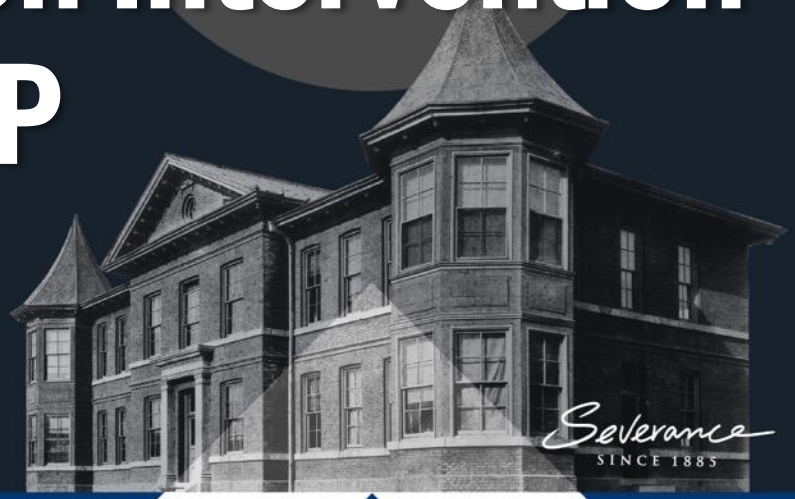
YONSEI UNIVERSITY

Complex Bifurcation Intervention in CHIP

Byeong-Keuk Kim, MD, PhD

Division of Cardiology, Department of Internal Medicine,
Severance Cardiovascular Hospital,
Yonsei University College of Medicine

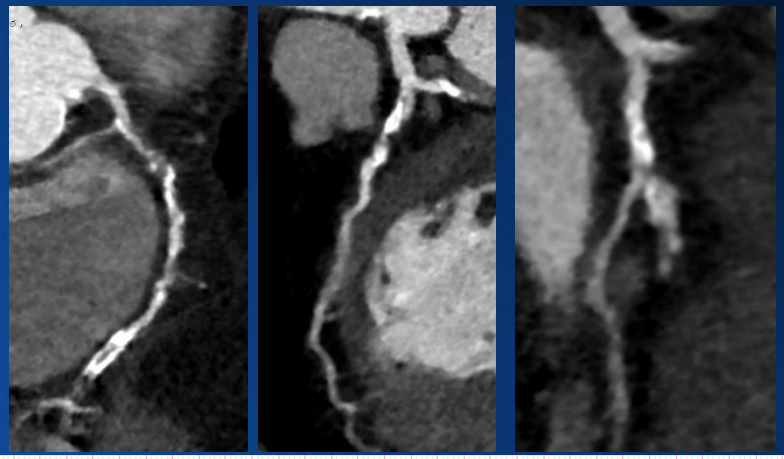


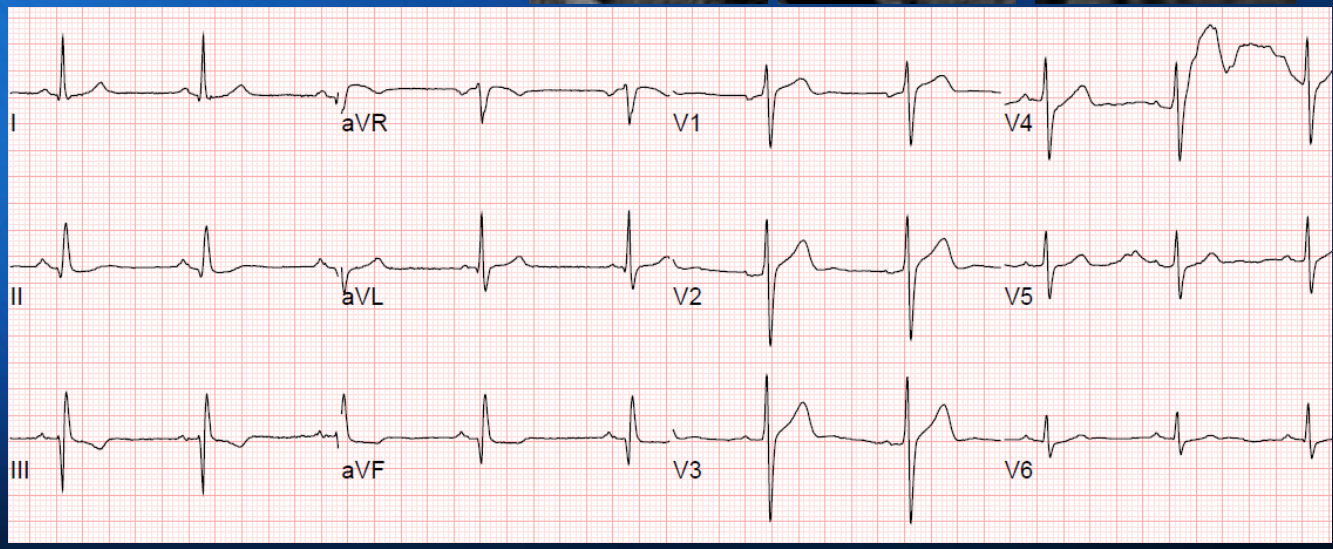
Nothing to disclose

Case 1. M/80

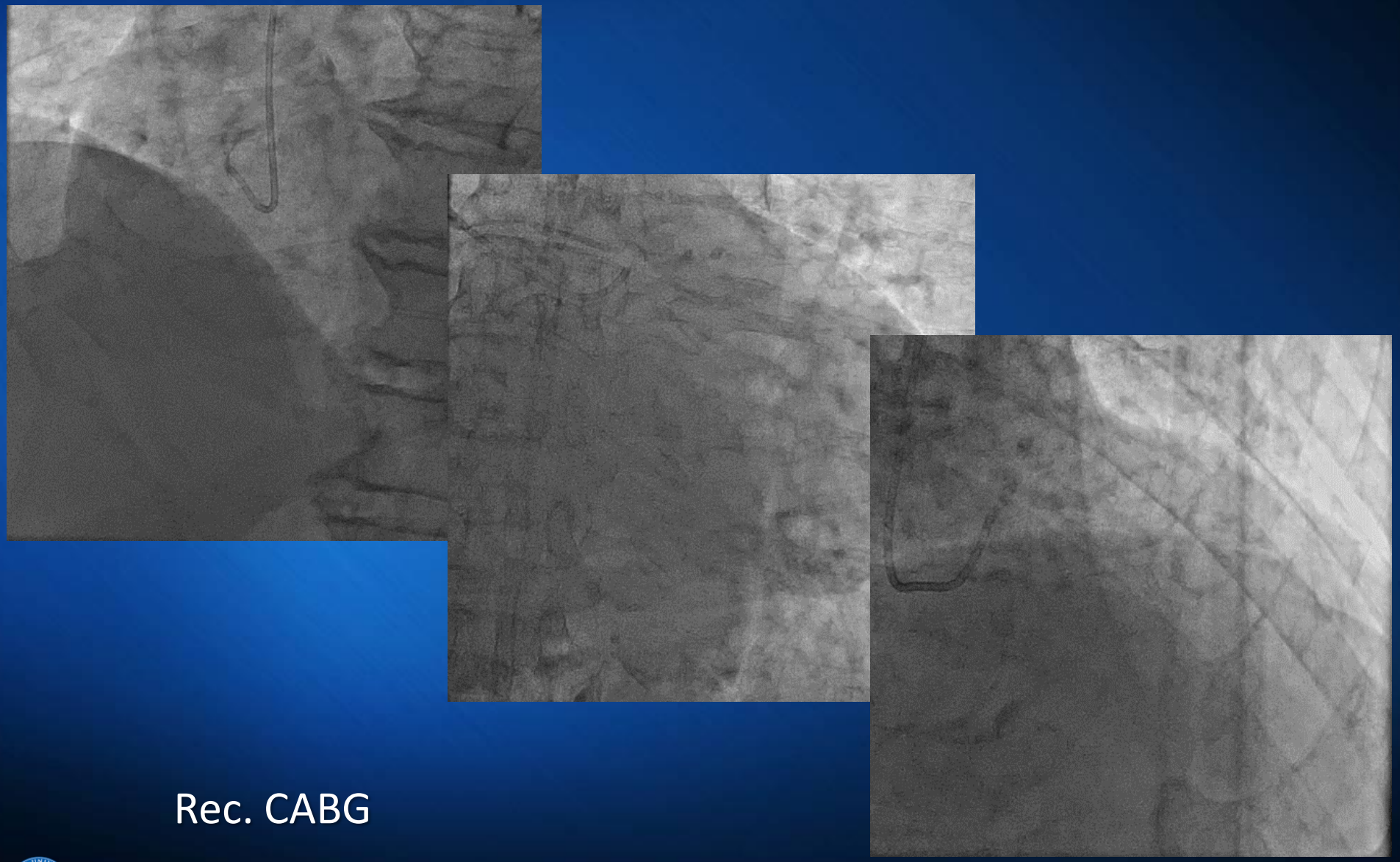
Ht/Bw/BSA: 161cm/ 62kg/ 1.67

- C.C; Exertional dyspnea
- Risk factors; HTN, COPD with home O2 therapy, Ex-smoker, Central Retinal Artery Occlusion
- Echo; EF 33%, RWMA (multivessel territory)
  akinesis with thinning in the inf. wall
- Coronary CT; 3VD





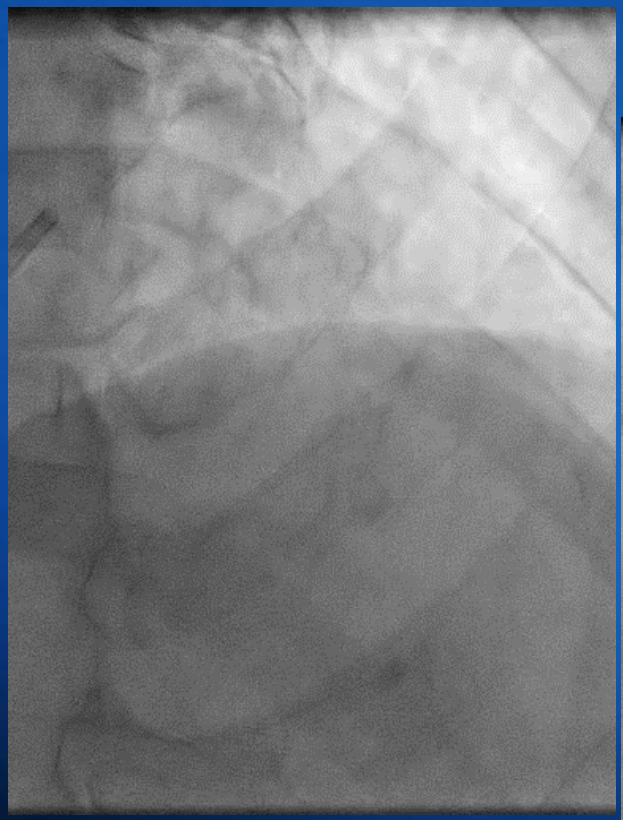
Pre CAG, 3VD with RCA CTO (Jan, 2019)

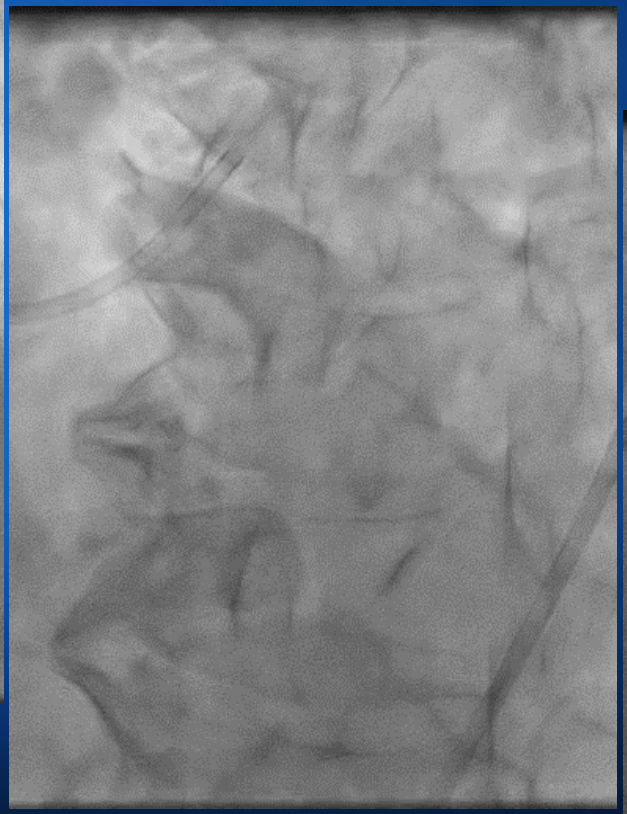


Rec. CABG

Refusal of CABG, Not condition for general anesthesia

Plan. LAD & LCx intervention (Feb, 2019)



