Contemporary ADR; The Evolution of Devices and Techniques

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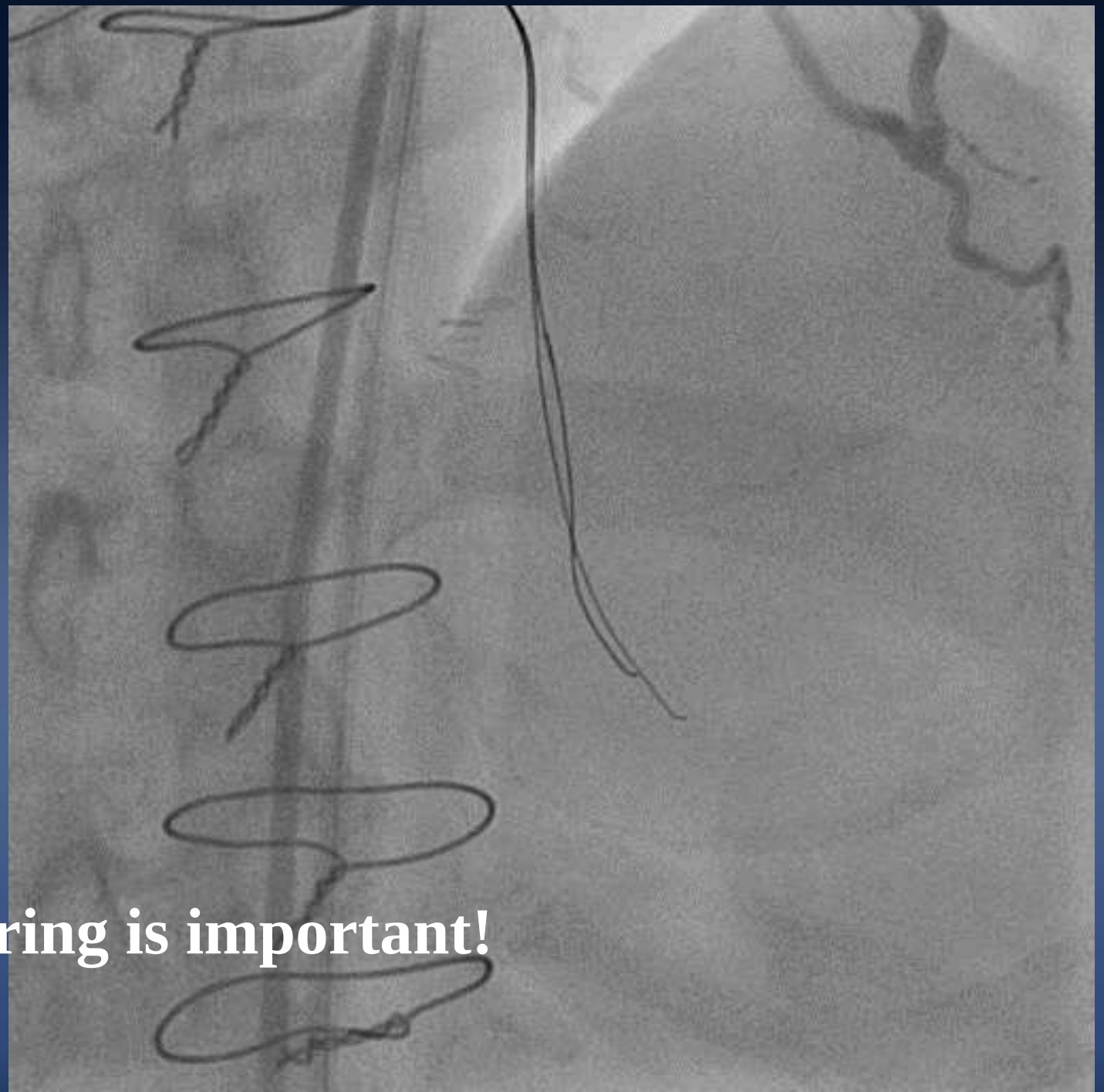
Chennai, India

Overview

- Disclaimer
- Basics of ADR
- Cases

AWE

- KNOW WHAT YOU CAN WIRE
- ADR NOT A SUBSTITUTE FOR GOOD WIRING SKILLS
- KNOW WHEN TO SWITCH STRATEGIES



Parallel wiring is important!

Why is ADR part of the algorithm?

- Long lesions cannot be consistently wired true to true
  - Even by experts and contemporary wires
- Some no viable retrograde options

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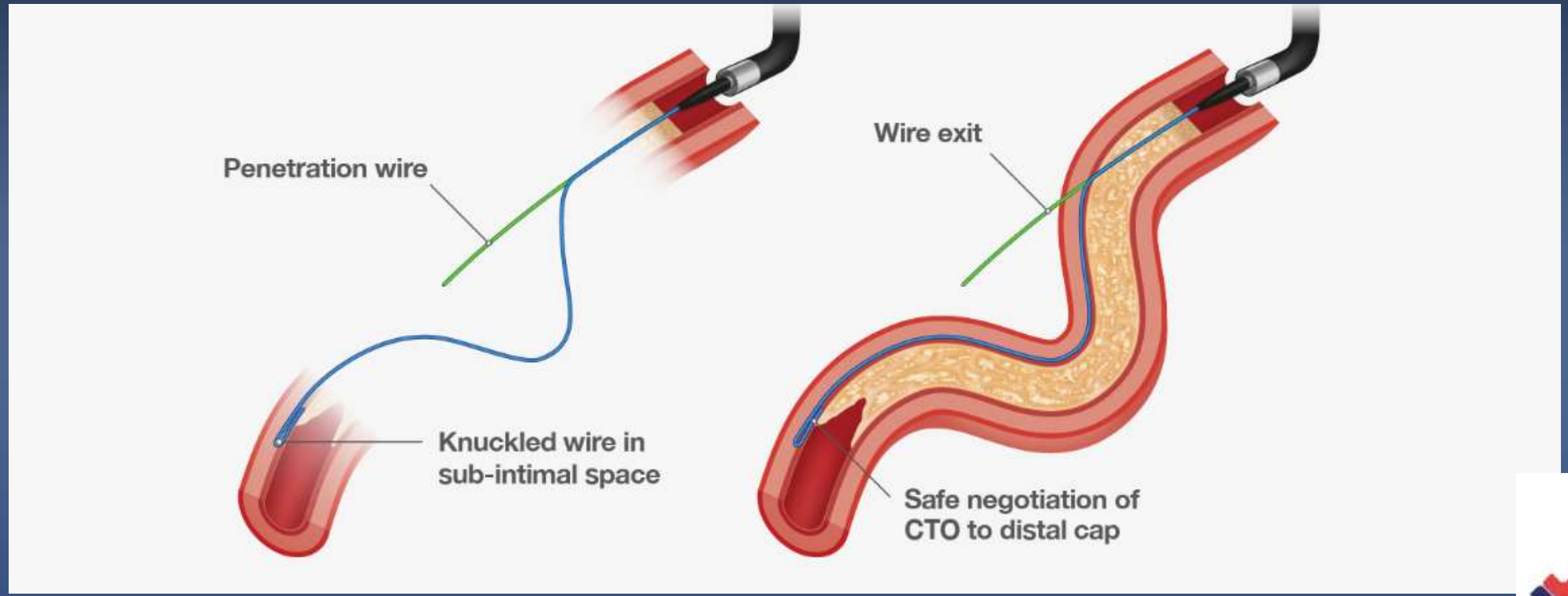
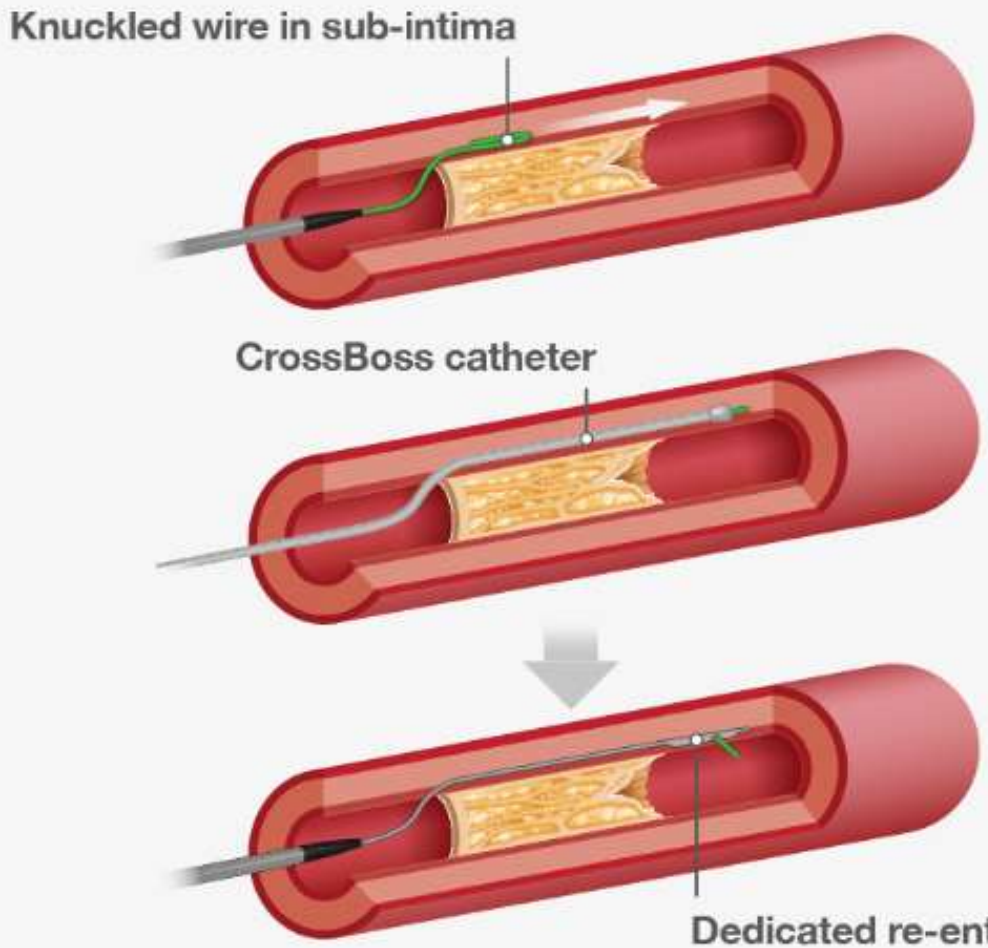
CTO Lesion assessment

Long lesion = dissection



ADR principles – refresher

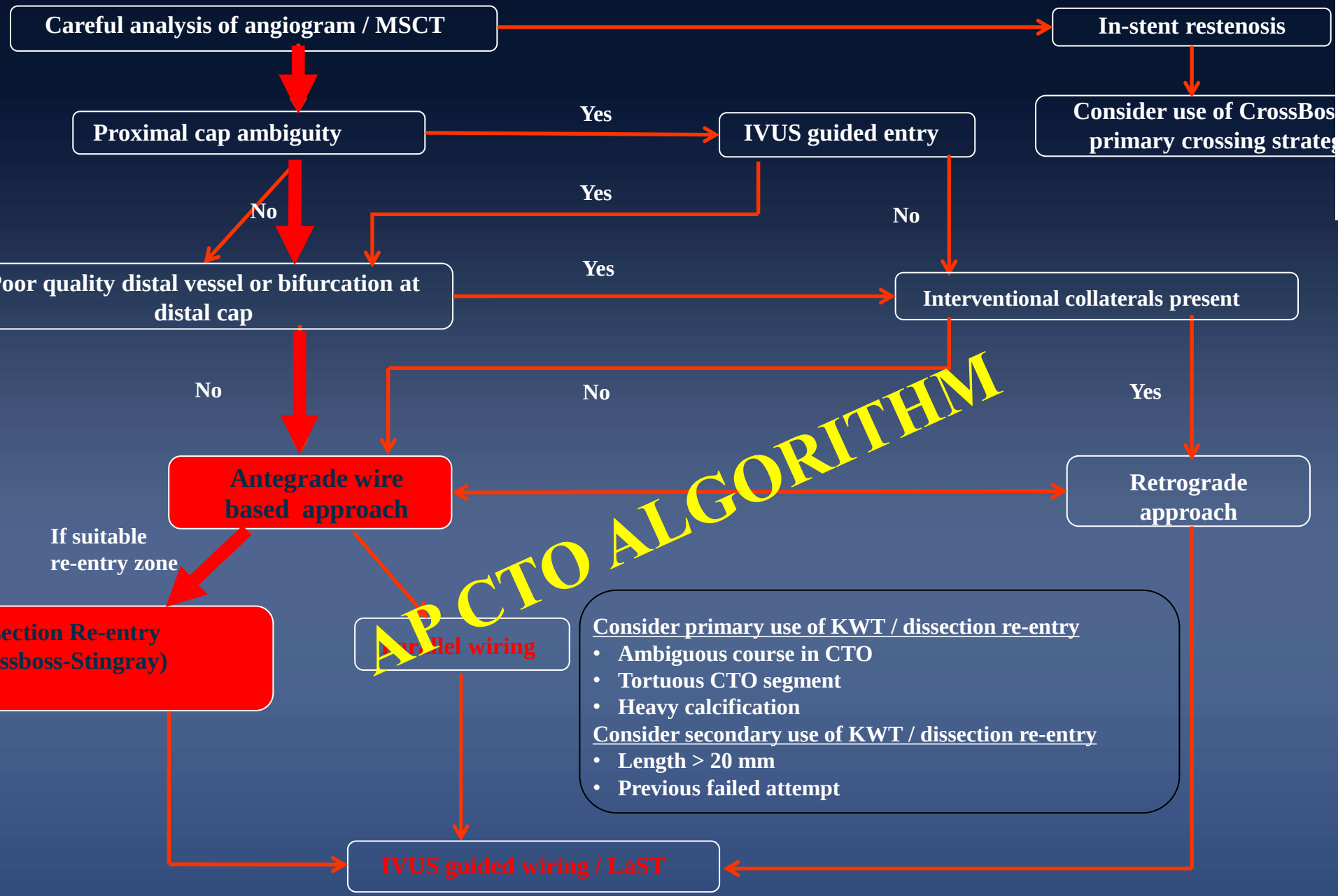


Deliberate access into the sub-intimal space with a knuckled wire which is then advanced just proximal to the distal cap

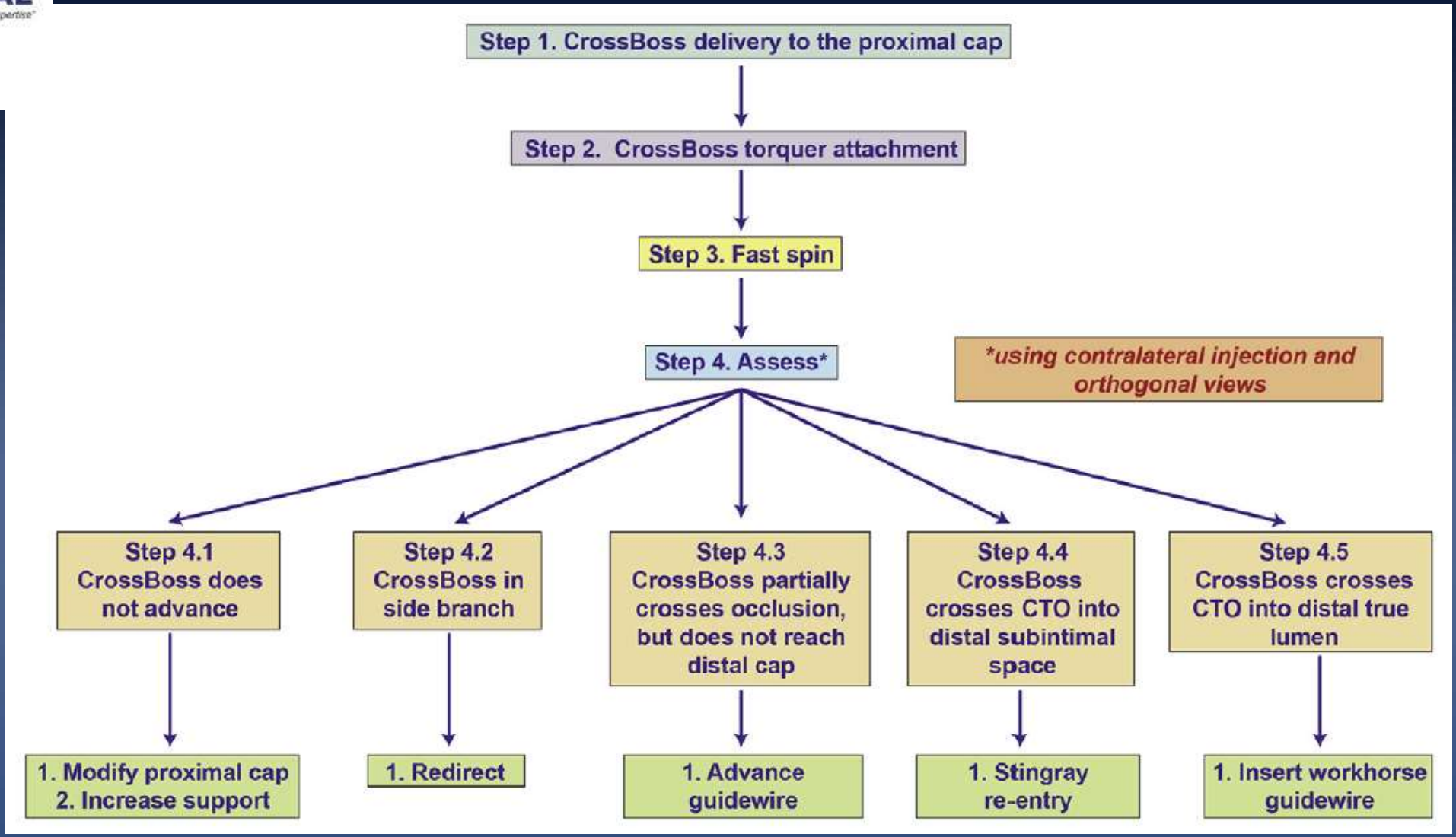
CrossBoss advanced beyond the distal cap to the landing zone

