

COMPLEX PCI 2023

**Wire had crossed CTO antegrade or retrograde but unable to pass any device,
Next move ?**

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DISCLOSURE

- Disclose potential conflicts of interest : No

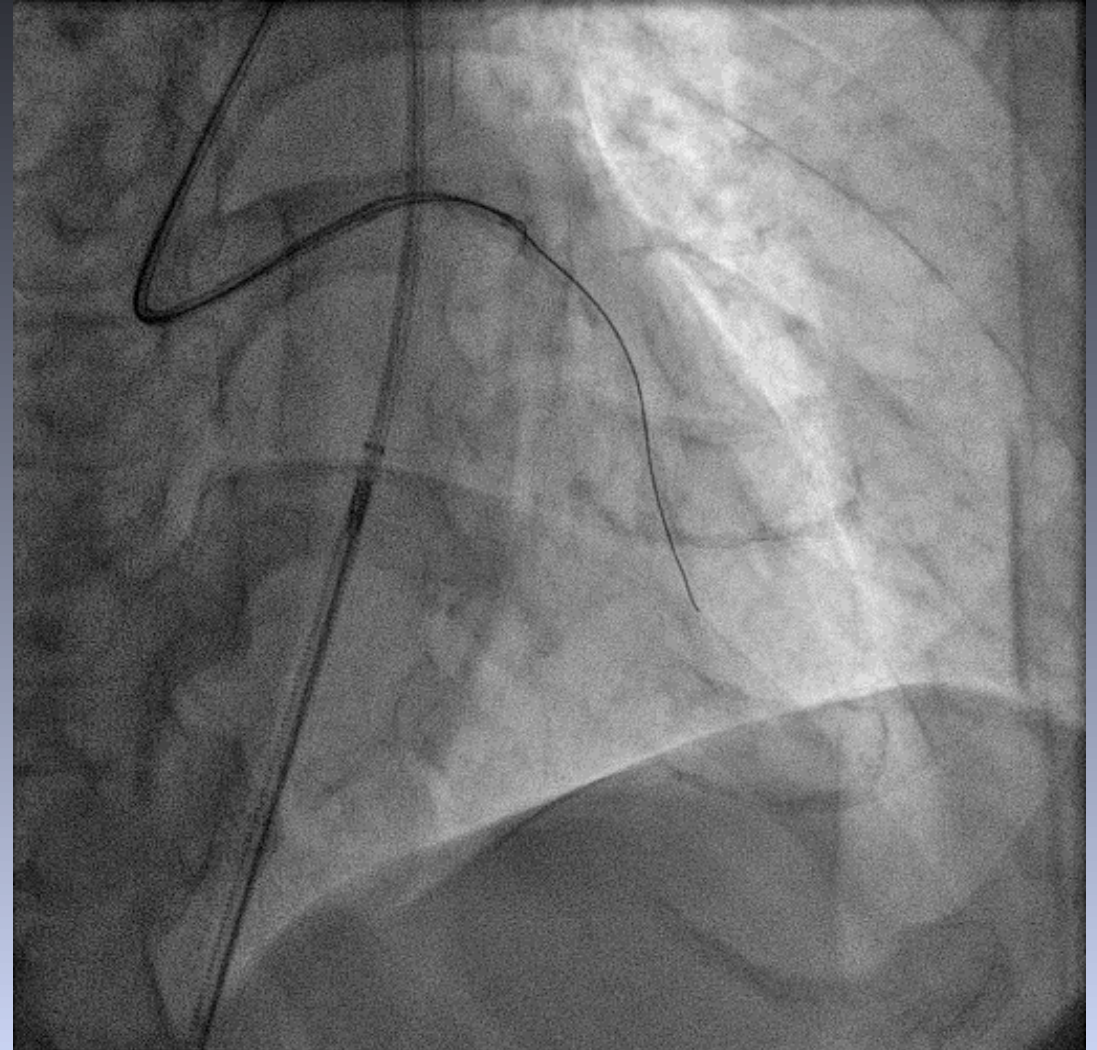
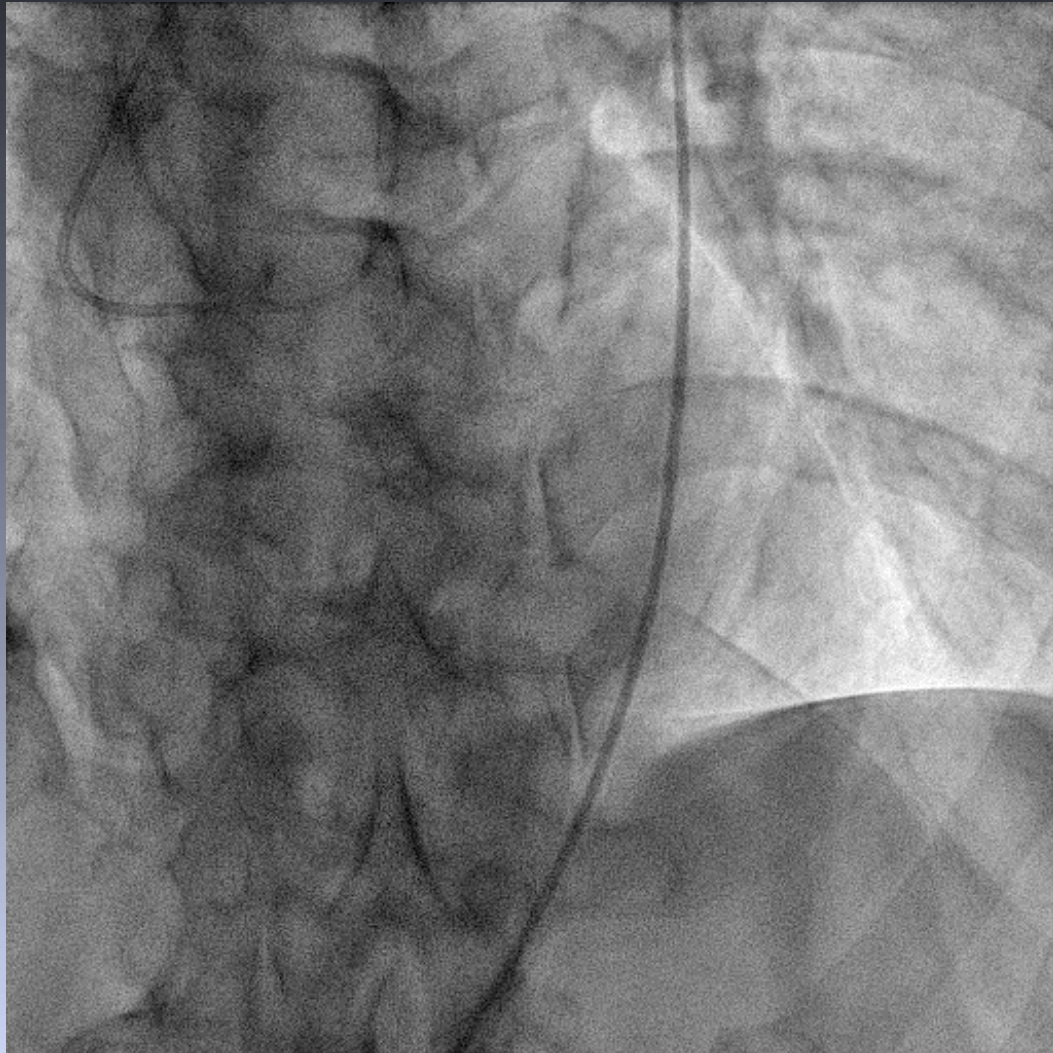
2021-1-29 First PCI

s/p DES implantation to CX

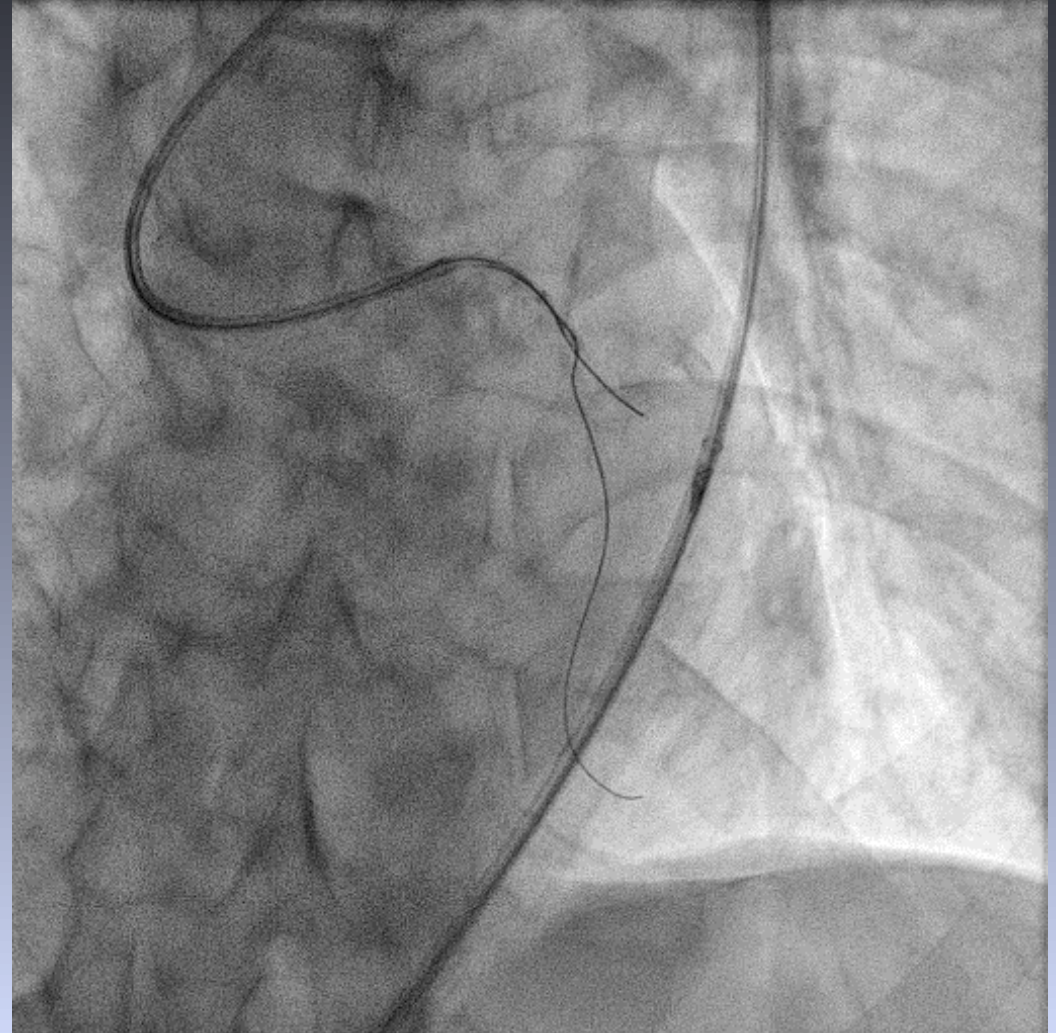
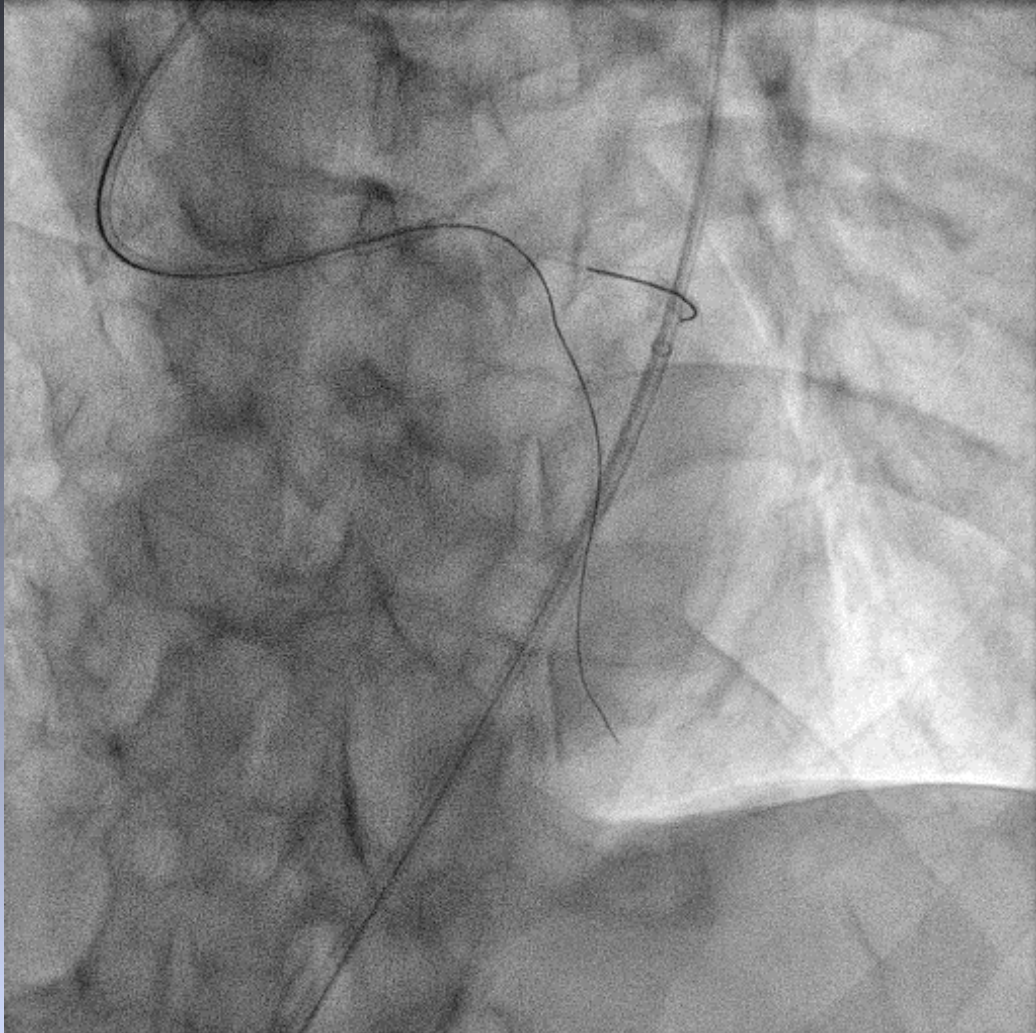
RCA multiple tandem lesions at proximal, mid & distal

LCX-mid 80% stenosis

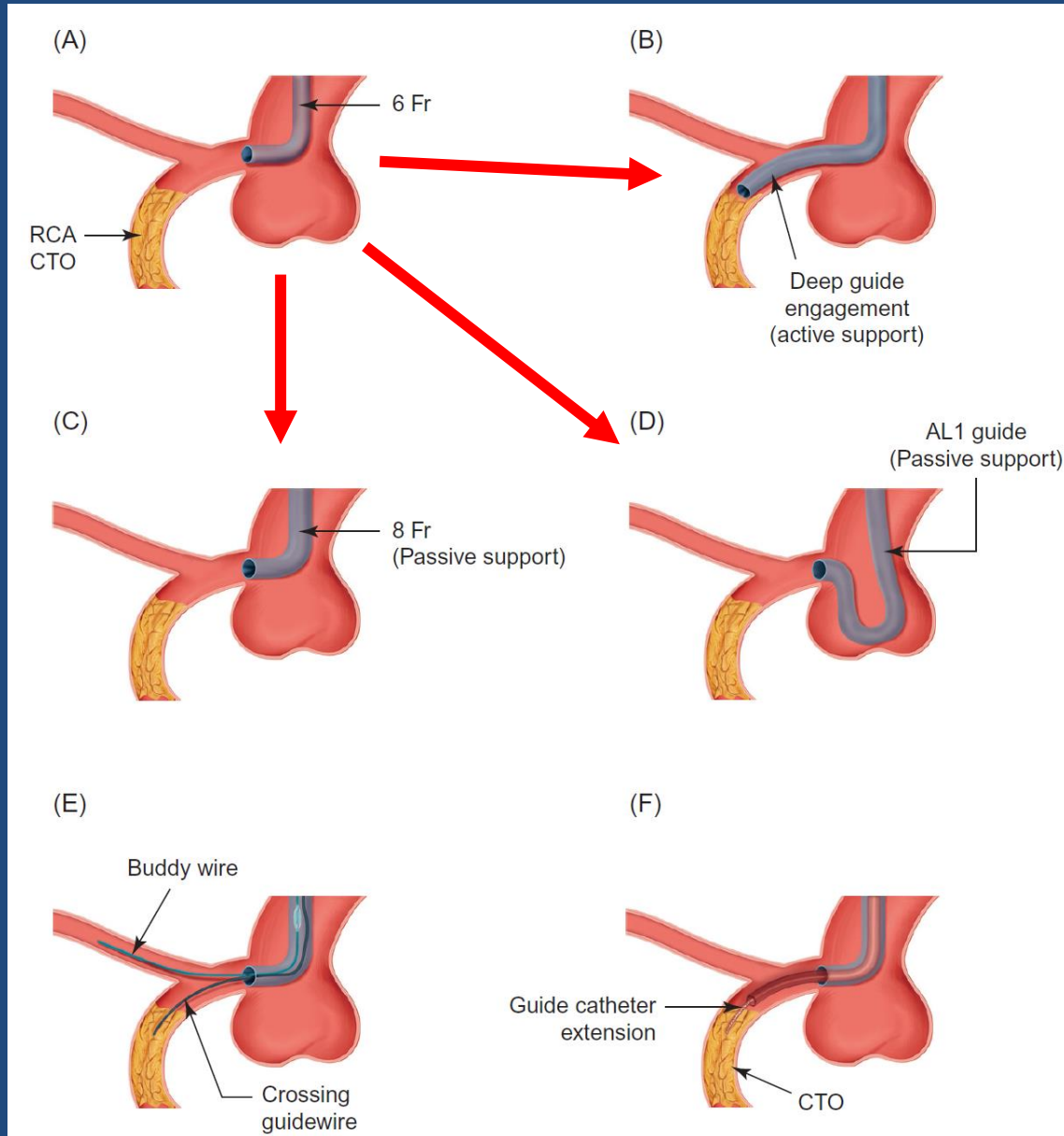
LAD-P CTO with bridging collateral to mid 1/3



6F EBU 3.75 guide, M.C. with XTA able to pass but the smallest balloon unable to pass even with guide extension support
(Procedure time 5.4 hours)



Guide catheter support for CTO



How to improve guiding support:

Co-axial as JR guide,

the bigger the better (passive support), active support by deep seating technique

Passive support by Amplatz or back-up type catheters

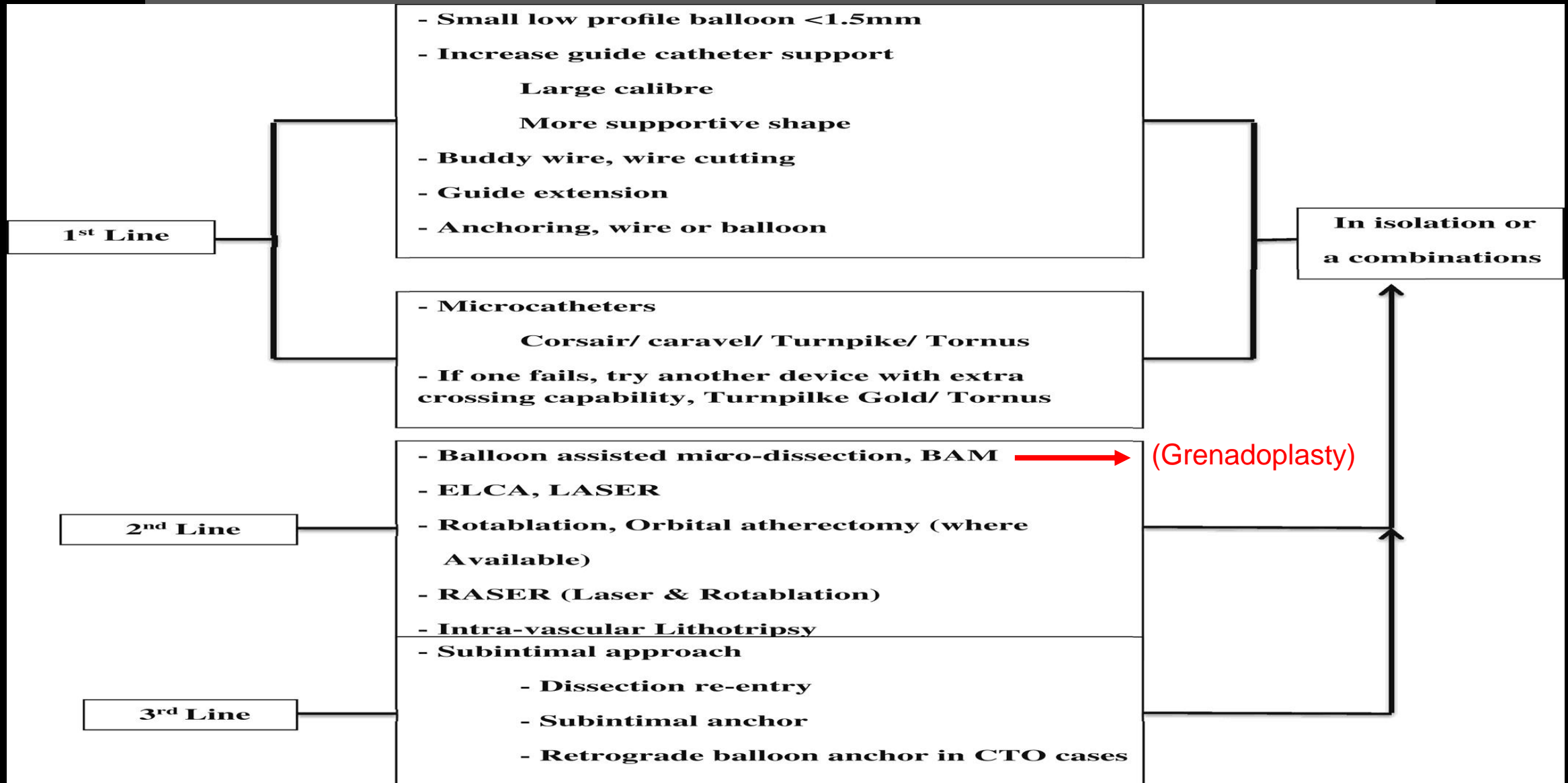
Buddy wires, Guide extension or anchoring balloon

Complex PCI Need Advanced Techniques (A. B. C. D. E. F.)

