

# **A Long RCA CTO Lesion Successfully Treated by reverse CART technique**

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# History

- Male, 49 years old bank clerk
- CC: recurrent chest discomfort on effort for 1 year, aggravated for 2 weeks
- PMH:
  - ◆ Hypertension for 1 month
  - ◆ Diabetes (-)
  - ◆ Smoking: half pack per day for 30 years



# PE

- T : 36.4 , P 78 bpm , R12 , BP126/76mmHg
- Clear lungs, no rales. Heart rate 74bpm, regular, no murmur. No edema in lower extremities



- ECHO : Normal, LVIDd 4.48cm , LVEF 62.4%
- LAB : LDL-C 4.35mmol/L, HDL-C 1.09mmol/L  
TG 4.96 mmol/L, HCY 57.1, HBA1c 5.4%  
Cr 120  $\mu$ mol/L  
TnI 0.01ng/mL
- EKG : Sinus rhythm



# Diagnosis

- Coronary heart disease  
Unstable Angina
- Hypertension



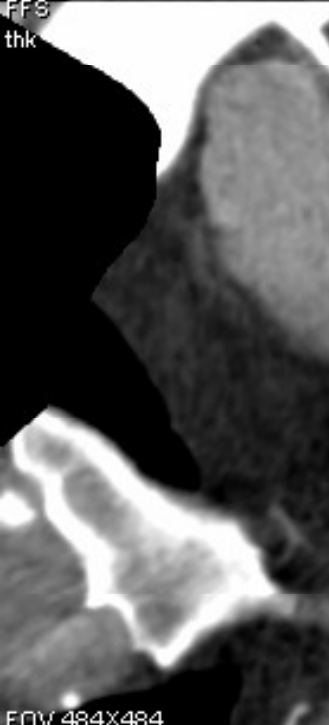
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SOMATOM Definition Flash  
Se 504  
Im 6  
CT  
FFS  
thk

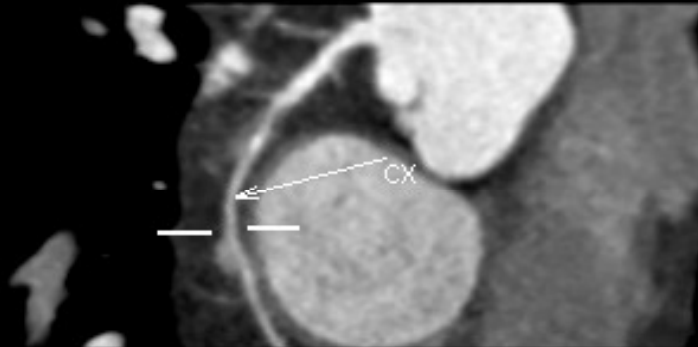


Idx 163  
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Se 505  
Im 6  
CT  
FFS  
thk

Idx 167  
SOMATOM Definition Flash  
Se 506  
Im 4  
CT  
FFS  
thk



Idx 175  
SOMATOM Definition Flash  
Se 508  
Im 4  
CT  
FFS  
thk



Aff12 Hospital ZJU  
2012-12-13  
hong xin M 49y  
M 049Y 1413893  
DOB:1963-07-27

FOV 484X484  
TP  
TI  
kVp  
mAs ( mA)  
GT  
Cardiac^0\_\_Flash\_Cardio (Ad Cardiac^0\_\_Flash\_Cardio (Adult)  
RCA  
2012-12-13/16:39:19

FOV 484X484  
TP  
TI  
kVp  
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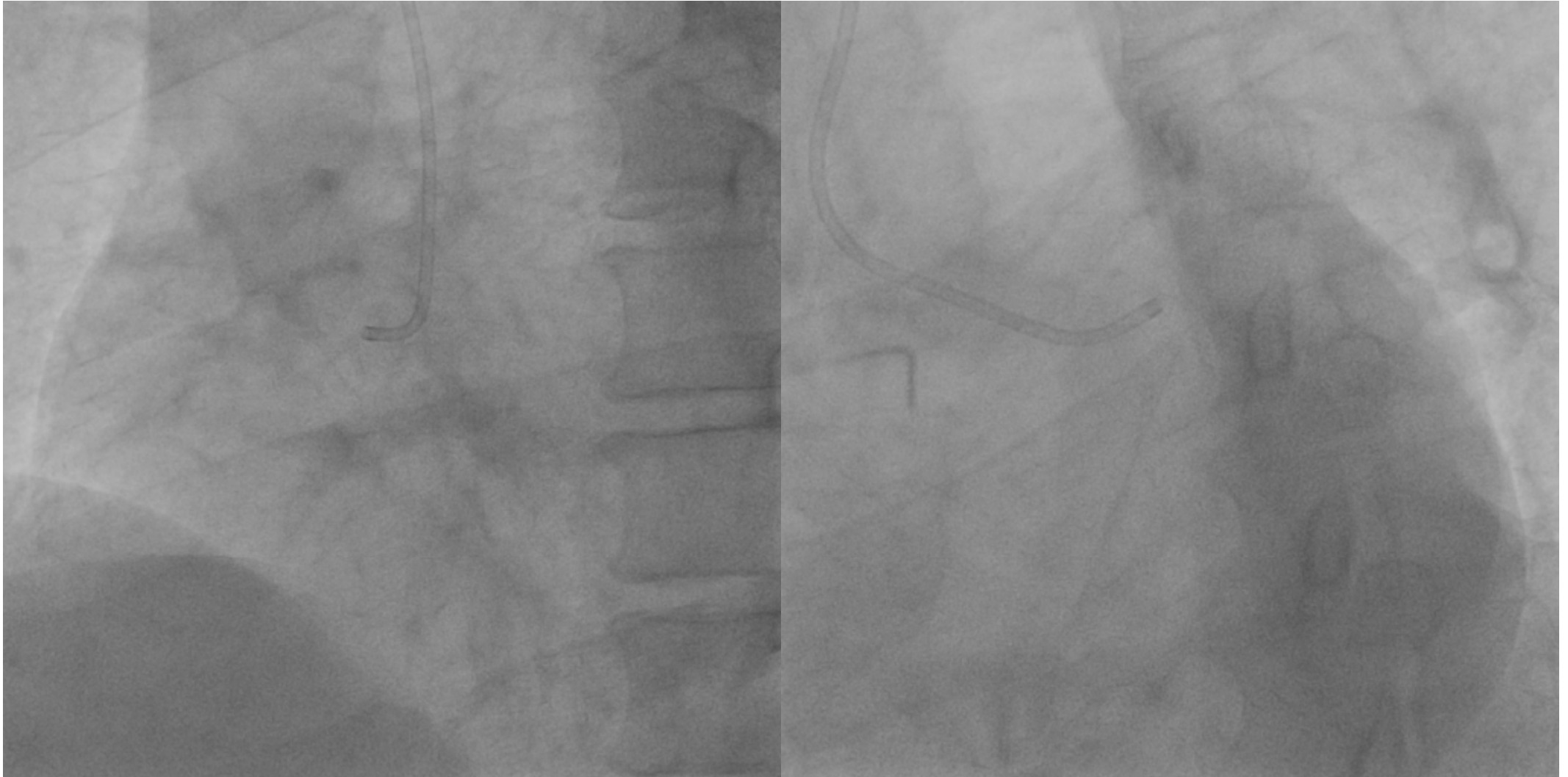
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TI  
kVp  
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CX  
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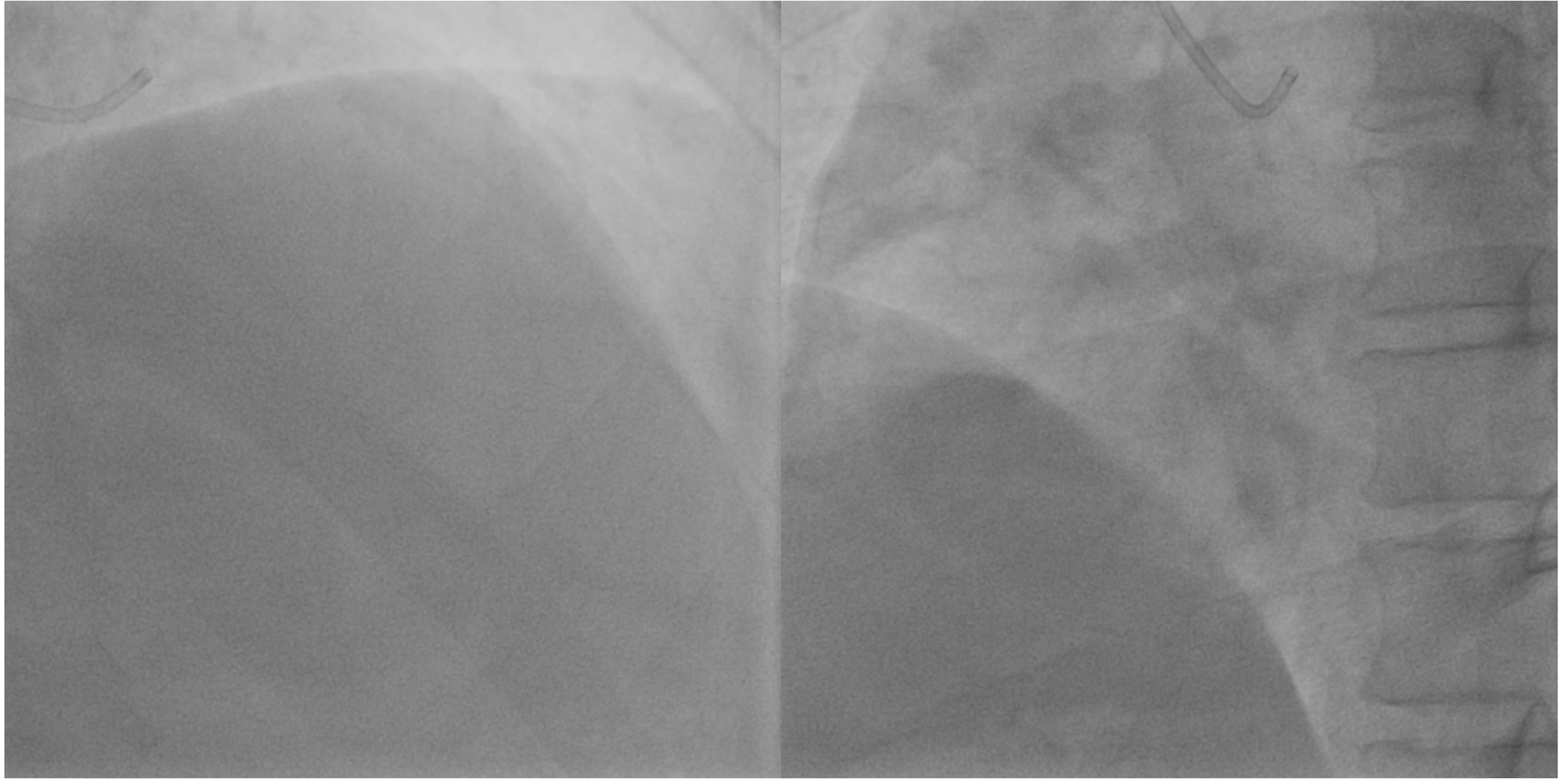
W 924  
L 230  
Z 100%

