

TCTAP 2021 Virtual Master the Complex: Through Innovative Technologies

~ Clinical Experience with **SYNERGY XD**~

Takuma Tsuda, MD, PhD

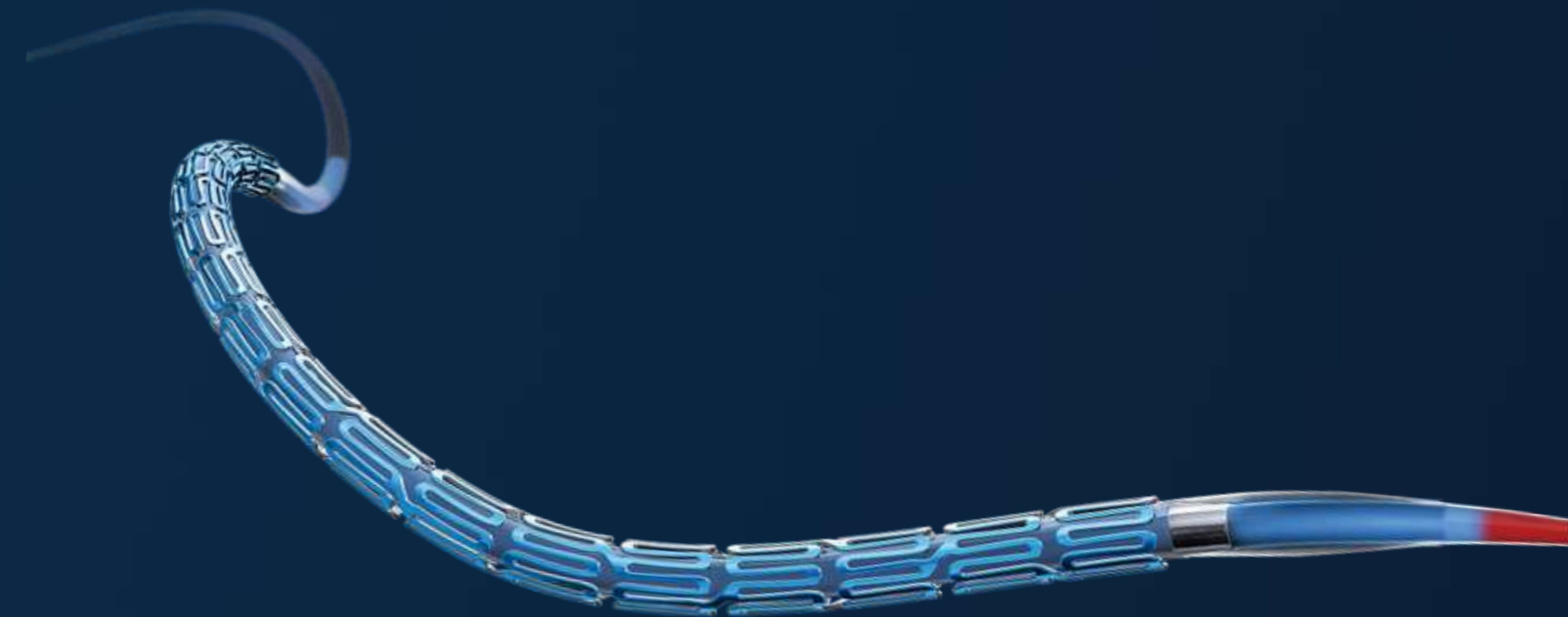
Nagoya Ekisaikai Hospital , Japan



Disclosure

- No

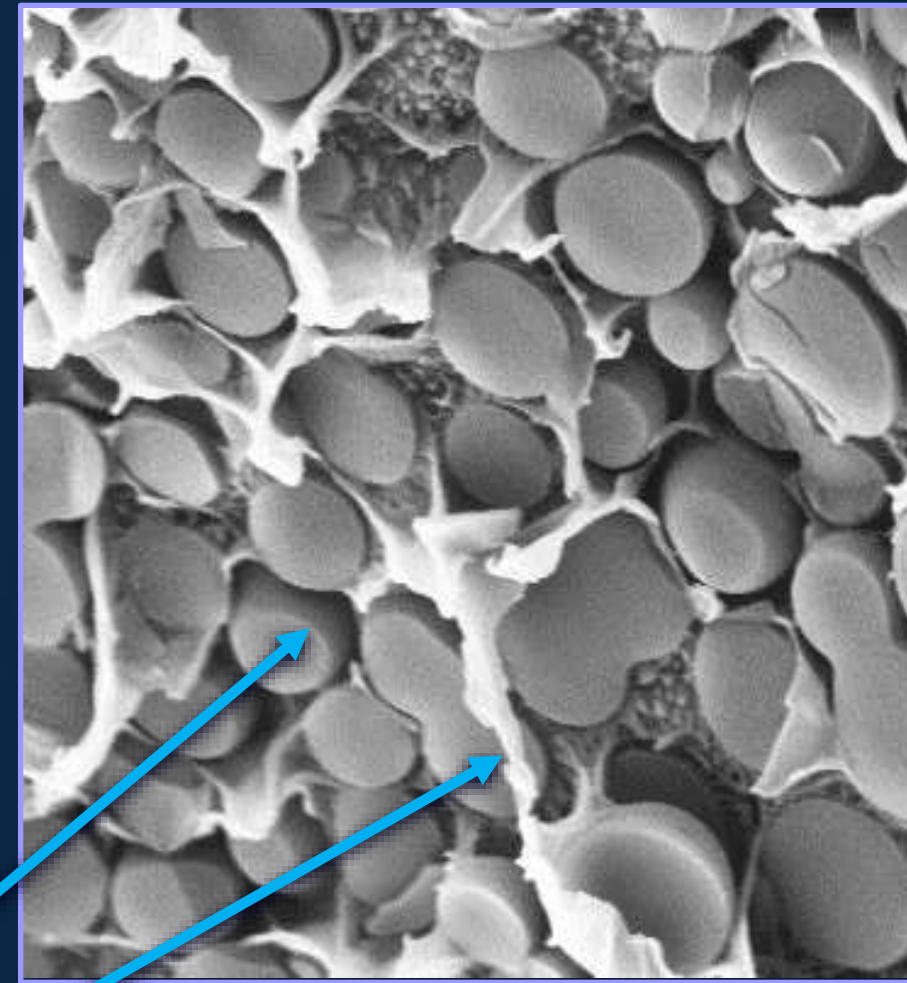
SYNERGY™



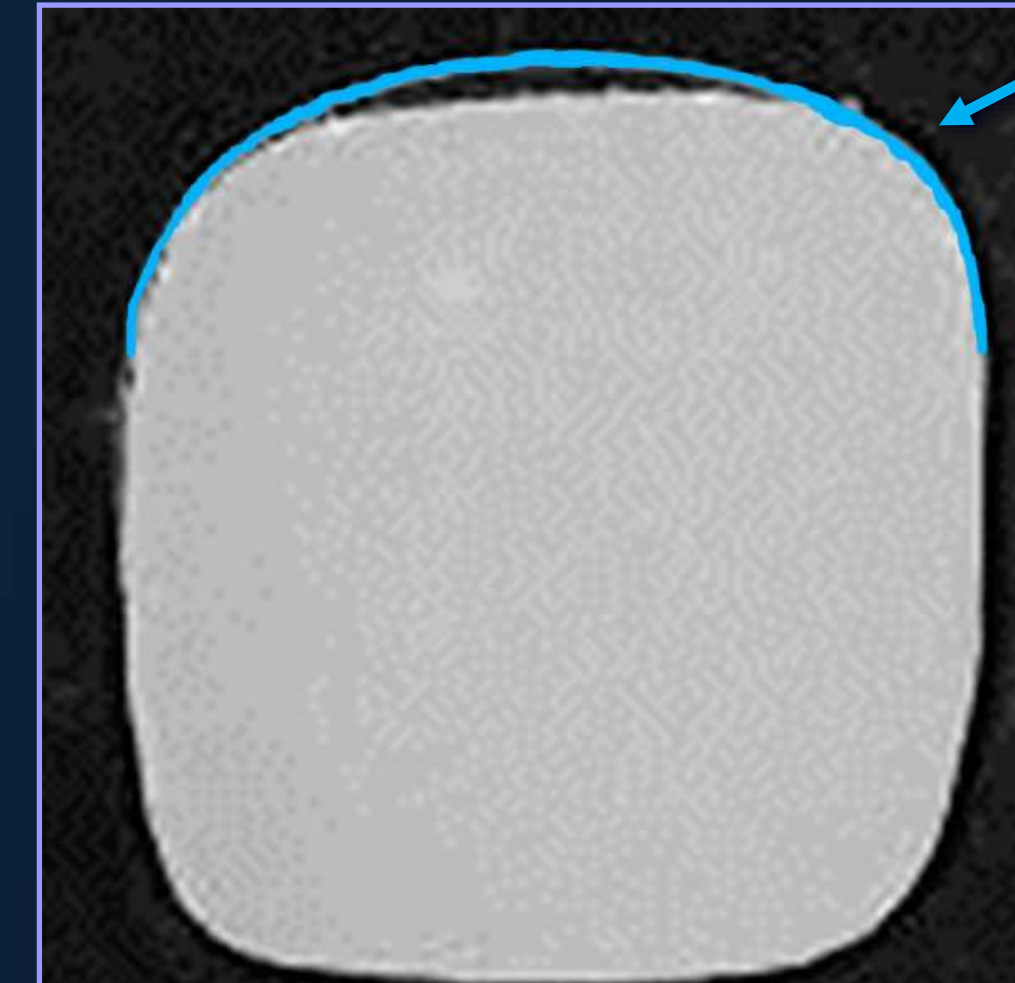
SYNERGY



Everolimus Drug
PLGA Polymer



SEM of coating (x5000)



Luminal

Drug & Polymer Coating

Abluminal (4 μ m)

Platform

Platinum chromium

- 74 μ m (0.0029in)
- Visibility
- Off-set peak to peak connection
- 4-2-2/ 5-2-2 link

Bioabsorbable Polymer Coating

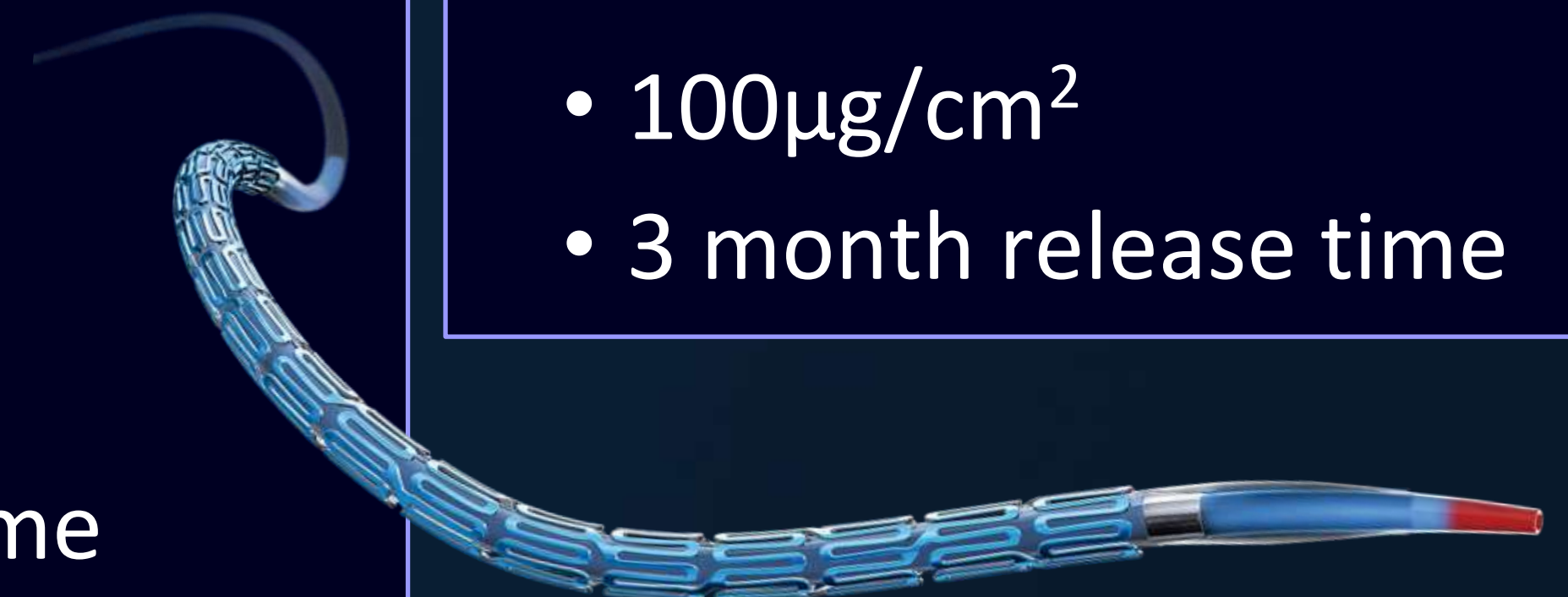
PLGA

- Abluminal
- 4 μ m thick
- 85:15 ratio
- < 4 month absorption time


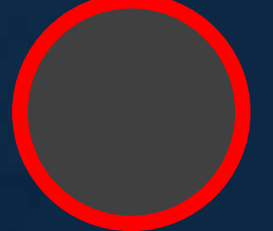






Drug

Everolimus

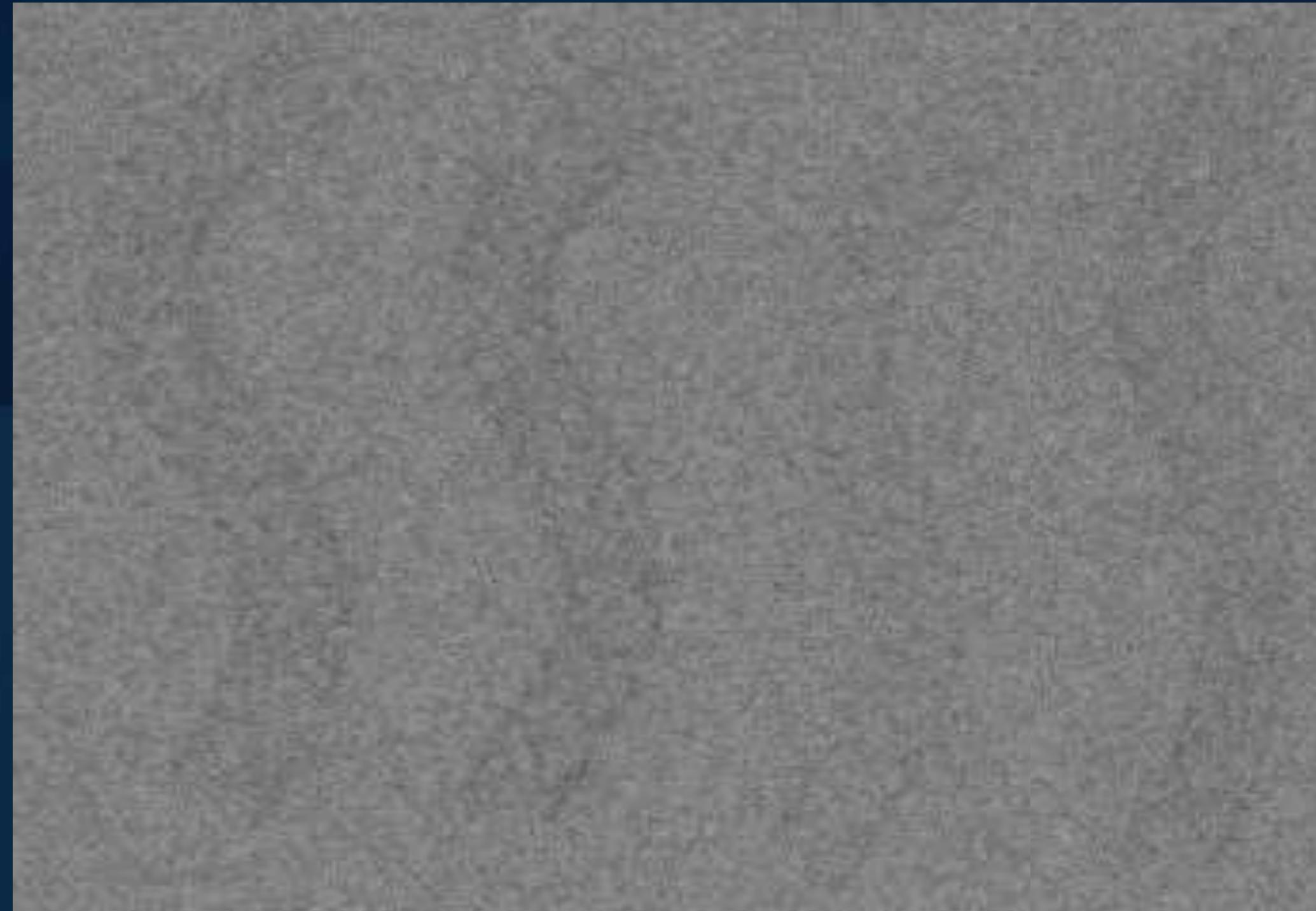
- 100 μ g/cm²
- 3 month release time



Contemporary DES Platforms

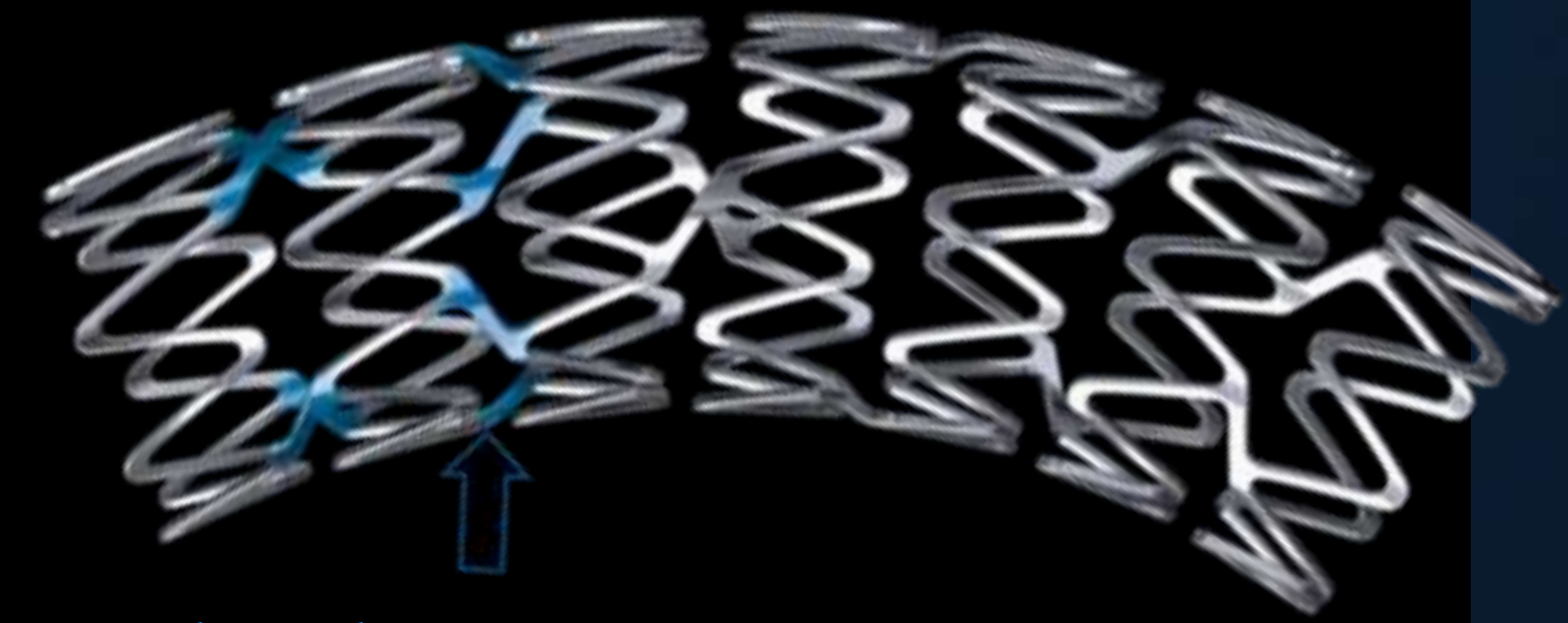
	Durable Polymer Coated		Bioabsorbable Polymer Coated					
	Xience CoCr-EES	Resolute Onyx	Biomatrix	Nobori	Ultimaster	SYNERGY	MiStent	Orsiro
	Promus PtCr-EES	CoPtIr-ZES	316L-BES	316L-BES	CoCr-SES	PtCr-EES	CoCr-SES	CoCr-SES
								
Strut thickness	81 μm 0.0032"	81 μm 0.0032"	120 μm 0.0046"	125 μm 0.0047"	80 μm 0.0031"	74 μm 0.0029"	64 μm 0.0025"	61 μm 0.0024"
Polymer	PVDF	BioLINX	PLA	PLA	PDLLA + PCL	PLGA	PLGA	PLLA Probio*
Distribution / thickness	Conformal 7-8 μm / side	Conformal 6 μm / side	Abluminal 10 μm	Abluminal 20 μm	Abluminal 15 μm	Abluminal 4 μm	Conformal 5 μm / 15 μm	Conformal 3.5 μm / 7.5 μm

SYNERGY ~ Visibility ~



	SYNERGY XD <small>[L] [SEP]</small> BP- DES	Promus ELITE™ <small>[L] [SEP]</small> PP-DES	XIENCE™ Sierra <small>[L] [SEP]</small> P P-DES	Resolute Onyx™ <small>[L] [SEP]</small> PP-DES
Alloy	PtCr	PtCr	CoCr	CoNi
Strut	0.0029"	0.0032"	0.0032"	0.0032"
Thickness	(74 μm)**	(81 μm)	(81 μm)	(81 μm)

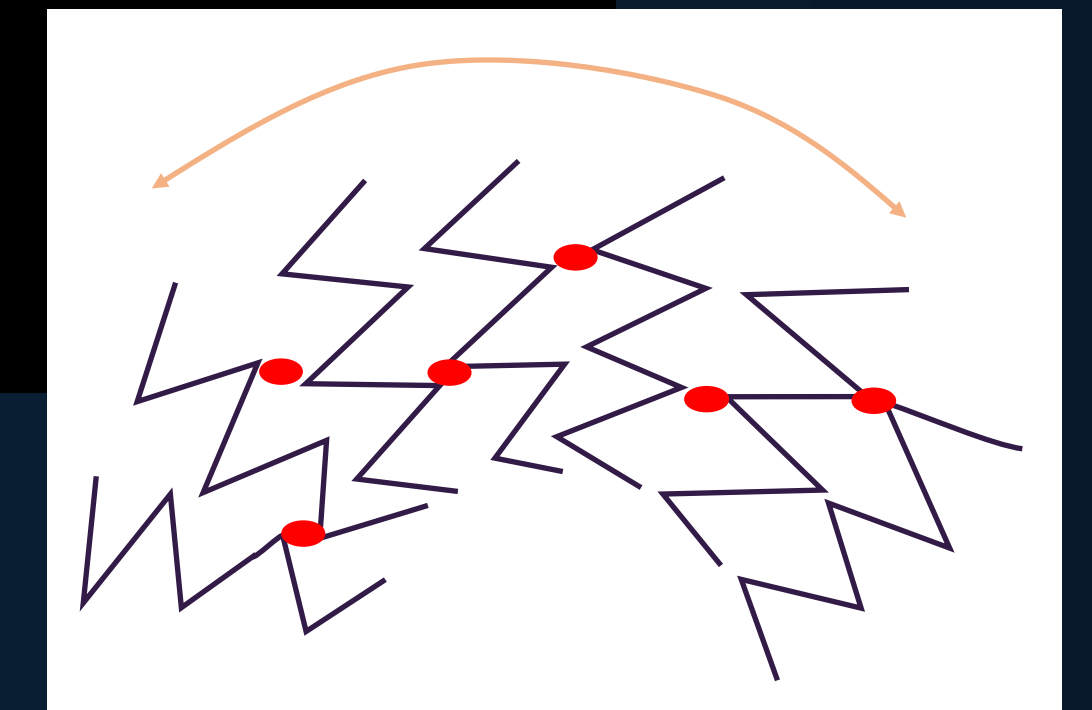
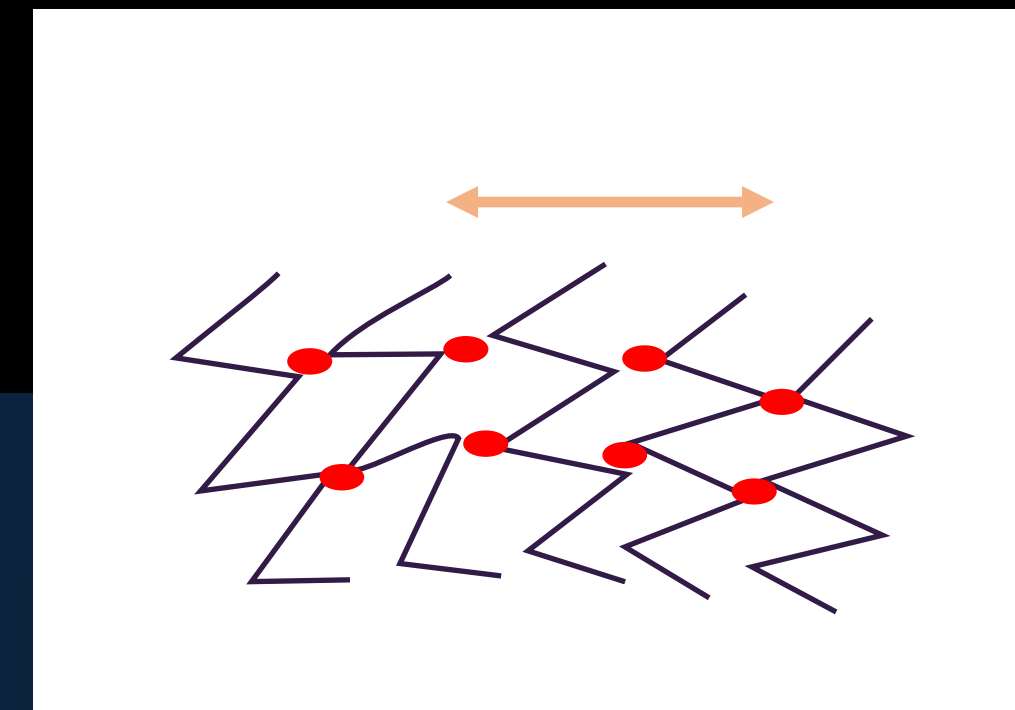
SYNERGY ~Conformability~



2-link connector

more link

less link



conformability

offset
peak-to-peak



Neointimal Coverage of DES -Angioscopic images @ 1y-



(B)
CoCr EES*
(e.g. XIENCE)

Mild coverage
Some thrombus
and yellow plaque



PtCr EES*
(e.g. PREMIER)

Mild coverage
Some thrombus
and yellow plaque



ZES*
(e.g. Resolute
Integrity/Onyx)

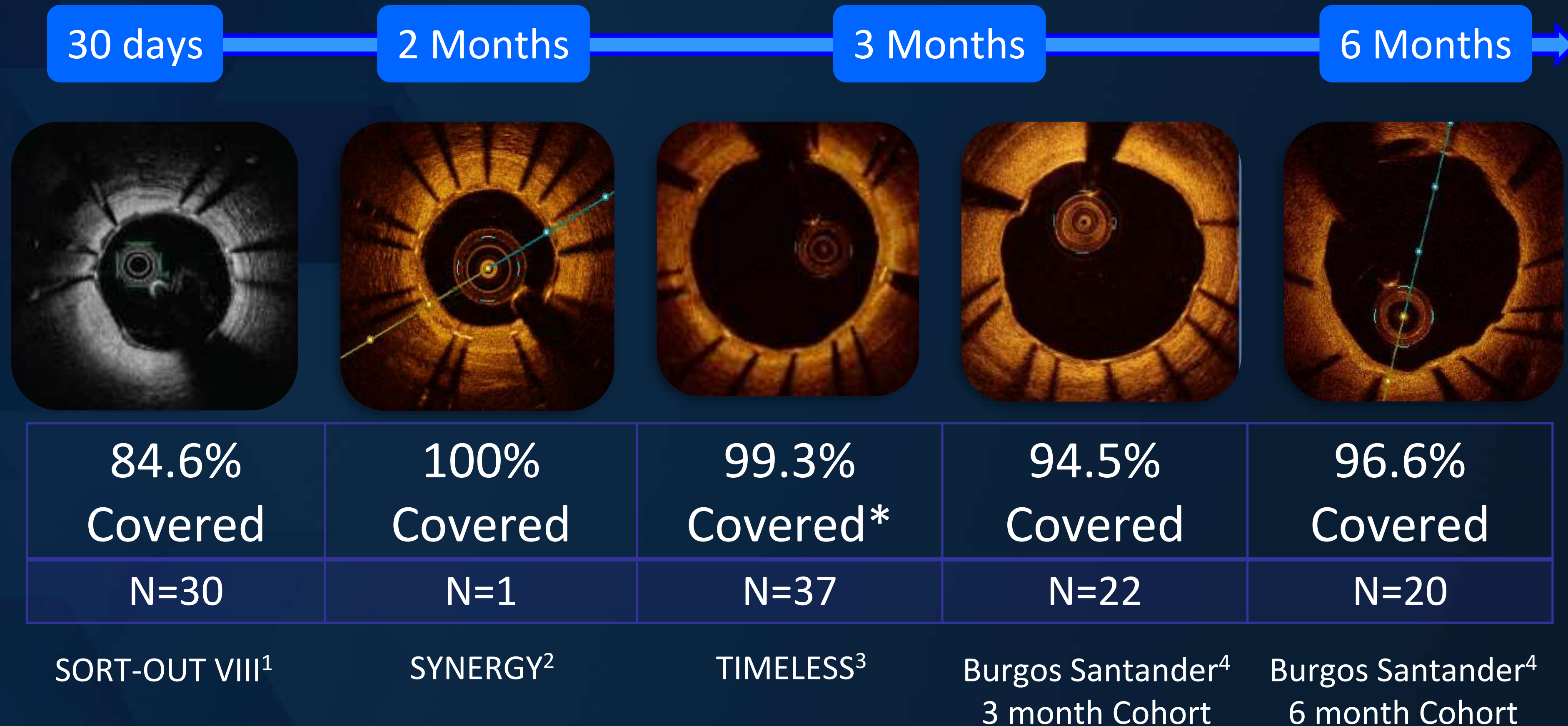
Mild coverage
Some thrombus
and yellow plaque



PtCr BP EES**
(e.g. SYNERGY)

