Provisional DCB treatment for CAD

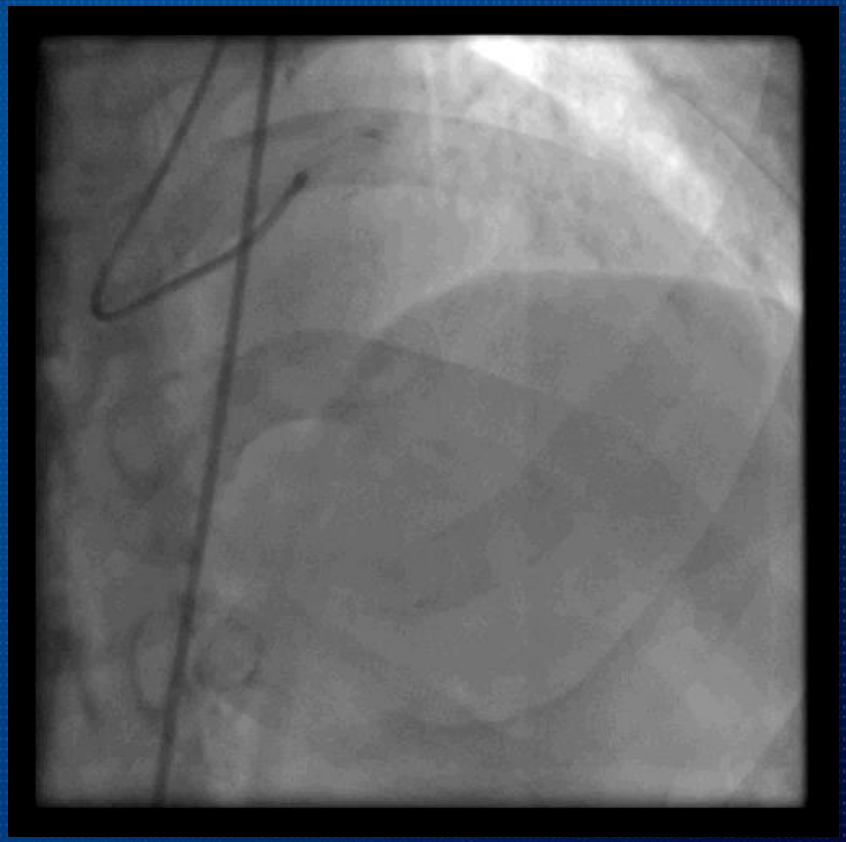
2019. 12. 14

Eun-Seok Shin MD/PhD
Division of Cardiology
Ulsan Medical Center, Ulsan, Korea

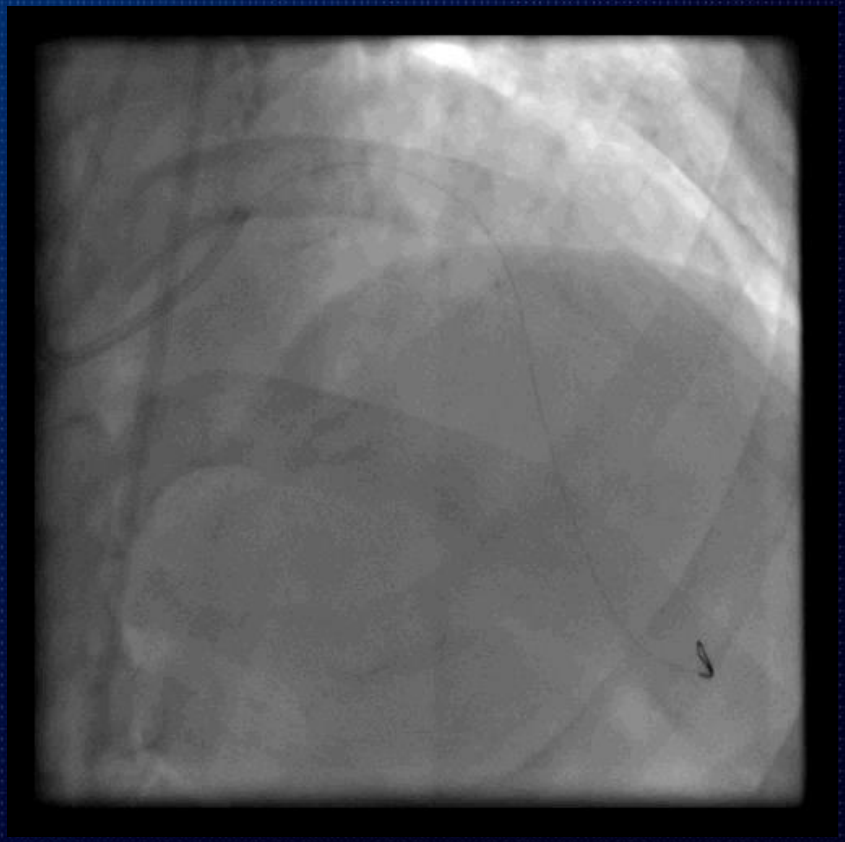
ULSAN MEDICAL CENTER

DCB treatment

Baseline

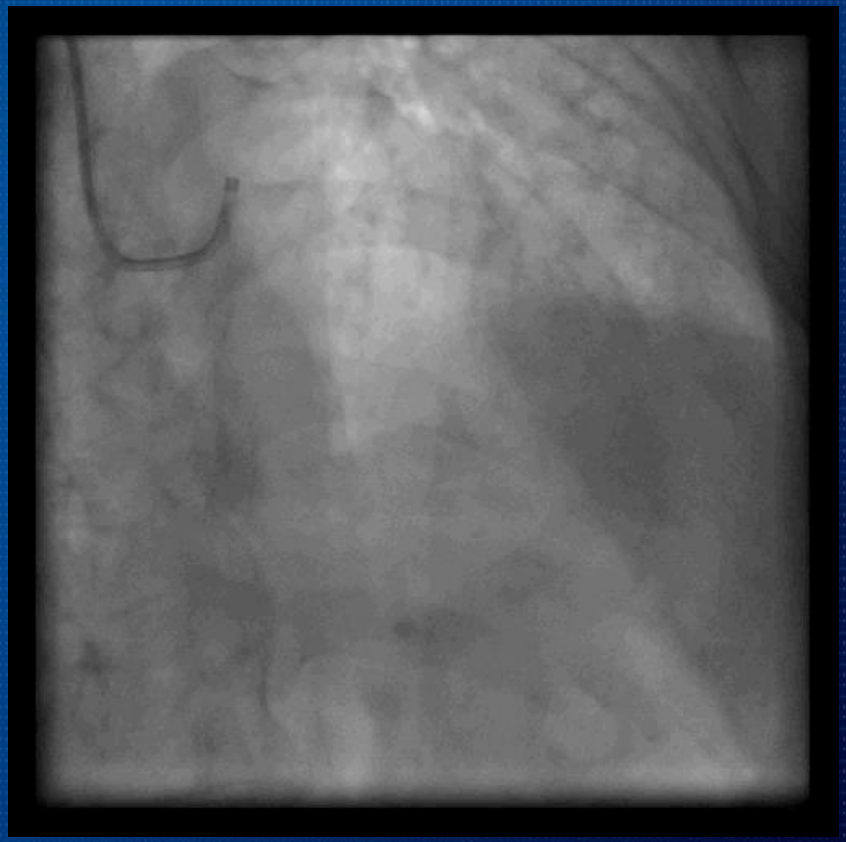


Balloon angioplasty

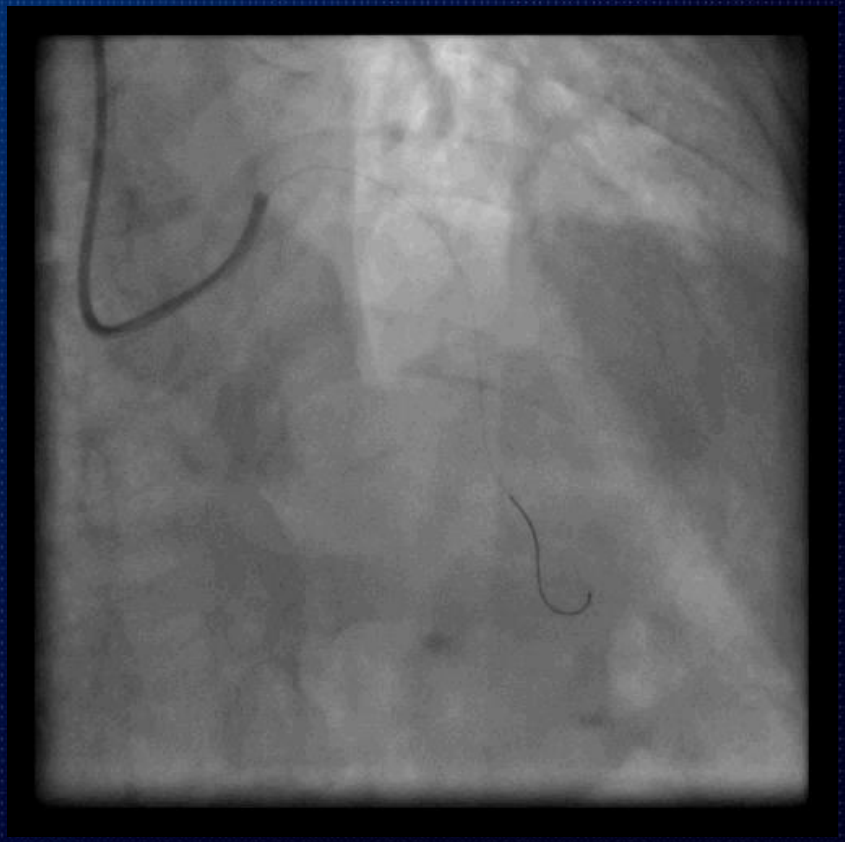


DES implantation

Baseline

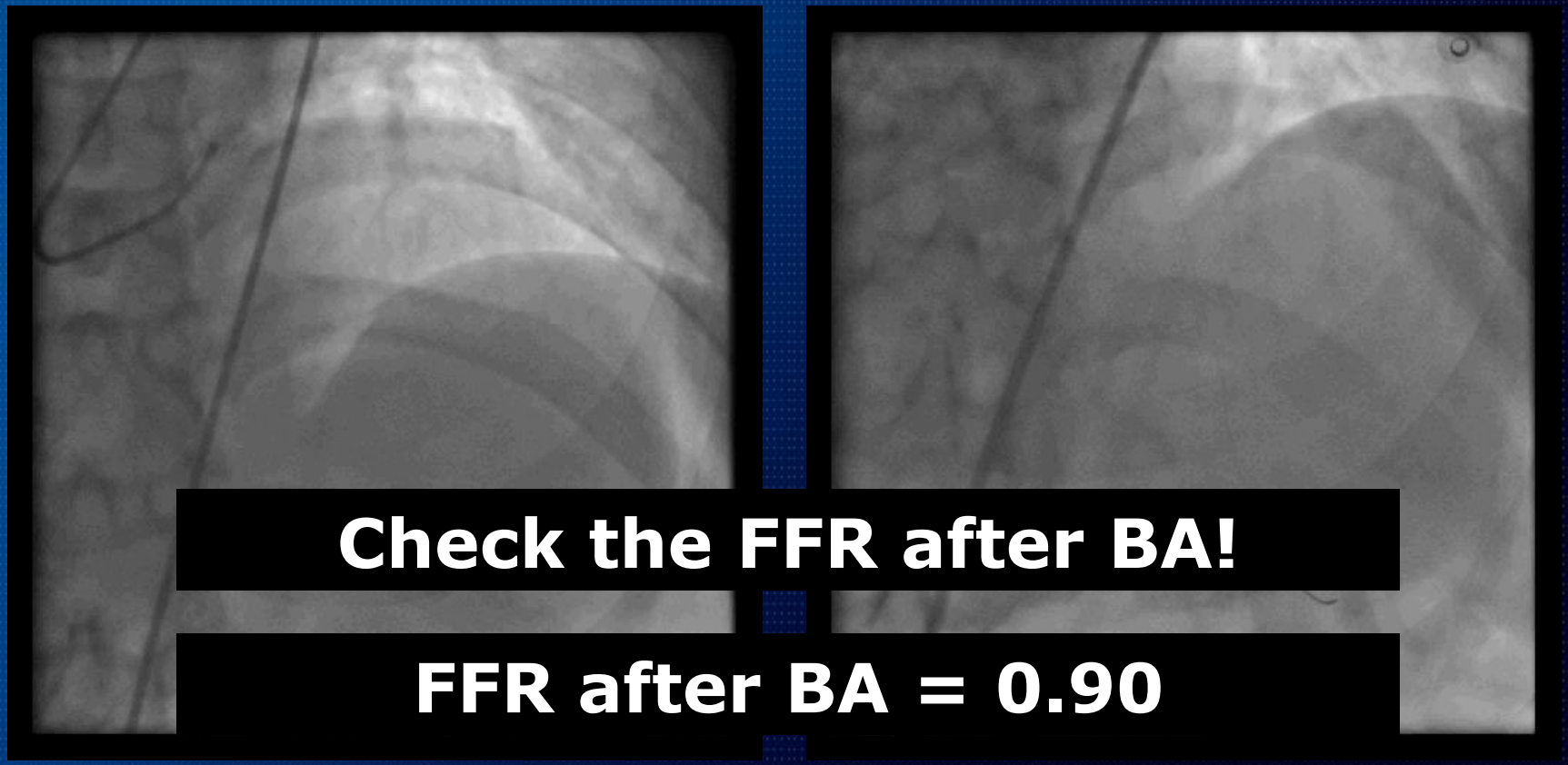


Balloon angioplasty



DCB treatment

Baseline **Balloon angioplasty**

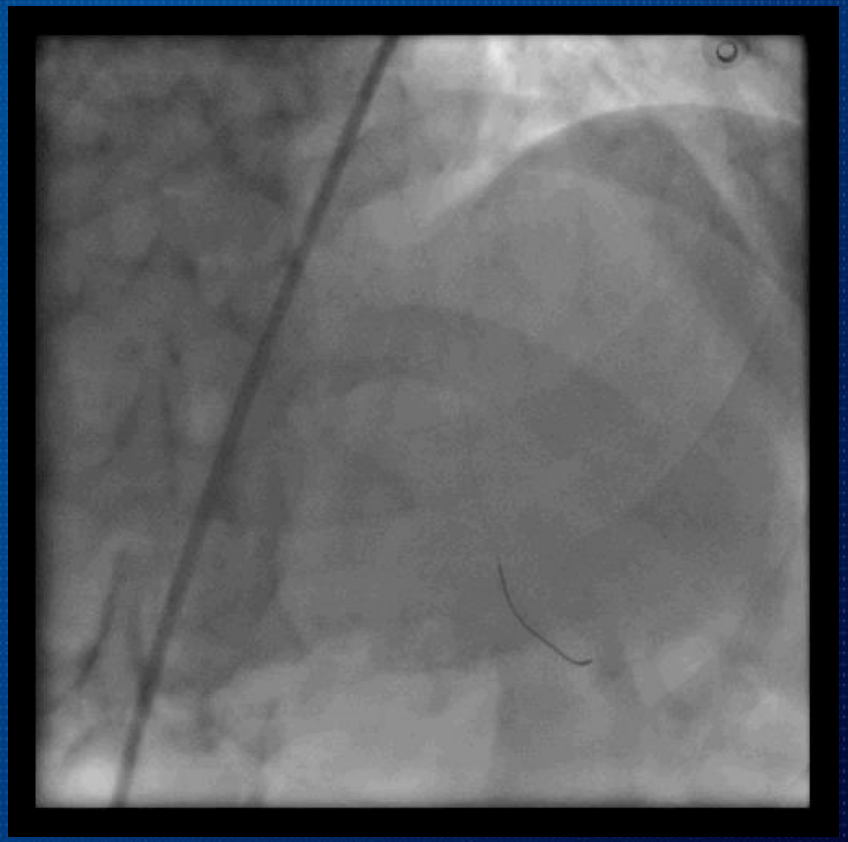


Check the FFR after BA!

