

# New CTO guide wires & technique

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# LAD CTO with micro channel

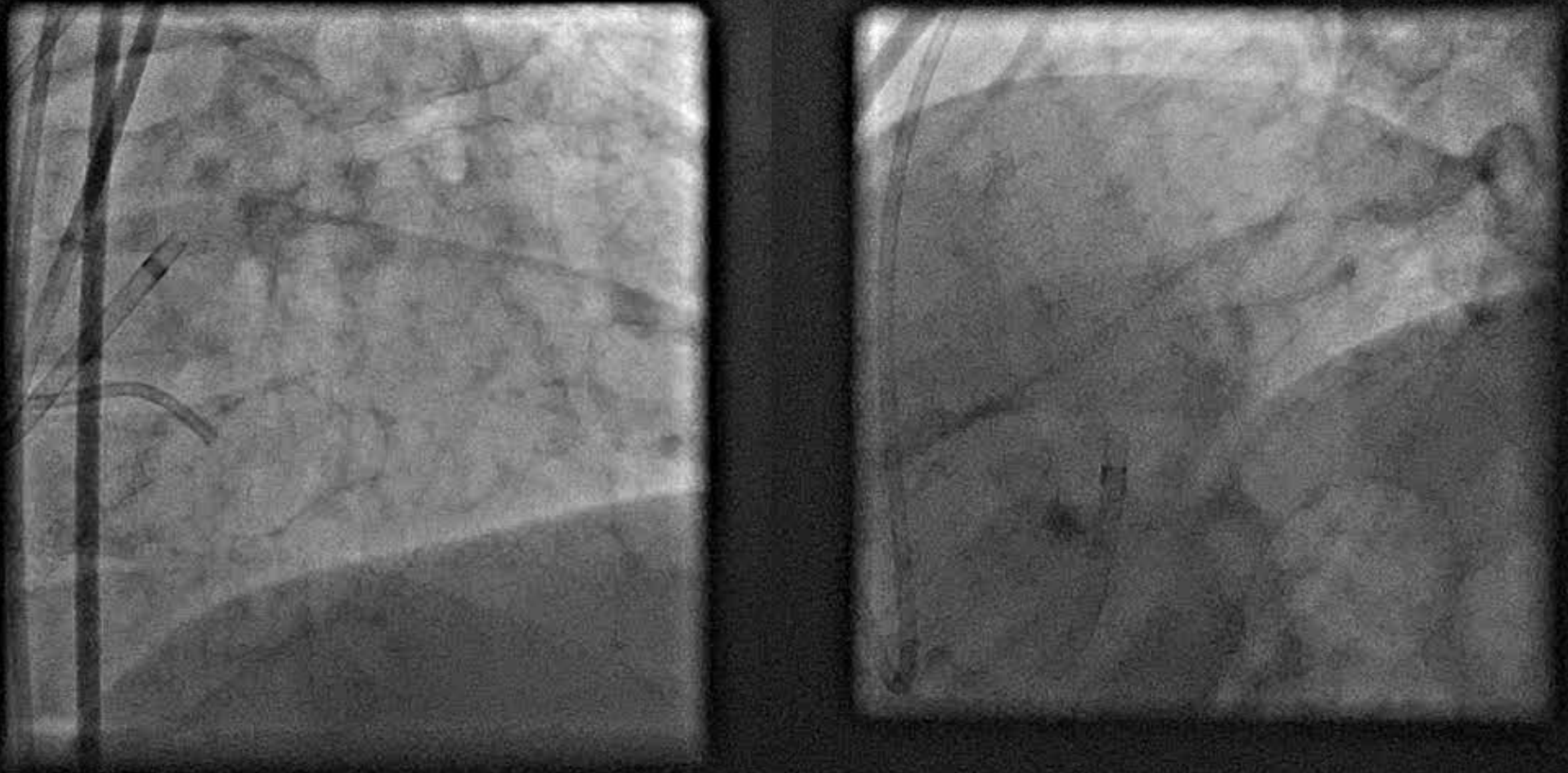


Diagnostic angiograms. LAD CTO lesion with a recanalization channel.

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# Micro channel



Simultaneous angiogram at the time of PCI. A very small and curving channel. Which guide wire should be selected?



# Micro channel negotiation



Controllable, taper wire. Fielder XTR could negotiate the channel.

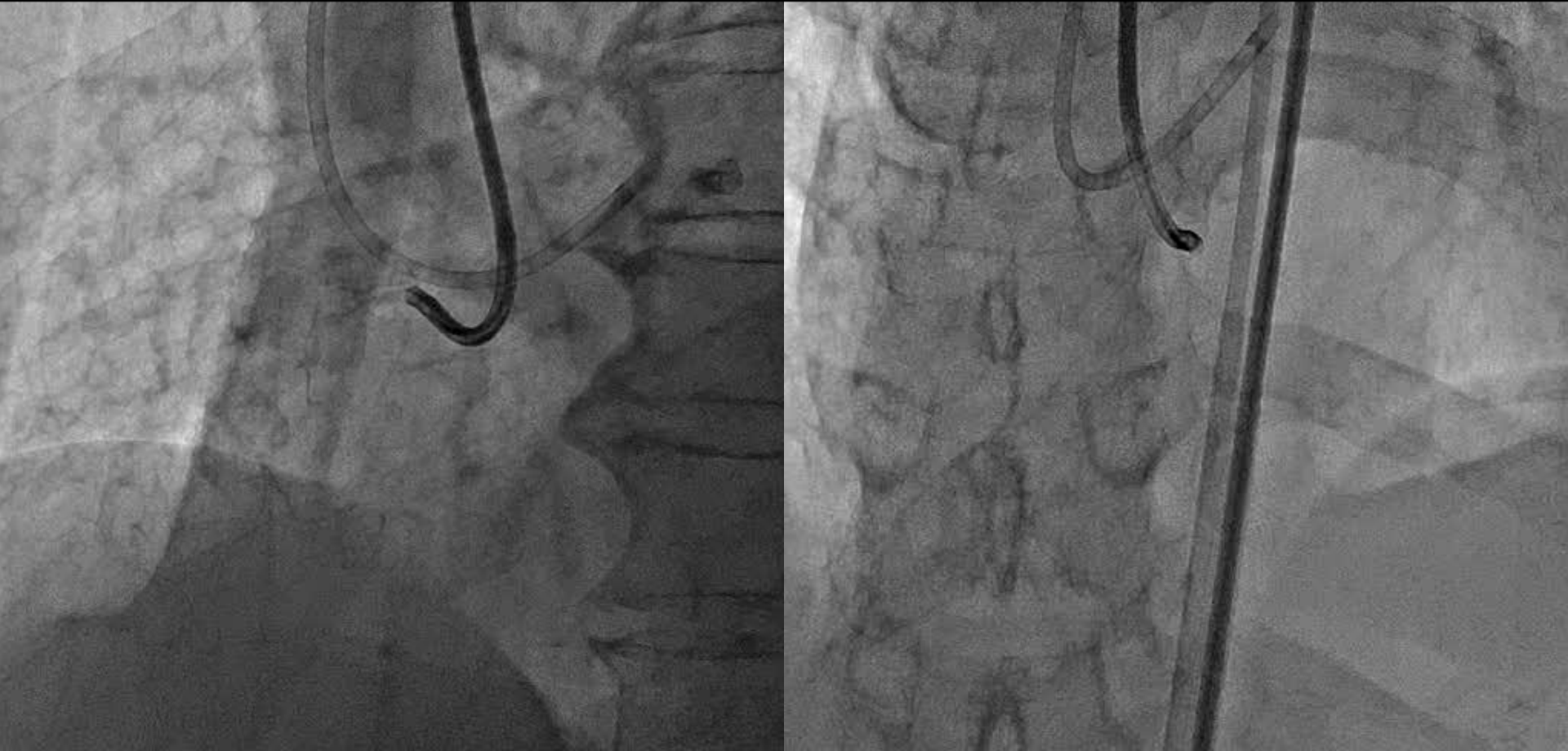
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# Final angiograms



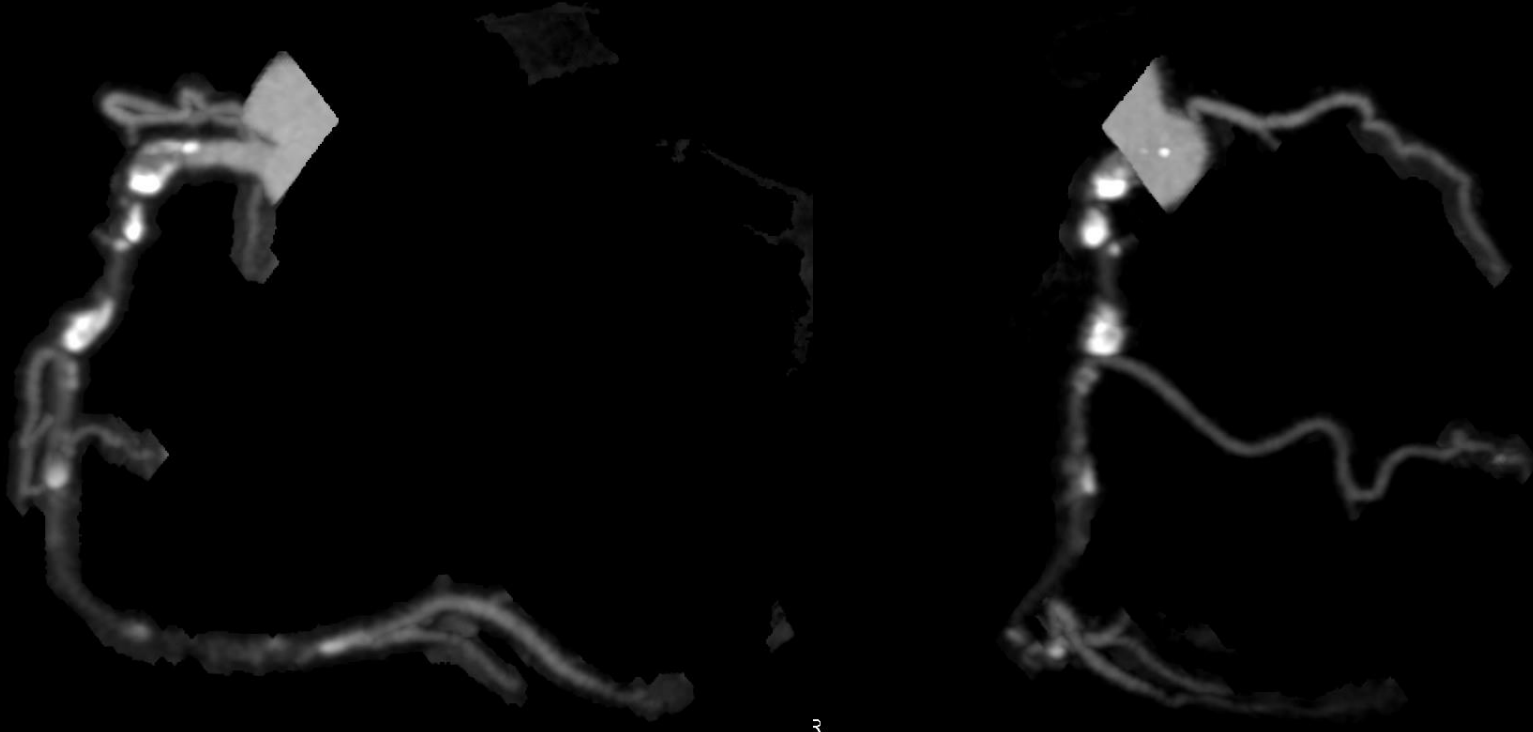
# RCA CTO lesion



Proximal and distal RCA CTO lesion. Small recanalization channel? Distal RCA?



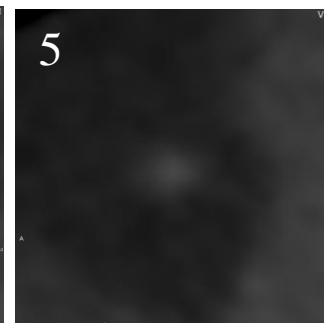
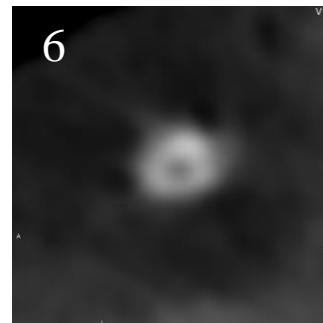
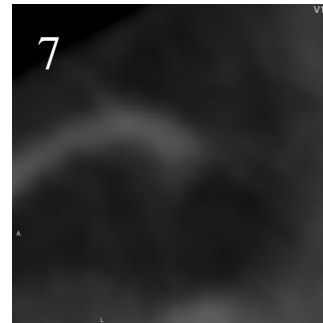
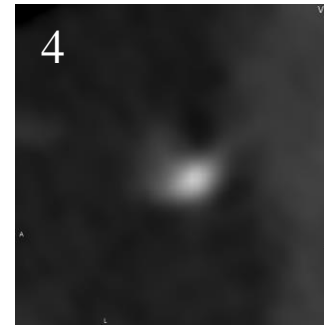
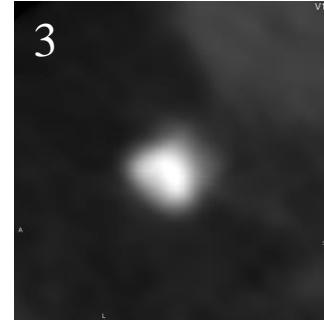
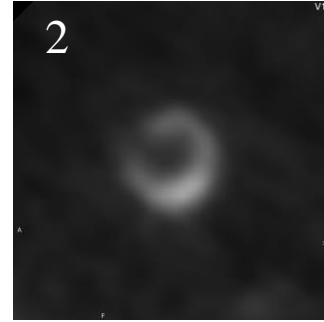
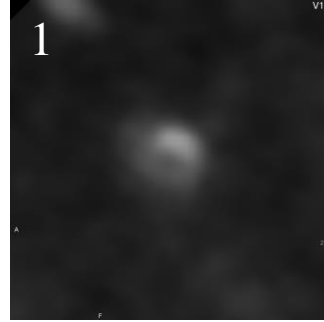
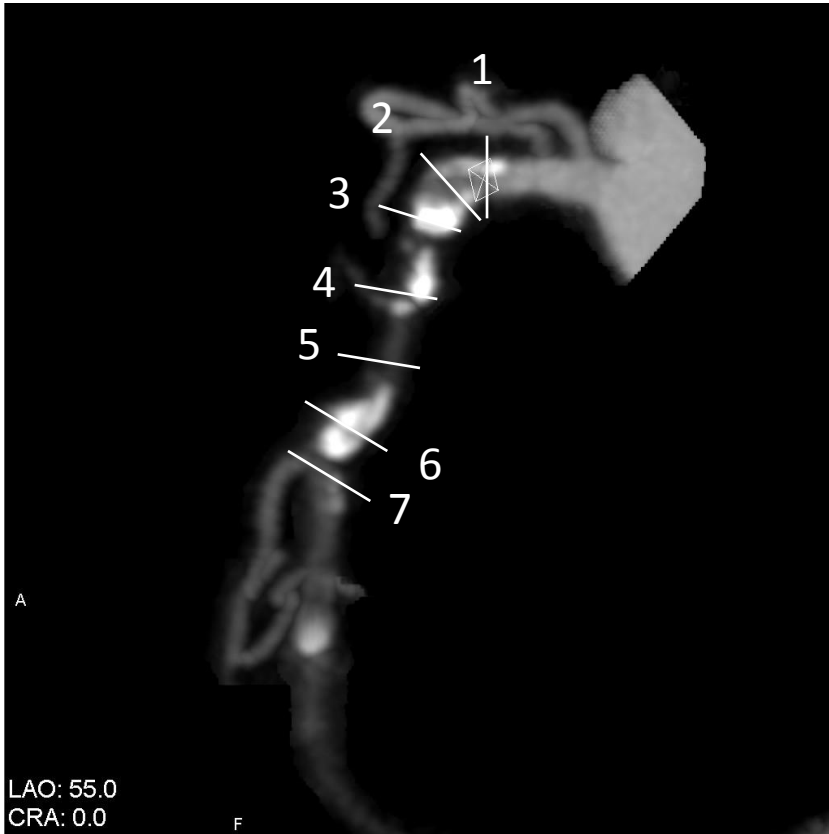
# Coronary MDCT (MIP)



Vessel course, size, lesion characteristics and calcium distribution.