Moderate
coverage
No thrombus
No yellow plaque

Endothelialization of SYNERGY -OCT images @ ~6months-



¹Presented by Ida Riise Balleby, ACC 2016.,

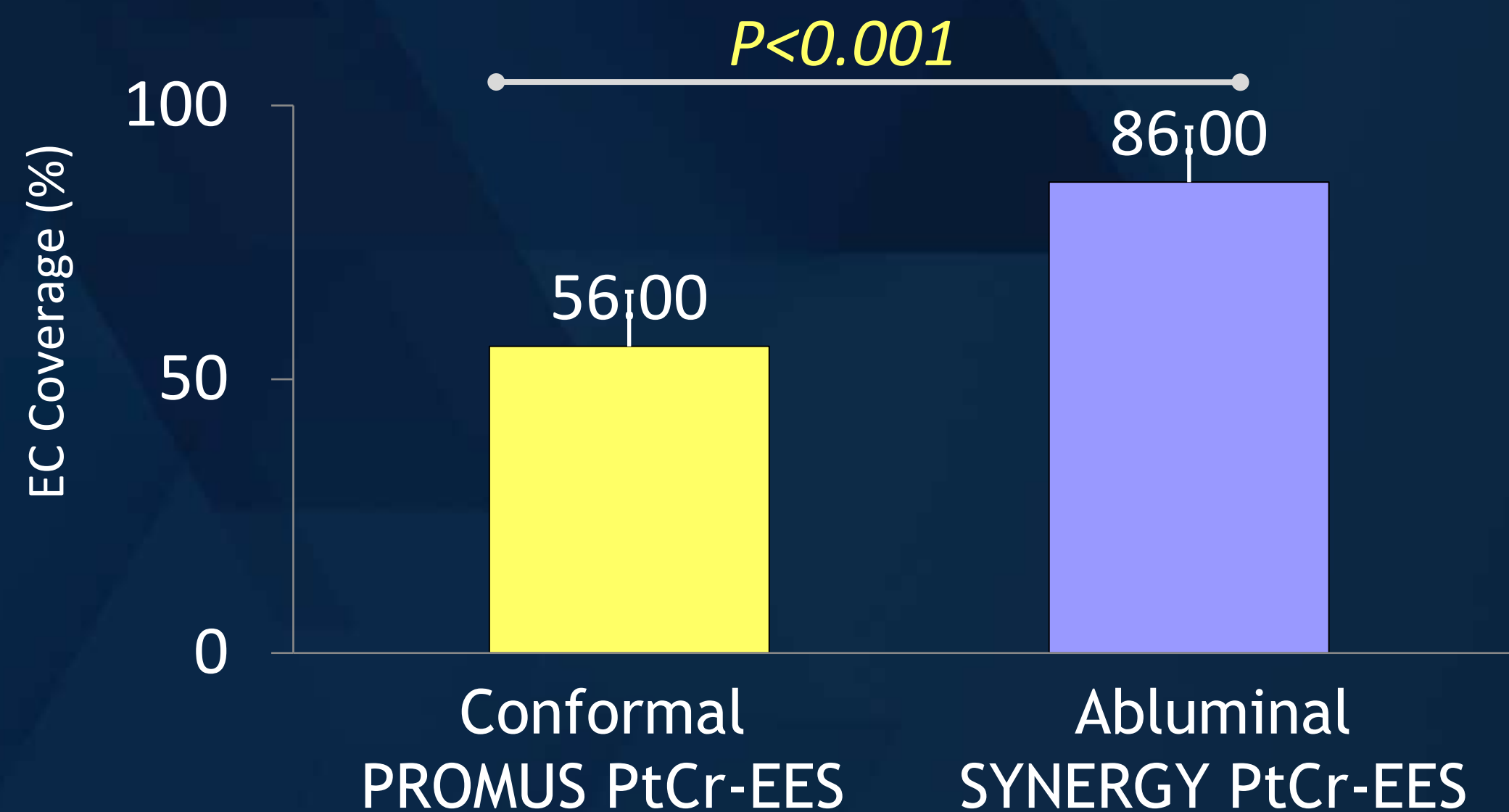
²Presented by J. M. de la Torre, MD at TCT 2014.,

³Adapted from presentation by Juan Granada, MD, at CRT 2015.,

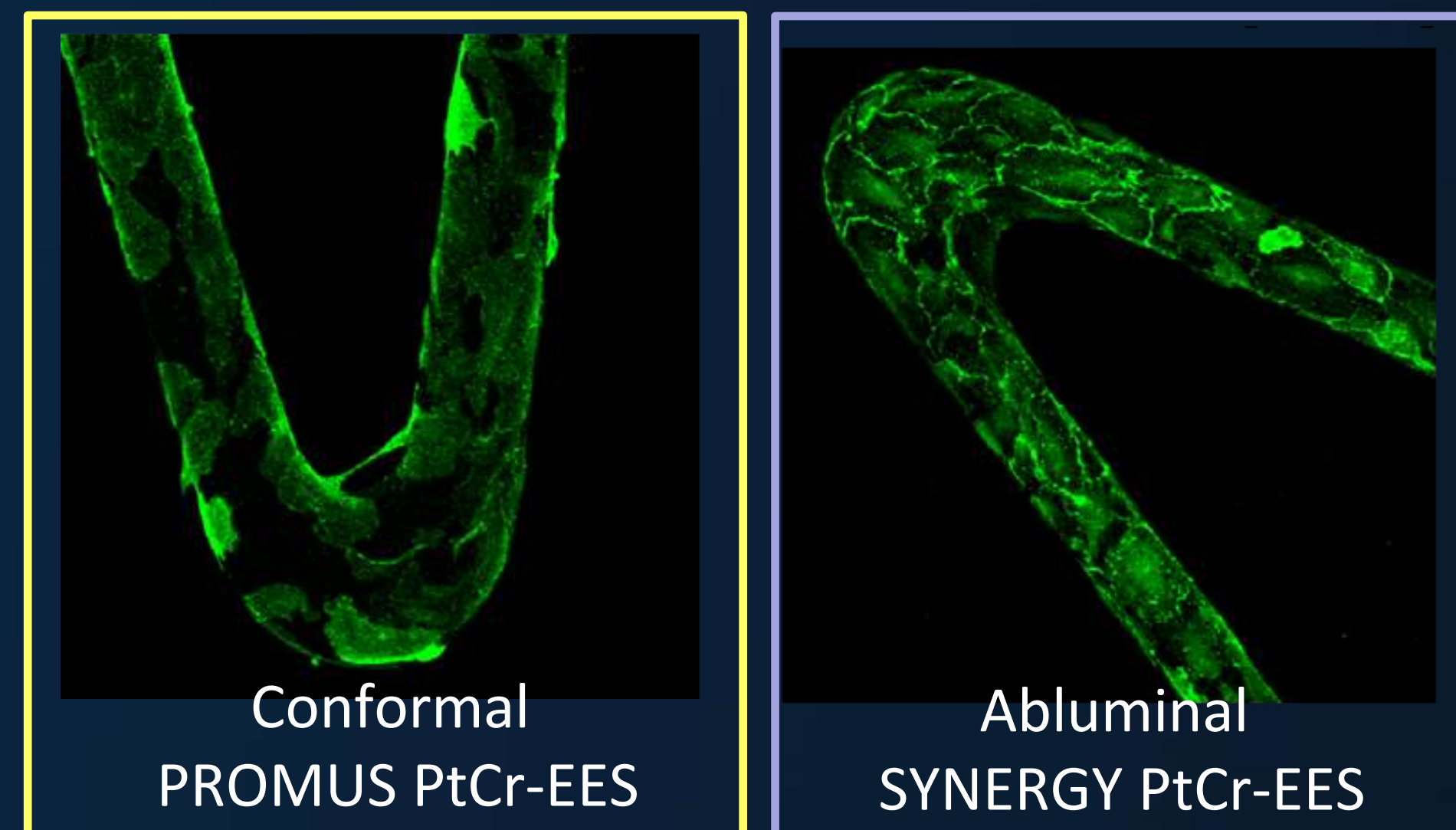
⁴De la Torre Hernandez, et al. Catheterization and Cardiovascular Interventions DOI 10.1002/ccd.

Endothelialization of DES -in vitro-

% Endothelial Cell (EC) COVERAGE
21 day cell assay



Endothelial Cell (EC) FUNCTION



Conformal
PROMUS PtCr-EES

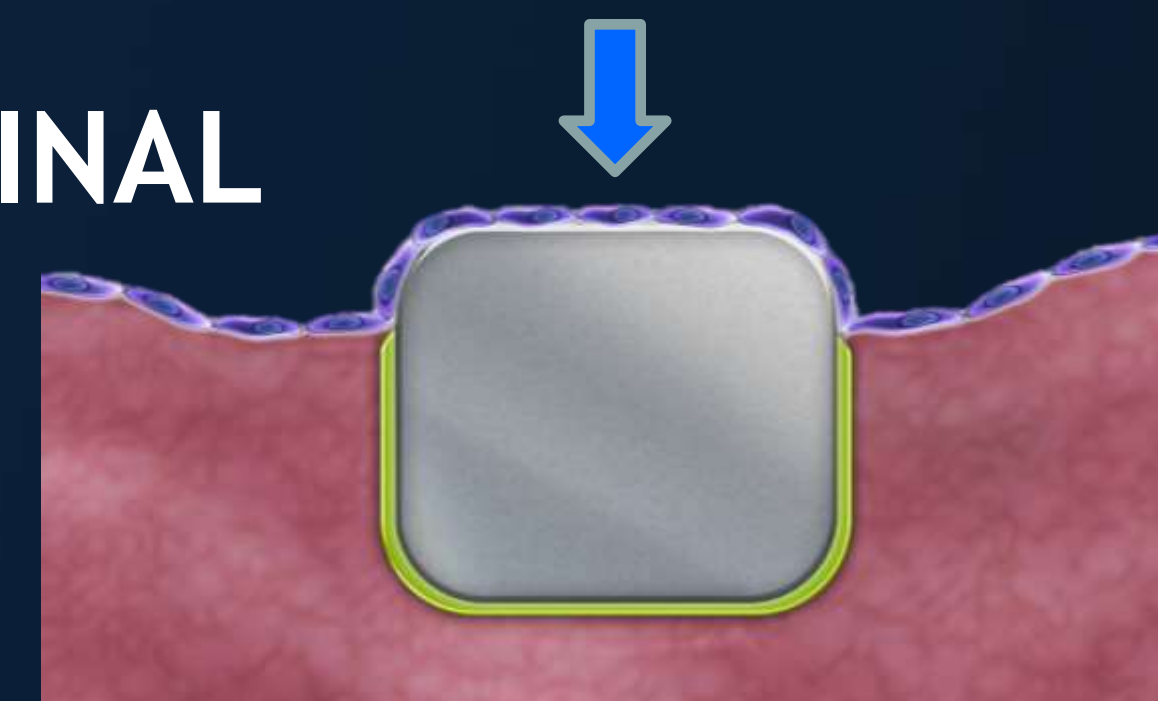
Abluminal
SYNERGY PtCr-EES

Greater localization of VE-Cadherin
at cell junctions → Improved EC function

CONFORMAL



ABLUMINAL



SYNERGY

SYNERGY™

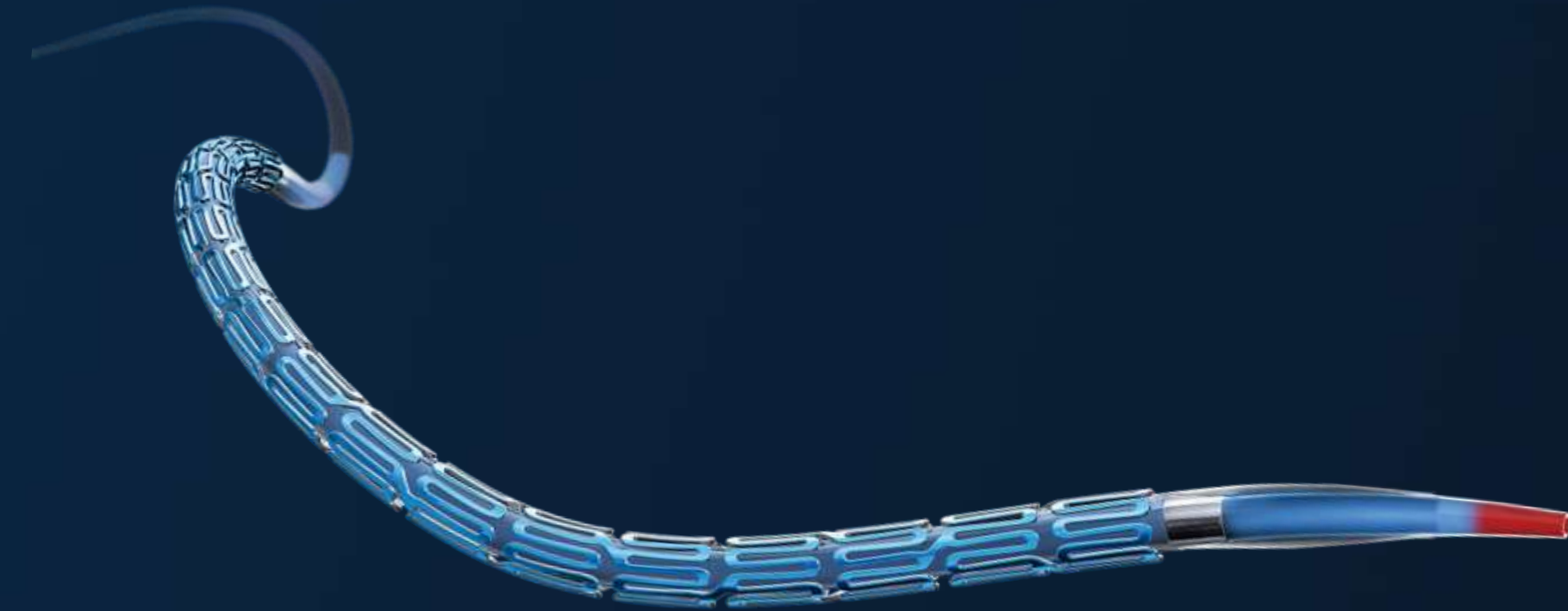
Well-balanced system

- crossability
- conformability
- pushability.

However,,,

3-Improvements were already done for TRI

in SYNERGY XD



SYNERGY XD (eXtra Deliverability)

Enhanced Delivery System

Increased Pushability
Increased Trackability

XD 48mm Length

First 48mm in the U.S.
Addressing Long Lesions

New Packaging

Optimized Hub
Easier-to-Open Packaging



Merit of TRI

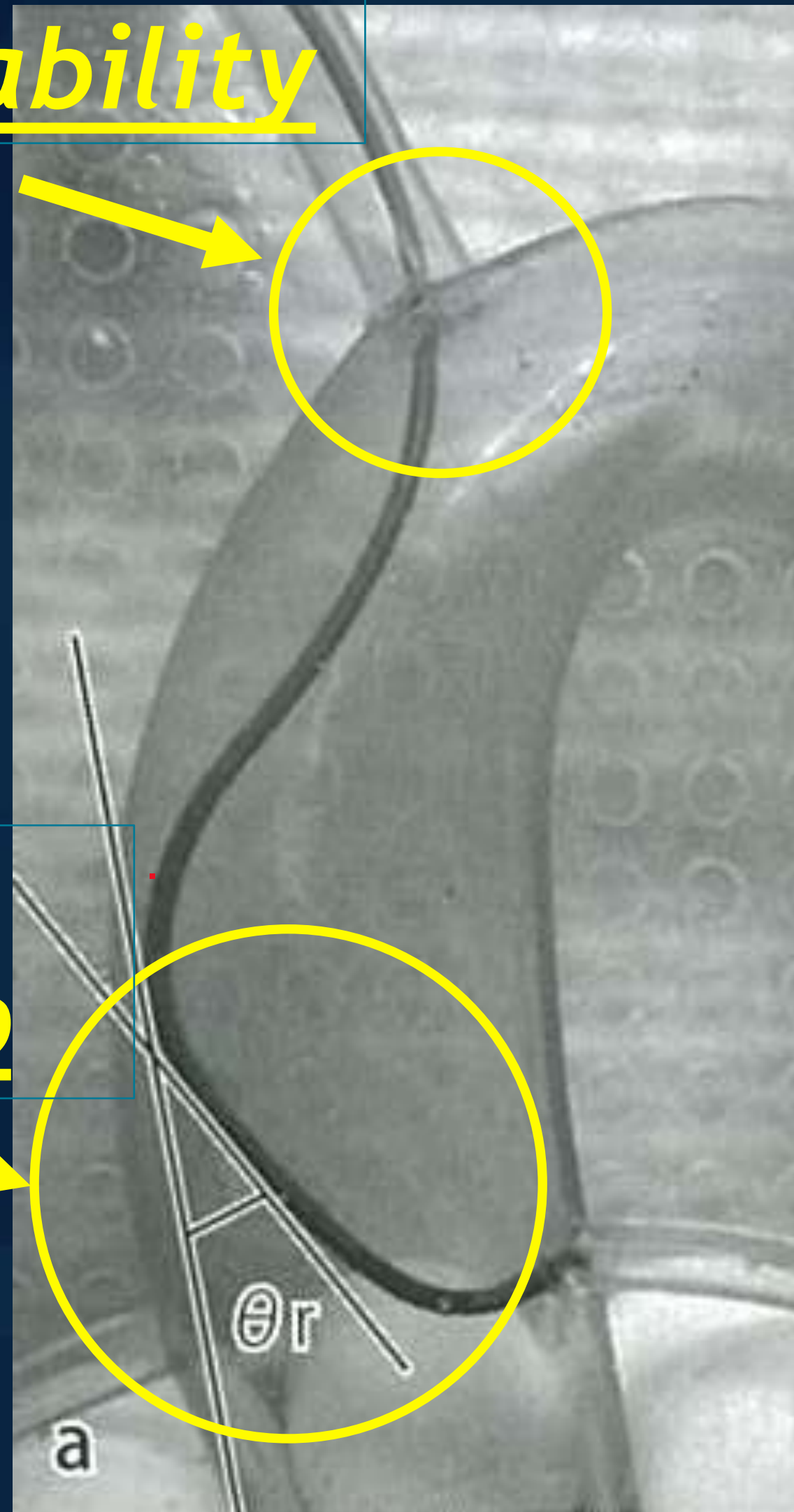
- ✓ TRI reduced **70% of puncture site complication** (OR 0.30, 95%CI 0.13~0.71).
(Jolly SS, et. al. *Lancet* 2011; 377: 1409-1420.)
- ✓ TRI reduced **33% of BARC 3 or 5 bleeding** (OR 0.67, 95%CI 0.49~0.92).
(Valgimigli M, et. al. *Lancet* 2015; 385: 2465-2476.)
- ✓ There was a **44% reduction of mortality** with TRI (OR 0.56, 95%CI 0.45-0.67).
(Bertrand OF, et. al. *Am Heart J* 2012; 163: 632-648.)
- ✓ TRI reduced **80% in transfusion** (OR 0.20, 95%CI 0.11-0.32).
(Andò G, et. al. *J Am Coll Cardiol* 2017; 69: 2592-2603.)
- ✓ TRI was associated with a **13% reduction in CI-AKI** (OR 0.87, 95%CI 0.77-0.98).
(Andò G, et. al. *Catheter Cardiovasc Interv* 2018; 92: E518-E526.)

Weak point of TRI

tortuous subclavian
= loss of pushability

TRI

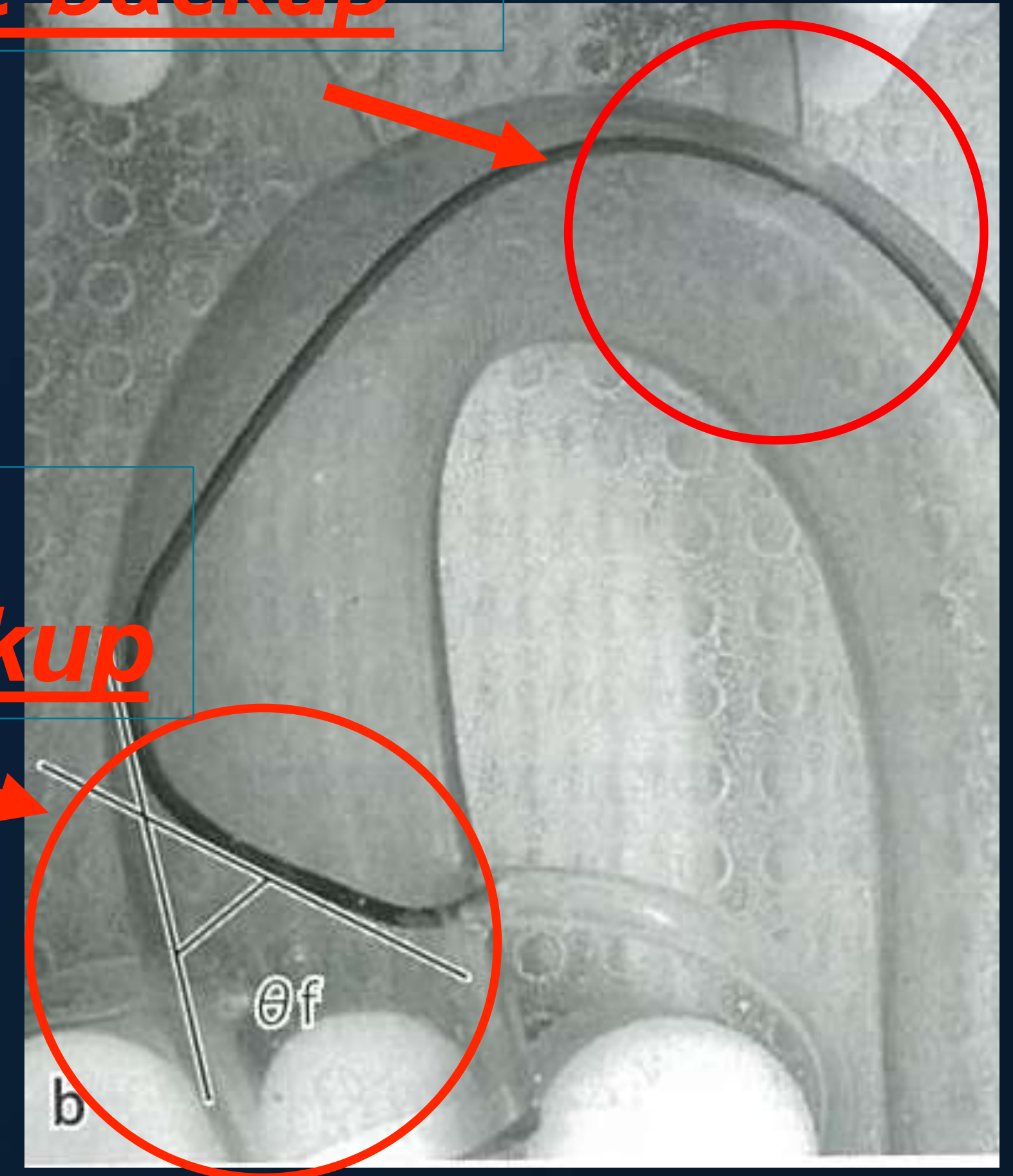
small angle
= weak backup



friction from Aorta
= great backup

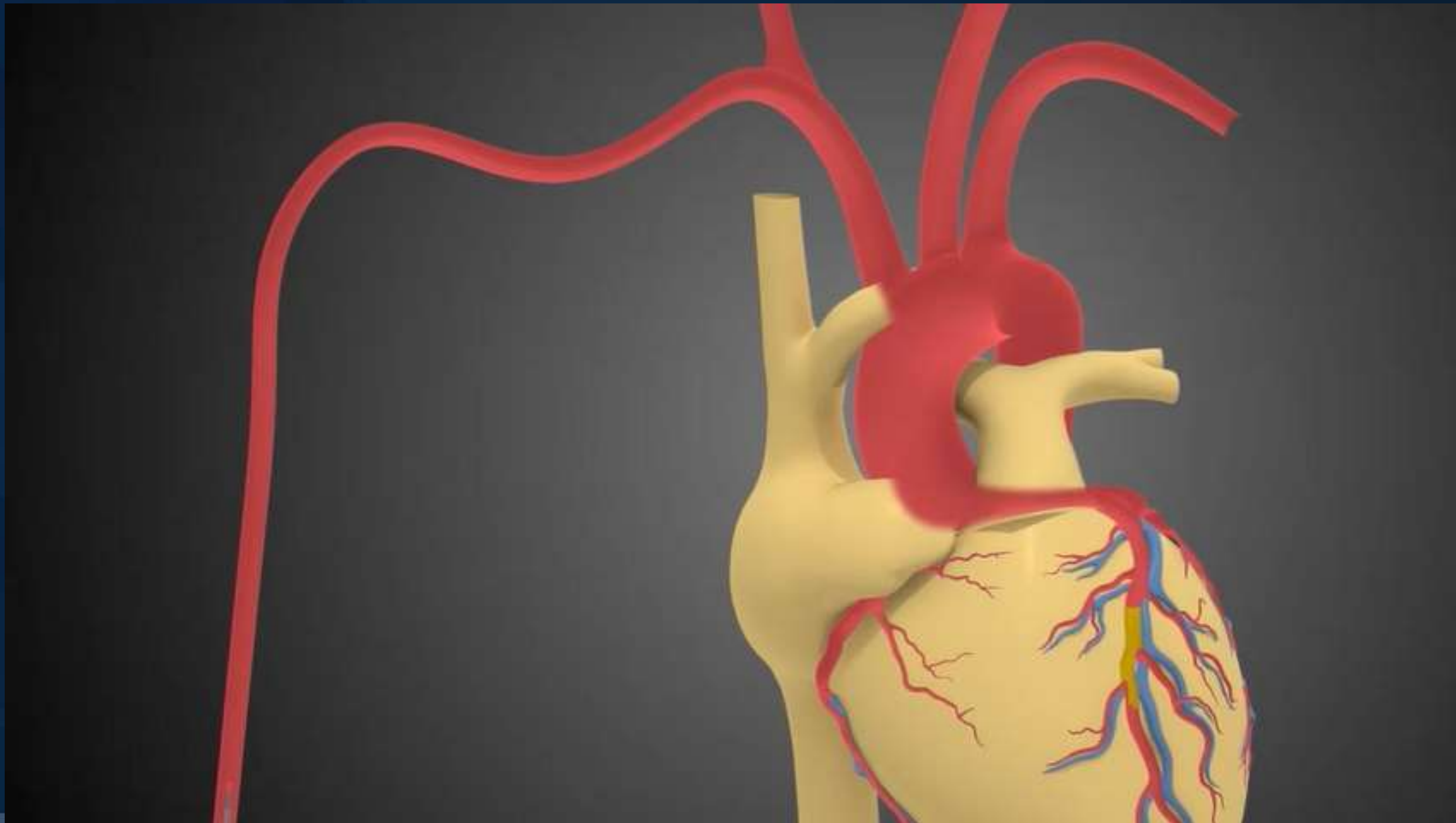
TFI

large angle
= strong backup



SYNERGY XD -Enhanced Delivery System-

Reduced friction in the subclavian due to added pushability and trackability is the key factor for better deliverability.

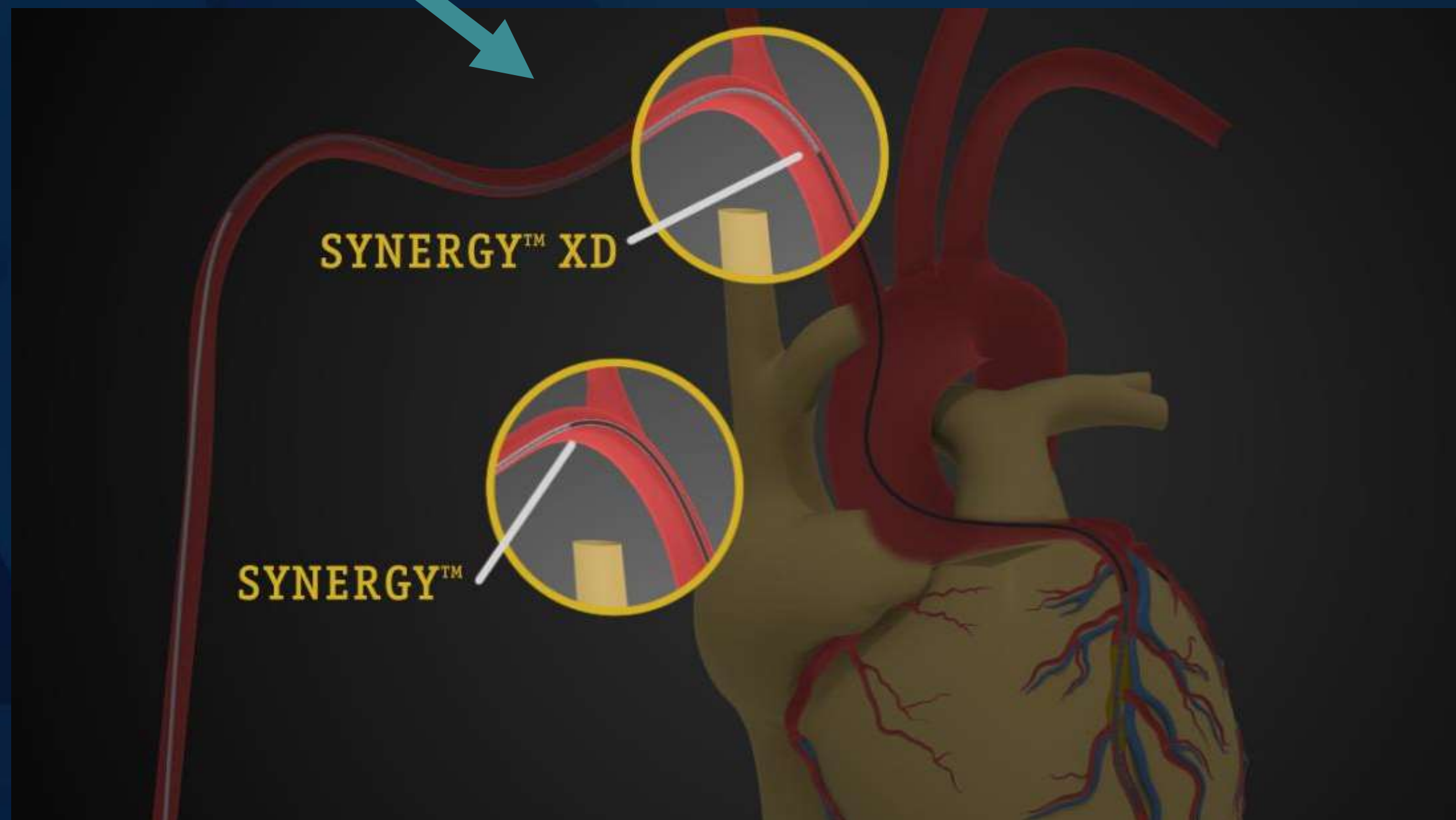


SYNERGY XD -Enhanced Delivery System-

Reduced friction in the subclavian due to added pushability and trackability is the key factor for better deliverability.

