

# Retorgrade approach

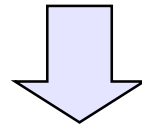
Current trend and Pitfalls

Toyohashi Heart Center

Maoto Habara, M.D.

# Registry Data 2017

Case enrollment : 504 CTO-PCIs

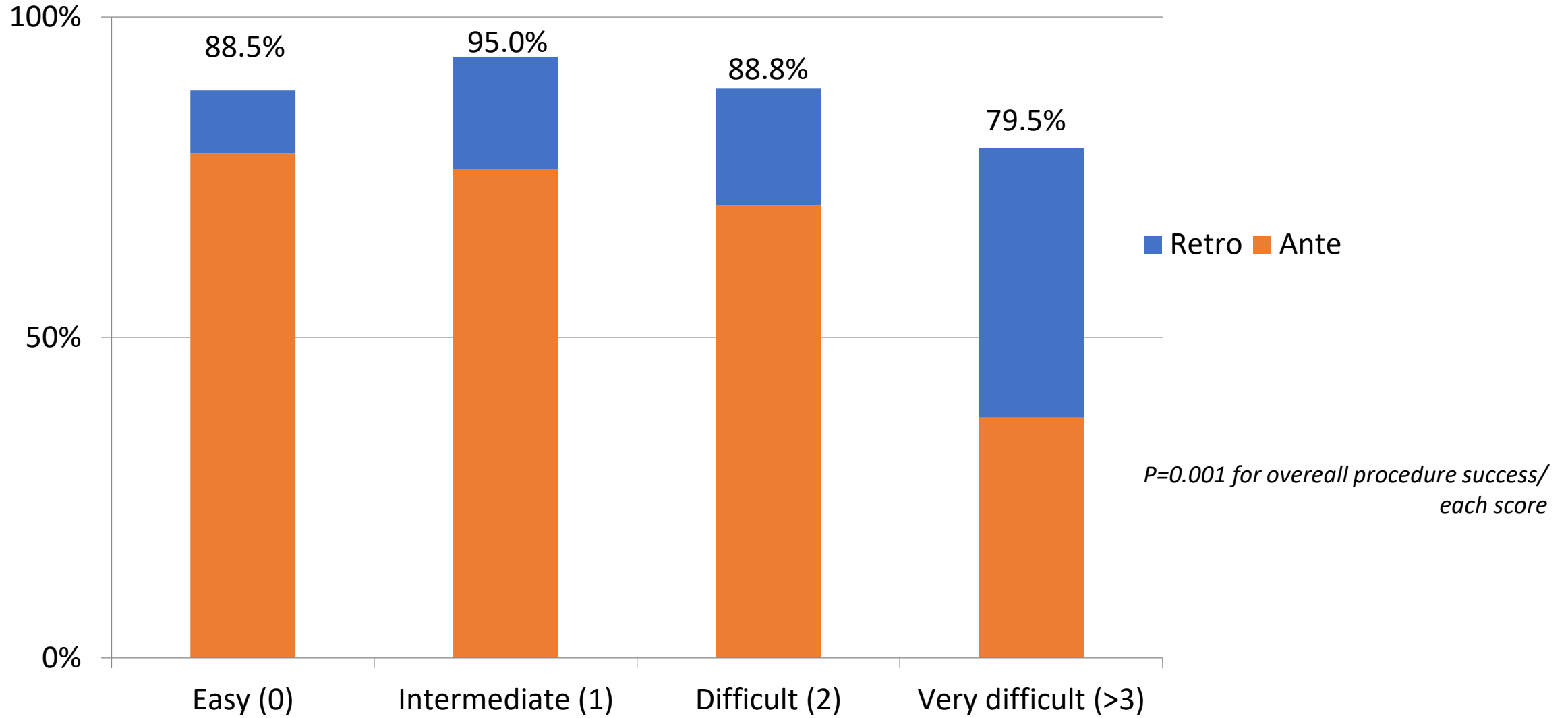


28 cases were excluded due to insufficient case card information

Final subject for analysis:  
476 CTO-PCIs

	Retrograde Summit Registry		Retrograde Summit General Registry			2017
	2012	2013	2014	2015	2016	
Participating centers	44	57	46	40	30	27
CTO-PCIs	1,553	1,676	1,045	737	465	476
- Retro	490 (32%)	538 (32%)	281 (27%)	218 (30%)	138 (30%)	137 (29%)

# Procedure success by J-CTO



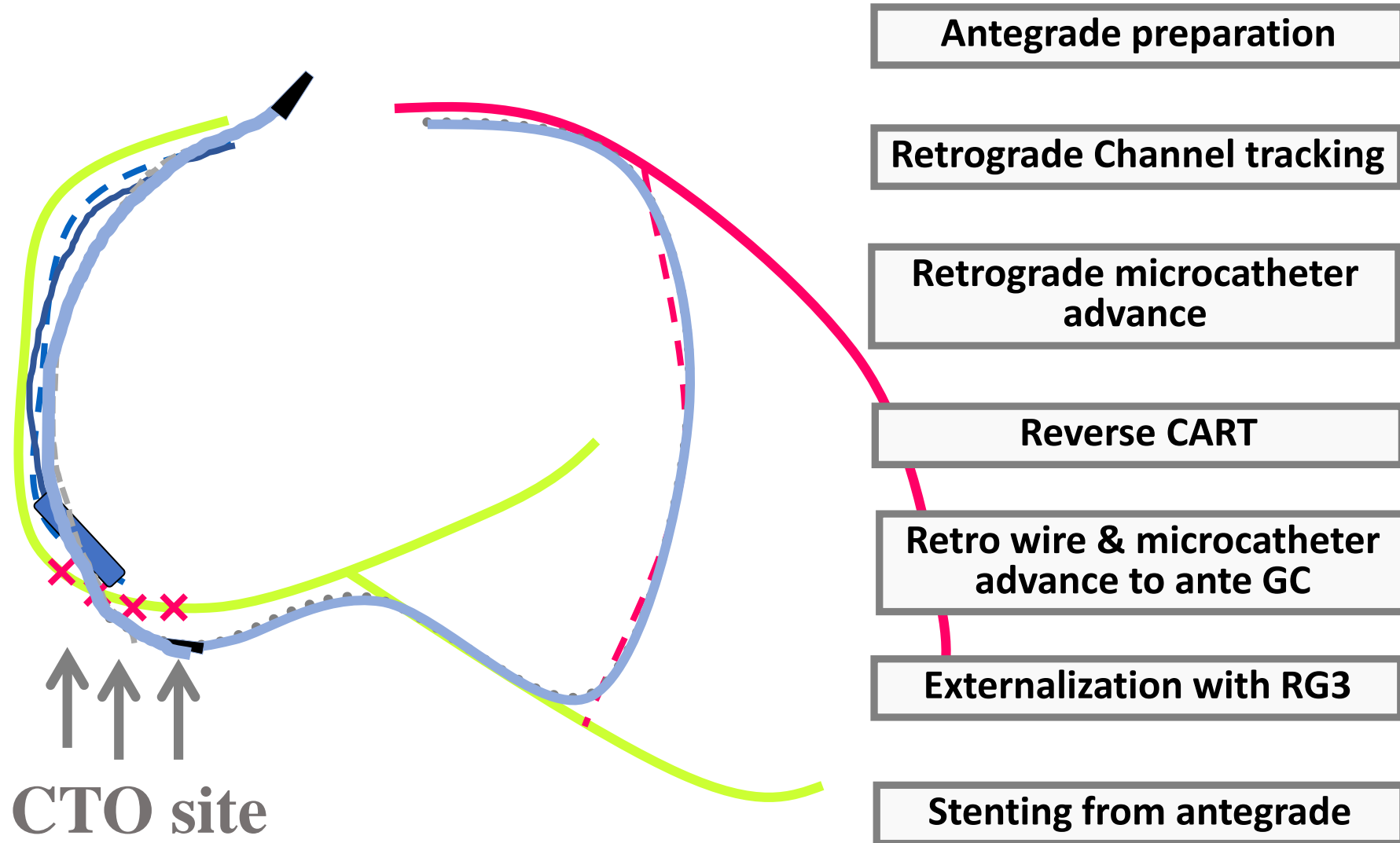
# Reverse CART has become the dominant retrograde crossing strategy

**Table 1. Retrograde approach in recently published CTO PCI series from Europe, the USA and Japan.**

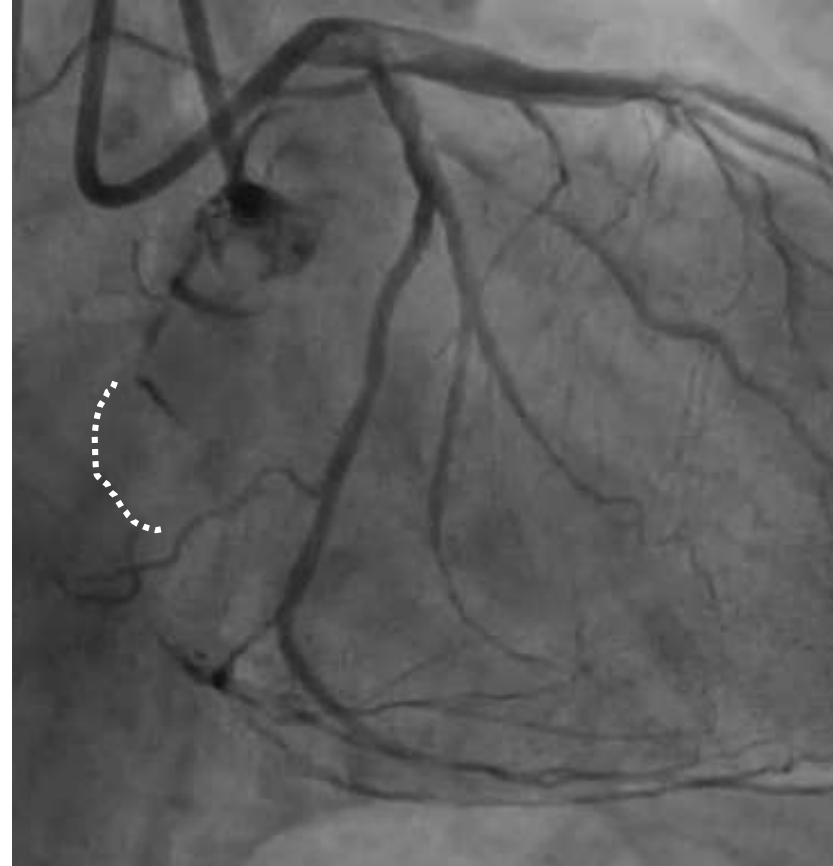
Country/region	Europe			USA			Japan		
Year	2011	2015	2016	2012	2016	2017	2013	2013	2017
Study	Galassi et al <sup>13,22</sup>		Maeremans et al <sup>24</sup>	Karpaliotis et al <sup>19,23</sup>		Sapontis et al <sup>25</sup>	Tsuchikane et al <sup>21</sup>	Yamane et al <sup>20</sup>	Suzuki et al <sup>26</sup>
Retrograde CTO PCI, n (%)	234 (12)	1,582 (16)	207 (17)	462 (34)	539 (41)	NA	801 (27)	378 (25)	1,206 (46)
Overall technical success in retrograde PCI, %	65	75	75	81	85	NA	85	84	84
Distribution of retrograde wire crossing strategies									
Reverse CART, %	–	16.0	67	46	62	70	55.2	42.1	62.4
CART, %	31.8	13.9	3	11.5	2.7	–	6.4	12.0	0.7
Retrograde wire crossing, %	37.2	31.2	28	NA	19	30	22.9	23.3	16.3
Kissing wire, %	22.3	22.0	NA	NA	3.3	–	15.5	22.6	17.7
CART: controlled antegrade and retrograde tracking technique; CTO: chronic total occlusion; NA: not assessed; PCI: percutaneous coronary intervention									

Matsuno S, Tsuchikane E, et al. EuroIntervention. 2018;14:94-101.

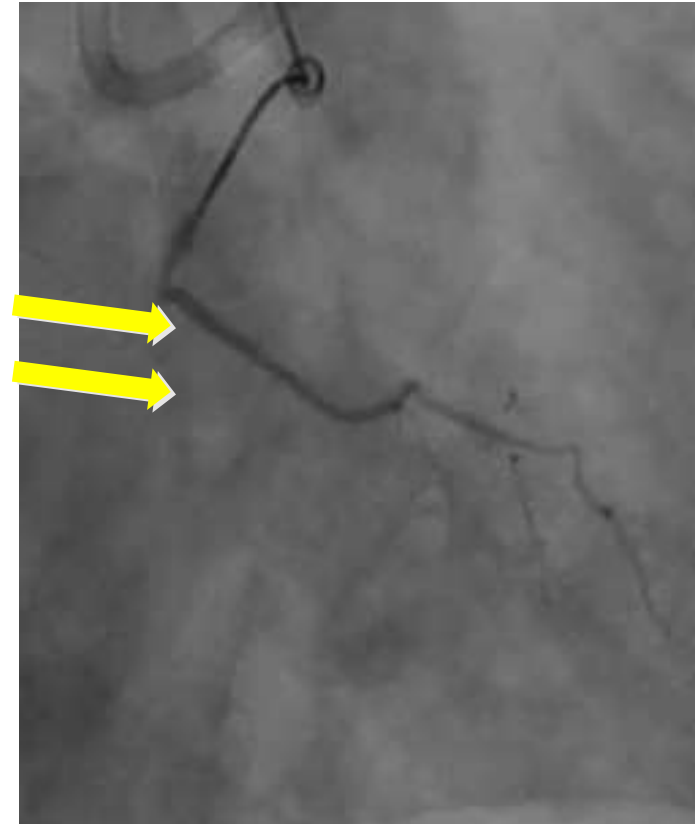
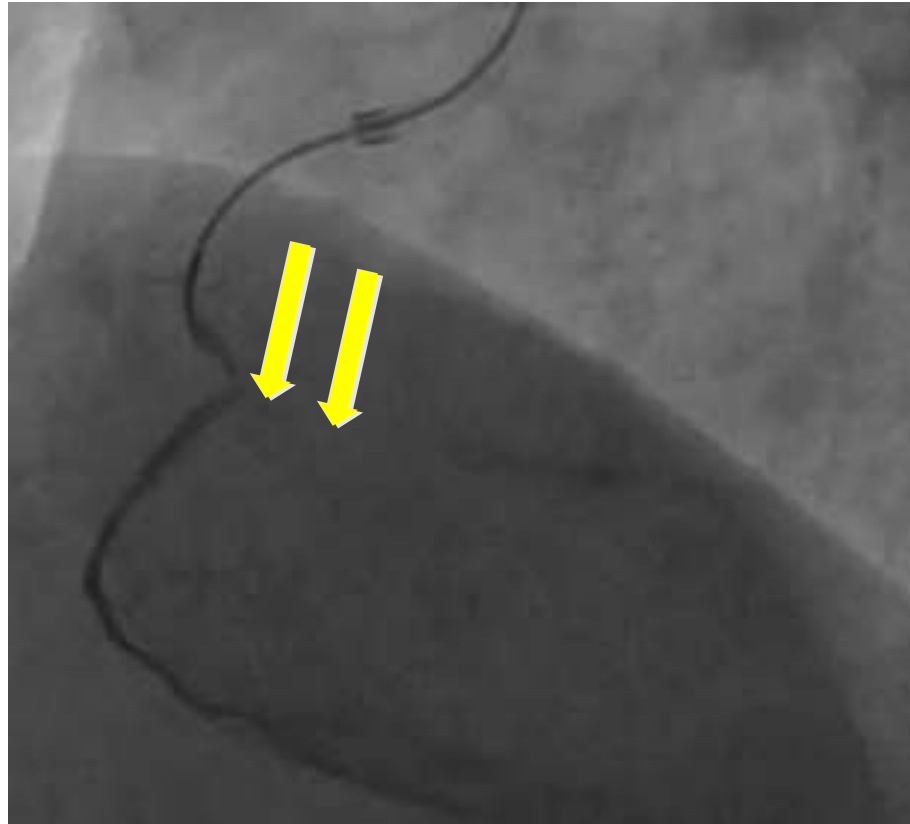
# Usual strategy in retrograde PCI

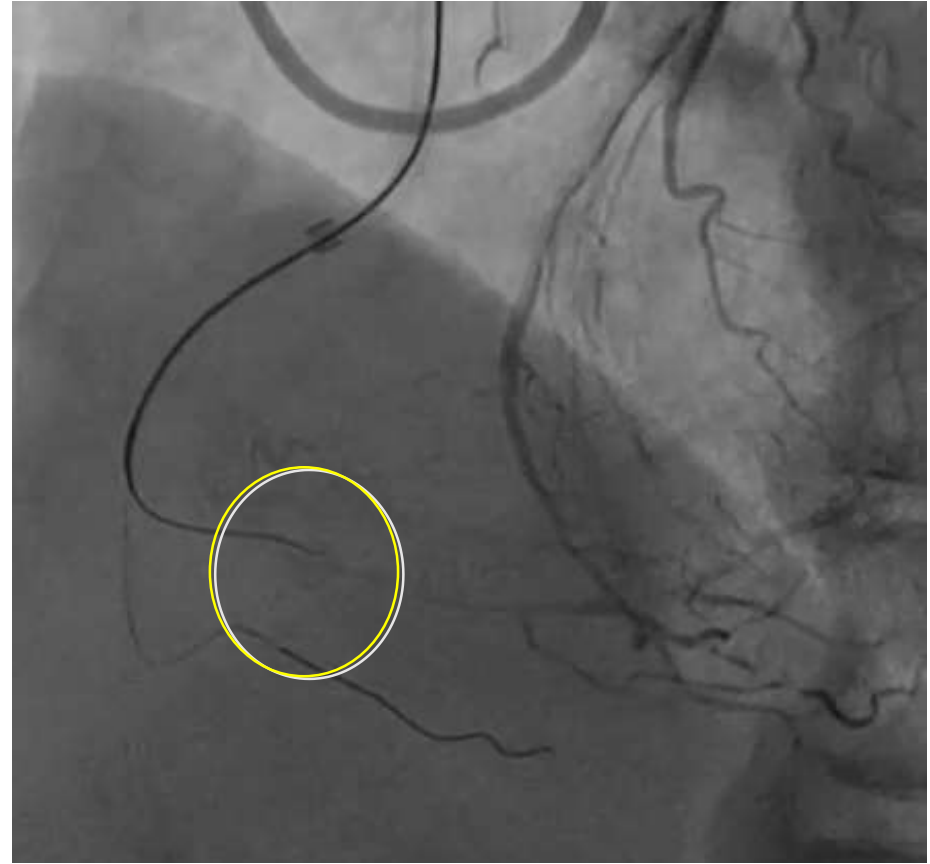
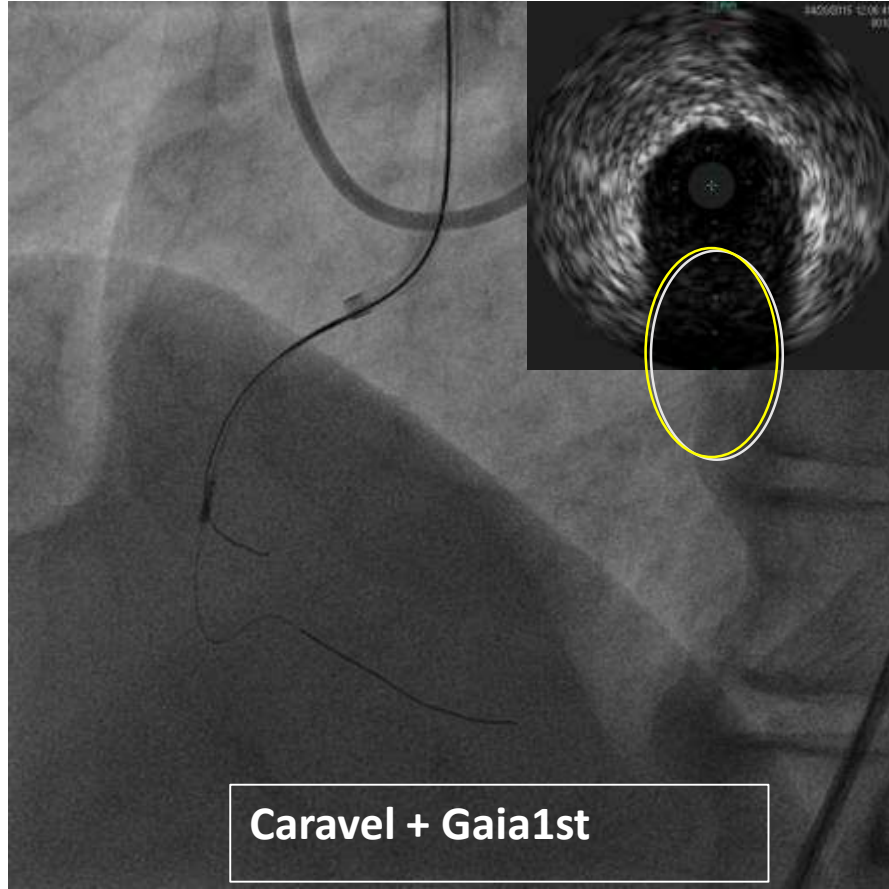


# Case: RCA-CTO



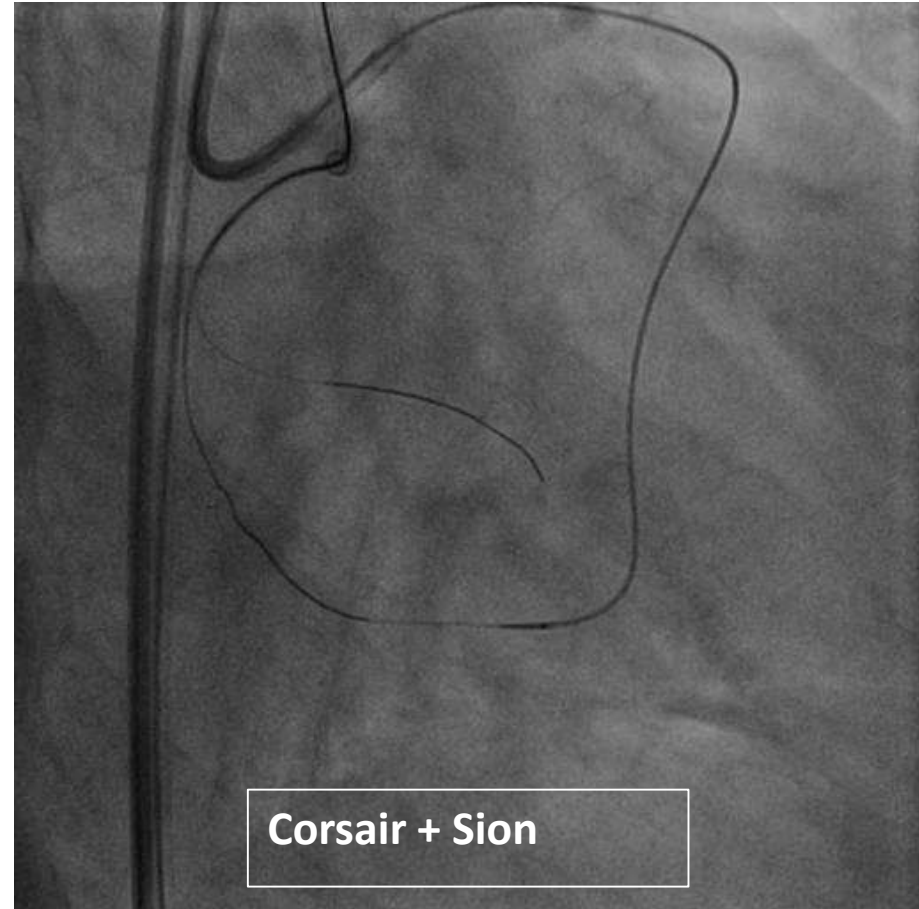
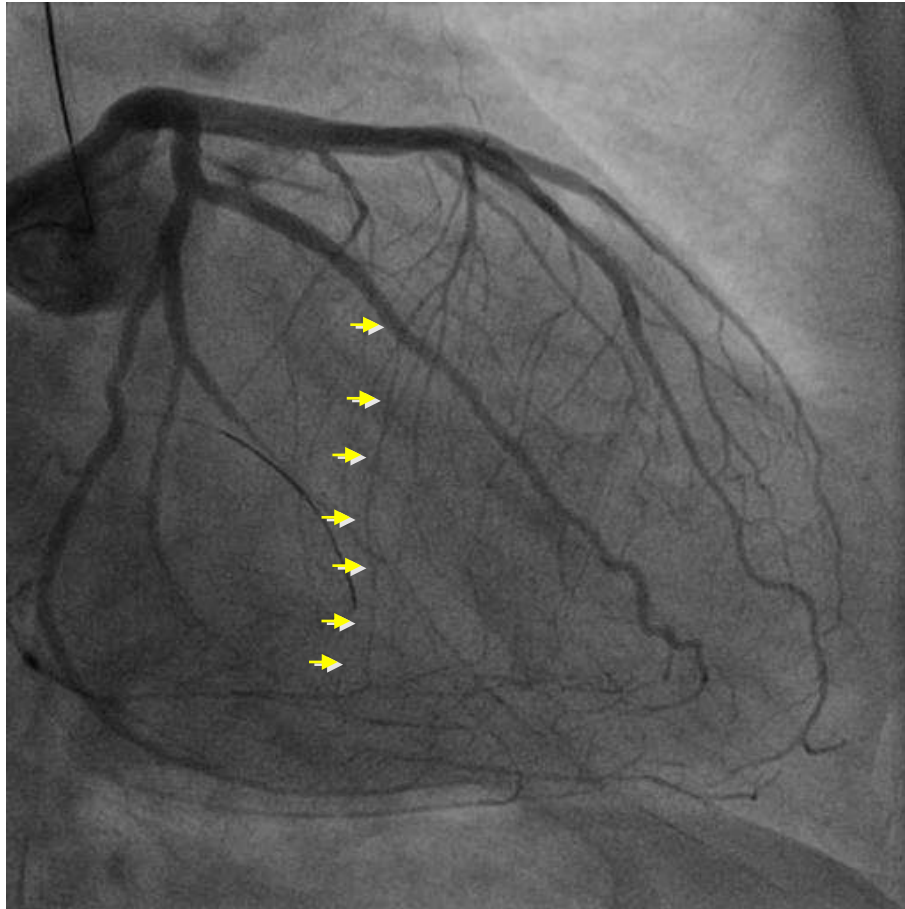
# Tip injection

