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SOCIME Annual Meeting

III Curso para Intervencionistas en Entrenamiento “Dr. José Gabay”
Pre Congreso SOLACI 2012 - México DF, 7 de Agosto 2012

Doença de Múltiplos Vasos Coronários e Tronco

Quando Indicar PCI em Lesões do Tronco



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2012 -- Potential conflicts of interest

Speaker's name: Costantino R Costantini, M.D., Ph.D., F.A.A.C.

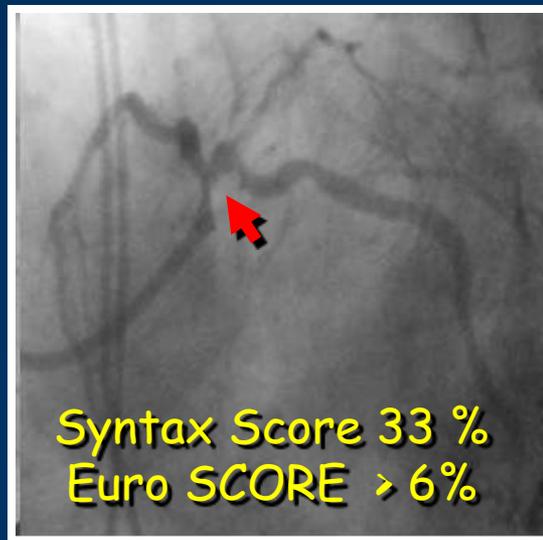
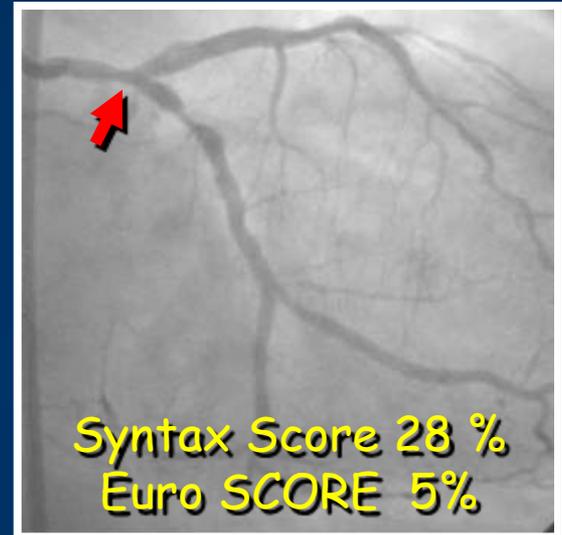
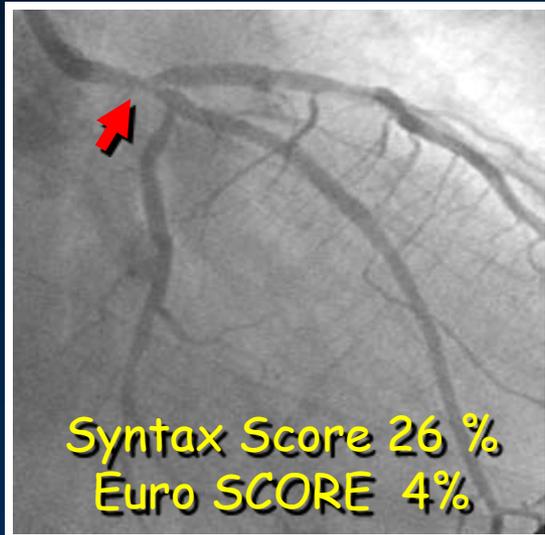
**Learning Center intracoronary ultrasound
Sponsored by Boston Scientific without medical fees.
Donation to Francisco Costantini Foundation**

Since 2008

Quando Indicar PCI em Lesões do Tronco



UPLM Revascularization



Imagens: Hospital Costantini

Quando Indicar PCI em Lesões do Tronco

- 1. Guidelines**
2. Resultados Cirurgia Cardíaca
3. Resultados Intervencionismo
4. Tecnologia
5. Experiência da Equipe

Coronary Artery Surgery Study (CASS): a **1983** randomized trial of coronary artery bypass surgery
 Survival data **780 pts but 1,8% (Left Main)**

CASS PRINCIPAL INVESTIGATORS AND THEIR ASSOCIATES*

| Variable | CASS (n = 780) |
|-----------------------|-------------------|
| Age (yr)* | 51.2 ± 7.4 |
| Male | 90.0 |
| NYHA class | |
| 0 | 26.5 |
| I | 14.5 |
| II | 59.0 |
| History of MI | 59.9 |
| EF >50% | 73.7 |
| CAD | |
| 1 Vessel | 27.4 |
| 2 Vessel | 39.5 |
| 3 Vessel | 33.1 |
| Proximal LAD | 31.5 |
| Any LAD | 71.7 |
| Left main (50 to 69%) | 1.8 |

in 129 patients was assessed within 60 days of surgery and the results have been published.¹⁰ A total of 334 distal anastomoses were evaluated in the 129 patients; 90% of the grafts were open, 97% of patients had at least one open graft, and in 81% of patients all grafts were patent.



Angio within 60 days in 129 pts
Graft Occlusion in 10%

Left Main
14 pts

CASS Trial, Circulation 1983;68:939-950
 HLATKY et al, JACC 1988; Vol 11. n 2; 237-45



Diretrizes da Sociedade Brasileira de Cardiologia – Intervenção Coronária Percutânea e Métodos Adjuntos Diagnósticos em Cardiologia Intervencionista (II Edição – 2008)

| Intervenção coronária percutânea para o tronco da artéria coronária esquerda não protegido por revascularização cirúrgica prévia | Recomendação | Nível de evidência |
|---|--------------|--------------------|
| Estenose no tronco da artéria coronária esquerda com evidências de alto risco cirúrgico, como reoperação, disfunção ventricular esquerda significativa (fração de ejeção < 35%) e/ou morbidades clínicas associadas, com expectativa de vida < 5 anos | IIa | C |
| Estenose no tronco da artéria coronária esquerda em pacientes desprovidos de fatores de risco promotores de alto risco cirúrgico | IIb | B |

Current Guideline Recommendations for UPLM Revascularization

ACC/AHA¹

- IIa Class III angina and >50% LM stenosis who are *not eligible* for CABG
- IIb *Alternative to CABG* may be considered in pts with anatomic conditions that are associated with a low risk of PCI procedural complications and clinical conditions that predict an increased risk of adverse surgical outcomes

ESC²

- IIa Left main (isolated or 1-vessel disease ostium/shaft)
- IIb Left main (isolated or 1-vessel disease distal bifurcation)
- IIb Left main plus 2- or 3-vessel disease, SYNTAX score <32
- III Left main plus 2- or 3-vessel disease, SYNTAX score >33

1 ACC/AHA 2009 Focused Updates for STEMI and PCI. Circulation 2009;120:2271–2306

2 Wijns W, Kolh P, et al. Eur Heart J 2010;31:2501-55

2011 ACC/AHA PCI Guidelines

Heart Team Approach to UPLM or Complex CAD



A Heart Team approach to revascularization is recommended in patients with unprotected left main or complex CAD.



Calculation of the STS and SYNTAX scores is reasonable in patients with unprotected left main and complex CAD.



2011 ACCF/AHA/SCAI Guideline for PCI and Coronary Revascularization

Current Guideline Recommendations for UPLM Revascularization

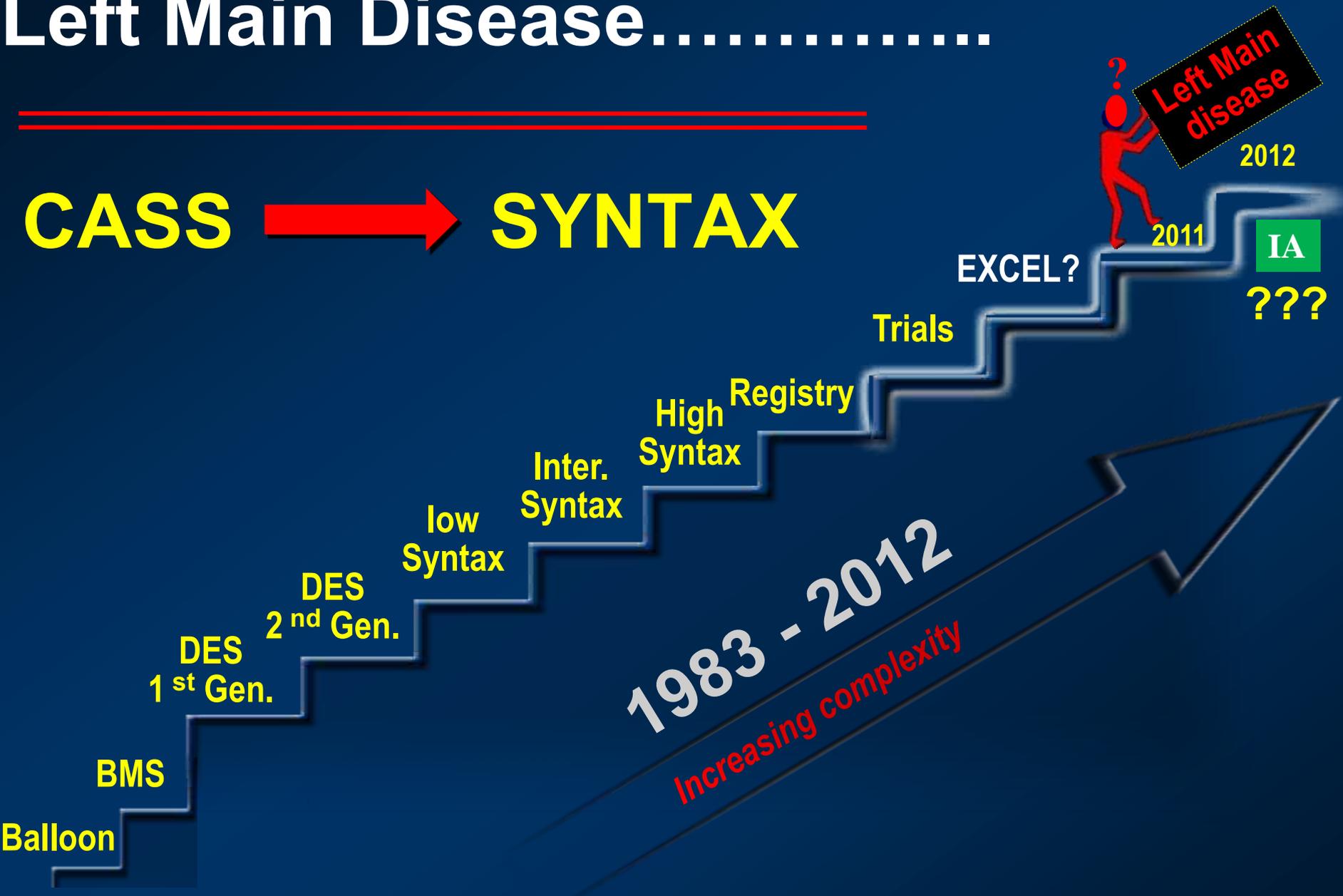
| LM Subset By Anatomy, Risk and Predicted Outcome | |
|--|-------|
| <ul style="list-style-type: none"> – Anatomy with a low risk of procedural complications and a high likelihood of good long-term outcome (SYNTAX score of ≤ 22, ostial or trunk left main CAD), <i>AND</i> – Characteristics predict significantly increased risk of adverse surgical outcomes (STS-predicted risk of operative mortality $\geq 5\%$) | IIa B |
| UA/NSTEMI if not a CABG candidate | IIa B |
| STEMI when distal TIMI flow grade < 3 and PCI can be performed more rapidly and safely than CABG | IIa C |
| <ul style="list-style-type: none"> – Anatomy low to intermediate risk of PCI procedural complications and intermediate to high likelihood of good long-term outcome (low-intermediate SYNTAX score of < 33, bifurcation left main CAD), <i>AND</i> – Characteristics predict increased surgical risk (moderate-severe COPD, disability from prior stroke, or prior cardiac surgery; STS-predicted risk of operative mortality $> 2\%$) | IIb B |
| Unfavorable anatomy for PCI and good candidates for CABG | III B |



2011 ACCF/AHA/SCAI Guideline for PCI and Coronary Revascularization

Left Main Disease.....

