Complete Revascularization with Temporary Mechanical Circulatory Support for Severe Heart Failure

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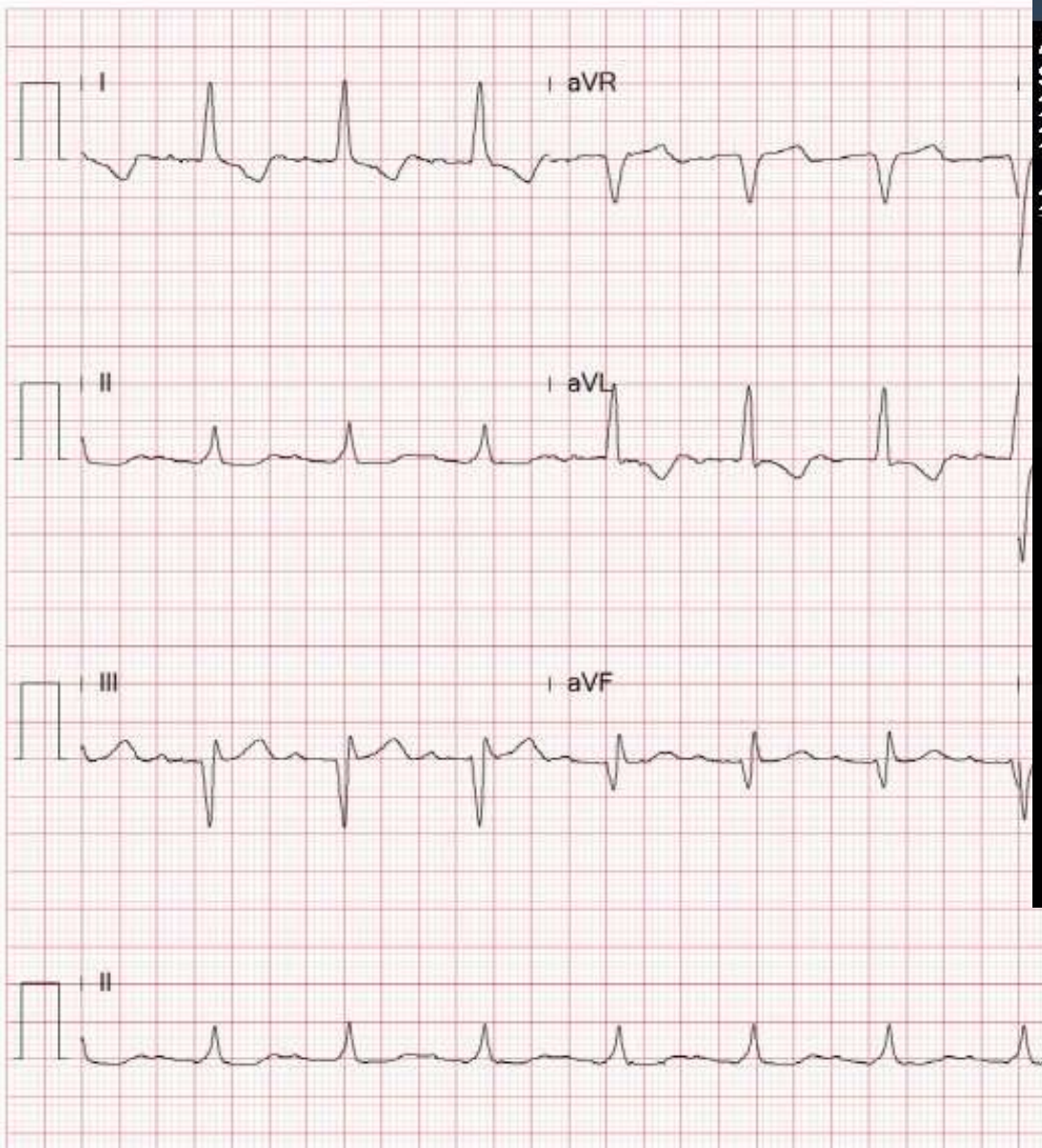
Case Presentation

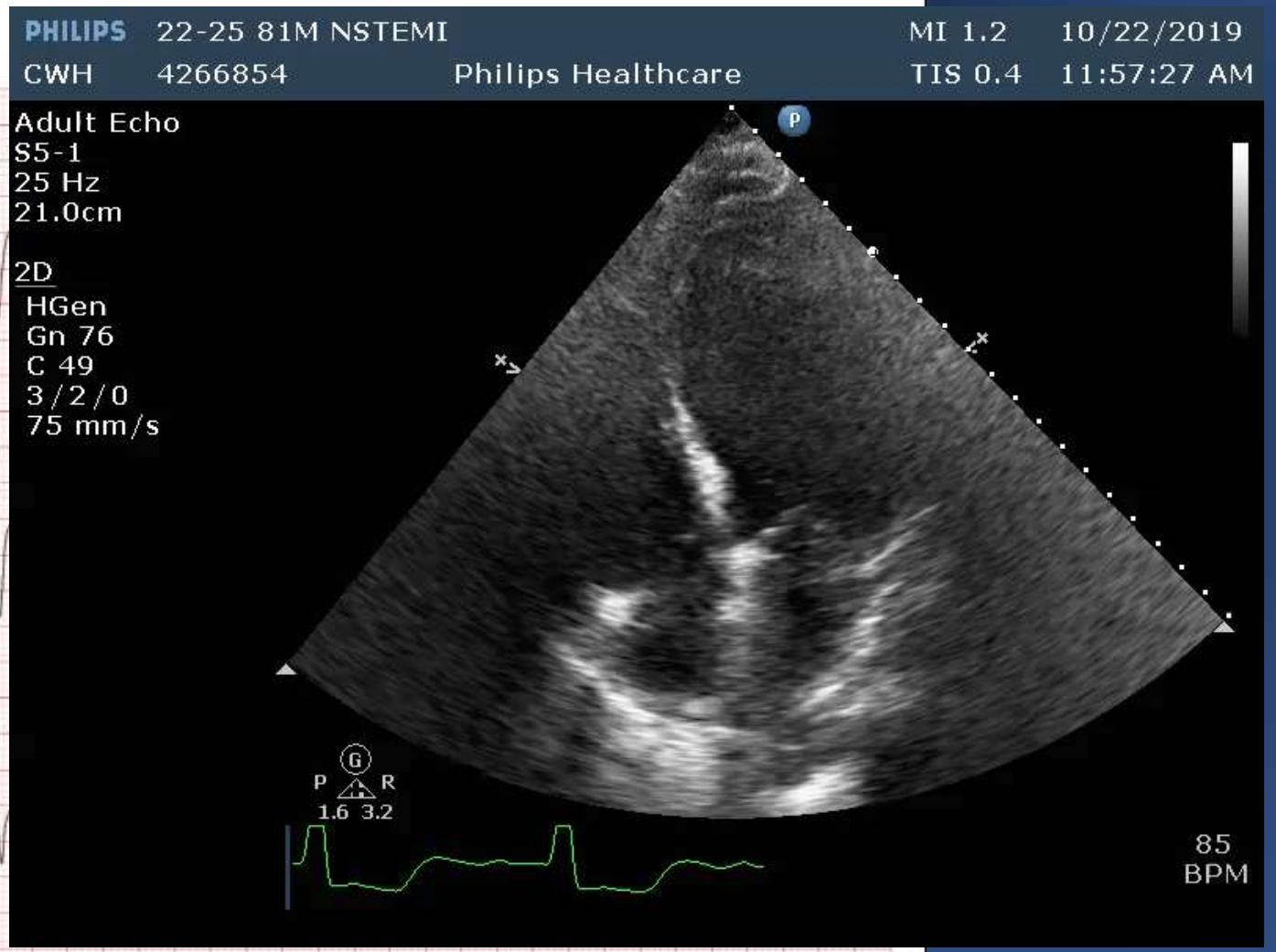
- 81 y/o, male
- SOB and orthopnea, he was brought to our ER
  - NT-proBNP >35000 pg/mL (< 450)
  - Peak troponin-I 2.705 ng/mL (< 0.056)
  - Cr: 2.92 mg/dL, eGFR 22
  - Echocardiography: LVEF 20% and poor RV function
- Hx of CAD old MI, DM with nephropathy, HTN, and Hyperlipidemia
- Previous LVEF 40%
- Due to old age and multiple co-mobidities, conservative treatment was considered initially

Order Number: 201910220031
Age: 81 Years
Sex: M
Name: 張幸一
Comment:

Vent rate:	82 BPM
PR int:	225 ms
QRS dur:	139 ms
QT/QTc:	437 / 514 ms
P-R-T axes:	0 4 148

Sinus rhythm...normal P axis, V-rate 50- 99
Prolonged PR interval...PR >210, V-rate 50- 90
Left bundle branch block...QRSd>120, broad/notched R



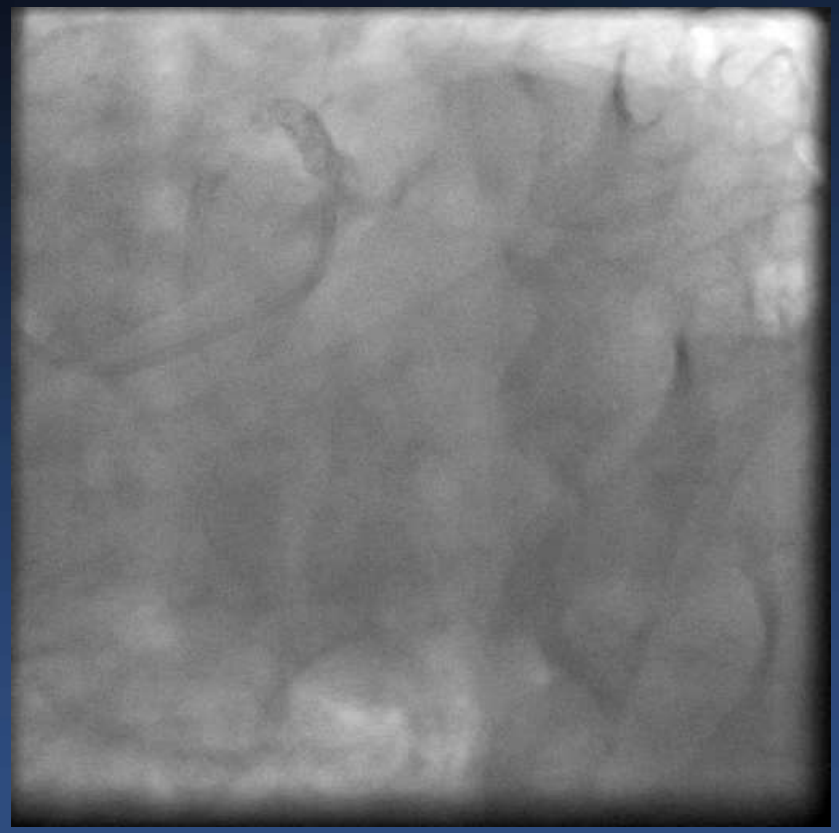
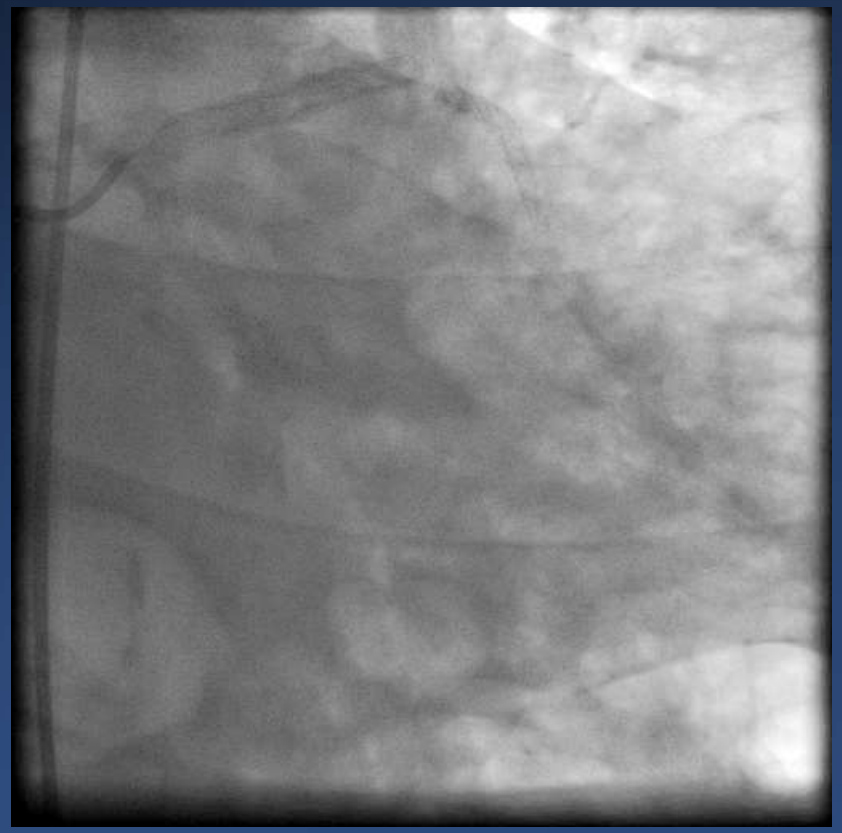
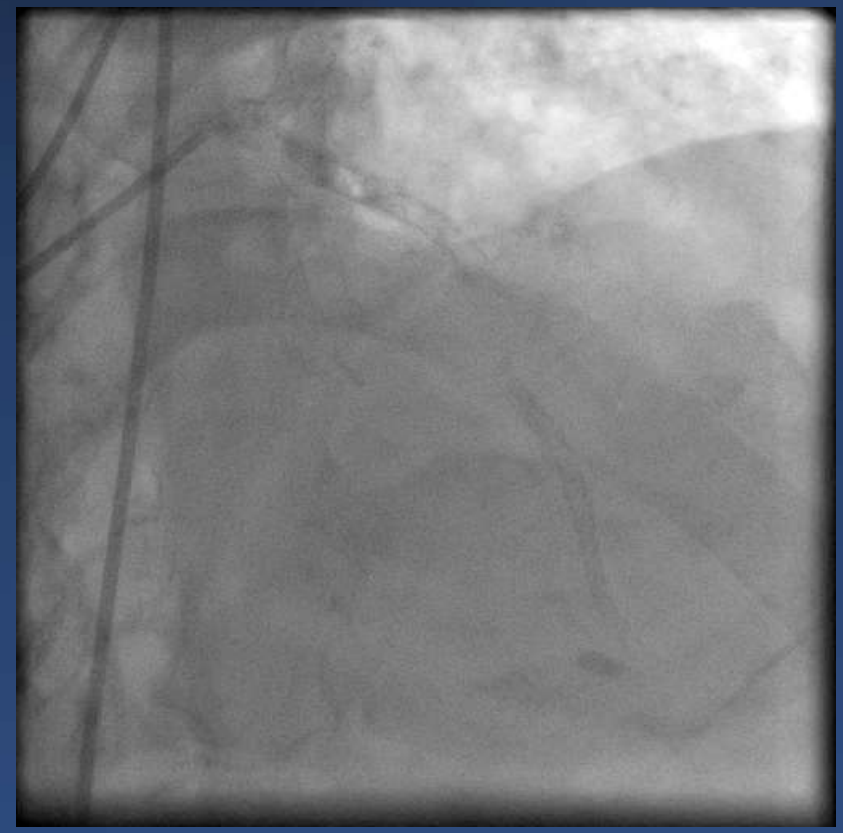


