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Antegrade approach: How to prepare / What to know before CTO-PCI

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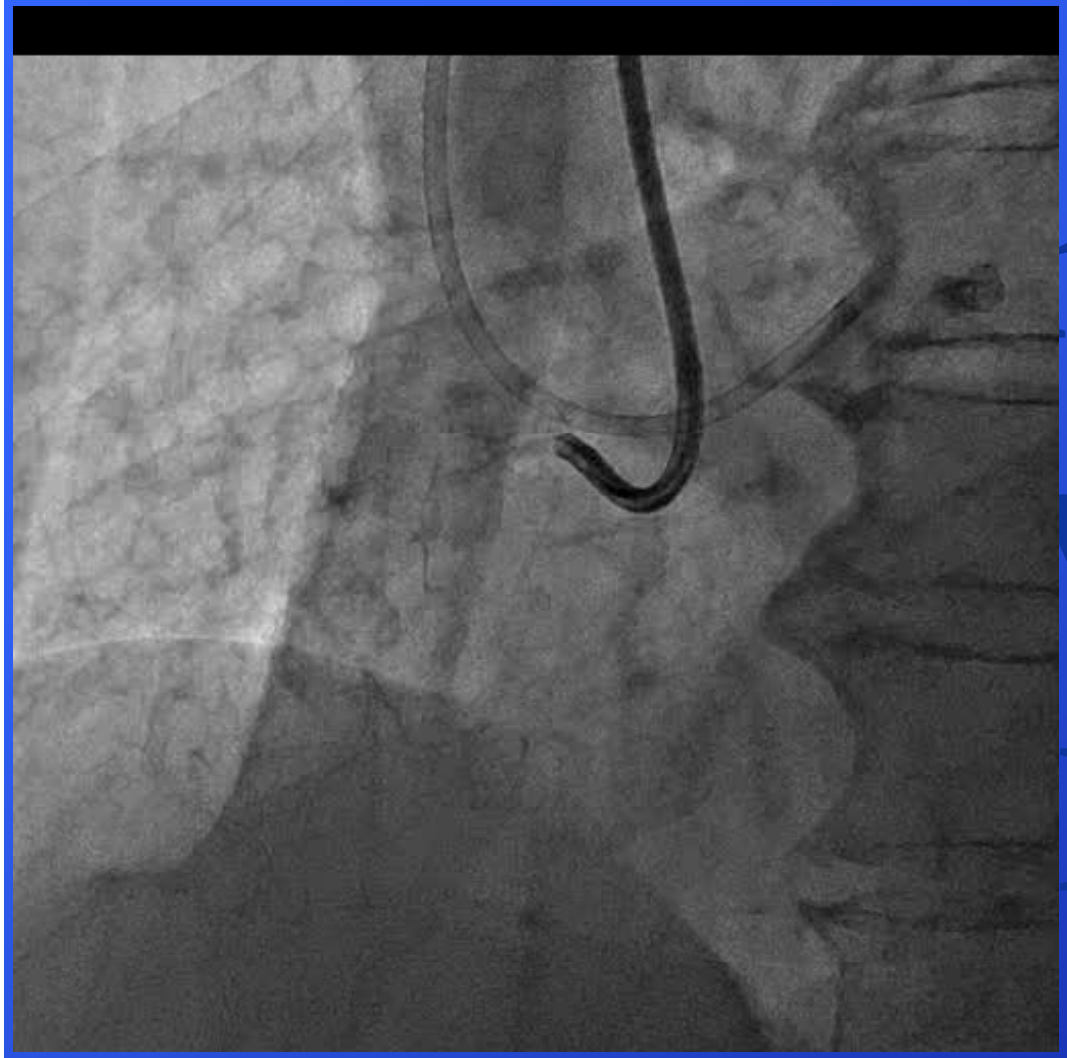
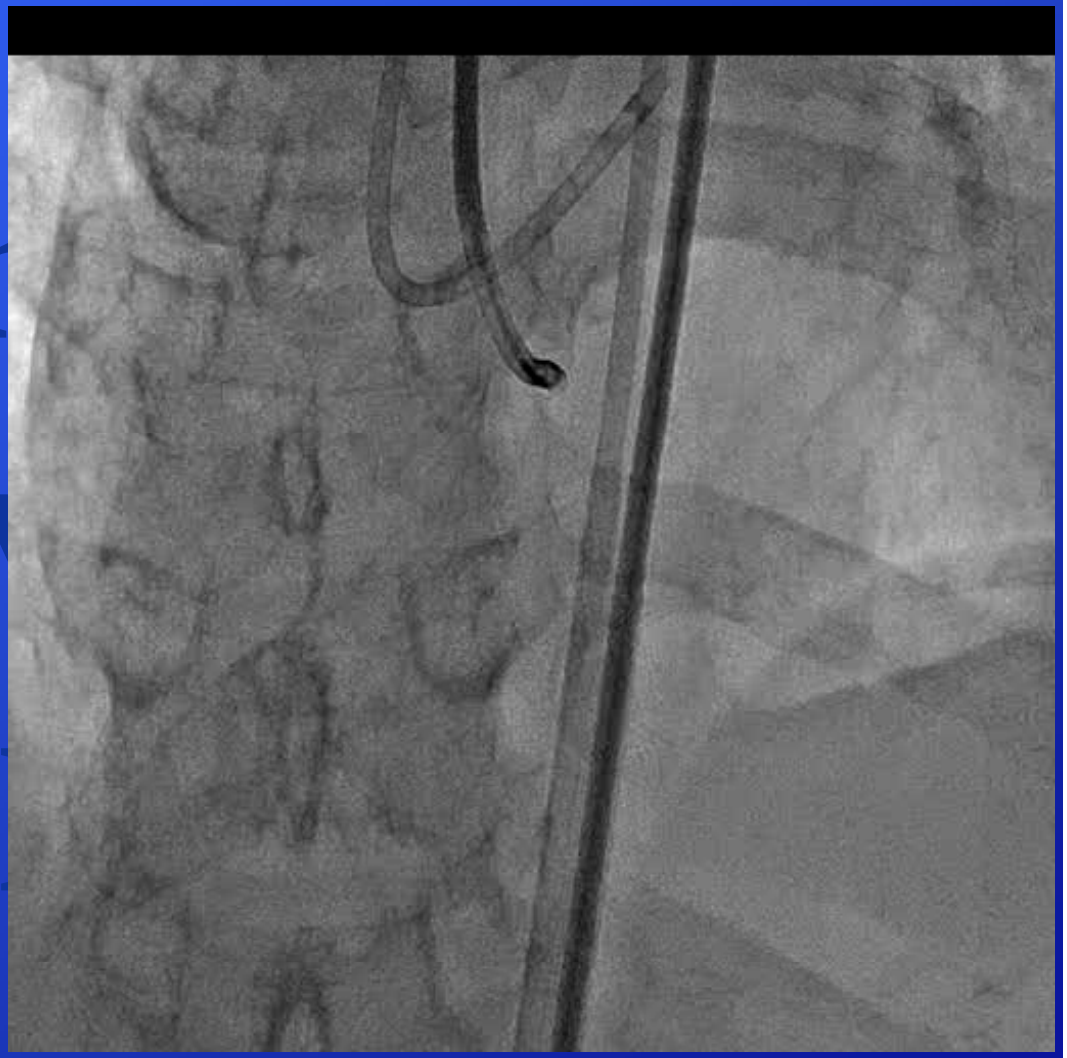
To know the lesion

- Lesion length
- Vessel route
- Vessel size
- Tissue characteristics
- Location of entry

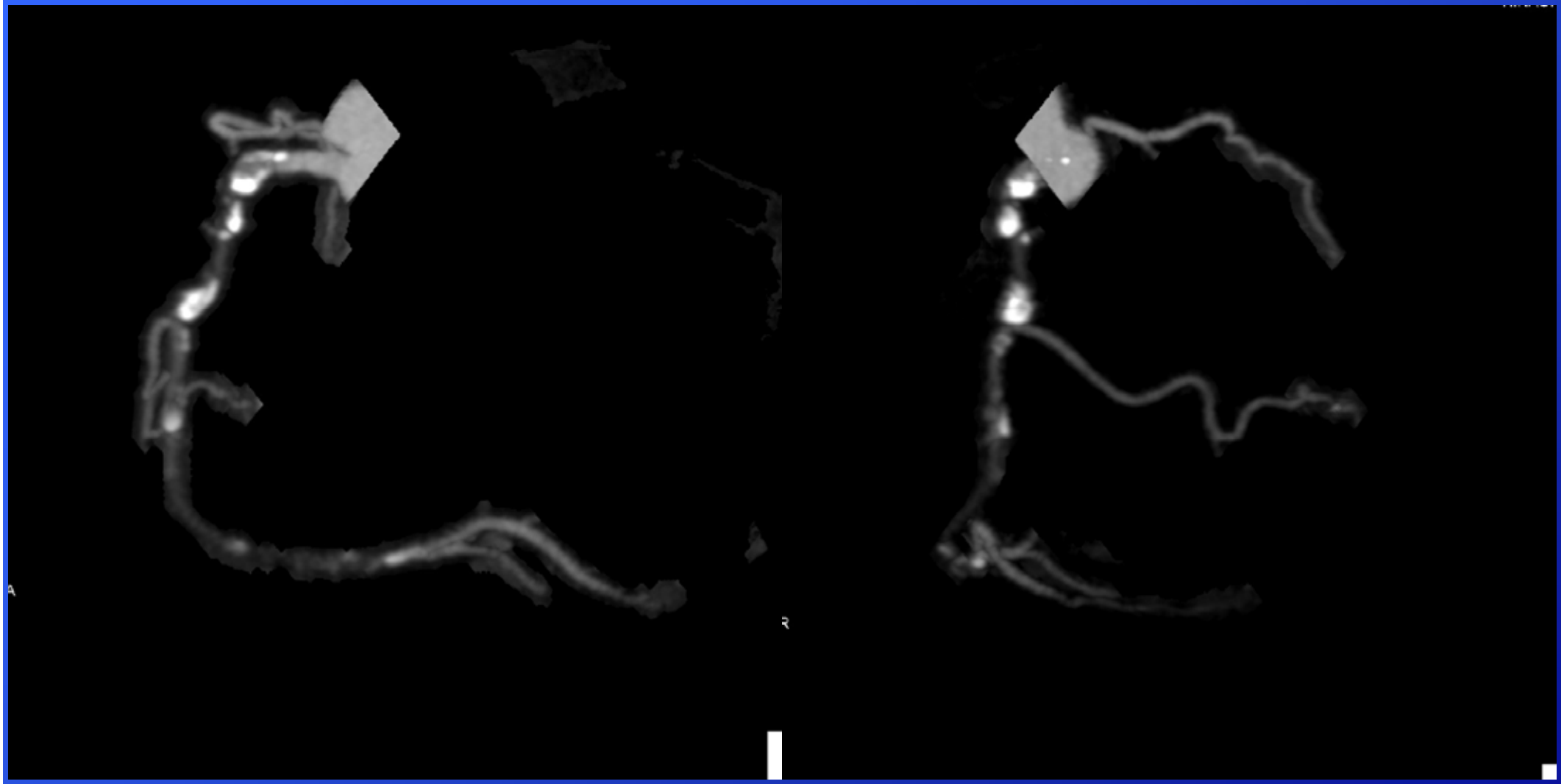
RCA CTO lesion





We can estimate the length of the proximal CTO by angiography. Fluoroscopy revealed lesion calcium. Therefore, we can vaguely image the vessel course via angiography. However, we cannot estimate the distal lesion by the angiography. Then where should we pass the wire?

Coronary MDCT (MIP)



Coronary MDCT shows the distribution of the calcium. We can know the lesion characteristics of the distal CTO. We can realize the vessel course and vessel size also. There is some contrast dye staining beyond the RV branch bifurcation. There is no dense calcium in the distal CTO.

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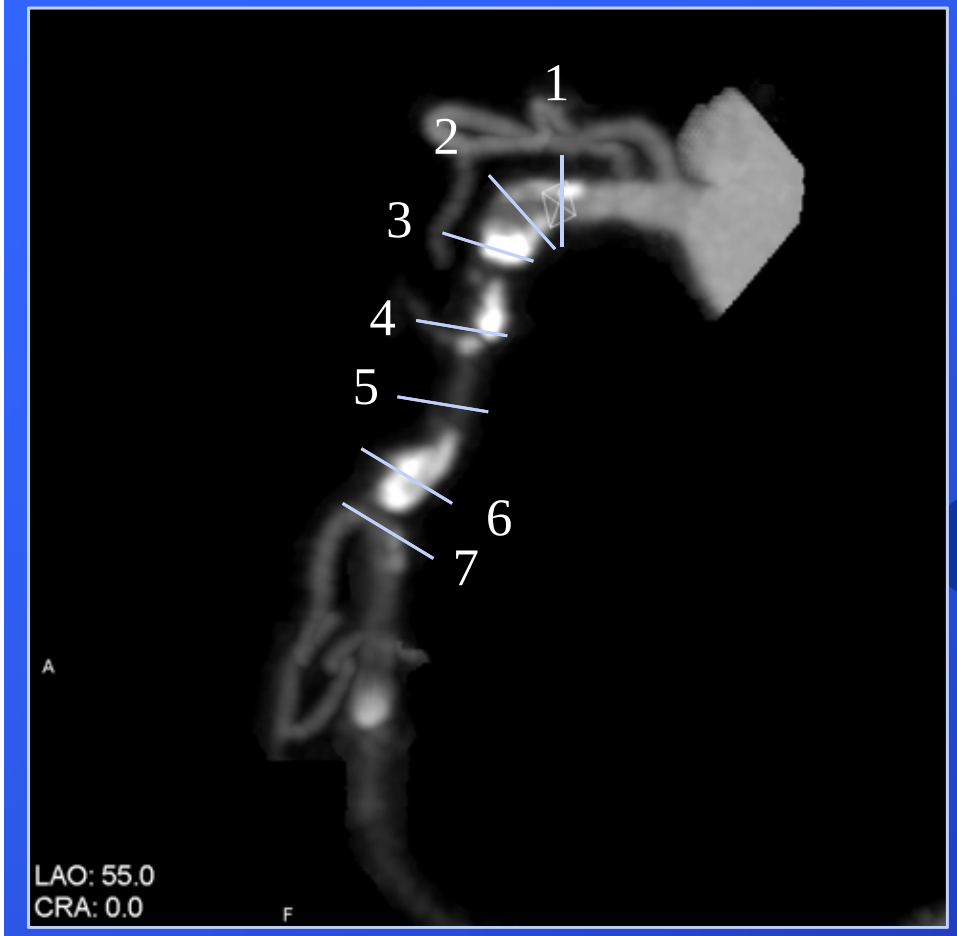
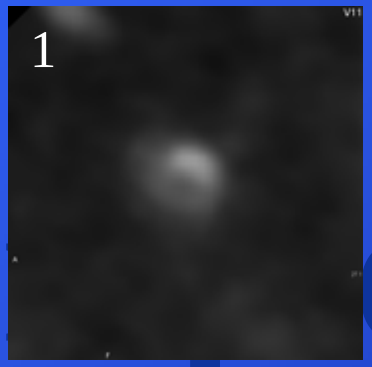
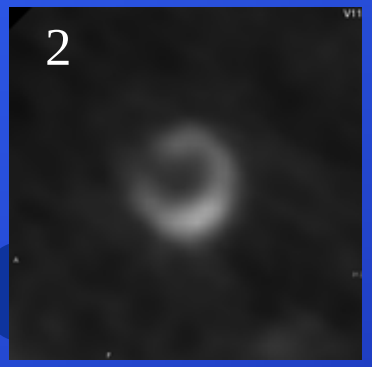
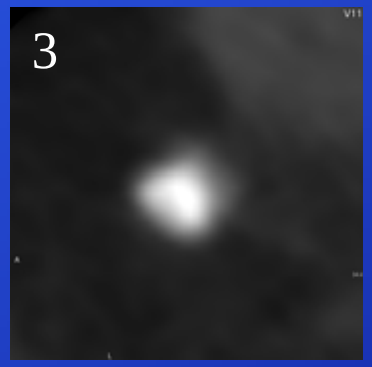
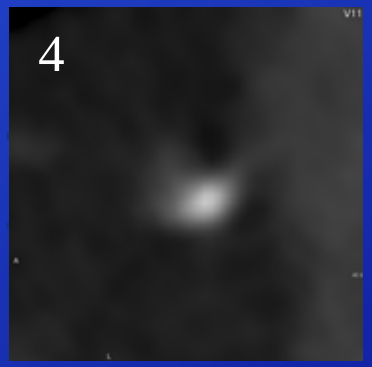
Coronary MDCT (MPR)

