How should I treat?

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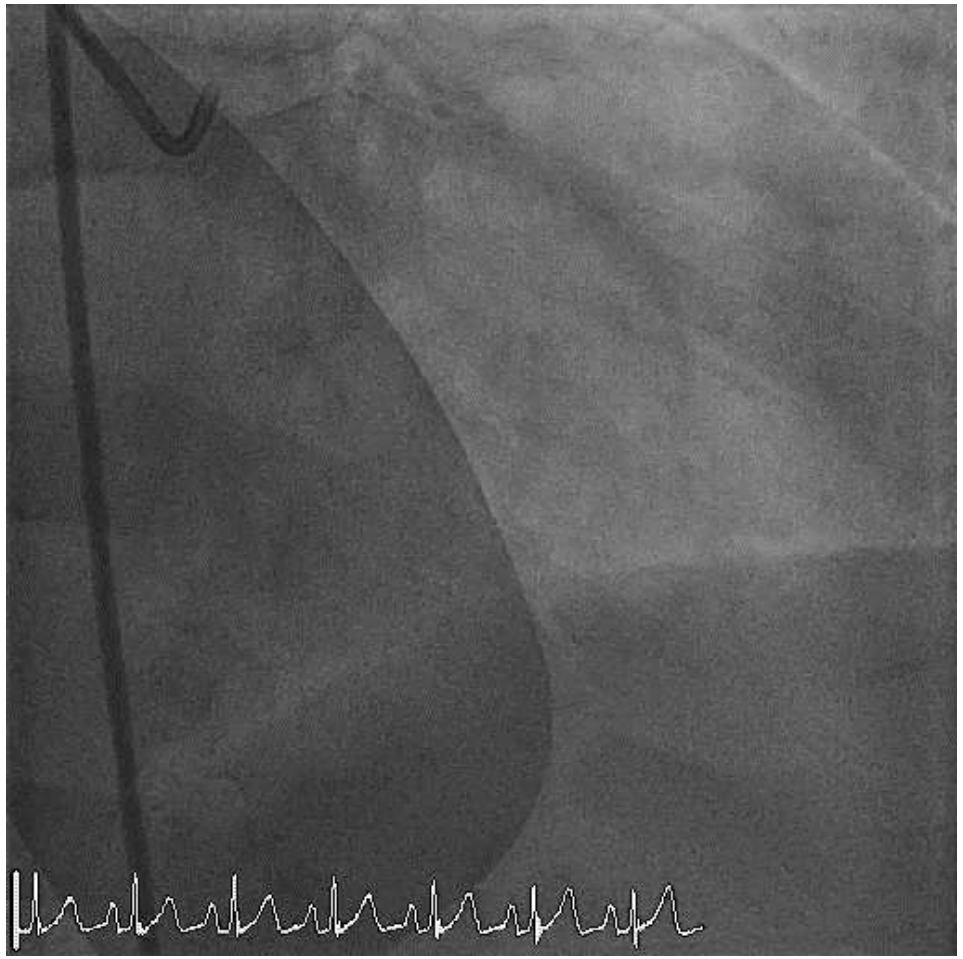
Thammasat University, Thammasat University Hospital

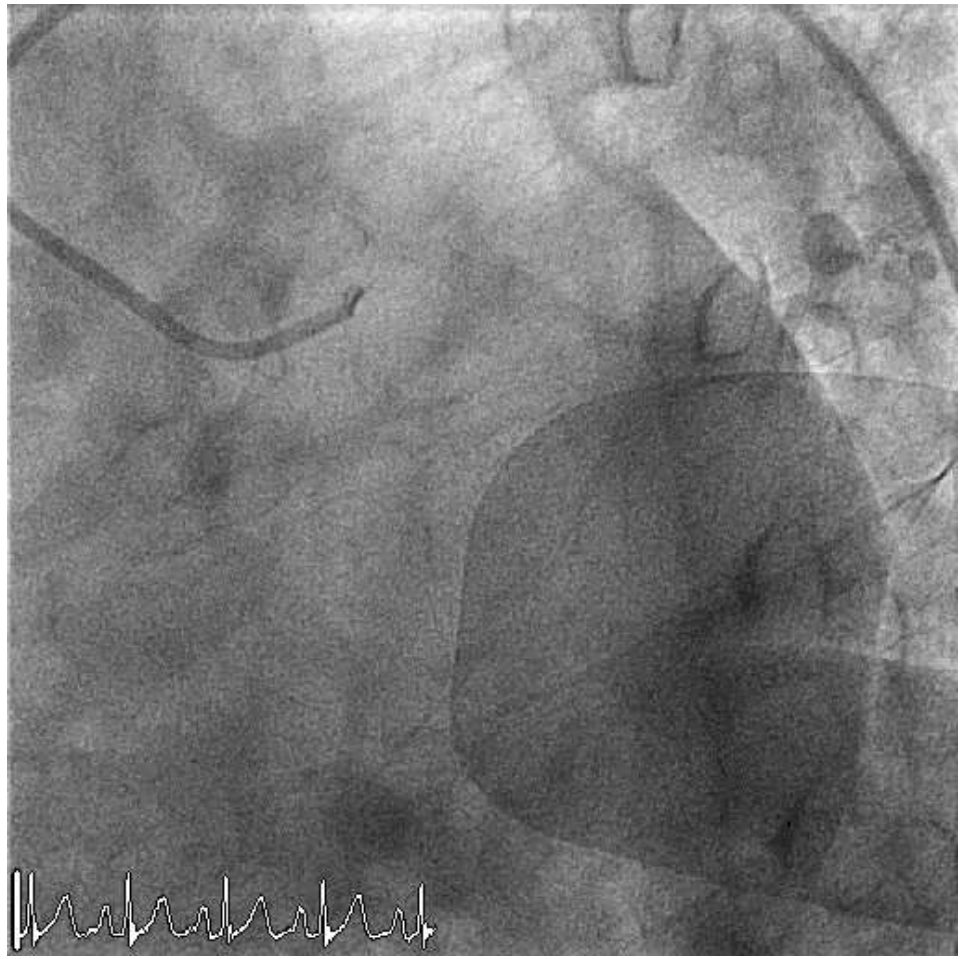
- 37 years old man
- Underlying disease: Gout, RA, ESRD on dialysis, CAD
- Present with angina off and on for 2 day
- Physical examination
- BP 124/85 mmHg, PR 100 bpm, RR 18/min
- CVS : Normal S1,S2, no S3, no murmur
- RS : Normal breath sound, no adventitious sound

Previous history of PCI 8 months prior

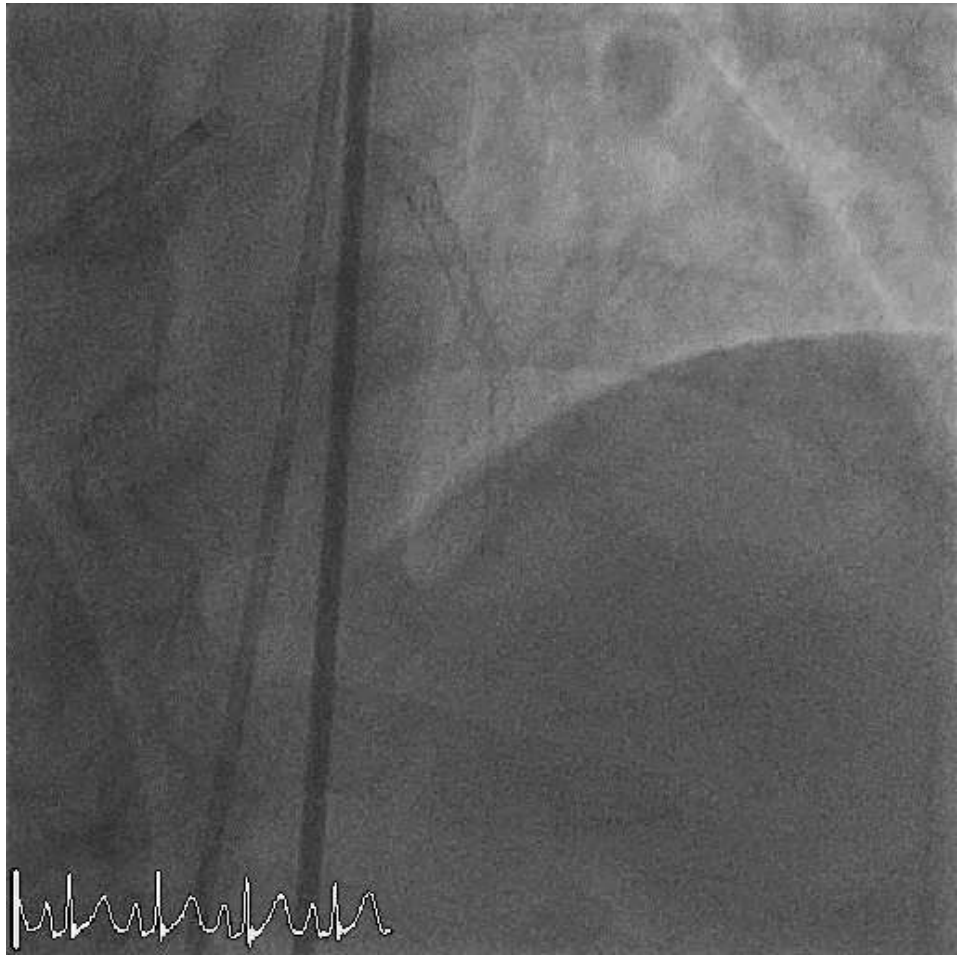
- CAG 4/2/2016
  - Right dominant
  - 50% stenosis distal LM, 90% stenosis of ostial LAD, 100% stenosis of proximal to mid LAD
  - 40% stenosis of mid RCA
- PCI
  - PCI with 3 DES(sirolimus DES) at LAD to distal LM(2.25x24 mm at mid LAD, 2.79x19 mm at proximal LAD, 3.5x13 mm at proximal LAD to mid LM)

