Repousser les frontières de la radiale ?: utiliser un “sheathless” !

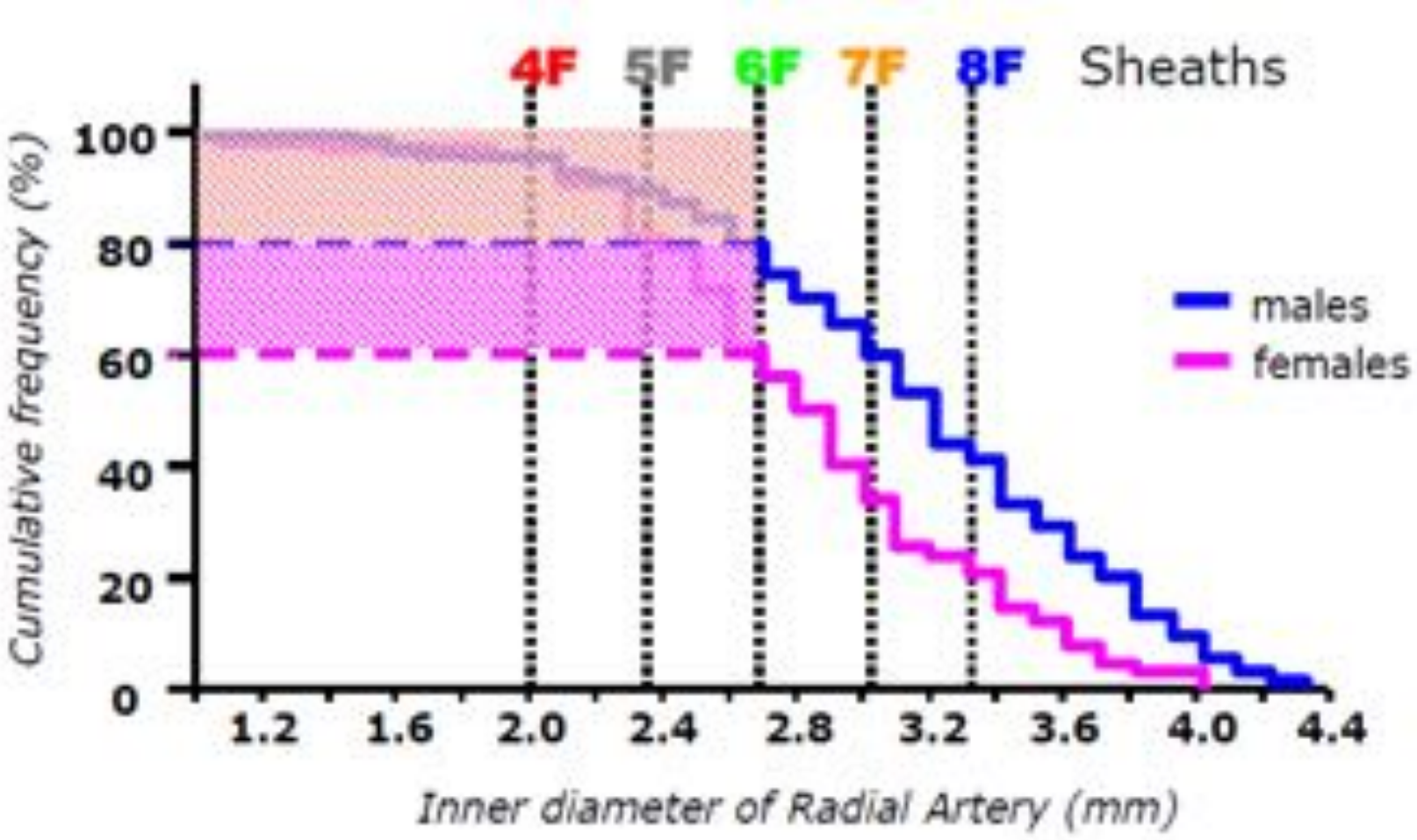
Yves Louvard, ICPS, Massy,
Générale de Santé-Ramsay, France

APPAC 2018, Biarritz

Radial access feasibility

The radial (ulnar) artery is a small vessel

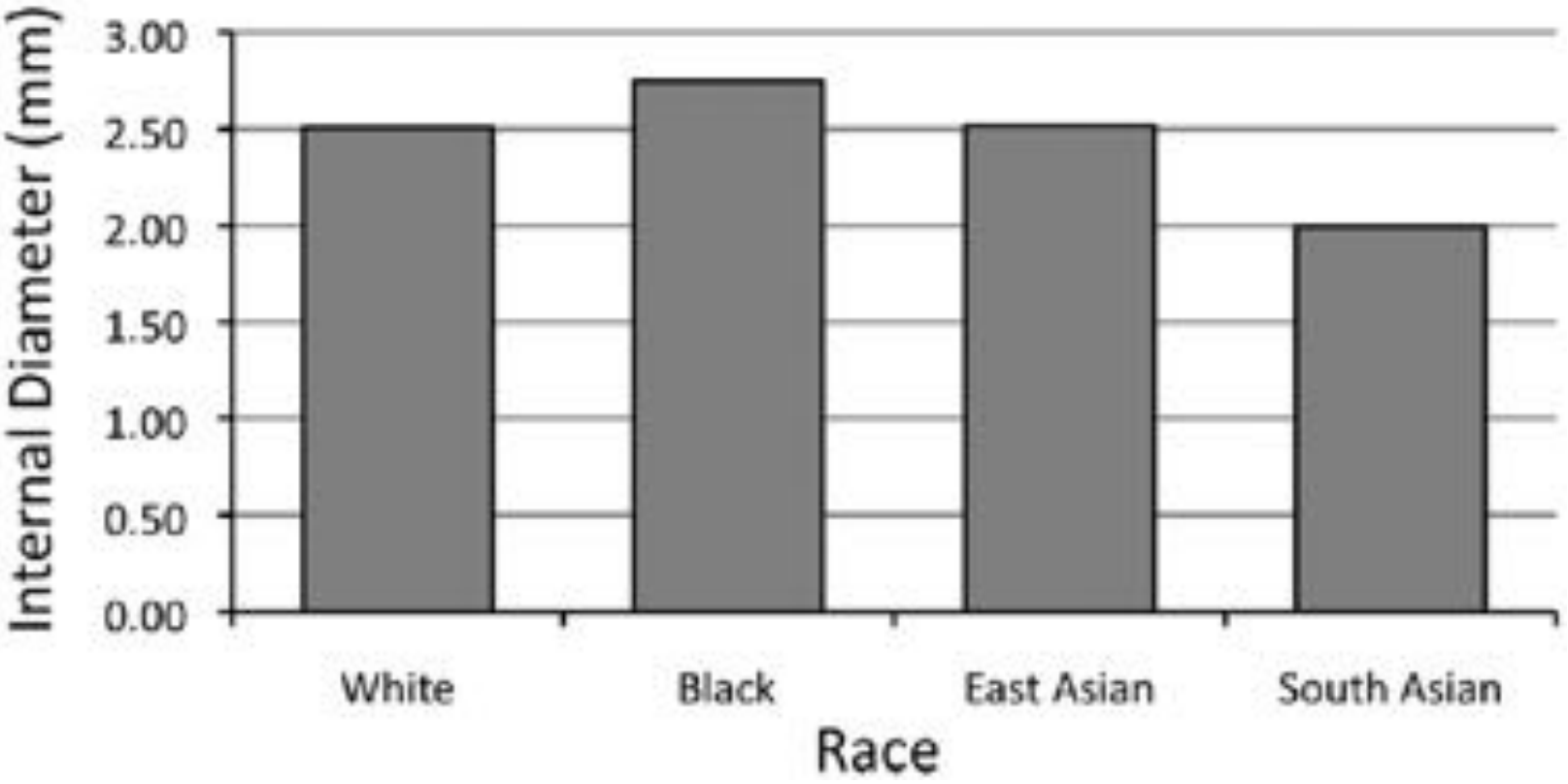
Cumulative diameters of radial artery (wrist, japanese population)



Saito S, Catheter Cadiovasc Interv. 1999;46(2):173-178

Predictors of radial artery size in patients undergoing cardiac catheterization: GRASP Study

Right radial artery internal diameter according to race



Kotowycz, Canadian Journal of Cardiology 30 (2014) 211-216

Predictors of radial artery size in patients undergoing cardiac catheterization: GRASP Study

Continuous variables that were evaluated as predictors of radial artery diameter

Variable	Mean (Range)	R^2	P
Height, cm	168 (133-188)	0.144	< 0.001
Weight, kg	82 (42-141)	0.179	< 0.001
BMI	29 (19-48)	0.071	0.002
BSA, m^2	1.9 (1.3-2.5)	0.217	< 0.001
Wrist circumference, cm	17.3 (13.5-21.5)	0.262	< 0.001
Shoe size, US units	9.0 (5.5-13)	0.250	< 0.001
Reverse Allen time, seconds	3.6 (1-15)	0.007	0.342
Reverse Pleth time, seconds	3.3 (0-30)	0.017	0.147

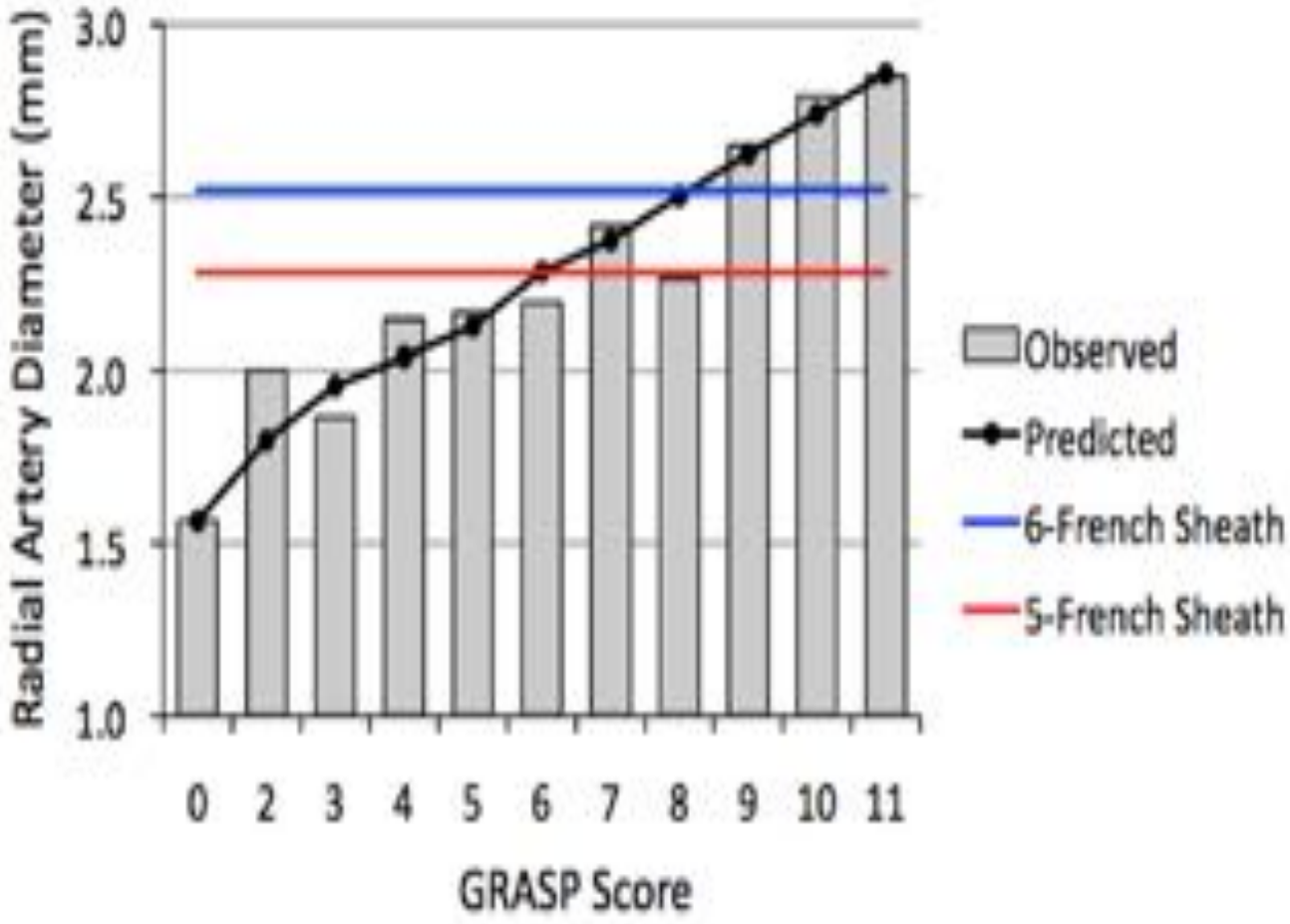
Independent predictors of radial artery size: wrist circumference (r2 = 0.26; P < 0.001), male sex (r2 = 0.06; P < 0.001), non-South Asian (r2 = 0.05; P = 0.006)

Kotowycz, Canadian Journal of Cardiology 30 (2014) 211-216

Predictors of radial artery size in patients undergoing cardiac catheterization: GRASP Study

The Good Radial Artery Size Prediction (GRASP) radial artery size prediction score

Variable	Weight
Sex:	
Female	0
Male	4
Race:	
South Asian	0
Non-South Asian	3
Wrist Circumference (cm):	
< 15.5	0
≥ 15.5 and < 17.0	1
≥ 17.0 and < 17.75	2
≥ 17.75 and < 18.5	3
≥ 18.5	4

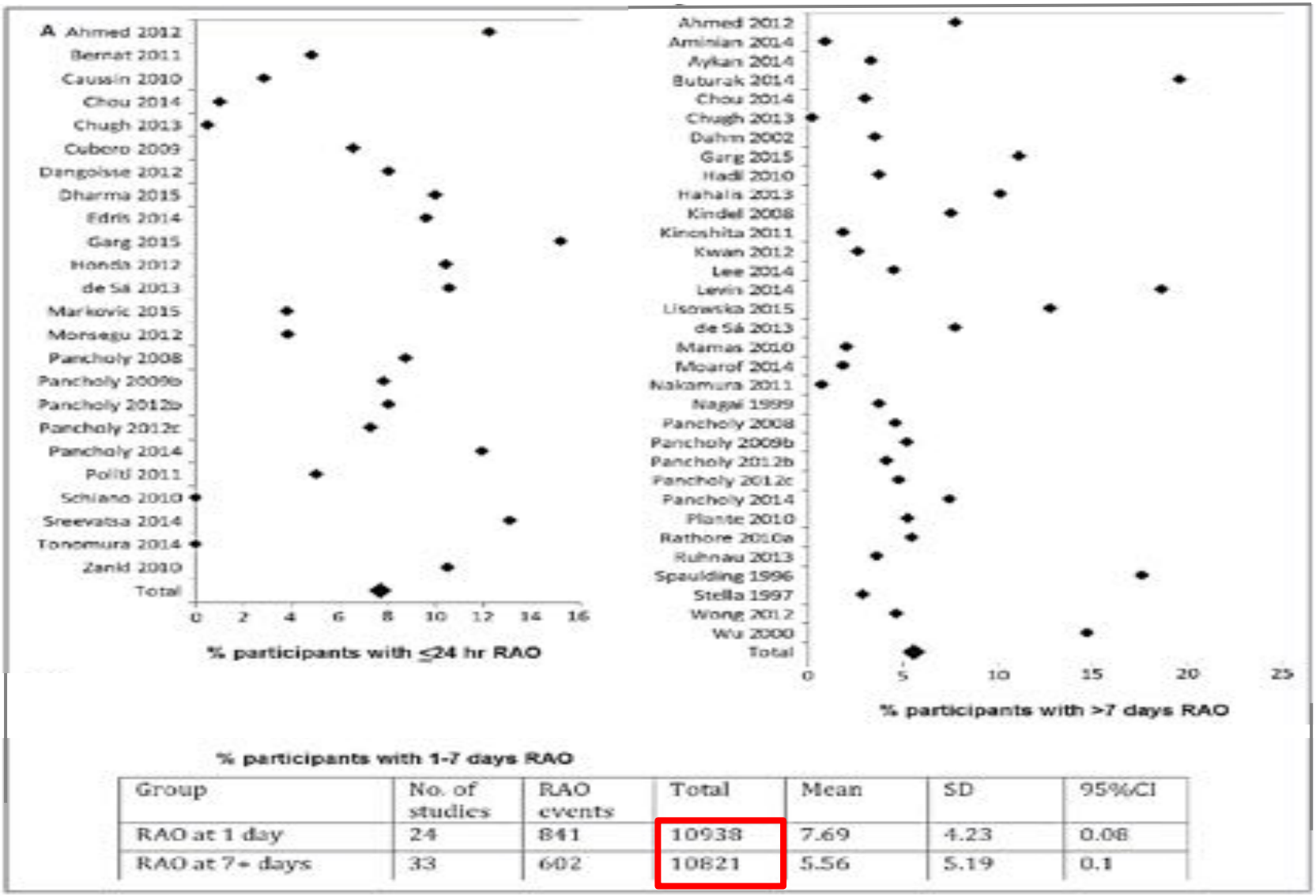


Kotowycz, Canadian Journal of Cardiology 30 (2014) 211-216

Radial artery occlusion

Radial artery occlusion rate is highly variable

Radial artery occlusion after transradial interventions: meta-analysis



Group	No. of studies	RAO events	Total	Mean	SD	95%CI
RAO at 1 day	24	841	10938	7.69	4.23	0.08
RAO at 7+ days	33	602	10821	5.56	5.19	0.1

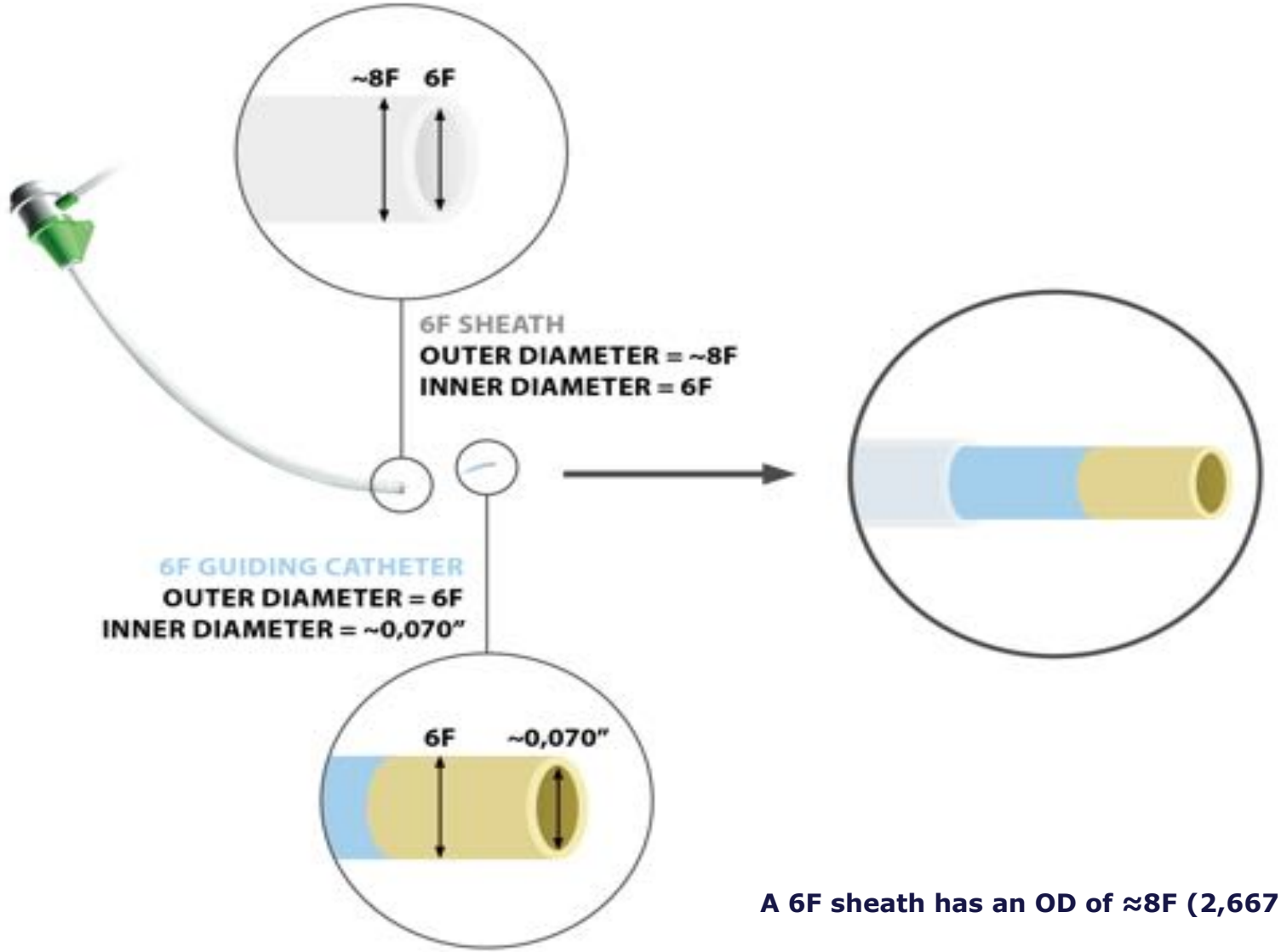
from Rashid, J Am Heart Assoc. 2016;5:e002686

Predictors of radial artery occlusion

Predictors of radial artery occlusion after transradial approach

- Older age
- Female gender
- Smaller body weight
- Peripheral artery disease
- Diabetes
- Actual or previous smoker
- 6 vs 5 F
- 6F sheath vs 6.5 F sheathless
- Higher sheath / artery diameter ratio
- PCI vs angiography
- Smaller heparin dosage
- Warfarin vs heparin
- No nitroglycerin
- Occlusive vs patent haemostasis
- Patent haemostasis vs patent haemostasis + ulnar compression

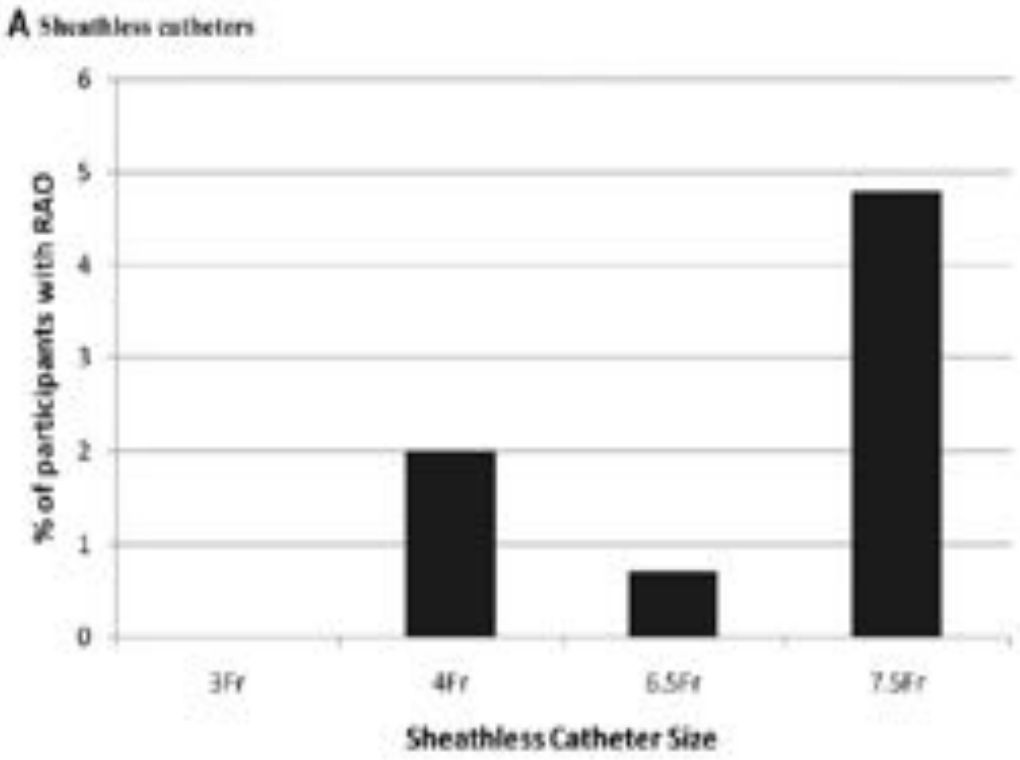
Reminder



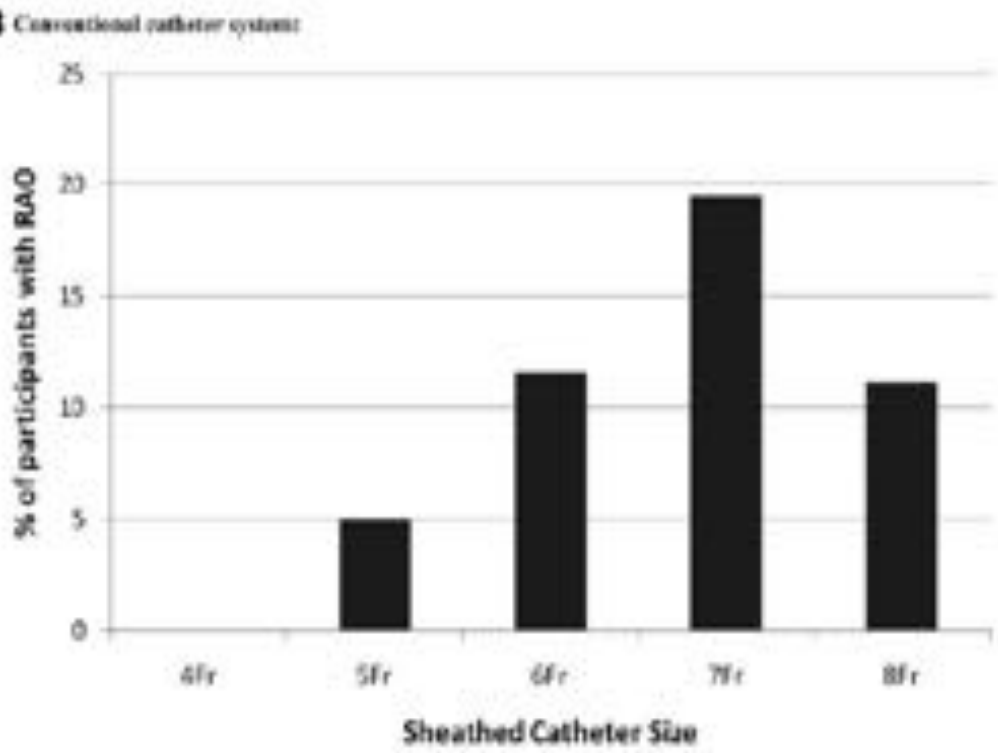
A 6F sheath has an OD of ≈8F (2,667 mm)

Radial artery occlusion after transradial interventions: meta-analysis

Pooled incidence of RAO by catheter size: A, Sheathless catheters. B, Conventional catheter system



Sheathless size	No. Studies	Events/Total	% RAO
3Fr	2	0/129	0
4Fr	1	8/400	2
6.5Fr	5	14/2020	0.7
7.5Fr	2	7/146	4.8



Sheathed catheter	No. Studies	Events/Total	% RAO
4Fr	1	0/80	0
5Fr	6	32/642	5
6Fr	8	133/1151	11.6
7Fr	2	15/77	19.5
8Fr	1	2/18	11.1

Rashid, J Am Heart Assoc. 2016;5:e002686

Sheathless for radial artery occlusion prevention

- Decrease material / artery ratio
- Preserve flow during procedure ?
- Decrease damage to radial artery wall: (endothelium, media, vasomotricity…)

Radial artery patent compression

Randomized Trial of Compression Duration After Transradial Cardiac Catheterization and Intervention

Study Outcomes

	20 Minutes (n=283)	60 Minutes (n=285)	*P* Value
RAO (primary end point)	14 (4.9%)	8 (2.8%)	0.19
Hemostasis during full pressure			
Hematoma <5 cm	4 (1.4%)	7 (2.5%)	0.37
Hematoma >5 cm	1 (0.4%)	4 (1.4%)	0.37
Any bleeding or hematoma*	10 (3.5%)	19 (6.7%)	0.09
Hemostasis after release			
Hematoma <5 cm	19 (6.7%)	7 (2.5%)	0.015
Hematoma >5 cm	5 (1.8%)	4 (1.4%)	0.75
Any bleeding or hematoma*	53 (18.7%)	40 (14.0%)	0.13
Retightening required (at any time)	58 (20.5%)	35 (12.3%)	<0.01

Lavi, J Am Heart Assoc. 2017;6: e005029

Early ultrasonic results

4 radial occluded (1.3%) :

- 2 with a negative flow
- 2 without flow

	Pre-procedure	Post-procedure	p
Diameter (mm)	3.64 ± 0.74	3.55 ± 0.77	ns
Upstream flow (cm/sec)	29.13 ± 9.51	30.8 ± 11.26	ns
Downstream flow(cm/sec)		28.73 ± 11.84	ns
Duration (mn)	2.92 ± 0.55	3.35 ± 0.83	ns

J. Monsegu, 2002

Late ultrasonic results

270 patients

- any new occlusion after hospital discharge
- about 4 initial occlusions : 3

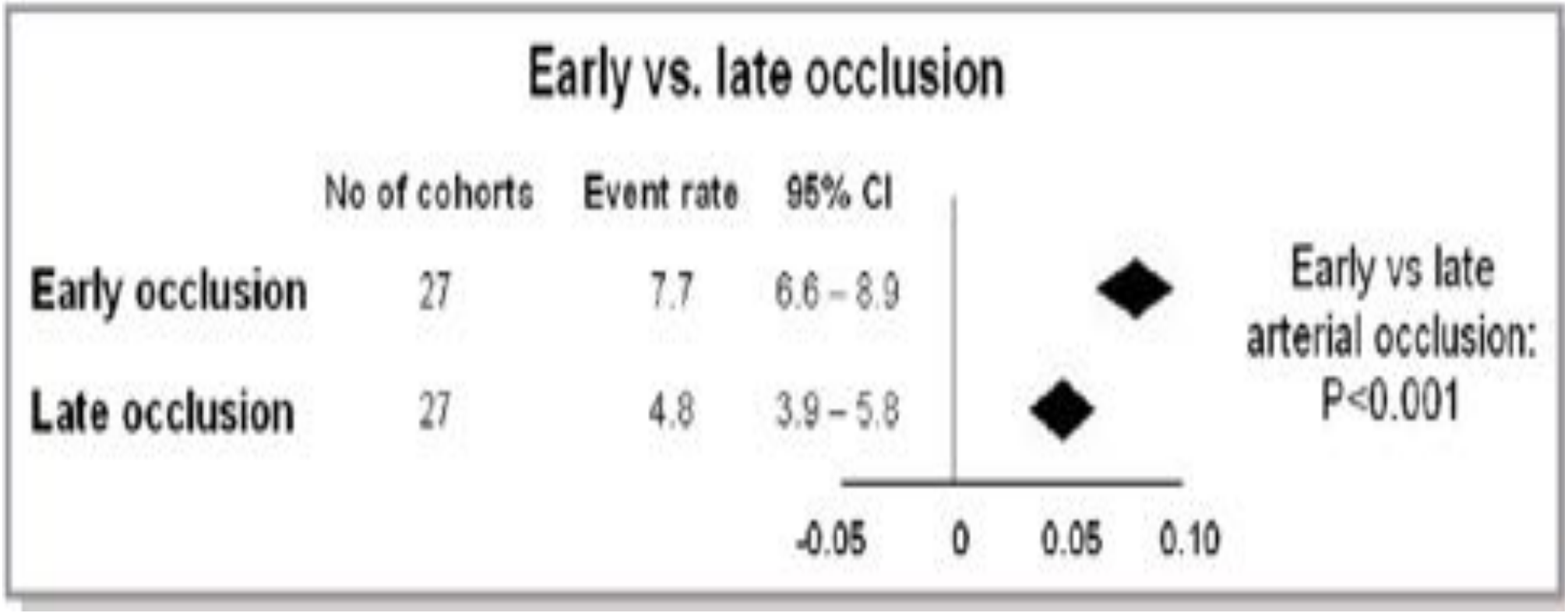
spontaneous recanalization

and 1 probably persistent

	Pre-procedure	3 months later	p
Diameter (mm)	3.64 ± 0.74	3.59 ± 0,75	ns
Flow (cm/sec)	29.13 ± 9.51	30.7 ± 11.03	ns
Duration (mn)	2.92 ± 0.55	2.42 ± 0.65	ns

J. Monsegu, 2002

Radial artery and Ulnar artery occlusions following coronary procedures and the impact of anticoagulation: ARTEMIS systematic review and meta-analysis



Hahalis J Am Heart Assoc. 2017;6:e005430

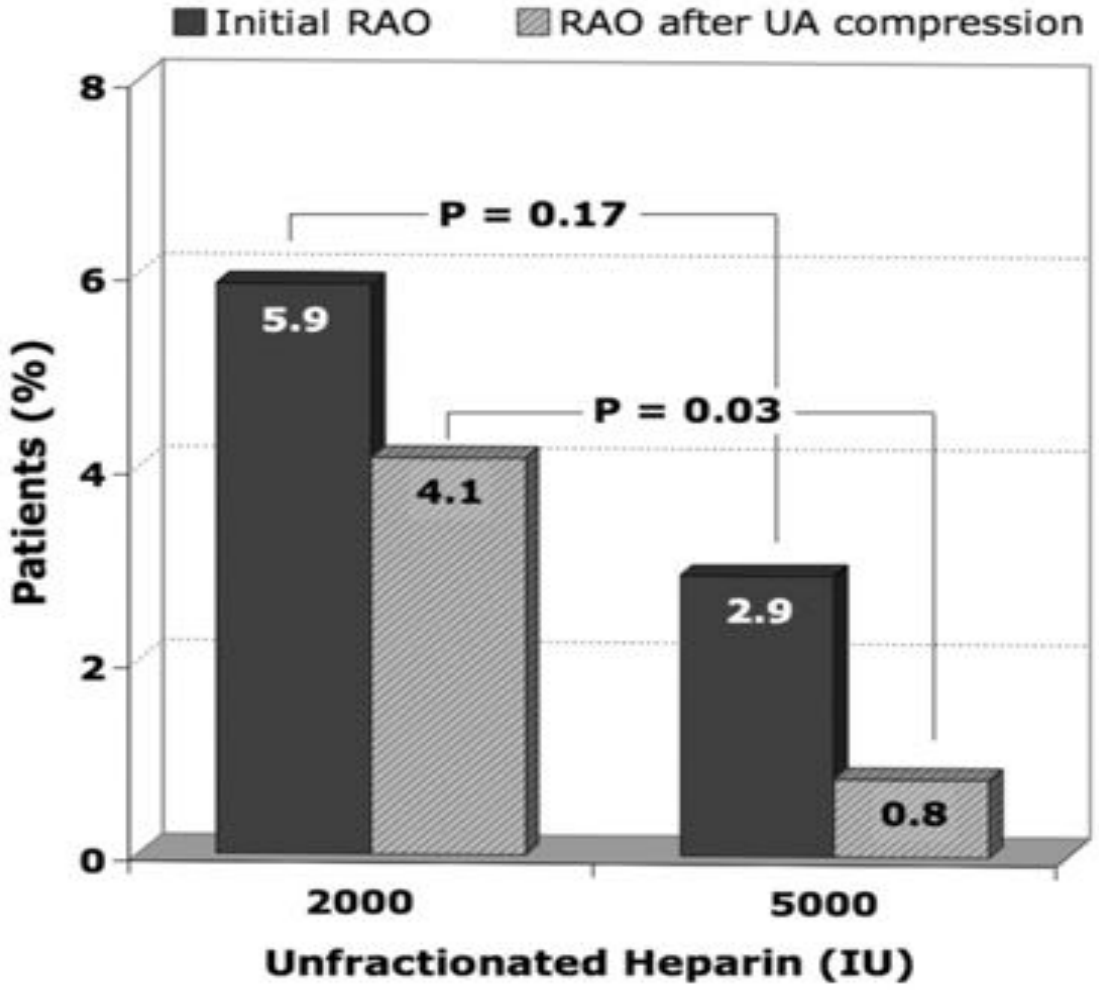
Efficacy and Safety of Transient Ulnar Artery Compression to Recanalize Acute Radial Artery Occlusion After Transradial Catheterization

Technique of ulnar compression. TR band inflated with maximum 18 ml of air placed directly on ulnar artery

Bernat, Am J Cardiol 2011;

Efficacy and Safety of Transient Ulnar Artery Compression to Recanalize Acute Radial Artery Occlusion After Transradial Catheterization