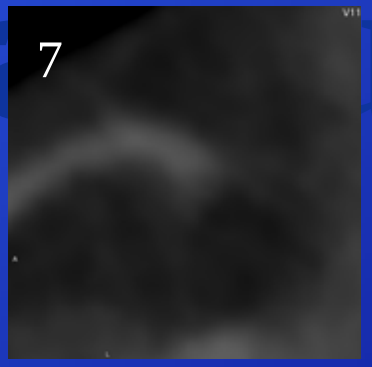


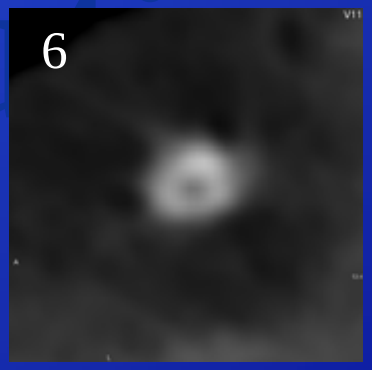


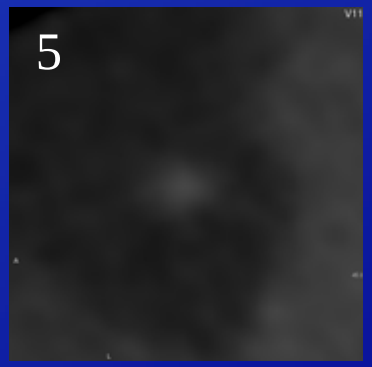






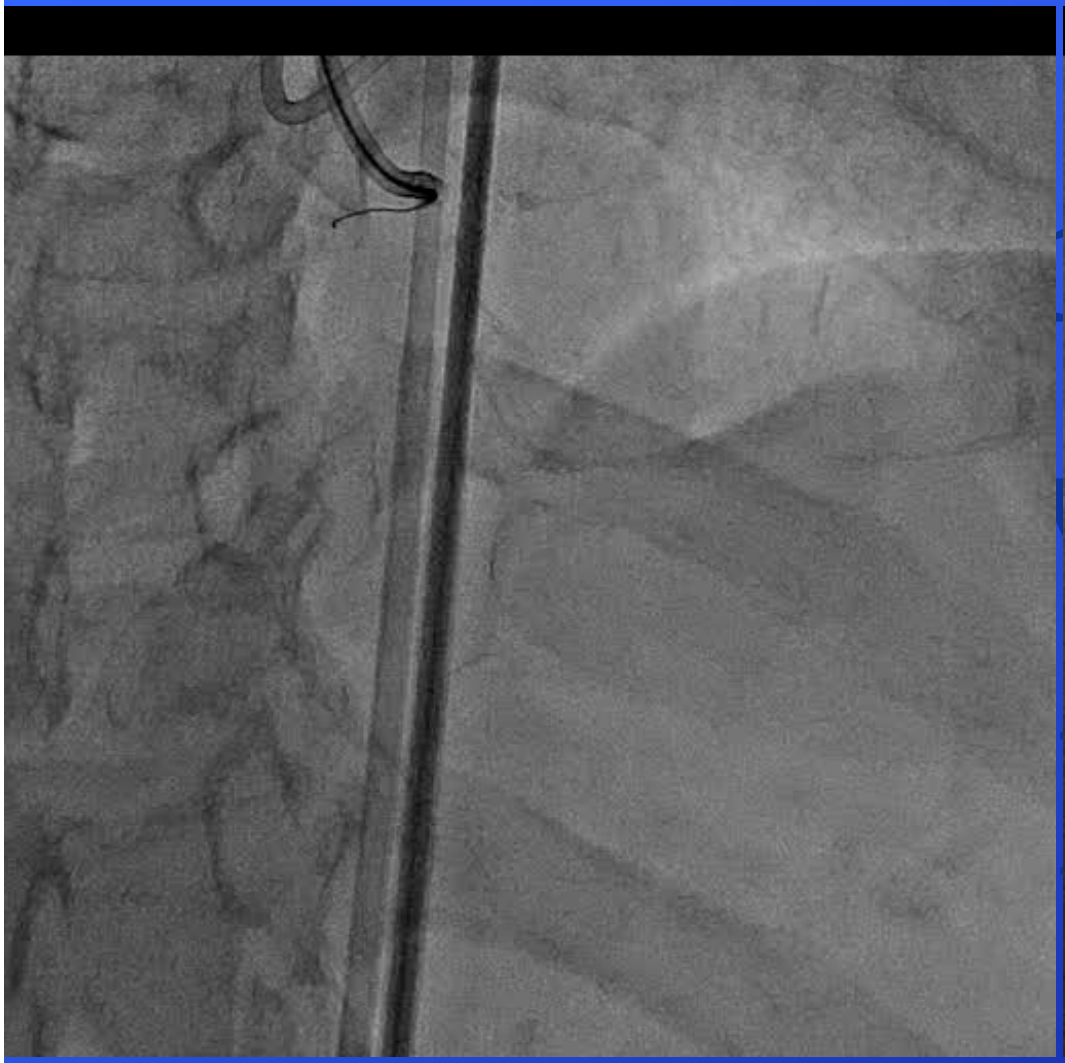


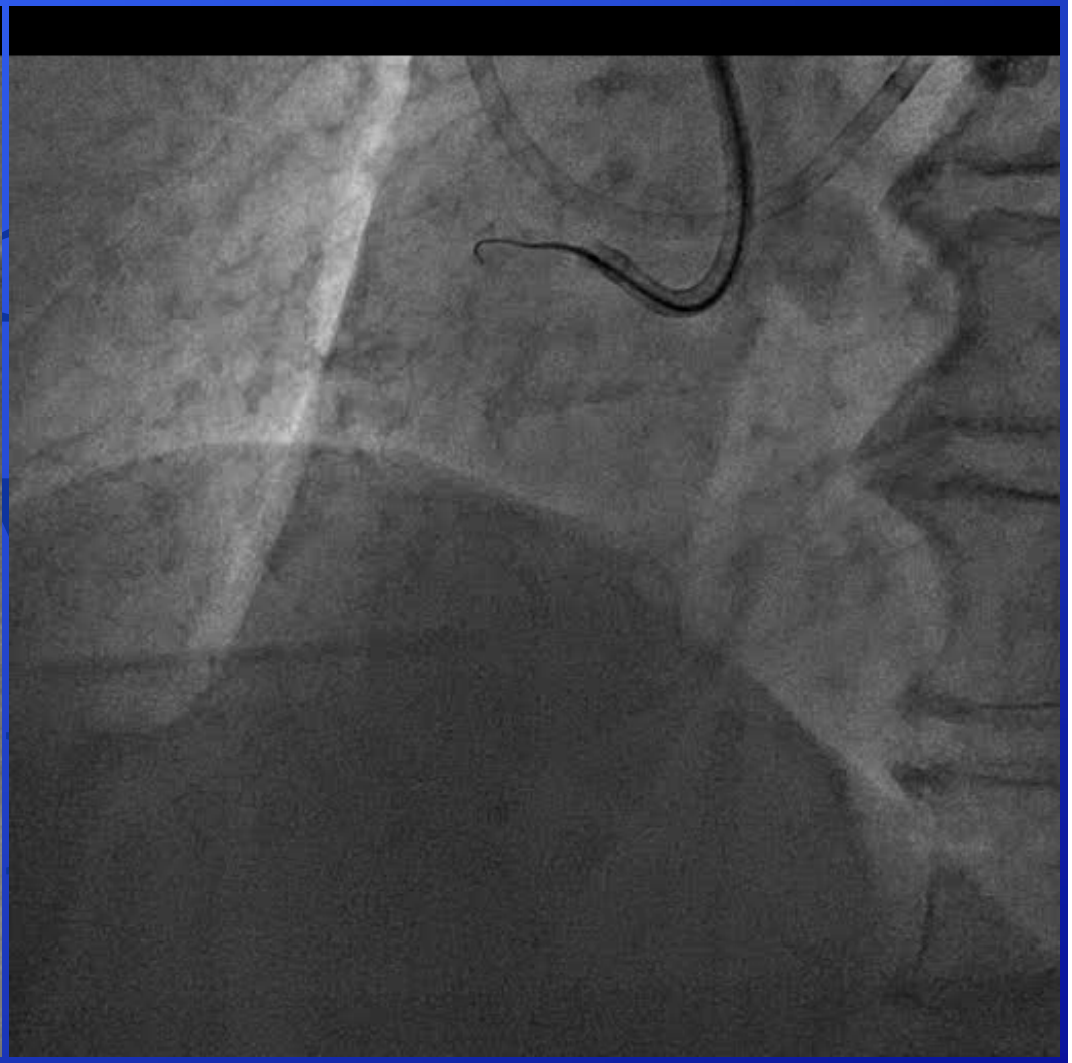




MPR showed the most of calcification was deep calcium and the most severe site seemed not to be a full moon configuration. Therefore, some space seemed to be remained.

Searching the soft lumen





Based on the MDCT findings, Fielder XT-R wire was chosen to negotiate loose tissue. Comparing with previous hydrophilic polymer jacket wire, Fielder XT-R possesses a better controllability.

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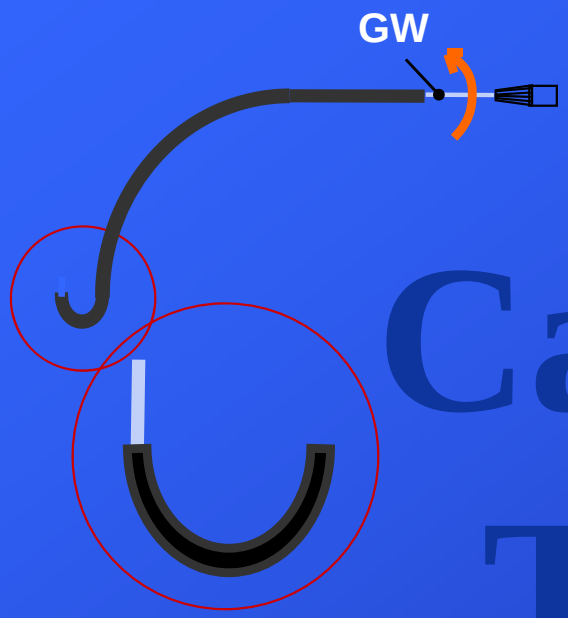
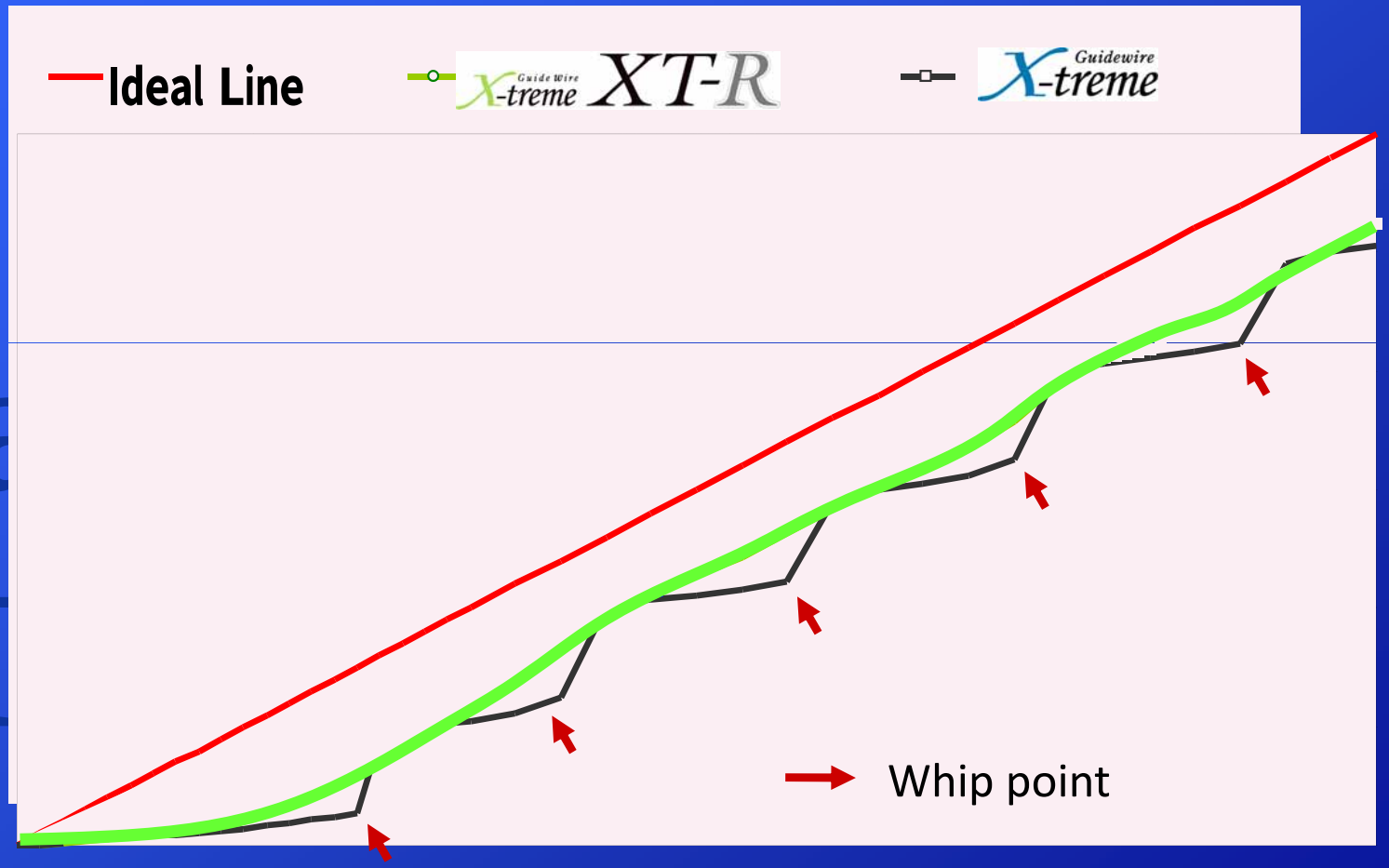
Importance of no whip motion



Micro curve model

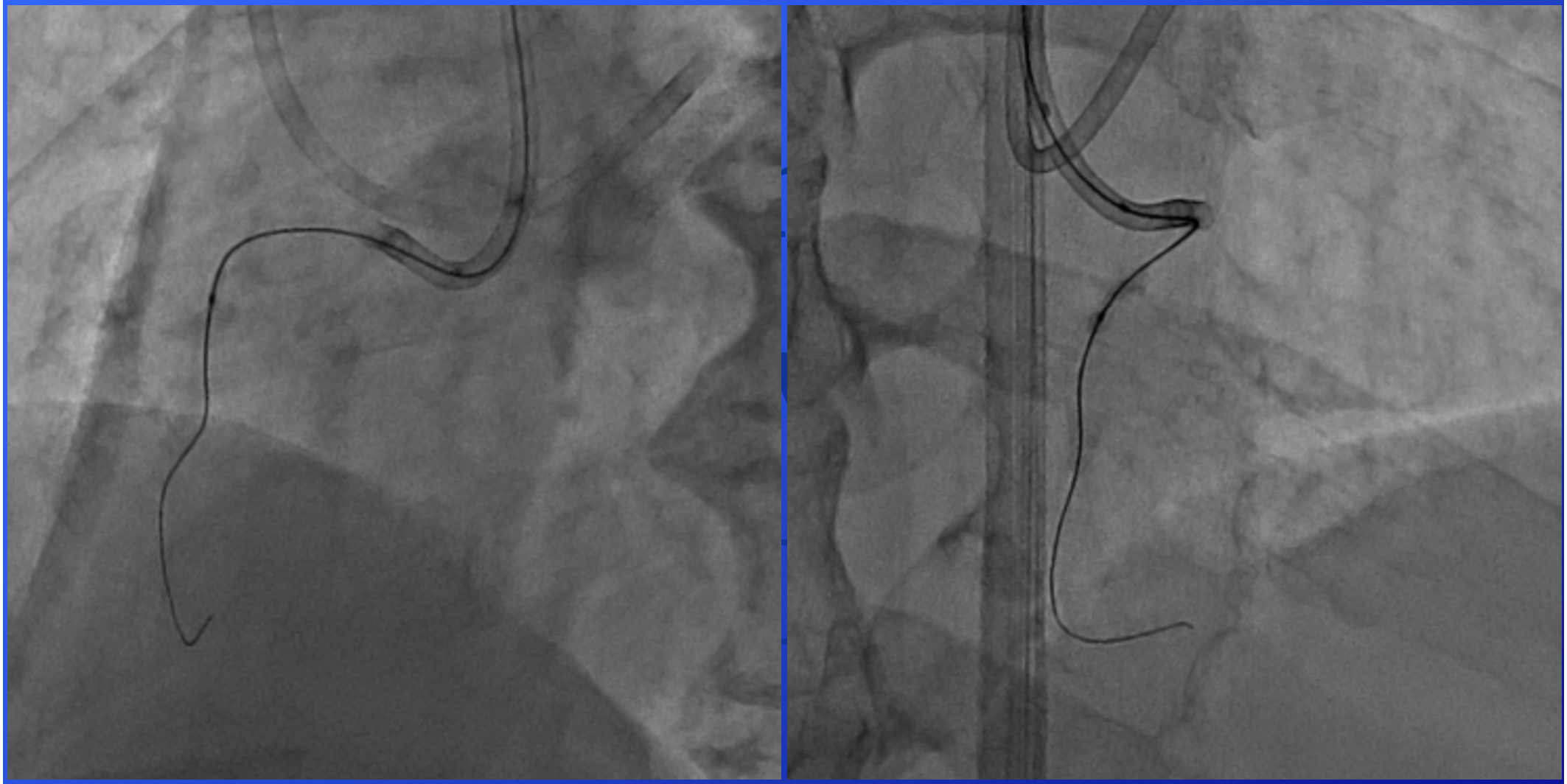


Relationship between driving angle and output angle in the experimental curved model. The rotation force was stored within the wire and then a GW releases a tension and rotates at a burst (whip). It causes the difficulty for GW control.

