Hemoducto Venoso: Cambio en el Paradigma de Tratamiento

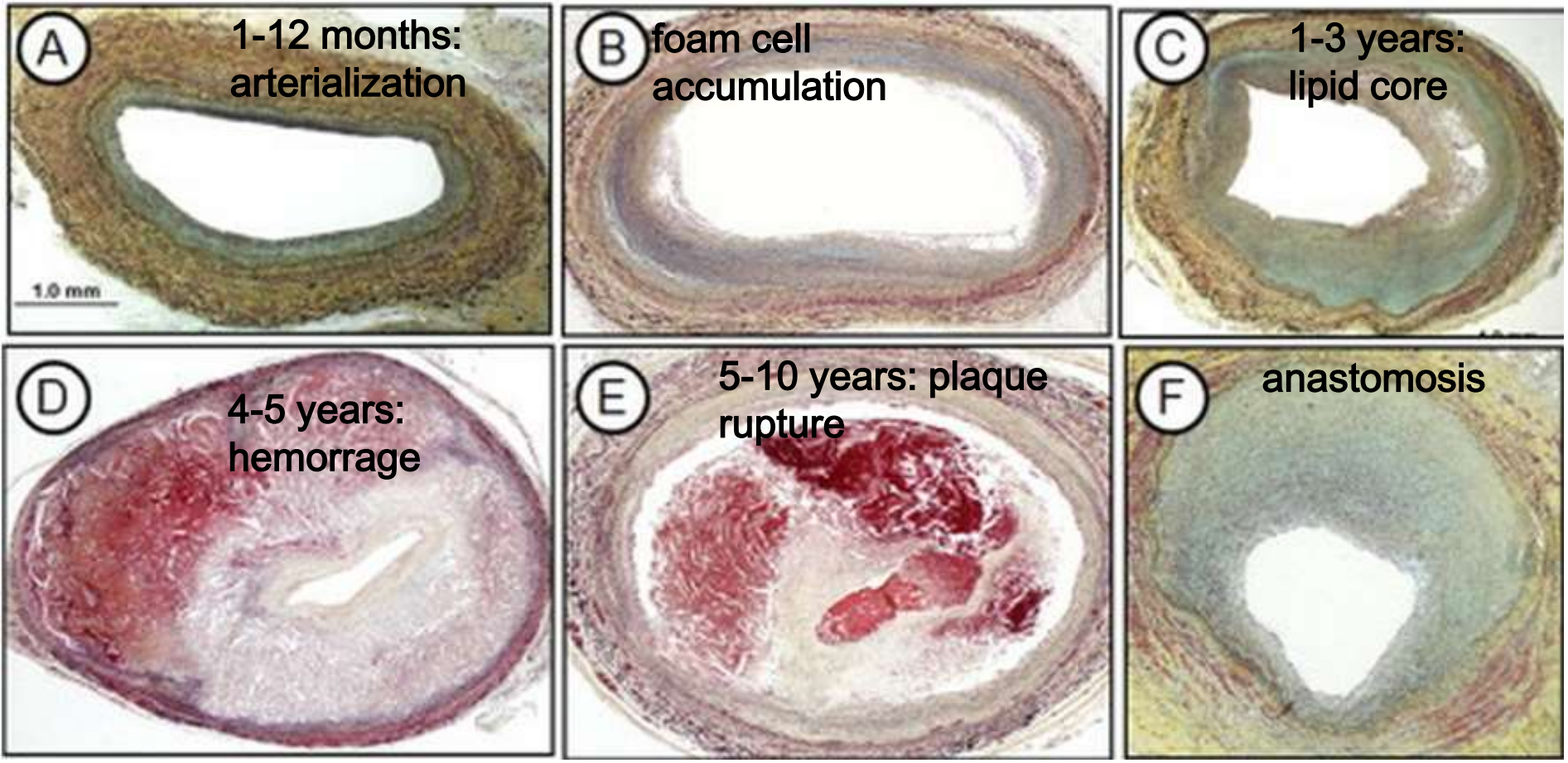
Augusto Pichard, M.D.

Director Innovation and Structural Heart Disease,
Vice Chair, Medstar Heart Institute,
Medstar Washington Hospital Center.
Professor of Medicine (Cardiology),
Georgetown University Medical School.

Washington, DC

Medstar Heart Institute

Cleveland Clinic
Heart and Vascular Institute

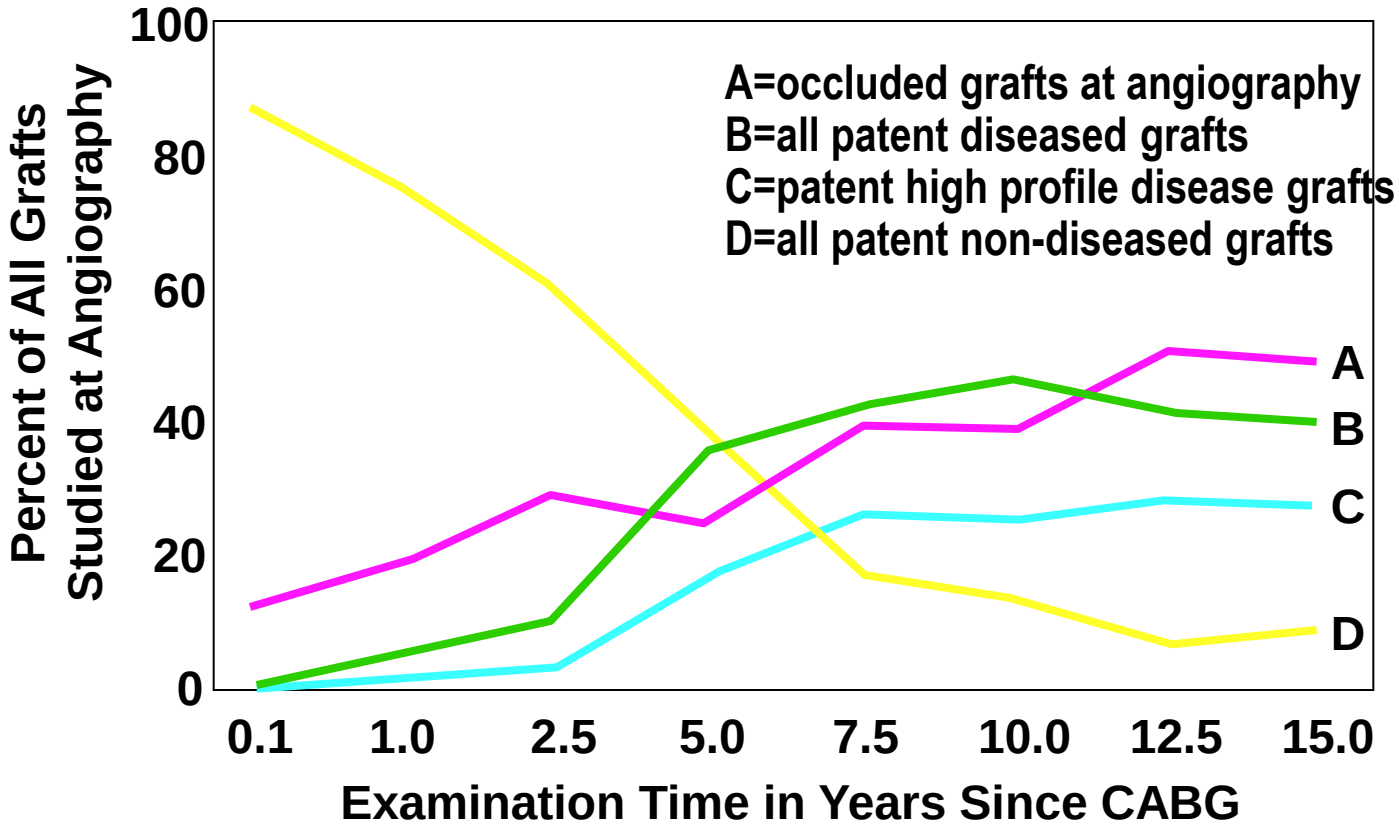


(A) Within the first year, arterialization and fibrointimal thickening of the vein graft is observed. (B) This is followed by foam cell accumulation within the neointima. (C) Between the first and third year, formation of a lipid core is observed. (D) After 4 to 5 years, hemorrhage into the lipid core and moderate-to-severe lumen narrowing is observed. (E) At 5 to 10 years, plaque rupture of a large necrotic core accompanied with hemorrhage often leads to luminal thrombus. (F) At the coronary anastomosis, fibrointimal growth is commonly observed, whereas atherosclerosis is uncommon.

Yazdani, Virmani et al. JACC Interv 2012;5(6):666-74

Longterm F-U of 5065 SVGs in 1388 patients.

Fitzgibbon et al. (Canada) JACC 1996;28:616-26



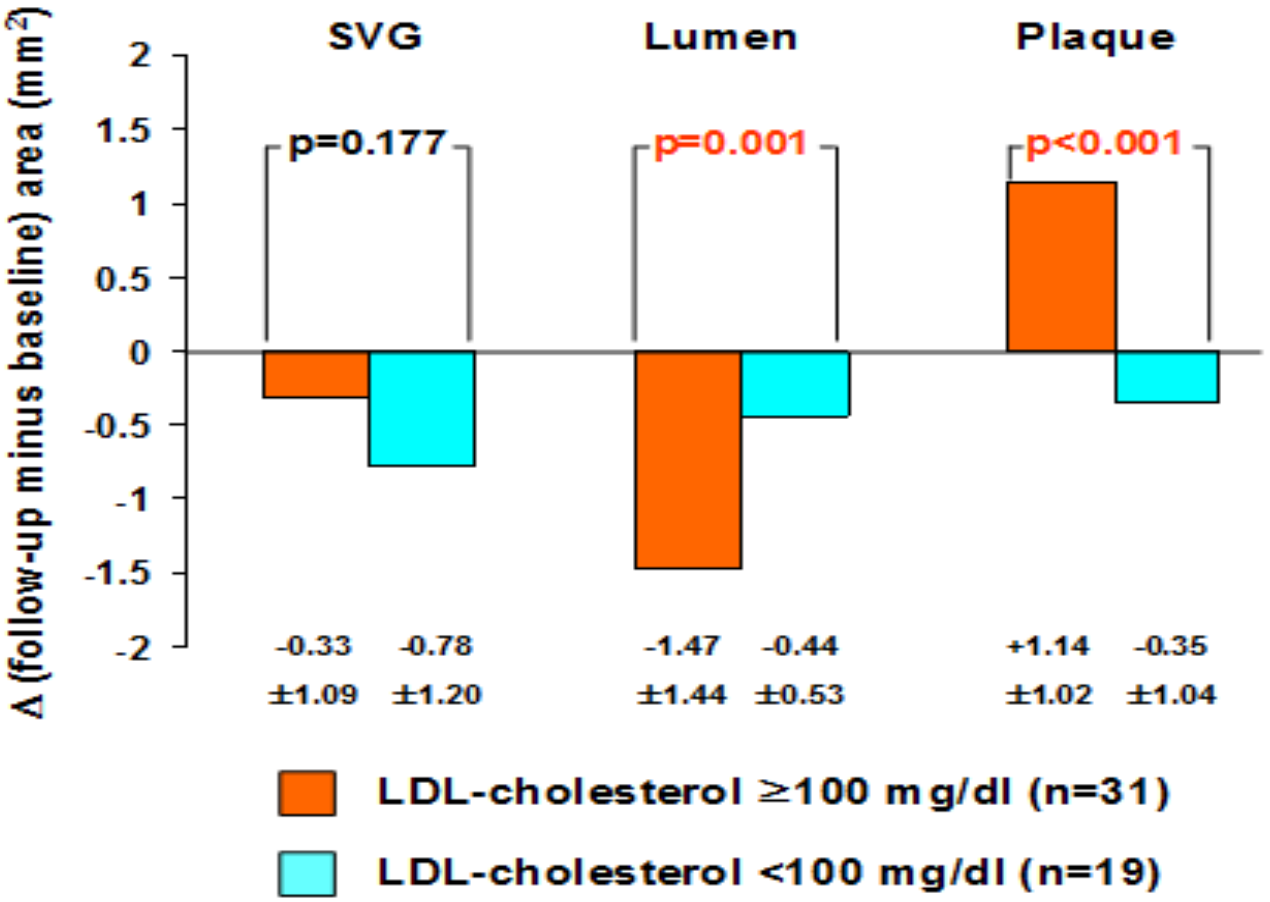
PCI of SVG's

- High risk of no-reflow
- Higher restenosis
- PCI of SVG's has become rare: 5.7% of 1,596,966 PCI's in NCDR (JACC Interv 2010;3:1068-73)

Lipid Therapy and Plaque Progression in SVG Disease

WHC: YJ Hong JACC 2009;53:1257–64

Area change (mm2)



Aggressive Lipid Therapy for SVG Disease.

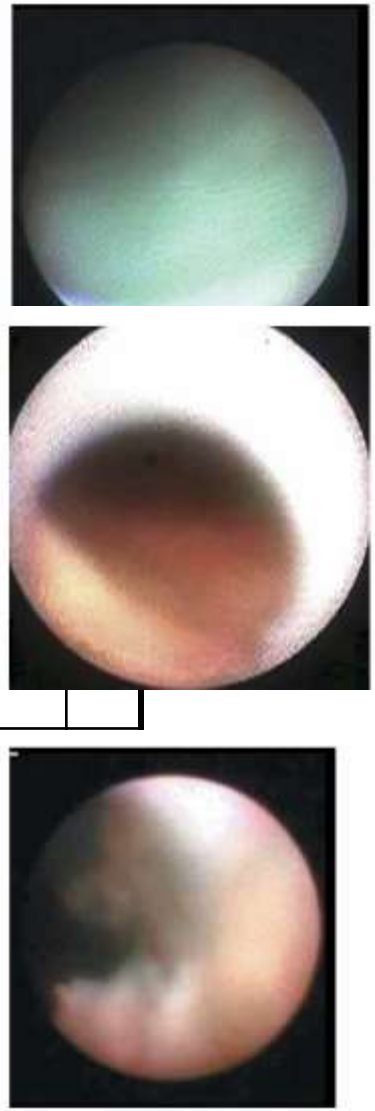
Hata et al. Ann Thorac Surg 2009;88:1440–4

21 patients, 27 SVG's.

Statin therapy until LDL <80mg and LDL/HDL ra

IVUS and angioscopy at 12-16 months.

	Aggressive Rx.	Standard Rx.
LDL	64	130
LDL/HDL ratio	1.36	2.64
IVUS eccentric plaques	0	79%
Yellow plaque by Angioscopy	0	100%
Thrombus by Angioscopy	0	79%



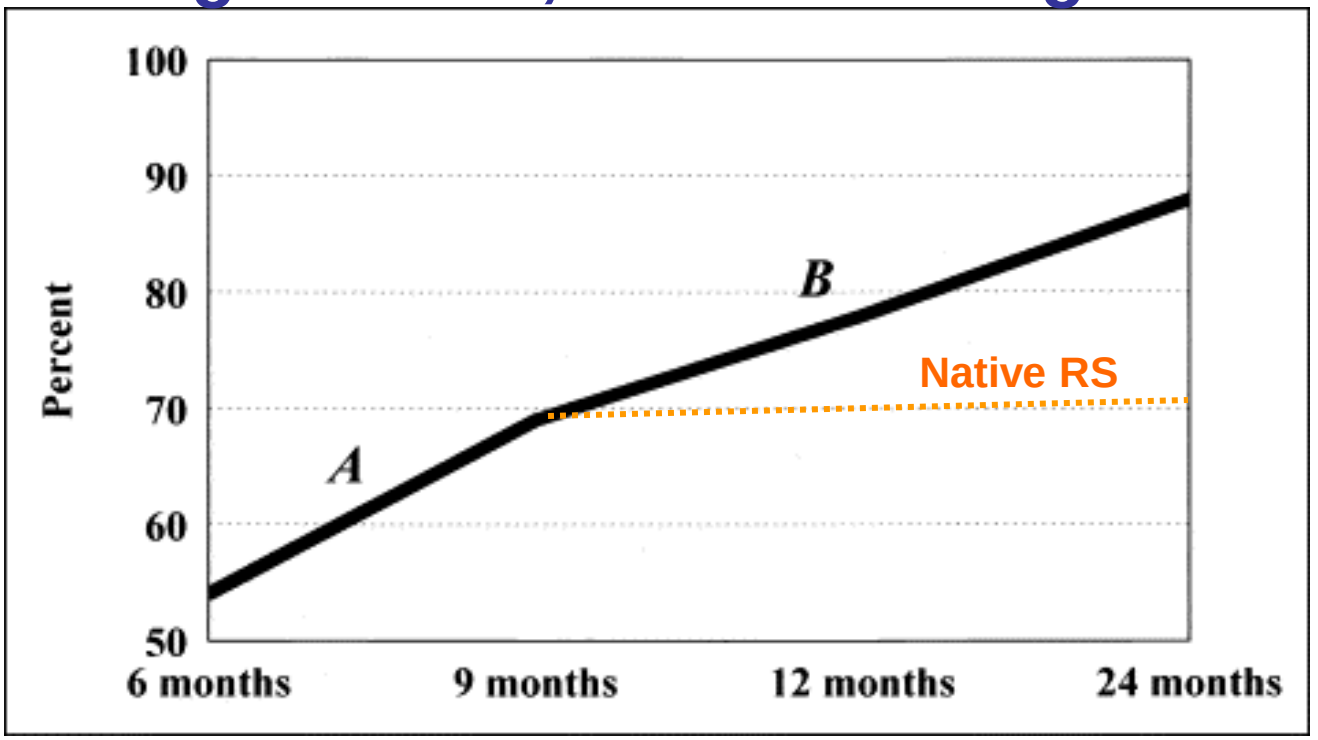
(More Aggressive group patients on Ticlid)

TVR after SVG PCI

WHC: Hong et al. AJC 2000;85:256-8

2,186 SVG lesions with successful PCI.