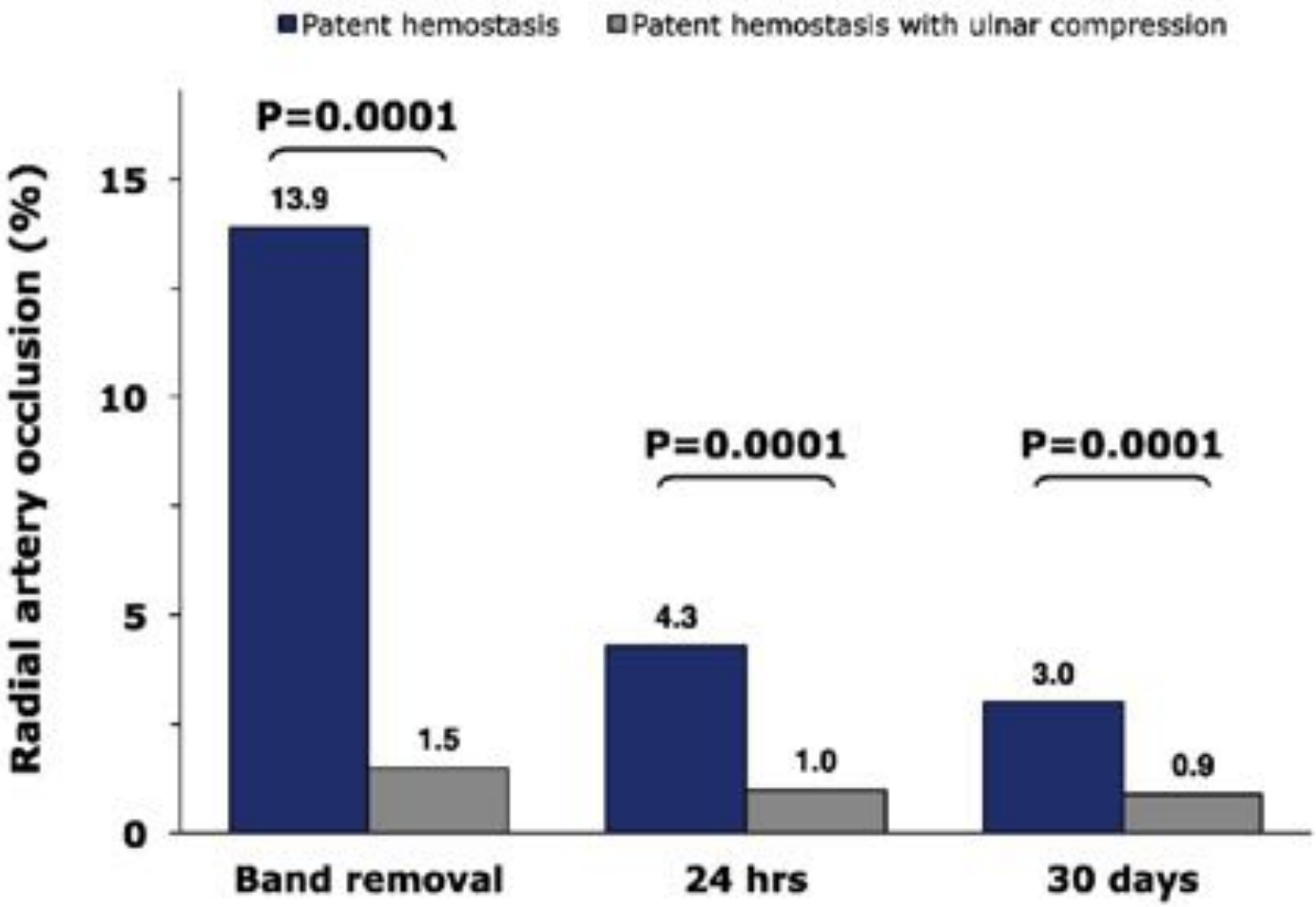
RAO before and after 1-hour ulnar artery compression



Bernat, Am J Cardiol 2011;

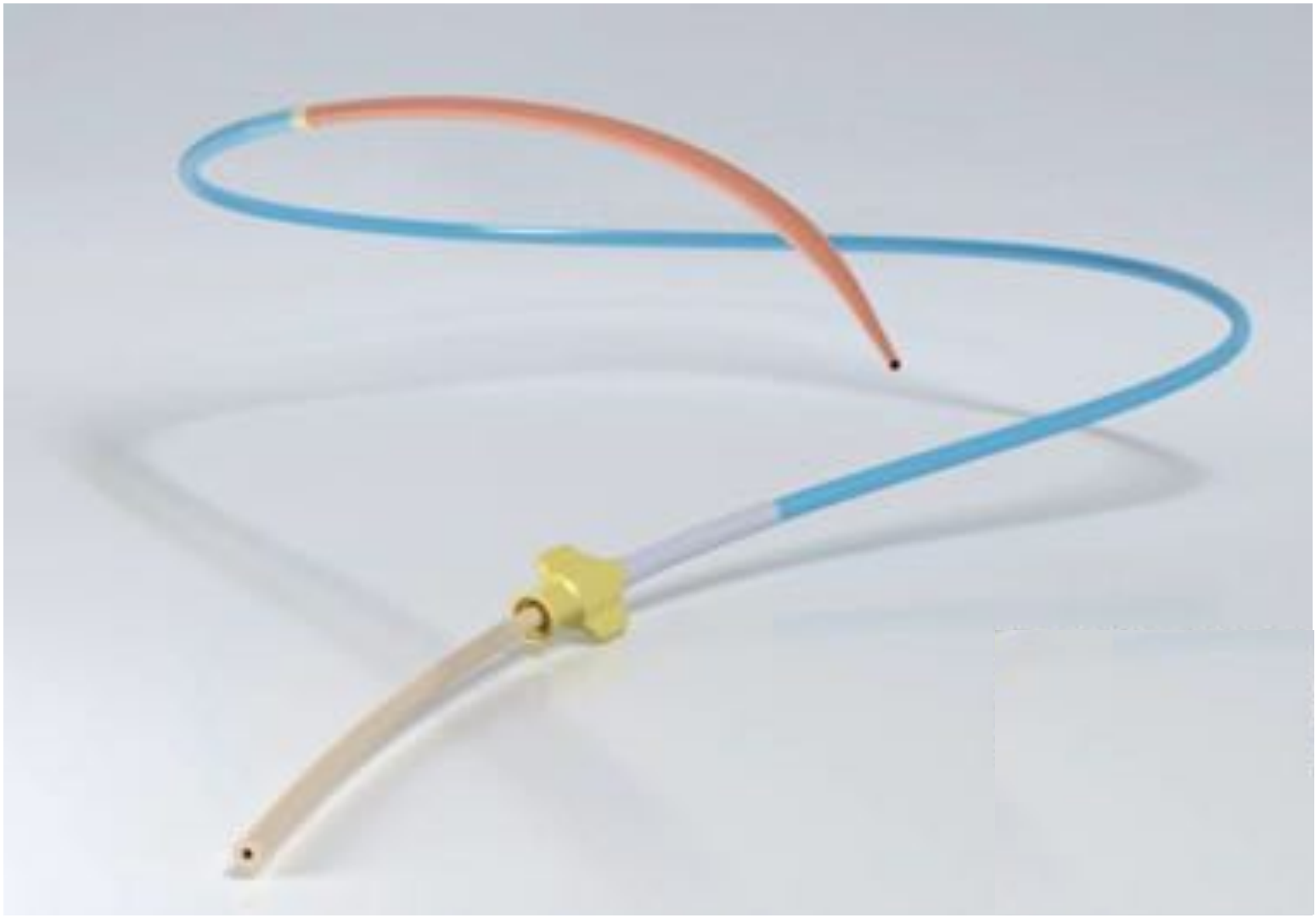
Prevention of radial artery occlusion after transradial catheterization the PROPHET-II randomized trial

Incidence of Radial Artery Occlusion

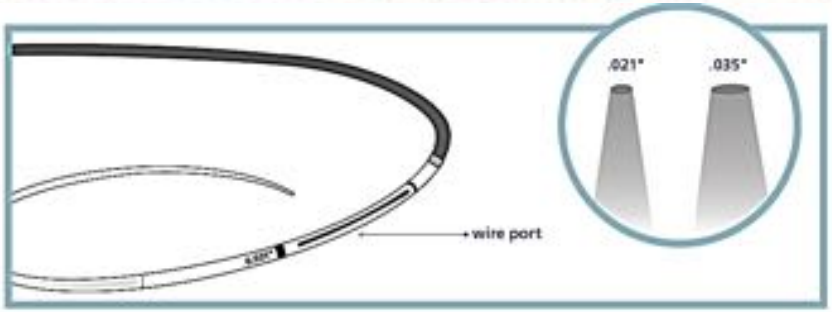


Pancholy, J Am Coll Cardiol Intv 2016;9:1992–9

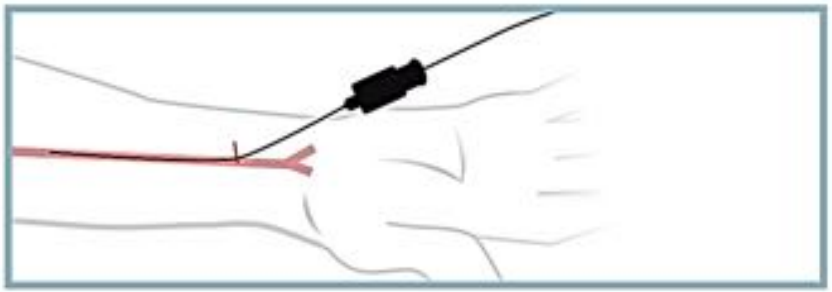
Railway



1


.021"
.035"
wire port

2



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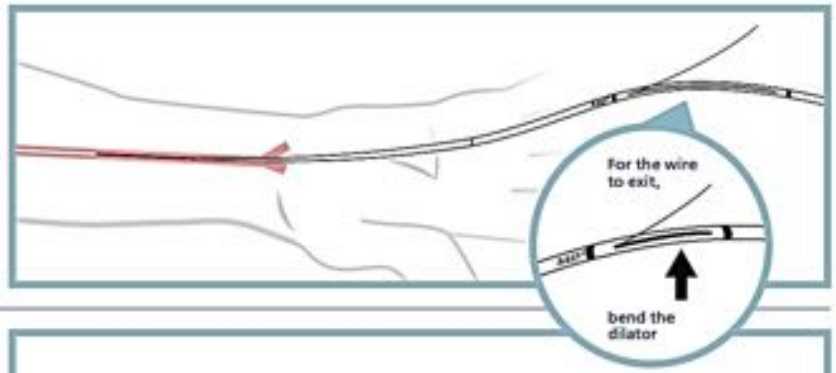
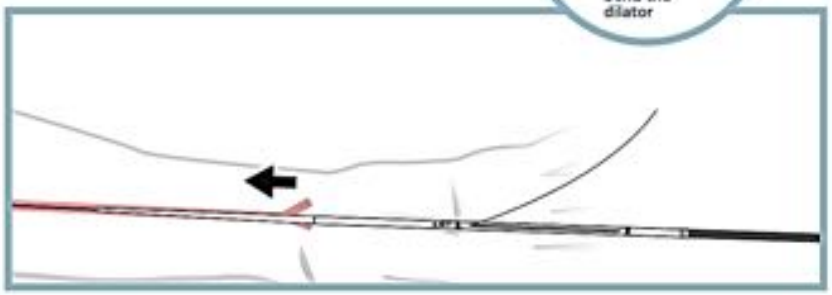

For the wire to exit,
bend the dilator

4



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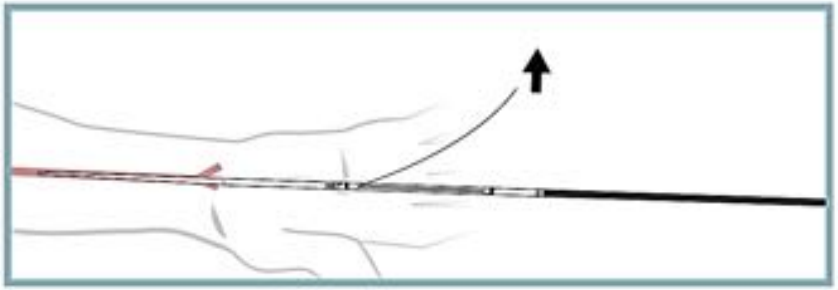
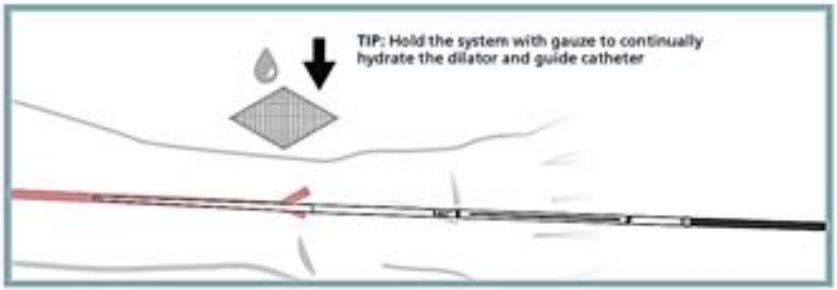
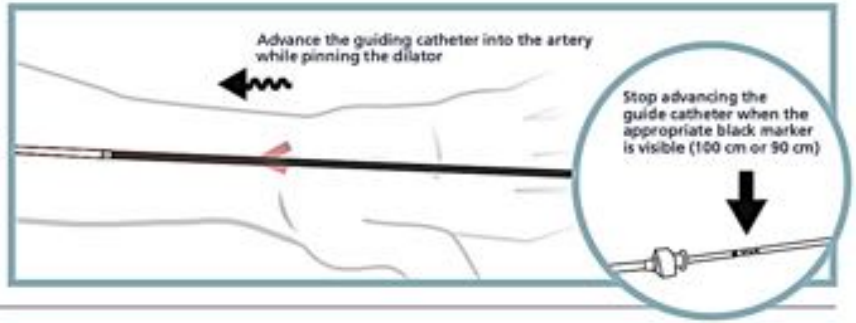


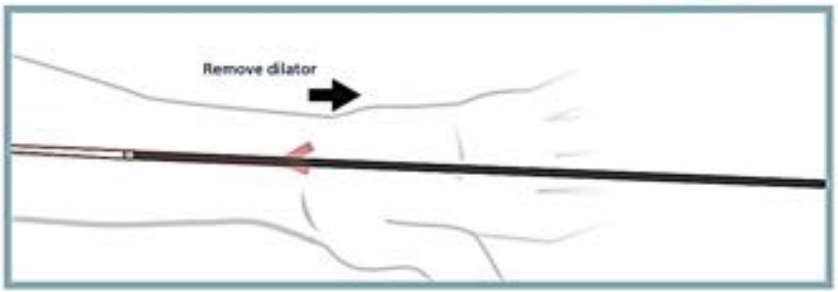
6


TIP: Hold the system with gauze to continually hydrate the dilator and guide catheter

7

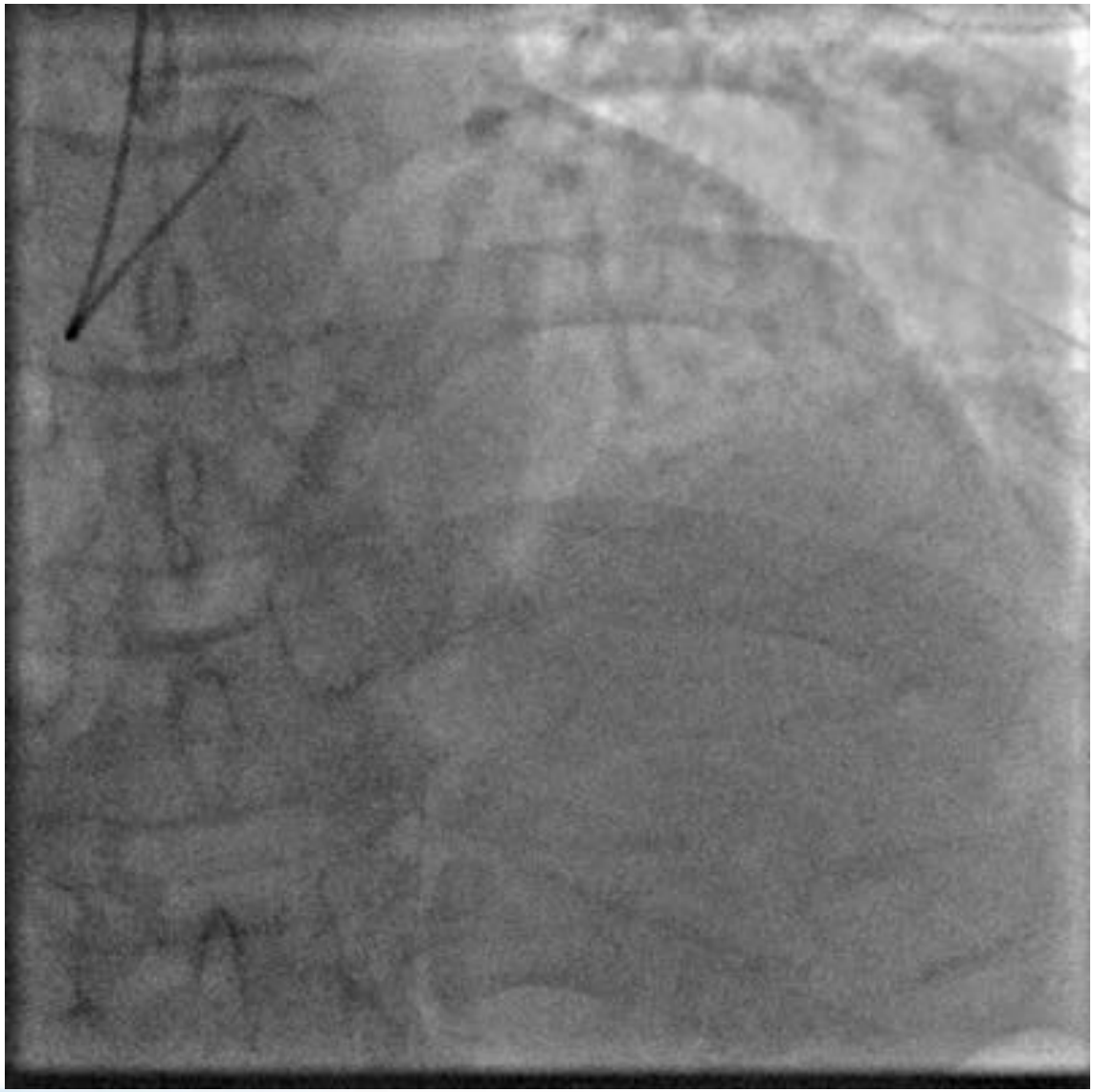

Advance the guiding catheter into the artery while pinning the dilator
Stop advancing the guide catheter when the appropriate black marker is visible (100 cm or 90 cm)

8

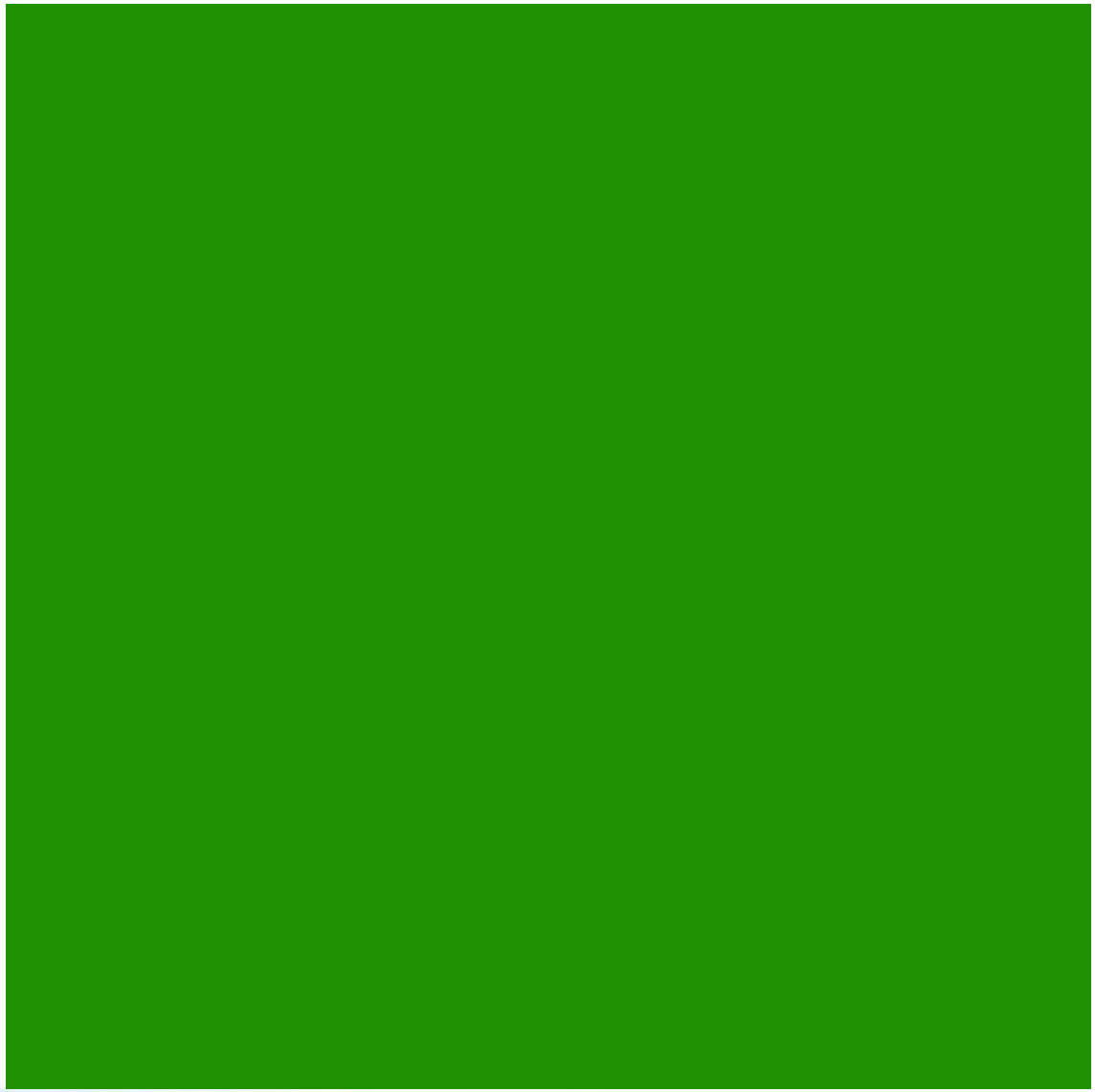

Remove dilator

RCA CTO + Bifurcation
Railway sheathless 6F

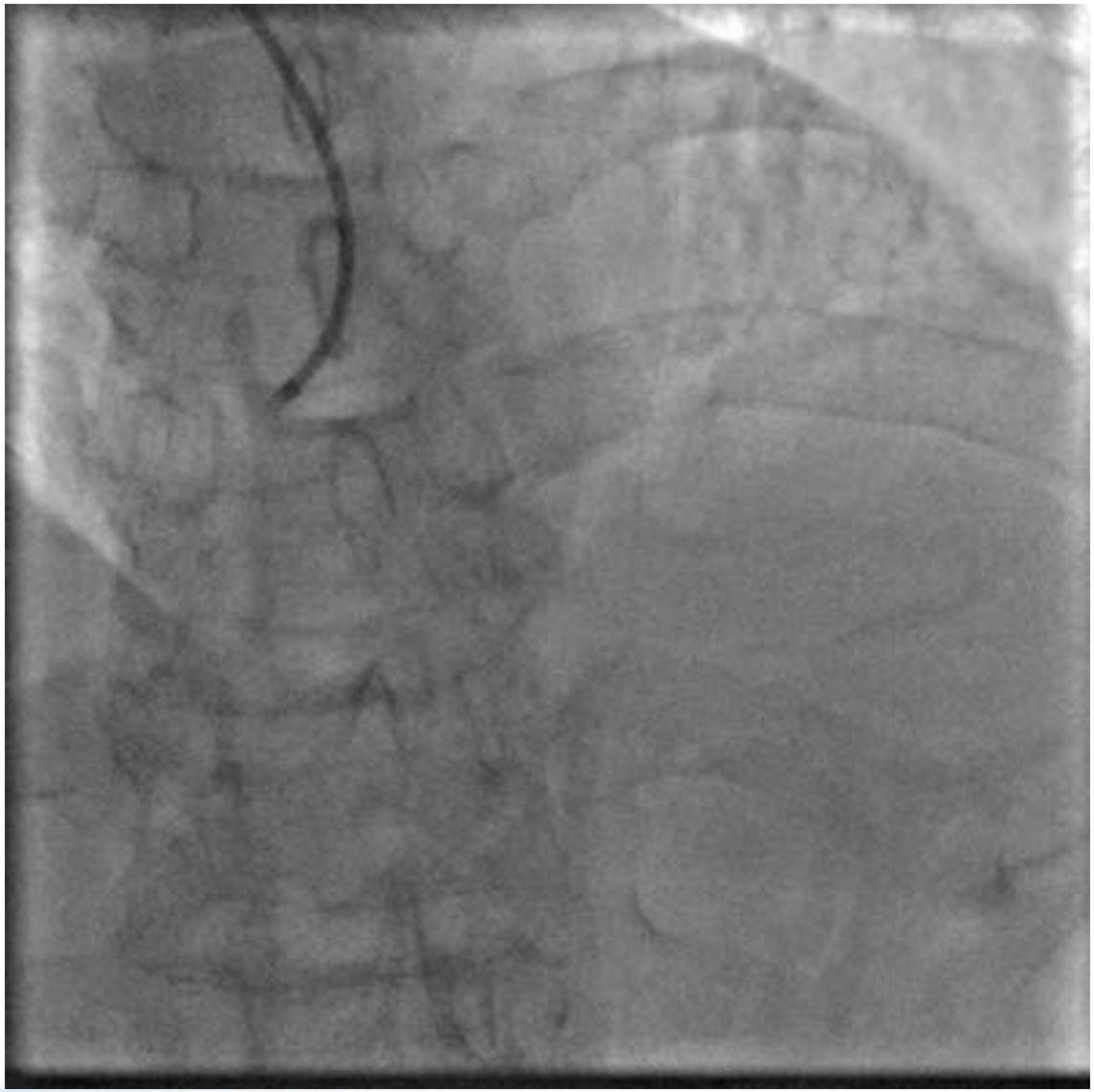
Coronary angiography



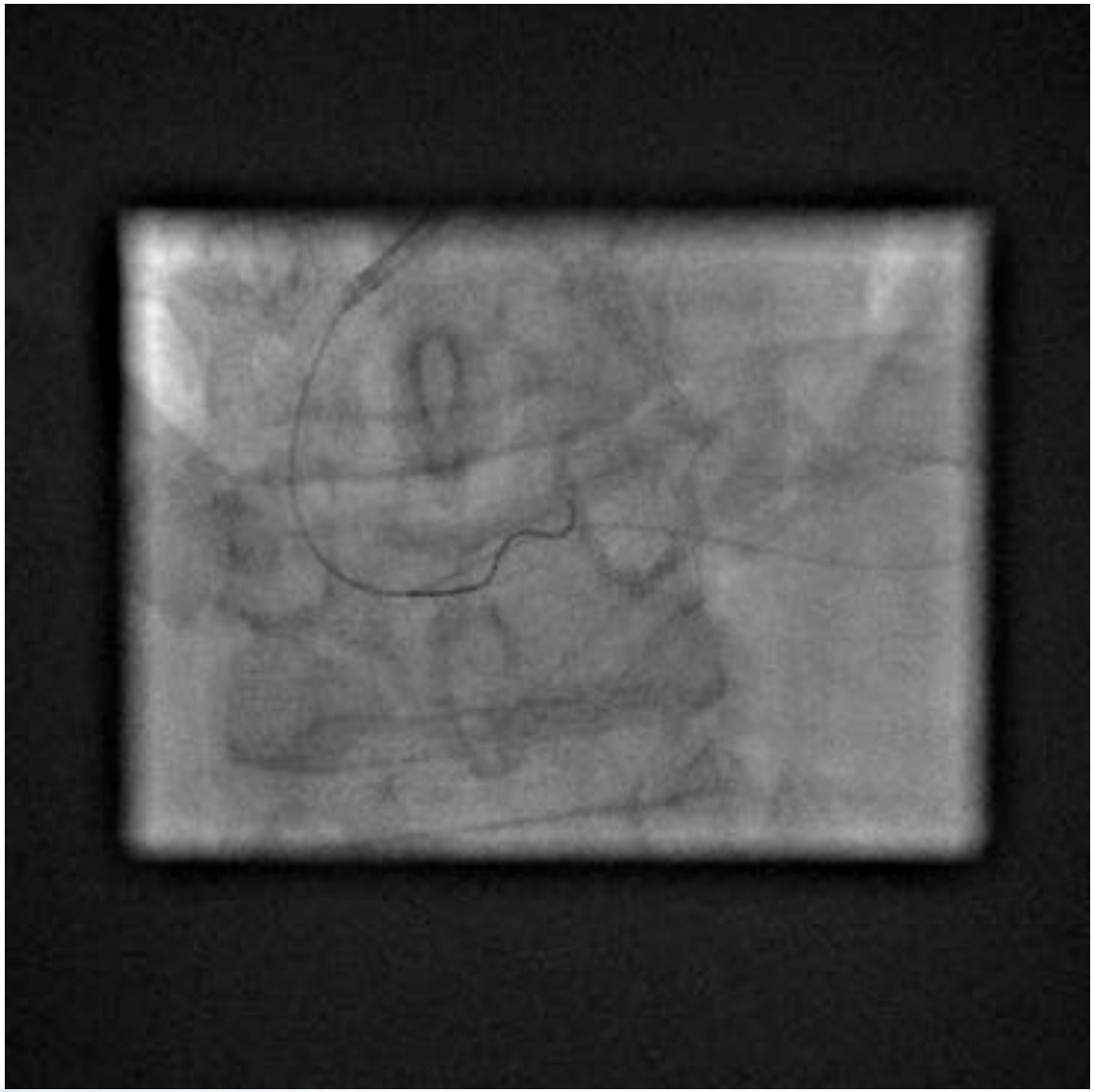
Right radial approach, JR3.5 6F, Railway



3D Right 6F

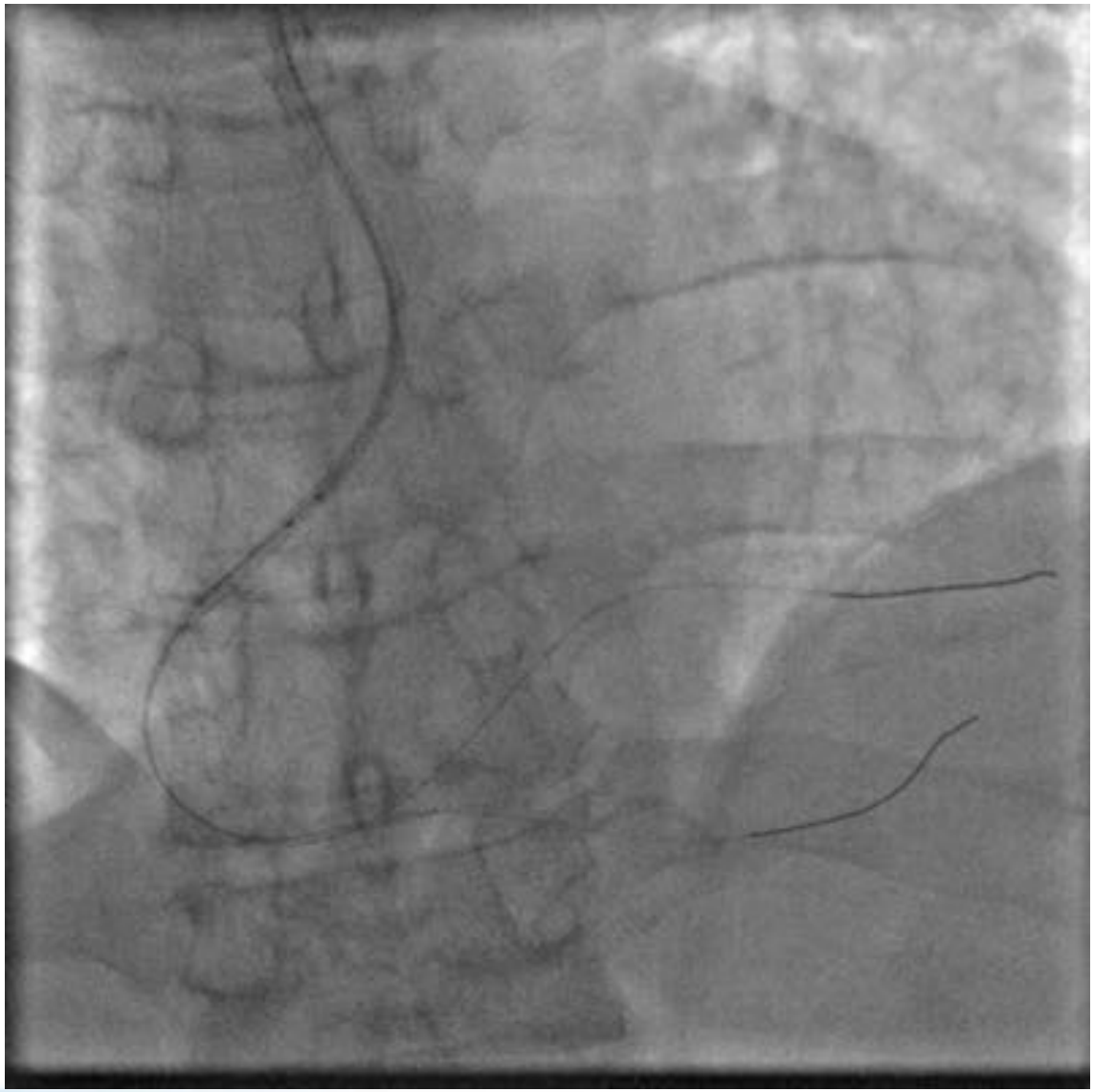


BMW in PDA, Fielder FC for PLA



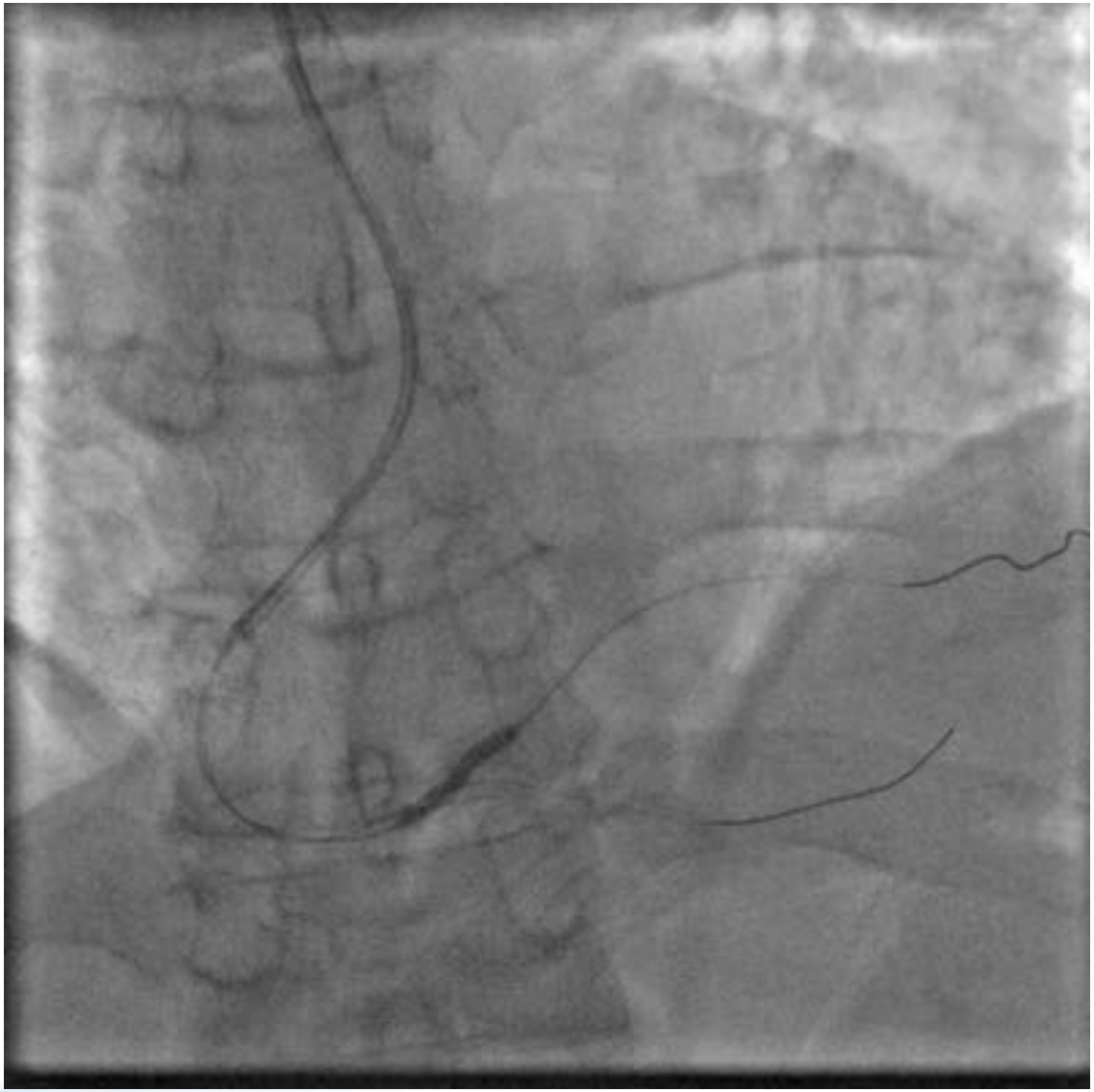
Successful crossing to PDA with 2.0X6 coaxial balloon and Fielder FC

