

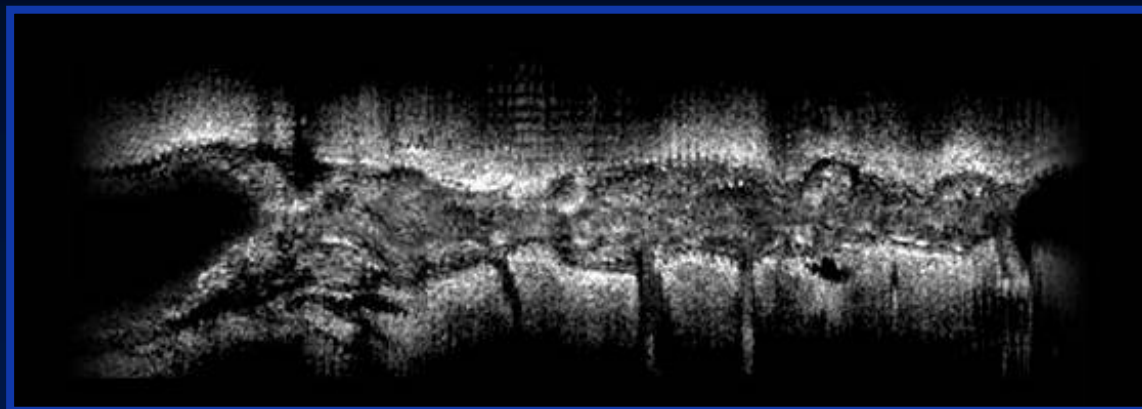


Current Japanese Approach for Chronic Coronary Total Occlusions (CTO)

Etsuo Tsuchikane, MD, PhD

Toyohashi Heart Center, Japan

CTO Club



*The Seminar
of
Angioplasty of Chronic Total Occlusions*

CTO Club

1st Seminar (1999), Kyoto	Lectures & case conference
2nd Seminar (2000), Kyoto	Lectures & live demonstration (2 cases)
3rd Seminar (2001), Kyoto	Lectures & live demonstration (5 cases)
4th Seminar (2002), Kyoto	Lectures & live demonstration (9 cases)
5th Seminar (2003), Kyoto	Live demonstration (16 cases)
6th Seminar (2004), Toyohashi	Live demonstration (14 cases)
7th Seminar (2005), Toyohashi	Live demonstration (19 cases)
8th Seminar (2006), Toyohashi	Live demonstration (17 cases)

Total 82 CTO cases

Demonstrated cases in the CTO Club





Lesion Characteristics (n=82)

Target vessel

- RCA **41% (34)**
- LAD 32% (26)
- LCx 15% (12)
- LMT 1% (1)
- CIA/EIA 6% (5)
- SFA 5% (4)

Occluded duration

- 3M <, ≤ 1yr 10% (8)
- 1y < or unknown **90% (74)**

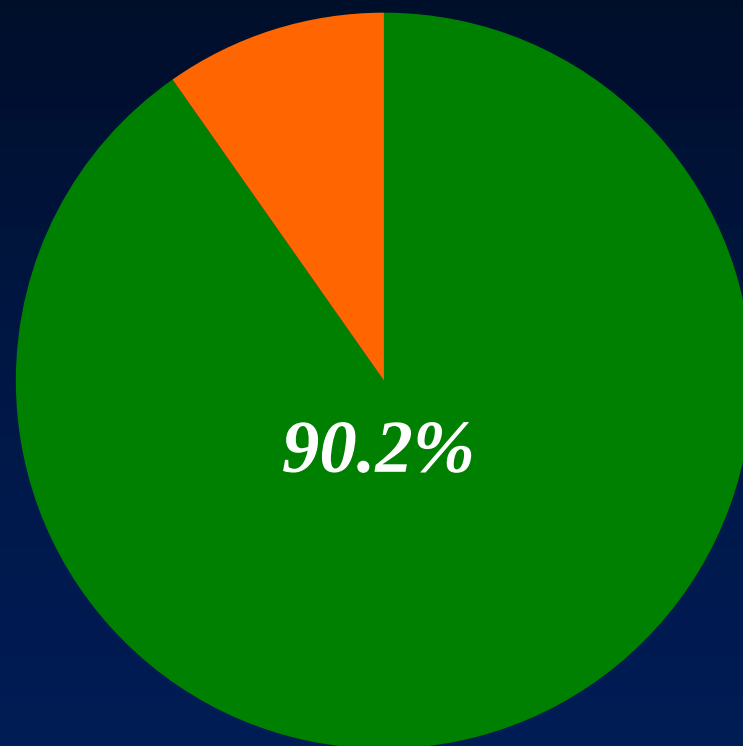
Reattempt

24% (20)



Overall Success Rate

(n=82)



■ Success ■ Unsuccess



Procedural Complications (n=82)

Major

- | | |
|-------------|---|
| • Death | 0 |
| • Em CABG | 0 |
| • QMI | 0 |
| • Tamponade | 0 |

Minor

- | | |
|--------------------|----------|
| • Non QMI | 3.7% (3) |
| • Wire perforation | 9.8% (8) |



Key to Success

1. Development of mechanical wire

Japanese wires dedicated for CTO-PCI

■ **MIRACLEbros** family

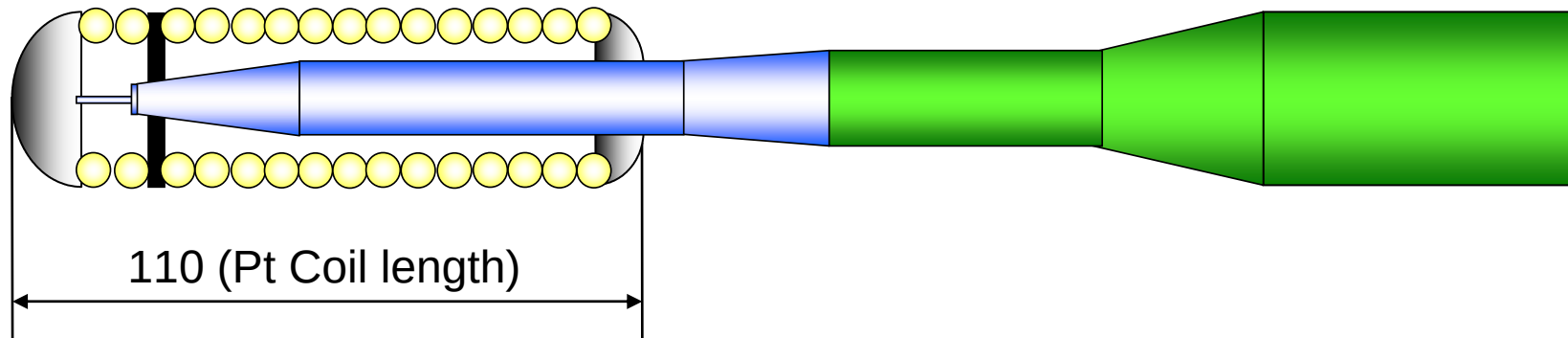
MIRACLEbros 3
MIRACLEbros 4.5
MIRACLEbros 6
MIRACLEbros 12

■ **Confianza** family

Confianza 9
Confianza 12
Confianza pro 9
Confianza pro 12
Confianza 8-20

MIRACLEbros 3

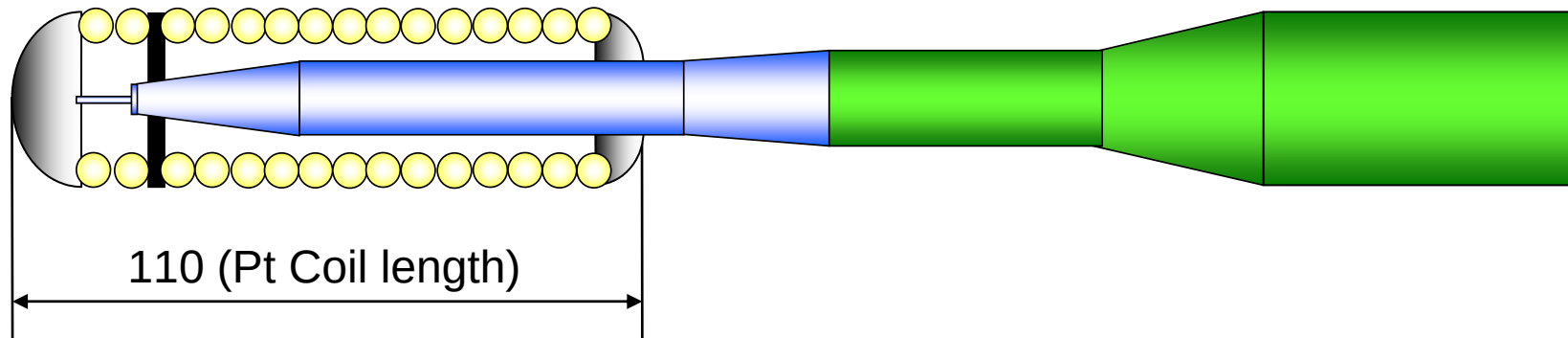
Tip load : 3.0g



- *Applying the structure with further improves torque performance for CTO use.*
- *This tip part has the structure which is difficult to be trapped by the lesions.*

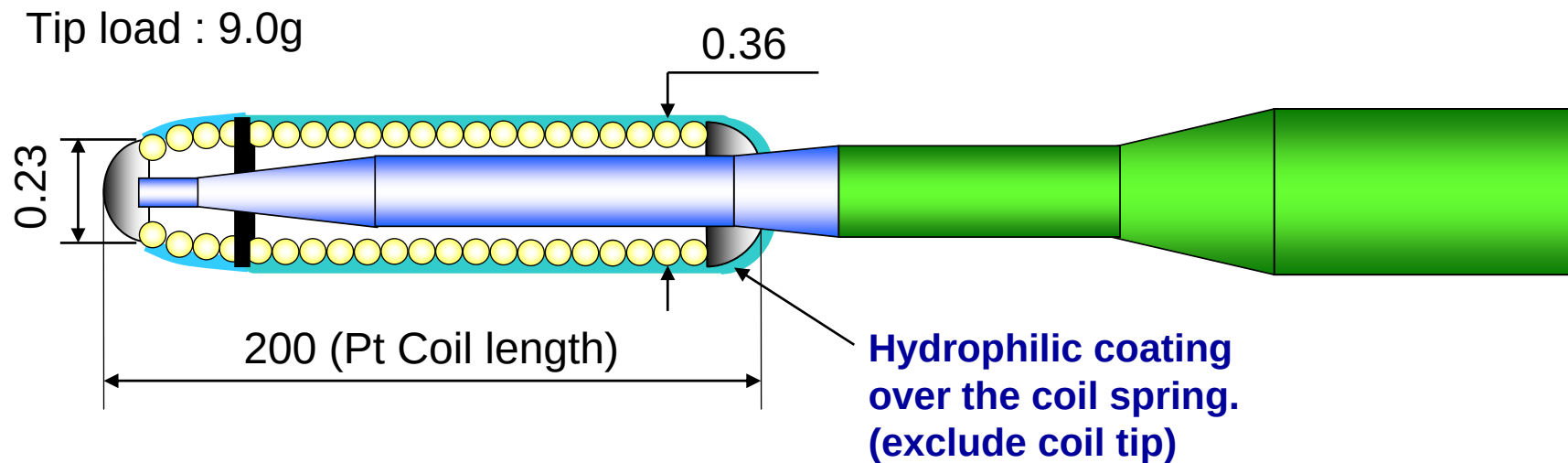
MIRACLEbros 12

Tip load : 12.0g



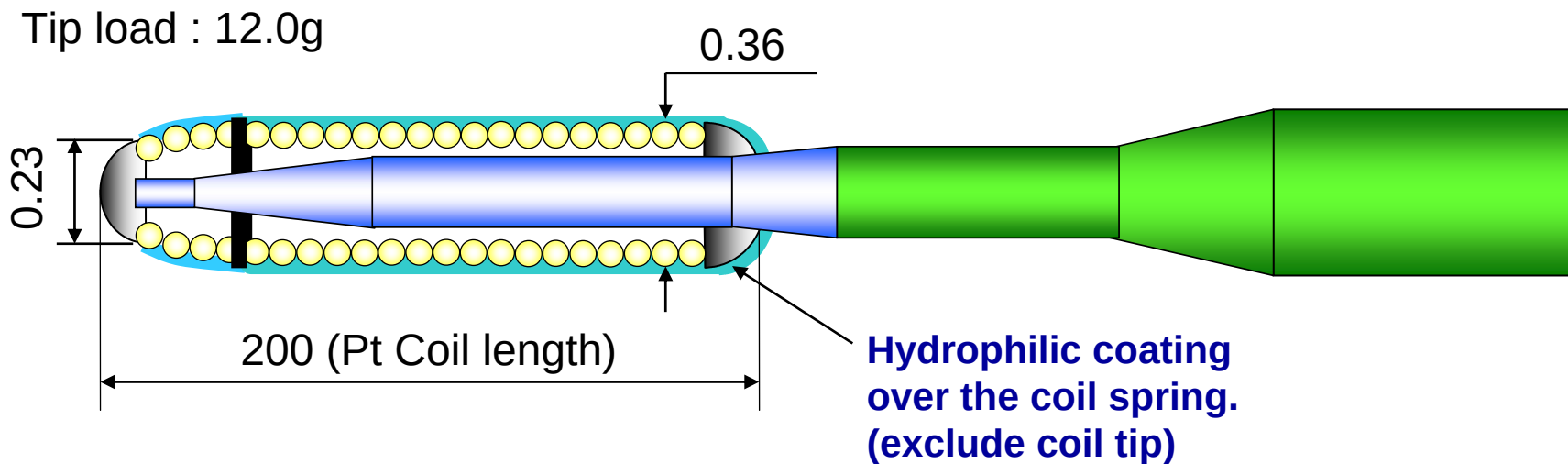
- *Applying the structure with further improves torque performance for CTO use.*
- *This tip part has the structure which is difficult to be trapped by the lesions.*

CONFIANZA PRO 9



- *Hydrophilic coating over the spring coil (exclude coil tip).*
- *Conquest Pro is hydrophilic coated version of Conquest. Higher slip ability is provided.*

CONFIANZA PRO 12



- ***Hydrophilic coating over the spring coil (exclude coil tip).***
- ***Conquest Pro 12 is hydrophilic coated version of Conquest Pro. Higher slip ability is provided.***
- ***The higher tip load of Conquest Pro 12 enhances the penetration ability to lesions.***



■ MIRACLEbros Family

Better torque performance

Less penetration force

Better crushing force

Better tactile feeling

■ Confianza Family

Less torque performance

Better penetration force

Less crushing force

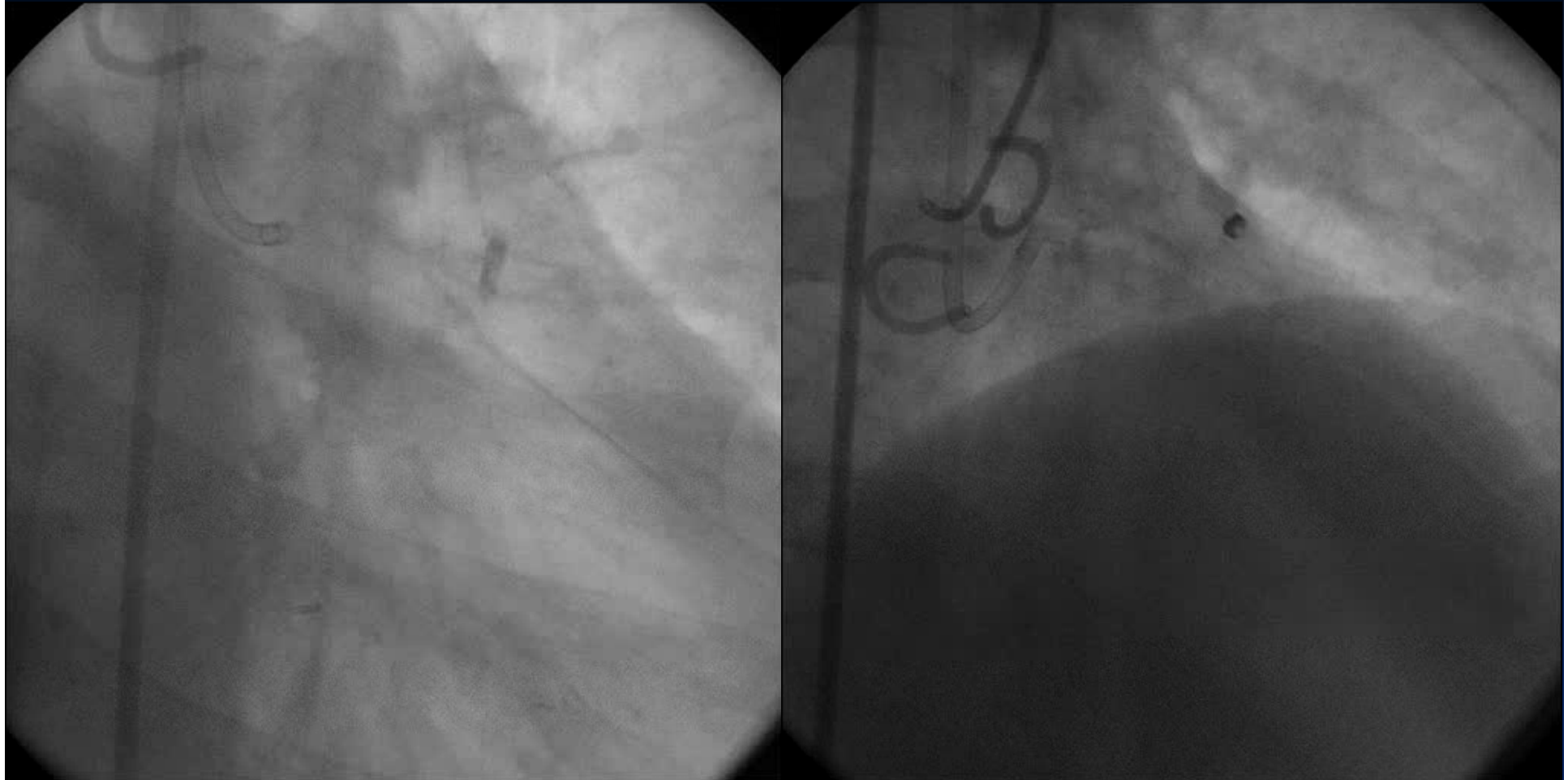
Less tactile feeling

CTO



Toyohashi Heart Center

LAD-CTO, Post CABG

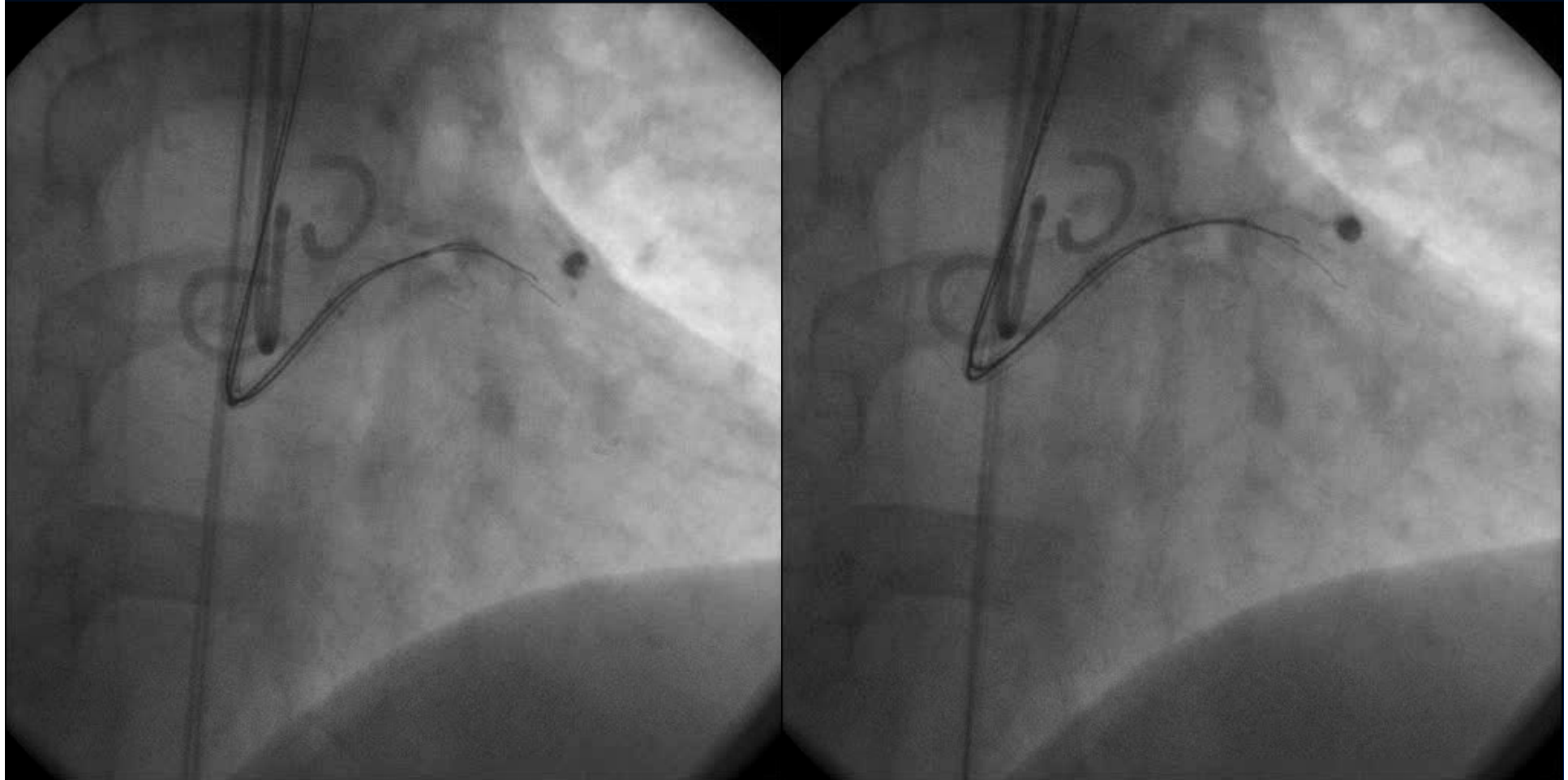


CTO



Toyohashi Heart Center

LAD-CTO, Post CABG



Confianza with MIRACLEbros 6

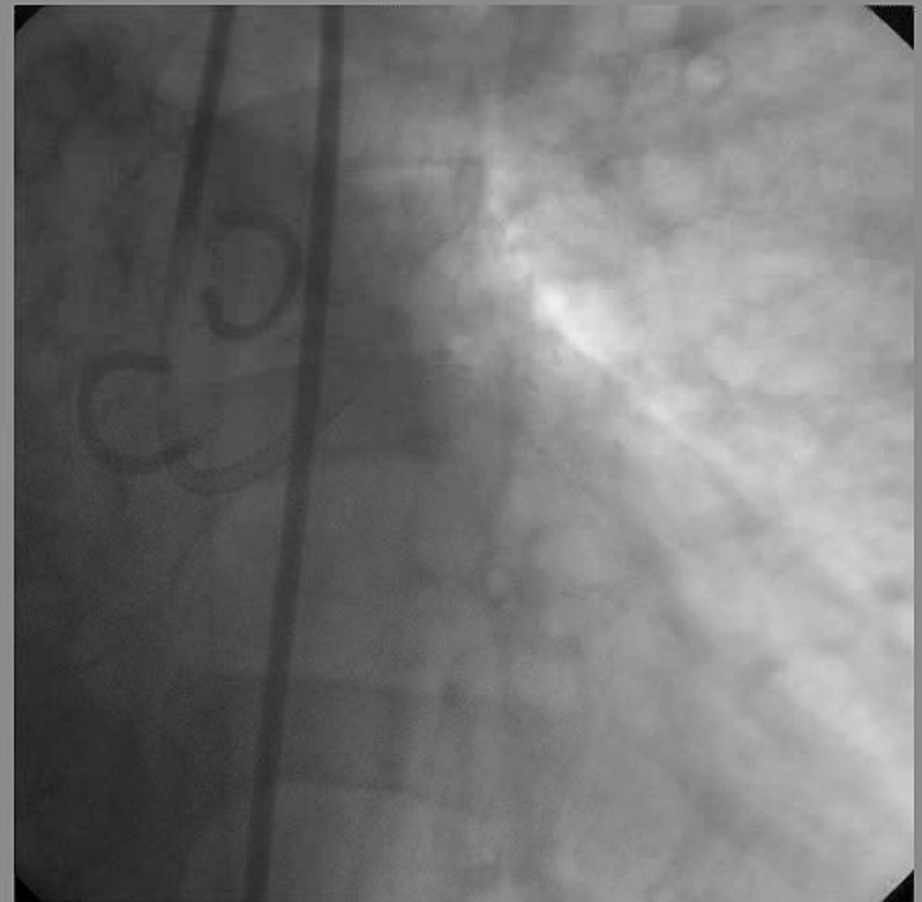
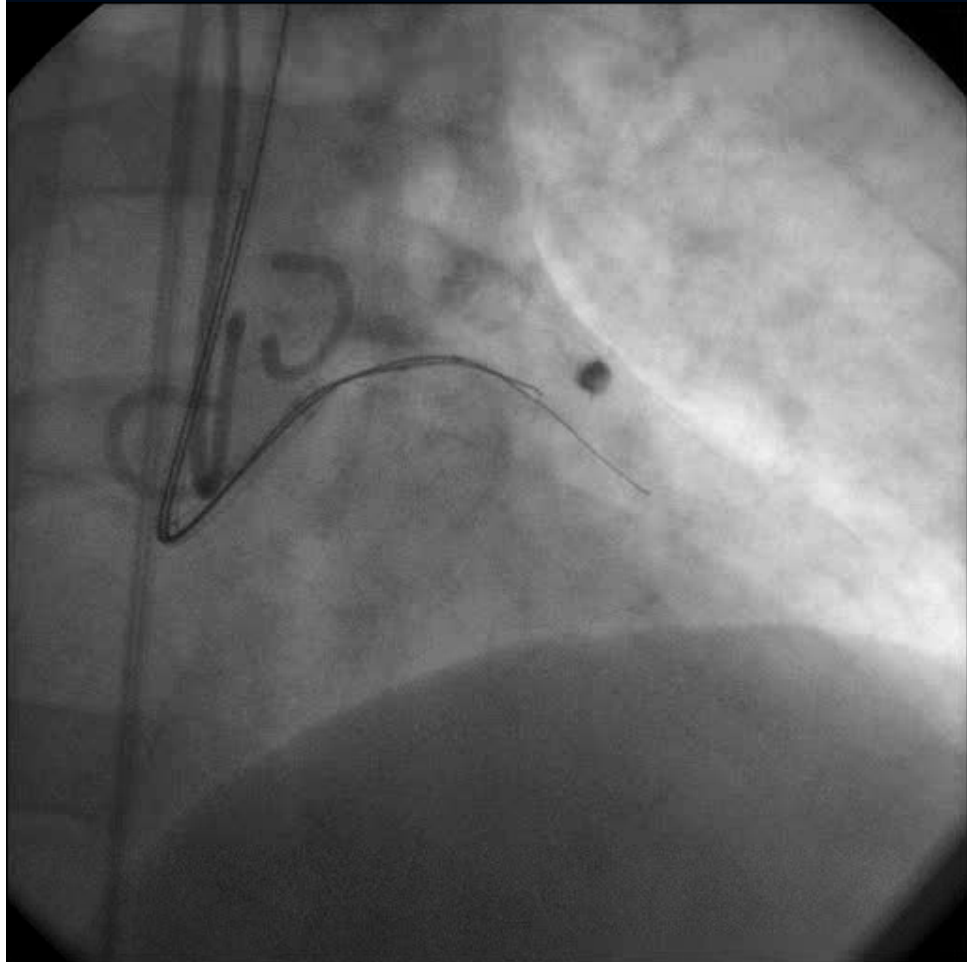
Angioplasty Summit 2007