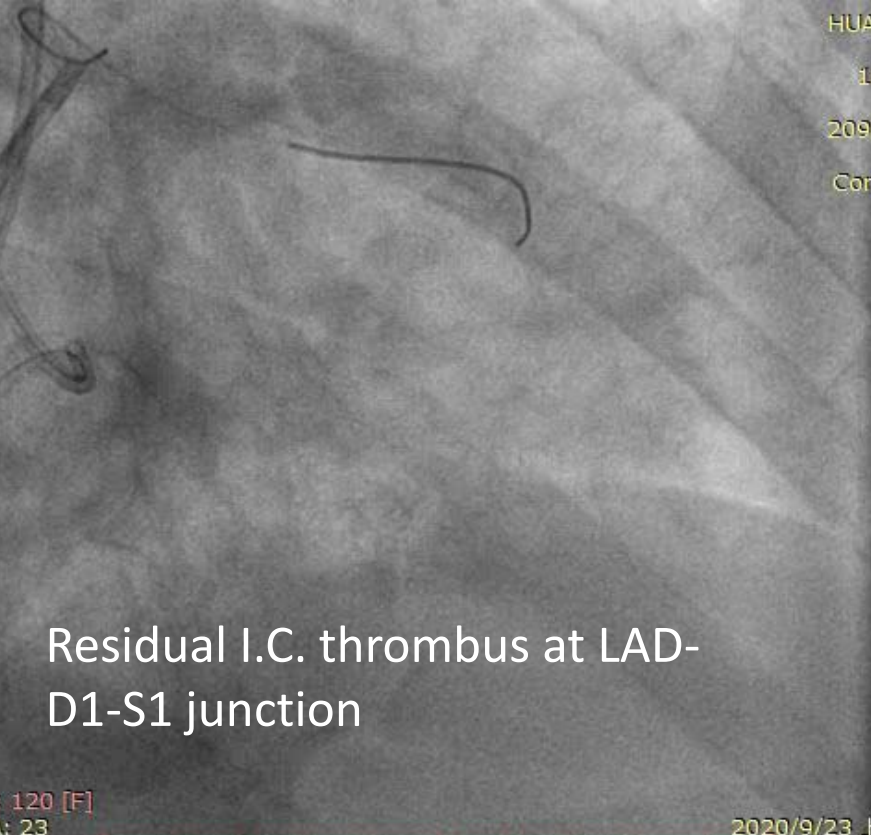
- ★ • Ancor technique
 - Wire anchor
 - Balloon anchor
 - coaxial
 - branch
- ★ • Buddy wire technique
- ★ • Changing guiding catheter
- ★ • Deep seating guiding catheter **child catheter crossover lesion, or Grenadoplasty**
- ★ • Engage coaxially
- ★ • Five in seven Fr guiding catheter (Child in mother technique)
 - Terumo Heartrail ST01 guiding catheter
 - Guidezilla/GuideLiner catheter

Uncrossable & Un-dilatable lesions

A practical approach to optimizing outcomes in PCI



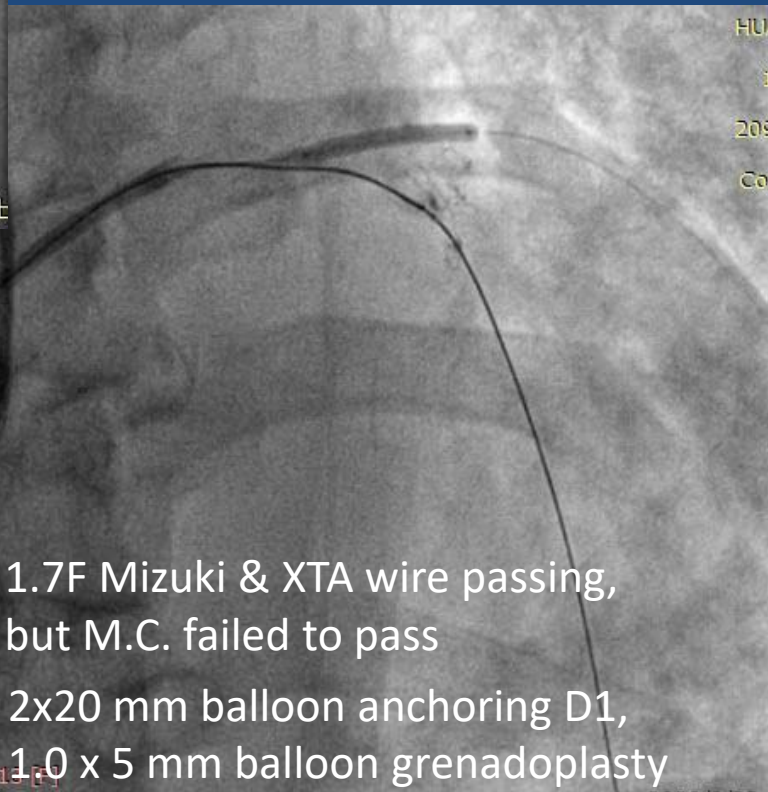
Preparation for LAD-CTO rotational atherectomy with "Grenadoplasty" Balloon Assist Micro-dissection (BAM)



Residual I.C. thrombus at LAD-D1-S1 junction

120 [F]
: 23

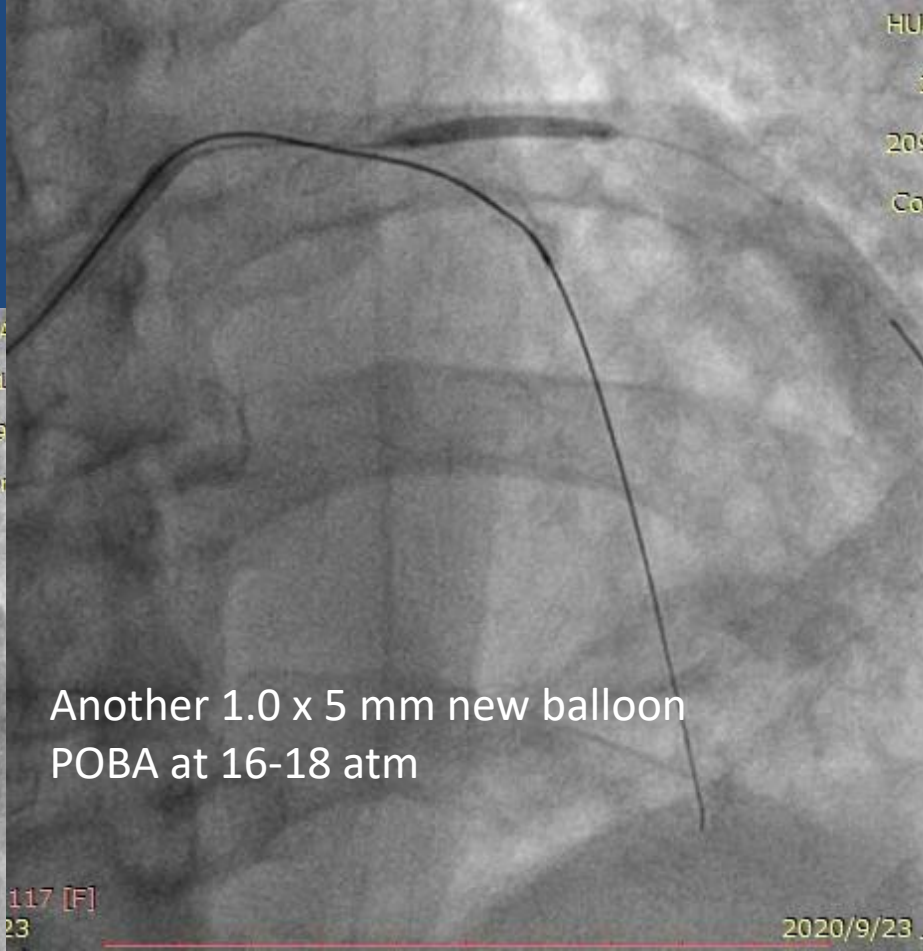
2020/9/23 上



1.7F Mizuki & XTA wire passing, but M.C. failed to pass
2x20 mm balloon anchoring D1,
1.0 x 5 mm balloon grenadoplasty

117 [F]
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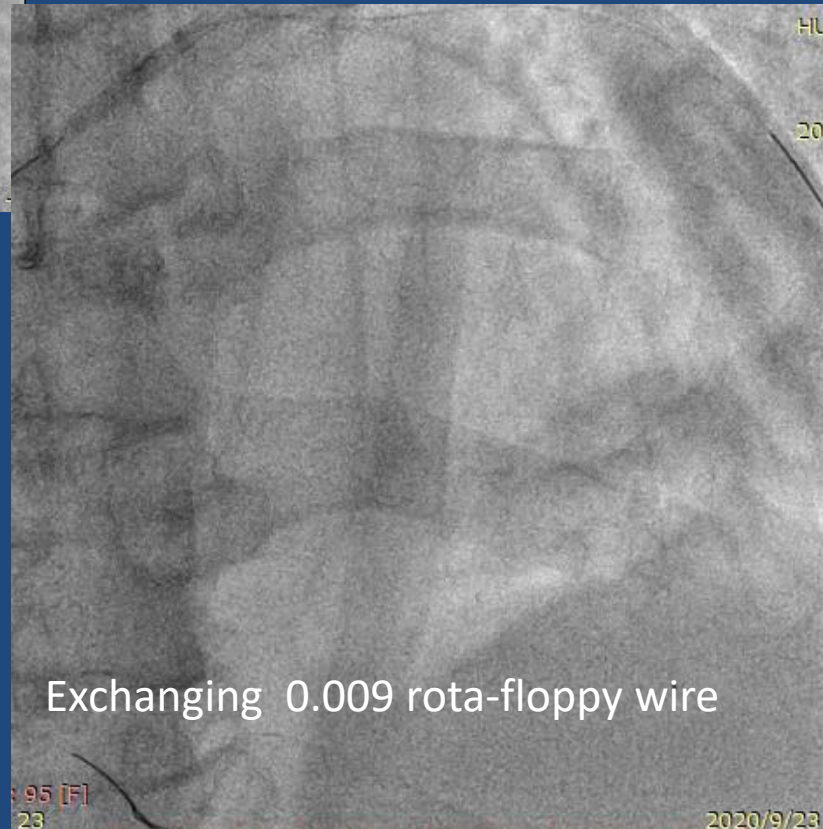
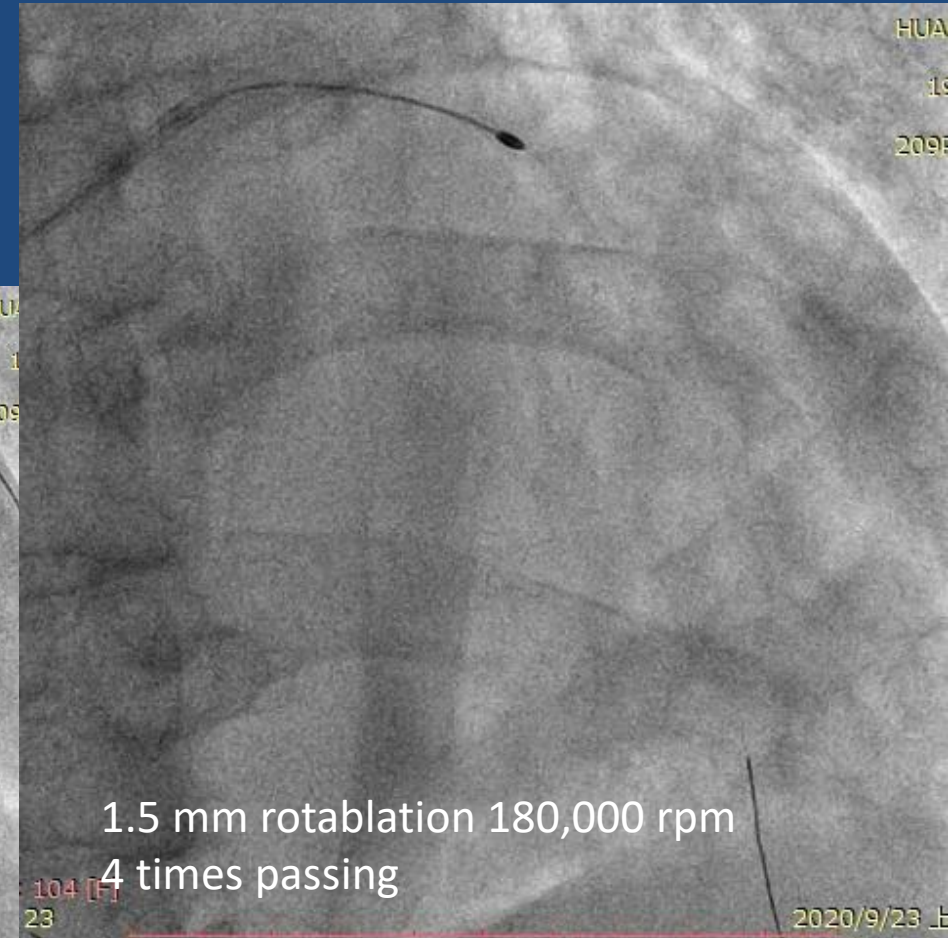
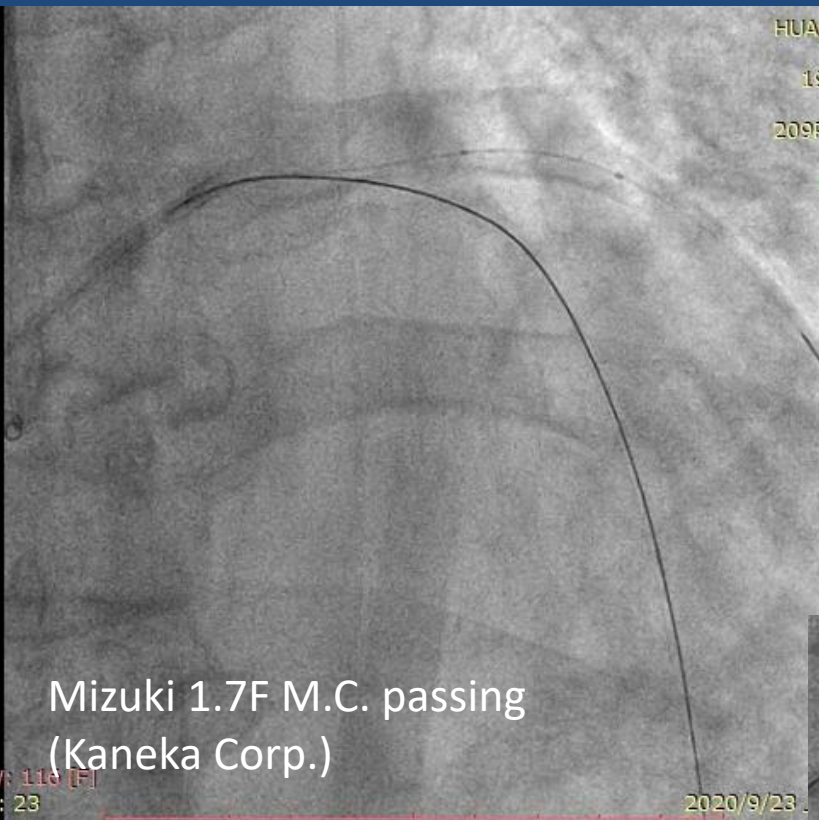


Another 1.0 x 5 mm new balloon POBA at 16-18 atm

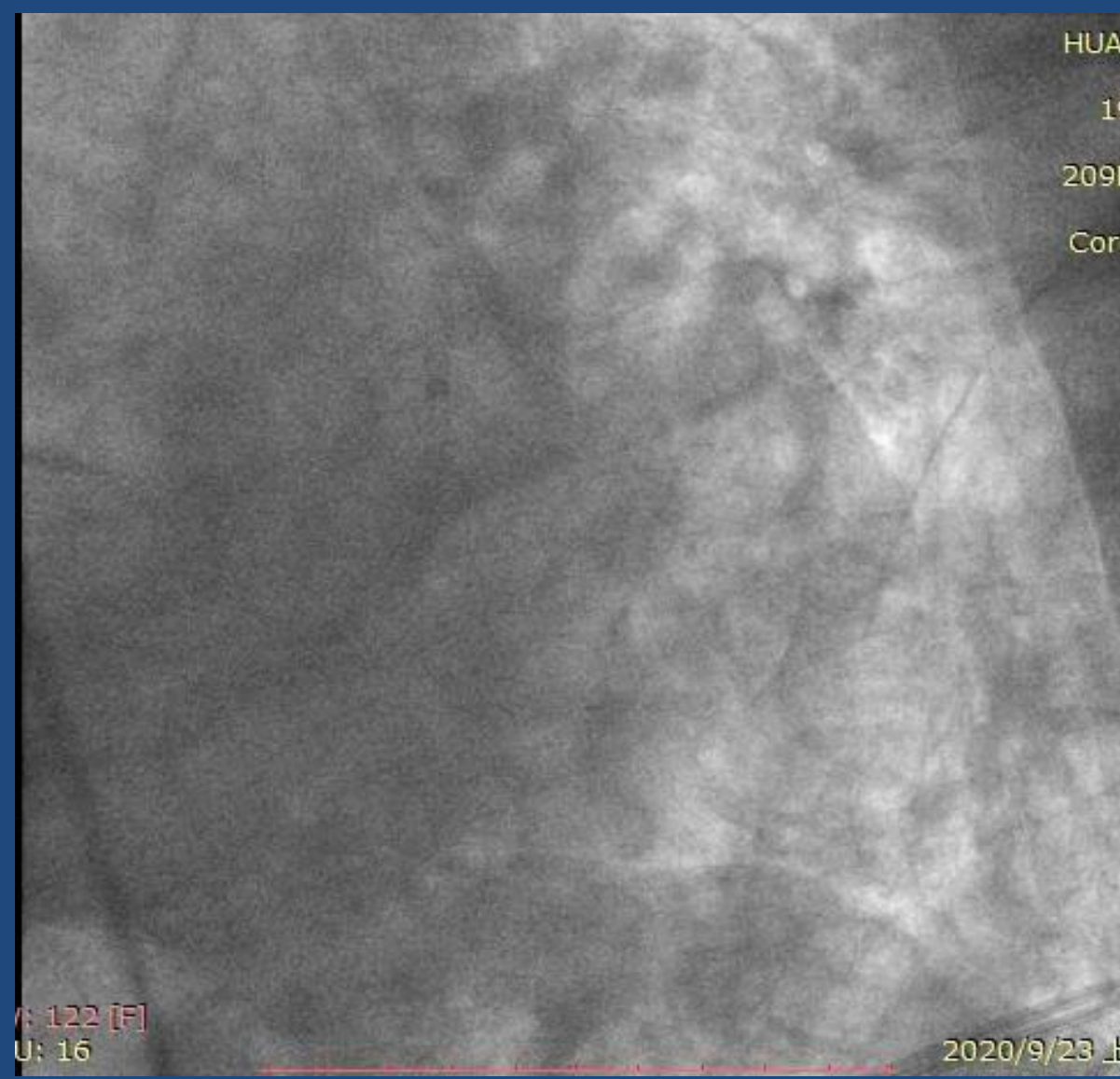
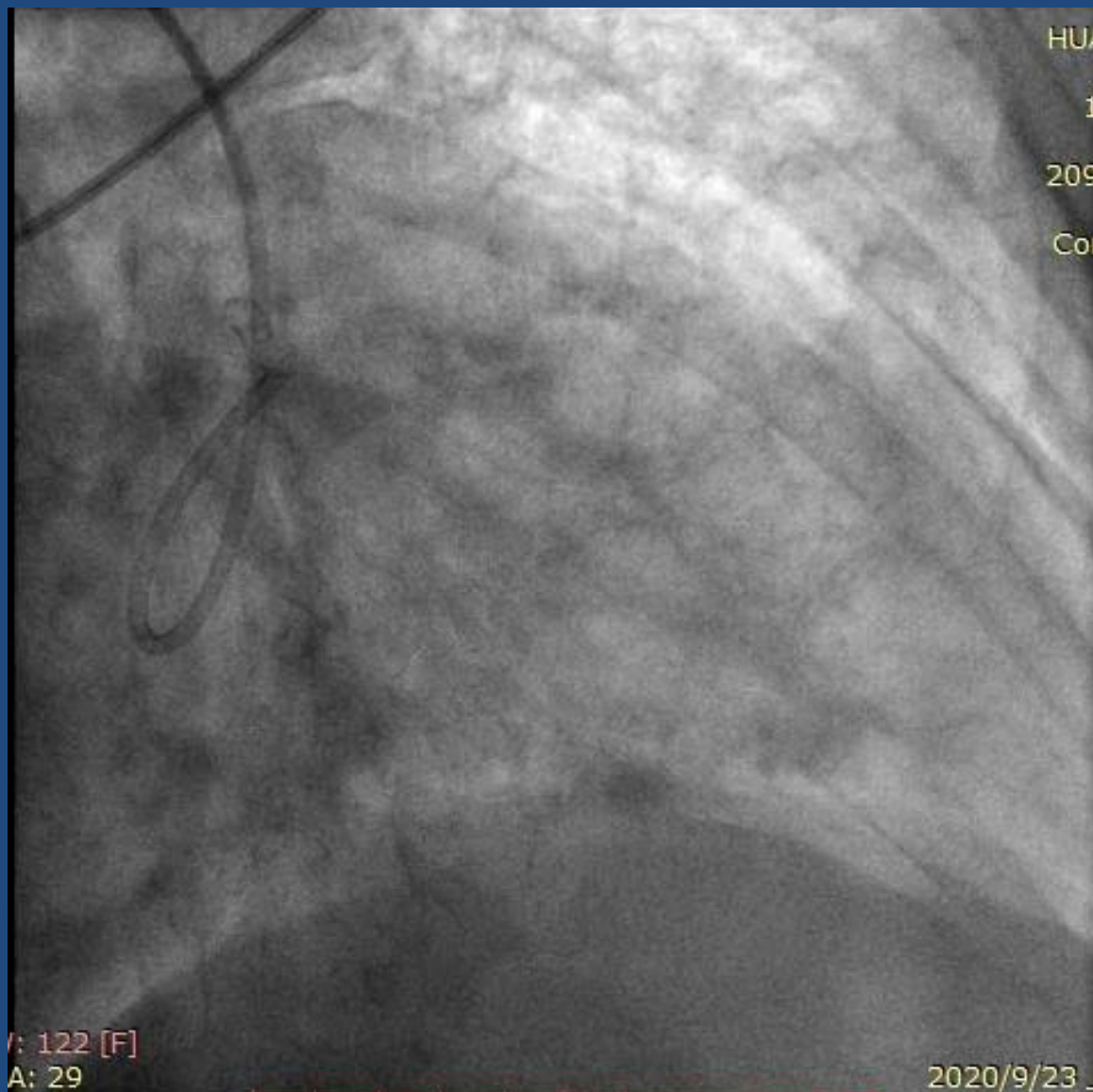
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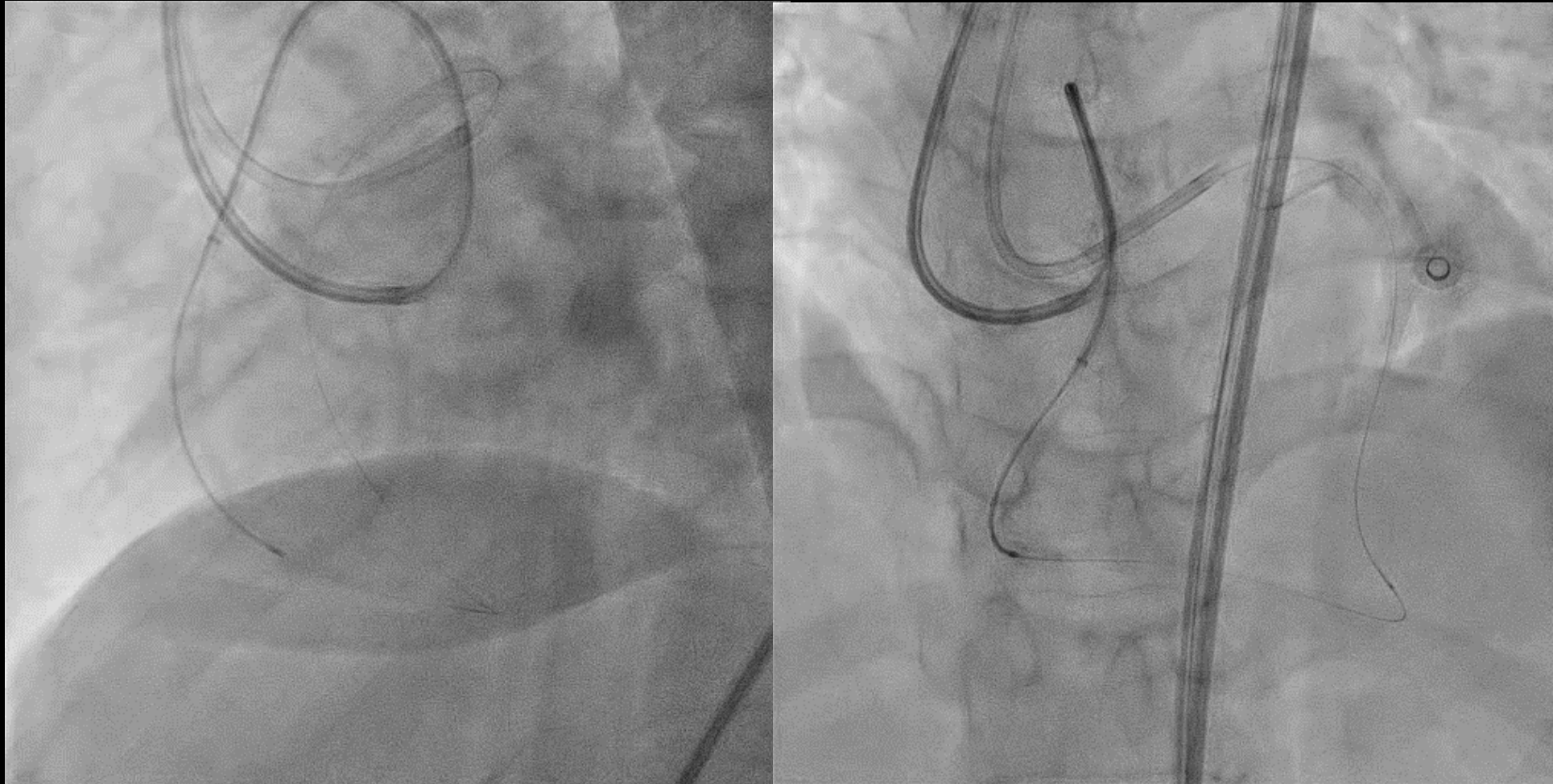
1.5 mm burr rotablation for focal calcified un-dilatable LAD-CTO