# Coronary MDCT (MPR)

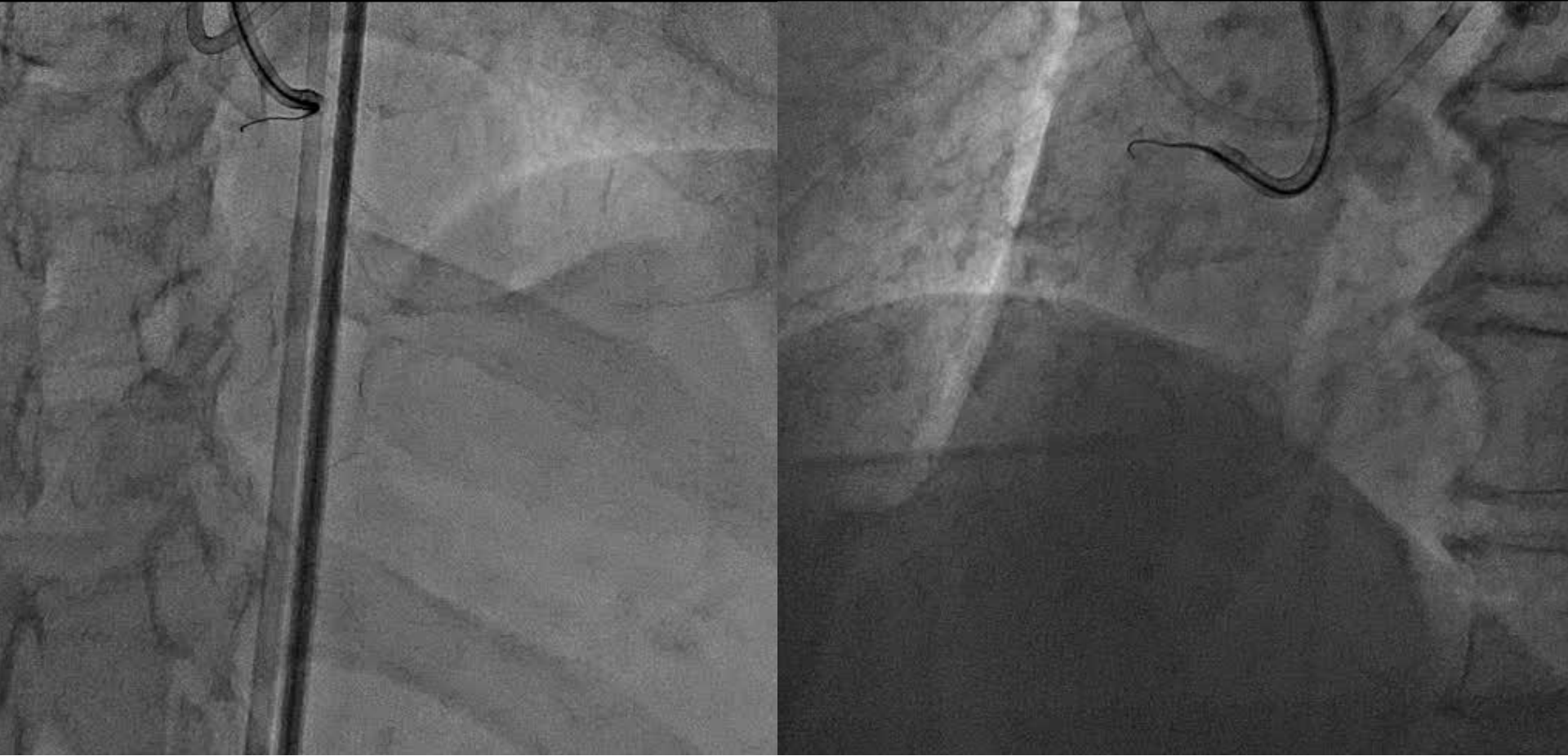


MPR image delineates calcium distribution. Calcium location, deep? Superficial?





# Loose tissue tracking



Possibility to pass with a floppy wire. Fielder XTR to negotiate loose tissue.



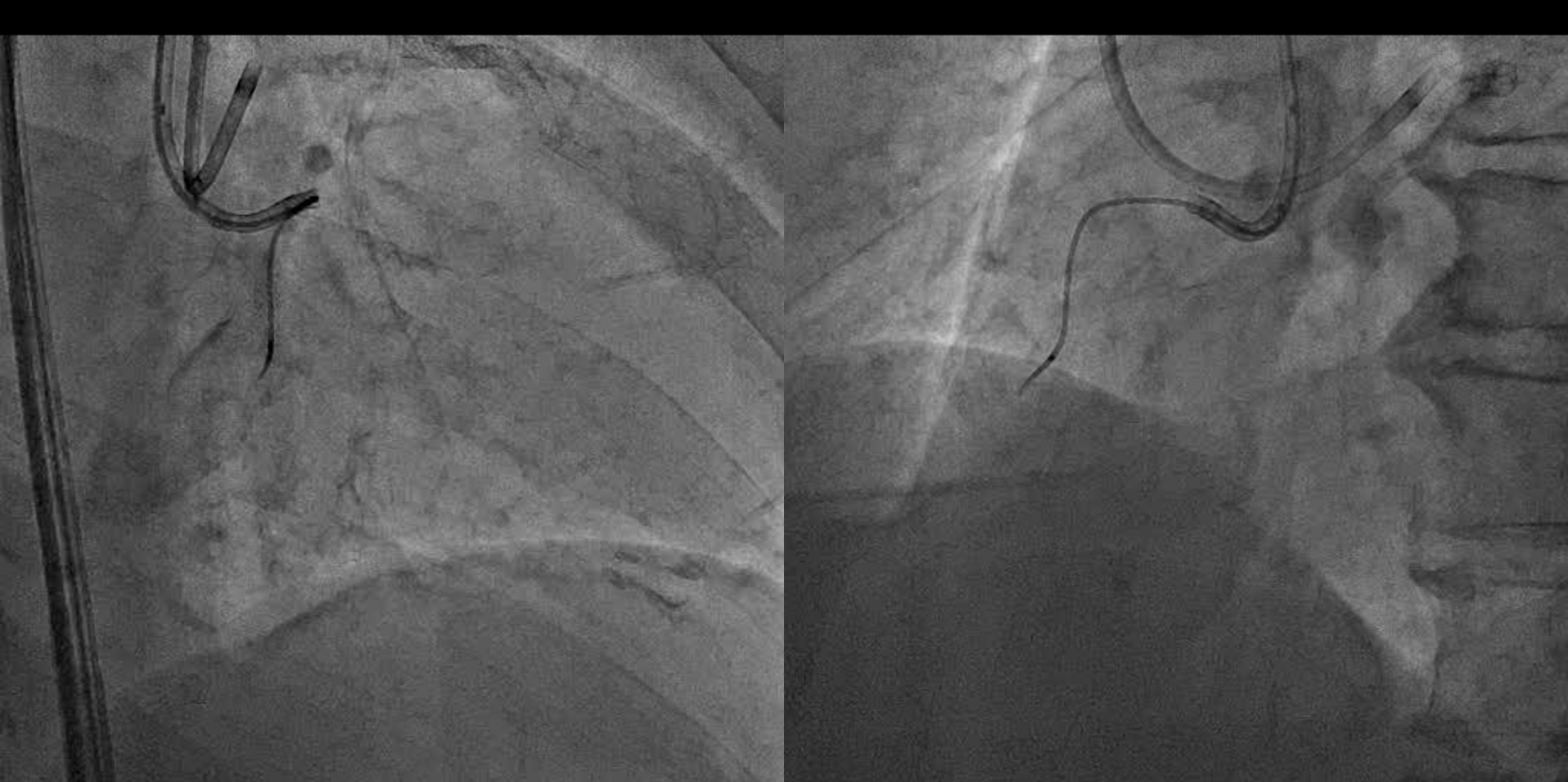
# Wire cross through the proximal CTO



Pass the lesion toward the RV branch.



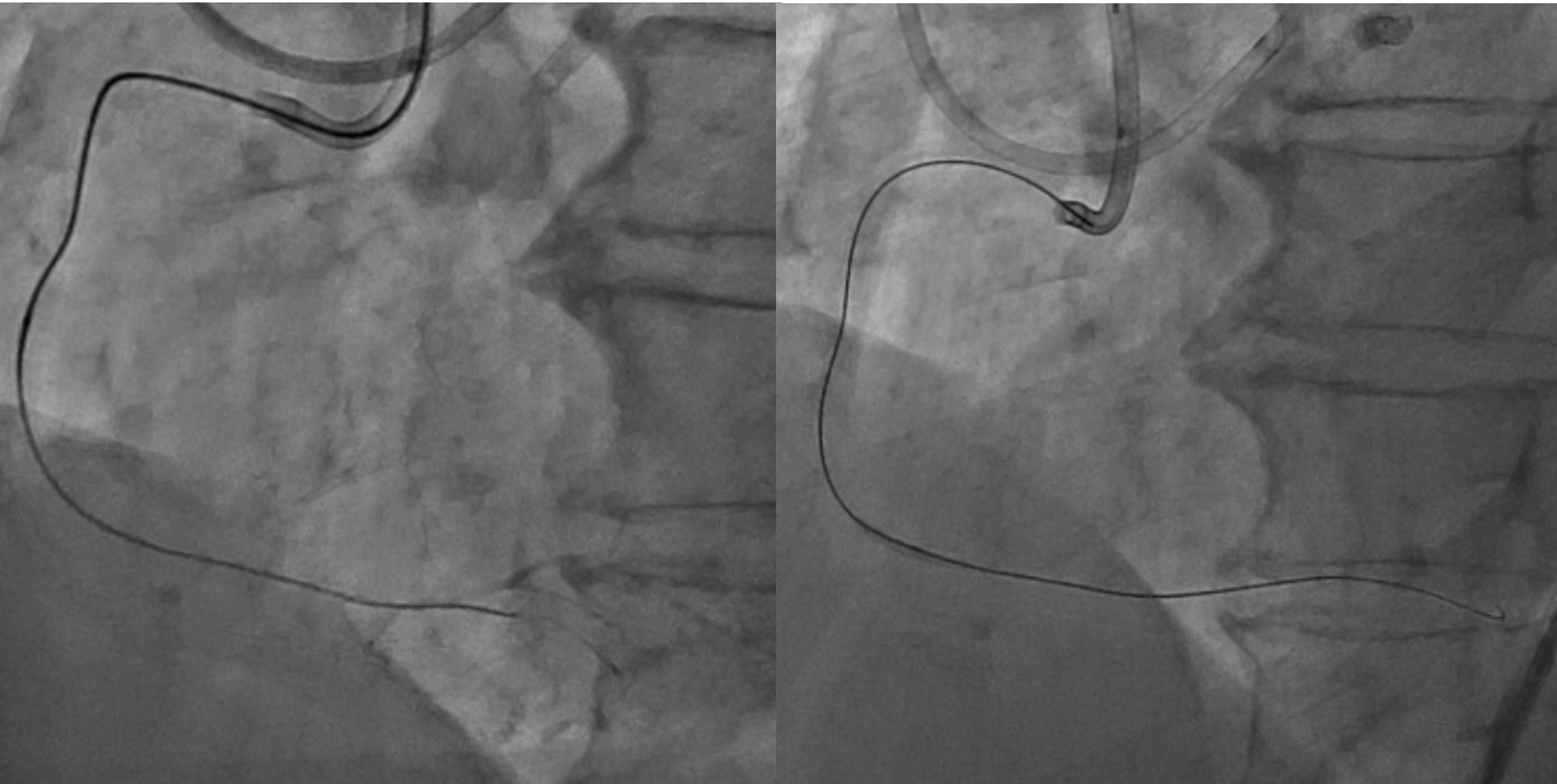
# Angiography from the micro catheter



Simultaneous injection via left coronary guide and micro catheter.



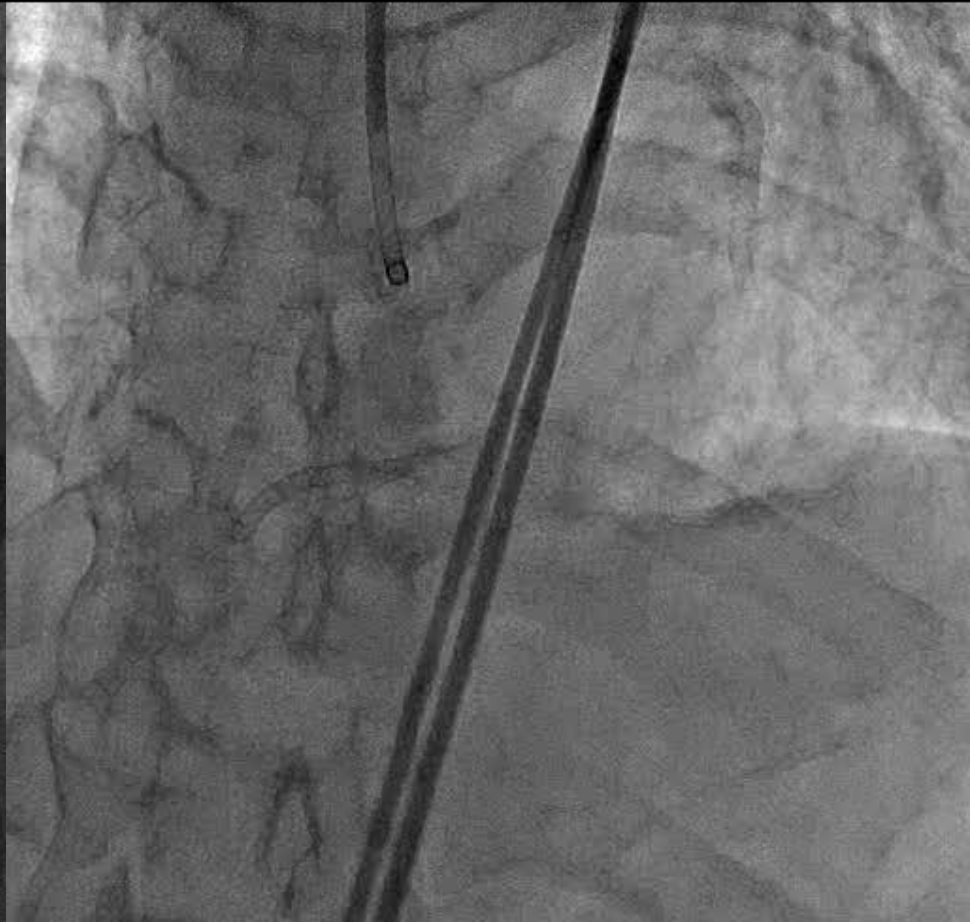
# Crossing the distal CTO



Fielder XT-R was also used.

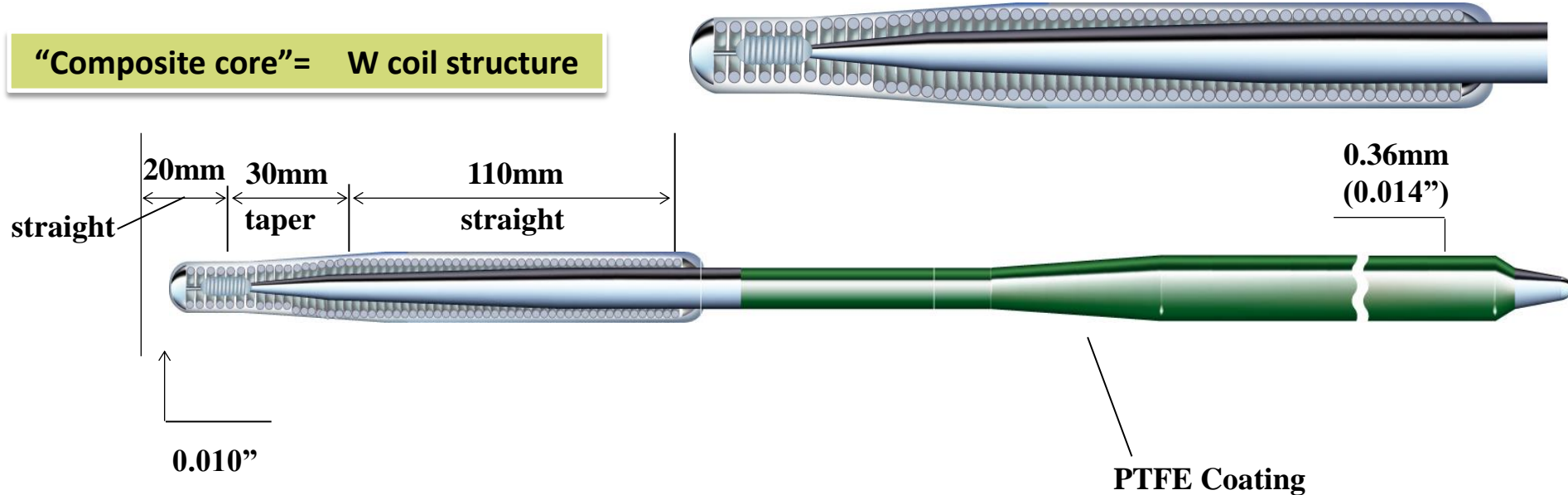


# Final angiograms



# Fielder XTR and XTA

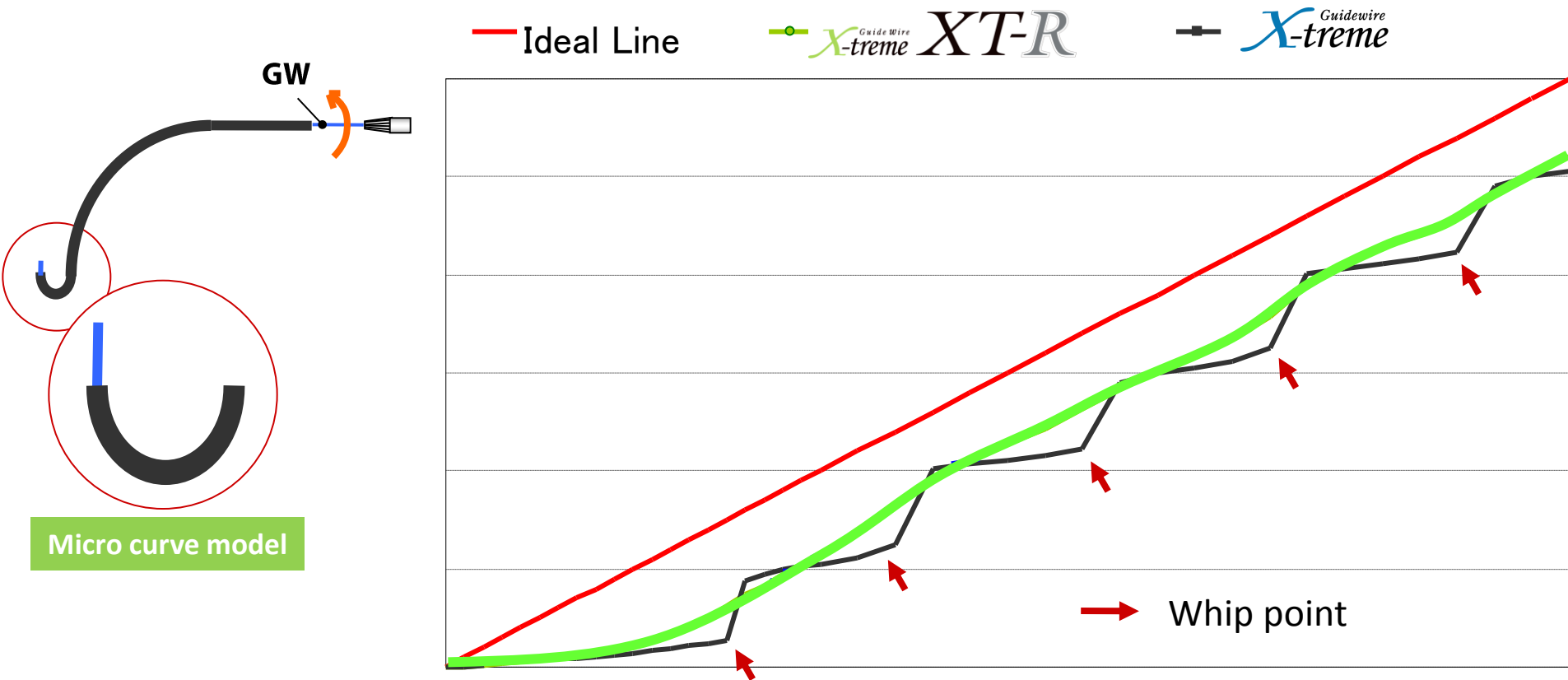
**"Composite core" = W coil structure**



Composite core provides less whip motion, therefore, an easy wire manipulation and channel tracking are achieved. This structure is resistant to wire fracture. The difference between XTR and XTA is tip load. XTR has its tip load of 0.5 gram and XTA has 1.0 gram.



