Retry or not in failed CTO intervention case ?

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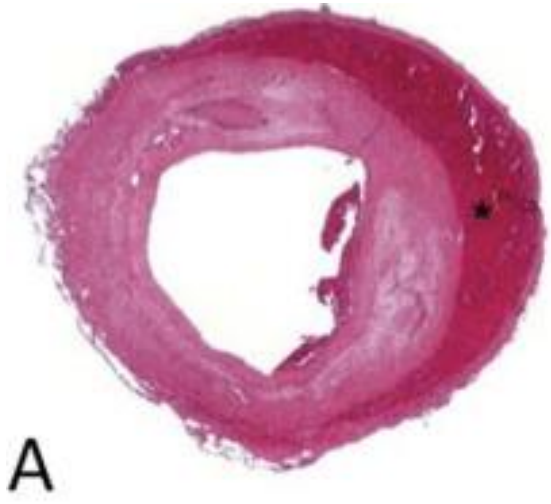
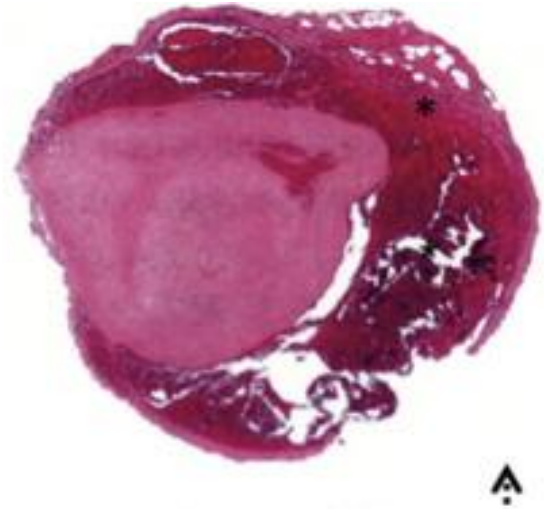
Reason for the failed CTO-PCI

Histopathology of CTO segment in autopsy case

(patient underwent unsuccessful CTO-PCI who eventually died from retroperitoneal hemorrhage)

