

# Is Complete Revascularization Necessary?

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C3 6-24-2019



# Unanswered Questions in CAD

**2.** Is Completeness of  
Revascularization Needed in SIHD?

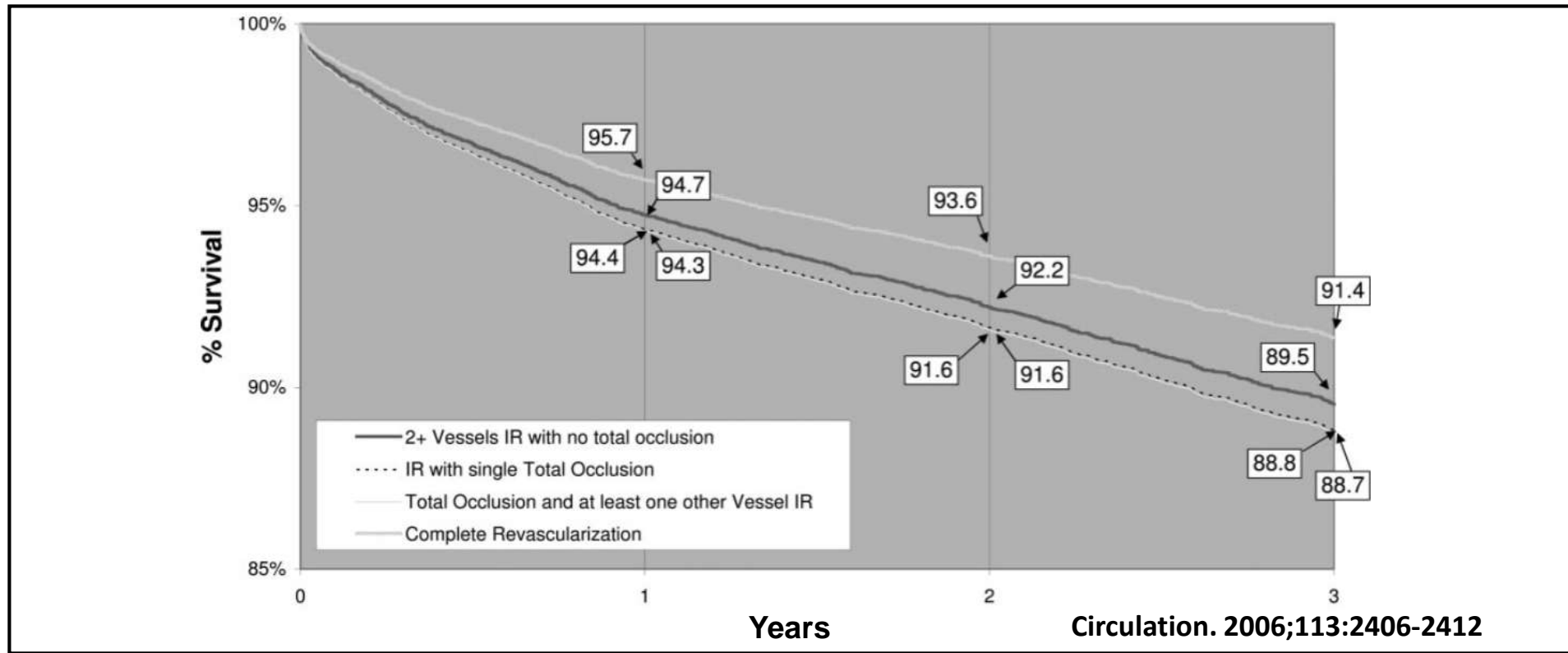


# Impact of Completeness of Percutaneous Coronary Intervention Revascularization on Long-Term Outcomes in the Stent Era



Edward L. Hannan, PhD; Michael Racz, PhD; David R. Holmes, MD; Spencer B. King III, MD; Gary Walford, MD; John A. Ambrose, MD; Samin Sharma, MD; Stanley Katz, MD; Luther T. Clark, MD; Robert H. Jones, MD

**Patients from NY State PCI Reporting System-Adjusted survival curves for stenting: 3 Incomplete Revasc. (IC) subgroups vs. Complete Revasc. (CR) group**



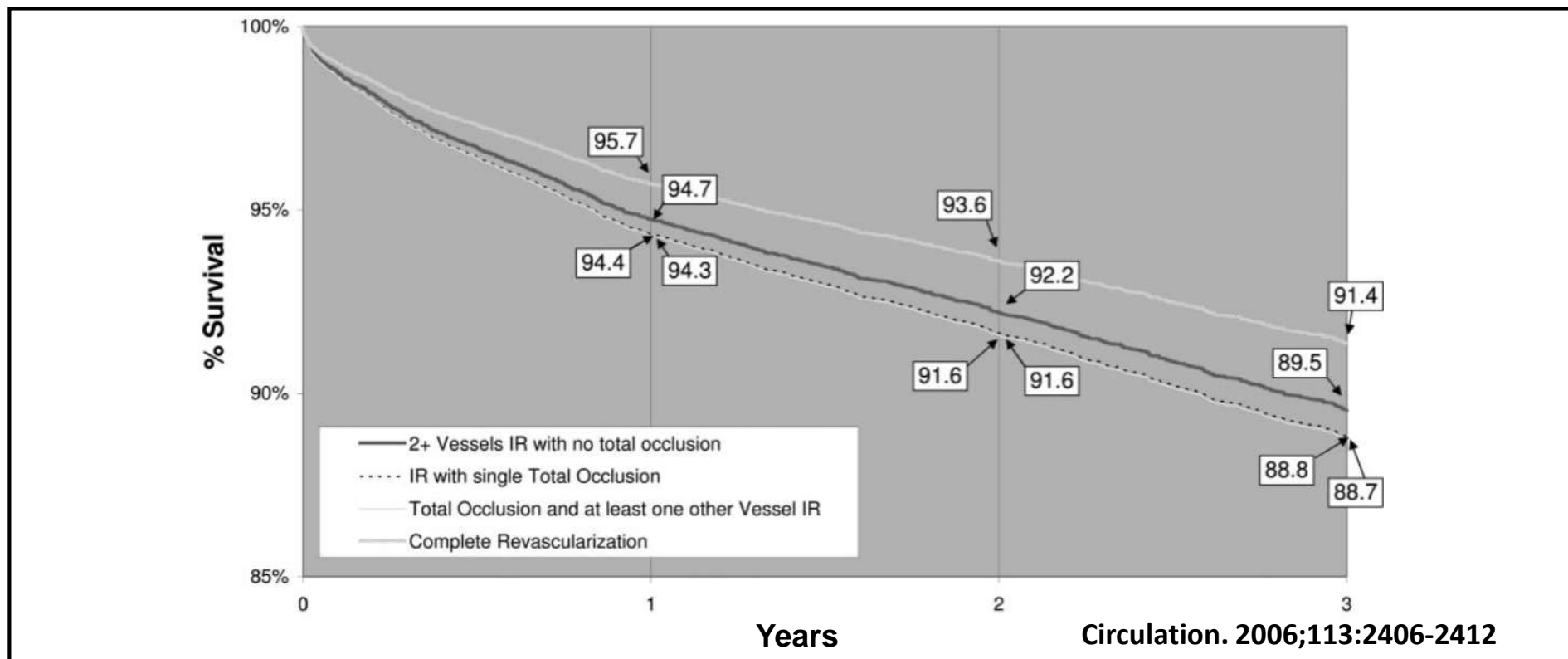


## Impact of Completeness of Percutaneous Coronary Intervention Revascularization on Long-Term Outcomes in the Stent Era

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**Revascularization was Incomplete in 64% of patients**





## Impact of Completeness of Percutaneous Coronary Intervention Revascularization on Long-Term Outcomes in the Stent Era

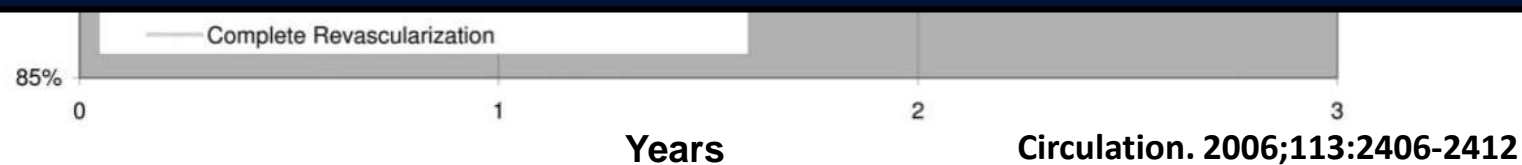
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**Revascularization was Incomplete in 64% of patients**

### Conclusion:

**Incomplete Revasc. is associated with an adverse impact on long-term mortality, and consideration should be given to either achieving Completer Revasc., opting for surgery, or monitoring PCI patients closely**



# **Incomplete revascularization for percutaneous coronary interventions: Variation among operators, and association with operator and hospital characteristics**



(Am Heart J 2017;  
186:118-26.)