# Wire movement in micro curve model



Both guide wires have initial delay to rotate. Tip movement of XTR is nearly parallel to the ideal line. The tip of Fielder XT does not rotate until whip motion occurs. After this, GW rotates at a burst. It causes difficulty for GW control.

# *X-treme*





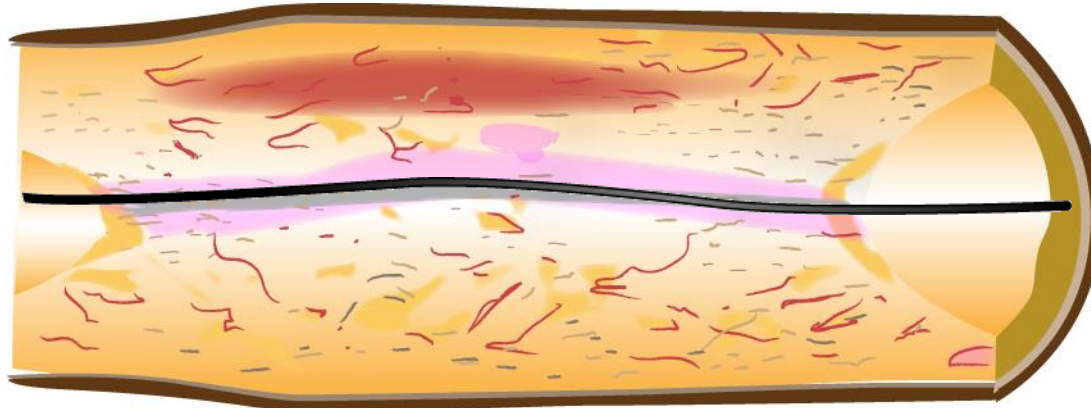
*XT-R*



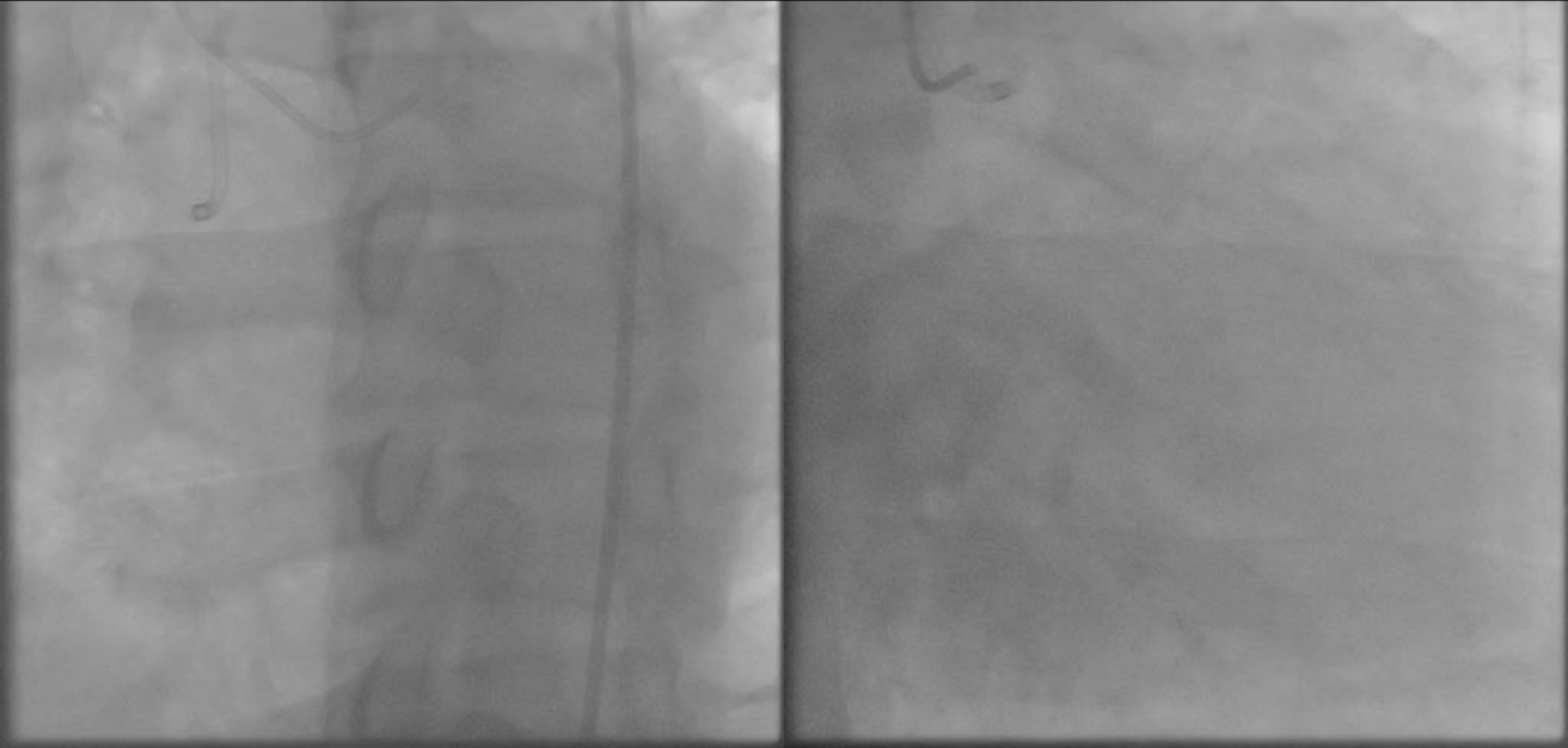
# Advantages of Fielder XTR

## Micro channel selection and loose tissue tracking

- Floppy tip → prevention for subintimal dissection
- Small tip profile → advance into the lesion
- Lubricity and torque response → crossing the lesion



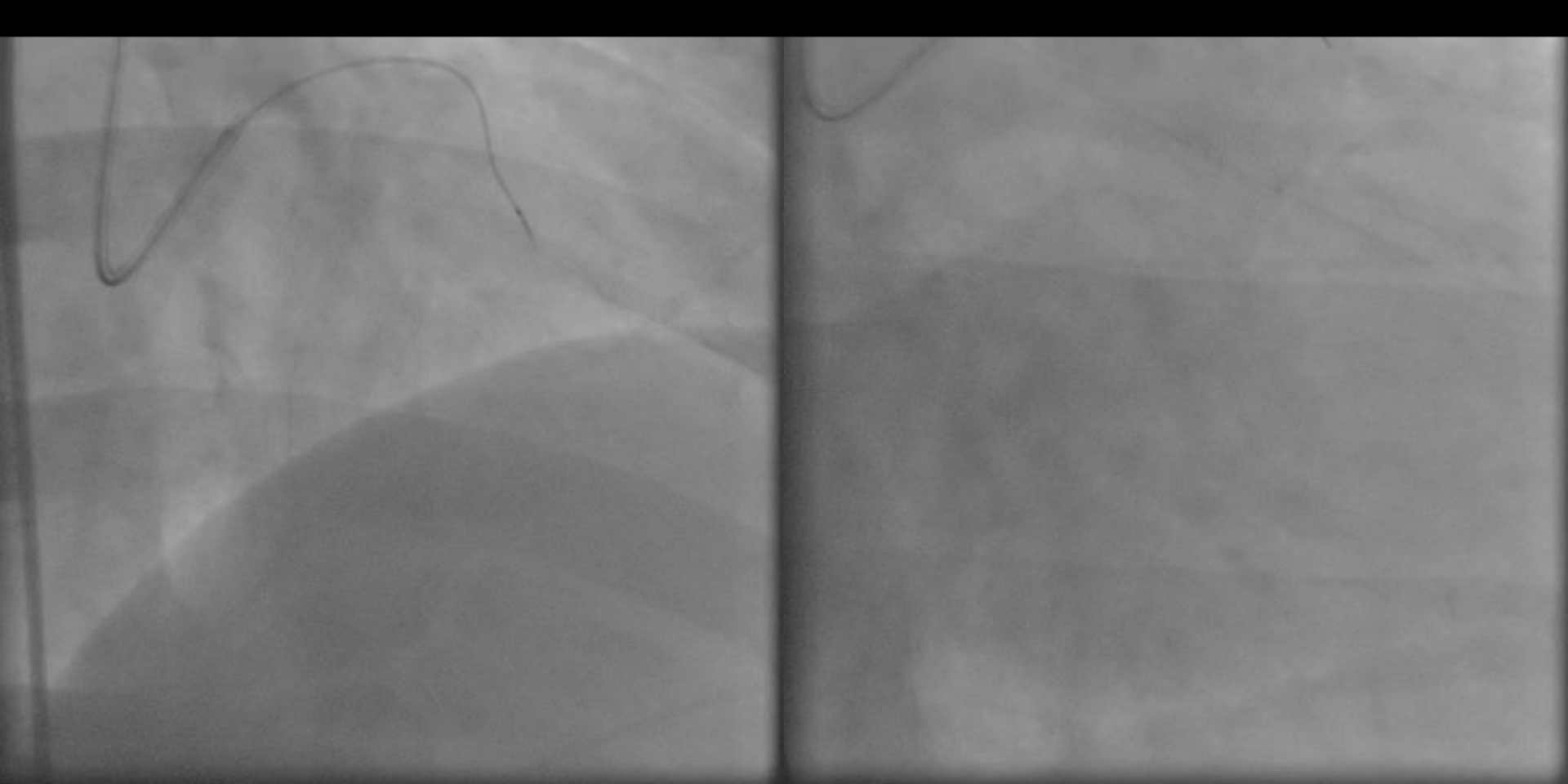
# RCA CTO



RCA CTO lesion. Collateral channel tracking. Very small septal channel.



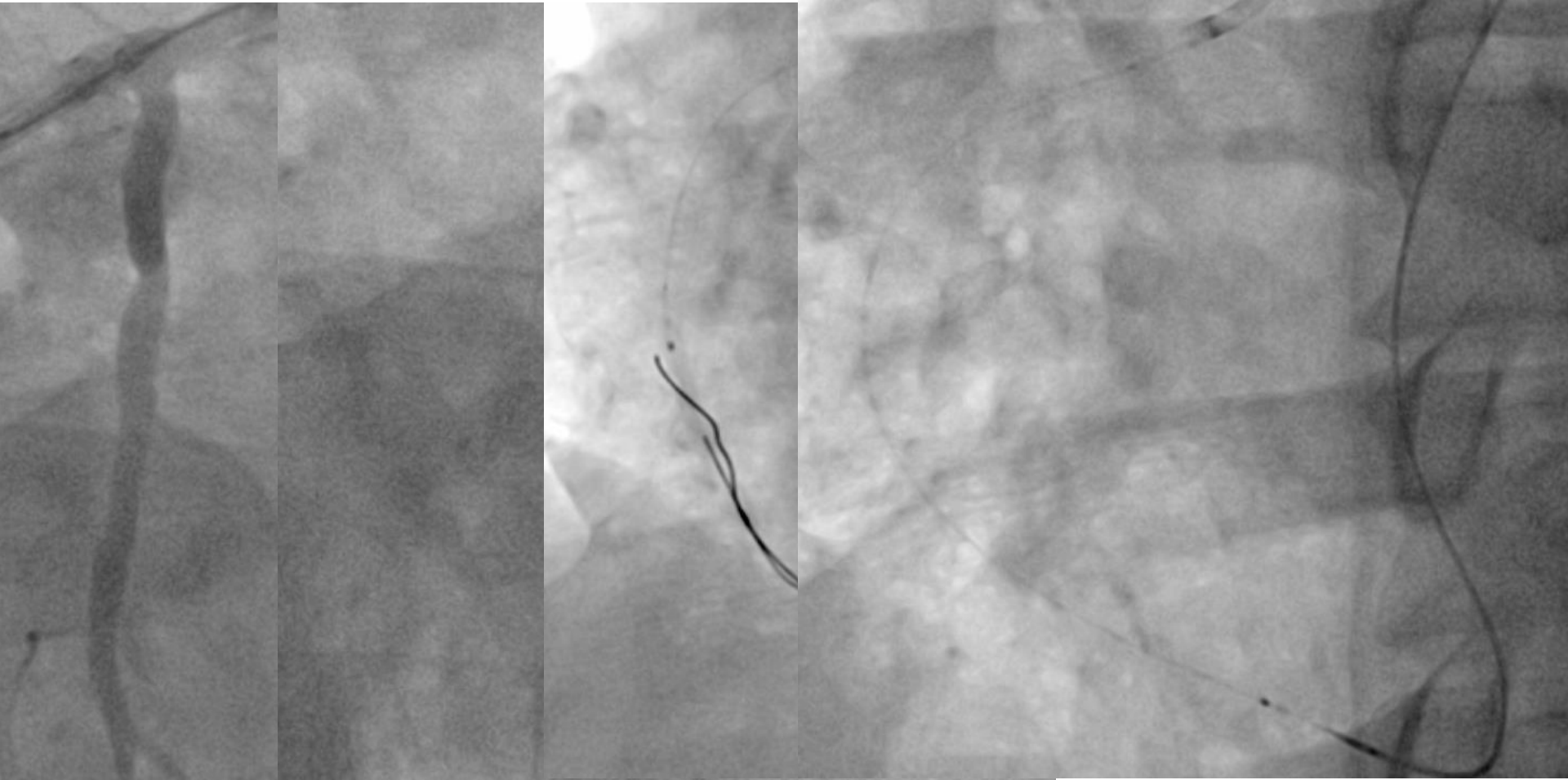
# Very small septal channel



A very small connection.



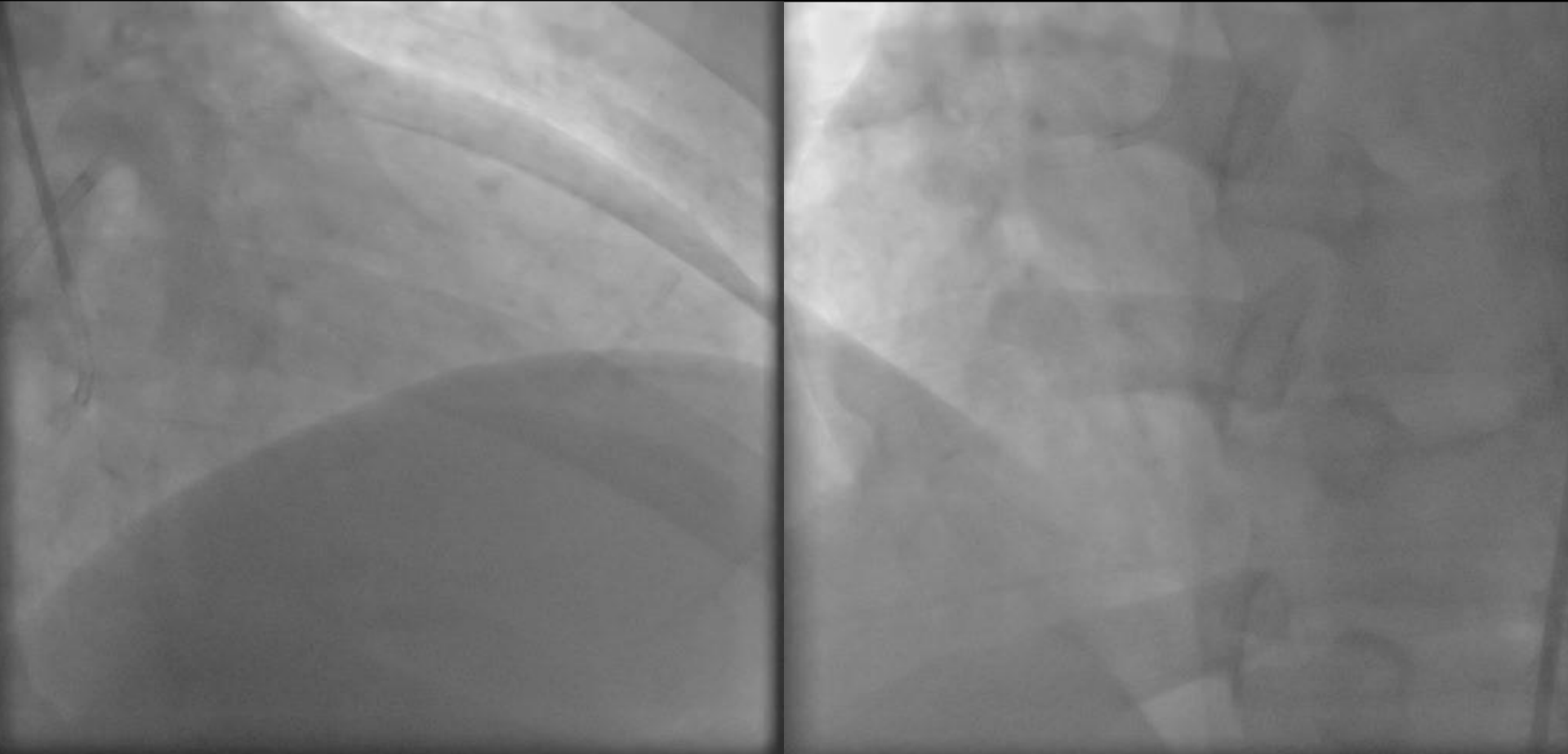
# Channel crossing by Fielder XTR



Channel tracking by a Fielder XTR. Reverse CART for CTO crossing.