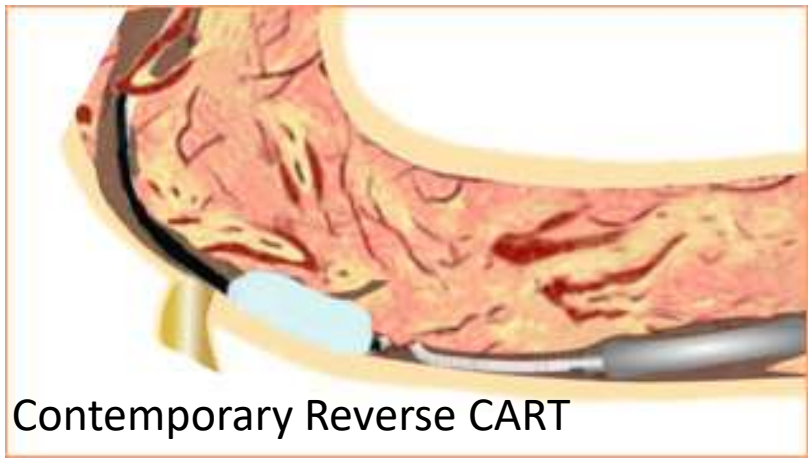




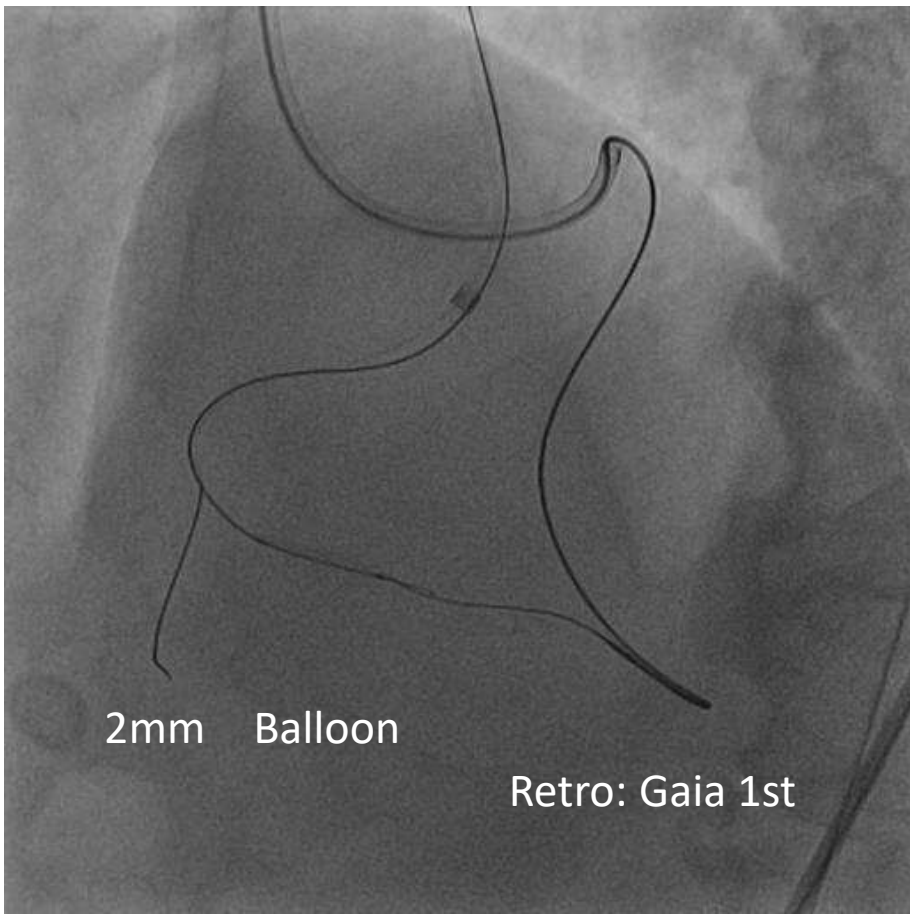


# Retrograde approach



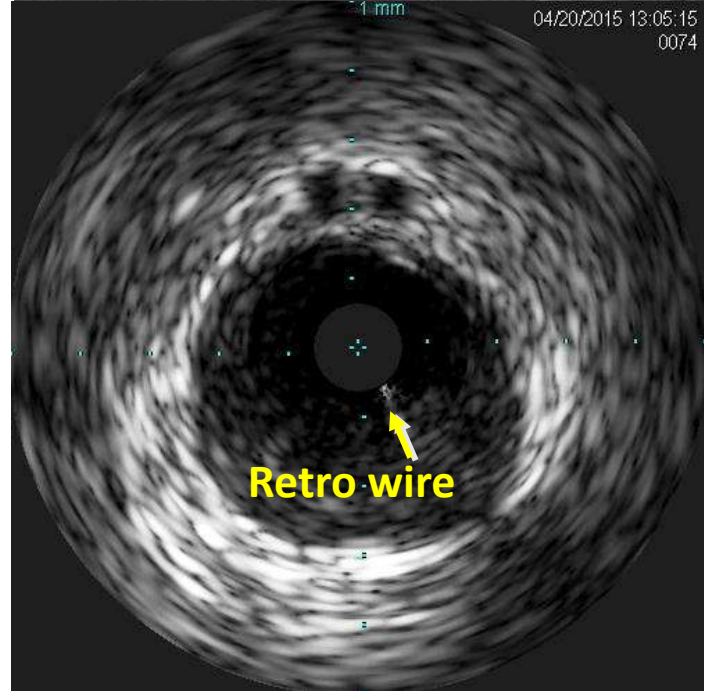
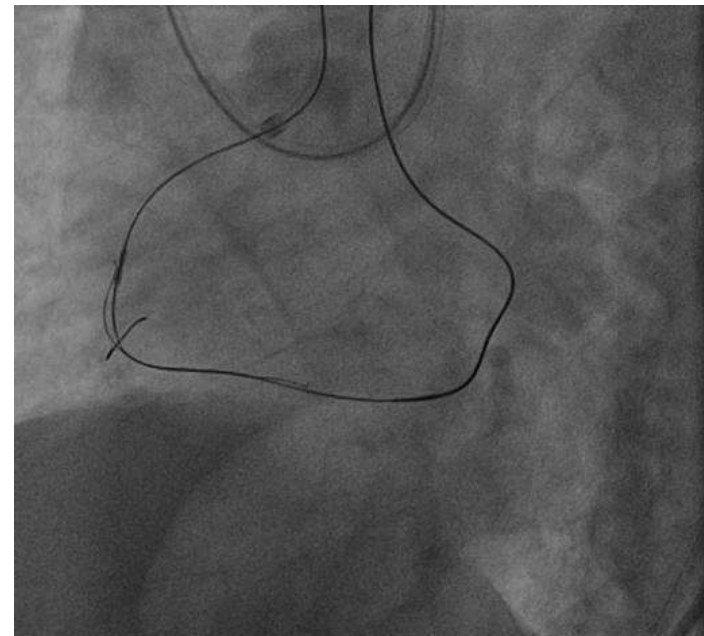


Contemporary Reverse CART



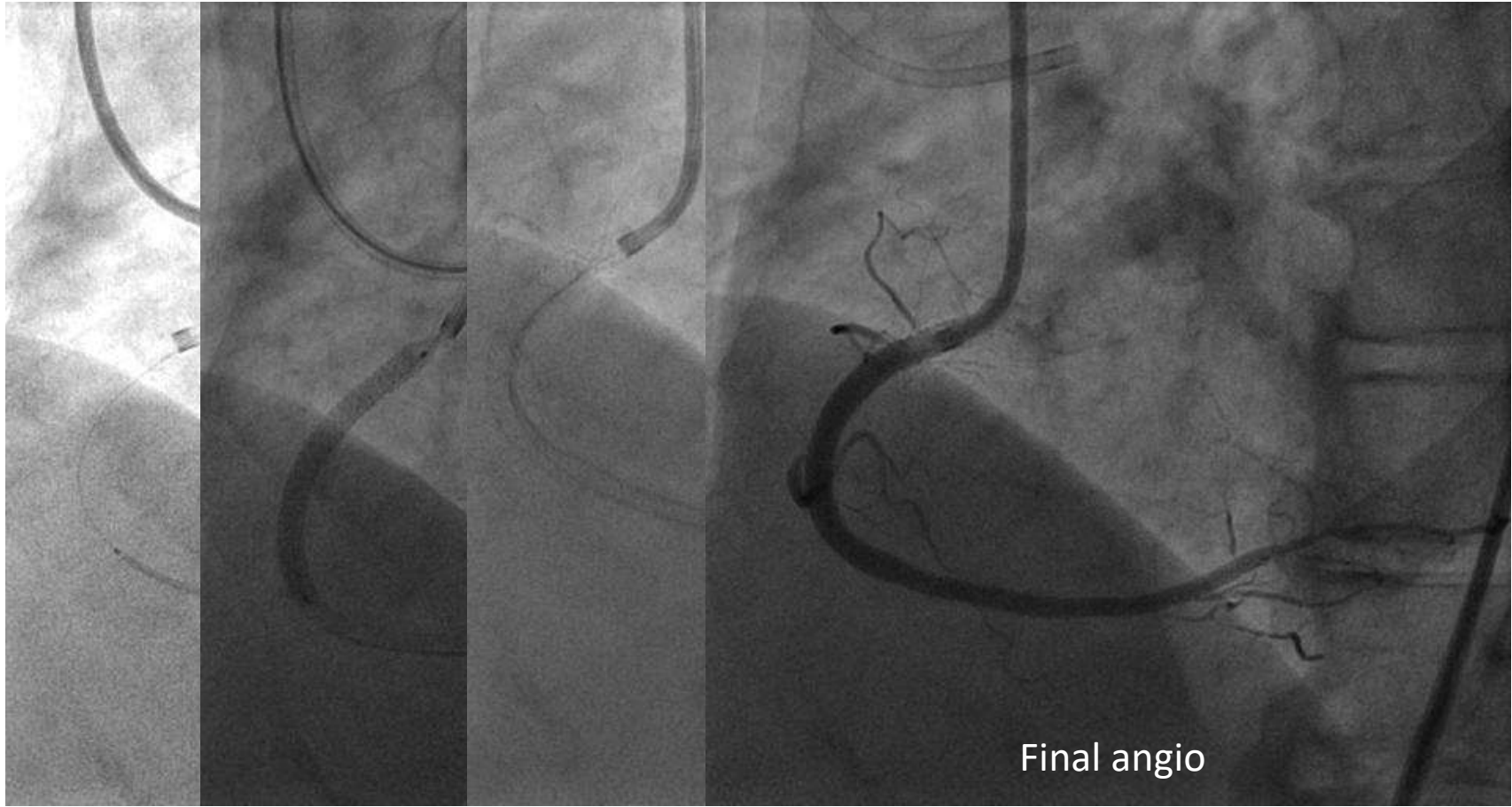
2mm Balloon

Retro: Gaia 1st



Retro wire

04/20/2015 13:05:15  
0074



Final angio

# Basics of Retrograde approach

- 1. Preparation for Retrograde approach**
- 2. Tip and tricks of channel & wire selection**
- 3. Wire crossing**

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# Preparation for Retrograde approach

1. **> 7Fr system for retrograde approach**
2. **Microcatheter ( Corsair or Caravel)**
3. **Guide wire to select channel (SION, Suoh03, or XT-R etc)**
4. **IVUS (Terumo WR, or Eagle-eye are recommended)**
5. **330cm guide wire (RG3) for externalization**
6. **ACT monitoring and flush guiding catheter**

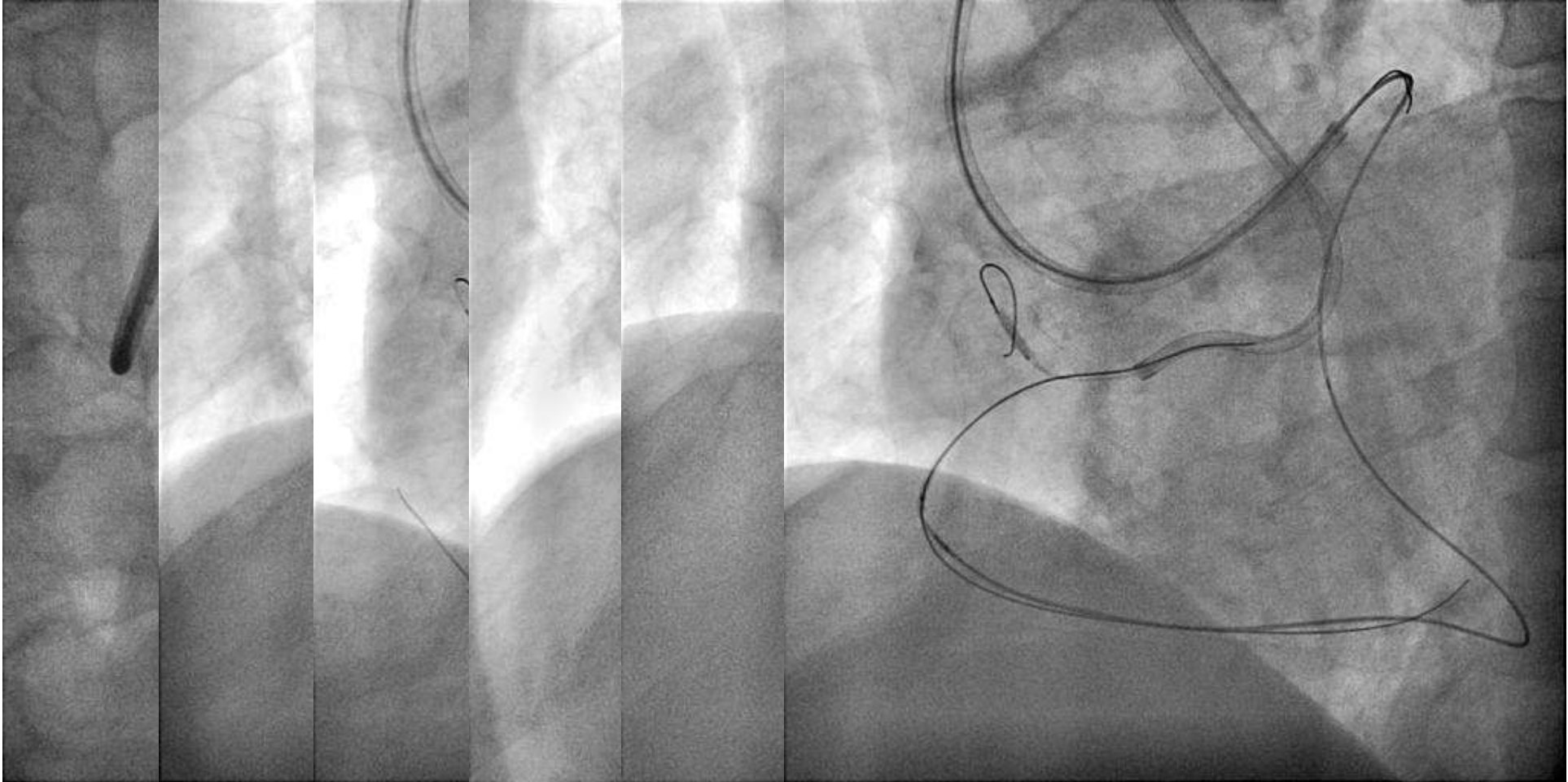
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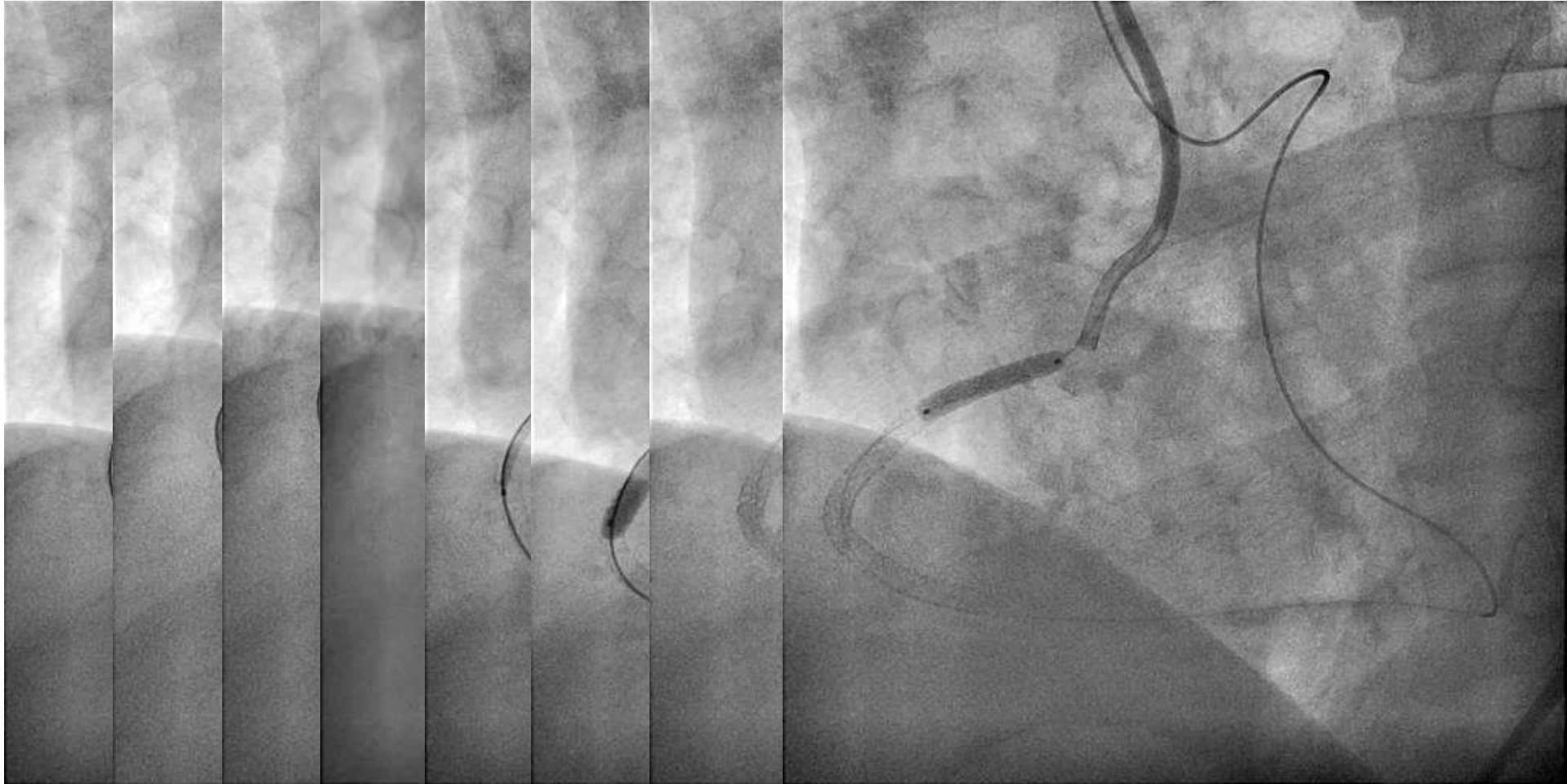
# Case: RCA-CTO



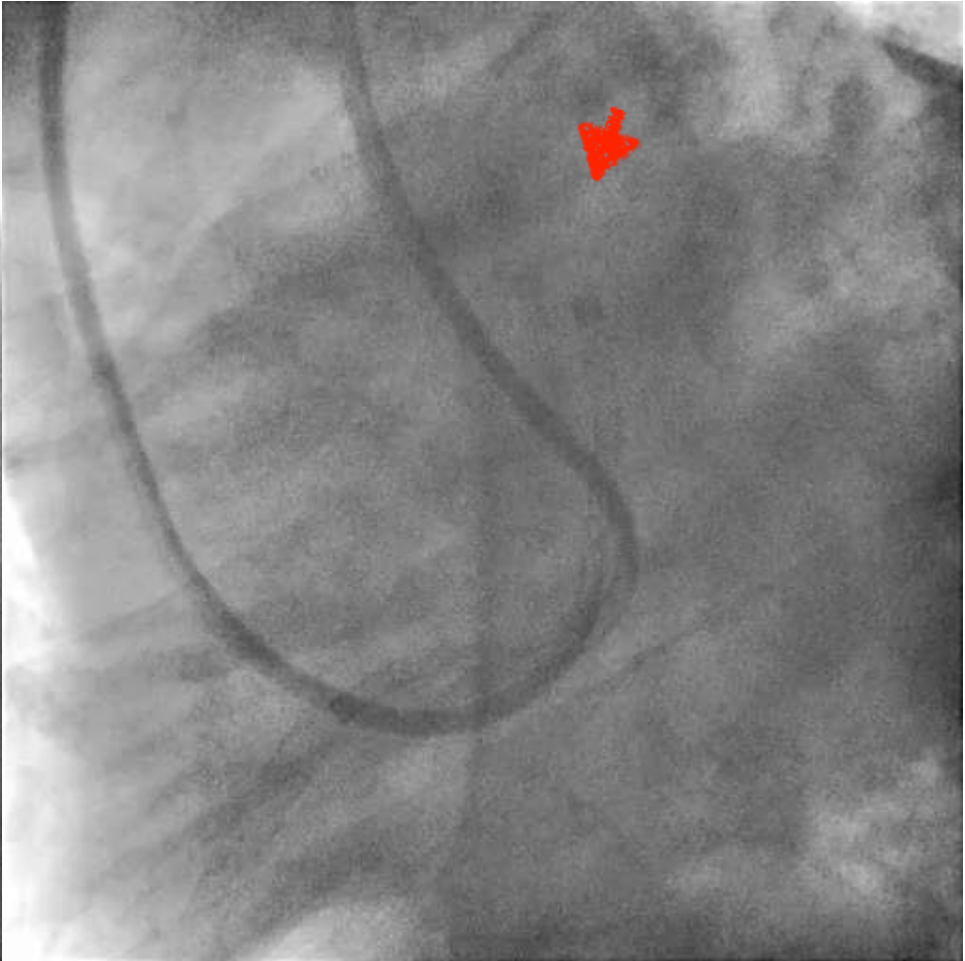
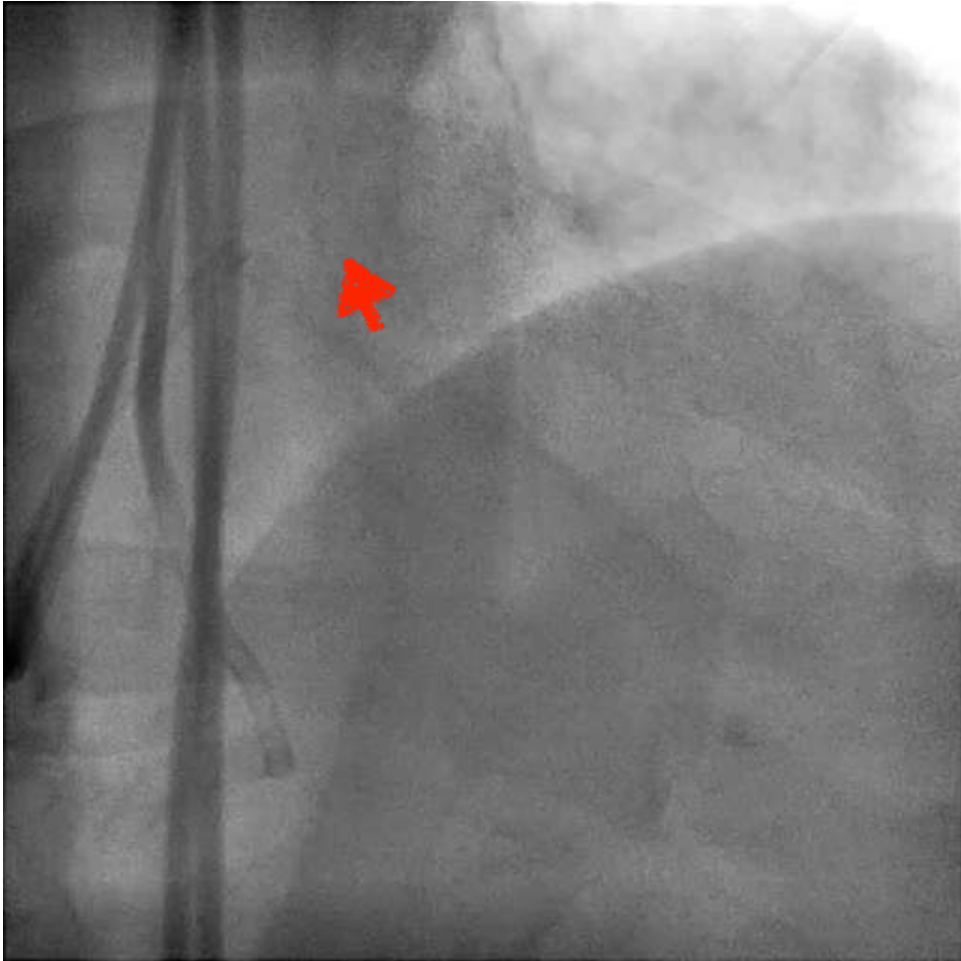