Post 2.0 balloon



Balloon 2.5X20

Balloon 2.5X20

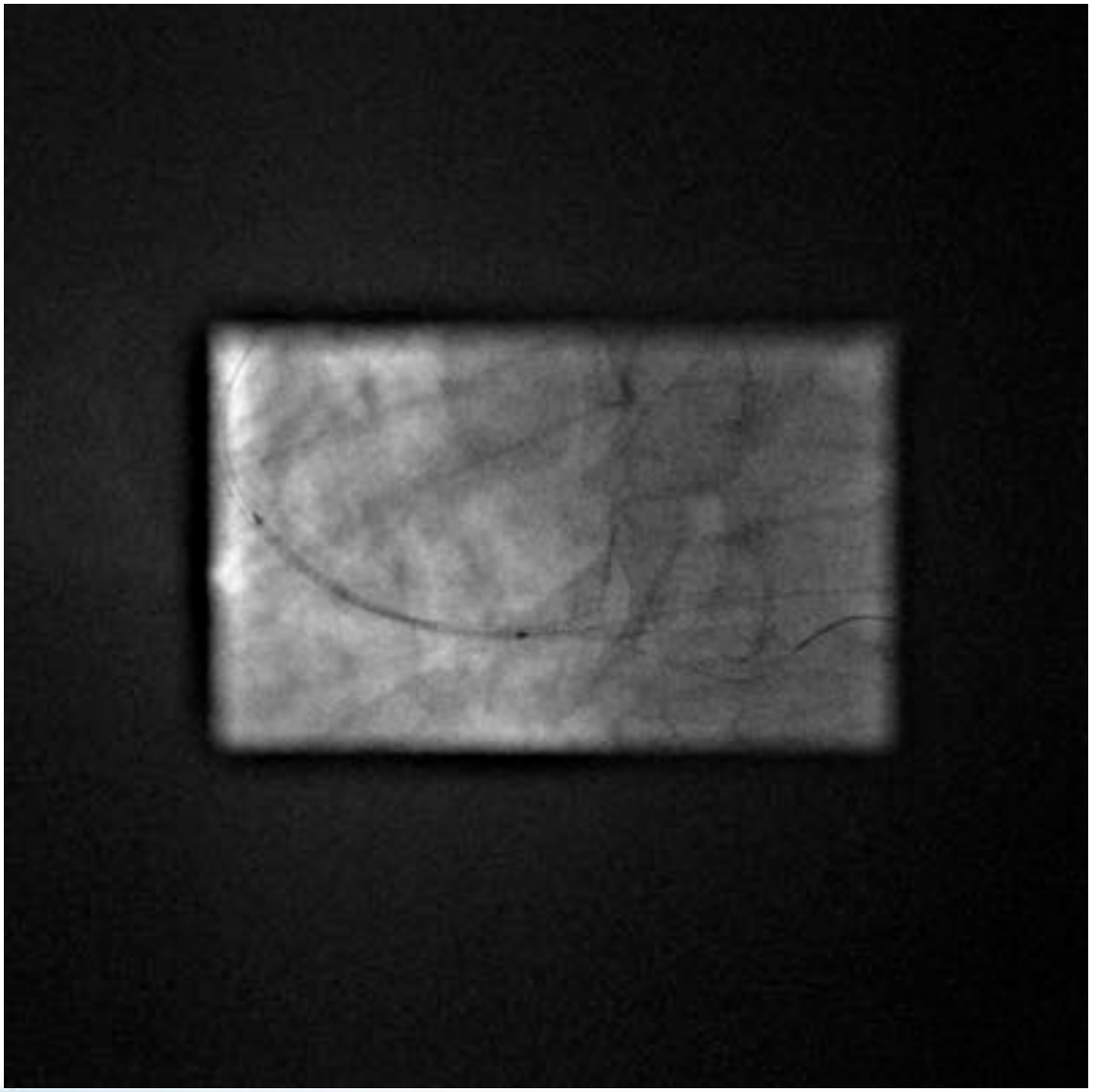


Stent 2.5X33

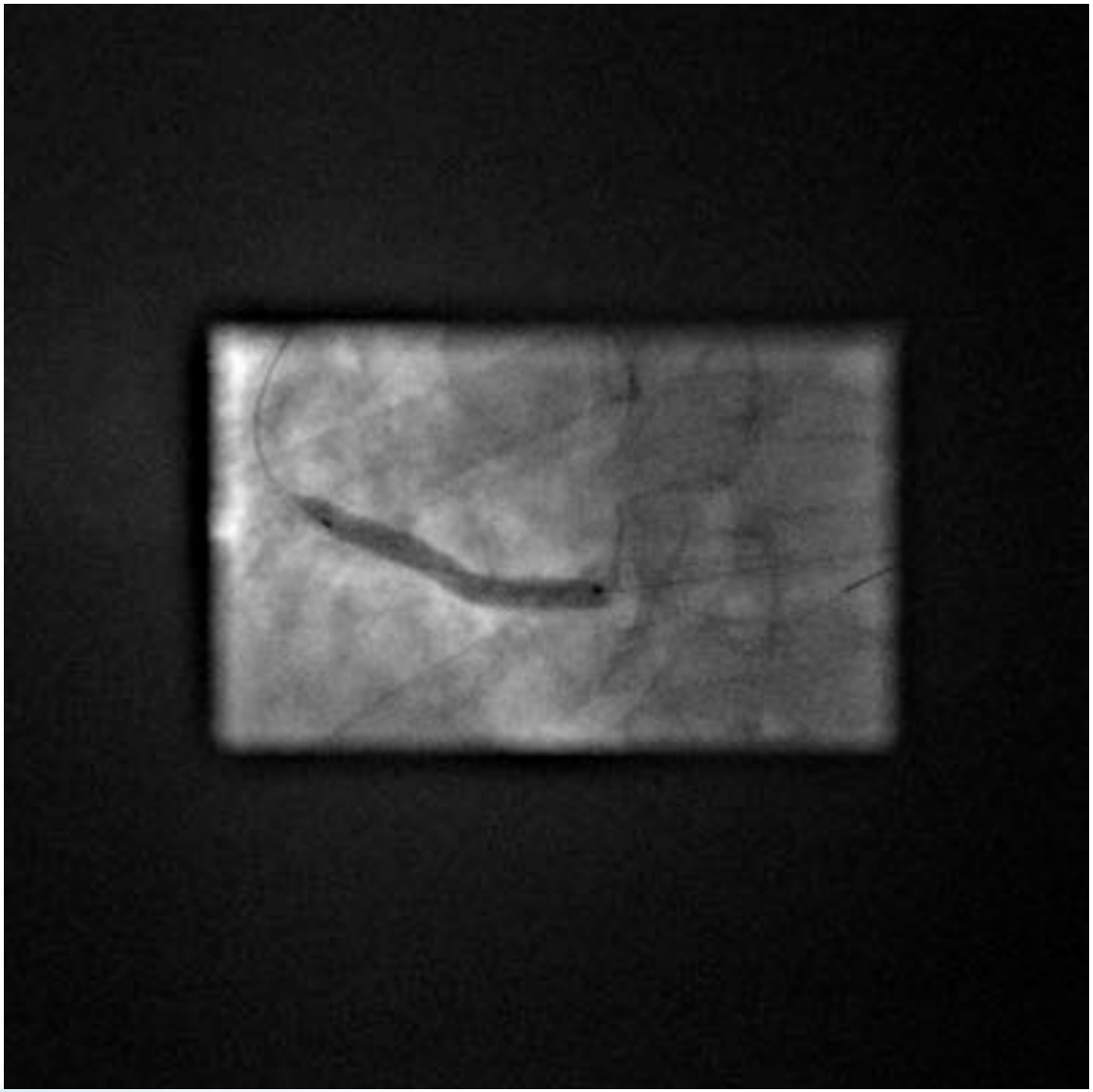
Post cross-over stenting

3.5 balloon for POT

Xience 3.5X38



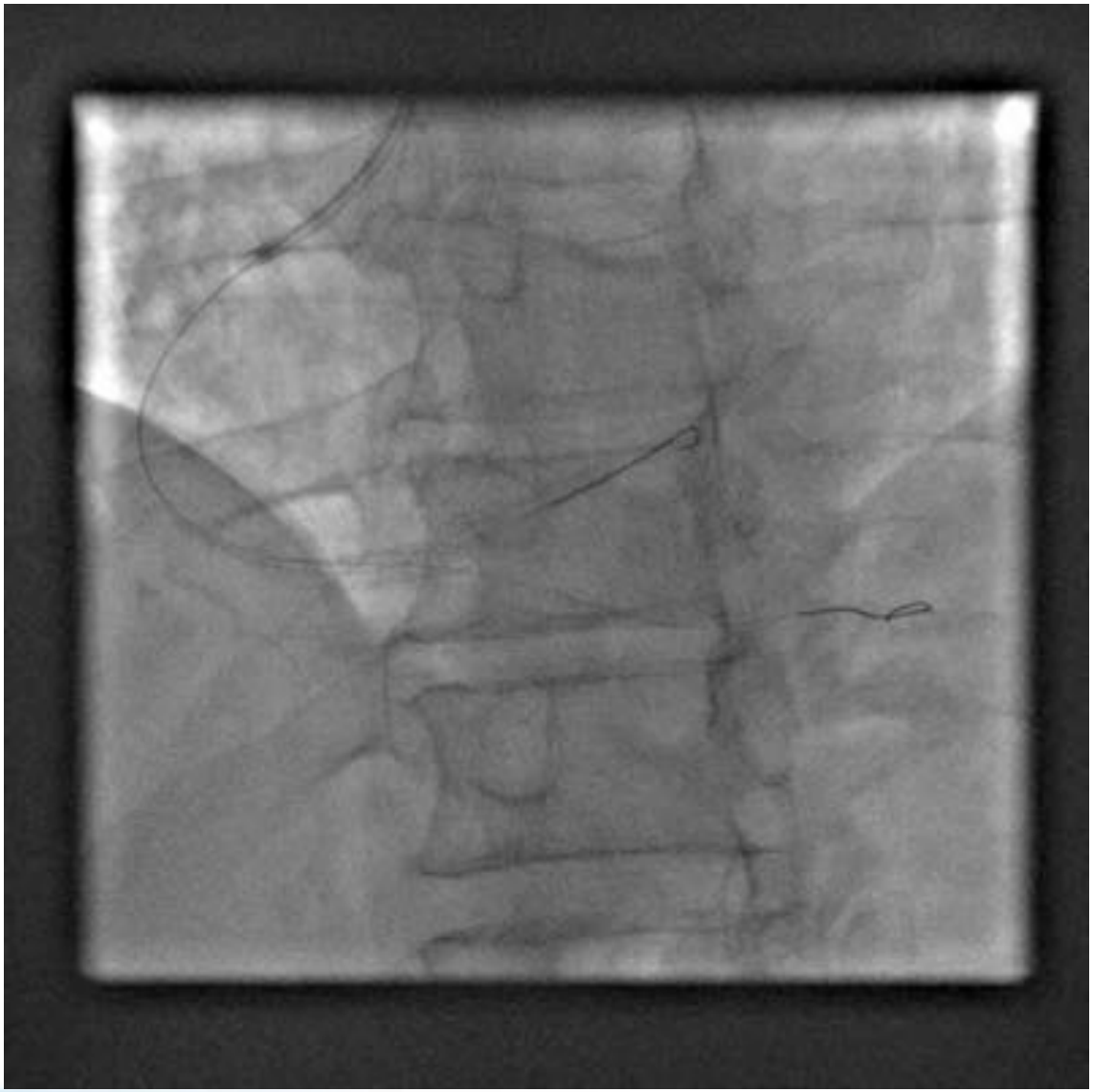
Xience 3.5X38



Post stenting

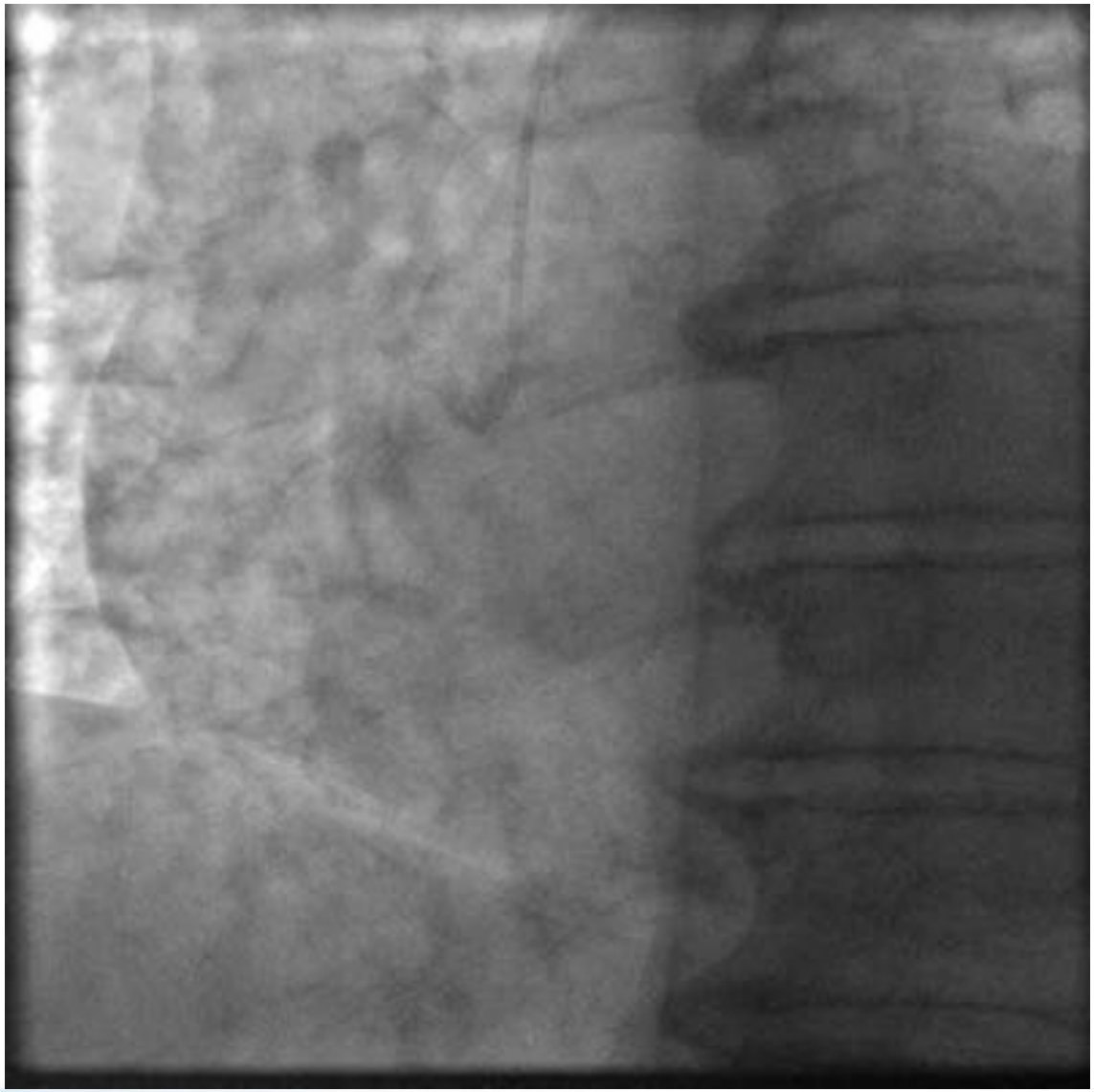
« Side » 2.0X12 (POT-Side-POT alternative to kissing)