CTO



Toyohashi Heart Center

LAD-CTO, Post CABG



Confianza

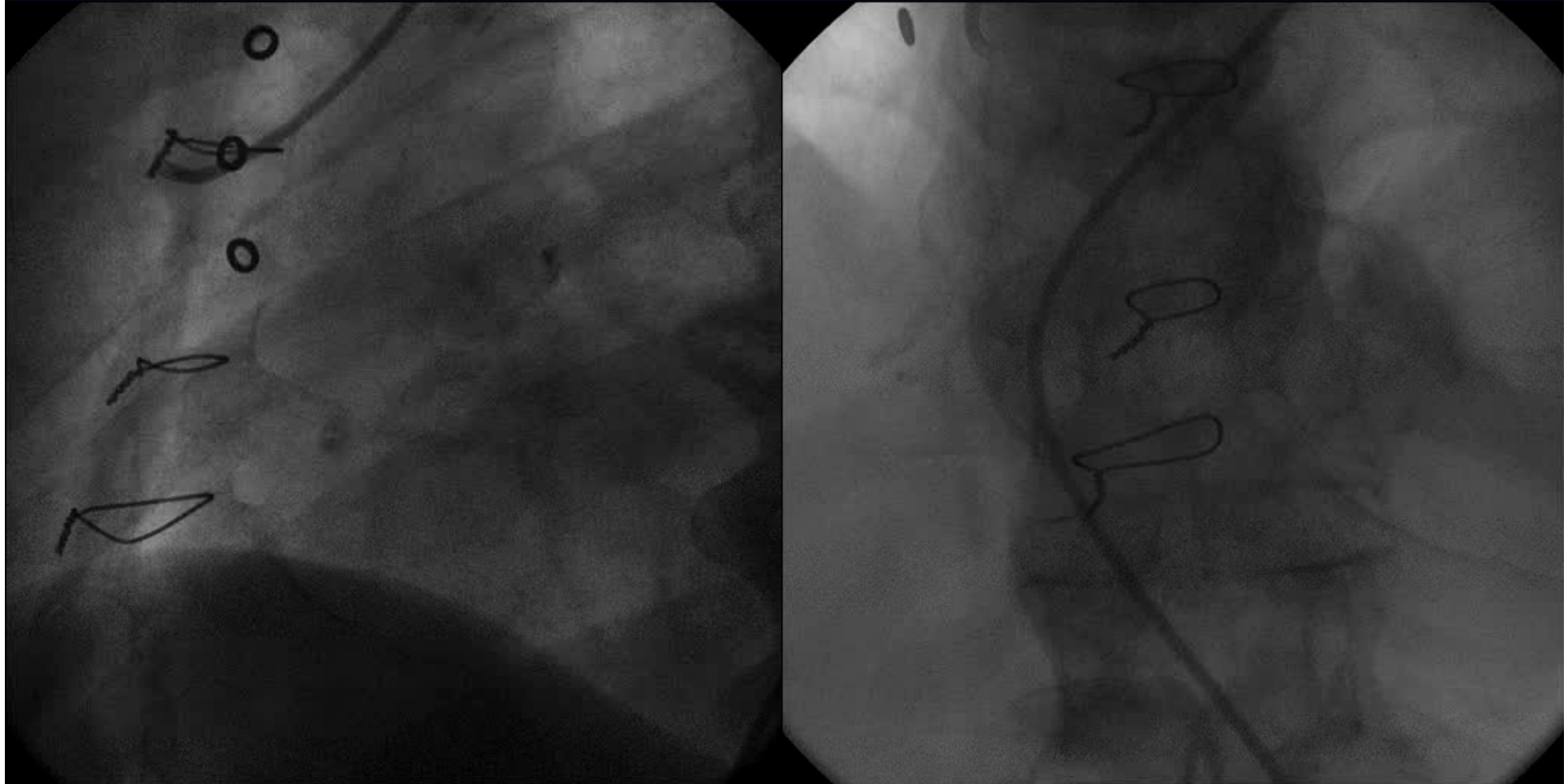
Angioplasty Summit 2007

CTO



Toyohashi Heart Center

RCA-CTO , Post CABG

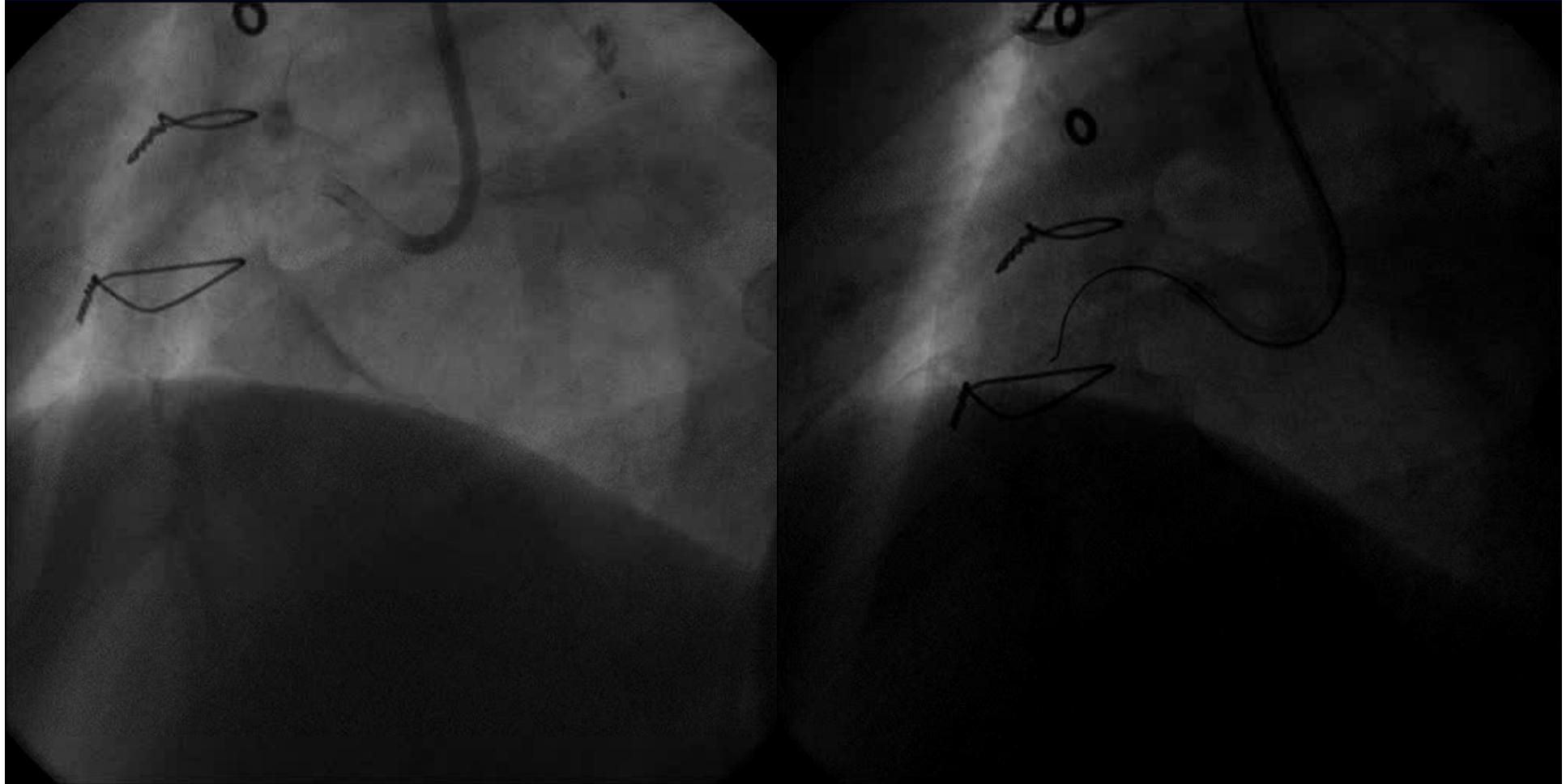


CTO



Toyohashi Heart Center

RCA-CTO , Post CABG



MIRACLEbros 3

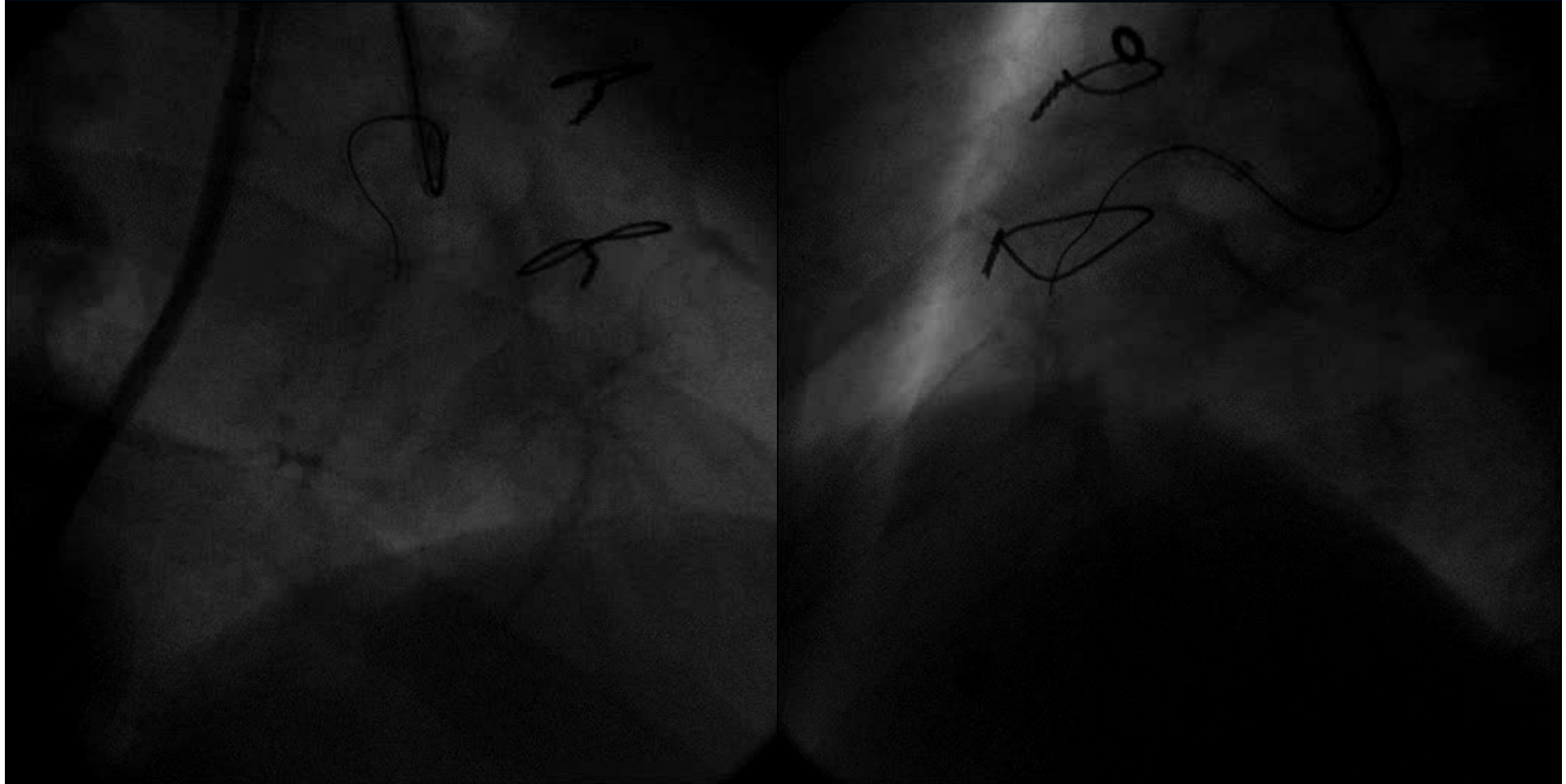
Angioplasty Summit 2007

CTO



Toyohashi Heart Center

RCA-CTO , Post CABG



MIRACLEbros 6

MIRACLEbros 6

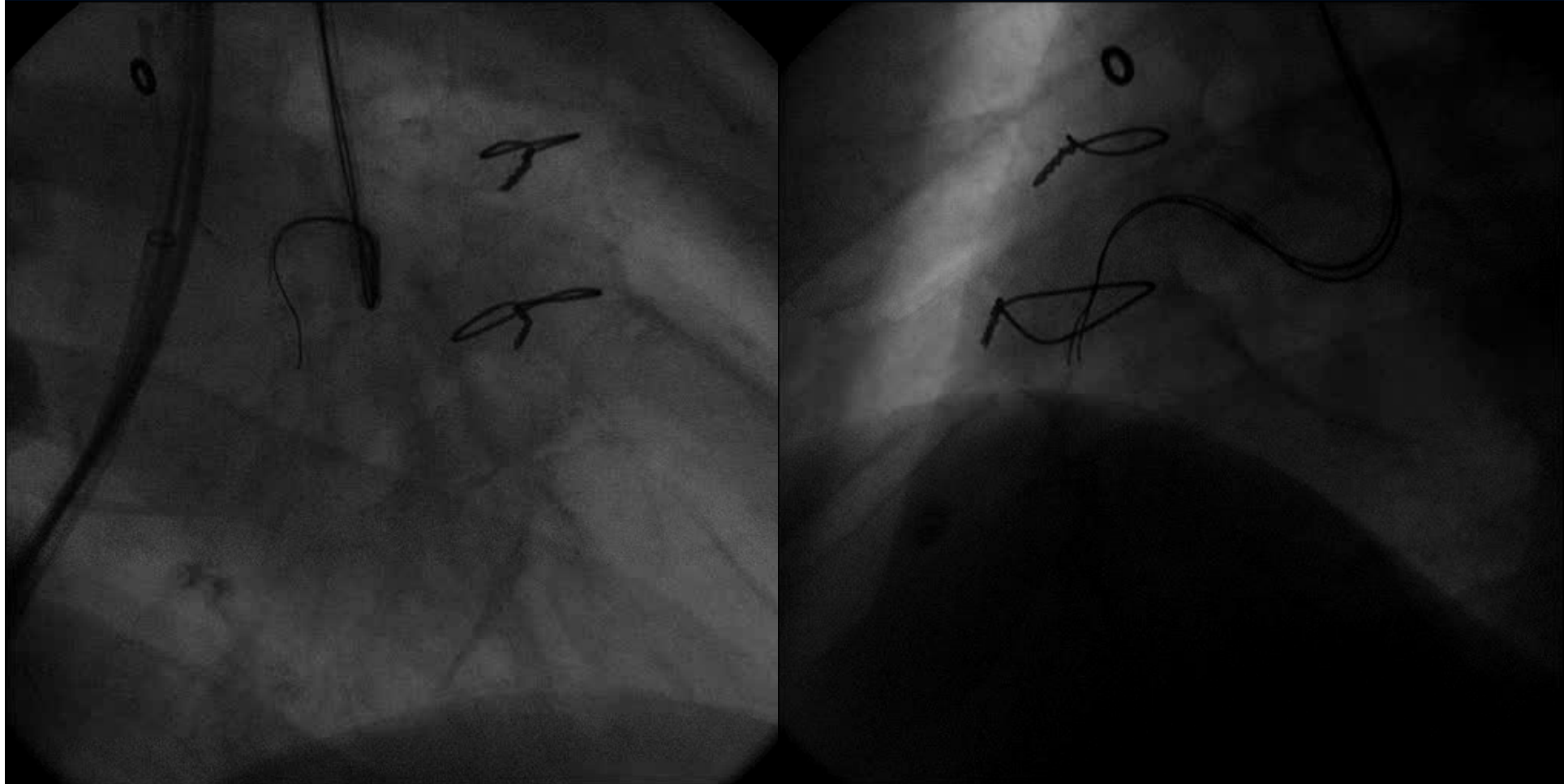
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RCA-CTO , Post CABG