FOV 960x960  
TP  
TI  
kVp  
mAs ( mA)  
GT  
Cardiac^0\_\_Flash\_Cardio (Adult)  
Circulation 1-CVRT COLLECTION  
2012-12-13/16:27:39



# Angiogram





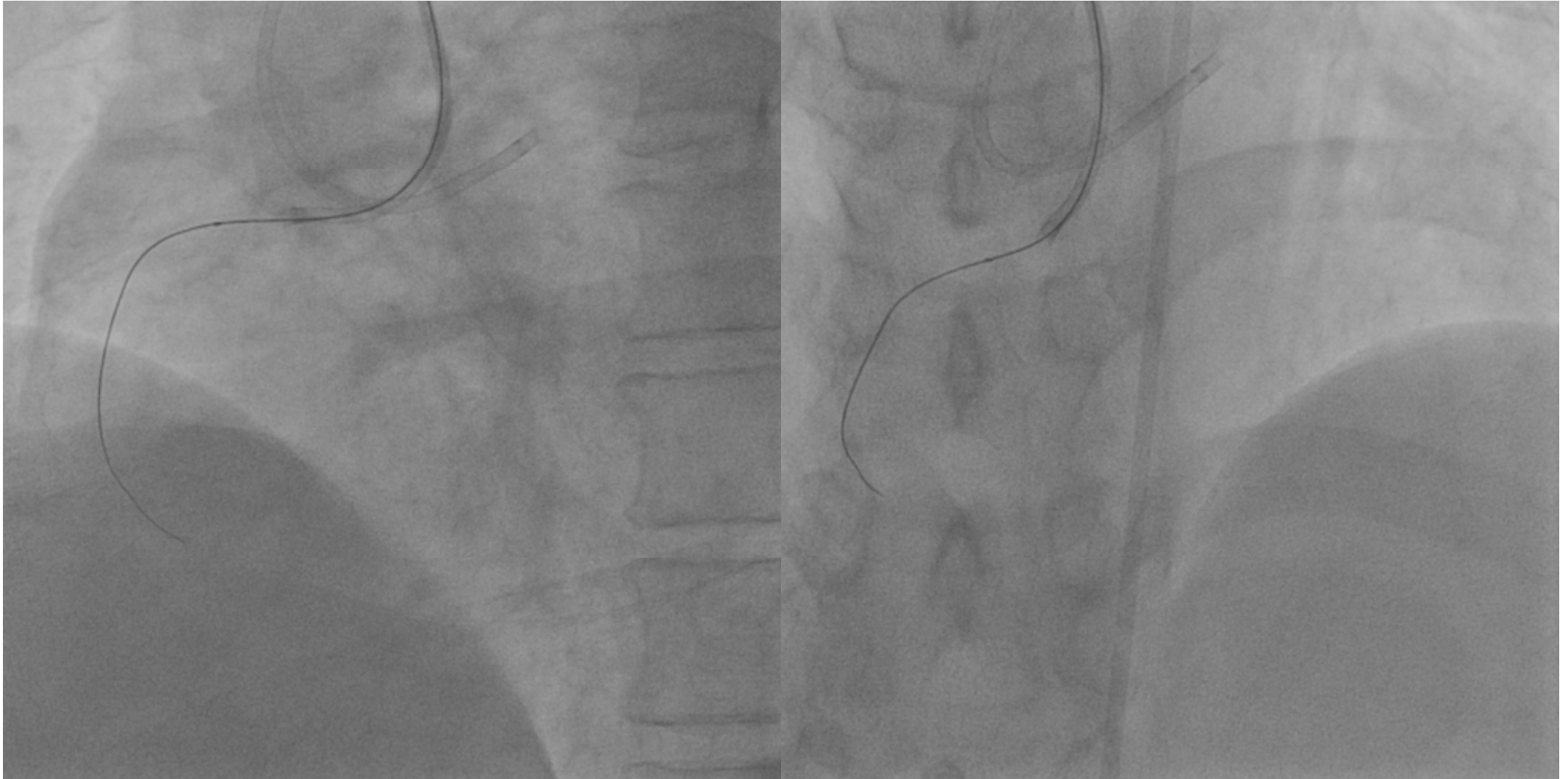


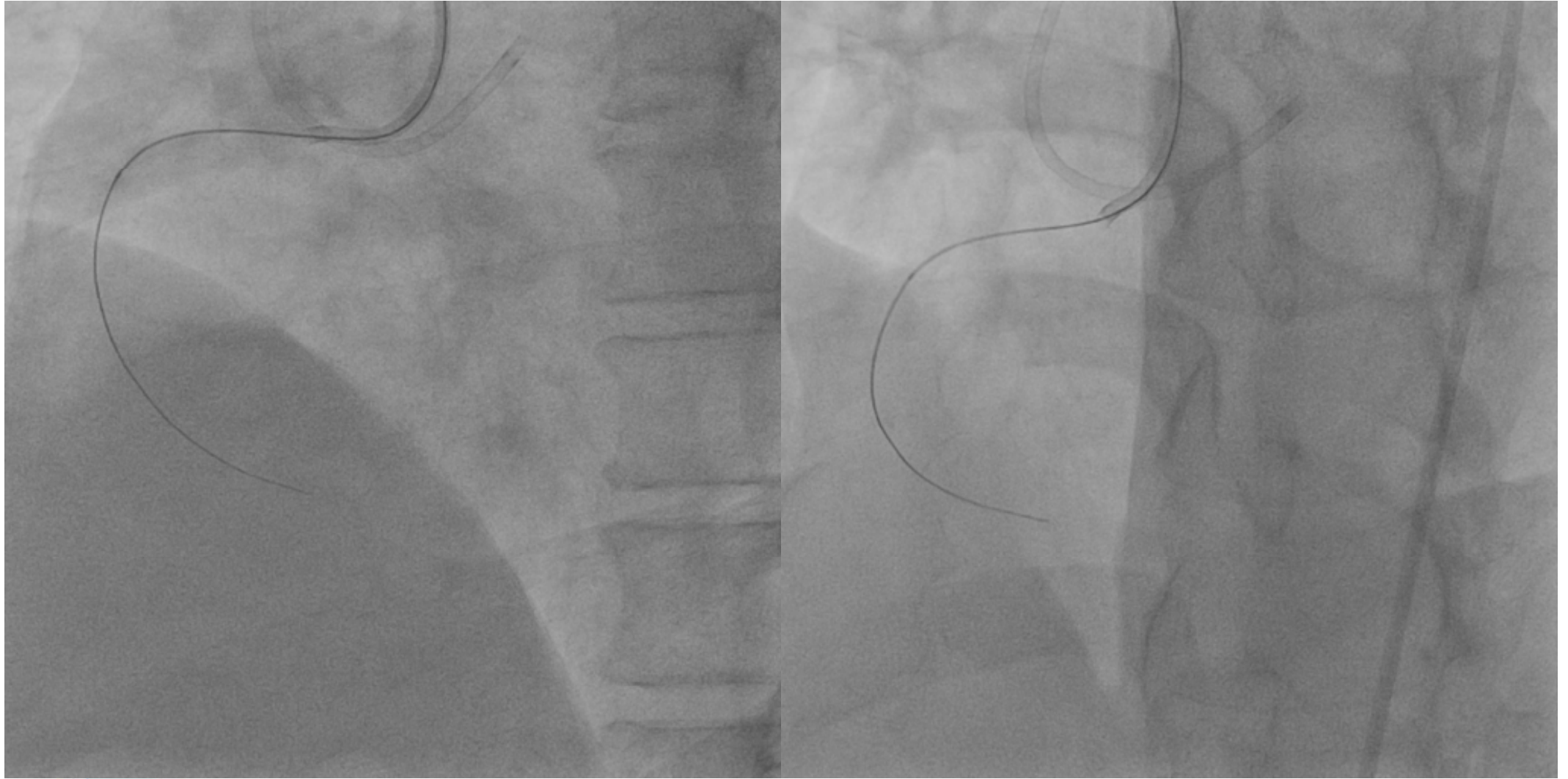
# Strategy

- CABG ?
  - ◆ Refused
- PCI?
  - ◆ RCA antegrade or retrograde?