Edward L. Hannan, PhD,<sup>a</sup> Ye Zhong, MD,<sup>a</sup> Alice K. Jacobs, MD,<sup>b</sup> Frederick S. K. Ling, MD,<sup>c</sup> Peter B. Berger, MD,<sup>d</sup> Gary Walford, MD,<sup>e</sup> Ferdinand J. Venditti, MD,<sup>f</sup> and Spencer B. King III, MD<sup>g</sup> *Albany, Rochester, Great Neck, NY; Boston, MA; Baltimore, MD; and Atlanta, GA*

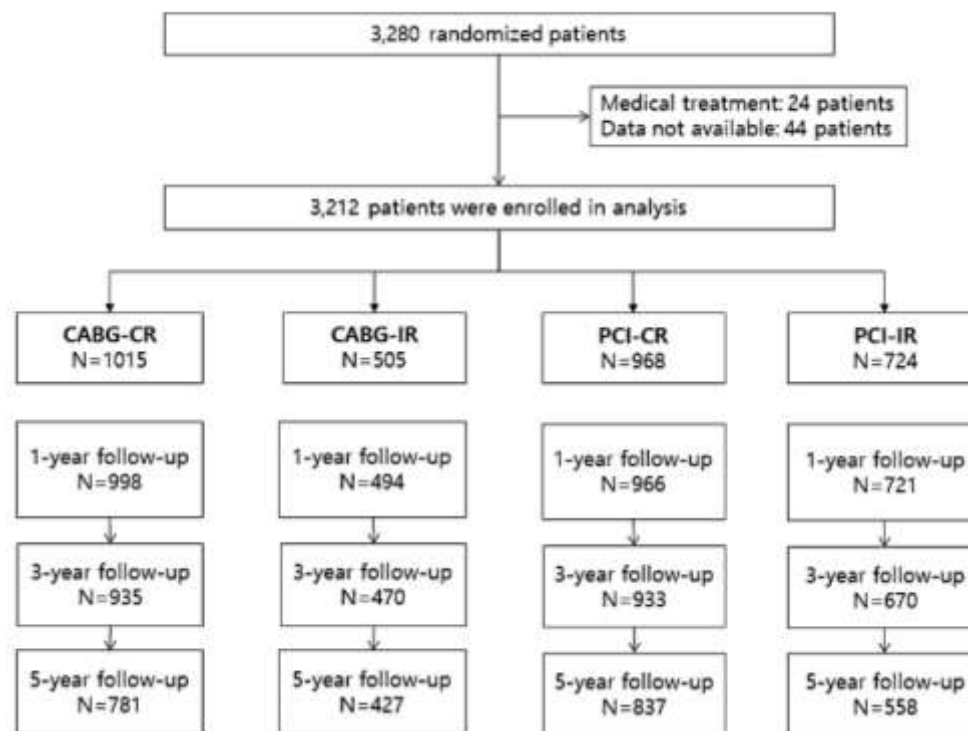
**PCI in patients with MVD who have IR, *more than 60% of the patients*, continue to have 35% higher medium-term (3-year) risk-adjusted mortality rates.**

**There is a large amount of variability among operators in the frequency with which IR occurs. Operators who have been in practice longer, and higher-volume operators and hospitals have lower rates of IR. Failed attempts at CR occur very infrequently.**



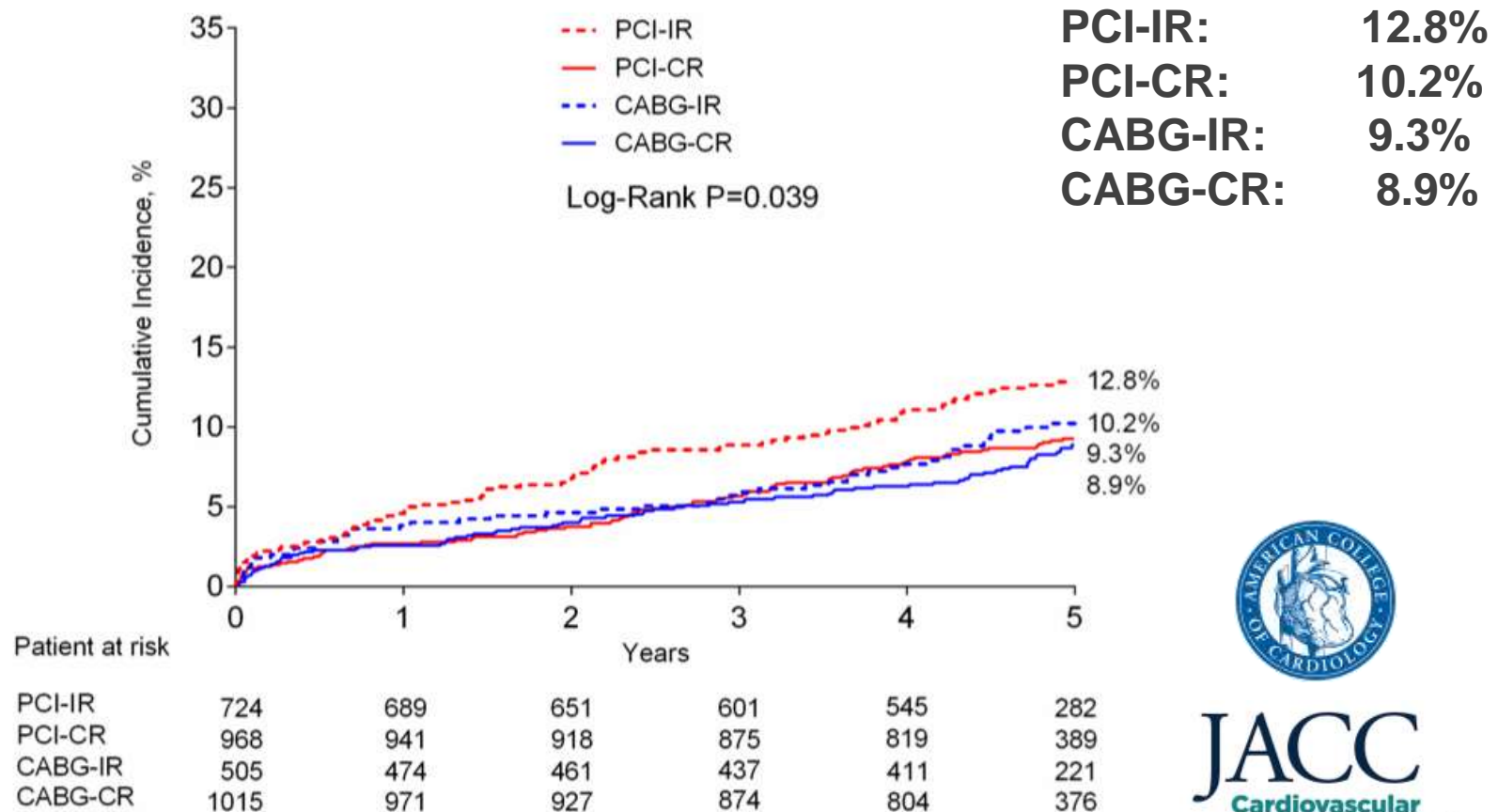
## Comparison of Stenting Versus Bypass Surgery According to The Completeness of Revascularization In Severe Coronary Artery Disease: Patient-Level Pooled Analysis of SYNTAX, PRECOMBAT, and BEST Trials

**Evaluate the long-term survival of patients undergoing coronary artery bypass surgery (CABG) with those undergoing percutaneous coronary intervention (PCI) achieving complete revascularization (CR) or incomplete revascularization (IR) in severe coronary artery disease.**



## Comparison of Stenting Versus Bypass Surgery According to The Completeness of Revascularization In Severe Coronary Artery Disease: Patient-Level Pooled Analysis of SYNTAX, PRECOMBAT, and BEST Trials

### Death from Any Cause

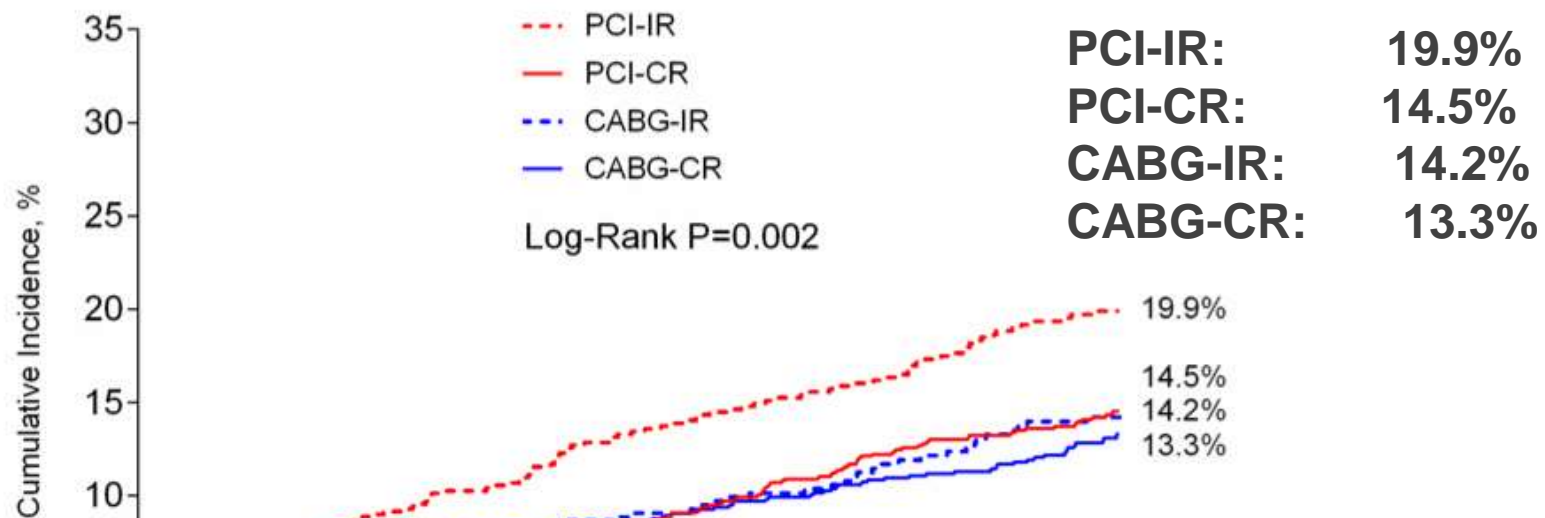


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## Comparison of Stenting Versus Bypass Surgery According to The Completeness of Revascularization In Severe Coronary Artery Disease: Patient-Level Pooled Analysis of SYNTAX, PRECOMBAT, and BEST Trials

### Composite Endpoint: Death / MI / Stroke



Patient at risk

	0	1	2	3	4	5
PCI-IR	724	665	619	564	509	260
PCI-CR	968	916	886	839	776	373
CABG-IR	505	458	443	418	394	210
CABG-CR	1015	939	891	834	765	350



