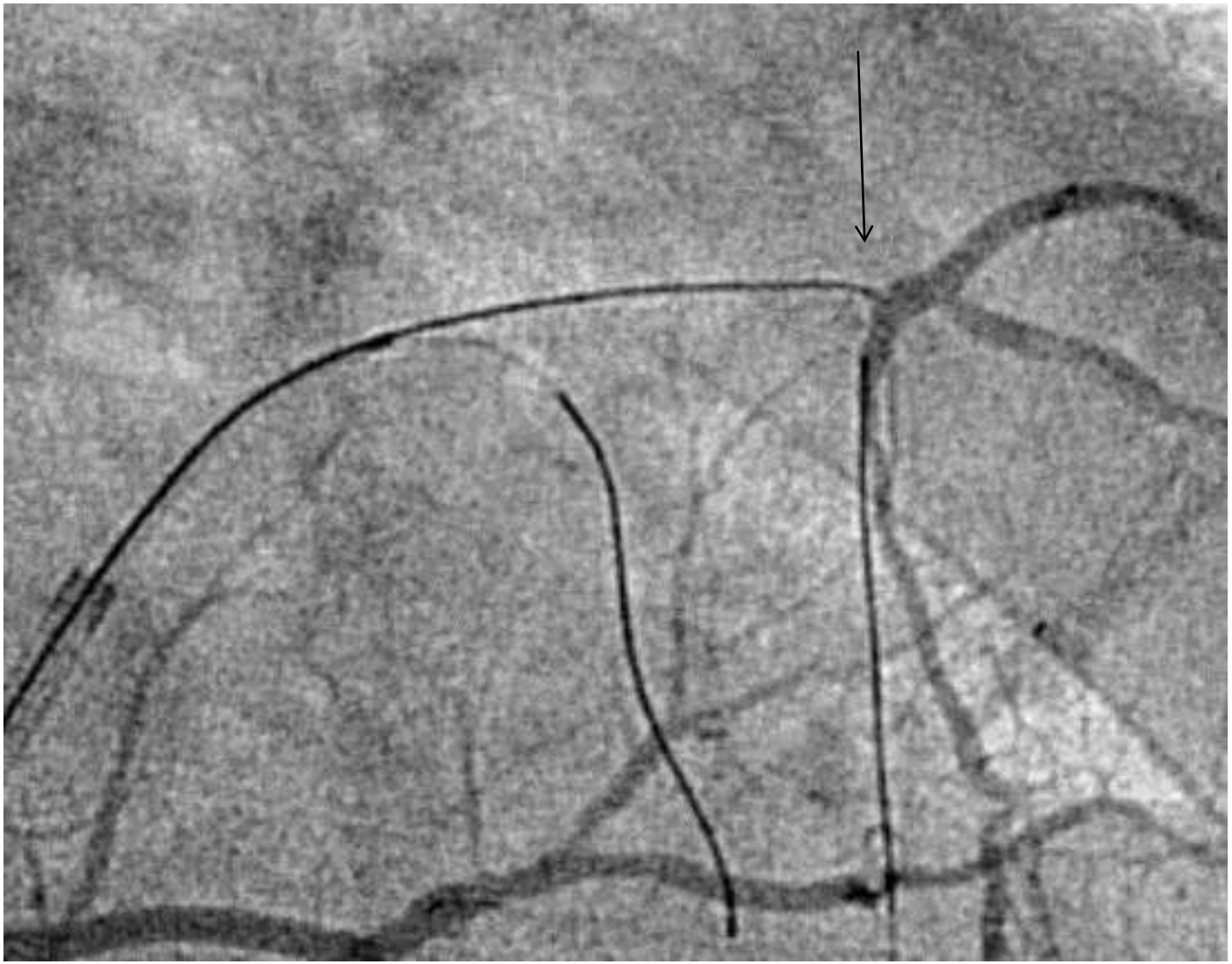
From small diagonal





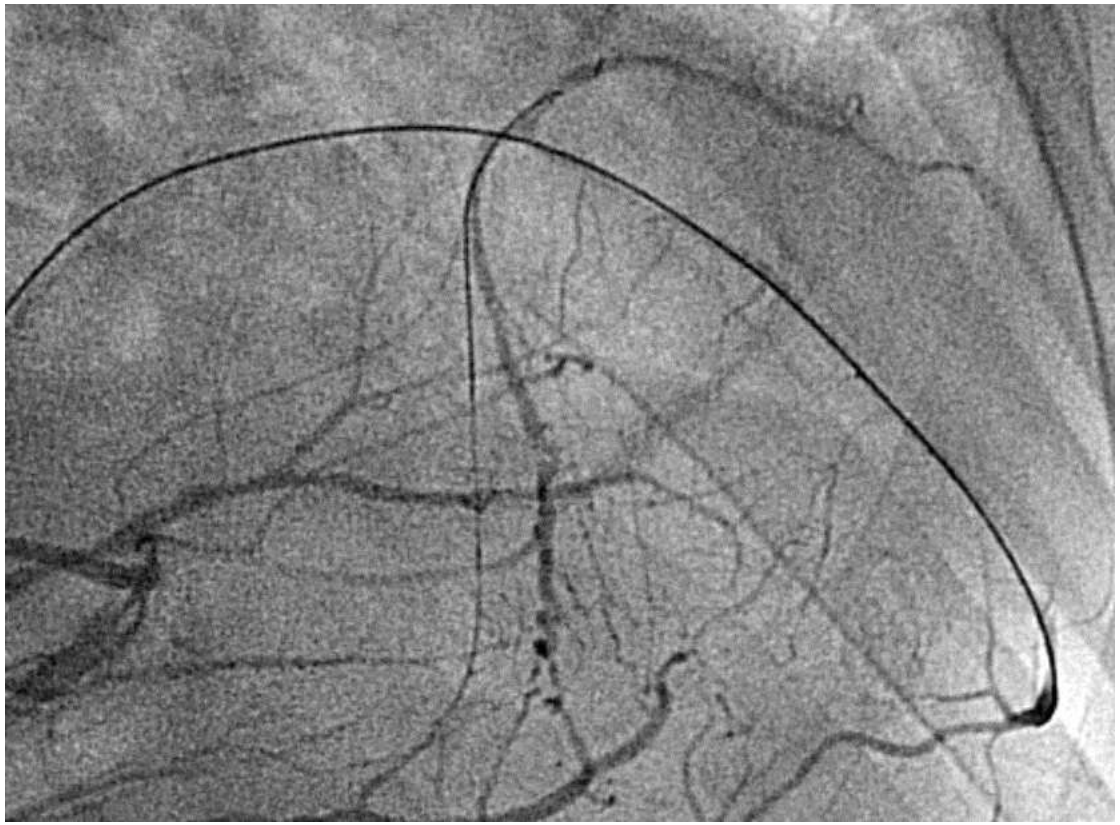
Transit Miracle 12g

There was a hard plaque at the exit point

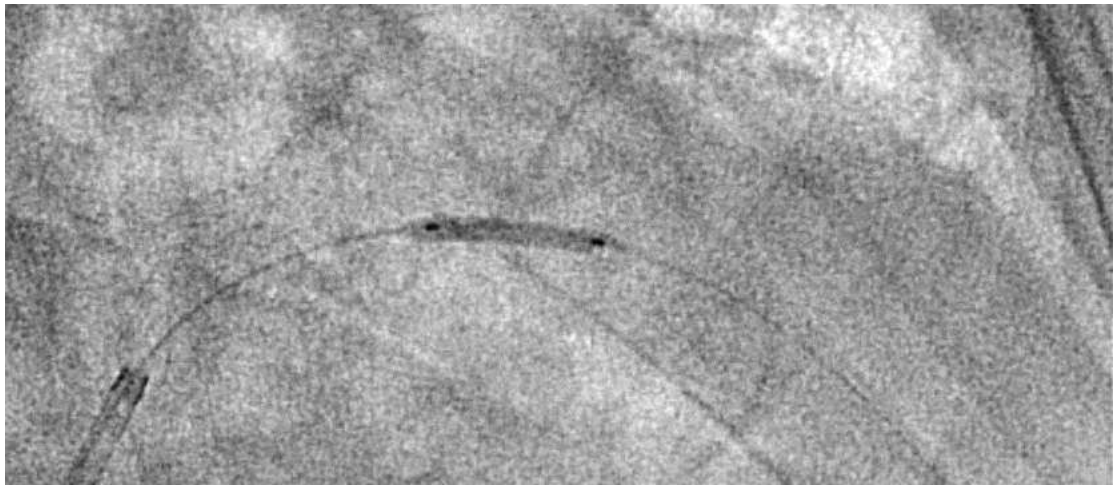


Conquest and Tornus

Conquest crossed to the distal

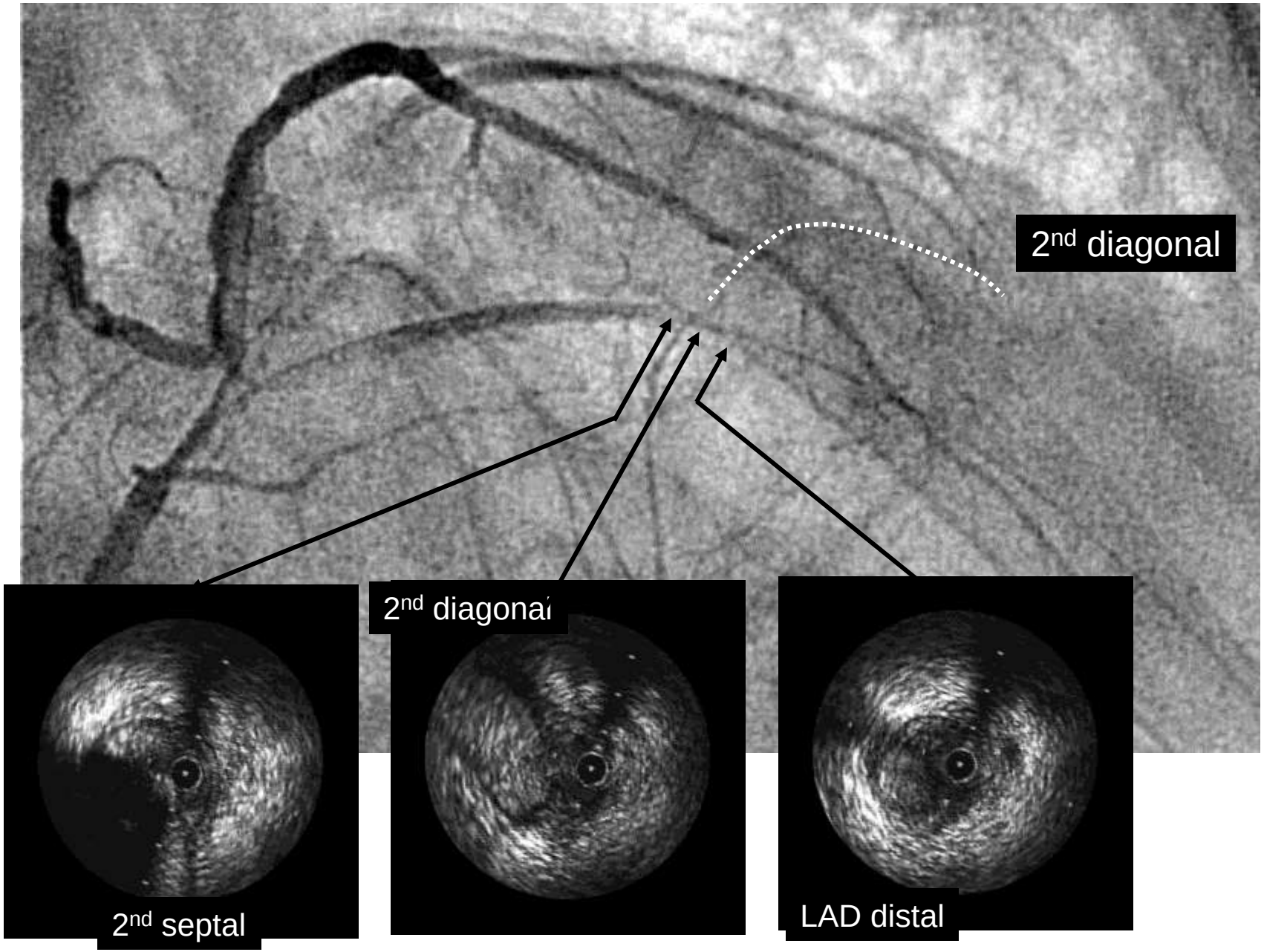


2.5mm balloon.

