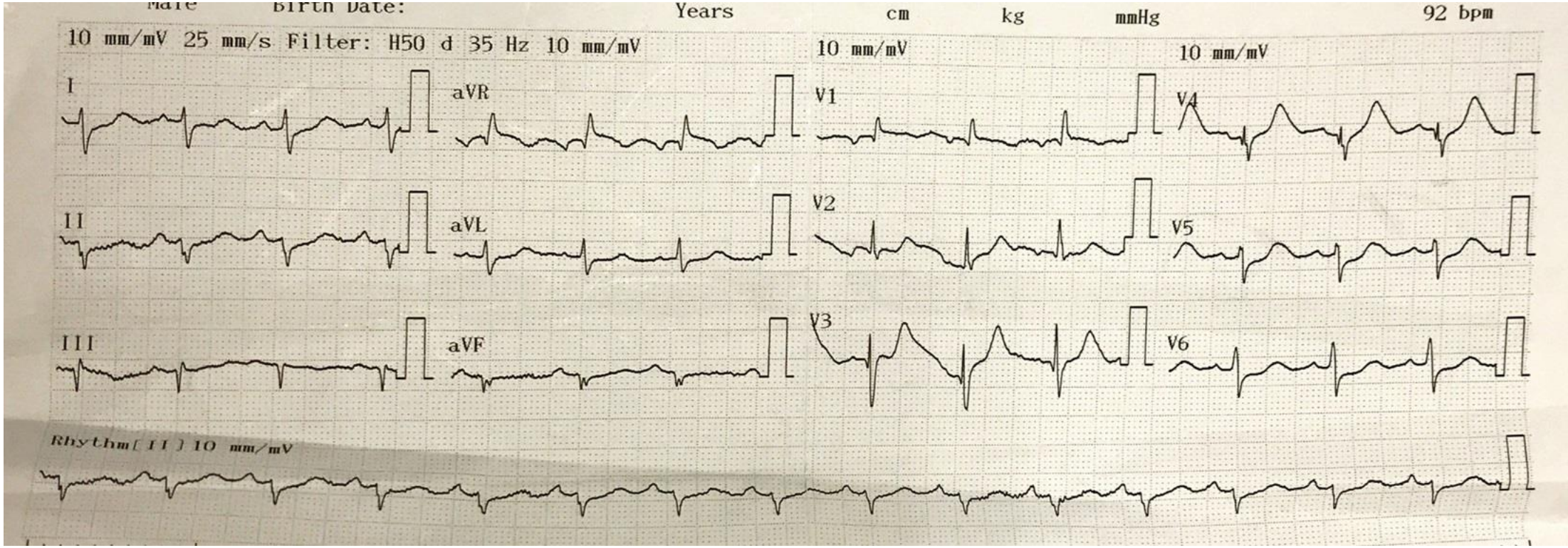
HOW TO CONQUER AND SIMPLIFY A C.H.I.P: CASE BASED

Hung M. NGO, MD, PhD, FACC, FAPSIC, FSCAI

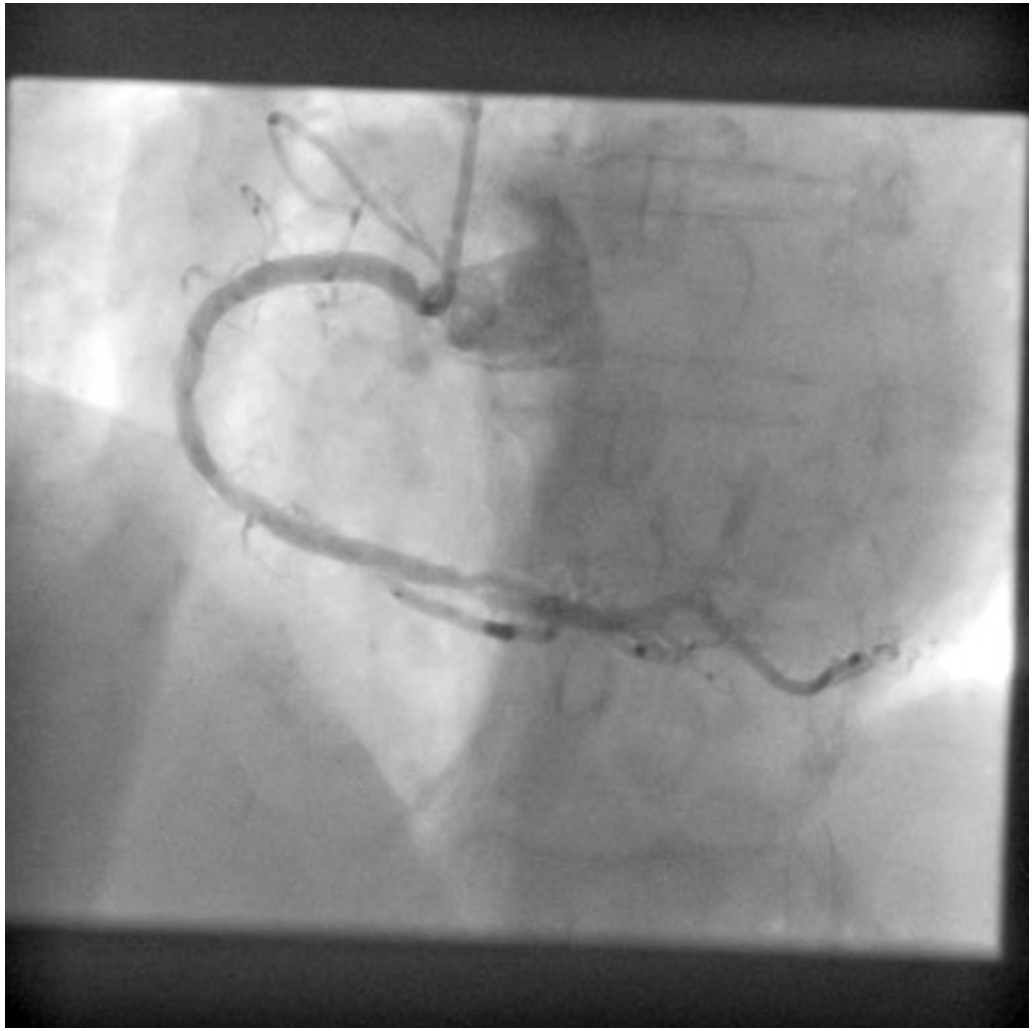
Clinical Case

- 82-year-old female
- CVRFs: HT, Dyslipidemia, DM2
- BMI: 20
- Past medical history: LMCA and TVD 2019 (RCA stented)
- Current Dx: NSTEMI (Killip 2), HT, DM2, Dyslipidemia
- ECG: Normal sinus rhythm, ST depressed at V1-V6, ST elevated at aVR
- EF: 35% RWMA detected globally