43% repeat revascularization at 2 years: 11% Target lesion, 32% non Target lesion

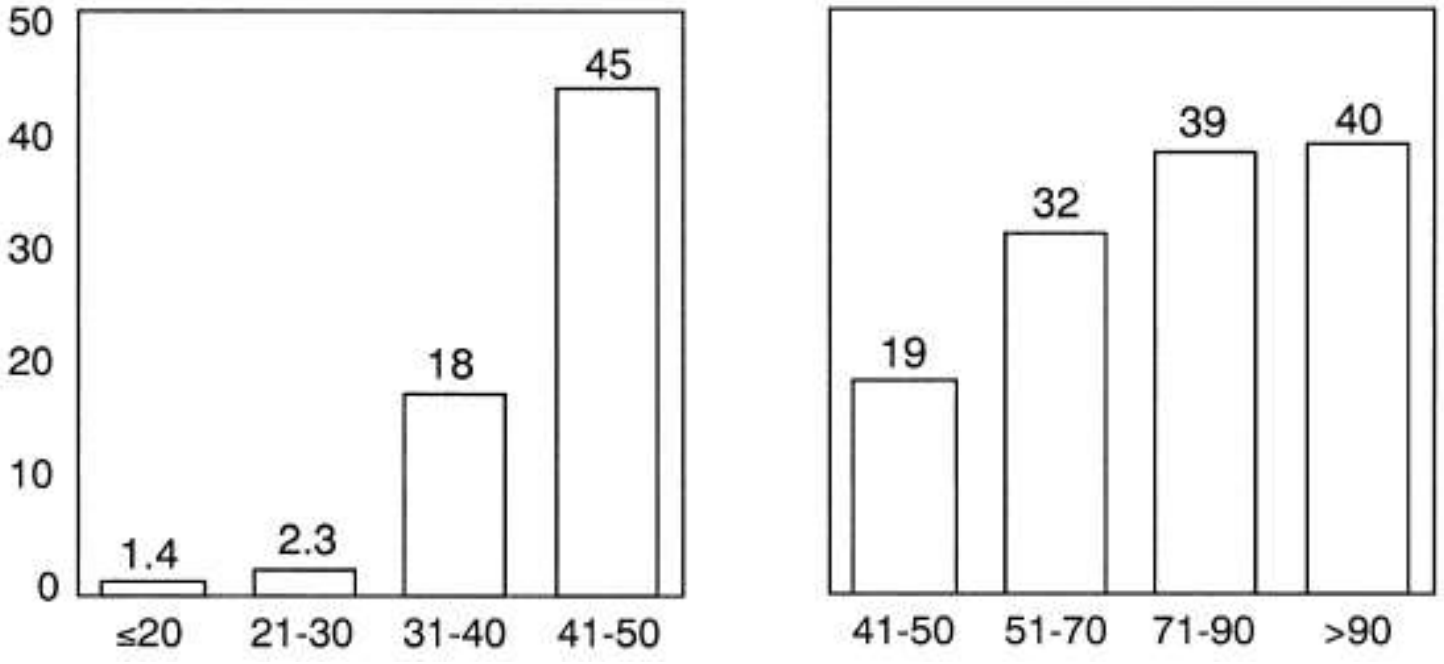


3 year outcome after PCI of SVG's.

CCF: Ellis et al. AJC 1997;79:1460–1464

1095 SVG segments in 103 patients

%Death, MI, Revasc.

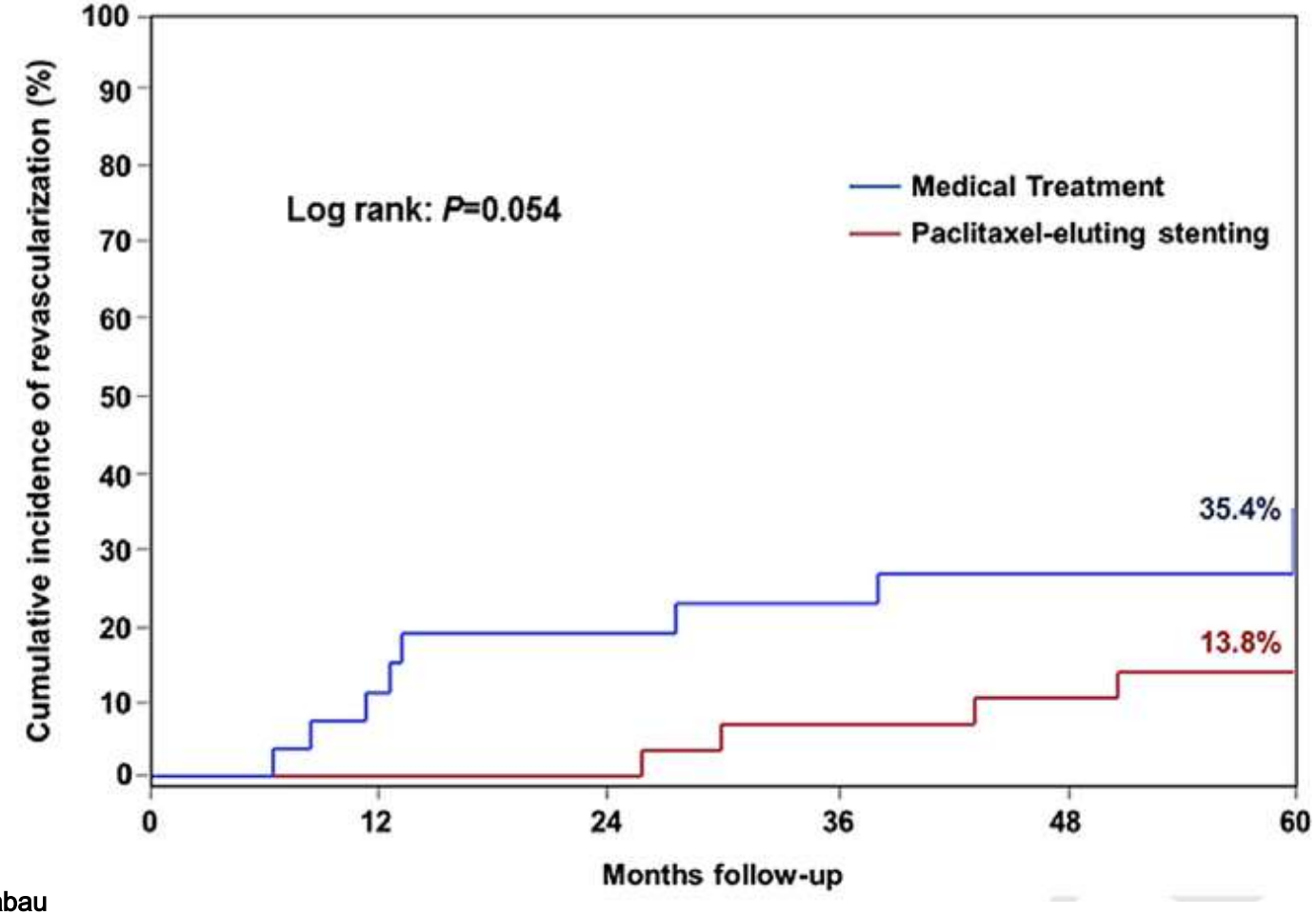


Initially Untreated **Initially Treated**

Veleti 5 year f-u.

Rodes-Cabau et al. Circul 2009;120:1978-86, Canadian J Cardiol In Press

Moderate SVG Lesions randomized to Medical Rx or Taxus DES.



Courtesy Dr Rodes-Cabau

Which lesions embolize?

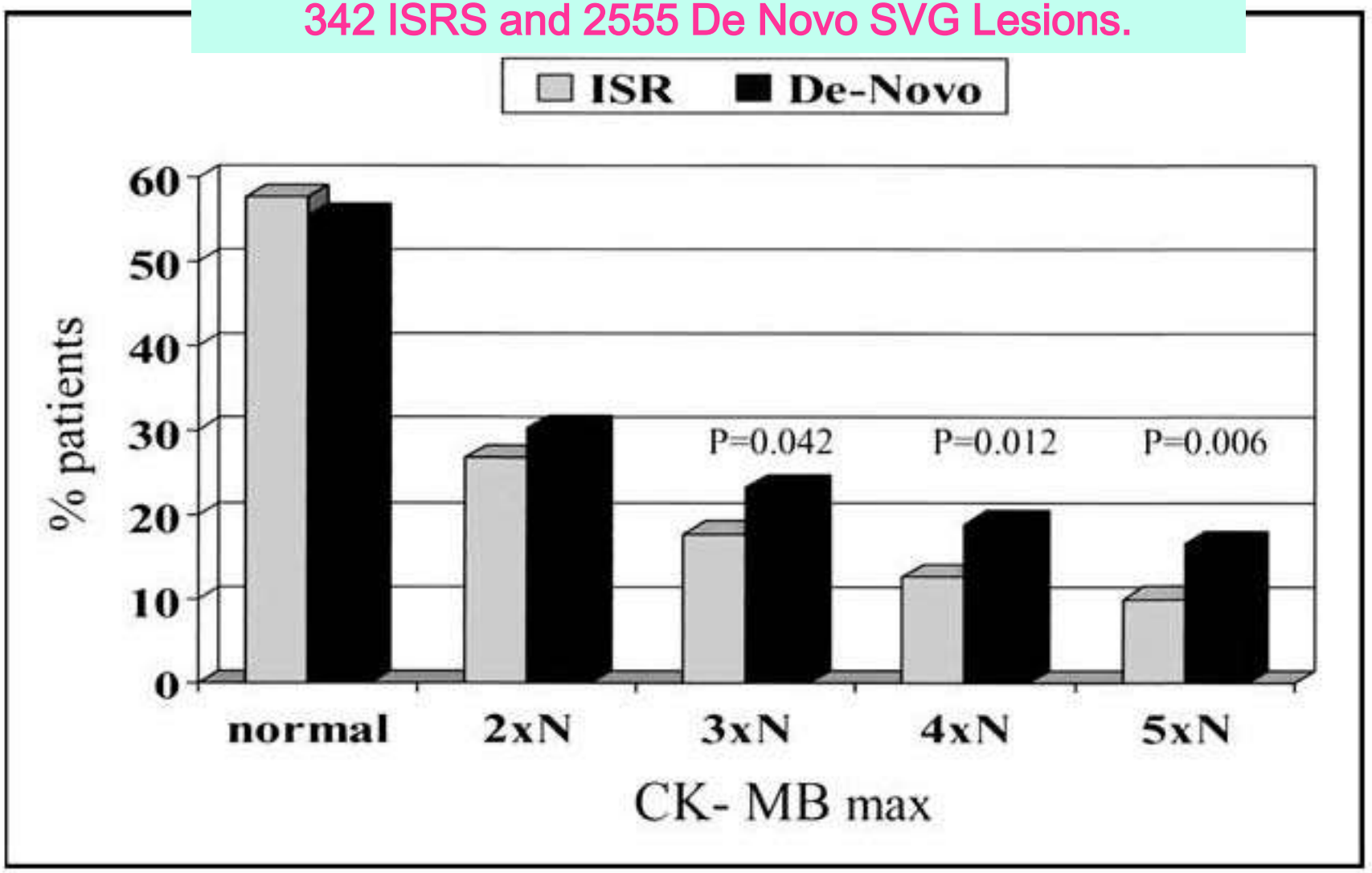
1. Cannot predict which lesion will embolize.
2. Cannot predict how severe the embolization will be.
3. Significant embolization occurs in 5-20% of SVG's.

(Predictors: ↑ plaque mass, positive remodeling, degeneration index).

CK release post PCI of De-Novo and ISRS in SVG

WHC: Wolfram, Am J Cardiol 2003;92:980-983

342 ISRS and 2555 De Novo SVG Lesions.

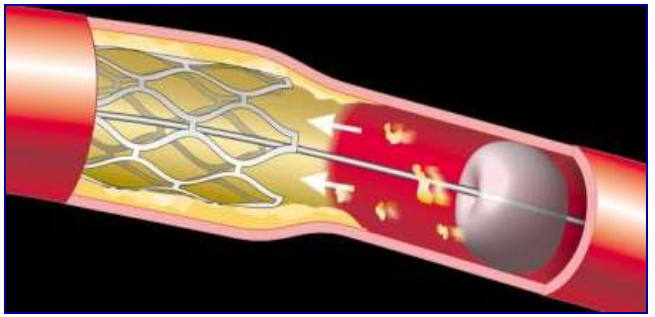


Protection Devices For Distal Embolization

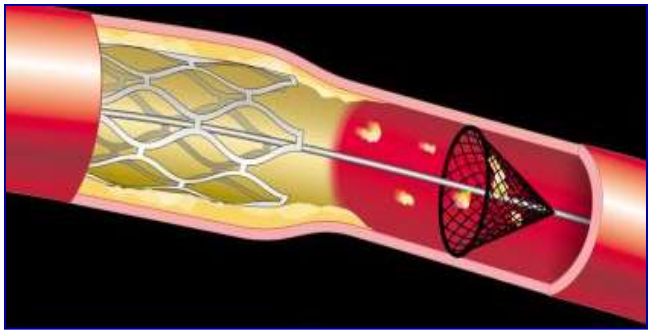
Distal occlusion

+ aspiration

(Percusurge)

