Management of Coronary Artery Calcification in Acute Myocardial Infarction

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UCLA Health

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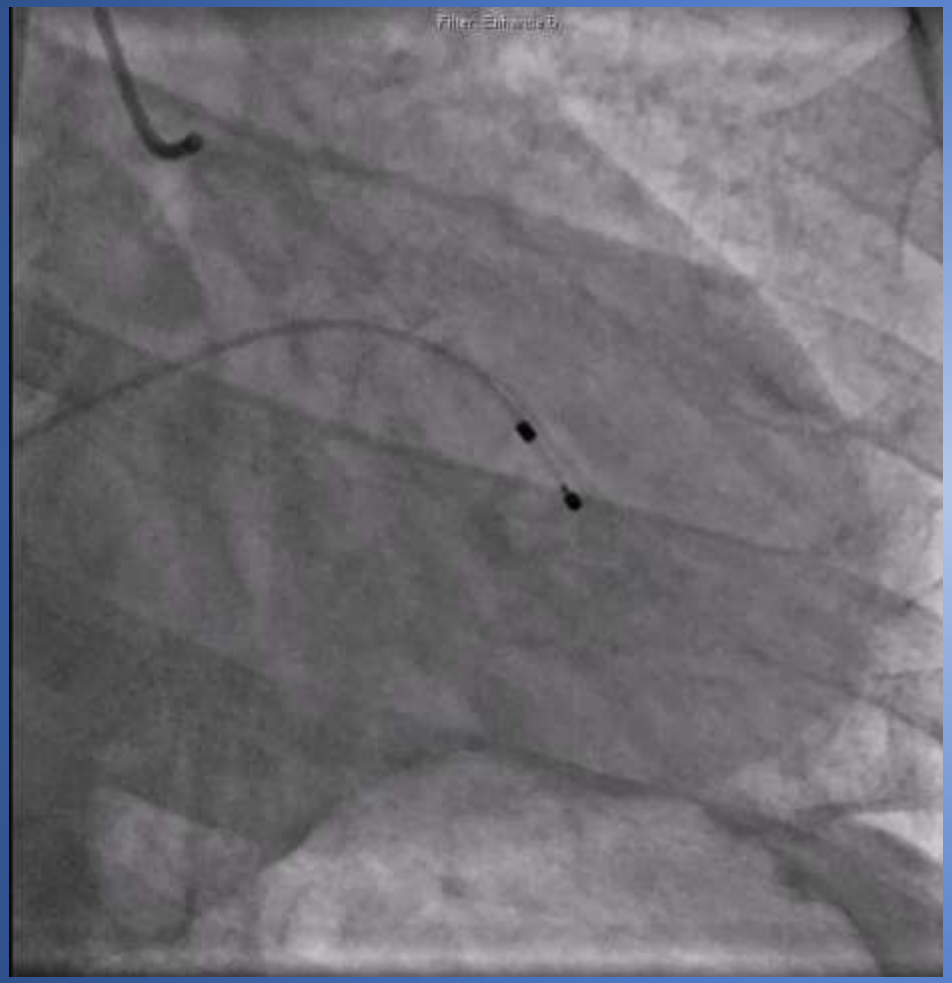
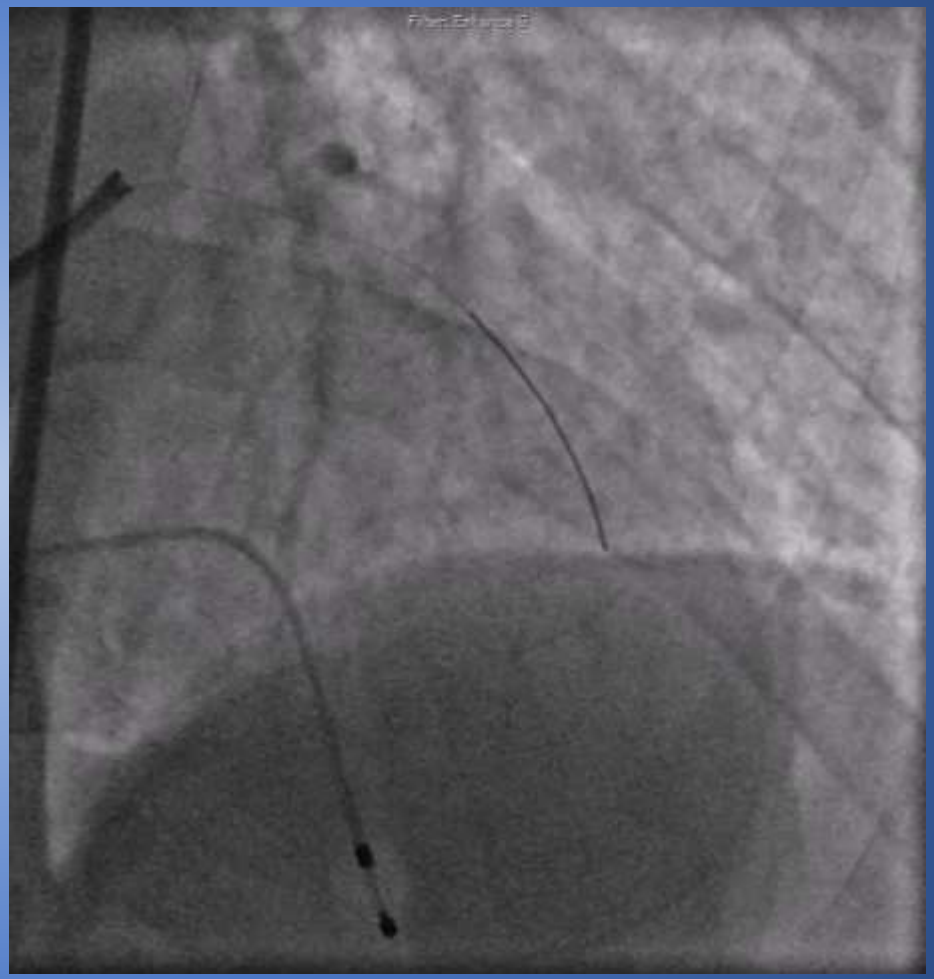
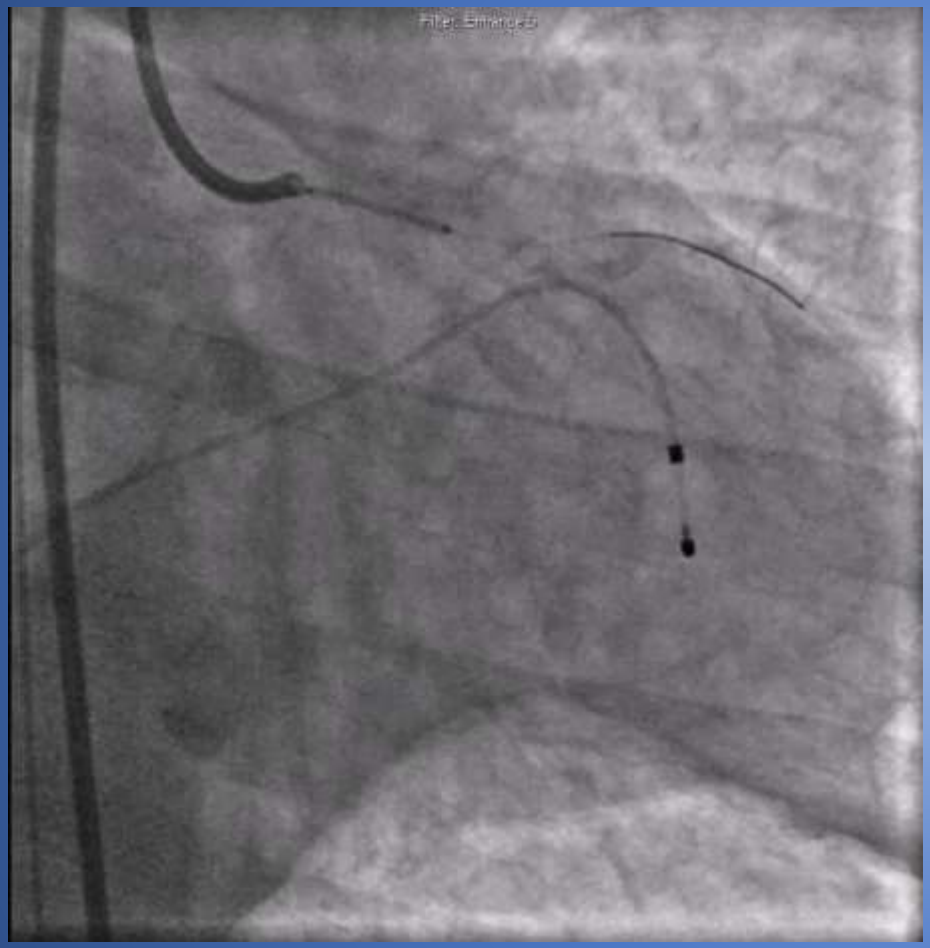
Acute Myocardial Infarction
Due to Thrombotic Occlusion