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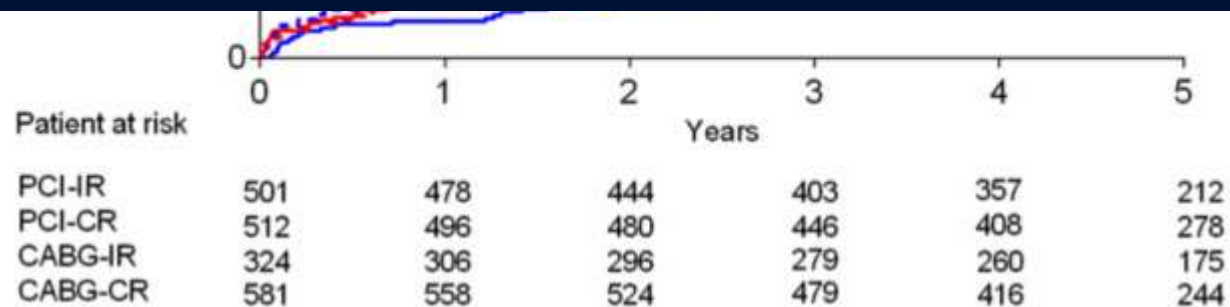
**Comparison of Stenting Versus Bypass Surgery According to The Completeness of Revascularization In Severe Coronary Artery Disease: Patient-Level Pooled Analysis of SYNTAX, PRECOMBAT, and BEST Trials**

**MVD: Death from Any Cause**



**Conclusion:**

**The treatment of LM or MVD in patients undergoing PCI achieving CR was associated with similar long-term survival rates with those undergoing CABG achieving CR.**

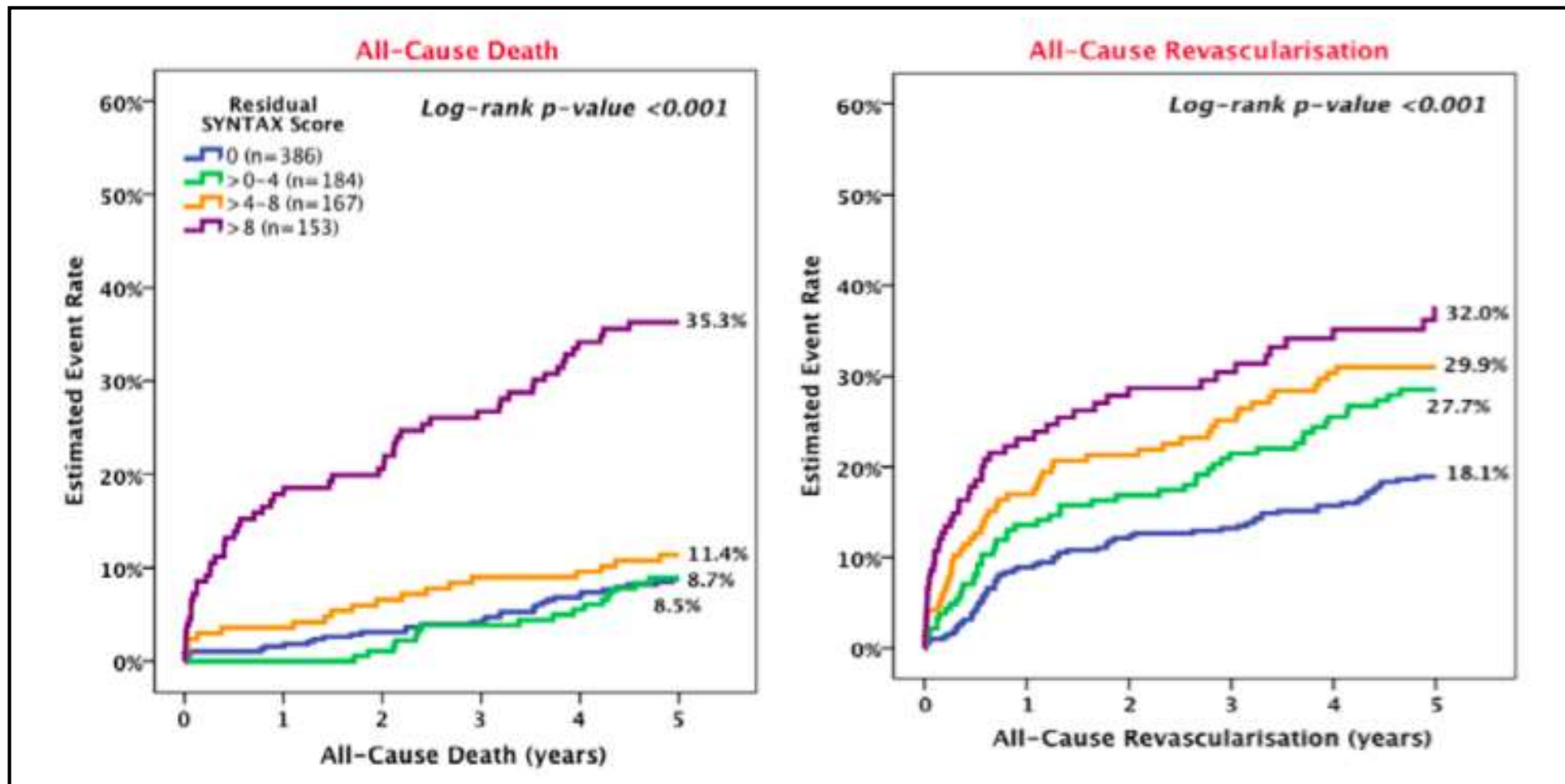


Possible explanation of inability to show that surgical incomplete revascularization effects outcomes

- Incomplete revascularization is unusual with surgery
- Even when revascularization is incomplete there is usually an internal mammary artery bypassing the LAD



## Quantification of Incomplete Revascularization and its Association With Five-Year Mortality in the Synergy Between Percutaneous Coronary Intervention With Taxus and Cardiac Surgery (SYNTAX) Trial Validation of the Residual SYNTAX Score



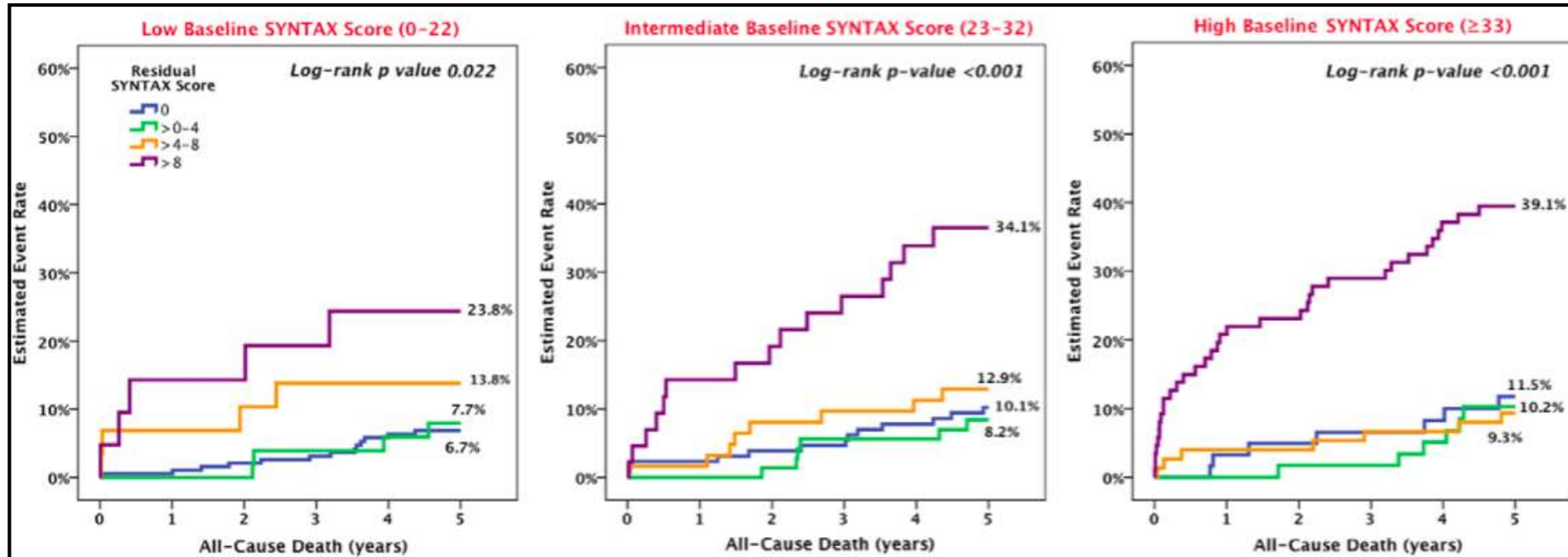


## Quantification of Incomplete Revascularization and its Association With Five-Year Mortality in the Synergy Between Percutaneous Coronary Intervention With Taxus and Cardiac Surgery (SYNTAX) Trial Validation of the Residual SYNTAX Score

Vasim Farooq, MBChB, MRCP; Patrick W. Serruys, MD, PhD; Christos V. Bourantas, MD; Yaojun Zhang, MD; Takashi Muramatsu, MD; Ted Feldman, MD; David R. Holmes, MD; Michael Mack, MD; Marie Claude Morice, MD; Elisabeth Stähle, MD; Antonio Colombo, MD; Ton de Vries, MSc; Marie-angèle Morel, BSc; Keith D. Dawkins, MD; Arie-Pieter Kappetein, MD, PhD; Friedrich W. Mohr, MD



**Completeness of Revascularization stratified based on conventional SYNTAX tertiles**  
**There is a Progressive rise in the 5-year mortality impact of residual SYNTAX >8**