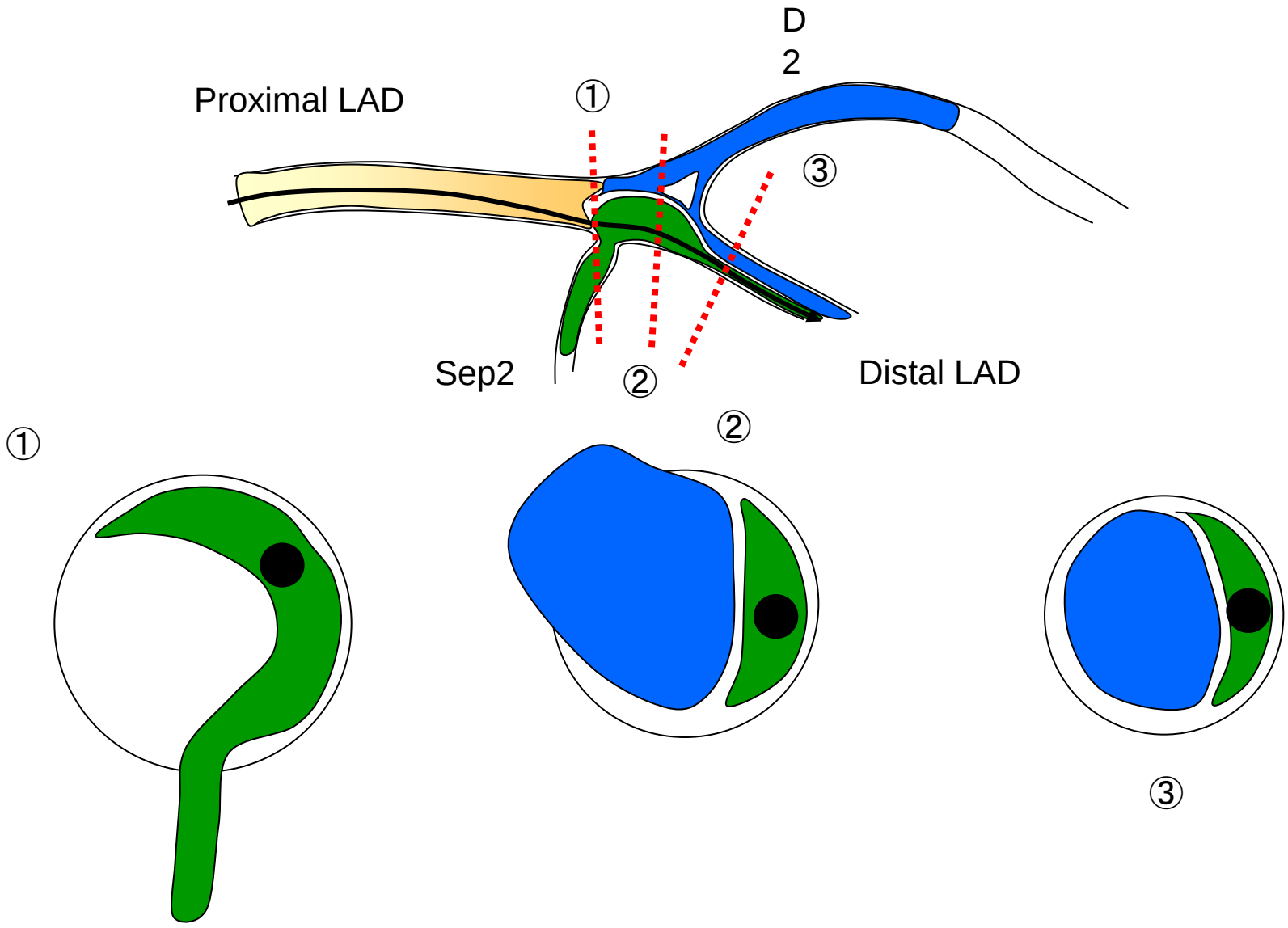


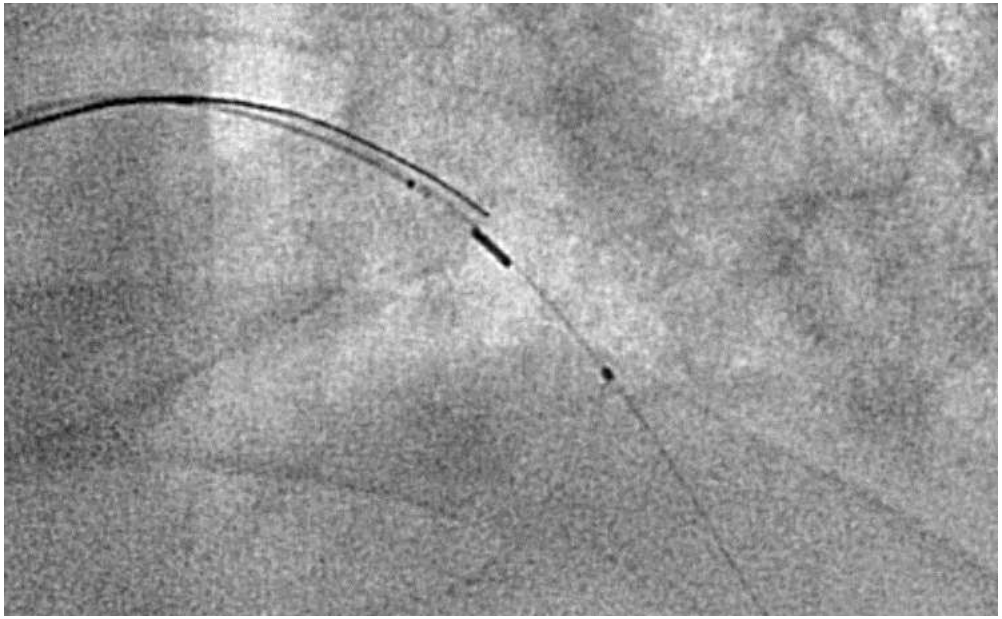
No flow of post balloon dilatation

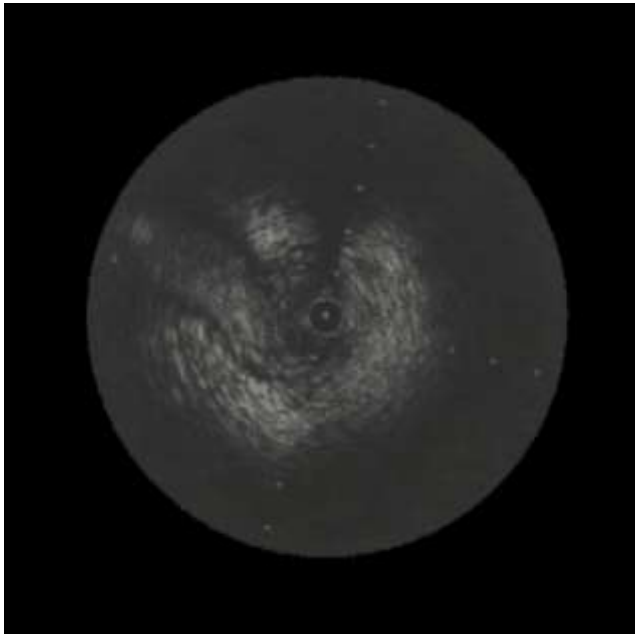
IVUS image of the LAD



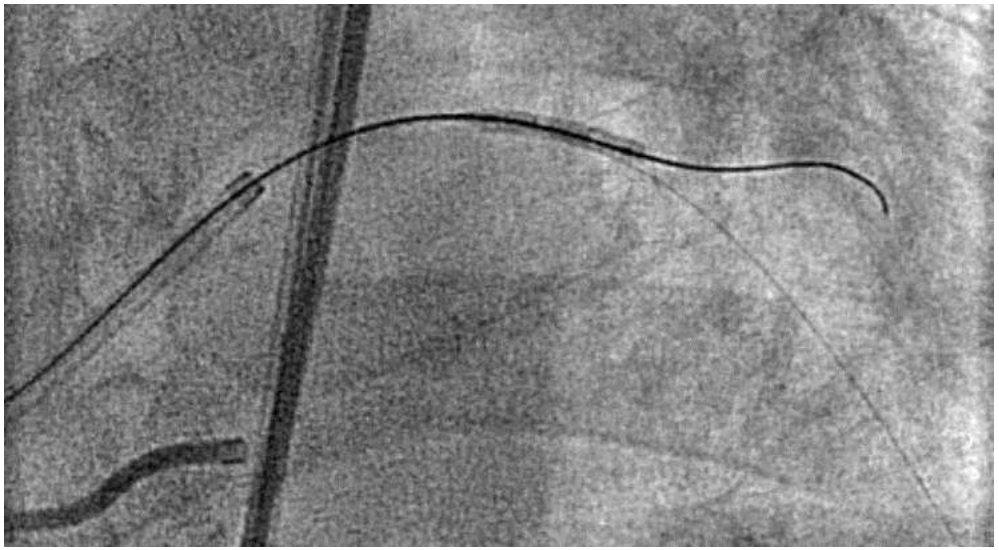
Schema of the wire route (subintimal space)