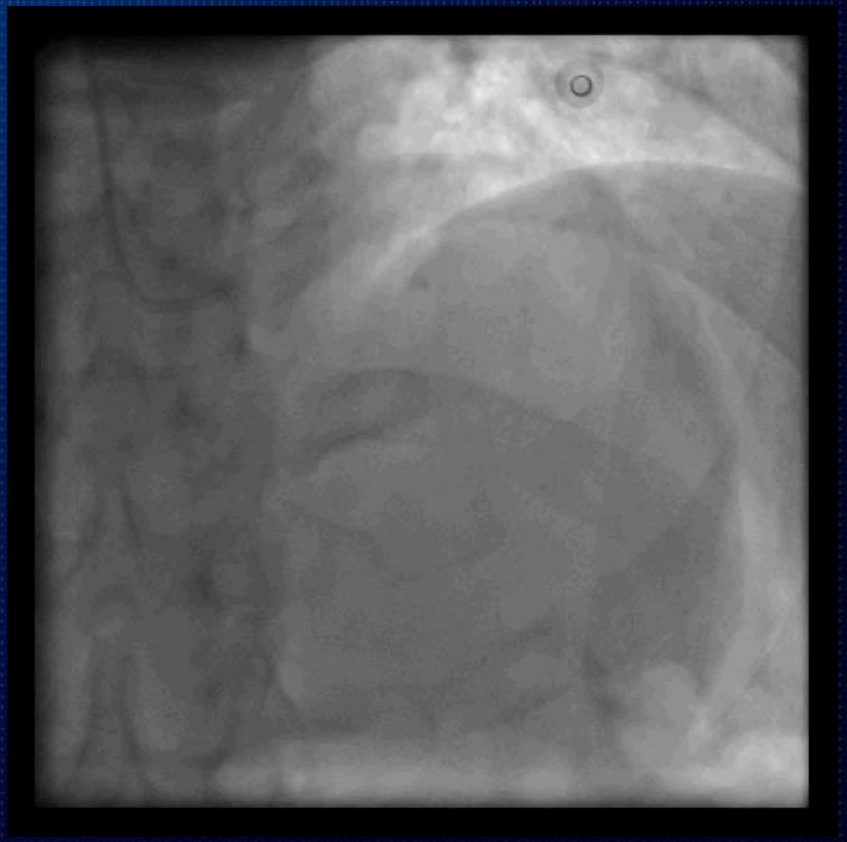
FFR after BA = 0.90

Safe DCB treatment

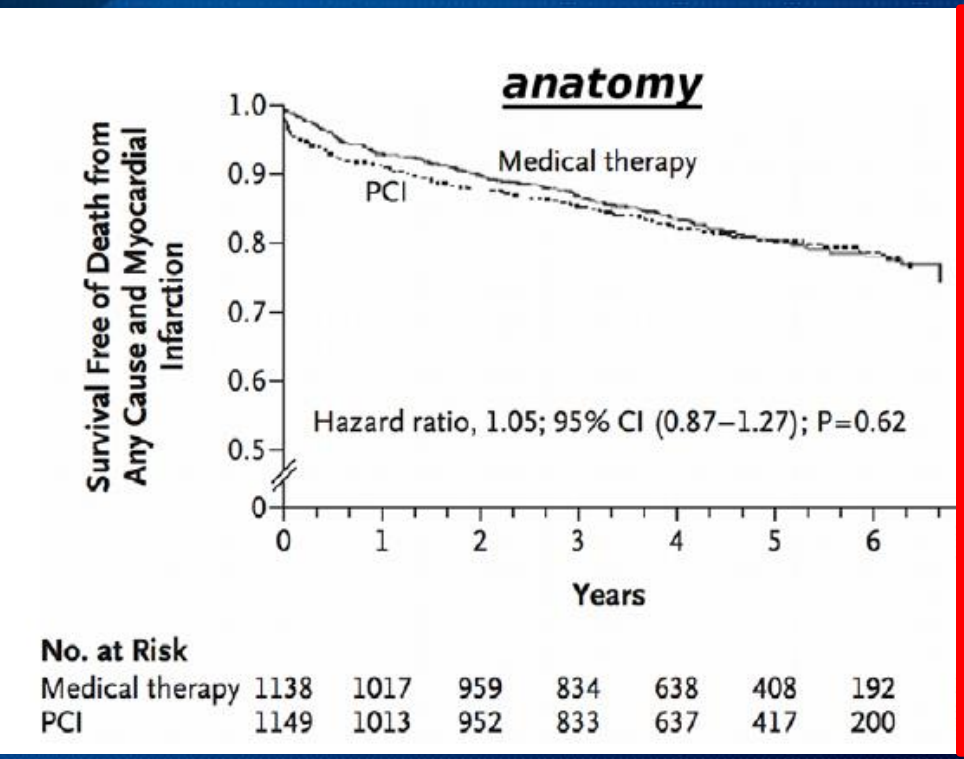
DCB treatment

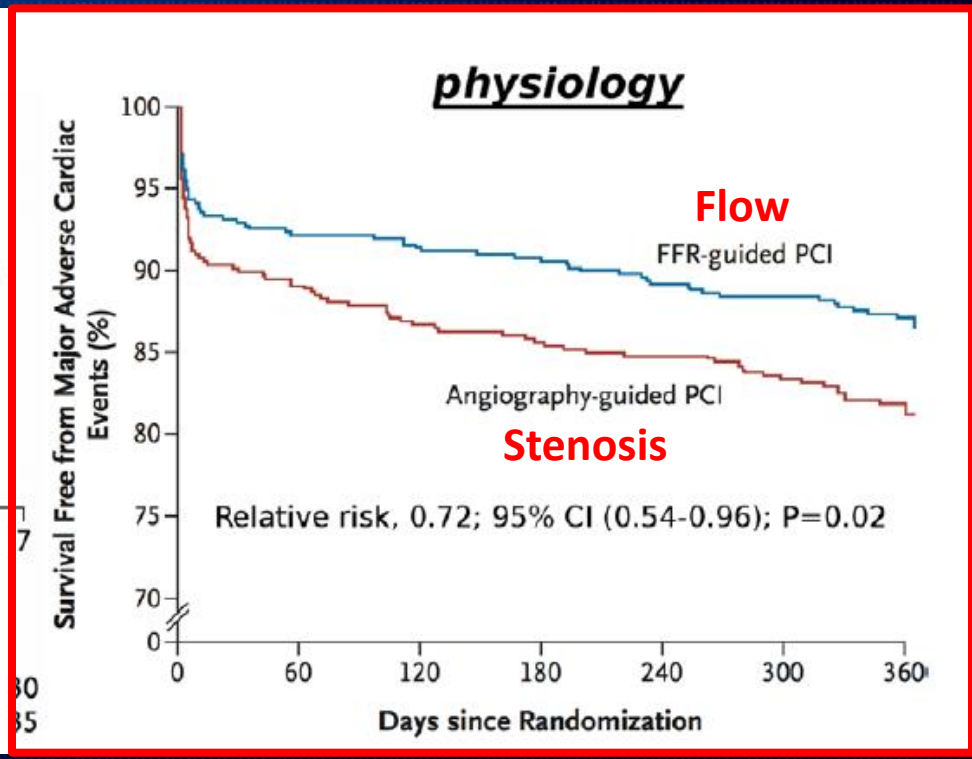


After 9-month



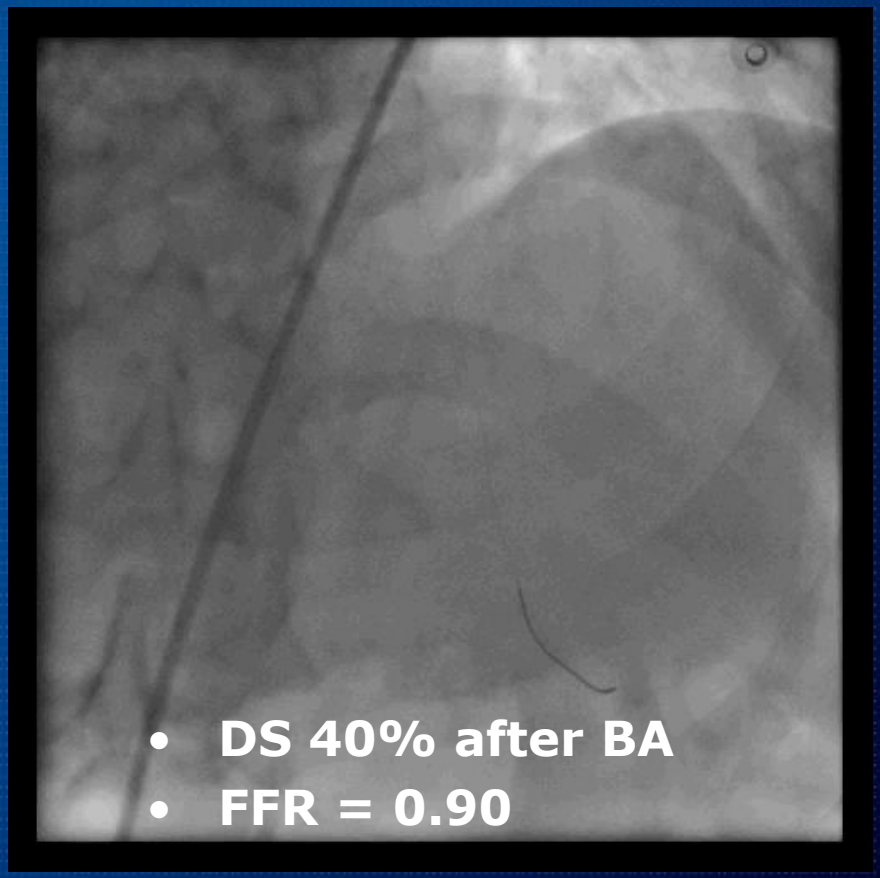
Flow-guided treatment is better than stenosis-based therapy





Circ Cardiovasc Imaging. 2013;6:81-832

Why do we put the stent after successful balloon angioplasty?



1. Prevent acute vessel closure

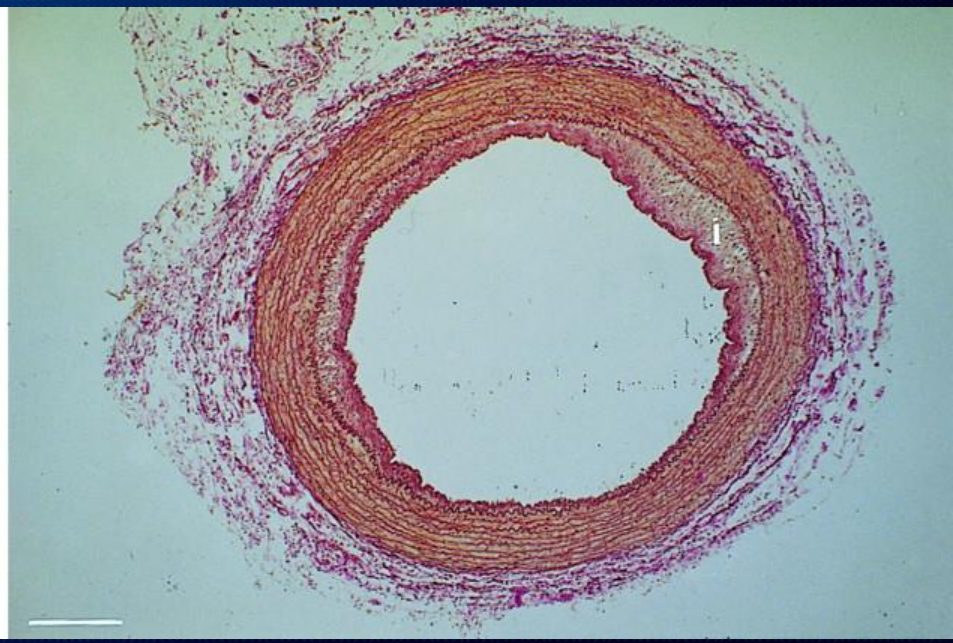
2. Reduce rate of restenosis

Why do we put the stent after successful balloon angioplasty?

- Prevent acute vessel closure
- Reduce rate of restenosis

Paclitaxel inhibits arterial smooth muscle cell proliferation in vitro and in vivo

untreated control animal



paclitaxel-treated animal

Circulation. 1997;96:636

BA vs. DCB

Multicenter retrospective observational study

	BA	DCB	p-value
9 months follow-up			
Reference vessel diameter, mm	2.1 ± 0.5	2.3 ± 0.5	0.068
Minimal lumen diameter, mm	1.2 ± 0.6	1.9 ± 0.6	<0.001
Diameter stenosis, %	43 ± 18	26 ± 13	<0.001
Binary restenosis, n (%)	7 (30.4)	2 (4.1)	<0.001
Lesion length, mm	16.3 ± 6.8	21.5 ± 6.1	0.008
Late luminal loss, mm	0.25 ± 0.50	- 0.12 ± 0.30	<0.001
Clinical events at 9 months FU			
TLR, n(%)	1 (4.3)	0	0.229
TVR, n(%)	3 (13.0)	0	0.033

Yonsei Med J 2016 Mar;57(2):337-341

Why do we put the stent after successful balloon angioplasty?

- Prevent acute vessel closure
- Reduce rate of restenosis

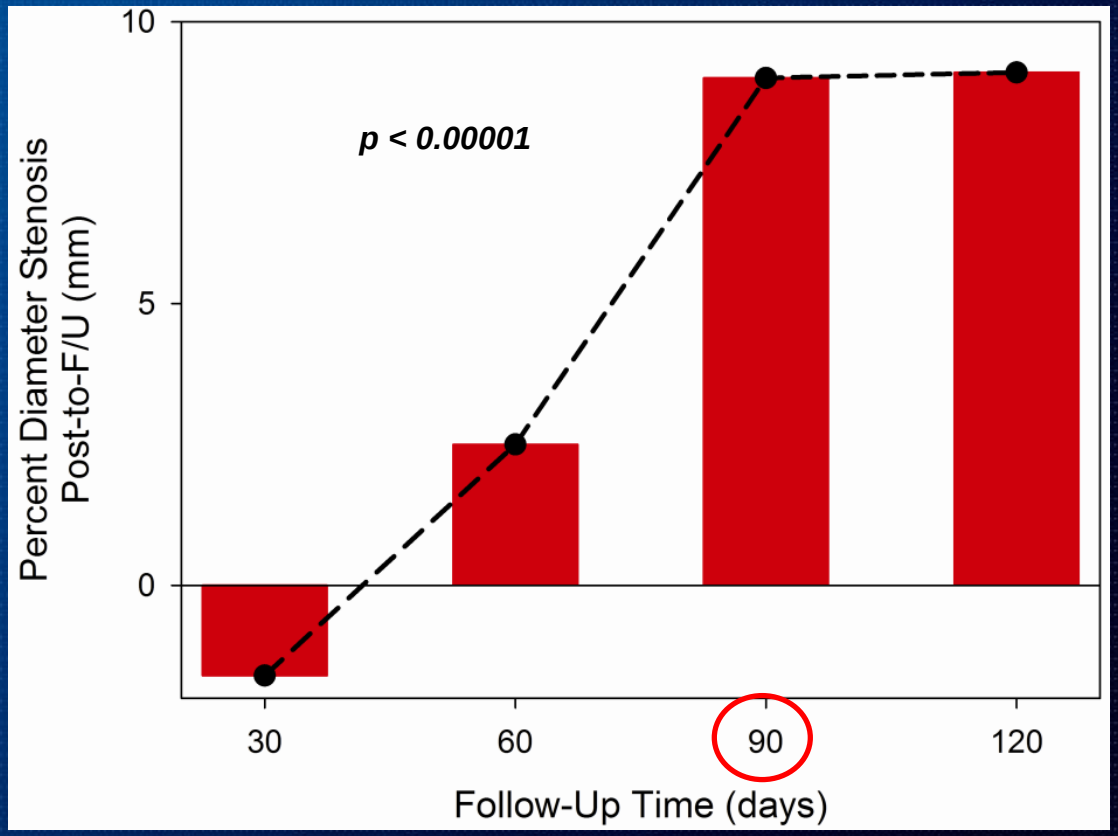
Abrupt vessel closure after BA

- Onset time from BA: < 30min
- Location: Cath lab (82%), postprocedure (6%), inpatient unit (12%)
- Cause: thrombus/dissection (55%), indeterminate (≈spasm, 45%)

JACC April;92(19):926-35

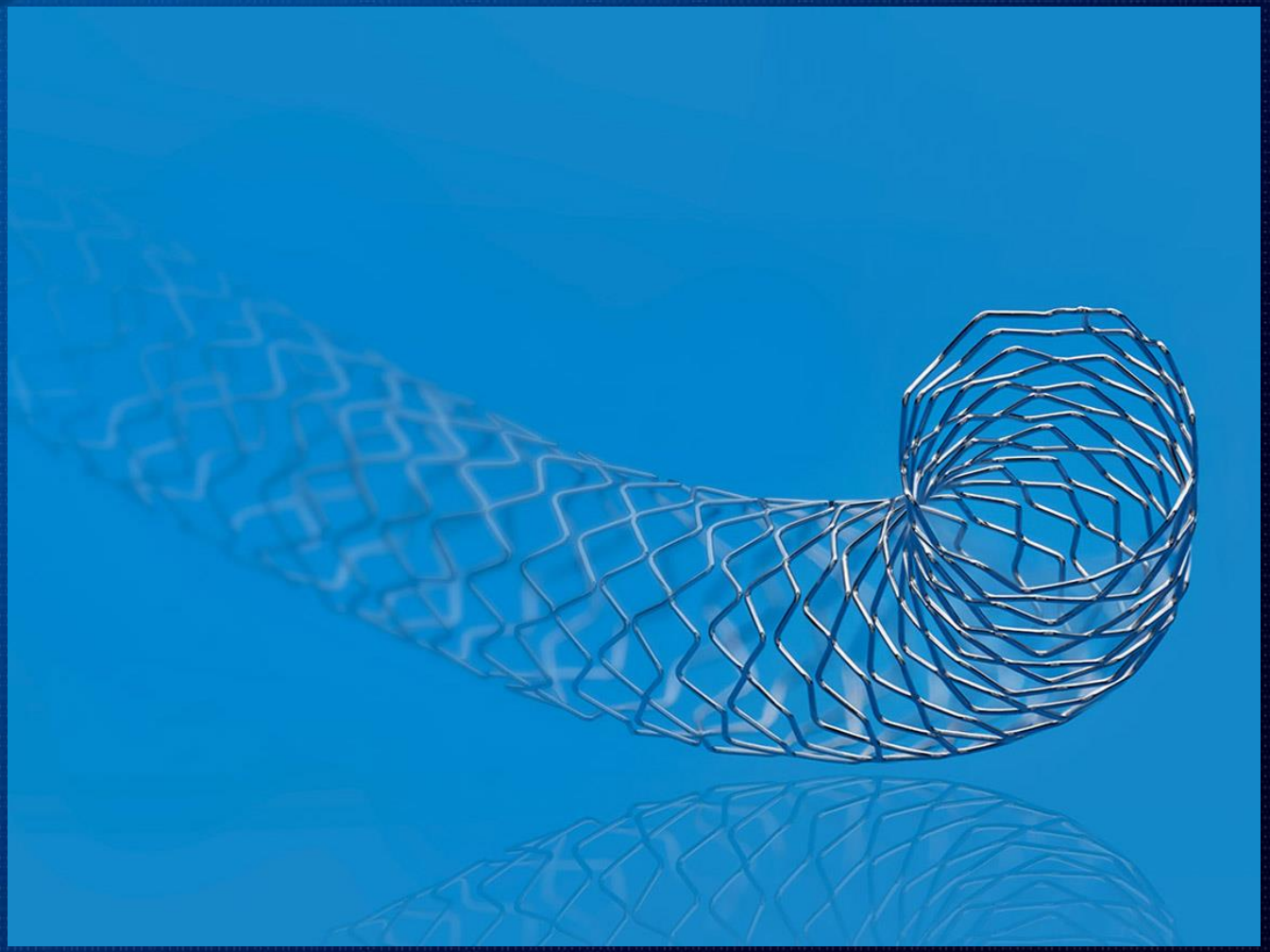
Lumen appears to stabilize 3-month after BA

Scaffolding of the Vessel is Only a Transient Need



Circulation 1988; 77: 361.

We have to seriously think about putting a permanent metal stent!



How can we be guaranteed 3-month of safety?

