Managing coronary calcification

Patrick Lim Zhan Yun

Khoo Teck Puat Hospital, Singapore

Disclosure

- Nil of note

Broadly speaking

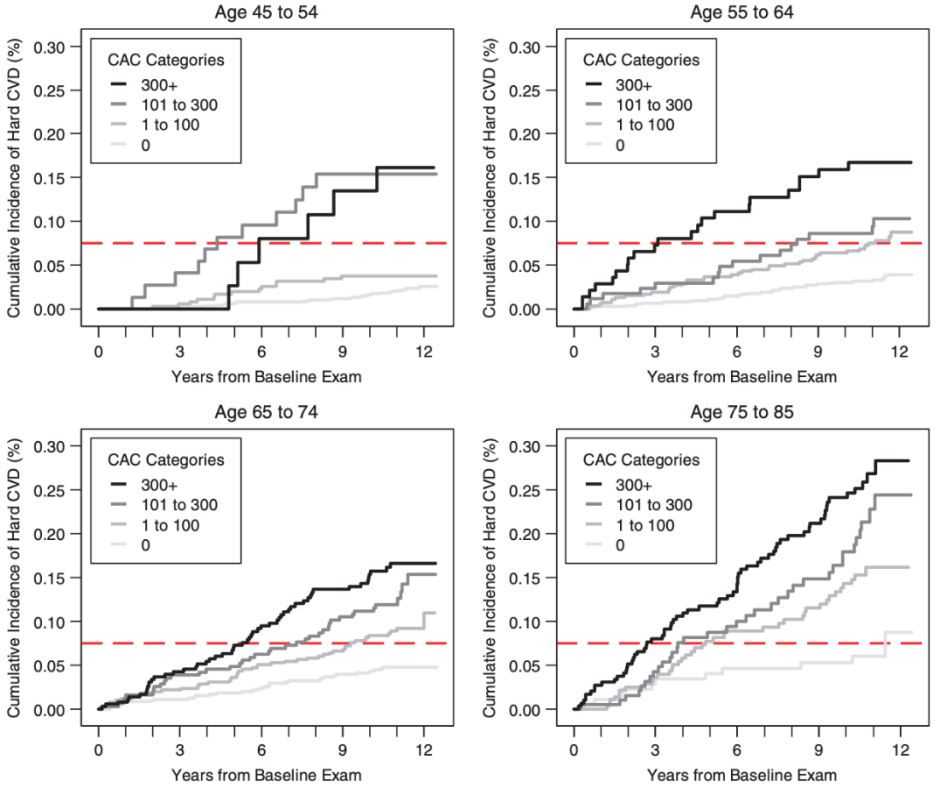
Why does it matter
Identify and characterize
Toolbox

Ten-year association of coronary artery calcium with atherosclerotic cardiovascular disease (ASCVD) events: the multi-ethnic study of atherosclerosis (MESA)

Matthew J. Budoff[1]*, Rebekah Young[2], Gregory Burke[3], J. Jeffrey Carr[4], Robert C. Detrano[5], Aaron R. Folsom[6], Richard Kronmal[2], Joao A.C. Lima[7], Kiang J. Liu[8], Robyn L. McClelland[2], Erin Michos[7], Wendy S. Post[7], Steven Shea[9], Karol E. Watson[10], and Nathan D. Wong[5]

CAC

MACE



N=6,783. Red dashed line shows 7.5% risk.

In Vivo Calcium Detection by Comparing Optical Coherence Tomography, Intravascular Ultrasound, and Angiography FREE ACCESS

Original Research

Xiao Wang, Mitsuaki Matsumura, Gary S. Mintz, Tetsumin Lee, Wenbin Zhang, Yang Cao, Akiko Fujino, Yongqing Lin, Eisuke Usui, Yoshihisa Kanaji, Tadashi Murai, Taishi Yonetsu, Tsunekazu Kakuta, and Akiko Maehara

J Am Coll Cardiol Img. 2017 Aug, 10 (8) 869–879

440 lesions.

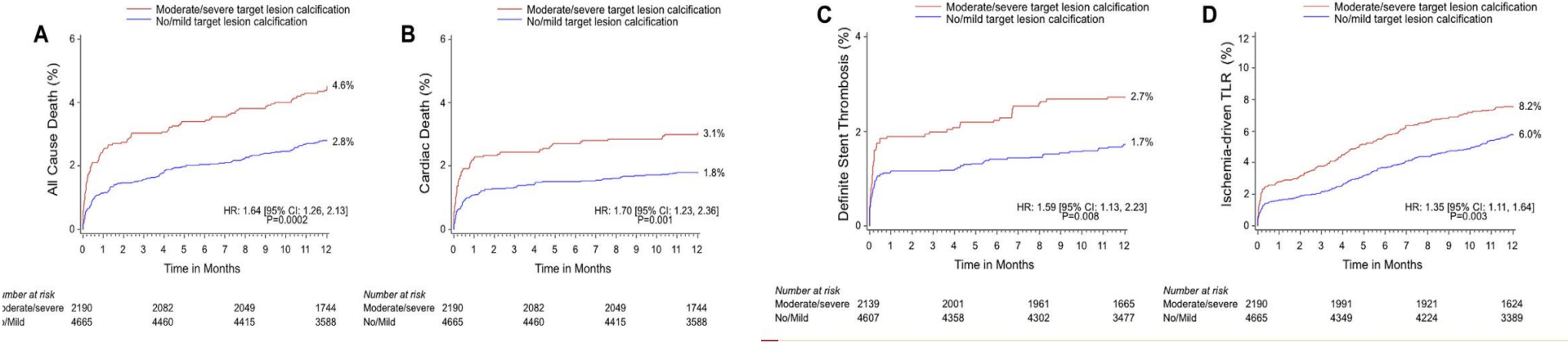
Calcification identified by

Coronary angiogram	40.2%
IVUS	82.7%
OCT	76.8%

Ischemic Outcomes After Coronary Intervention of Calcified Vessels in Acute Coronary Syndromes

Pooled Analysis From the HORIZONS-AMI (Harmonizing Outcomes With Revascularization and Stents in Acute Myocardial Infarction) and ACUITY (Acute Catheterization and Urgent Intervention Triage Strategy) Trials

Philippe Généreux, MD,*†‡ Mahesh V. Madhavan, BA,* Gary S. Mintz, MD,*† Akiko Maehara, MD,*† Tullio Palmerini, MD,§ Laura LaSalle, BA,† Ke Xu, PHD,† Tom McAndrew, MS,† Ajay Kirtane, MD, SM,*† Alexandra J. Lansky, MD,‖ Sorin J. Brener, MD,†¶ Roxana Mehran, MD,†# Gregg W. Stone, MD*†



Increased MACE with PCI in moderate/severe calcium

Intravascular Ultrasound–Derived Calcium Score to Predict Stent Expansion in Severely Calcified Lesions

Mingyou Zhang, Mitsuaki Matsumura, Eisuke Usui, Masahiko Noguchi, Tatsuhiro Fujimura, Khady N. Fall, Zixuan Zhang, Tamim M. Nazif, Sahil A. Parikh, LeRoy E. Rabbani, Ajay J. Kirtane, Michael B. Collins, Martin B. Leon, Jeffrey W. Moses, Dimitri Karmpaliotis, Ziad A. Ali, Gary S. Mintz and Akiko Maehara

Originally published 19 Oct 2021 | https://doi.org/10.1161/CIRCINTERVENTIONS.120.010296 | Circulation: Cardiovascular Interventions. 2021;14

