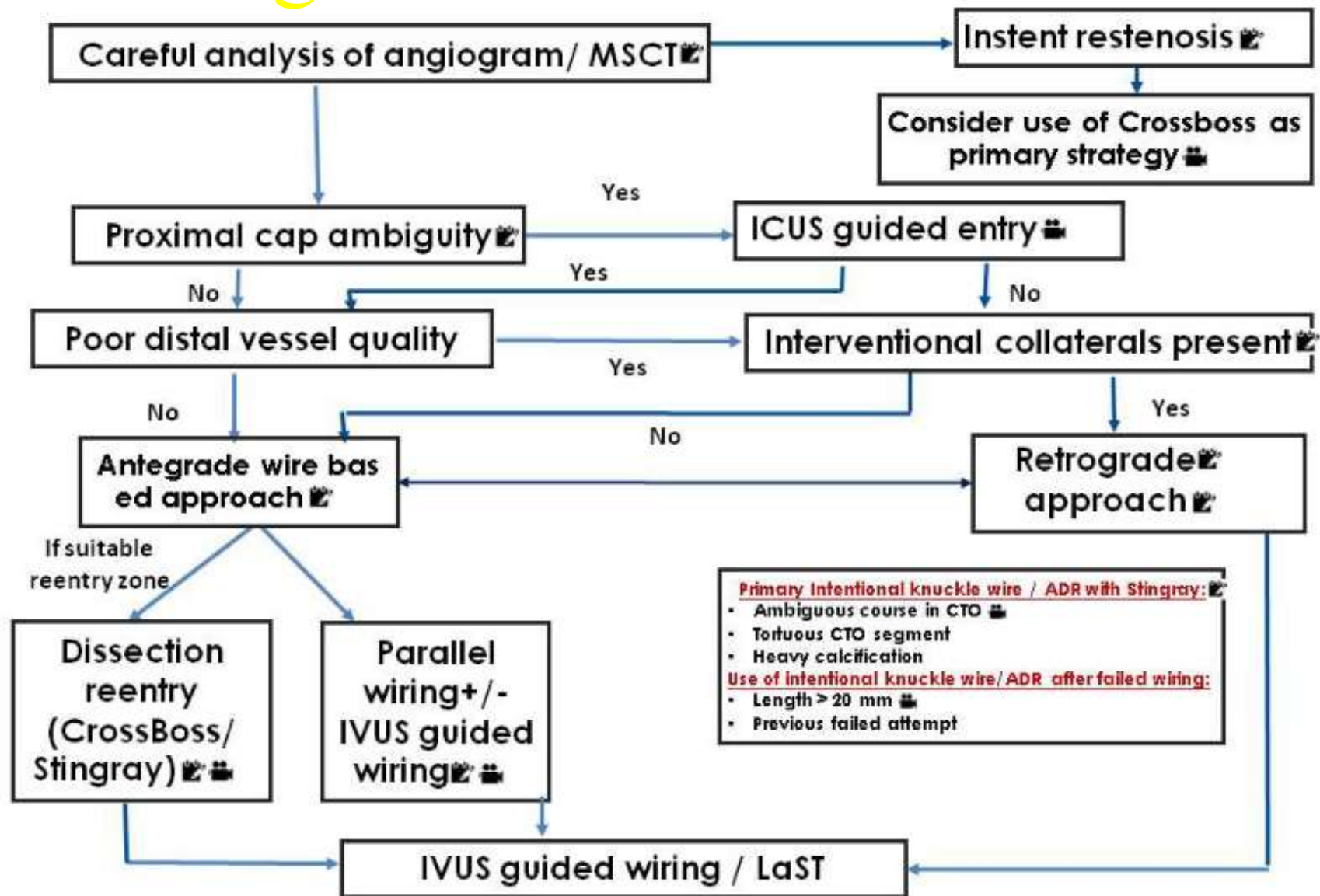


# Advanced PCI technique 2018'

Toshiya Muramatsu

Tokyo General Hospital

# Algorithm of Asia CTO club



- Primary Intentional knuckle wire / ADR with Stingray:**
- Ambiguous course in CTO
  - Tortuous CTO segment
  - Heavy calcification
- Use of intentional knuckle wire/ADR after failed wiring:**
- Length > 20 mm
  - Previous failed attempt

Consider stopping if > 3 hr; 3.7x eGFR ml contrast; Air Kerma > 5 Gy unless procedure well advanced.