Original Studies

Fractional Flow Reserve-guided Paclitaxel-coated Balloon Treatment for De Novo Coronary Lesions

Eun-Seok Shin,[1*] MD, PhD, Soe Hee Ann,[1] MD, Gillian Balbir Singh,[1] MBCHB, FRACP, Kyung Hun Lim,[1] MD, Franz X. Kleber,[2] MD, and Bon-Kwon Koo,[3] MD, PhD

Objectives: To assess the safety and efficacy of fractional flow reserve (FFR) guided paclitaxel-coated balloon (PCB) treatment for de novo coronary artery lesions. Background: There is limited data on PCB treatment for de novo lesions especially of major

High FFR after BA

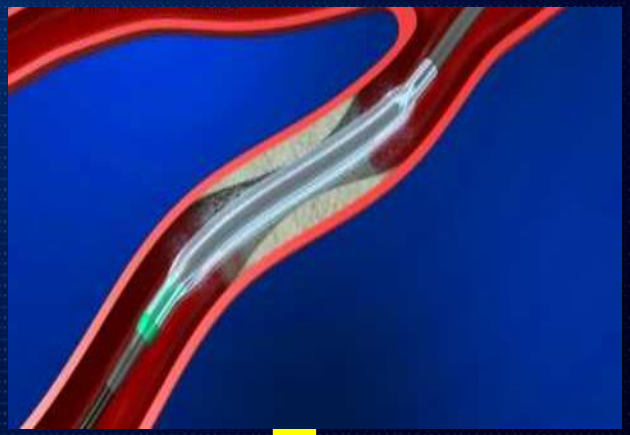
→ No acute vessel closure

Lower restenosis

plasty; de novo lesion; late luminal loss

Catheter Cardiovasc Interv. 2016 Aug;88(2):193-200.

History of PCI



BA — 1977 — *Dissection, Acute recoil, Restenosis*

BMS — 1986 — *Stent thrombosis, In-stent restenosis*

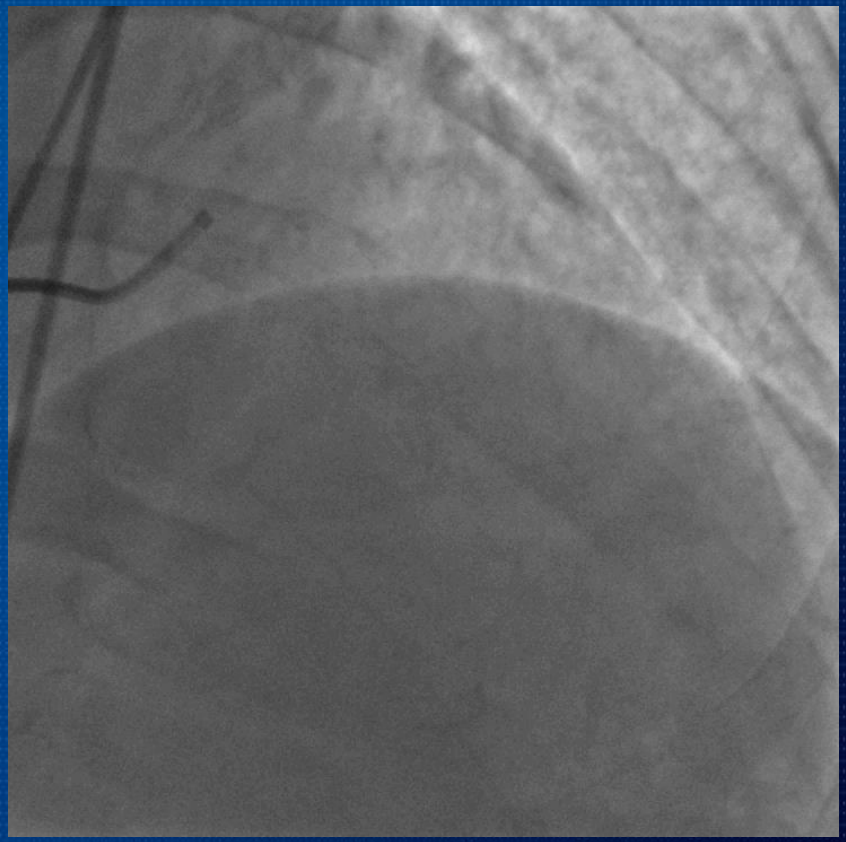
DES — 2002 — *LST, VLST, Prolonged DAPT, Restenosis, Neoatherosclerosis*

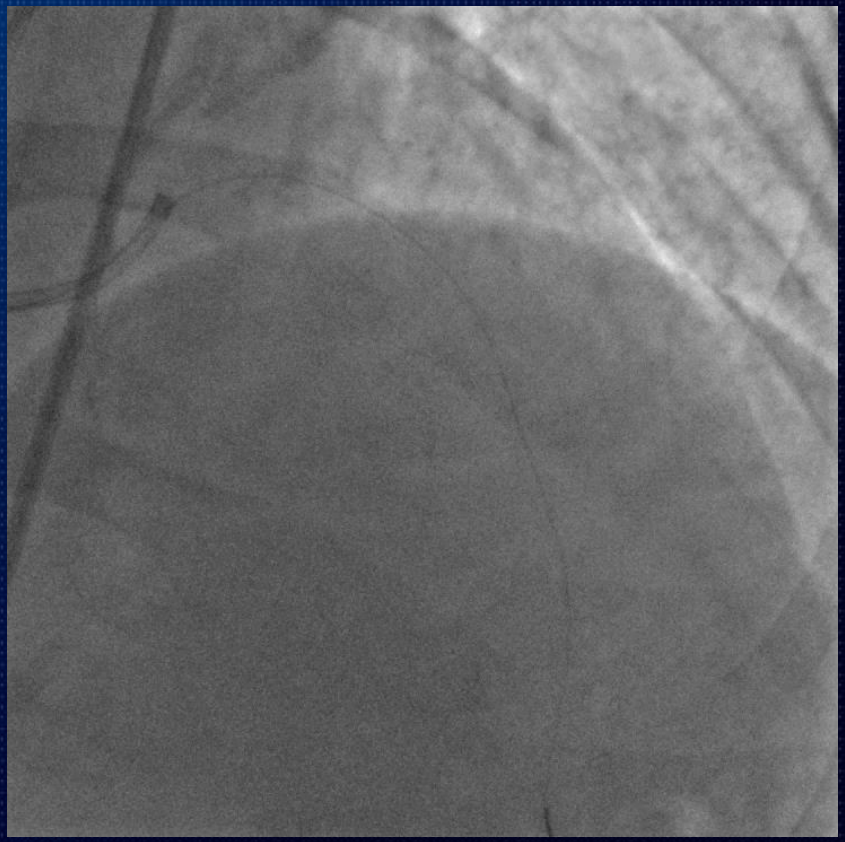
Predict acute vessel closure by FFR

Prevent restenosis by DCB

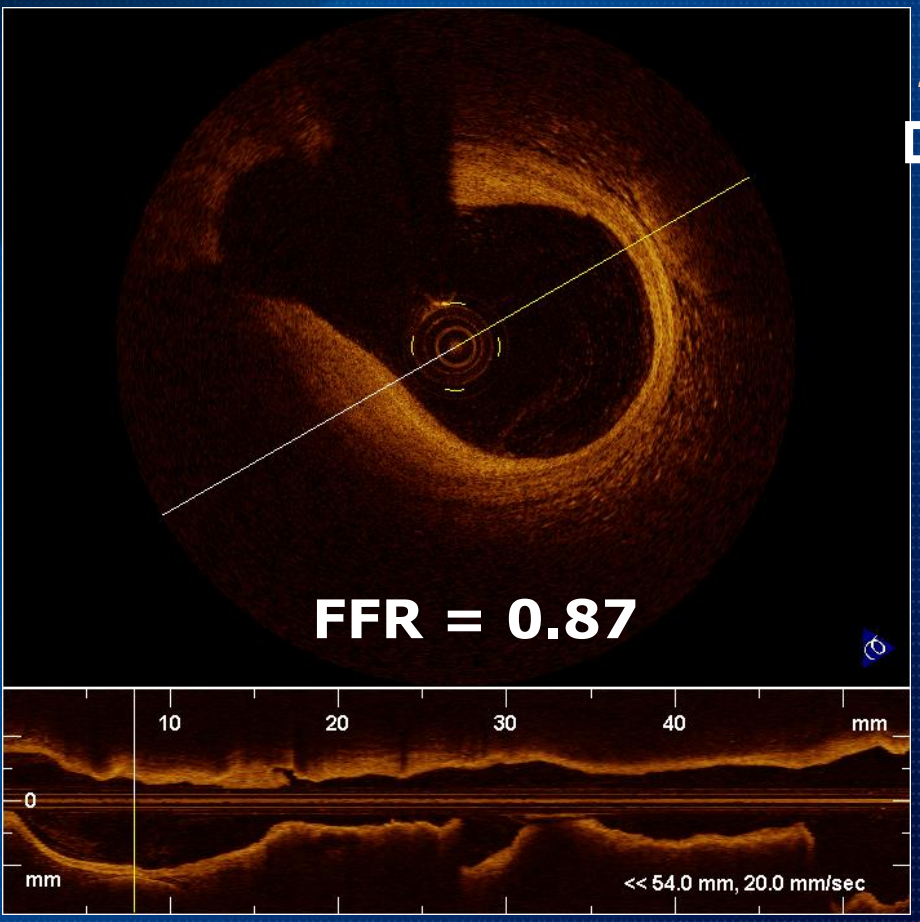
Functionally adequate residual lesion → DCB treatment

