

Complete Revascularization with Temporary Mechanical Circulatory Support for Severe Heart Failure

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Case Presentation

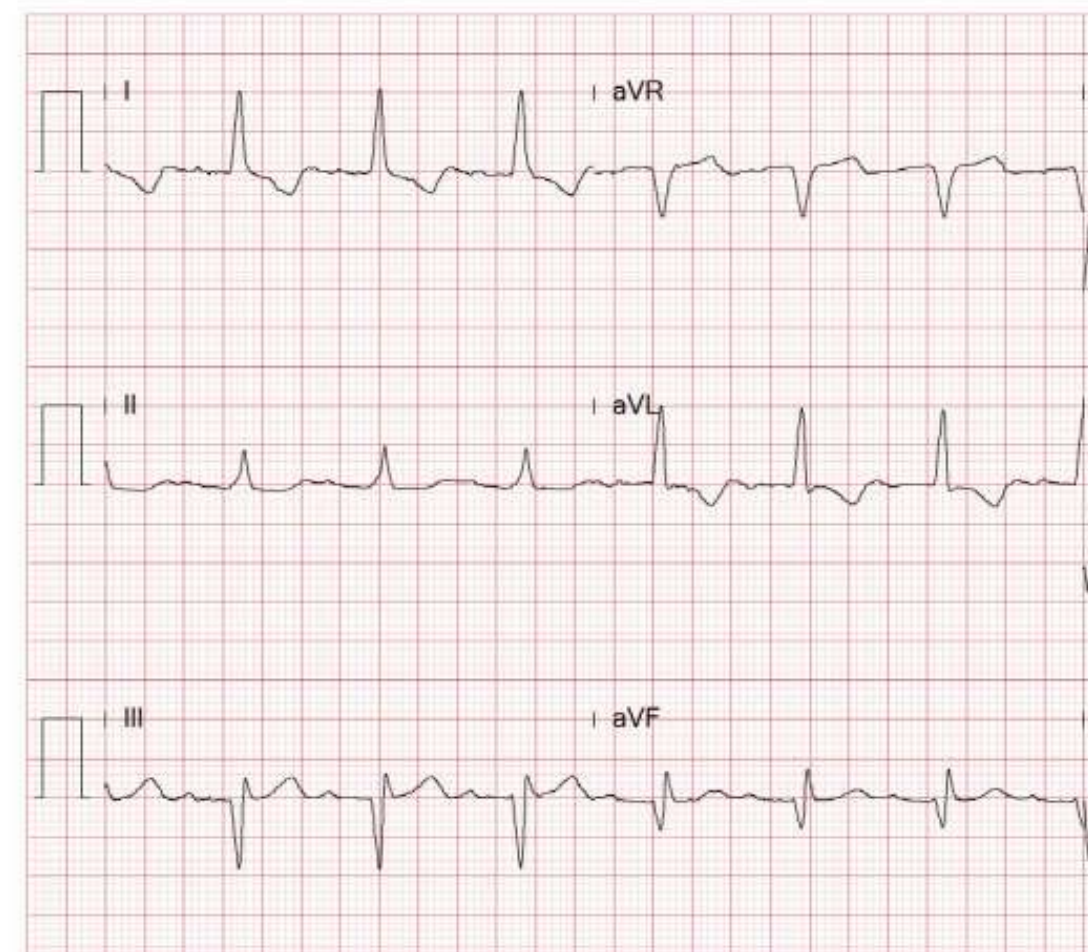
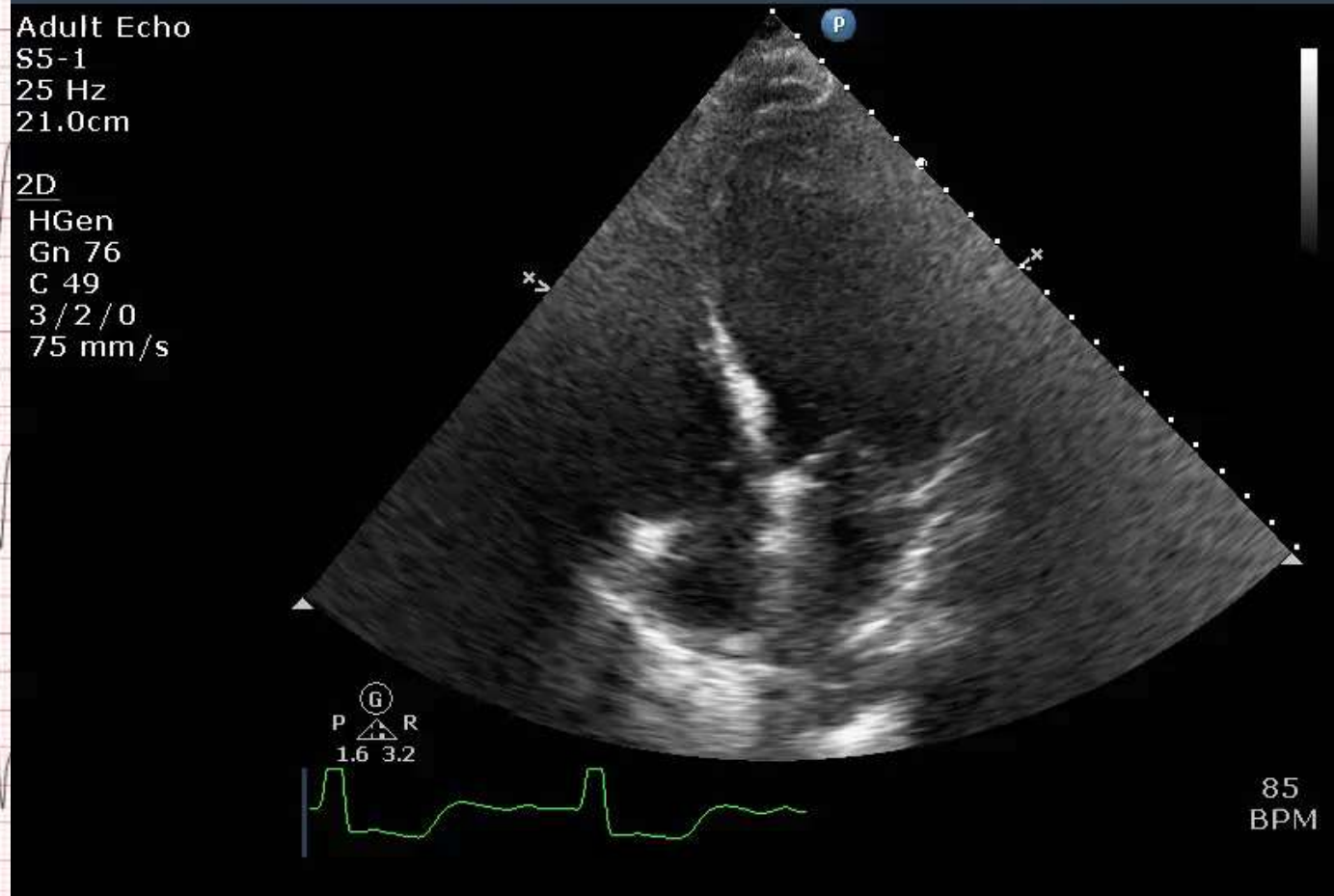
- 81 y/o, male
- SOB and orthopnea, he was brought to our ER
 - NT-proBNP >35000 pg/mL (< 450)
 - Peak troponin-I 2.705 ng/mL (< 0.056)
 - Cr: 2.92 mg/dL, eGFR 22
 - Echocardiography: LVEF 20% and poor RV function
- Hx of CAD old MI, DM with nephropathy, HTN, and Hyperlipidemia
- Previous LVEF 40%
-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