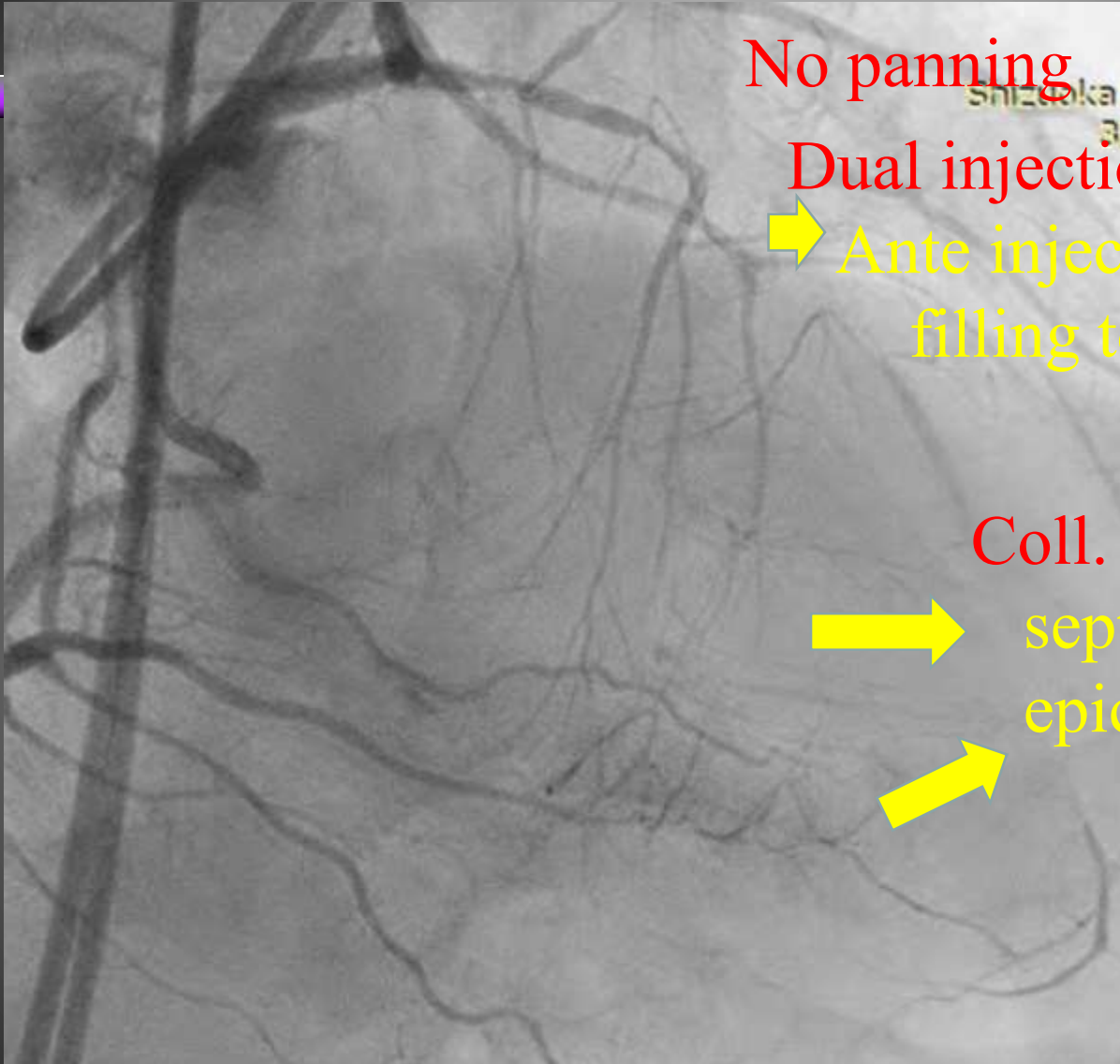
# Retrograde approach of CTO

- **Reading angiogram**
  - CTO vessel course
  - Appropriate channel
- **Collateral channel crossing**
  - Septal channel classification
  - Epicardial channel GW choice
- **CTO crossing**
  - IVUS evaluation
  - r-CART
  - Knuckle wire technique
- **Less invasive procedure**
- **Complication**
- **How to learn**

# Appropriate angiogram



# *Appropriate angiogram*



No panning

Dual injection

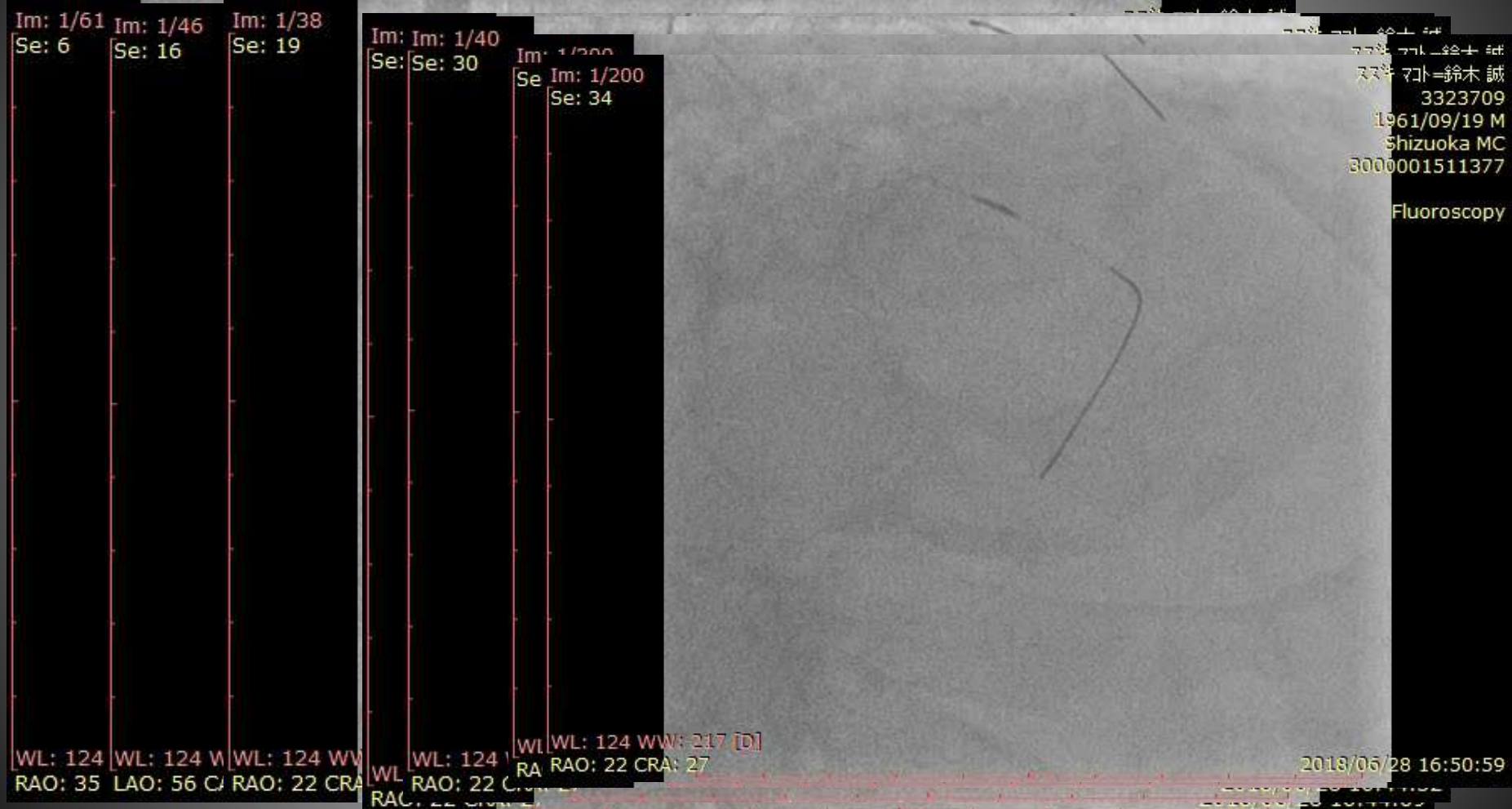
→ Ante injection after collateral filling to distal main vessel