Fit 63%

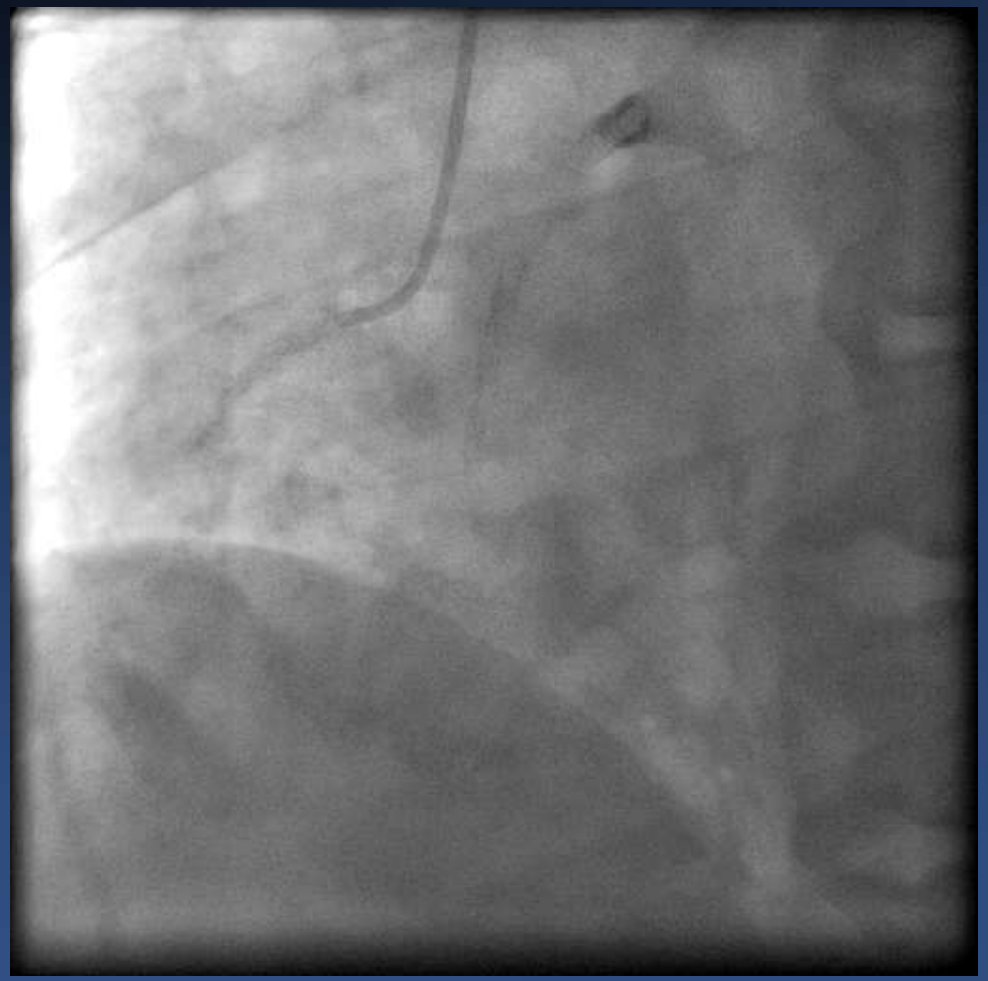
Hospital course

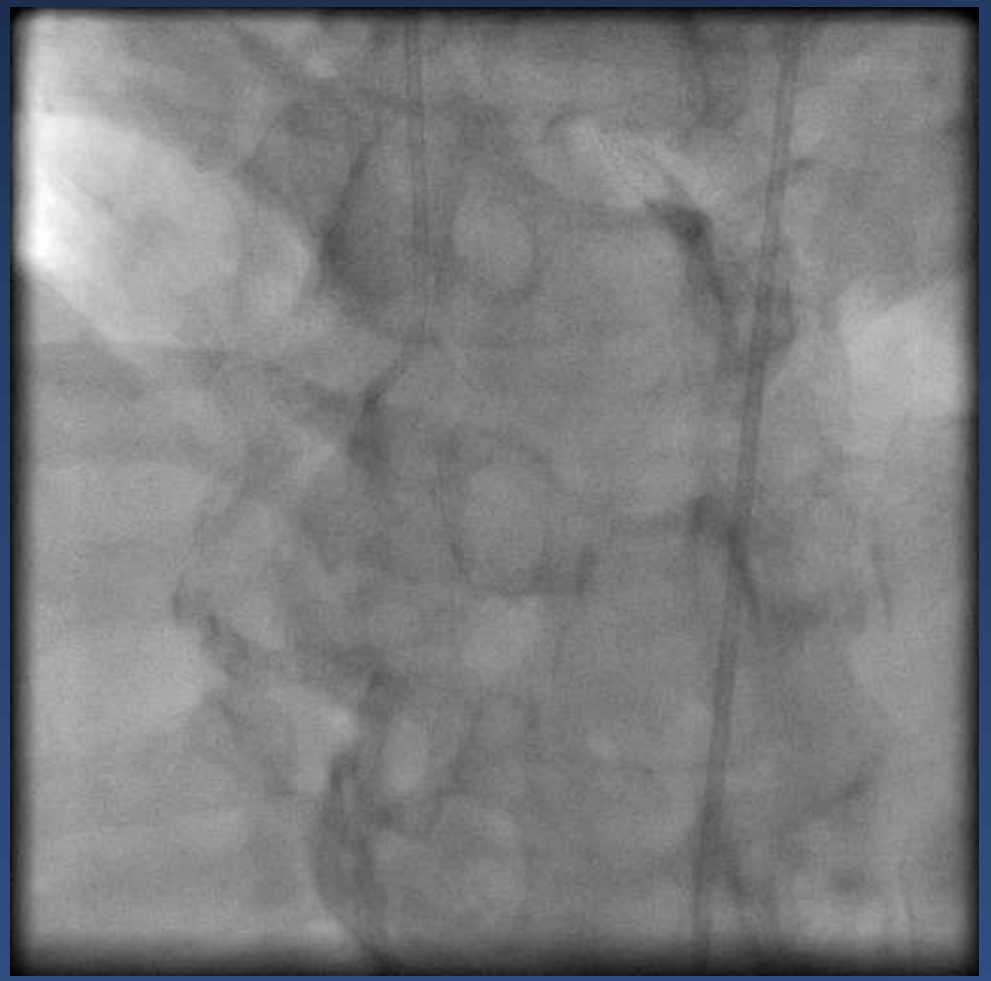
- Developed cardiogenic shock on the next day
  - hypotensive, SBP 60-70mmHg despite inotropic agents (dopamine, norepinephrine, and dobutamine)
  - acute renal failure with low urine output
  - drowsiness
  - serum lactic acid 7.9 mmol/L (0.9-1.7)
- Hb 8.8 g/gL, Platelet 88000/uL
- Discussed with family about PCI under ECMO support

ECMO: 15F Arterial cannula via left CFA, 19F venous cannula to IVC
CAG: Distal LM BF (1,1,1) with calcification, long diffuse disease of LCx

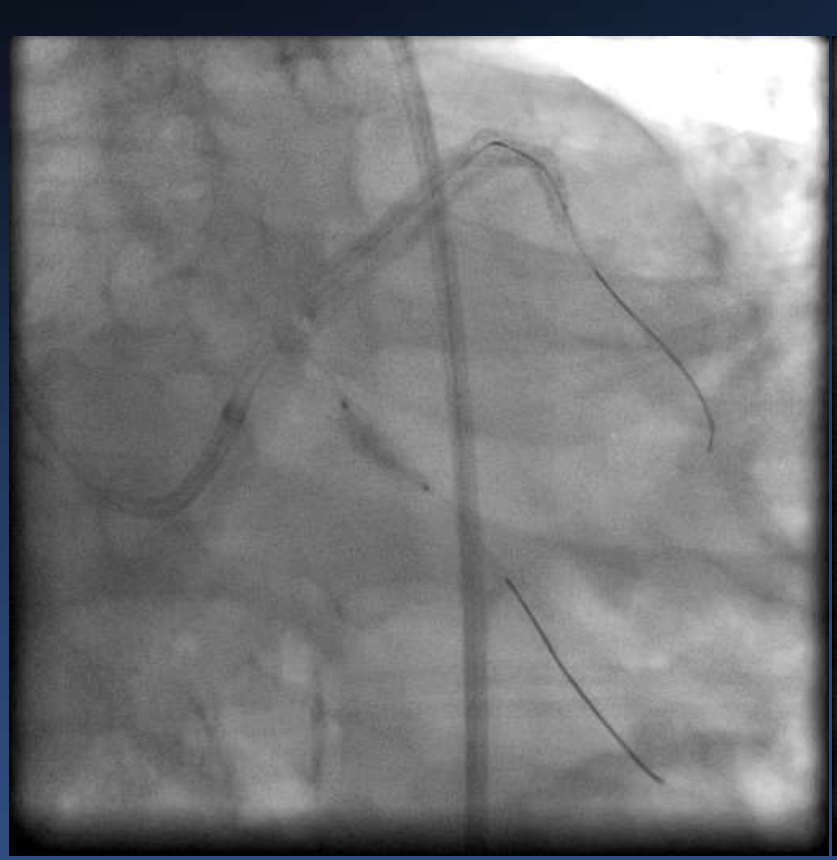




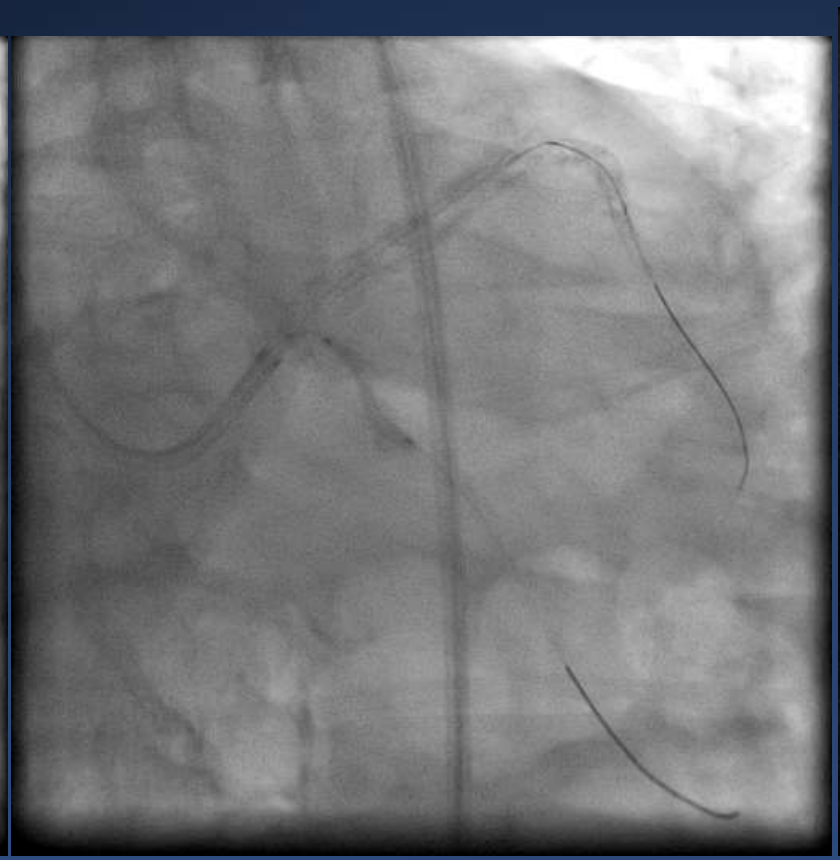
RCA: diffuse and calcified disease, near occlusion of PDA and total occlusion of PL br