Final result after 2nd POT

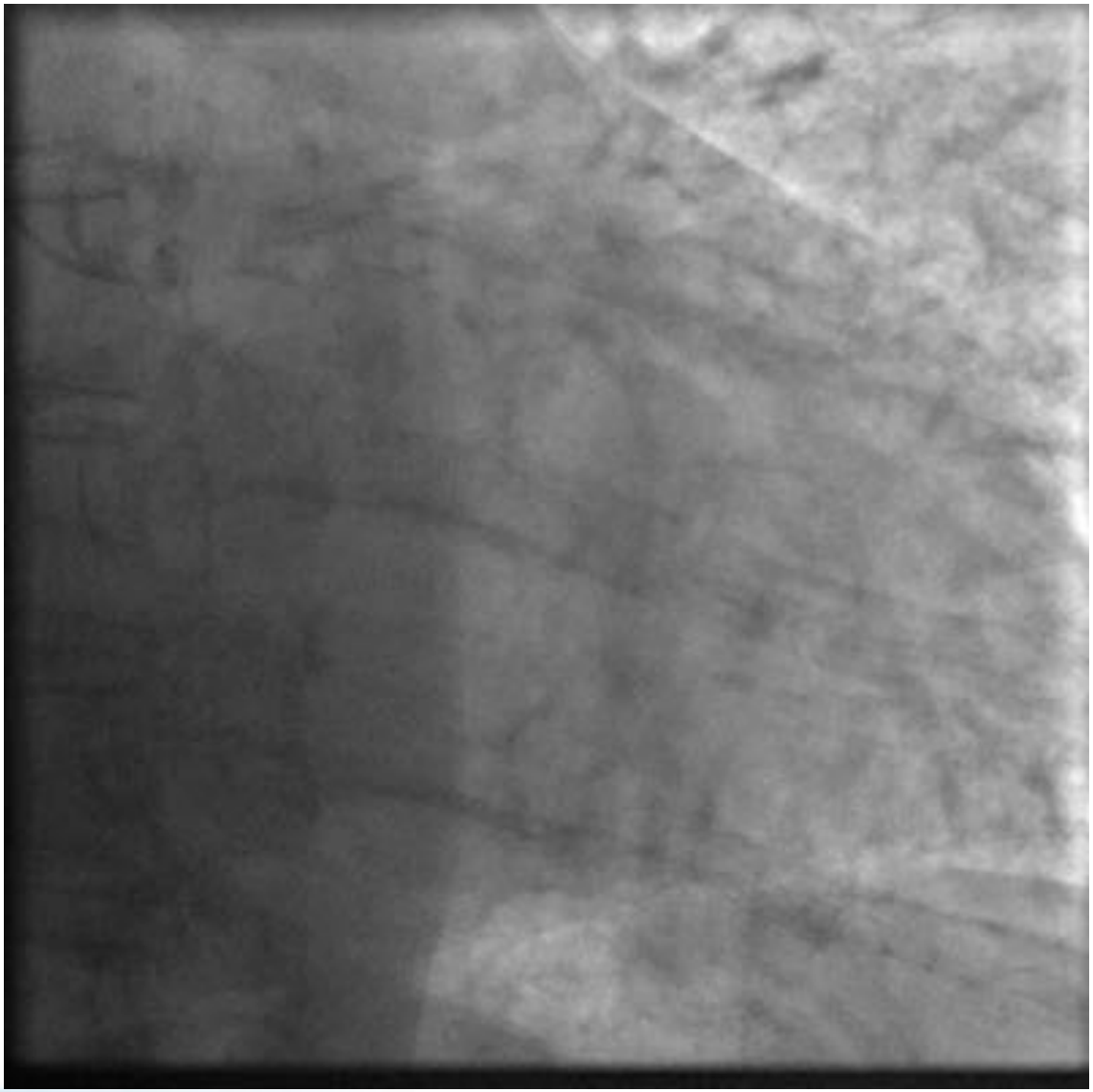


LM stenting
Railway sheathless 6F

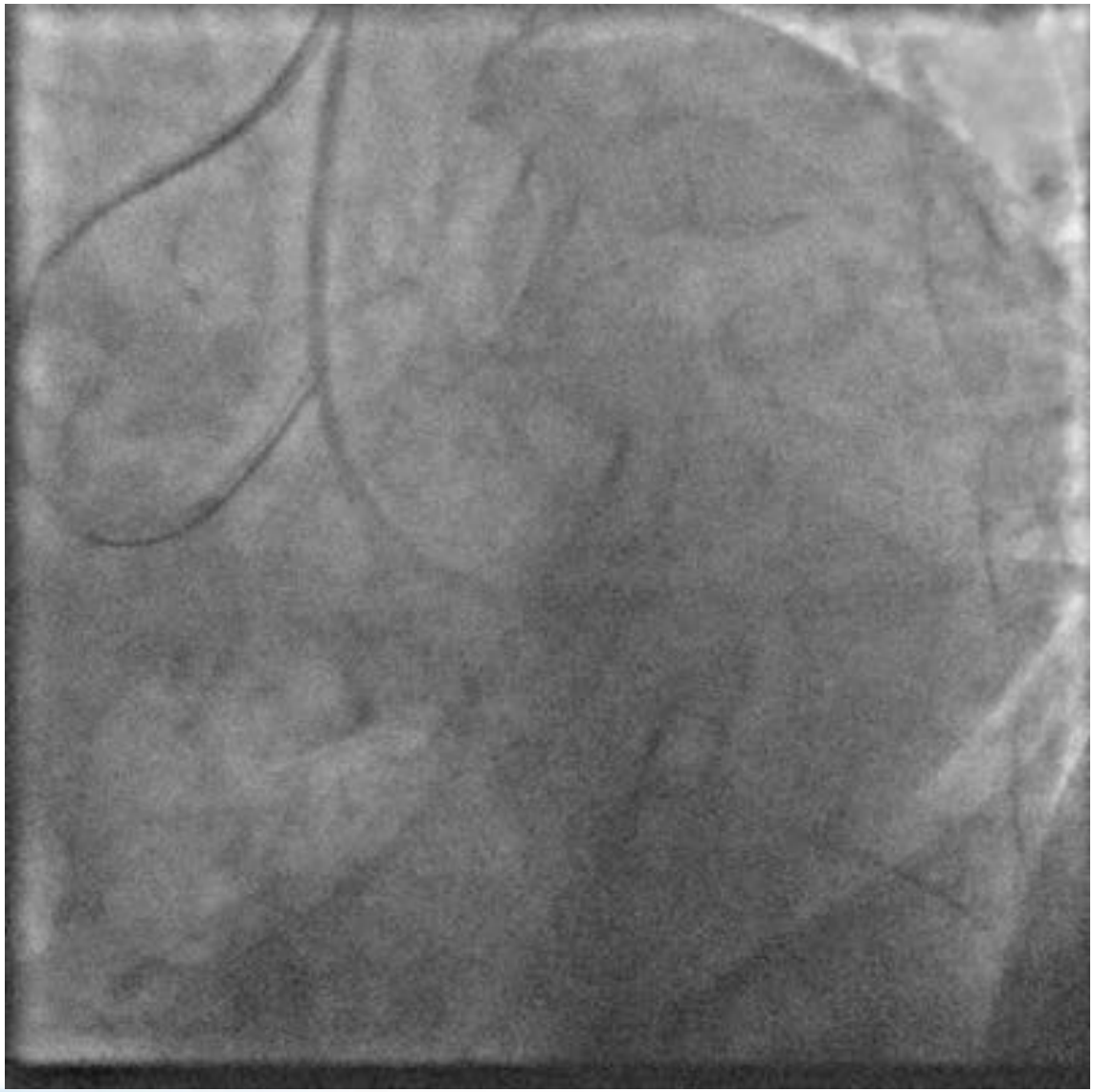
Coronary angiography



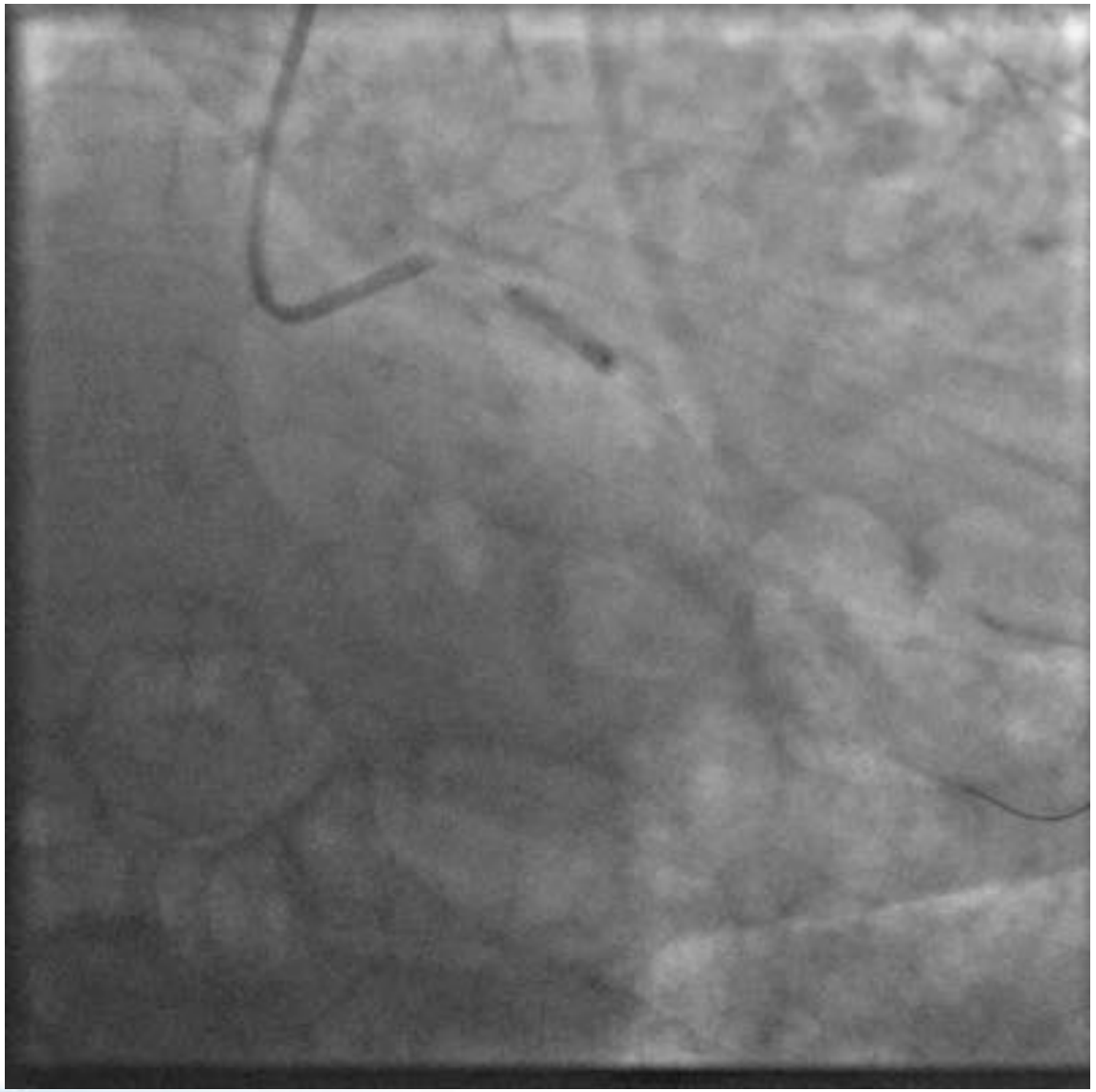
Coronary angiography



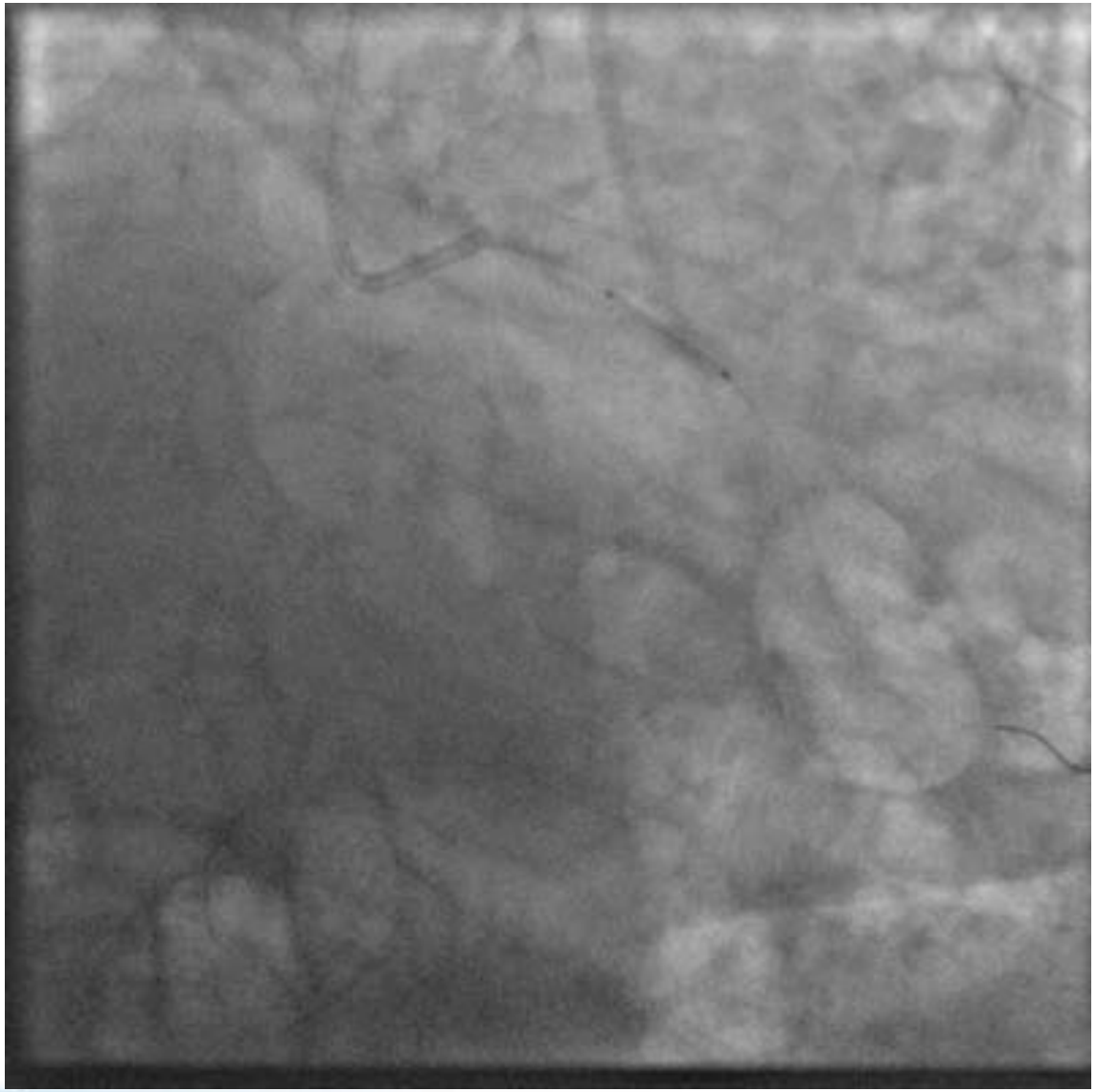
EBU 3.5



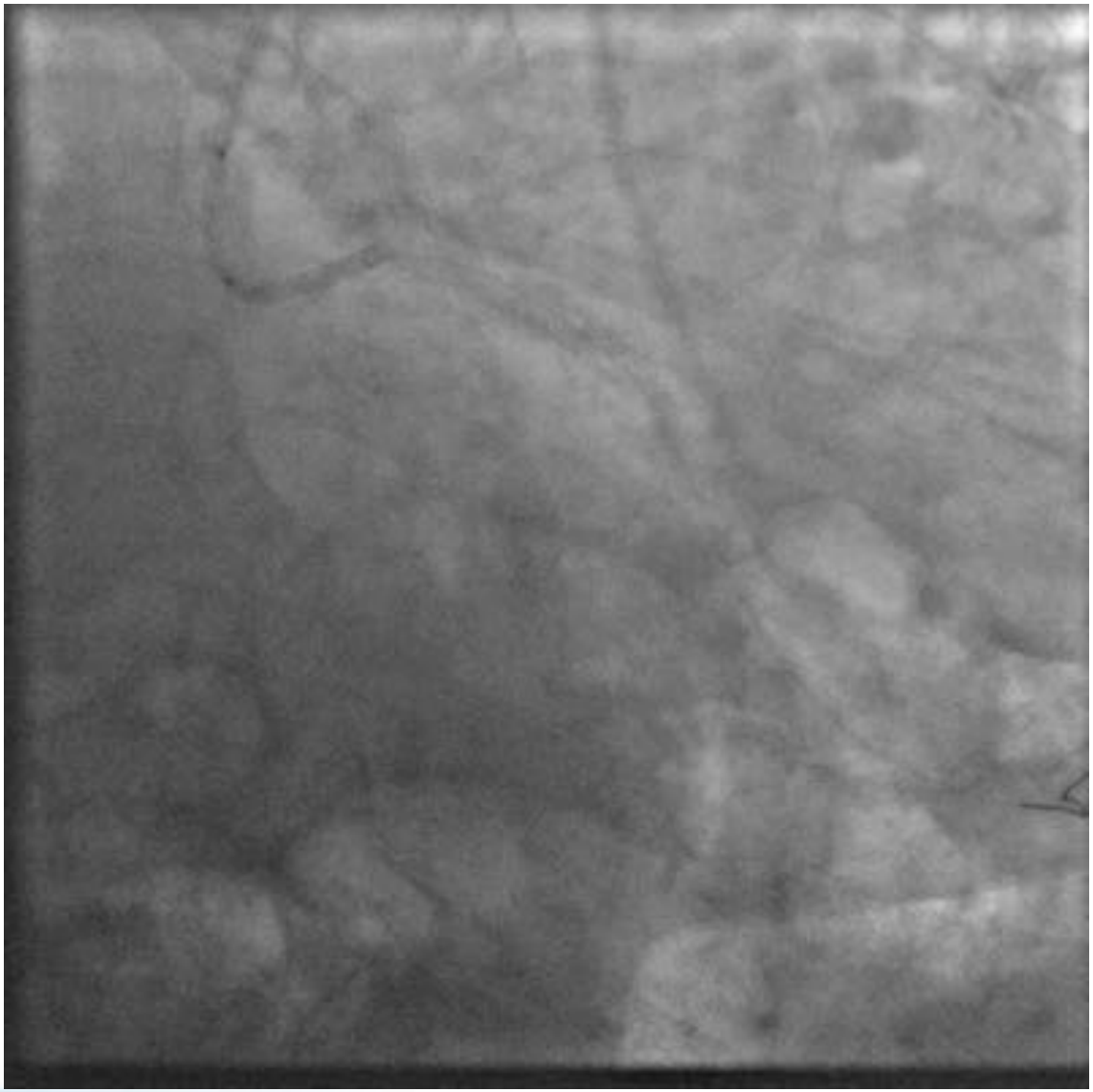
LCx BMW, predilation 3X15 nc



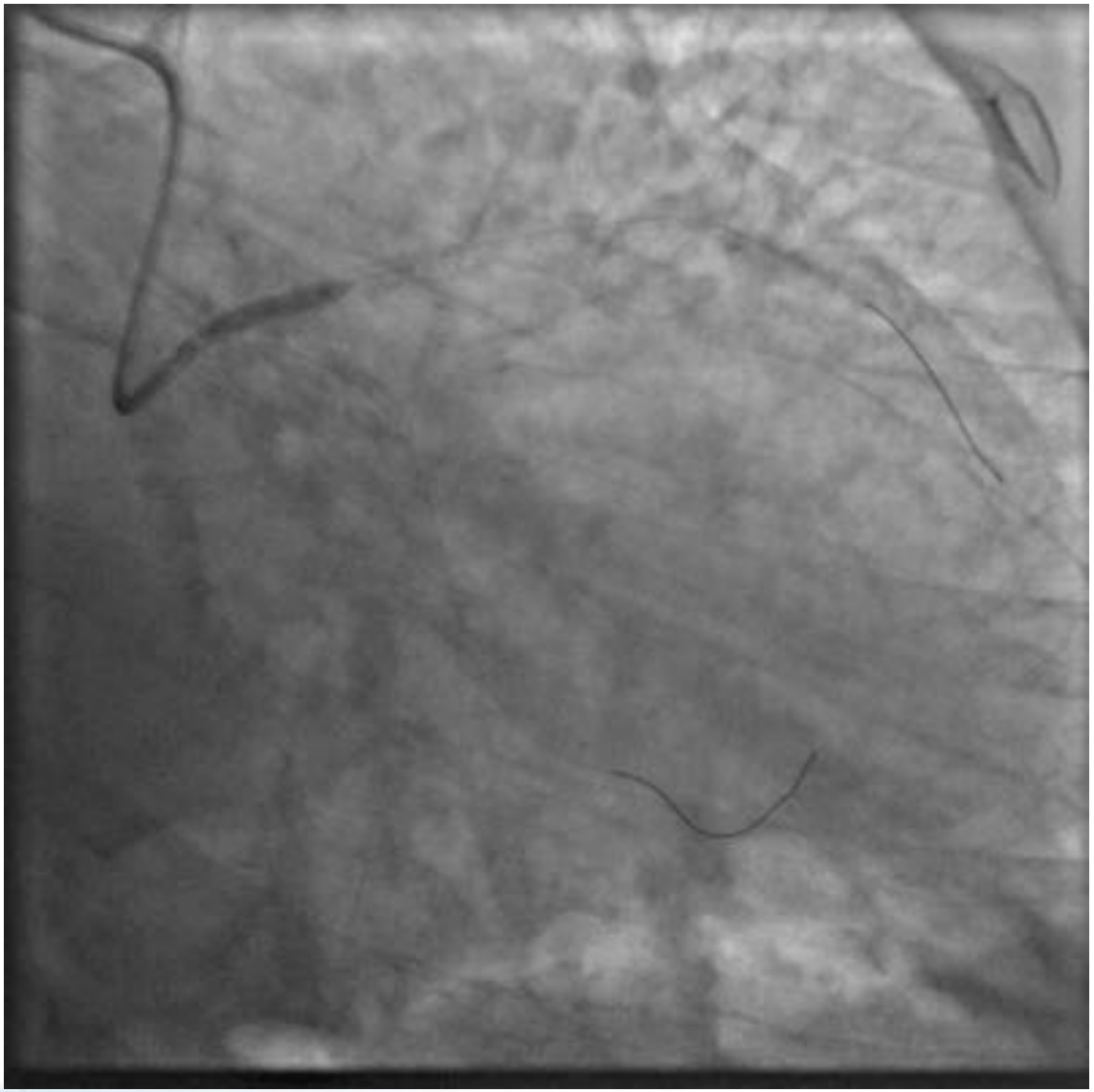
LCx stent 3.0X18



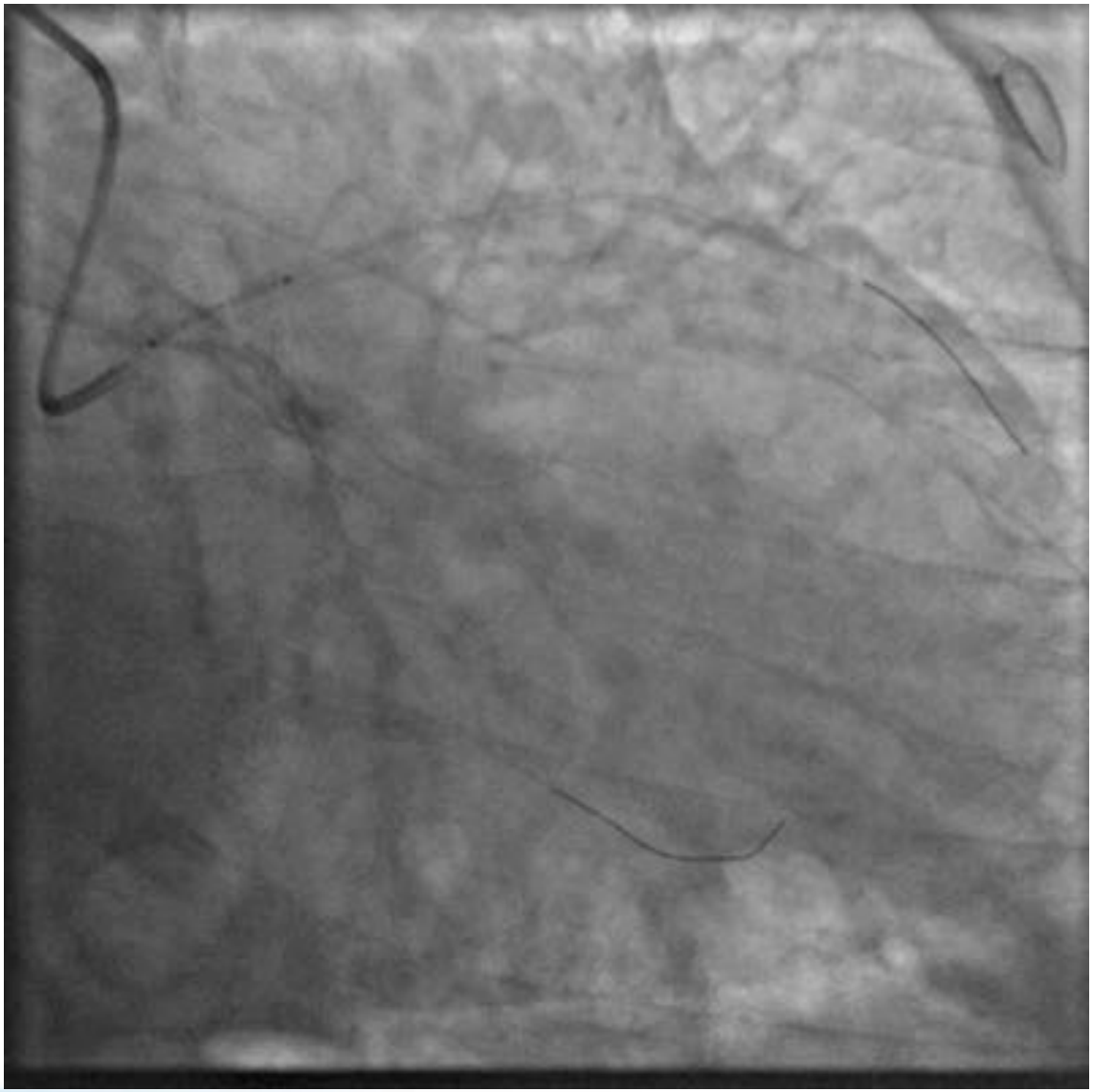
LCx post stenting



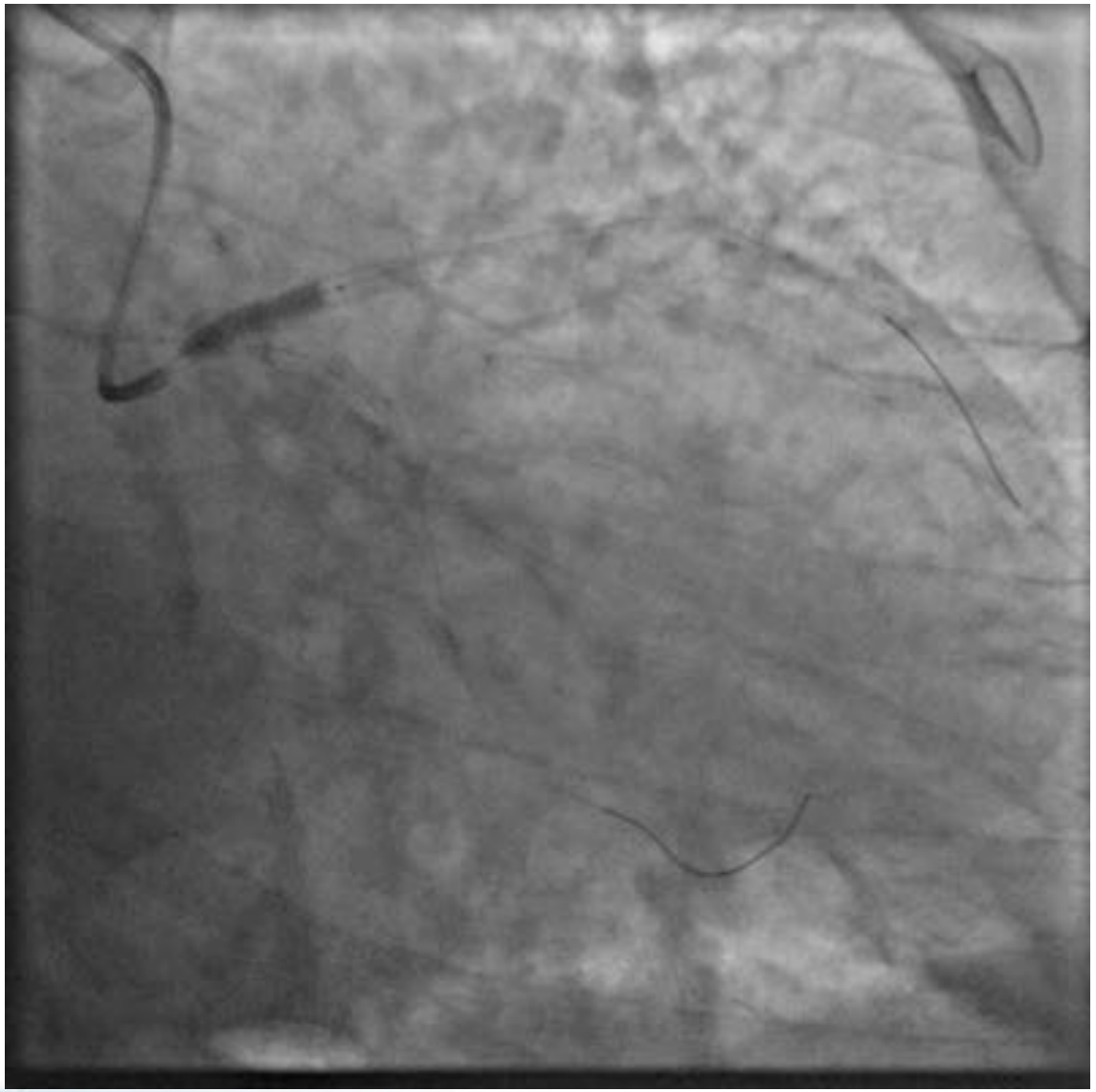
LAD BMW, predilation 3X15



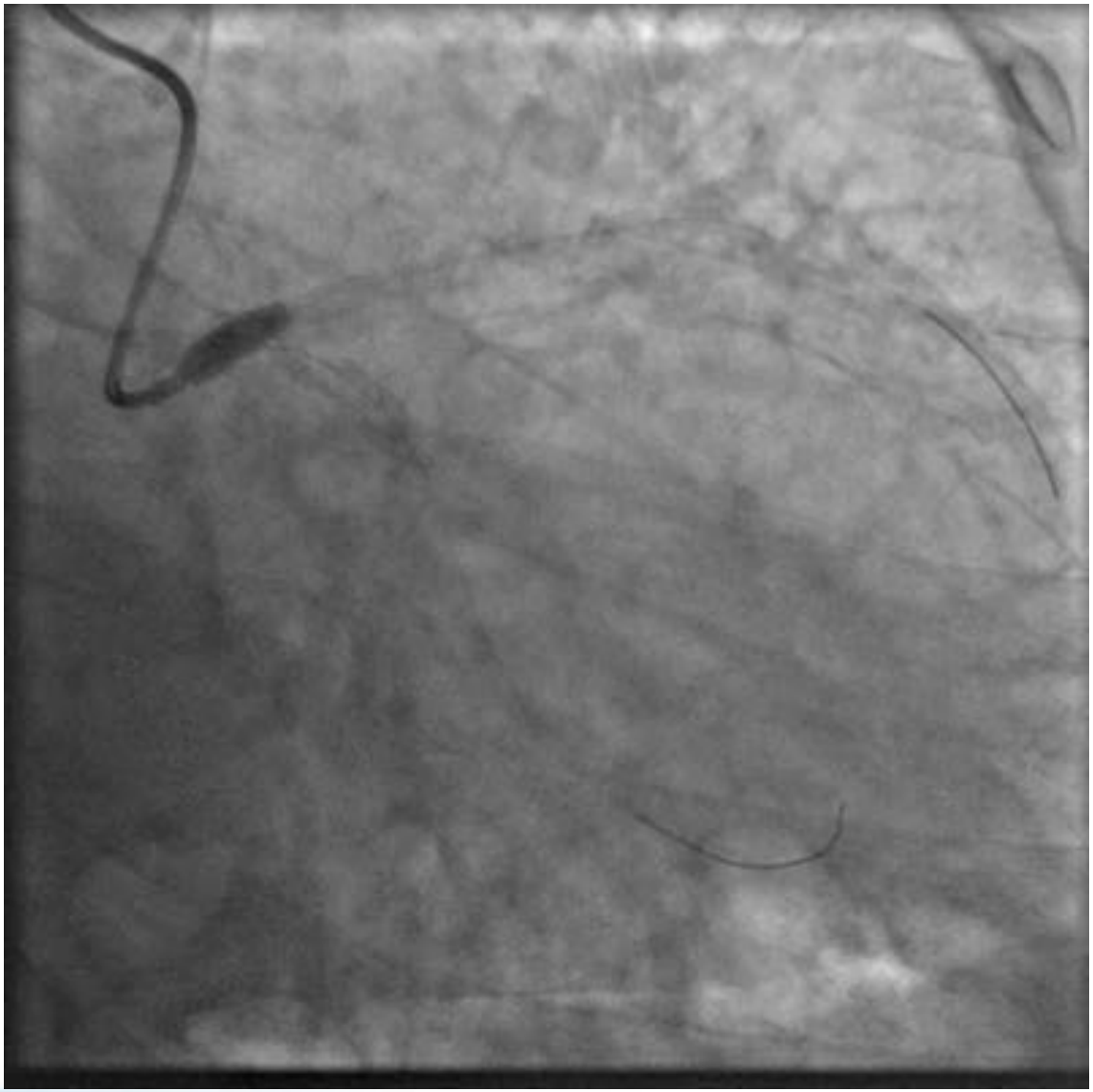
LM to LAD cross-over stenting: Xience 3.5X18



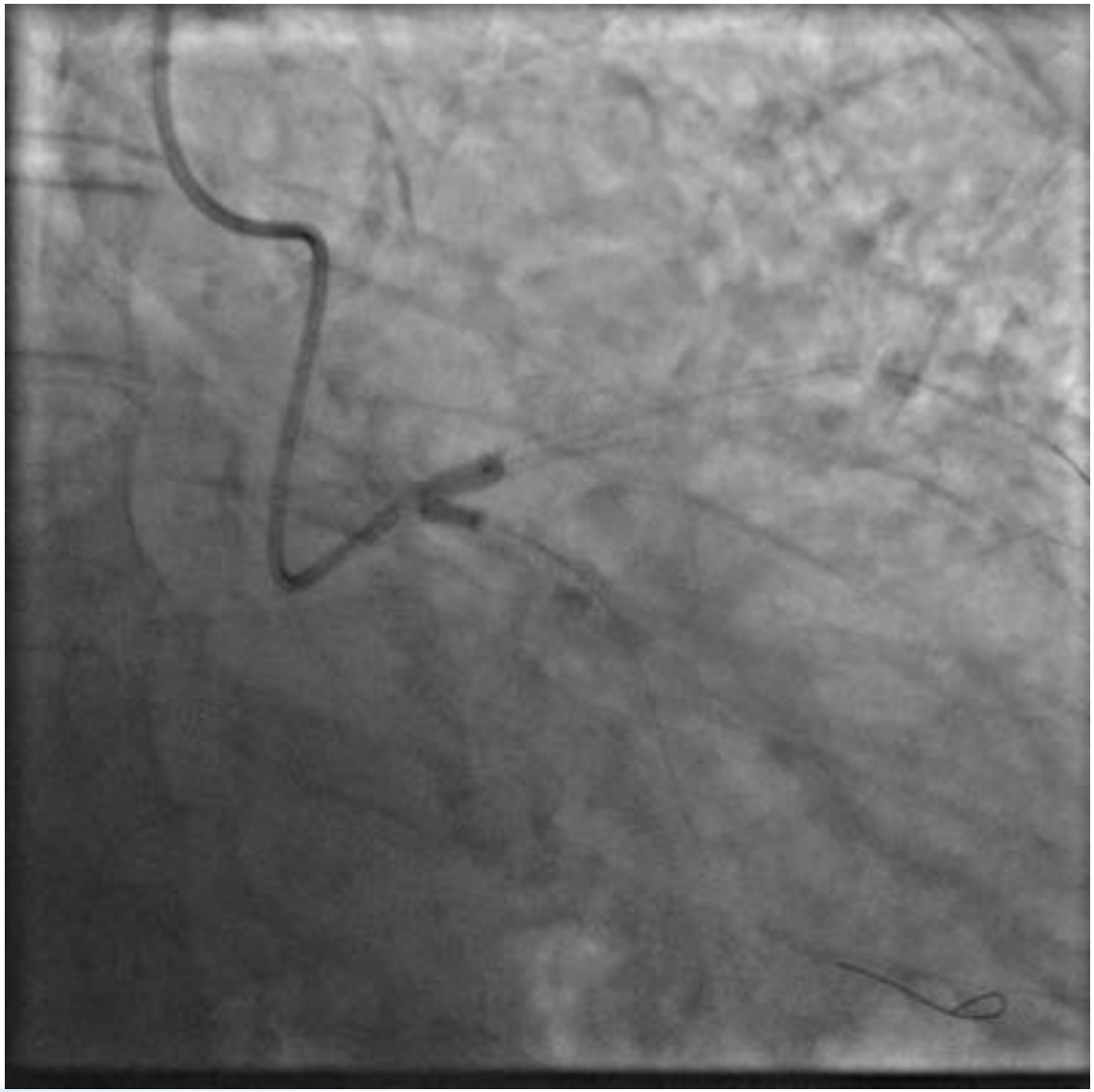
Xience 3.5X18



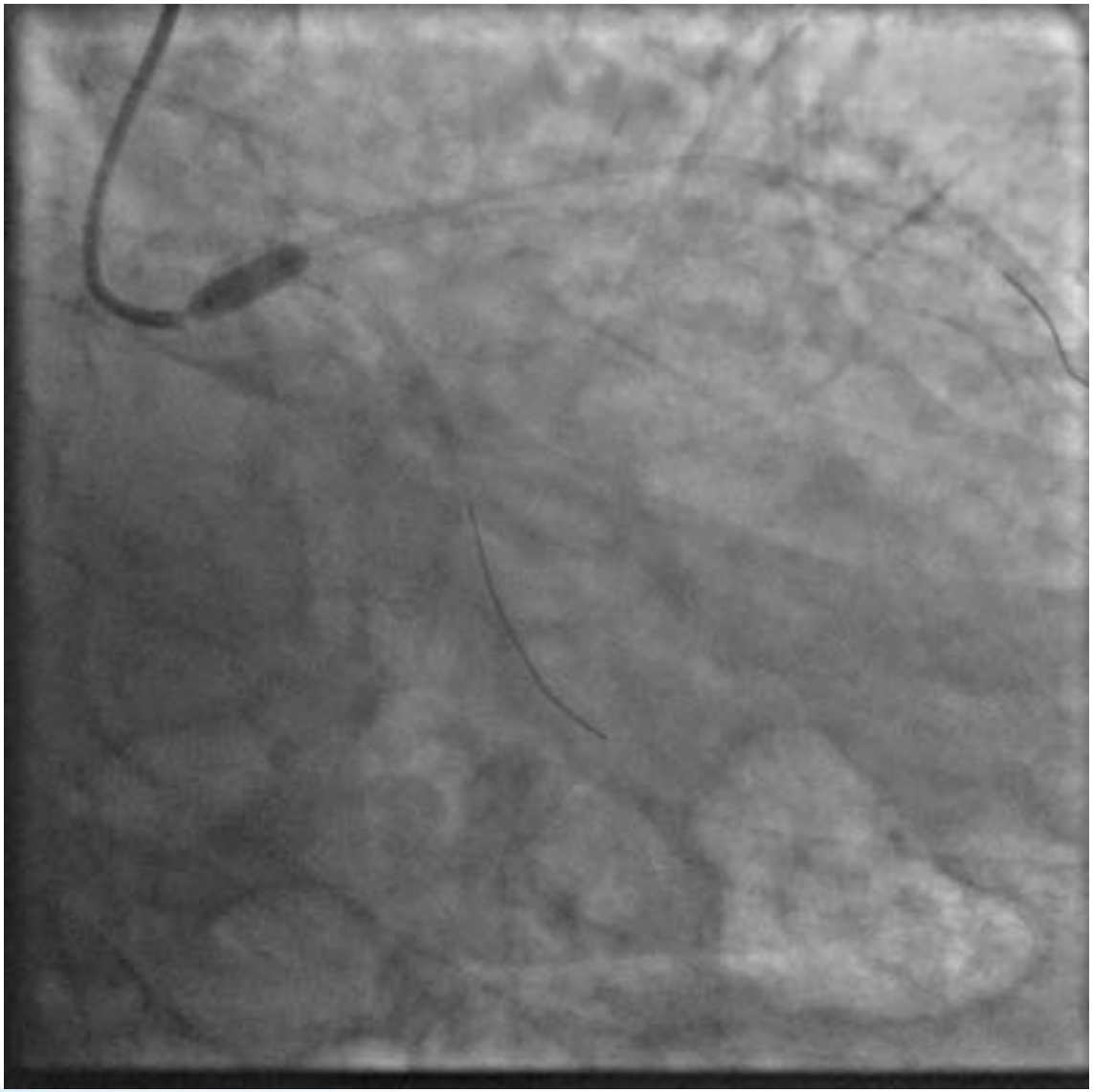
POT 4.5X12



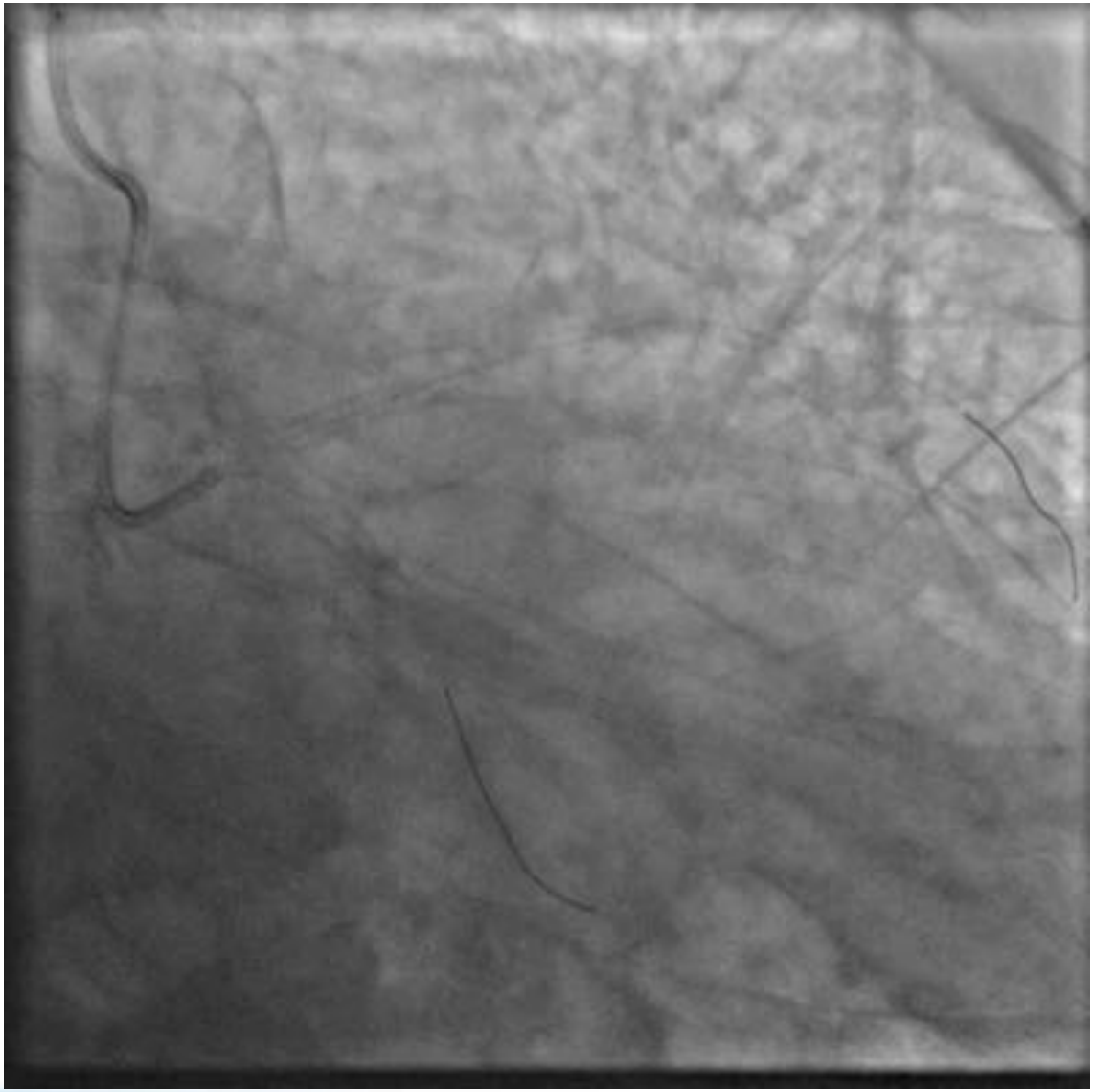
Kissing 3.5 in LAD / 3.0 nc in LCx



POT 4.5X12



Final result

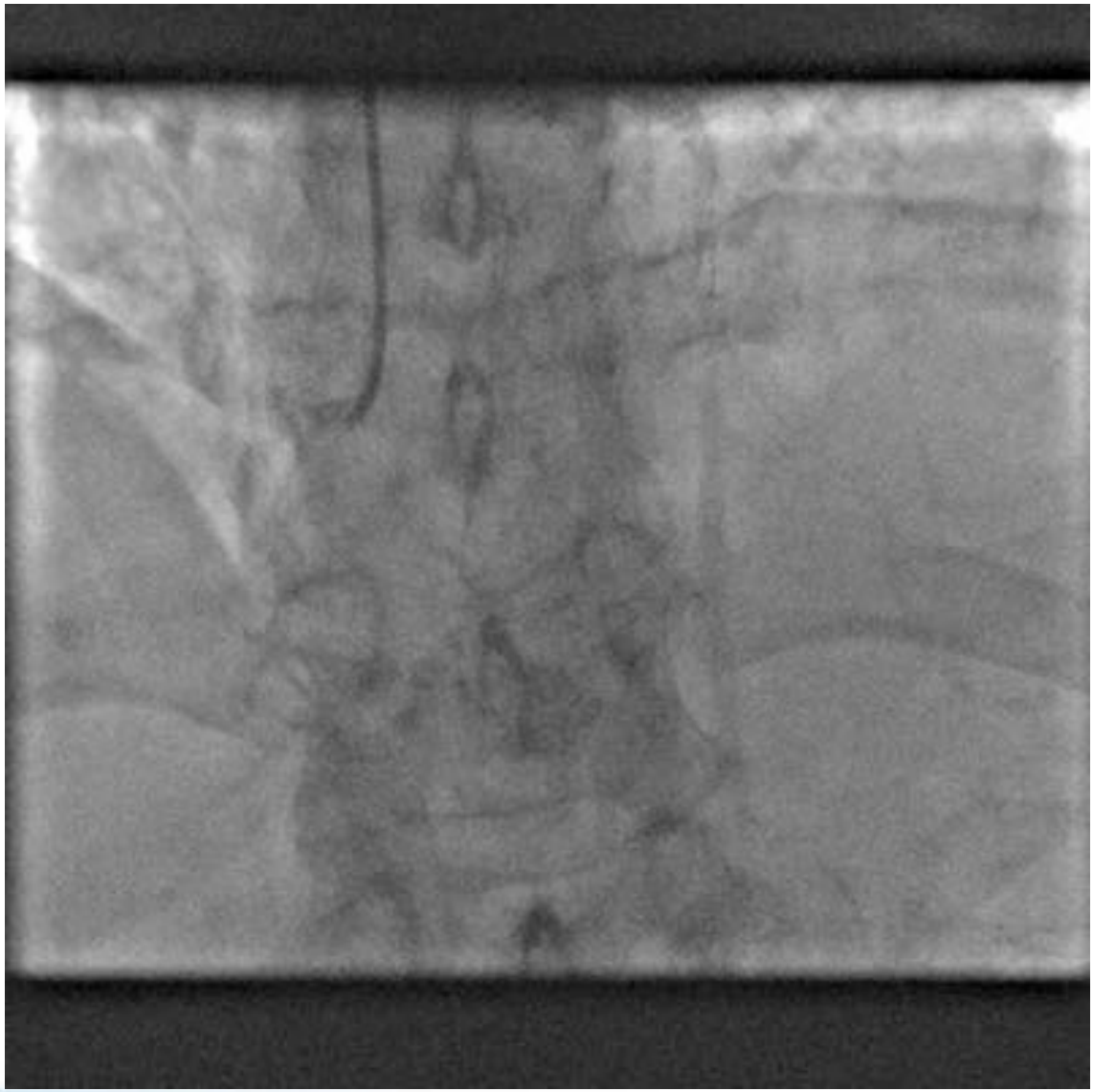


Final result

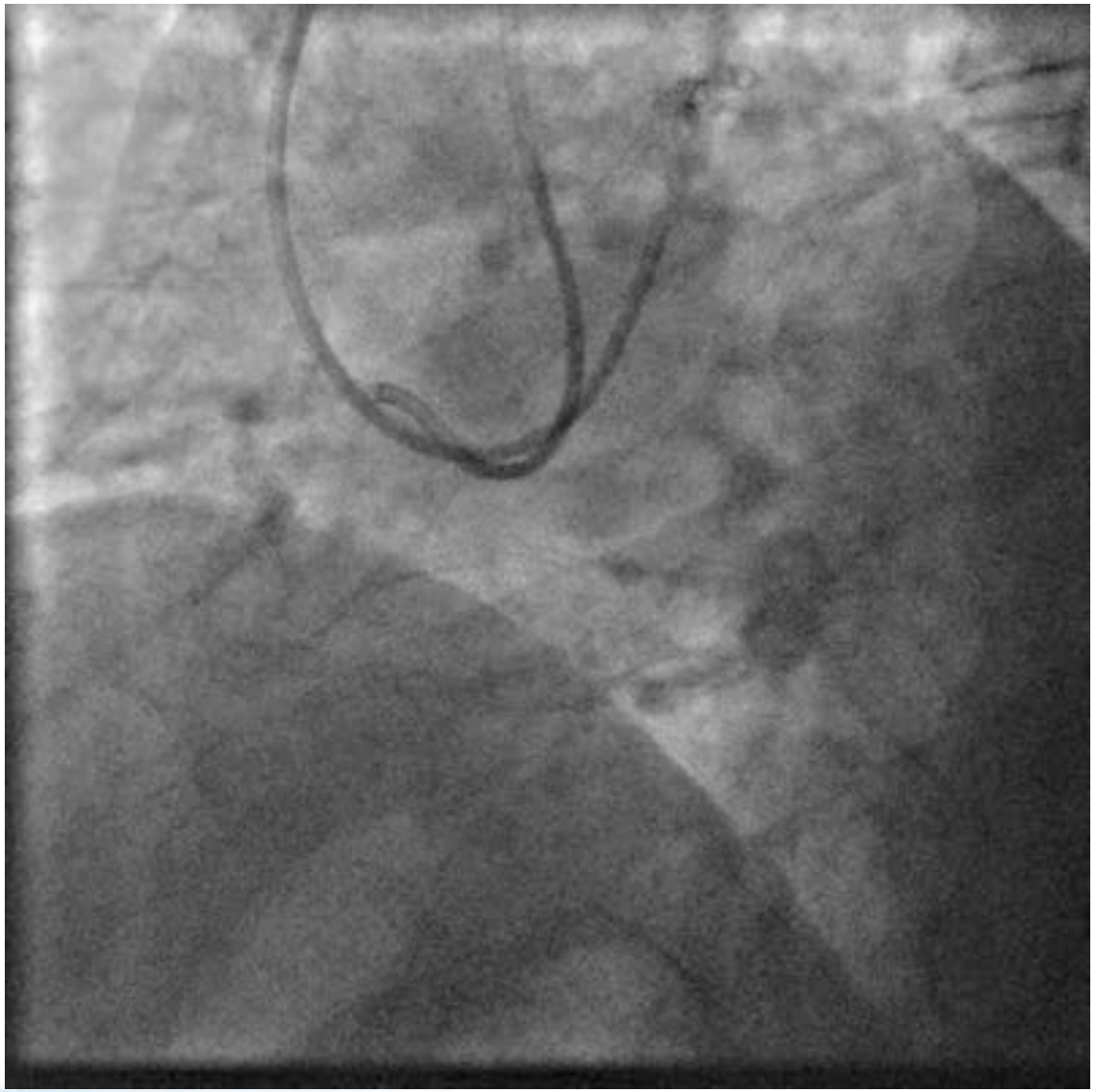
Stent enhancement:
1 stent = 2 diameters, strut « projection » toward the LCx (3 diameters)

RCA very calcified CTO, Bifurcation …
Sheathless Railway 6F

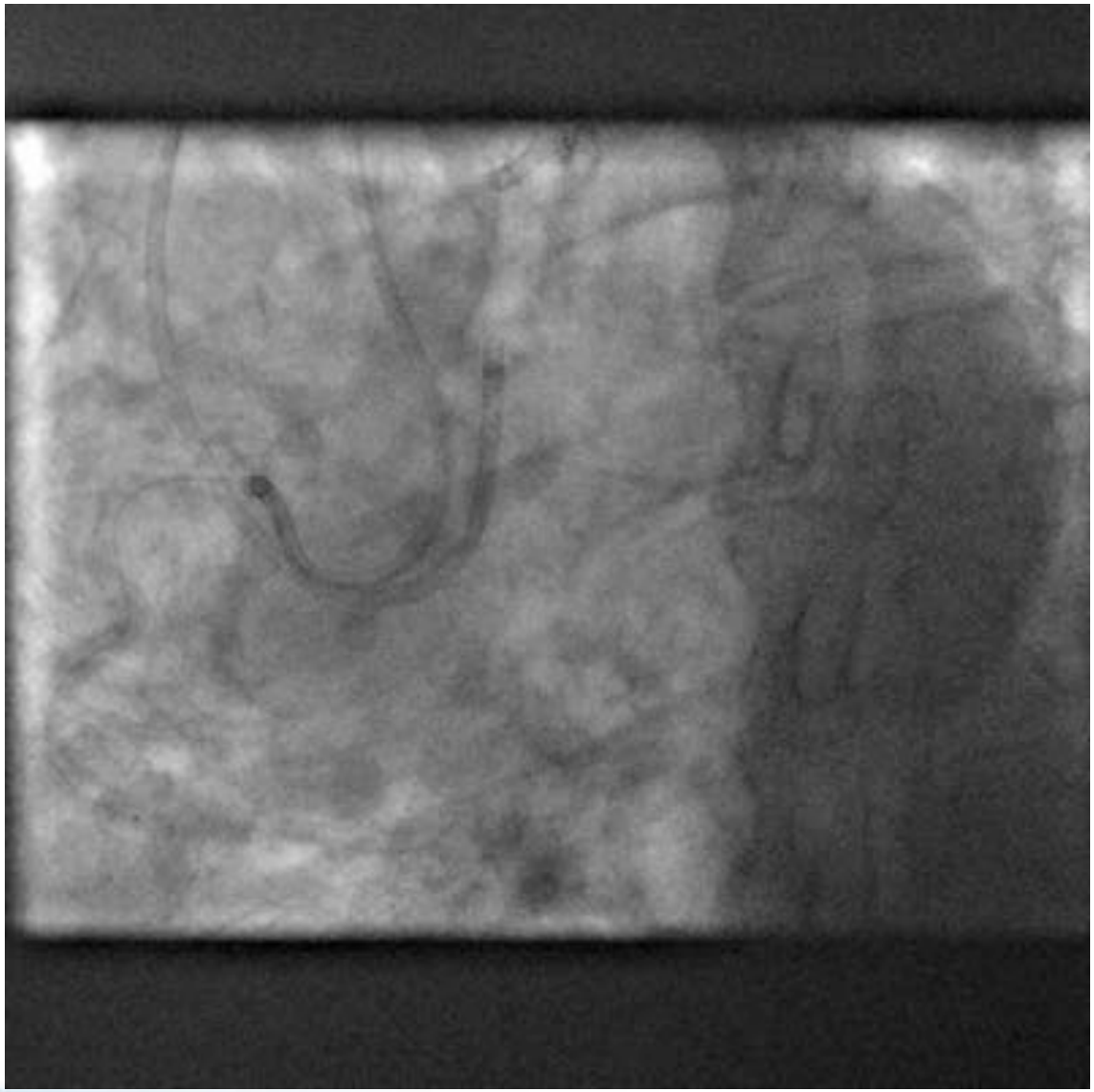
Coronary angiography



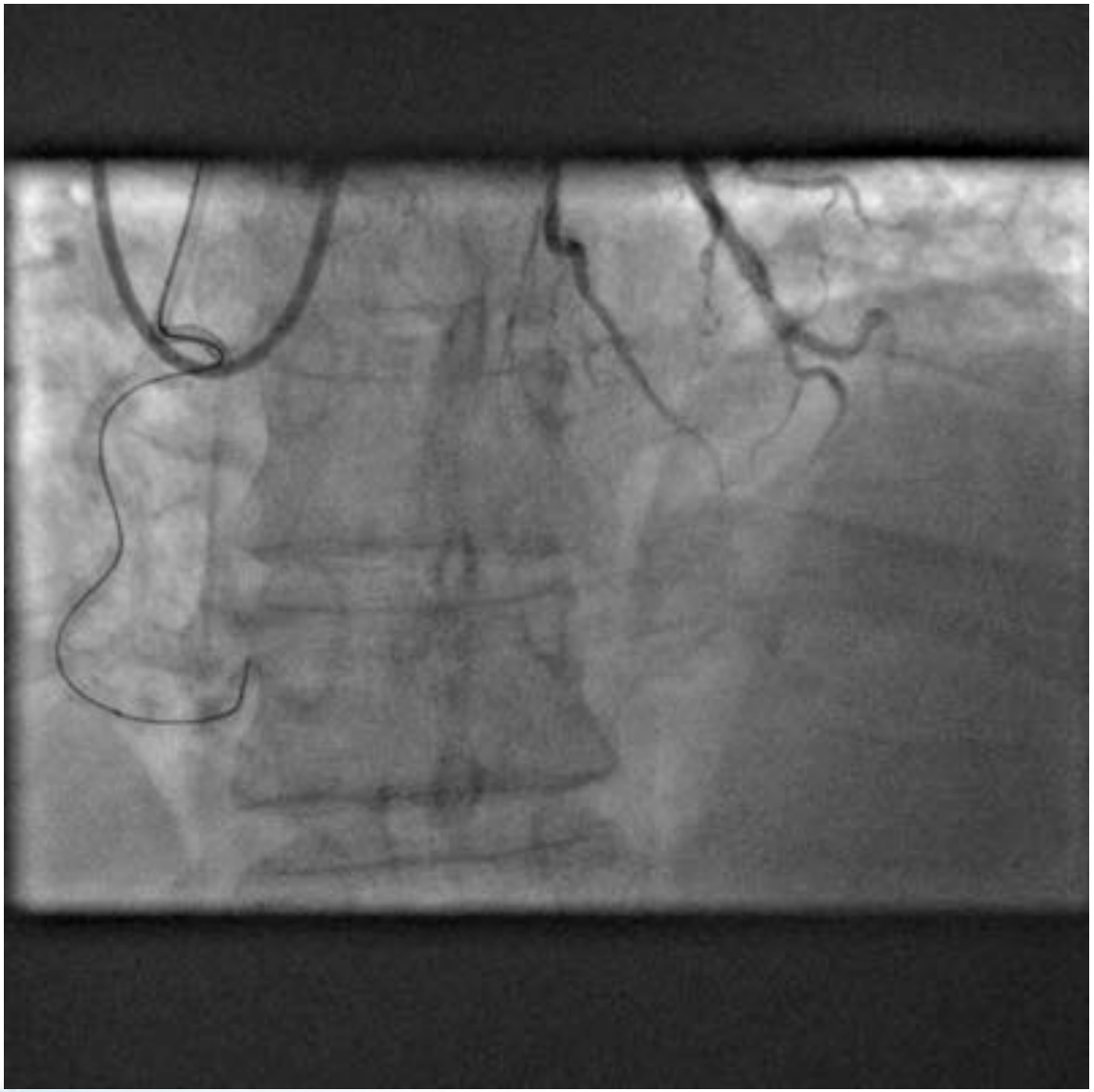
Double radial approach 6F Railway: AL2 EBU3.5