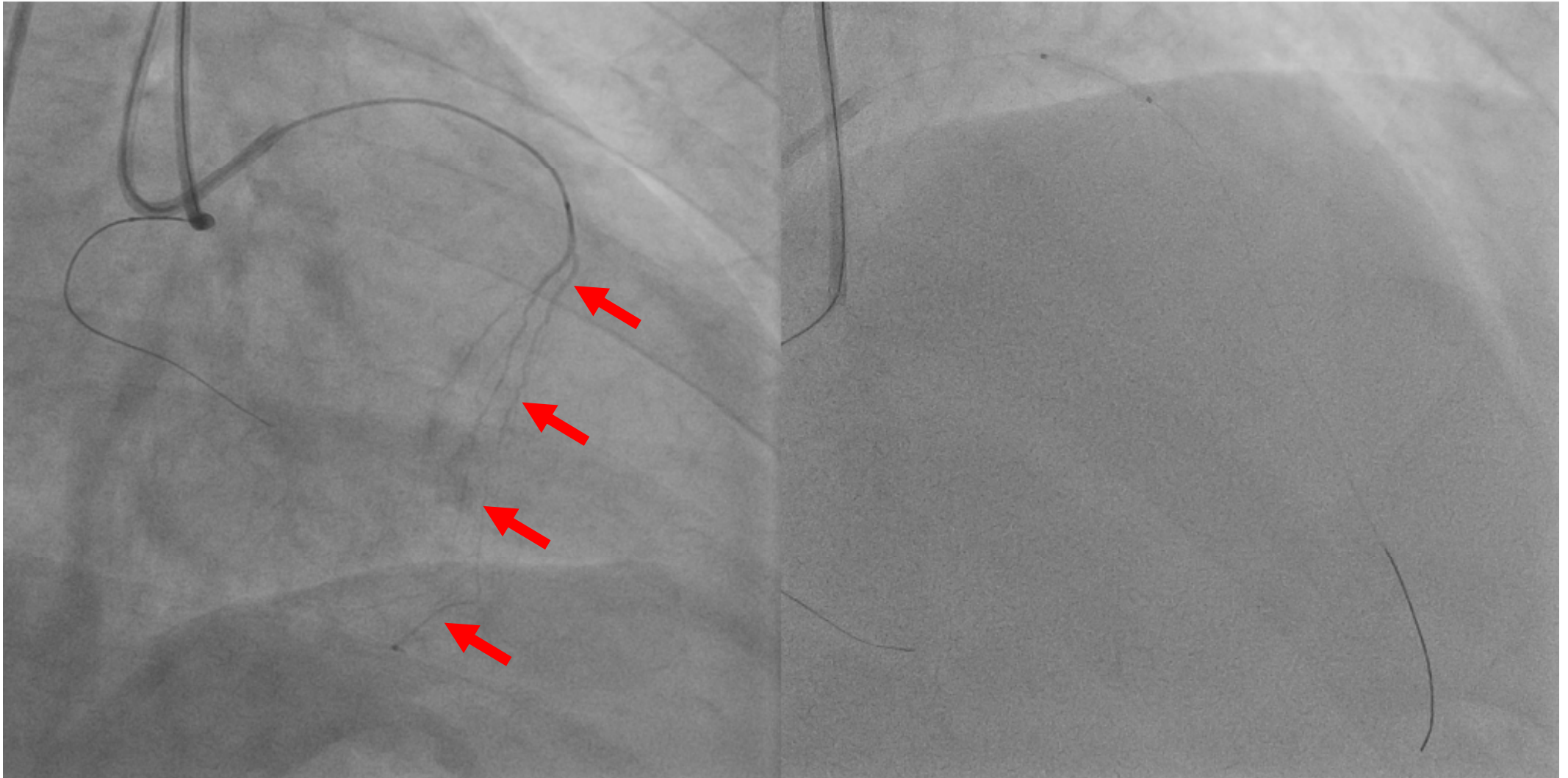
**Right radial 6F SAL0.75, right femoral 6F  
EBU3.5; Finecross microcatheter; Fielder XT**





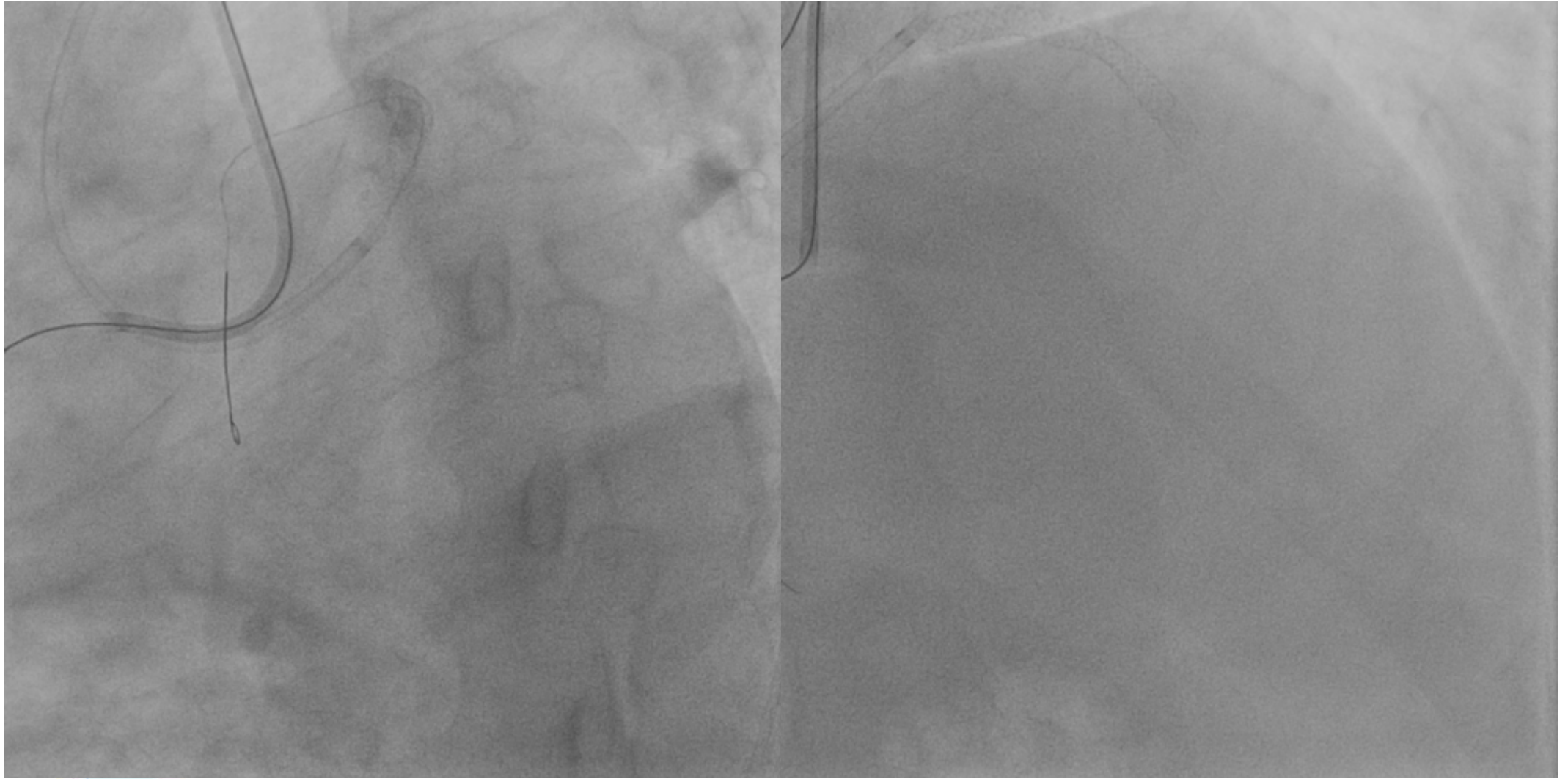
# Corsair tip injection

## Patient had angina, LAD PCI



# Promus Element 3.5\*38mm stent Quantum 3.5\*15、4.0\*8mm balloon

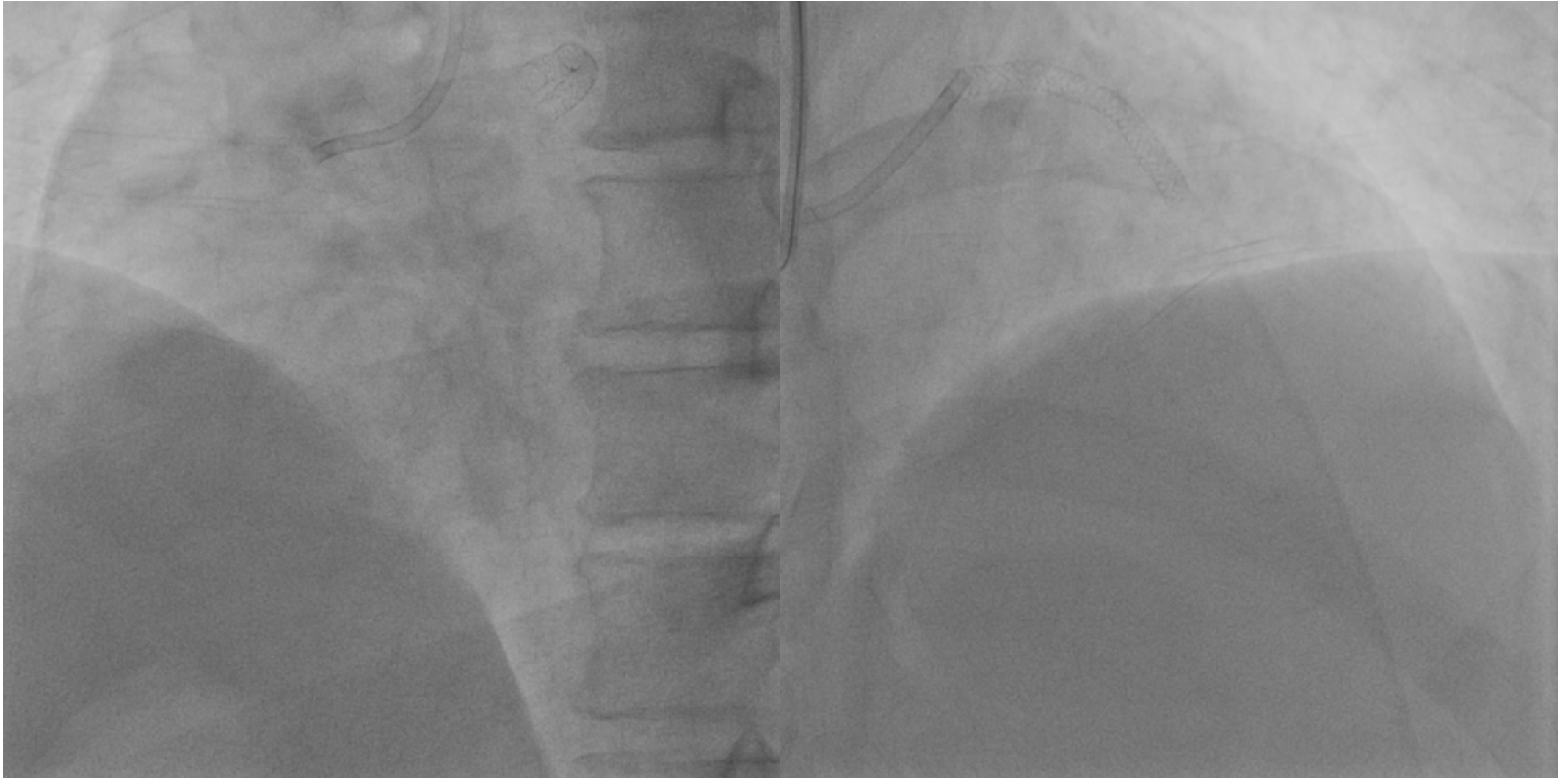




- Peak TnI after PCI: 0.47 ng/mL
- Medication: aspirin, plavix, crestor 20mg, metoprolol
- One month later, he became asymptomatic
- 3 months later, RCA PCI again
- Lab: Cr 117  $\mu\text{mol/L}$ , LDL-C 2.62mmol/L, TG 3.23 mmol/L, HCY 14.4