Confianza with Mb 6

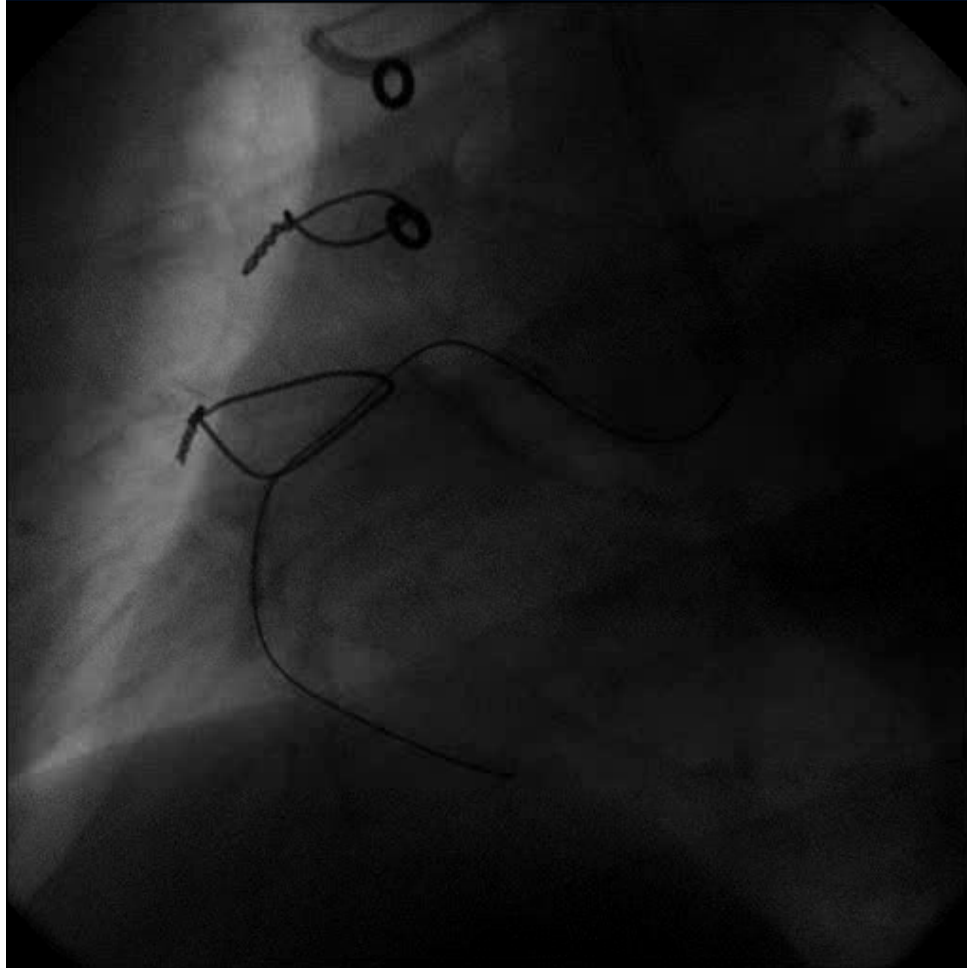
MIRACLEbros 12 with 6

CTO

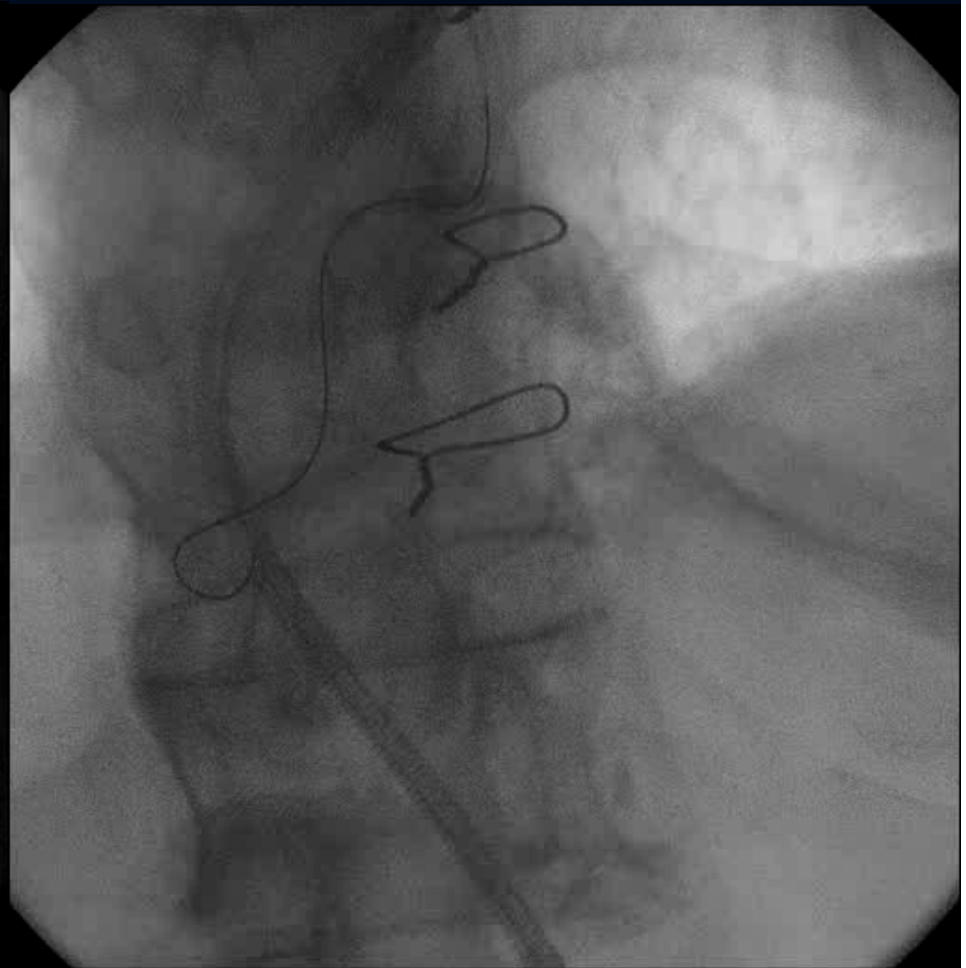


Toyohashi Heart Center

RCA-CTO , Post CABG



MIRACLEbros 12



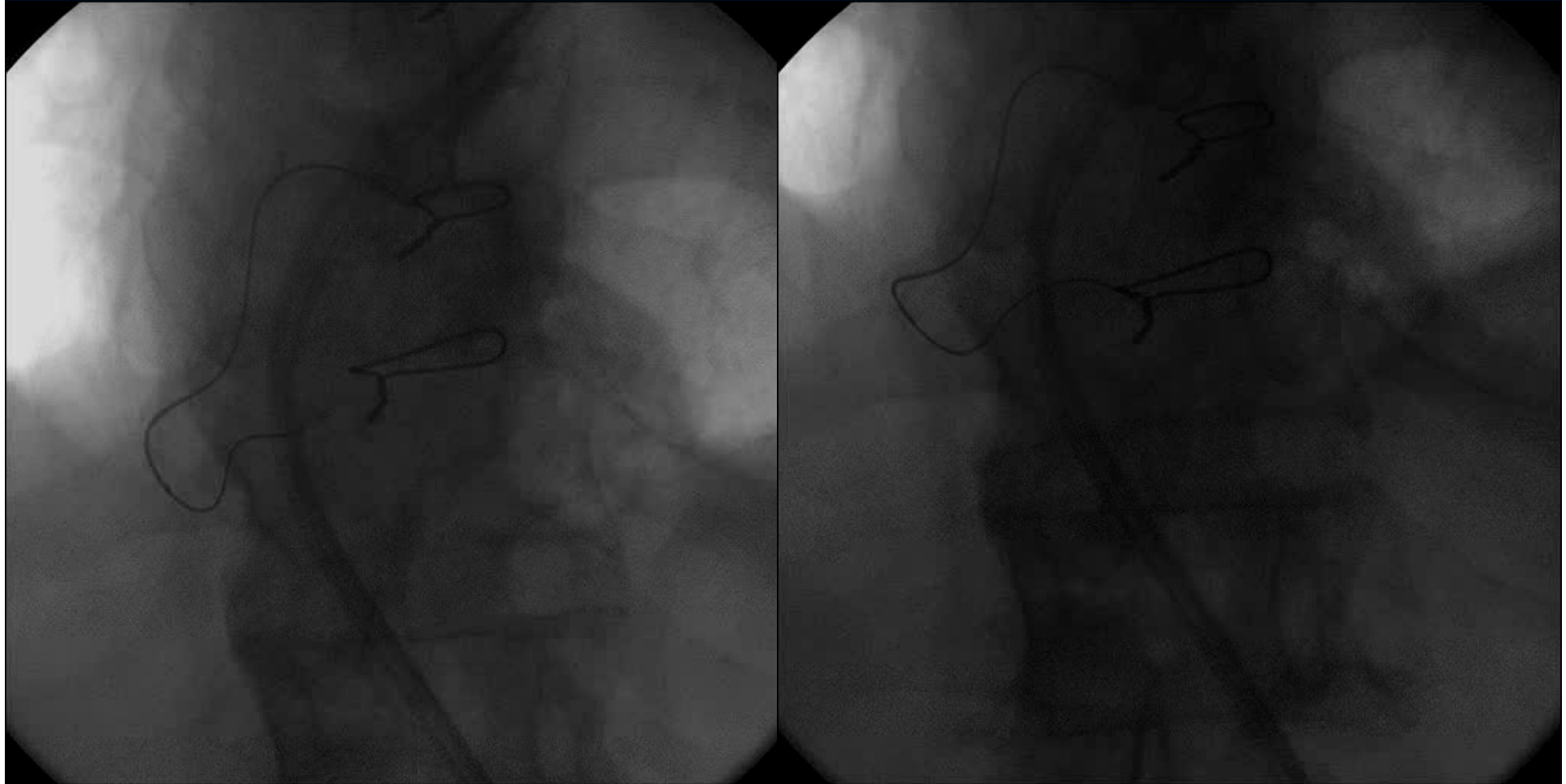
MIRACLEbros 3

CTO



Toyohashi Heart Center

RCA-CTO , Post CABG



MIRACLEbros 3

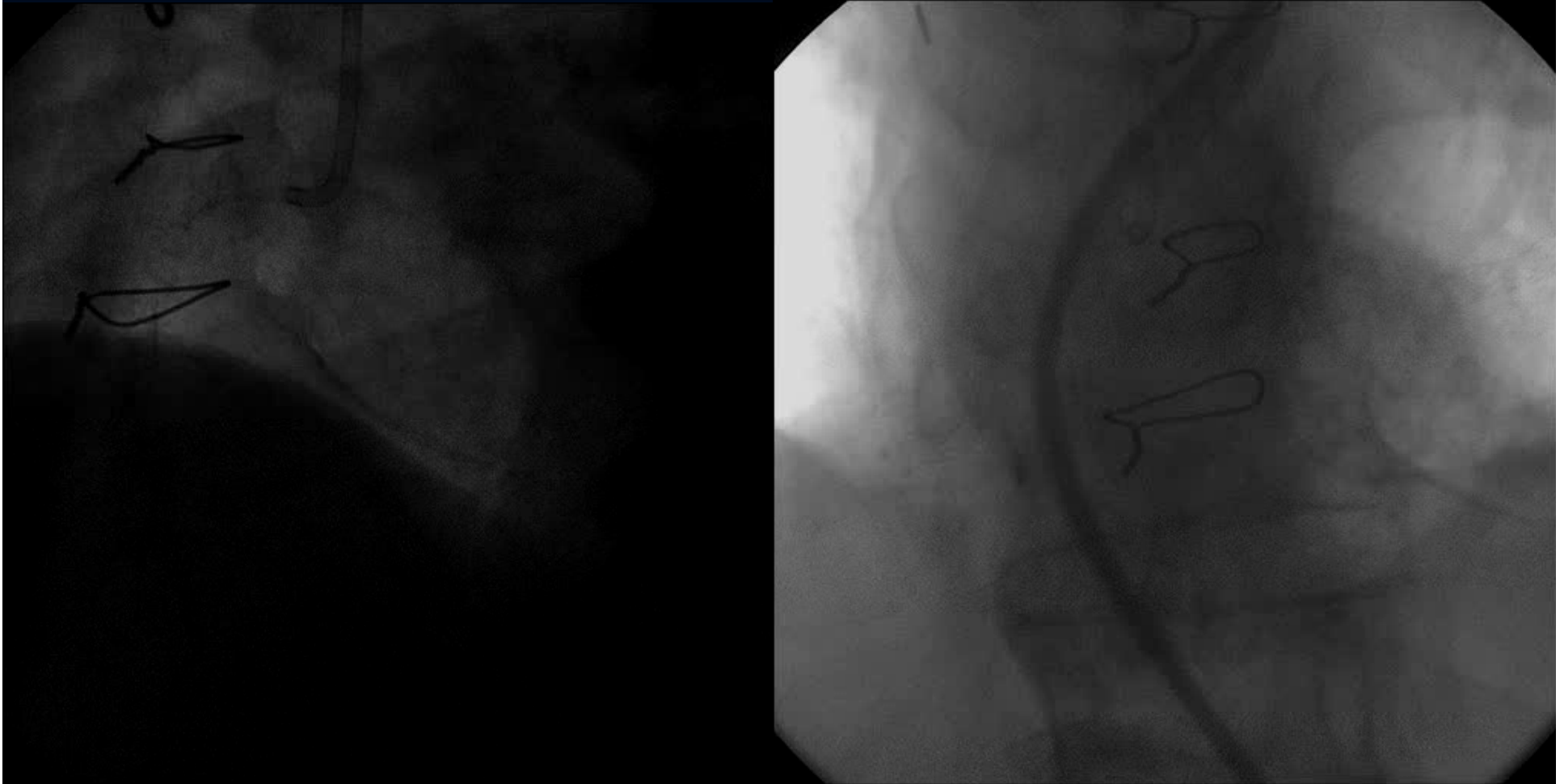
Angioplasty Summit 2007

CTO



Toyohashi Heart Center

RCA-CTO , Post CABG





■ MIRACLEbros Family is **more controllable**

to penetrate proximal or distal cap,
to advance in the hard CTO **with tortuosity**,
to puncture from pseudo to true lumen.

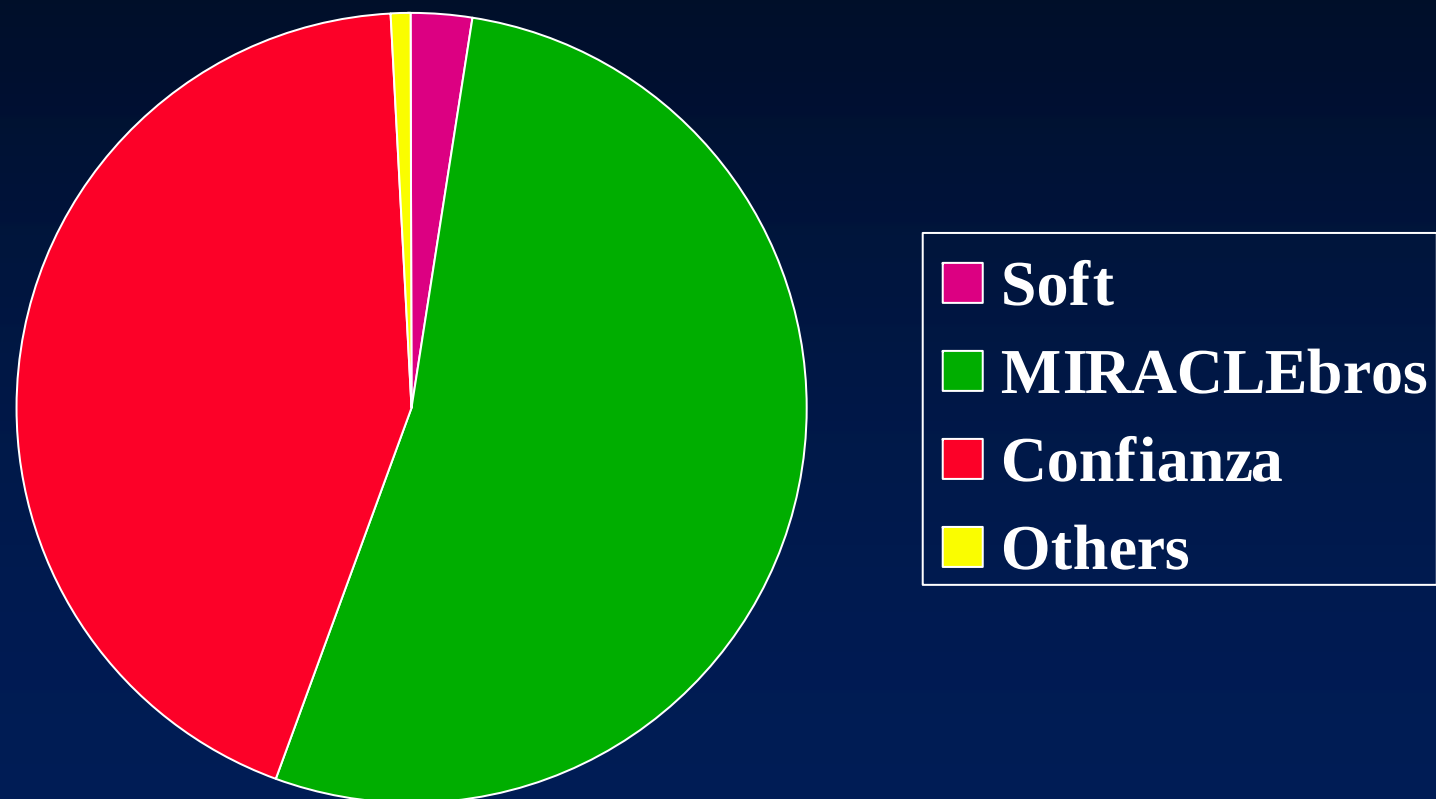
■ Confianza Family should be used

only when the near target is detected,
to penetrate proximal or distal cap (**parallel**),
to puncture from pseudo to true lumen (**IVUS guide**).

■ Confianza Family should **not** be used

to **seek the true channel** or **advance over a long distance**,
particularly in CTO with tortuosity.

Key Wire for Success (n=200)





Key to Success

1. Development of mechanical wire

2. Development of wiring technique



Current Wiring Technique for Coronary CTO

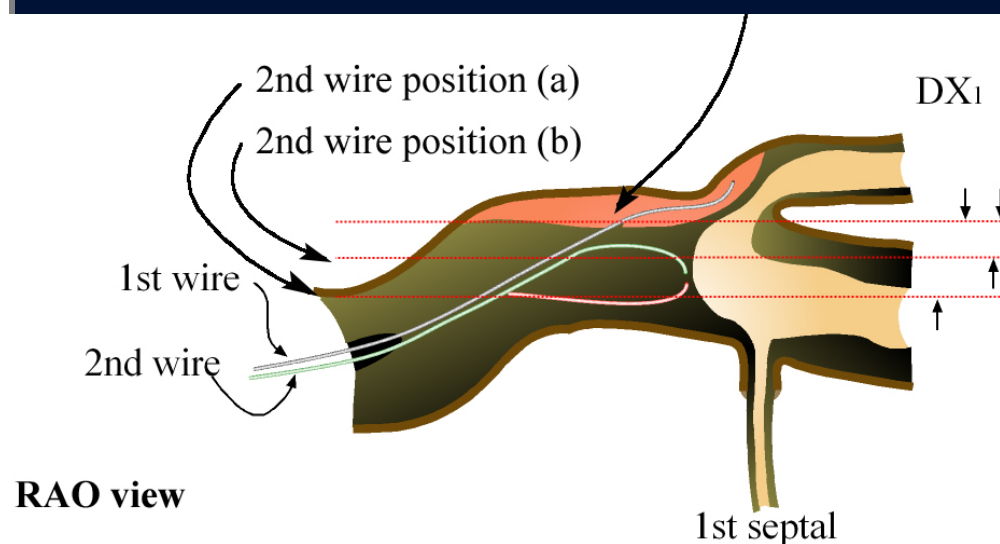
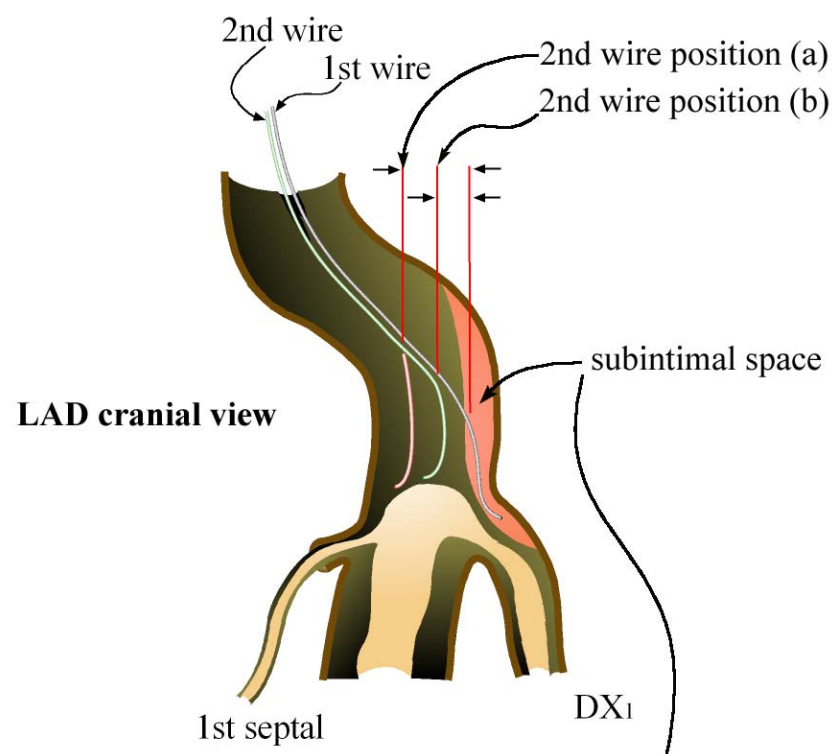
1. Anchor technique
2. Parallel wiring technique
3. Side branch technique
4. Retrograde wiring technique
5. IVUS guided wiring technique



Current Wiring Technique for Coronary CTO

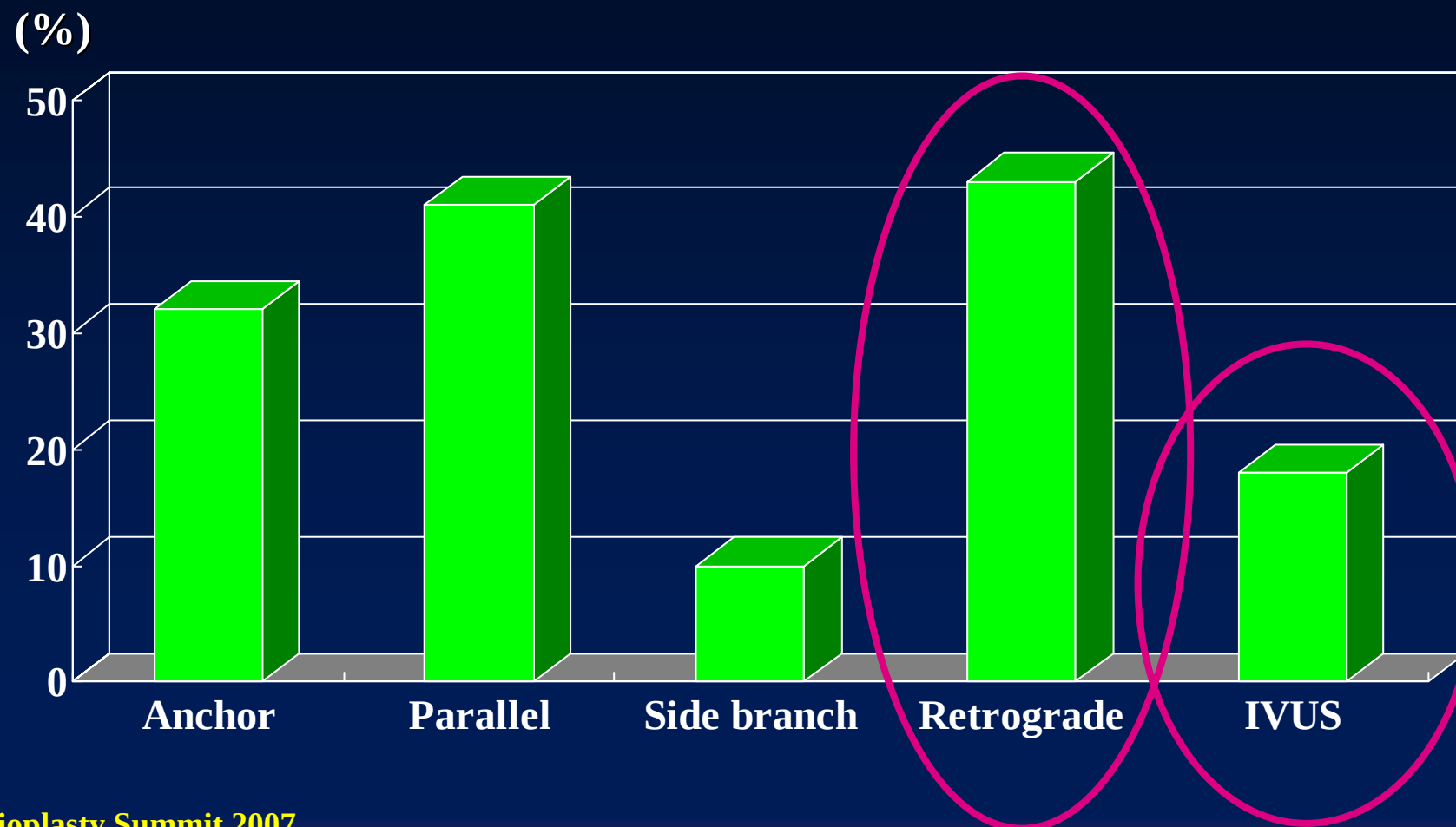
1. Anchor technique
- 2. Parallel wiring technique**
3. Side branch technique
4. Retrograde wiring technique
5. IVUS guided wiring technique

Concept of **Parallel Wire Technique**



Current Wiring Technique for Coronary CTO

(N=120)



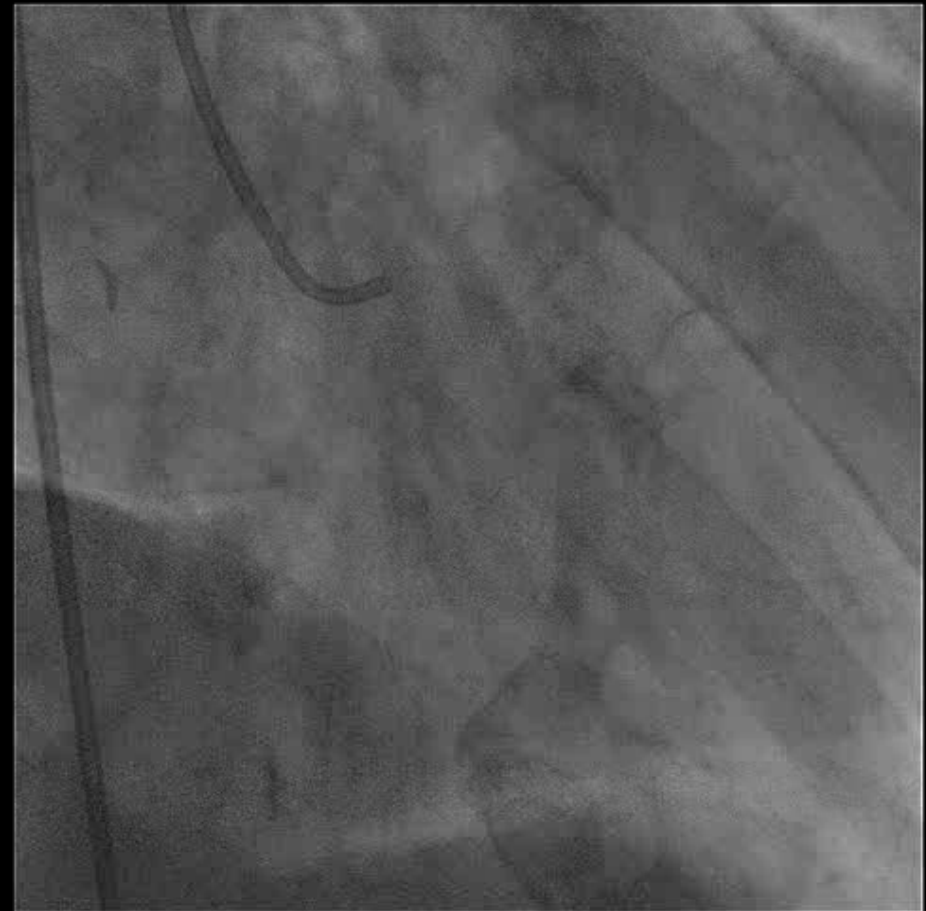
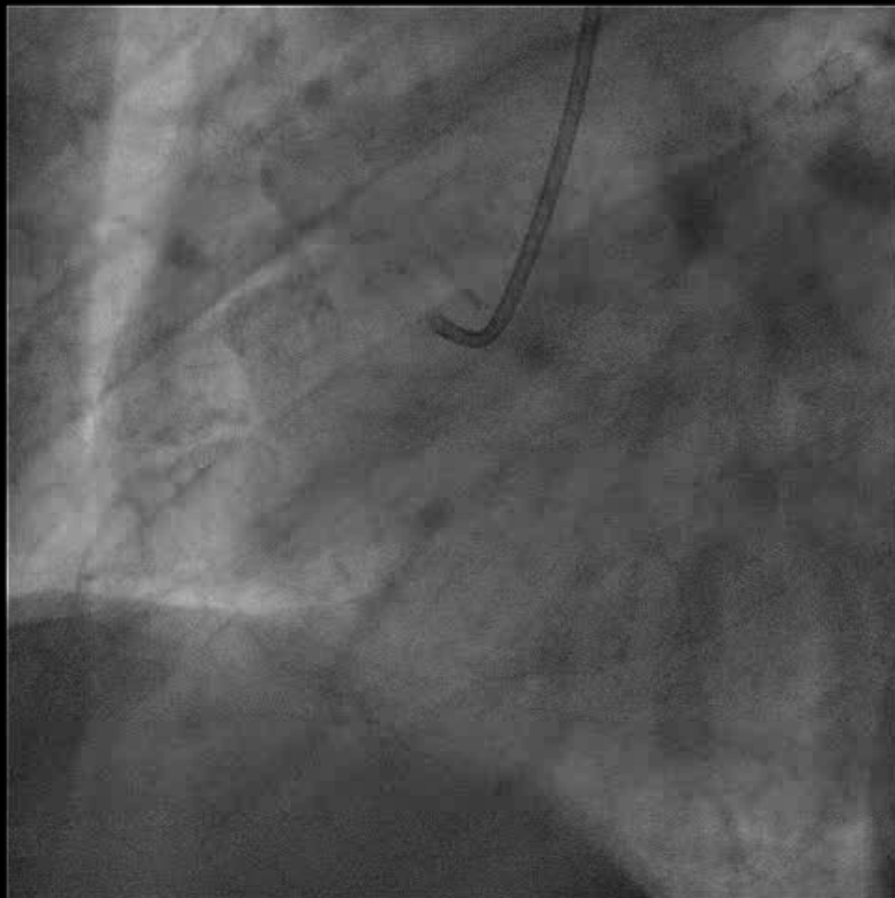


