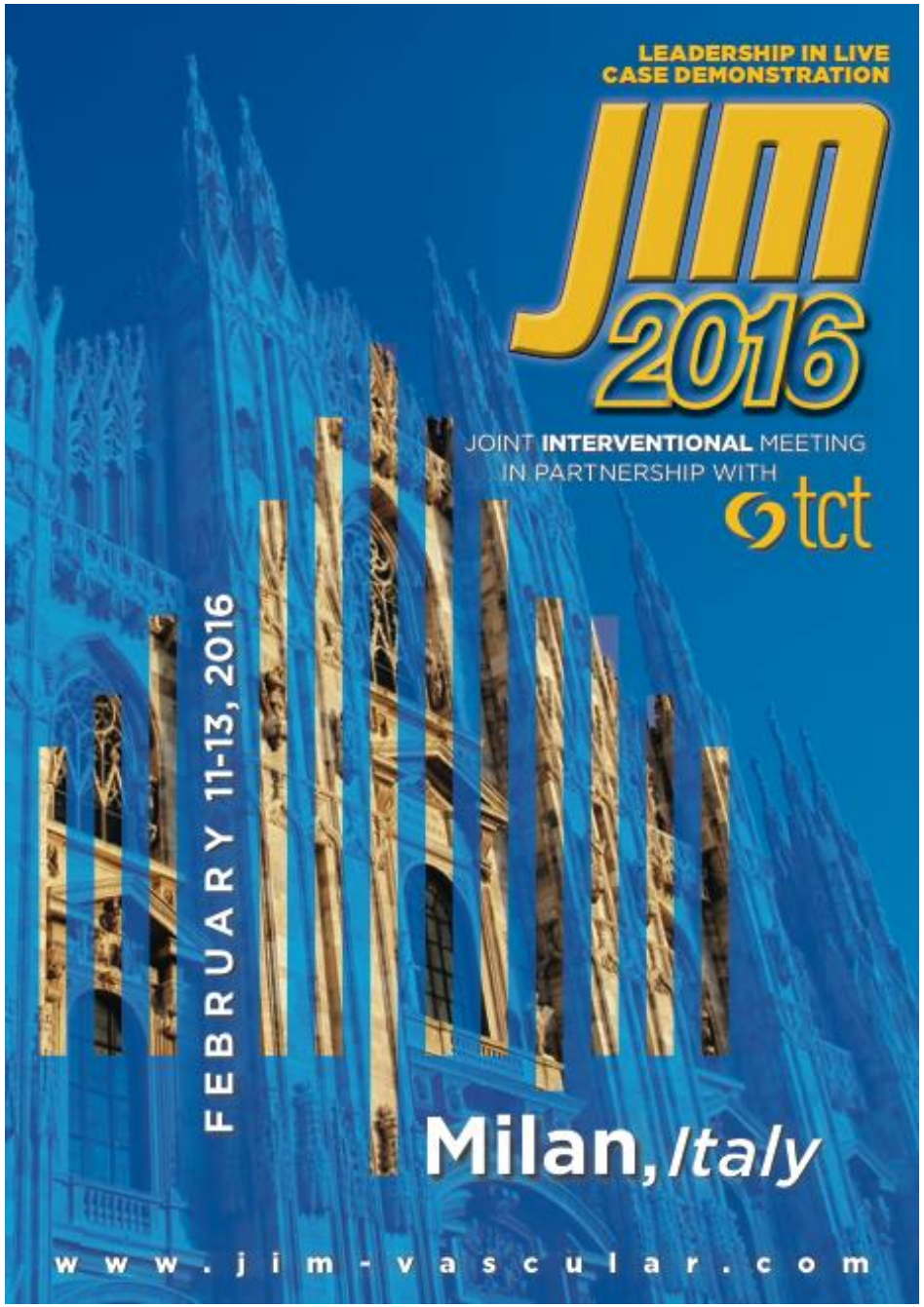
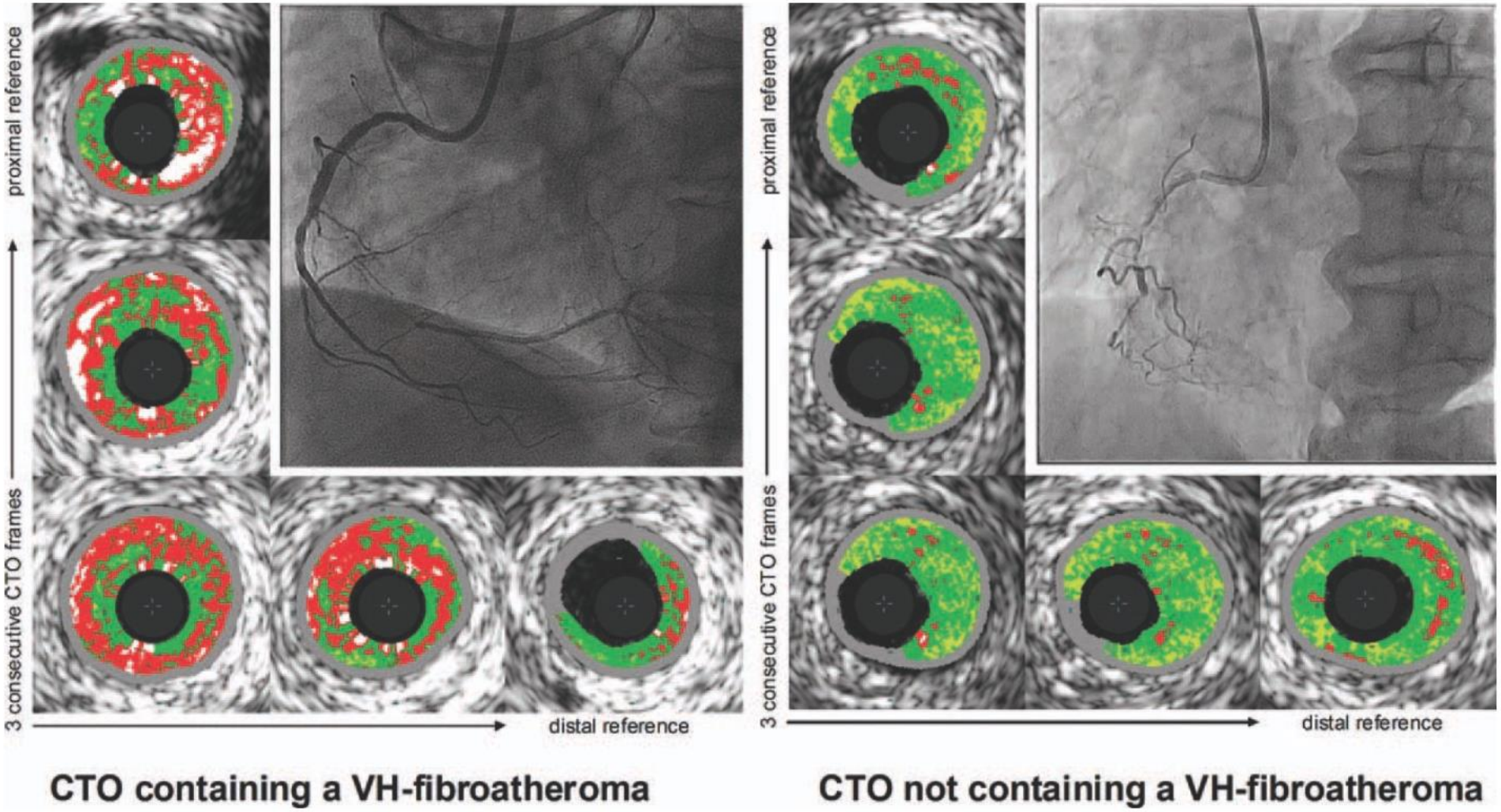


How and when to use IVUS during CTO

Roberto Garbo, MD
San Giovanni Bosco Hospital
Turin, Italy

What's about IVUS and CTO???

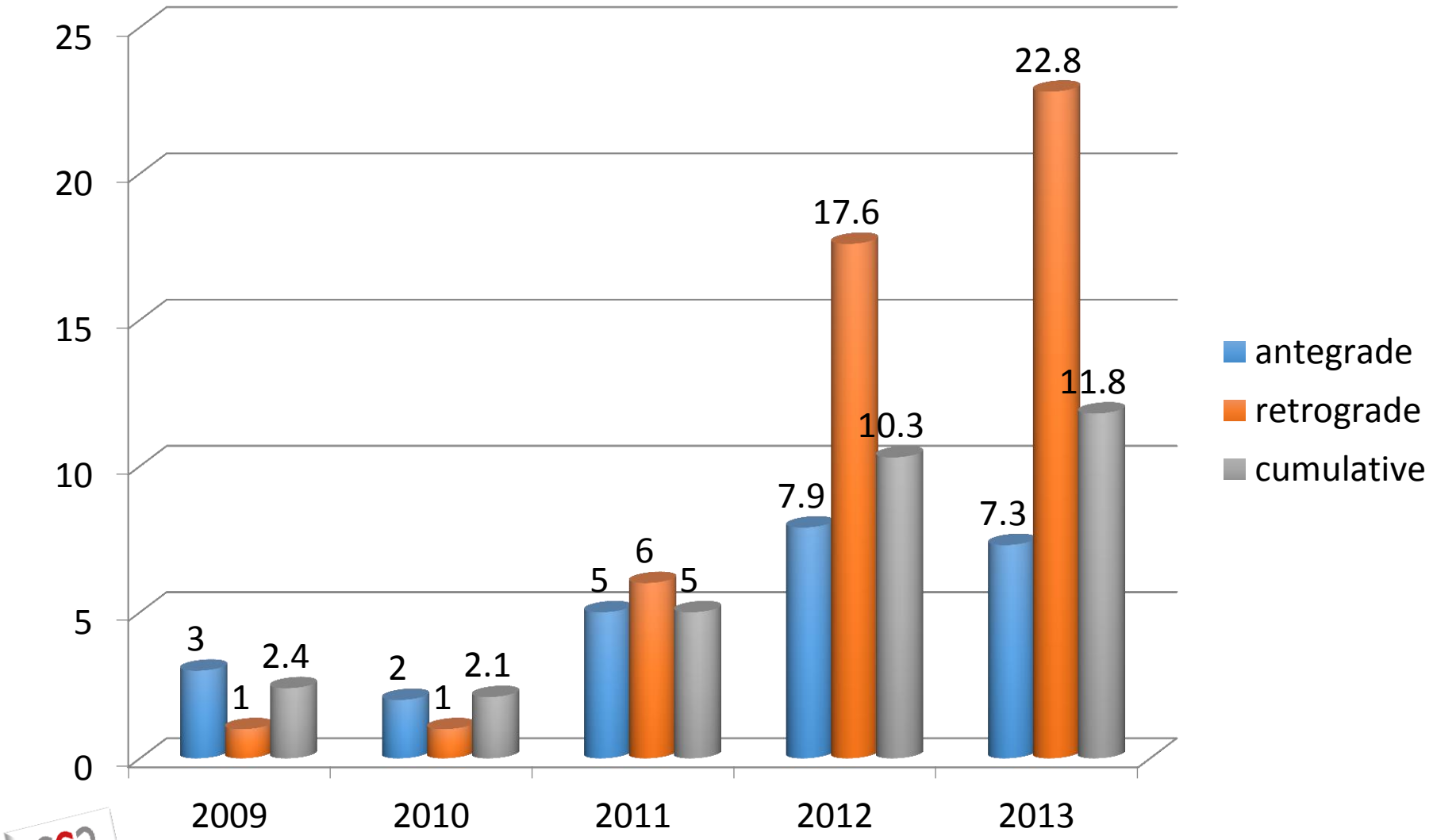
VH IVUS and plaque composition of CTO



Two mechanisms of CTO formation
evolving from ACS and thrombosis (majority)
atherosclerosis progression (minority)

A Virtual Histology IVUS Analysis of Coronary Chronic Total Occlusions
Guo et al Catheter Cardiovasc Interv. 2013 Feb;81(3):464-70

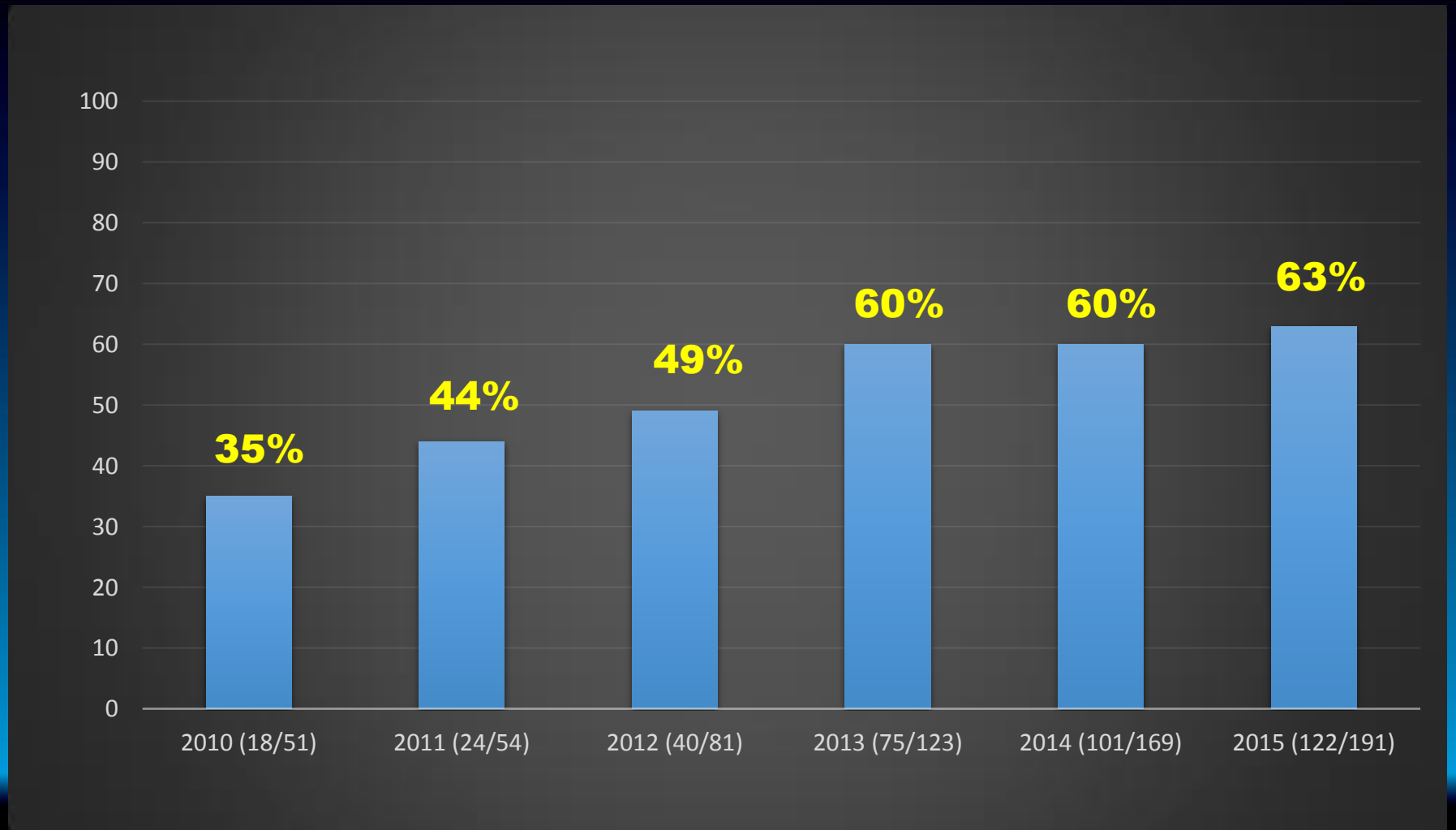
Frequency of IVUS guidancy
EURO CTO Registry



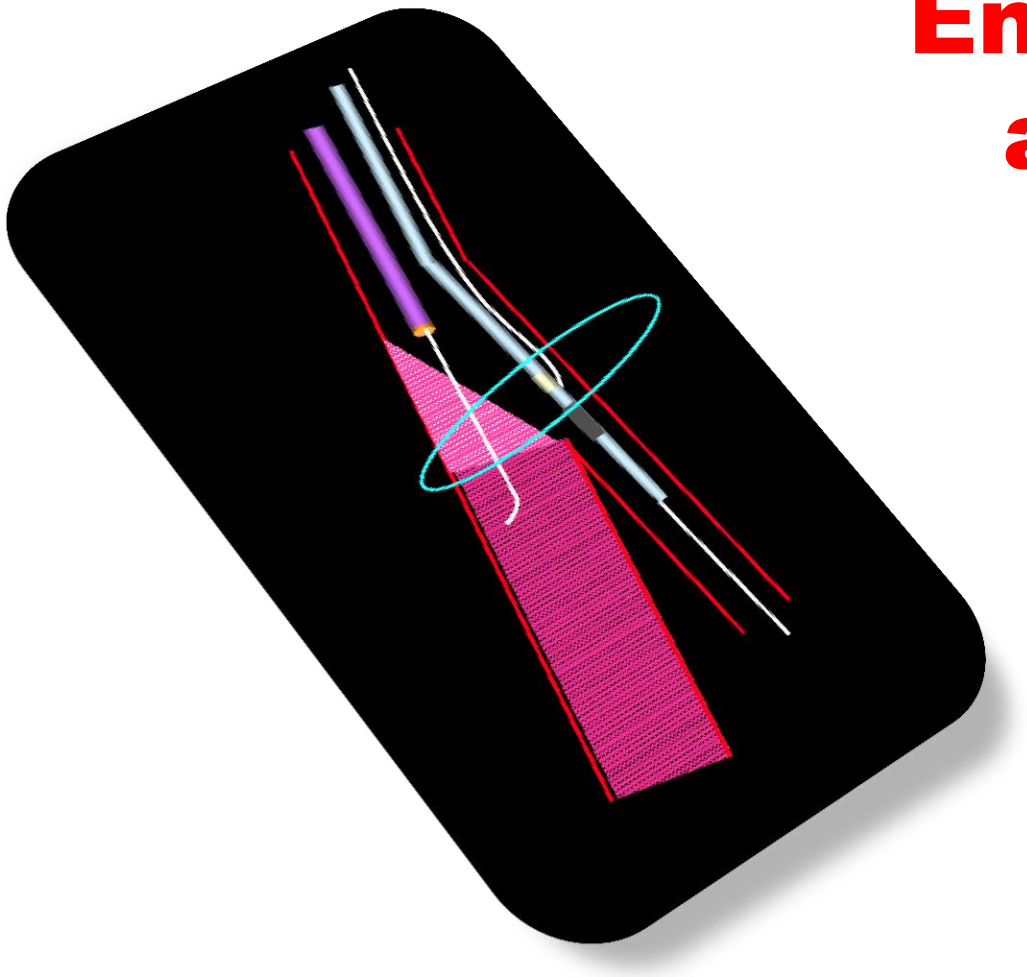
EURO CTO CLUB

IVUS-GUIDED CTO-PCI

(MY EXPERIENCE 2010 - 2015)