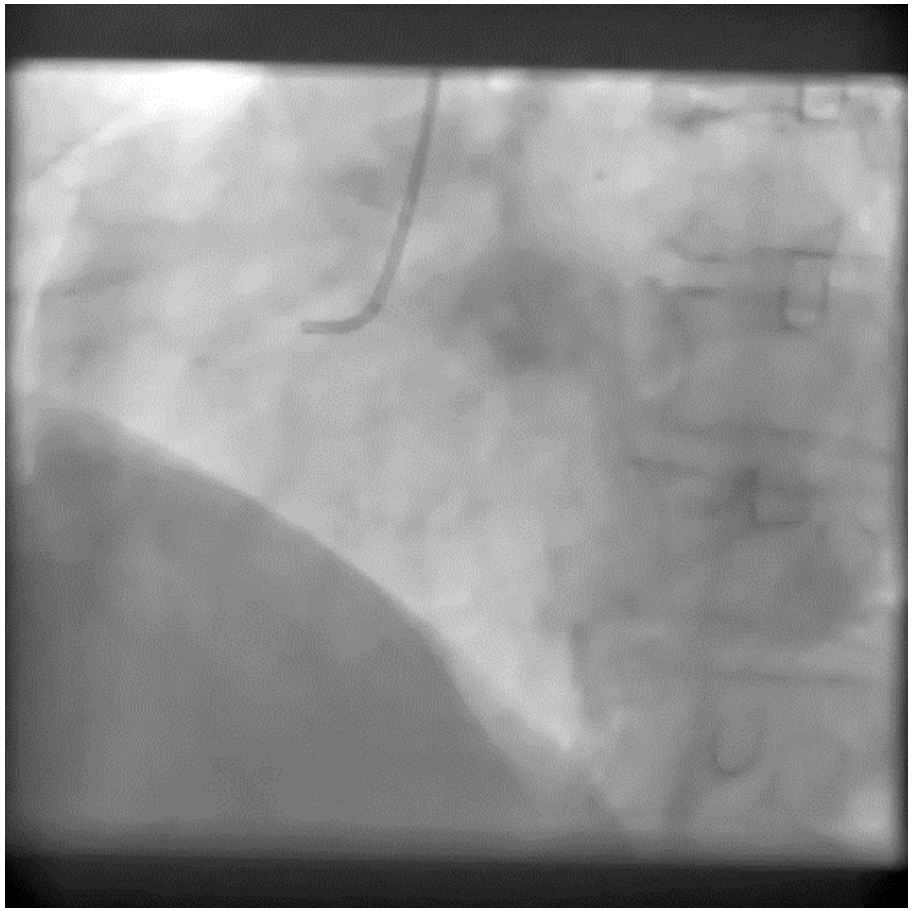
ECG 1

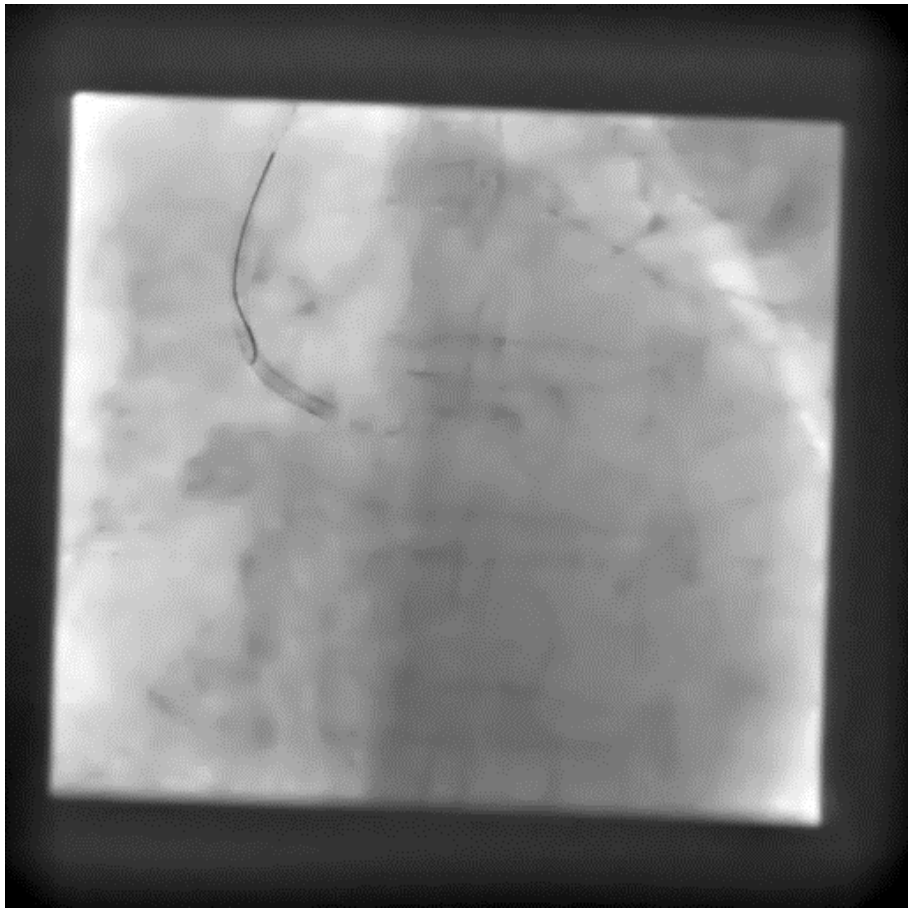

Male
Birth Date:
Years
cm
kg
mmHg
92 bpm
10 mm/mV 25 mm/s Filter: H50 d 35 Hz 10 mm/mV
10 mm/mV
10 mm/mV
I
aVR
V1
V4
II
aVL
V2
V5
III
aVF
V3
V6
Rhythm[II] 10 mm/mV