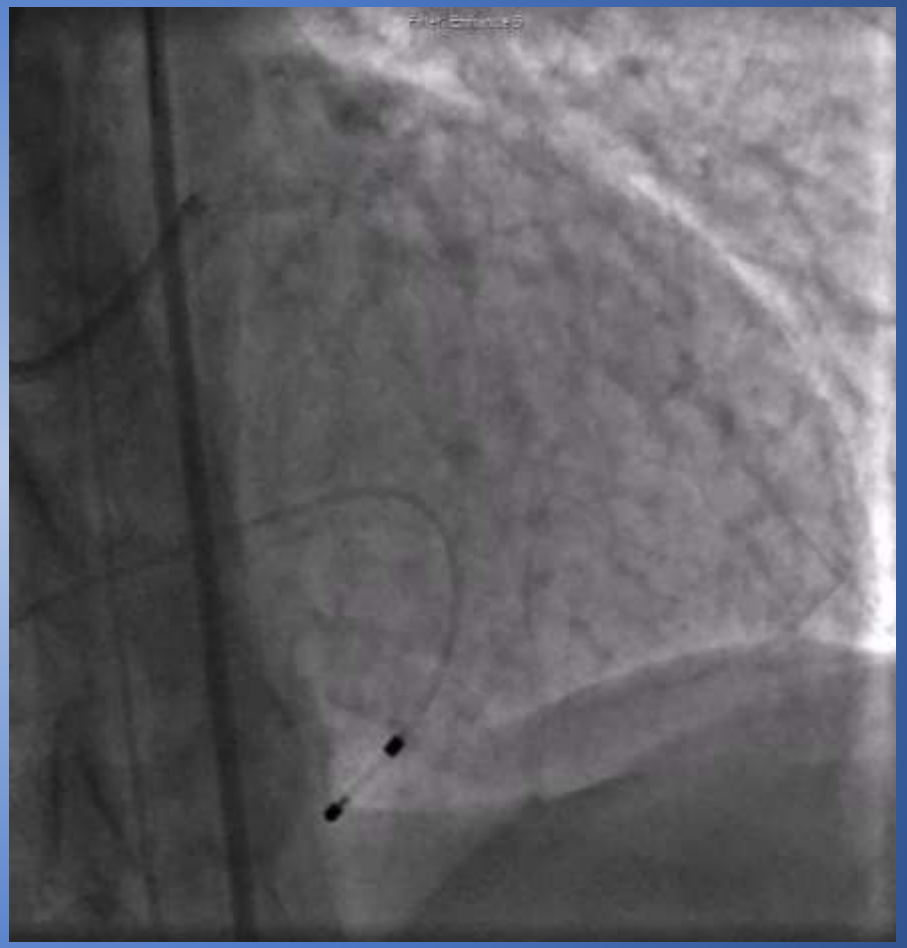




68 y.o. male with chest pain, ST-elevation in aVR, shock on inotropes

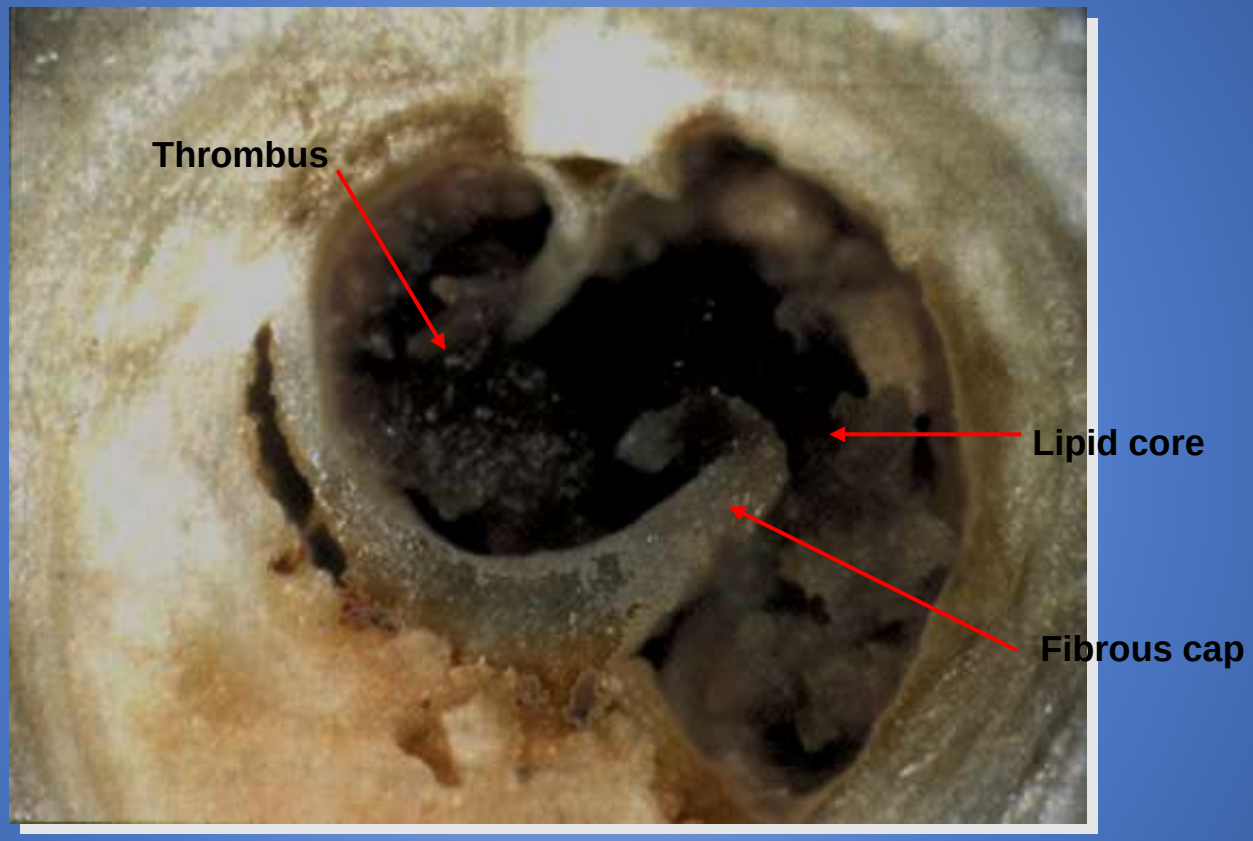
ULMCA PCI in Myocardial Infarction





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

The Pathophysiology of AMI

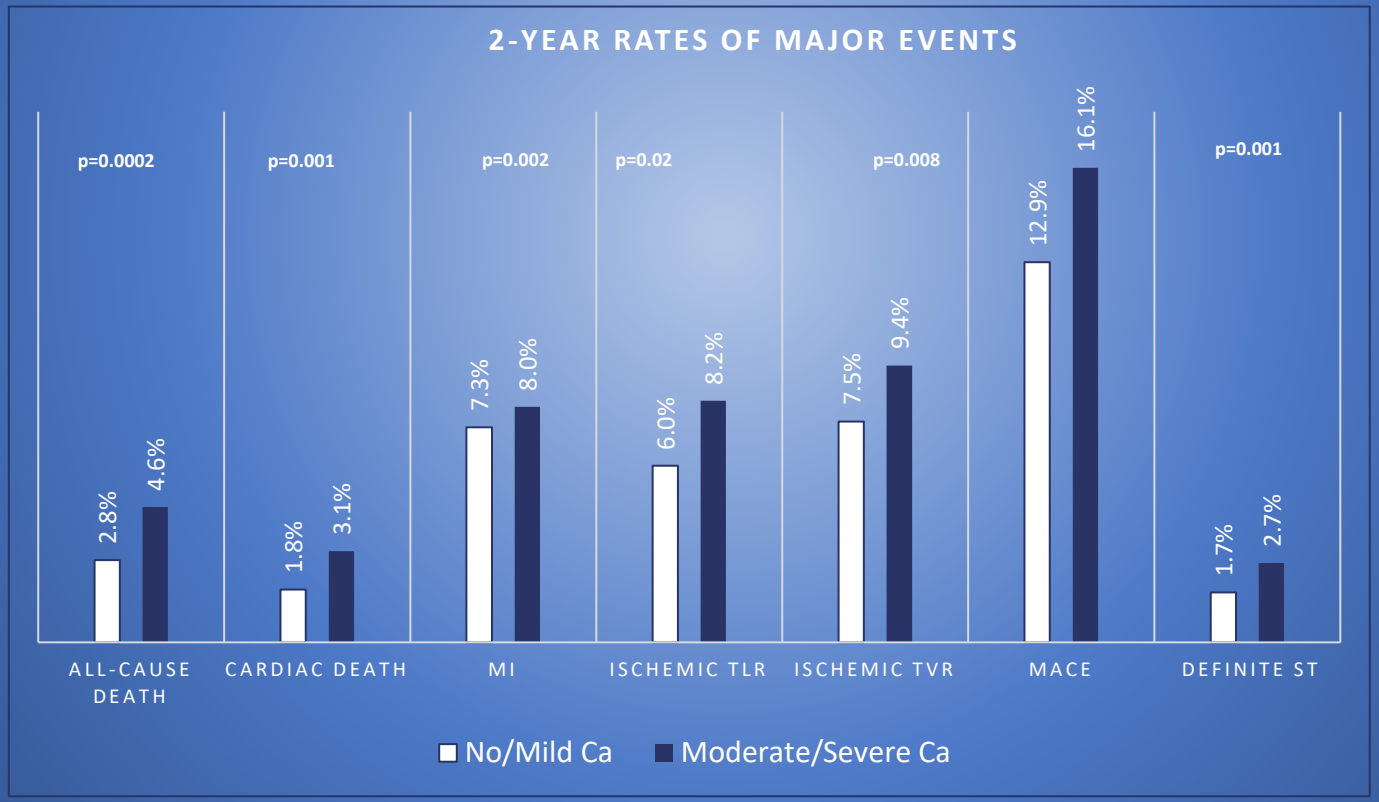