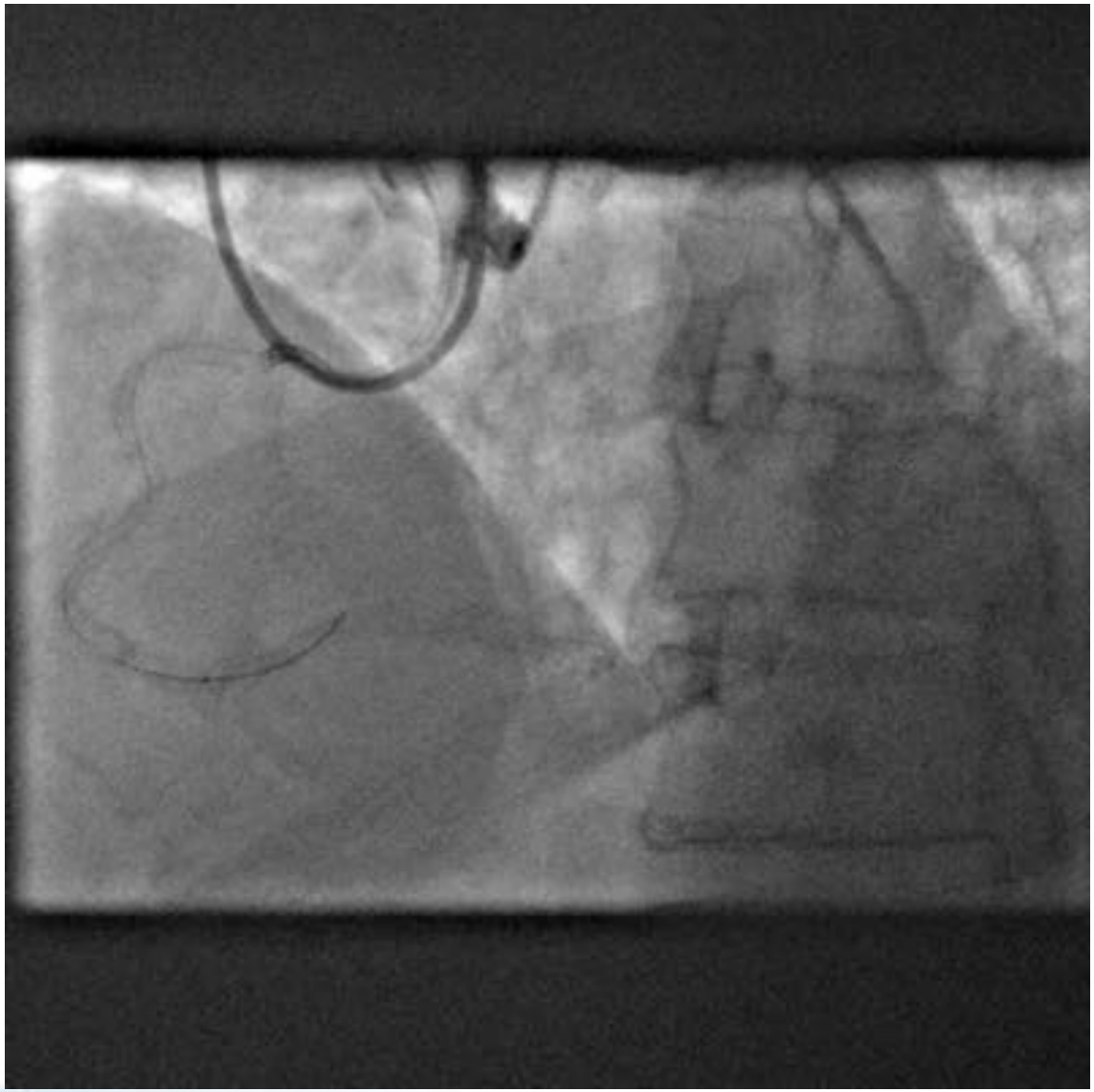
Double injection: selective in RCA (Finecross)