Final angiography: Proc. T. = 111 min, Fluoro. T = 59 min, contrast volume = 400 ml, F/U Echo. 2 days later LVEF = 29%

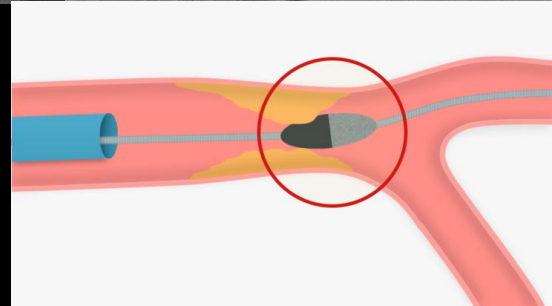
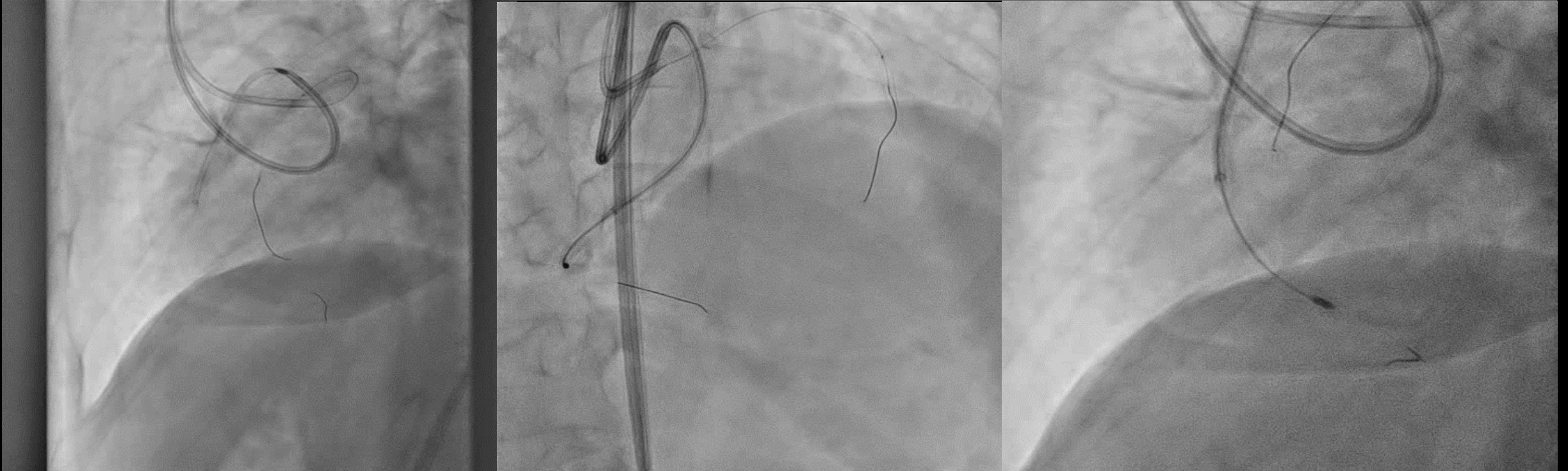


**SLE, ESRD, failed anteg. PCI, s/p R-CART RG-3 externalization,
1.5-2-2.5 un-dilatable RCA-d CTO, Turnpike Gold → failed to pass**



7F Gazella guide-extension

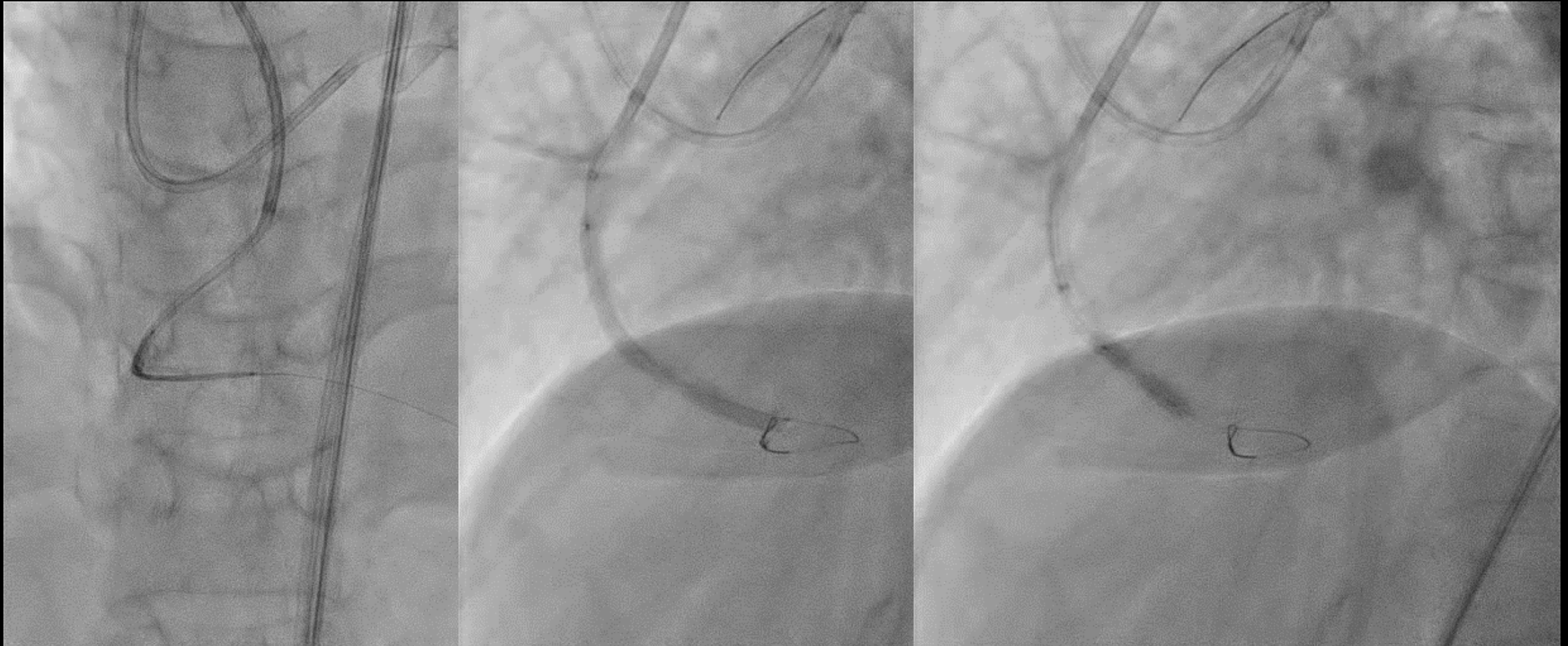
Rota Floppy wiring through CTO along with the created channel into RCA-PDA, 1.5mm burr 170-186k rpm



7F Gazella guide-extension 1.5 mm rotablation

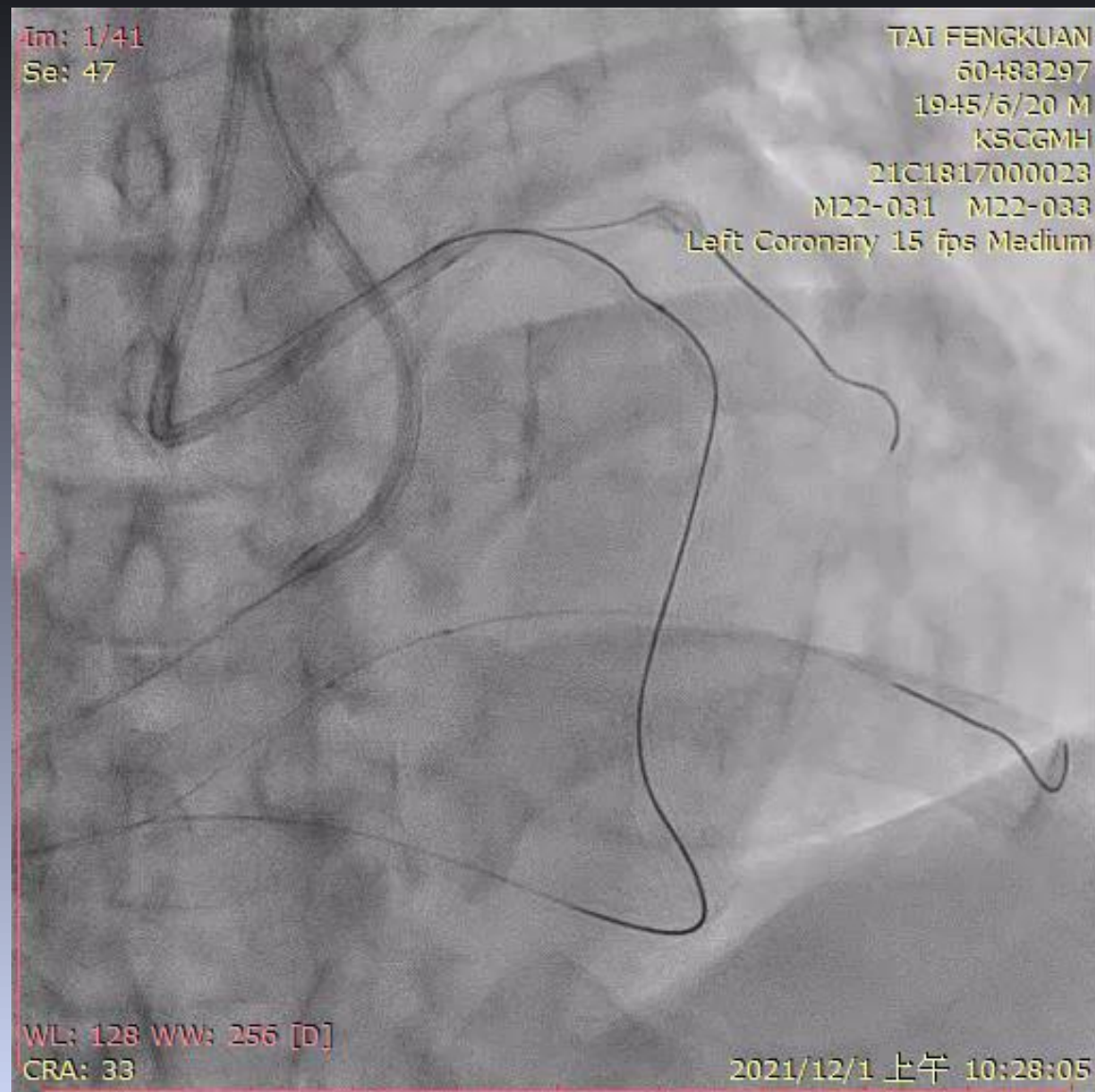
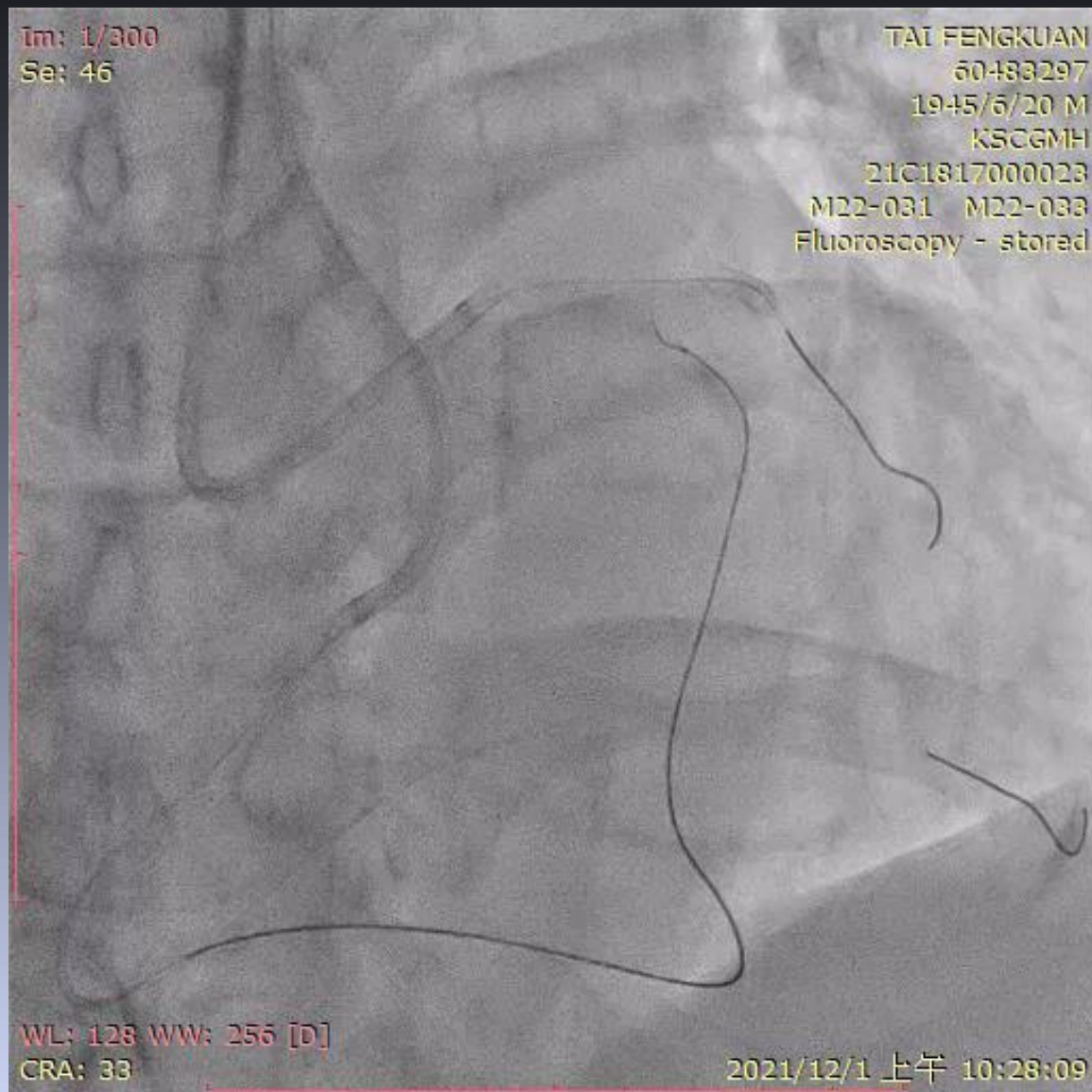
Stuck rotablator burr (Kokeshi phenomenon)

**1st DES: Synergy 3.0x48mm 16 atm
NC Accuforce 3.5x15mm up to 24 atm**



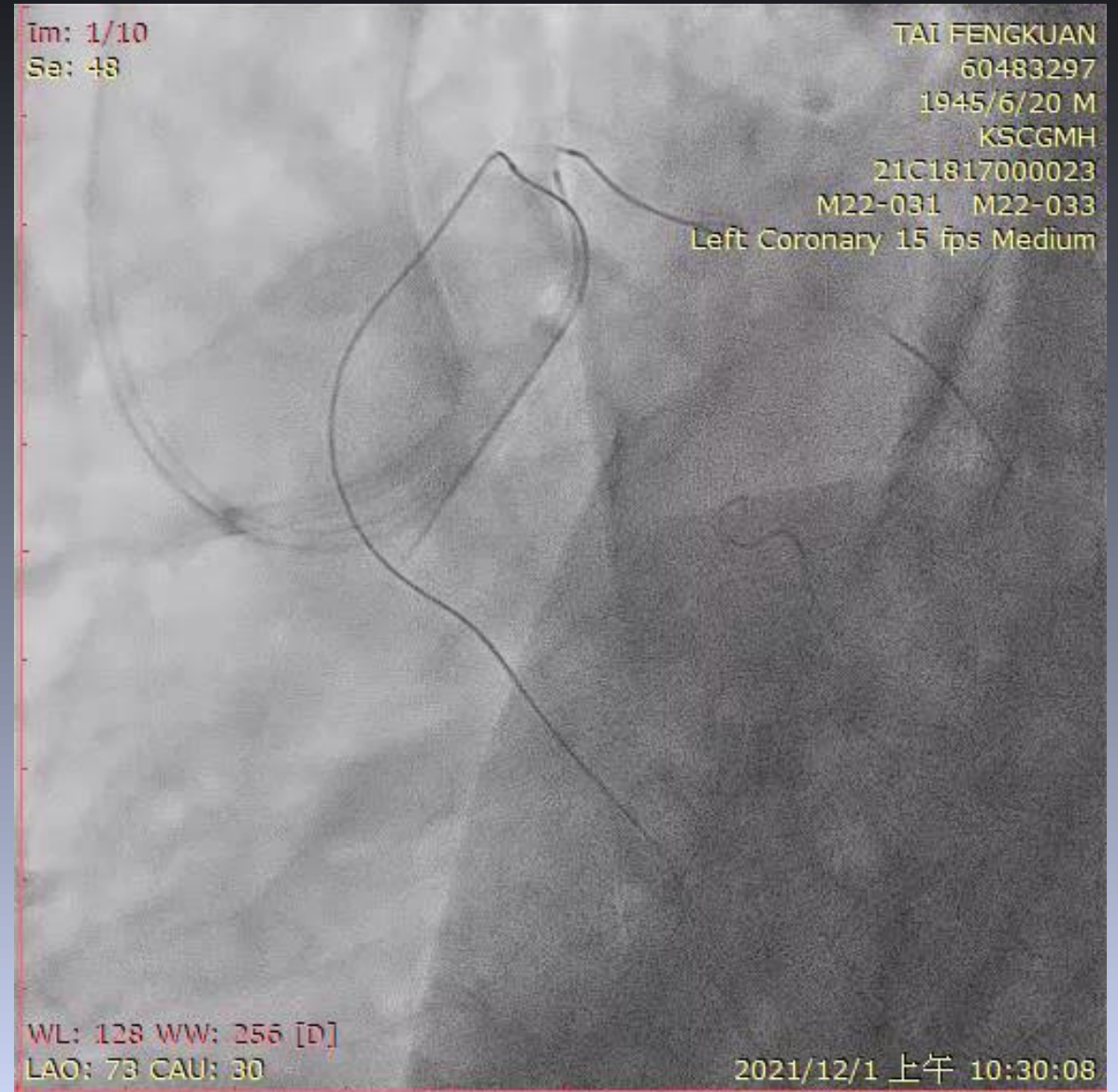
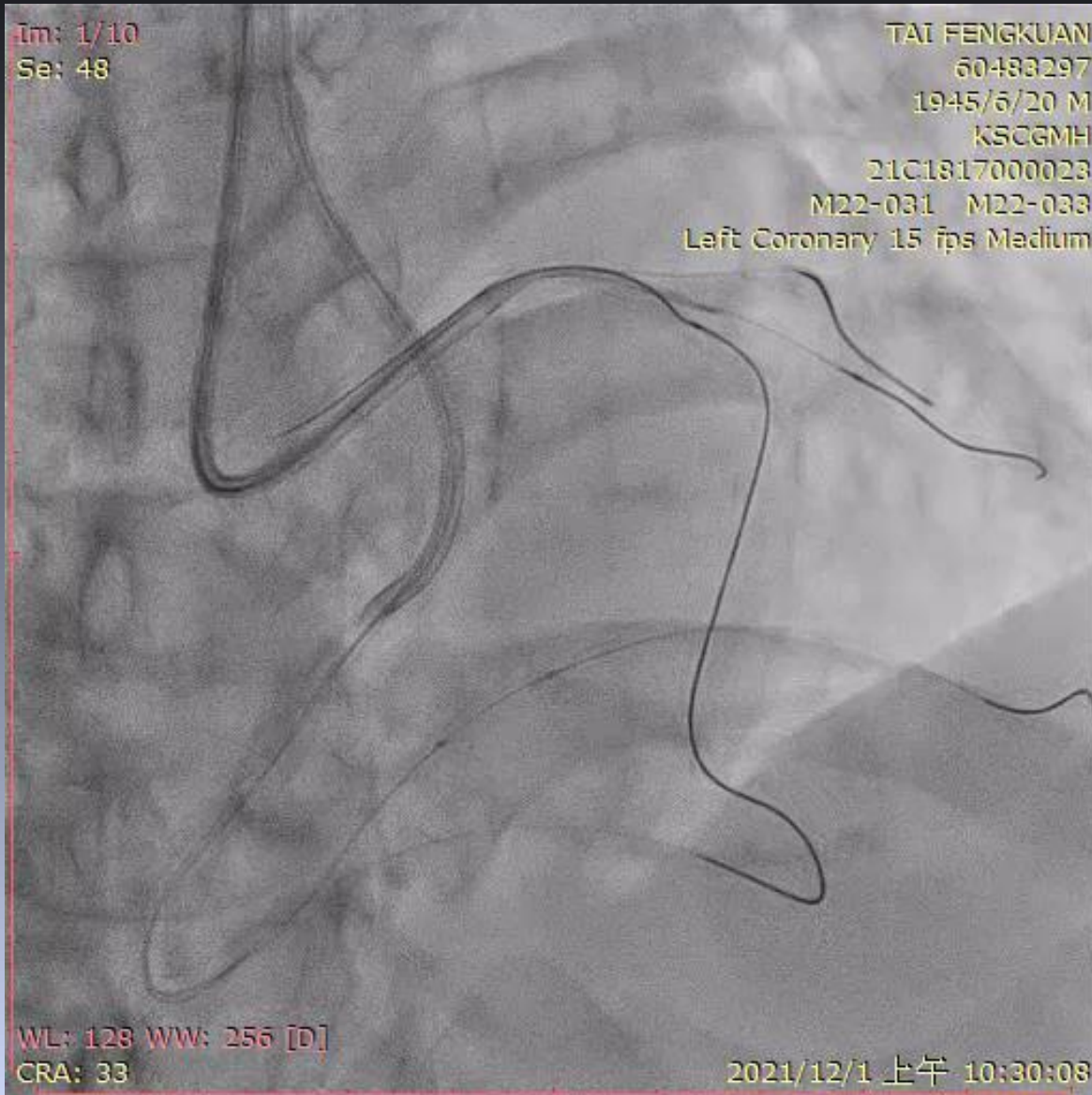
3rd time PCIs Retrograde puncture and outside GC