Whip motion

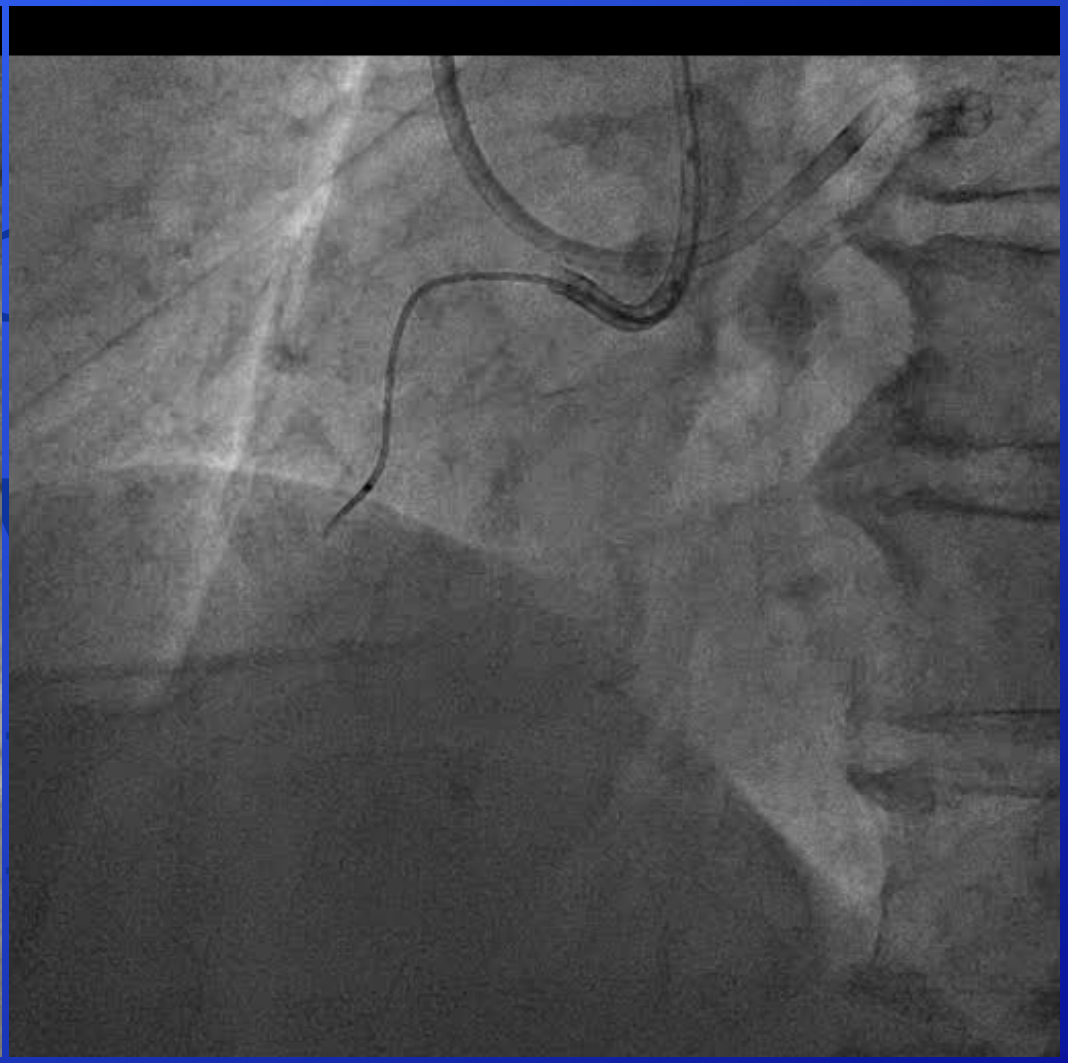
Less whip motion

Wire crossing



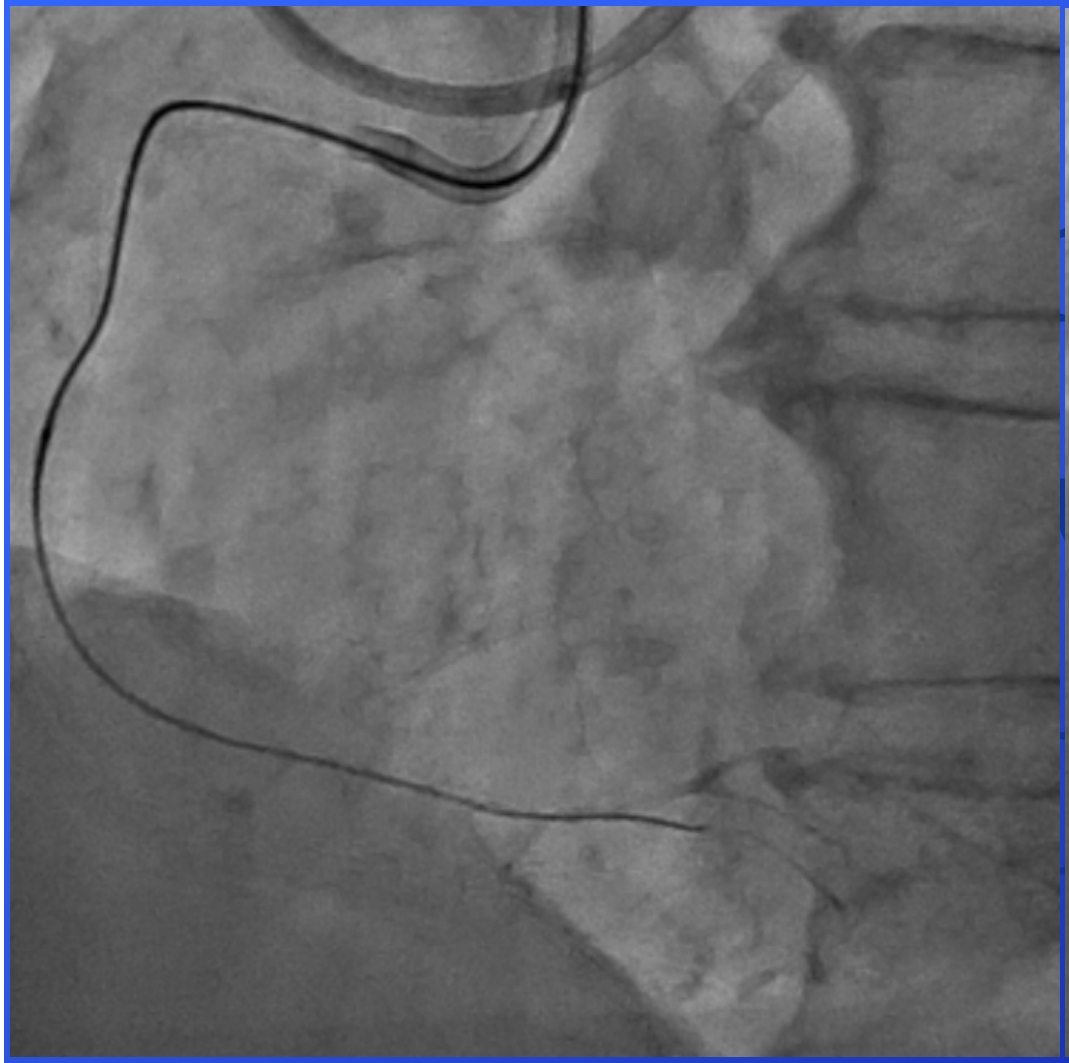
As expected, guide wire was successfully crossed the lesion toward the RV branch. Then a balloon dilation was performed with a small sized balloon

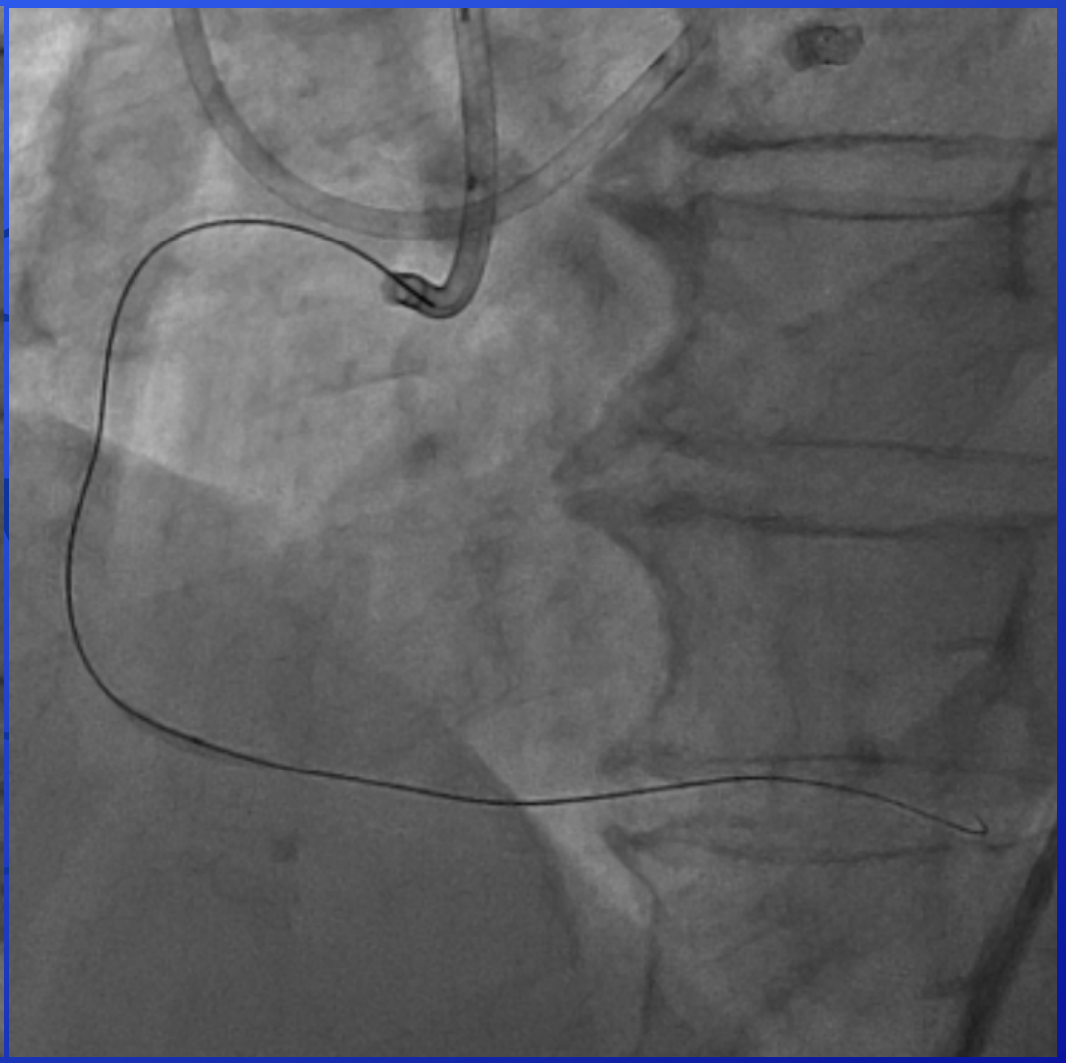
Micro catheter insertion



After introducing a micro catheter, blood back flow was confirmed. Then the simultaneous angiography was done via left coronary artery guide and micro catheter to delineate the distal CTO lesion. Small recanalization channel was barely seen.

Crossing the distal lesion



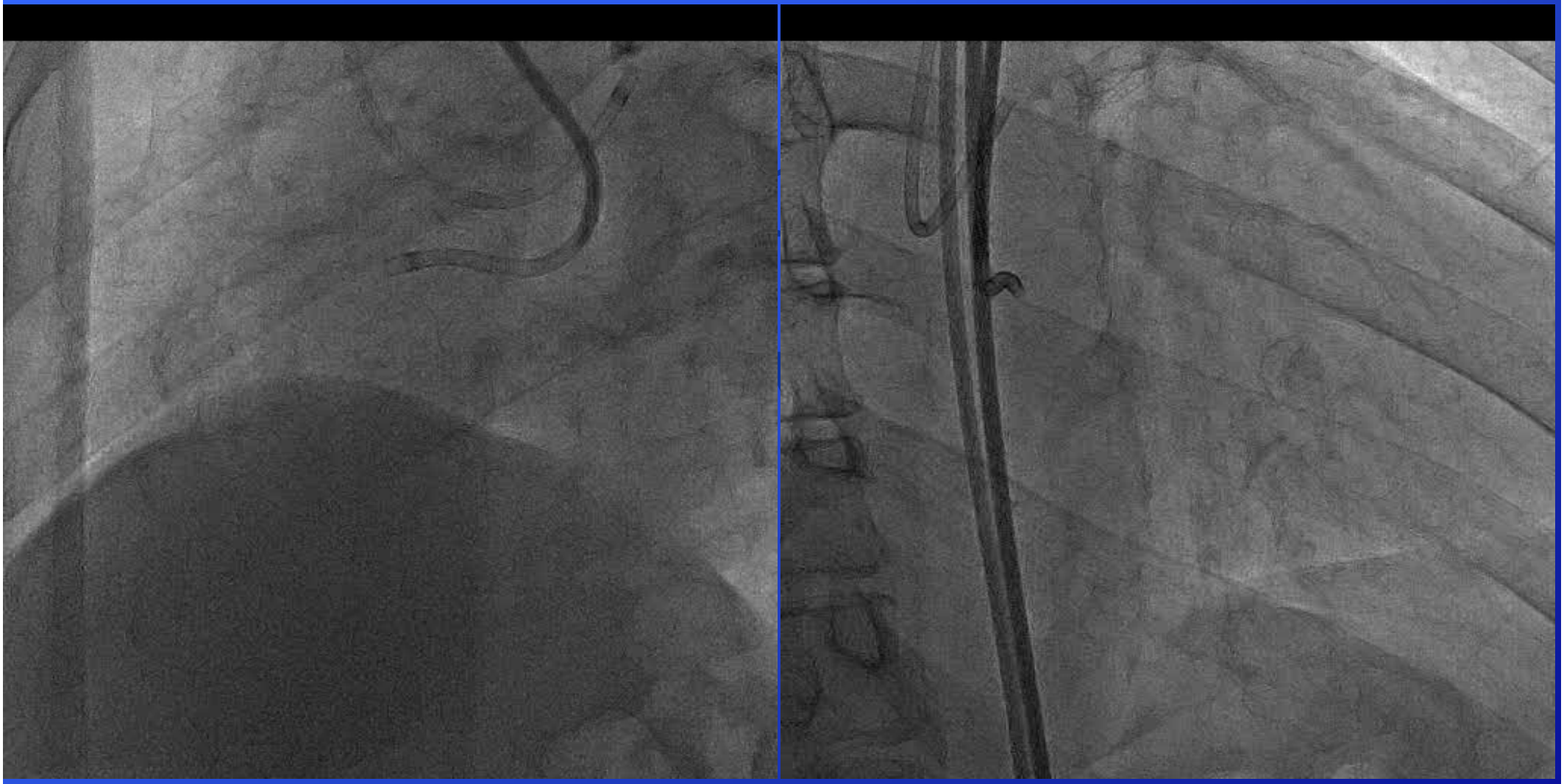


To cross the lesion, Fielder XT-R was also used and lesion was successfully crossed by this guide wire.

Final angiograms

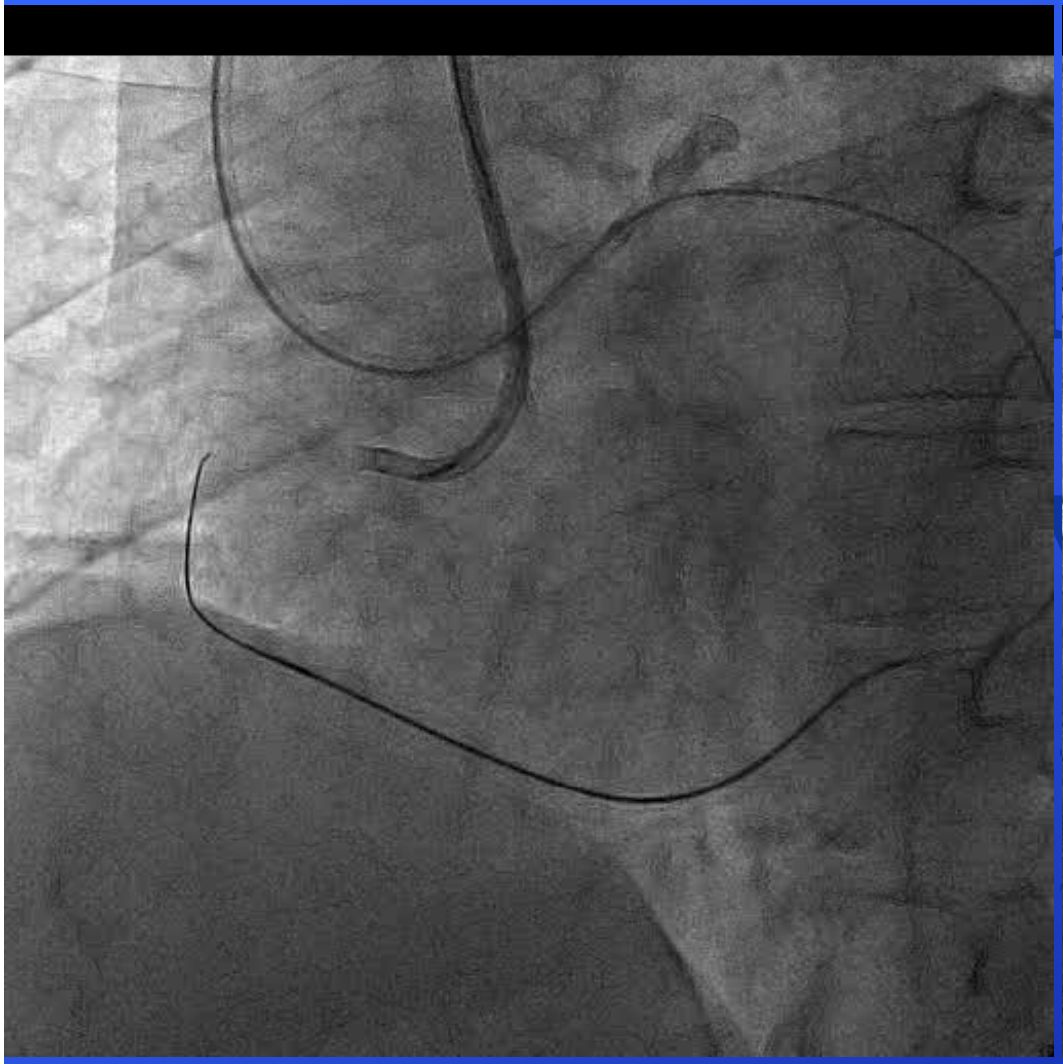
Successful recanalization was achieved after drug eluting stent implantation.

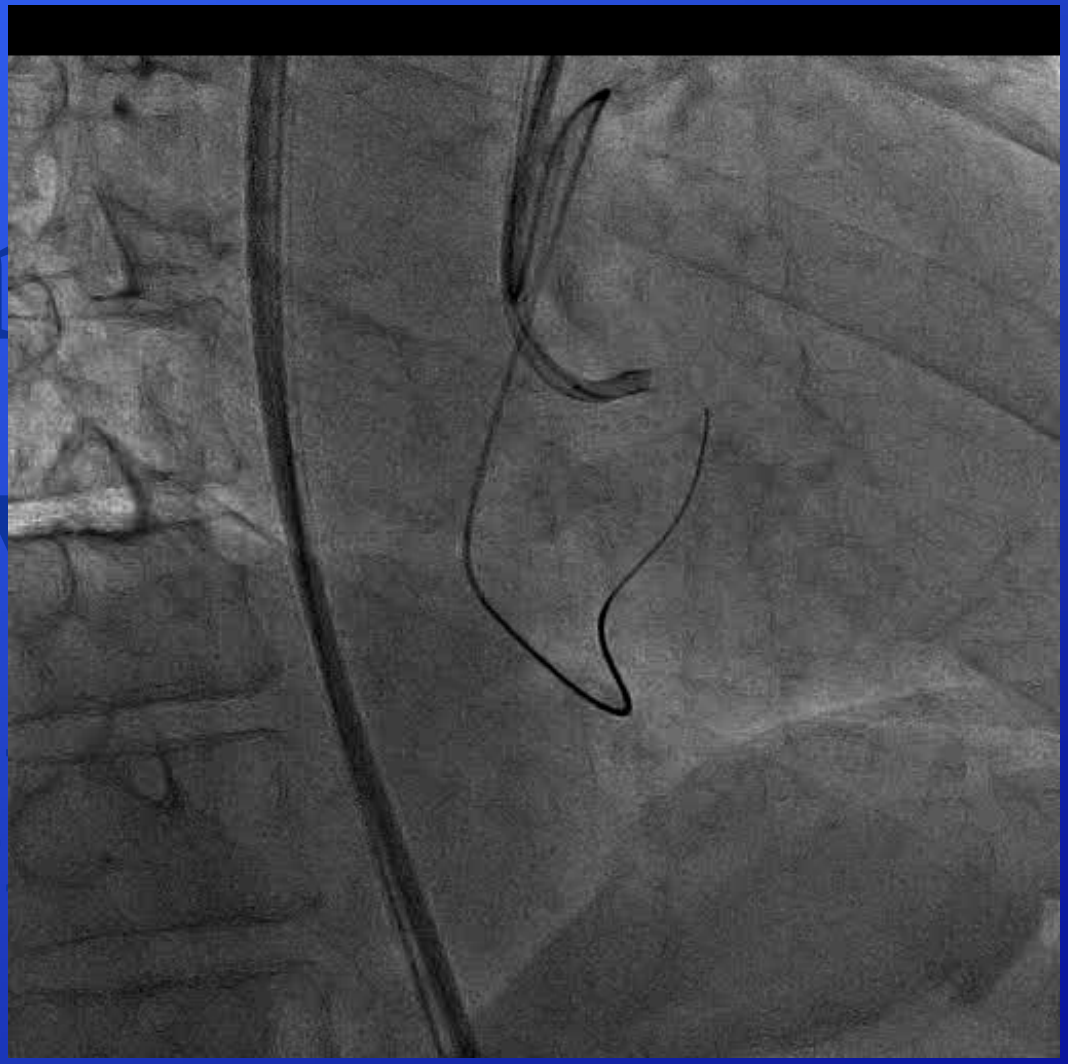
RCA CTO lesion



Proximal RCA CTO lesion. It is quite difficult or impossible to determine the entry of the CTO by the angiography. It seems a small branch originated from the ostium of the RCA. Length of the CTO is very long and we cannot see the vessel course absolutely.

