# How to Choose Between Various MCS Devices During STEMI


David Geffen School of Medicine

UCLA Health

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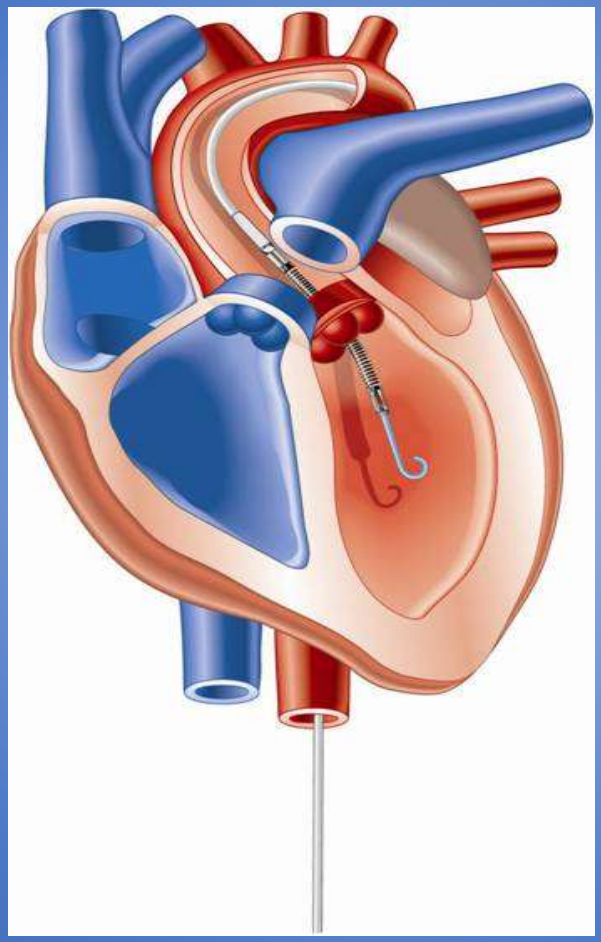
Interventional Cardiology

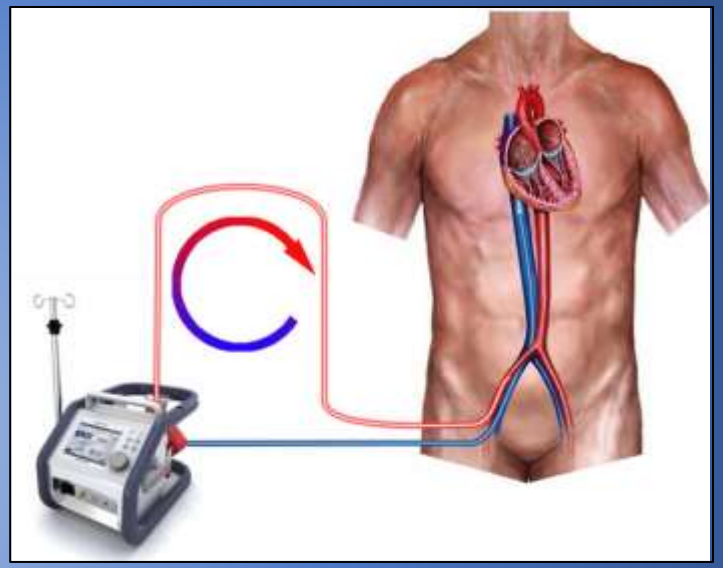
# Percutaneous LV Assist Devices

## IABP

## Impella



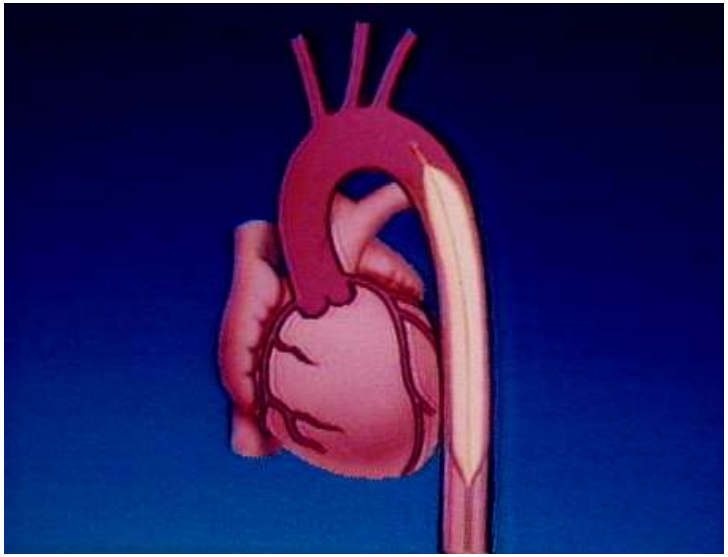
## ECMO

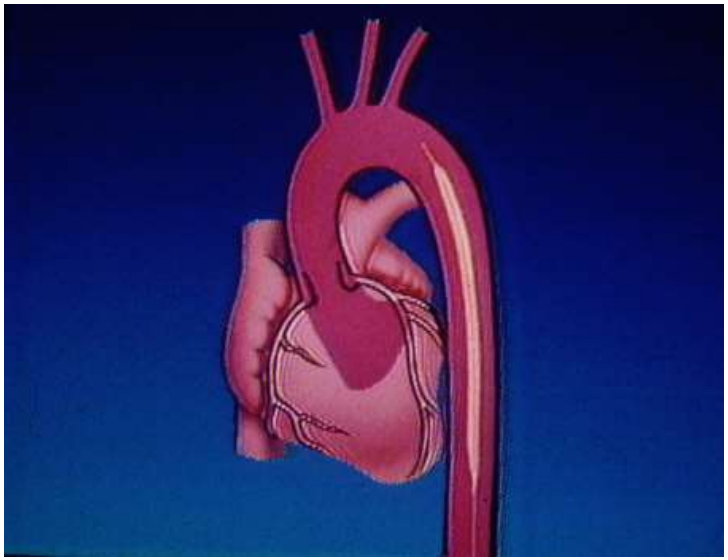


Lee MS. Cardiol Clin 2006;24:265-275.