CAG



CAG





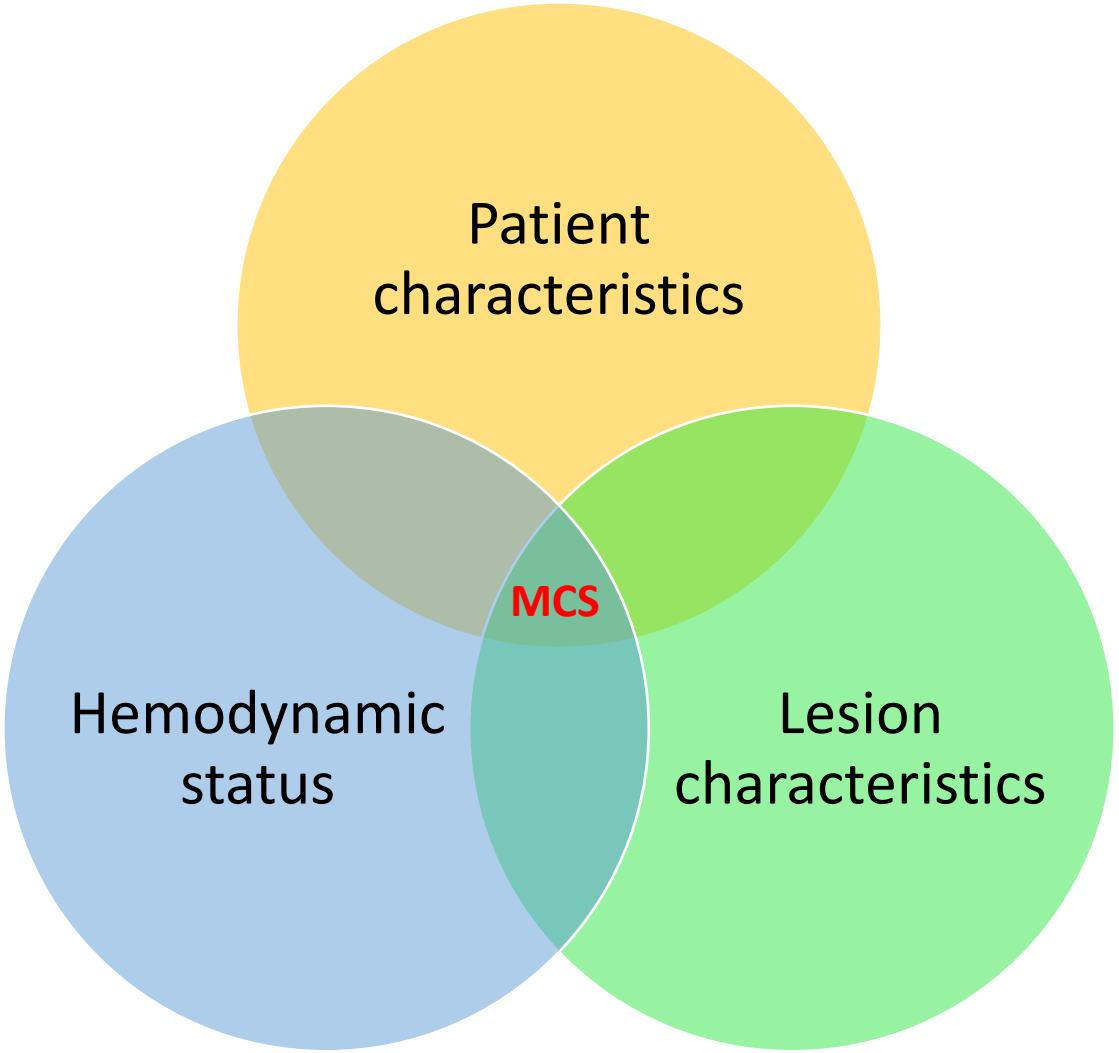
CHIP

Patient specific risk factor
Diabetes mellitus
Chronic lung disease
CKD
Prior MI
Reduced LVEF
PAD
Advanced age
Frailty

Hemodynamic Status
ACS
Symptomatic HF
Arrhythmias (aFib, VFib) underlying valvular lesions, eg. severe aortic stenosis)

Lesion
Unprotected left main stenosis,
Heavy calcified or diffuse disease,
True bifurcation lesions (Medina 1/1/1, 1/0/1, and 0/1/1),
Saphenous vein graft lesions,
CTOs (Retrograde)
Last remaining vessel

CHIP


Patient characteristics
MCS
Hemodynamic status
Lesion characteristics

LMCA DISEASE WITH SEVERE CALCIFICATION AND CTO LAD

- Good candidate for OPCAP
- STS and EURO risk score are high

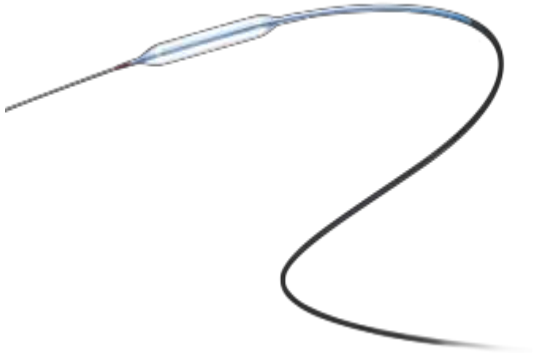
Q1: What should I do?

- The patient was not keen on CABG and preferred PCI or OMT (if PCI was not an option). The surgeon also refused to perform CABG.

