13th Annual
Angioplasty Summit TCT Asia Pacific
3rd APSIC Fellowship Convocation

Euro-Asia CTO Club

Can we Implement Japanese Techniques in Europe ?

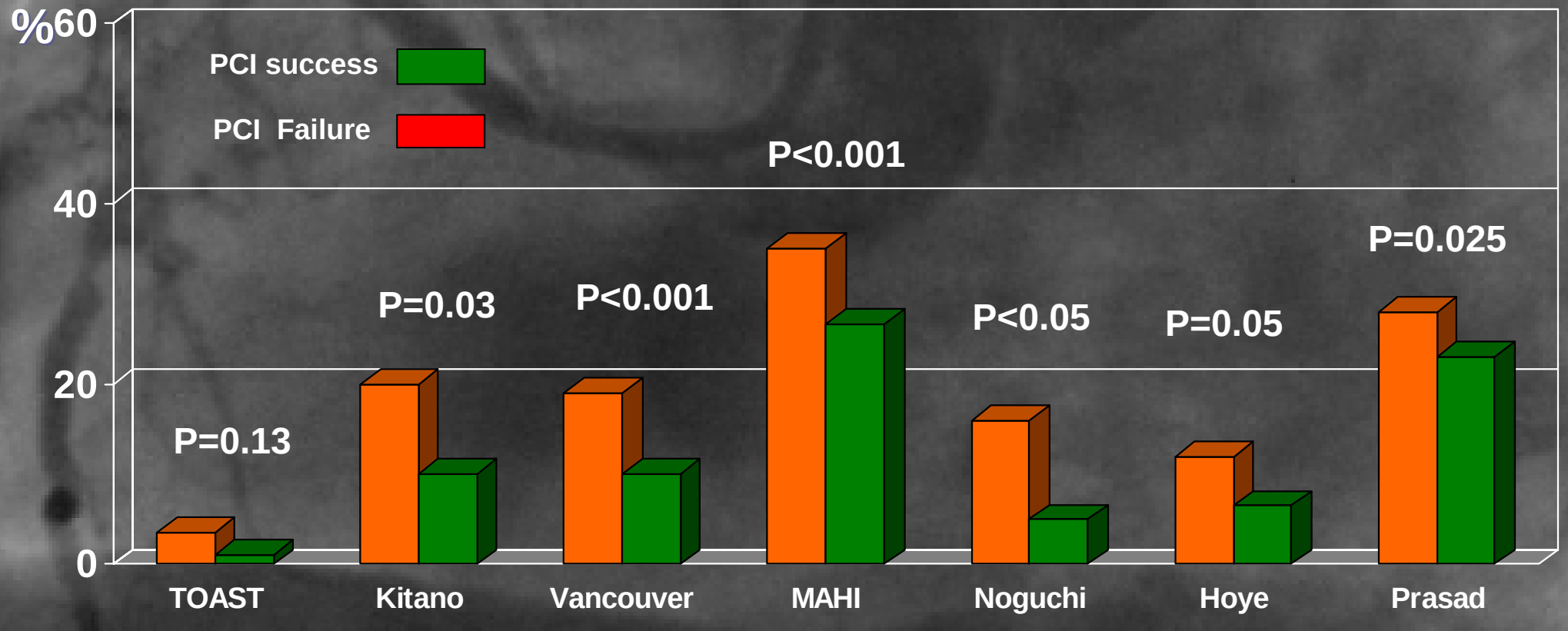
T. Lefèvre,

Institut Cardiovasculaire Paris Sud, Massy, France

Background

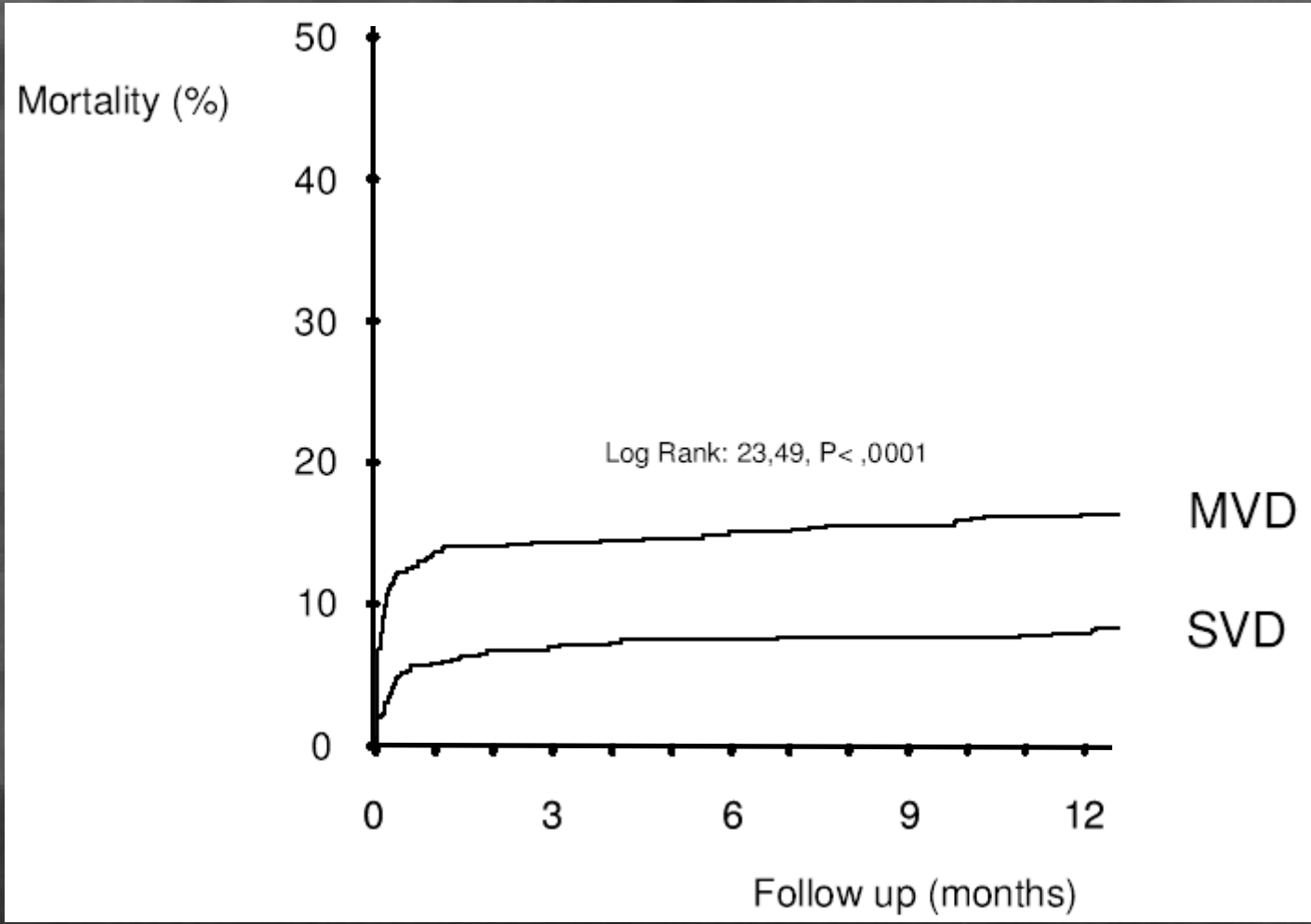
- ✓ Despite continuous improvement, PTCA of chronic total occlusion remains a real technical challenge.
- ✓ However, successfull reopening and long term patency after PCI may have a very important clinical impcat