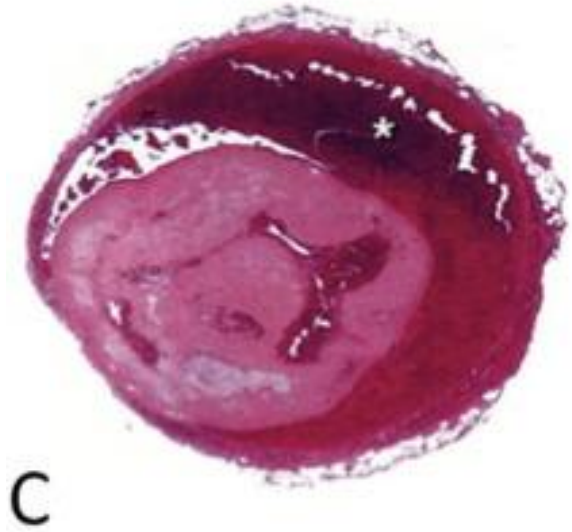
Proximal true lumen site

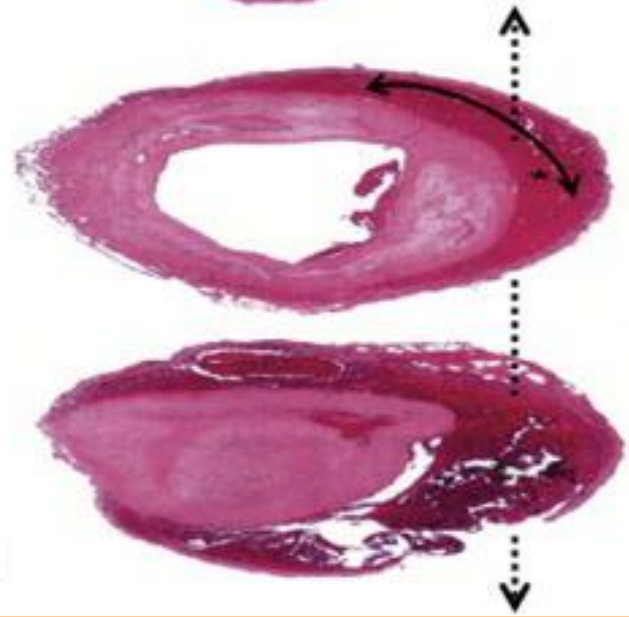




CTO site with subintimal hematoma

Distal true lumen collapsed by extended hematoma

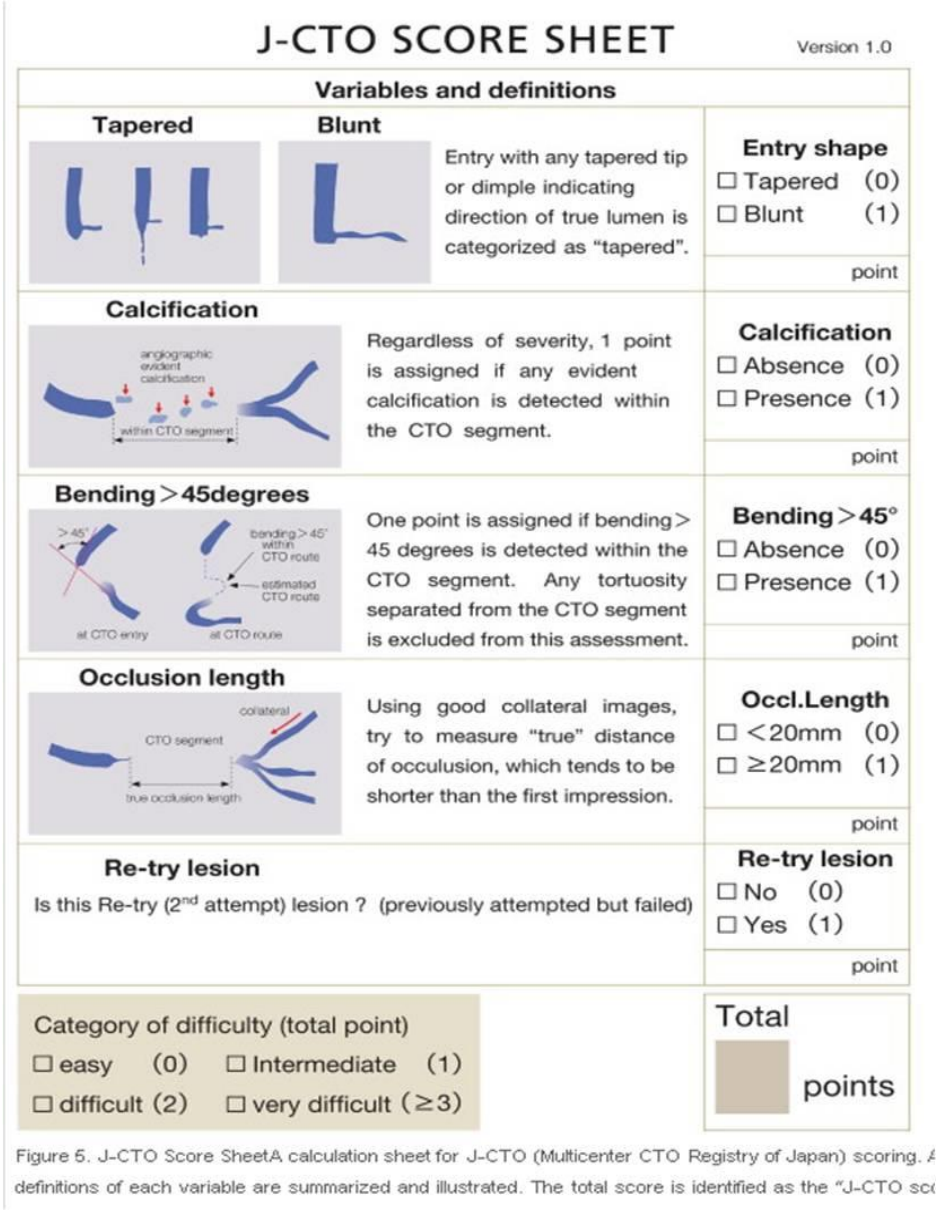




Subintimal space extension (transversely & longitudinally)

Sumitsuji S et al. JACC-Interv 2011

Procedural significance of retry lesion as reflected in J-CTO score



J-CTO SCORE SHEET

Version 1.0

Variables and definitions

Tapered **Blunt**

Entry with any tapered tip or dimple indicating direction of true lumen is categorized as "tapered".

Entry shape
☐ Tapered (0)
☐ Blunt (1)
point

Calcification

angiographic evident calcification
within CTO segment

Regardless of severity, 1 point is assigned if any evident calcification is detected within the CTO segment.

Calcification
☐ Absence (0)
☐ Presence (1)
point

Bending＞45degrees

＞45°
bending＞45° within CTO route
estimated CTO route
at CTO entry
at CTO route

One point is assigned if bending＞45 degrees is detected within the CTO segment. Any tortuosity separated from the CTO segment is excluded from this assessment.

Bending＞45°
☐ Absence (0)
☐ Presence (1)
point

Occlusion length

collateral
CTO segment
true occlusion length

Using good collateral images, try to measure "true" distance of occulusion, which tends to be shorter than the first impression.

Occl.Length
☐ ＜20mm (0)
☐ ≥20mm (1)
point

Re-try lesion

Is this Re-try (2nd attempt) lesion ? (previously attempted but failed)

Re-try lesion
☐ No (0)
☐ Yes (1)
point

Category of difficulty (total point)
☐ easy (0) ☐ Intermediate (1)
☐ difficult (2) ☐ very difficult (≥3)

Total
points

Figure 5. J-CTO Score SheetA calculation sheet for J-CTO (Multicenter CTO Registry of Japan) scoring. A definitions of each variable are summarized and illustrated. The total score is identified as the "J-CTO sc

Retry lesion means at least J-CTO score 1 (intermediate)
→ not for the beginner or non-CTO expert

Morino Y et al. JACC-Interv 2011

When to consider retry CTO-PCI

Situations which allows retry CTO-PCI

The BOTTOM LINE – no serious complications happened during previous attempt, such as

