

# Long-term outcomes of percutaneous coronary intervention for unprotected left main coronary artery disease: Initial clinical experience.

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**Hellenic Institute of Cardiovascular Diseases**

# INTRODUCTION

- **Significant stenosis of the unprotected left main stem (ULM) has a worse prognosis than any other form of coronary artery disease.**
- **Surgical data from the 1970s and 1980s demonstrated that bypass surgery for LM disease dramatically reduced mortality as compared with medical therapy (68% and 33% relative mortality reduction at 5 and 10 years post bypass). This clearly established bypass surgery as the gold-standard treatment for LM coronary disease.**
- **The excellent results obtained with DES suggest that these devices can be an effective and safe alternative to CABG when treating left main disease in cases with anatomy suitable for percutaneous intervention**



# Objectives

**This study aims to evaluate the clinical outcome of patients undergoing PCI to ULMCA disease in a regional hospital.**



# METHODS

- Of 1,376 PCI procedures performed in our institution from January 2007 to February 2011, 52(2.9%) consecutive patients receiving unprotected LMCA intervention were identified using a prospective database.
- Unprotected LMCA stenosis was defined as >50% diameter stenosis without patent graft to left anterior descending artery (LAD) or left circumflex artery (LCX), nor established collaterals from right coronary artery (RCA).
- The decision for PCI over other modalities is based on surgical risk, and/or patient/physician preference.





## Demographic and Clinical data (n=52)

<b>Age (yrs)</b>	<b>64,4 1 ± 3,5</b>
Male	42 (80.7%)
DM	10 (19.2%)
Arterial hypertension	22 (53.8%)
Hypercholesterolemia	23 (44.2%)
Smoking	28 (53.8%)
COPD	4 (7.7%)
Peripheral artery disease	3 (5.7%)
Previous MI	8 (15.3%)
Previous PCI	12 (23.1%)
Previous CABG	4 (7.7%)
History of stroke	2 (3.8%)
Left ventricular ejection fraction <40%	12 (23.1%)
<b>NSTE-ACS</b>	<b>27 (51.9%)</b>
<b>STEMI</b>	<b>3 (5.8%)</b>



## Angiographic data (n=52)

**Isolated LM** 16 (30.8%)

**LM with 1-vessel disease** 29 (55.8%)

LM with 2-vessel disease 6 (11.5%)

LM with 3-vessel disease 1 (1.9%)

Ostium involvement 14 (26.9%)

Shaft involvement 2 (3.9%)

**Distal LM involvement** 36 (69.2%)

Right coronary artery involvement 16 (30.7%)

No. of diseased vessels treated per patient 1.6±0.66

Mean Syntax Score 21,49±10,47

SS ≤22 37 (71.1%)

SS >22 and <33 8 (15.4%)

**SS ≥33** 7 (13.5%)



## Procedural data (n=52)

Mean number of vessels treated per patient (range)	1.6 <sub>±</sub> 0.6
Mean number of lesion treated per patient (range)	1.98 <sub>±</sub> 0.81
Mean number of stents per patient	2.26 <sub>±</sub> 1.38
Mean stent length per patient (mm)	43.74 <sub>±</sub> 30.85
Post-Dilatation (%)	100%
Single stent in distal LM	30 (83.4%)
Kissing post-dilation of distal LM)	21 (58.3%)
<b>IABP support</b>	<b>10 (19.2%)</b>
<b>IVUS guidance</b>	<b>16 (30.7%)</b>
<b>Complete revascularization</b>	<b>41 (78.8%)</b>
Procedural success	52 (100%)



## Clinical outcome (n=52)

Follow-up period (months) 28.17+18.46

**Death** 0 (0%)

Myocardial infarction 0 (0%)

Stroke 0 (0%)

**Repeat revascularization** 5 (9.61%)

PCI 5 (9.61%)

CABG 0 (0%)

Left main re-PCI 4 (7.69%)

Stent Thrombosis 0 (0%)

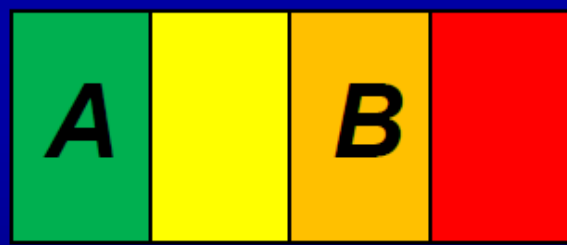
**MACE** 5 (9.61%)



# Updated 2011 ACC/AHA/SCAI Guidelines for ULMCA Stenosis

**Pre-2011**

**I IIa IIb III**

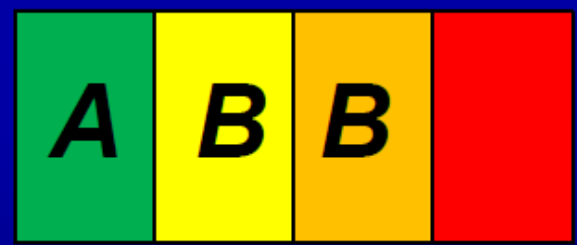


*Benefit ≥ Risk  
May be Considered*

**PCI**

**Post-2011**

**I IIa IIb III**



*Benefit >> Harm  
Is reasonable*

*Ostial, mid-shaft  
lesions,  
SYNTAX <22*

**PCI**

*SYNTAX <33  
Surgical mortality >2%*



# Percutaneous Coronary Intervention vs. Coronary Artery Bypass Graft Surgery for Unprotected Left Main Coronary Artery Disease in the Drug-Eluting Stents Era

– An Aggregate Data Meta-Analysis of 11,148 Patients –

Mahboob Alam, MD; Henry D. Huang, MD; Saima A. Shahzad; Biswajit Kar, MD; Salim S. Virani, MD; Paul A. Rogers, MD; David Paniagua, MD; Biykem Bozkurt, MD; Igor Palacios, MD; Neal S. Kleiman, MD; Hani Jneid, MD

“Unprotected Left Main Coronary Artery”  
Limit (01/01/2003 – 12/01/2011)  
= 340 citations [PubMed.gov (NLM)]  
= 15 citations [ClinicalTrials.gov]



Circulation Journal  
Official Journal of the Japanese Circulation Society  
<http://www.j-circ.or.jp>

Additional filters applied using keywords  
“Percutaneous Coronary Intervention” AND “Coronary  
Artery Bypass Graft”  
= 116 Citations [PubMed.gov (NLM)]  
No additional filters applied to ClinicalTrials.gov

**Circulation Journal  
released online  
October 31,2012**

Abstracts of remaining 131 citations reviewed  
independently by two investigators (M.A and H.H.)

224 citations excluded

Abstracts and Bibliography of remaining 33 citations  
reviewed and 11 studies removed [duplicate data]

**98 citations excluded:**  
- 45 Lack of comparison group  
- 28 Review articles  
- 11 Case Reports  
- 3 Meta - analyses  
- 11 Ongoing/Inactive studies

27 studies met the inclusion criteria and included in  
meta-analysis [4 Randomized Clinical Trials]