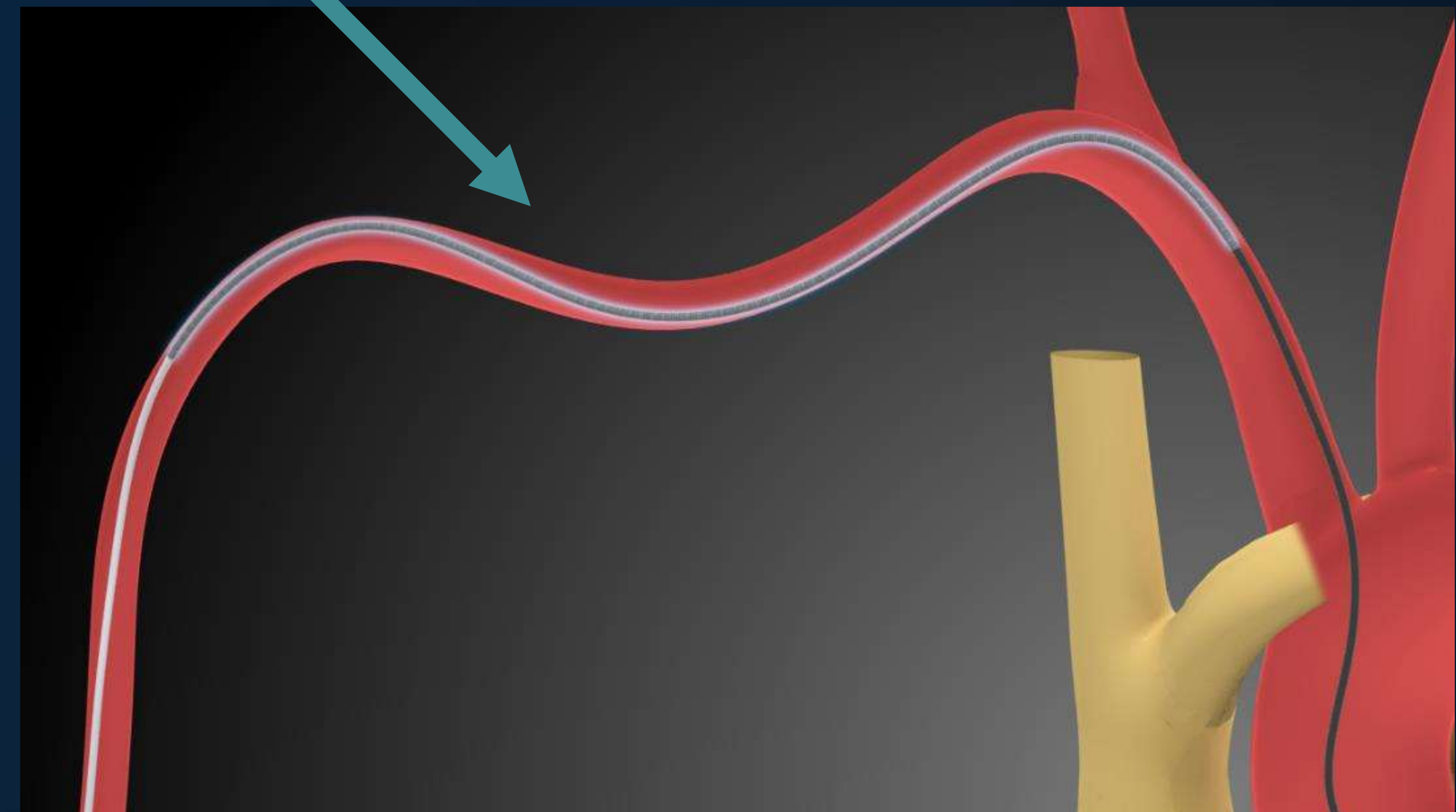
Extended laser-cut hypotube

Replaces polymer with metal to provide increased pushability

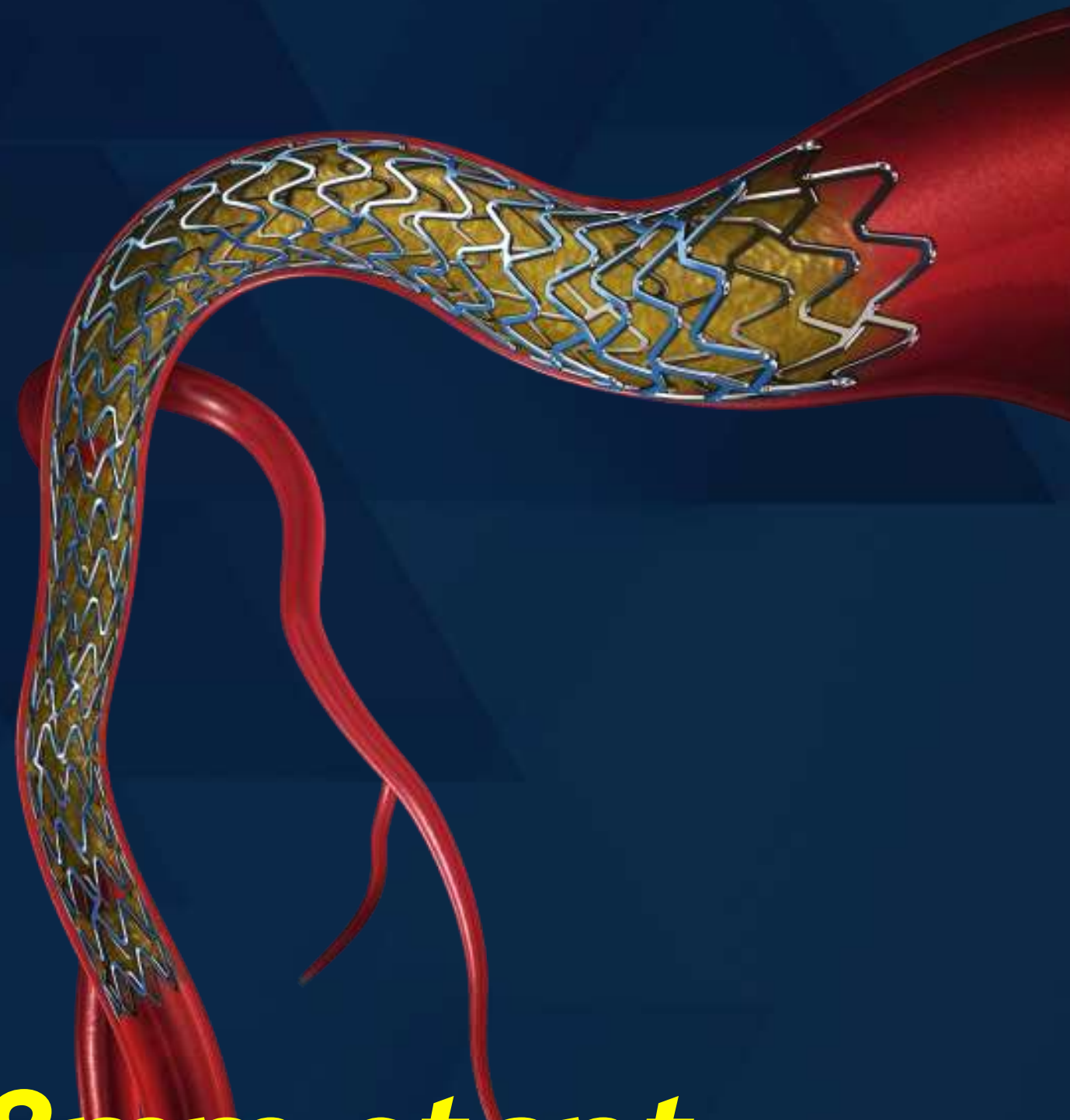


Extended lubricious coating covering midshaft

Reduces friction to provide increased trackability



SYNERGY XD -48mm Length & New Packaging-



48mm stent

- ✓ covers long lesion
- ✓ saves number of stent
- ✓ reduce stent overlapping



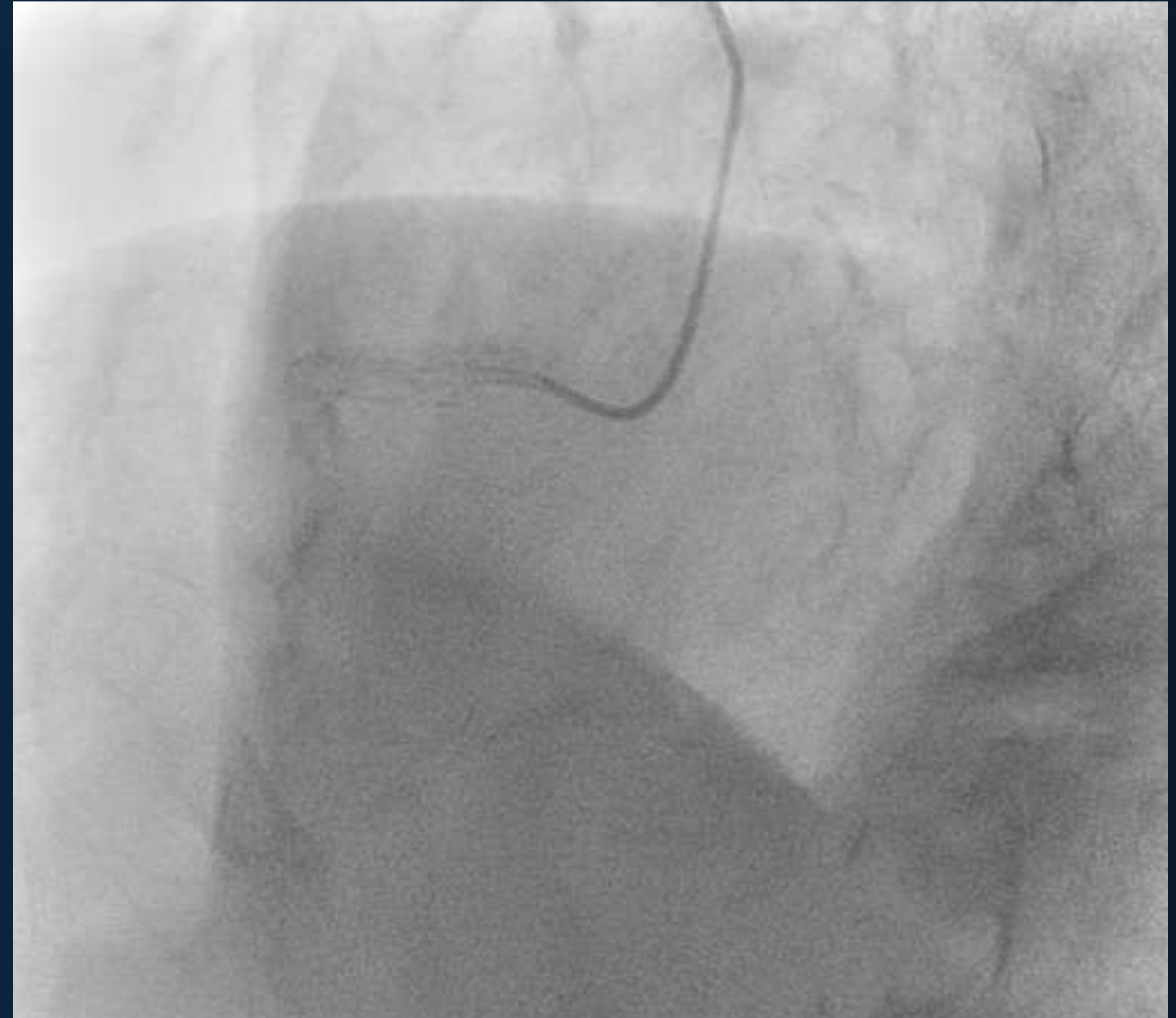
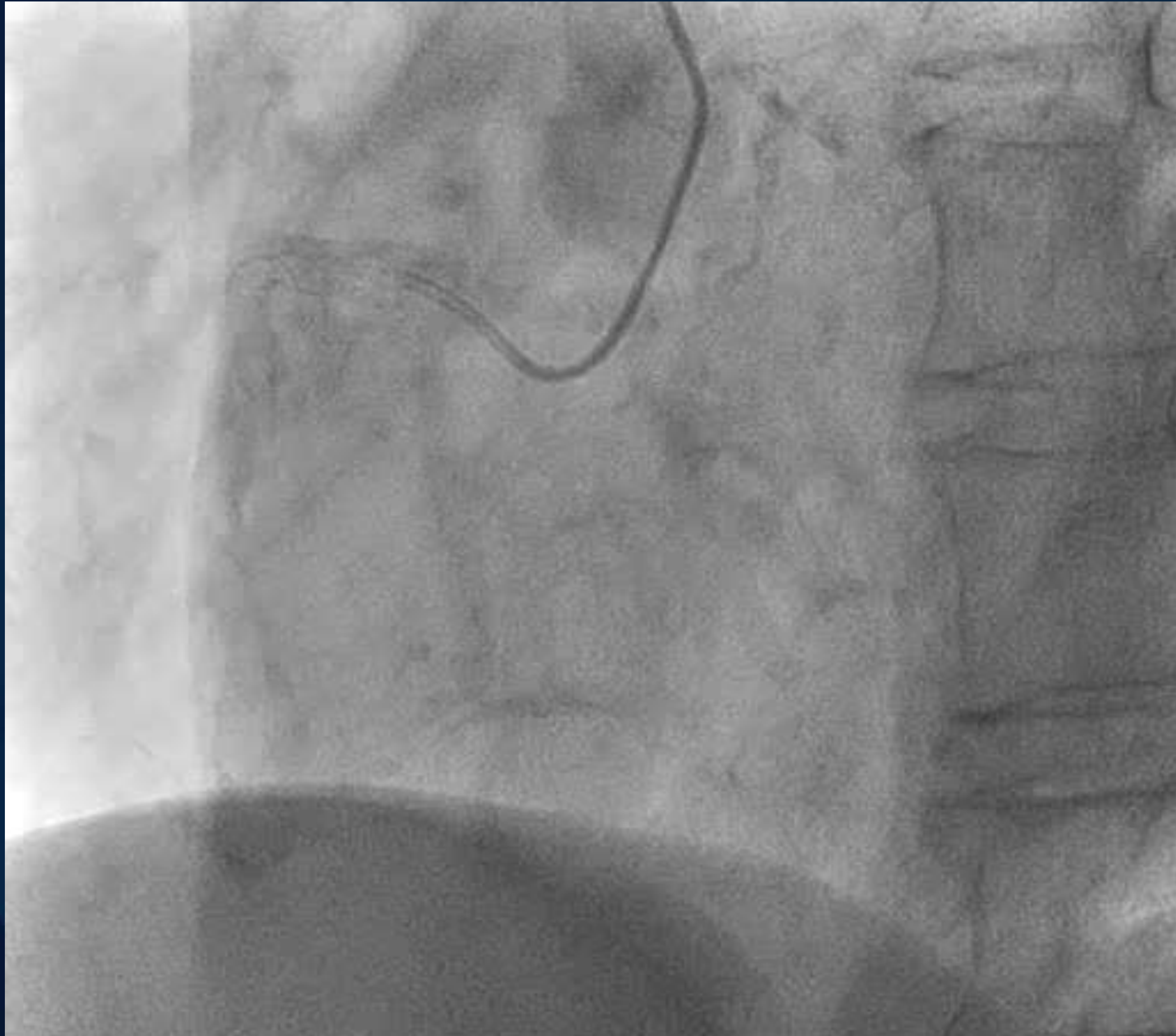
New packaging

- ✓ easy to read letter
- ✓ easy to attach or detach

Representative cases of SYNERGY XD

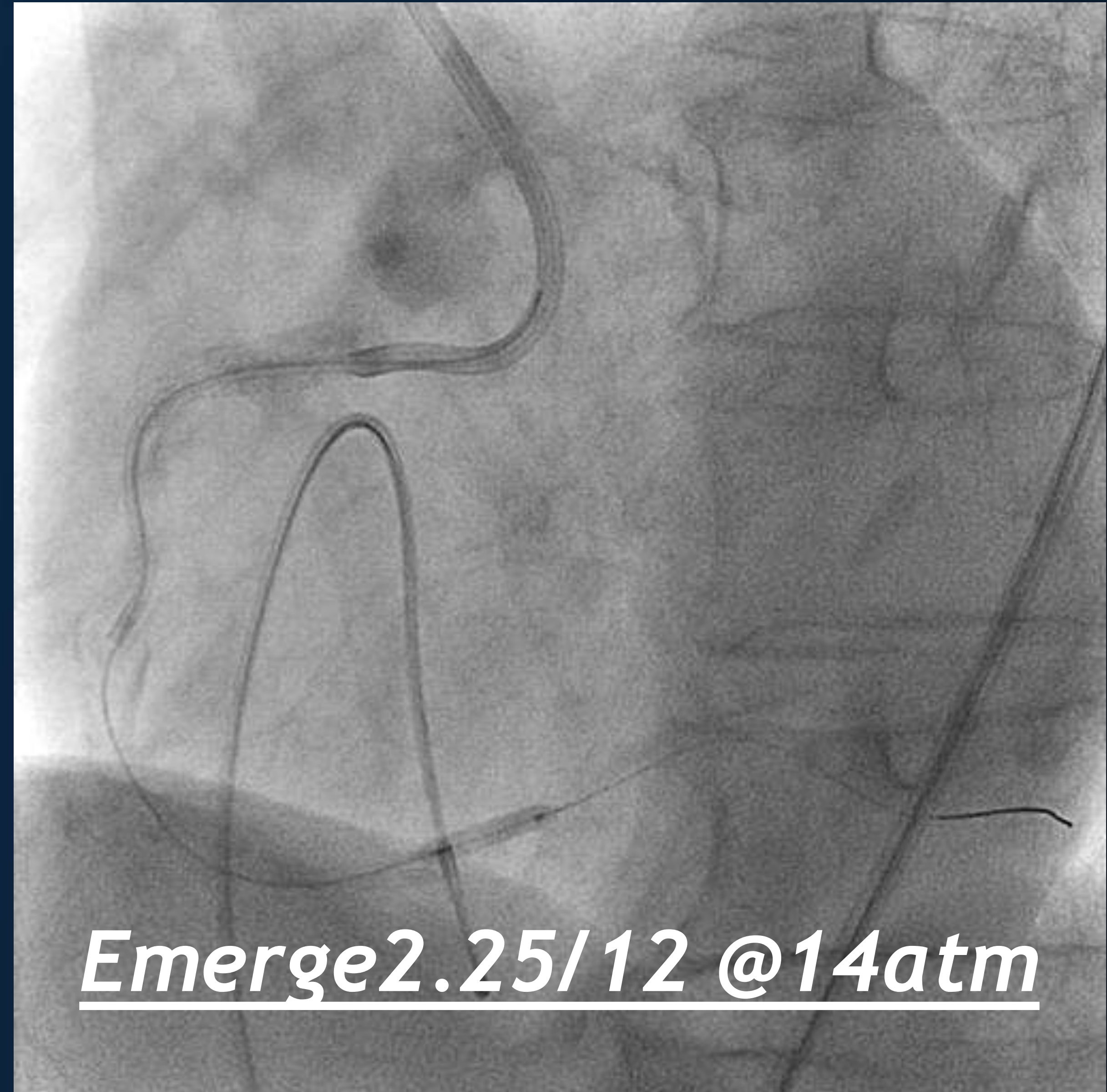
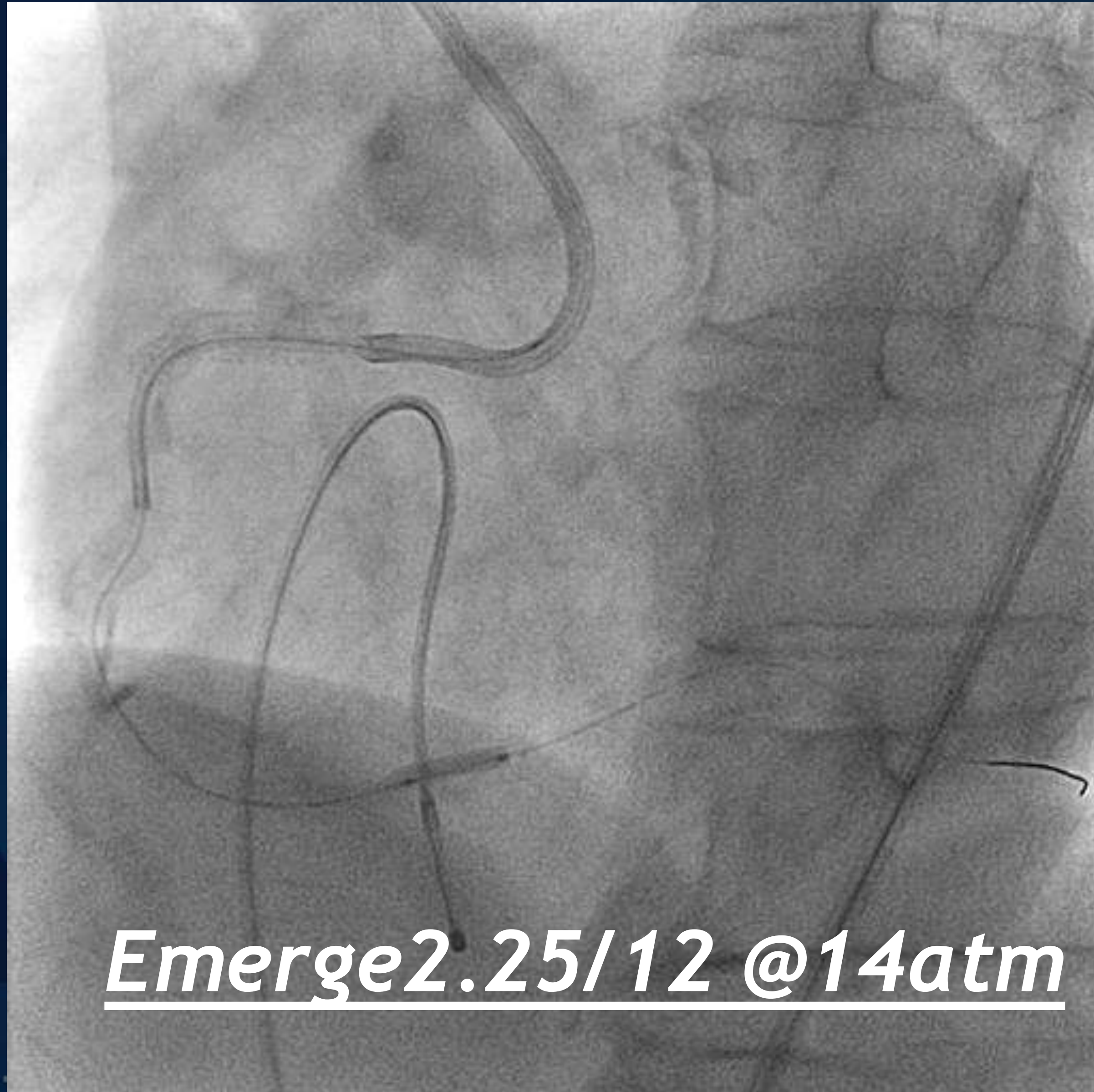
Case 1

Case1 : 80's-y-o-male

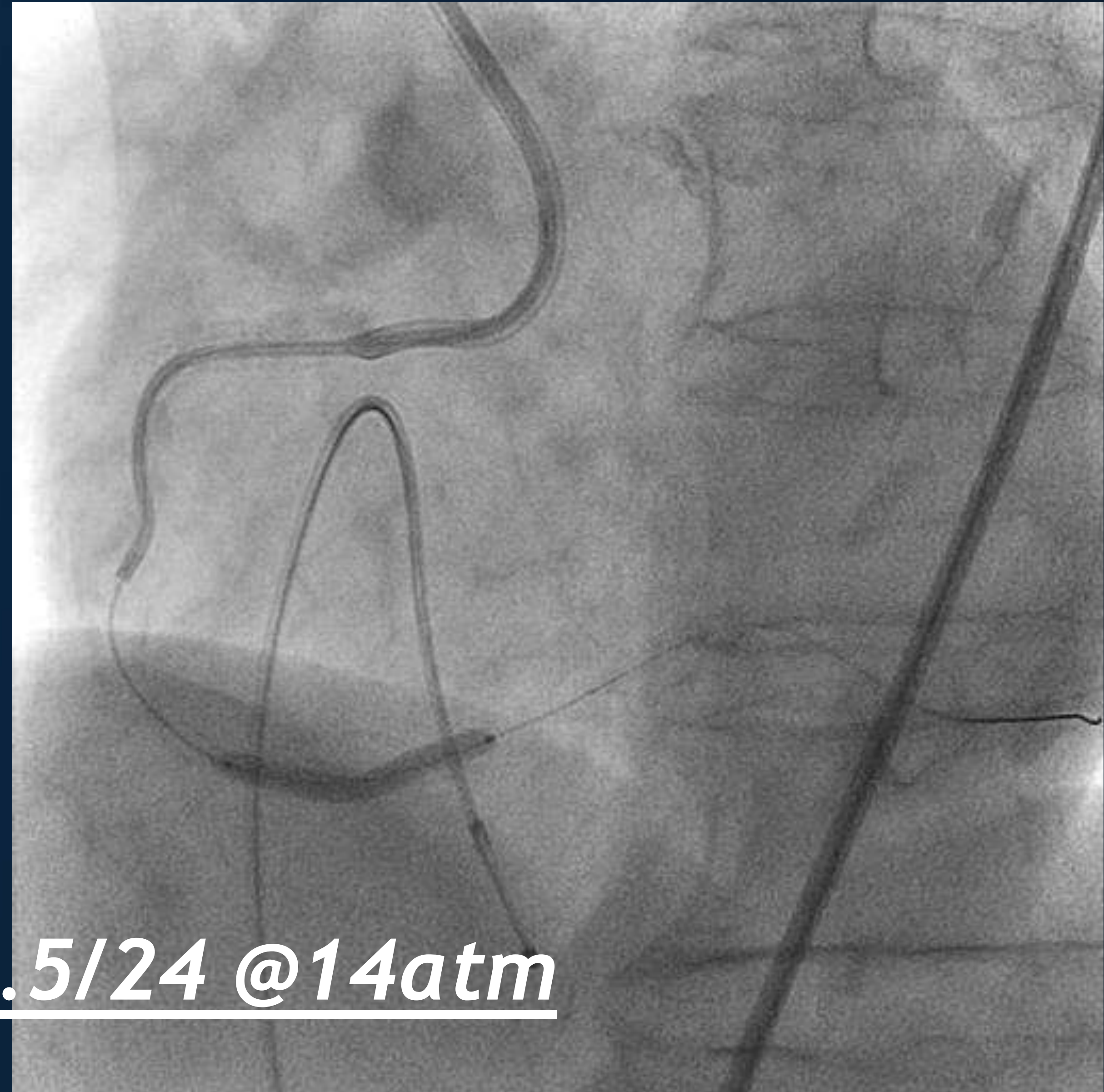
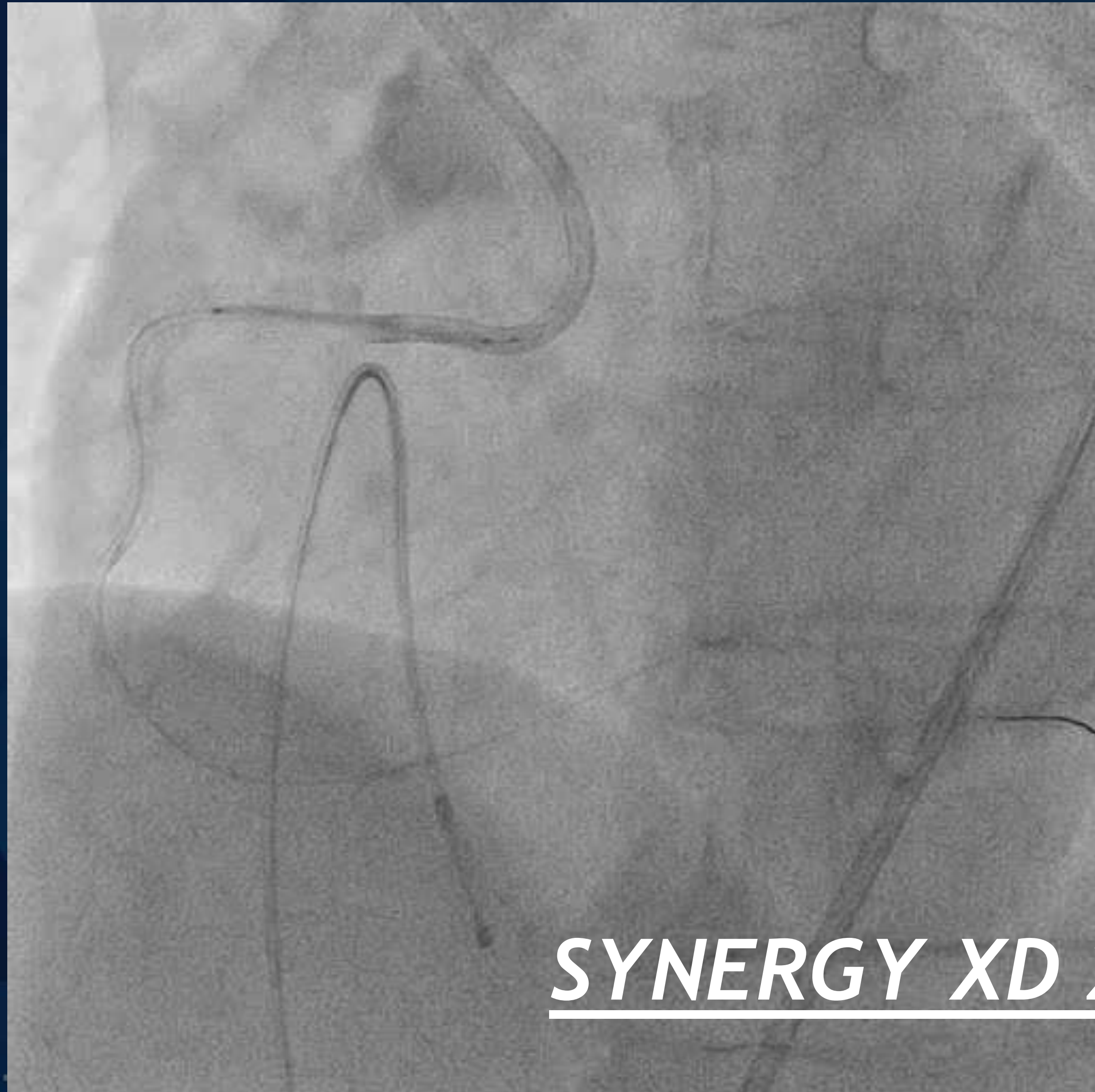