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

2019/10/22 08:26:10
Vent rate: 82 BPM
PR int: 225 ms
QRS dur: 139 ms
QT/QTc: 437 / 514 ms
P-R-T axes: 0 4 148

Age not entered, assumed to be 80 years old for purpose of ECG interpretation
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

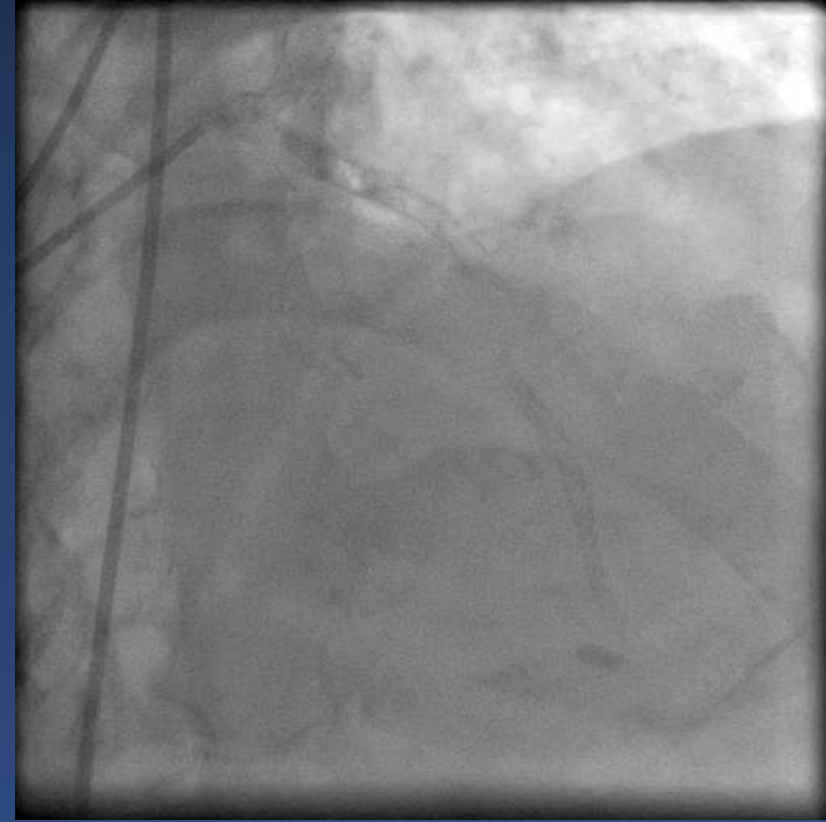
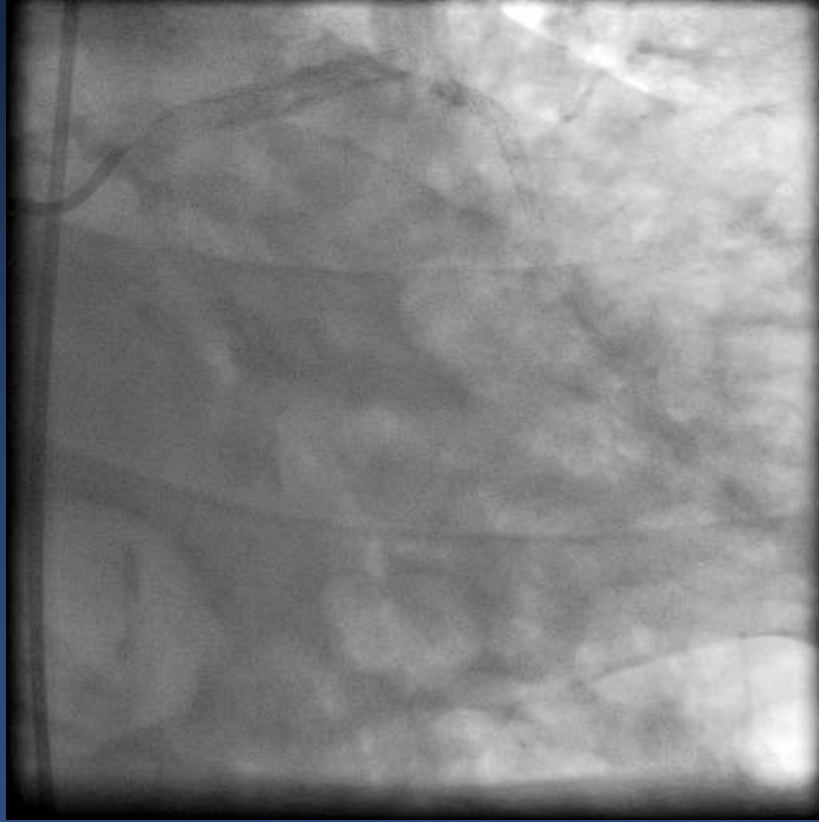
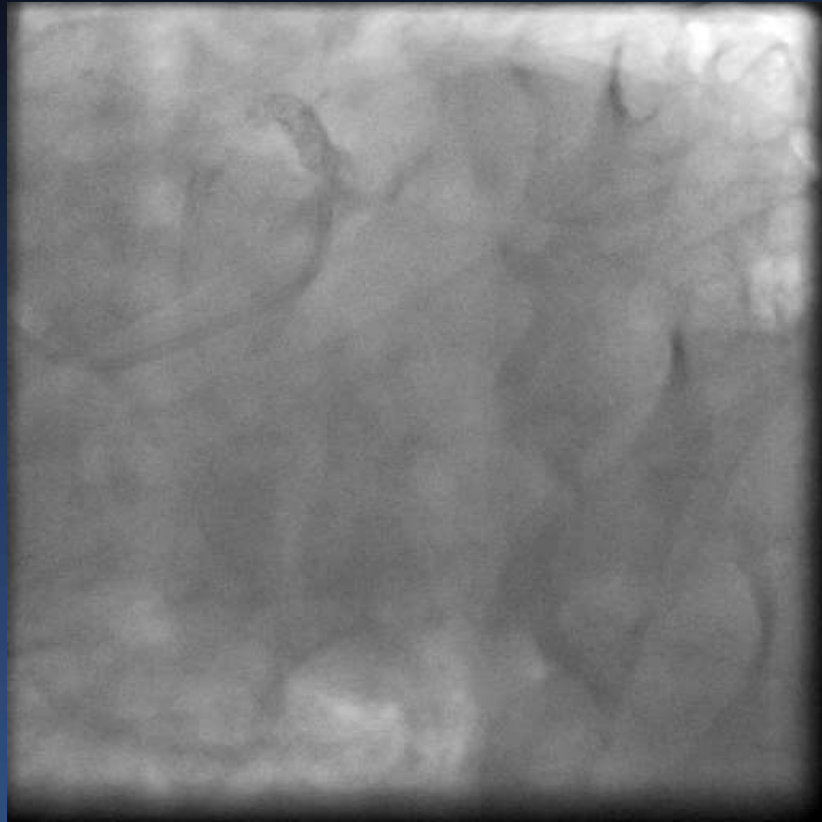
PHILIPS 22-25 81M NSTEMI MI 1.2 10/22/2019
CWH 4266854 Philips Healthcare TIS 0.4 11:57:27 AM



