

# Impella-Assisted CHIP-PCI

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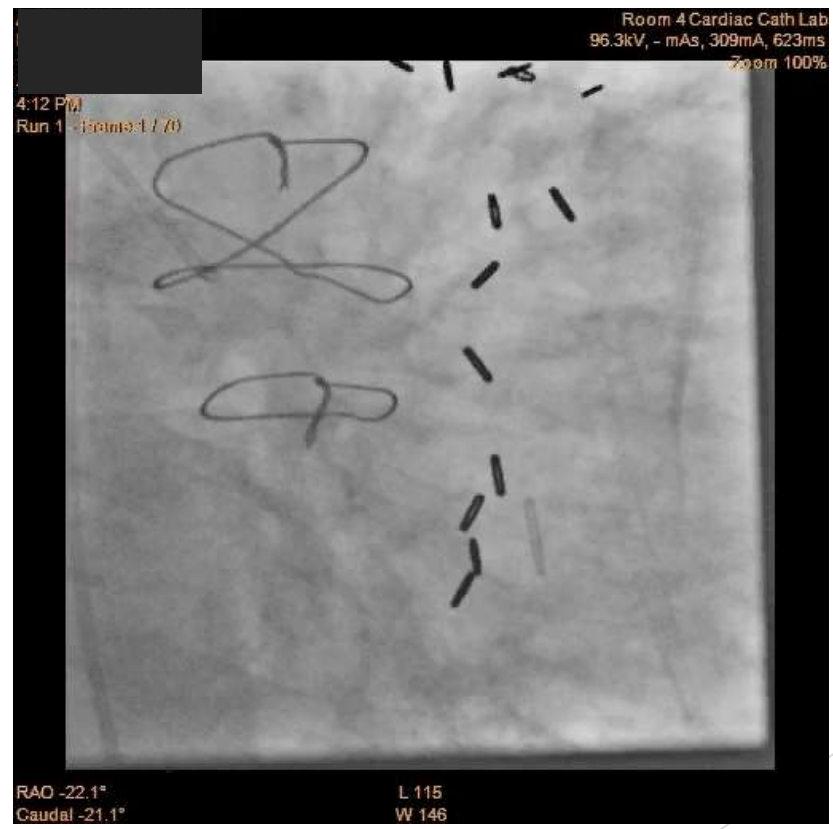
# Disclosures

- ▶ Research grants from Abiomed, PulseCath

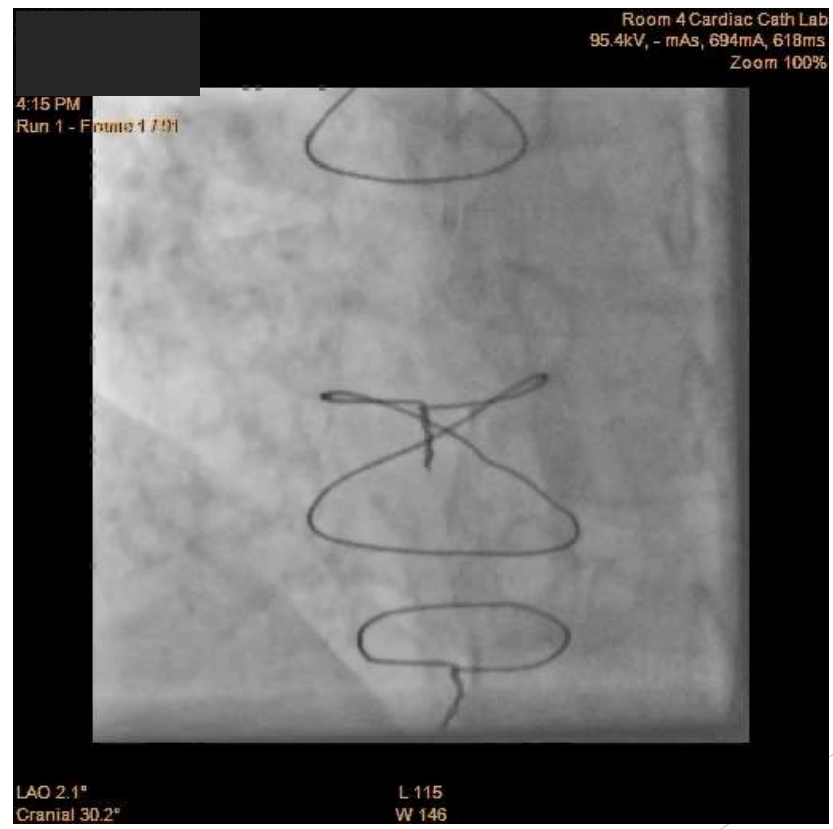
# Case Example

- ▶ 76y/o man, NIDDM, HLP, ex-smoker
- ▶ CKD with eGFR 30ml/min/1.73M<sup>2</sup>
- ▶ CAD s/p CABG 9yrs ago with LIMA-LAD, SVG-OM, RCA not grafted
- ▶ Recurrent angina and CHF
- ▶ LVEF 25% with LVEDD 67, apical aneurysm, lateral and inferior hypokinesia

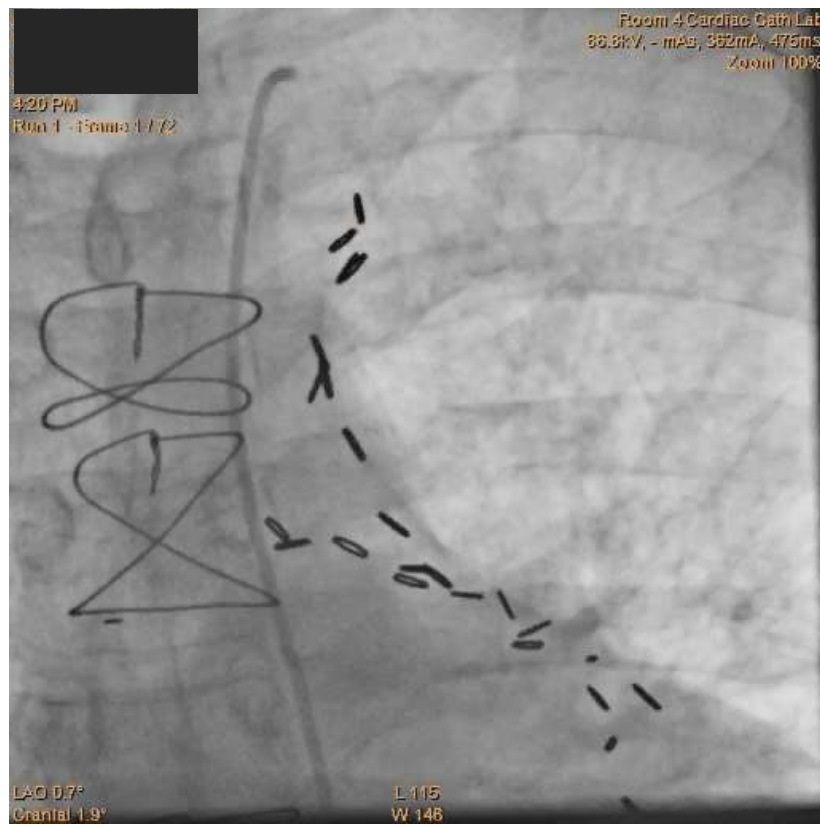
# LCA



# RCA



# Baseline LIMA and SVG

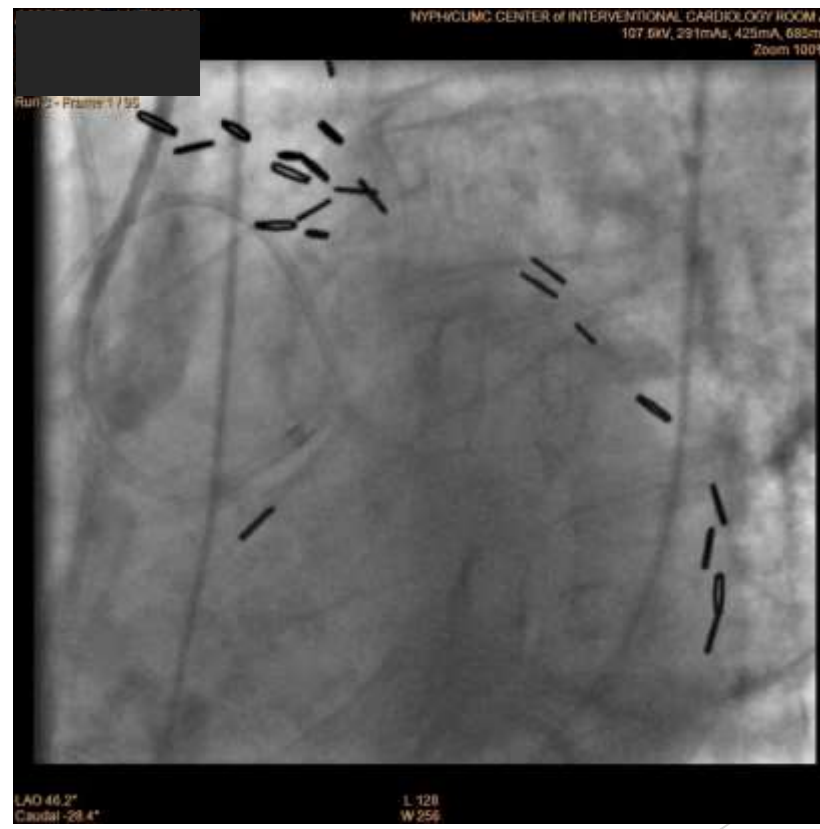


# Baseline LVG



- ▶ Heart team, surgeon declined
- ▶ Medical treatment intensified, partial improvement for 2 months
- ▶ But ACS with resting chest pain and troponin elevation occurred