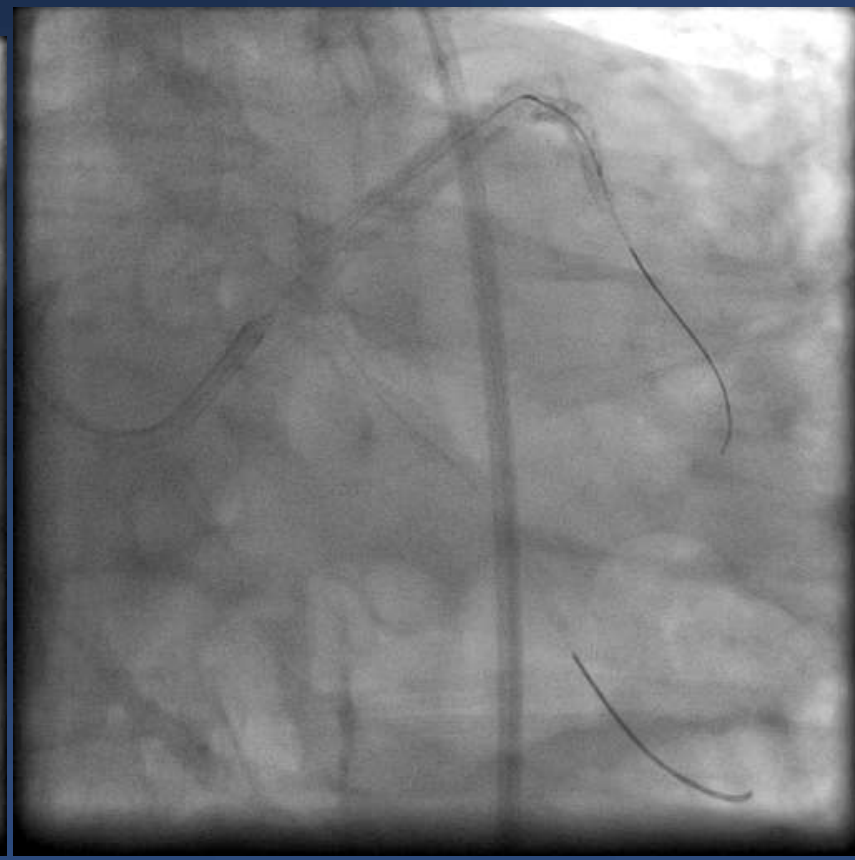




Balloon dilatation to LCx



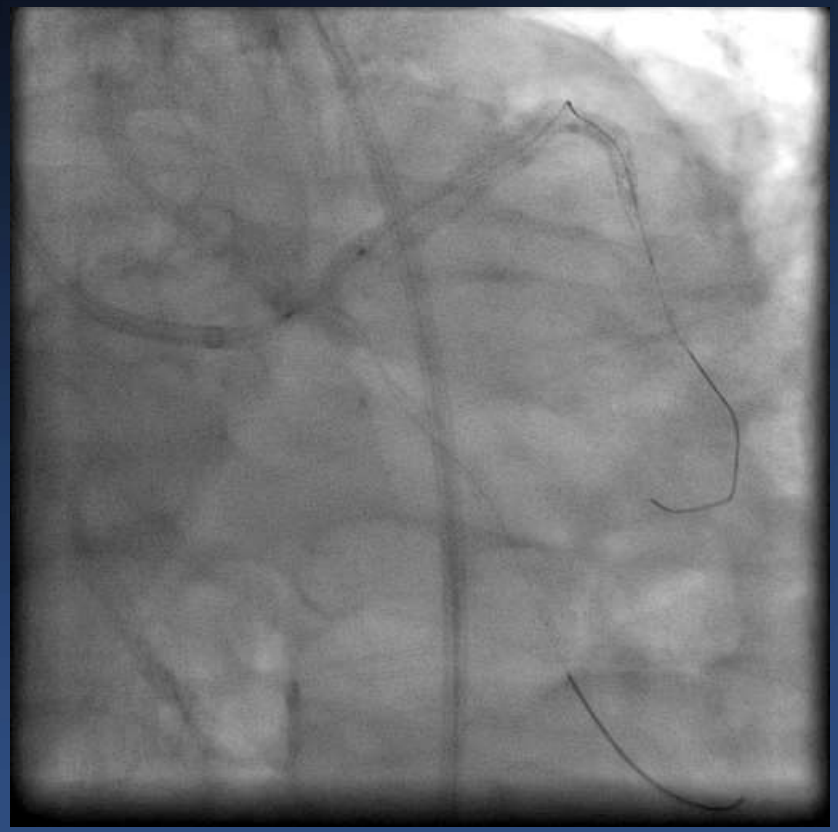


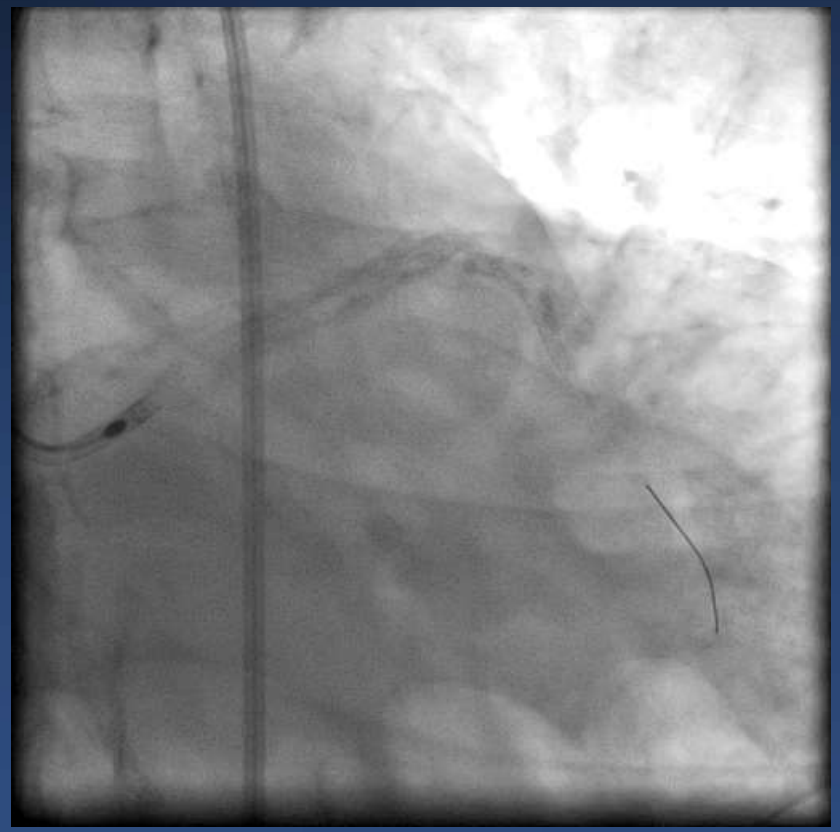


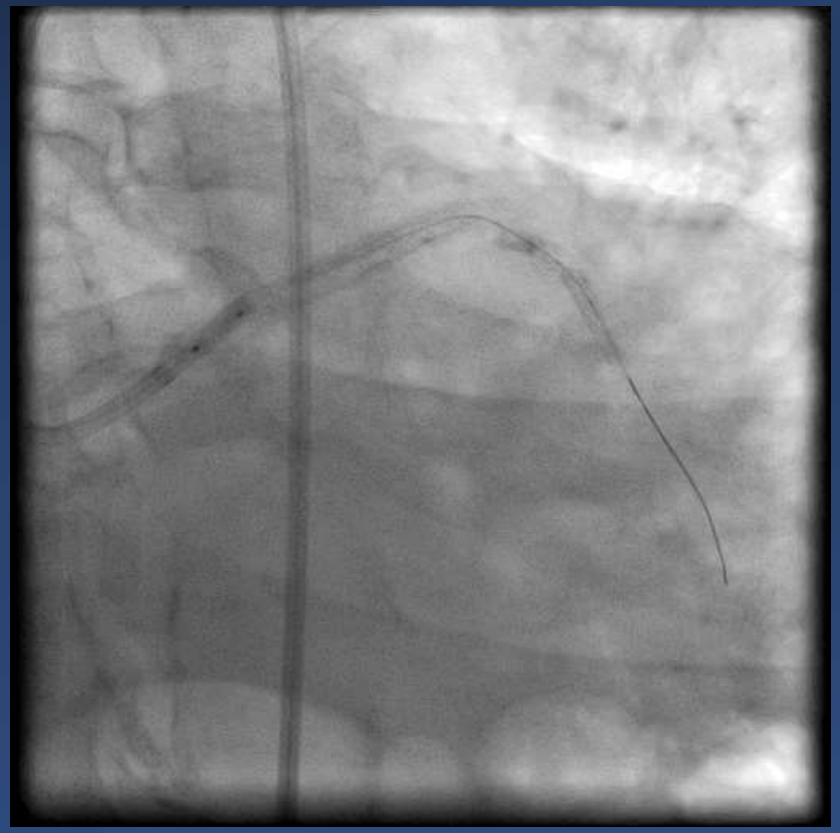
LM: balloon undilatable with NC 3.0 x 12 mm