Ruptured fibrous cap with luminal and intraplaque occlusive thrombus

Impact of Coronary Artery Calcification Among Patients Undergoing PCI

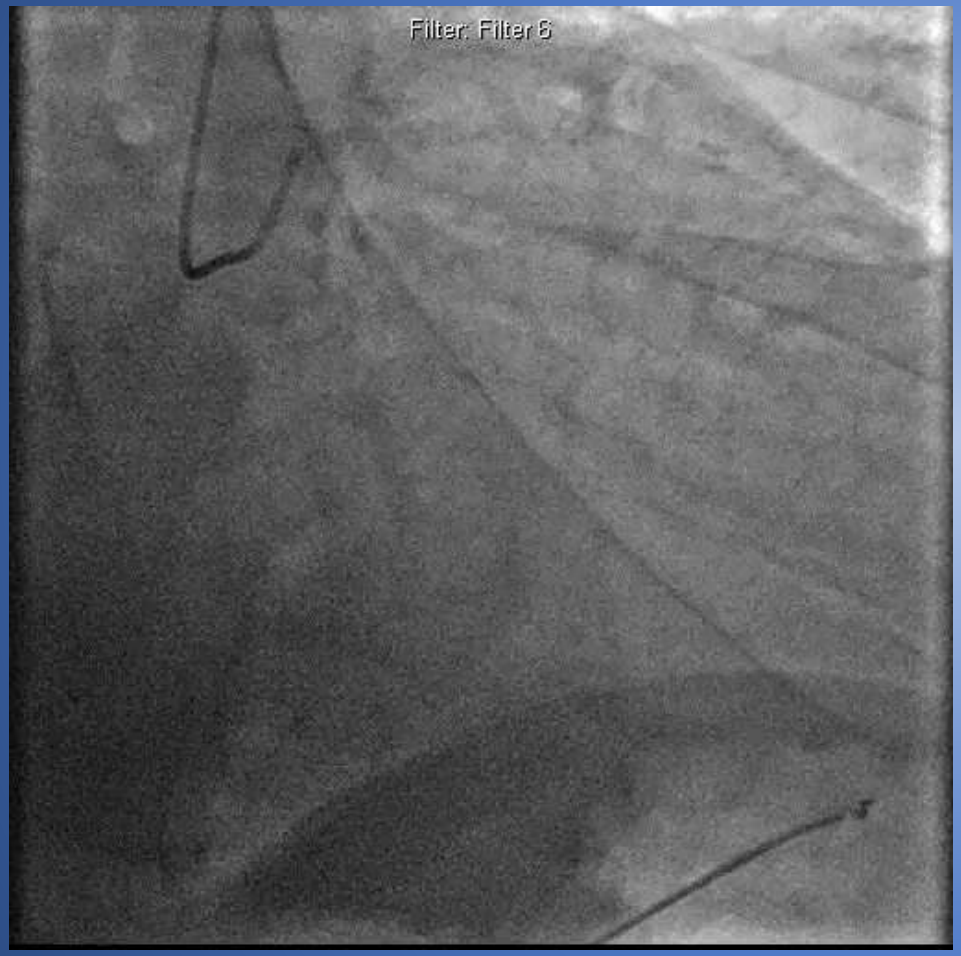
Pooled data from ARRIVE I and II Registry

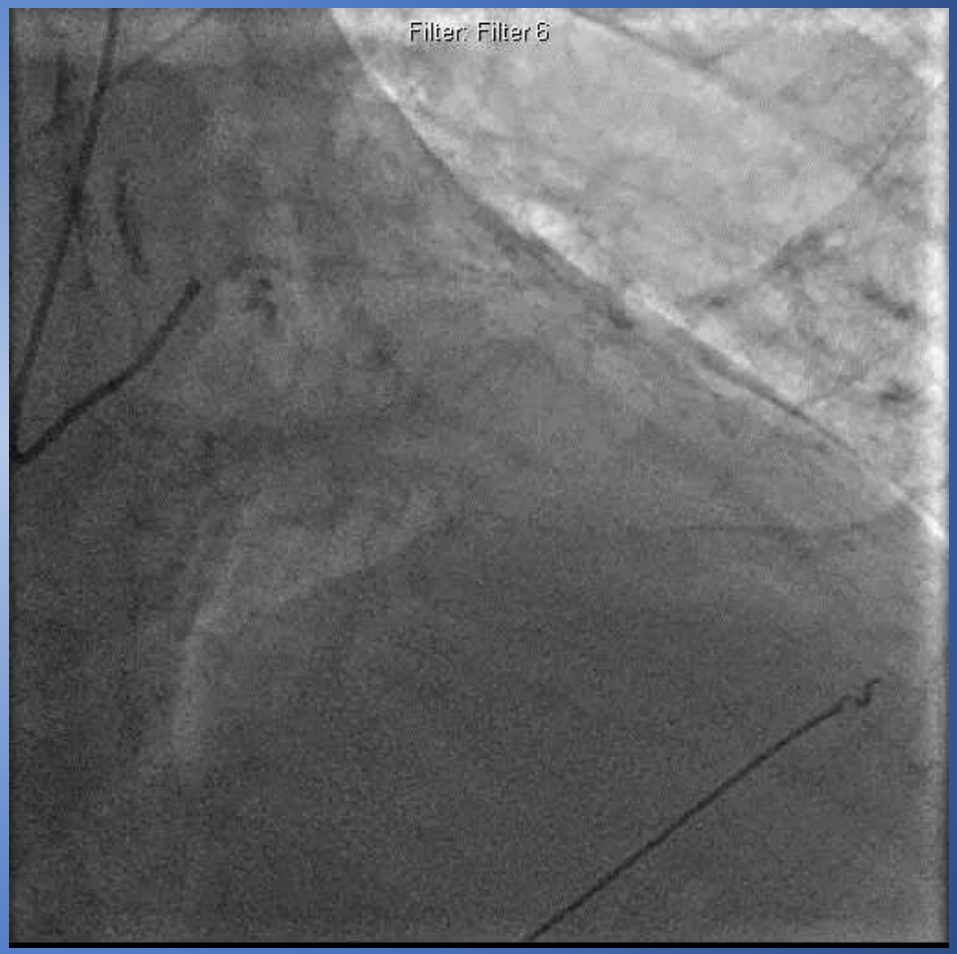
Moderate and severe lesion calcification was relatively frequent in patients (19.6%).