# LM and Dx progression

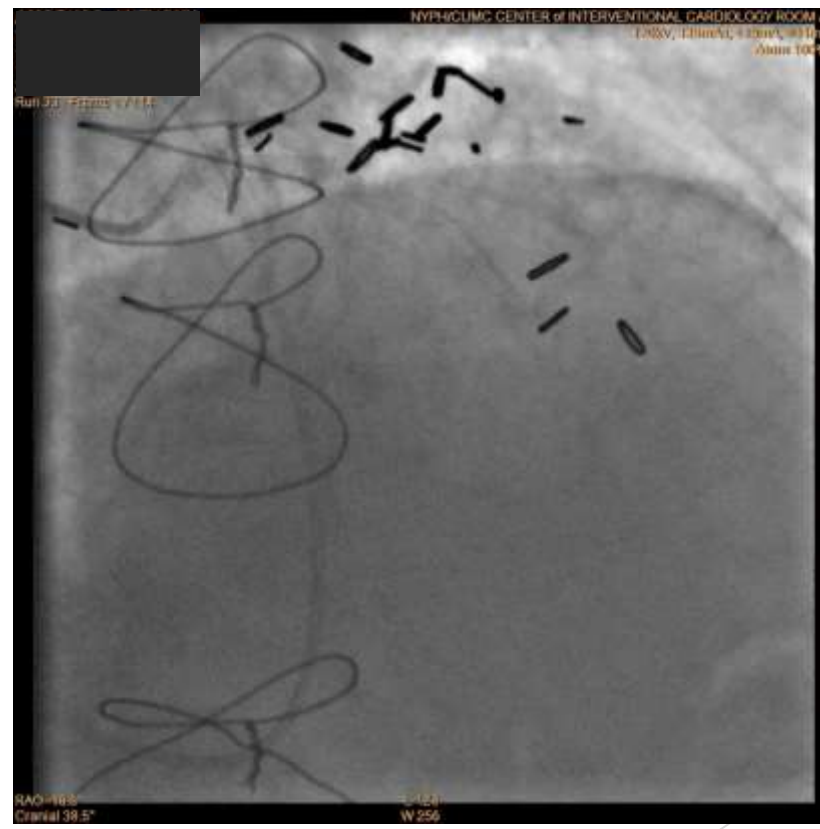
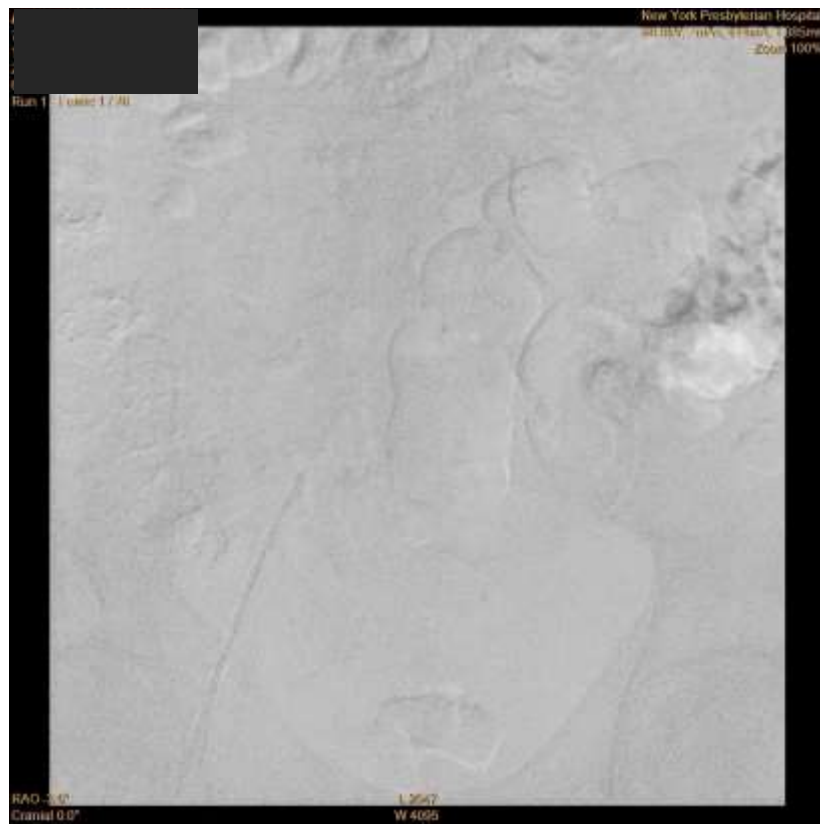




# Urgent PCI

- ▶ Marked elevation of PAP and wedge pressure with any balloon inflation
- ▶ Poor left femoral pulse and no IABP possibility
  