Death After CTO PCI



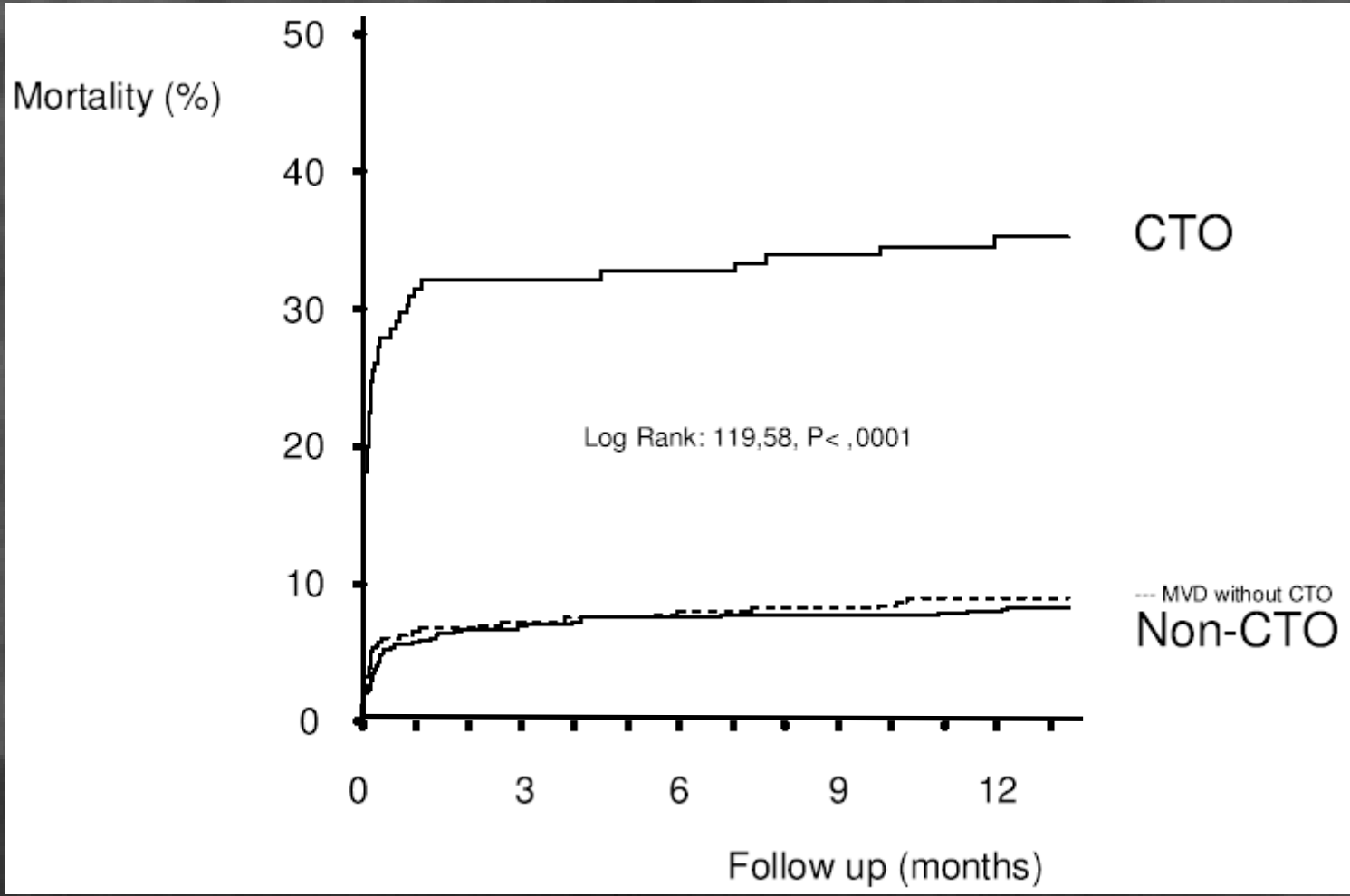
	TOAST	Kitano	Vancouver	MAHI	Noguchi	Hoye	Prasad
N	369	288	1,458	2,007	230	885	1262
F-up	1 year	5 years	6 years	10 years	12 years	5 years	10 years
	JACC 2003;41:1672-8	*AHA 2001*	*Circ 2001;104:415*	*JACC 2001;38:409-14*	*CCI 2000;49:258-64*	*EHJ 2005;26:2630-6*	*JACC 2007;15:1611-8*

The Impact of Multivessel disease in STEMI



Van der Shaaf et al. TCT 2006

The Impact of Multivessel disease in STEMI



Van der Shaaf et al. TCT 2006

CTO: Limitations

« Low » rate of success

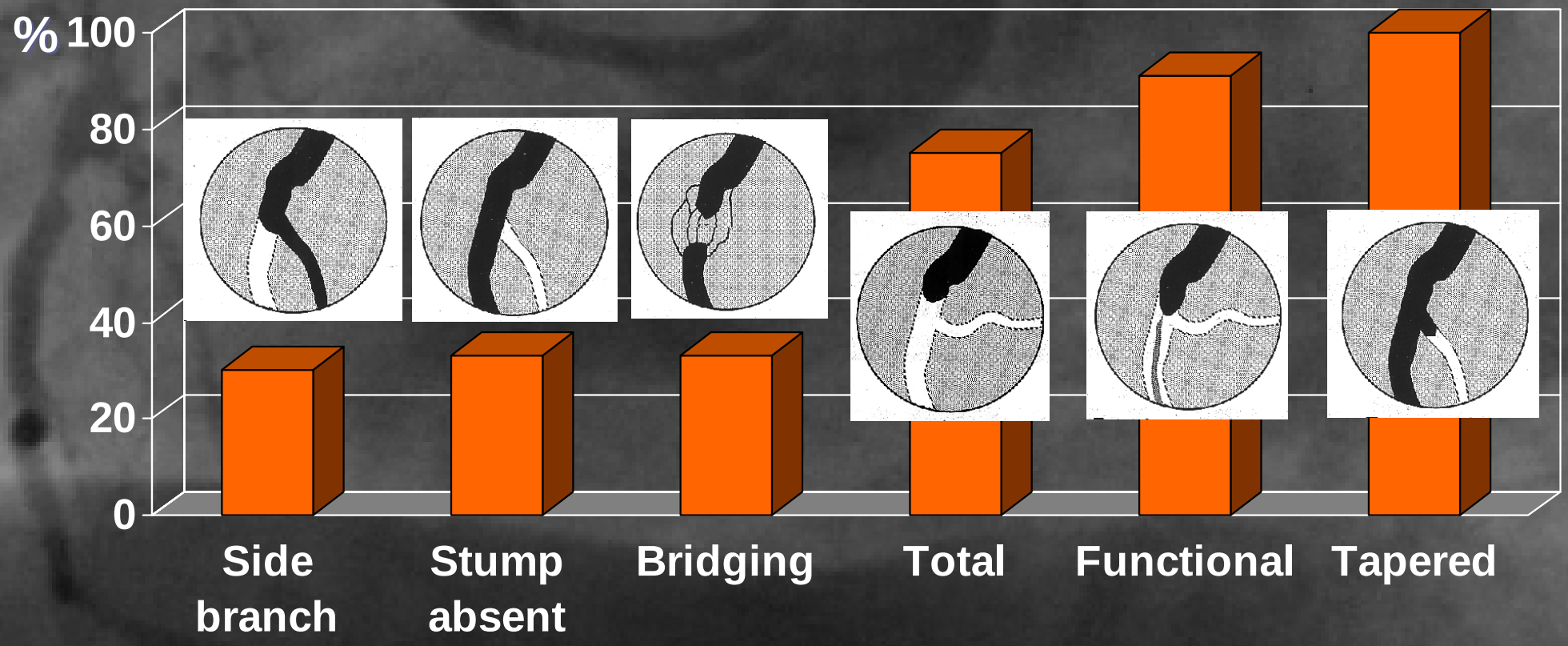
- ✓ Wire crossing
- ✓ Balloon crossing

Safety issues

- ✓ Contrast media
- ✓ X ray exposure
- ✓ Complications

A Randomized Study Comparing Two Guidewires Strategies

Procedural success in 1998 (74%)