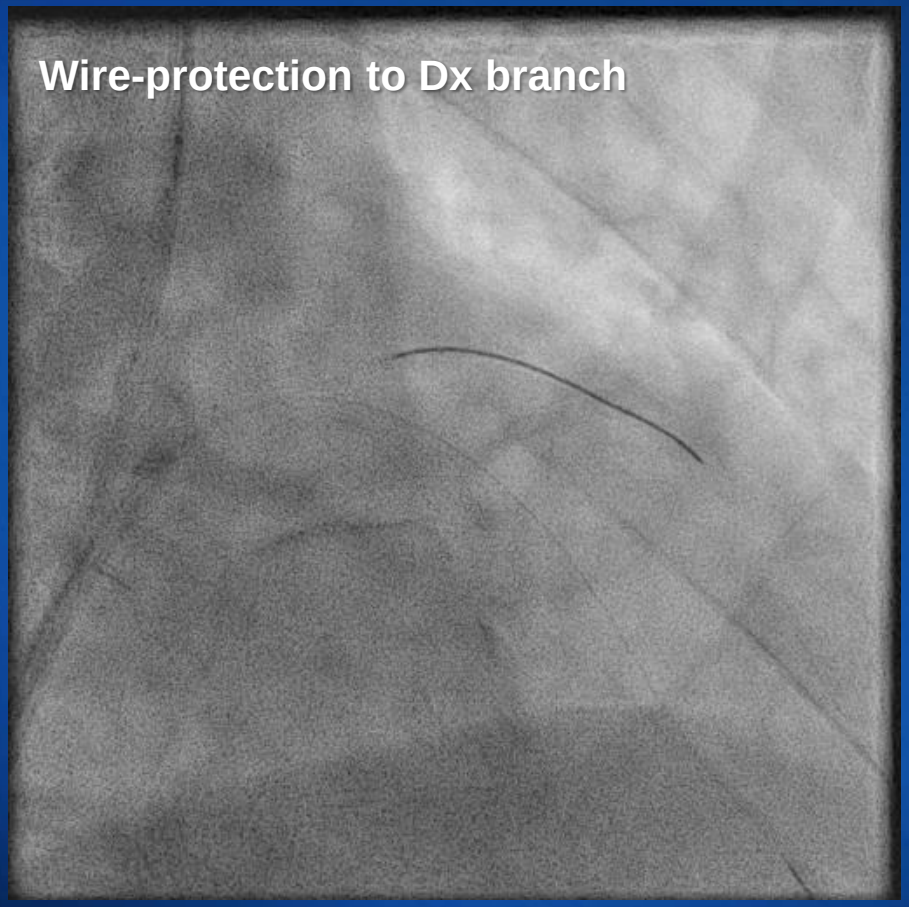


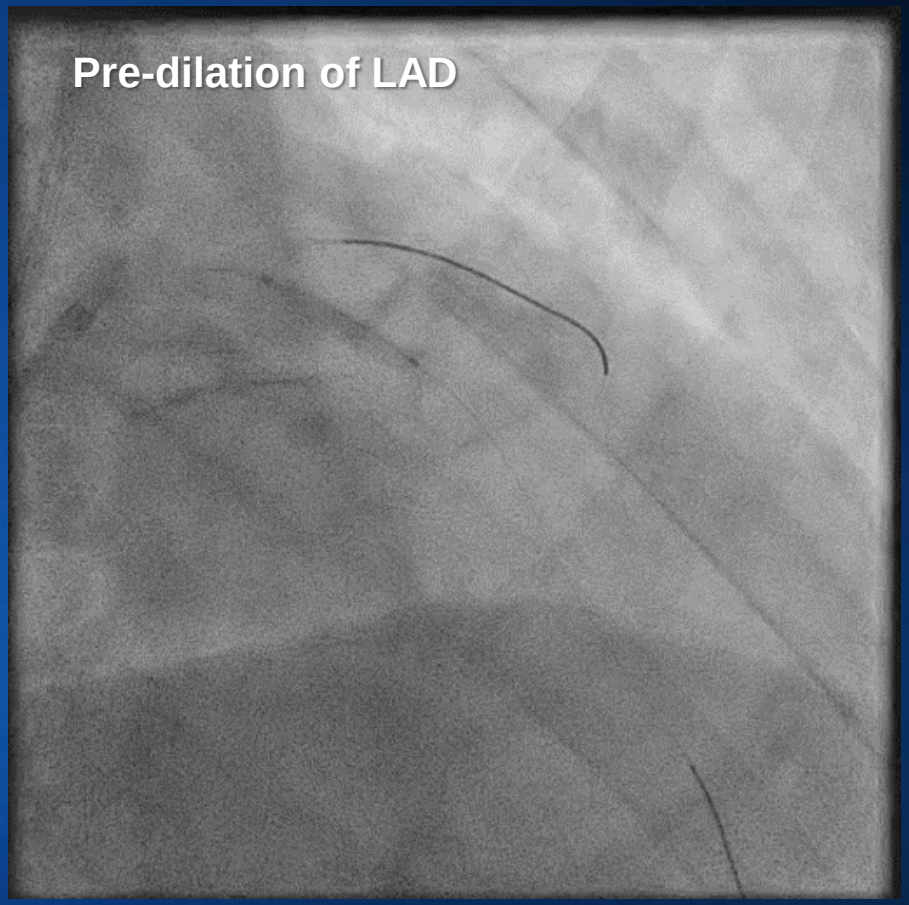
1. LAD intervention

→ Saving high Dx branch
; relatively non-small side branch
; non-eligible side-branch stenting
; Dx-predilation for the protection will cause vessel-damage requiring stent implantation and time-consuming in HF patients.

✓ **We need the safe & effective certain way to protect side branch (minimize the risk of dissection of SB-ostium) !**

1.1 LAD intervention with wire protection of SB





- Double 014"G/W (2 Runthrough)
- Semi-balloon 2.5x14 mm

1.1. After pre-dilation of LAD

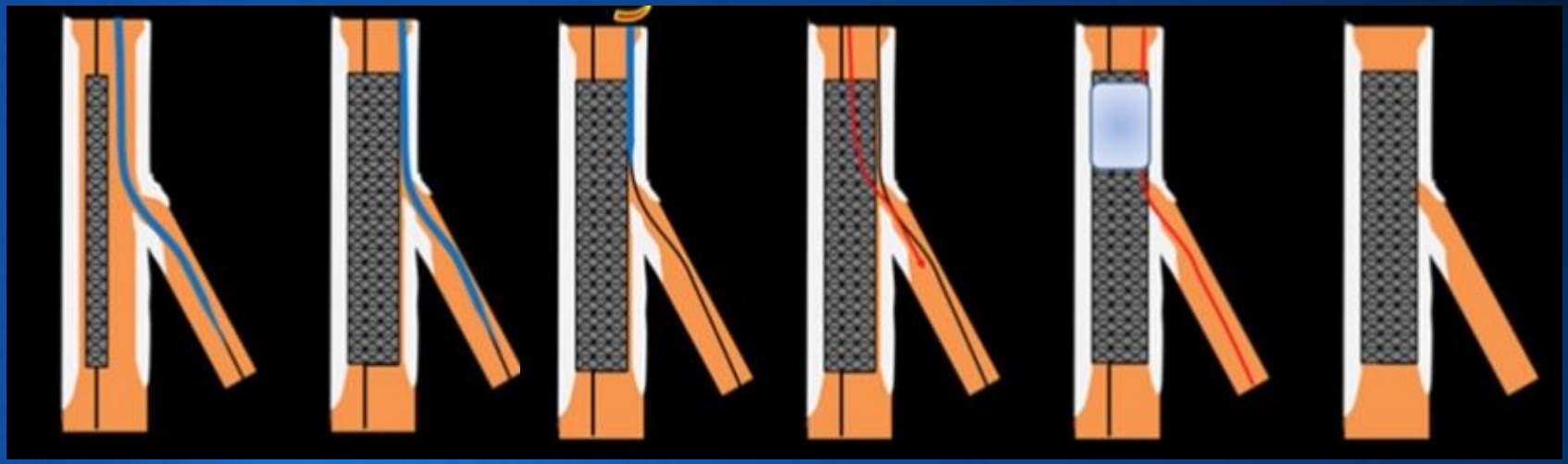
- Chest pain → BP ↓ → IV inotropics → BP recovered.

✓ **What's the safe & effective way to protect side branch?**

Jailed Corsair technique to protect side branch

Jailed Corsair technique

The jailed wire technique could not always prevent SB occlusion.

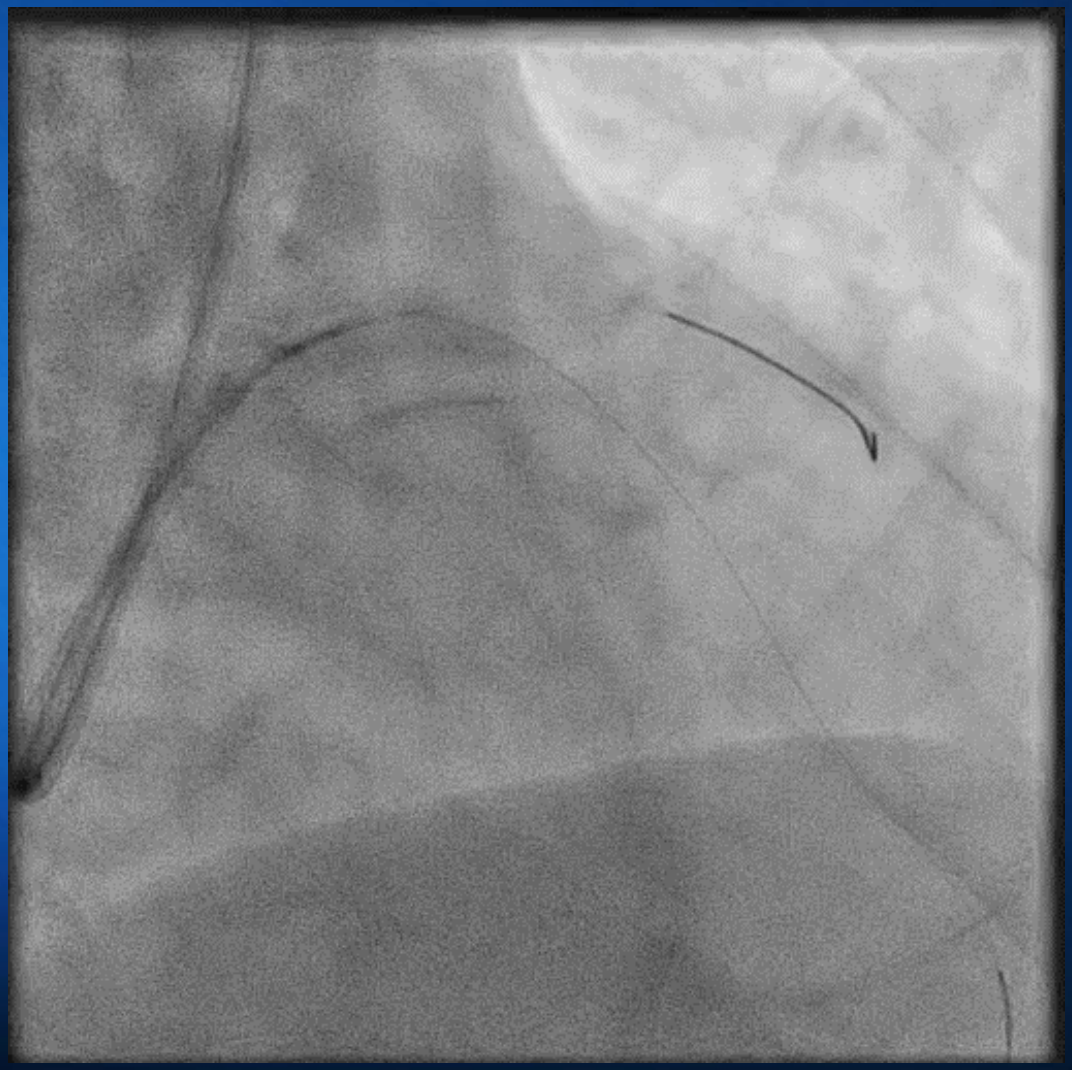


- The similar technique to the jailed balloon technique.
- Advantage
  - **Few risk of dissection at the ostium of side branch**
  - **Facilitating guide-wire recross to side branch**

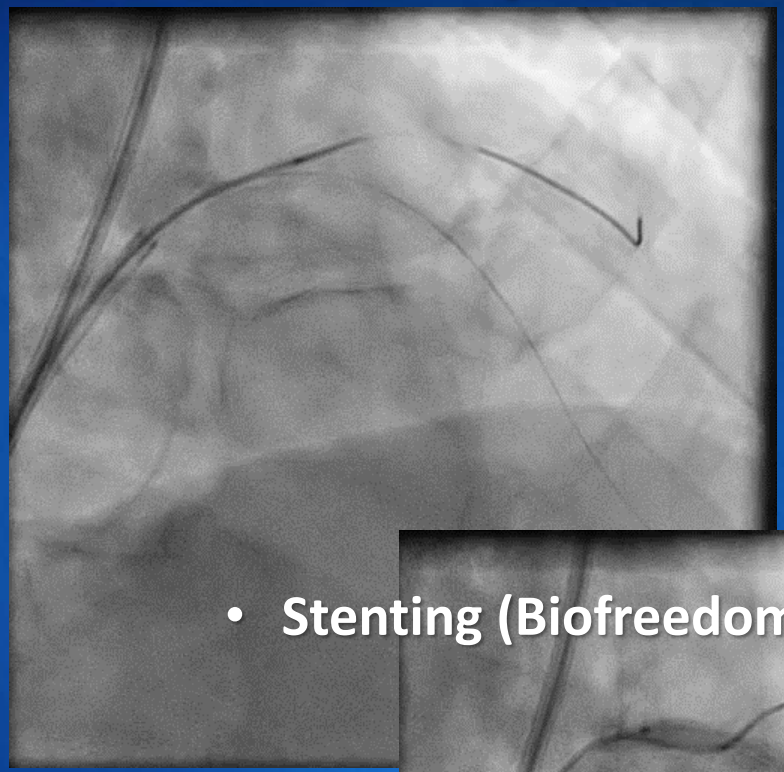
Numasawa Y, et al. Cardiovasc Revasc Med. 2017;18:295-298.

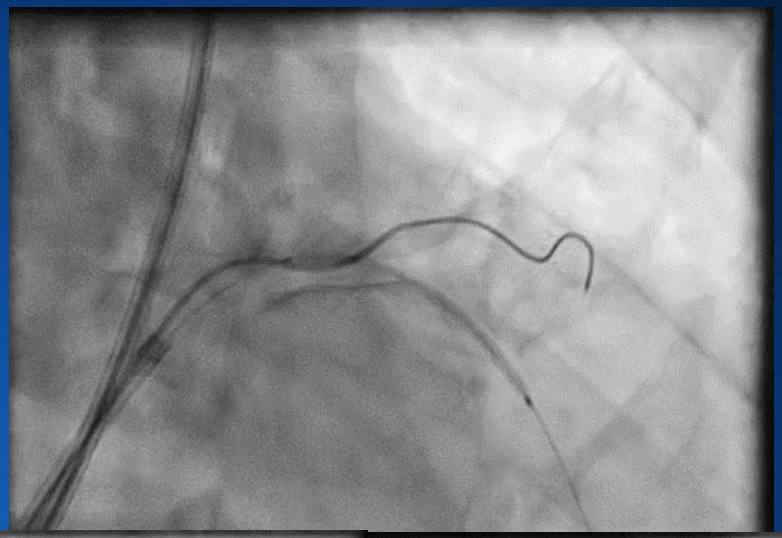
1.2. Jailed Corsair technique

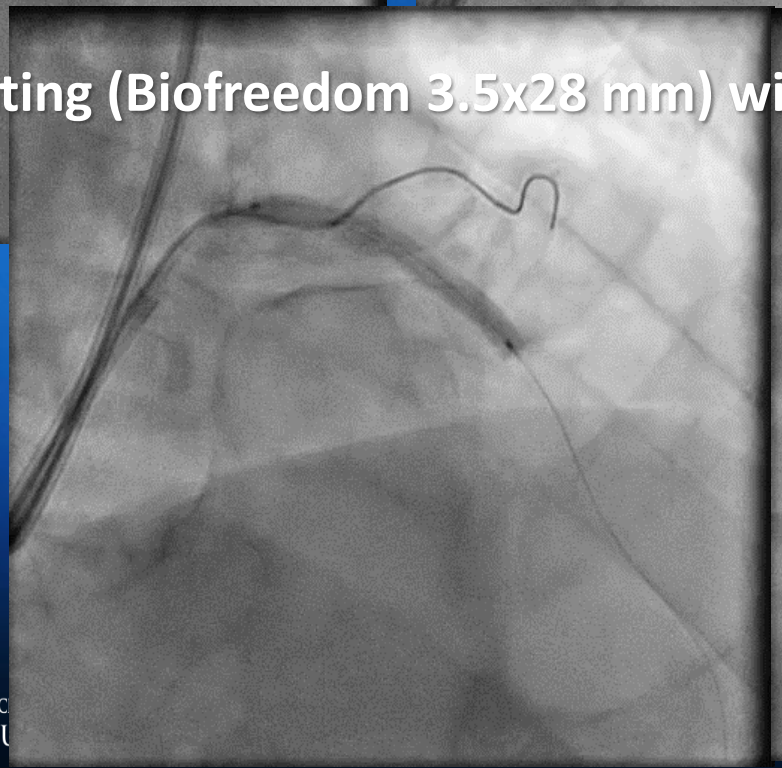
Corsair from LAD to 1st DG for SB protection