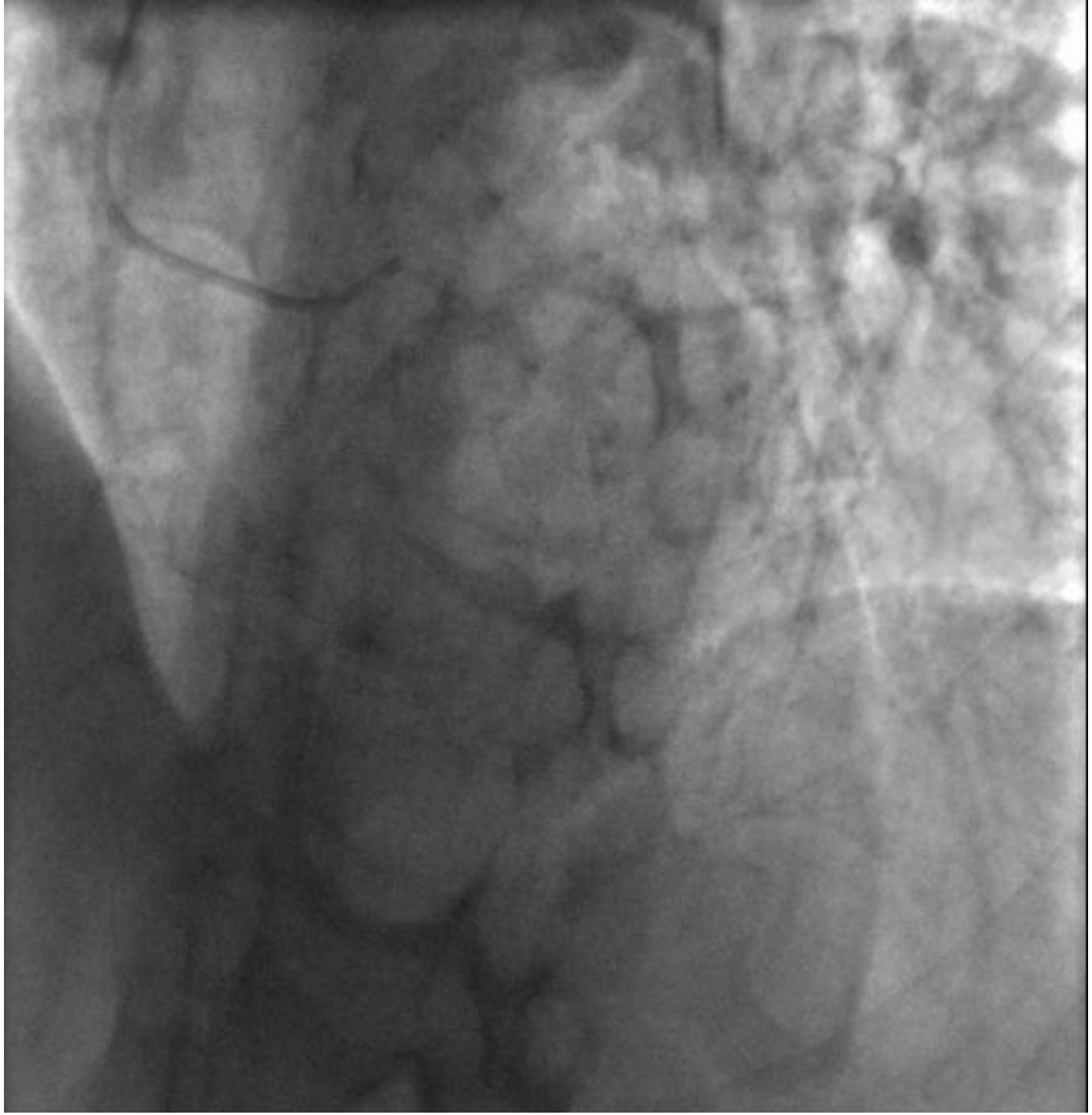


IVUS in Antegrade 1

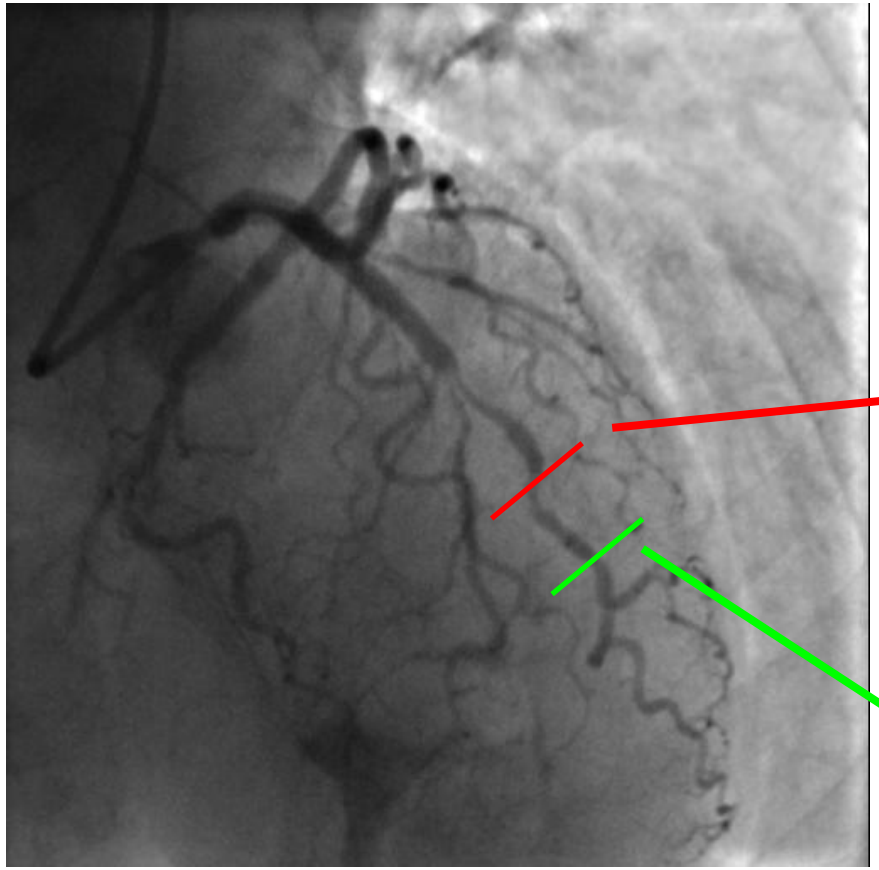


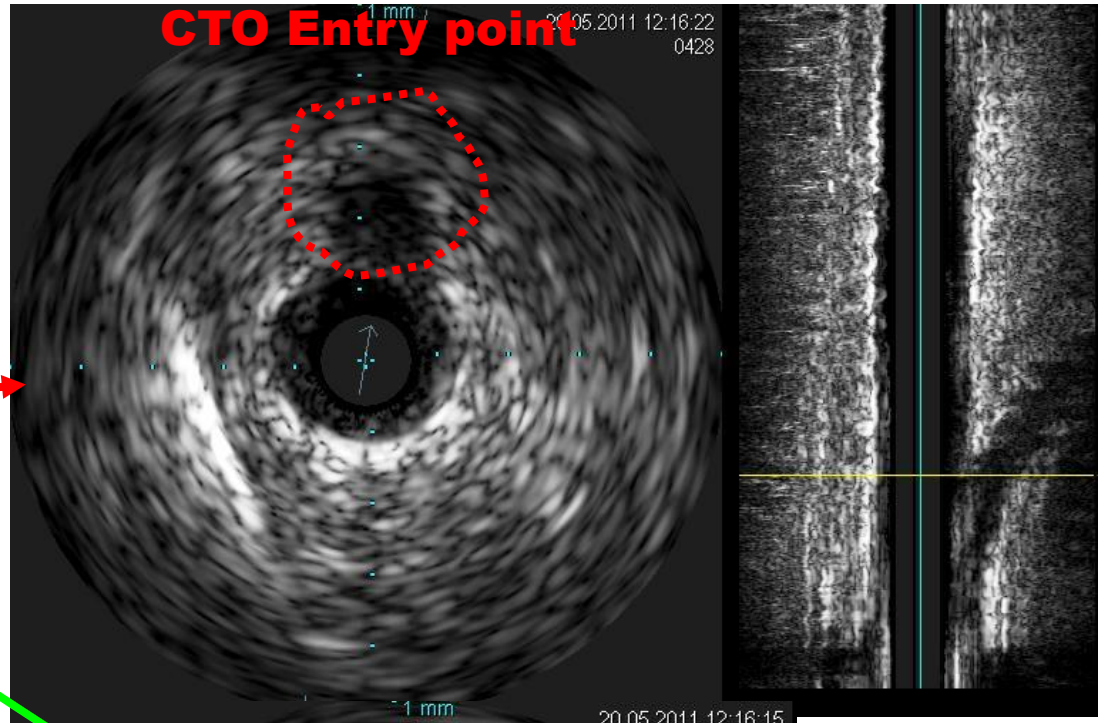
Entry point identification and IVUS-guided CTO penetration

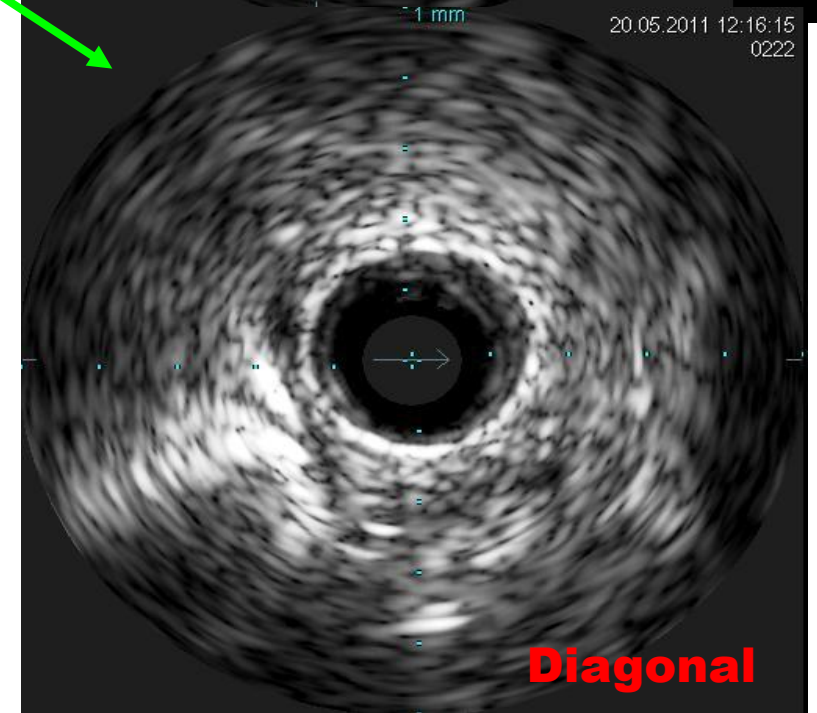
CTO with blunt stump
Side branch location



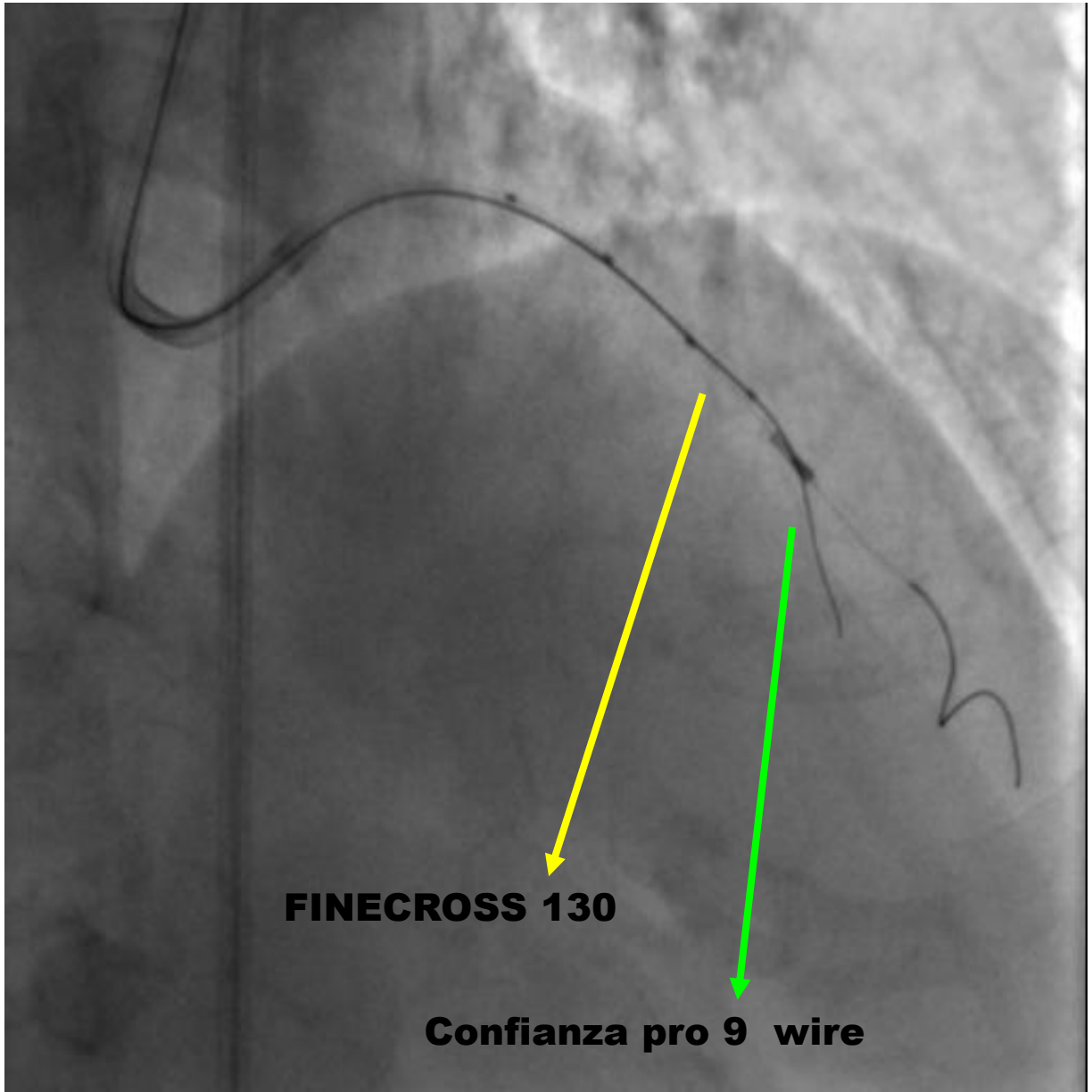
60y female, mid-LAD CTO without retrogade collaterals