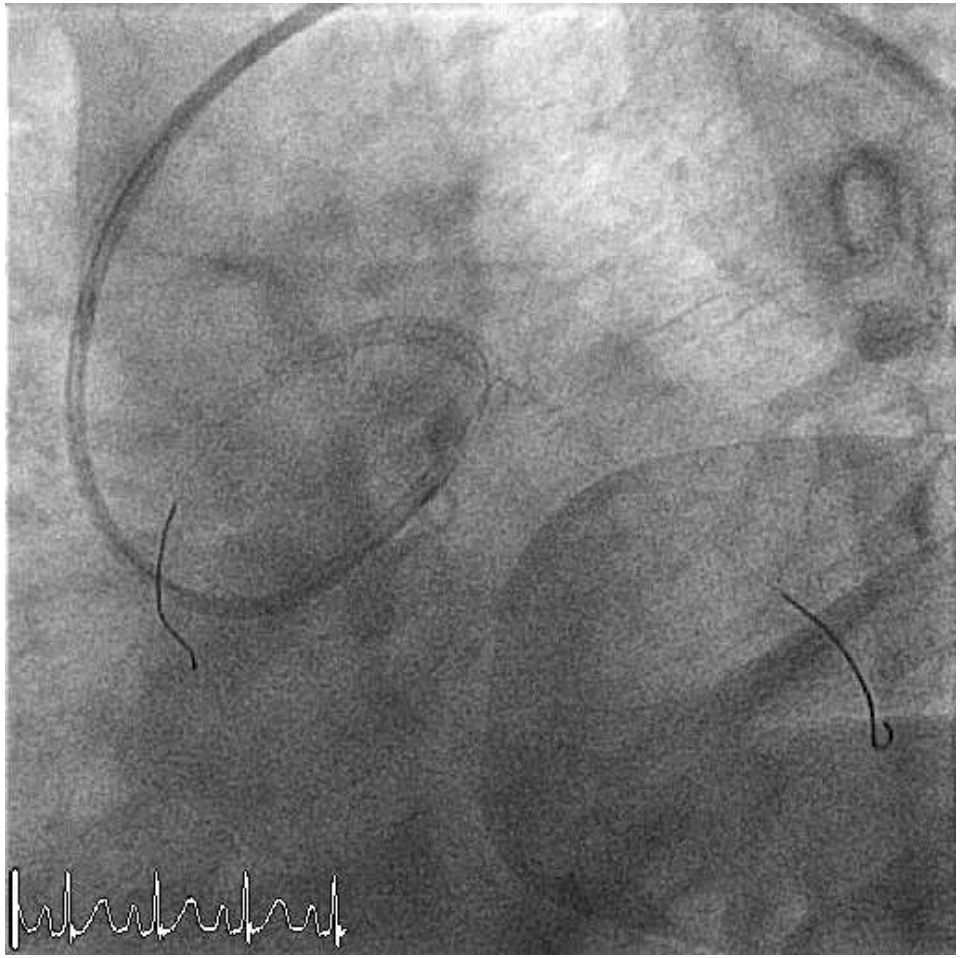
First CAG LCA before intervention



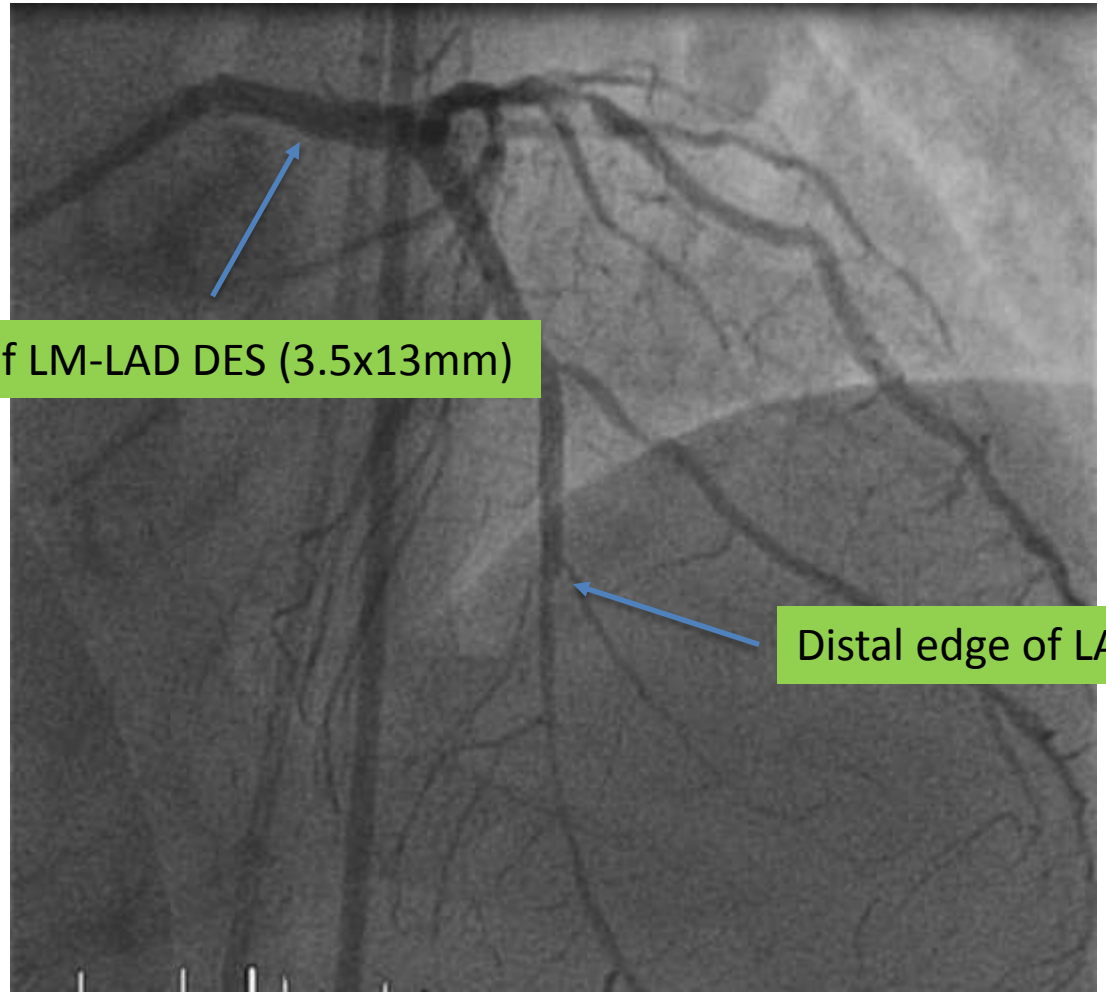


Final CAG





Final CAG


Proximal edge of LM-LAD DES (3.5x13mm)
Distal edge of LAD DES (2.25x24mm, 2.75x19mm)

- ECG : as shown
- TTE : Normal LV systolic function; LVEF 55%, no RWMAs, Diastolic dysfunction grade 1
- Cardiac enzyme rising
- Dx : NSTEACS

ECG

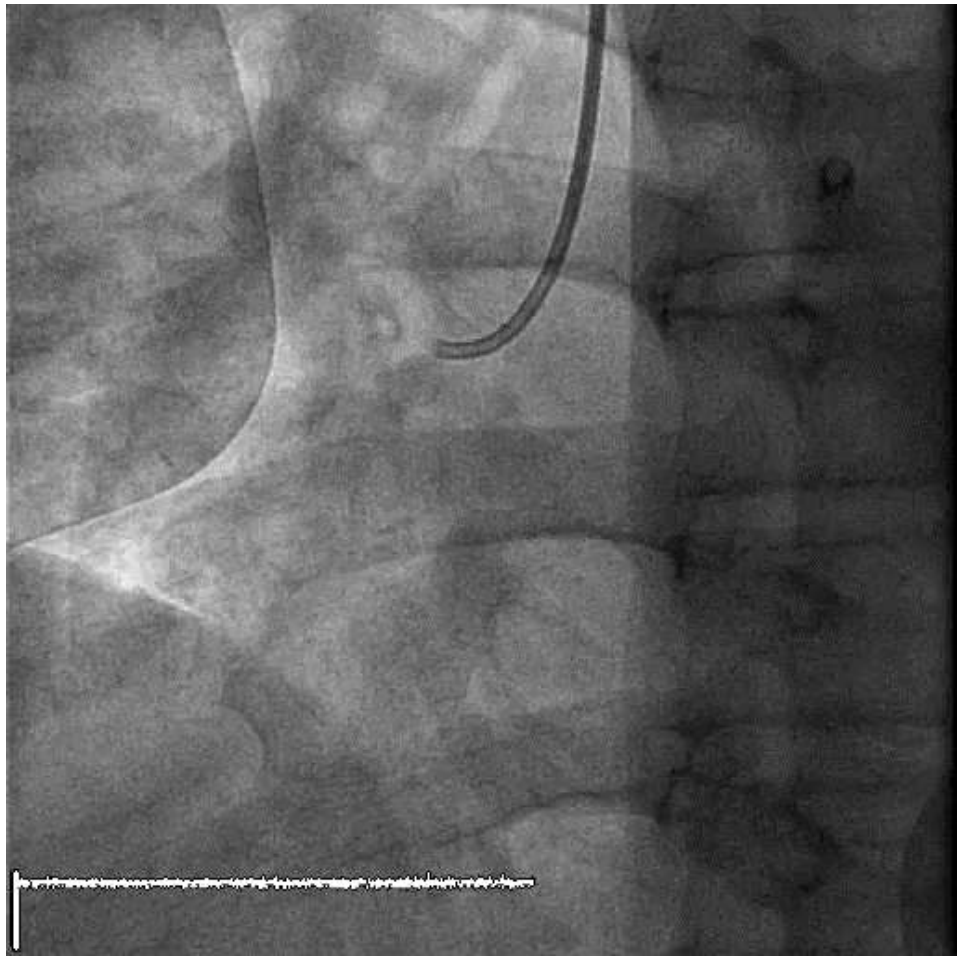

ID:
Name:
Sex:Male
Birth Date:
Symptoms:
10 mm/mV 25 mm/s Filter: H50 d 35
Medication:
cm kg mmHg 98 bpm
History:
10 mm/mV
26-Oct-2016 12:30
I
II
III
aVR
aVL
aVF
V1
V2
V3
V4
V5
V6
1350K 05-05 03-05 Dept.:
Exam:

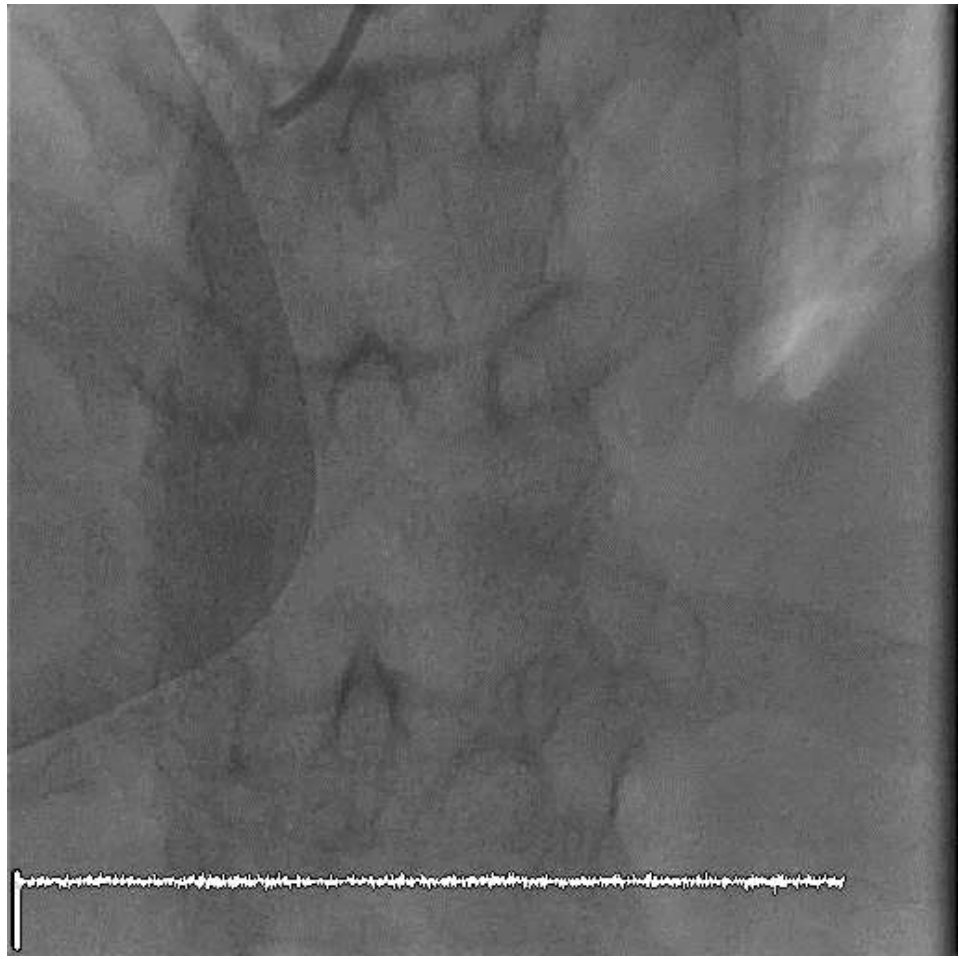
Current medication

- ASA 81 mg/d
- Clopidogrel 75 mg/d
- Rosuvastatin 40 mg/d
- Enalapril 5 mg/d
- Carverdilol 6.25 mg/d