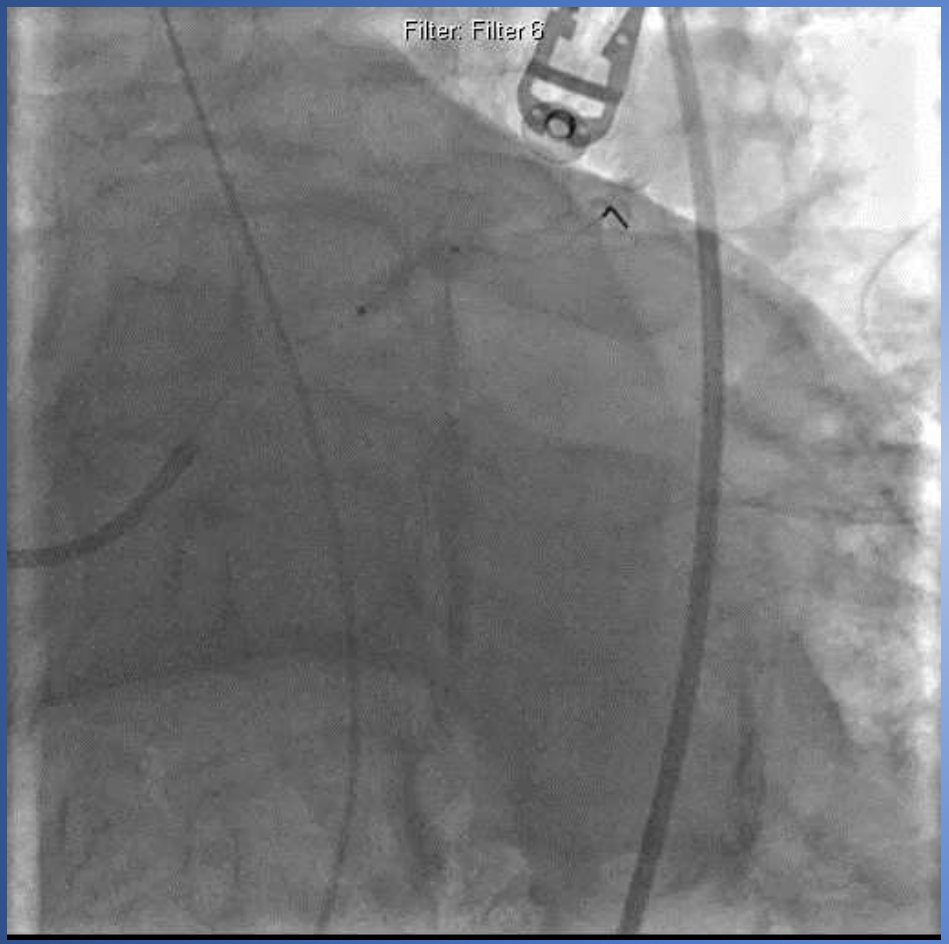
Lee MS, et al. Catheter Cardiovasc Interv 2015.

80 year-old diabetic with ACS

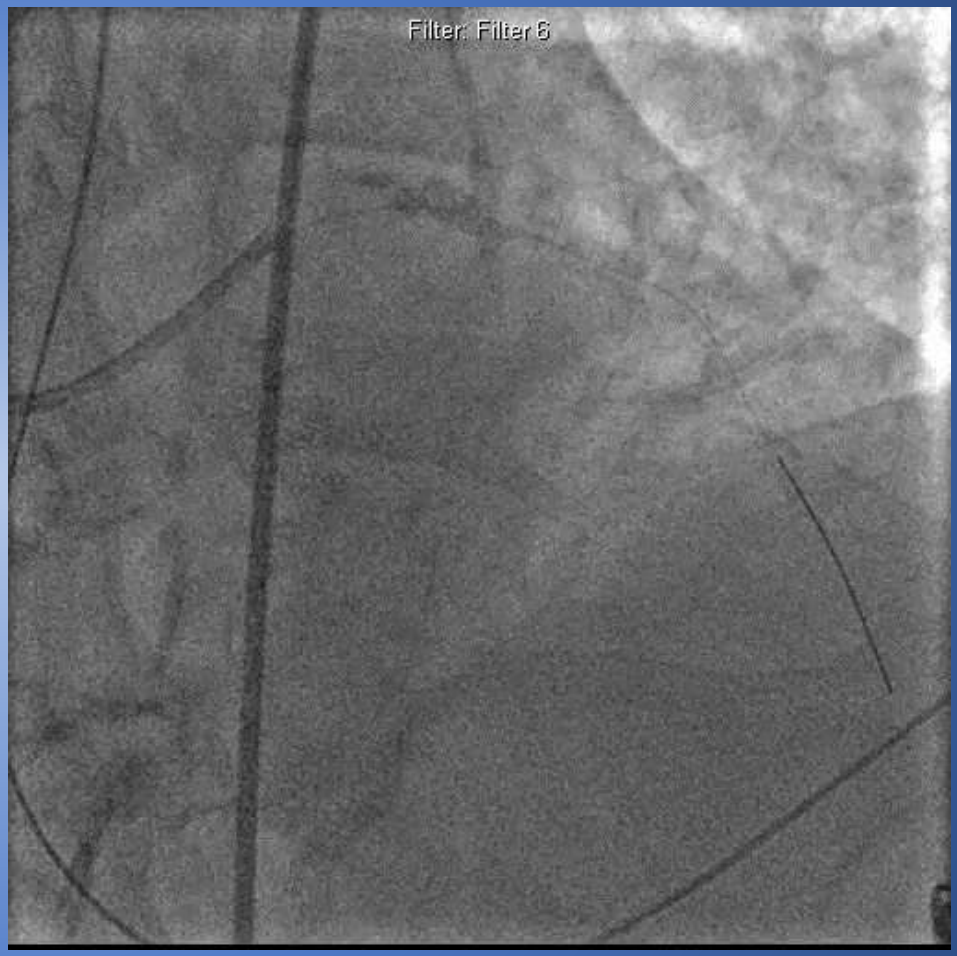




Severely calcified proximal LAD



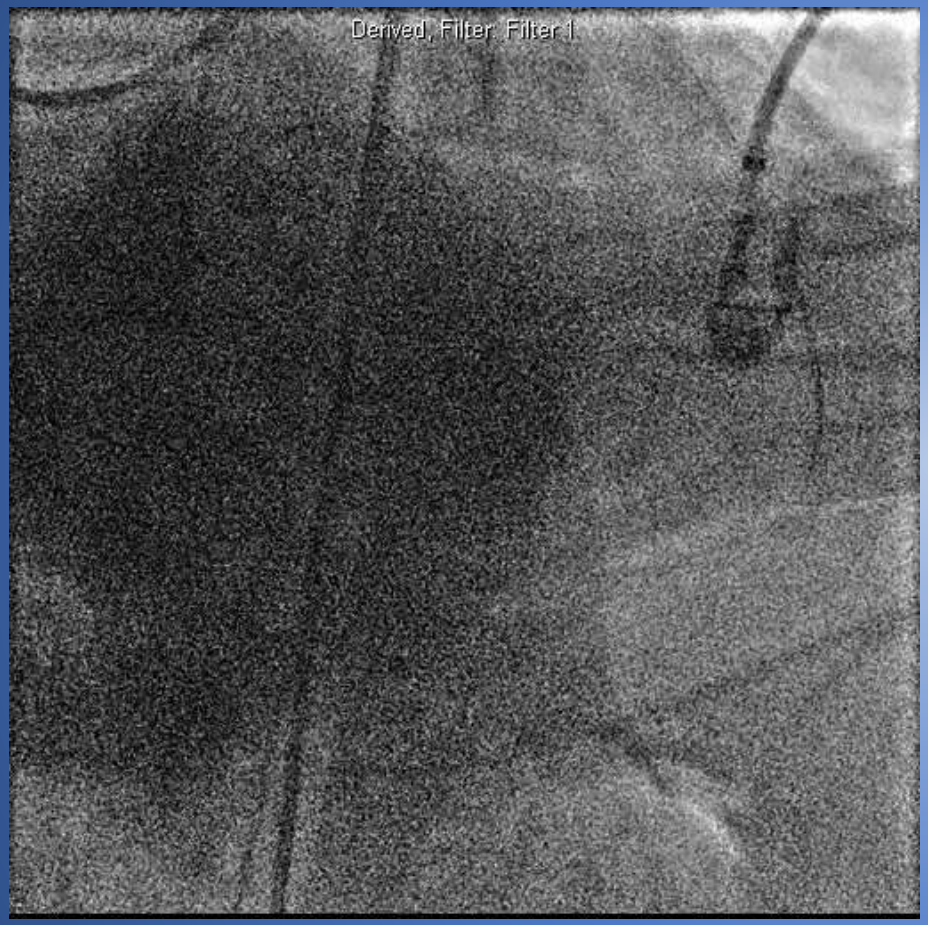
- Multiple, prolonged, high-pressure inflations
- Unable to fully dilate balloon