Target: RCA prox-mid 90%, dis 75%

Predilation w/ guide-extension

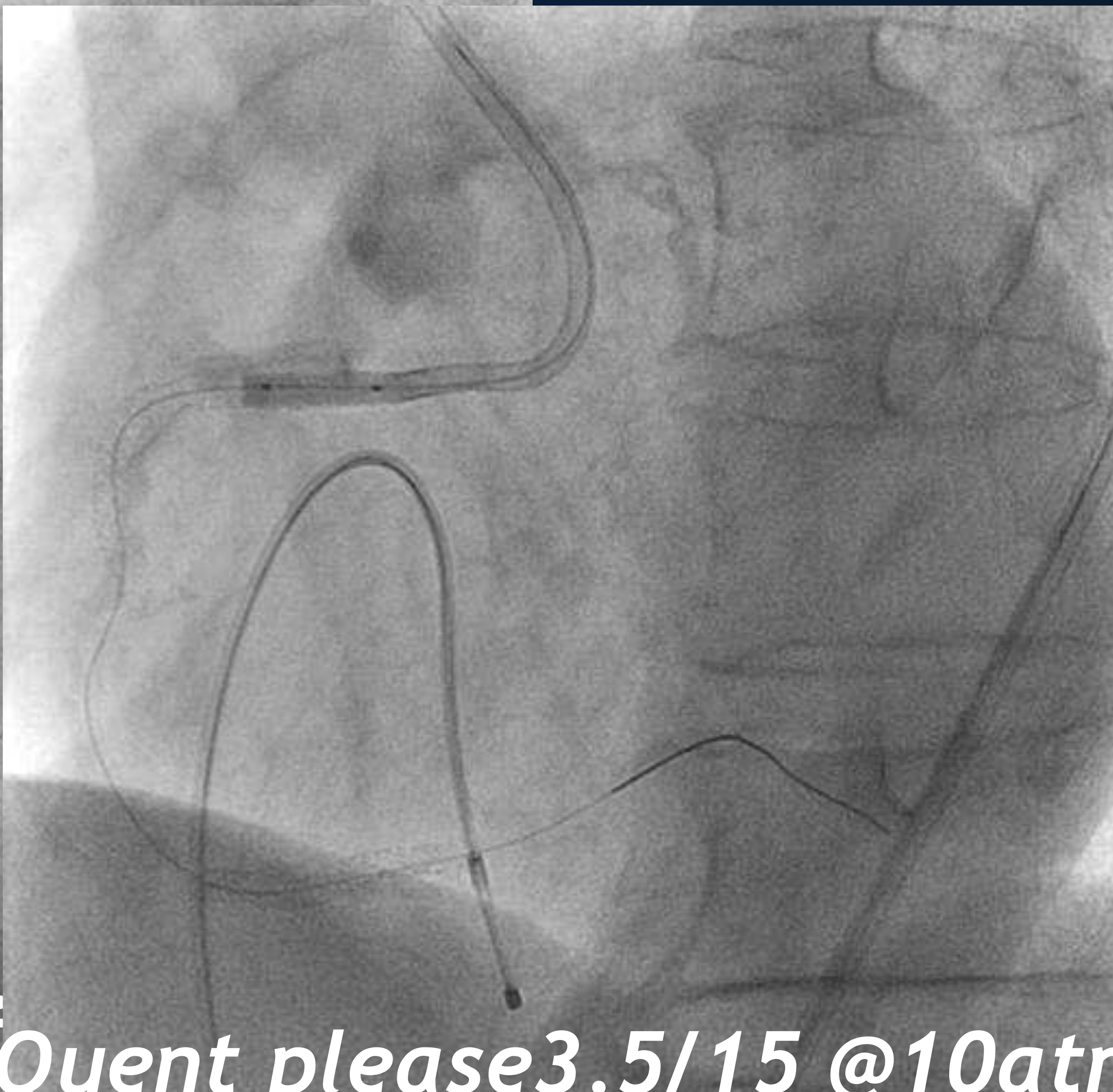
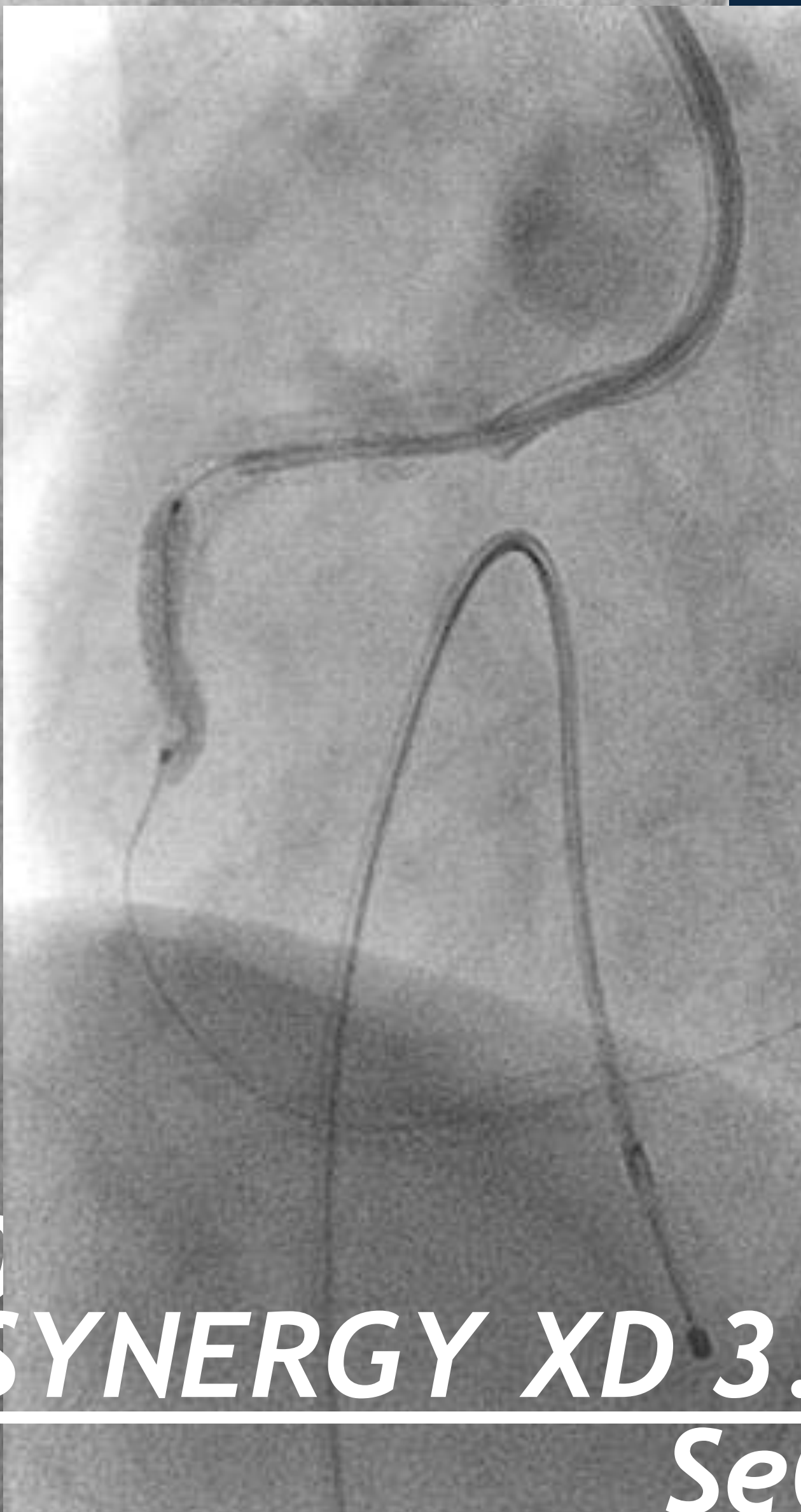
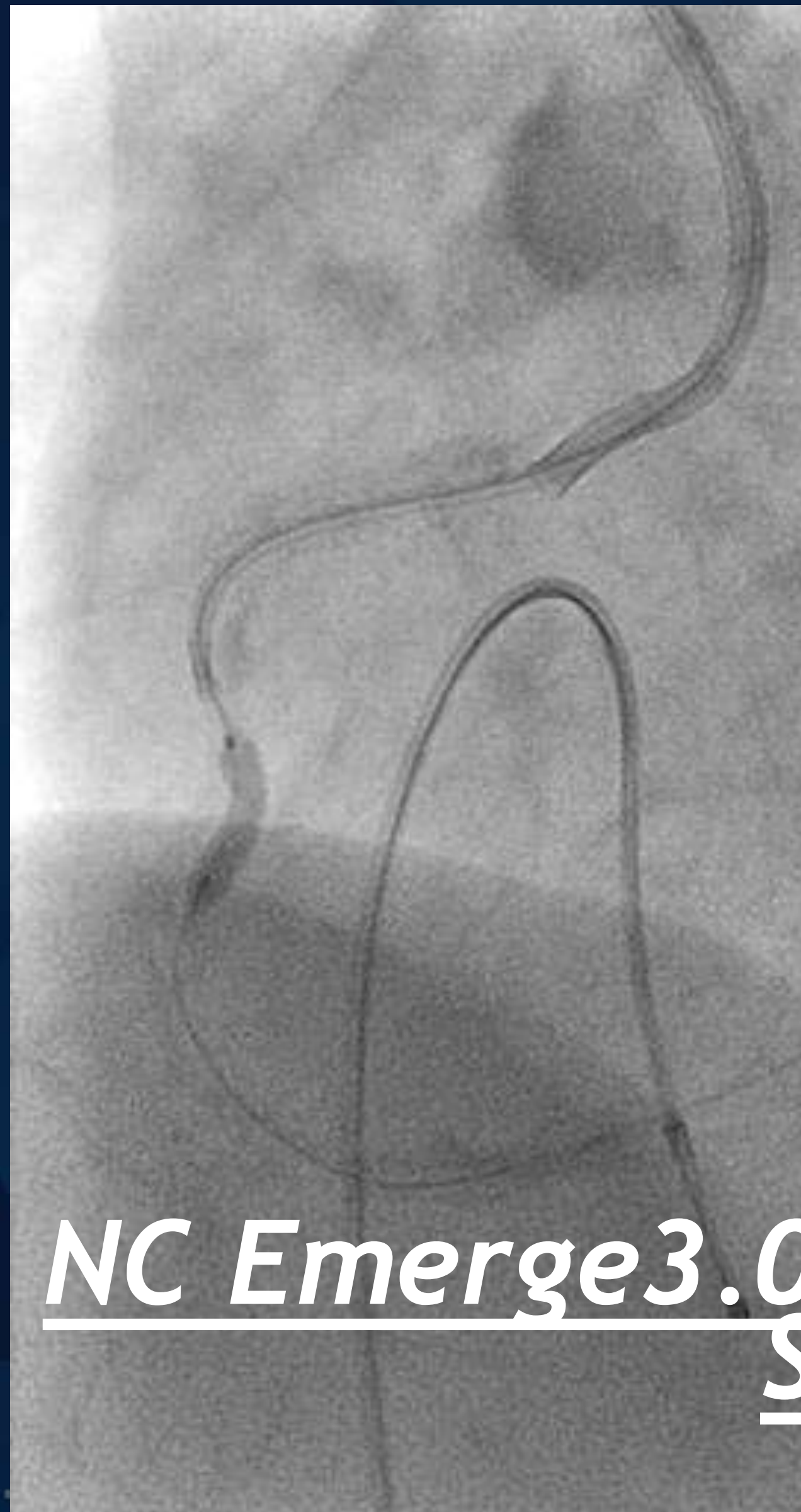


SYNERGY XD implantation @ d-RCA

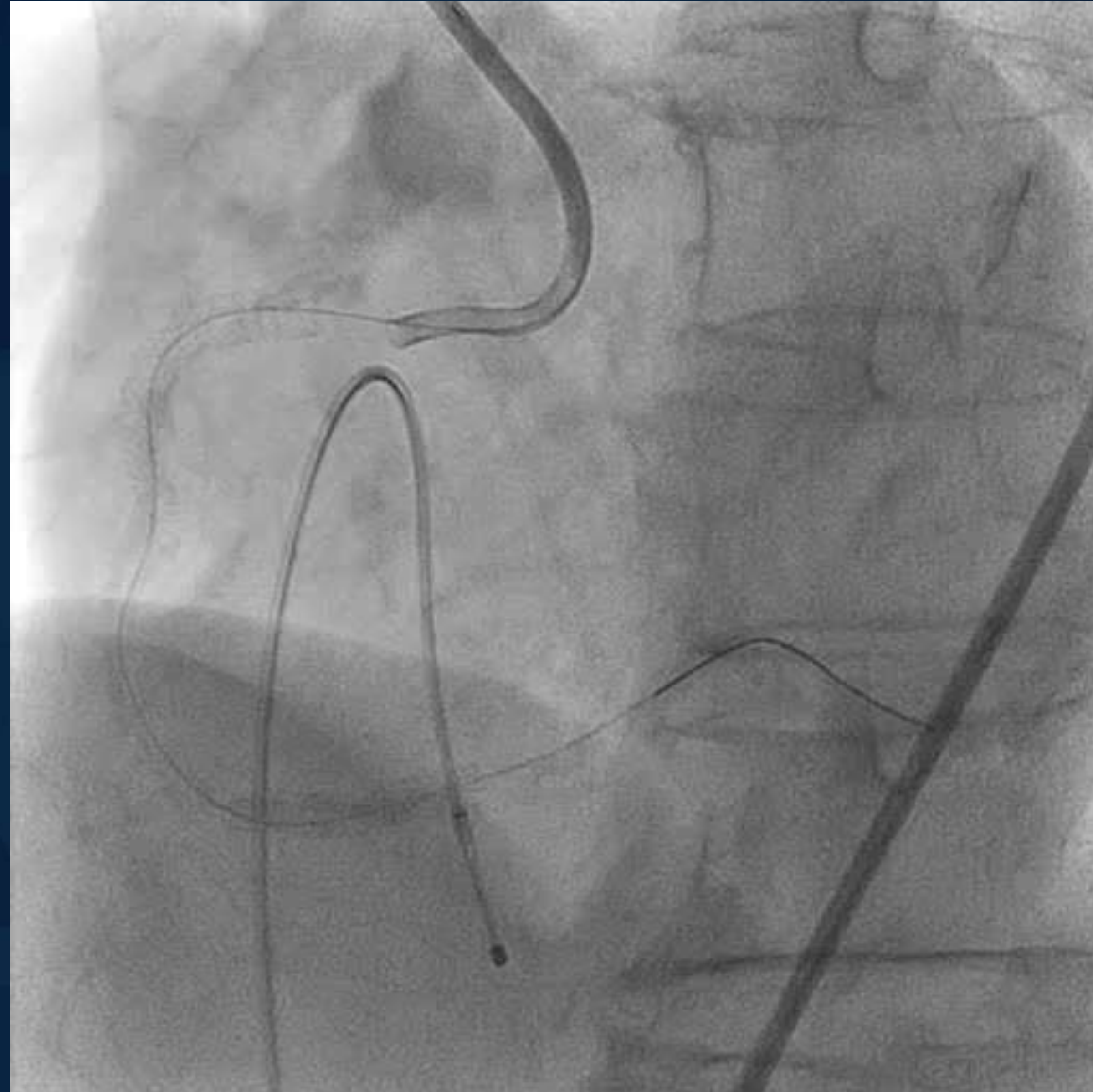


SYNERGY XD 2.5/24 @14atm

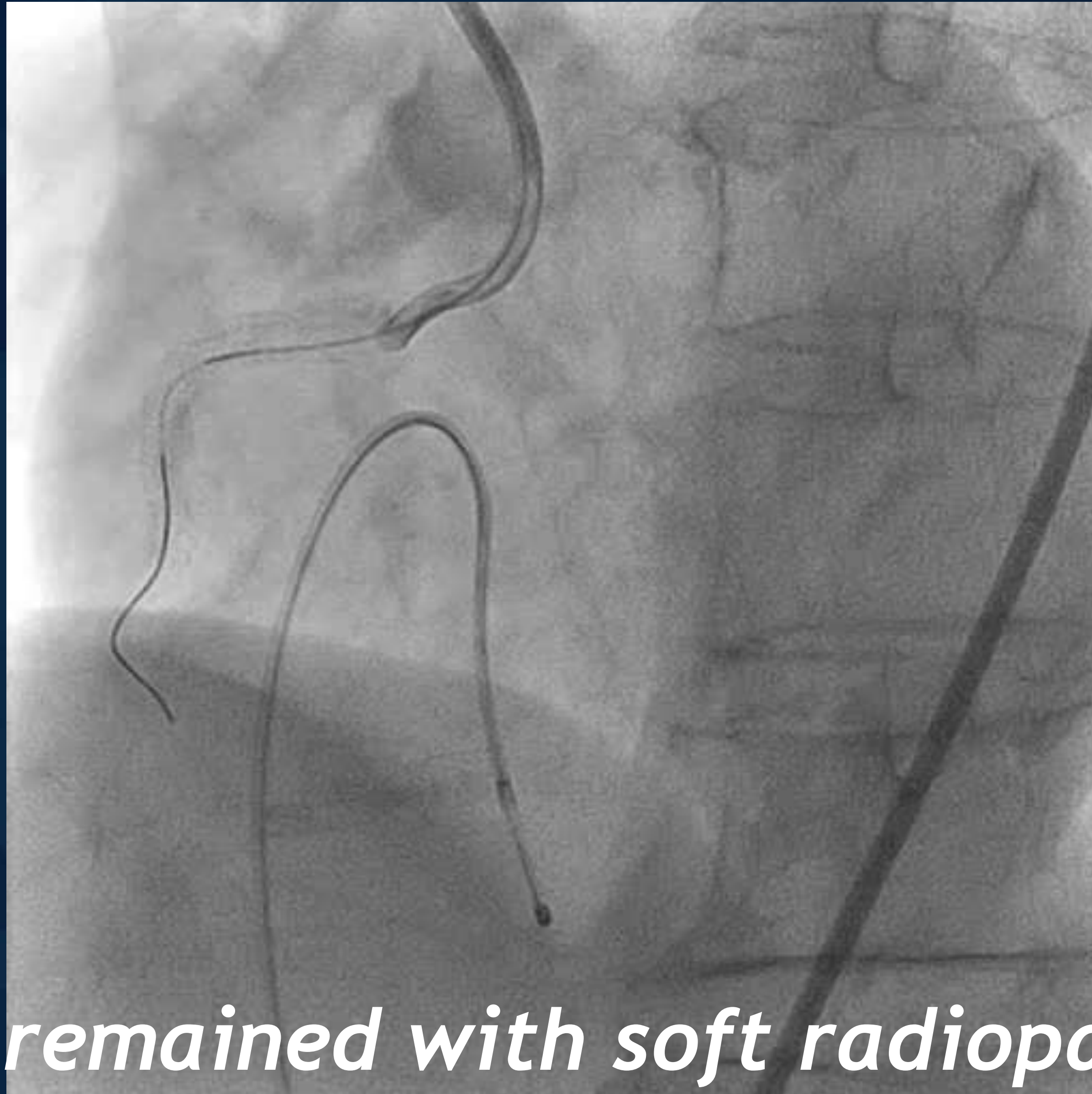
SYNERGY XD implantation @ m-RCA



Accordion phenomenon occurred ??



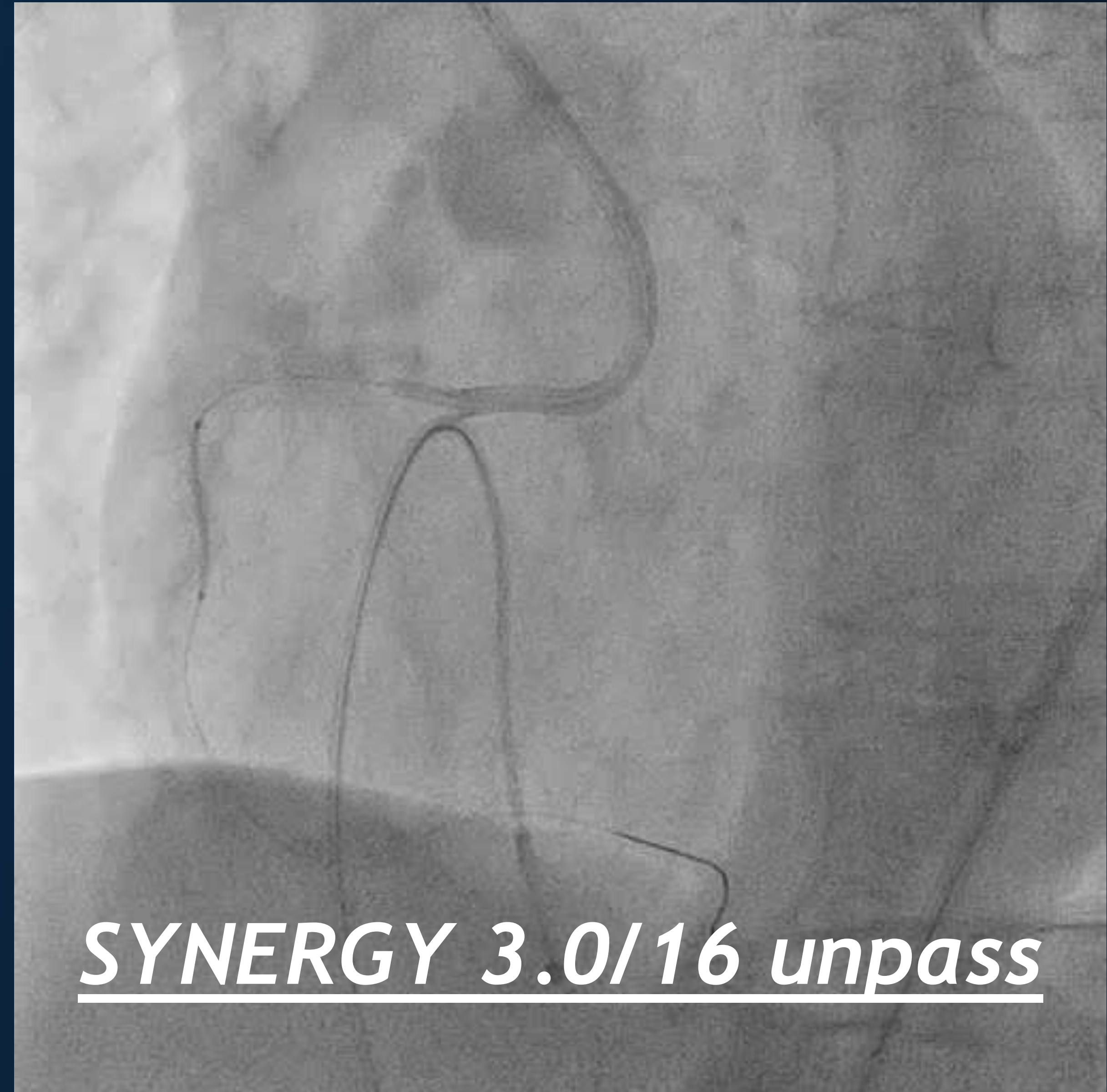
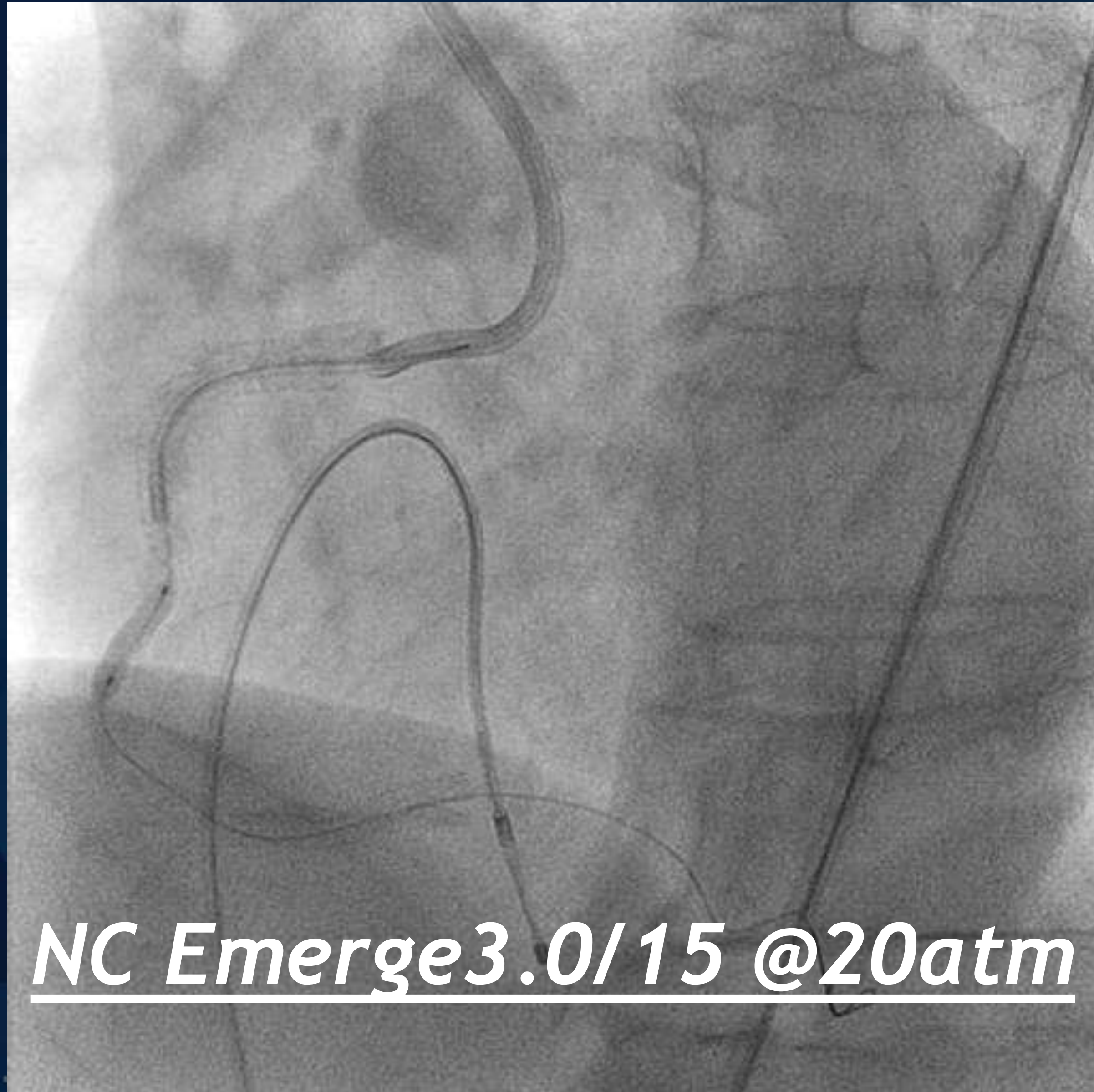
Plaque shift !!



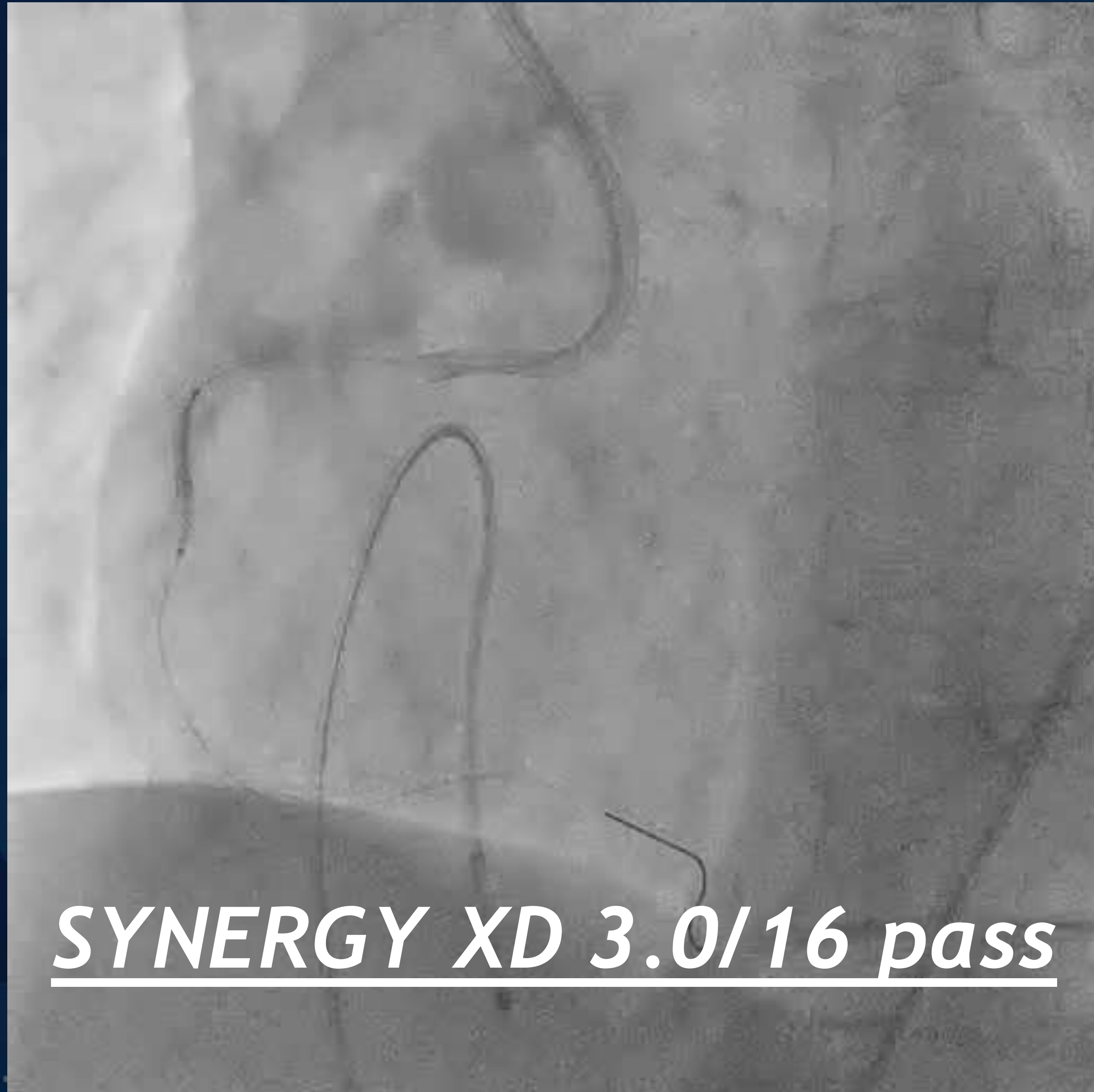
Stenosis was remained with soft radiopaque position.

