CARDIOVASCULAR INNOVATIONS DIGITAL 2020

PCI of distal left main bifurcation with 5 cc of contrast

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CARDIOVASCULAR INNOVATIONS FOUNDATION

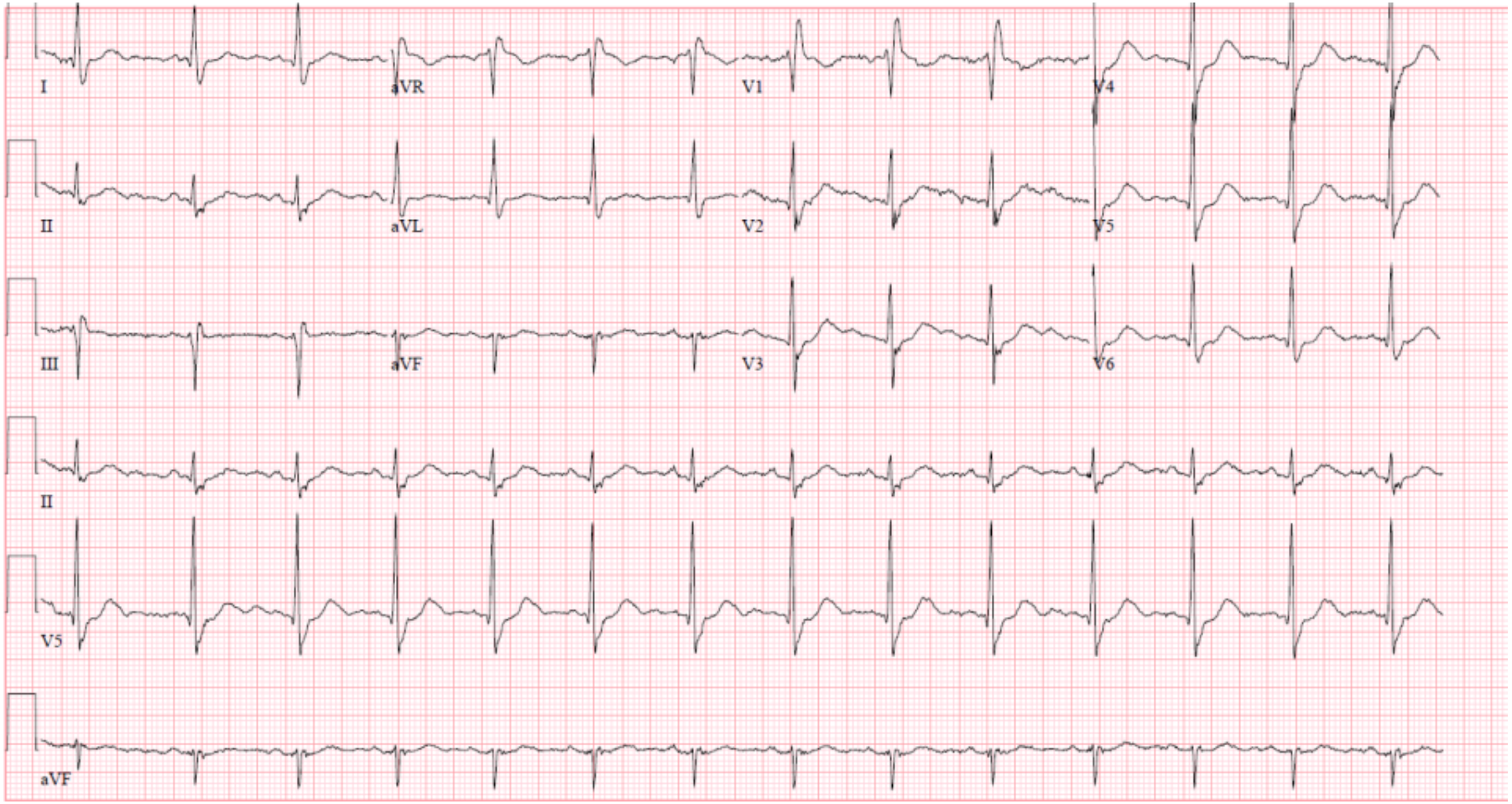
Disclosure

- None

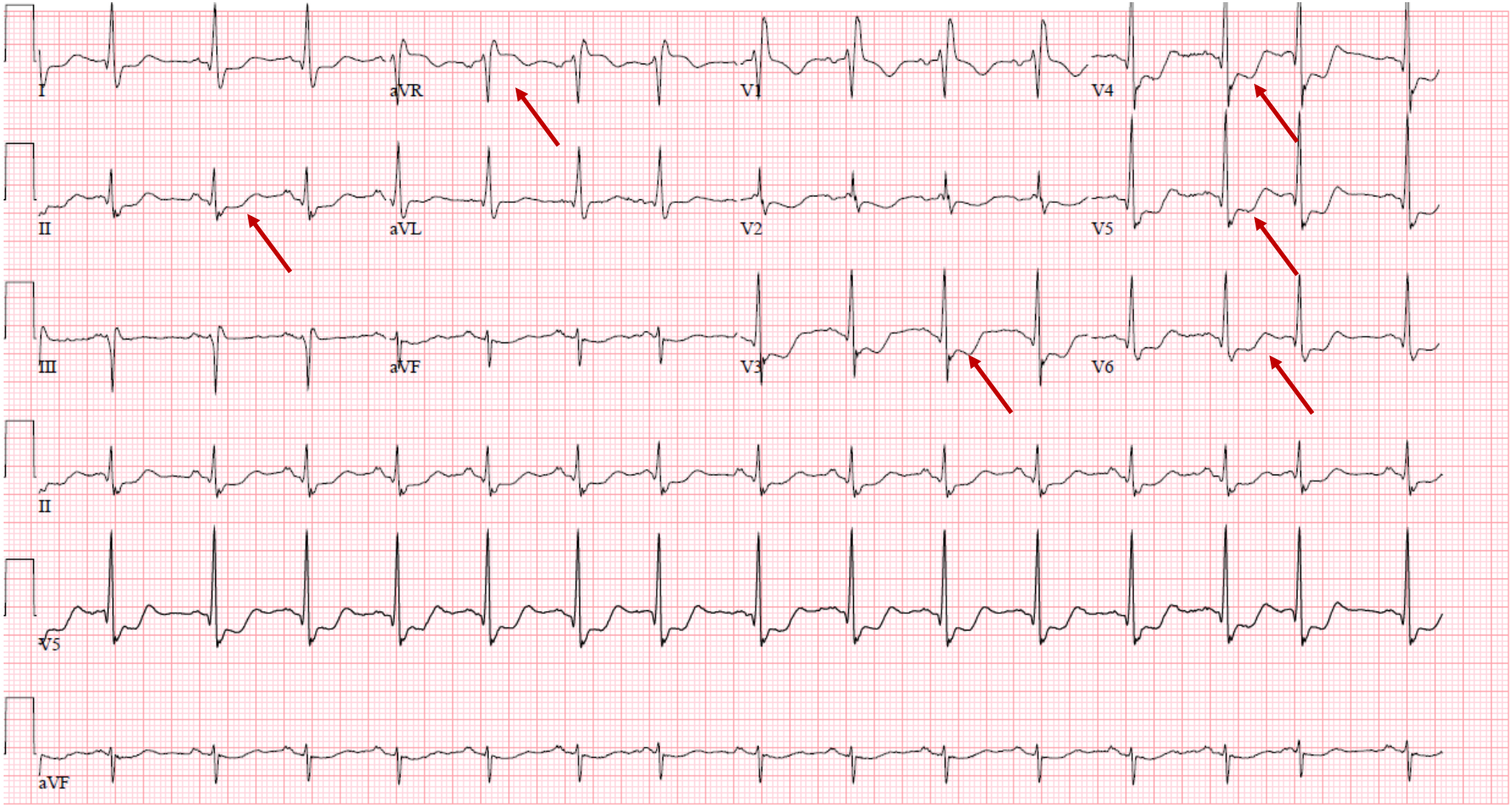
History

- 90-year-old man admitted with typical chest pain and NSTEMI.
- PMH: CKD stage IIIb, HTN, TIA.
- EKG: RBBB, dynamic ST depression (4 mm) in most leads.
- Echo: Normal LV systolic function, moderate pulmonary HTN.