Current Wiring Technique for Coronary CTO

- 1. Anchor technique**
2. Parallel wiring technique
3. Side branch technique
4. Retrograde wiring technique
5. IVUS guided wiring technique

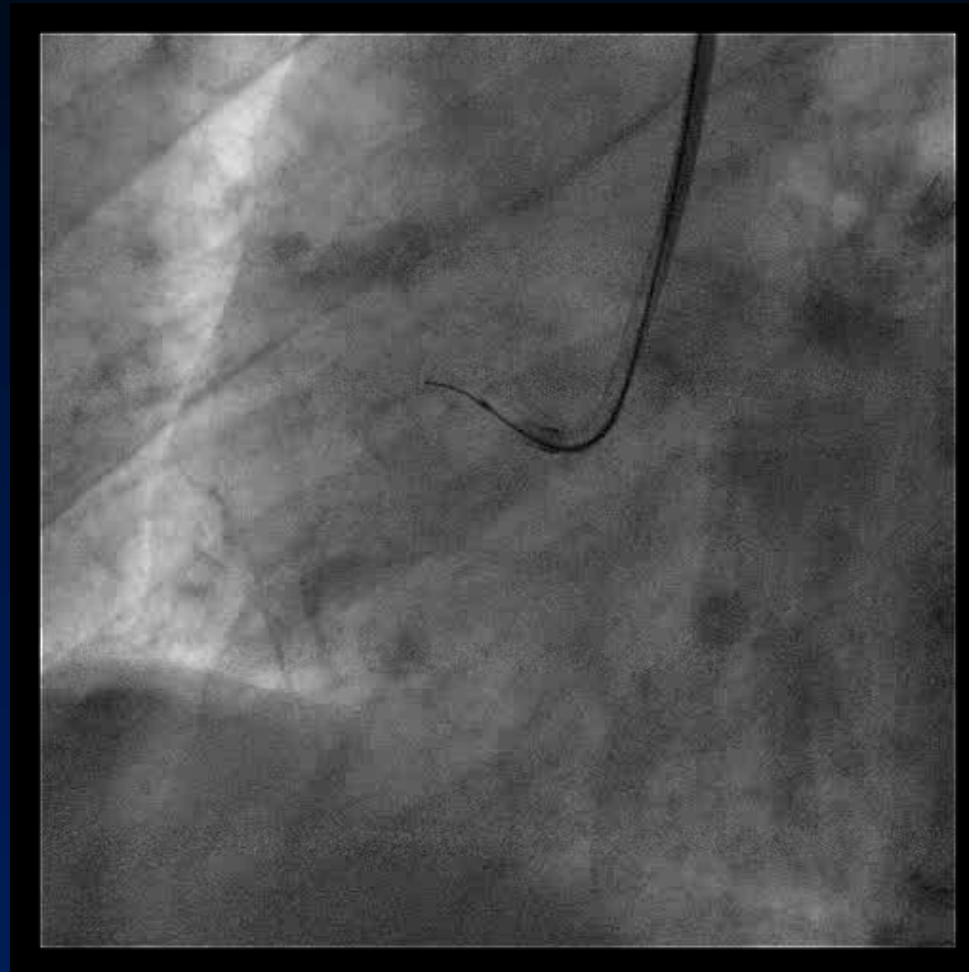
CTO

RCA-CTO



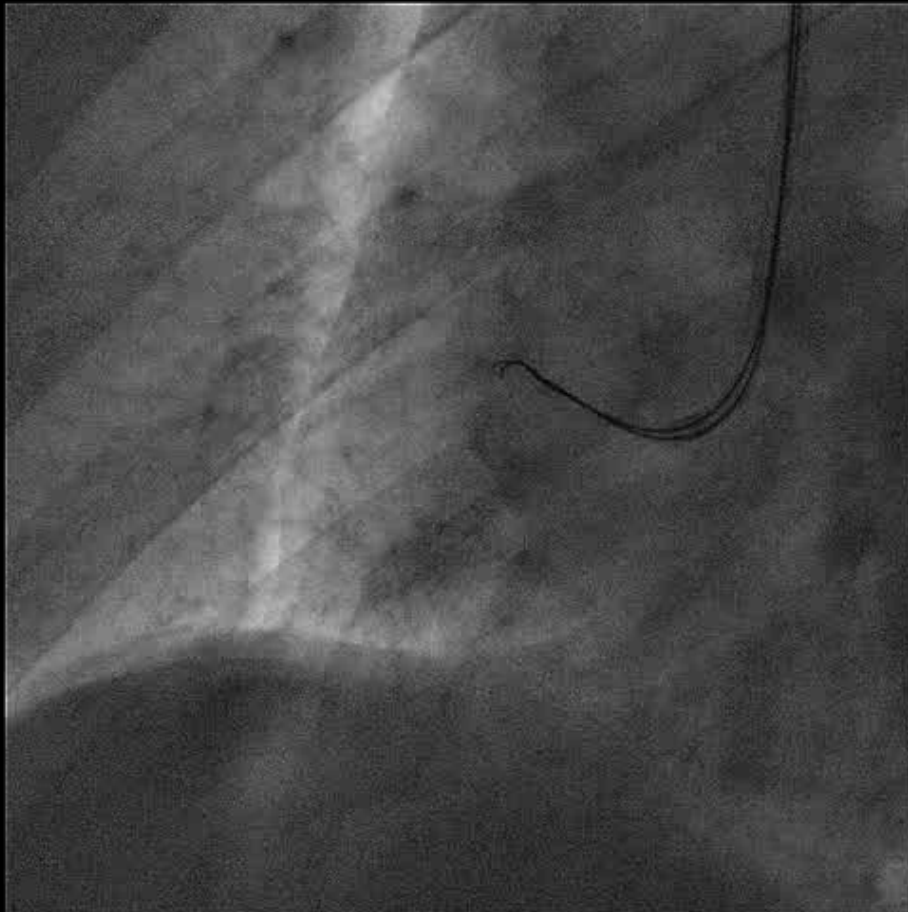
CTO

RCA-CTO

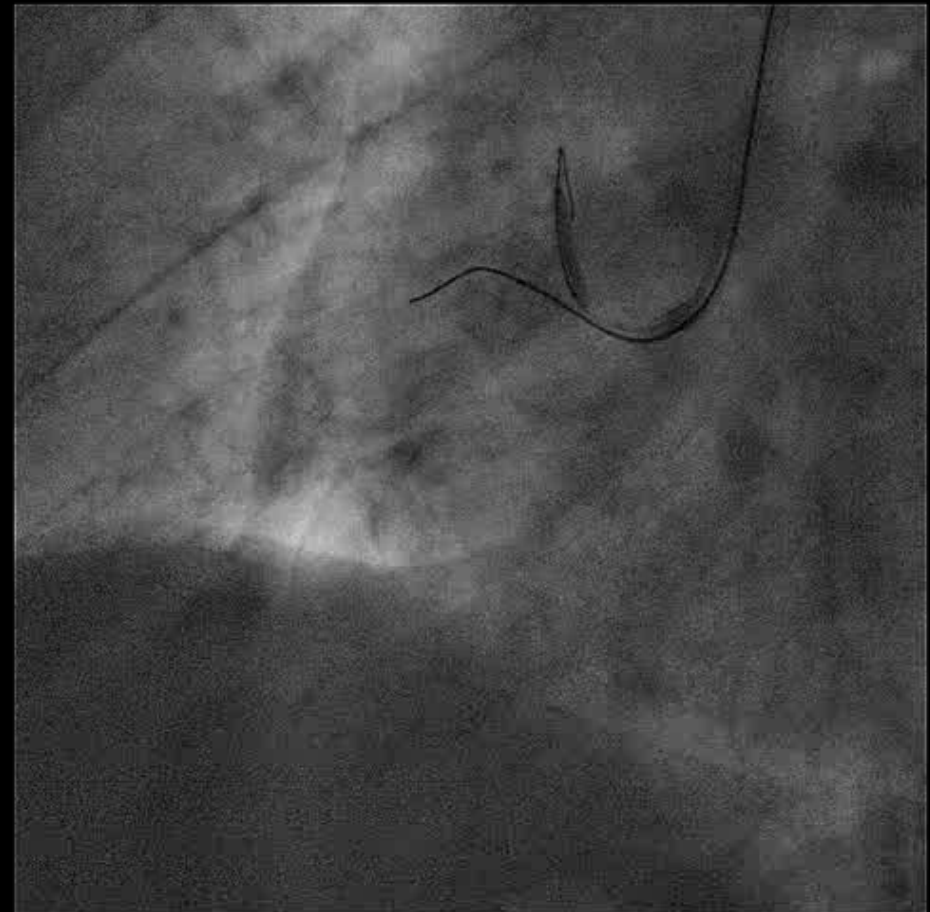


CTO

RCA-CTO



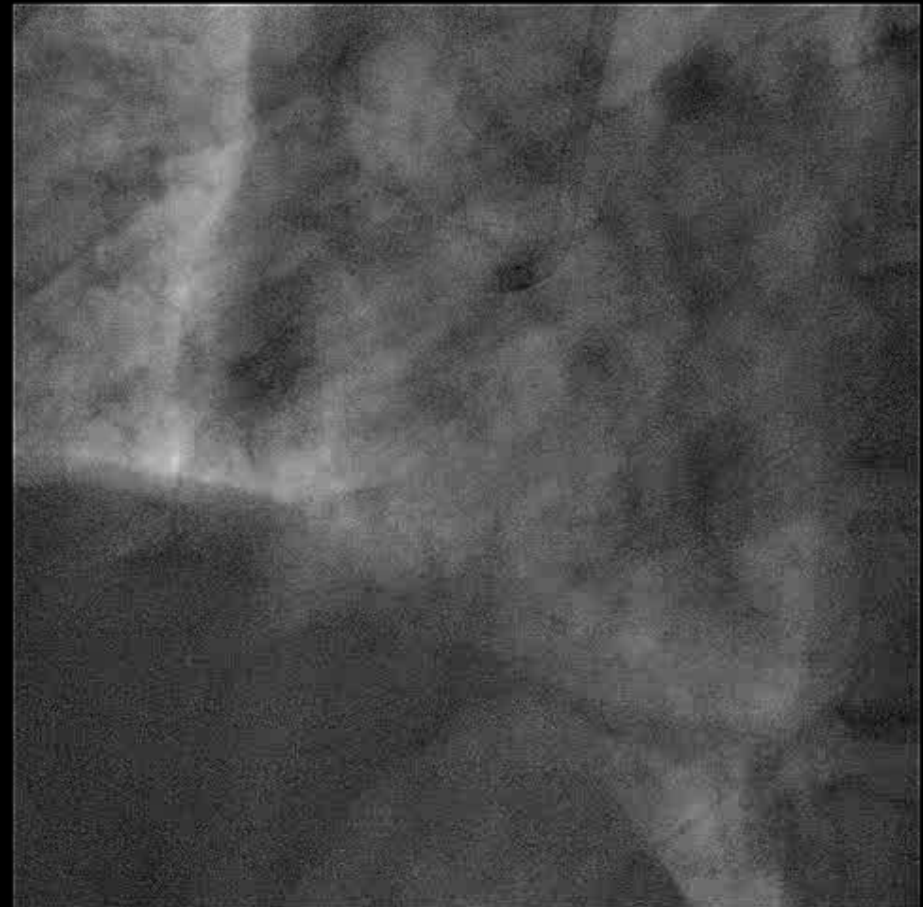
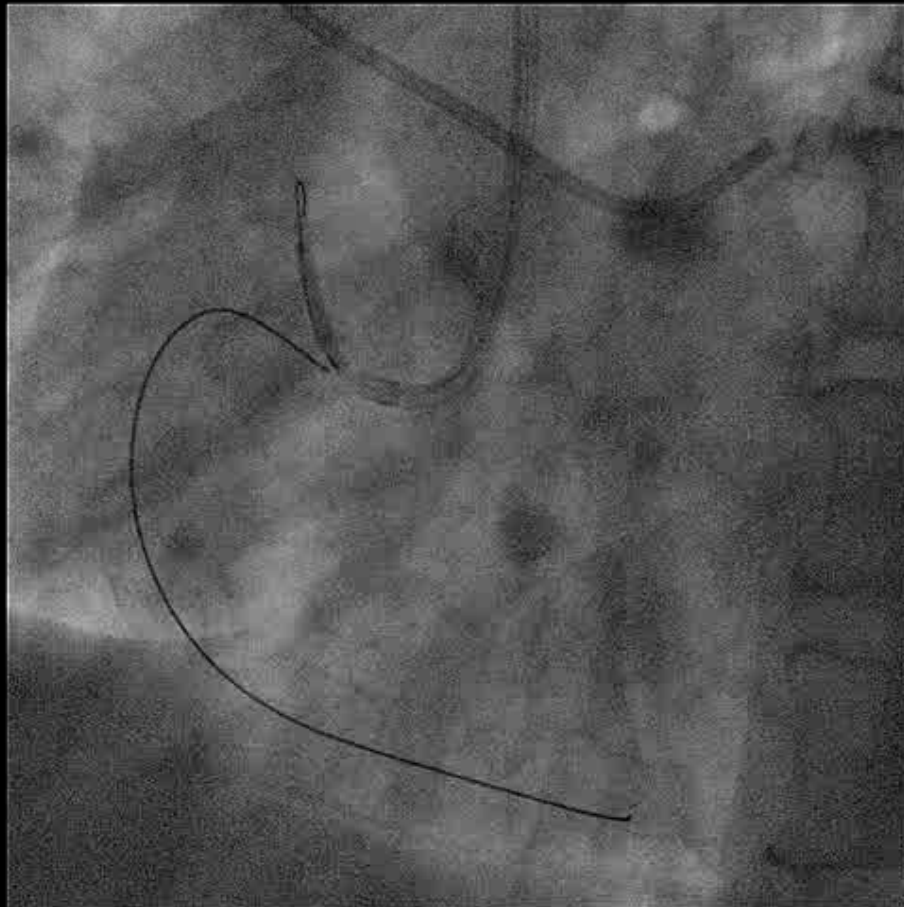
Unstable back-up for wire handling