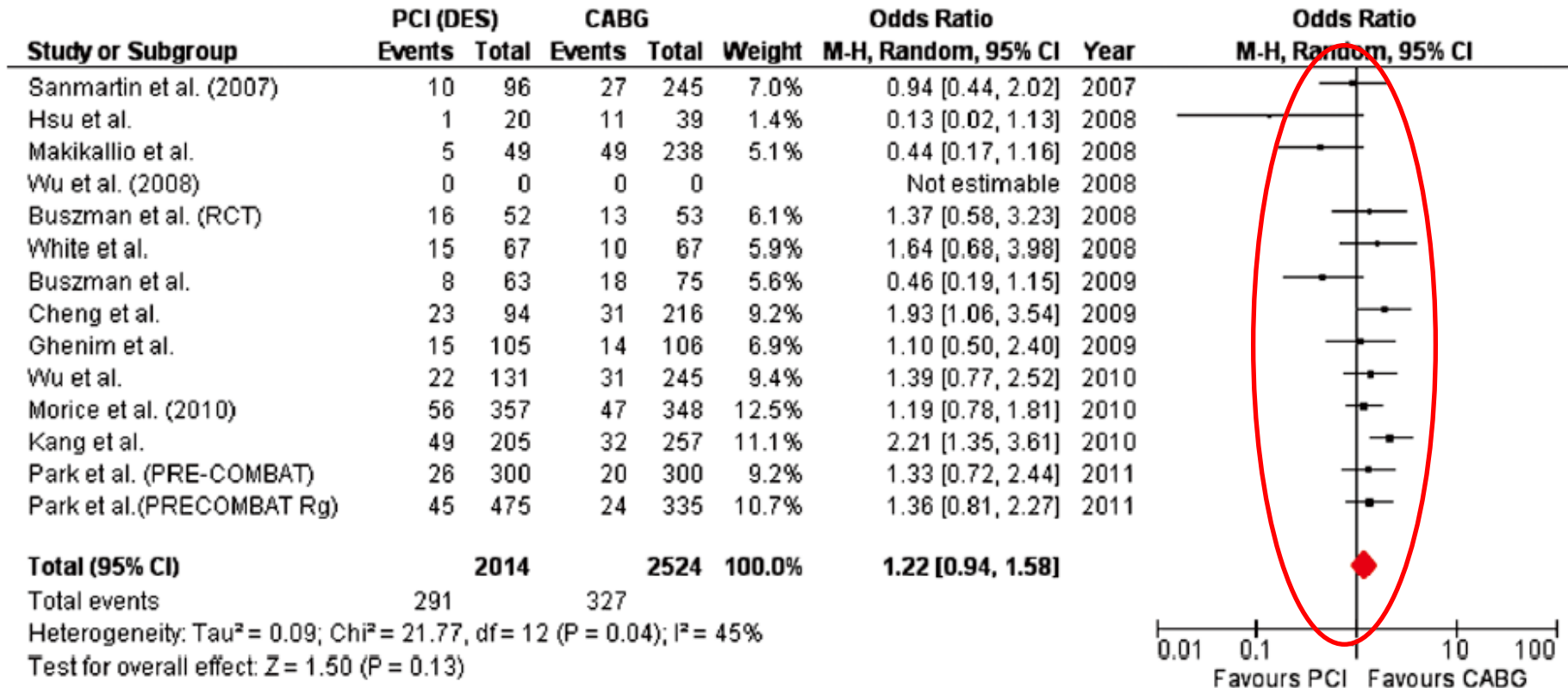
5 citations identified and  
Included in the meta-analysis





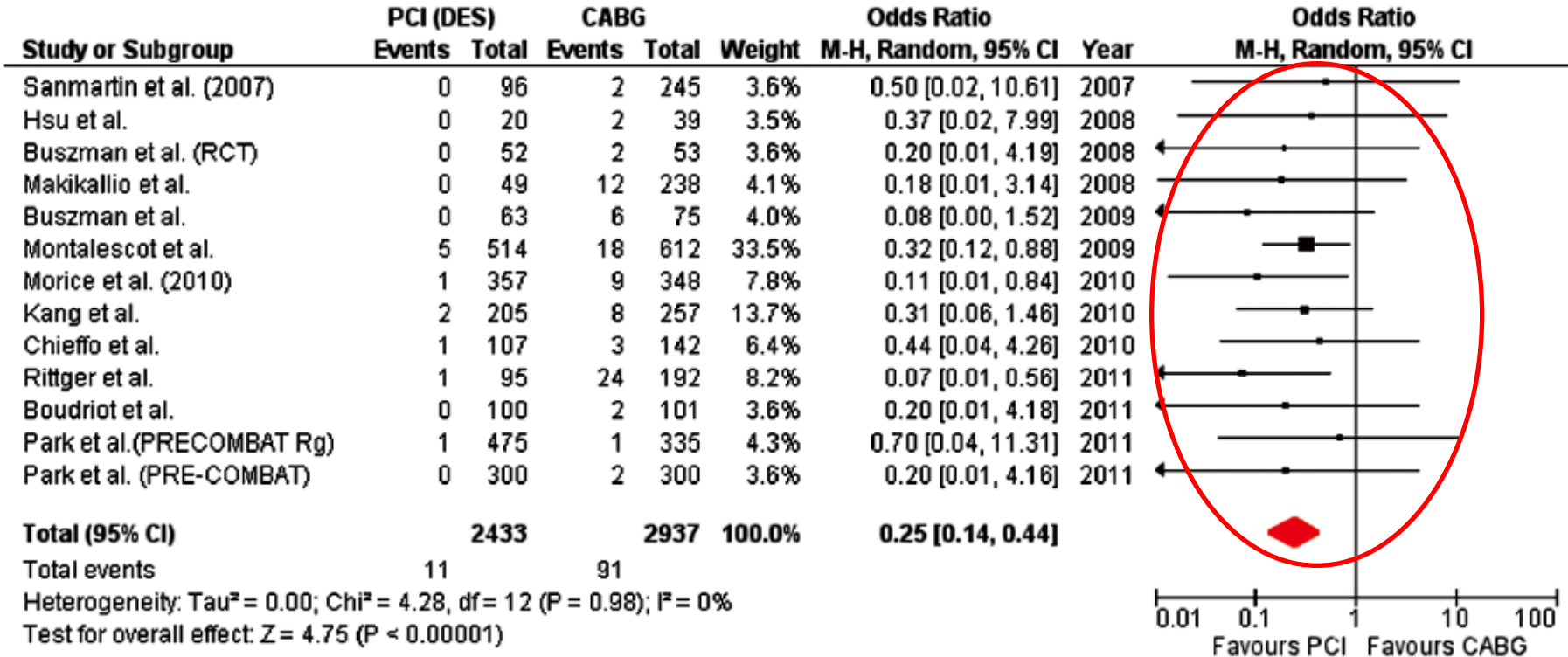
# 12-month major adverse cardiac and cerebrovascular events (MACCE)