7Fr. EBU 4.0 and 7Fr. SAL1



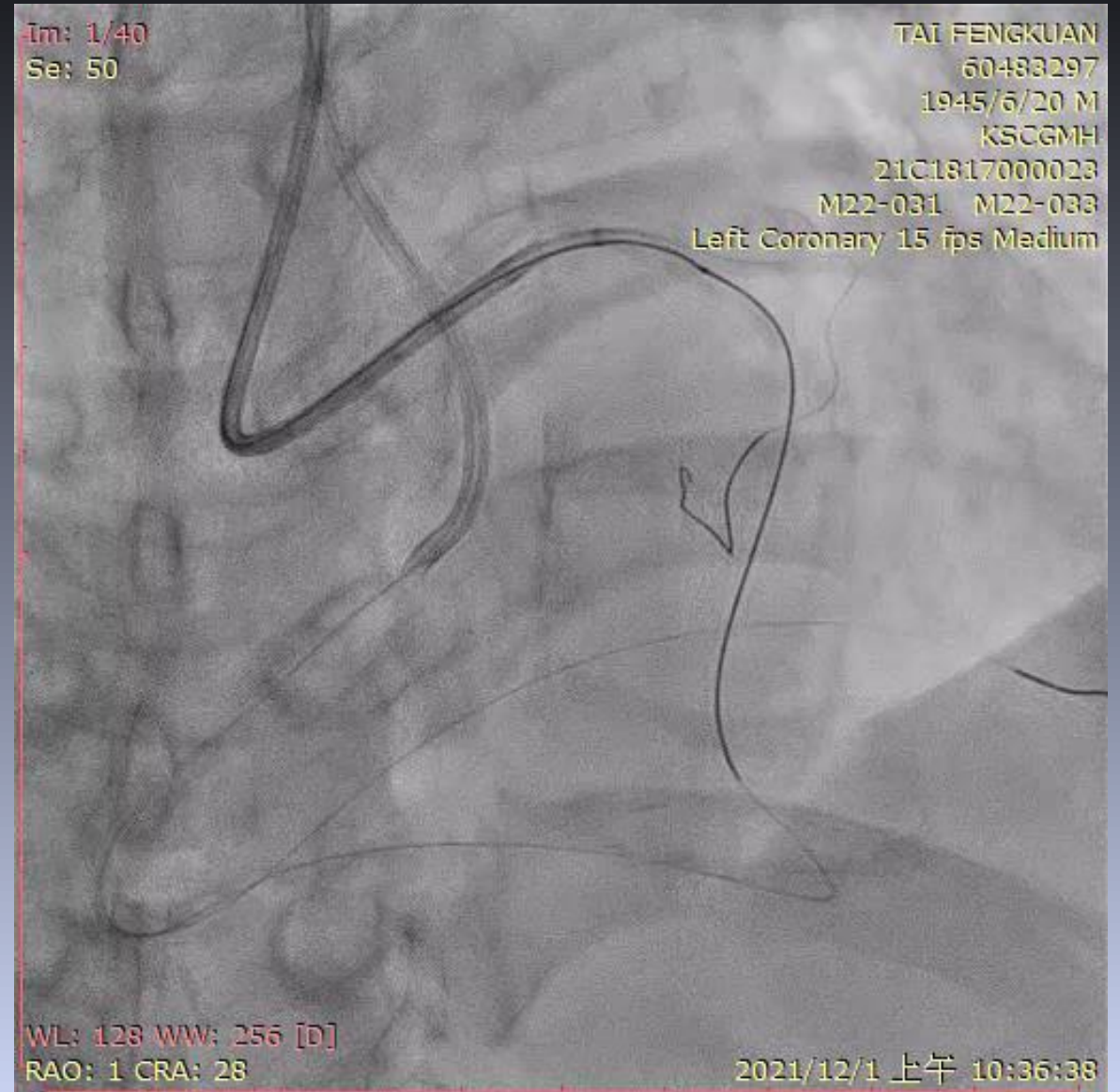
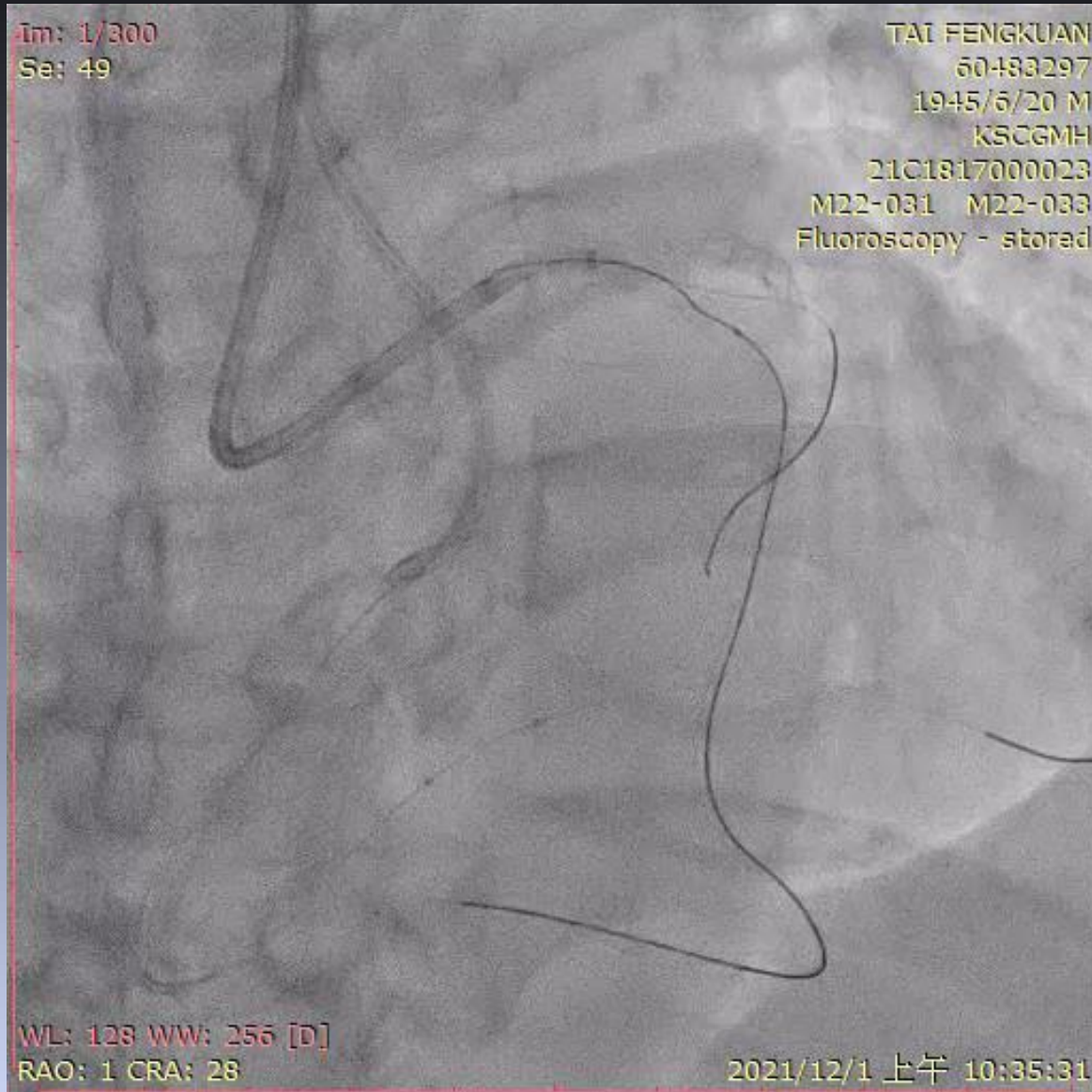
Antegrade wiring to D1

IVUS confirmed of retrograde wire inside LAD-P true lumen

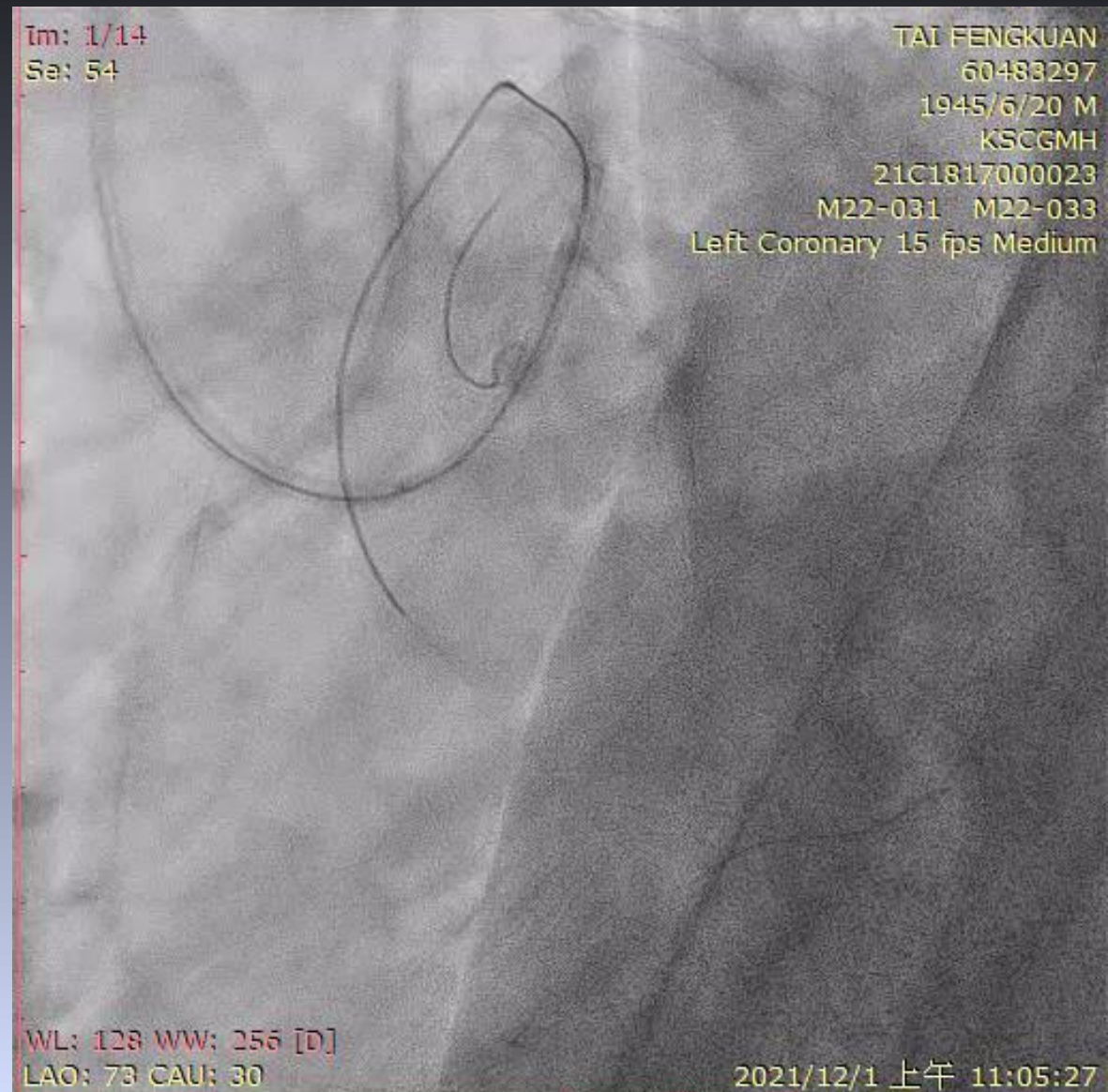
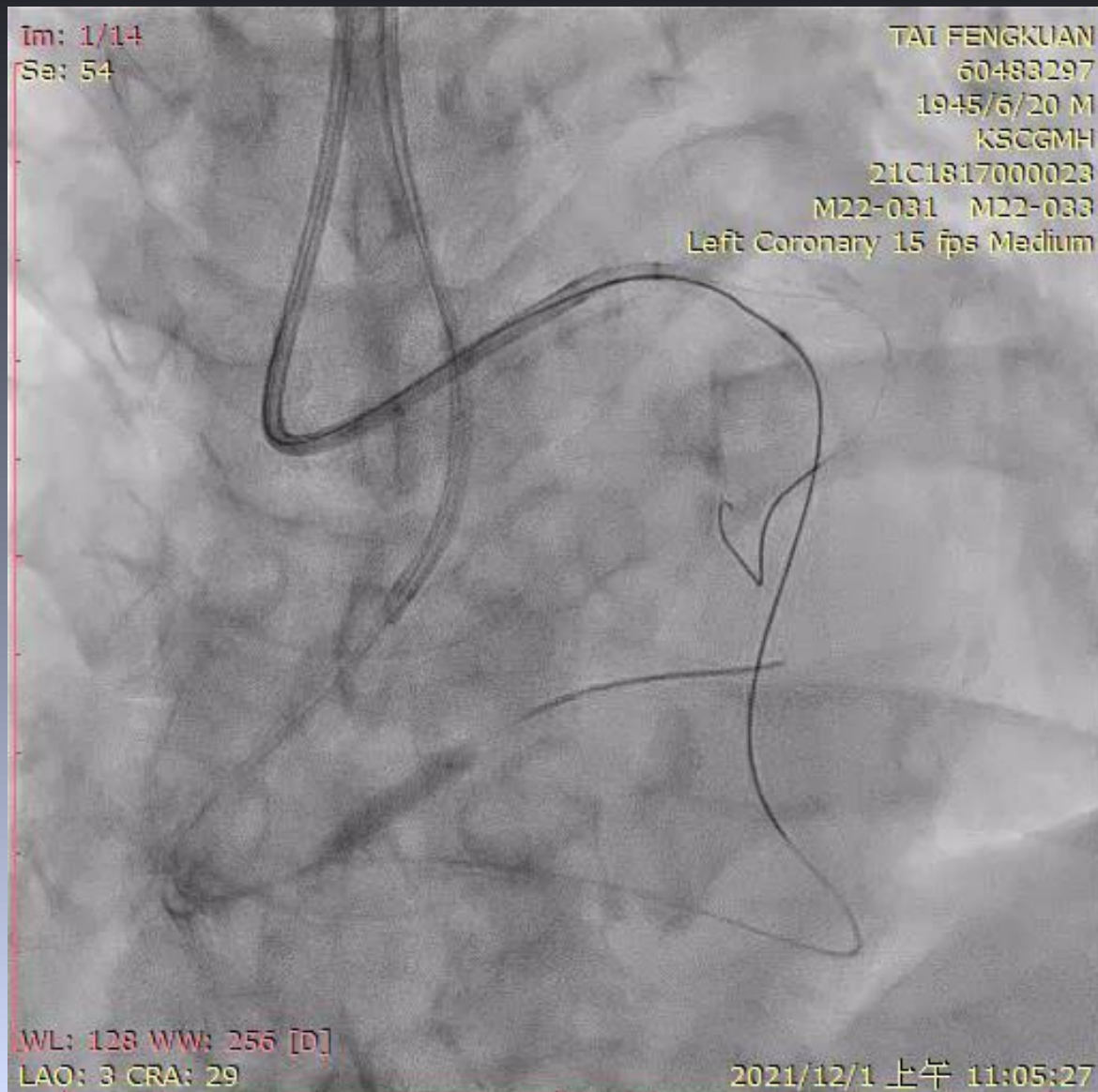


Retrograde XTA wiring and able to get inside guide-extension

7Fr. EBU 4.0 and 7Fr. SAL1

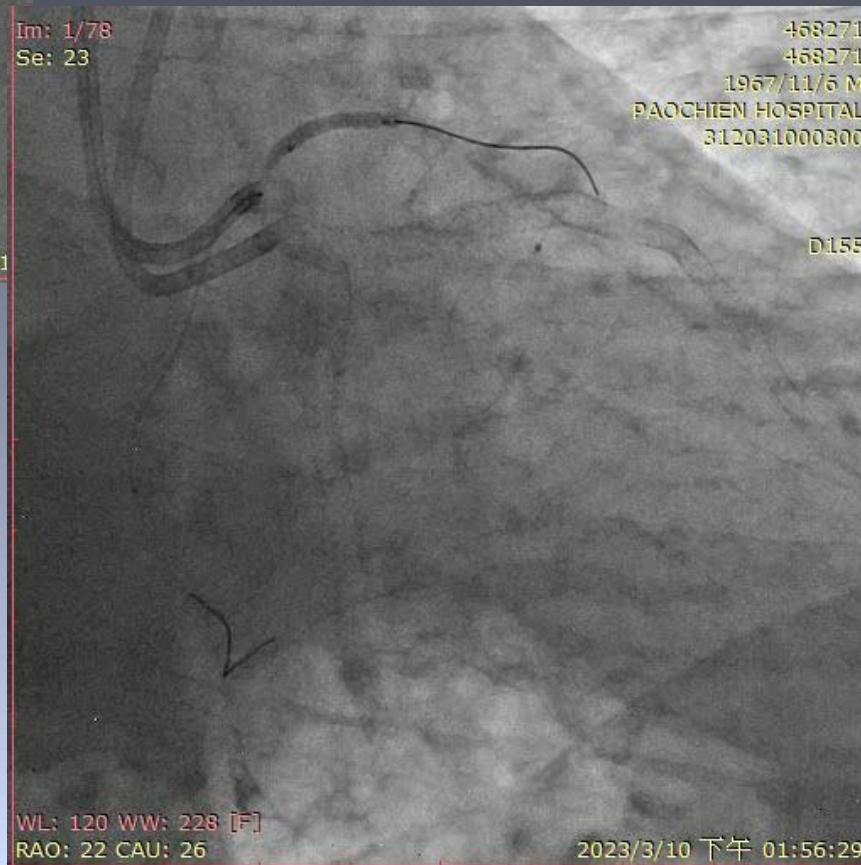
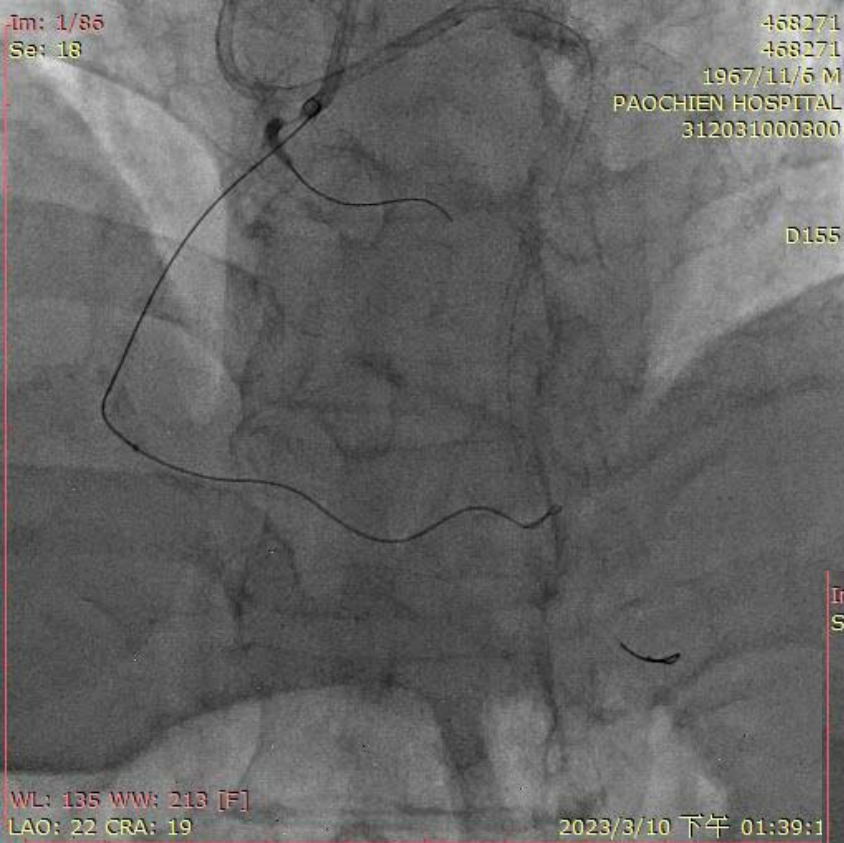


Anchoring to facilitate retrograde M.C. (F/C, 1.7F Instant-pass, Corsair-XS) & smallest 1x5 mm balloon x 3 unable to pass



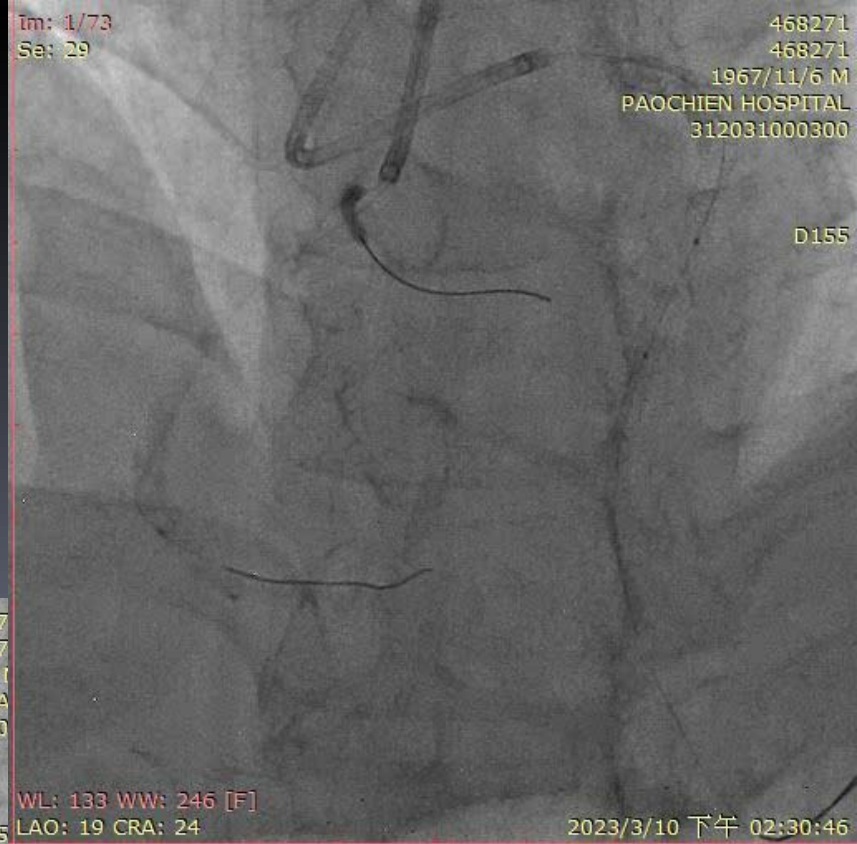
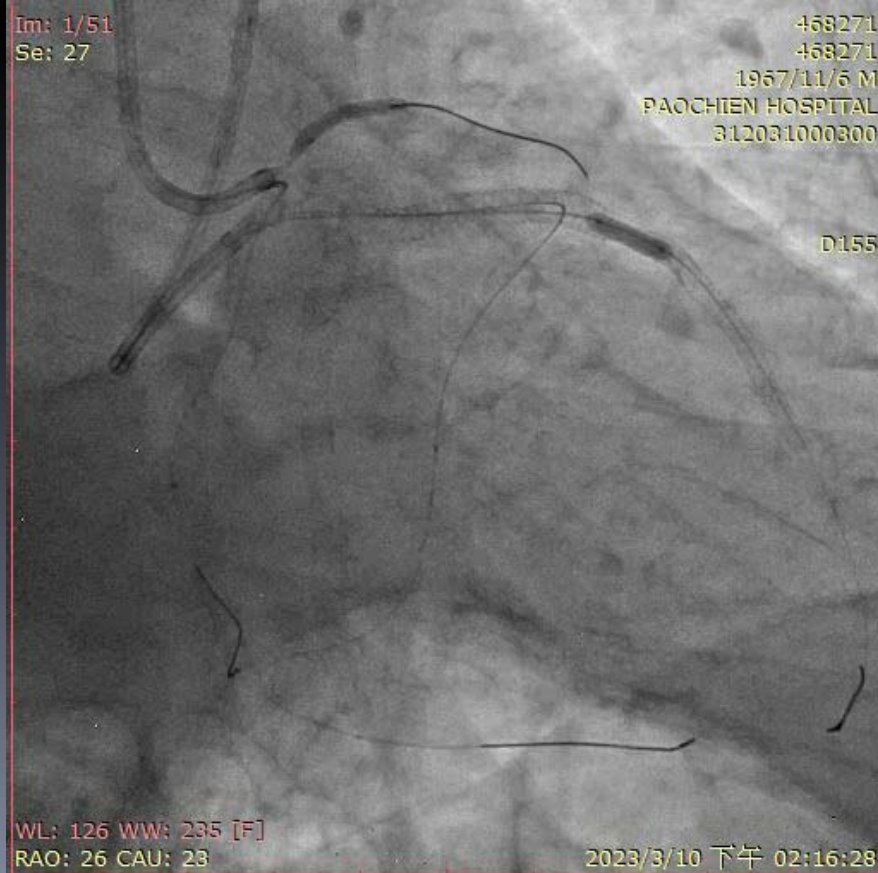
How to manage the situation like this pt ?