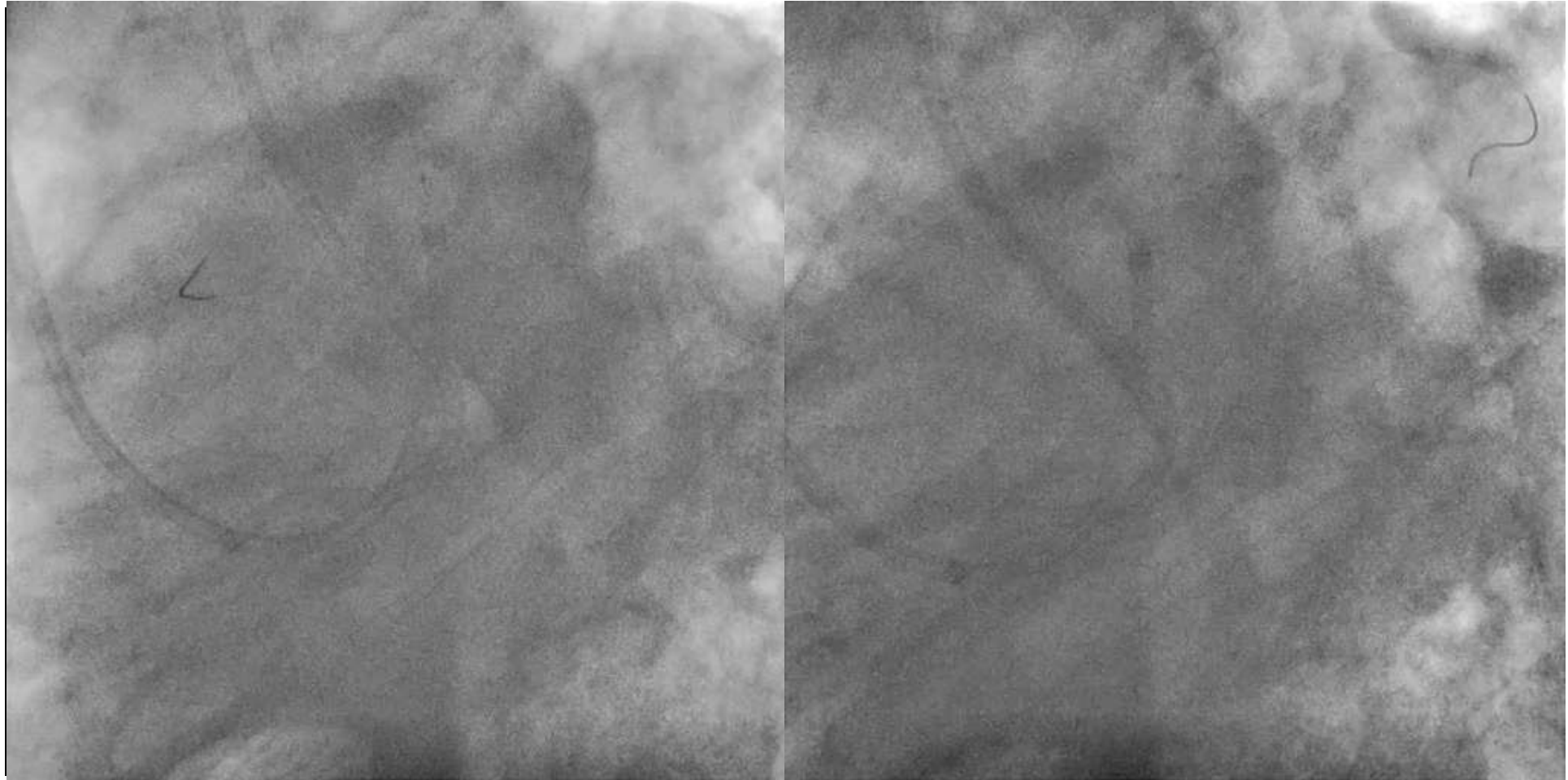
# POBA & Stenting



Final?



# Thrombus

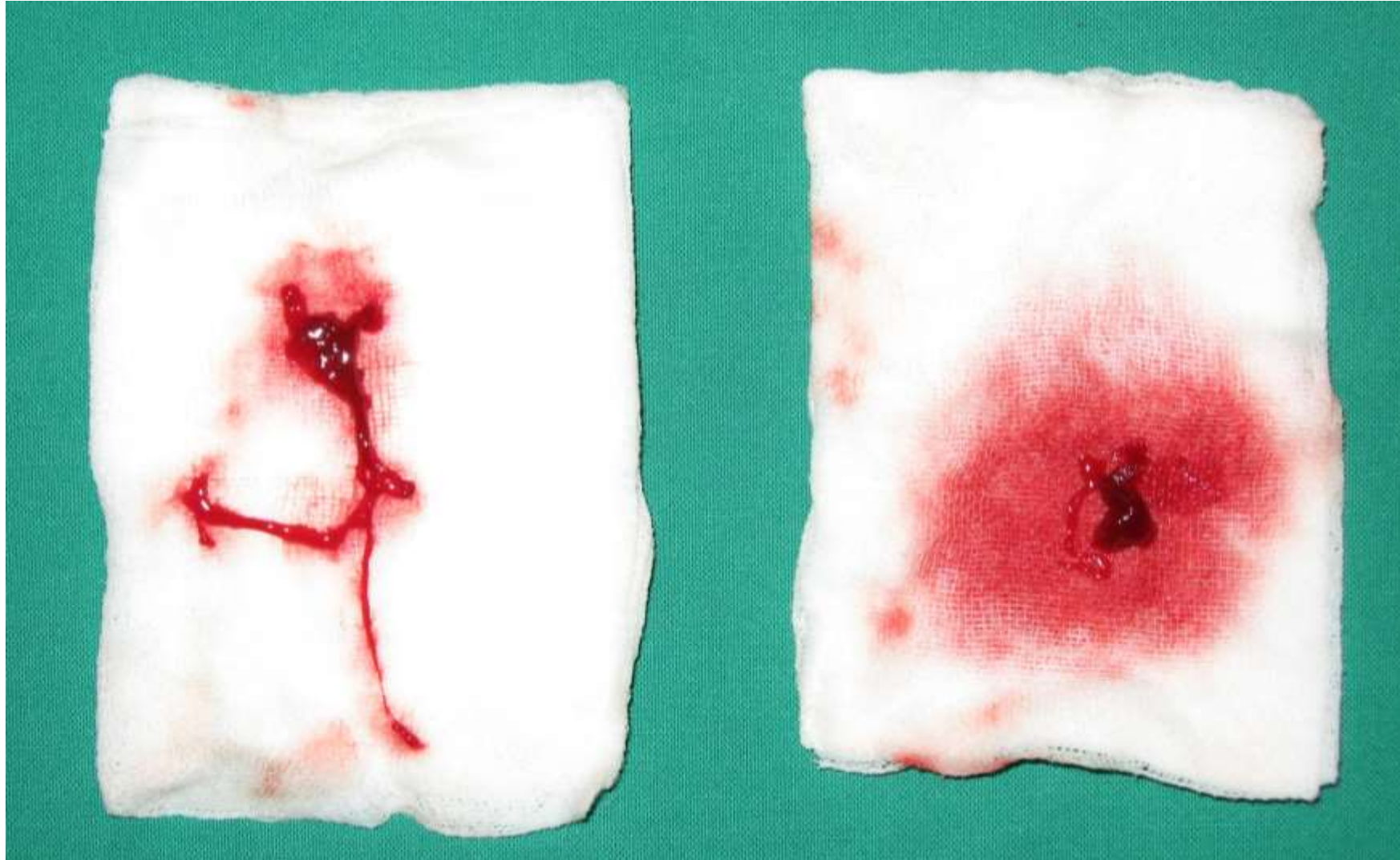


# Post Aspiration (Final)



# Complication in Retrograde approach

**Thrombus retrieved from GC**



# How to prevent complication (GC thrombus) of CTO PCI

- 1. ACT should be kept >300sec**
- 2. ACT should be checked every 30 minutes.**
- 3. Flush saline every 10 minutes for retro GC.**
- 4. Single GC strategy is not recommended.**

# Basics of Retrograde approach

1. Preparation for Retrograde approach
2. Tip and tricks of channel & wire selection
3. Wire crossing



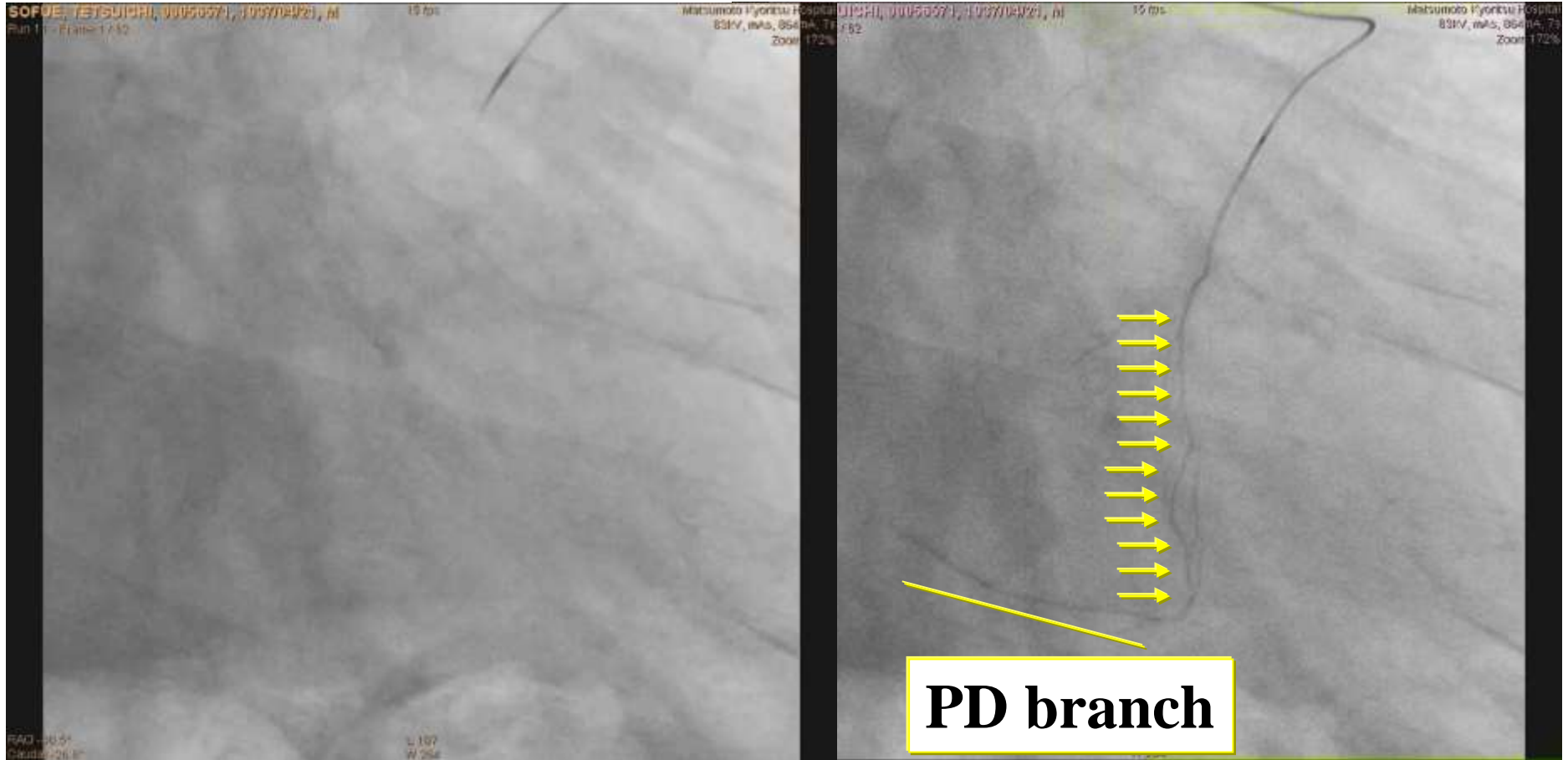
# Angiographic view is very important



**RAO CRA**

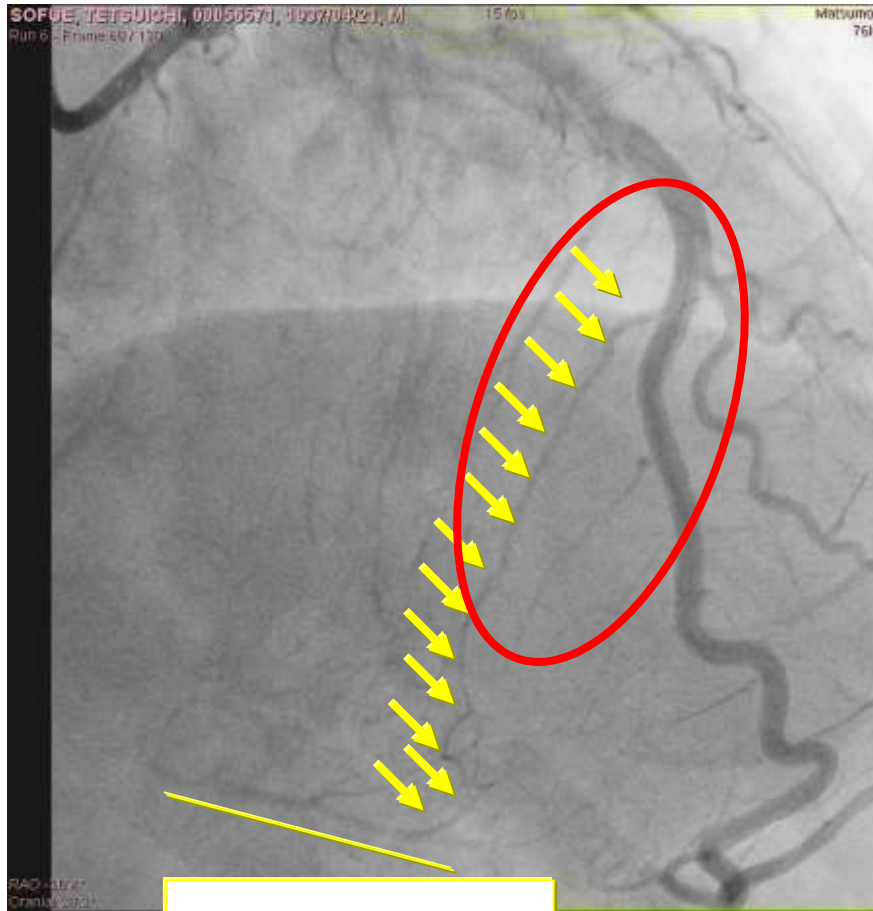
**PD branch**

# Angiographic view is very important

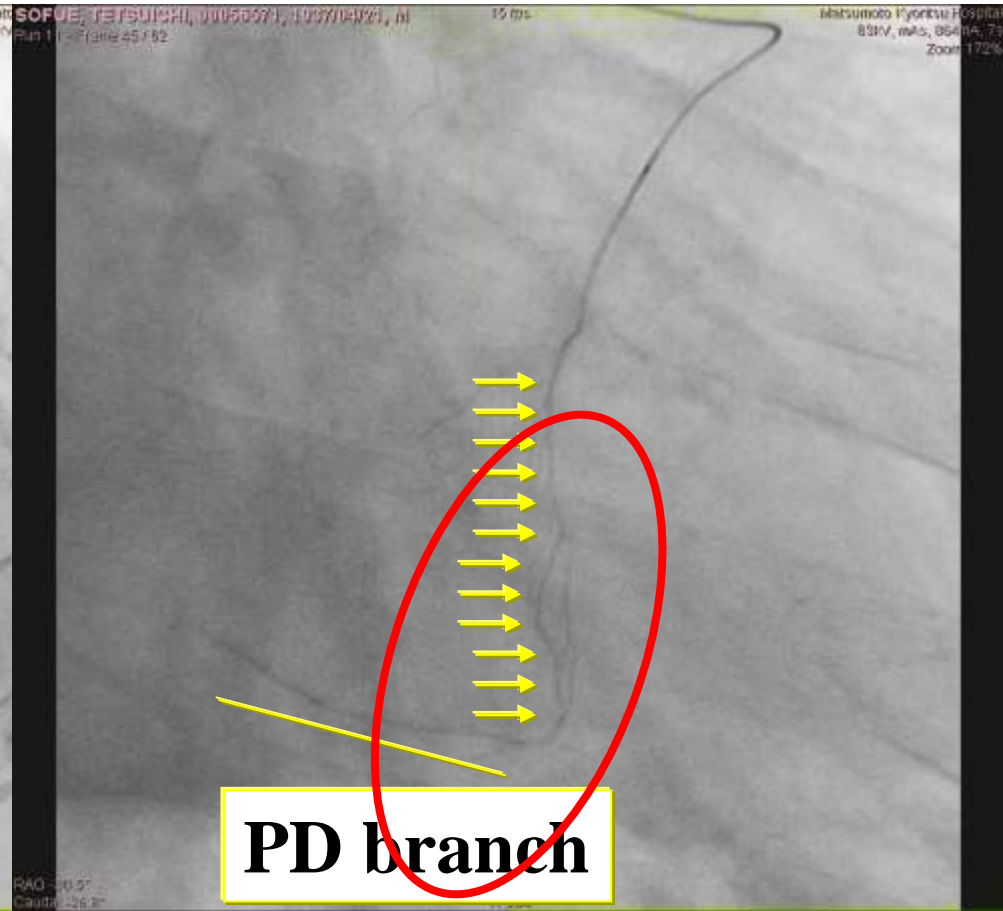


**RAO CAU**

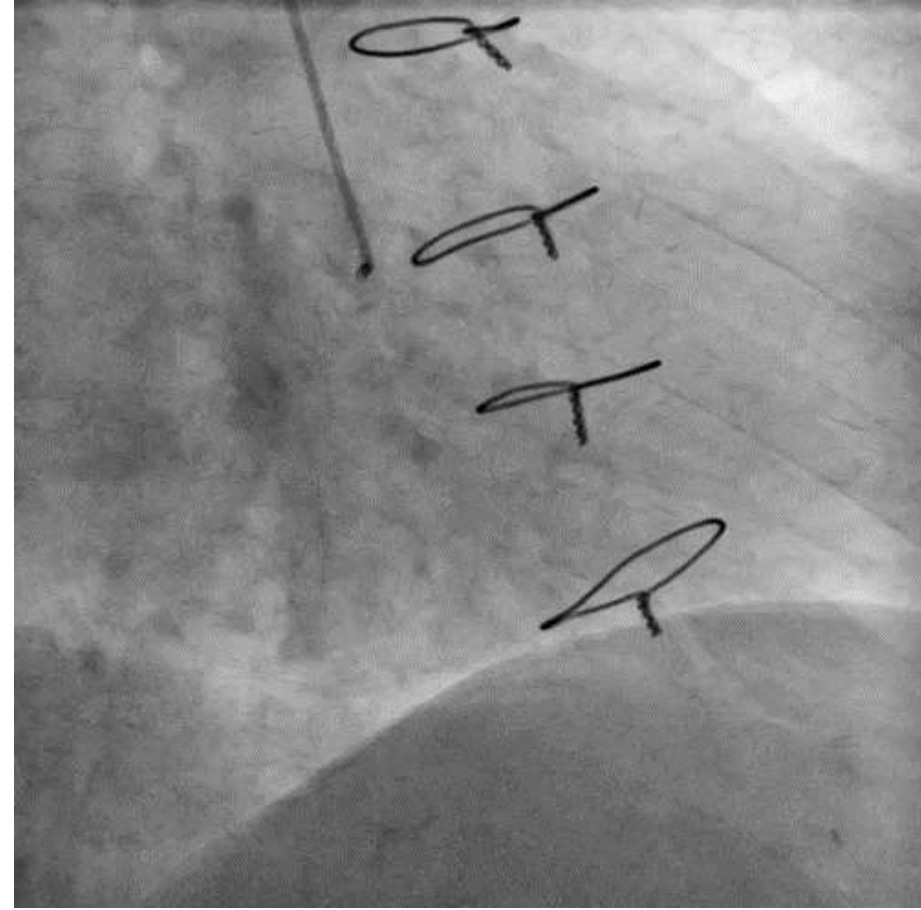
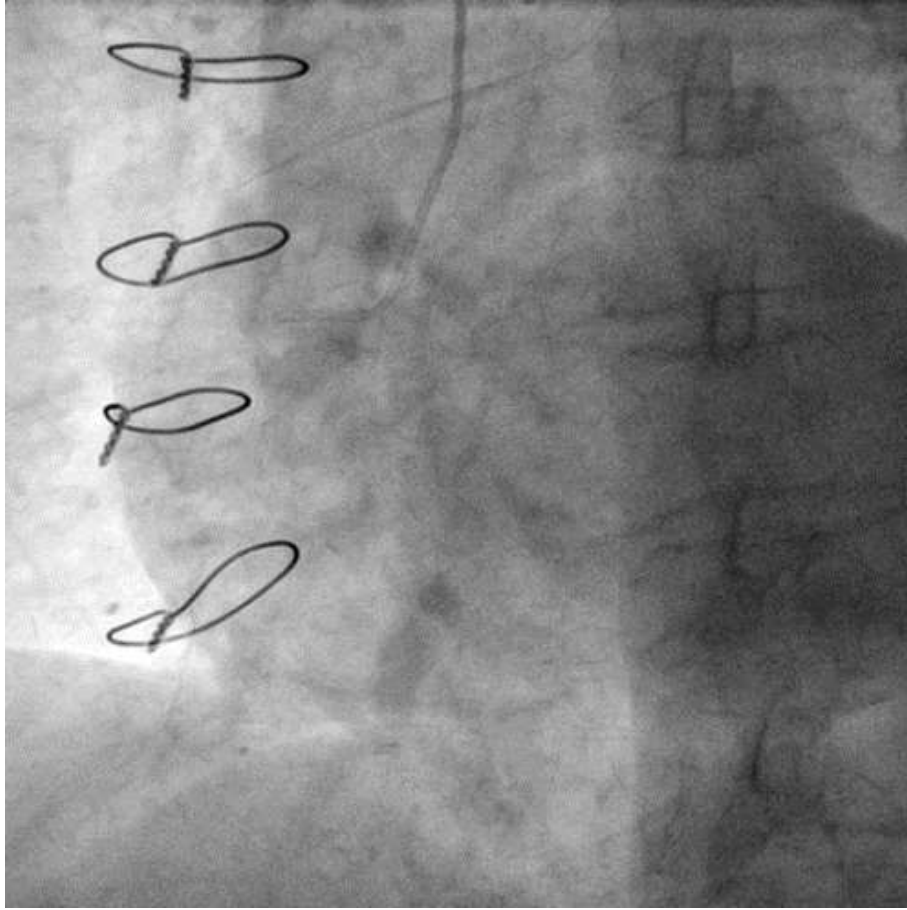
# RAO CRA