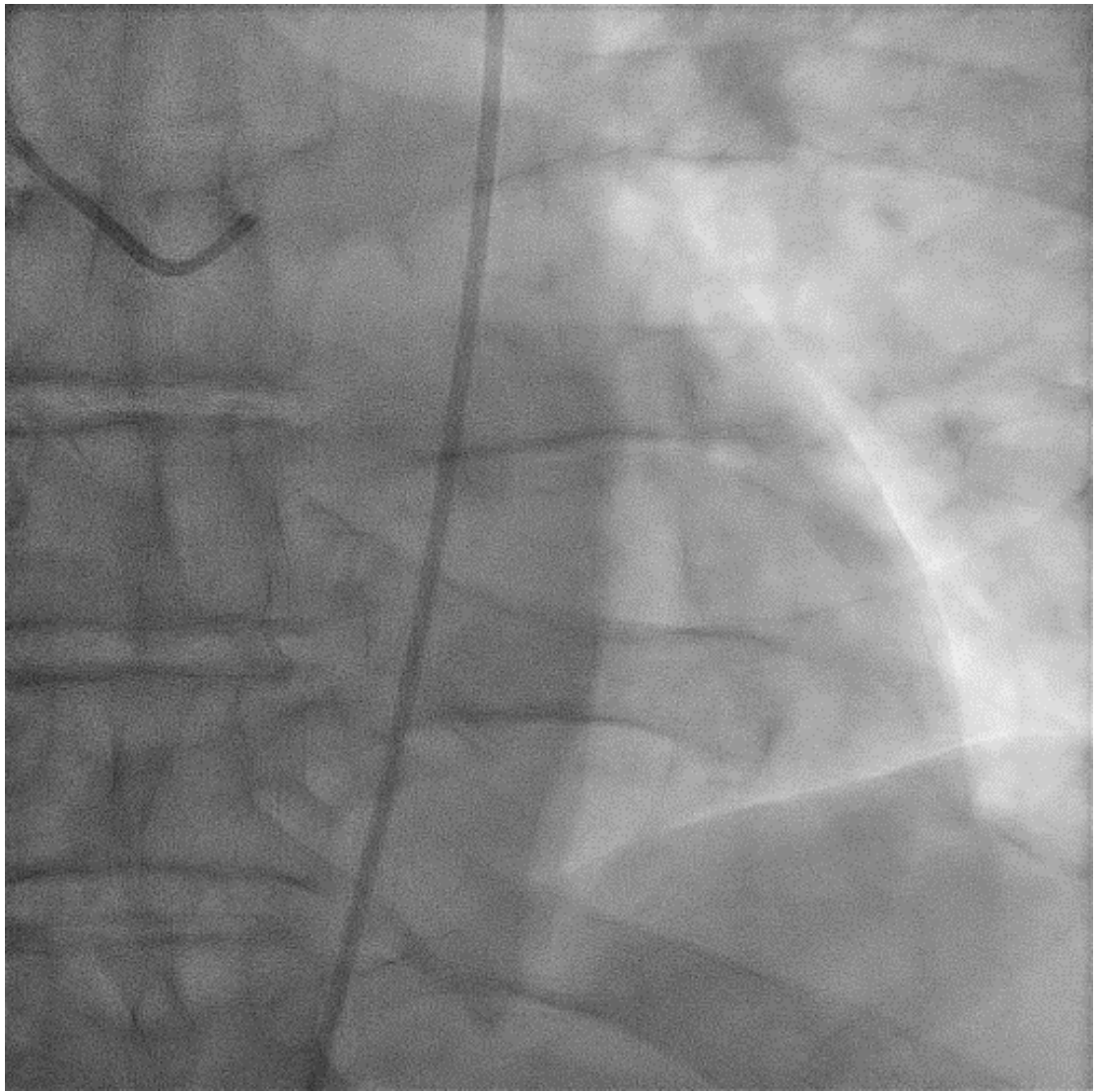
Baseline EKG: sinus Rhythm, RBBB

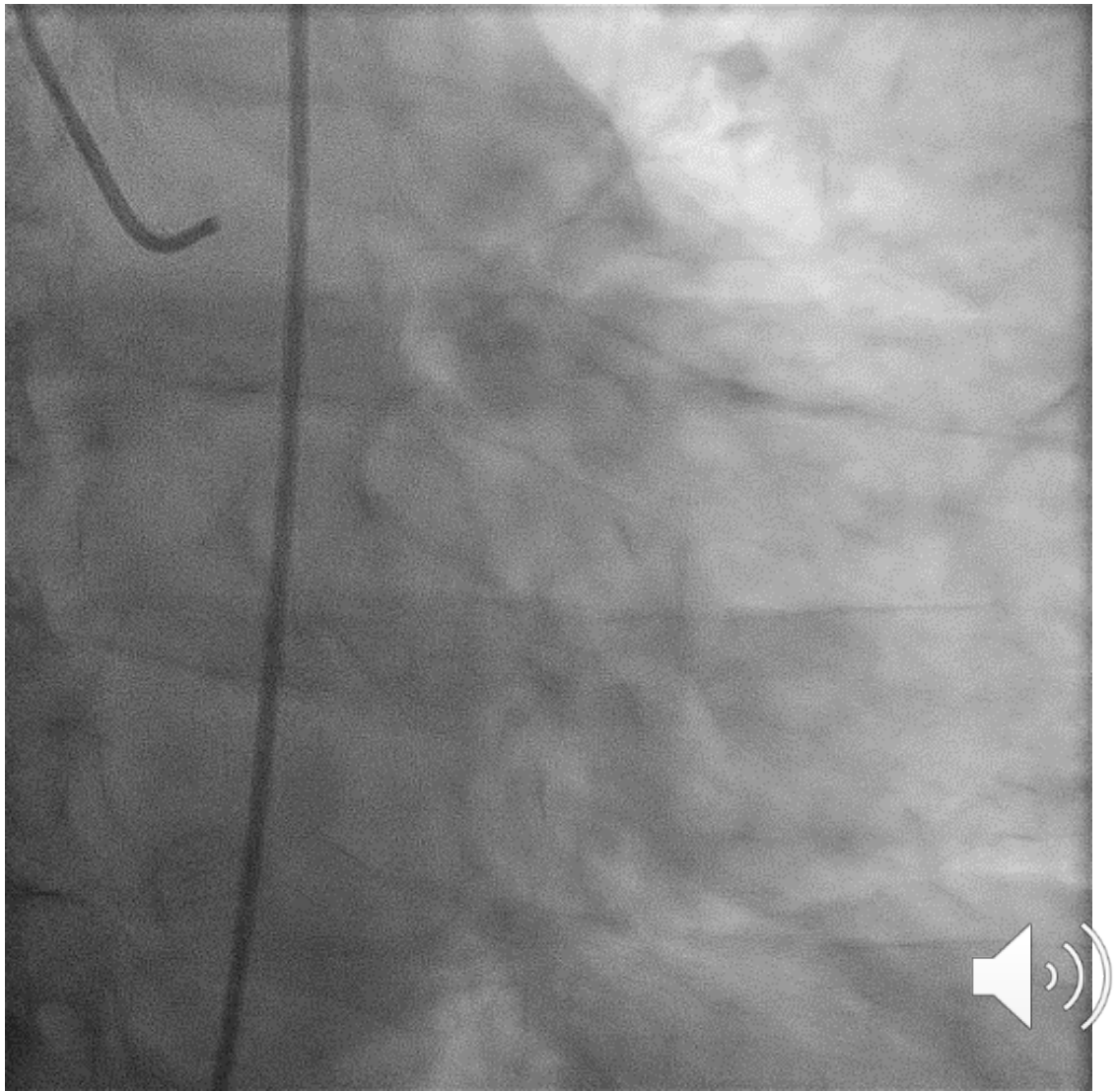


Dynamic EKG changes on admission:
ST ⬆ ⬆ aVR, diffuse ST ⬇ ⬇

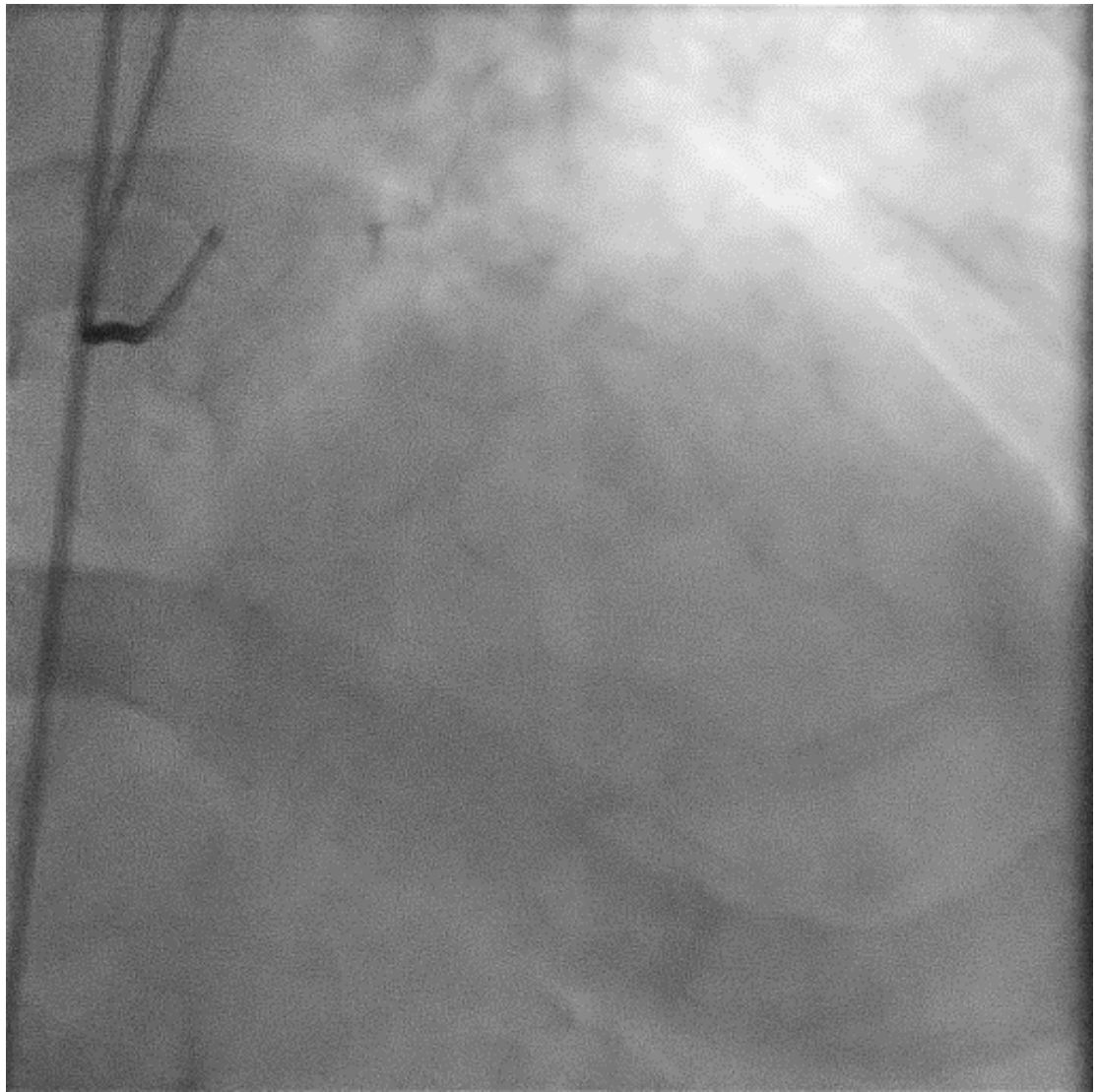


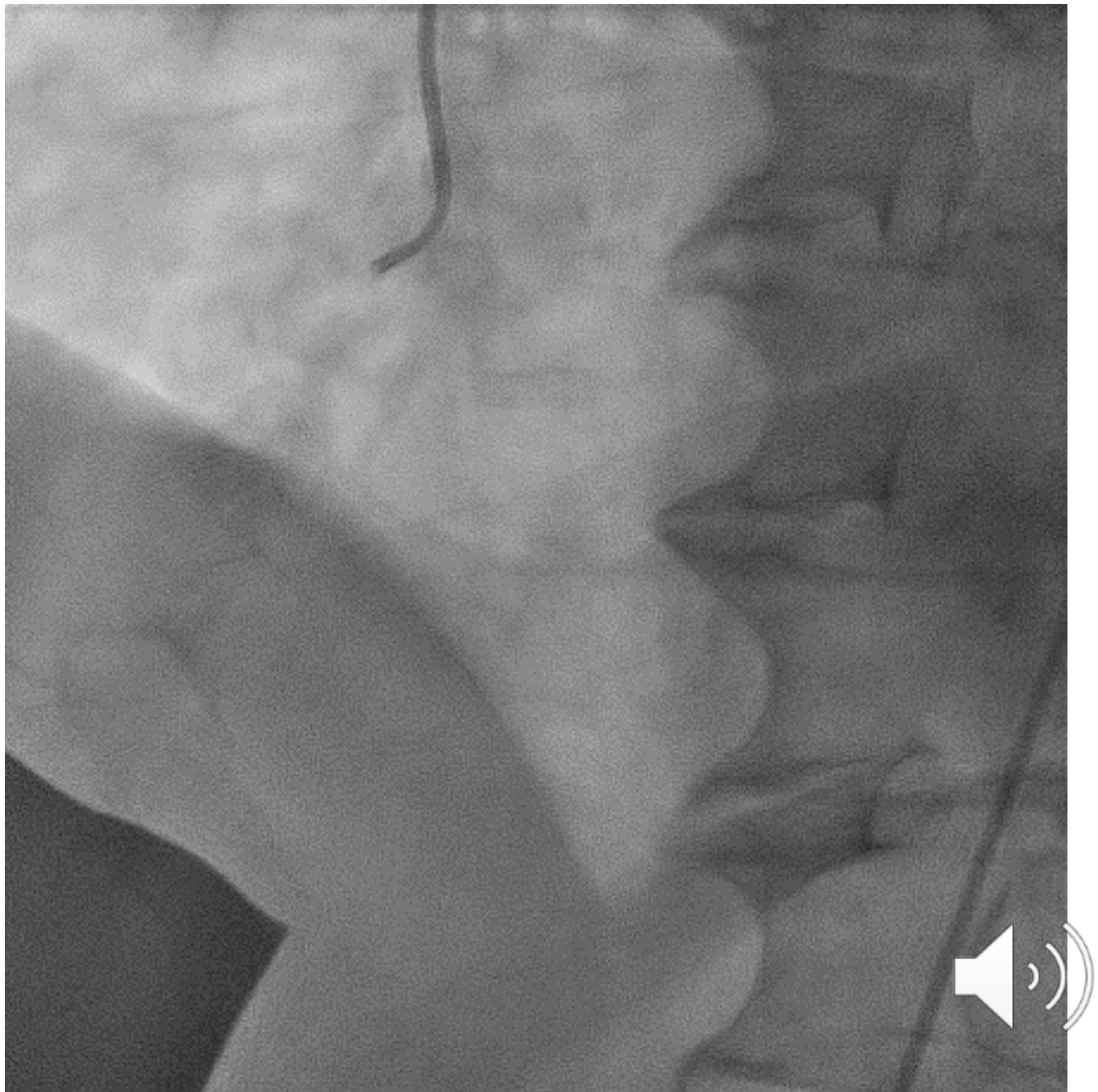
Diagnostic coronary angiography





Diagnostic coronary angiography: note calcification in mid LAD





BMP before and after diagnostic CA

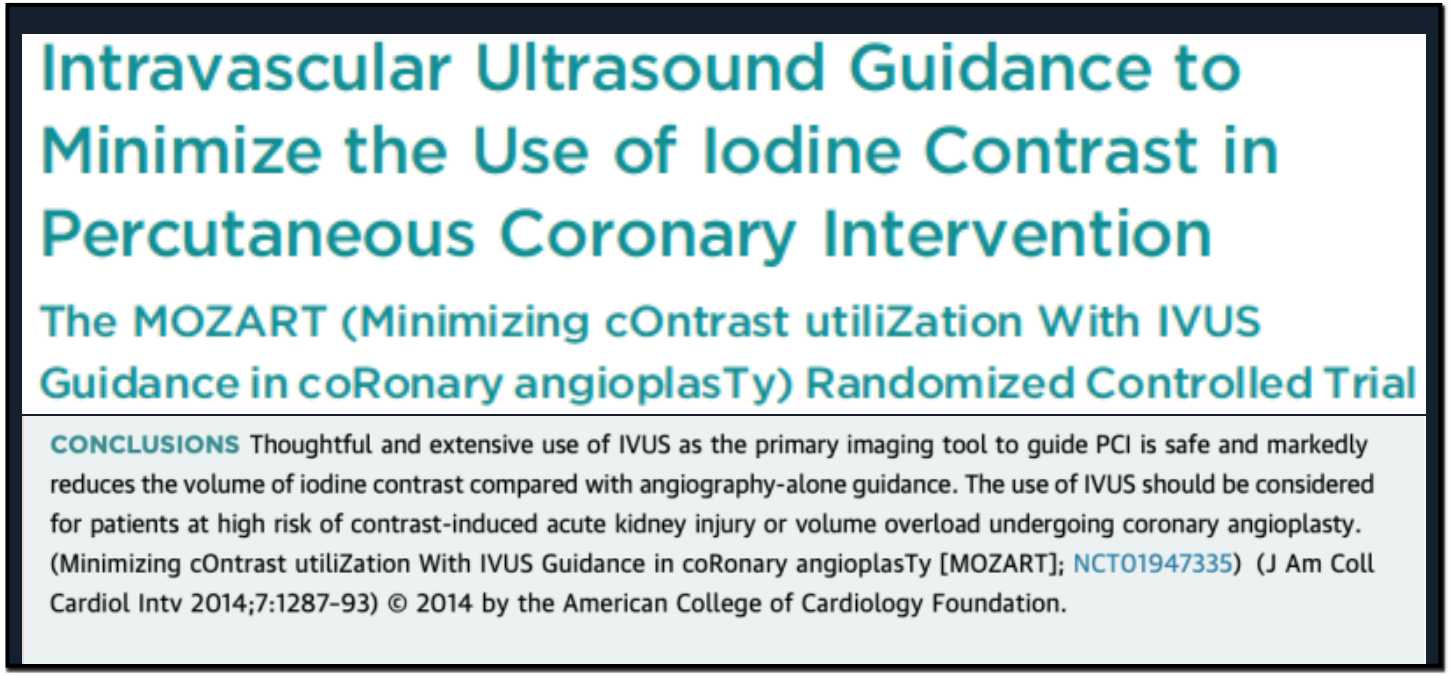
	6/1/2020 0316		5/30/2020 0839	
CHEMISTRY, COMMON				
SODIUM	143		139	
POTASSIUM	4.3		3.7	
CHLORIDE	109		111	▲
CO2,TOTAL	24		23	
ANION GAP	10		5	
GLUCOSE	163	▲	150	▲
CALCIUM	8.1	▼	8.2	▼
BUN	34	▲	32	▲
CREATININE	1.81	▲	1.71	▲
BUN/CREAT RATIO ...	19		19	
GFR if African Ame...	43	▼	46	▼
GFR if not African...	35	▼	38	▼

Decision making

- **Diagnostic angiography demonstrated left main and 3 -vessel coronary artery disease.**

- **After discussion with the patient and the referring physician, it was decided to proceed with PCI of the mid-LAD and distal left main, minimizing the amount of contrast given because of the patient's known chronic kidney disease.**

Intravascular Imaging Guidance



Intravascular Ultrasound Guidance to Minimize the Use of Iodine Contrast in Percutaneous Coronary Intervention

The MOZART (Minimizing cOntrast utiliZation With IVUS Guidance in coRonary angioplasTy) Randomized Controlled Trial

CONCLUSIONS Thoughtful and extensive use of IVUS as the primary imaging tool to guide PCI is safe and markedly reduces the volume of iodine contrast compared with angiography-alone guidance. The use of IVUS should be considered for patients at high risk of contrast-induced acute kidney injury or volume overload undergoing coronary angioplasty. (Minimizing cOntrast utiliZation With IVUS Guidance in coRonary angioplasTy [MOZART]; NCT01947335) (J Am Coll Cardiol Intv 2014;7:1287-93) © 2014 by the American College of Cardiology Foundation.