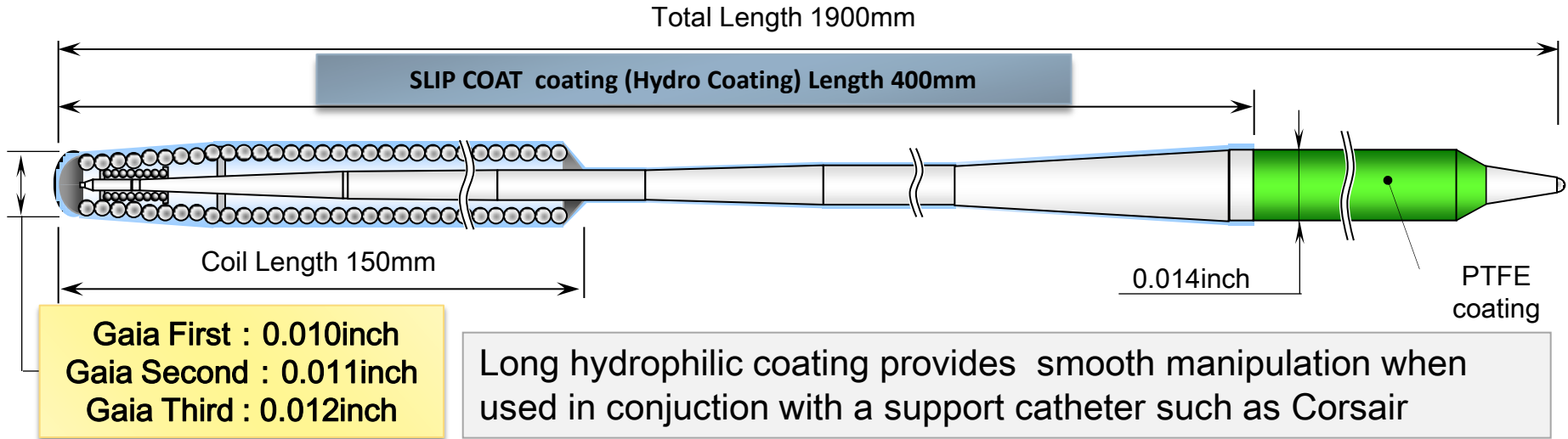
# Final angiograms



Successful recanalization was achieved.



# GAIA: Basic structure



Line-up options allow the operator to choose the appropriate wire for a variety of situations

**Gaia First**

Diameter : 0.010 - 0.014"  
Tip load : 1.5gf

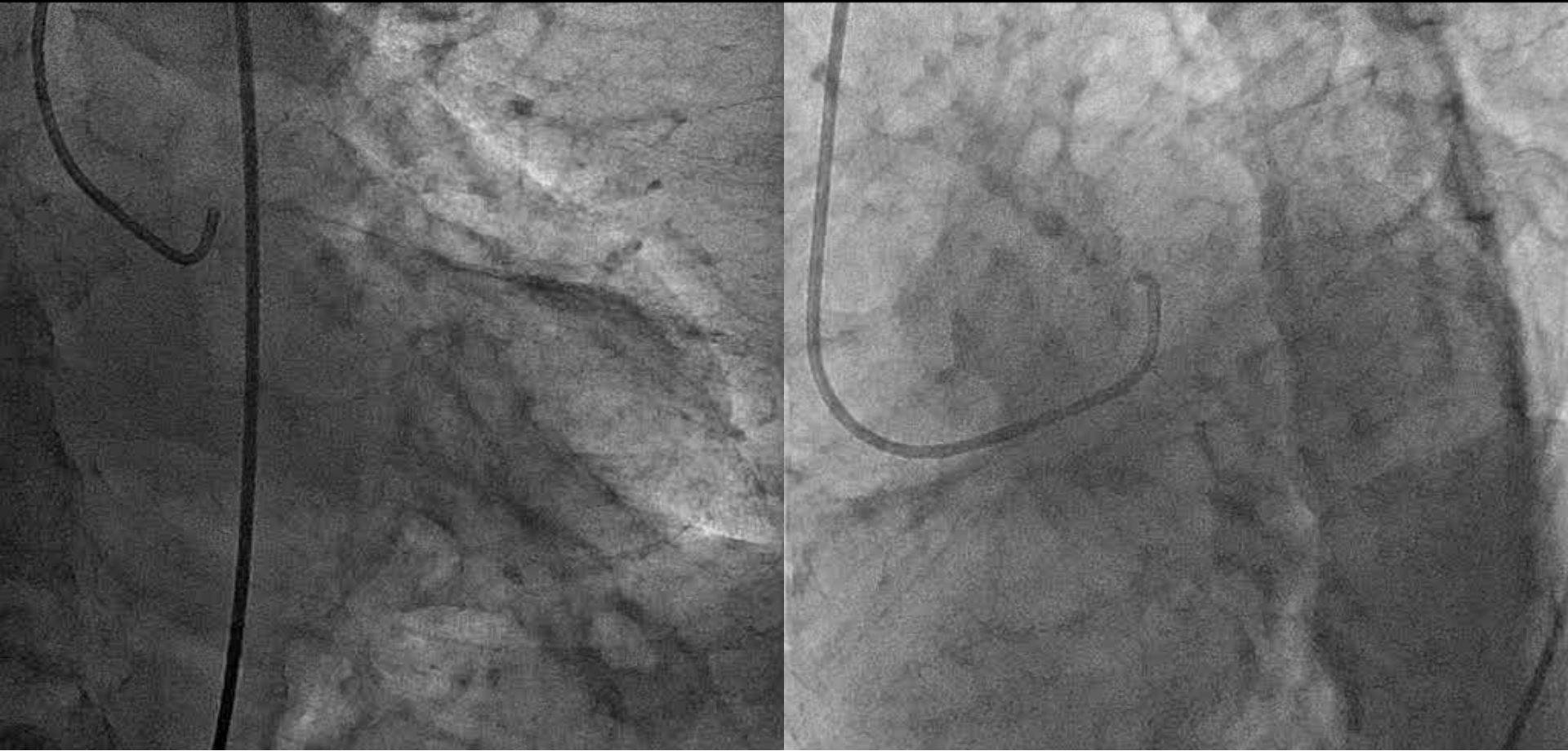
**Gaia Second**

Diameter : 0.011 - 0.014"  
Tip load : 3.5gf

**Gaia Second**

Diameter : 0.012 - 0.014"  
Tip load : 4.5gf

# LCX in stent occlusion

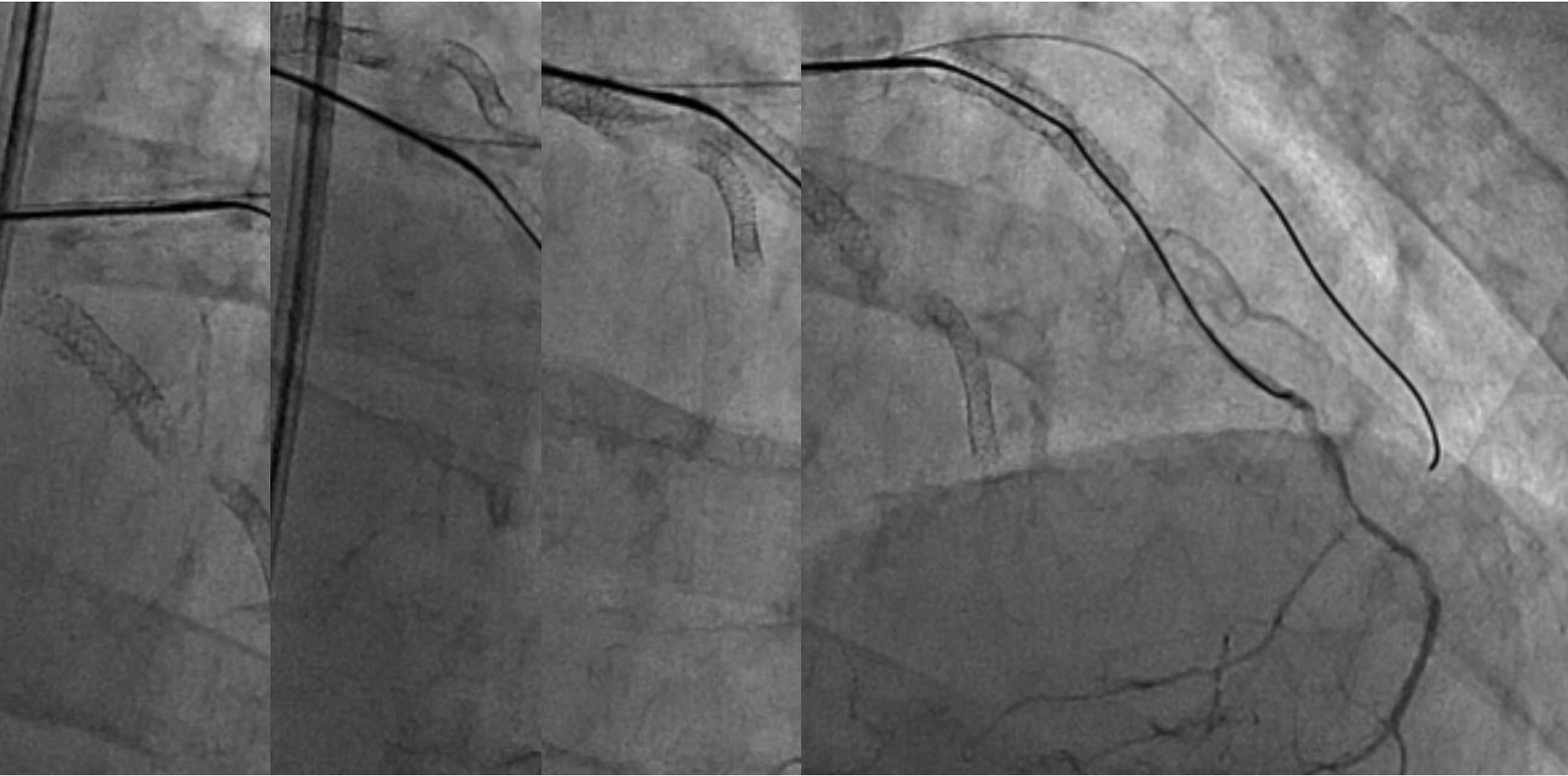


LCX in stent CTO lesion.





# LCX in stent occlusion



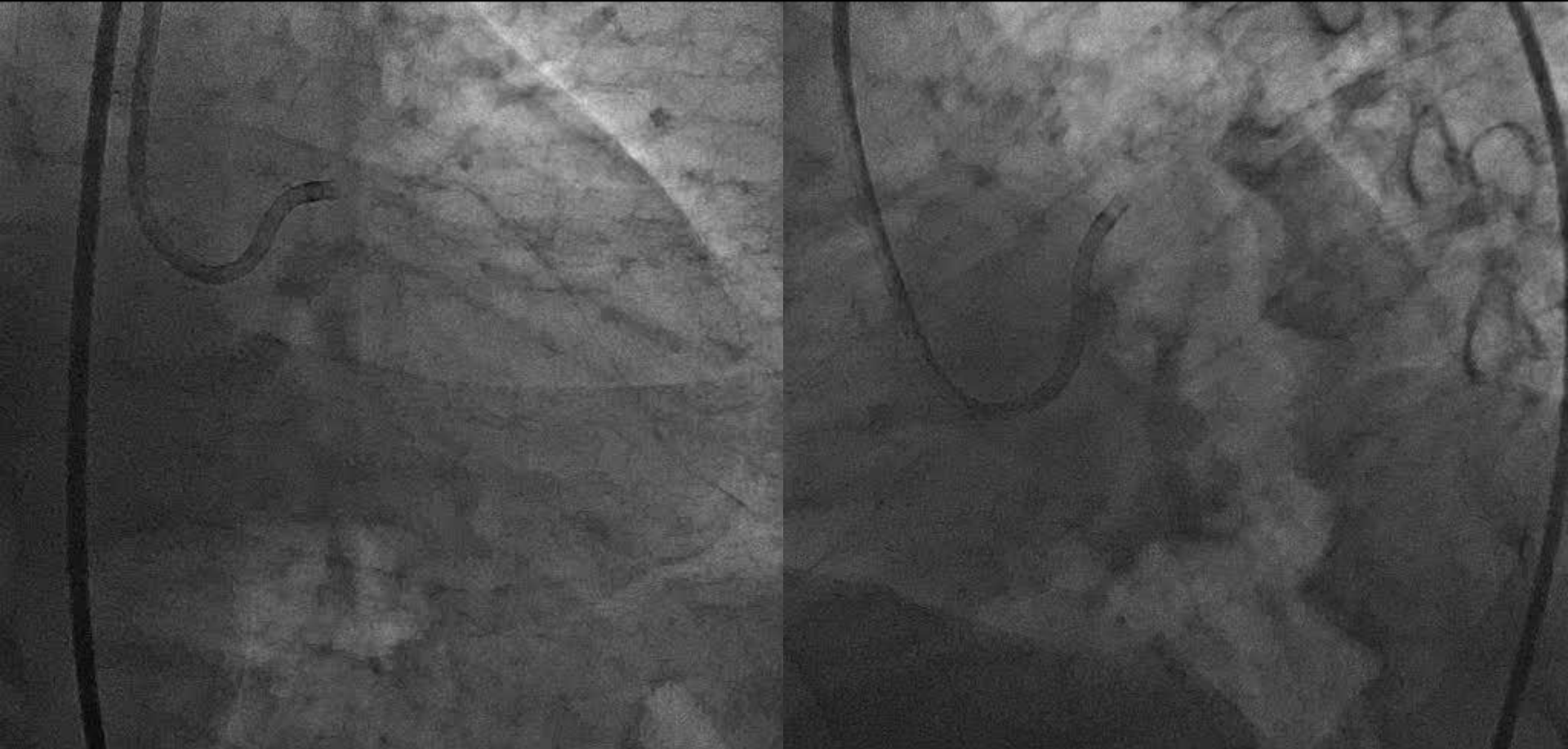
Small lumen with many small curves.



# Final angiograms



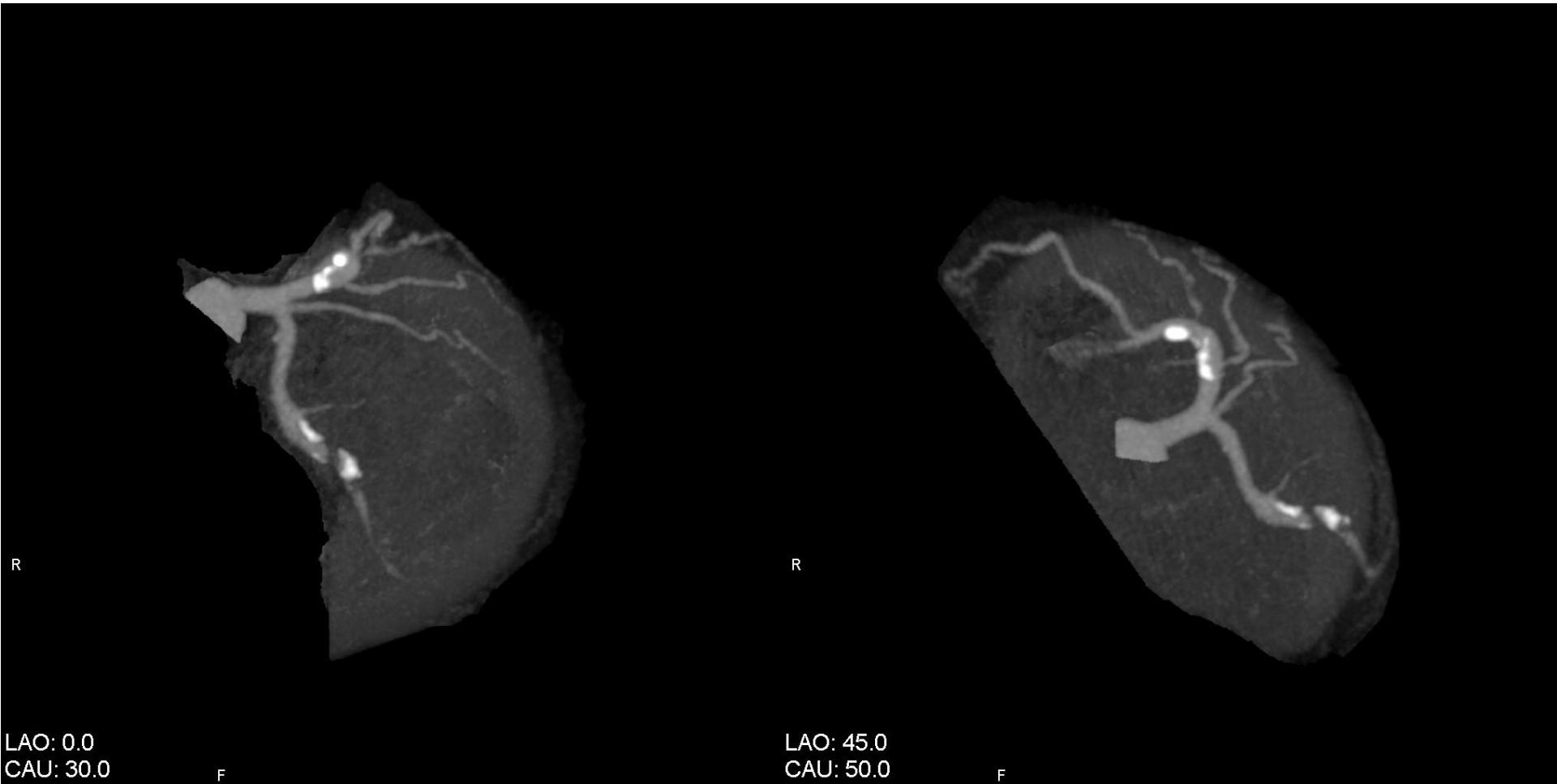
# LCX CTO lesion



Mid LCX CTO lesion (Second attempt).