- Slow flow
- Ischemia
- Contrast staining c/w dissection

- Cardiac arrest
- CPR

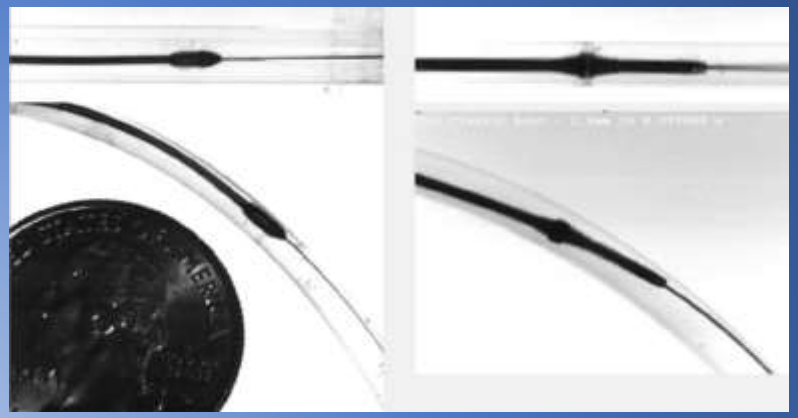
- Impella insertion
- Rotational atherectomy



- Intubated, multiple vasopressors
- Hemo-metabolic shock, septic shock, mult-organ failure
- Died

Orbital Atherectomy

Mechanism of Action



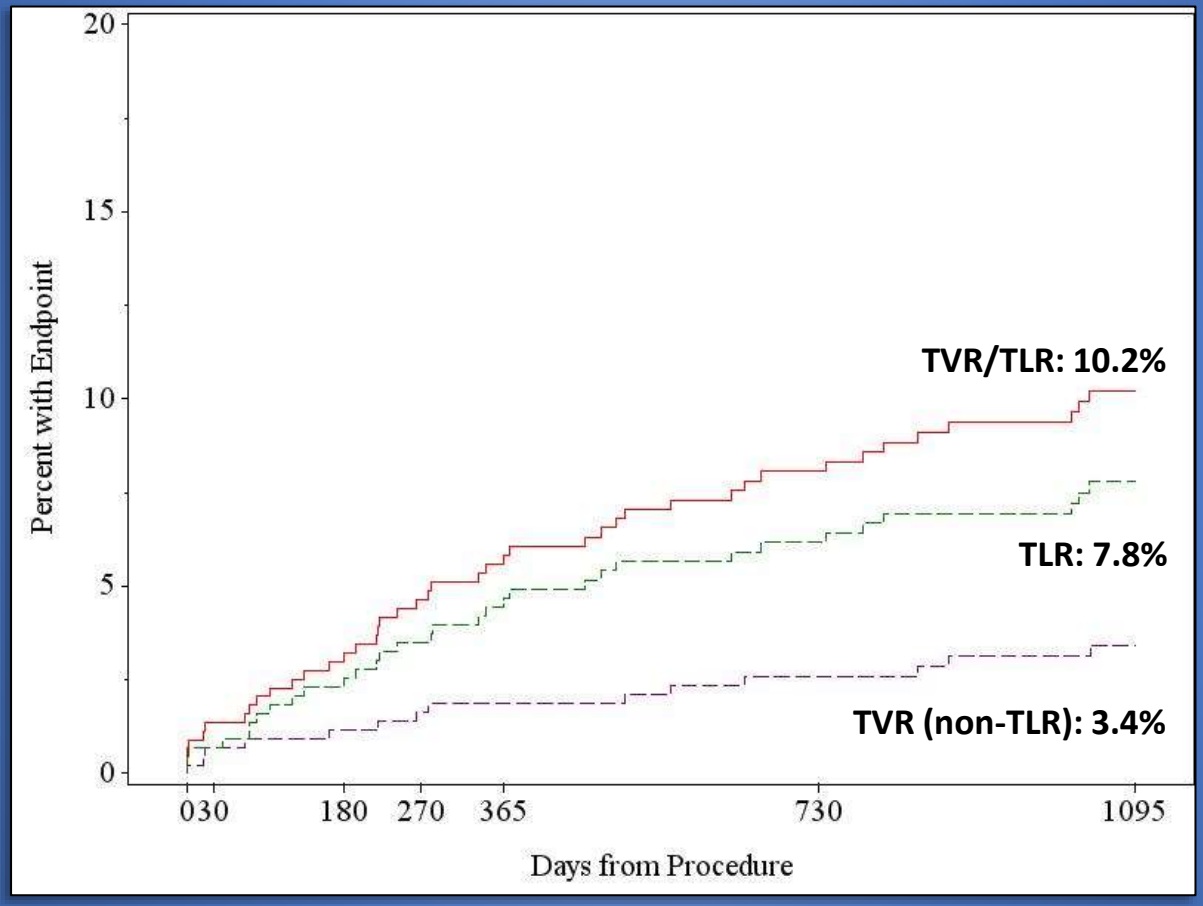
Differential Sanding:

- 30 micron diamond coating
- Bi-directional sanding, eccentric mounted crown
- Healthy elastic tissue flexes away minimizing damage to the vessel

Centrifugal Force:

- 360° crown contact designed to create a smooth, concentric lumen
- Allows constant blood flow and particulate flushing during orbit
- Increasing speed increases orbital diameter
- Ability to treat multiple vessel diameters with one crown (1.25 mm)
- Treat large vessels through small sheaths (6 French)

ORBIT II
3-Year TVR/TLR



Number at risk (TVR/TLR)	443 430	413	403	392	356	228
Number at risk (TLR)	443 432	415	407	396	363	234
Number at risk (TVR)	443 433	421	416	407	377	242

Lee MS, et al. Cardiovasc Revasc Med. 2017;18:261-264

Angiographic Complications

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ORIGINAL INVESTIGATION

Real-World Multicenter Registry of Patients with Severe Coronary Artery Calcification Undergoing Orbital Atherectomy

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Objectives: *We evaluated the safety and efficacy of orbital atherectomy in real-world patients with severe coronary artery calcification (CAC).*

Background: *The presence of severe CAC increases the complexity of percutaneous coronary intervention as it may impede stent delivery and optimal stent expansion. Atherectomy may be an indispensable tool for uncrossable or undilatable lesions by modifying severe CAC. Although the ORBIT I and II trials report that orbital atherectomy was safe and effective for the treatment of severe CAC, patients with kidney disease, recent myocardial infarction, long diffuse disease, severe left ventricular dysfunction, and unprotected left main disease were excluded.*

Methods: *This retrospective study included 458 consecutive patients with severe CAC who underwent orbital atherectomy followed by stenting from October 2013 to December 2015 at 3 centers.*