Retrograde approach





There are two available collateral channels for retrograde approach. Practically, in this kind of long CTO lesion, retrograde approach is promising method. Therefore, retrograde wiring was performed via an atrial channel. However, the retrograde wire did not go into the correct route. Therefore, antegrade wiring is needed. Where shall we enter the wire?

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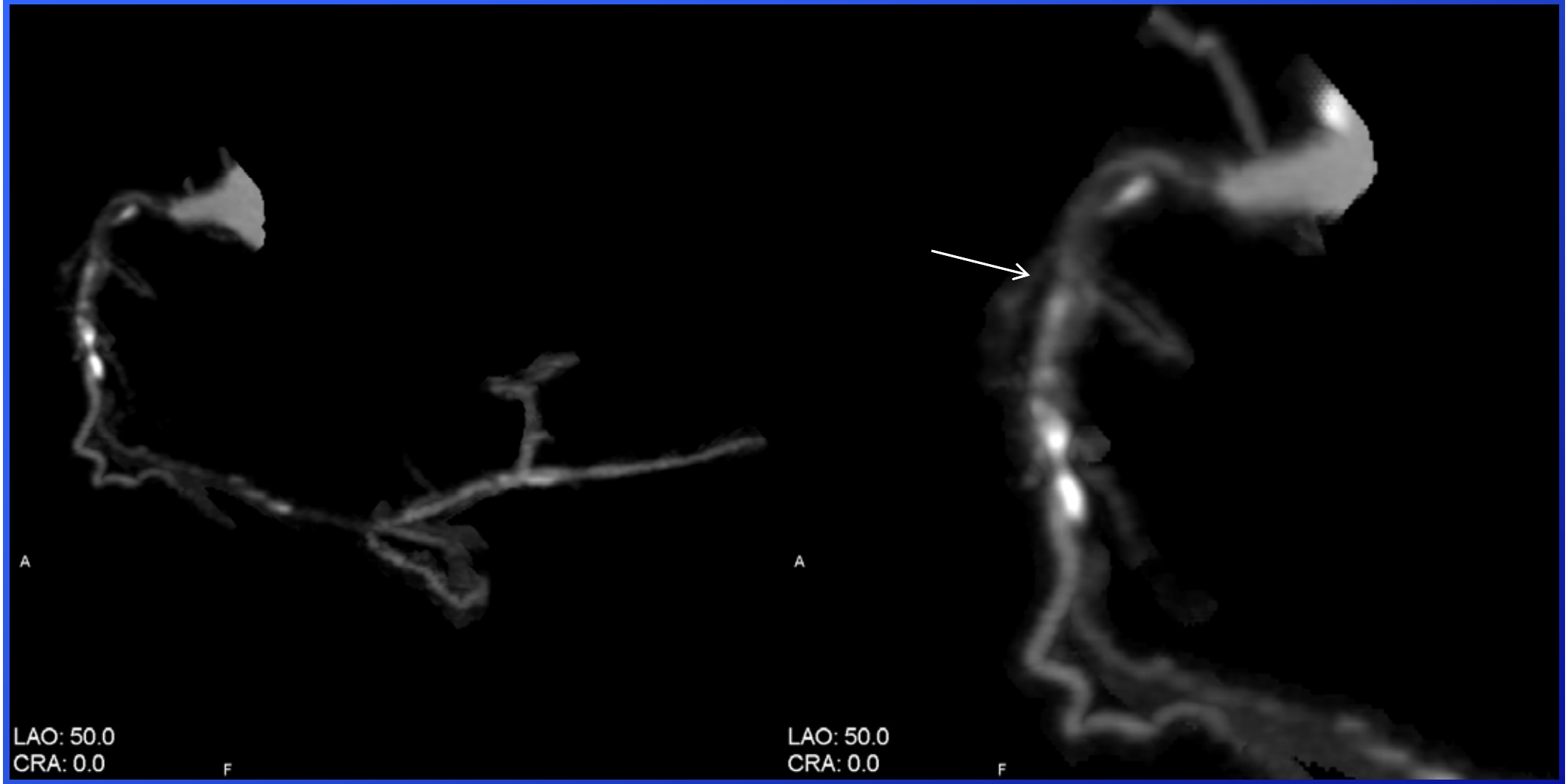
Coronary MDCT (MIP)



Coronary MDCT shows the location of the entry of CTO clearly. From this image, it became clear the small branch as if originated from the ostium of RCA is not the branch but the remaining lumen of the main vessel itself. We can determine the entry site by this CT image.

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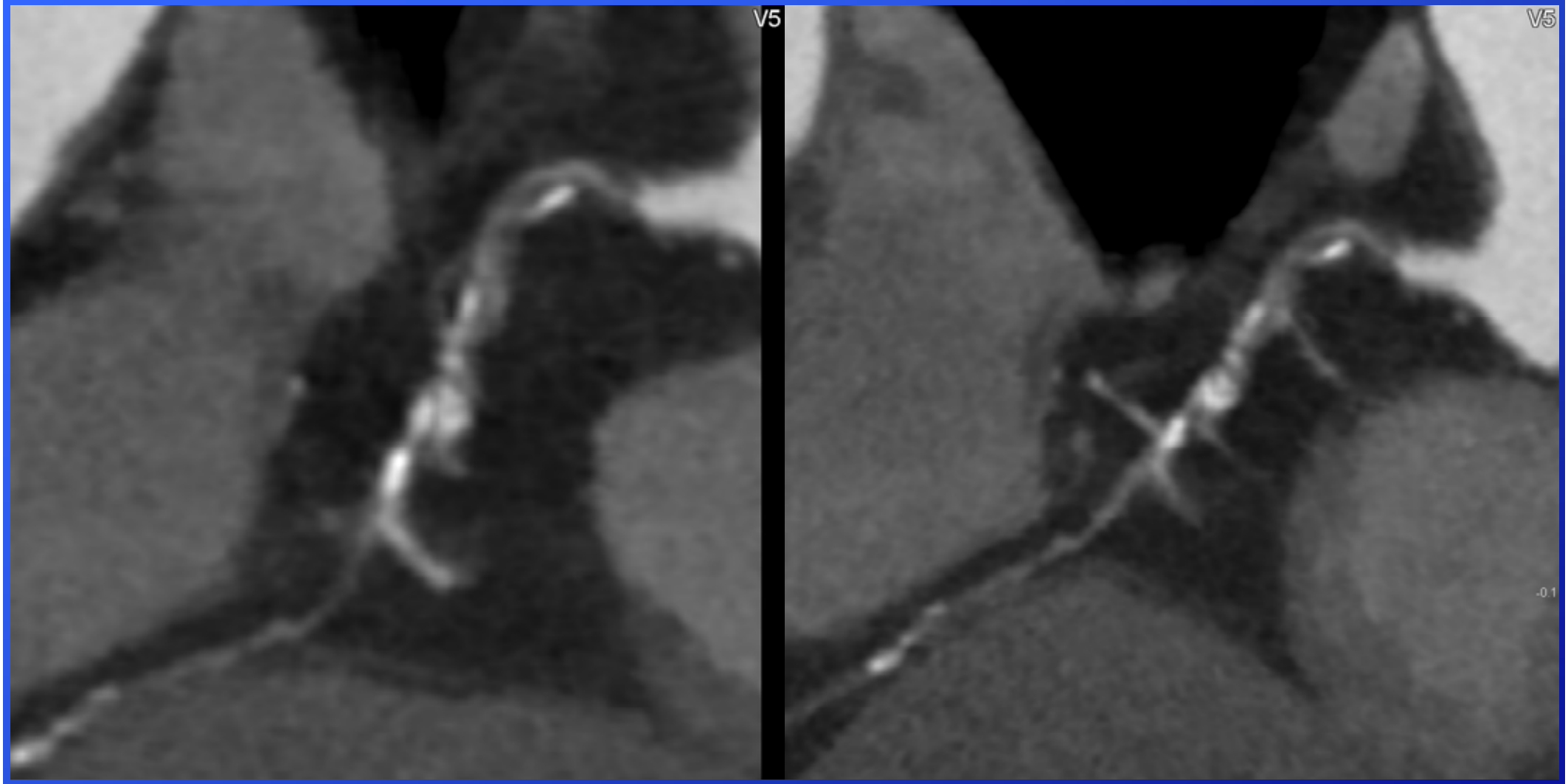
Coronary MDCT (CPR)



From CPR image, we can estimate the proximal vessel size also. This means that we can dilate this site with an appropriate sized balloon for introduction the device such as IVUS probe.

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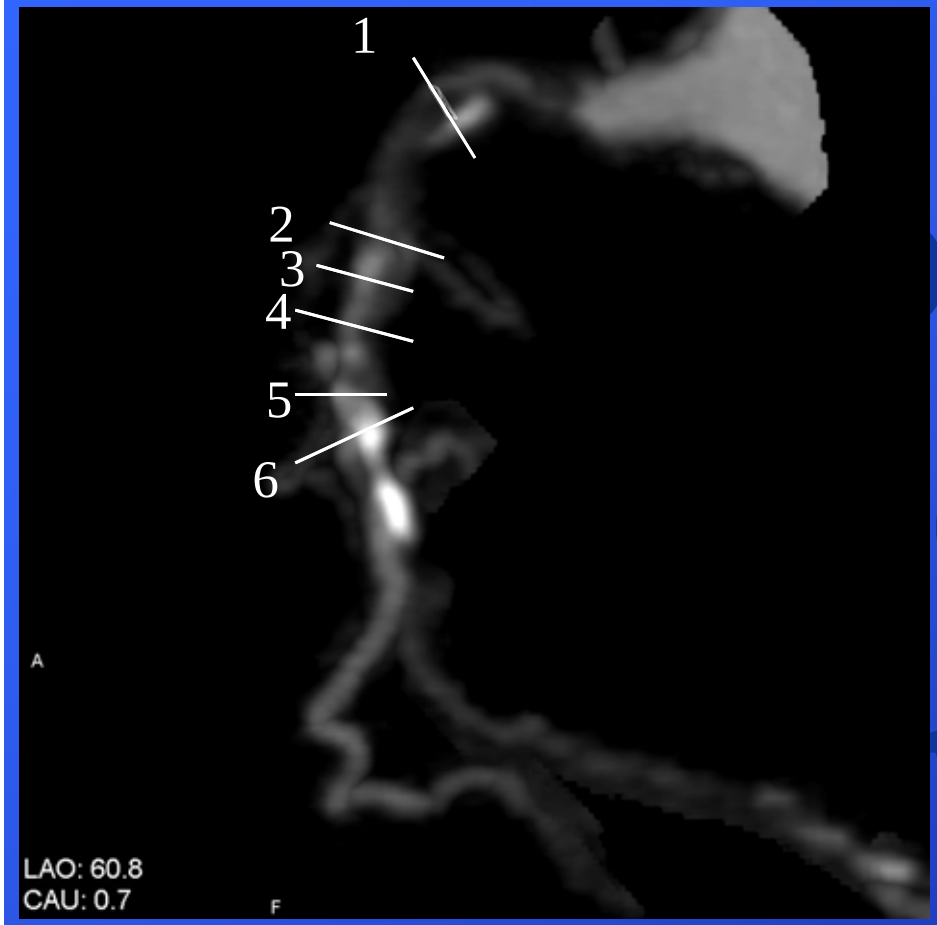
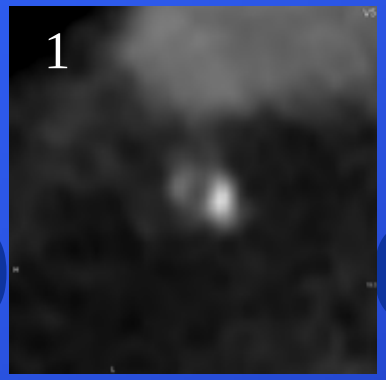
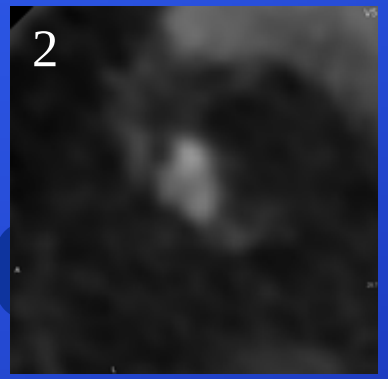
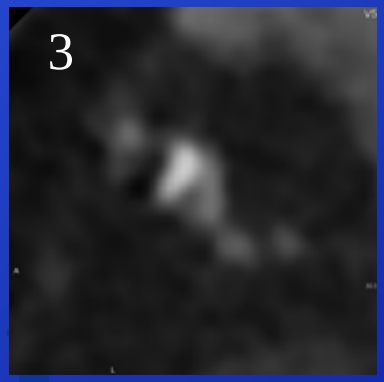
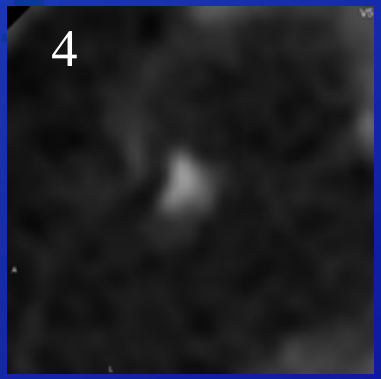
Coronary MDCT (MPR)