FFR after BA: 0.87

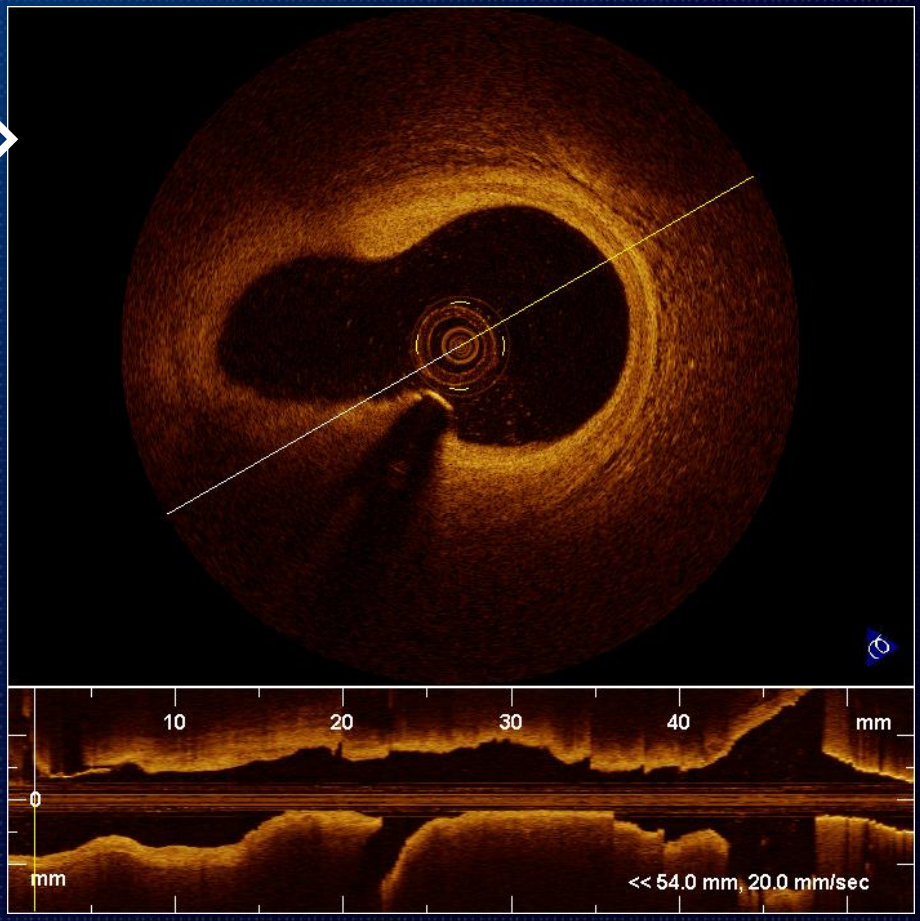




DCB treatment



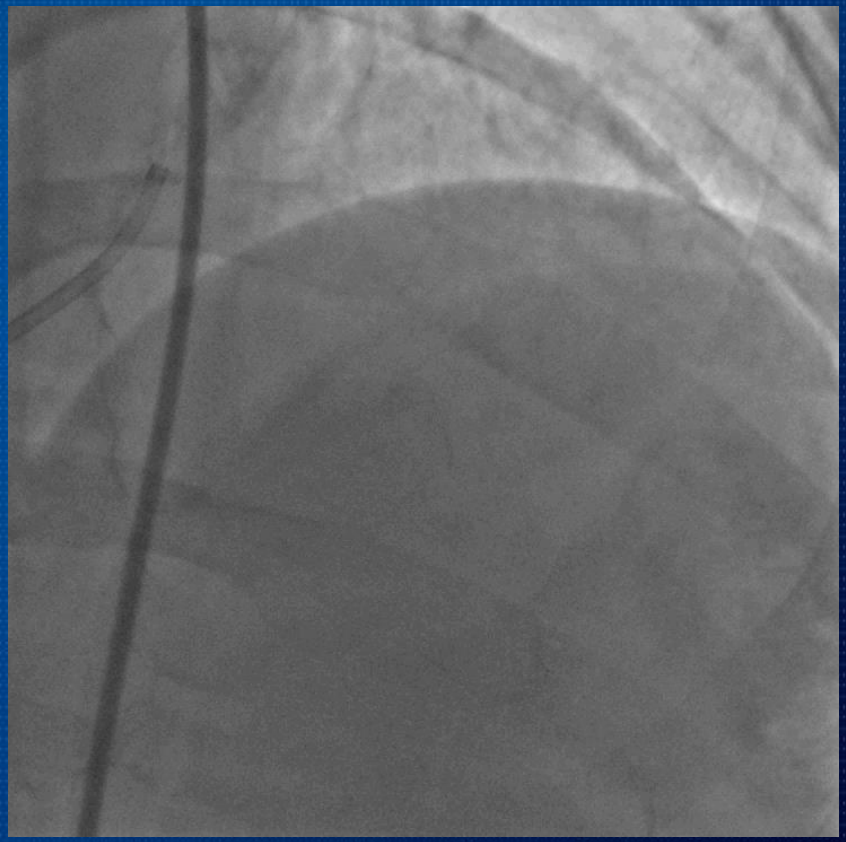
2 m



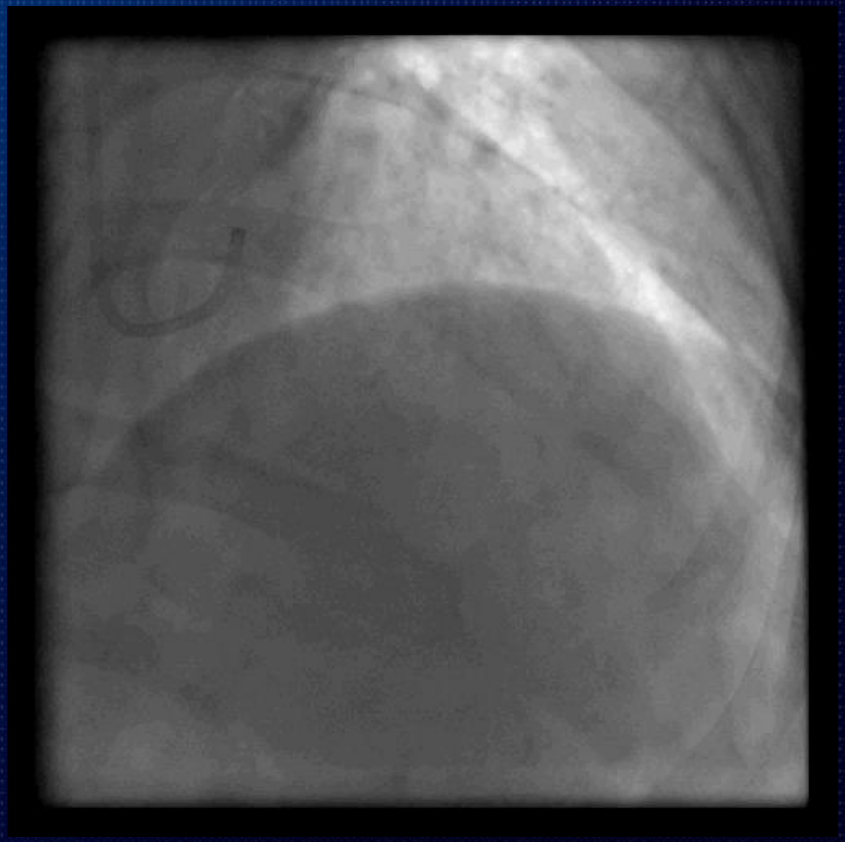
Patent lumen with rapid healing

67/F, UA

After 2-month

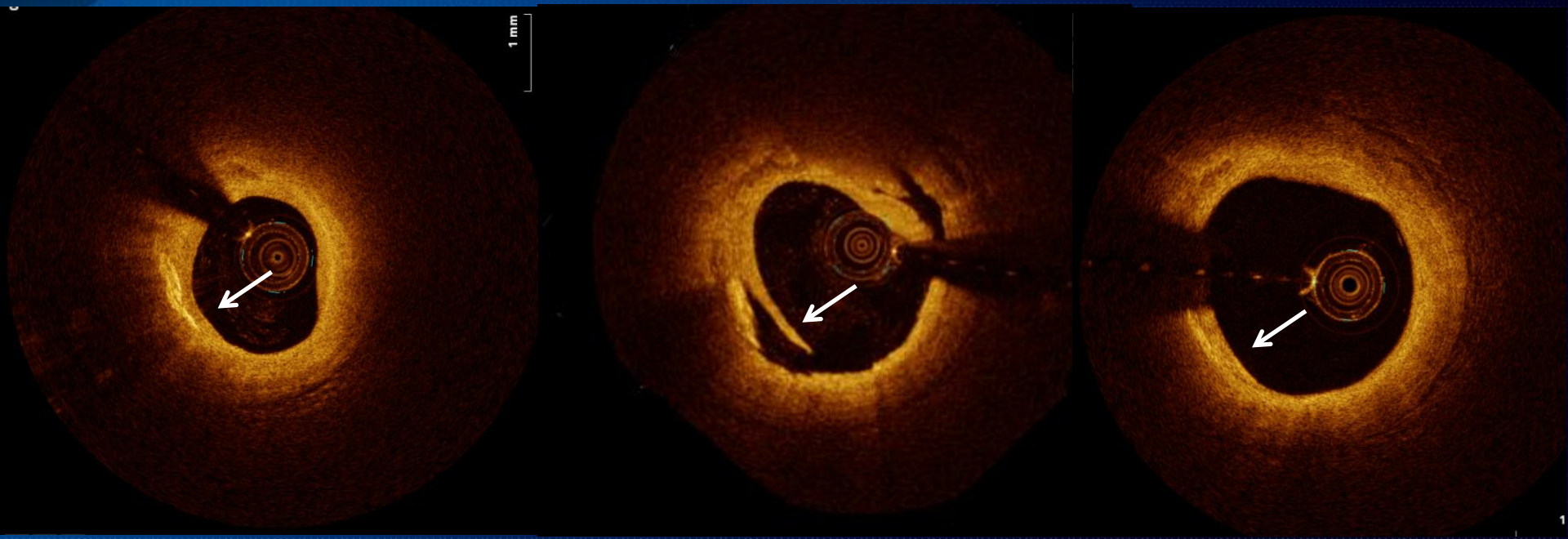


After 9-month



Healing process after DCB

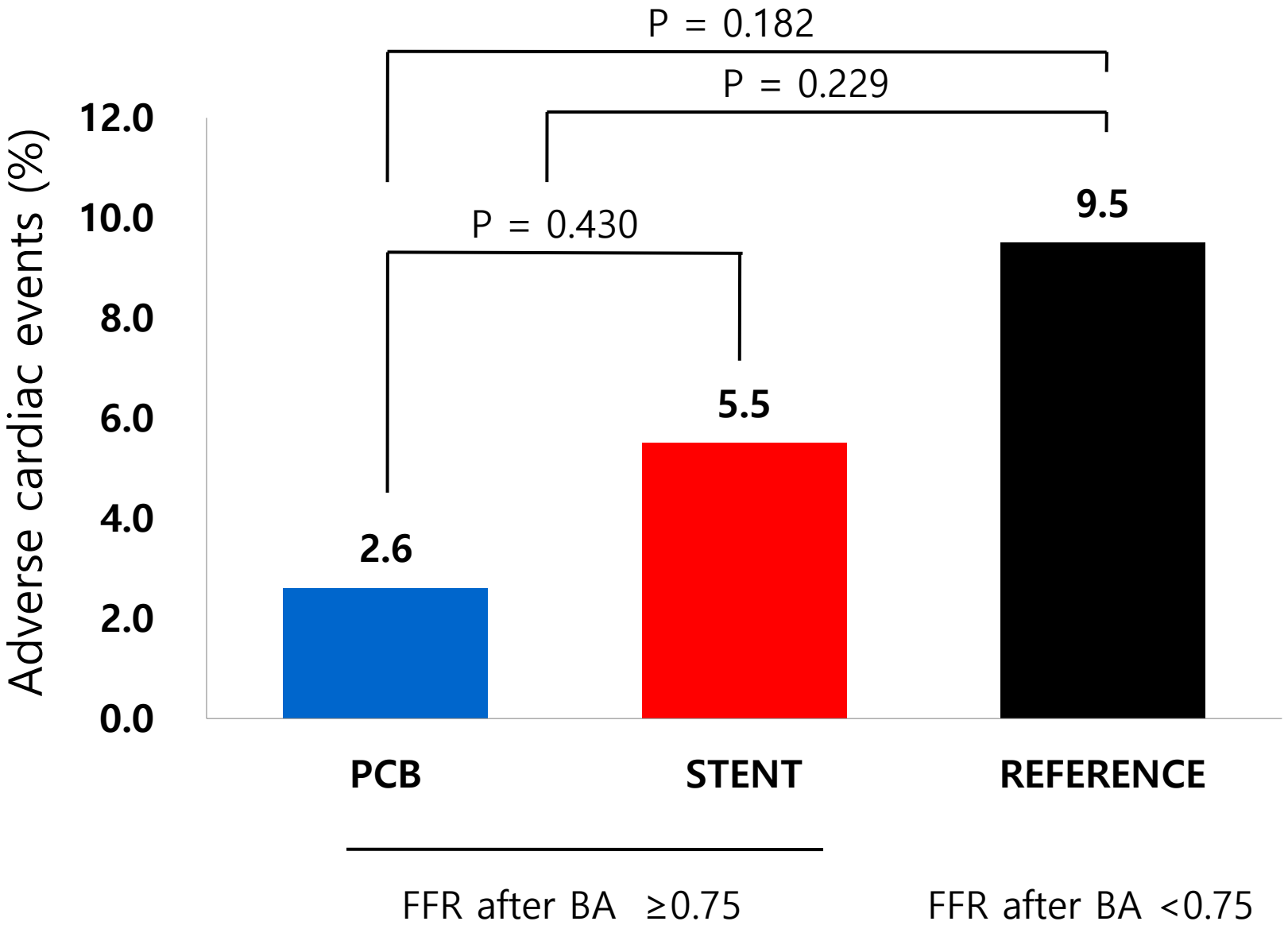
Base BA & DCB 9-month



Plaque burden ↓ Minimal lumen area ↑ Phenotype stabilized

"Plaque modification & stabilization"

Cardiac death, MI, thrombosis, revascularization



International Journal of Cardiovascular Imaging (2018) 34:1339–1347

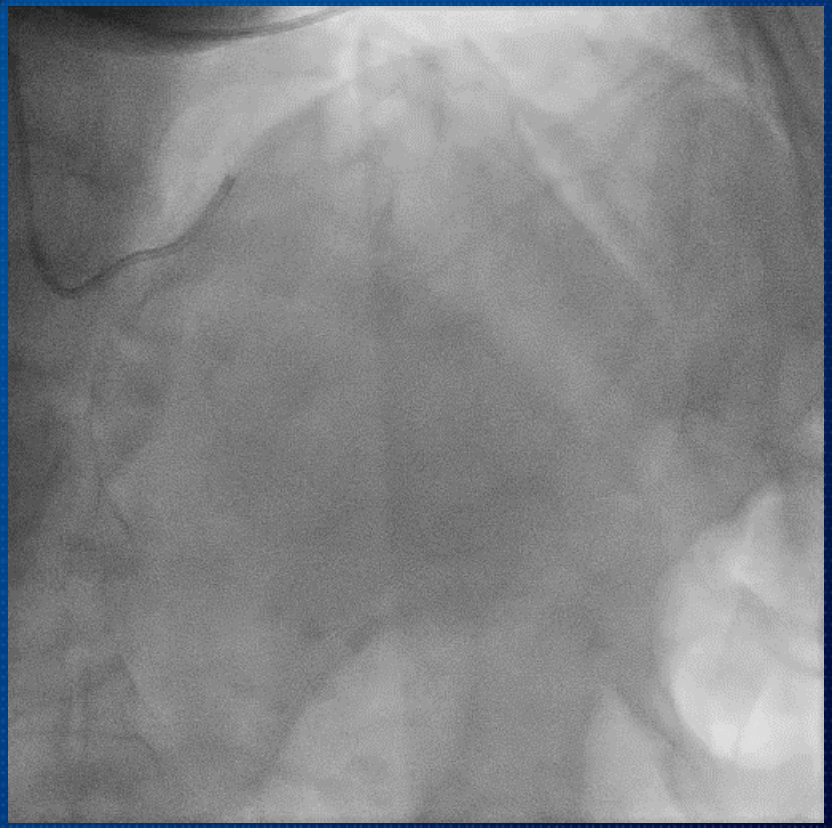
Benefits of DCB

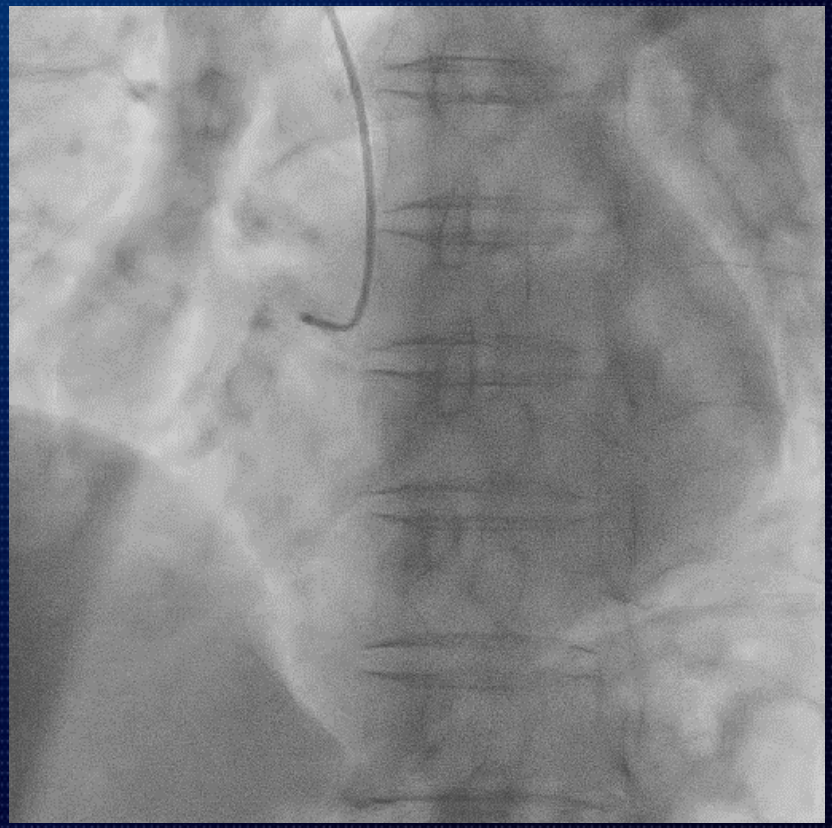
- Short duration of DAPT (1 month)
- For patients of poor drug compliance
- High-bleeding risk patients
- Chance of repeated revascularization

Case 1

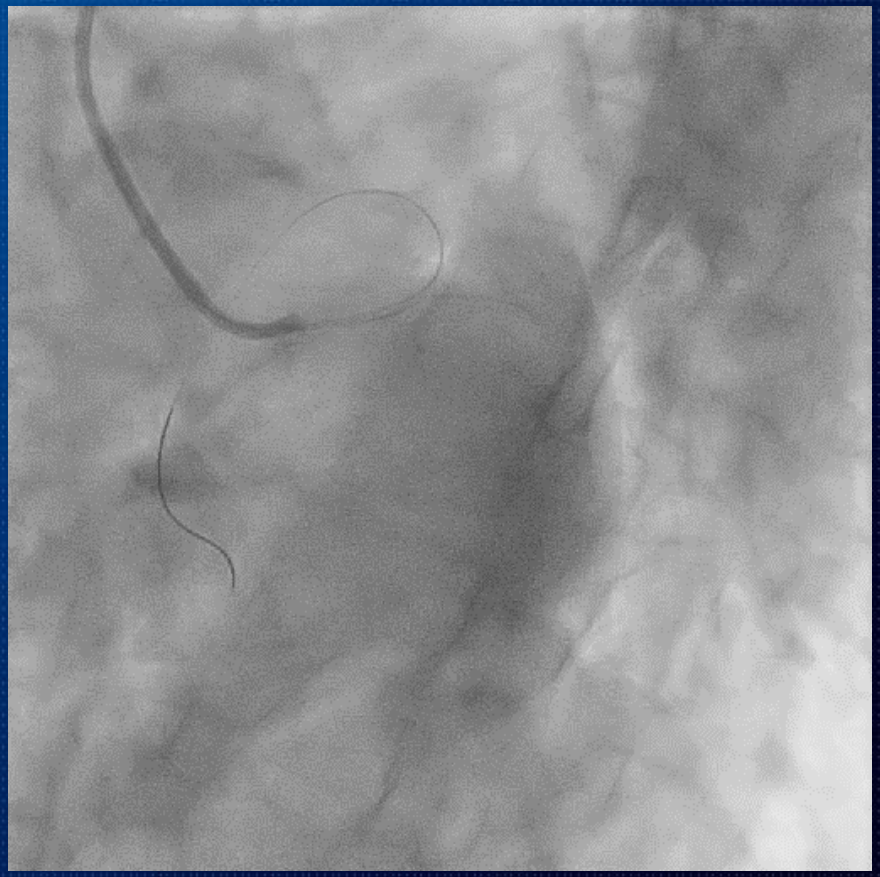
- M/78
- Chief complaint: effort related chest pain for 2 weeks
- PMH: none
- Risk factors: none
- Lab: T-chol 190/HDLc 51/LDLc 151/TG 162 mg/dl
  Hb 12.4 g/dl, Cr 0.57mg/dl, HbA1C 6.0%
- EchoCG: EF = 60%, no RWMA
- TMT: positive