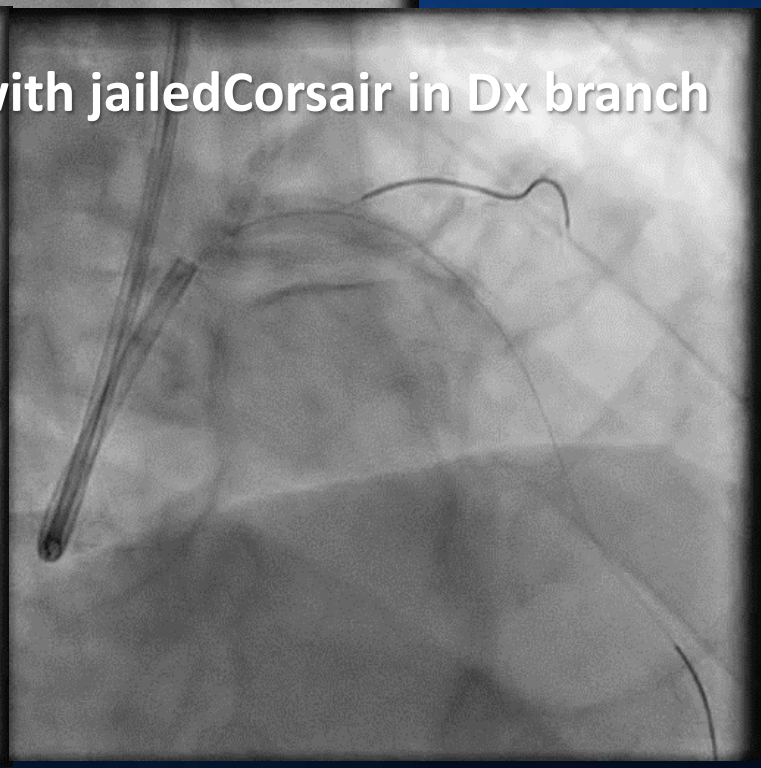


1.3. Stent implantation.





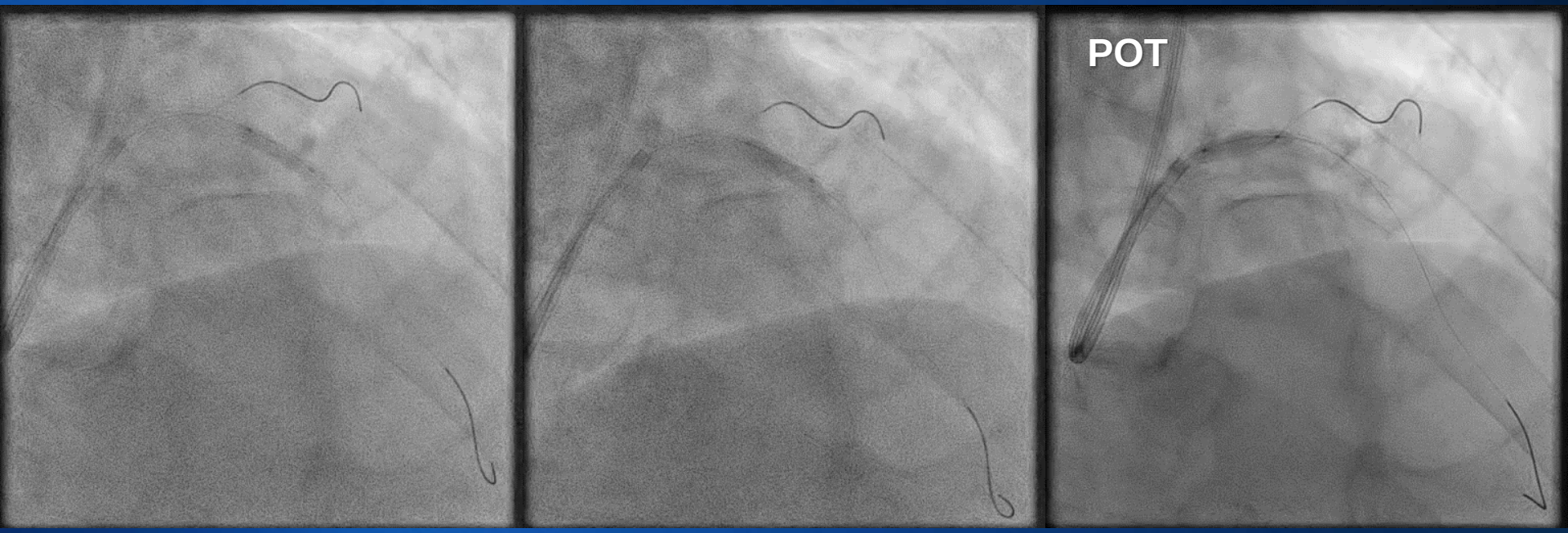




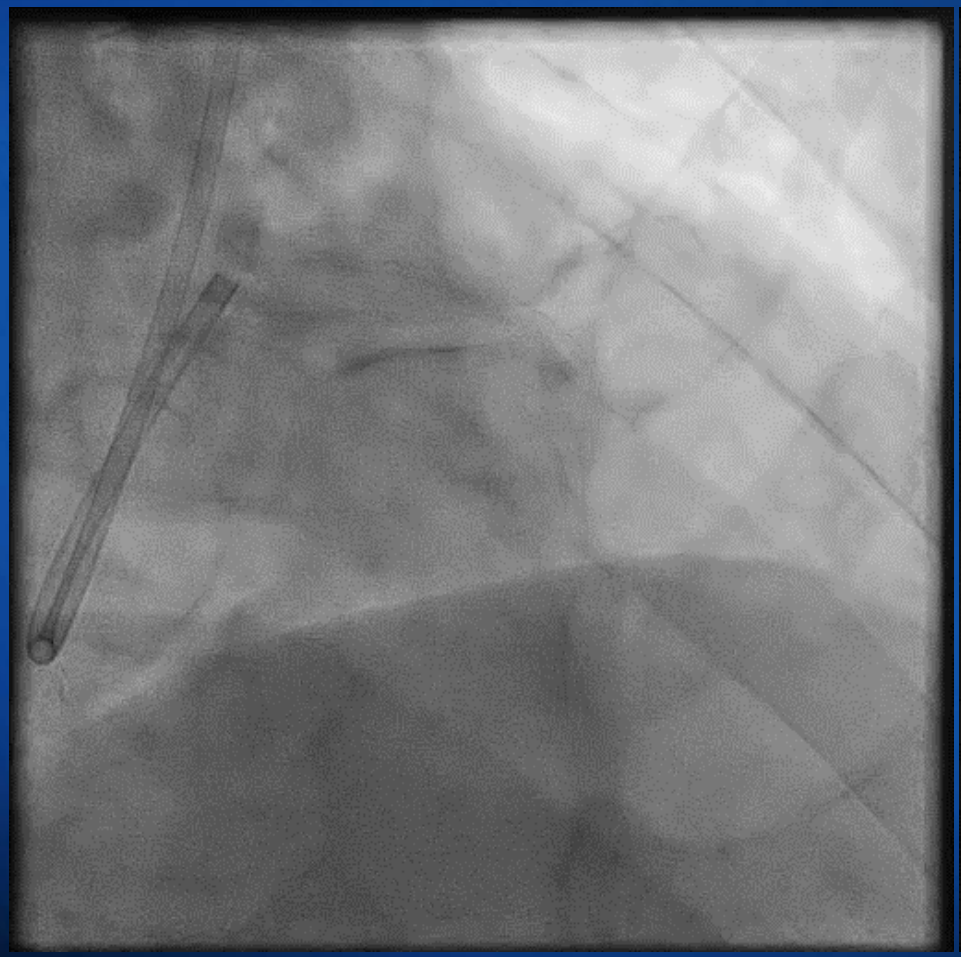
- Stenting (Biofreedom 3.5x28 mm) with jailedCorsair in Dx branch

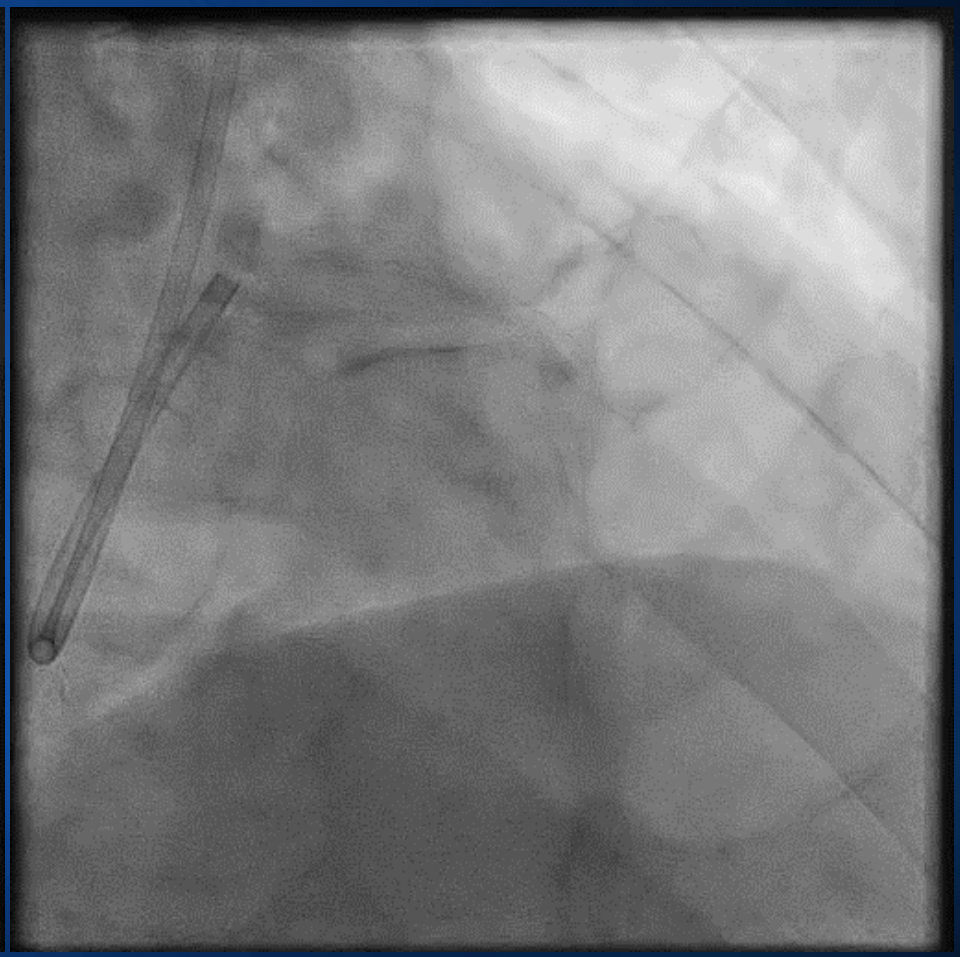
1.4. After re-wiring to Dx, post-dilation

Post-dilatation with POT (NC Balloon 3.5x12) up to 24 atm



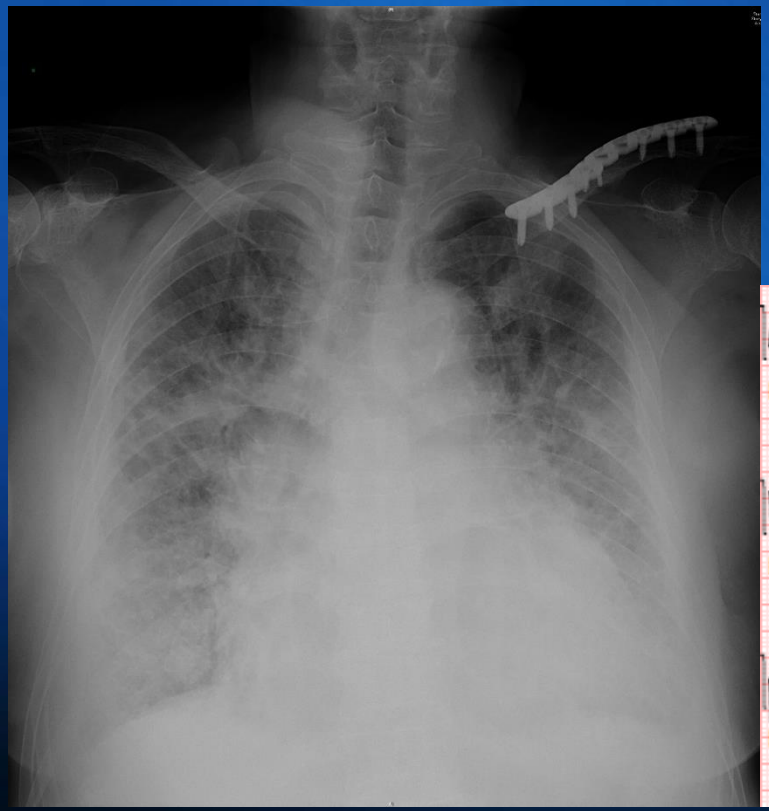
LAD PCI, final CAG



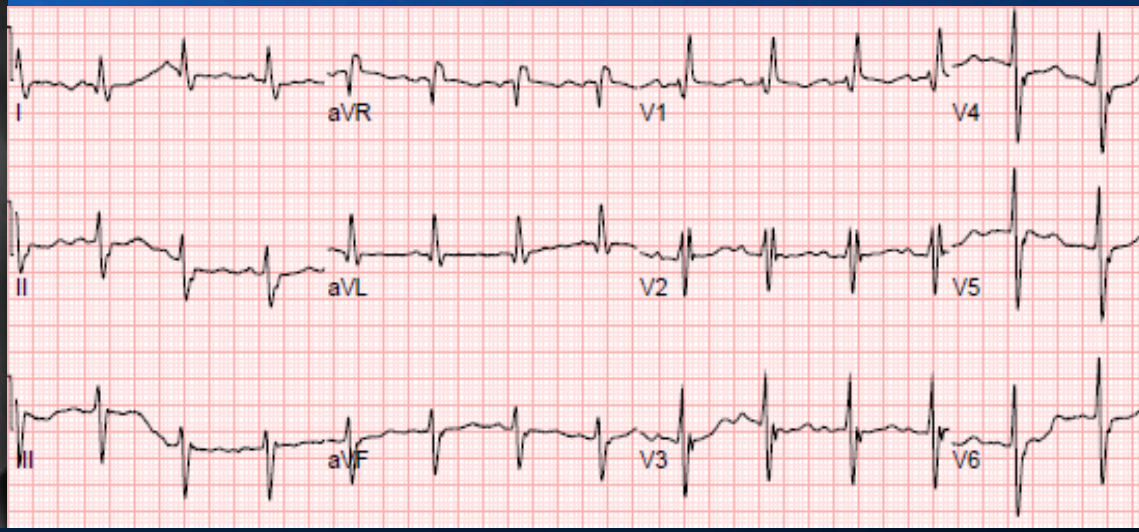


Case 2. F/85 158cm/57.4kg, BSA: 1.59/m2

- C.C; dyspnea for 2 days
- Risk factors; HTN, DM, Atrial fibrillation
- Hx; s/p PCI @ m-d-LAD (Xience 2.75x38 & 3.0x38) 1 months ago
- Echo; Newly developed RWMA at LCx territory, decreased EF (70%->**35%**, compared with 19.02.15)