- ▶ Patient had to be sedated for the procedure
- ▶ 2 DES hurried into LM and Dx

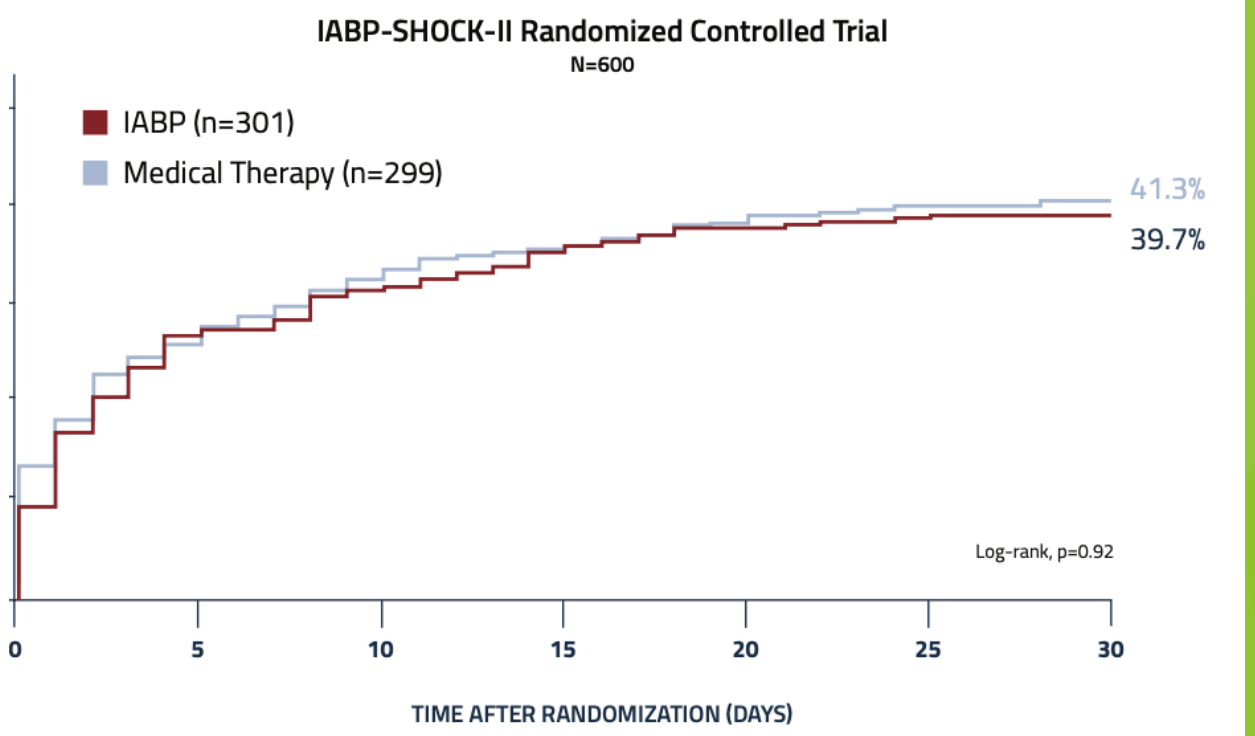
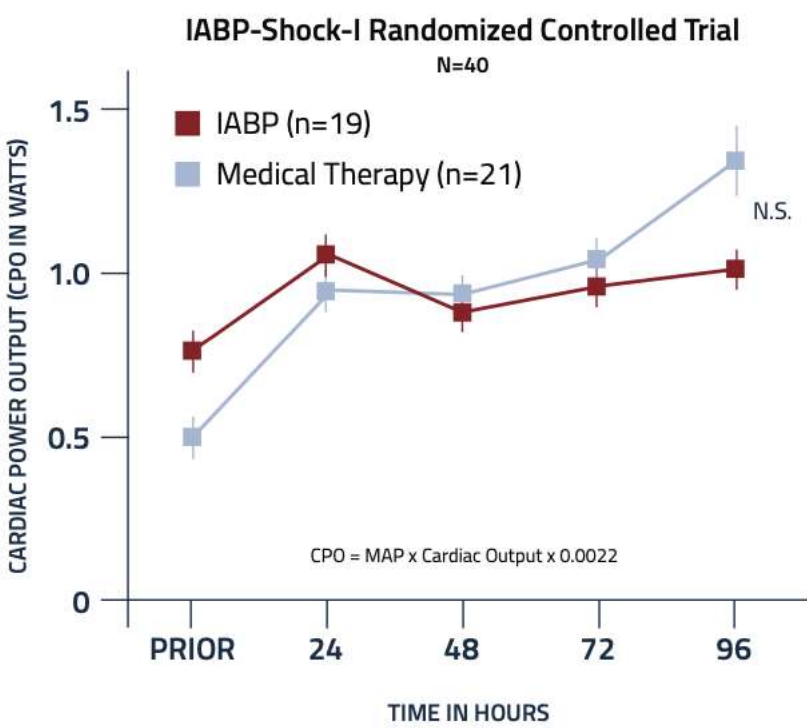
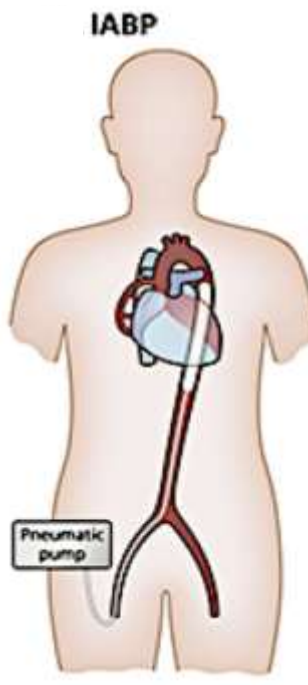
# Results



# Post-PCI course

- ▶ Still Fc 4 angina and dyspnea, bed-ridden
- ▶ Surgeon consulted again, and refused again
- ▶ Tl201 scan showed inferior viable but ischemic myocardium
- ▶ **MCS-assisted CHIP-PCI is the only solution, but which?**

# IABP



# ECMO

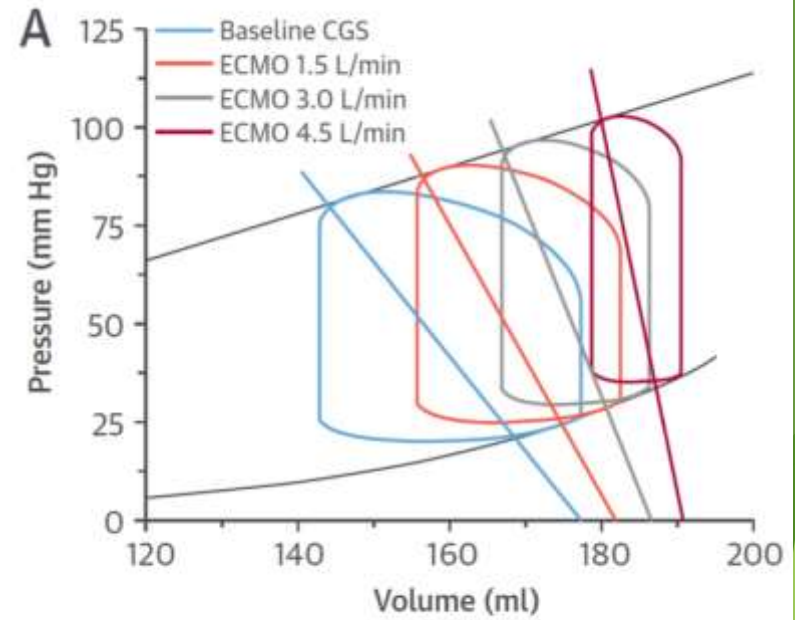
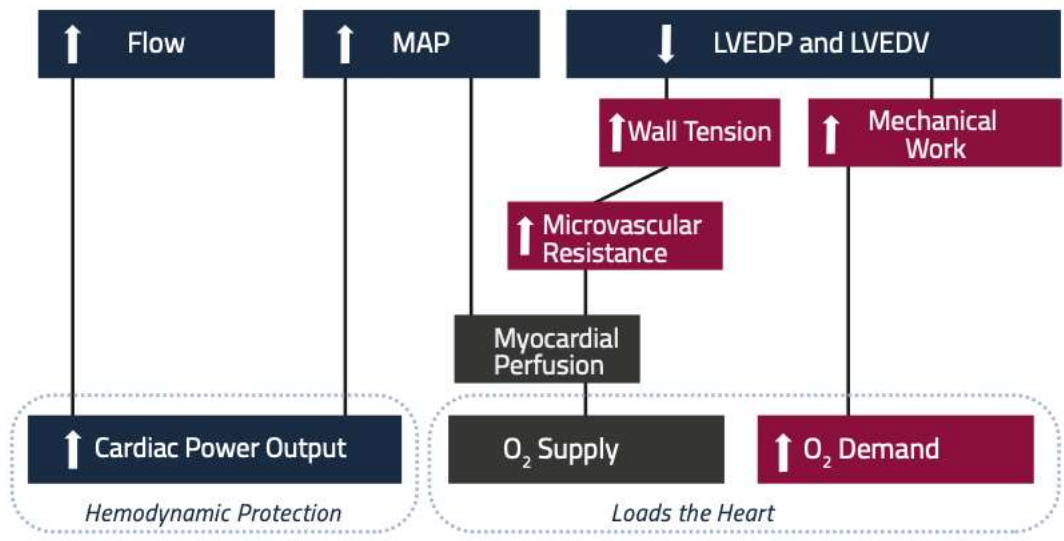
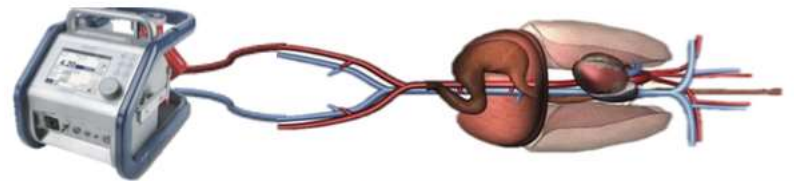
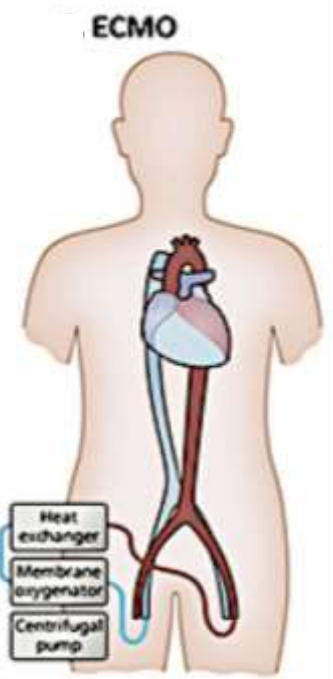
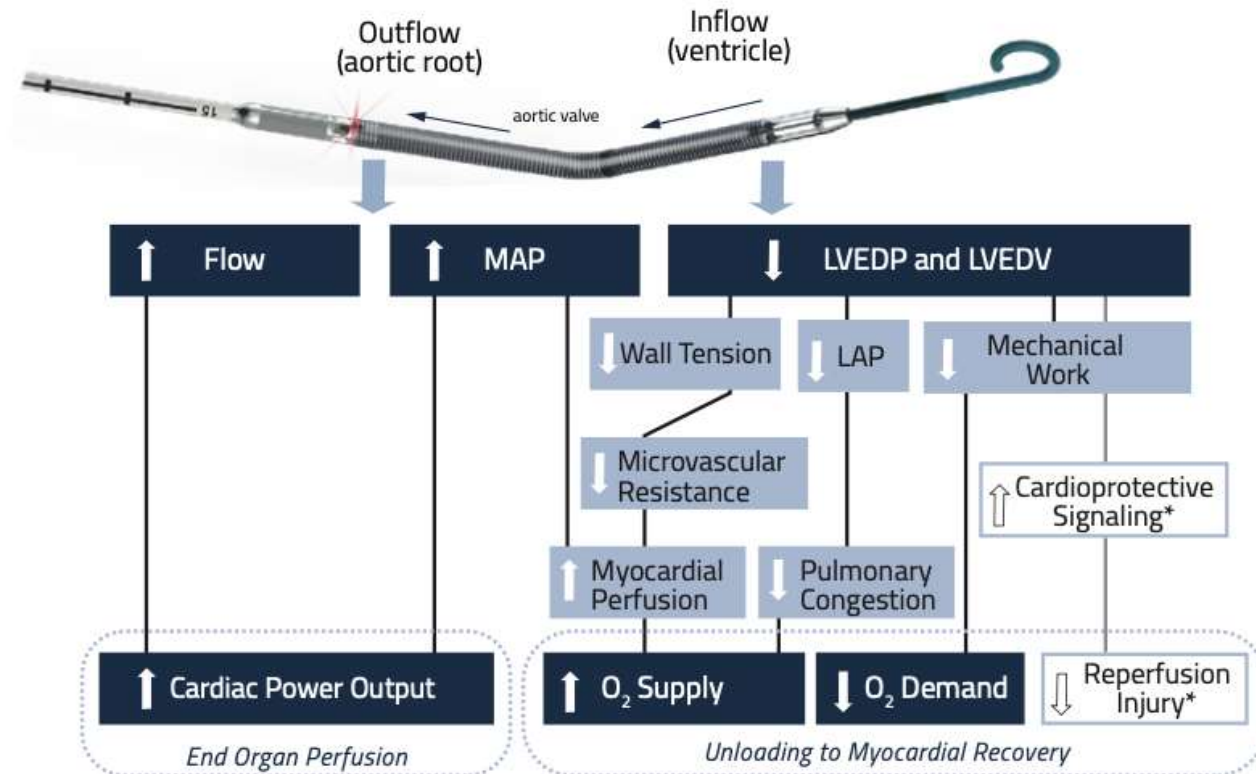