UCLA Health

# PCI with IABP

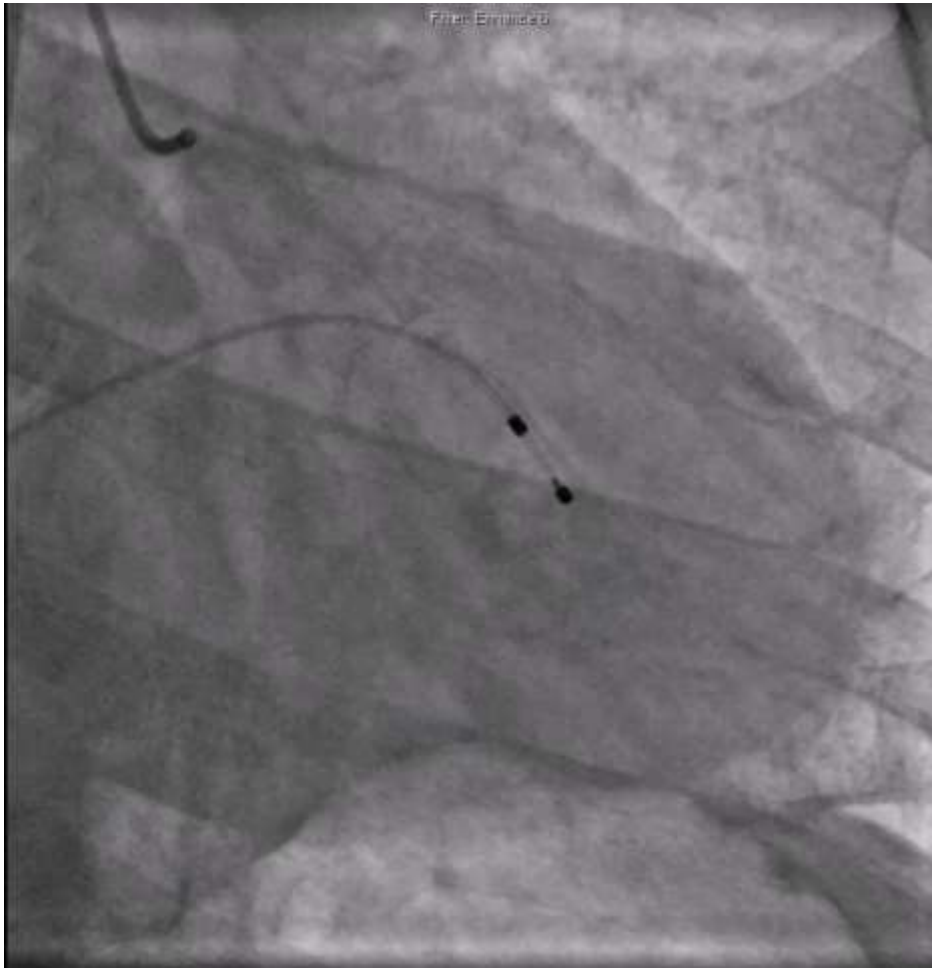


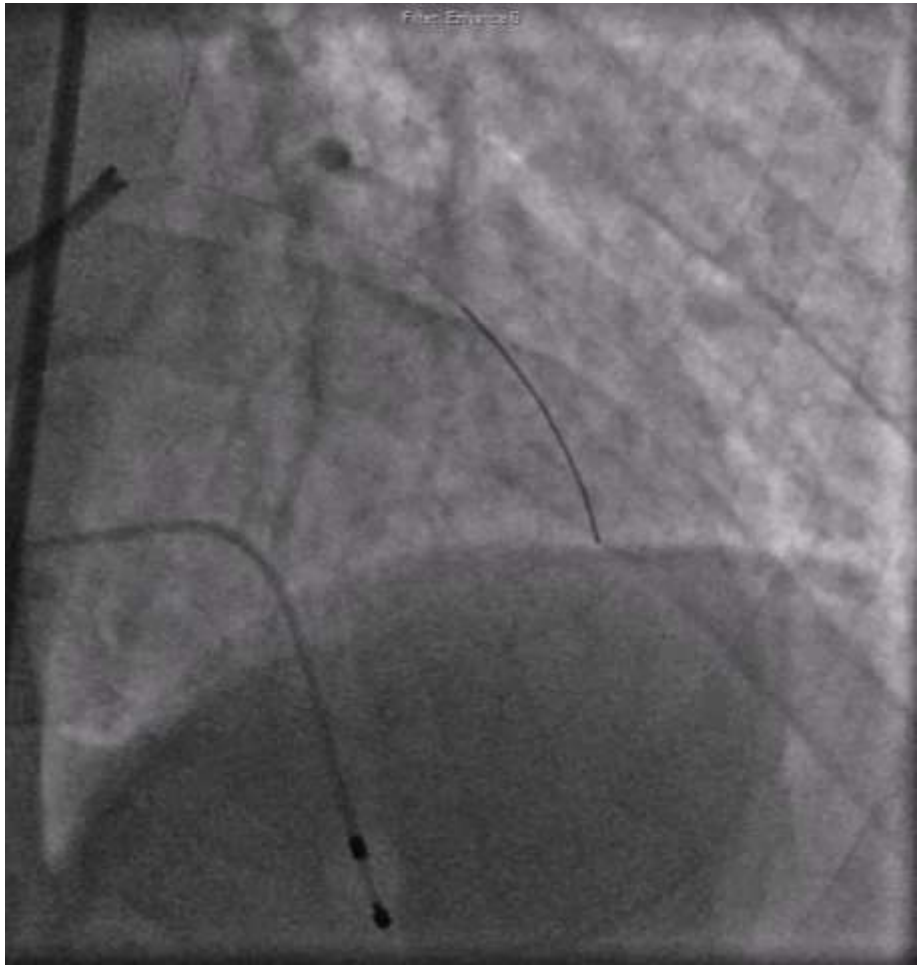


**Advantages**
- Easy
- Inexpensive ($800)
- 7F and 8F

**Disadvantages**
- Increases cardiac output by 0.5 L/m

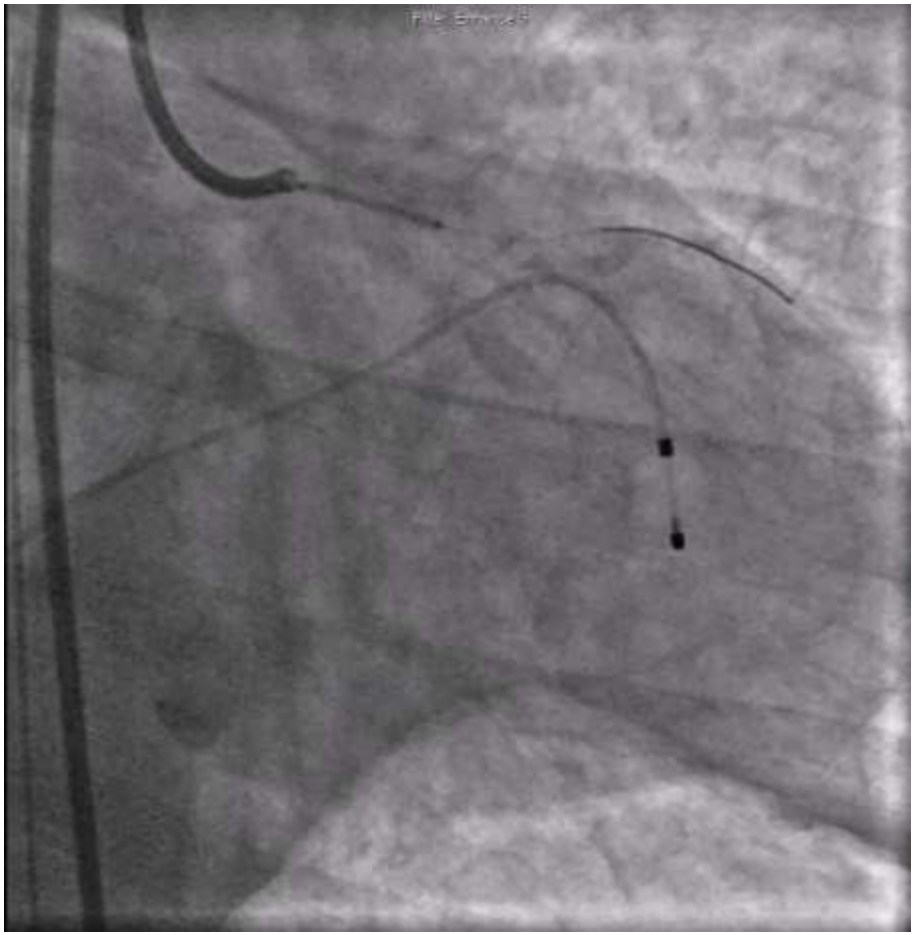
# ULMCA PCI
# With IABP

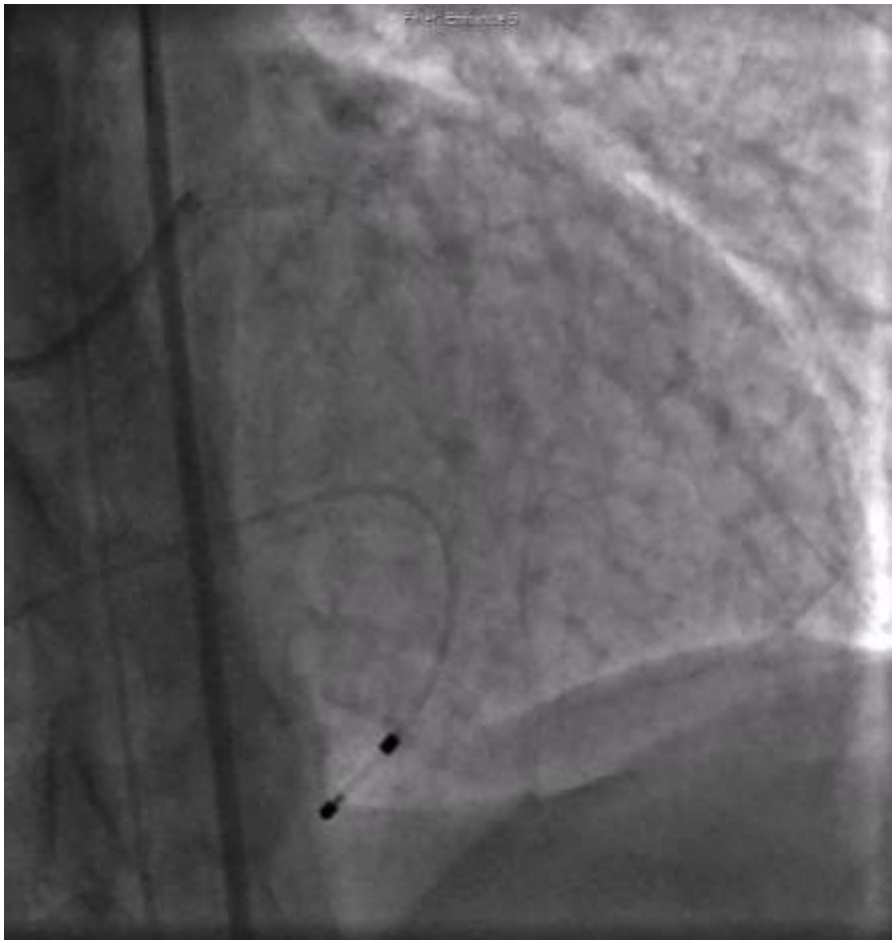




68 y.o. male with chest pain, ST-elevation in V1-V6, shock on inotropes

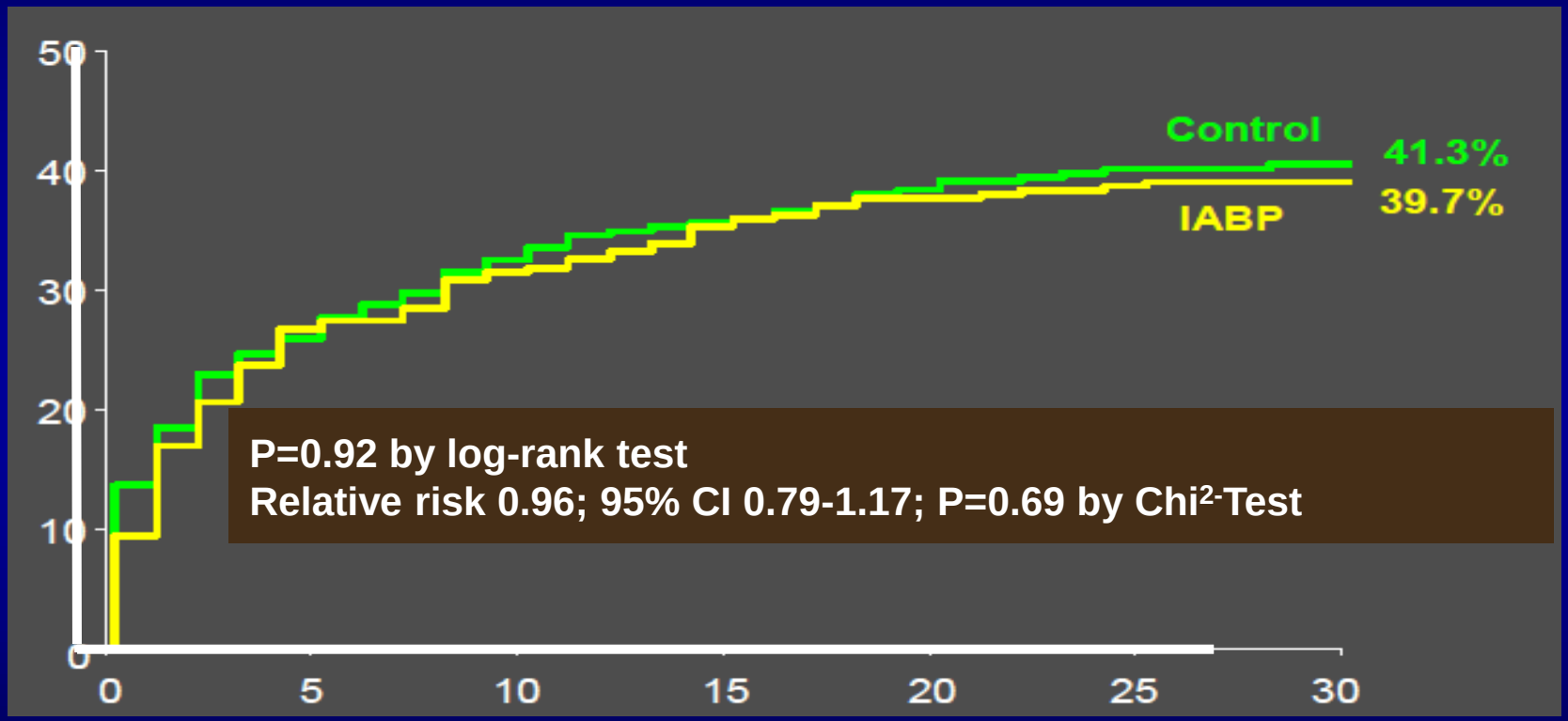
# ULMCA PCI
# With IABP





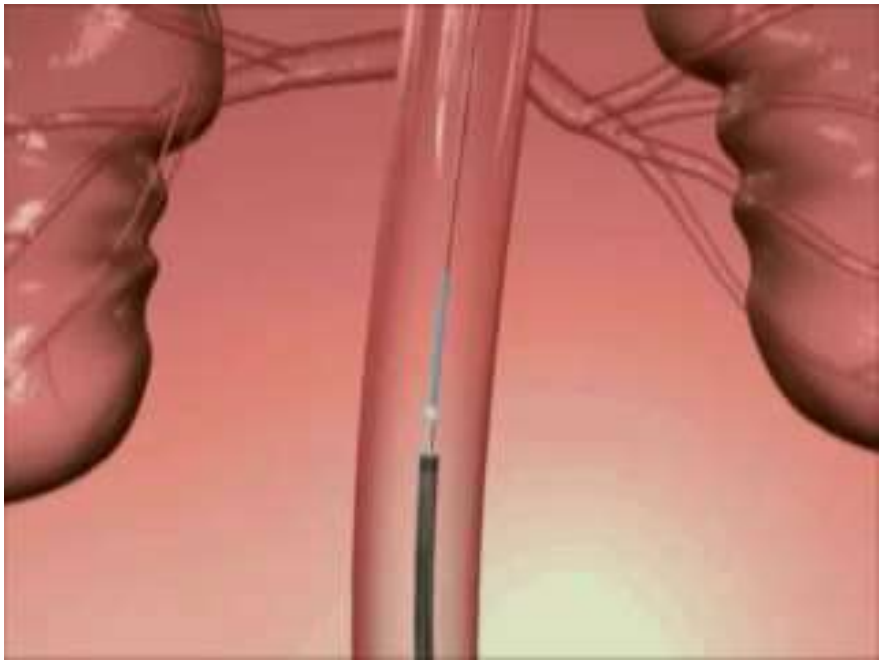
68 y.o. male with chest pain, ST-elevation in V1-V6, shock on inotropes