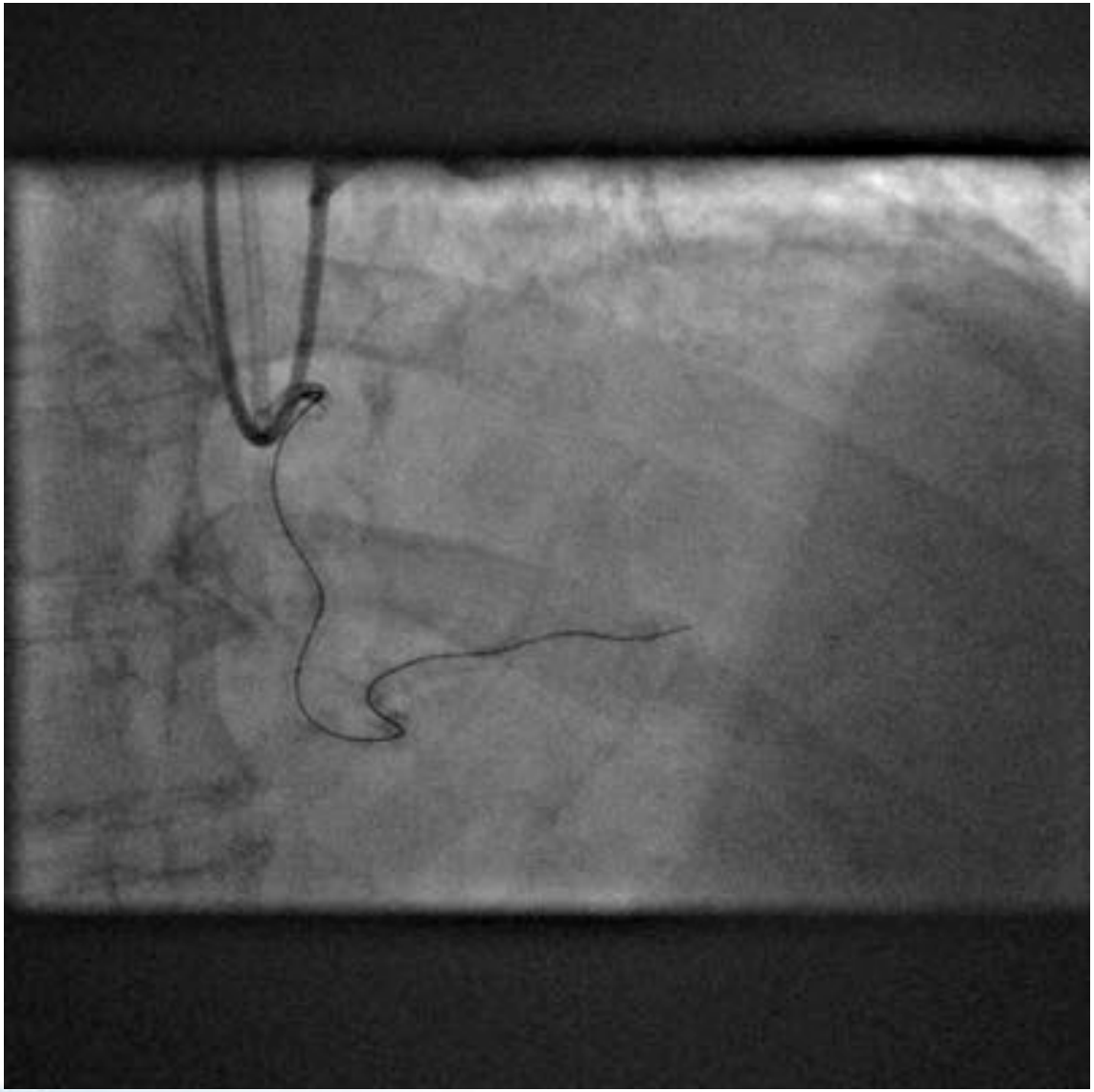
Finecross Pilot 200



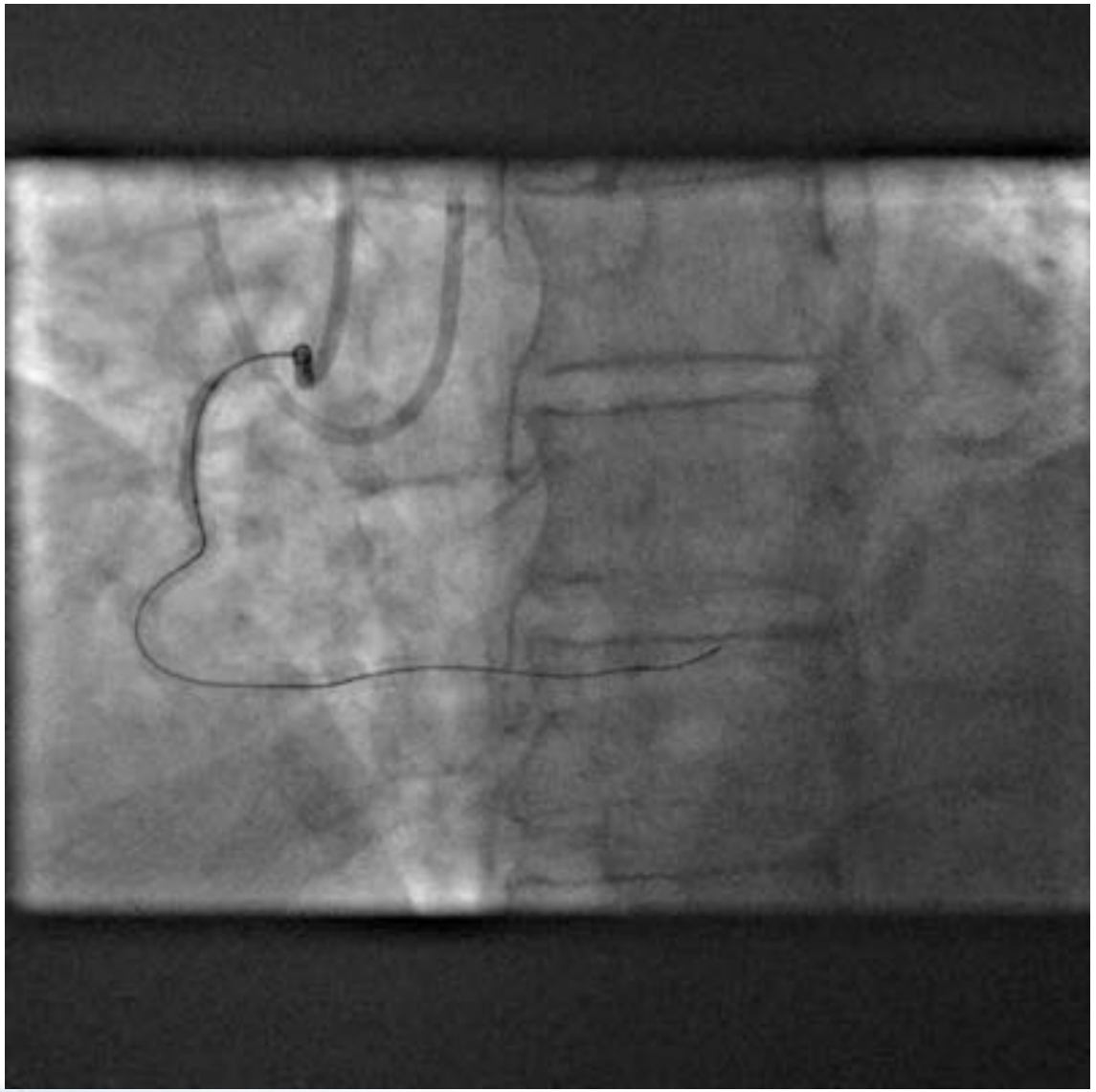
Finecross Gaia 1st-3rd

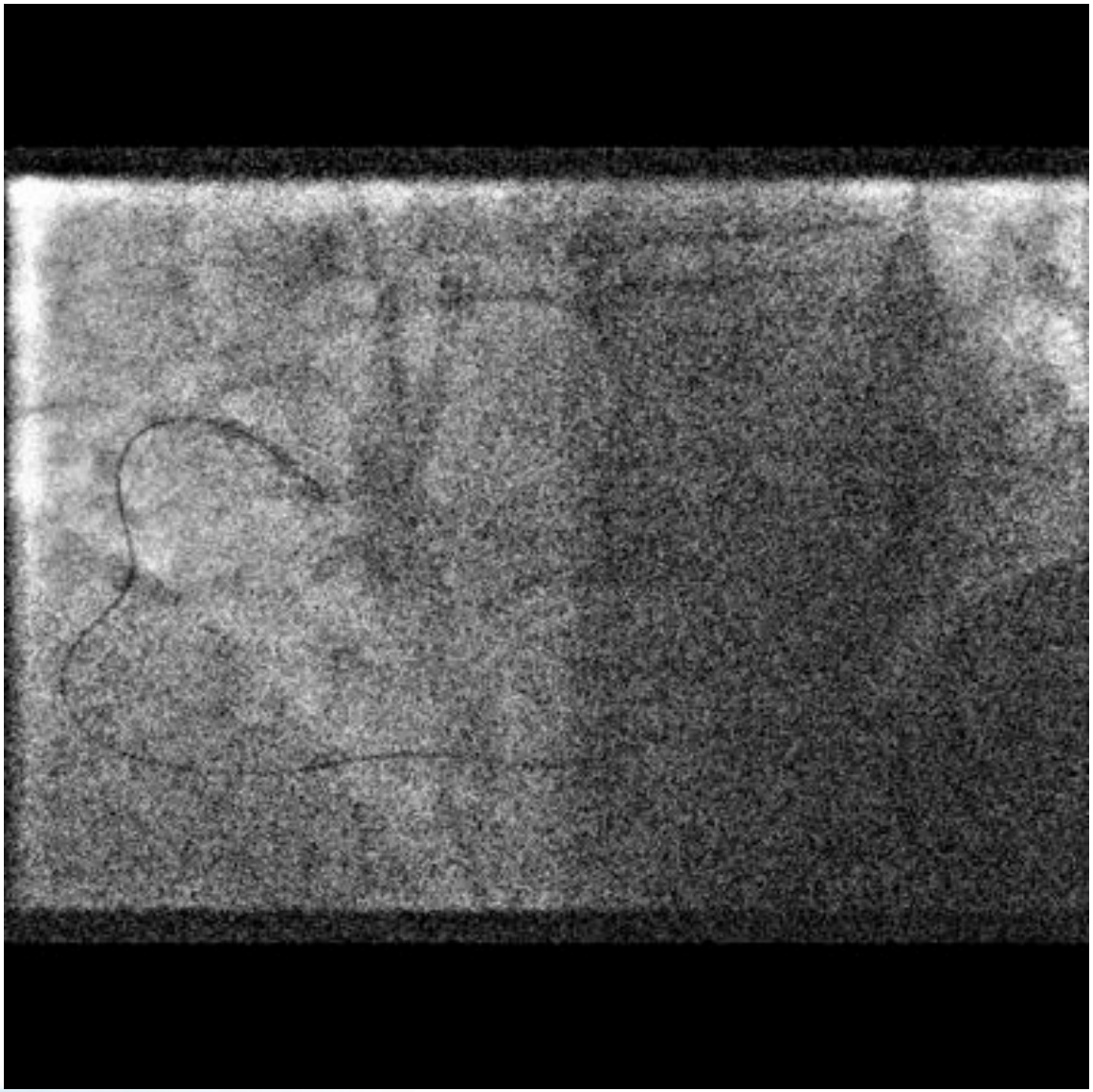


Finecross Pilot 200

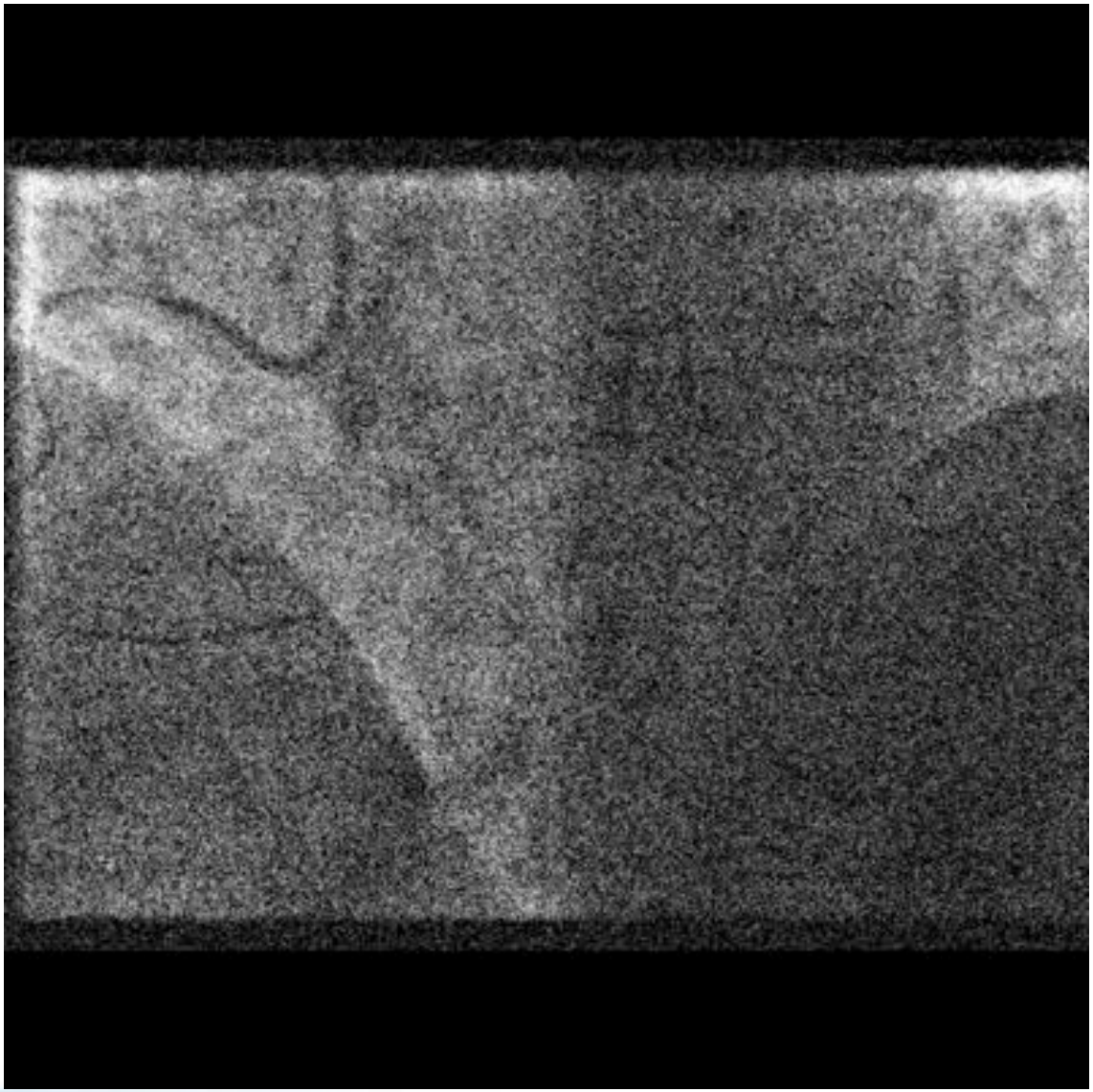


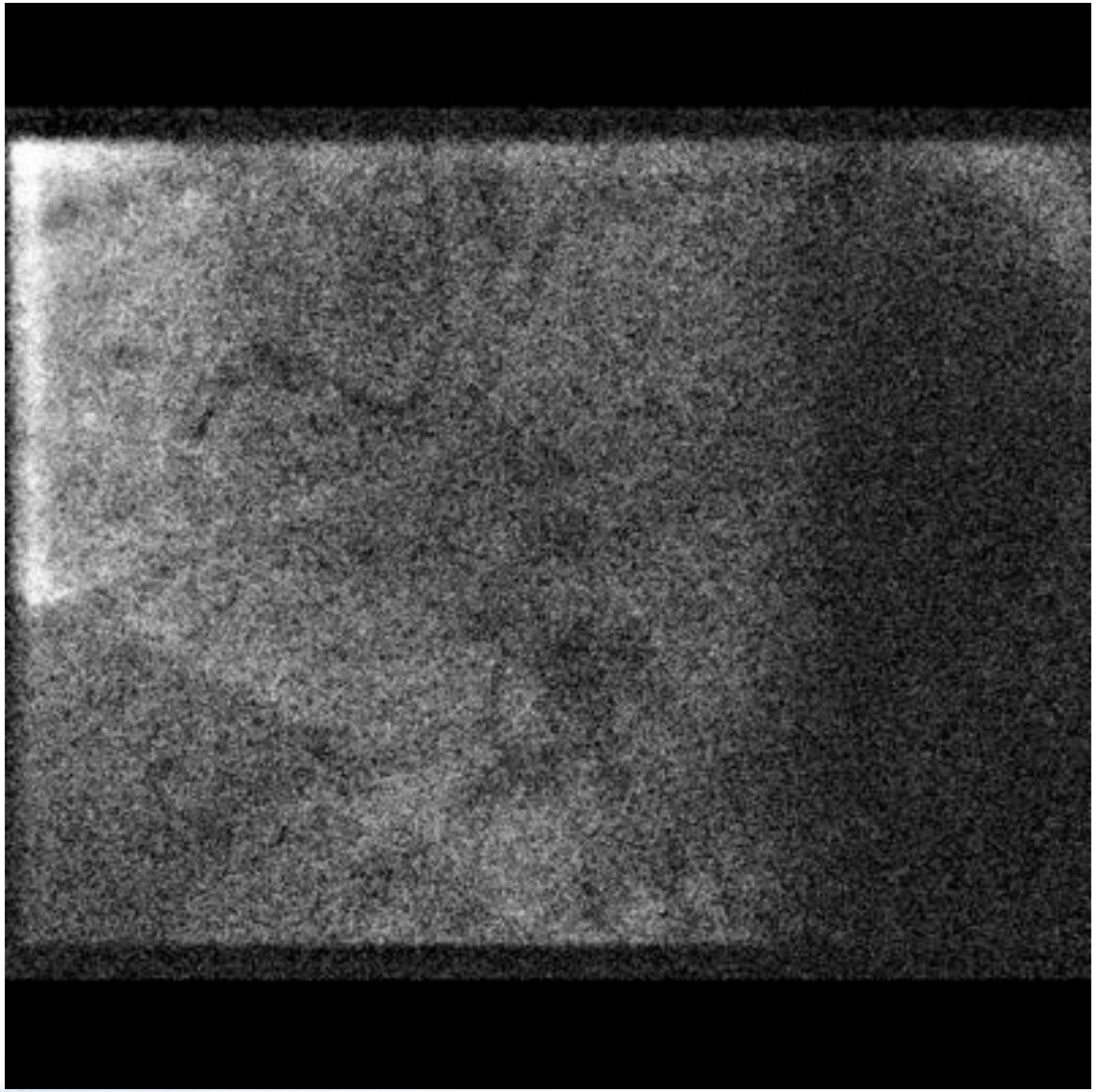
2.5 NC Balloon 30 atm



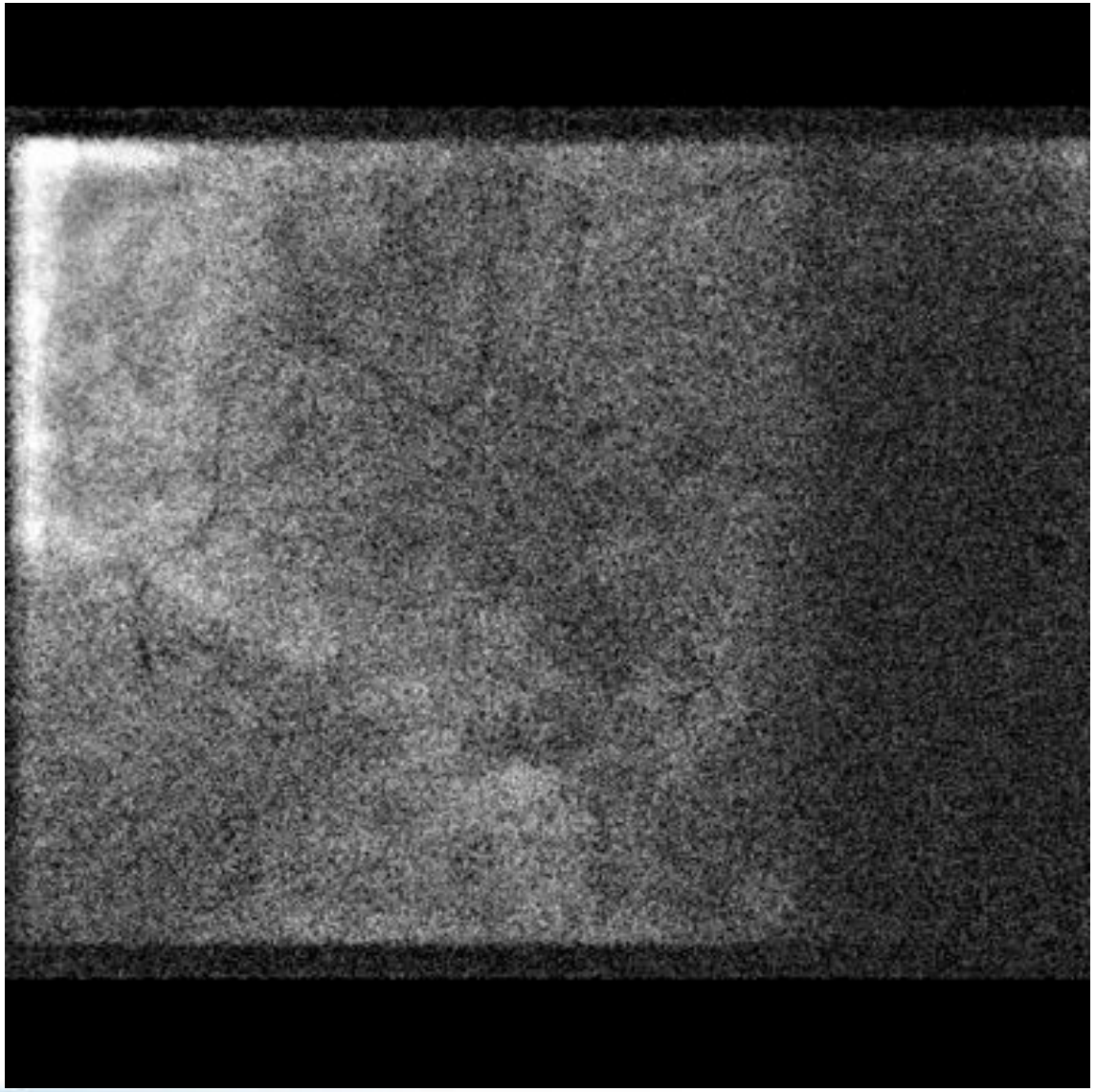


Heartrail 5 in 6, Caravel, Rotawire





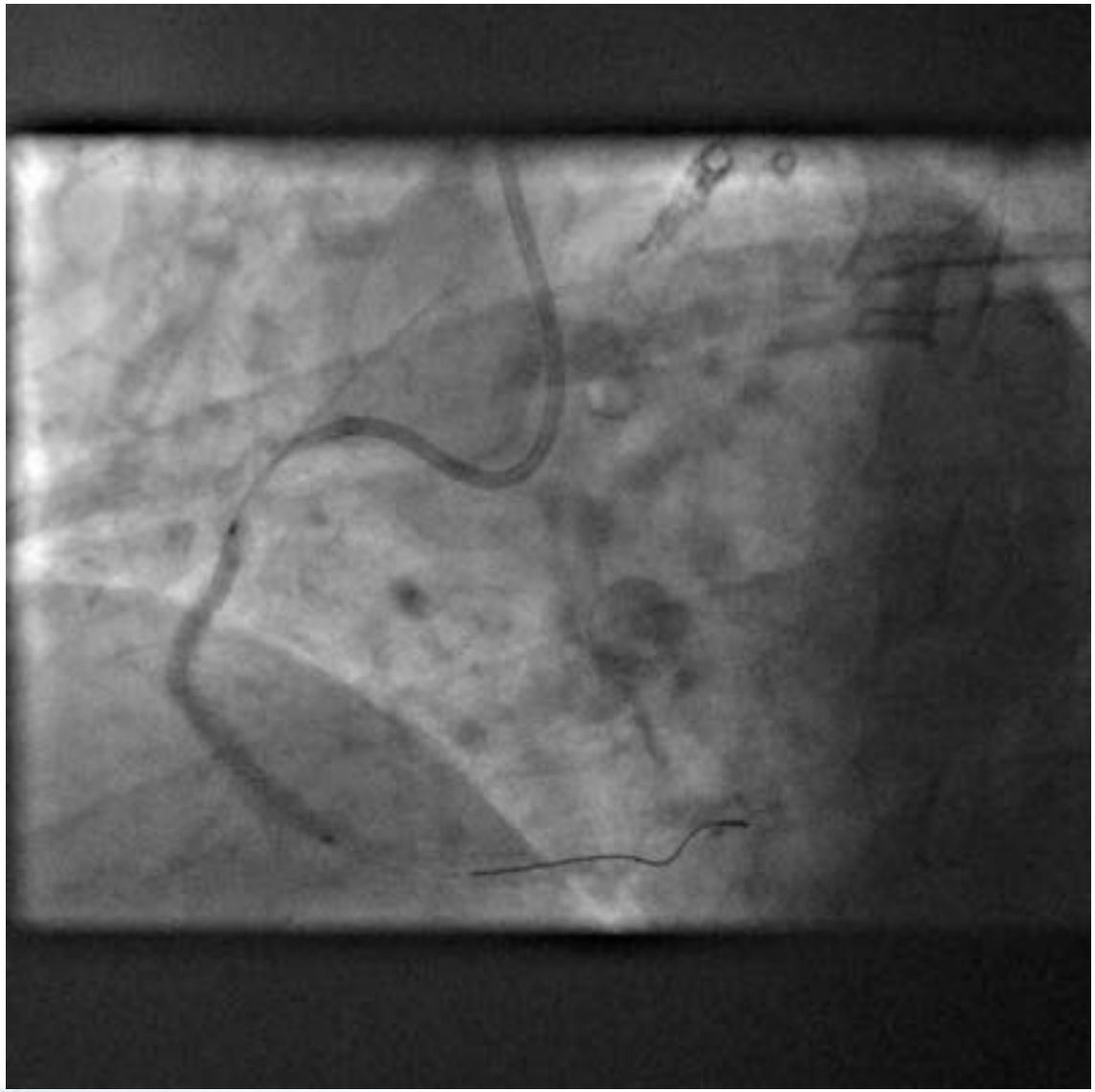
Rota 1.25



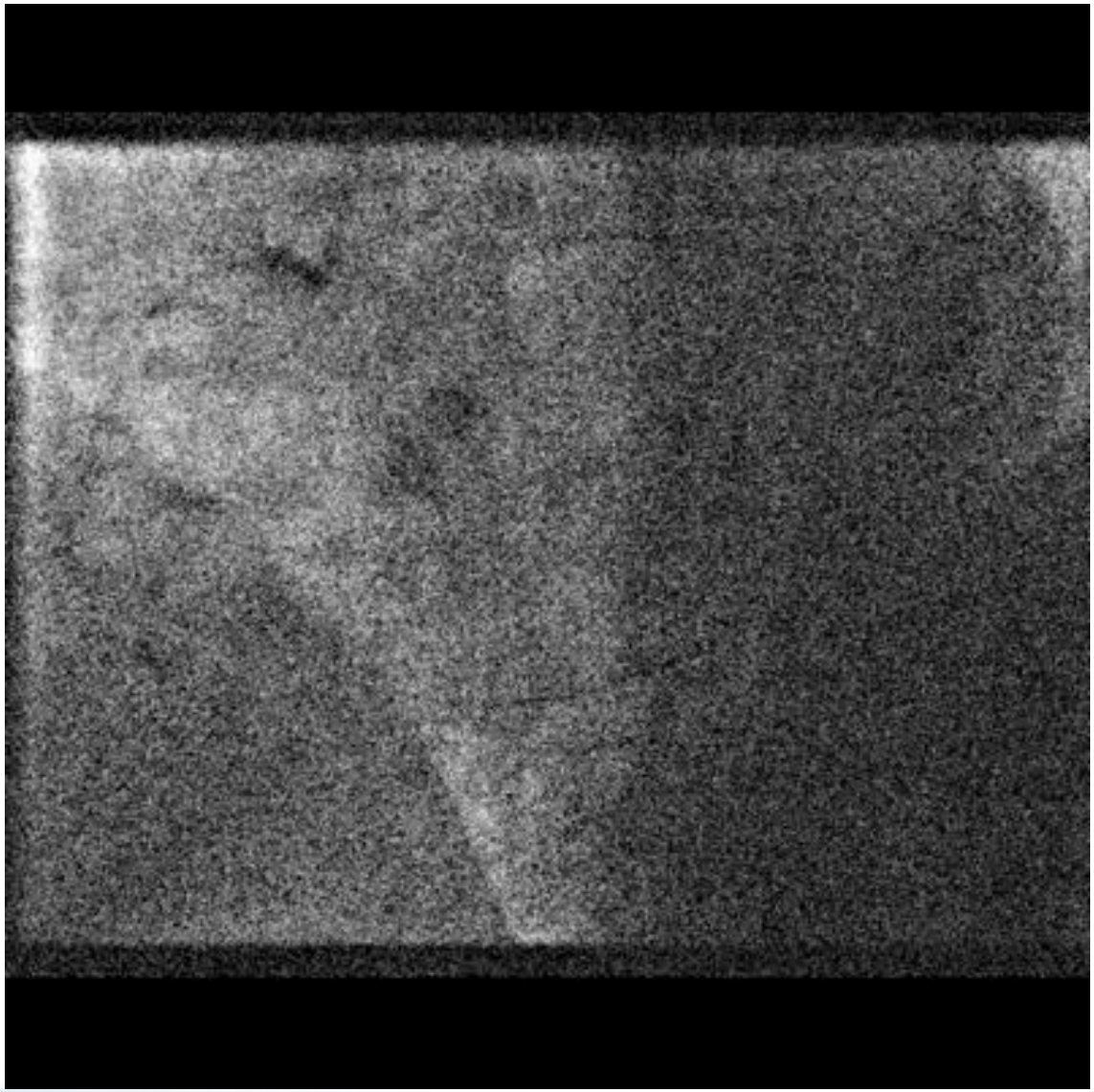
BMW 2.5, compliant balloon

Pre stenting

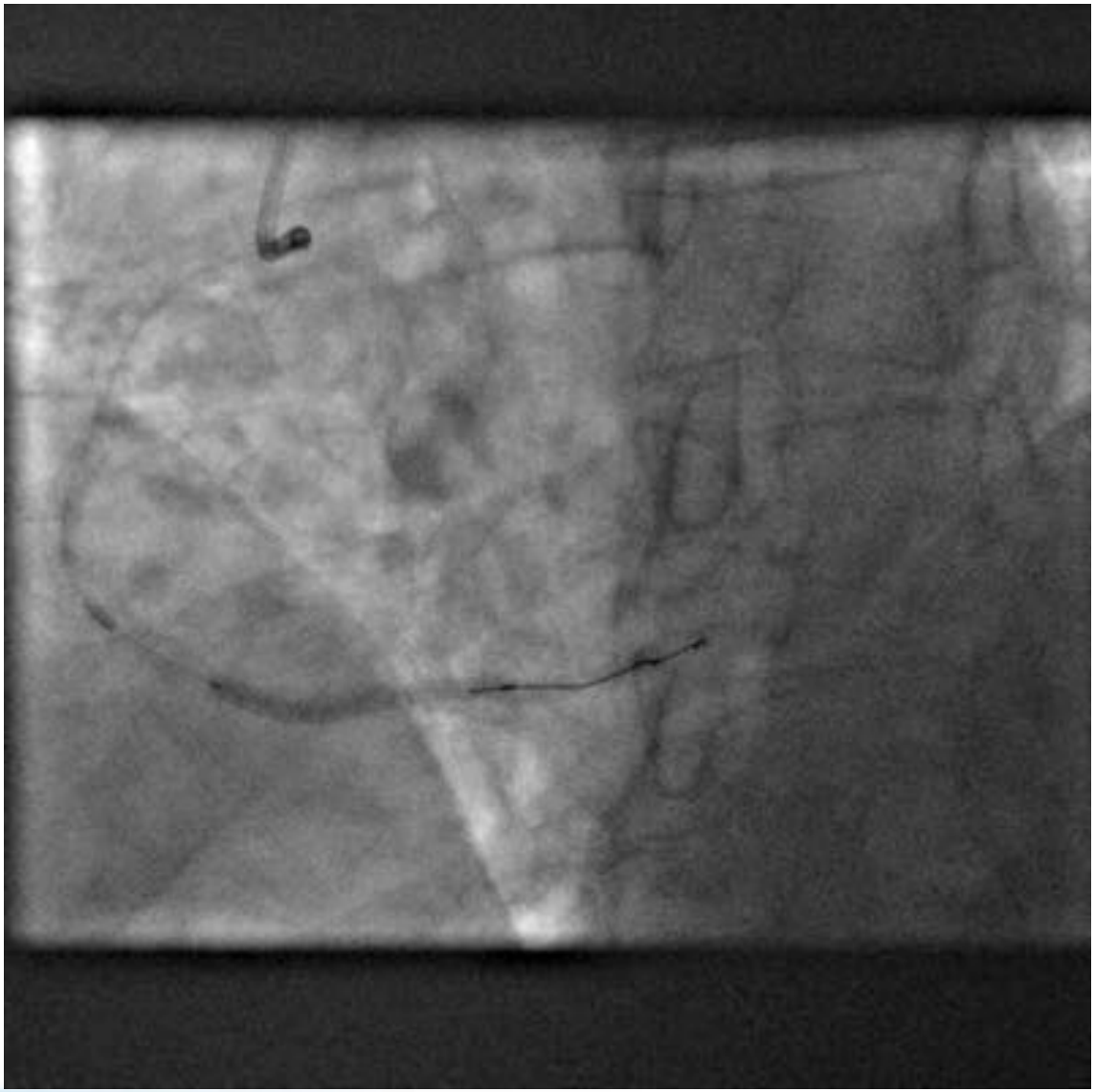
Heartrail, 2.5 balloon



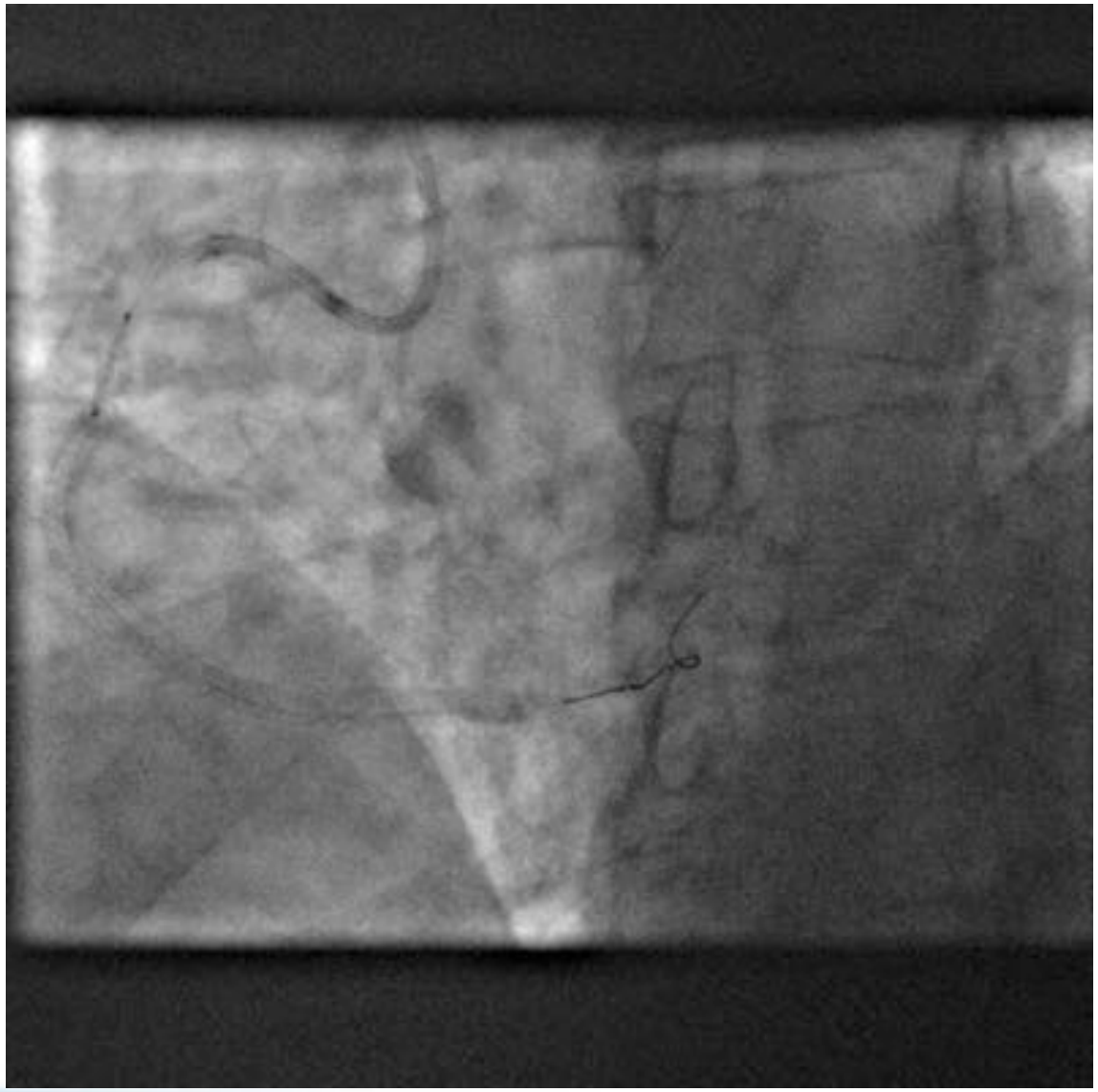
Heartrail, Xience 2.5X48



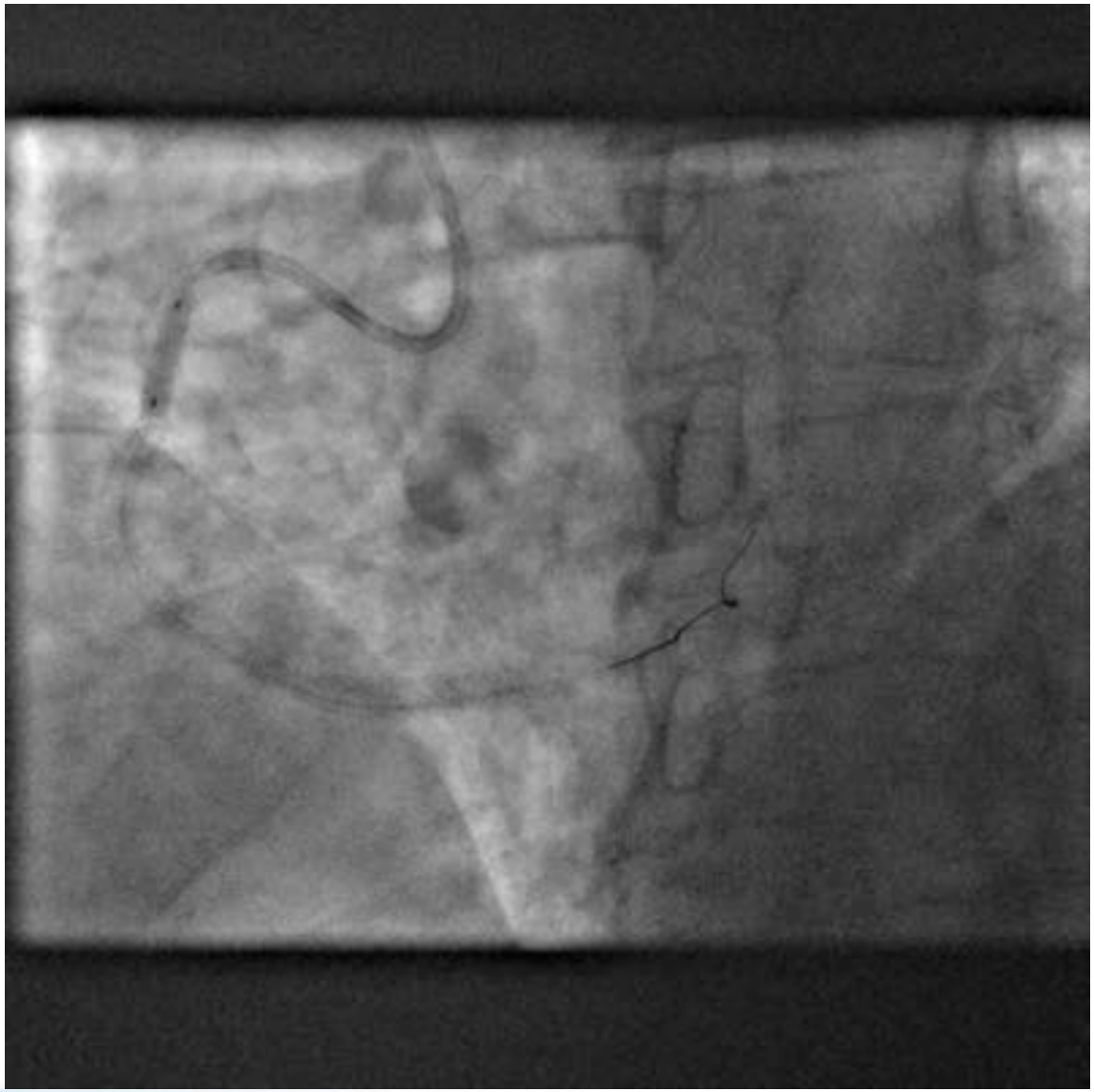
Xience 2.5X48



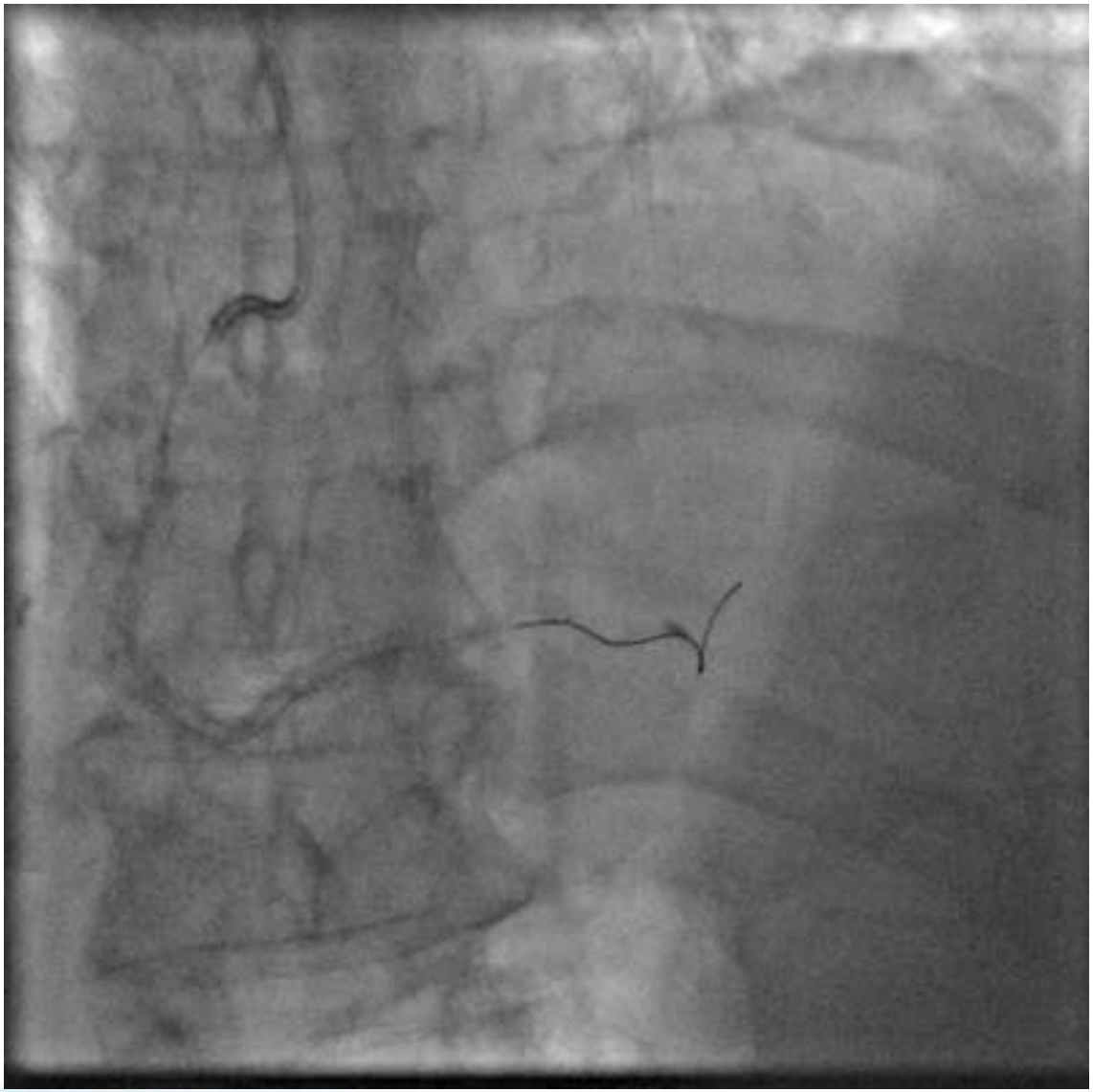
After Xience 2.5X38, Xience 3X12



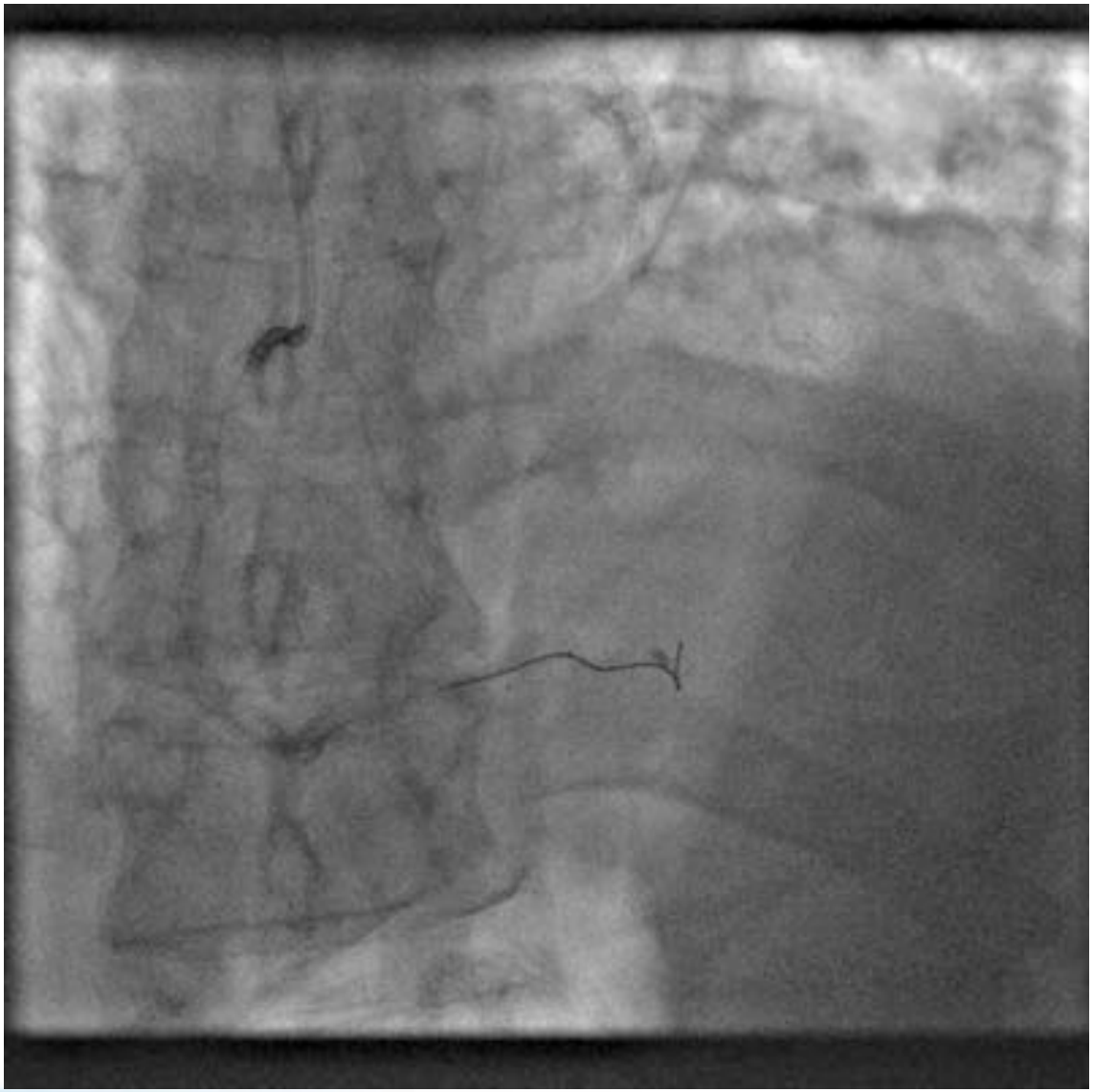
Xience 3X12



Final result

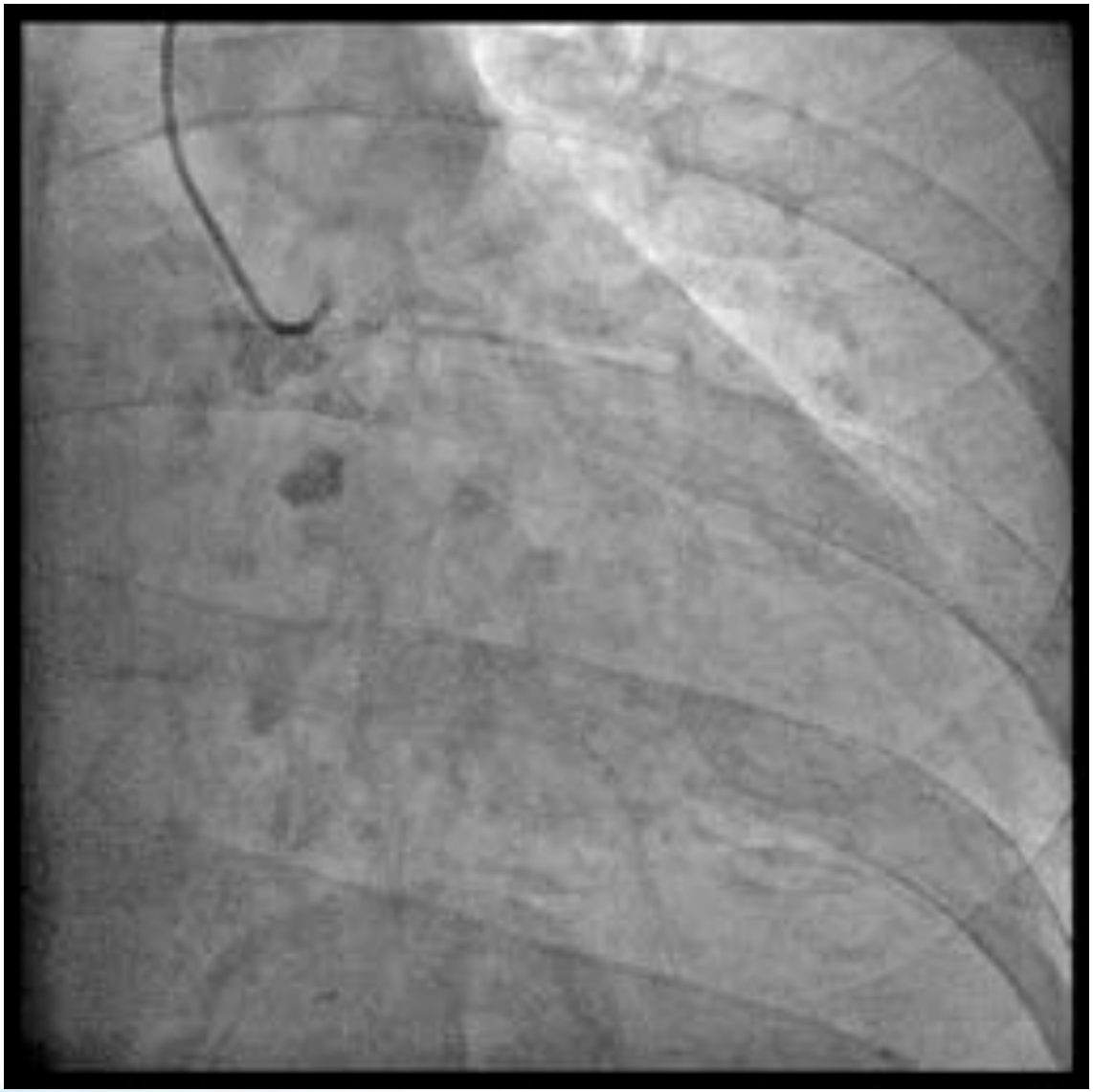


Final result

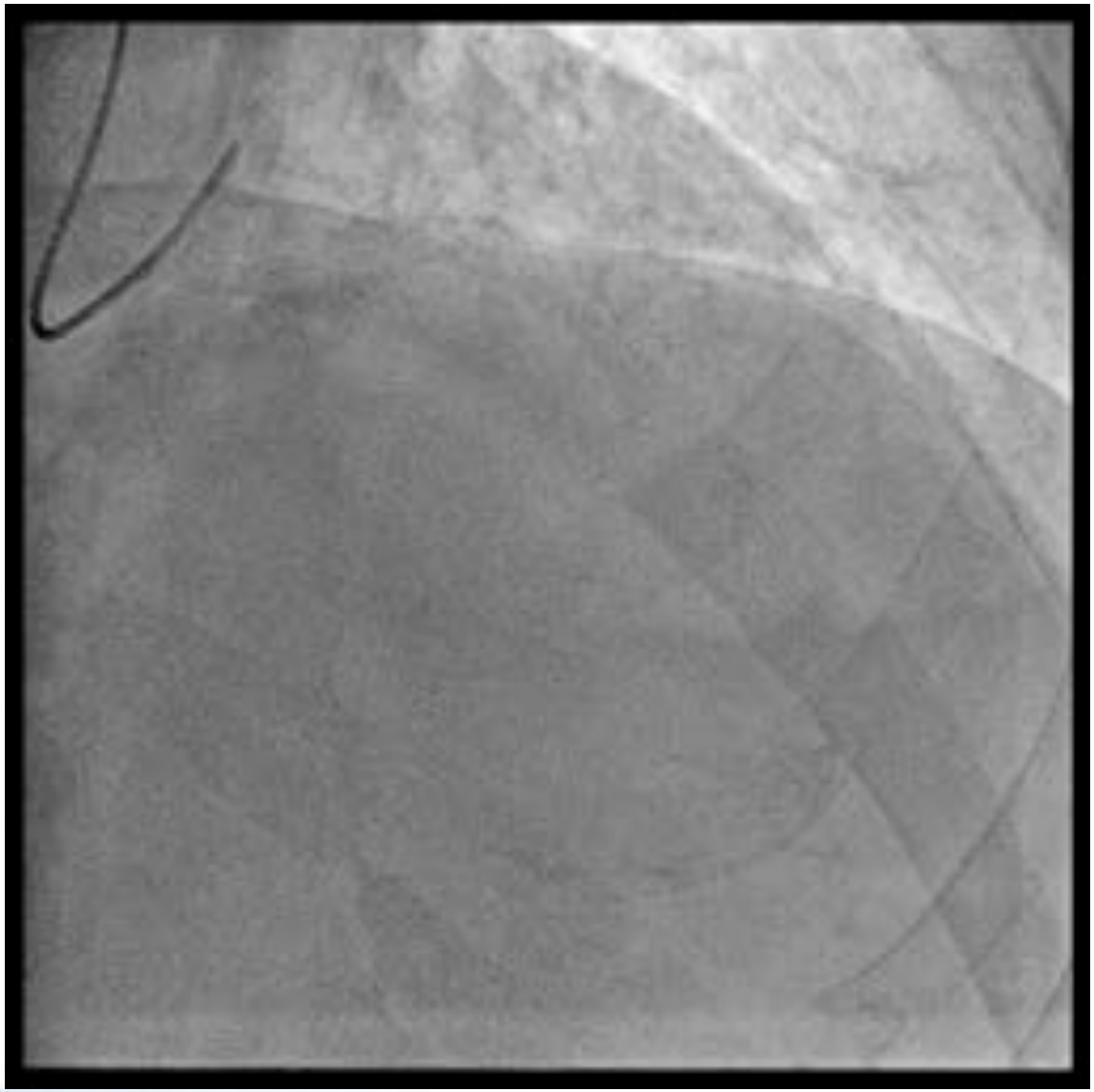


LAD CTO and LM bifurcation PCI
Left radial 7F sheathless Railway,
right radial 6F sheathless Railway