- Wire extension attach to passed CTO XTA wire, gradually pushing out from antegrade EBU4 guide, another 130 cm M.C. via antegra. route rendezvous near CTO exit, after removal of retrog. XTA and extension wire, try shooting 0.009 inch Rotar wire along with the XTA created channel, then 1.5 mm **rotational atherectomy**, or **Laser** w/o changing 0.014 inch wire
- 2nd : M.C. at CTO distal exit via retrograde route, remove the 0.014 XTA wire, shooting micro-channel with a 0.010 inch RG-3 wire, snare out in AsAo, then try POBA, Tornus-88, Turnpike-Gold, Laser or Rotar via antegrade route
- 3rd: **bypass the hard rock** via retrograde knuckle up, CP-12 or 8/20 puncture aiming to subintimal retro. Wire and R-CART at subintimal space, via antegra. Created subintimal space, do RDR or ADR at LAD-mid
- 4th: retrograde wire changing to Astato 30-40 with tip at CTO-d-exit do “BASILICA”, try breaking hard part of CTO by **electrical coagulation power**



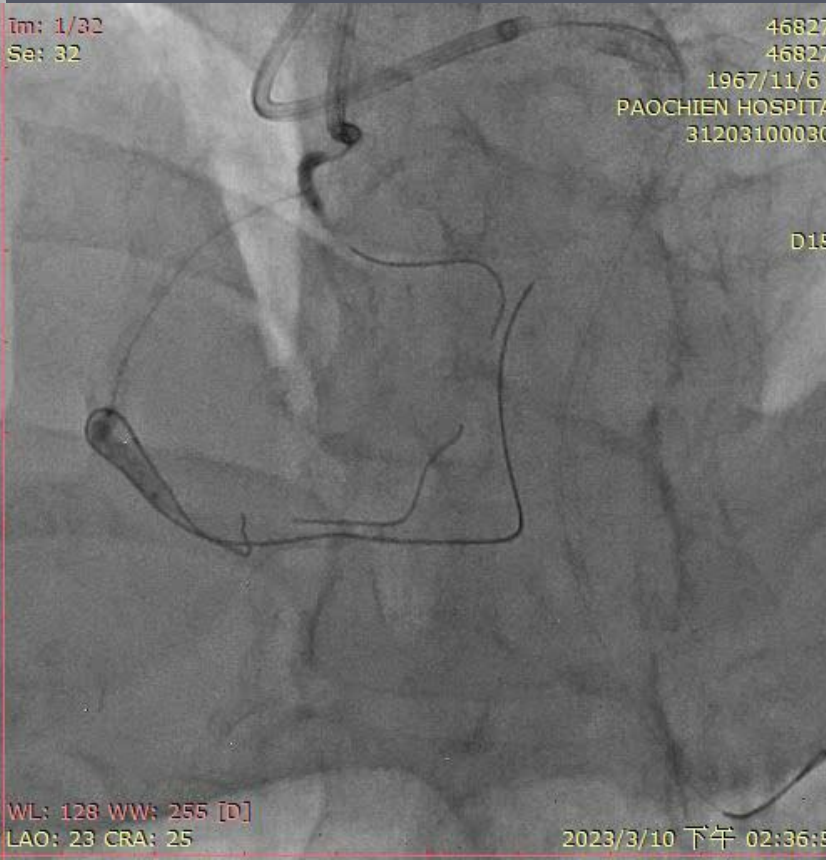
Antegrade 1x5 mm Ryurei balloon x II failed to pass calcified CTO segment, loss XTA wire position in PDA but in PL branch, " no Rotablator " available in the Hospital

Leaving the 130 cm F/C and XTA wire from antegrade, Switch Gear to retrograde, septal surfing & reached intermediate branch near PDA-PL bifurcation



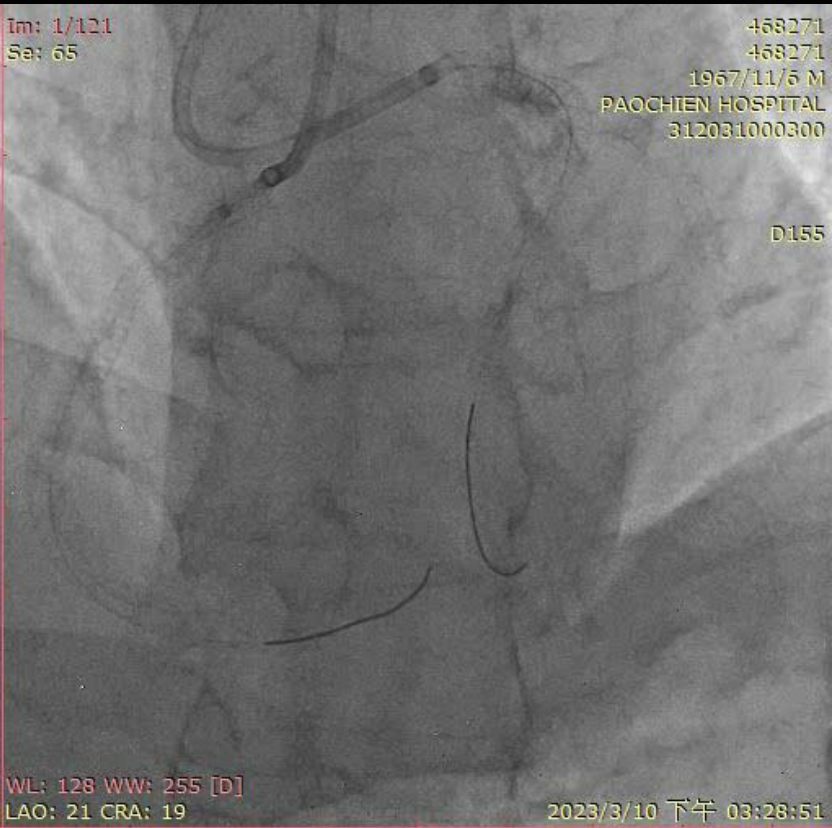
A 150 cm F/C unable to pass septal channel, required 1x5 mm Ryurei passing as a channel dilator, then 150 cm F/C was able to pass into RCA-d

A 3x15 mm HPB blocking at in-stent portion preventing F/C prolapse into LAD-m-d, then the 150 cm Finecross was able to reach RCA-d for tip injection



From Sion to Gaia-2nd, intentional knuckle into subintimal space, bypass the CTO hard rock

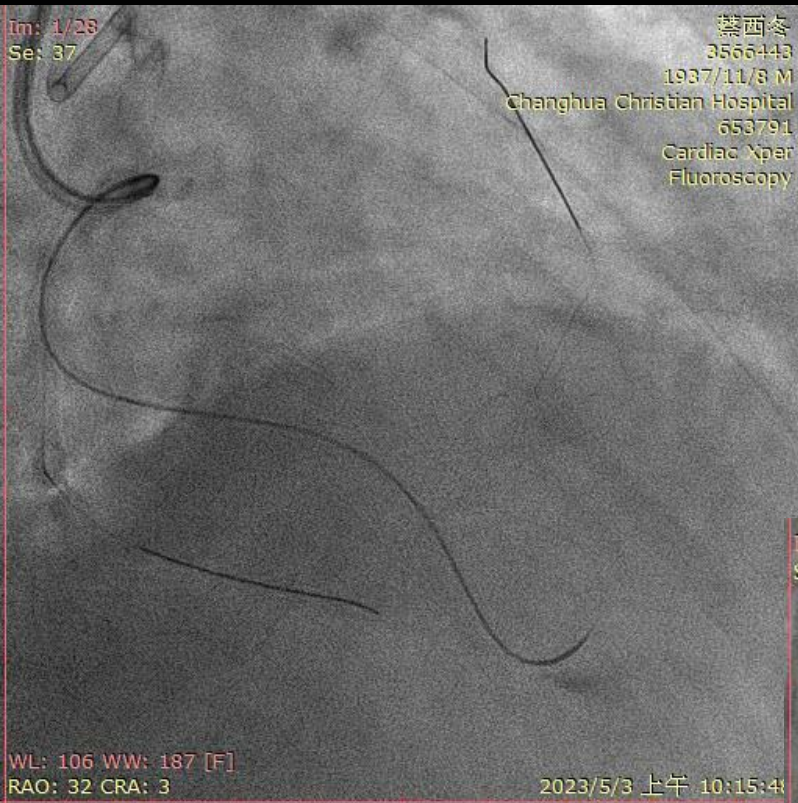
R-CART from 1x5 mm, 2.5x15 to 3x15 mm HPB 20-24 atm, 6F Gazella guide extension for AGT captured retrograde FC wire & 0.010 inch RG-3 wire externalization



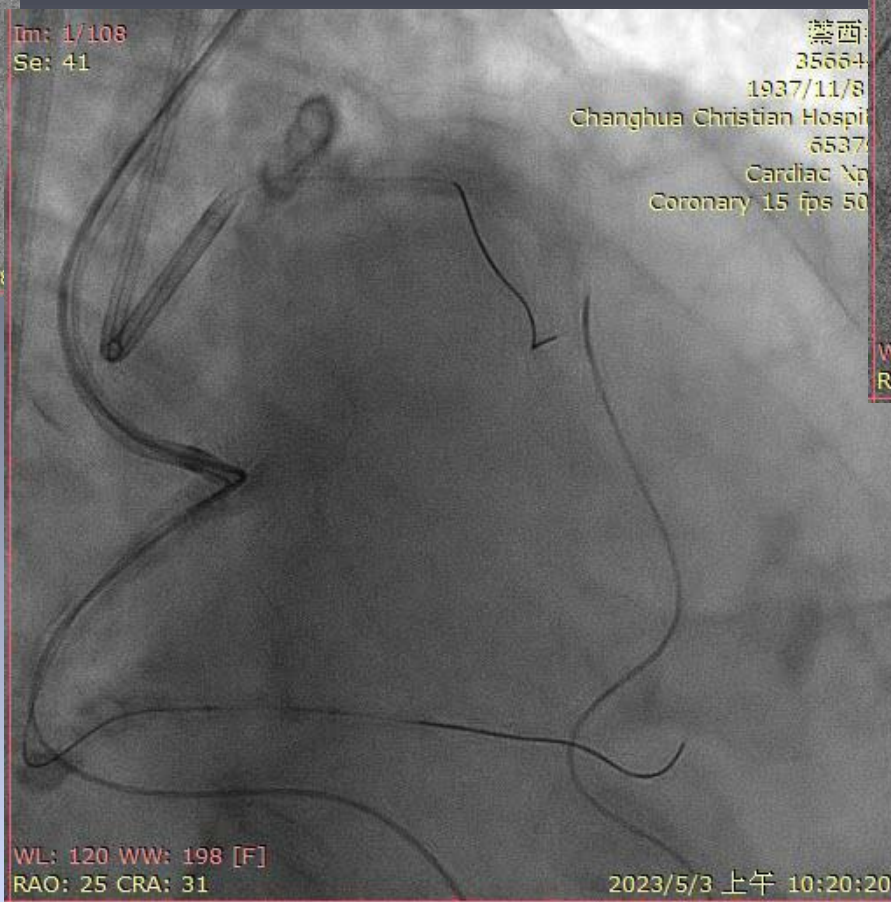
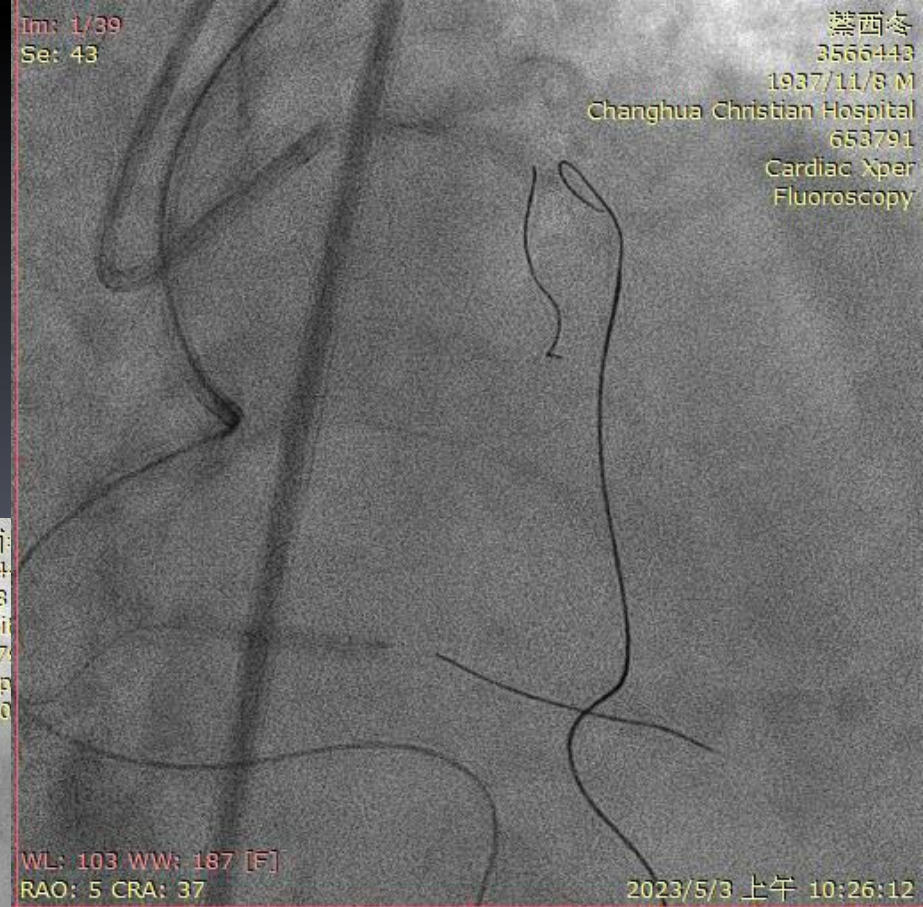
Final angio. LAO-cranial and RAO cranial views, partial jailed of PDA flow (TIMI-2) w/o final kissing POBA

LAD-m-d s/p 2.5x30 & 3x30 mm DCB treatment

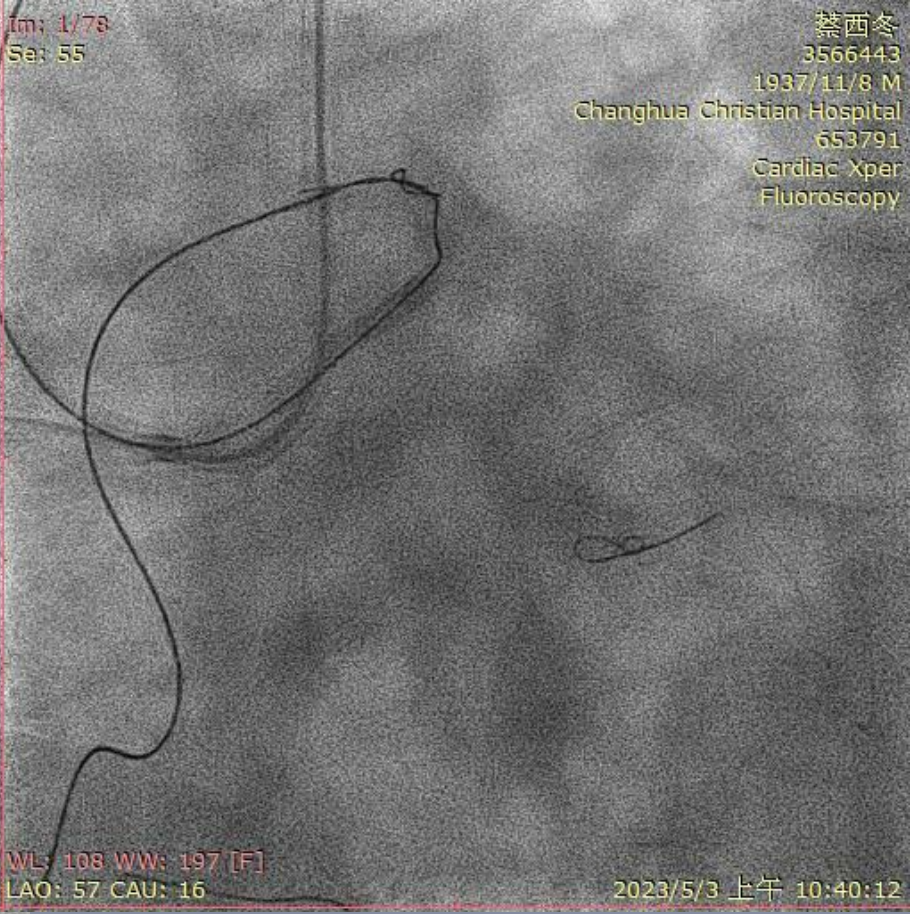
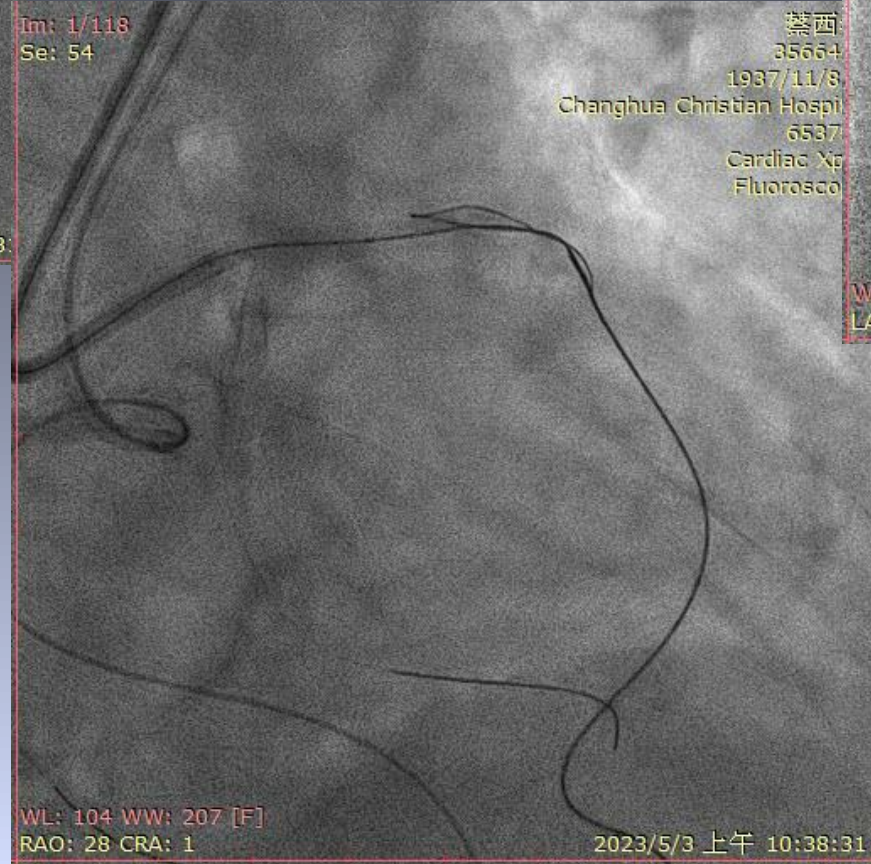
Total procedure T. = 180 mins
Fluoroscopic T. = 58 mins
Total contrast volume = 280 ml



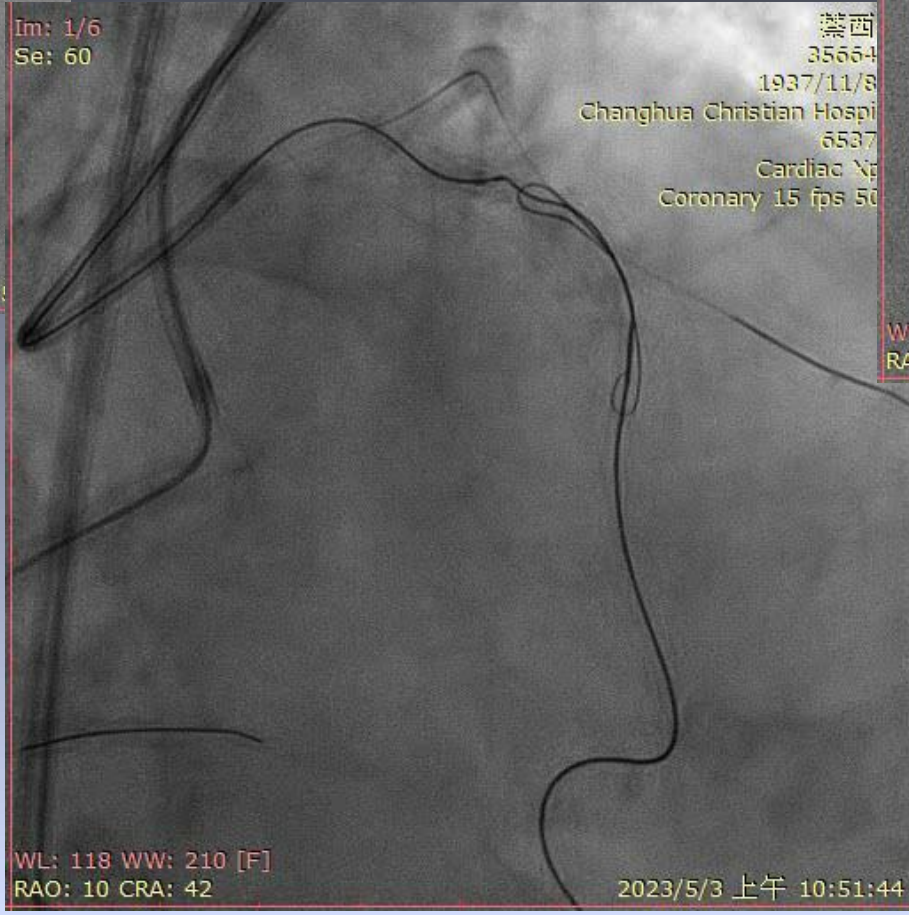
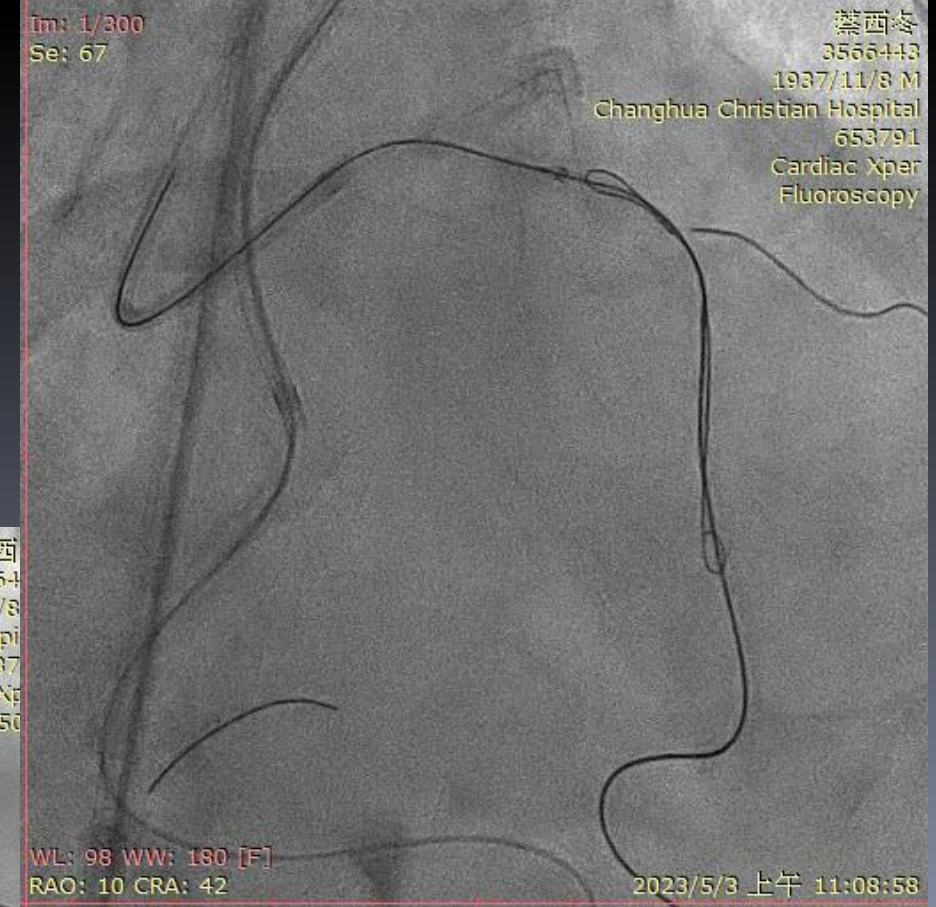
Another case of Bypass the hard rock