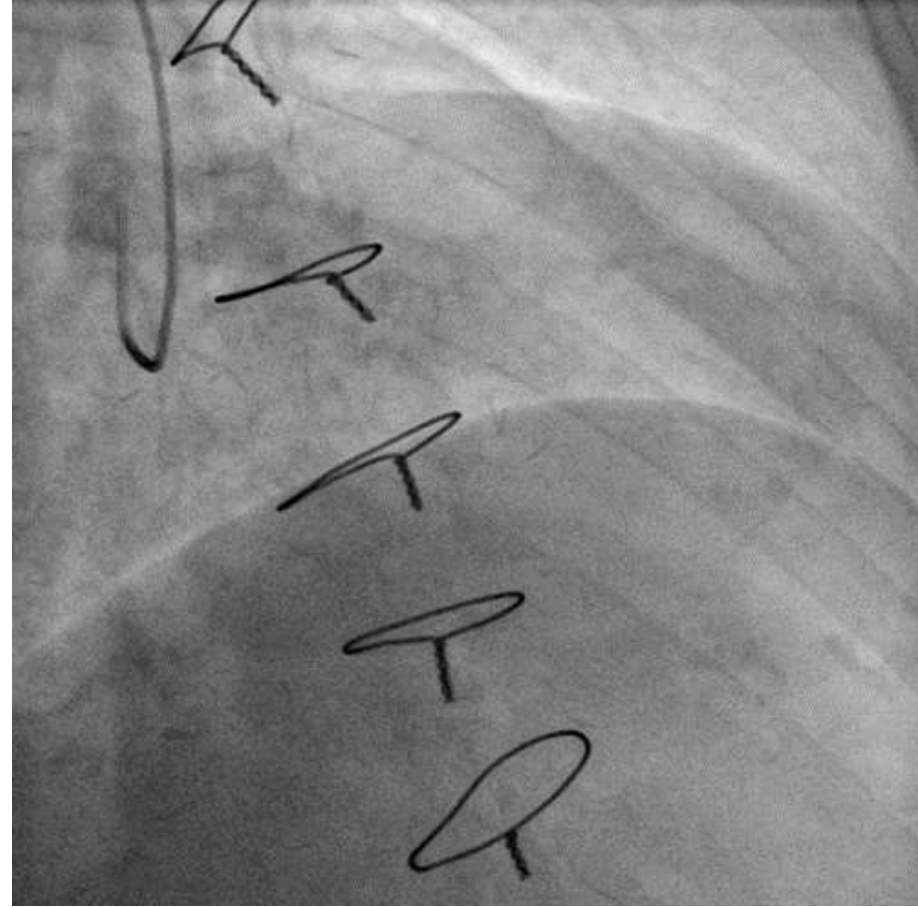


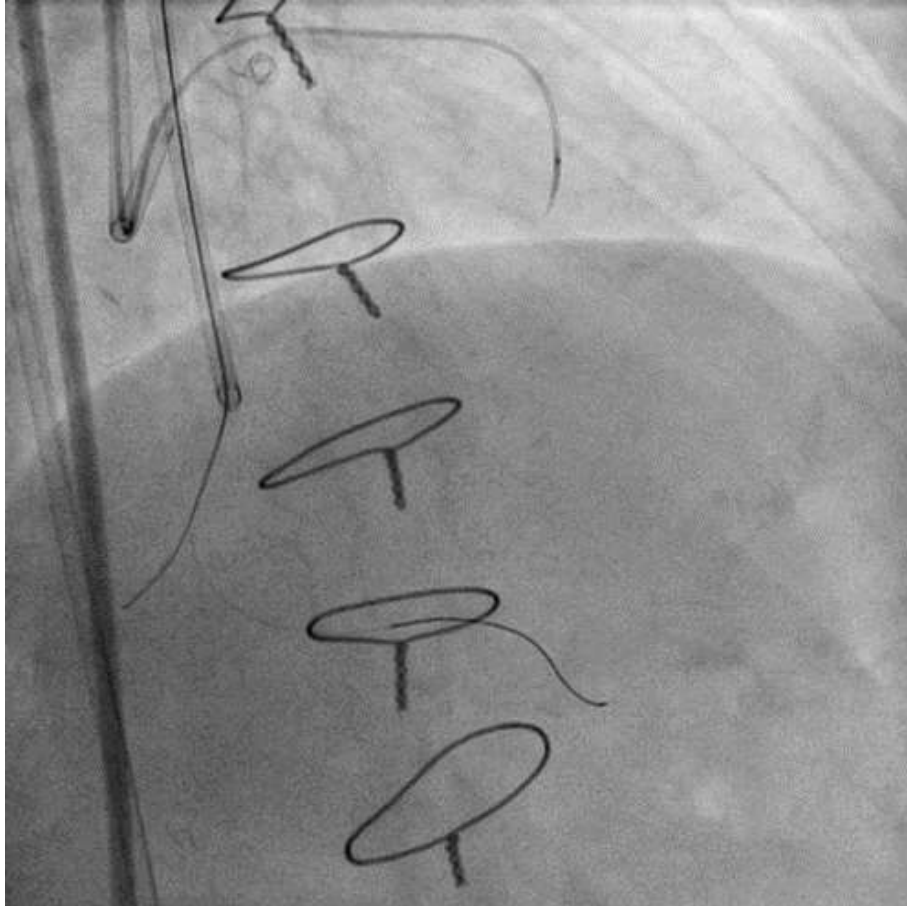
# RAO CAU



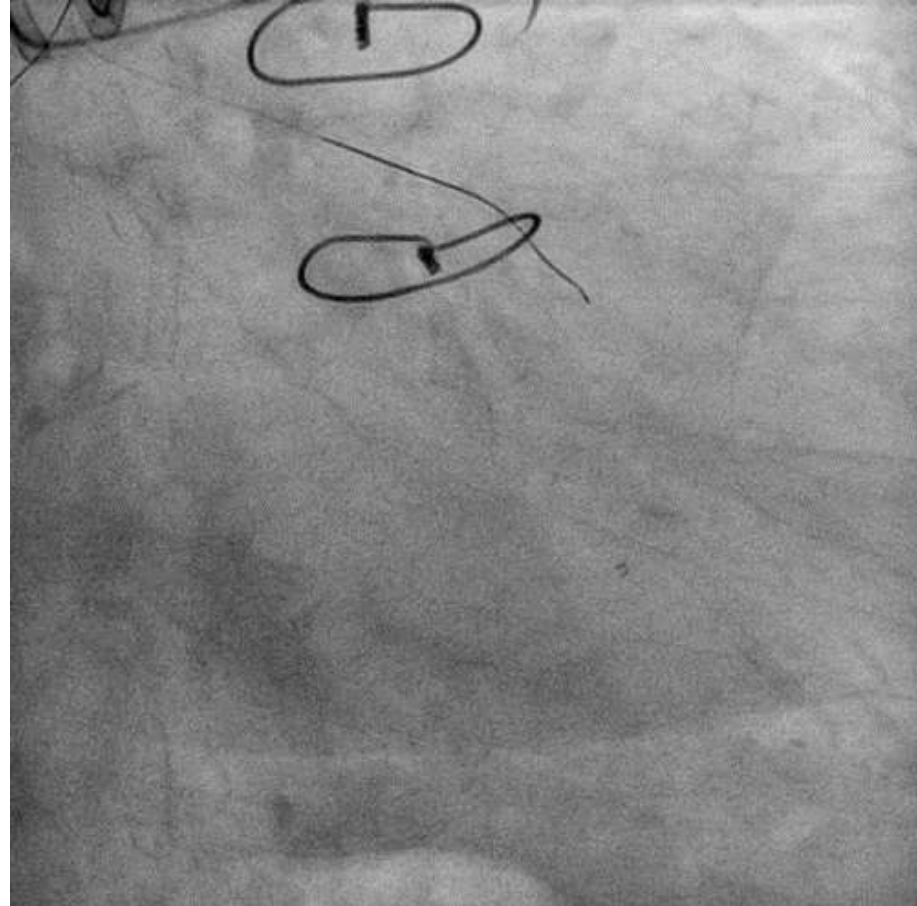
# Case; RCA CTO



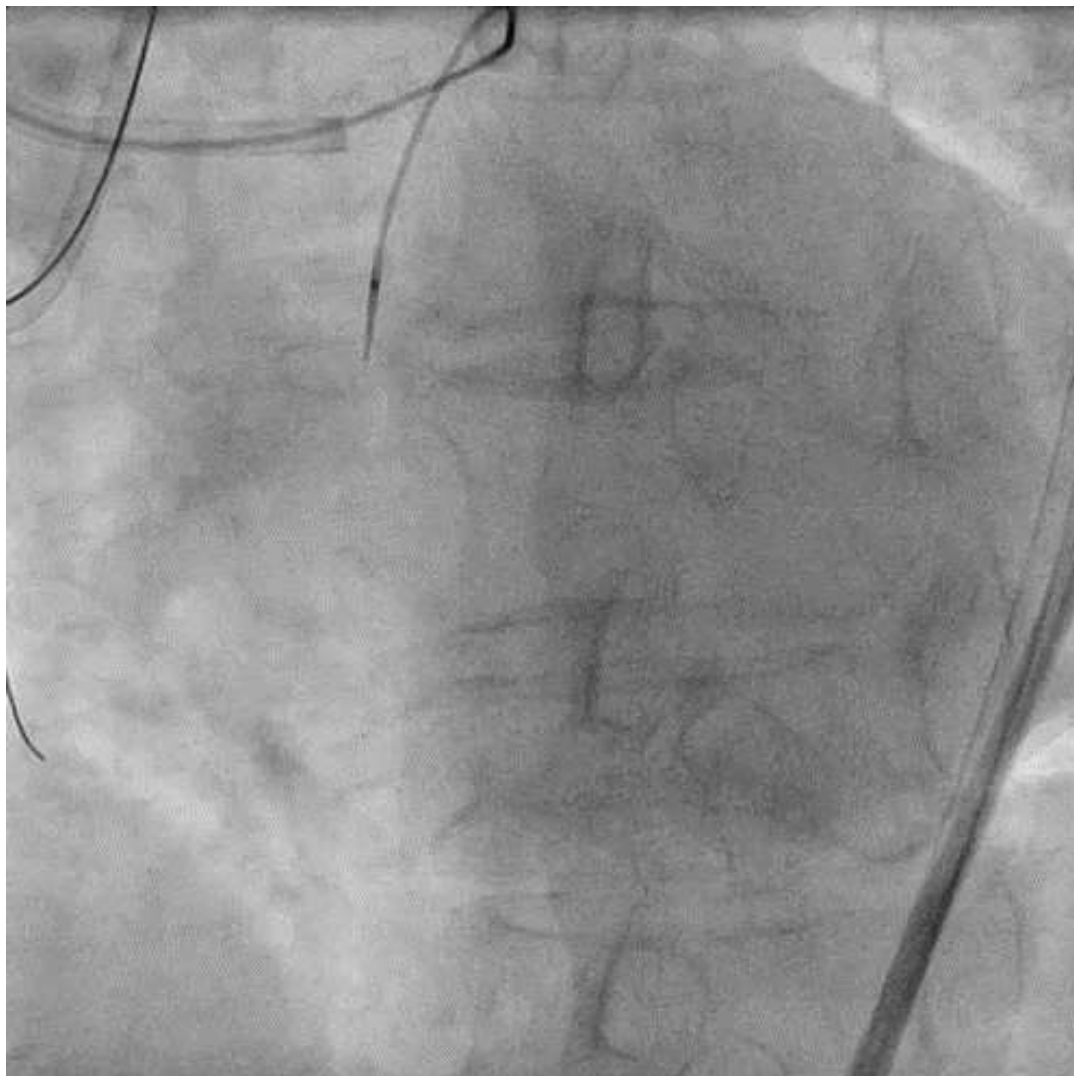




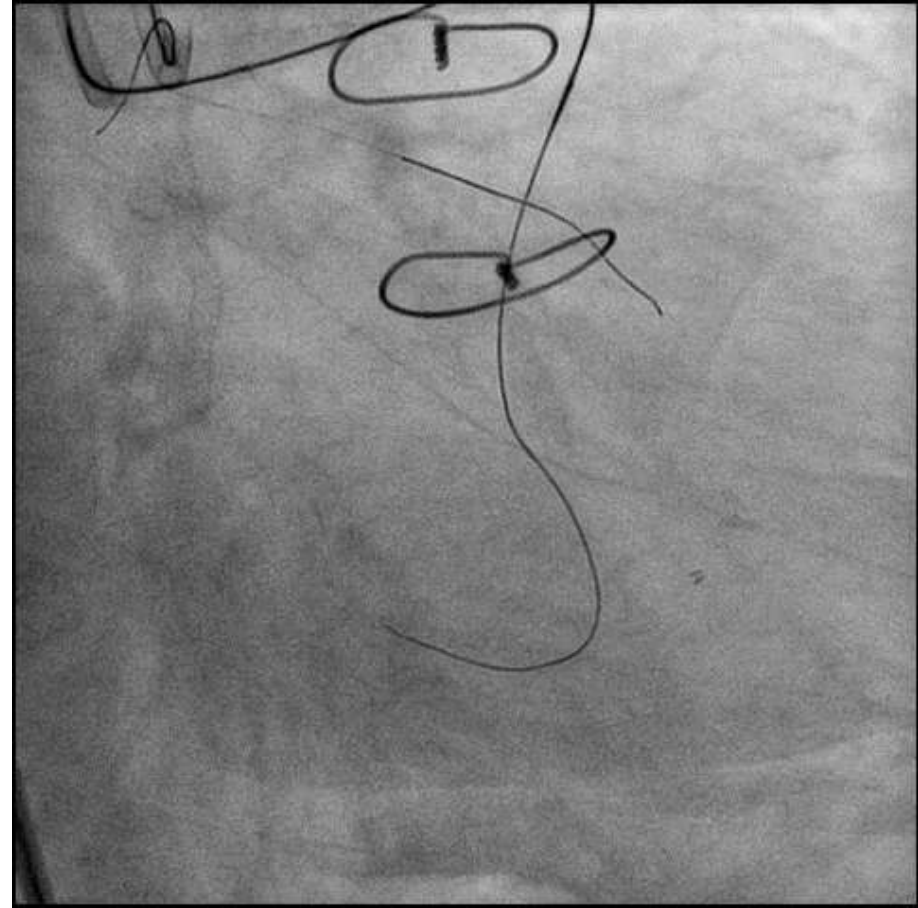
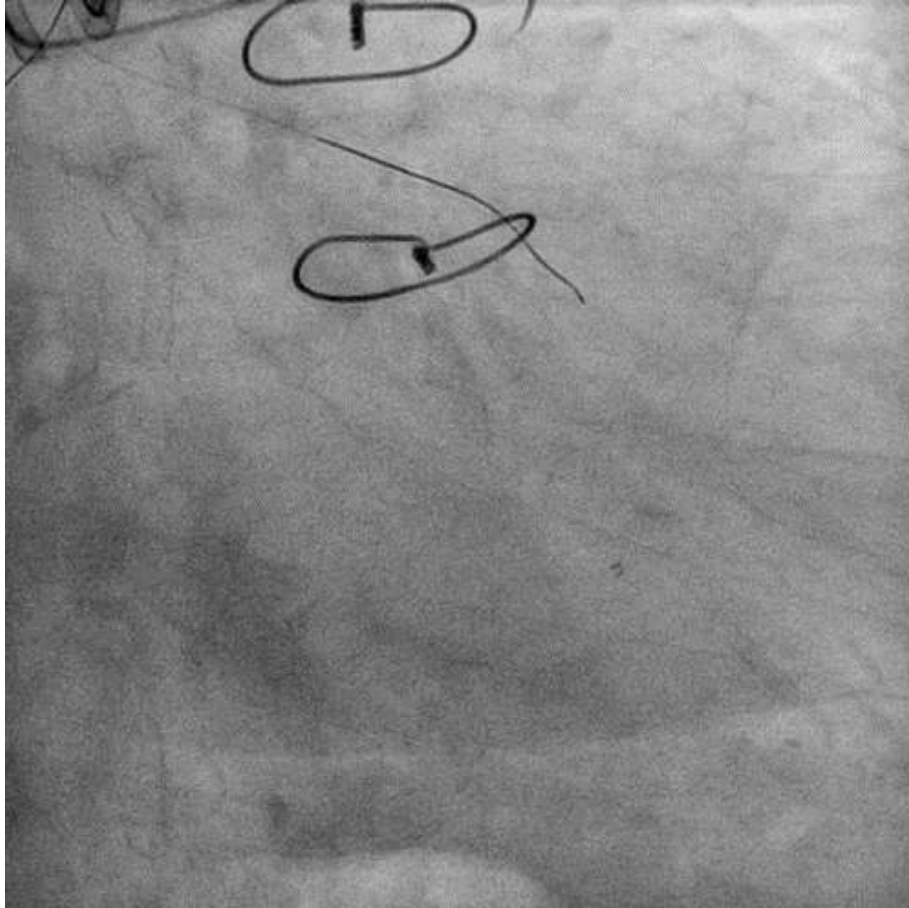
**RAO CRA**



**RAO CAU**



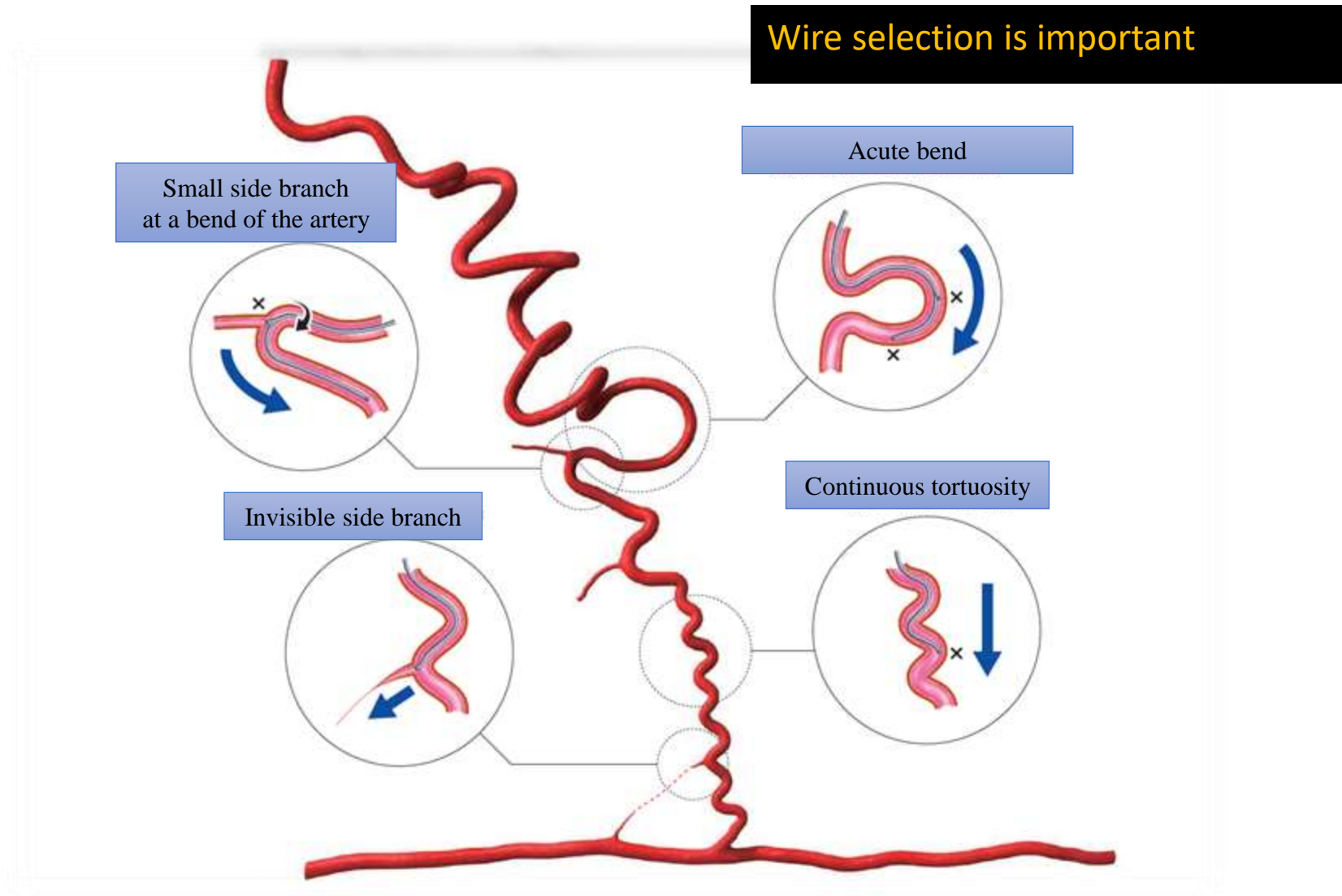
**LAO CRA**



**RAO CAU**



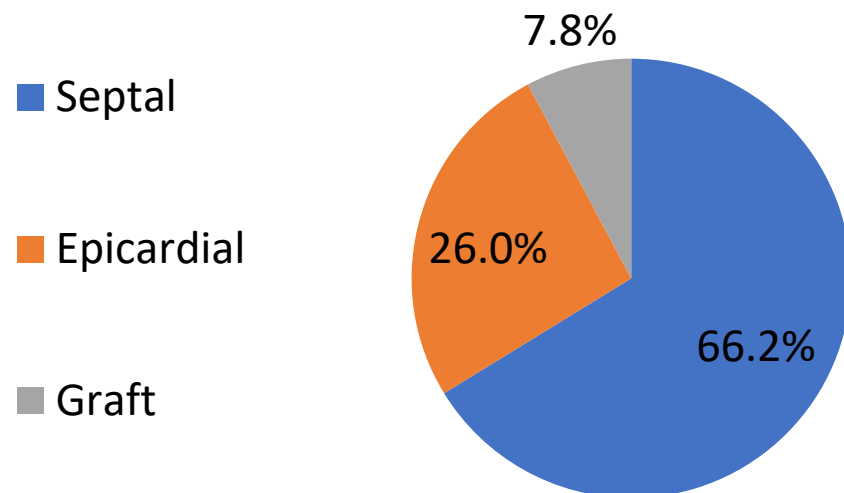
# Reason why collateral channel crossing is difficult



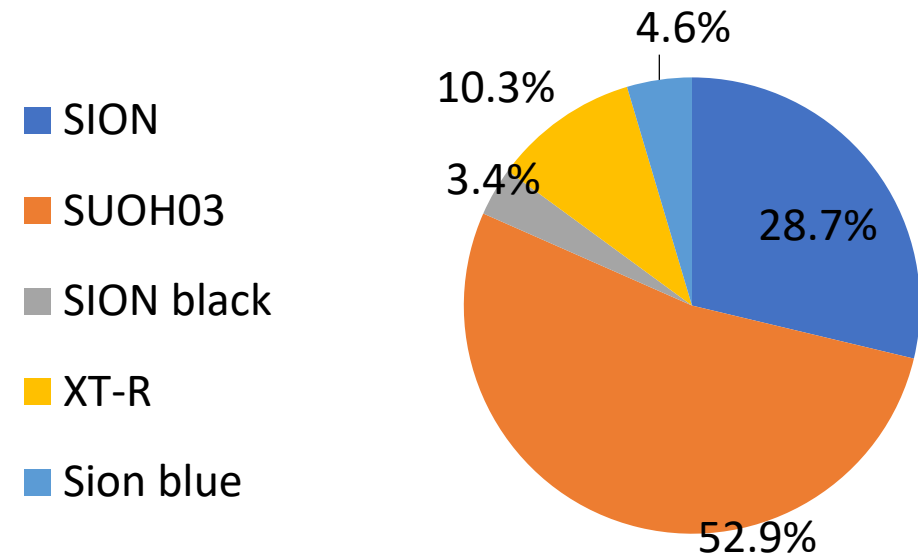
# Collateral channel crossing

- Primary retrograde/ all retrograde: **53.3%** (73/137)
- Access site: **Femoral(74.4%)**, Radial(20.4%),
- Guiding catheter size: **7Fr.(67.9%)**, 8Fr.(18.3%)
- Successful collateral crossing by GW: **74.5% (102/137)**
- Guidewire# used for collateral crossing: **1.9 ± 1.2**