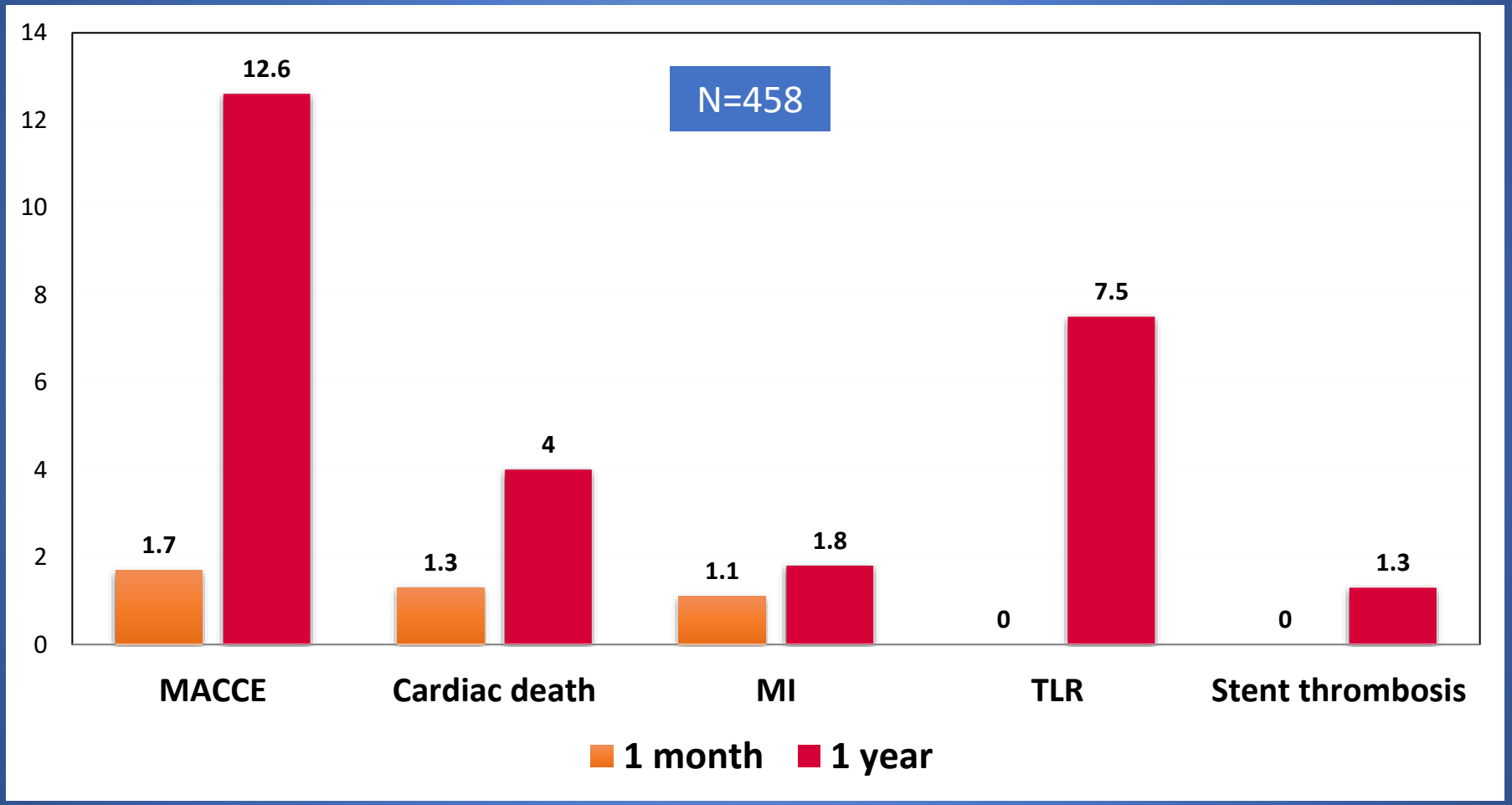
Results: *The primary endpoint of major adverse cardiac and cerebrovascular events at 30 days was 1.7%. Low rates of 30-day all-cause mortality (1.3%), myocardial infarction (1.1%), target vessel revascularization (0%), stroke (0.2%), and stent thrombosis (0.9%) were observed. Angiographic complications were low: perforation was 0.7%, dissection 0.9%, and no-reflow 0.7%. Emergency coronary artery bypass graft surgery was performed in 0.2% of patients.*

Conclusion: *In the largest real-world study of patients who underwent orbital atherectomy, including high-risk patients who were not surgical candidates as well as those with very complex coronary anatomy, acute and short-term adverse clinical event rates were low. A randomized clinical trial is needed to identify the ideal treatment strategy for patients with severe CAC.* (J Interven Cardiol 2016;9999:1–6)

	n=458
Perforation	3 (0.7%)
Dissection	4 (0.9%)
No reflow	3 (0.7%)

Lee MS, et al. J Interv Cardiol 2016.

Orbital Atherectomy
30-day and 1-year follow-up

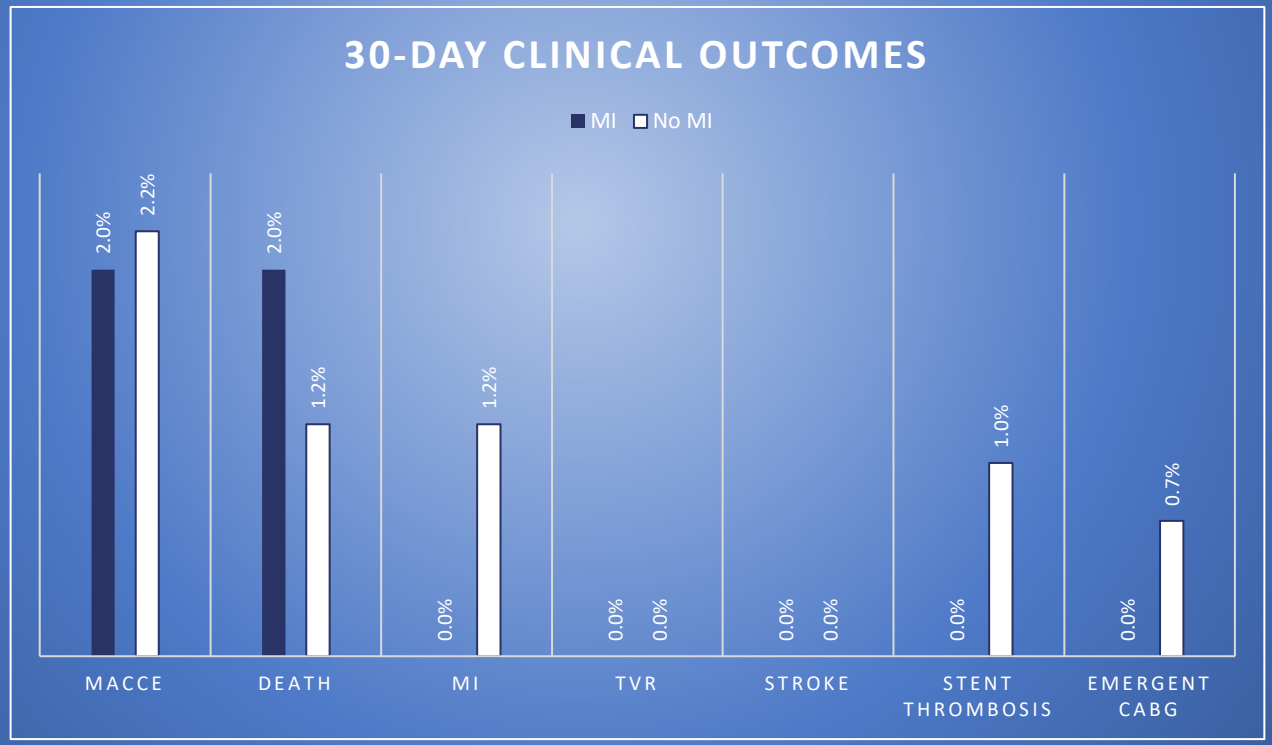


Lee MS, et al. J Interv Cardiol 2016
Lee MS, et al. J Invasive Cardiol 2018

UCLA Health

Orbital Atherectomy for Severely Calcified Lesions in MI patients

- 454 patients with severe CAC who underwent OA
- 51 patients with MI vs. 403 patients without MI