Tip injection via M.C. & Gaia-
2nd retrograde puncture &
intentional knuckle up
bypass the CTO hard rock

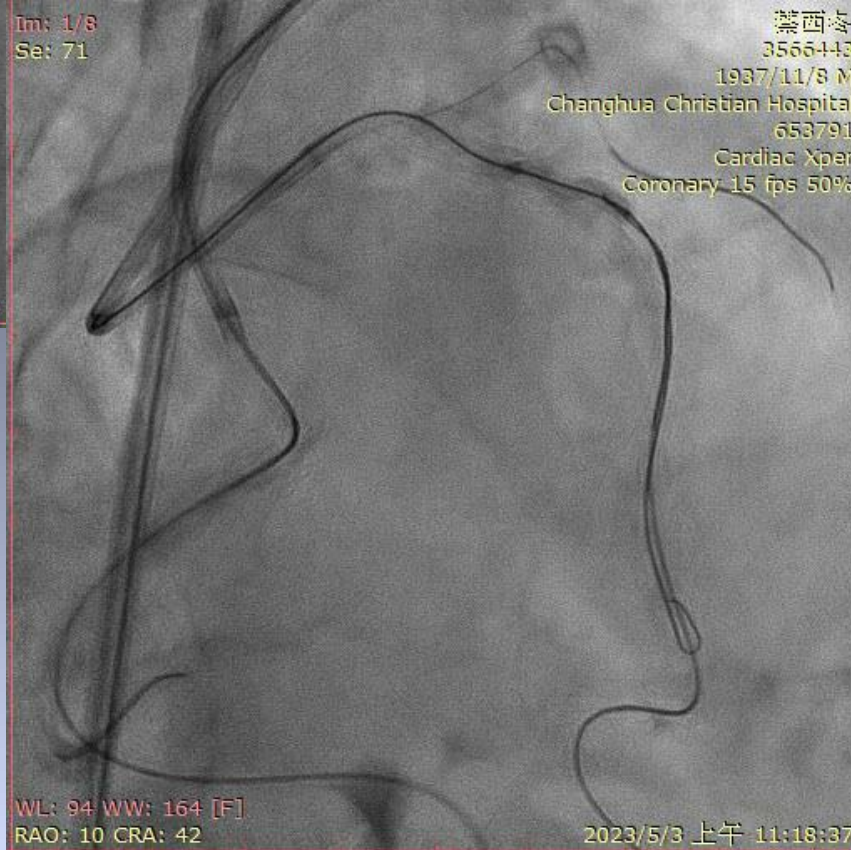
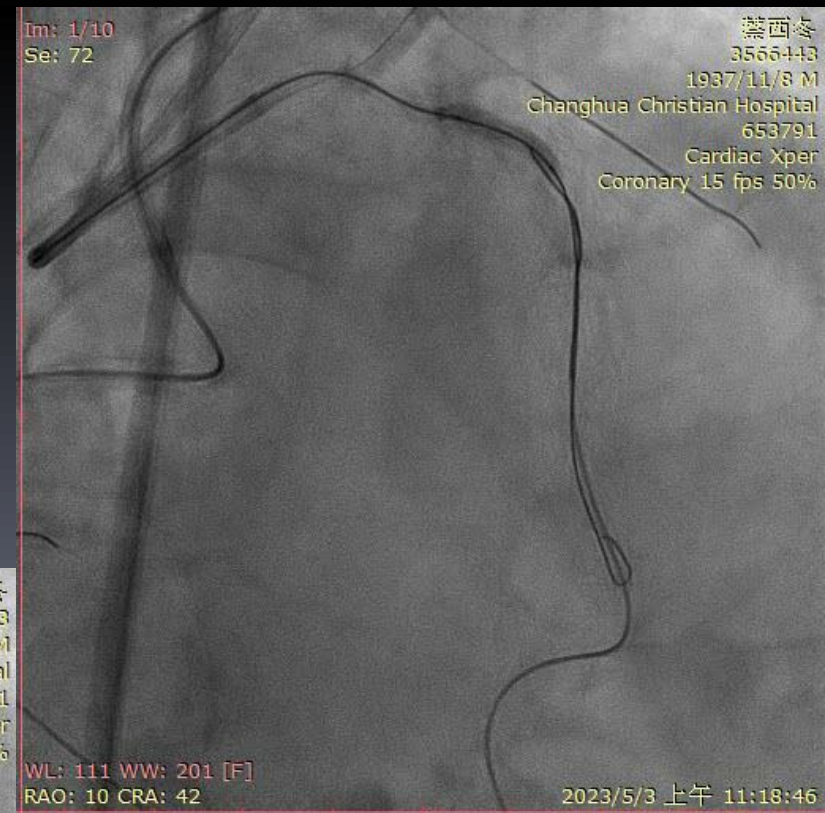
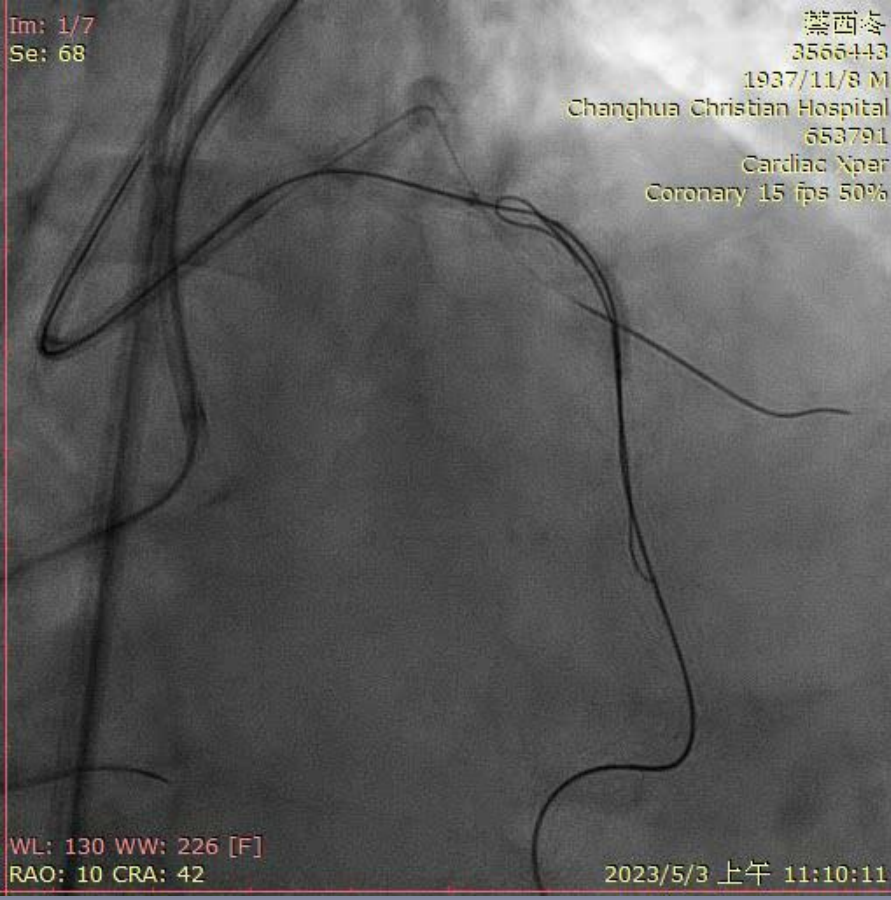


Aiming retro. Knuckle wire,
DLMC support, CP-12
puncture into same
subintimal space, prepare
for R-CART



Antegrade 1x5 & 1x6 mm smallest balloon unable to pass CTO exit for R-CART, CP-12 also became knuckle

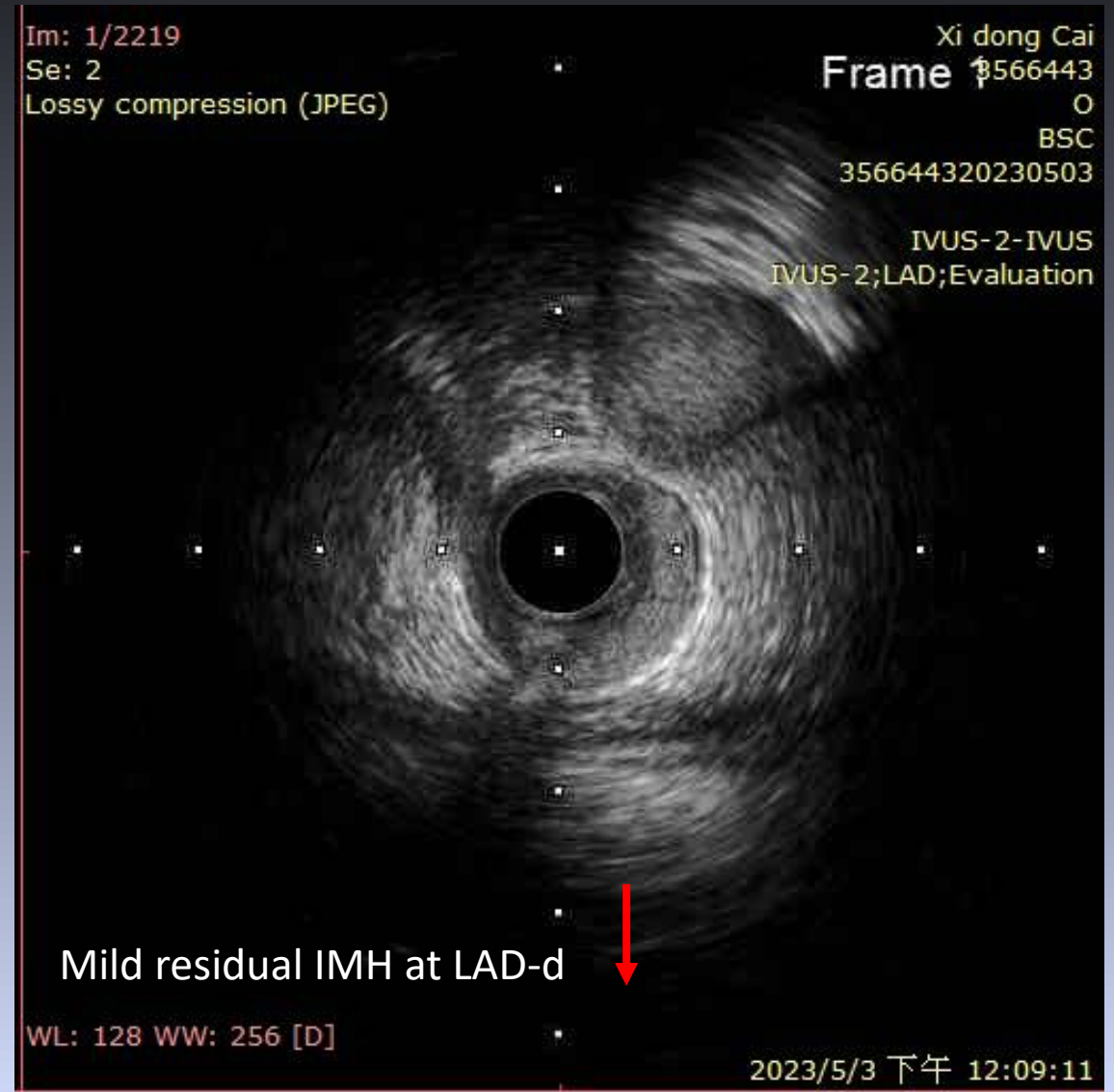
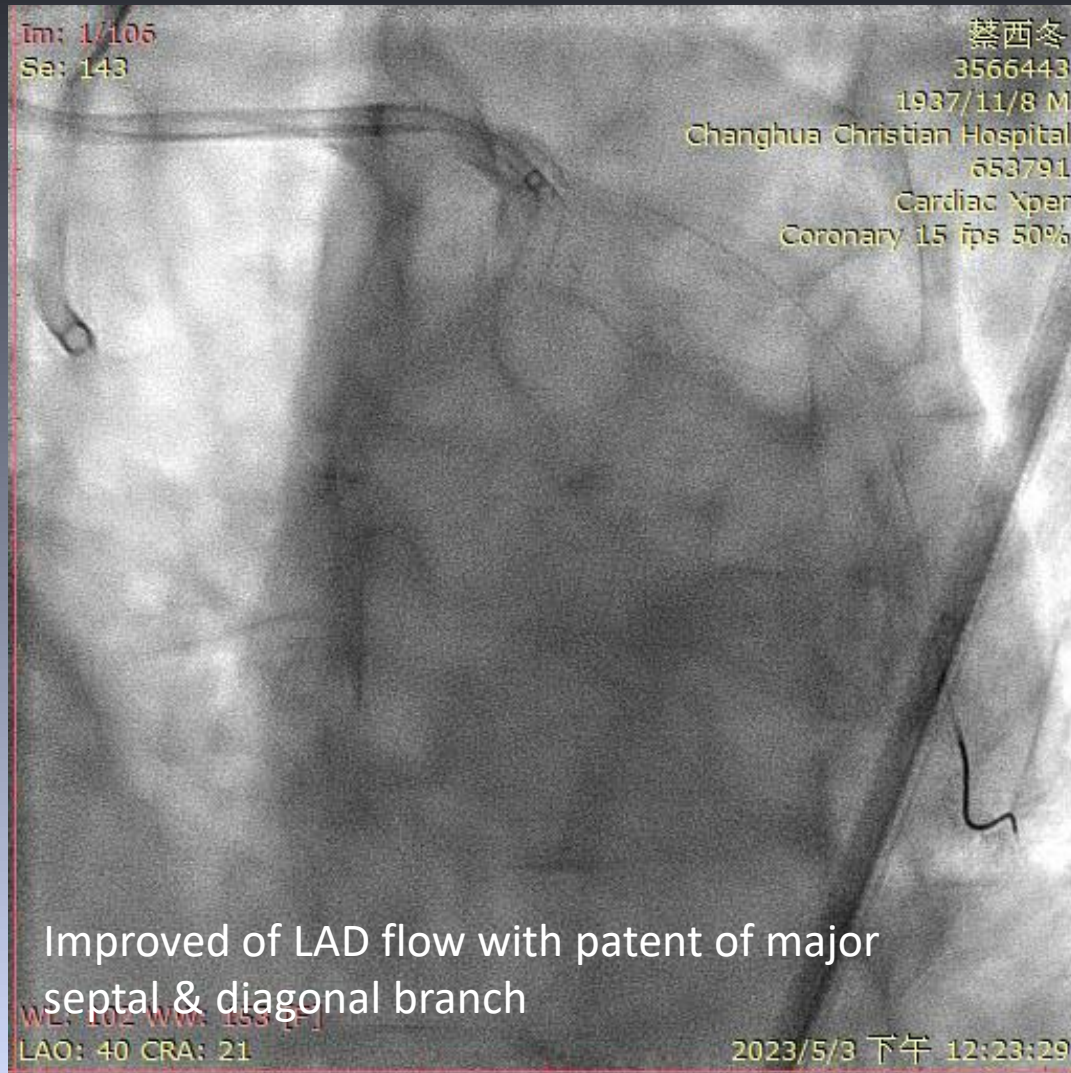
Finally required a 135 cm Corsair-Pro drilling at CTO exit, then R-CART was able to proceed



R-CART at CTO segment

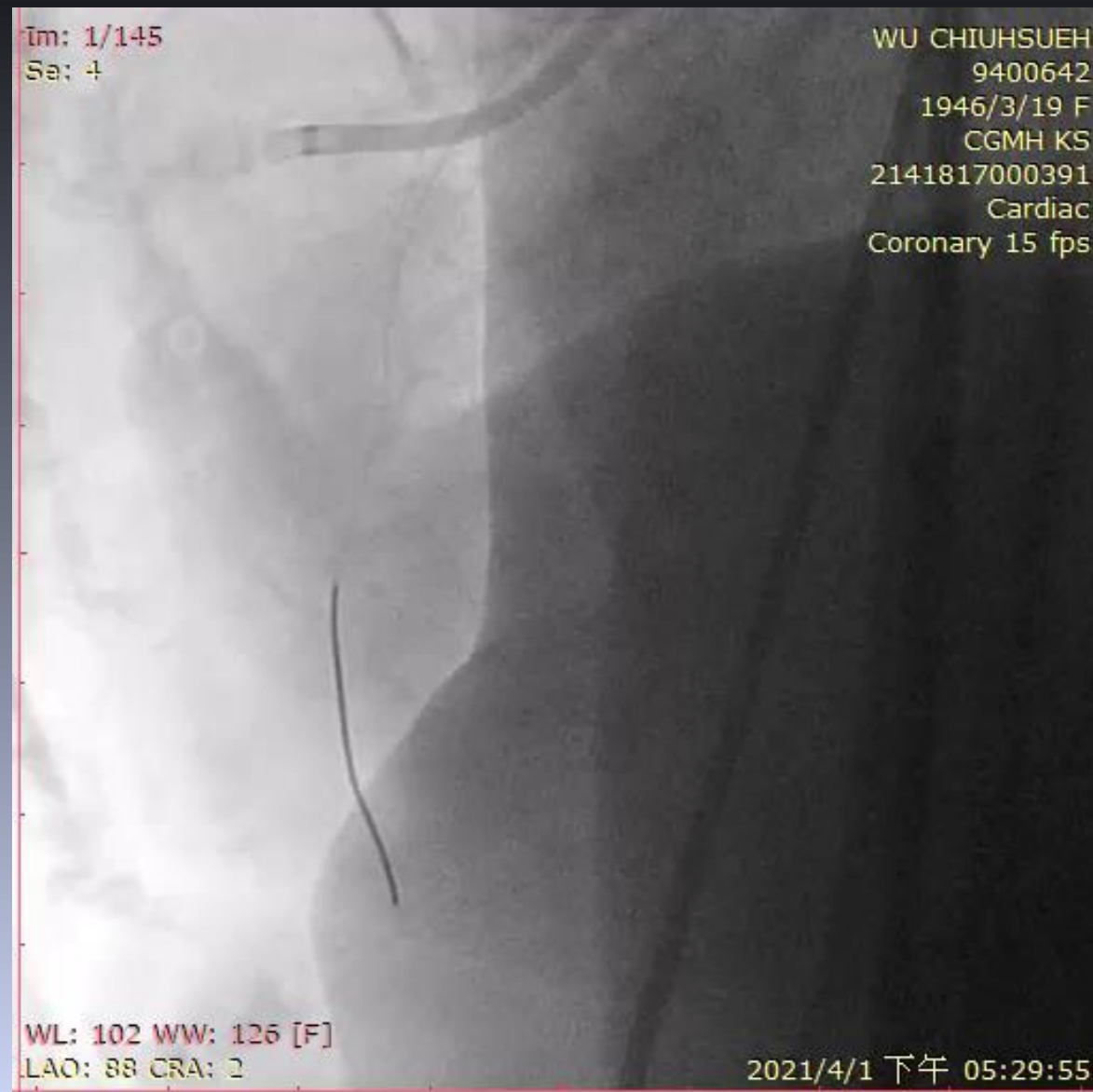
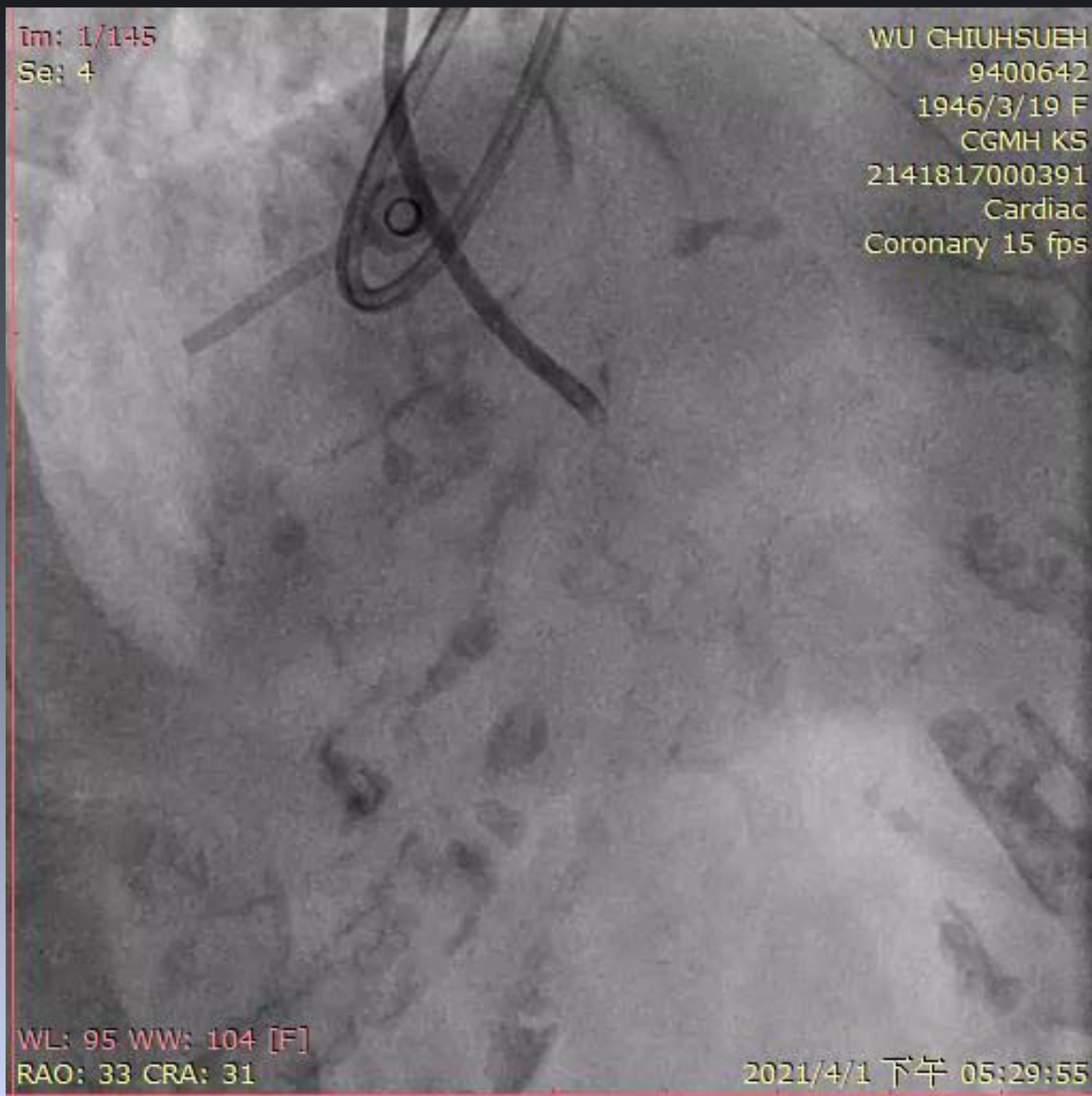
CTO part difficult to achieve popping need 2.5x15 & 3x15 mm HPB at 24-26 atm, LAD mid-d IMH need cutting fenestration