1.75-mm burr RA

CB 3.5 x 6

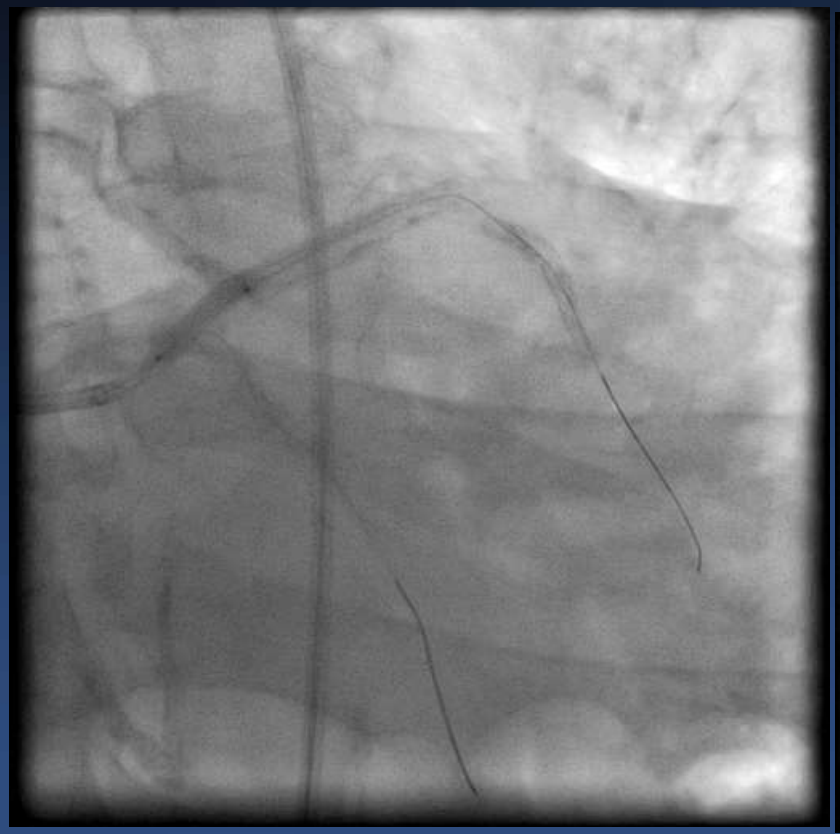


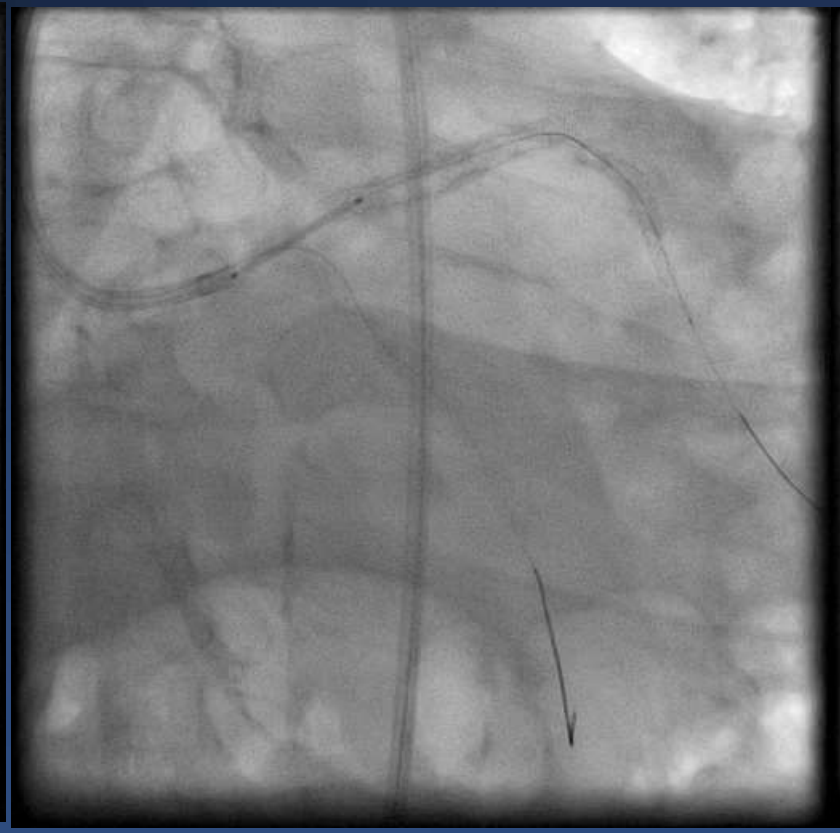


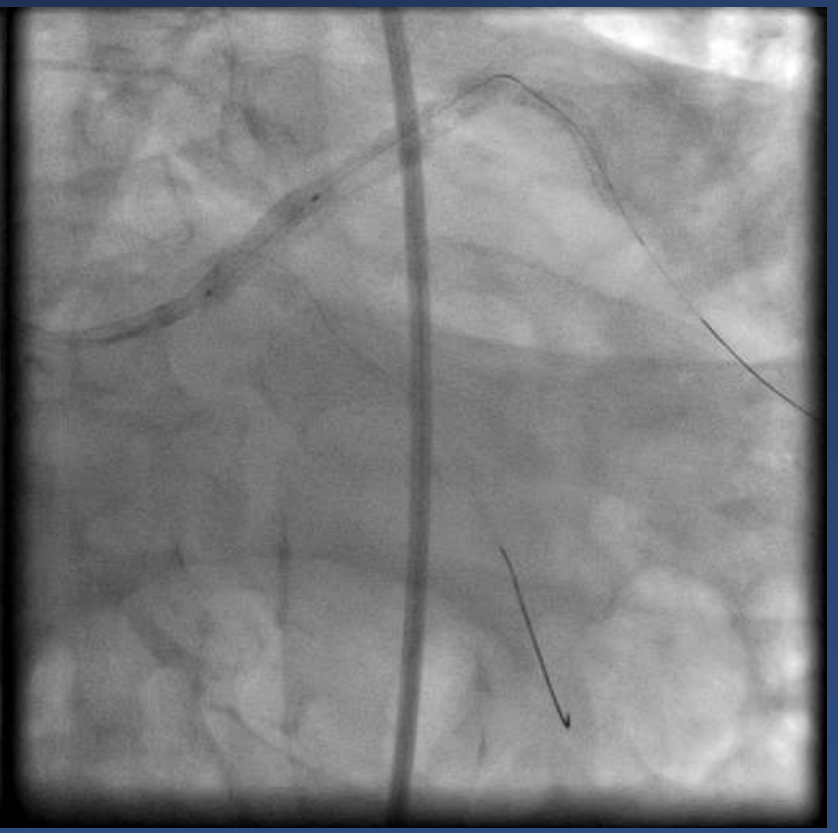


NC 3.5 x 15 mm

DES 3.5 x 15 mm

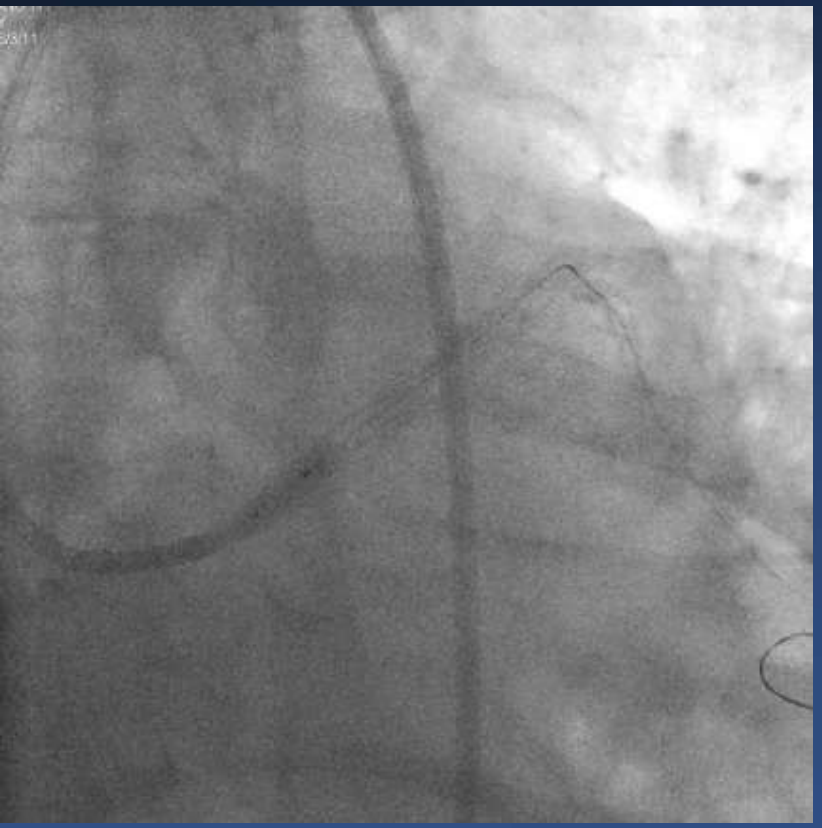


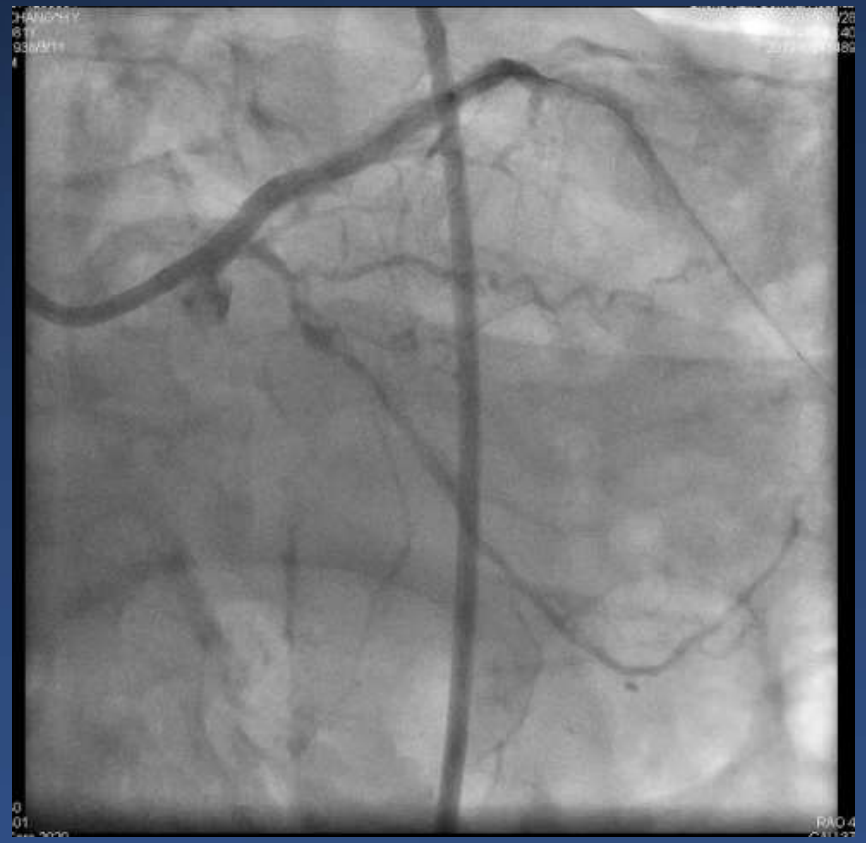