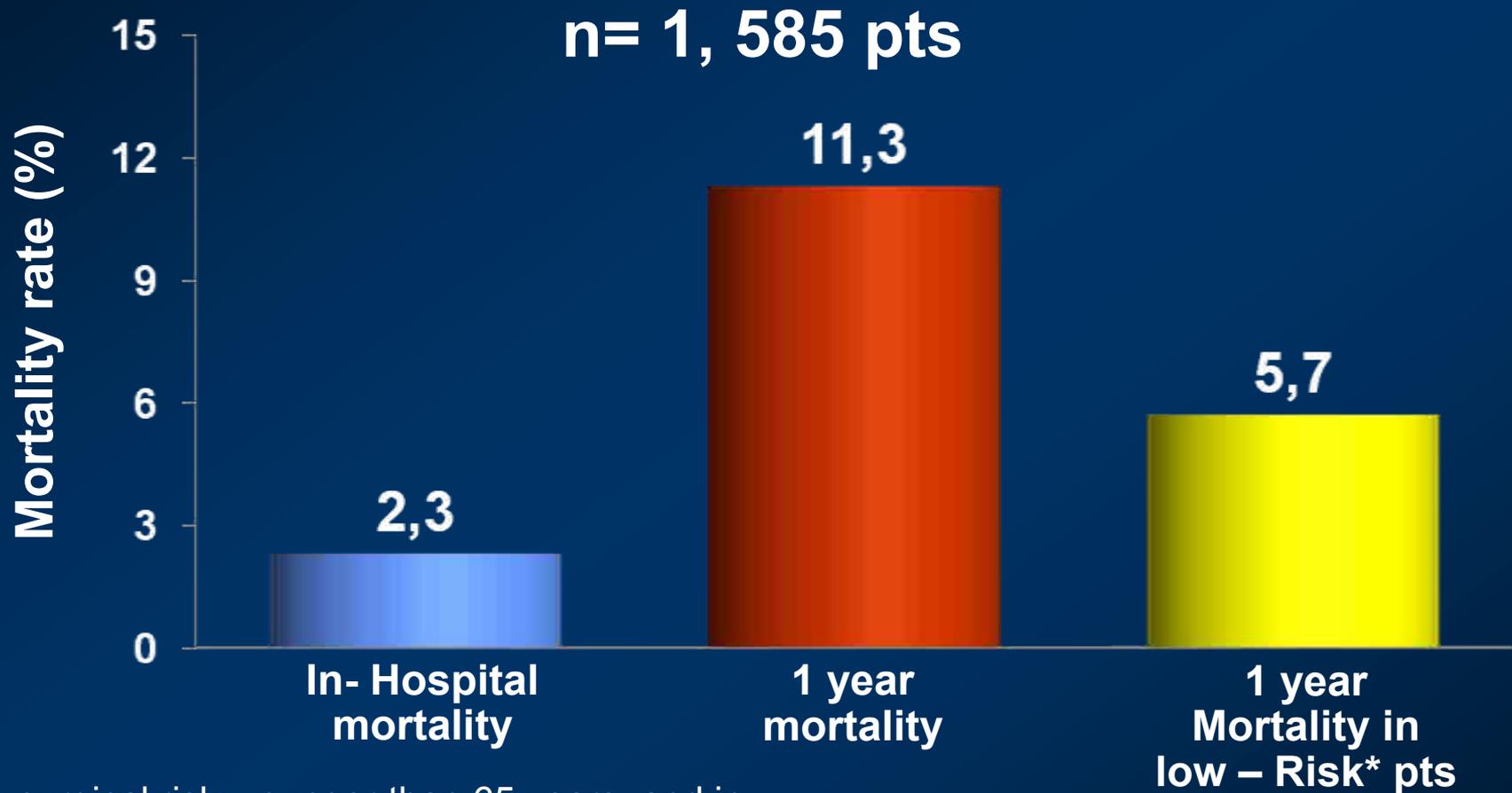
CASS → **SYNTAX**



Quando Indicar PCI em Lesões do Tronco

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- 2. Resultados Cirurgia Cardíaca**
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Experiência da Cleveland Clinic Cirurgia em TCESQ (1998)



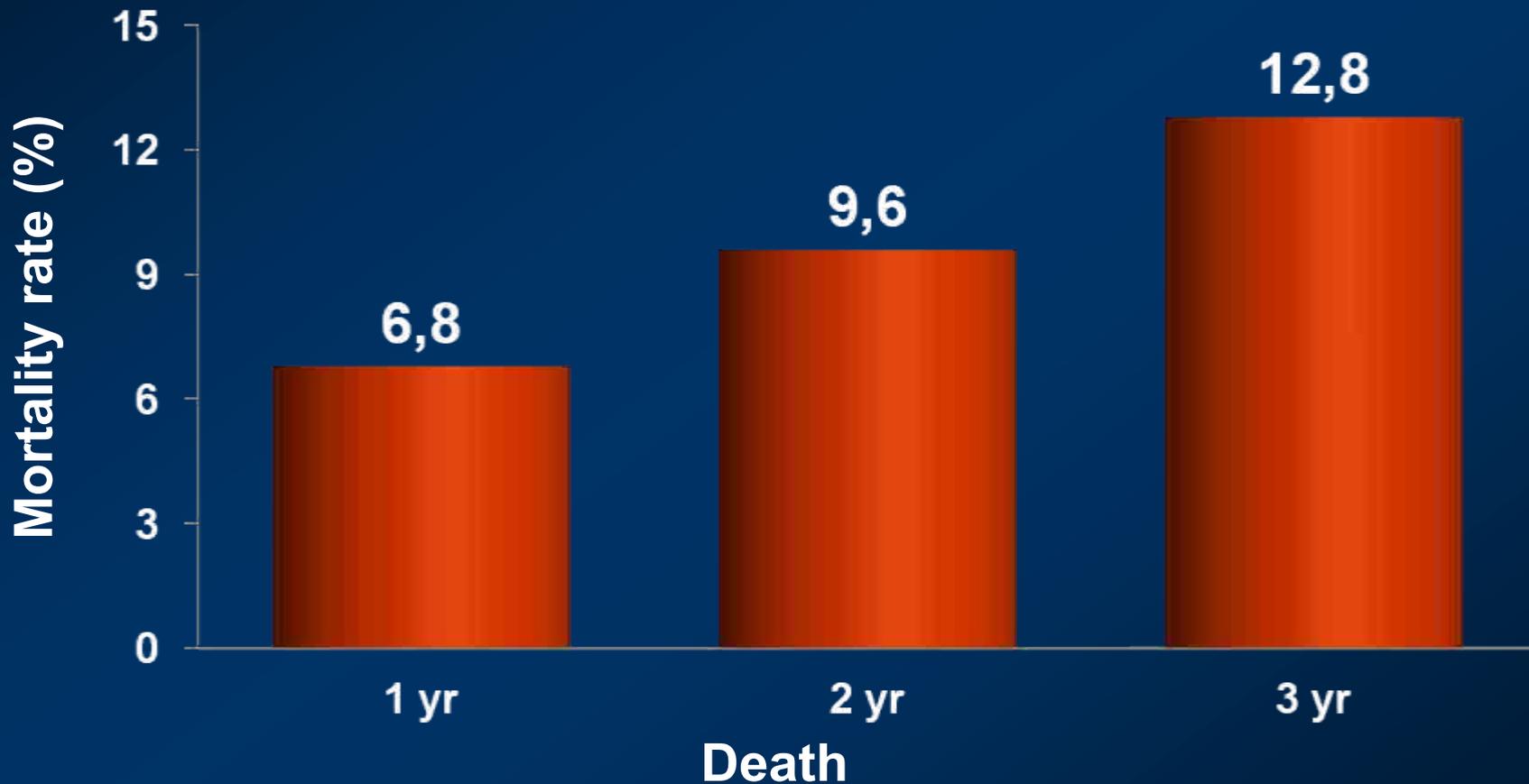
*low surgical risk: younger than 65 years, and in New York Heart Association heart failure no greater than class II

Ellis SG et al Am Heart J 1998;135:335-8.

NYS Database

CABG for Left Main Disease (1997-2000)

n= 16,365 pts



Hannan et al Circulation 2007;116(10):1145-1152.

Duke Database

CABG for Left Main Disease (2006)

n= 1,374 pts



TCT MD 2006; Roxana Mehran



Cirurgia de Revascularização Miocárdica. Resultados do Sistema Único de Saúde

Myocardial Revascularization Surgery (MRS). Results from National Health System (SUS)

Leopoldo S. Pimenta, Olímpio J. Nogueira V. Bittar, Nagib Haddad
 Instituto Dante Pazzanese de Cardiologia, São Paulo, SP - Brasil

Mortalidade hospitalar em pacientes submetidos à CRM isolada, de acordo com o volume cirúrgico dos hospitais no Brasil

Entre 2005 e 2007 foram realizadas 63.529 cirurgias em 191 hospitais. Foram excluídos 16 hospitais de muito baixo volume cirúrgico, restando 63.272 cirurgias para análise final. **A mortalidade hospitalar total foi de 6,22%**

| Volume | Nº. de hospitais | % | Nº. de cirurgias | % | Nº. de óbitos | % |
|--------------|------------------|------------|------------------|------------|---------------|-------------|
| Pequeno | 120 | 69 | 18.733 | 30 | 1.365 | 7,29* |
| Grande | 55 | 31 | 44.539 | 70 | 2.569 | 5,77 |
| Total | 175 | 100 | 63.272 | 100 | 3.934 | 6,22 |

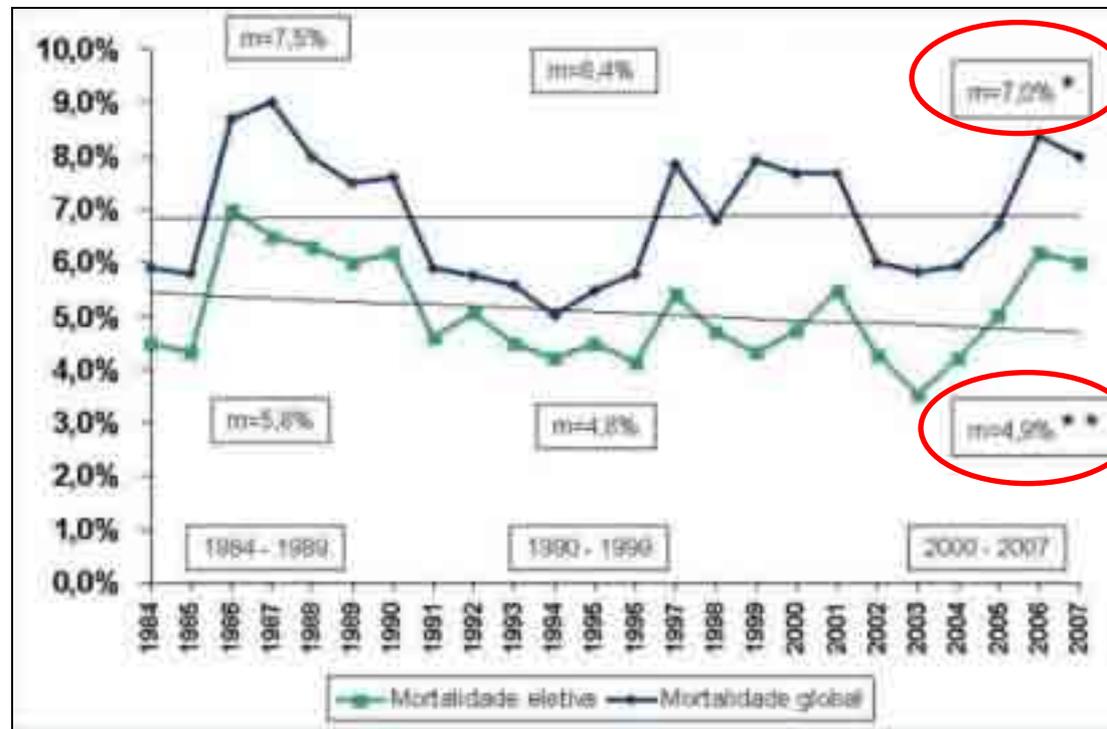
Evolução da Cirurgia Cardiovascular no Instituto do Coração: Análise de 71.305 Operações **INCOR – SAO PAULO**

2010

Evolution of Cardiovascular Surgery at the Instituto do Coração: Analysis of 71,305 Surgeries

Luiz Augusto F. Ladeira, Luiz Felipe P. Moreira, Omar Vilca Mejia, Luiz Alberto Cl. Dallari, Pablo M. A. Romenozzi, Roberto Costa, Luiz B. Fing, Fabio B. Istene, Miguel Barbero Marcial, Noedir A. C. Stoff
 Instituto do Coração do Hospital das Clínicas da Faculdade de Medicina da Universidade de São Paulo, São Paulo, SP - Brasil

A mortalidade global média, que no início era de **7,5%**, atualmente é de **7,0%**, sendo de 4,9% entre os procedimentos eletivos. Nas **cirurgias de revascularização miocárdica**, a mortalidade média atual é de 4,8%.



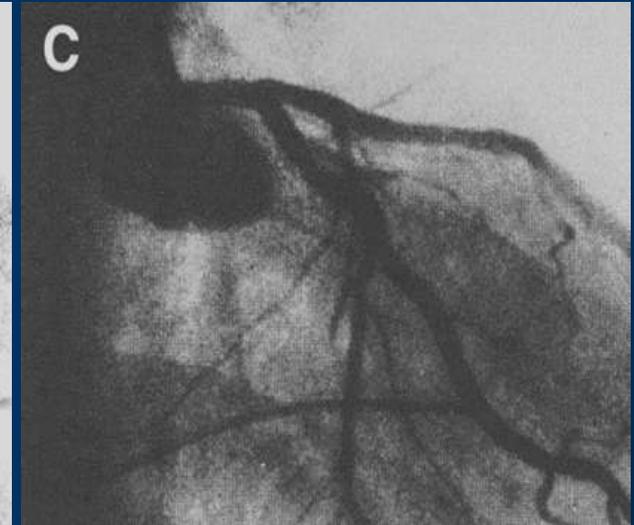
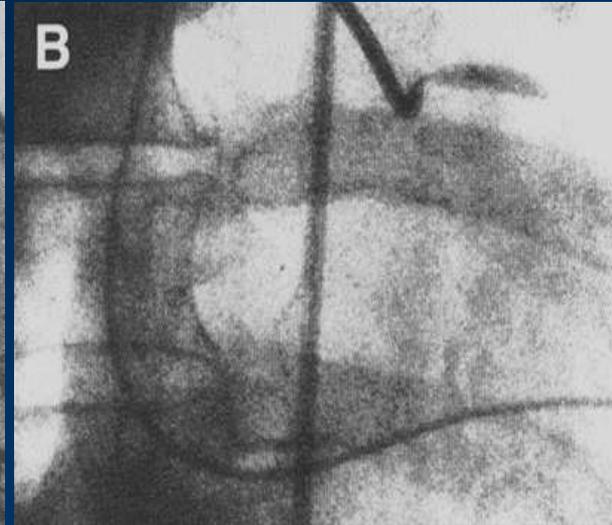
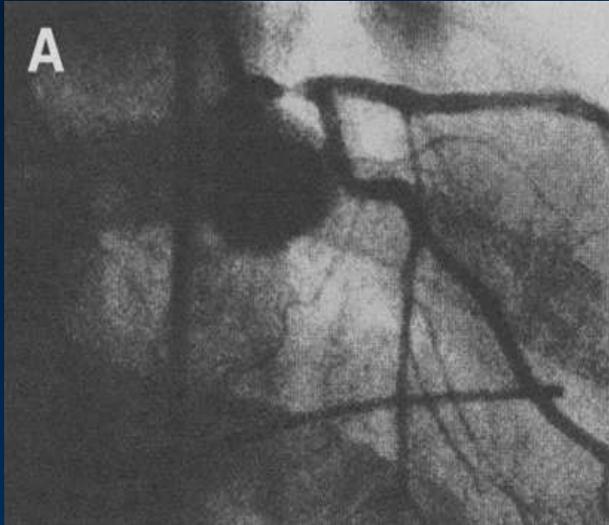
† GLOBAL
7,0%

Eletiva
4.9%

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First PCI of Left Main in The World..... 1977



EDITOR'S NOTE

Gruentzig presented this case at the 1977 AHA Scientific Session. The ovation was so prolonged he could barely finish the talk. Now 30 years later we are still wondering if left main disease can be safely treated with PCI. The SYNTAX trial results will help.