1 mm
20.05.2011 12:16:22
0428
CTO Entry point

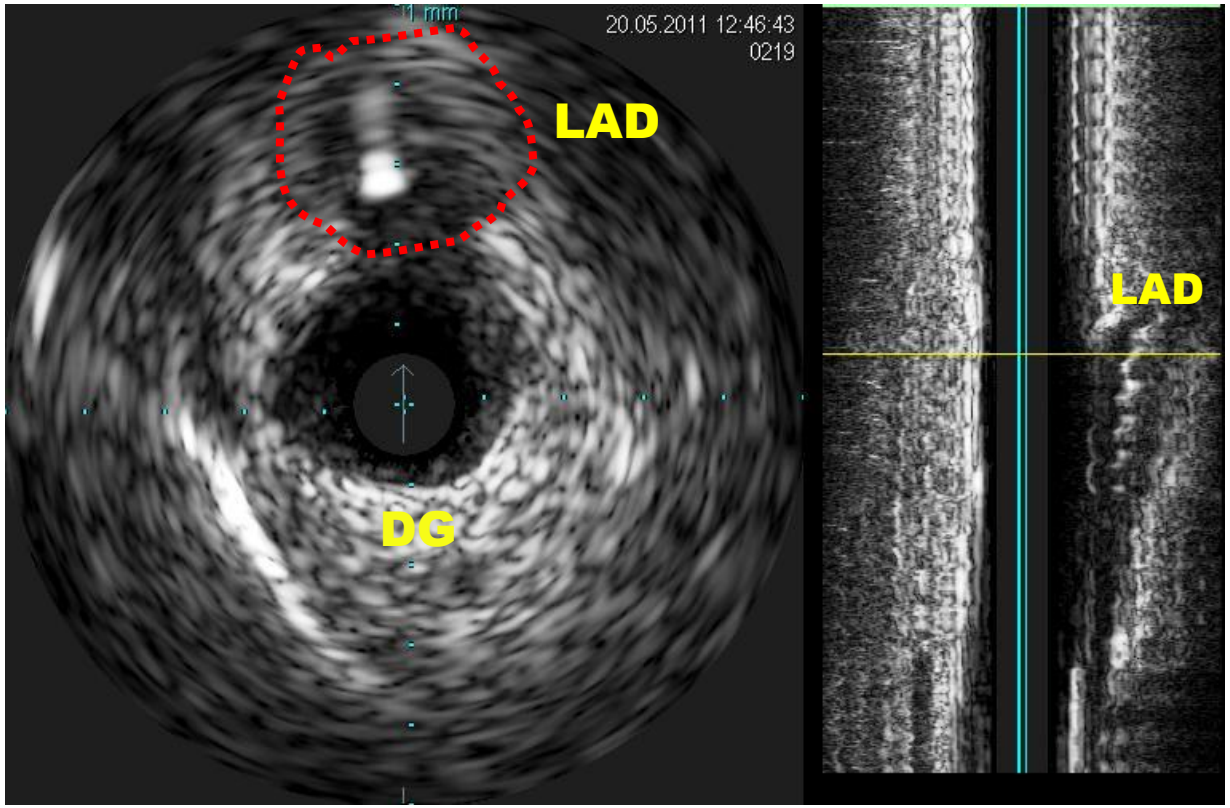

1 mm
20.05.2011 12:16:15
0222
Diagonal

IVUS-guided antegrade recanalization

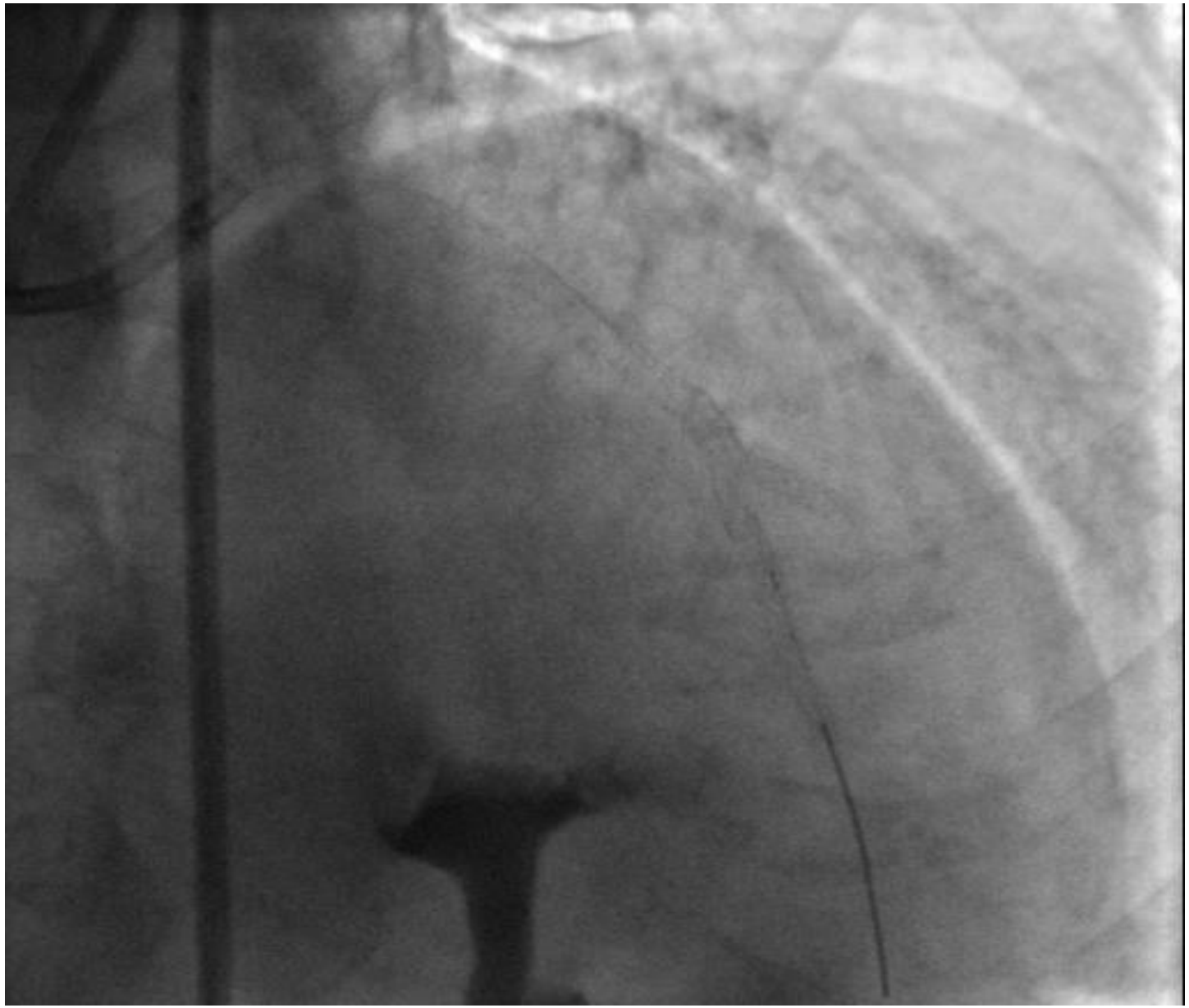


7F: FINECROSS + IVUS

Conquest pro 9 located in the center of proximal cap



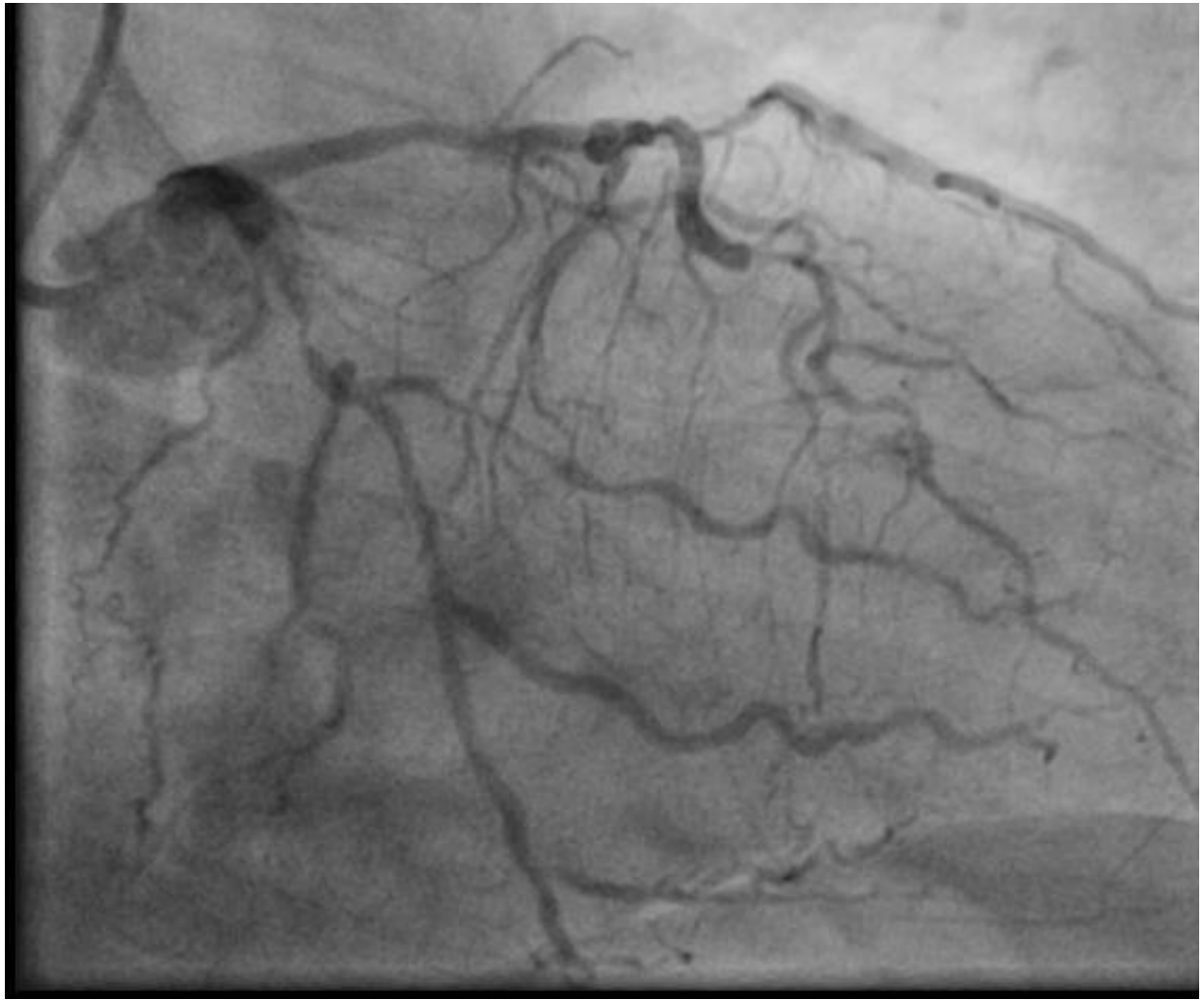
FINAL RESULT



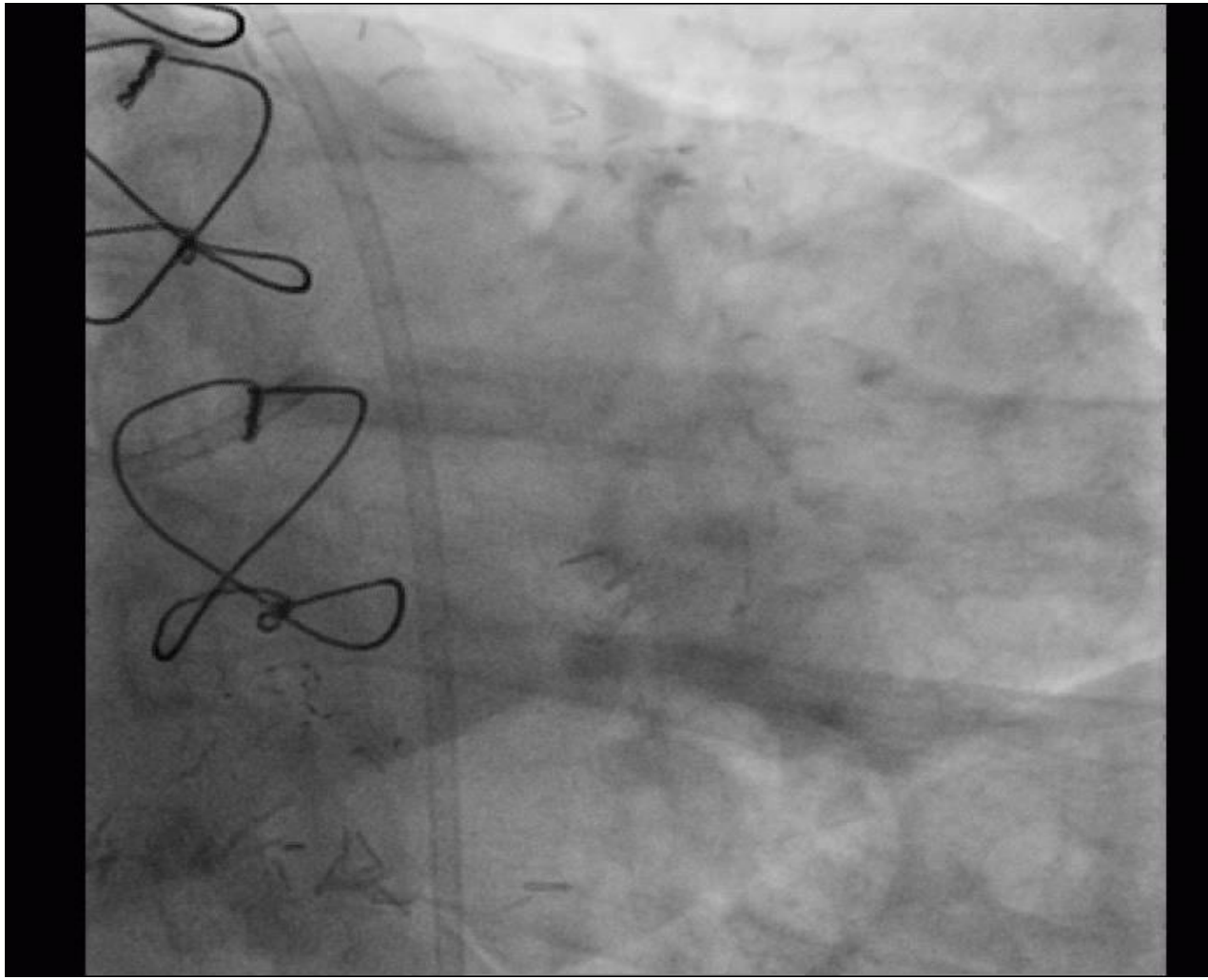
47y man, 2014 CABG: RIMA-LAD, LIMA-Dg-OM2, GEA-PDA. Severe effort angina CCS III, lateral ischemia +++ Angio: RIMA and GEA patent, LIMA with occlusion after Diagonal branch. Scheduled for CTO-PCI ostial LCX

10th february 2016

Basal Angio pre-CABG 2014

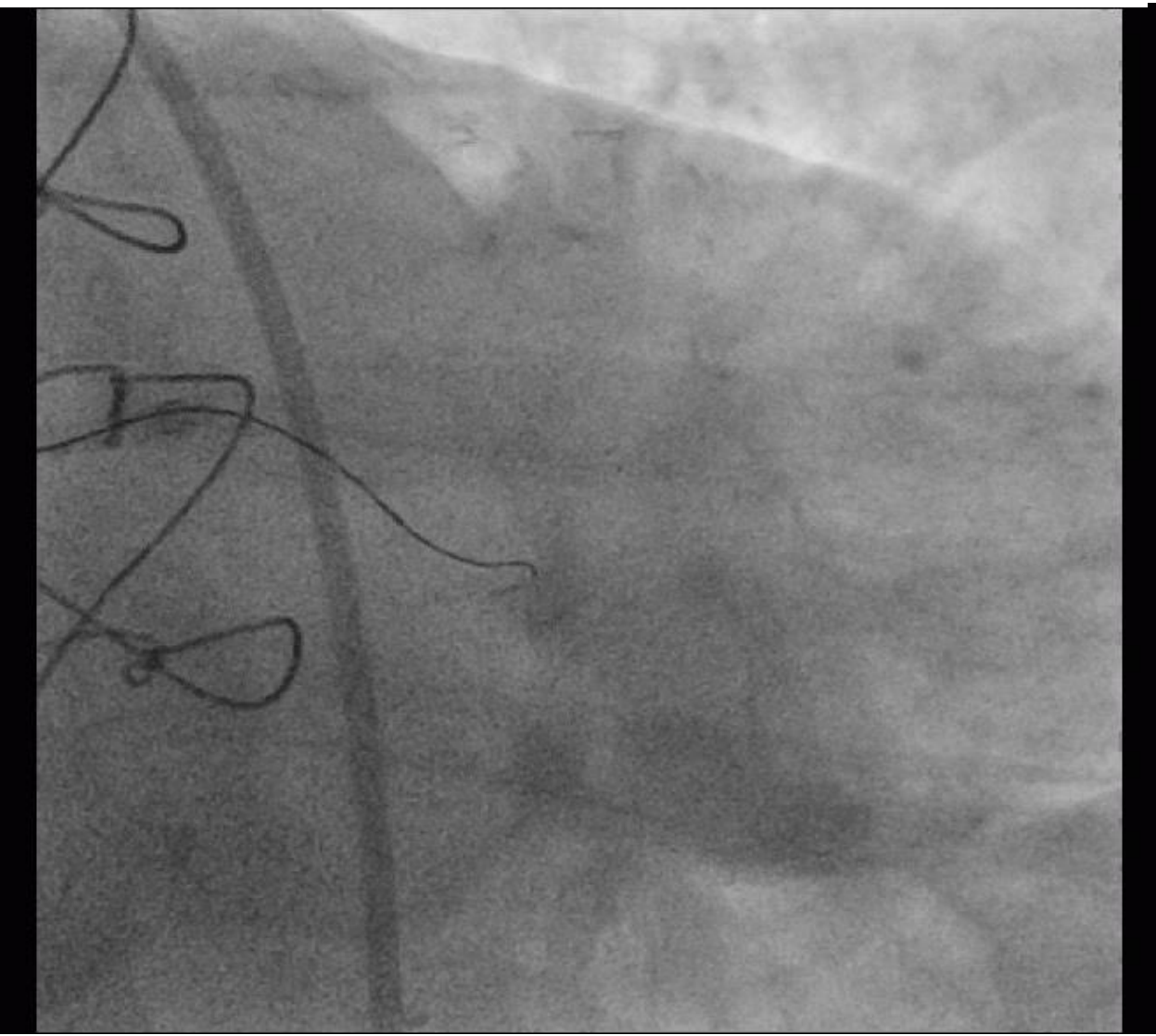


Basal Angio pre-CTO 10.2.2016

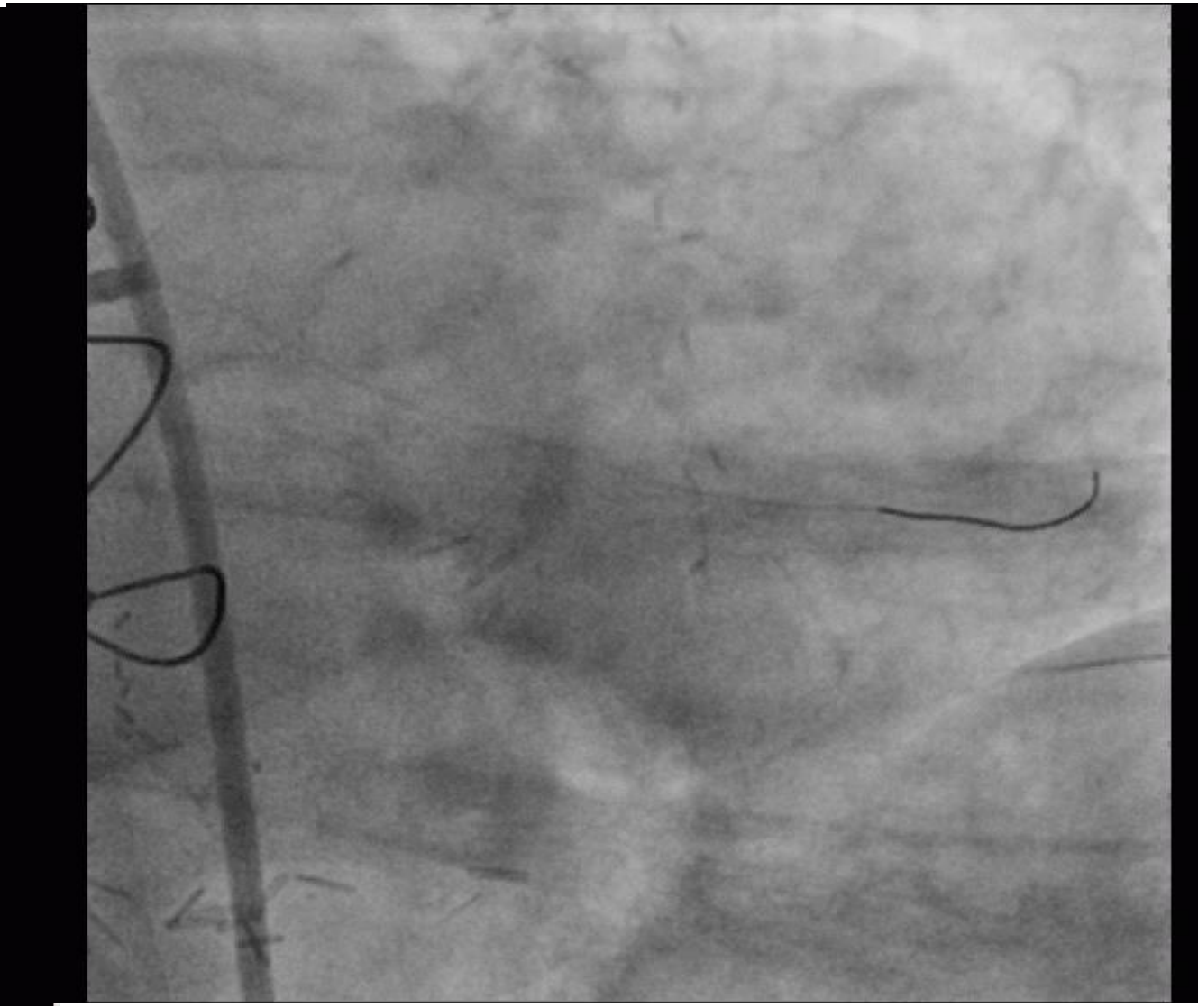


47y man, 2014 CABG: RIMA-LAD, LIMA-Dg-OM2, GEA-PDA. Severe effort angina CCS III, lateral ischemia +++ Angio: RIMA and GEA patent, LIMA with occlusion after Diagonal branch. Scheduled for CTO-PCI ostial LCX 10th february 2016

Knuckle First Obtuse Marginal

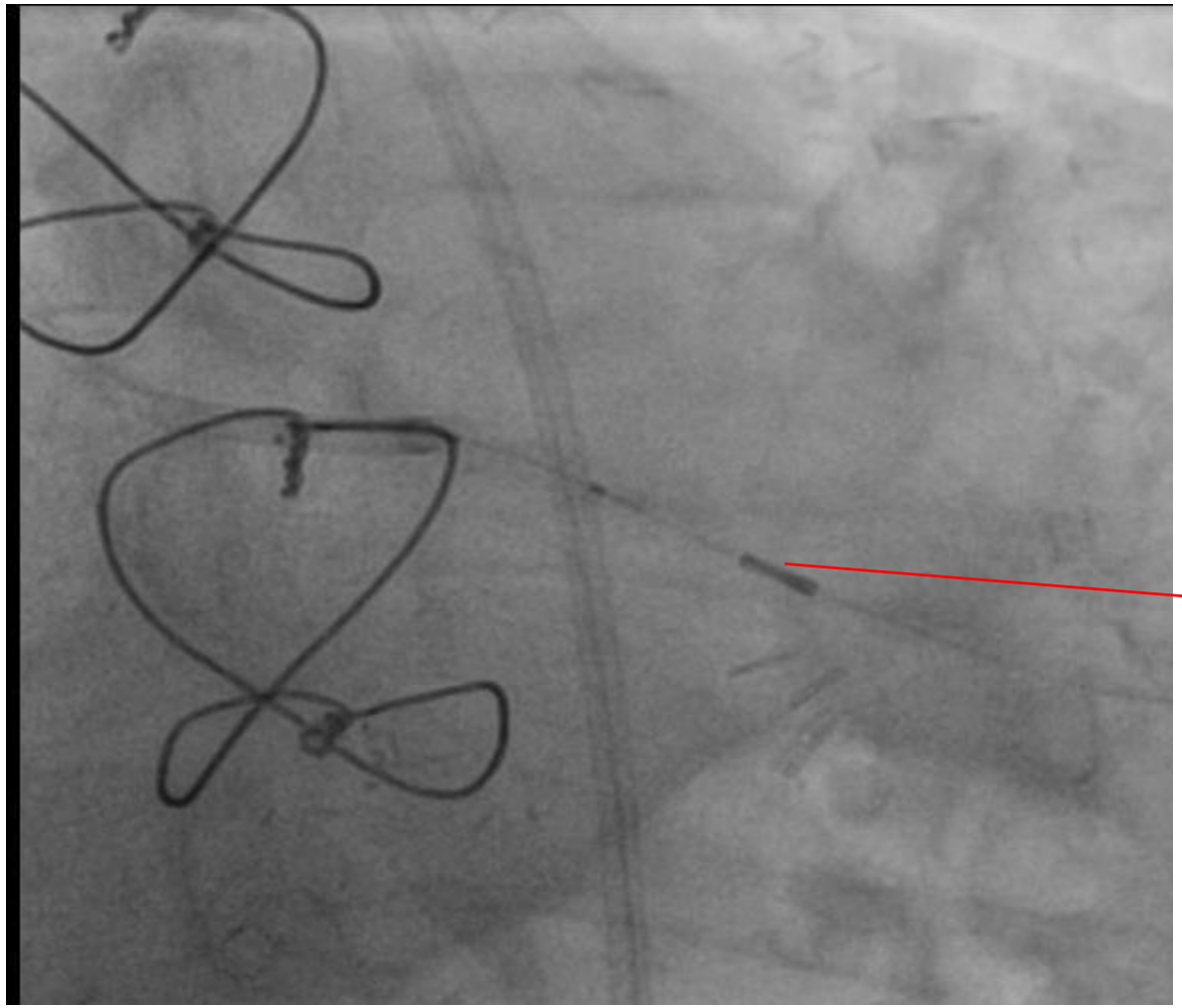


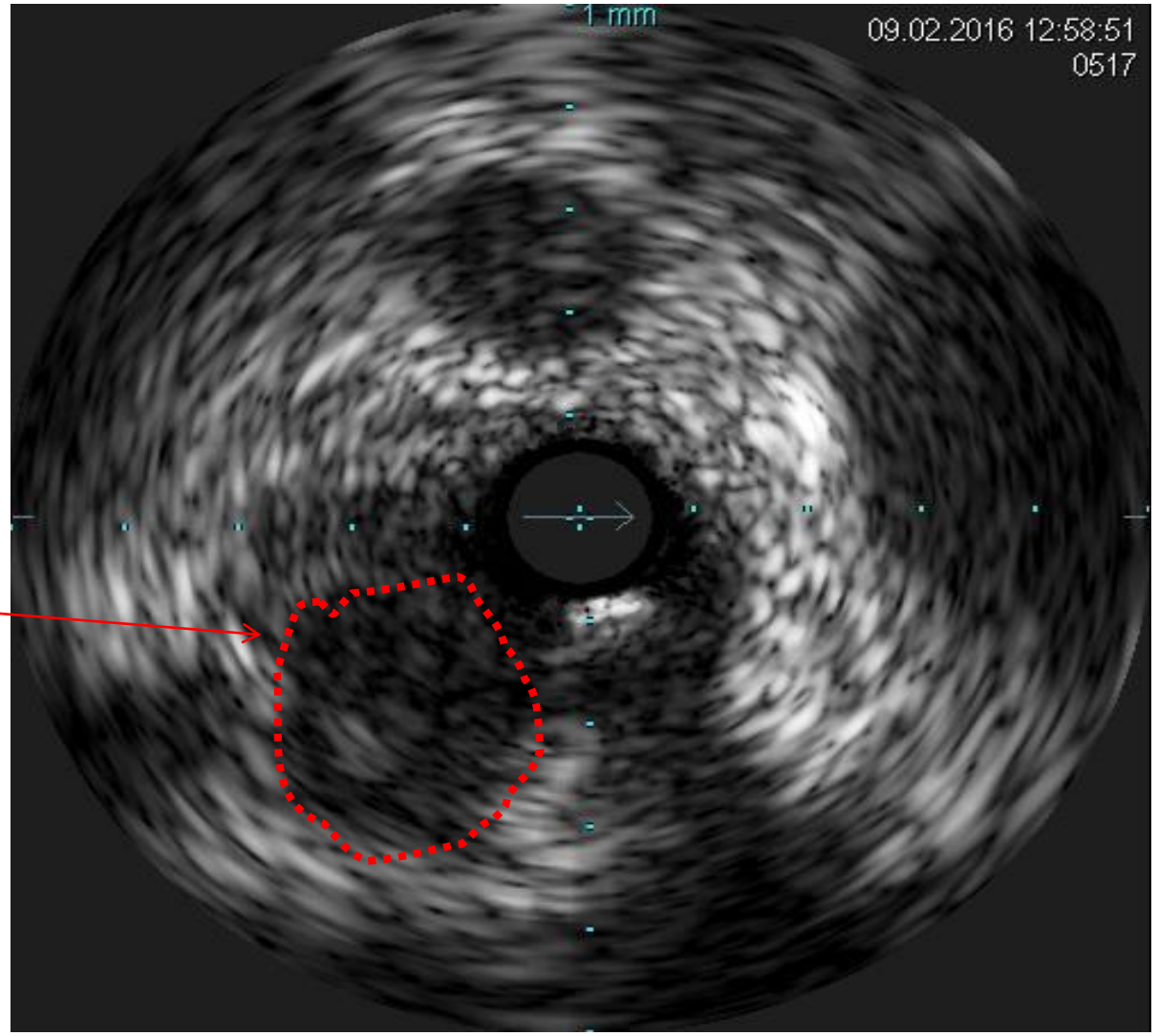
Angio post



47y man, 2014 CABG: RIMA-LAD, LIMA-Dg-OM2, GEA-PDA. Severe effort angina CCS III, lateral ischemia +++ Angio: RIMA and GEA patent, LIMA with occlusion after Diagonal branch. Scheduled for CTO-PCI ostial LCX 10th february 2016