Primary endpoint	**Angiography-guided (n=42)**	**IVUS-guided (n=41)**	***P***
Total contrast volume, ml	71.4 ± 35.9	22.9 ± 12.5	<0.001

Marini et al. JACC Int 2014; 7:1287

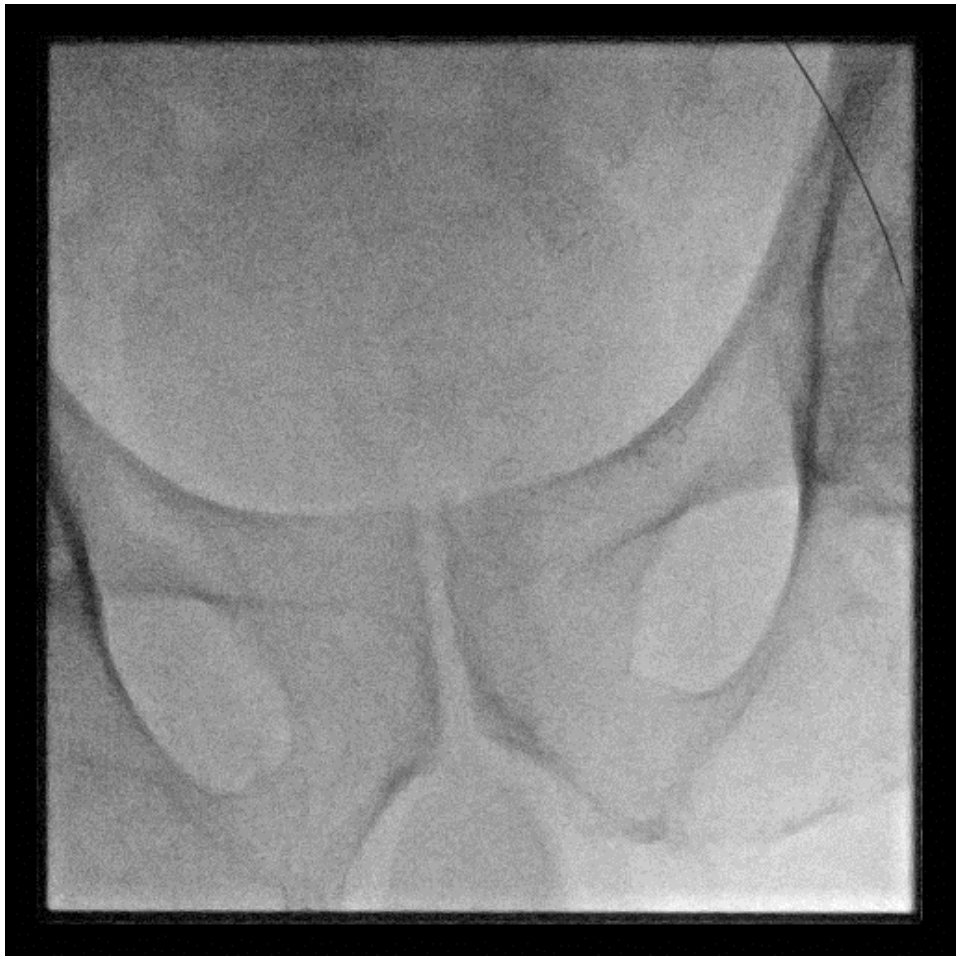
2018 ESC recommendations for the prevention of contrast induced nephropathy

Recommendations	Dose	Class[a]	Level[b]
Patients undergoing coronary angiography or MSCT			
It is recommended that all patients are assessed for the risk of contrast-induced nephropathy.		I	C
Adequate hydration is recommended.		I	C
Patients with moderate or severe CKD (National Kidney Foundation stages 3b and 4)			
Use of low-osmolar or iso-osmolar contrast media is recommended.[284–286]		I	A
It is recommended that the volume of contrast media be minimized.[287,288]	Total contrast volume/GFR <3.7.[c]	I	B

Preparation: “If you want peace, prepare for war”

- Vascular access:
  - Femoral: for highly complex cases, femoral access provided more support.
  - 8 Fr 45 cm long pinnacle destination sheath.
  - 3.75 8 Fr. EBU

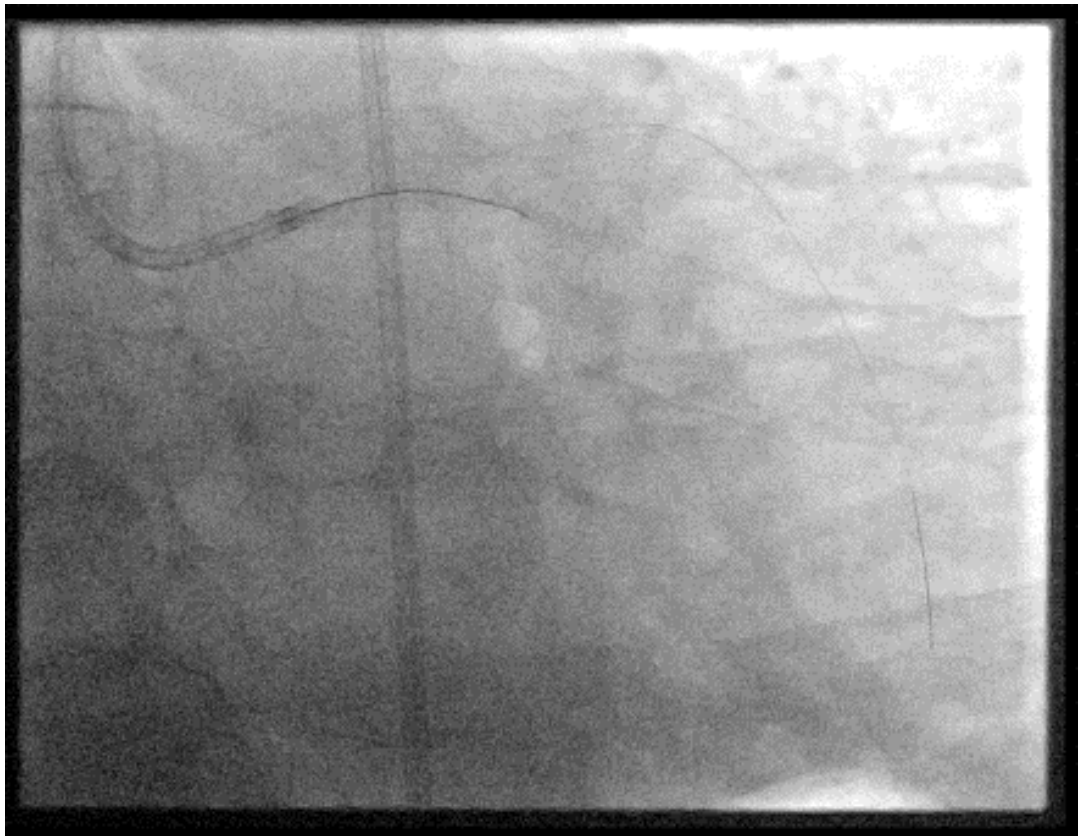
Needle position confirmed with fluoroscopy

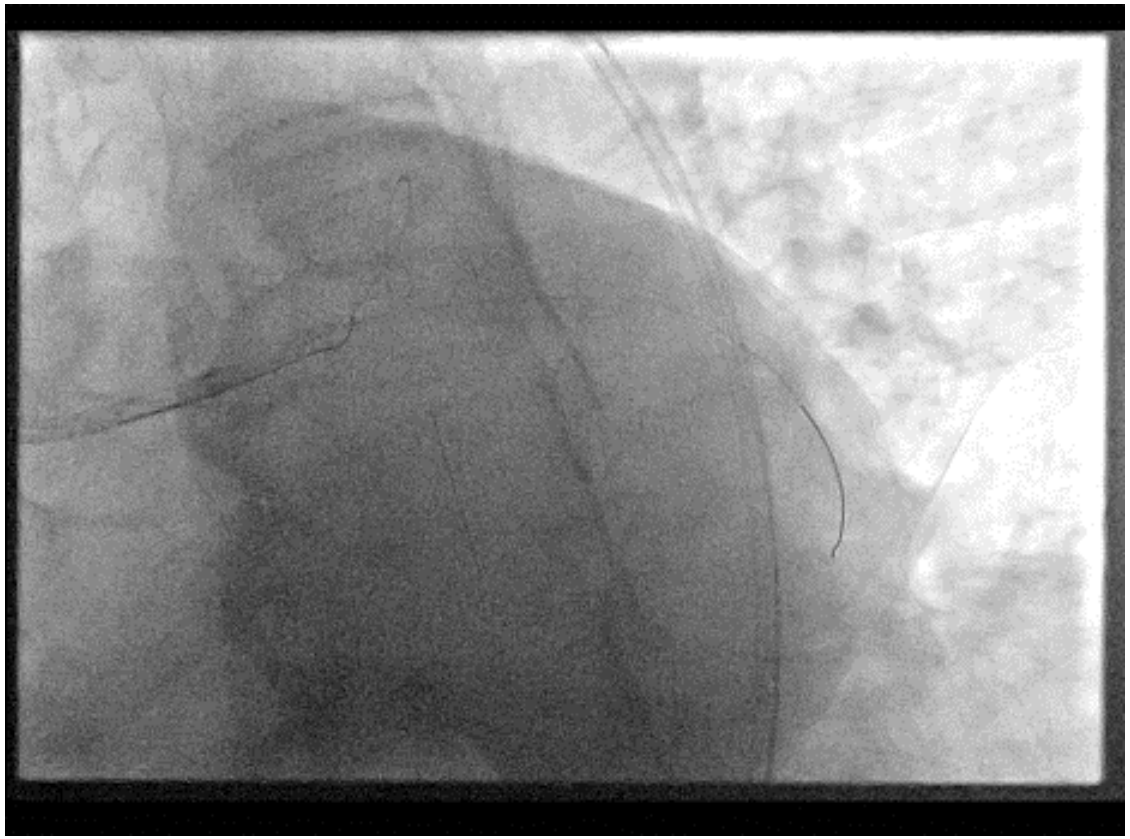


Saline injection with EKG monitoring to confirm guide engagement in the left main