Anchor technique

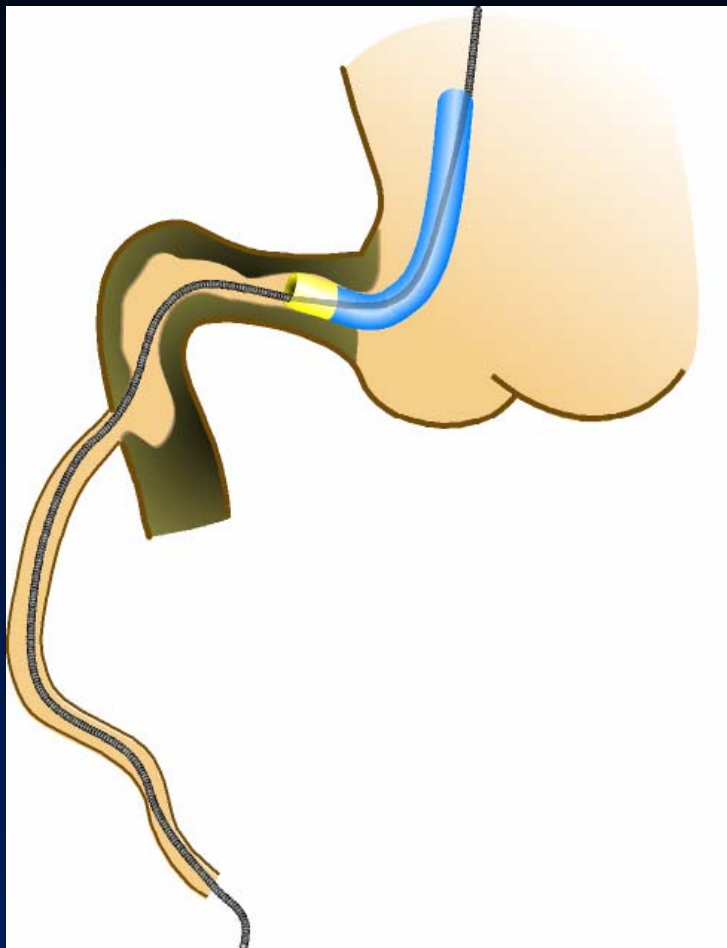
CTO

RCA-CTO

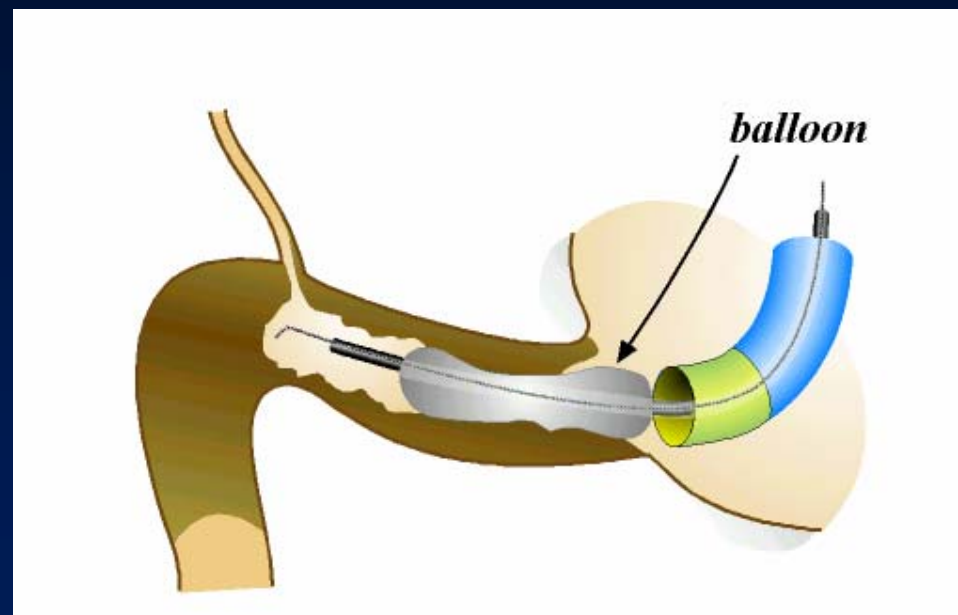


Stable back-up by anchoring balloon

Another Anchoring Technique



**Anchor wire
(by support wire)**



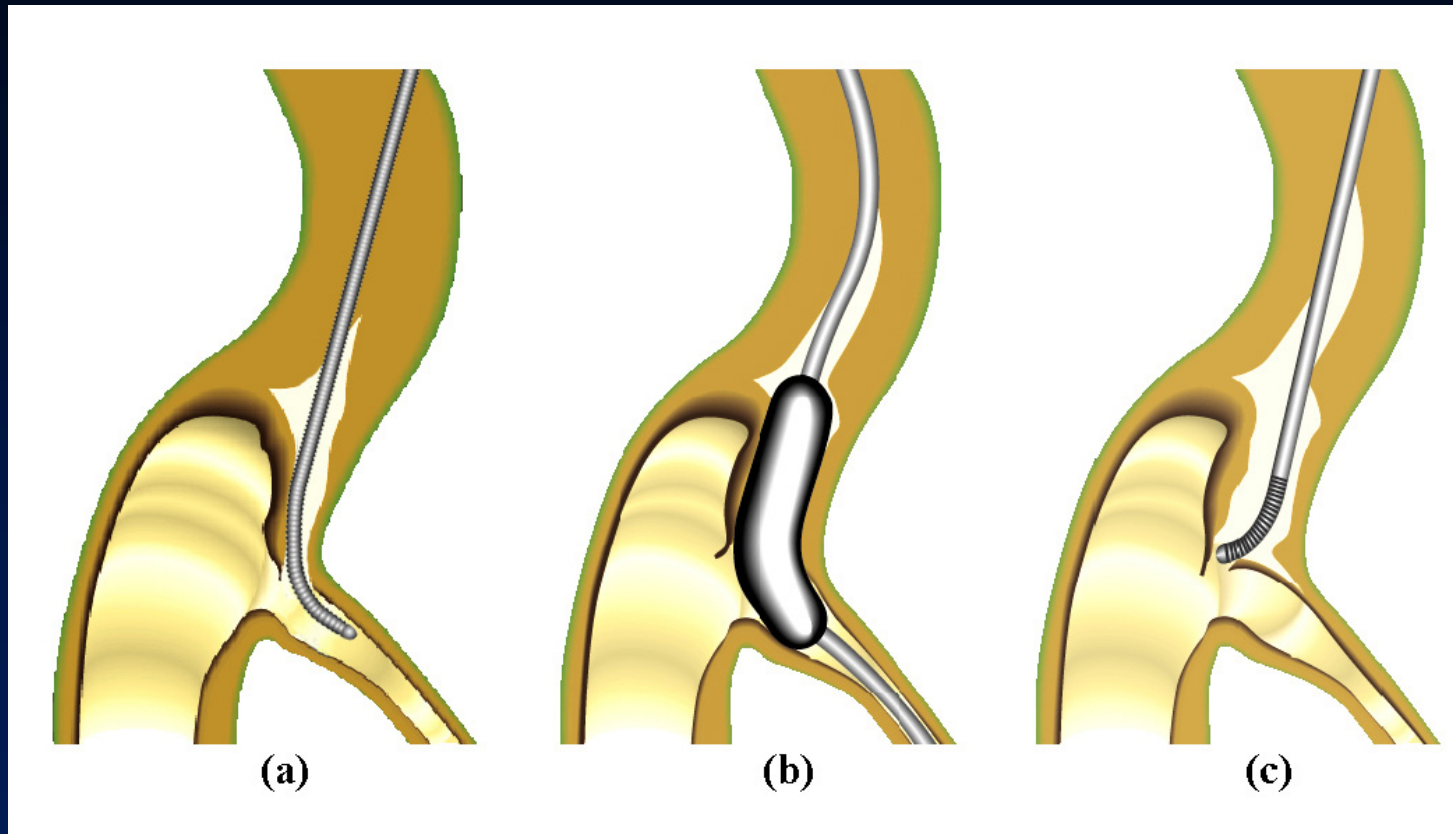
Anchor OTW balloon



Current Wiring Technique for Coronary CTO

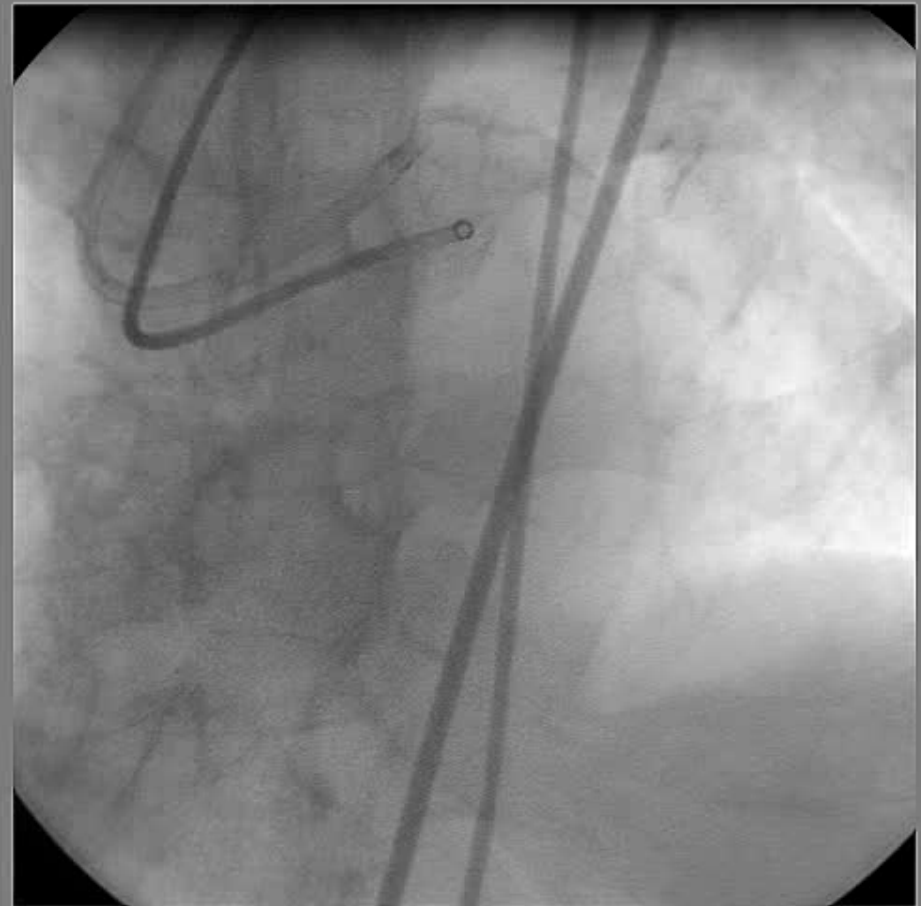
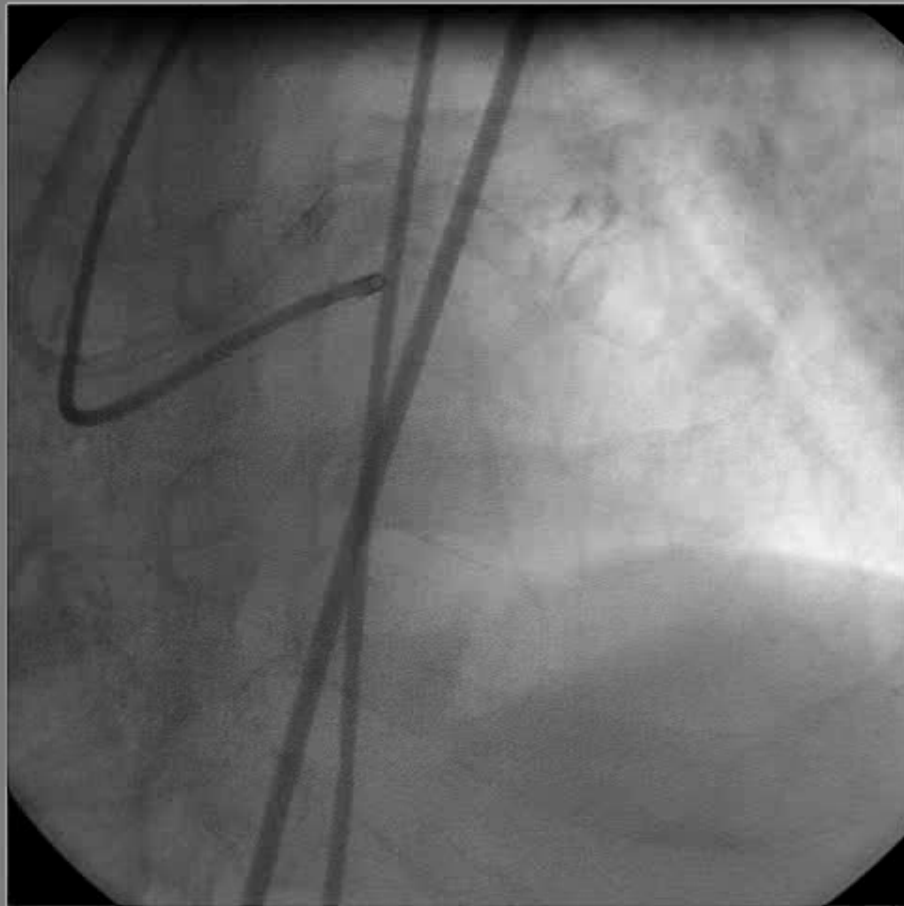
1. Anchor technique
2. Parallel wiring technique
- 3. Side branch technique**
4. Retrograde wiring technique
5. IVUS guided wiring technique

Side Branch Technique



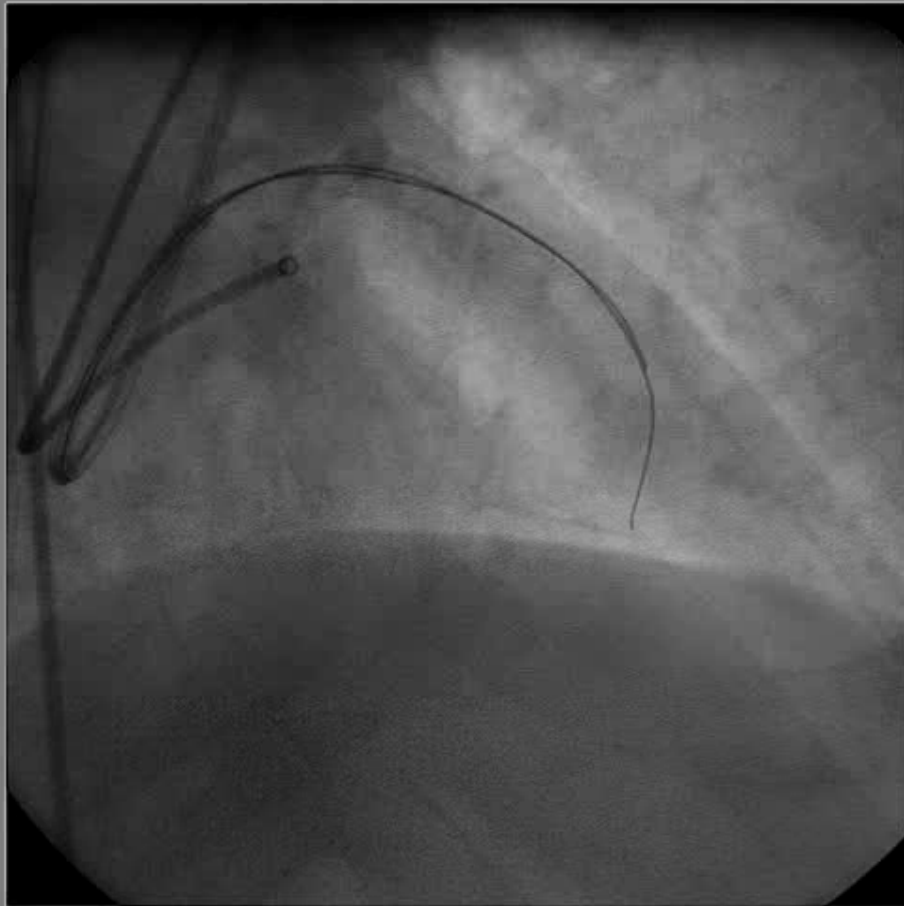
CTO

LAD-CTO

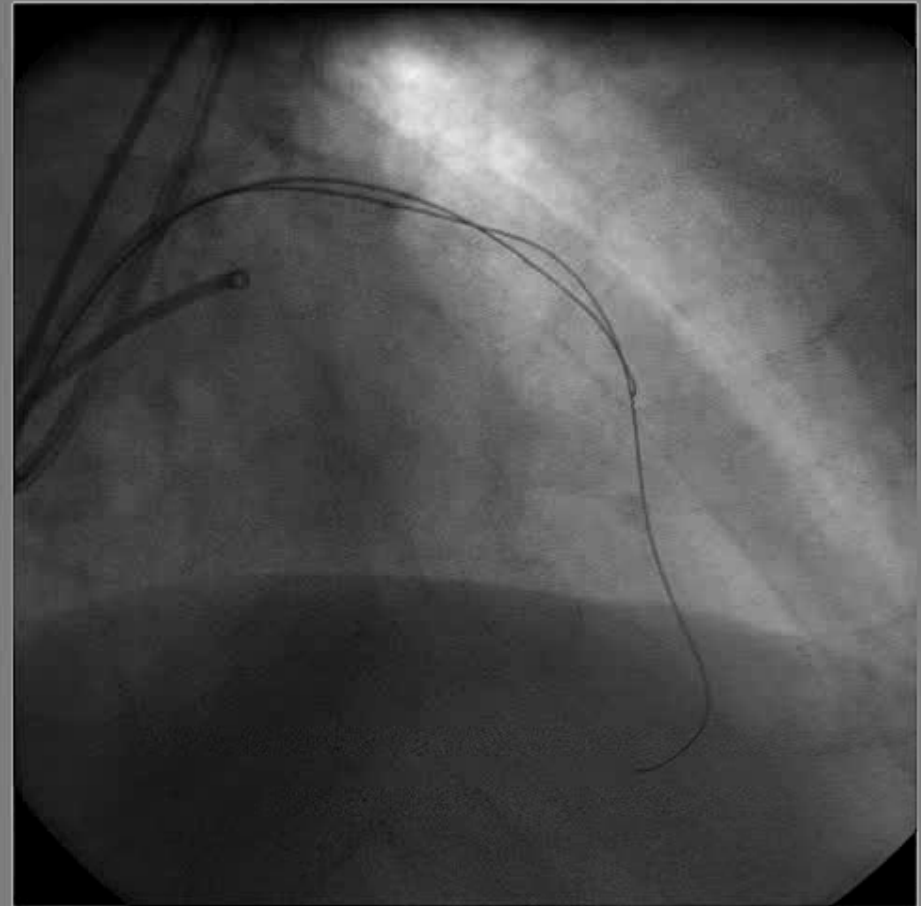


CTO

LAD-CTO



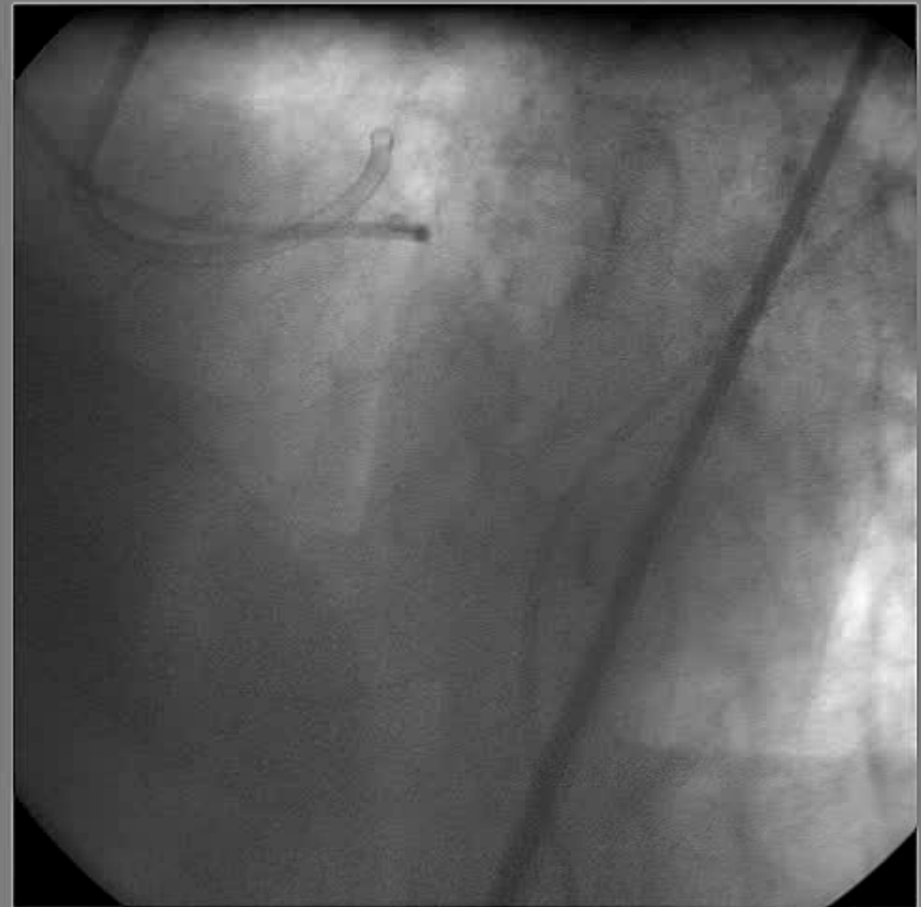
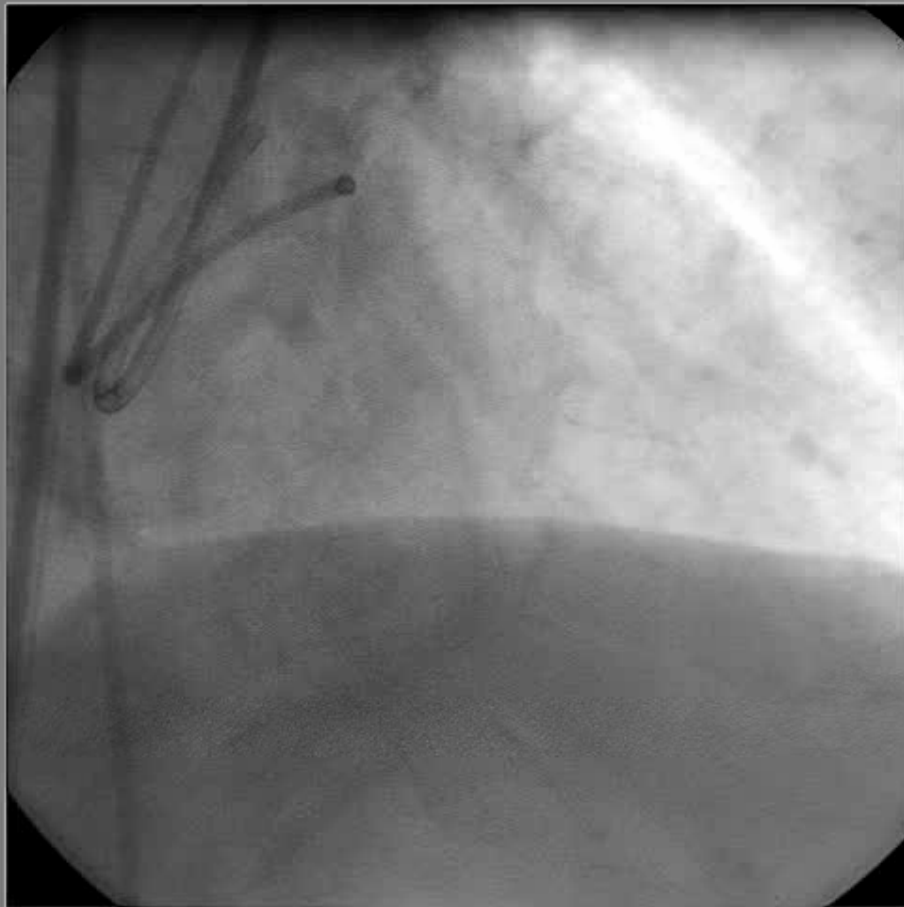
Mb 12 with 6



Side branch technique

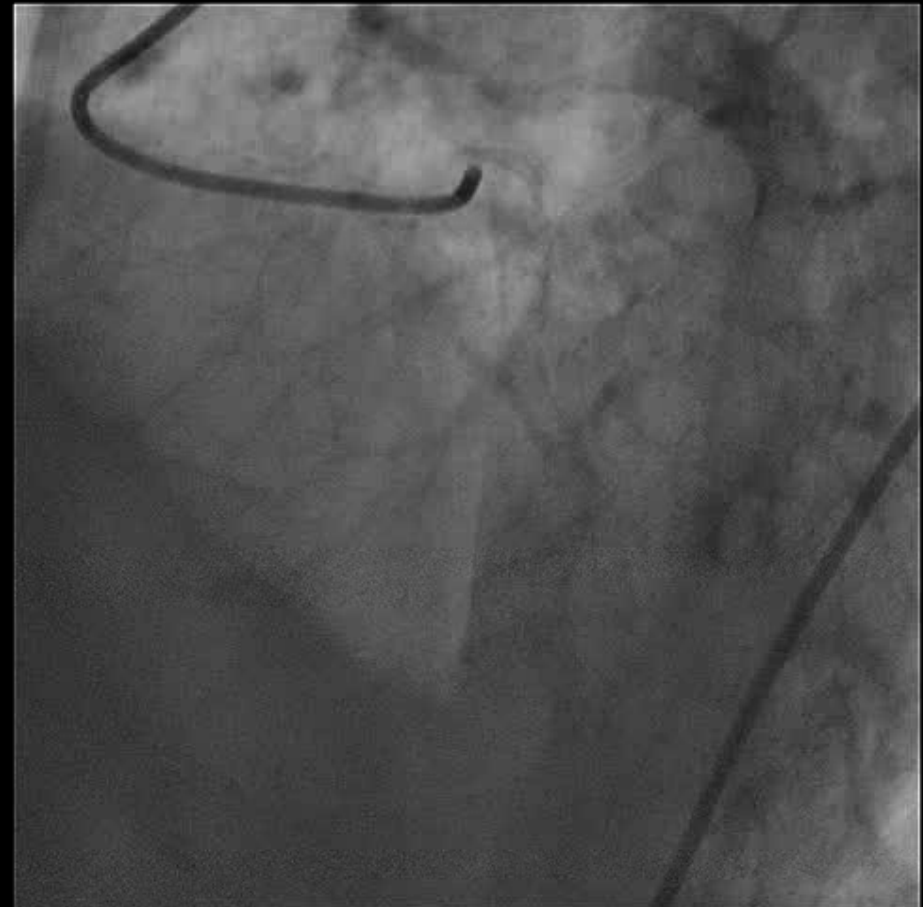
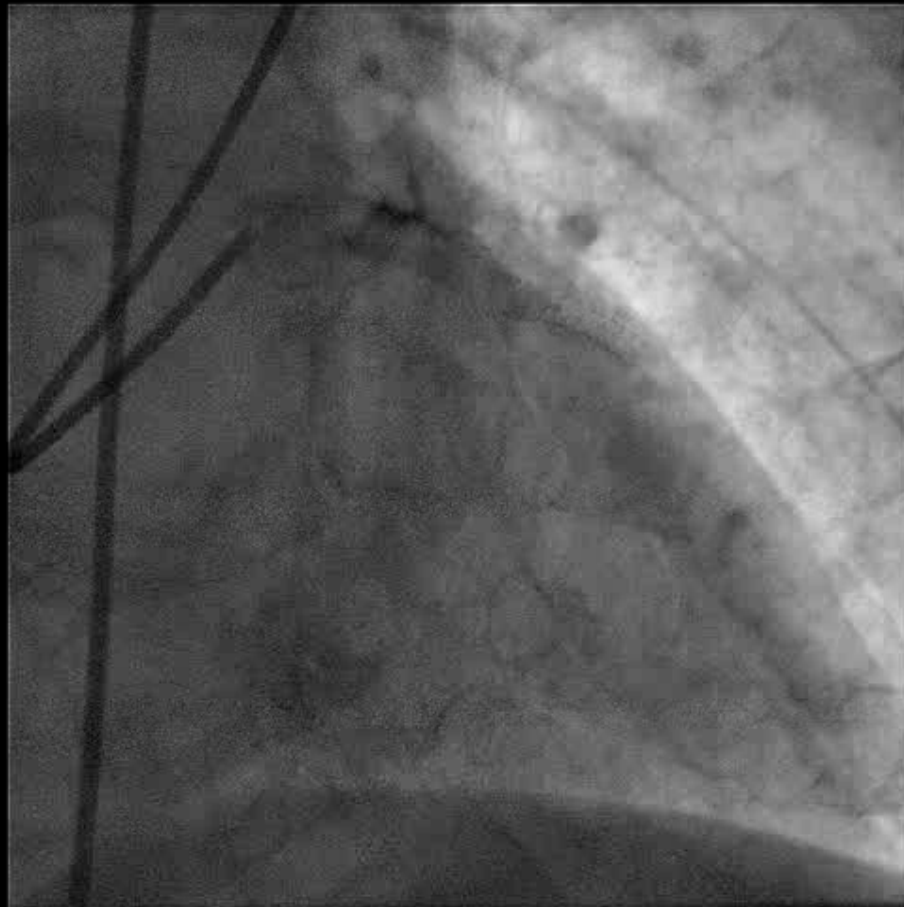
CTO

LAD-CTO



CTO

6M Fu



Controlled STAR Technique



Current Wiring Technique for Coronary CTO

1. Anchor technique
2. Parallel wiring technique
3. Side branch technique
- 4. Retrograde wiring technique**
5. IVUS guided wiring technique

Retrograde Approach for Coronary CTO

- **Collateral channels**

A. bypass graft

B. epicardial collateral

C. septal perforator

- **Techniques**

Retrograde wire crossing

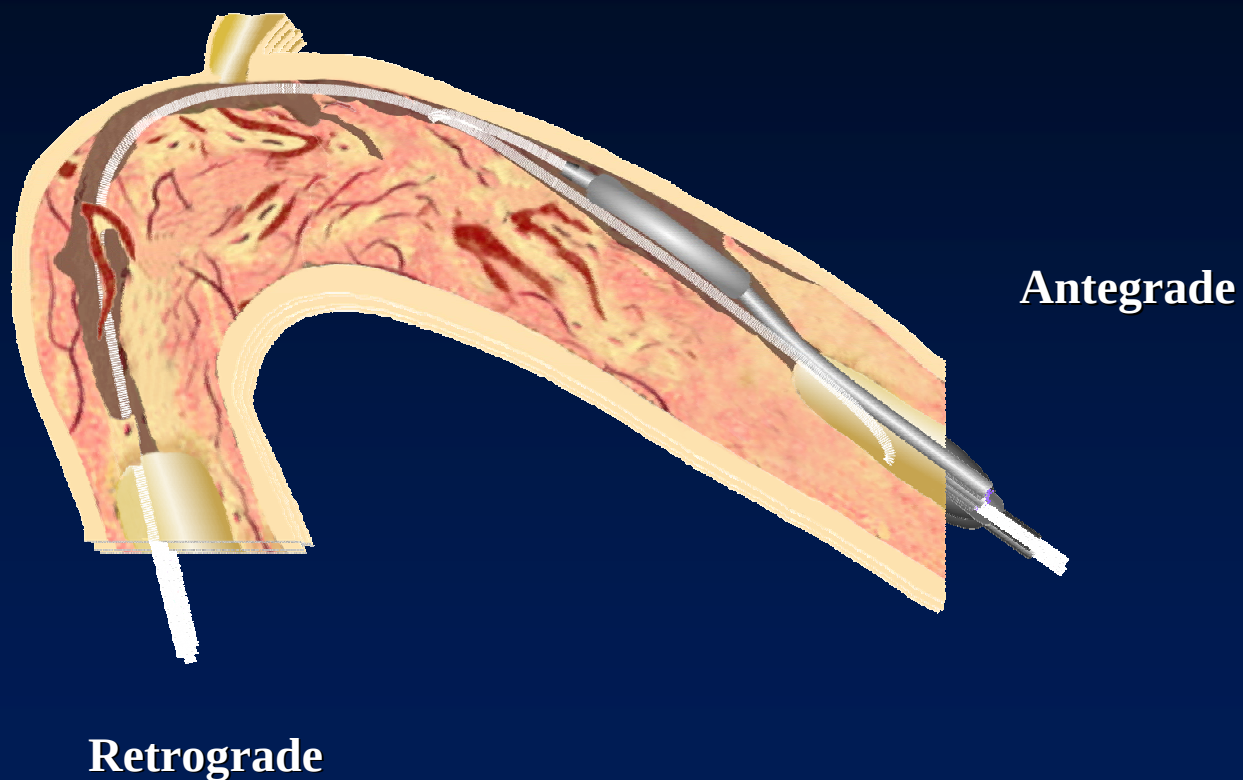
Kissing wire technique

Knuckle wire technique

CART technique
(Revere **CART** technique)