Spencer B. King III, MD, MACC

Rahimtoola, S. H. J Am Coll Cardiol Intv 2008;1:108

Contemporary Mortality Risk Prediction for Percutaneous Coronary Intervention

2010

Results From 588,398 Procedures
in the National Cardiovascular Data Registry

181,775 procedures

January 2004 – March 2006

Evaluated pre-procedure and angiographic risk factors

Using logistic regression

Results

| | | |
|----------------|-----------------------|--------------|
| Average | PCI mortality: | 1.27% |
| | Elective PCI: | 0.65% |
| | PCI in STEMI: | 4.81% |



Intervenção Coronariana Percutânea no Brasil. Resultados do Sistema Único de Saúde

Percutaneous Coronary Intervention in Brazil. Results from the Brazilian Public Health System

Leopoldo Soares Piegas e Nagib Hadad
 Instituto Dante Pazzanese de Cardiologia, São Paulo, SP - Brasil

Mortalidade hospitalar em pacientes submetidos à ICP isolada, de acordo com o volume dos hospitais no Brasil

Entre os anos de 2005 a 2008 foram realizados 166.514 procedimentos em 180 hospitais. **A mortalidade hospitalar total foi de 2,33%** No diagnóstico de angina a mortalidade foi de 1,03%

| Volume | Nº. de hospitais | % | Nº. de cirurgias | % | Nº. de óbitos | % |
|--------------|------------------|------------|------------------|------------|---------------|-------------|
| Pequeno | 45 | 25 | 7.229 | 4,3 | 182 | 2,52 |
| Médio | 90 | 50 | 58.067 | 34,9 | 1.330 | 2,29 |
| Grande | 45 | 25 | 101.218 | 60,8 | 2.362 | 2,33 |
| Total | 180 | 100 | 166.514 | 100 | 3.874 | 2,33 |

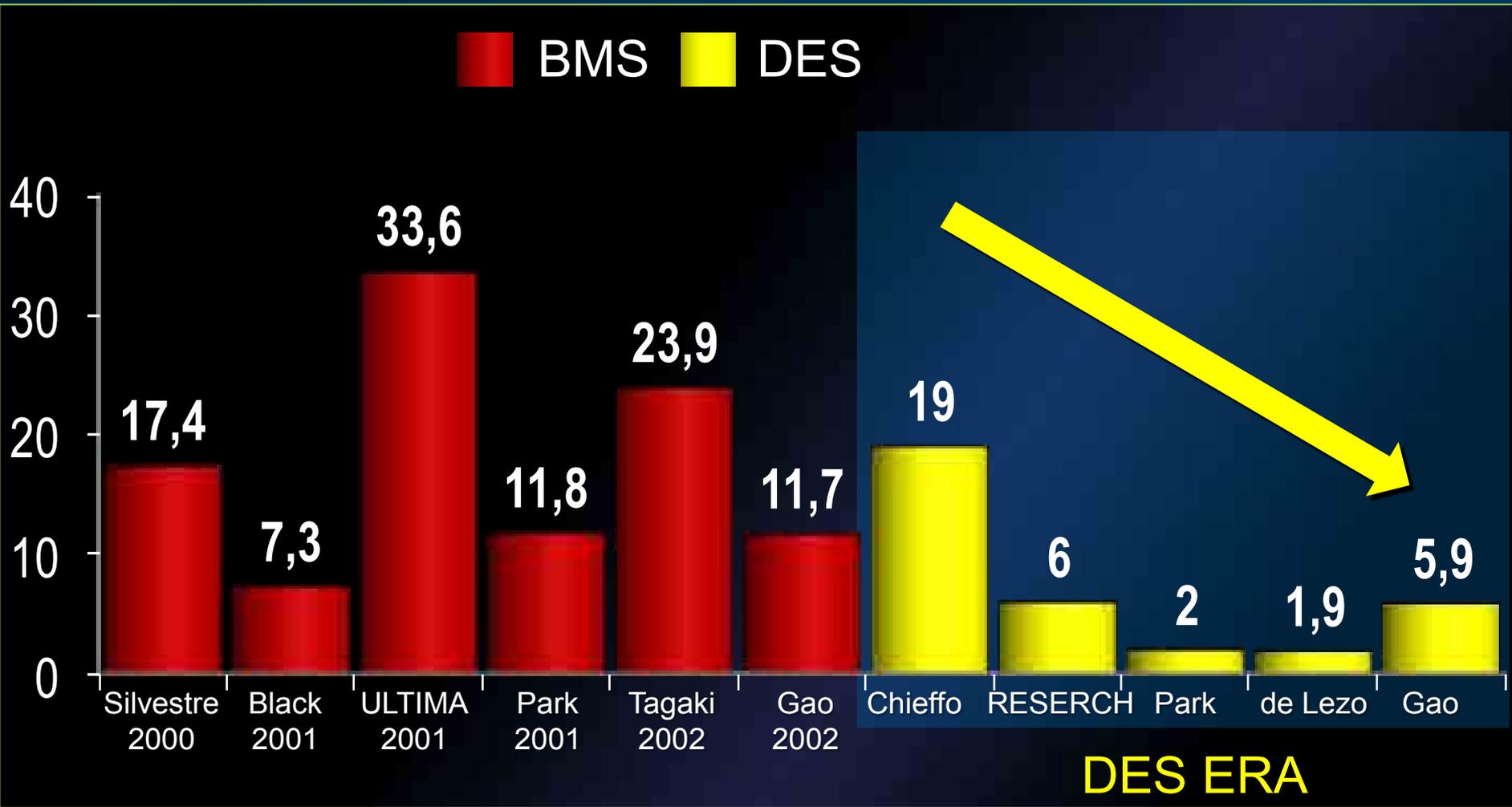
Thrombosis and Left Main Stenting

| First Author | Year | Registry | Inclusion Criterion | Stent Type | Sample Size | Duration of Follow-up | Definite Stent Thrombosis | Probable Stent Thrombosis | Possible Stent Thrombosis |
|--------------|------|---------------|---------------------|------------|-------------|-----------------------|---------------------------|---------------------------|---------------------------|
| Onuma | 2010 | Netherlands | ULMCA | DES | 148 | 49.1 | 1.3 | NA | NA |
| Park DW | 2010 | MAIN COMPARE | ULMCA | DES | 784 | 62 | 1.5 | NA | NA |
| Chieffo | 2010 | Italy | ULMCA | DES | 107 | 61.9 | 0.9 | NA | NA |
| Serruys | 2010 | SYNTAX | ULMCA | DES | 348 | 12 | 0.9 | NA | NA |
| Godino | 2010 | TRUE Registry | ULMCA | DES | 93 | 48.3 | 1.1 | 1 (1.1) | 0 |
| Lee MS | 2009 | Multicenter | ULMCA | DES | 221 | 44.8 | 0.45 | 1 (0.45) | 0 |
| Tamburino | 2009 | Italy | Trifurcation | DES | 11 | 32 | 0 | 0 | 0 |
| Shammas | 2009 | Iowa | Trifurcation | DES | 52 | 9.7 | 0 | 0 | 1 (2.5%) |
| Kim U | 2009 | South Korea | ULMCA | DES | 84 | 24 | 1.2 | 0 | 0 |
| Mehilli | 2009 | Germany | ULMCA | DES | 607 | 12 | 0.5 | 1 (0.16%) | 0 |
| Pavei | 2008 | France | ULMCA | DES | 148 | 29 | 0 | 0 | 0 |
| Tamburino | 2009 | Italy | Trifurcation | DES | 210 | 28 | 0.5 | 1 (0.5%) | 1 (0.5%) |
| Lee MS | 2008 | Multicenter | ULMCA | DES | 62 | 19.5 | 0 | 1 (1.6%) | 1 (1.6%) |
| Melina | 2009 | Multicenter | ULMCA | DES | 288 | 36 | 0.3 | 0 | 0 |
| Chieffo | 2008 | Multicenter | ULMCA | DES | 731 | 29.5 | 0.5 | 3 (0.4%) | 20 (4.1%) |
| Kim YH | 2008 | Columbia, NY | ULMCA | DES | 63 | 11.7 | 0.6 | 0 | 0 |
| Erglis | 2007 | Latvia | ULMCA | DES | 103 | 6 | 0 | 0 | 0 |
| Sheiban | 2007 | Italy | ULMCA | DES | 85 | 19.8 | 0 | 0 | 0 |