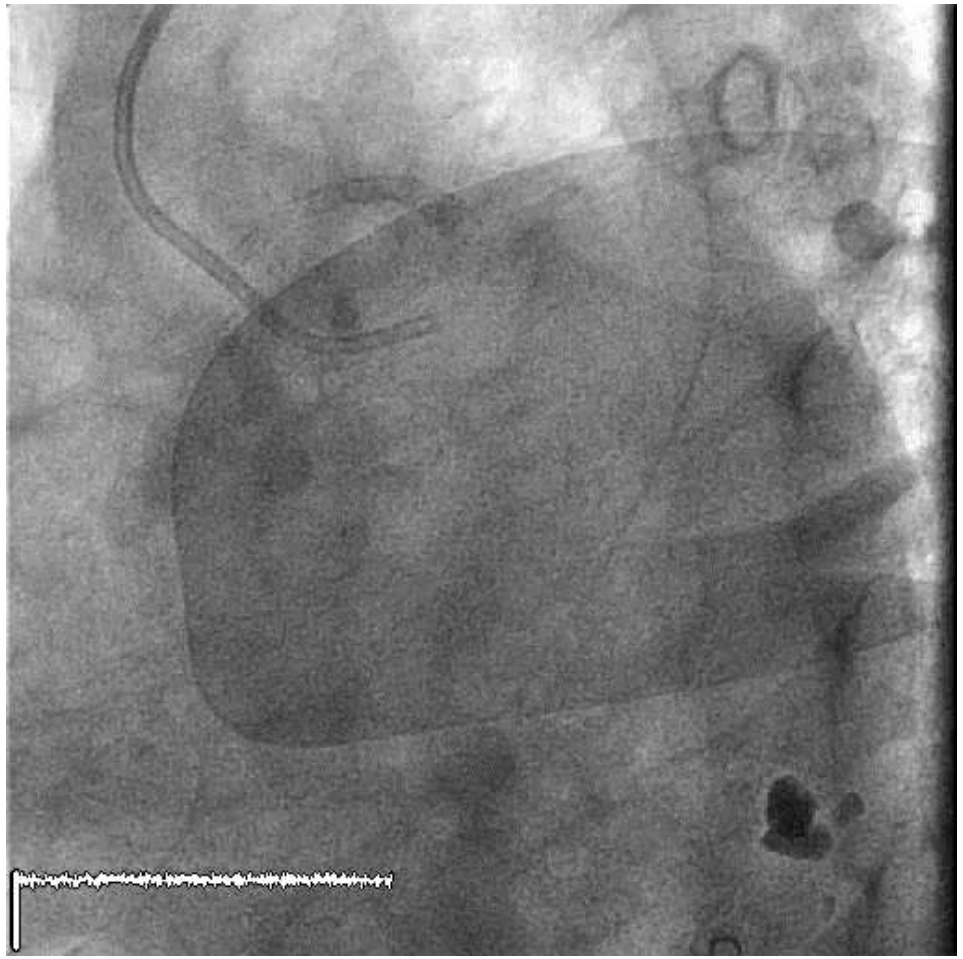
THIS ADMISSION CAG

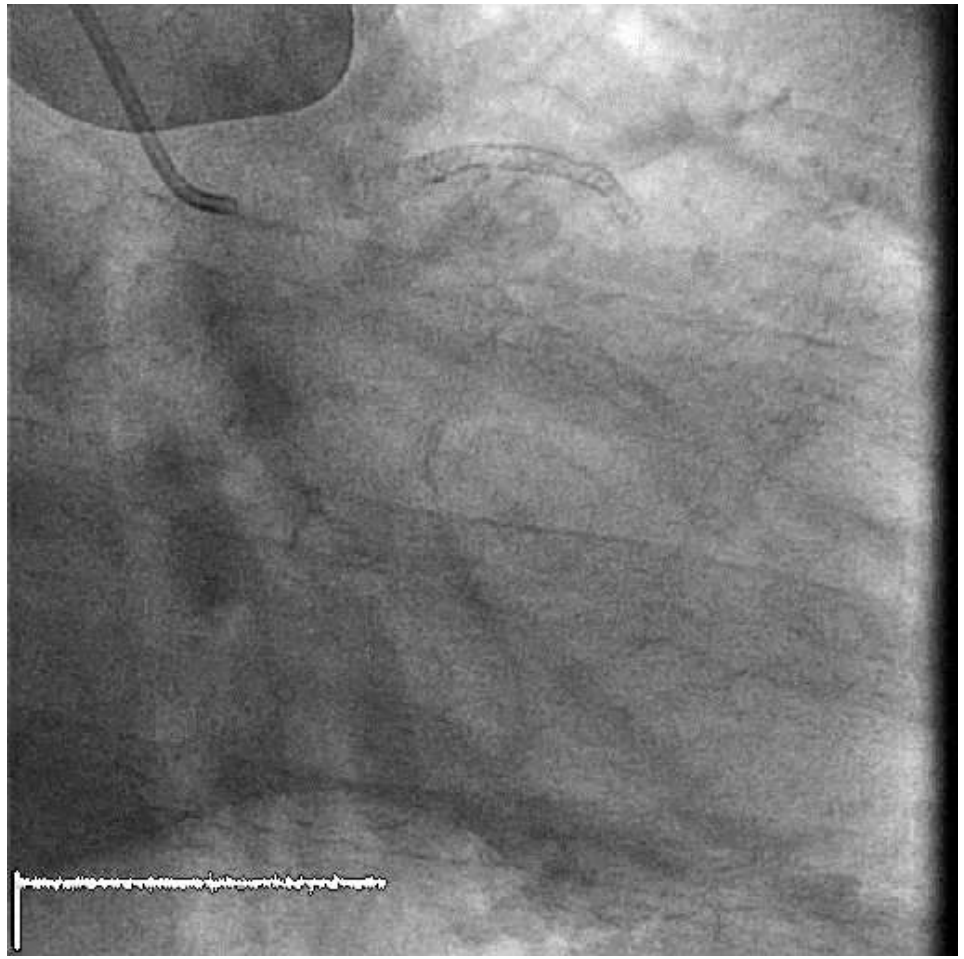
RCA



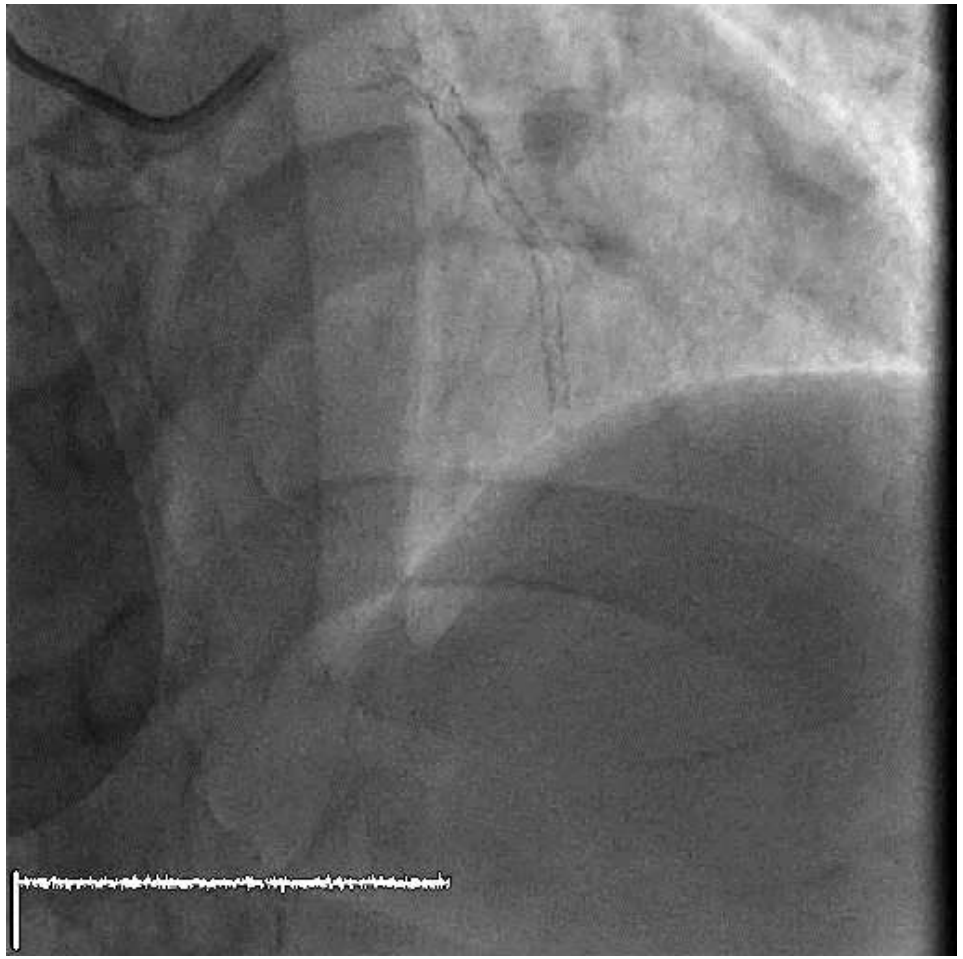


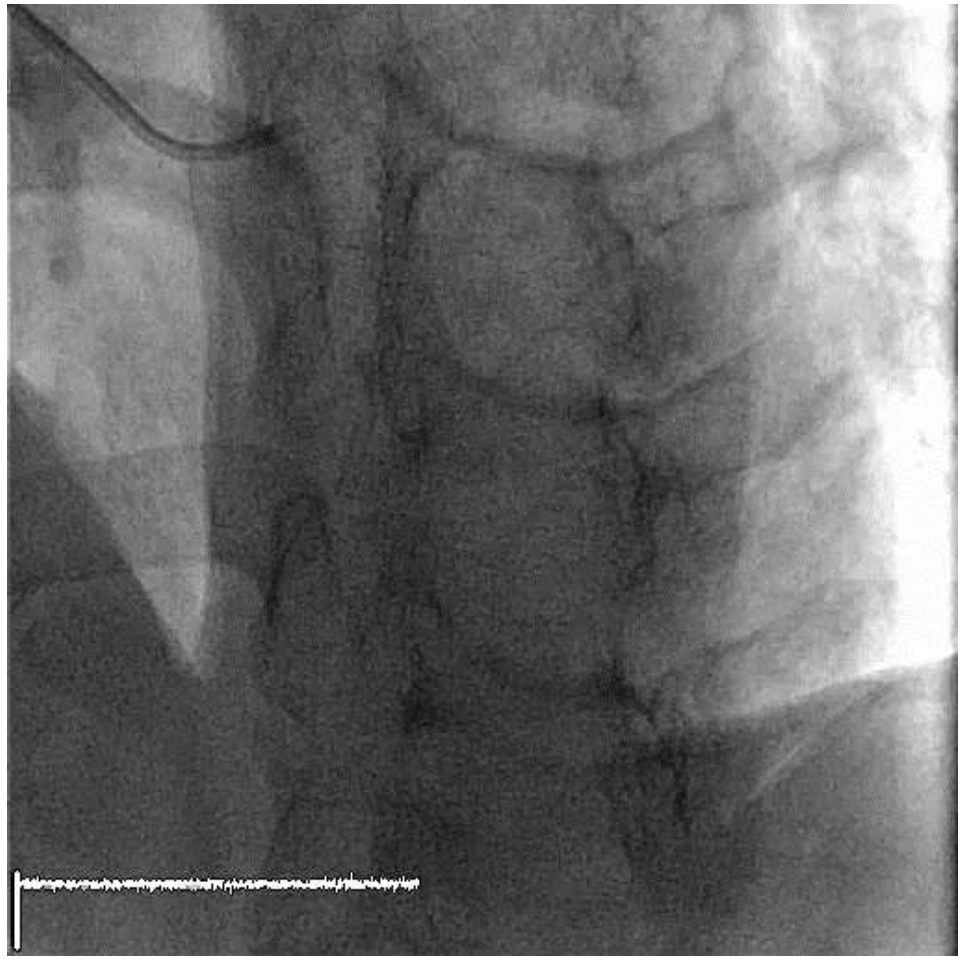
LCA





LCA





HOW DID I TREAT?

What should we concern first?