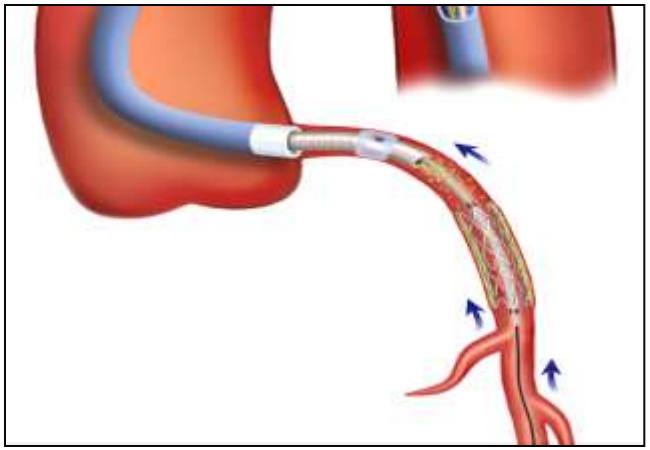


Distal filters



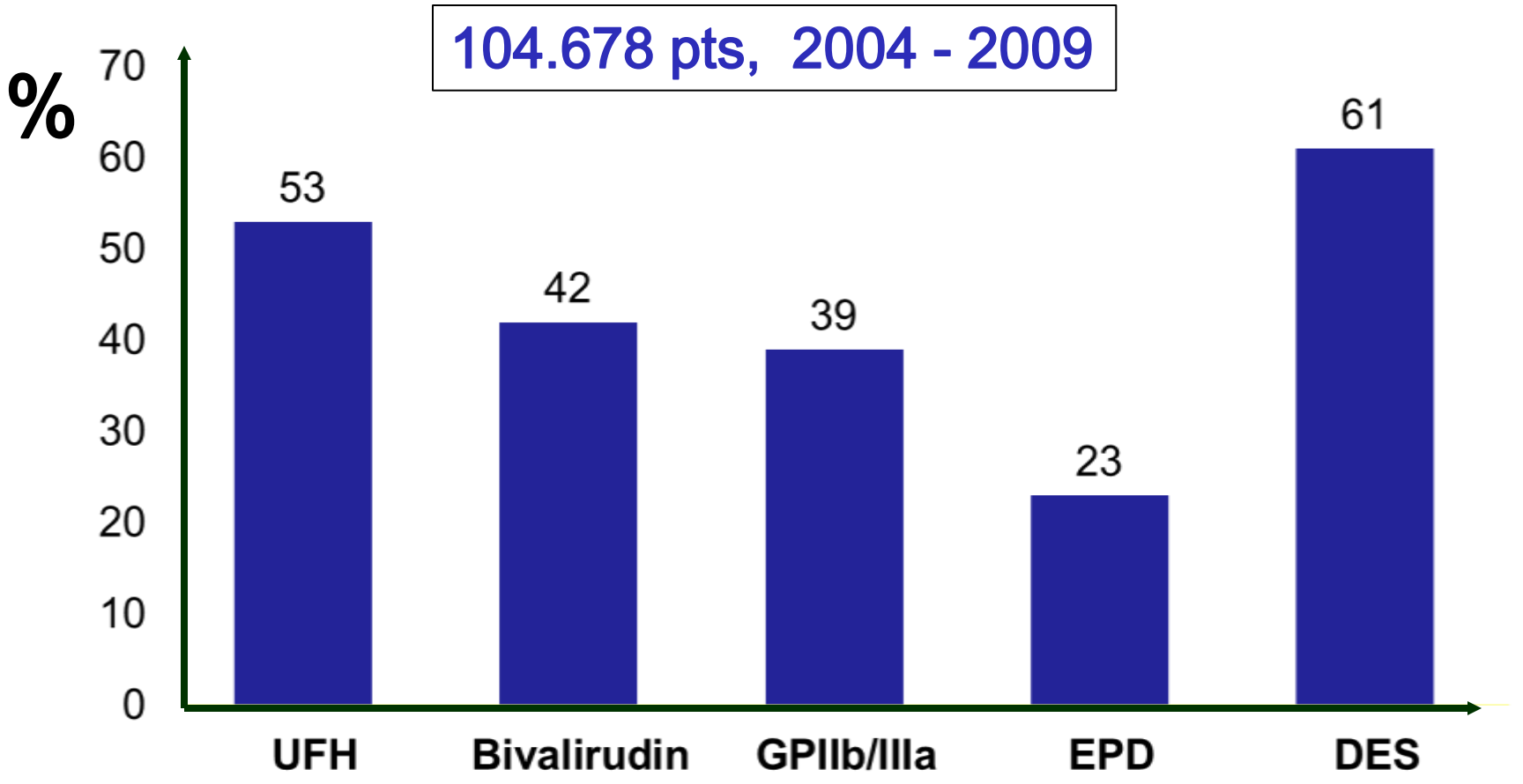
Proximal occlusion

+ Aspiration

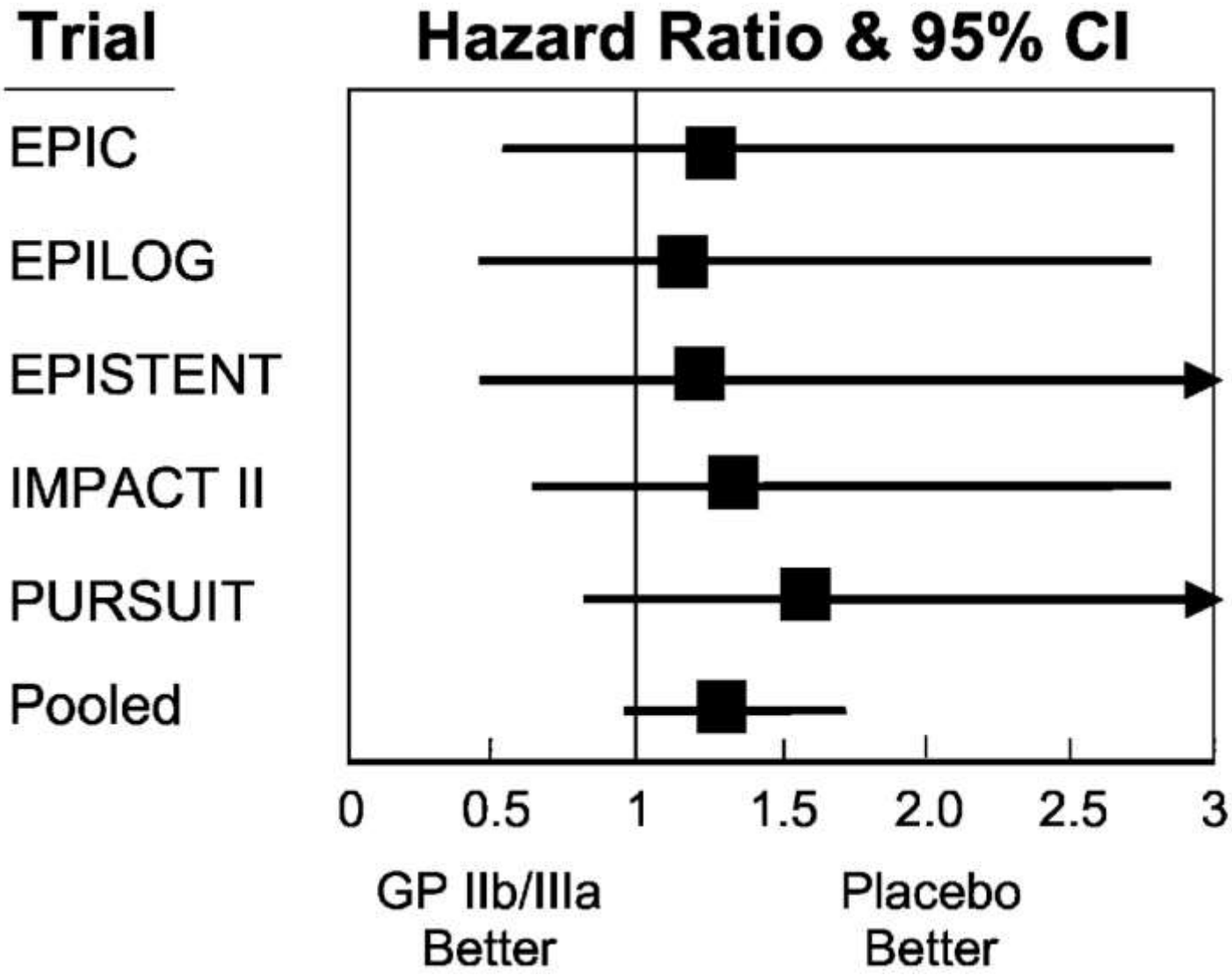


NCDR Registry: SVG PCI

Brilakis ES JACC Interv 2011;4:844-50



Is there a role for 2B3A inhibitors in SVG angioplasty?



Roffi et al, Circulation 2002;106:3063

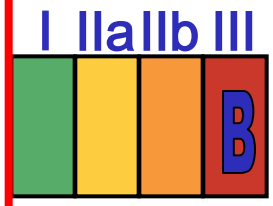
2B3A in SAFER Trial

	Percusurge	No Percusurge	*p*-Value
IIb/IIIa	10.1%	20.8%	0.003
No IIb/IIIa	7.1%	12.4%	0.051

Baim DS, SAFER subset analysis presented November 18, 2002; AHA.

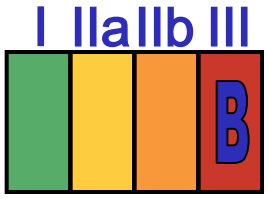
2011 ACCF/AHA/SCAI Guidelines for PCI. Saphenous Vein Grafts

EPDs should be used during SVG PCI when technically feasible.



No Benefit

Platelet GP IIb/IIIa inhibitors are not beneficial as adjunctive therapy during SVG PCI.



Harm

PCI is not recommended for chronic SVG occlusions.

Pre dilatation before stenting?

NO!

- **Always plan on direct stenting.**
- **Predilatation often associated with distal embolization.**

Post dilatation after stenting ?

NO!

- **It is the most common cause of distal embolization.**
- **Do it only if severe stent under expansion is evident.**
- **Always with distal protection.**

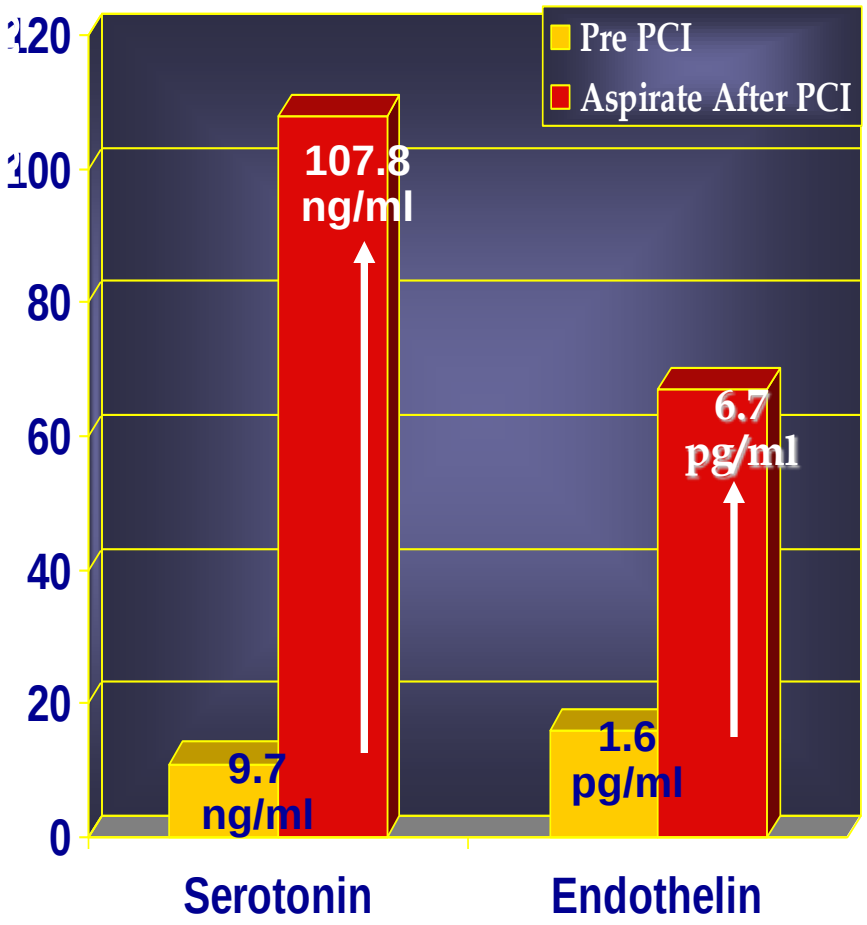
Direct Stent in SVG's.

WHC: Leborgne et al. AHJ 2003;146:501-6

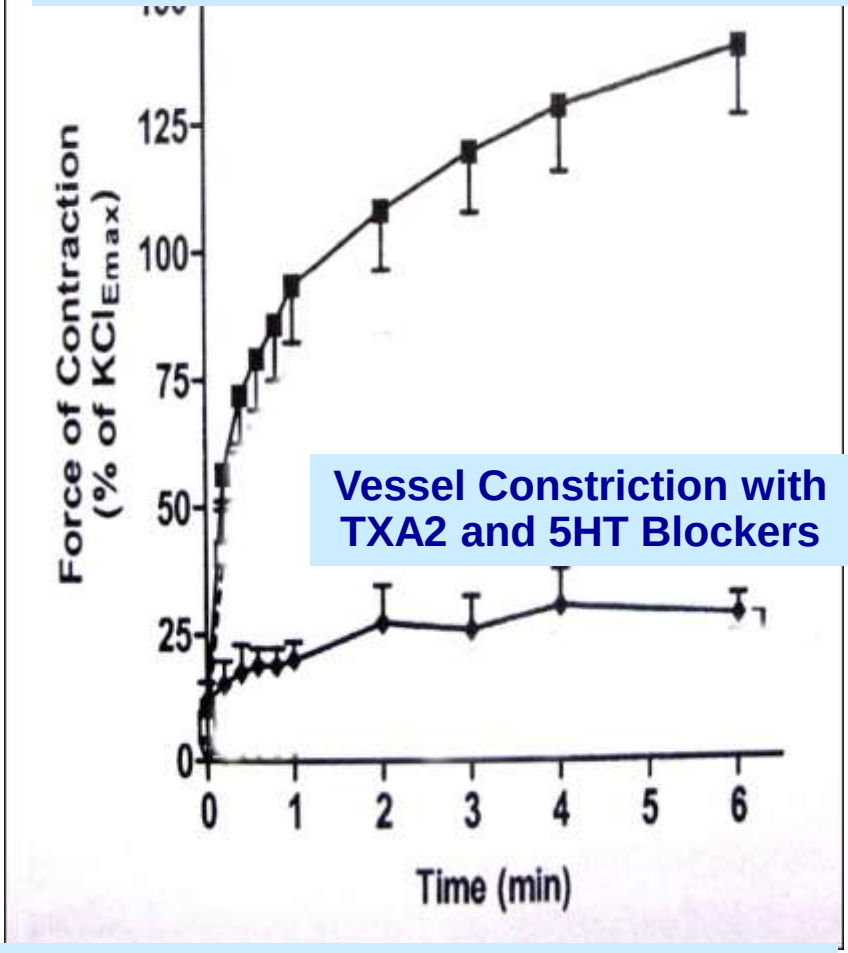
- 507 patients (672 lesions) with 12 m f/u.
- 229/672 lesions with direct stenting.
- Direct stenting had
  - Less CK MB >4x (13.6 vs 23. p<0.12)
  - Lower Maximum CK MB (9.5 vs 19.6 p<0.001)
  - Less NQMI (10.7 vs 18.4 p< 0.024)
  - Less TLR at 1 year (p<0.02)
  - Improved EFS at 12 months

Any role for Vasodilators in PCI of SVG's?

Vasoconstrictors Released in PCI of SVG.



Vessel Constriction Induced by SVG Aspirate. (TXA2, 5HT & ET Release)



Salloum J, et al., 2005 JIC, 17:575-581.

Leineweber et al JACC 2006;47:981-6.

Pharmacologic Agents to Reverse No Reflow

IC Diltiazem 23/24 cases (95%) reversal to normal flow.

Mooney, et al 1995, *AJC*.

IC Adenosine with 92-94% reversal to normal flow

Fischell, et al, 1998, *Cath Cardiovasc Intervent* 45:360-365.

IC Verapamil -> 90% with improved flow.

Piana, Baim et al., 1994 *Circulation* 89:2514-2518.

IC Nitroprusside reversal in >90% of cases.

Hillegas, et al, *J Am Coll Cardiol*, 2001 37(5):1335-43.

IC Nitroprusside + Adenosine reversal in >90% of cases.

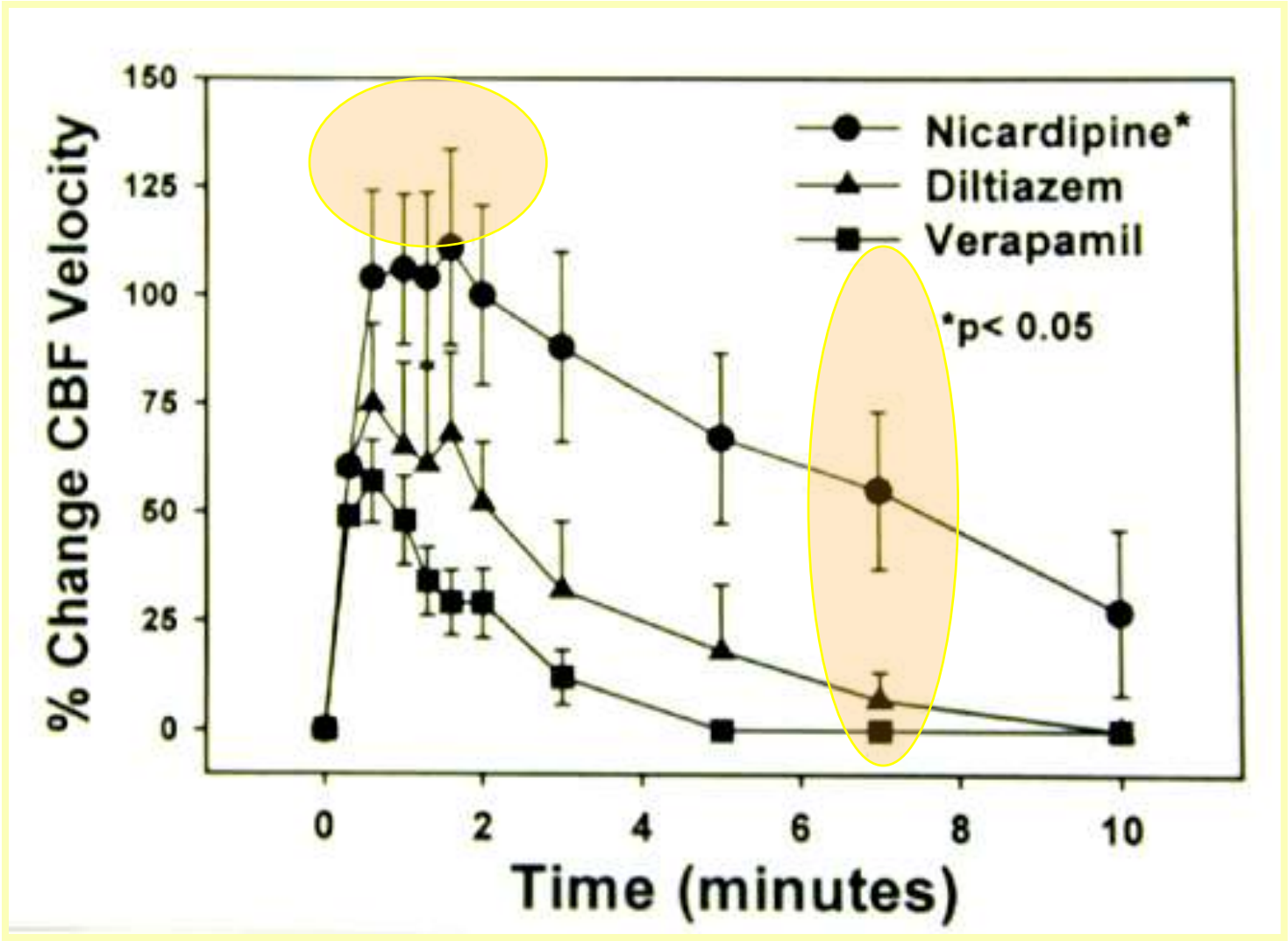
Barcin, et al, *Cath Cardiovasc Intervent* 61(4):484-491.

IC Nicardipine (Cardene): prevents no reflow in 98% of pts.

Fishell et al. JIC 2007;19:58-62

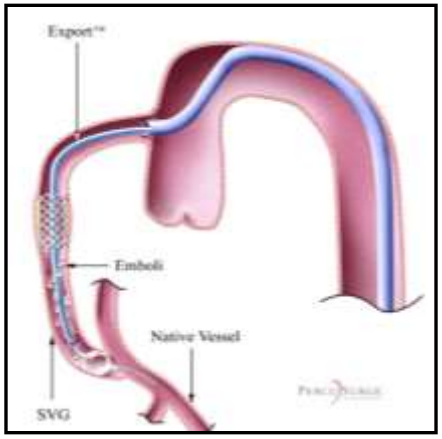
CBF and IC Calcium Channel Blockers.