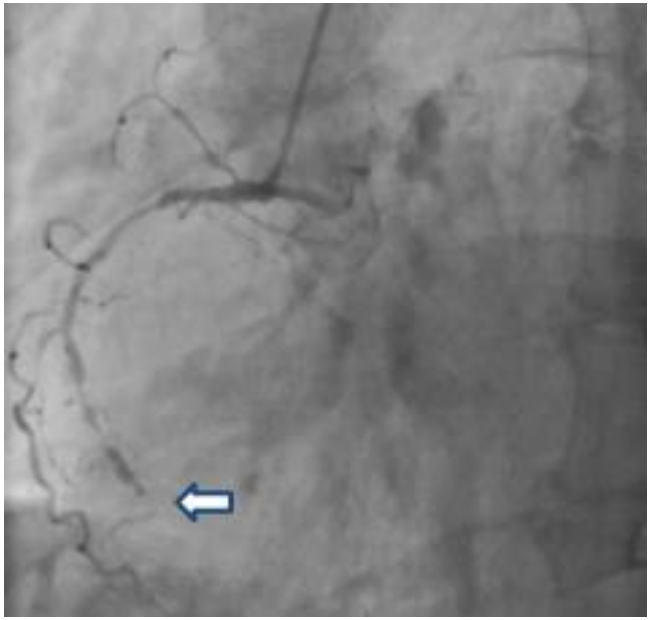
1) **Coronary rupture with cardiac tamponade**
2) **Irreversible damage by contrast-induced nephropathy or radiation dermatitis from previous attempt**
3) **Collateral channel perforation with subsequent sealing procedure (no future collateral tracking possible)**
4) **Stent placed in subintimal space without clear connection to the distal true lumen**

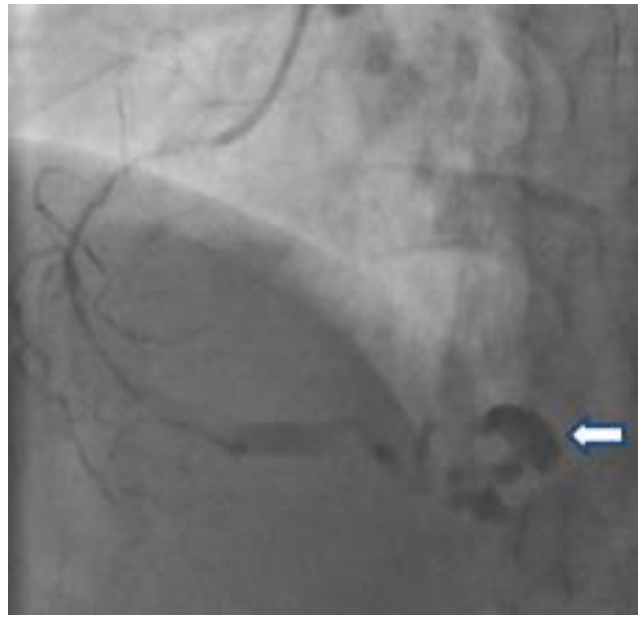
Otherwise, IT IS BETTER TO DO Retry CTO-PCI, as long as proper resources are available

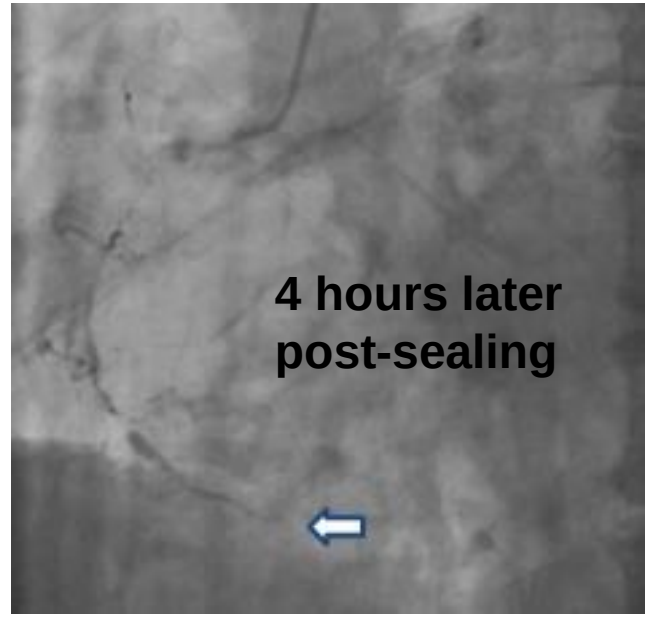
Best candidate – previous only wiring attempt without aggressive wire manipulation (as well as patient's willingness for retry)

Coronary perforation with sealing procedure

M/55, hypertension and DM
CAOD(LM+2VD: LM 70%, mLAD 80%, mRCA-CTO)
PCI at LM-LAD performed 2 days ago
During this PCI, type III perforation developed with accompanying chest pain after 1.25x15mm Ryujin balloon several times → Gelfoam embolization performed successfully