Lefèvre et al, Am J Cardiol 2000; 85: 1144-7

CTO Learning Phase

Basic Wire-Handling Strategies for CTOs

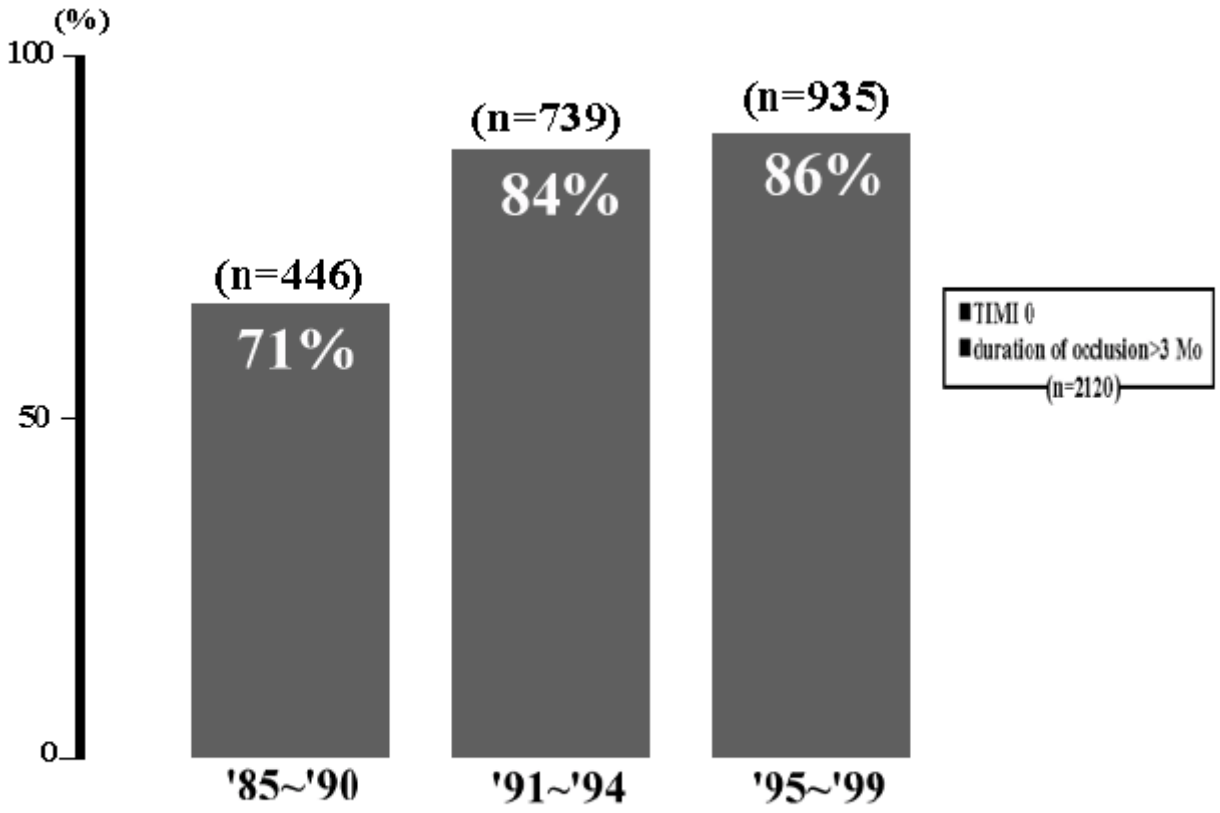


Figure 1: Success rates over the years
The graph shows the author's own success rates, which passed 80% in 1992, stabilizing at about 85% since 1993.

Katoh et al. CCT 2002

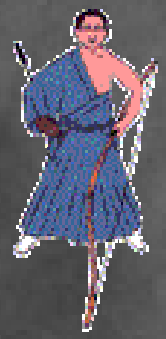
Determinants of procedural failure in CTO

Multivariate analysis of procedural failure-

Period IV	P value	Odds ratio (95% CI)
Tortuosity	<0.001	5.45 (2.05-14.51)
Calcification	0.003	3.64 (1.56-8.48)
Bridging collateral	0.089	0.41 (0.14-1.15)
Long lesion	0.091	1.92 (0.90-4.07)
Abrupt type	0.161	1.92 (0.77-4.80)
Occl. Age (>3Mo)	0.409	1.68 (0.49-5.79)
Side branch	0.572	0.78 (0.33-1.86)

Mitsudo et al. CCT 2002

ICPS Registry



Initial learning phase 2002-2003

- ✓ Dedicated wires
- ✓ New techniques
- ✓ Mental power

Prospective registry 2004-2007

New Techniques

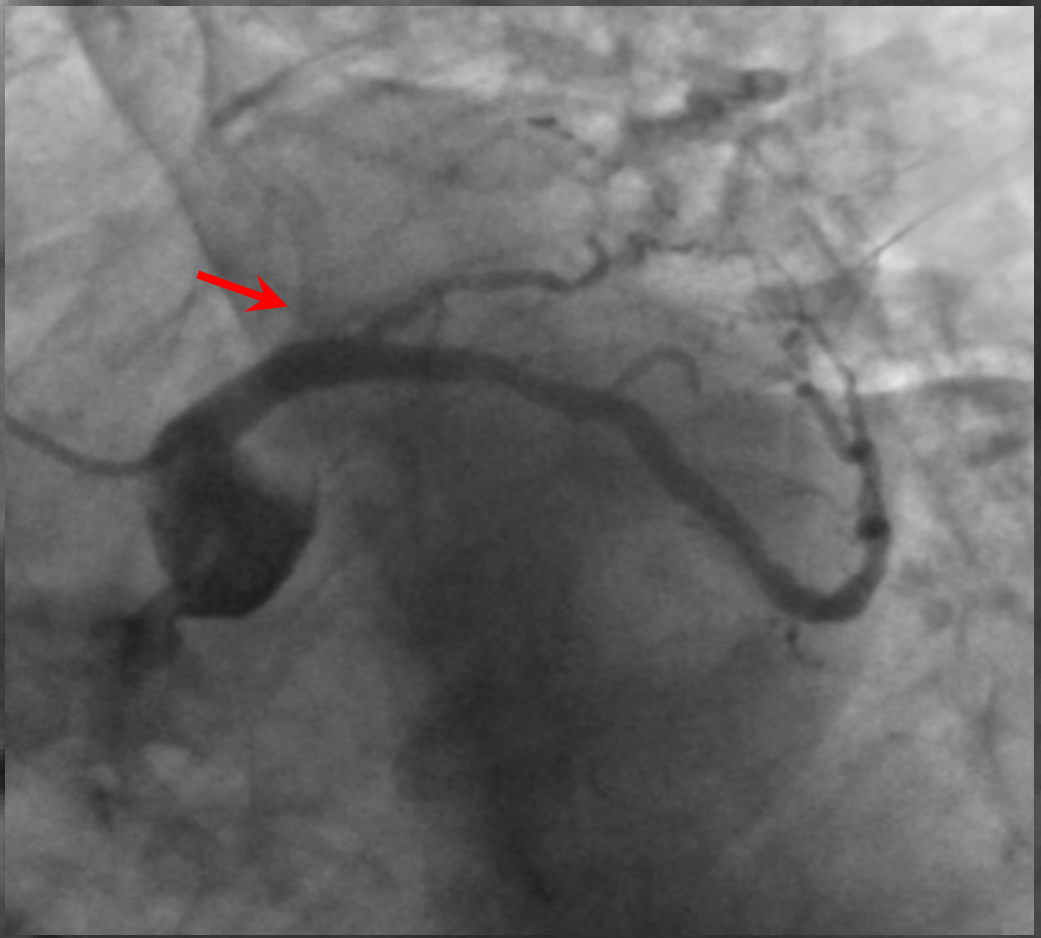
1. To Improve GC Support

- ✓ Coaxial balloon or microcathéter
- ✓ « Mother and child »
- ✓ Anchoring wire technique
- ✓ Anchoring balloon technique