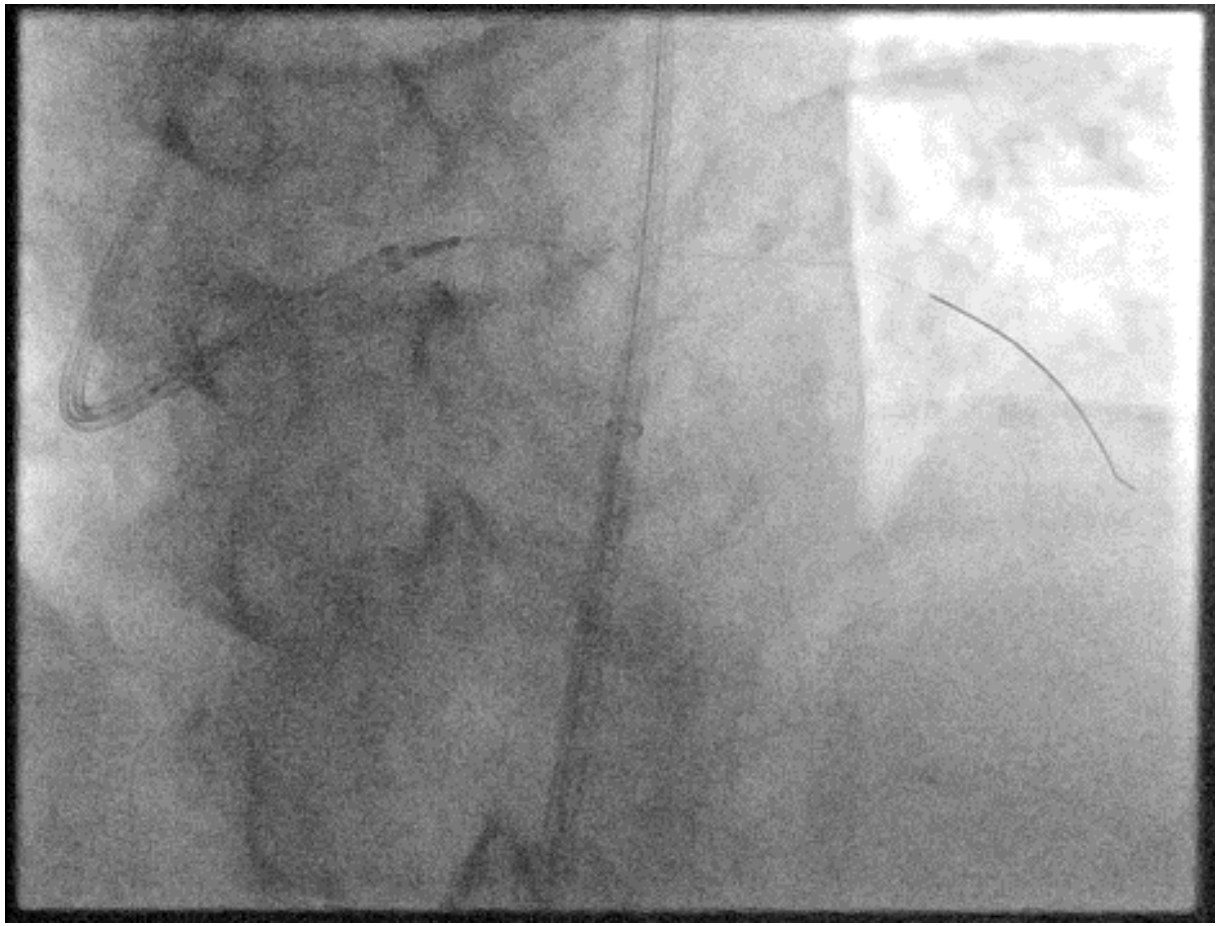
Wiring LAD

Wiring OM1 and LCx

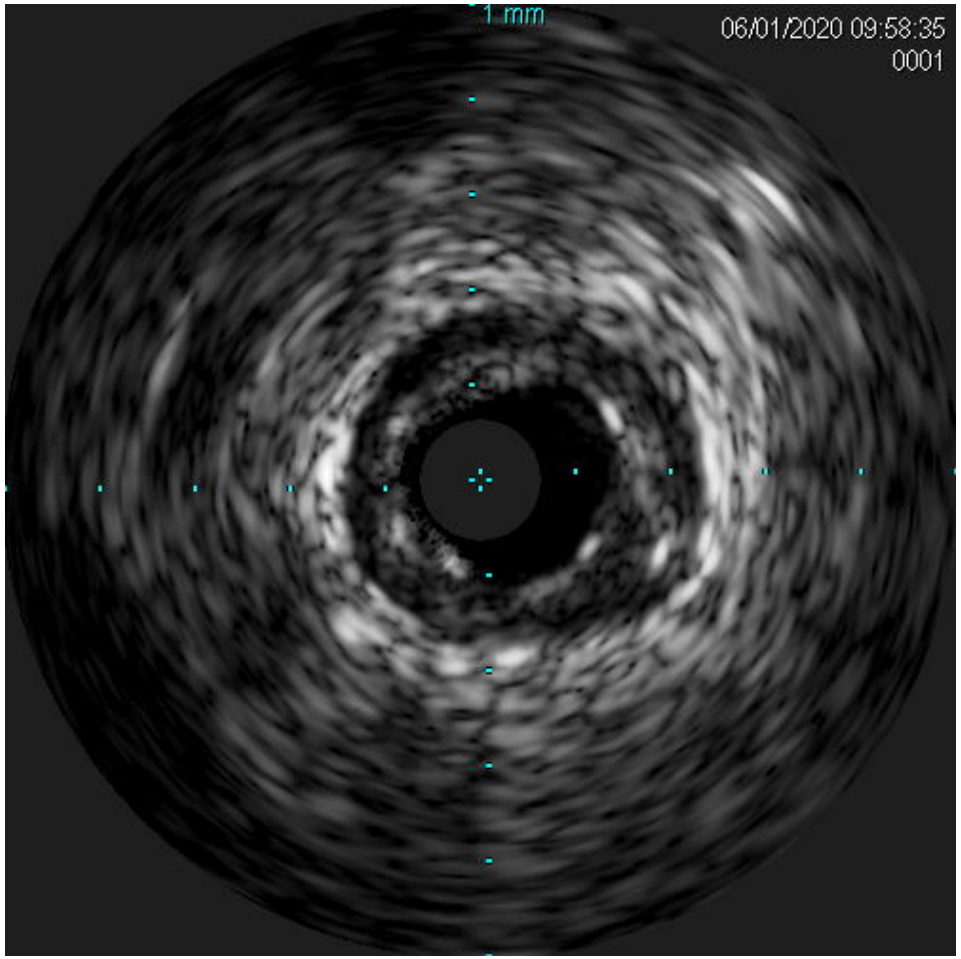




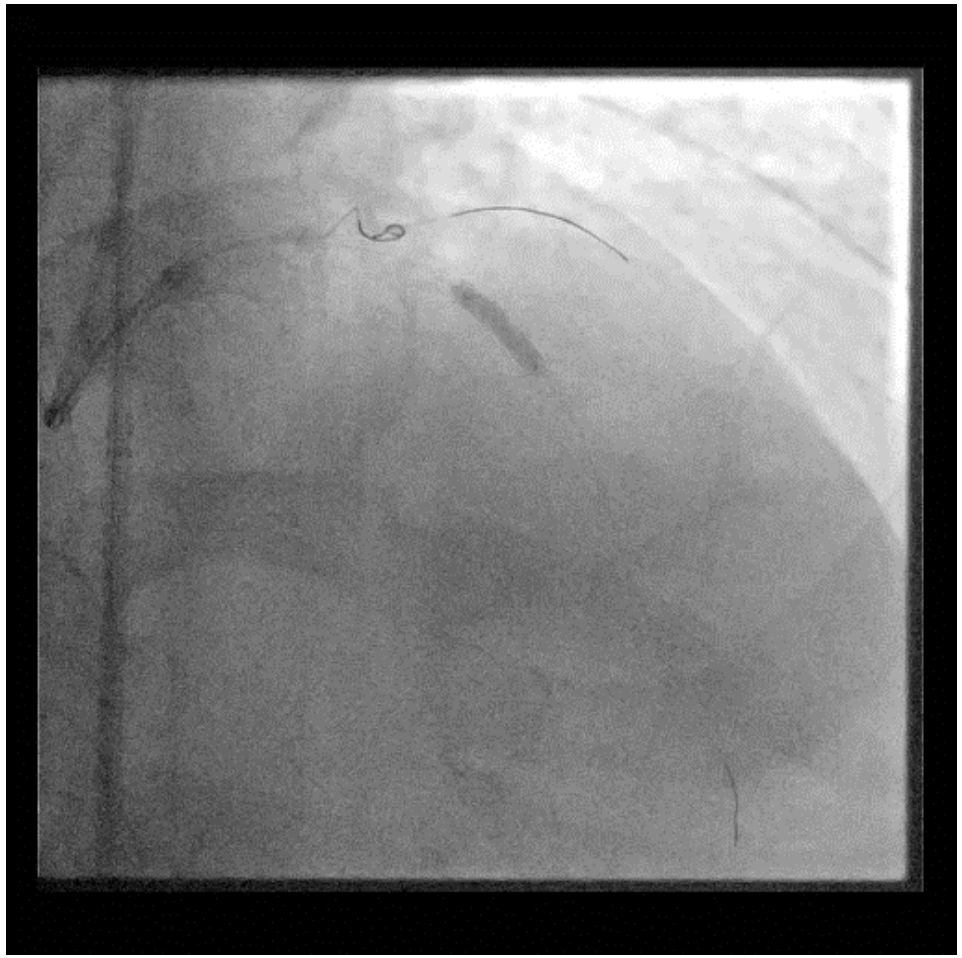
Delivering IVUS to mid LAD



Initial IVUS imaging: calcific mid LAD, distal LM

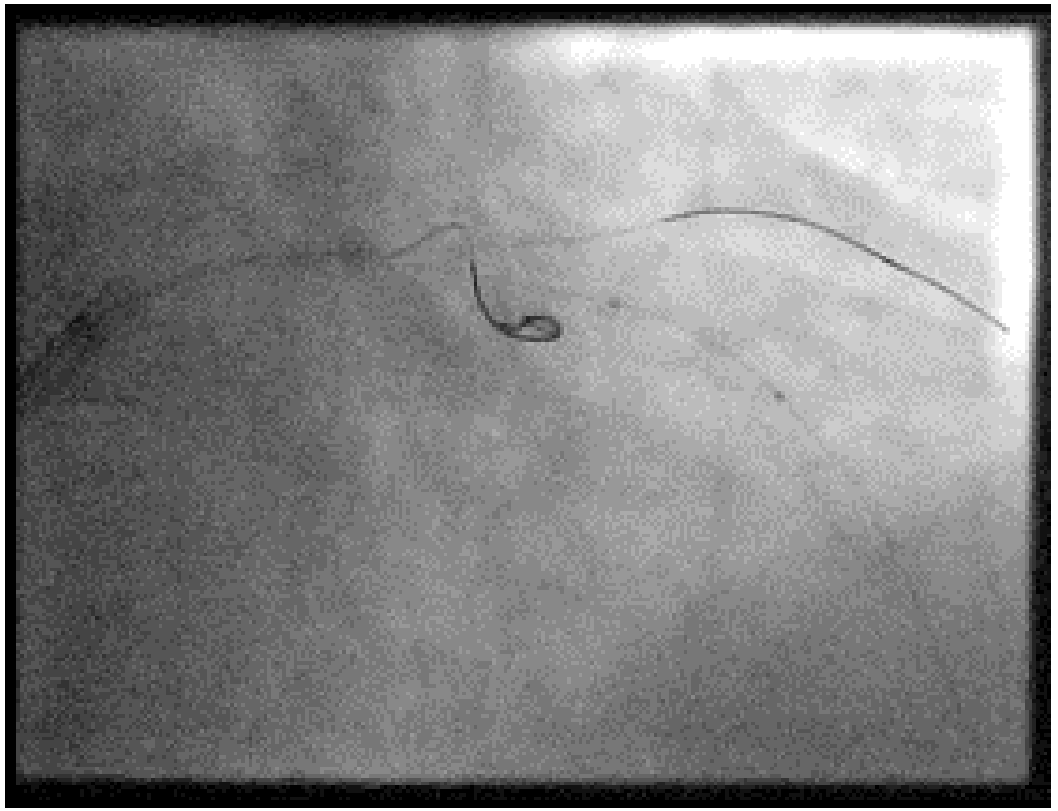


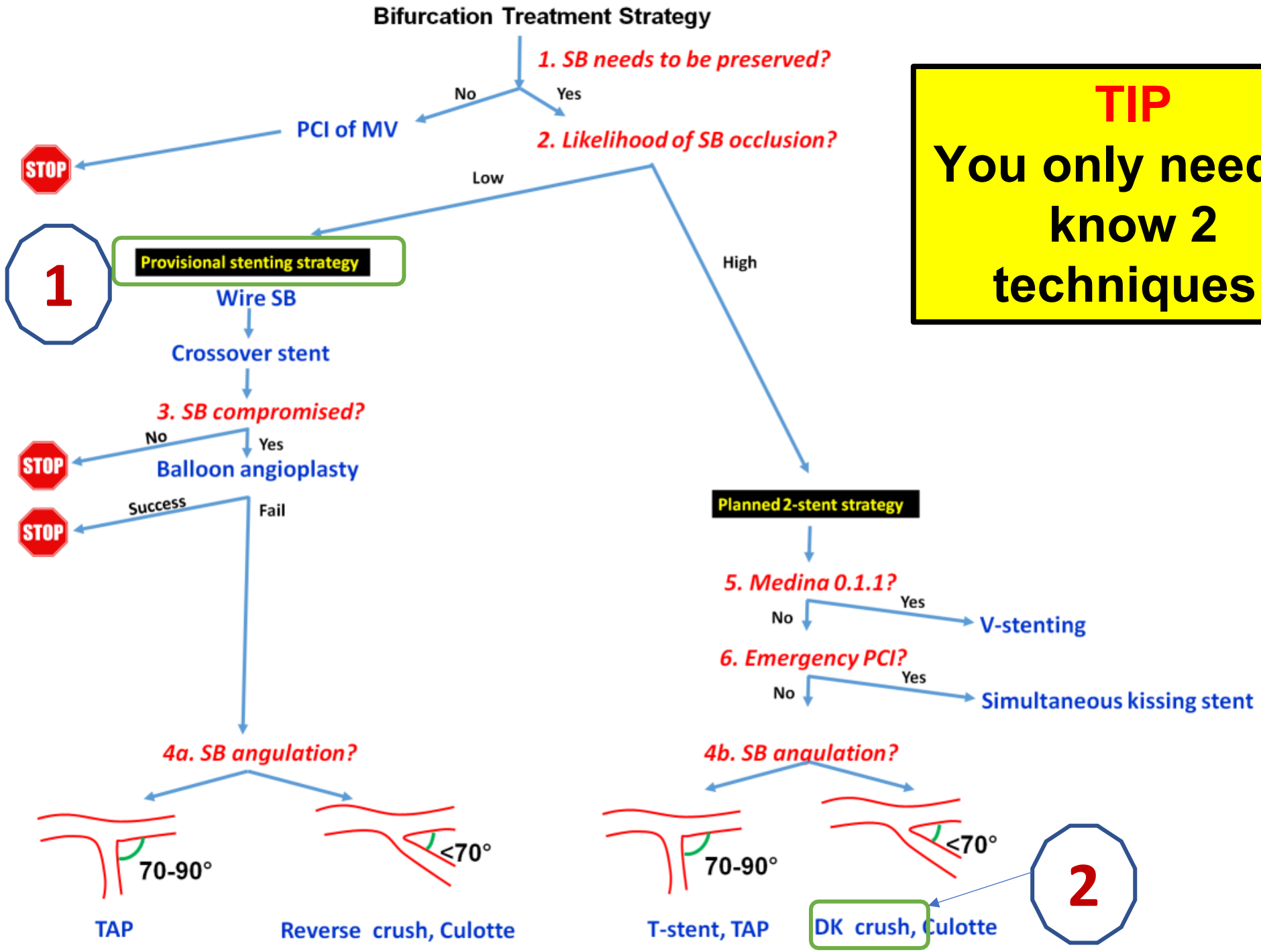
Provisional approach:
DES 3.0 x 28 mm to mid LAD
(sized according to distal MV)



LAD calcification in prior LAD image

POT with 3.25 mm NC Balloon



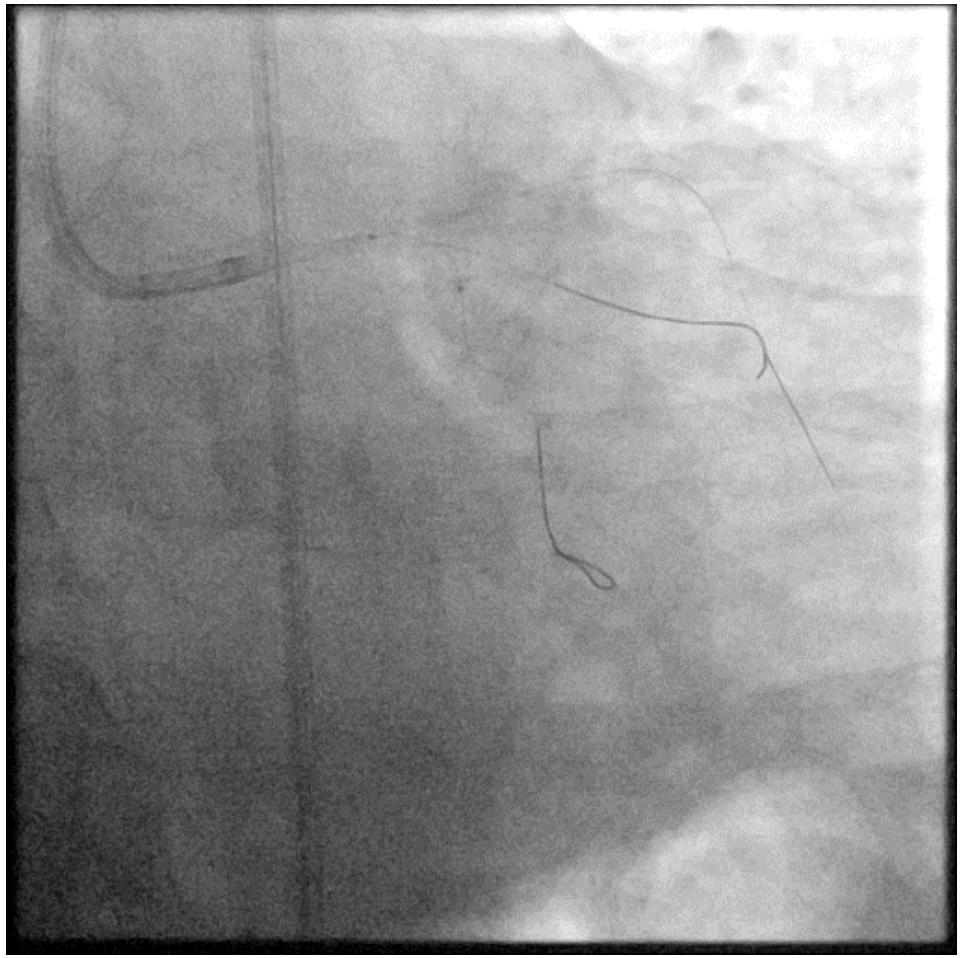

Bifurcation Treatment Strategy
1. SB needs to be preserved?
No
Yes
PCI of MV
STOP
2. Likelihood of SB occlusion?
Low
High
1
Provisional stenting strategy
Wire SB
Crossover stent
3. SB compromised?
No
Yes
STOP
Balloon angioplasty
Success
Fail
STOP
4a. SB angulation?
70-90°
<70°
TAP
Reverse crush, Culotte
Planned 2-stent strategy
5. Medina 0.1.1?
Yes
No
V-stenting
6. Emergency PCI?
Yes
No
Simultaneous kissing stent
4b. SB angulation?
70-90°
<70°
T-stent, TAP
DK crush, Culotte
2
TIP
You only need to know 2 techniques!