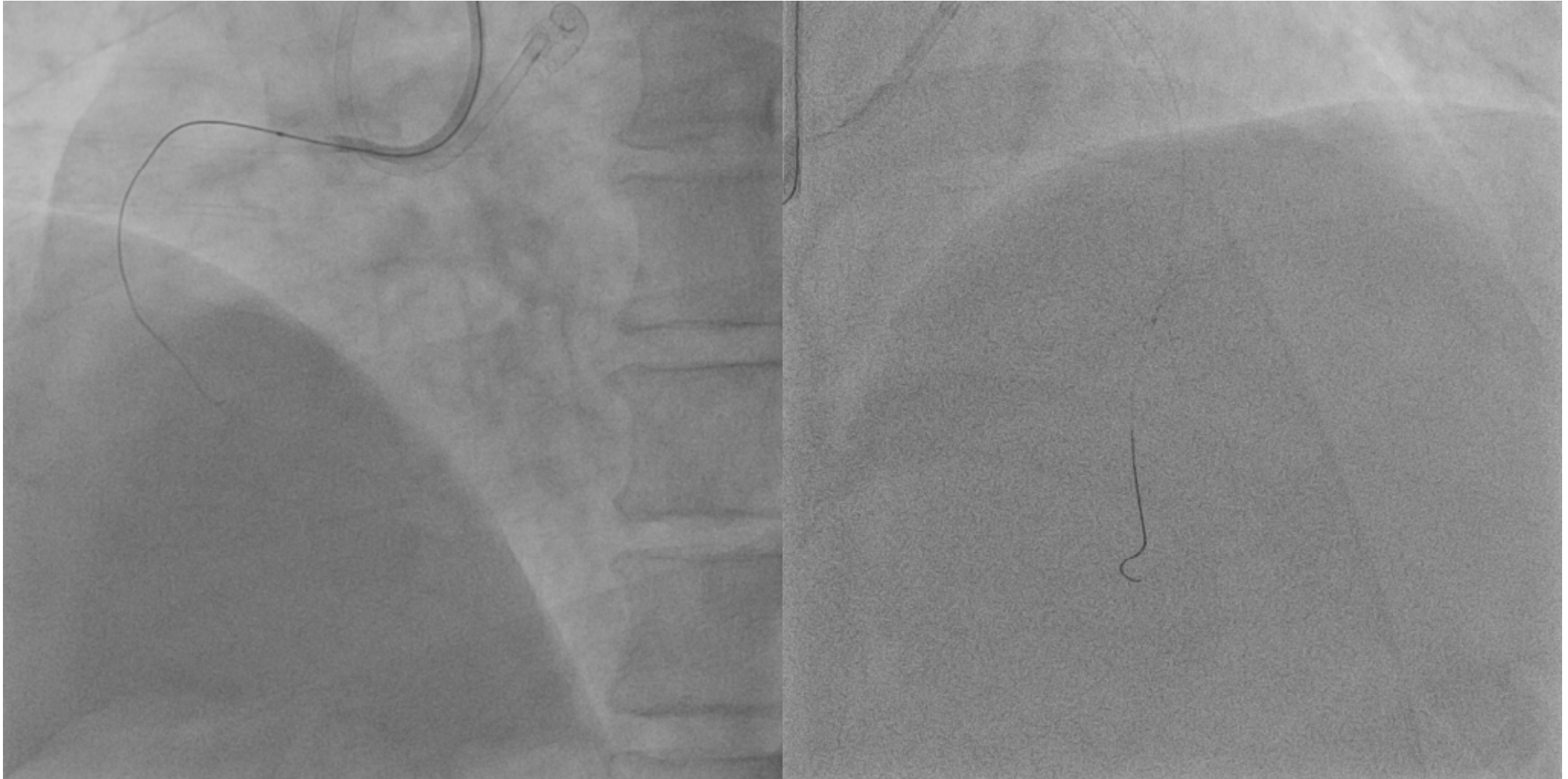


# Angiogram





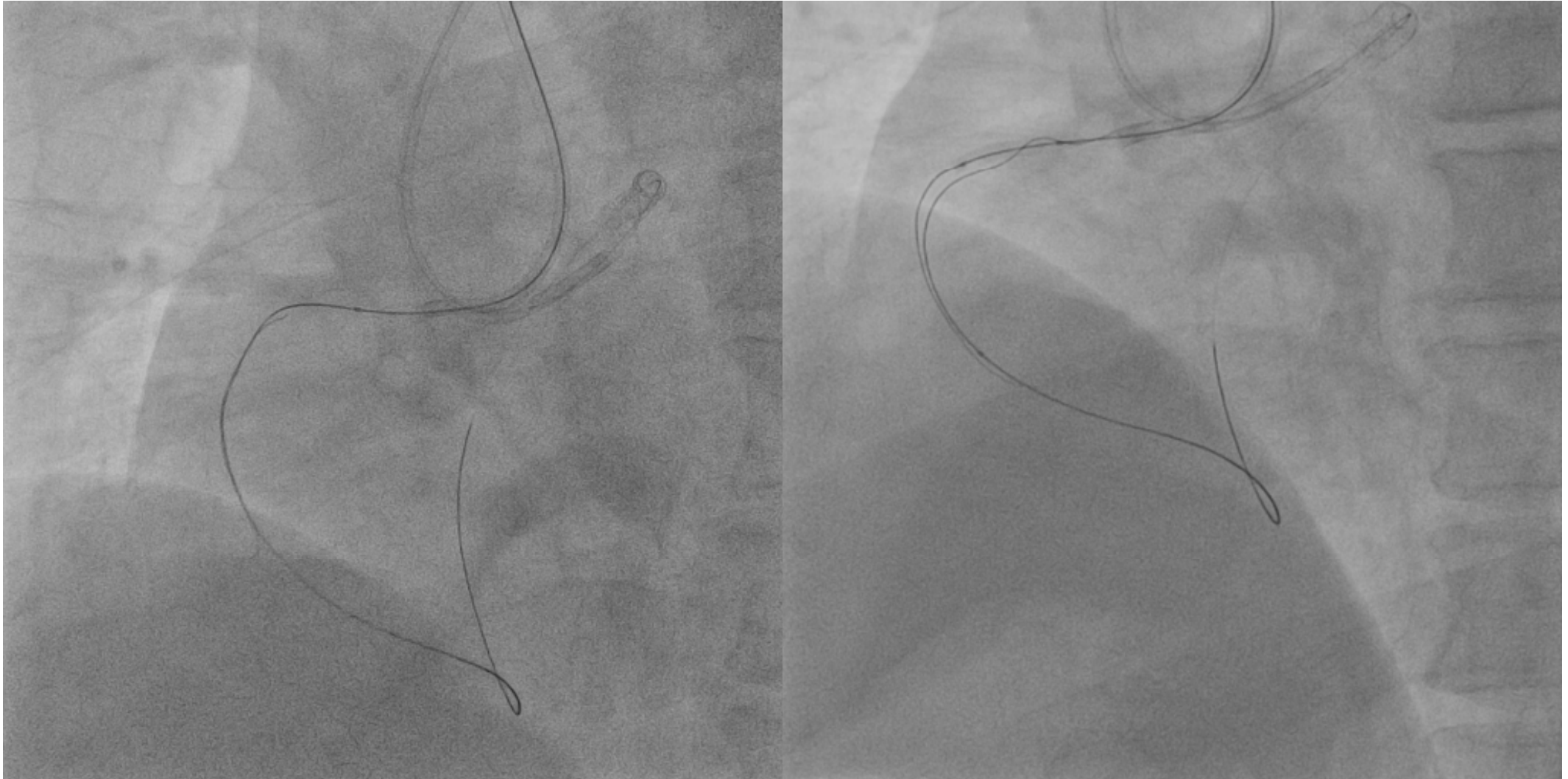
# Bilateral radial access, 6F SAL.75 EBU3.5 GC, Finecross microcatheter, Sion GW