Lesion preparation by plaque type

Soft/fatty — Fibrotic — Calcific

Optimize stent placement



POBA

Avoid Slippage

WOLVERINE™ Cutting Balloon Device

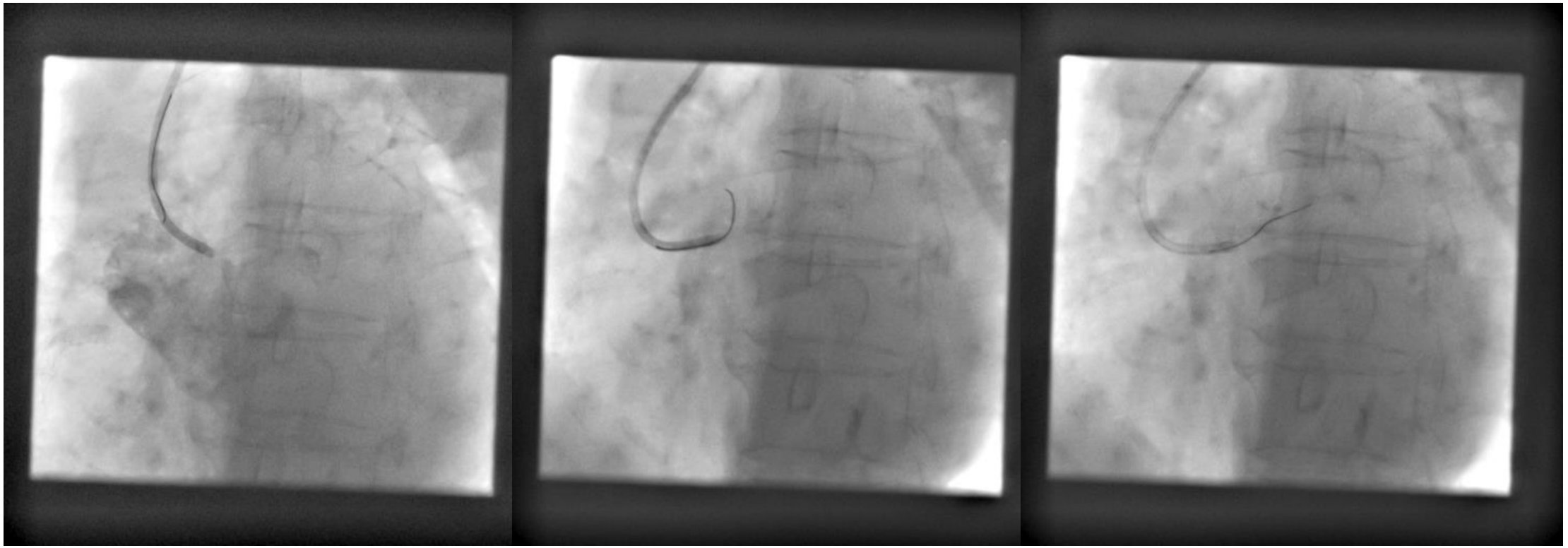
Avoid Plaque Shift

IVL, OA

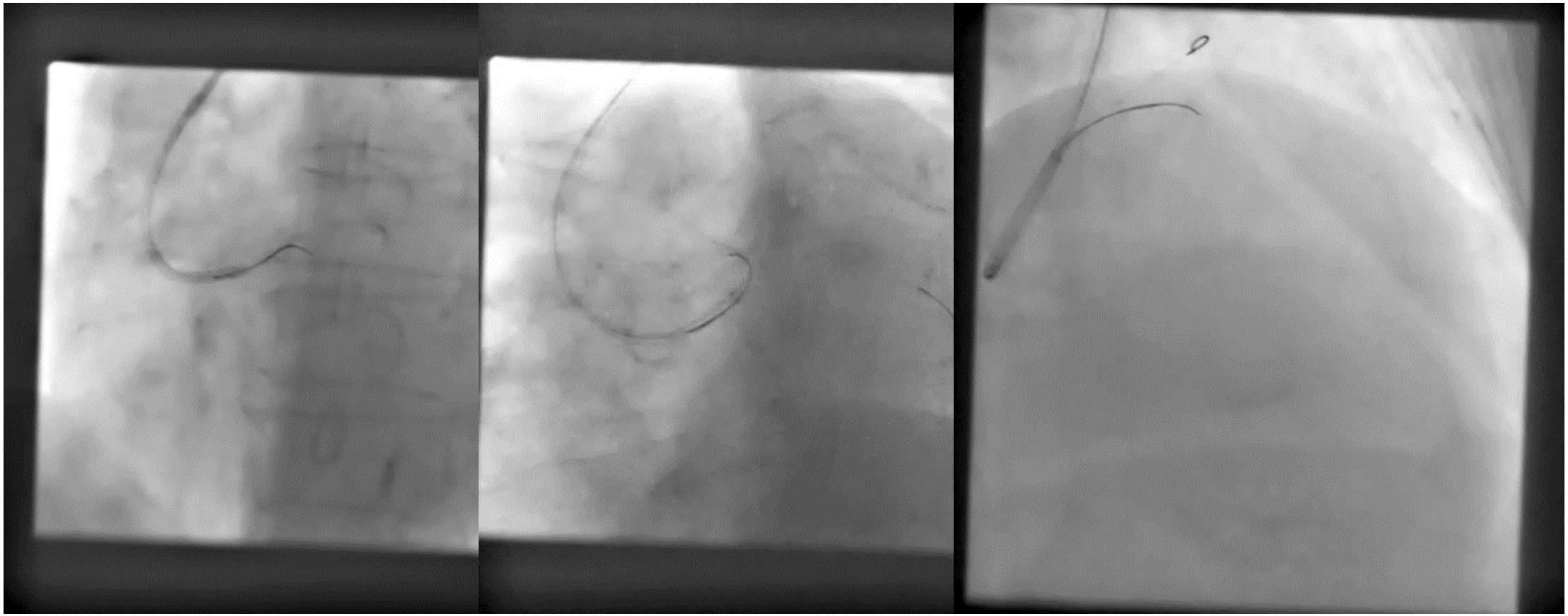
Change Lesion Compliance

Rotational Atherectomy

LMCA PCI: UNABLE TO CANNULATE GC



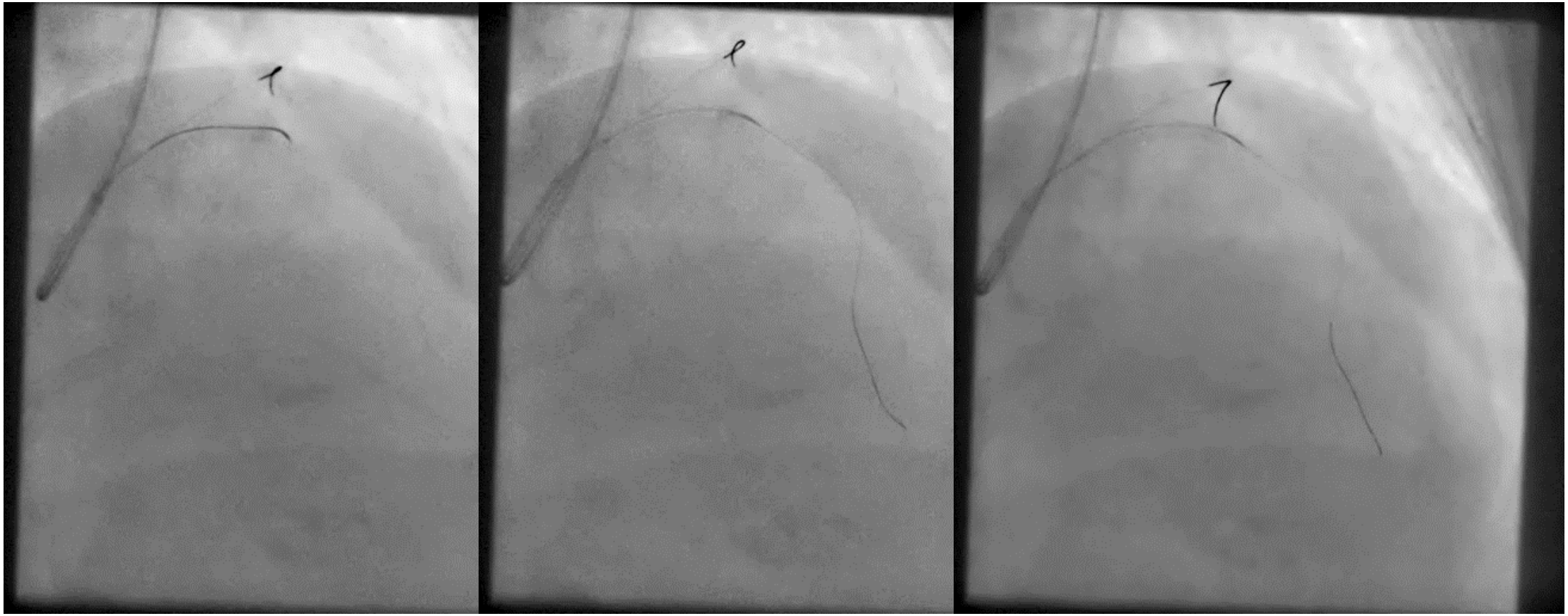
LMCA WIRING



ISSUES TO DEAL WITH

- Severe stenosis of LMCA with severe calcification
- Severe stenosis at pLAD and D1
- CTO mLAD

CTO PCI



Q2: How do we do plaque modification?

A. Non-compliance balloon
B. Cutting balloon
C. Compliance balloon
D. RA/Orbital/DCA
E. IVL

Efficacy and Safety of Rotational Atherectomy for un-crossable and/or un-dilatable coronary lesions with very severe calcification

Abstract

Background: *We usually have to accept failure when we can't cross severely calcified coronary lesions with smallest balloons and/or dilate them sufficiently.*

Objects and Method: *To examine the safety and efficacy of rotational atherectomy (RA) for un-crossable and/or un-dilatable severely calcified coronary lesions. This is an interventional and prospective study with in-hospital follow-up.*