Coll. angiogram

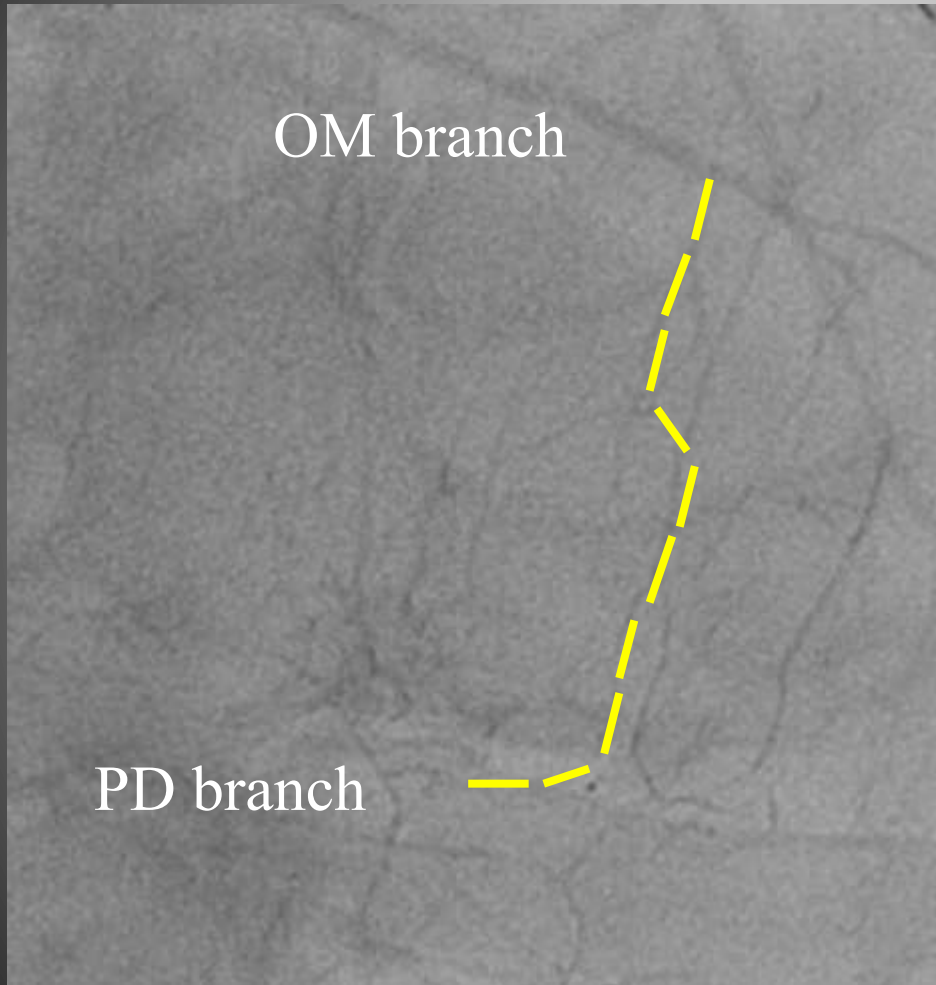
→ septal coll  
epicardial coll



# How to find channel on angiogram



# *How to find channel on angiogram*



Carefull check angio

Retrograde searching channel  
from CTO distal vessel

Consider appropriate direction  
to watch epicardial channel

Powerful injection from GC

# Retrograde approach of CTO

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# How to select guidewire

	<b>Septal</b>	<b>Epicardial</b>	<b>Graft</b>
SION	◎	◎	◎
SUOH03	◎	◎	○
XT-R	○	△ ~ ×	△
SION black	△	△	○
SION blue	○	○	○

# Septal surfen



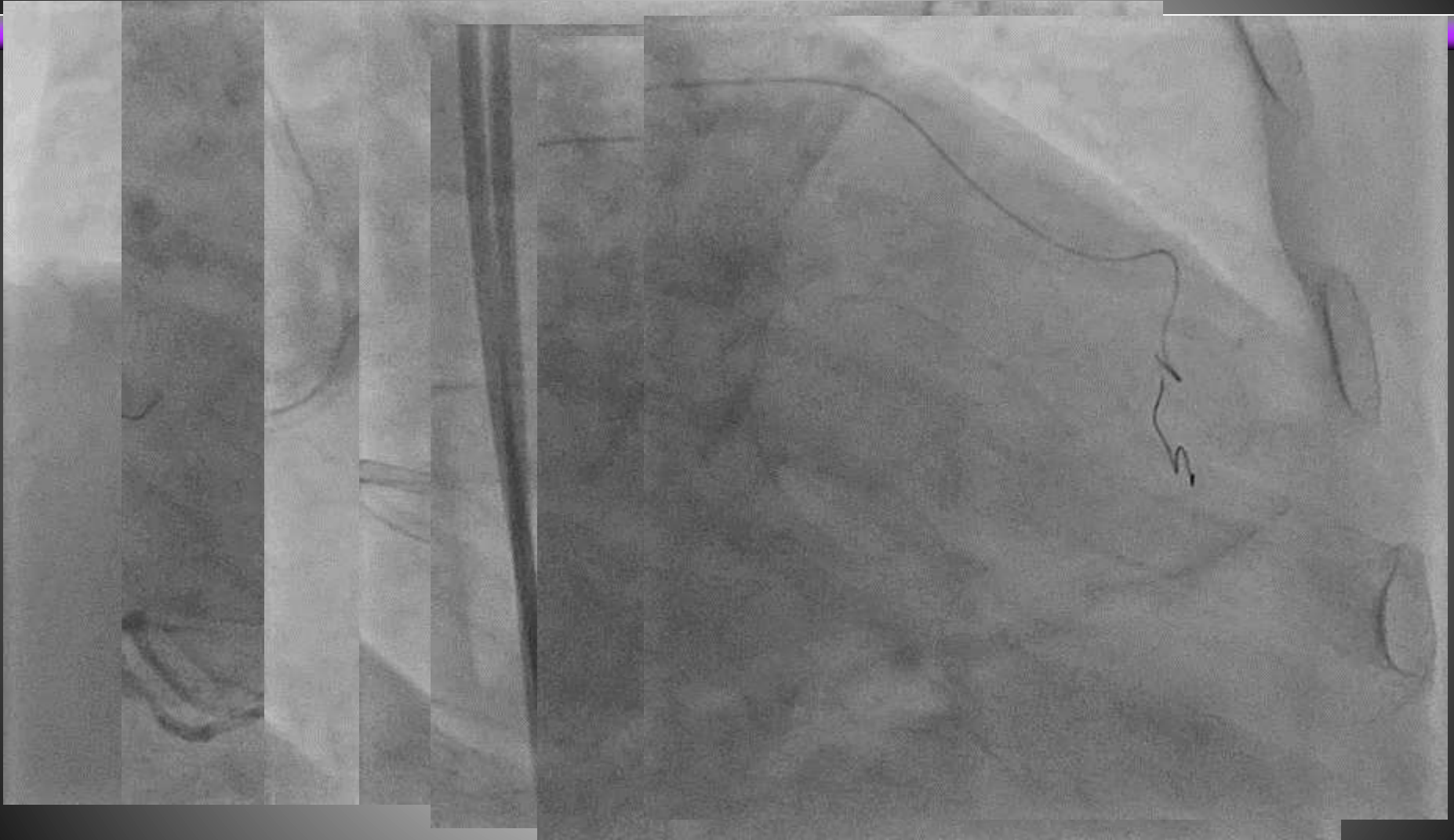
# Septal surfin

- Suoh 03 GW, Sion black GW
- Bloom type septal channel
- Expect roughly channel course
- Not to push strongly, rotate control is main manipulation
- Not too much concentrate one channel, change to try another channel