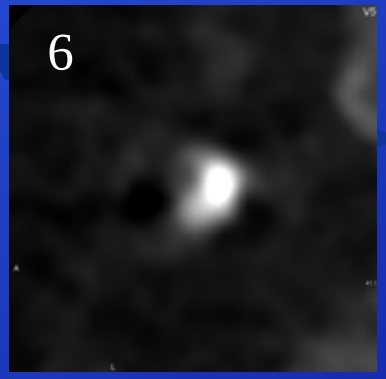


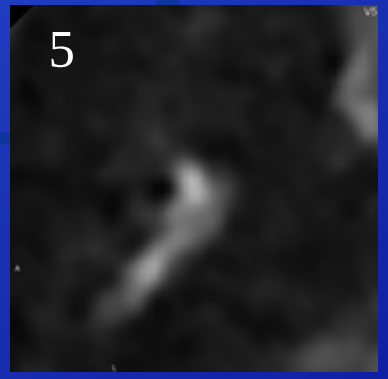






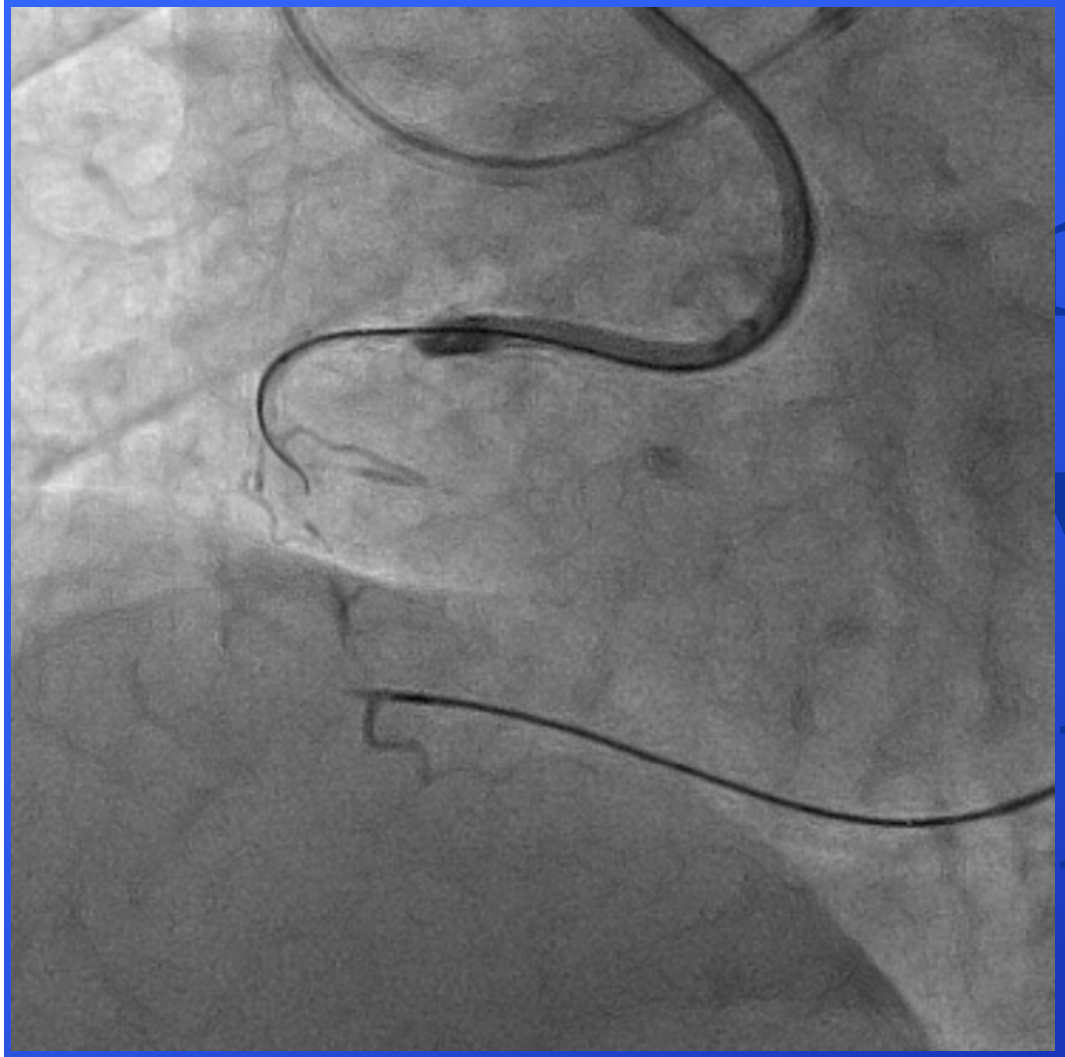


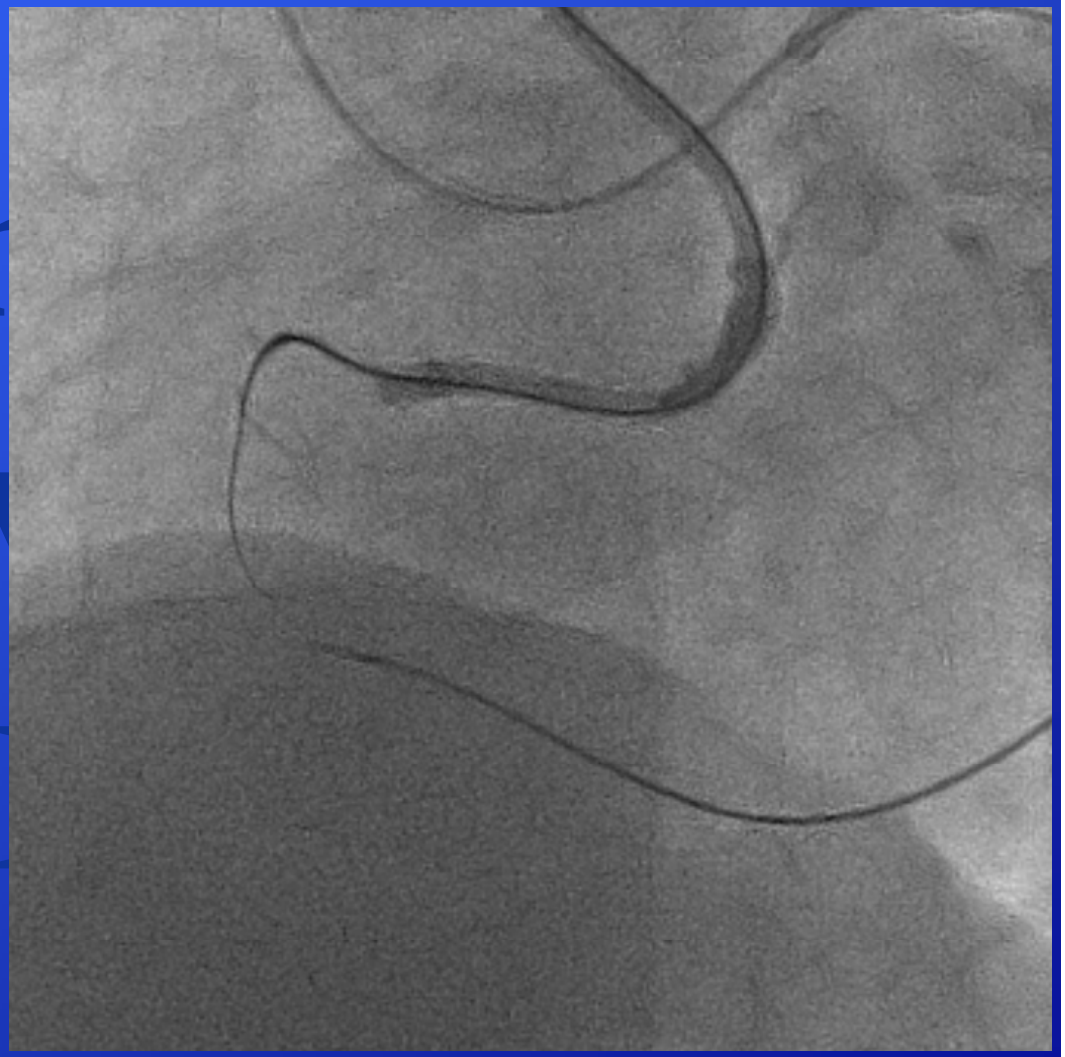




MPR showed the characteristics of the lumen. The entry of the CTO is occupied with the calcium in this image. Therefore, we can imagine we need a stiff wire to enter the lesion.

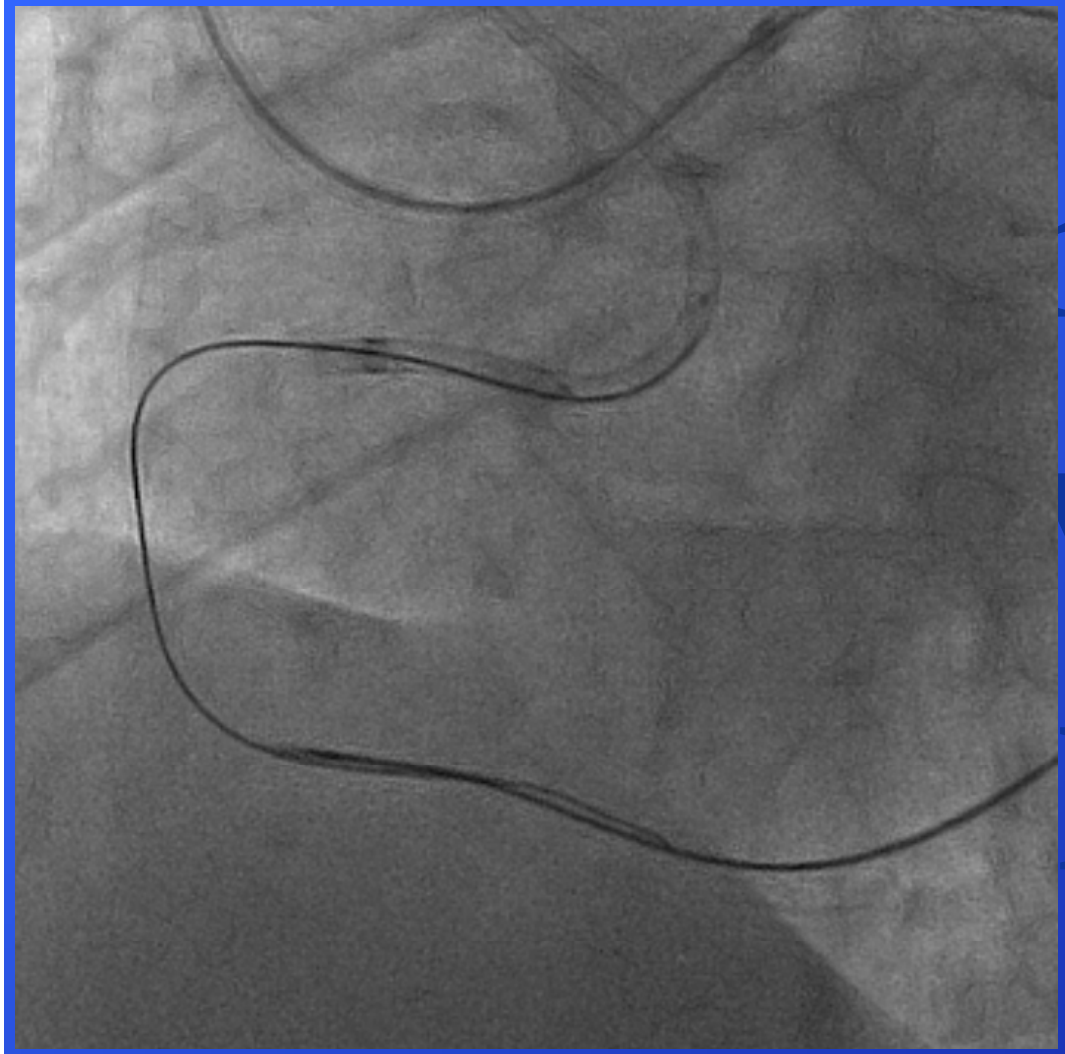
Antegrade wiring

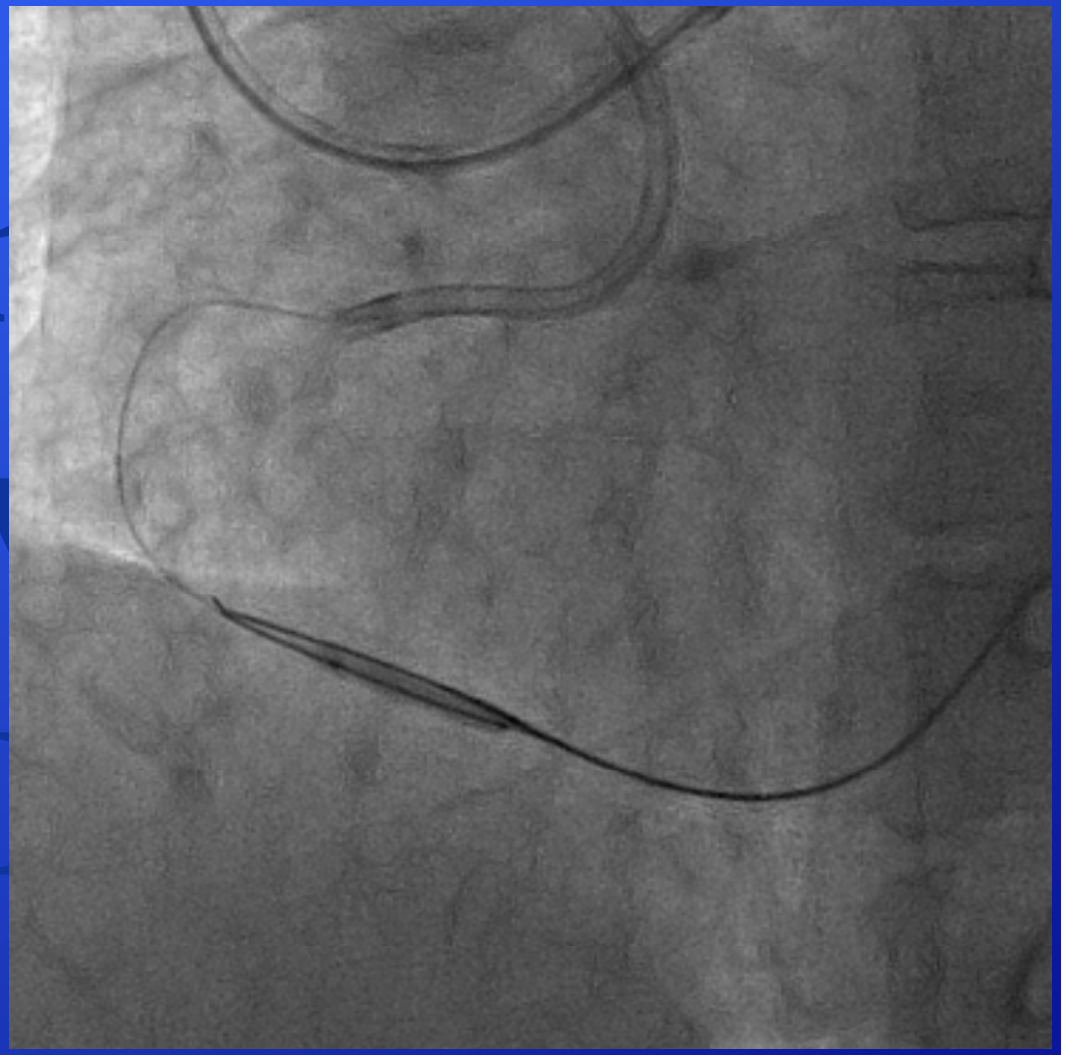




Based on the CT findings, a conquest pro 12 guide wire was chosen to enter the CTO and advanced carefully. Retrograde wire or device is helpful to advance the antegrade wire.

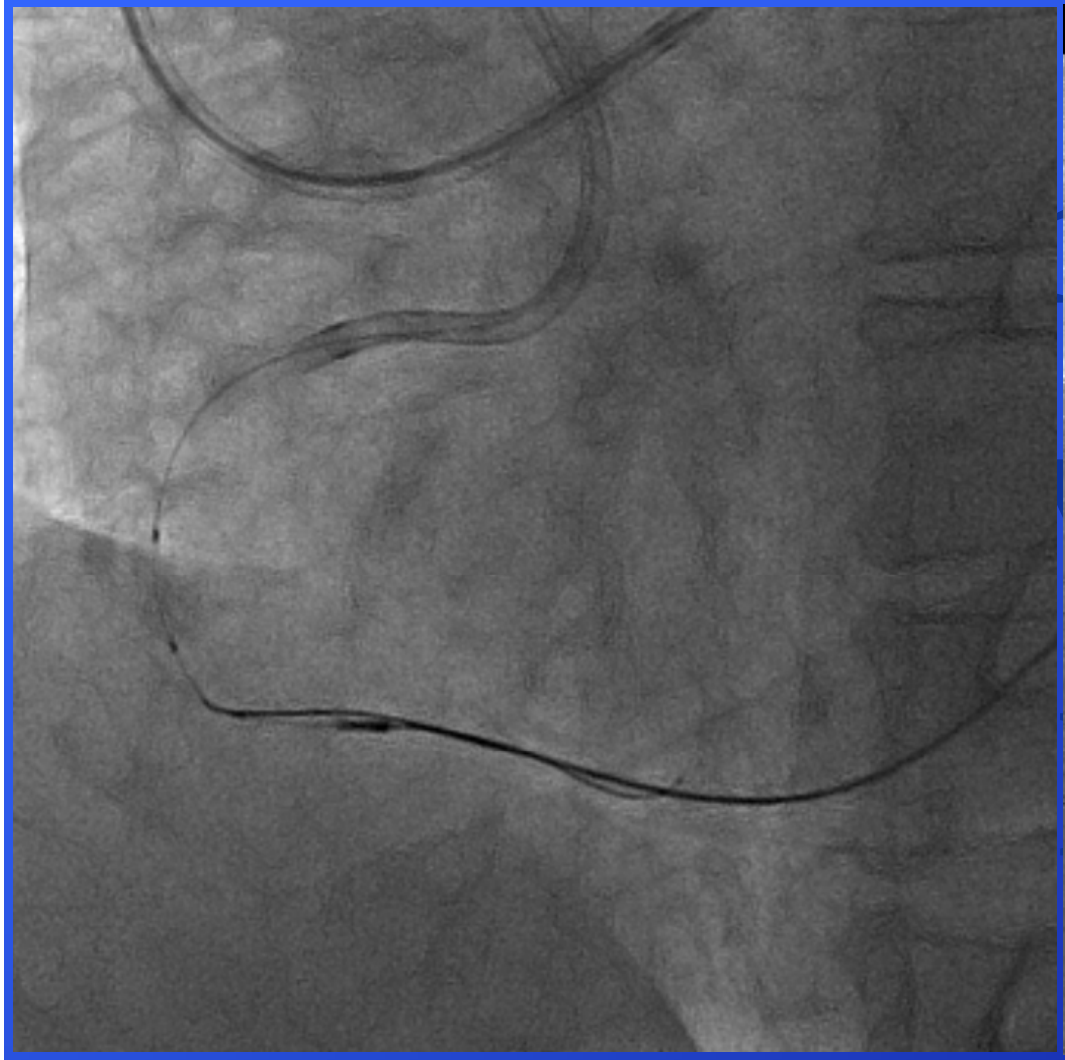
Reverse CART

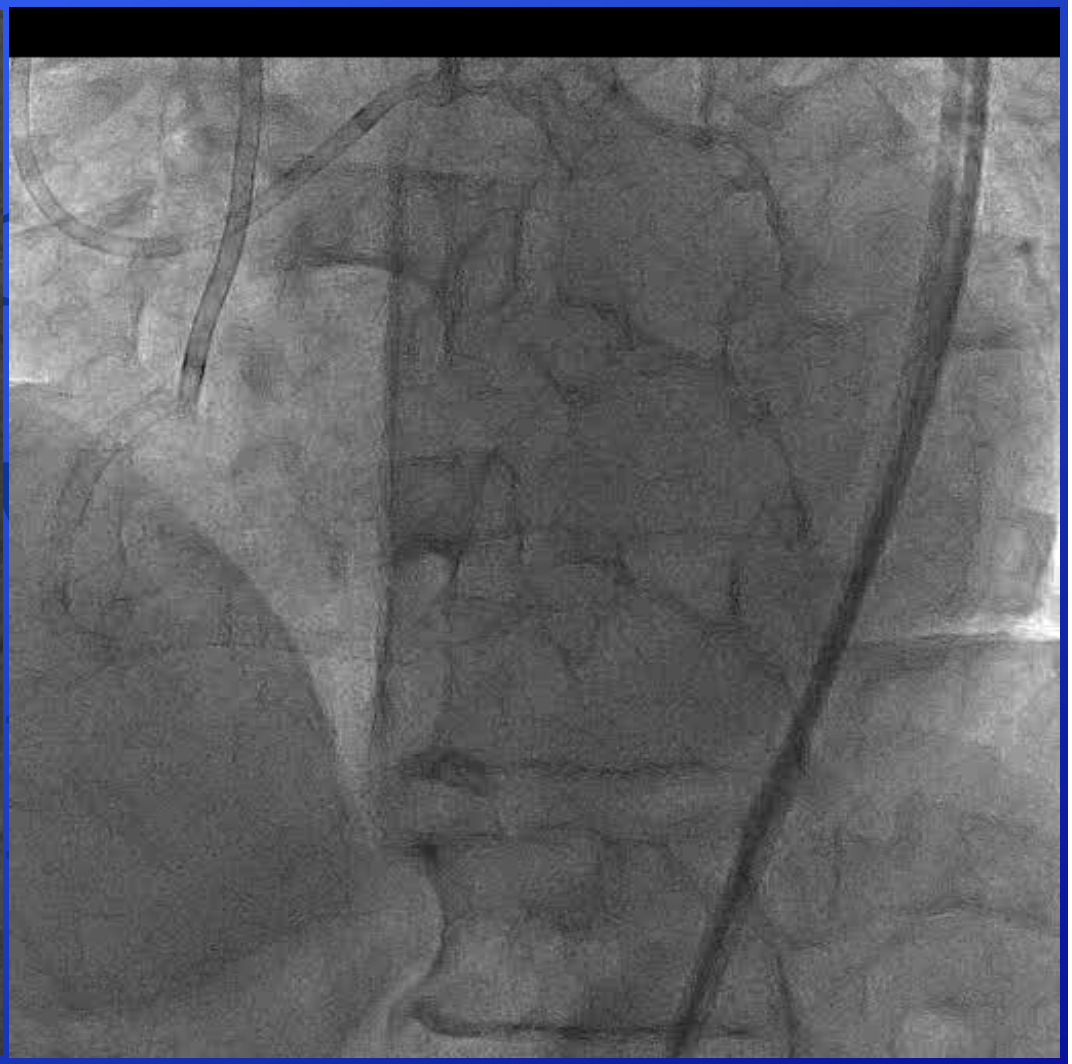




Antegrade and retrograde wires was reached almost overlapped position. Because there is less calcification in this site, it is promising for connecting the two lumens.