Oral presentation; Raj Makkar TCT 2010

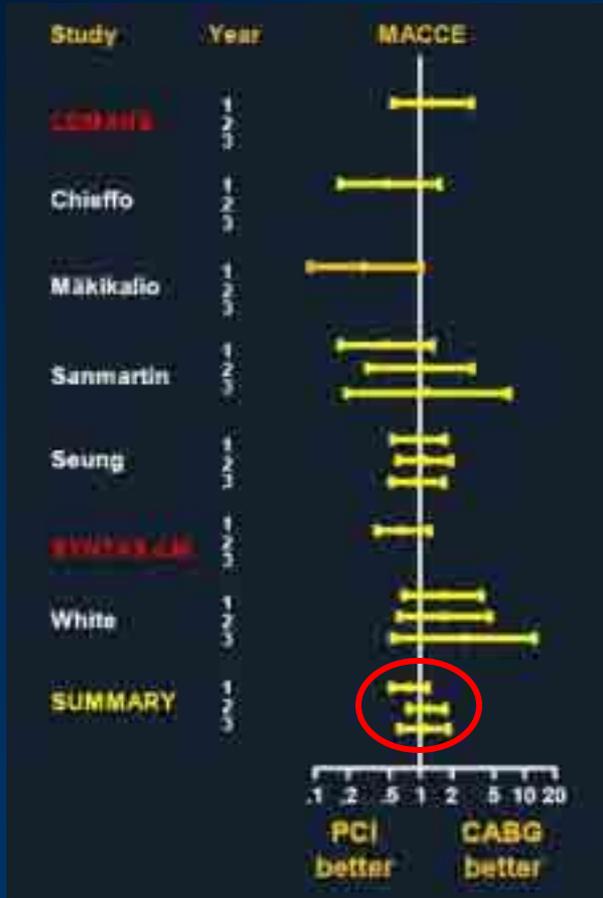
Significant Reduction of TLR with DES

Unprotected Left main stenting

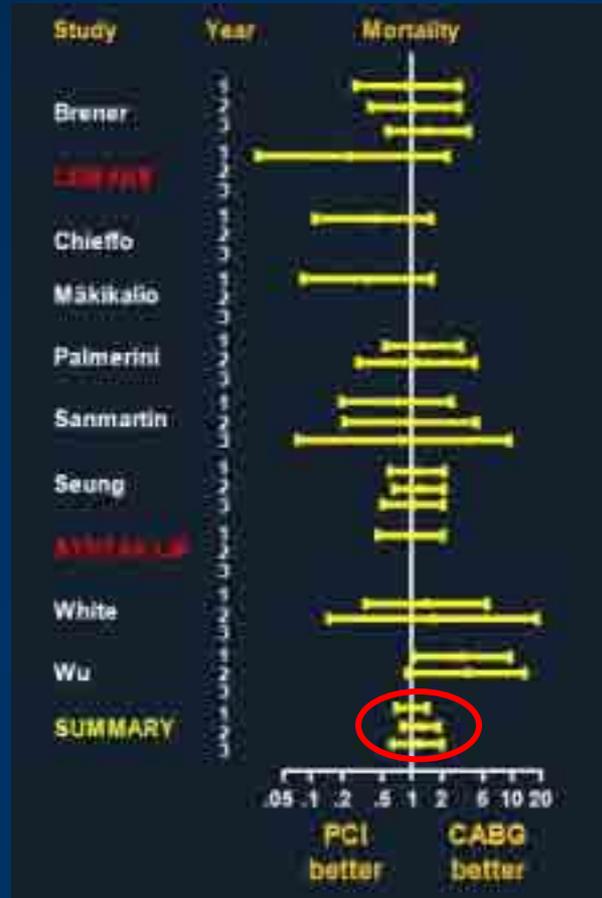


A Meta-Analysis of PCI vs CABG in 3,773 UPLM Patients

MACCE
No difference



Mortality
No difference



TVR
CABG better

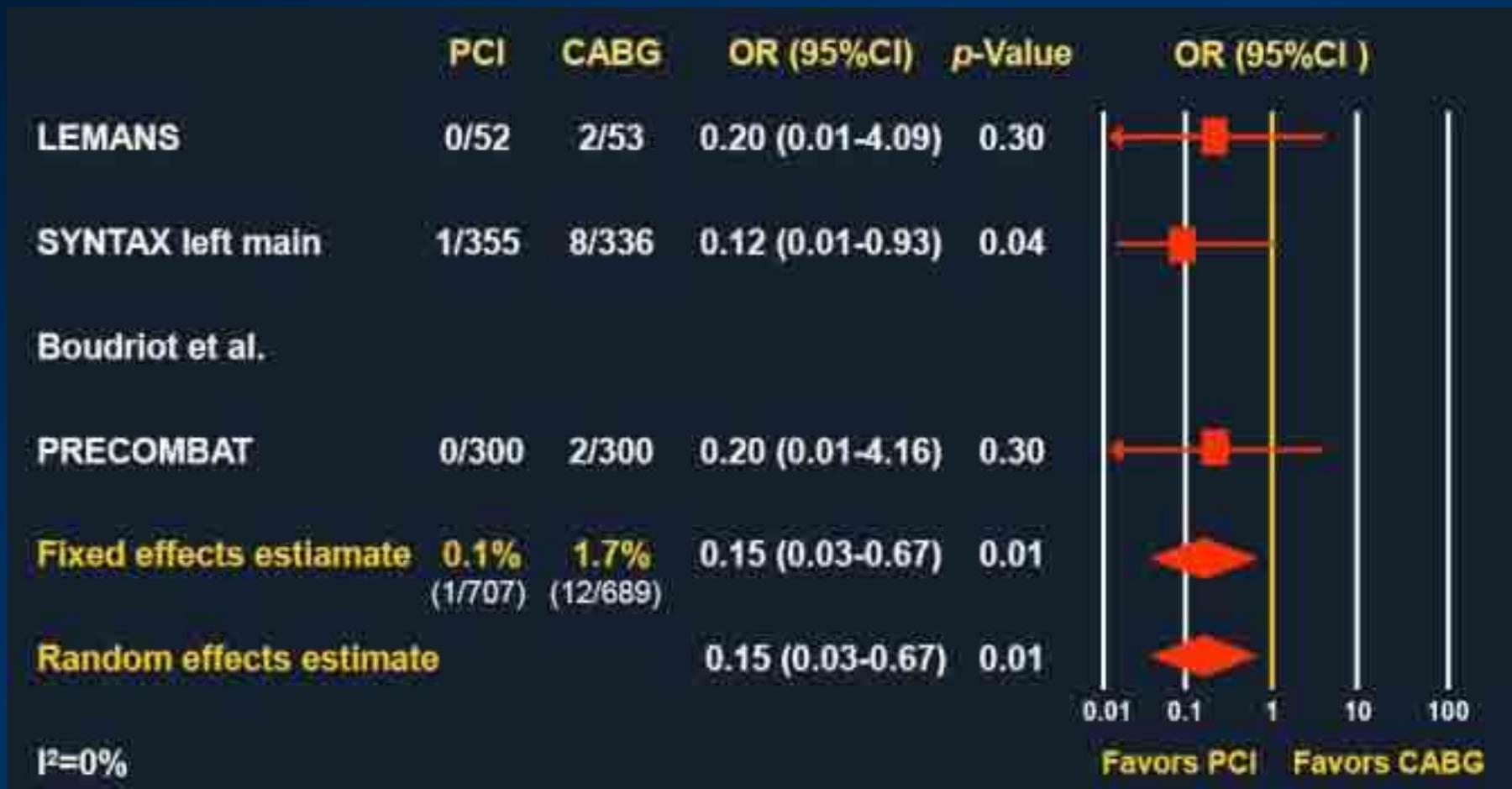


PCI vs. CABG for Left Main Disease Meta-analysis of 4 RCTs, 1,611 Patients (1 Year Mortality)



Capodanno et al, *JACC* 2011;58:1426-32

PCI vs. CABG for Left Main Disease Meta-analysis of 4 RCTs, 1,611 Patients (1 Year Stroke)



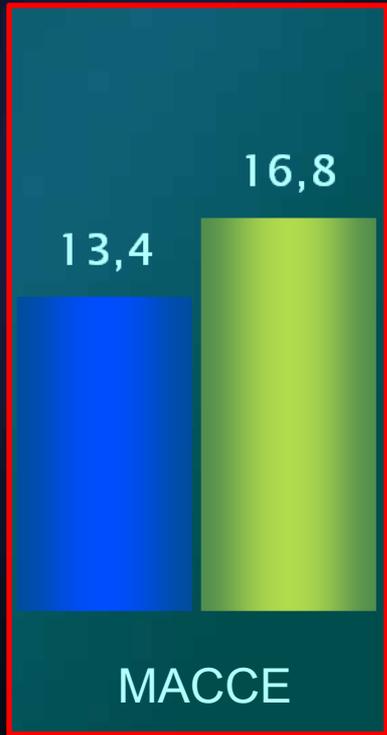
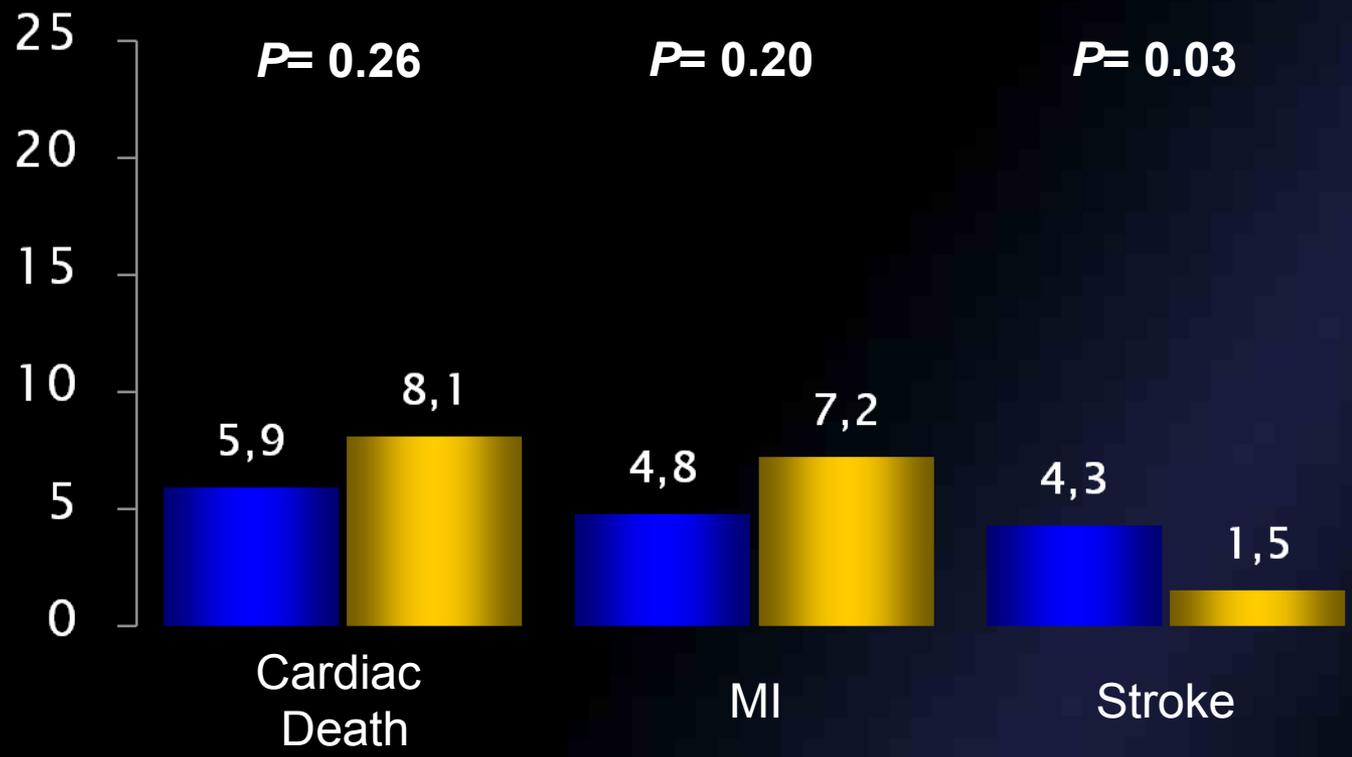
Capodanno et al, *JACC* 2011;58:1426-32

4 Years Outcomes

LM Subset

SYNTAX

CABG **TAXUS**



MACCE Without Revascularization !!

Oral presentation, TCT 2011 • November • Serruys

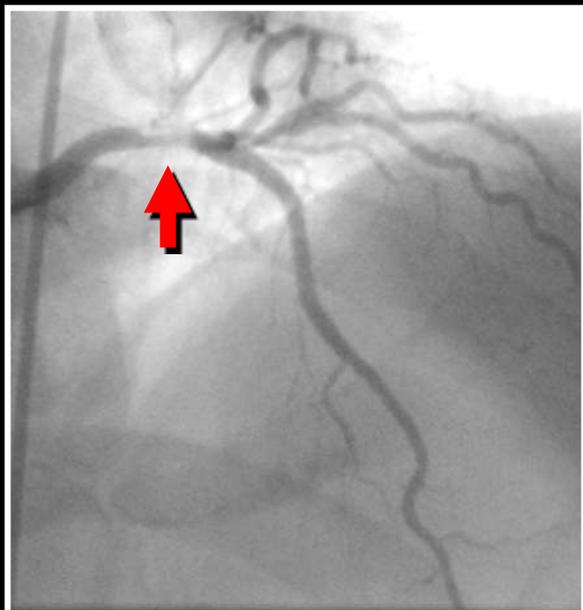
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All Left Main are Equal ???

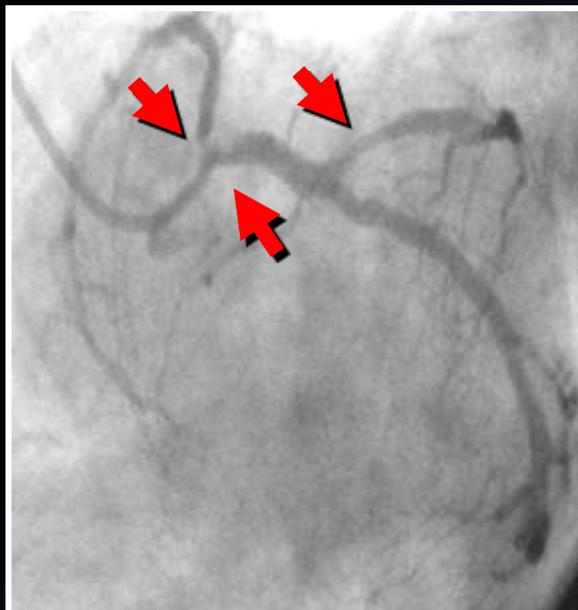
NOT.....

**Euro Score 4
Inter. Risk**



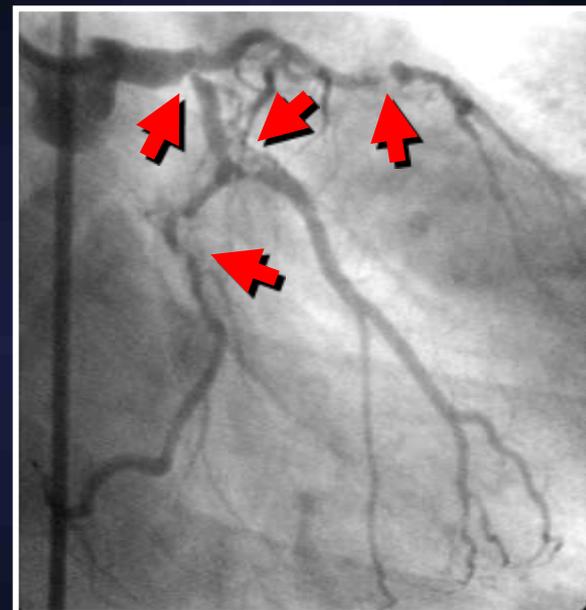
**Syntax Score 18
Low Risk**

**Euro Score 2
Low Risk**



**Syntax Score 23
Inter. Risk**

**Euro Score > 6
High Risk**

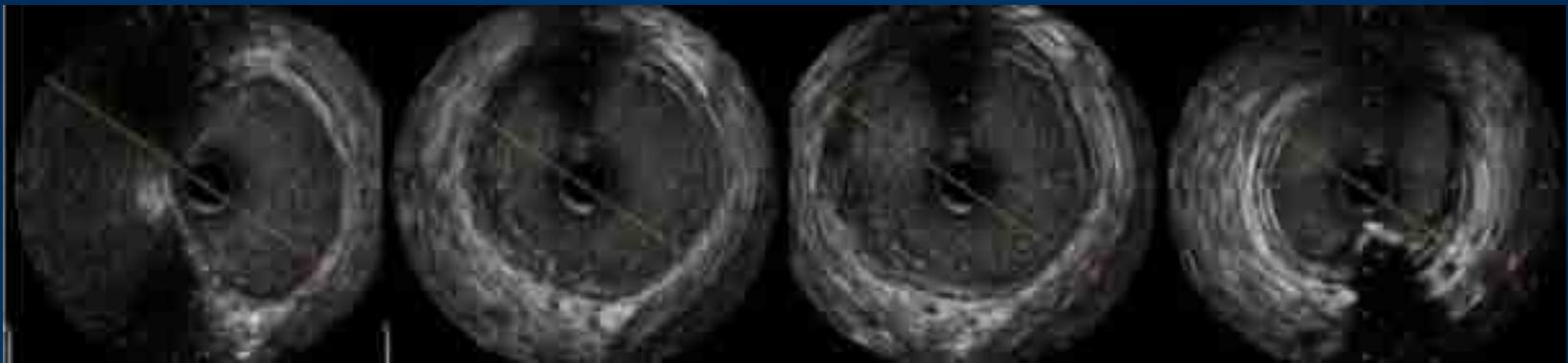


**Syntax Score 36
High Risk**

Source: Hospital Costantini registry PCI in UPLM.