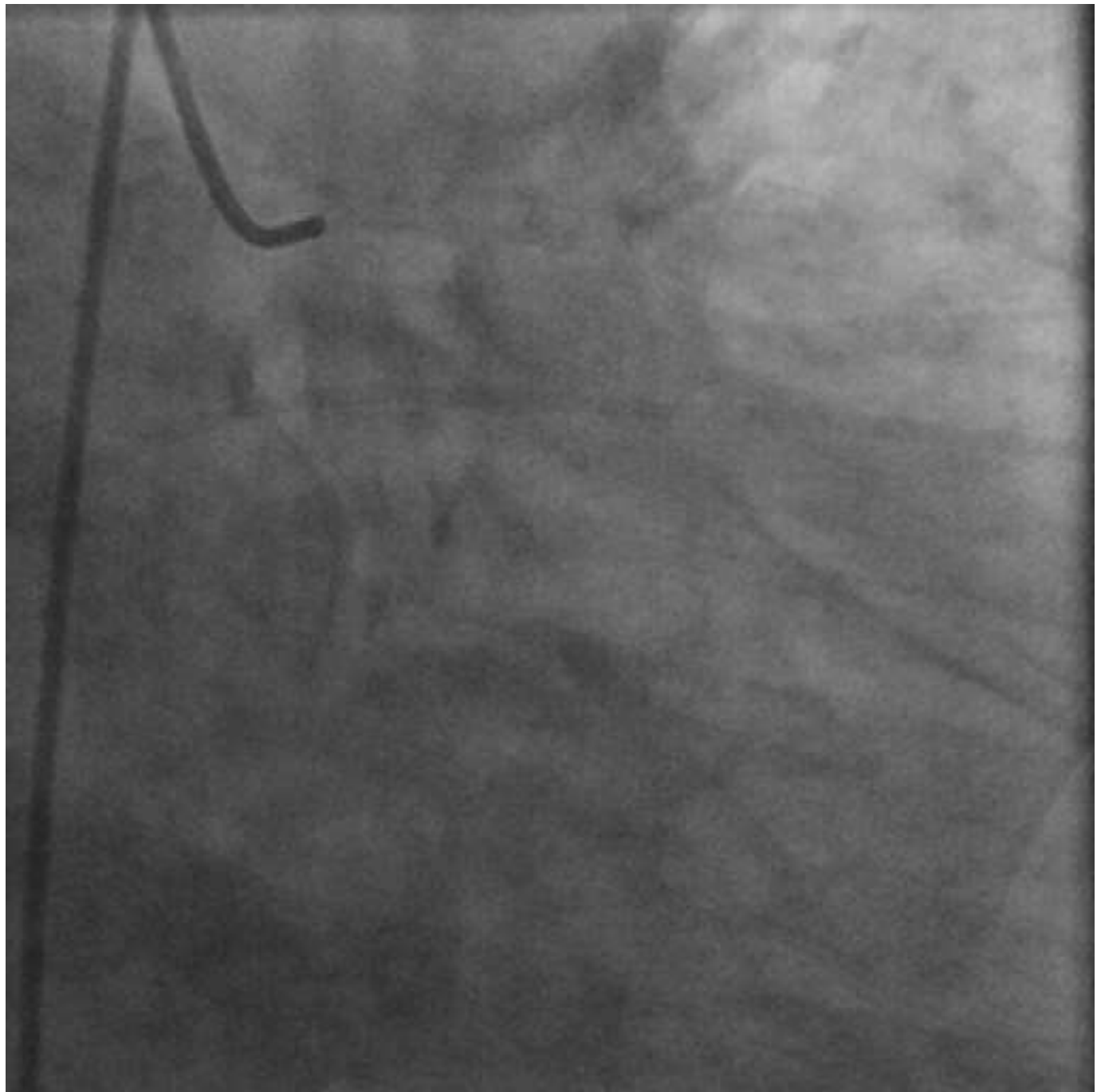
# Will attempts to achieve complete revascularization in patients with MVD improve survival?

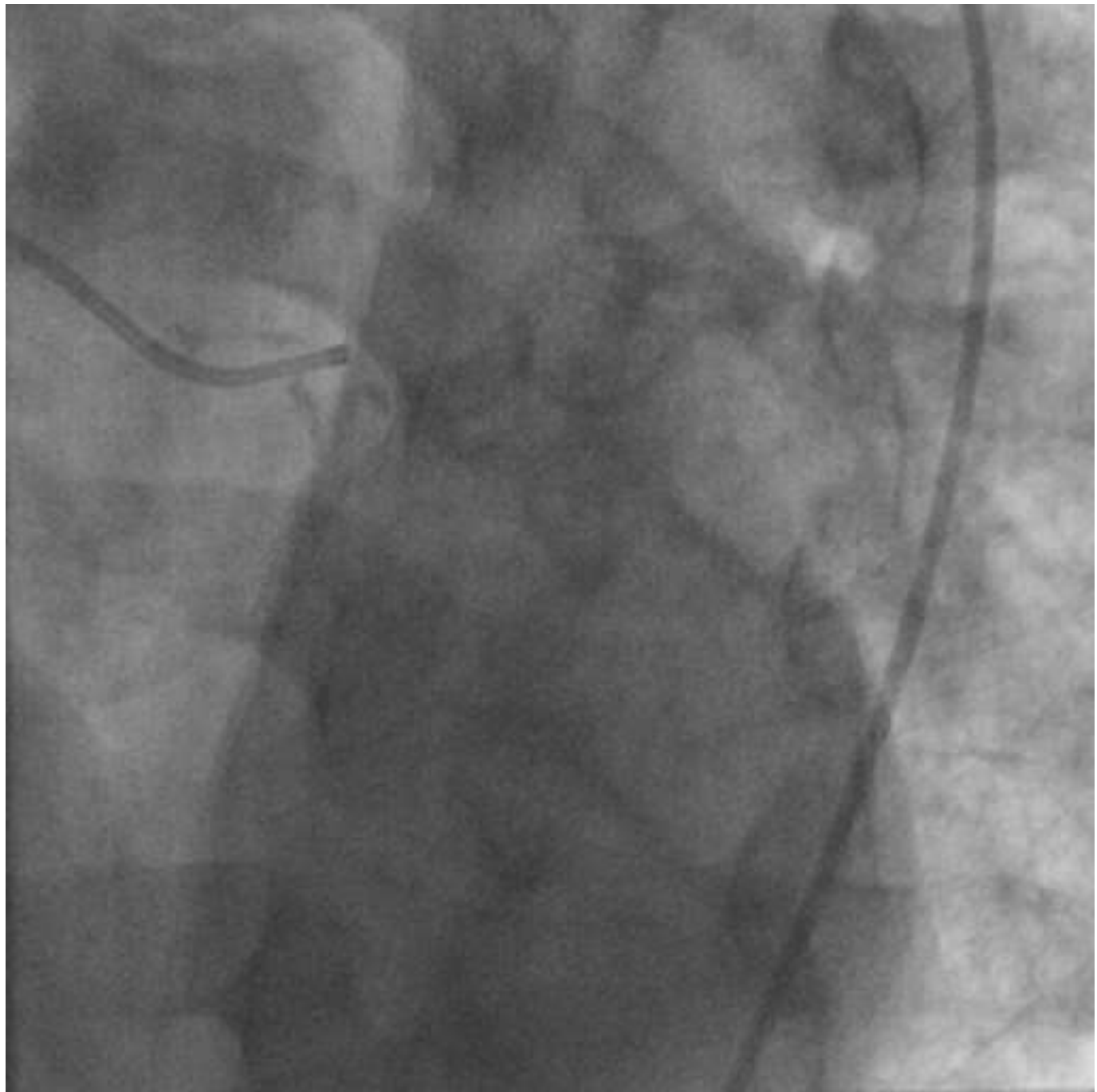
- RCTs that are large enough to evaluate subsets such as which vessel is left unrevascularized and the impact of viability are needed.
- Most incomplete revascularization is due to anatomic unsuitability (not modifiable) of the vessel or non flow limiting lesions (modifiable).
- In future trials it will be important to study both reasons.