A dedicated re-entry system is used to access the true lumen

Initial antegrade strategy

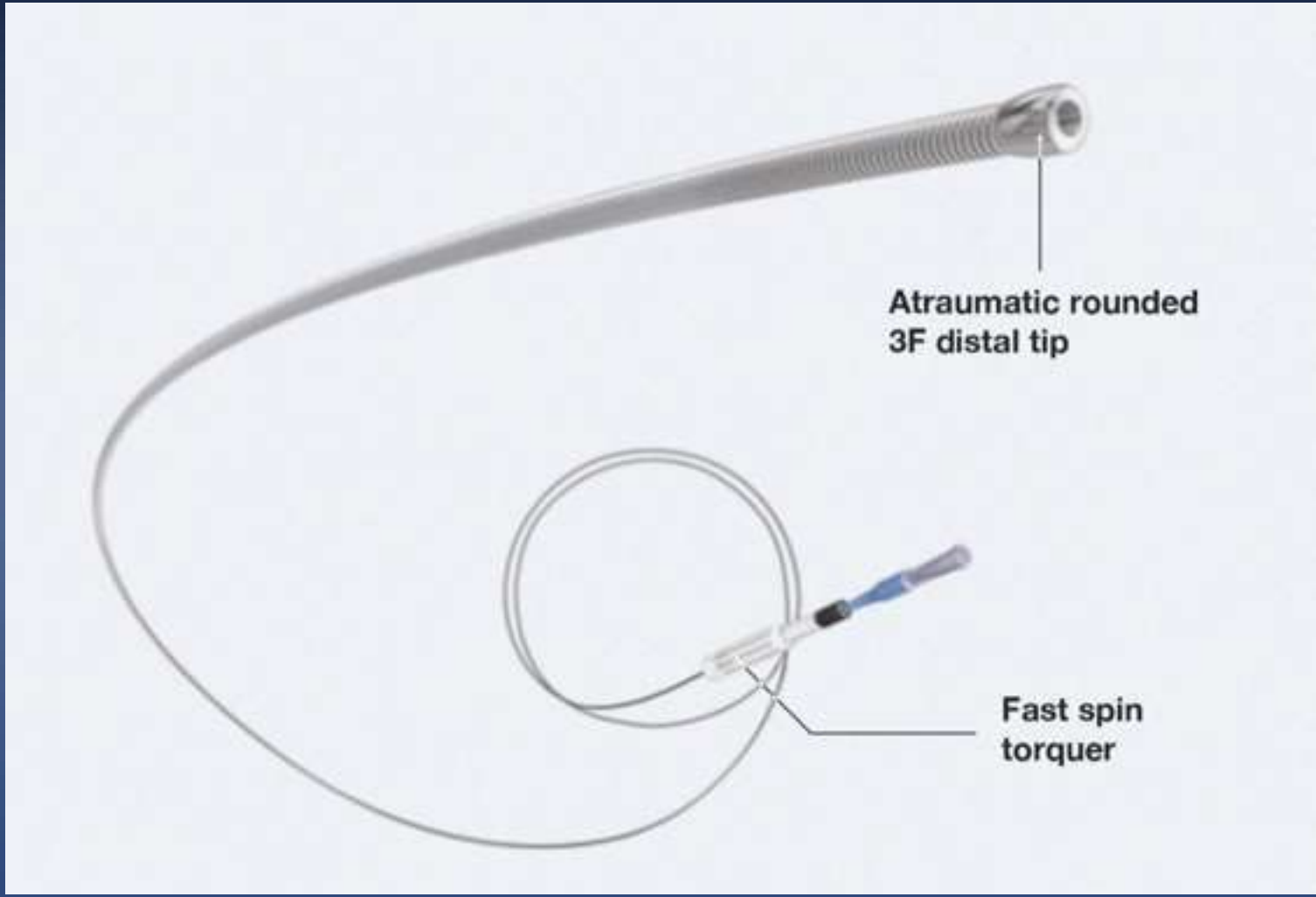

Careful analysis of angiogram / MSCT
In-stent restenosis
Proximal cap ambiguity
Yes
IVUS guided entry
Consider use of CrossBos
primary crossing strate
No
Yes
No
Poor quality distal vessel or bifurcation at distal cap
Yes
Interventional collaterals present
No
No
Yes
AP CTO ALGORITHM
Antegrade wire based approach
Retrograde approach
If suitable re-entry zone
Dissection Re-entry (Crossboss-Stingray)
Parallel wiring
Consider primary use of KWT / dissection re-entry
• Ambiguous course in CTO
• Tortuous CTO segment
• Heavy calcification
Consider secondary use of KWT / dissection re-entry
• Length > 20 mm
• Previous failed attempt
IVUS guided wiring / LaST
Consider stopping if >3 hours, 3.7 x eGFR ml contrast, Air Kerma > 5 Gy unless procedure well advanced

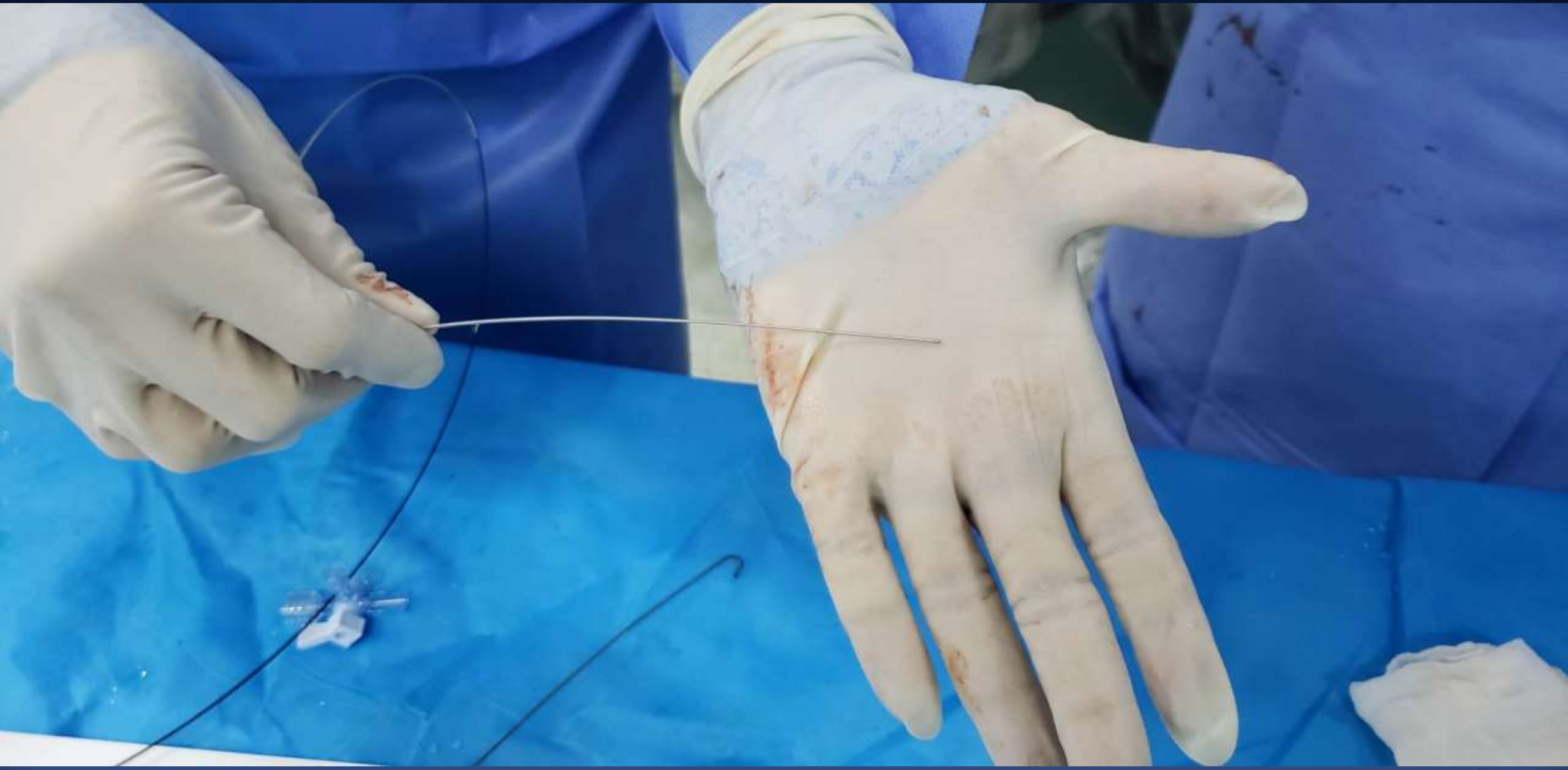
ADR with CrossBoss



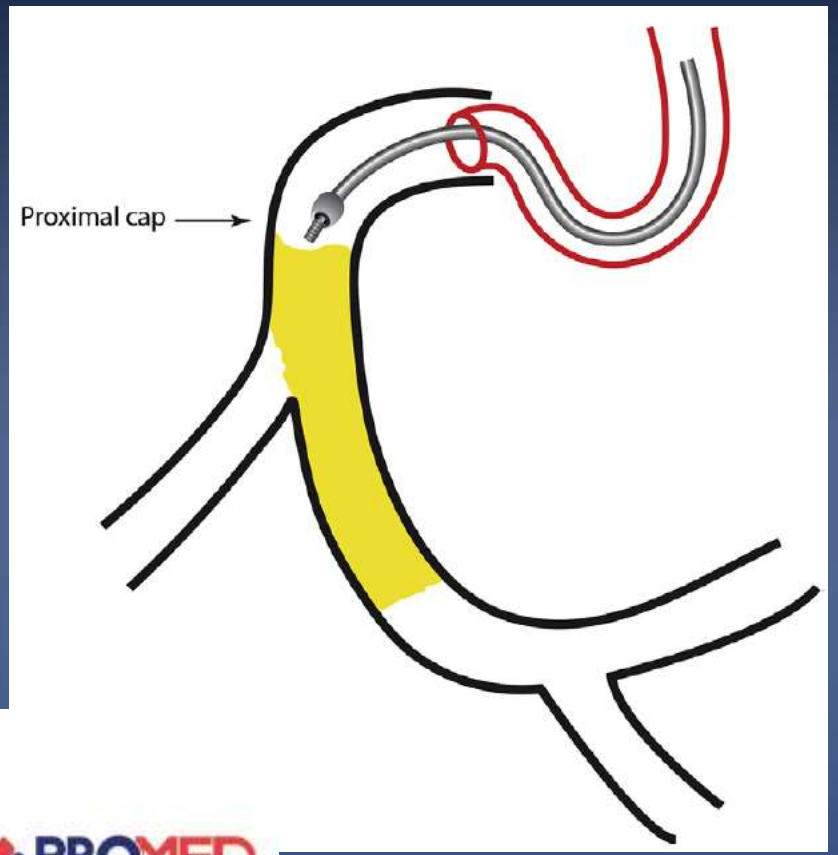
Brilakis ES. Manual of coronary CTO interventions 2nd edition. Elsevier 2017

CrossBoss

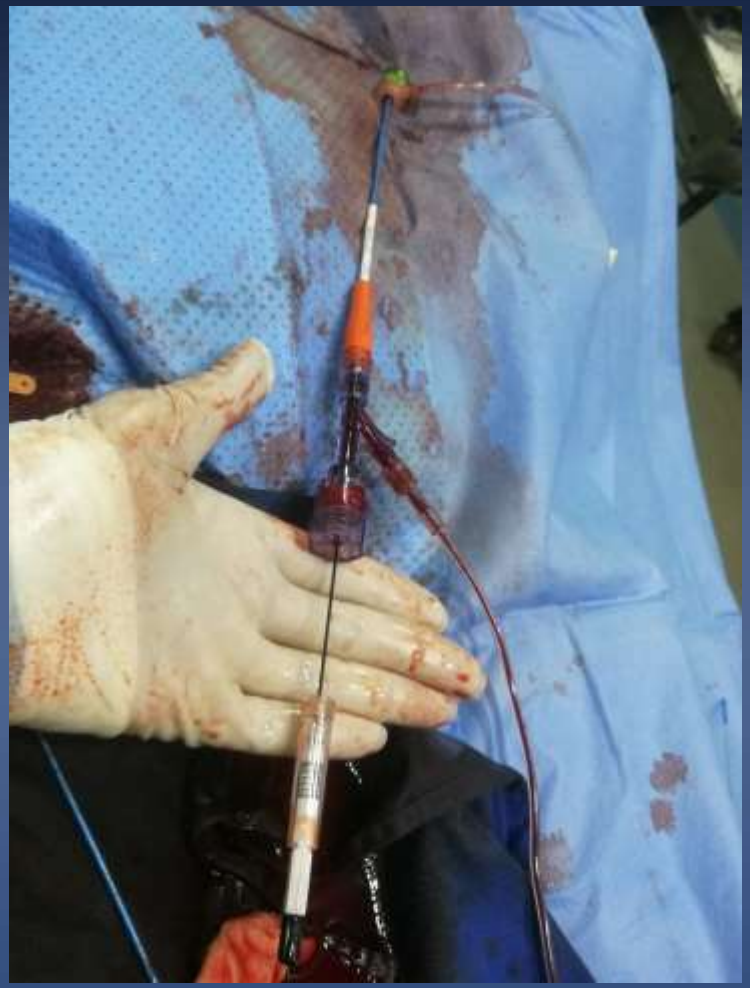




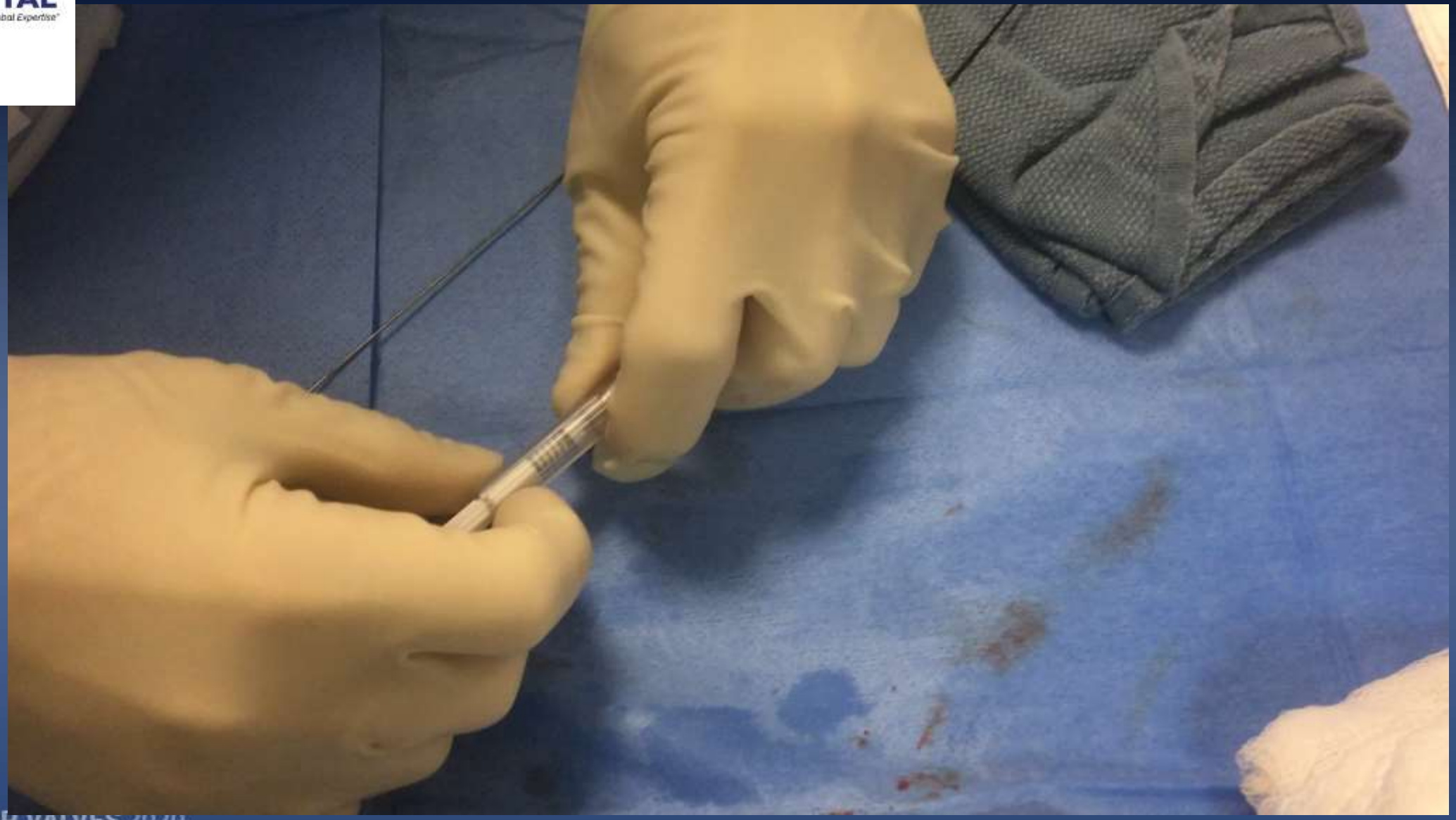
1. Proximal cap



2. Torquer attachment



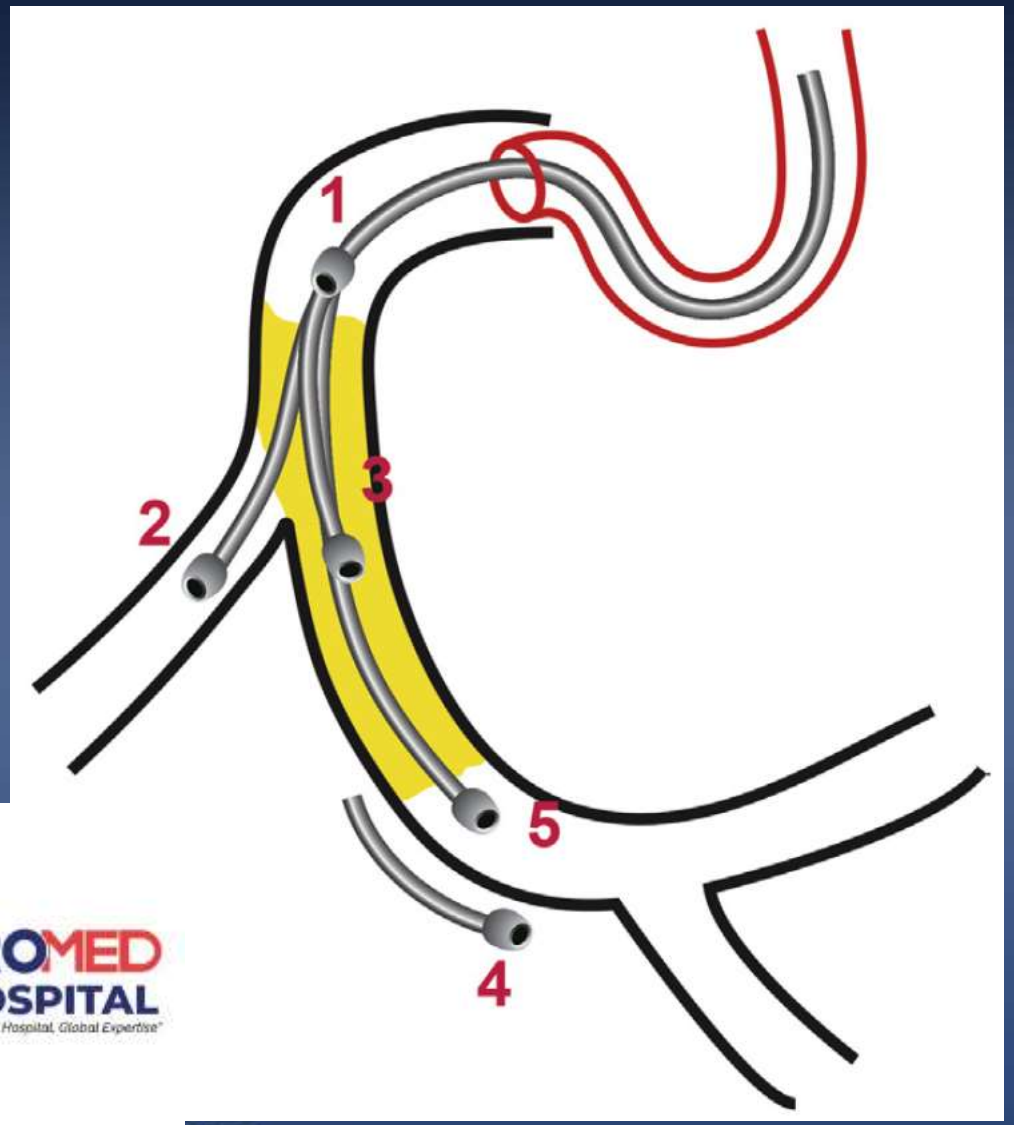
3. Fast spin



Blunt versus Tapered Cap

- CrossBoss only works to cross proximal cap if ca p is tapered
- Often times, with a blunt cap, penetrate with a Pe netration wire and a microcatheter, and then switc h penetration wire to knuckle wire
- Advance knuckle, and then switch microcatheter t o CrossBoss after trapping to finish with CrossBo ss