Final angio. & IVUS: total procedure T.= 230 min, Fluoro. T. =75 min,
Contrast vol. = 280 ml



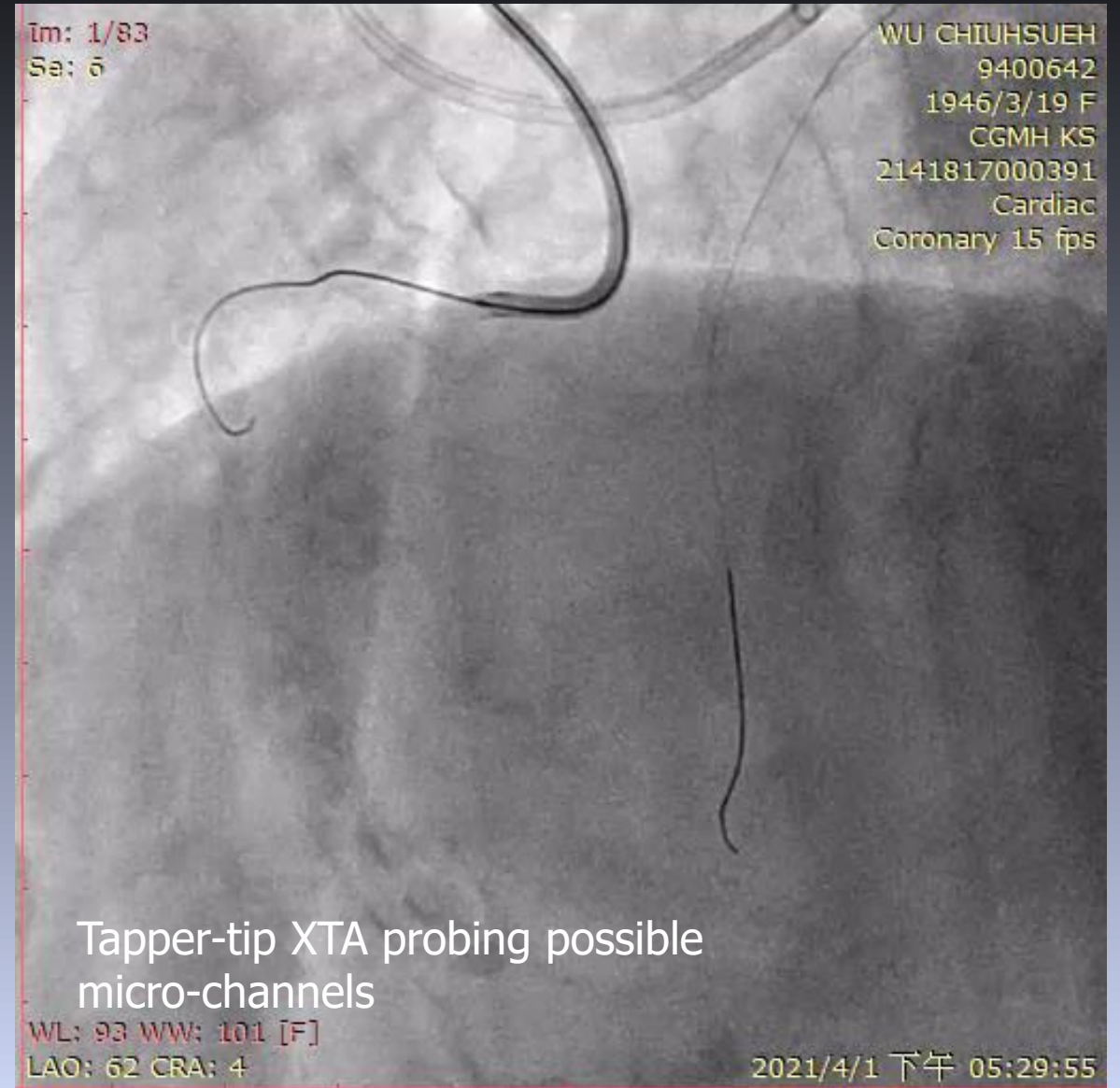
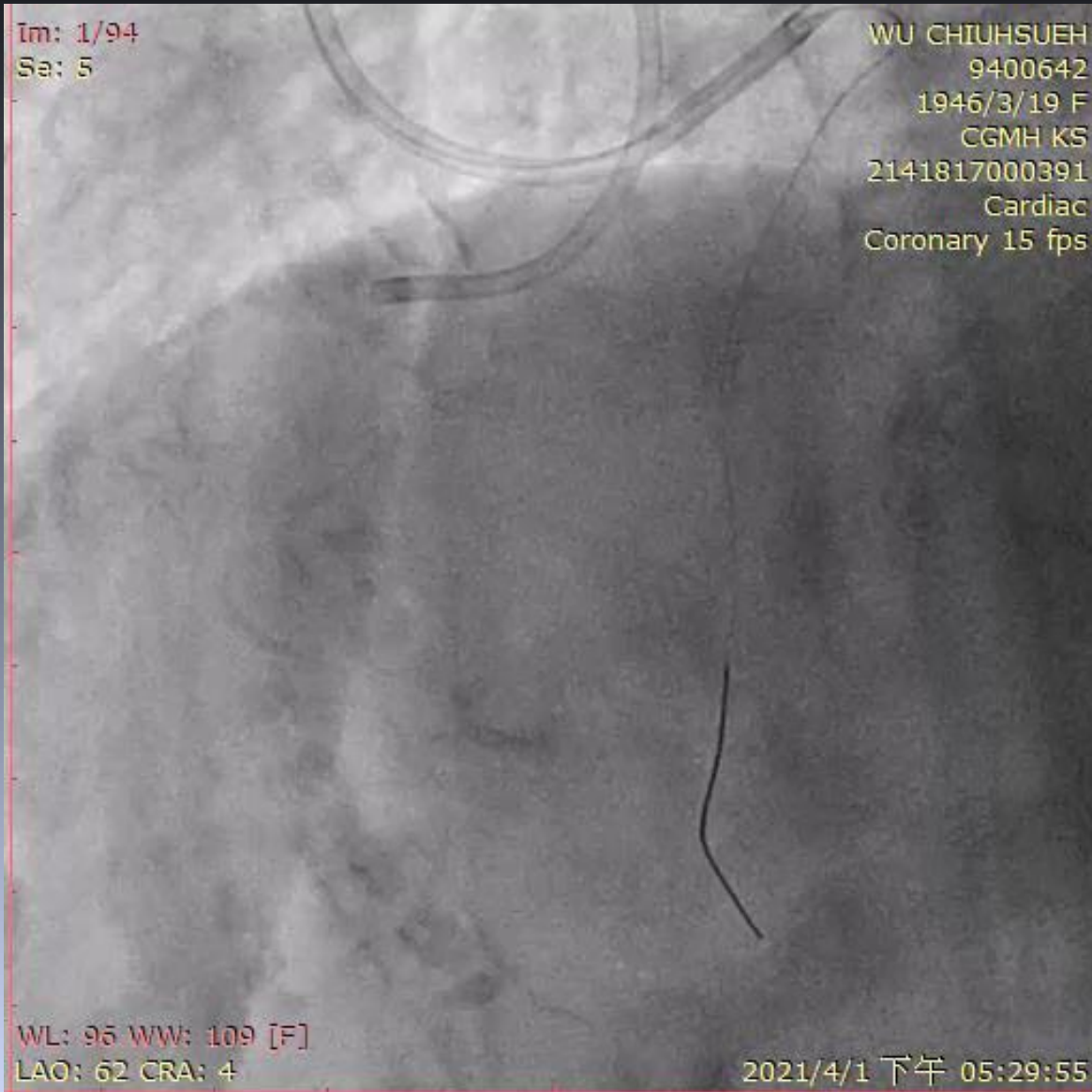
ESRD on H/D, RCA CTO, Bilateral injection via bilateral brachial A.

7Fr. EBU 4.0 and 6Fr. SAL1



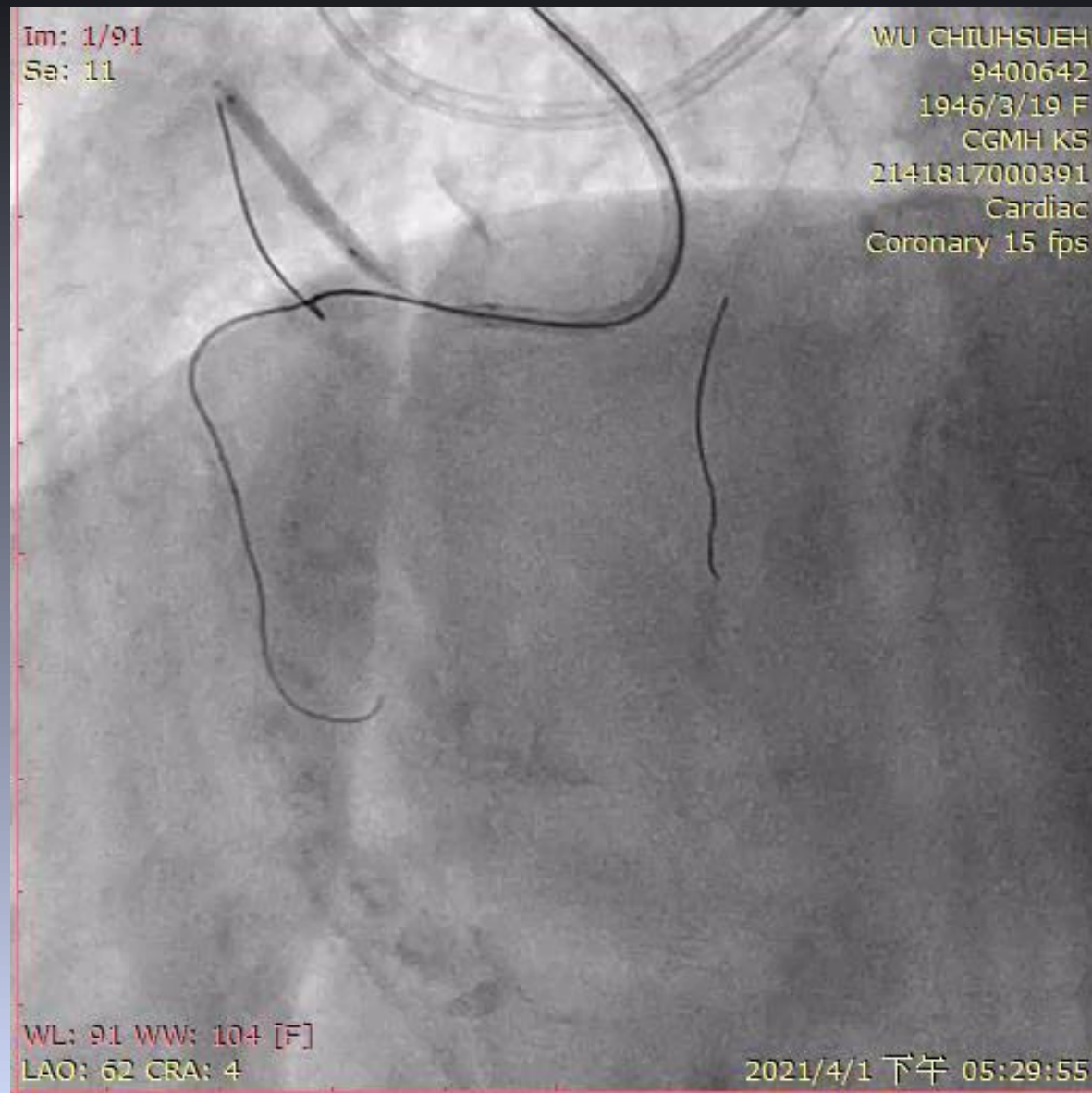
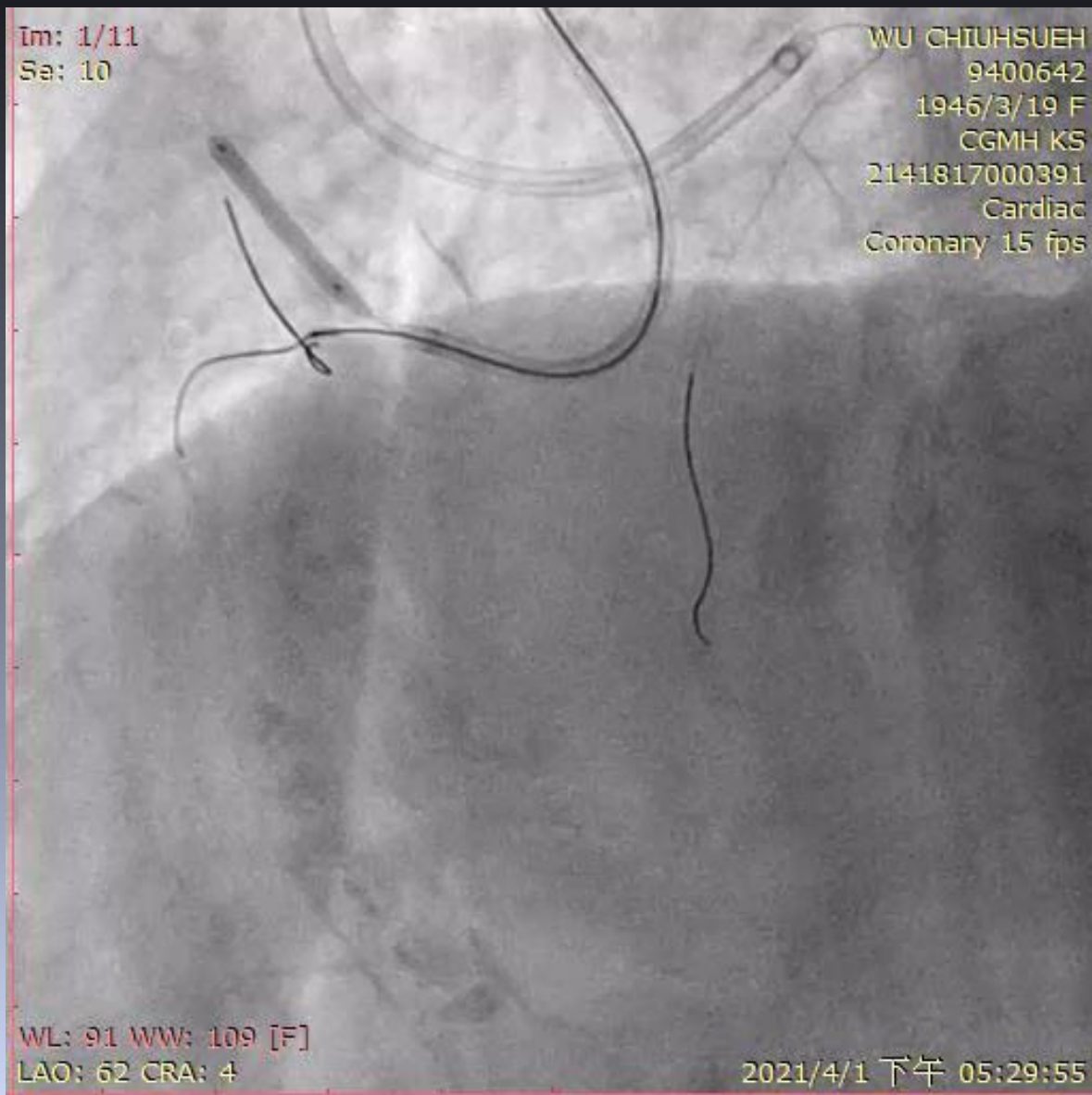
Finecross 130cm with Fielder XT-A

7Fr. EBU 4.0 and 6Fr. SAL1



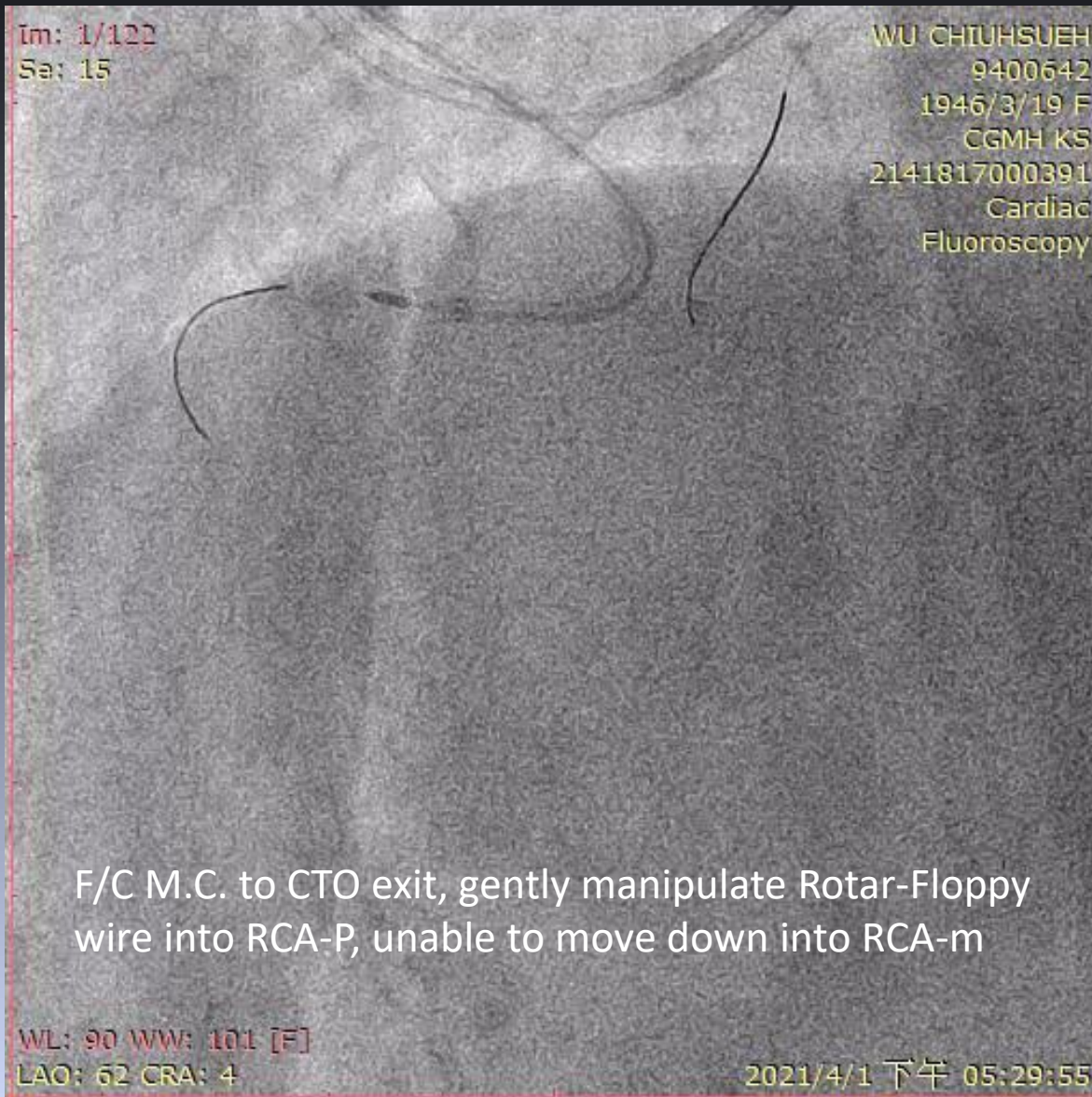
Fielder XT-A went into subintimal space distal

7Fr. EBU 4.0 and 6Fr. SAL1



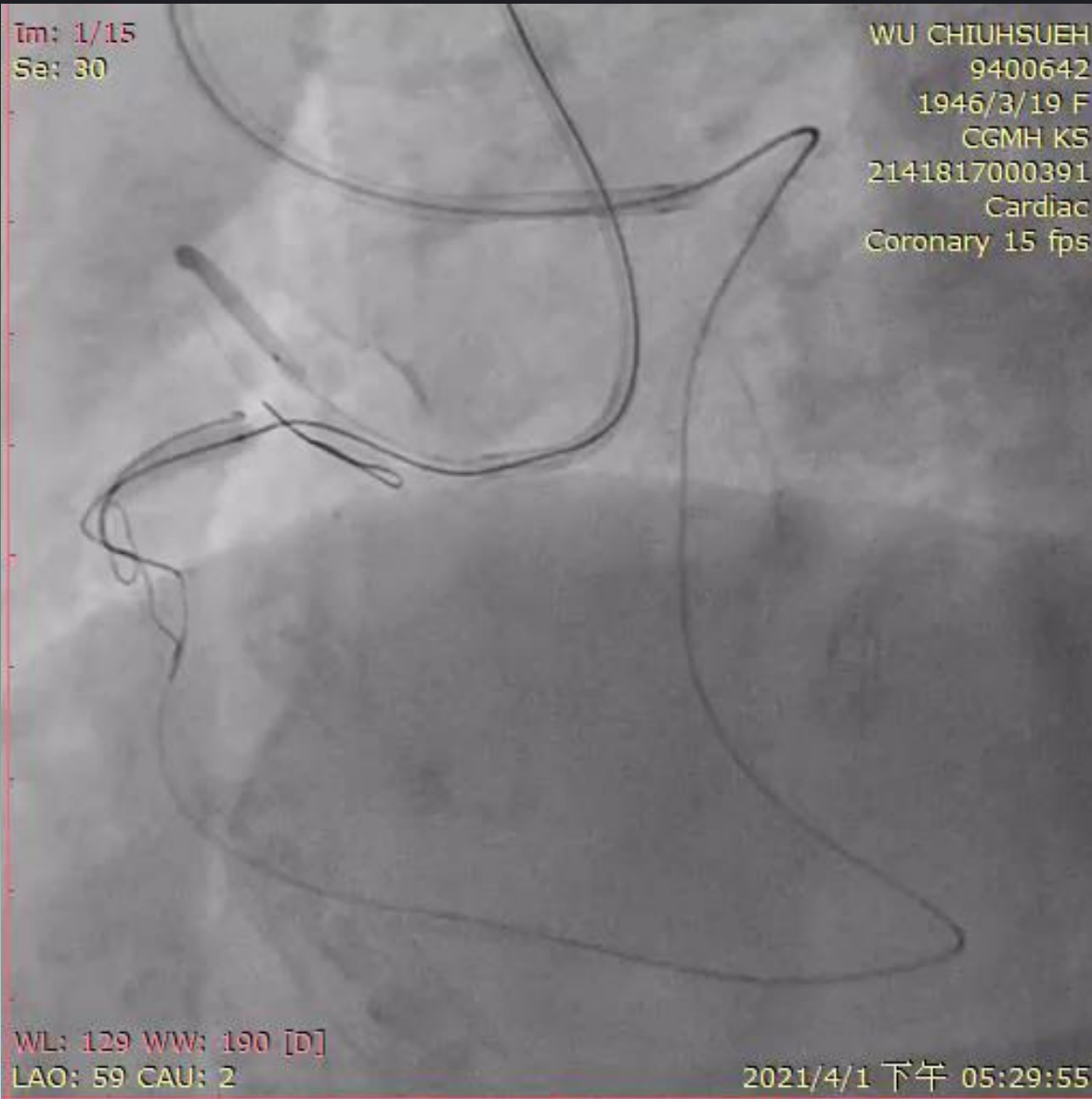
Rotablation with 1.25mm burr, just debulking CTO exit