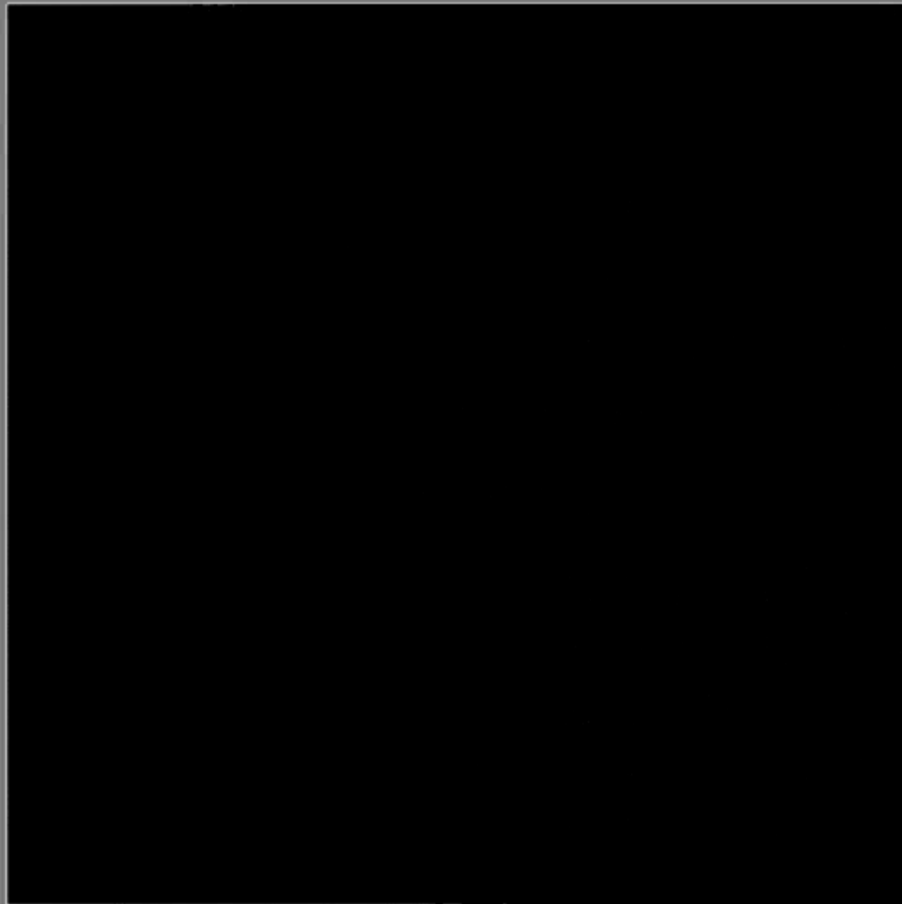


Concept of **Reverse CART** technique

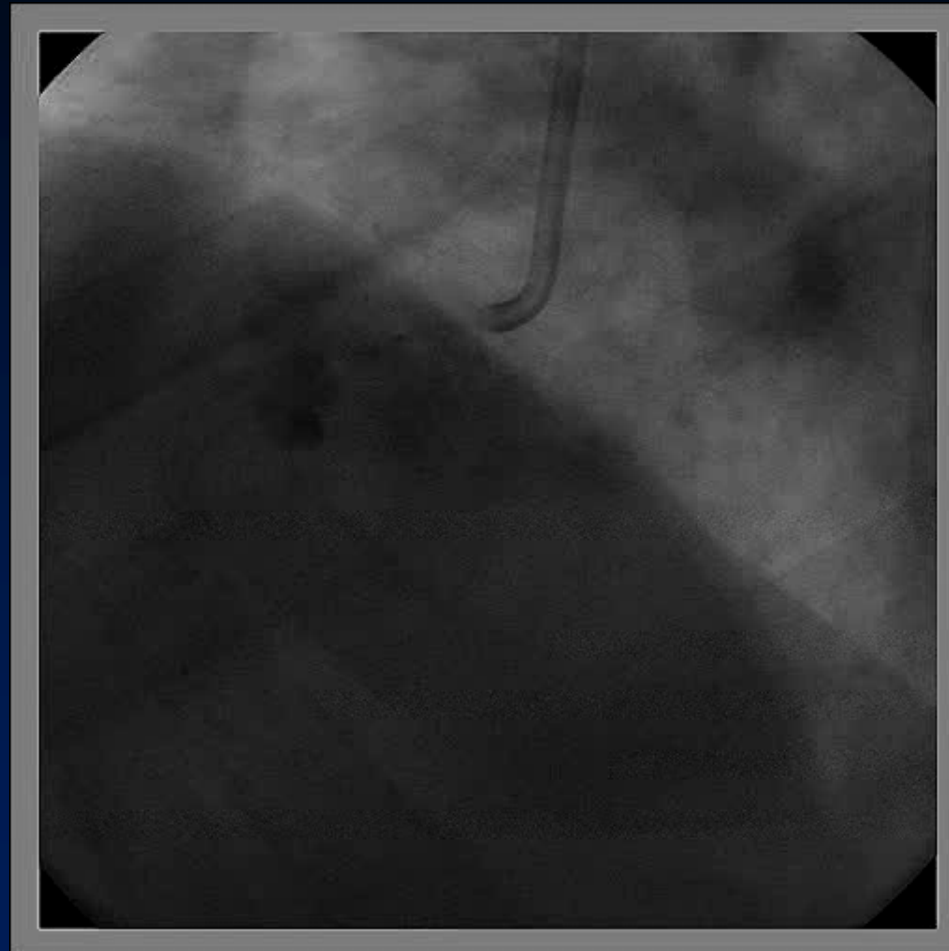


CTO

Case: RCA-CTO (Reattempt)



Pre CAG at the 1st attempt

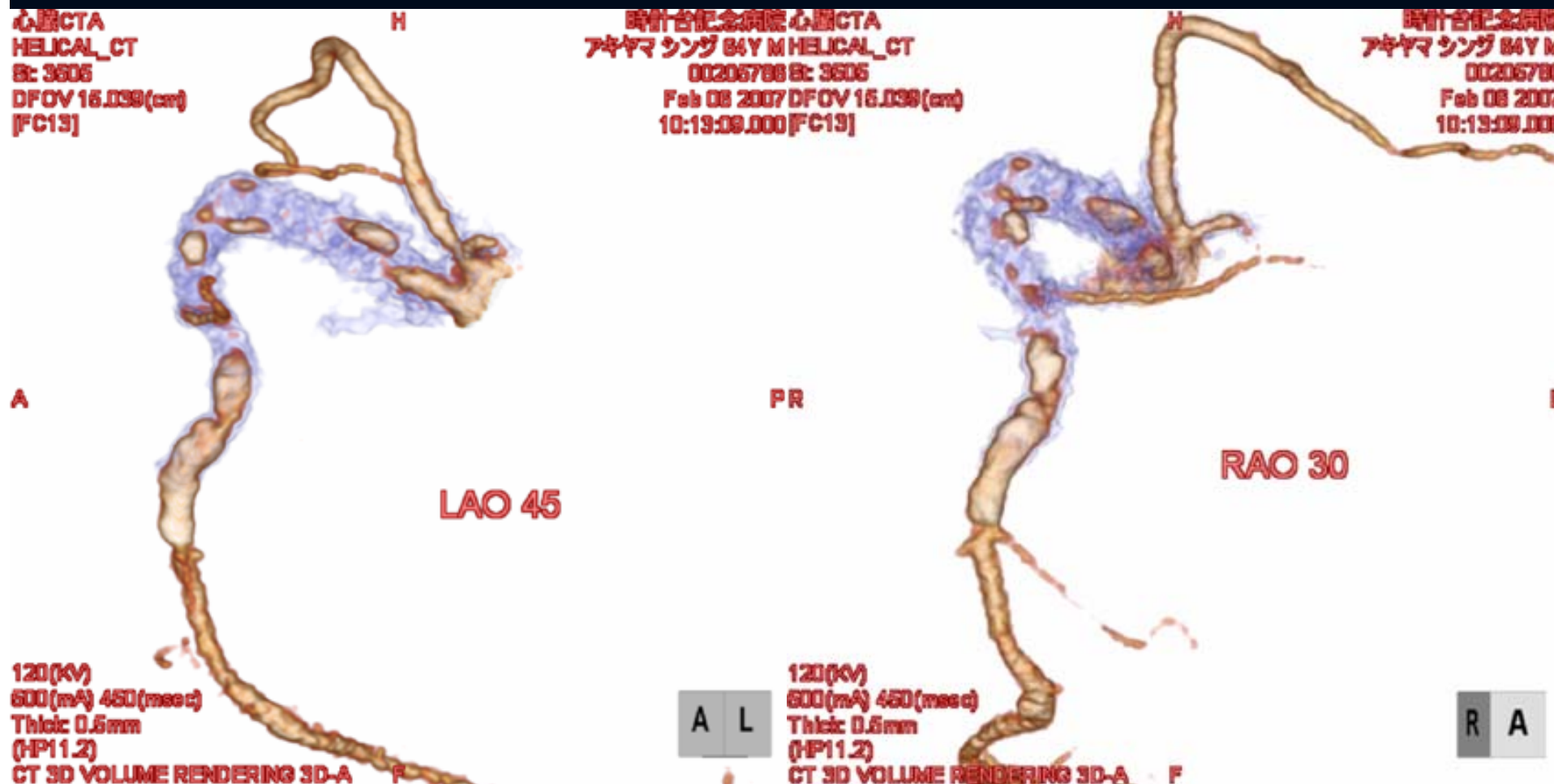


Wire perforation by Confianza

CTO



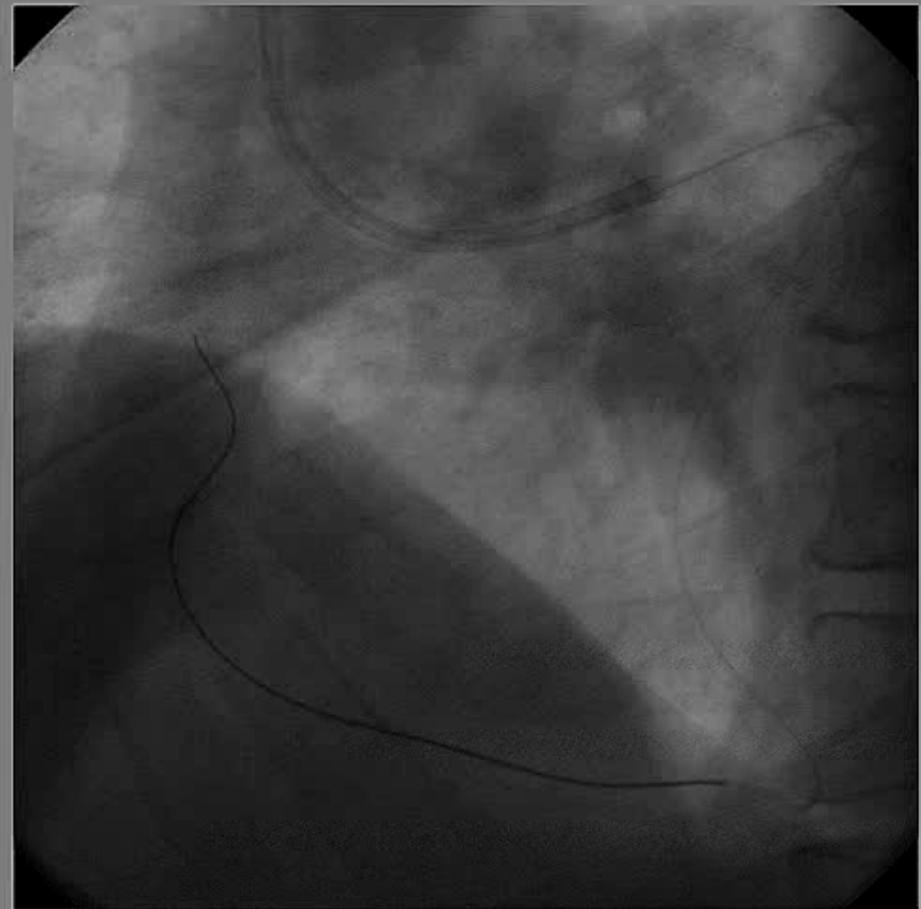
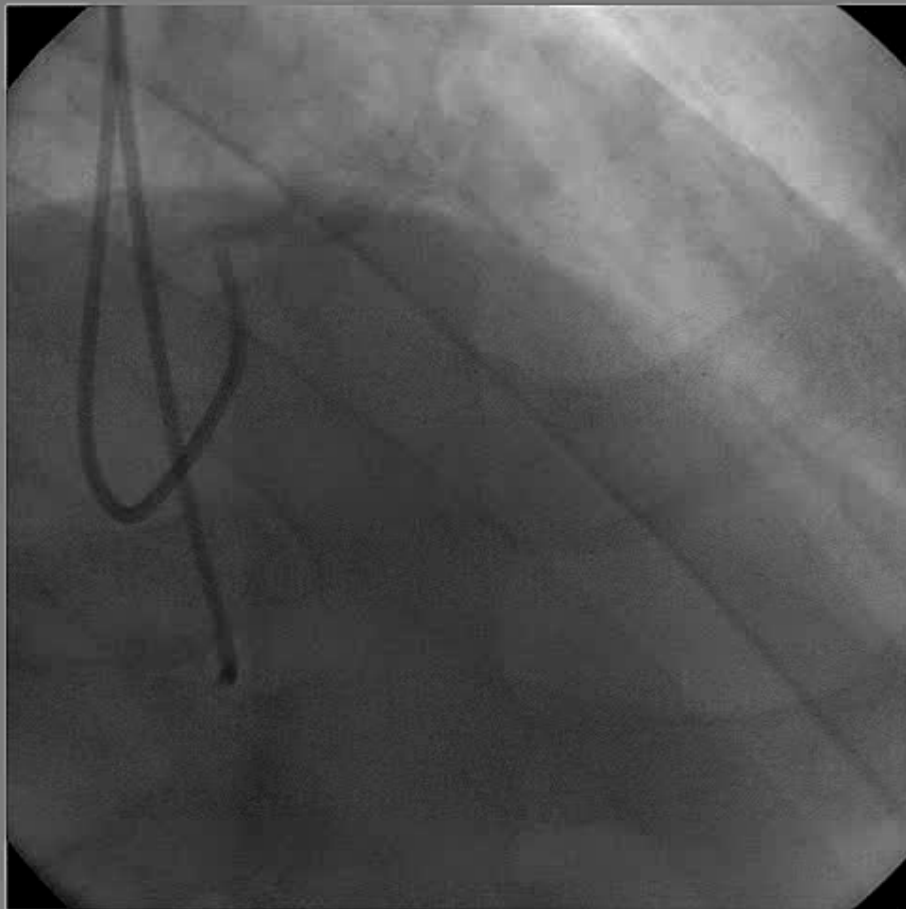
Toyohashi Heart Center



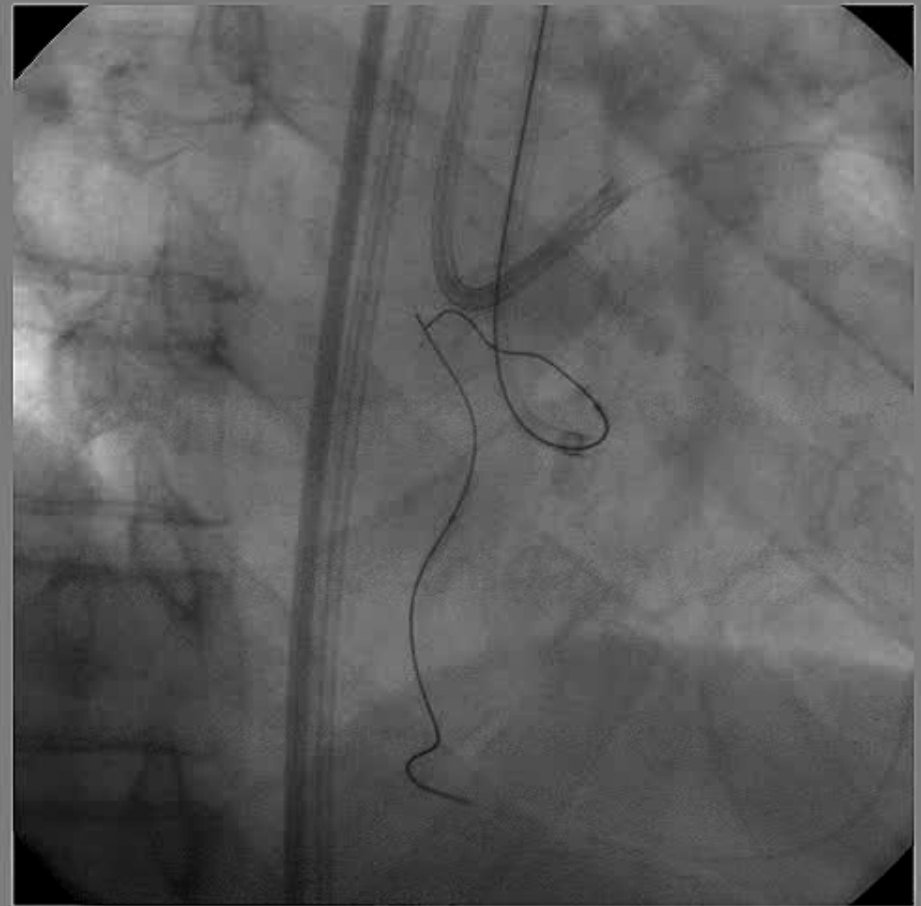
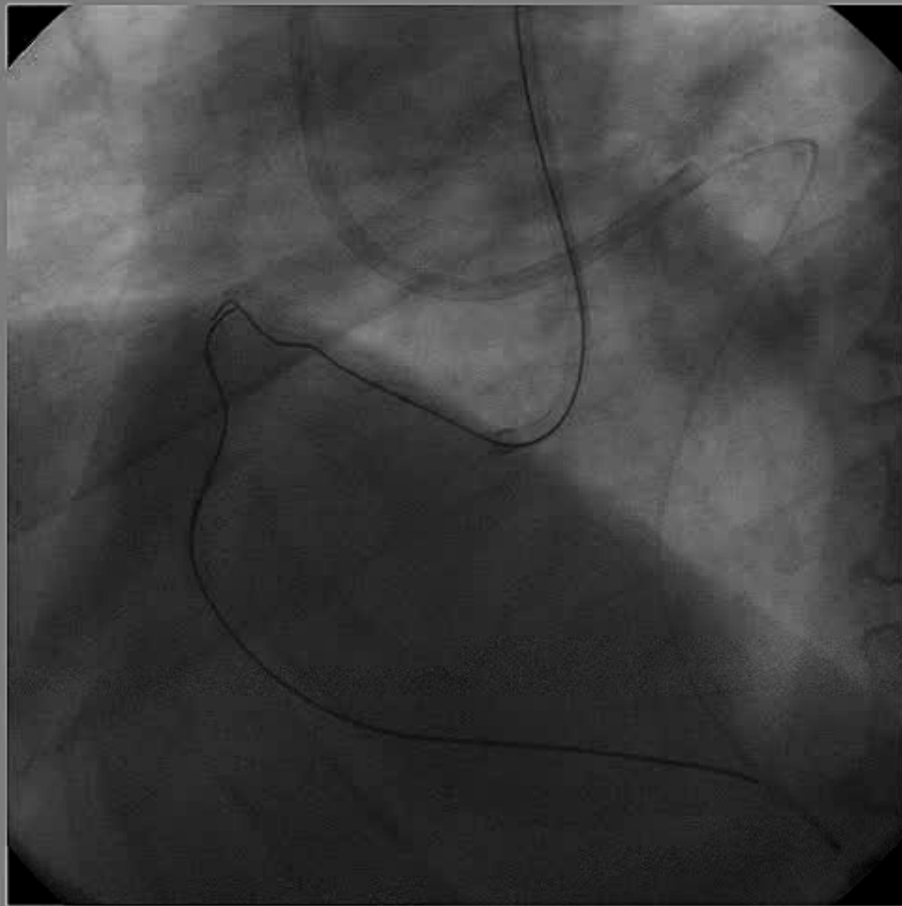
MSCT Images after the 1st Attempt

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CTO

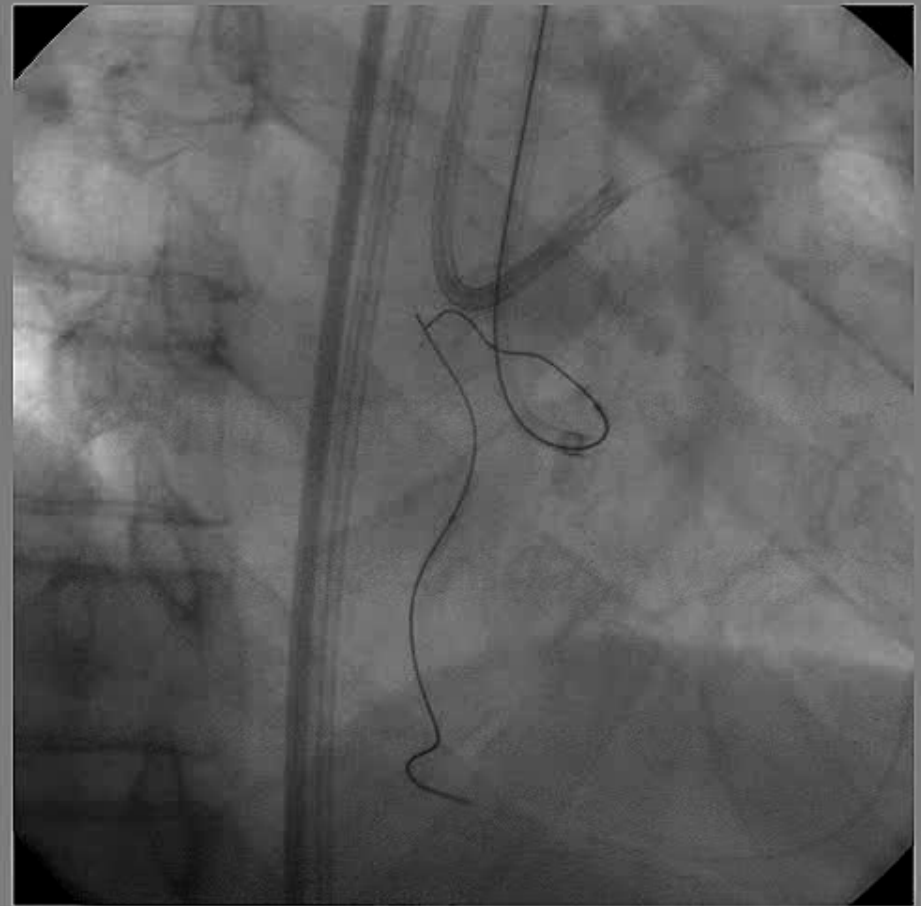
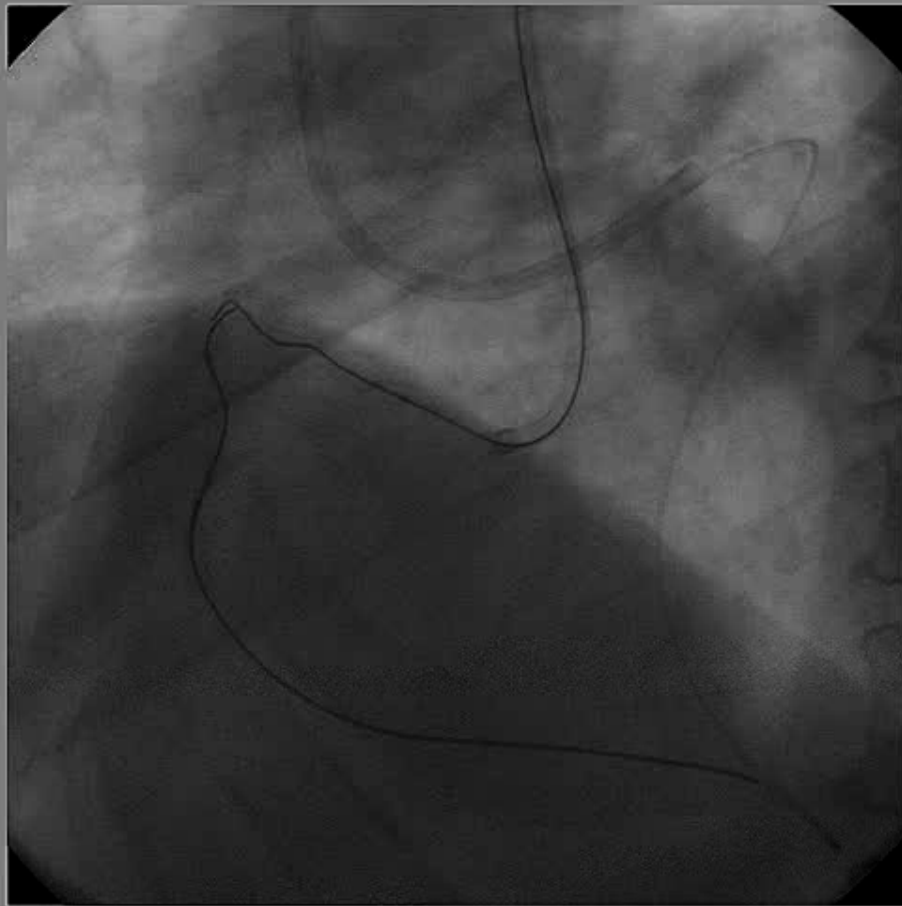


The 2nd Attempt



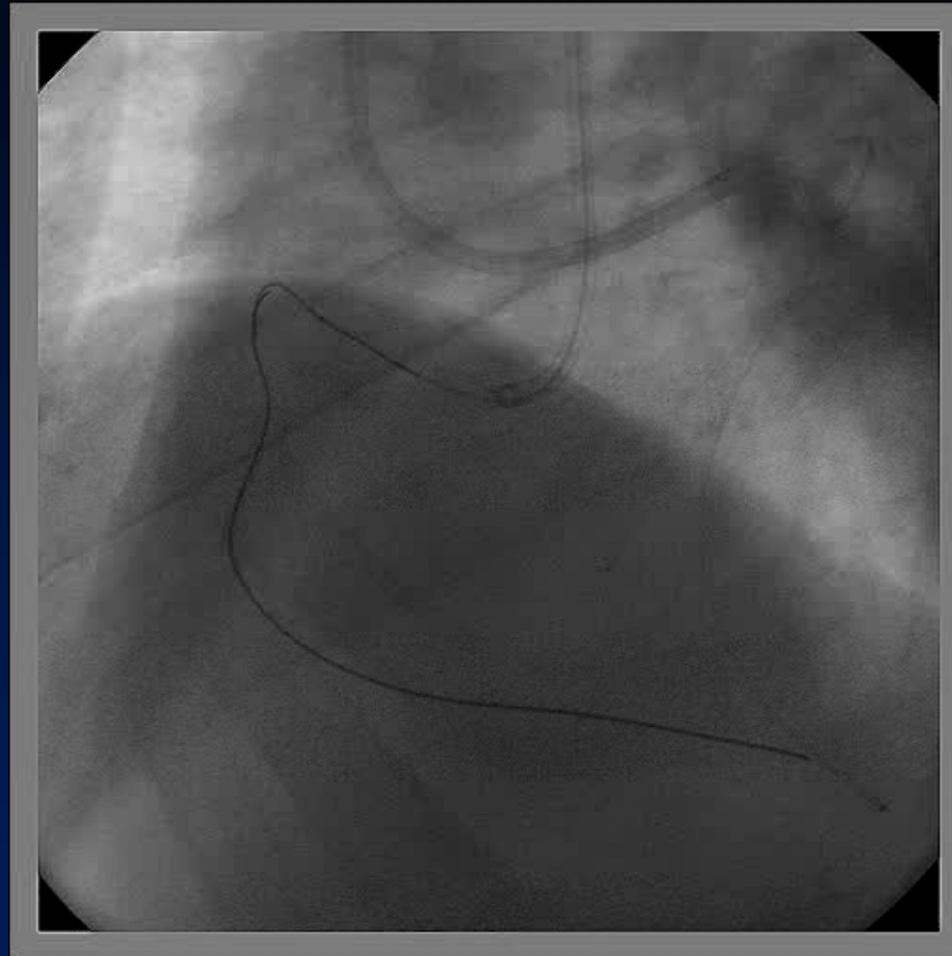
Kissing wire technique failed.