Superficial calcium angle > 270 degrees and longer than 5mm
360 degrees of superficial calcium
Calcified nodule
Vessel diameter < 3.5mm

CLINICAL RESEARCH

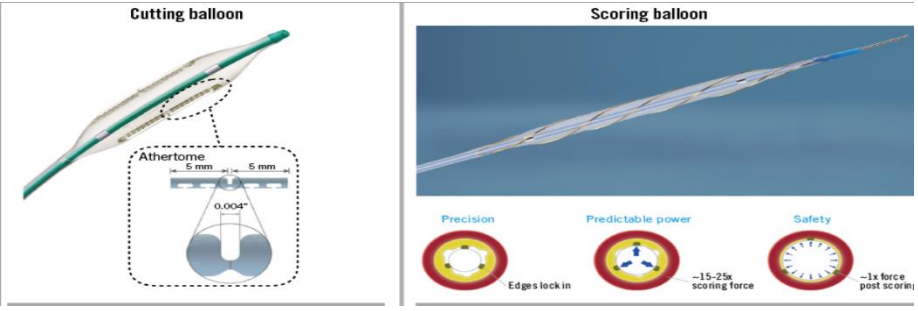
DOI: 10.4244/EIJ-D-17-00962

A new optical coherence tomography-based calcium scoring system to predict stent underexpansion

Akiko Fujino [1,2], MD; Gary S. Mintz [2], MD; Mitsuaki Matsumura [2], BS; Tetsumin Lee [1,2], MD; Song-Yi Kim [1,2], MD; Masahiro Hoshino [3], MD; Eisuke Usui [3], MD; Taishi Yonetsu [3], MD; Elizabeth S. Haag [4], RN; Richard A. Shlofmitz [4], MD; Tsunekazu Kakuta [3], MD, PhD; Akiko Maehara [1,2]*, MD

Calcium max angle > 180 degrees
Calcium max thickness > 0.5mm
Calcium length > 5mm