Fugit et al. JIC 2000;12:80-5



Prevention of No Reflow in SVG PCI
Variety of Distal Protection Approaches & Costs

PercuSurge™
Cost ~ $1,195
Extra Time ~ 20 min.
Complexity **



FilterWire EX
Cost ~ $1,195
Extra Time ~ 20 min.
Complexity *

Prophylactic IC Nicardipine
Cost $87/vial
Extra Time ~ 2 min.
Complexity *

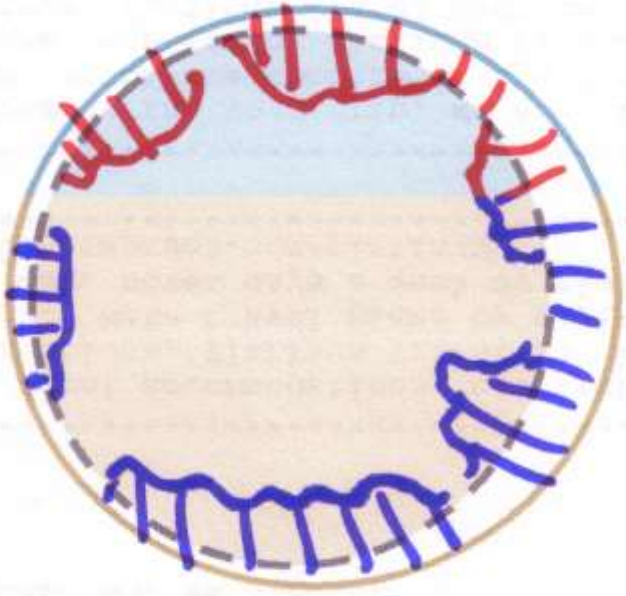
Courtesy Tim Fishell, TCT 2007

New Strategy

Small Stent for Large SVG's

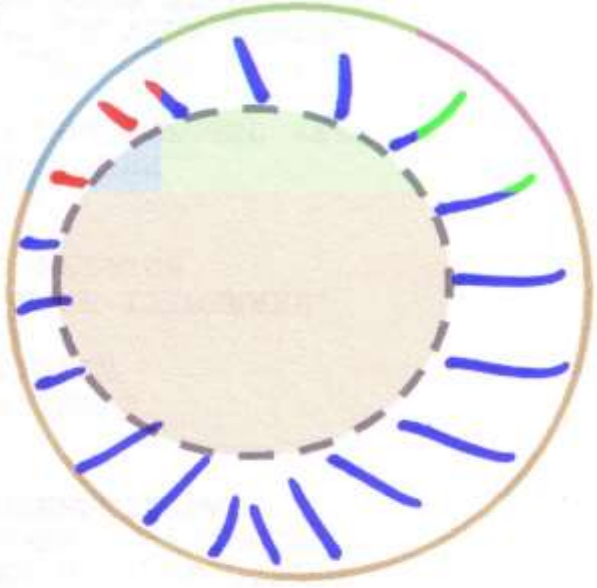
Small Stents for Large SVG's

Large Stent
in Large Vein

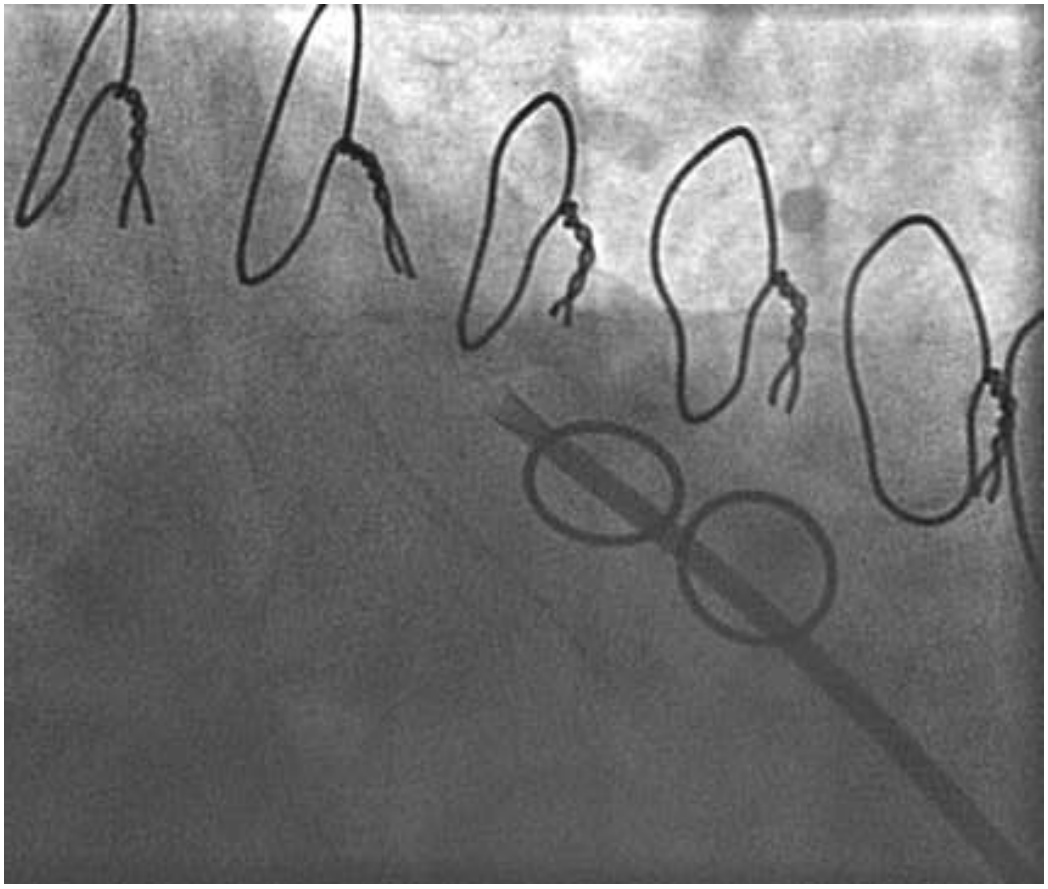


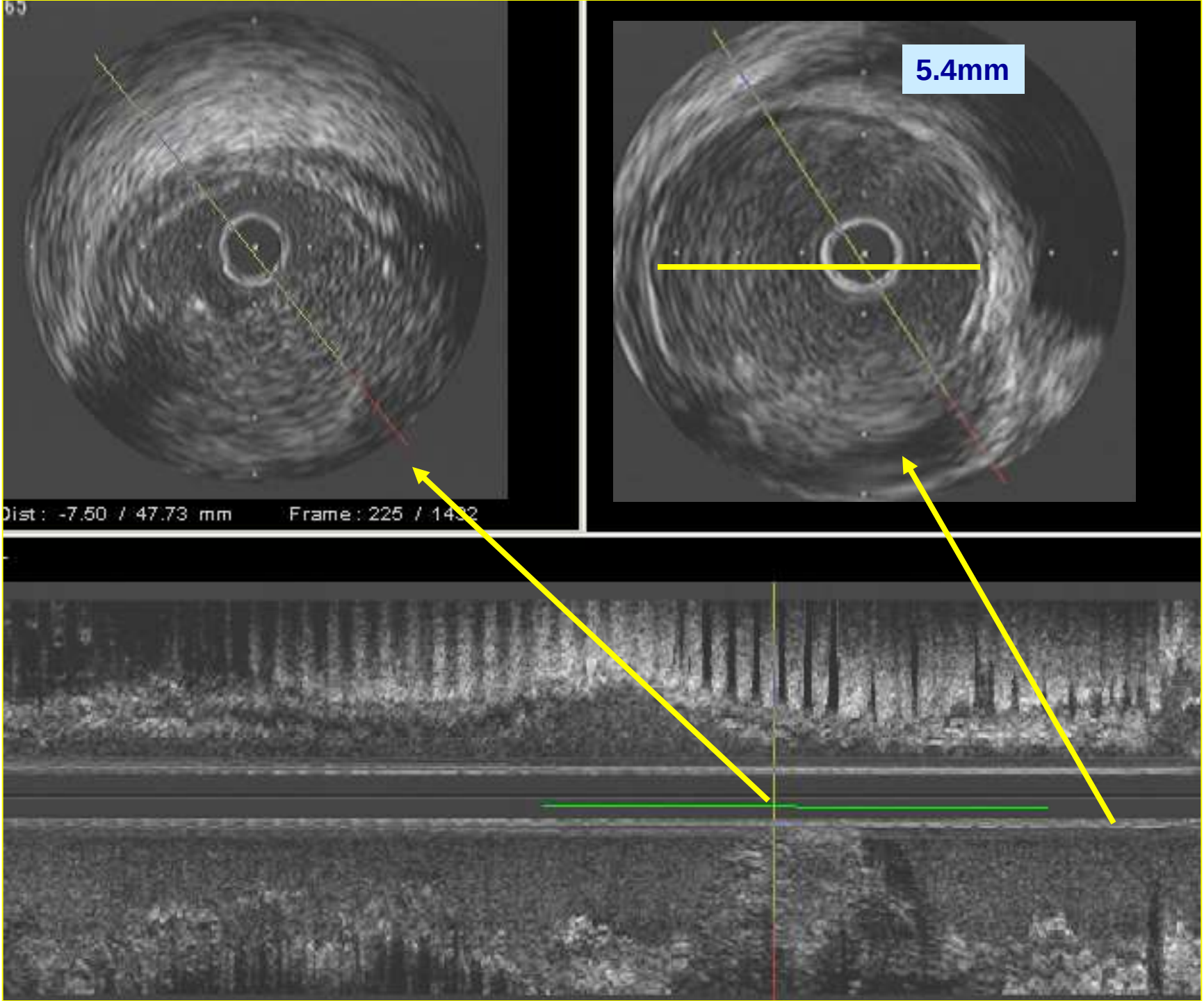
Plaque extrudes through the stent into the lumen