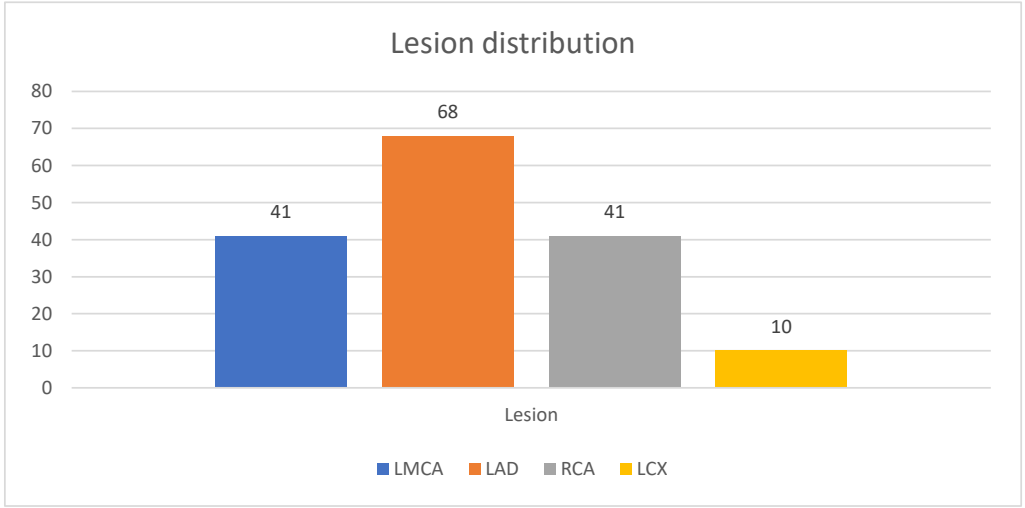
Results: *We enrolled 160 patients with mean age 70.10 ± 8.59 (yrs), in which 93 (58.1%) male patients. Lesion Stenosis and lesion length were 90.26 ± 5.90% and 56.13 ± 21.13 mm respectively and calcium classification was 3(+). 1.25mm, 1.5mm and 1.75mm burrs using for ablating are 125 (78.1%), 33 (20.6%) and 2 (1.3%) respectively. RA procedures were successfully performed for 157/160 (98.10%) patients. Mean runs to cross lesions are 4.34 runs with ablating time of 51.28 ± 47.10 (seconds) and at mean speed of 179,836 ± 11,771 rpm. Mean procedure time was 113.27 ± 42,95 mins and mean contrast volume was 175.76 ± 64.76 (ml). There were 3 complicated cases (1 case with severe dissection and 2 cases without any significant progress after ablating for more than 10 mins.*

Conclusions: *Rotational Atherectomy is safe and effective for un-crossable and/or un-dilatable severely calcified coronary lesions. This technique is highly invasive one, therefore, it should be performed by high volume centers and experienced operators and teams.*

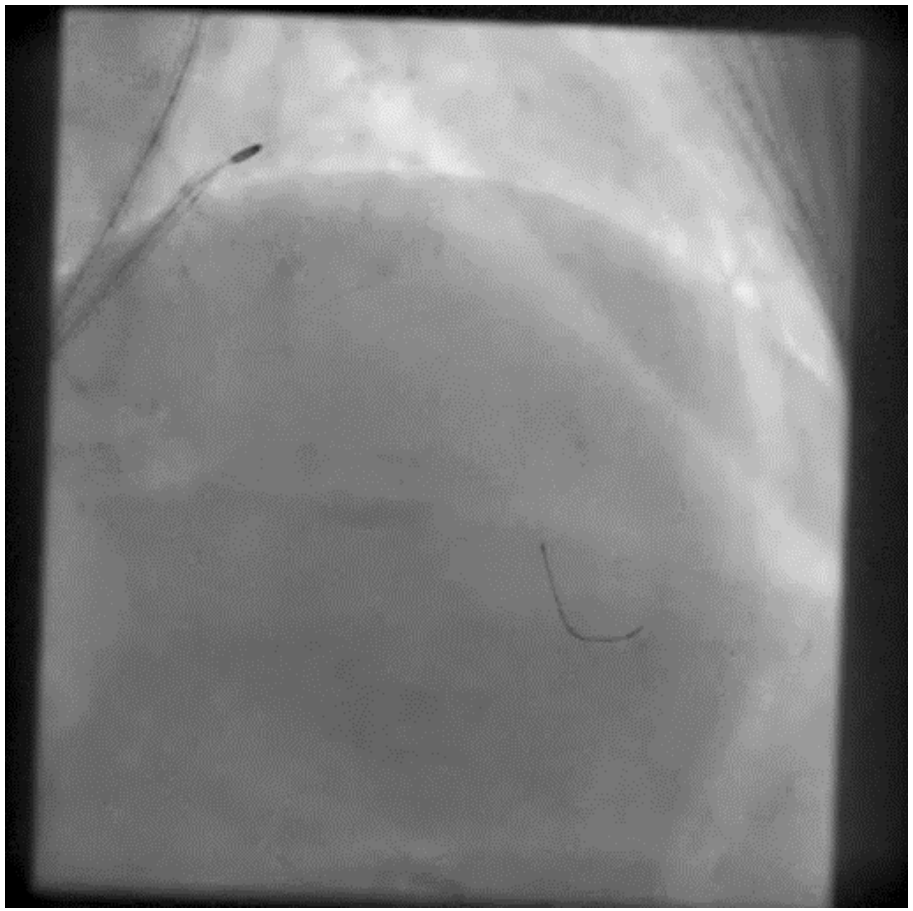
Ngo Minh Hung *et al. (2022) Efficacy and Safety of Rotational Atherectomy for Un-Crossable and/or Un-dilatable Coronary Lesions with Very Severe Calcification. Ho Chi Minh City Journal of Medicine 2022; Vol. 26 No. 2:255-264.*

Indication and lesion distribution

Indication	*n*	*%*
STEMI	*8*	*5*
NSTEMI	*16*	*10*
UA	*16*	*10*
Stable angina	*120*	*75*