C



# Non-fatal stroke at 12-months follow-up.

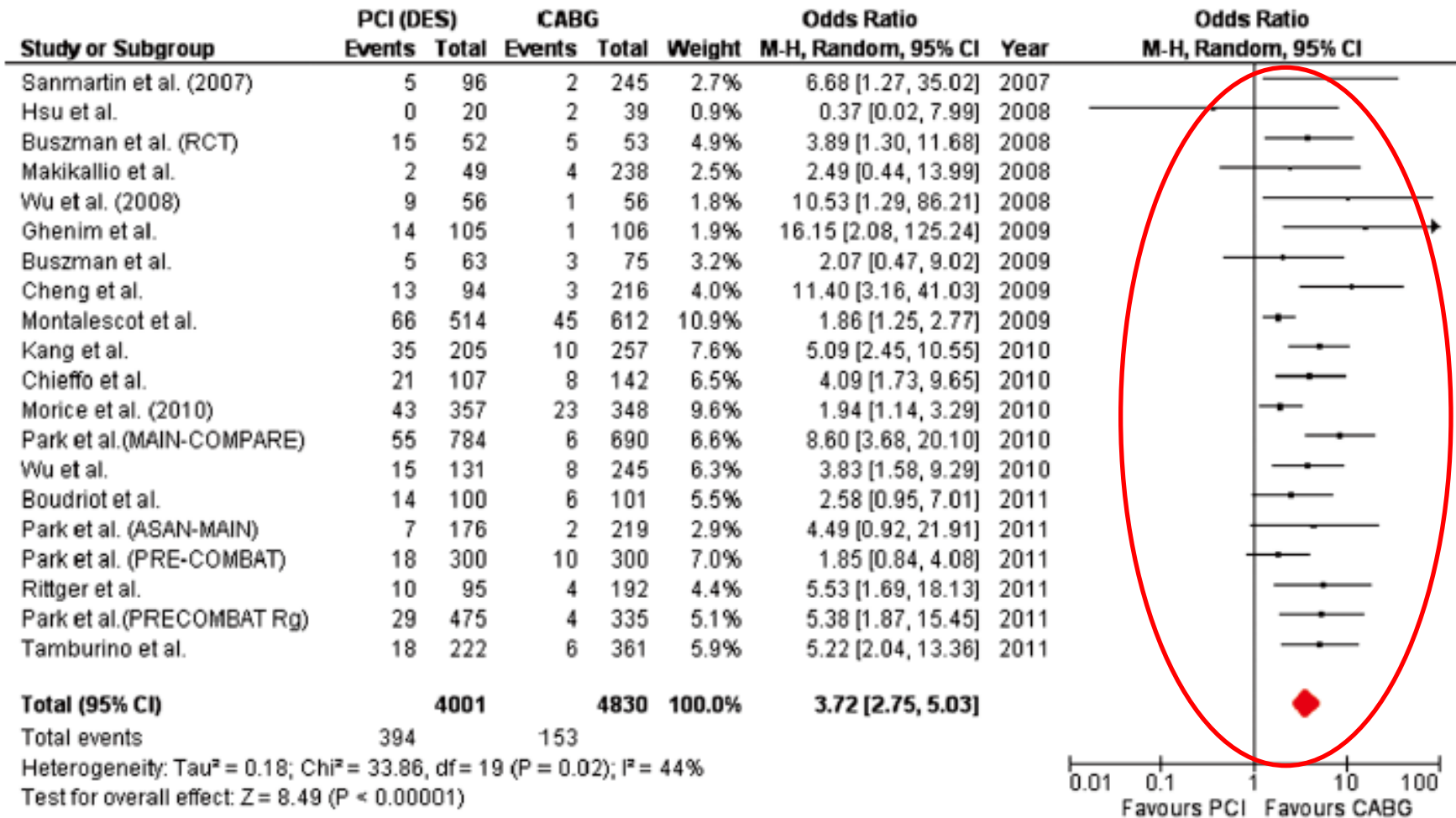
**B**





# Repeat revascularization at 12-months follow-up.

D



# MACCE to 5 Years Left Main Subset

SYNTAX

■ CABG (N=348)

■ TAXUS (N=357)



**At 5 years, overall MACCE in the PCI group was comparable with CABG (31.0% CABG vs 36.9% PCI)**

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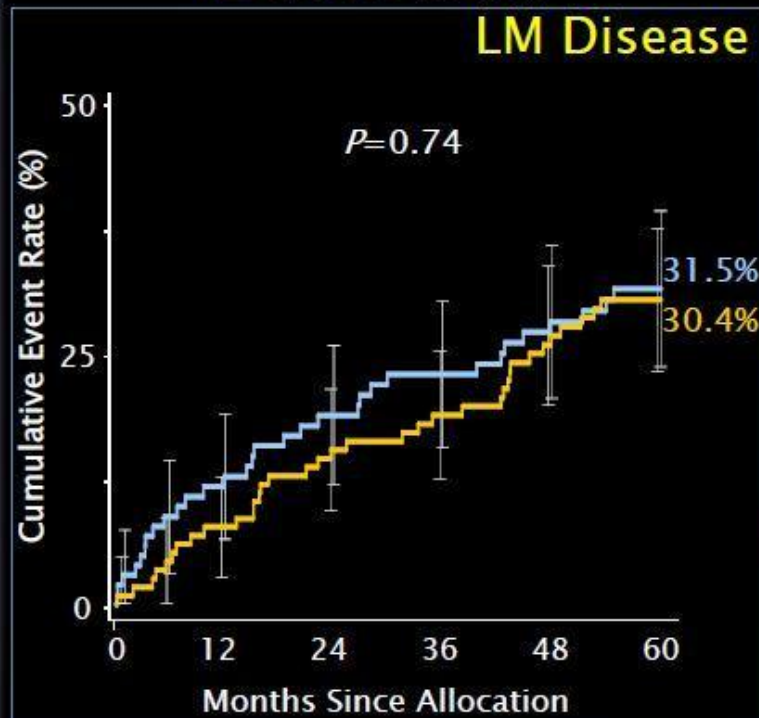


# MACCE to 5 Years by SYNTAX Score Tercile

## LM Subset *Low Scores 0-22*



■ CABG (N=104)  
■ TAXUS (N=118)



Cumulative KM Event Rate  $\pm$  1.5 SE; log-rank  $P$  value

SYNTAX 3VD 5-year Outcomes - TCT 2012 - Serruys - 23 October 2012 - Slide 17

	CABG	PCI	$P$ value
Death	11.3%	7.0%	0.28
CVA	4.1%	1.8%	0.28
MI	3.1%	6.2%	0.32
Death, CVA or MI	15.2%	13.9%	0.71
Revasc.	20.3%	23.0%	0.65

Site-reported Data; ITT population

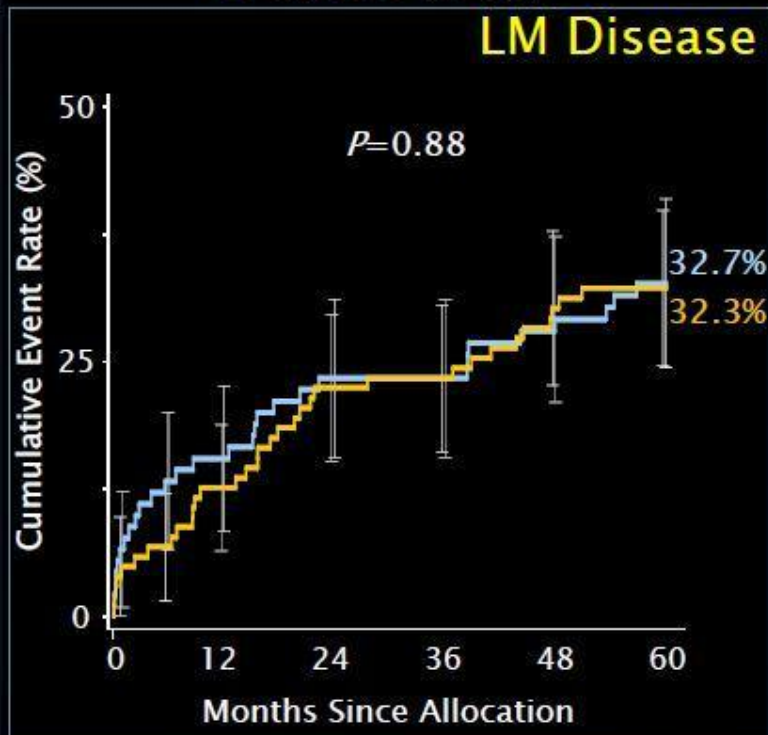




# MACCE to 5 Years by SYNTAX Score Tercile LM Subset *Intermediate Scores 23-32*

SYNTAX

■ CABG (N=92)  
■ TAXUS (N=103)



	CABG	PCI	P value
Death	19.3%	8.9%	0.04
CVA	3.6%	1.0%	0.23
MI	4.6%	6.0%	0.71
Death, CVA or MI	24.9%	15.7%	0.11
Revasc.	16.6%	22.2%	0.40