4. Assess



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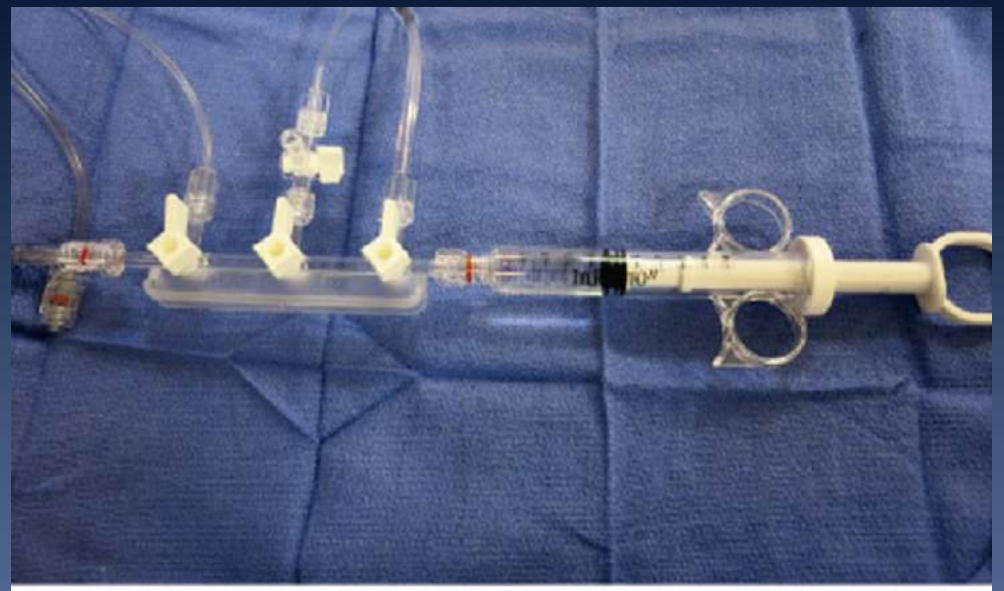
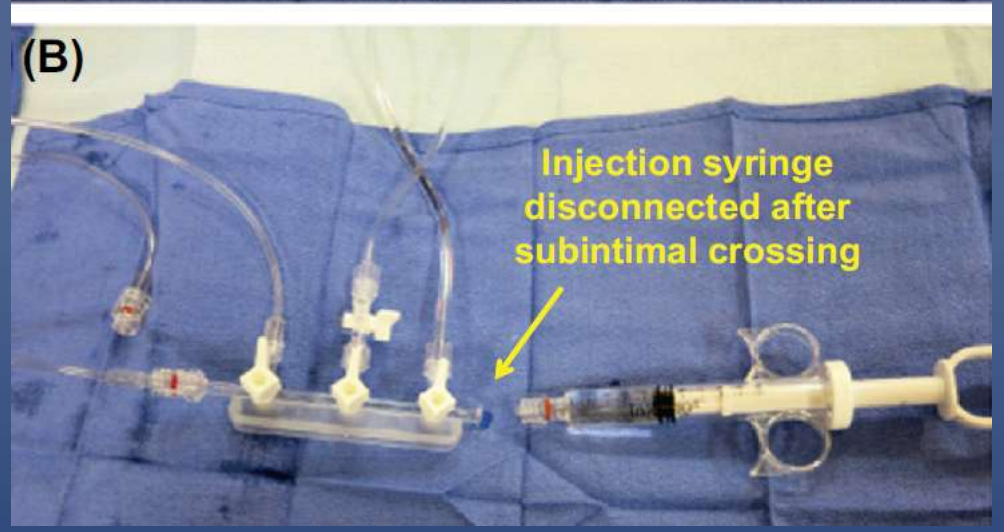
Disconnect syringe