Baseline CAG

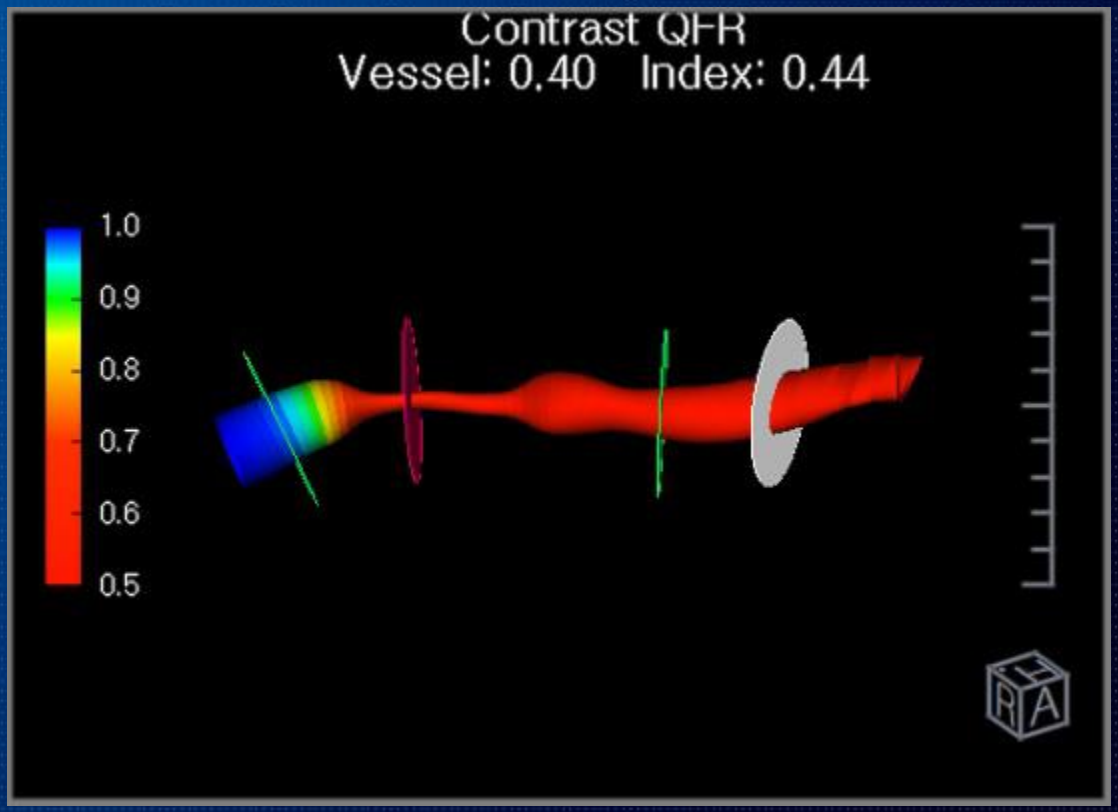




Baseline CAG

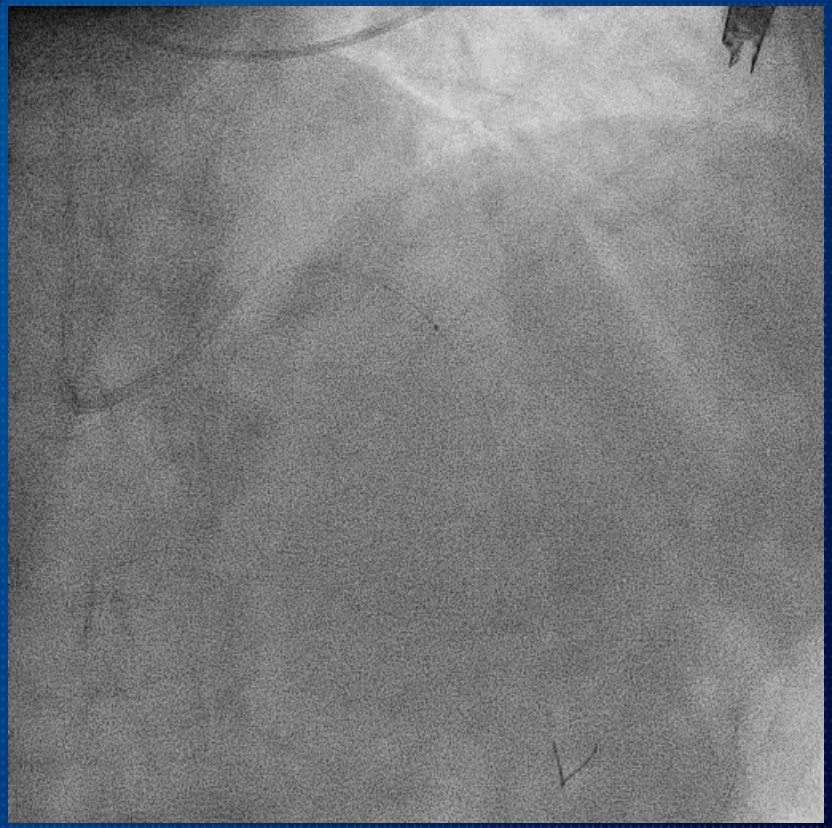


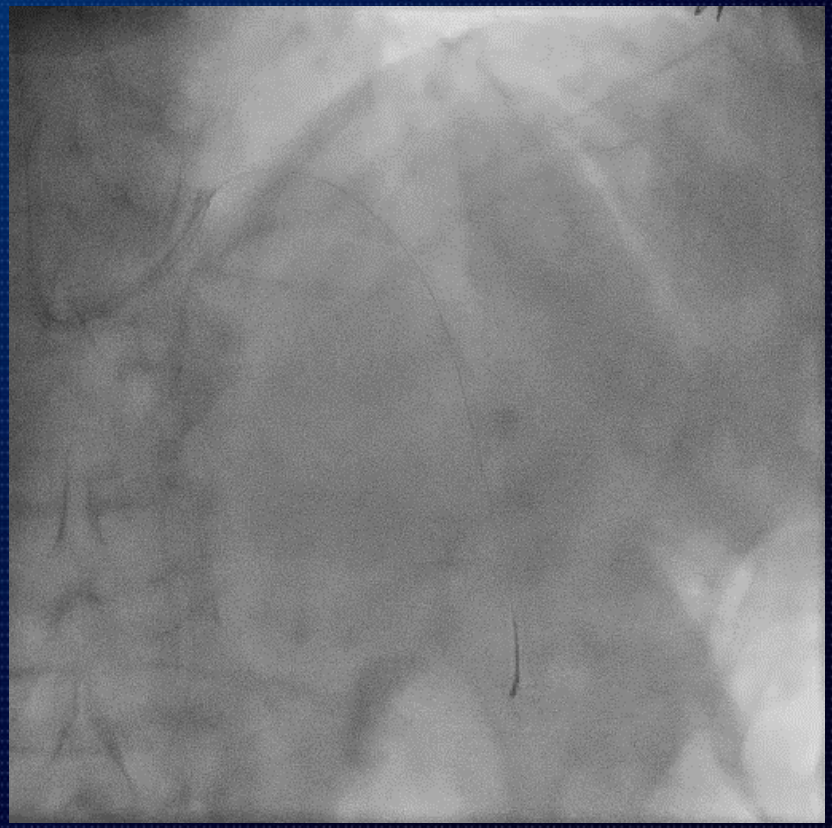
DS = 75.4%, MLD = 0.9mm, QFR = 0.40



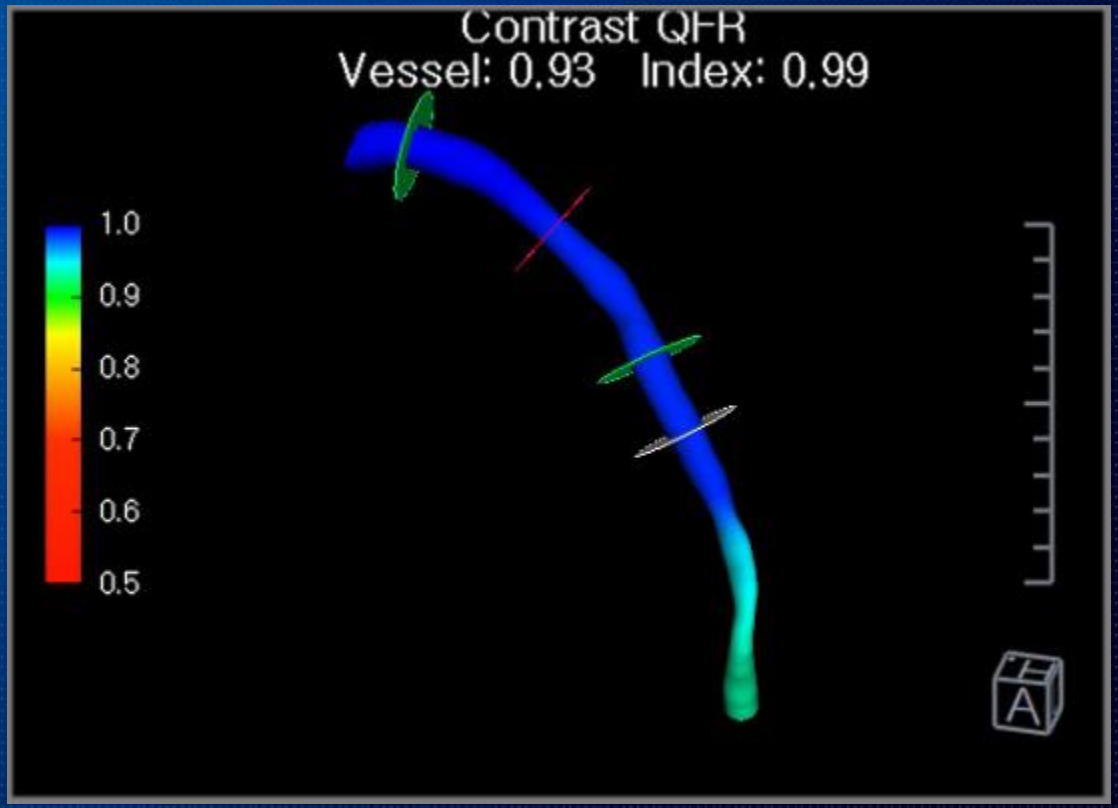
Balloon Angioplasty

Angiosculpt 3.5x10mm upto 10atm (3.65mm)



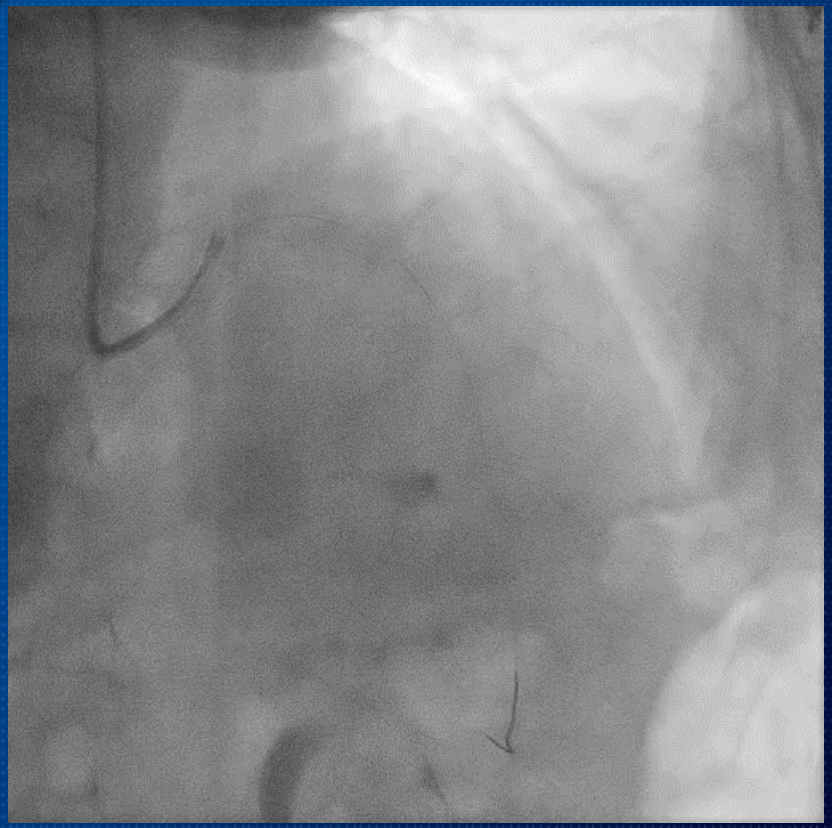


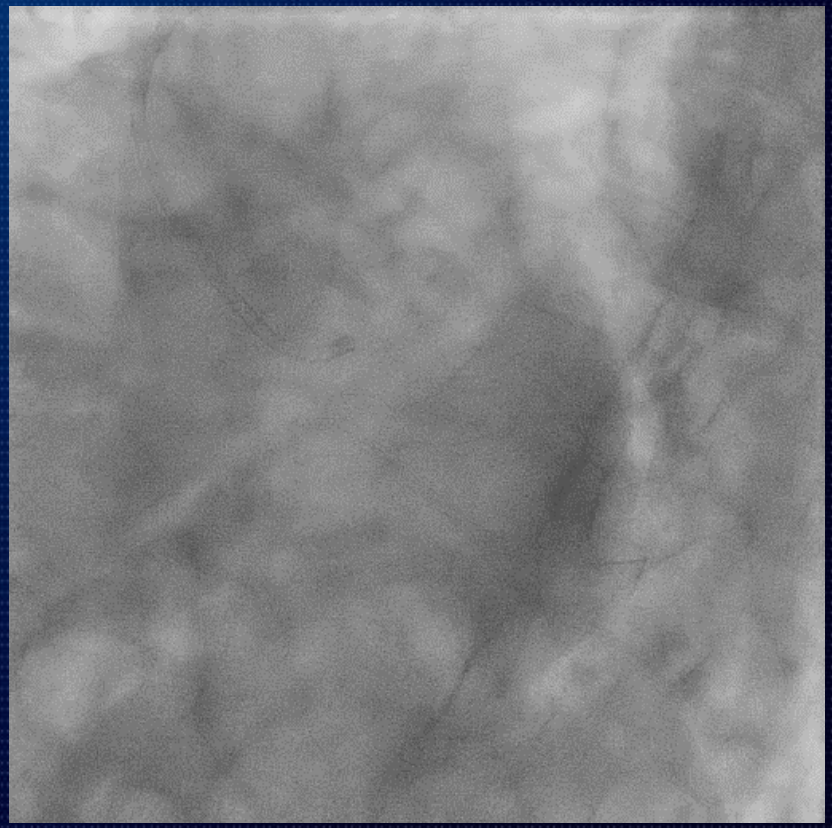
DS = 26.3%, MLD = 2.1mm, QFR = 0.93



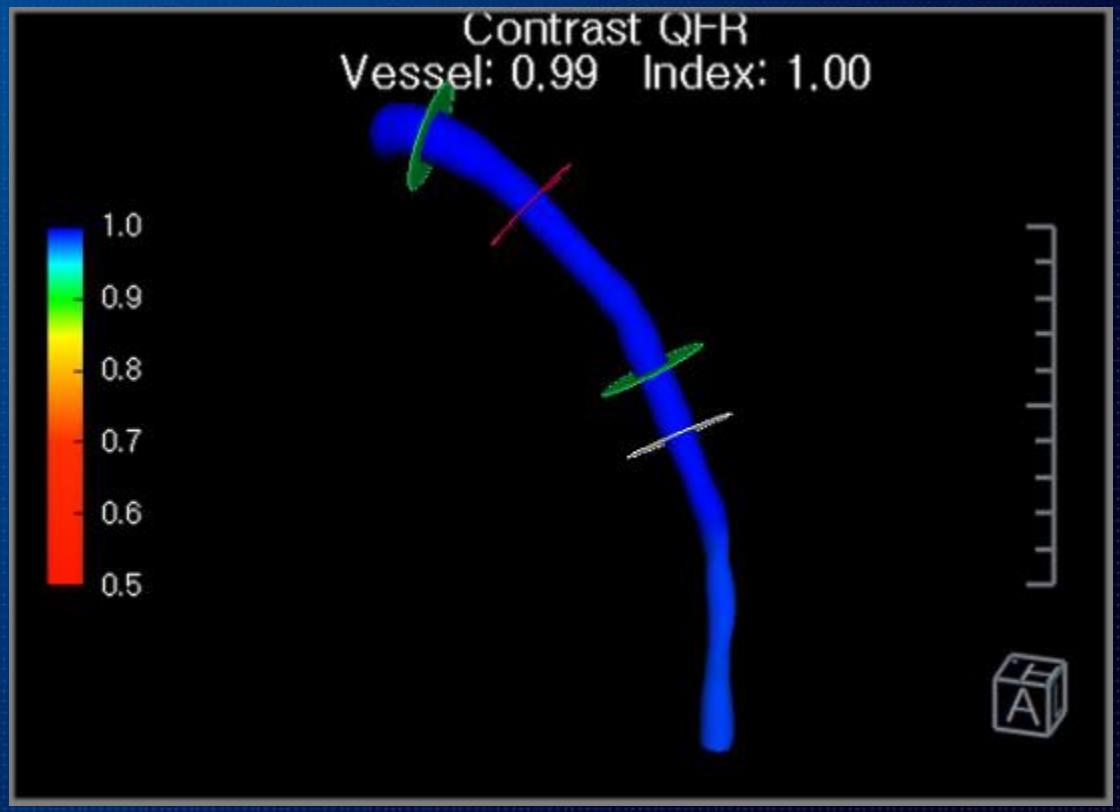
DCB Treatment

SeQuent please 3.5x20mm up to 8atm (3.56mm)





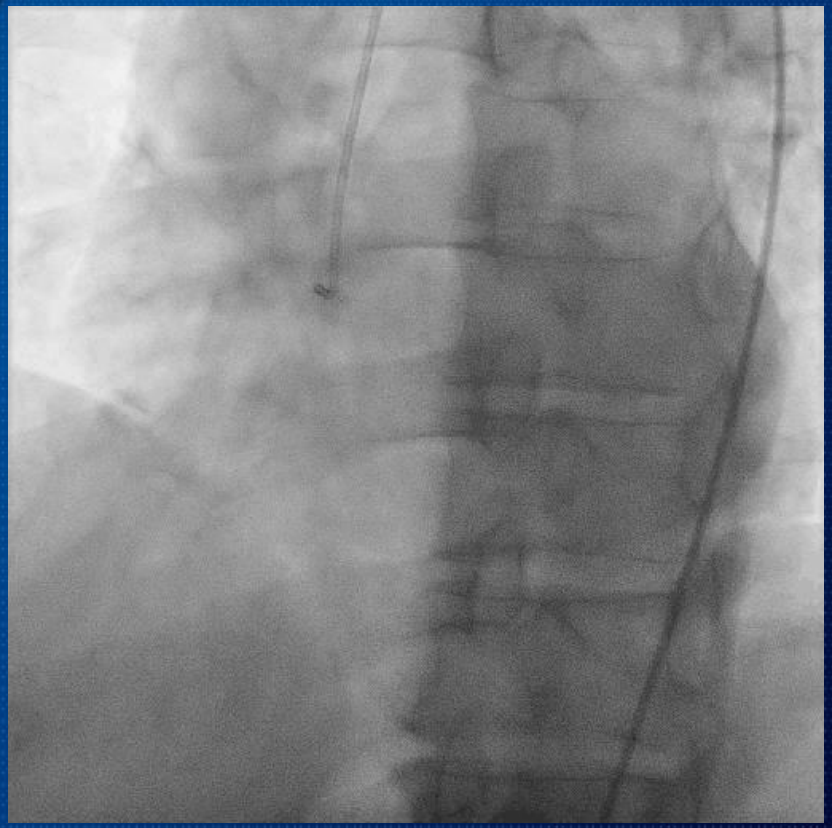
DS = 17.2%, MLD = 2.5mm, QFR = 0.99

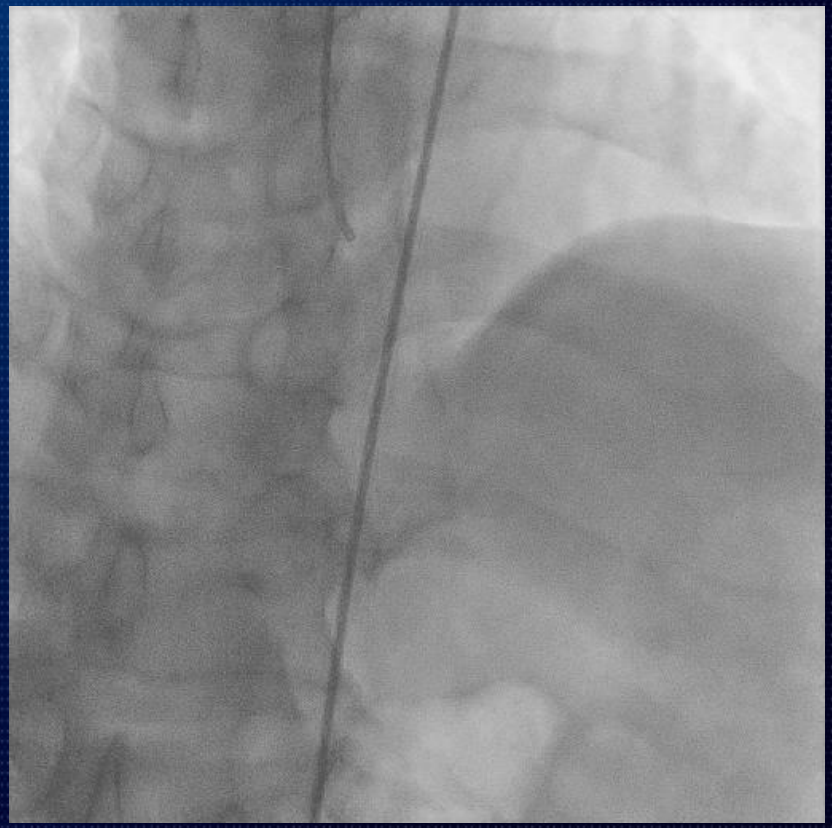


Case 2

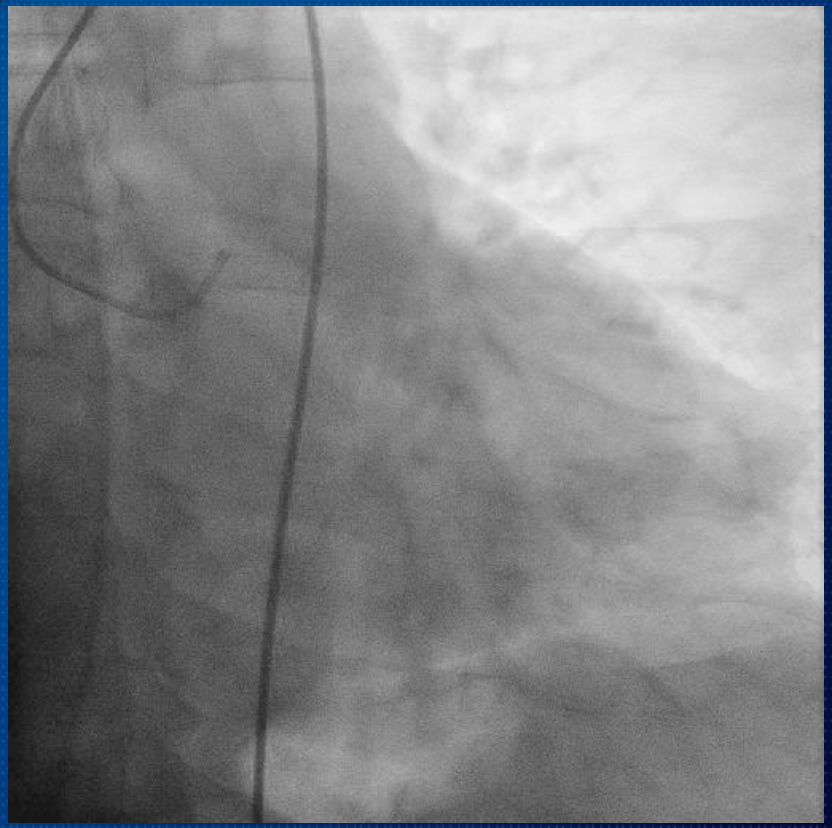
- M/61
- Chief complaint: effort related chest pain for 2 months
- PMH: none
- Risk factors: current smoking
- Lab: T-chol 235/HDLc 43/LDLc 208/TG 138 mg/dl
  Hb 15.7 g/dl, Cr 0.84mg/dl, HbA1C 6.0%
- EchoCG: EF = 65%, no RWMA
- TMT: positive