2. To know Were to Go

- ✓ Controlateral injection
- ✓ CT Scan
- ✓ Echo guided

CT Scan



3. To Cross the lesion with the Wire

- ✓ Parallel wire technique
- ✓ See saw technique
- ✓ Side branch technique
- ✓ Retrograde approach

4. To Cross and Predilate the Lesion

- ✓ « Anchoring Balloon Technique »
- ✓ « Mother and Child »
- ✓ Buddy wire technique
- ✓ Coaxial Balloon
- ✓ Rotablator
- ✓ Tornus

5. Retrograde Approach

ICPS Registry

- ✓ Prospective Registry
- ✓ January 2004 – December 2007
- ✓ All consecutive patients
- ✓ Ischaemia in the index territory
- ✓ Patients not considered for surgery as a first option

ICPS Registry

Patient Characteristics (n=511)

Age (years)	63±12
Diabetes (%)	28
Prior PCI (%)	33
Prior MI (%)	22
Prior CABG (%)	5.7
Unstable angina (%)	13.3
3-Vessel disease (%)	29.0
Ejection fraction (%)	58±11
Repeat attempt (%)	6.7

ICPS Registry

Lesion characteristics (n=566)

RCA/ LAD/Circ system (%)	44/32/23
Instent occlusion (%)	9.2
Reference diameter (mm)	2.9±0.7
Lesion age (months)	38±28
Lesion length (mm)	21±15
Mod-severe calcification (%)	32.8
Tortuous anatomy (%)	16.3
Bridging collaterals (%)	39.4
Intraluminal bridging (%)	10.9
No visible stump (%)	16.5
Side branch (%)	39.4

ICPS Registry

Techniques/material used (%)

CTO specific wire use, ≥ 3g (%)	75.3
Parallel wire technique (%)	20.5
Controlateral injections (%)	23.8
Side branch technique (%)	4.6
Anchoring balloon technique (%)	4.8
Coaxial balloon (%)	45.0
Microcatheter (%)	8.5
Retrograde approach (%)	5.3
CT scan (%)	9.3
Tornus/rotablator (%)	1.2/1.4
IVUS guided penetration (%)	2.1

ICPS Registry

Procedural Results

Contrast media (ml)	303±189
Fluoroscopy time (min.)	40±28
Procedural time (min.)	82±41
Guidewire success (%)	72.6
Complete angiographic success (%)	68.0
Uncomplete angiographic success (%)	2.5
Total stent length in CTO (mm)	43±22

ICPS Registry

Multivariate Analysis

Predictors of success

CTO involving a bifurcation	p = 0.009, OR 2.1, 95% CI 1.2-3.7
Functional occlusion	p = 0.007, OR 3.3, 95% CI 1.4-7.8

Predictors of Failure

Moderate-severe calcification	p < 0.001, OR 2.9, 95% CI 1.9-4.5
Lesion length	p = 0.008, OR 1.5, 95% CI 1.1-1.9

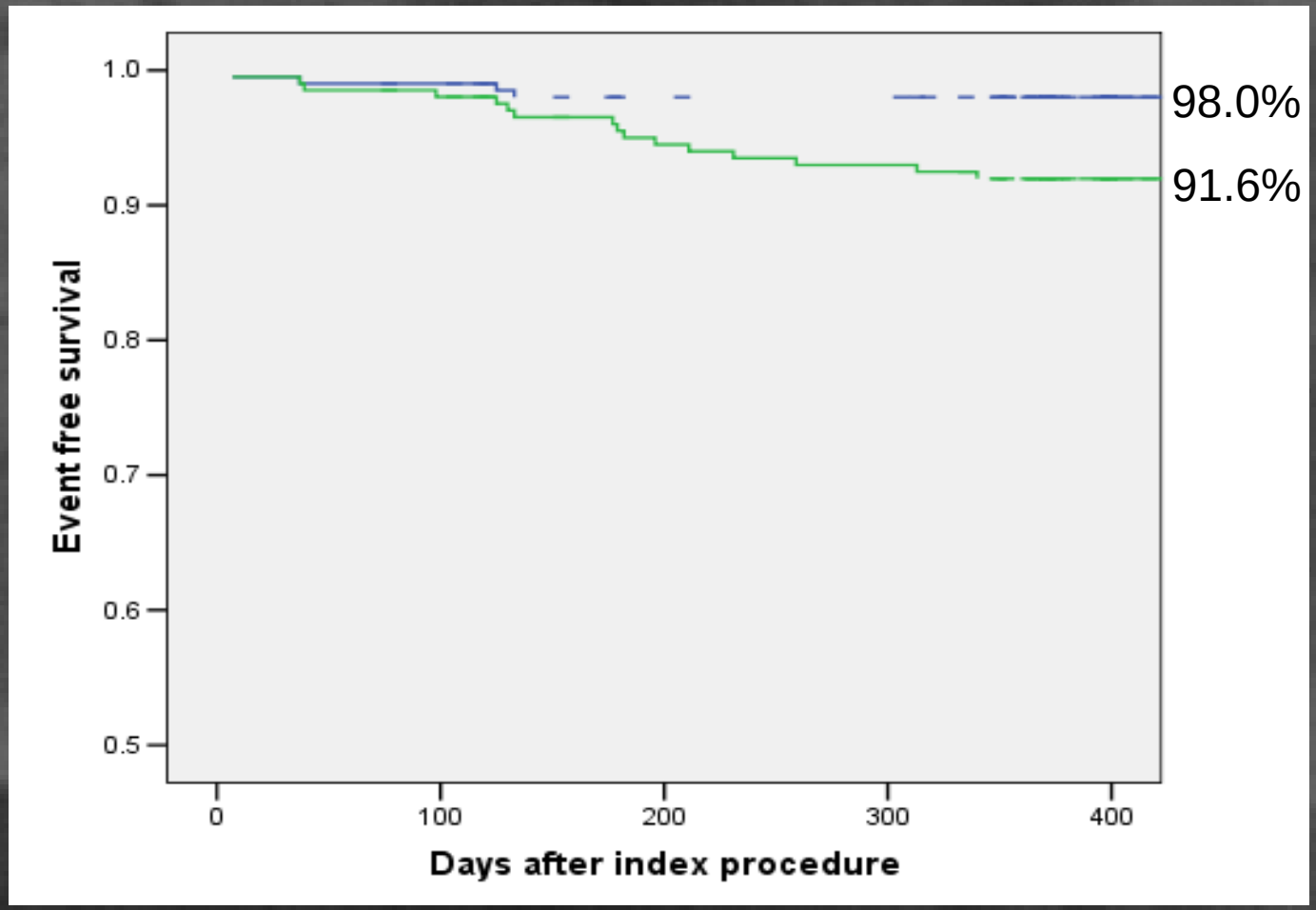
ICPS Registry

In-Hospital Outcome*

Access site complication (%)	0.2
Non-Q-wave MI (%)	0.5
Q-wave MI (%)	0.5
Cardiac tamponade (%)	0.7
Emergency CABG (%)	0.2
Emergency PCI (%)	0.4
Renal failure (%)	0
Stroke (%)	0.2
In-hospital Death (%)	1.1
In-hospital MACCE (%)	2.1