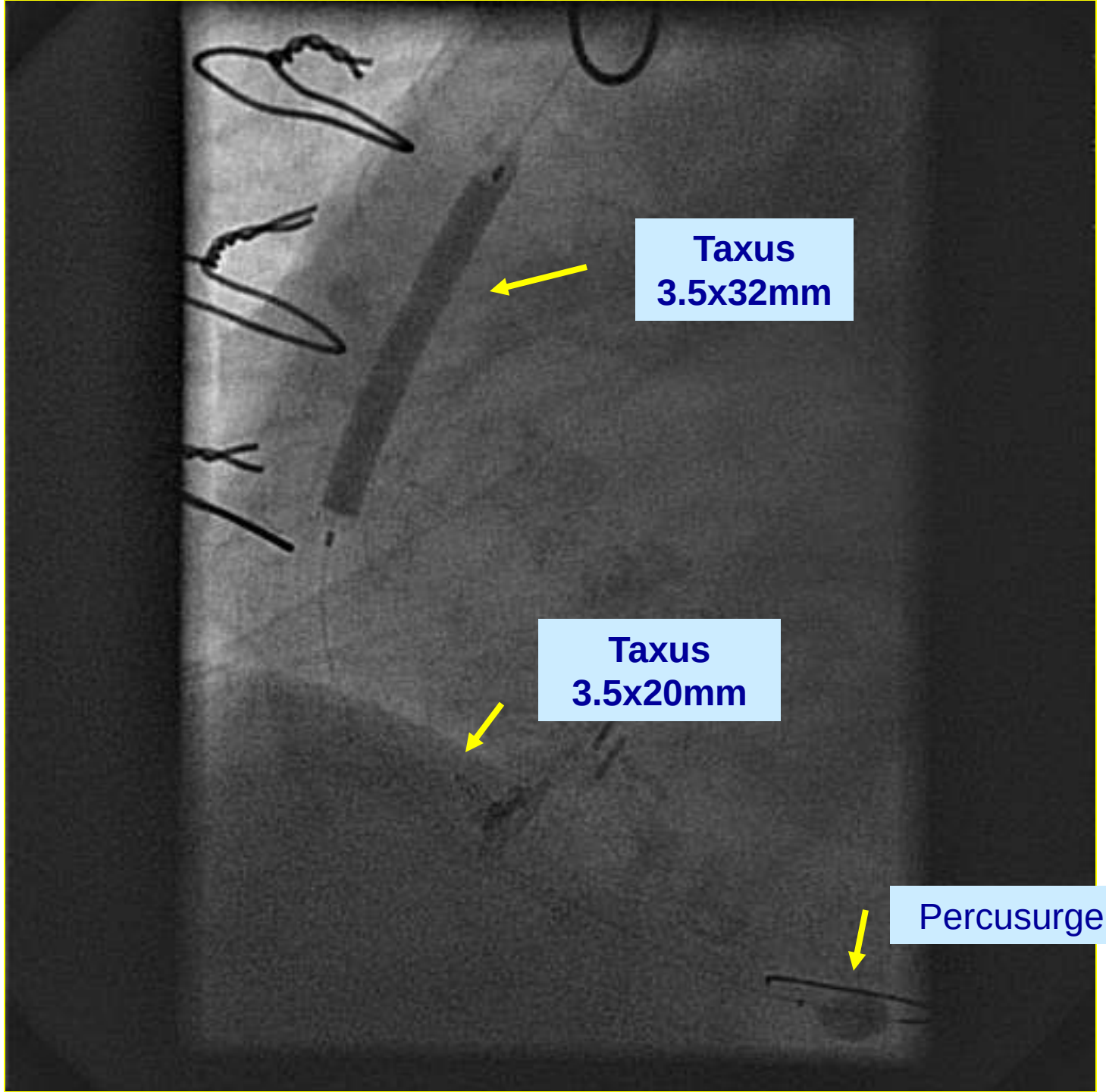
Small Stent
in Large Vein

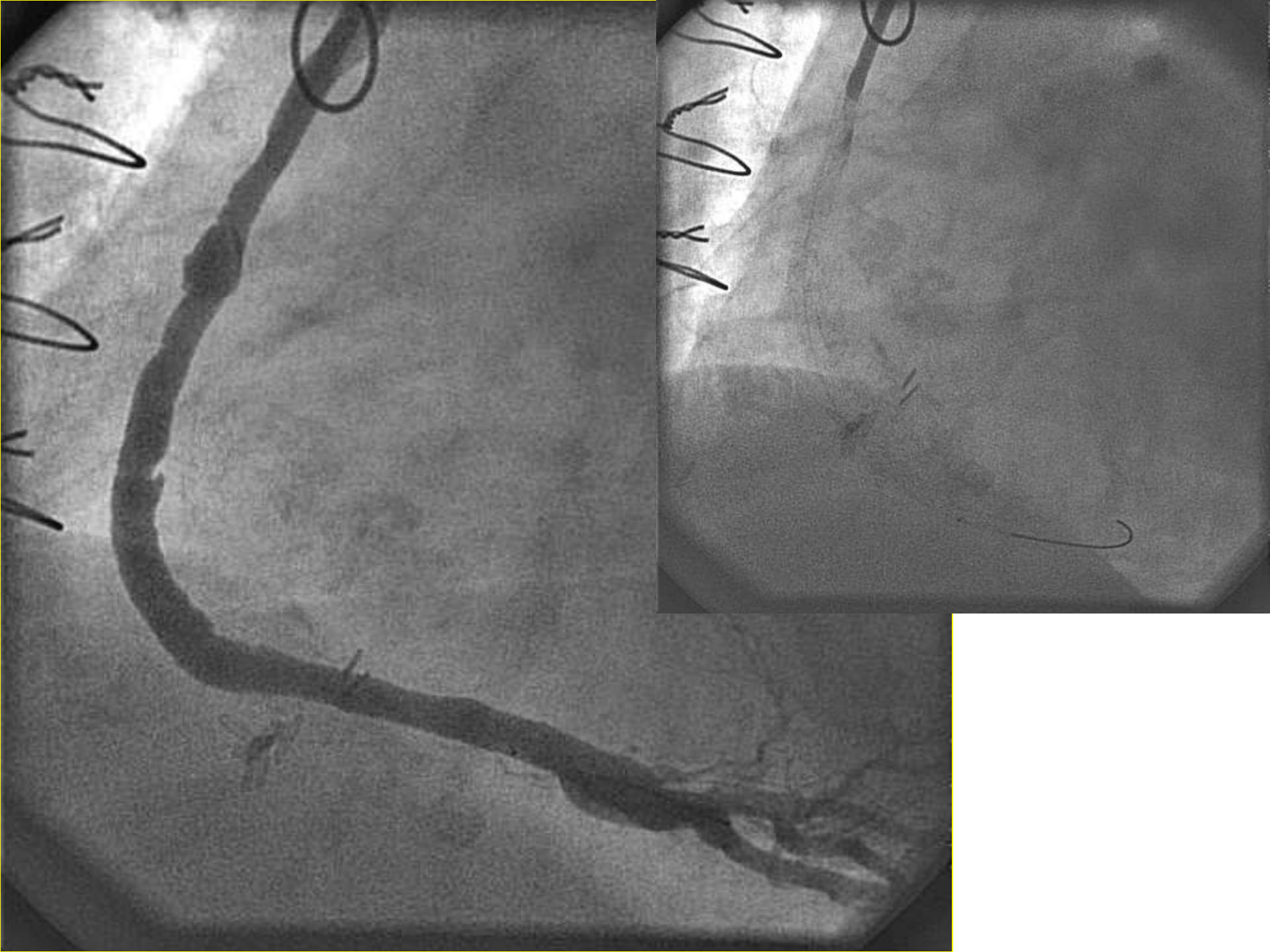


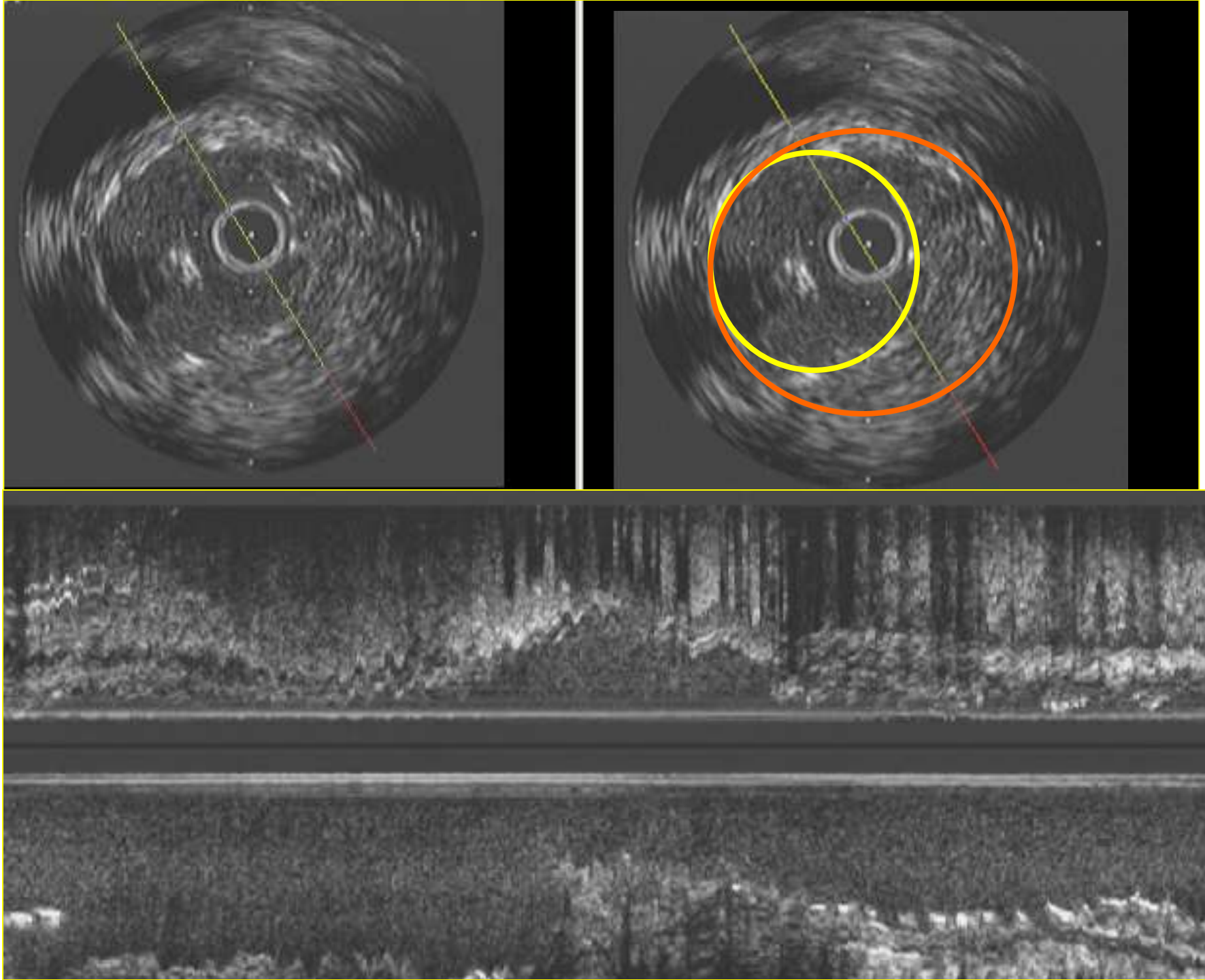
Plaque stays behind the stent struts

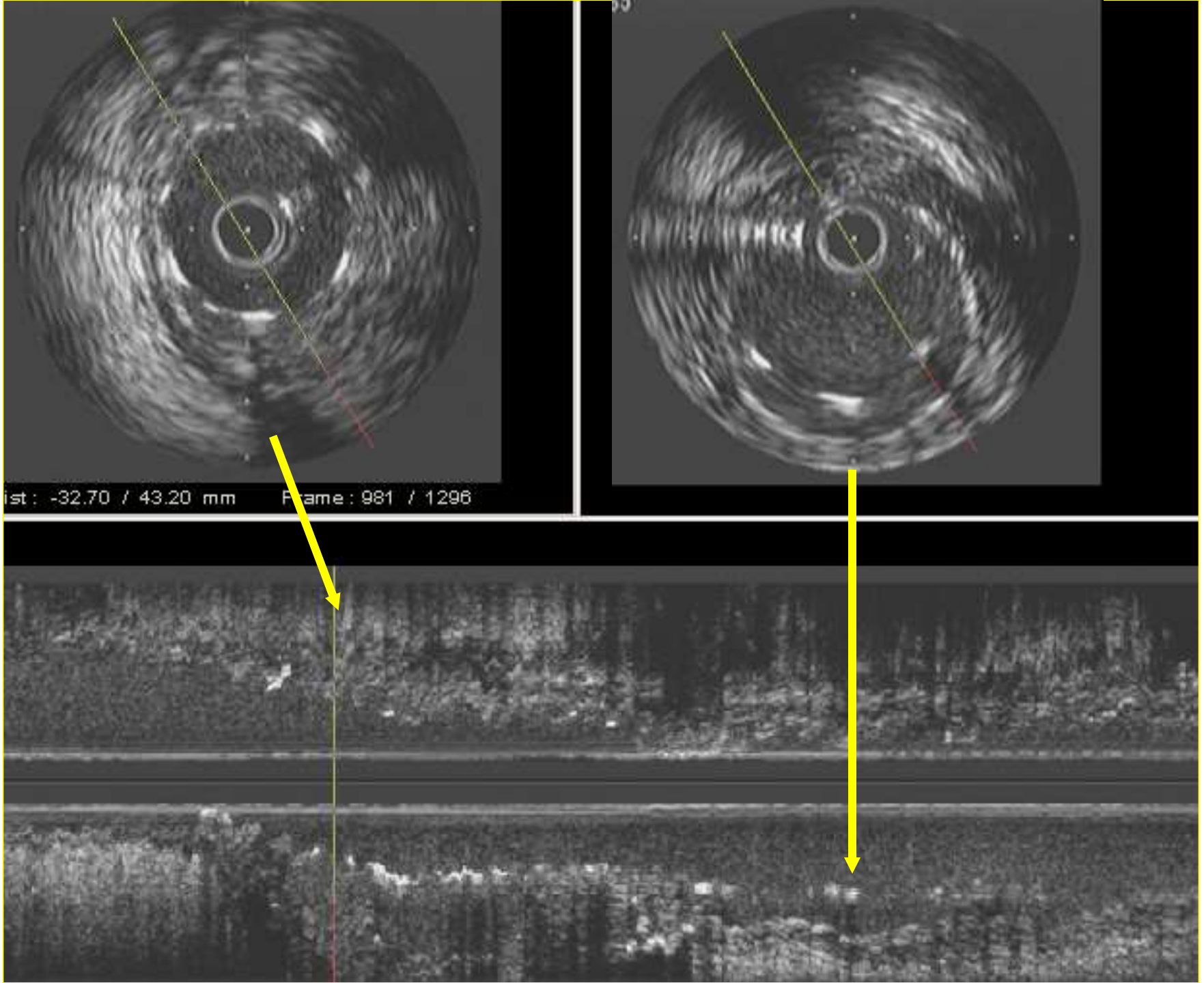



5.4mm
Dist : -7.50 / 47.73 mm
Frame : 225 / 1432

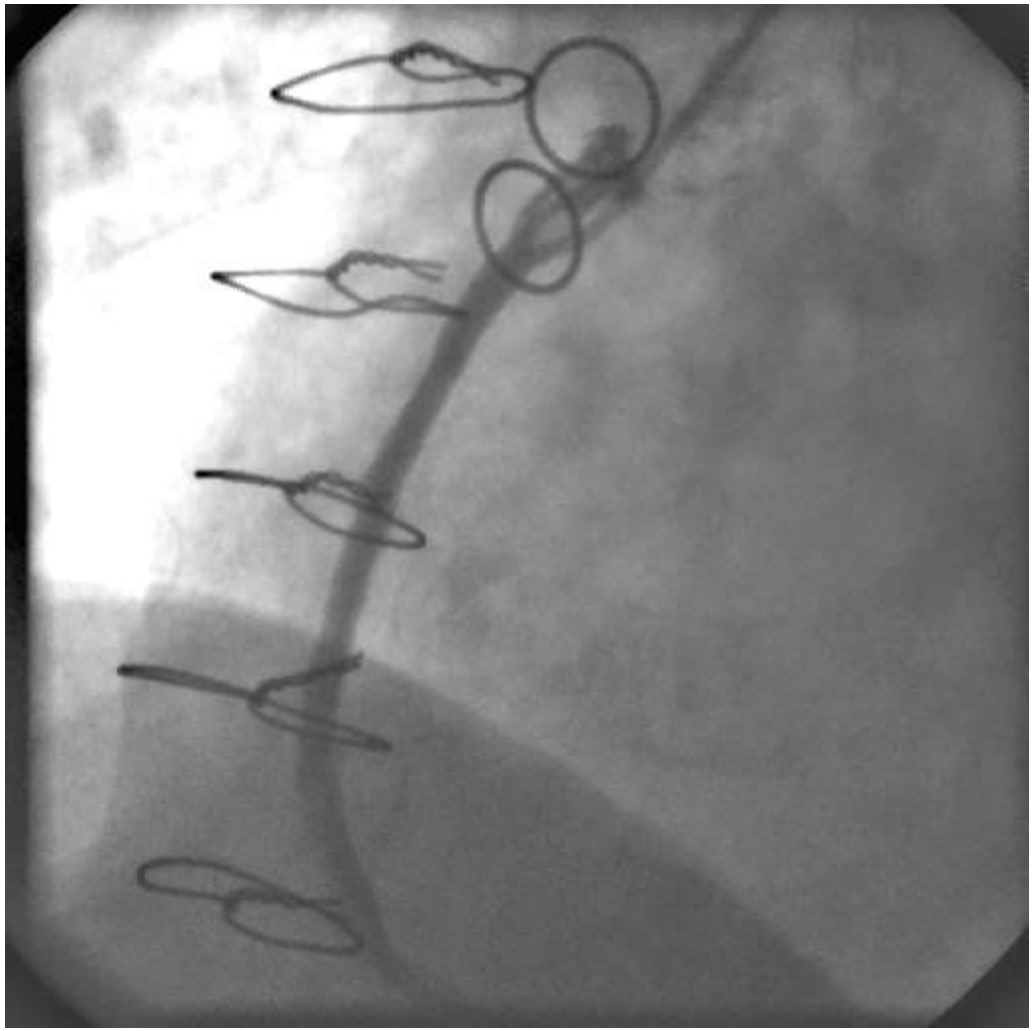

Taxus
3.5x32mm
Taxus
3.5x20mm
Percusurge





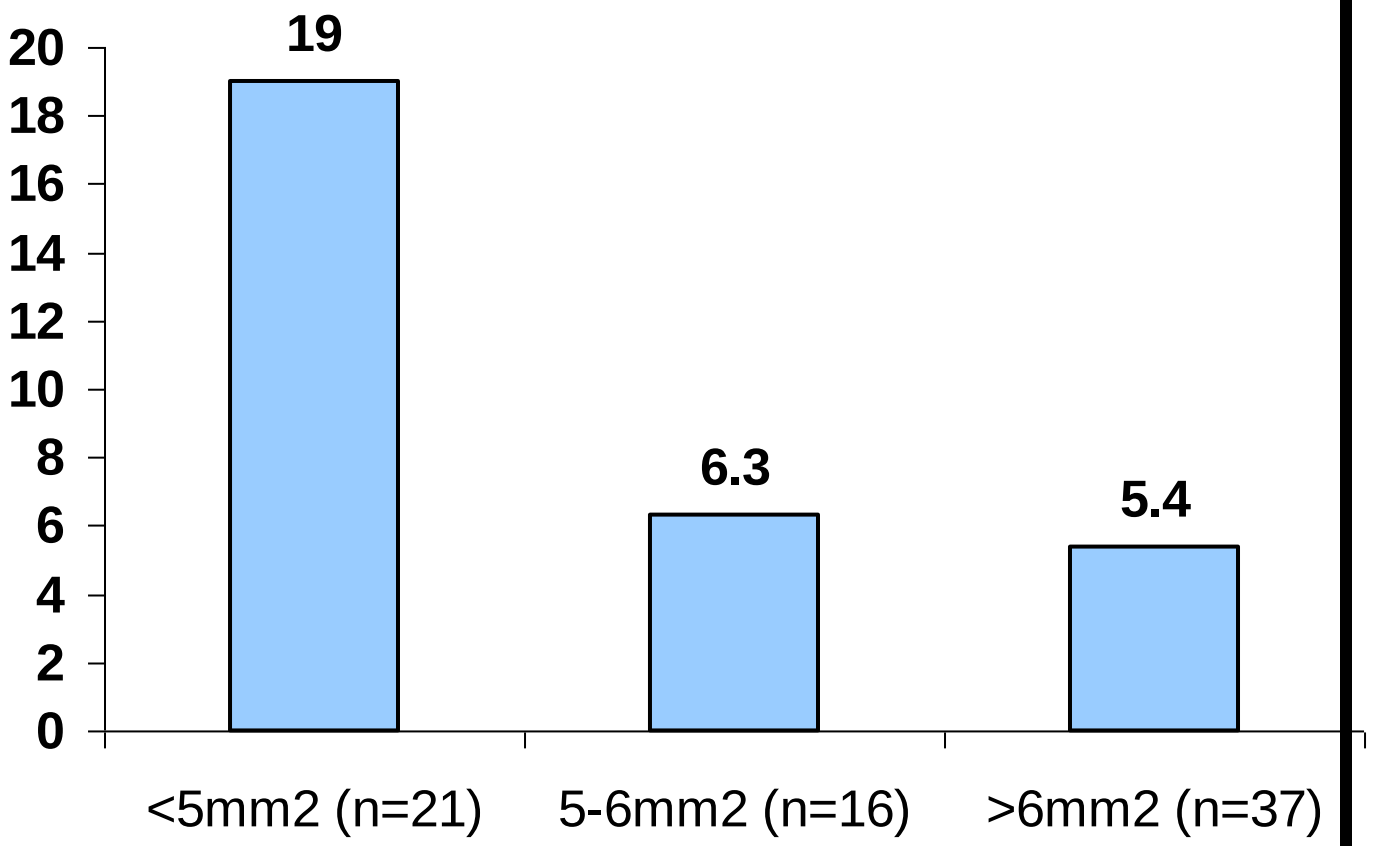

ist : -32.70 / 43.20 mm
ame : 981 / 1296

2 years later



Small Stents in Large SVG's. TLR at 1 year in 72 patients.

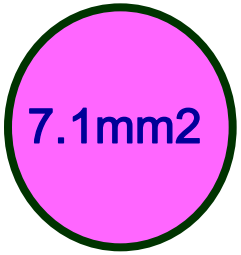
Washington Hospital Center. Salah et al. 06



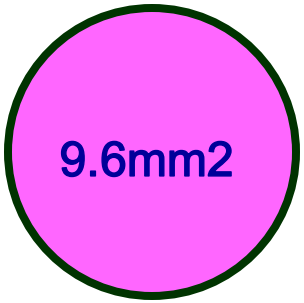
Minimum Stent Area (mm^2) by IVUS

2.5x2.5 mm

3x3 mm

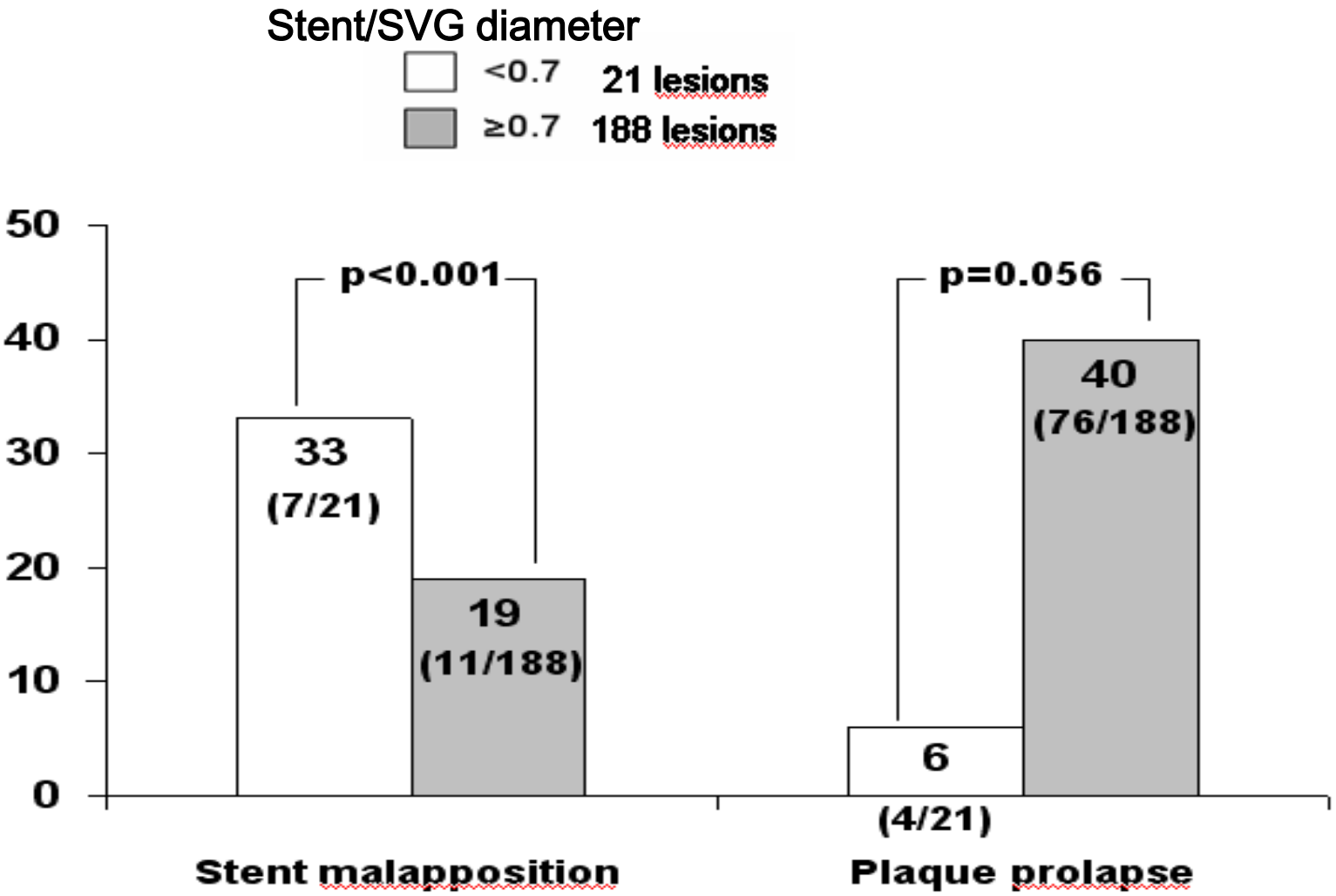


3.5x3.5 mm



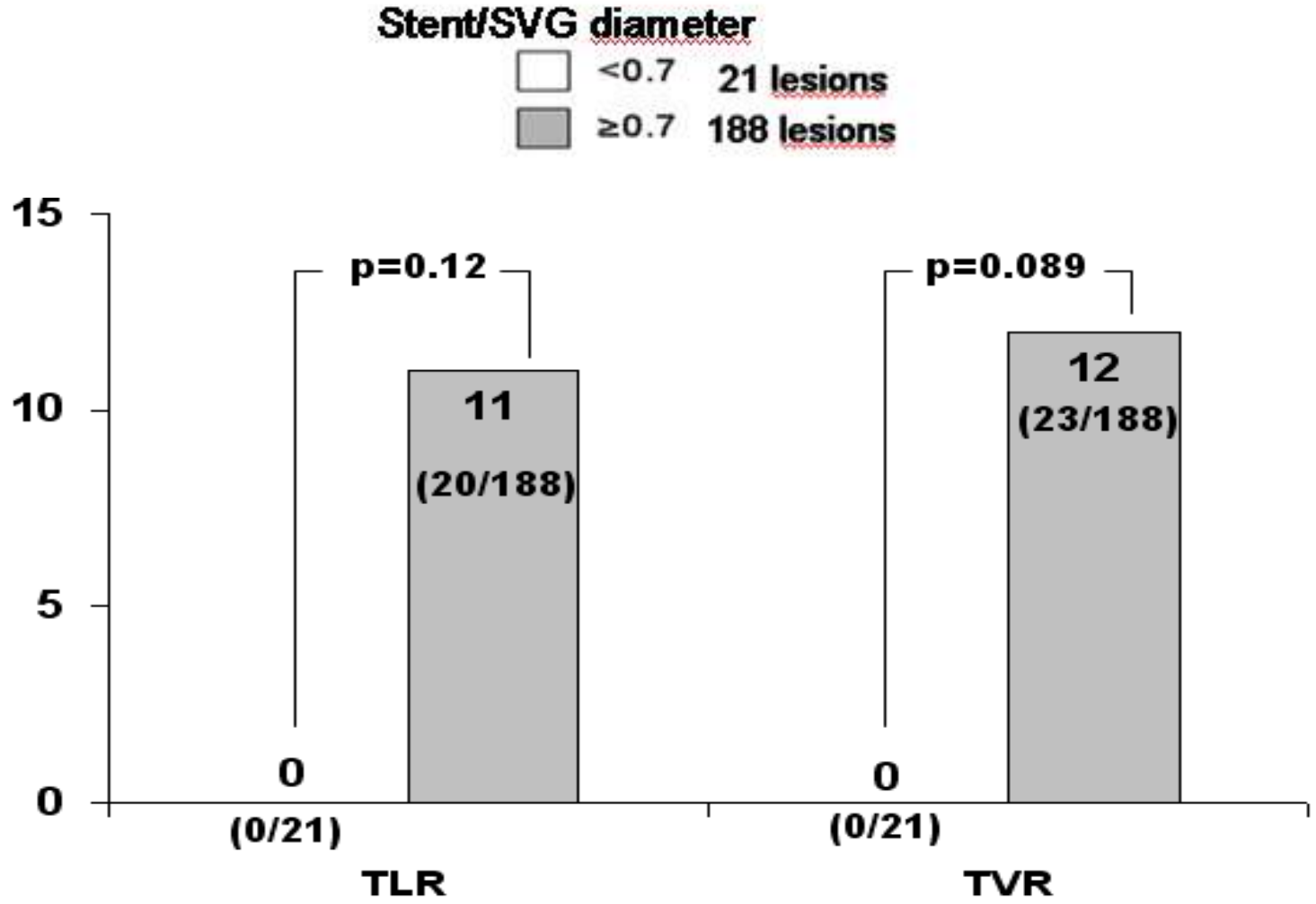
Small Stent in Large SVG. IVUS Findings.