Balloon based devices



Rotablator

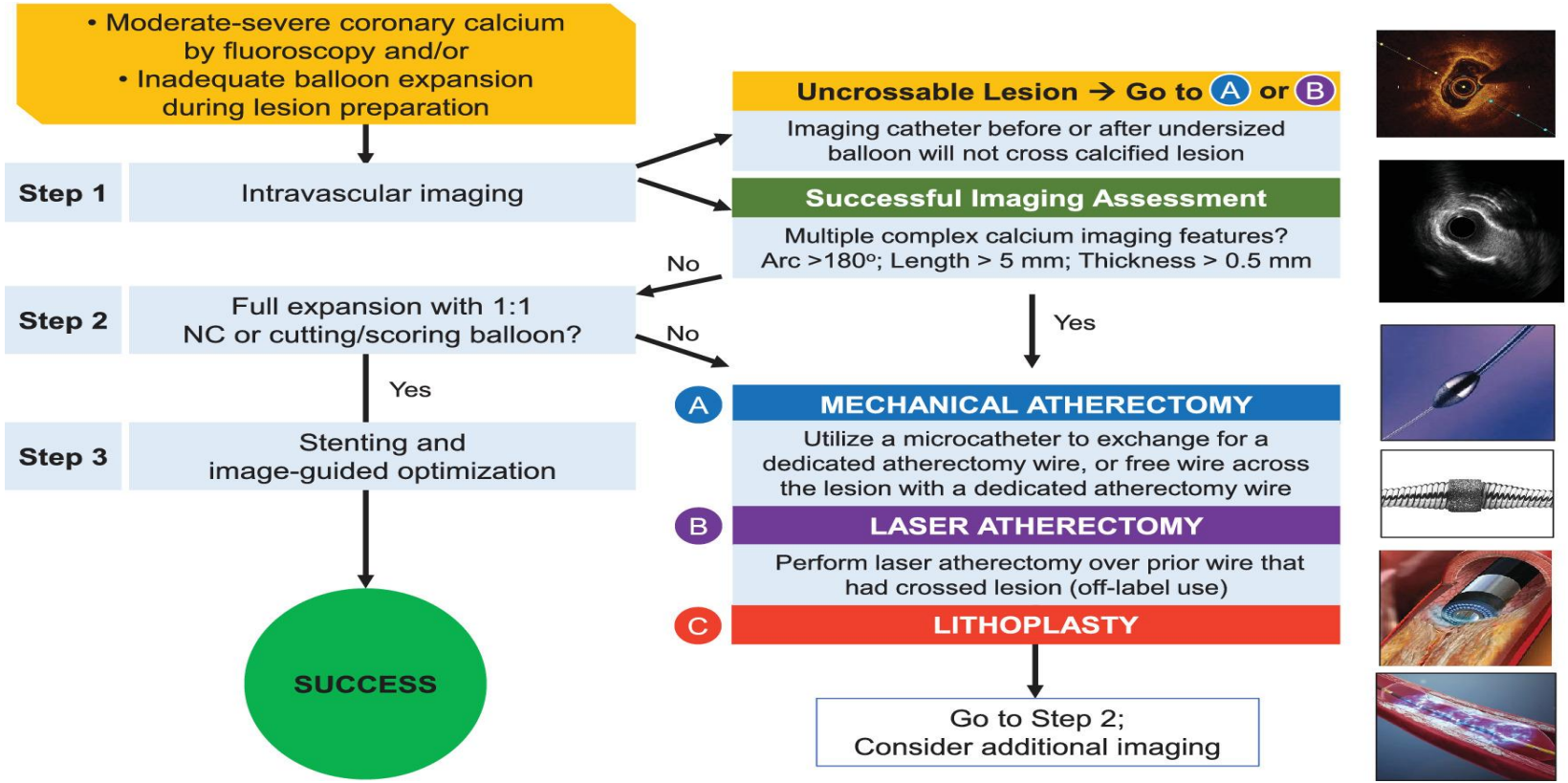
Currently available tools

Orbital

Lithotripsy

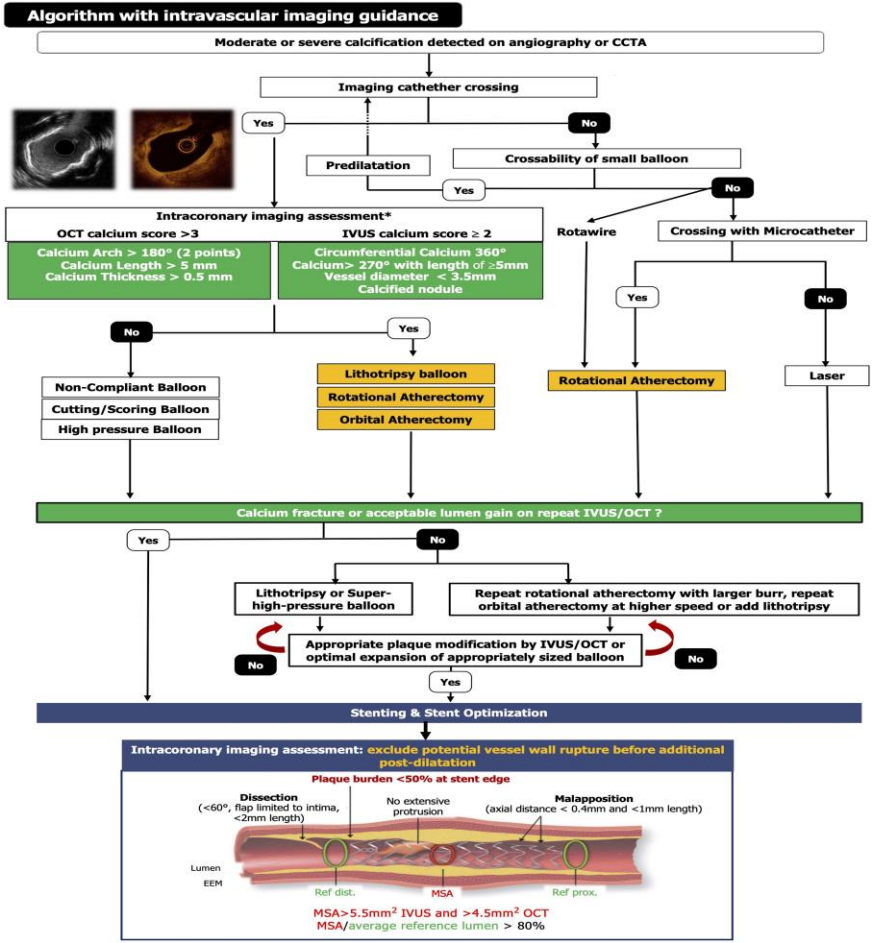
Laser

SCAI position statement on optimal percutaneous coronary interventional therapy for complex coronary artery disease



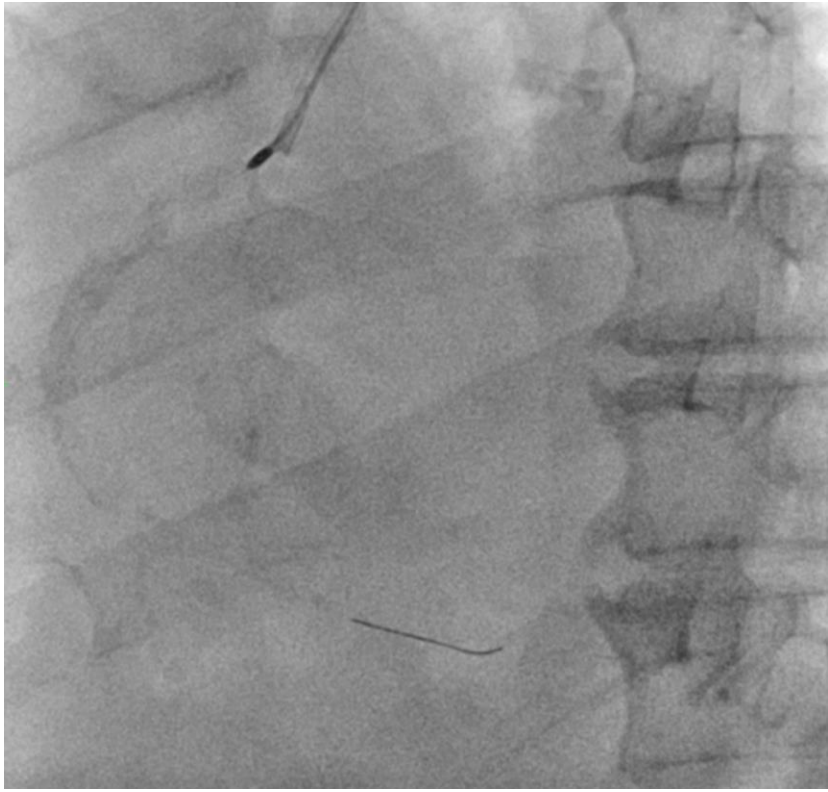
Cathet Cardio Intervent, Volume: 96, Issue: 2, Pages: 346-362, First published: 14 May 2020, DOI: (10.1002/ccd.28994)

EAPCI 2024 Optimal interventional management of calcified lesions based on intravascular imaging

