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
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/dL, 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
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
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 inotrop ic 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
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
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 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**

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

**RANDOMIZATION**

Stratified for intended timing of NCL PCI:
- During initial hospitalization or after discharge (max 45 d)

**COMPLETE REvascularization**

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

N=2016

*Everolimus-eluting stents strongly recommended

**CULPRIT-LESION-ONLY REvascularization**

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

N=2025

**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 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.