# IABP-Shock II Trial
# Primary Study Endpoint:
# 30-day Mortality




*Thiele H et al. NEJM 2012;367:1287.*

# PCI with Impella



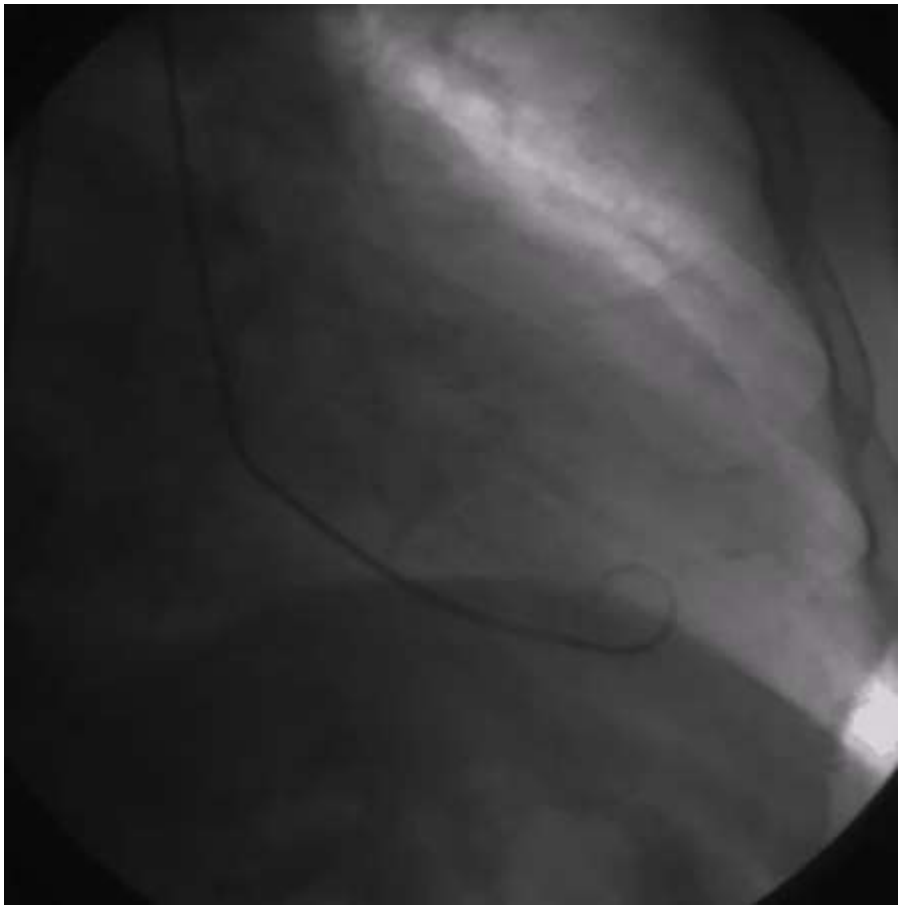
**Advantages**

- Augment cardiac output by 3.5 L/min
- Use up to 7 days
- Does not require stable cardiac rhythm or native cardiac output/blood pressure signal for optimal function
- Unloads left ventricle, decrease wall stress and myocardial oxygen consumption

**Disadvantages**

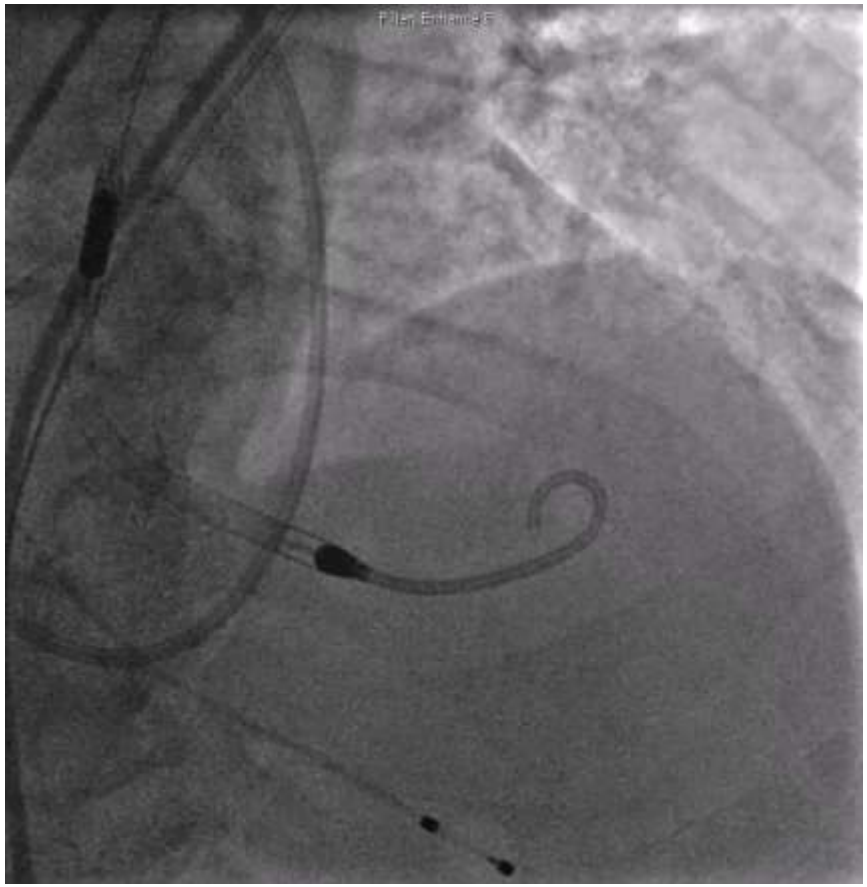
- Requires 14 F catheter
- Vascular complications
- Non-pulsatile flow
- Hemolysis
- $20,000
- Lack of clinical trial data