- Possible lesion that we will encounter with…
  - New lesion at either LCX or RCA
  - ISR of LM
  - ISR of LAD
- Access site
  - Femoral route
  - Radial route
  - Ulnar route

Culprit lesion from ECG and CAG -> LM-LAD

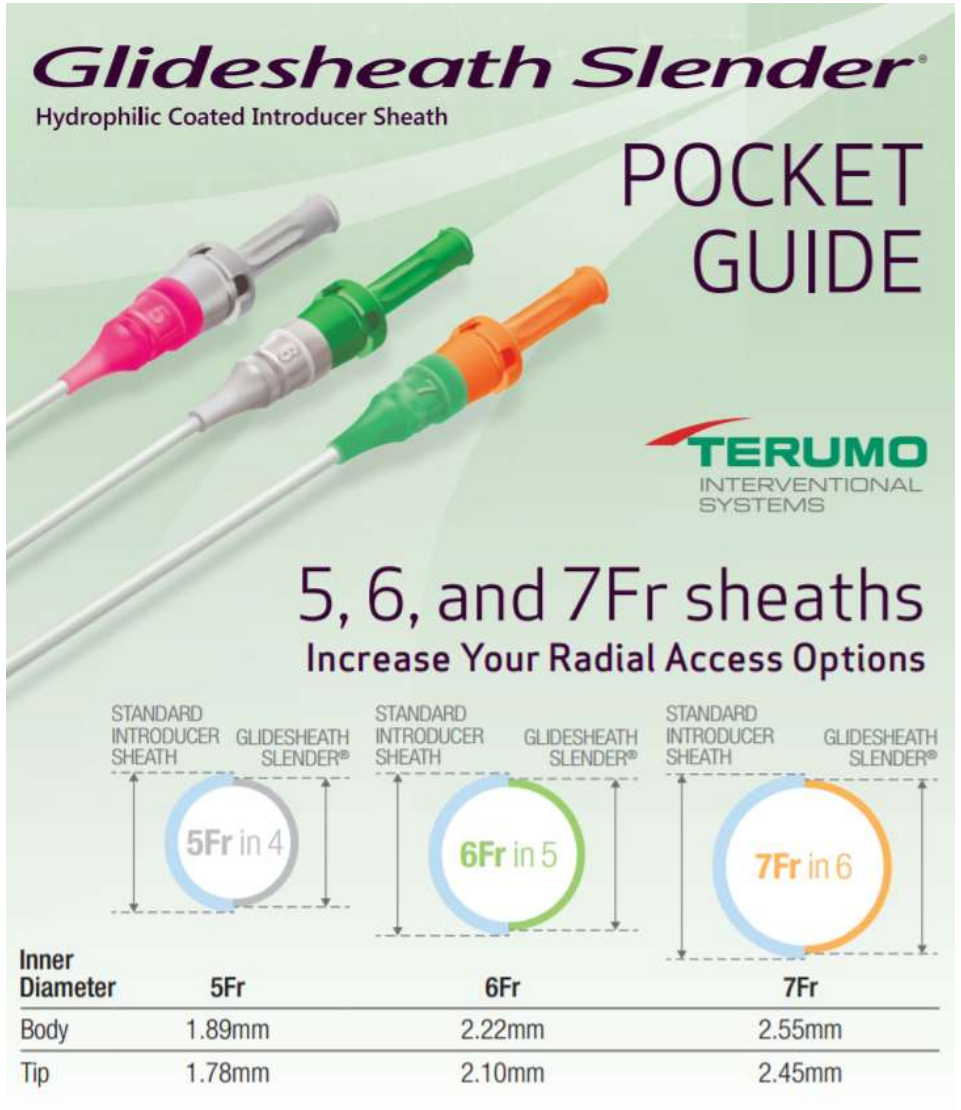
Access site

	TFA	TRI	TUI
Access site bleeding risk	Highest	Lowest	Lower
Large bore catheter	Suitable	Limitation	May be limitation
Spasm	None	More	Less

In this case, we make decision to proceed with TUI

7 Fr Glidesheath Slender, 7 Fr EBU 3.5 guiding catheter

Add on benefit of TUI : Safe radial a. for dialysis route

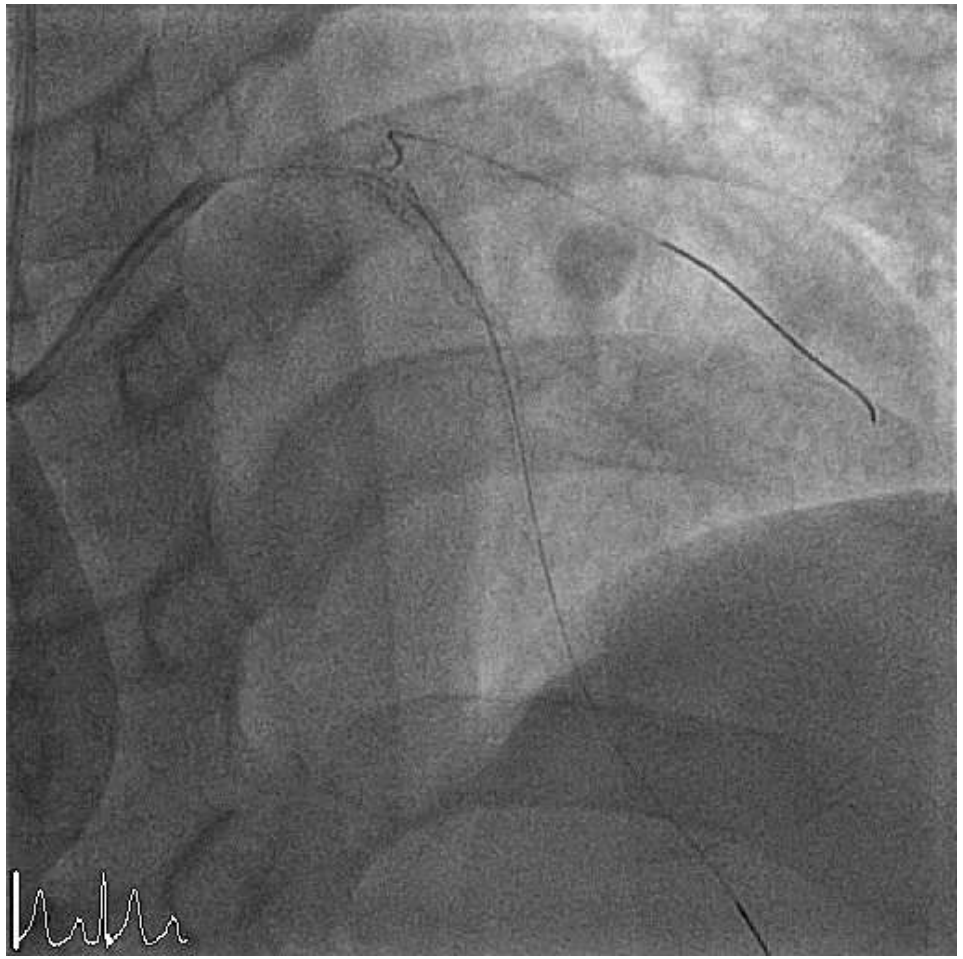


OUTER DIAMETER COMPARISON CHART[3]

SHEATHS	4Fr	5Fr	6Fr	7Fr
GLIDESHEATH SLENDER®	–	2.13mm	2.46mm	2.79mm
GLIDESHEATH™	1.98mm	2.29mm	2.62mm	–
MERIT® PRELUDEEASE™	2.07mm	2.38mm	2.66mm	–
VASC VSI RADIAL™	2.16mm	2.58mm	2.74mm	–
CORDIS® AVANTI®	–	2.38mm	2.67mm	–
ARROW® TRANSRADIAL	–	2.35mm	2.80mm	–

References: 1. Patel's Atlas of Transradial Intervention, *The Basics and Beyond.* © 2012 by Tejas Patel, pages 8-17. **2.** Rao SV, Tremmel JA, Gilchrist IC, et al. Best practices for transradial angiography and intervention: a consensus statement from the Society for Cardiovascular Angiography and interventions' transradial working group. *Catheter Cardiovasc Interv.* 2014;83:228-236. **3.** Data on file.

Wiring to LAD and LCX

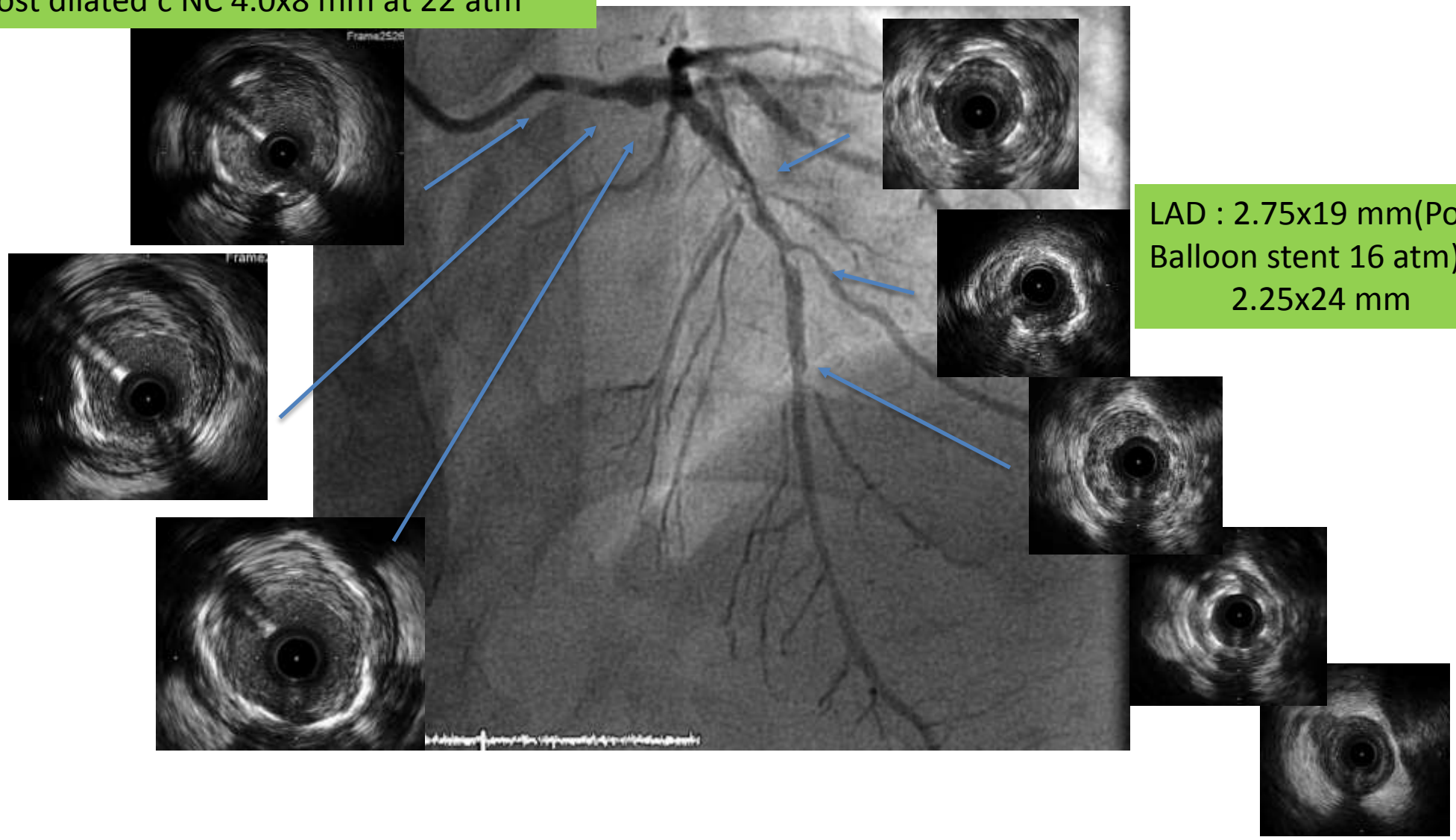


- Plan :
  - Check IVUS at focal ISR at mid LAD
  - If Type I focal -> POBA
  - LM lesion check IVUS for expansion of previous stent

  - Add DES to LM and TAP at LCX(Due to plaque progression at LCX)
  - Final KBI at LM-LAD-LCX