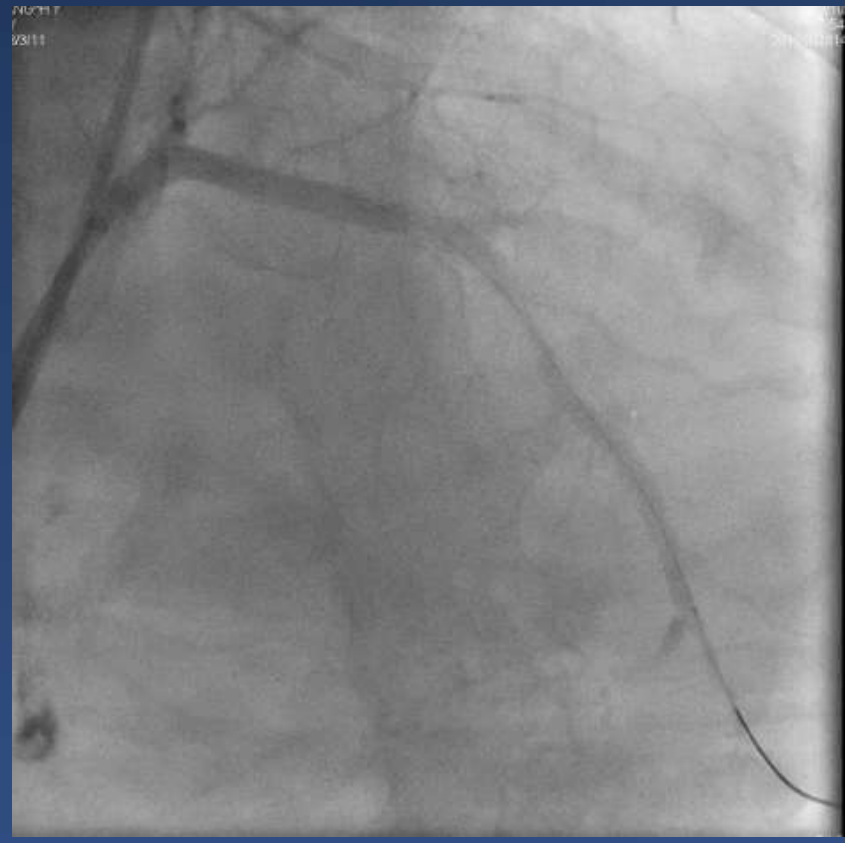


Final angiography of LCA

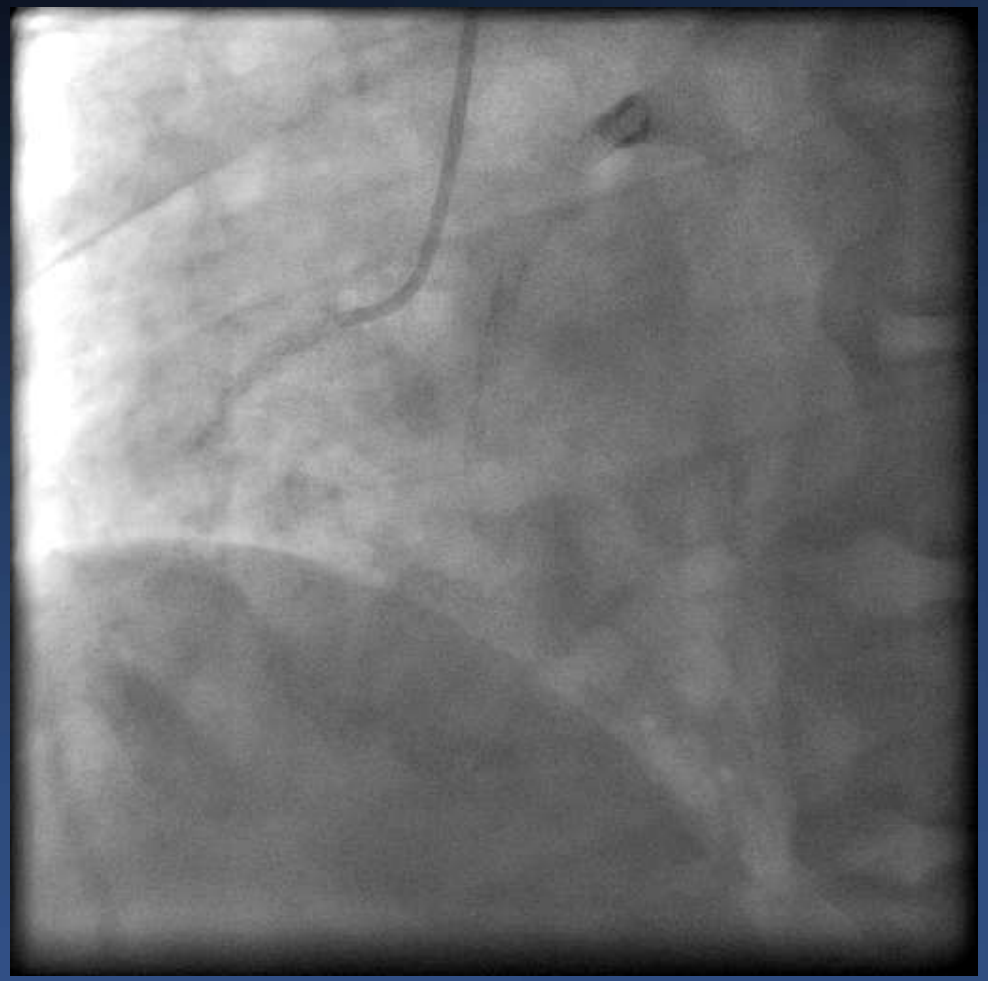
POT: NC 4.0 x 8

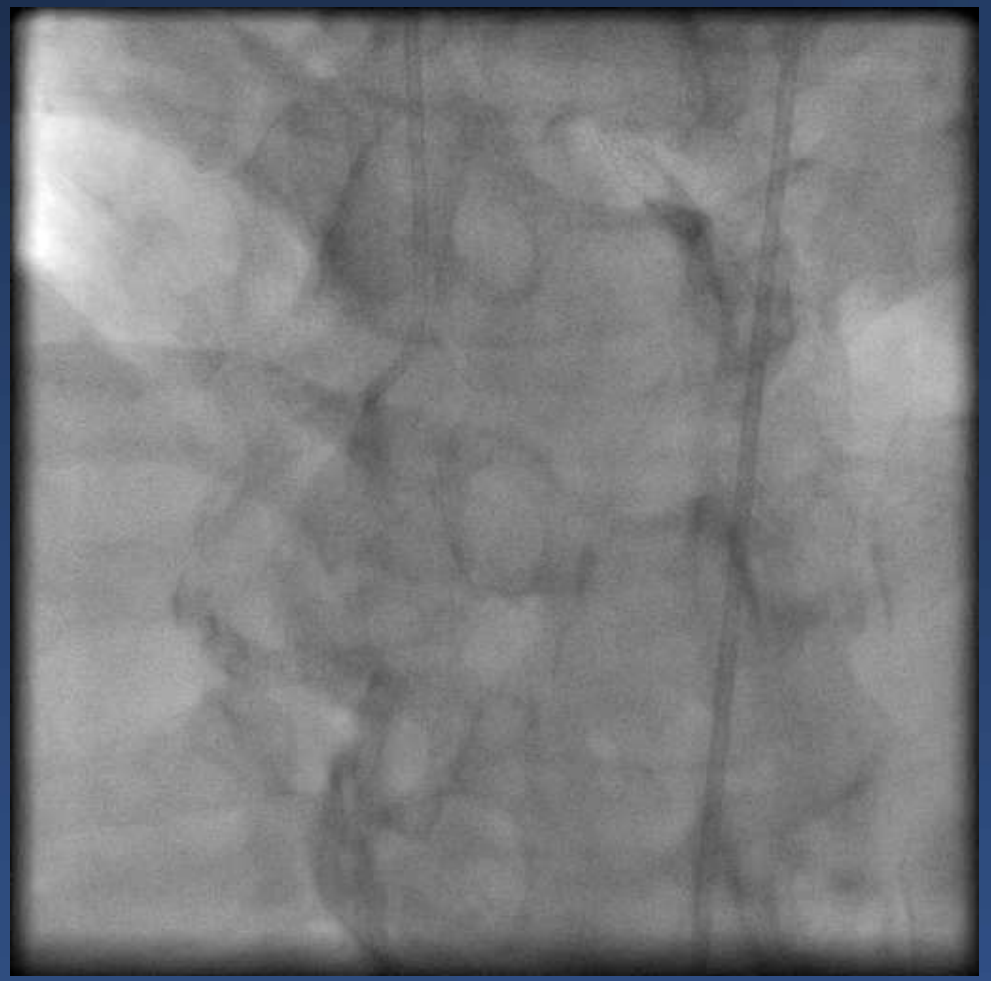




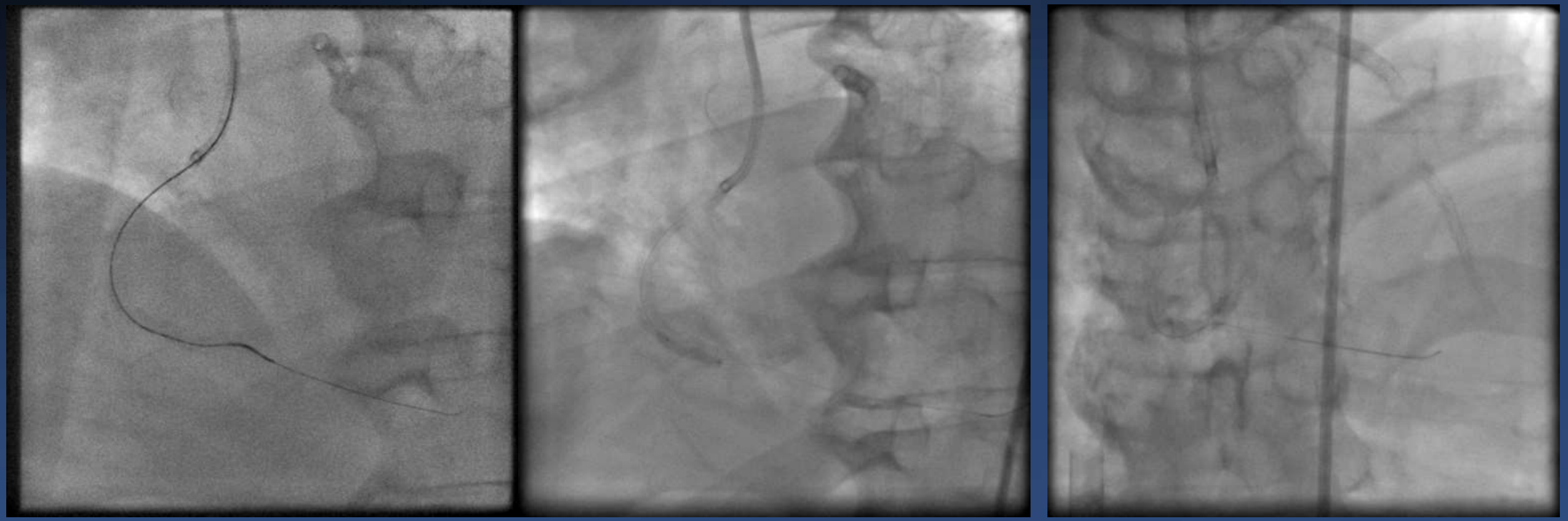


RCA: diffuse and calcified disease, near occlusion of PDA and total occlusion of PL br