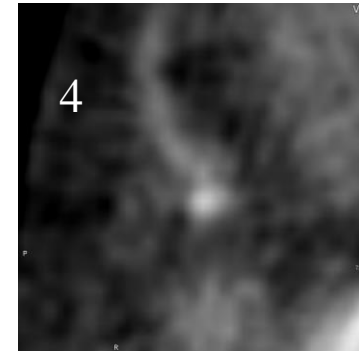
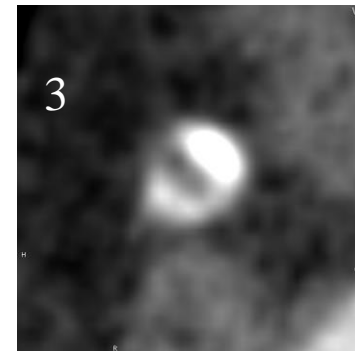
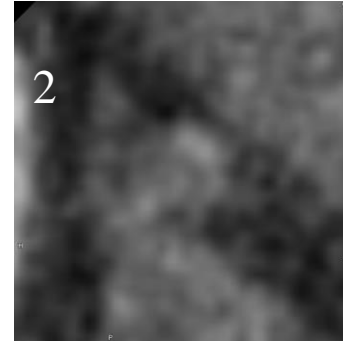
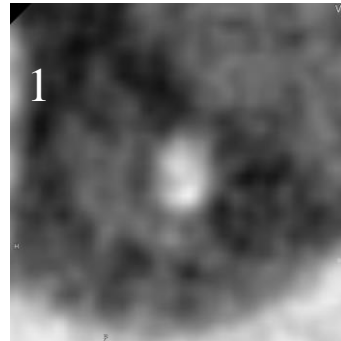
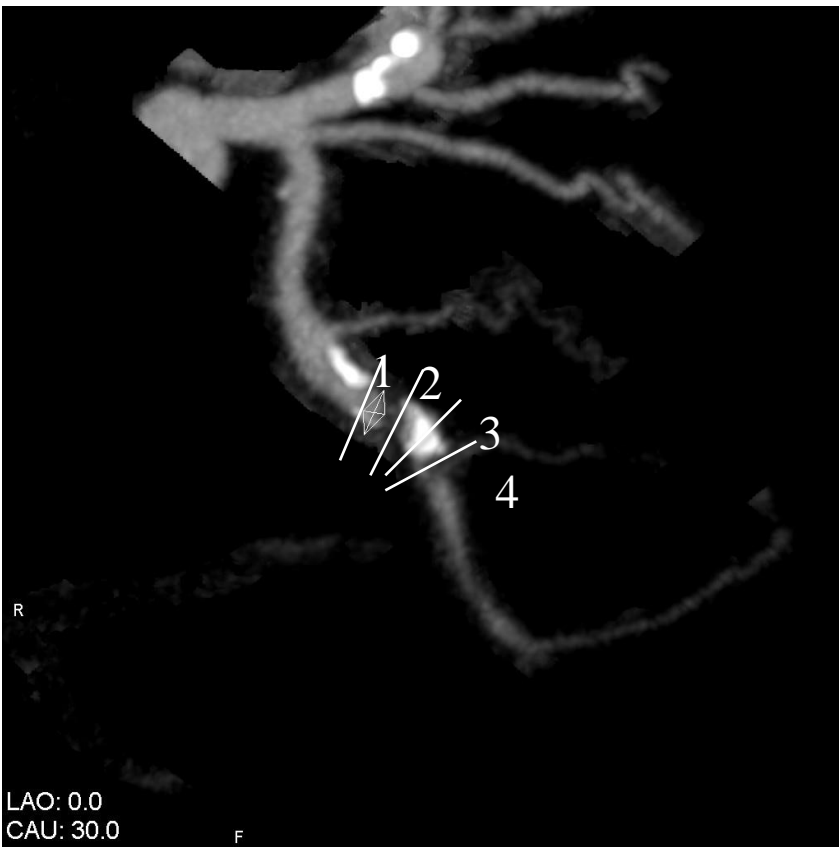
# Coronary MDCT (MIP)



Coronary MDCT shows lesion has dense calcium. It was thinking that guide wire passage was blocked by this dense calcium spot .



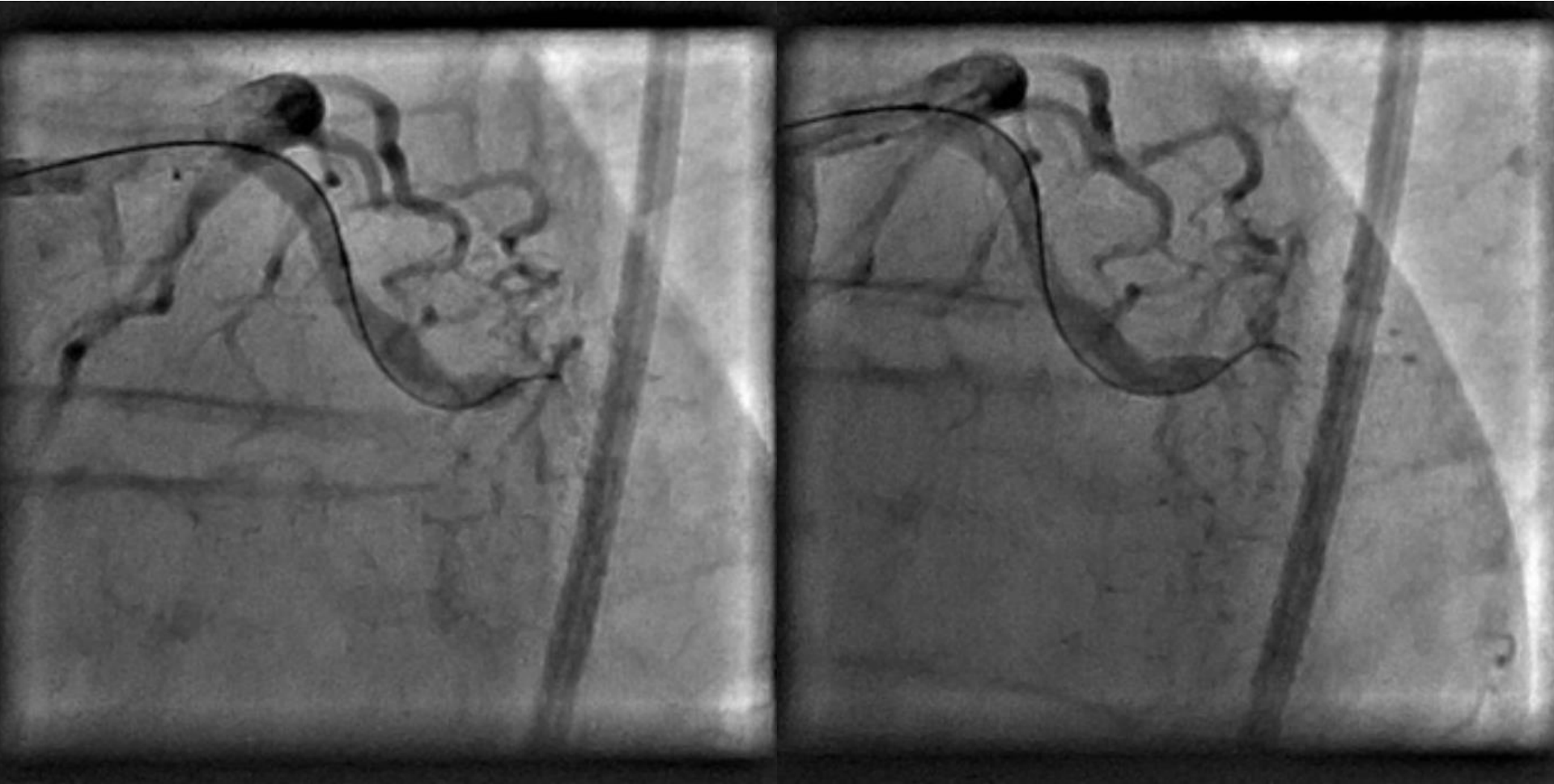
# Coronary MDCT (MPR)



Some space surrounded by a dense calcium.



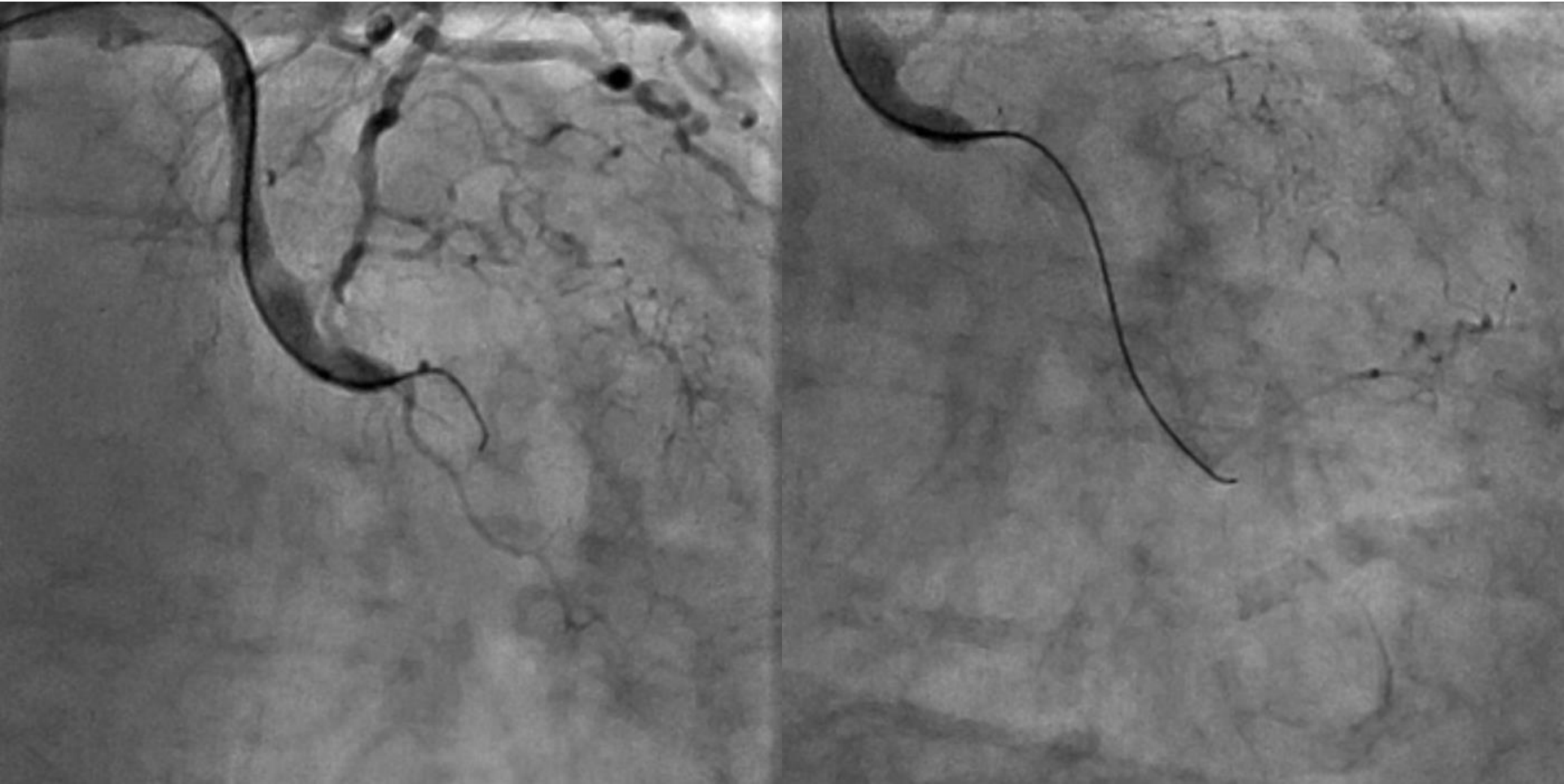
# Penetration fibrous cap



Penetration proximal cap and step down.



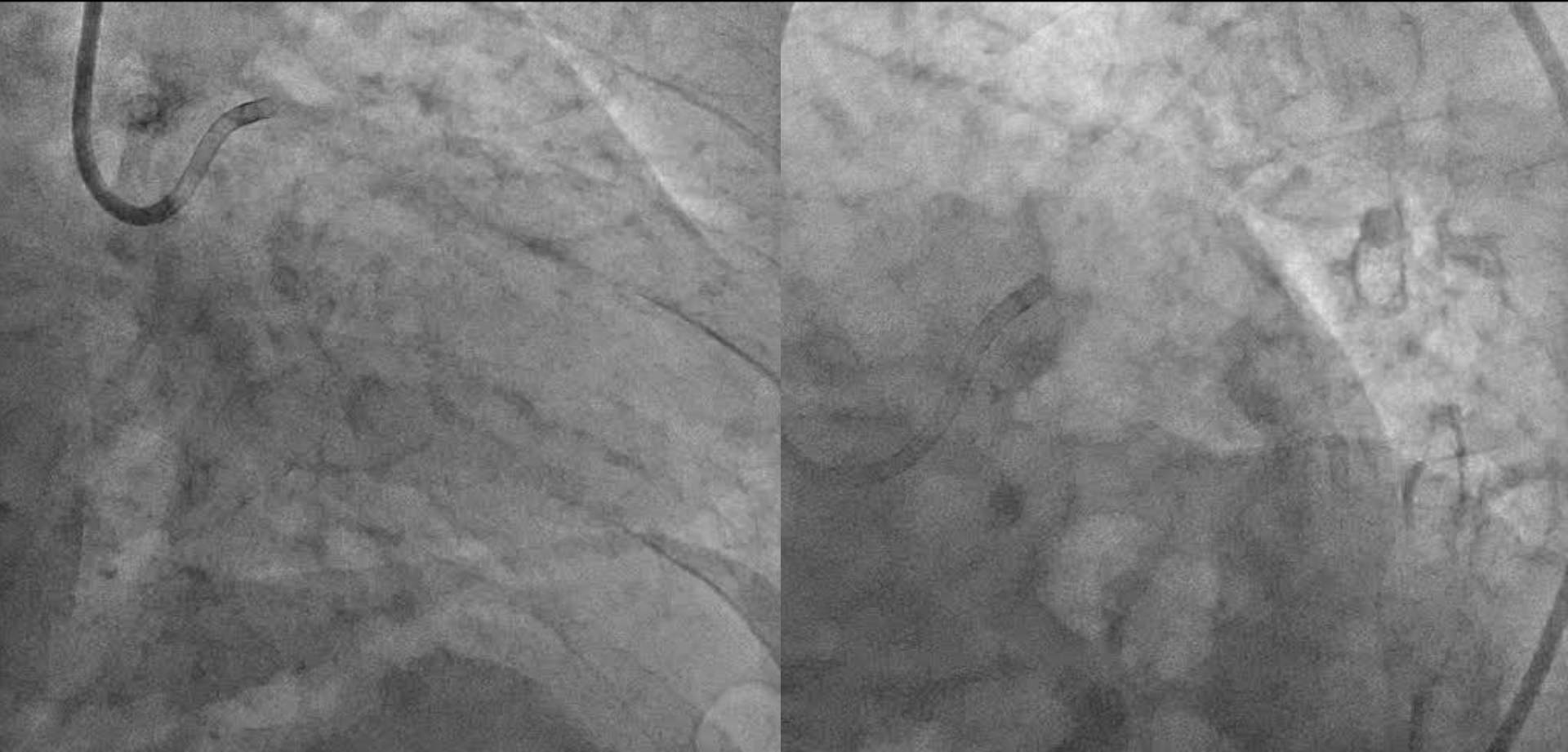
# Advancing the wire



Deflection control of the GAIA second.



# Final angiograms





# Wire movement in CTO model



In this CTO model, a Conquest pro with its tip curve is 30° could not turn the direction.



# Wire movement in CTO model



A Conquest pro with its tip curve is  $60^\circ$  could turn the direction. However, it is difficult to control the direction.



# Wire movement in CTO model

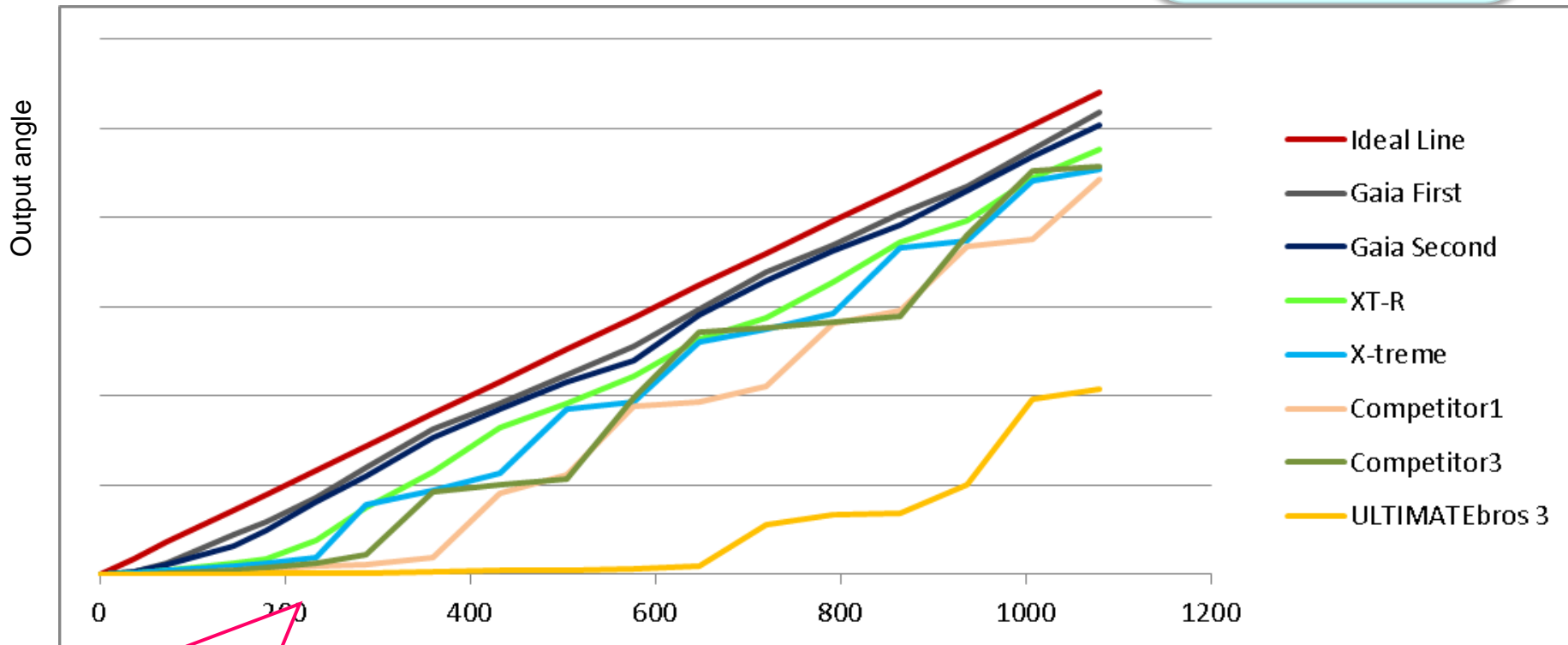
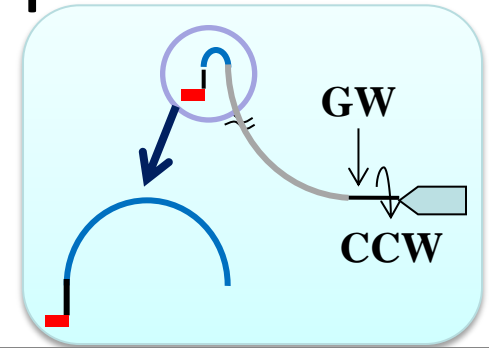


A Gaia second with its tip curve is 60° displays good controllability.