WHC: WJ Hong et al. AJC Jan 2010



Small Stent in Large SVG. IVUS Findings.

WHC: WJ Hong et al. AJC 2010

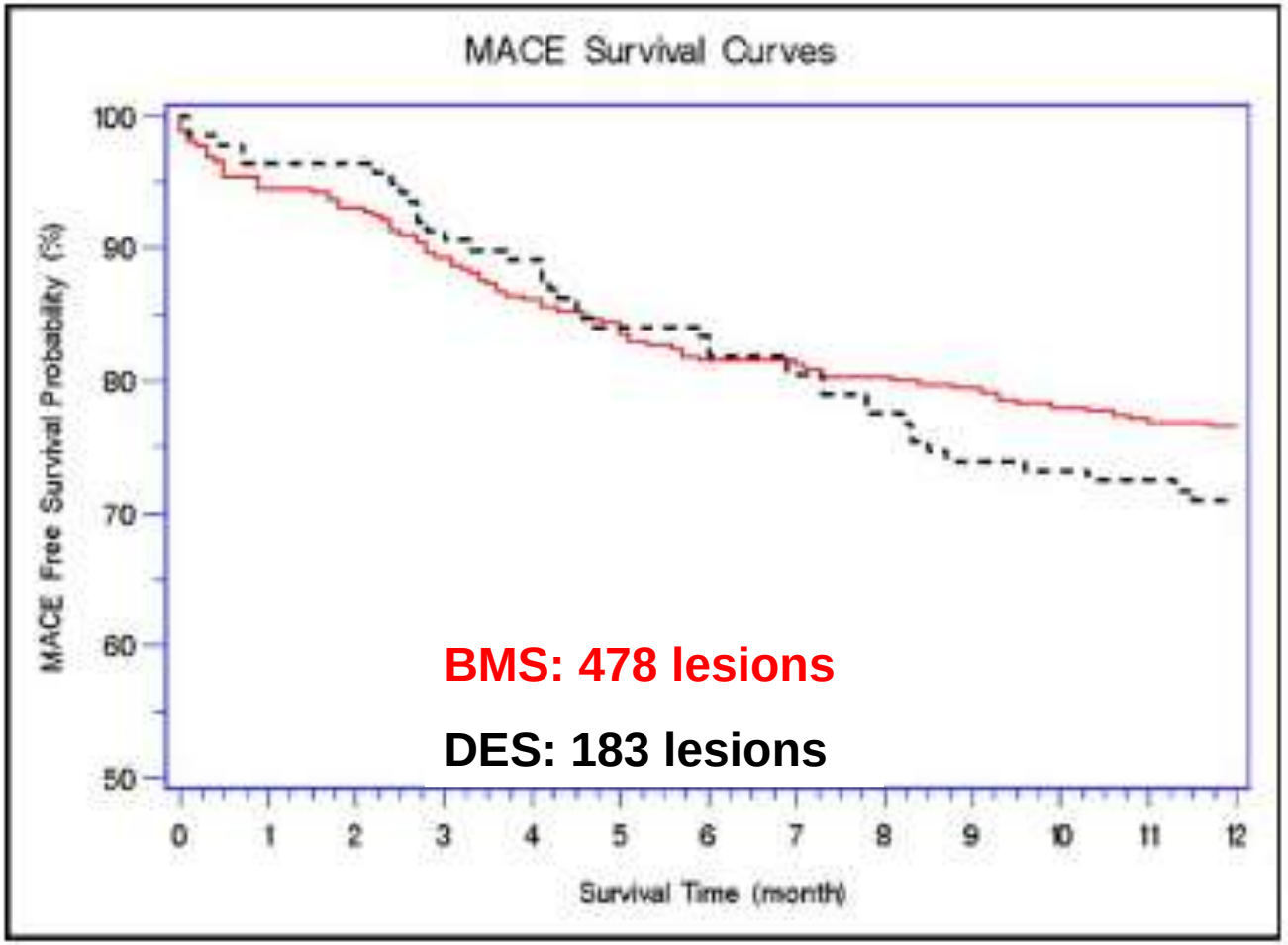


Small Stents for Large SVG's

- Vein grafts are often oversized.
- Stent size that matches the target native vessel provides adequate flow.
- Small stents in large saphenous veins decreases acute and longterm MACE.
- No increase in restenosis if MLA >6mm2.
- No embolic protection devices needed.

DES vs BMS for SVG's.

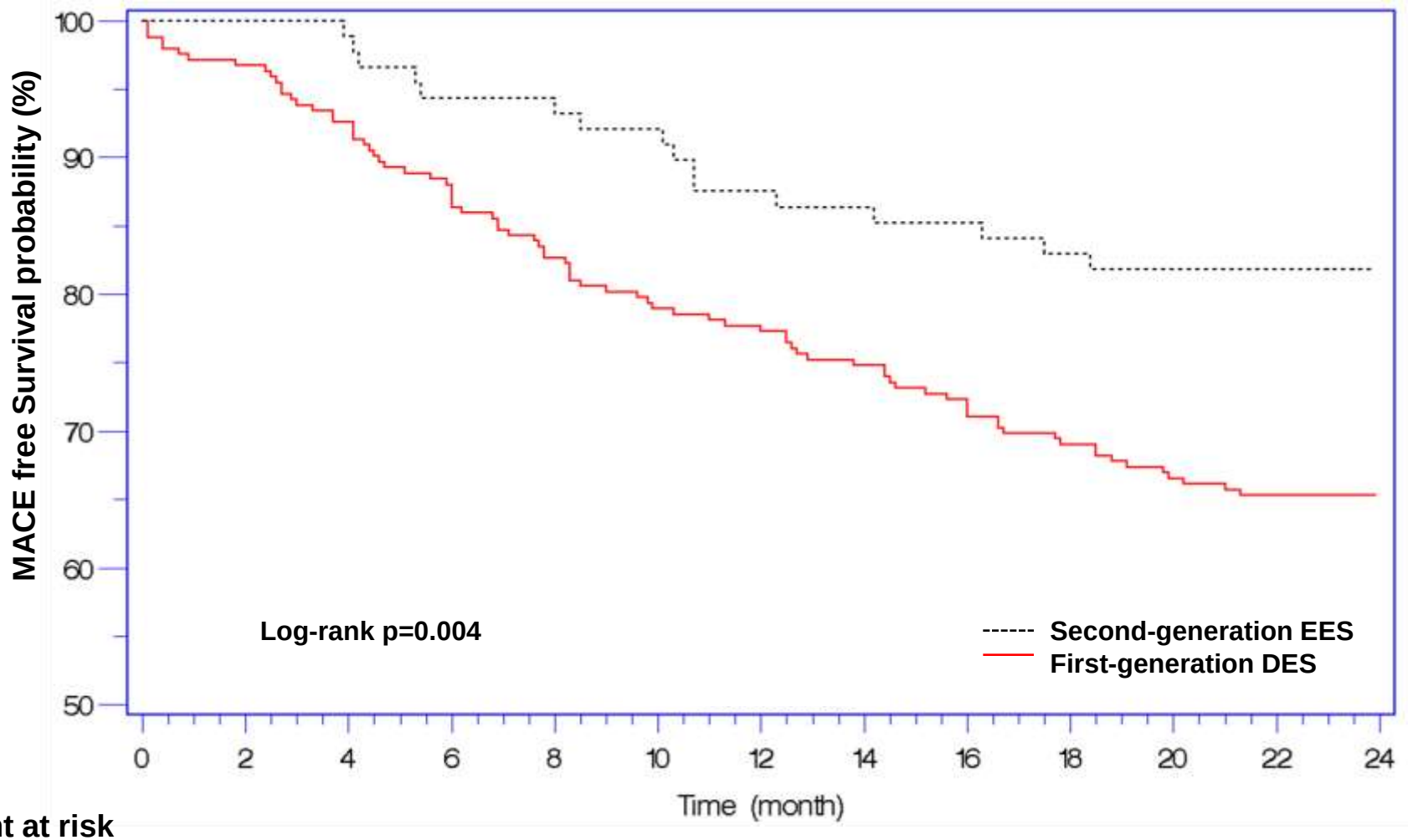
WHC: Okabe et al. AJC 2008; 102:530-4



138 cases with 183 lesions (sirolimus-eluting stents, n = 117; paclitaxel-eluting stents, n = 66) and the BMS group consisted of 344 cases with 478 lesions

1st vs 2nd Generation DES in SVG.

WHC: Kitabata et al. AJC 2013;112:61-7



Patient at risk

1st-generation DES	243	224	200	188	175	162	152
2nd-generation EES	88	87	83	77	75	72	59

1st vs 2nd Generation DES in SVG.

WHC: Kitabata et al. AJC 2013;112:61-7

Event	2nd-generation EES (n=88)	1st-generation DES (n=243)	p Value
Major adverse cardiovascular events	16 (18.2%)	85 (35.0%)	0.003
Death	11 (12.5%)	35 (14.8%)	0.618
Cardiac death	4 (4.5%)	15 (6.2%)	0.790
Myocardial infarction	3 (3.8%)	12 (5.6%)	0.767
Q-wave myocardial infarction	1 (1.1%)	2 (0.8%)	1.000
Non–Q-wave myocardial infarction	2 (2.4%)	10 (4.7%)	0.524
Target vessel revascularization	6 (6.8%)	54 (24.5%)	<0.001
Target lesion revascularization	1 (1.1%)	25 (11.6%)	0.005
Stent thrombosis	0	2 (0.8%)	1.000

We now use only DES for SVG's

PCI of LIMA Anastomosis

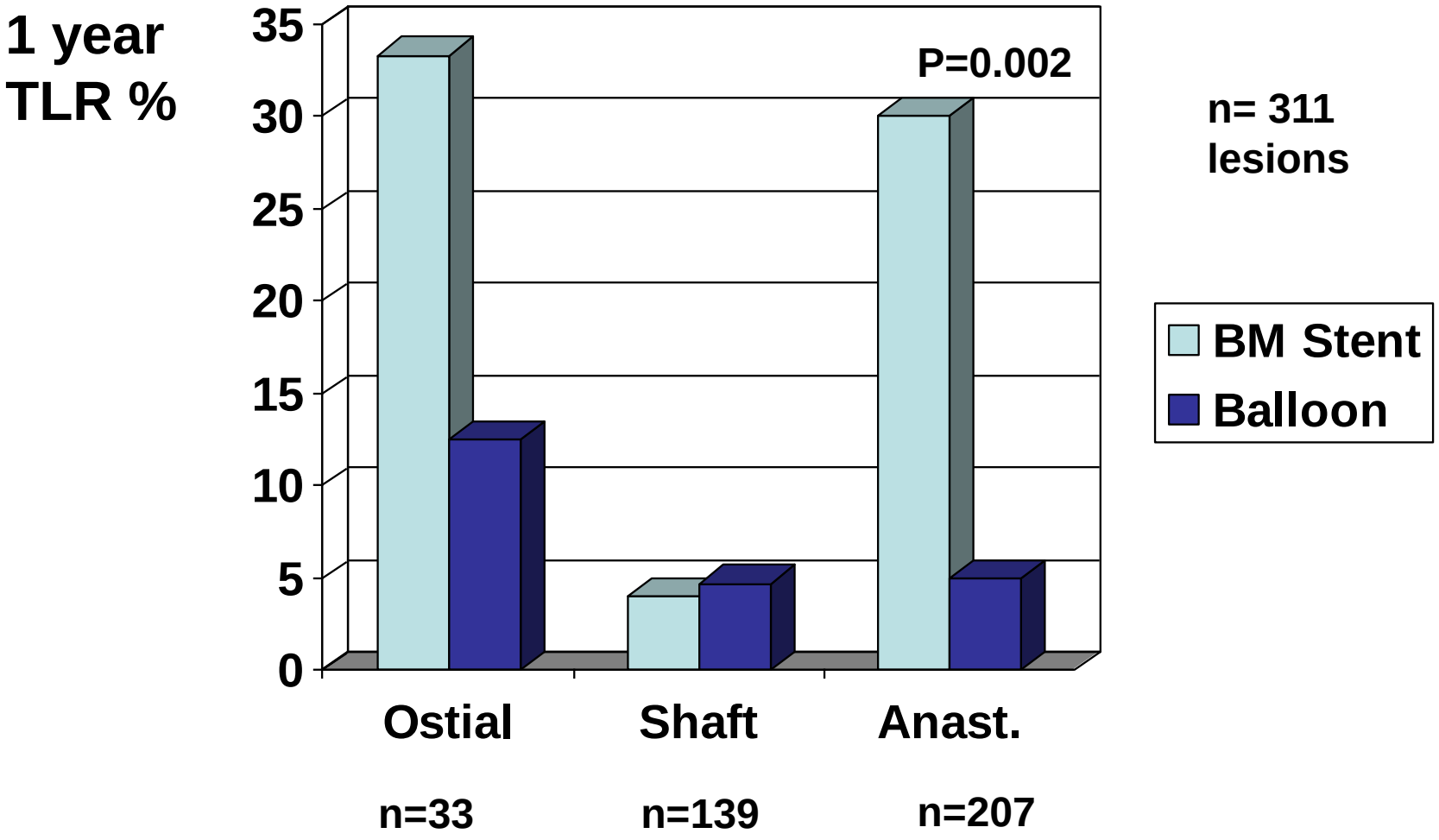
- **Anastomotic stenosis in first 2-4 weeks**
  - **Do not touch**
  - **It often resolves completely**

Anastomotic stenosis beyond 4 weeks:

Balloon Only

PCI of Internal Mammary Arteries

WHC: Sharma et al. CCI 2003; 59:436-441



Better result with Balloon than Stent at LIMA anastomosis

DES vs BMS for LIMA Anastomosis.