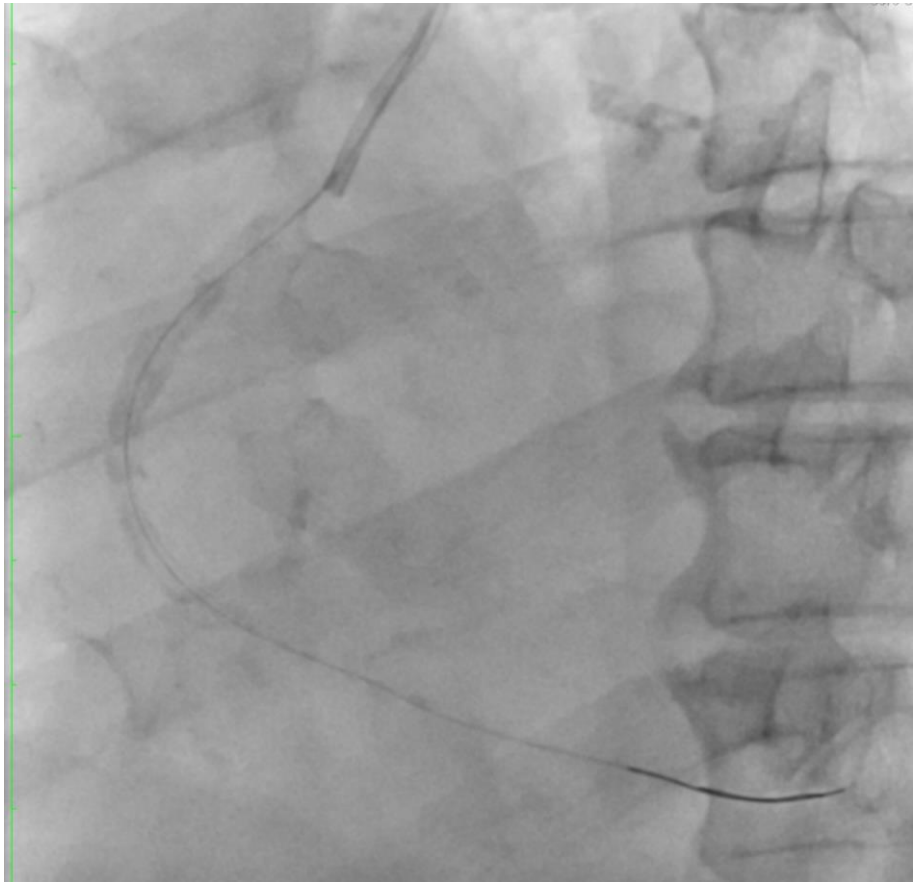


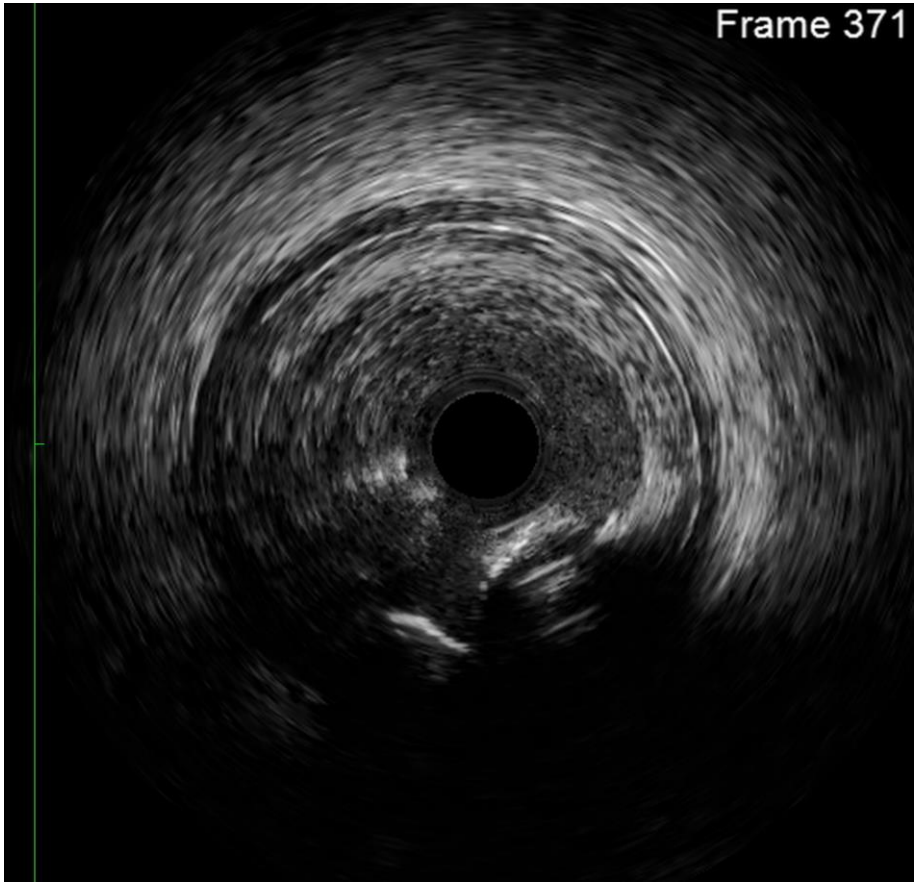
Eur Heart J, Volume 44, Issue 41, 1 November 2023, Pages 4340–4356, https://doi.org/10.1093/eurheartj/ehad342