# ULMCA PCI
# With Impella

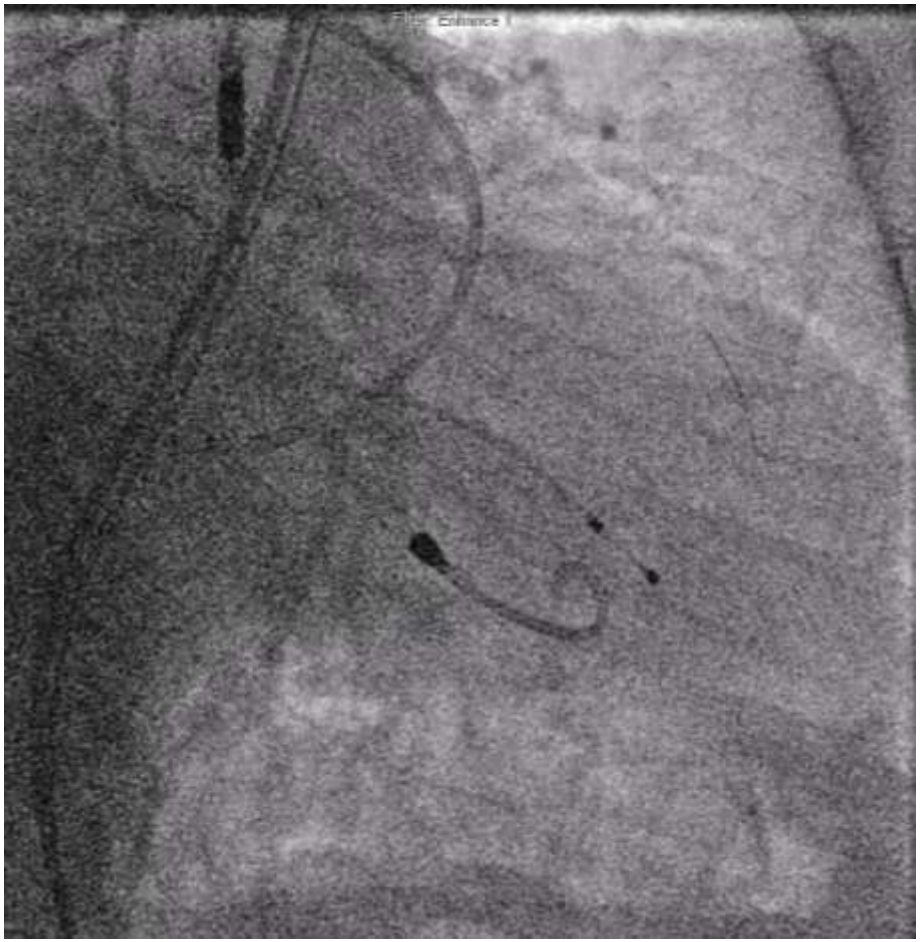


85 y.o. male with CKD, polio presents with NSTEMI

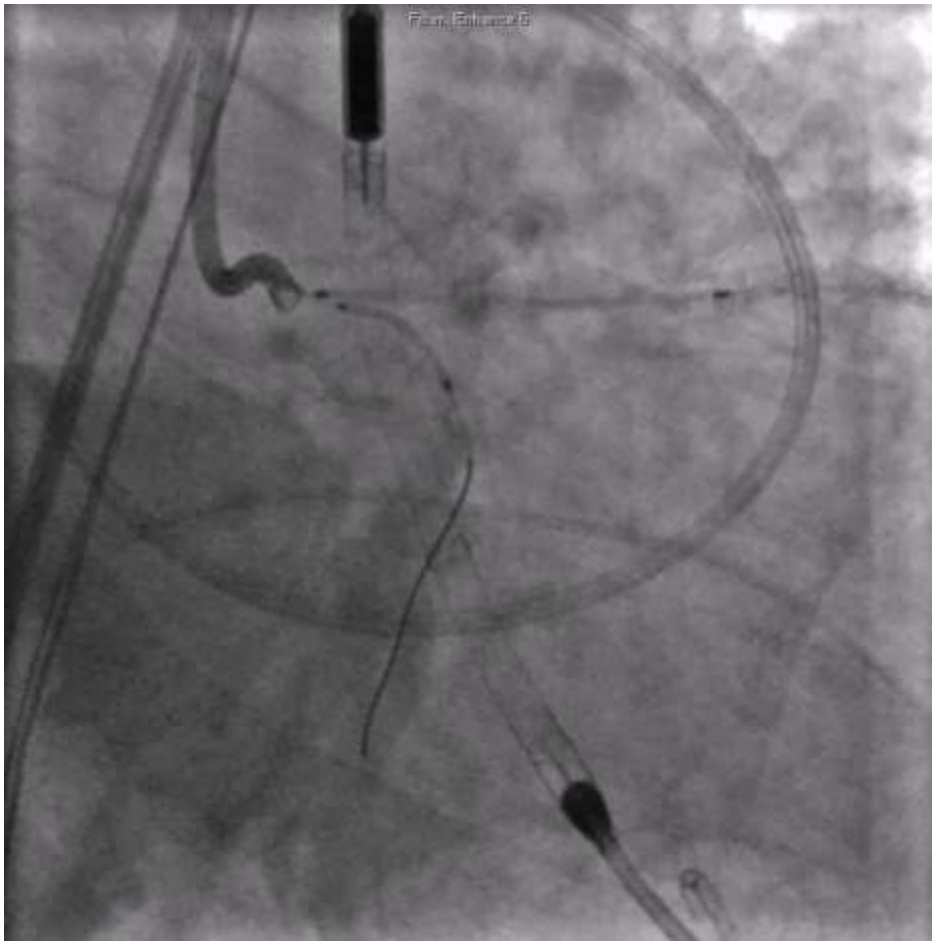
# ULMCA PCI
# With Impella



# ULMCA PCI With Impella

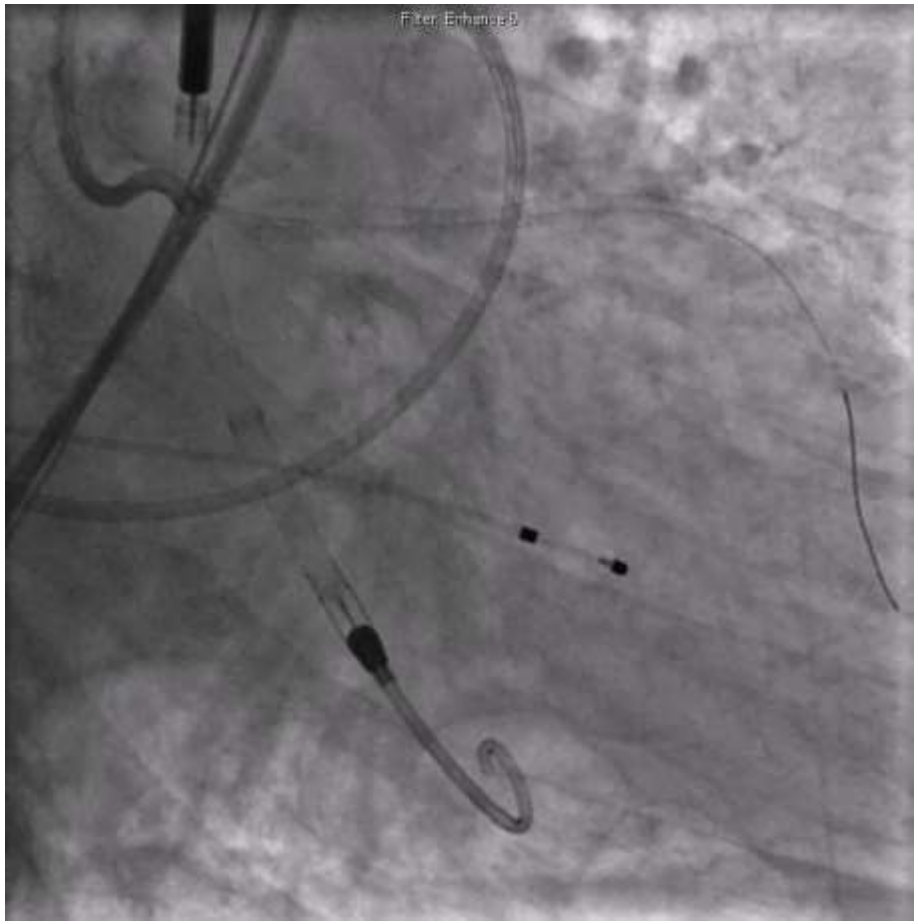


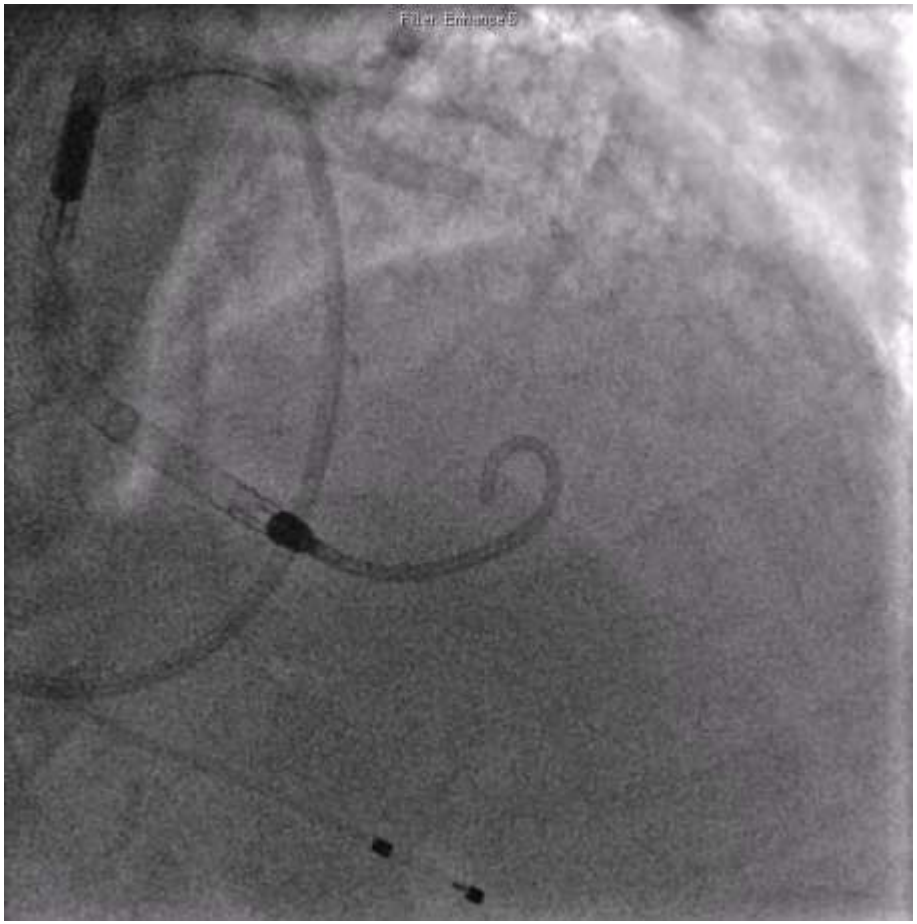
Rotational atherectomy



Crush technique

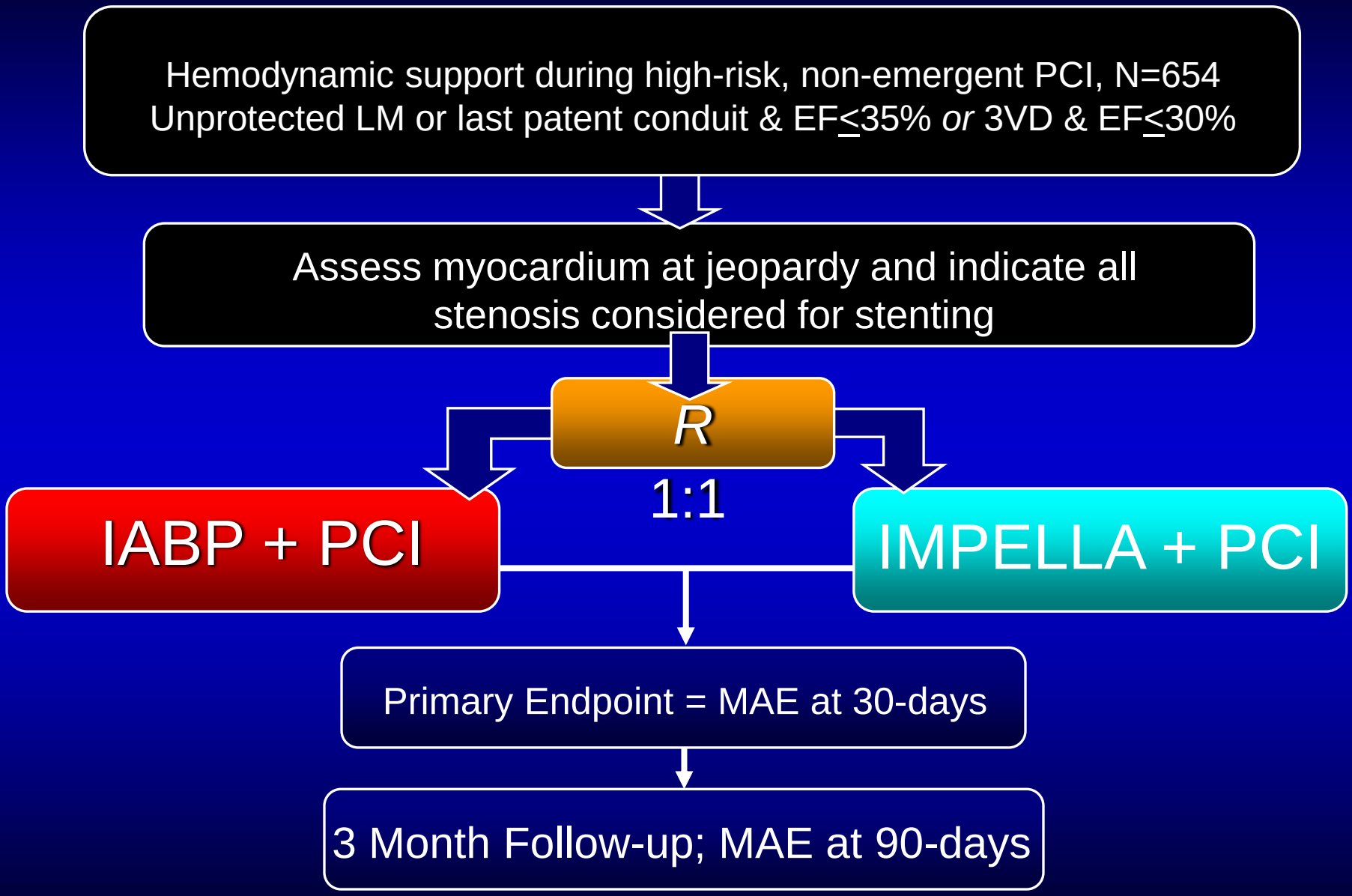
# ULMCA PCI With Impella





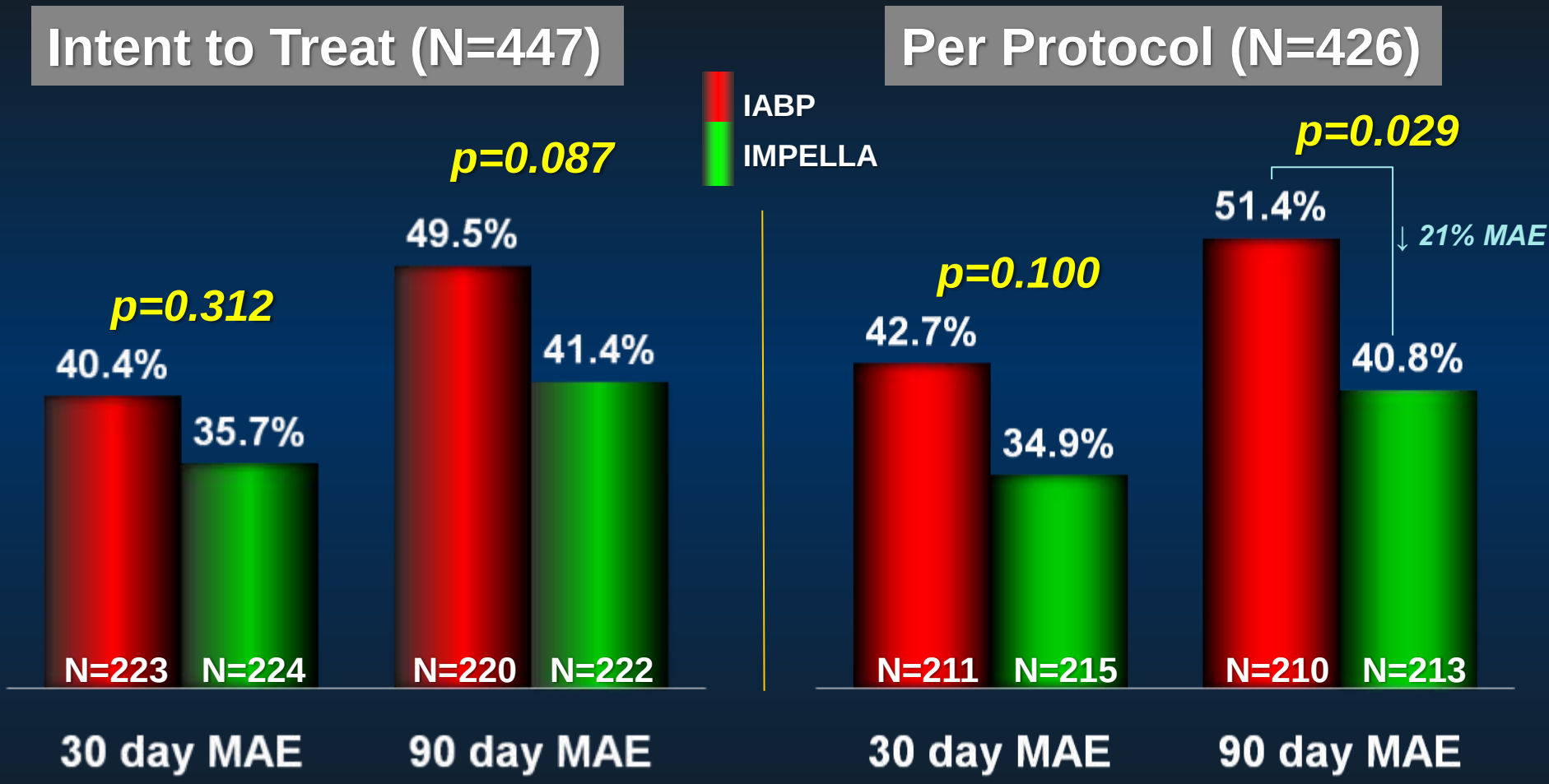
**Final angiography**

# PROTECT II Trial Design




*O'Neill et al, Circulation. 2012;126:1717*

# PROTECT II MAE Outcome




*MAE= Major Adverse Event Rate*