# Torque response • Whip

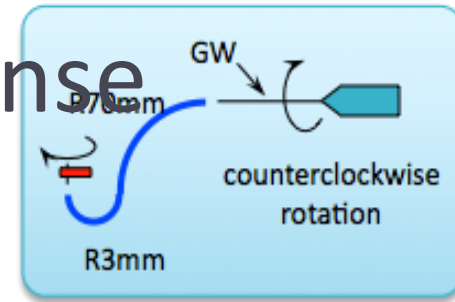
GAIA preserves the performance of less delayed torque response and minimum whip motion in the strong resistance.



Initial Delay

GW tip did not rotate while rotating the wire

# Difference in torque response



Ultimate 3g  
(flattened core)

Polymer-filled wire 3g  
(flattened core)

Gaia second  
(non-flattened core)



remarkable delay of  
Initial torque response  
with a whip

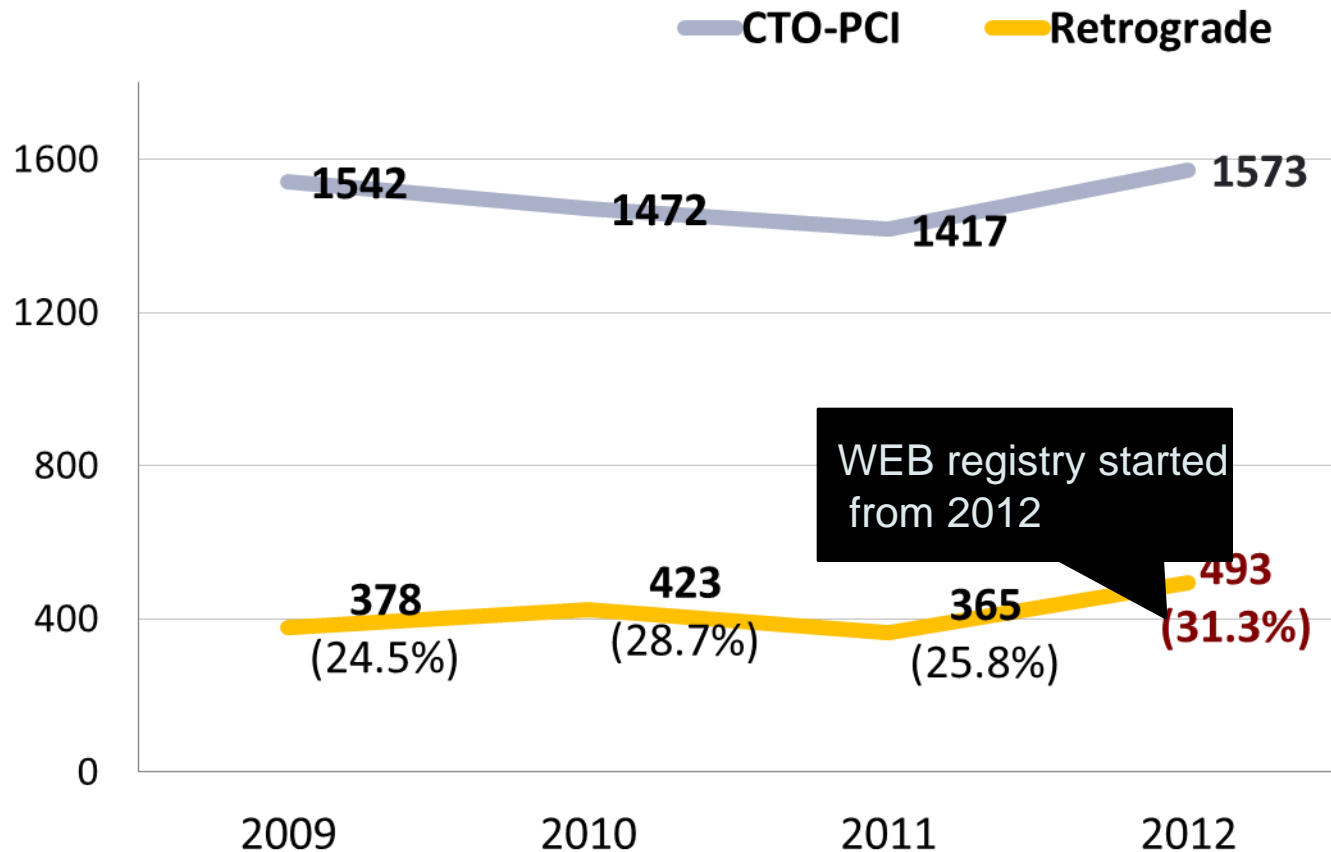
Delay of Initial response

no initial delay  
no axial whip





# Retrograde summit: Number of registry



Retrograde summit has been conducted from 2009. Currently, data were collected from 44 hospitals. Around 1500 CTO cases were performed every year and retrograde approach was done in about 30%.

# Procedure outcome

	<b>Total (1573)</b>
Successful CTO crossing by guidewire	89.8%
Number of guidewire used for CTO approach	3.3 ± 2.3
Number of stent	1.7 ± 1.2
<b>Procedure success</b>	<b>88.6%</b>
Procedure time, min	141.2 ± 87.2
Contrast dose, ml	227.2 ± 107.9
Fluoroscopy time, min	72.6 ± 188.0



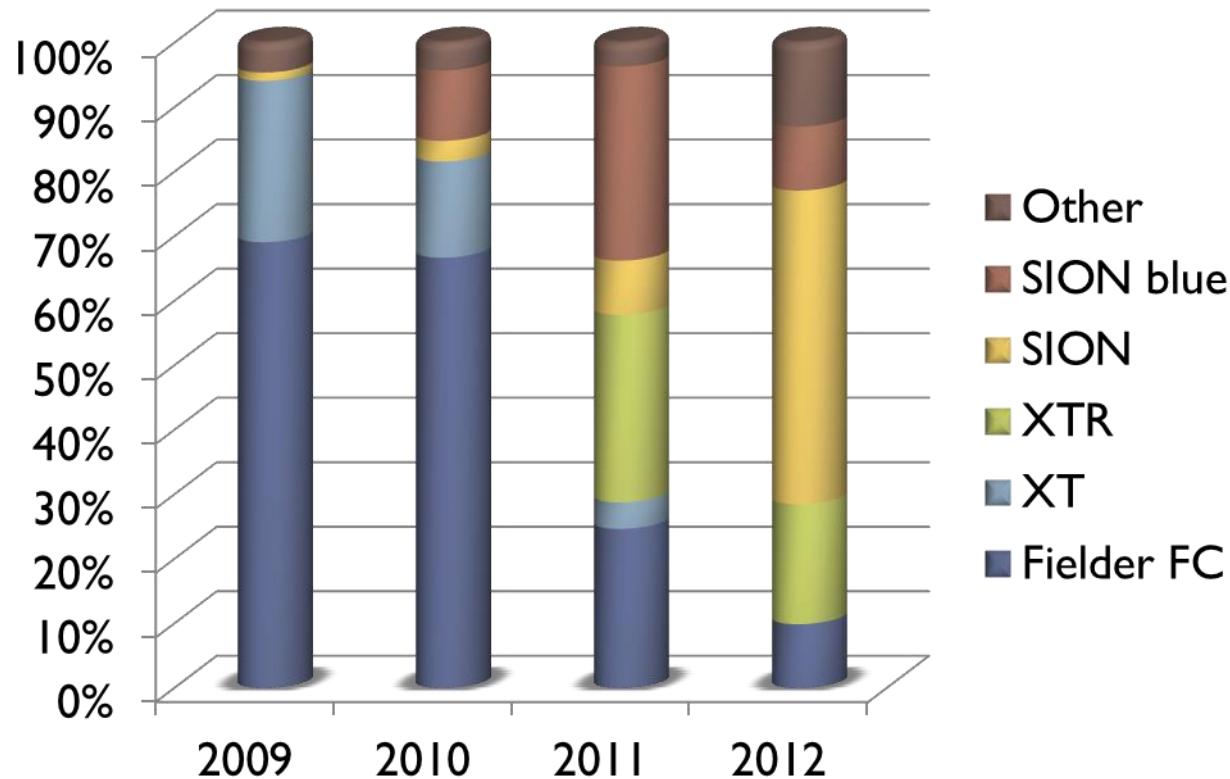
# Procedure outcome

	Antegrade (1371)	Retrograde (493)
Number of guidewire used for CTO approach	3.1 ± 2.2	5.1 ± 2.7
Number of stent	1.6 ± 1.1	2.2 ± 1.5
<b>Procedure success</b>	<b>77.8%</b>	<b>83.0%</b>
Procedure time, min	134.1 ± 83.6	202.3 ± 92.9
Contrast dose, ml	226.1 ± 108.4	268.6 ± 120.8
Fluoroscopy time, min	70.4 ± 200.6	94.5 ± 45.8





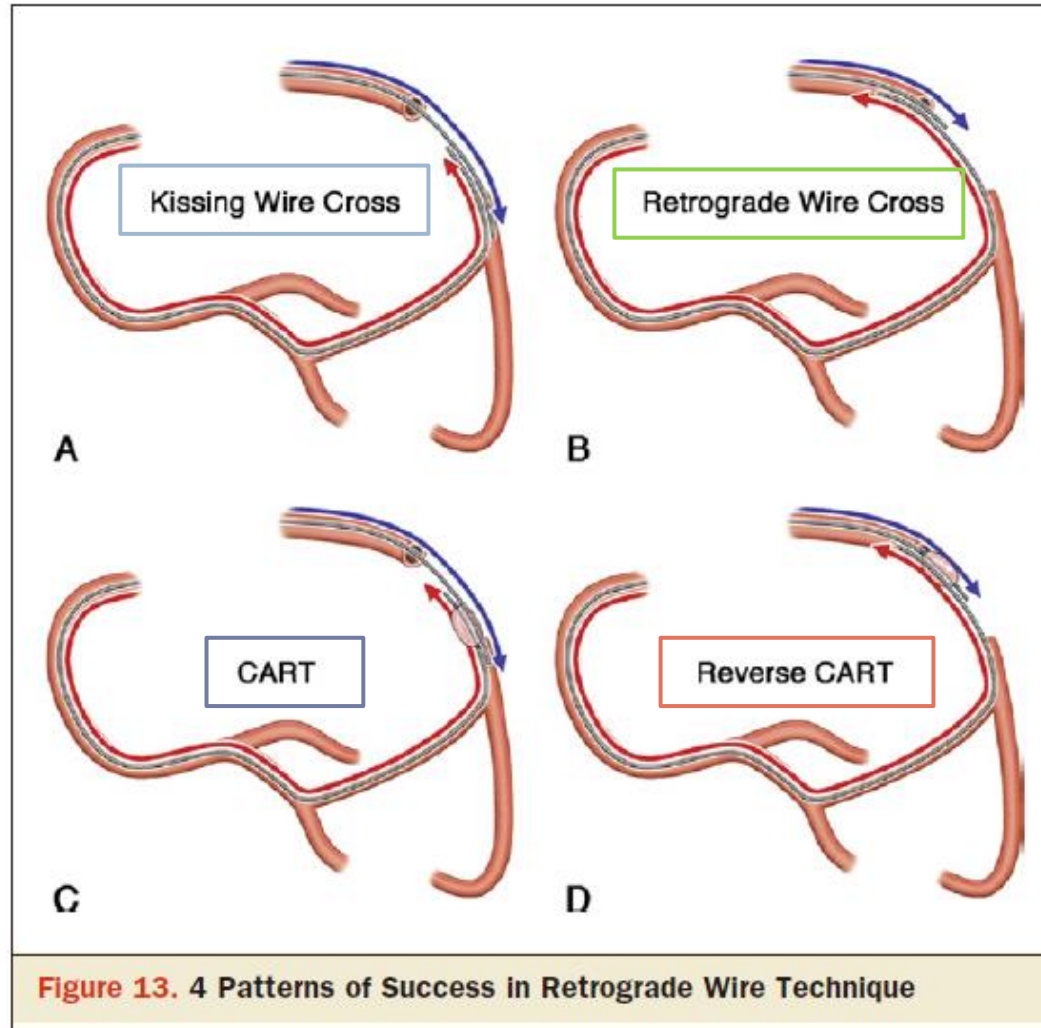
# Guide wires for collateral crossing



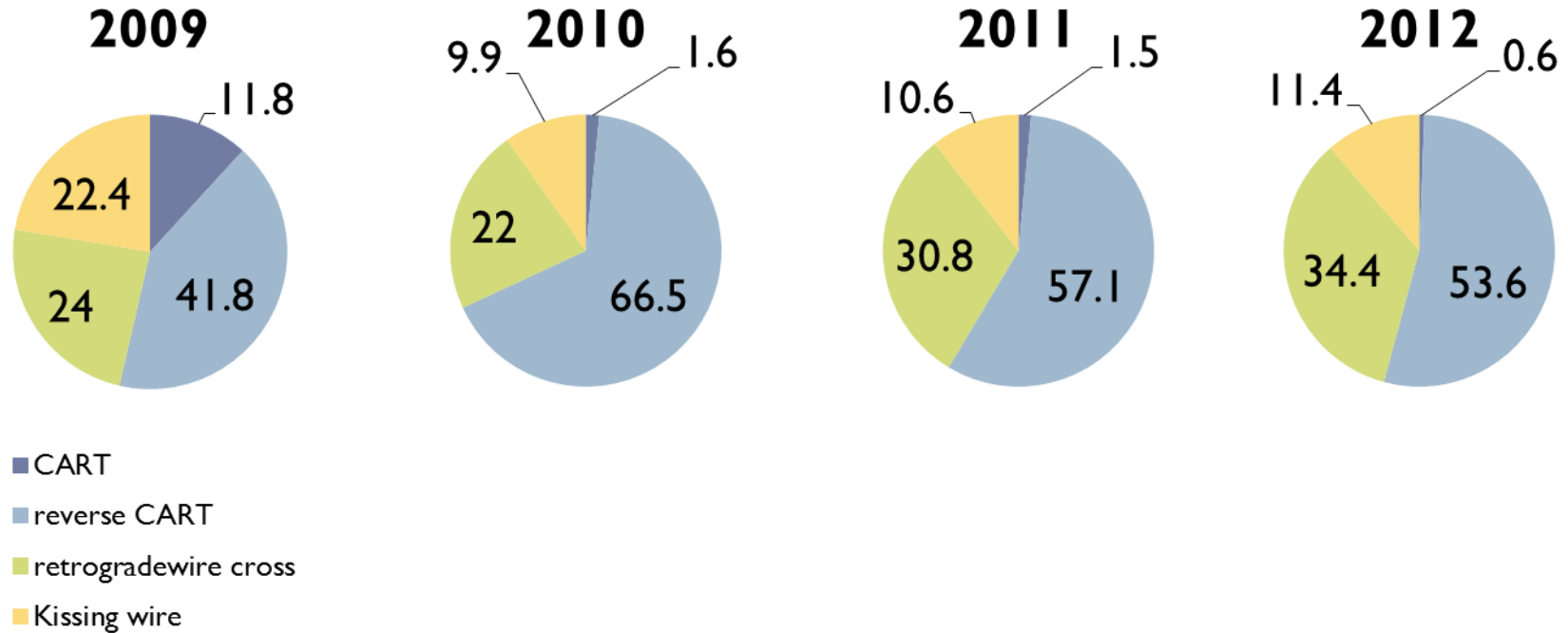
Fielder FC and XT were the main current in 2009 and 2010. After launching of XTR, XT usage decreased rapidly. The advent of newly designed coil wires, the position of polymer jacket wires has changed dramatically. The percentages of polymer jacket wires (FC and XTR, not XT) last year was less than 30%. A newly designed coil wires (SION and SION blue) became the main current in use. Recently, SUOH, a prototype of SION, and SION black, an improved type of FC were used in some special cases.