Case 1- 70M, ESRF, LVEF 25%

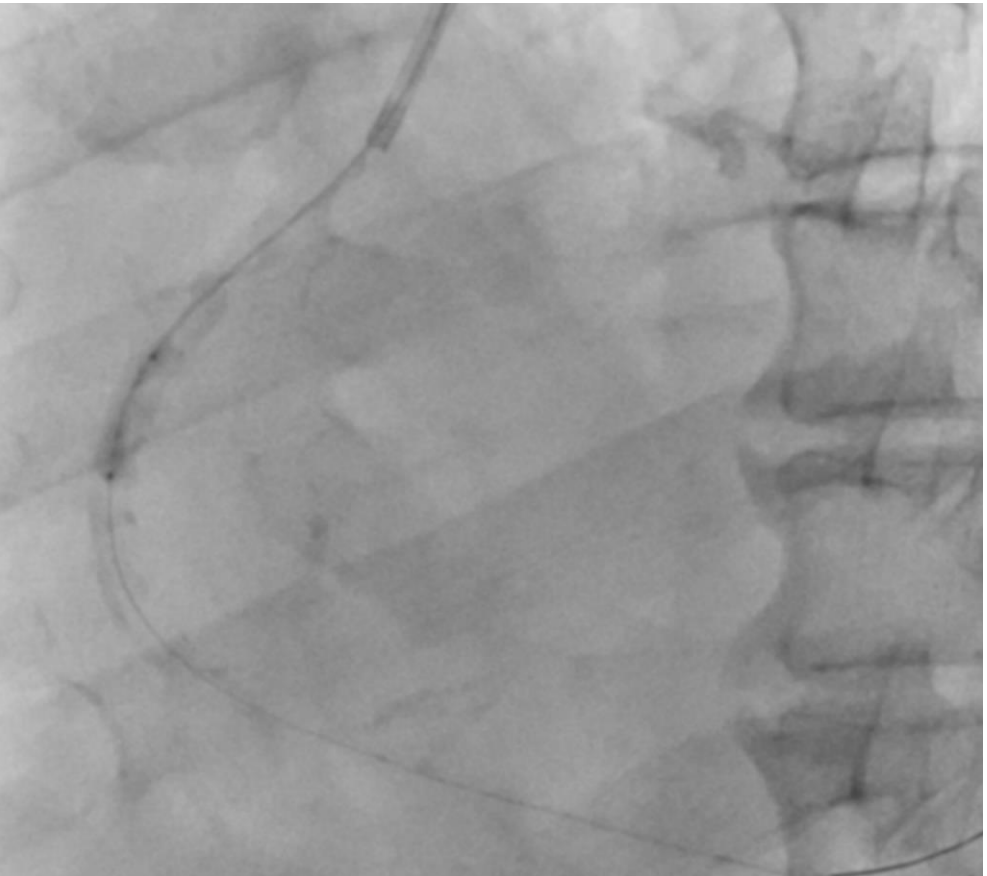


After initial lesion prep

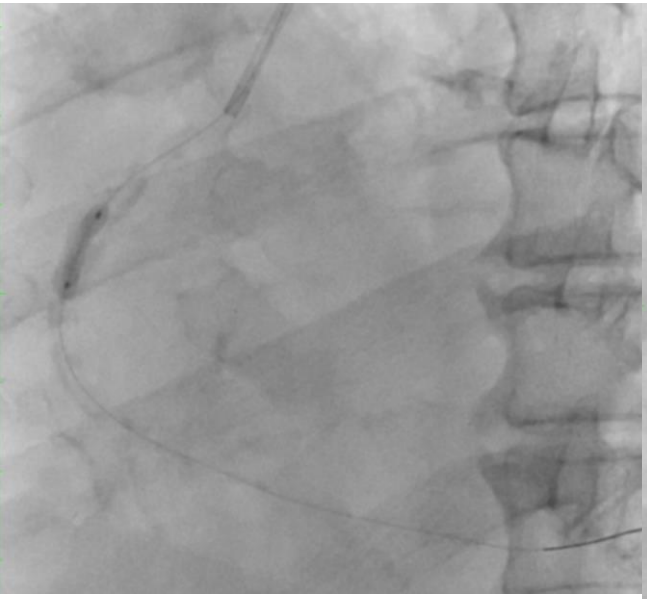


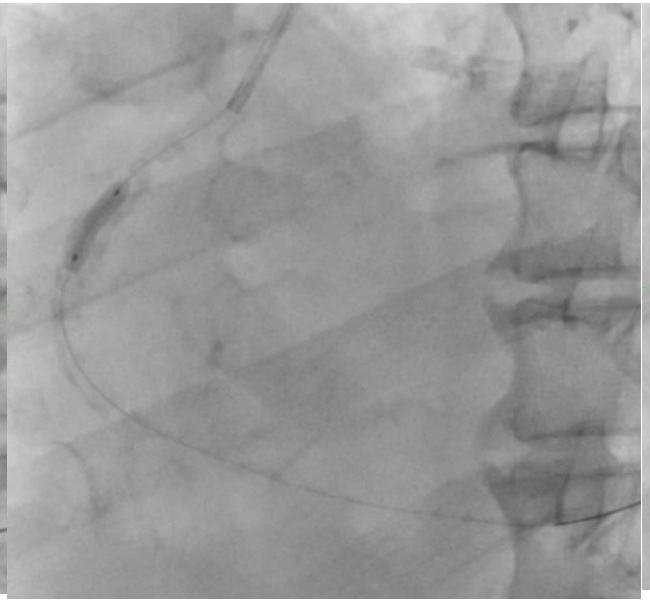


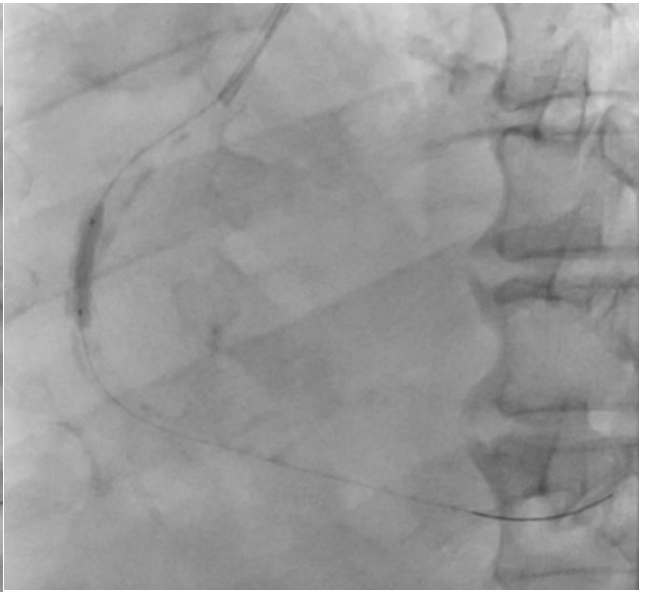
2nd calcium modification



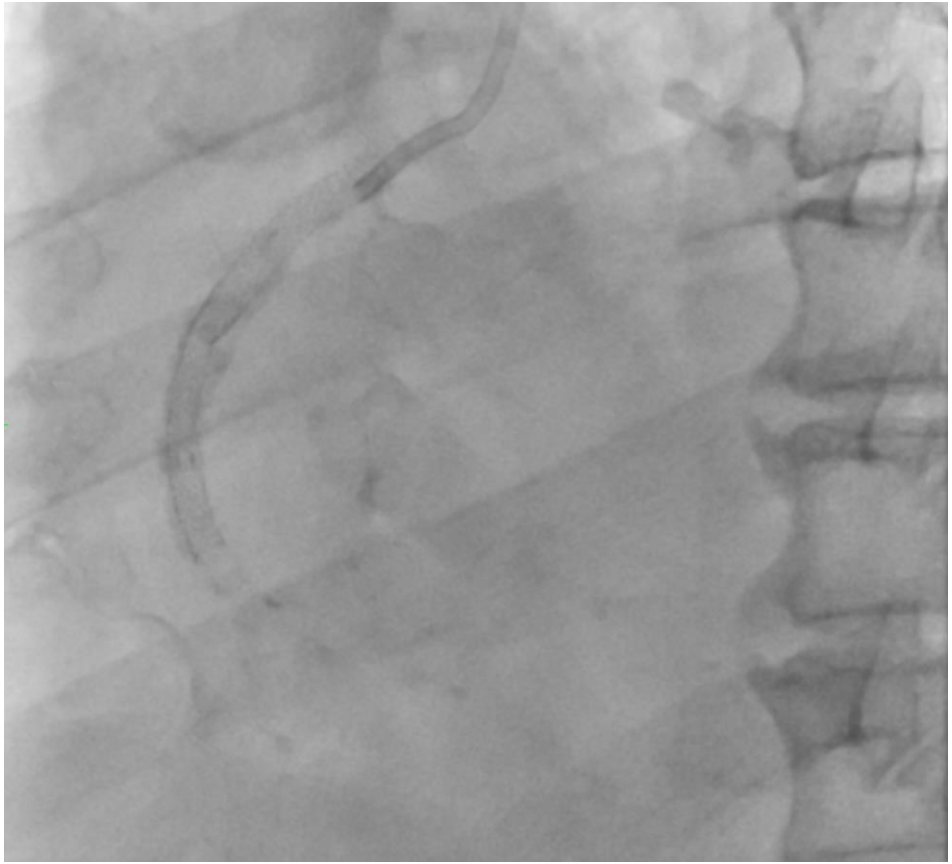
3rd calcium modification

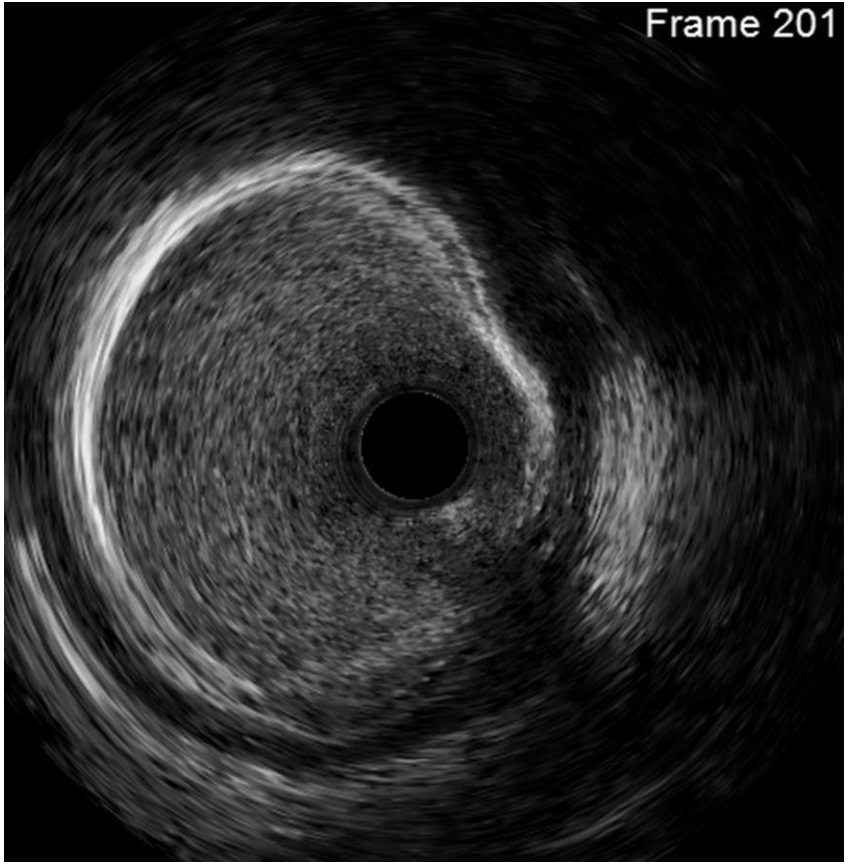




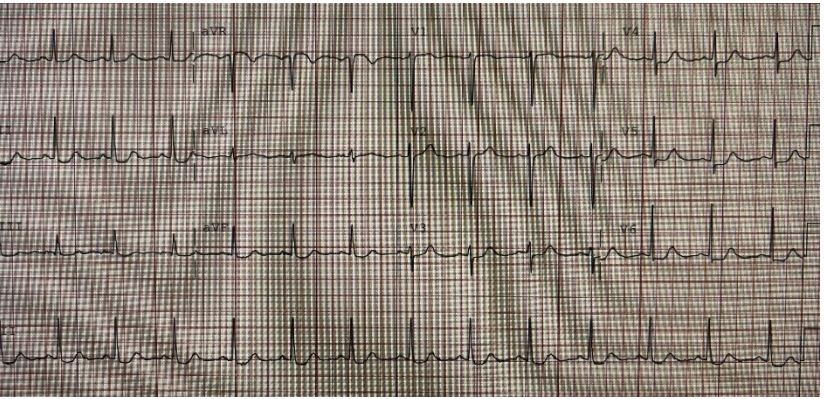