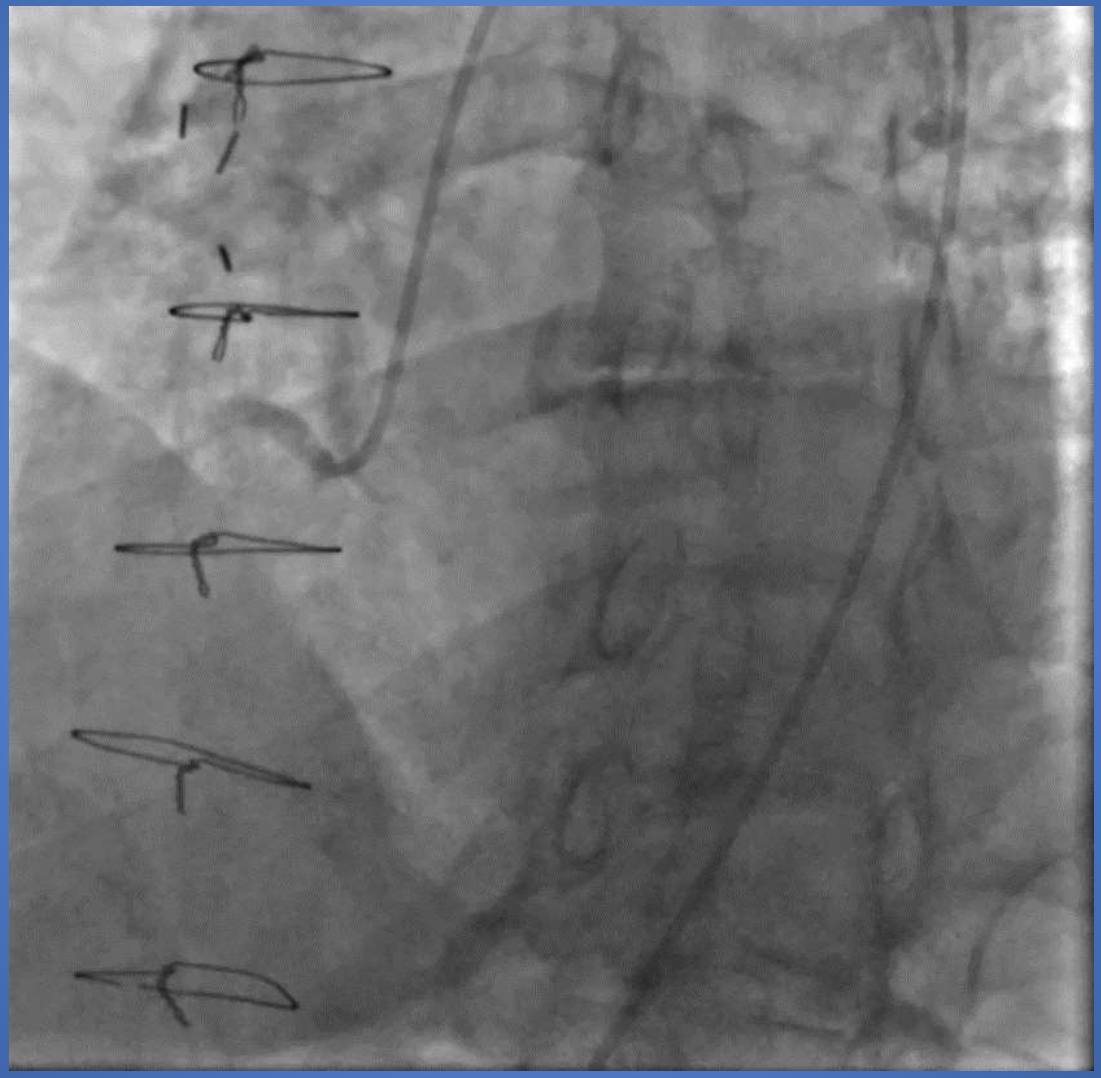


Patients with MI had a higher prevalence of CKD, lower mean EF, and required more vessels to be treated.

Similar clinical outcomes at 30 days with orbital atherectomy

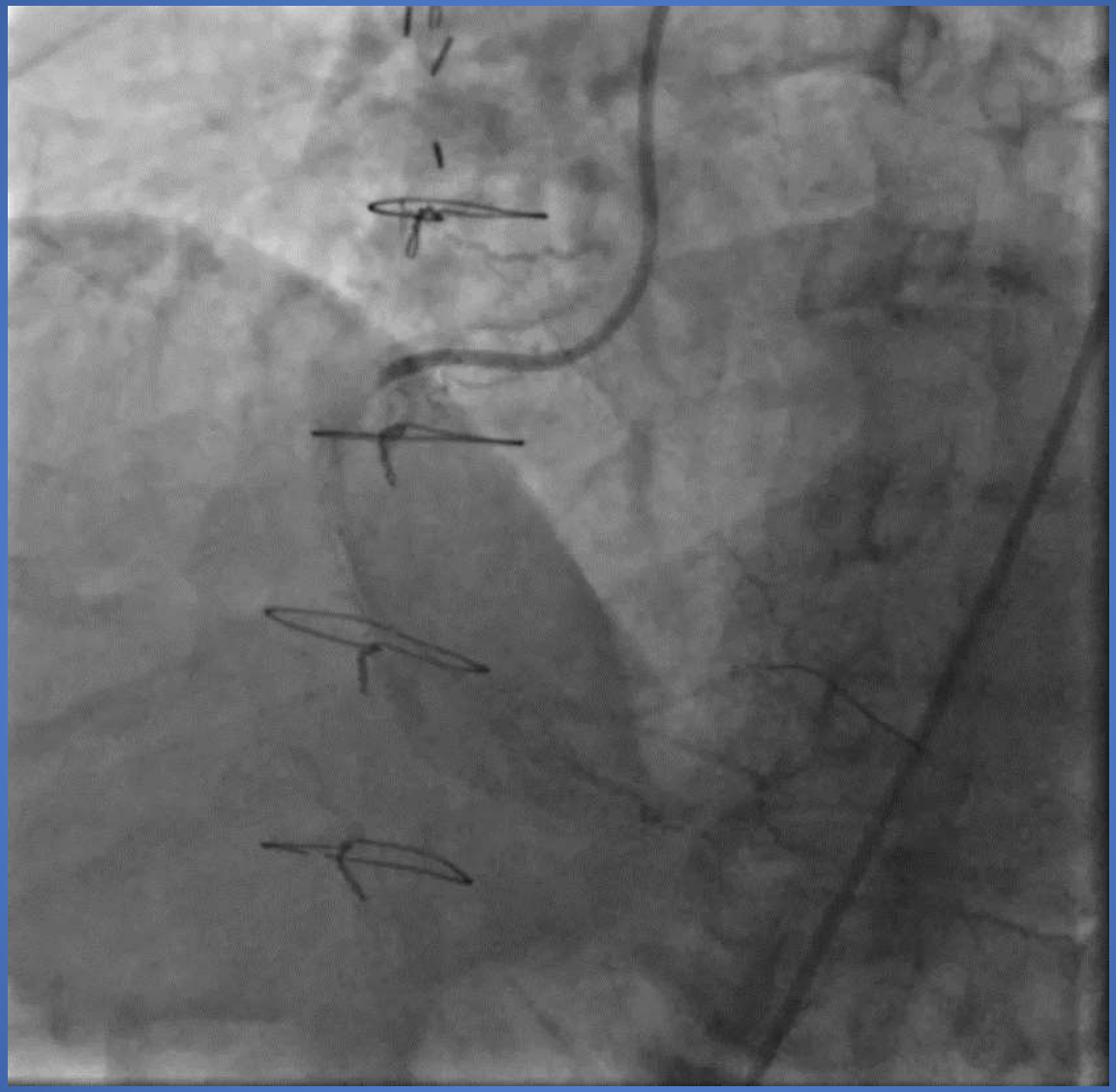
Lee MS, et al. *Cardiovasc Revasc Med*. 2017;18:497-500.