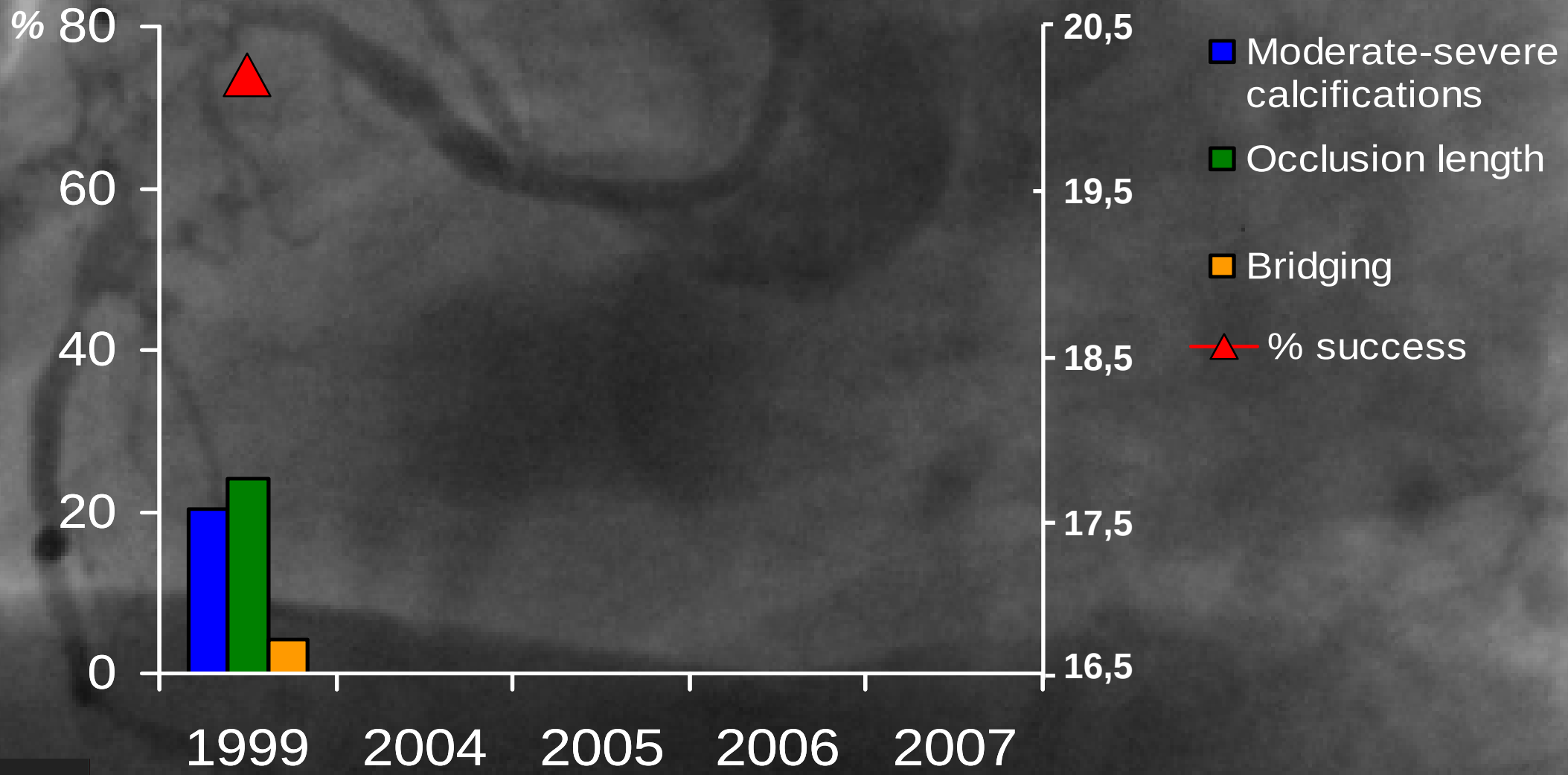
**** Non Hieradchical***

Kaplan Meier Curve for Freedom for cardiac death and MACE*



**** 203 Patients treated with DES, 100% F-up***

ICPS Registry



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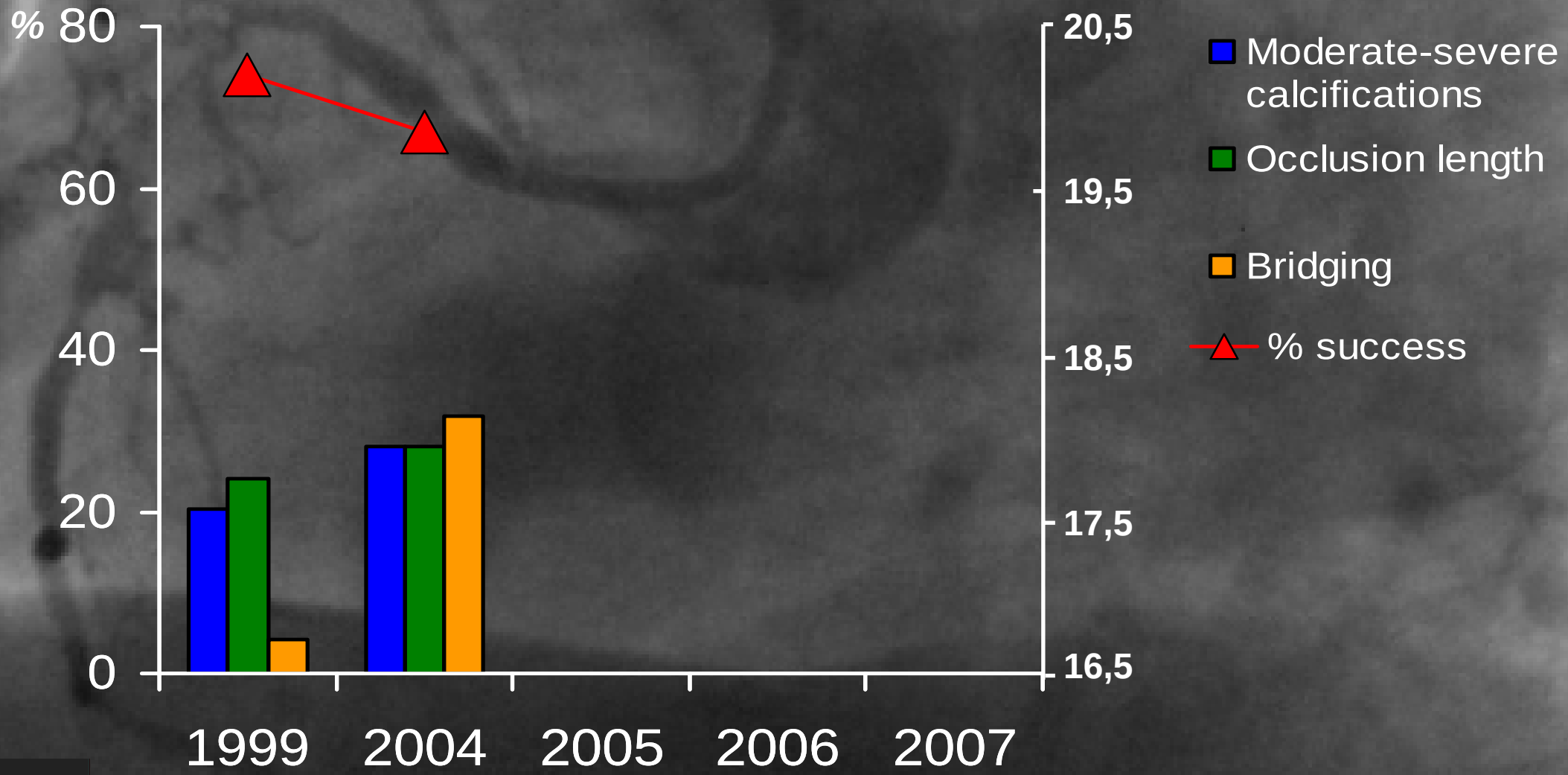