LCA coronary angiography

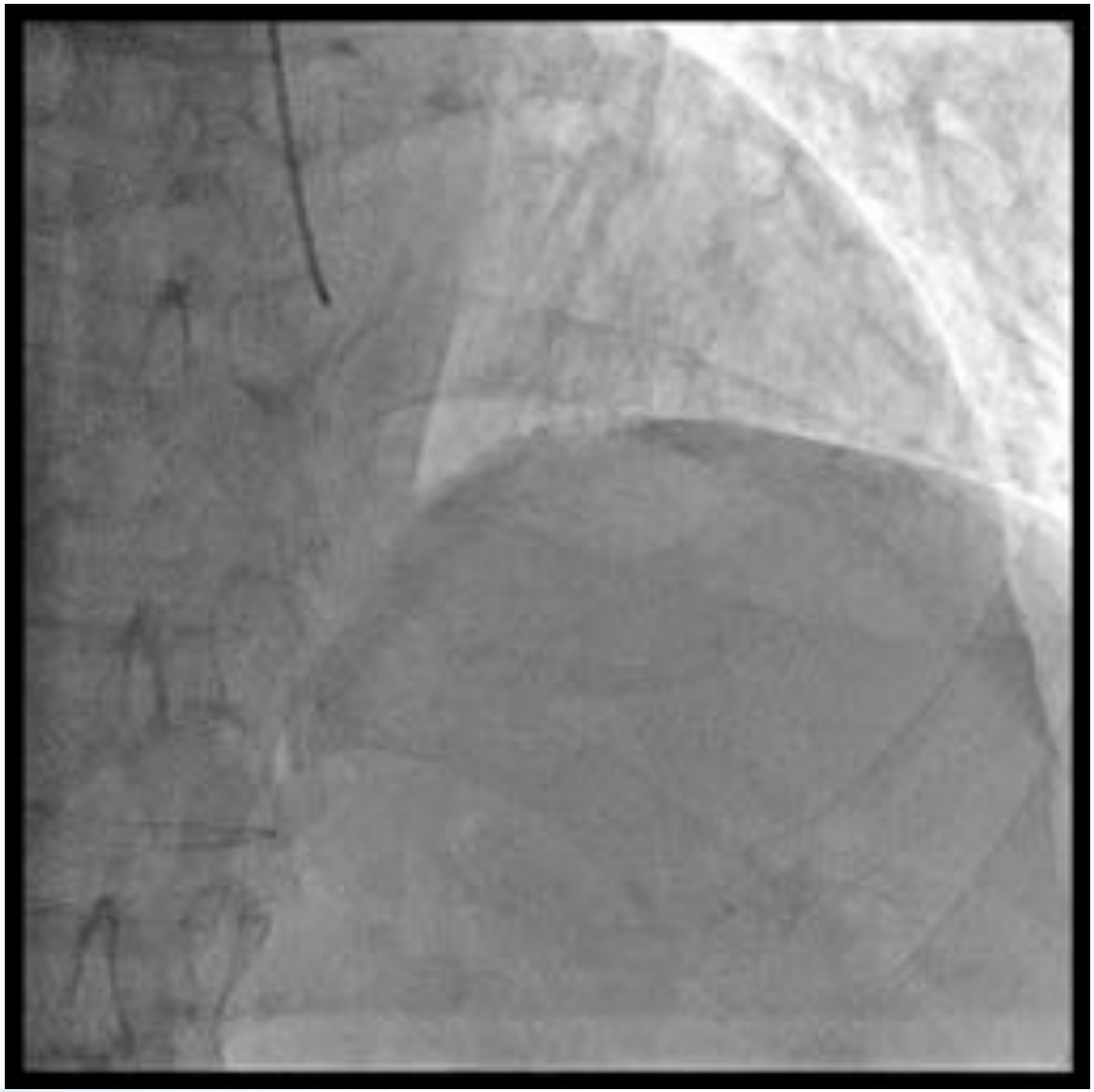


LCA coronary angiography



LCA coronary angiography

RCA coronary angiography



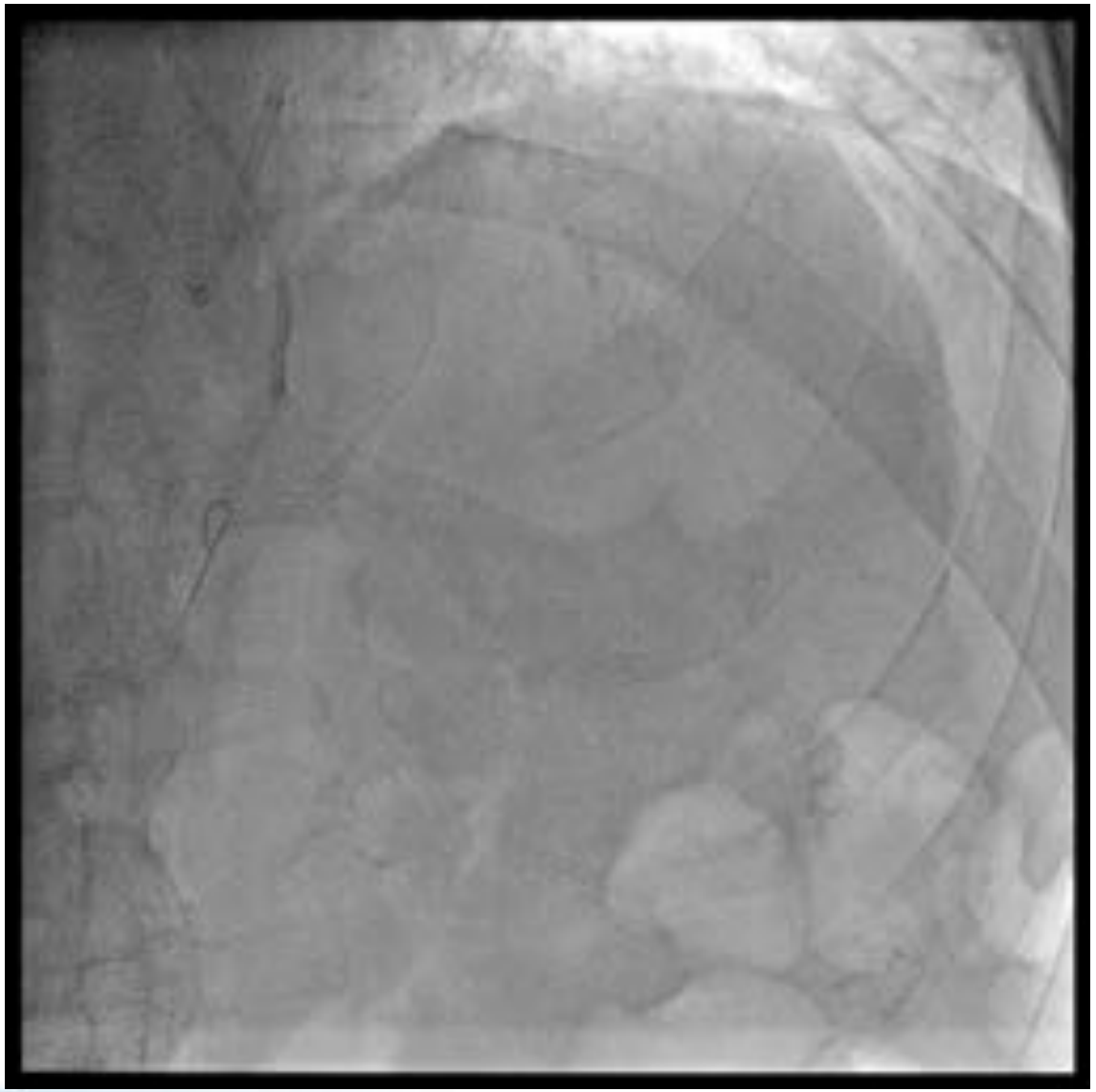
CTO PCI

- Calcified
- Blunt occlusion
- < 20 mm

J-CTO score: 2

LAD CTO and LM PCI

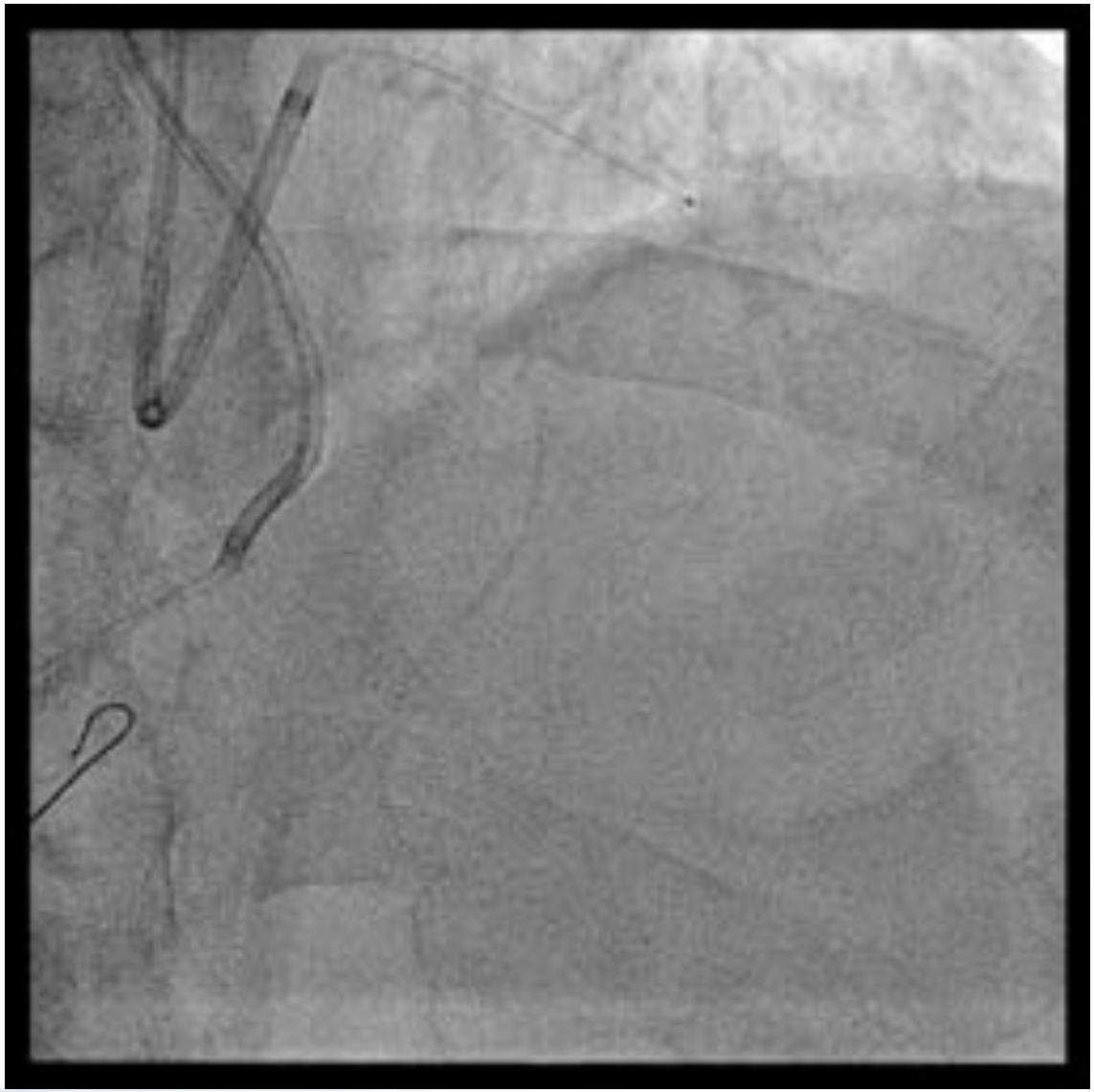
Double injection



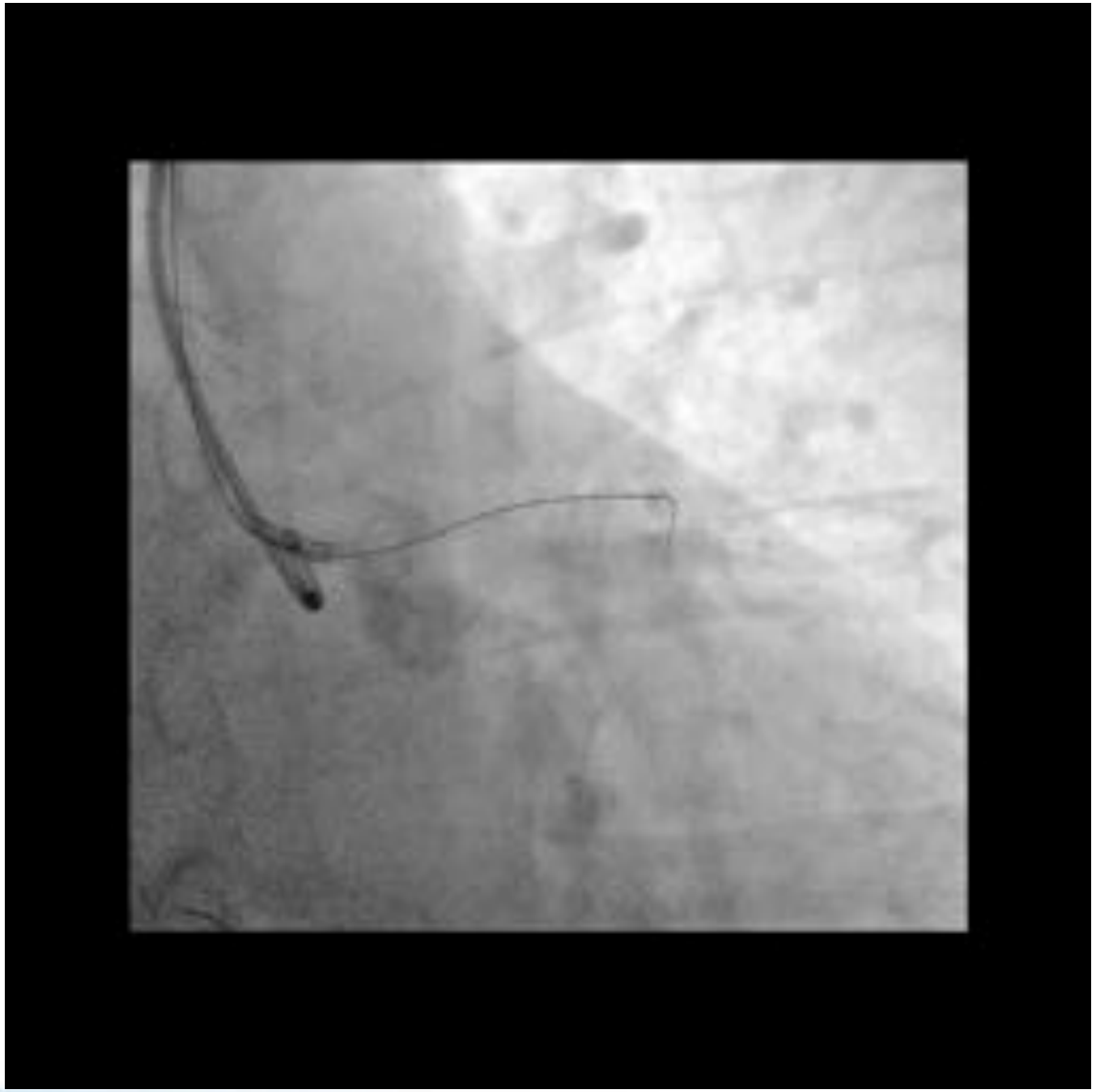
J-CTO: 2

EBU 3.5 7F in LM, AL1 6F in RCA

Selective injection close to CTO: Finecross

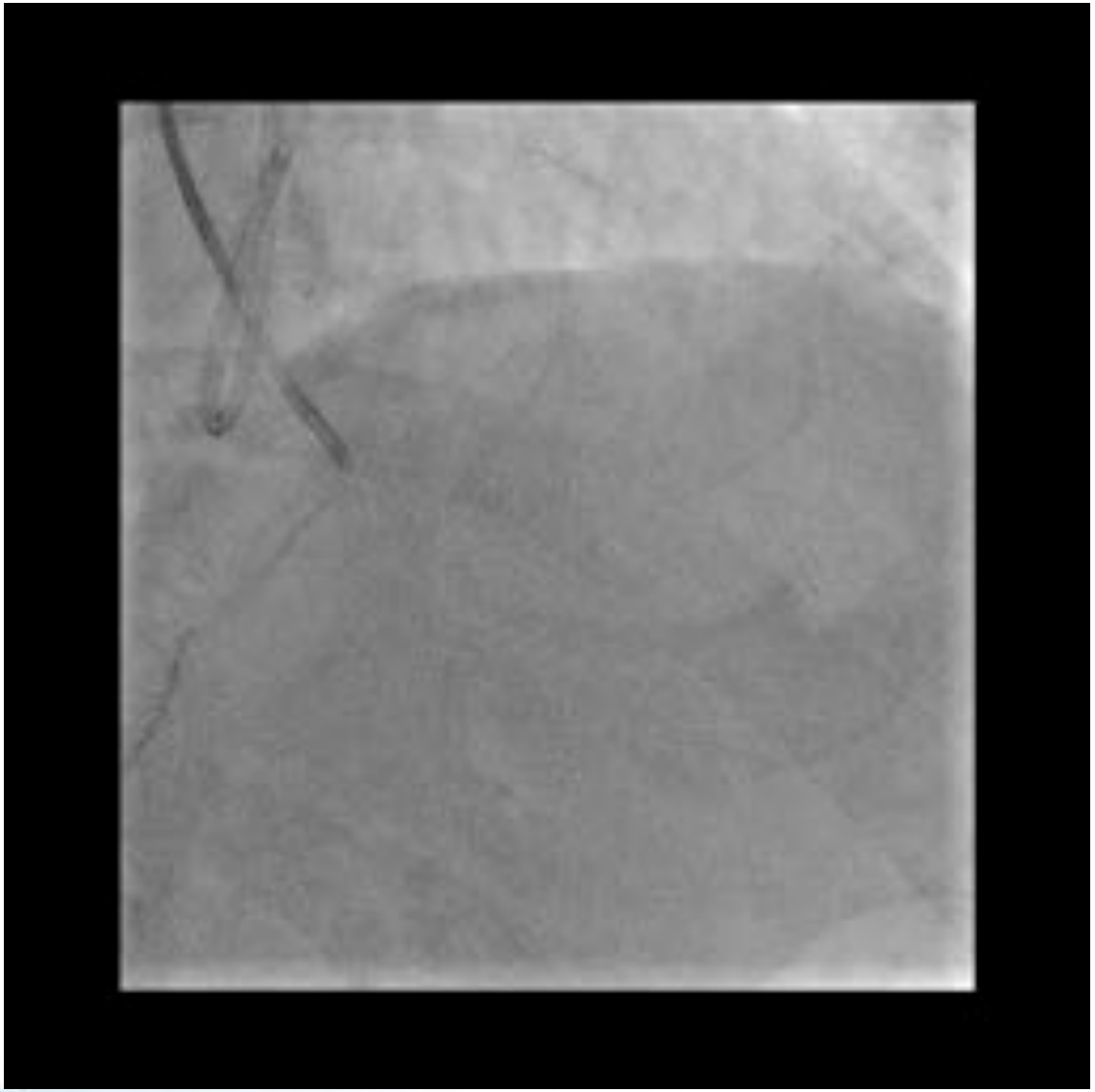


Fielder XT



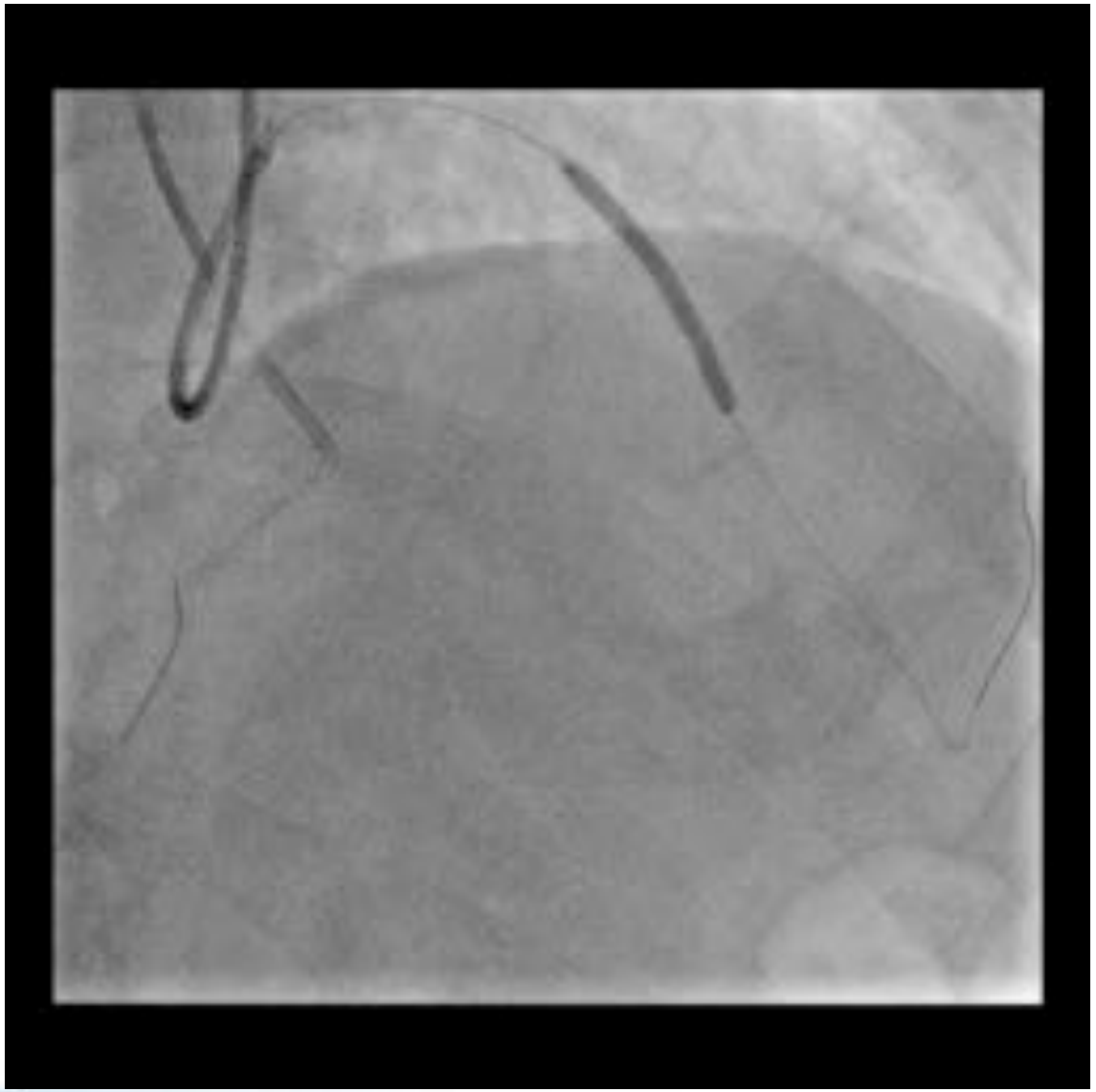
Gaia 1st

Finecross

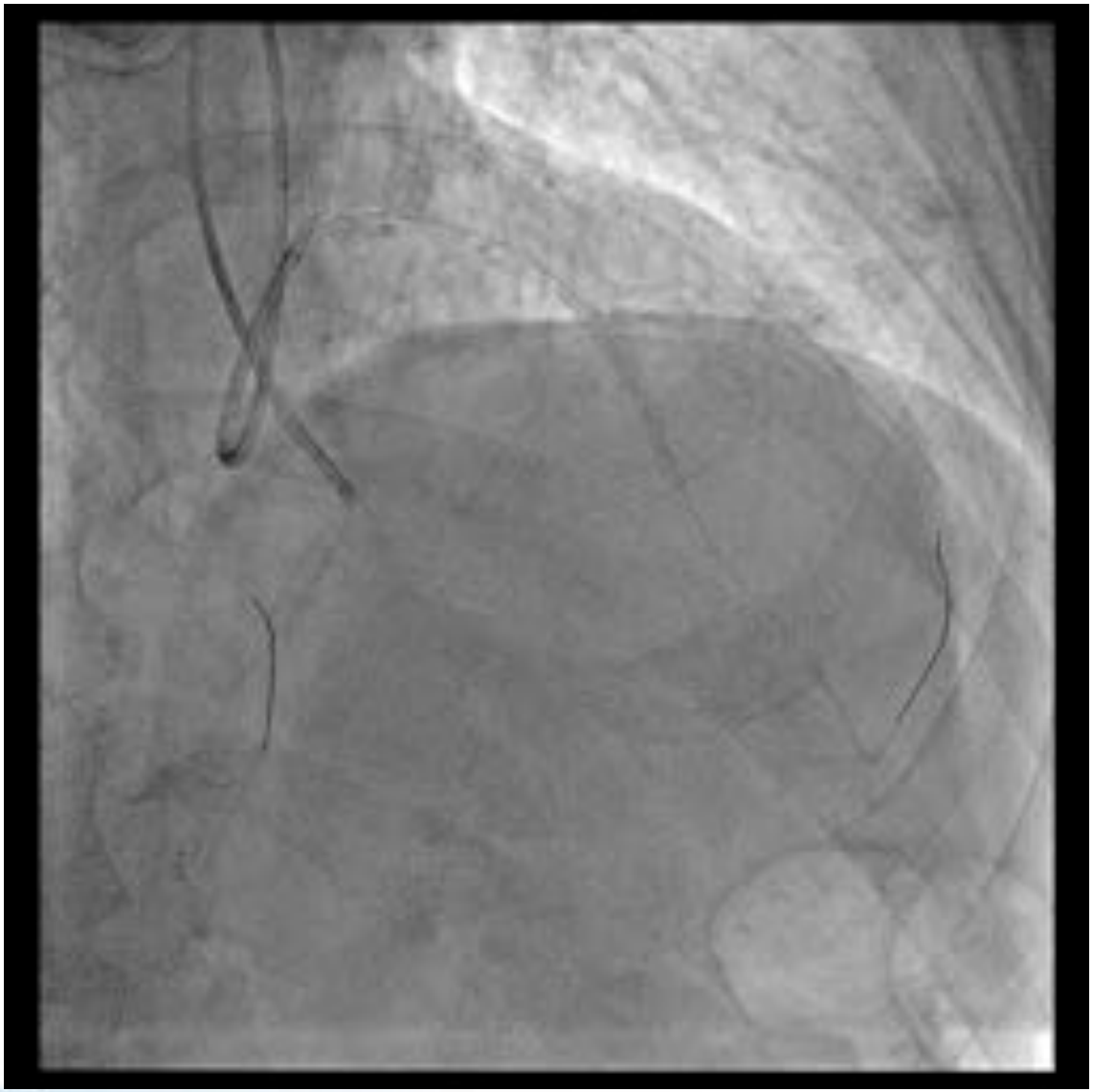


BMW
Trek 2X20

Onyx 2.75X34



LAD CTO PCI result



LM PCI

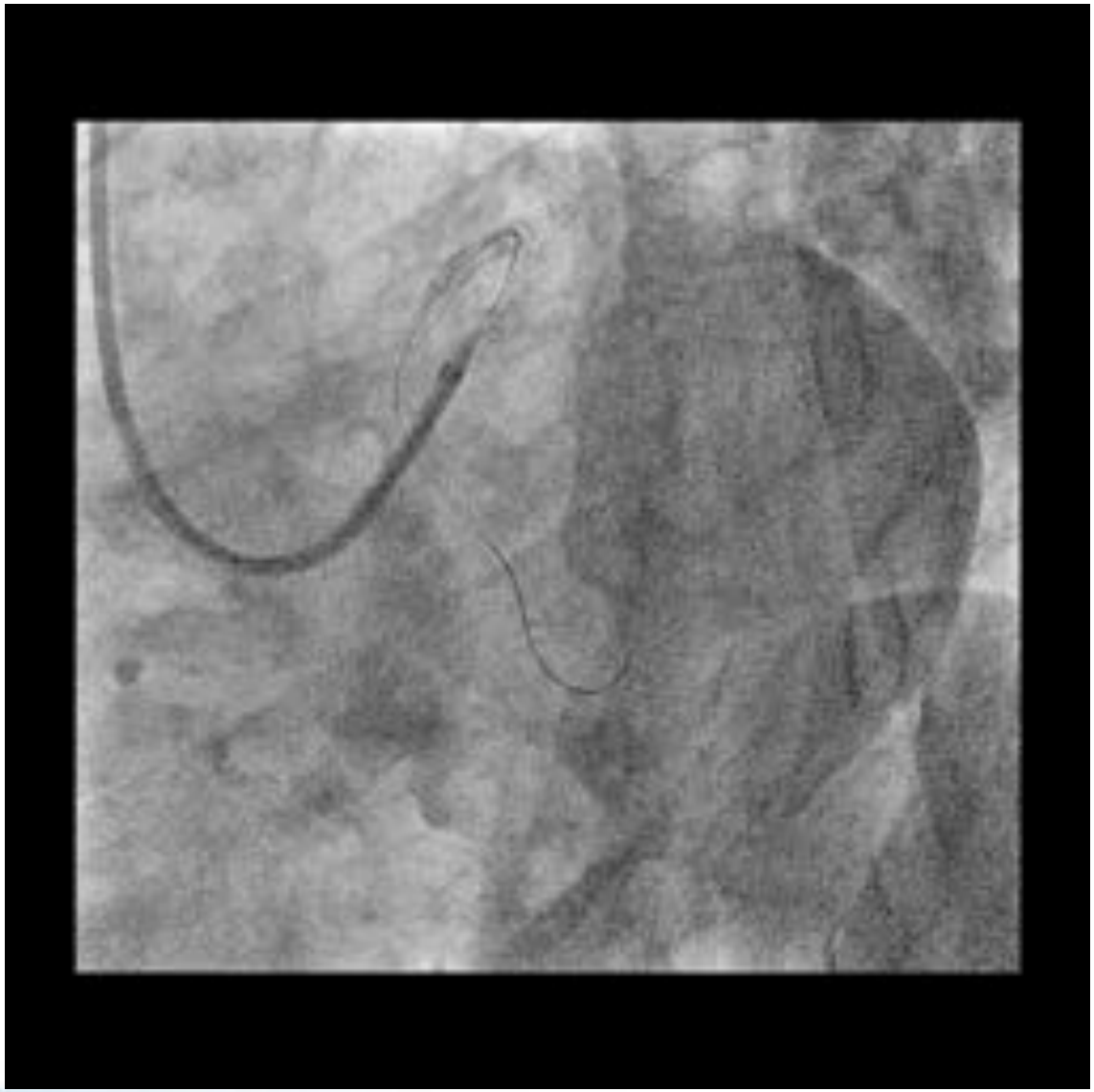
- 1,1,1
- Moderately calcified

- **EBC main study** (: randomized double stenting)

- Technical choice: provisional strategy for double stenting (T/TAP)