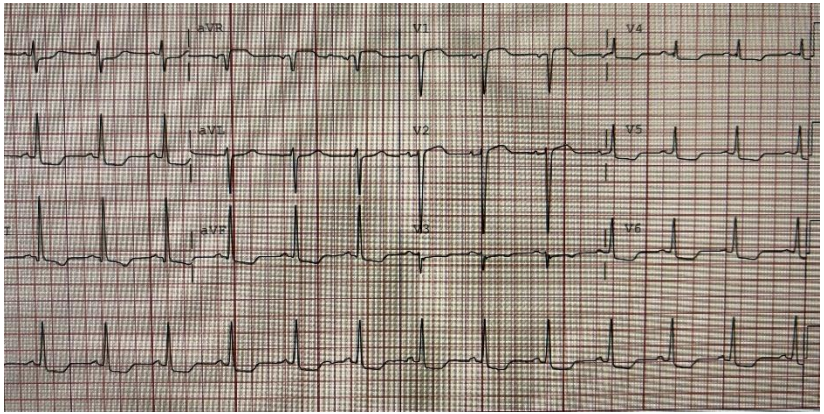
Final results





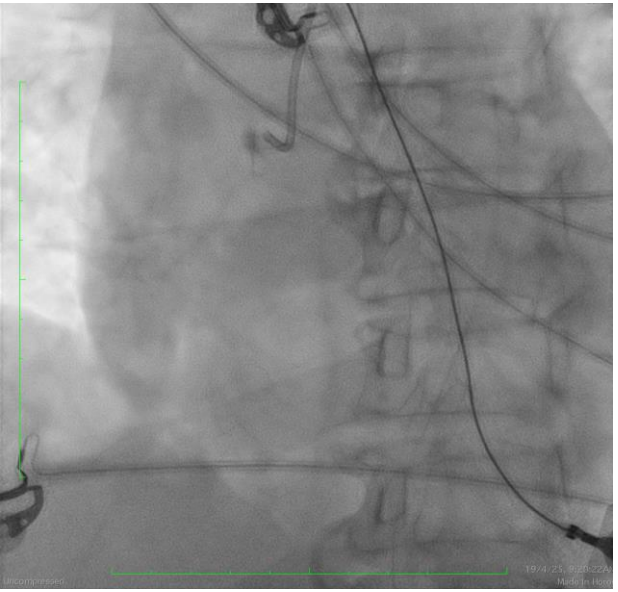
Case 2- 70 female

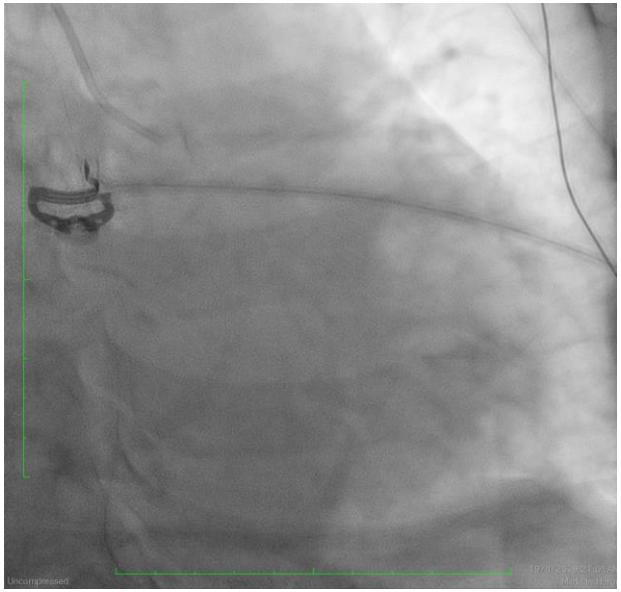


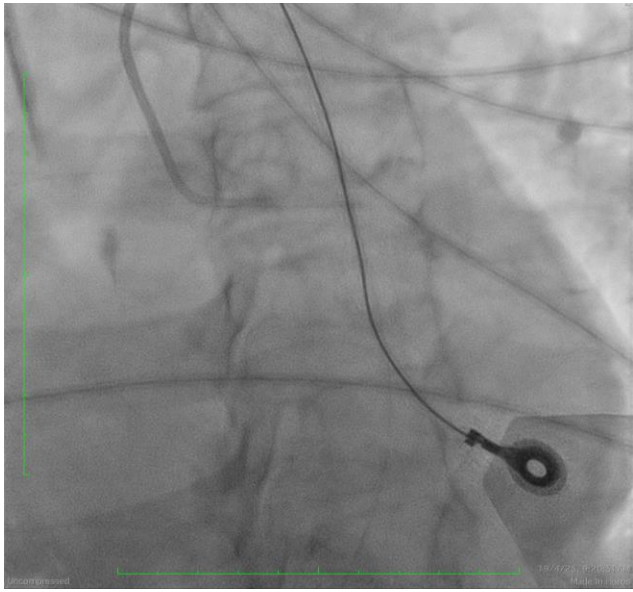


- Trop rise from normal to 2k
- Hypotension
- Intubated
- Bedside LVEF 30%

Diagnostic coronary angiogram





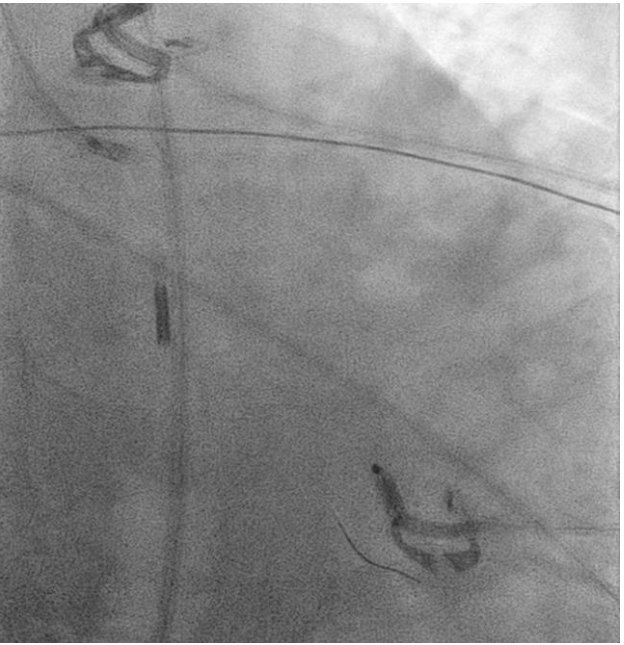


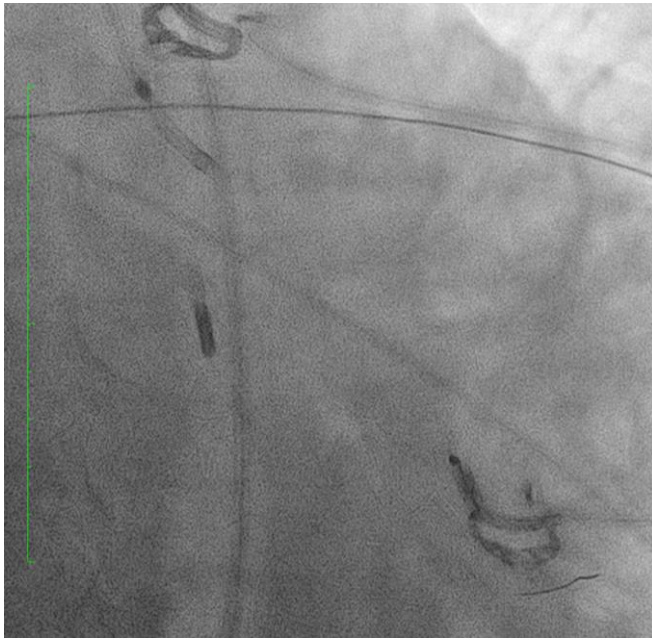