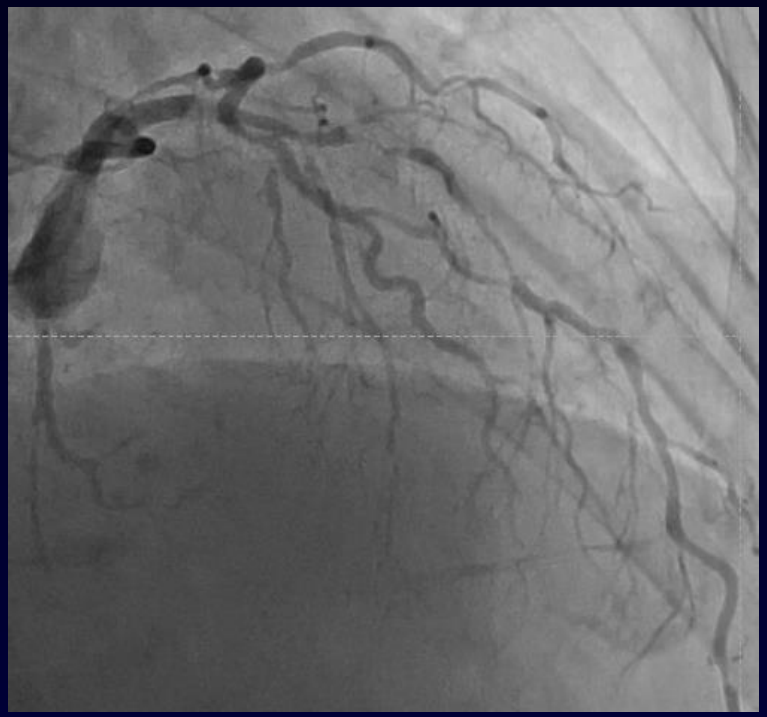


- Lab finding;
  - **WBC/Hb/HCT/PLt 8780-12.8/37.3-196k**
  - **CK/CK-MB/TnT 77/3.7/71 ↑**
  - **Bun/Cr 12.0/0.65 eGFR ≥ 90ml/min/1.73**
  - **NT-proBNP 3051 ↑**

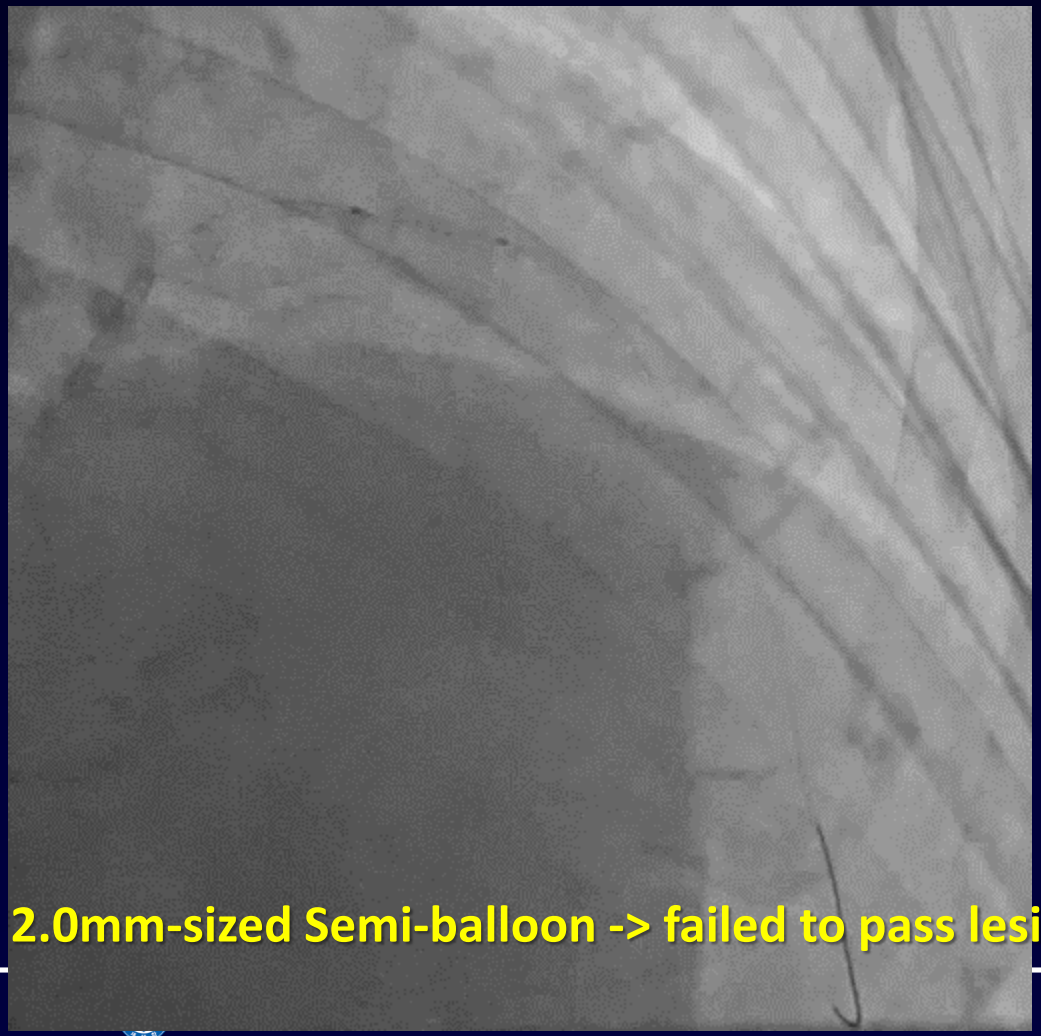


Previous CAG (19.02.18) – 2VD

PCI at m-LAD (19.02.18)

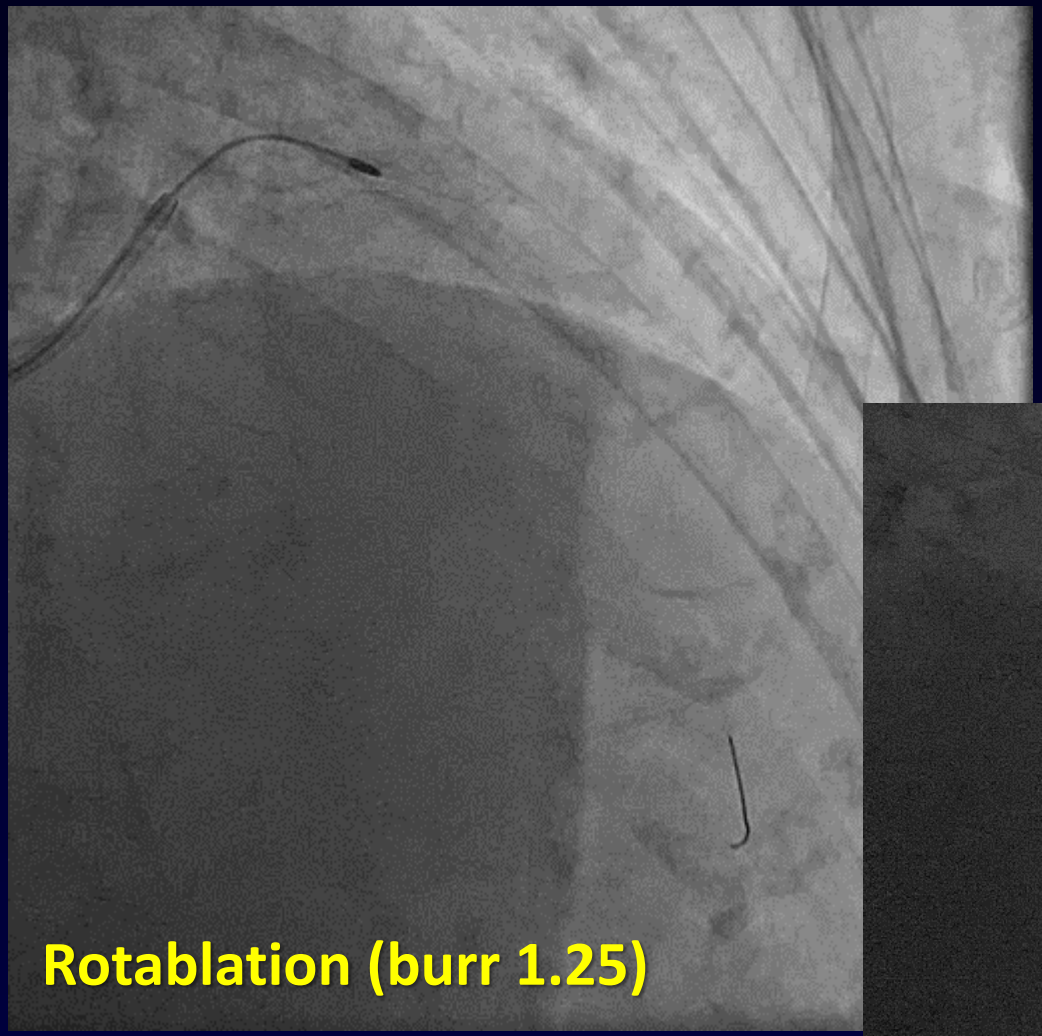


- Considering old age, PCI strategy performed (revascularization of vessel of large ischemic burden) → LAD PCI



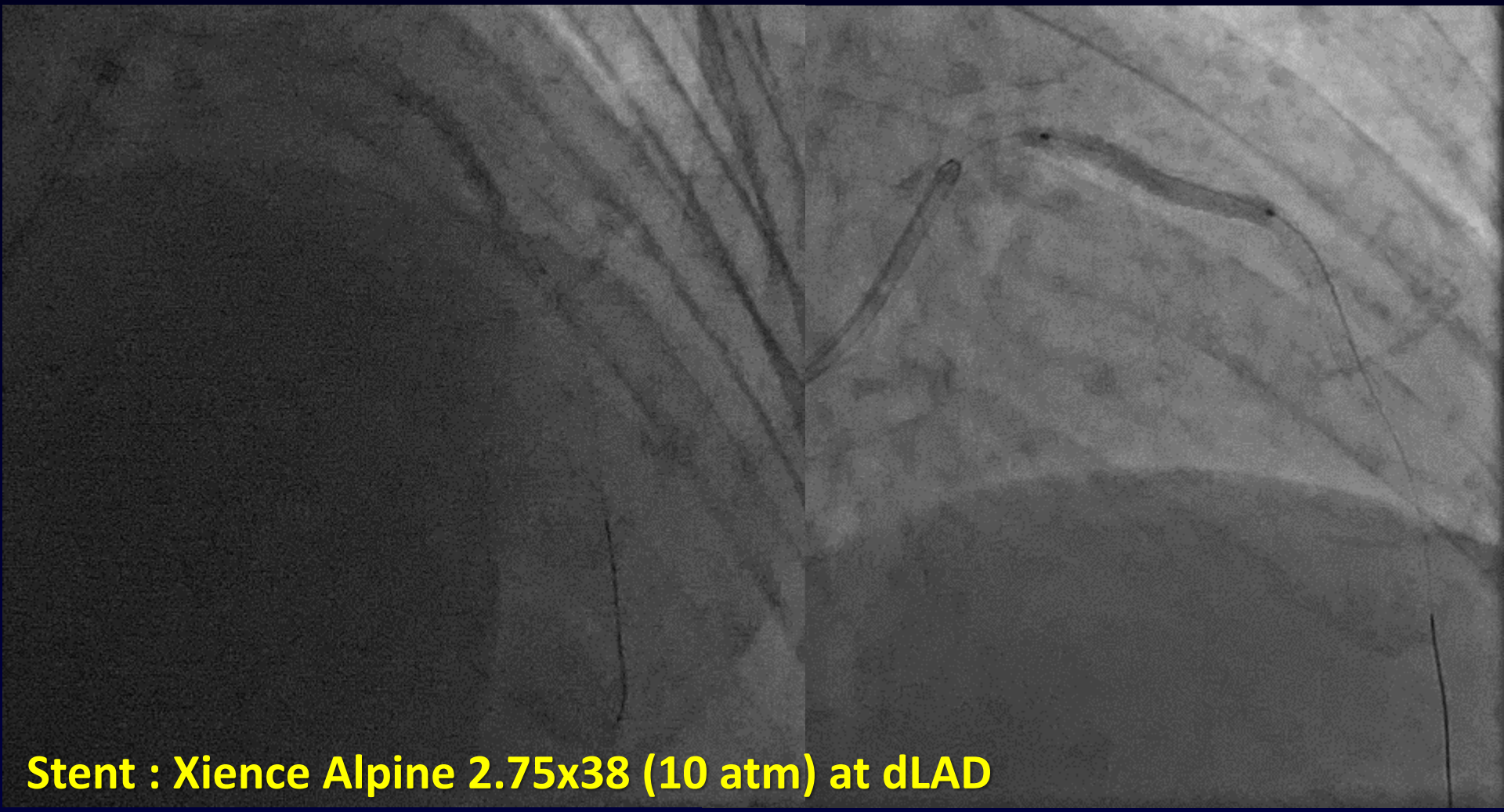
- **2.0mm-sized Semi-balloon -> failed to pass lesion**

PCI at m-LAD (19.02.18)



2.5x15 balloon pass the lesion -> multiple ballooning

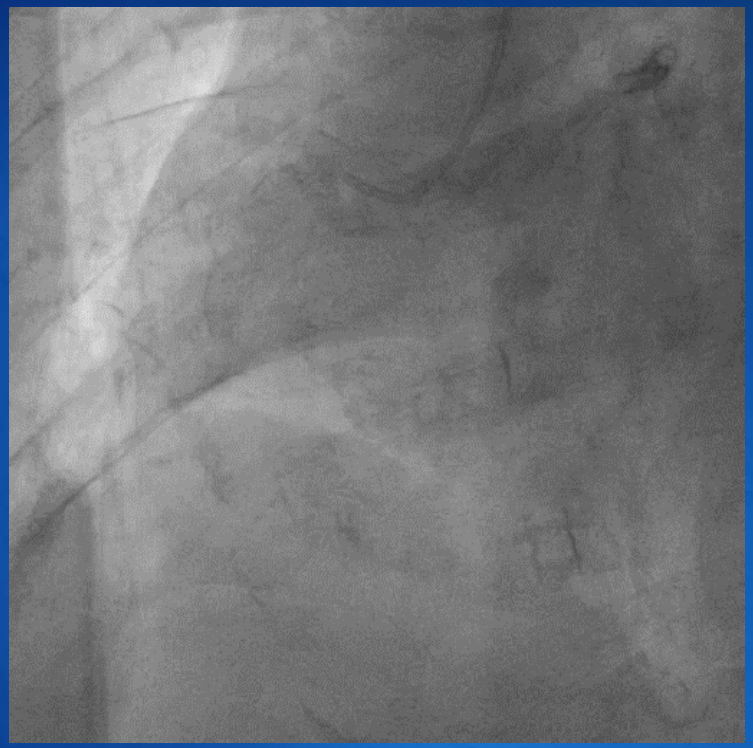
PCI at mLAD (19.02.18)