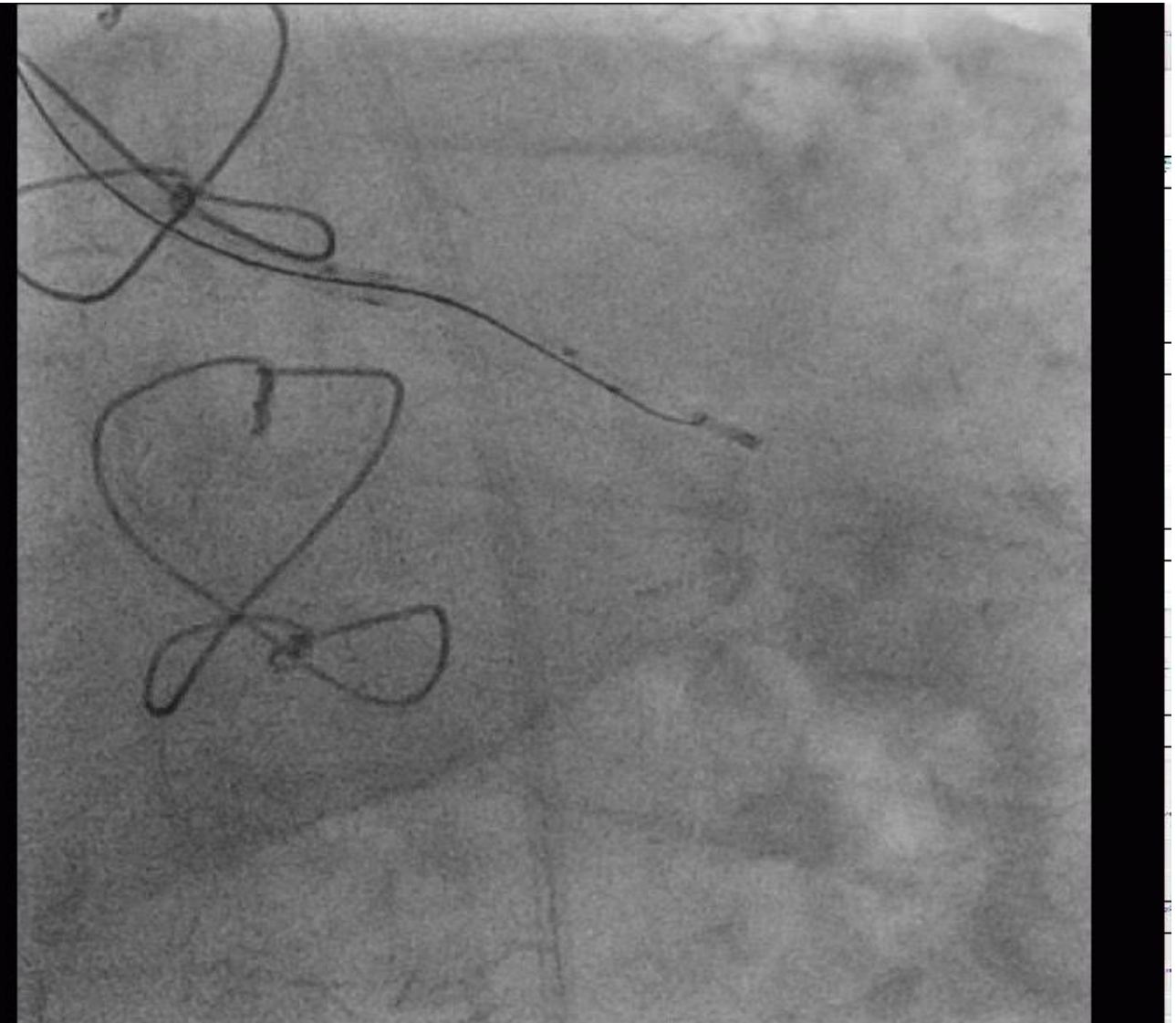
IVUS for Entry point in mid- Circumflex

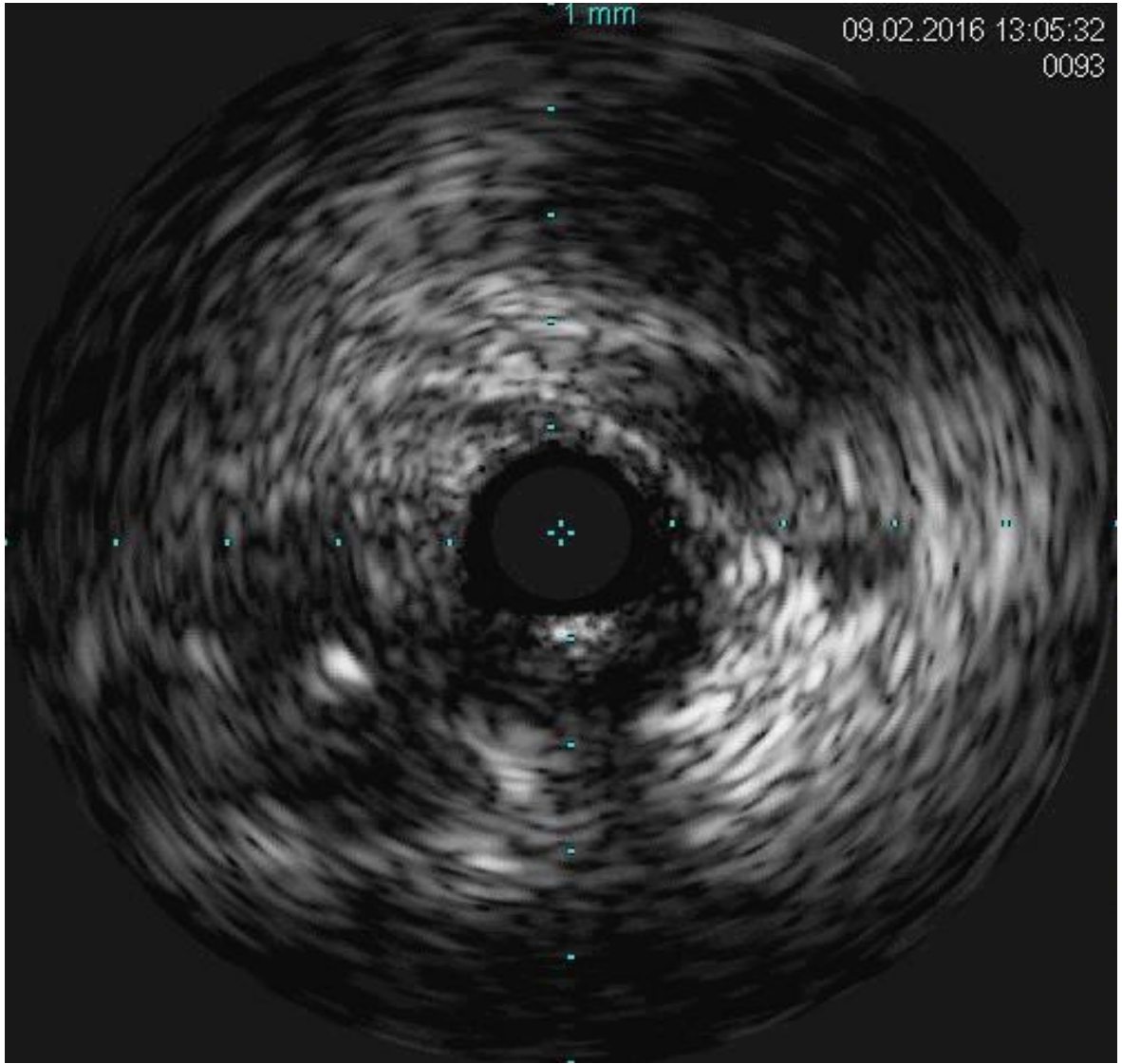




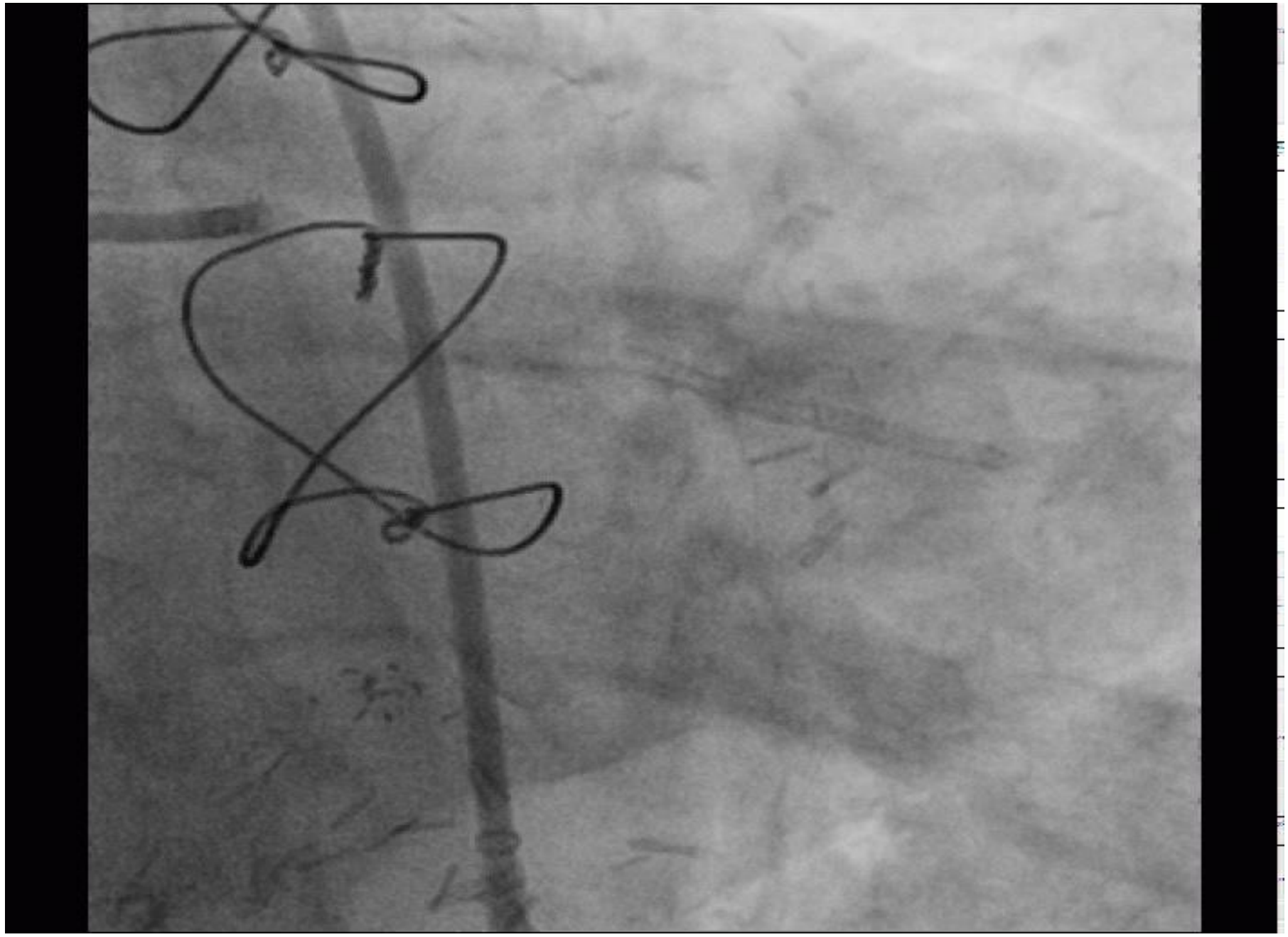
47y man, 2014 CABG: RIMA-LAD, LIMA-Dg-OM2, GEA-PDA. Severe effort angina CCS III, lateral ischemia +++ Angio: RIMA and GEA patent, LIMA with occlusion after Diagonal branch. Scheduled for CTO-PCI ostial LCX 10th february 2016

IVUS guided Gaia 2 penetration in mid- Circumflex

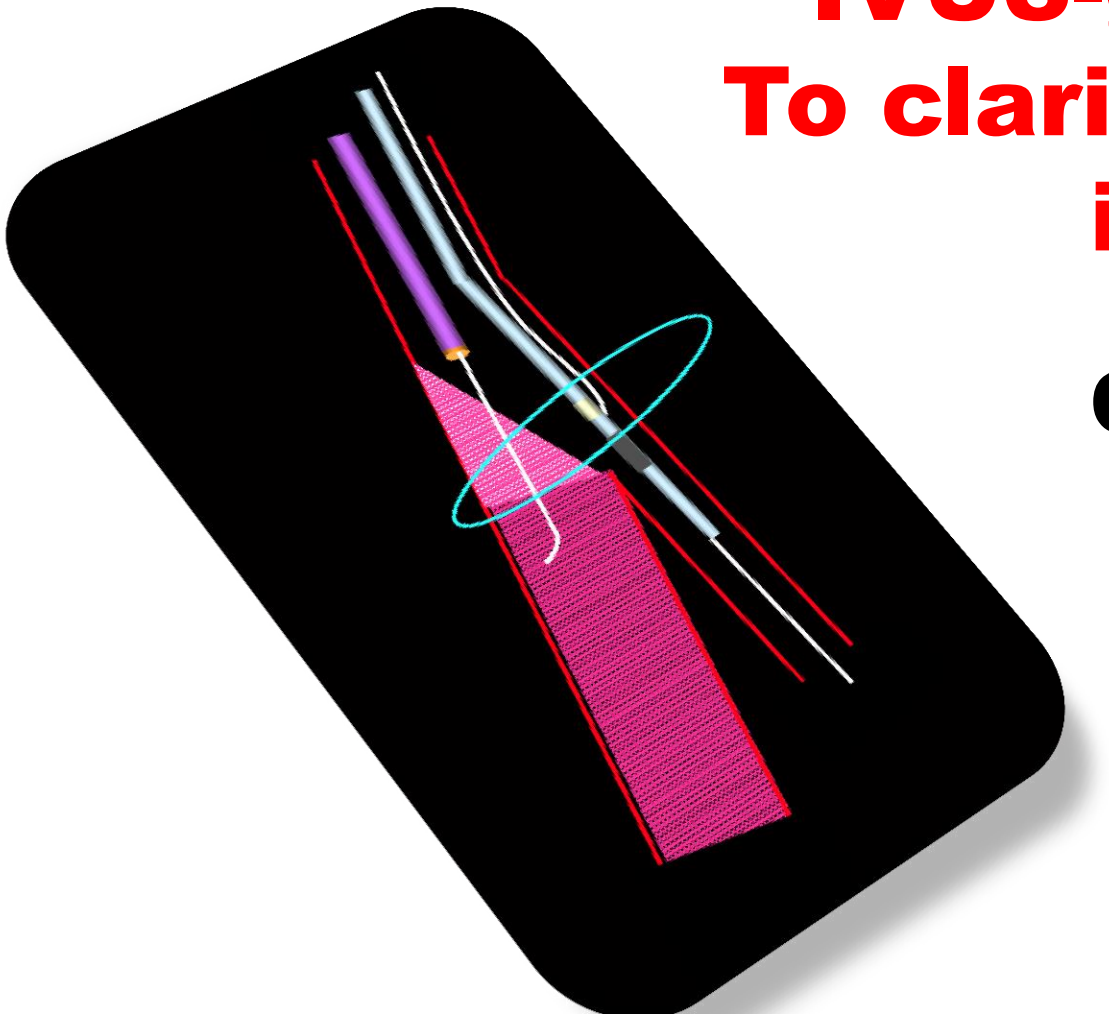




FINAL RESULT

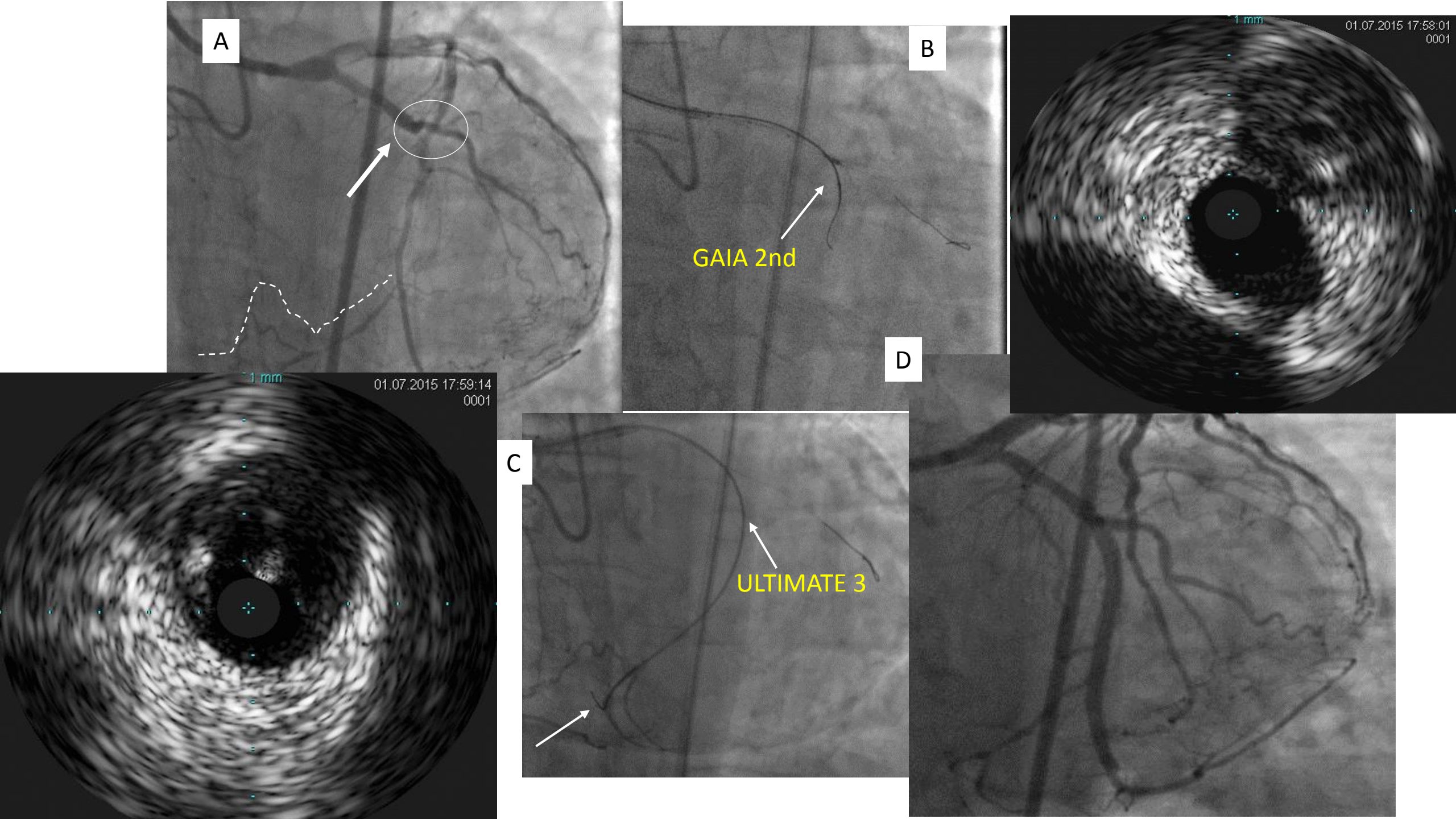


IVUS in Antegrade 1



IVUS-guided CTO penetration:
To clarify the position of the wire in the proximal cap

CTO with blunt stump
Side branch location


A
B
GAIA 2nd
1 mm
01.07.2015 17:58:01
0001
D
1 mm
01.07.2015 17:59:14
0001
C
ULTIMATE 3

IVUS in Antegrade 2

IVUS guided re-entry from subintimal space

ADR (antegrade dissection and re-entry) IVUS- guided after parallel wire failure and when NO retrograde option

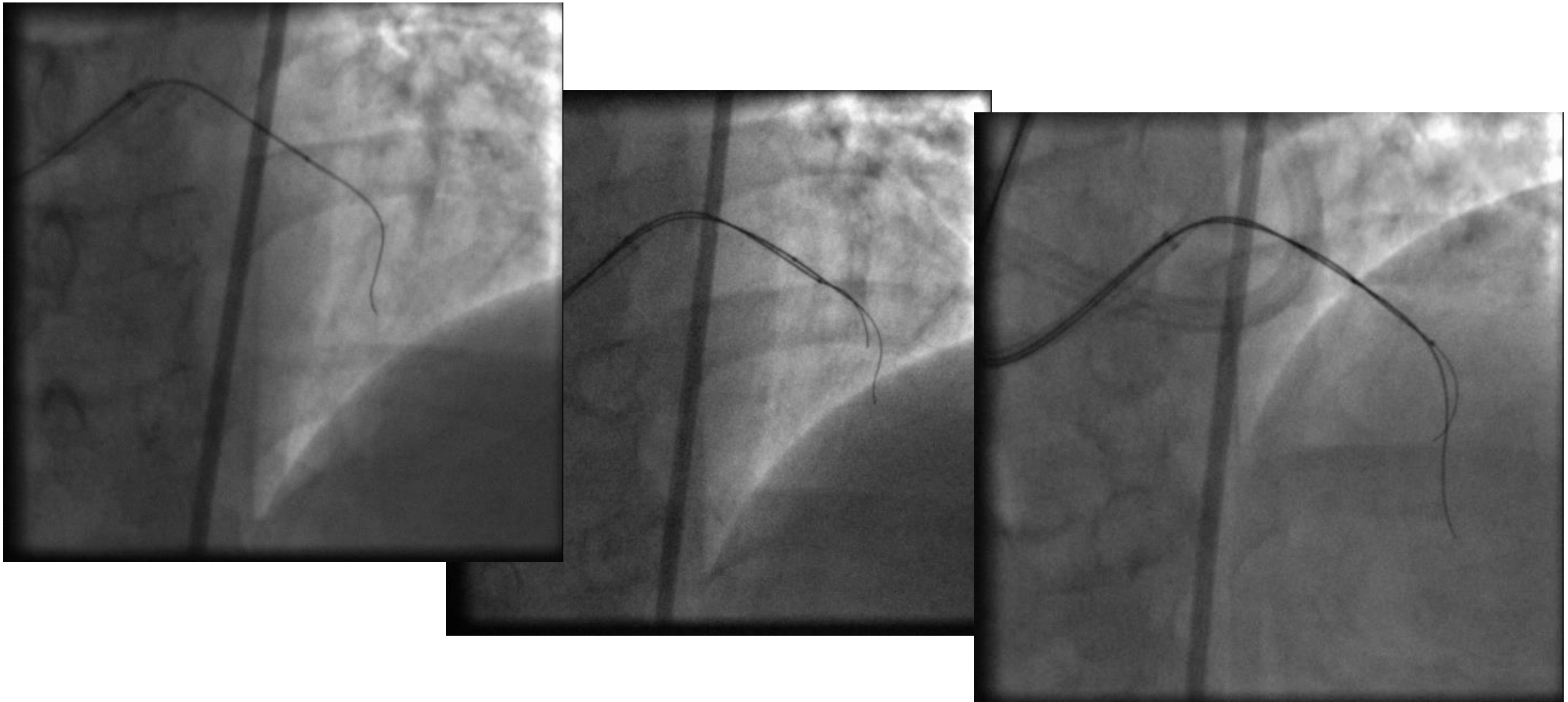
. Possible also after STAR with long subintimal segment

. Advance IVUS in false lumen and re-enter with stiffer wire (dilate false lumen)