However,,,

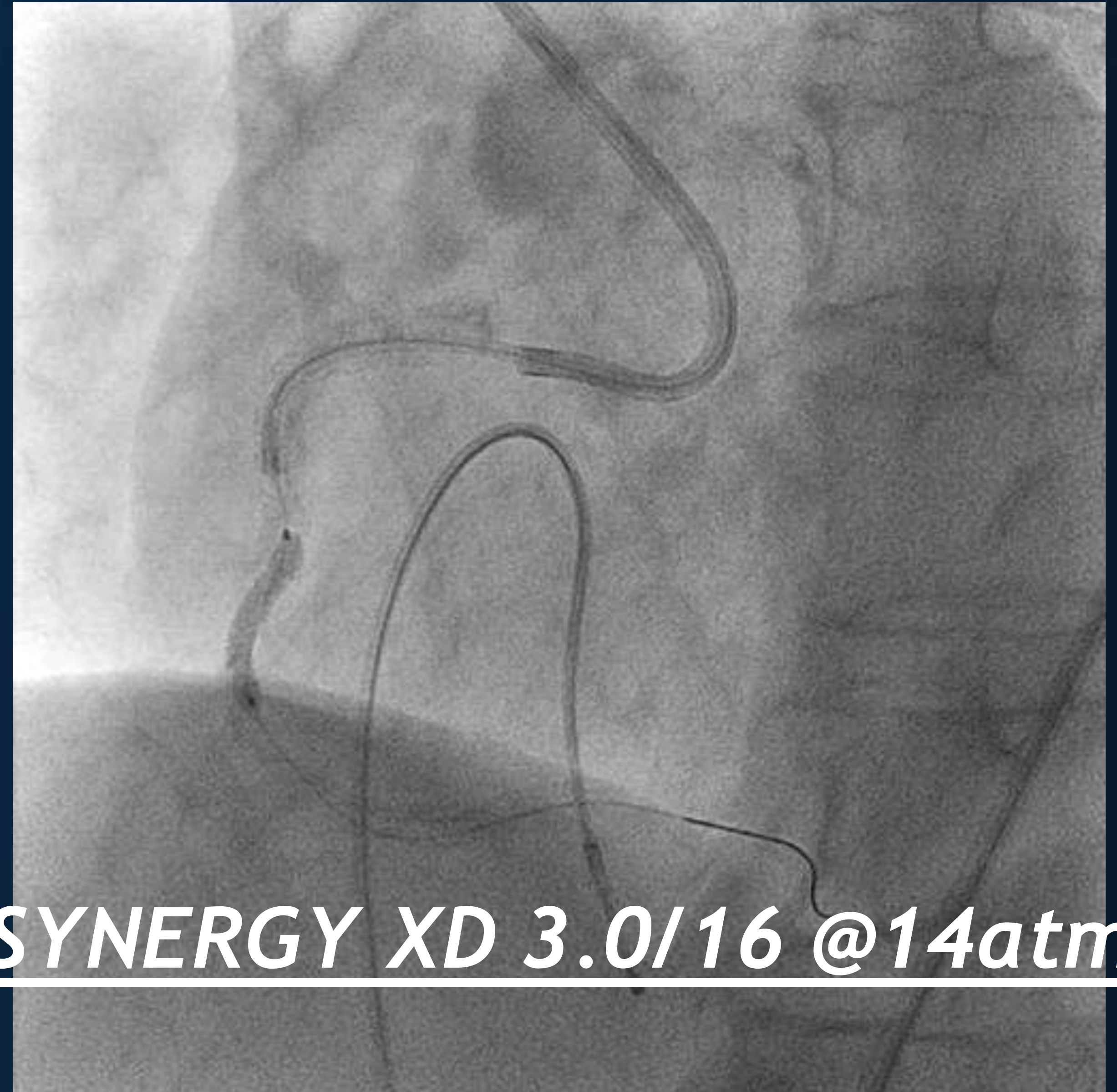
SYNERGY couldn't pass



SYNERGY XD implantation @ m-RCA

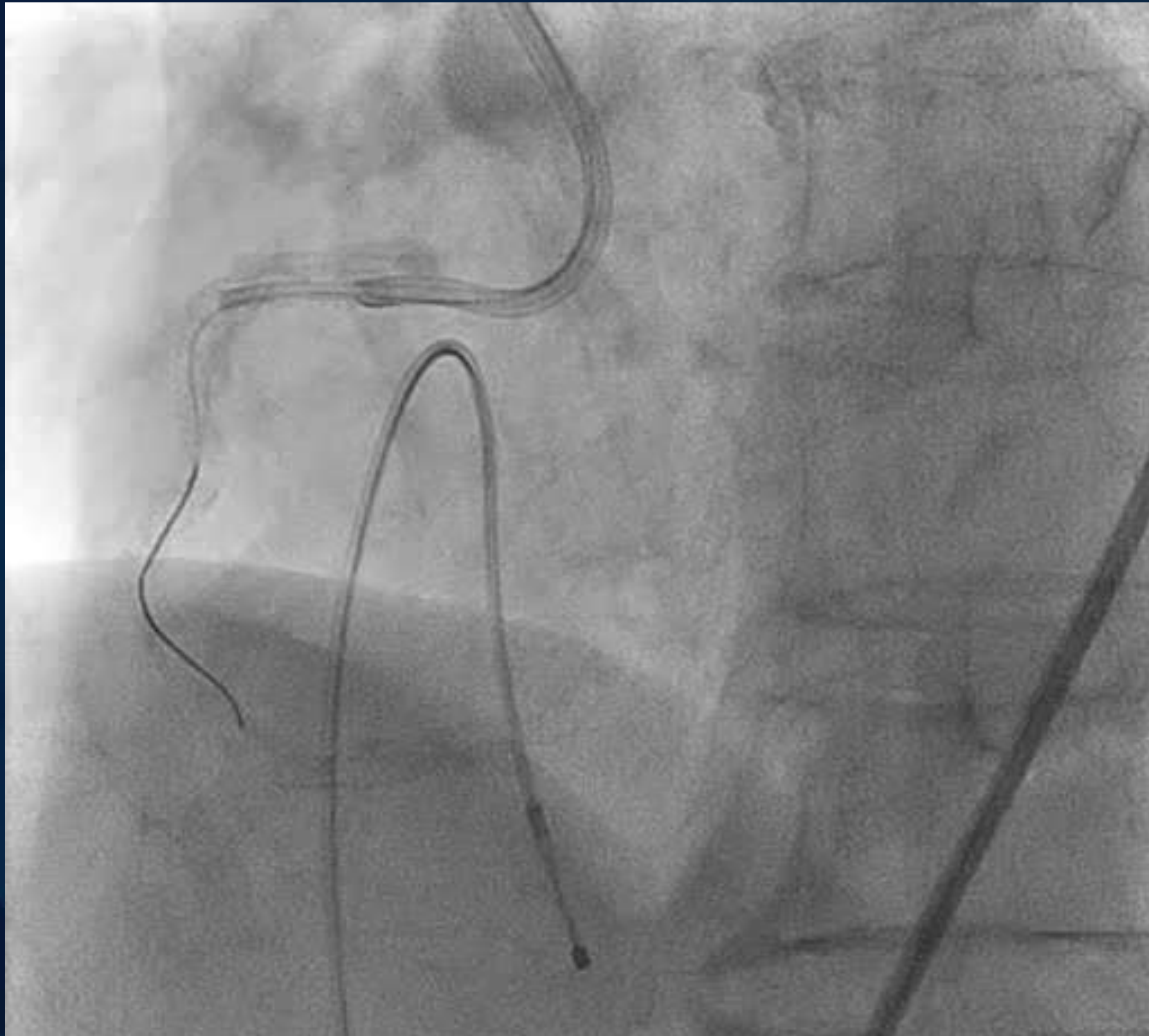


SYNERGY XD 3.0/16 pass



SYNERGY XD 3.0/16 @14atm

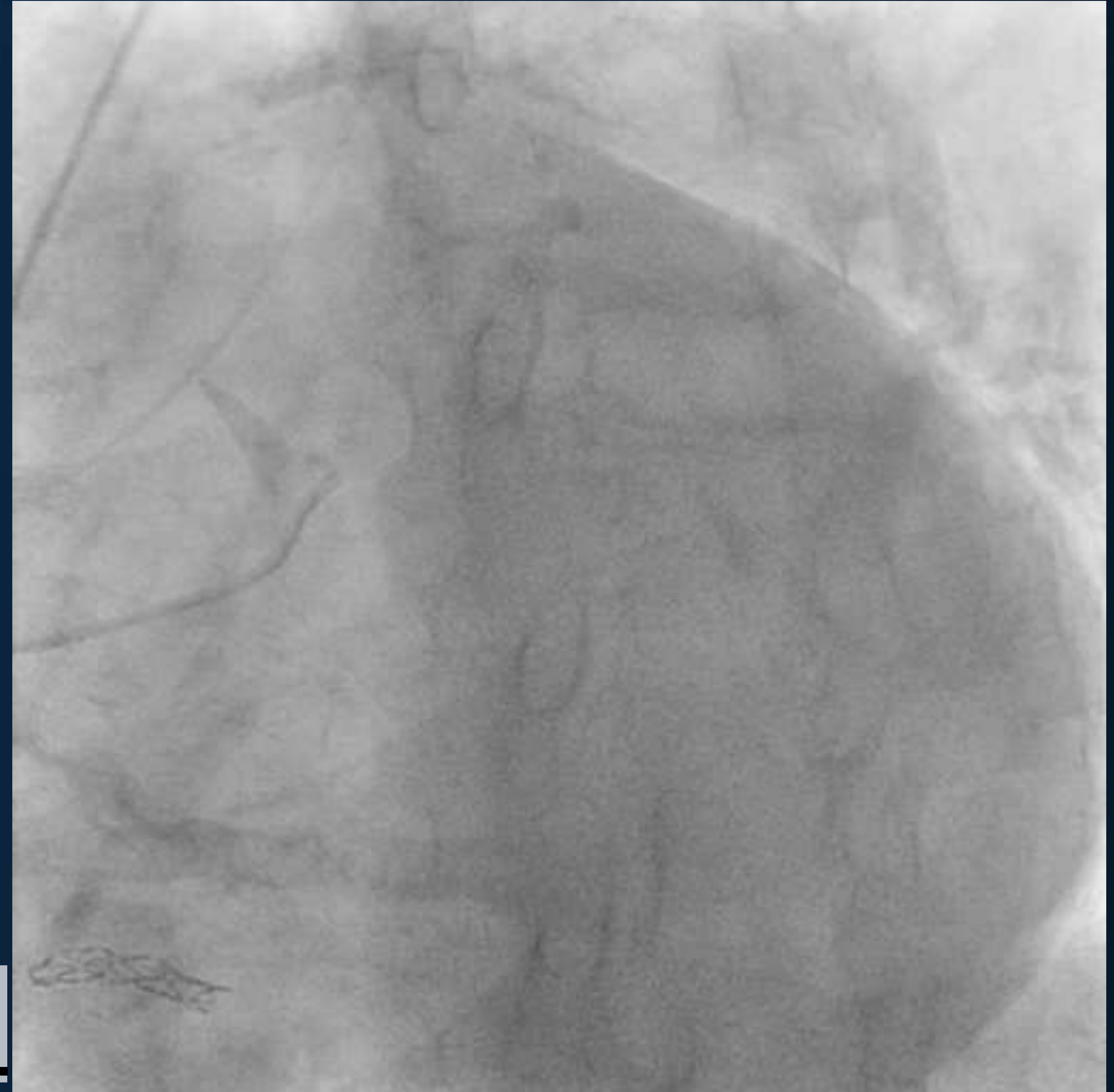
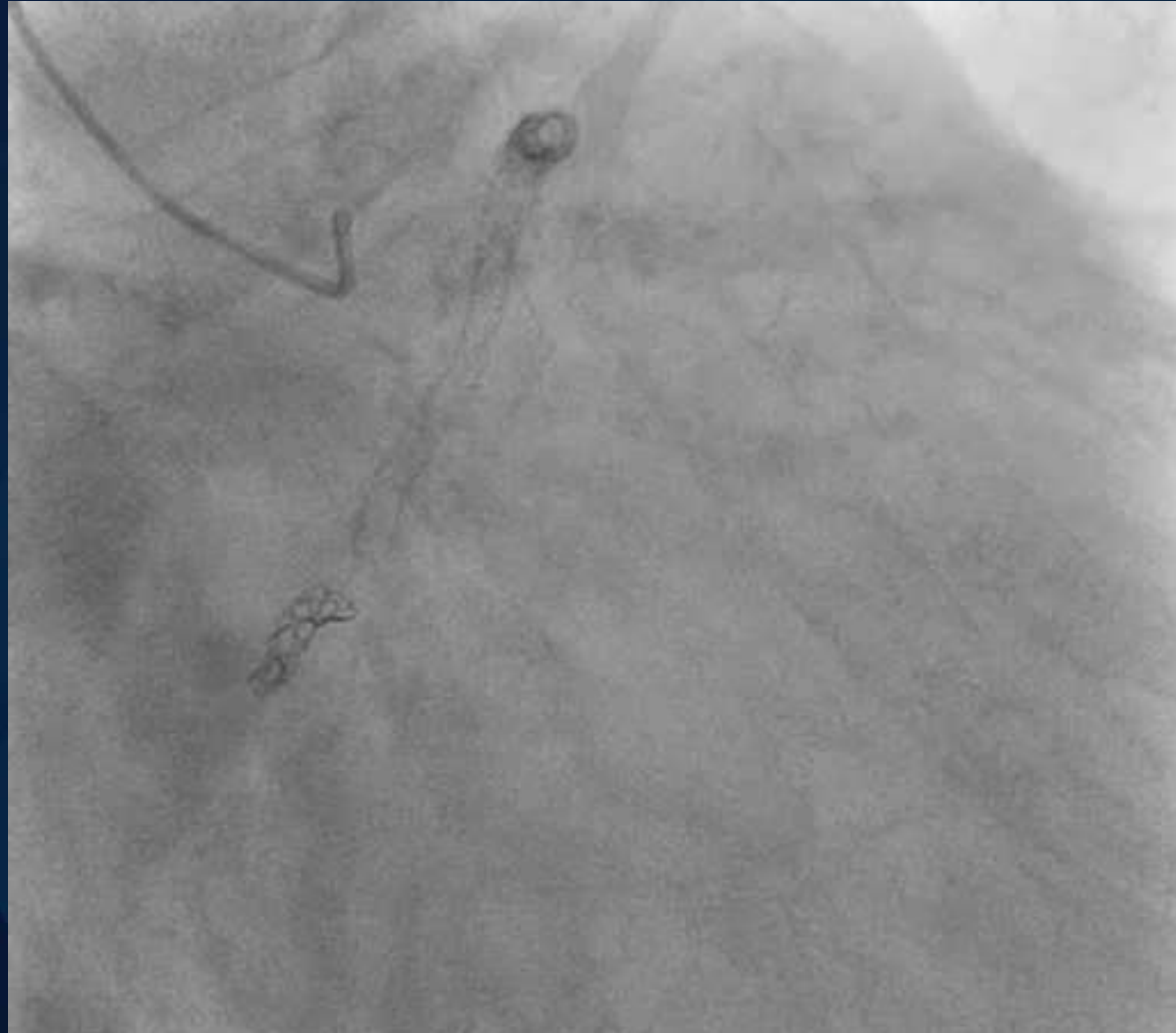
Final Angiography