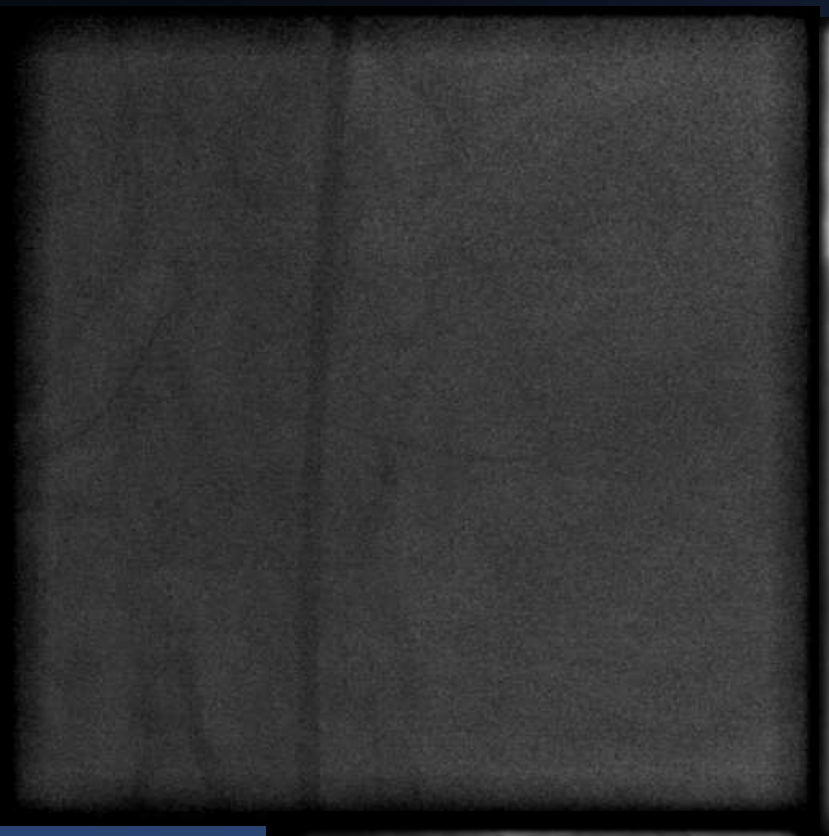


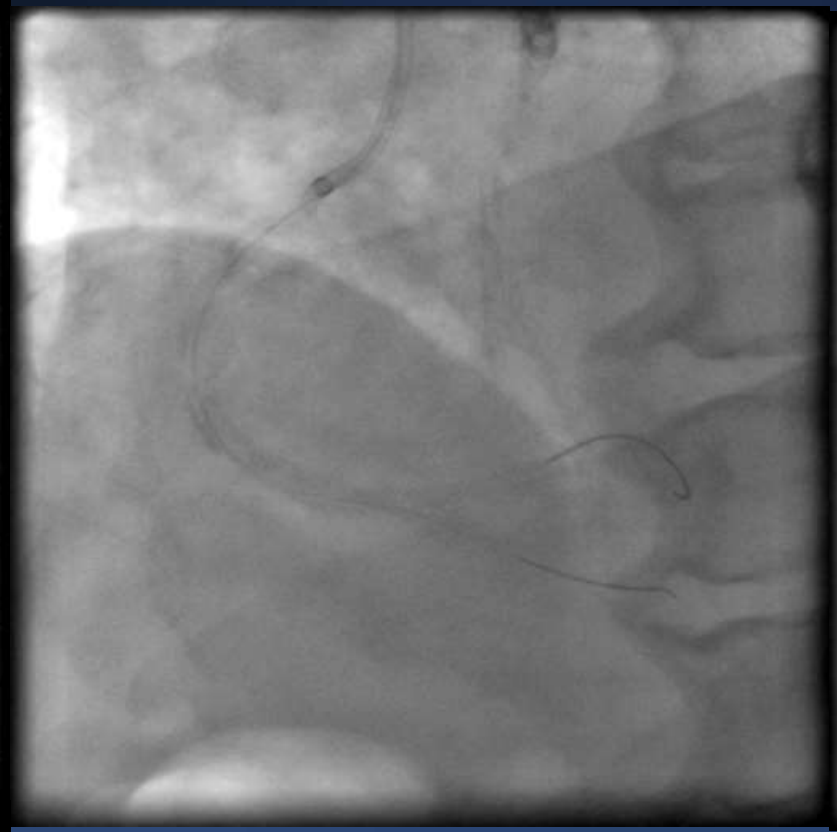


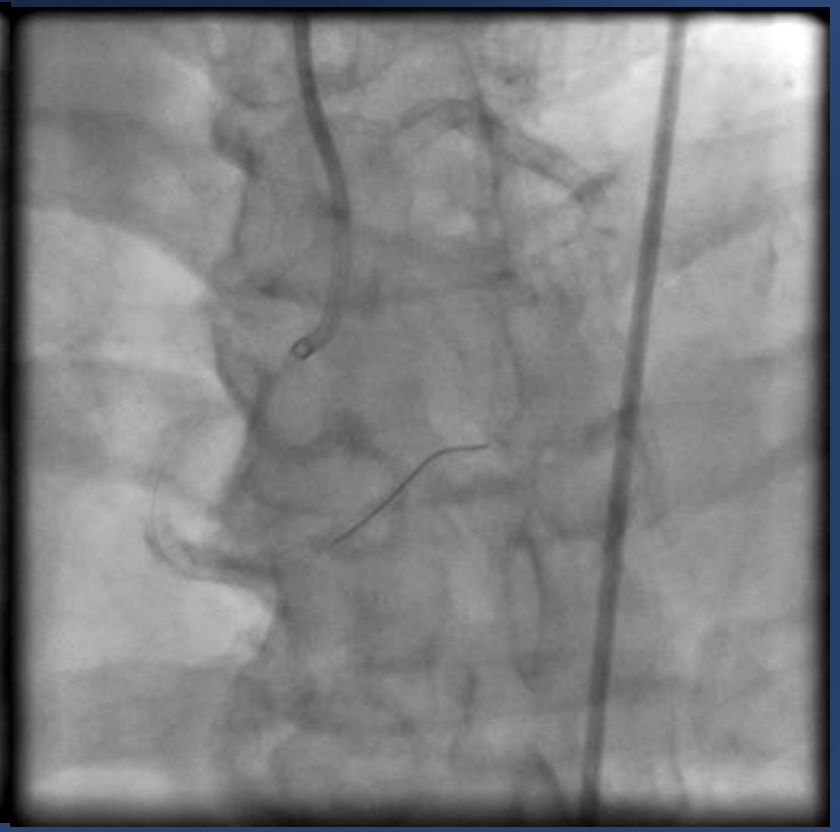
Turnpike MC + Filter XTA to PDA

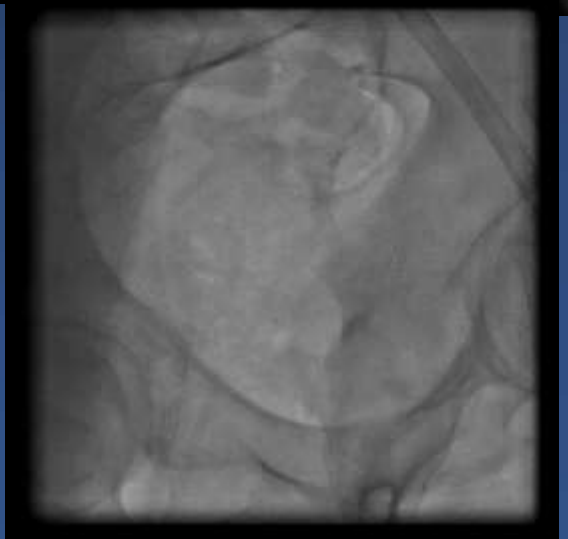


3.0 x 15 DES to d-RCA and 2.75 mm DEB to PL









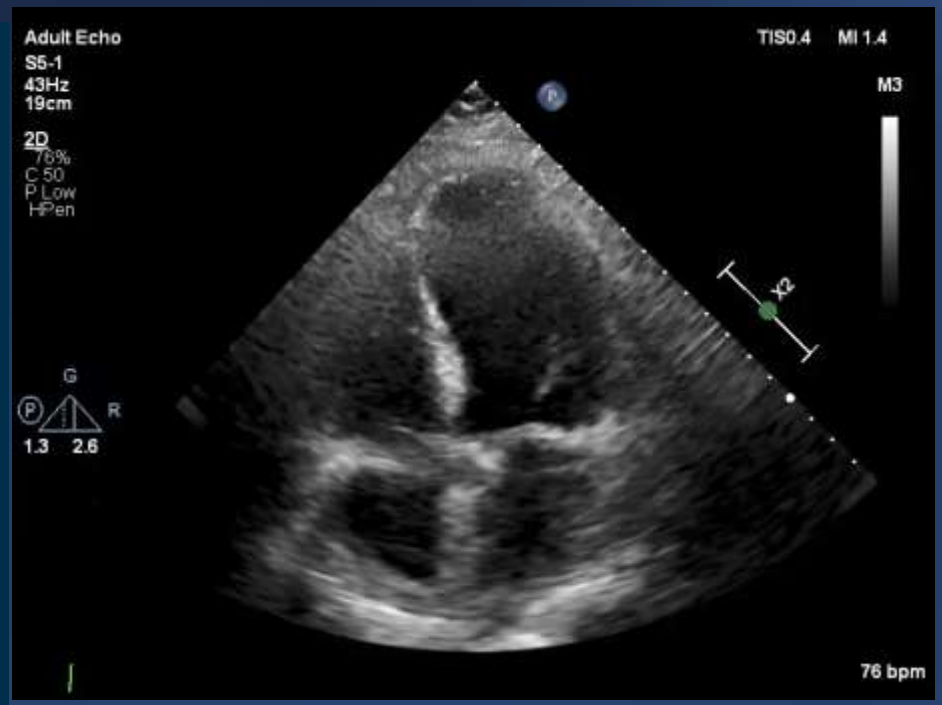
ECMO was removed right after PCI and the puncture site was sutured with 2 proglides

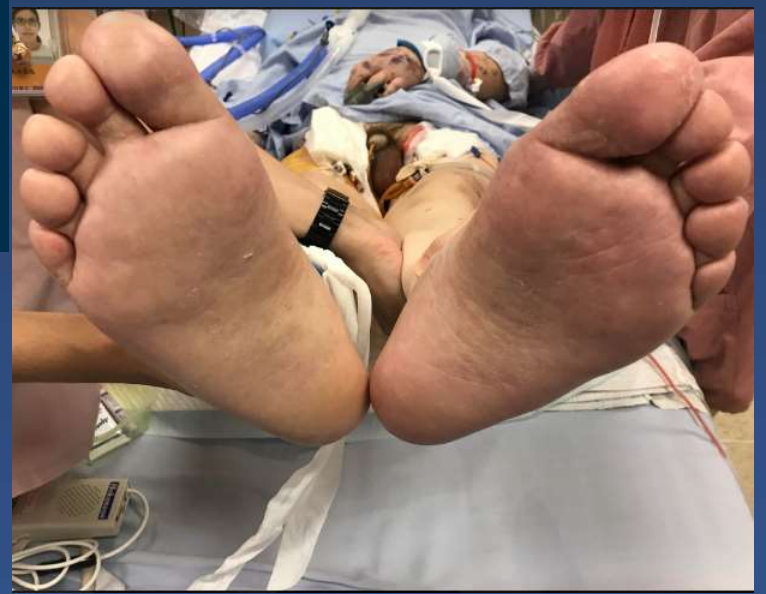
Inserted IABP for subsequent hemodynamic support via right FA

Hospital course

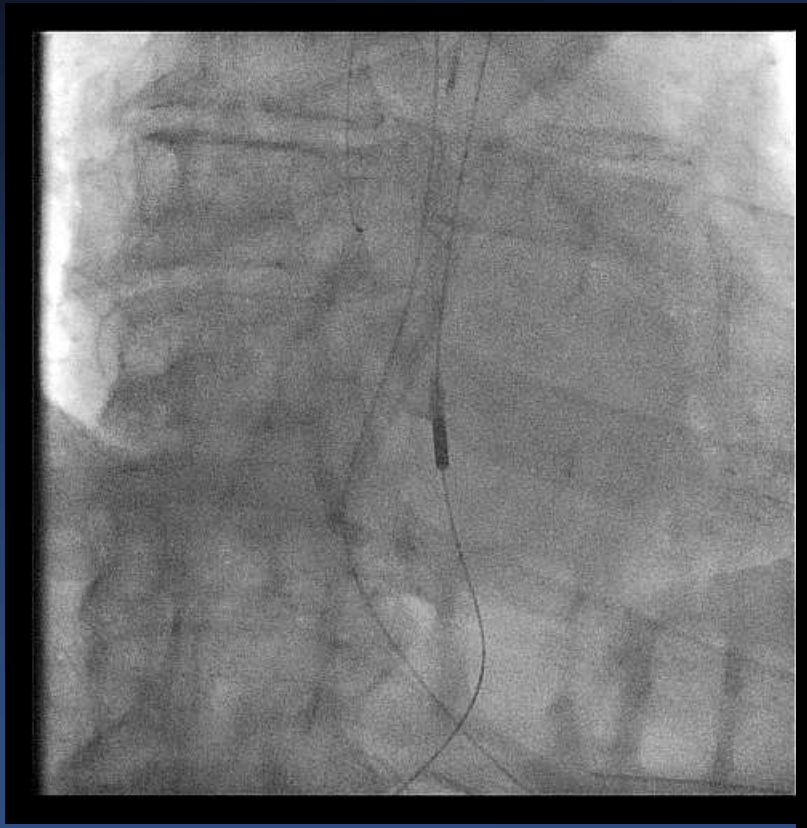
- LV and RV function improved
- SBP 90-110mmHg, gradually tapered inotropic agents

- But cyanotic change of left foot with coldness was noted, acute limb ischemia was highly suspected on the second day following PCI
- We brought patient to cath lab immediately

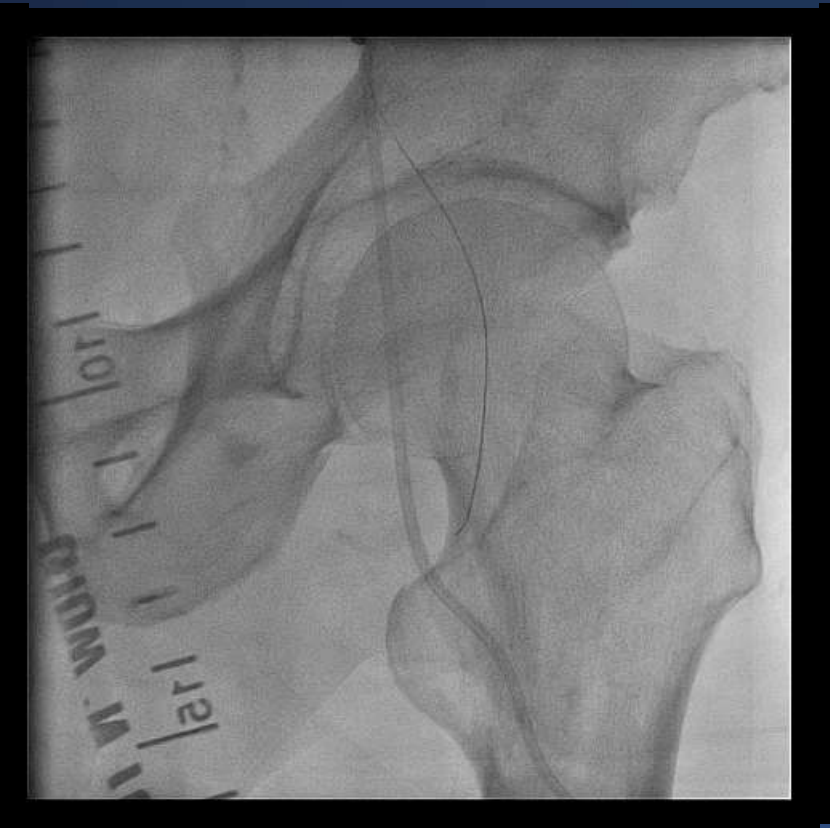




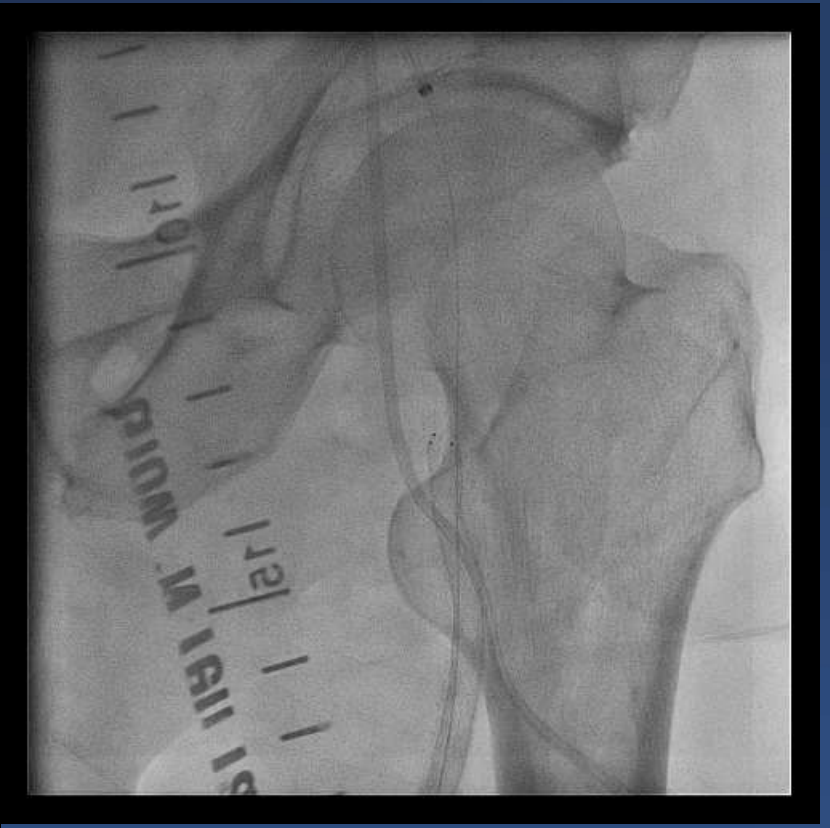
Removed IABP from Rt groin, and performed left low limb angio. and PTA