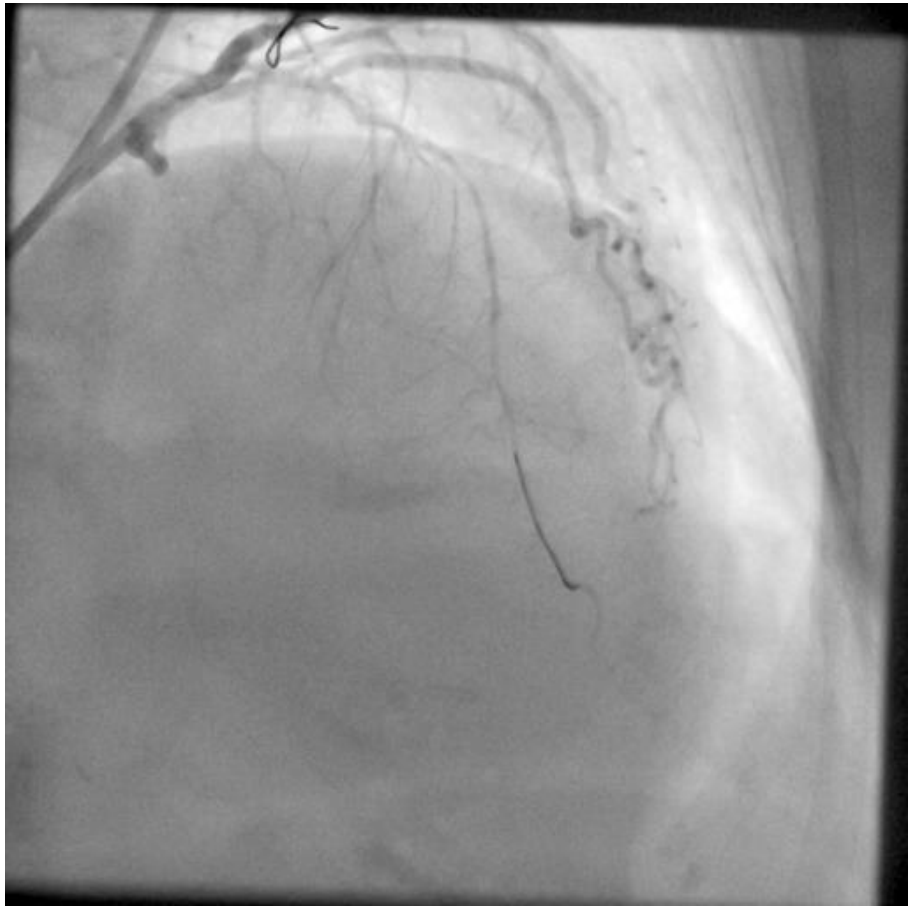


ROTATIONAL ATHERECTOMY



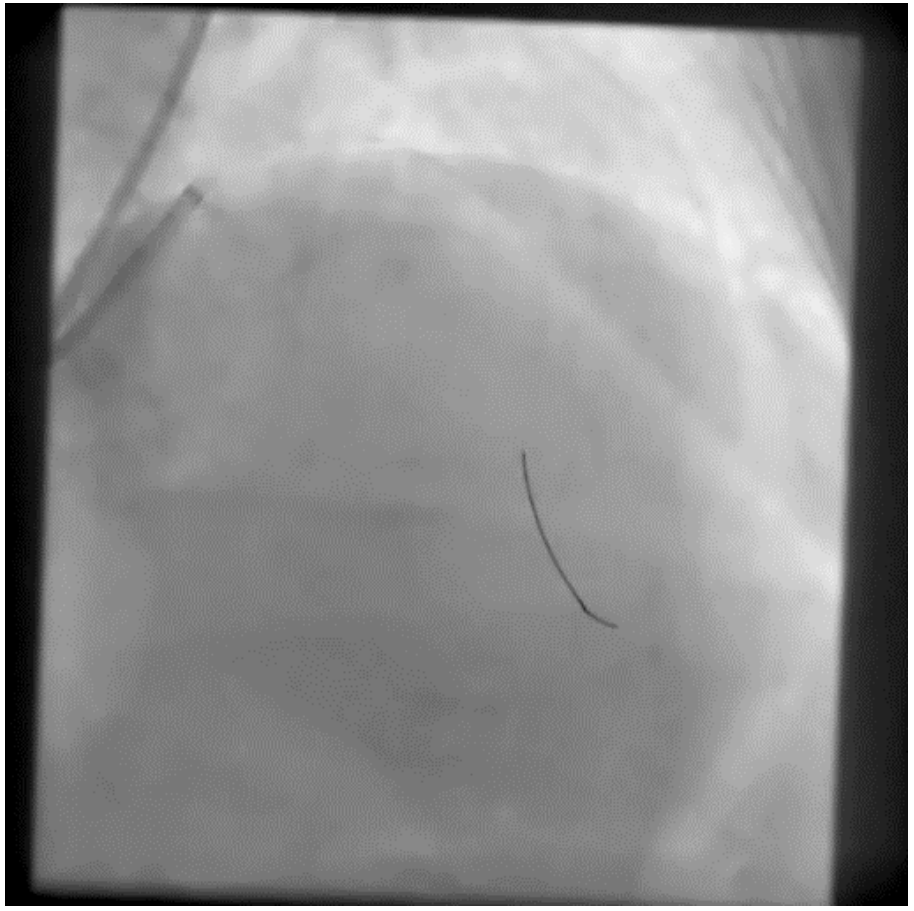
Ngo Minh Hung *et al. (2022) Efficacy and Safety of Rotational Atherectomy for Un-Crossable and/or Un-dilatable Coronary Lesions with Very Severe Calcification. Ho Chi Minh City Journal of Medicine 2022; Vol. 26 No. 2:255-264.*

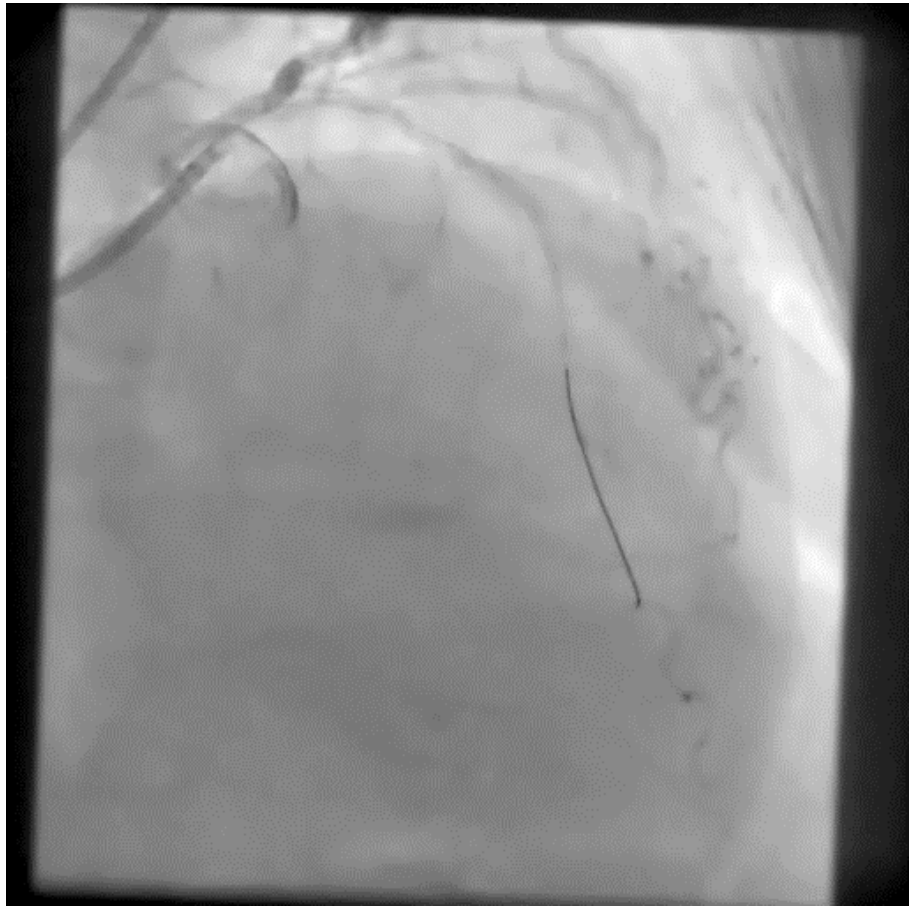
POBA (NC Balloon, and OPN)



Ngo Minh Hung *et al. (2022) Efficacy and Safety of Rotational Atherectomy for Un-Crossable and/or Un-dilatable Coronary Lesions with Very Severe Calcification. Ho Chi Minh City Journal of Medicine 2022; Vol. 26 No. 2:255-264.*

STENTING FOR DISTAL LAD





Q3: What should we do next?

- To protect the D1 (viable): ONE VS TWO-STENT STRATEGY

Should we choose less complex?