Highly bended RCA was treated

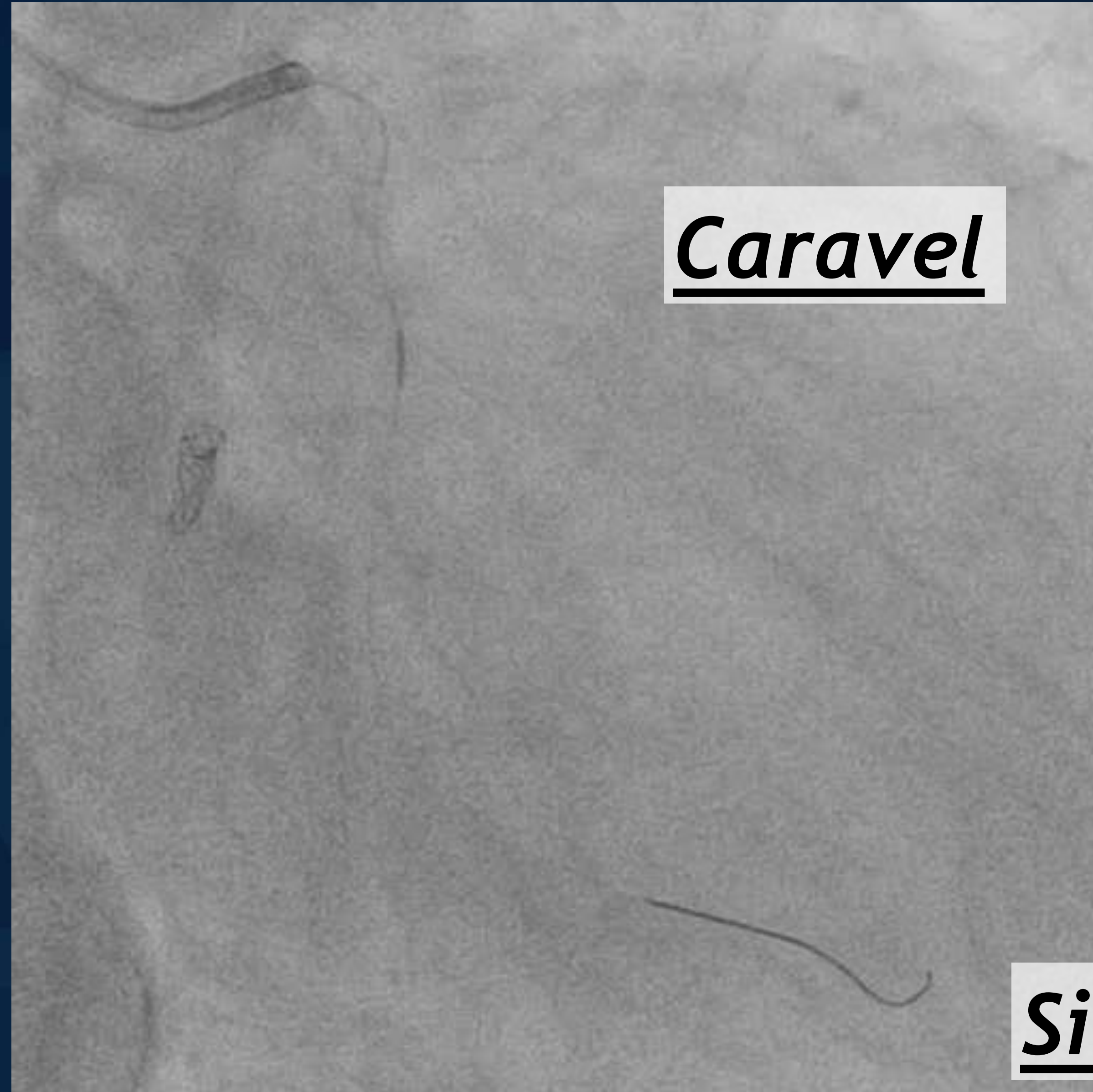
Case 2

Case2 : 70's-y-o-male



Target: LCx prox~mid 90%

Wire passed distal LCx



Caravel

Sion blue

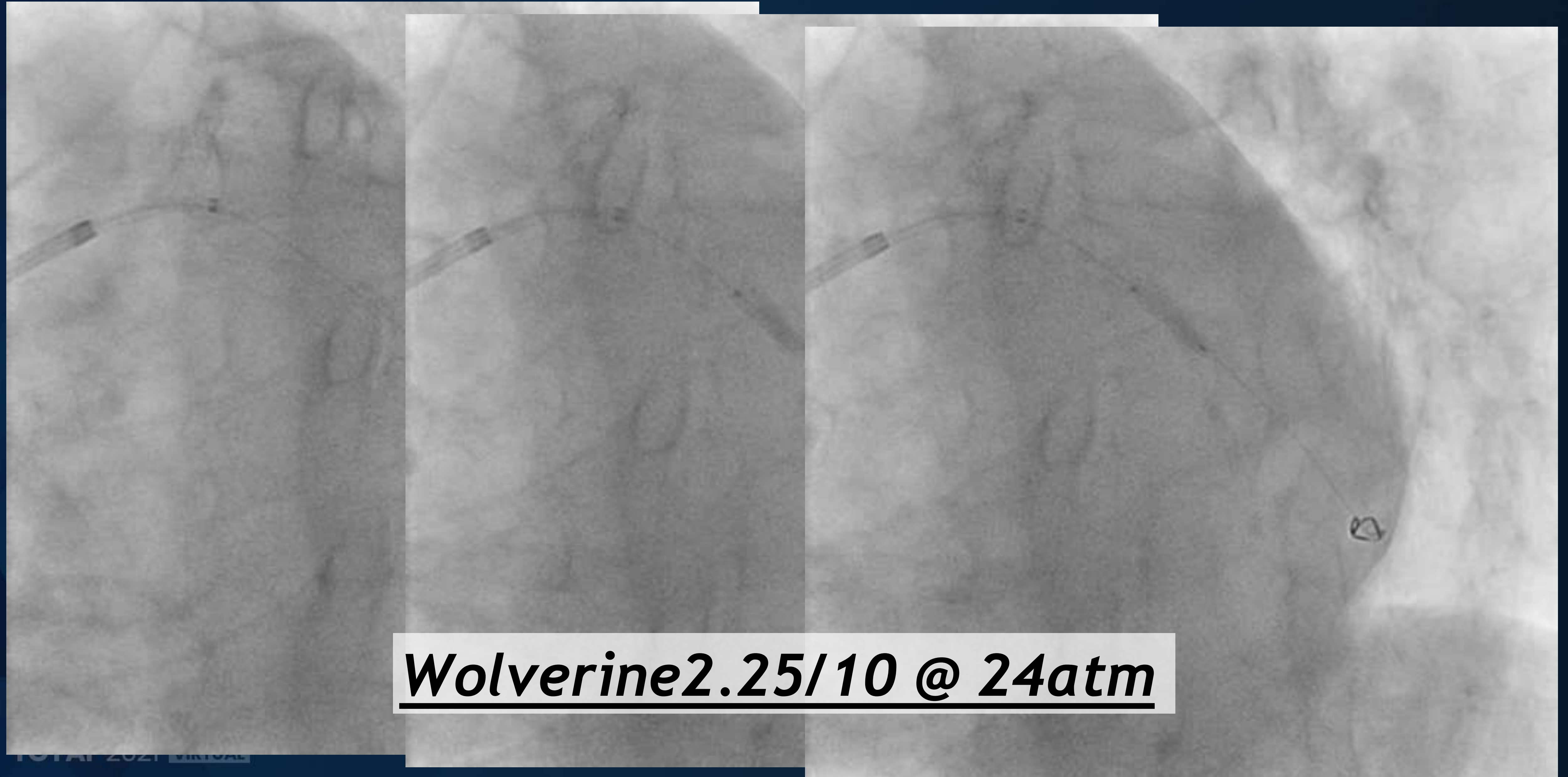
Rotablation with 1.25mm w/ 200000bpm

6Fr-GZ

II

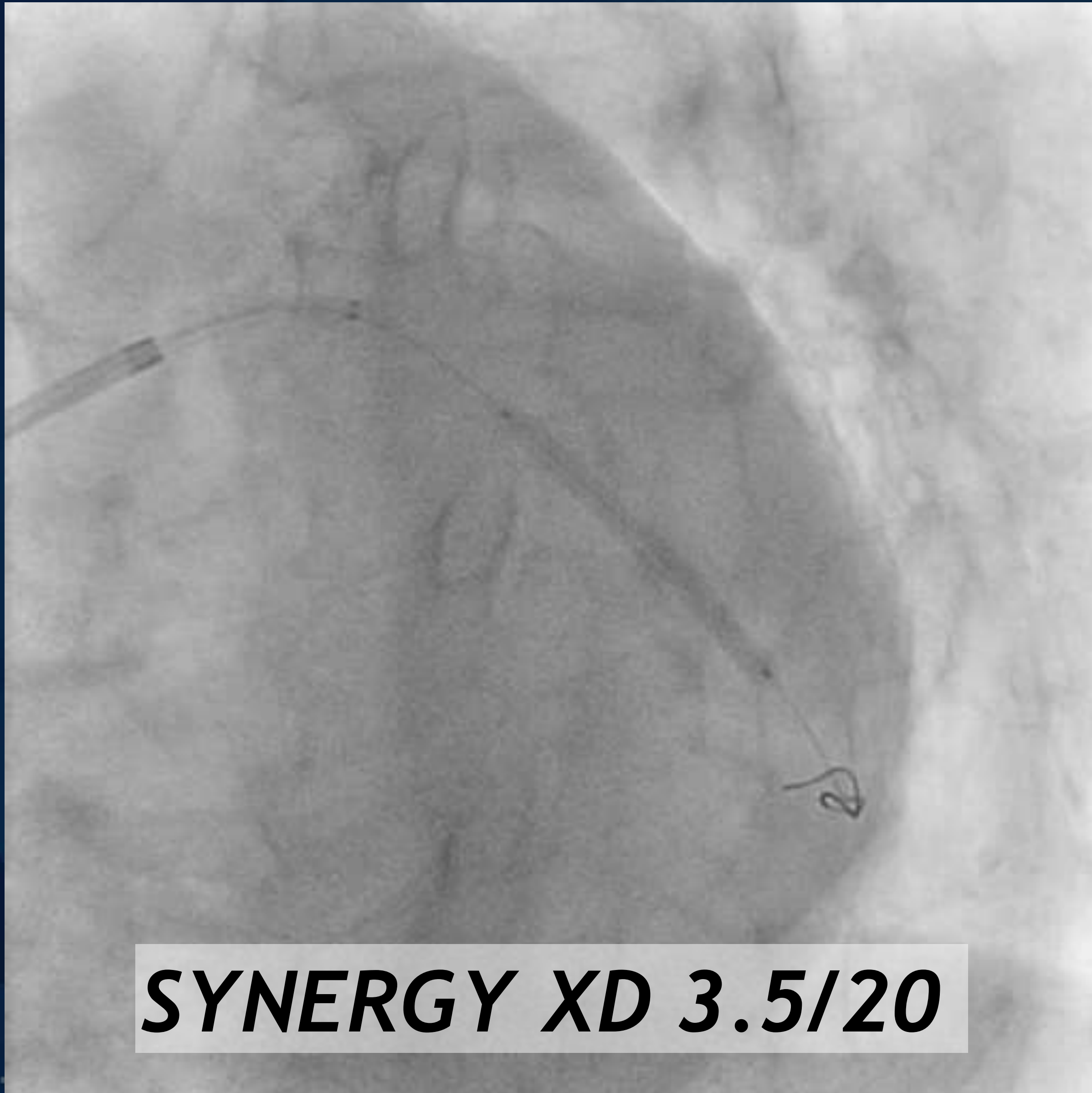
Rotafloppy

POBA

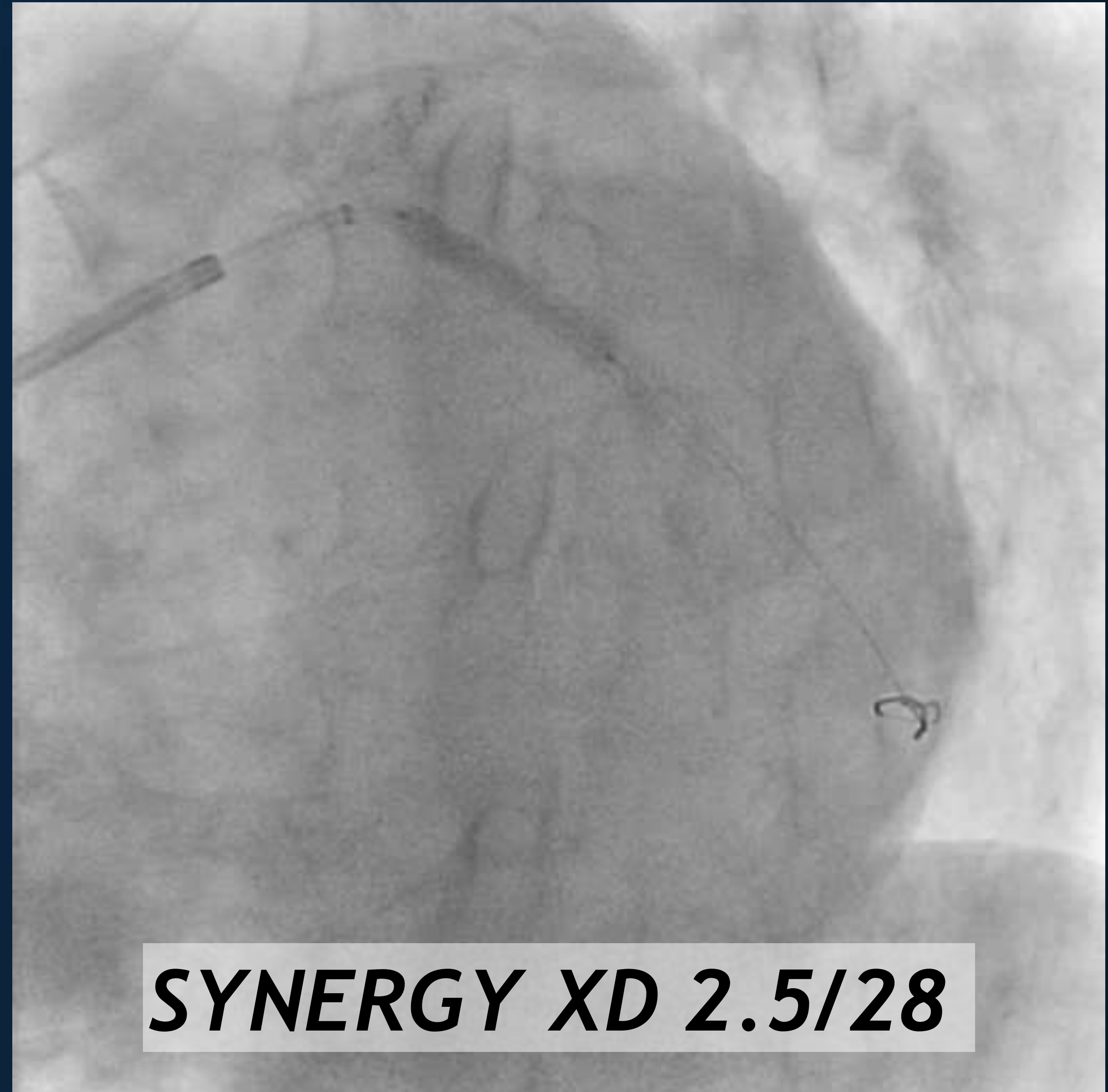


Wolverine 2.25/10 @ 24atm

SYNERGY XD implantation @ p/m-LCx



SYNERGY XD 3.5/20



SYNERGY XD 2.5/28

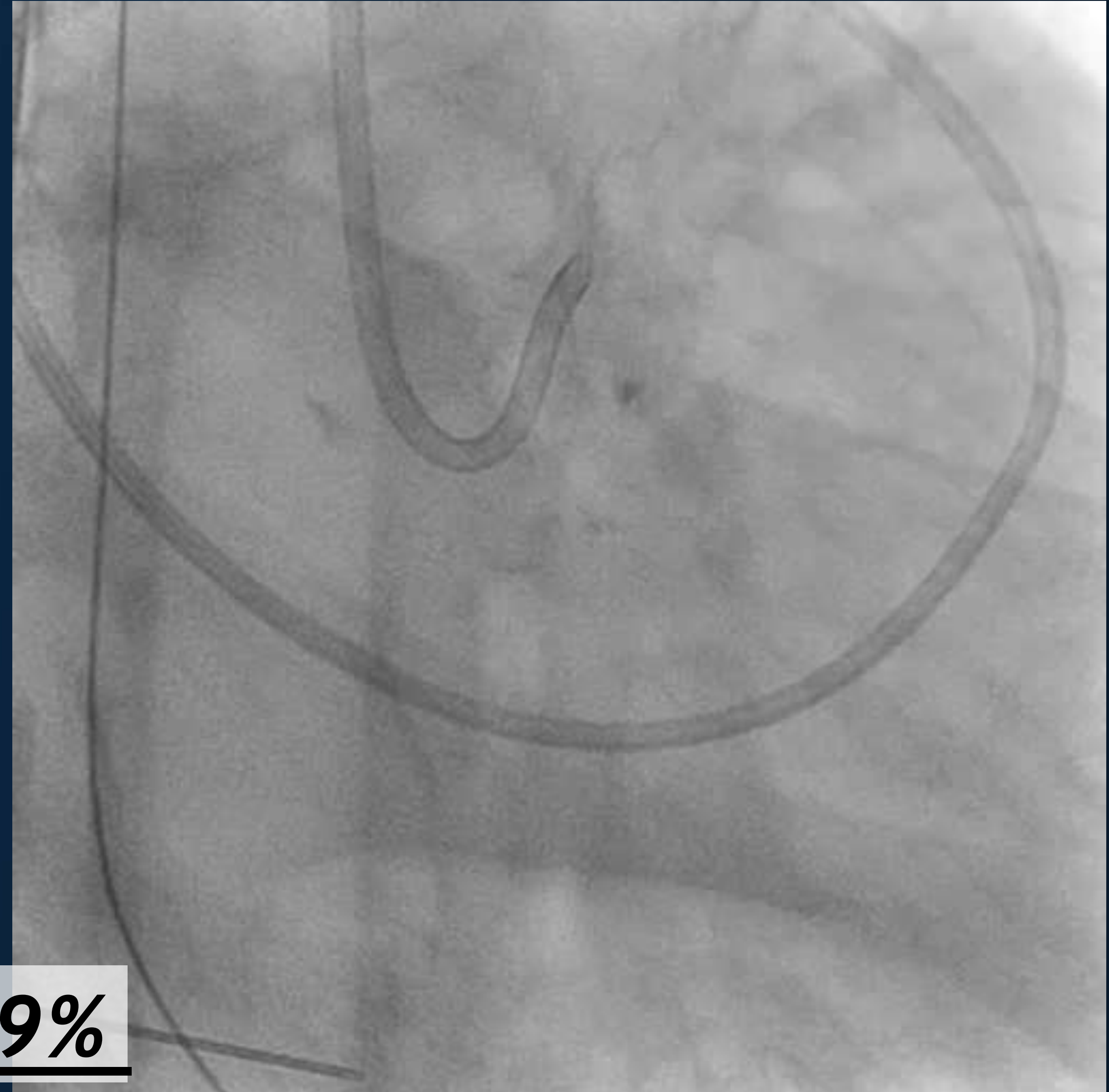
Final Angiography



Highly bended LCx was treated

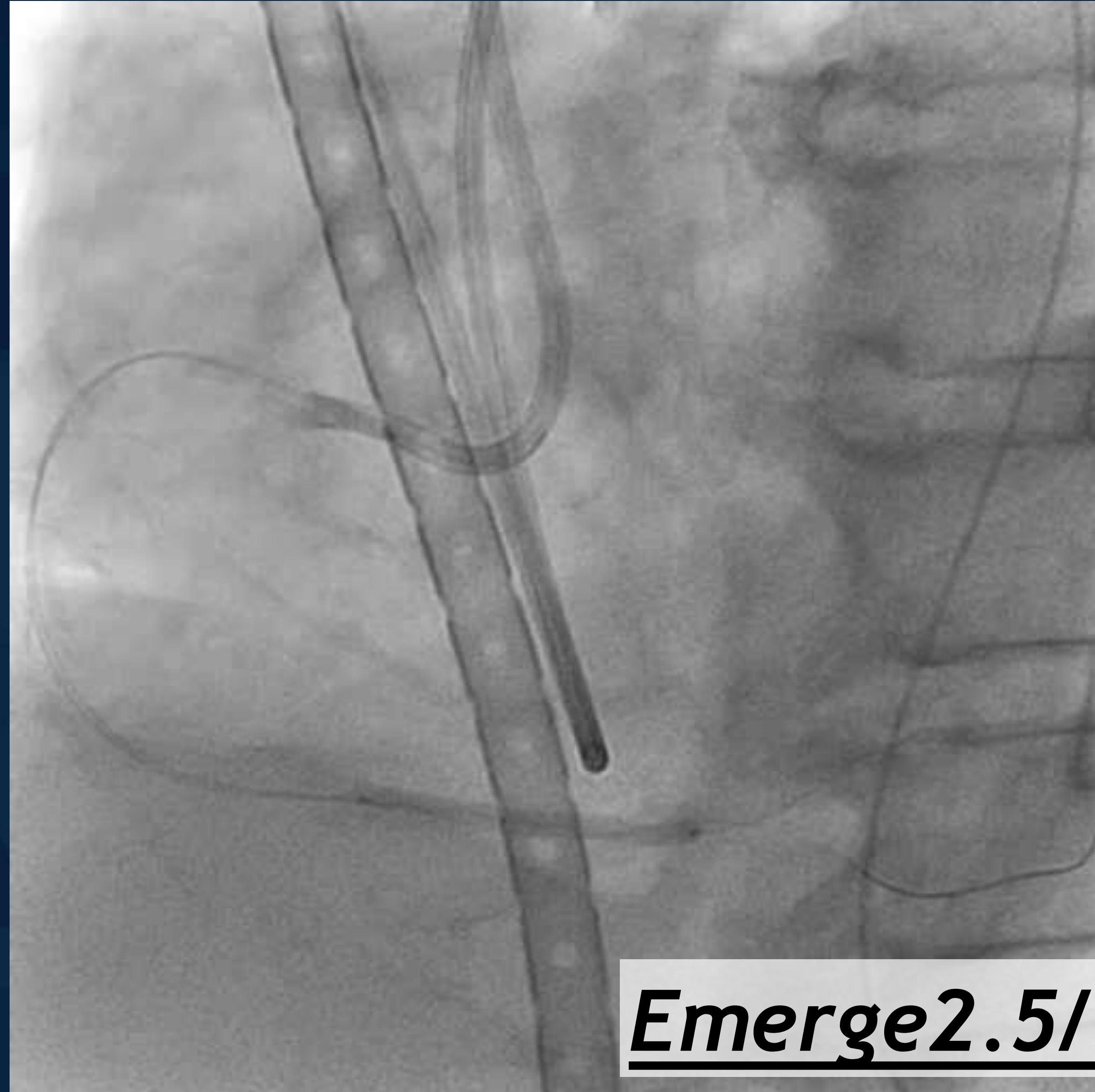
Case 3

Case3 : 50's-y-o-male



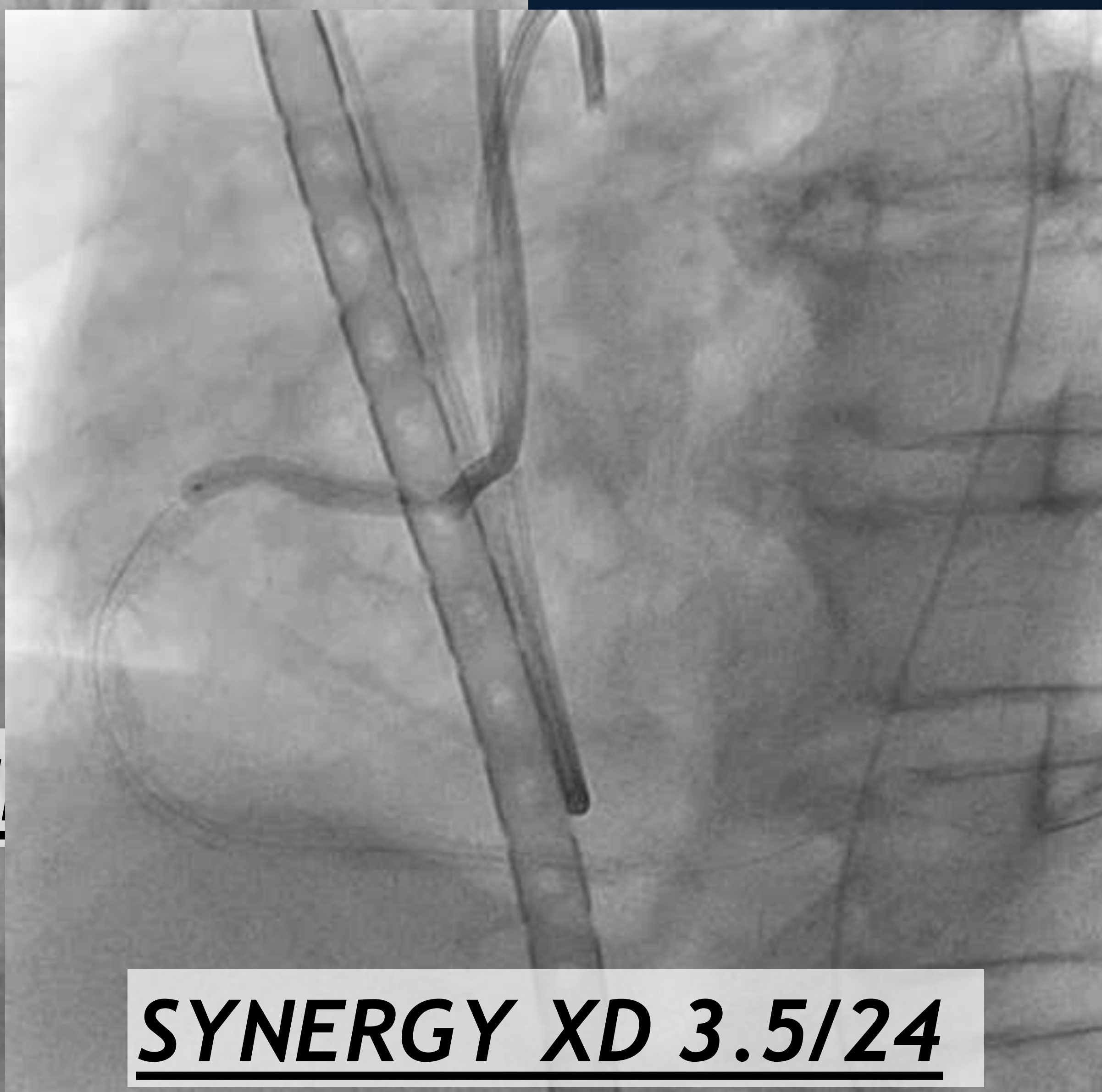
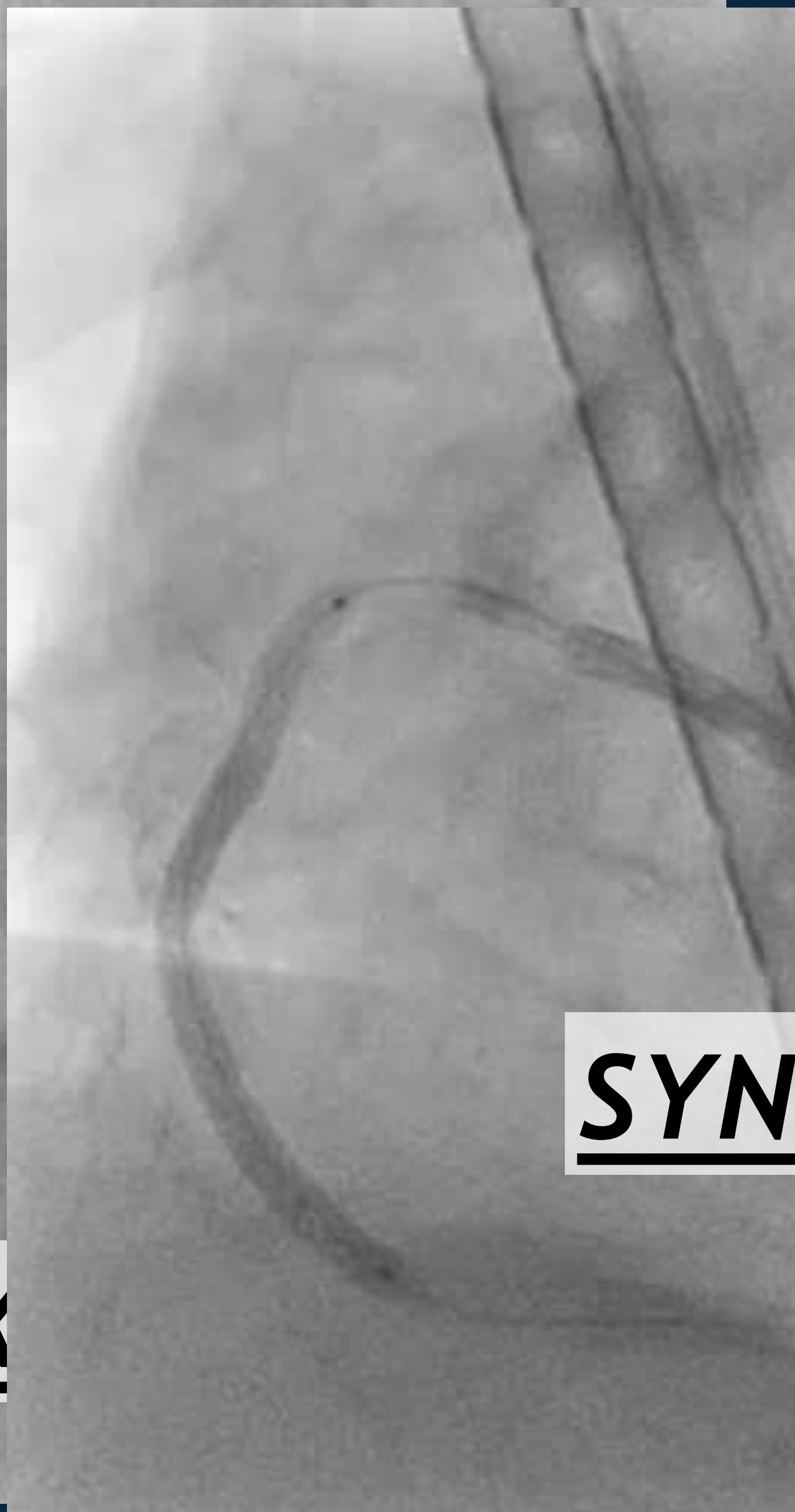
Target: RCA prox-mid 90-99%