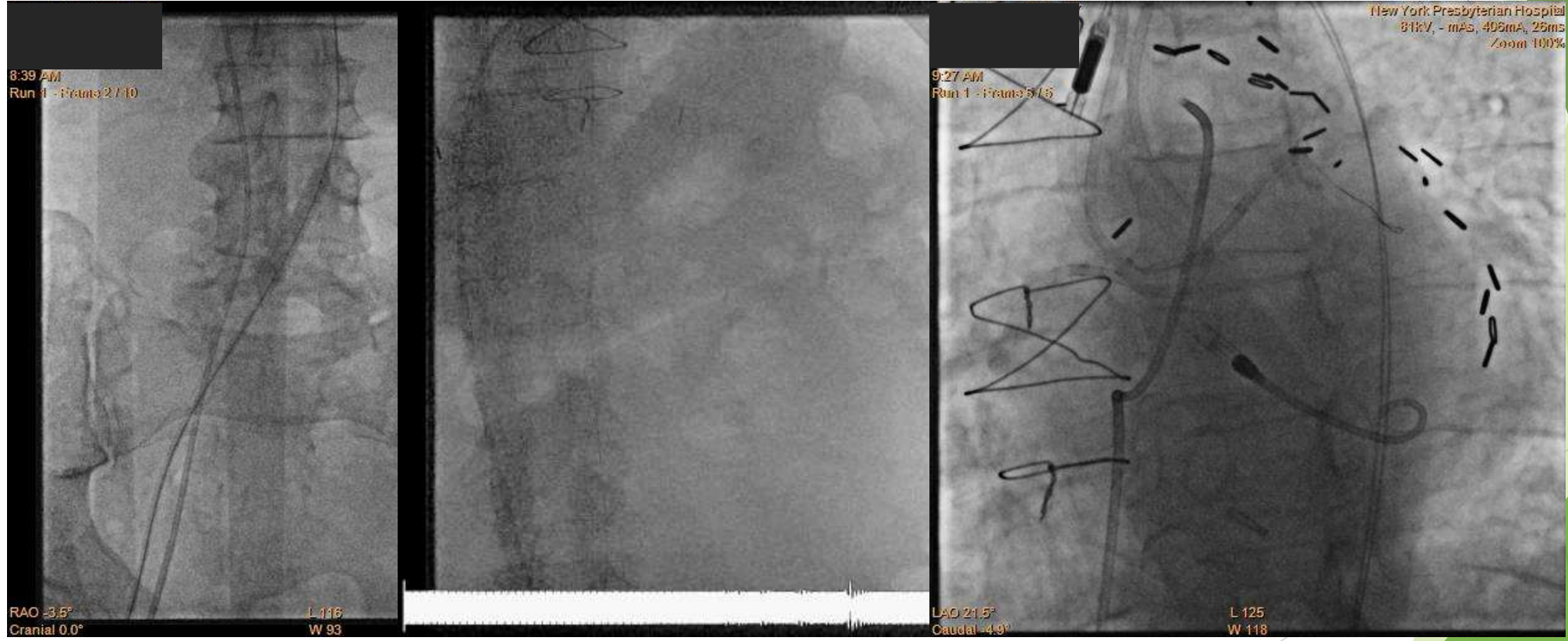
Figure 5: Ventricular Effects of ECMO<sup>30</sup>