IVUS in LM no Treated

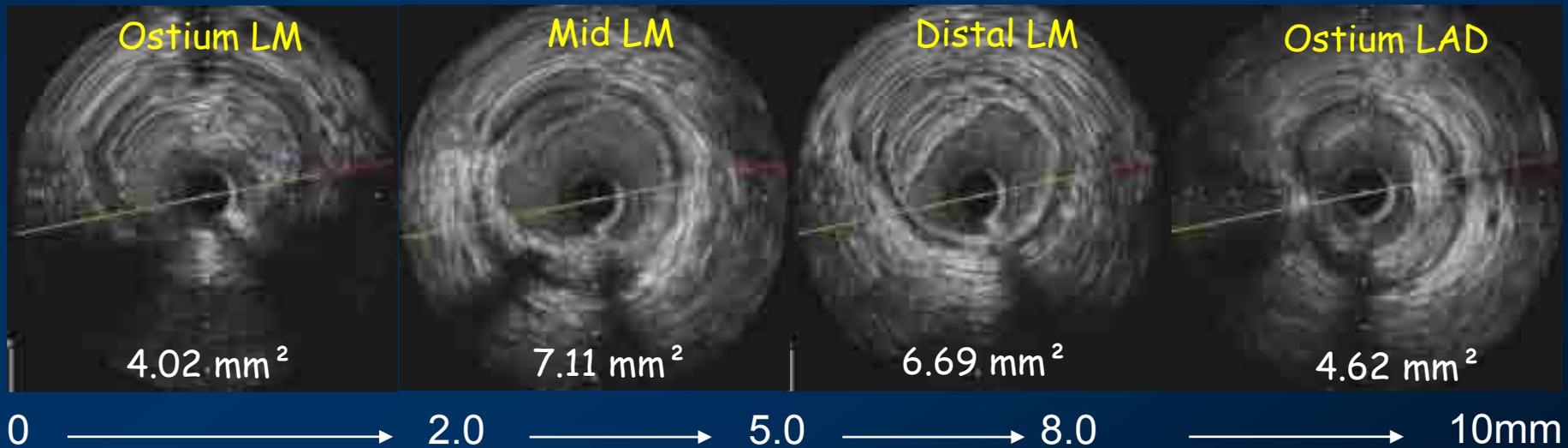
Source: Hospital Costantini

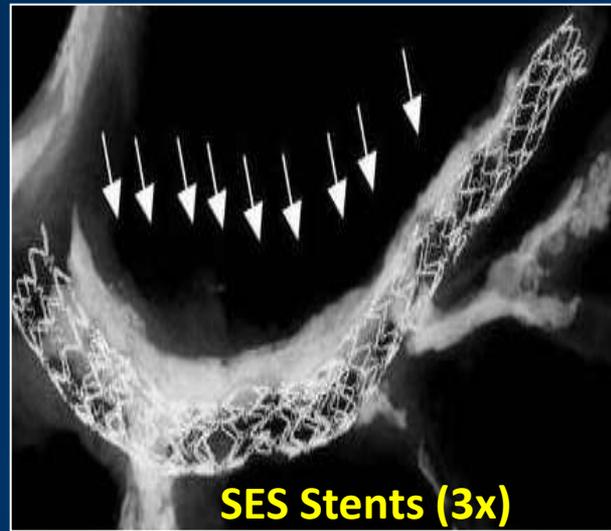
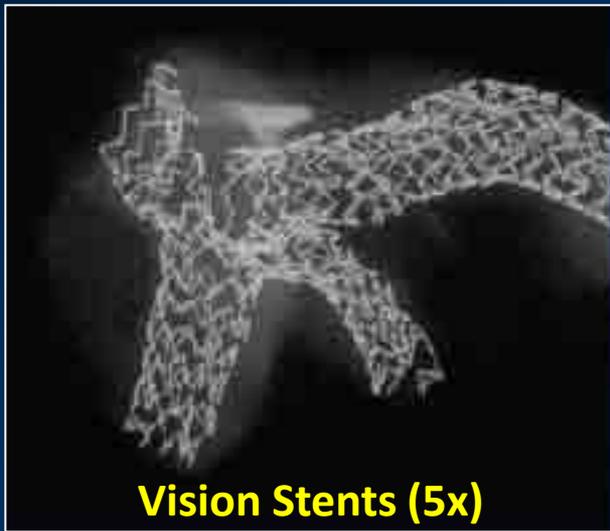
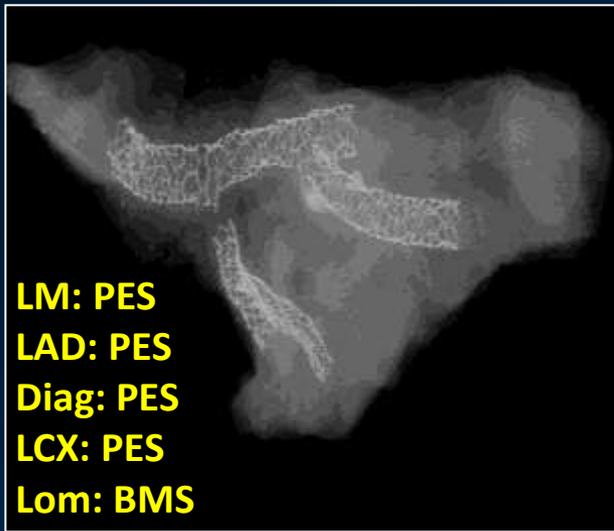


0 → 2.5 → 9.0mm

IVUS in LM Treated

Source: Hospital Costantini





Vorpahl M, Virmani R. presented ACC 2010

!!!!!! 1995 !!!!!

Who Was Thrombogenic: The Stent or the Doctor?
Patrick W. Serruys, MD, PhD; Carlo Di Mario, MD, PhD

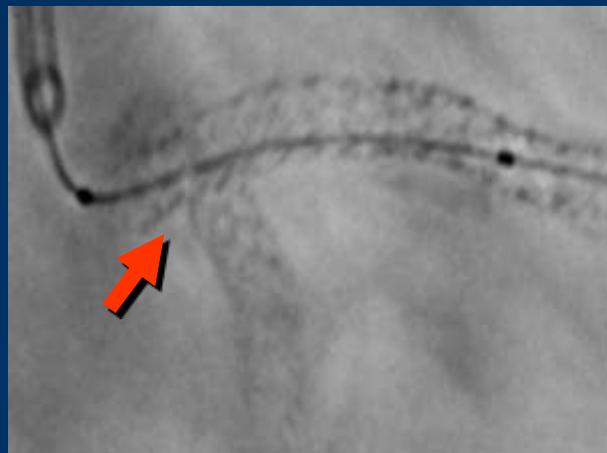
Patrick Serruys. Circulation. 1995;91:1891-1893

Left Main Stent Boost !!!!

RX
Post Mortem



Stent BOOST
In Vivo



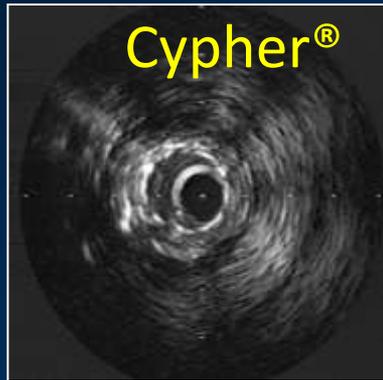
Kissing Final



HF ♂ - 68 yrs
27008 - 14Sep10

USIC Preditor de Trombose e de Reestenose na Era dos Stents Farmacológicos.

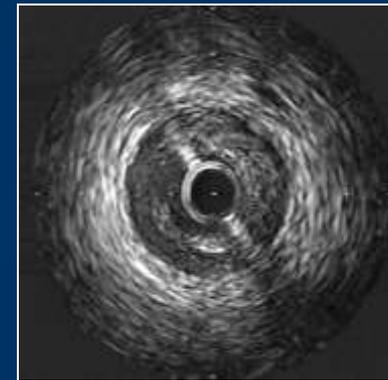
O Stent, a Técnica ou os Dois !!!!!!!!



Hipoexpansão



Mal Aposição



Trauma de Bordos



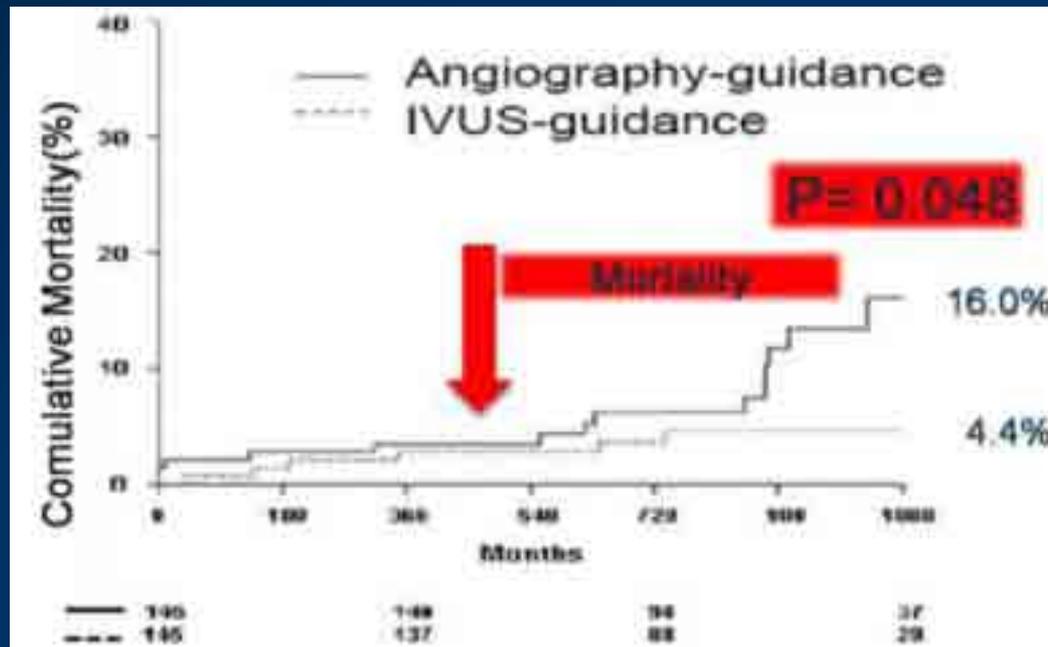
Bifurcações



Images Hospital Cardiológico Costantini

Impact of Intravascular Ultrasound Guidance on Long-Term Mortality in Stenting for Unprotected Left Main Coronary Artery Stenosis

Seung-Jung Park, MD, PhD*; Young-Hak Kim, MD, PhD*; Duk-Woo Park, MD, PhD; Seung-Whan Lee, MD, PhD; Won-Jang Kim, MD, PhD; Jon Suh, MD; Sung-Cheol Yun, PhD; Cheol Whan Lee, MD, PhD; Myeong-Ki Hong, MD, PhD; Jae-Hwan Lee, MD, PhD; Seung-Wook Park, MD, PhD; for the MAIN-COMPARE Investigators

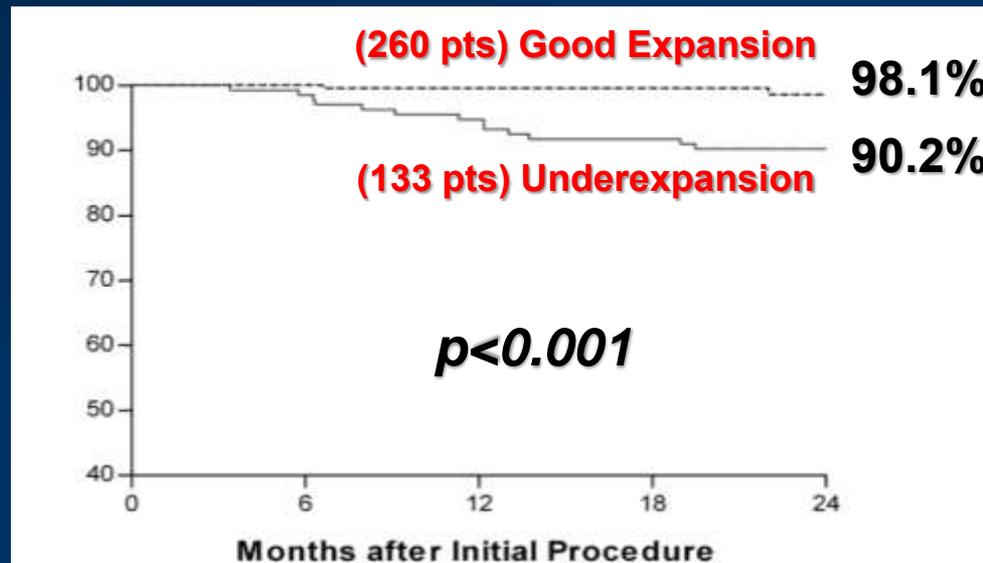


Conclusions: PCI IN Left main IVUS guidance, reduce the long-term mortality rate for unprotected left main coronary artery stenosis when compared with conventional angiography guidance.

Park SJ et al, Circ Cardiovasc Intervent. 2009;2:167-177

Comprehensive Intravascular Ultrasound Assessment of Stent Area and Its Impact on Restenosis and Adverse Cardiac Events in 403 Patients With Unprotected Left Main Disease

UnderExpansion Mortality Predictor !!!!