Cumulative KM Event Rate  $\pm$  1.5 SE; log-rank P value

Site-reported Data; ITT population

SYNTAX 3VD 5-year Outcomes - TCT 2012 - Serruys - 23 October 2012 - Slide 18

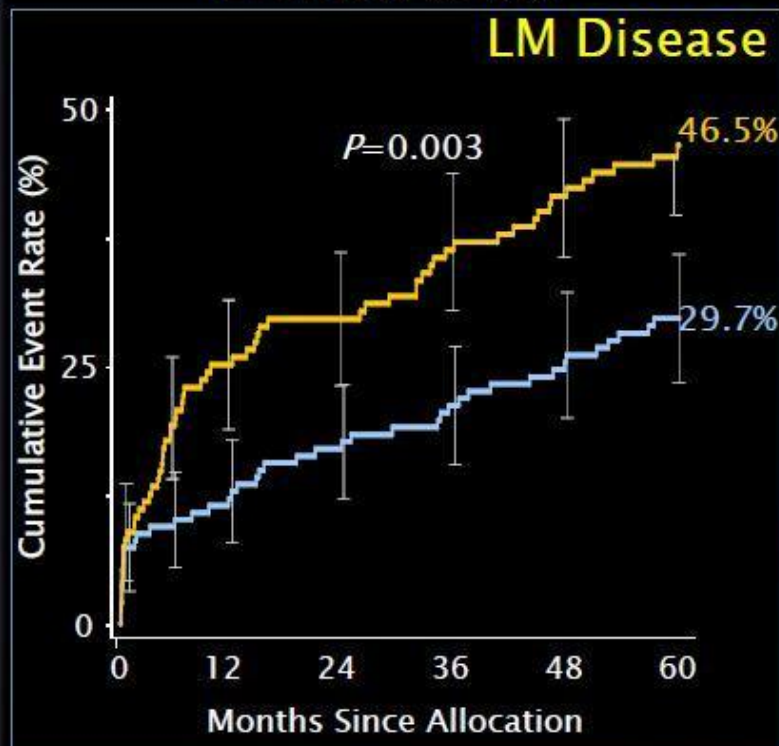


# MACCE to 5 Years by SYNTAX Score Tercile

*LM Subset High Scores  $\geq 33$*



■ CABG (N=149)  
 ■ TAXUS (N=135)



	CABG	PCI	P value
Death	14.1%	20.9%	0.11
CVA	4.9%	1.6%	0.13
MI	6.1%	11.7%	0.13
Death, CVA or MI	22.1%	26.1%	0.40
Revasc.	11.6%	34.1%	<0.001

Cumulative KM Event Rate  $\pm$  1.5 SE; log-rank P value

Site-reported Data; ITT population

SYNTAX 3VD 5-year Outcomes - TCT 2012 - Serruys - 23 October 2012 - Slide 19



## Joint ESC/EACTS Guidelines for Myocardial Revascularization 2010

### 4.1 Patient Information

Patient information needs to be objective and unbiased, patient orientated, evidence based, up-to-date, reliable, understandable, accessible, relevant and consistent with legal requirements. **Informed consent requires transparency, especially if there is controversy about the indication for a particular intervention.** *Specialty bias and self-referral should not interfere with the process.*

### 4.2 Multidisciplinary decision making (Heart Team)

The creation of a Heart Team serves the purpose of a balanced multidisciplinary decision process. **Standard protocols compatible with the current Guidelines may be used to avoid the systematic need for case-by-case review of all diagnostic angiograms.**

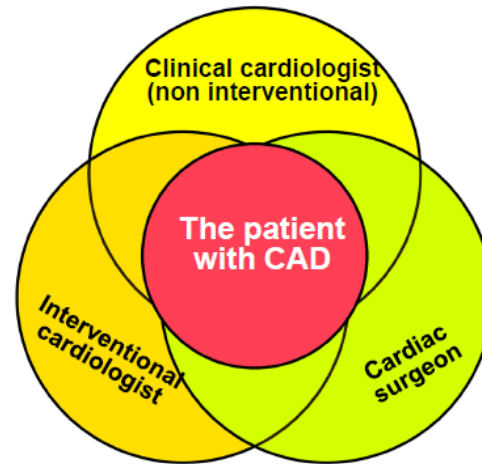
	Class	Level
It is recommended that patients be adequately informed about the potential benefits and short- and long-term risks of a revascularisation procedure. Enough time should be spared for informed decision making.	I	C
The appropriate revascularisation strategy in patients with MVD should be discussed by the Heart Team.	I	C





# The meaning of HEART TEAM

## The Heart Team



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# It is practical as the Heart Team...

## Advantages reported in the literature

- ...improves (consistent) decision (making more accurate according to guidelines)
- ...Team has more knowledge than an individual
- ...Increases physician and patient wellbeing
- ...Higher ratings of patients' experience of care
- ...Physicians “share the burden”
- ...Improves outcomes
- ...Liability

But remember **“Medicine is not a democracy”**





## Patient information and consent



**When asked, most patients will prefer the less invasive PCI over surgery**



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# *How do we consent suitable patients?*

“While the guidelines do not give left main stenting the highest recommendation and while most doctors are traditionally inclined to send patients such as yourself for bypass surgery, **published evidence suggests similar survival rates with bypass and stent procedures.** Your risk of stroke is definitely 4-5 fold lower with stent procedure, but you do have a higher risk of a repeat procedure due to stent renarrowing.

**In my opinion a very reasonable option for you is ...”**



# CASE 1

## Choice of the HEART TEAM



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# CASE 1

- 48 y.o. male.
- Risk factors for IHD:
  - Hypertension
  - Dyslipidaemia
  - Smoker.
- Recent hospitalization for unstable angina