The patient stabilized and discharged without further issues
→ However, the patient was discouraged to do retry CTO-PCI. To make matters worse, the patient developed CIN (S-Cr 1.4 → 2.8)
→ No candidate for retry CTO-PCI

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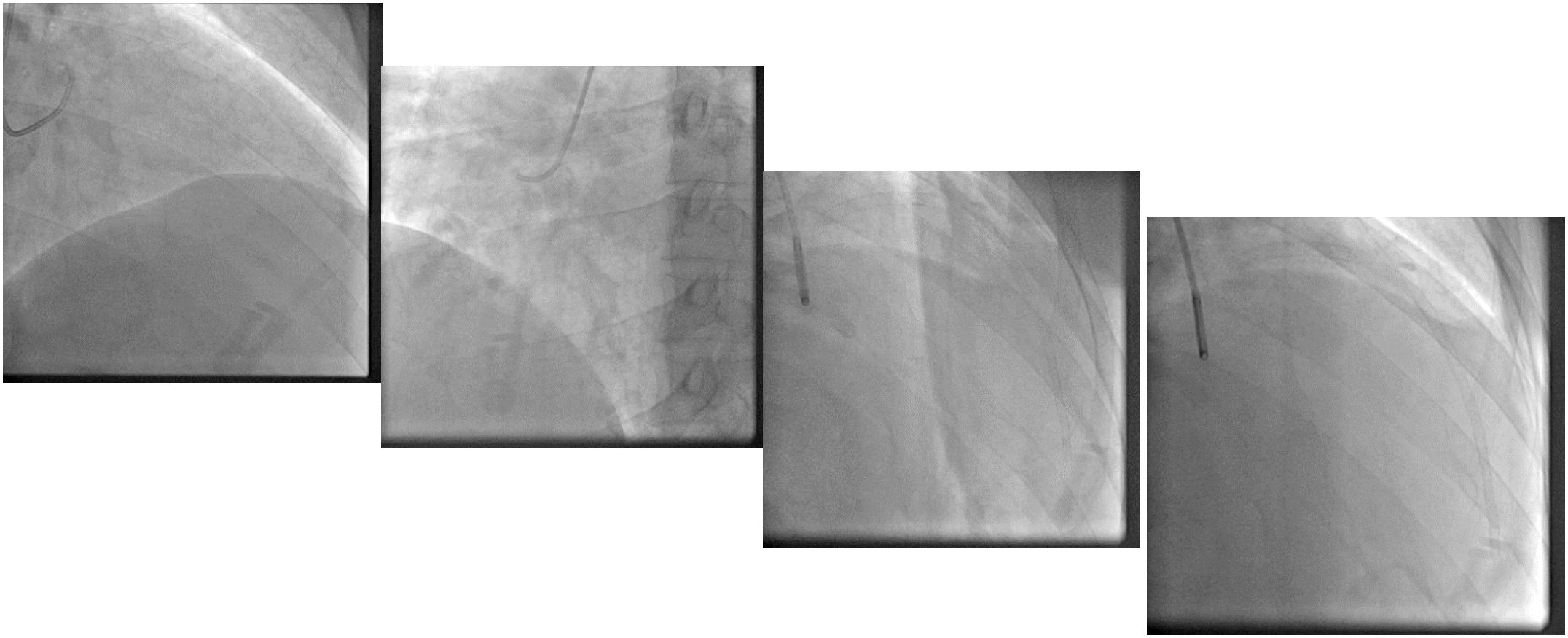
Previous stent implanted in the wrong space

M/33, #140229193

Acute ischemic stroke on DAPT, chest pain(+)

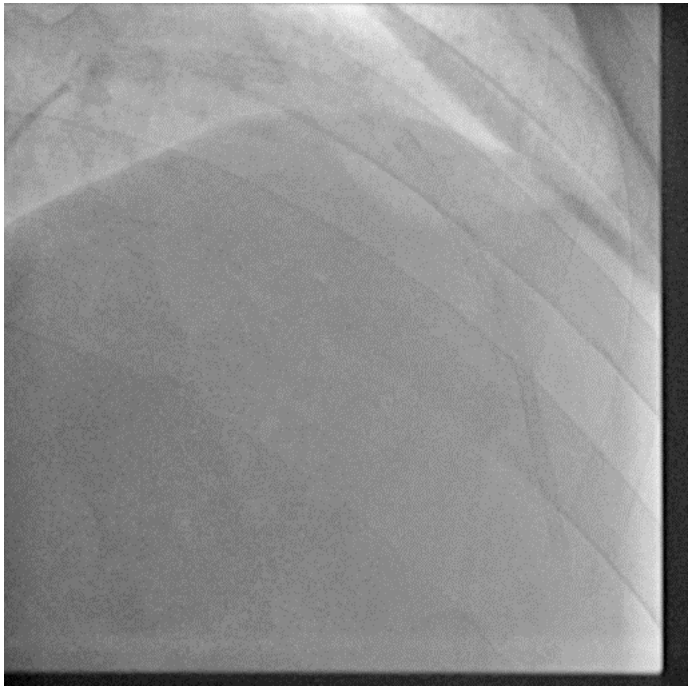
Echo: LVEF 47%, RWMA on LAD territory, LV apical thrombi(+)