*Per Protocol= Patients that met all incl./ excl. criteria.*

# PCI with ECMO

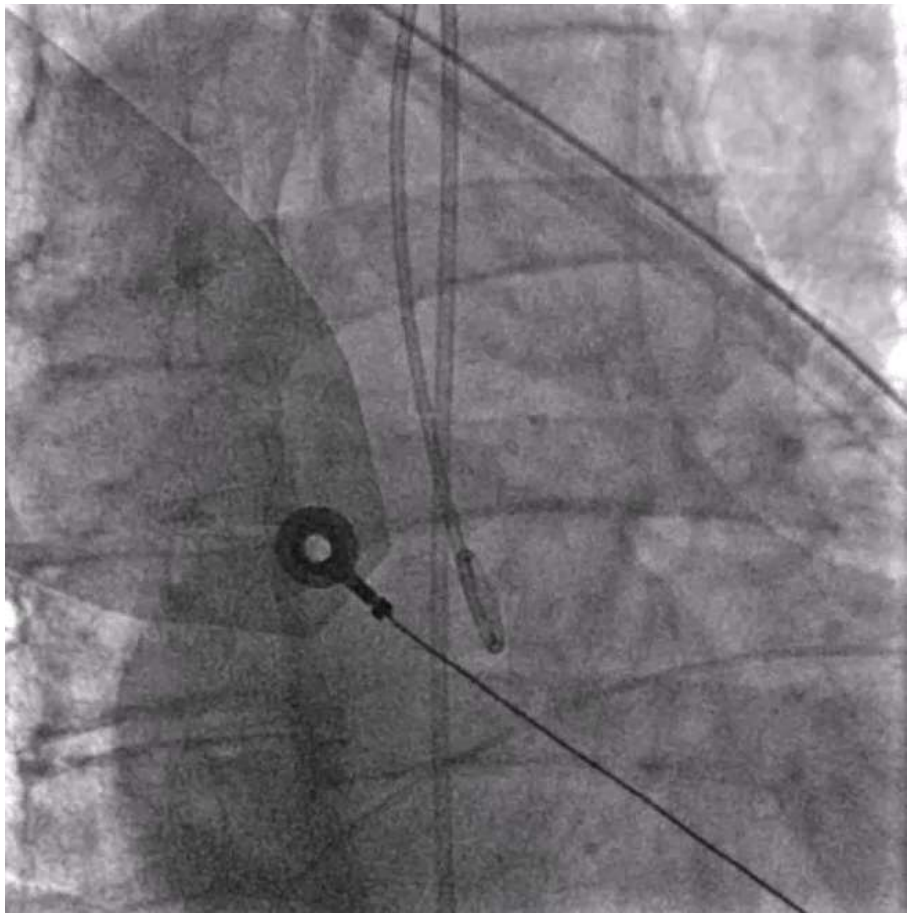
**Advantages**

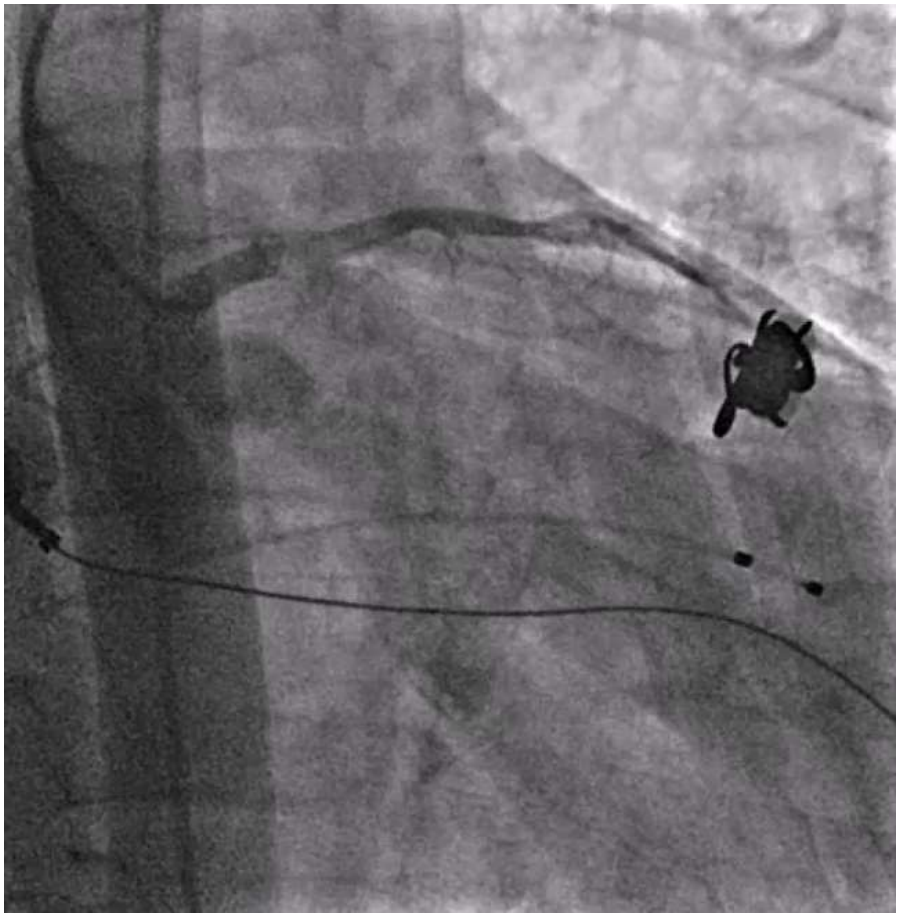
- Augment cardiac output by >4.5 L/min
- Use up to several weeks
- Does not require stable cardiac rhythm or native cardiac output/blood pressure signal for optimal function
- Rapid
- Does not require fluoroscopy

**Disadvantages**

- Requires 21F and 18F catheters
- Vascular complications
- Non-pulsatile flow
- Increases afterload
- No unloading
- $25,000
- Dedicated perfusionist at bedside