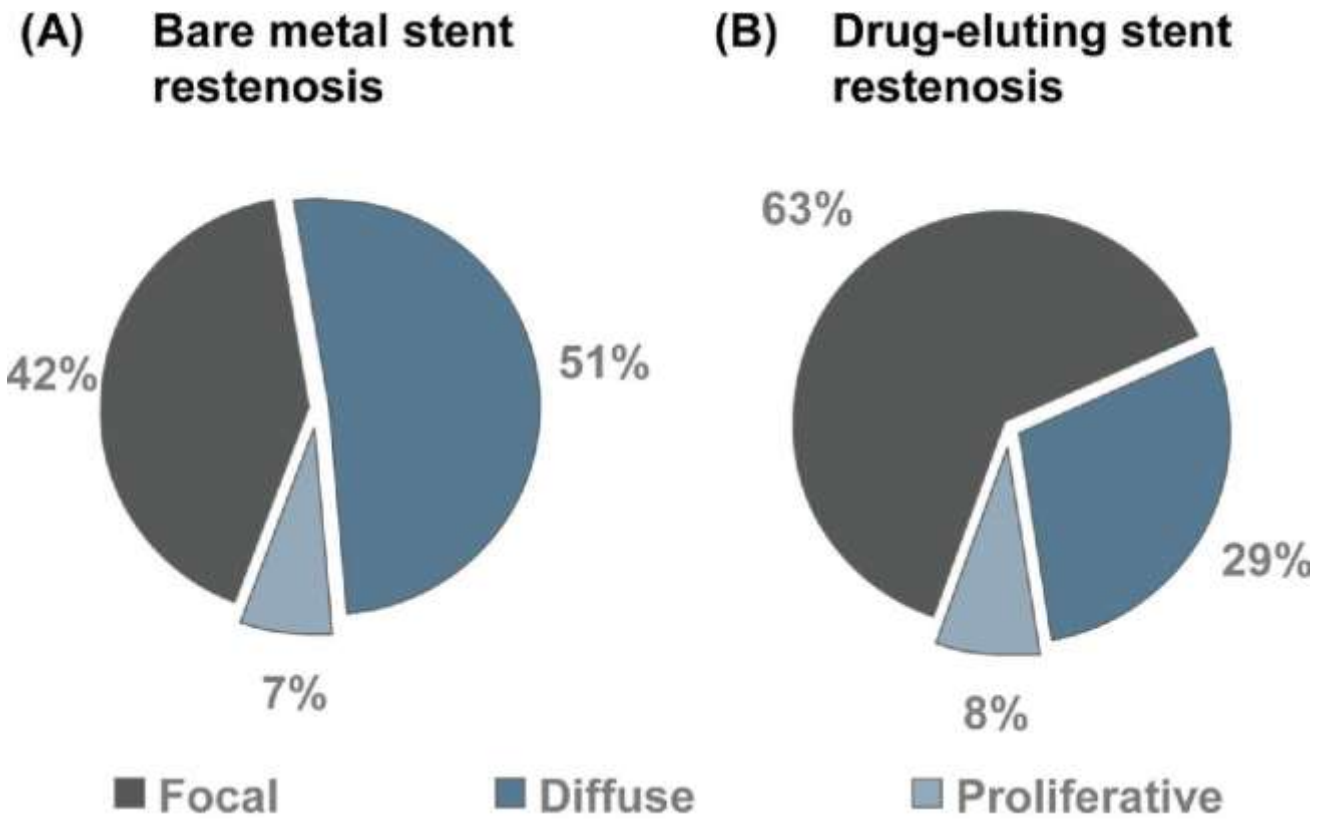
IVUS

LM : Sirolimus biodegradable DES 3.5x13 mm
Post dilated c NC 4.0x8 mm at 22 atm



LAD : 2.75x19 mm(Post dilated c Balloon stent 16 atm)
2.25x24 mm

Distribution of Morphological Patterns of Restenosis After BMS & DES



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Clinical and angiographic predictors of TLR and DES

Table 3
Clinical and angiographic predictors of 1-Year TLR, adjusted for procedure date and DES use.

	TLR predictor	Hazard ratio	95% CI	*p*-Value
Clinical model	Age (per 10 y)	0.821	0.751–0.898	<0.0001
	Male sex	0.736	0.596–0.908	0.0043
	Diabetes	1.414	1.153–1.733	0.0009
	Prior PCI	1.591	1.299–1.950	<0.0001
	Prior CABG	1.576	1.254–1.982	<0.0001
Angiographic model	SVG location	2.404	1.778–3.251	<0.0001
	In-stent restenosis lesion	2.200	1.636–2.958	<0.0001
	Stent length (per 10 mm)	1.081	1.034–1.129	0.0005
	Minimum stent diameter	0.519	0.410–0.656	<0.0001

CABG = coronary artery bypass graft surgery, PCI = percutaneous coronary intervention, SVG = saphenous vein graft, TLR = target lesion revascularization.

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Table 4 Predictors of ISR or TLR After DES Implantation

Patient Characteristics	Lesion Characteristics	Procedural Characteristics
Age	ISR	Treatment of multiple lesions
Female sex	Bypass graft	Type of DES
Diabetes mellitus	Chronic total occlusion	Final diameter stenosis
Multivessel coronary artery disease	Small vessels	
	Calcified lesion	
	Ostial lesion	
	Left anterior descending coronary artery lesion	

DES = drug-eluting stent(s); ISR = in-stent restenosis; TLR = target lesion revascularization.

Possible Mechanisms of Restenosis After Drug-Eluting Stenting

- **Biological-related factors**
  - Drug resistance
  - Hypersensitivity
- **Mechanical-related factors**
  - Stent underexpansion
  - Nonuniform stent strut distribution
  - Stent fracture
  - Overdilatation of undersized stent
  - Nonuniform drug deposition
  - Polymer peeling
- **Technical-related factors**
  - Barotrauma outside the stented segment
  - Stent gap
  - Residual uncovered atherosclerotic plaques

JACC Vol. 56, No. 23, 2010:1897–907

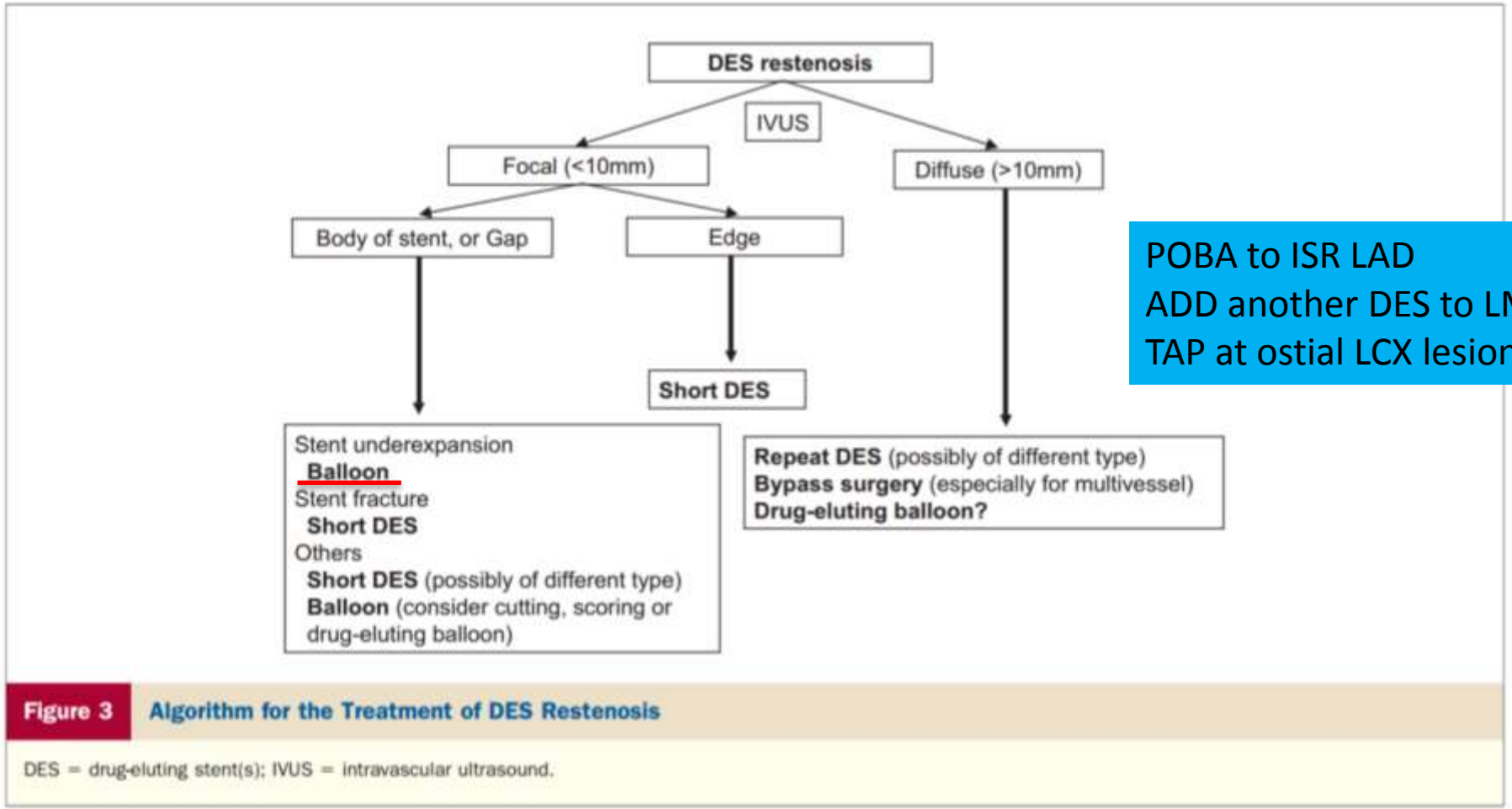


Figure 3 **Algorithm for the Treatment of DES Restenosis**

DES = drug-eluting stent(s); IVUS = intravascular ultrasound.

POBA to ISR LAD
ADD another DES to LM
TAP at ostial LCX lesion

JACC Vol. 56, No. 23, 2010:1897–907

Catheterization and Cardiovascular Interventions 87:1080–1091 (2016)

Management of Drug Eluting Stent in-Stent Restenosis: A Systematic Review and Meta-Analysis

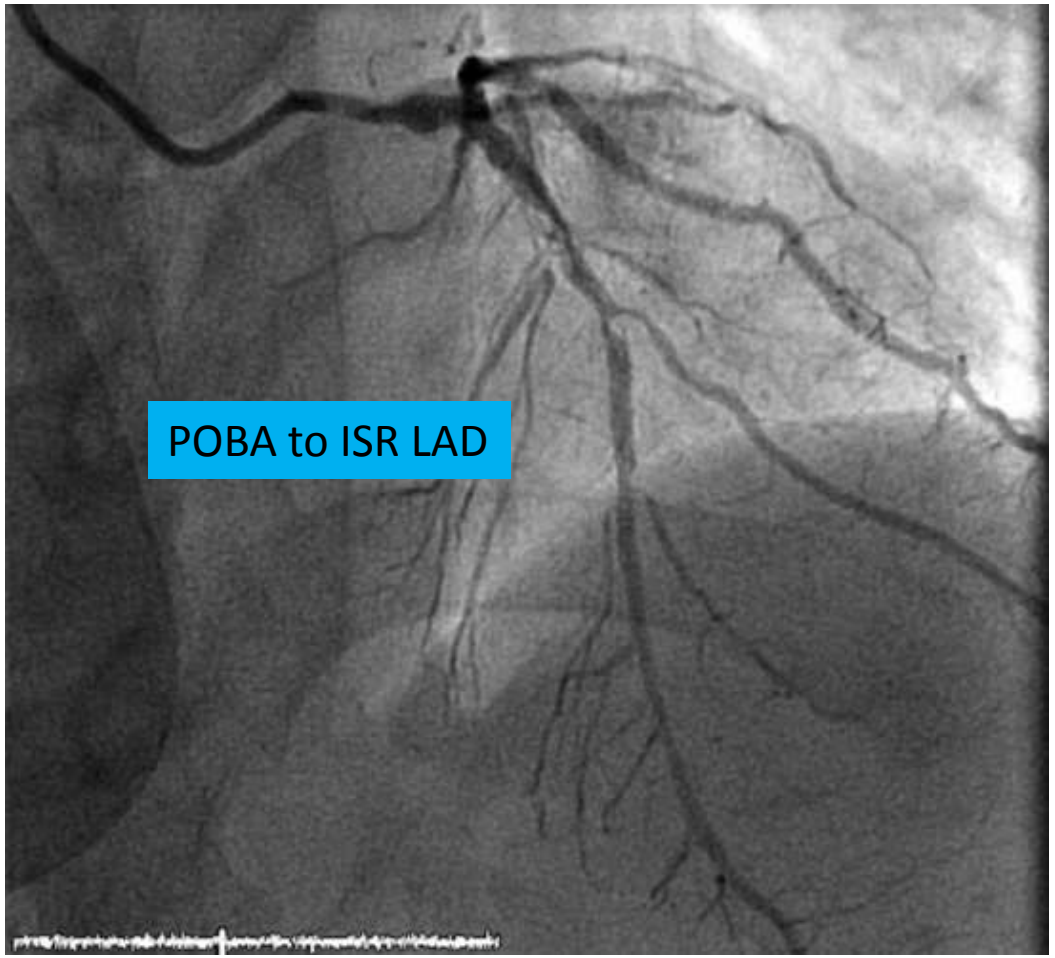
Sachin S. Goel,[1] MD, Rama Dilip Gajulapalli,[2] MD, Ganesh Athappan,[3] MD, Femi Philip,[4] MD, Supriya Gupta,[2] MD, E. Murat Tuzcu,[2] MD, Stephen G. Ellis,[2] MD, Gregory Mishkel,[1] MD, and Samir R. Kapadia,[2*] MD