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

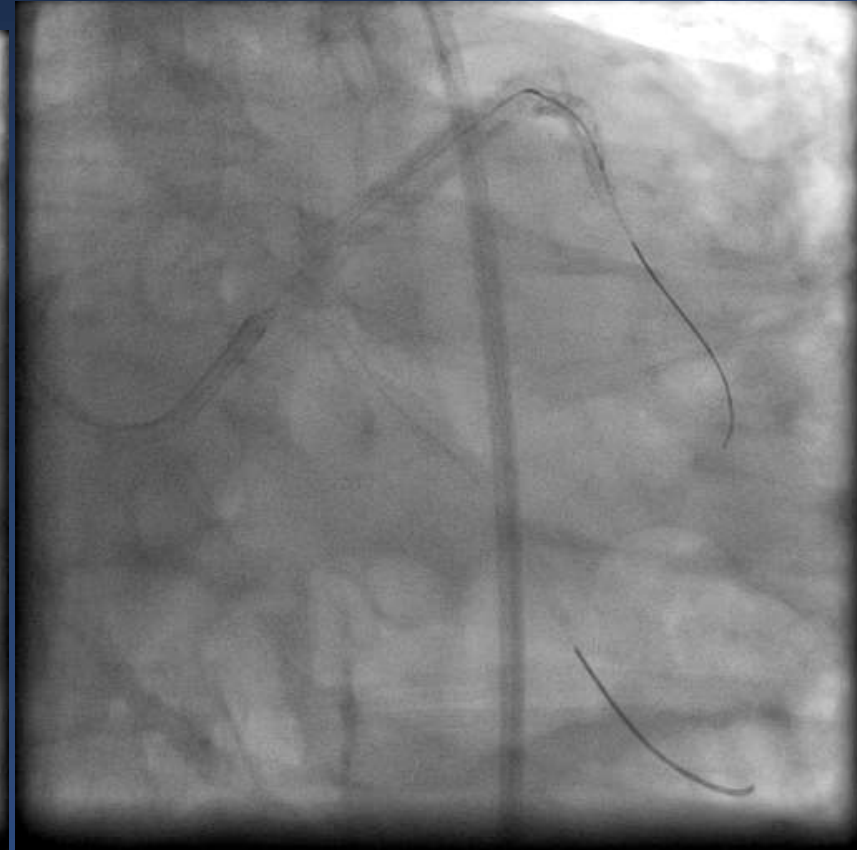
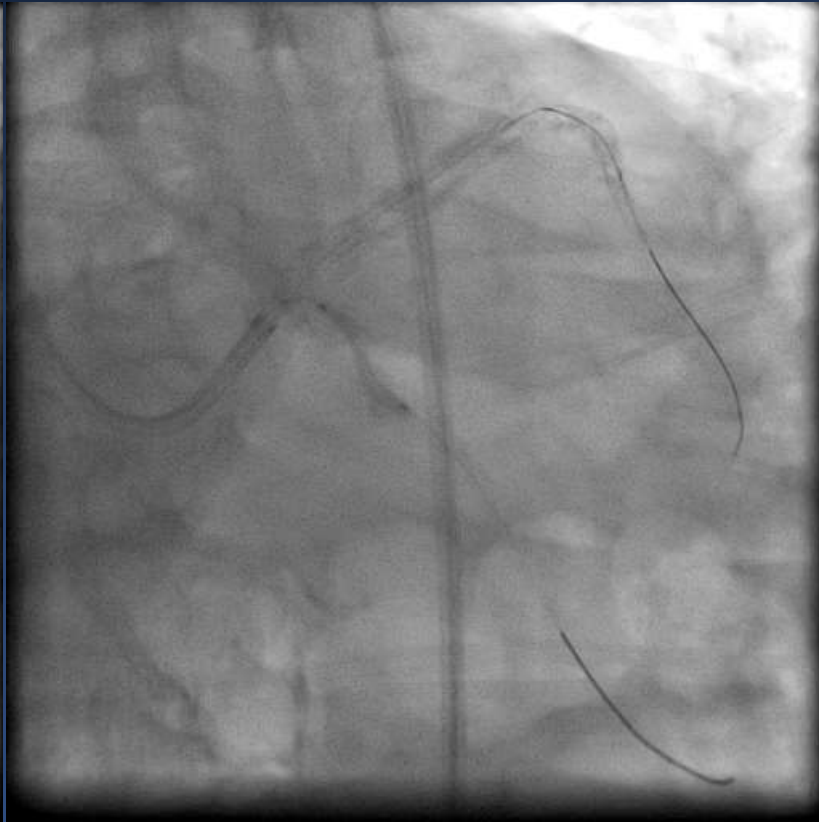
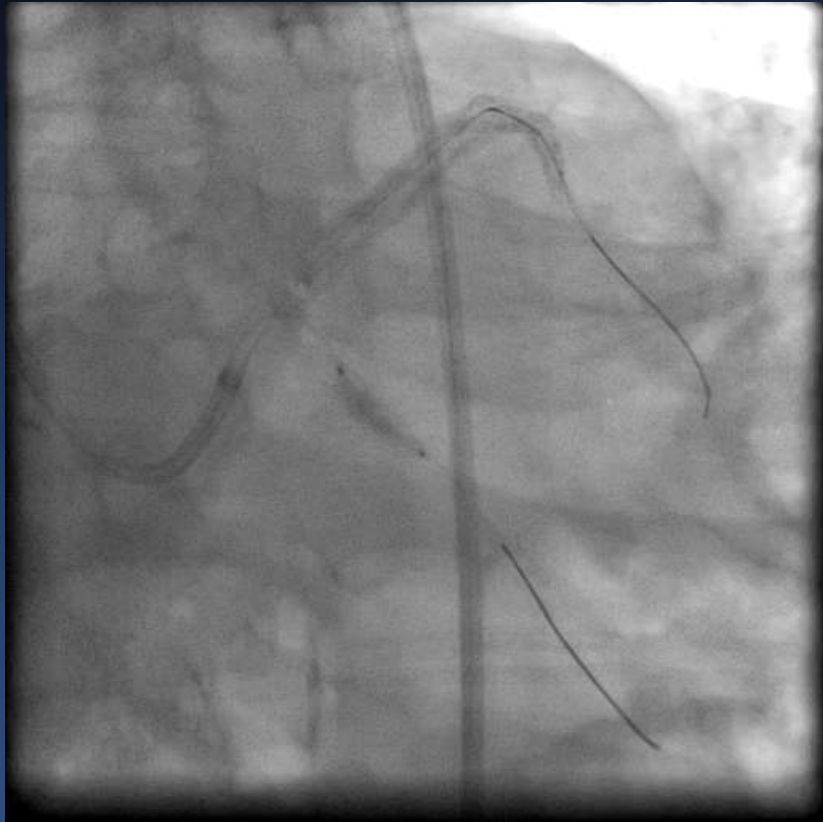
ECMO: 15F Arterial cannula via left CFA, 19F venous cannula to IVC
CAG: Distal LM BF (1,1,1) with calcification, long diffuse disease of LCx