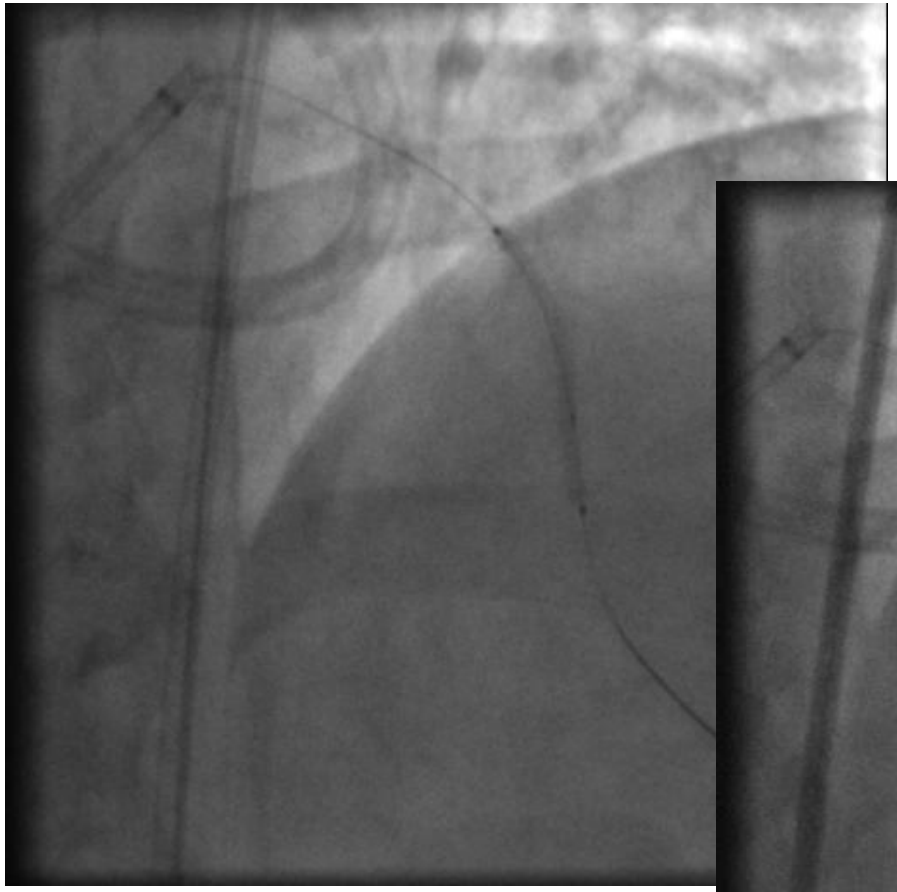
61y, female, mid-LAD CTO, no retrograde collaterals

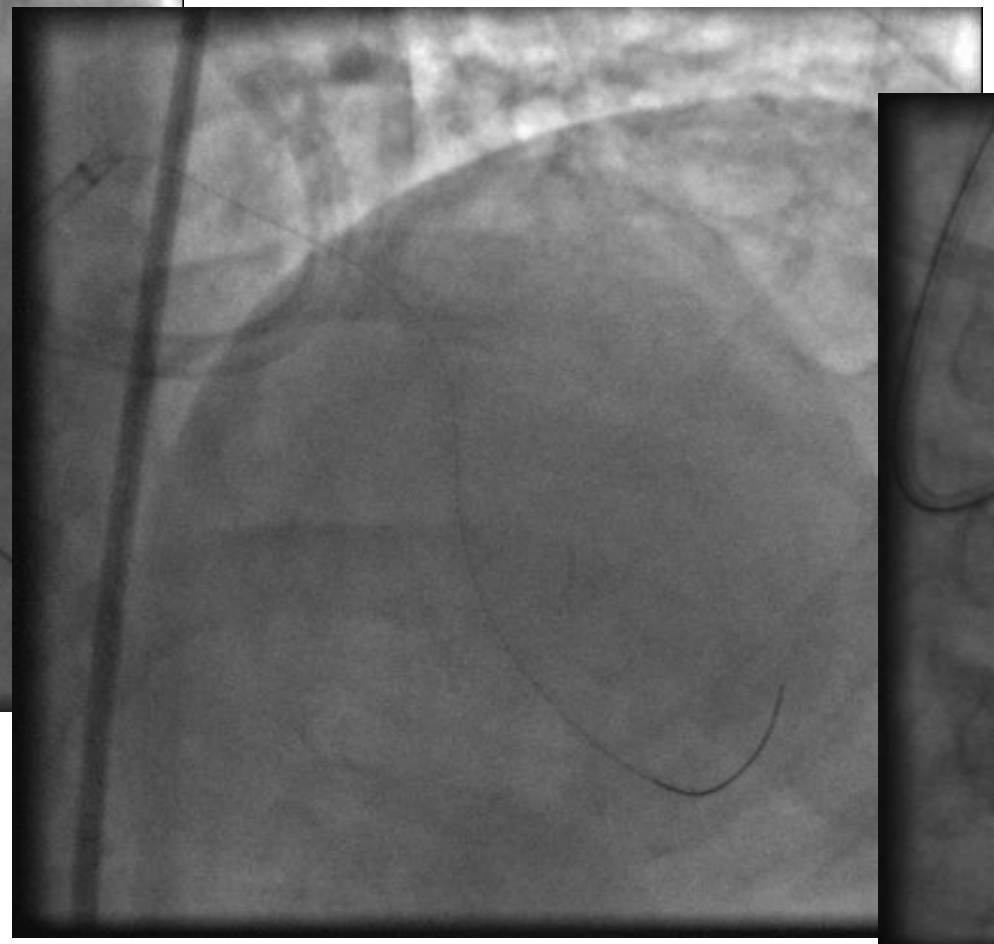
February 2010

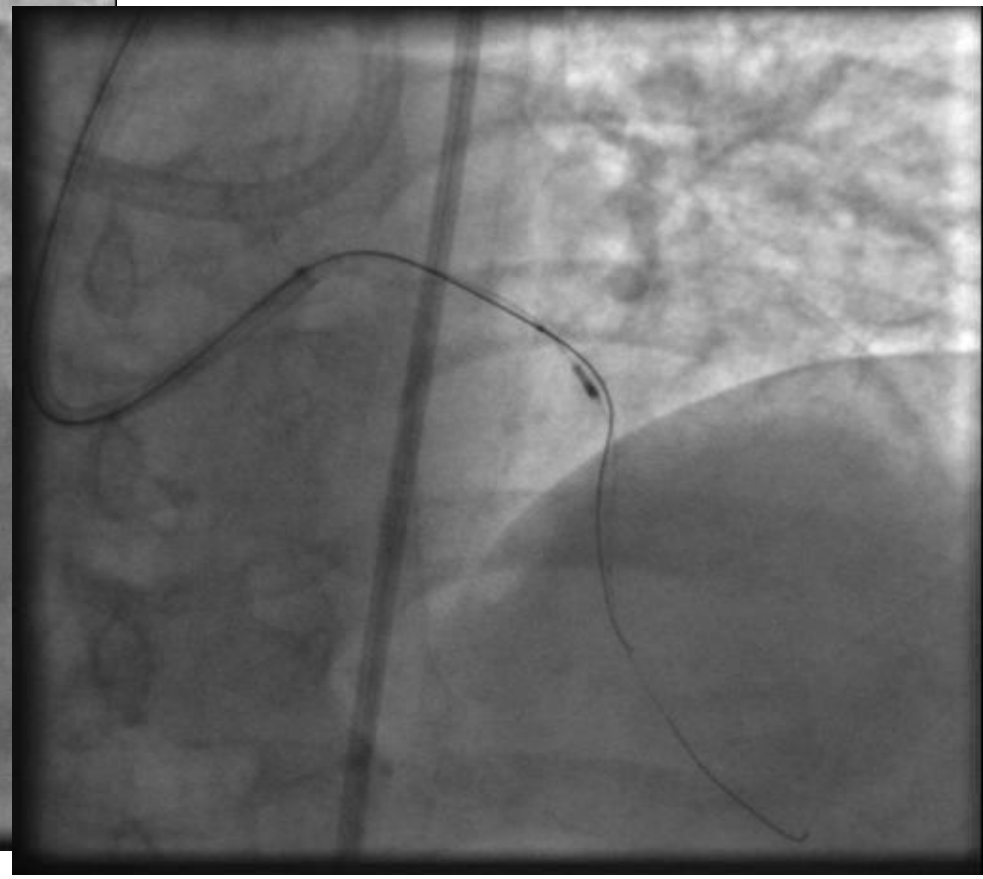
Unsuccessfull attempt to cross the CTO antegrade with parallel wires (Fielder XT, Miracle 3, Confianza pro).
The distal wire is in subintimal space.



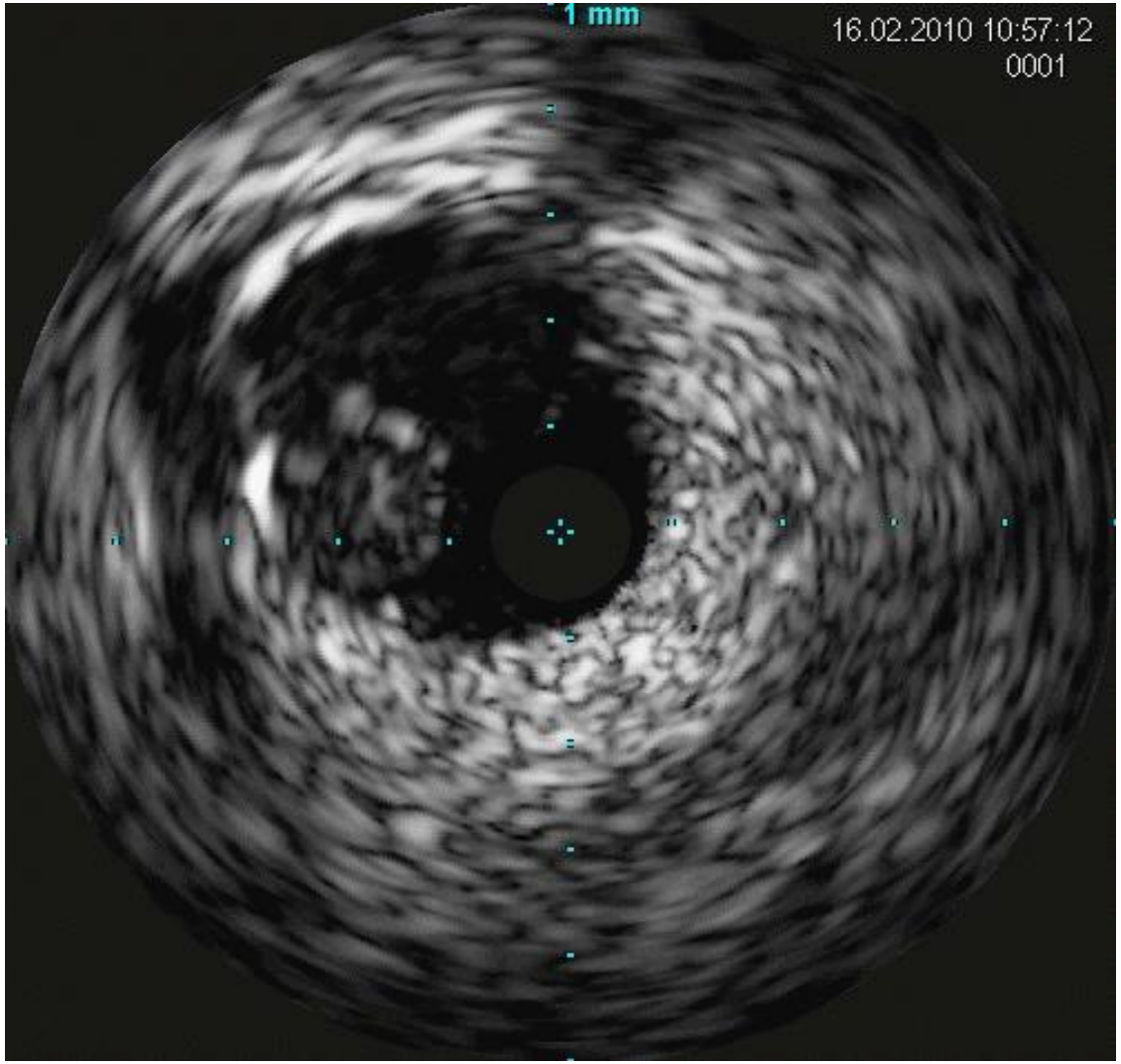
The last chance was to insert IVUS in subintimal space, After balloon dilatation (2.0/30), to guide parallel wire re-entry in true lumen

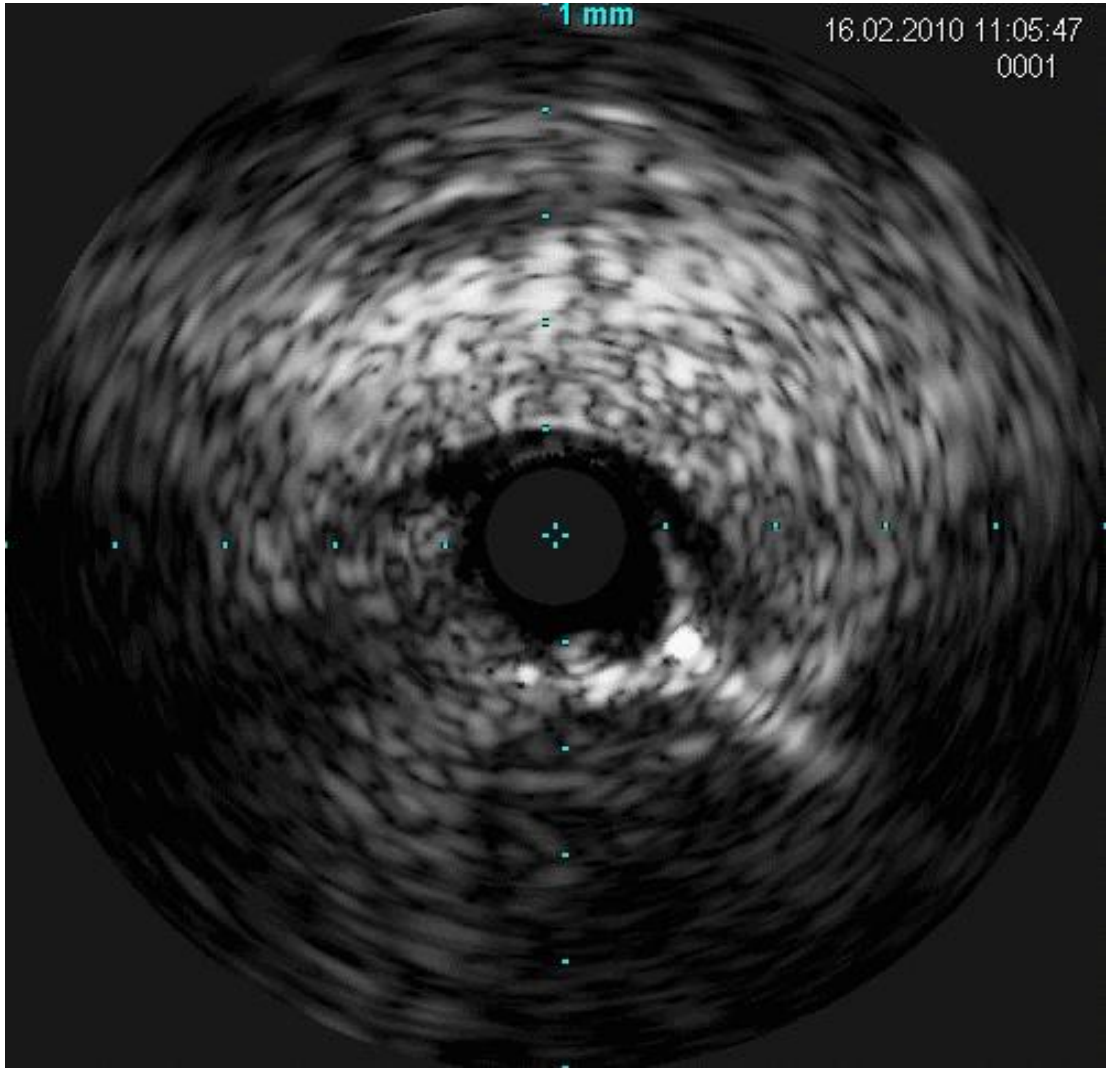




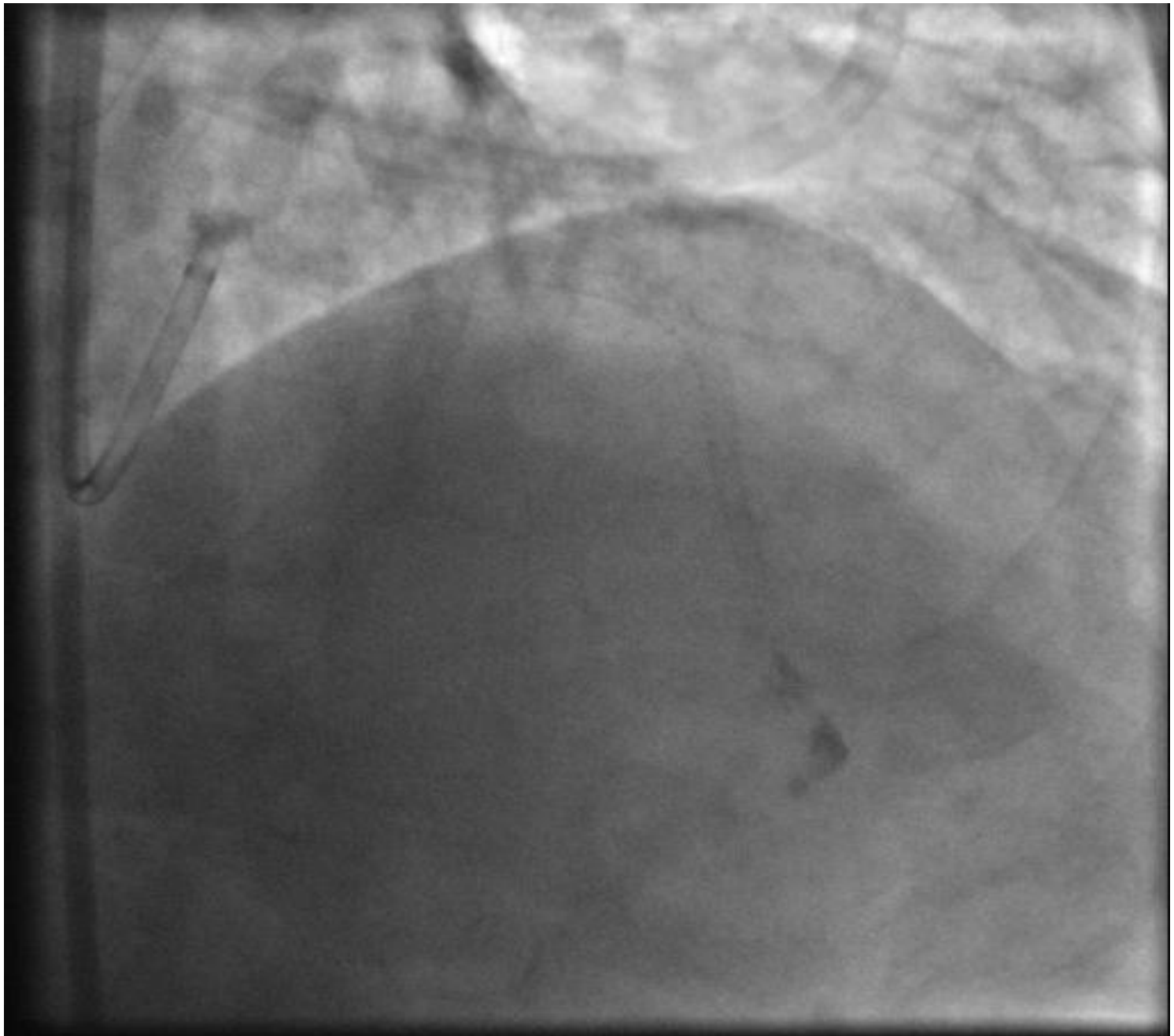


IVUS-guided re-entry from false to true lumen.
Confianza pro 12 gr (with Finecross)
was directed in true lumen only with IVUS guidance