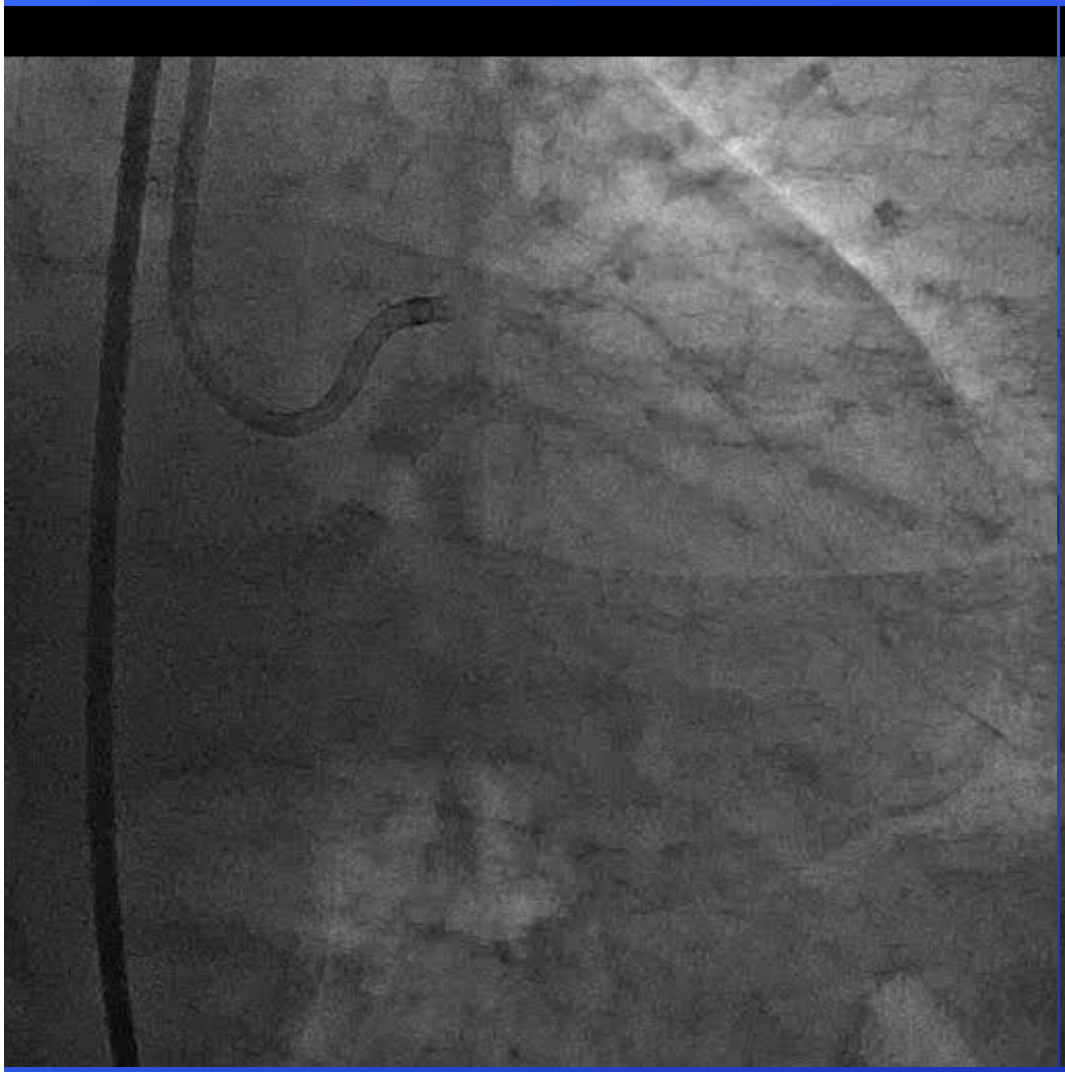
IVUS confirming and final angiogram





After confirming the retrograde wire entering the antegrade true lumen, balloon dilation and stent implantation were performed. Successful recanalization was achieved.

LCX CTO lesion



Mid LCX CTO lesion (Second attempt). The first attempt was failed because of a bend in the CTO lesion. Guide wire easily migrated into the subintimal space. Why?

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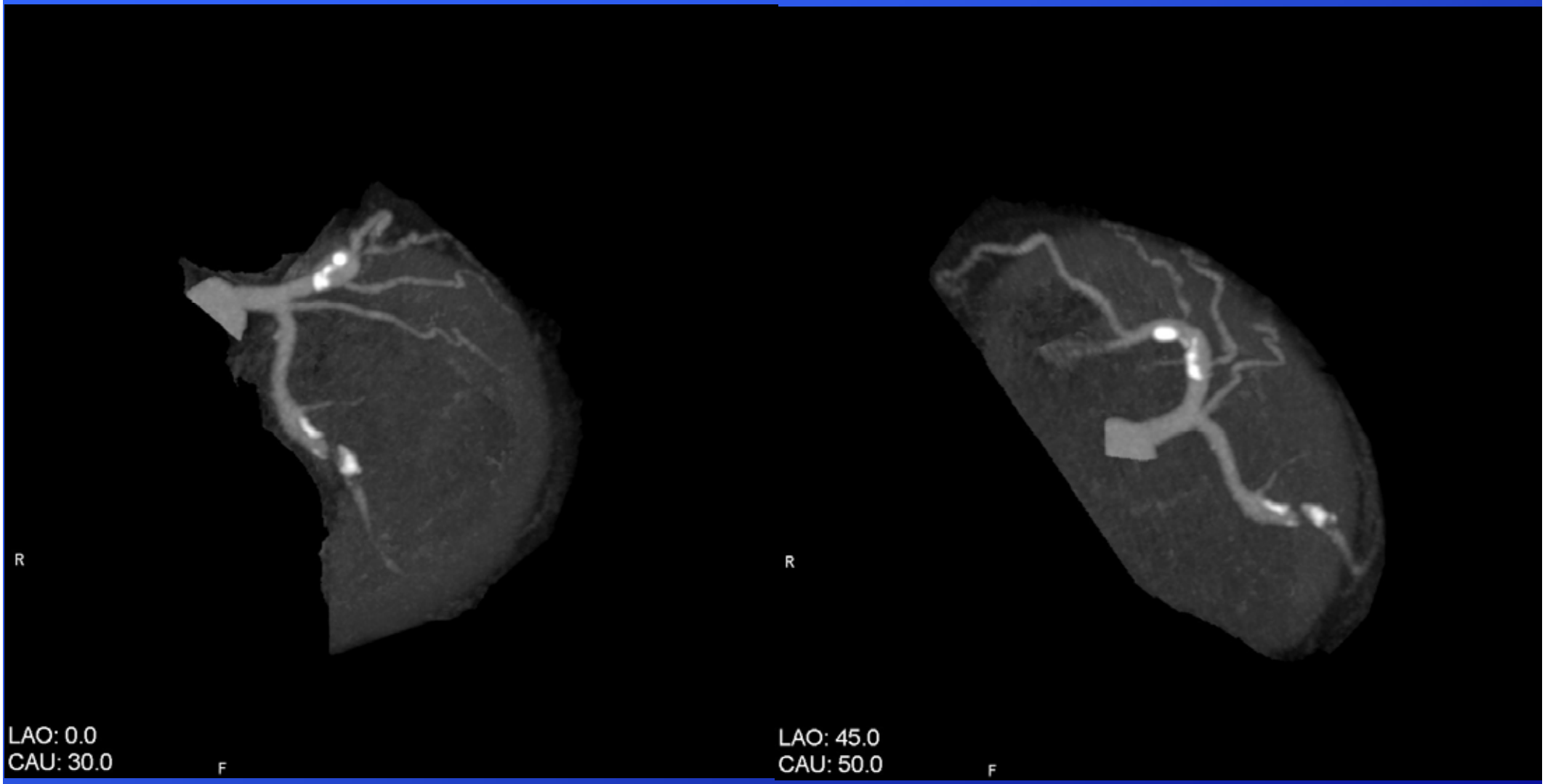
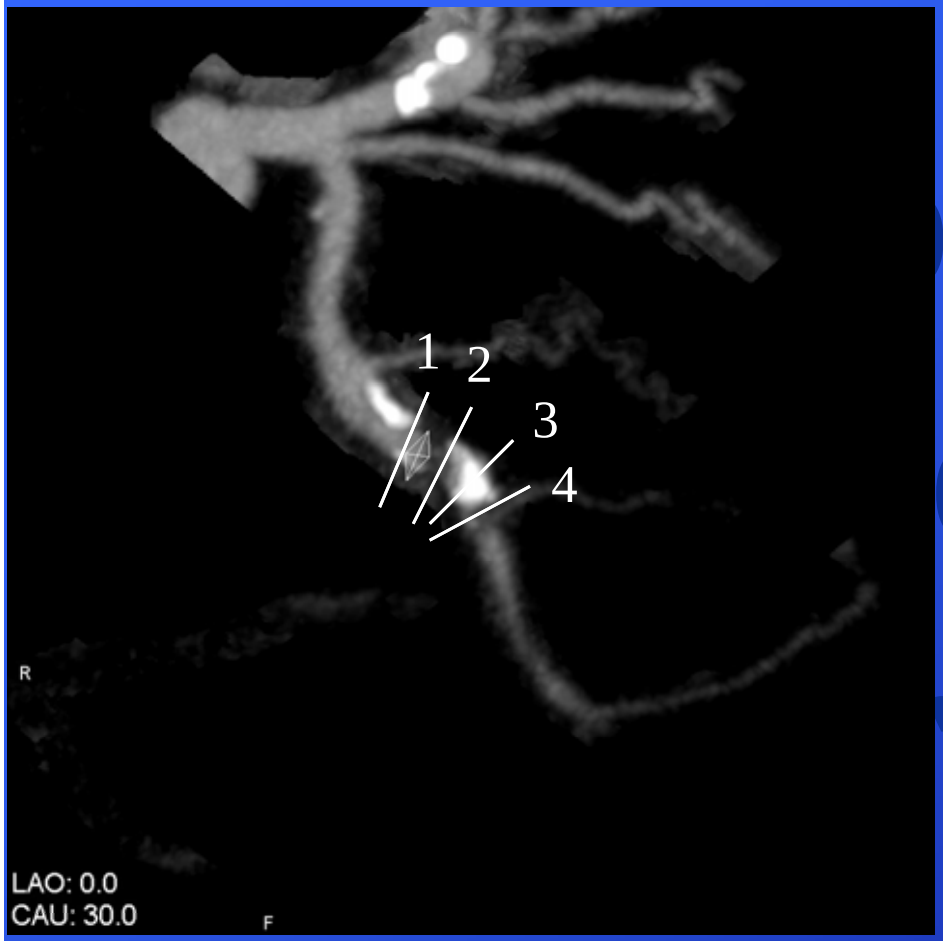
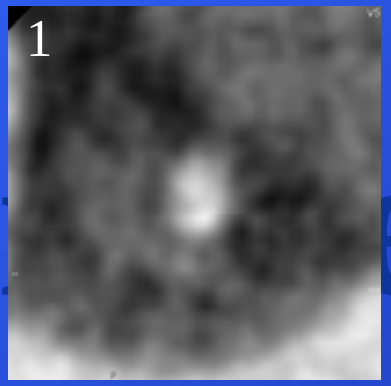
Coronary MDCT (MIP)

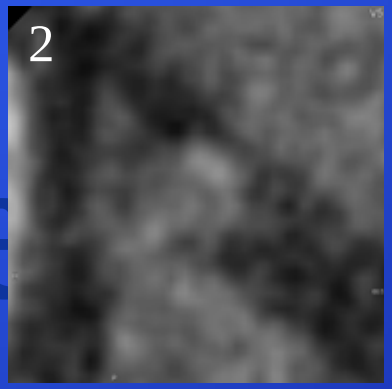


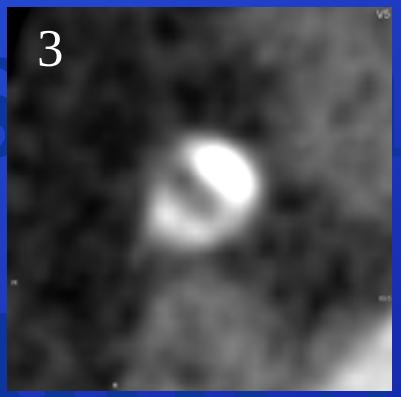
Coronary MDCT shows lesion has dense calcium. It was thinking that guide wire passage was blocked by this dense calcium spot .

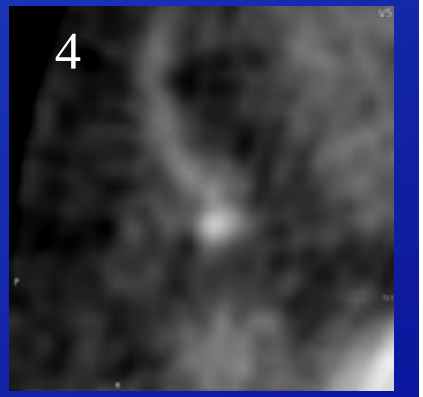
Coronary MDCT (MPR)





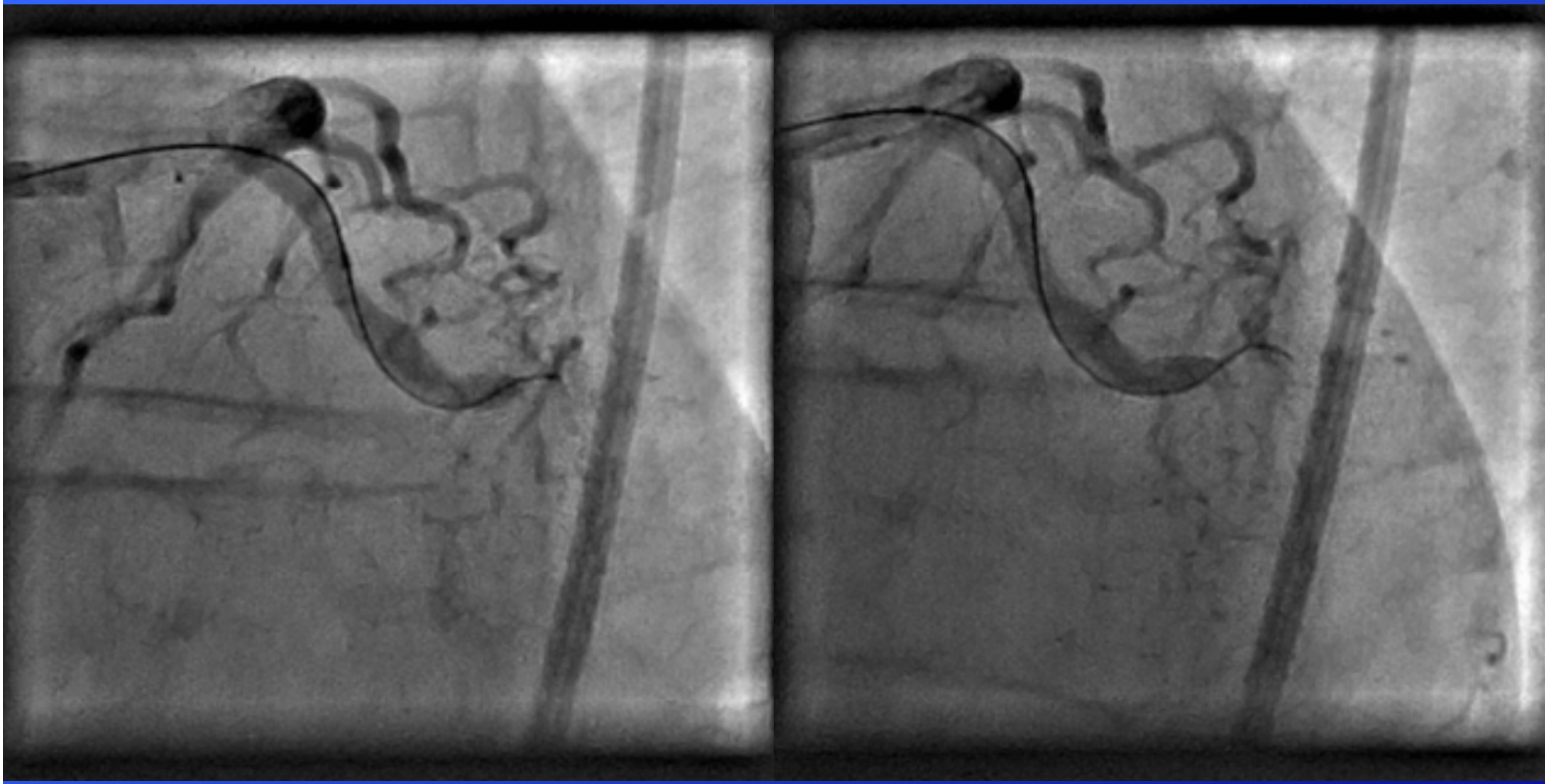






MPR showed some space in the CTO lesion. It was surrounded with a dense calcium.

Antegrade wiring



To gain a better back up support, balloon dilation was done at the proximal site and pushed the guide wire to the lesion. To advance the wire into the bend lesion, it is important to use deflection of the wire well.