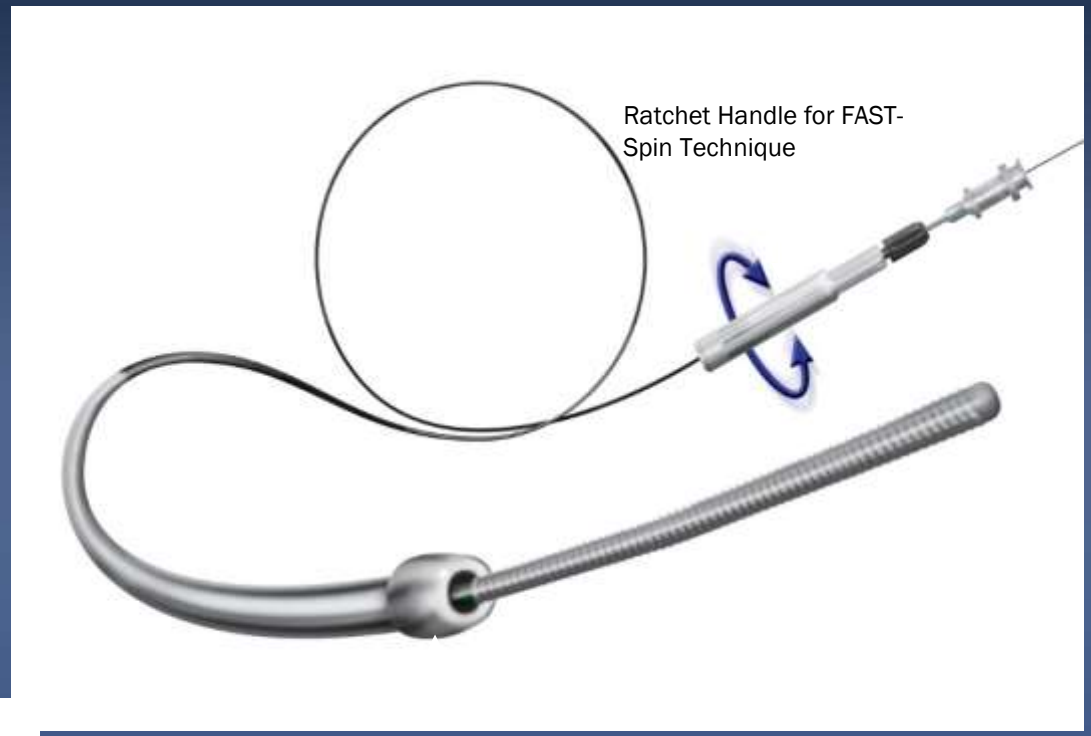




CVRF

Dissection

CrossBoss



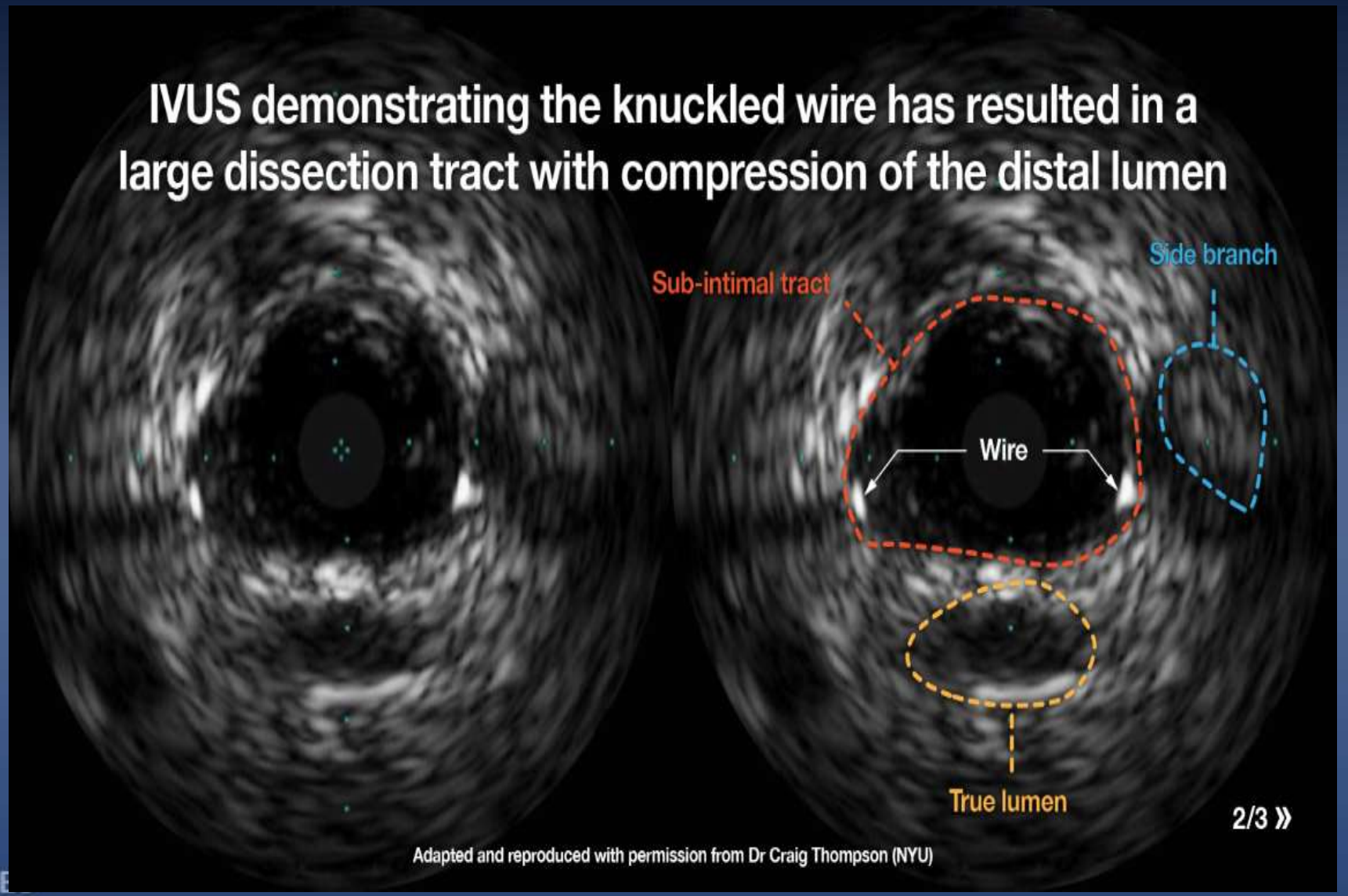
Knuckle wire

Polymer-jacketed guidewire

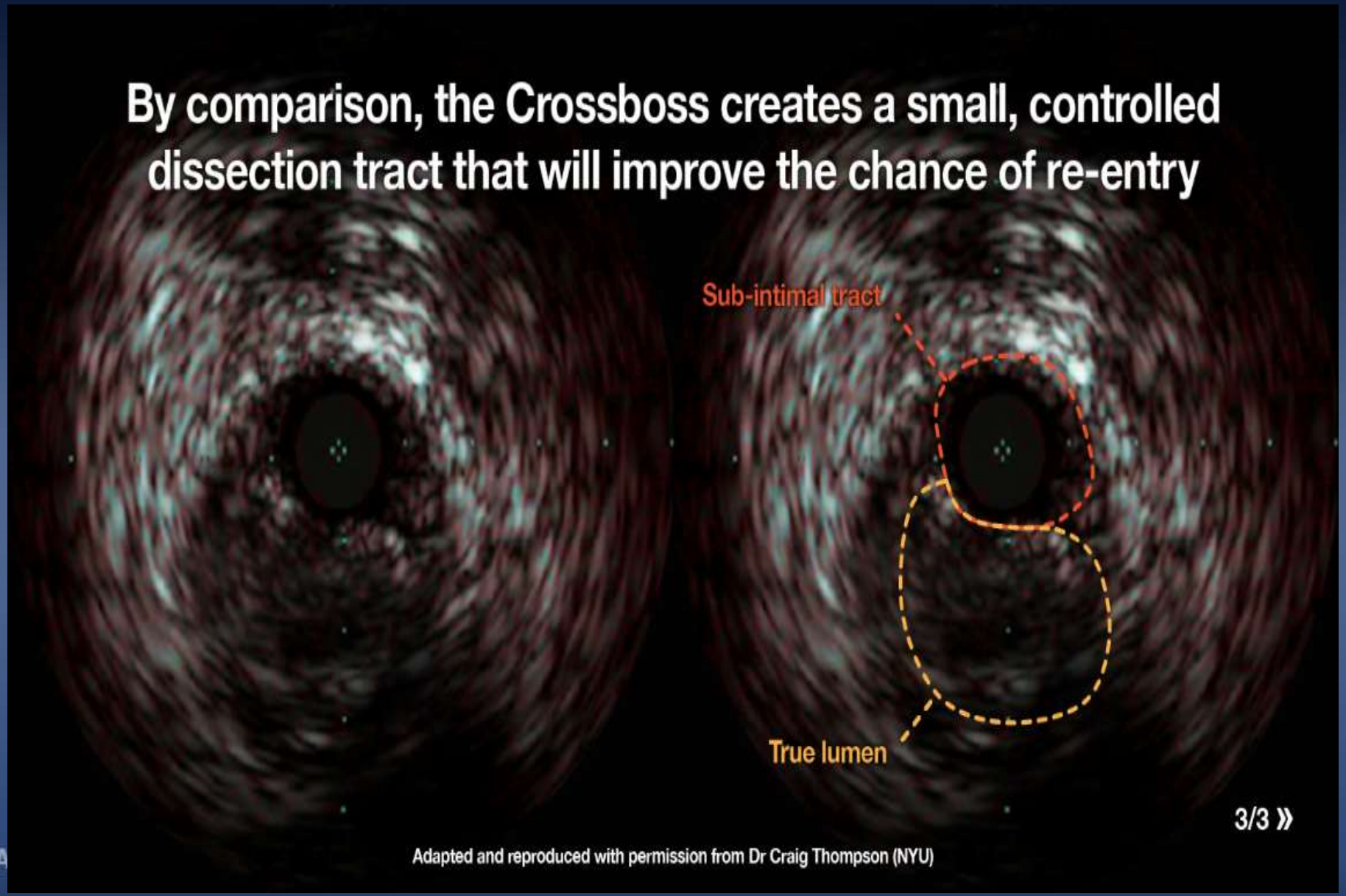
ADR with Knuckle

- Finish with CrossBoss if knuckled wire

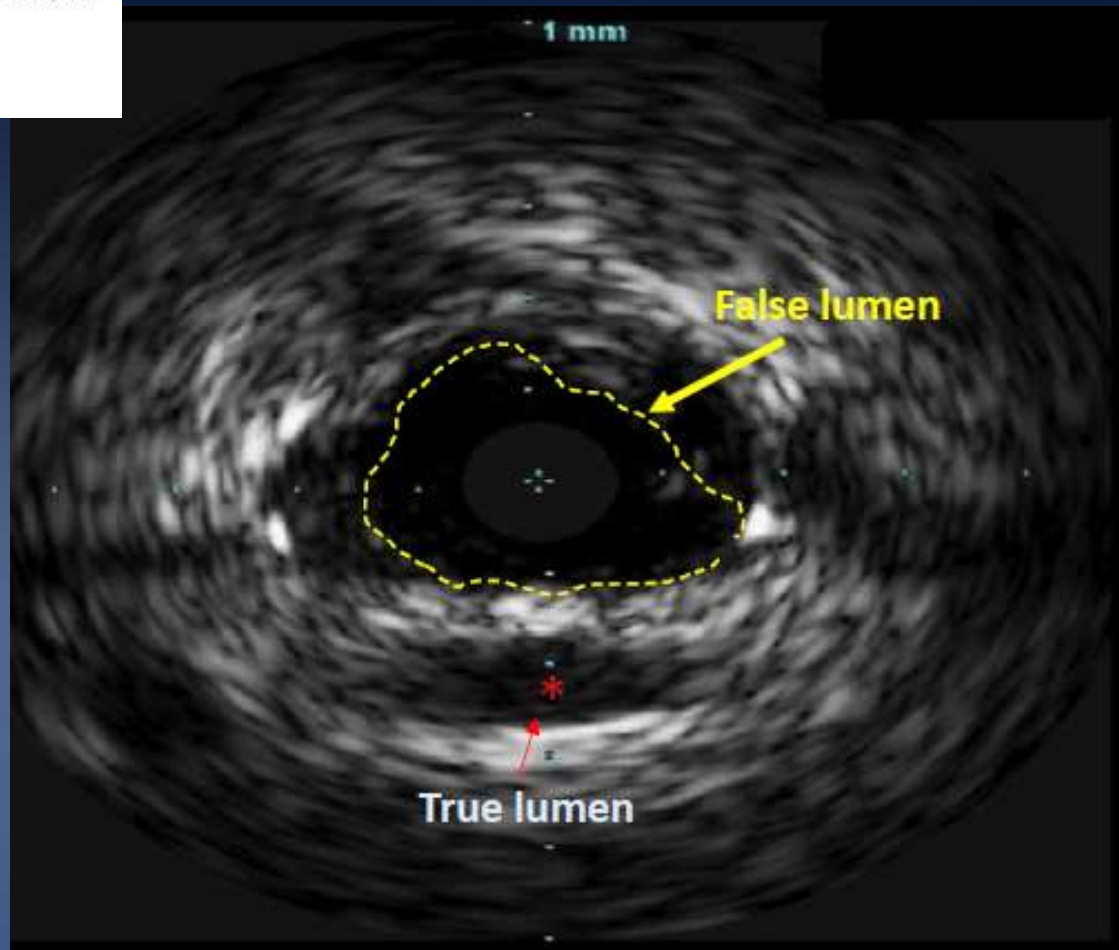
Dissection with knuckle



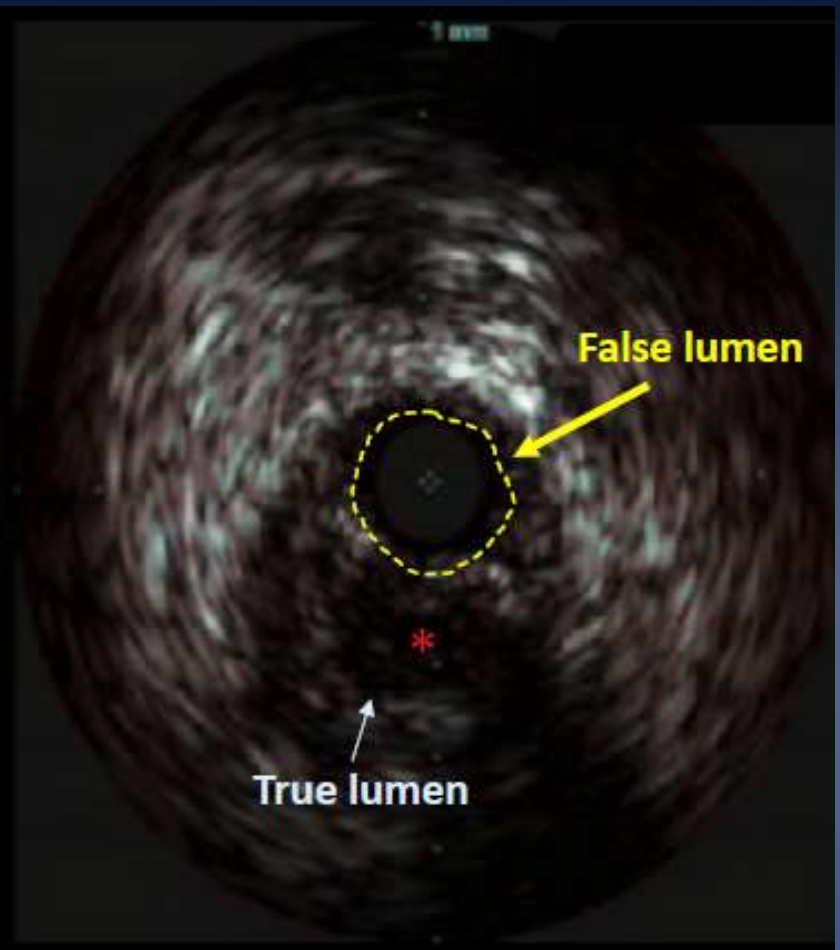
Dissection with CrossBoss



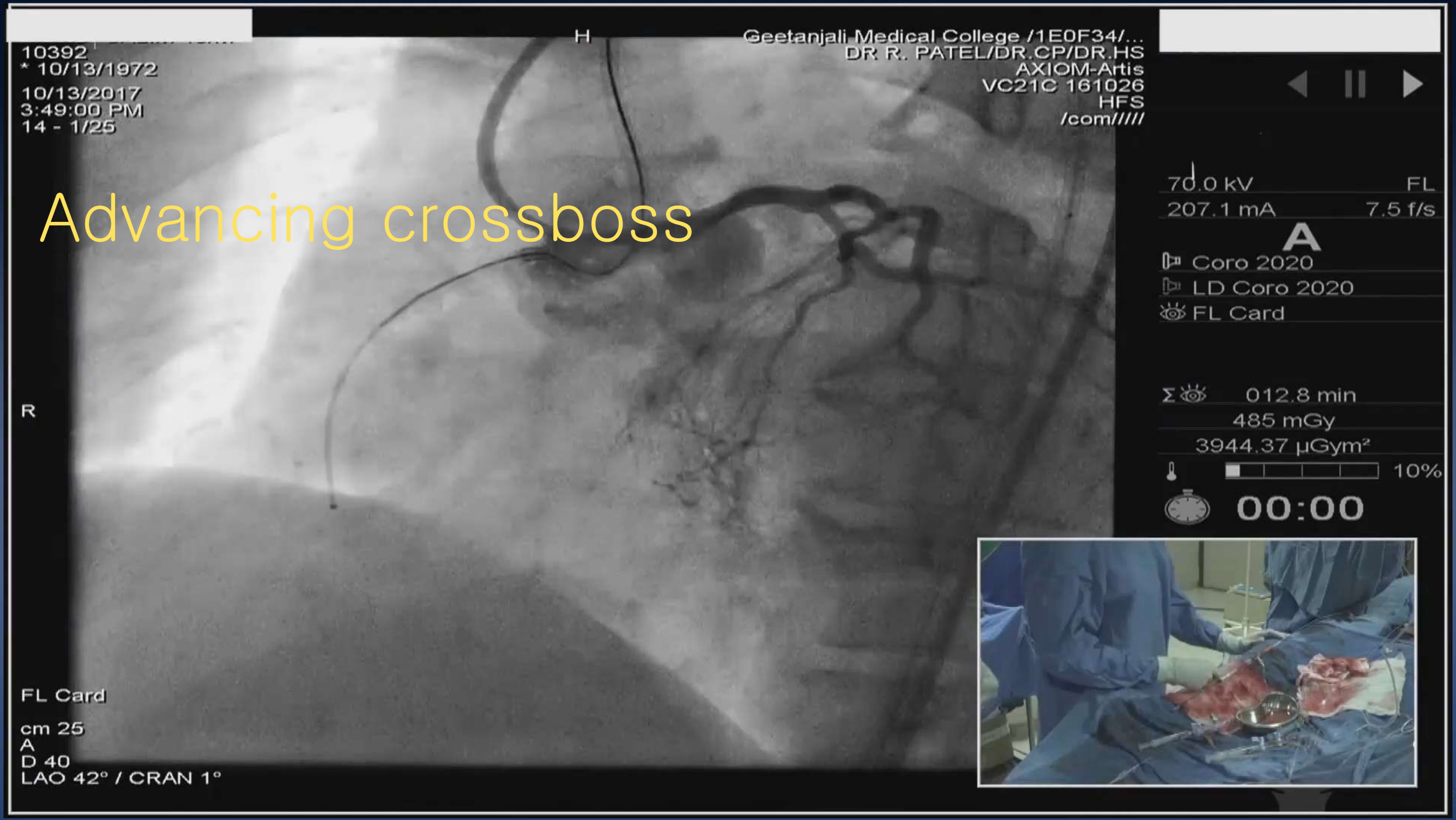
CrossBoss vs knuckle



Knuckle wire



Cross boss


10392
* 10/13/1972
10/13/2017
3:49:00 PM
14 - 1/25
H
Geetanjali Medical College /1E0F34/...
DR R. PATEL/DR.CP/DR.HS
AXIOM-Artis
VC21C 161026
HFS
/com/////
Advancing crossboss
70.0 kV
FL
207.1 mA
7.5 f/s
A
Coro 2020
LD Coro 2020
FL Card
012.8 min
485 mGy
3944.37 µGym²
10%
00:00
R
FL Card
cm 25
A
D 40
LAO 42° / CRAN 1°

Stingray® Coronary CTO Re-Entry System

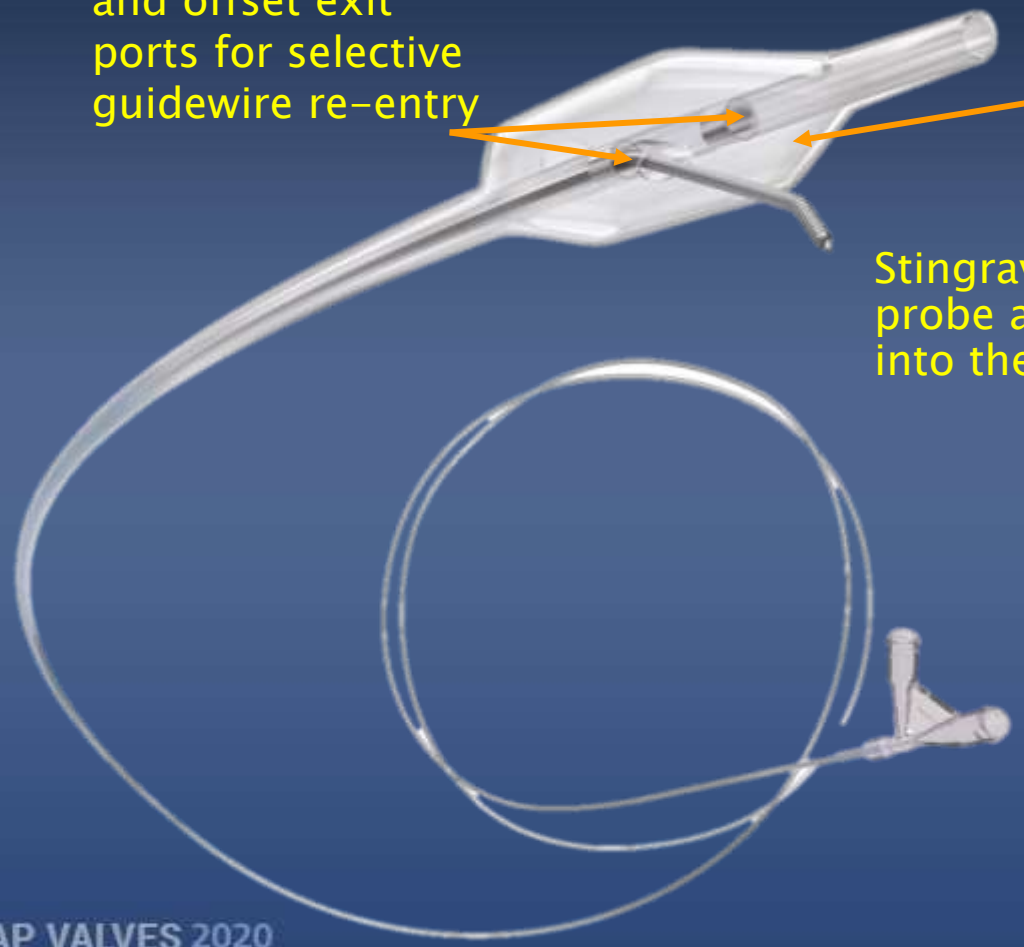
Target and re-enter the true lumen from a subintimal position in coronary arteries

2 radiopaque marker bands

180° opposed and offset exit ports for selective guidewire re-entry

Self-orienting, flat balloon hugs the vessel, positioning one exit port toward the true lumen

Stingray Guidewire's angled tip and distal probe are designed for facilitated re-entry into the true lumen



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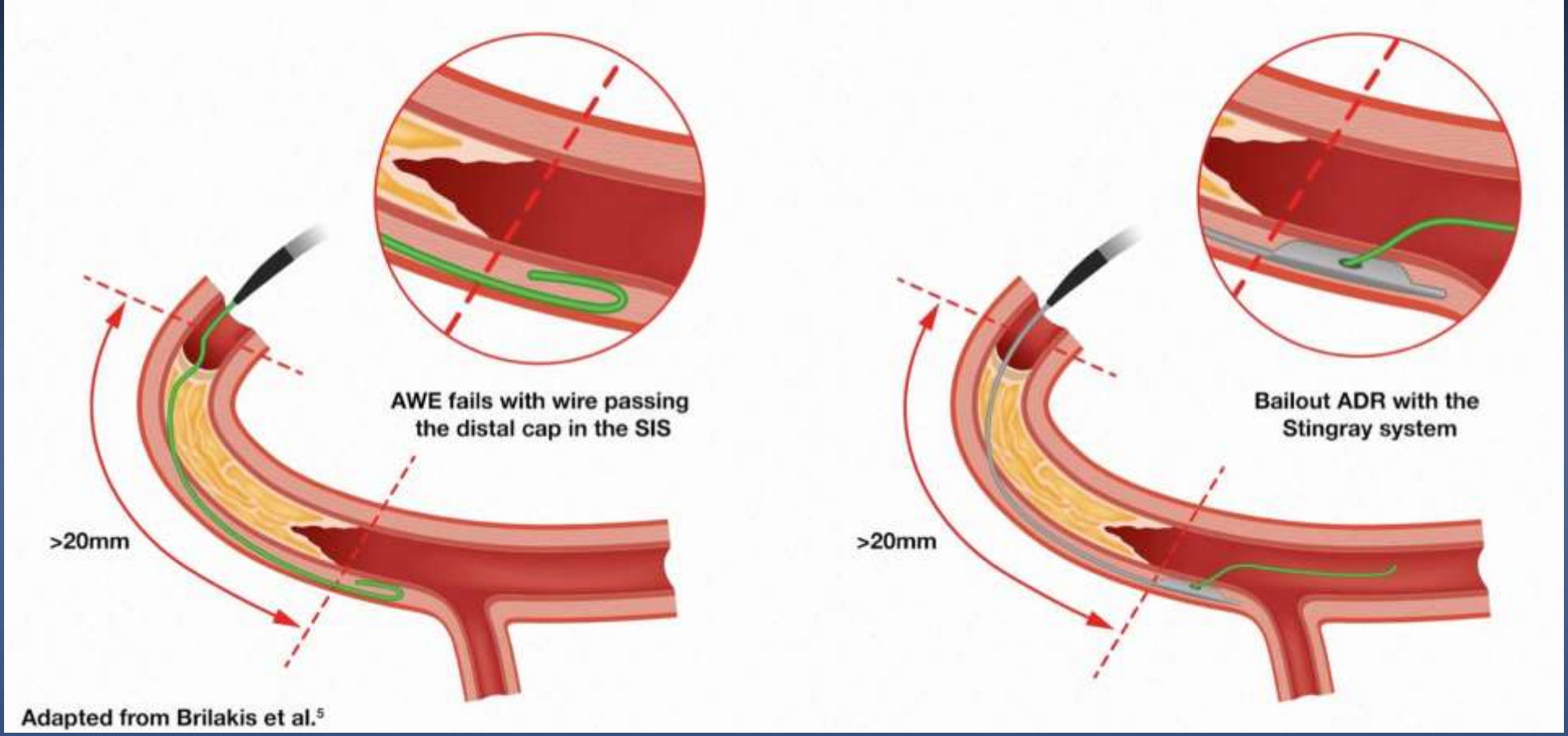
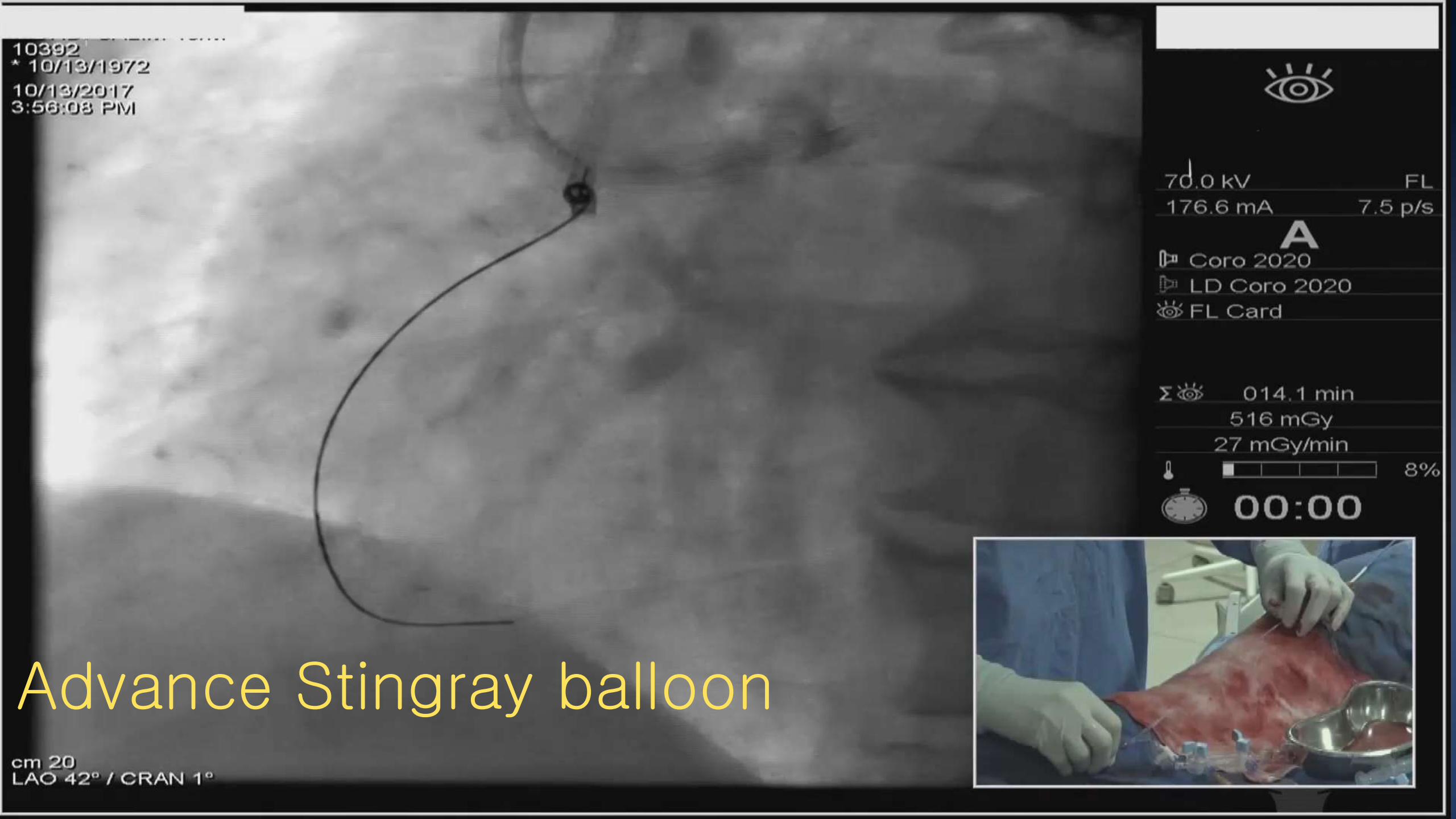
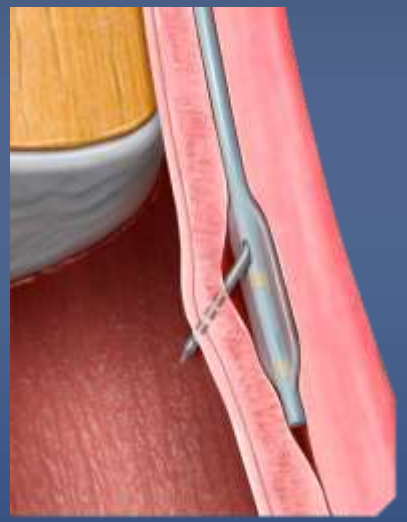
Targeted re-entry

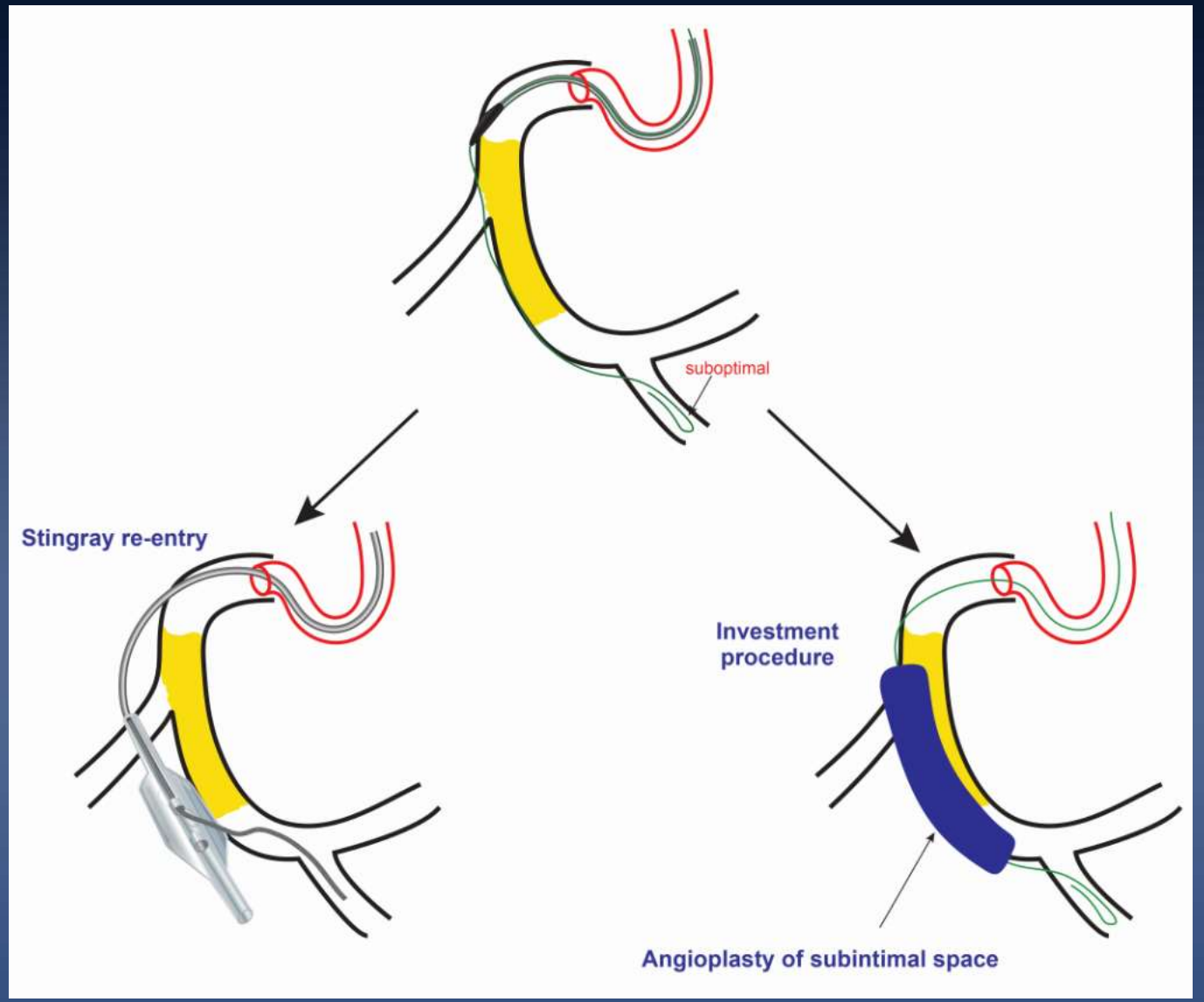


Adapted from Brilakis et al.[5]


10392
* 10/13/1972
10/13/2017
3:56:08 PM
70.0 kV
FL
176.6 mA
7.5 p/s
A
Coro 2020
LD Coro 2020
FL Card
014.1 min
516 mGy
27 mGy/min
8%
00:00
Advance Stingray balloon
cm 20
LAO 42° / CRAN 1°