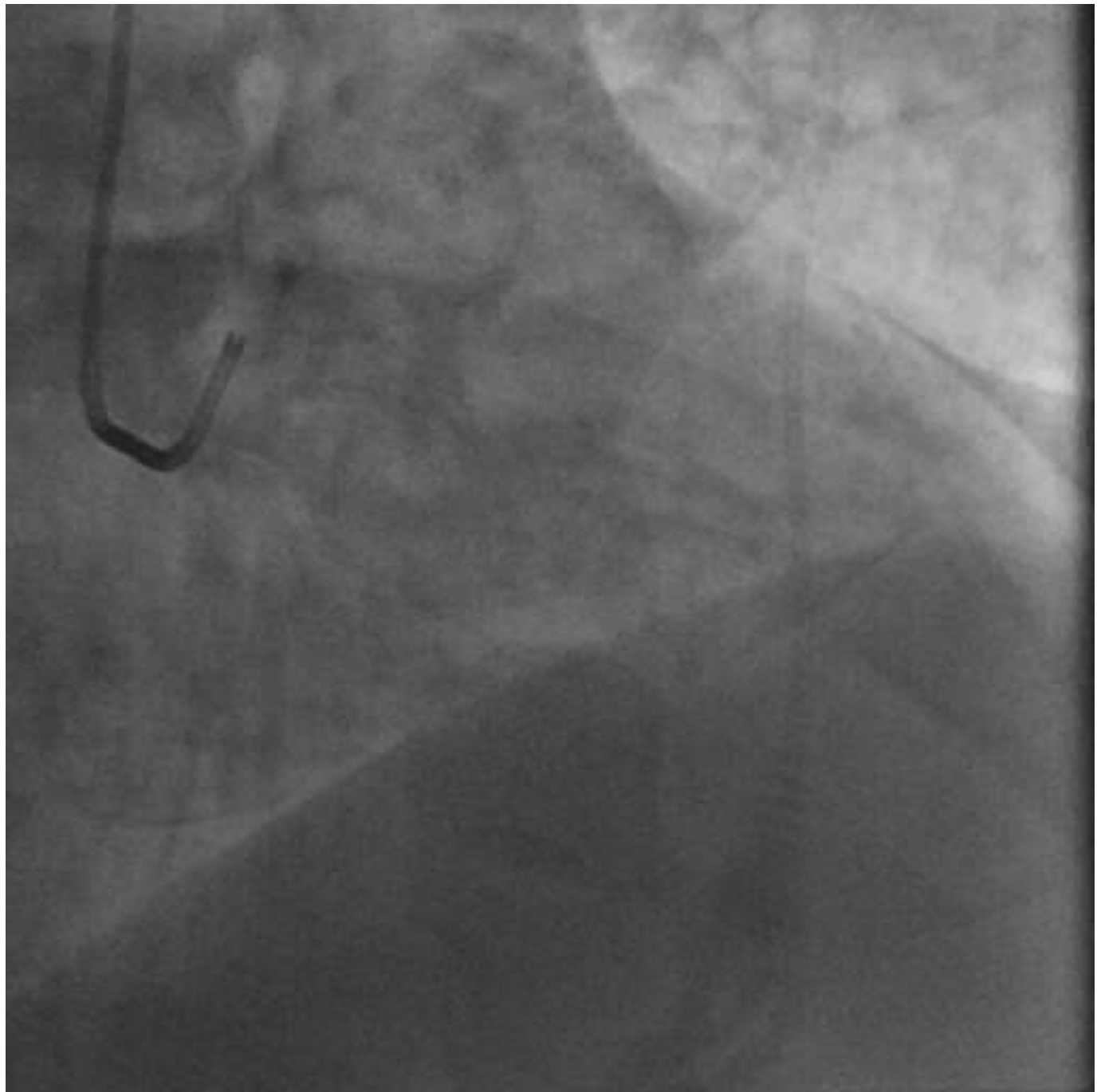


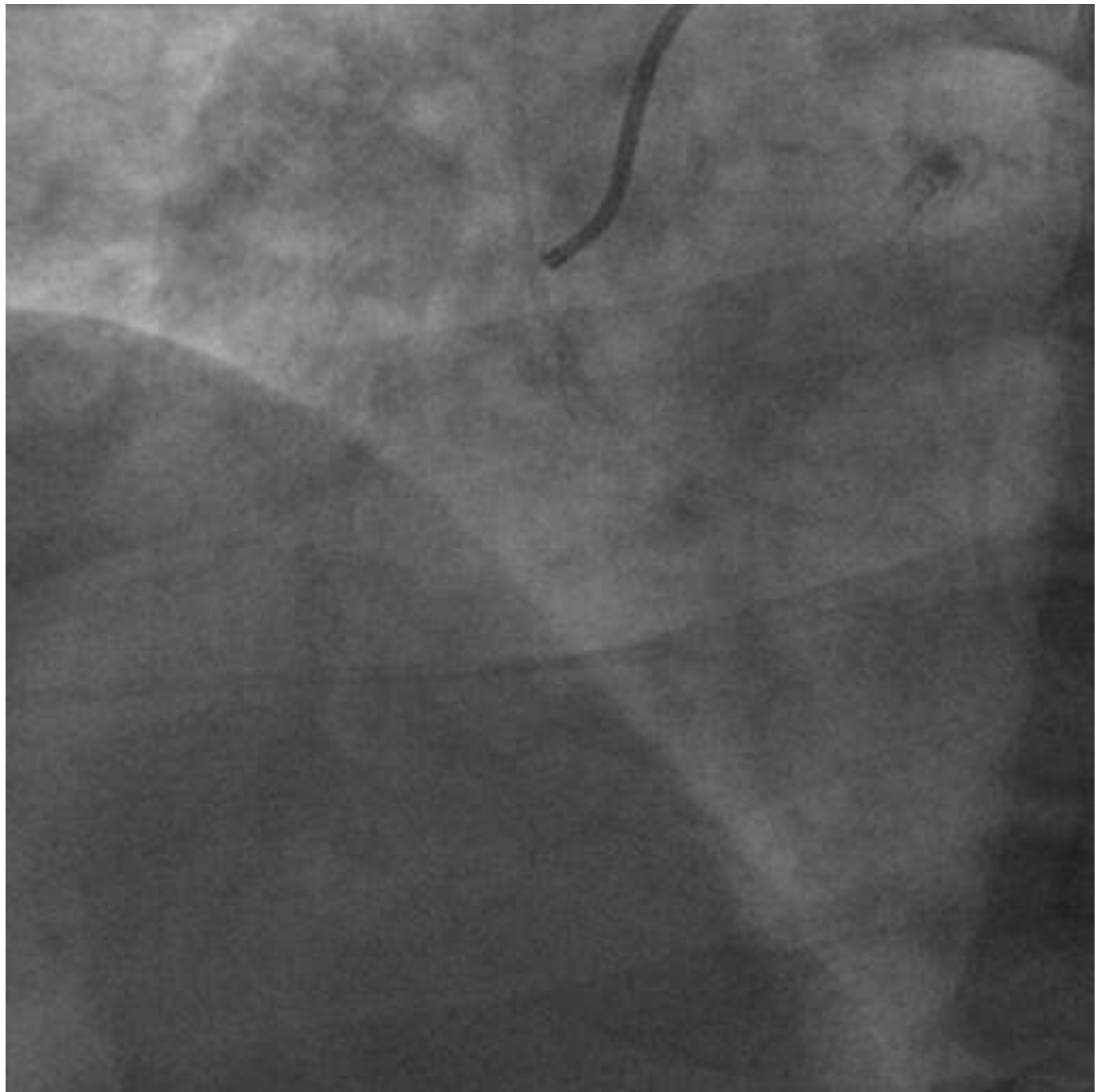
# Clinical Presentation

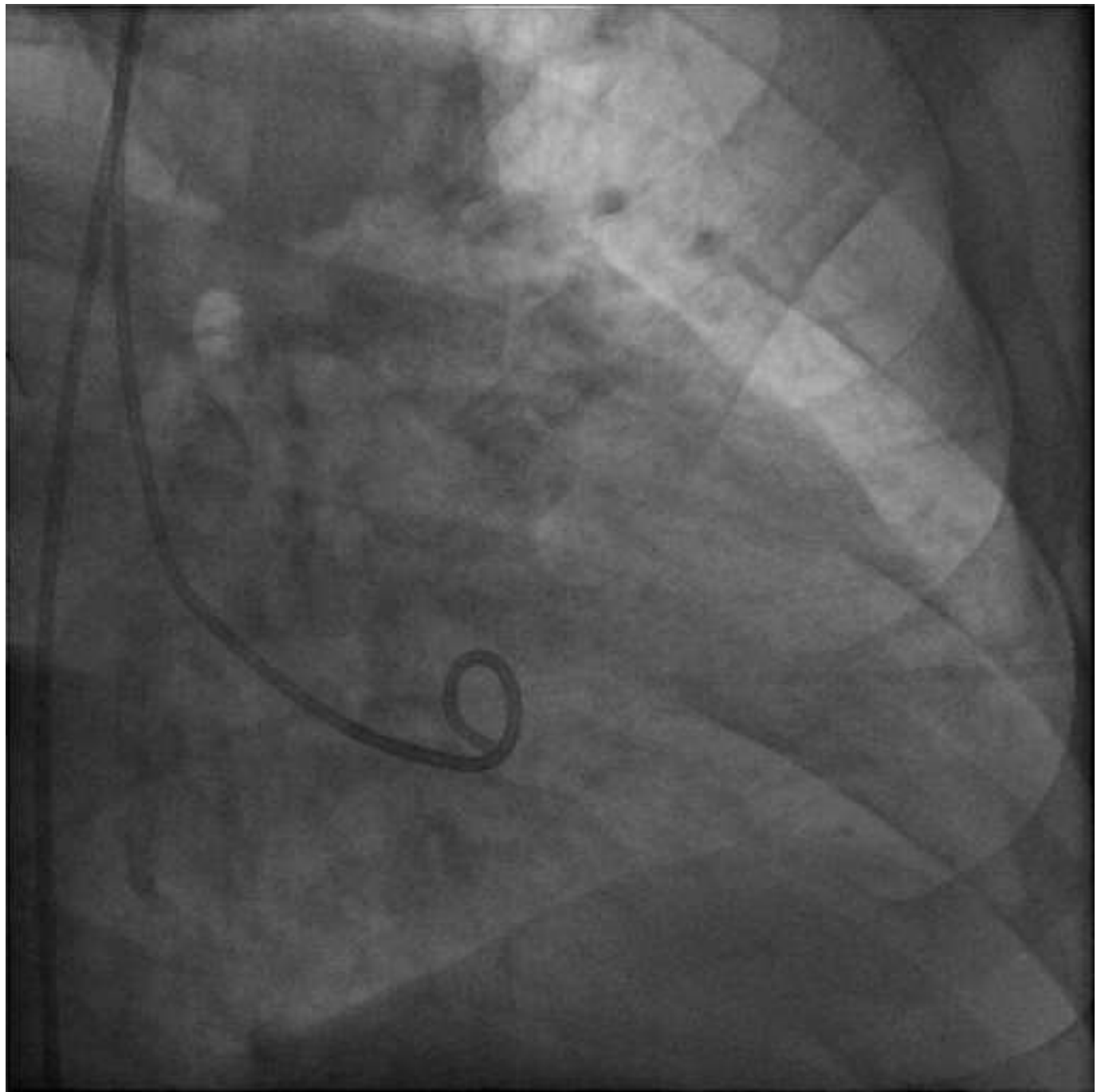
- 48 y.o. AA male presented with 3 weeks of progressive chest pain
- PMH:
  - Diabetes Mellitus (from age 11)
  - ESRD on peritoneal dialysis
  - combined renal/pancreas transplant (2001)
    - Renal transplant failed in 2002 due to medical non-compliance
    - Pancreas transplant failed in 2004 due to medical non-compliance
  - PAD
  - HTN
  - HLD