DK crush steps

1. Insert MV balloon (sized 1:1 with the distal MV) in the MV at or distal to the SB origin
2. Deliver SB stent protruding 2-3 mm in the MV
3. Deploy SB stent
4. Remove SB balloon
5. Perform angiography to assess SB result
6. Crush SB stent by inflating MV balloon
7. Rewire SB through crushed stent, then remove jailed SB wire
8. Deliver balloon in SB
9. First kissing balloon inflation
10. Remove SB and MV balloon
11. Deliver and deploy MV stent
12. Assess MV stent result
13. POT
14. Rewire SB through MV stent then remove the SB wire
15. Second kissing balloon inflation
16. Final POT
17. Final angiography

Dr. Brilakis YouTube channel: https://www.youtube.com/watch?v=3gLTztQjCzQ

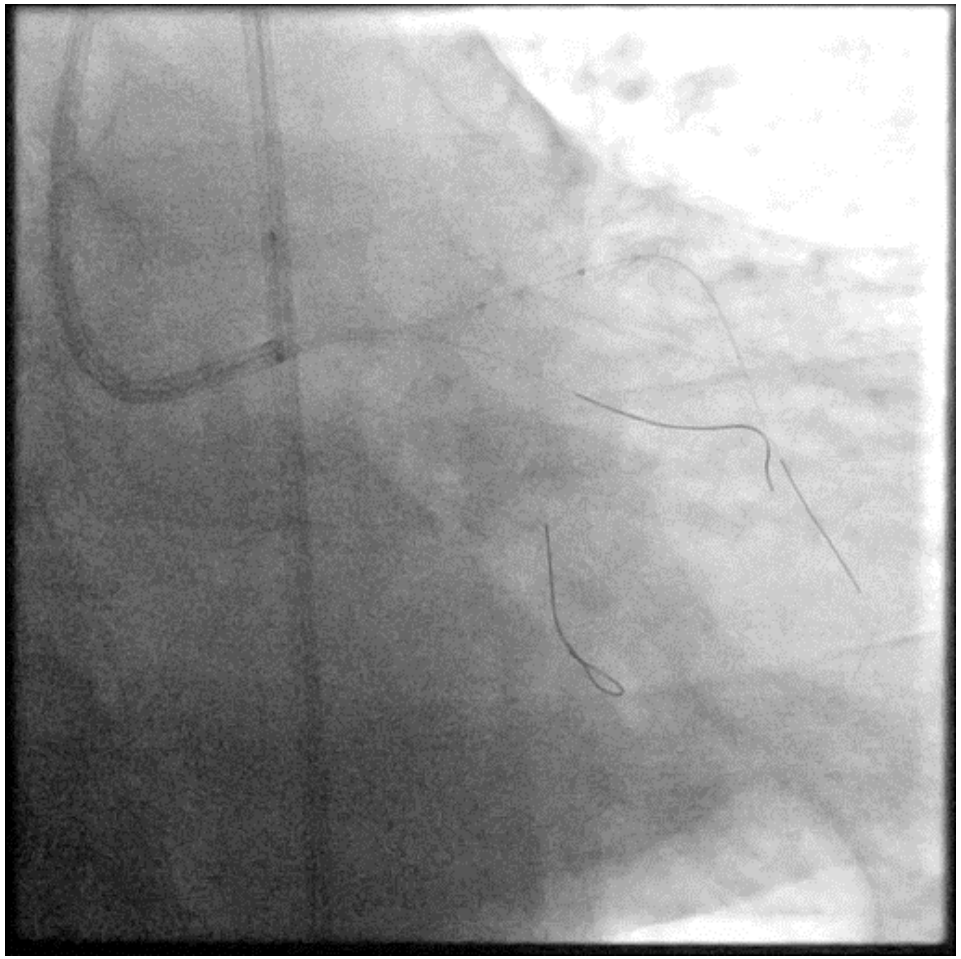
Preparation of the lesion:
2.5 x 15 mm balloon was used to dilate the pLCx



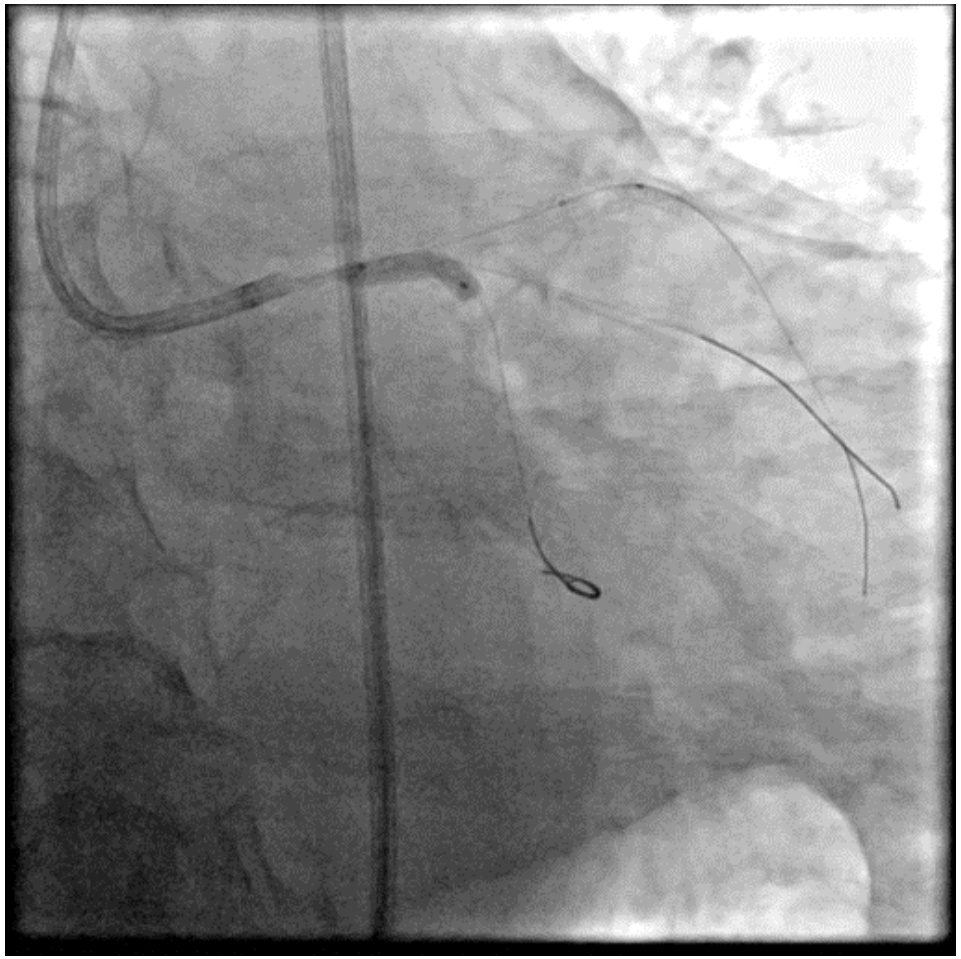
#Challenge of balloon not crossing SB ostium:

- Smaller balloon: Sapphire pro 1.0 mm
- Microcatheter: modify ostium
- Supportive wire: Wiggle wire
- Increasing guide support:
  - Guide extension
  - Side branch anchor technique
- Atherectomy

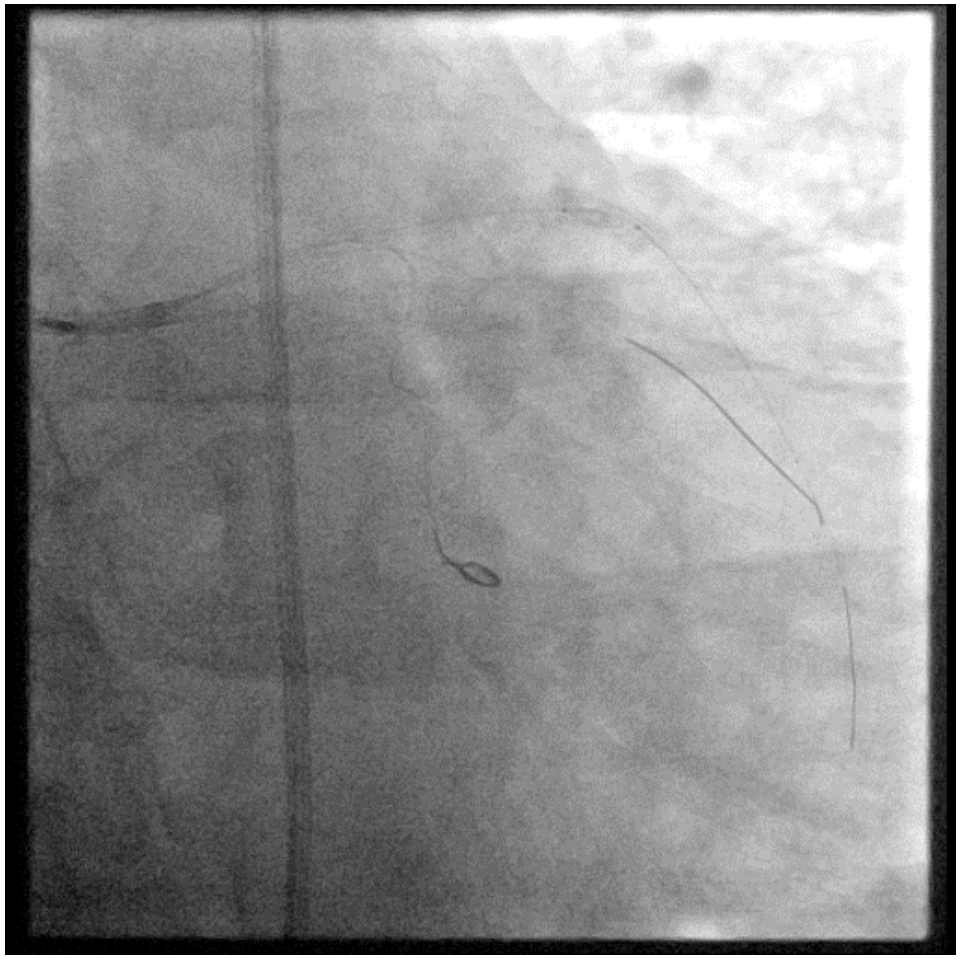
Step 1: Insert main vessel Balloon (1:1 distal MV)



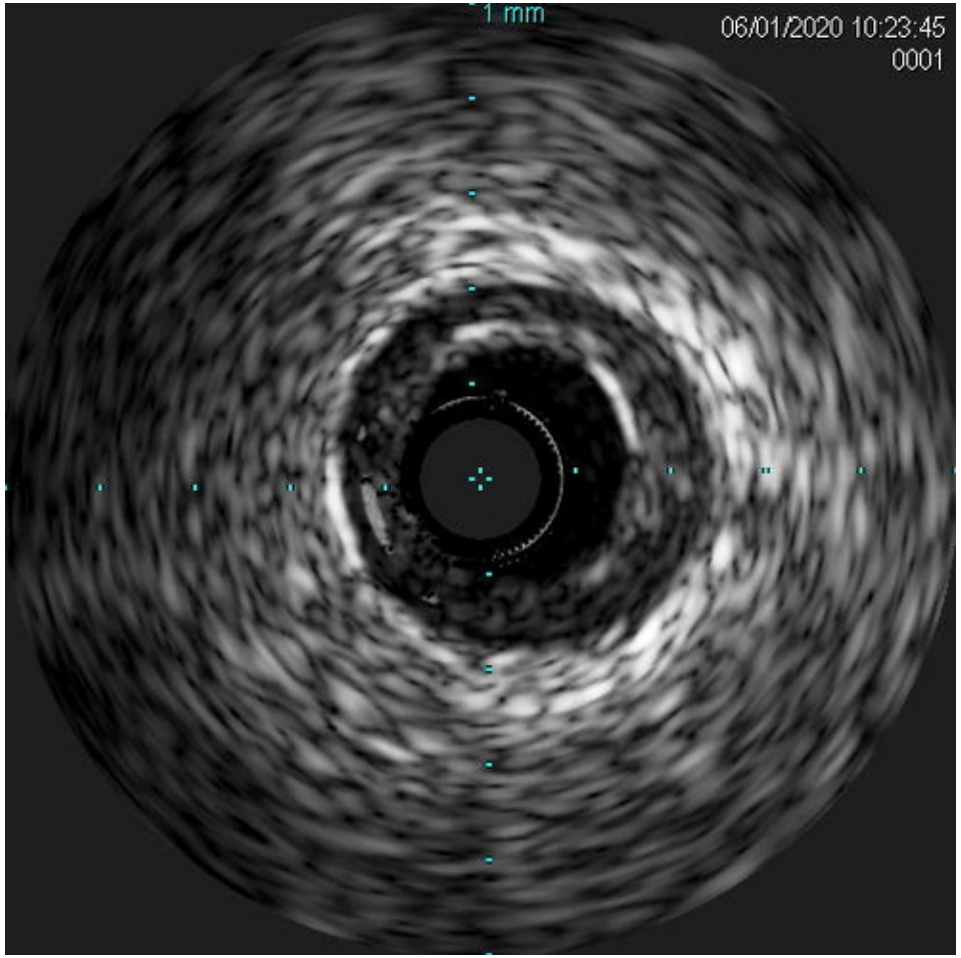
Step 2: Deliver SB stent (protruding 2-3 mm in MV)
Step 3: Deploying SB stent (3.0x12 mm)