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

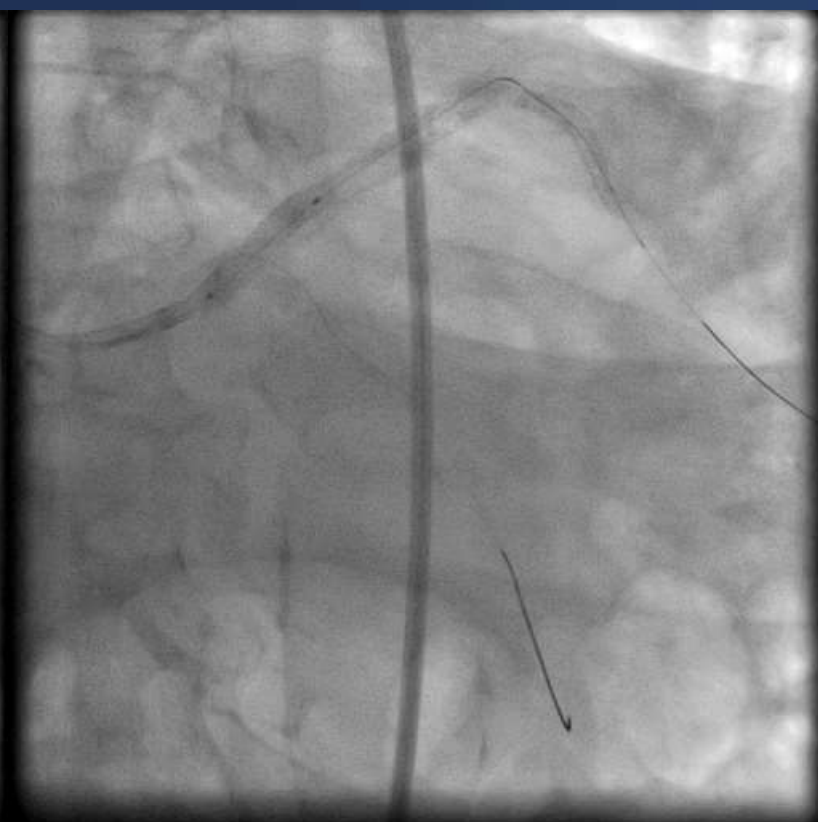


CB 3.5 x 6



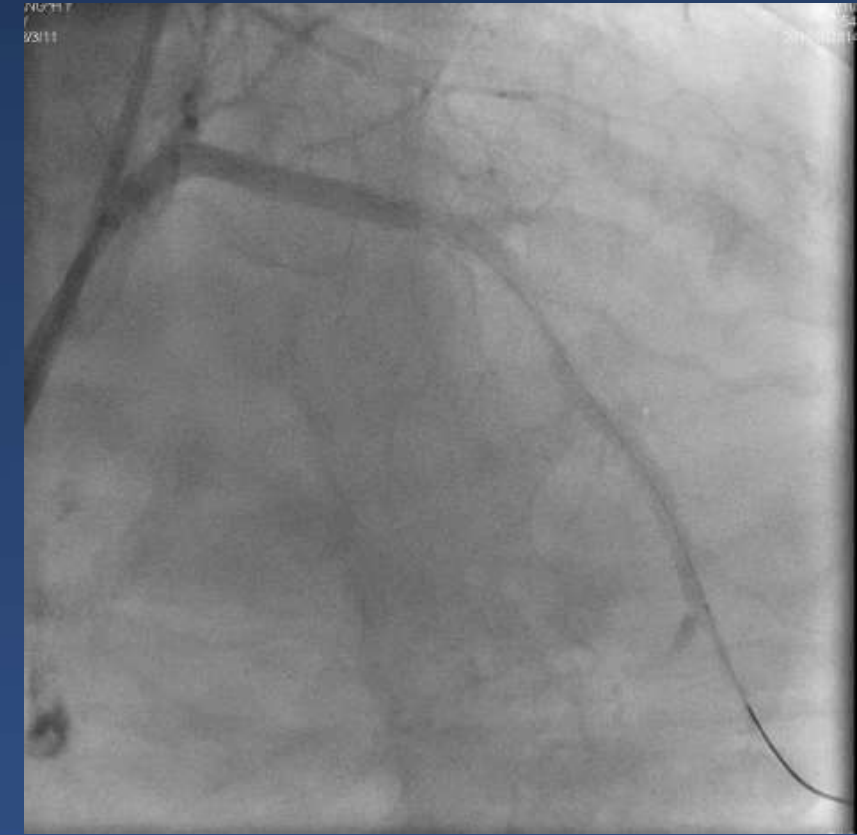
NC 3.5 x 15 mm

DES 3.5 x 15 mm



Final angiography of LCA

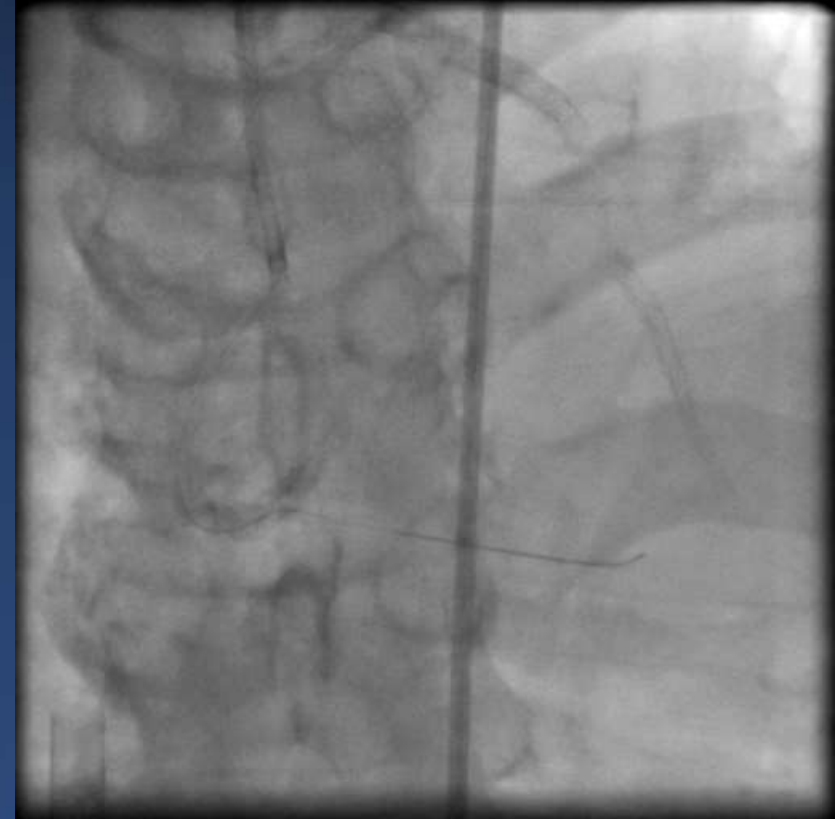