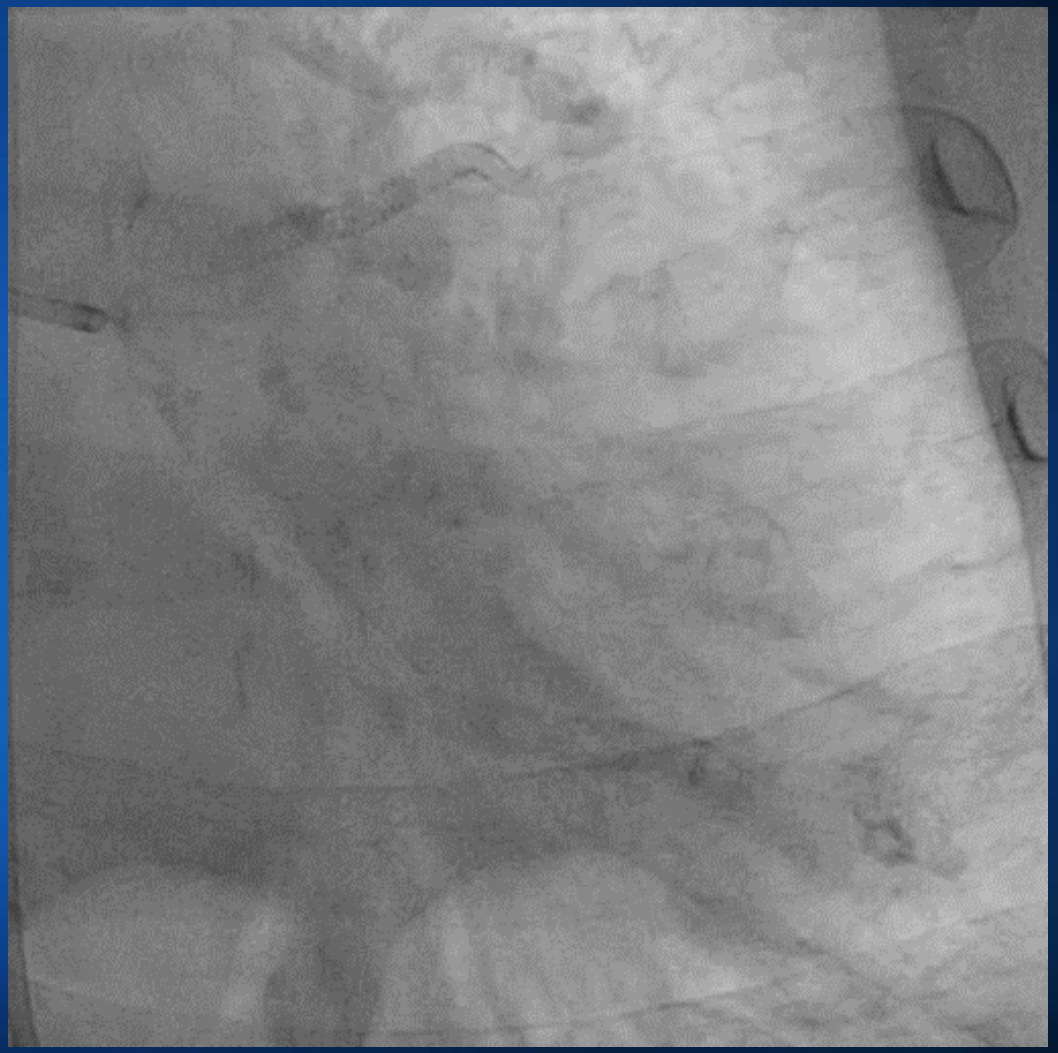


Stent : Xience Alpine 2.75x38 (10 atm) at dLAD
Xience Alpine 3.0x28 (10 atm) at mLAD

Final angiography (19.02.18)

Coronary angiography (19.03.15)



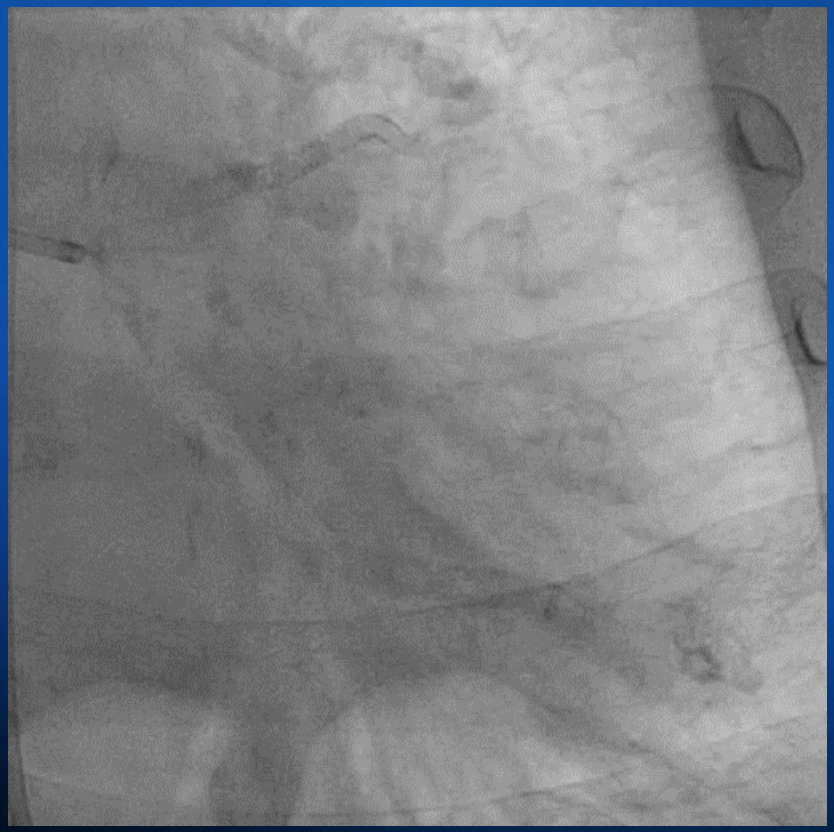


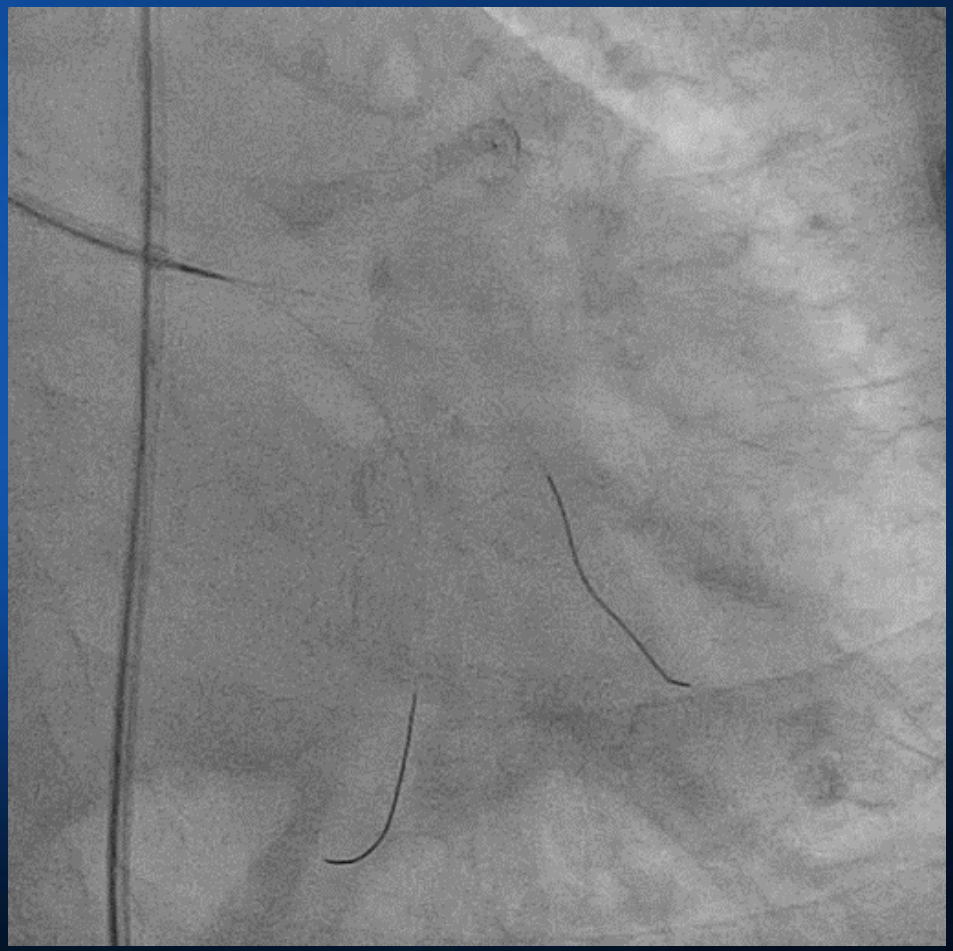
- No IC of RCA, patent previous LAD stents

→ Planning of PCI of LCx (big OM)

PCI at LCx (19.03.15)

- **Double 014” G/W using <u>Corsair supporting for the safe & efficient wiring</u>** (for the prevention of flow-inhibition due to the wiring-difficulty)
- **<u>Corsair dilation</u> for the tight tortuous lesion .. Definitely better than small-sized balloon**

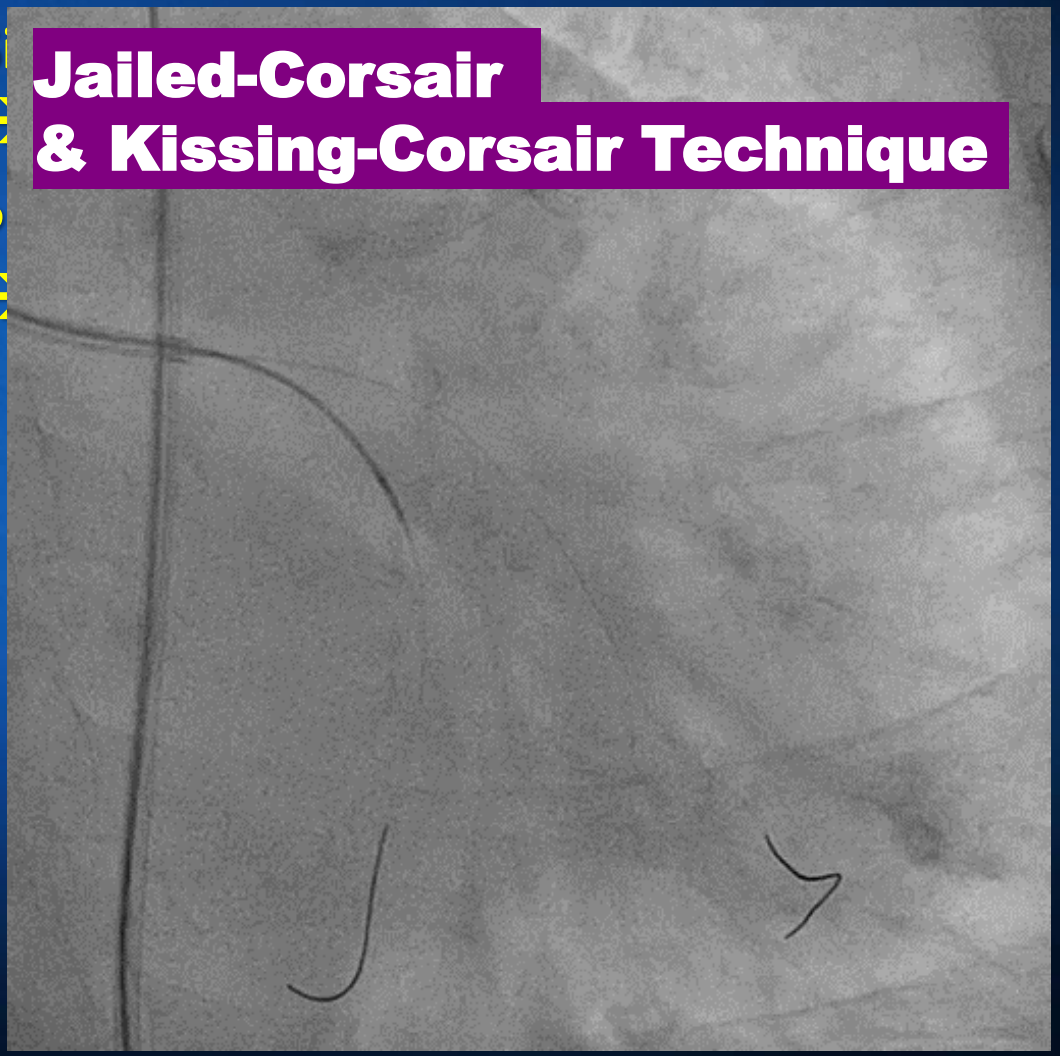




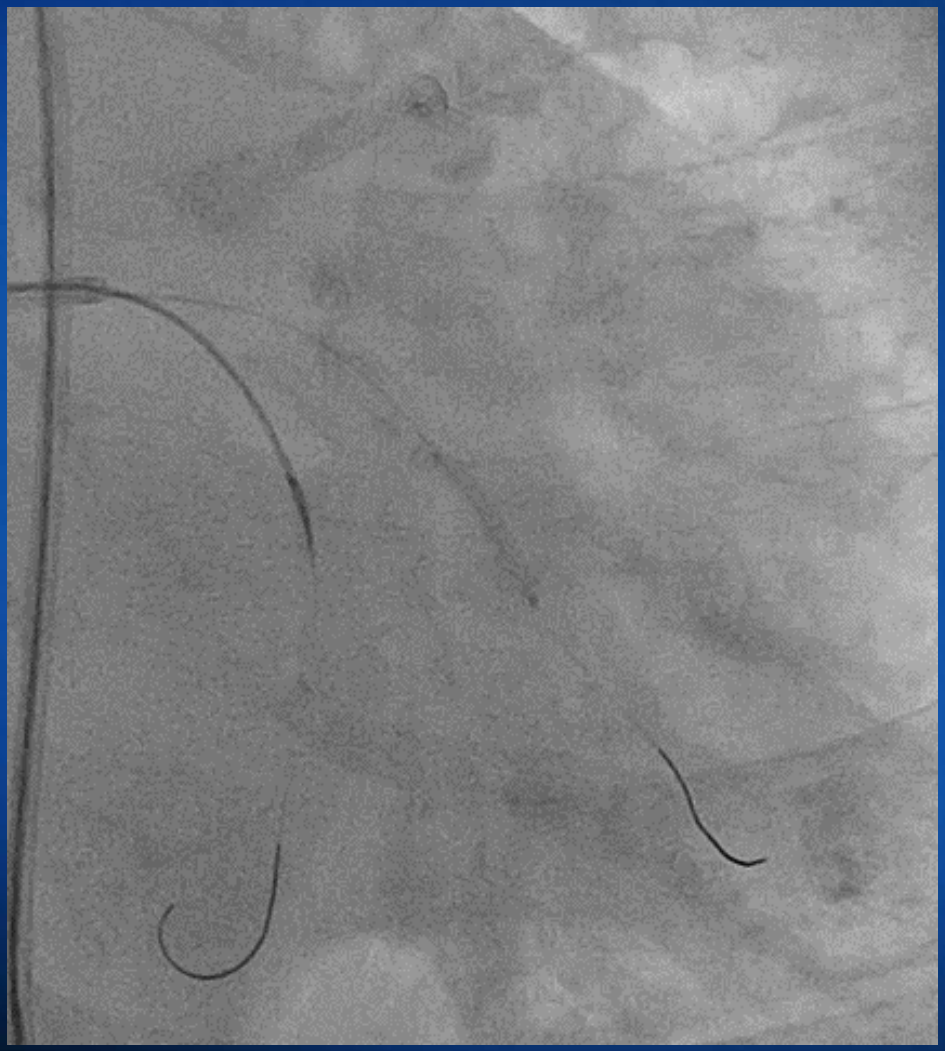
Protection of side branch … acute HF & pul edema in old -aged patient