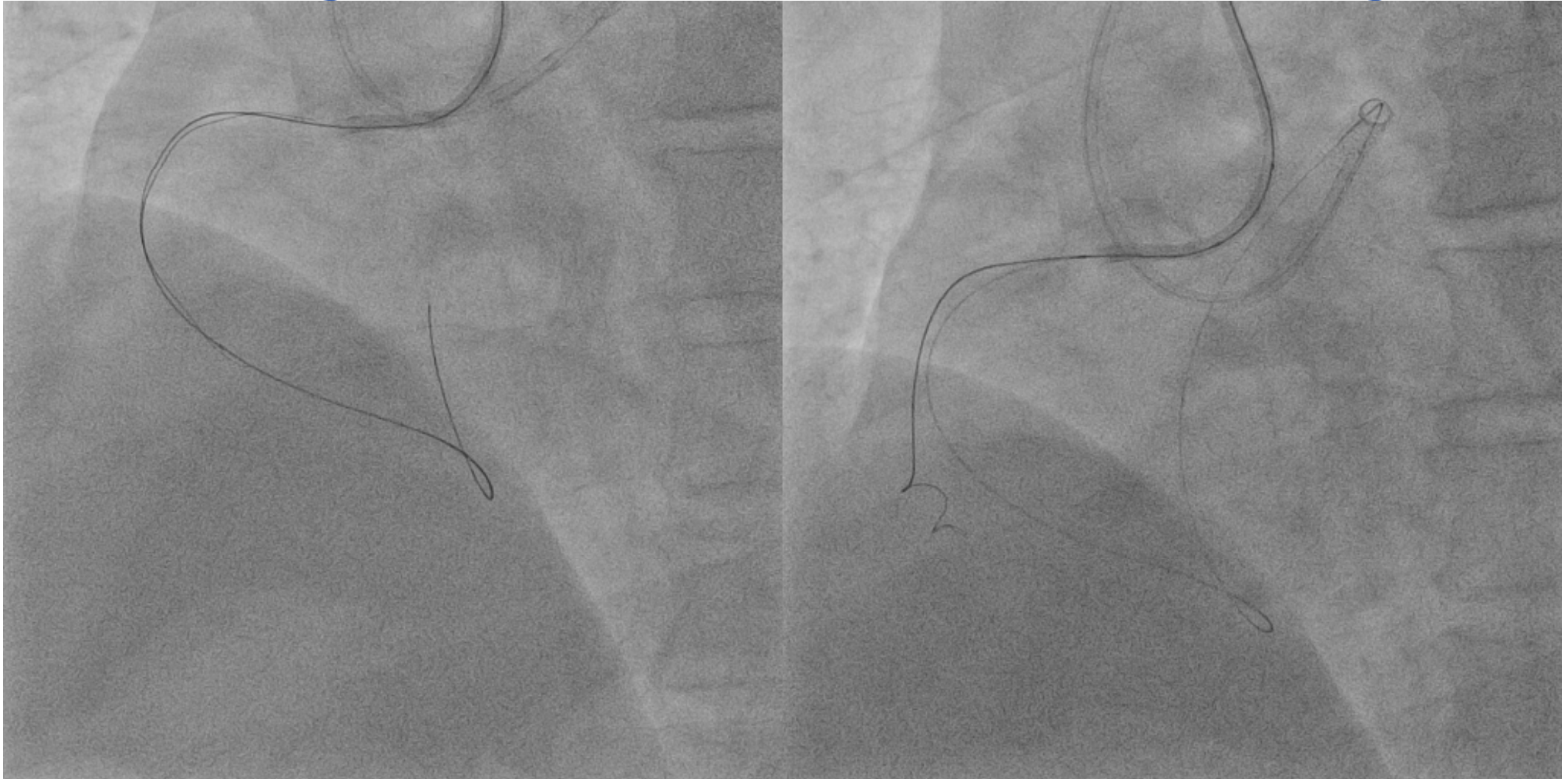
# 150cm Finecross tip injection



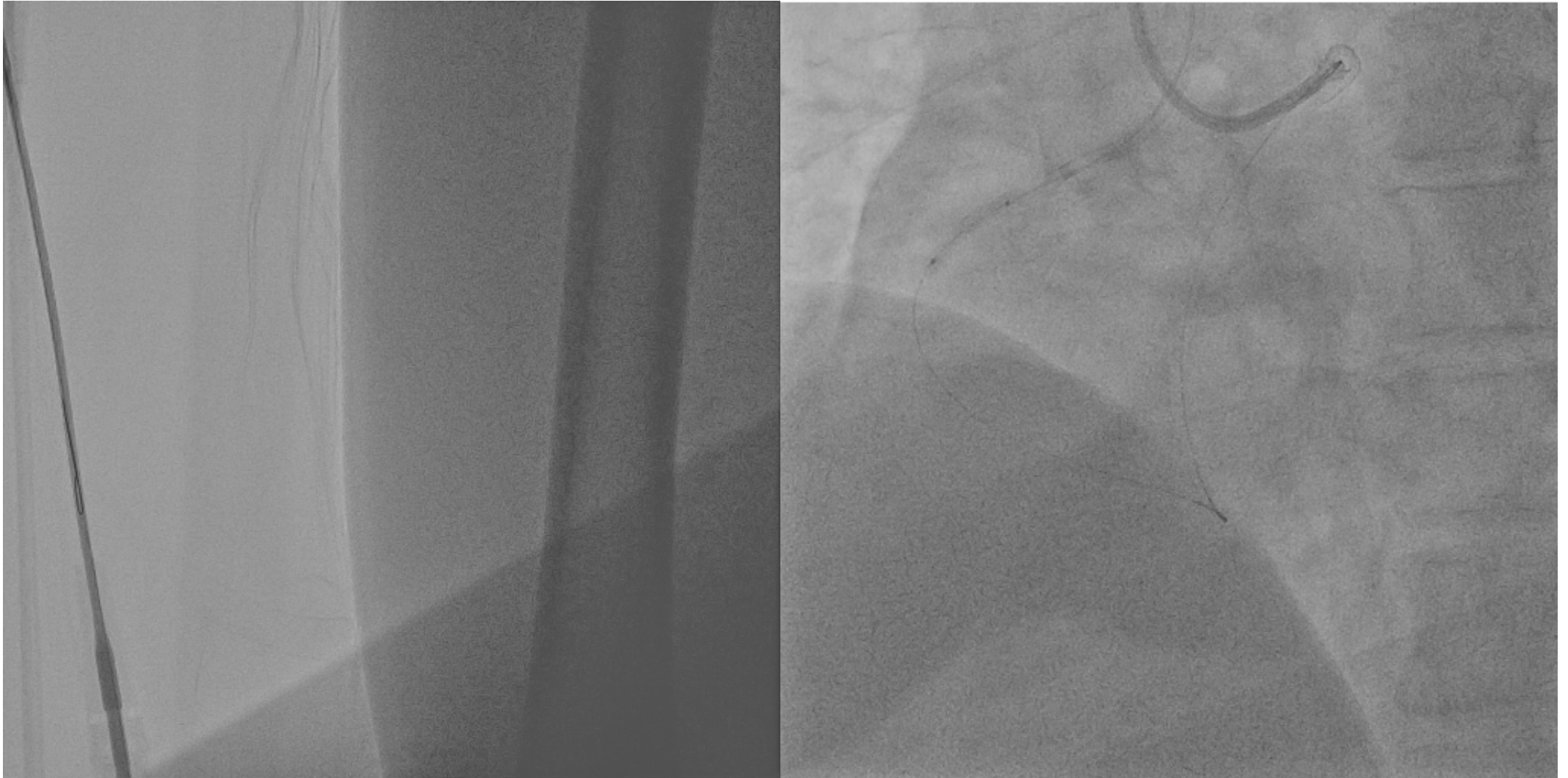
# Retrograde Fielder XT GW, reverse CART with Sprinter 2.5\*15 balloon



# Retrograde wire and microcatheter into antegrade GC with balloon anchoring



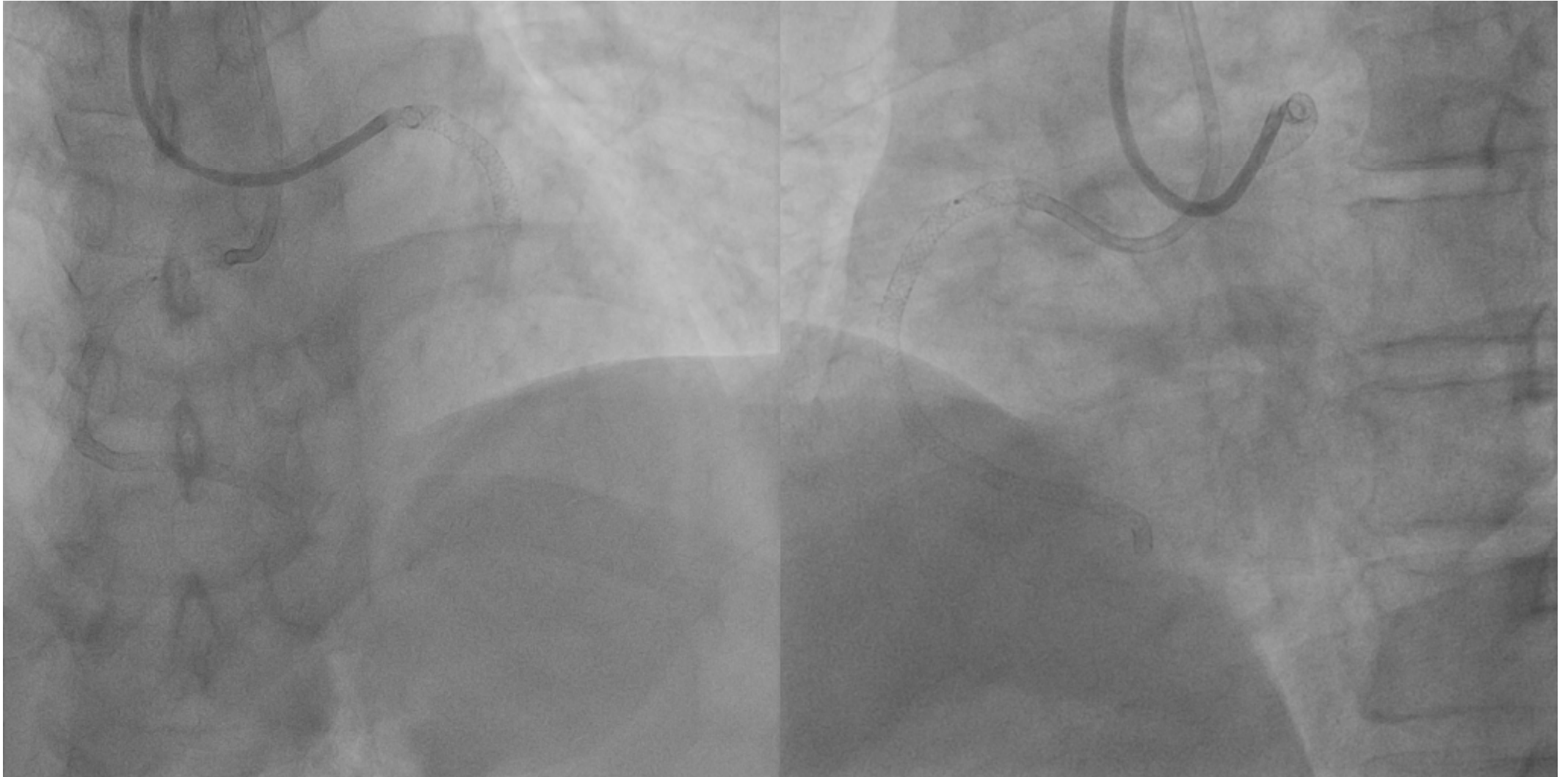
# Fielder FC 300 externalization, PTCA with sprinter 2.5\*15mm balloon