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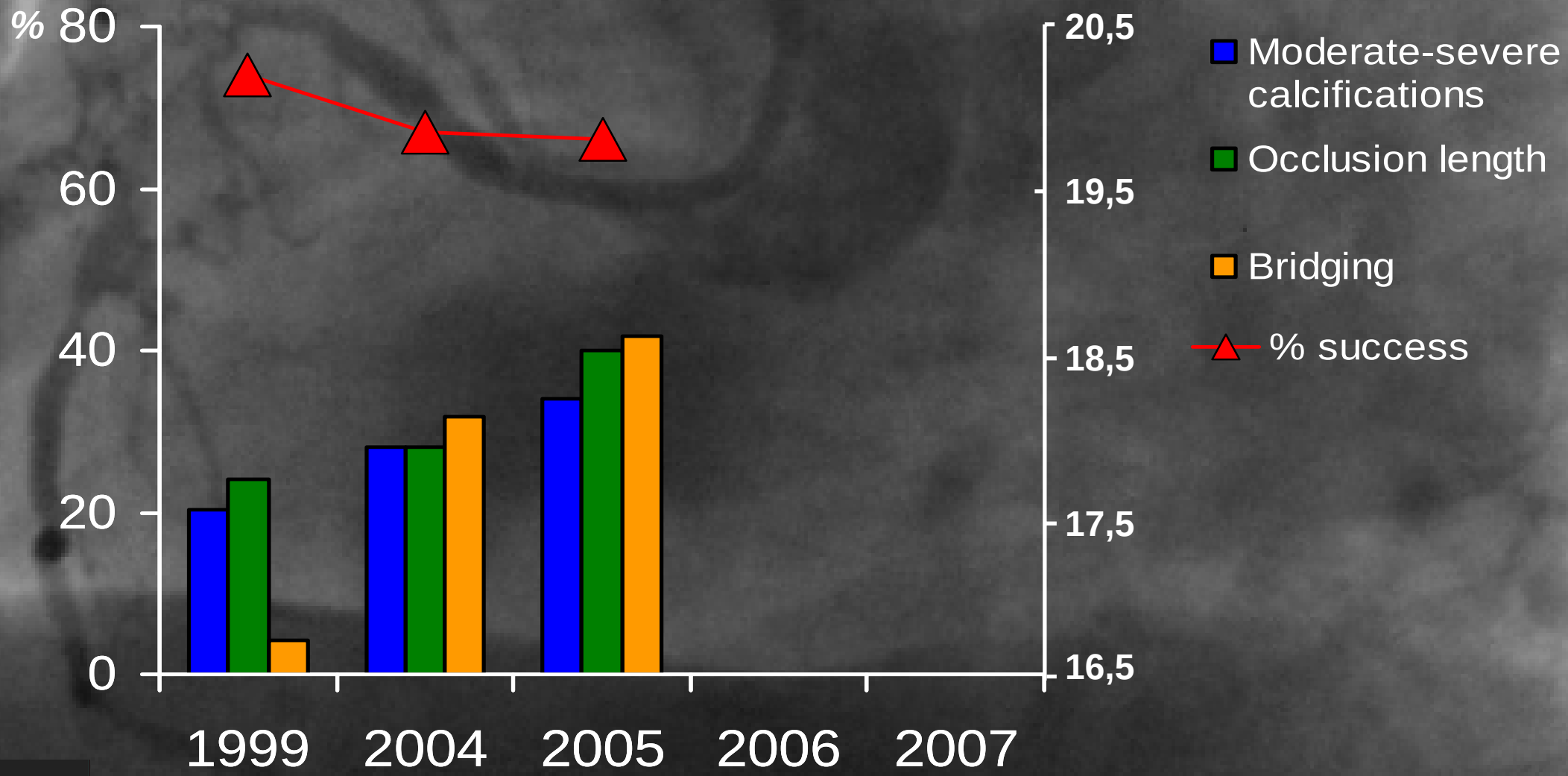

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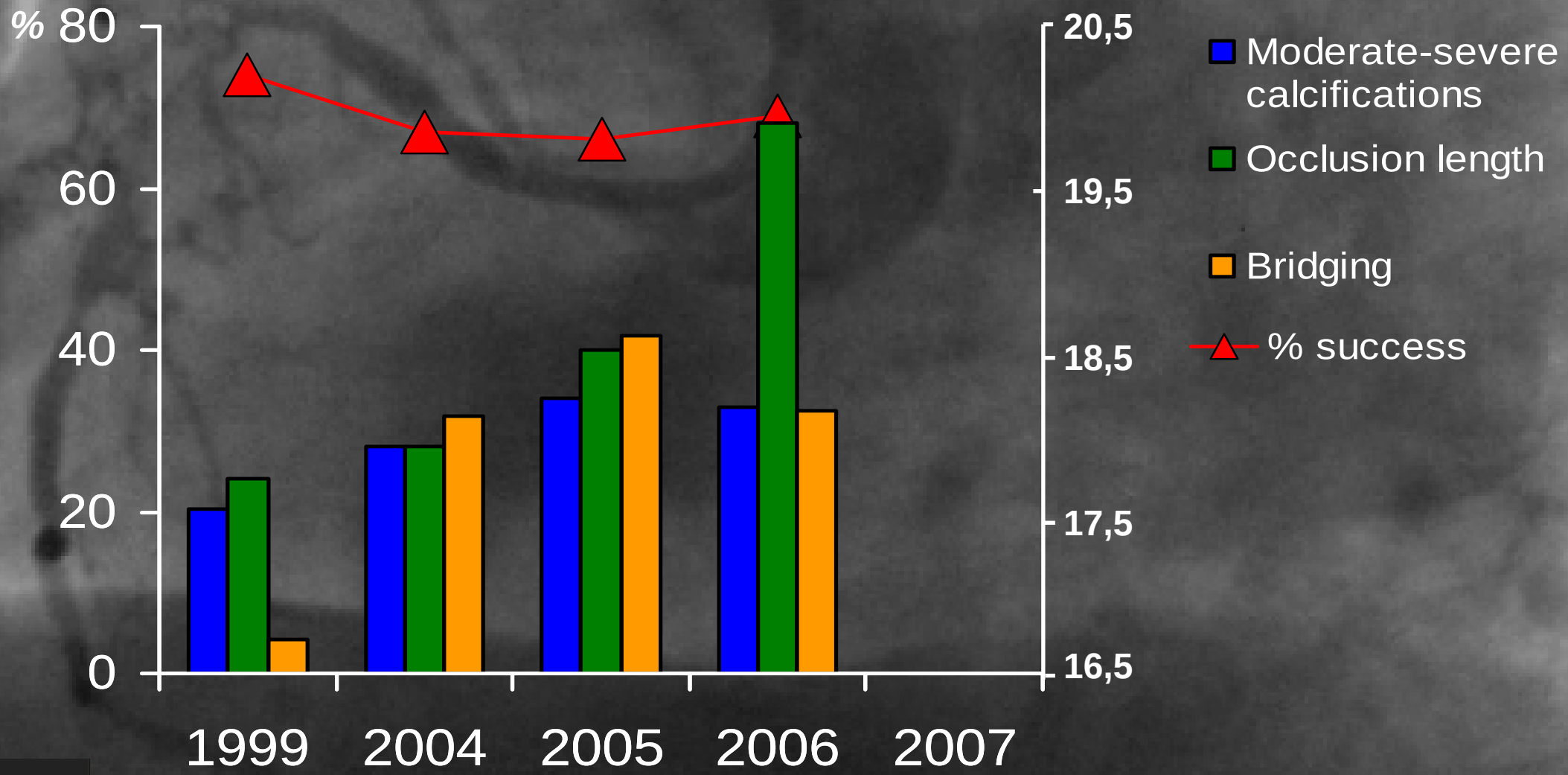