# Retrograde approach of CTO

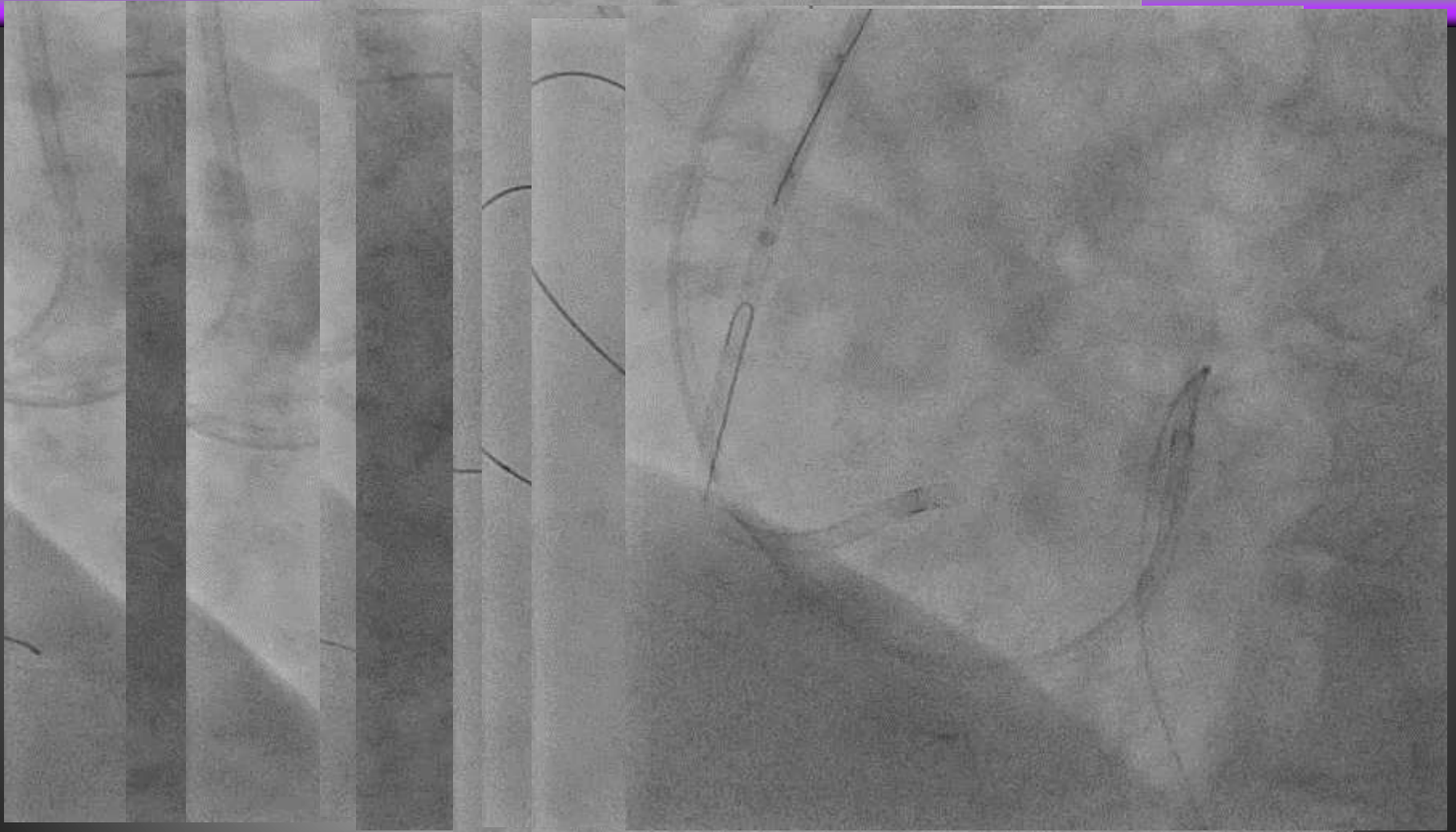
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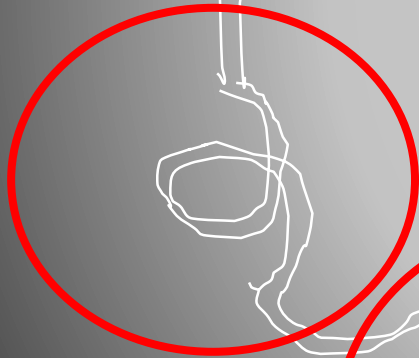
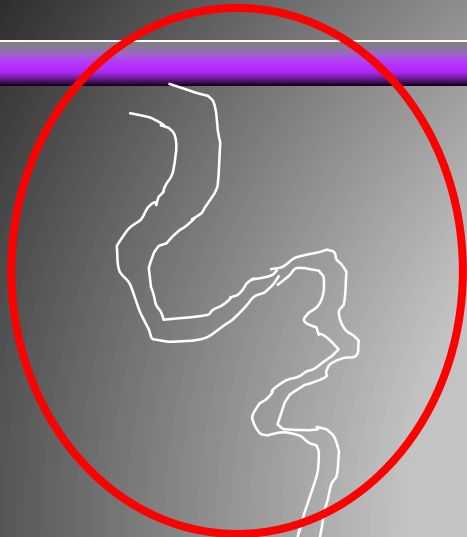
# Case of Suoh 03 GW+Caravell





# Case of Suoh 03 GW+Caravell





Sion GW


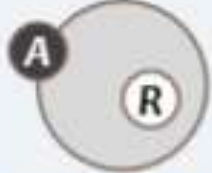
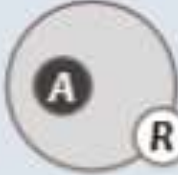
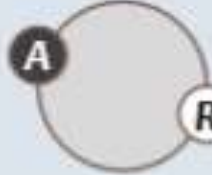
Suoh 03 GW

Suoh 03 GW

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# IVUS : Retrograde

		Antegrade wire	
		Intimal Plaque	Subintima
Retrograde wire	Intimal Plaque	 <p>Antegrade ballooning and Retrograde wiring</p>	 <p>Retrograde wiring and More proximal connection</p>
	Subintima	 <p>Antegrade ballooning or More distal connection</p>	 <p>Antegrade ballooning</p>

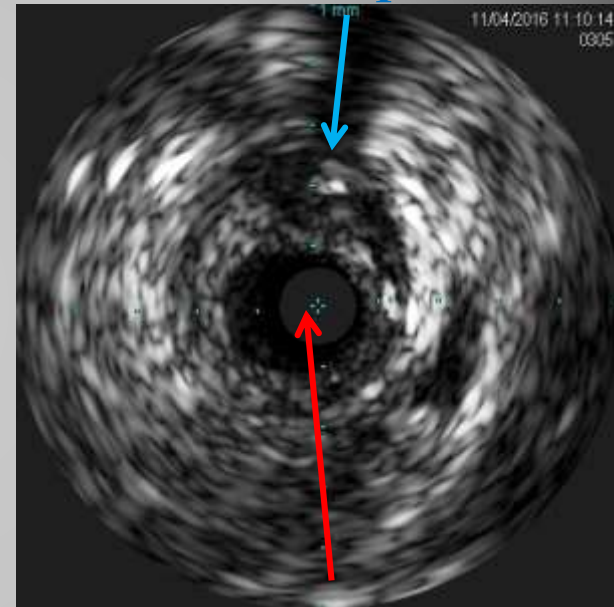
# IVUS findings in the reverse CART

This case is pattern C (very complex)  
Antegrade GW in intimal plaque  
Retrograde GW in subintimal space

To create a connection,

- 1) Dilate a proper sizing balloon to create connection between 2 GWs
- 2) Advance antegrade GW distally to reach subintimal space and change into pattern B