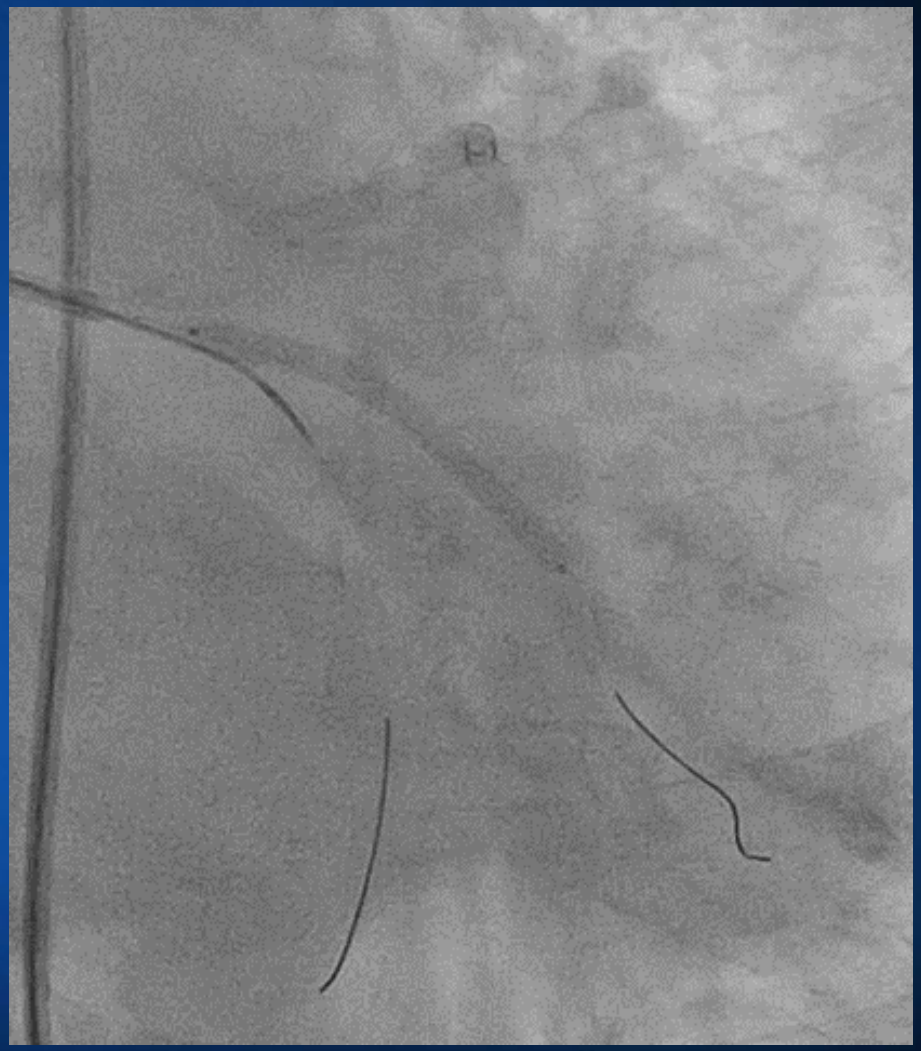
- Elective 2-stenting for OM & LCx proper
  → benefit < risk d/t ↑procedure time
- S
- P

Jailed-Corsair
& Kissing-Corsair Technique



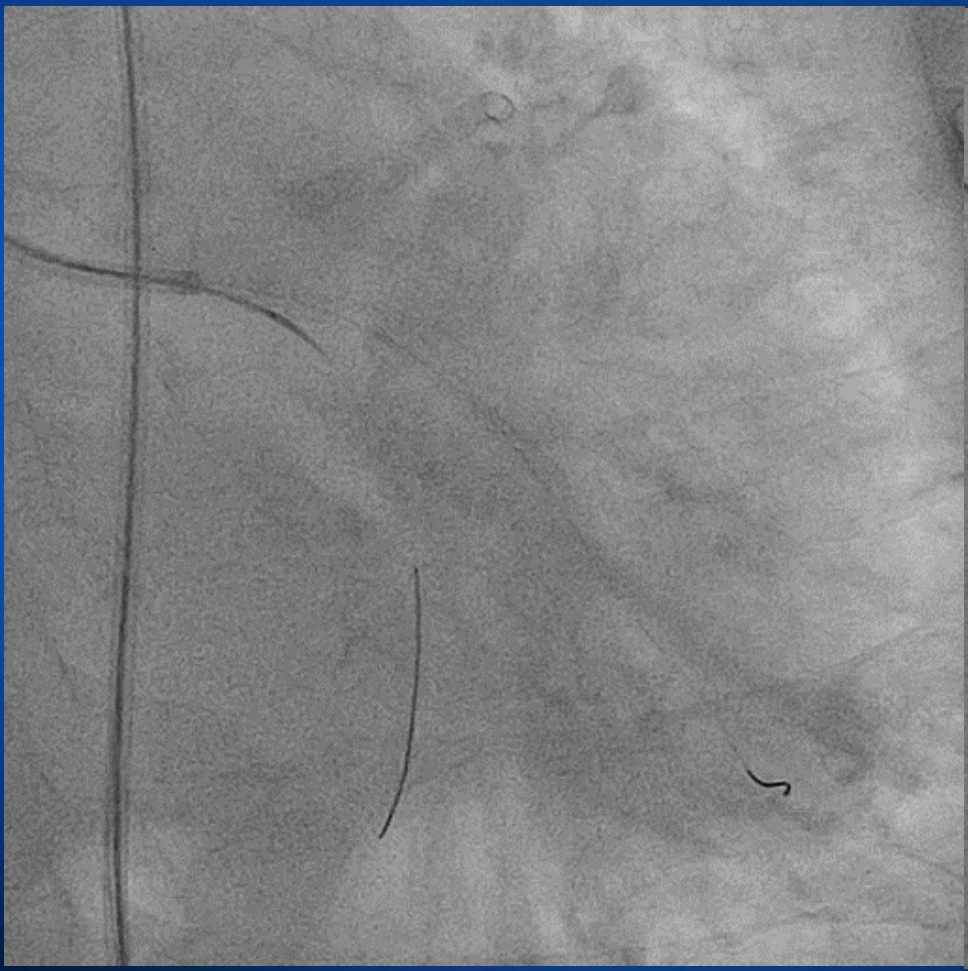
Pre-dilation & stenting using "Jailed Corsair technique"



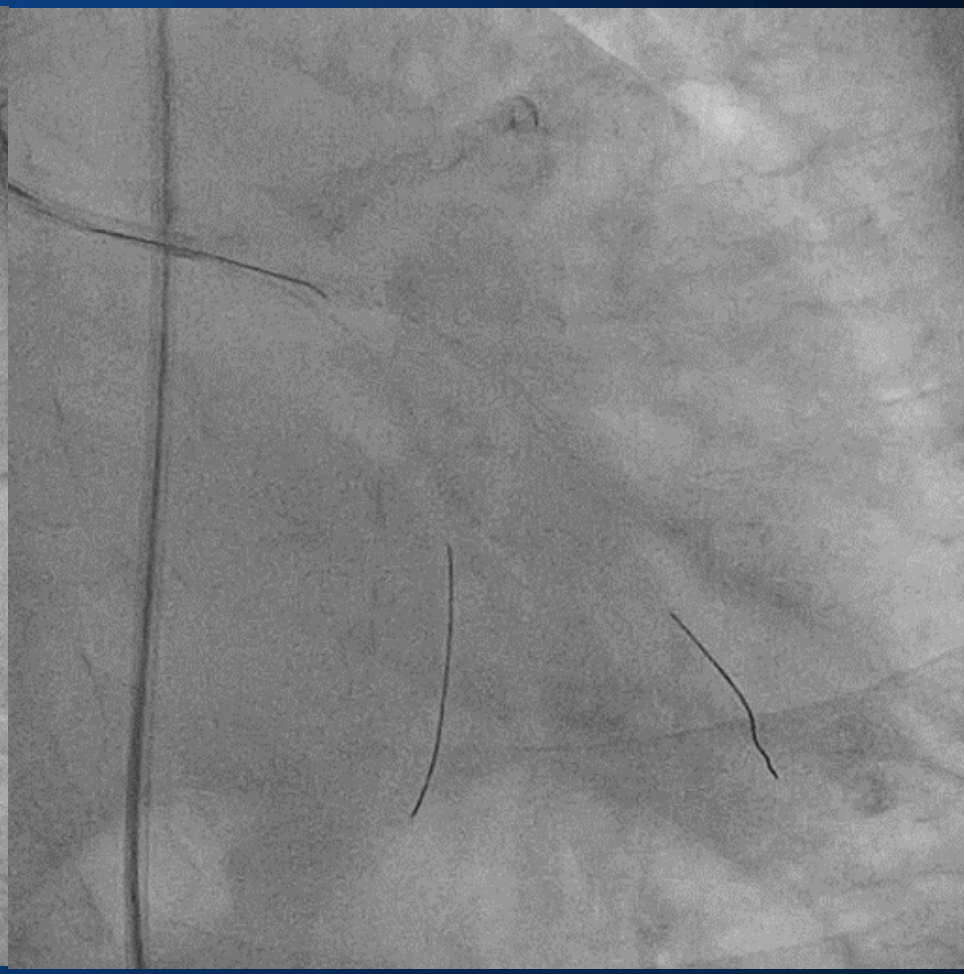


- 2.5x14mm sized semi-balloon
- Synergy 3.0x38 (nominal pr,11 atm) with jailed corsair @ LCx proper

1. Jailed Corsair technique

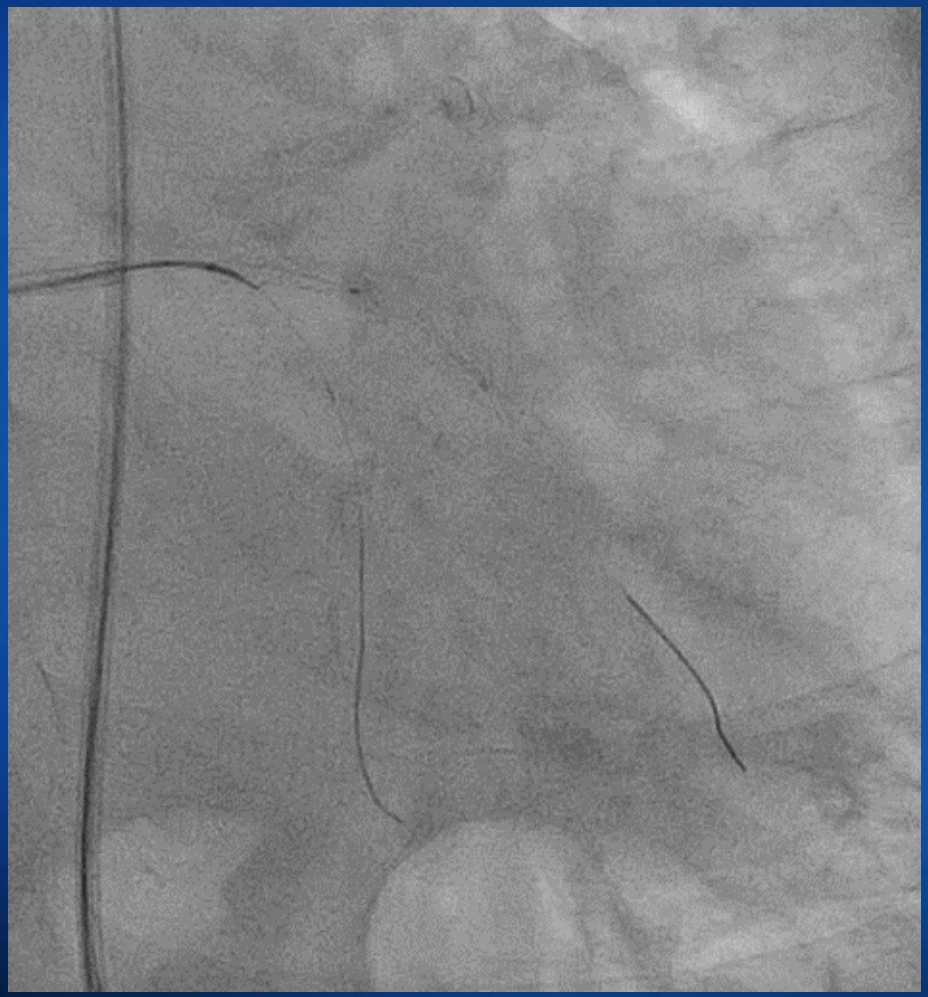


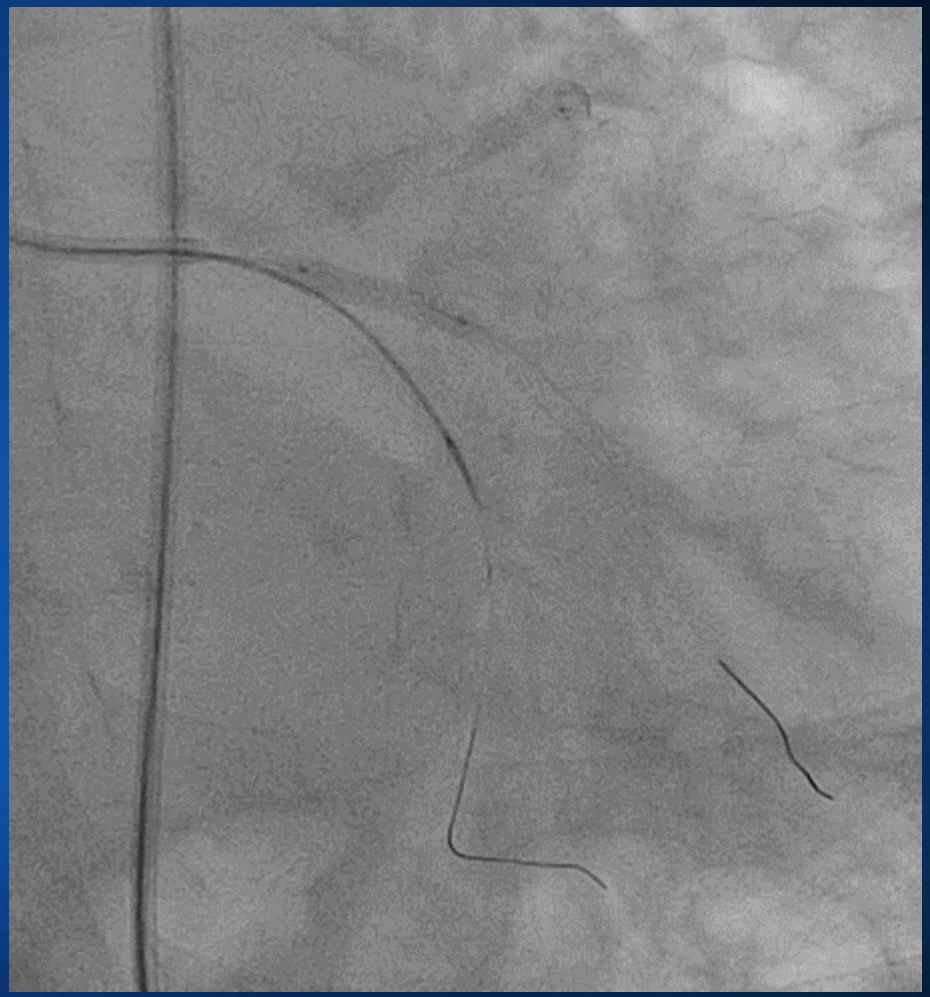
- Remove Corsair with rotation after norminal-pressure jailing