# Hemodynamic features of Impella

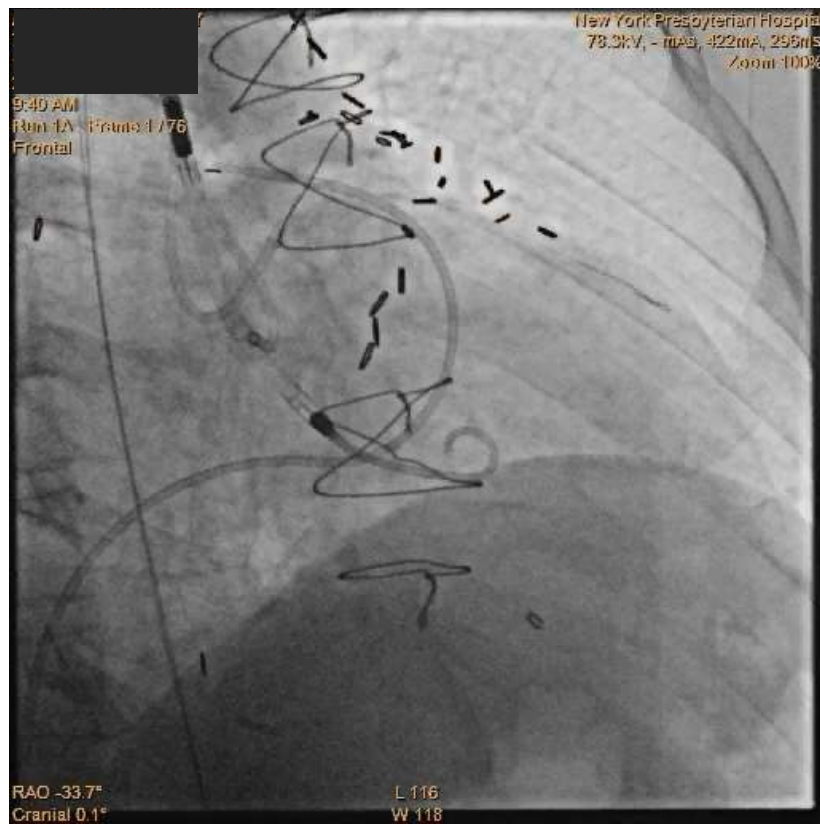




# PTA, Impella and PAC in position

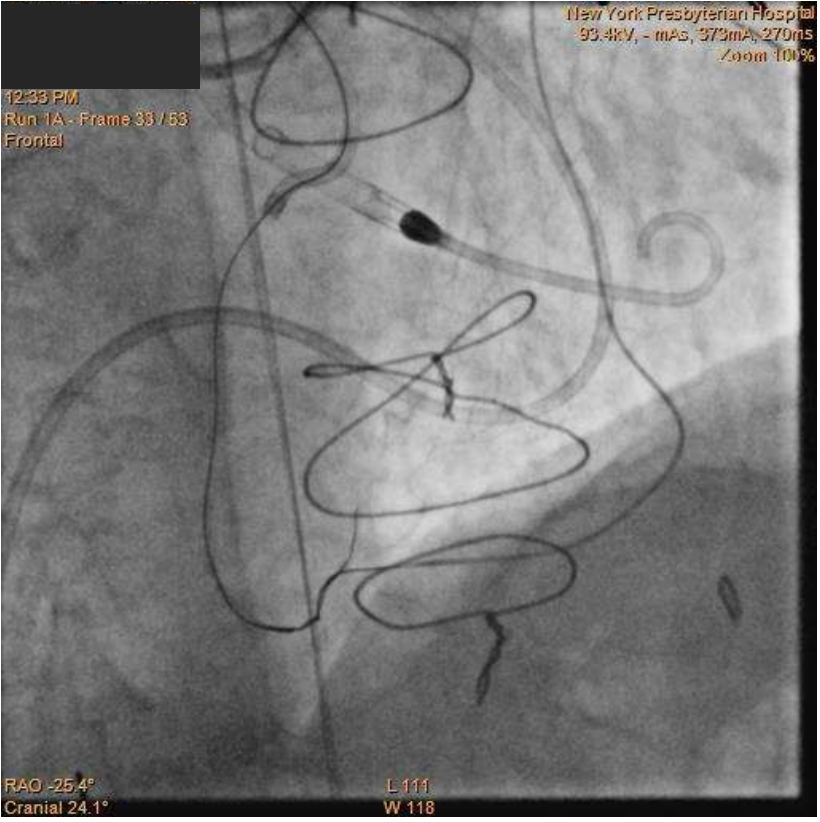


# Bi-radial approach

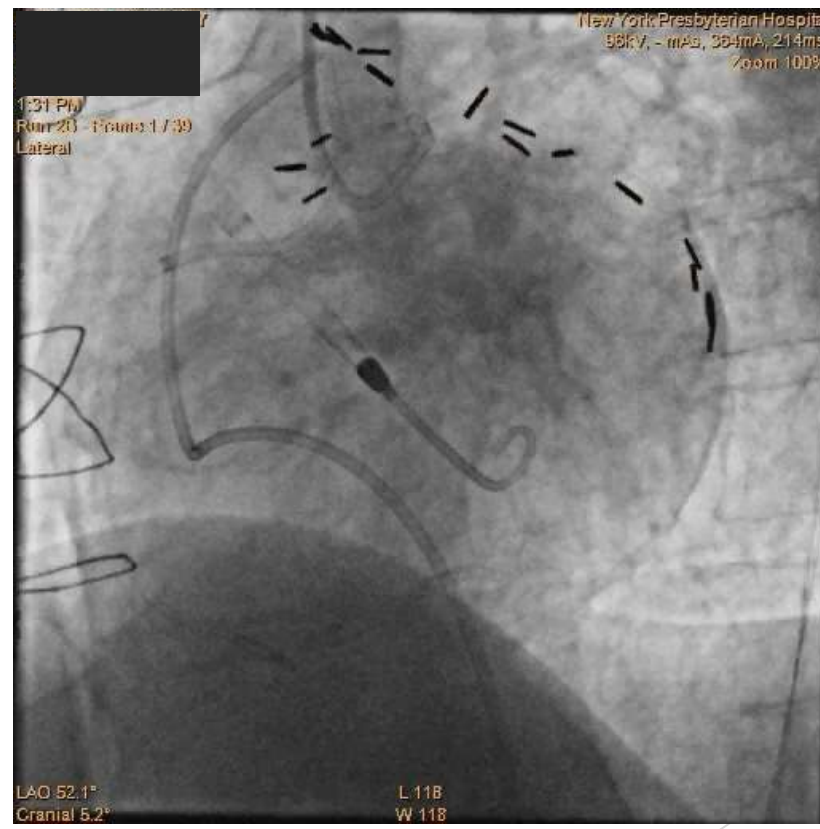
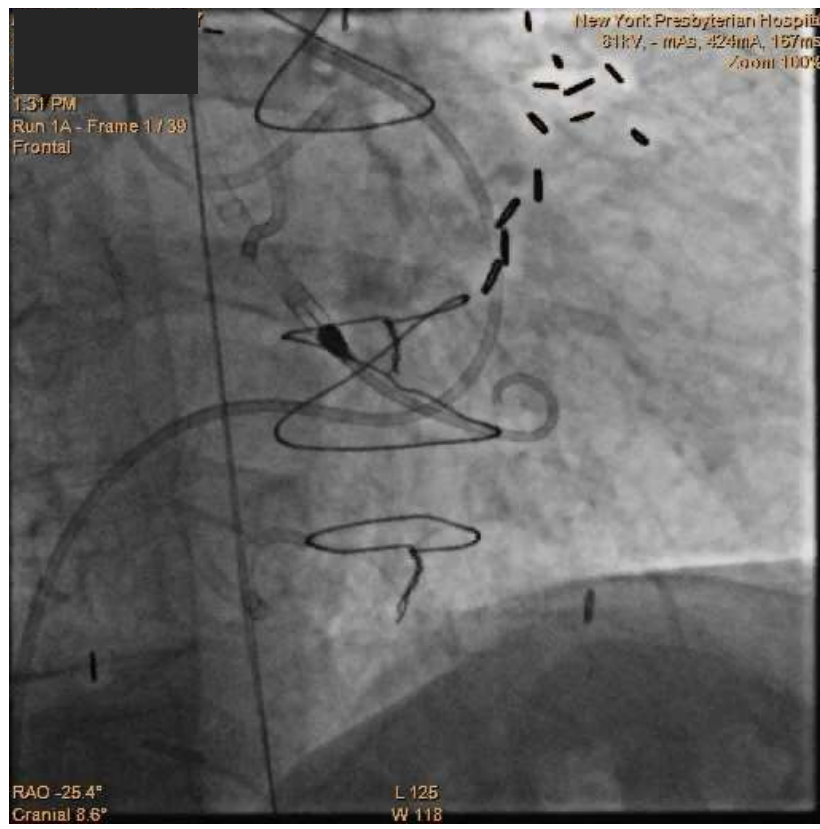




# Retrograde successful

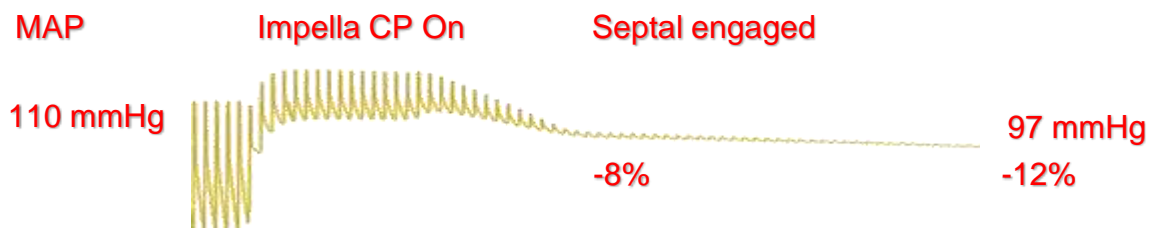


# Final angiogram

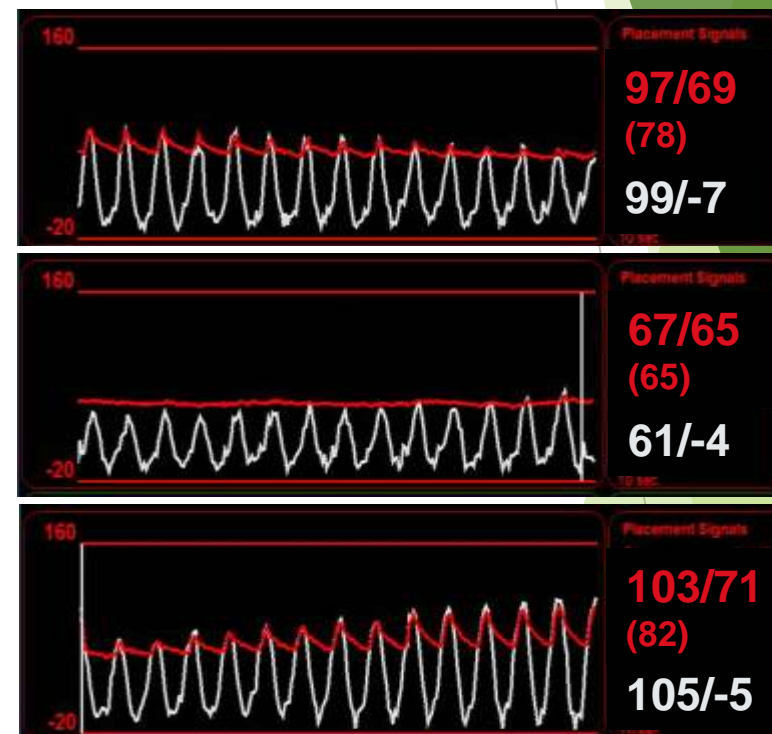


# Procedure summary

- ▶ Stable hemodynamics throughout the procedure
  - ▶ PAP <30mmHg, LVEDP <10mmHg
  - ▶ No inotropic/vasopressor needed
  - ▶ Patient conscious and comfortable with only nasal O2