ULMCA PCI in Myocardial Infarction



85 y.o. with inferior STEMI
Unable to advance a balloon

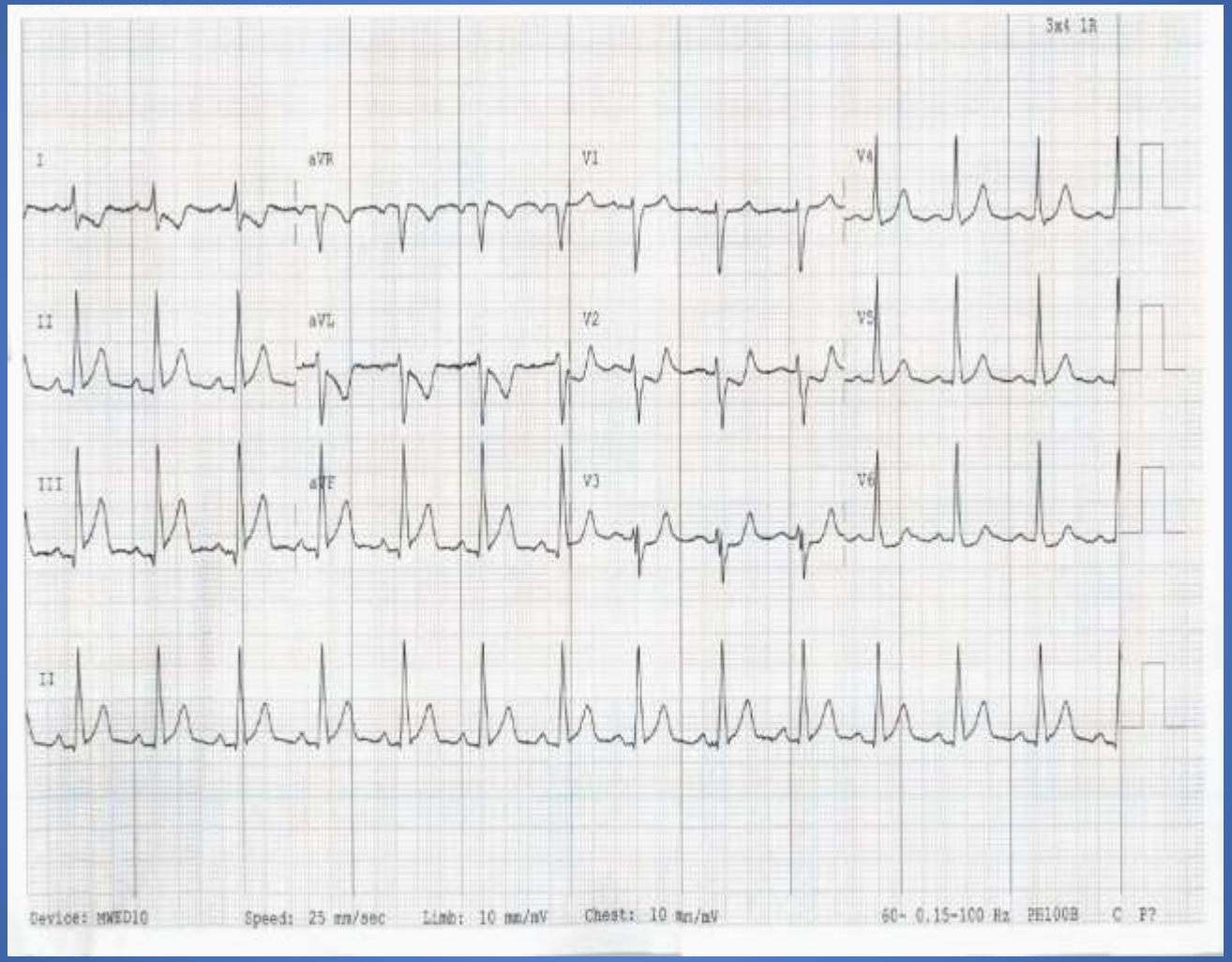
Orbital atherectomy



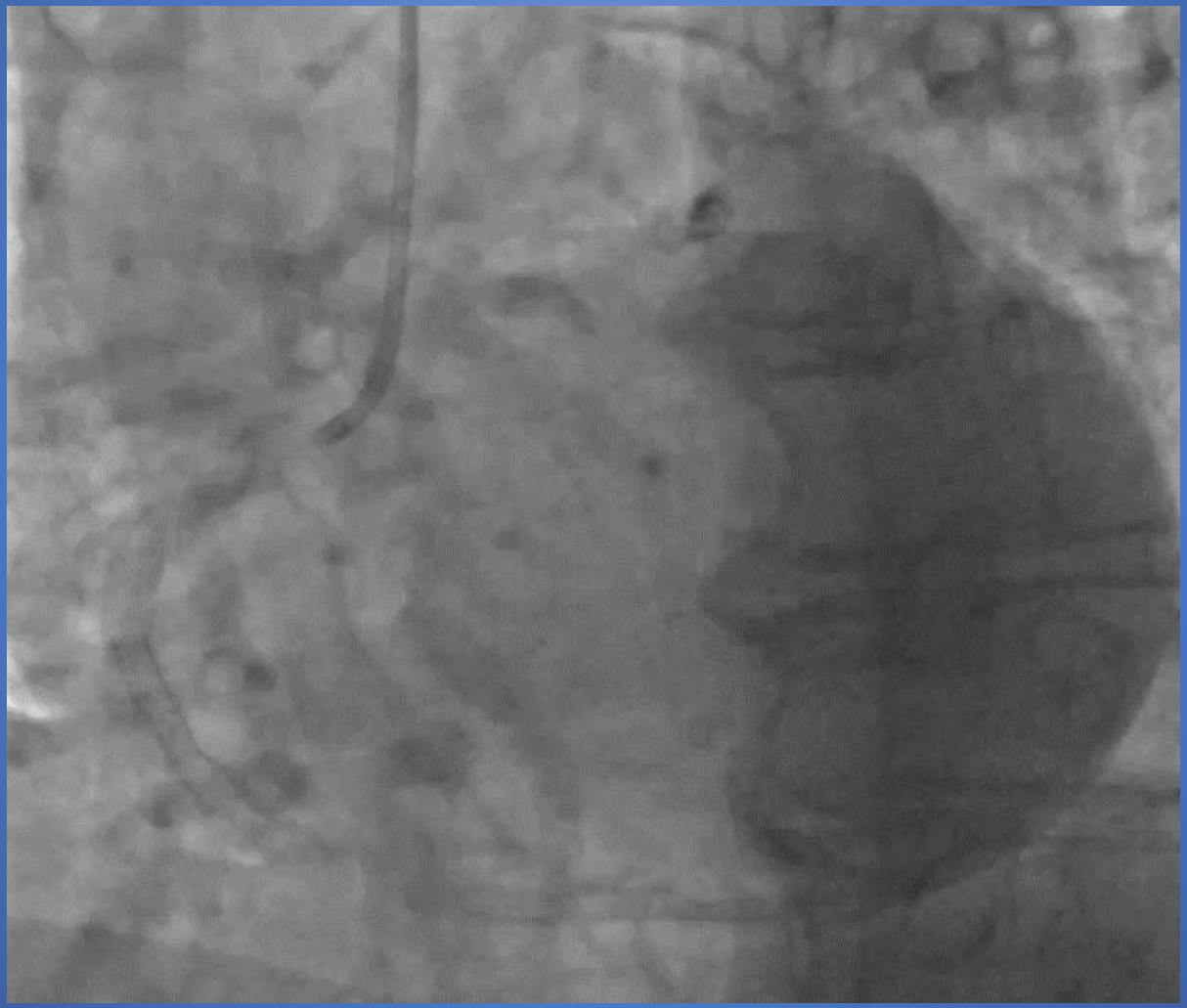
Angiographic results after OA

Final Angiography

61 y.o. Male Inferior STEMI

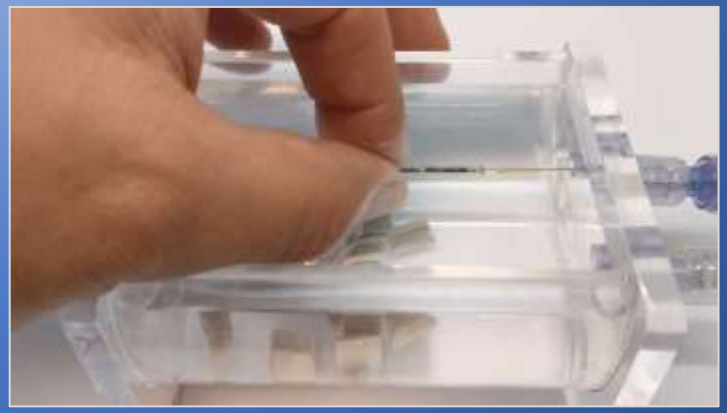


Thombotic Occlusion of RCA



Stent Underexpansion

Shockwave Intravascular Lithotripsy



Intravascular Lithotripsy with 4 x 40 mm

Final Angiography

Conclusions

- Coronary artery calcification (CAC) is observed in 32% of patients with acute coronary syndrome (ACS)
- Orbital atherectomy and IVL may be considered in select cases in MI patients with CAC