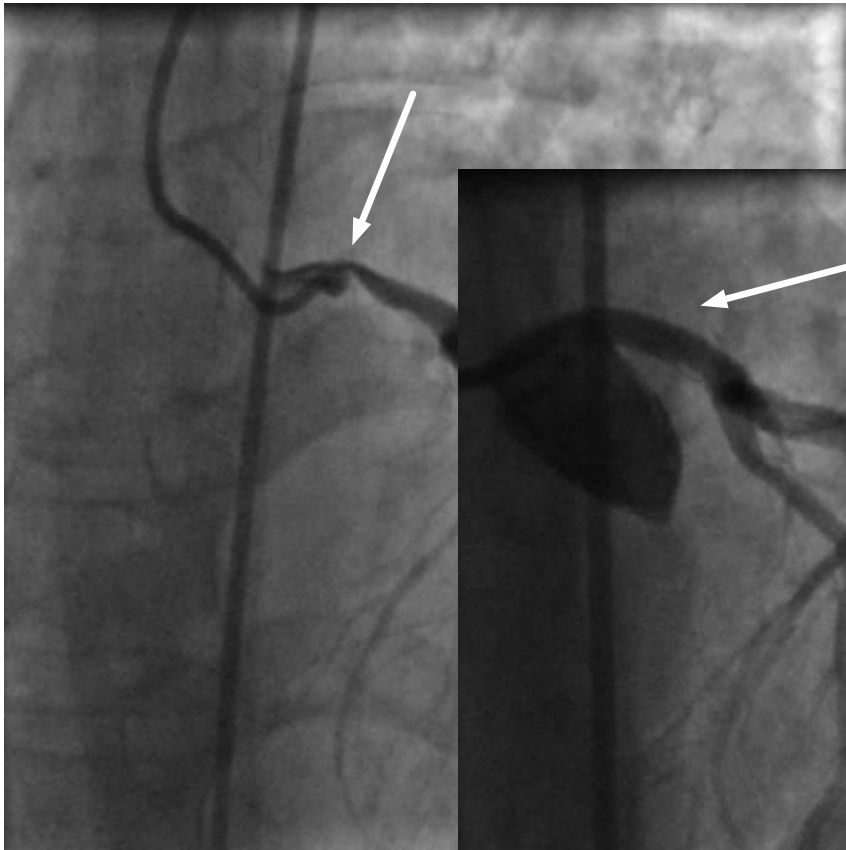


# Critical stenosis at the ostium of left main



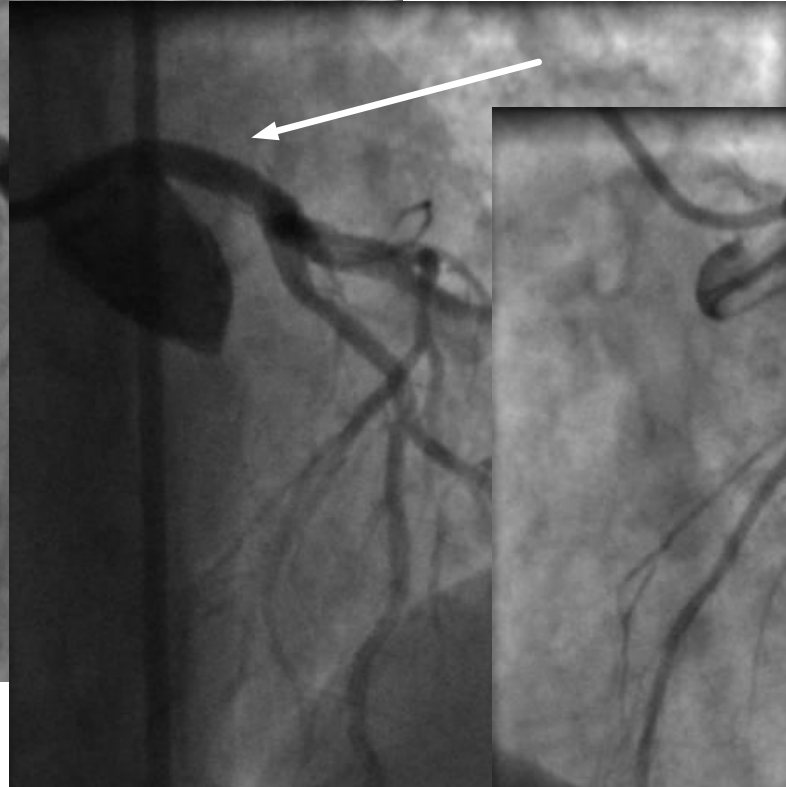
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Pre PCI

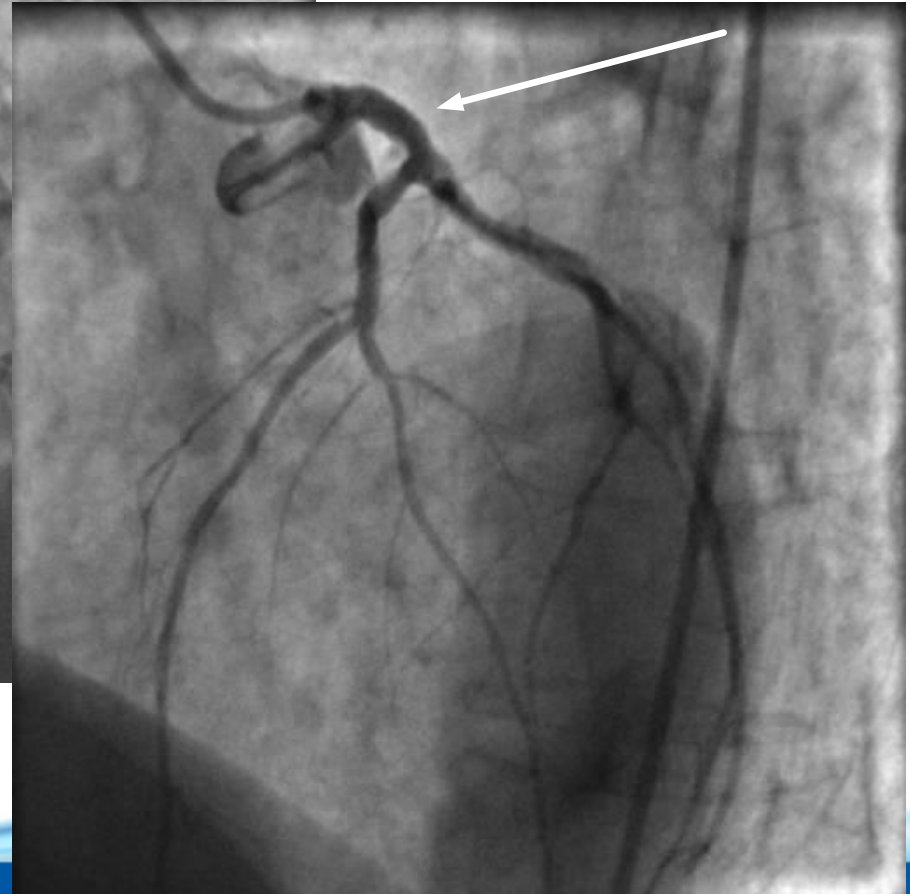


The patient remains asymptomatic after 3 years

Post PCI



FU 6 months



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# CASE 2

## Patient's willingness



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# CASE 2

- 60 y.o. male.
- Risk factors for IHD:
  - Hypertension
  - Dyslipidaemia
  - ex-smoker

- In June 2006, underwent coronary artery bypass grafting for left main and three vessel disease.

LIMA – LAD

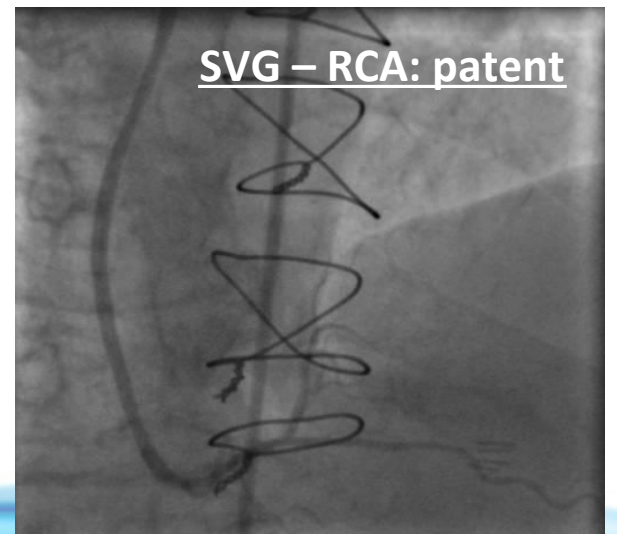
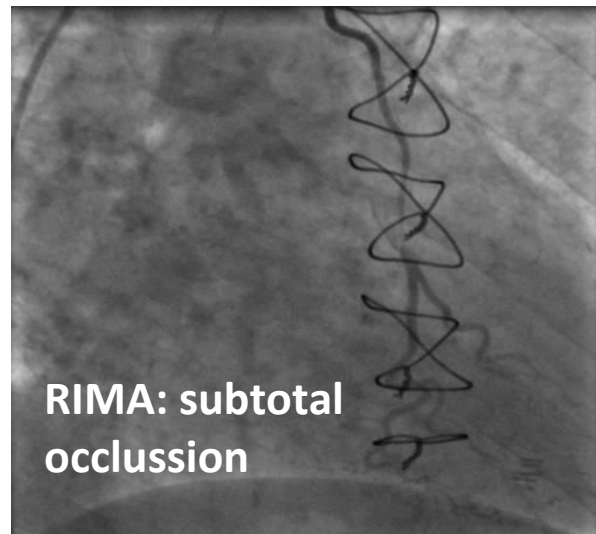
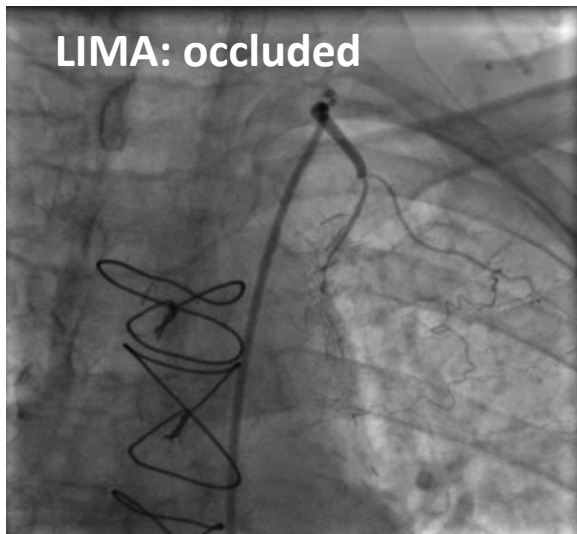
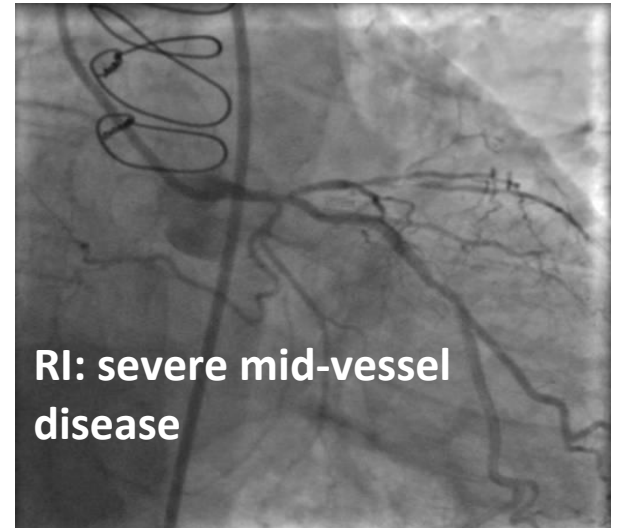
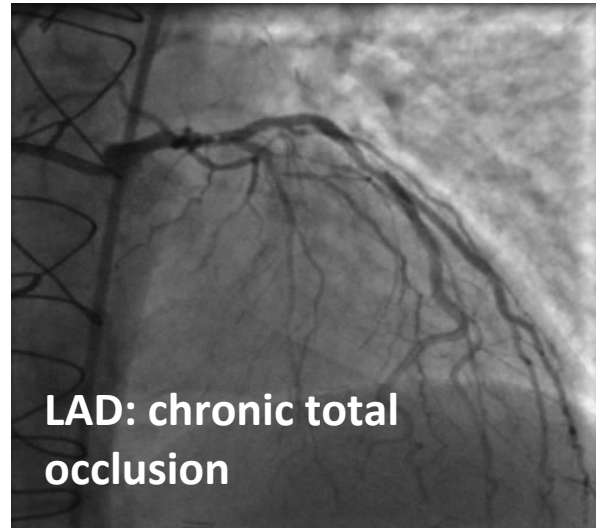
RIMA – Ramus intermediate