4. Assess





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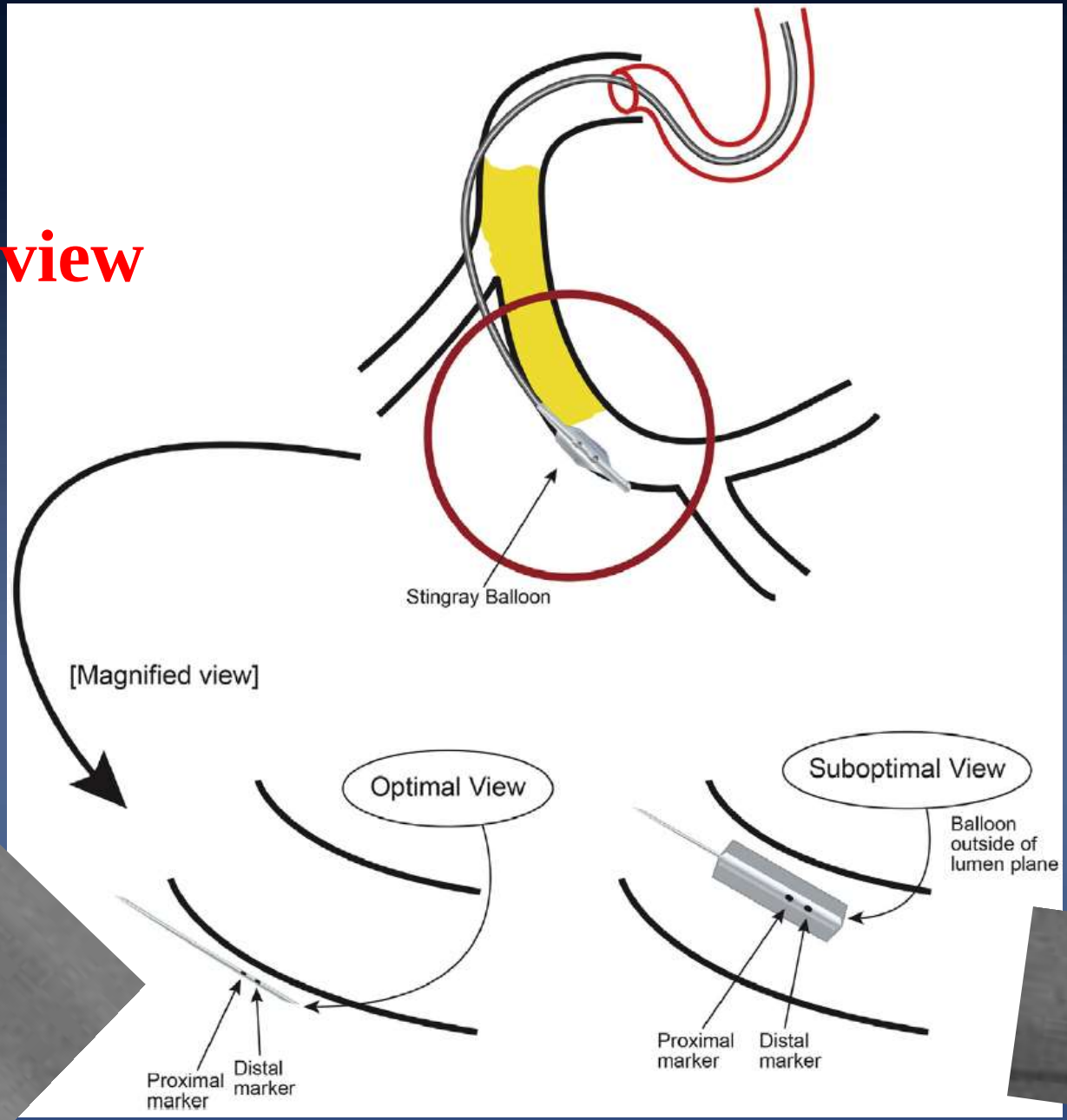
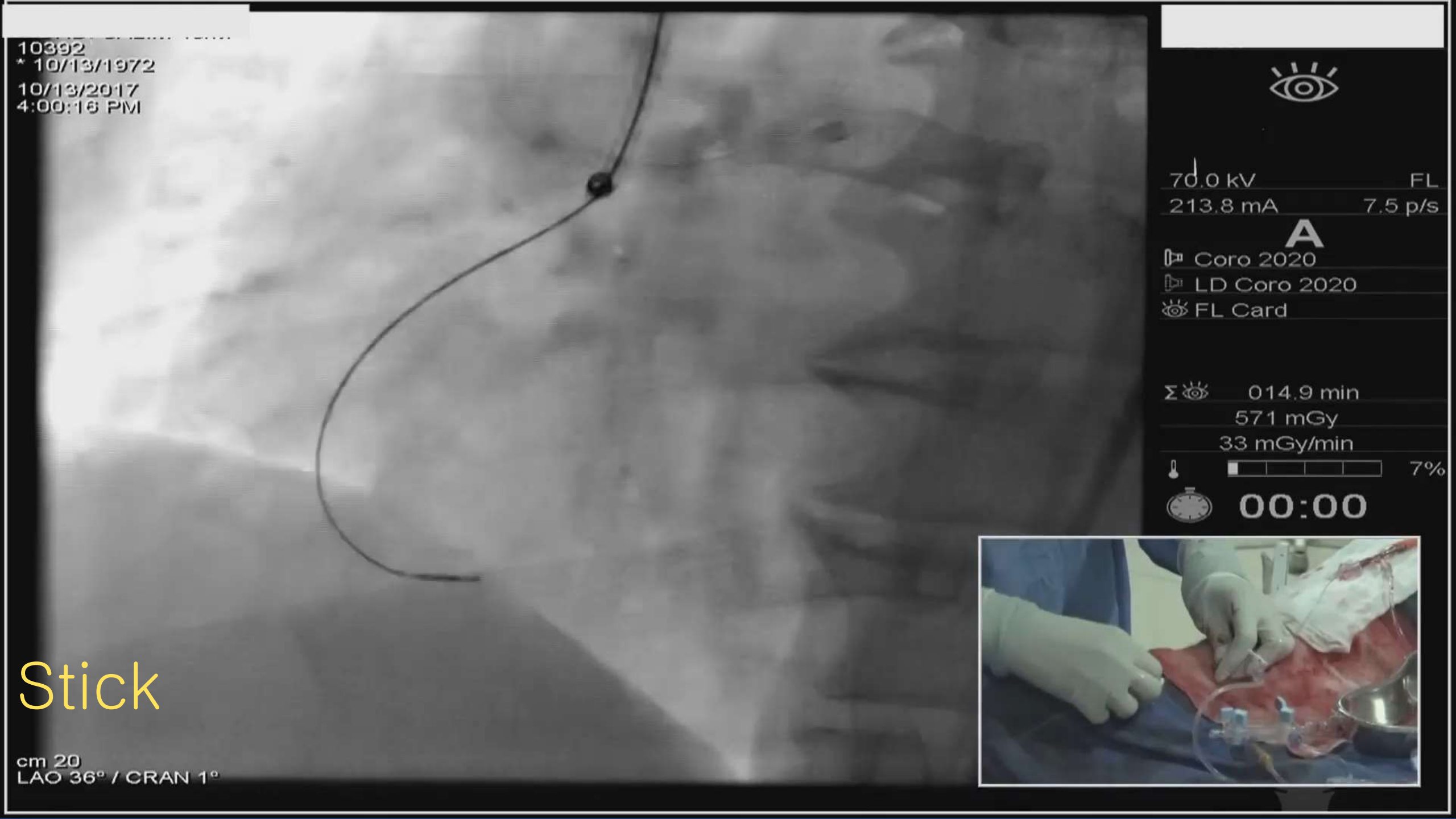
Brilakis ES. Manual of coronary CTO interventions 2nd edition. Elsevier 2017

Optimal view



Railroad tracks

Brilakis ES. Manual of coronary CTO interventions 2nd edition. Elsevier 2017


10392
* 10/13/1972
10/13/2017
4:00:16 PM
70.0 kV
FL
213.8 mA
7.5 p/s
A
Coro 2020
LD Coro 2020
FL Card
Σ
014.9 min
571 mGy
33 mGy/min
7%
00:00
Stick
cm 20
LAO 36° / CRAN 1°

Stick and swap

Polymer jacketed wire

f wire cannot track into di

Polymer-jacketed wire tracks distal vessel

Brilakis ES. Manual of coronary CTO interventions 2nd edition. Elsevier 2017

Swap for Pilot 200

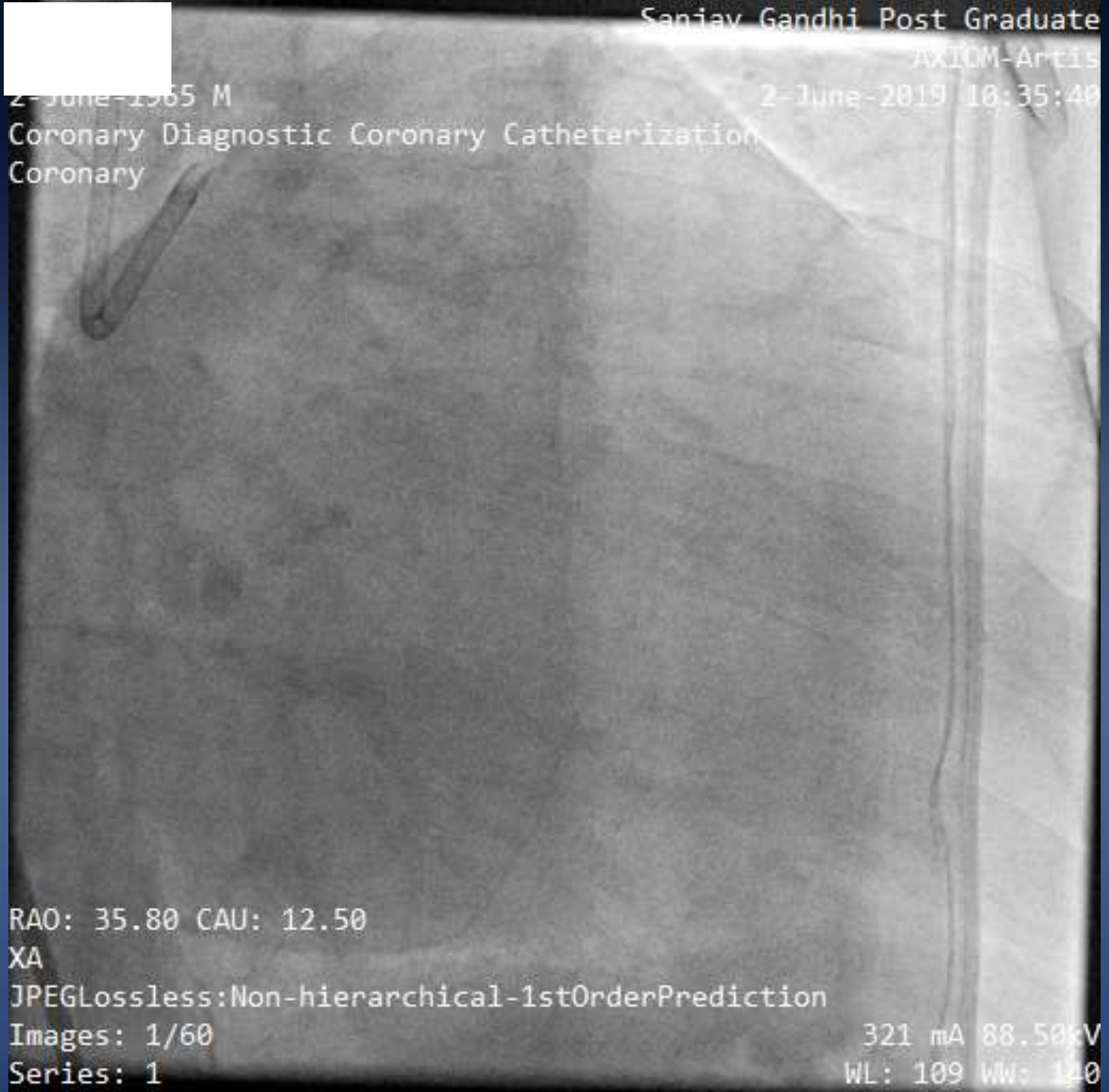
Contemporary approach to ADR

	Classic ADR 2011	Contemporary ADR 2018
Set up	8Fr Femoral with supportive guides AL0.75/EBU 3.5	Compatible with radial access 7F r with 7F Trapliner or 6Fr without guide extension
Initial Microcatheter	CrossBoss	Start with wire and microcatheter Finish with CrossBoss to limit dissection in re-entry zone
CrossBoss utilization	Almost always	Decreasing use worldwide
Re-entry catheter	Stingray	Stingray LP
Re-entry wire	Stingray wire	Stingray /Astato 20/Hornet 14/ GAIA 3rd Next
Re-entry Technique	Stick and go	Stick and swap with Pilot 200; Stick and go with other wires
Hematoma Management	STRAW- if loss of visualization of distal vessel	Active management with Trapliner upfront and preemptive STRAW

Contemporary approach to ADR

	Classic ADR 2011	Contemporary ADR 2018
Problem Solving	Not much experience	Algorithms within algorithms for problem solving
Wire Based ADR	Stent data unavailable	Really use as salvage and still consider stenting only after IVUS and ensuring loss of branches
Re-entry zone	Easiest area to reenter necessitating longer stents than required	Striving to minimize stent length by reentering as close to the distal cap as possible
Operators	Most in the west	Global
Lesion length	20 mm	Long Plus
	Only part of hybrid	Newer schools of thought – as an evolution from hybrid and adapted to regional sensibilities – APCTO club algorithm

Case


Sanjay Gandhi Post Graduate
AXIOM-Artis
2-June-1965 M
2-June-2019 10:35:40
Coronary Diagnostic Coronary Catheterization
Coronary
RAO: 35.80 CAU: 12.50
XA
JPEGLossless:Non-hierarchical-1stOrderPrediction
Images: 1/60
321 mA 88.50kV
Series: 1
WL: 109 WW: 140


Sanjay Gandhi Post Graduate
2-June-1965 M
2-June-2019
Coronary Diagnostic Coronary Catheterization
Coronary
LAO: 40.60 CAU: 28.90
XA
JPEGLossless:Non-hierarchical-1stOrderPrediction
Images: 1/48
272 mA 105.80kV
Series: 2
WL: 109 WW: 139

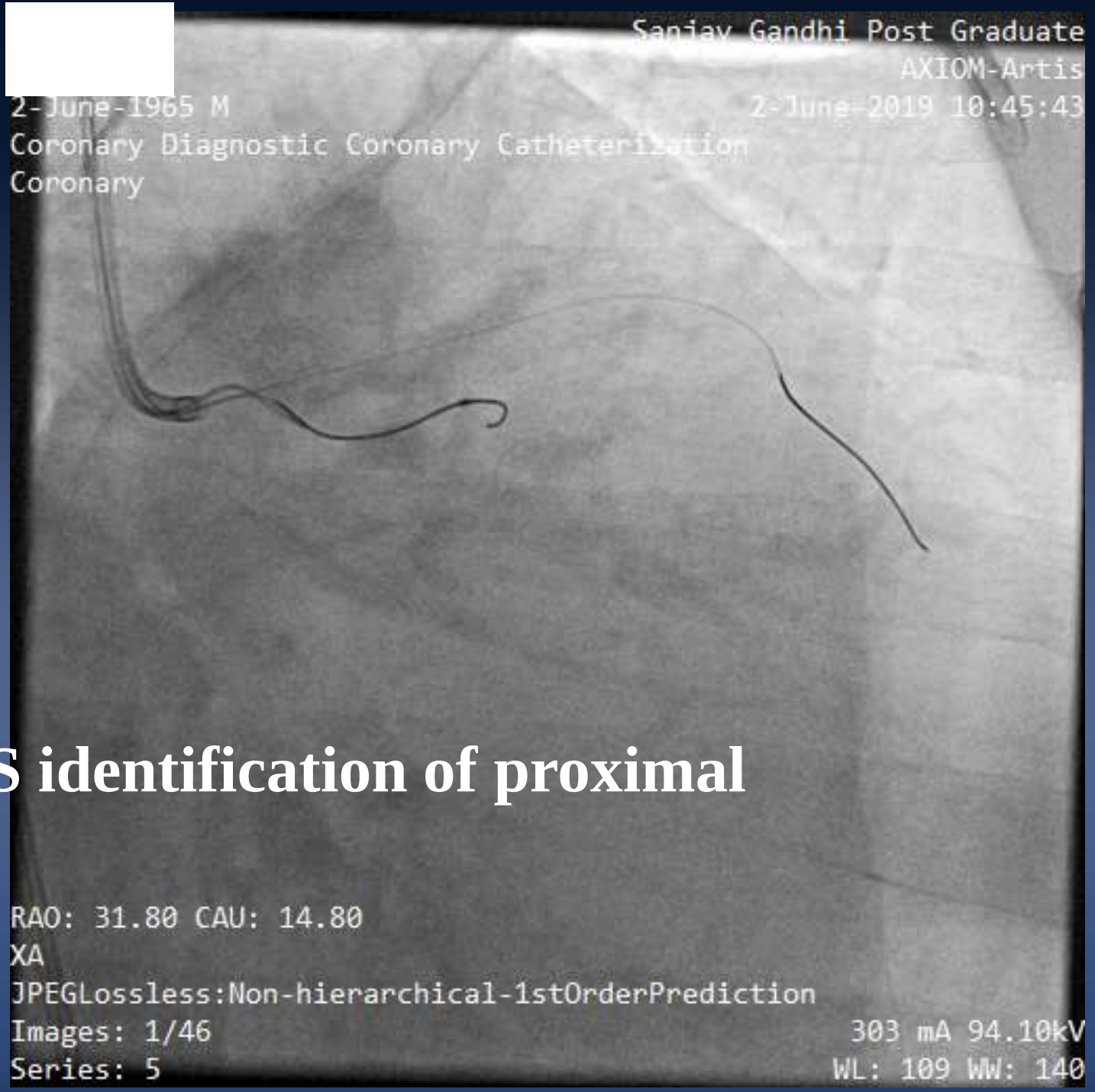
Target vessel: Circumflex

ASSESSMENT

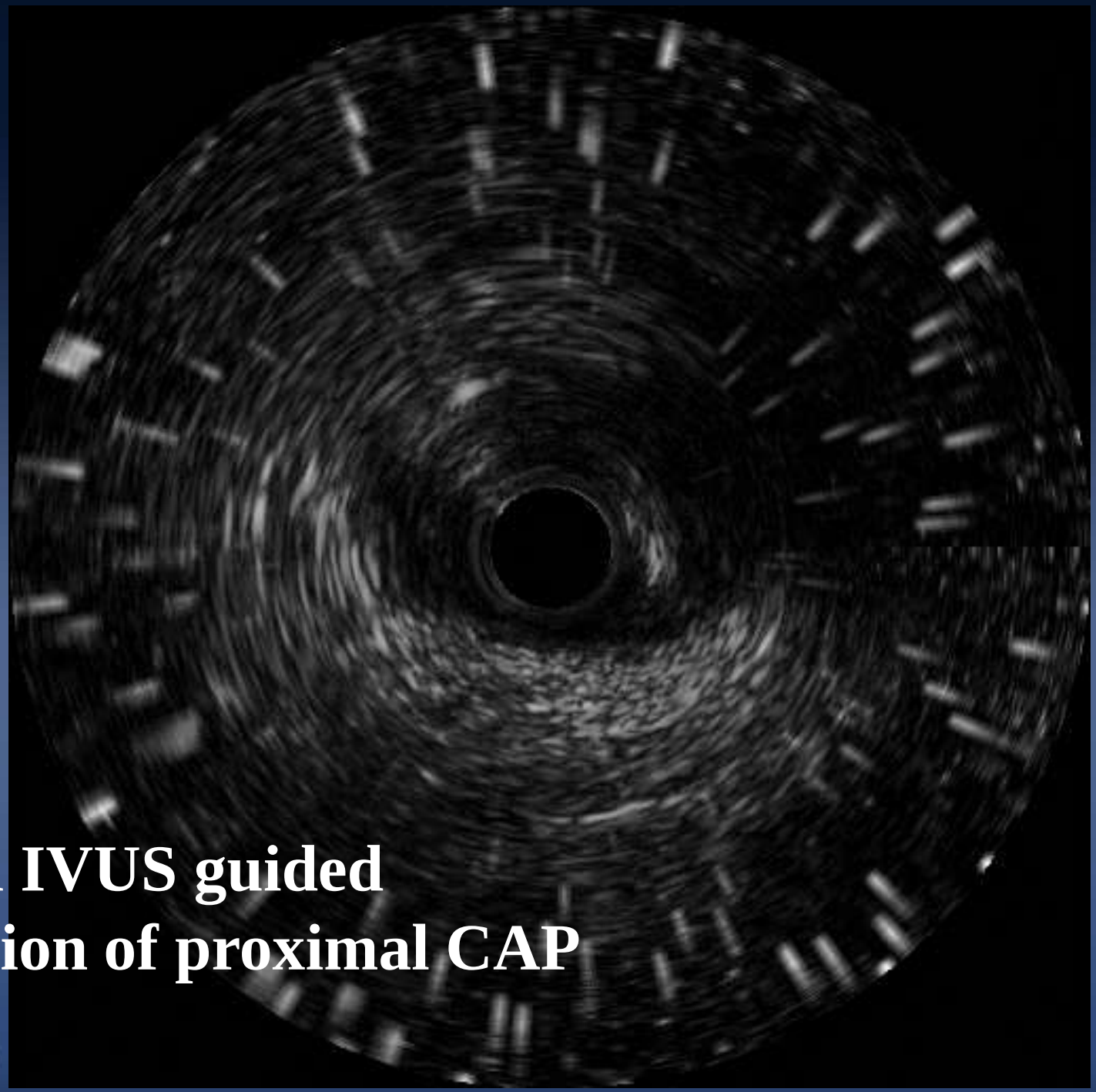
Length:	> 20 mm
Distal vessel:	Possibly ok
Collaterals:	Unsure
Proximal cap:	Ambiguous