- Rewiring to LCx proper (pilot)

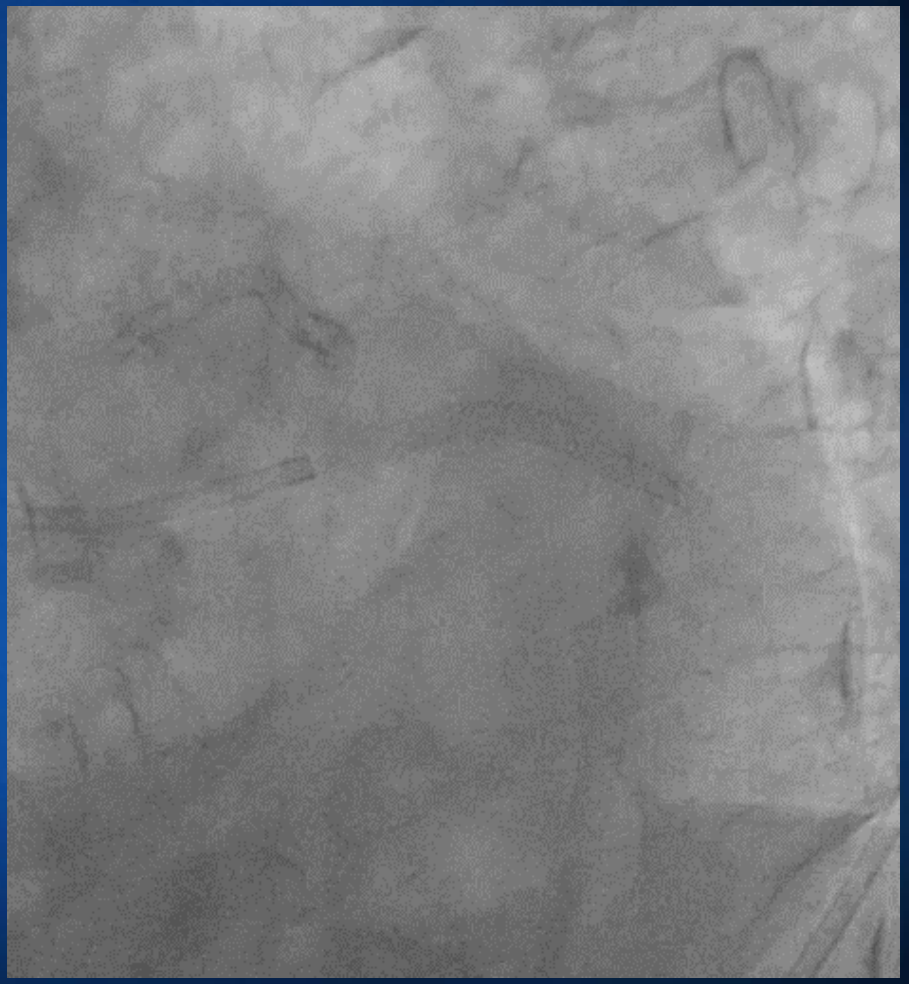
2. Kissing-Corsair technique





- Corsair recross to LCx under OM anchoring (3.0mm-size NC balloon)
- Kissing-Corsair & NC balloon @OM stent (3.0mm-size NC balloon up t0 18 atm)

Final angiography

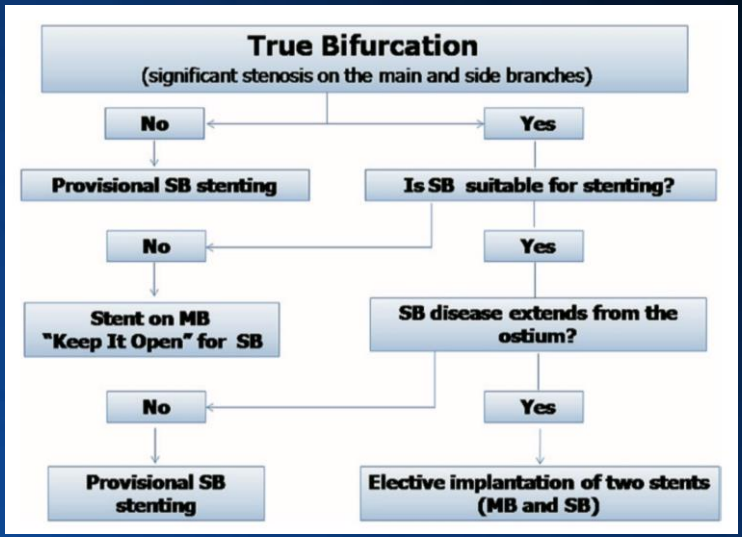


"Keep It Open (KIO)" Strategy

- Preferred when **SB is not suitable (too small) for stenting** or clinically irrelevant AND has **ostial or diffuse disease**.

  … as follows:

  1. Wire both branches.
  2. Dilate MB if needed but not SB.
  3. Stent MB and leave wire in the SB.
  4. Perform post-dilation of the MB with jailed wire @ SB.
  5. Do not rewire SB or postdilate SB.



- This "jailed wire" strategy allows protection of a SB that may not require treatment but where the need to maintain patency is important.

- This strategy can be used as a stand-alone technique or as part of the provisional strategy when the operator may need to eventually dilate or stent the SB.

Latib A, Colombo A. JACC Cardiovasc Interv. 2008;1:218-26.
Lassen JF, et al.EuroIntervention. 2018;13:1540-1553.

"Keep It Open (KIO)" Strategy

Concerns of KIO

- The trapped wire may suffer a fracture during the removal maneuver.

  Predictors of jailed wire rupture

  1) Calcification of the vessel wall,
  2) Length of the trapped wire,
  3) High-pressures used at the MB stent deployment
  4) Conflicting results whether to use polymer-coated wires

  12th EBC consensus. 2018.

- Limitation in performing adjuvant high-pressure ballooning
- Difficulty in the rewiring irrespective of removing of jailed wire
- Not sufficient to protect SB occlusion completely

  → Resultant of the failure of SB protection …

- ***If there are SBs which need to be desperately protected*** **(important SBs but not indicated of SB stenting or impossible SB stenting),** ***"KIO" must have many limitations and uncertainty of procedural success.***

SB pre-dilation

Assessment of side branch predilation before a provisional T-stent strategy for bifurcation lesions. A randomized trial

Manuel Pan, MD, PhD,[a] Alfonso Medina, MD, PhD,[b] Miguel Romero, MD, PhD,[a] Soledad Ojeda, MD, PhD,[a] Pedro Martin, MD, PhD,[b] Javier Suarez de Lezo, MD, PhD,[a] Jose Segura, MD, PhD,[a] Francisco Mazuelos, MD, PhD,[a] Jose Novoa, MD, PhD,[b] and Jose Suarez de Lezo, MD, PhD[a] *Cordoba, Spain and Las Palmas de Gran Canaria, Spain*

Background A simple approach is the predominant strategy for the percutaneous coronary intervention of bifurcation lesions. Performing side branch (SB) predilation in this context is currently a matter of controversy. In this study, we assess the efficacy of SB predilatation before a provisional T-stent strategy for bifurcation lesions.

Methods Between February 2009 and November 2012, 372 patients with true bifurcation lesions were randomized to either predilation of the SB (n = 187) or no predilatation (n = 185) before main branch (MB) stent implantation and a subsequent SB provisional stent strategy.

Results There were no significant differences between the patient groups regarding the baseline characteristics. After MB stent implantation, the TIMI flow of the SB was higher in the patients with SB predilation: TIMI flow 0 to 1; 2 (1%) versus 18 (10%), P< .001; and TIMI flow III; 179 (96%) versus 152 (82%), P< .001. Side branch stenting rates were 4% versus 3%, P = not significant. In addition, 60 patients (32%) from the SB predilation group presented SB residual stenosis by visual inspection <50%, and TIMI flow ≥III did not require any additional treatment. The failure rate of SB rewiring, the time of rewiring, the number of wires used, and the incidence of major events were similar in both groups of patients.

Conclusions Predilation of the SB resulted in improved TIMI flow after MB stenting and less indication to subsequently treat the SB. If rewiring of the SB is required, predilation did not hinder this maneuver. (Am Heart J 2014;168:374-80.)

Circ J 2018; **82:** 1293–1301
doi:10.1253/circj.CJ-17-0921

ORIGINAL ARTICLE
Cardiovascular Intervention

Effect of Side Branch Predilation in Coronary Bifurcation Stenting With the Provisional Approach

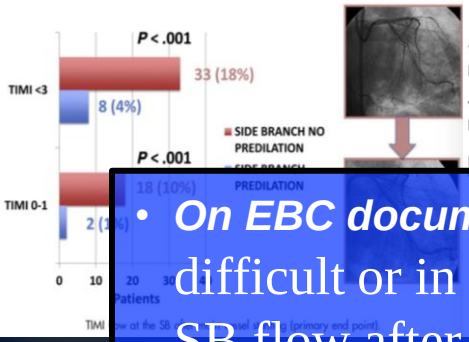
— Results From the COBIS (Coronary Bifurcation Stenting) II Registry —

Seung Hwa Lee, MD; Young Bin Song, MD, PhD; Joo Myung Lee, MD, PhD; Taek Kyu Park, MD; Jeong Hoon Yang, MD, PhD; Joo-Yong Hahn, MD, PhD; Jin-Ho Choi, MD, PhD; Seung-Hyuk Choi, MD, PhD; Sang Hoon Lee, MD, PhD; Joong Hyun Ahn; Keumhee C. Carriere, PhD; Myung-Ho Jeong, MD, PhD; Hyo-Soo Kim, MD, PhD; Ju Hyeon Oh, MD, PhD; Yangsoo Jang, MD, PhD; Hyeon-Cheol Gwon, MD, PhD

Background: Whether side branch (SB) predilation before main vessel (MV) stenting is beneficial is uncertain, so we investigated the effects of SB predilation on procedural and long-term outcomes in coronary bifurcation lesions treated using the provisional approach.

Methods and Results: A total of 1,083 patients with true bifurcation lesions undergoing percutaneous coronary intervention were evaluated. The primary outcome was a major adverse cardiovascular event (MACE): cardiac death, myocardial infarction, or target lesion revascularization. SB predilation was performed in 437 (40.4%) patients. Abrupt (10.5% vs. 11.3%; P=0.76) or final SB occlusion (2.7% vs. 3.9%; P=0.41) showed no differences between the predilation and non-predilation groups. The rates of angiographic success (69.1% vs. 52.9%, P<0.001) and SB stent implantation (69.1% vs. 52.9%, P<0.001) were significantly higher in the predilation group. During a median follow-up of 36 months, we found no significant difference between the groups in the rate of MACE (9.4% vs. 11.5%; P=0.67) in a propensity score-matched population. In subgroup analysis, patients with minimal luminal diameter of the parent vessel ≤1 mm benefited from SB predilation in terms of preventing abrupt SB occlusion (P for interaction=0.04).

Conclusions: For the treatment of true bifurcation lesions, SB predilation improved acute angiographic and procedural outcomes, but could not improve long-term clinical outcomes. It may benefit patients with severe stenosis in the parent vessel.