POBA



Emerge2.5/30

SYNERGY XD implantation @ p/d—RCA



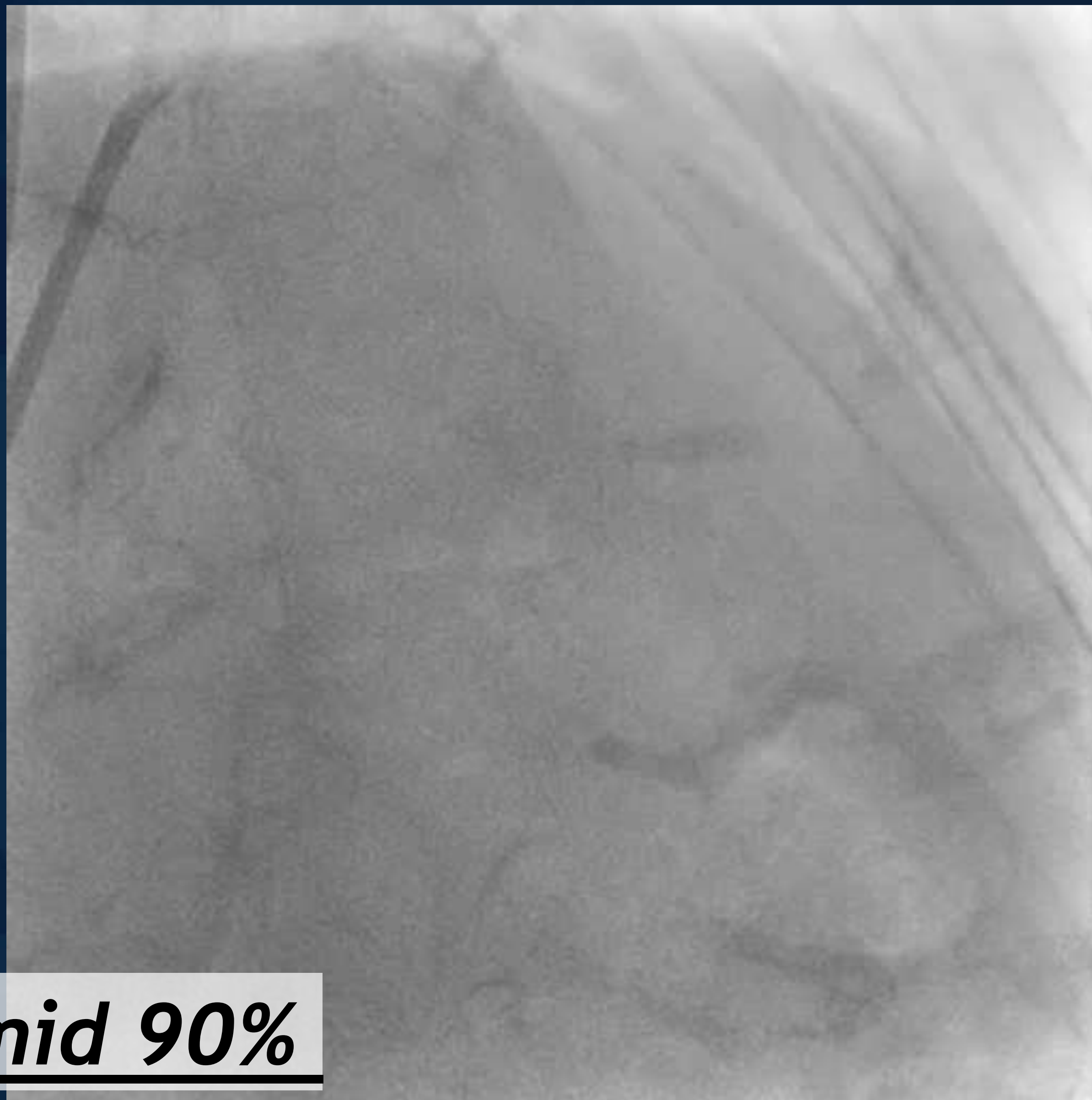
Final Angiography



Highly bended RCA was treated

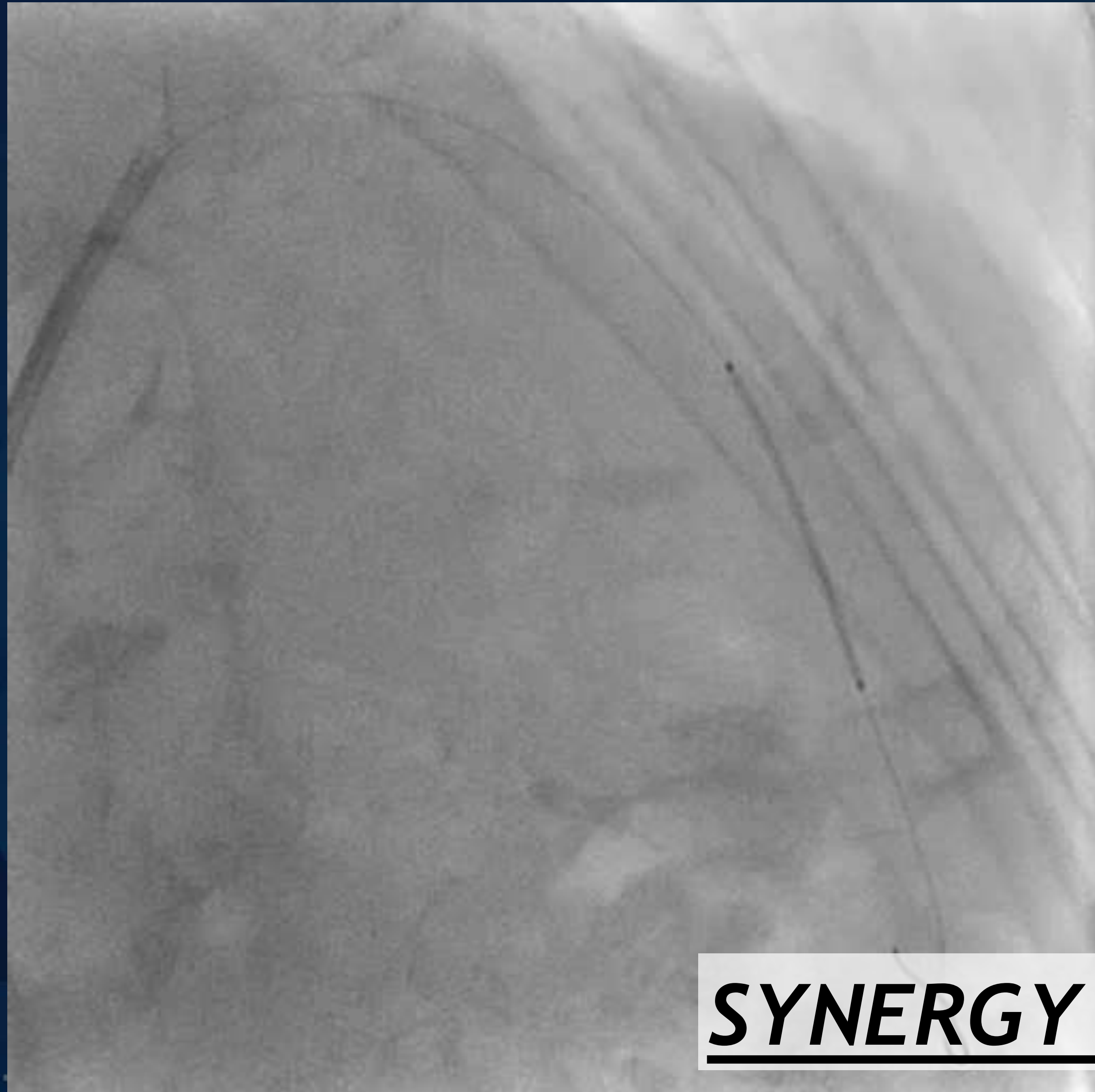
Case 4

Case4 : 80's-y-o-female



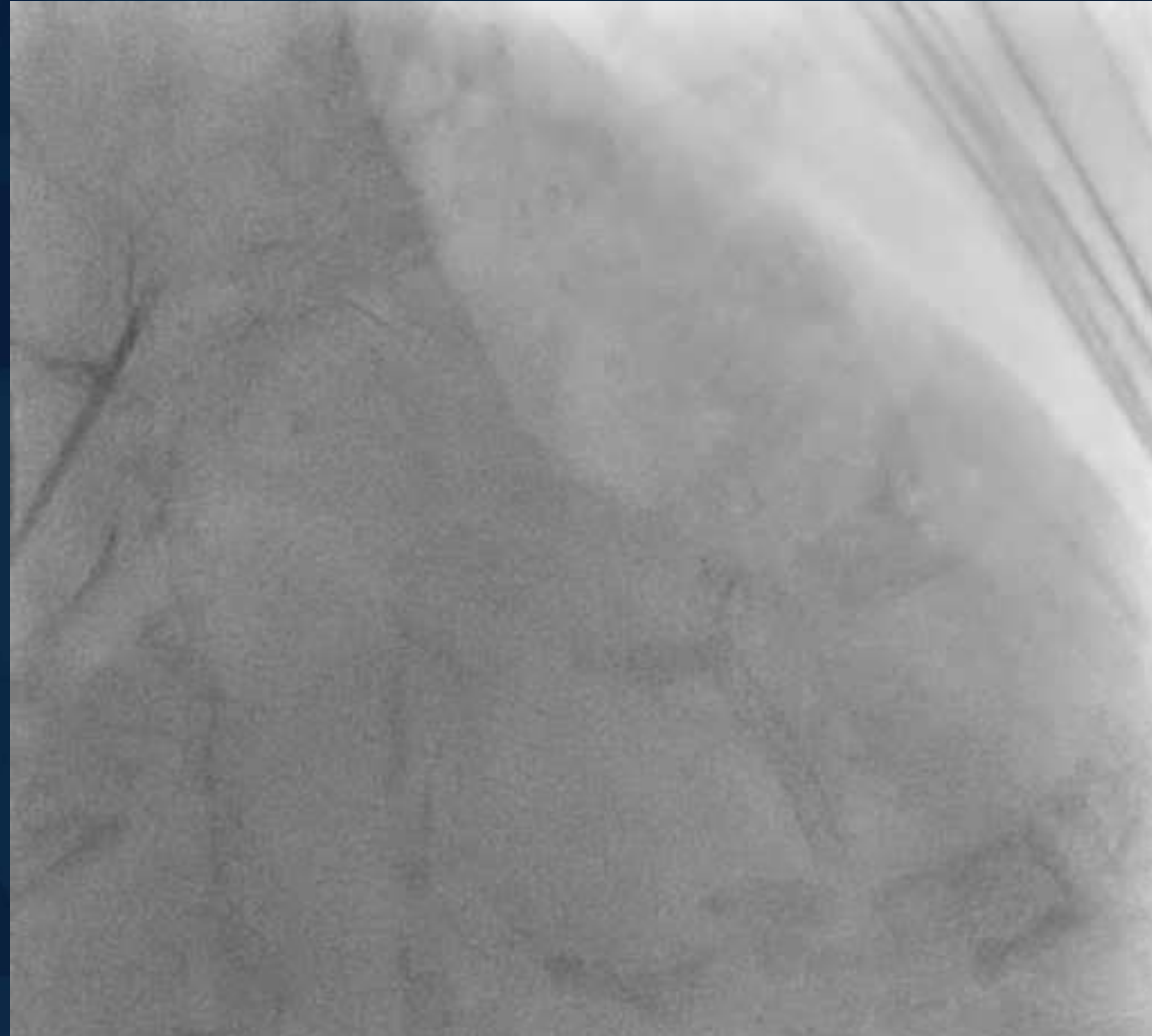
Target: LADmid 90%

SYNERGY XD implantation @ d-LAD



SYNERGY XD 3.0/38

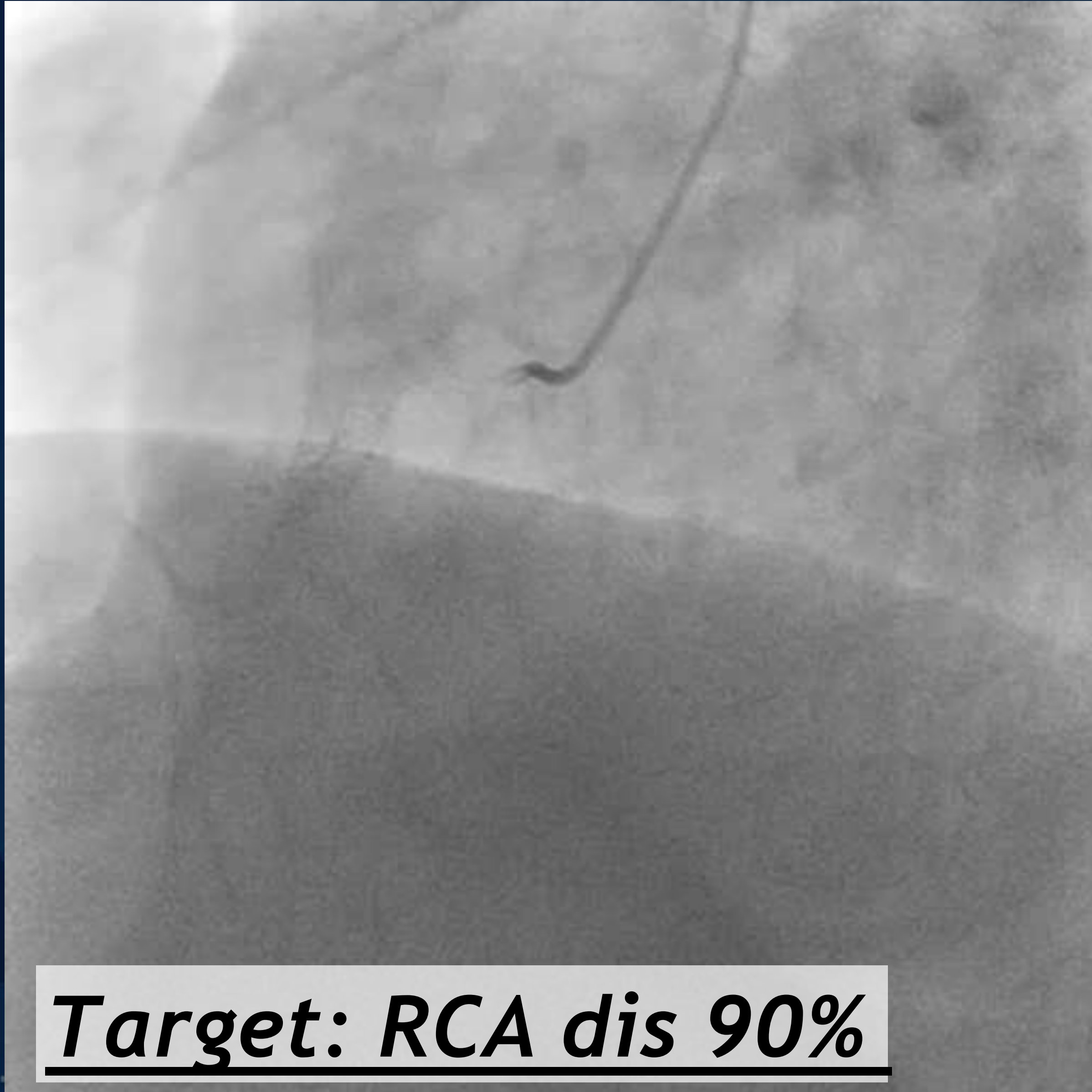
Final Angiography



Highly bended LAD was treated

Case 5

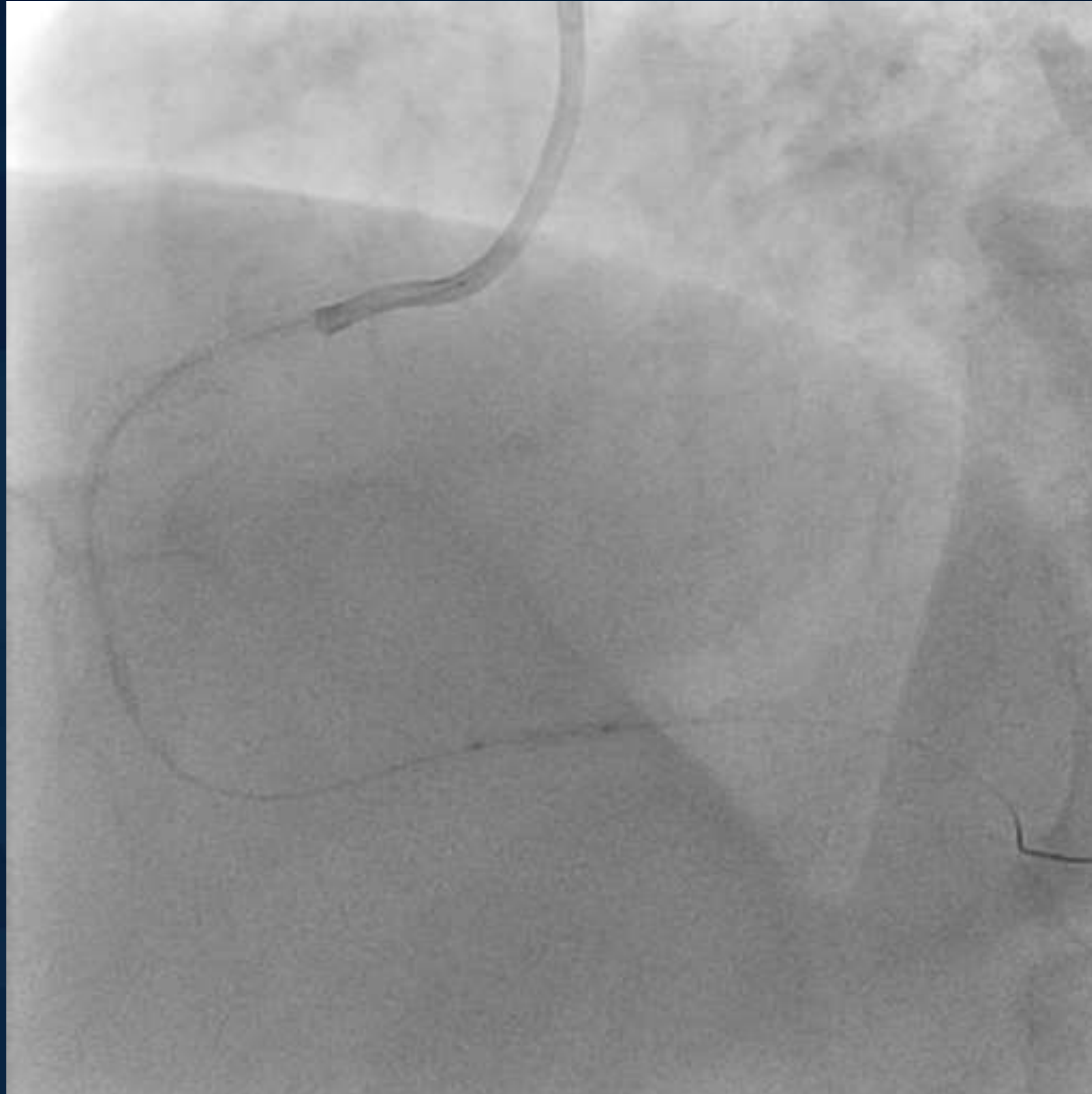
Case5 : 60's-y-o-male



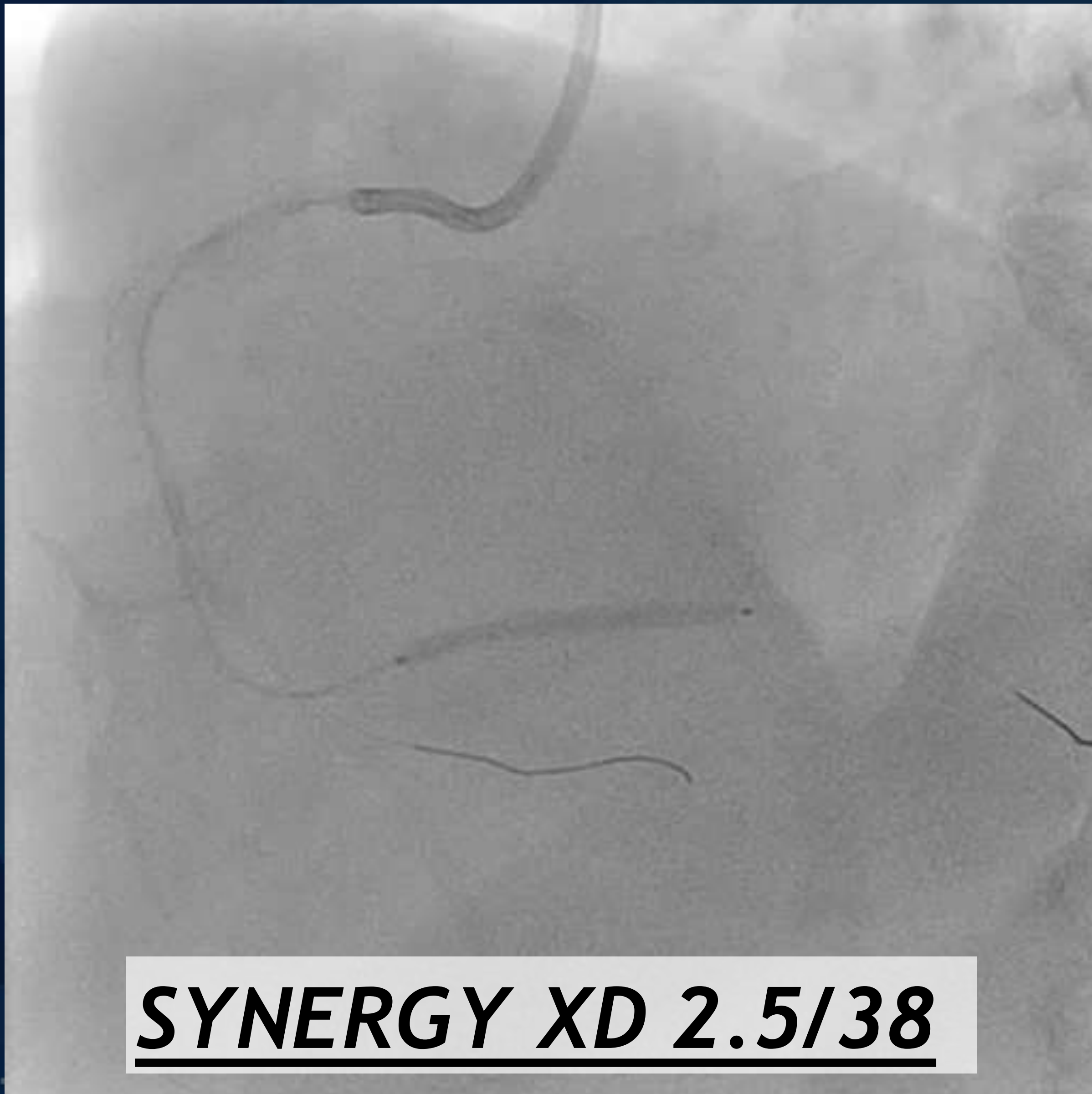
Target: RCA dis 90%



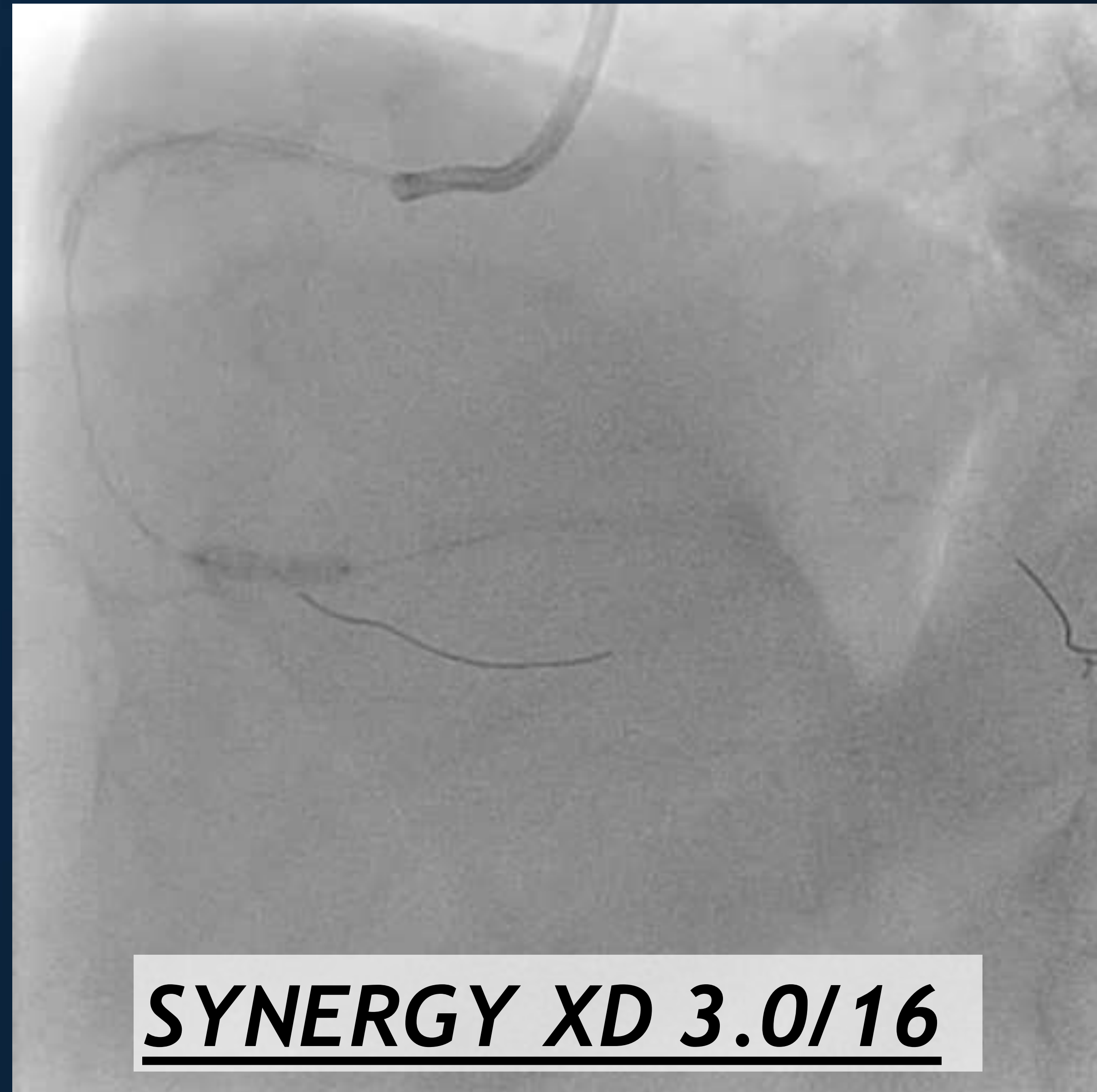
POBA



SYNERGY XD implantation @ m/d-RCA



SYNERGY XD 2.5/38



SYNERGY XD 3.0/16

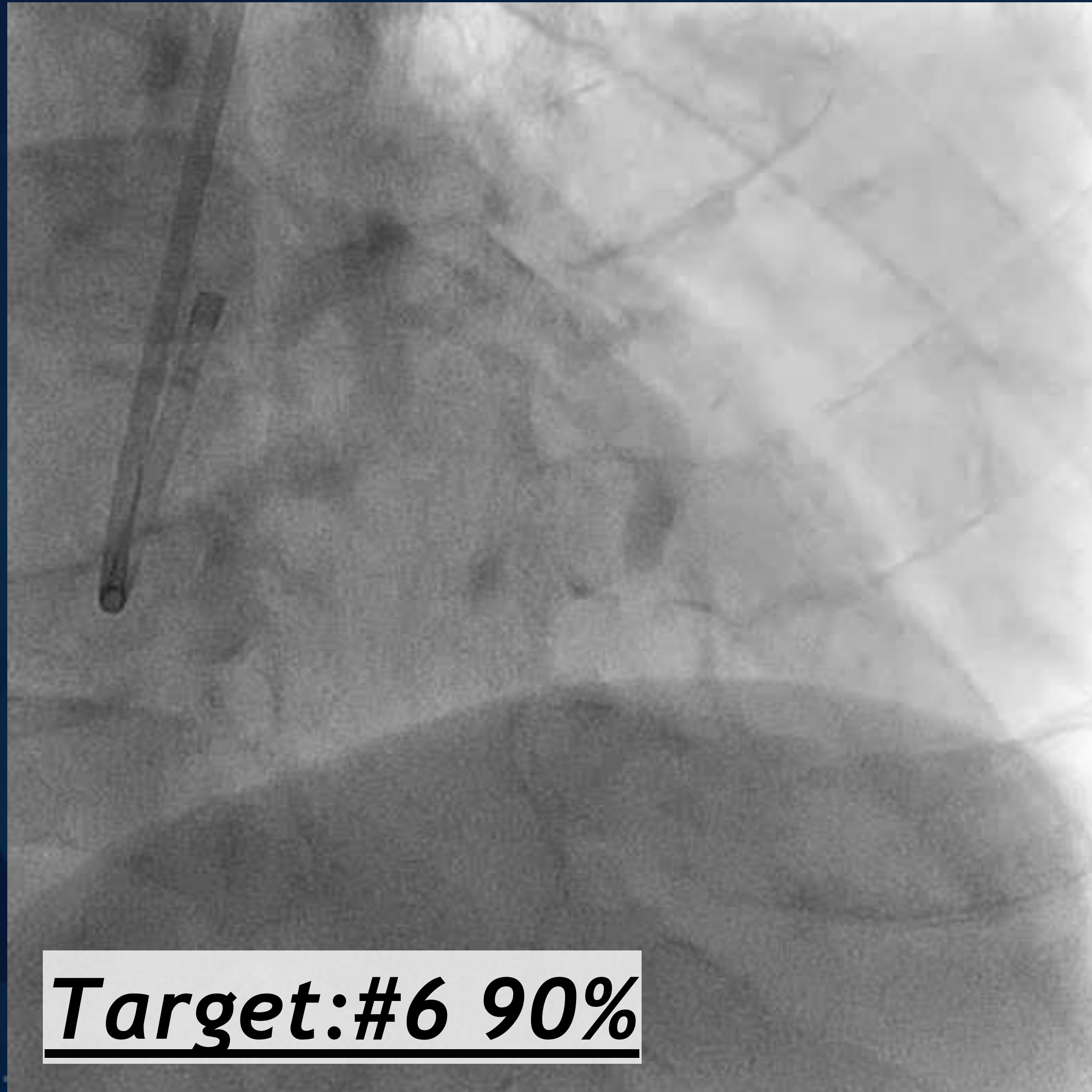
Final Angiography



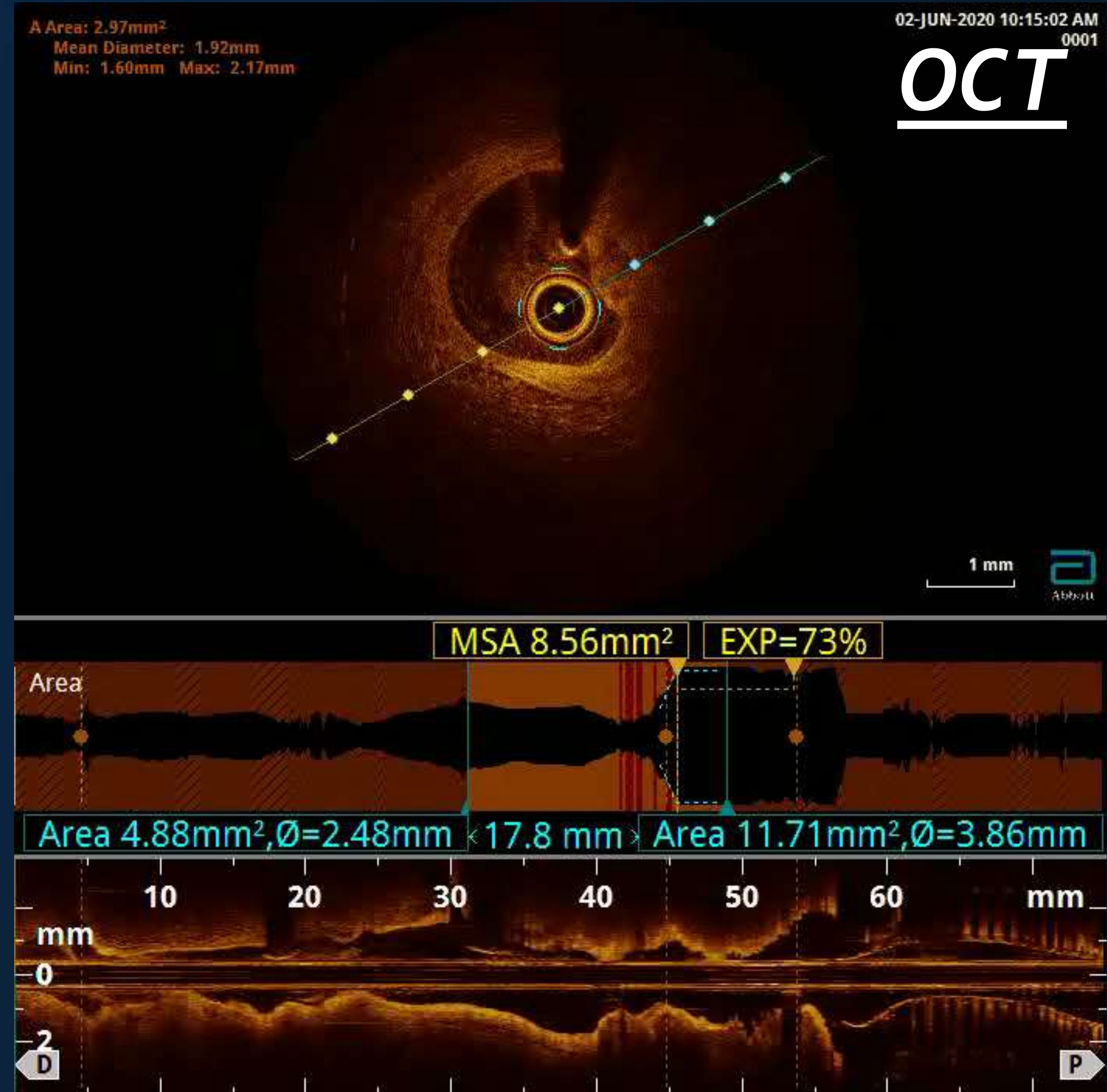
Highly bended RCA was treated

Case 6

Case 6 : 60's-y-o-male



Target: #6 90%



Rotablation



Rota 1.75mm @200000rpm
w/ Rota floppy

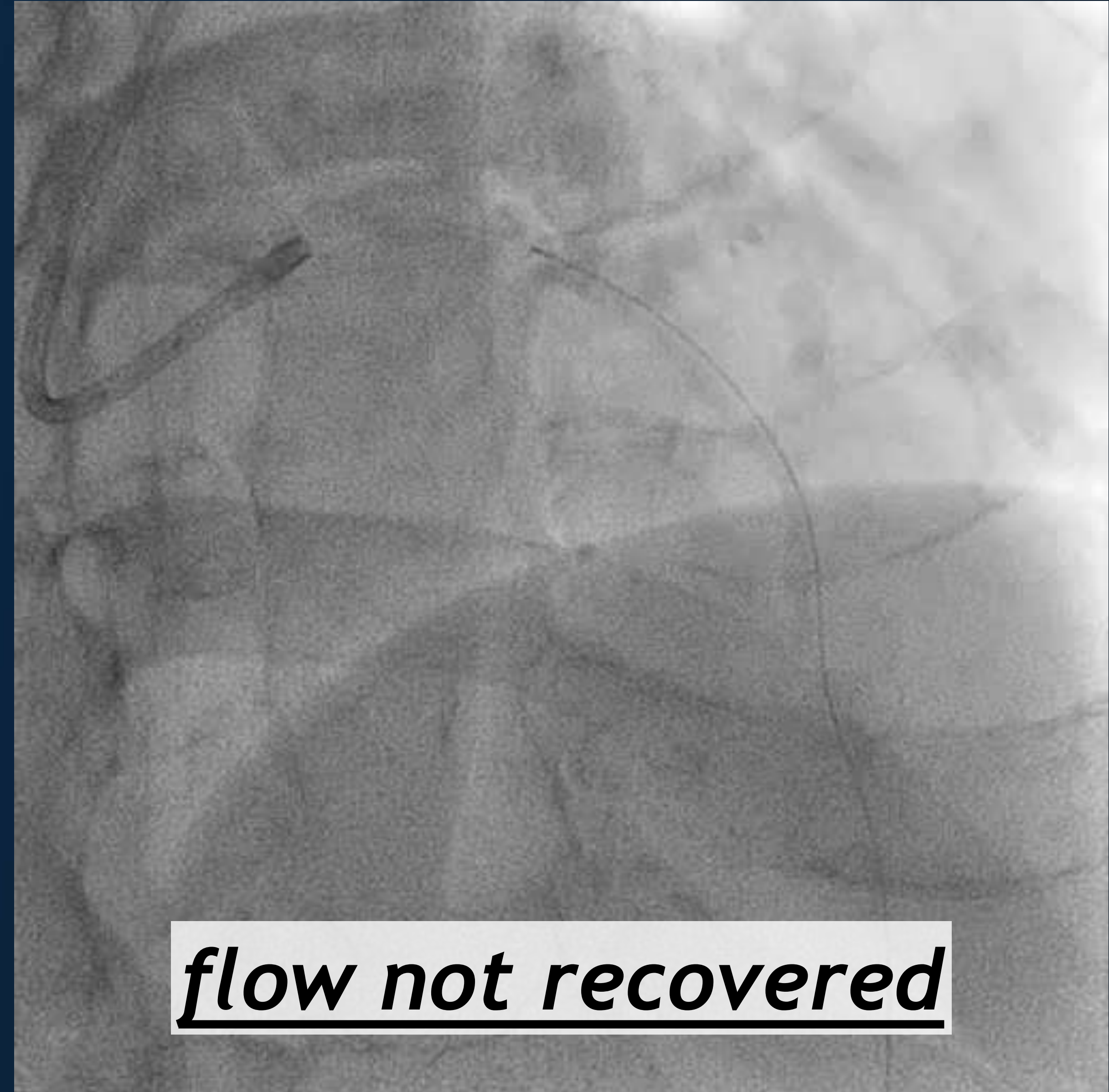
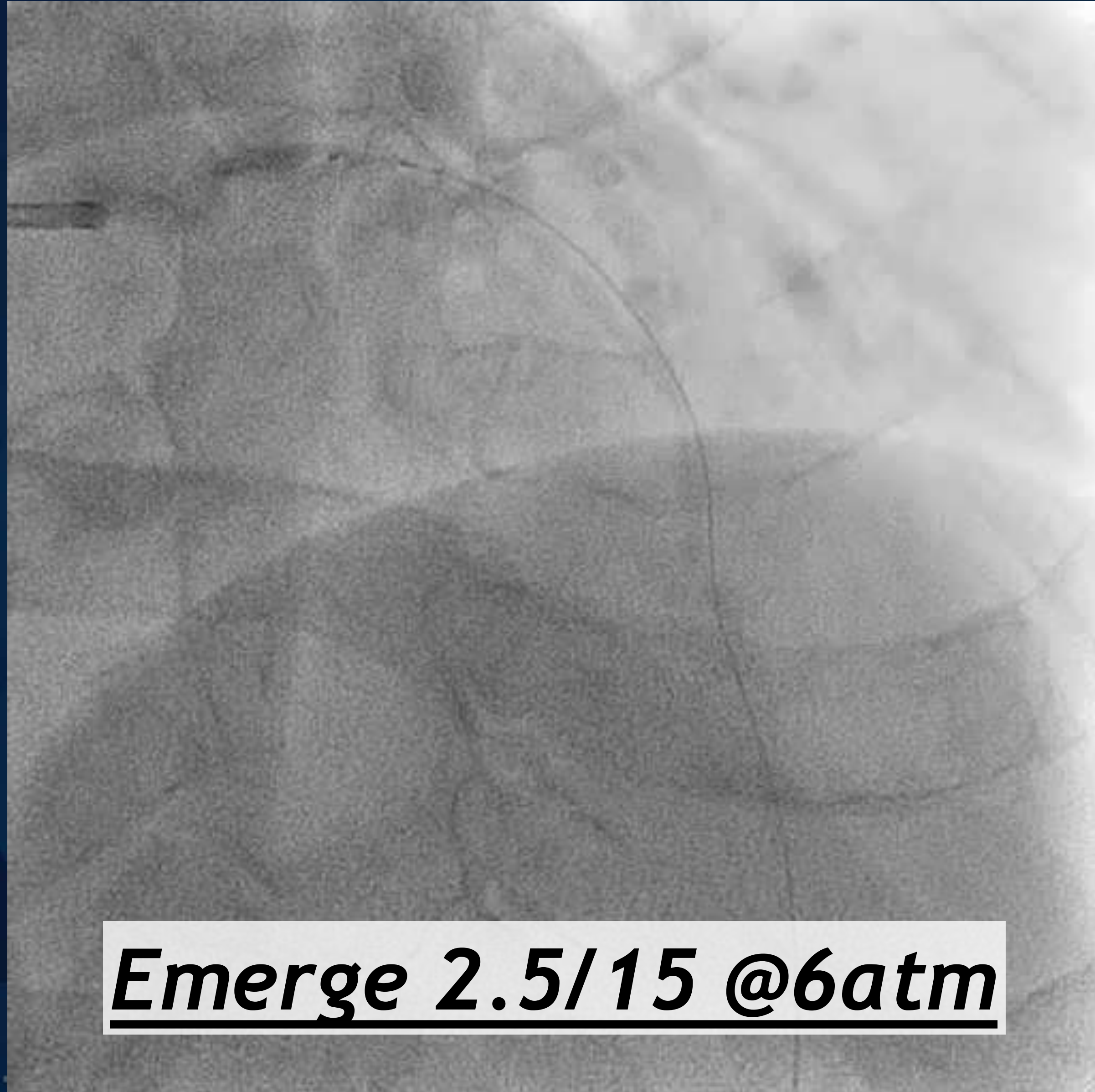
Complication



LMT no-reflow !!

→BP dropped immediately !!!