# Promus Element 2.5\*38, 2.75\*38, 3.0\*32mm stents, Quantum 3.0\*15 balloon



# Final result



- Cr 95  $\mu\text{mol/L}$ , TnI 0.43ng/mL
- Remain asymptomatic during follow up





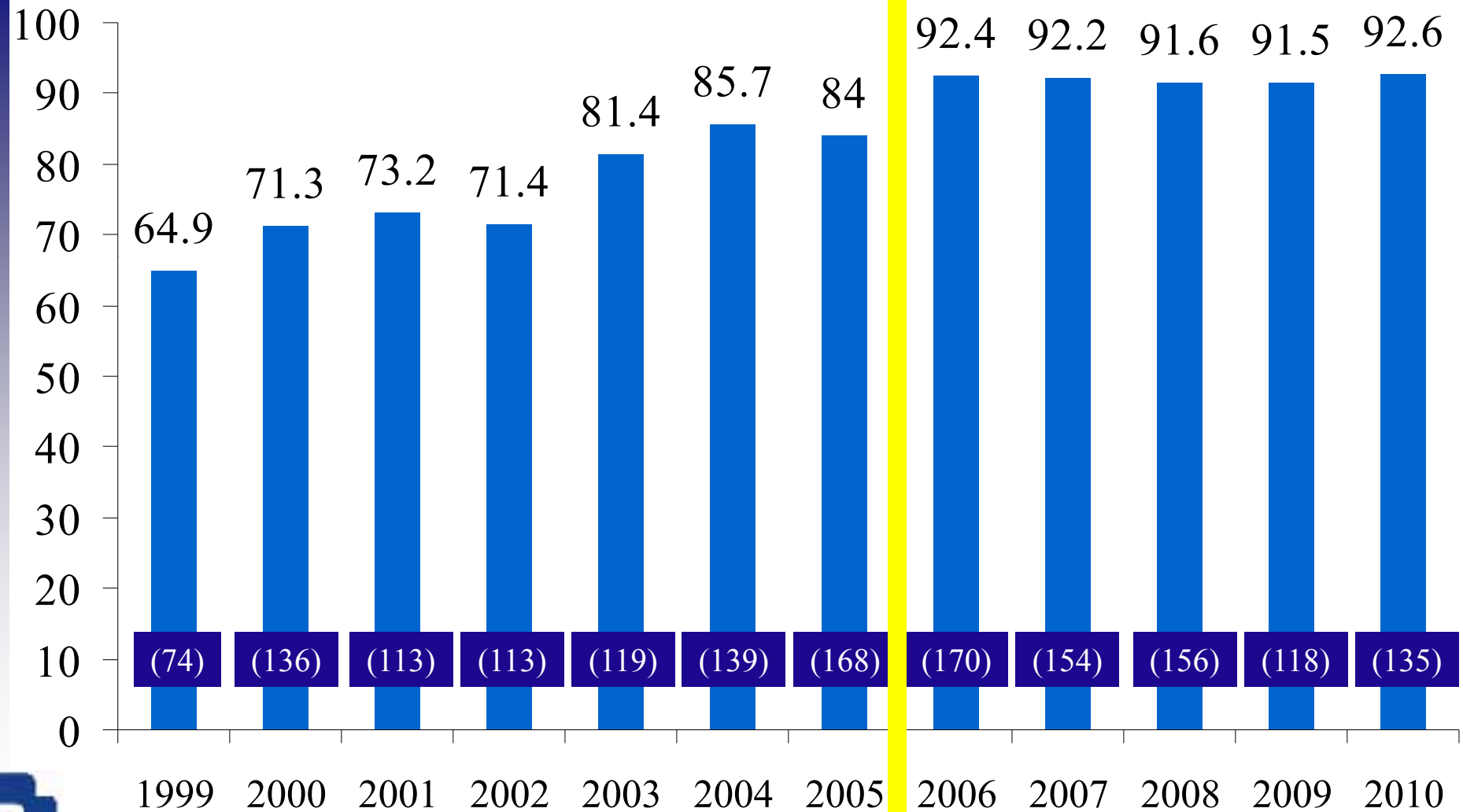
# CTO PCI Outcomes

	Non Retrograde Operator (n=241 cases)	Retrograde Operator (n=395 cases)	P value
Procedural Success (%)	58.9	75.2	<0.0001
Procedure Time (min)	141.1	107.3	<0.0001
Fluoroscopy Time (min)	45.0	42.0	NS
Contrast Total (cc)	433.5	342.2	<0.0001
Death	0	0	NS
Myocardial Infarction (%)	3.32	2.53	NS
Significant Perforation (%)	0.83	1.01	NS
MACE (%)	4.15	3.04	NS