- EUROSCORE II 48.9%

Consideration of lesion prep

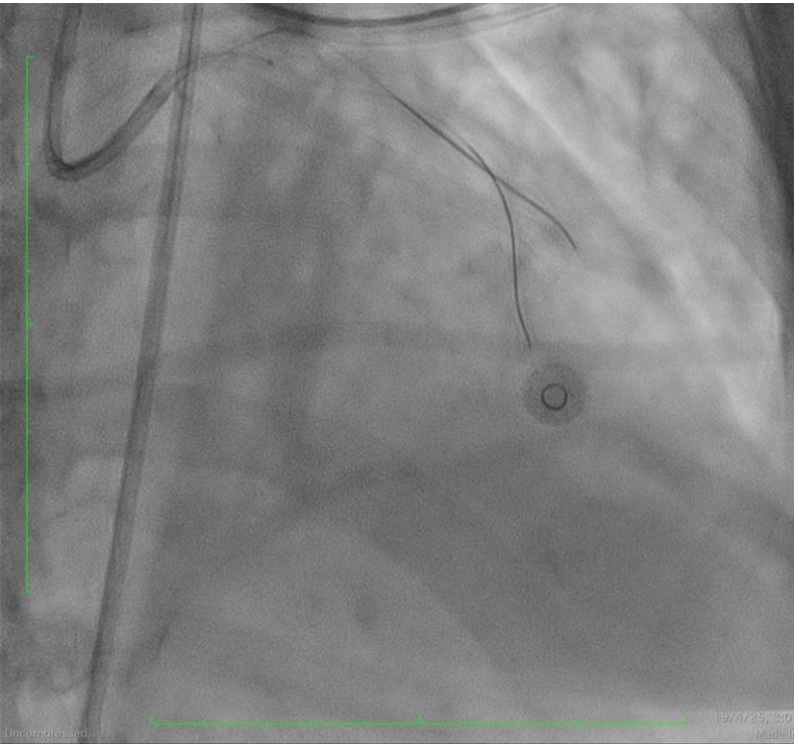
- No assessment of LAD flow yet
- Upfront imaging vs debulk to reduce ischaemia
- Left main- Large vessel/ Co-axial/ Burr size (not too big to get stuck and not too small to do nothing)
- Haemodynamic support peri procedure
- Bailout strategy-> Left main to Cx stent and elective CABG after