POT: NC 4.0 x 8



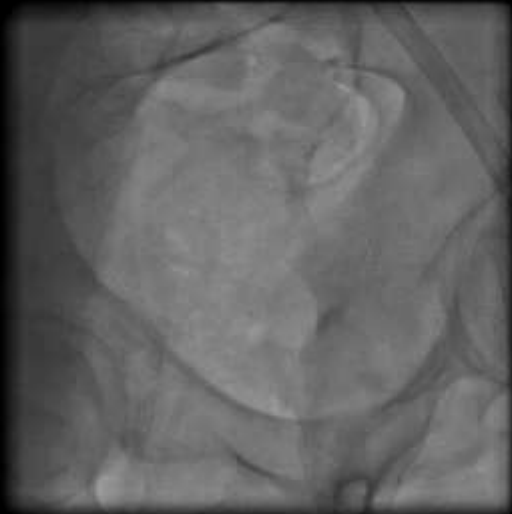
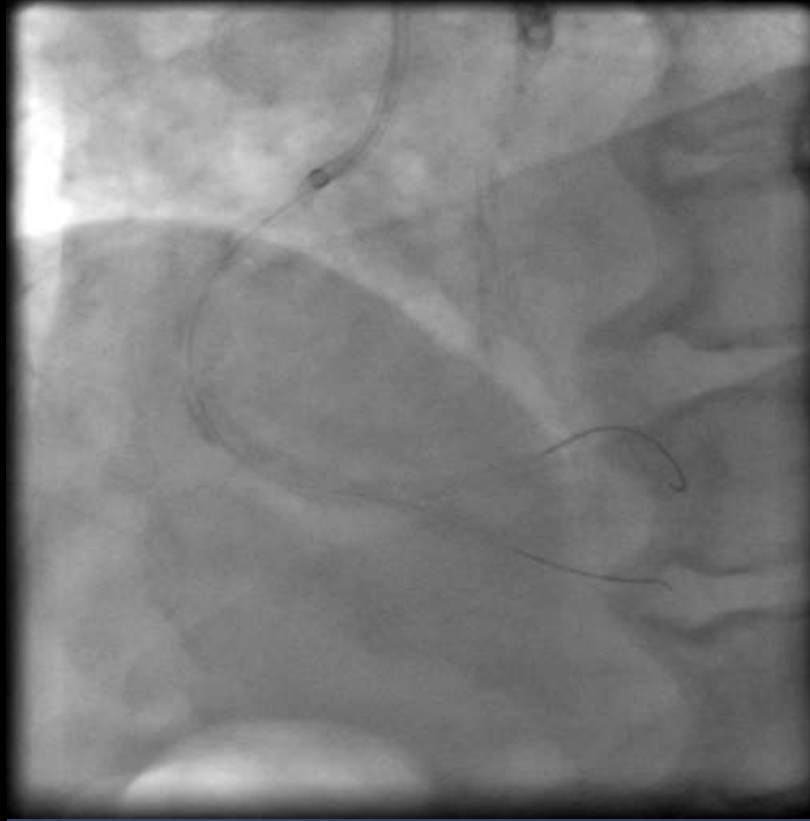
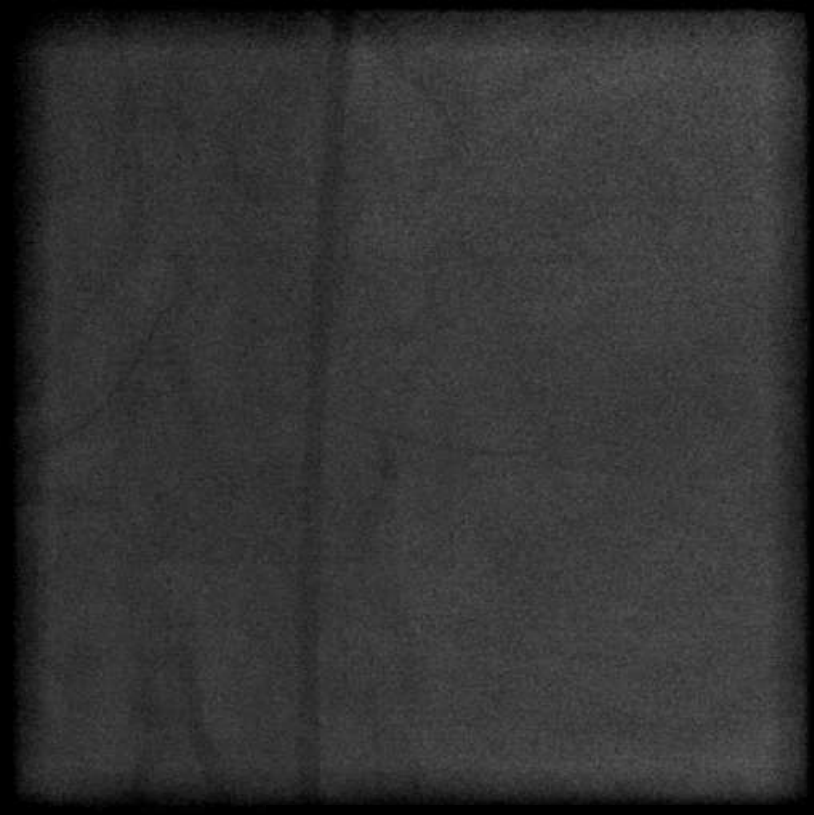
RCA: diffuse and calcified disease, near occlusion of PDA and total occlusion of PL br