Successful collateral channel

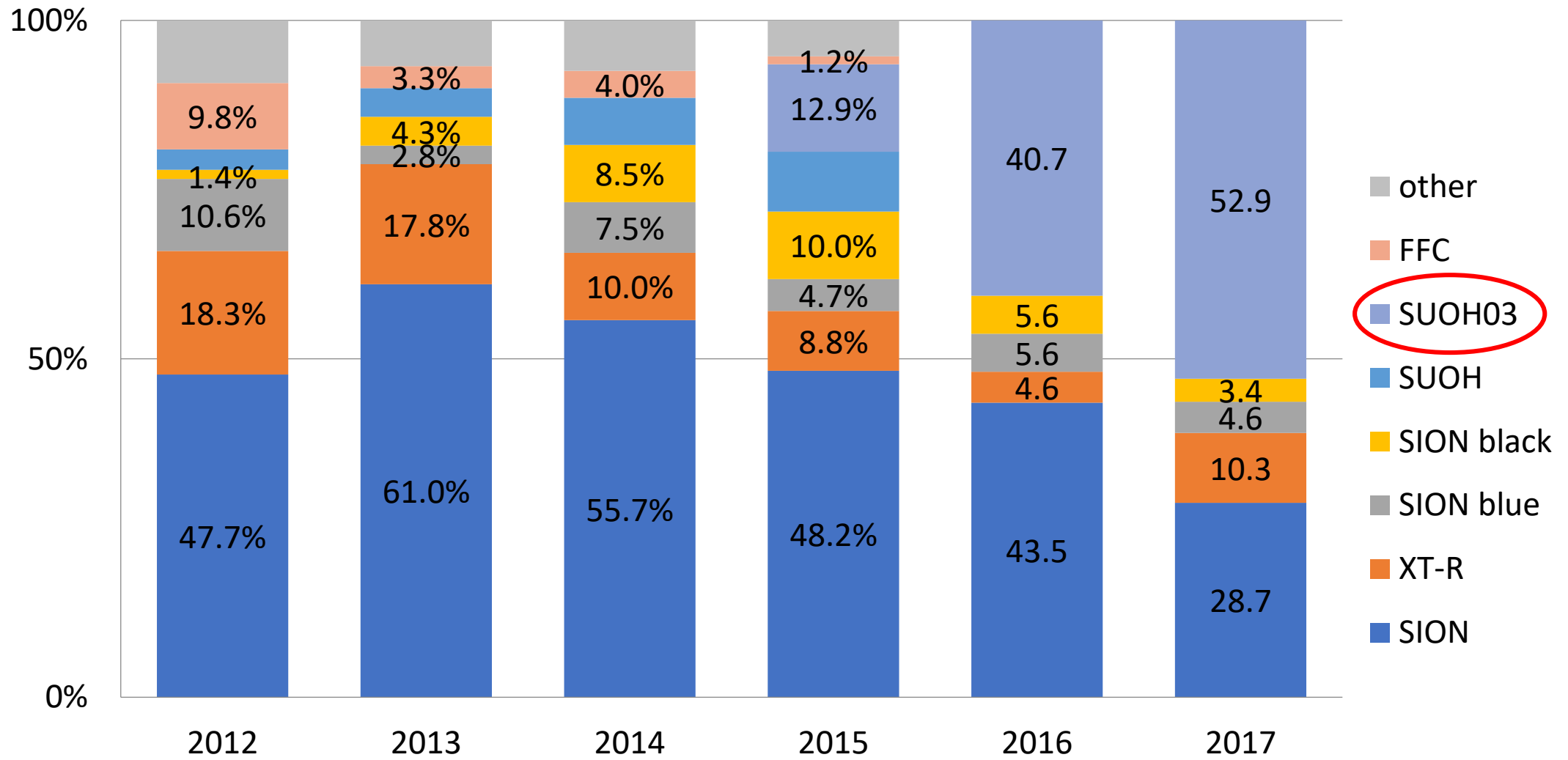


Successful guidewire for collateral crossing



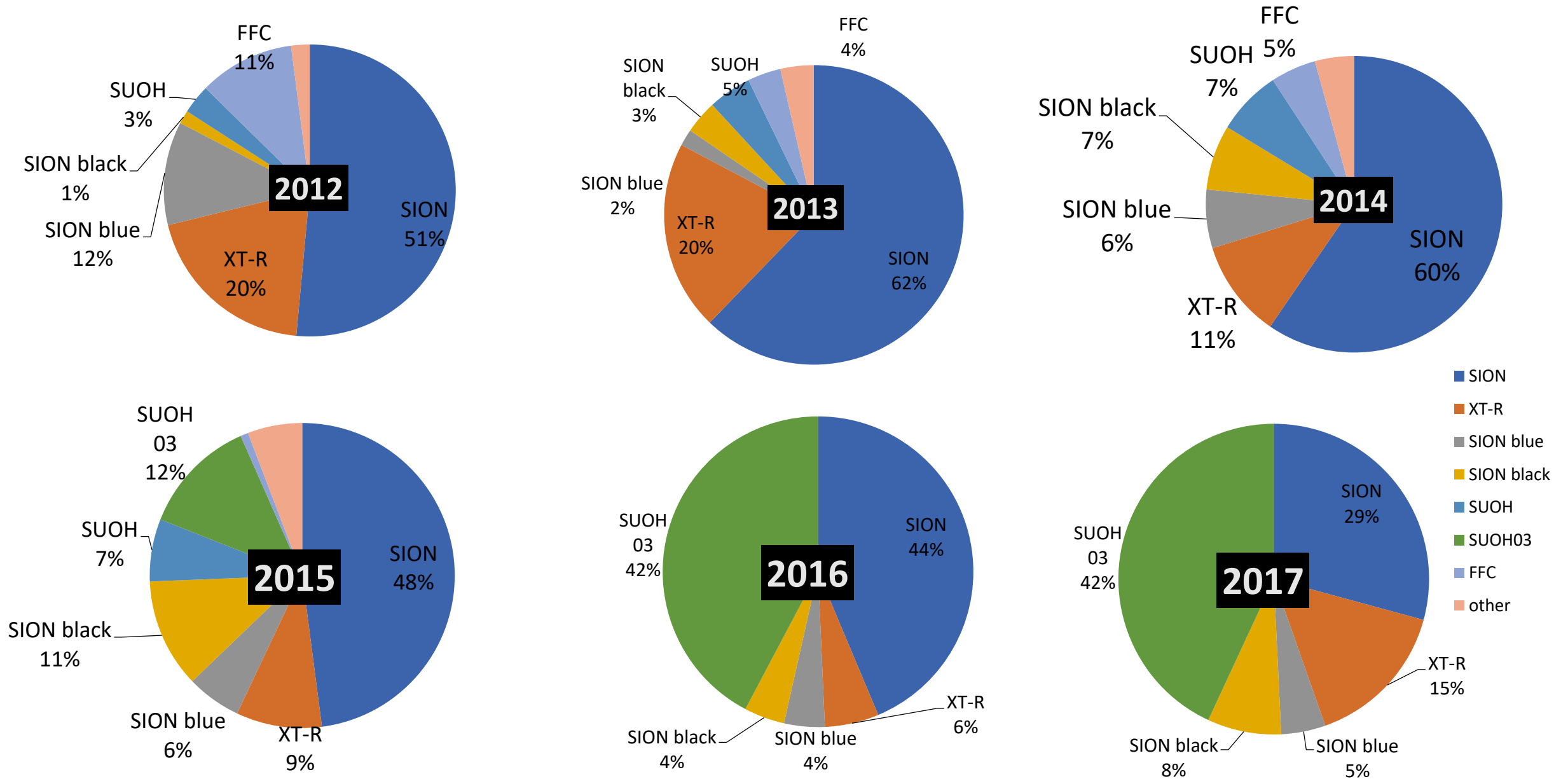
# Annual change from Retrograde summit Japan

## Annual change Successful GW for collateral channel



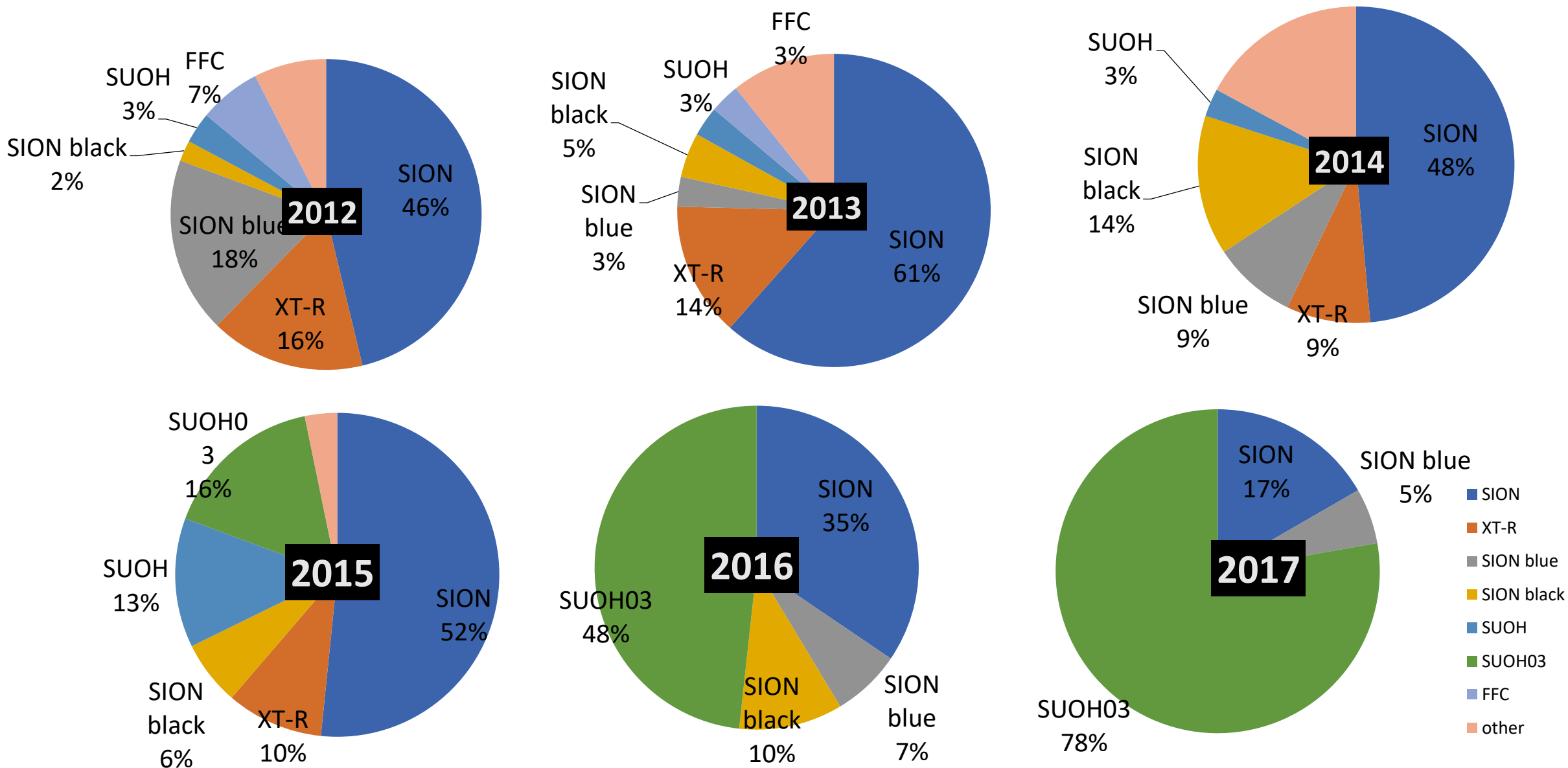
# Annual change from Retrograde summit Japan

## Successful GW for *septal channel*



# Annual change from Retrograde summit Japan

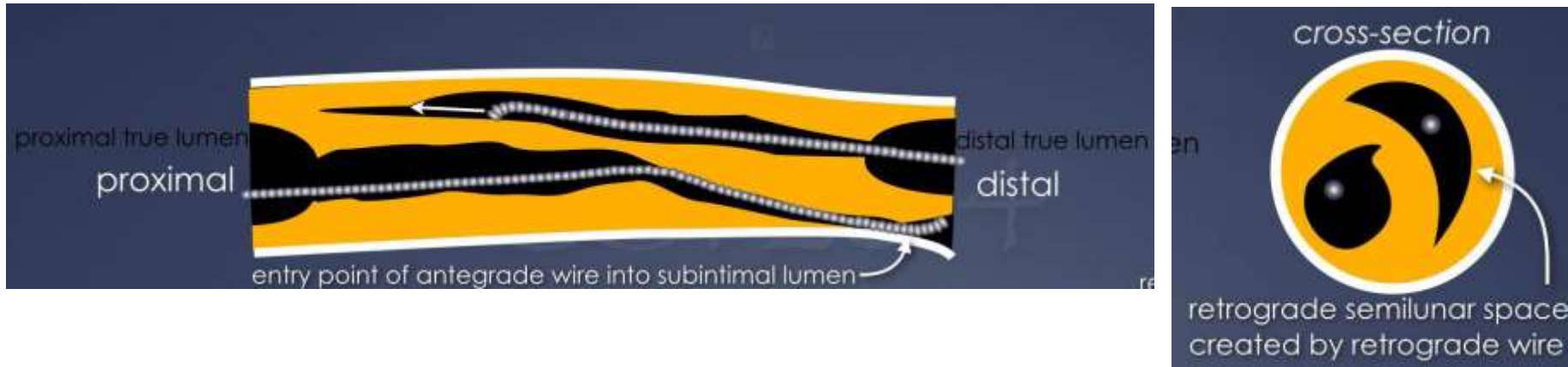
## Successful GW for *epicardial channel*



# Basics of Retrograde approach

1. Preparation for Retrograde approach
2. Tip and tricks of channel & wire selection
3. Wire crossing

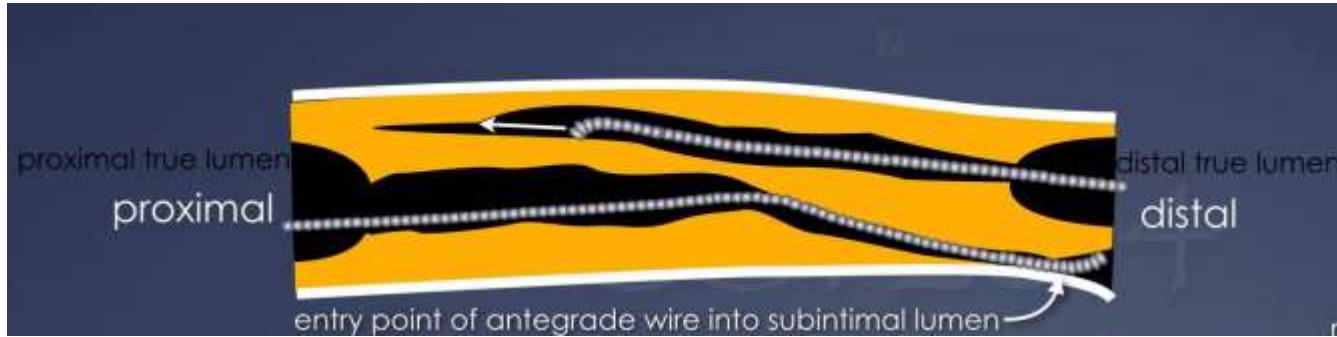
# Concept of **directed** reverse CART



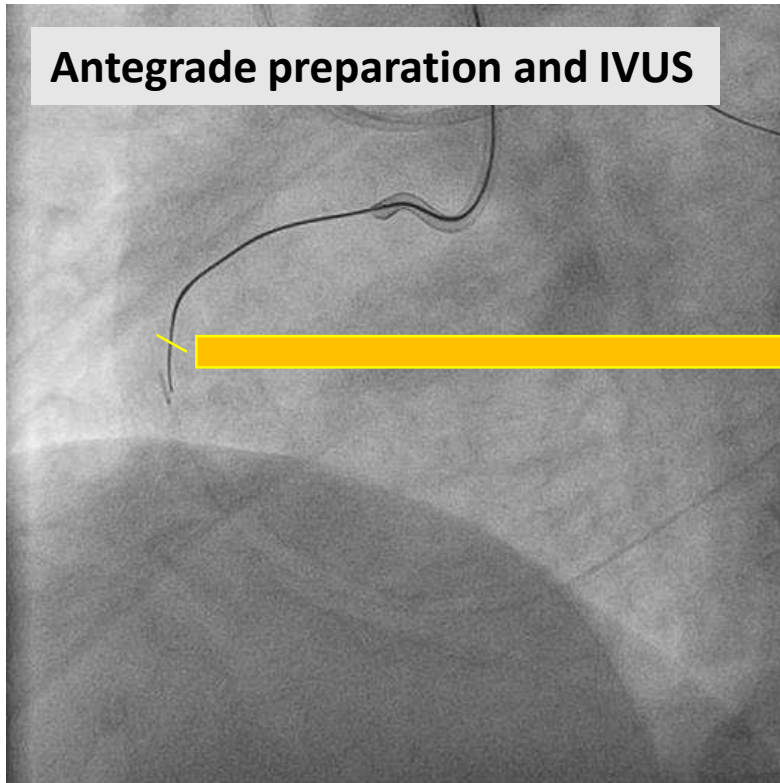
**1. Antegrade preparation for CTO site and IVUS examination should be recommended to contemporary reverse CART.**

- **Wire control from antegrade approach is definitely easier and safer than that from retrograde approach**
- **To find suitable point for penetration of the retrograde wire. (the point without dense fibrous and calcification is better.)**
- **To decide antegrade balloon size for reverse CART (We don't need the big balloon as conventional reverse CART!!)**

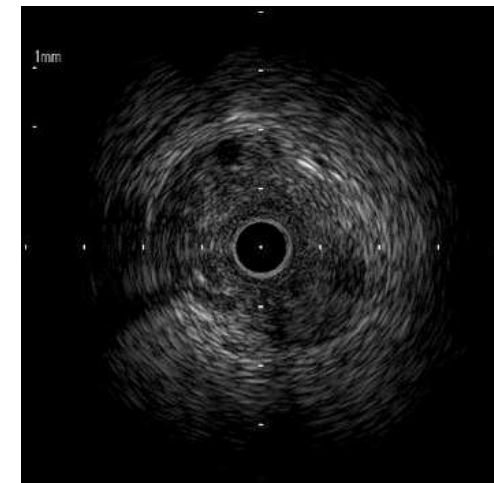
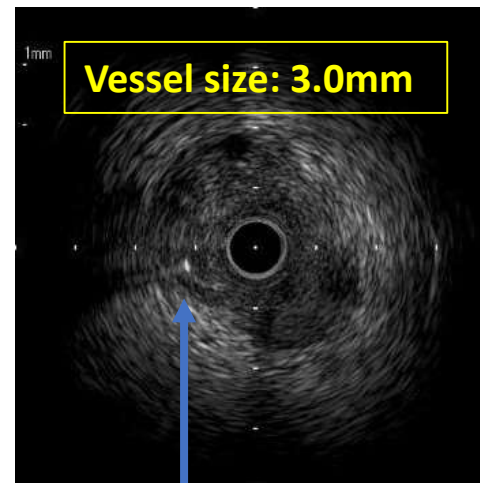
# Concept of **directed** reverse CART



**Antegrade preparation and IVUS**



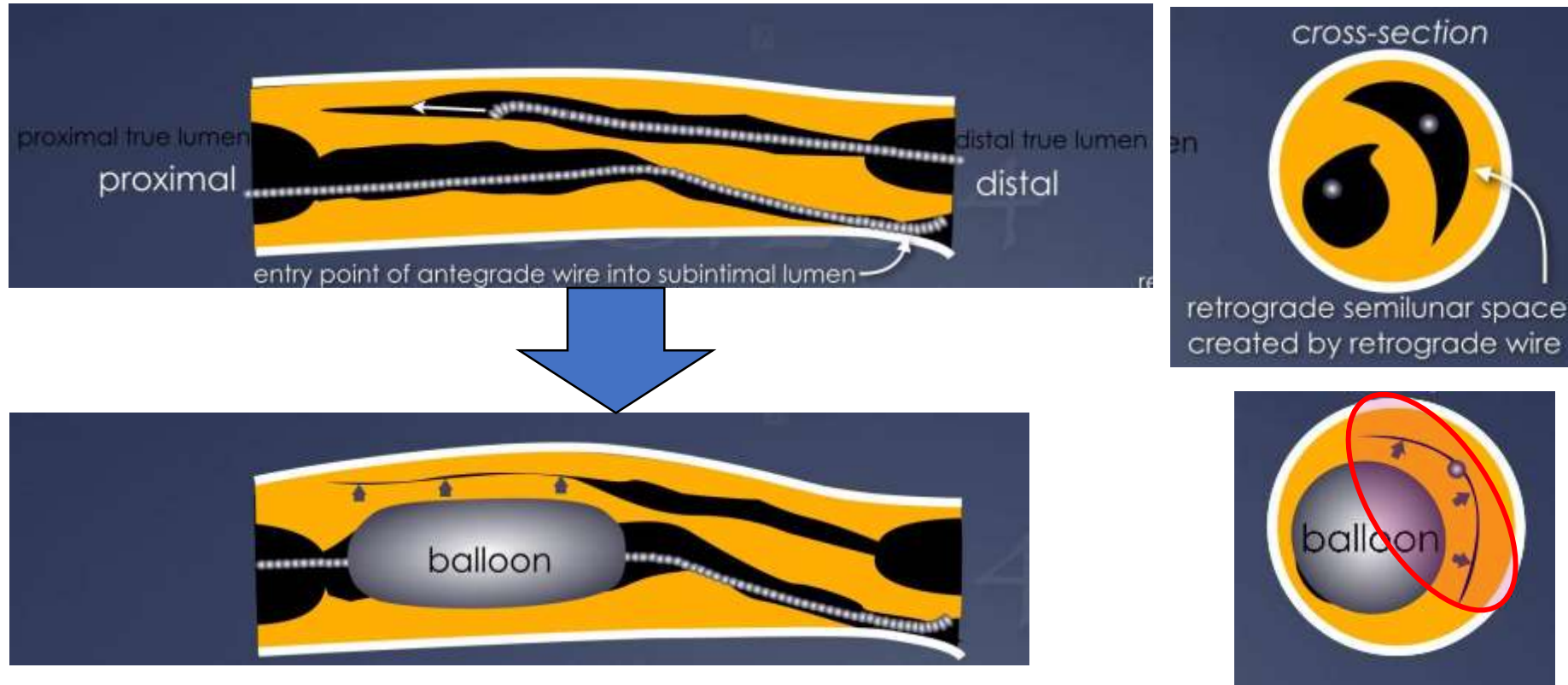
**Antegrade IVUS findings**



**Retro wire is in the plaque**

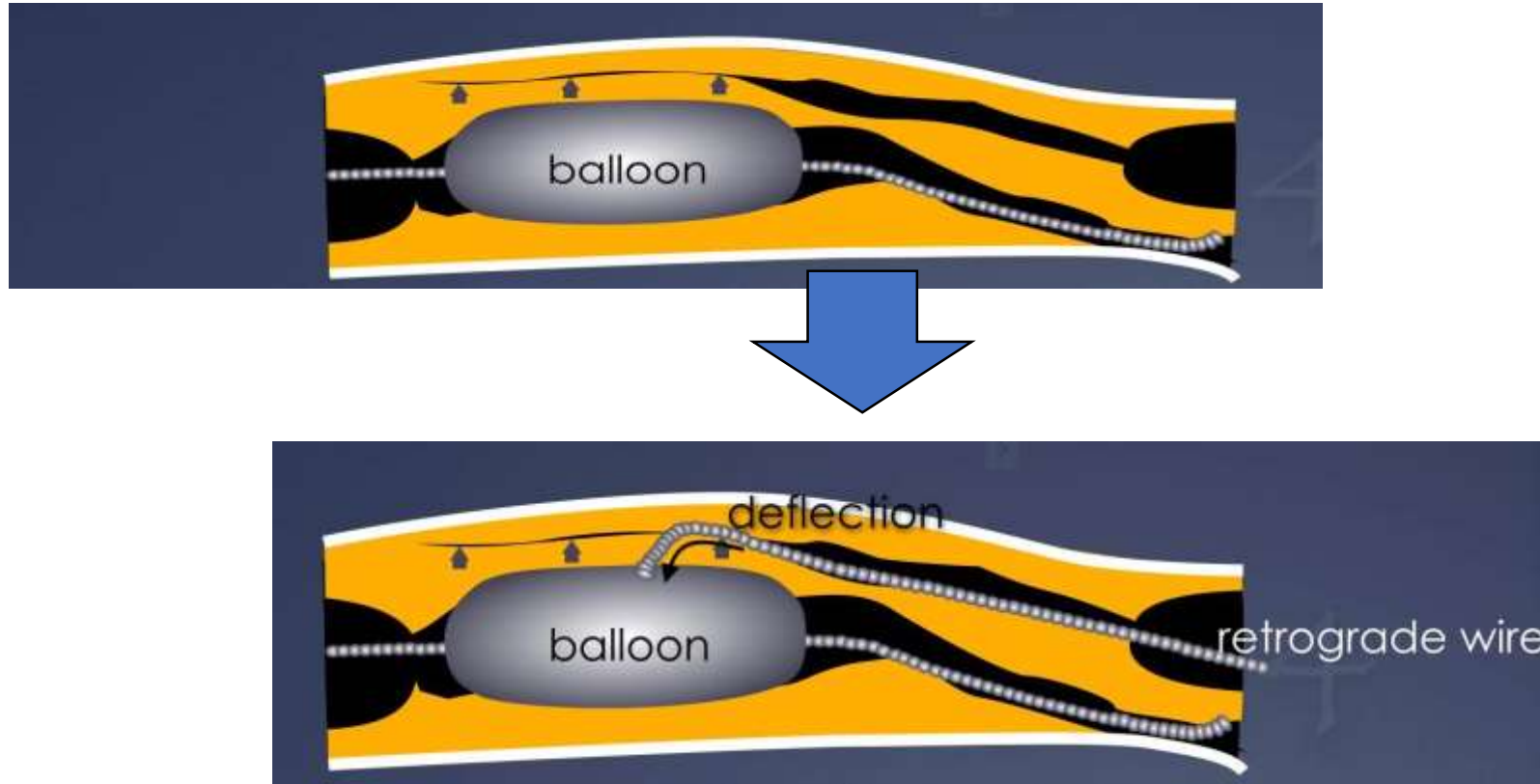


# Concept of **directed** reverse CART



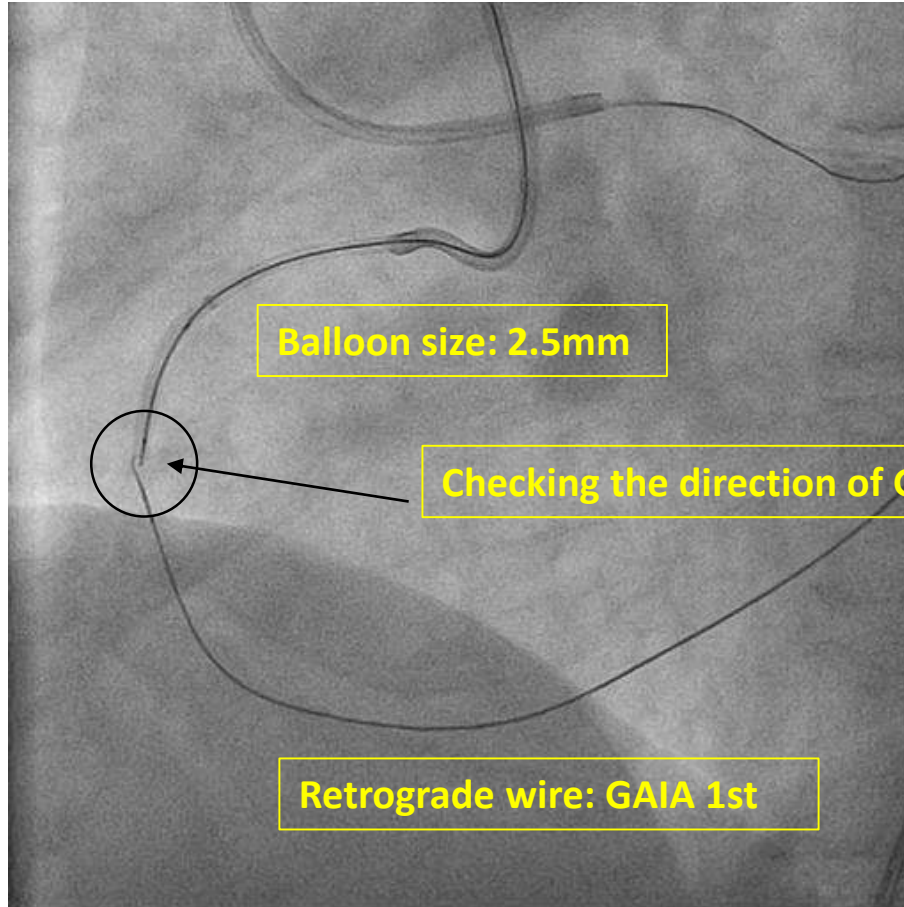
2. Balloon dilatation to compress the space around retrograde GW.