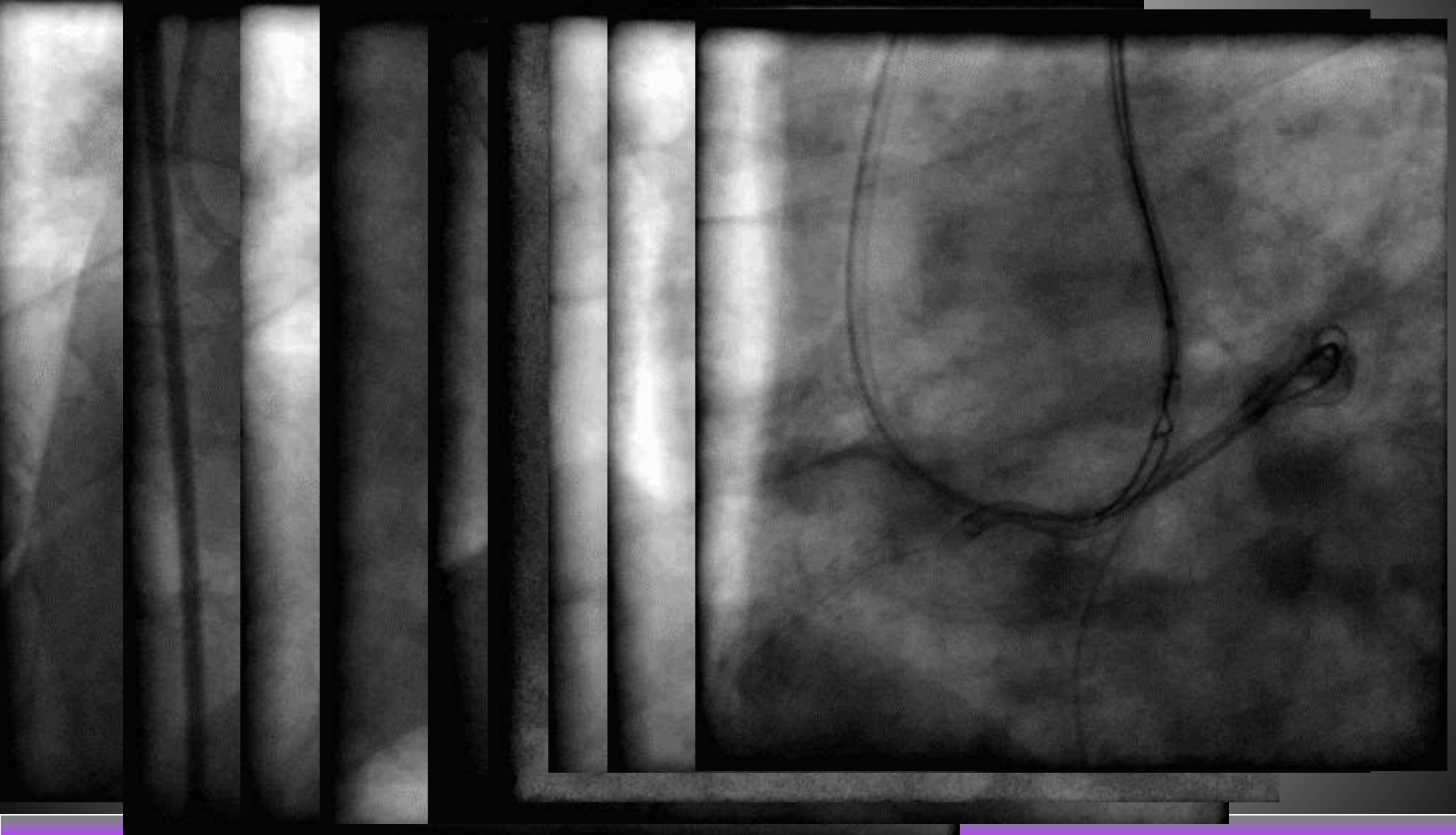
Retrograde GW  
in subintimal space



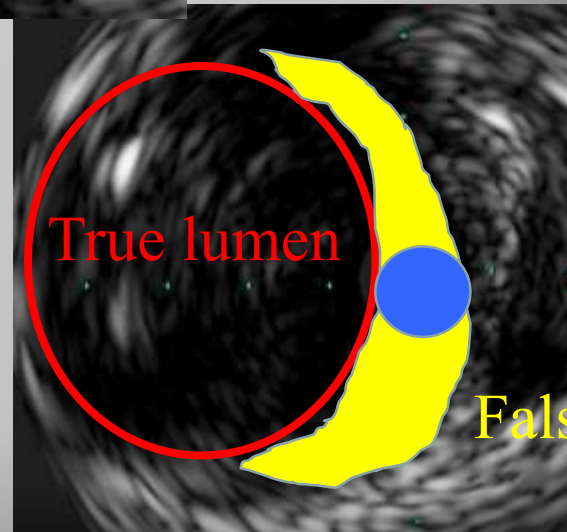
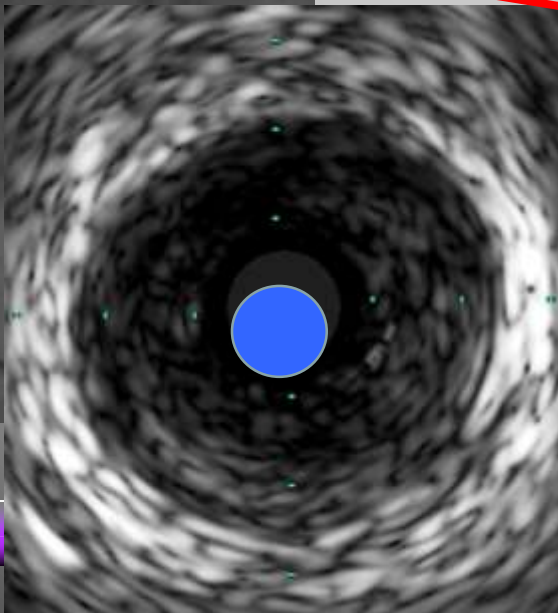
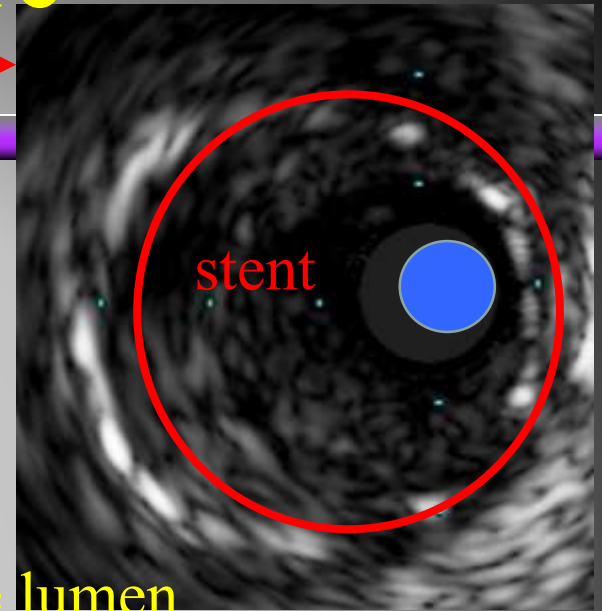
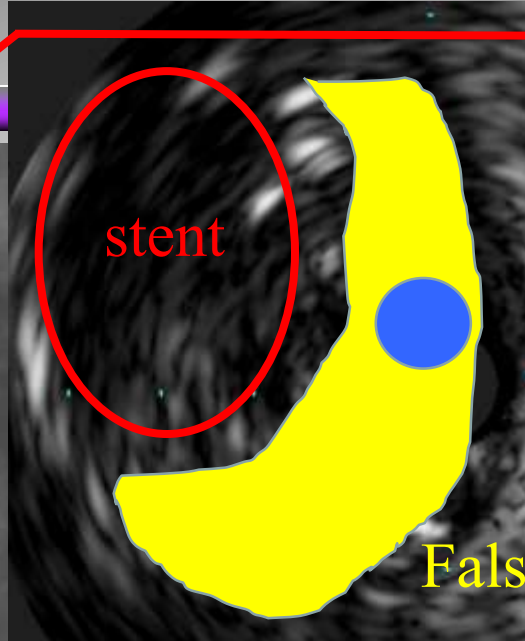
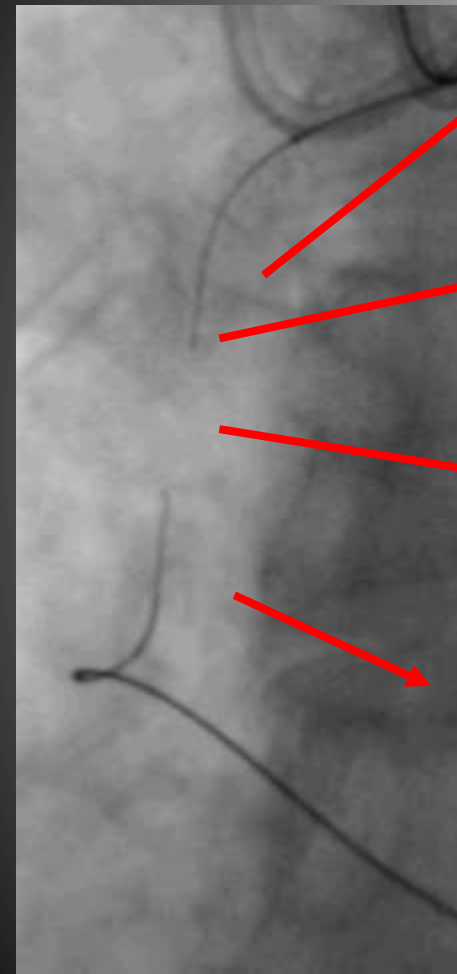
Antegrade GW  
(IVUS)  
in intimal plaque