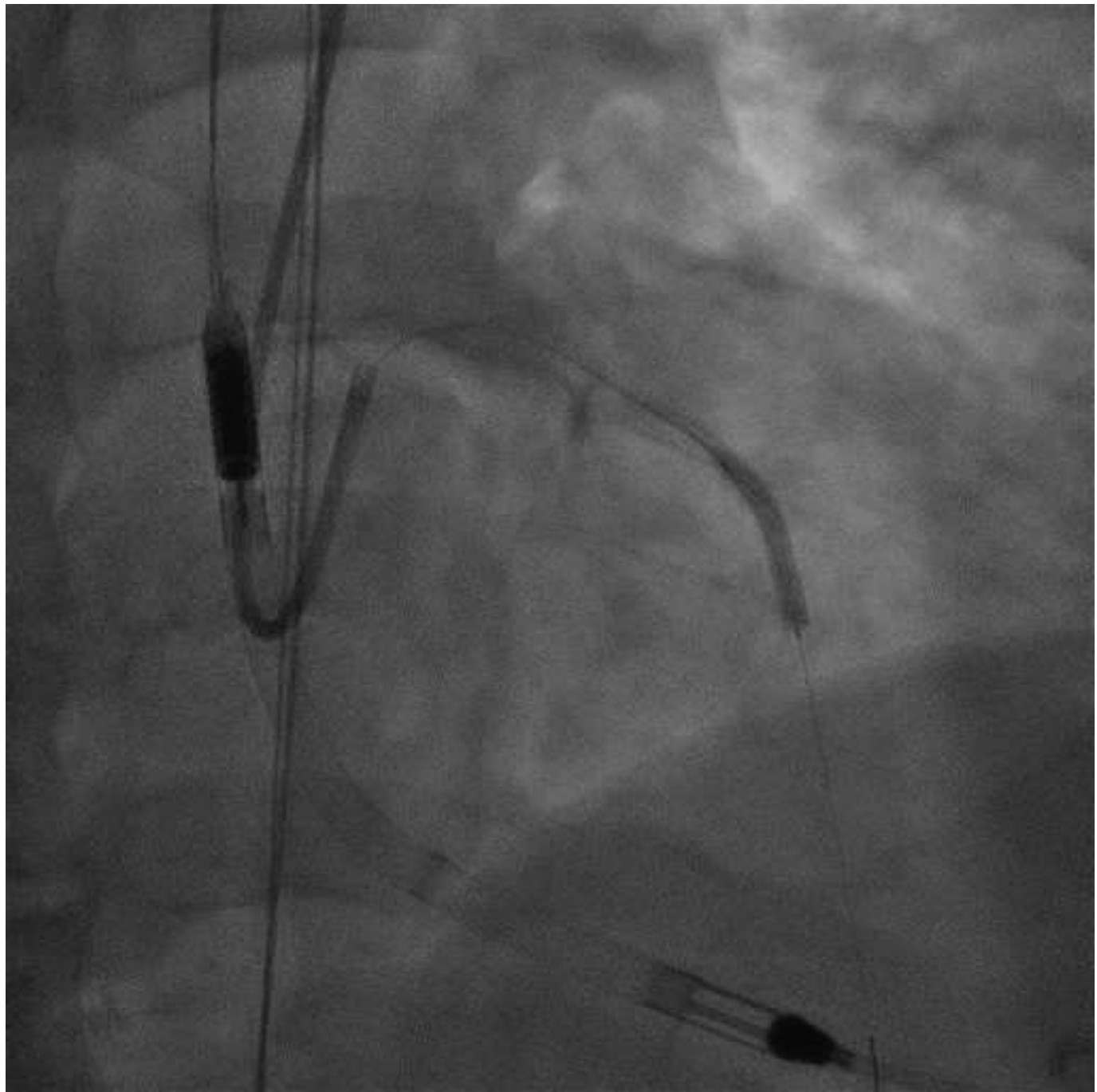


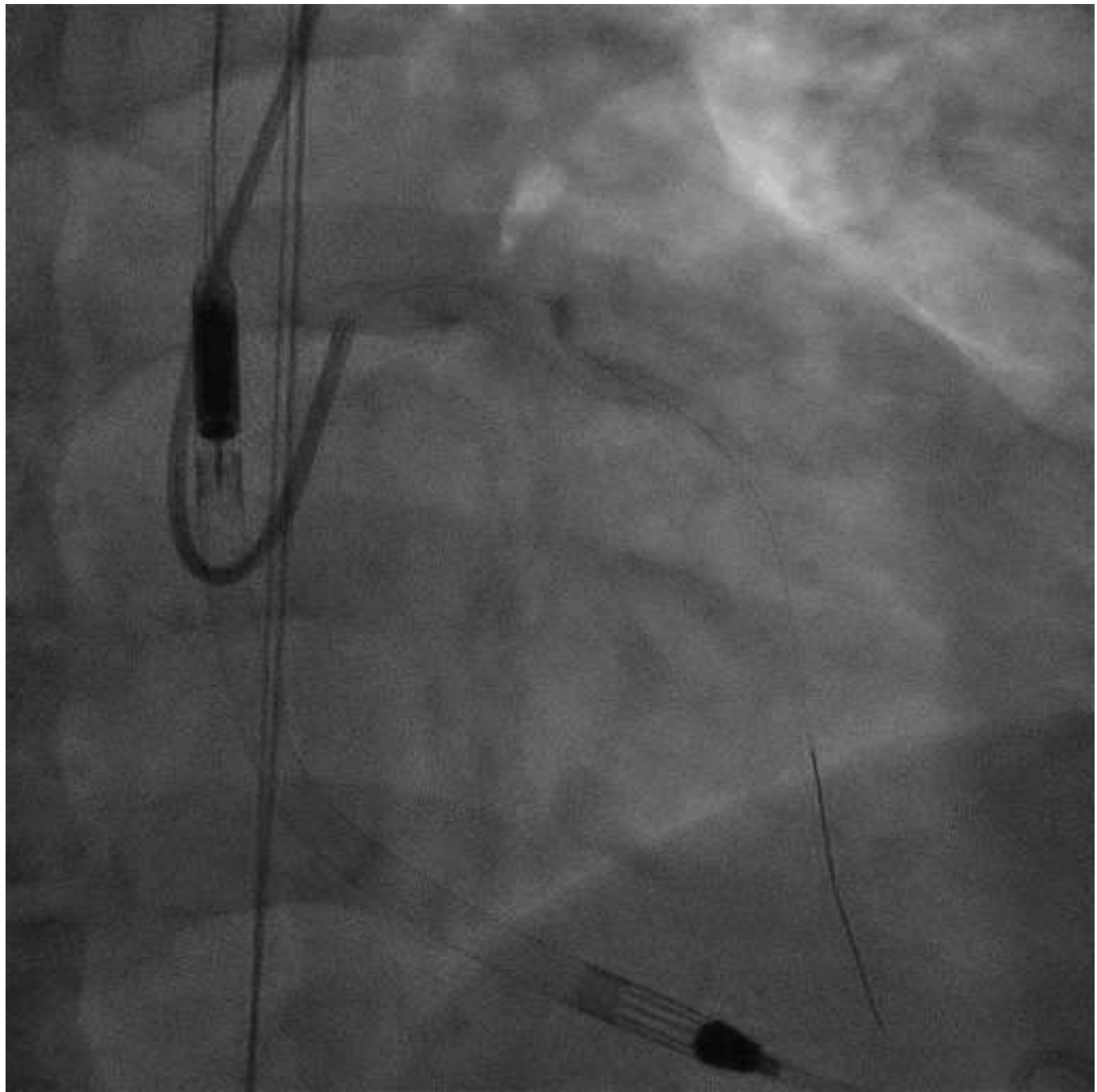






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# Conclusions

- Complete revascularization with PCI is unusual in most multivessel disease patients treated
- Complete revascularization, when it can be accomplished, is associated with better outcomes
- Most of the determiners of incomplete revascularization are the patient characteristics
- Incomplete revascularization is usually predictable
- When residual obstructions are predicted to be severe, alternative therapies should be considered.
- There are many exceptions.



# Unanswered Questions in CAD

**3.** Is Completeness of  
Revascularization Needed in the  
Clinical Setting of STEMI & MVD?

# Survival After Varying Revascularization Strategies in Patients With ST-Segment Elevation Myocardial Infarction and Multivessel Coronary Artery Disease



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Giuseppe Tarantini, MD, PhD,<sup>a</sup> Gianpiero D'Amico, MD,<sup>a</sup> Sorin J. Brener, MD,<sup>b</sup> Paola Tellaroli, MSc, PhD,<sup>c</sup> Marco Basile, MD,<sup>d</sup> Alessandro Schiavo, MD,<sup>a</sup> Marco Mojoli, MD,<sup>a</sup> Chiara Fraccaro, MD, PhD,<sup>a</sup> Alfredo Marchese, MD,<sup>d</sup> Giuseppe Musumeci, MD,<sup>e</sup> Gregg W. Stone, MD<sup>f</sup>

Cardiol Intv 2016;9:1765–76

**Objectives:** We conducted a systematic pairwise and network meta-analysis to assess optimal treatment strategies in patients with **ST-segment elevation myocardial infarction (STEMI)** and **multivessel coronary artery disease (MV-CAD)** undergoing primary PCI.

**Background:** Patients with STEMI and MV-CAD have a worse prognosis than those with single-vessel CAD. The optimal revascularization strategy for these patients is uncertain.

**32 Studies**  
**Total N= 54,148 patients**  
**N= 42,112 Infract Related Artery-only PCI**  
**N= 8,138 single procedure MV-PCI**  
**N= 3,898 staged MV-PCI**

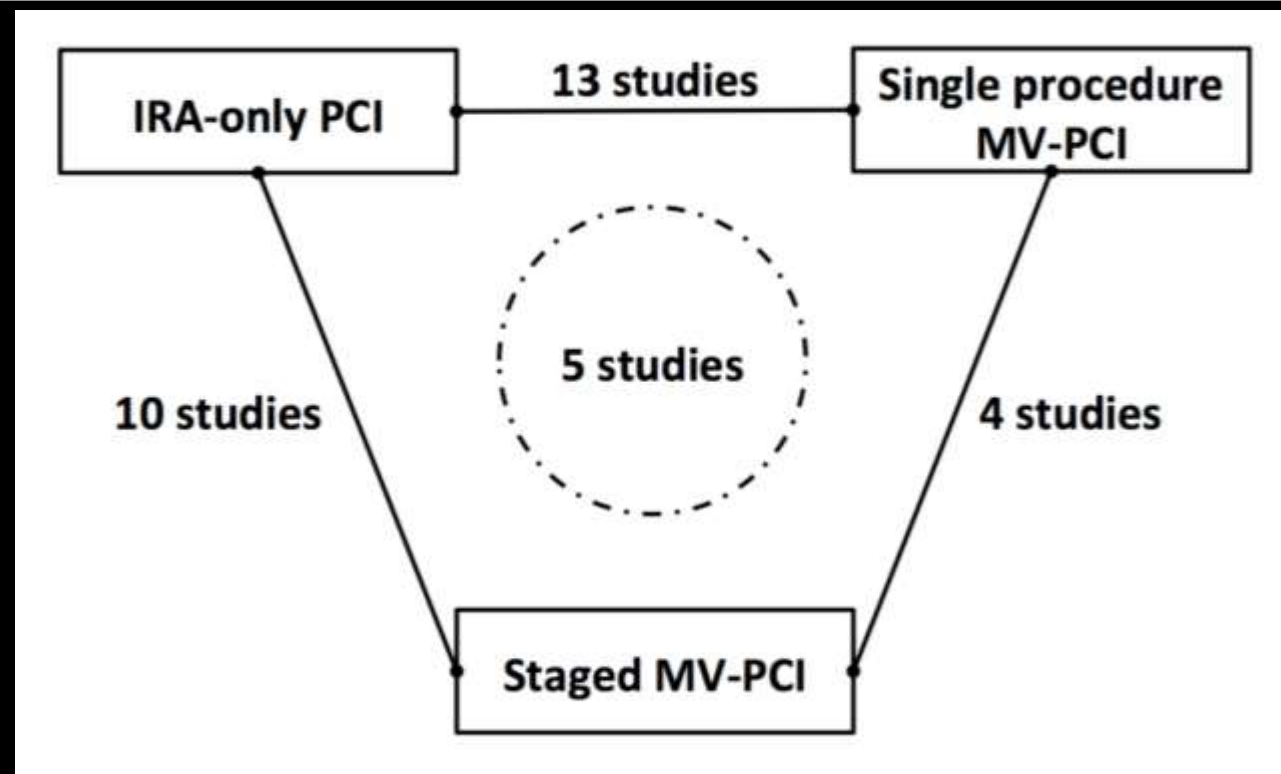


# Survival After Varying Revascularization Strategies in Patients With ST-Segment Elevation Myocardial Infarction and Multivessel Coronary Artery Disease