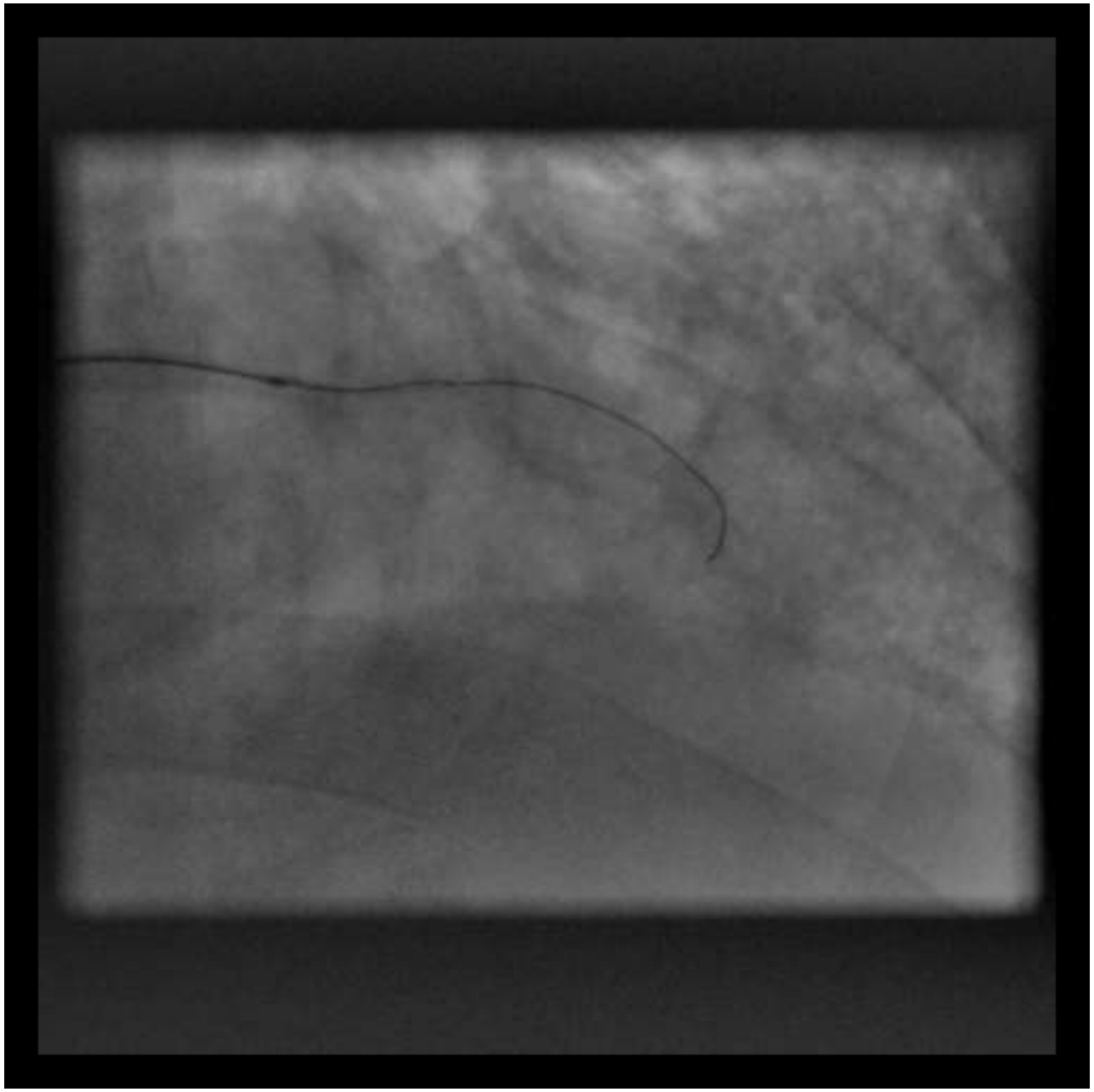


Wire aiming direction is opposite to the IVUS catheter



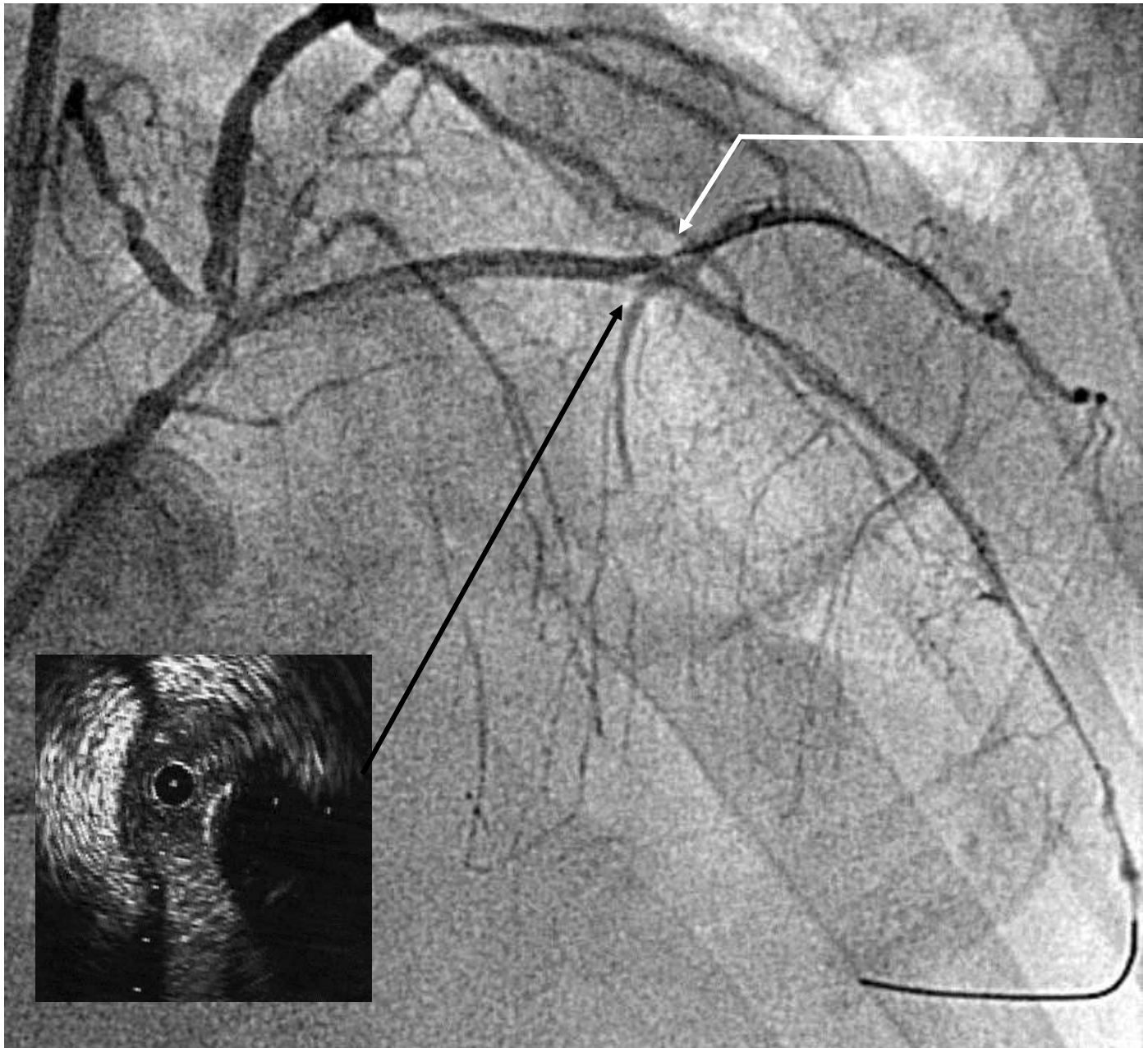
The wire crossed to the diagonal true lumen.
IVUS was in the pseudo lumen

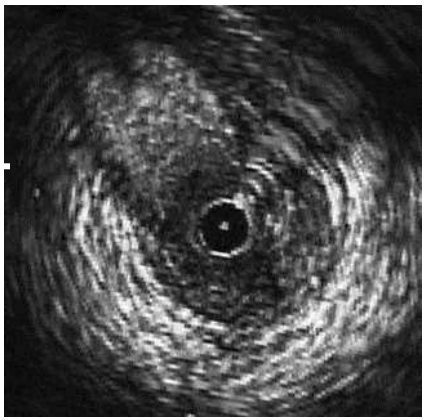
Make a crack to the true lumen by 2.0mm dilatation (side branch technique)



A second wire advanced into the diagonal.

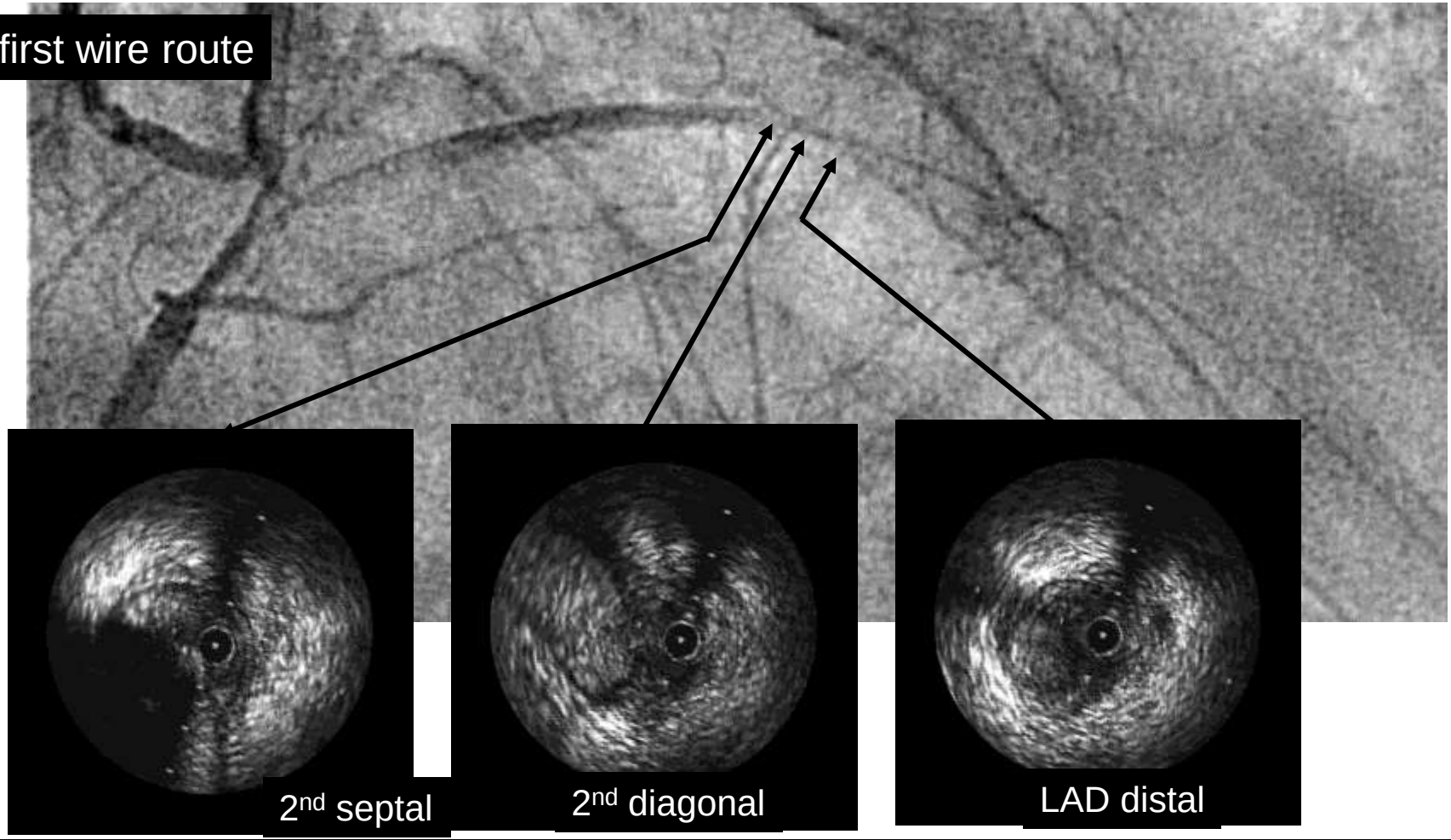
Pulling back to the LAD which is connected from the diagonal.