# Concept of **directed** reverse CART

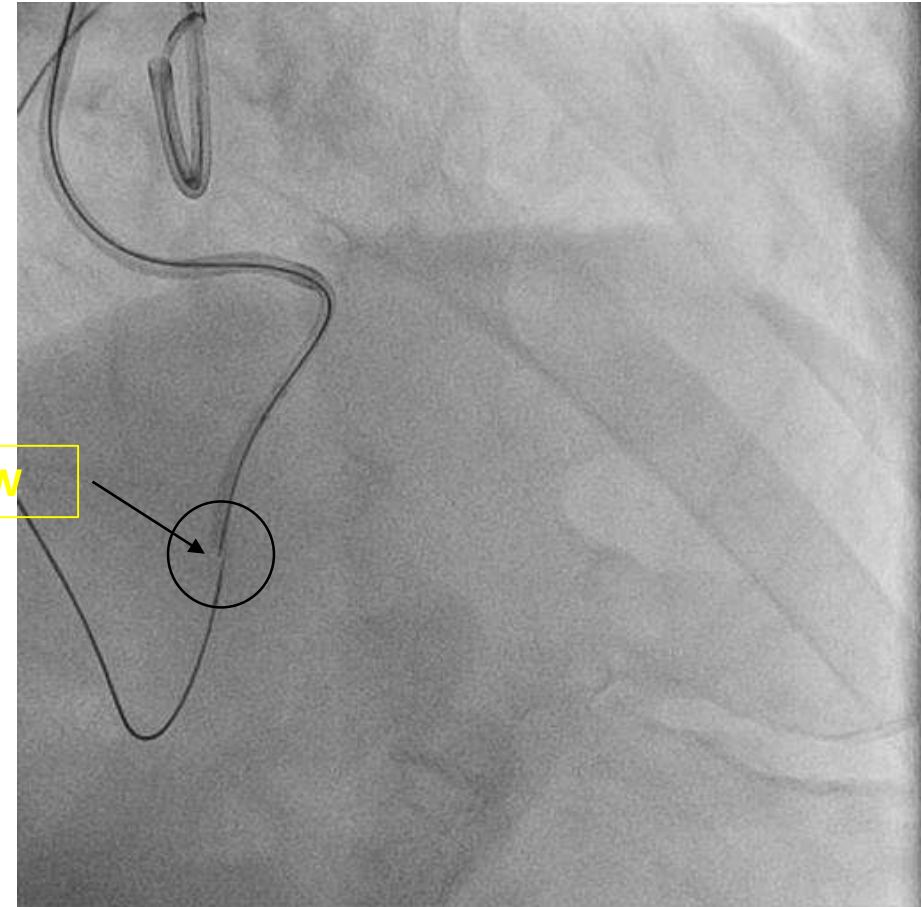


**3. The inflated balloon should be targeted using deflection mechanism of the retrograde wire.**

# Concept of **directed** reverse CART

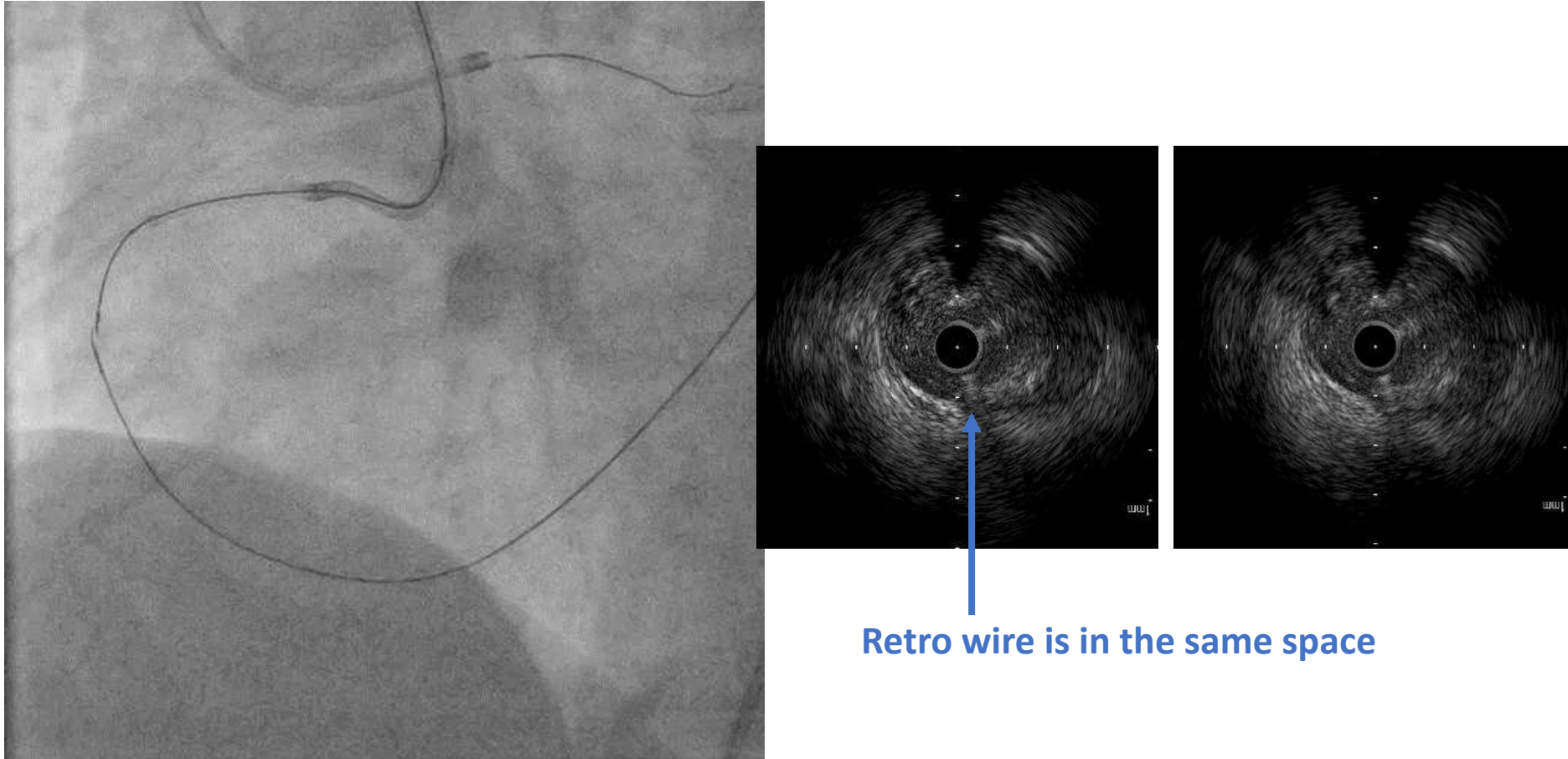


LAO 50



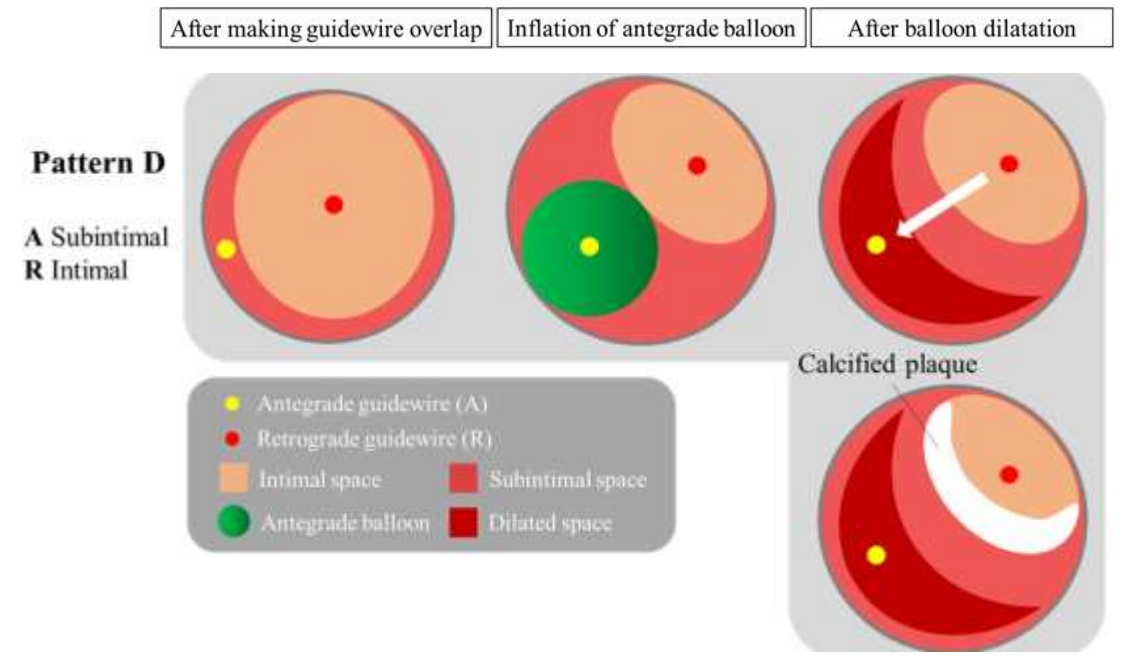
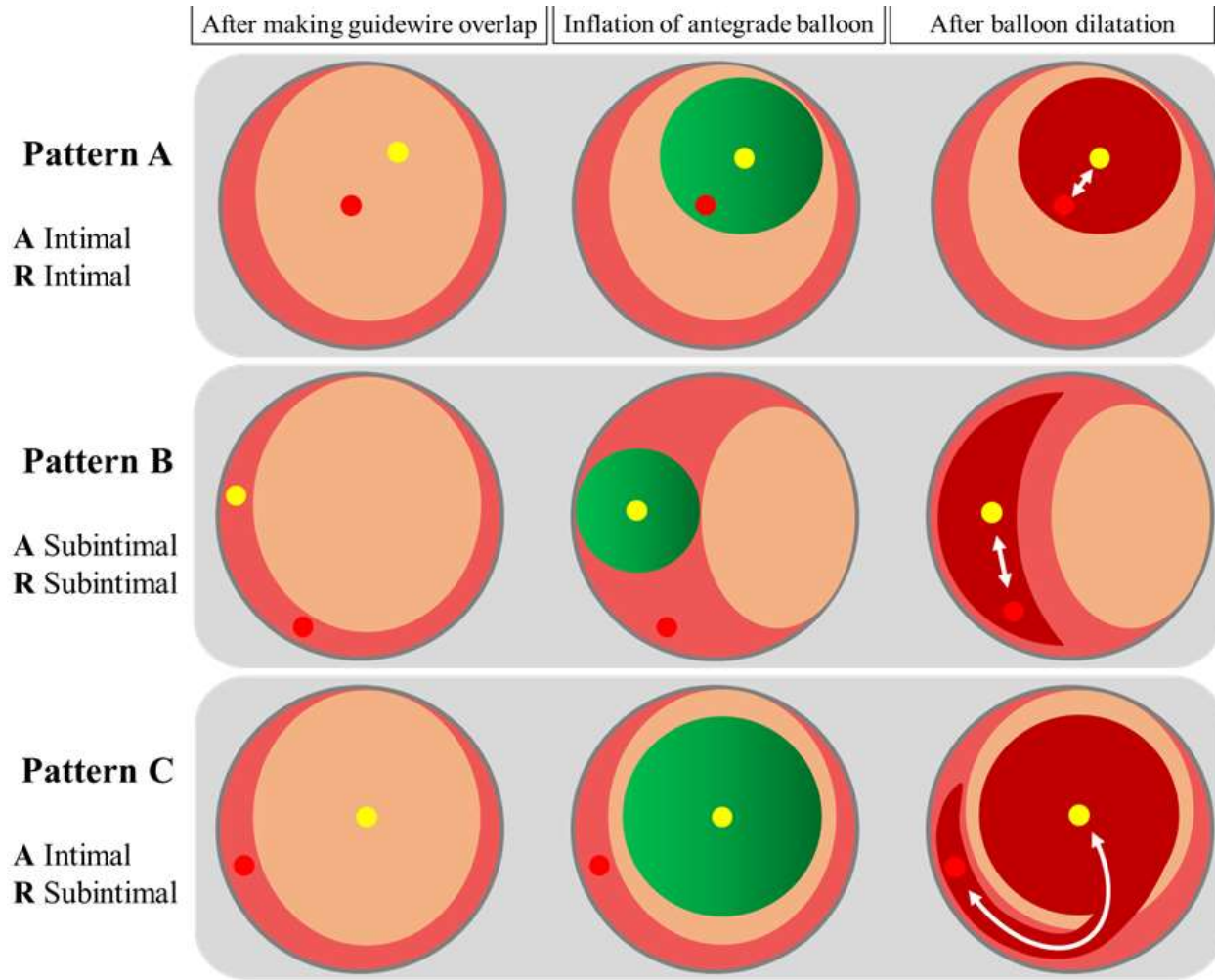
RAO 30

# Concept of **directed** reverse CART

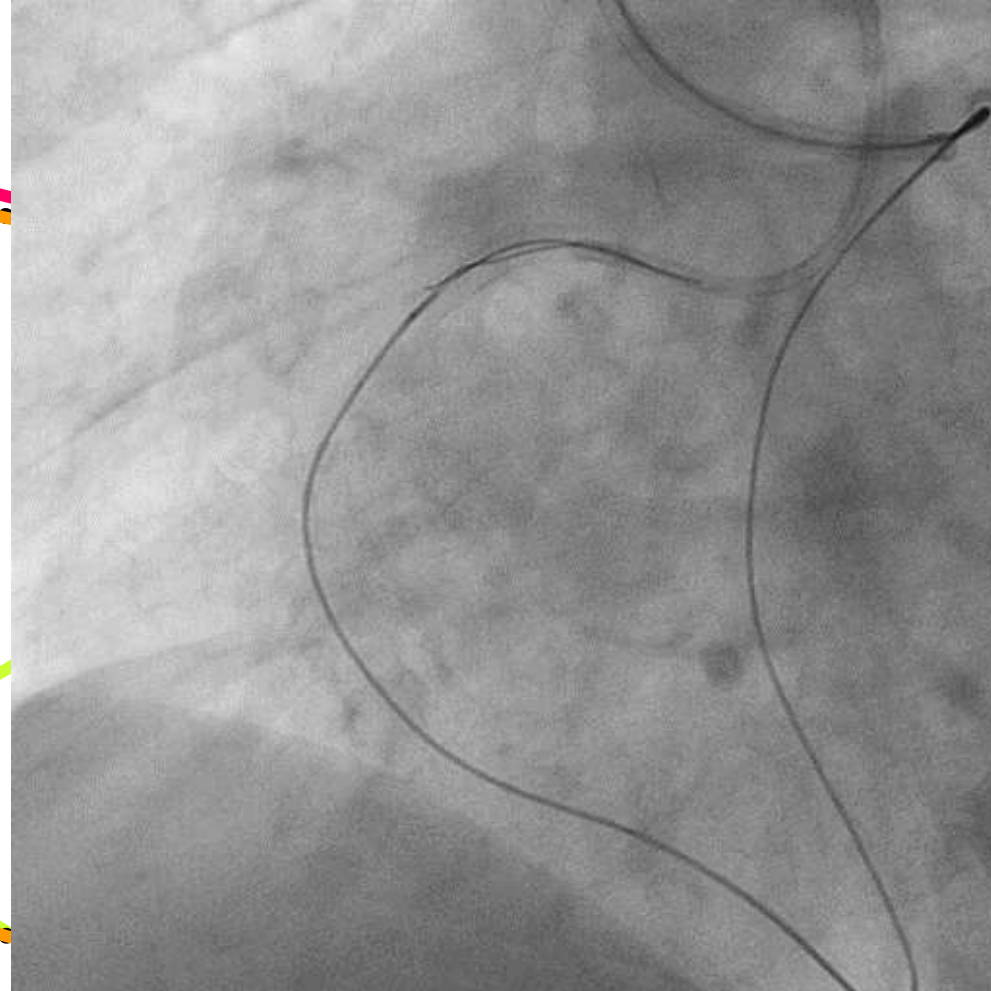
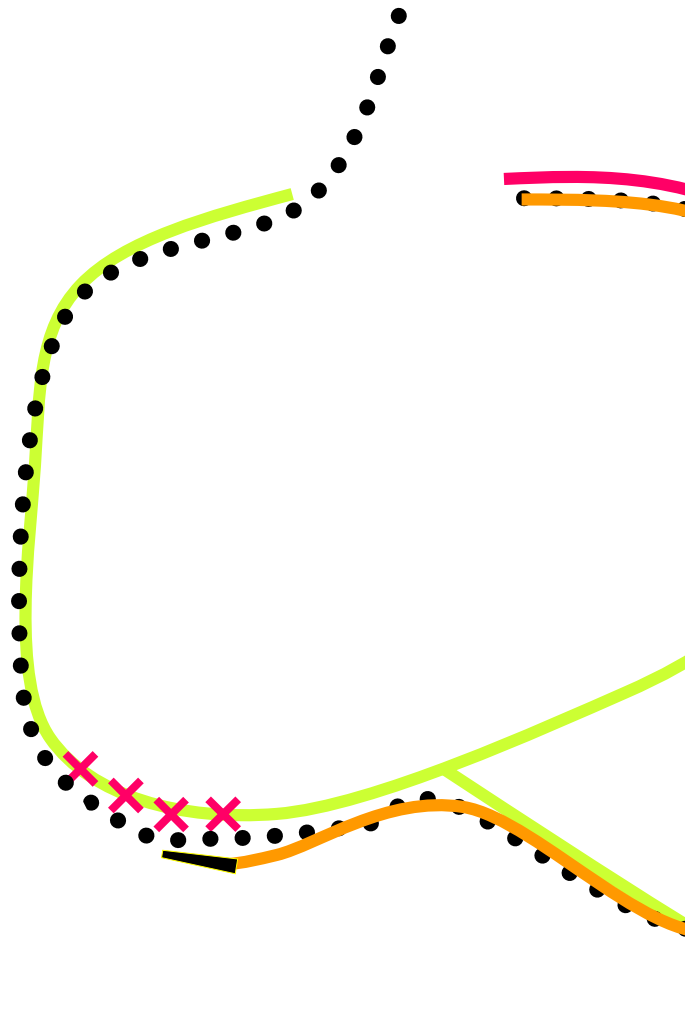