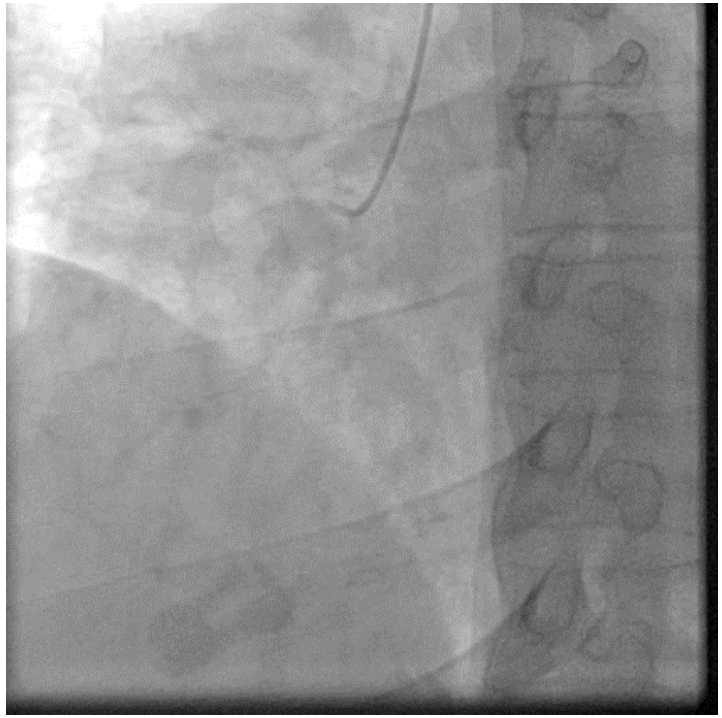
PCI was performed – after GW went down, 4 Orsiro 3.5x30mm, 3.0x26mm, 2.75x40mm, 2.5x30mm were deployed in overlapped fashion

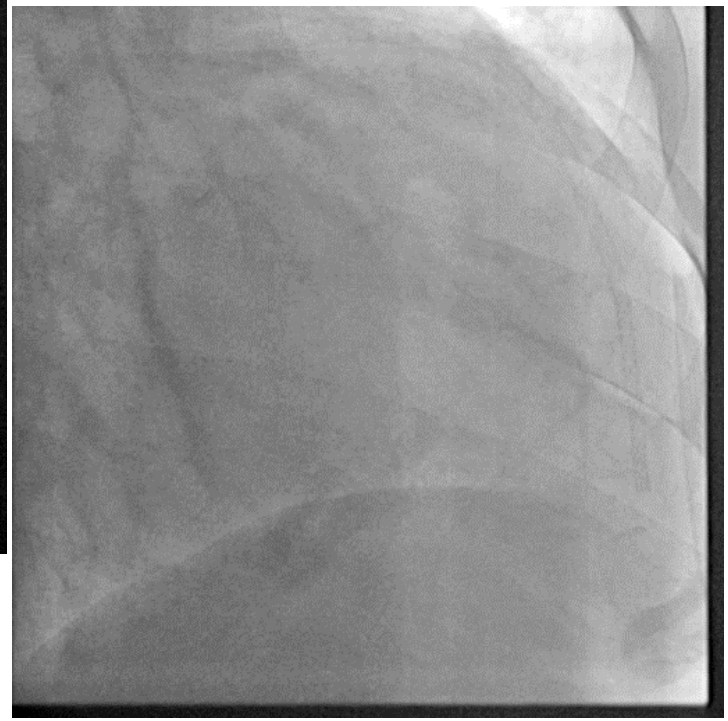


Previous stent implanted in the wrong space

7 Days later ……







FU CAG reveled same situation with much developed collaterals from RCA

→ No candidate for retry CTO-PCI

Things to consider when doing retry CTO-PCI

Meticulous planning (*for not to fail again*)

Pre-procedural coronary CT angiogram

- **To identify the course of CTO from proximal to distal cap**
- **To check the location and degree of CTO calcification**
- **To obtain information on collateral channel for retrograde approach**

Complete review of previous coronary angiogram (tip morphology, location of calcium, collateral network etc.)

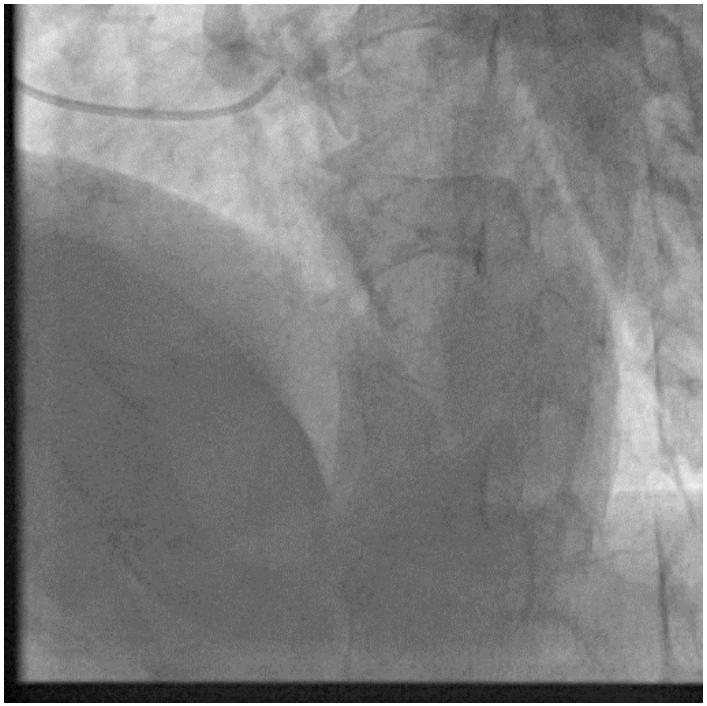
Consideration for retrograde approach (short GC with proper size, suitable GW and microcatheter, long GW for externalization etc.)