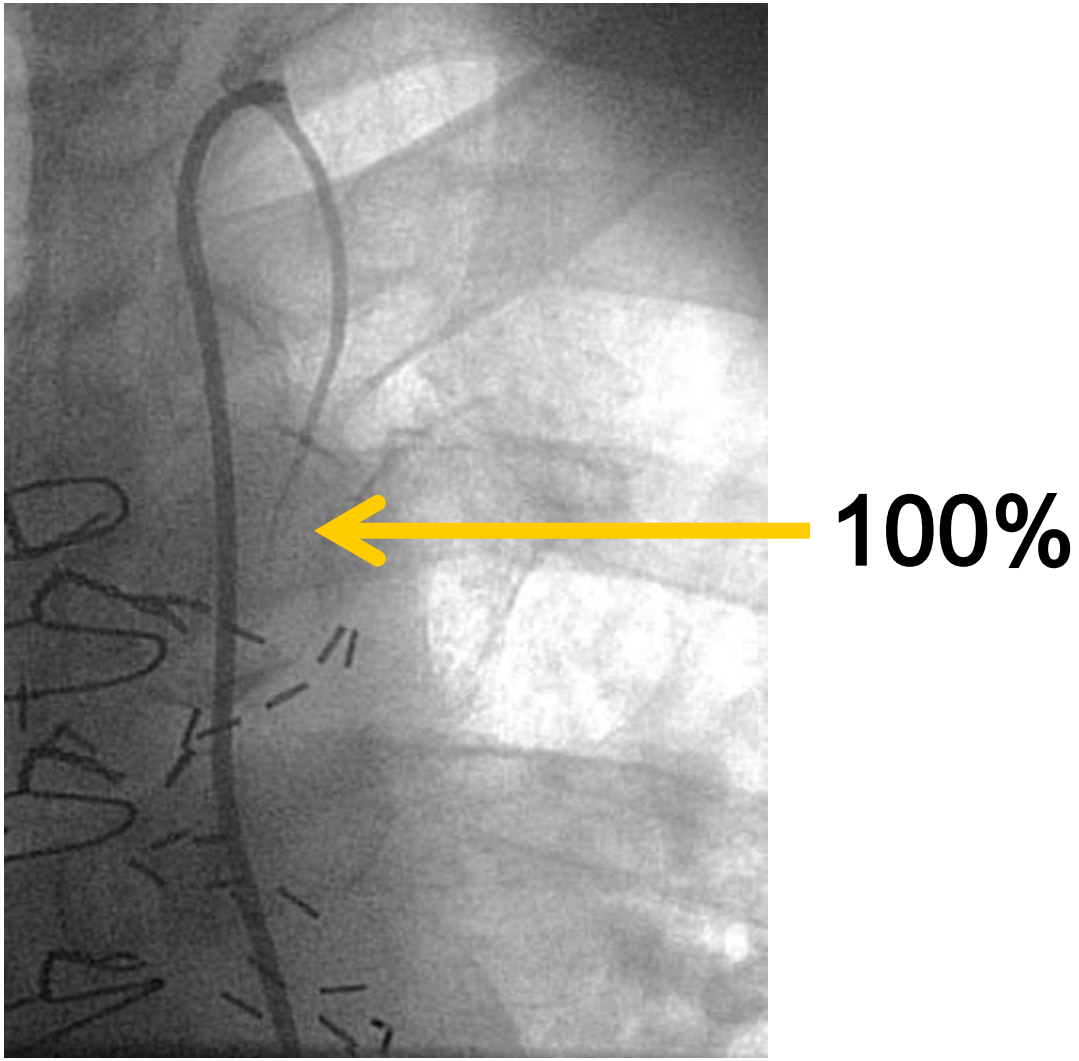
WHC: Buch et al. AJC 2006;98:722-4

6 months outcome	BMS n=39	DES n=30	p=
Death	2 (5.1%)	2 (6.7%)	1.0
Myocardial infarction			
Q wave	0	1 (3.3%)	0.43
Non–Q wave	2 (5.1%)	4 (1.3%)	0.39
TLR	4 (10%)	1 (3.3%)	0.38
TLR/MACEs	6 (15.4%)	3 (10%)	0.72
Late thrombosis	0	0	—

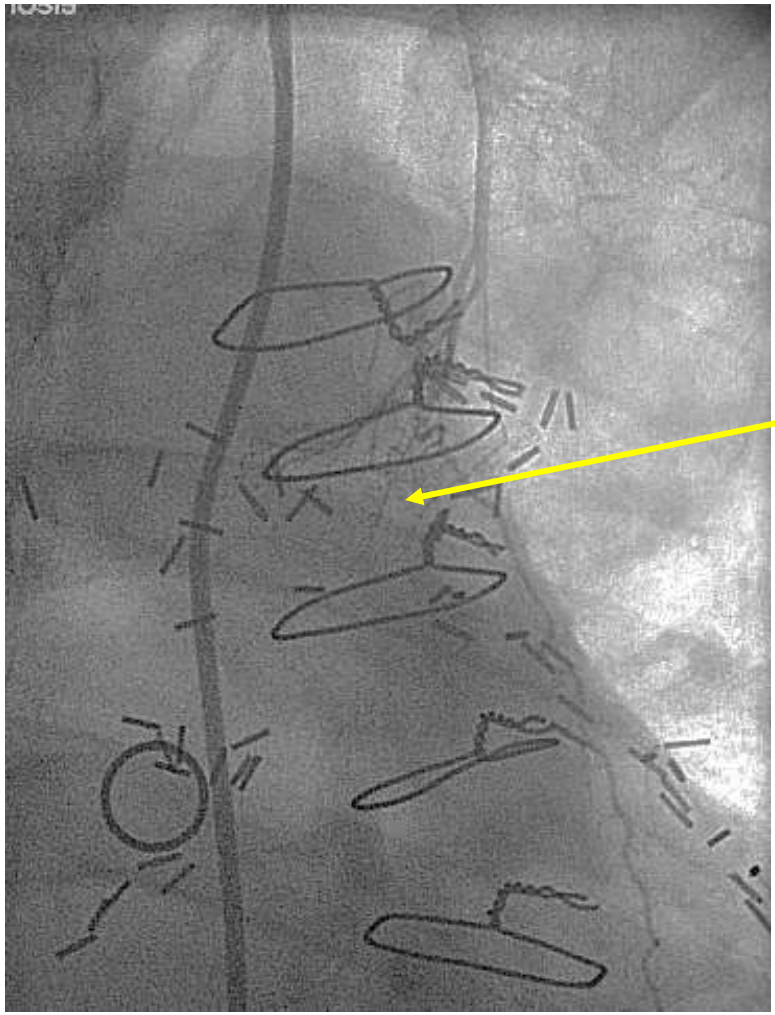
Stenosis LIMA Anastomosis

- **Balloon alone if Optimal result**
- **DES only if sub-optimal result**

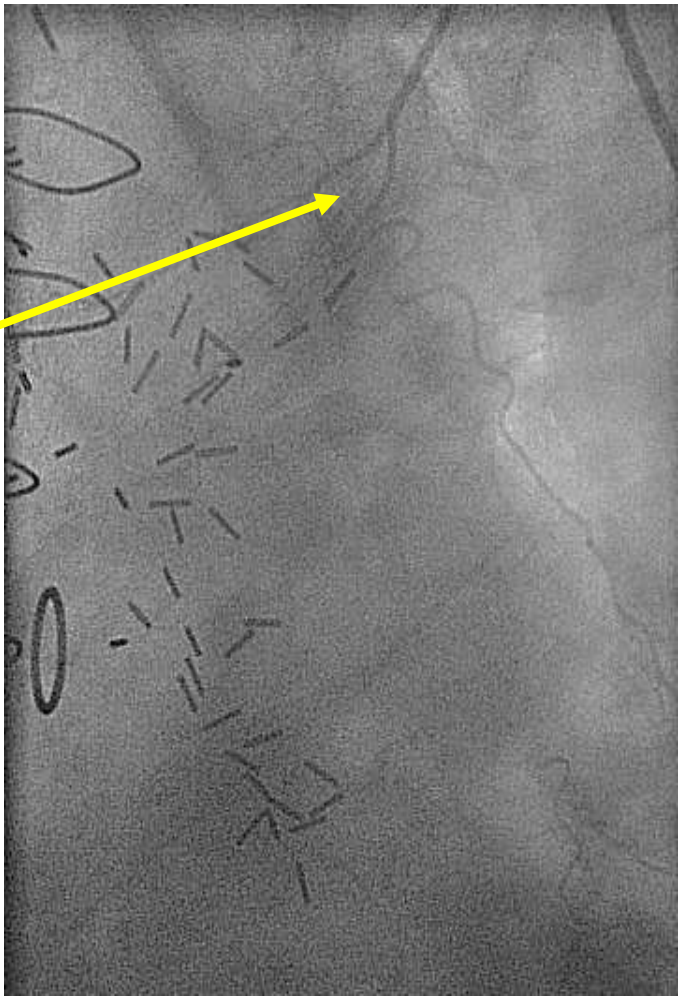
Never abandon an occluded IMA



LIMA occluded since 1987

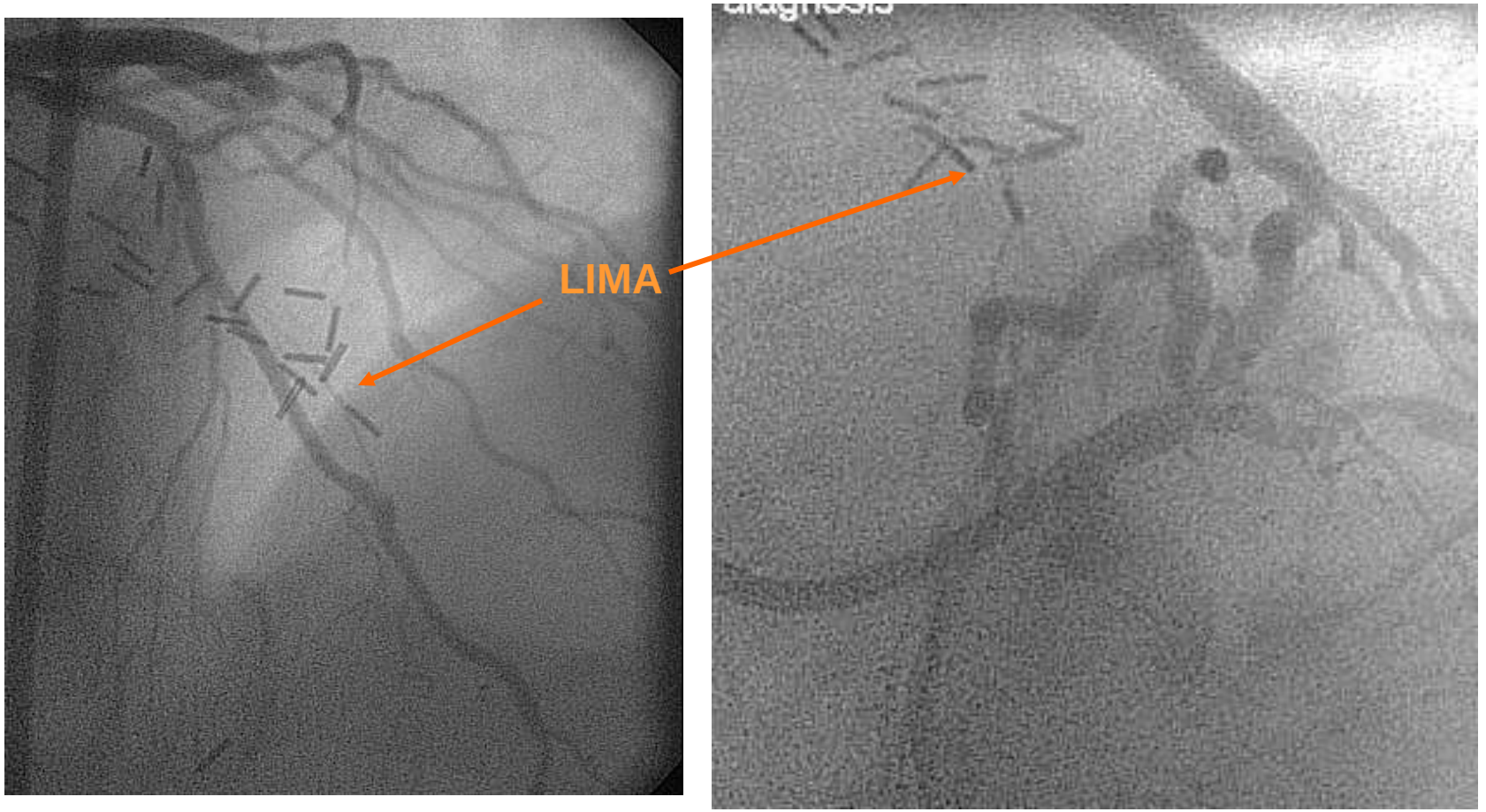


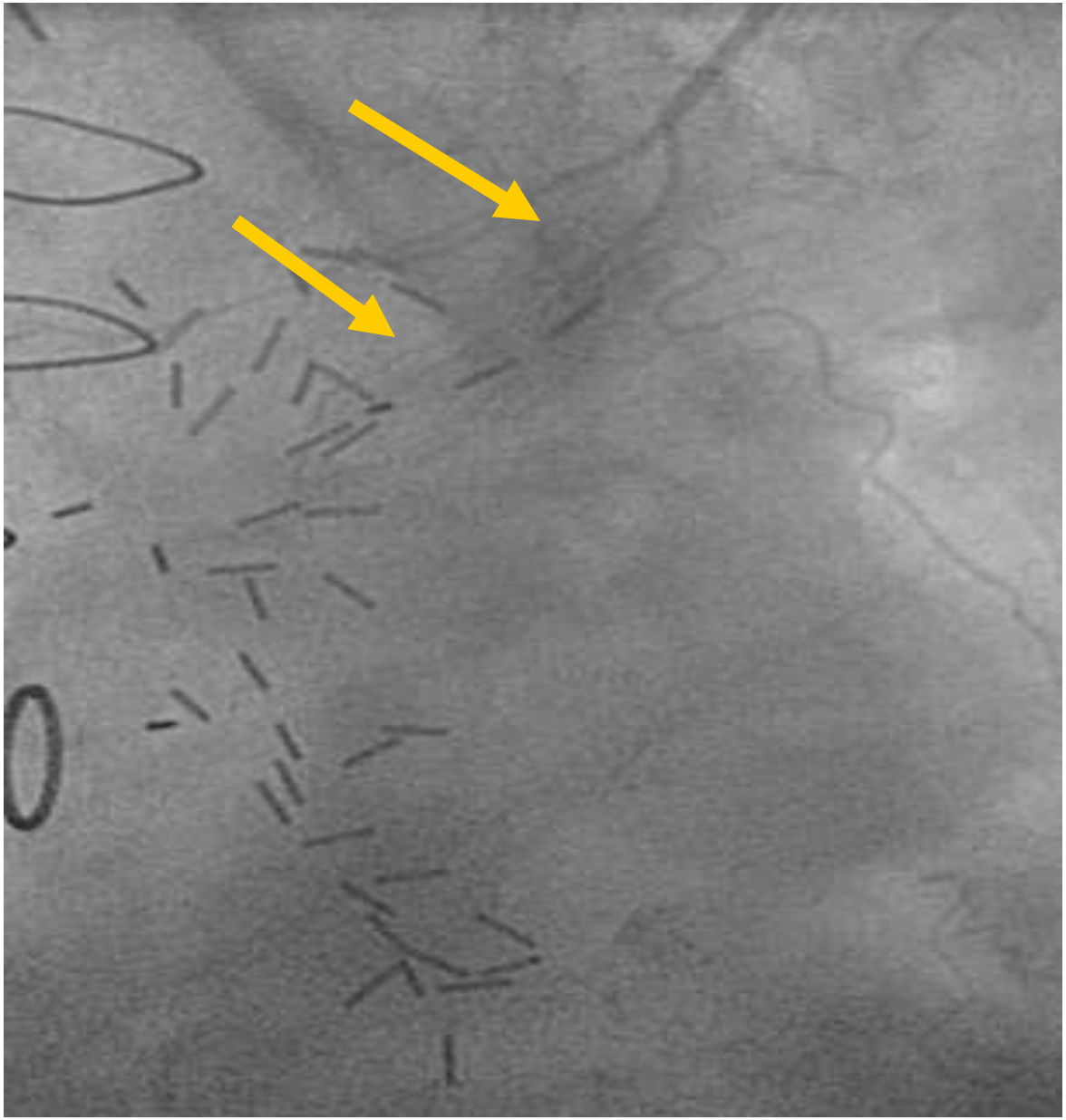
100% occlusion



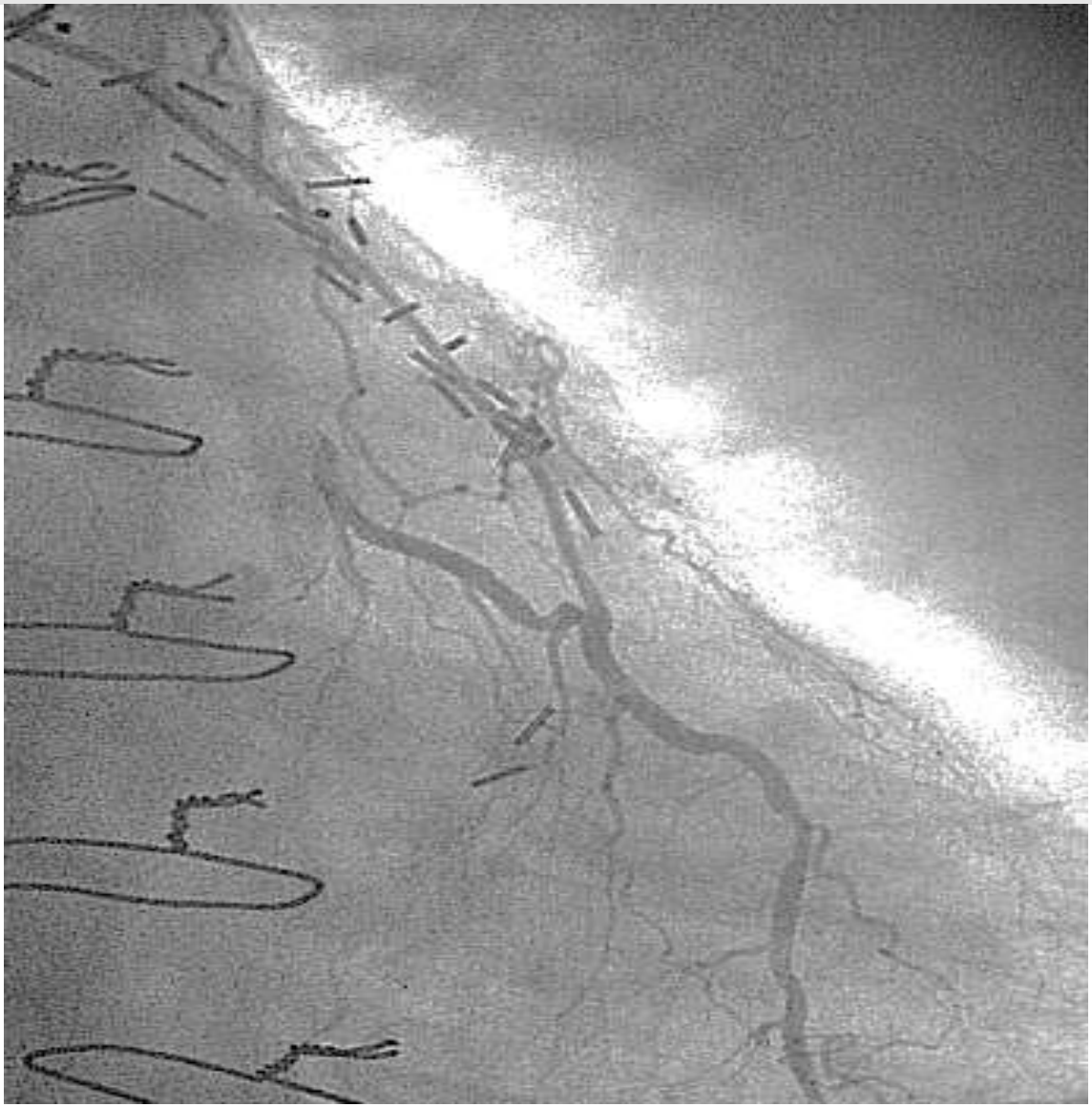
June 2003

Severe LM and Ostial LAD.