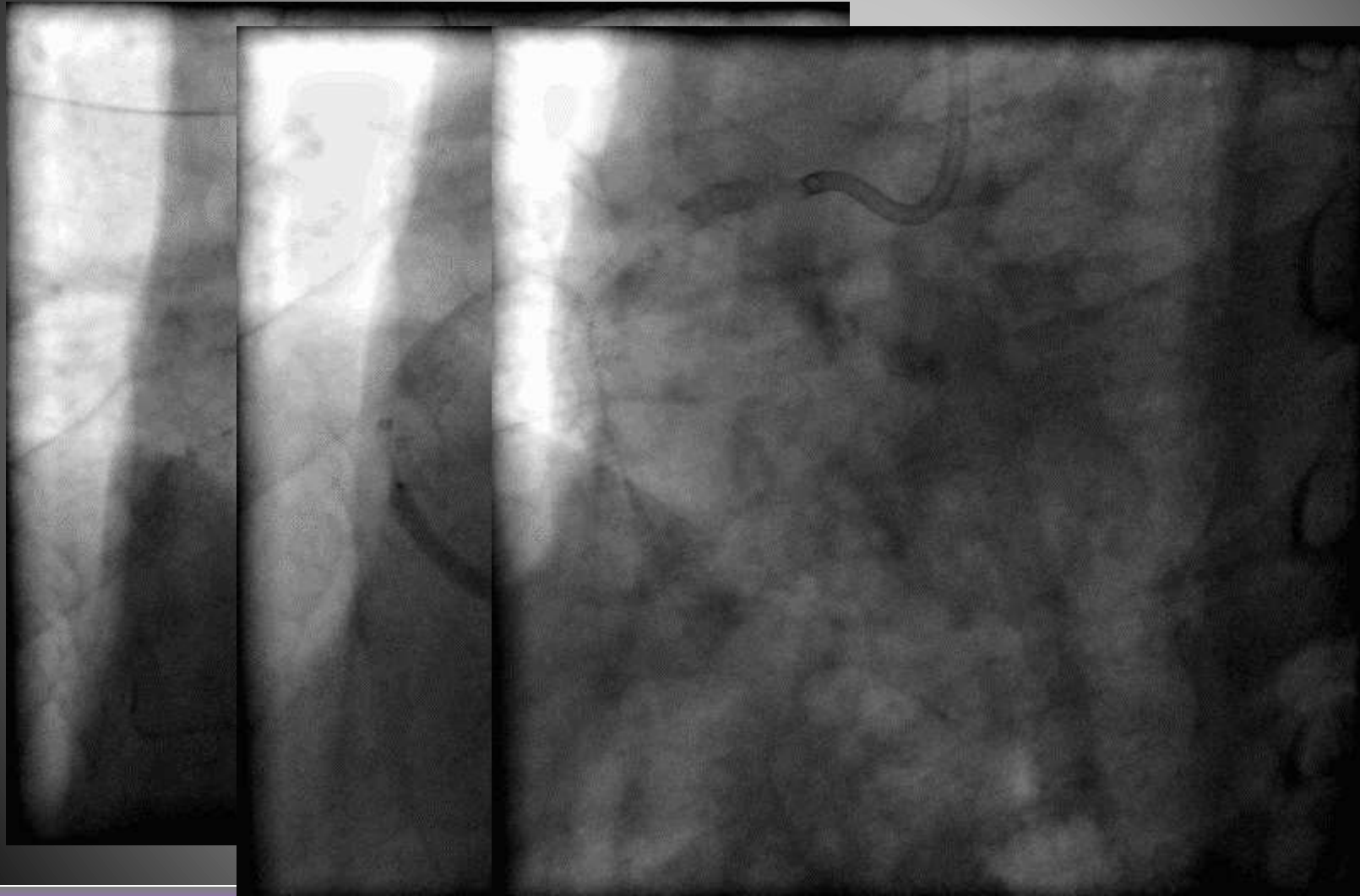
# IVUS guided knuckled wire



# IVUS guided knuckled wire



# IVUS guided knuckled wire



*Tokyo General Hospital*

# Knuckle wire+guide extension method for Subintimal stent around ISR-CTO



Ante GW into subintima

Both GW into subintima

Both Knuckled GW

Loop into subintima

Subintimal stenting around previous ISR-CTO

Tokyo General Hospital

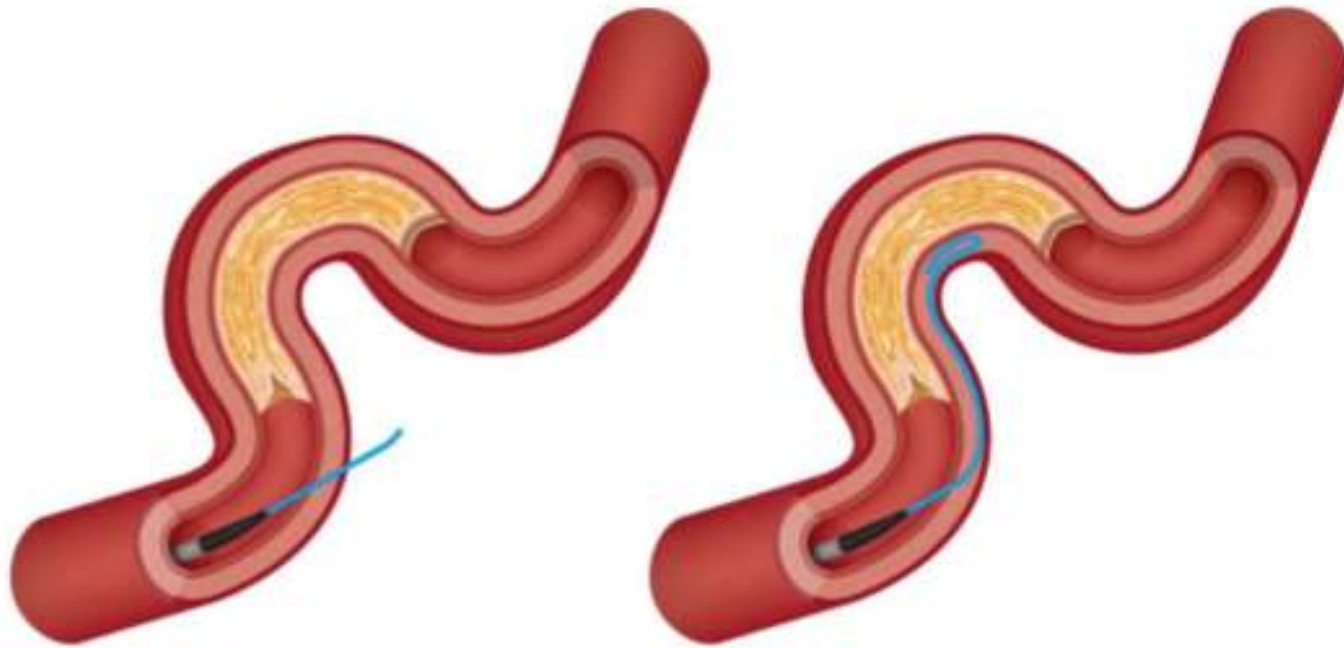


# Retrograde approach of CTO

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## Straight vs. Knuckled wires



Illustrations from 'A Guide to Mastering Retrograde CTO PCI' / [www.ctoibooks.com](http://www.ctoibooks.com)

# Key issue of knuckle wire technique

- **Use of knuckle GW**  
XTR GW, Fielder FC GW
- **Timing of knuckle wire**  
Long CTO, Both GW into subintima
- **How to make it**  
More than 90 degree bent of GW tip
- **How to advance**  
Support microcatheter
- **Avoid complication**  
Try to introduce same line as antegrade GW  
Don't inject dye  
Don't insert side branch and injury area which created by stiff GW

# Guide Extention

Im: 1/14  
Se: 37

Im: 1/14  
Se: 44

Im: 1/300  
Se: 45

スズキ マチ=鈴木 誠  
3323709  
1961/09/19 M  
Shizuoka MC  
3000001511377

Fluoroscopy

WL: 124 WW:  
LAO: 50 CRA:

WL: 120 WW: 2  
LAO: 50 CRA: 5

WL: 124 WW: 217 [D]  
LAO: 50 CRA: 5

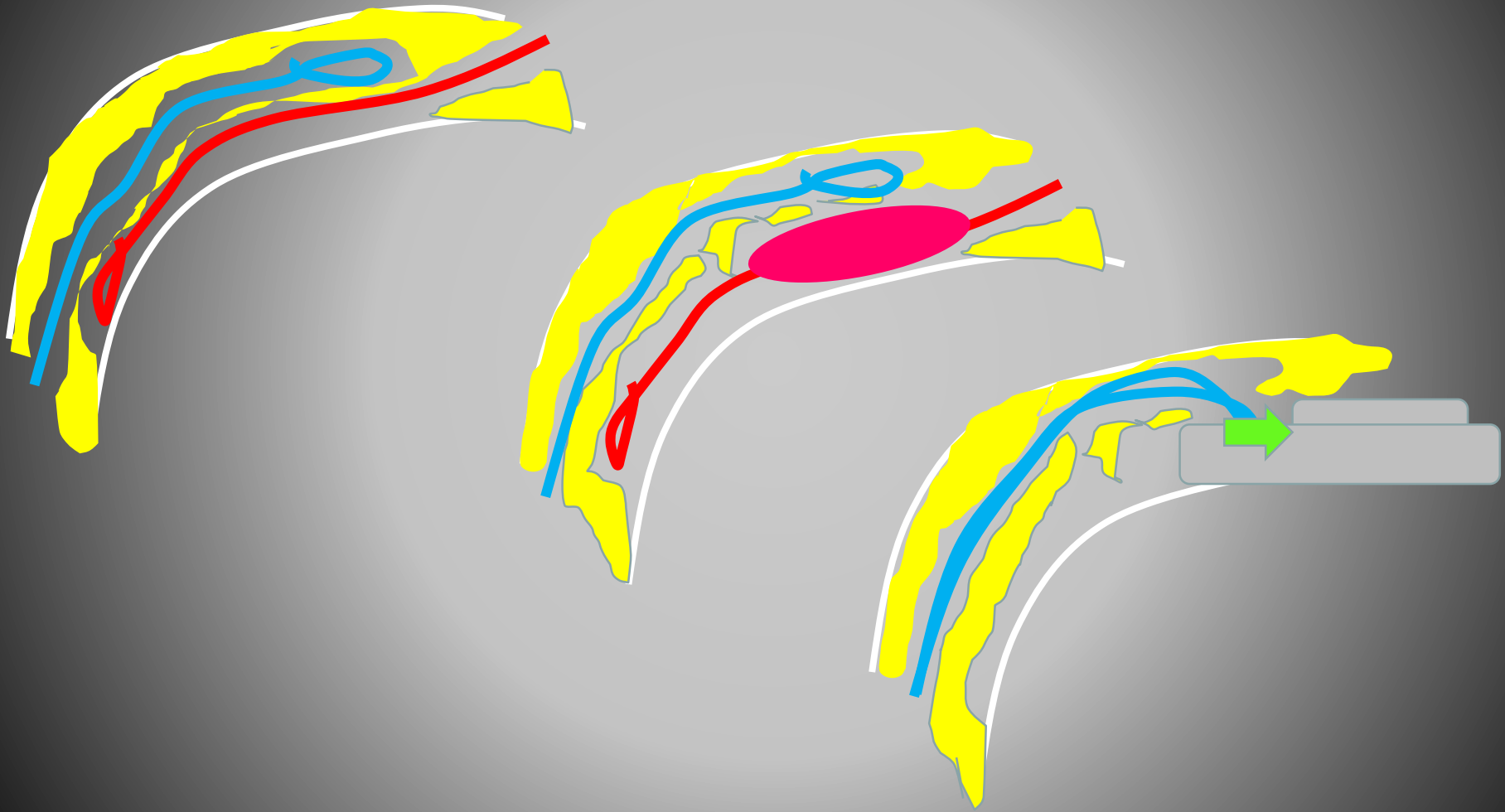
2018/06/28 17:36:15

2018/06/28 17:34:50

# *knuckle wire+guide extention method*



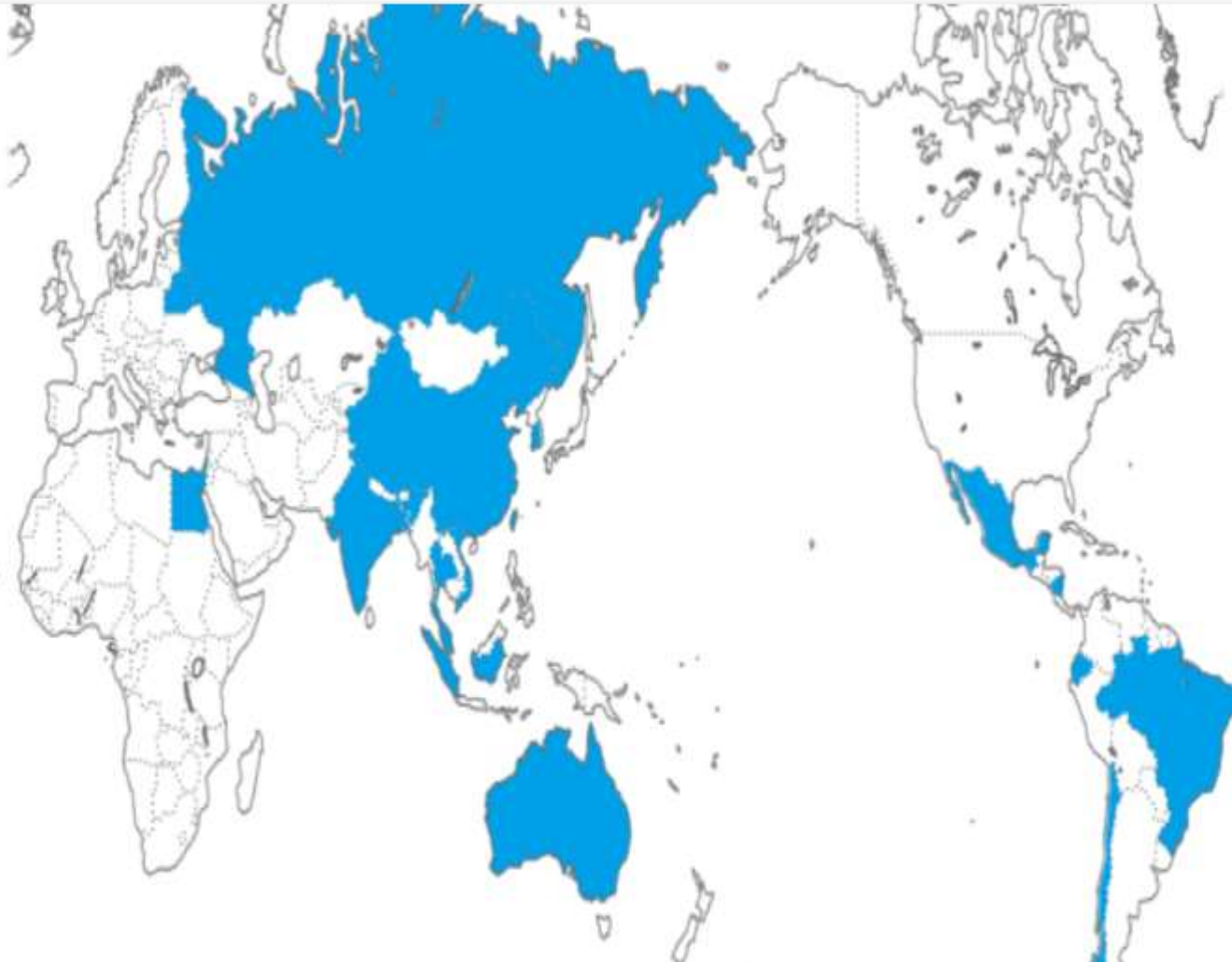
# *knuckle wire+guide extention method*





**How to educate**

**PCI for complex CTO**



**Successive participants are from 20 countries.**

# In-bound Program

Morning Conference



Brief live demonstration



Observe PCI



Lectures



Hands-on training with simulators



# Section 1 guidewire shaping and handling / microcatheter



③ Antegrade wiring has been by D2 image