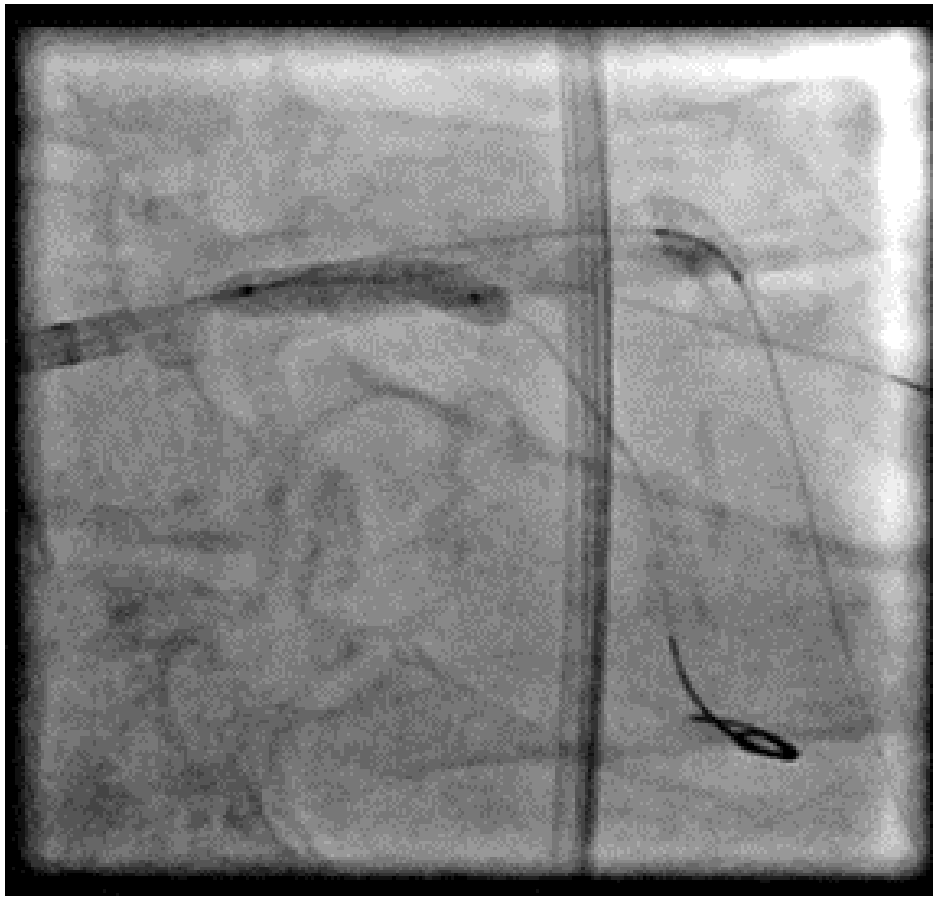
Step 4: Removing SB balloon
Step 5: Assessing results with IVUS



IVUS imaging showing stent under-expansion

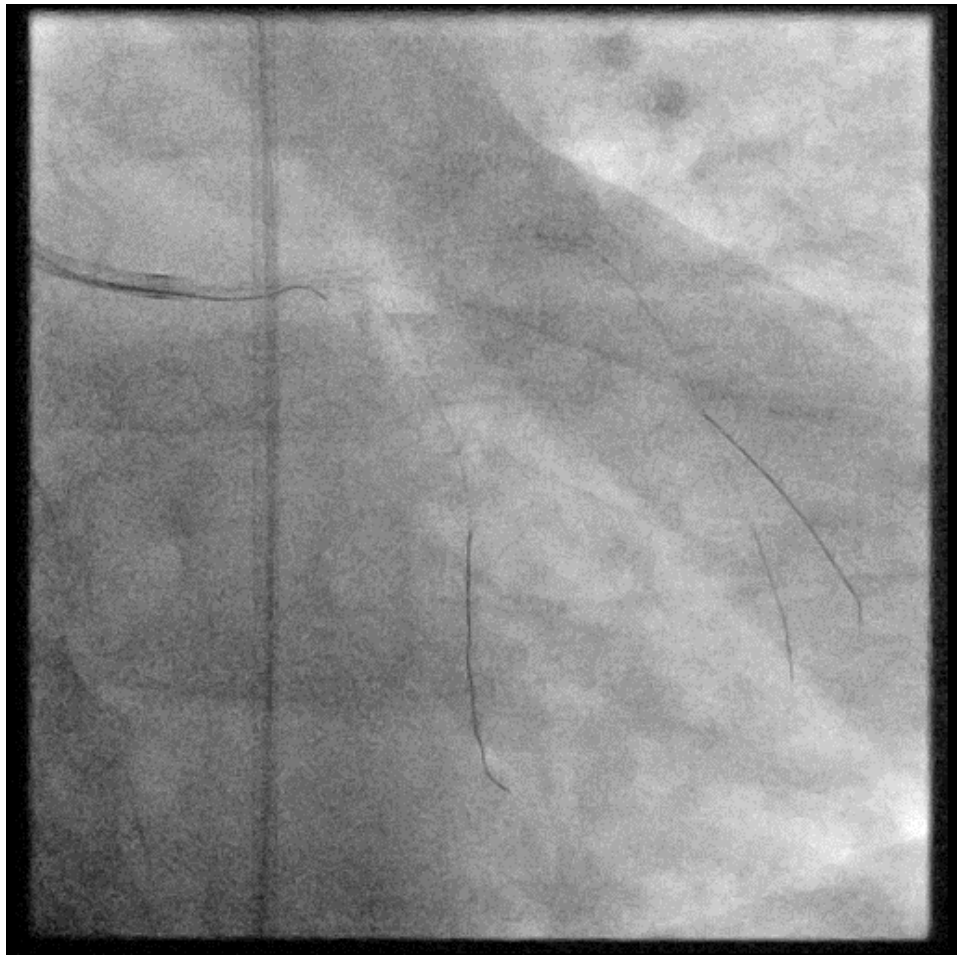


Post dilatation with 3.25mm x 15mm NC Balloon (up to 28 atm)

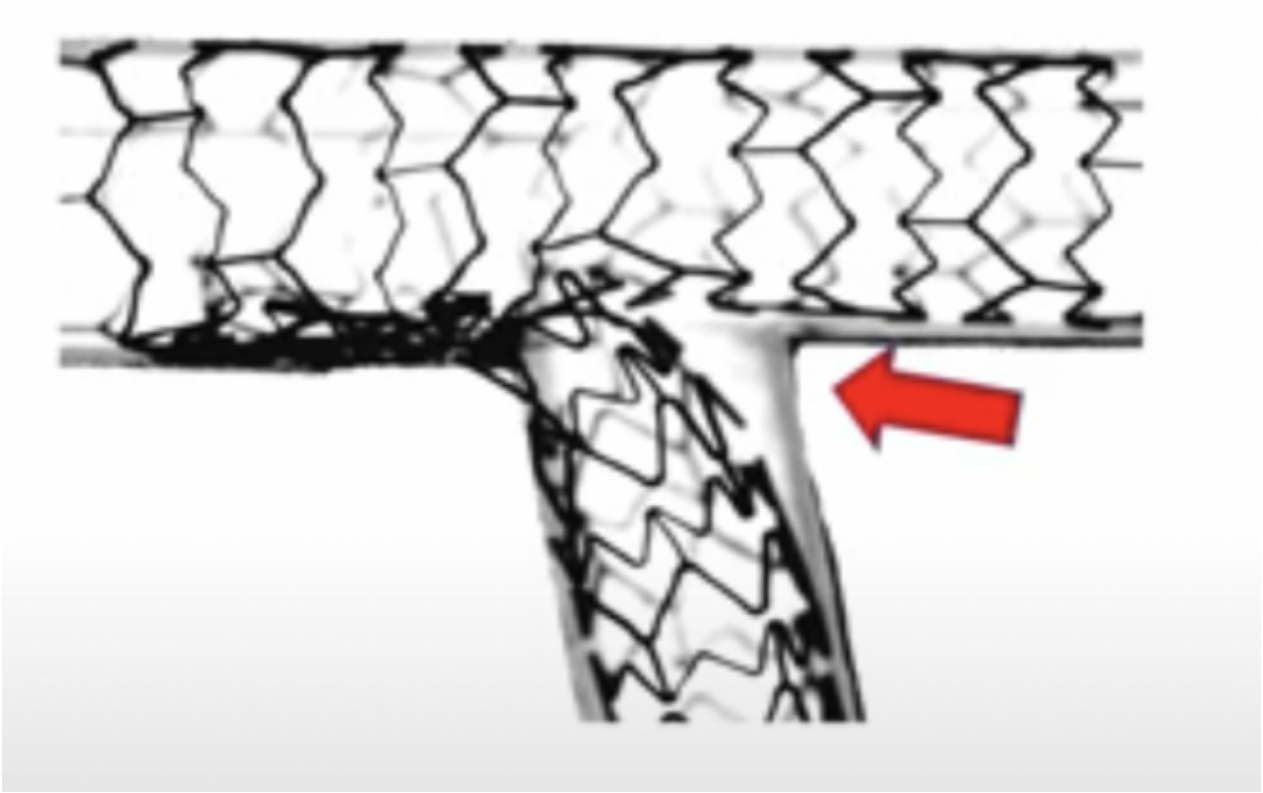


Step 6: Crush SB stent by inflating MV balloon

Step 7: Rewire proximal part of SB stent (Sion blue wire)