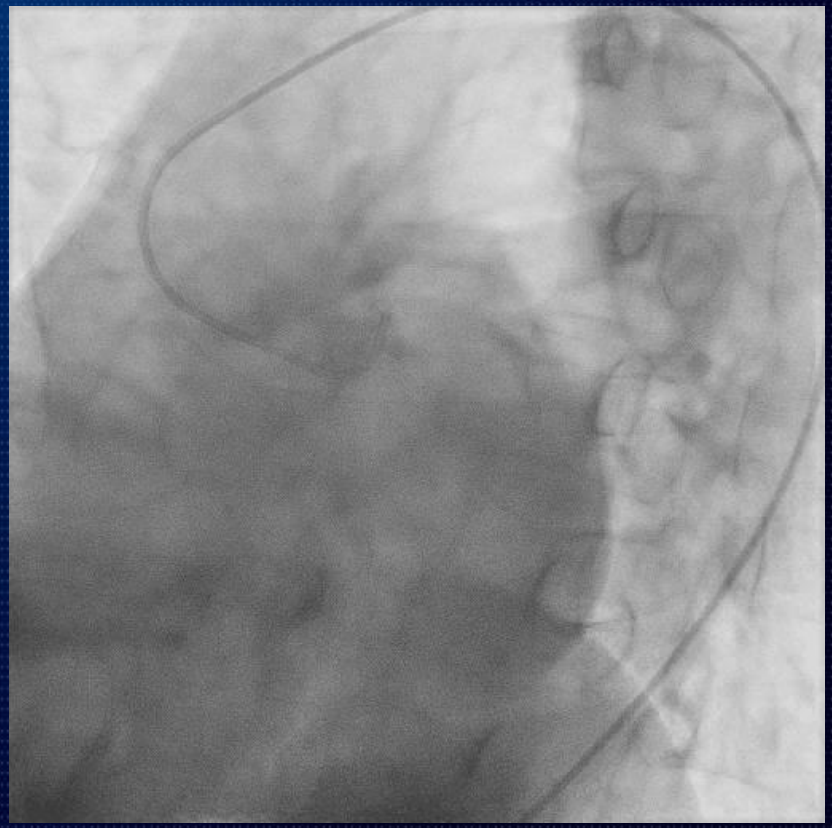
Baseline CAG





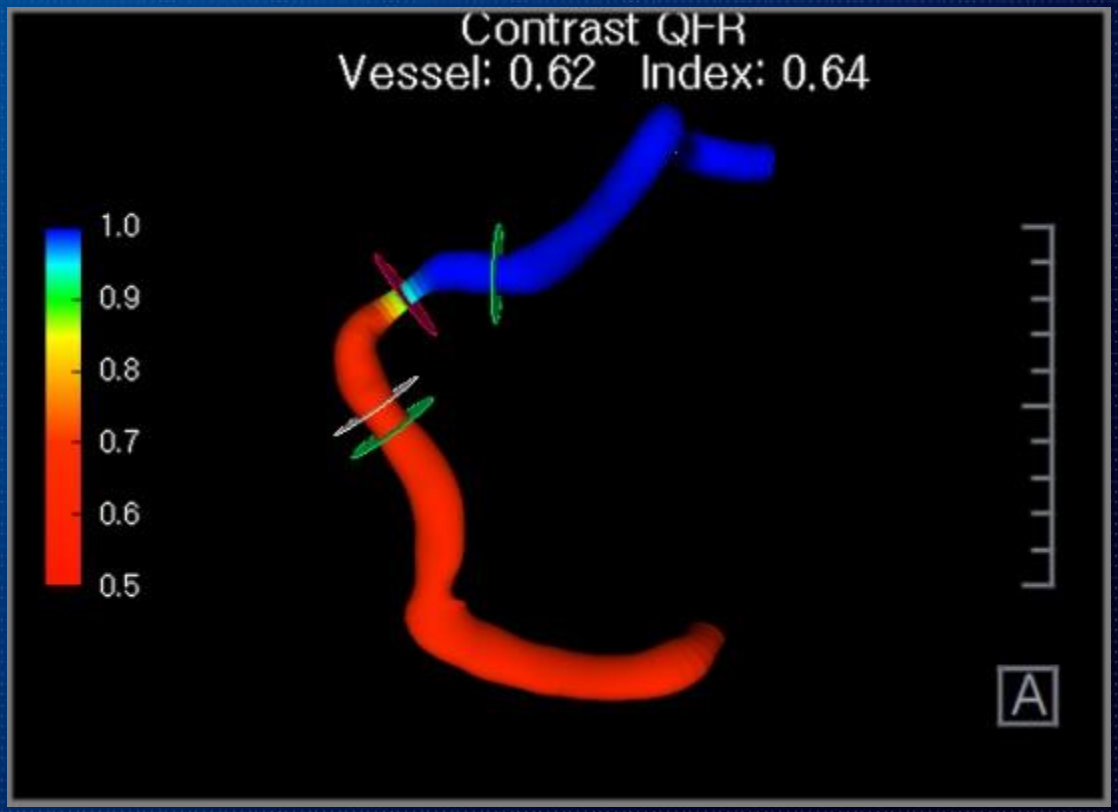
Baseline CAG





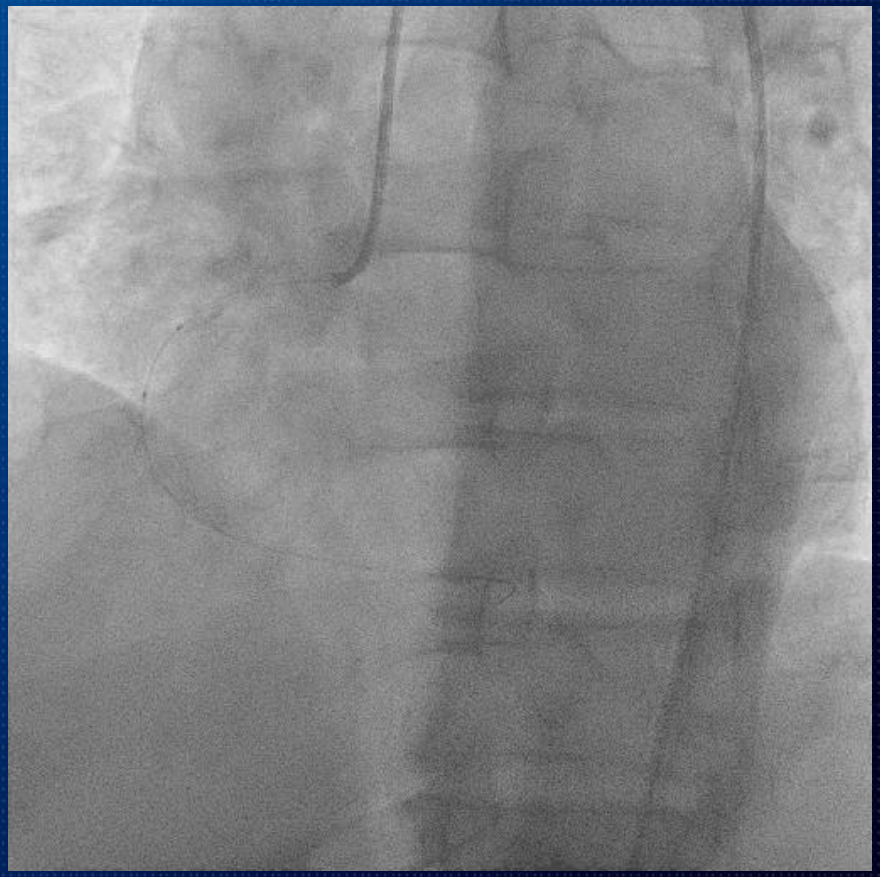
RCA at baseline

DS = 76.4%, MLD = 0.6mm, QFR = 0.62



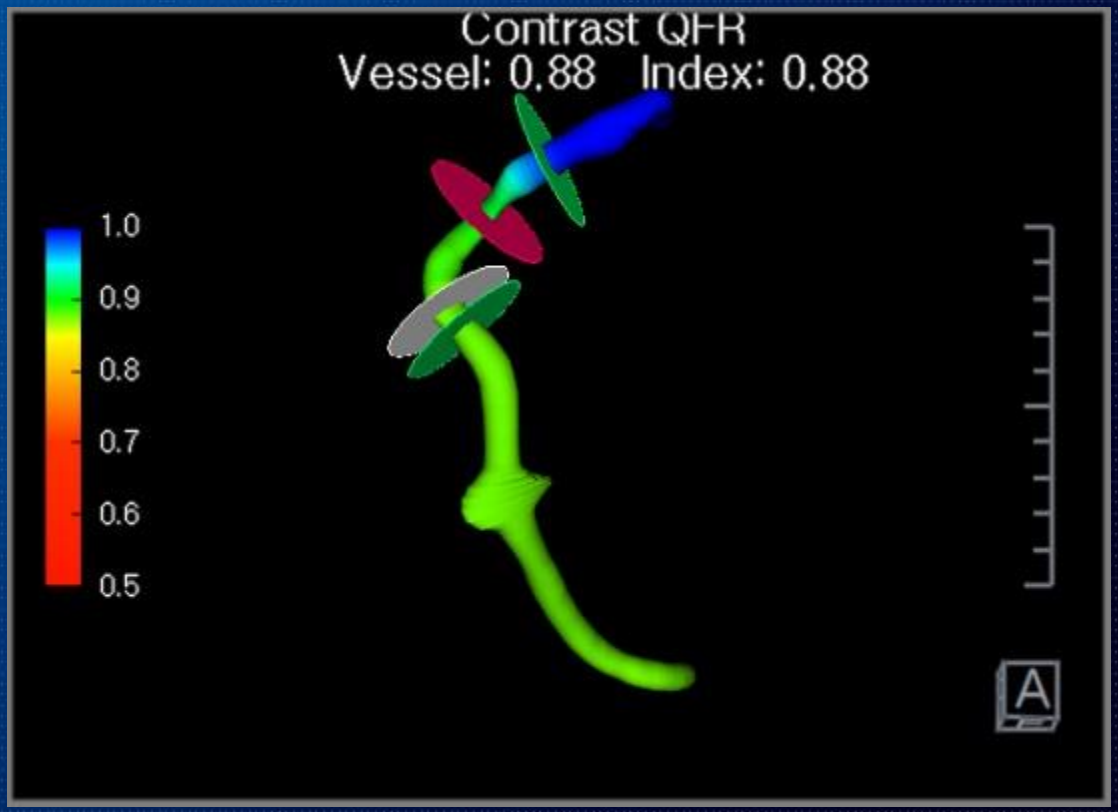
Balloon Angioplasty

NC balloon 3.0x15mm up to 12atm



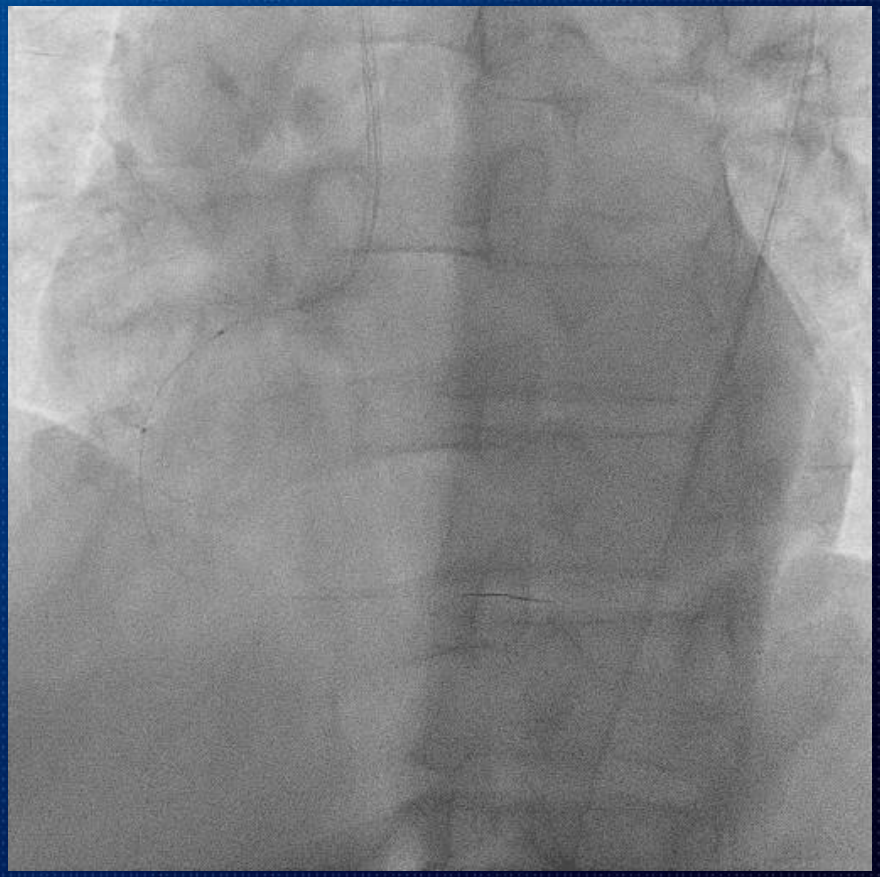
RCA after BA

DS = 48.8%, MLD = 1.5mm, QFR = 0.88

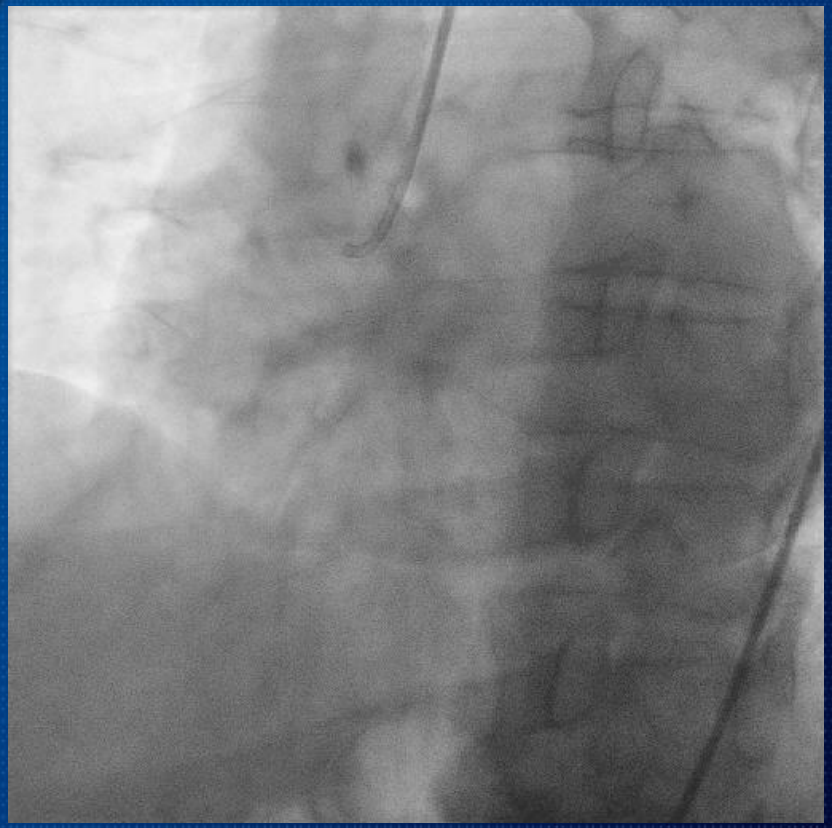


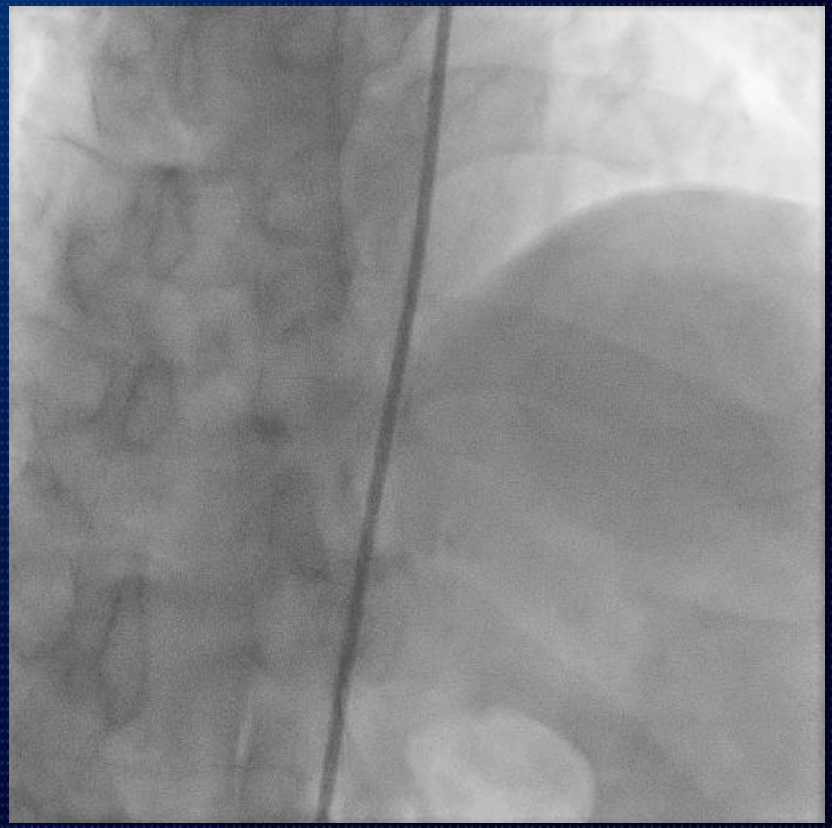
DCB treatment

SeQuent please 3.0x20mm up to 8atm (3.06mm)