4. After deflation of balloon, retrograde wire can penetrate intimal tissue.

# possible patterns of antegrade and retrograde wire position

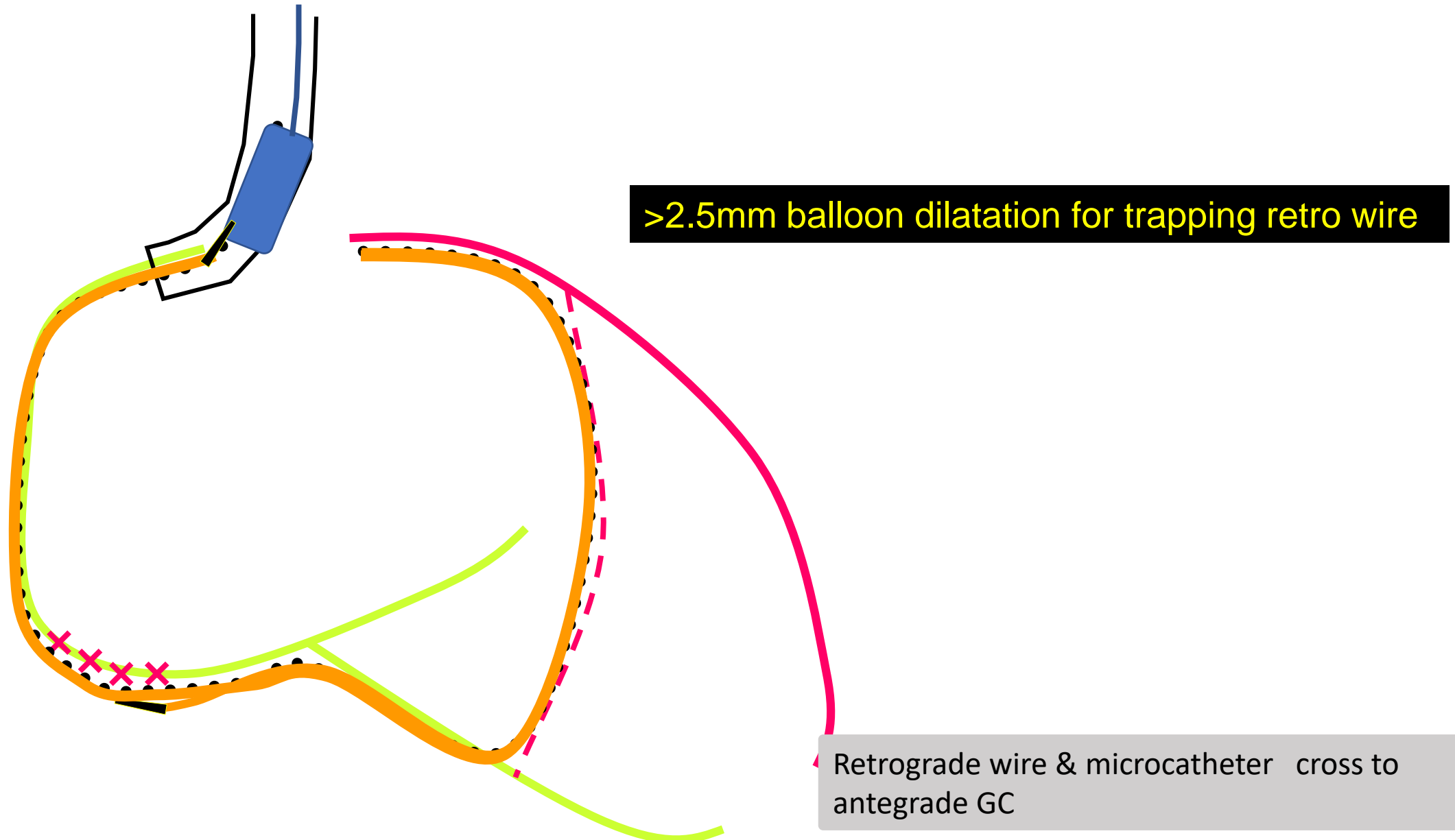


# After connection of retrograde wire

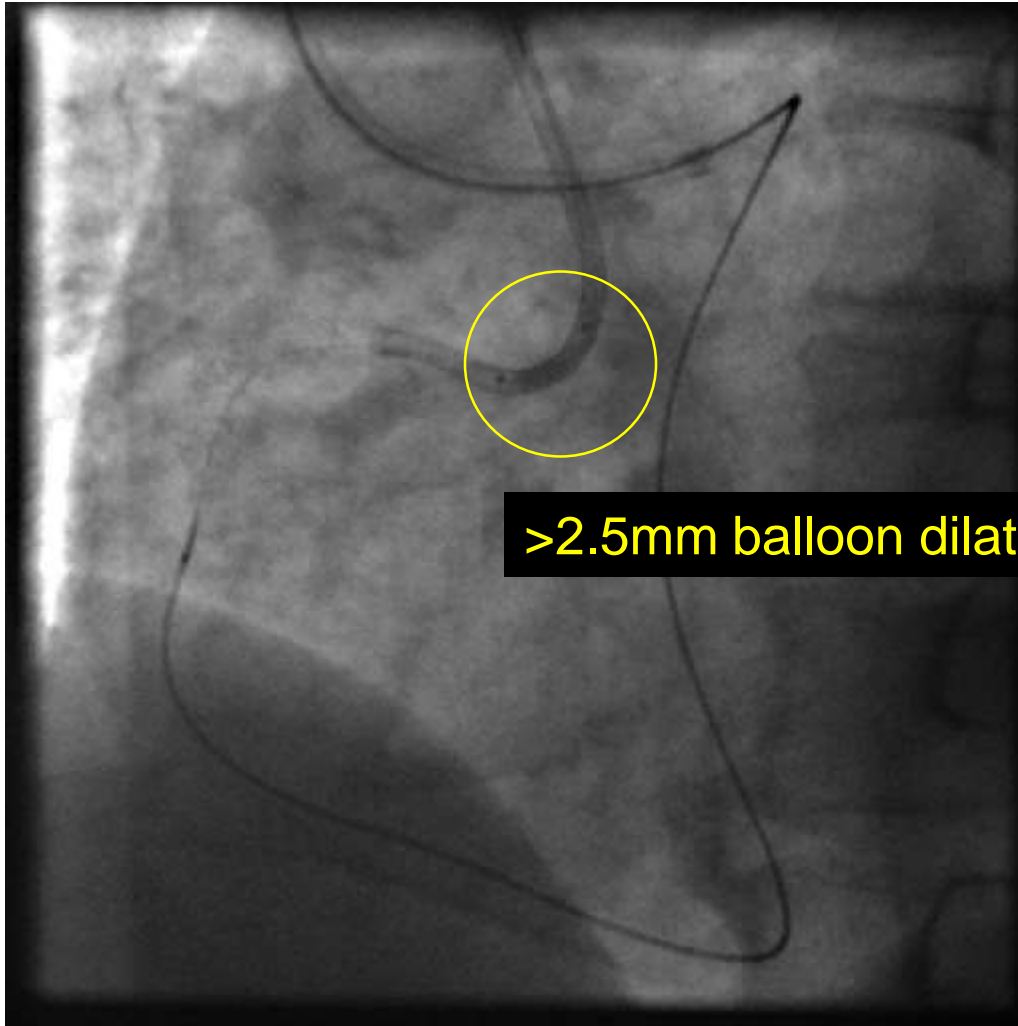


Retrograde wire & microcatheter cross to antegrade GC

# Trapping retrograde wire in GC



# Trapping retrograde wire in GC

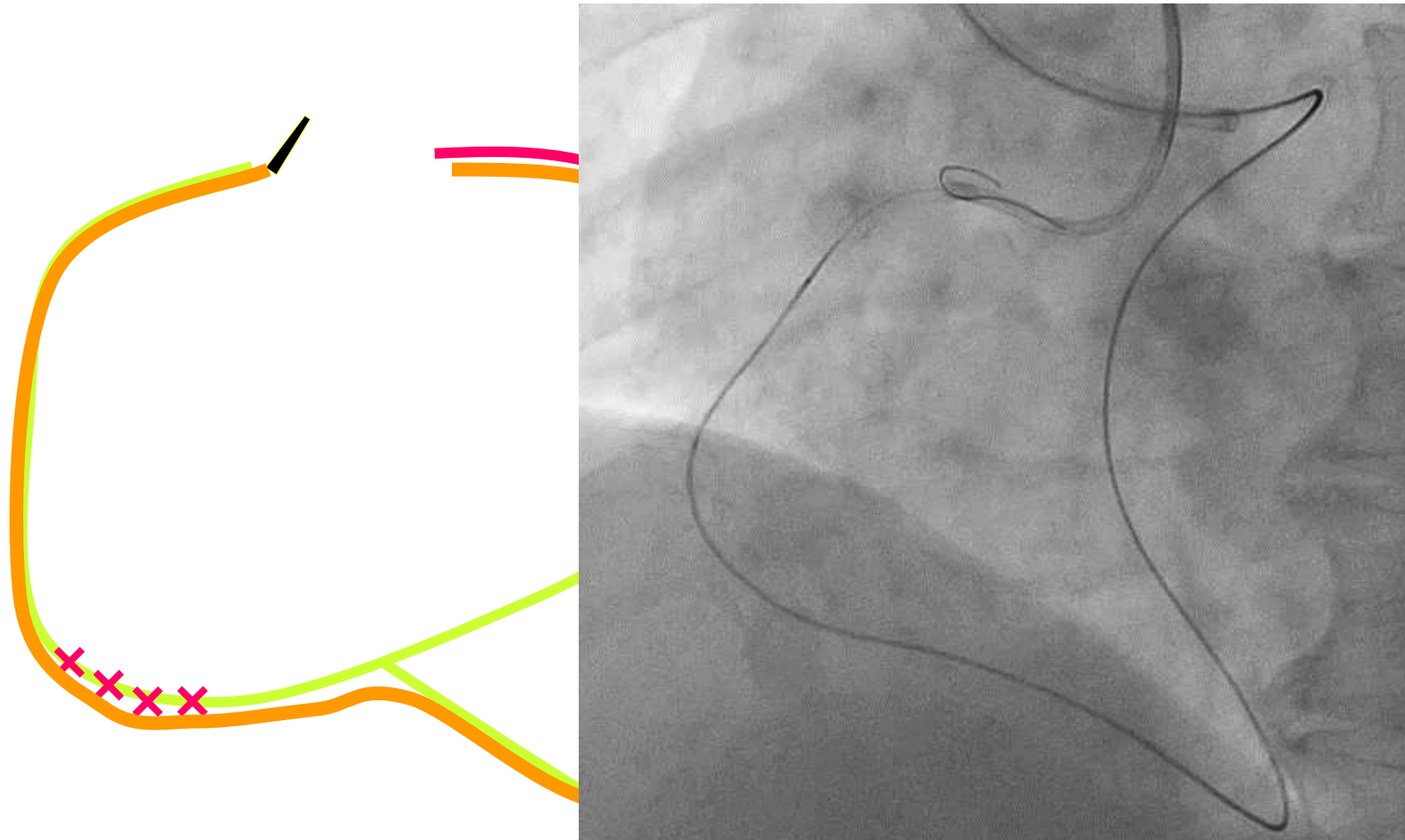


>2.5mm balloon dilatation for trapping retro wire

Retrograde wire & microcatheter cross to antegrade GC



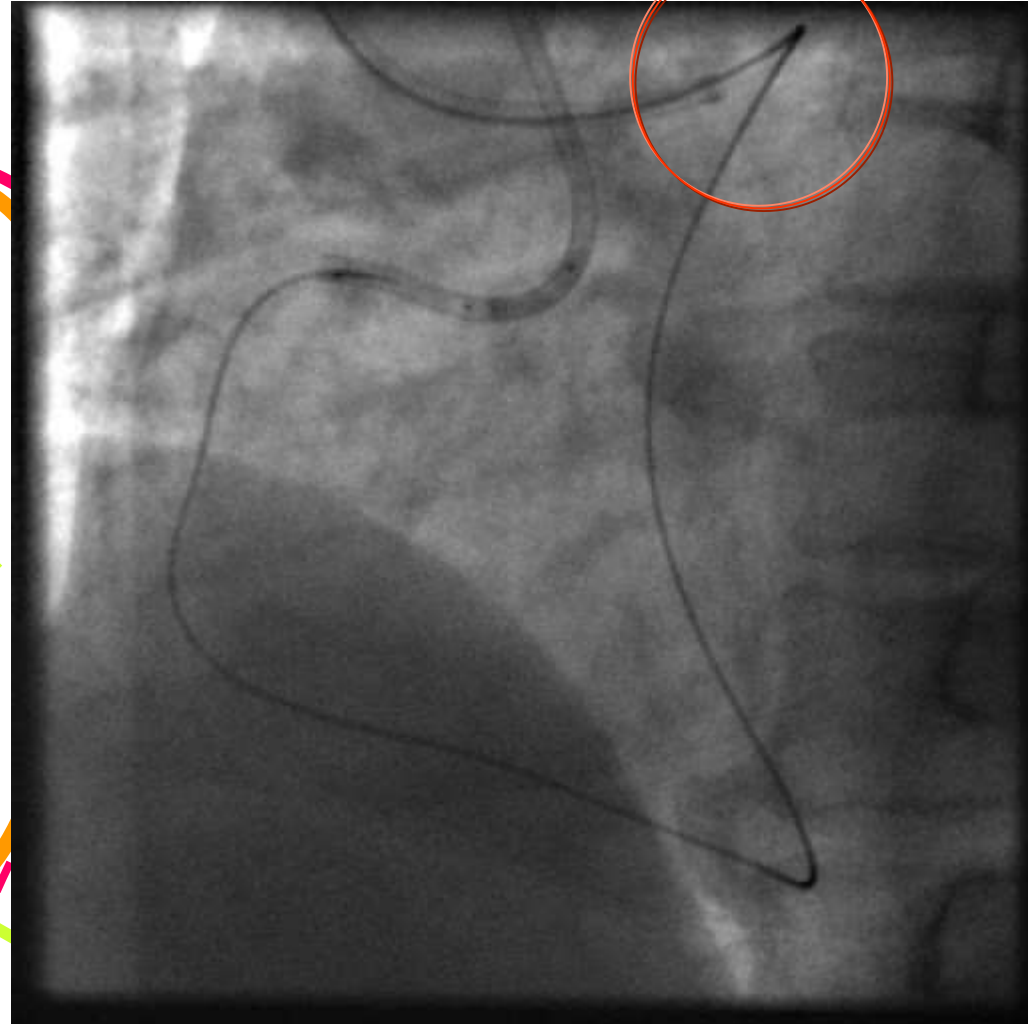
# Crossing microcatheter



Retrograde wire & microcatheter cross to antegrade GC

# Crossing microcatheter

Keep coaxial position of retro GC to get strong back-up force for Corsair advancement



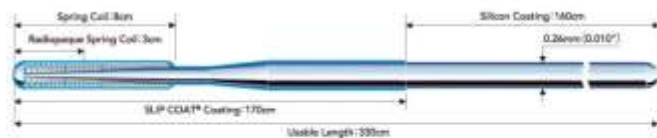
ASAHI  
**RG3**  
PTCA GUIDE WIRE

#### Characteristics

- Optimal wire strength, hydrophilic coating and 0.26mm shaft provide superior inside-catheter pushability.
- With the inner wall damage possibility reduced in tortuous vessels as well, the risk of complication is minimized.

#### Ordering Information

##### Structure

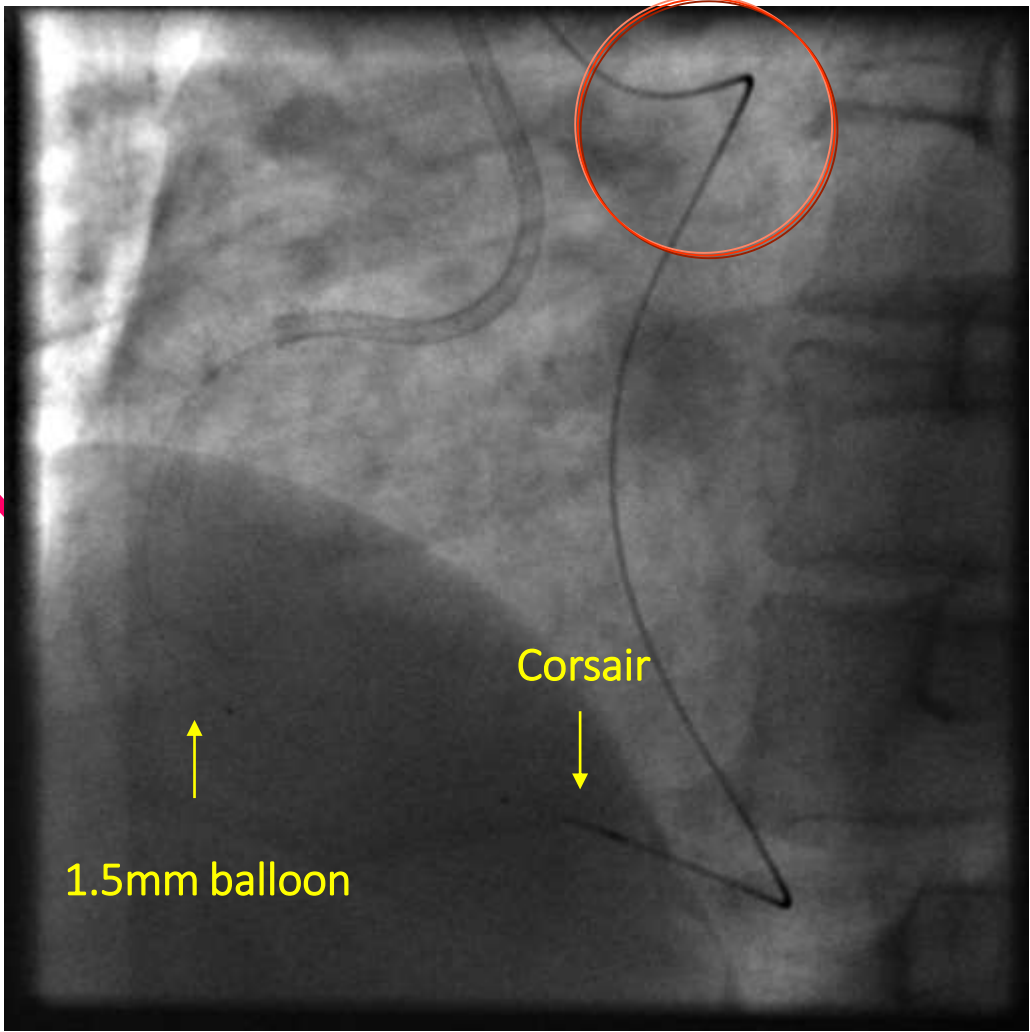
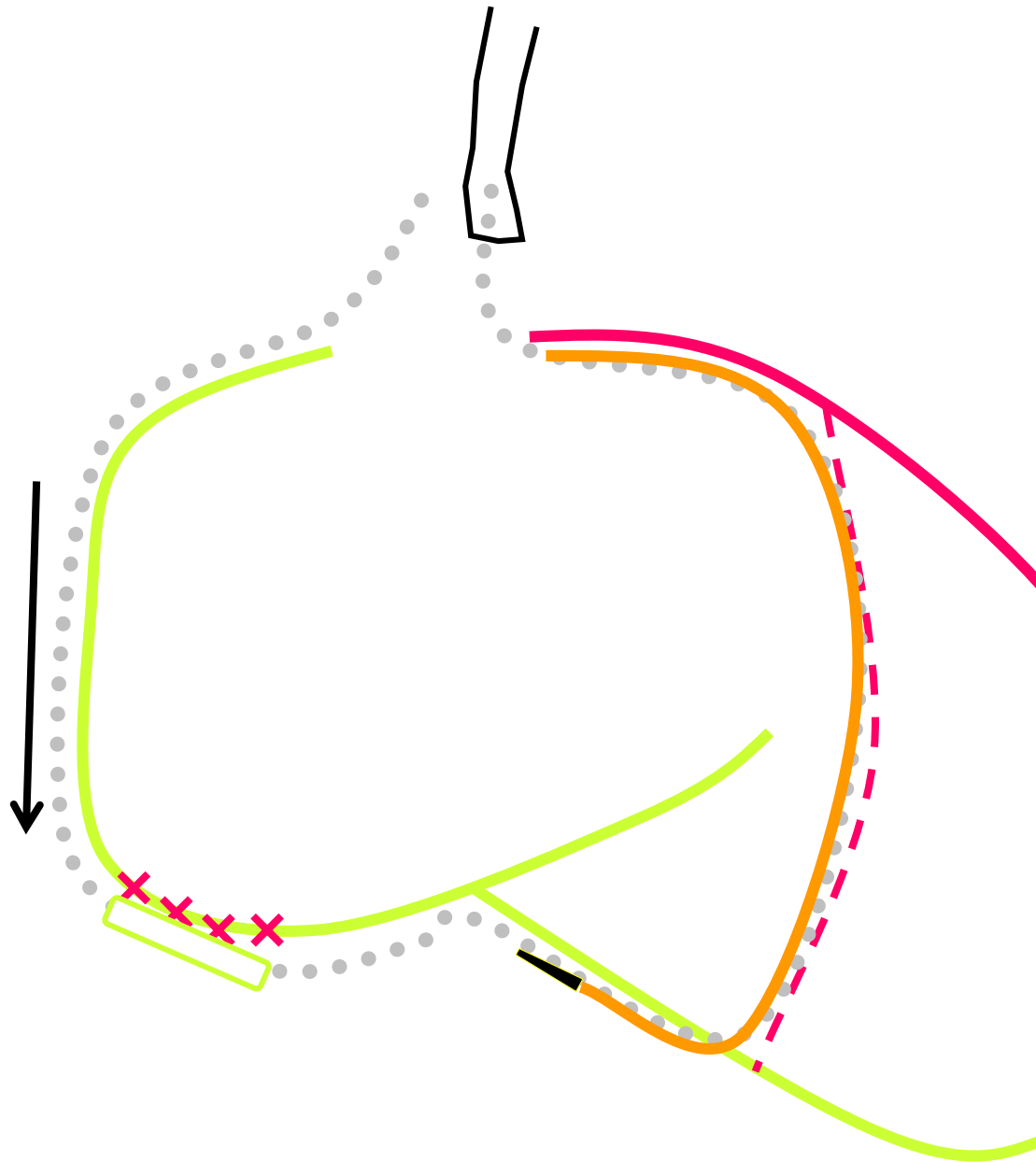


Model	Catalog No.	Diameter	Handle Length	Handle Coil Length	Radial Spring Length	Tip Shape
ASAHI R13	AHW1053025	0.26mm (0.010inch)	230cm	6cm	3cm	Straight

Externalization

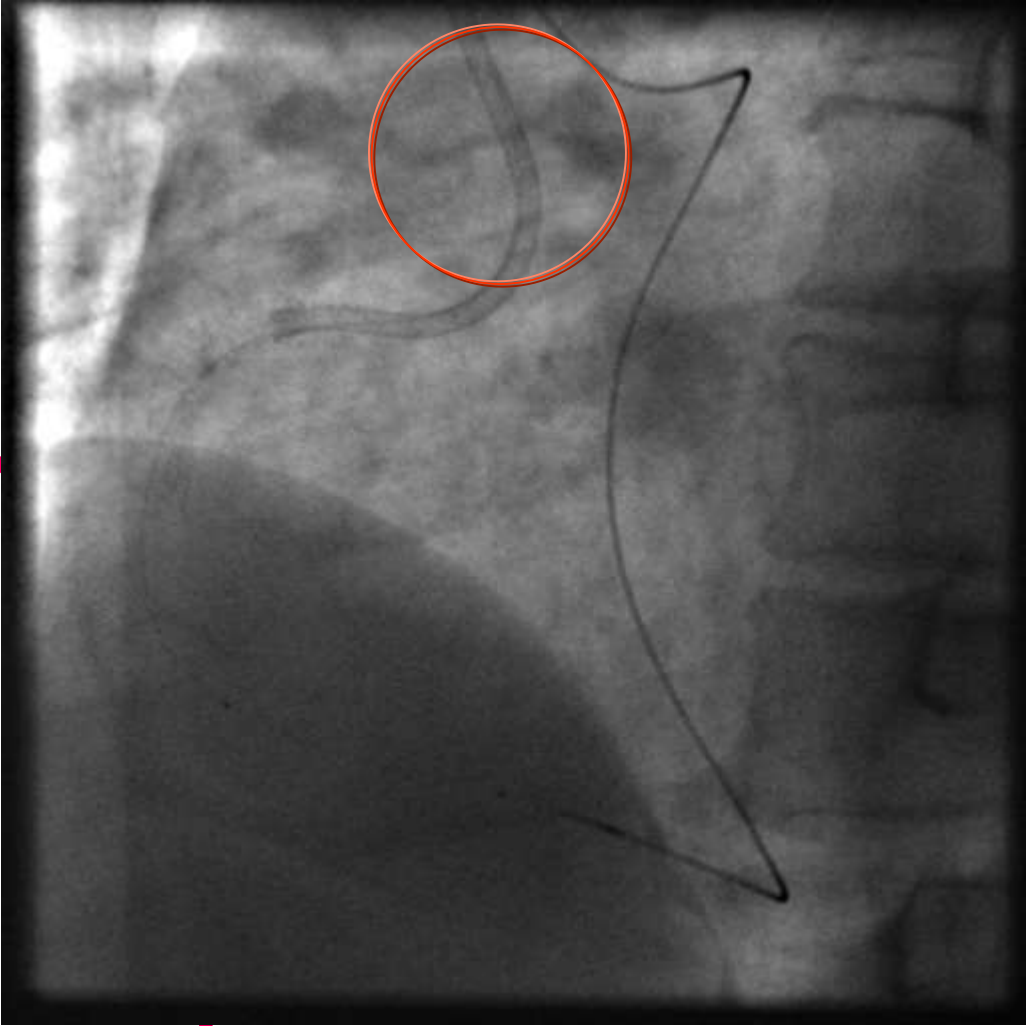
Retrograde wire & microcatheter cross to antegrade GC

# Pullback microcatheter after externalization



# Pullback microcatheter

Disengaging retro GC during pulling back Corsair to prevent ostial dissection in donor artery