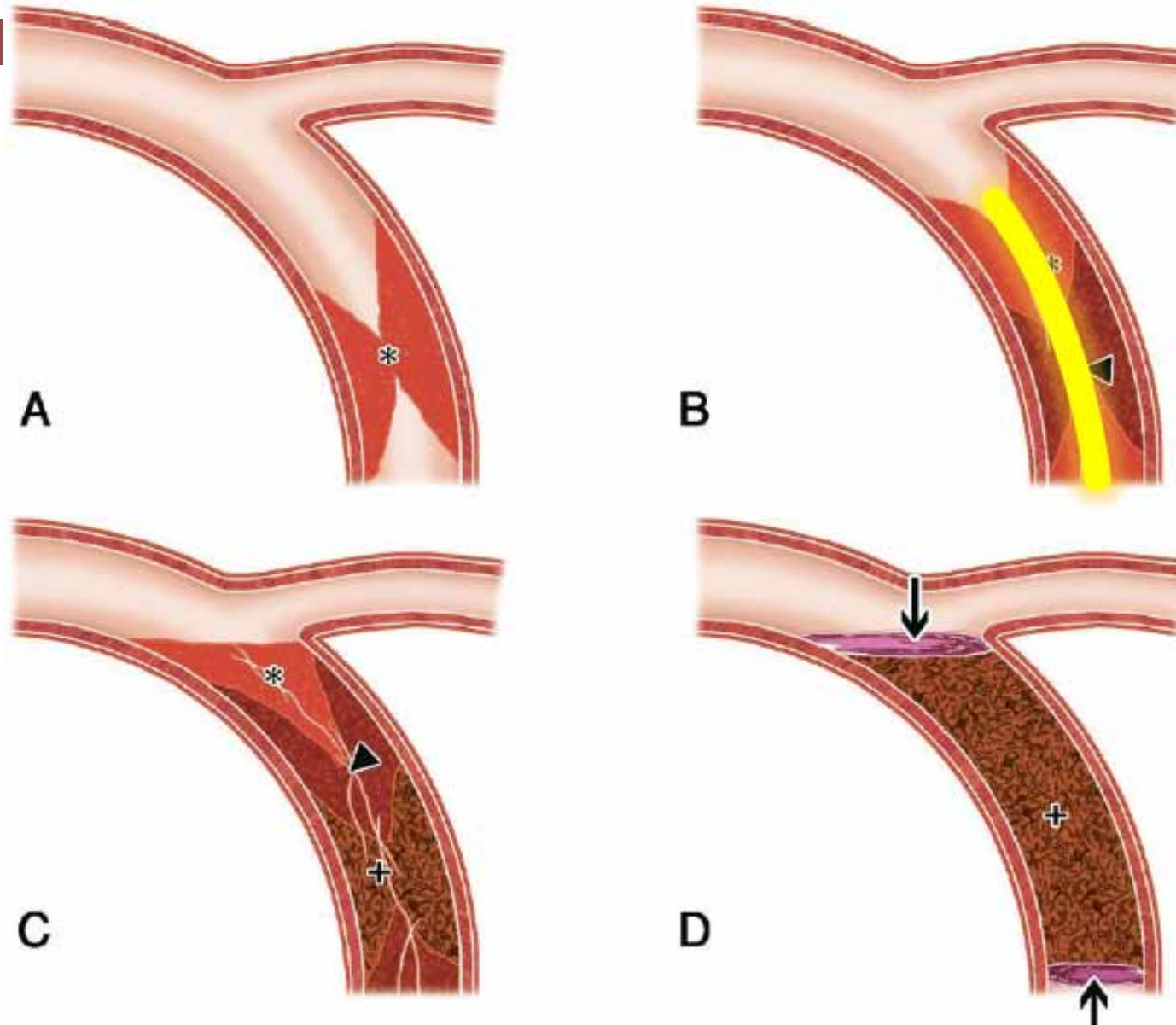


*Dartmouth –North Cascade Multicenter CTO Registry,  
Thompson CA, Lombardi WL*

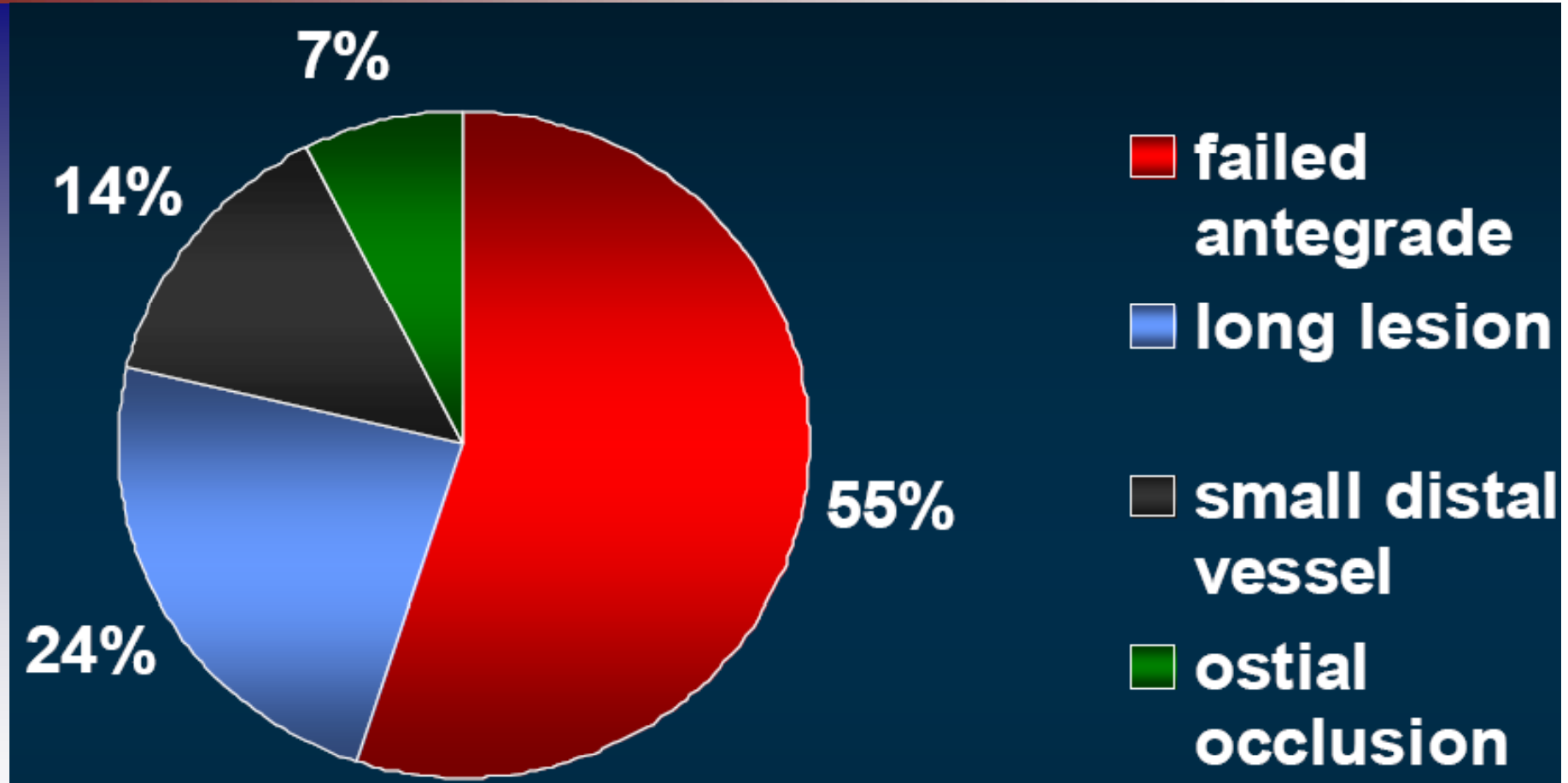
# CTO PCI success rate in Toyohashi Heart Center



# Progression of CTO lesions



# Indication for CTO retrograde approach

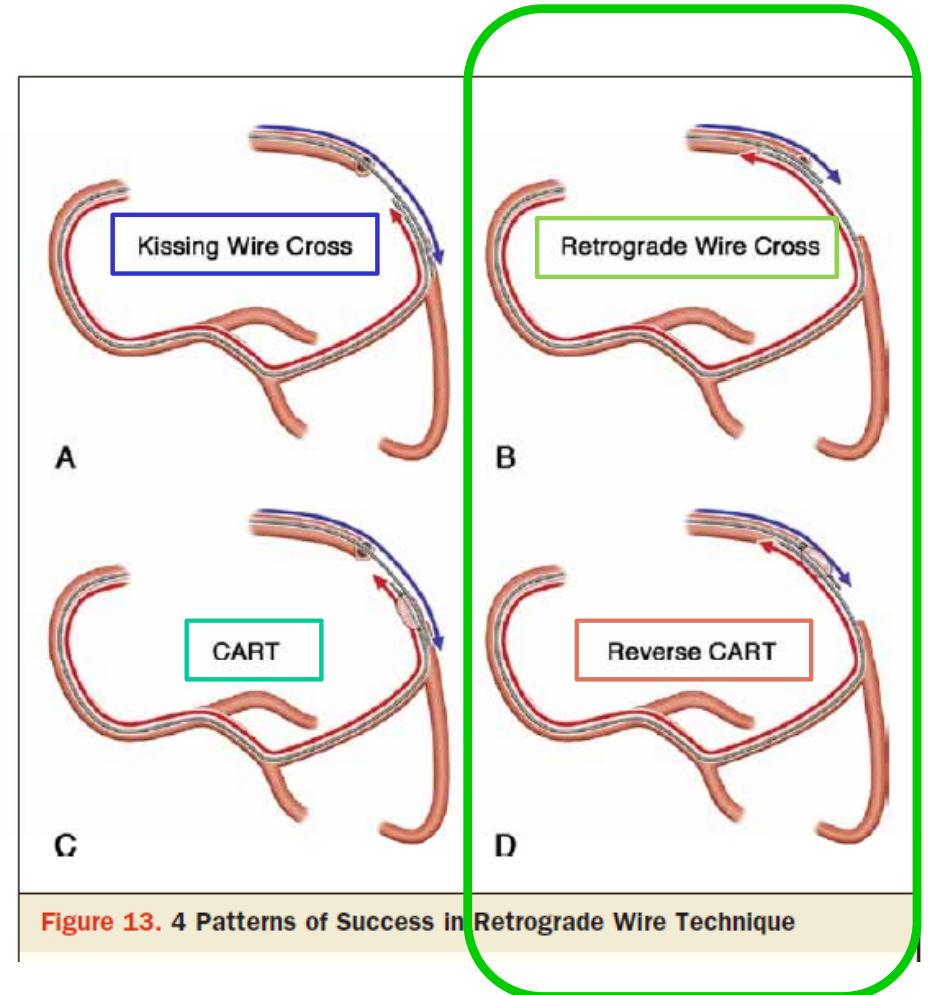
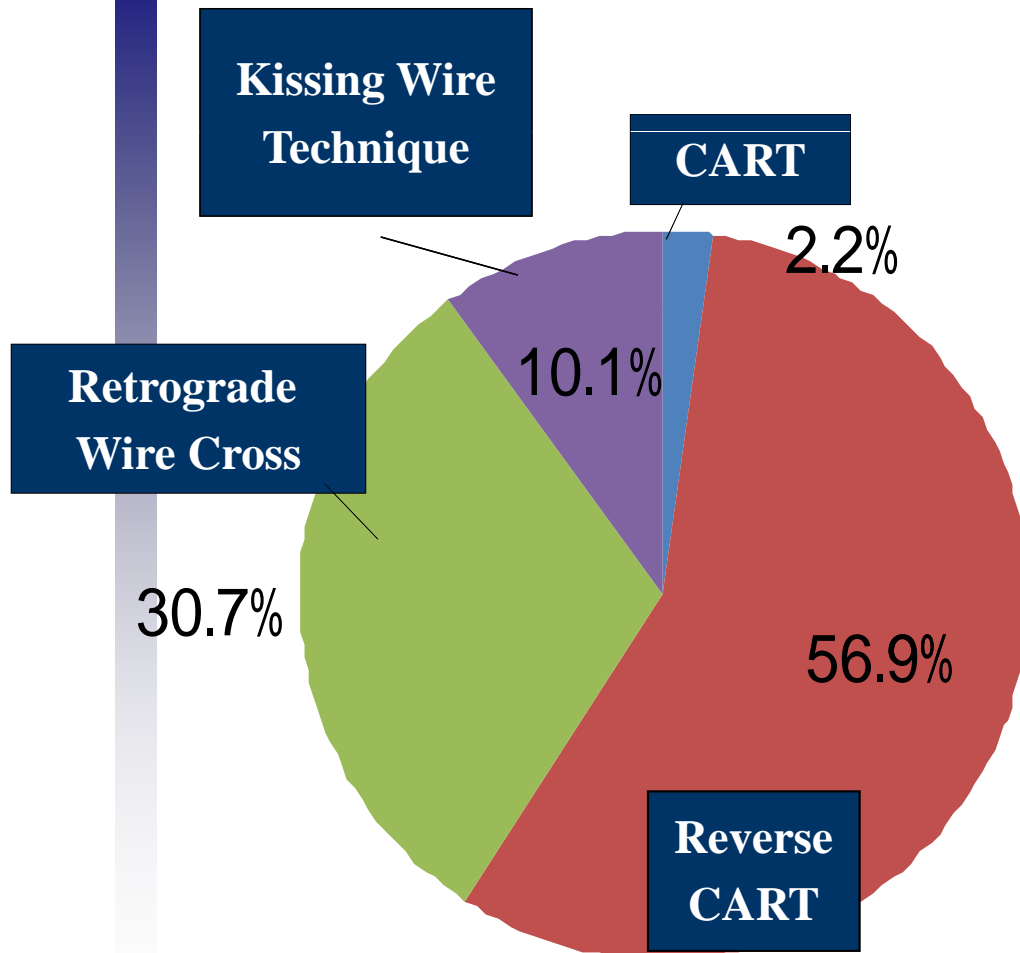


# Predictors of Procedural Success in Retrograde Approach

Variable	Retrograde success N=103	Retrograde failure N=54	P value
Significant side branch	16(15.5%)	10(18.5%)	0.656
Severe tortuosity	14(13.6%)	7(13%)	0.993
Severe calcification	14(13.6%)	9(16.7%)	0.695
Non aorto ostial	15(14.6%)	7(13.0%)	0.878
Bridging collaterals	26(25.2%)	12(22.2%)	0.845
CTO length, mean+/-SD	37.15+/-18.84	34.76+/-16.83	0.436
Collateral channel –Septal	74(71.8%)	32(59.3%)	0.150
Epicardial	19(18.4%)	20(37%)	0.018
SVG	10(9.7%)	2(3.7%)	0.221
Collateral channel type			
CC0	3(2.9%)	20(37%)	<0.001
CC1	66(64.7%)	12(22.2%)	<0.001
CC2	33(32.4%)	22(40.7%)	0.029