SVG – RCA





# 14 months later, presented with unstable angina



- ***re- do CABG?***

- Logistic EUROSCORE: 2.37.

- Patient unwilling to undergo surgery for a second time.

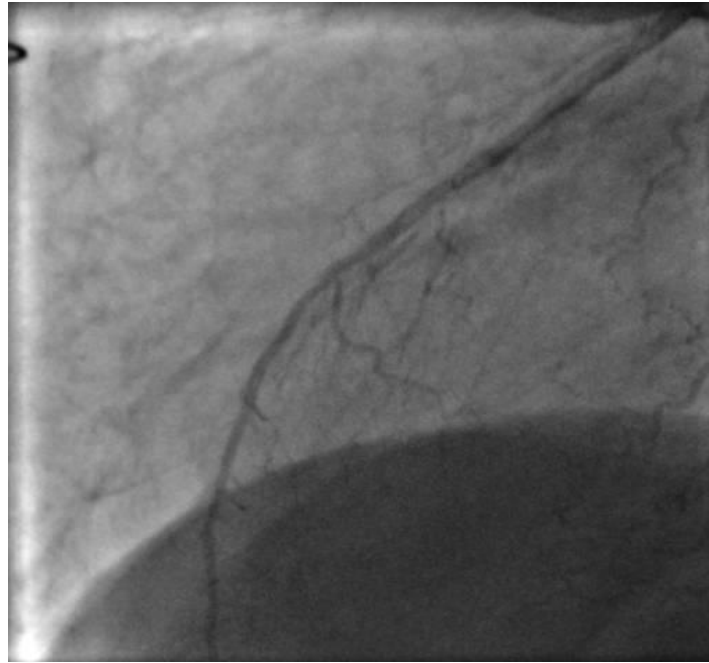
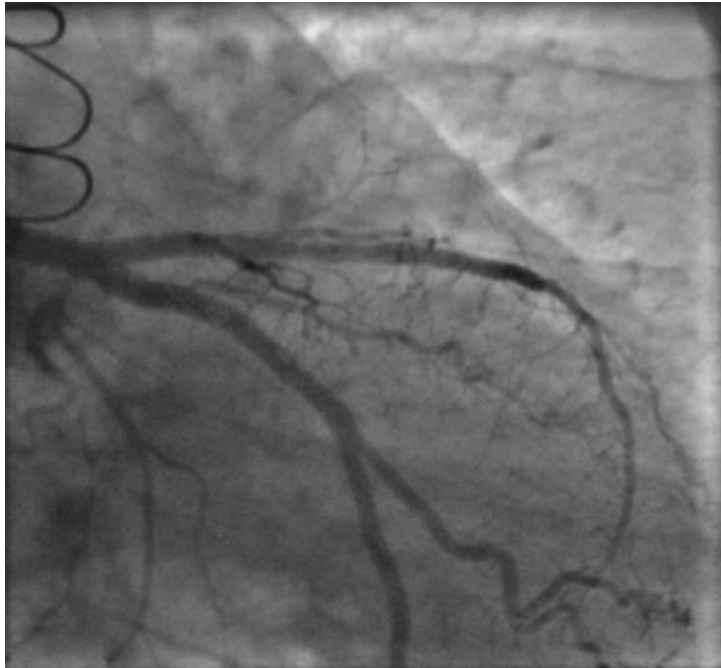
- ***PCI?***

- SYNTAX score: 47.5.

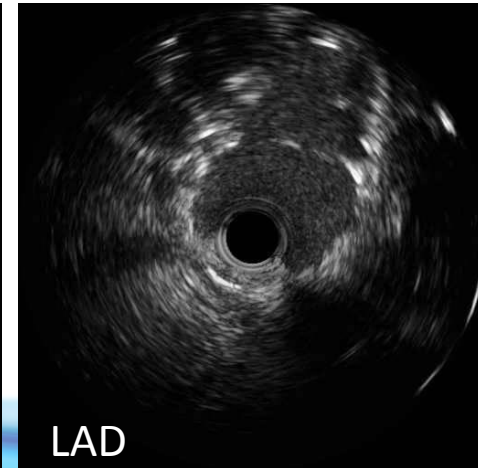
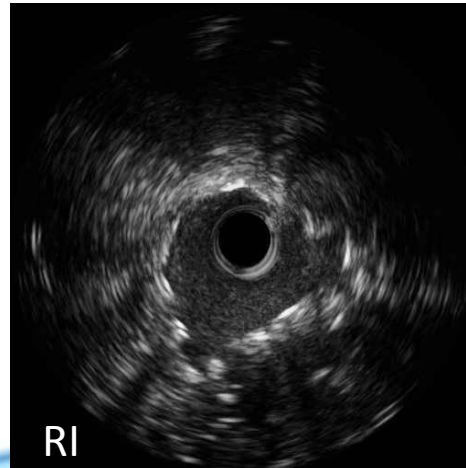
- Informed consent.