# Manner of retrograde CTO Crossing



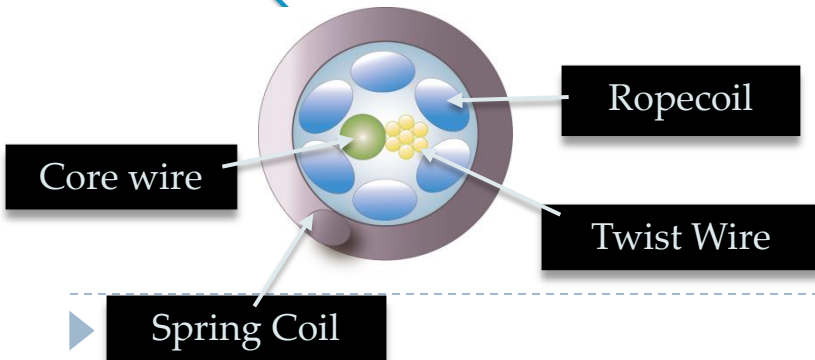
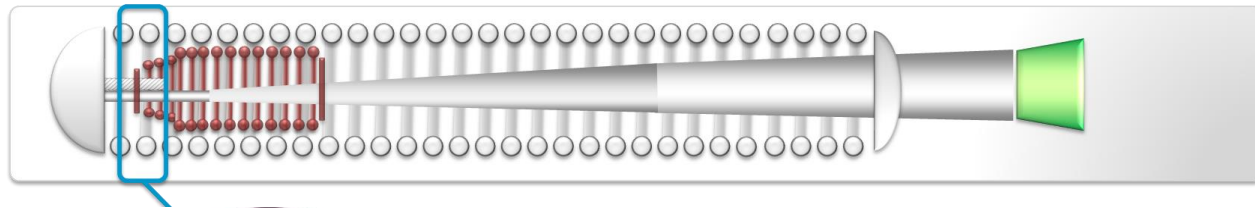
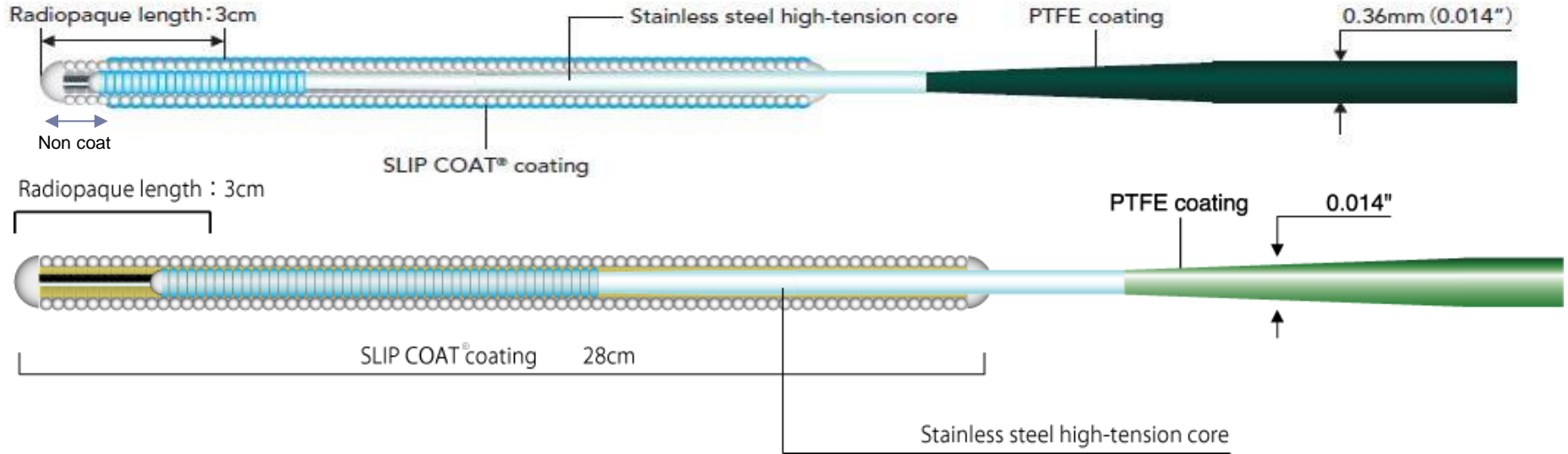
# Manner of retrograde CTO Crossing



Reverse CART is the main method for CTO crossing. However, some change has been seen from 2011. After innovation of GAIA, there is a trend of increasing retrograde wire crossing. GAIA obviously influenced the retrograde procedure.

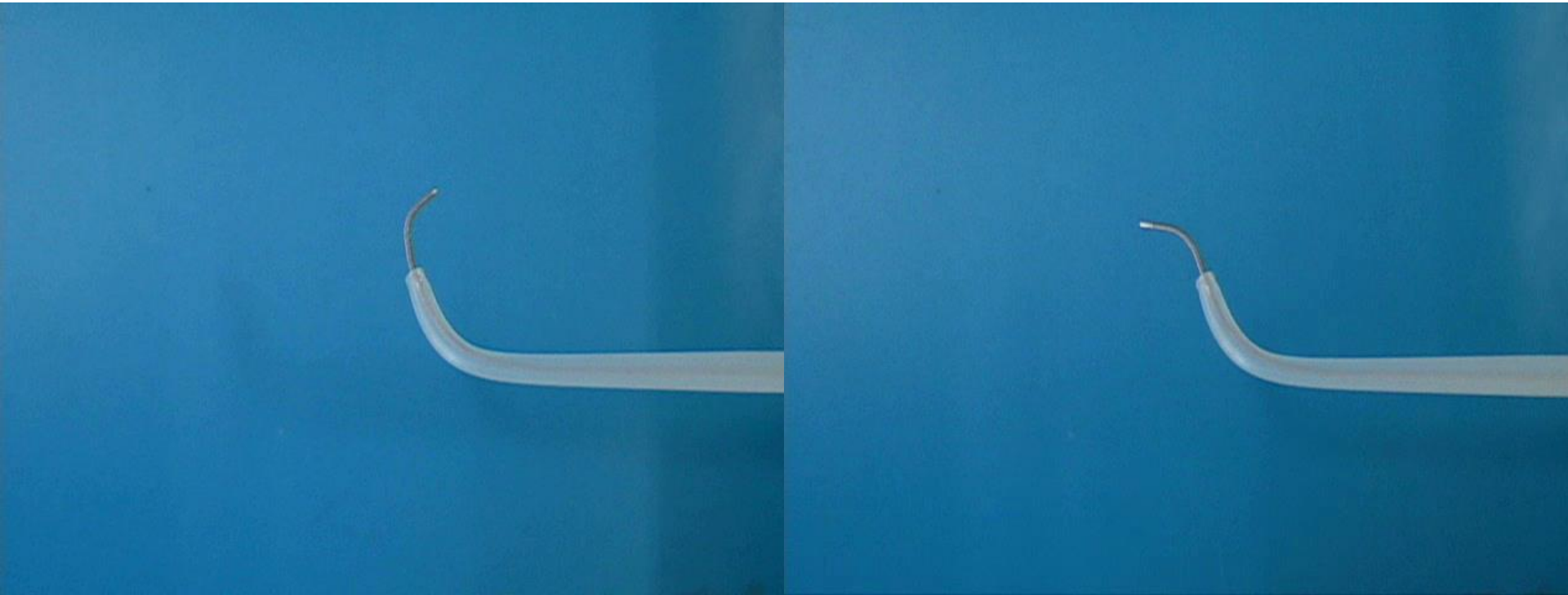


# SION blue and SION



W coil structure produce good controllability.  
 Frontline guide wire for channel crossing  
 Tip Load 0.5g~0.7g  
 Superior lubricity - Full Hydrophilic coating  
 (SION)

# Importance of less whip motion



Conventional GW

SION



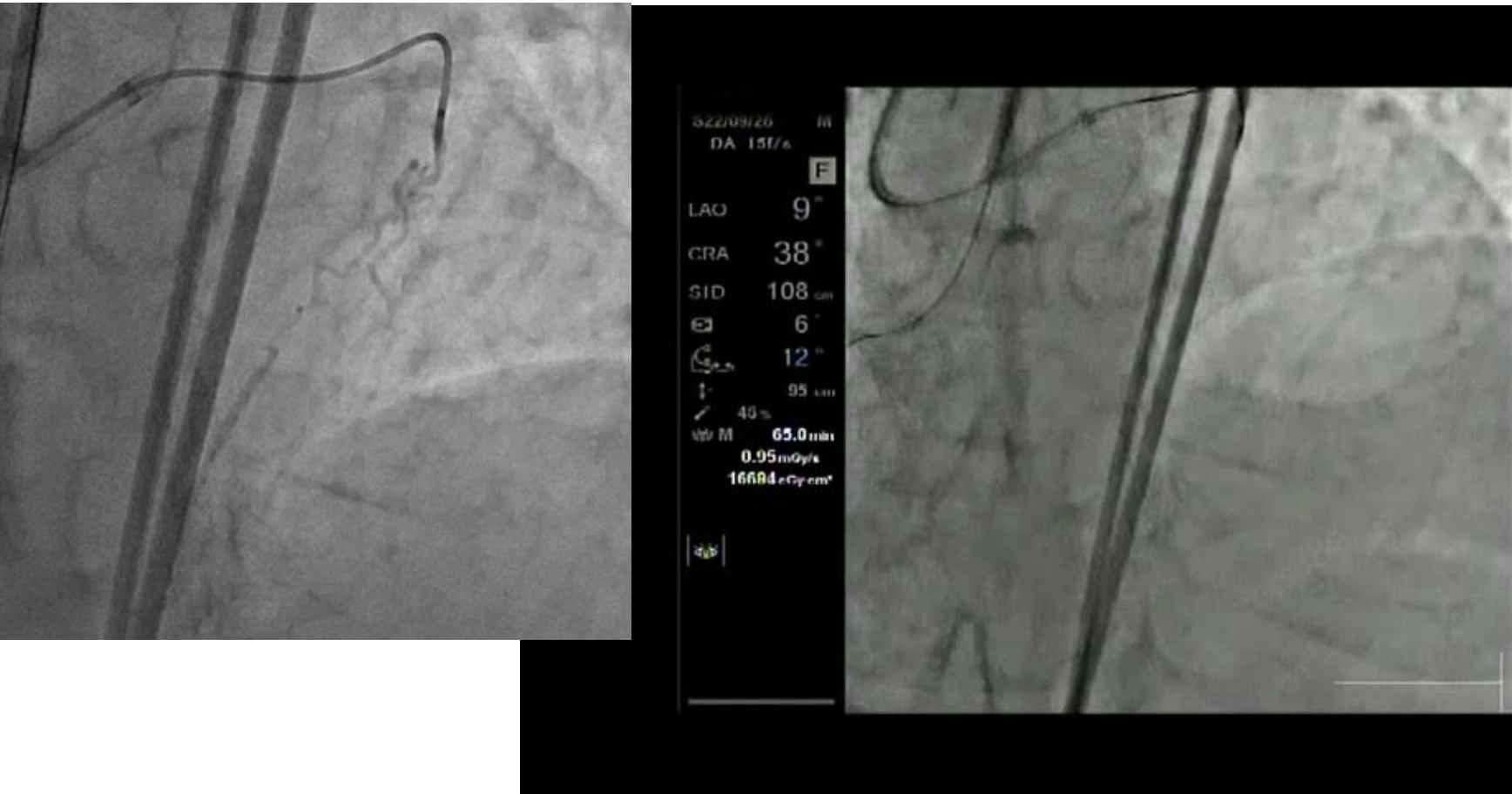
# Case (RCA CTO)



Proximal RCA CTO lesion. Mid RCA also has diffuse atherosclerosis. Distal RCA is supplied via atrial collateral channel from LCX.



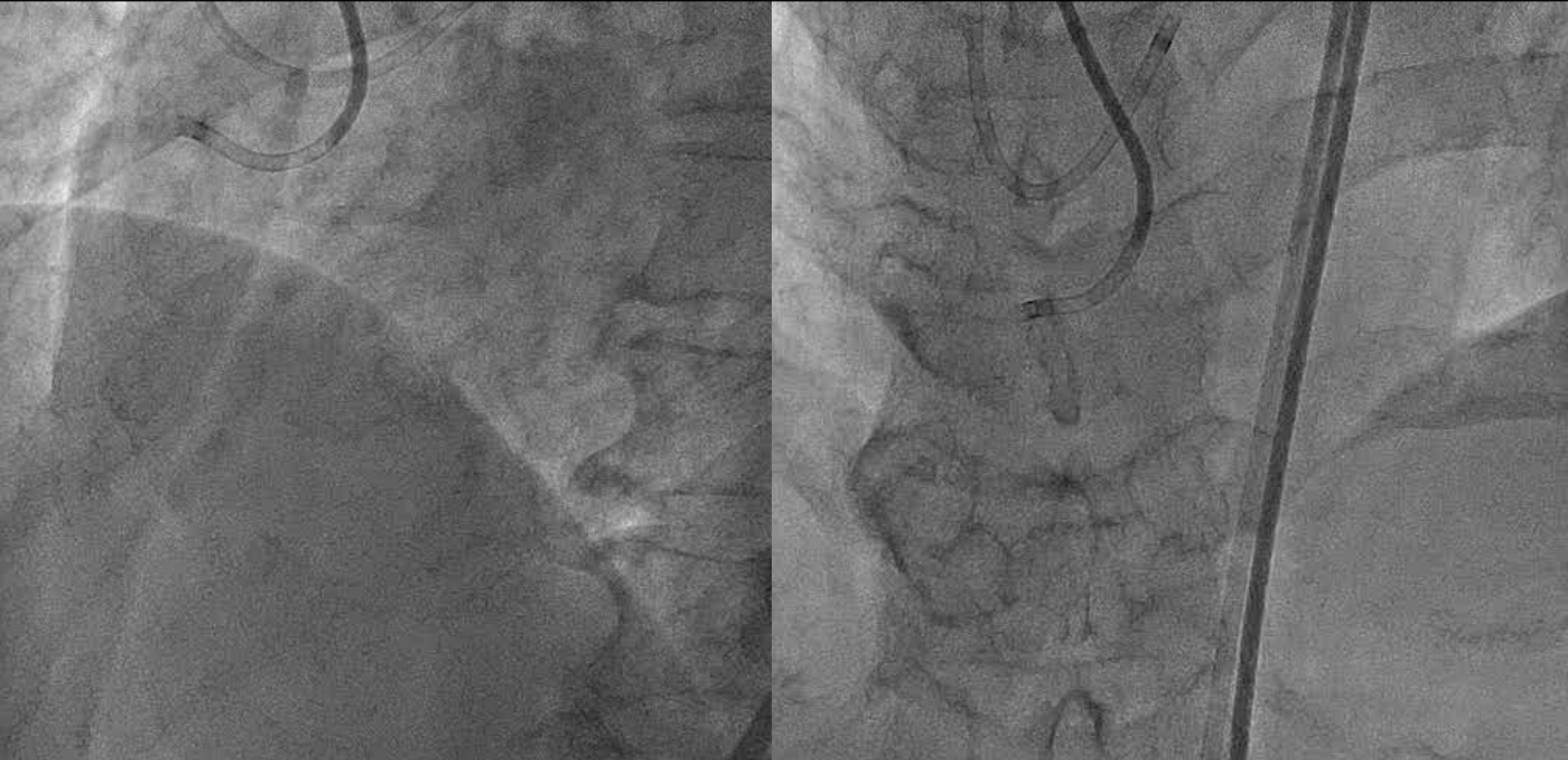
# Channel negotiation using SION



The atrial channel is tortuous. However, a SION wire successfully crossed the channel.



# RCA CTO

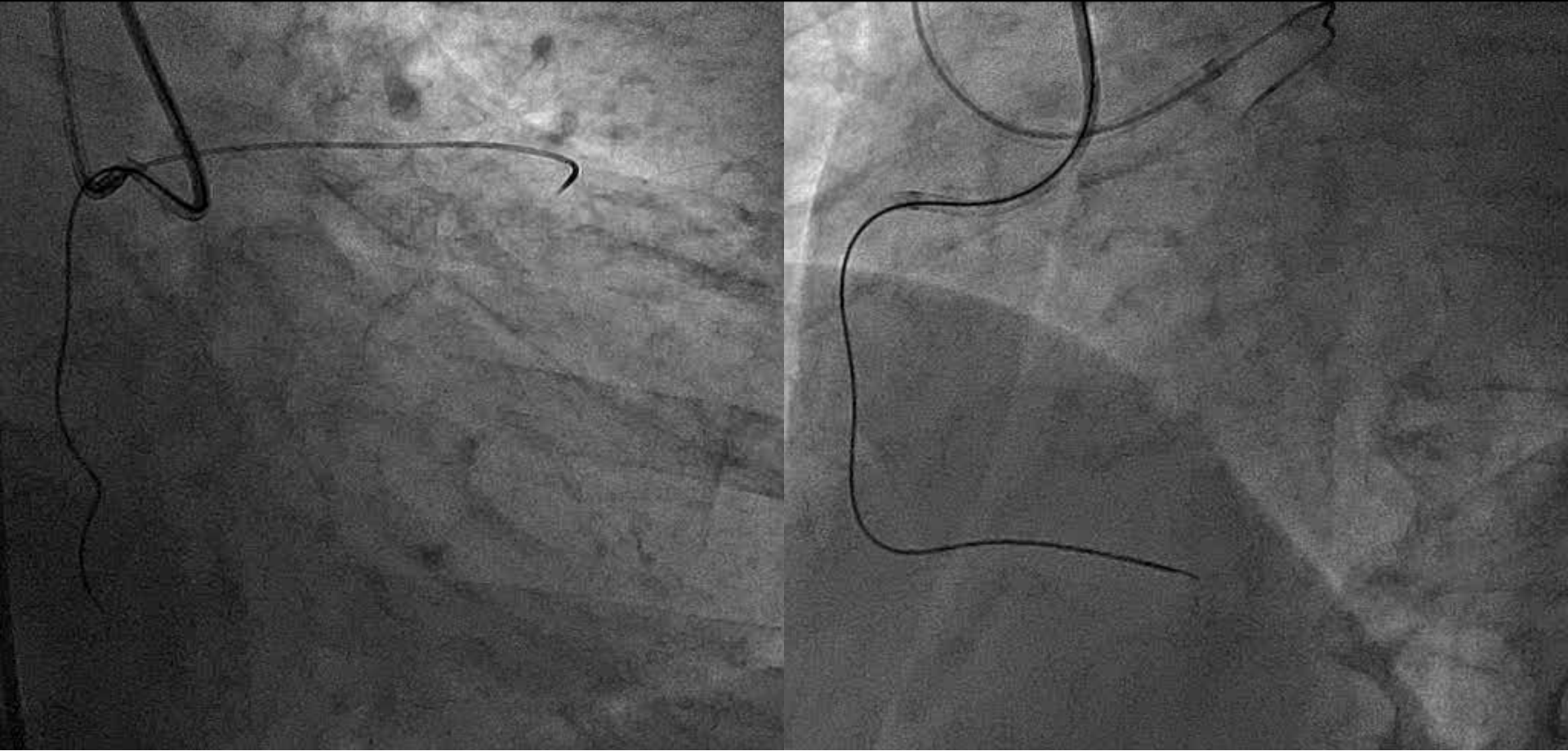


Distal RCA CTO lesion. Distal RCA was supplied via septal collateral.