PLAN

1. **Antegrade wire escalation after IVUS entry**
2. **Retrograde**
3. **ADR**

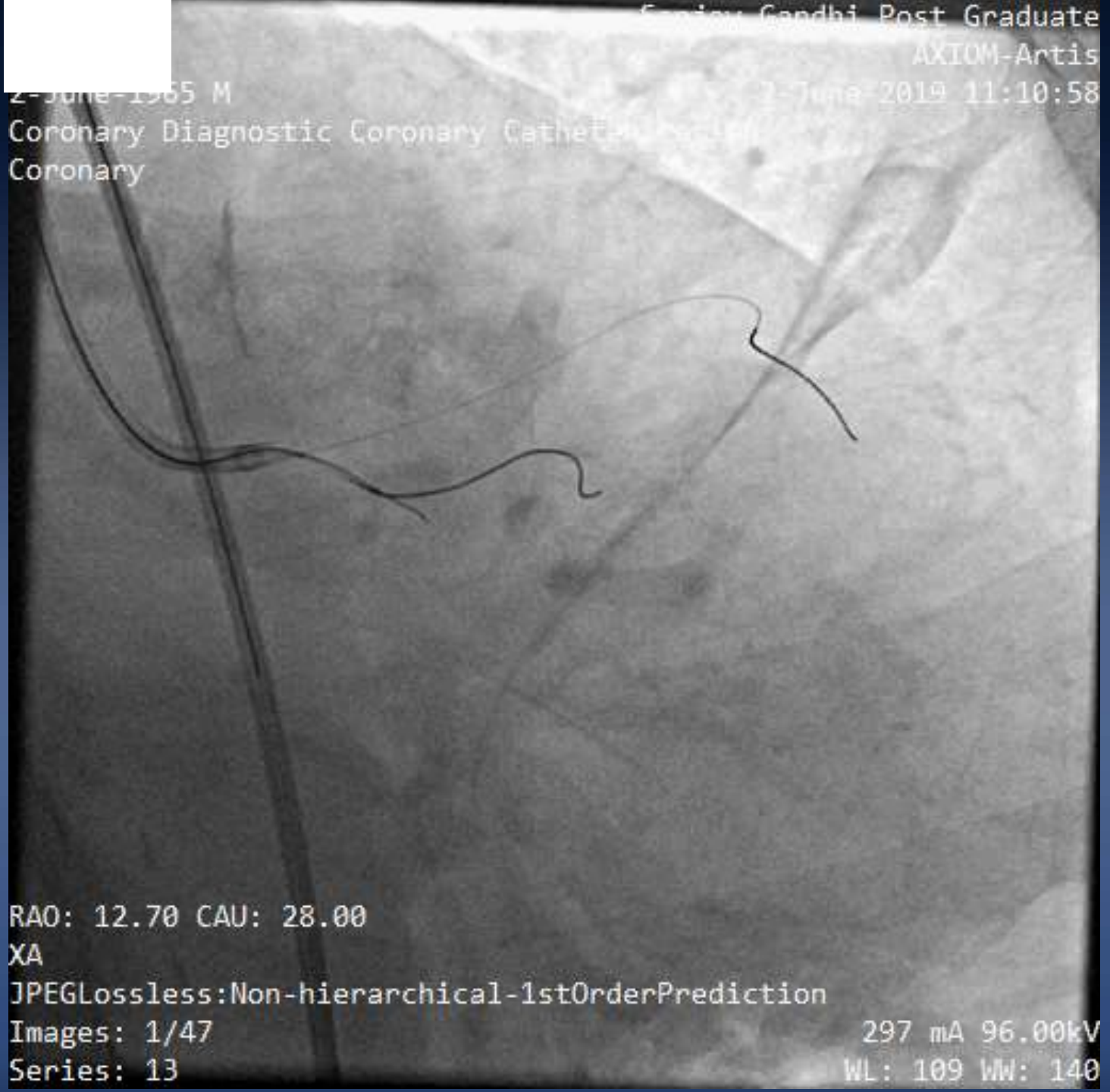


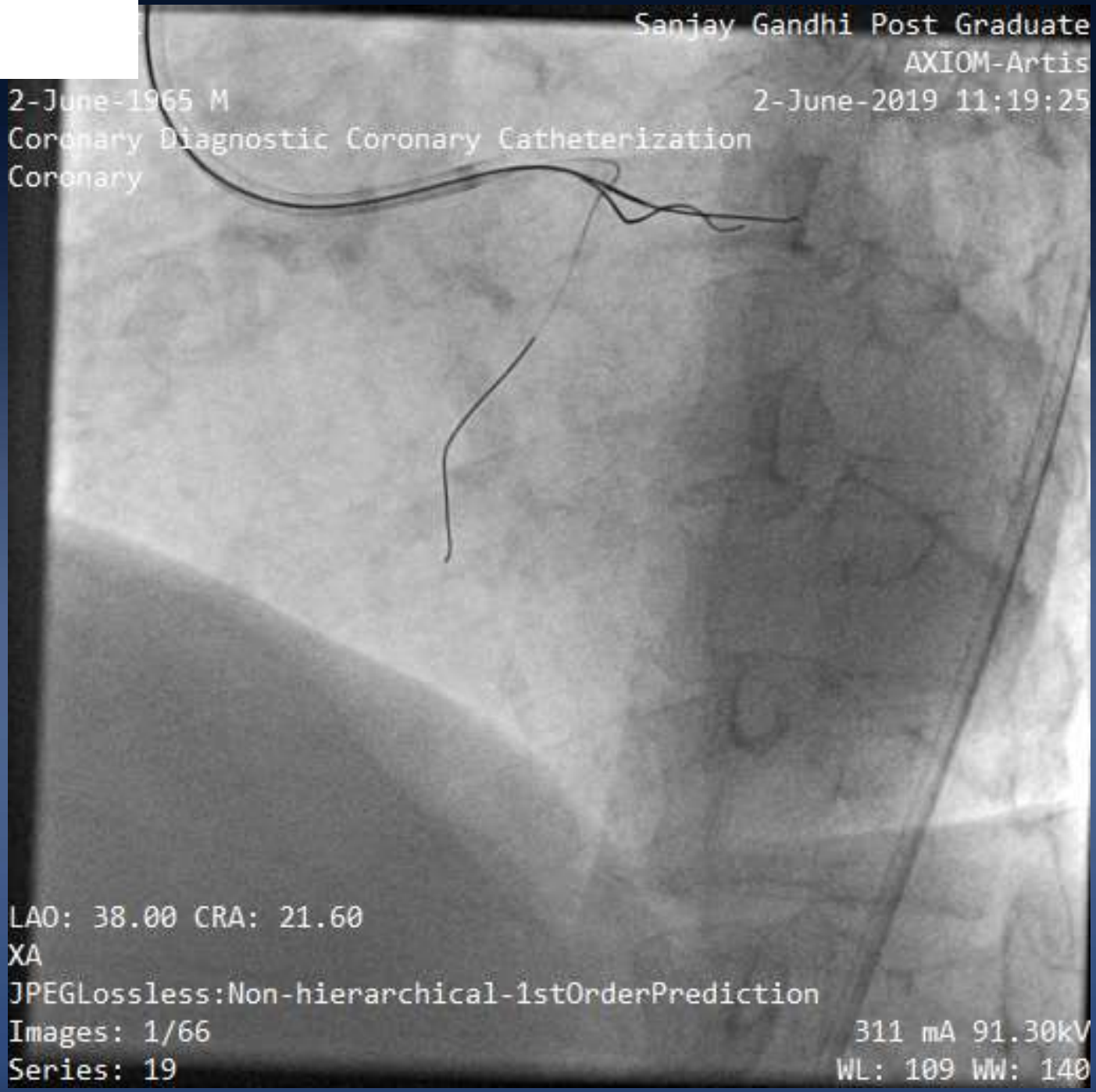
IVUS identification of proximal cap



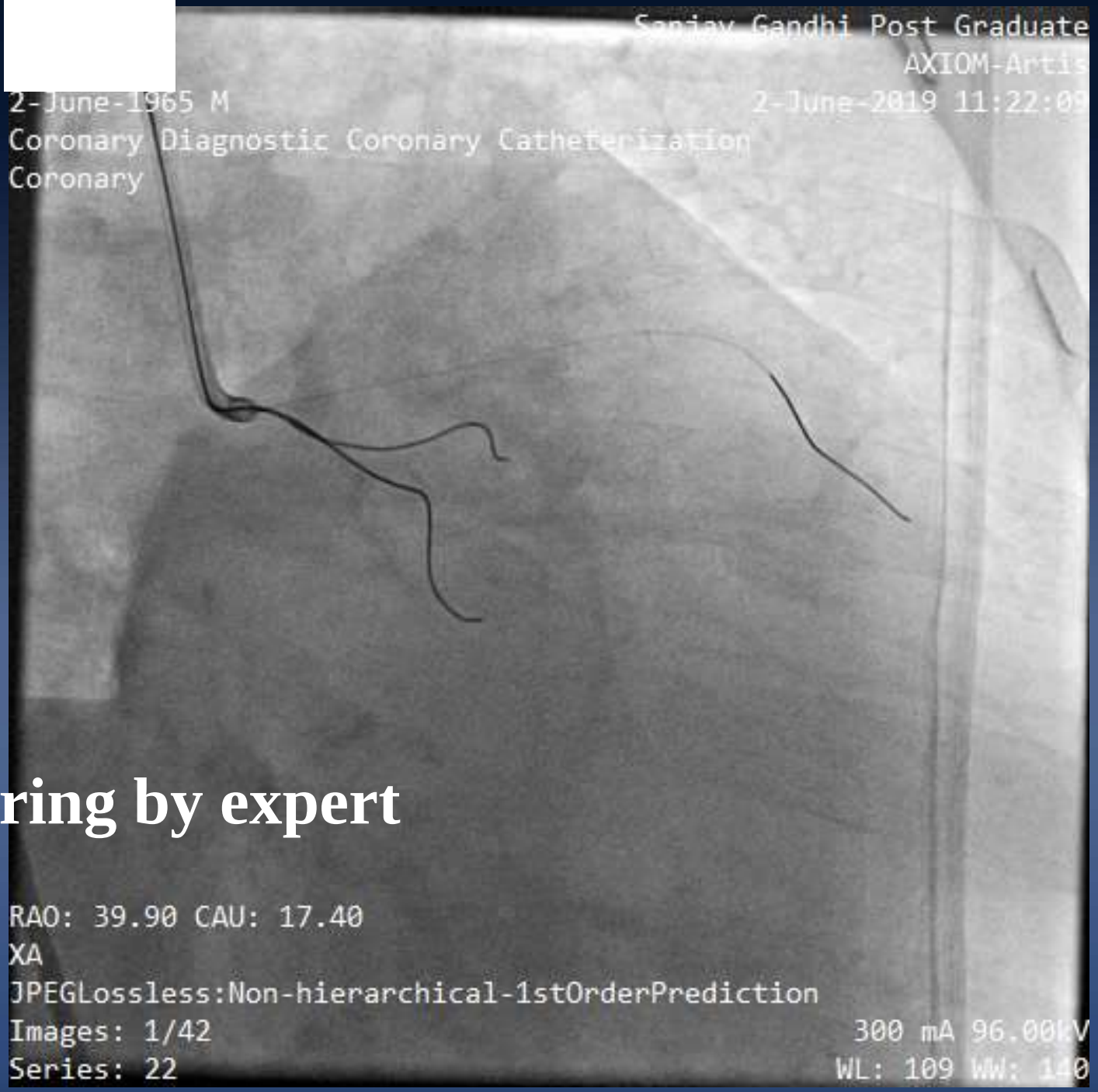
Successful IVUS guided identification of proximal CAP

Crusade and entry with penetrative wire

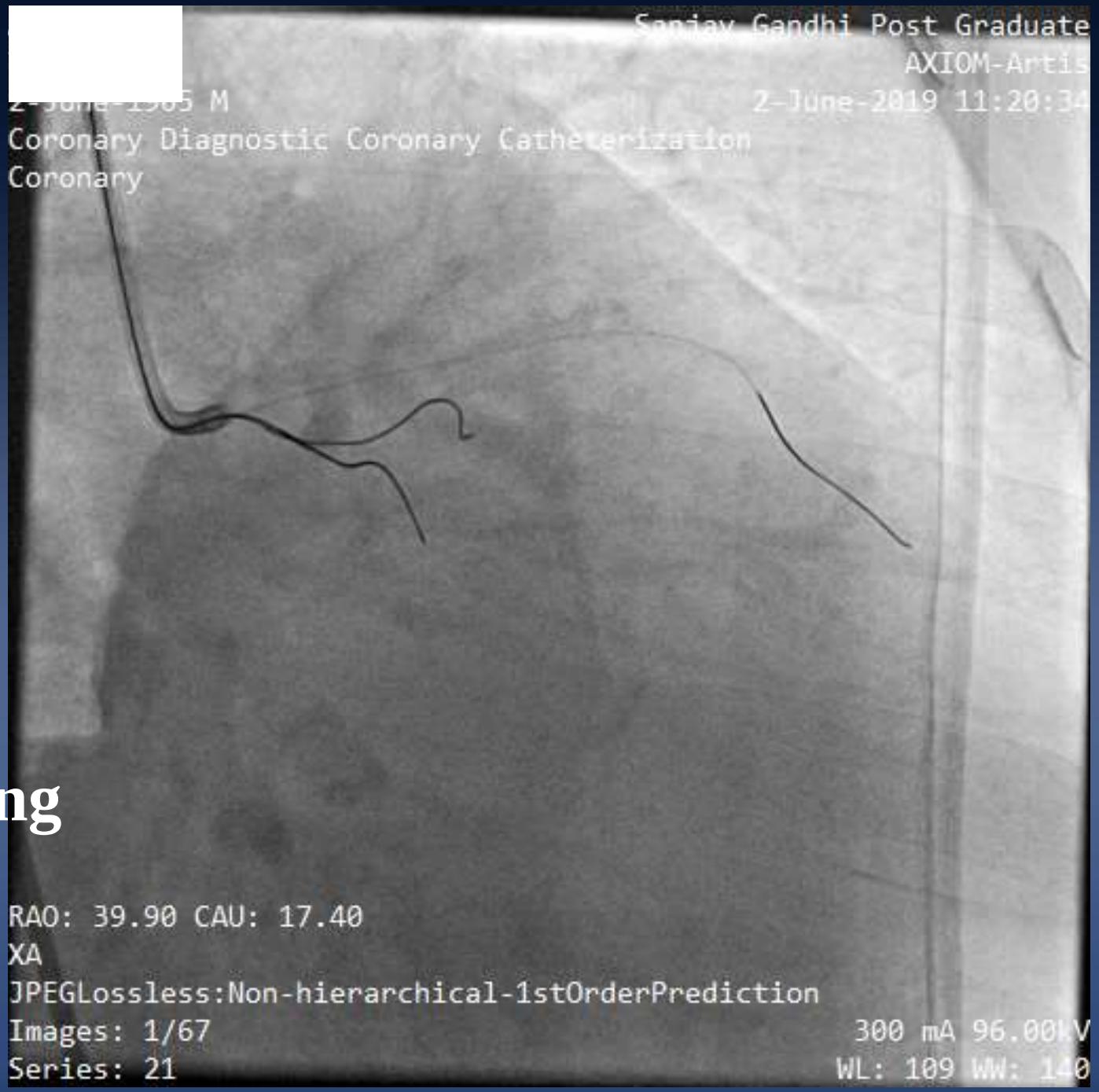



Sanjay Gandhi Post Graduate
AXIOM-Artis
2-June-1965 M
2-June-2019 11:19:25
Coronary Diagnostic Coronary Catheterization
Coronary
LAO: 38.00 CRA: 21.60
XA
JPEGLossless:Non-hierarchical-1stOrderPrediction
Images: 1/66
Series: 19
311 mA 91.30kV
WL: 109 WW: 140

Unsuccessful wiring by expert



Unsuccessful wiring



Other events

- Unable to wire despite multiple attempts, and different wires including XT, Gaia, UB3

(Fail AWE)

- Collateral explored unsuccessfully

(no Retro Option)