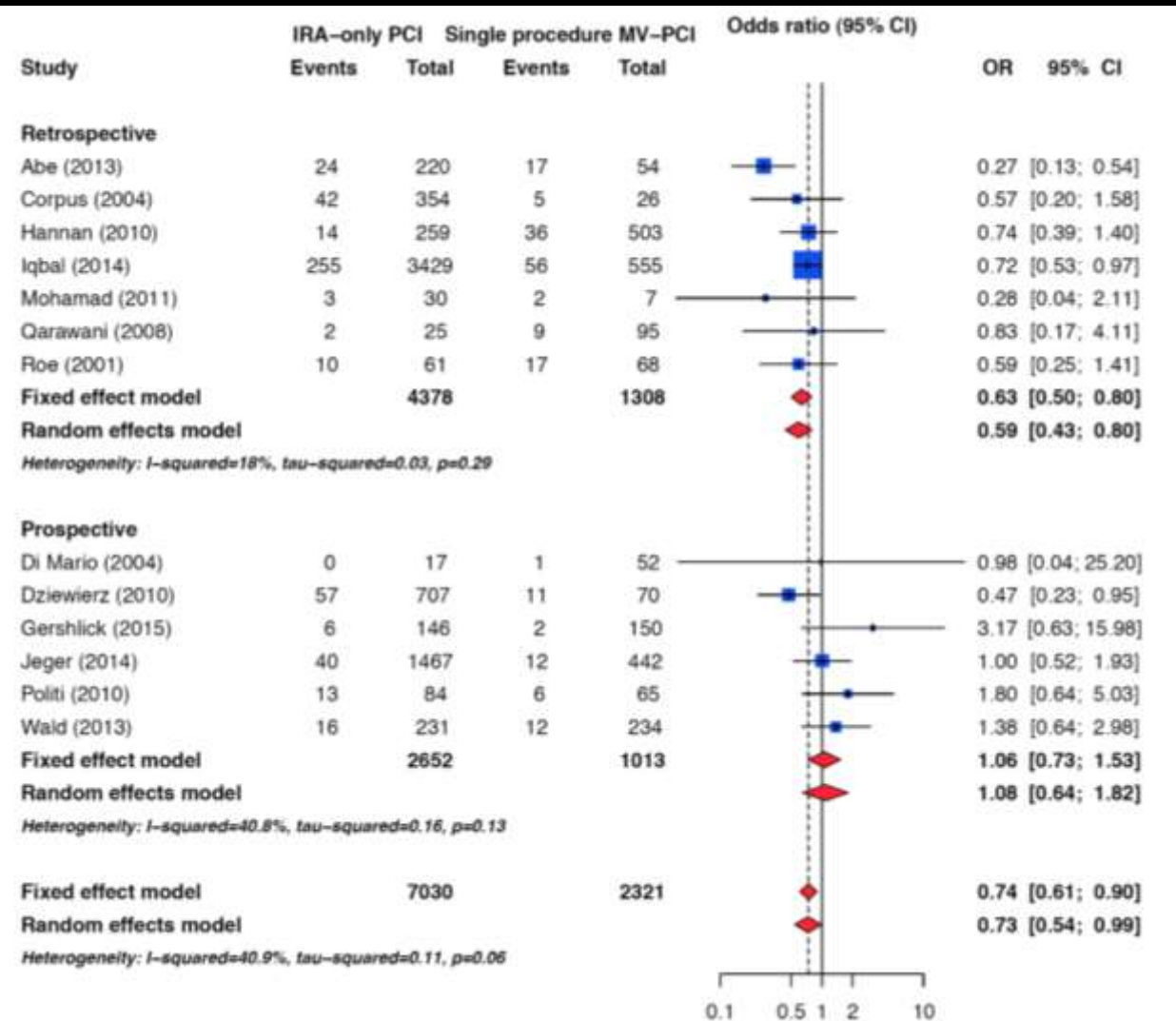
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# Infract Related Artery only PCI vs. Multivessel Single Procedure PCI