	SB predilation (n = 187)	No-SB predilation (n = 185)	P
Impossibility to recross (wire/balloon)	2 (1.5%)*	2 (1%)	.62
Time of rewiring (min)	2.2 ± 6*	3.2 ± 7	.20
No. of wires used in the rewiring	1.1 ± 0.4*	1.3 ± 0.6	.023
Final % of stenosis at SB	16 ± 17	15 ± 16	.59
Troponin postprocedure (IU/L)	2.9 ± 7.2	2.8 ± 6.2	.87
- Death	1 (0.5)		1
- TLR	5 (2.7%)	5 (2.7%)	1
- Death	1 (0.5%)	3 (1.6%)	.37

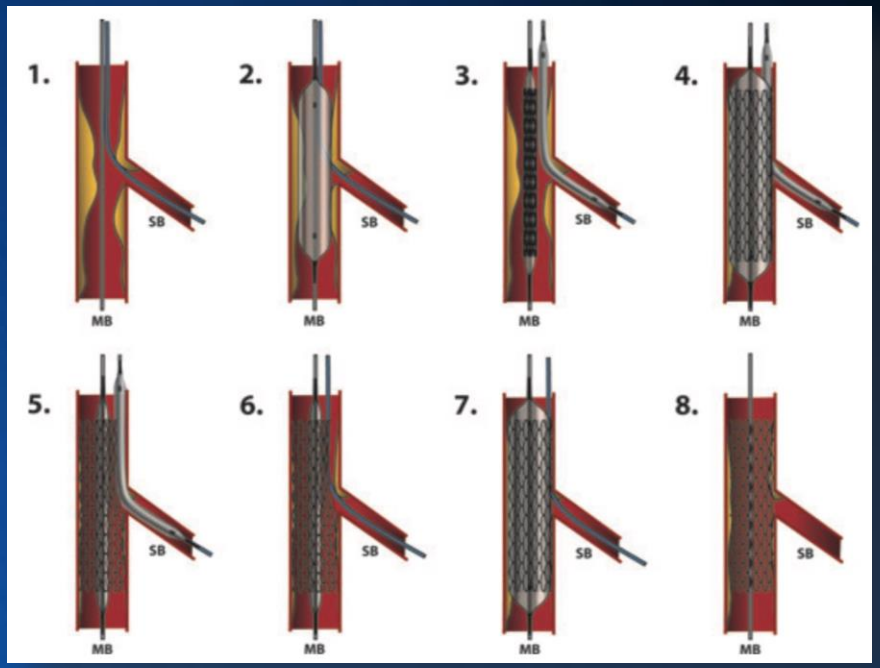
Table 4. Acute Angiographic and Procedural Outcomes in the Total and Propensity Score-Matched Populations

	Total population			Propensity score-matched population		
	Non-predilation (n=646)	Predilation (n=437)	P value	Non-predilation (n=392)	Predilation (n=392)	P value
Postprocedural MLD						
PV	3.0 (2.7–3.4)	3.1 (2.7–3.6)	0.006	3.03 (2.69–3.41)	3.10 (2.67–3.57)	0.22
MV	2.6 (2.3–2.9)	2.7 (2.4–3.0)	0.11	2.63 (2.35–3.01)	2.65 (2.33–2.98)	0.63
SB	1.2 (0.9–1.9)	1.6 (1.1–2.2)	<0.001	1.32 (0.89–2.01)	1.65 (1.12–2.25)	<0.001
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	0.001
Final kissing balloon	295 (45.4)	246 (56.5)	<0.001	208 (53.1)	219 (55.9)	0.43
Intraprocedural event						
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	0.16
Final TIMI flow <3	29 (4.5)	12 (2.7)	0.14	18 (4.6)	10 (2.6)	0.13
Angiographic success						
In MV	633 (98.0)	430 (98.4)	0.79	384 (98.0)	385 (98.2)	0.80
In SB	342 (52.9)	302 (69.1)	<0.001	229 (58.4)	274 (69.9)	0.001
Overall	335 (51.9)	299 (68.4)	<0.001	224 (57.1)	271 (69.1)	0.001
[illegible] MACE	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	0.02
Procedural success†	304 (47.7)	299 (68.4)	<0.001	223 (56.9)	271 (69.1)	<0.001
Periprocedural MI‡	118 (19.6)	69 (17.5)	0.40	70 (19.2)	64 (17.8)	0.63

- ***On EBC document*** . . . SB pre-dilatation should be performed when SB access is difficult or in cases of severe diffuse and/or calcified SB lesion or compromised SB flow after wiring.
- ***Non-applicable cases frequently exist*** … High risk of SB dissection after ballooning, especially **diffuse long stenosis in small vessel disease**.

Jailed balloon technique

- Extension of the jailed-wire technique and modified provisional stenting technique that aims to maintain SB patency and improve SB access.



- Use of the jailed-balloon allows for treatment of any plaque shift that occurred during stenting of the MB without losing access to the SB.

- **Concerns/Limitations of Jailed-balloon technique**
  1. SB balloon entrapment
  2. SB balloon rupture
  3. Ostium of SB dissection following SB balloon inflation

Burzotta F, et al. EuroIntervention. 2010;5:809-13.
Singh J, et al. J Interv Cardiol. 2012;25:289-96.

Jailed Corsair technique

Comparison of characteristics with Jailed Corsair technique versus Jailed balloon technique.

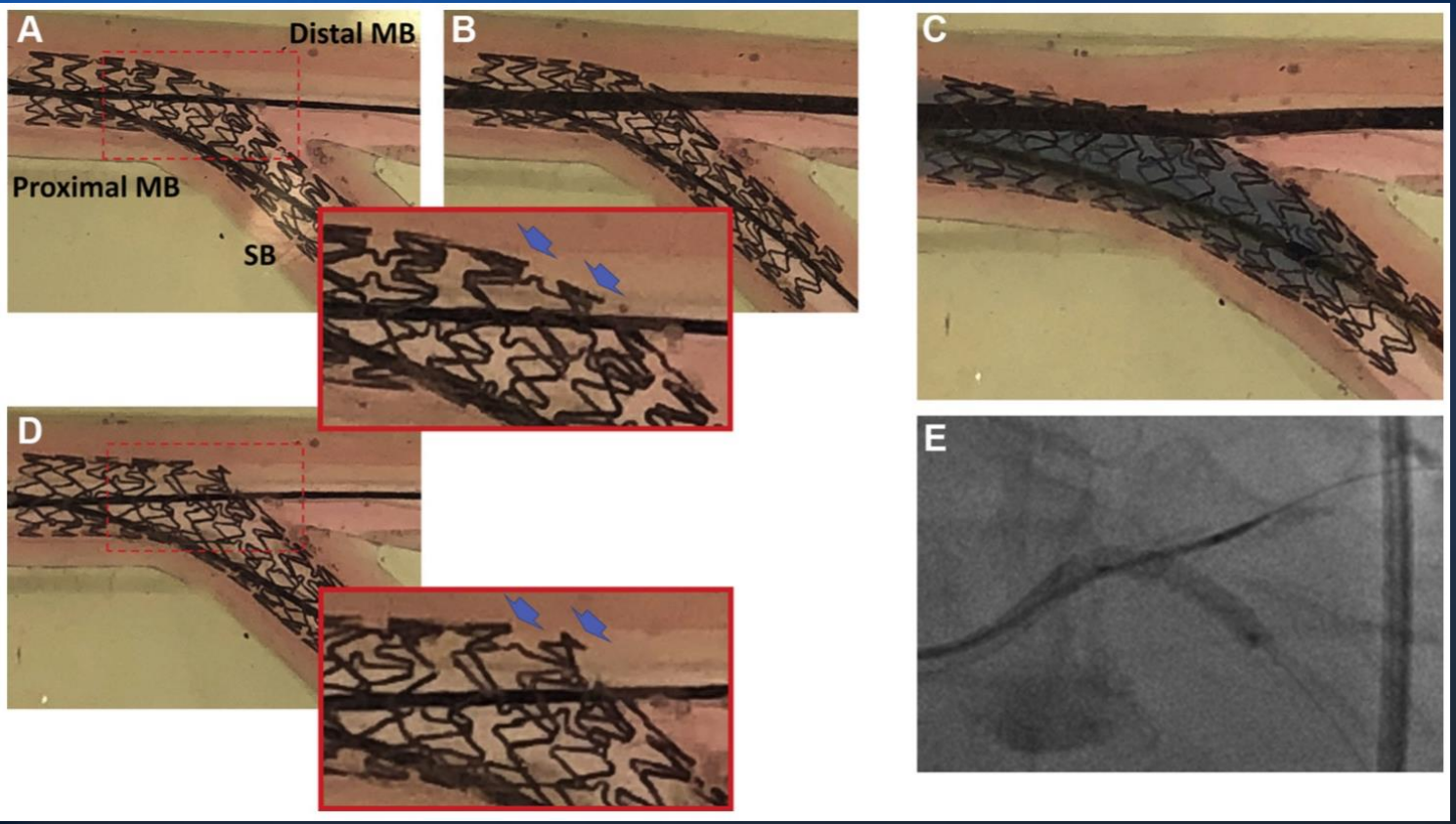
	Jailed Corsair Technique	Jailed Balloon Technique
Purpose	Side branch protection	Side branch protection
Risk of dissection at the ostium of side branch	Minimum	Depends on the size of balloon and inflation pressure
Difficulty level of guidewire recross to the side branch	Easy **Limitation:** **6Fr G/C – non-applicable**	Depends on the dissection at the ostium of side branch
Inflation pressure of stent implantation	Nominal or less than nominal	Nominal. Should be greater than inflation pressure of the jailed balloon
Predilatation and/or lesion modification to main vessel before stent implantation	Critically important. Sufficient lesion preparation enables stent expansion with minimum inflation pressure.	Should be important.
Removal of the jailed device	Pull back with rotating Corsair	Pull back without rotating balloon
Advantage	Few risk of dissection at the ostium of side branch, which facilitates guide wire recross to side branch	There are several literatures supporting the efficacy and safety of this procedure.
Possible complications	Entrapment, Tip transection	Entrapment, Jailed balloon rupture

Numasawa Y, et al. Cardiovasc Revasc Med. 2017;18:295-298.

Kissing-Corsair technique

- The 1-mm Corsair shaft serves as a small balloon, providing the quasi-effect of the kissing balloon technique.
- Option for the Tx of patients in whom small balloons cannot pass the SB.

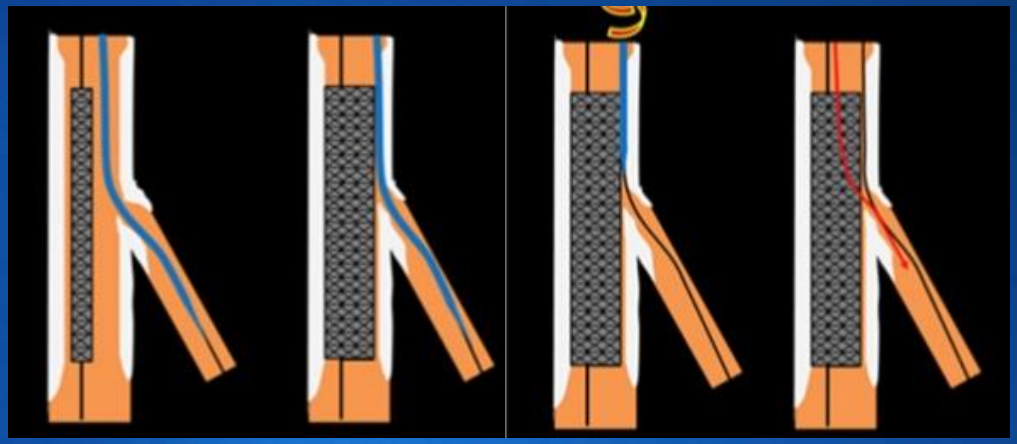
Bench Testing (Main Branch, 3.5 mm; Side Branch, 2.5 mm)



Yoshida R, et al. JACC interv. 2019 Mar 25;12(6):e53-e54

A novel side branch protection and dilation before and after stent implantation:

Consecutive Jailed-Cosair and Kissing-Corsair technique



Jailed Corsair → Removal → Re-wiring

Re-enter Corsair → Kissing balloon

Kissing-Corsair

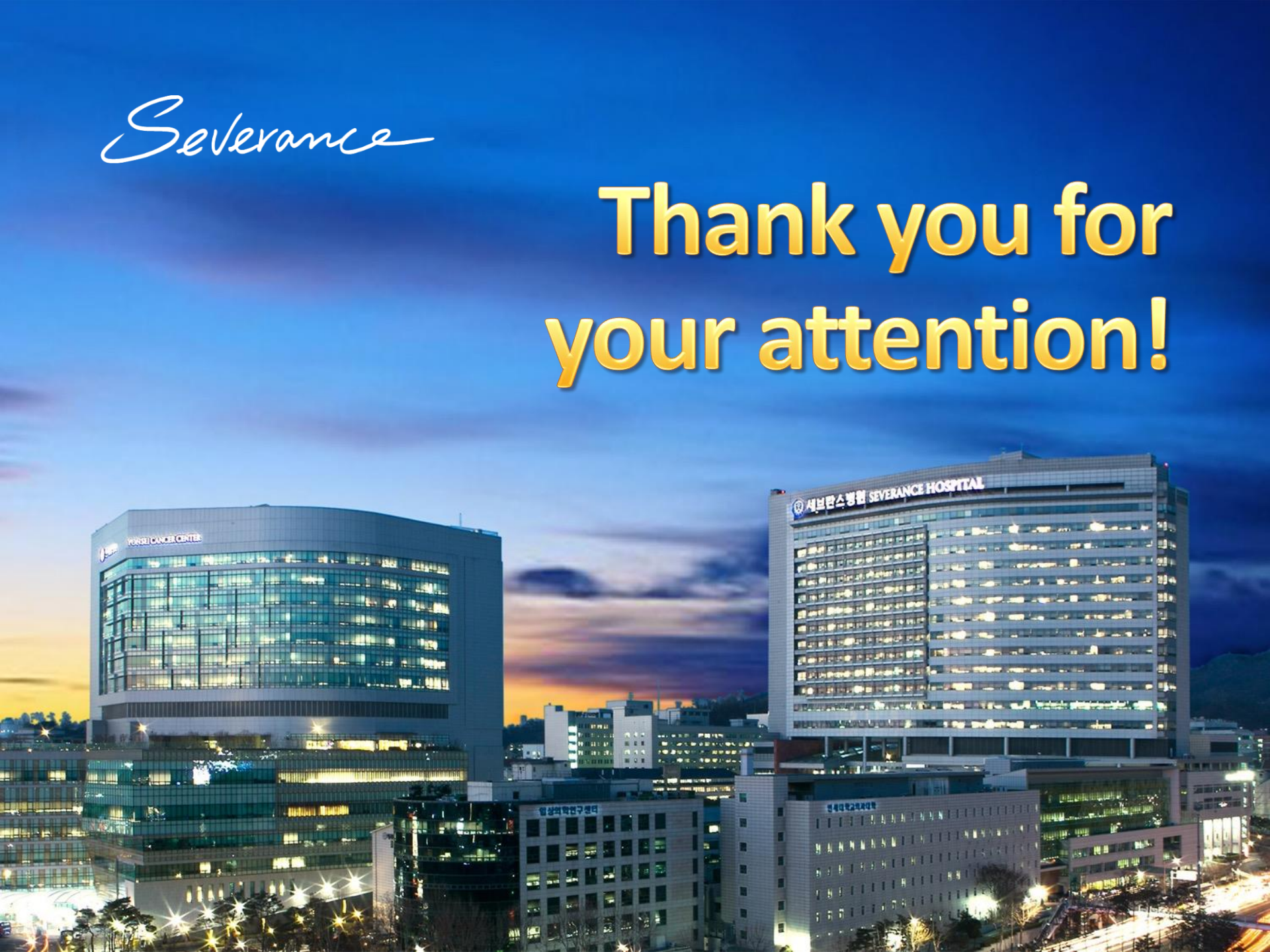
SUMMARY

Complex Bifurcation Intervention in CHIP

- For the successful "Bifurcation PCI of CHIP patients (under situation without LV assisted devices)",
  - Not to cause procedural complications
  - Not to cause procedural time delay, especially in the situation

  … Simple bifurcation strategy could be the best !

- A novel technique of side branch protection and dilation before and after stent implantation, "Consecutive Jailed-Cosair and Kissing-Corsair technique" is …
  - A efficient, safe, and time-saving technique by using single Corsair microcatheter
  - SB protection and dilation not to cause SB compromise by the consecutive Jailed-Cosair and Kissing-Corsair technique
  - Good option for patients with SB which need to be desperately protected without procedural time-delay (CHIP patients not using LV-assisted devices)
  - A economic method reducing the No. of small balloons used


Severance
Thank you for your attention!
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