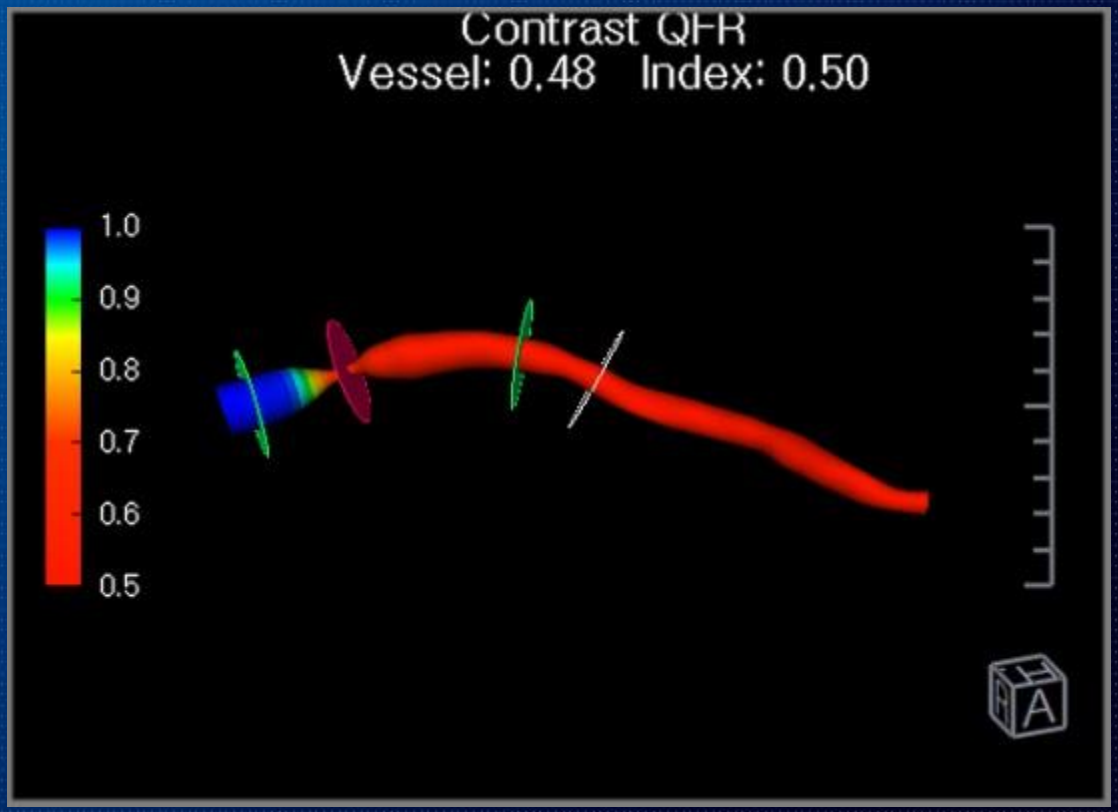
After DCB Treatment





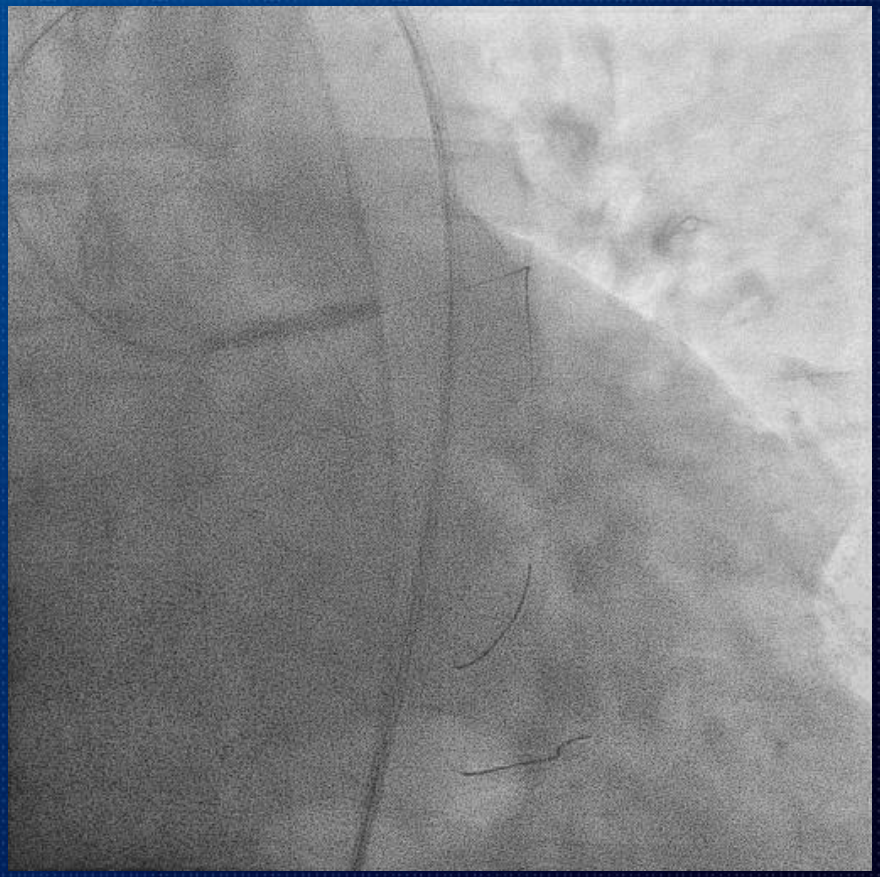
LAD at baseline

DS = 79.2%, MLD = 0.6mm, QFR = 0.48

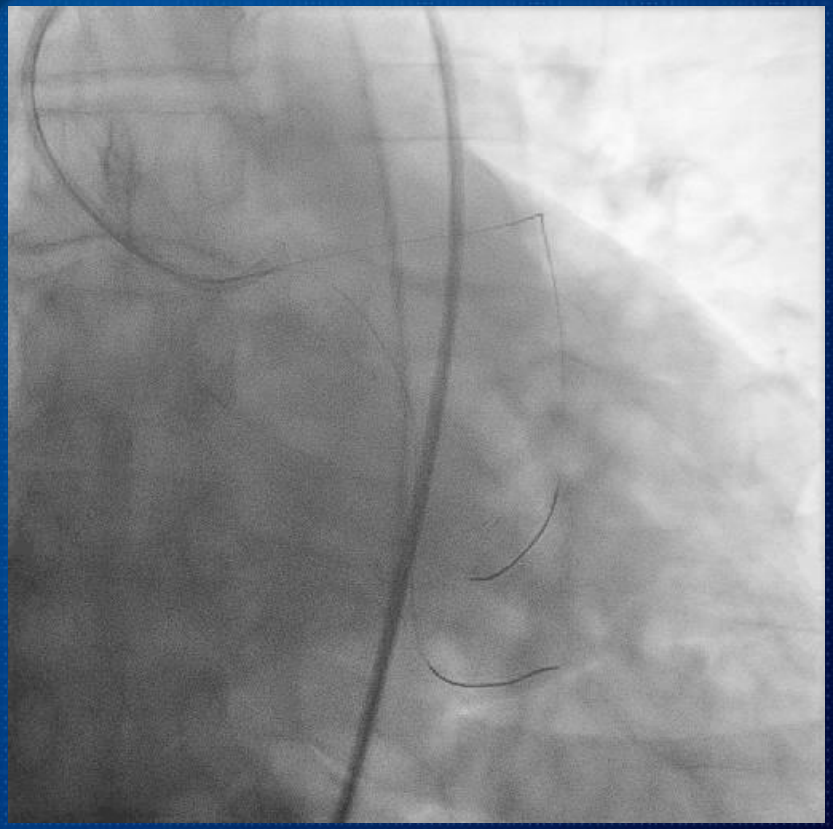


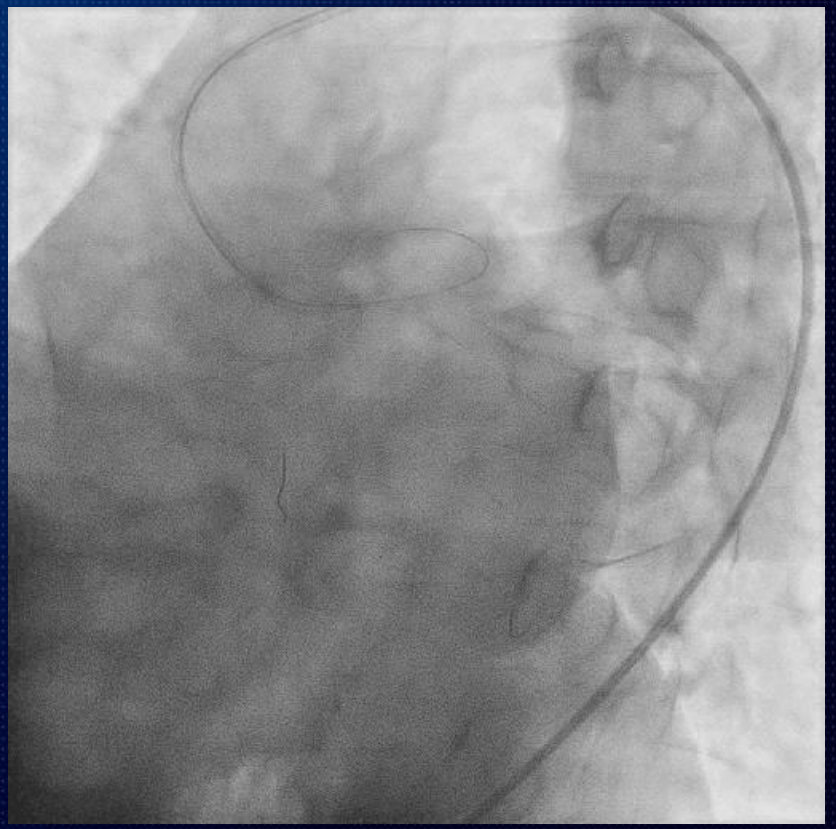
Balloon Angioplasty for LM

NC balloon 3.5x15mm up to 14atm



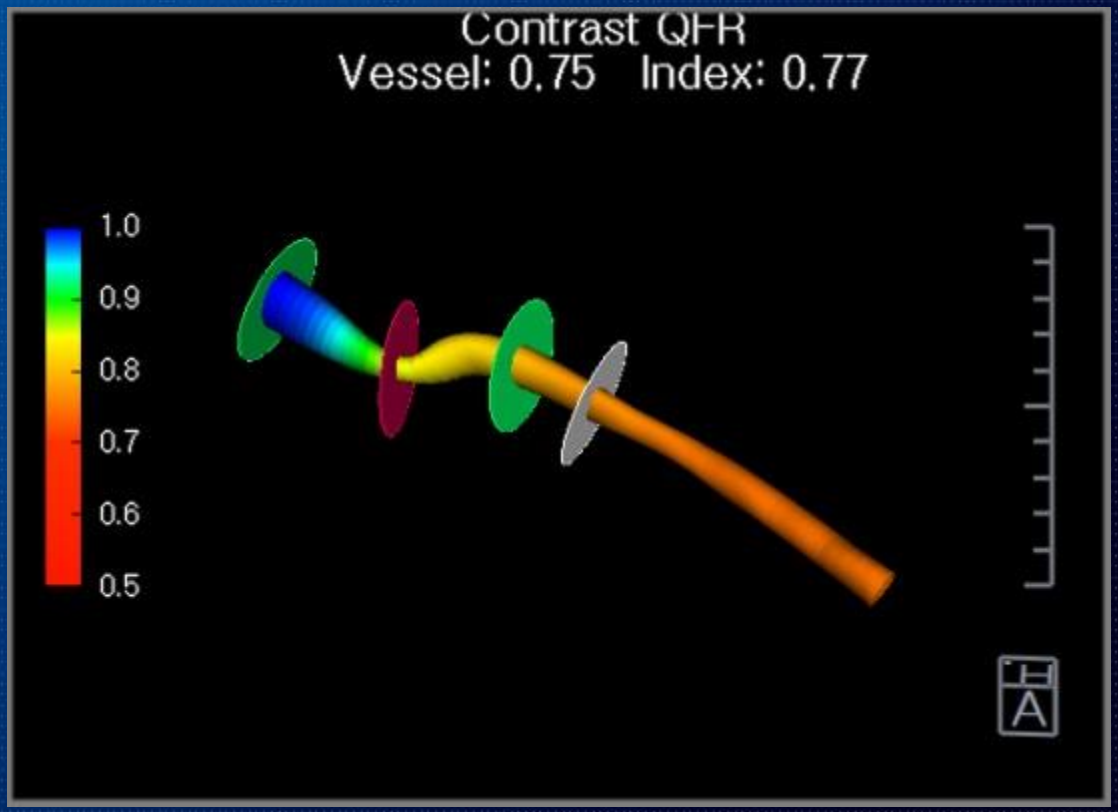
After Balloon Angioplasty





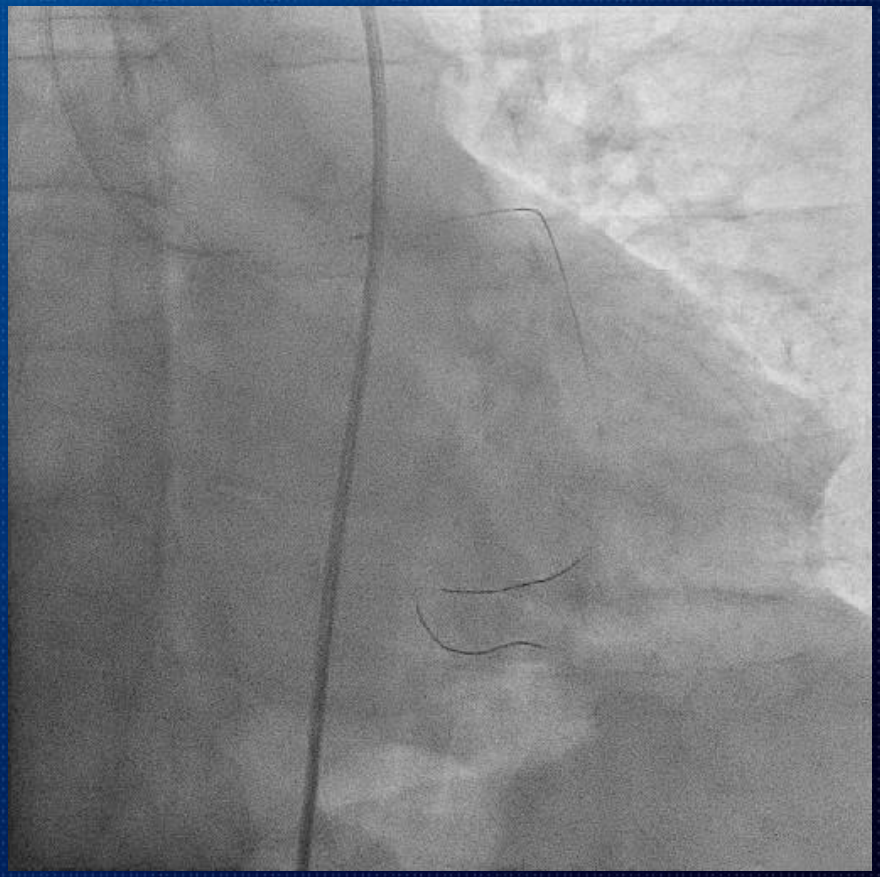
LAD after BA

DS = 51.8%, MLD = 1.6mm, QFR = 0.75

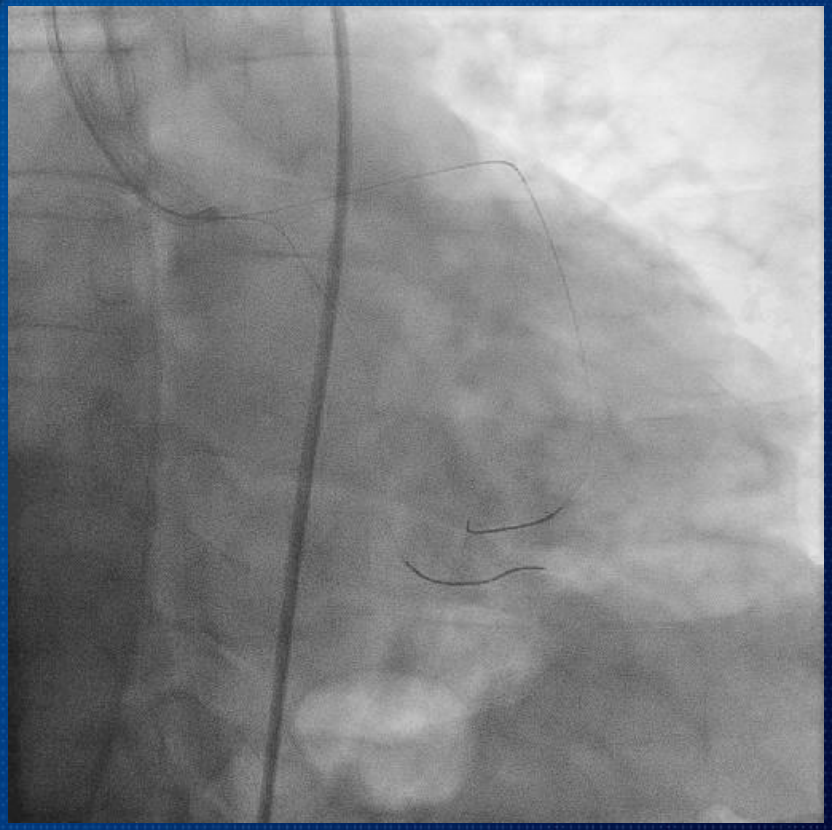


DCB Treatment

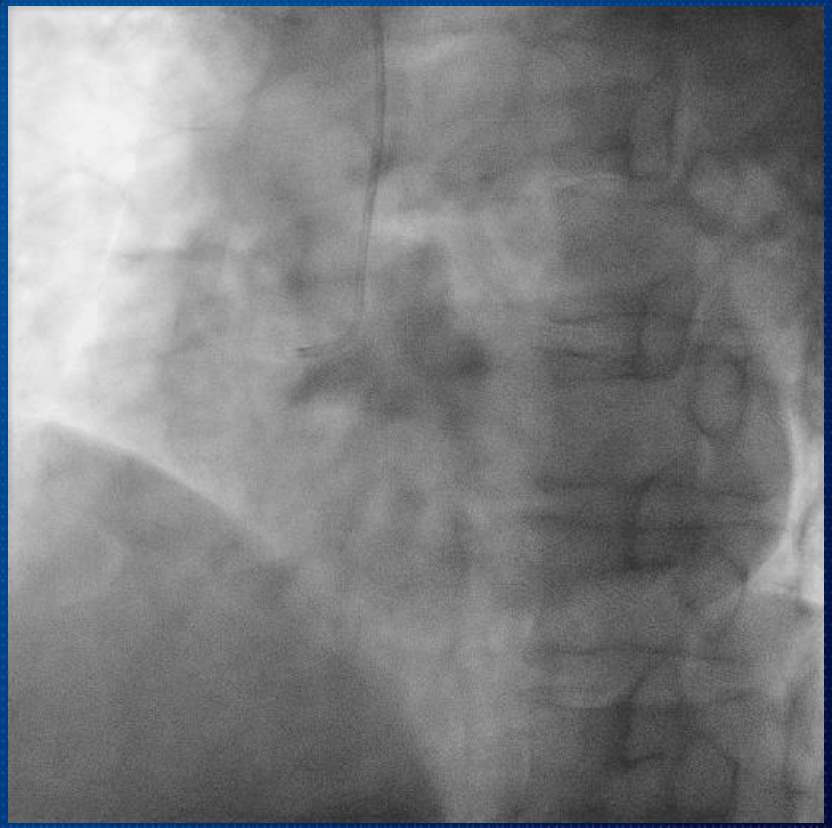
SeQuent please 3.5x20mm

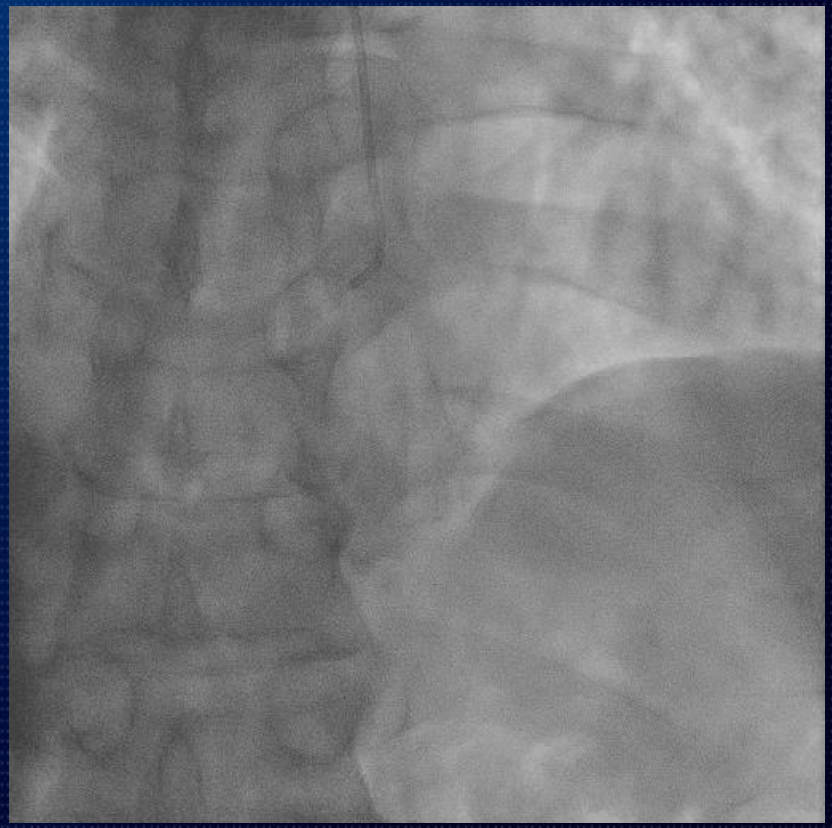


After DCB Treatment



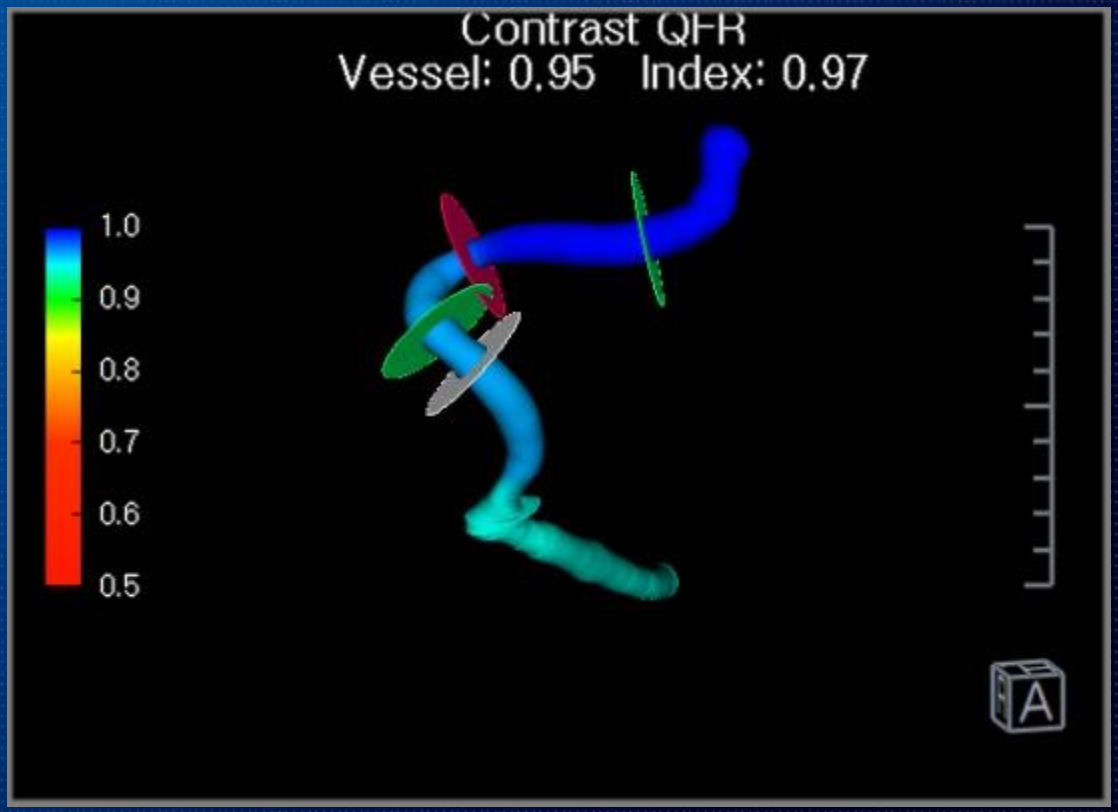
After 6 Months



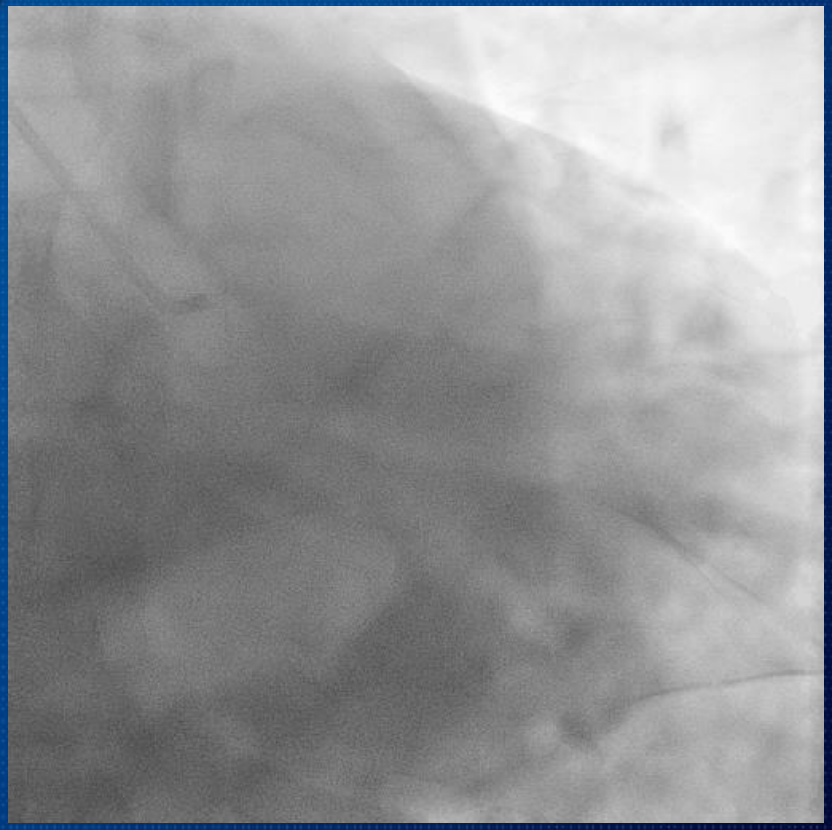


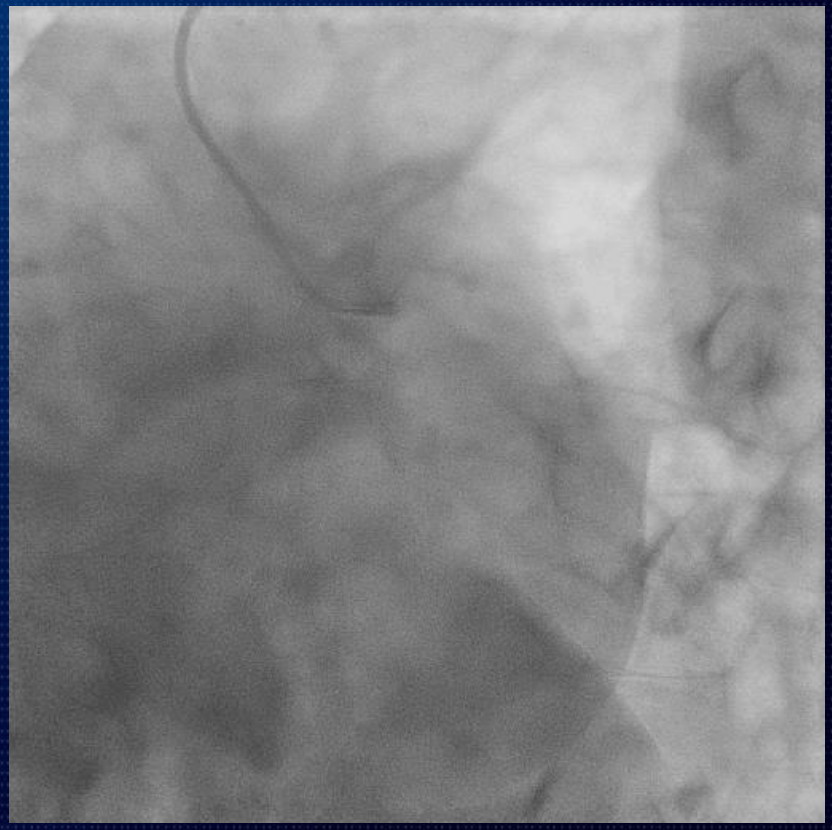
RCA at 6 months

DS = 35.6%, MLD = 2.0mm, QFR = 0.95