# POBA and stenting from antegradely

**Never inject from ante GC  
after Reverse CART!!**

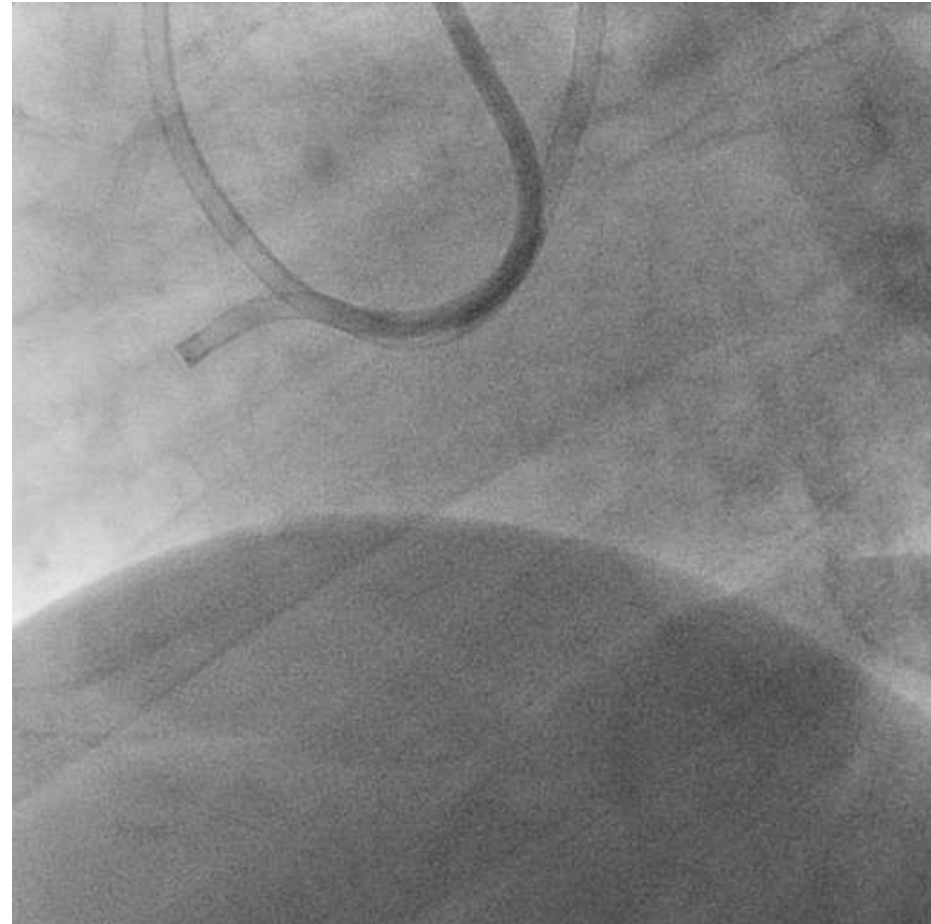
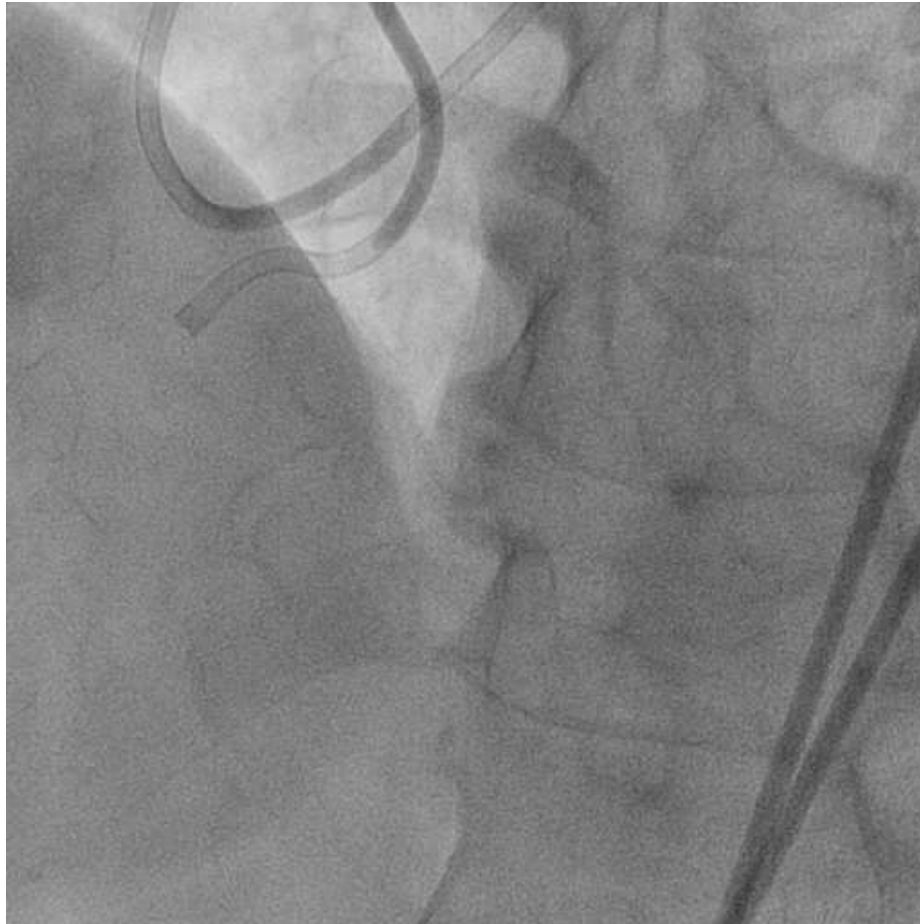
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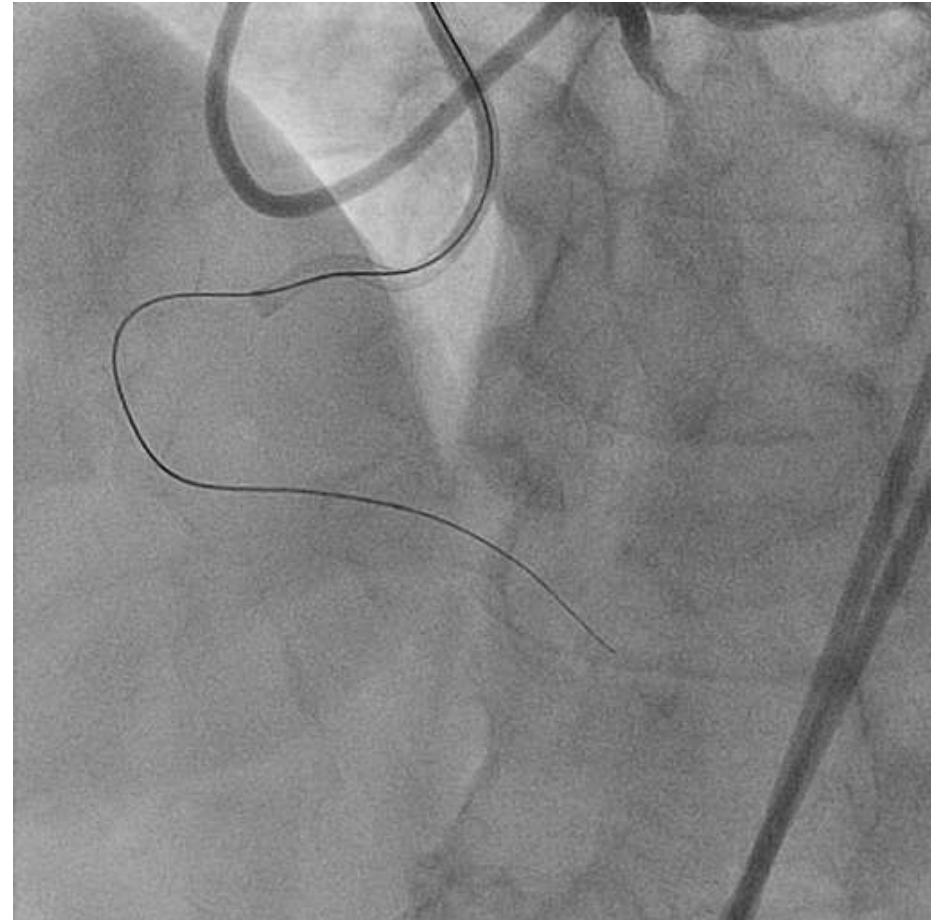
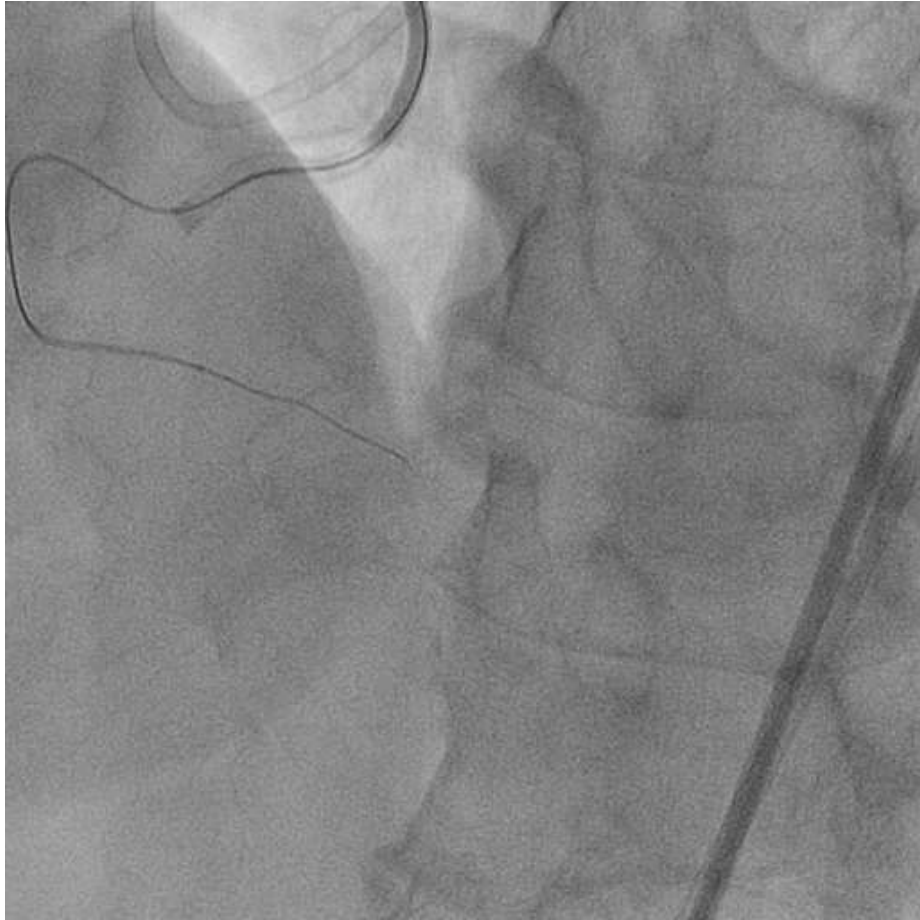
**Making connection by POBA**

||

**Making dissection (hematoma) in CTO site**

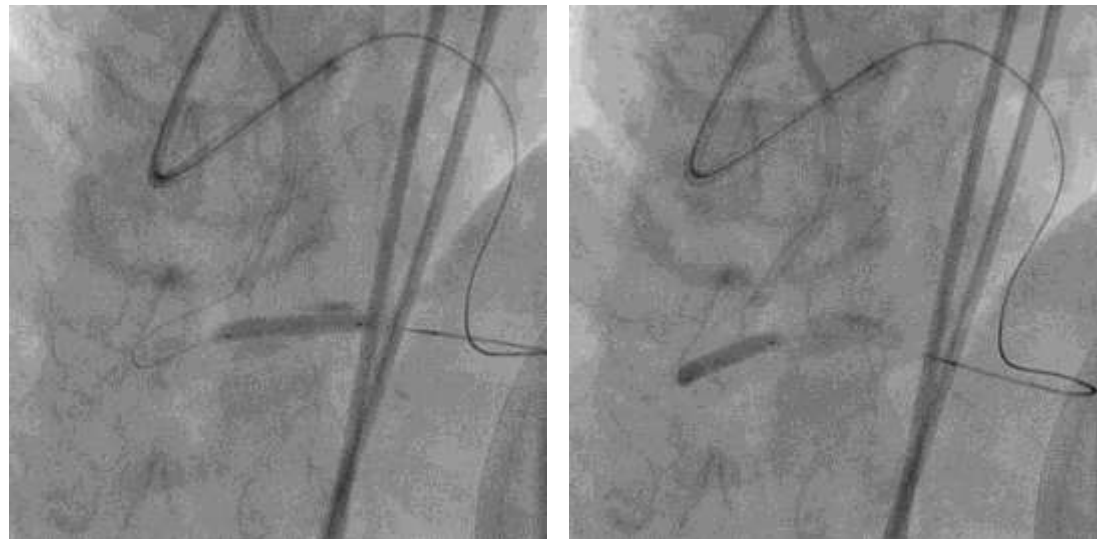
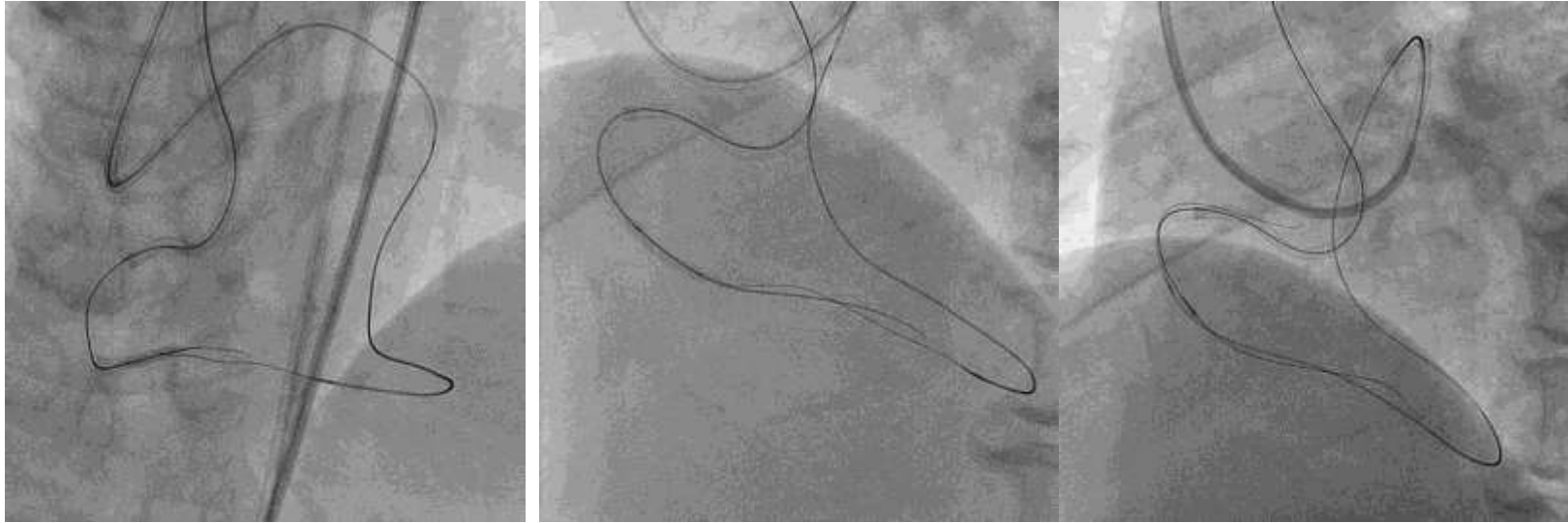
# Case: RCA CTO treated by Reverse CART





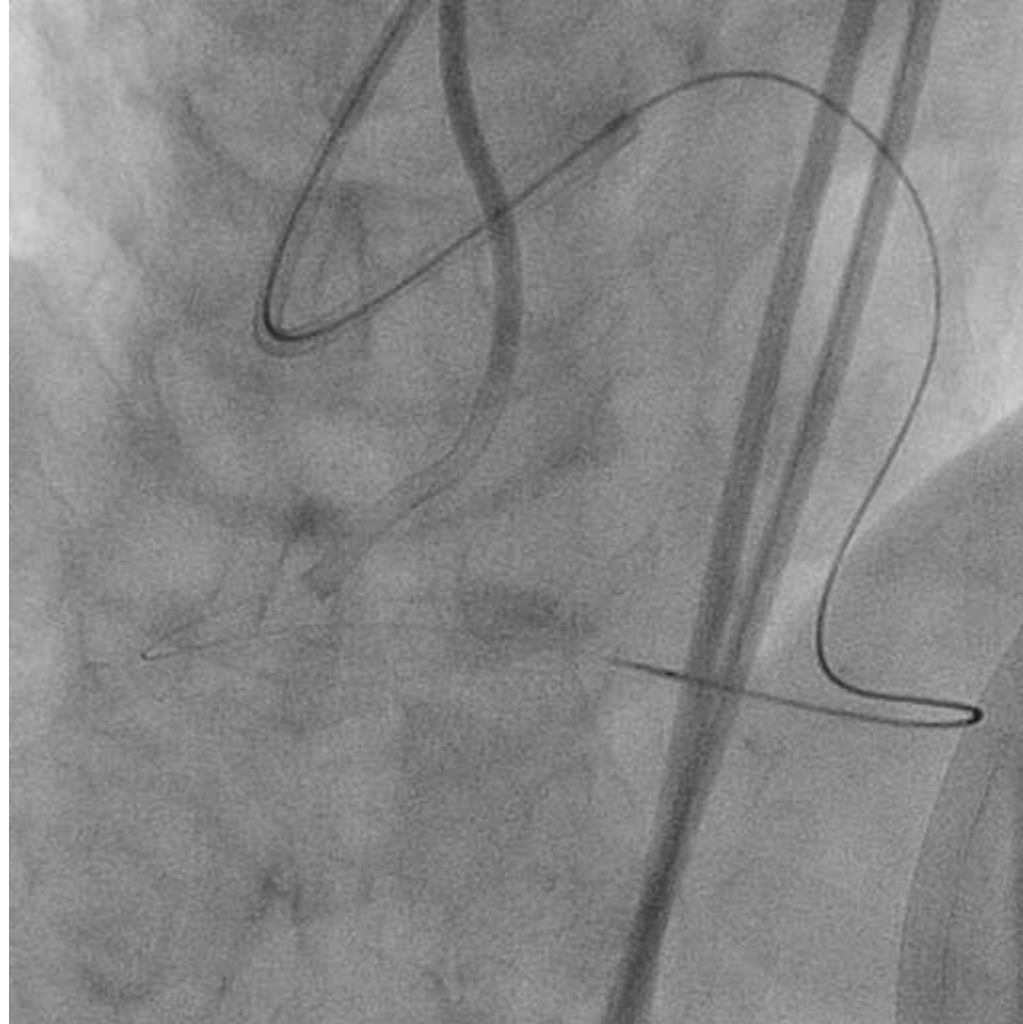
Failure of penetration

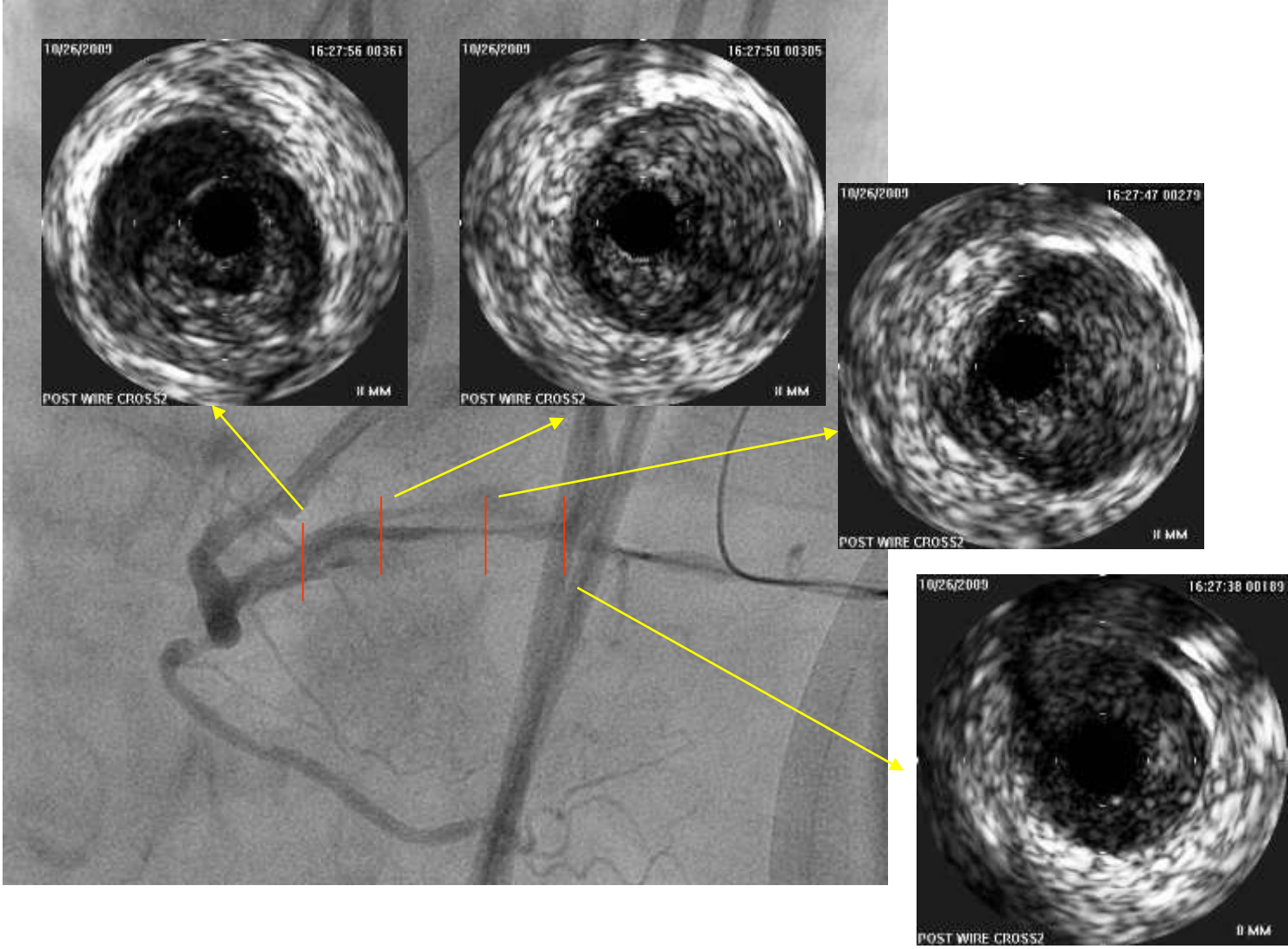
# Reverse CART technique



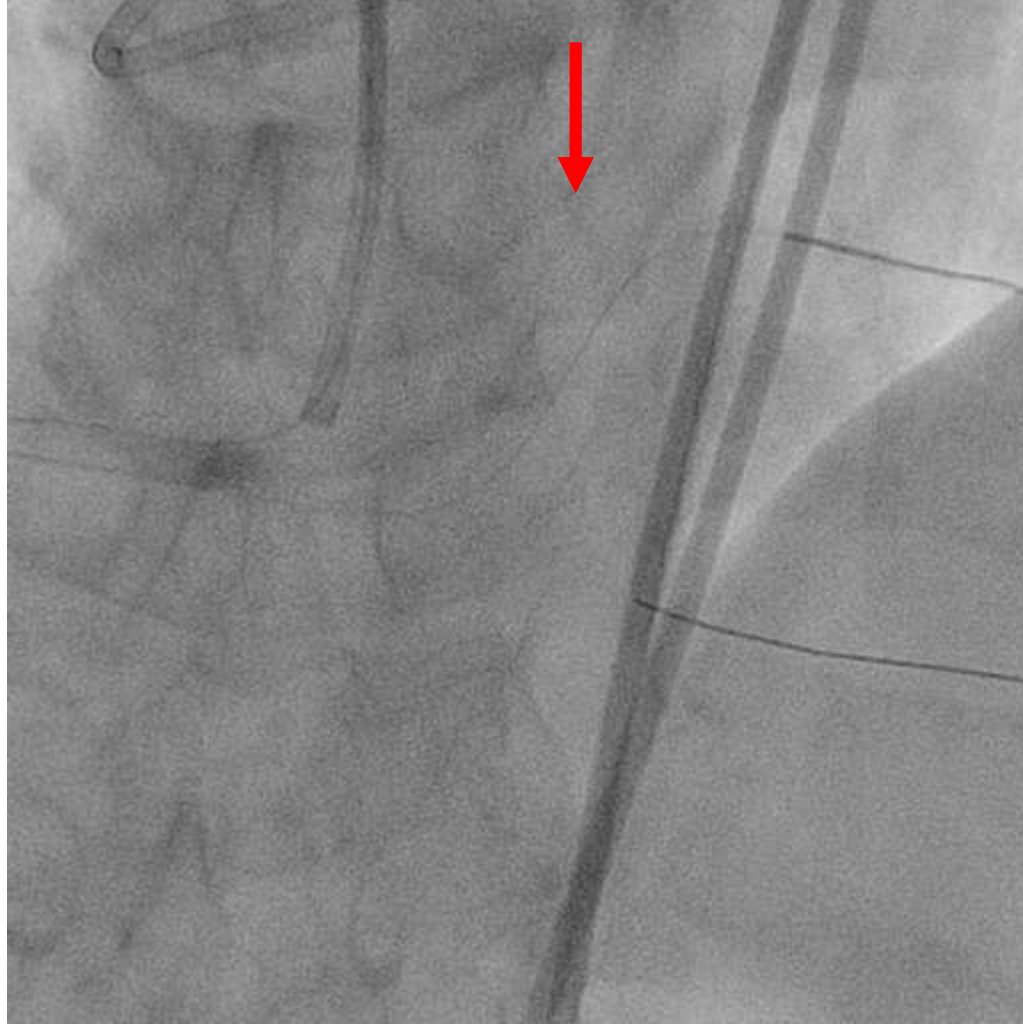


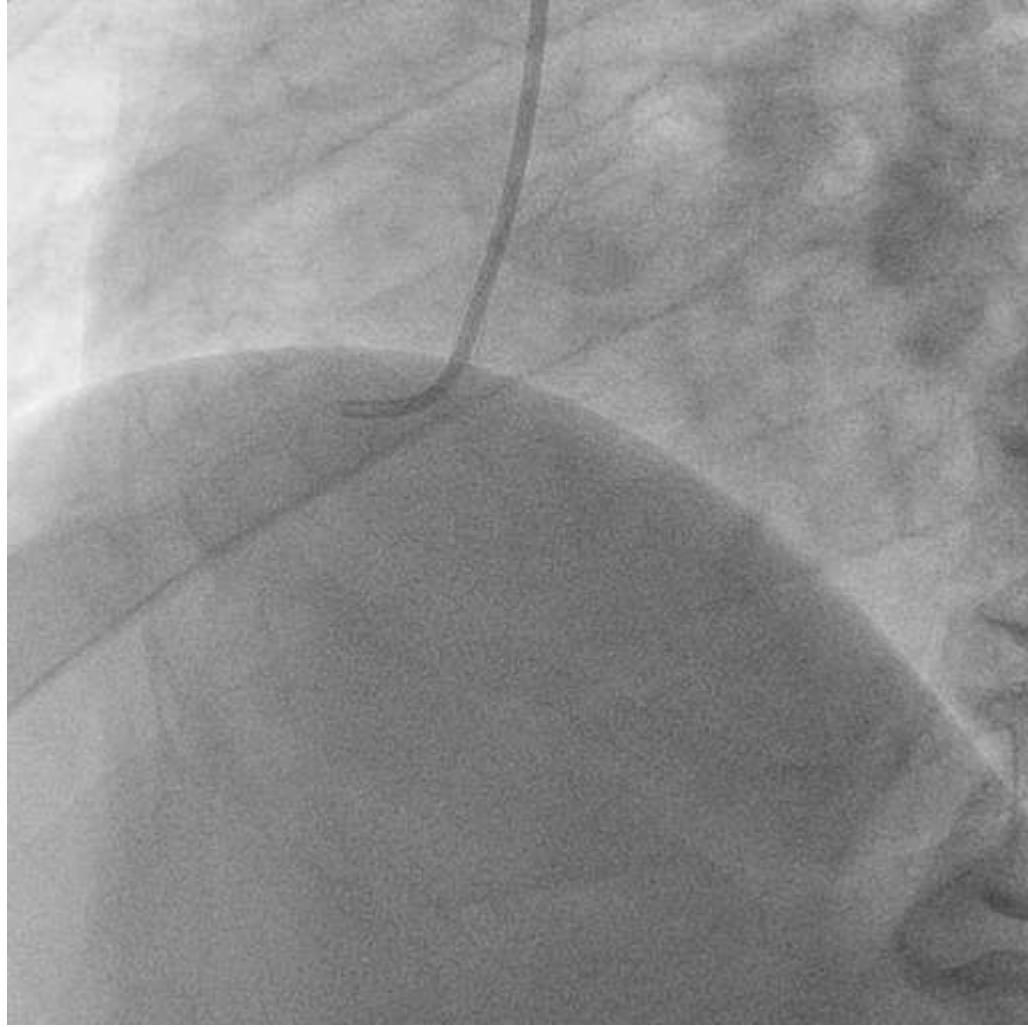
# Antegrade injection after GW crossing...





**Injection again...**





# Summary

- 1. ACT should be kept >300sec and flushing saline should be done in retro GC every 10 minutes.**
- 2. Tip injection from >2 angles is important to identify channel morphology**
- 3. IVUS should be used for contemporary Reverse CART to identify the location of retro wire.**
- 4. Strong back-up force of GC system is needed for advancement of Corsair**
- 5. Never inject from ante GC after Reverse CART!!**