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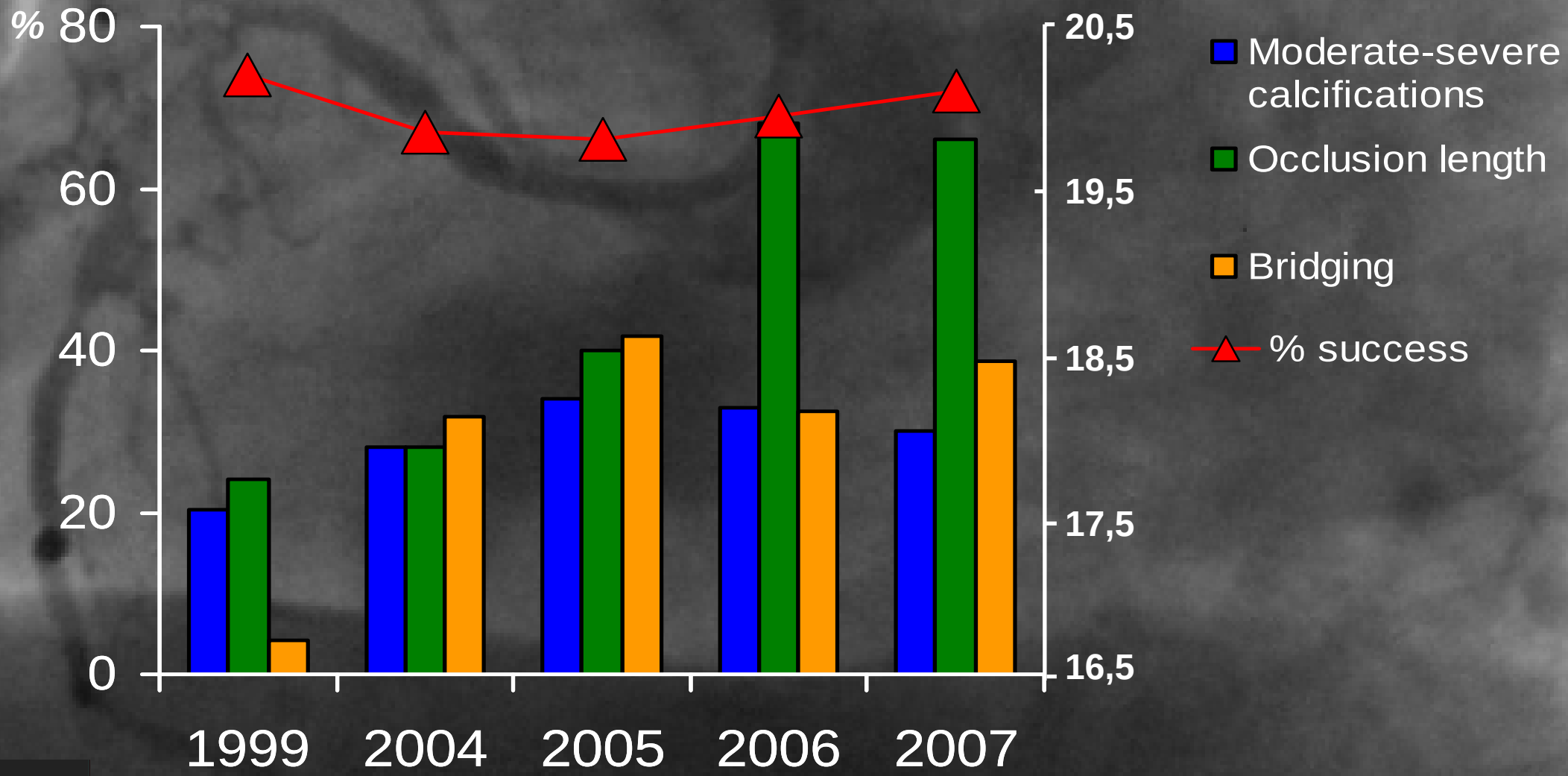
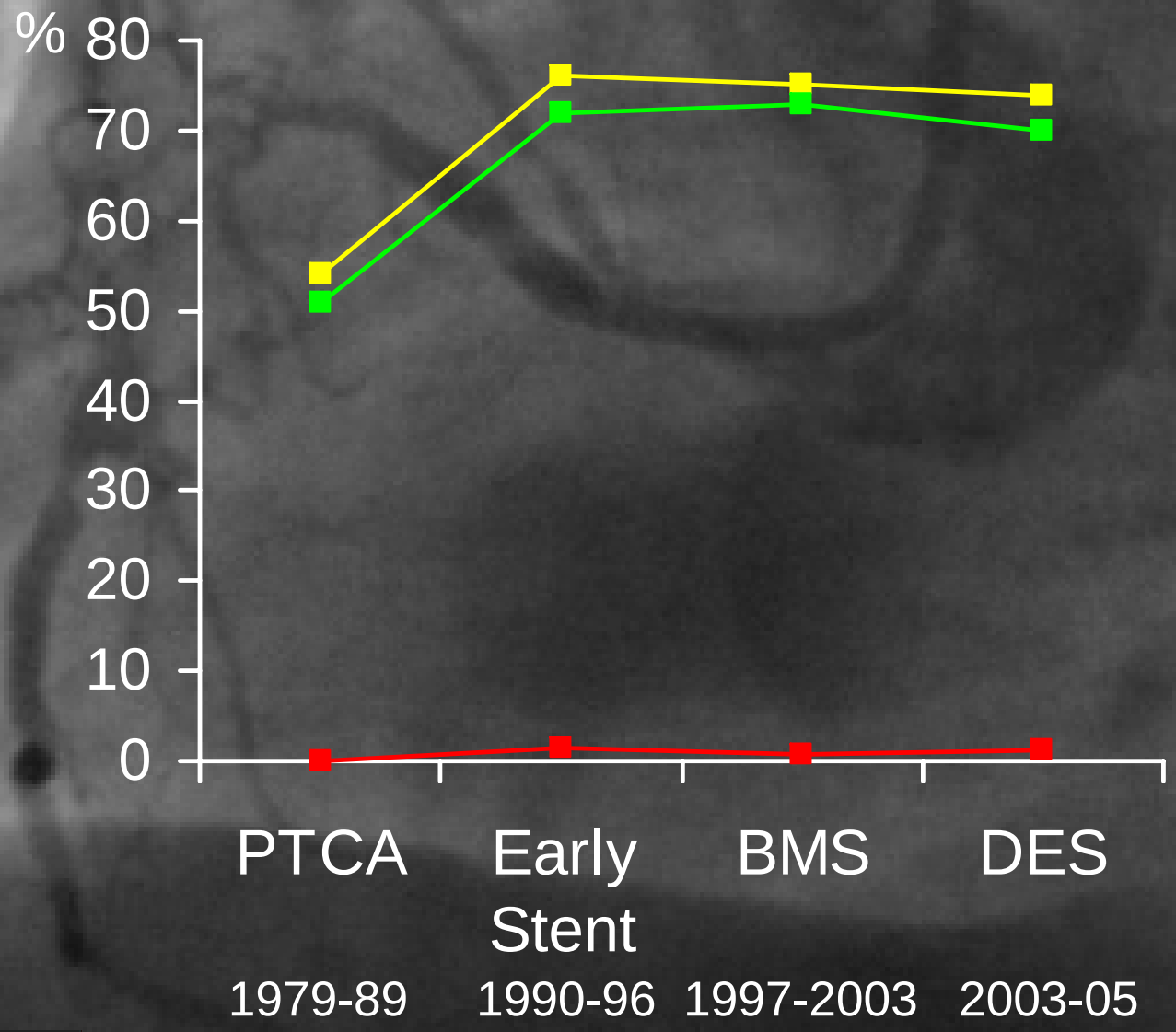


Conclusion

- ✓ New dedicated wires and techniques have dramatically modified the type of CTO treated in our Cathlab.
- ✓ Despite an ongoing learning curve, safety is acceptable.
- ✓ Predictors of failure are now completely different compared to our previous experience.