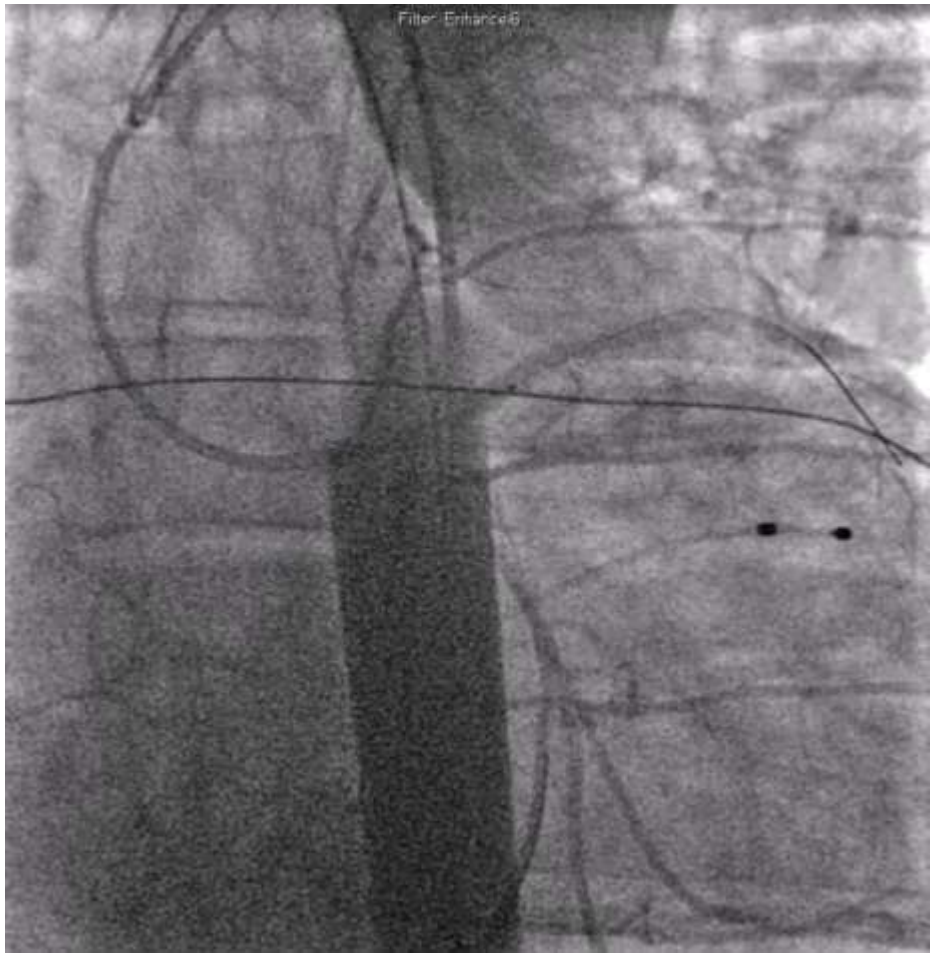
# ULMCA PCI With ECMO



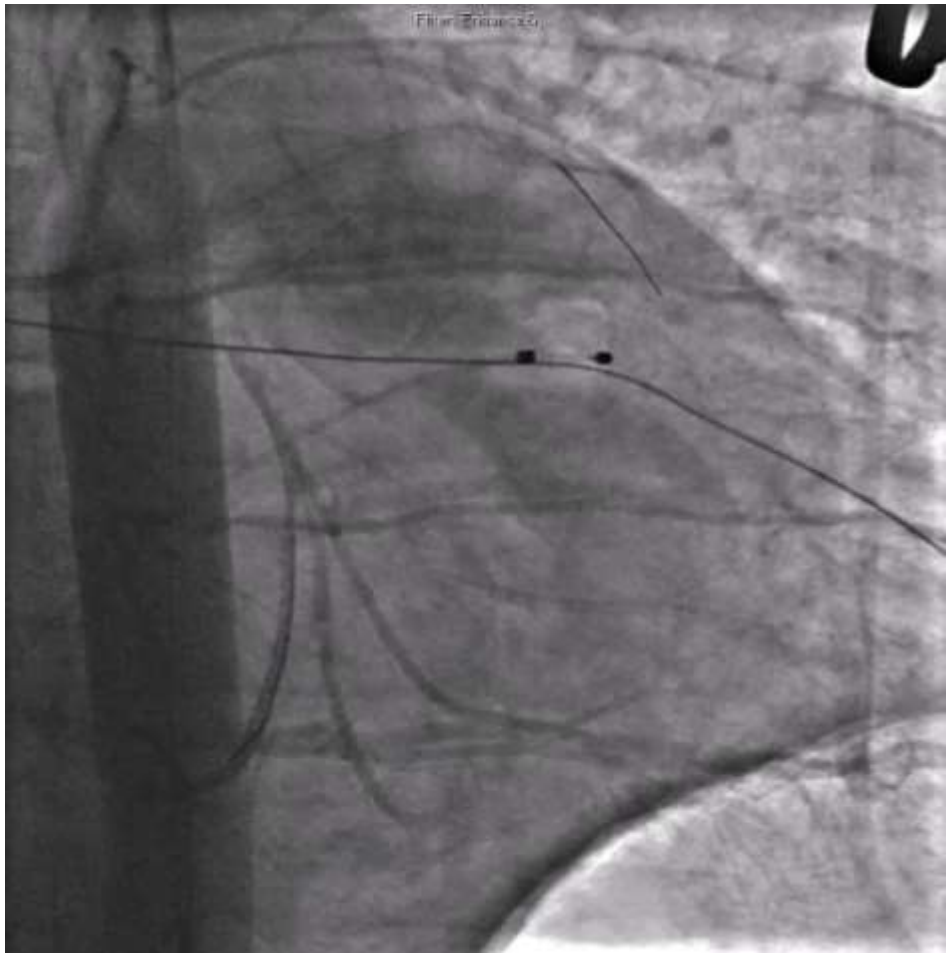


**49 y.o. male with inferior ST-elevation and cardiac arrest in ED**

# ULMCA PCI With ECMO

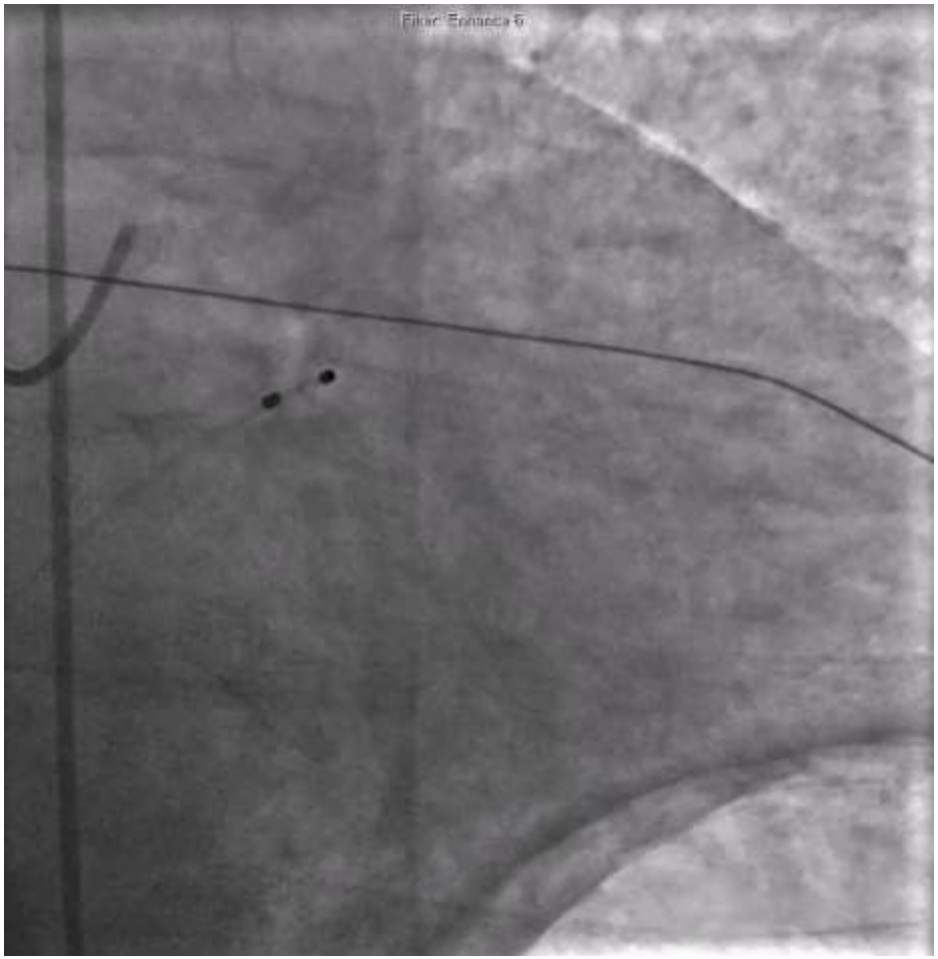


LM stent across LCX
ECMO inserted

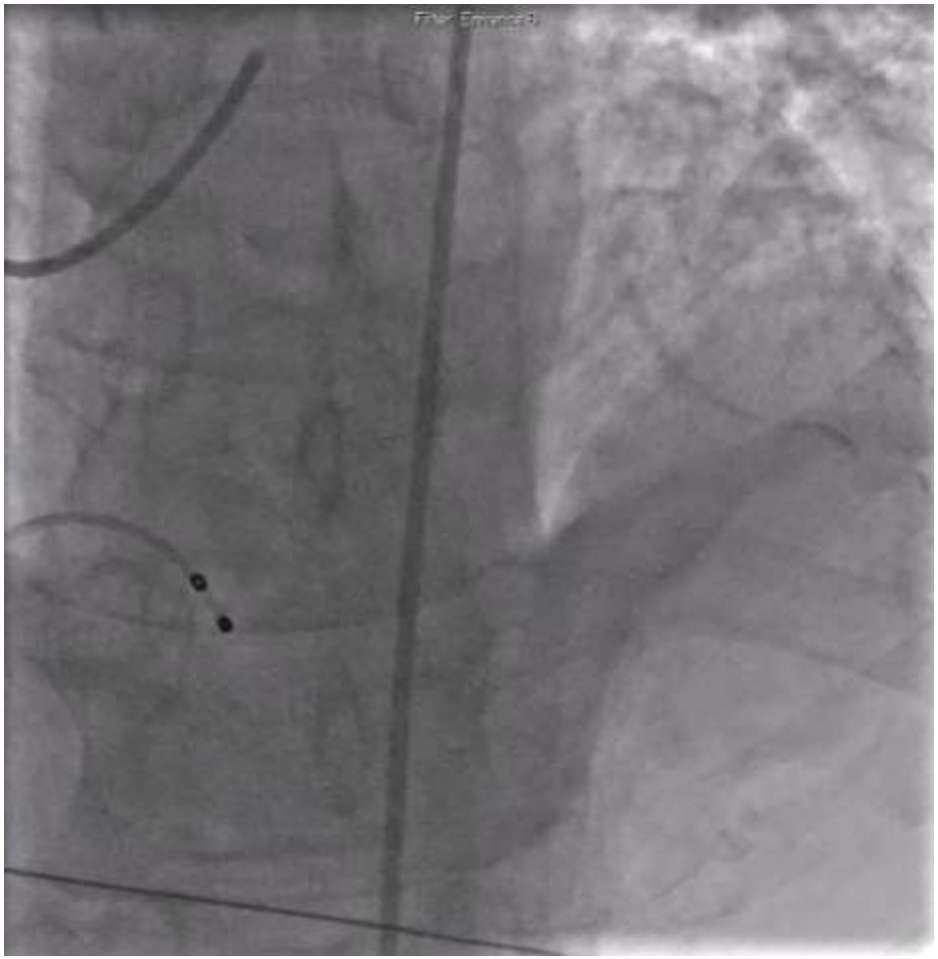


Compromise of LCX

# ULMCA PCI With ECMO

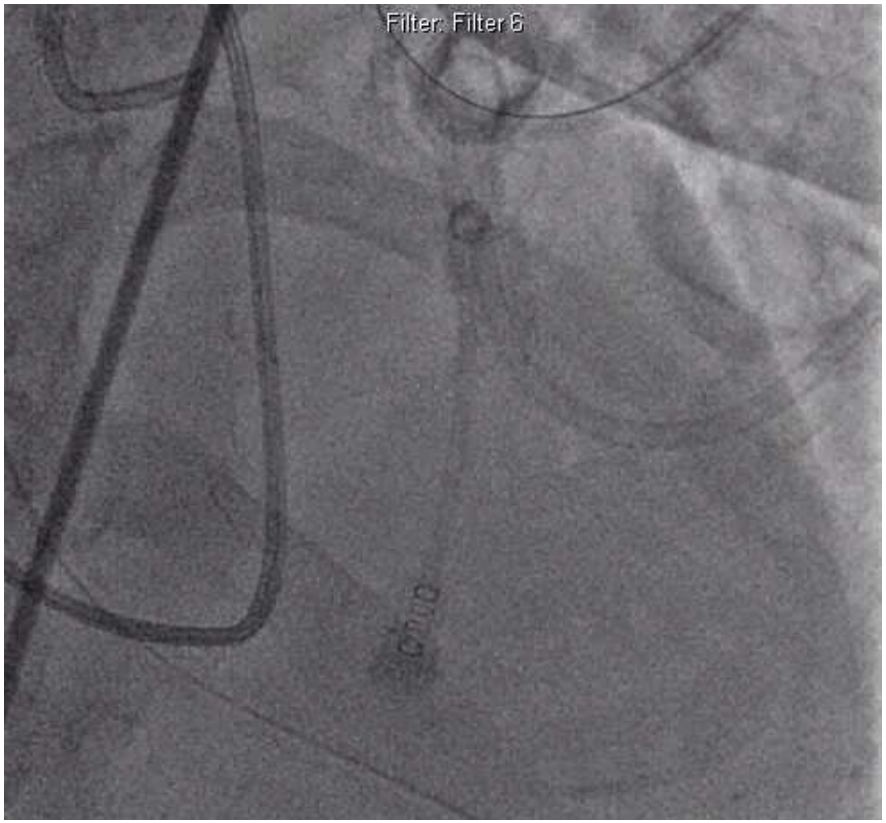


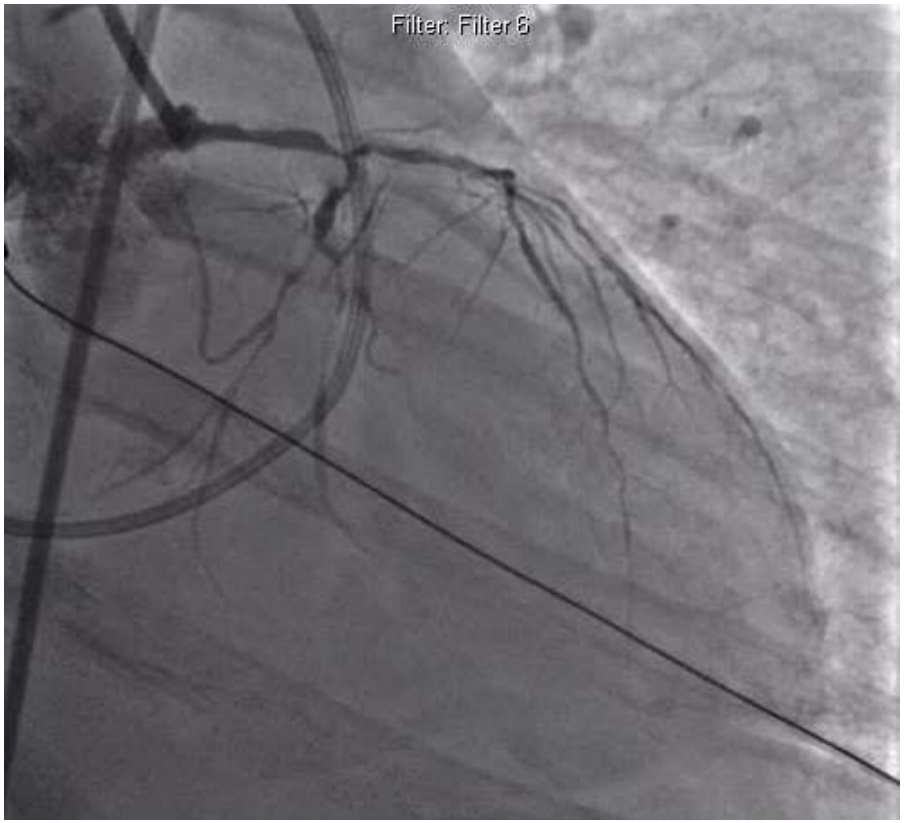
Final angiography



Ventricular fibrillation