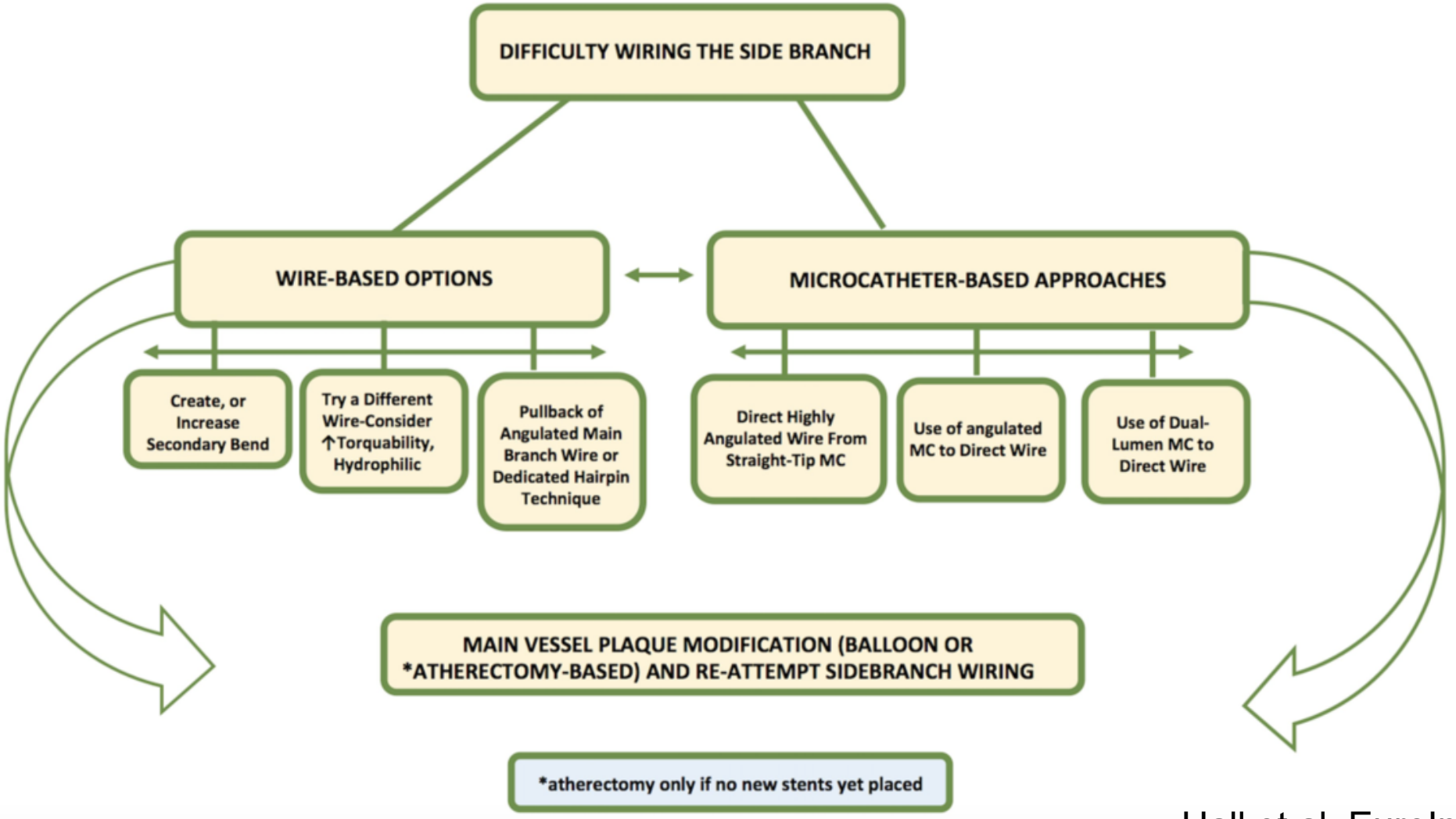


SB stent malformation with distal cell crossing



NOT RECOMMENDED

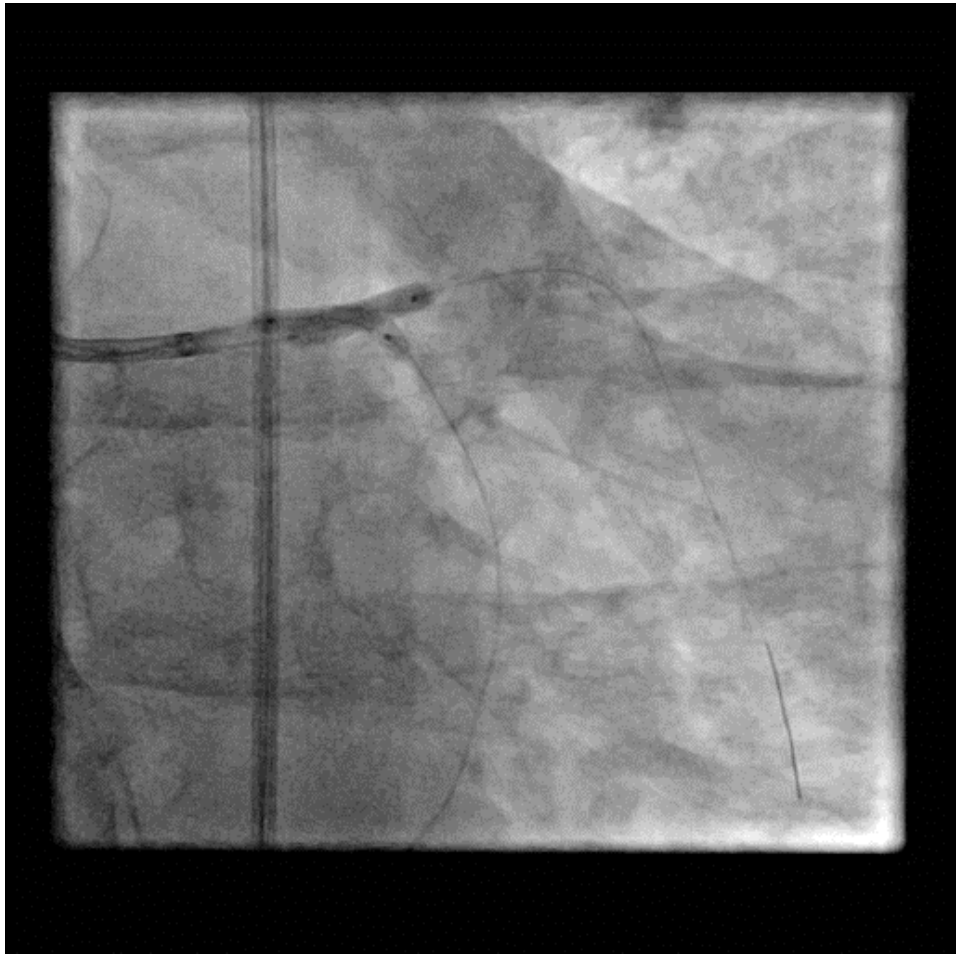
Algorithm for approaching a difficult to wire SB



Hall et al. EuroIntervention: 2020

Step 8: Deliver 2.5mm x 15mm Balloon in SB

Step 9: First Kissing Balloon Inflation



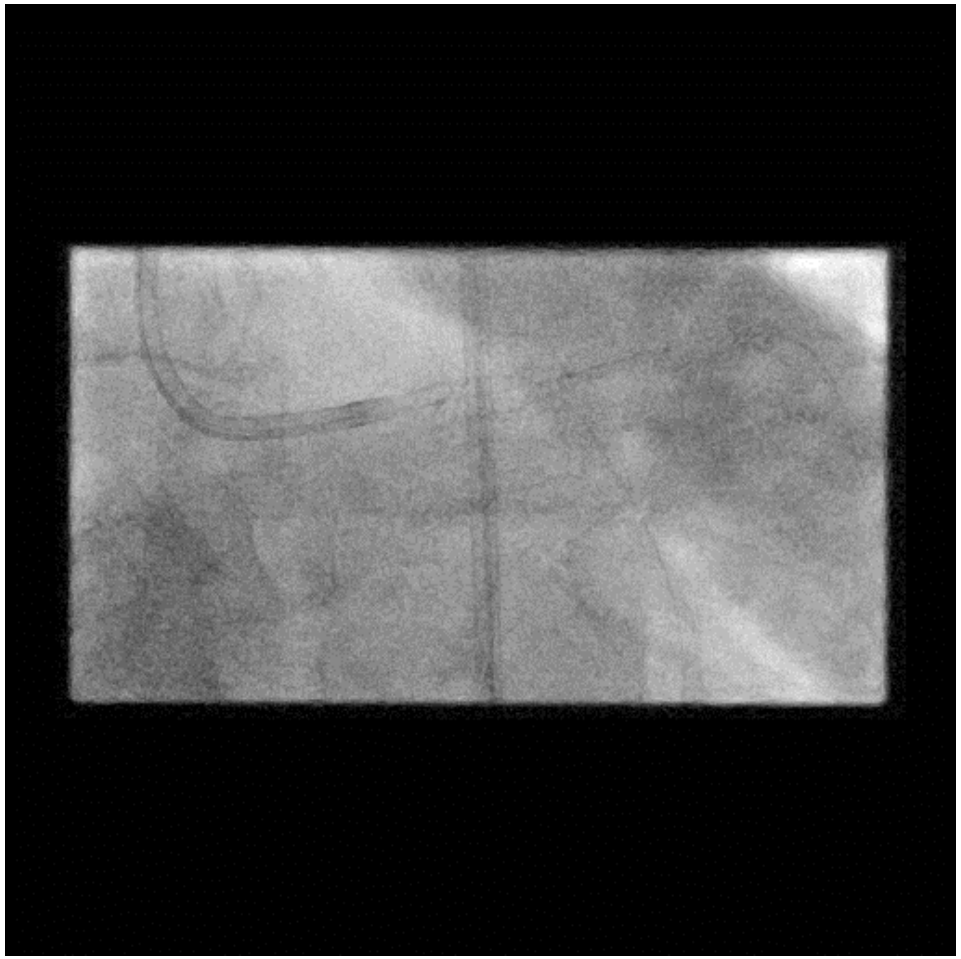
- Balloon size: According to **Finet's law**, the simultaneously inflated balloons have an effective diameter proximal to the bifurcation that is equal to 2/3 of the sum of each balloon diameter

- Diameter of proximal main vessel=
  0.678 x (balloon 1 diameter + balloon 2 diameter)
  0.678 x (2.5 mm + 3.0 mm) = 3.7 mm

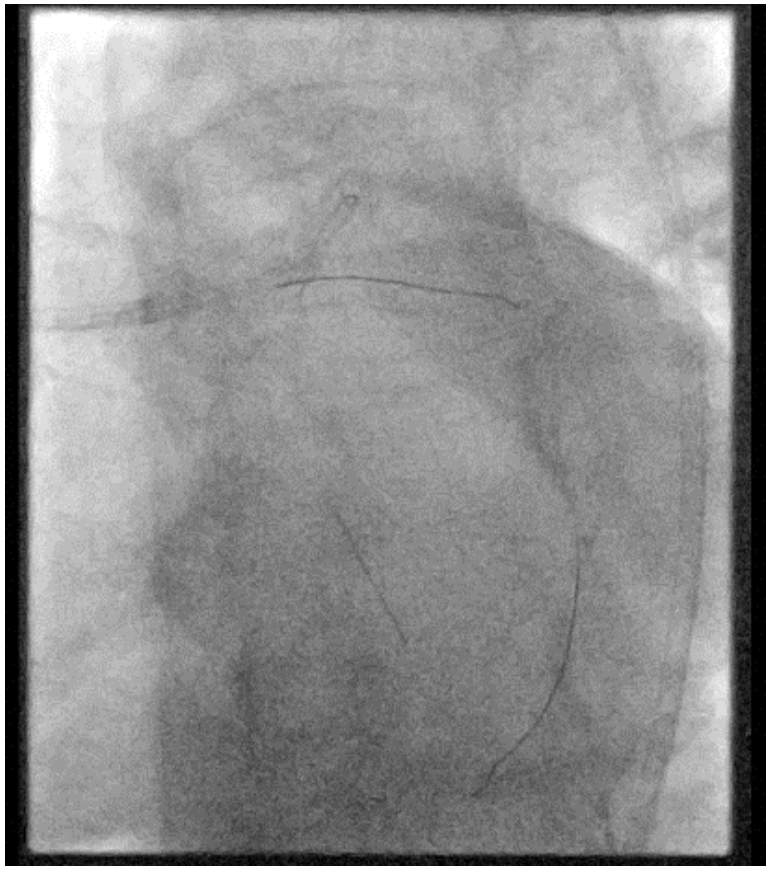
- Two-step kiss: individual high pressure in each branch, followed by kissing balloon at low pressure
Balloon inflated for 4 sec @ 18 atm in the pLCx.
Balloon inflated for 7 sec @ 16 atm in the pLAD.
Balloon inflated for 12 sec @ 14 atm in the pLCx.
Balloon inflated for 12 sec @ 14 atm in the pLAD.

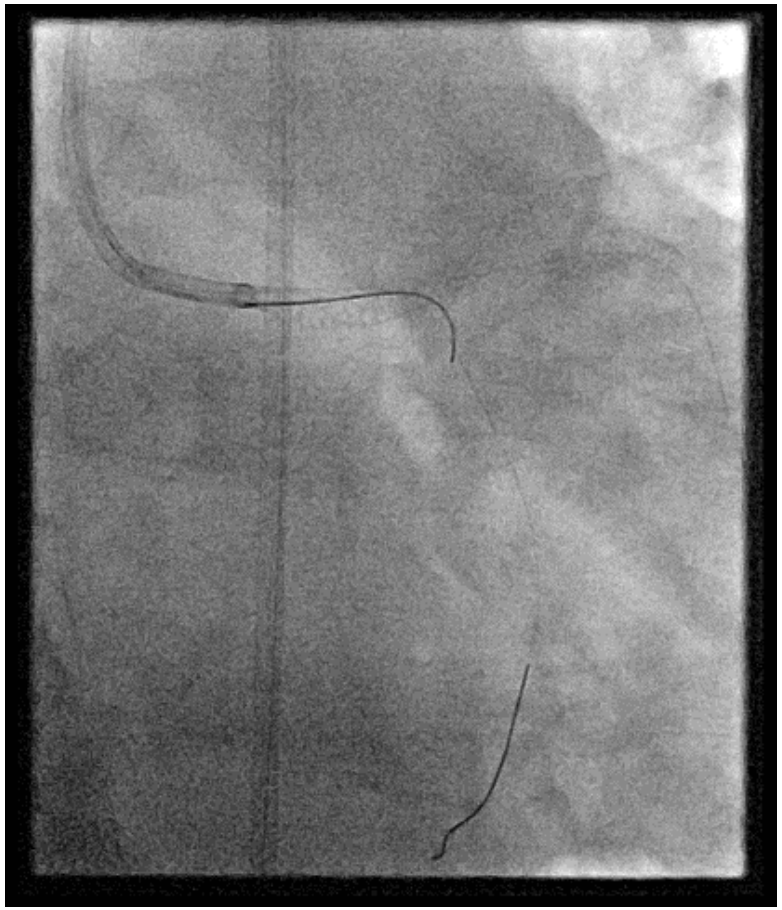
Step 10: Remove SB and MV Balloon
Step 11: Deliver and deploy MV stent (3.5mm x 20mm)

Step 11: 11: Assess MV stent result
Step 12: 1st POT with 4 mm x 15 mm NC in the left main