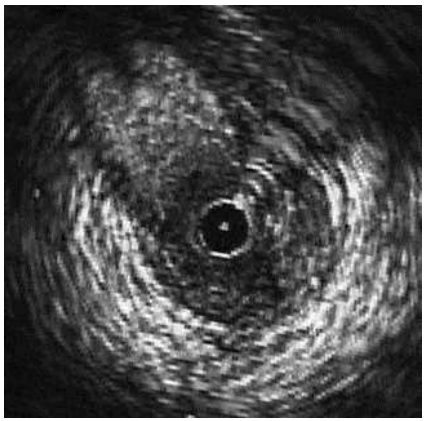




Diagonal and LAD wires are the same lumen

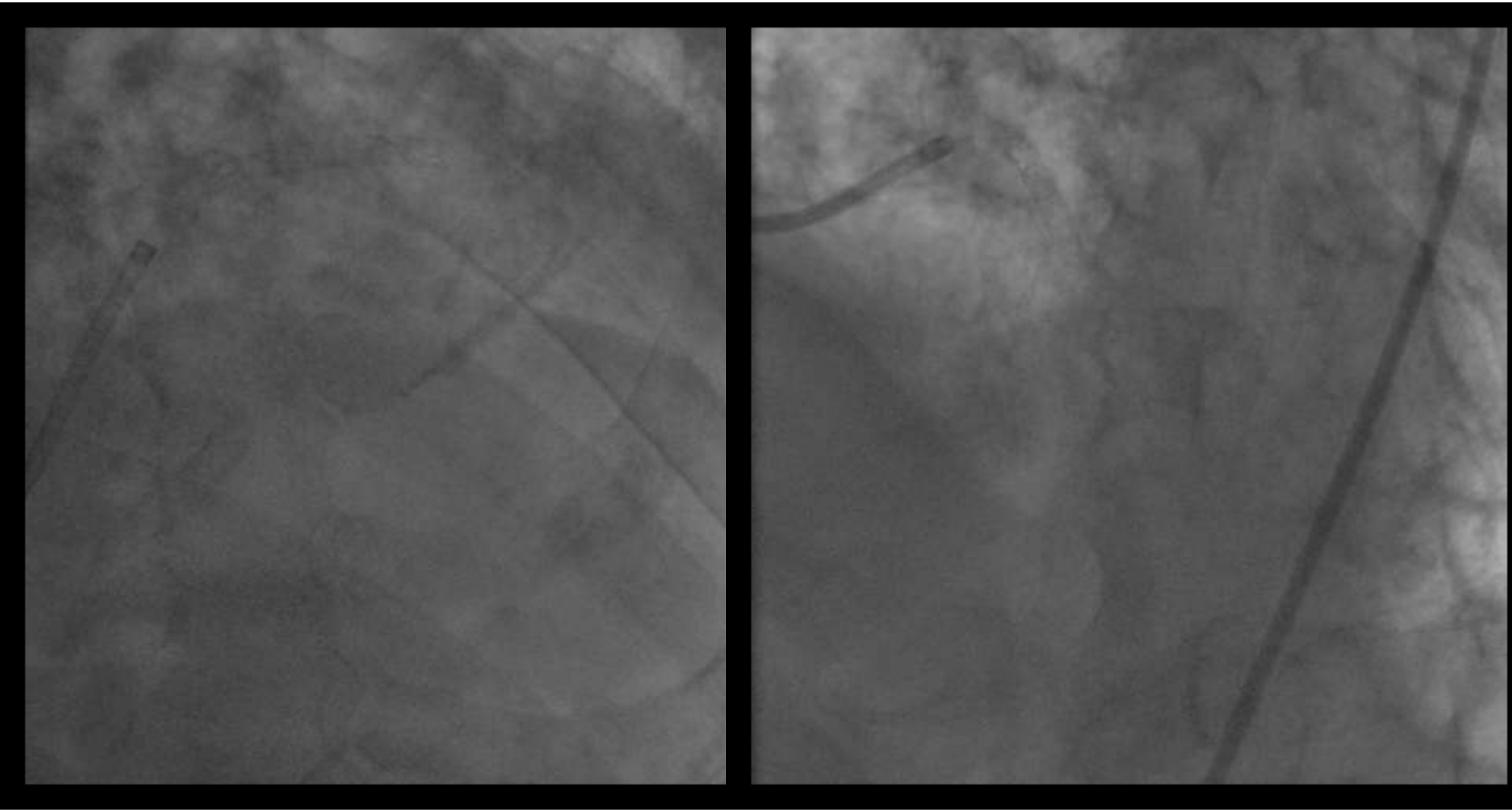
The first wire route





After re-route by IVUS guidance

Final

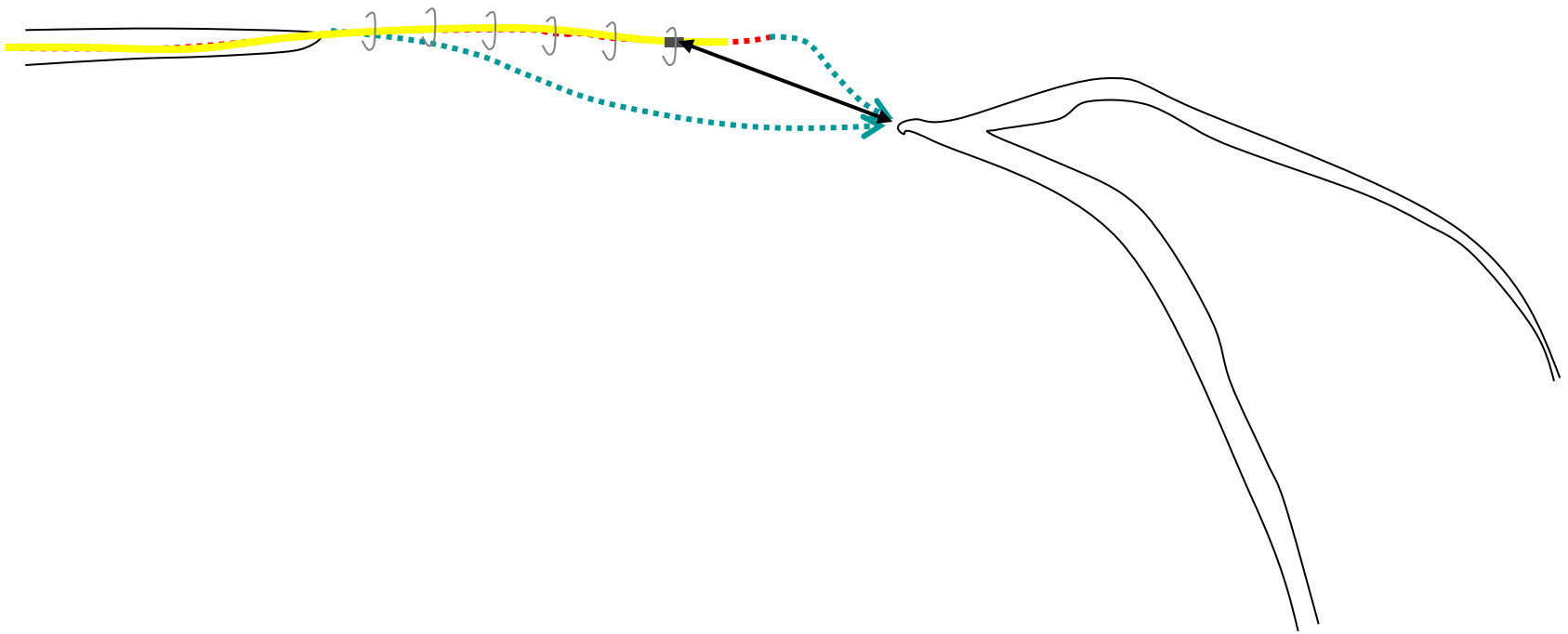


SES 3.5x33mm 17 atm

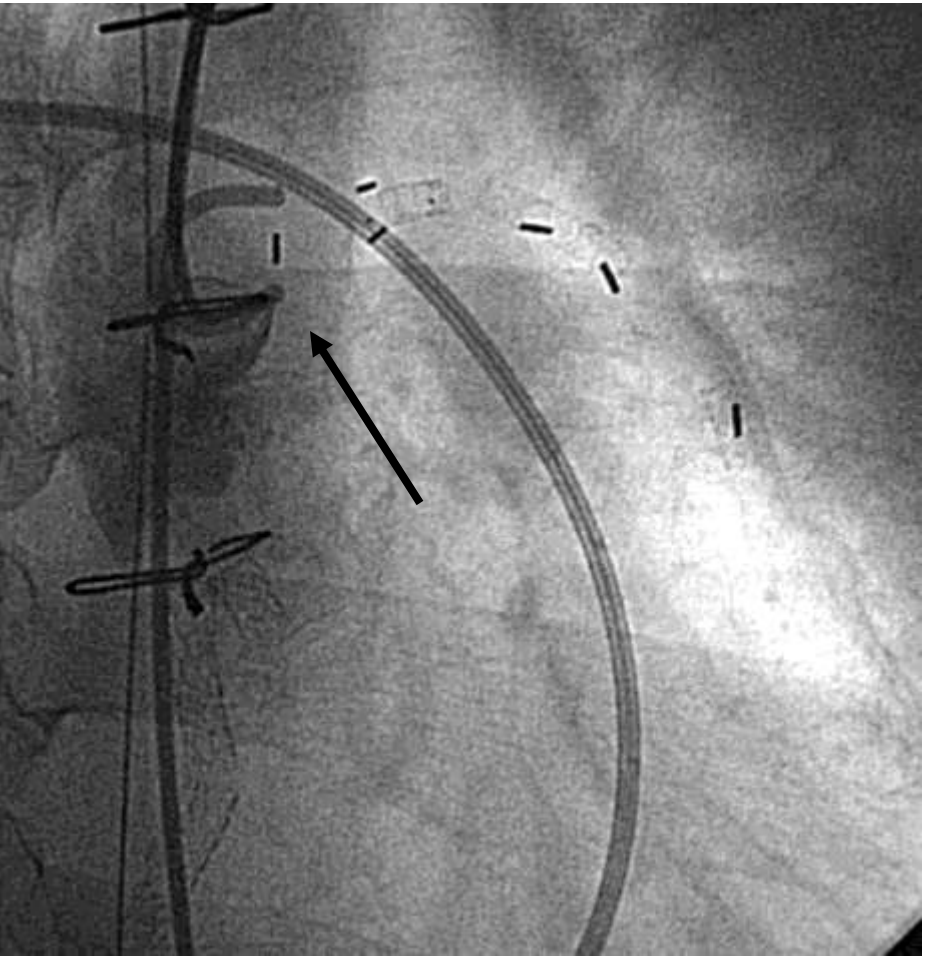
2) IVUS guided wireing in the CTO to control appropriate route.

1. Check the un-crossable wire route by IVUS
2. Usually, the wire deflected at a hard plaque and goes to edge of the vessel (so called pseudolumen)
3. Try to rewiring at the deflected point to pick up plaque center. Penetrating direction was decided by IVUS and fluoroscopic guide.

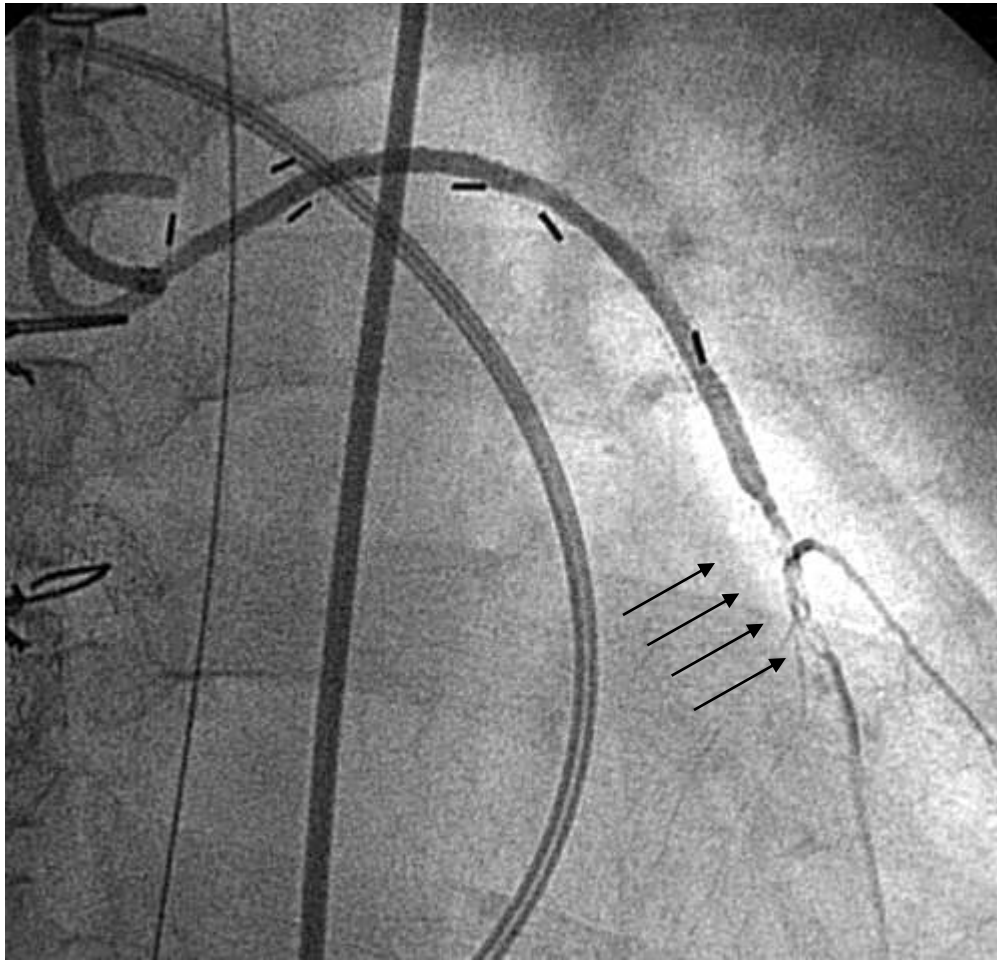
3) If you come to dead rock during procedure, confirm what's going in the vessel and change the strategy.



Case Example : Anterior MI due to SVG-LAD graft occlusion (CABG25 years before)