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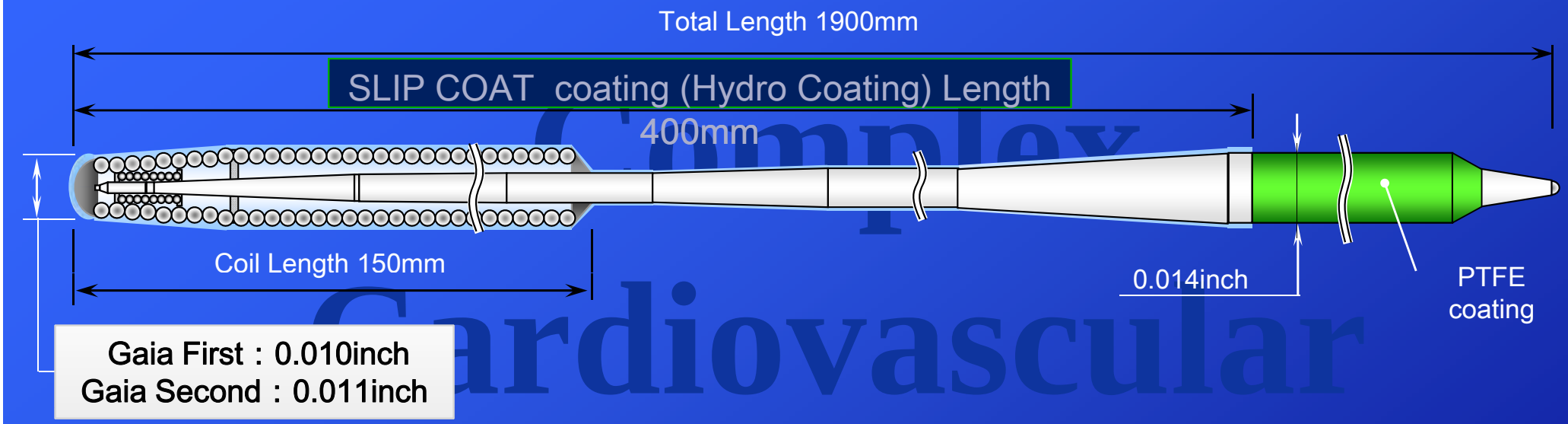
Gaia specification/structure/performance

GAIA: Basic structure



Gaia First : 0.010inch
Gaia Second : 0.011inch

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

Long hydrophilic coating provides smooth manipulation when used in conjunction with a support catheter such as Corsair

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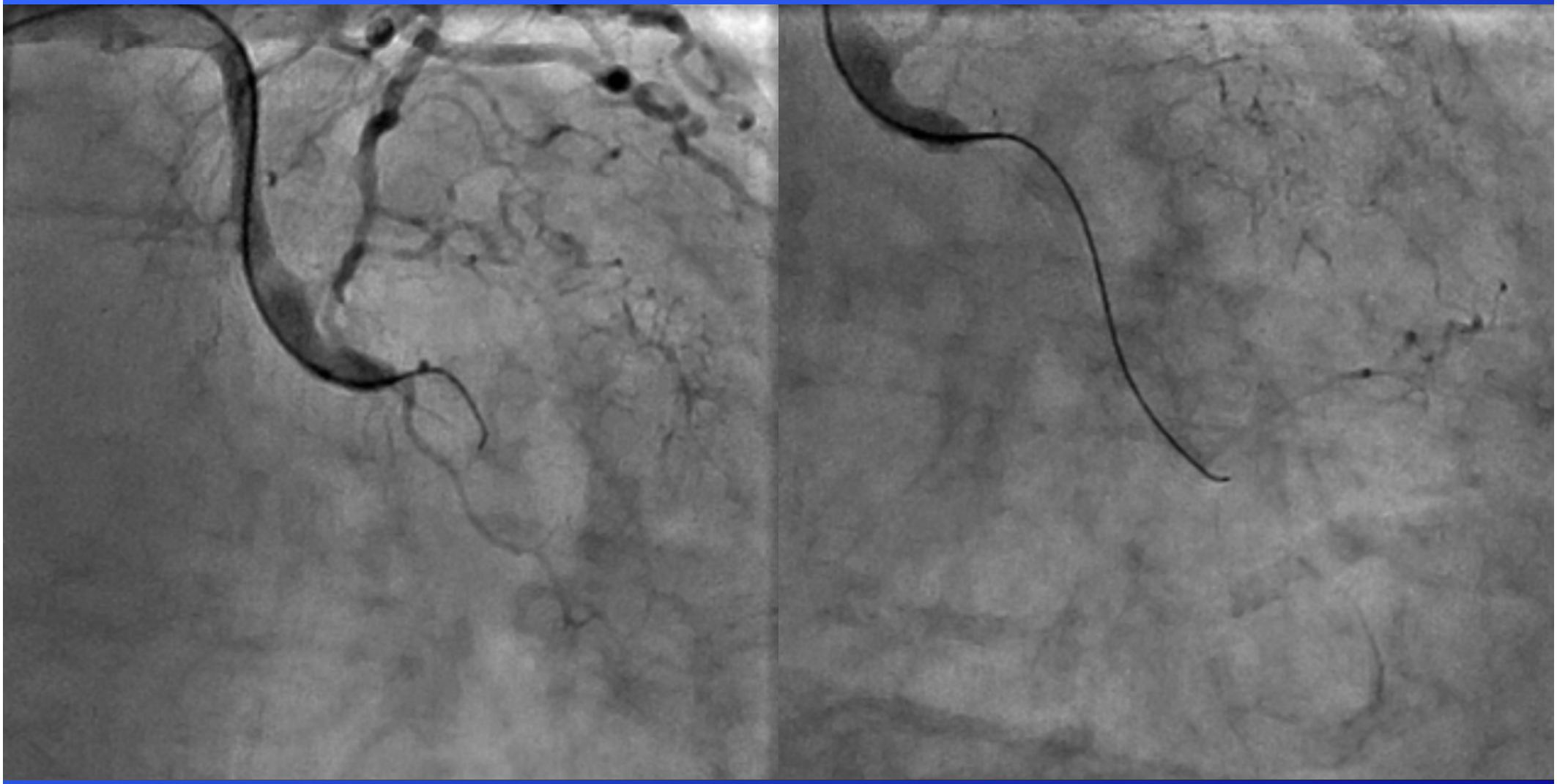
Comparison in whip motion

Ultimate bros 3
Tip load:3g

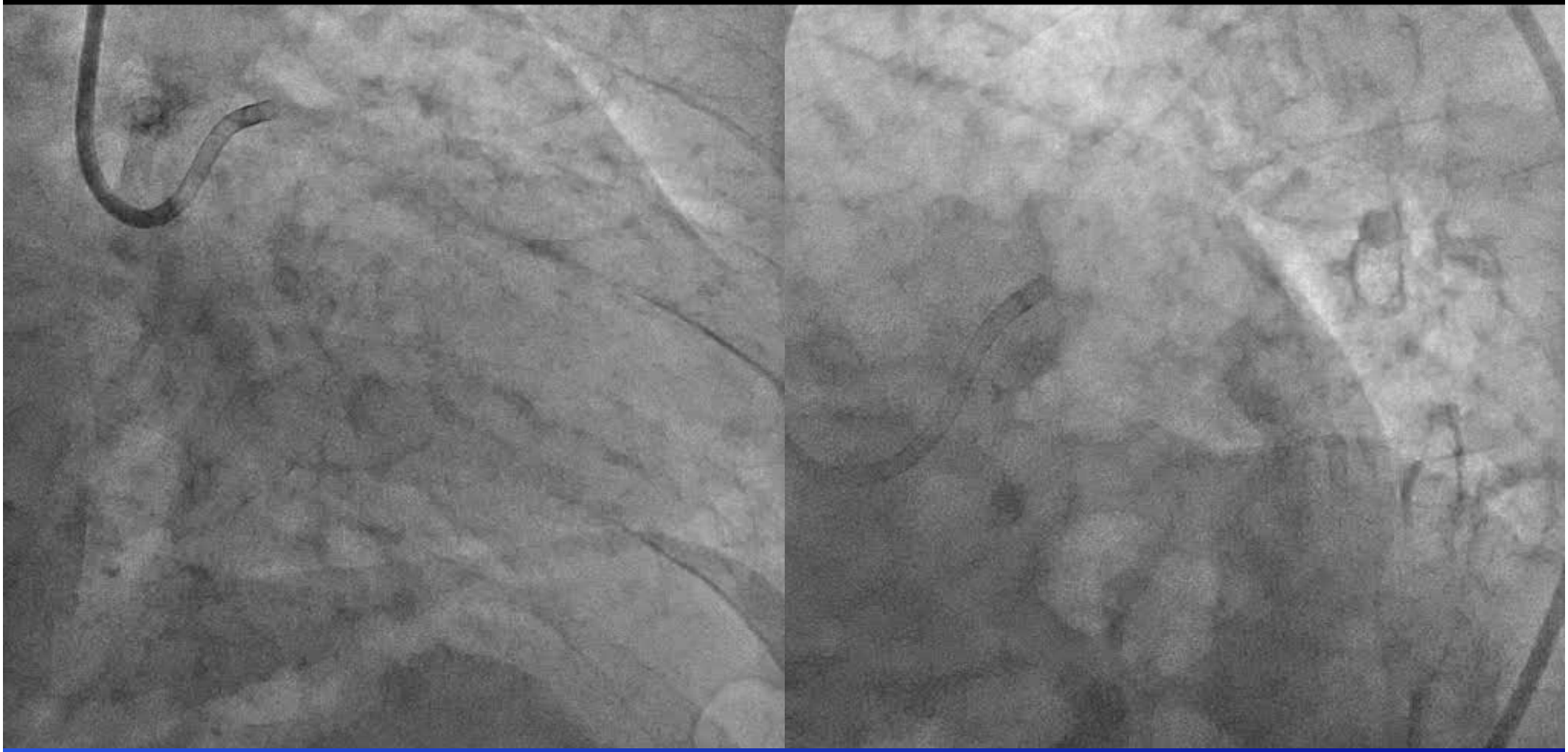
GAIA 2nd
Tip load: 3.5gr

Advancing the wire



Using a GAIA 2nd wire, the lesion was successfully crossed..

Final angiograms



Successful recanalization was achieved after drug eluting stent implantation.

RCA CTO lesion

Mid RCA CTO lesion. There is some contrast staining before the occlusion. It looks tapered type occlusion with a soft plaque. However, the lesion seems very tortuous and cardiac motion is quite dynamic in this segment.

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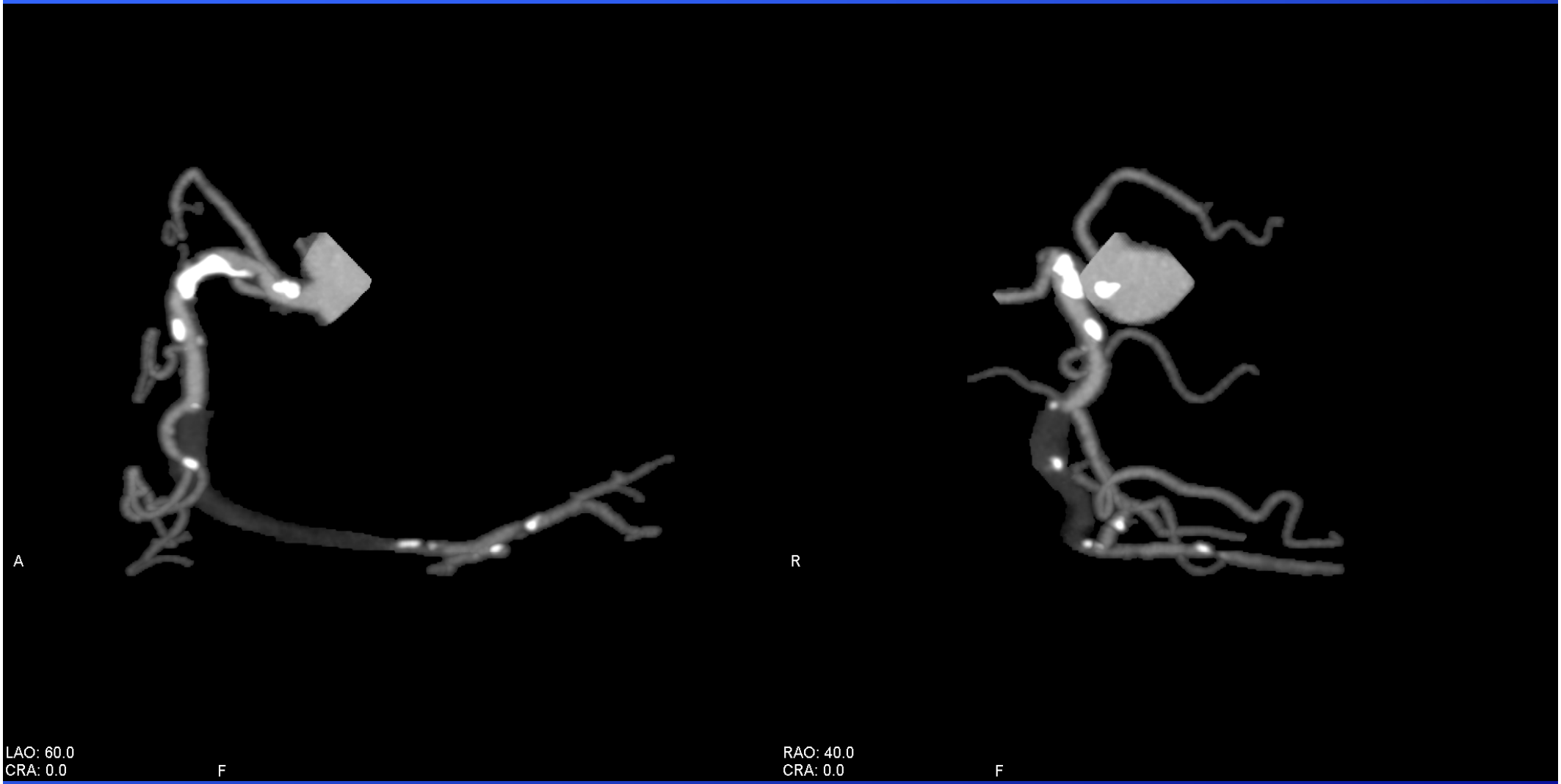
Coronary MDCT (MIP)

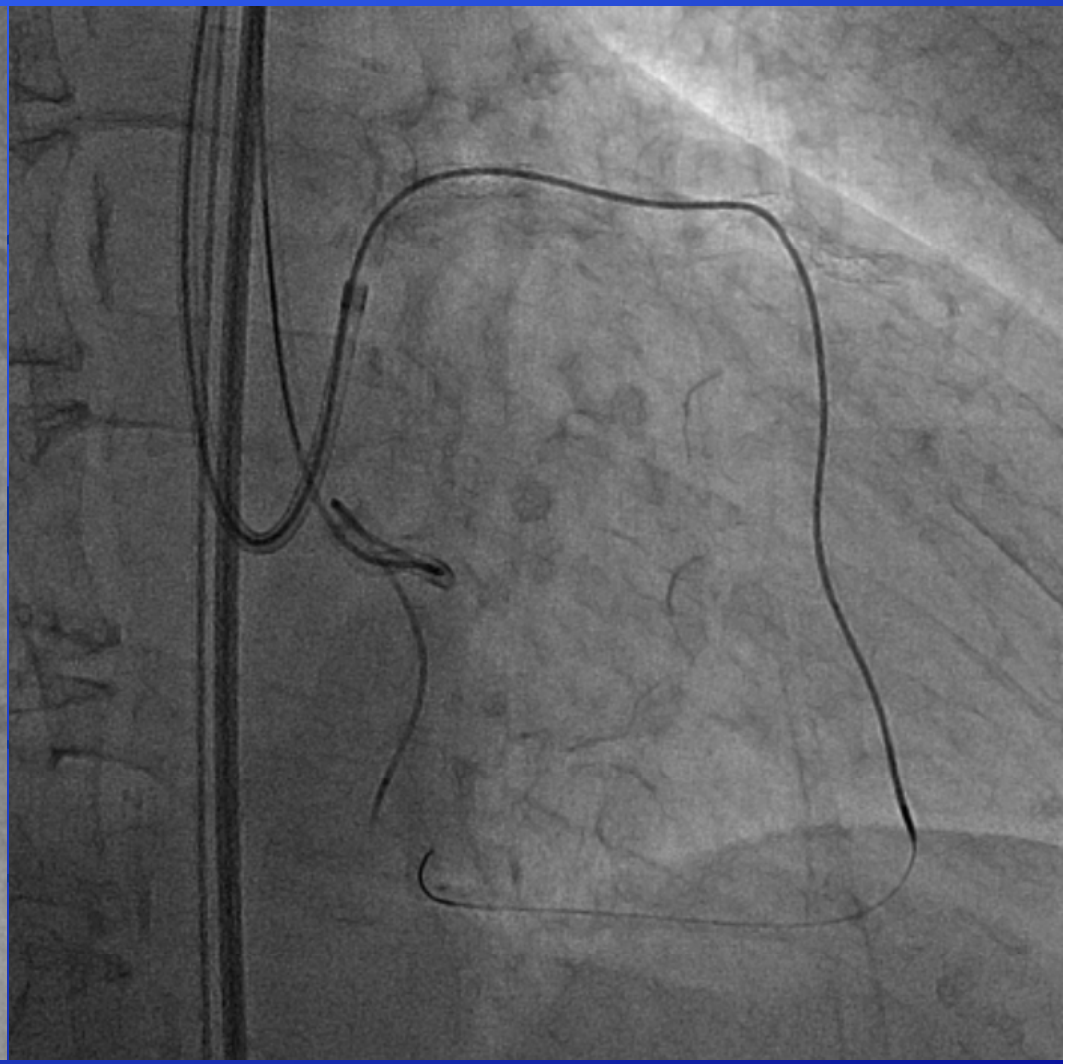


Coronary MDCT shows the CTO is consisted of soft tissue and vessel size is large likely because of positive remodeling. There is a calcium spot at the hinge point. It was compatible with organized thrombus.