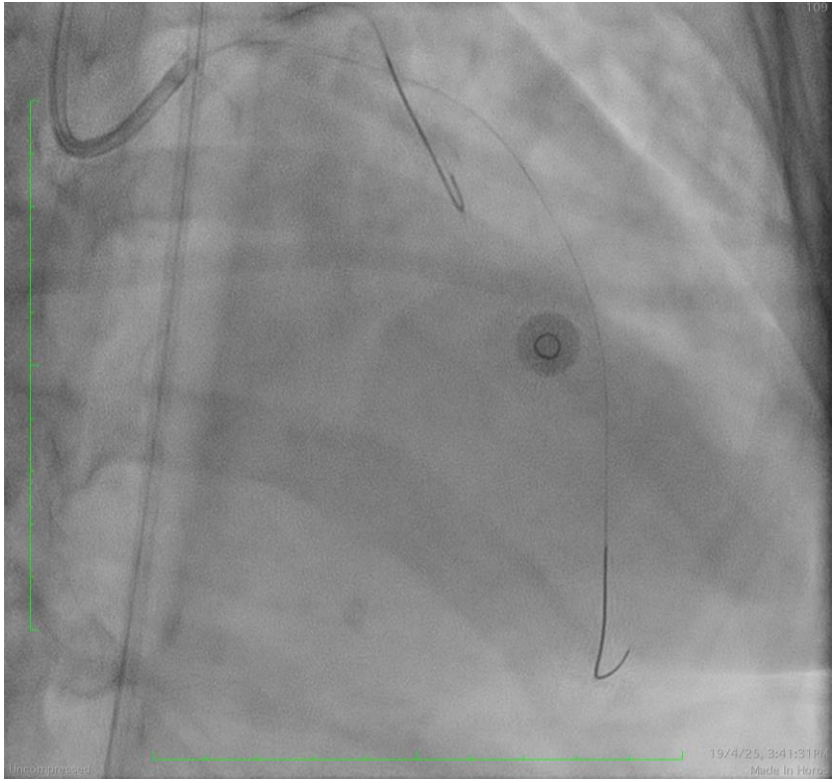
Lesion prep



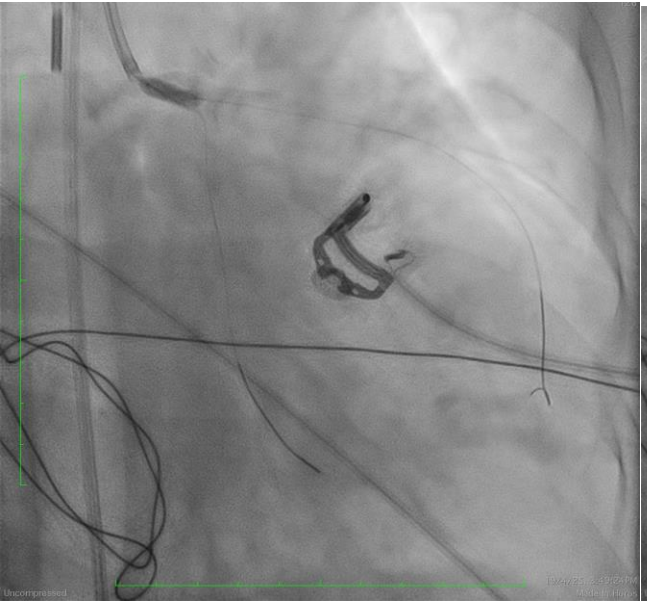


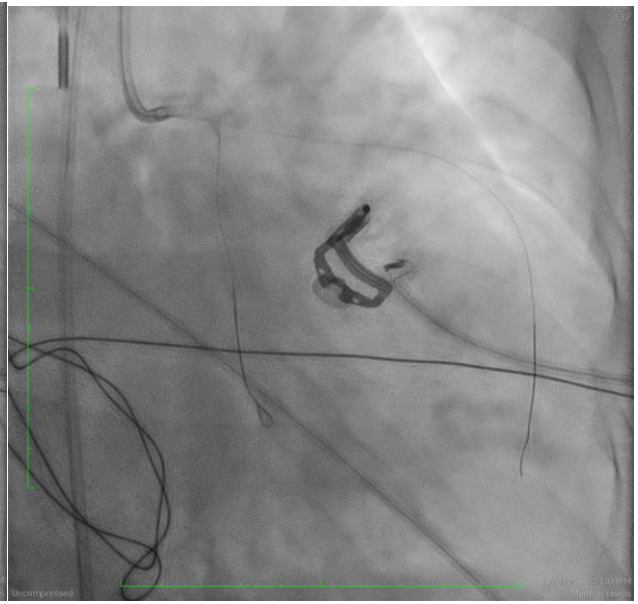
Calcified proximal LAD and mLAD CTO

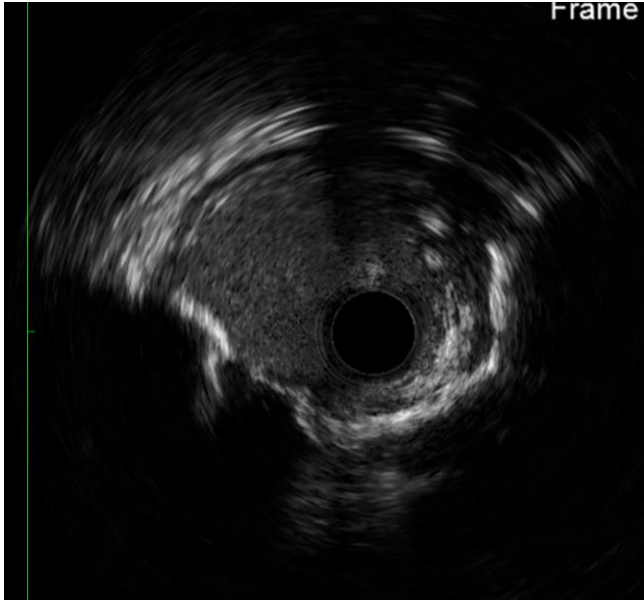




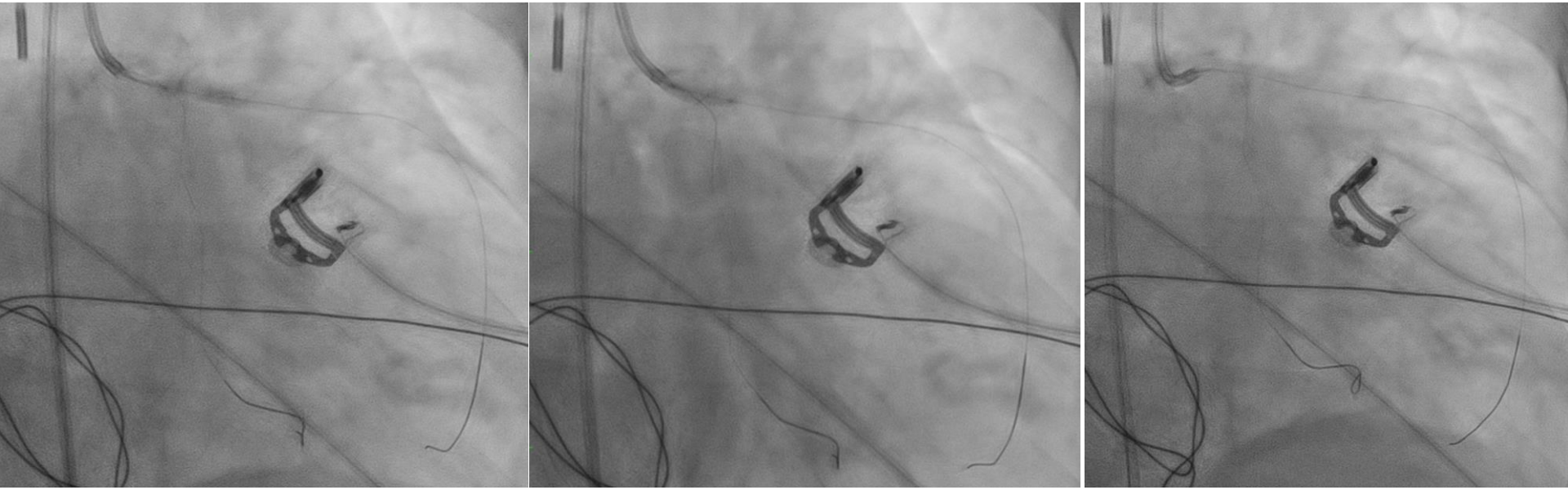
After balloon preparation/ IVUS



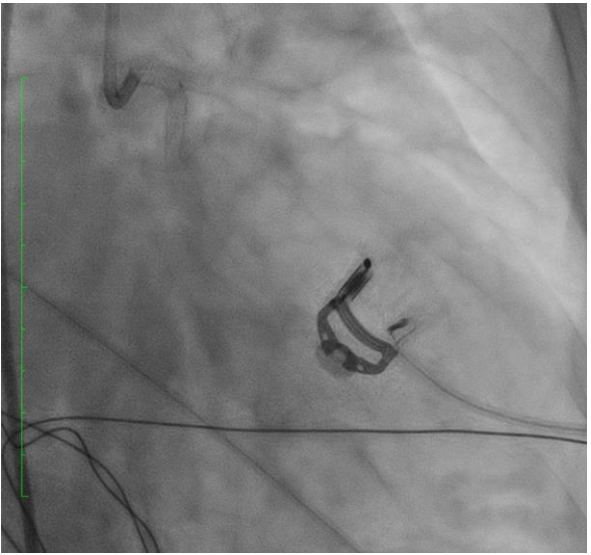


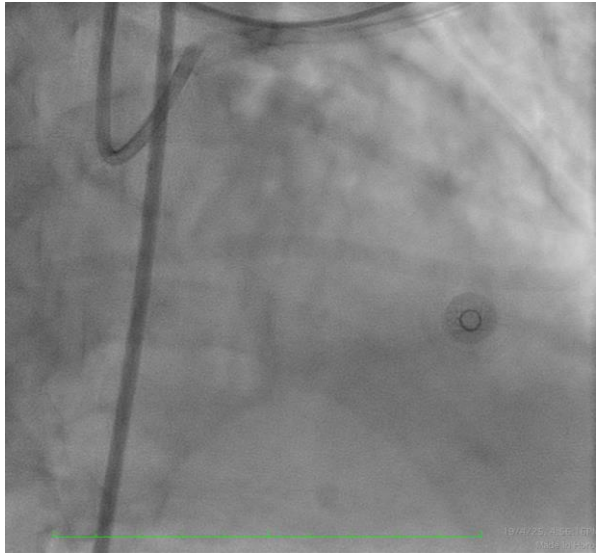


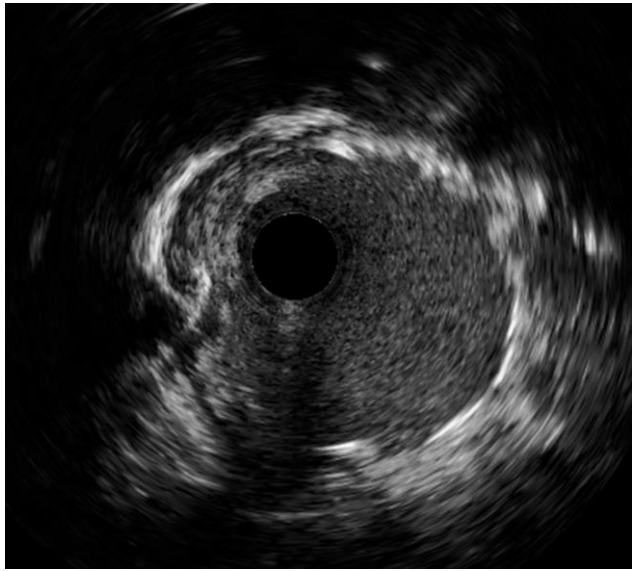
Lithotripsy 3.5mm



2 stents and 2 DCB







Conclusion

- Revascularisation in heavily calcified coronary lesions are historically associated with increased MACE.
- Intra coronary imaging is superior to angiography to identify coronary calcification.
- Haemodynamic support during lesion prep
- In some circumstances, lesion prep prior to imaging.
- Pre procedural imaging is helpful to decide on calcium modification tools
- Assessment of wire bias
- Lesion modification vs debulk
- Confirm lesion prep (1:1 NC +/- imaging)