# CTO Crossing

## Successful strategy



~ 90%



# Standard Retrograde Approach with Channel Dilator

**1. Collateral channel tracking**



**2. Advancement of channel dilator**



**3. Retrograde wire cross or reverse CART**



**4. Externalization of 300cm wire**

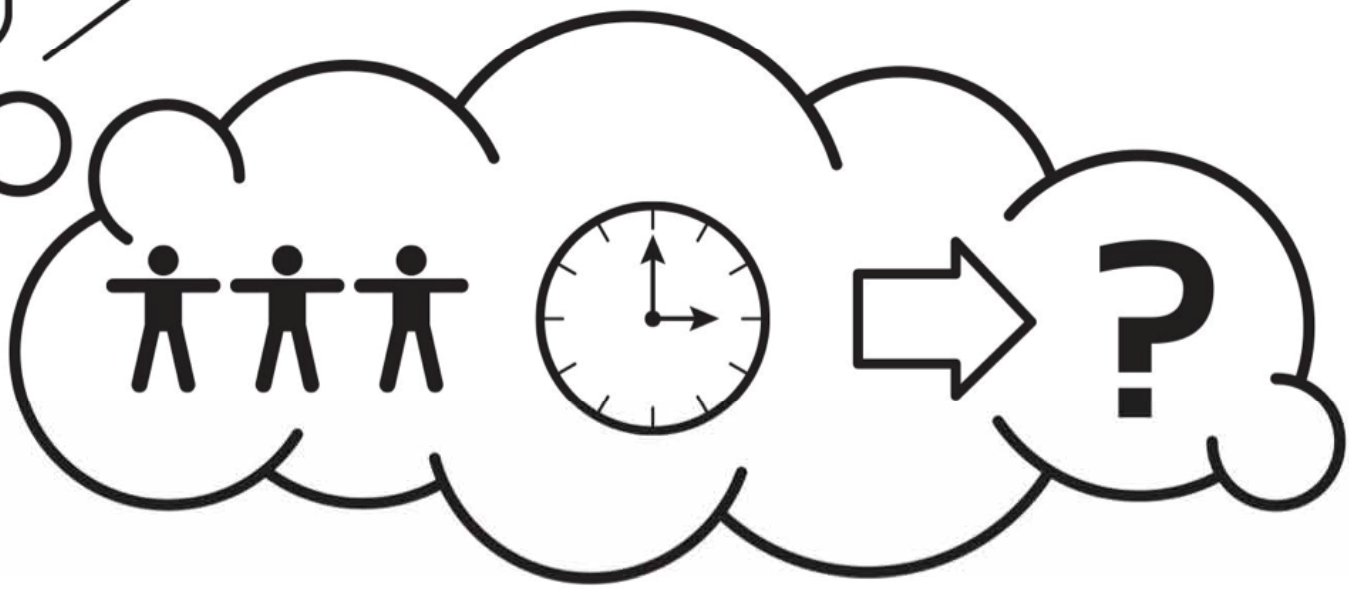


**5. Antegrade balloon/stent through the reversed 300cm wire**

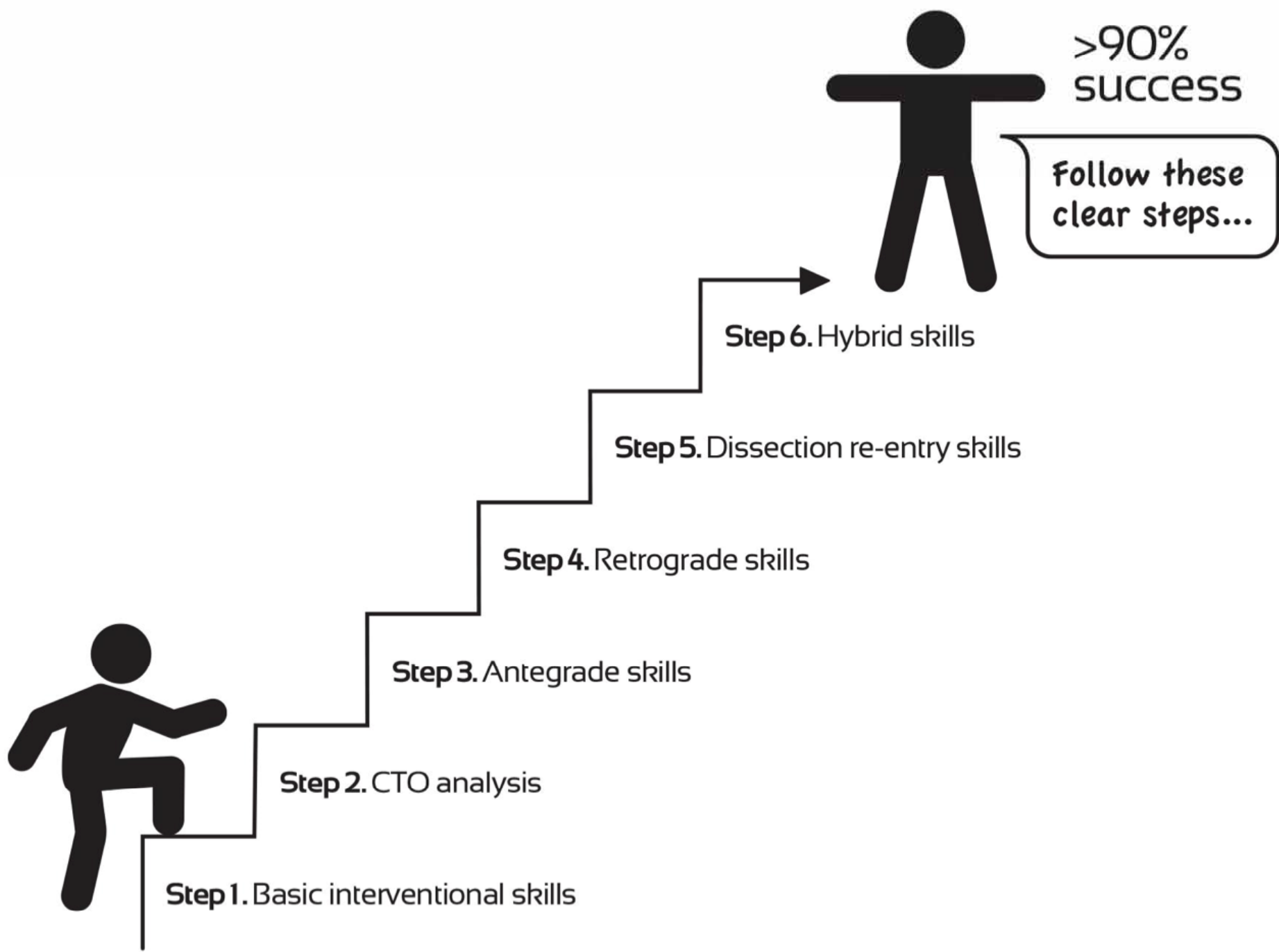


>90%  
success

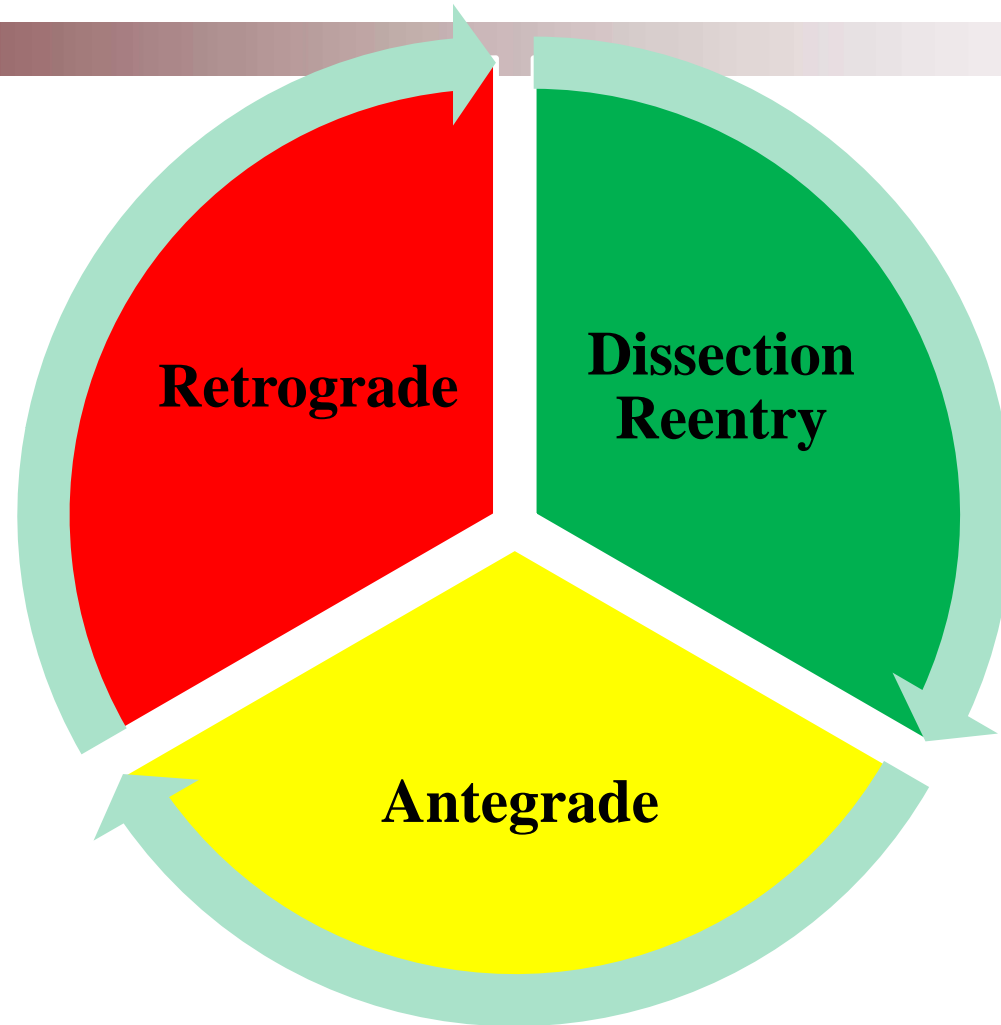
How do I get  
that good?







# Continuum of CTO PCI: Hybrid Strategy



Adoption of only 1 or 2 of these strategies will limit the patients who can be treated on the basis of coronary anatomy

# Hybrid Algorithm for CTO PCI

## *Symplifying the Procedure and Equipment*