LM PCI

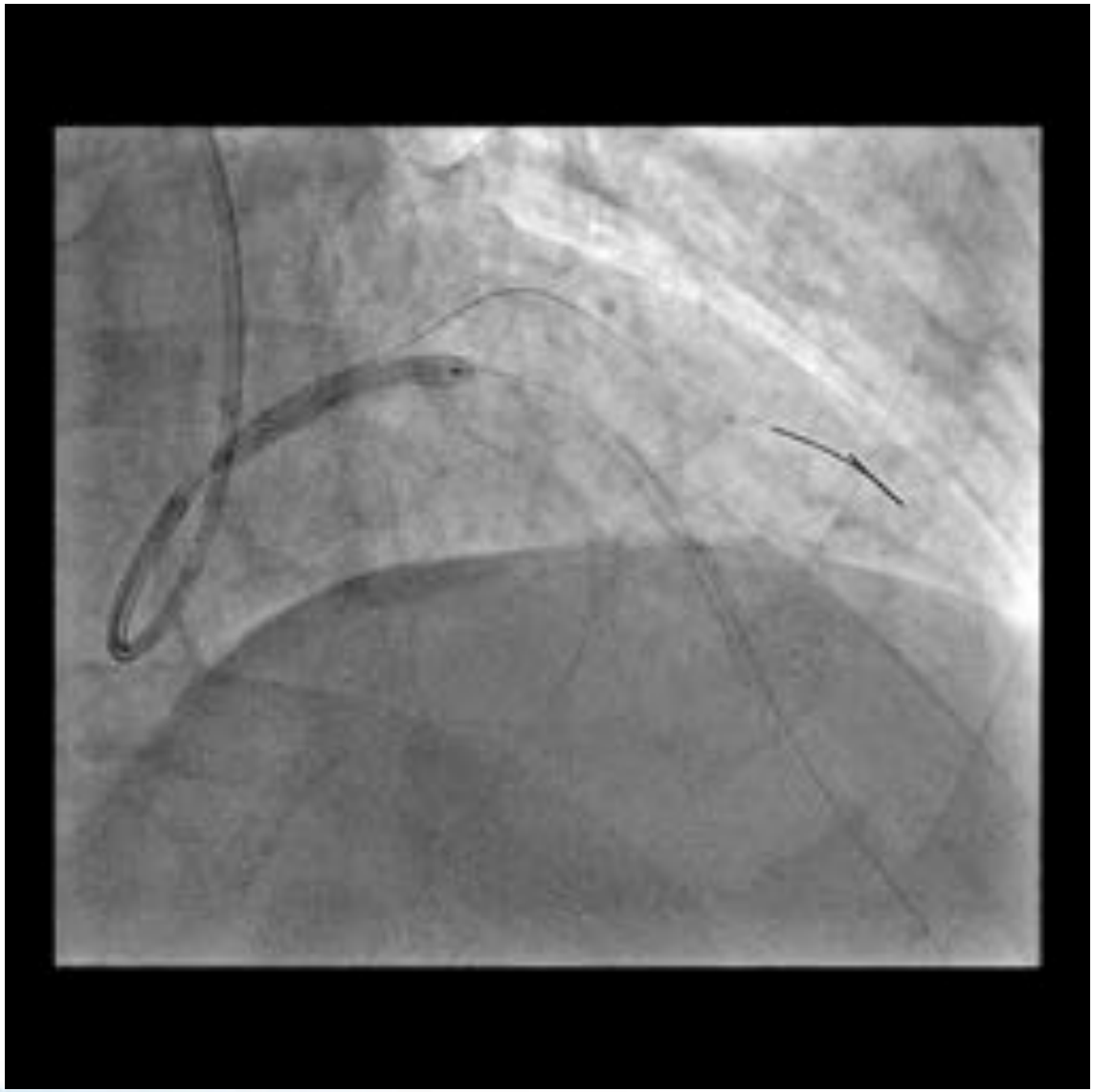
LM PCI



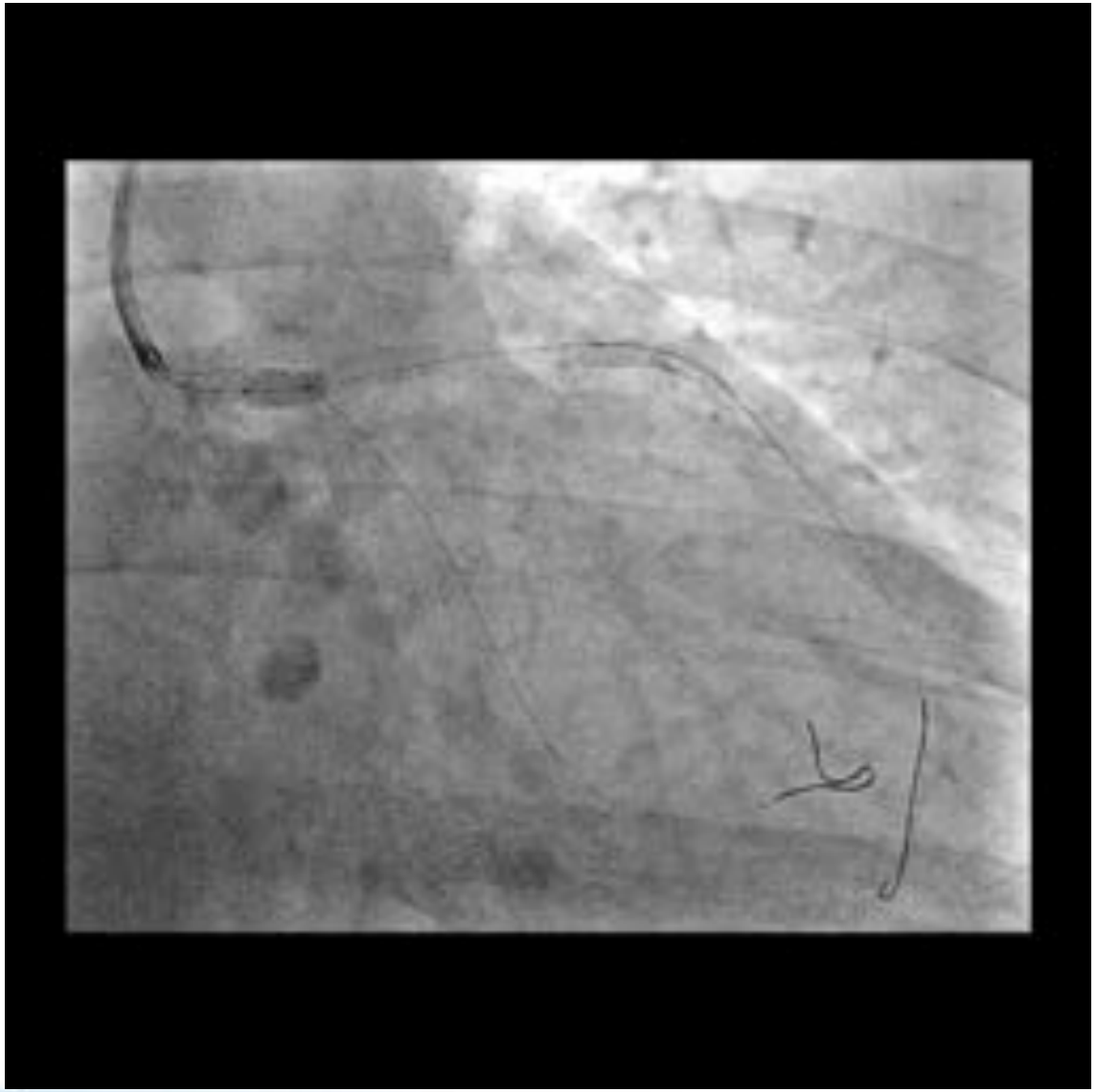
LM to LAD stent measurement

EBU 3.5 7F

2 BMW, Onyx 3.5X26

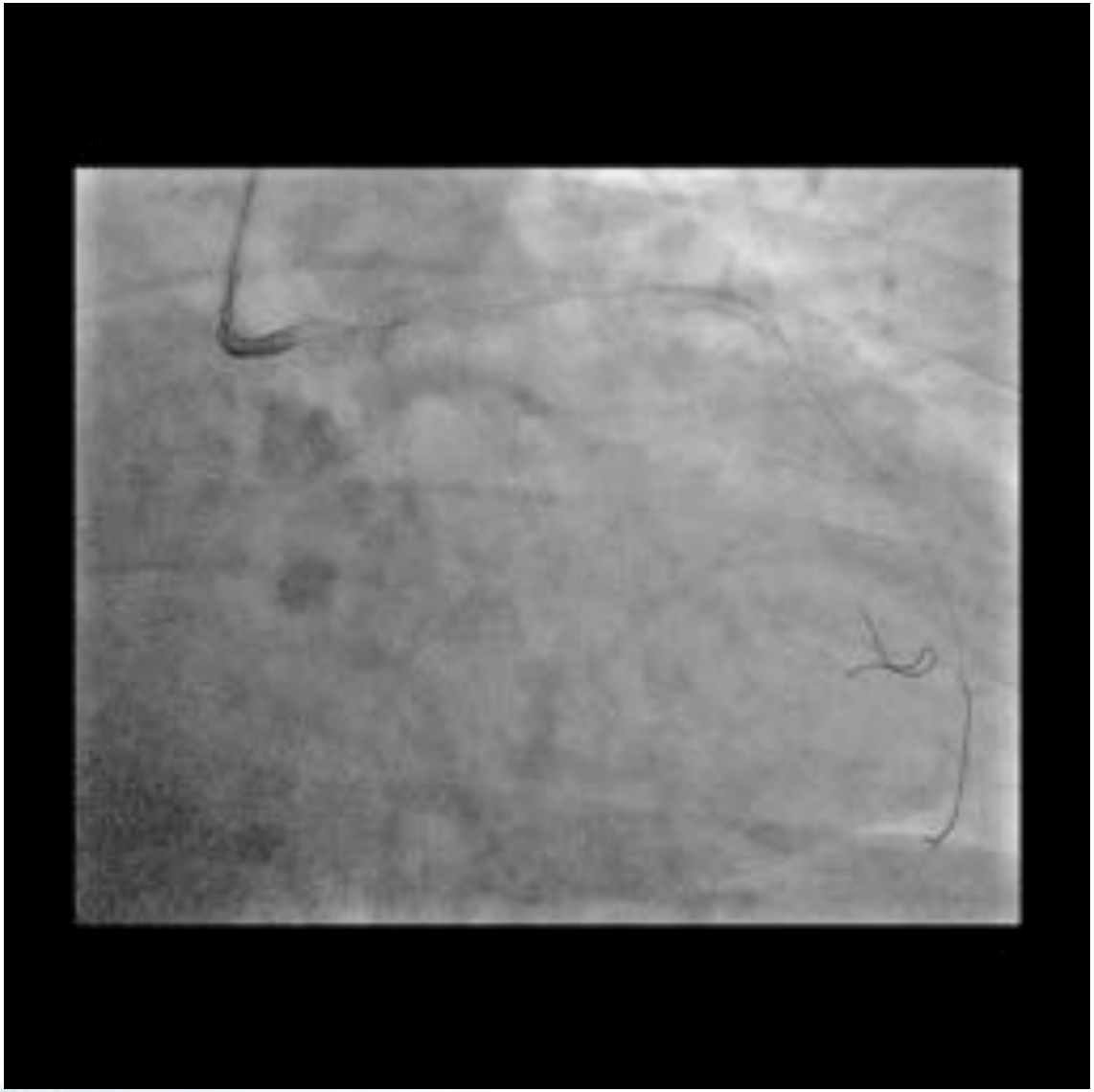


Trek 4X12

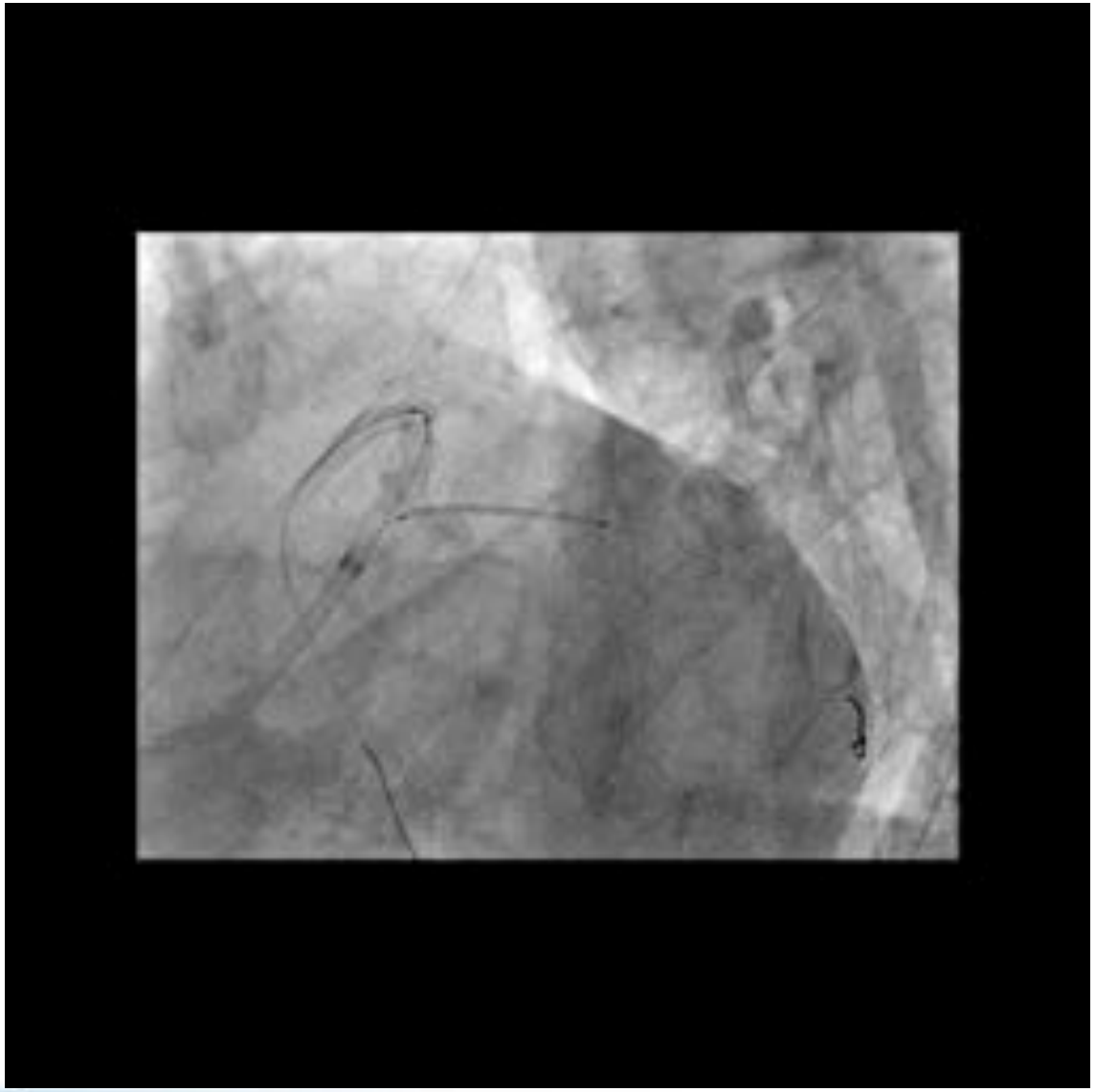


Post cross-over stenting

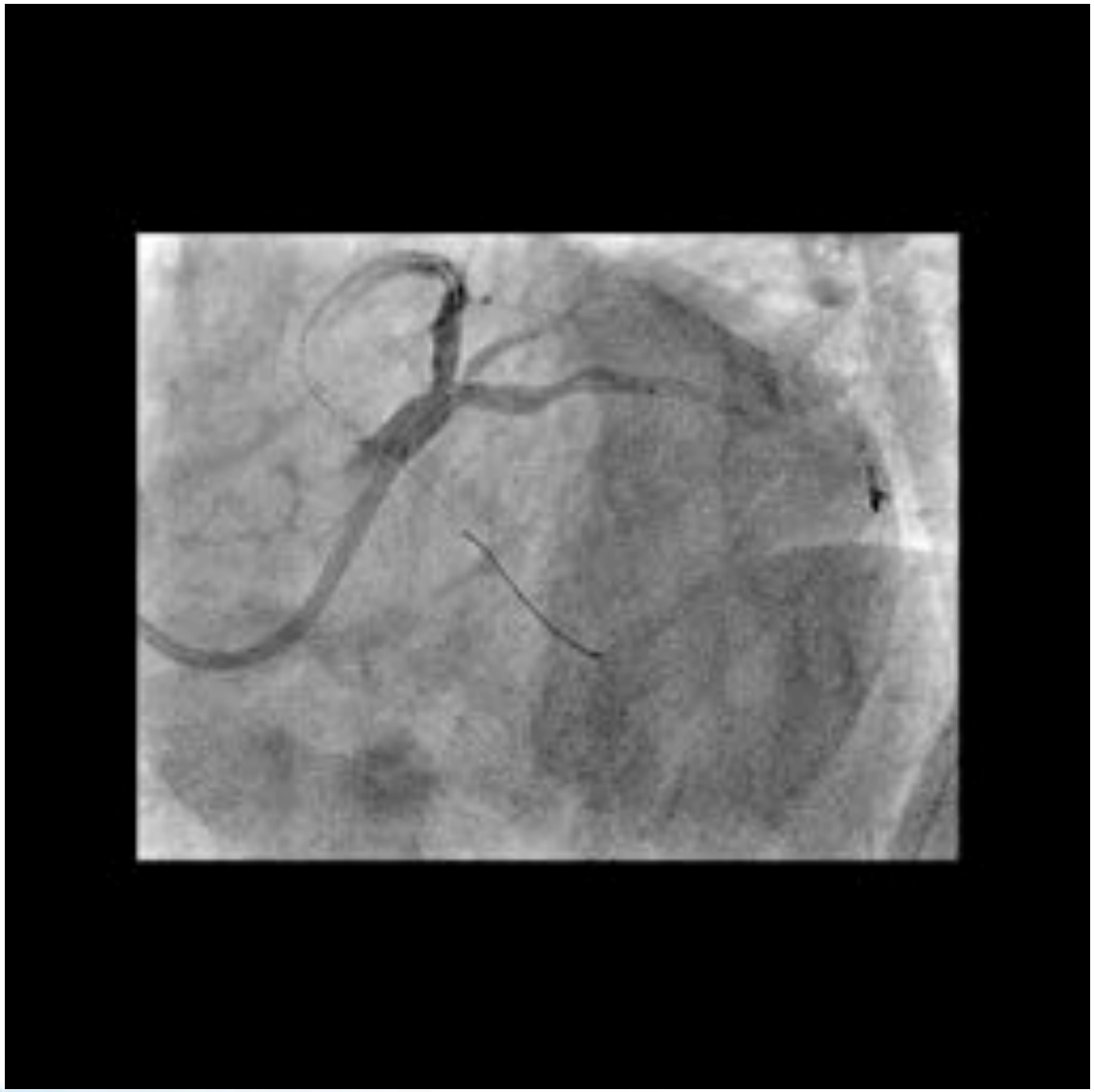
3rd wire: BMW



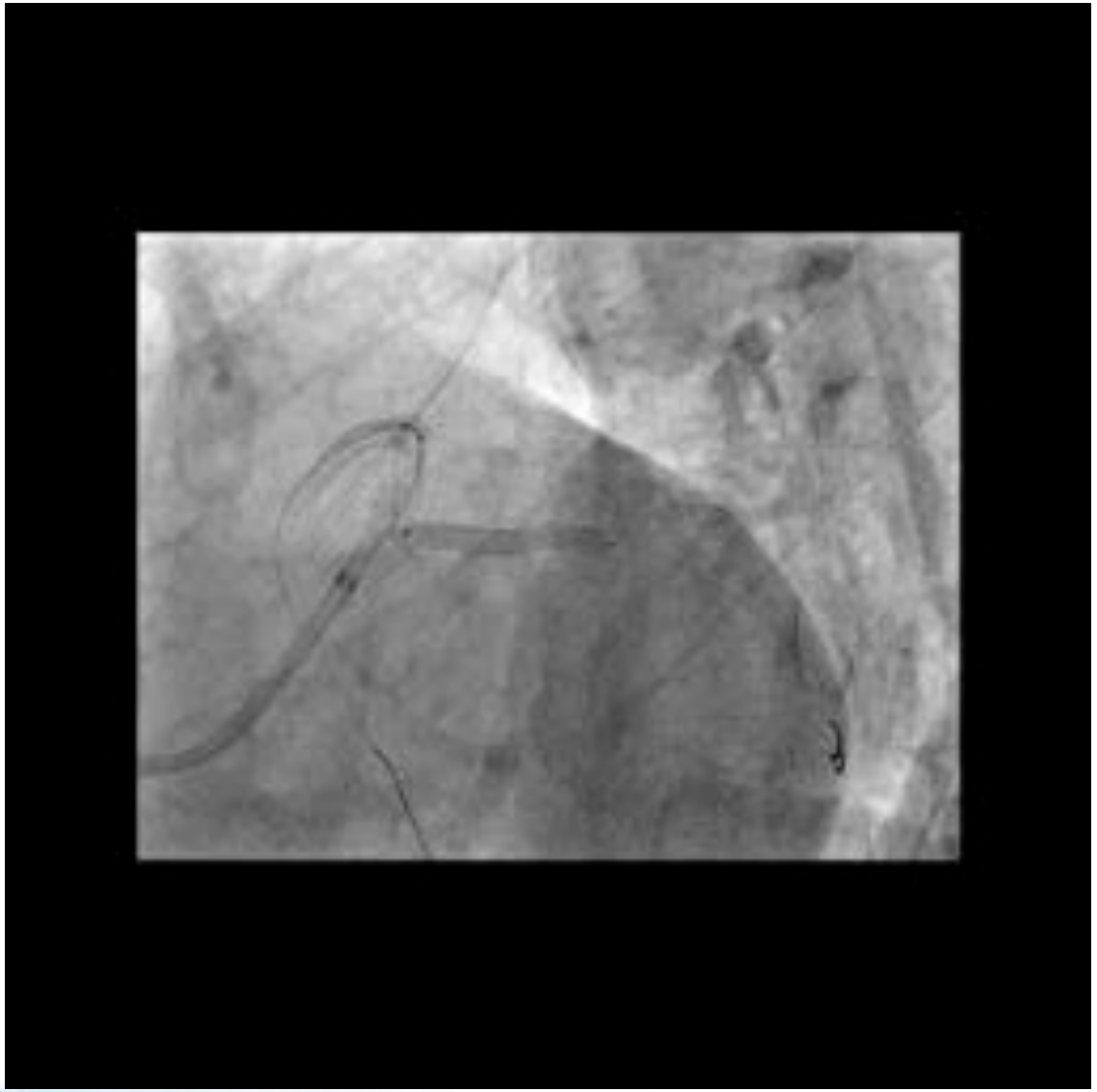
Resolute Onyx 3X22



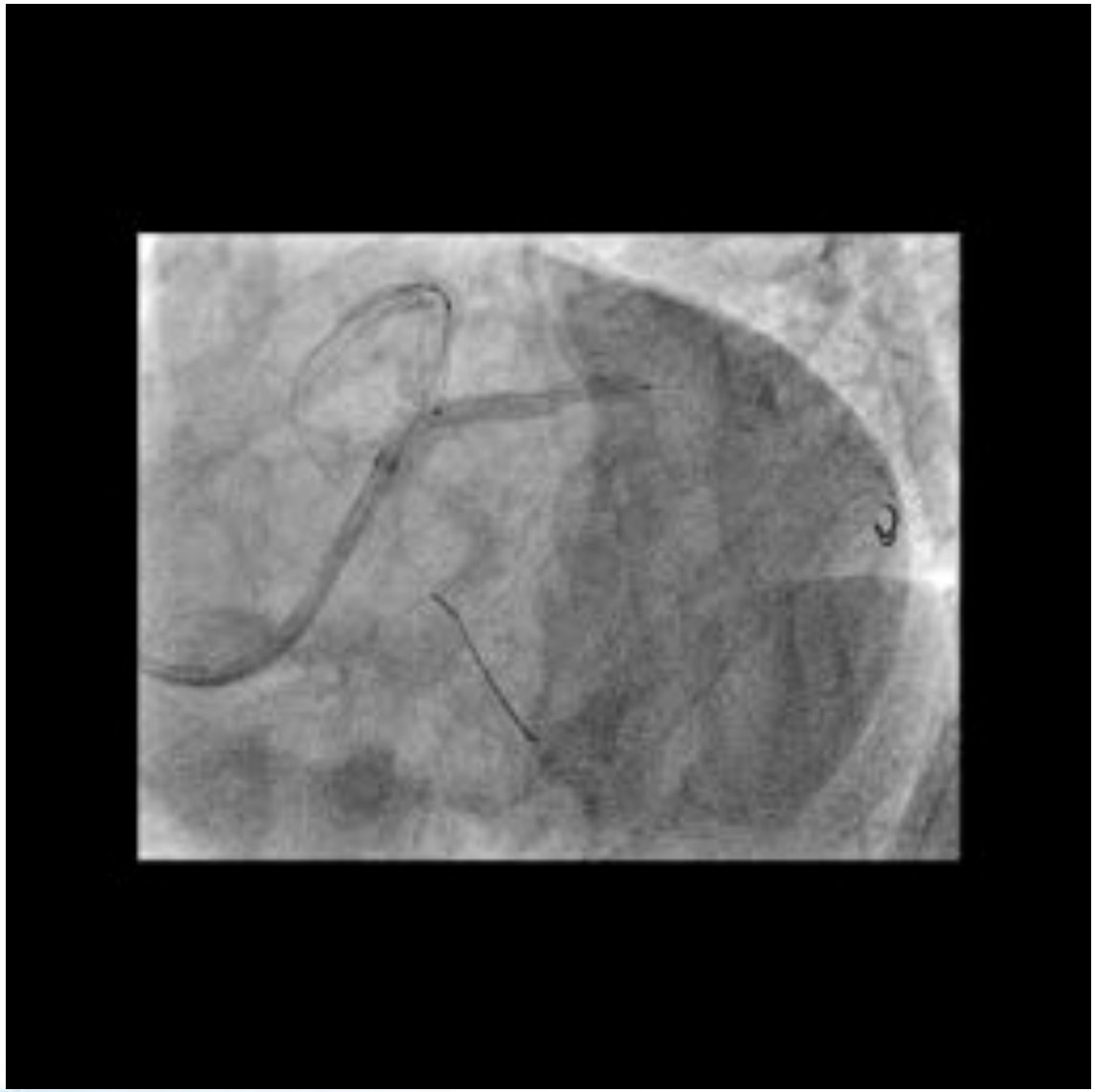
Resolute Onyx 3X22



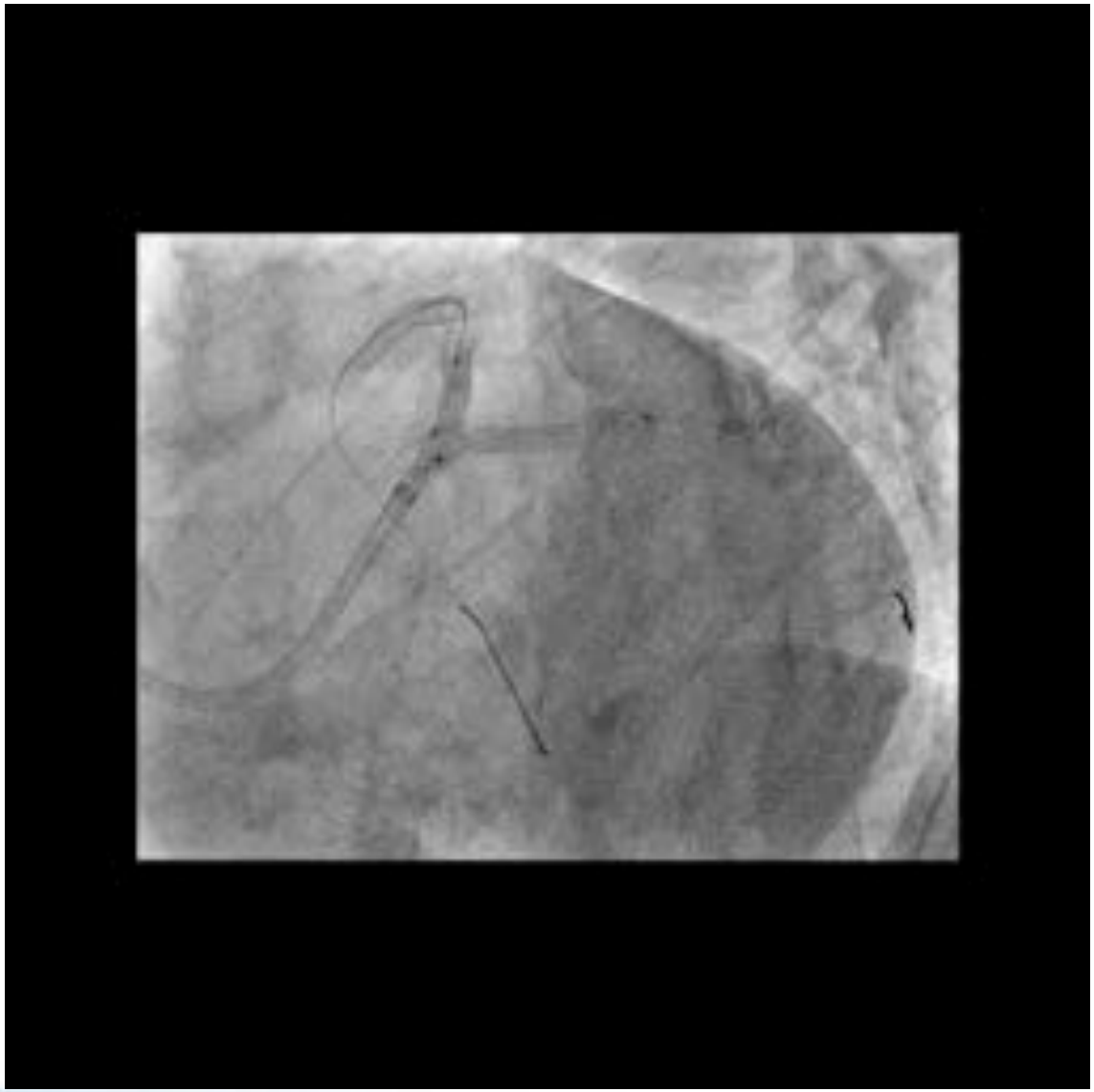
Resolute Onyx 3X22



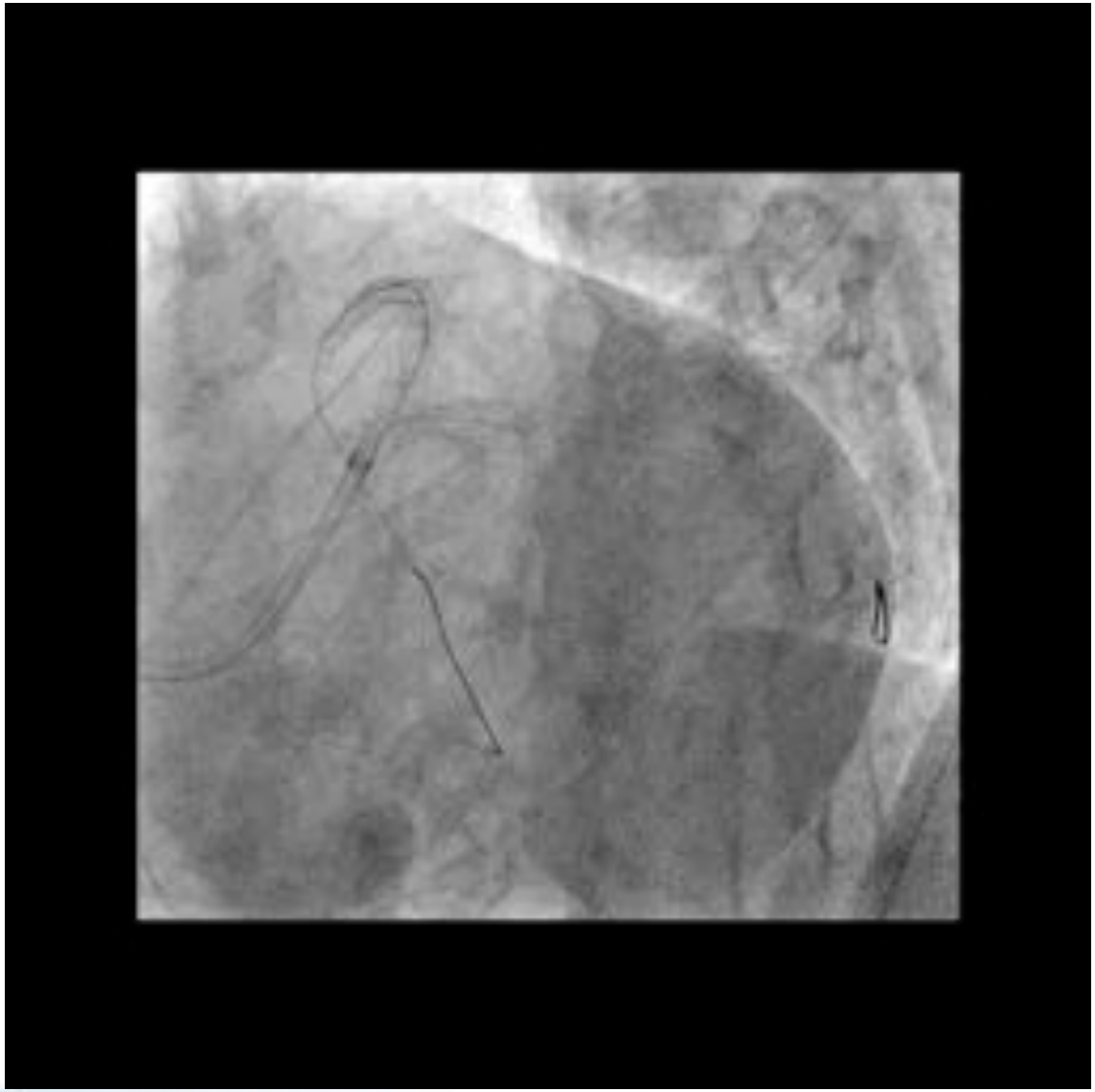
Resolute Onyx 3X22



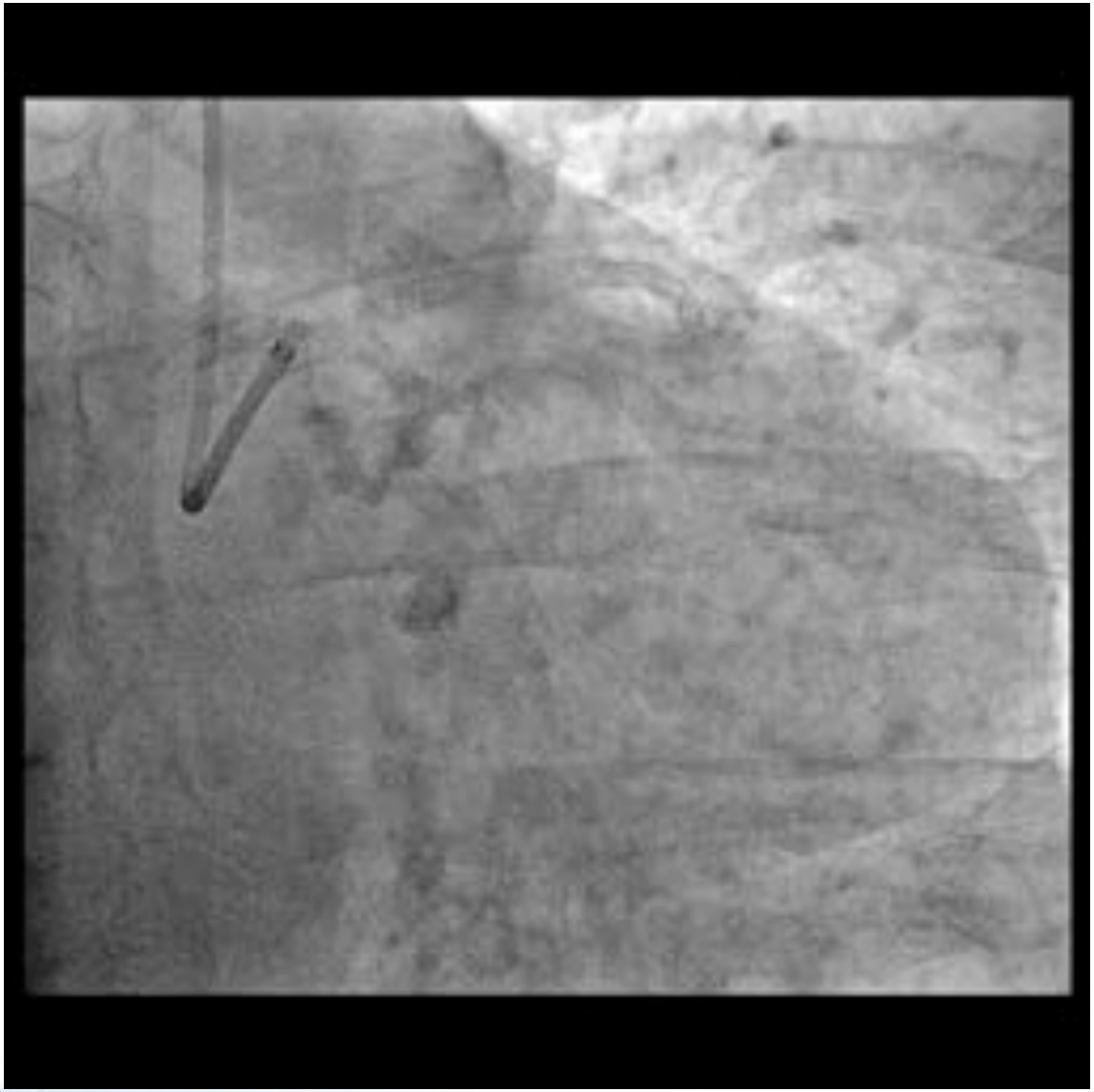
Kissing 3.5X3.5



Final result

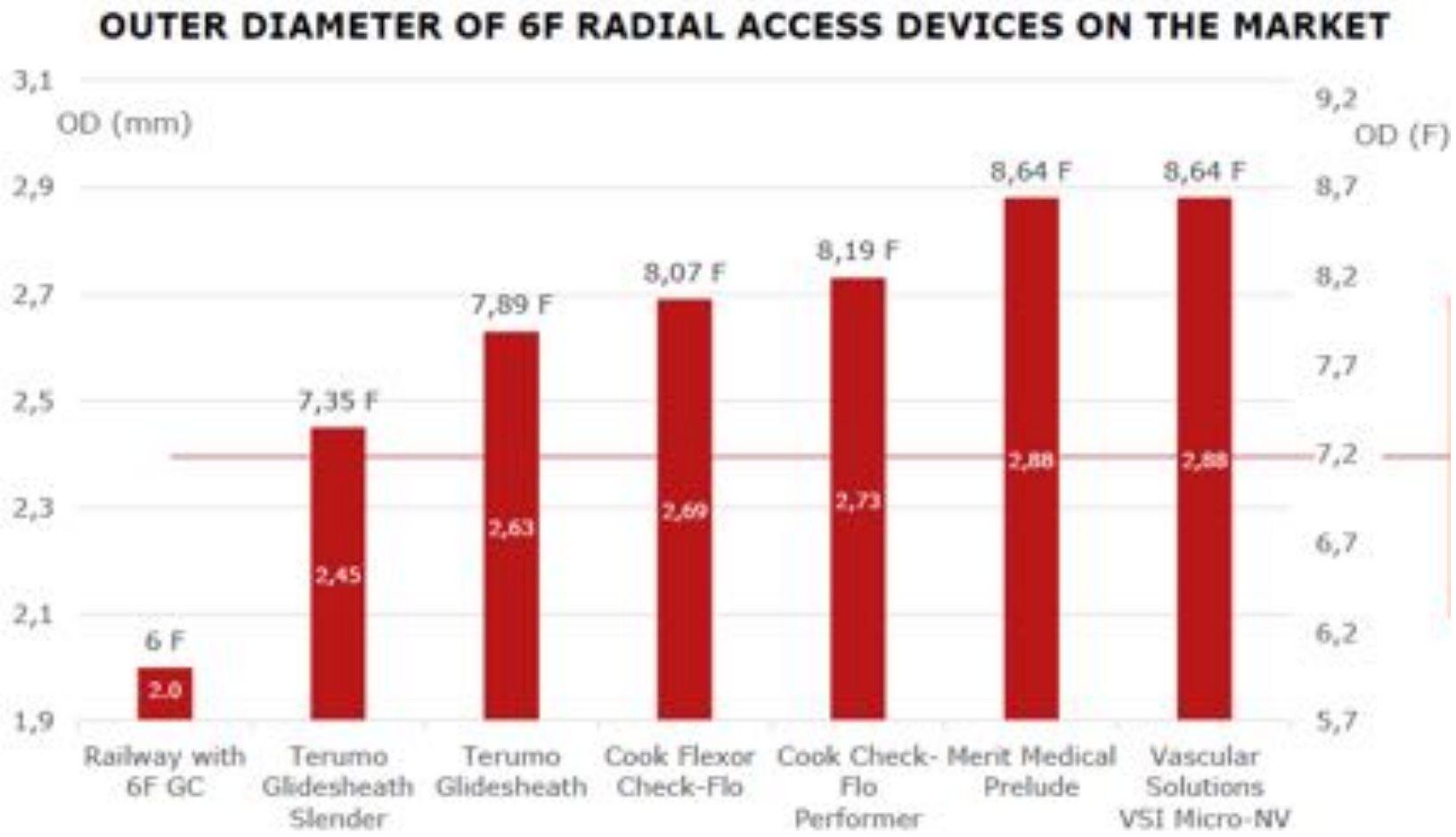


Final result



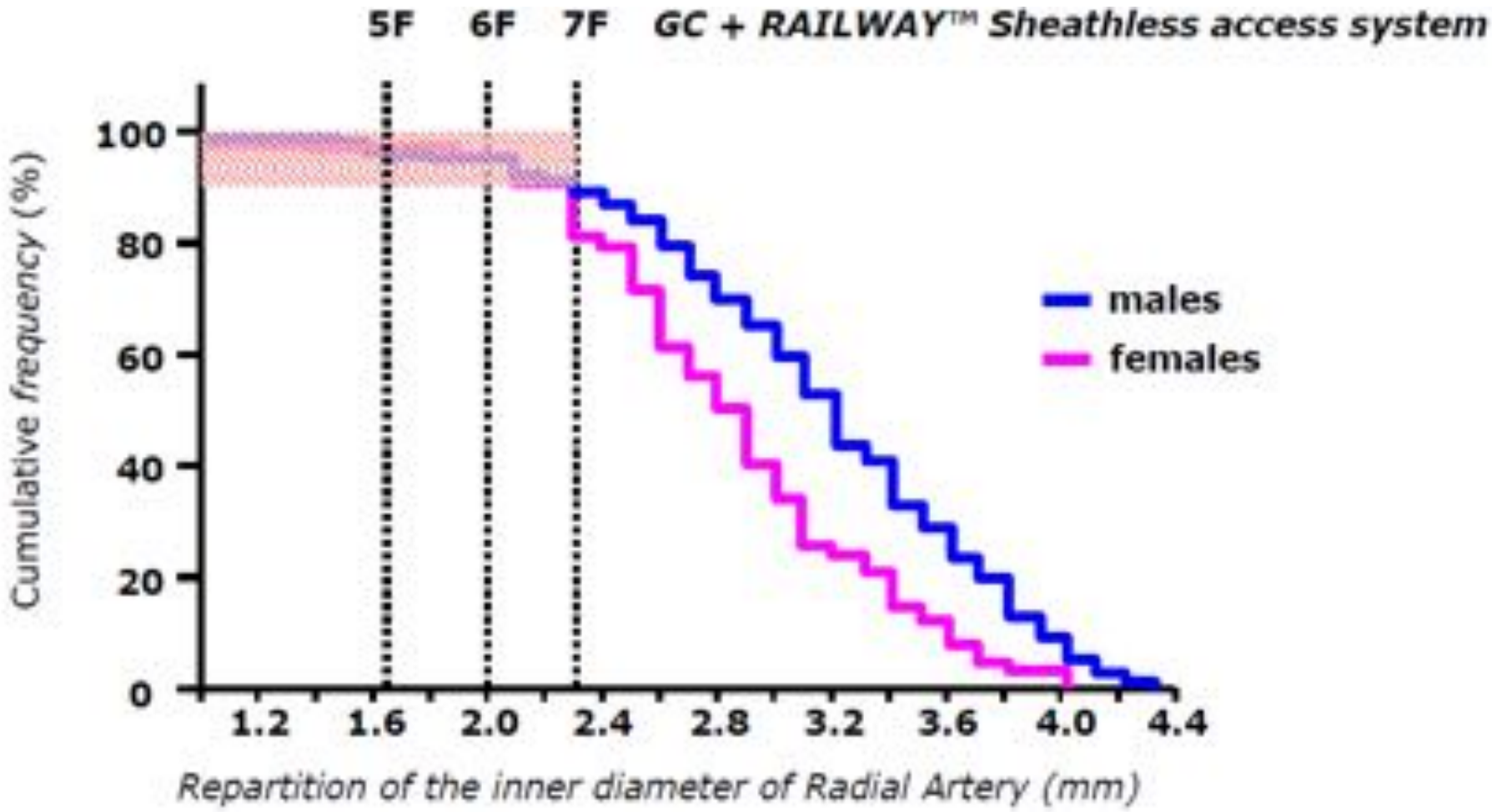
Why I like Railway sheathless ?

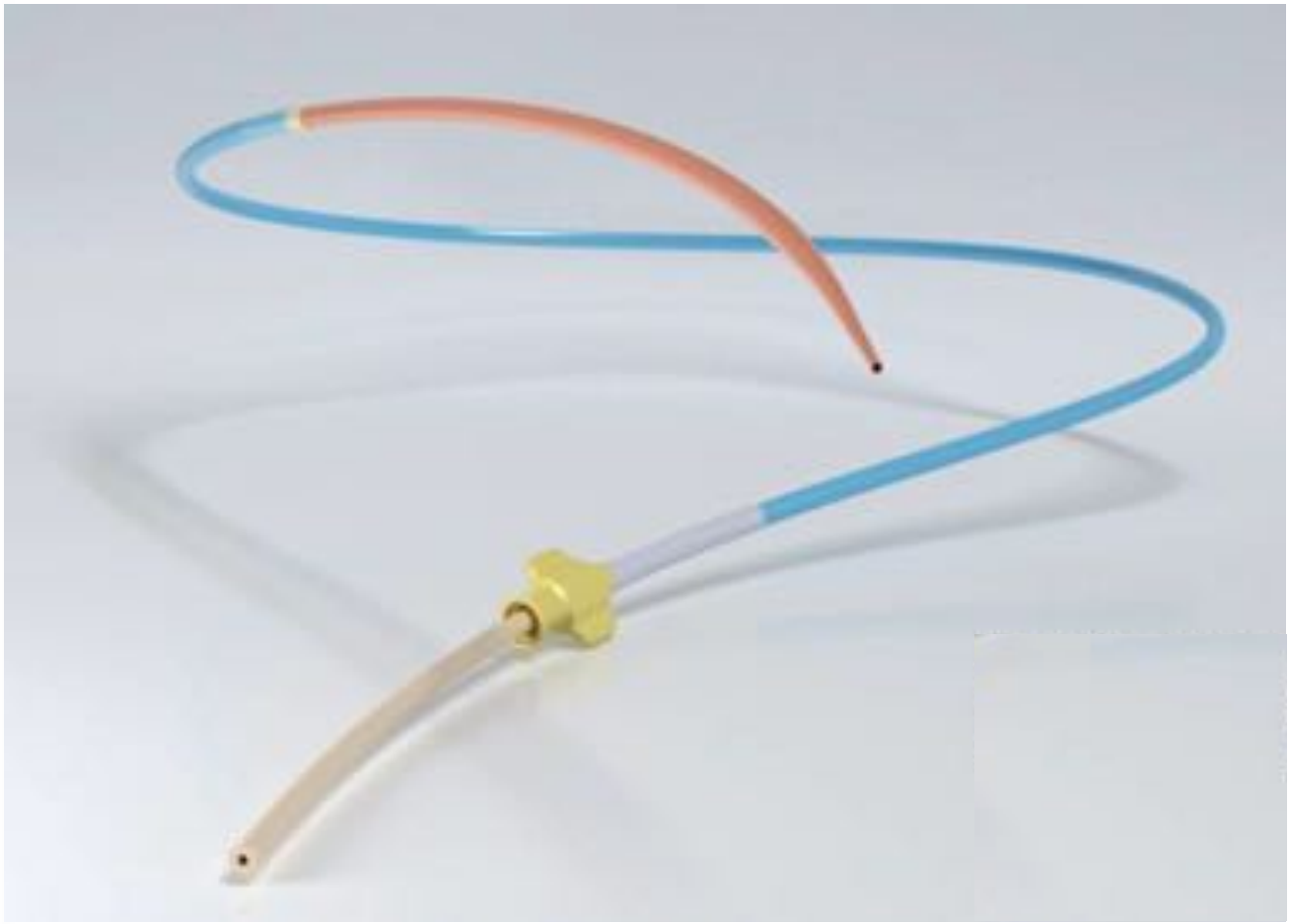
Railway™: up to 2F reduction of size of the arteriotomy compared to a conventional sheath system



Cordis

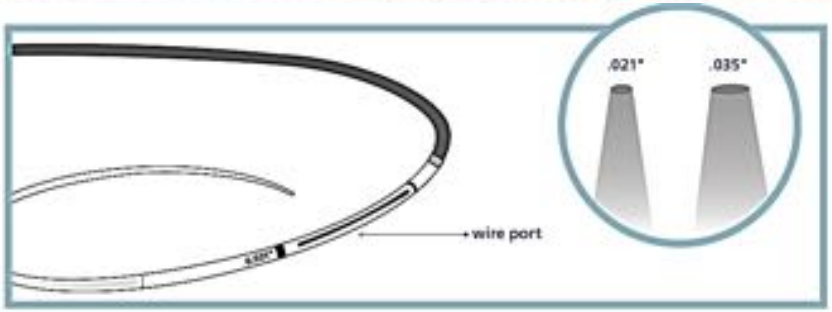
90% of PCI patients have radial arteries that can accomodate a 7F guiding catheter + Railway™



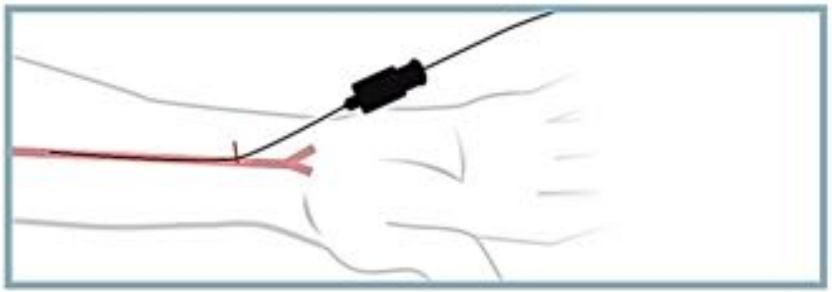


- Save 2F / conventional sheath (1.5F / Terumo glidesheath)
- Save 0.5 F / Asahi Eaucath sheathless for identical GC ID (Cordis GC)
- Railway™ works with more than 120 GC 5, 6, 7F
- Monorail and coaxial
- Hydrophilic coating on 20 distal cm

1


.021"
.035"
wire port

2



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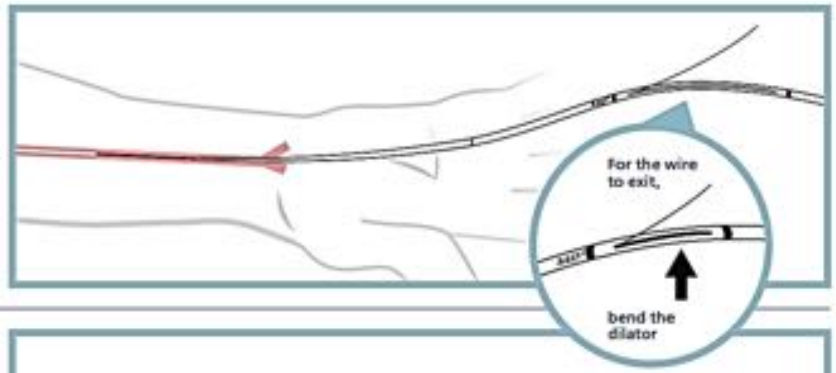
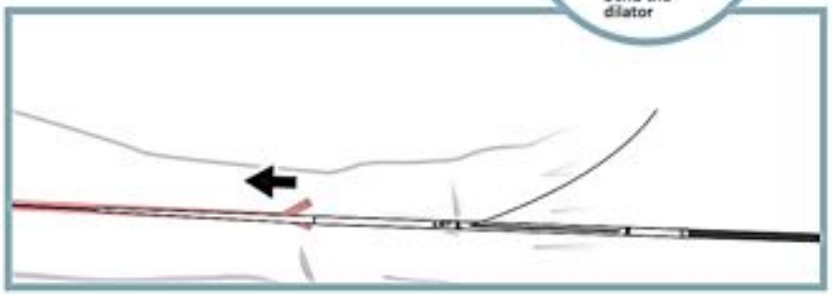

For the wire to exit,
bend the dilator

4



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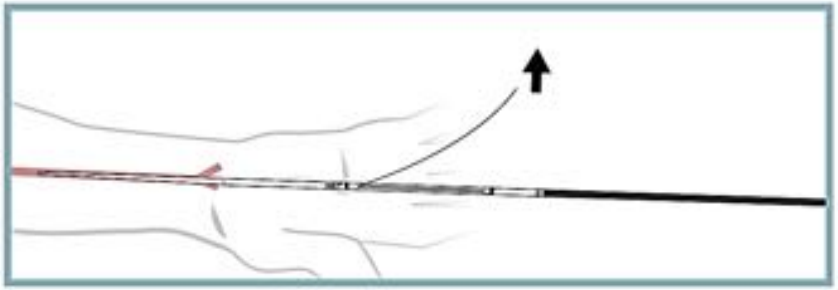

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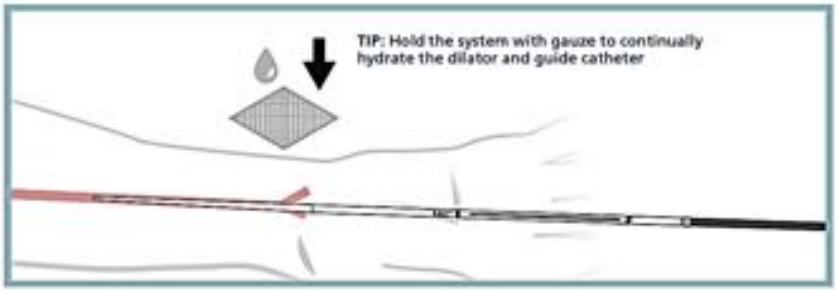
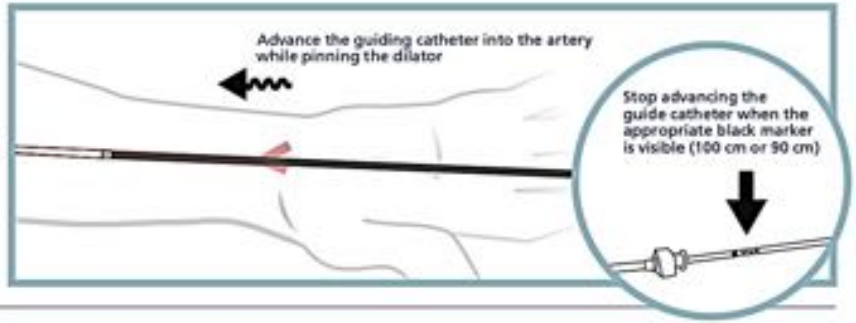
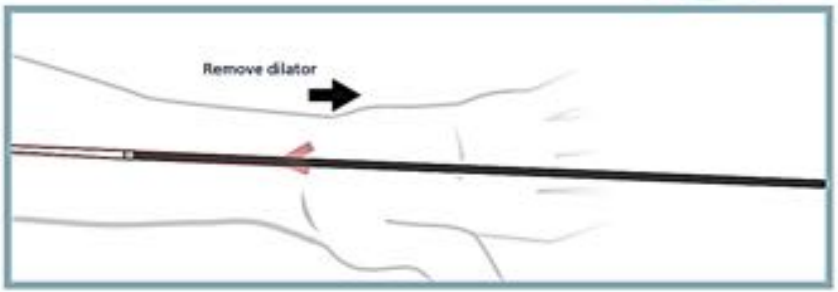

TIP: Hold the system with gauze to continually hydrate the dilator and guide catheter

7


Advance the guiding catheter into the artery while pinning the dilator
Stop advancing the guide catheter when the appropriate black marker is visible (100 cm or 90 cm)

8


Remove dilator