CTO



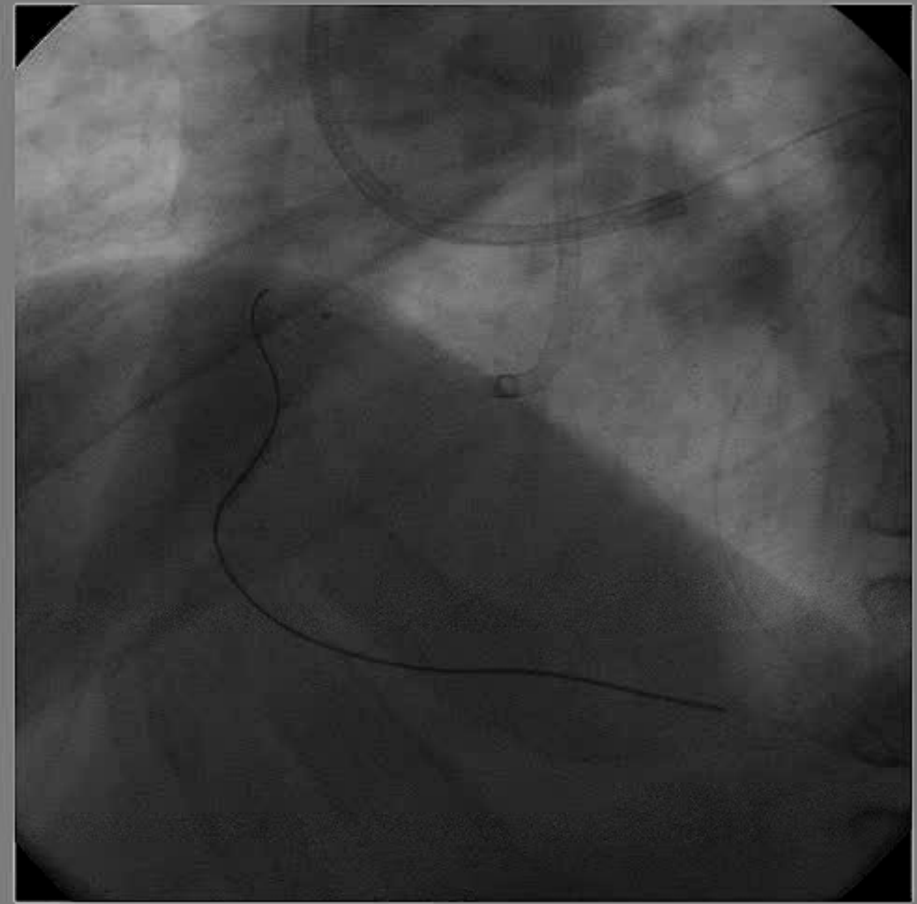
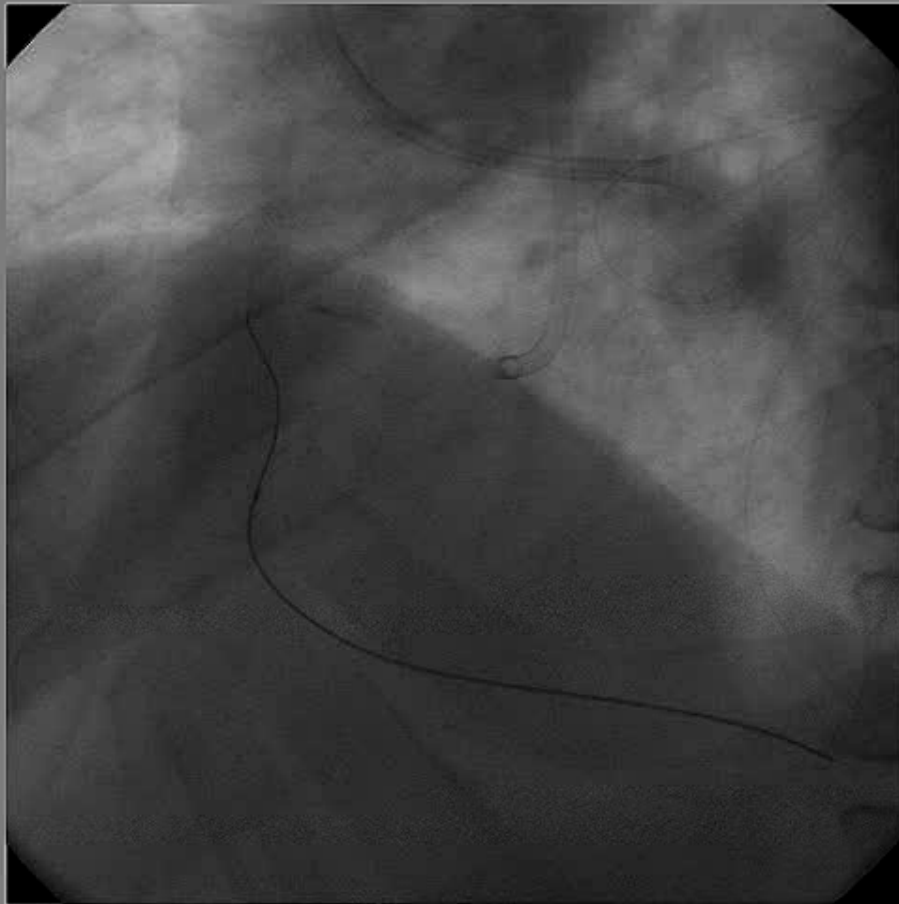
Retrograde balloon could not be advanced into the CTO.

CTO



Antegrade Tornus

CTO

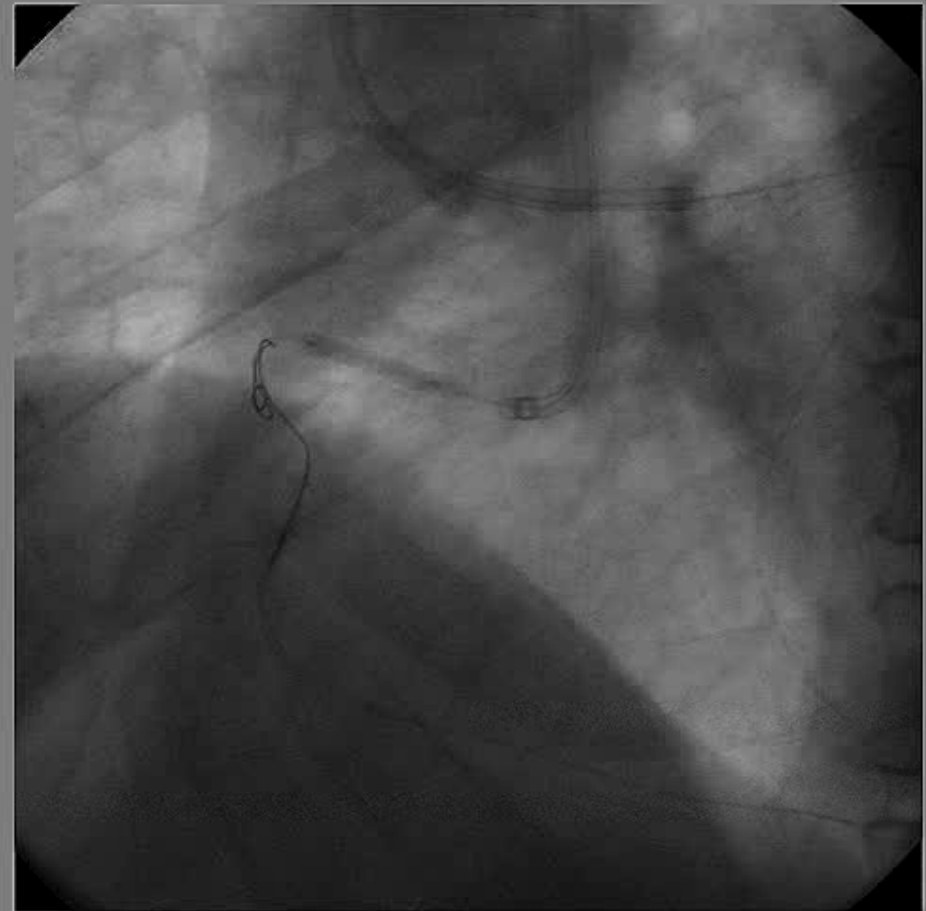
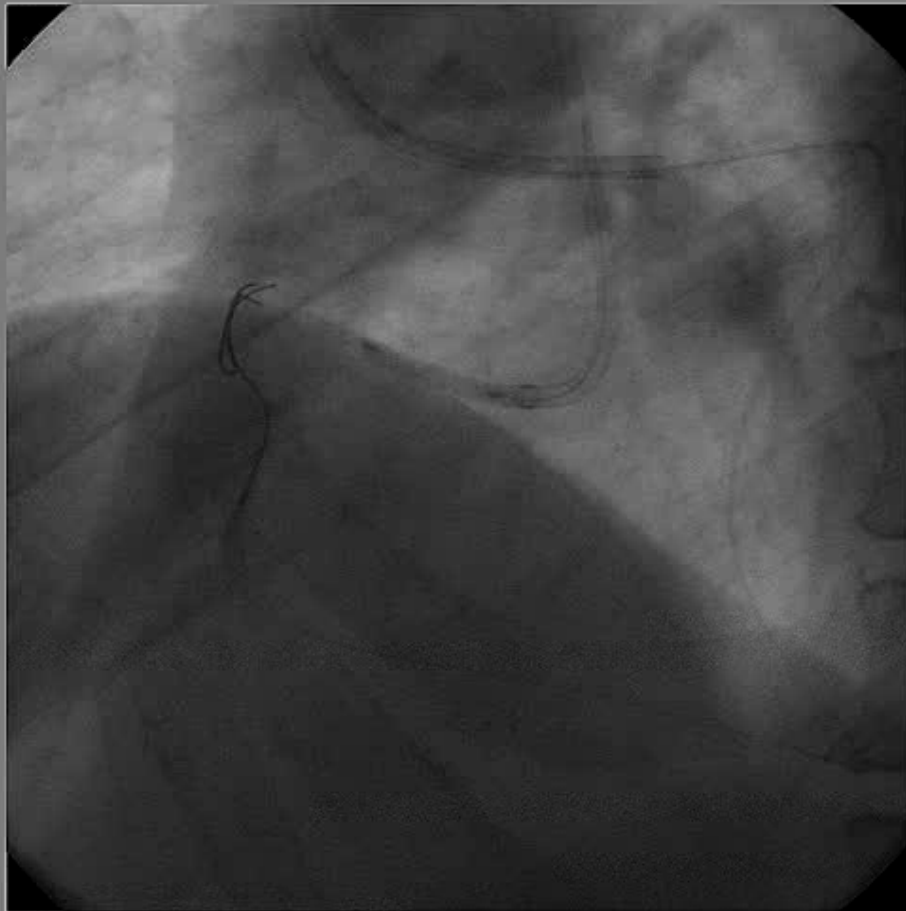


Antegrade 1.5mm ballooning

CTO



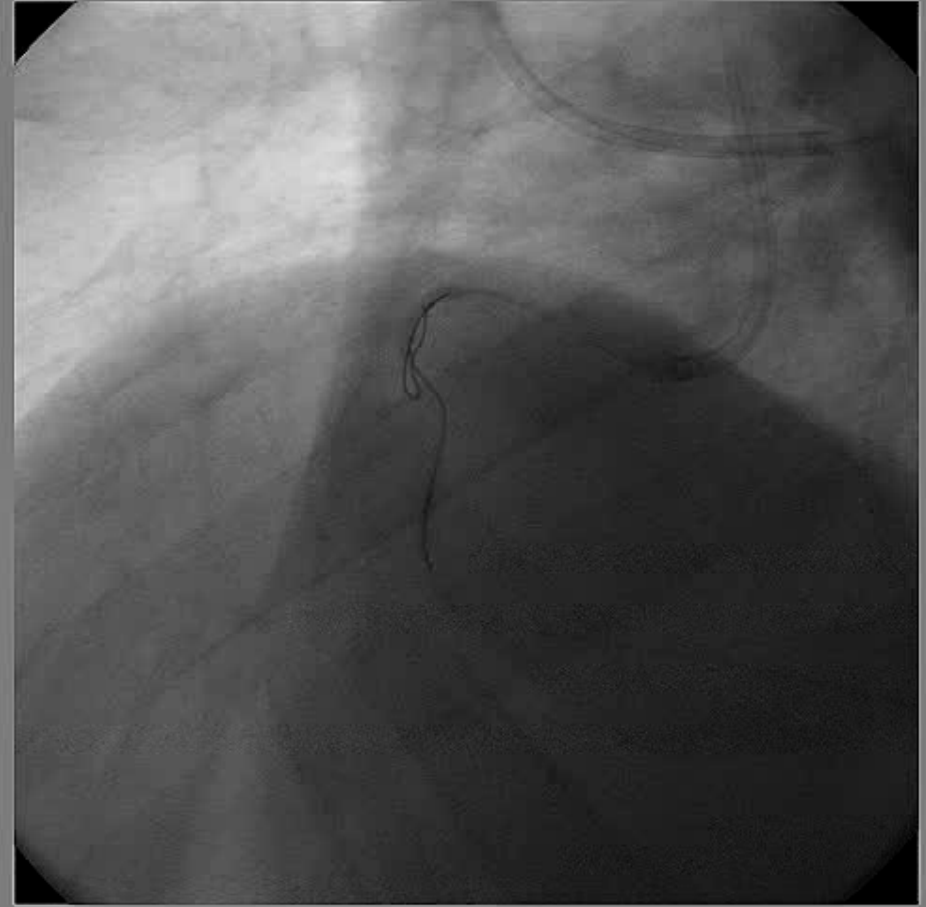
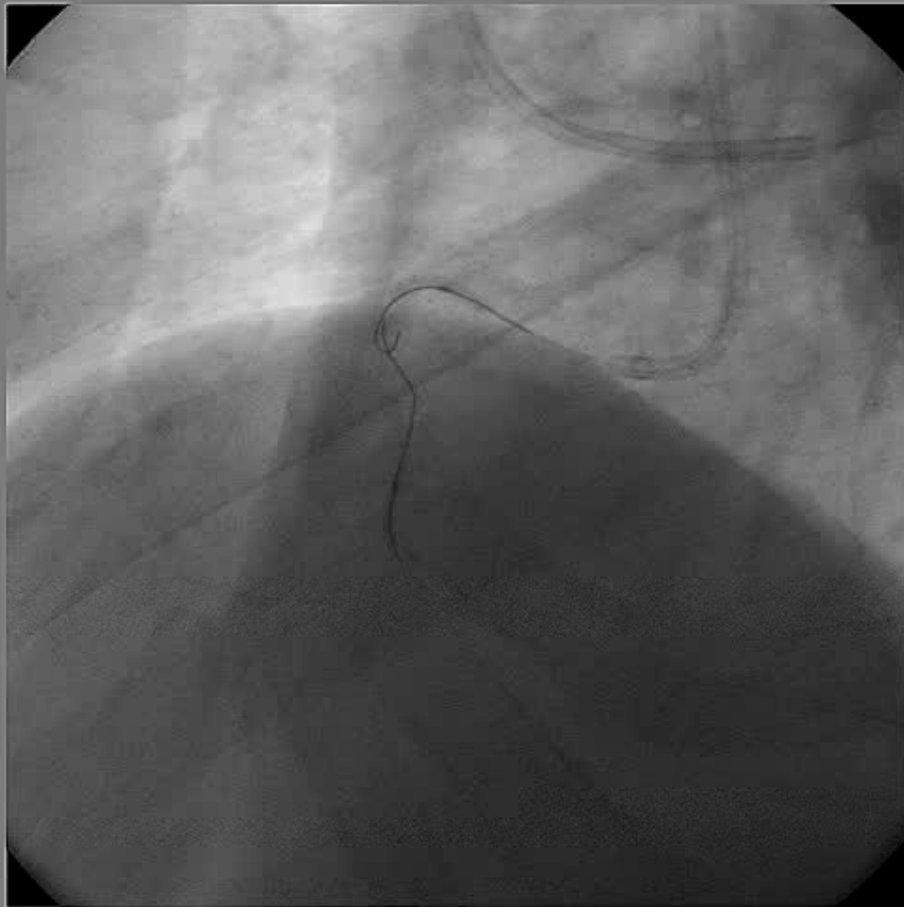
Toyohashi Heart Center



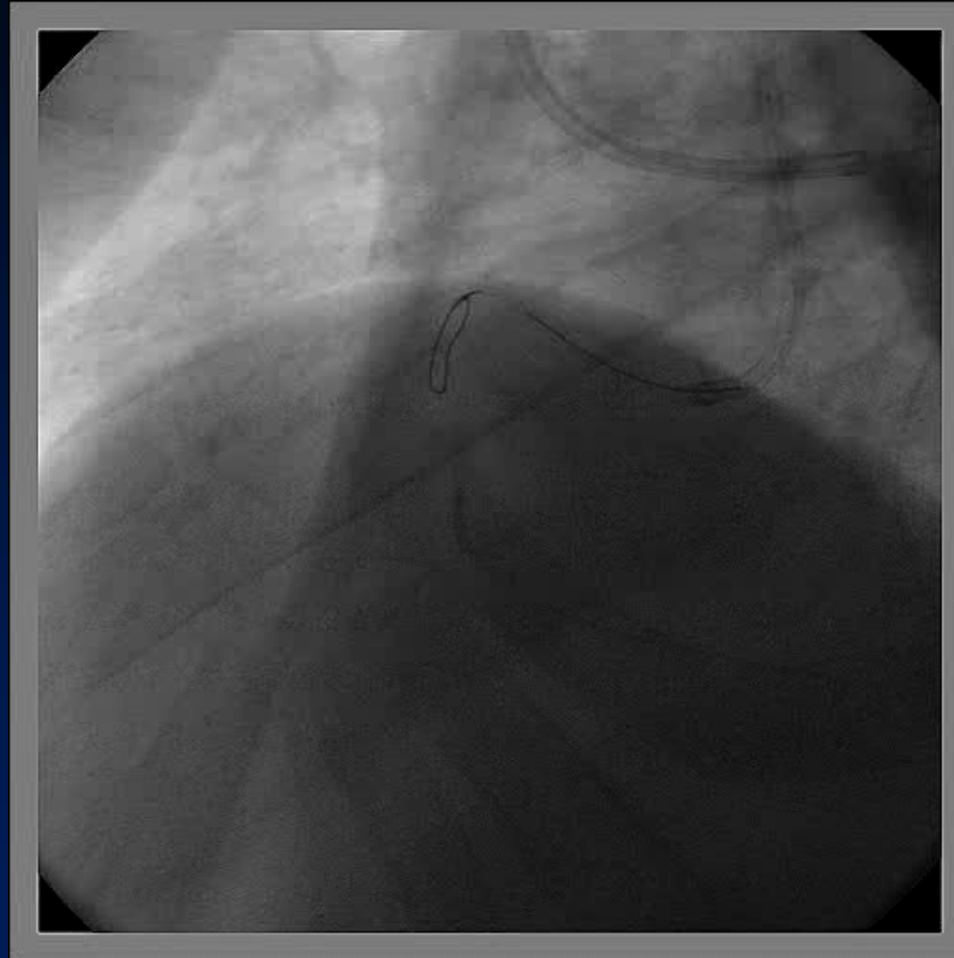
Antegrade 2.5mm ballooning with the knuckle wire technique

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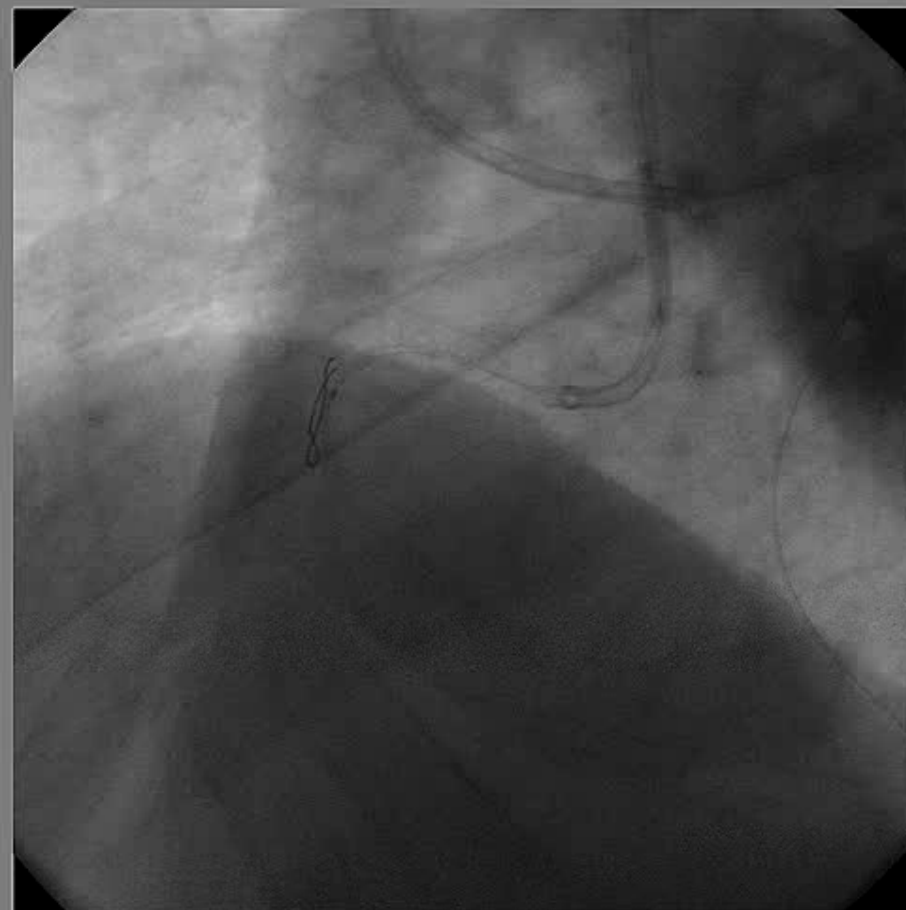
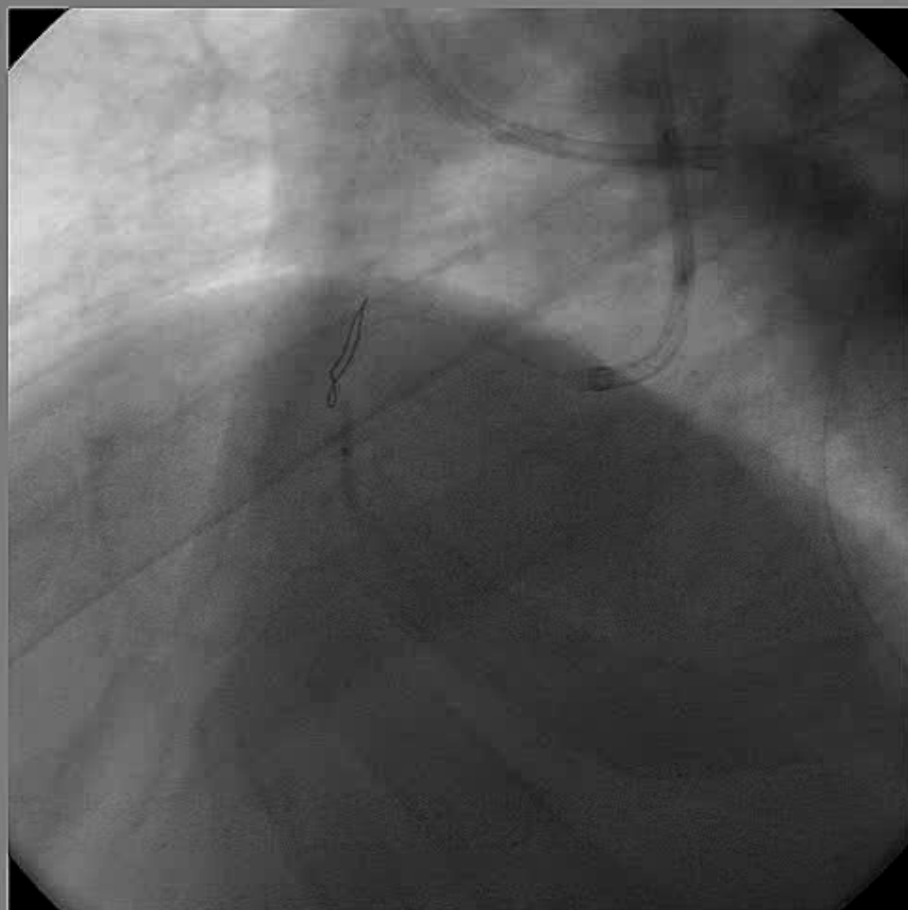
CTO