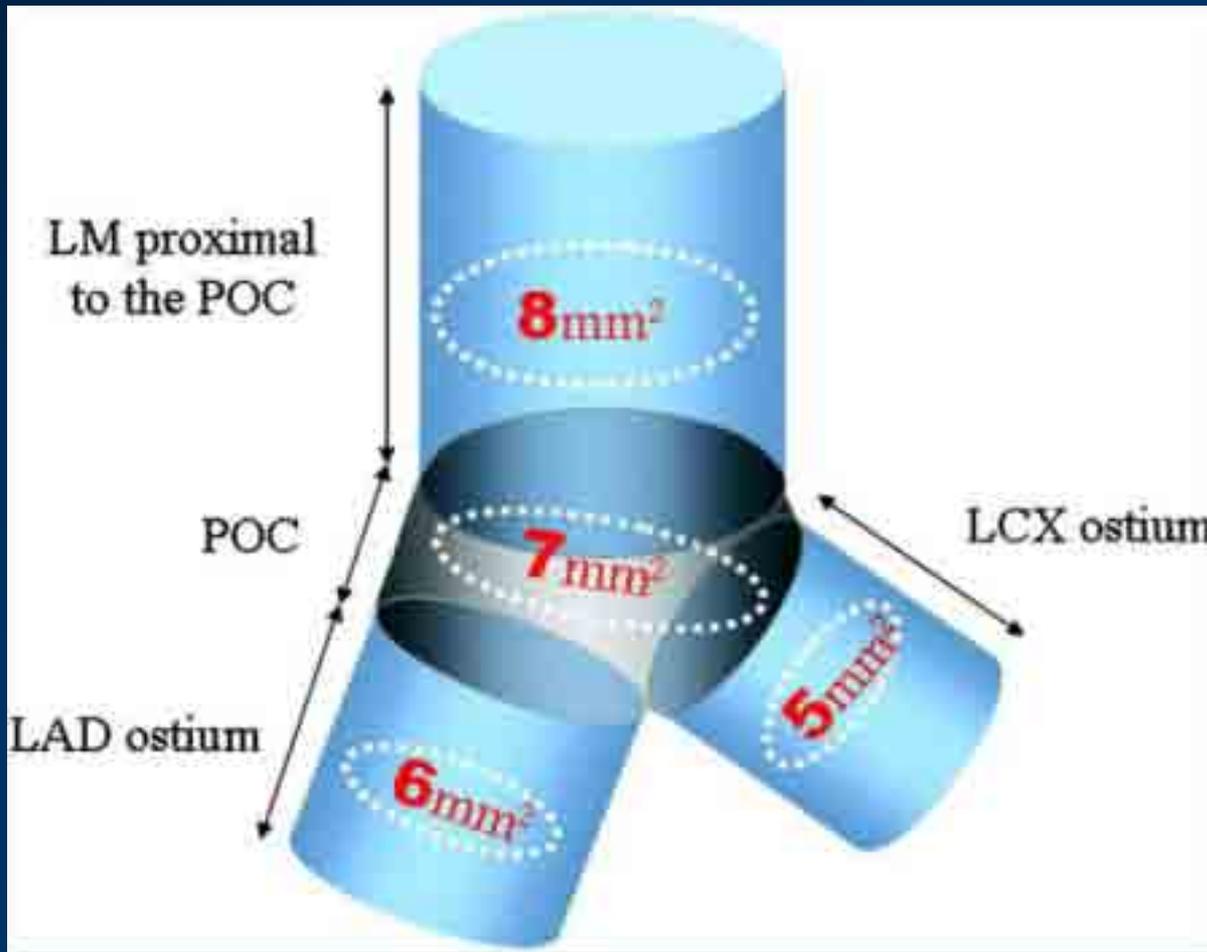


Conclusion

A smaller IVUS-MSA within any one of these segments was responsible for a higher rate of angiographic ISR and clinical MACE. Correcting underexpansion with these optimal IVUS criteria using IVUS guidance during LM stenting procedures may reduce cardiac events after DES treatment for unprotected LM disease.

Kang S et al. Circ Cardiovasc Interv. 2011;4:562-569

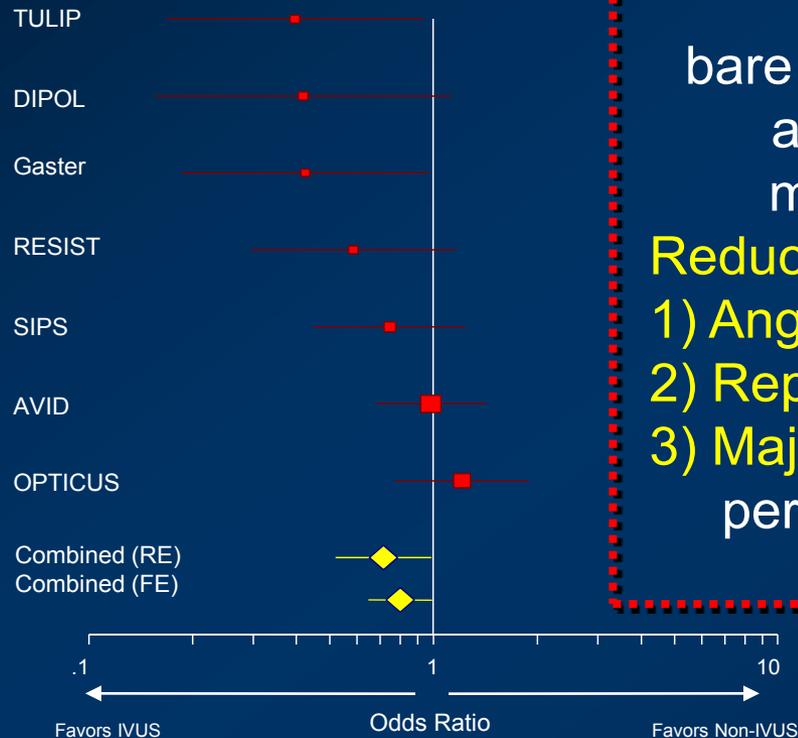
Minimal stent area threshold values for the prediction of angiographic in-stent restenosis



Kang S et al. Circ Cardiovasc Interv. 2011;4:562-569

Meta-Analysis of Randomized Studies Comparing Intravascular Ultrasound Versus Angiographic Guidance of Percutaneous Coronary Intervention **in Pre-Drug-Eluting Stent Era**

MACE



In conclusion, IVUS guidance for bare metal stent implantation improved the acute procedural results (angiographic minimum lumen diameter) and thereby

Reduced:

- 1) Angiographic restenosis
- 2) Repeat revascularization
- 3) Major adverse cardiac events, a follow-up period of 6 months to 2,5 years.

Repeat Revascularization to 4 Years

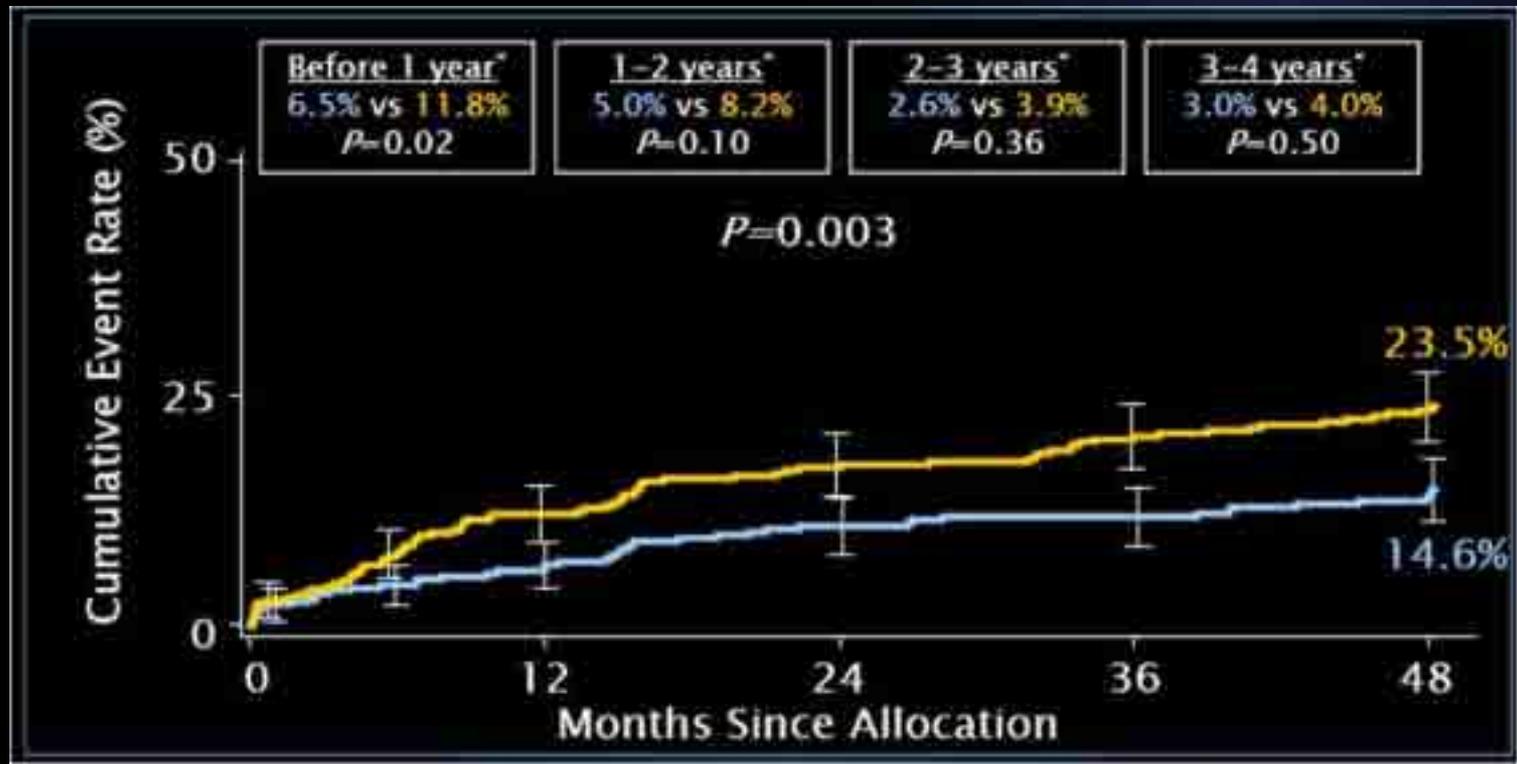
LM Subset



< 10% with IVUS ??????

■ CABG (n=348)

■ TAXUS (n=357)



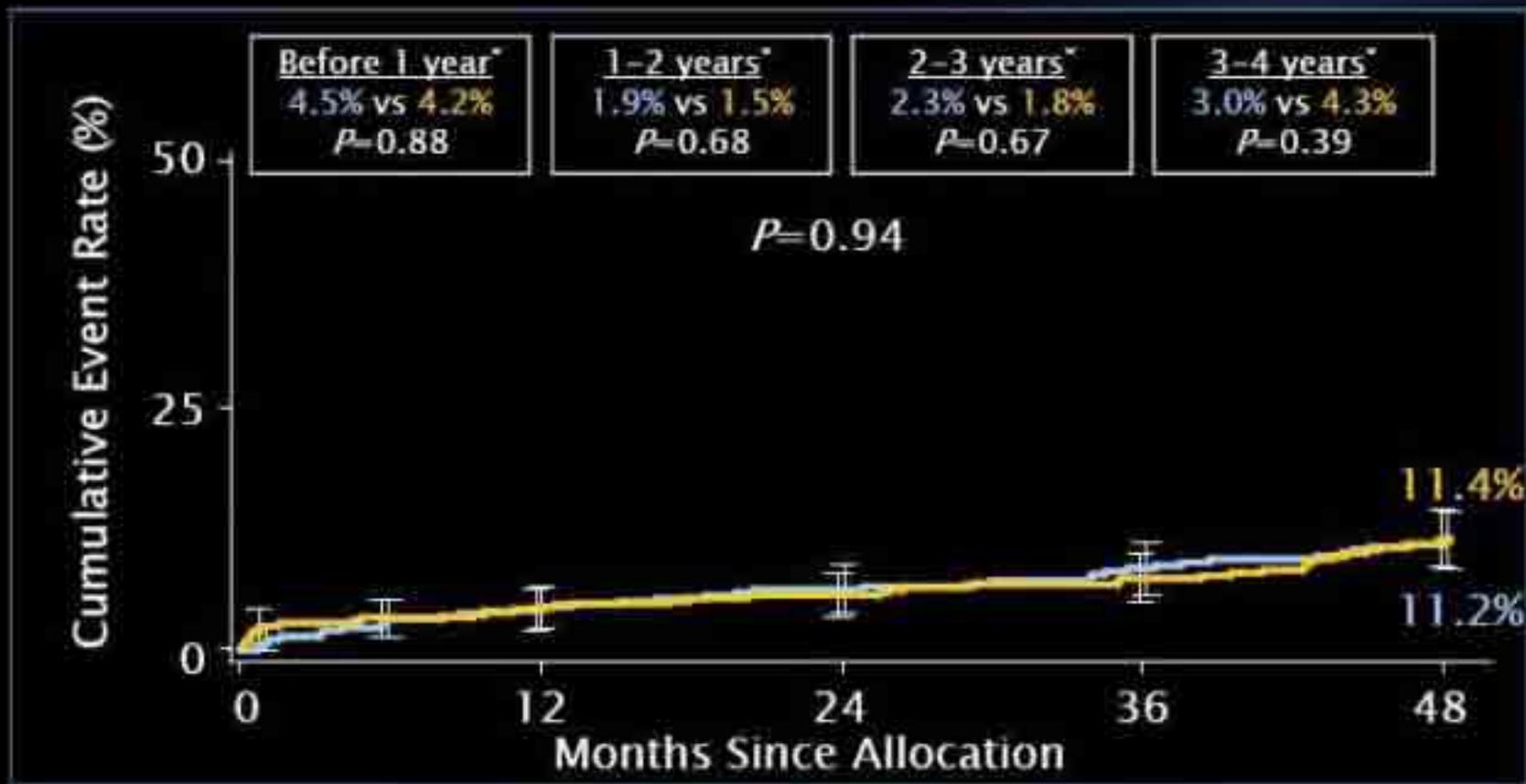
Oral presentation, Patrick W. Serruys, TCT 2011

All-cause Mortality to 4 Years

LM Subset

SYNTAX

< 10% with IVUS ??????