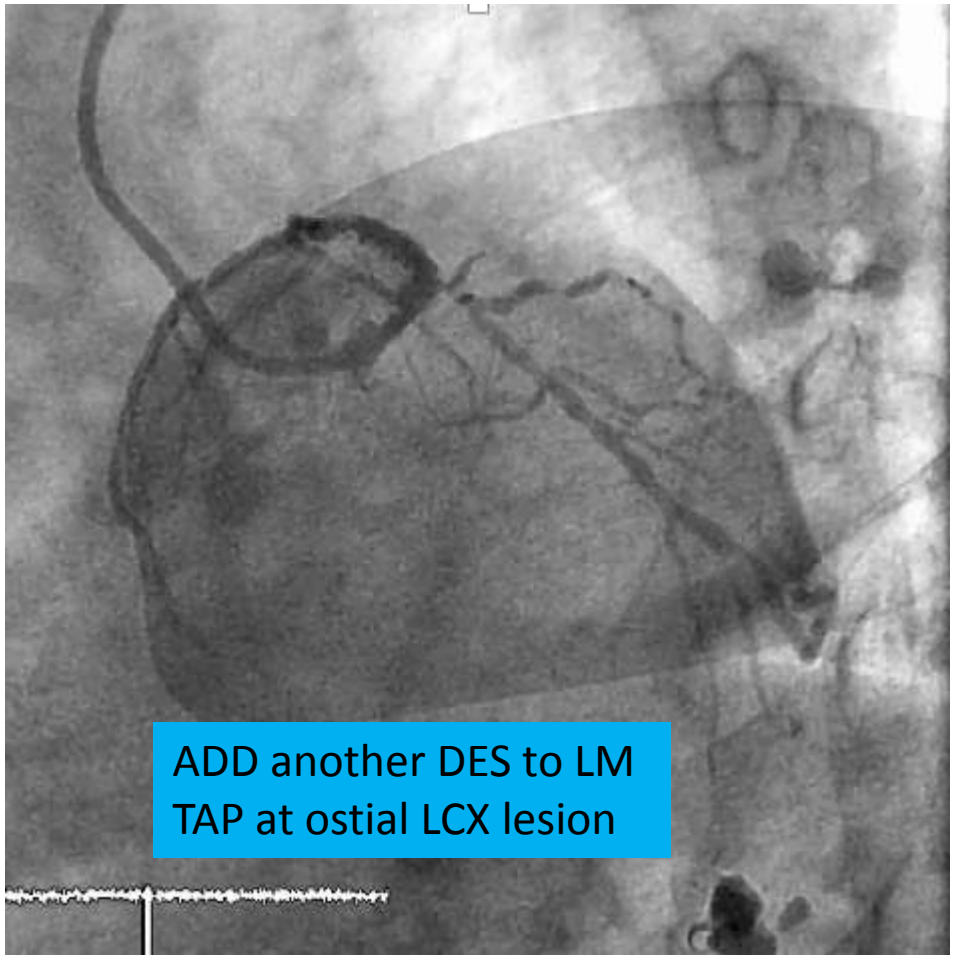
Background: The optimal management for coronary drug eluting stent in-stent restenosis (DES ISR) is unclear. We performed a meta-analysis of observational and randomized studies to compare the outcomes of management of DES ISR using DES, drug eluting balloon (DEB), or balloon angioplasty (BA). Methods: Eligible studies (25 single arm and 13 comparative, including 4 randomized studies with a total of 7,474 patients with DES ISR) were identified using MEDLINE search and proceedings of international meetings. Outcomes studied include major adverse cardiac events (MACE), target lesion revascularization (TLR), target vessel revascularization (TVR), myocardial infarction (MI), stent thrombosis (ST), and mortality. Follow-up ranged from 0.5 to 3.5 years (mean 1.4 years). Results: The rate of TLR was significantly lower in the DES (odds ratio [OR] 0.50, 95% confidence interval [CI] 0.36–0.69) and DEB (OR 0.31, 95% CI 0.18–0.55) groups compared to BA. Similarly, TVR rate was significantly lower in the DES (OR 0.55, 95% CI 0.39–0.77) and DEB (OR 0.32, 95% CI 0.18–0.58) groups compared to BA. All other outcomes were similar between the DES/BA and DEB/BA comparisons. TLR was significantly lower in the DES group compared to BA for vessels < or > 2.75 mm. Conclusion: Treatment of coronary DES ISR with DES or DEB is associated with a reduction in the risk of TLR and TVR compared to BA alone. The relative risk reduction for TLR with DES is similar to DEB. DEBs have a potential role in the treatment of DES ISR by avoiding placement of another layer of stent.