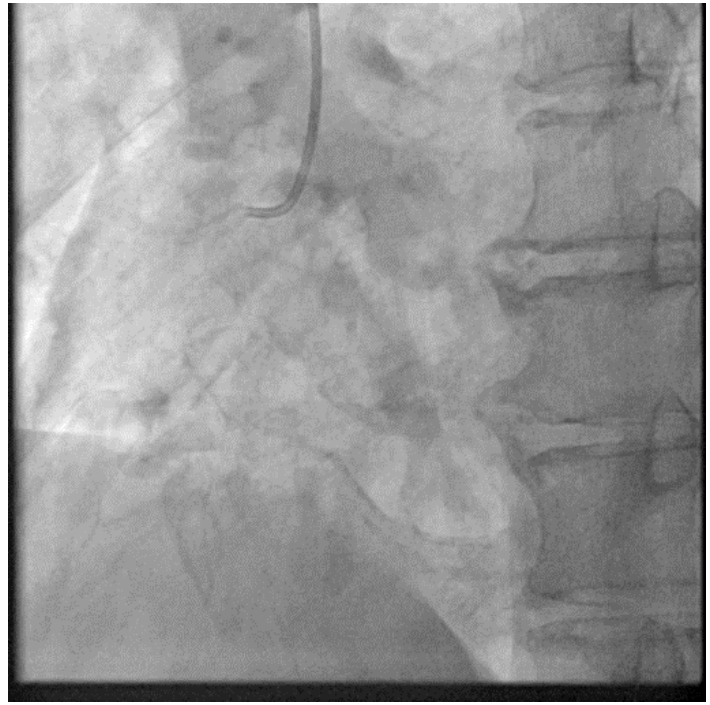
The decision whether to do IVUS-guided wiring

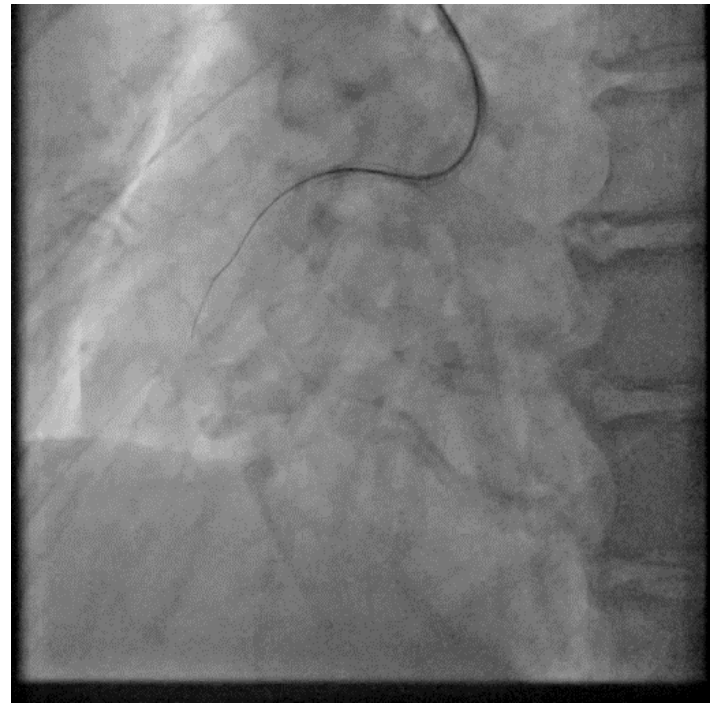
- **Consider to use bigger guide from the beginning**
- **To check suitable branch vessel for positioning IVUS**
- **To judge if it is possible to do IVUS-guided re-wiring in retrograde approach**

Never forget bilateral angiogram

F/69, ad-hoc PCI of RCA-CTO immediately after Dx CAG
Rt. radial approach (AL-1 6Fr guide, 0.014” Fielder-XT /c Corsair)
Unilateral approach first ……