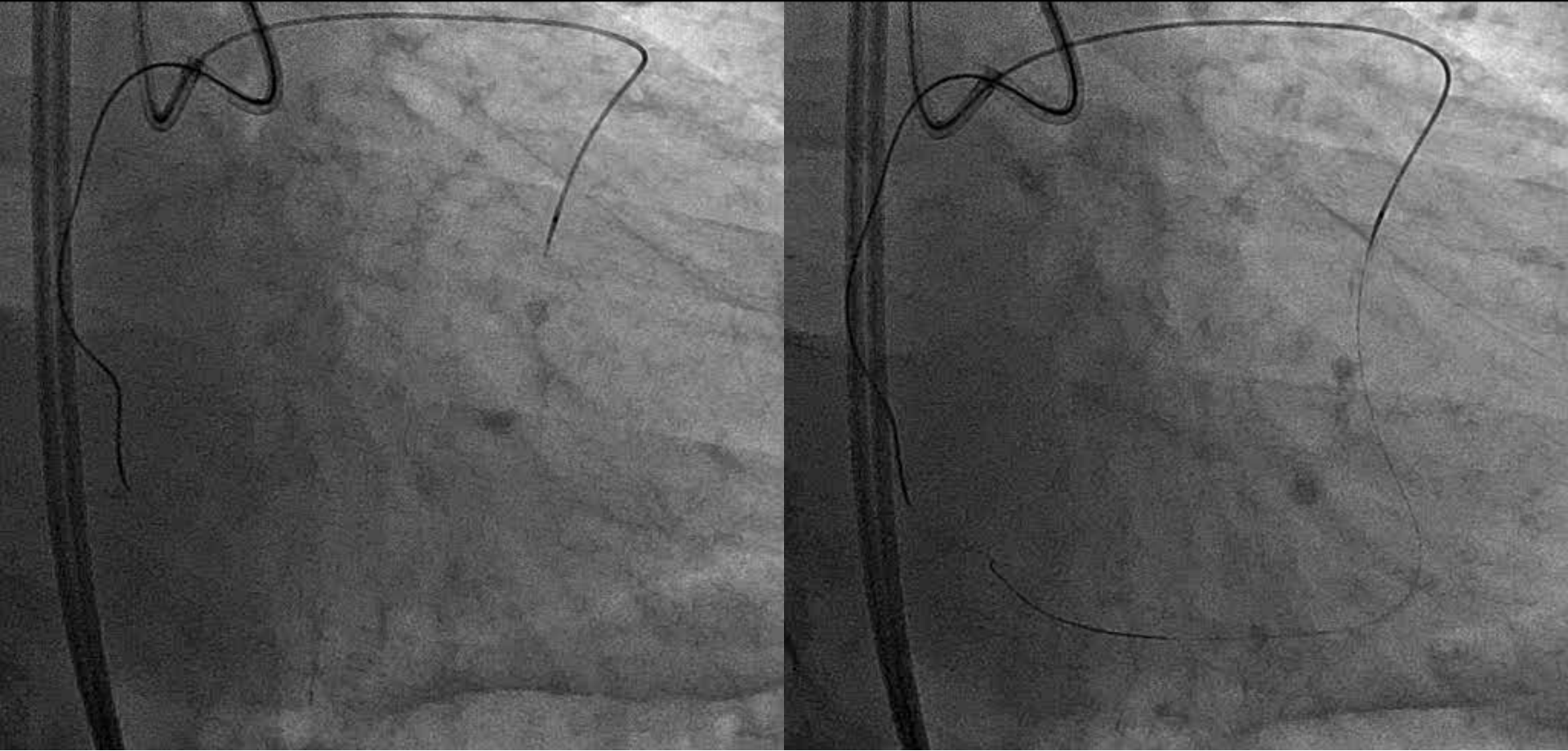
# Tip injection



Septal channel looks thread like and it seems easy to negotiate the channel.



# Channel negotiation

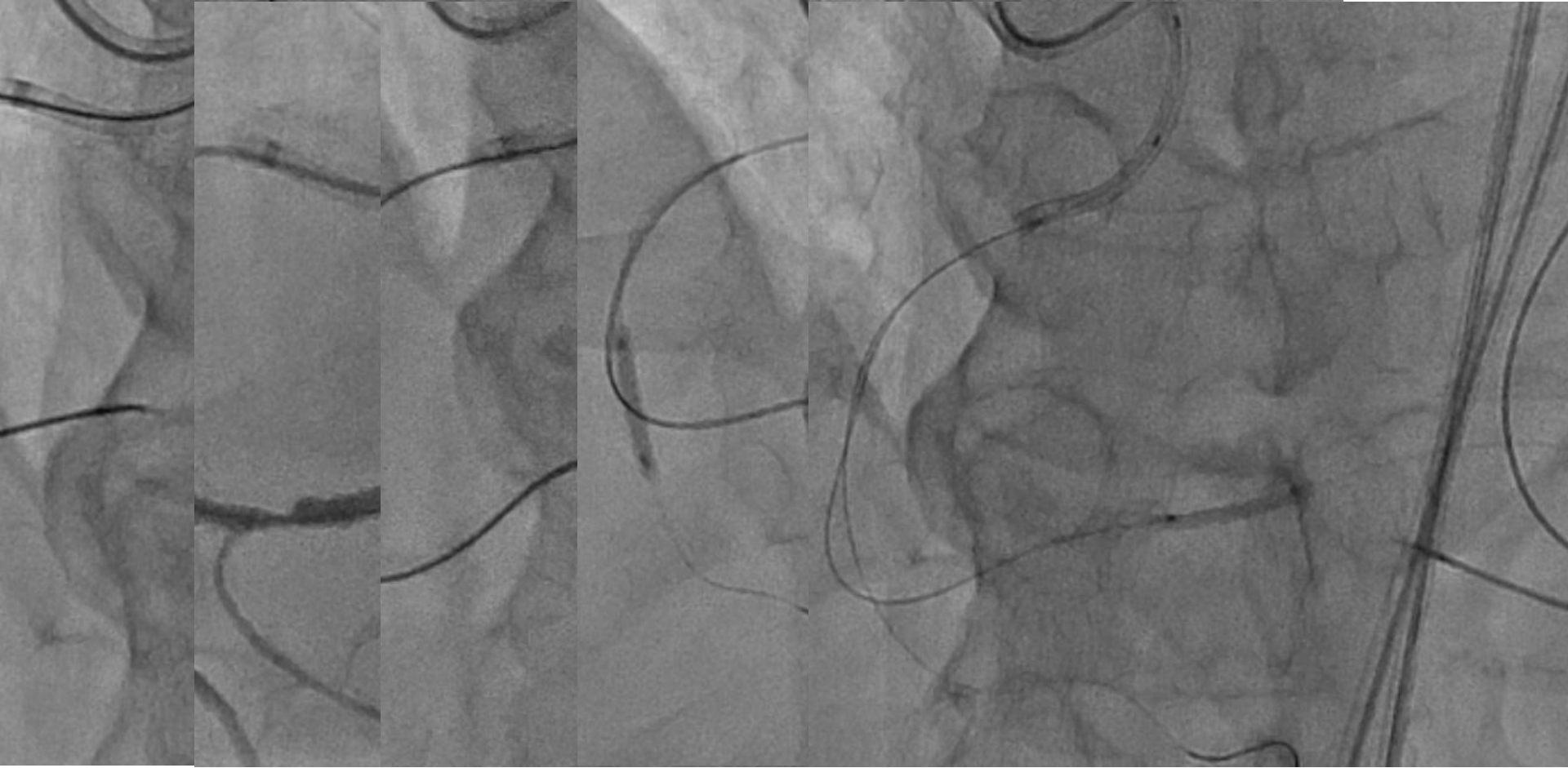


Underestimating the channel sometimes causes complications. Sometimes GW advanced into small branches. Reattempt toward main channel was successful in this case.

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# Kissing wire



Entry and exit of CTO are also abrupt type of occlusion. A stiff wire was needed to penetrate the lesion. CTO entry was penetrated using a Conquest pro 12. However, it advanced just straightly. Change the wire to GAIA third and advance it toward exit. Retrograde wire (Gaia third) almost kissed within the bend lesion. Then, the antegrade wire advanced to distal true lumen.

# Final angiograms



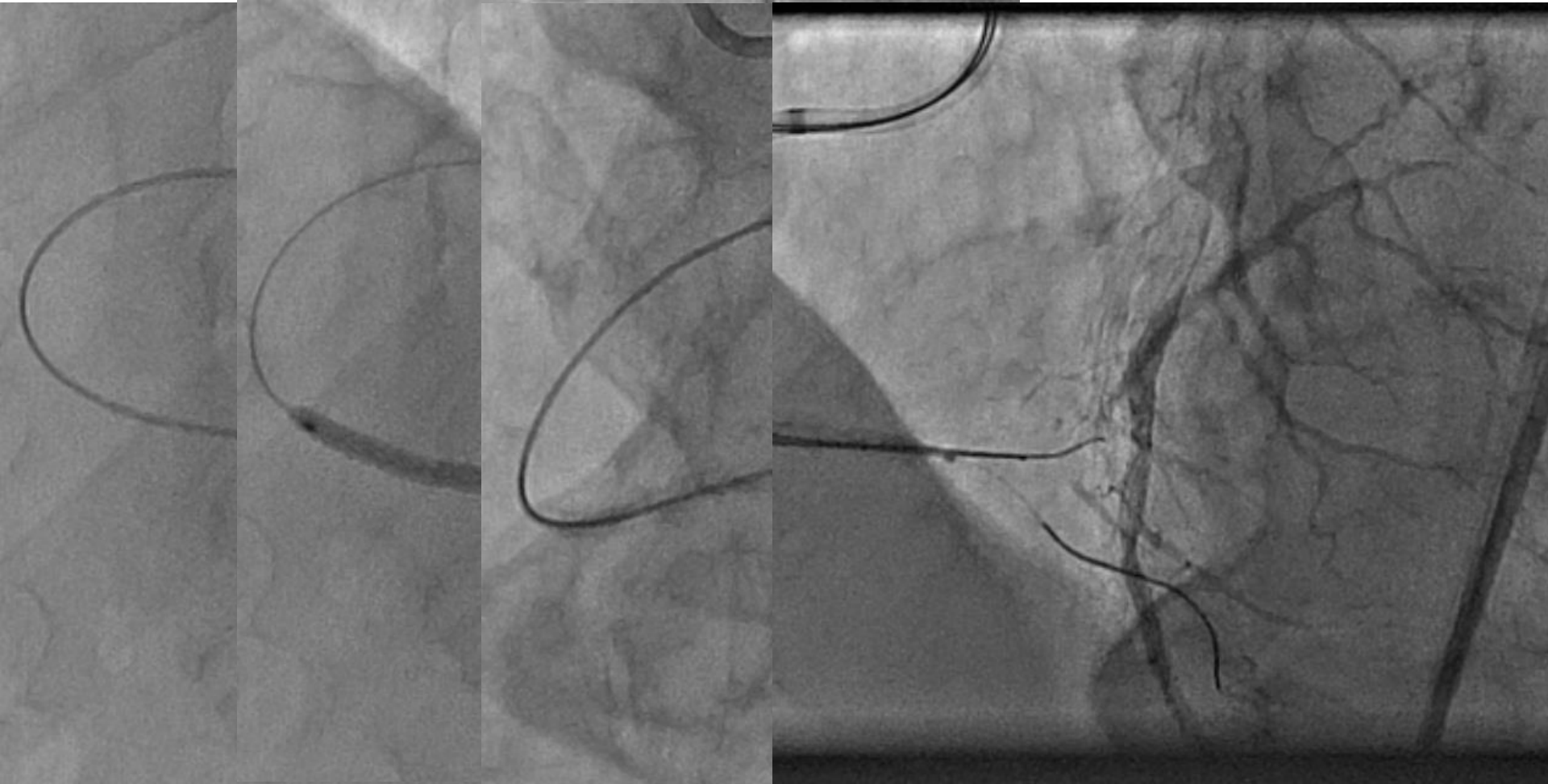
# RCA CTO



Distal RCA CTO lesion at bifurcation.



# Antegrade approach



Antegrade wiring was performed by IVUS guidance. A GAIA first wire, following GAIA second wire was advanced into the CTO lesion via parallel wire technique, however, it went into subintima.

# Very tortuous atrial channel



Channel crossing using a SION wire is difficult. Therefore, I used a SUOH, a prototype of SION family.



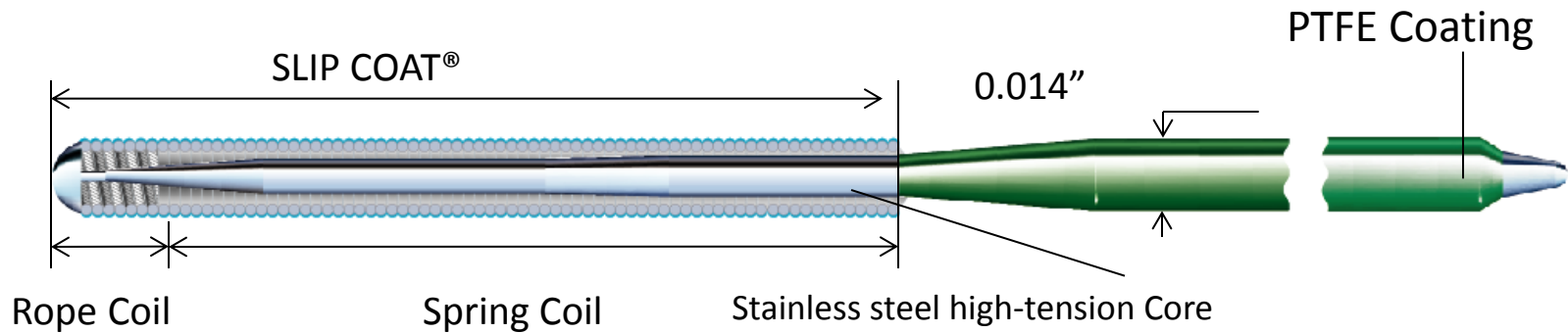
# Channel crossing using SUOH



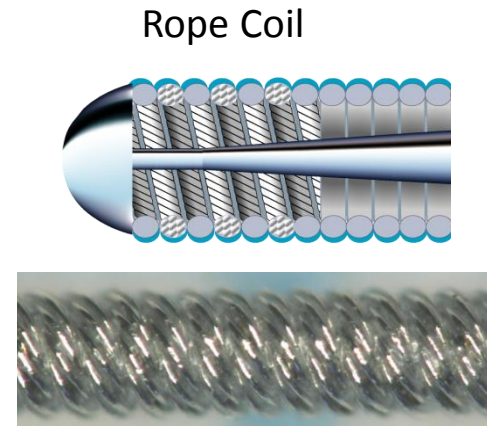
Channel crossing was achieved using a SUOH. Because of an antegrade wire was far from true lumen that was estimated retrograde tip angiography, a retrograde wire intentionally advanced into the estimated true lumen using a GAIAs second wire and it was successfully crossed toward proximal true lumen.



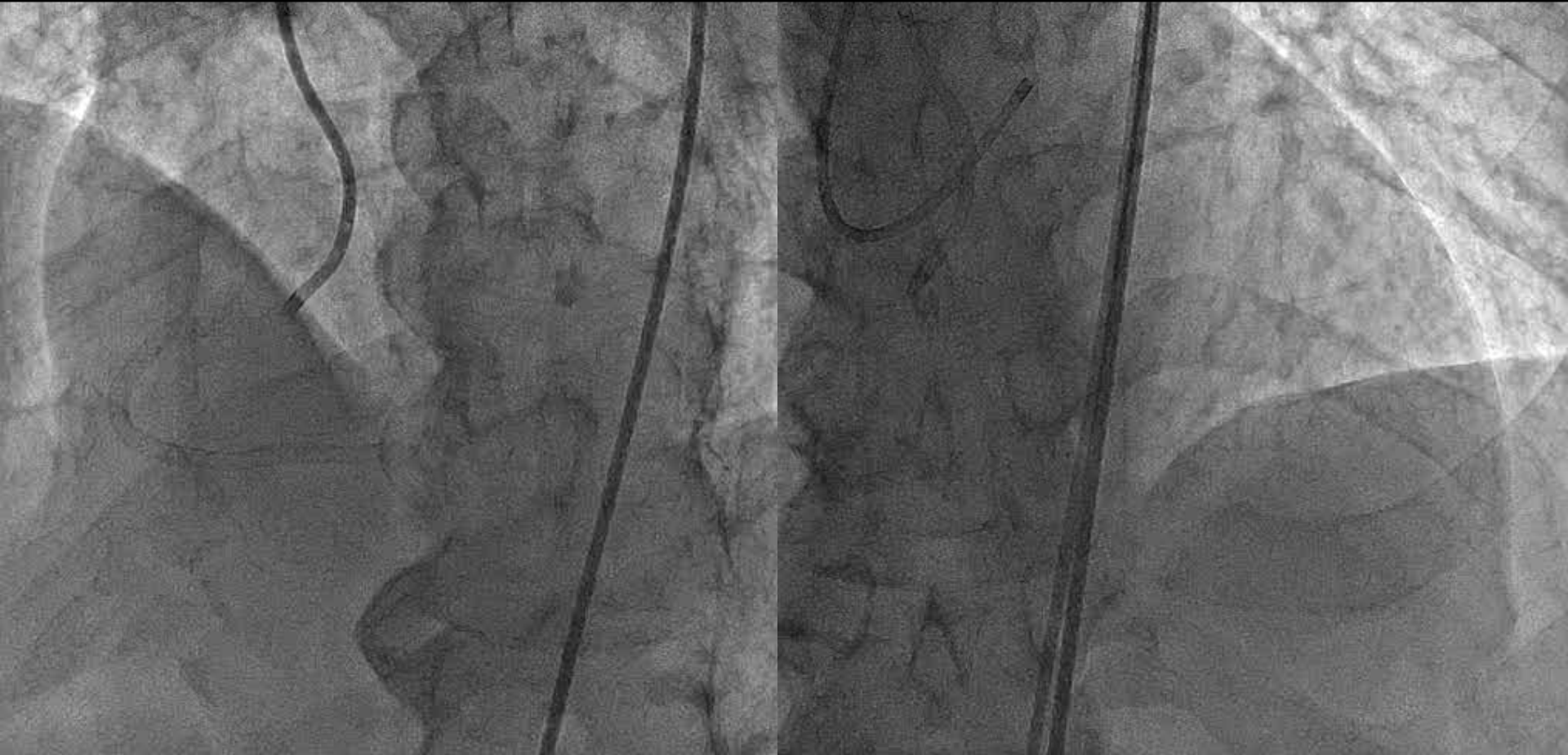
# SUOH



- Tip Load 0.5g
- Radio-opacity 3cm
- Coil 21cm
- Diameter 0.014inch
- Length 175cm



# Final angiograms



# Messages

- Recent technological advances of GW changes the CTO PCI strategy both in antegrade and retrograde.
- Channel crossing was achieved using new coil wires in many cases.
- High success rate was achieved.
- After innovation of new guide wires, conventional and kissing wire crossing the CTO lesion have been increasing in retrograde approach.