# ULMCA PCI With ECMO

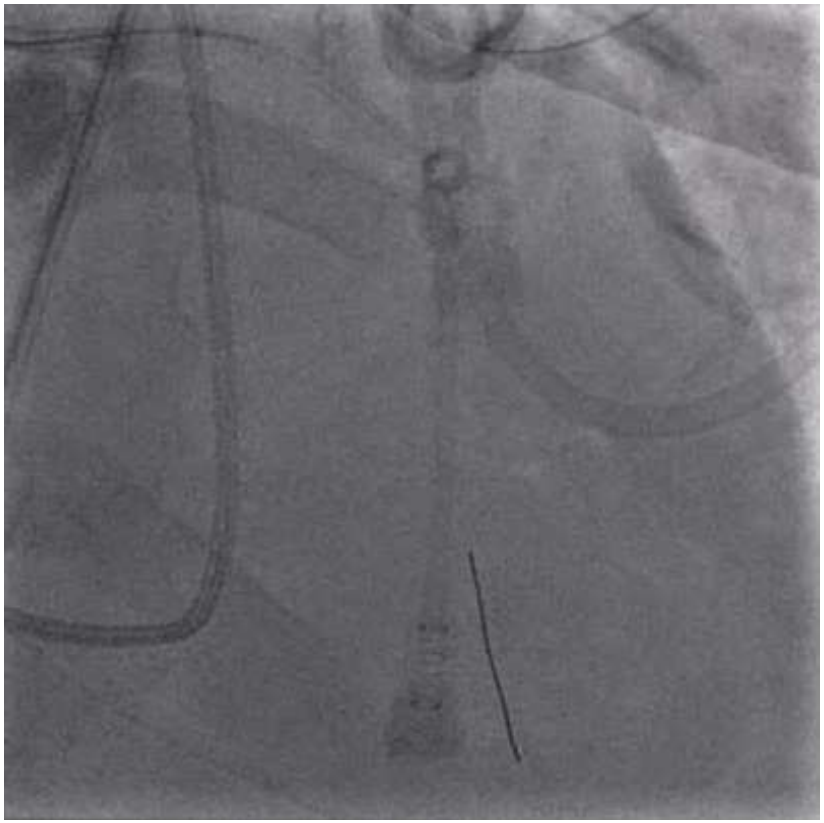


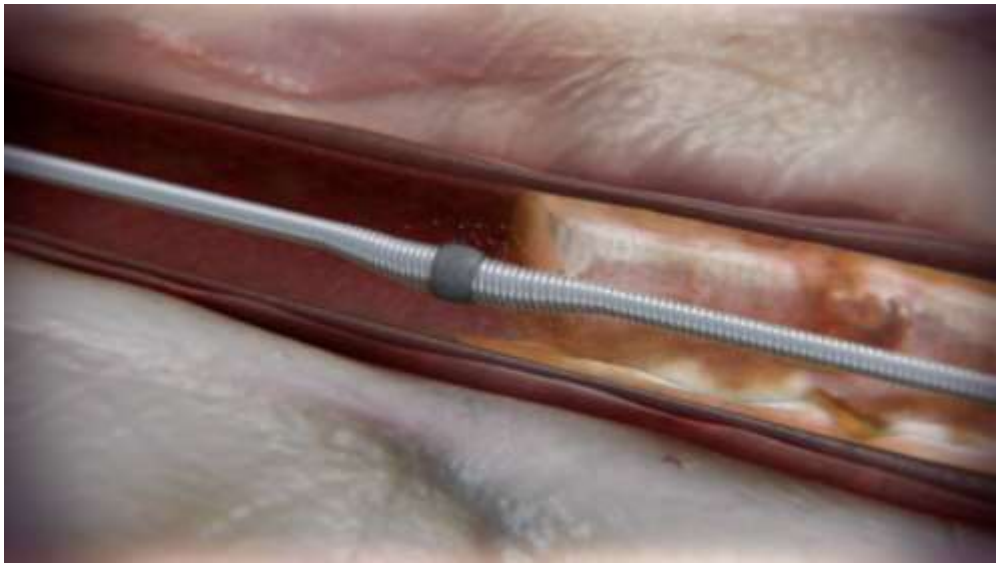




48 y.o. male with DM who presents with MI, cardiac arrest, cardiogenic shock, on 4 vasopressors, and ECMO

# Orbital Atherectomy

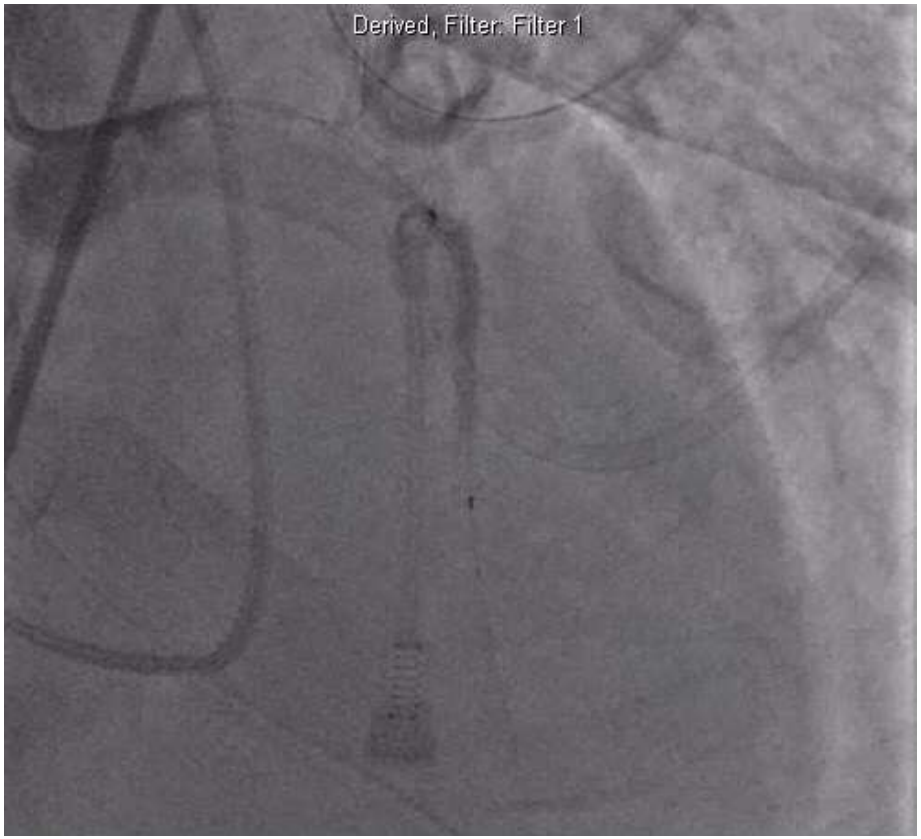
## *Differential Sanding and Centrifugal Force*

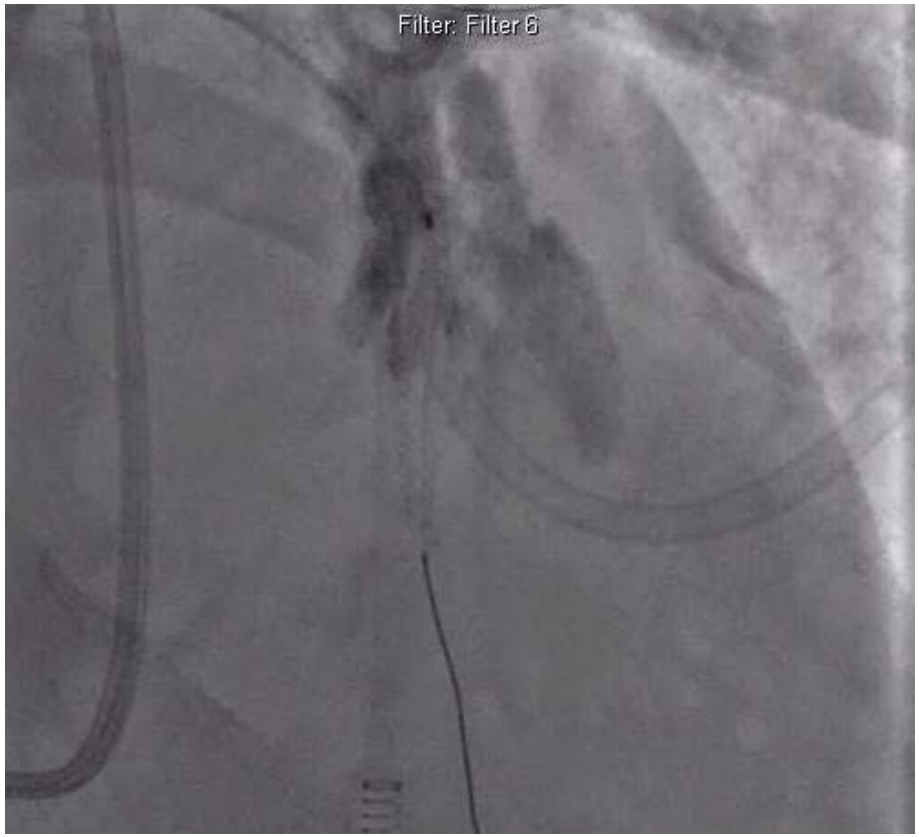




**MOA treats 360˚ of the vessel.The diamond coated crown sands away calcium and allows healthy elastic tissue to flex away minimizing injury to the vessel.**