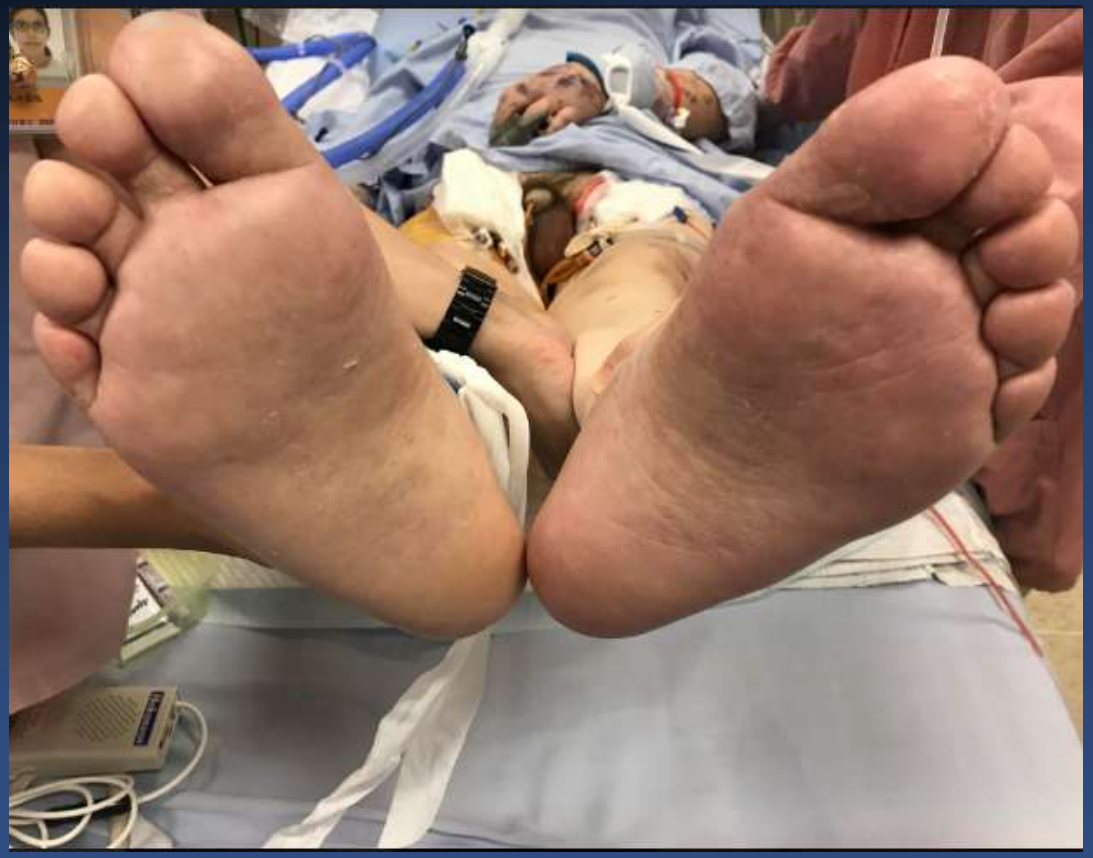
Total occlusion of left SFA



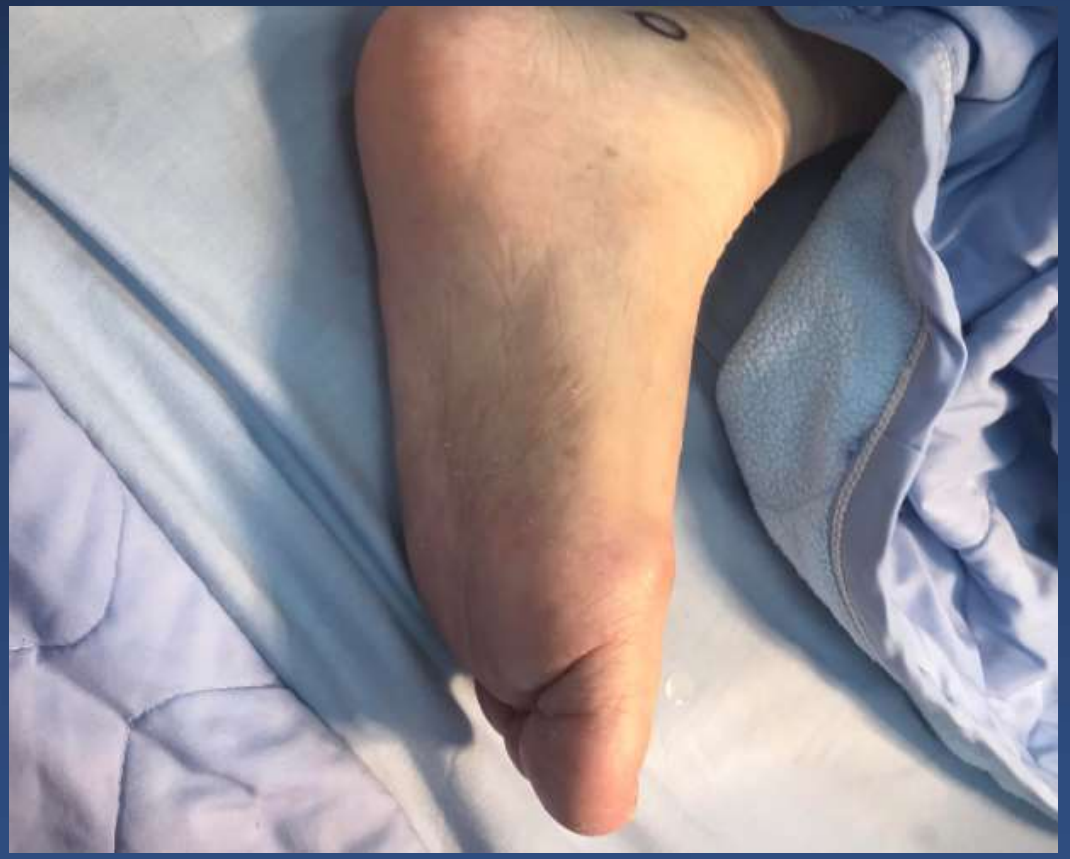
6 x 120 mm stent placement



Prior to PTA



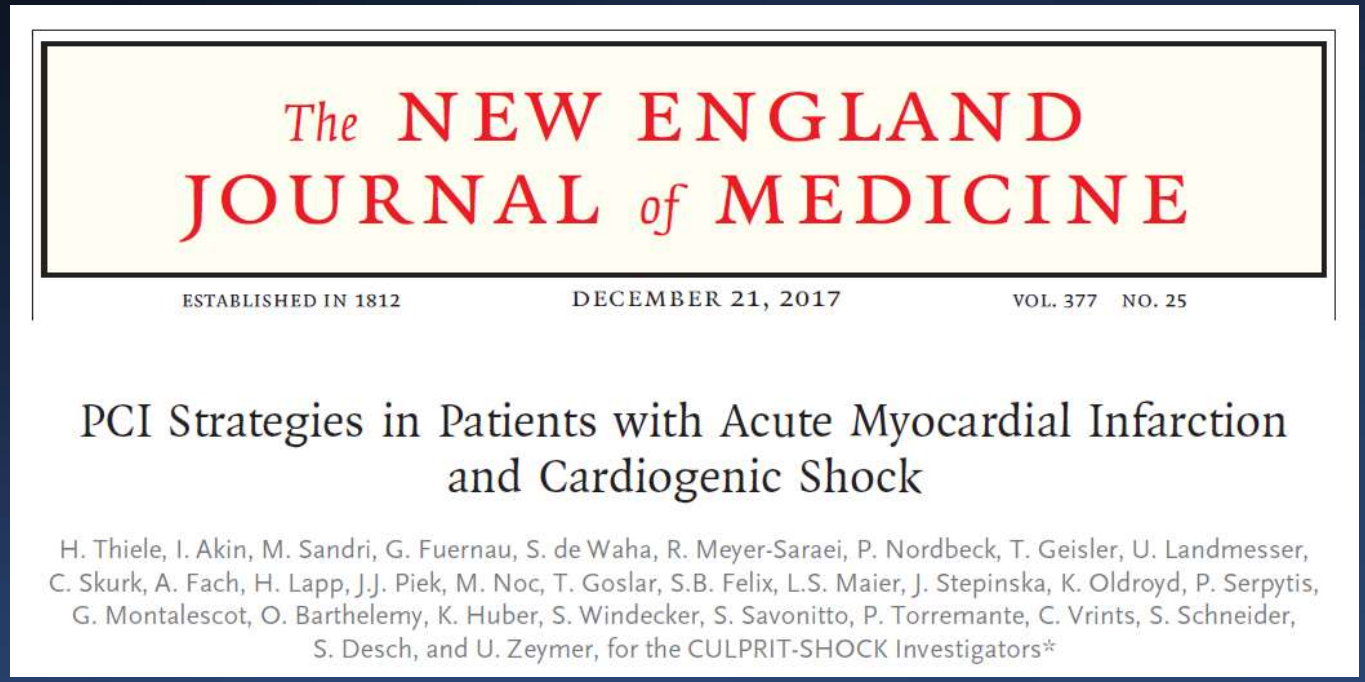
Post PTA and stenting



Complete Revascularization in AMI with shock patients

- 80% of patients with AMI with CGS have MVD
- MV PCI may theoretically improve myocardial perfusion and hence improve myocardial function
- The goal of MCS in high-risk PCI is to provide sufficient CO to maintain myocardial flow and end-organ perfusion
- However, MV PCI may also lead to harm due to increased procedural time, more contrast use, increased thrombogenicity

CULPRIL SHOCK Trial



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PCI Strategies in Patients with Acute Myocardial Infarction and Cardiogenic Shock

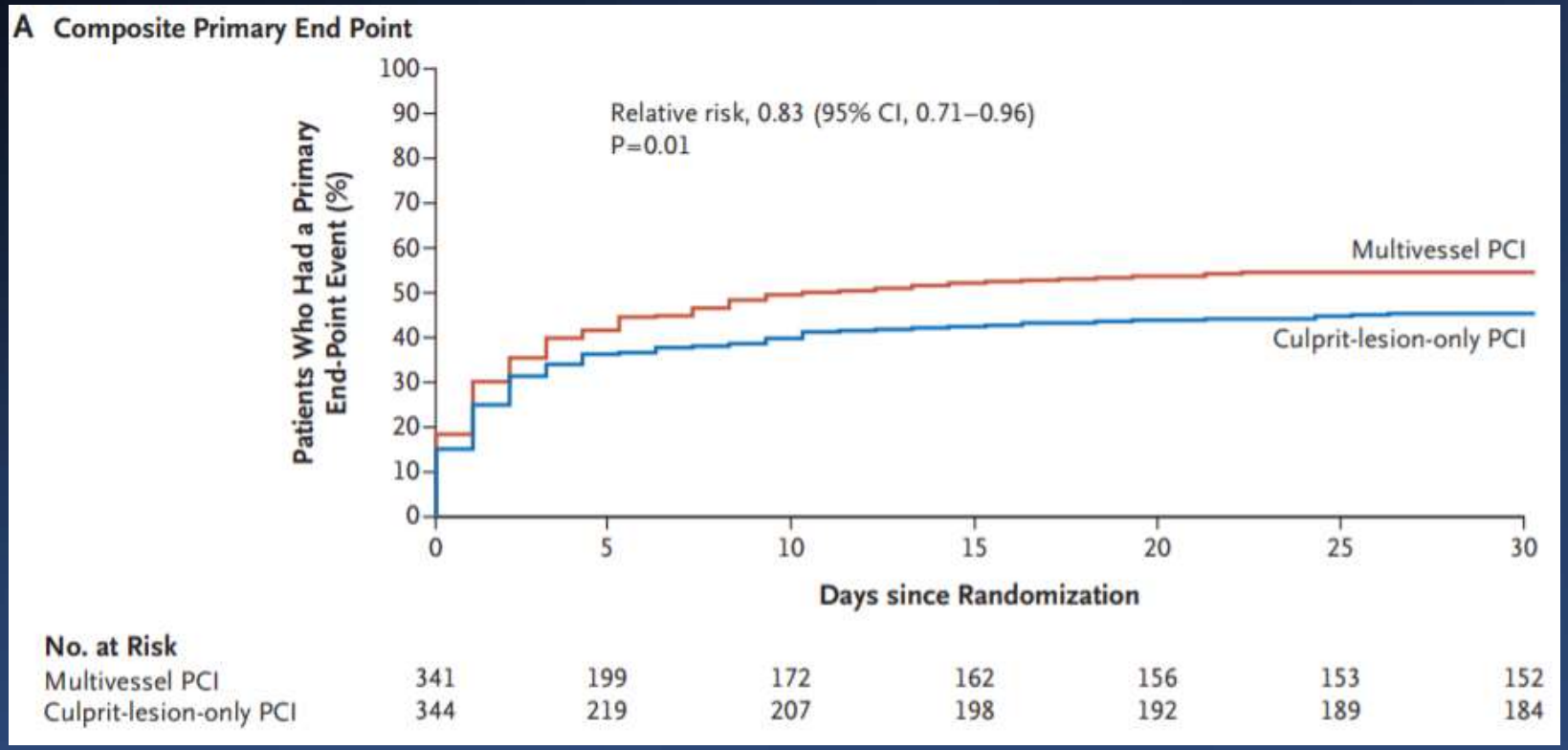
H. Thiele, I. Akin, M. Sandri, G. Fuernau, S. de Waha, R. Meyer-Saraei, P. Nordbeck, T. Geisler, U. Landmesser, C. Skurk, A. Fach, H. Lapp, J.J. Piek, M. Noc, T. Goslar, S.B. Felix, L.S. Maier, J. Stepinska, K. Oldroyd, P. Serpytis, G. Montalescot, O. Barthelemy, K. Huber, S. Windecker, S. Savonitto, P. Torremante, C. Vrints, S. Schneider, S. Desch, and U. Zeymer, for the CULPRIT-SHOCK Investigators*

706 patients who had MVD, AMI, and cardiogenic shock

PCI of the culprit lesion only or immediate multivessel PCI

The primary end point: composite of death or severe renal failure leading to renal-replacement therapy within 30 days

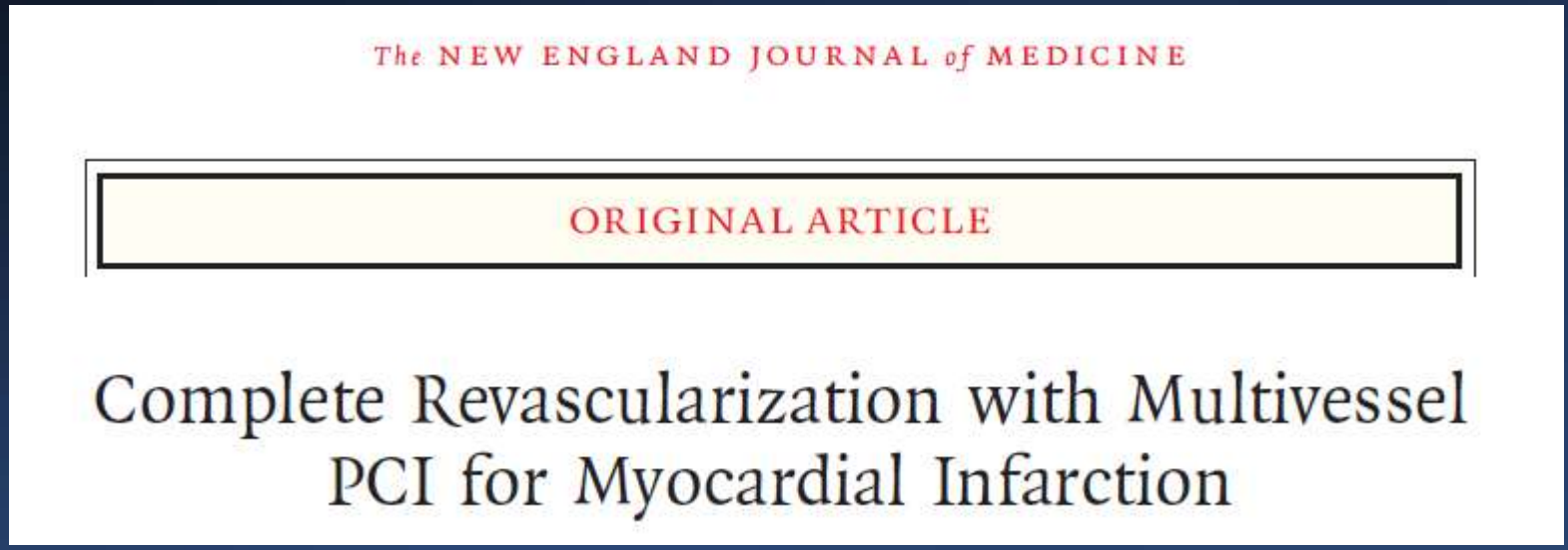
CULPRIT-SHOCK Trial – 30-Day Results



Conclusion: Among patients who had MVD and AMI with cardiogenic shock, the 30-day composite of primary end points:

Culprit lesion only is superior to immediate multivessel PCI

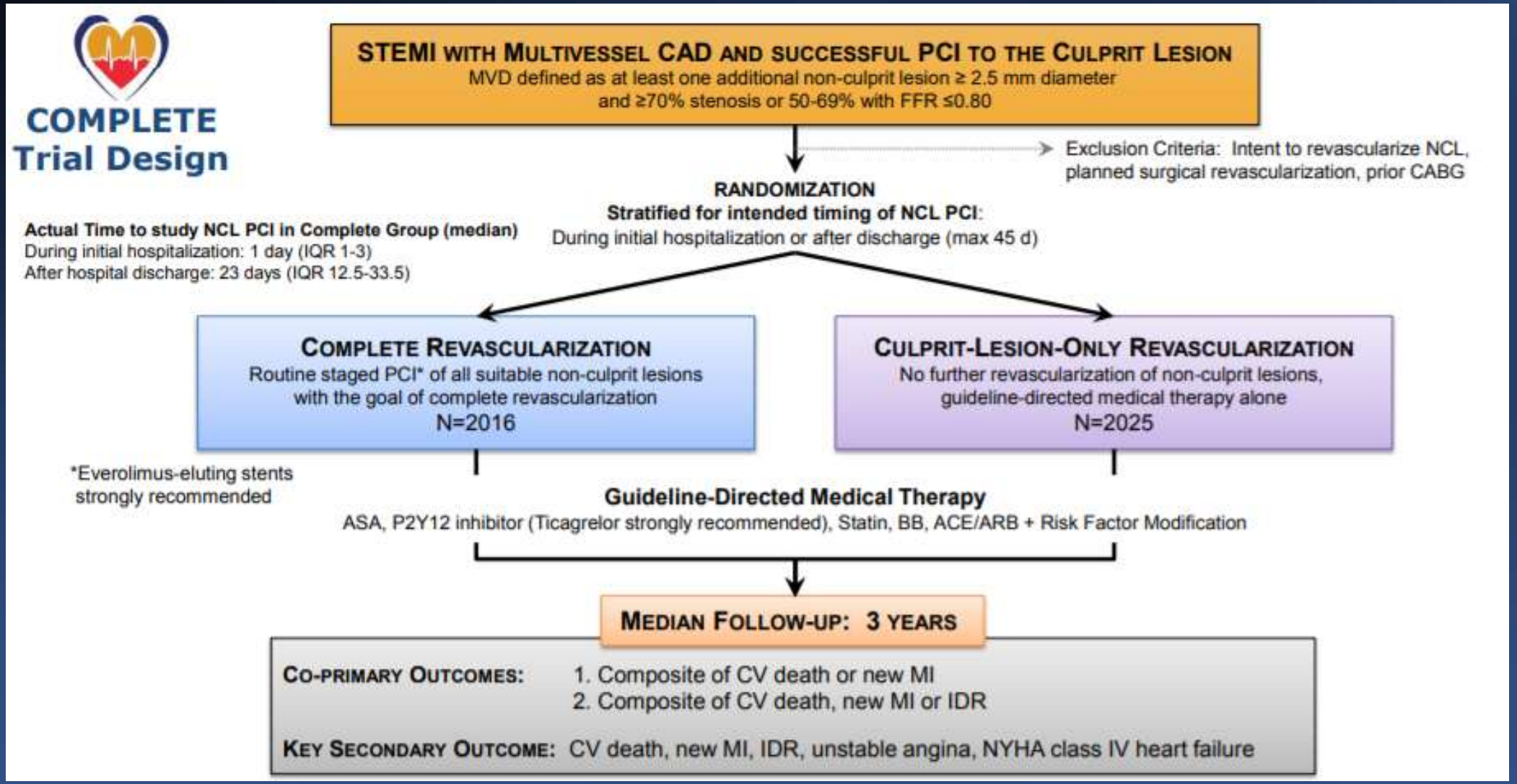
COMPLETE Trial



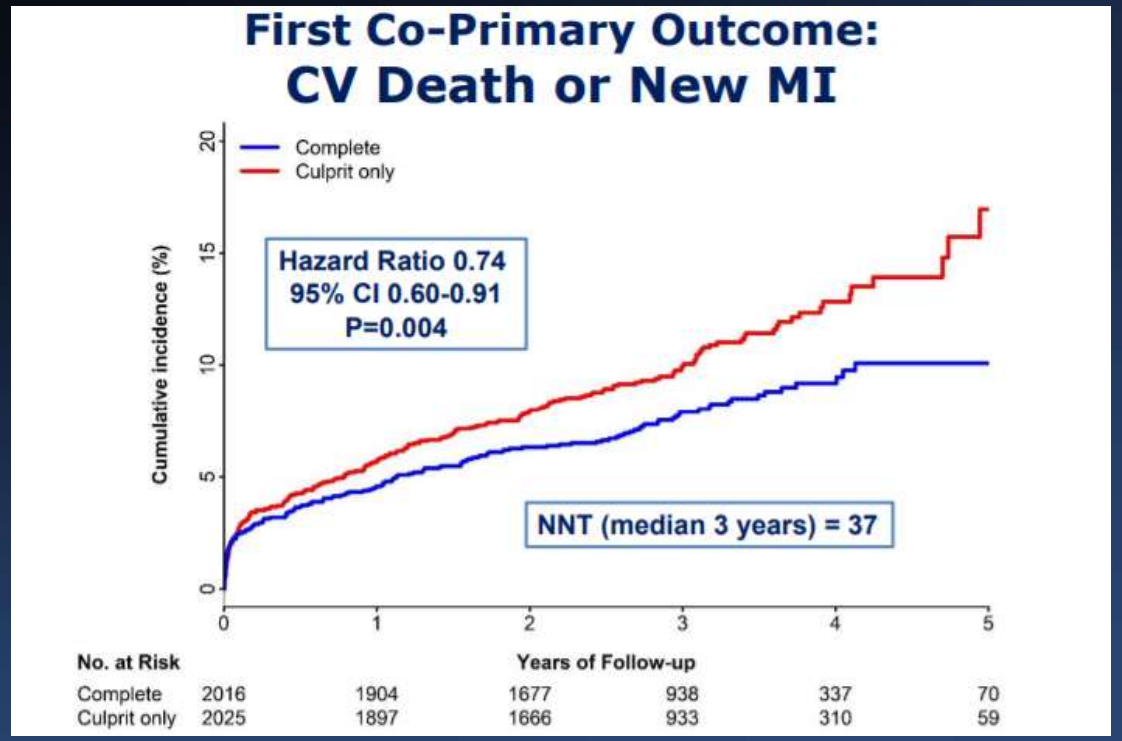
Shamir R. Mehta MD, MSc

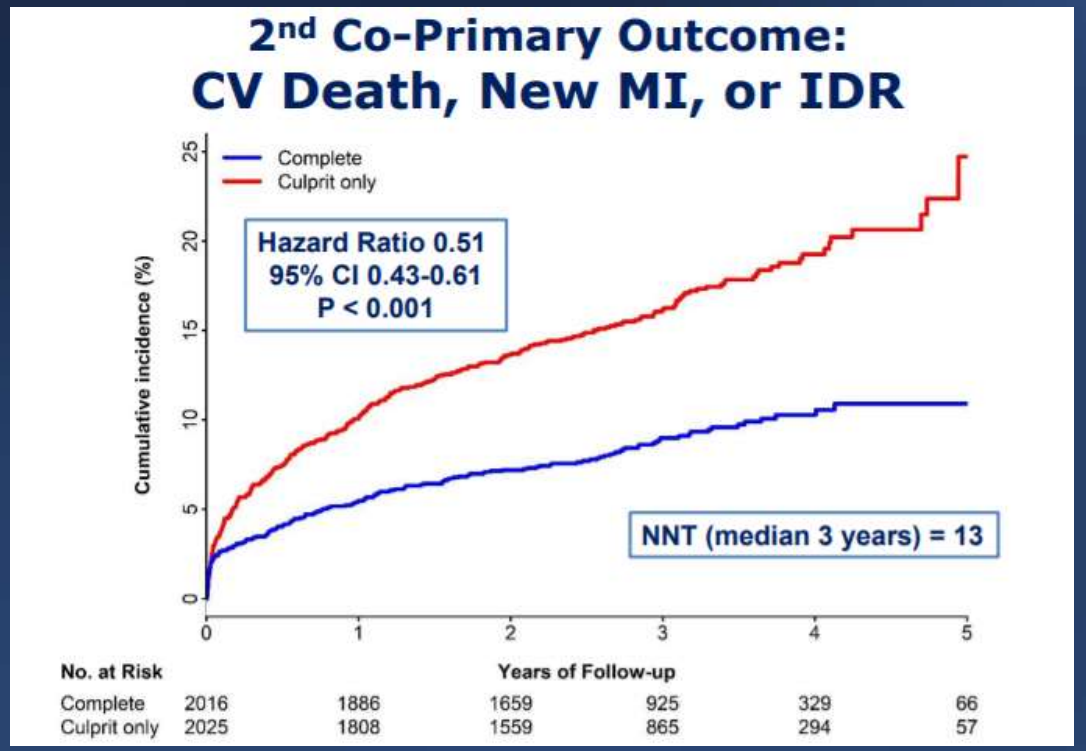
Complete revascularization vs. culprit lesion-only PCI for AMI

COMPLETE Trial Design



COMPLETE Trial



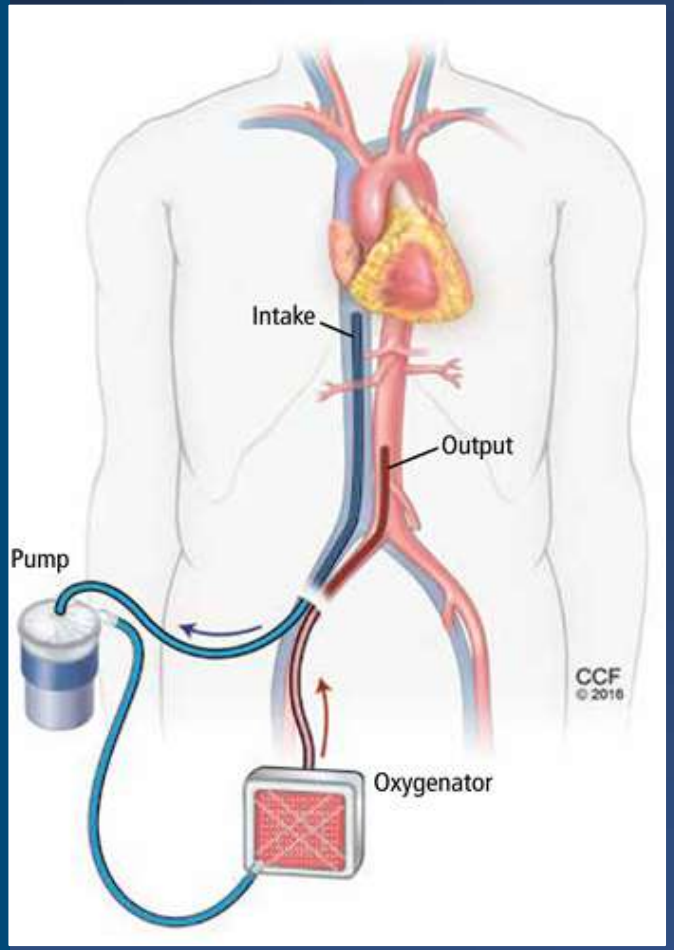


Complete Revasularization:
Reduced CV death or new MI by 28% (p=0.004) NNT=37
Reduced CV death, new MI or IDR by 49% (p<0.001), NNT=13

Complete revascularization is superior to culprit lesion only PCI

Why did we choose ECMO for this patient?

- IABP shock trial did not show benefits
- Cannulation of ECMO can be done at the bedside or cath room
- Impella is an ideal MCS device but it is expensive and not available in Taiwan yet
- ECMO provides a more comprehensive circulatory support and oxygenation
- ECMO is more favorable for bi-ventricular dysfunction
- Our Heart team cardiac surgeon and perfusionist are available 24 hrs and react quickly



Conclusion/Take-home Message

- Complete revascularization in patients with cardiogenic shock complicating AMI is feasible if supported by appropriate MCS
- Although ECMO has a higher complication rate but it saves heart and life in AMI shock patients
- Short-term ECMO may reduce the ECMO related complications
- Early delivery MCS prior to PCI may improve survival in AMI shock patients
- Randomized trials are necessary to establish effectiveness of percutaneous MCS in adjunction with MV PCI in shock patients