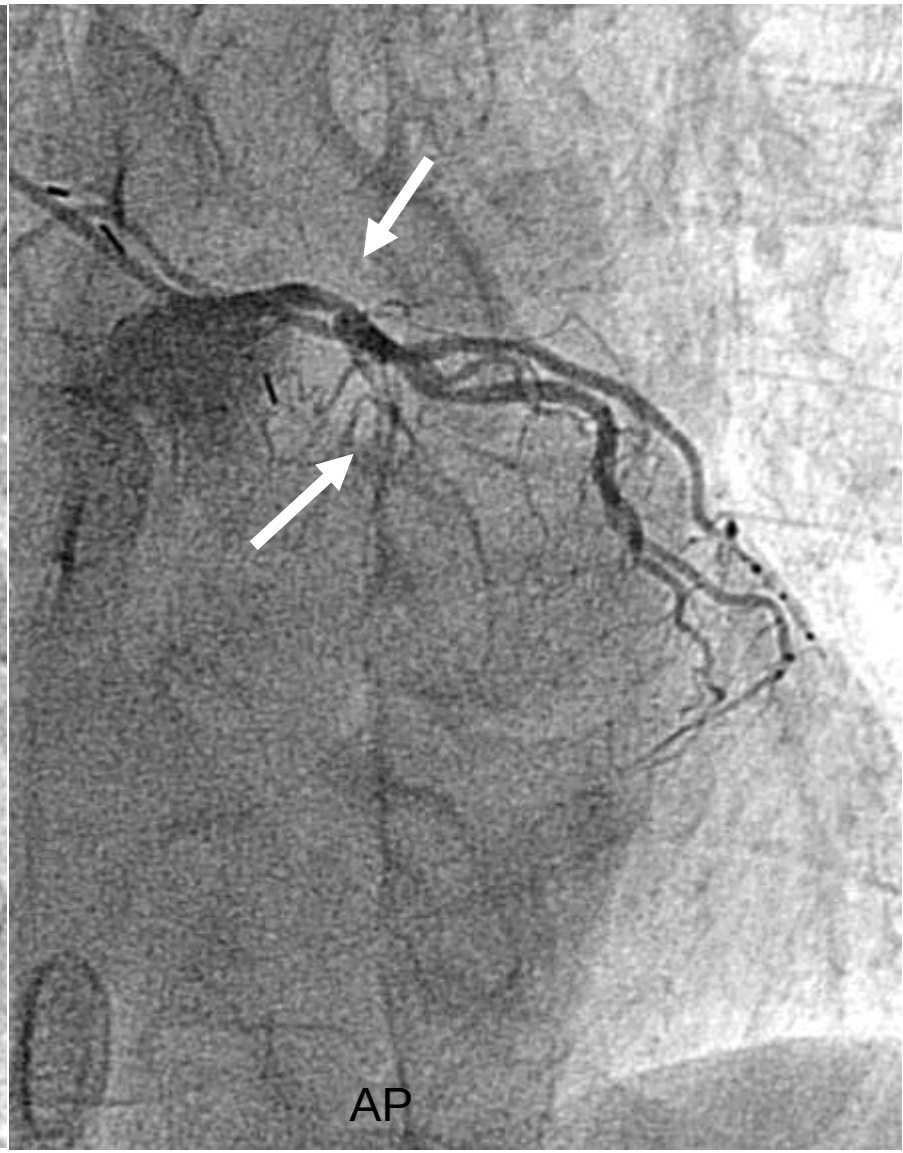
Pre



Post

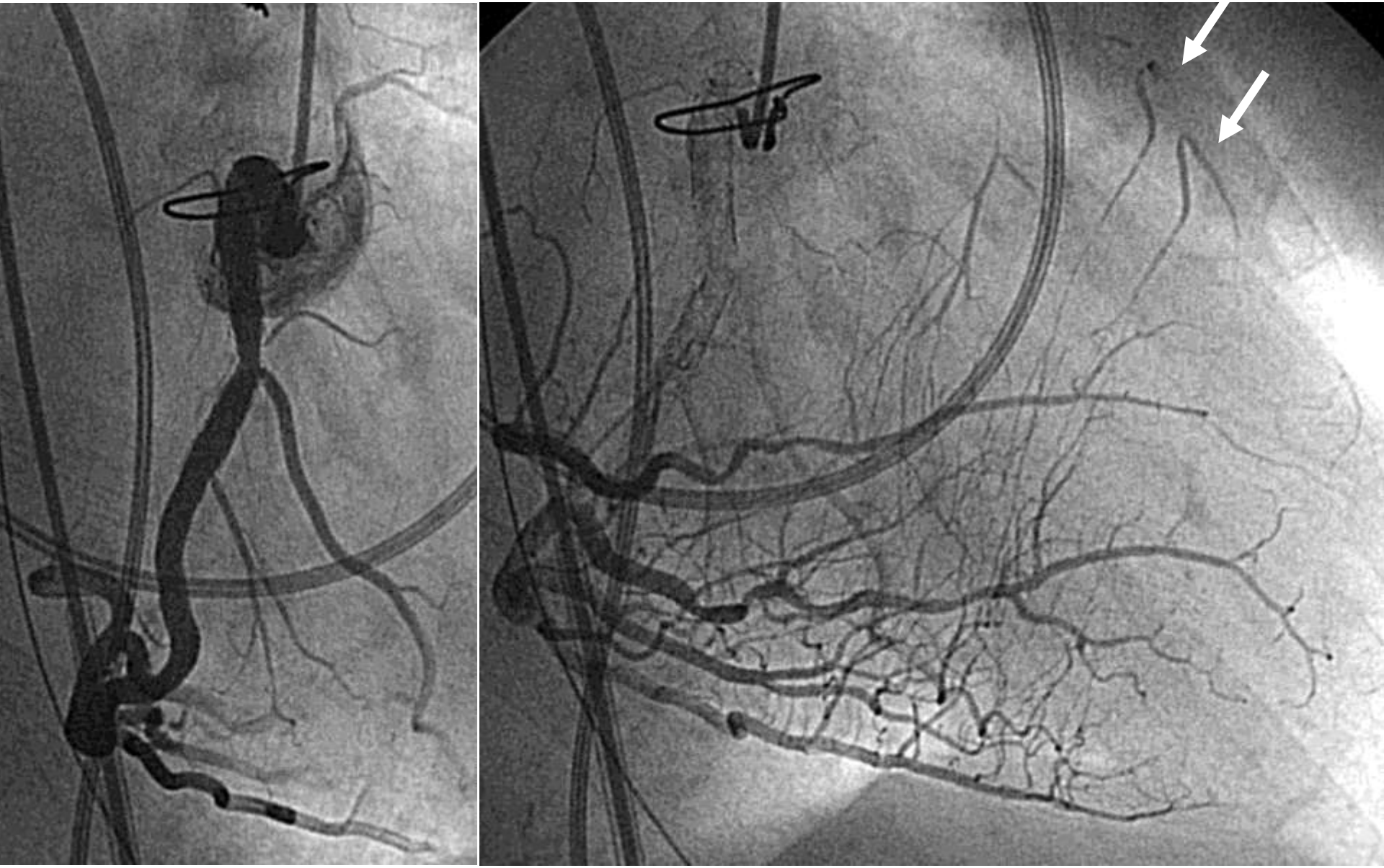
Balloon and suction but had residual thrombus.
The graft has received 5 times intervention in recent years.

LAD recanalization was planed



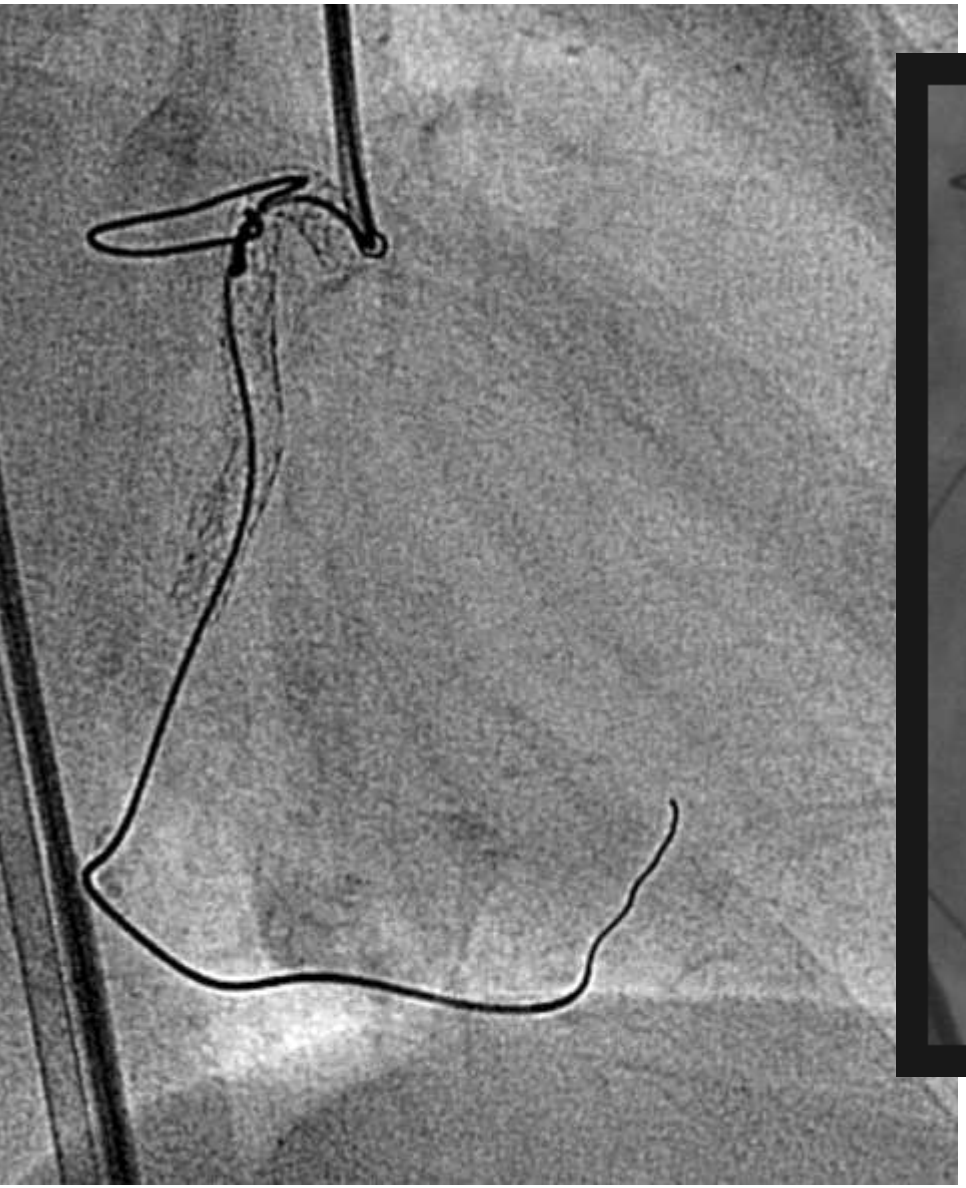
LMT disease and LAD CTO more than 7 years

LAD receives collaterals from RCA



RAO

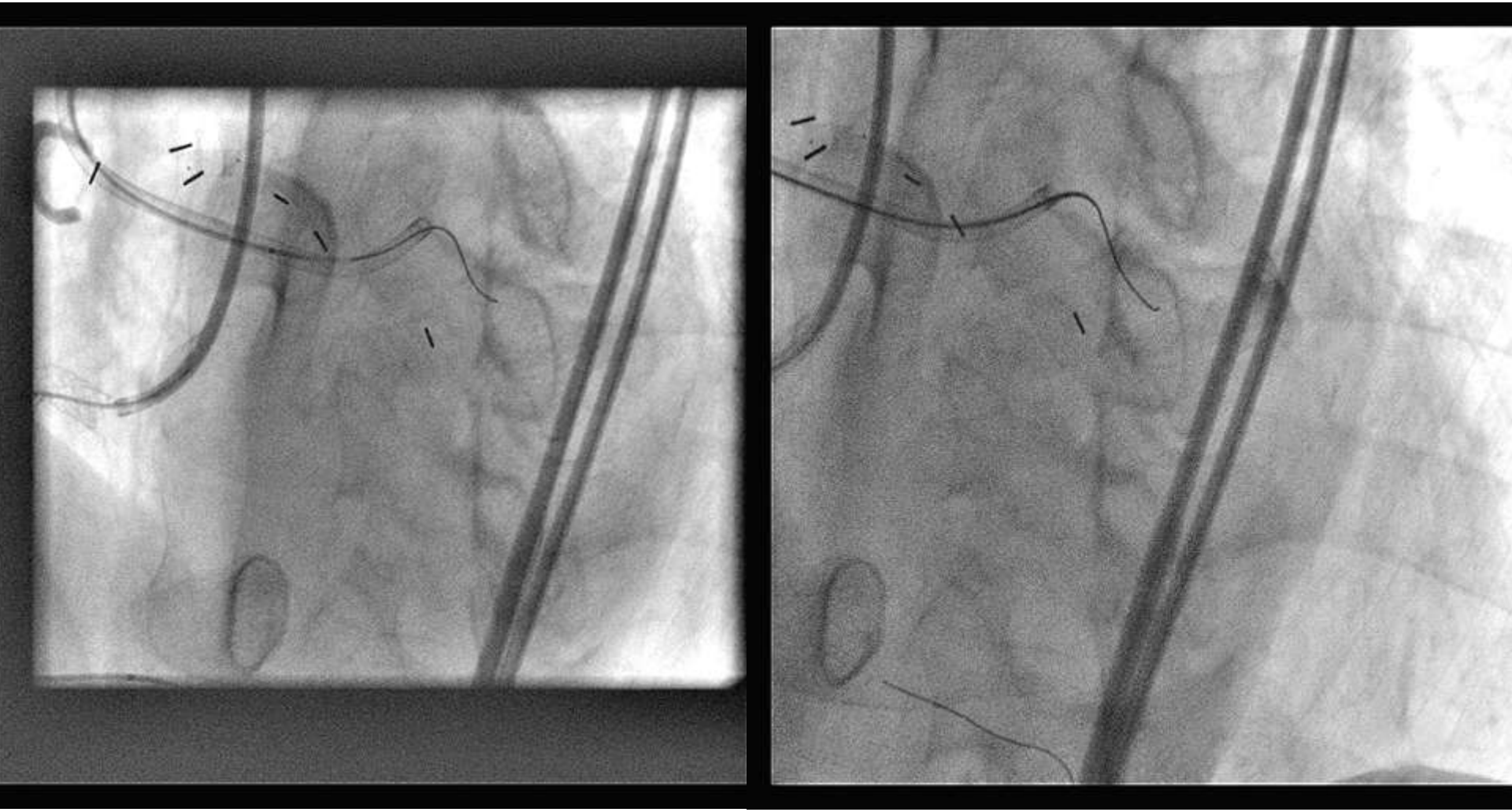
ST elevation in inferior leads because of accordion phenomenon