Turnpike MC + Filter XTA to PDA



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

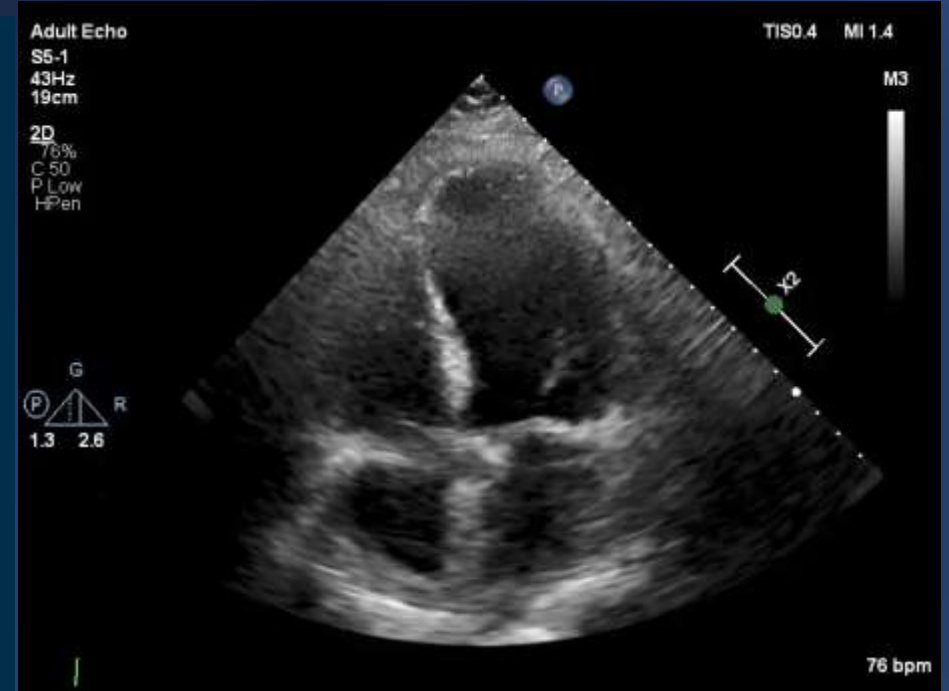


ECMO was removed right after PCI and the puncture site was sutured with 2 proglides

Inserted IABP for subsequent hemodynamic support via right FA

Hospital course

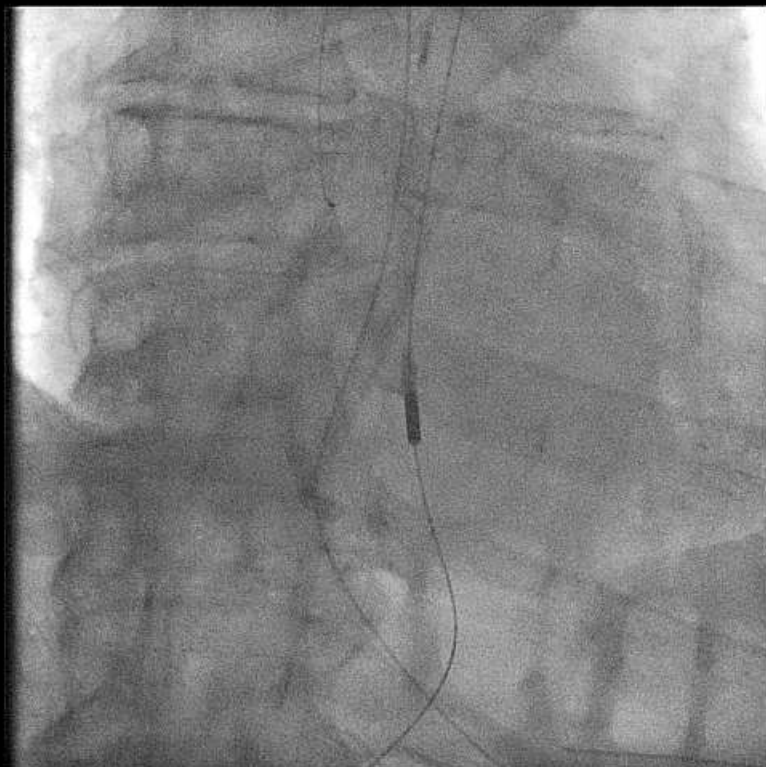
- LV and RV function improved
- SBP 90-110mmHg, gradually tapered inotropic agents
- But cyanotic change of left foot with coldness was noted, acute limb ischemia was highly suspected on the second day following PCI
- We brought patient to cath lab immediately