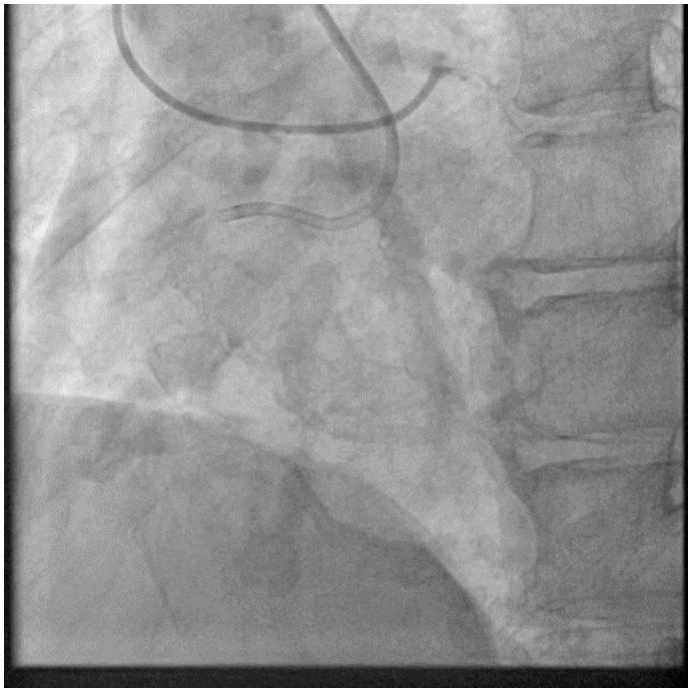


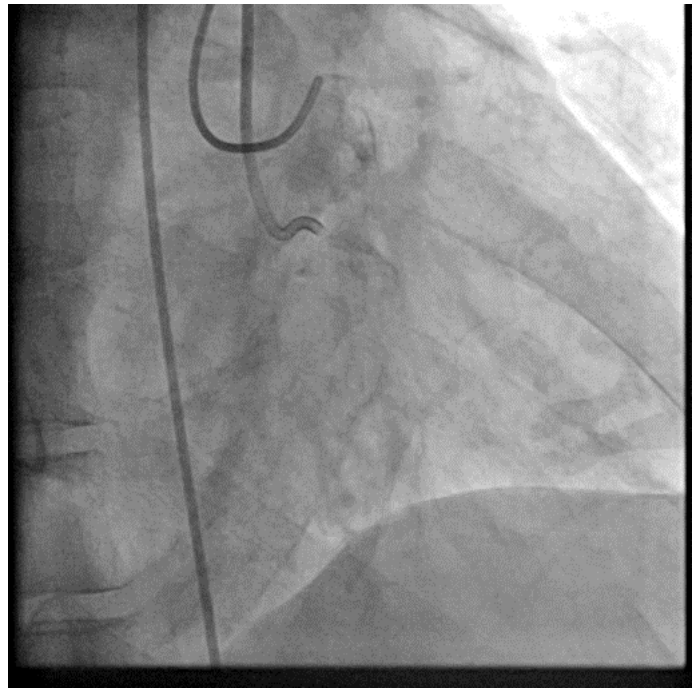
After 30 minutes struggling with guidewire, it doesn’t seem to cross.

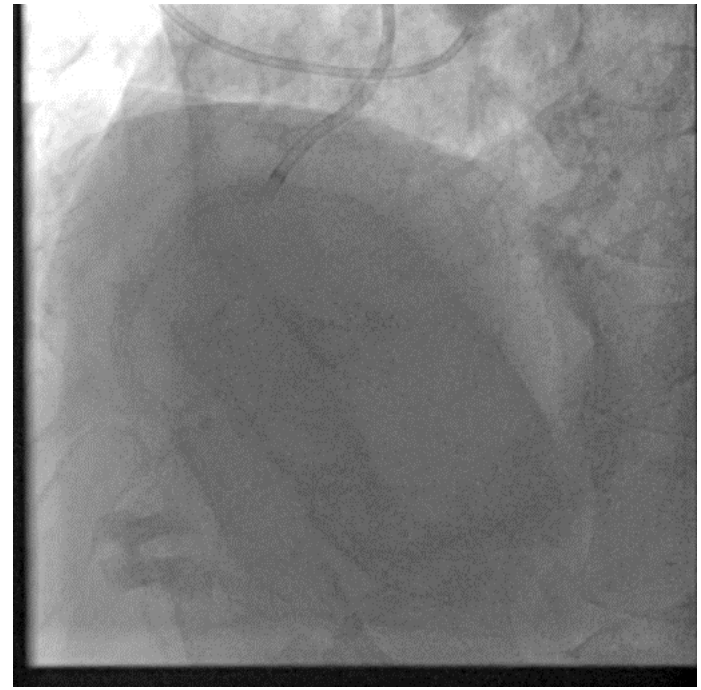
Never forget bilateral angiogram

Turned to bilateral approach

→ Less visible, smaller looking retrograde collaterals





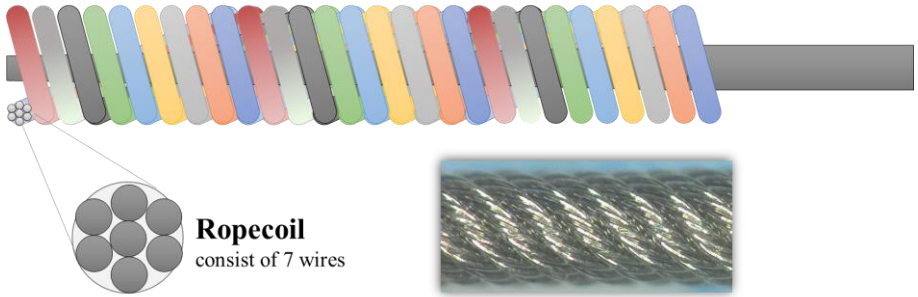


However, finally succeeded with putting two DESs.