7Fr. EBU 4.0 and 6Fr. SAL1



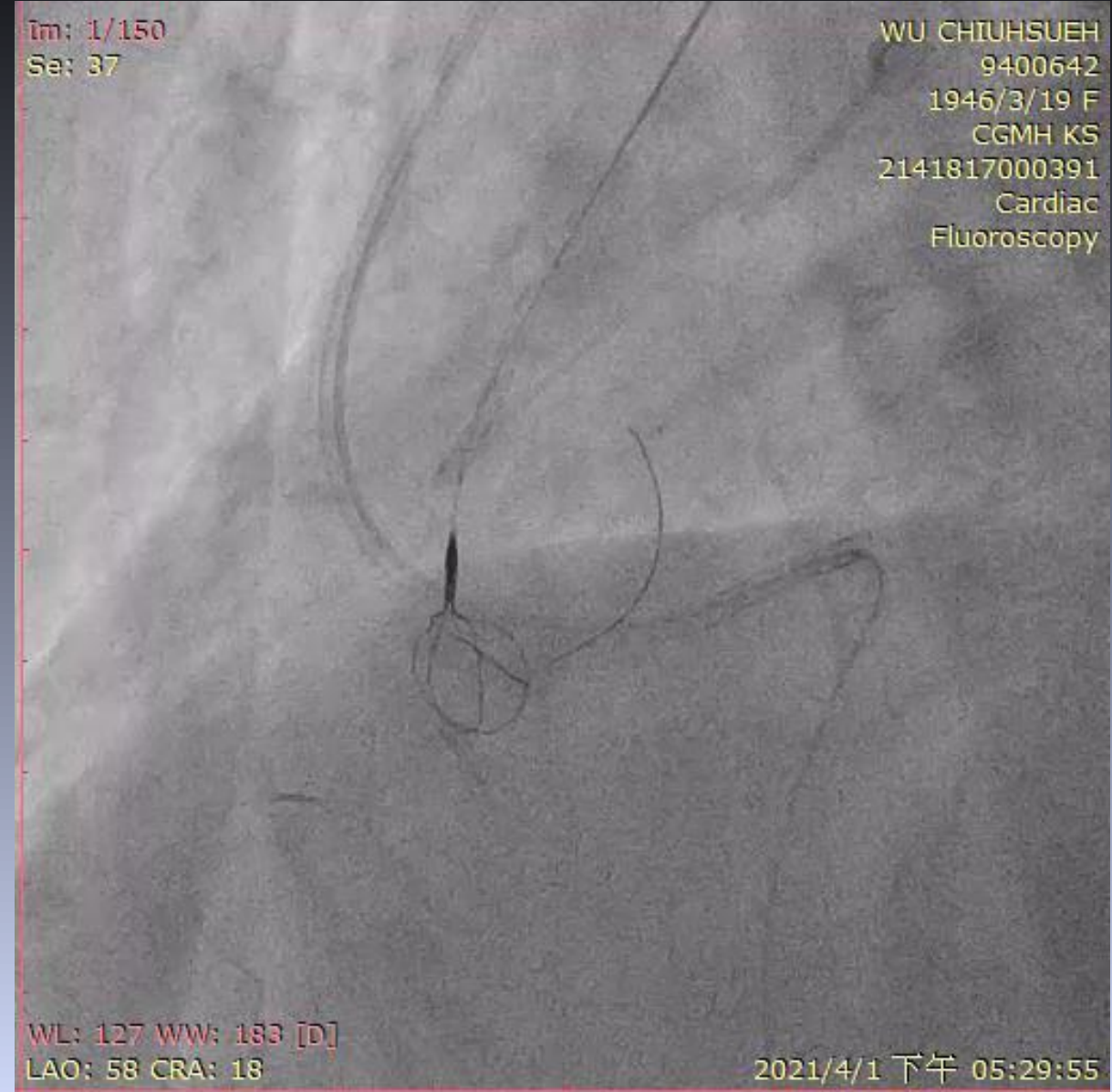
Bilateral Knuckle Wire

Retrograde with Gaia-2, UB-3, Fielder FC wire



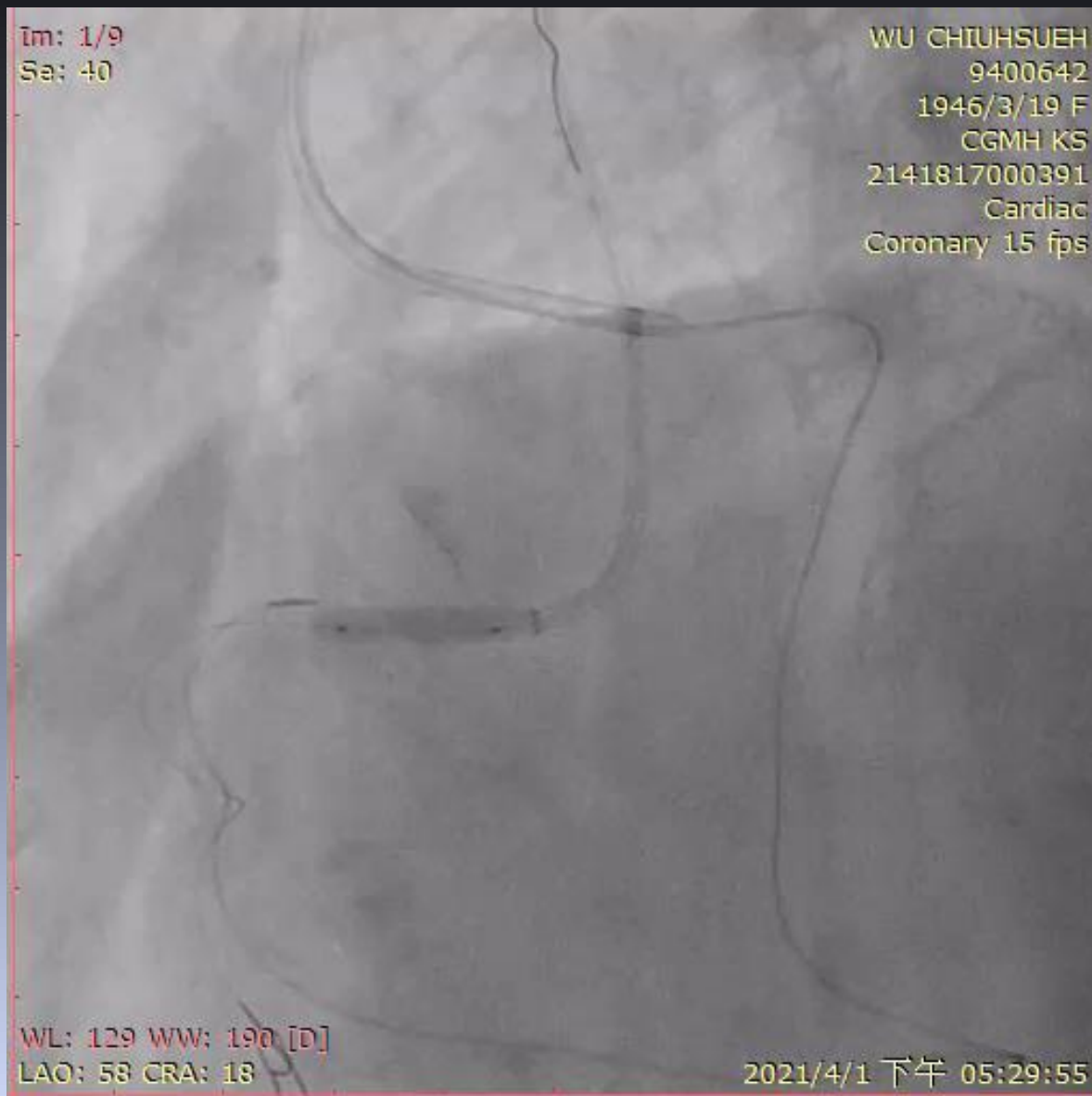
Retrograde wire in AsAo

Snare successfully



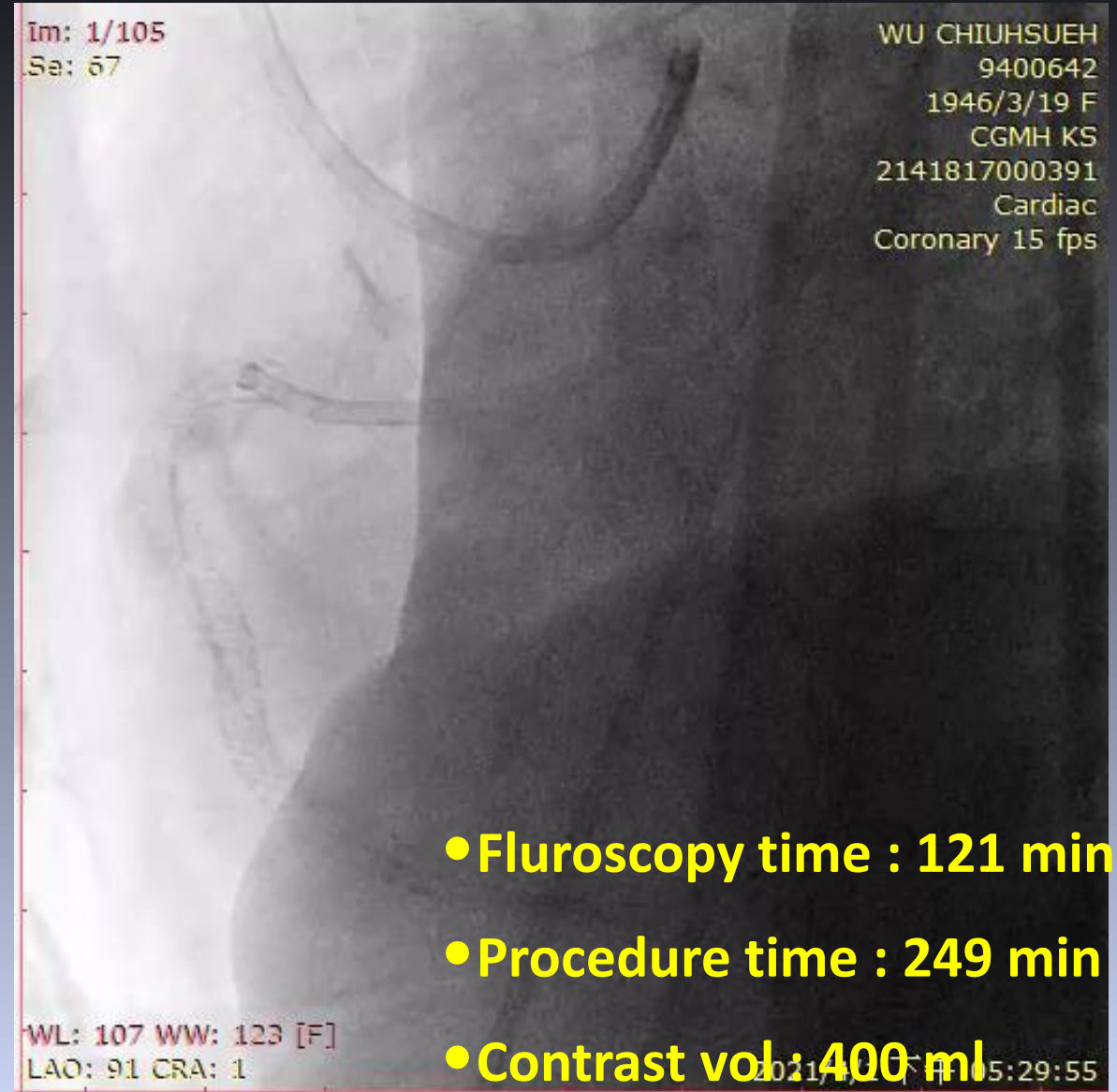
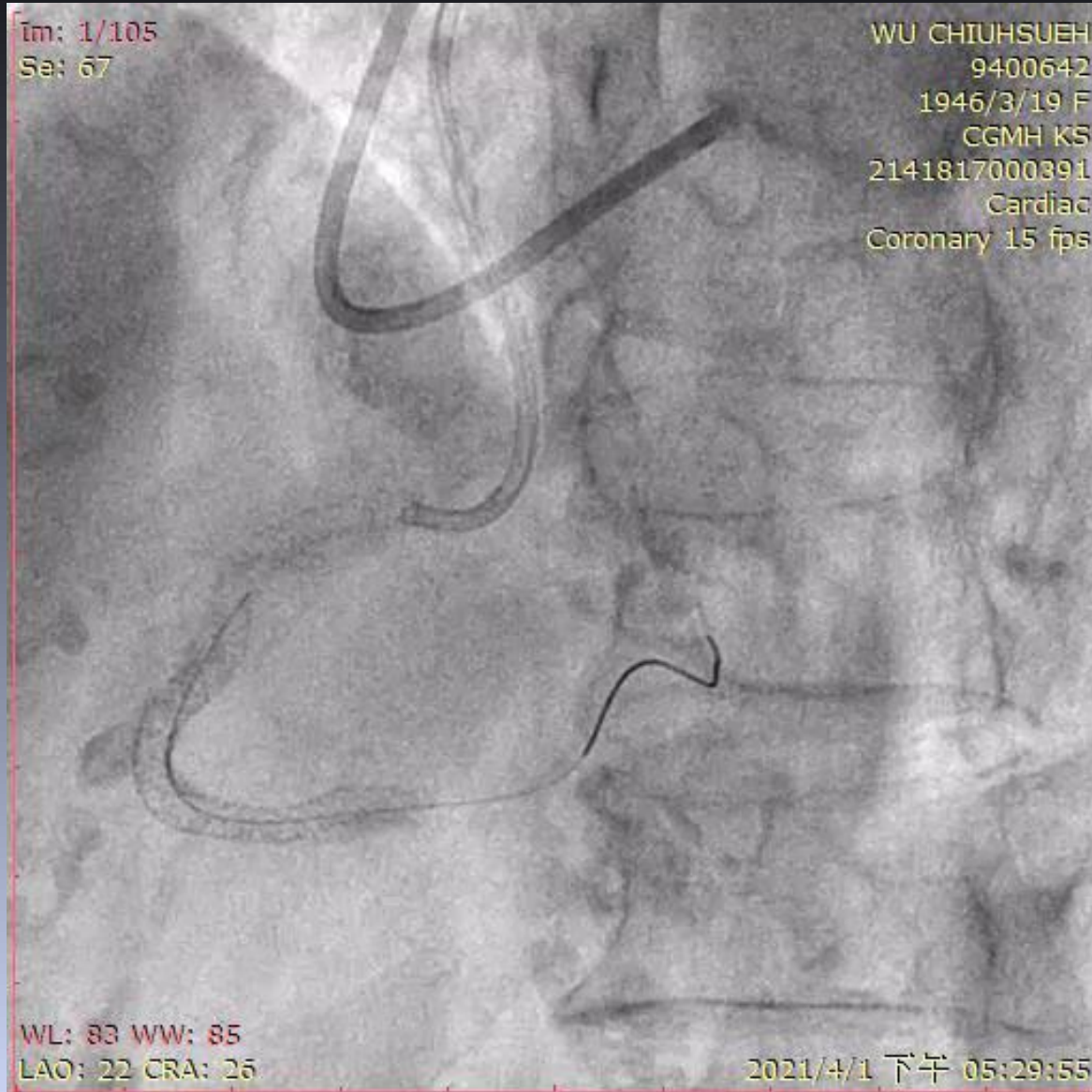
Step wise anchoring in p-RCA 3.5x15mm

After Caravel in antegrade GC, Externalization with RG 3



Final result

Synergy 3.0x48mm, 3.5x48mm post dilate upto 4.0 HPB upto 28 atm

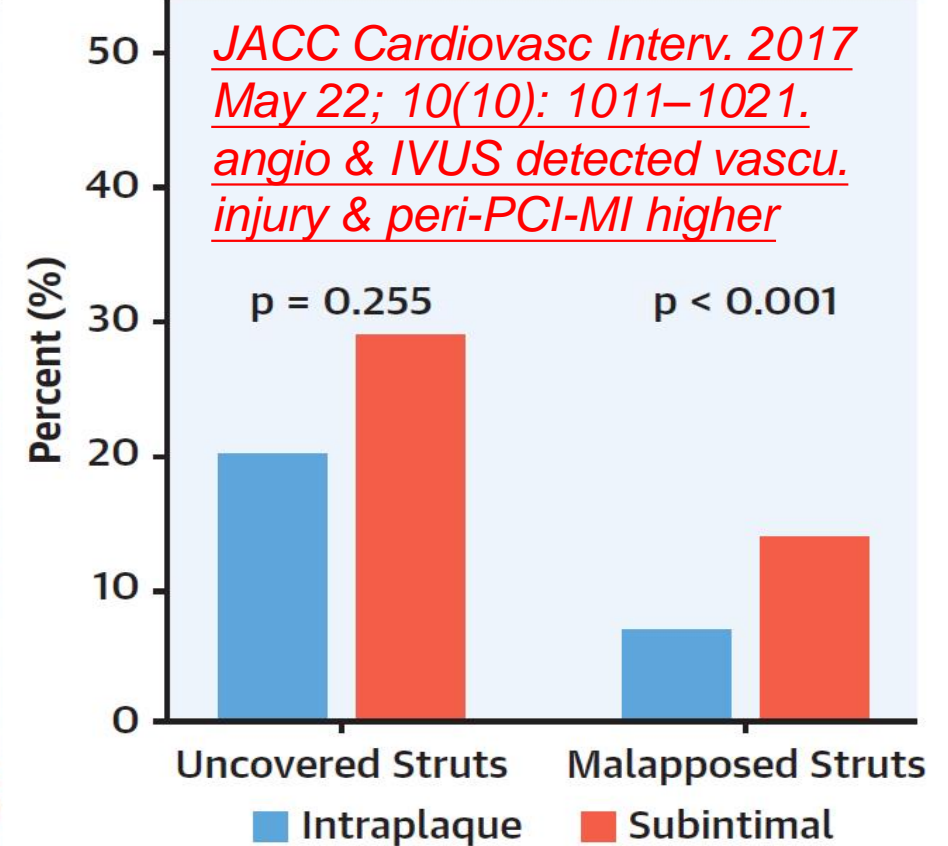
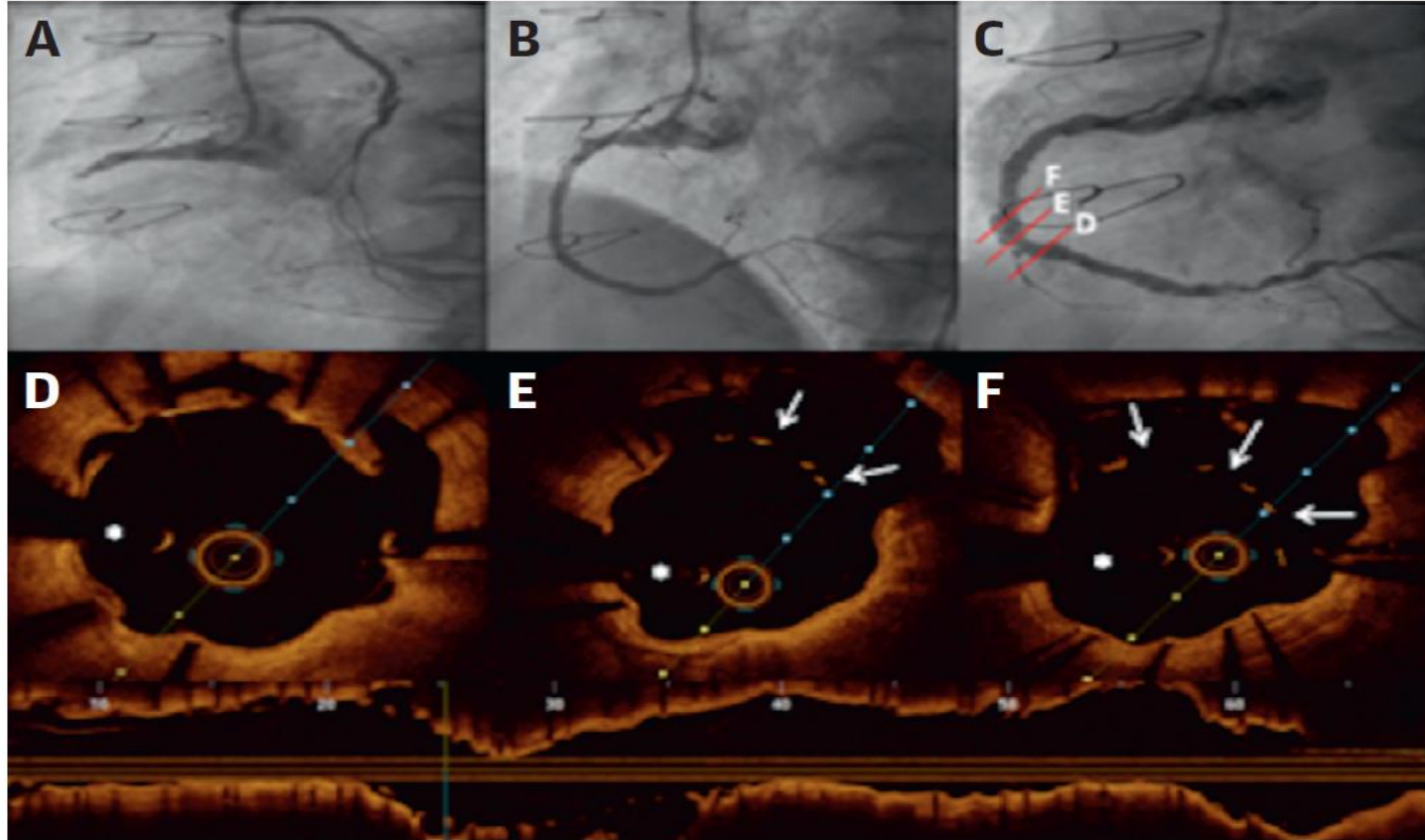


Conclusions:

- Sometimes, wire passing through CTO calcified portion either antegrade & retrograde, but smallest balloon unable to pass: try grenadoplasty (BAM), Turnpike-Gold, Tornus-88 or rotablator
- Laser can be done w/o changing 0.014 wire, but hard rock may not work (also not routinely available in all the Cath. Lab.)
- Rotablation need wire exchange, through the 0.014 wire created channel can be done in > 90% success rate (CGMH experience)
- IVL and Orbital need to create a small channel before passing
- Cutting, Scoreflex, NSE-Alpha, OPN were also similar
- In considering of the these, “ **Bypass the hard Rock** “ would be other alternatives, but drawback of subintimal DES stenting

CENTRAL ILLUSTRATION OCT Findings Following Subintimal as Compared to Intraplaque Recanalization of Coronary Chronic Total Occlusions

ISAR-OCT-CTO Registry JACC interv 2019;12:1889



Xhepa, E. et al. J Am Coll Cardiol Interv. 2019;12(19):1889-98.

(Left) Baseline angiography and follow-up angiography and intravascular optical coherence tomographic (OCT) imaging in a patient with a chronically occluded right coronary artery. **(A)** Initial dual coronary injection. **(B)** Final angiographic result after subintimal recanalization of the chronically occluded artery. **(C)** Eccentric coronary evaginations at the midportion of the recanalized vessel visible at angiographic follow-up but not on baseline angiography. **(D to F)** OCT cross sections showing eccentric bulging of the vessel lumen and marked stent strut malapposition. **(Right)** Percentage of uncovered and malapposed stent struts as determined by follow-up intravascular OCT imaging according to recanalization technique. *Guidewire artifact. **Arrow** = malapposed stent struts.