CROSSING THE CTO SEGMENT

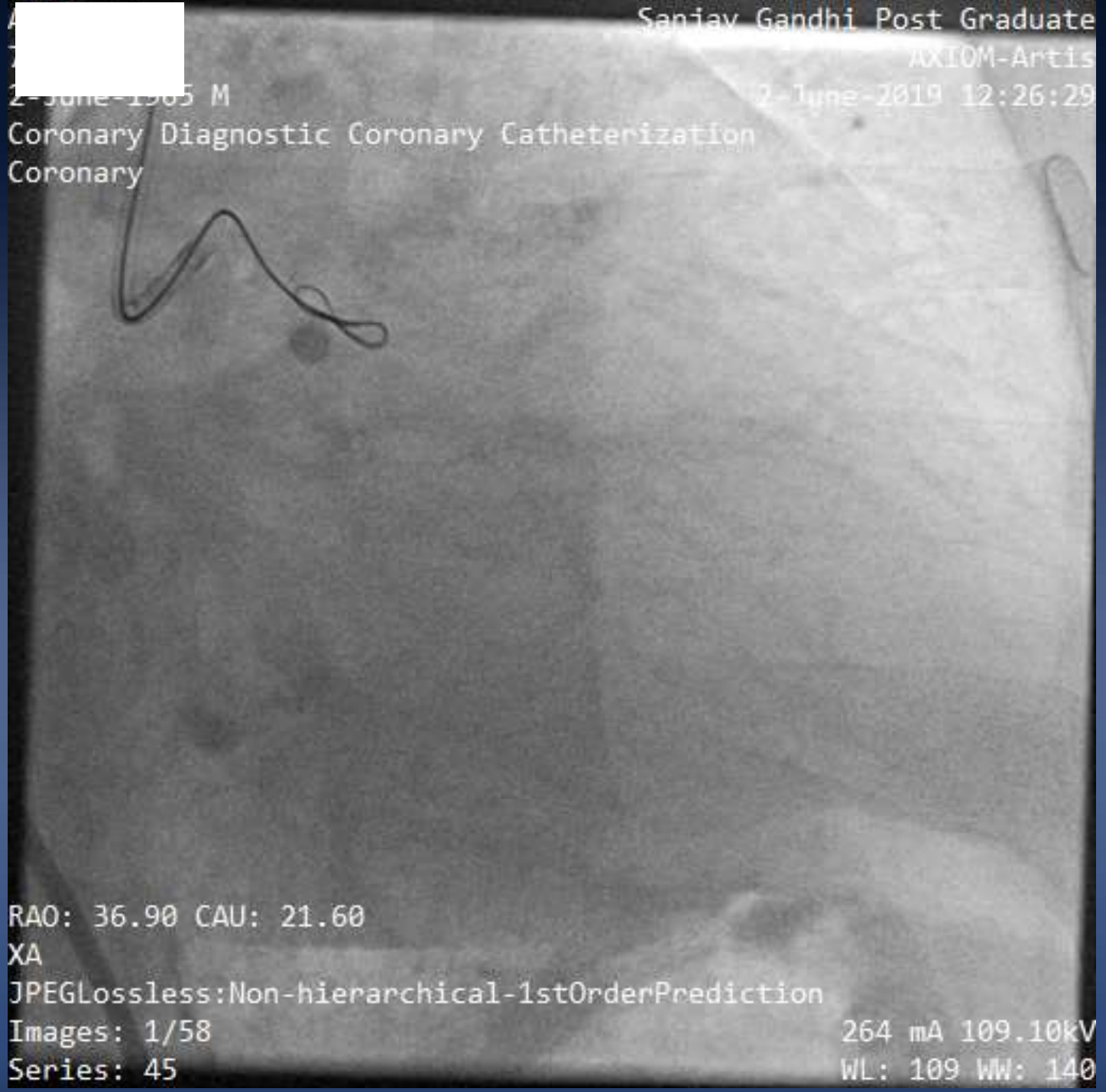
Courtesy: William Lombardi MD

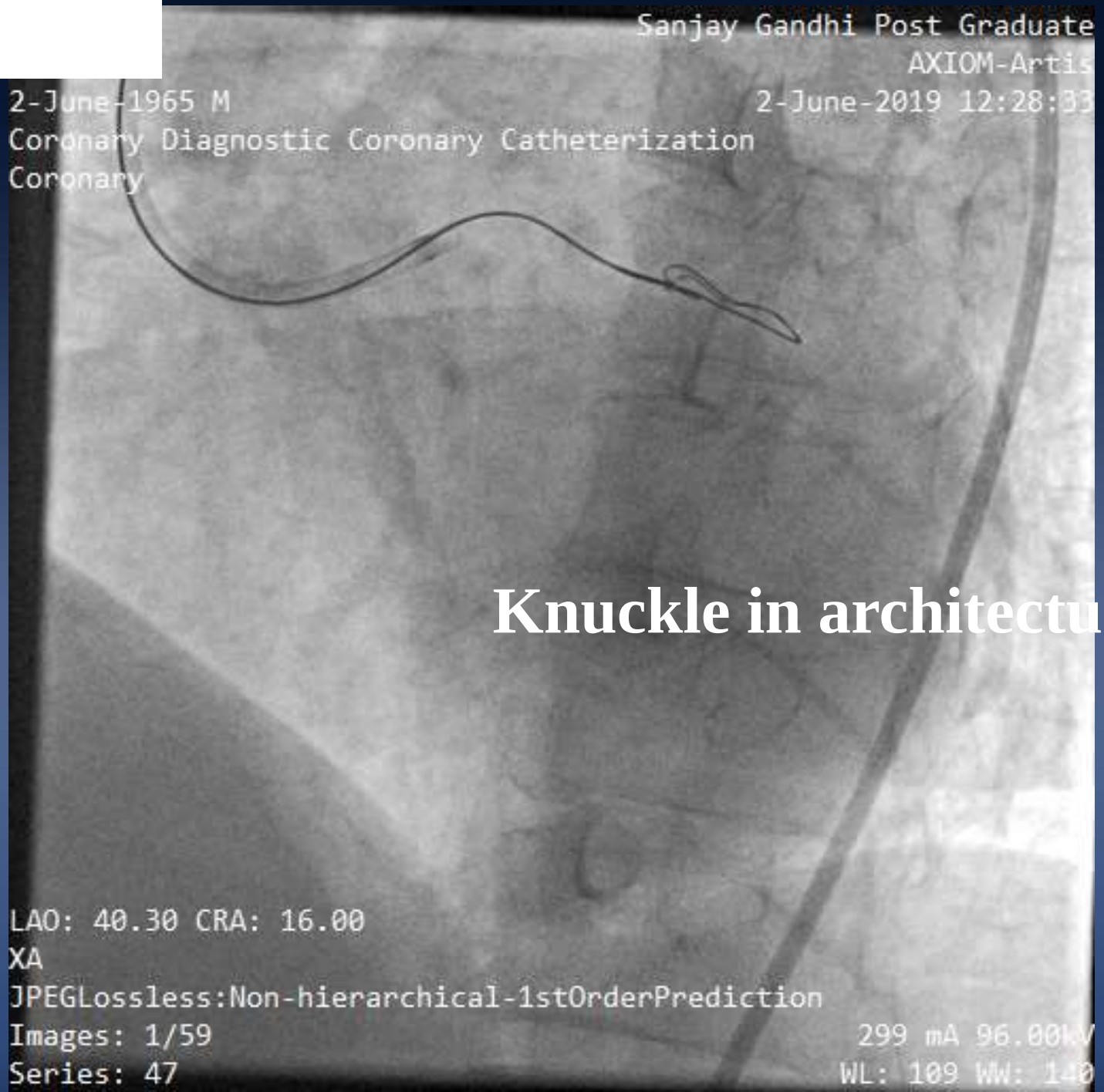
Courtesy: William Lombardi MD

Desperate times, Desperate measures

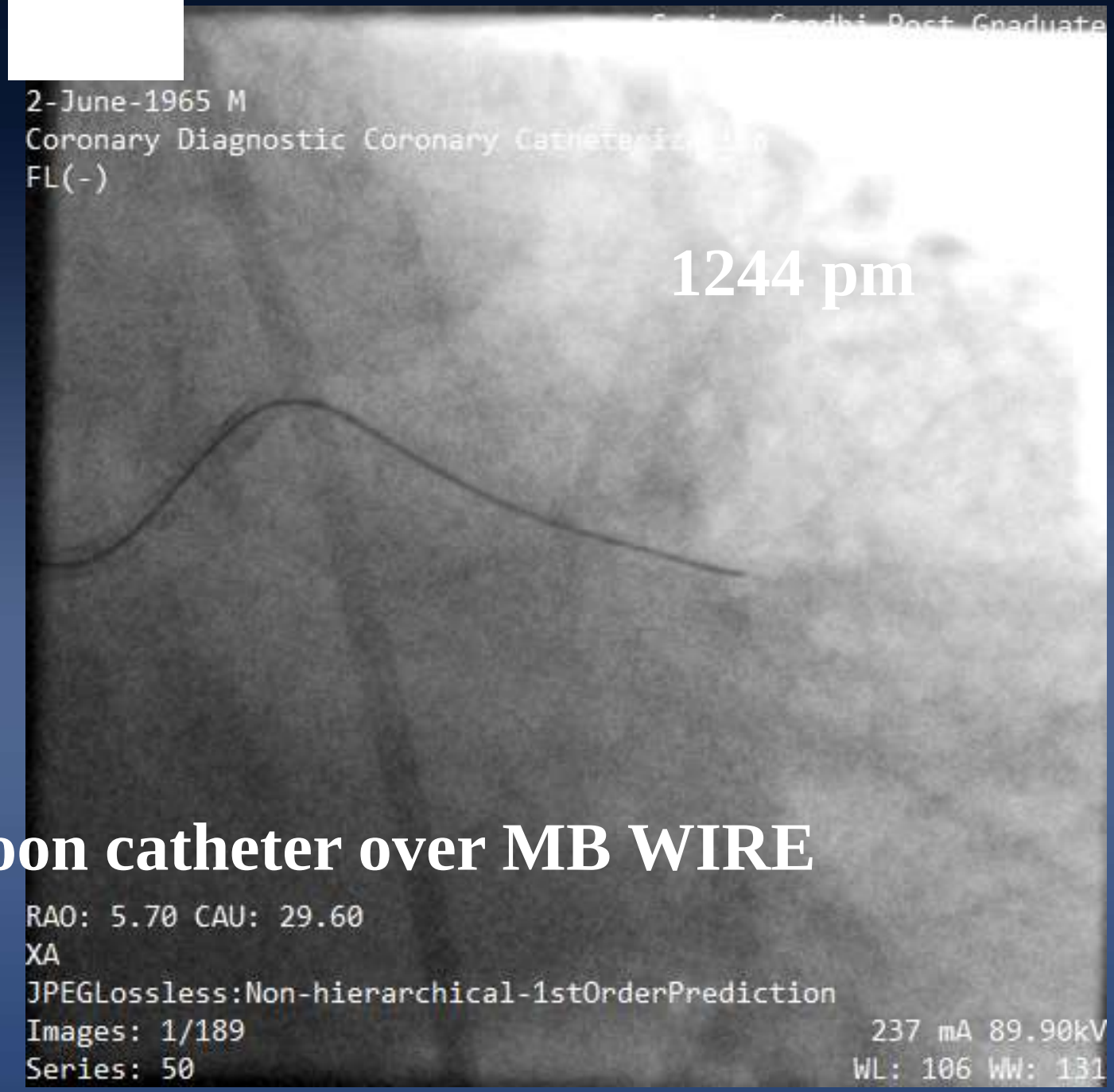
- Primary operator agreed to knuckle

Decision to switch strategy to knuckle

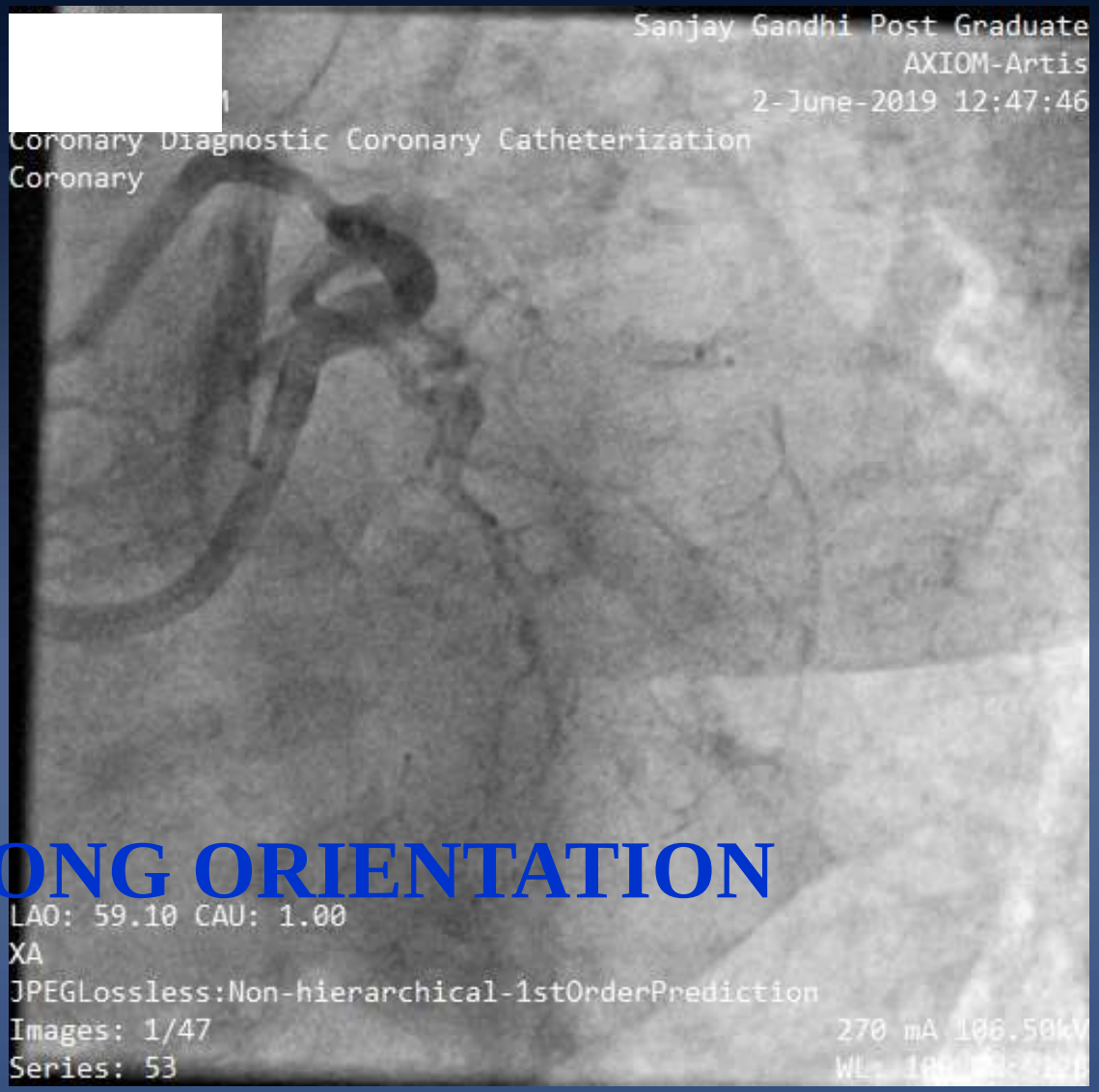




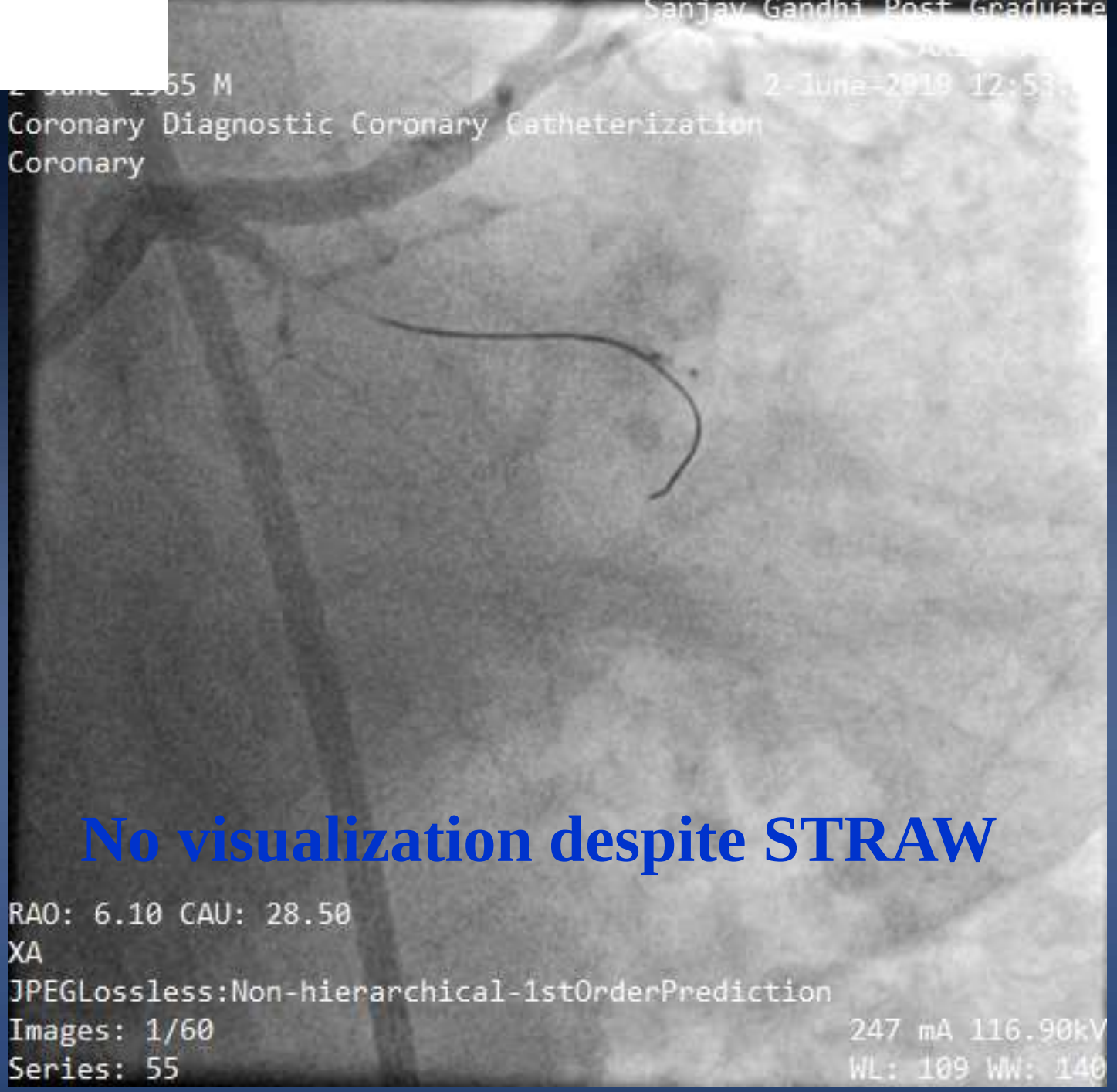
Knuckle in architecture of vessel

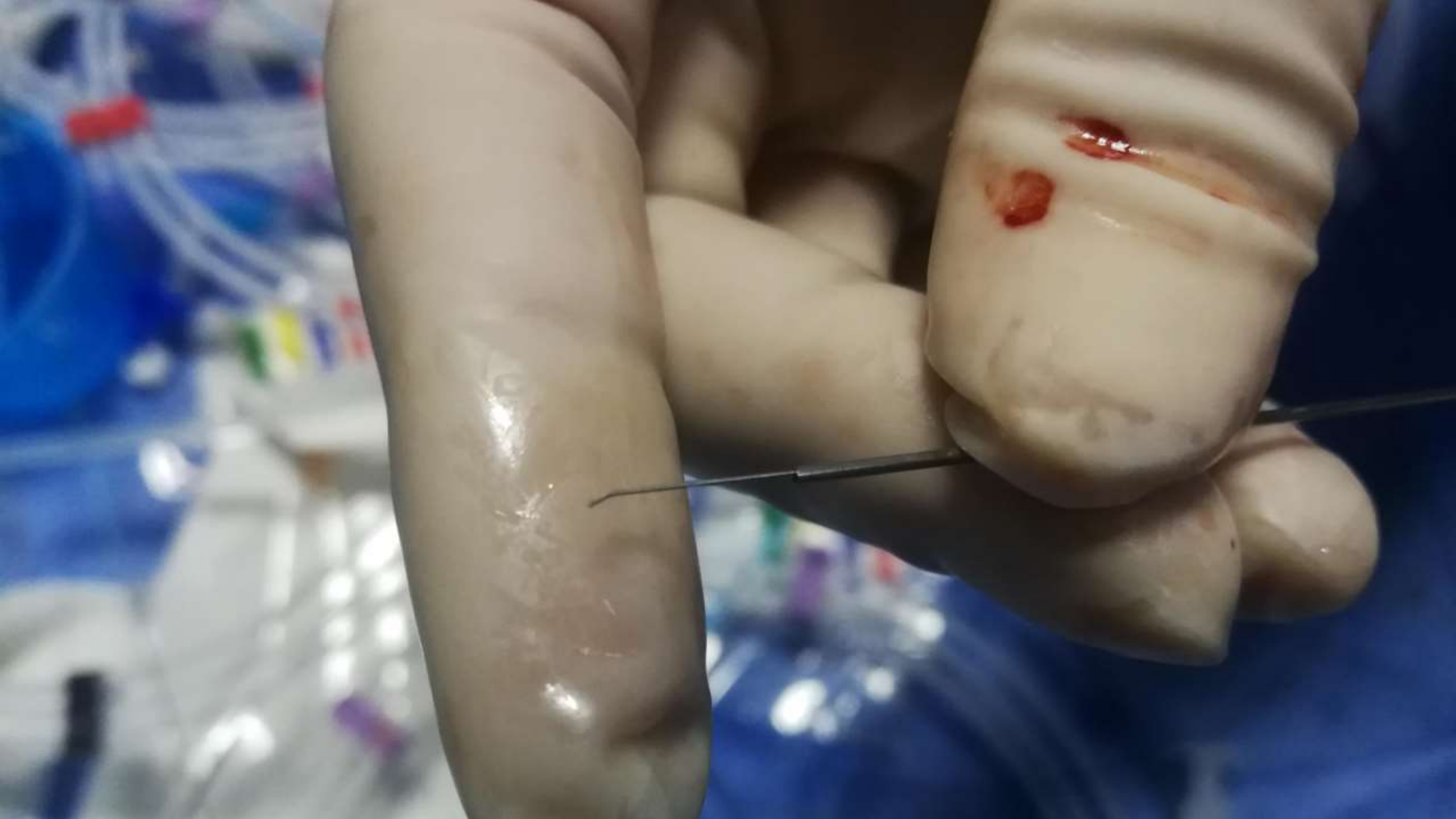


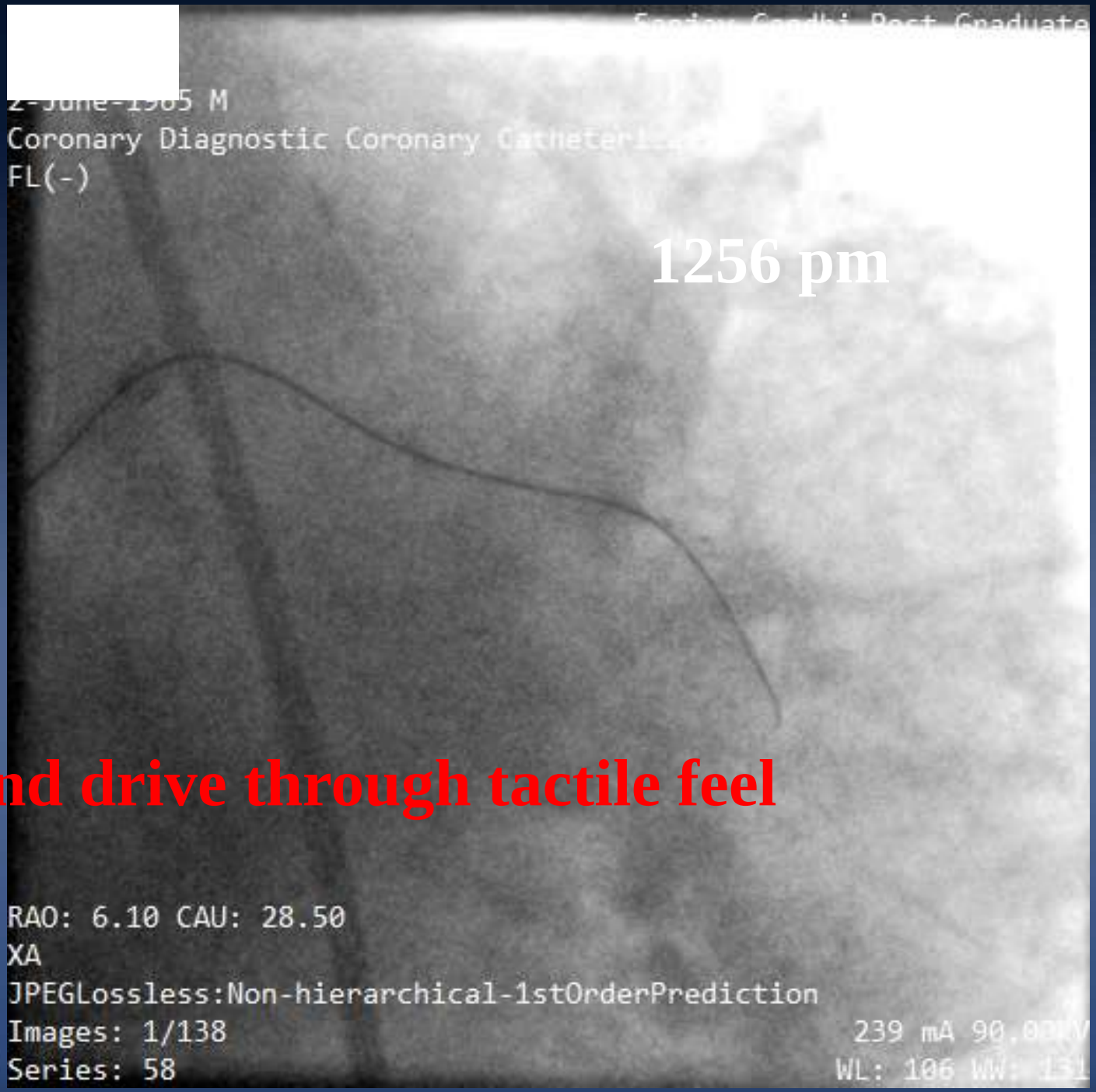
Stingray balloon catheter over MB WIRE


Sanjay Gandhi Post Graduate
AXIOM-Artis
2-June-2019 12:47:46
Coronary Diagnostic Coronary Catheterization
Coronary
WRONG ORIENTATION
LAO: 59.10 CAU: 1.00
XA
JPEGLossless:Non-hierarchical-1stOrderPrediction
Images: 1/47
Series: 53
270 mA 106.50kV

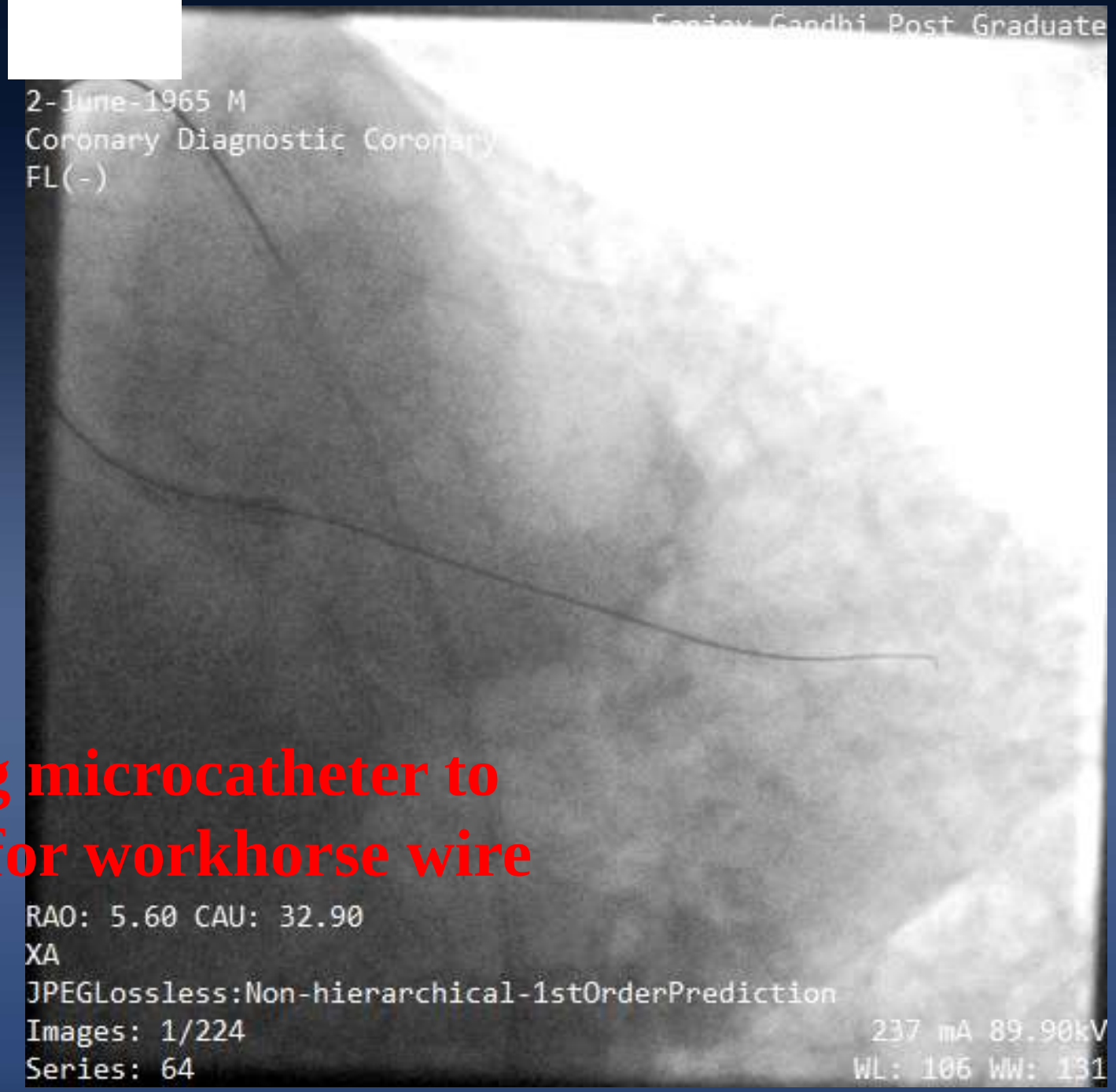

Coronary Diagnostic Coronary Catheterization
Coronary
Correct orientation
RAO: 5.70 CAU: 29.60
XA
JPEGLossless:Non-hierarchical-1stOrderPrediction
Images: 1/67
Series: 52
241 mA 119.40kV
WL: 109 WW: 140


Sanjay Gandhi Post Graduate
65 M
2 June 2019 12:53