Use of novel and renovated devices

Retry CTO-PCI should be different !! (consider using different or newer-version device)

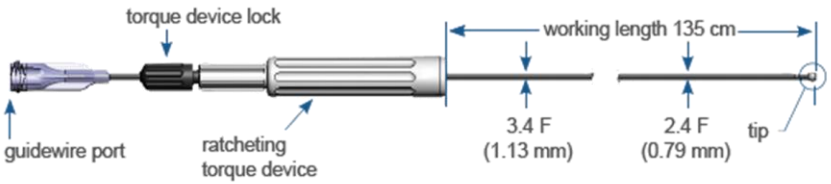
Gaia-Next

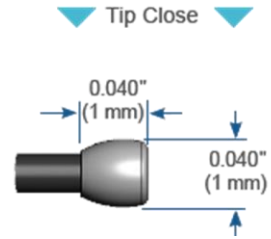


.48mm
(1.4Fr)

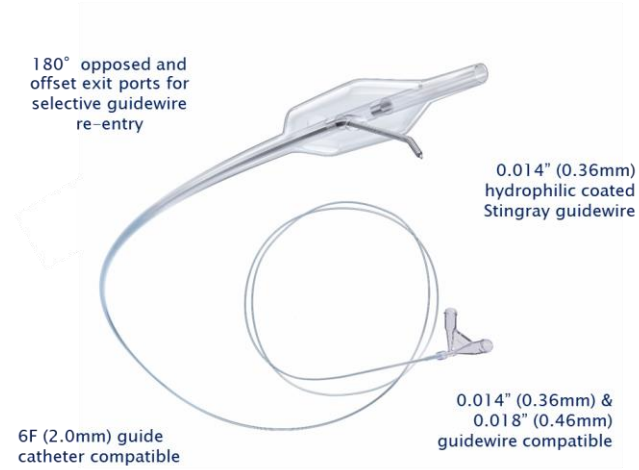
Caravel™

CrossBoss™ Catheter





Stingray™ Catheter & Guidewire



Mindset for CTO operator (in my opinion)

- Overall confident as well as skeptical (beware of 근자감)

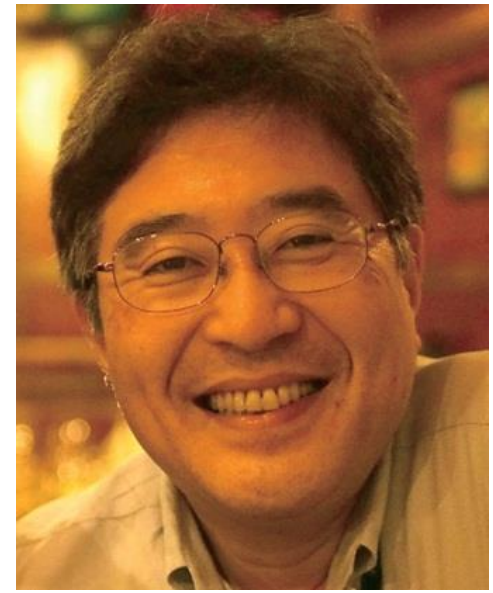
- Imagine final success and patient's delight (*auto-suggestion*)

- Always seek for second thought as back-up strategy

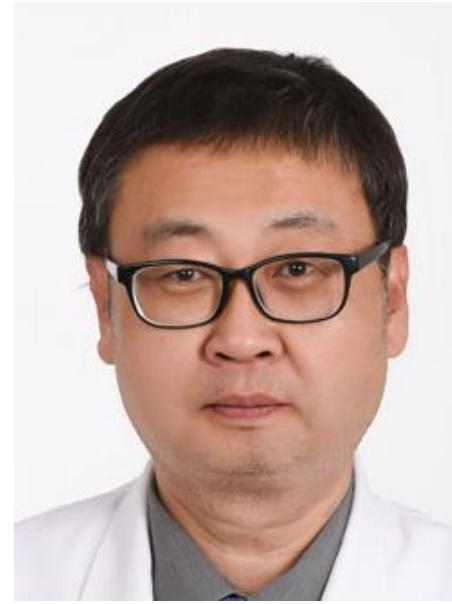
- Communicate with the patient during the procedure when things are not going smoothly

- Although painful, acknowledge the expected failure and stop the procedure before it is too late





We are not alone !!!

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Summary

- **The classic scenario of the failed CTO-PCI is the wire ends up in the subintimal space with producing mural hematoma extending towards distal true lumen with further collapsing it, making it even more difficult for the wire to re-enter into the true lumen.**

- **There is no general rule to prohibit retry CTO-PCI in the literature. However, in case of serious complication happened during previous attempt, it might be better to turn to other treatment strategies such as optimal medical therapy or surgical intervention.**

- **Better planning, better mindset will give us more probability to final success in retry CTO-PCI**


Thanks for your attention !!!