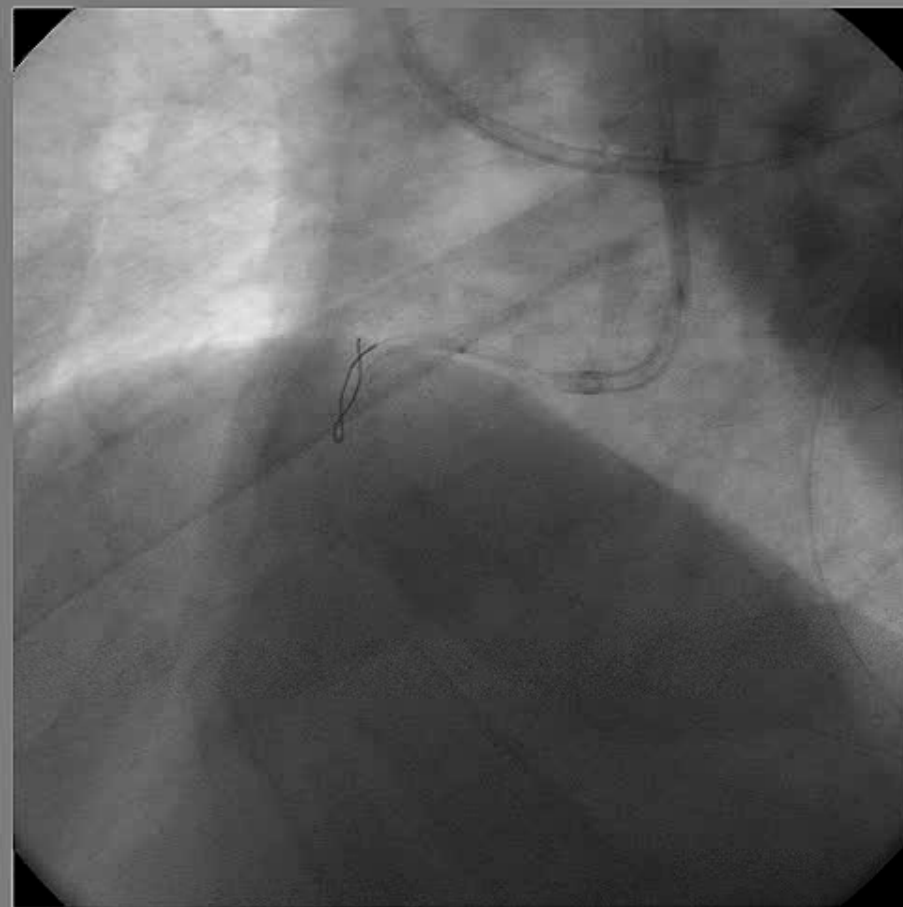
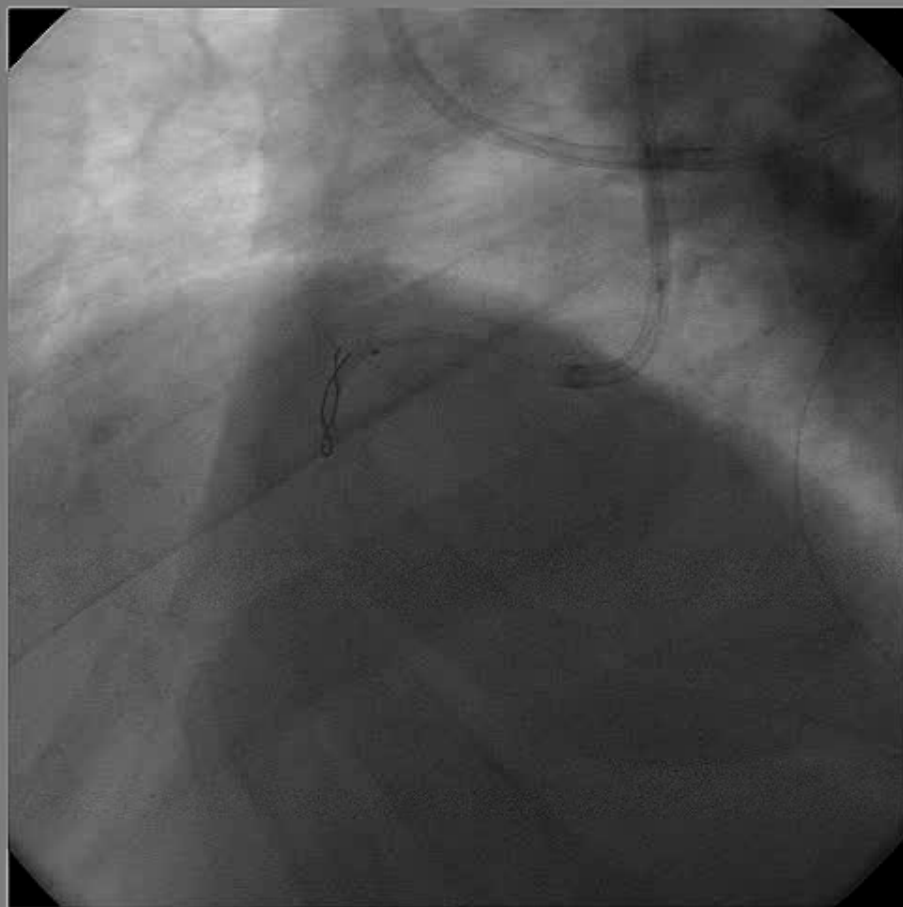
Antegrade 1.5mm ballooning beyond the shoulder



Successful retrograde wiring (Reverse CART)

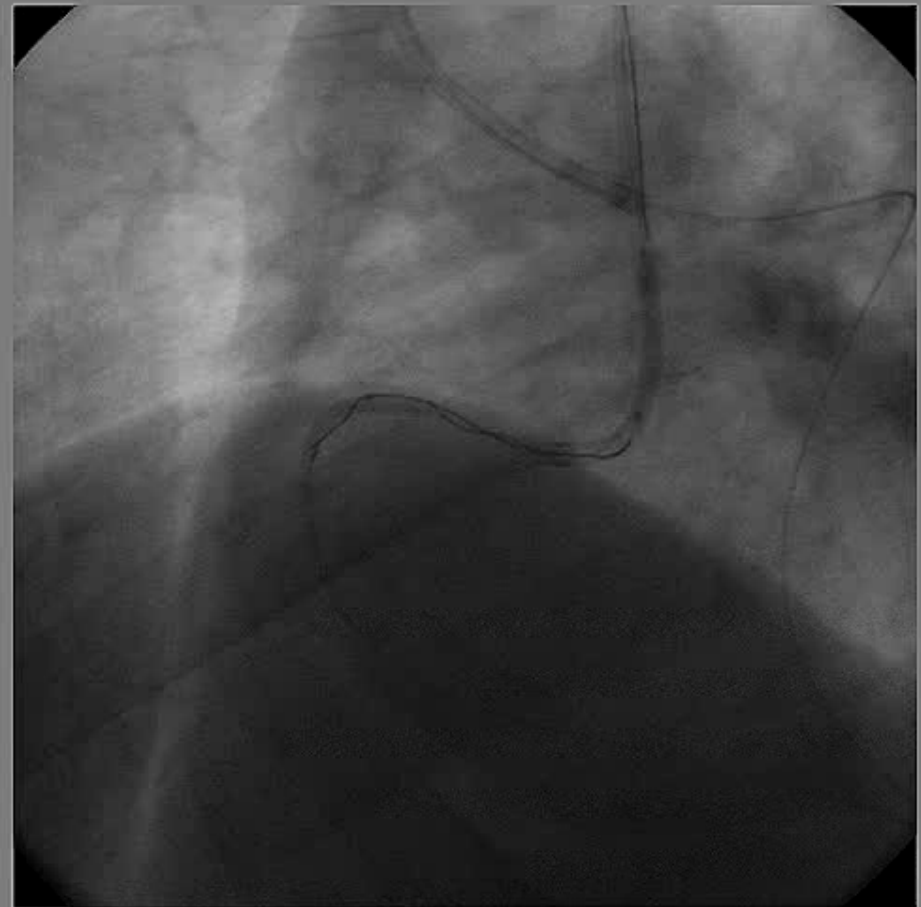
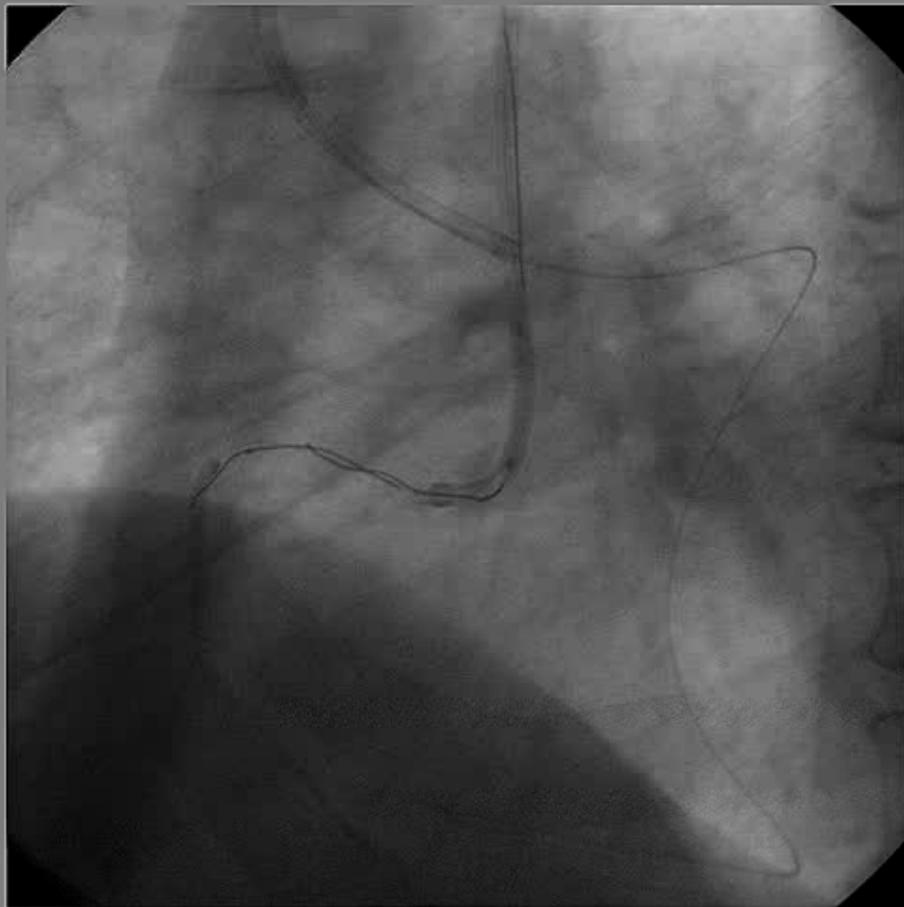


**Retrograde 1.5mm ballooning under trapping the
retrograde wire in the antegrade GC**



**Retrograde 1.5mm ballooning under trapping the
retrograde wire in the antegrade GC**

CTO

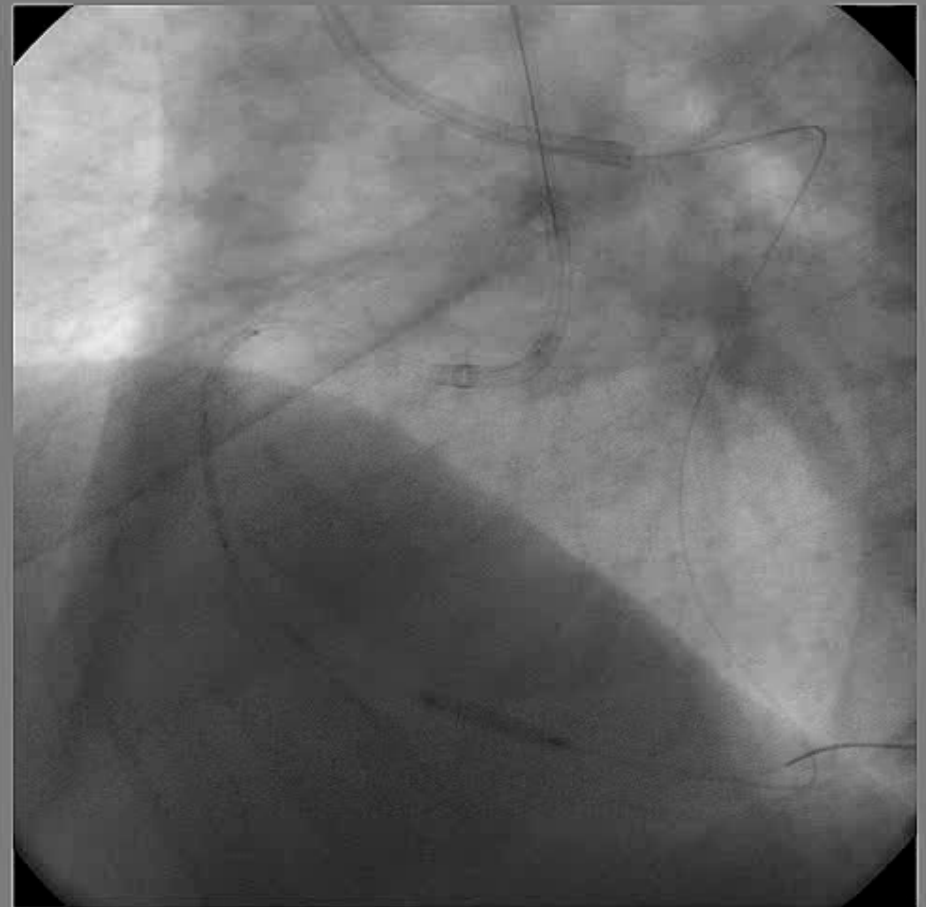
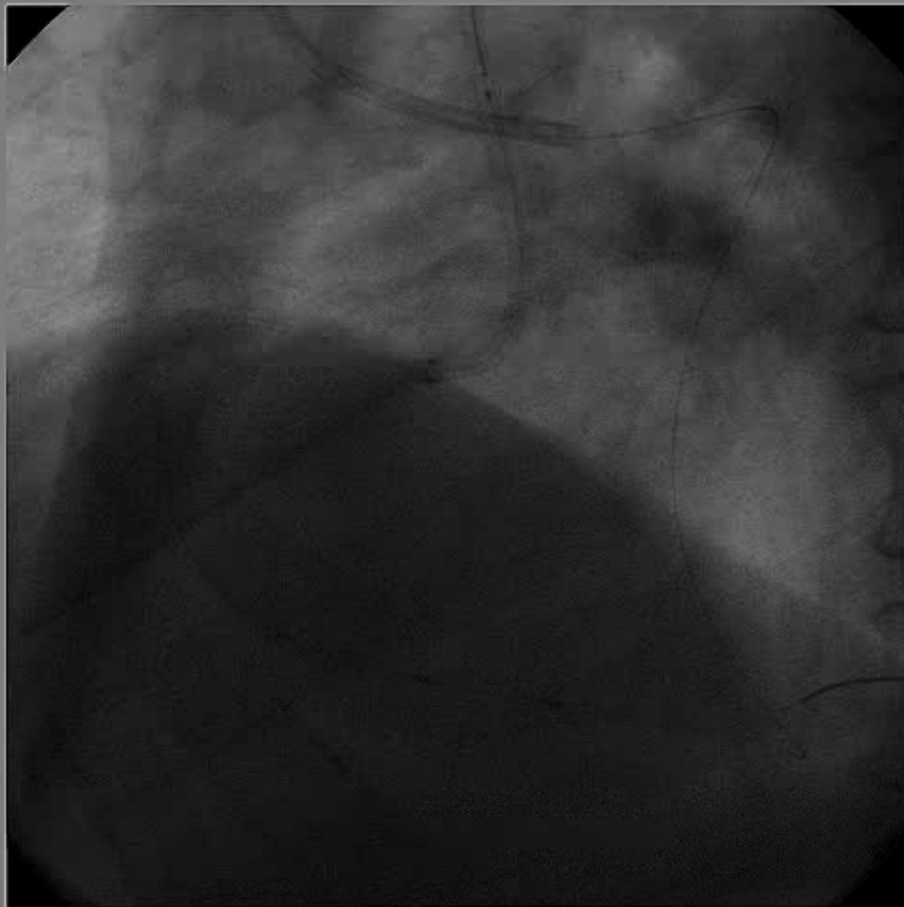


Retrograde 2.5mm ballooning
→ **Successful antegrade wire crossing**

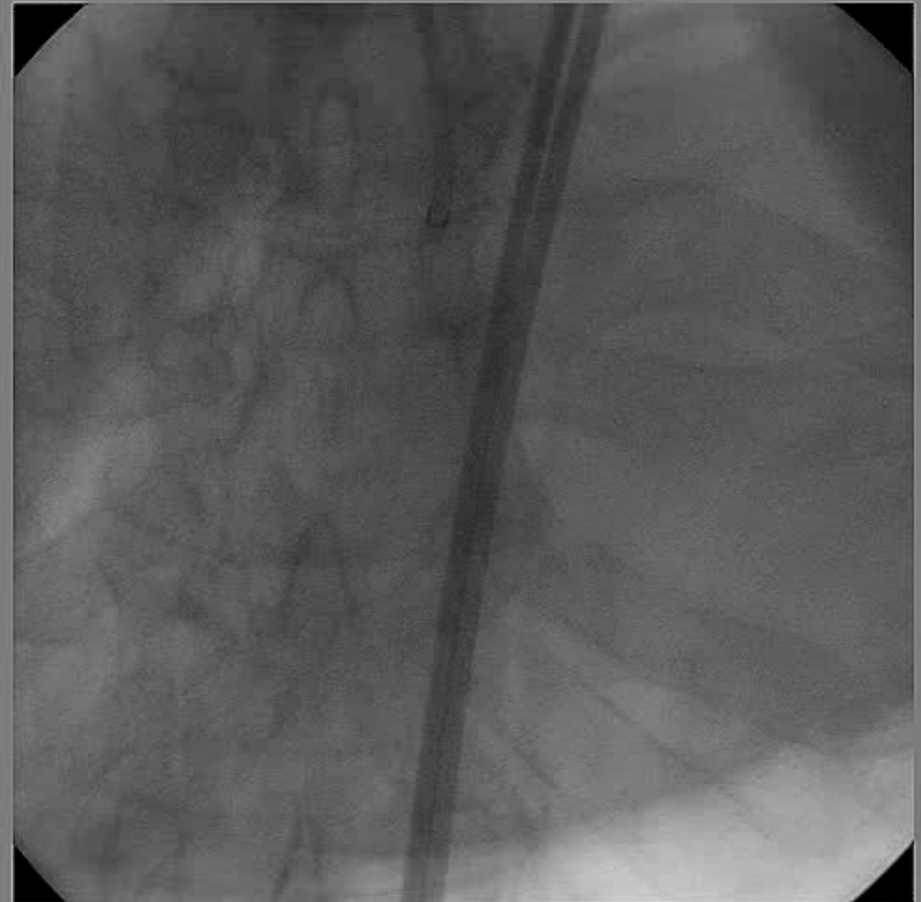
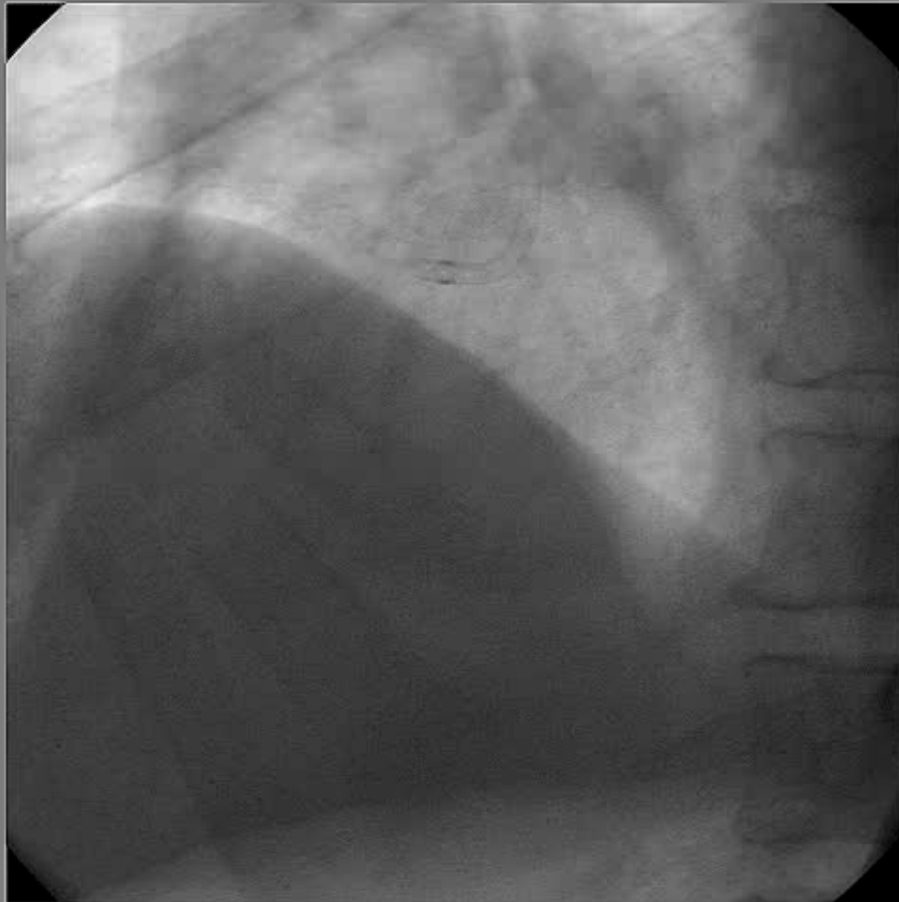


**2.5mm antegrade ballooning under trapping the
antegrade wire by retrograde balloon**

CTO



CTO





Tips and Tricks in This Case

- **MSCT** provides information about the occlusion morphology.
- **Reverse CART technique** should be considered when the standard CART technique can not be applied.
- **Tornus** works well to advance balloons into the CTO.
- **Knuckle wire technique** makes a crack inside the CTO.
- In bilateral approach, **trapping the wire** by using balloon in the other side provides the super extra back-up for balloon crossing.