# ULMCA PCI With ECMO

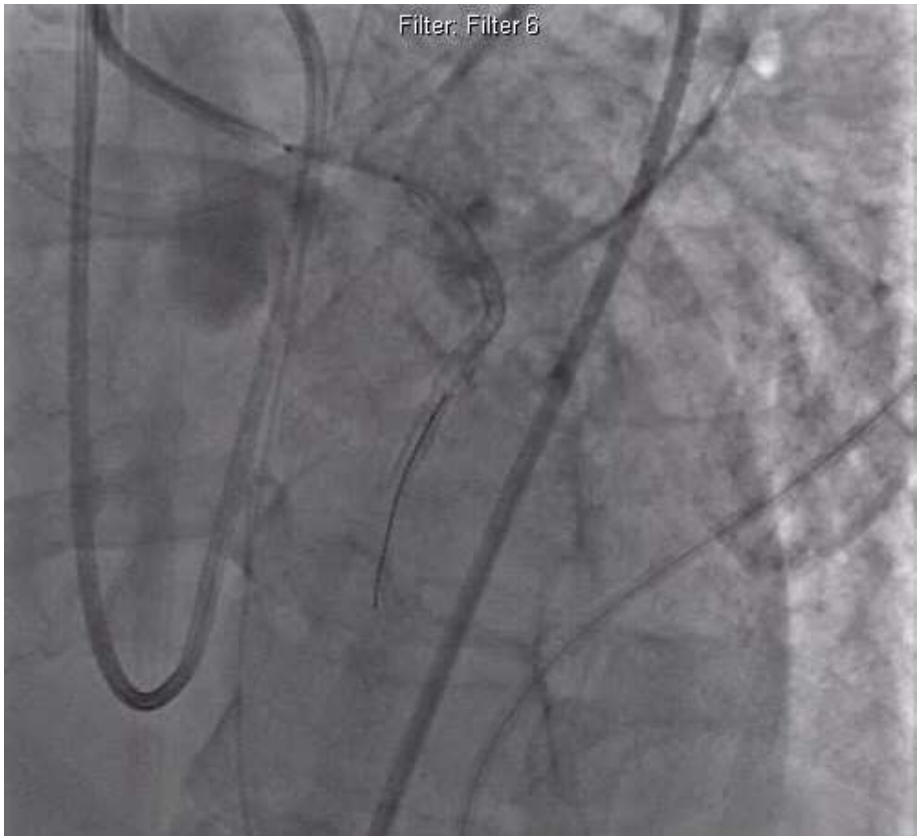


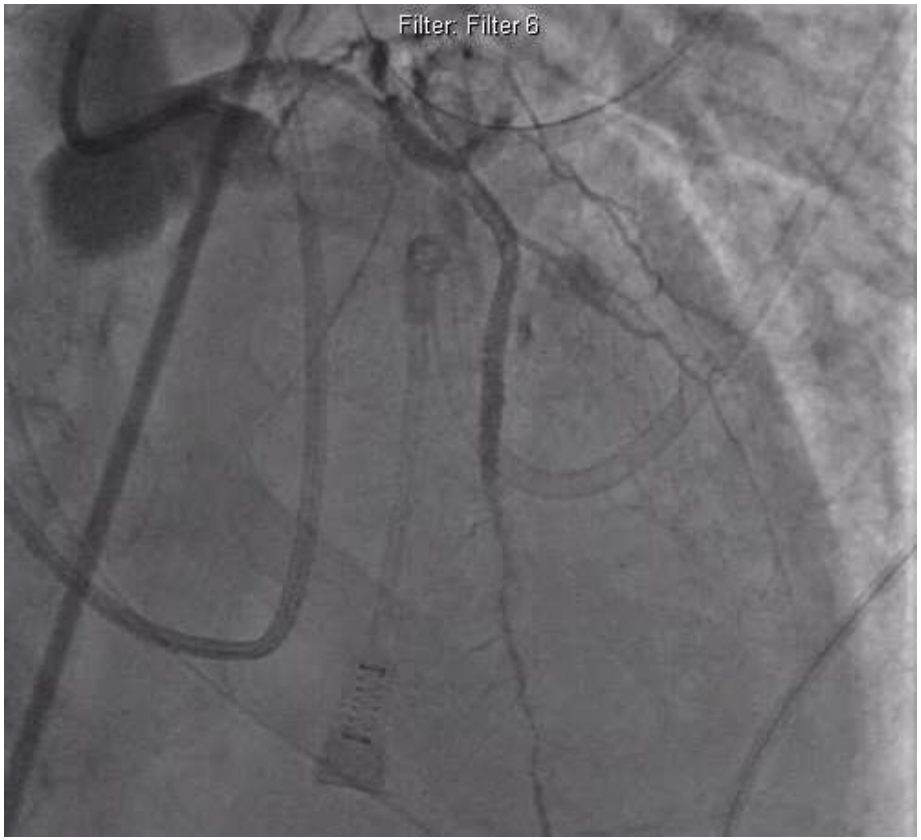

**2.75 x 38 mm EES**

**Grade 3 perforation**

# ULMCA PCI With ECMO




LM stenting in LAO cranial




Final angiography after covered stent

# ULMCA PCI in Myocardial Infarction

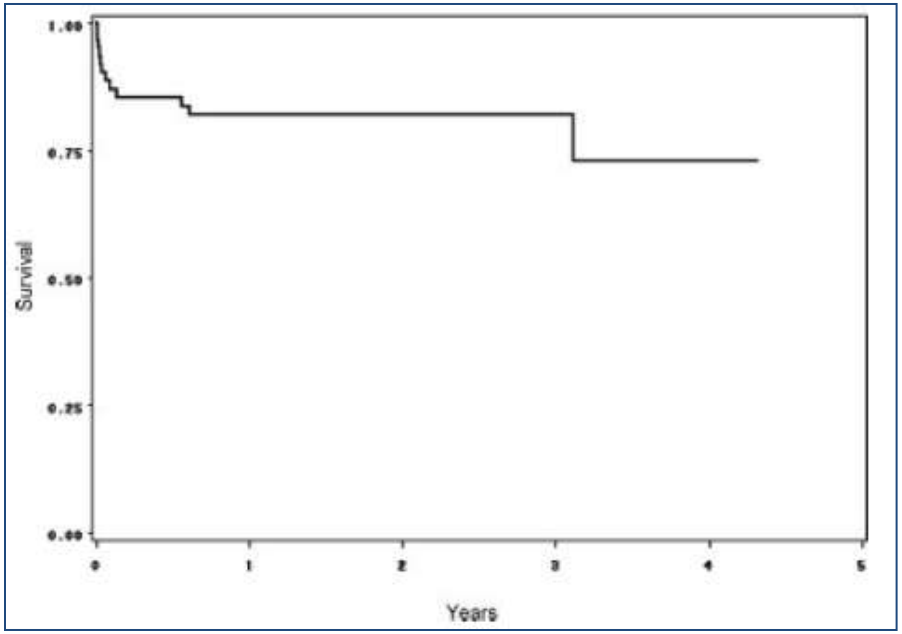
## Multicenter International Registry of Unprotected Left Main Coronary Artery Percutaneous Coronary Intervention With Drug-Eluting Stents in Patients With Myocardial Infarction

Michael S. Lee,[1*] MD, Dario Sillano,[2] MD, Azeem Latib,[3] MD, Alaide Chieffo,[3] MD, Giuseppe Biondi Zoccai,[2] MD, Ravi Bhatia,[1] Imad Sheiban,[2] MD, Antonio Colombo,[3] MD, and Jonathan Tobis,[1] MD

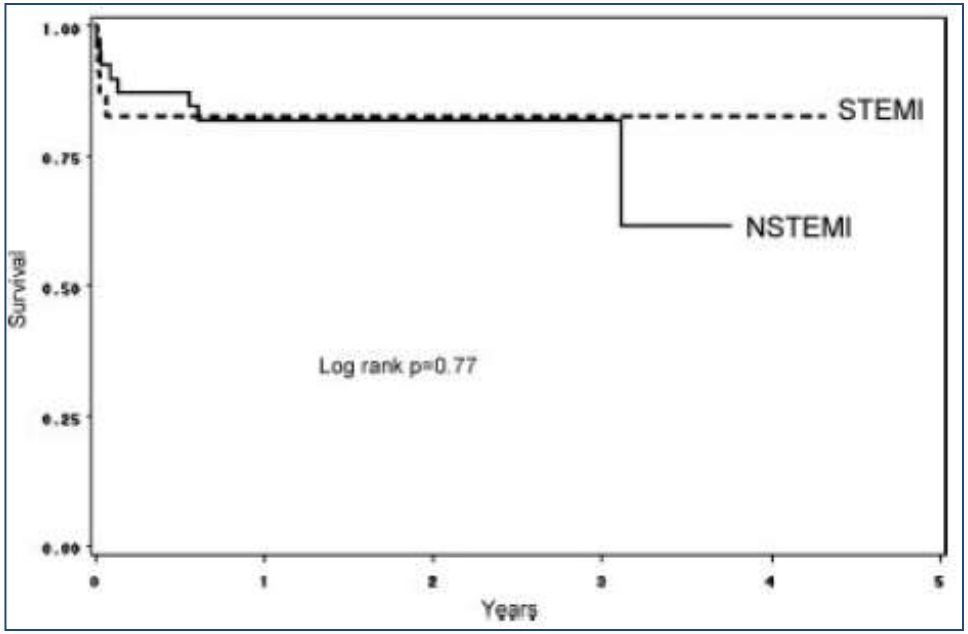
Background: Patients who present with myocardial infarction (MI) and unprotected left main coronary artery (ULMCA) disease represent an extremely high-risk subset of patients. ULMCA percutaneous coronary intervention (PCI) with drug-eluting stents (DES) in MI patients has not been extensively studied. Methods: In this retrospective multicenter international registry, we evaluated the clinical outcomes of 62 consecutive patients with MI who underwent ULMCA PCI with DES (23 ST-elevation MI [STEMI] and 39 non-ST-elevation MI [NSTEMI]) from 2002 to 2006. Results: The mean age was 70 ± 12 years. Cardiogenic shock was present in 24%. The mean EuroSCORE was 10 ± 8. Angiographic success was achieved in all patients. Overall in-hospital major adverse cardiac event (MACE) rate was 10%, mortality was 8%, all due to cardiac deaths from cardiogenic shock, and one patient suffered a periprocedural MI. At 586 ± 431 days, 18 patients (29%) experienced MACE, 12 patients (19%) died (the mortality rate was 47% in patients with cardiogenic shock), and target vessel revascularization was performed in four patients, all of whom had distal bifurcation involvement (two patients underwent repeat PCI and two patients underwent bypass surgery). There was no additional MI. Two patients had probable stent thrombosis and one had possible stent thrombosis. Diabetes [hazard ratio (HR) 4.22, 95% confidence interval (CI) (1.07–17.36), $P = 0.04$), left ventricular ejection fraction [HR 0.94, 95% CI (0.90–0.98), $P = 0.005$), and intubation [HR 7.00, 95% CI (1.62–30.21), $P = 0.009$) were significantly associated with increased mortality. Conclusions: Patients with MI and ULMCA disease represent a very high-risk subgroup of patients who are critically ill. PCI with DES appears to be technically feasible, associated with acceptable long-term outcomes, and a reasonable alternative to surgical revascularization for MI patients with ULMCA disease. Randomized trials are needed to determine the ideal revascularization strategy for these patients. 

# ULMCA PCI in Myocardial Infarction

## Overall Survival




## STEMI vs. NSTEMI




**N=62**
**Cardiogenic shock 24%**
**All in-hospital deaths from cardiogenic shock**

# ULMCA PCI in Myocardial Infarction

Minimum 1 hour

# ULMCA PCI in Myocardial Infarction


STATE-OF-THE-ART PAPER

## Unprotected Left Main Coronary Disease and ST-Segment Elevation Myocardial Infarction

***"Absent a randomized trial, it is our belief that physicians and guidelines committees should recognize emergent PCI as the preferred reperfusion modality for selected patients with MI and LMCA occlusion."***

pared with CABG with acceptable short- and long-term outcomes, and is associated with a lower risk of stroke. PCI of the ULMCA should be considered as a viable alternative to CABG for selected patients with MI, including those with ULMCA occlusion and less than Thrombolysis In Myocardial Infarction flow grade 3, cardiogenic shock, persistent ventricular arrhythmias, and significant comorbidities. The higher risk of target vessel revascularization associated with ULMCA PCI compared with CABG is an acceptable tradeoff given the primary need for rapid reperfusion to enhance survival. (J Am Coll Cardiol Intv 2010;3:791–5) © 2010 by the American College of Cardiology Foundation

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PRACTICE GUIDELINE

# 2011 ACCF/AHA/SCAI Guideline for Percutaneous Coronary Intervention

A Report of the American College of Cardiology Foundation/American Heart Association Task Force on Practice Guidelines and the Society for Cardiovascular Angiography and Interventions

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## 2.2. Revascularization to Improve Survival: Recommendations

### Left Main CAD Revascularization

**CLASS I**

1. CABG to improve survival is recommended for patients with significant (≥50% diameter stenosis) left main coronary artery stenosis (24–30). *(Level of Evidence: B)*

**CLASS IIa**

1. PCI to improve survival is reasonable as an alternative to CABG in selected stable patients with significant (≥50% diameter stenosis) unprotected left main CAD with: 1) anatomic conditions associated with a low risk of PCI procedural complications and a high likelihood of good long-term outcome (e.g., a low SYNTAX score [≤22], ostial or trunk left main CAD); and 2) clinical characteristics that predict a significantly increased risk of adverse surgical outcomes (e.g., STS-predicted risk of operative mortality ≥5%) (13,17,19,23,31–48). *(Level of Evidence: B)*
2. PCI to improve survival is reasonable in patients with UA/NSTEMI when an unprotected left main coronary artery is the culprit lesion and the patient is not a candidate for CABG (13,36–39,44,45,47–49). *(Level of Evidence: B)*
3. PCI to improve survival is reasonable in patients with acute STEMI when an unprotected left main coronary artery is the culprit lesion, distal coronary flow is less than TIMI (Thrombolysis In Myocardial Infarction) grade 3, and PCI can be performed more rapidly and safely than CABG (33,50,51). *(Level of Evidence: C)*