## Long-term mortality



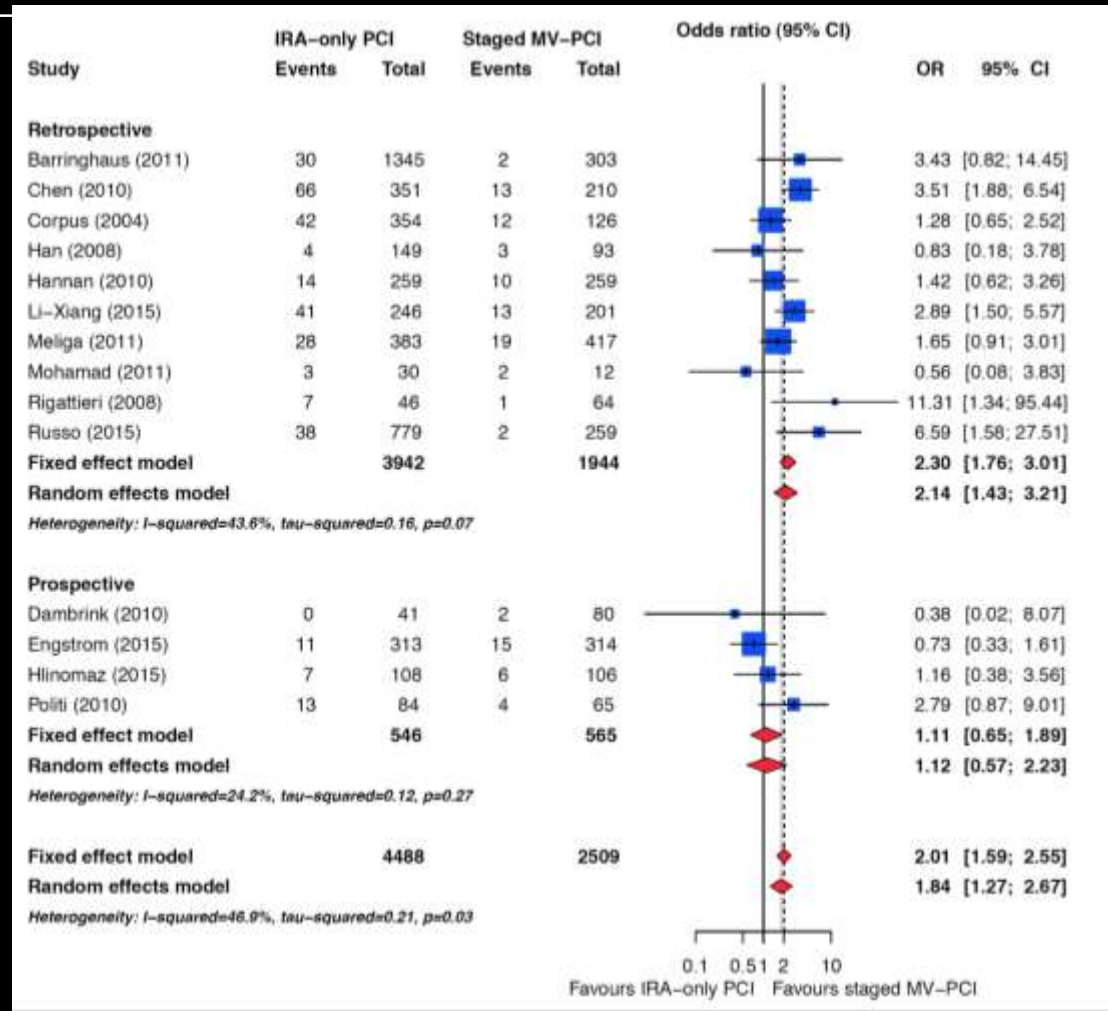
J Am Coll Cardiol Intv 2016;9:1765-76

Favors IRA-only PCI

Favors MV-PCI

# Infract Related Artery only PCI vs. Staged Multivessel PCI

## Long-term Mortality



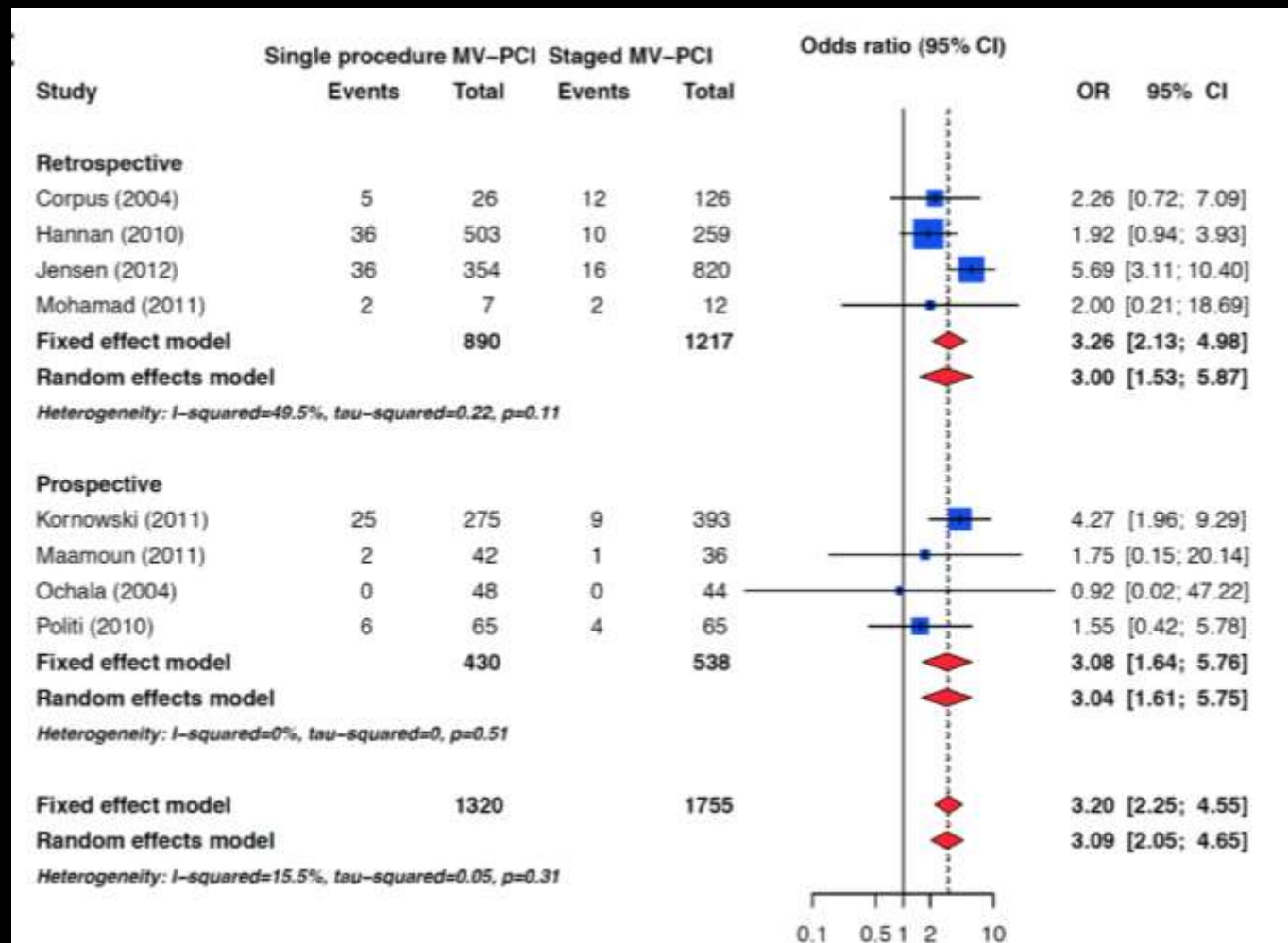
Favors IRA-only PCI

Favors Staged MV-PCI



# MV-PCI Single procedure vs. Staged MV-PCI

## Long-term Mortality



Favors MV-PCI Single procedure

Favors Staged MV-PCI



# Survival After Varying Revascularization Strategies in Patients With ST-Segment Elevation Myocardial Infarction and Multivessel Coronary Artery Disease



Giuseppe Tarantini, MD, PhD,<sup>a</sup> Gianpiero D'Amico, MD,<sup>a</sup> Sorin J. Brener, MD,<sup>b</sup> Paola Tellaroli, MSc, PhD,<sup>c</sup> Marco Basile, MD,<sup>d</sup> Alessandro Schiavo, MD,<sup>a</sup> Marco Mojoli, MD,<sup>a</sup> Chiara Fraccaro, MD, PhD,<sup>a</sup> Alfredo Marchese, MD,<sup>d</sup> Giuseppe Musumeci, MD,<sup>e</sup> Gregg W. Stone, MD<sup>f</sup>

Cardiol Intv 2016;9:1765–76

## Conclusion:

**In patients with MV-CAD presenting with STEMI undergoing primary PCI, a staged multivessel revascularization strategy may improve survival.**



# Complete or Culprit-Only Revascularization for Patients With Multivessel Coronary Artery Disease Undergoing Percutaneous Coronary Intervention



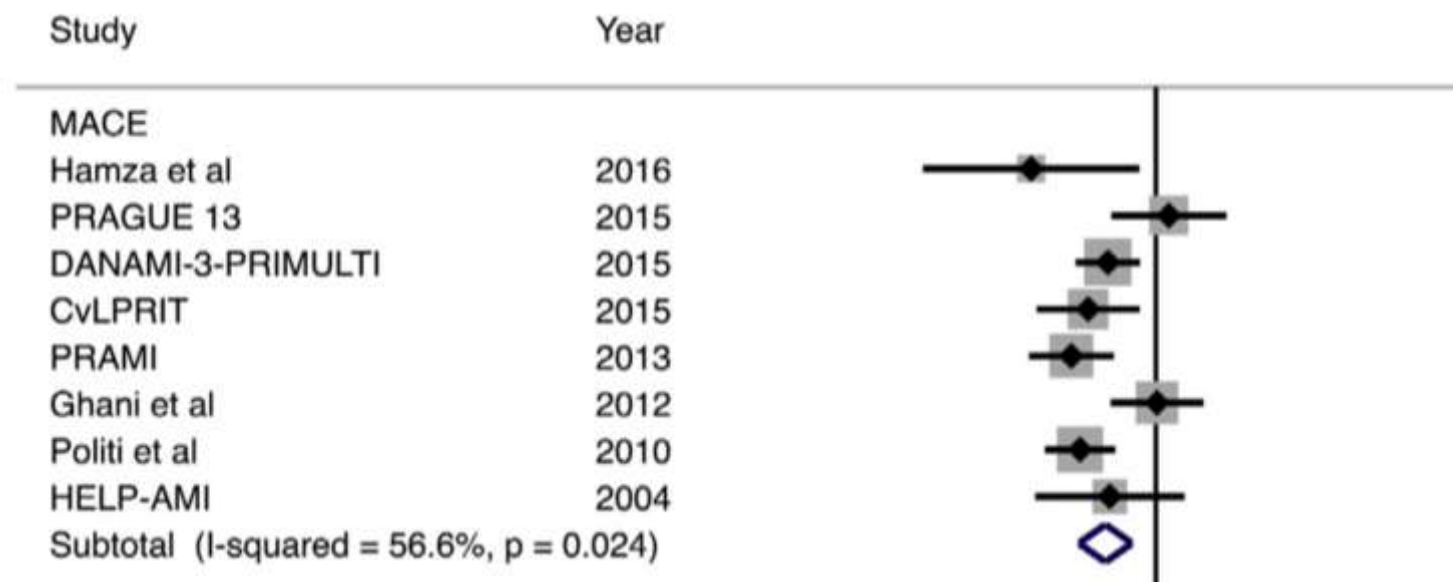
Islam Y. Elgendy, MD,<sup>a</sup> Ahmed N. Mahmoud, MD,<sup>a</sup> Dharam J. Kumbhani, MD, SM,<sup>b</sup>  
Deepak L. Bhatt, MD, MPH,<sup>c</sup> Anthony A. Bavry, MD, MPH<sup>a,d</sup>

**Trials that randomized 2285 STEMI patients with MVD to any combination of the 4 different revascularization strategies (i.e., complete revascularization at the index procedure, staged procedure during the hospitalization, staged procedure after discharge or culprit-only revascularization) were included.**

JACC Cardiovasc Interv. 2017 Feb 27;10(4):315-324

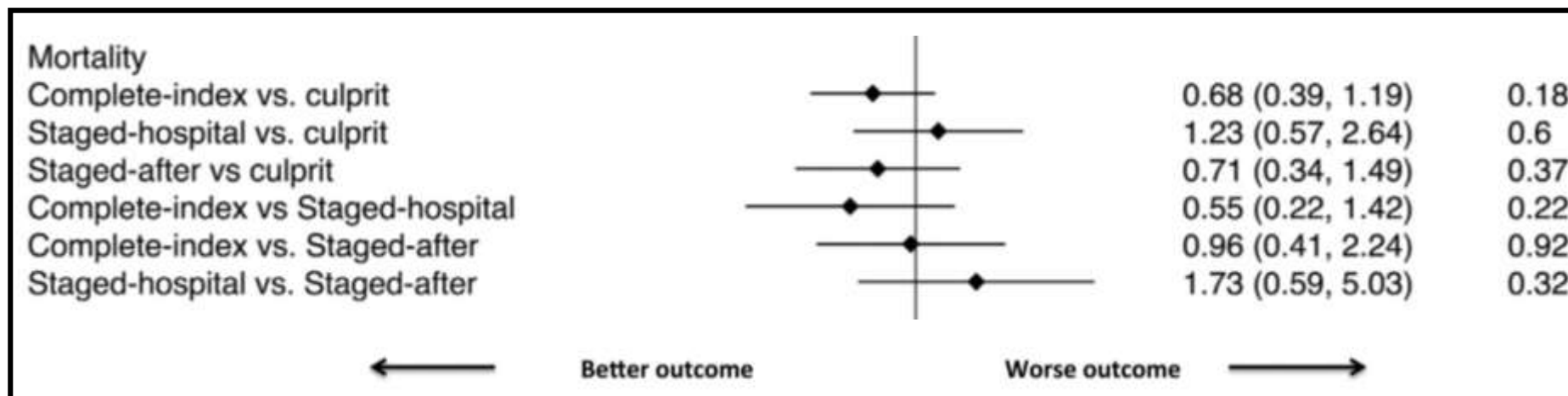


# Complete or Culprit-Only Revascularization for Patients With Multivessel Coronary Artery Disease Undergoing Percutaneous Coronary Intervention



← Better outcome with complete revascularization

# Comparison of timing of revascularization strategies



## Conclusion:

**None of the strategies have been shown to reduce the overall mortality.**

**In the absence of other evidence decisions must be highly individualized.**



## **Comparison of timing of revascularization strategies**

### **Factors influencing decisions in approaching STEMI patients:**

- 1. Severity and importance of the non-culprit lesion**
- 2. Time of presentation, regular vs. off hours**
- 3. Expertise of operator and team**

# Is culprit vessel primary PCI inferior to MVD primary PCI?

- Future trials should stratify the patients by the non culprit vessel. (Is the vessel left unrevascularized the LAD?)
- Current studies are inconclusive.
- Future studies should aim at establishing which scenarios are unsafe for leaving non culprit vessels unrevascularized.