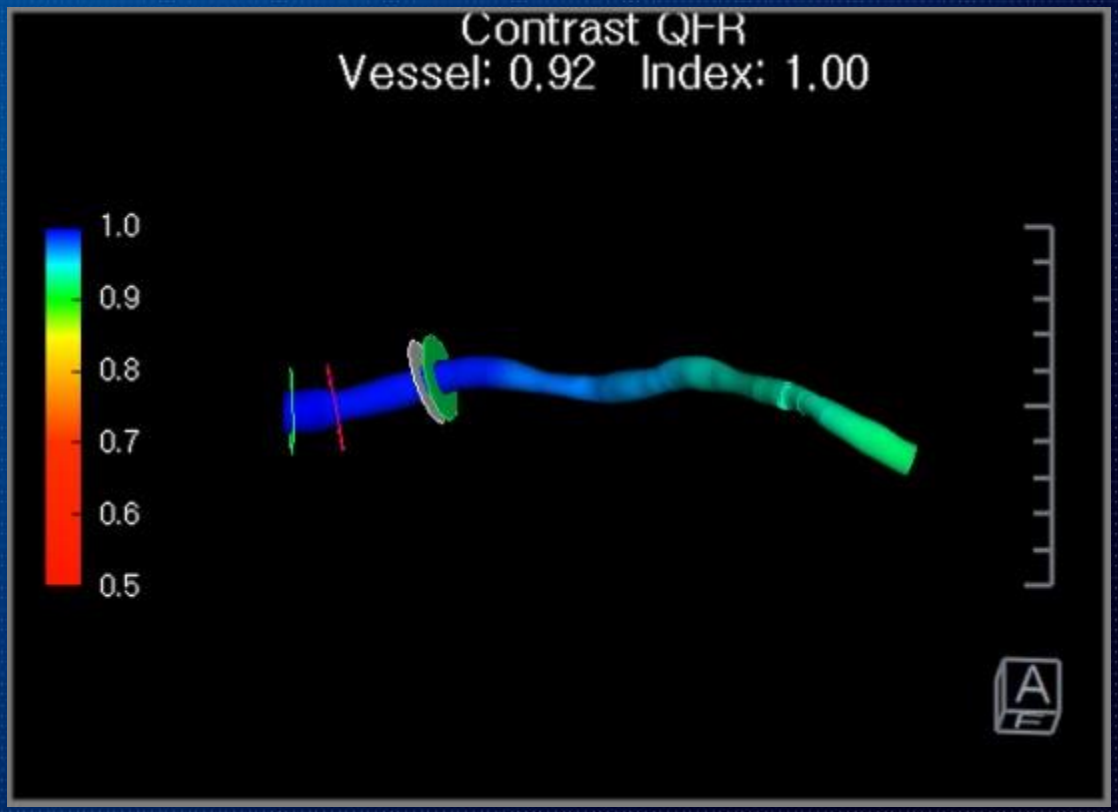
After 6 Months



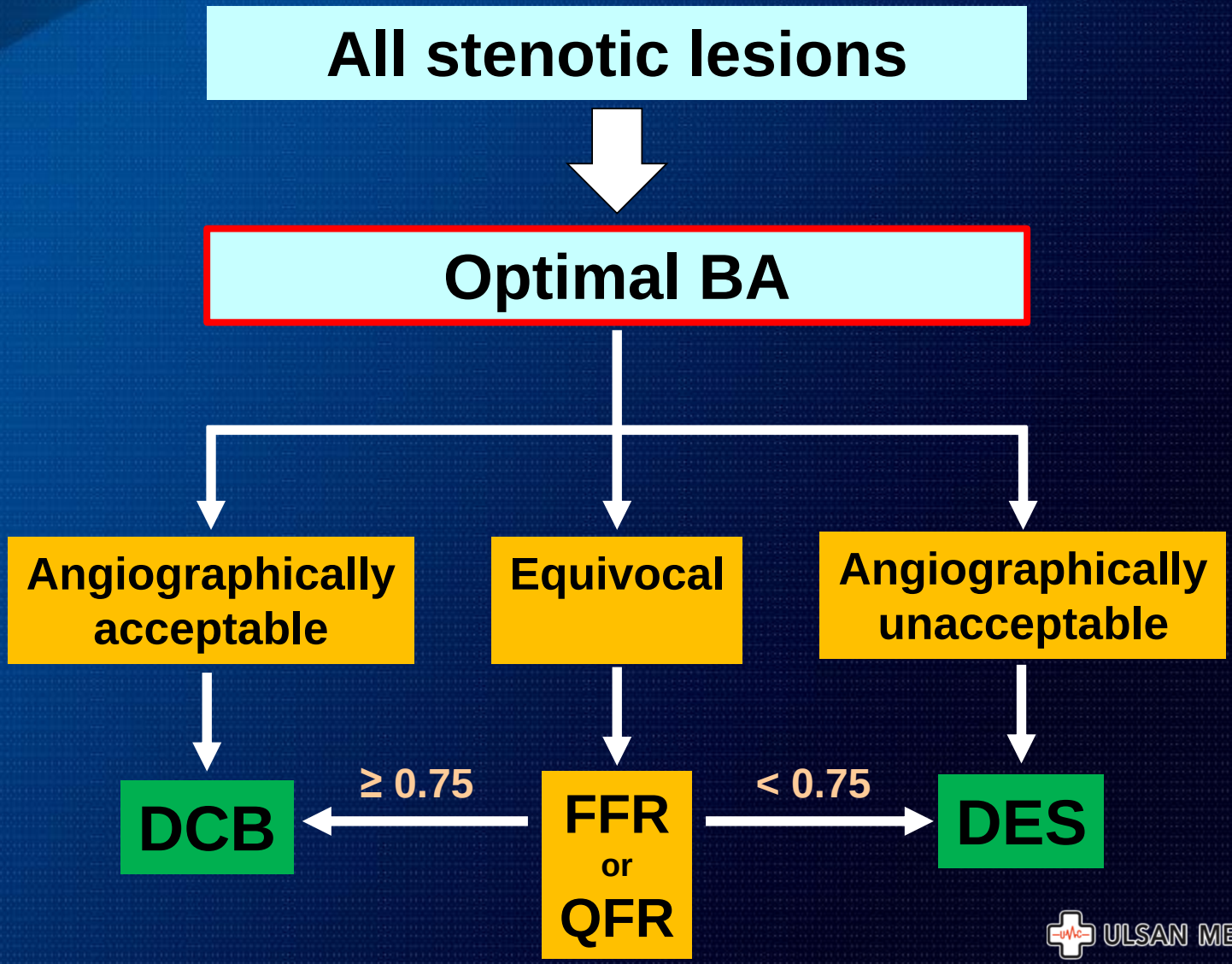


LAD after 6 months

DS = 20.8%, MLD = 2.7mm, QFR = 0.92



Provisional DCB strategy for de novo lesions



Take Home Messages

1. Optimal balloon angioplasty is the major value to achieve successful DCB treatment.

2. FFR-guided DCB treatment is safe and have a good efficacy in de novo major epicardial coronary artery disease, esp. LAD lesions

3. Luminal gain and flow after DCB treatment is sustained without restenosis or any adverse clinical outcomes.

4. There are high mismatch between angiographic lesion characteristics and FFR values after balloon angioplasty.

5. **Provisional DCB strategy guided by FFR after BA** shows a new option in coronary interventions on de novo lesions.


Let’s go to the next revolution!