## Section 2 retrograde channel tracking



③ ② ① ④ ⑤ ⑥ ⑦ ⑧ ⑨ ⑩ ⑪ ⑫ ⑬ ⑭ ⑮ ⑯ ⑰ ⑱ ⑲ ⑳ ㉑ ㉒ ㉓ ㉔ ㉕ ㉖ ㉗ ㉘ ㉙ ㉚ ㉛ ㉜ ㉝ ㉞ ㉟ ㊱ ㊲ ㊳ ㊴ ㊵ ㊶ ㊷ ㊸ ㊹ ㊺ ㊻ ㊼ ㊽ ㊾ ㊿ ① ② ③ ④ ⑤ ⑥ ⑦ ⑧ ⑨ ⑩ ⑪ ⑫ ⑬ ⑭ ⑮ ⑯ ⑰ ⑱ ⑲ ⑳ ㉑ ㉒ ㉓ ㉔ ㉕ ㉖ ㉗ ㉘ ㉙ ㉚ ㉛ ㉜ ㉝ ㉞ ㉟ ㊱ ㊲ ㊳ ㊴ ㊵ ㊶ ㊷ ㊸ ㊹ ㊺ ㊻ ㊼ ㊽ ㊾ ㊿





# Take Home Message

- Retrograde approach has made to big change CTO PCI strategy.
- Even, Detail appropriate reading of angiography is still most important key issue to overcome complex CTO cases.
- Two important issues are how to cross tiny, tortuous channels and how to cross CTO retrogradely.
- Compared to antegrade approach, there are some pit holes in retrograde approach and so it is necessary to obtain how to bail out from crisis of complication.
- In the future, Training and educational organization will be more important roles for young interventional cardiologist.