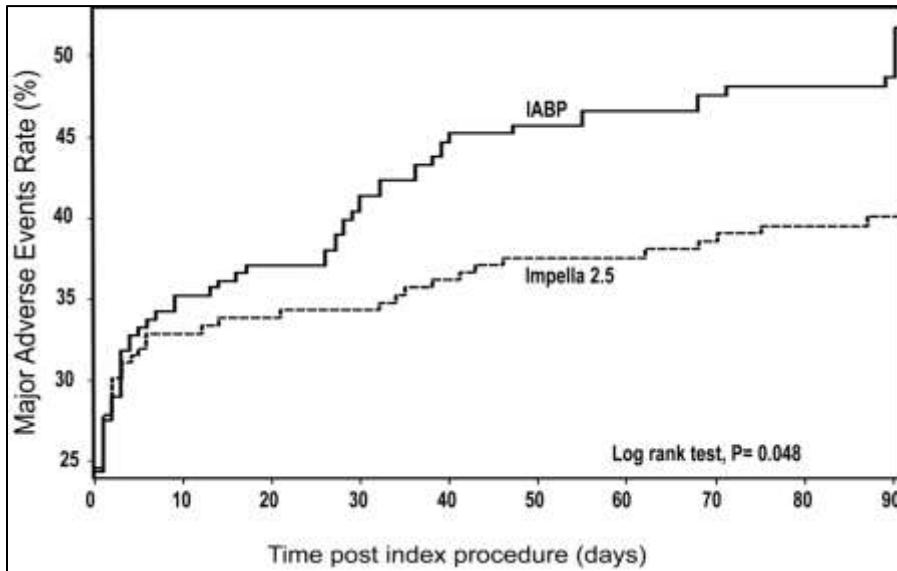


- ▶ No access complication and ambulatory the next day
- ▶ Discharged on D2 without CIN, remained CCS/NYHA Fc 1



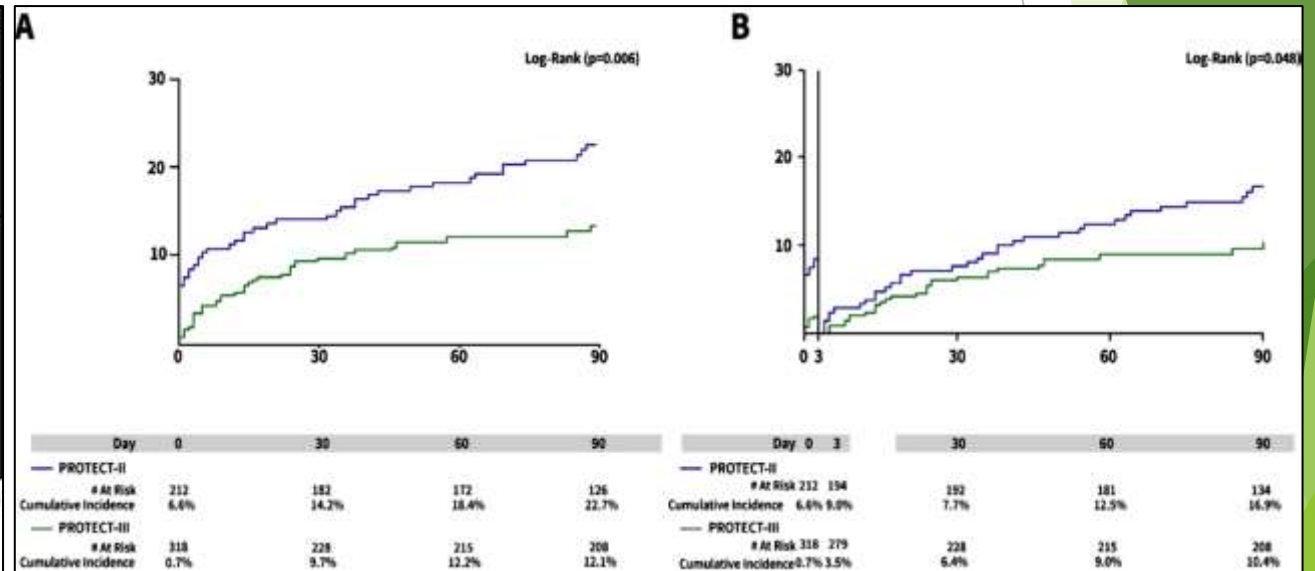
# PROTECT II and III results

Lower 90-day MACE with Impella2.5 vs. IABP



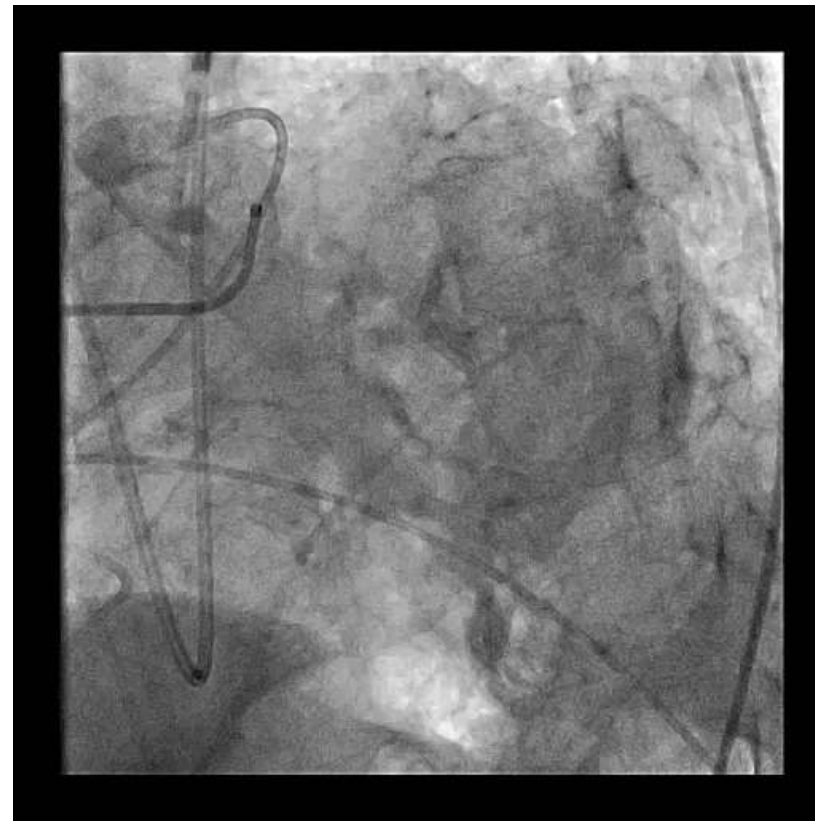
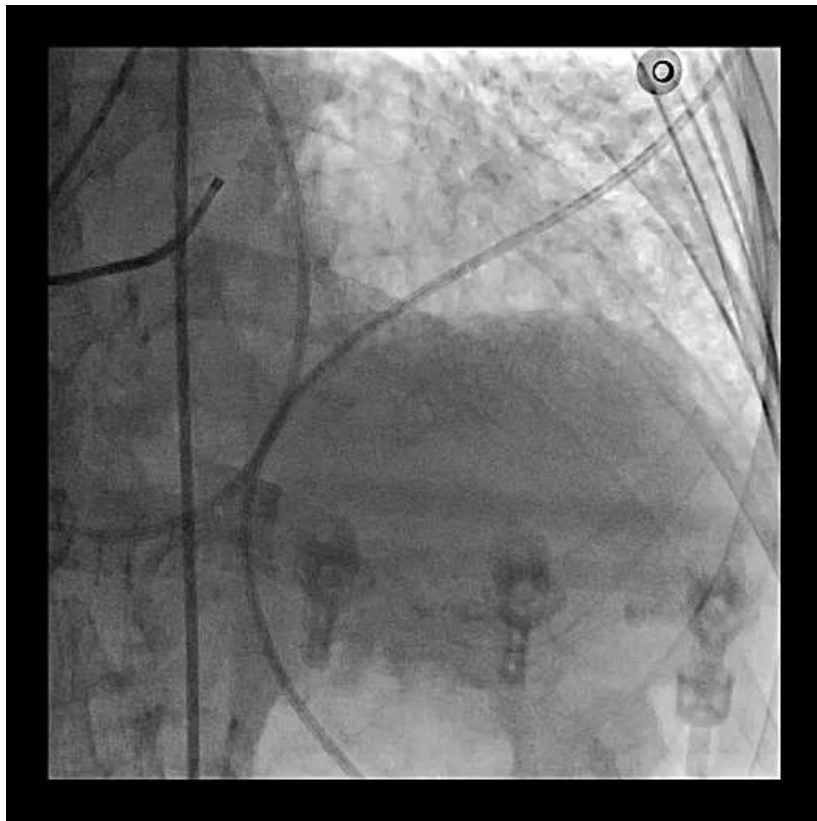
O'Neill WW, et al. Circulation 2012