Key words: stent restenosis; stent; drug eluting; balloon; drug coated/eluting

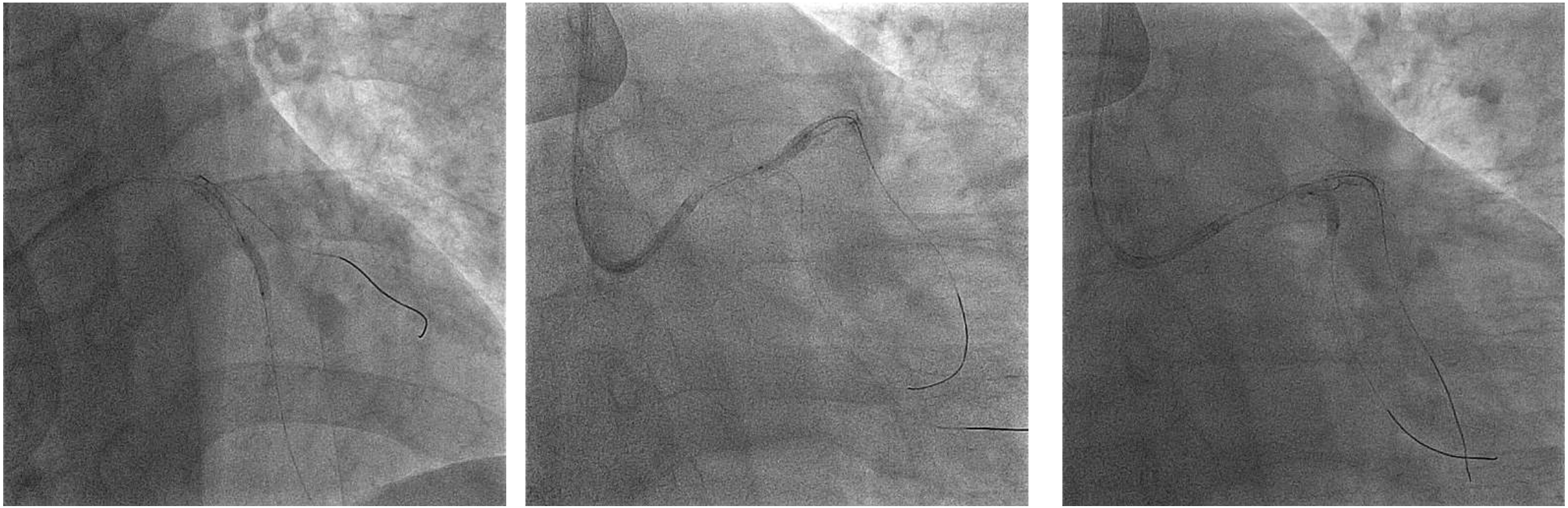
DES or DEB better than BA

DES similar to DEB


POBA to ISR LAD

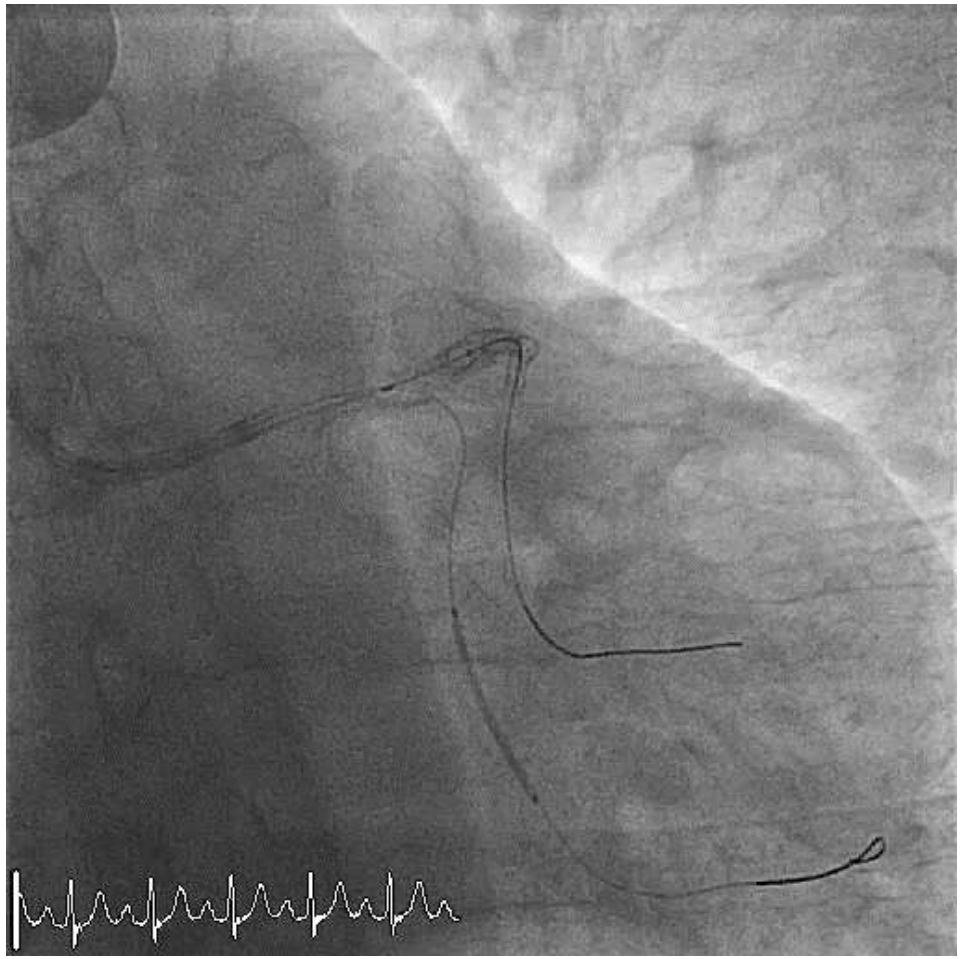

ADD another DES to LM
TAP at ostial LCX lesion

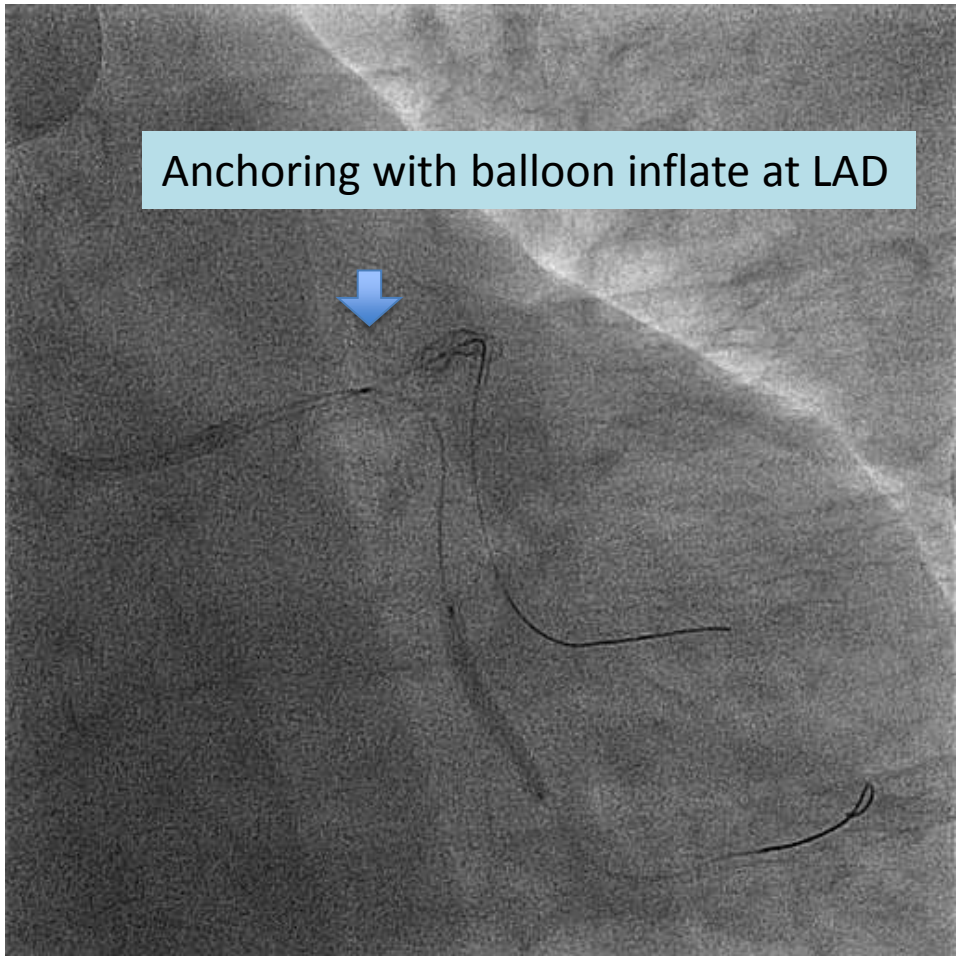
POBA LAD and LCX



NC balloon 2.5x15 mm at 18-20 atm

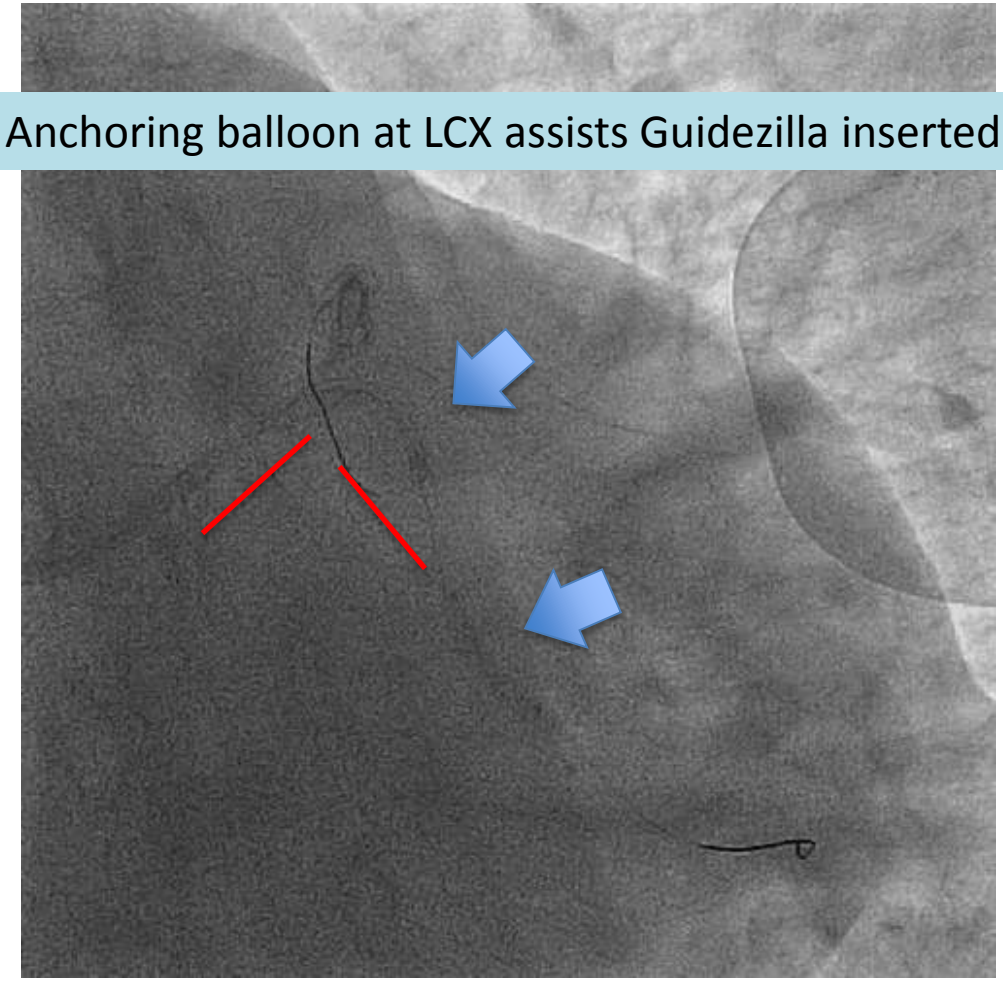
Stent LCX

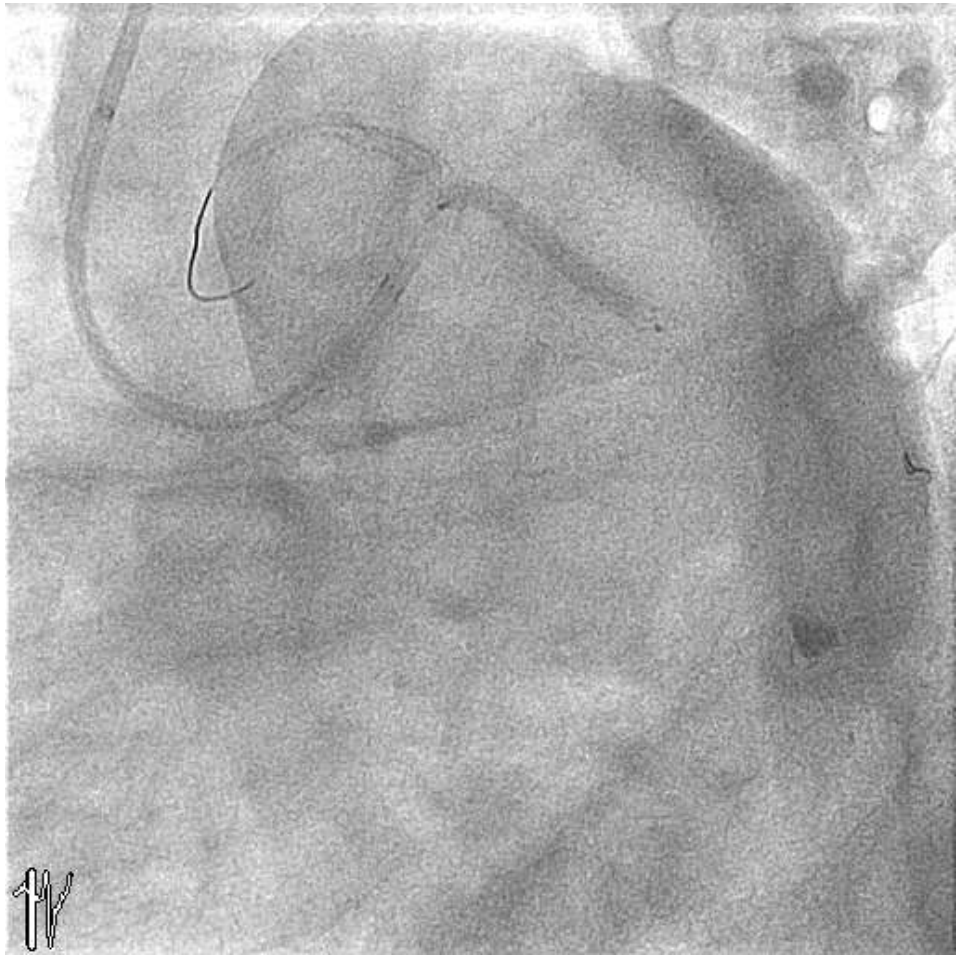




Everolimus DES 2.75x20mm at 12 atm

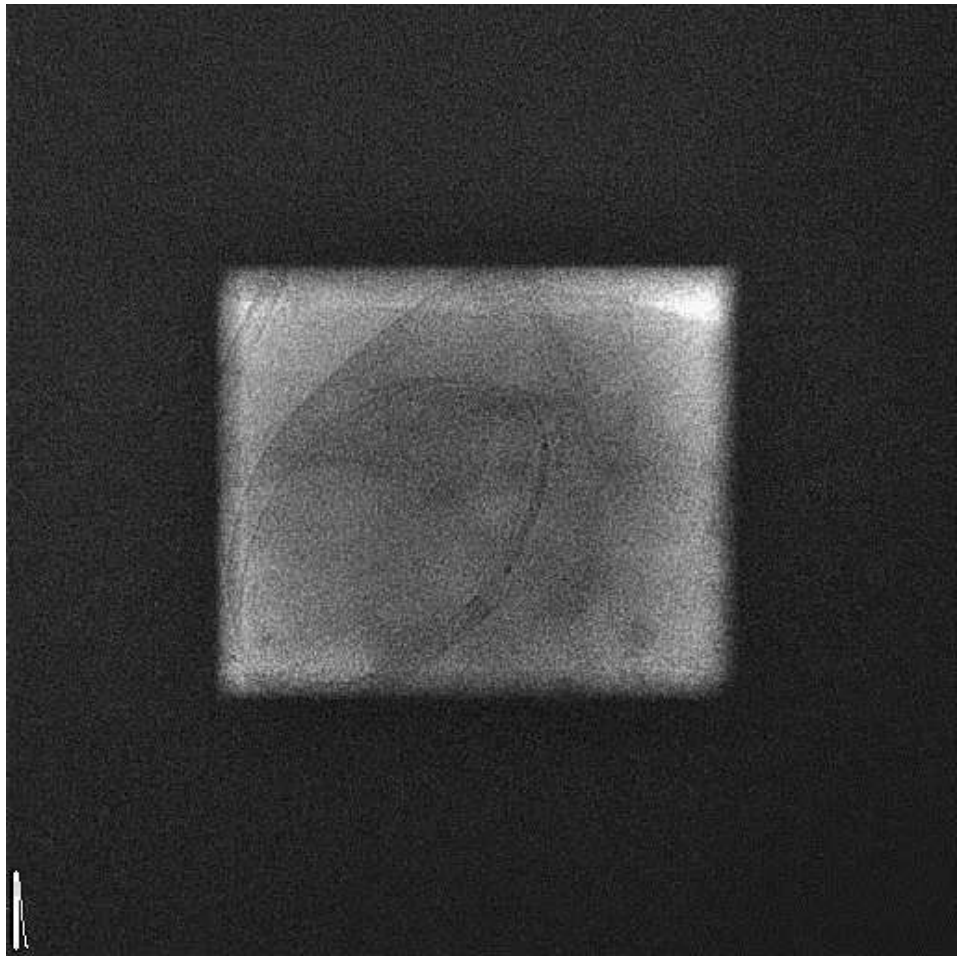
Stent ostial LCX T stent

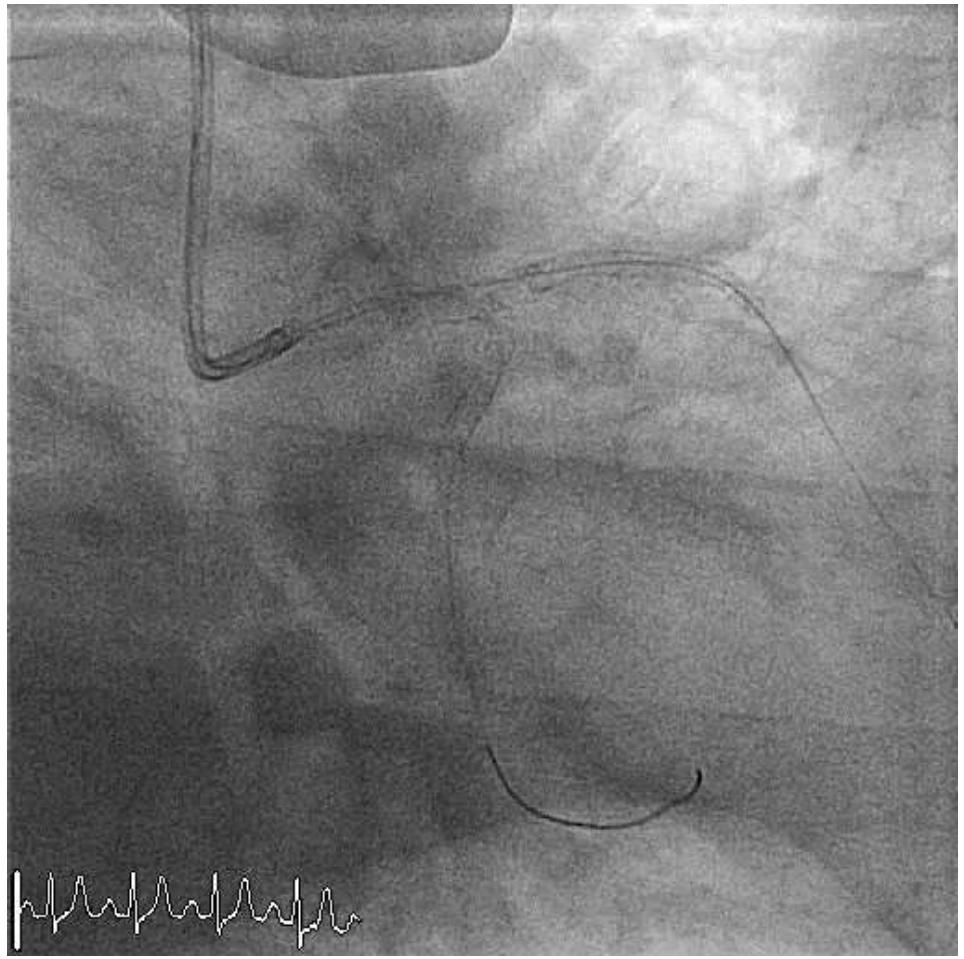




Everolimus DES 3.0x28 mm at 12-16 atm

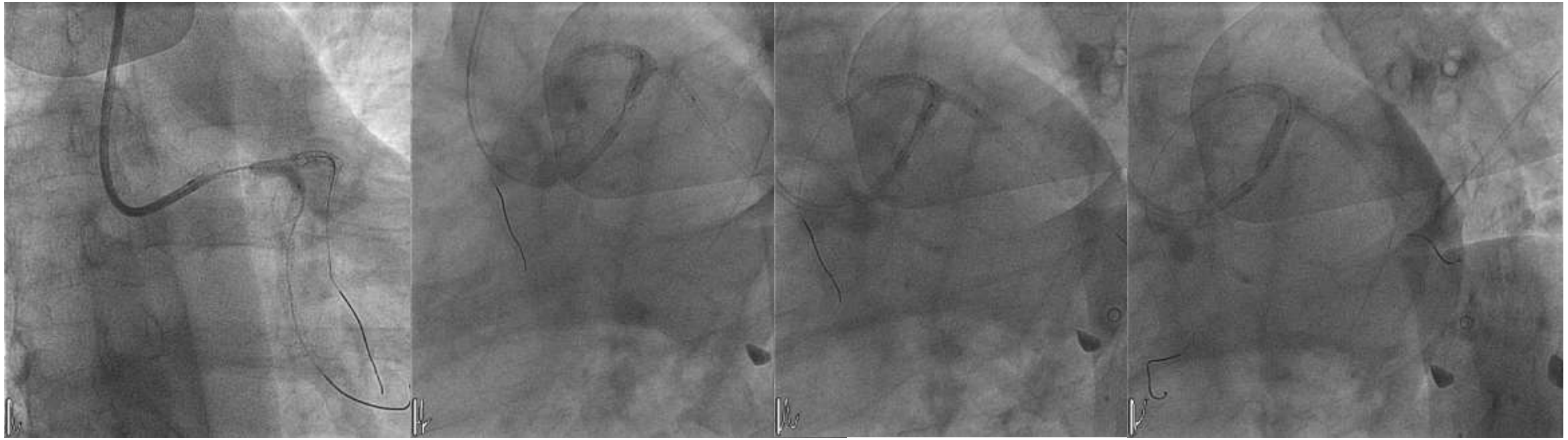
Add DES at ostial-body LM





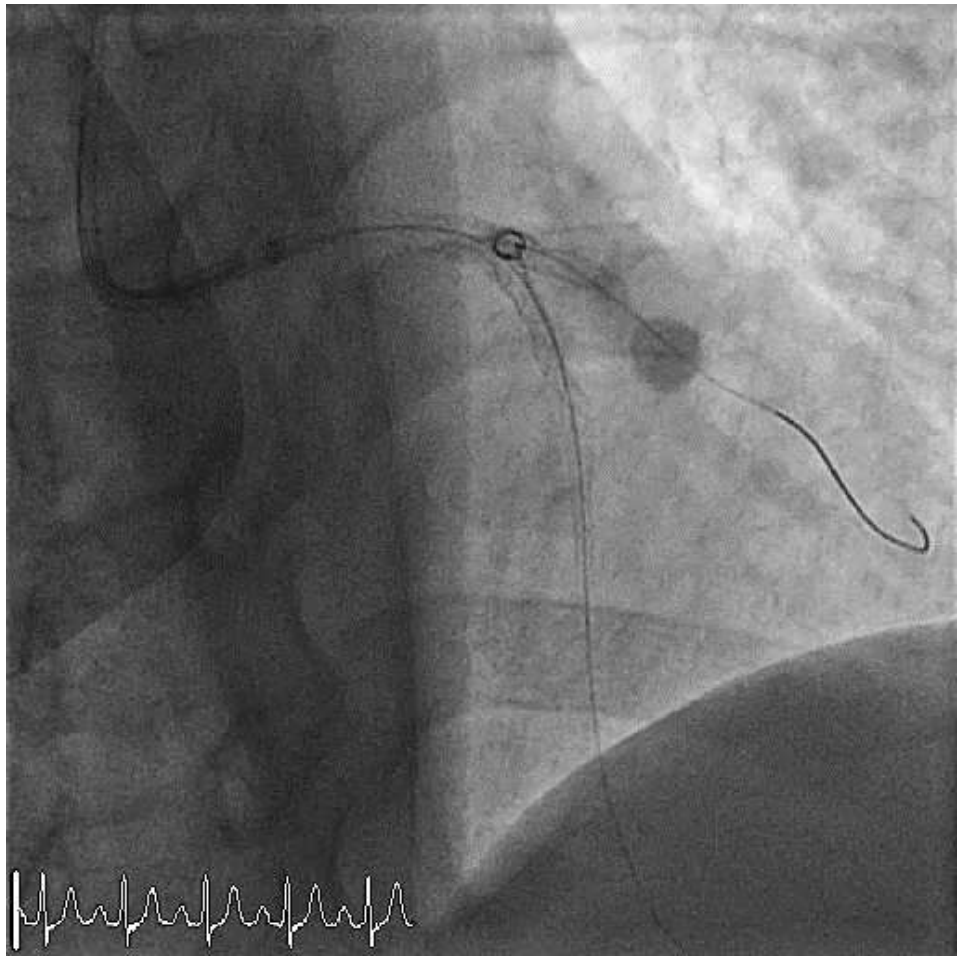
Predilated with scoring balloon 3.0x13 mm at 18-20 atm/ Everolimus DES 3.5x16 mm at 11 atm