# The patient remains asymptomatic 48 months after the 2<sup>nd</sup> PCI.



**Final result**



IVUS  
post-PCI



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# CASE 3

## The inoperable patient



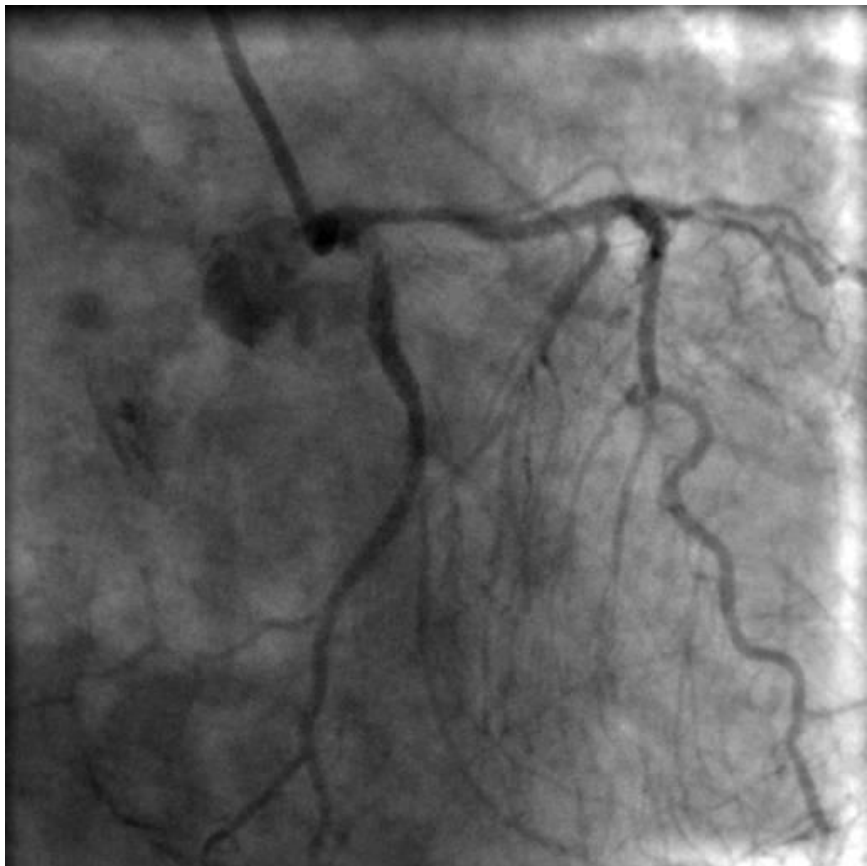
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# CASE 3

- 87 y.o. male with unstable angina (repeated hospitalizations)
- Risk factors for IHD:
  - Hypertension
  - Dyslipidaemia
  - ex-smoker.
- In the last year 2 PCIs in LAD, Cx and OM1 in another hospital







**LAD**: Critical lesion at the ostium (severe calcification)

**Cx** : Severe lesion at the ostium (restenosis, severe calcification)

**OM1** : Total occlusion (restenosis)



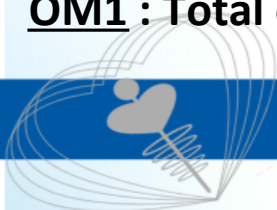
**RCA**: Total occlusion  
**EF 25-30%.**

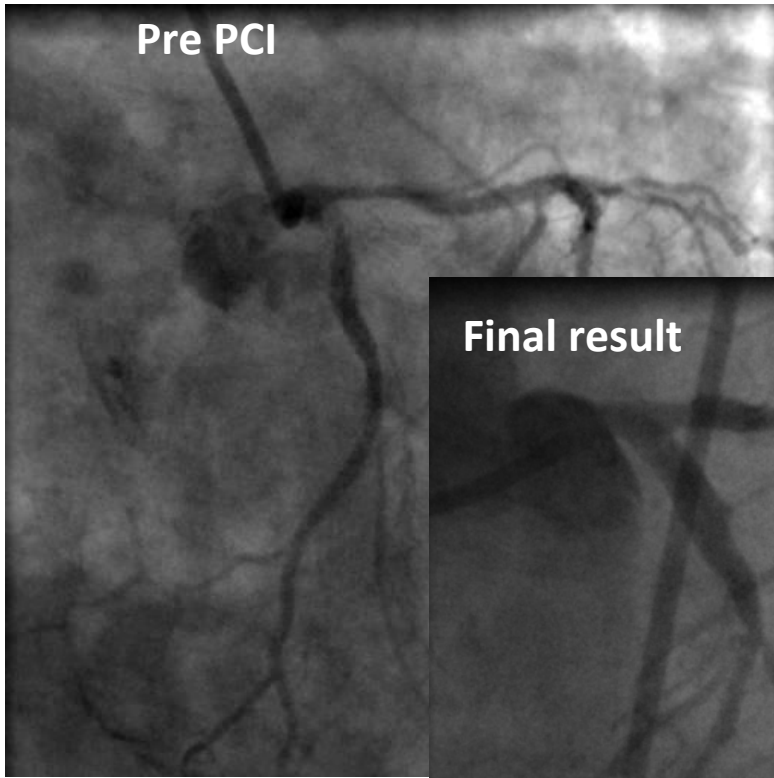
Logistic Euroscore 82.76

SYNTAX score: 38.

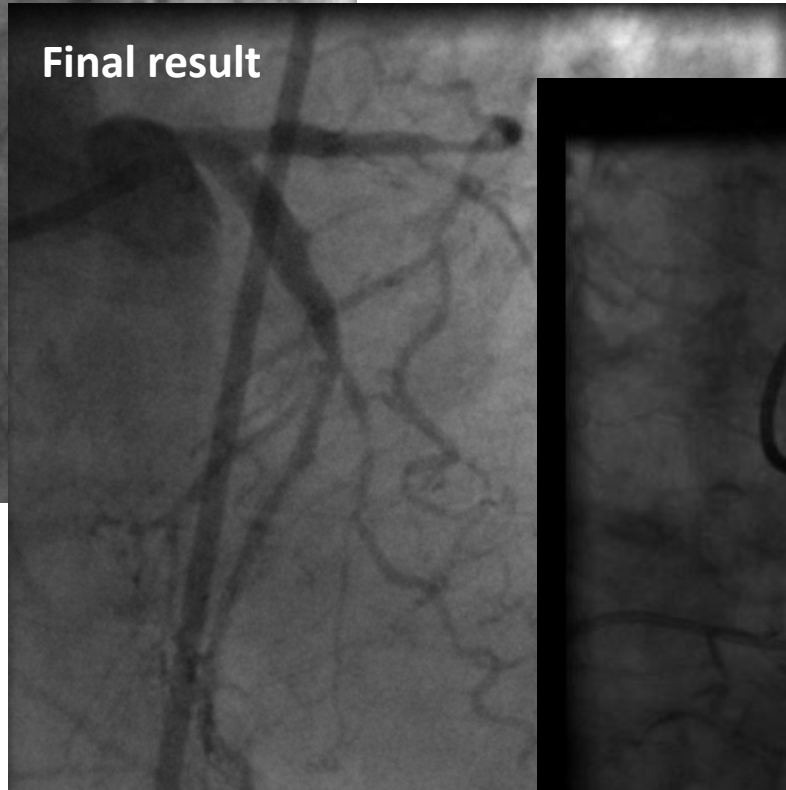
Informed consent.

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**The patient is free of MACE after 3 years**



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# CASE 4

**Fighting with a catastrophe. The only option?**



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# CASE 4

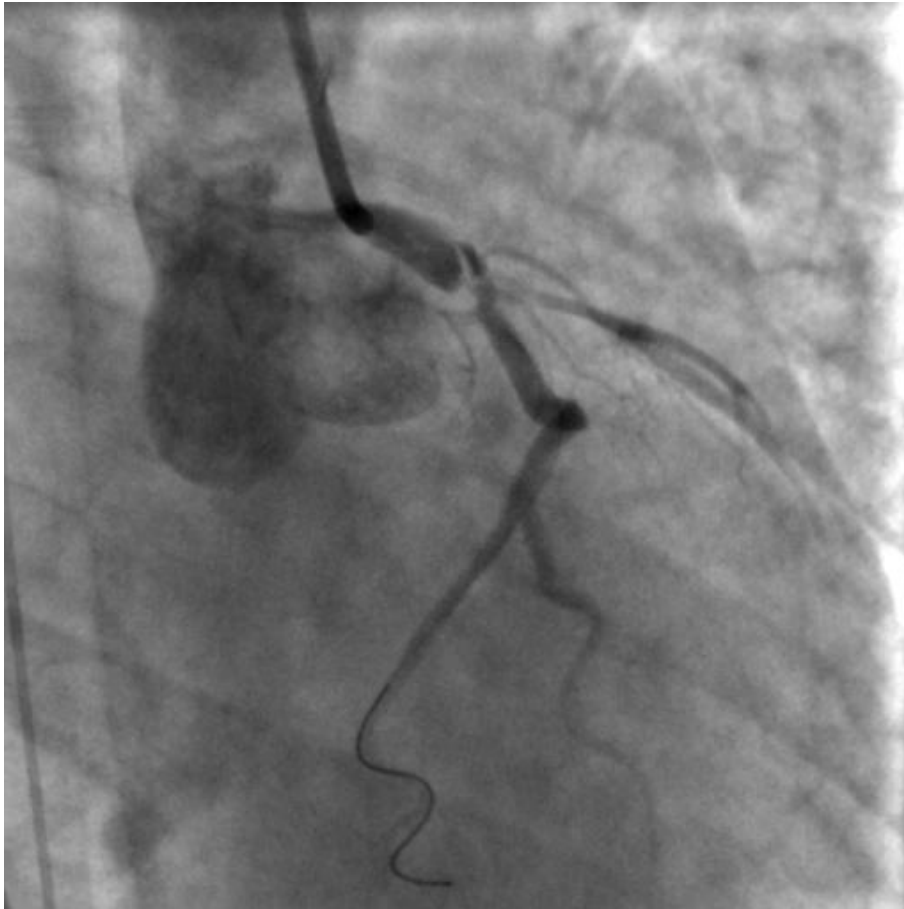
- **A 42 years old caucasian woman**
- **No any previous medical history or any risk factors for coronary artery disease.**
- **Presented to a district general hospital, with no cardiac catheter laboratory facilities, with acute anterior MI, complaining about a sudden-onset substernal chest pain lasting for the past 2h.**
- **Thrombolytic treatment was started immediately, with regression of the angina and almost normalization of the ECG changes.**