**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

The NEW ENGLAND
JOURNAL *of* MEDICINE

ESTABLISHED IN 1812

DECEMBER 21, 2017

VOL. 377 NO. 25

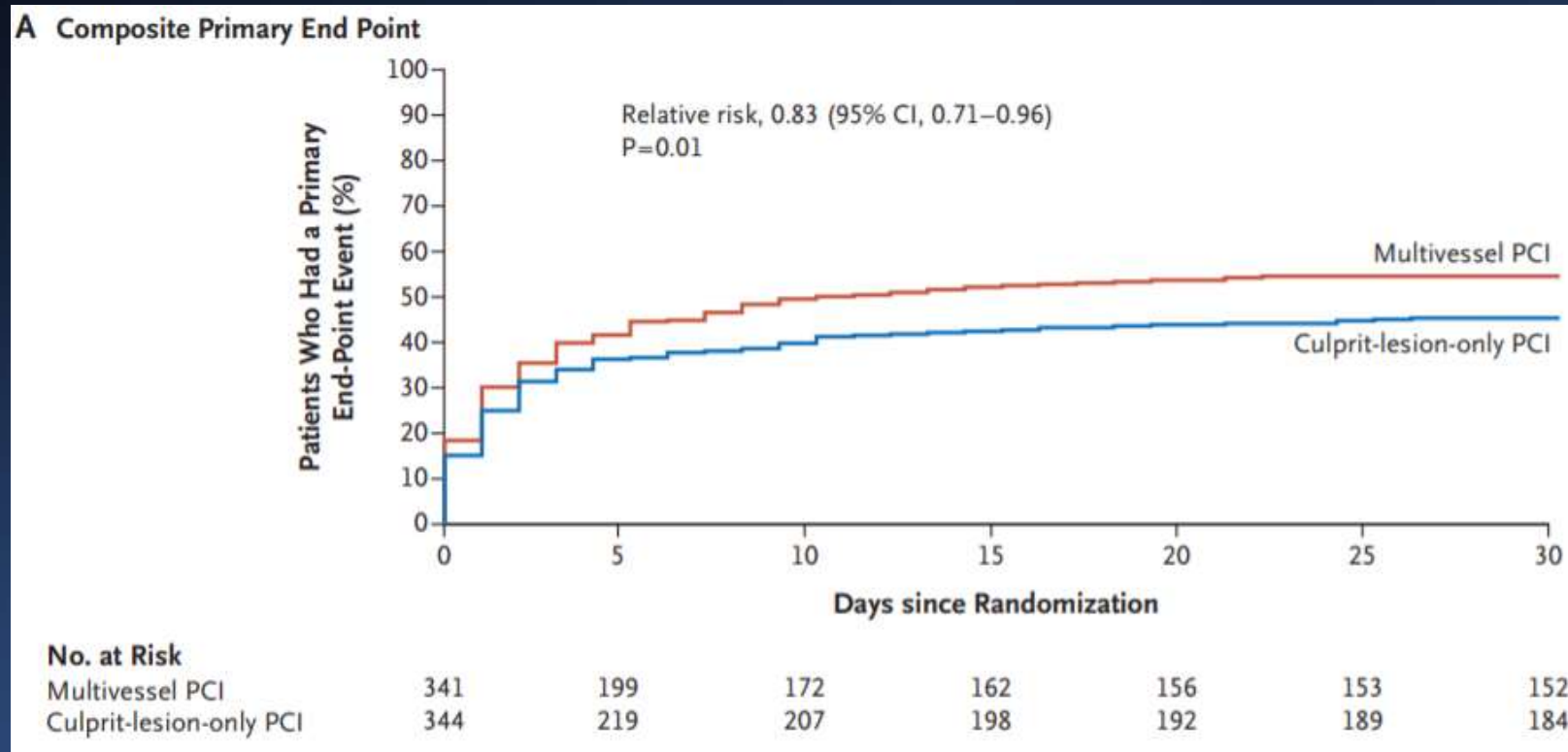
PCI Strategies in Patients with Acute Myocardial Infarction
and Cardiogenic Shock

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

The NEW ENGLAND JOURNAL of MEDICINE

ORIGINAL ARTICLE

Complete Revascularization with Multivessel PCI for Myocardial Infarction

Shamir R. Mehta MD, MSc

Complete revascularization vs. culprit lesion-only PCI for AMI



COMPLETE Trial Design

STEMI WITH MULTIVESSEL CAD AND SUCCESSFUL PCI TO THE CULPRIT LESION

MVD defined as at least one additional non-culprit lesion ≥ 2.5 mm diameter and $\geq 70\%$ stenosis or 50-69% with FFR ≤ 0.80

Exclusion Criteria: Intent to revascularize NCL, planned surgical revascularization, prior CABG

RANDOMIZATION

Stratified for intended timing of NCL PCI:

During initial hospitalization or after discharge (max 45 d)

Actual Time to study NCL PCI in Complete Group (median)

During initial hospitalization: 1 day (IQR 1-3)

After hospital discharge: 23 days (IQR 12.5-33.5)

COMPLETE REVASCULARIZATION

Routine staged PCI* of all suitable non-culprit lesions with the goal of complete revascularization

N=2016

CULPRIT-LESION-ONLY REVASCULARIZATION

No further revascularization of non-culprit lesions, guideline-directed medical therapy alone

N=2025

*Everolimus-eluting stents strongly recommended

Guideline-Directed Medical Therapy

ASA, P2Y12 inhibitor (Ticagrelor strongly recommended), Statin, BB, ACE/ARB + Risk Factor Modification