- For
  - The simpler technique is, the easier the DAPT is
  - Less work for operators
- Against
  - Risk of losing branches
  - Risk of optimizing
  - Risk of failure or regret PCI

SAFETY AND EFFICACY OF PROTECTION BALLOON TECHNIQUE IN PROTECTING SIDE-BRANCH DURING BIFURCATION PCI

Background: *True bifurcation lesions are common in clinical practice. Carina and/or plaque usually shift and cause stenosis or occlusion of side branch during main vessel PCI. There are several methods to protect ostium and normal flow of side branch.*

Object: *To study the role of protective balloon technique in protecting side branch for true bifurcation lesion PCI.*

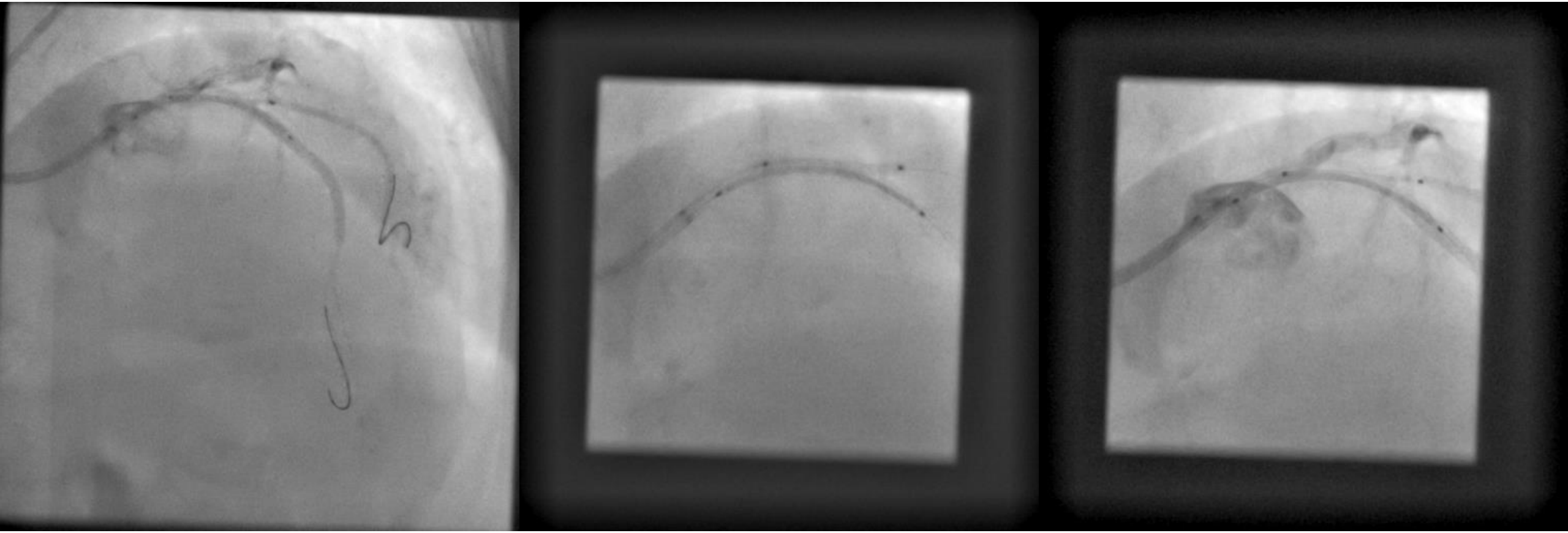
Method: *This is an interventional study without comparation group*

Results: *The study enrolled 43 patients in which mean age was 65.07 ± 11.05 (years) and male patients were account for 27/43 (62.8%). Forty-three patients with Medina (1-1-1) or (0-1-1) were performed jailed balloon techniques for protecting side branches. Mean stenosis of side branch was 90% and main vessel was 86.16 ± 9.99%. Distribution of lesions were diagonal branch (72.1%); obtuse marginal (11.6%); left circumflex (9.3%); posterior descending artery (4.7%) and major septal (2.3%). Success rate was 97.67%. There were no complications relating to the technique noted (balloon stuck, stent deformed…).*

Conclusion: *Protective balloon technique is feasible, safe and effective in protecting side branch without indication for stenting. We should consider this technique to protect small side branch during PCI for true bifurcation with 1 stent strategy.*

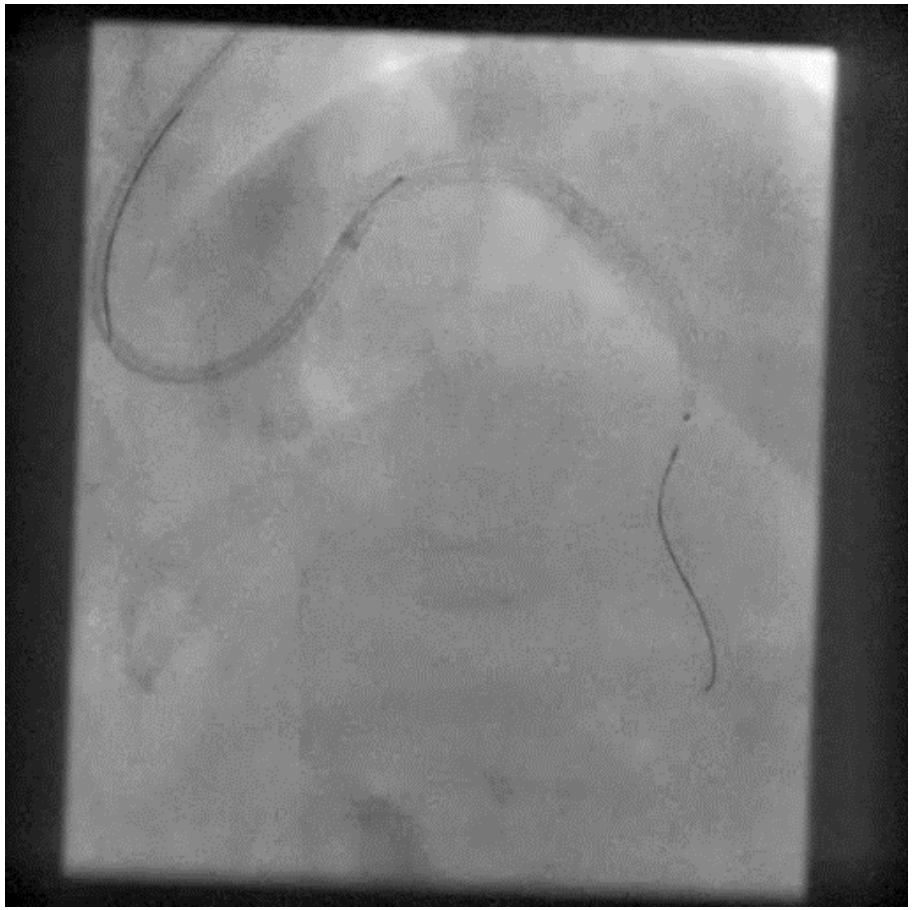
Key words: Protective Balloon Technique (PBT); true bifurcation; side branch