**On the eighth in hospital day, the patient suffered another episode of substernal chest pain, with hypotension and signs of left ventricular heart failure.**



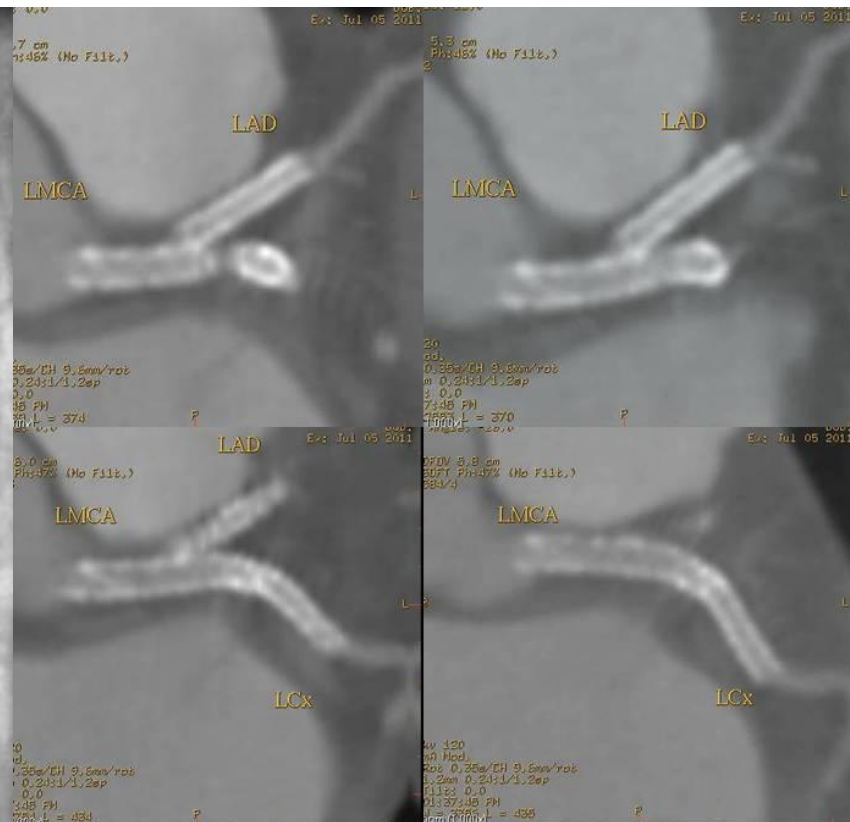
# Spontaneous Left Main dissection



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**The patient remained asymptomatic at 3 months follow up and a MSCT coronary angiography showed the absence of re-stenosis**

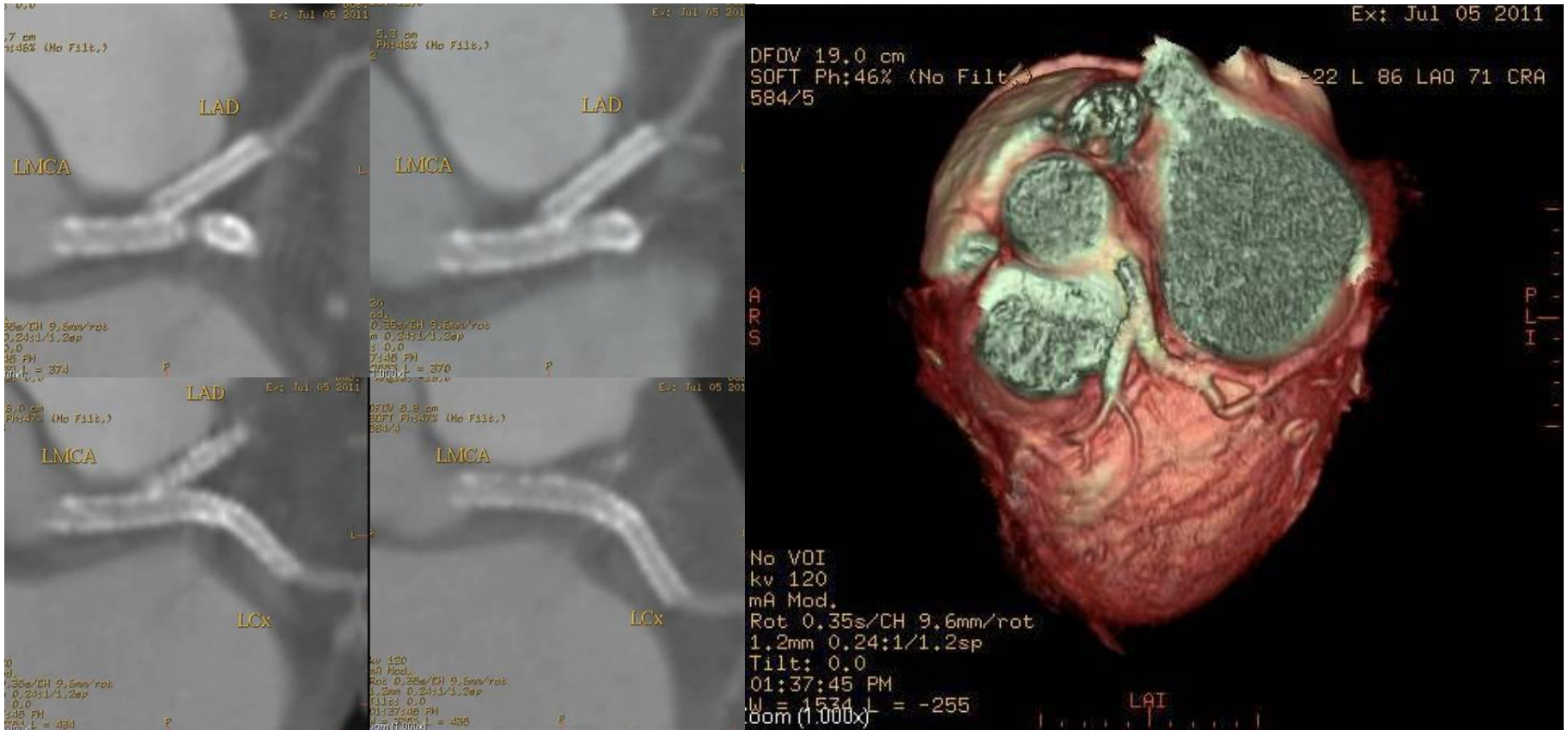


**Hospital discharge on day 8.**  
**Echocardiography at 1 month: ejection fraction was 35% with a moderate mitral regurgitation.**

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# The patient remained asymptomatic at 3 months follow up and a MSCT coronary angiography showed the absence of re-stenosis



He was also



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