PCI of LIMA: after multiple inflations with 2 mm balloon



Summary

- **30-50% lesions should be stented.**
- **Intensive Lipid Therapy is Very effective to delay SVG's disease.**
- **Protection devices are effective.**
- **2b3a inhibitors offer no benefit.**
- **Pharmacological vasodilation is most effective.**
- **Direct stenting is better.**
- **Small stent in large veins: preferred approach.**
- **Do not abandon an occluded LIMA!**

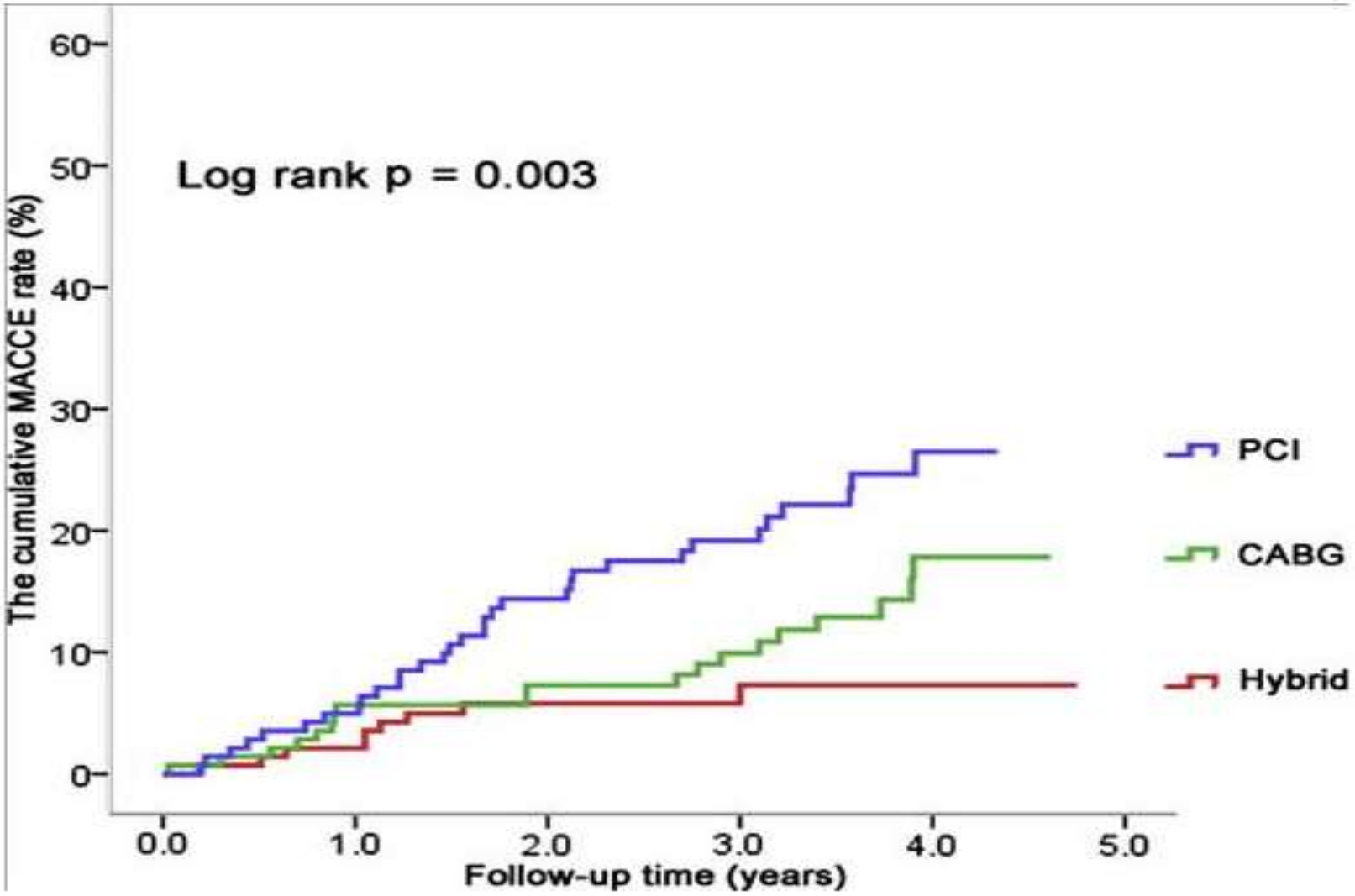
Hybrid Revascularization

Gao et al. JACC 2013;61:2525-33

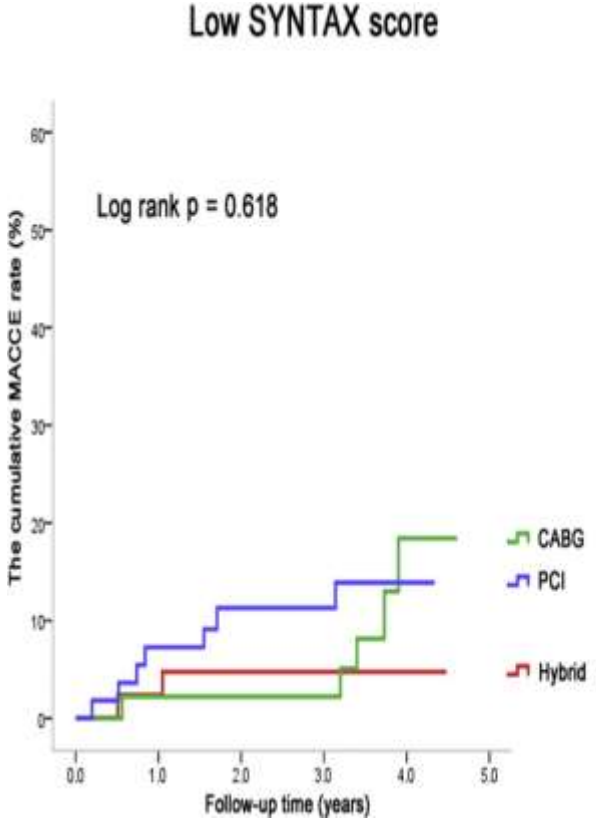
- **LIMA to LAD through ministernotomy. On or off Bypass.**
- **Angio to confirm patency of LIMA.**
- **ASA 100 mg perioperatively.**
- **Plavix off for 7 days. Plavix 300 through NG tube immediately after patency of LIMA confirmed.**
- **Heparin for ACT >250.**
- **PCI of non LAD vessels with DES**

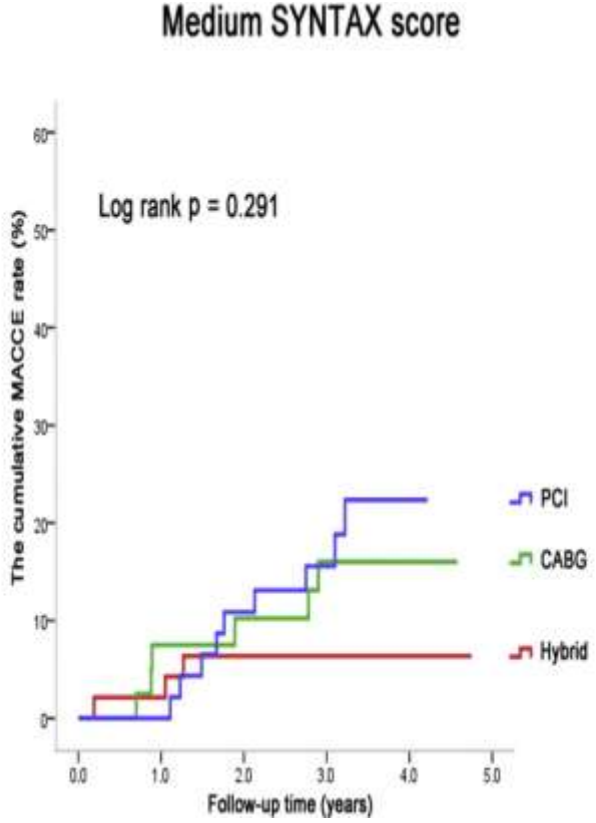
Hybrid Revascularization

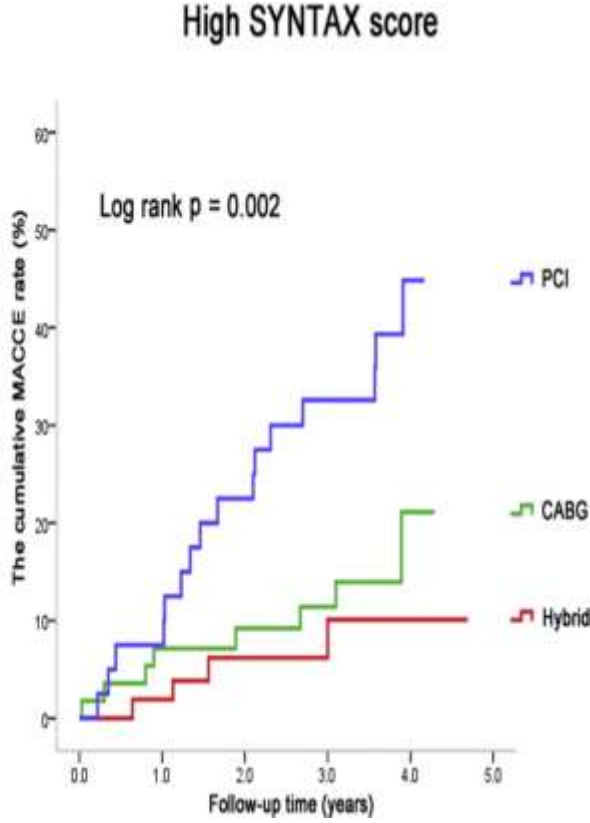
Gao et al. JACC 2013;61:2525-33



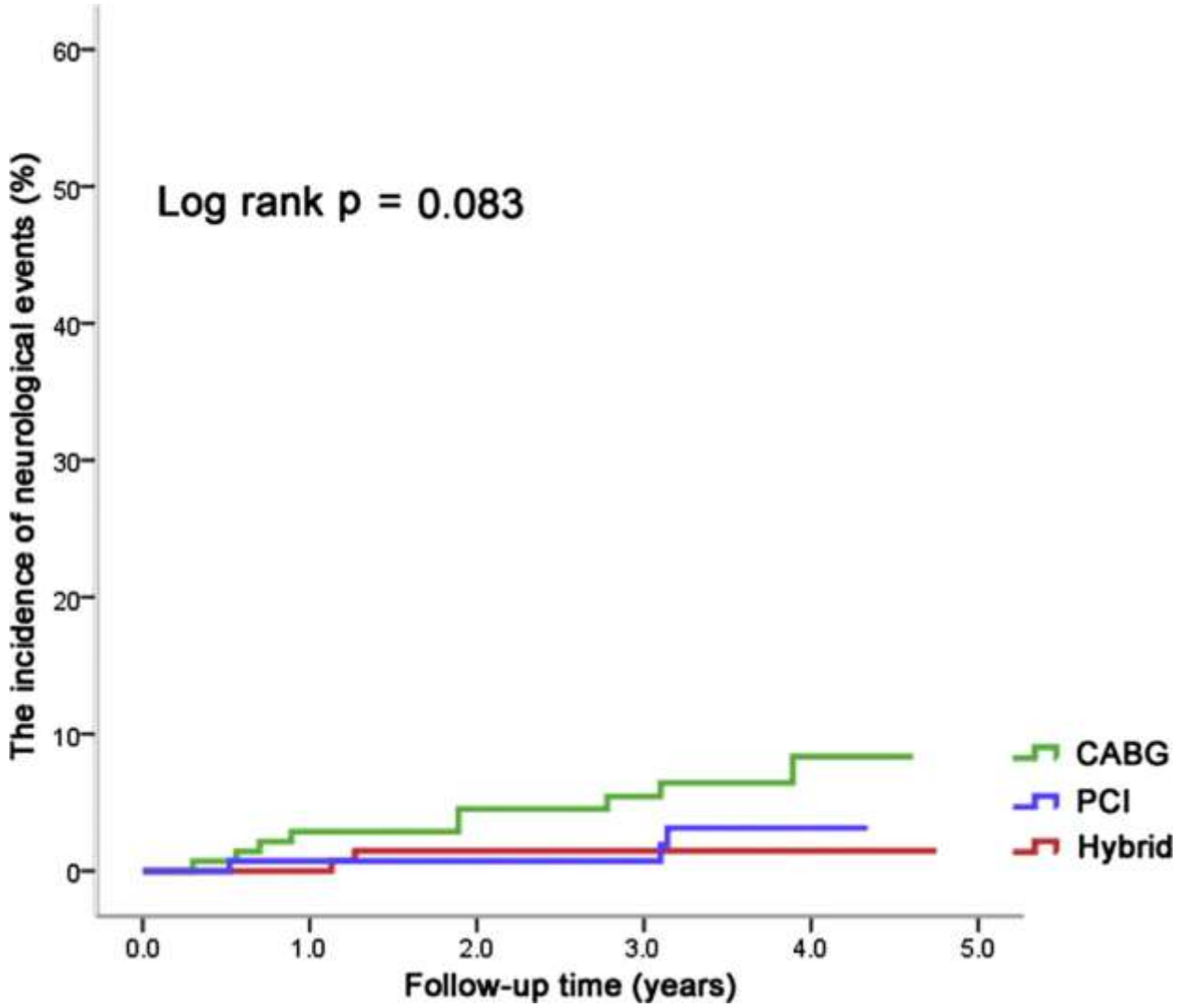
Hybrid Revasc. and Syntax Score







Neurological Events



HYBRID: A Prospective, Randomized Trial of Hybrid Coronary Revascularization Versus Standard Surgical Revascularization in Multivessel Disease

Michal Hawranek, MD

on behalf of the

HYBRID Trial Investigators

STUDY DESIGN

Hybrid revascularization – timing of the procedures and medications

- Pre-procedure
- Aspirin 75mg/d starting at least 12h before procedure

1 stage – MIDCAB LIMA - LAD

Assessment of:
- Drainage ≤ 25ml/h within last 2 hours
- HCT > 25%; Plt >80.000

- Pre-Procedure
- Clopidogrel 600mg <2h before PCI
- Clopidogrel 300mg <6h before PCI
- Procedural
- Heparin initial bolus 100IU/kg i.v., ACT > 250s
- Post-procedure
- Aspirin 75mg indefinitely
- Clopidogrel 75 mg for 12 months

2 stage – PCI with DES

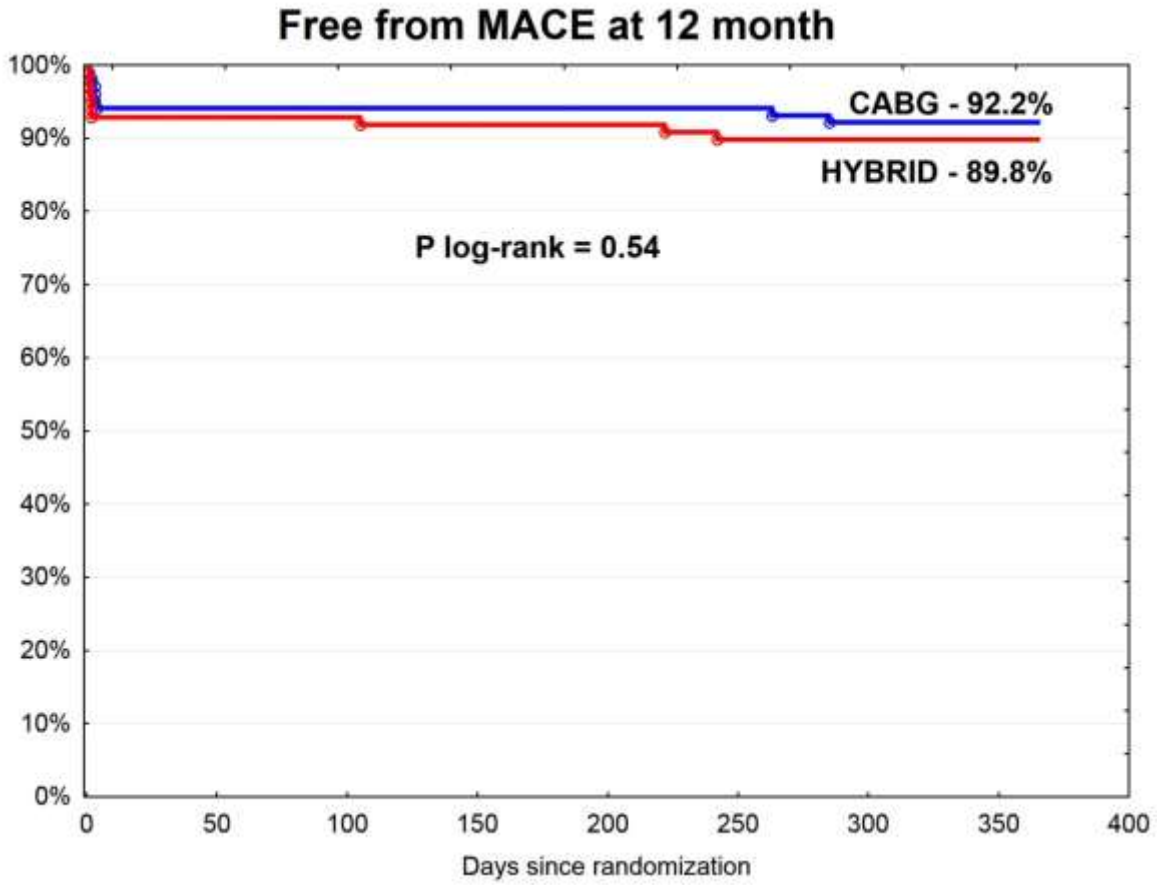
- Co-Cr everolimus eluting stents

< 36 hours

RESULTS

PRIMARY ENDPOINT - SAFETY

- Major Adverse Cardiac Events – death, MI, stroke, TVR, major bleedings



The end