Coronary Diagnostic Coronary Catheterization
Coronary
No visualization despite STRAW
RAO: 6.10 CAU: 28.50
XA
JPEGLossless:Non-hierarchical-1stOrderPrediction
Images: 1/60
Series: 55
247 mA 116.90kV
WL: 109 WW: 140

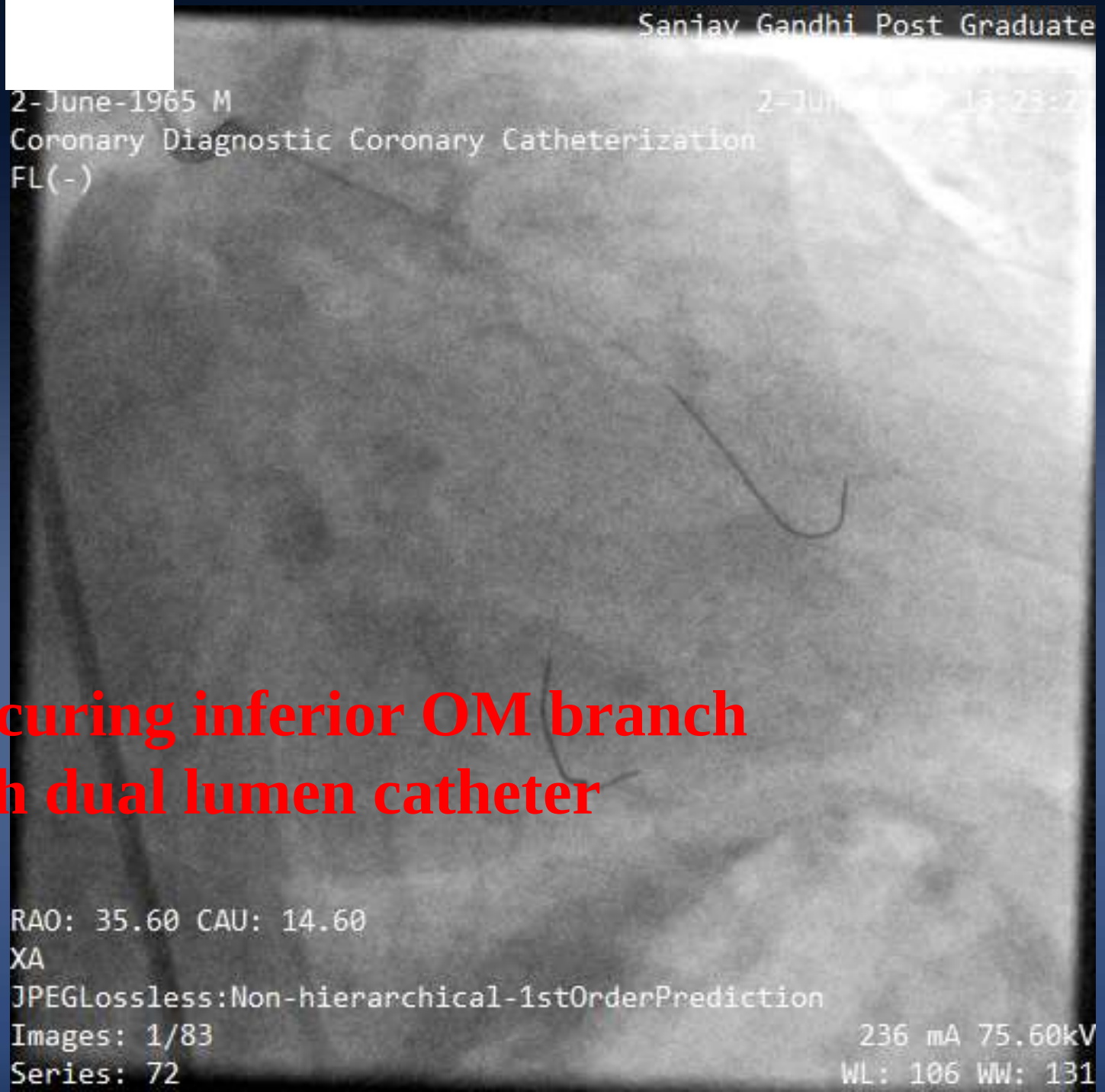




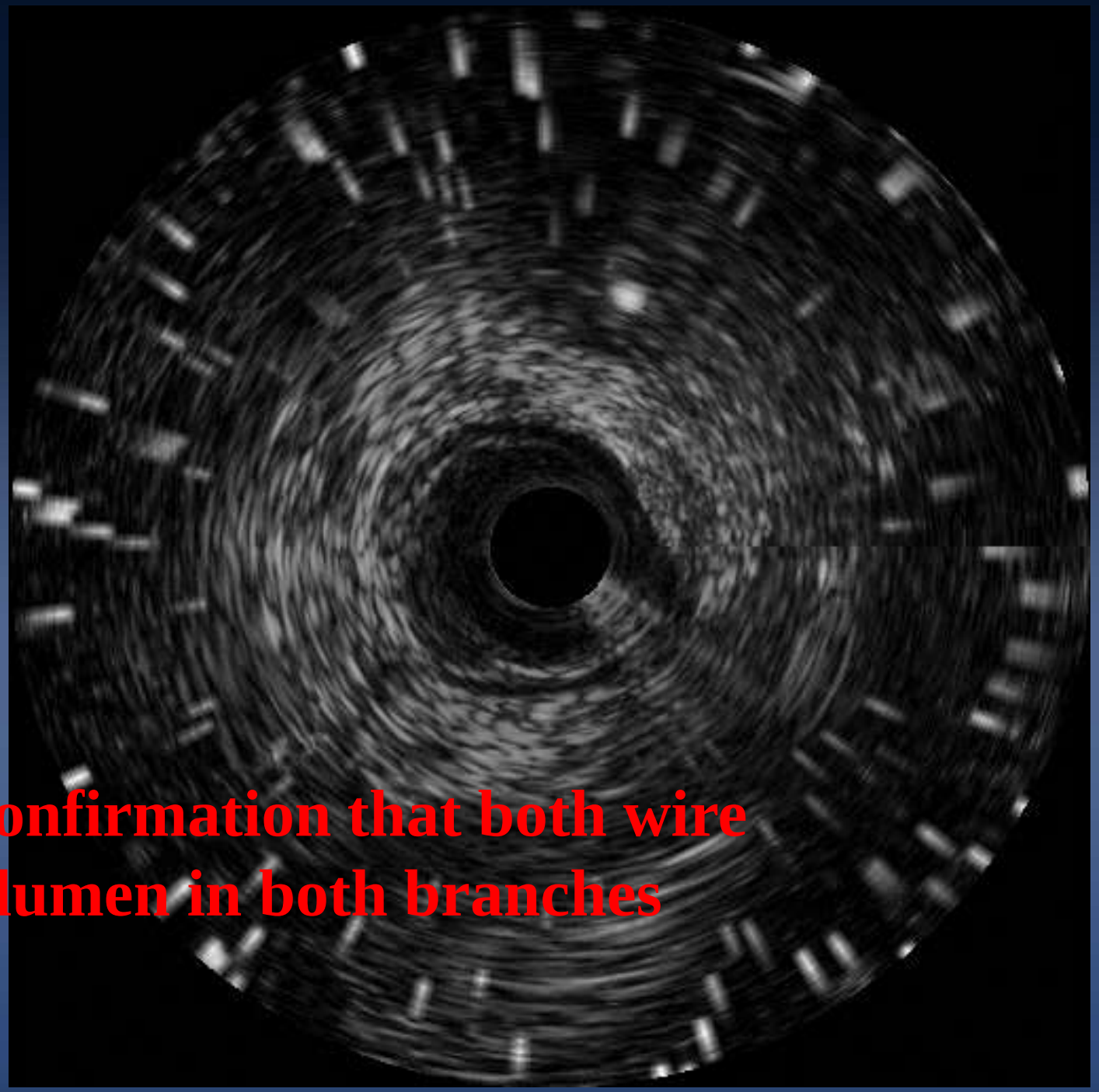
Blind stick and drive through tactile feel



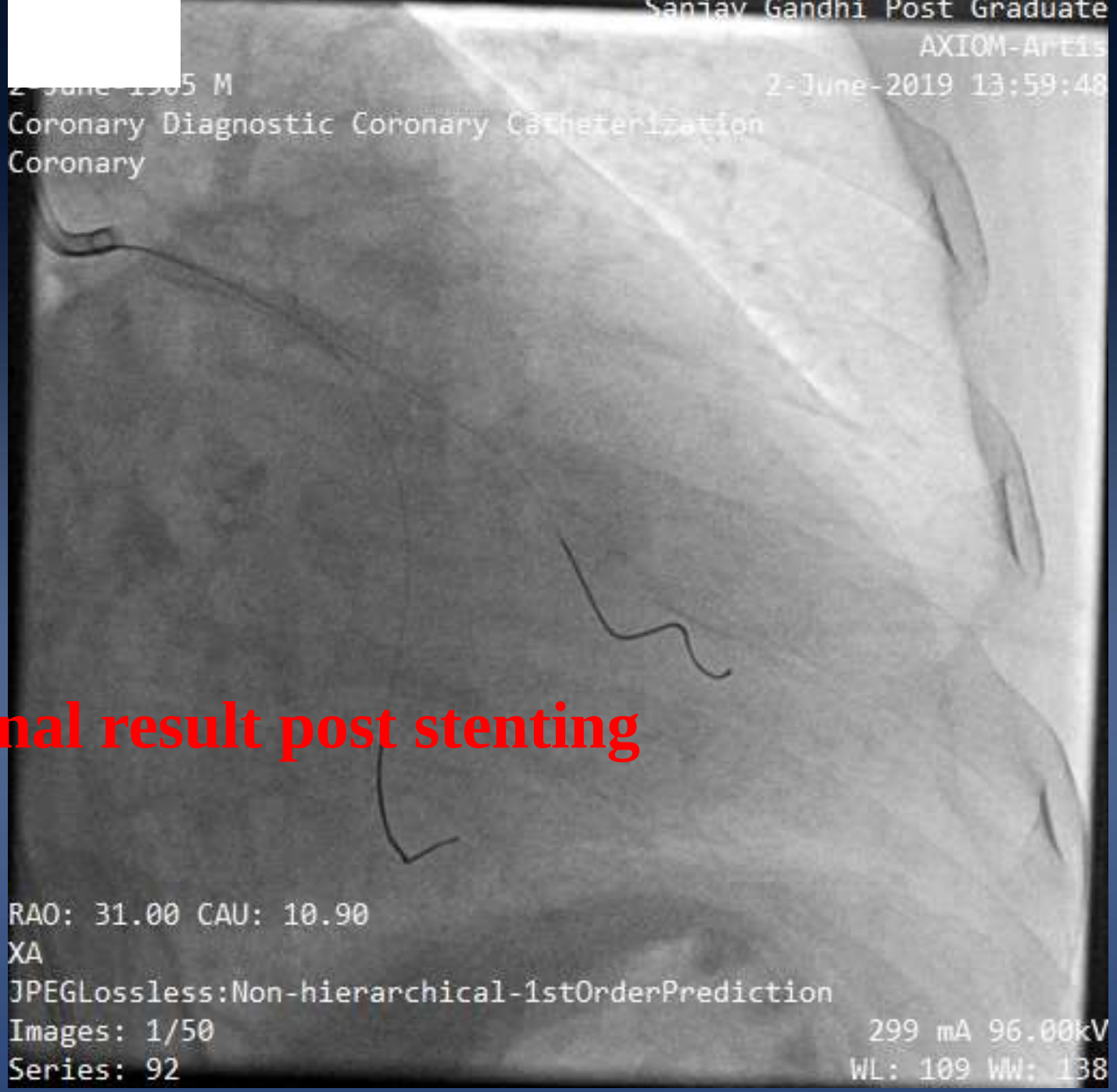
Advancing microcatheter to exchange for workhorse wire



Post securing inferior OM branch through dual lumen catheter



IVUS confirmation that both wire in true lumen in both branches



Final result post stenting

Lessons:

- Early switch to ADR
  - Was definitely harder due to hematoma and lac k of visualization
- Not every lesion can be wired or done retrograde
  - Long
  - Tortuous and ambiguous course
- Knucking is very useful in CTO PCI

Conclusions

- ADR: important CTO technique
- Have a game plan before every case
- Can be done as a primary strategy OR Secondary Strategy after AWE or Retro failure
- Technique is evolving
- Preventing and managing hematoma is key
- If you decide to do ADR, do it sooner than later