Back-up Slides

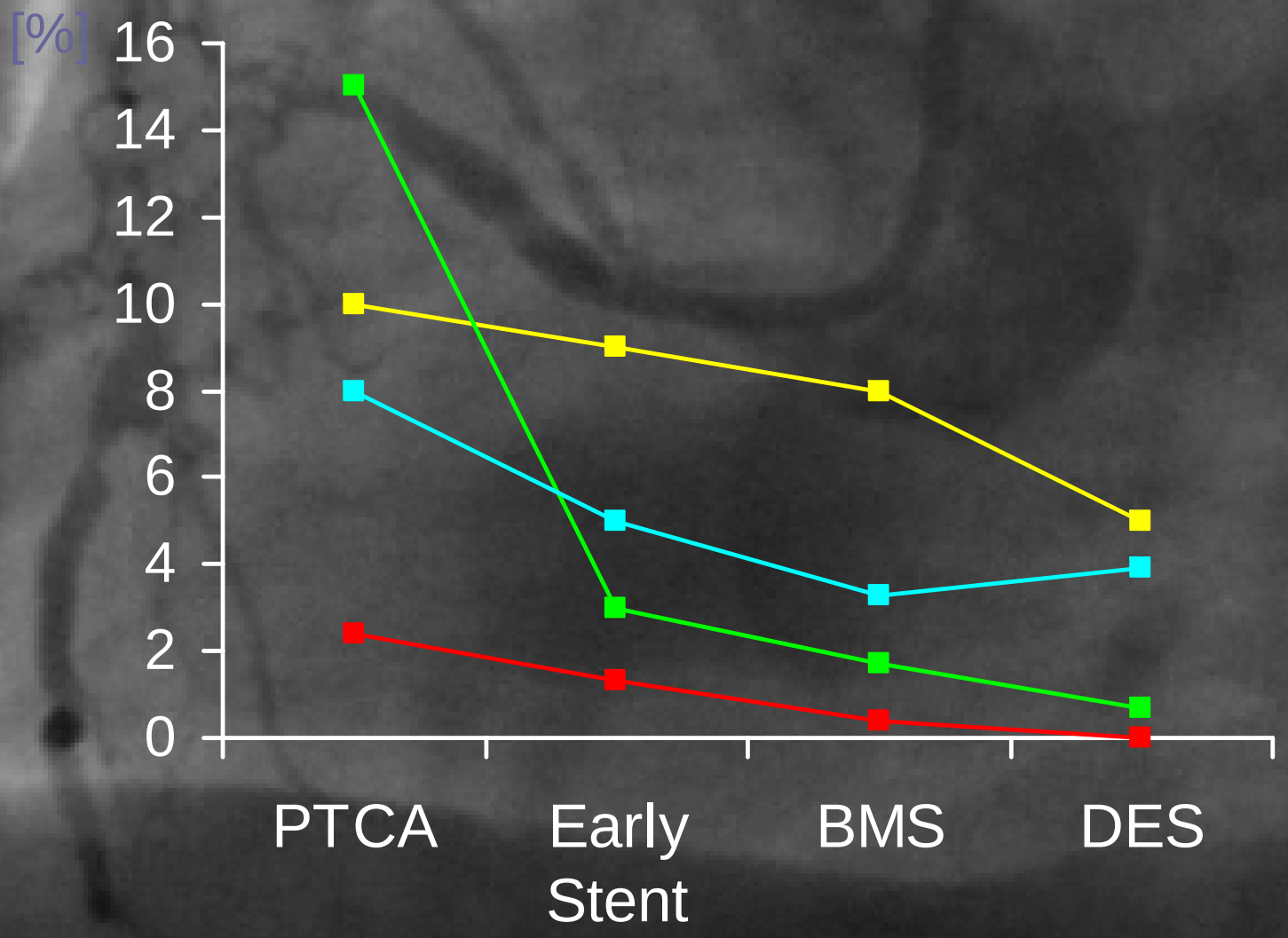
In-hospital outcomes after PCI in CTOs 1979 – 2005 (n= 1262)



	p- Value
Technical success	<0.001
Procedural success	<0.001
Tamponade	0.88

Prasad A, et al. JACC 2007; 49: 1611-8

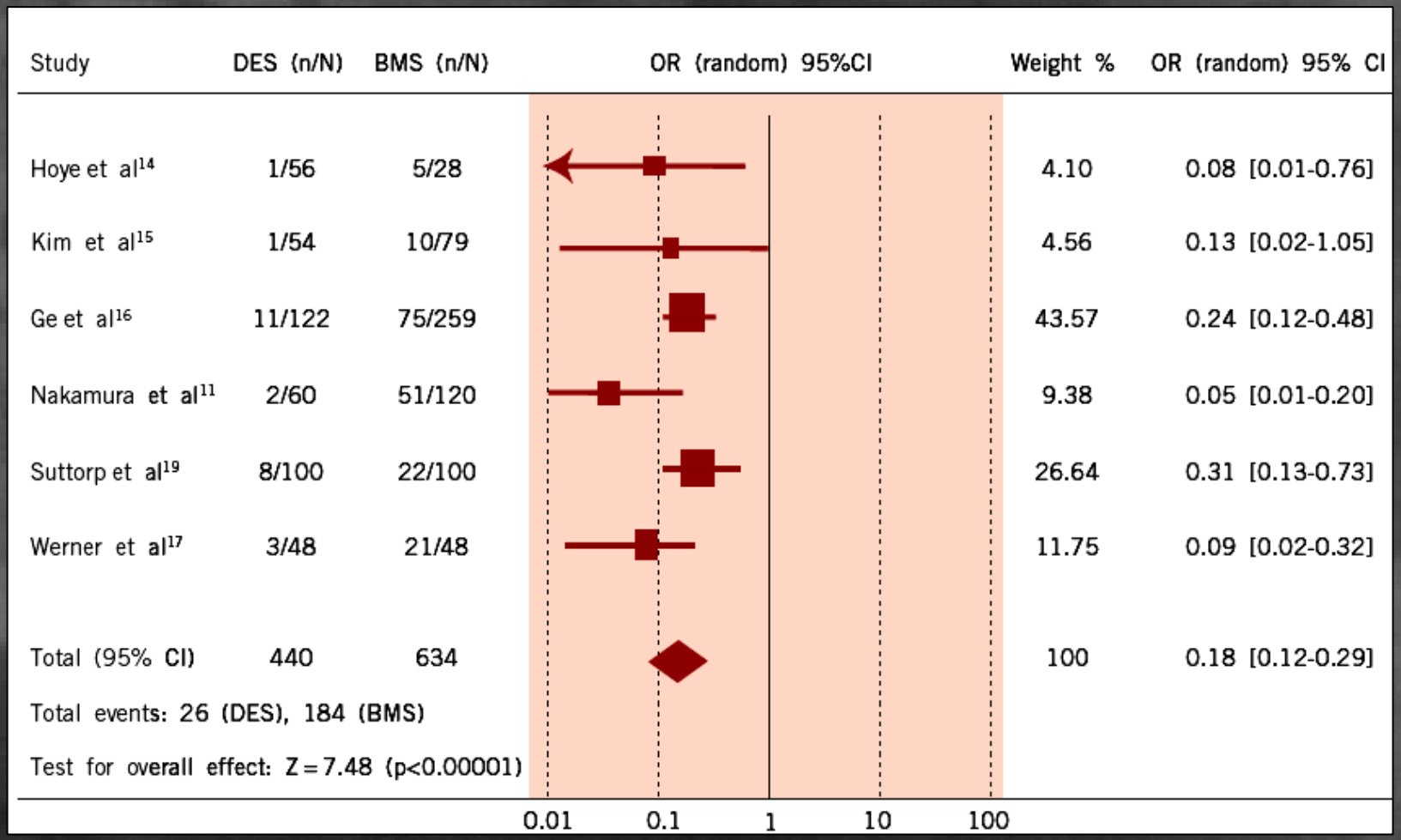
In-hospital outcomes after PCI in CTOs 1979 – 2005 (n= 1262)



	p- Value
Death	0.009
Any MI	0.081
CABG	<0.001
MACE	0.052

Prasad A, et al. JACC 2007; 49: 1611-8

Need for Target Vessel Revascularization: BMS vs DES



Hoye et al. EuroIntervention 2007; 26: 2630-6