SUOH(Asahi) and Corsair 150cm (Asahi)

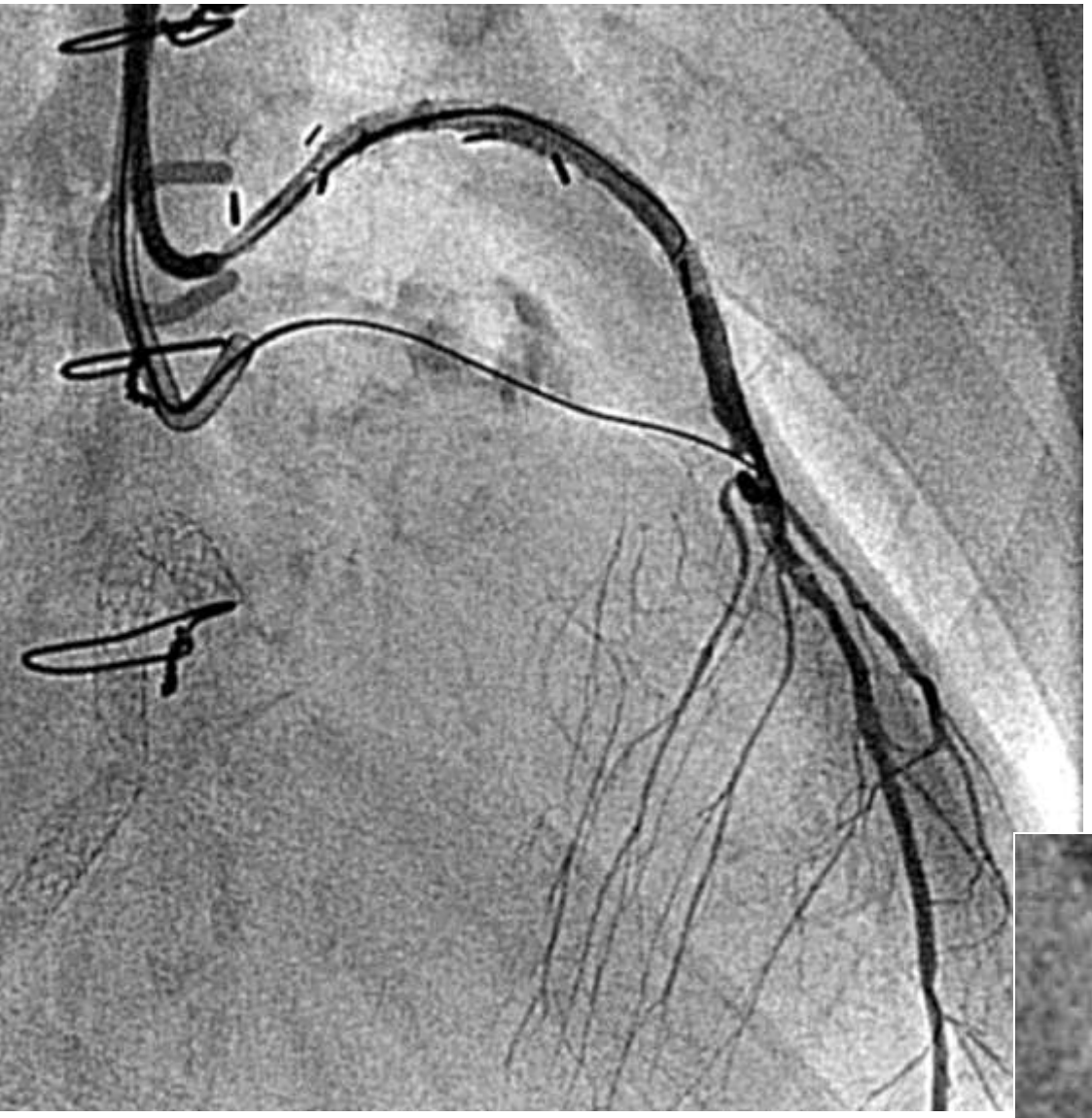
Strategy was changed to antegrade approach

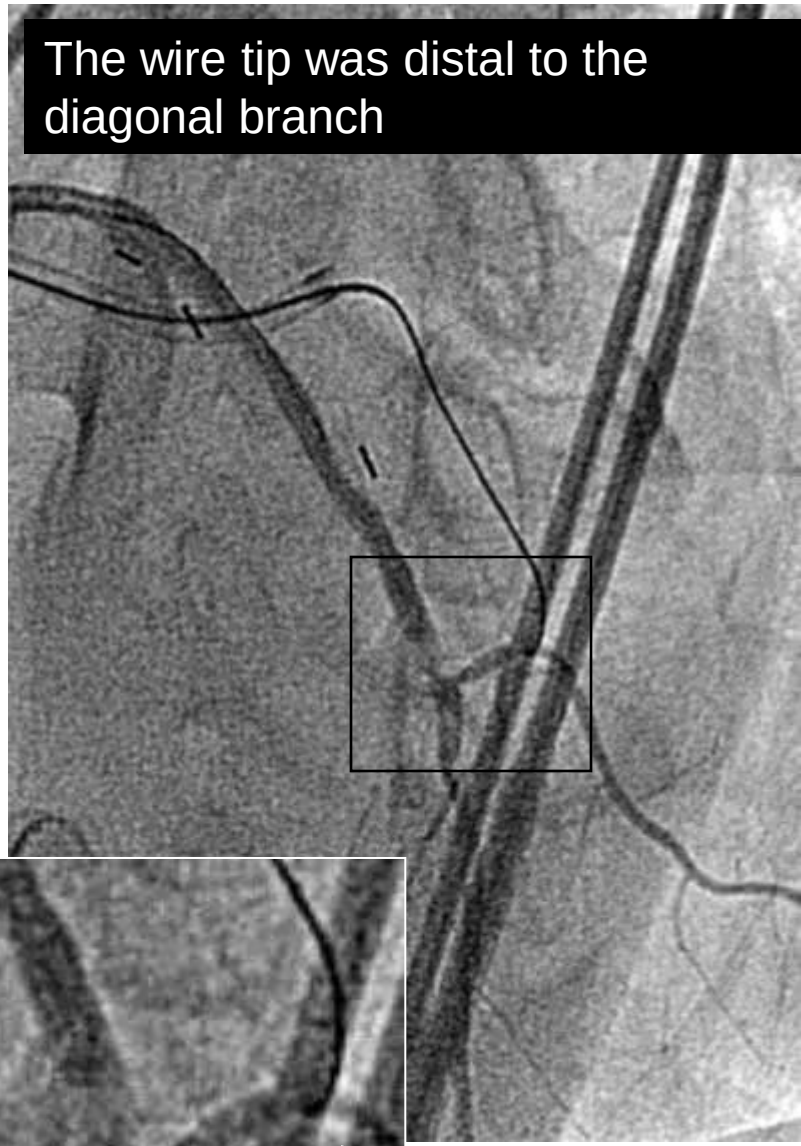
Antegrade approach (8F JL4.0 SH)



Micro channel tracking. Fielder XT did not enter.
ULTIMATE Bros3g made a perforation. Balloon sealing.

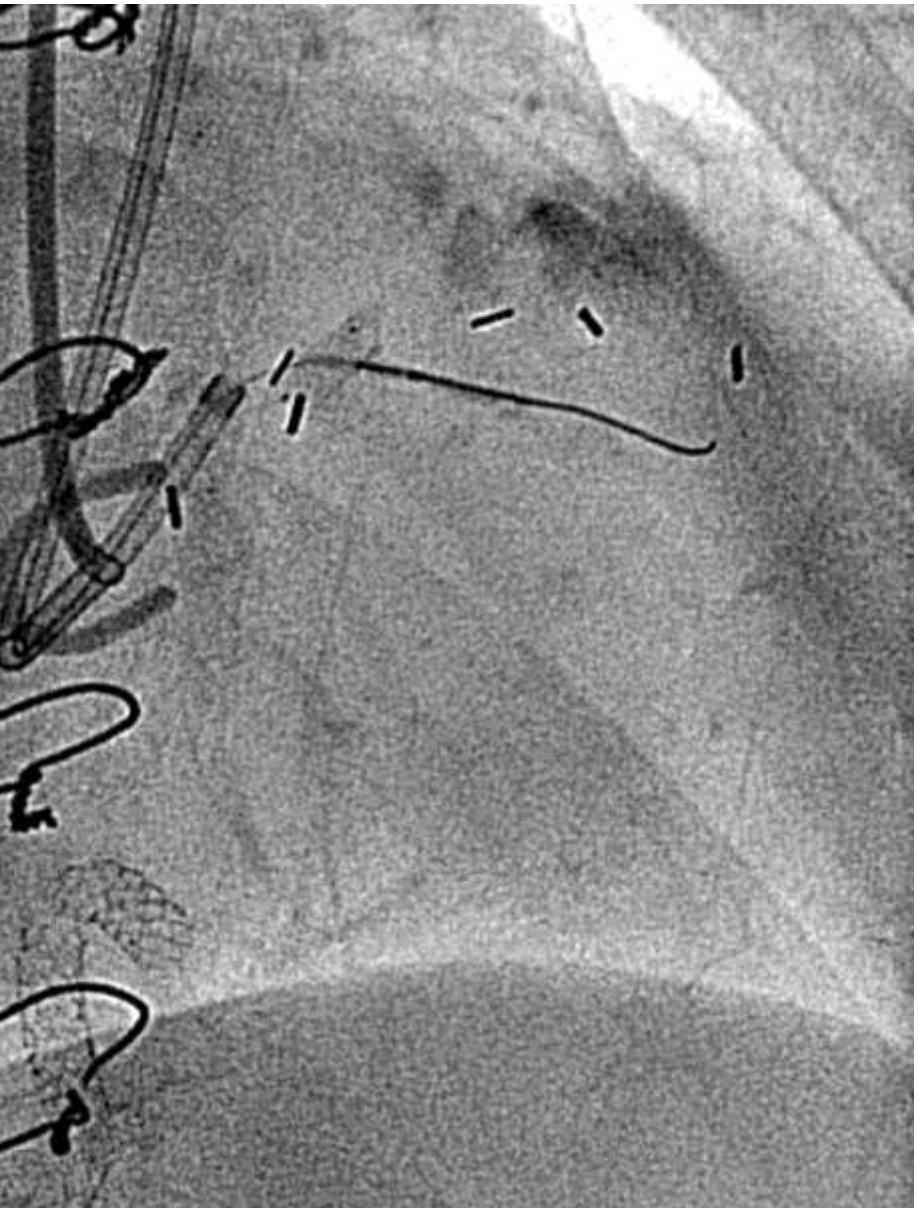
Strange wire direction?