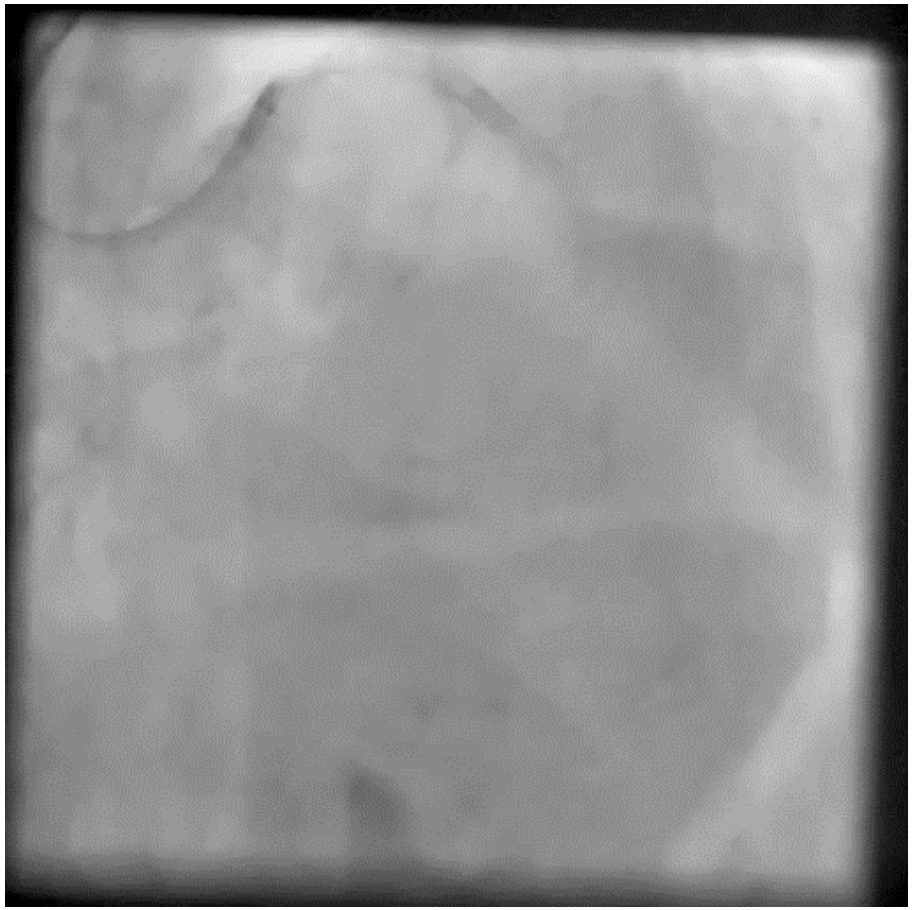
PROTECTION BALOON TECHNIQUE



Ngo Minh Hung *et al. (2022) Efficacy and Safety of Protection Balloon Technique in Protecting Side-Branch During Bifurcation PCI. Ho Chi Minh City Journal of Medicine 2022; Vol. 26 No. 2:284-289.*

IVUS FOR OPTIMIZING THE STENTING





Q4: How about the MCS for CHIP?

- IABP
- ECMO
- Impella CP

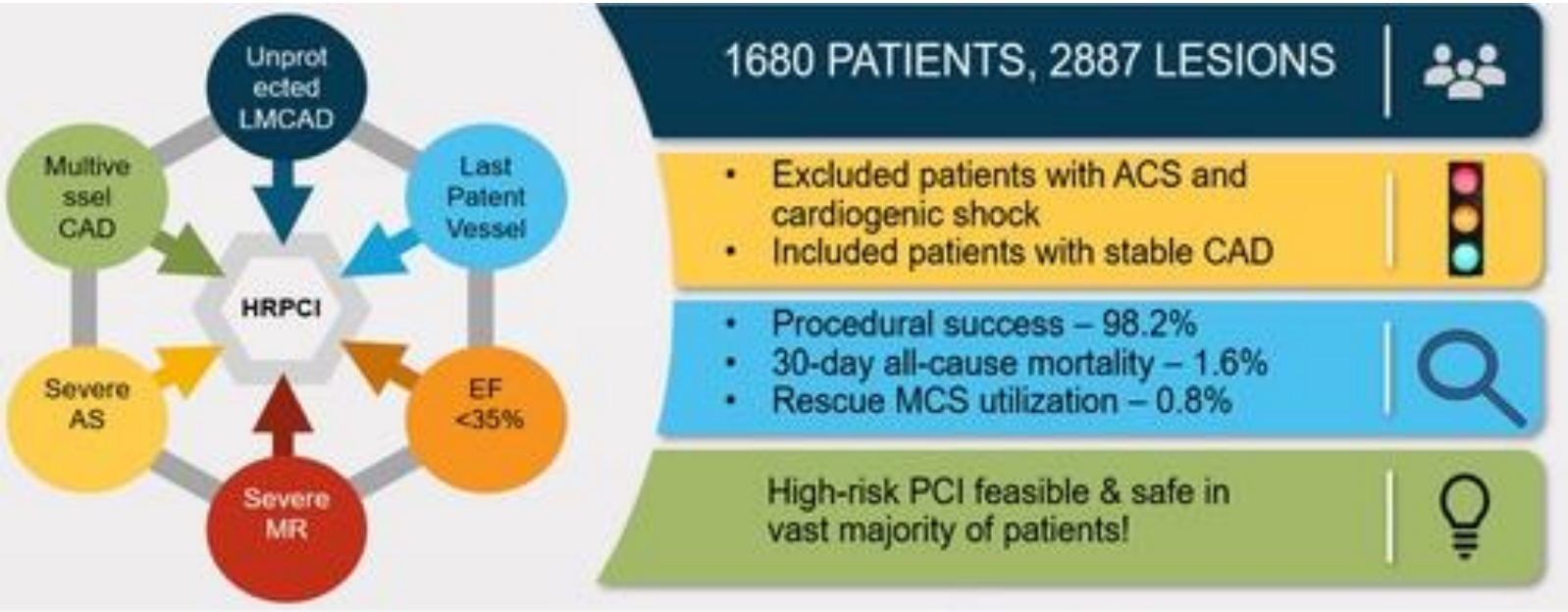
Optimizing Rotational Atherectomy in High-Risk Percutaneous Coronary Interventions: Insights from the PROTECT II Study

Mauricio G. Cohen,[1*] MD, Abhijit Ghatak,[1] MD, Neal S. Kleiman,[2] MD, Srihari S. Naidu,[3] MD, Joseph M. Massaro,[4] PhD, Ajay J. Kirtane,[5] MD, SM, Jeffrey Moses,[5] MD, E. Magnus Ohman,[6] MD, Vladimír Džavík,[7] MD, Igor F. Palacios,[8] MD, Alan W. Heldman,[1] MD, Jeffrey J. Popma,[9] MD, and William W. O'Neill,[10] MD

Objective: To study rotational atherectomy (RA) outcomes in patients undergoing high-risk PCI randomized to receive hemodynamic support using either IABP or Impella 2.5 in the PROTECT II trial. Background: RA of heavily calcified lesions is often necessary for complex PCI but can be associated with slow-flow, hypotension, and higher risk of periprocedural MI. Methods: We compared baseline, angiographic, procedural characteristics, and outcomes of patients treated with and without RA. We examined also RA technique and outcomes. Results: RA was used in 52 of 448 patients (32 with Impella

MauricioG.Cohen, et al. CatheterizationandCardiovascularInterventions83:1057–1064(2014)

Feasibility and Safety of High-Risk Percutaneous Coronary Intervention Without Mechanical Circulatory Support



- Rescue MCS was required in 0.8% of the patients.
- Procedural success was observed in 98.2% of the patients, while the 30-day mortality rate was 1.6%. The incidence of major complications was as follows: all-cause mortality, 1.6%; cardiac death, 0.8%; acute renal failure, 4.6%; stroke, 0.2%; and major bleeding, 1.1%

https://doi.org/10.1161/CIRCINTERVENTIONS.120.009960 Circulation: Cardiovascular Interventions. 2021;14:e009960

Take-home message

- *CHIPs are not rare! Calcified or heavy plaque burden LMCA lesions are complex and need a suitable strategy.*
- *Advanced techniques like Rotational Atherectomy, and super-high pressure balloon dilatation are safe and effective for preparing calcified coronary lesions.*
- *Protection balloon technique (with a plain balloon or DEB) should be applied in some situations to minimize stents used and make the procedure simpler.*
- *CHIP could be performed at high-volume centers and experienced operators and teams with or without MCS.*