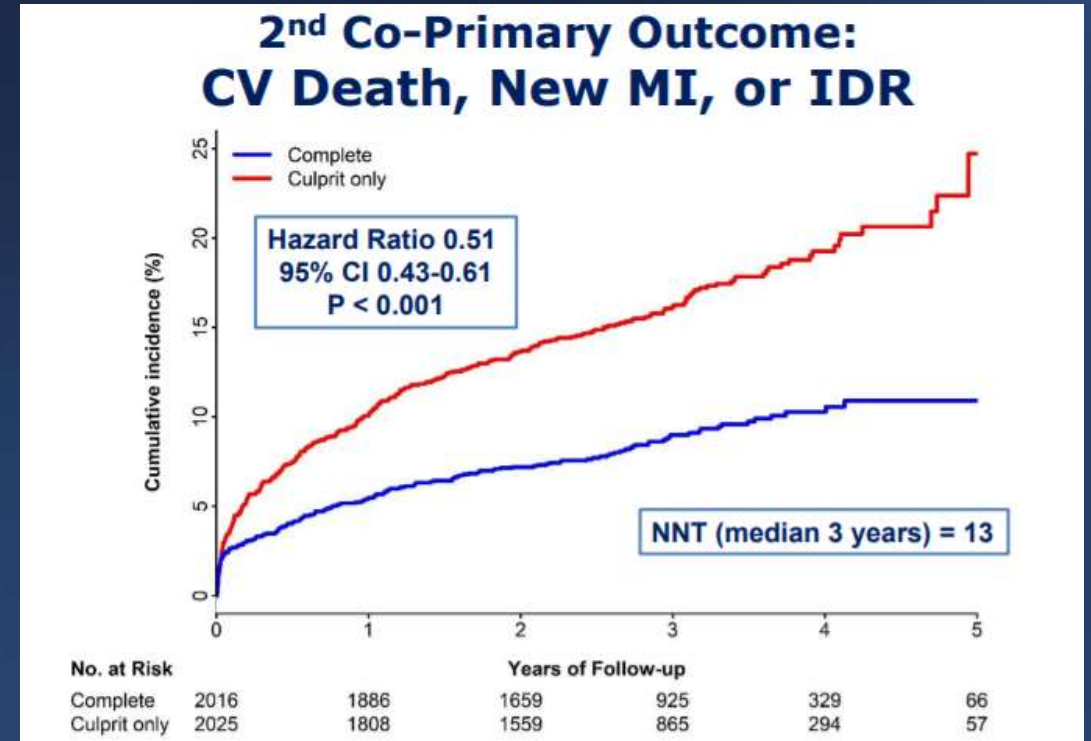
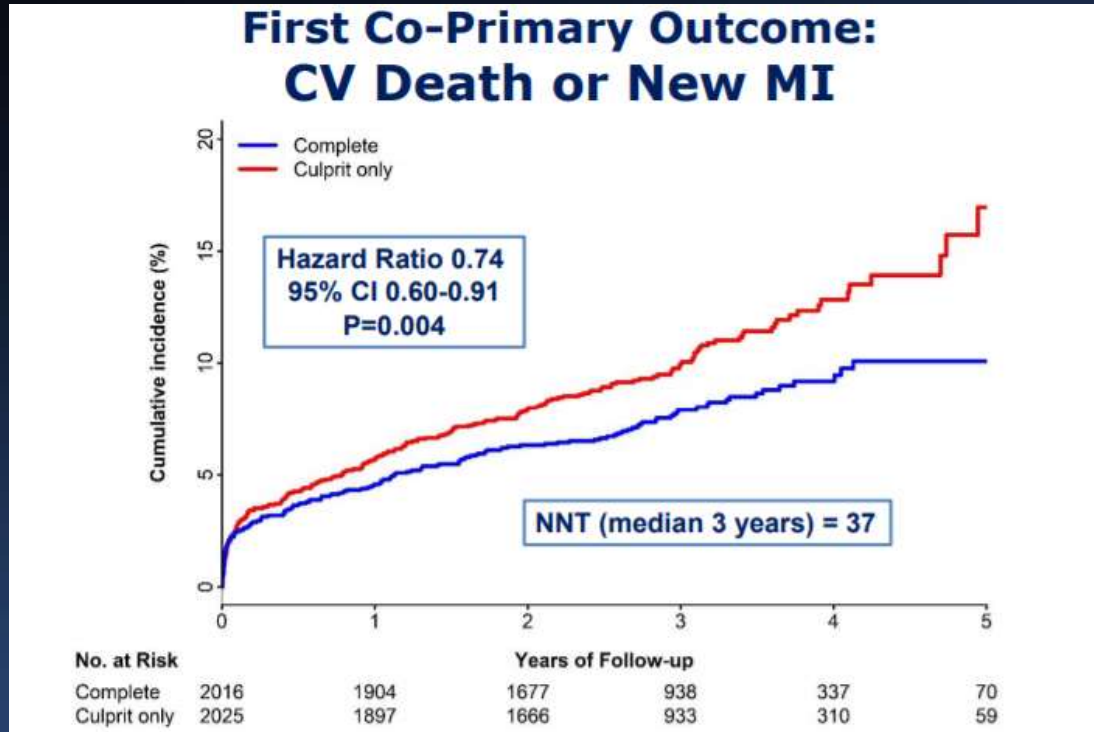
MEDIAN FOLLOW-UP: 3 YEARS

CO-PRIMARY OUTCOMES:

1. Composite of CV death or new MI
2. Composite of CV death, new MI or IDR

KEY SECONDARY OUTCOME: CV death, new MI, IDR, unstable angina, NYHA class IV heart failure

COMPLETE Trial

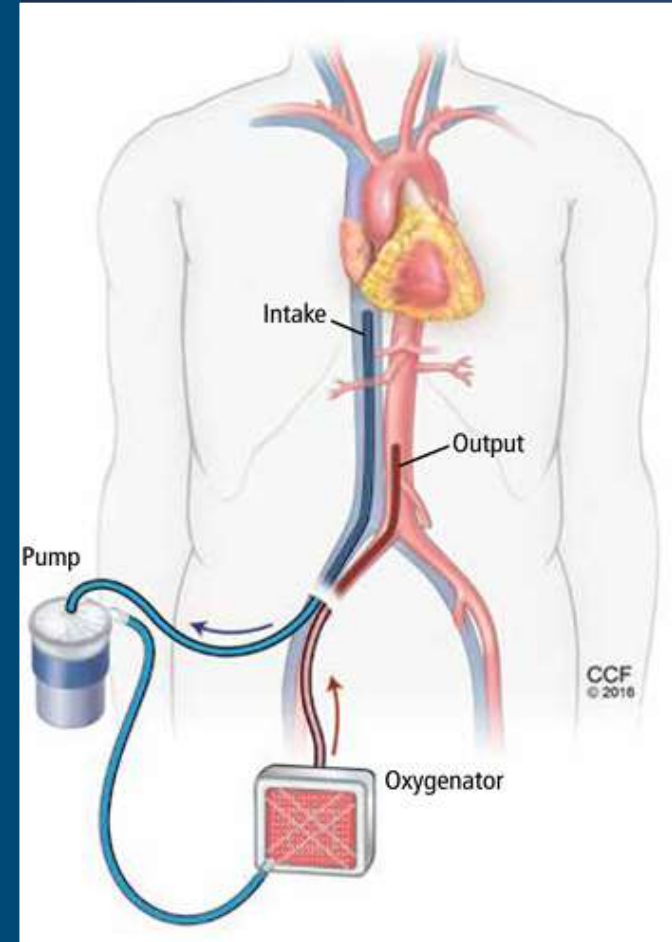


Complete Revascularization:
Reduced CV death or new MI by 28% (p=0.004) NNT=37
Reduced CV death, new MI or IDR by 49% (p<0.001), NNT=13

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