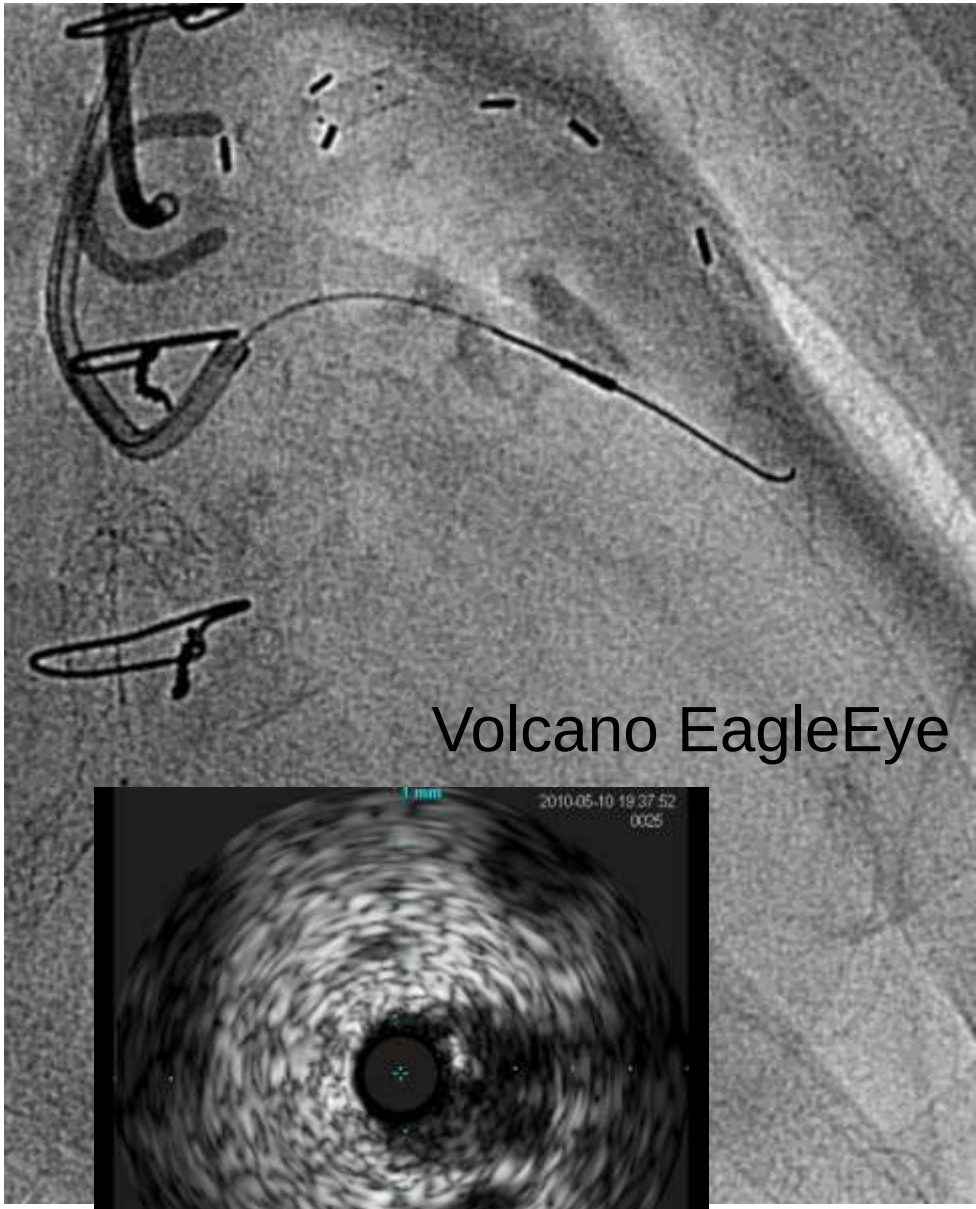


ULTIMATE Bros3g and Corsair

Attempting IVUS to check what's going on

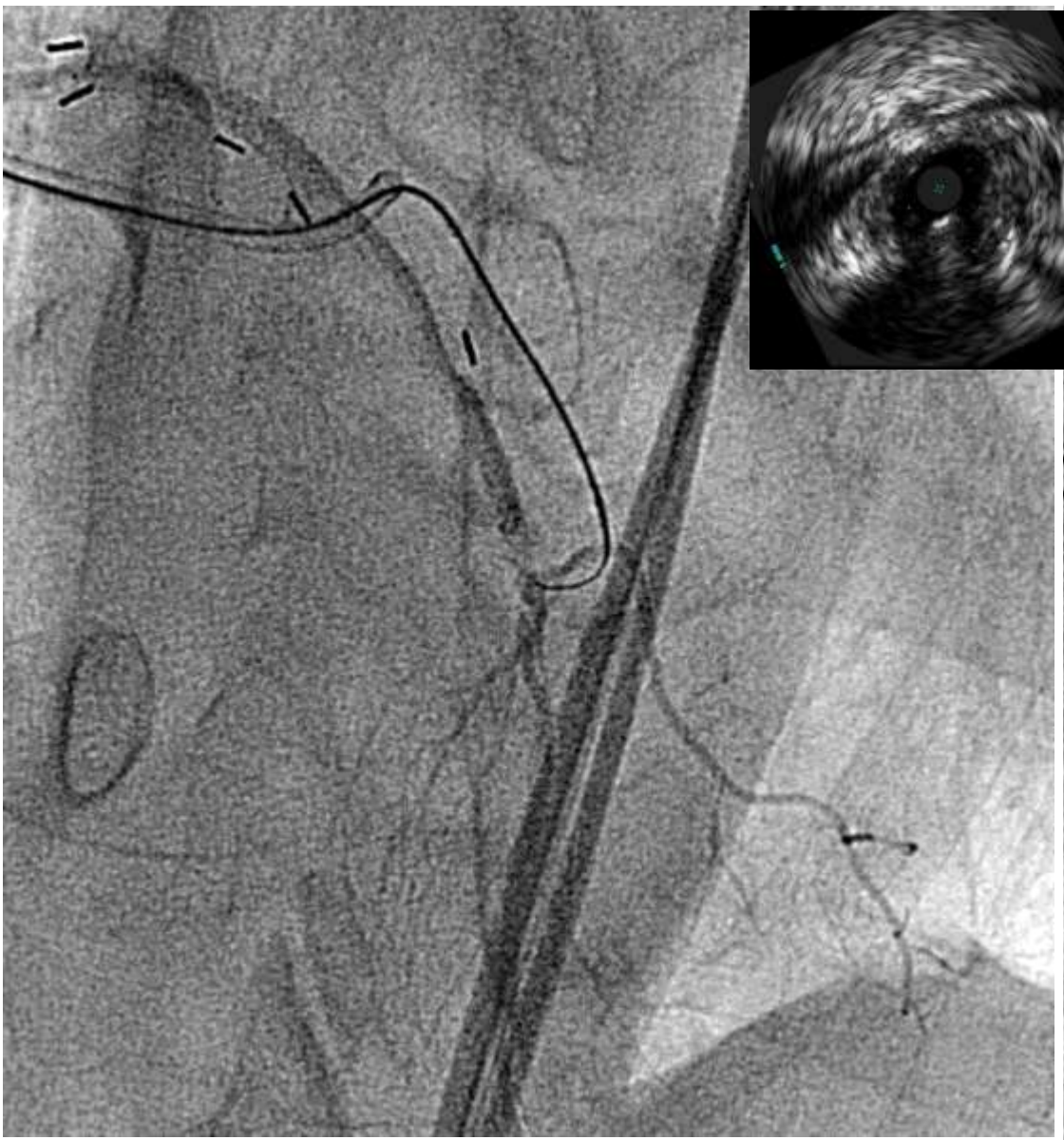


1.25mm dilatation at proximal

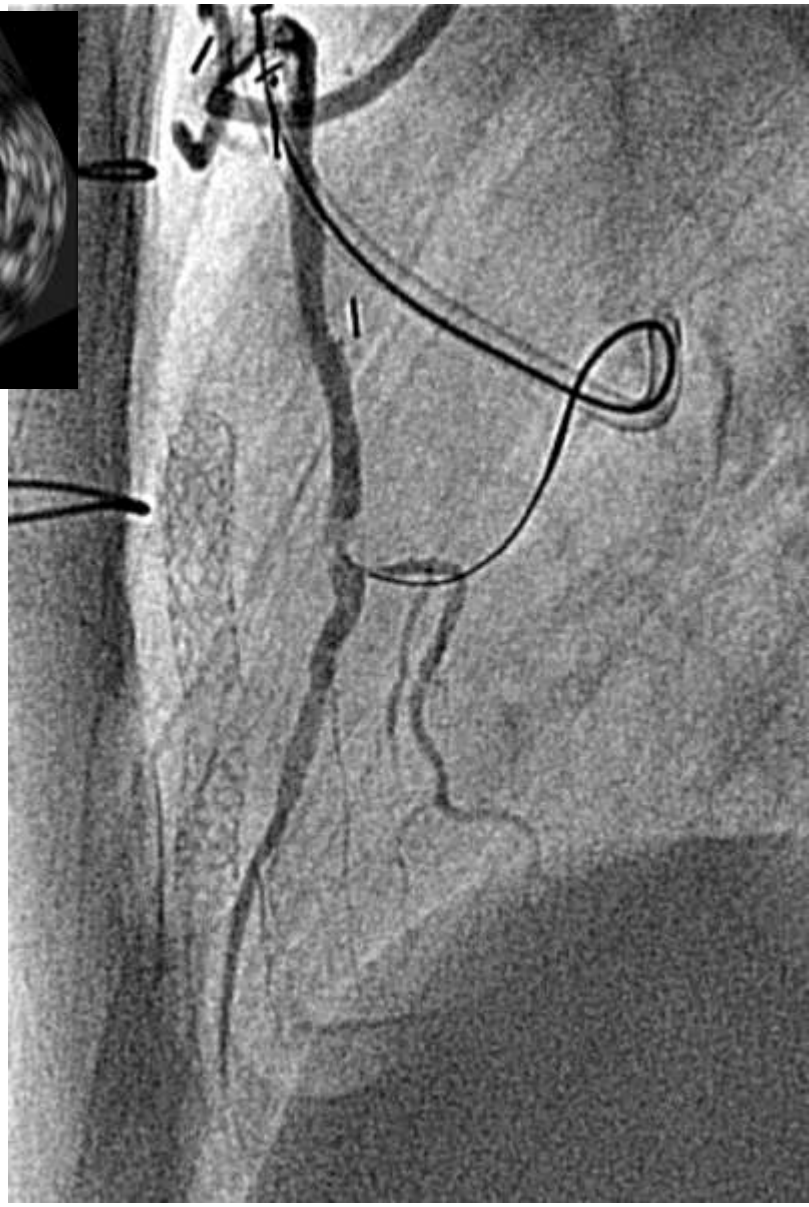


Volcano EagleEye

IVUS was placed into the SVG to LAD

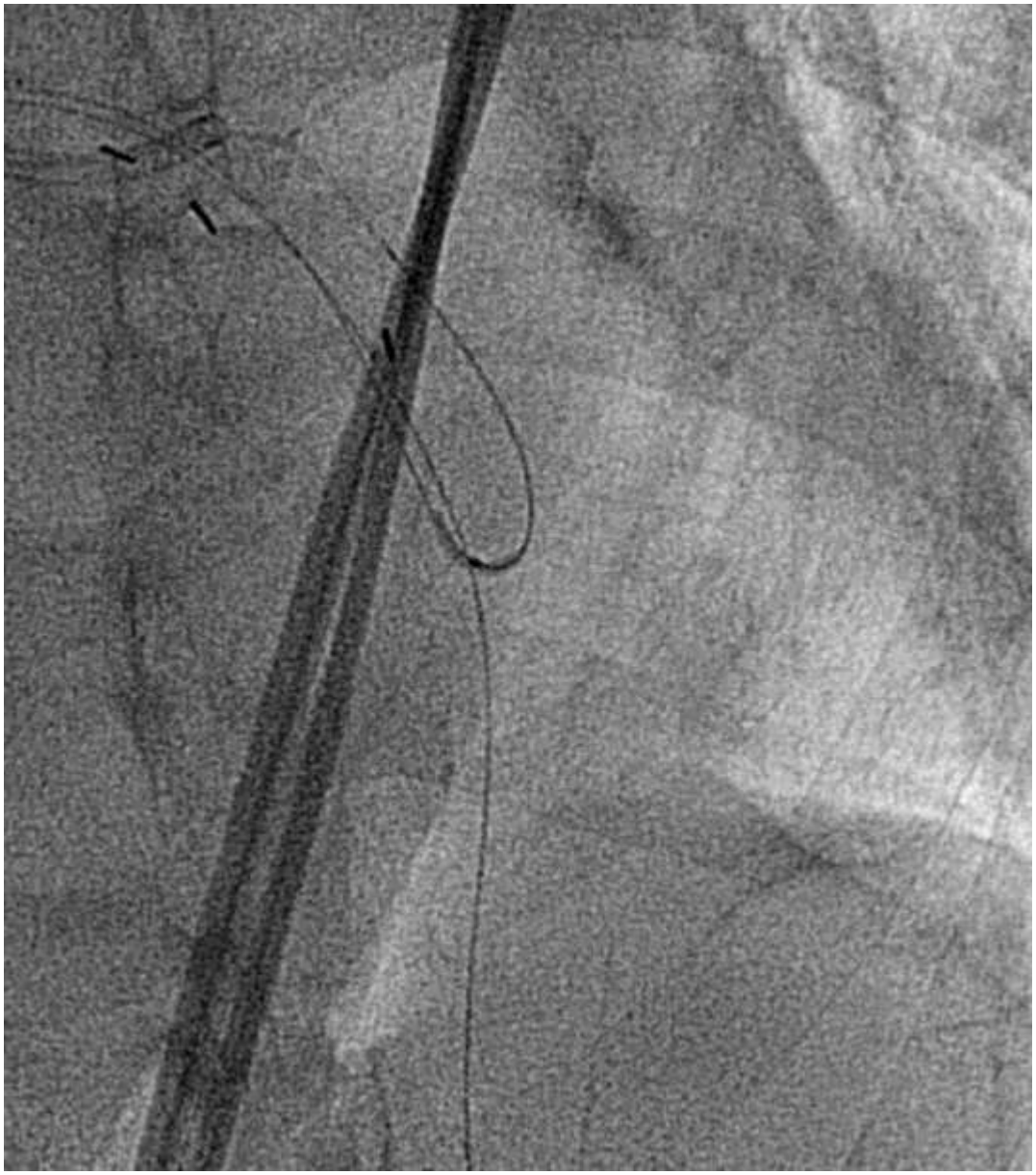


F spec HAKEN 10 (tapered wire)