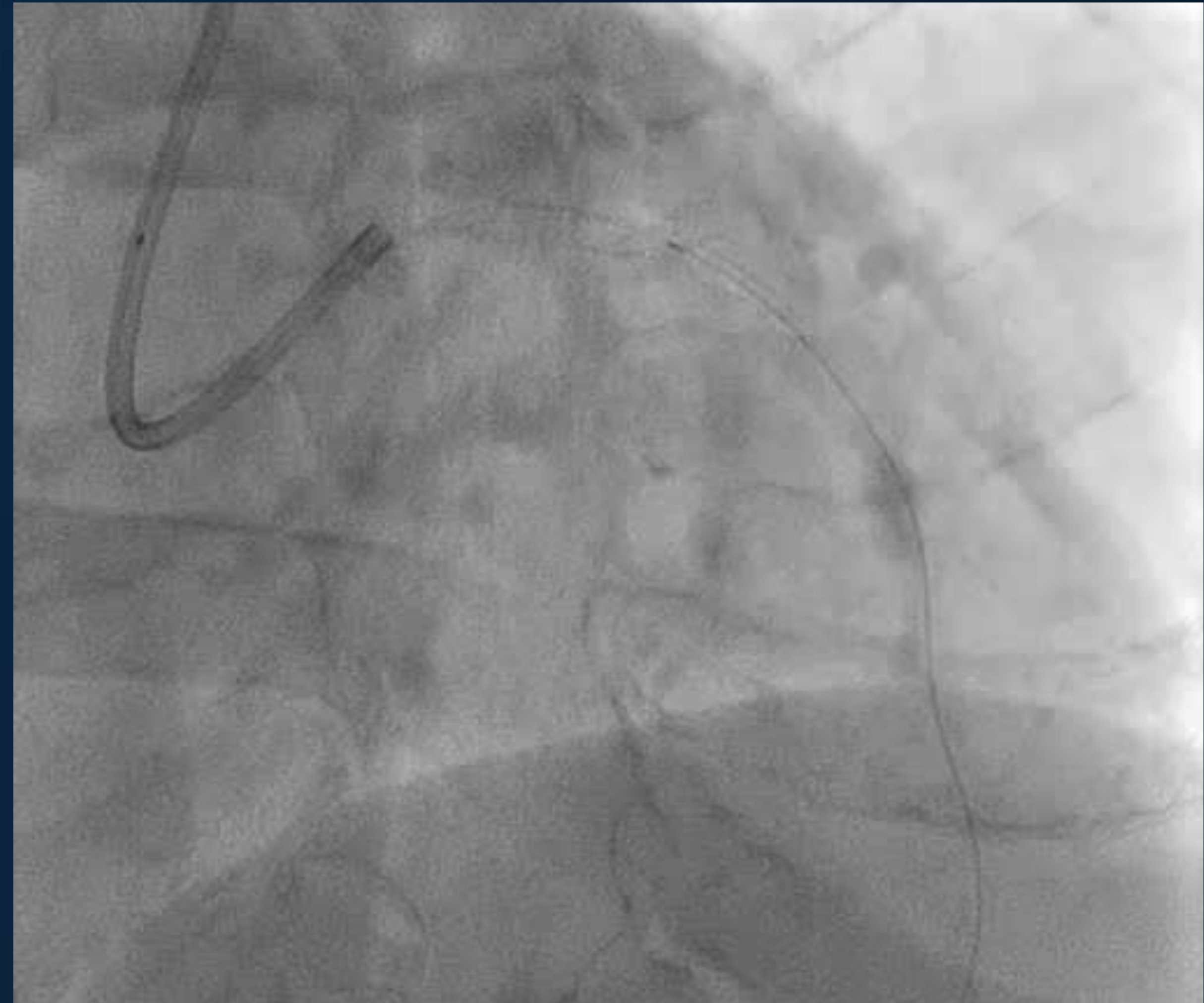
POBA



SYNERGY XD implantation @ LMT-LAD

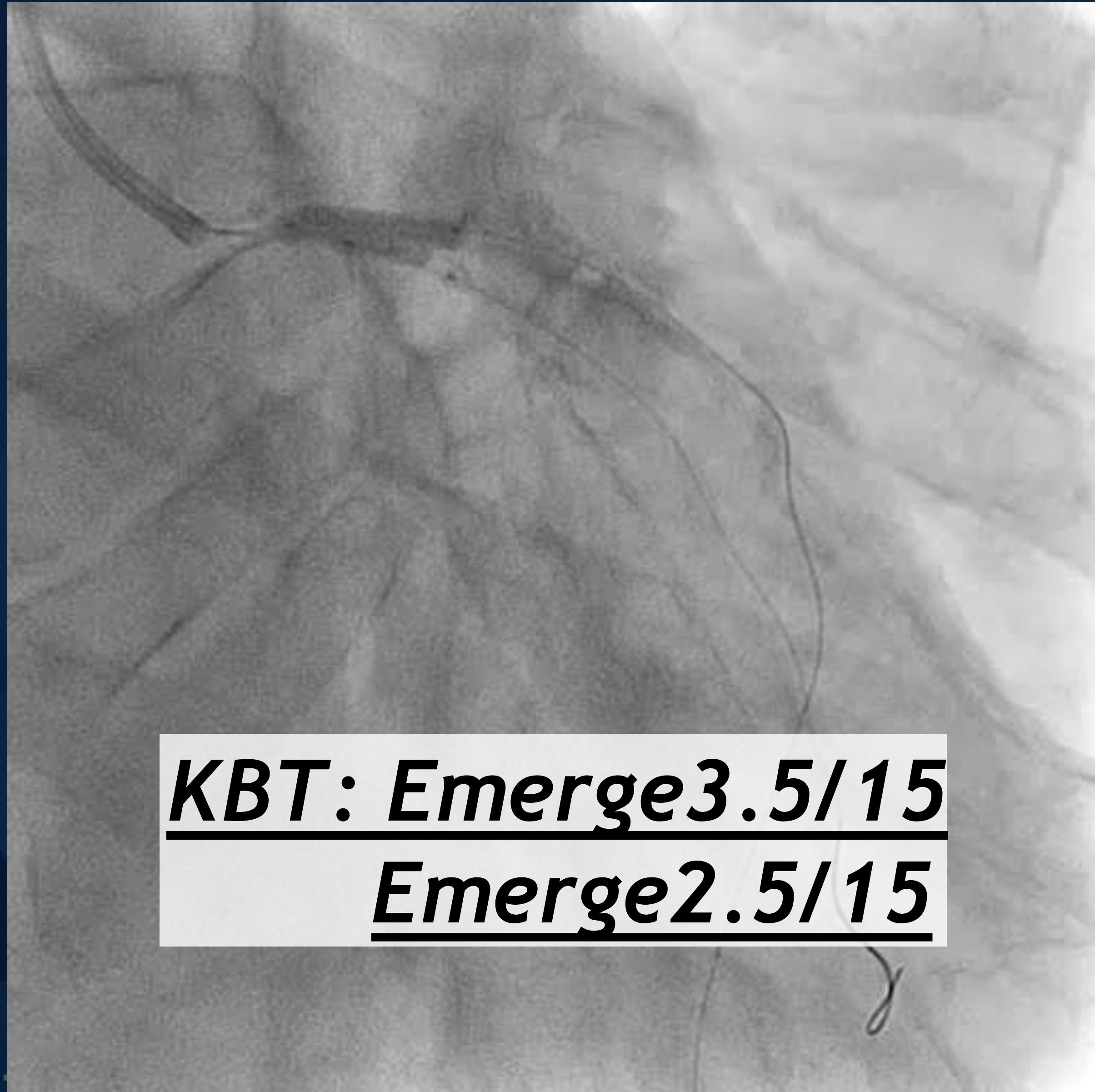


SYNERGY XD 3.5/38 @7atm



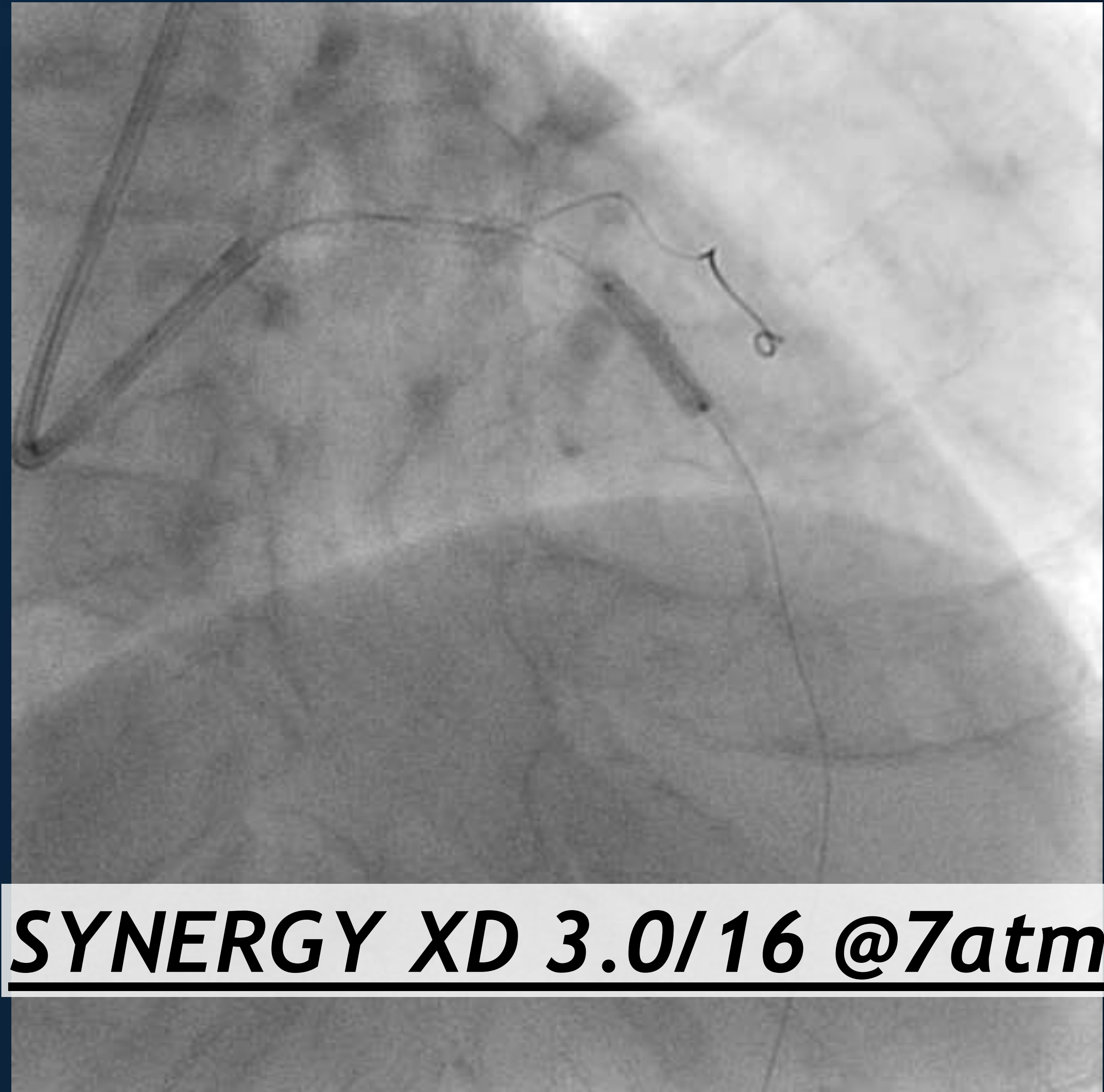
flow recovered !!

SYNERGY XD implantation @ m-LAD



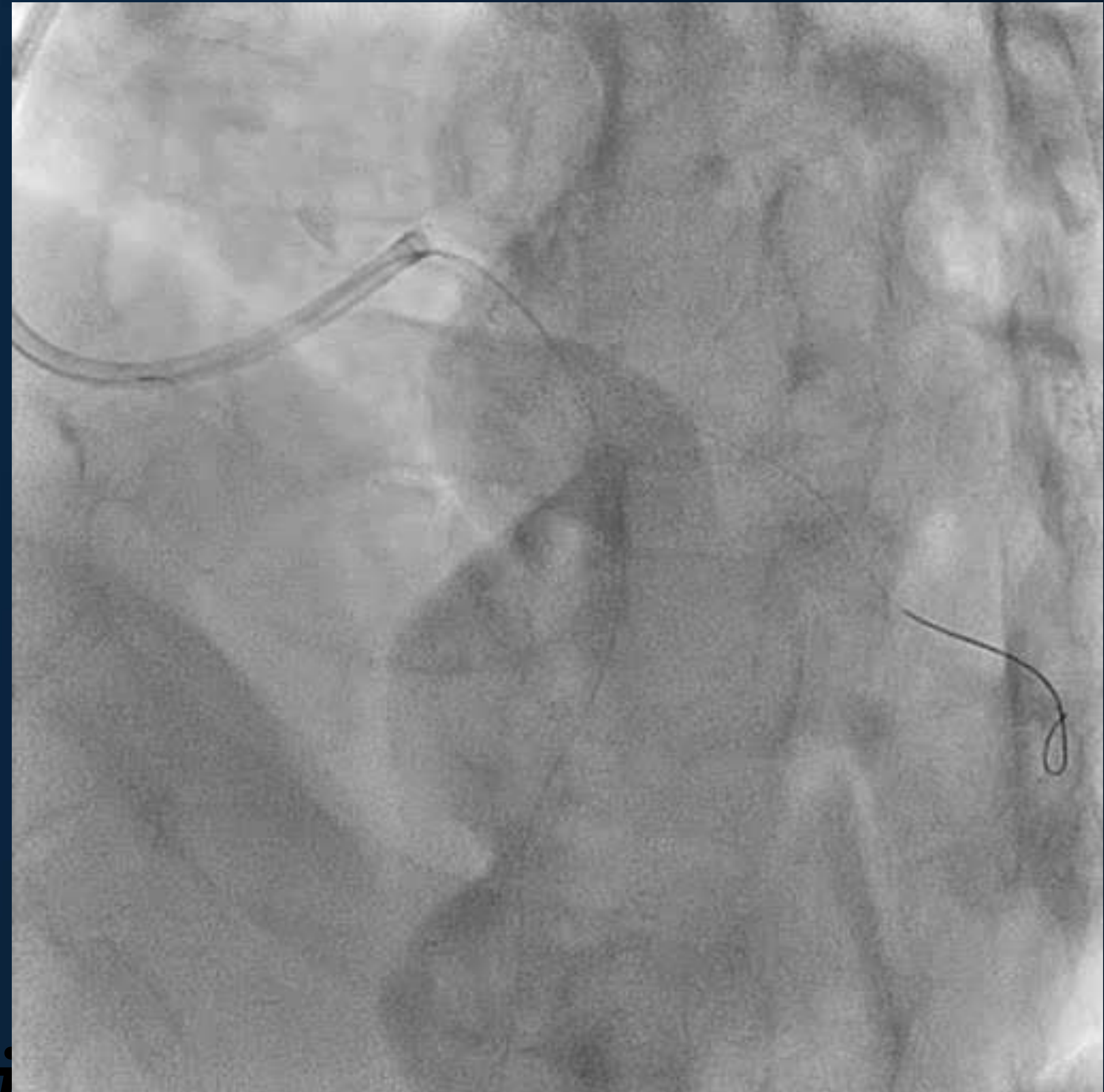
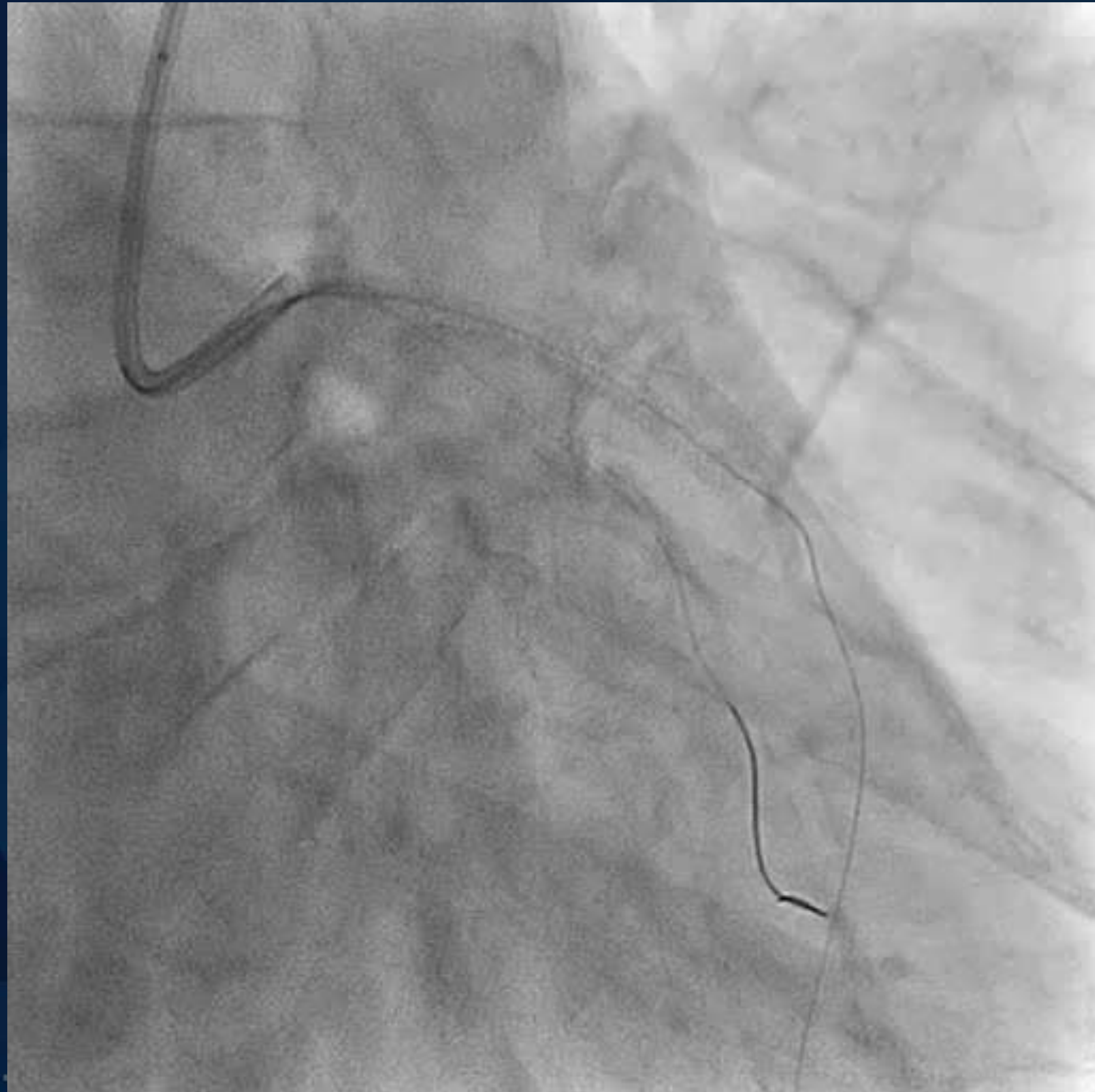
KBT: Emerge3.5/15

Emerge2.5/15



SYNERGY XD 3.0/16 @7atm

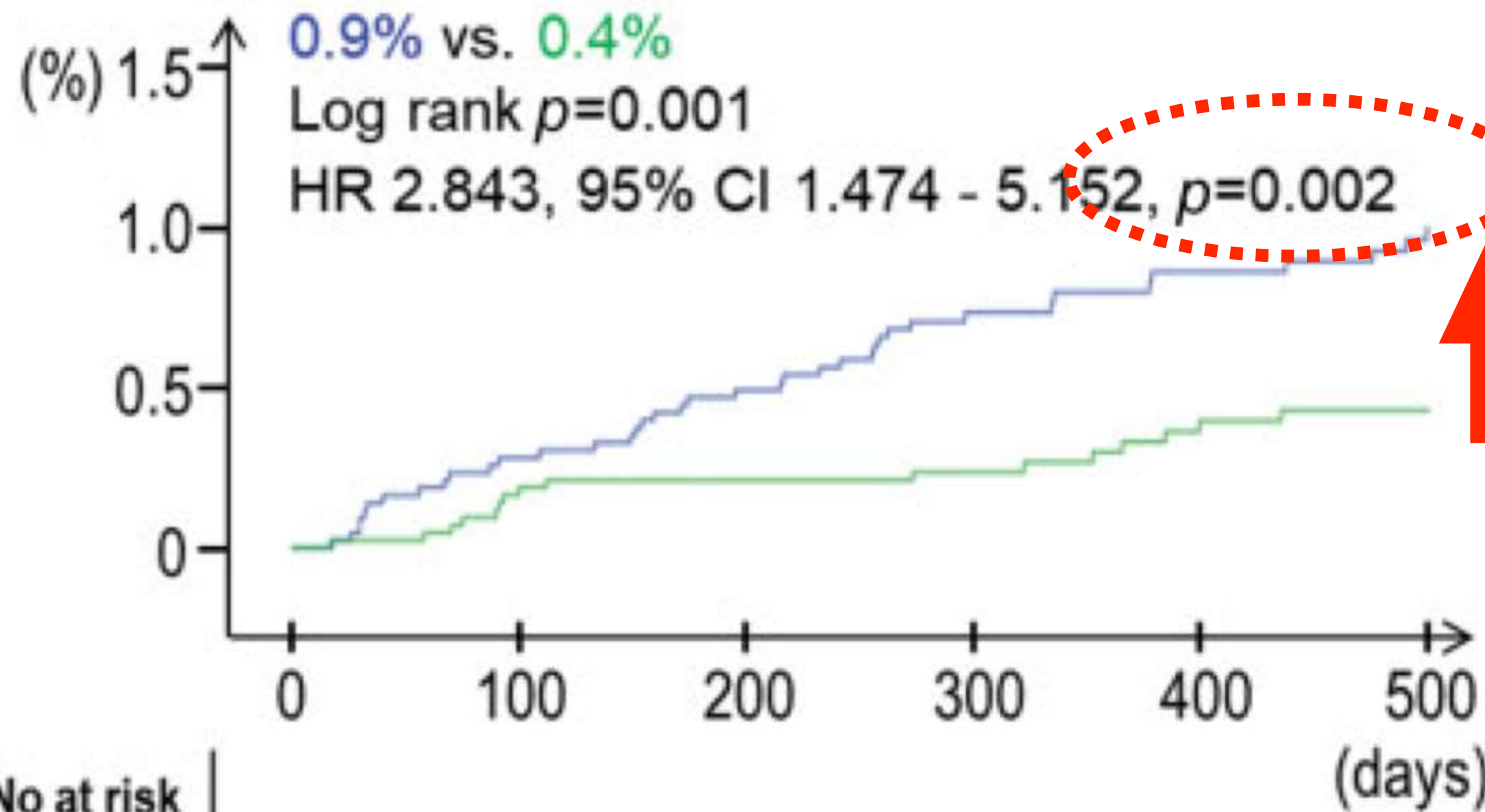
Final Angiography



***SYNERGY XD** succeeds the clinical data of SYNERGY*

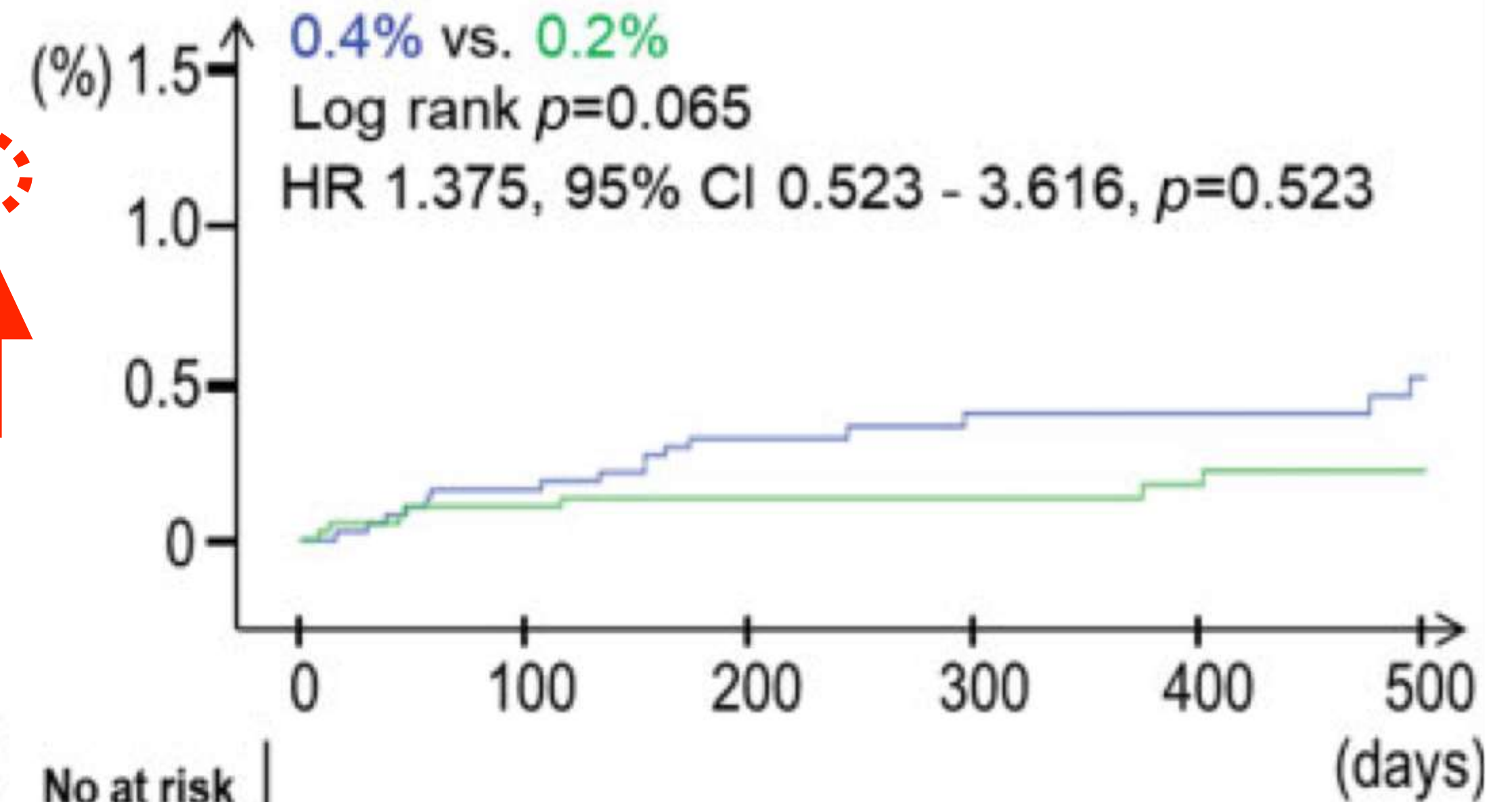
Bleeding risk during DAPT in East Asians

4. B East Asians



No at risk	0	100	200	300	400	500
Prolonged DAPT	4262	4227	4198	3297	3056	
SAPT	4238	4212	4183	3299	3021	

4. C Non-East Asians



No at risk	0	100	200	300	400	500
Prolonged DAPT	3768	3659	2668	2309	2233	
SAPT	3770	3671	2678	2346	2267	

Fig. 4 Bleeding outcomes by dual anti-platelet therapy (DAPT) duration. A Kaplan–Meier curve also showed that bleeding events were increased by prolonged DAPT in (A) the total population. However, when divided into race, prolonged DAPT only increased bleeding events only in (B) East Asians, whereas had no effect in (C) non-East Asians.

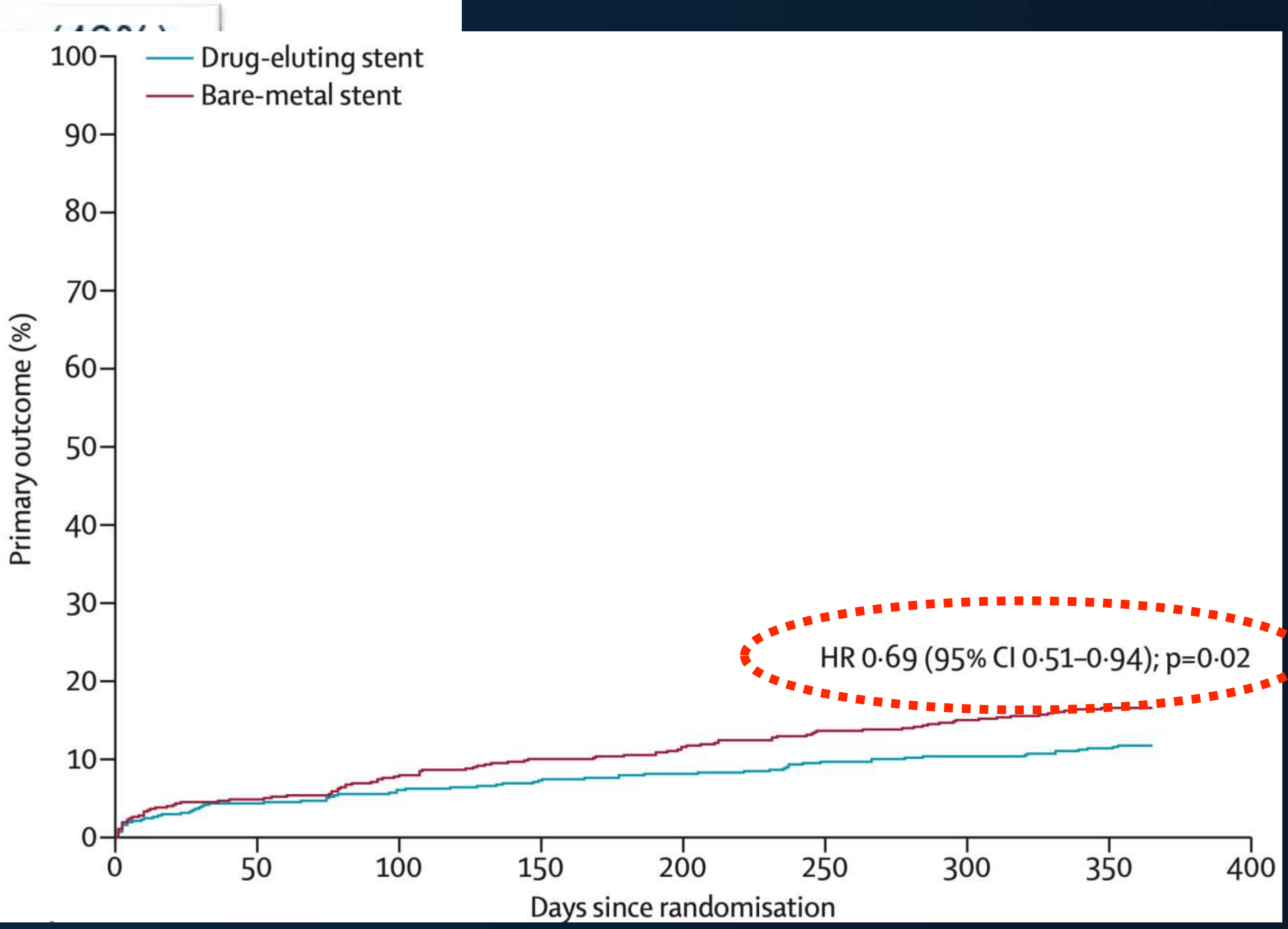
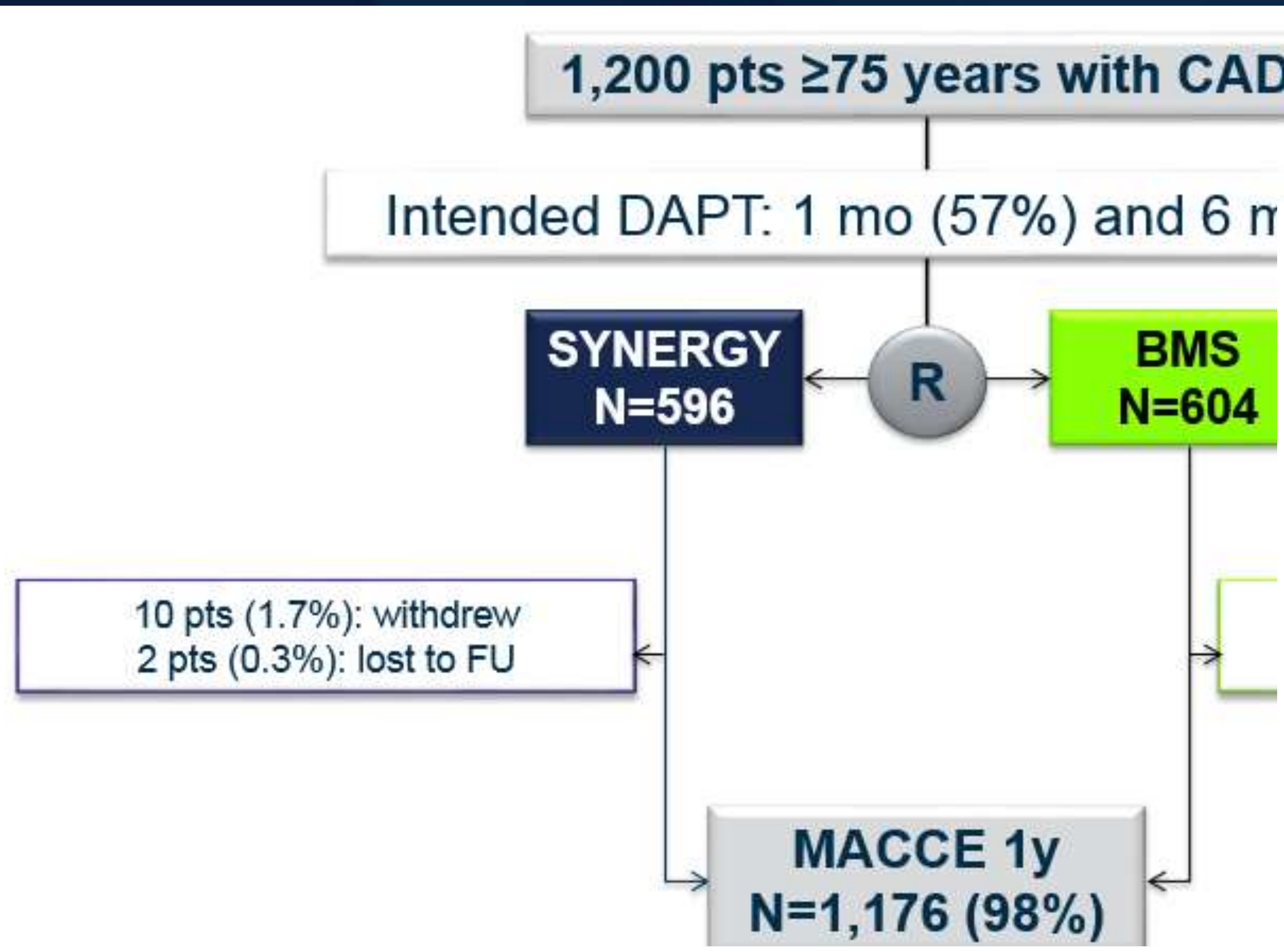
Safety of DES in HBR patient

ORIGINAL

Meta-analysis in coronaries

Characteristics	LEADERS-FREE 2015	SENIOR 2018	ZEUS-HBR 2016 ^a
Study type	Randomized, double-blind	Randomized, single-blind	Pre-specified analysis of randomized, single-blind study
Trial sites	68 (20 countries in 4 continents)	44 (9 countries in Europe)	20 (4 countries in Europe)
Number of patients randomized	2,432 (DES-1221 BMS-1211)	1,200 (DES-596 BMS-604)	828 (DES-424 BMS-404)
Inclusion criteria	High bleeding risk	Age ≥75 years	High bleeding risk ^a
Randomization	1:1	1:1	1:1
Type of stents	BioFreedom polymer-free umirolimus-coated stent vs similar BMS	Synergy bioabsorbable polymer DES vs thin-strut BMS ^b	Endeavor zotarolimus eluting stent vs thin-strut BMS ^b
1 year follow up	98% in both groups	98% in both groups	99% in both groups
Primary endpoint	Cardiovascular mortality, myocardial infarction, or stent thrombosis	All-cause mortality, MI, stroke, or ischemia-driven TLR	All-cause mortality, MI, or any TVR
Myocardial infraction	Spontaneous or peri-procedural	Spontaneous or peri-procedural	Spontaneous or peri-procedural
Statistical analysis	Modified intention-to-treat analysis	Intention to treat analysis	Intention-to-treat analysis
Antiplatelet therapy	Aspirin and clopidogrel for 1 month followed by monotherapy ^c	DAPT with aspirin and P2Y12 inhibitor for 1 month for stable presentation and 6 months for unstable presentation	DAPT with aspirin and a P2Y12 inhibitor for 1 month followed by monotherapy

SYNERGY with HBR patients in SENIOR trial



Summary of SYNERGY XD

Deliverability for TRI

Improvement of deliverability according to better pushability and trackability during TRI.

eXtra
Deliverability

Delivering More

Xtra TRI Deliverability. Optimal Healing.

Clinical Data of SYNERGY was took over

eXceptional
stent Design

eXcellent
clinical Data

Flexible stent design of SYNERGY was took over, and 48mm long stent covers diffuse long lesion.



Summary of SYNERGY XD

Deliverability for TRI

Improvement of deliverability according to better trackability and trackability

For a case with poor backup due to highly bended subclavian artery.

Delivering More

Xtra TRI Deliverability. Optimal Healing.

Clinical Data of SYNERGY was took over

For a case with diffuse long lesion.

For a case with HBR patients.

Flexible stent design of SYNERGY was took over, and 48mm long stent covers diffuse long lesion.





Takuma Tsuda, MD, PhD.
*Department of Cardiology,
Nagoya Ekisaikai Hospital*