Significant MACE improvement with ImpellaCP vs. 2.5



O'Neill WW, et al. AHJ 2022

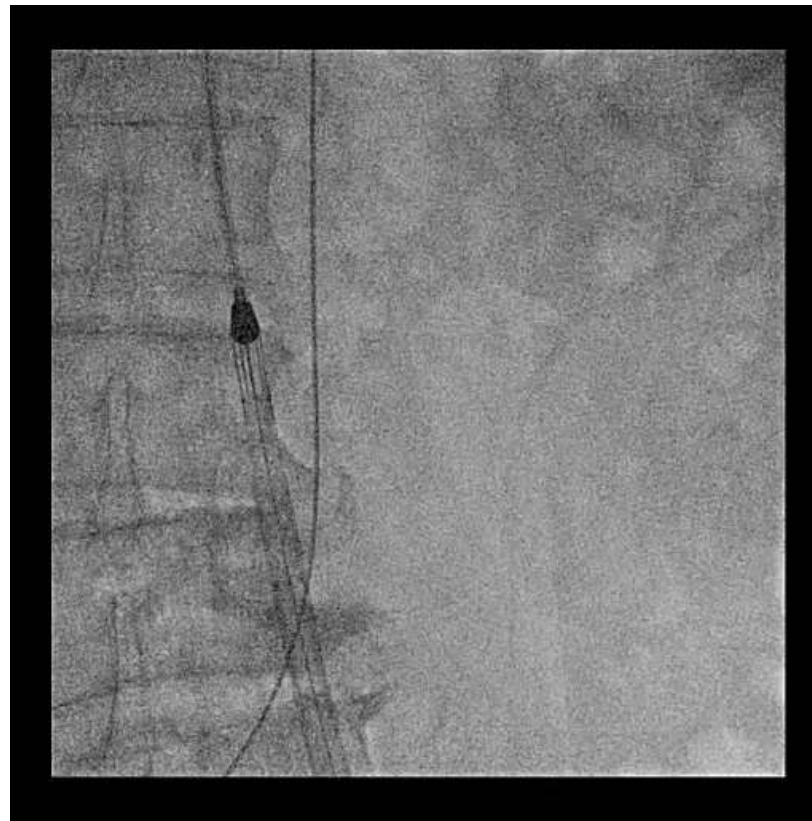
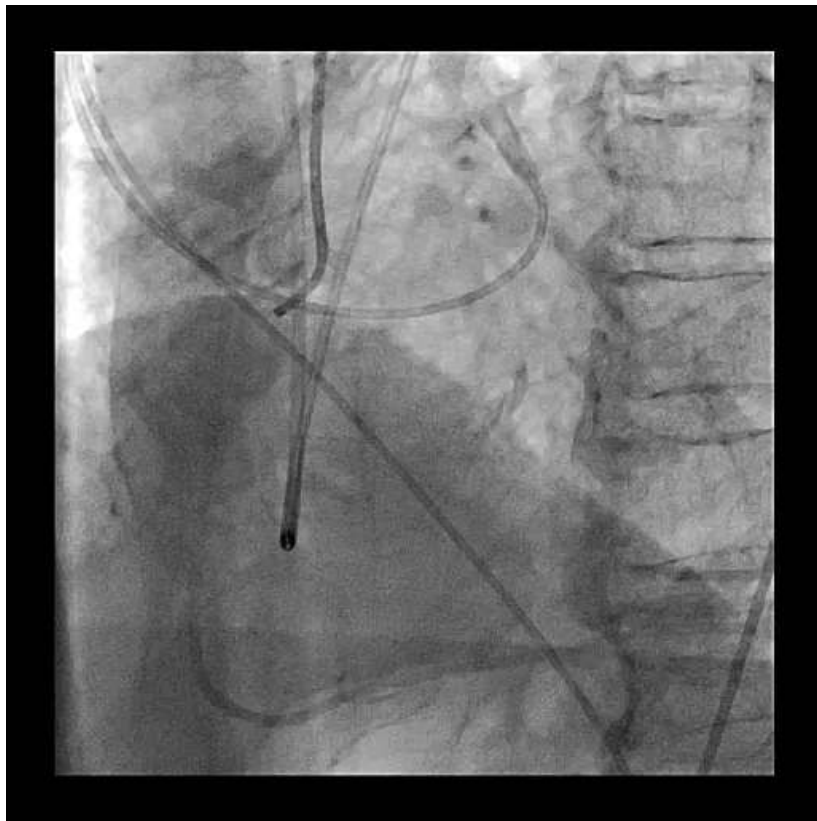
# Another case of surgical refusal