Final kissing LM-LAD-LCX, POT LM



FKS LAD: NC balloon 4.0x15 mm, LCX: NC balloon 3.0x12 mm/ POT LM : NC balloon 4.0x15 mm at 18 atm

Final angiogram



Procedure

- Total contrast 170 ml
- Total procedure time 140 minutes
- Flu time 40 minutes
- DAP 101535 mGy cm2

- Clinical follow up at 6 months
- Patient did not develop either new chest pain or DOE.
- Medications
  - ASA 81 mg/d
  - Clopidogrel 75 mg/d
  - Rosuvastatin 40 mg/d
  - Enalapril 5 mg/d
  - Carverdilol 6.25 mg/d

Point of learning

- In DES treatment failure, the pattern of restenosis is more often focal
- Treatment
- DM, smalle[illegible]MLD are still significant

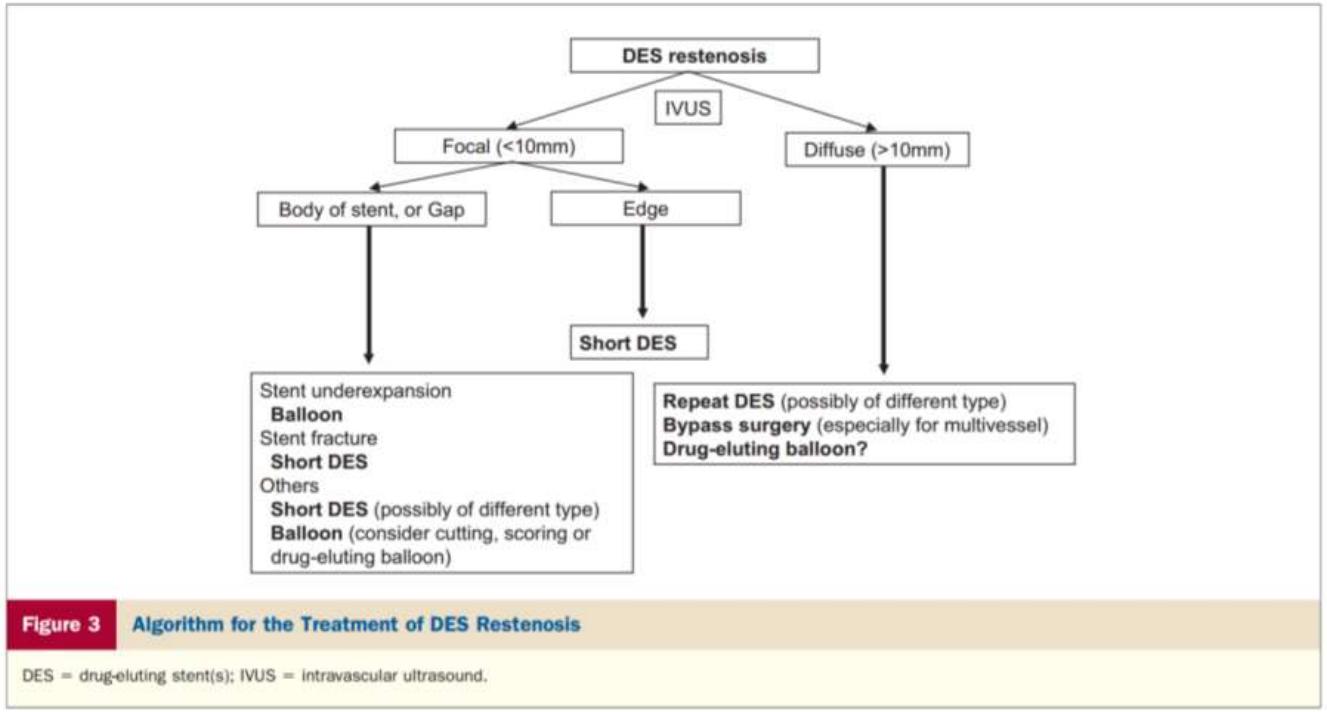


Figure 3 Algorithm for the Treatment of DES Restenosis

DES = drug-eluting stent(s); IVUS = intravascular ultrasound.

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Thank you