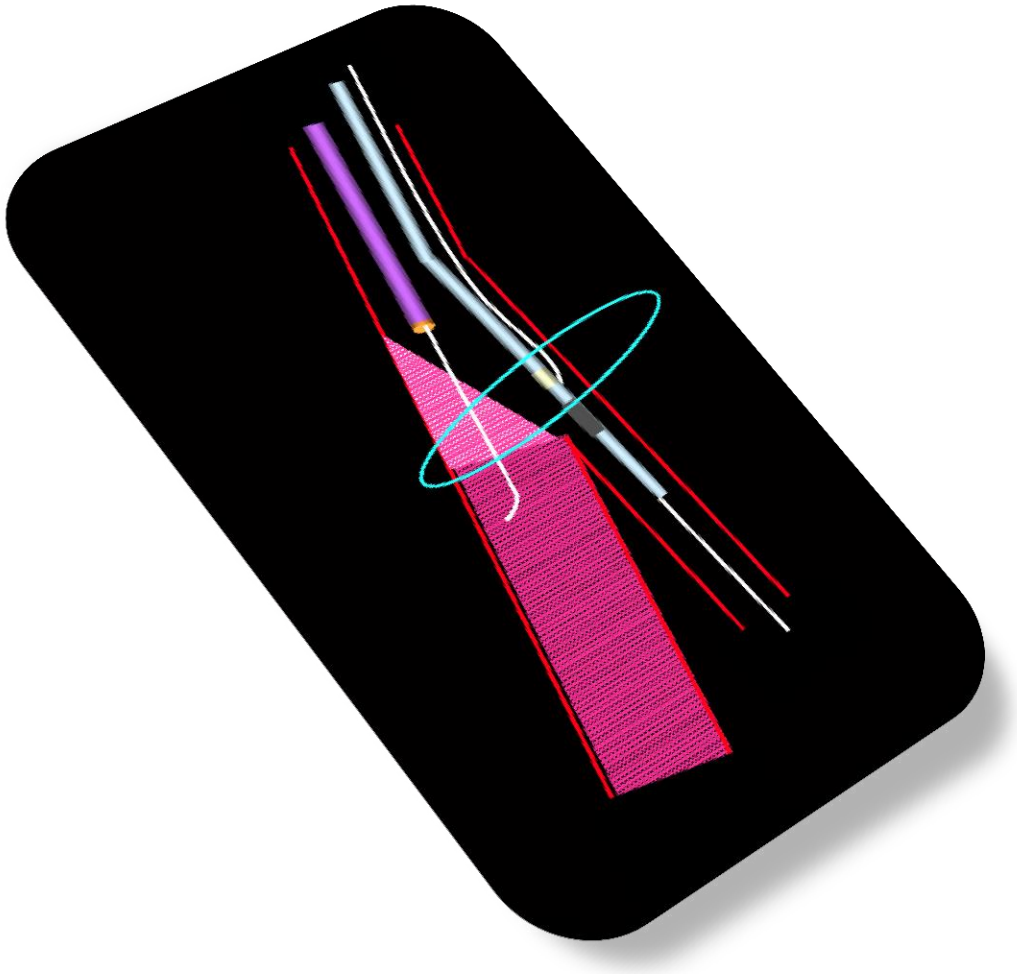




FINAL RESULT

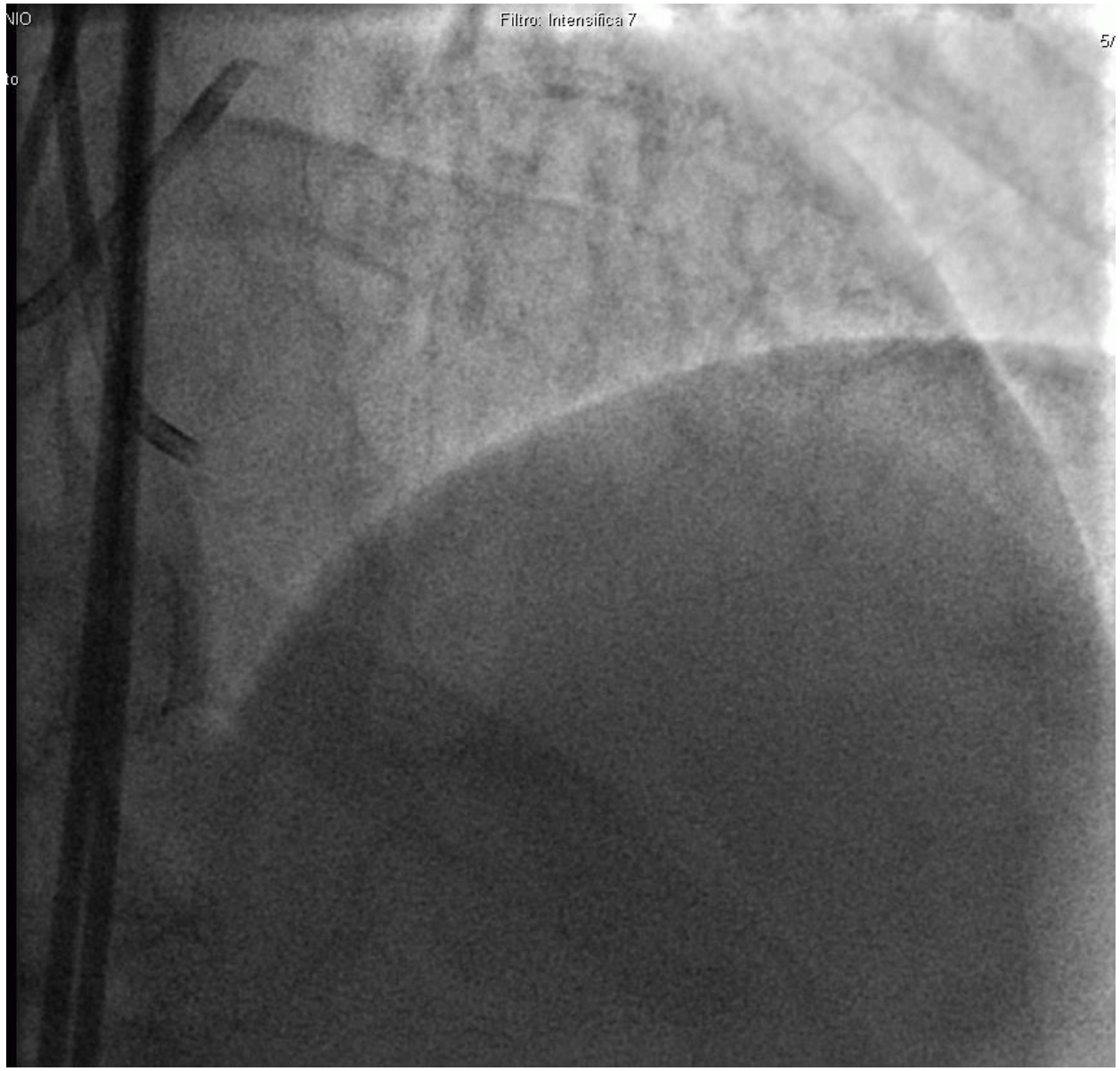


IVUS in Retrograde

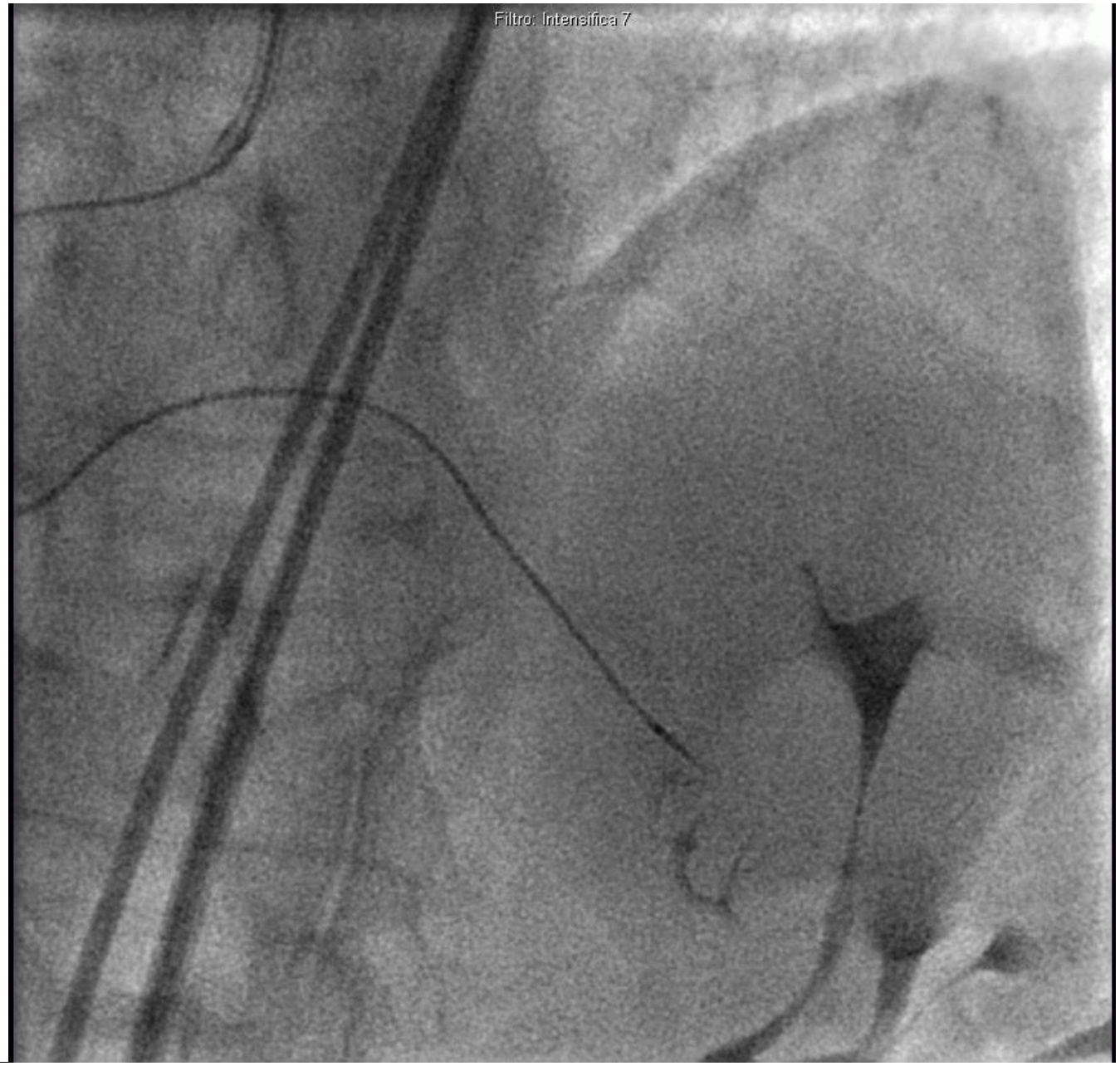


- Clarify wire position in Retrograde crossing (exp. Left Main or CTO in stented bifurcation)
- Select position and balloon size for XCART
- Reduces complications (you know where you are; NO need to inject antegrade, avoiding dissection)
- Save contrast
- Vessel diameter/ stent length

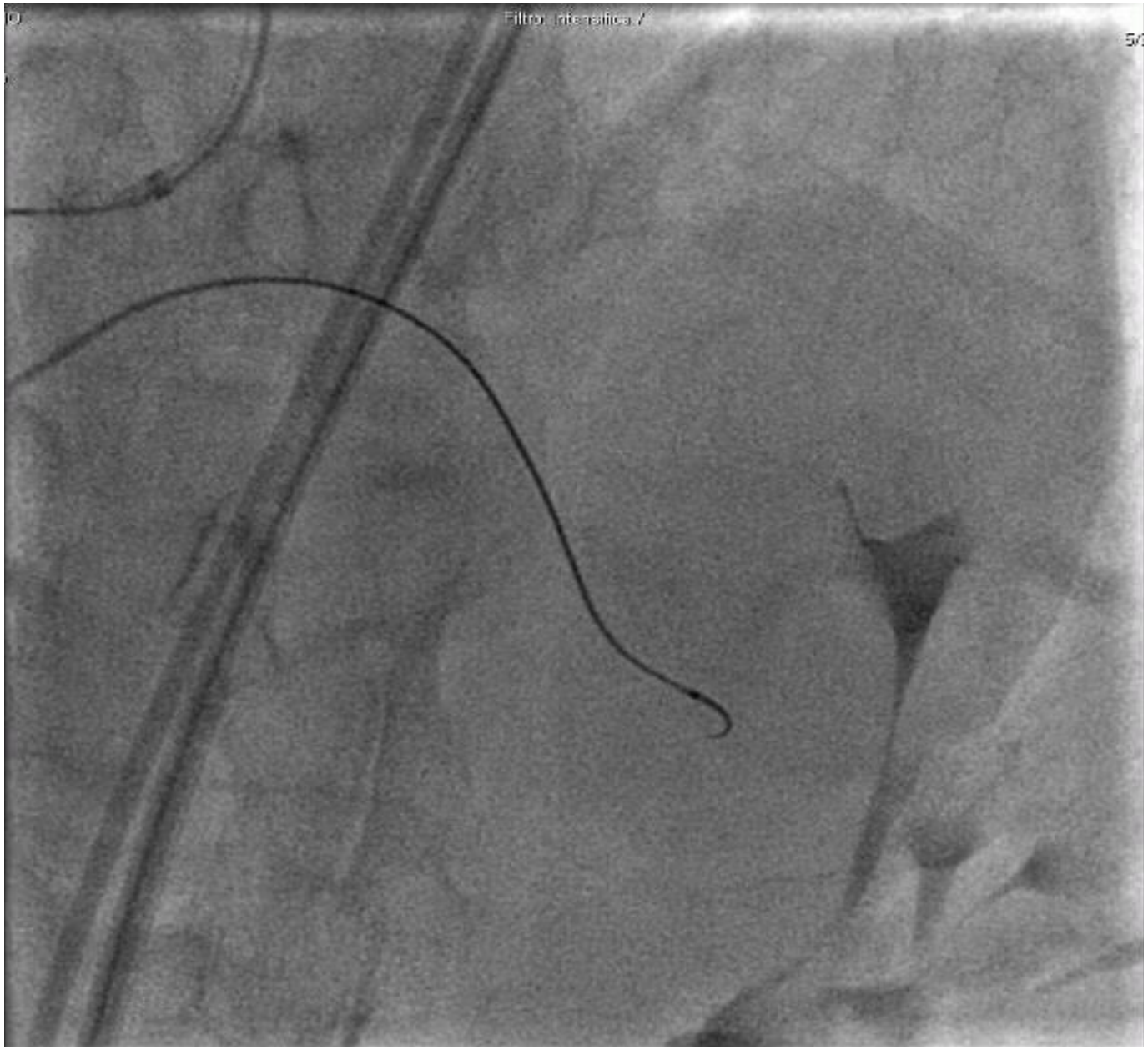
51y male, proximal LAD-CTO in bifurcation with Dg1 stented, anterior ischemia, RCA epicardial retrograde collaterals



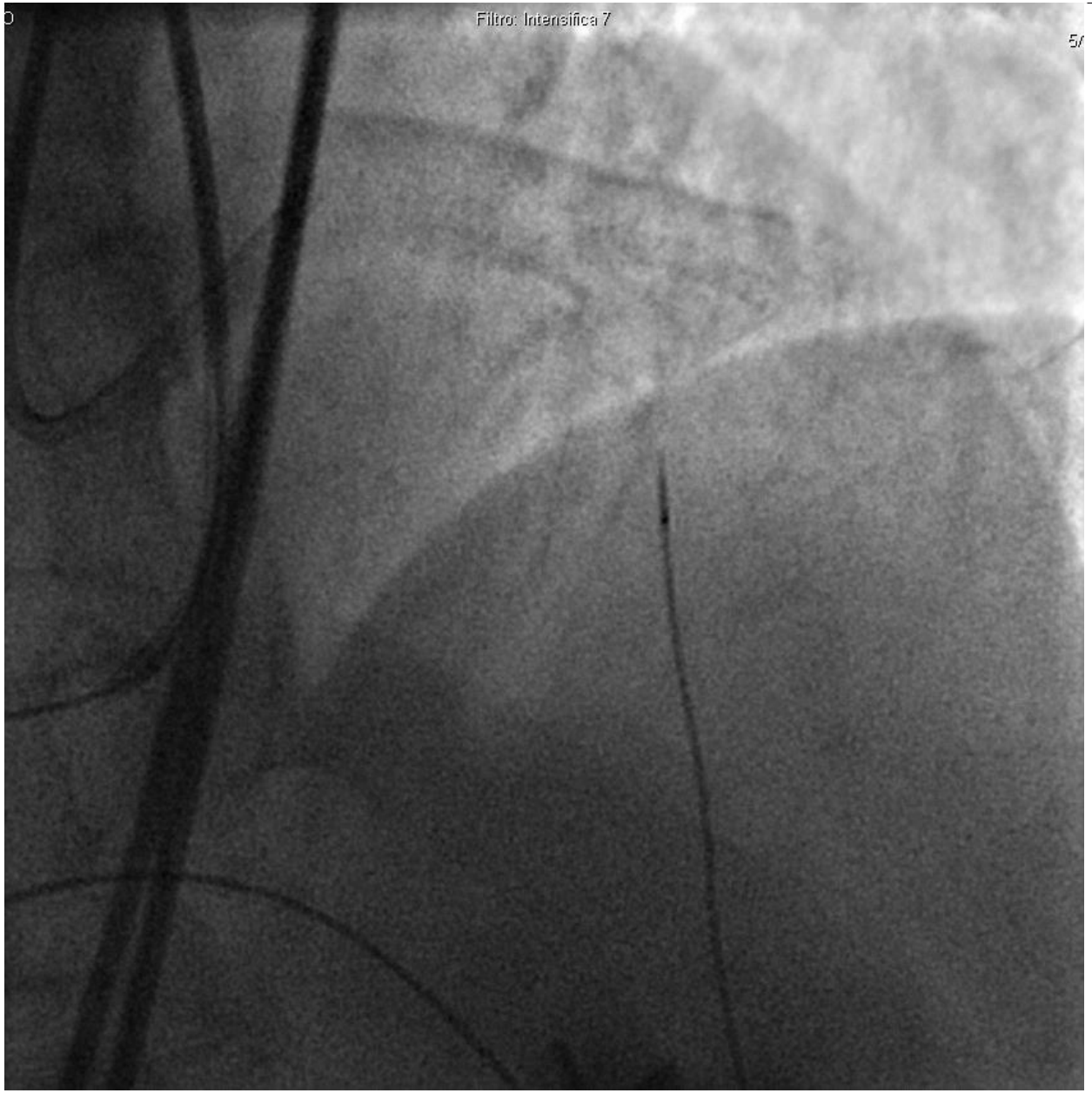
Corsair tip injection



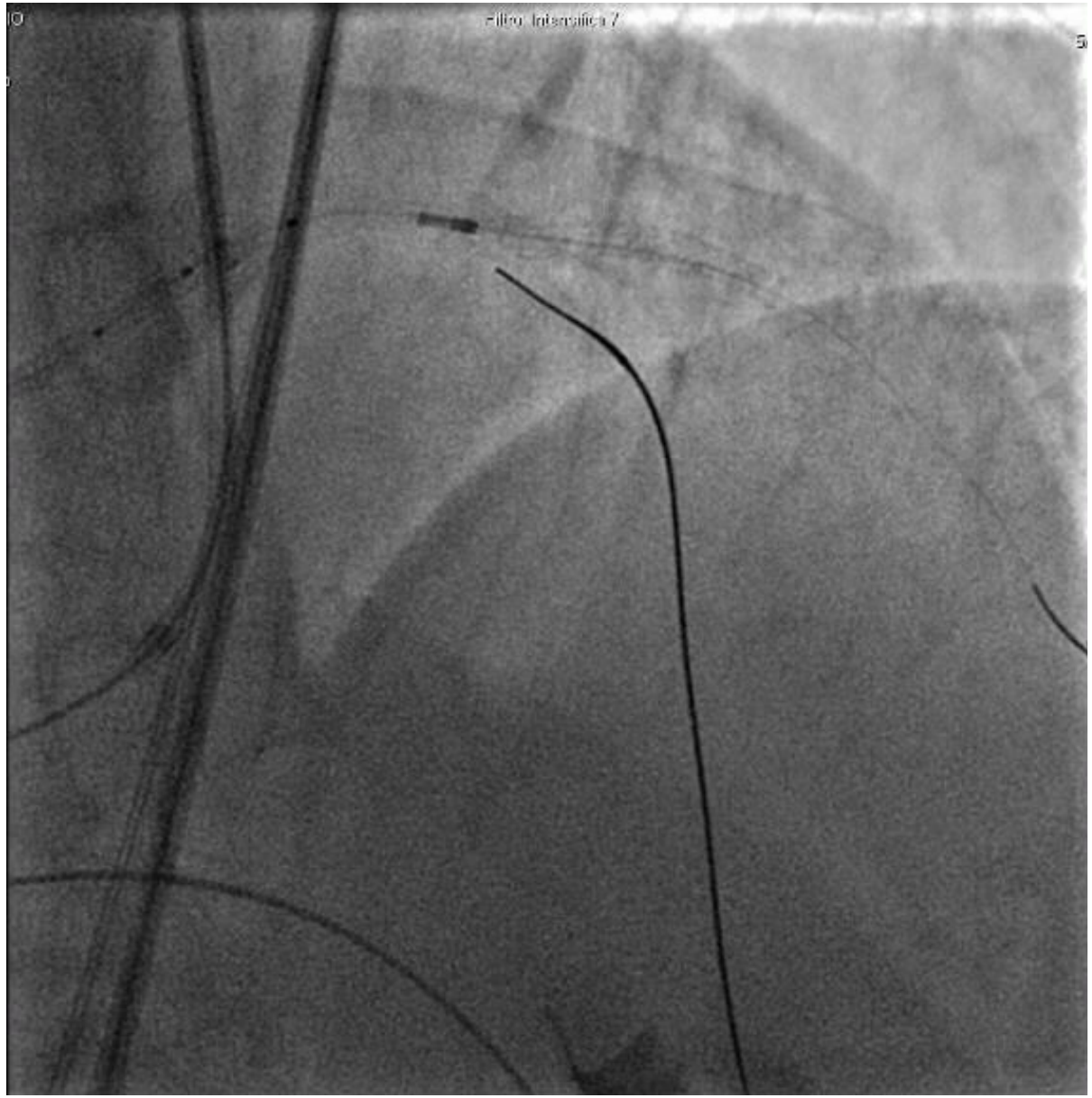
Fielder XT epicardial collateral–crossing