Antegrade wiring

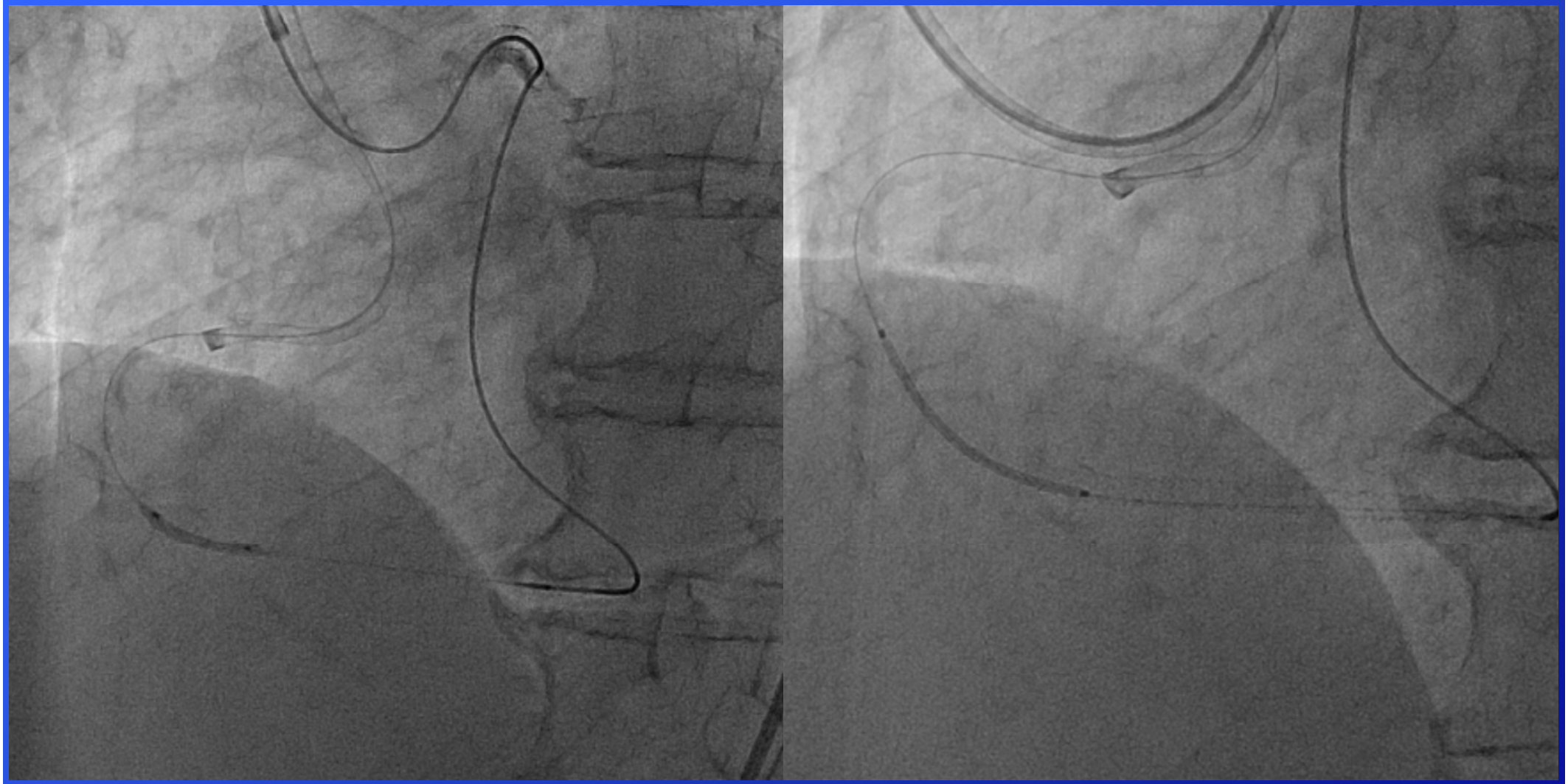
As expected, guide wire control was quite difficult mainly because of the tortuosity and cardiac movement. Another important reason against to the wire control is inability of making the deflection of the wire. It is due to the vessel size and tissue homogeneous morphology.

Retrograde approach



Therefore, retrograde approach was applied via septal channel. The retrograde wire was smoothly passed the lesion with a SION black guide wire.

Direct retrograde crossing



Retrograde wire was directly crossed the lesion. After externalization, balloon dilation and stent implantation was performed.

Final angiograms

Successful recanalization was achieved.

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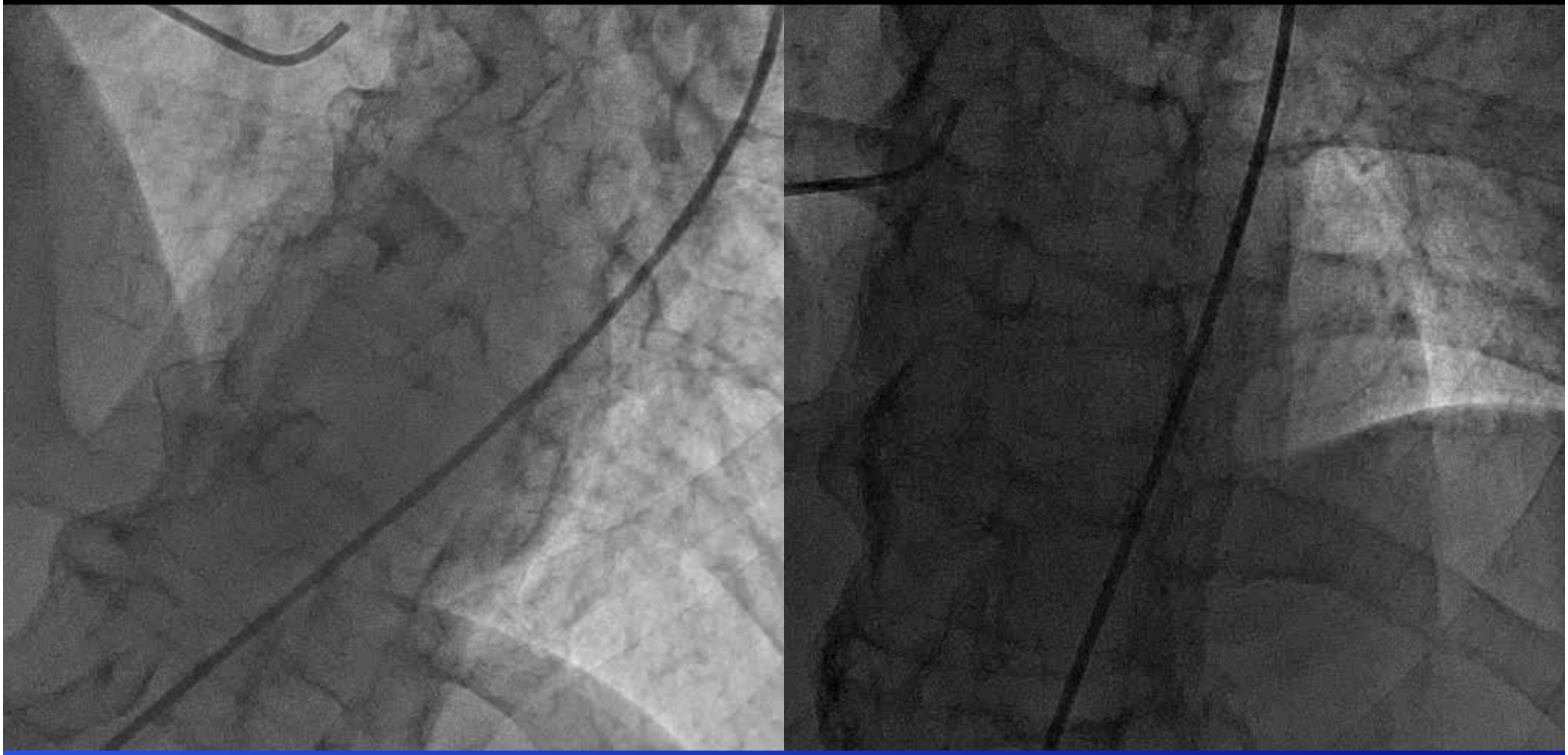
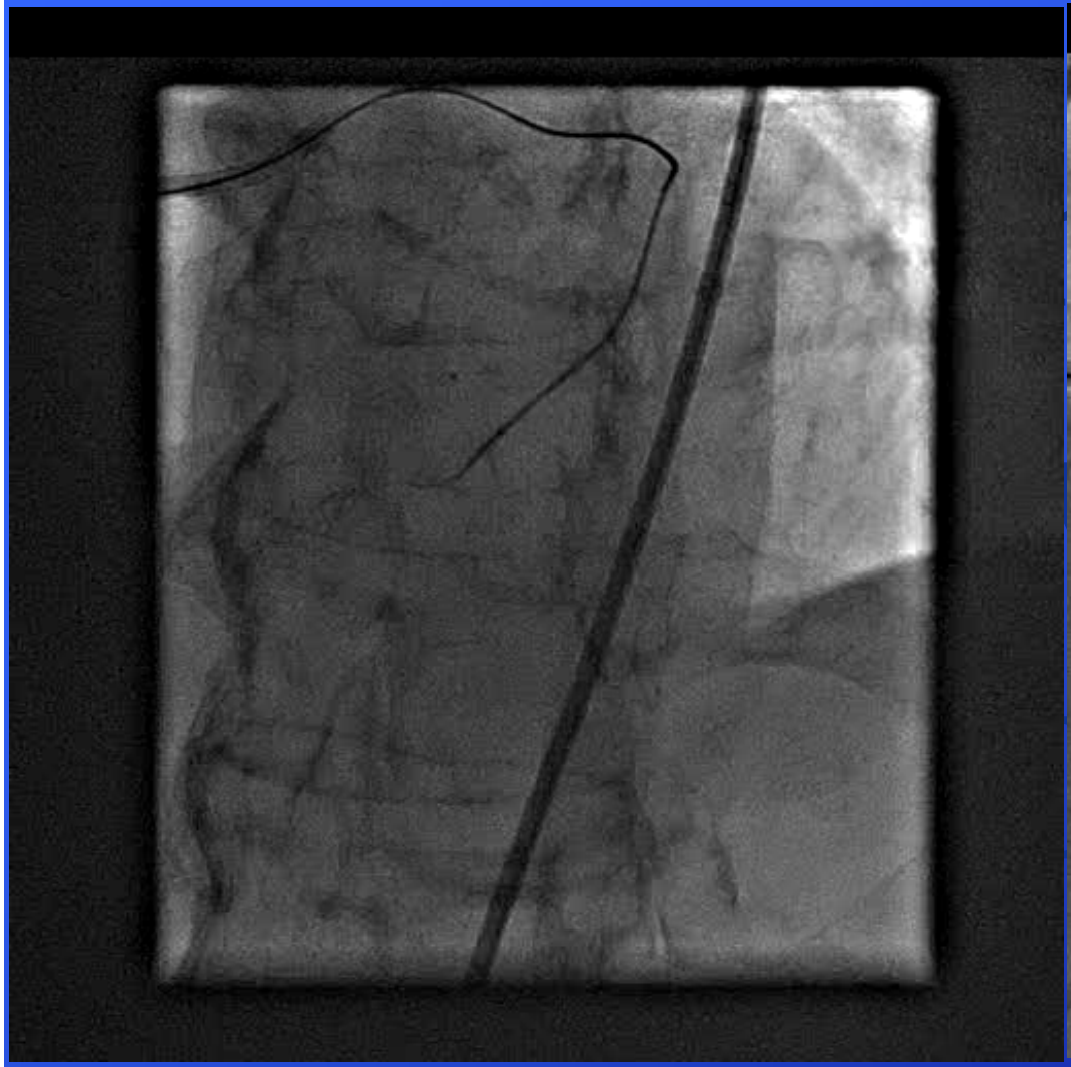
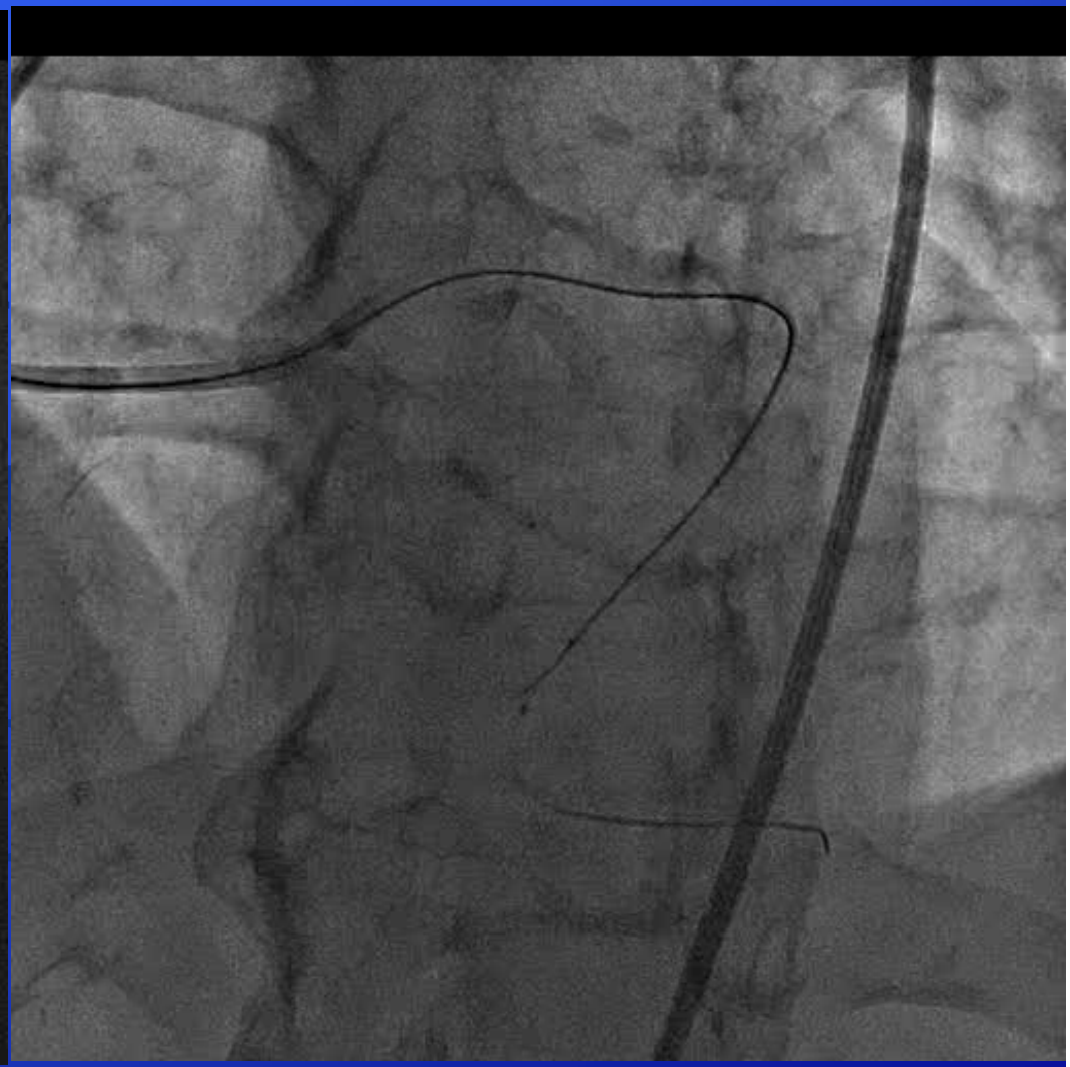
LCX distal CTO lesion



Distal LCX CTO lesion. The occlusion is in the distal segment after very tortuous proximal segment. Cardiac motion is dynamic at that point. The lesion was tapered type of sub total occlusion, therefore a hydrophilic tapered wire was used.

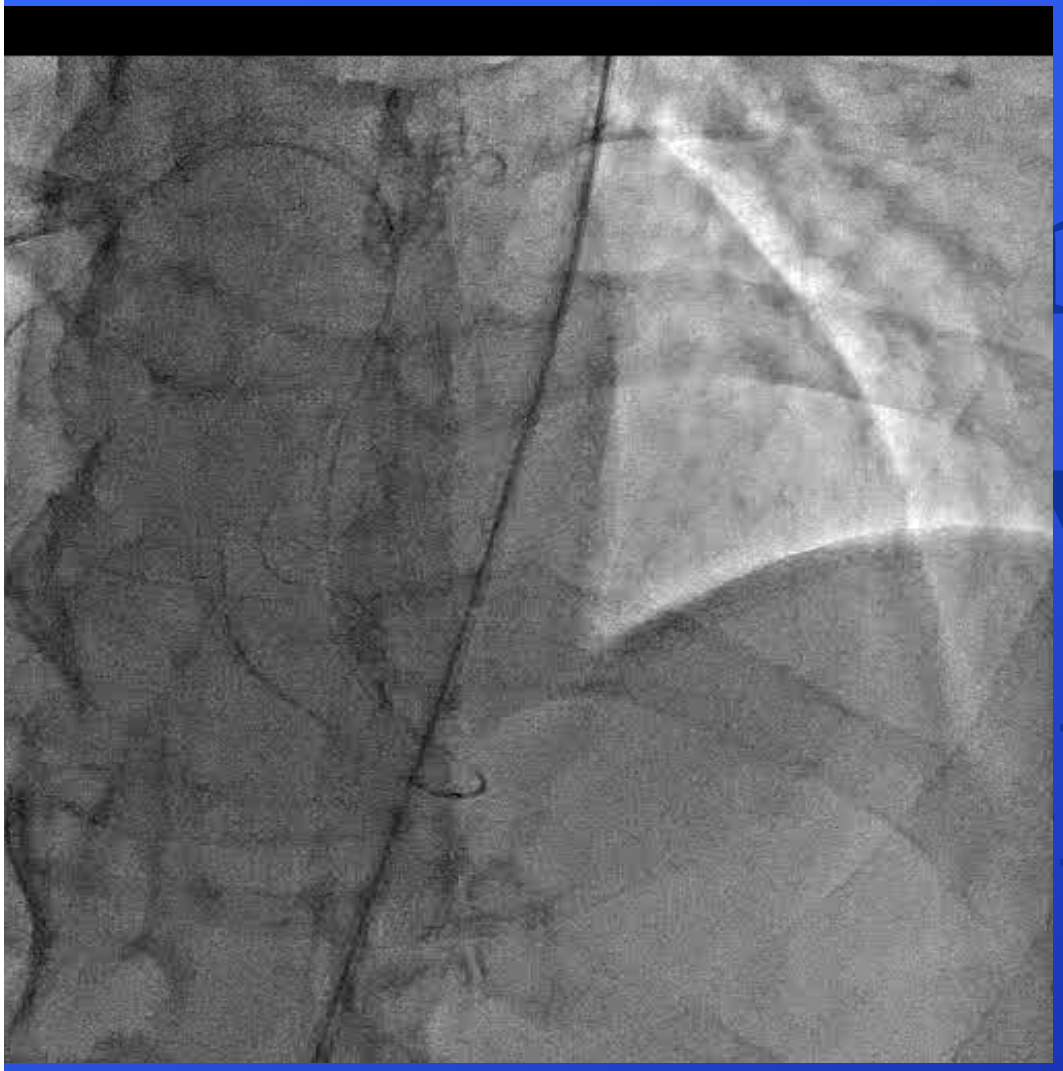
Antegrade wiring





Guide wire control was quite difficult because of the dynamic cardiac motion. It is difficult to stabilize the guide wire position even though using a Crusade device and eventually channel was injured.

Retrograde approach



Therefore, retrograde approach was applied via septal channel and successful dilatation was achieved with a small septal perforation and hematoma which was blocking by the embolic coil.

To achieve successful crossing

- Proper selection of the guide wire
- Stabilize the wire position (balloon or micro catheter support)
- Using the deflection
- Step up and step down

Messages

- It is important to estimate lesion characteristics before the procedure
- For this purpose, coronary MDCT provides a useful information
- During wire manipulation, it is important to stabilize wire position using a micro catheter or balloon
- Whip motion may create false lumen
- Deflection of the wire is the principle of wire movement