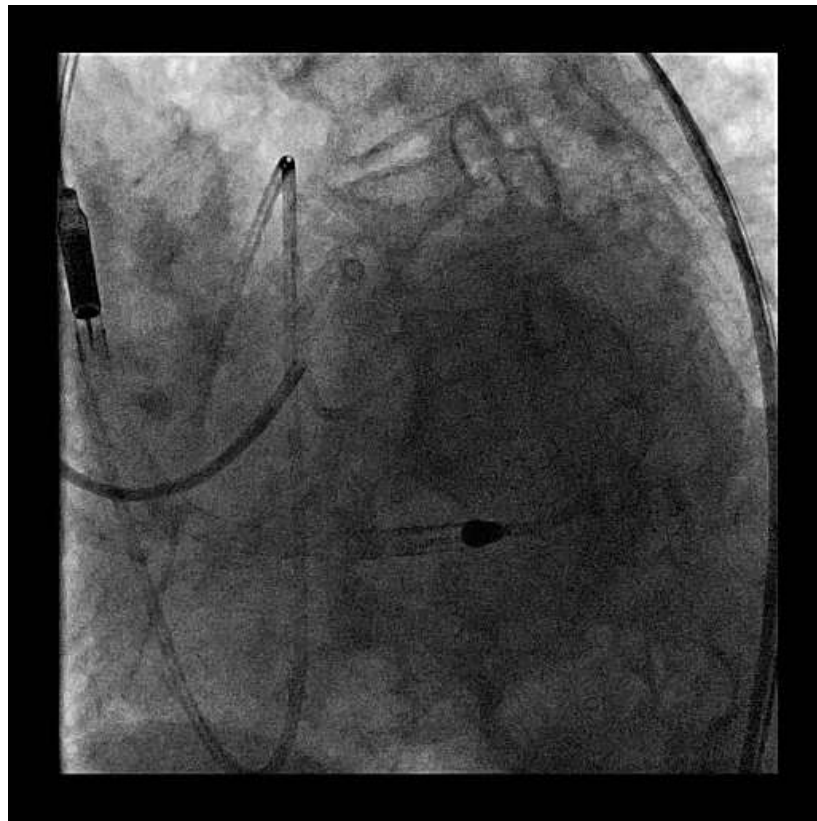


# Impella-assisted CHIP-PCI

Starting PCWP 35mmHg CO 3.6L/min CPO 0.6W

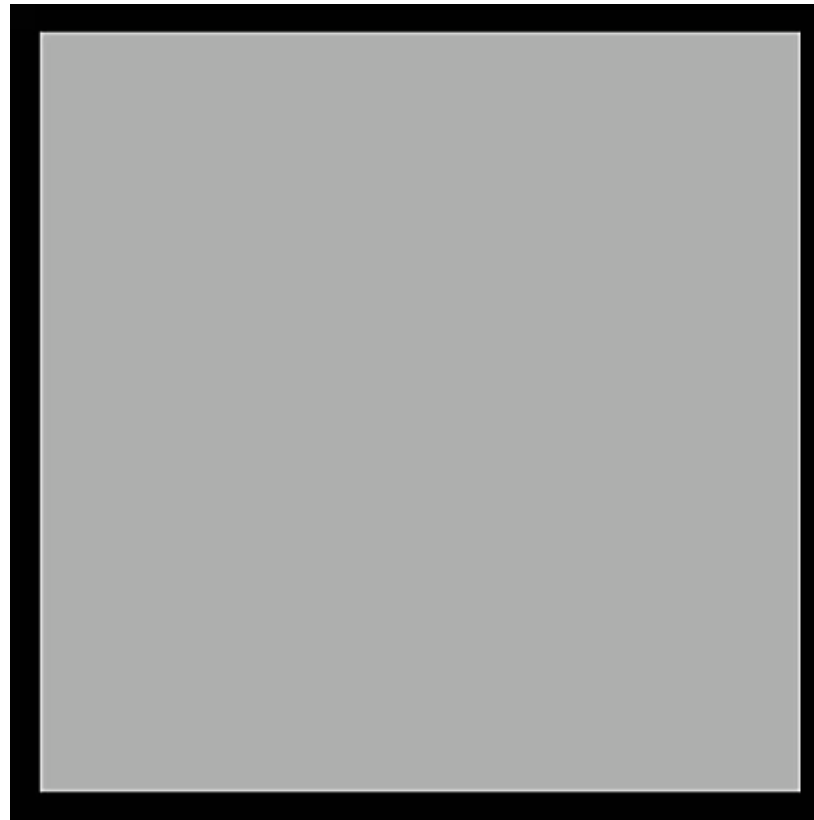


PCWP 12mmHg CO 5.5L/min CPO 1W during MCS  
LCA final



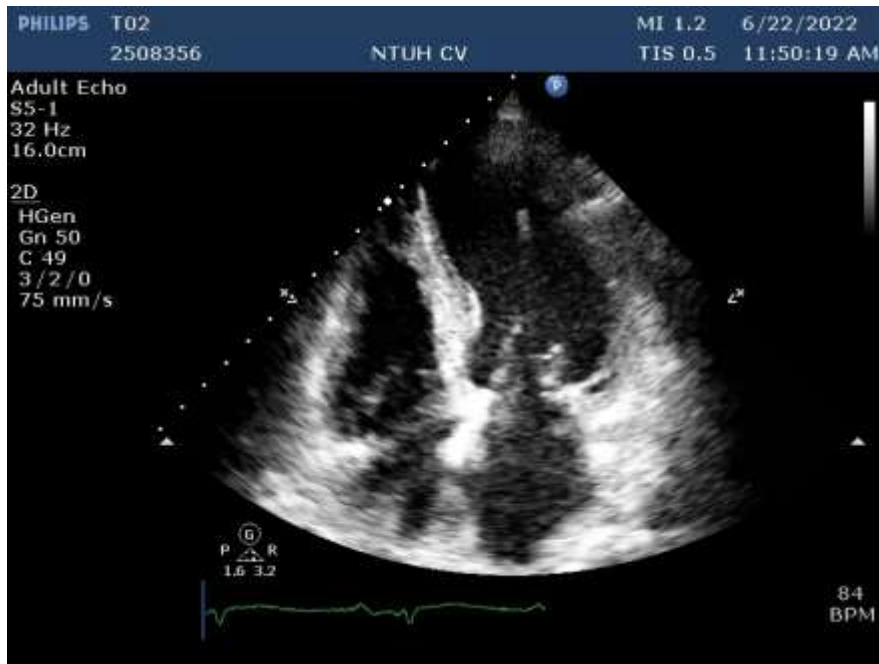
Patient without any complaint

# Final RCA and groin angiograms

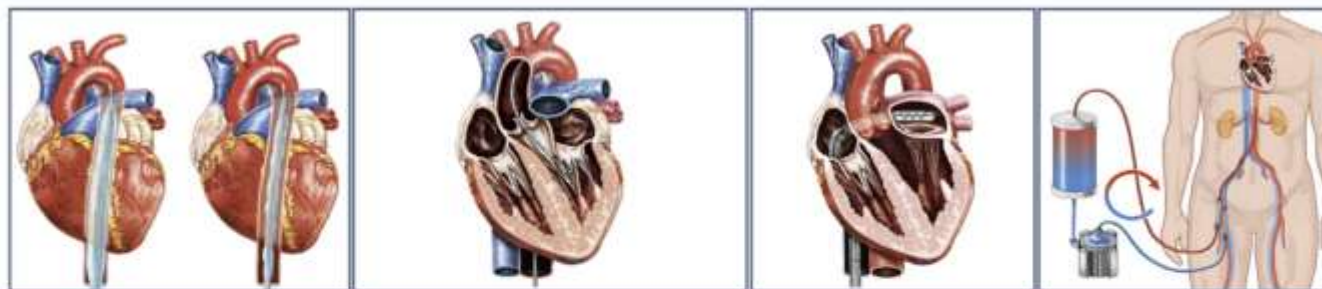




# Echocardiography baseline and 1 month



# Comparison of MCS



	IABP	IMPELLA	TANDEMHEART	VA-ECMO
Cardiac Flow	0.3-0.5 L/ min	1-5L/ min (Impella 2.5, Impella CP, Impella 5)	2.5-5 L/ min	3-7 L-min
Mechanism	Aorta	LV → AO	LA → AO	RA → AO
Maximum implant days	Weeks	7 days	14 days	Weeks
Sheath size	7-8 Fr	13-14 Fr Impella 5.0 - 21 Fr	15-17 Fr Arterial 21 Fr Venous	14-16 Fr Arterial 18-21 Fr Venous
Femoral Artery Size	>4 mm	Impella 2.5 & CP - 5-5.5 mm Impella 5 - 8 mm	8 mm	8 mm
Cardiac synchrony or stable rhythm	Yes	No	No	No
Afterload	↓	↓	↑	↑↑↑
MAP	↑	↑↑	↑↑	↑↑
Cardiac Flow	↑	↑↑	↑↑	↑↑
Cardiac Power	↑	↑↑	↑↑	↑↑
LVEDP	↓	↓↓	↓↓	↔
PCWP	↓	↓↓	↓↓	↔
LV Preload	---	↓↓	↓↓	↓
Coronary Perfusion	↑	↑	---	---
Myocardial oxygen demand	↓	↓↓	↔↓	↔

# EAPCI/ACVC expert consensus on percutaneous LVAD 2021

**Table 2** Indication for pVAD-support in HR-PCI<sup>a</sup>

Device	Indication	Evidence
IABP	Should <b>III</b> be used	BCIS-1 <sup>10</sup>
AFP	May be considered in highly selected patients undergoing HR-PCI in case of acceptable femoral access (>6 mm diameter common femoral artery, no severe tortuosity)	PROTECT II <sup>11</sup> and cohort studies <sup>12-15</sup>
VA-ECMO	Should <b>III</b> be used	No data available

AFP, microaxial flow pump; HR-PCI, high-risk percutaneous coronary intervention; IABP, intra-aortic balloon pump; VA-ECMO, veno-arterial extracorporeal membrane oxygenation.

<sup>a</sup>There is no common definition of HR-PCI. PCIs might be considered as high risk in patients satisfying the followings clinical and/or anatomical high-risk criteria: clinical characteristics [stable/decompensated LVEF <35%, haemodynamic instability, diabetes mellitus, acute coronary syndromes (ACS), previous cardiac surgery, chronic kidney disease] angiographic characteristics (diffuse CAD, multivessel disease, unprotected left main coronary disease involving bifurcation, severe coronary total occlusion, severely calcified lesions needing rotational atherectomy, last patent conduit).<sup>2</sup>



European Heart Journal: Acute Cardiovascular Care (2021) 10, 570-583  
doi:10.1093/ehjacc/zaab015

REVIEW

**Joint EAPCI/ACVC expert consensus document  
on percutaneous ventricular assist devices**

# Conclusions

- ▶ CHIP-PCI is not just about techniques and devices, but overall planning
- ▶ Expect the worst and refresh knowledge on circulatory physiology
- ▶ In patients with minimal reserve, preemptive use of MCS is the key to a successful and uncomplicated procedure

**Select Your Support Wisely**

# Algorithm for MCS use