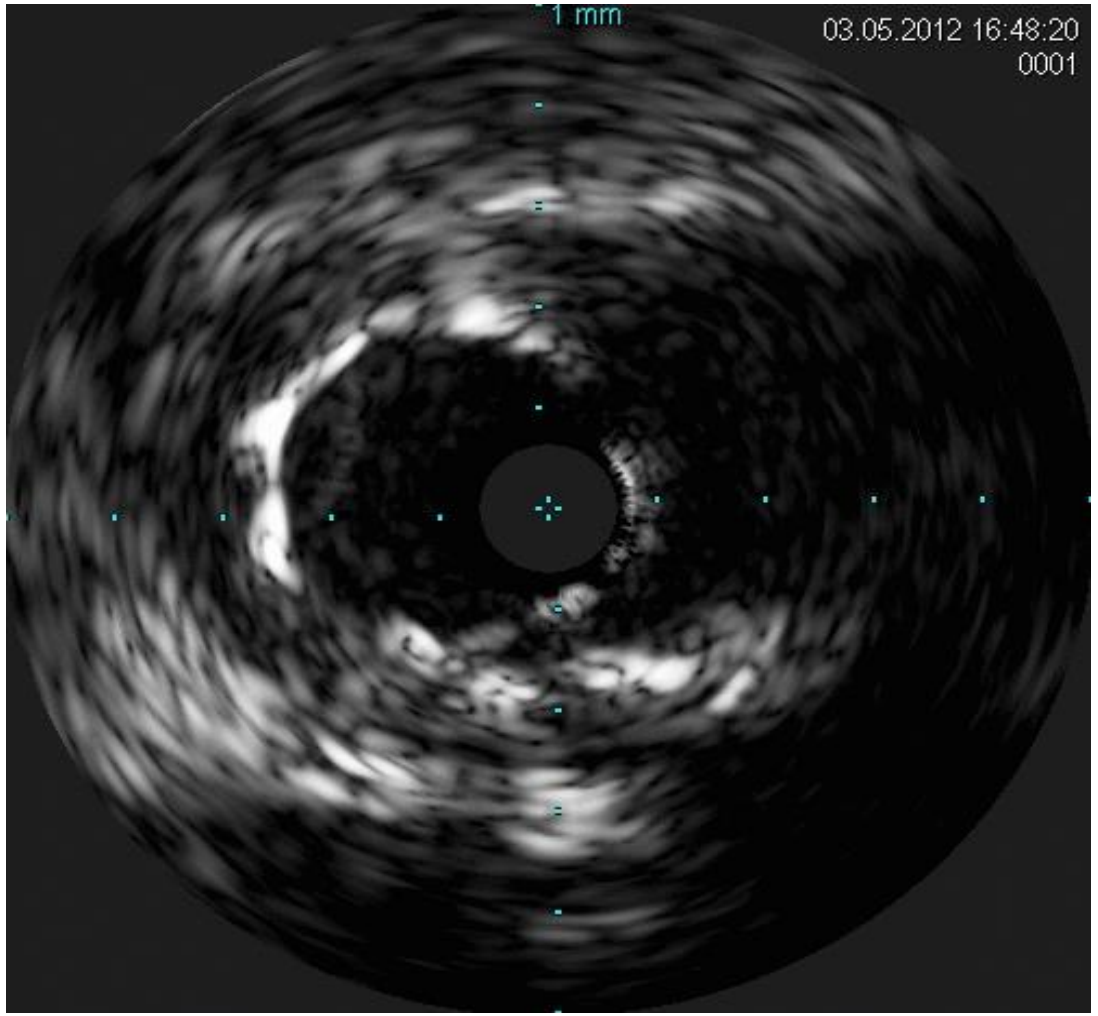


Corsair tip injection

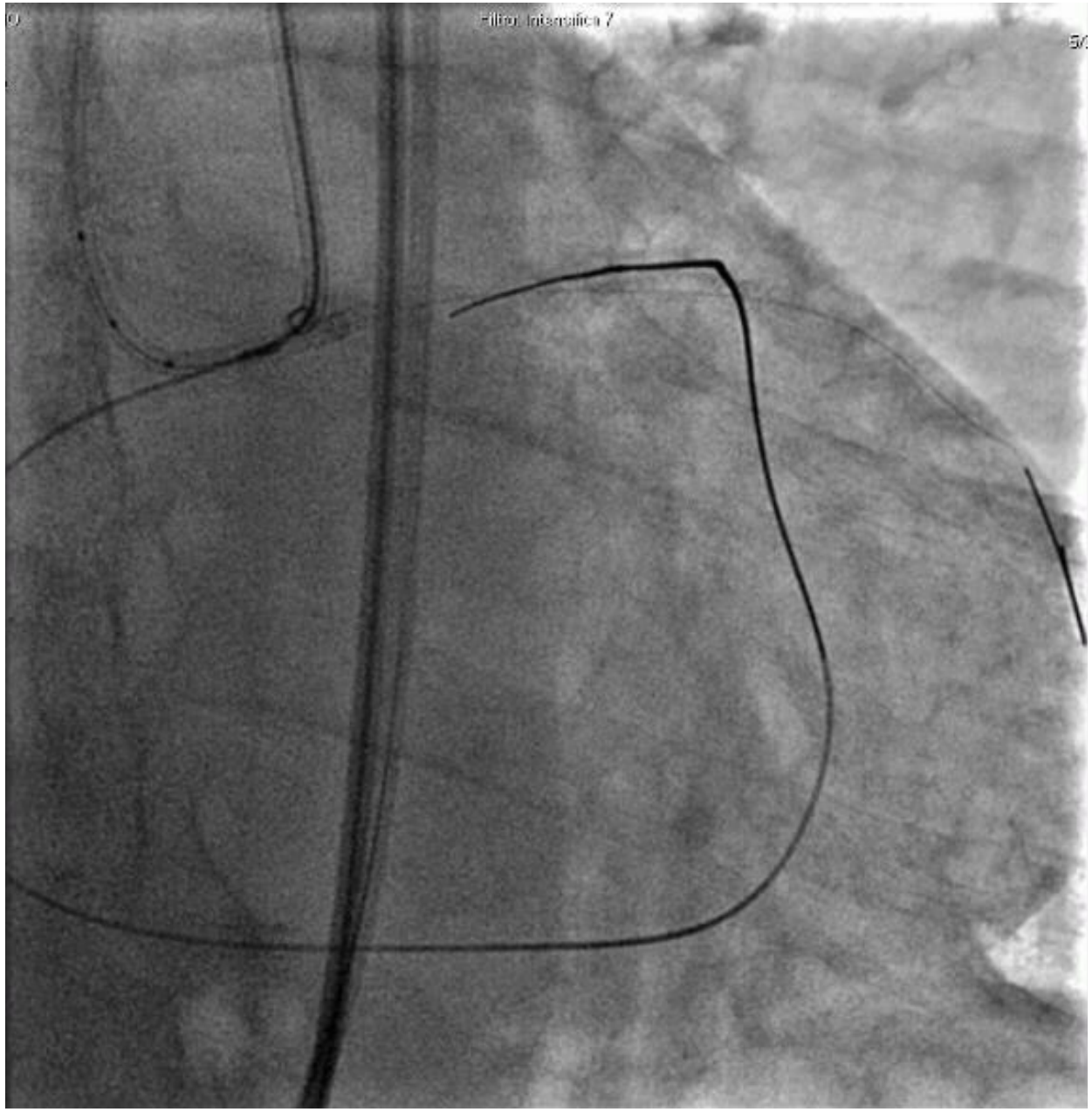


Retrograde Ultimate3 and IVUS in Dg branch

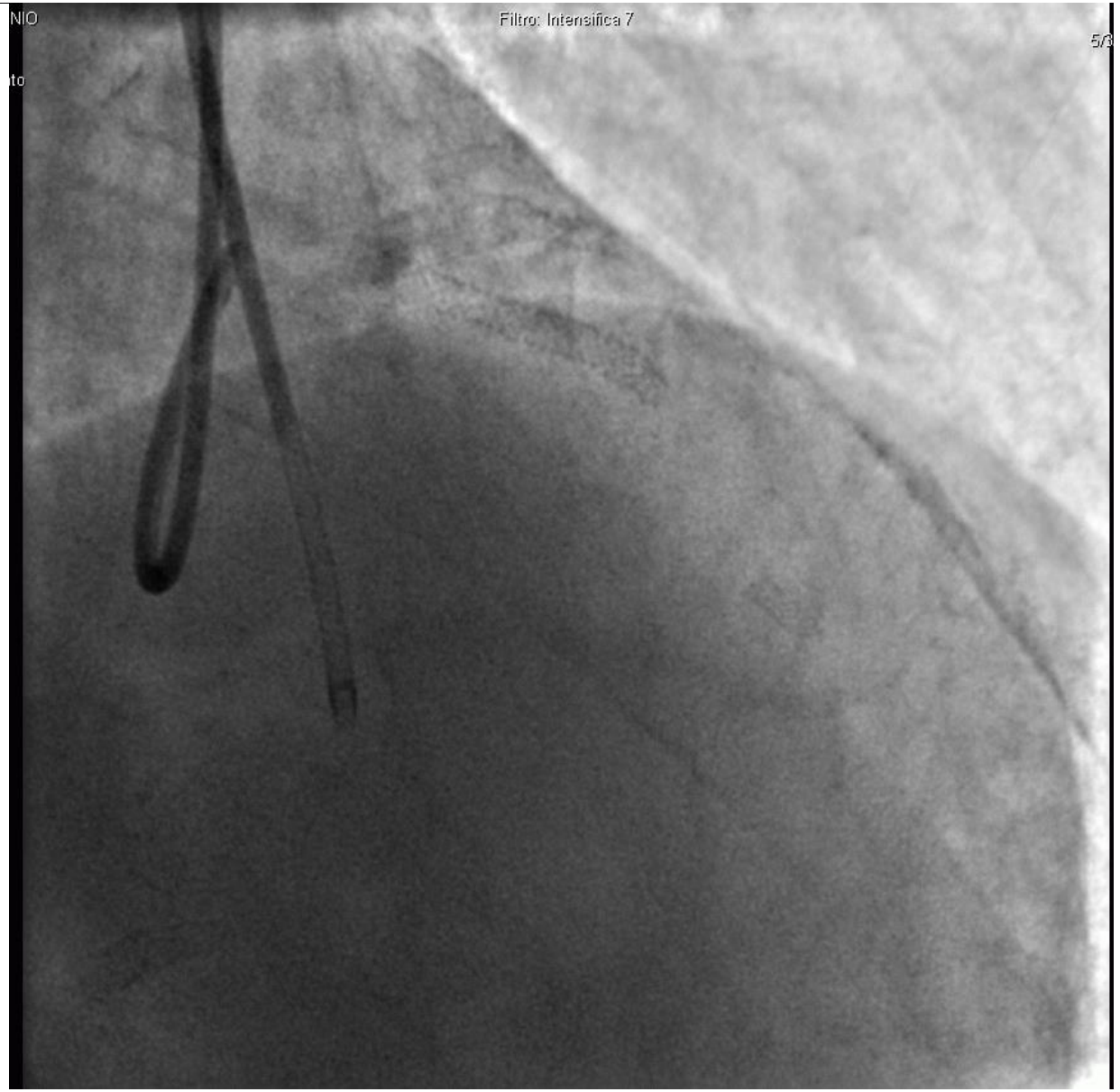


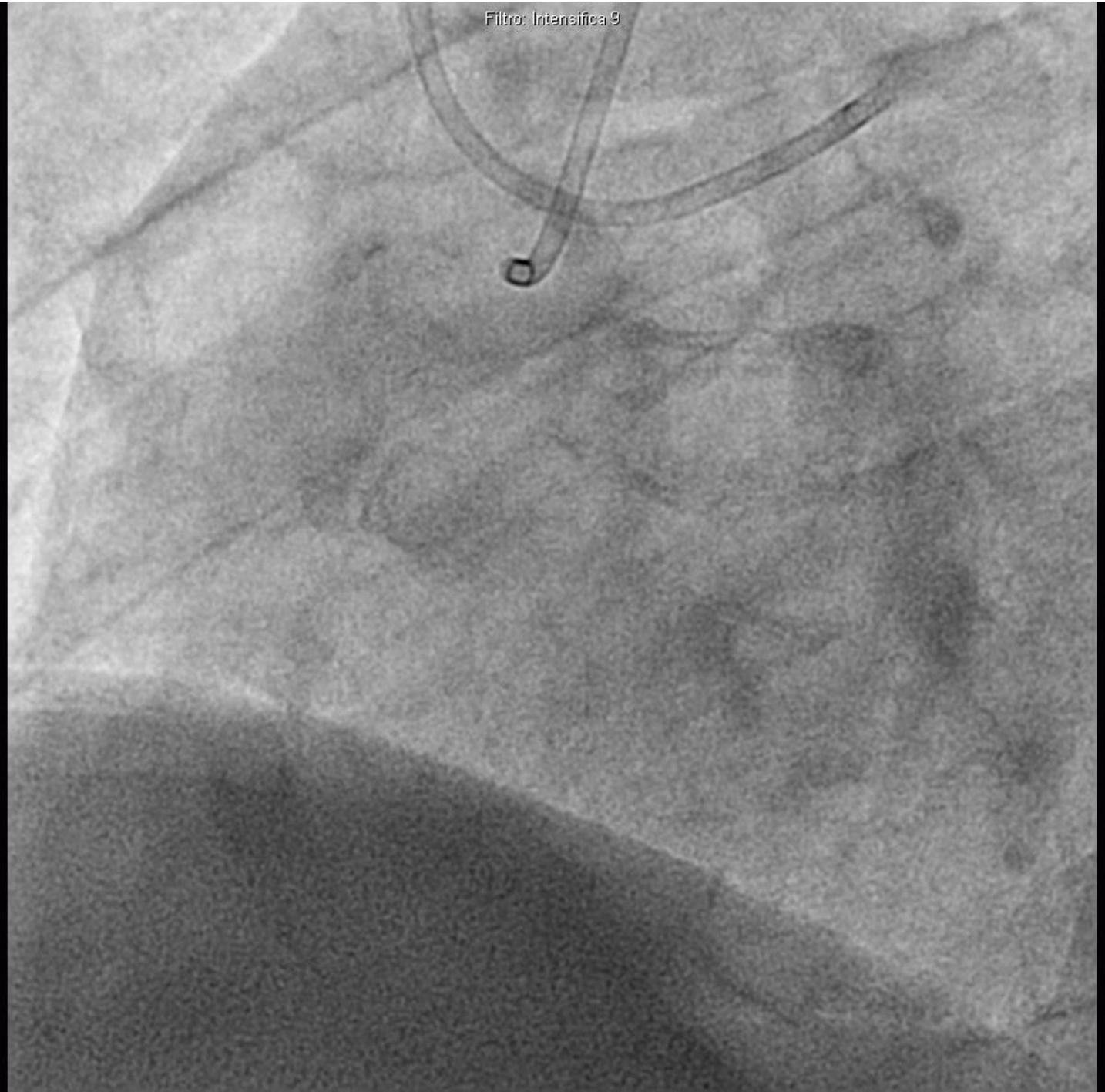


Retrograde Ultimate3 re-entry in GC

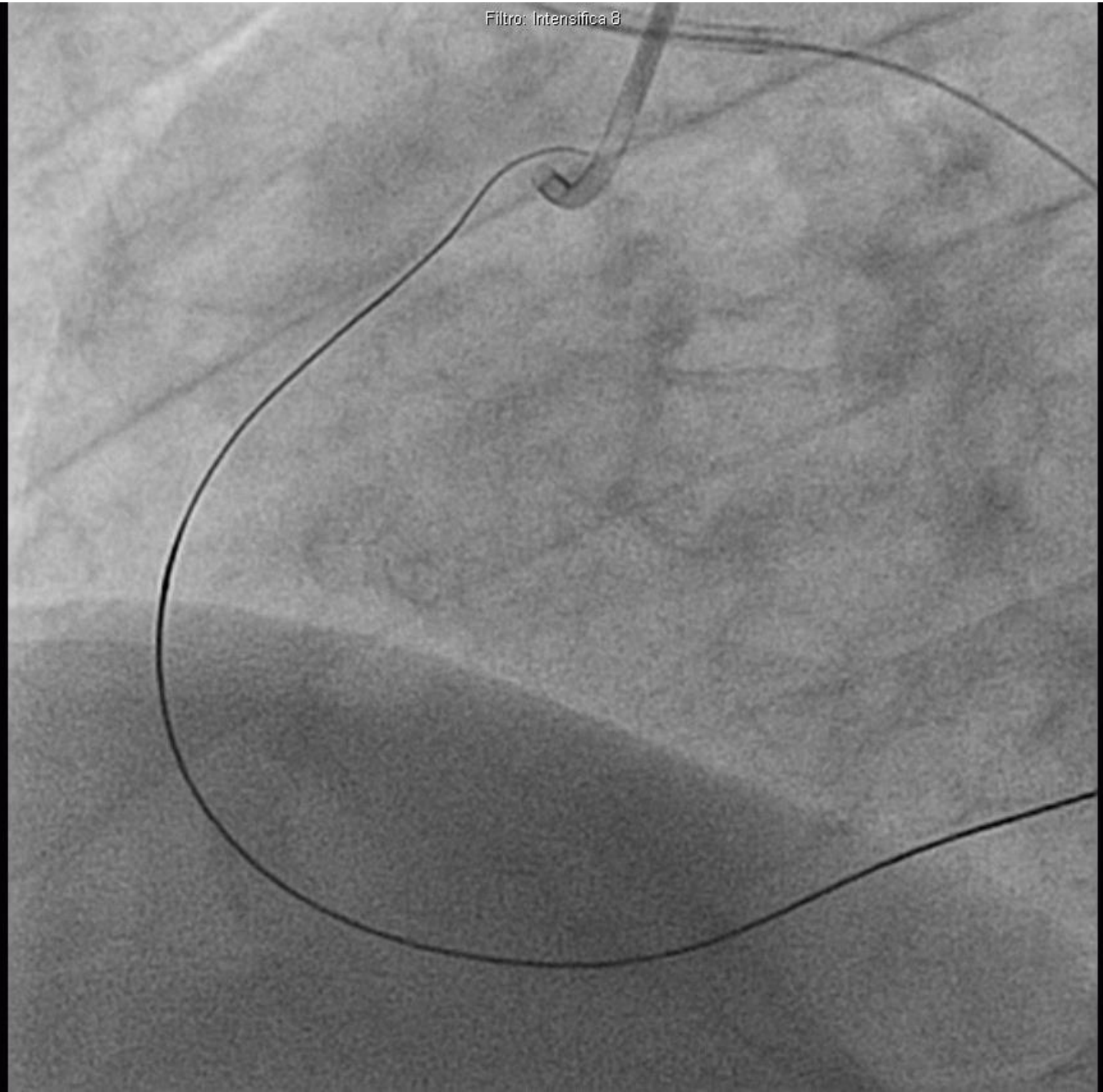


FINAL RESULT



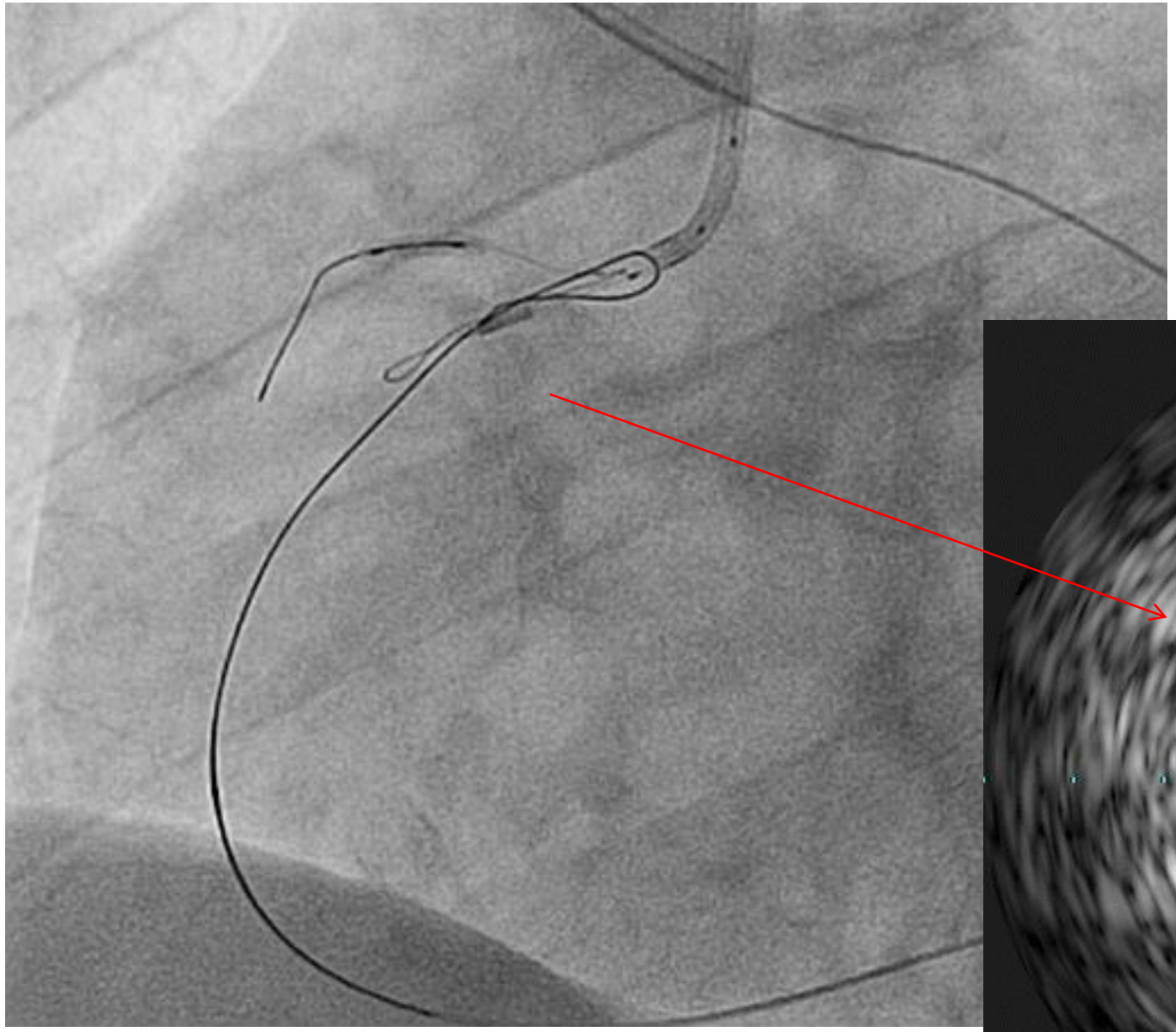


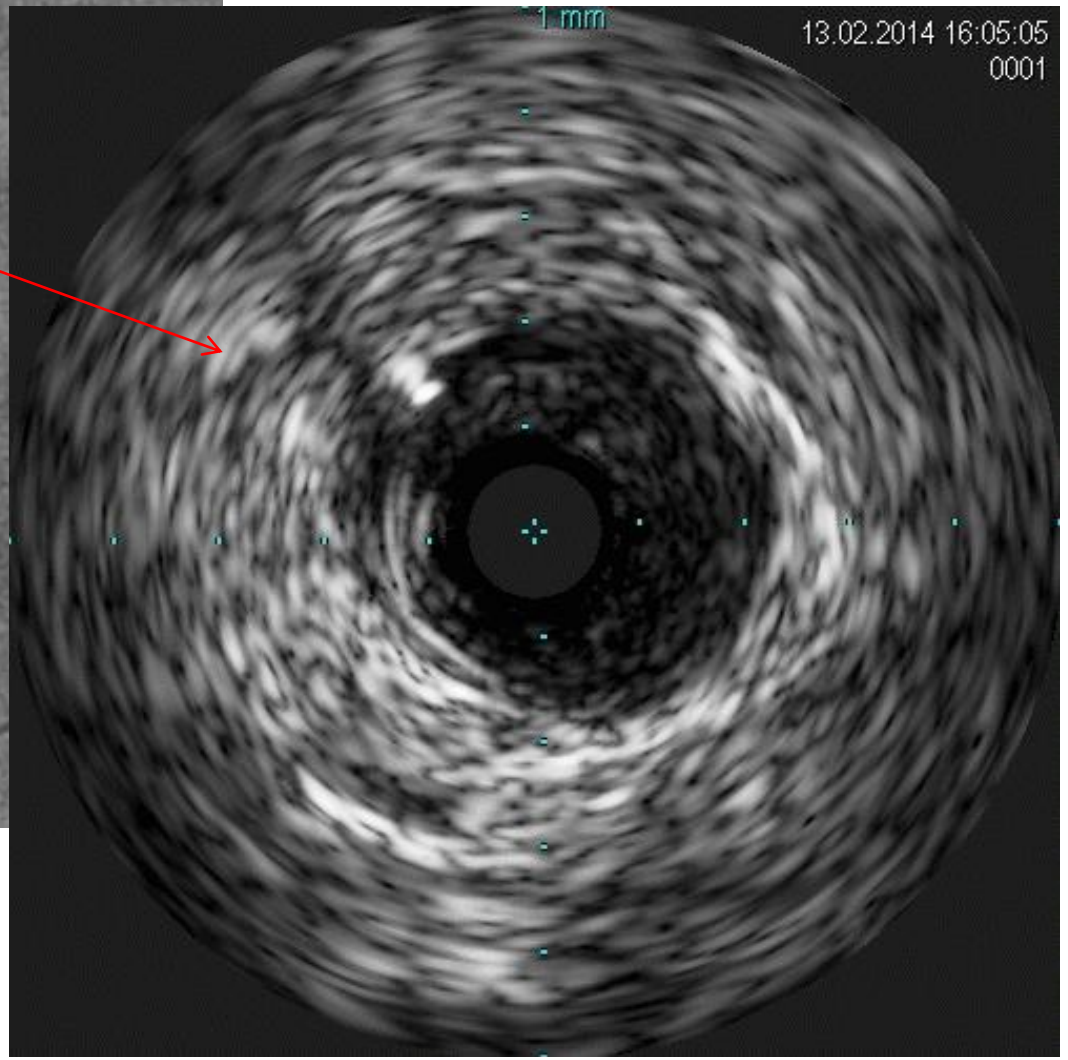
63 y man,
effort angina
with ostial RCA CTO