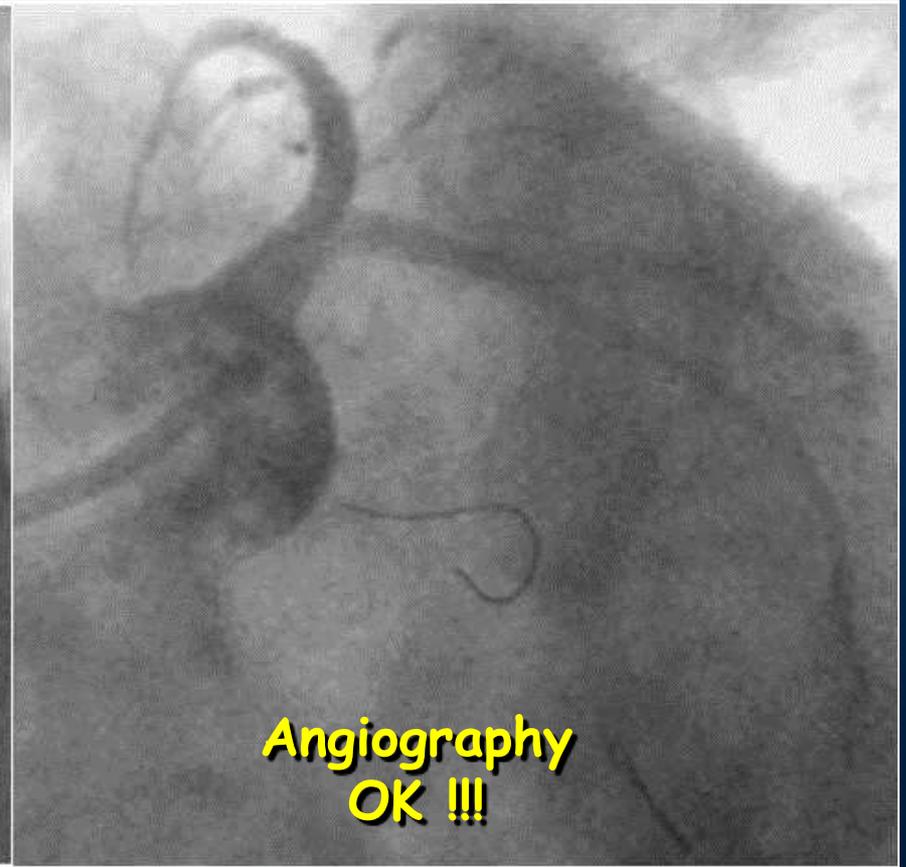
Oral presentation, Patrick W. Serruys, TCT 2011

IVUS for All !!!

Pre Intervention

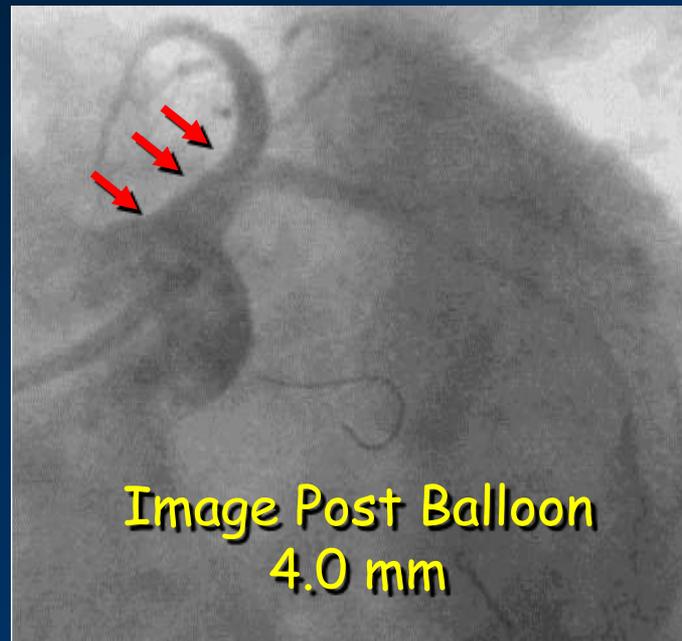


Image Post Stents



Angiography
OK !!!

- 1- Taxus 3.5 * 32
- 2- Taxus 3.5 * 8
- 3- Taxus 3.0 * 32

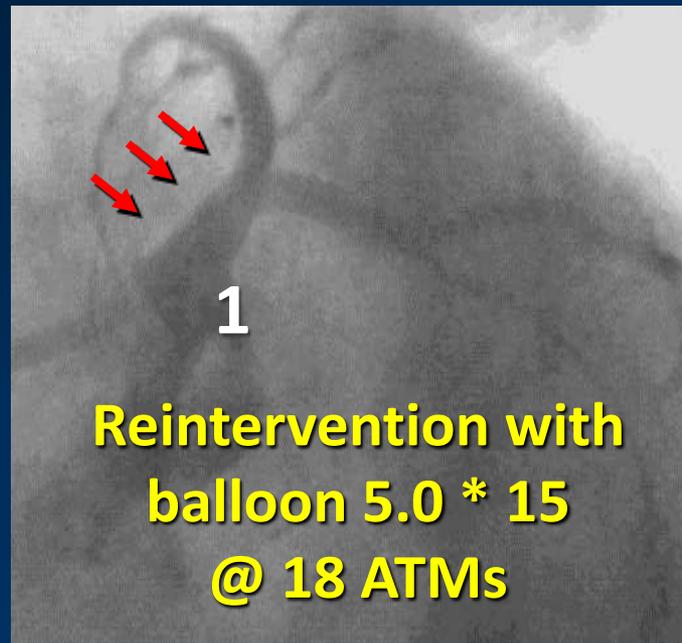


Malapposition



0 —————> 3.0 —————> 6.0mm

**1- Ballon 5.0 *
15 at 18 ATM**

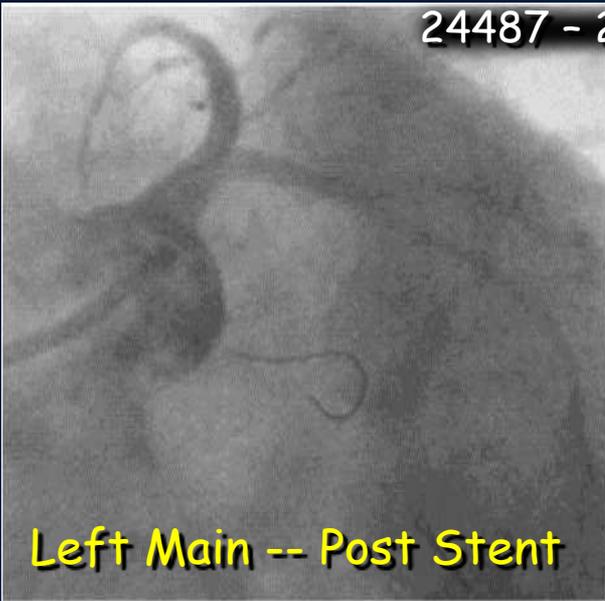


IVUS Post Reintervention

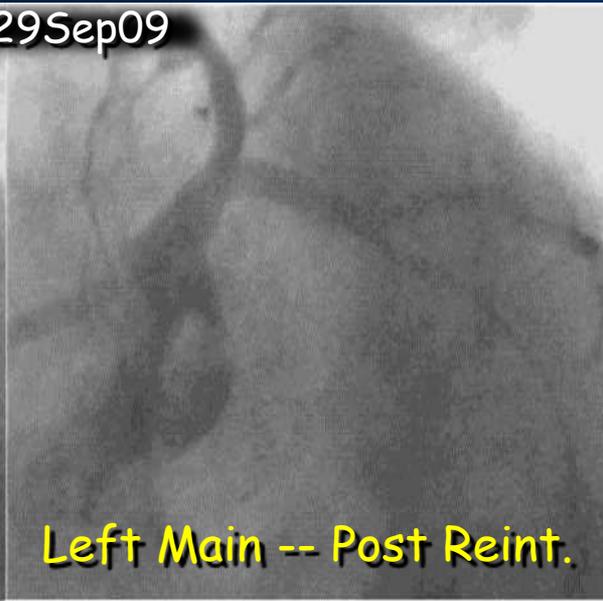


0 —————> 3.0 —————> 6.0mm

24487 - 29Sep09

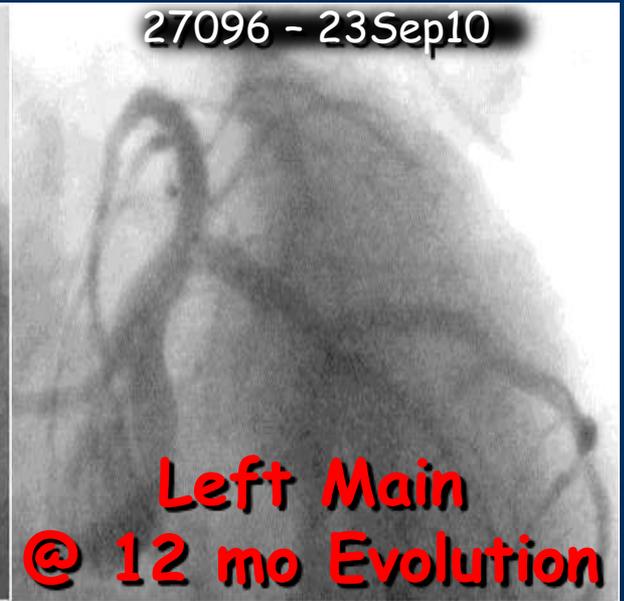


Left Main -- Post Stent

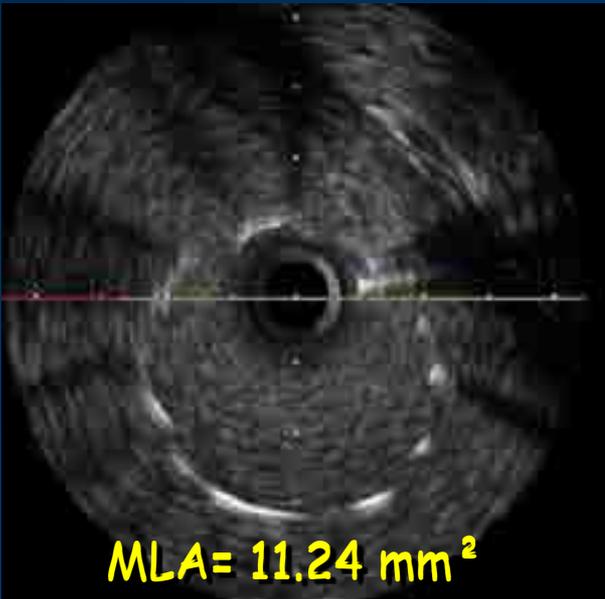


Left Main -- Post Reint.

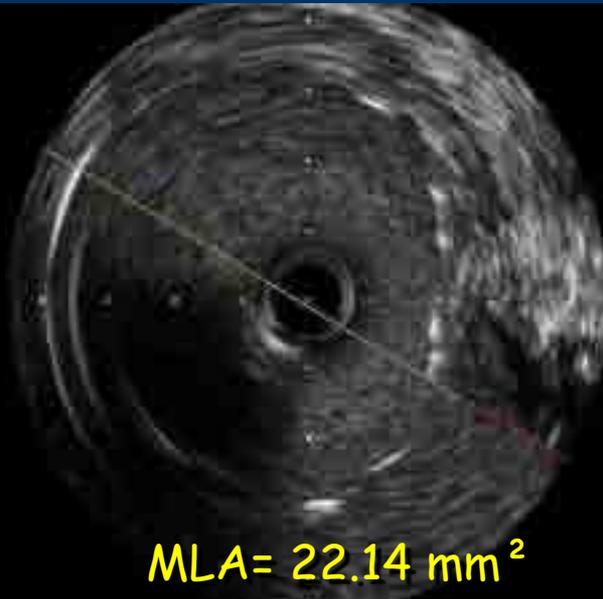
27096 - 23Sep10



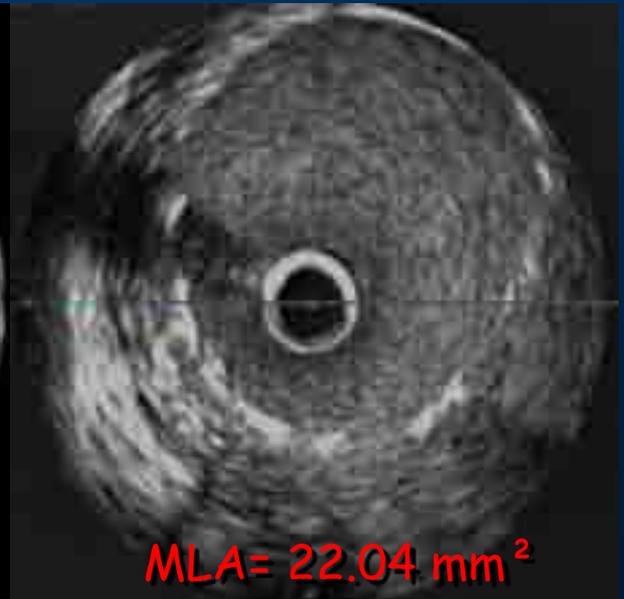
Left Main
@ 12 mo Evolution



MLA= 11.24 mm²



MLA= 22.14 mm²



MLA= 22.04 mm²

Quando Indicar PCI em Lesões do Tronco

1. Guidelines
2. Resultados Cirurgia Cardíaca
3. Resultados Intervencionismo
4. Tecnologia
- 5. Experiência da Equipe**

The First Brazilian Registry UPLM PCI

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Artigo Original

Evolução Clínica de Pacientes com Lesões de Tronco de Coronária Esquerda Não-Protegido Submetidos a Angioplastia Coronária com Implante de Stents Farmacológicos