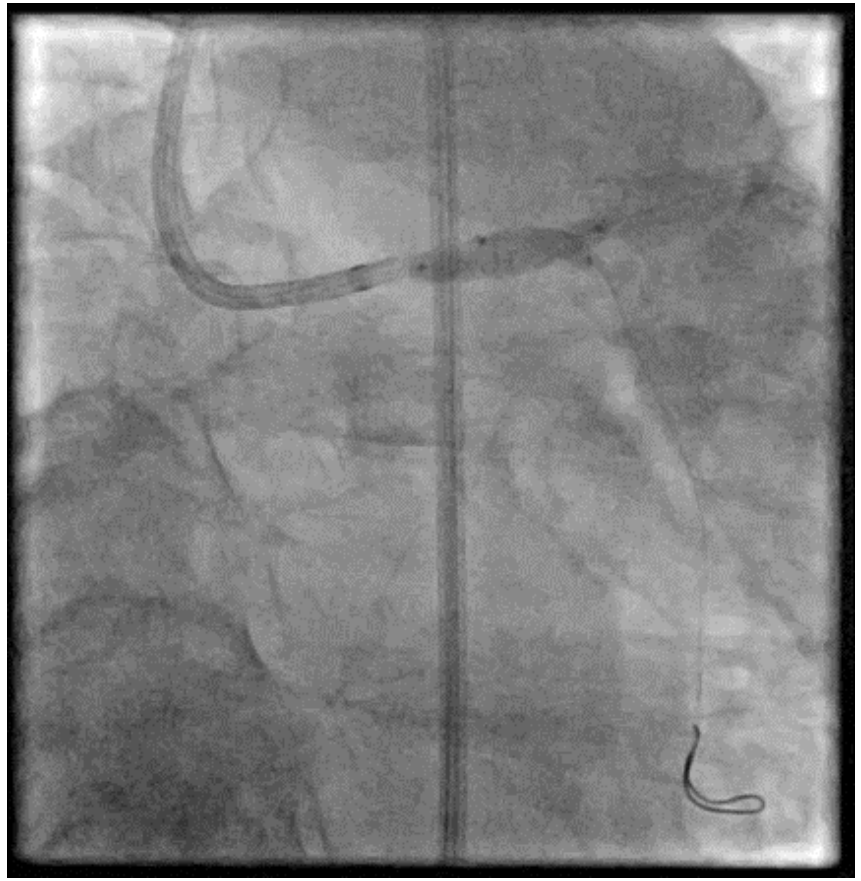


Step 14: Rewiring SB through MV stent

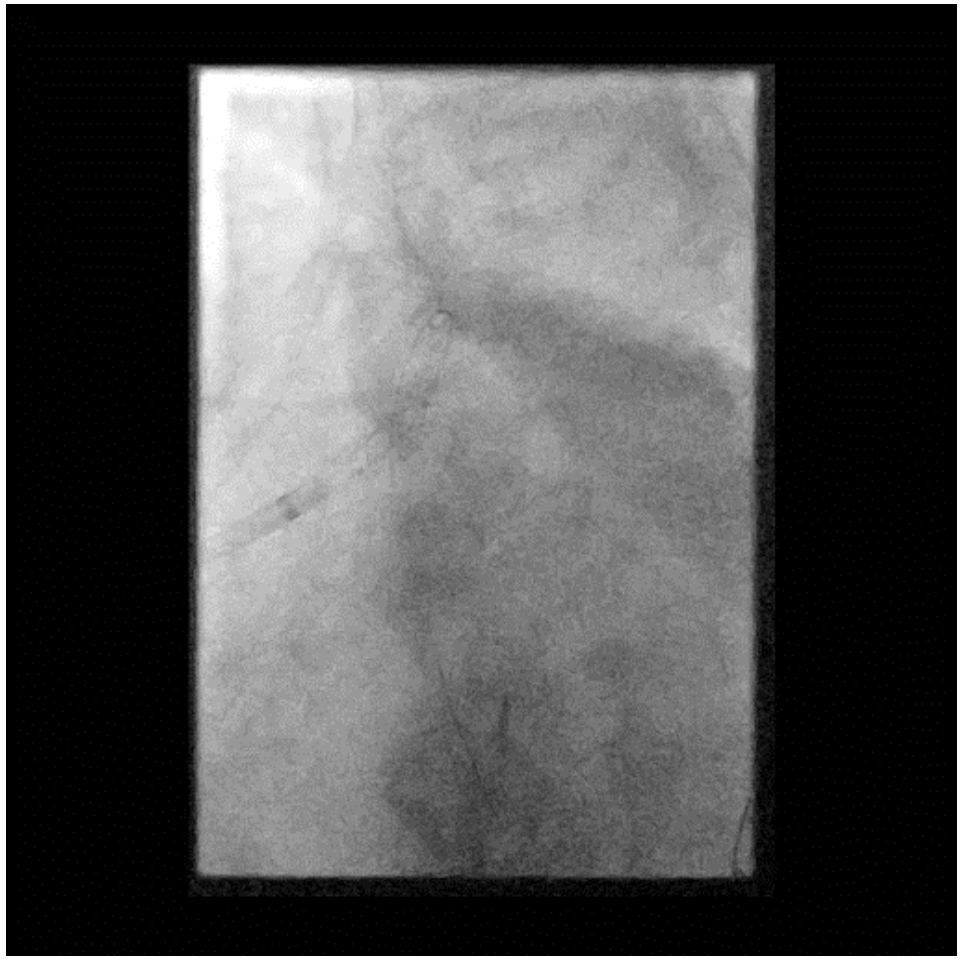


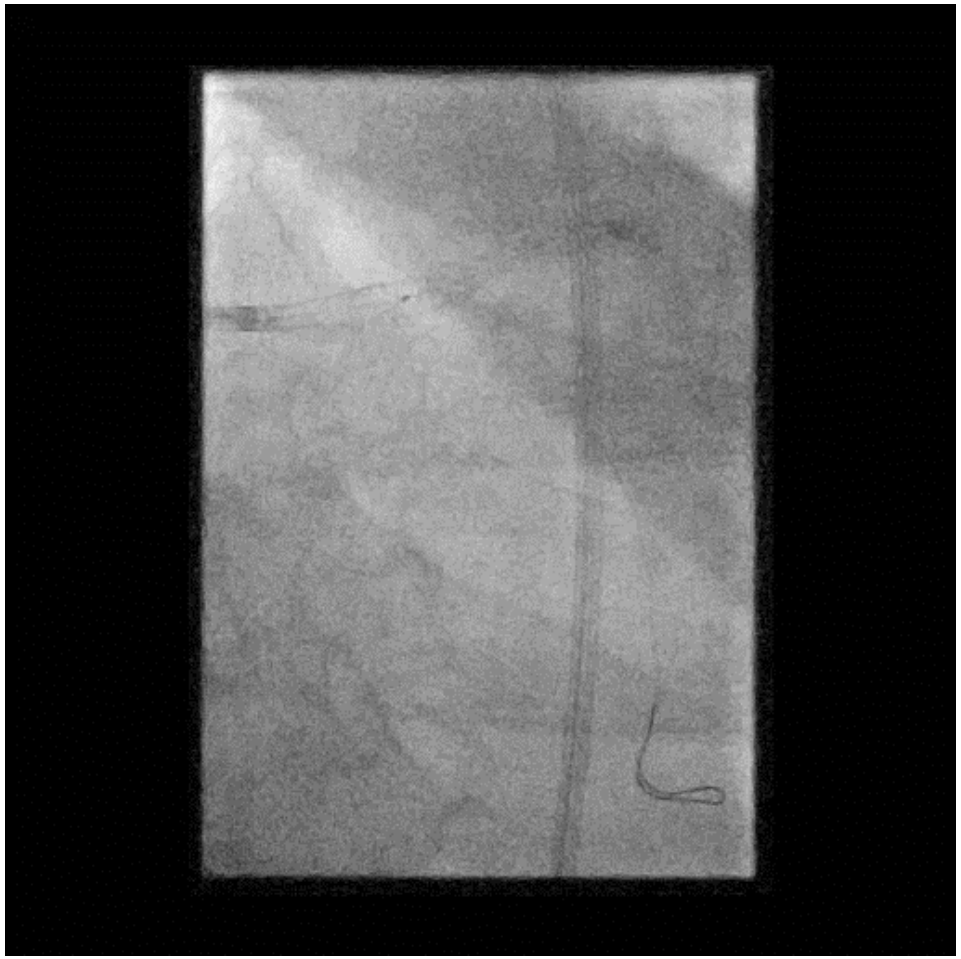


Step 15: Second Kissing Balloon Inflation: patient developed transient hypotension

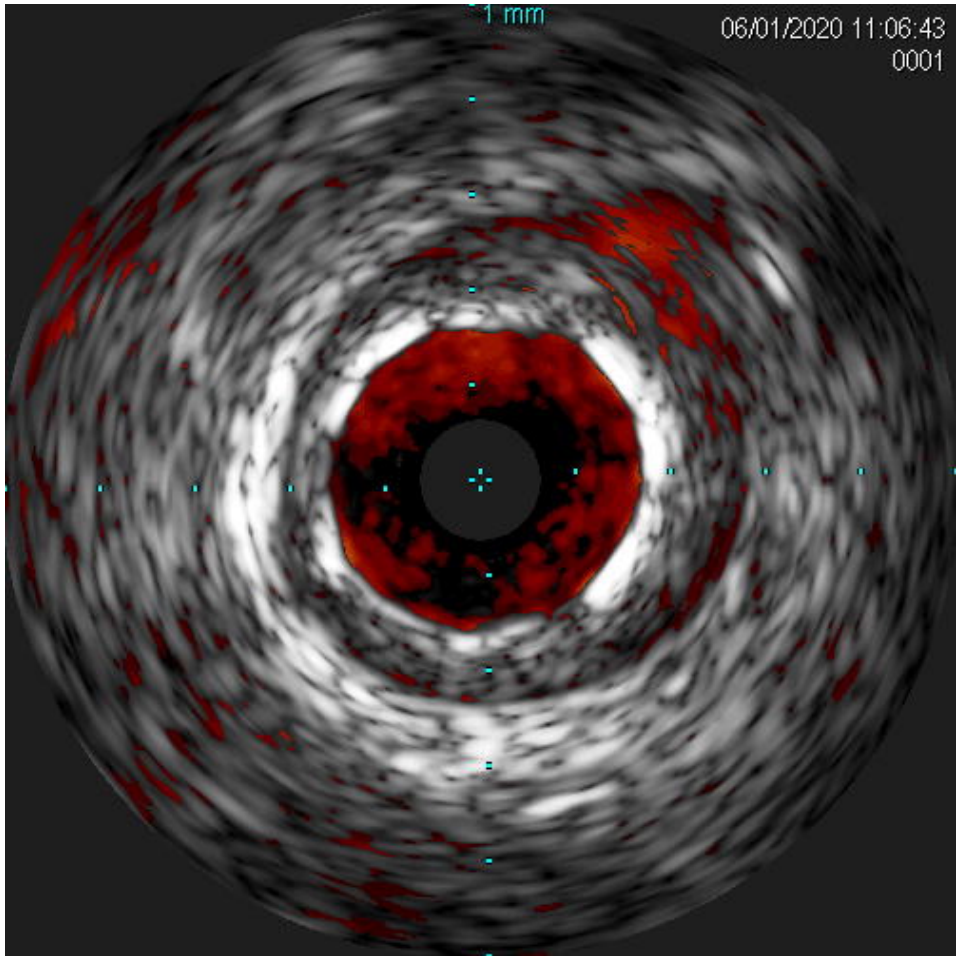


Step 16: 2nd POT
(to maintain circular geometry through the bifurcation)





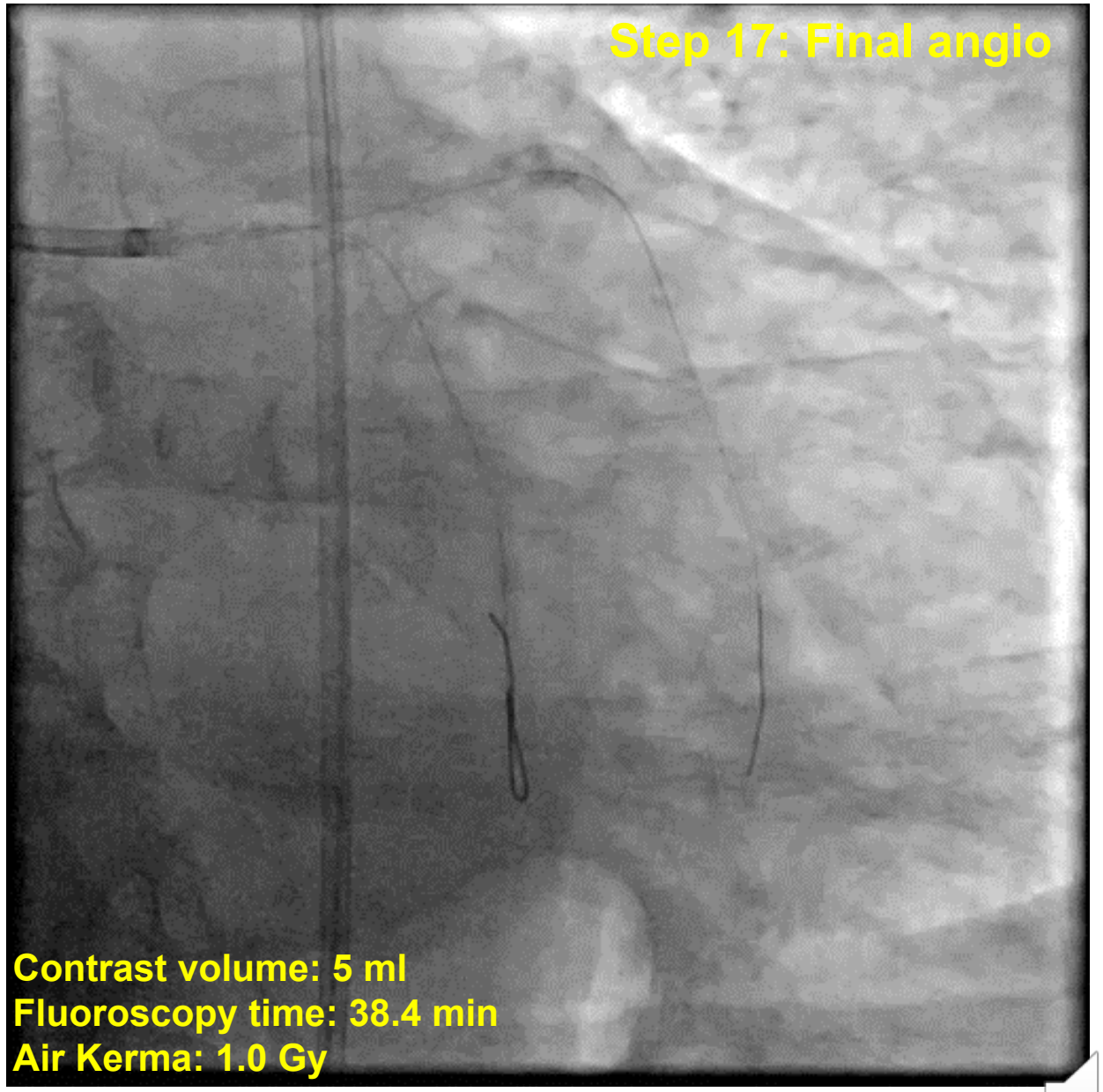
Final IVUS



Conclusions

1. Nonagenarian patients with CKD are at high risk for contrast induced nephropathy and need for hemodialysis after PCI

2. “Ultra-low contrast” IVUS guided DK-Crush PCI can be performed even in complex left main bifurcation lesions.



Clinical course

- Patient was discharged 2 days after the procedure.
- At 5 days post-discharge follow up, he reports no symptoms and his creatinine was stable at 1.5 mg/dl.

	1 6/8/2020 1027	2 6/3/2020 0658	3 6/2/2020 1914	4 6/2/2020 1315	5 6/2/2020 0630
CHEMISTRY, COMMON					
SODIUM	140 *				143
POTASSIUM	4.4 *	3.8	4.0	3.6	3.4
CHLORIDE	106 *				111
CO2,TOTAL	28 *				24
ANION GAP	6 *				8
GLUCOSE	98 *				119
CALCIUM	7.9 *				8.1
BUN	12 *				36
CREATININE	1.50 *	1.42			1.53
BUN/CREAT RATIO ...	8 *				24
GFR if African Ame...	53 *	57			52
GFR if not African...	44 *	47			43
MAGNESIUM		2.3			

Double-Kiss-Crush Bifurcation Stenting: Step-by-Step Troubleshooting

jaa
Just accepted article

EuroIntervention

Title: **Double-Kiss-Crush Bifurcation Stenting: Step-by-Step Troubleshooting.**

Authors: Allison B. Hall, M.D; Ivan Chavez, M.D; Santiago Garcia, M.D; Mario Gössl, M.D; Anil Poulose, M.D; Paul Sorajja, M.D; Yale Wang, M.D; Yves Louvard, M.D; Yiannis S. Chatzizisis, M.D, PhD; Subhash Banerjee, M.D; Iosif Xenogiannis, M.D; M. Nicholas Burke, M.D; Emmanouil S. Brilakis, M.D

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