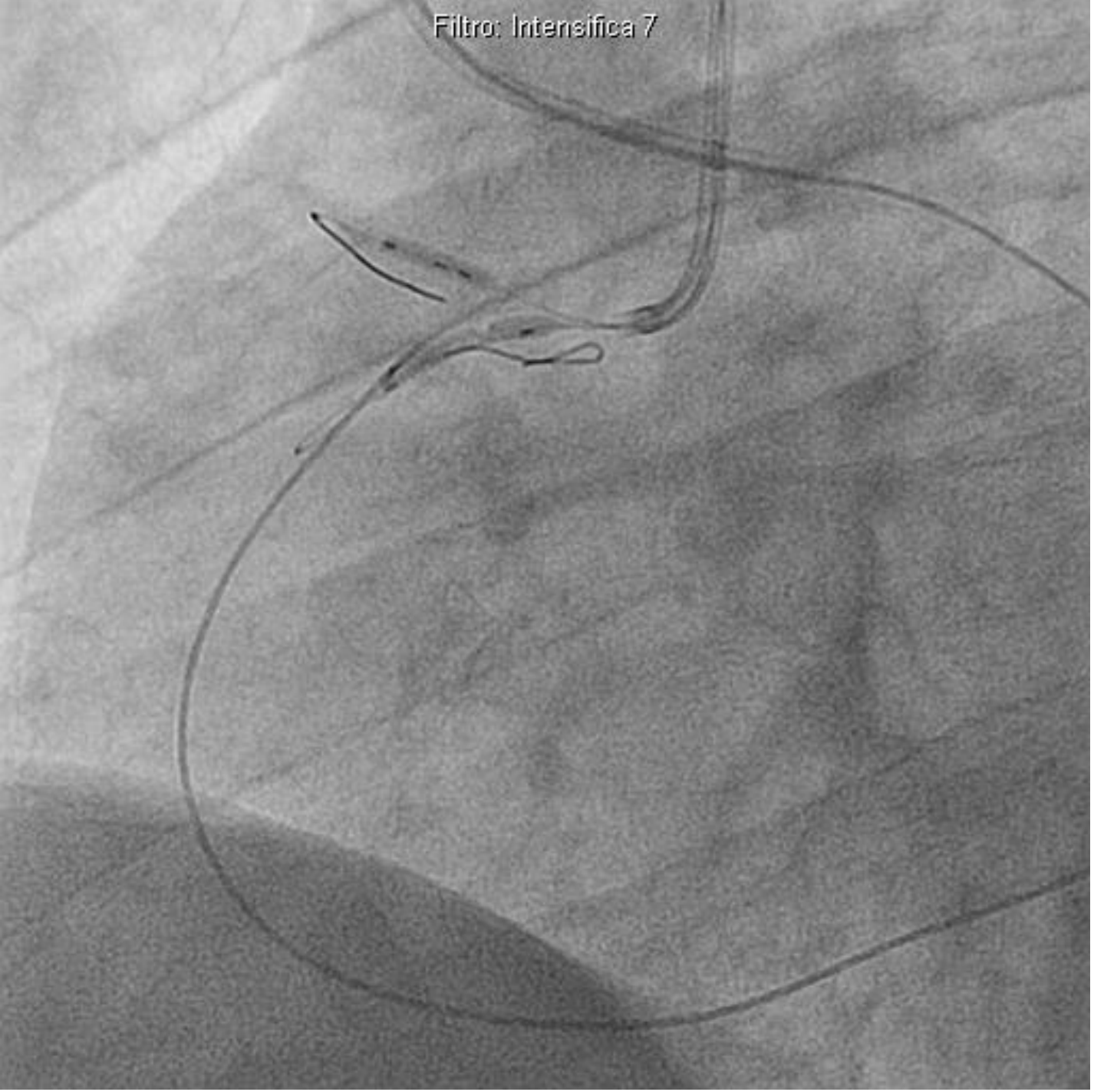


Ultimate 3 subintimal at the RCA ostium can not re-enter in the Guiding Catheter

IVUS

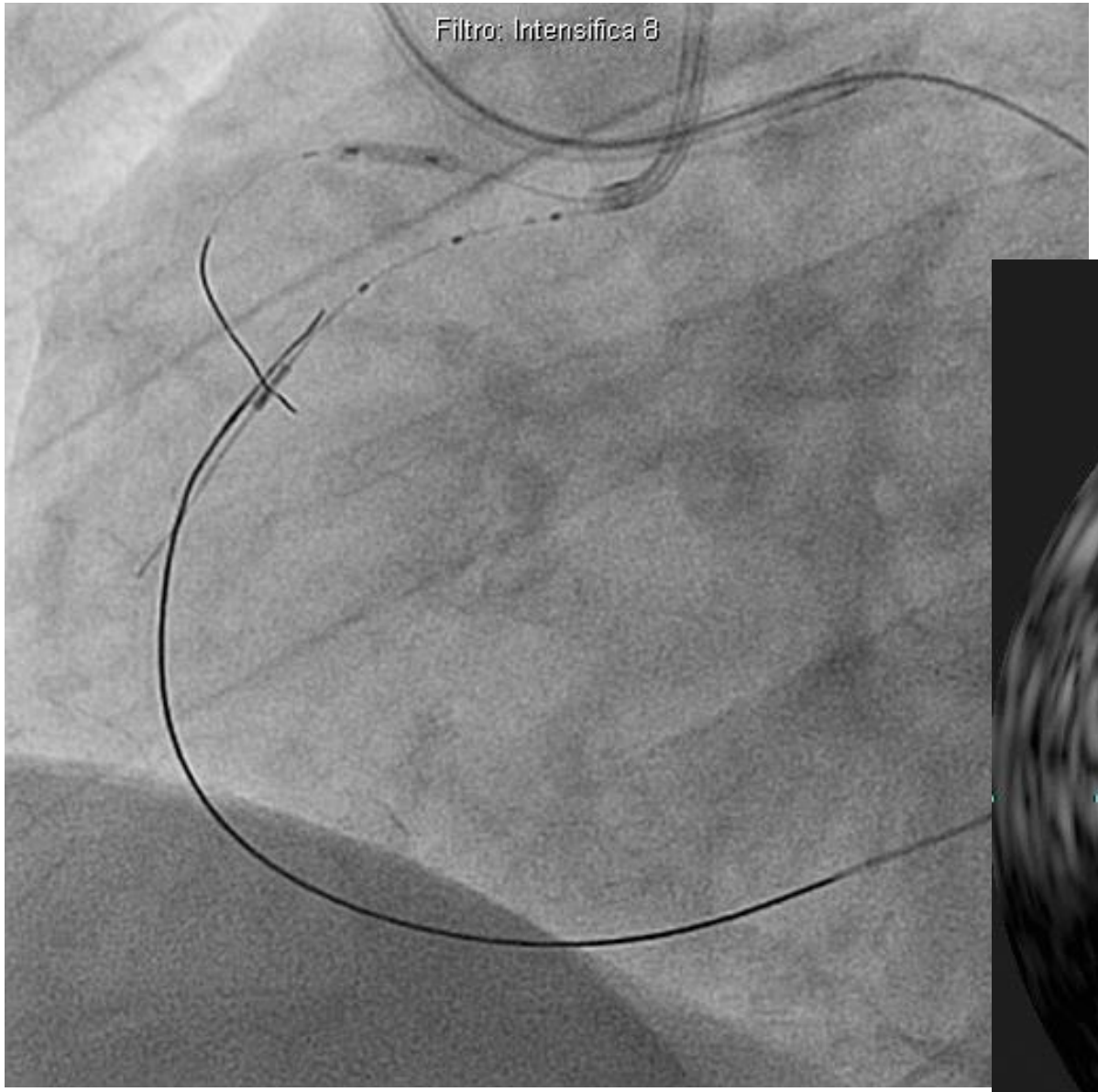


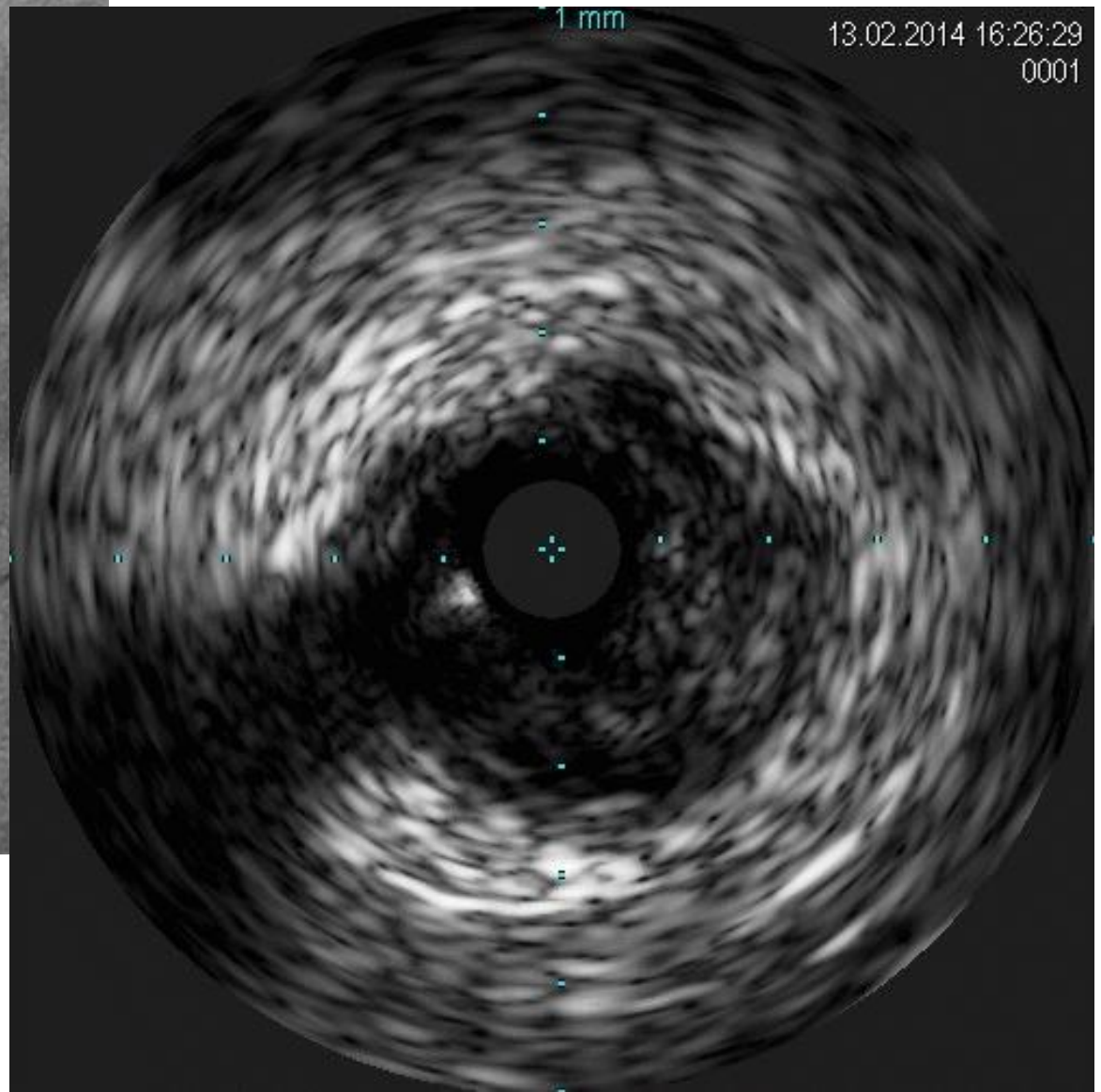




Balloon dilatation
with 2.5
In Proximal and Mid RCA
(IVUS-reverse CART)

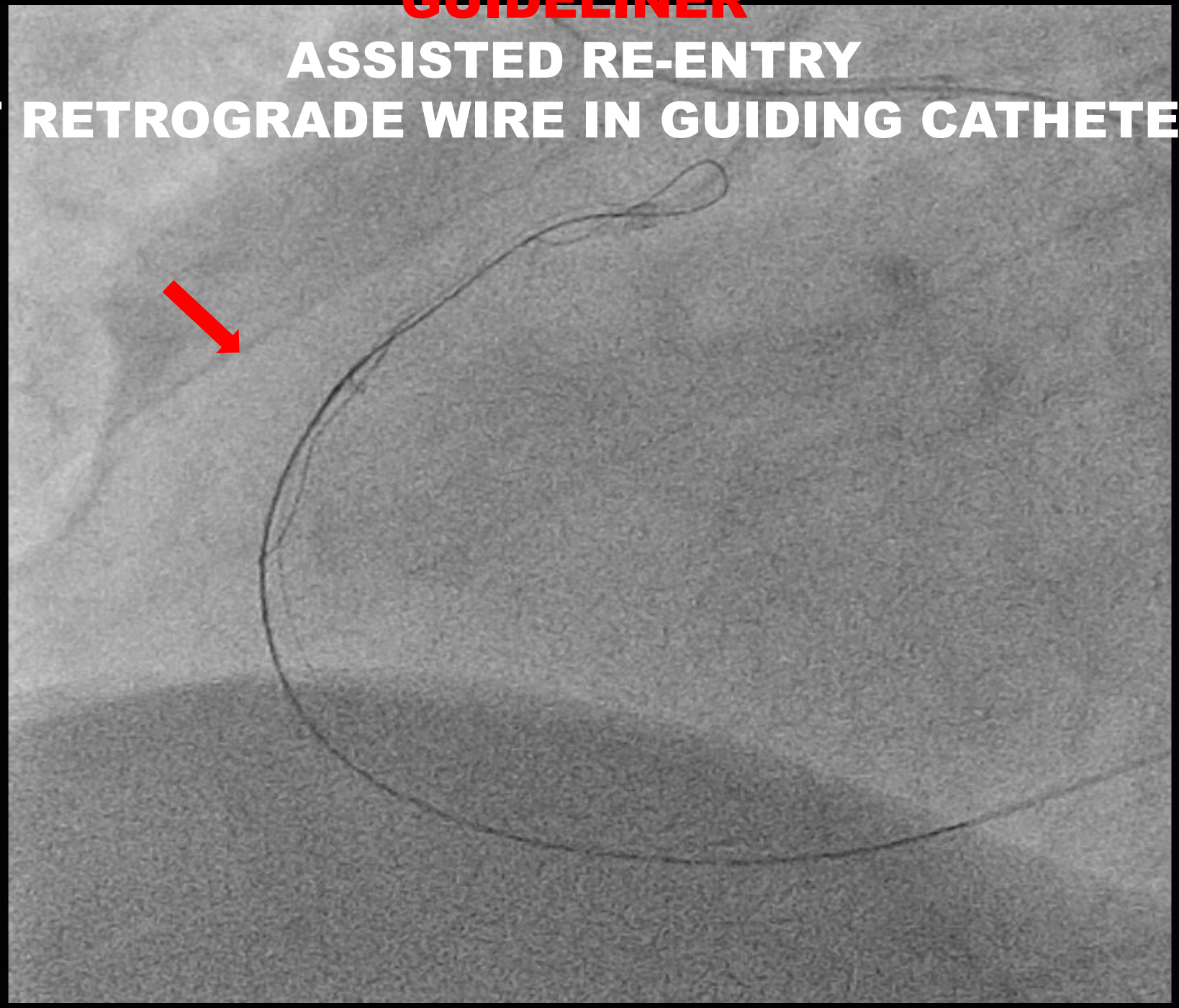
Retrograde wire in true lumen (mid RCA)

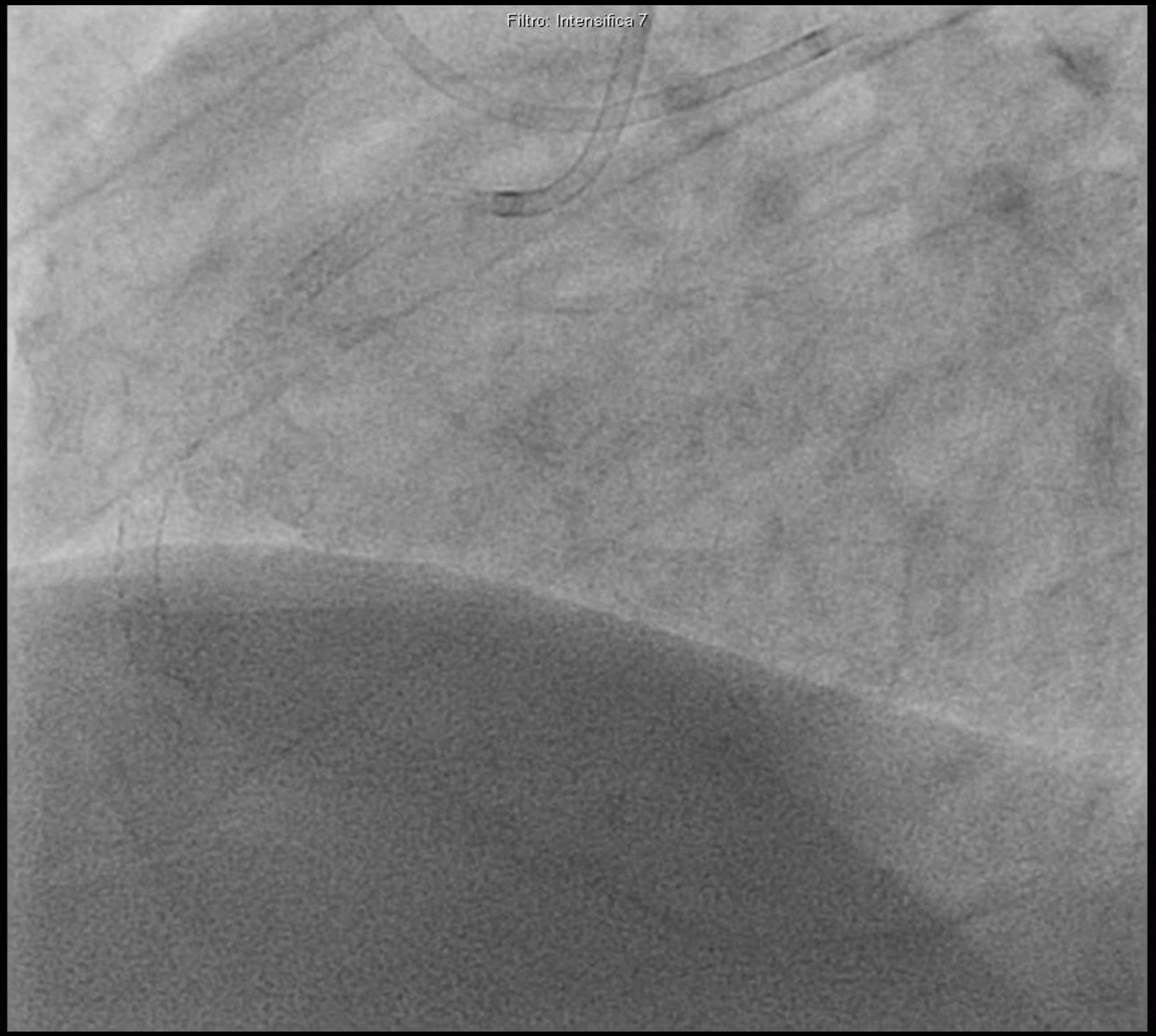




GUIDELINER

ASSISTED RE-ENTRY
OF RETROGRADE WIRE IN GUIDING CATHETER





FINAL RESULT

CONCLUSION 1

- **IVUS is a very important tool that makes CTO procedures more predictable, more effective and safer**
- **IVUS is Mandatory in Antegrade approach to confirm the " CTO Entry point" and to understand the position of your wire in the proximal cap**
- **It's very useful to navigate from subintimal space to intima in the ADR technique**
- **Obviously IVUS permits to optimize stent sizing and expansion in complex coronary reconstruction**

CONCLUSION 2

- **In Retrograde approach is very useful to clarify retrograde wire location and the exact point of re-entry (exp in ostial LAD or LCX CTO)**

- **In Reverse CART is very useful for balloon sizing and to understand where is possible to try to make the conection between antegrade and retrograde wires**

- **With IVUS evaluation is also possible to avoid antegrade injection, minimizing the risk to propagate iatrogenic dissection distally or retrograde in the aortic wall (Ostial RCA CTO) and to reduce the use of contrast**