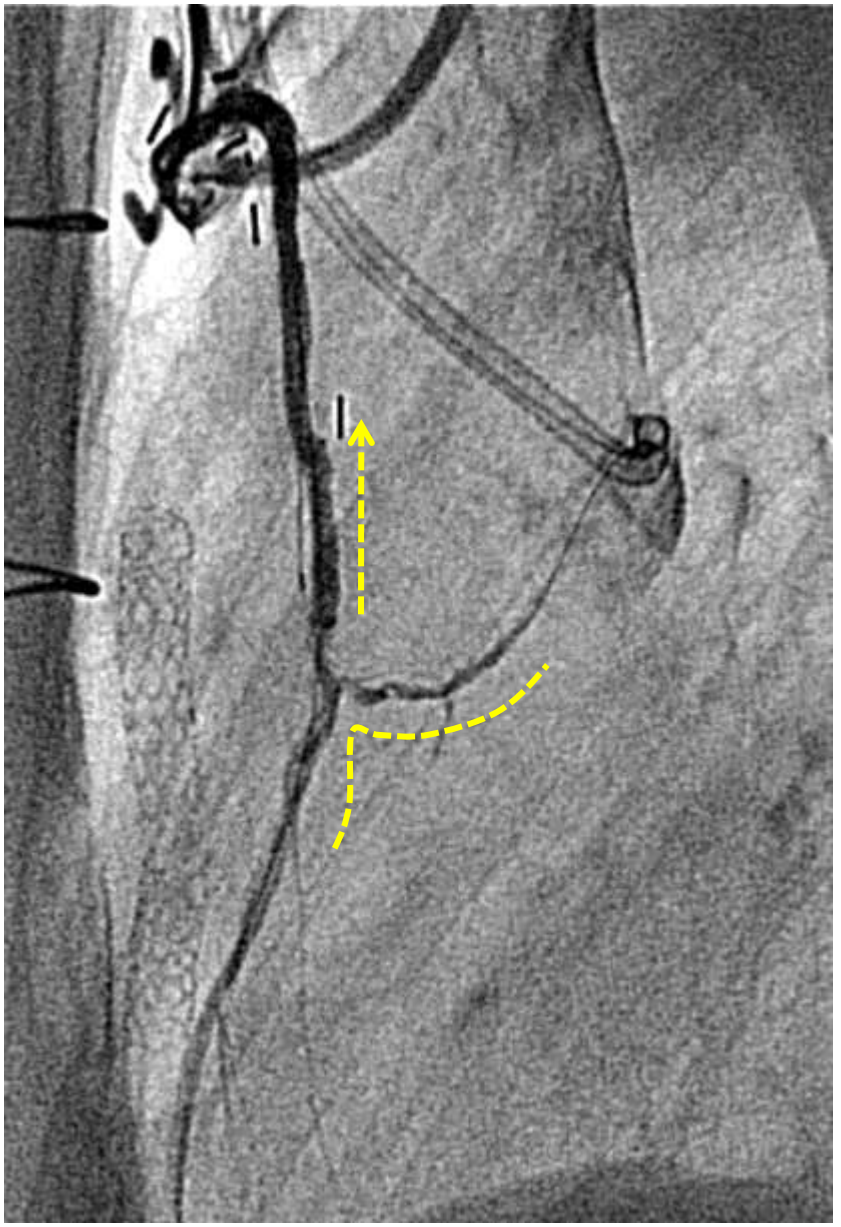


Lateral view

The SVG graft pulled up the native coronary

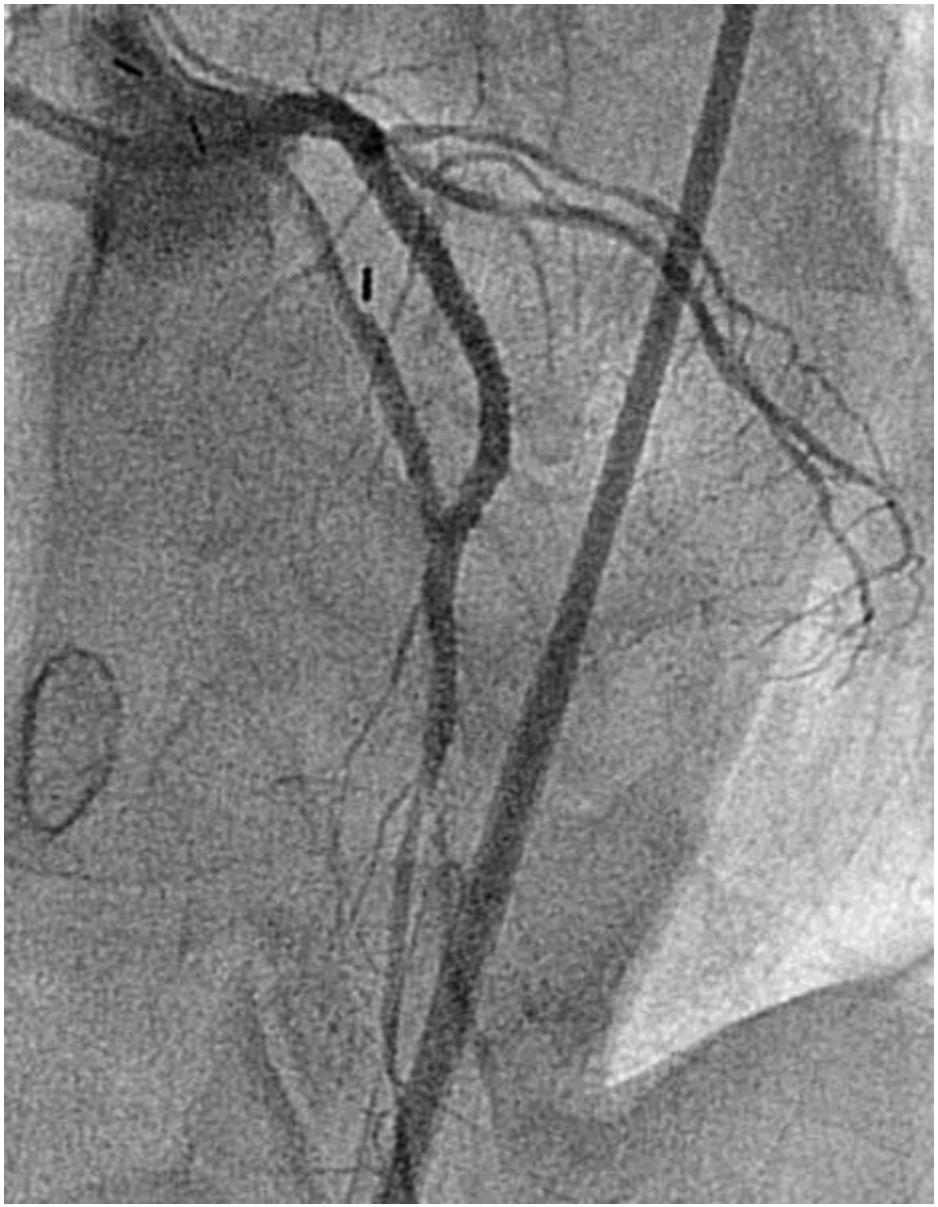


1.25mm balloon AP cranial

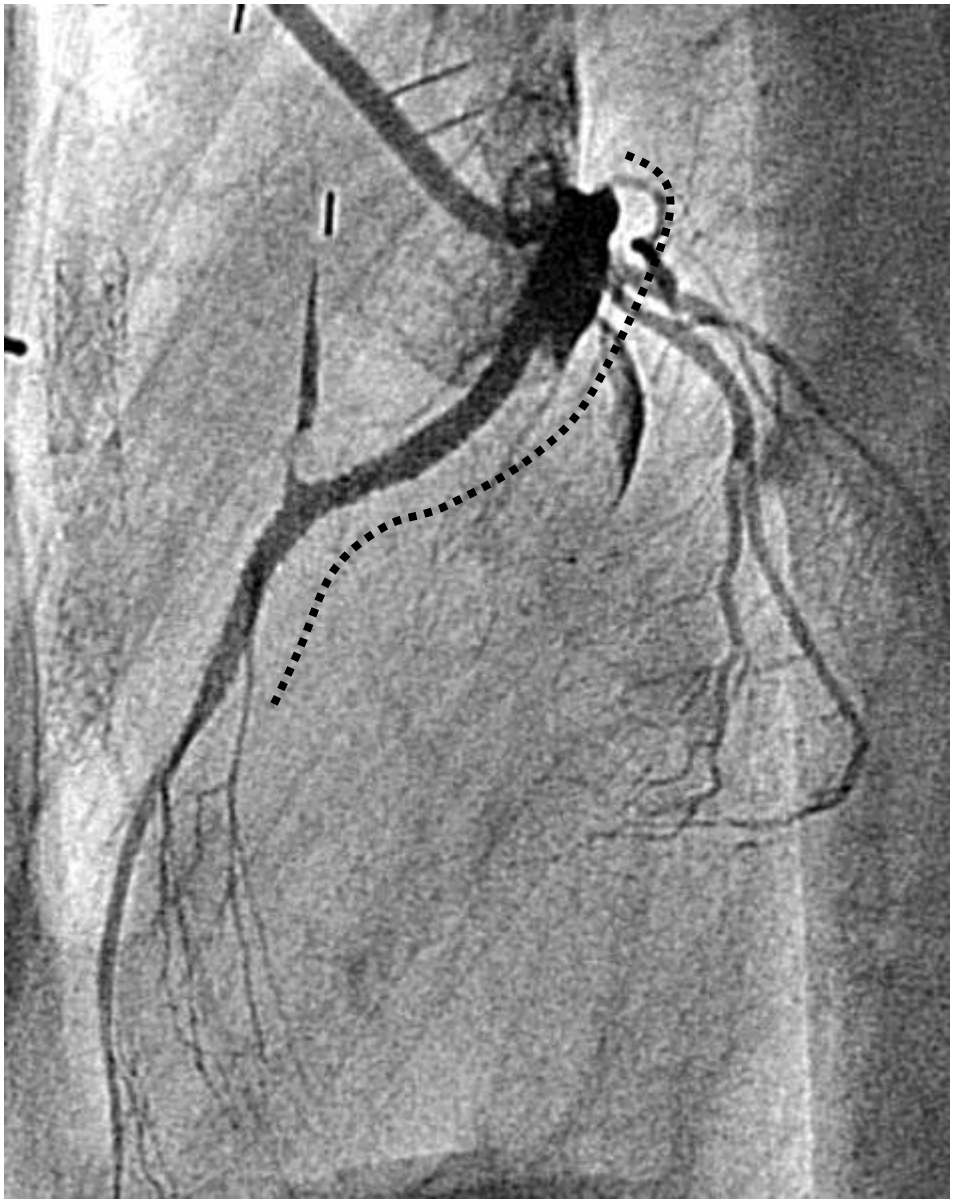


Lateral view Post dilatation

Everolimus Eluting stents(3 stents of 79mm) from LMT to distal LAD



AP cranial



Lateral view

IVUS role of antegade wireing in CTO

1. Find out CTO entrance by IVUS. After you penetrate the CTO entrance repeat IVUS should be recommended to confirm the wire is truly in the CTO or not.

2. If your wire in the false lumen and not crossing the distal true lumen, you can check the wire route by IVUS and re route the wire. Point is penetrate the plaque center at the deflected point.

3. If you come to dead rock during procedure, do IVUS to confirm what’s going on in the vessel.

Takme home message

- CTO procedure is wiring to imagined vessel by fluoroscope guidance.
- If you have any doubt during the wiring, do IVUS and get information.
- Organizing the angio, fluoro and IVUS findings give clear mind to the operator what should do the next.