Costantino R. Costantini¹, Daniel Zanuttini¹, Marcos A. Denk¹, Sergio G. Tarbine¹, Marcelo F. Santos¹, Eduardo F. Oliveira¹, Marcos H. Bubna¹, José F. Rocha¹, Marcos J. Barbosa¹, Costantino O. Costantini¹

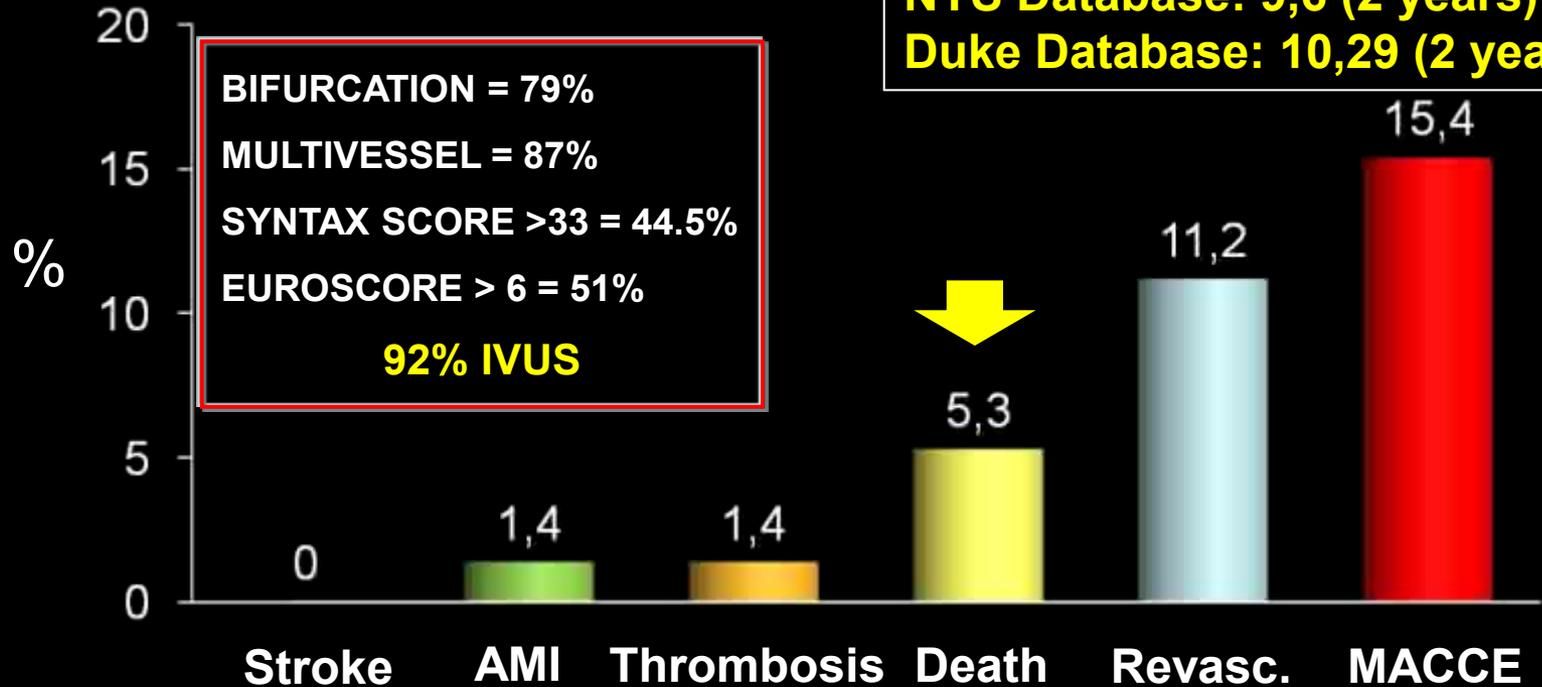
Costantini et al. RBCI; Junho, 2011;19(2): 153-9

Costantini Experience in UPLM

Clinical Follow up 917 ± 743 days

142 patients

CABG Results (F/U mortality)
Cleveland: 11,3 (1 year)
NYS Database: 9,6 (2 years)
Duke Database: 10,29 (2 years)



Costantini et al. RBCI; Junho, 2011;19(2): 153-9

Angioplastia em Tronco não Protegido

Experiência HCC

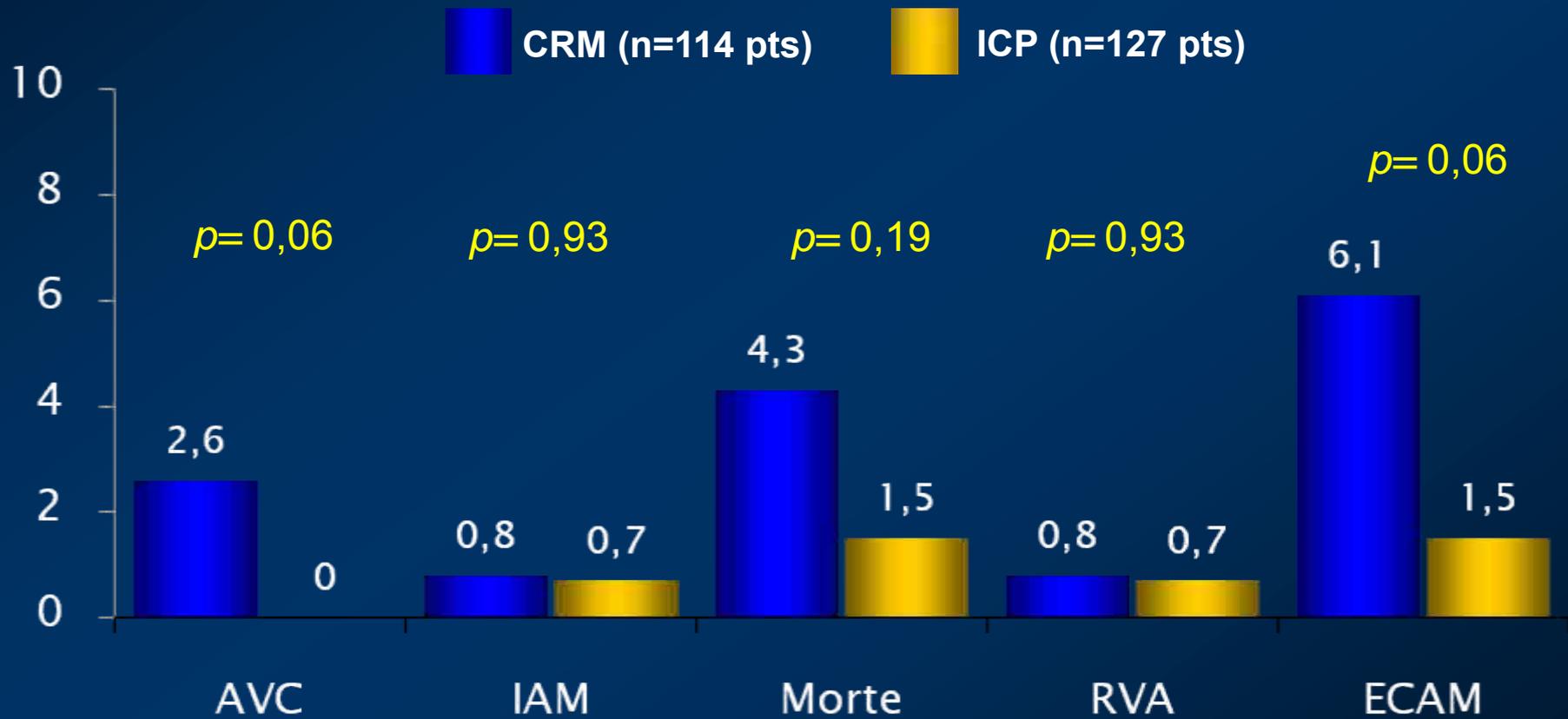
**Ultrassom
Intracoronário
92%**

Nov 2003 -- Jun 2012



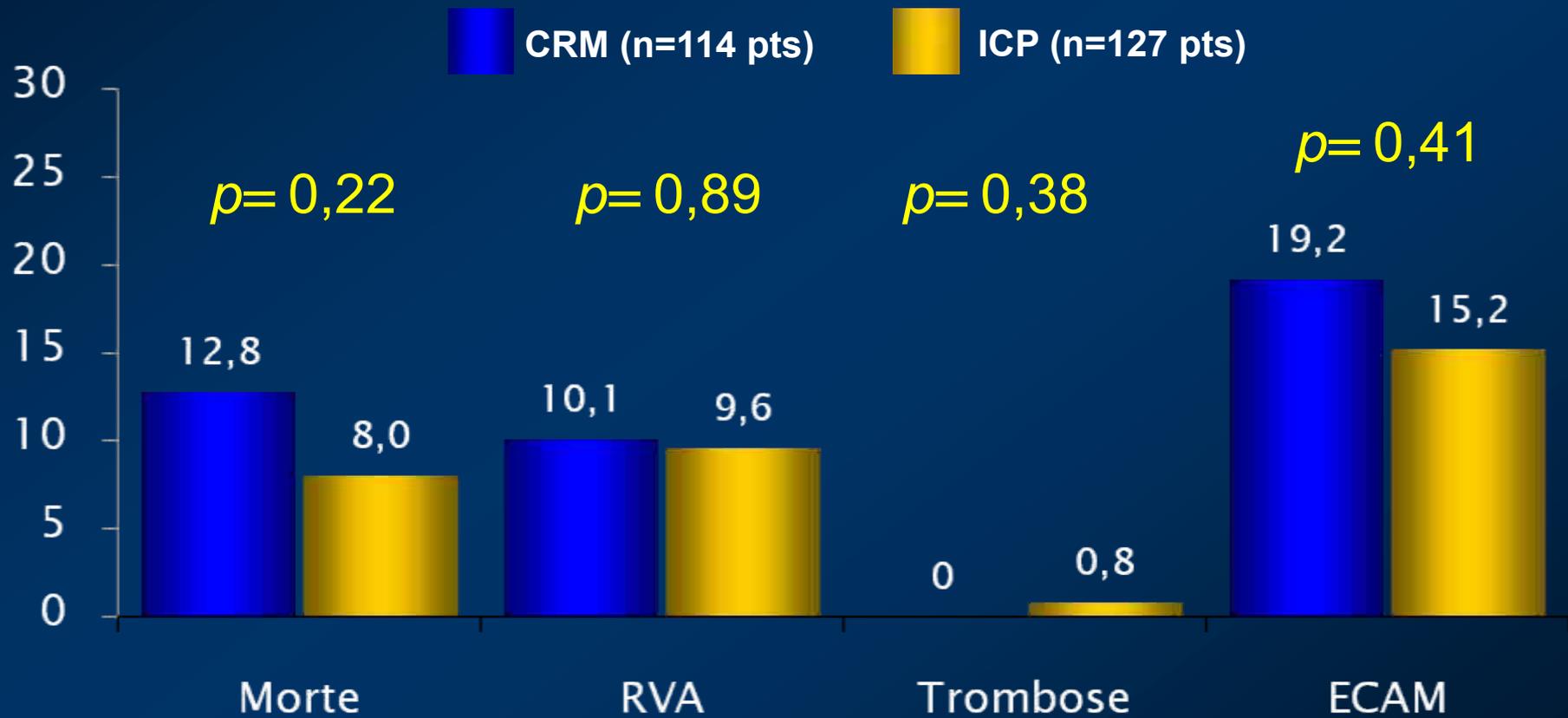
Evolução Clínica em Pacientes com Lesões de Tronco de Coronária Esquerda Tratados com CRM vs. ICP com Stents Farmacológicos.

Evolução Intra Hospitalar



Evolução Clínica em Pacientes com Lesões de Tronco de Coronária Esquerda Tratados com CRM vs. ICP com Stents Farmacológicos.

Evolução 940 dias



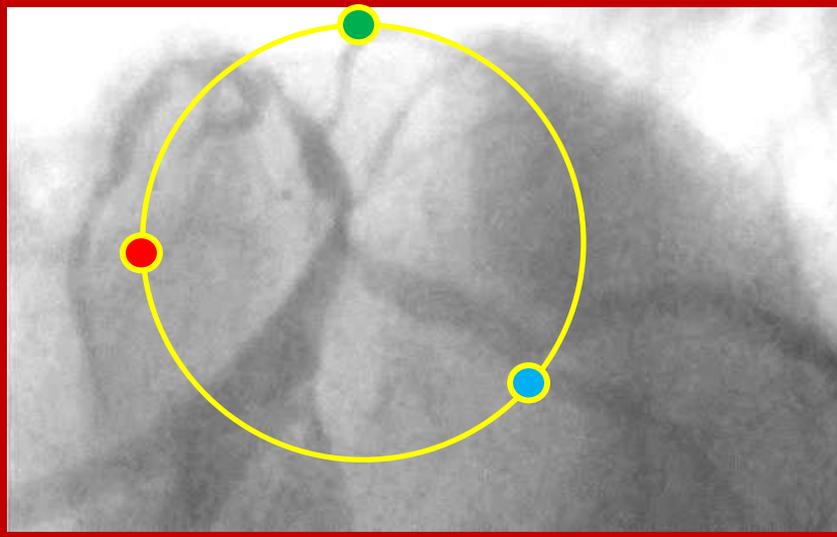
Medicina Baseada em Evidências



[David L. Sackett](#) OC, FRSC, MD, MA, FRCP, was the founding Chair of Canada's first [Department of Clinical Epidemiology & Biostatistics](#)

- **Conhecimento científico sólido**
Preditores de Risco
- **Experiência do médico**
- **Preferência do paciente !!!!!!!!!!!!!**

Left Main Today.....



- Experience
- Technology
 - ✓ IVUS
 - ✓ Stent Boost
 - ✓ OCT
 - ✓ FFR
- Judgment
- Honesty



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