Resténose intra stent d'une lésion de bifurcation

Dr Zied Ibn Elhadj

H. A Mami, Ariana. Tunisie

Présentation clinique

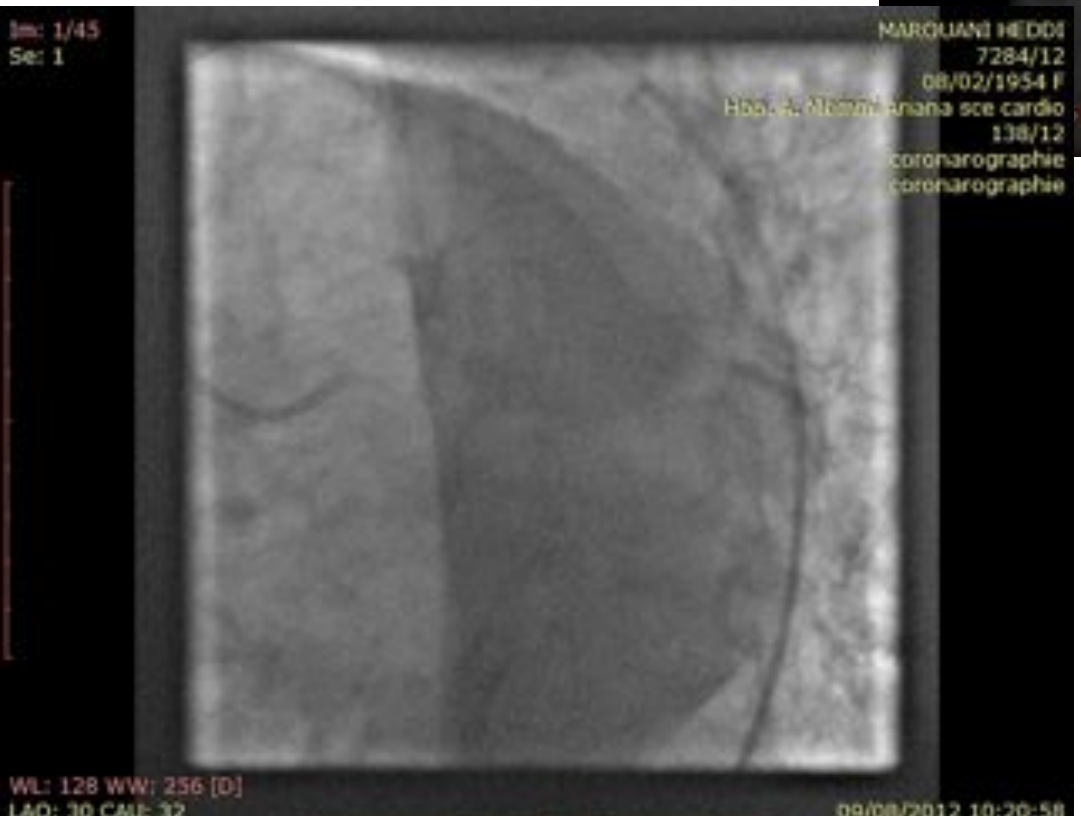
- F 60 ans
- 1m56, 63 Kg
- FDRCV : HTA, ménopause

- SCA ST- tropo +

- ETT : FEVG 48% , Hypokinésie antérieure

CORO


Im: 1/49
Se: 1
MAROUANI HEDDI
7284/12
08/02/1954 F
Hop. A. Mimmi Ariana sce cardio
138/12
coronarographie
coronarographie


Im: 1/45
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MAROUANI HEDDI
7284/12
08/02/1954 F
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coronarographie
coronarographie
WL: 128 WW: 256 [D]


Im: 1/61
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MAROUANI HEDDI
7284/12
08/02/1954 F
Hop. A. Mami Ariana sce cardio
138/12
coronarographie
coronarographie
WL: 128 WW: 256 [D]
RAO: 7 CRA: 20
09/08/2012 10:25:42

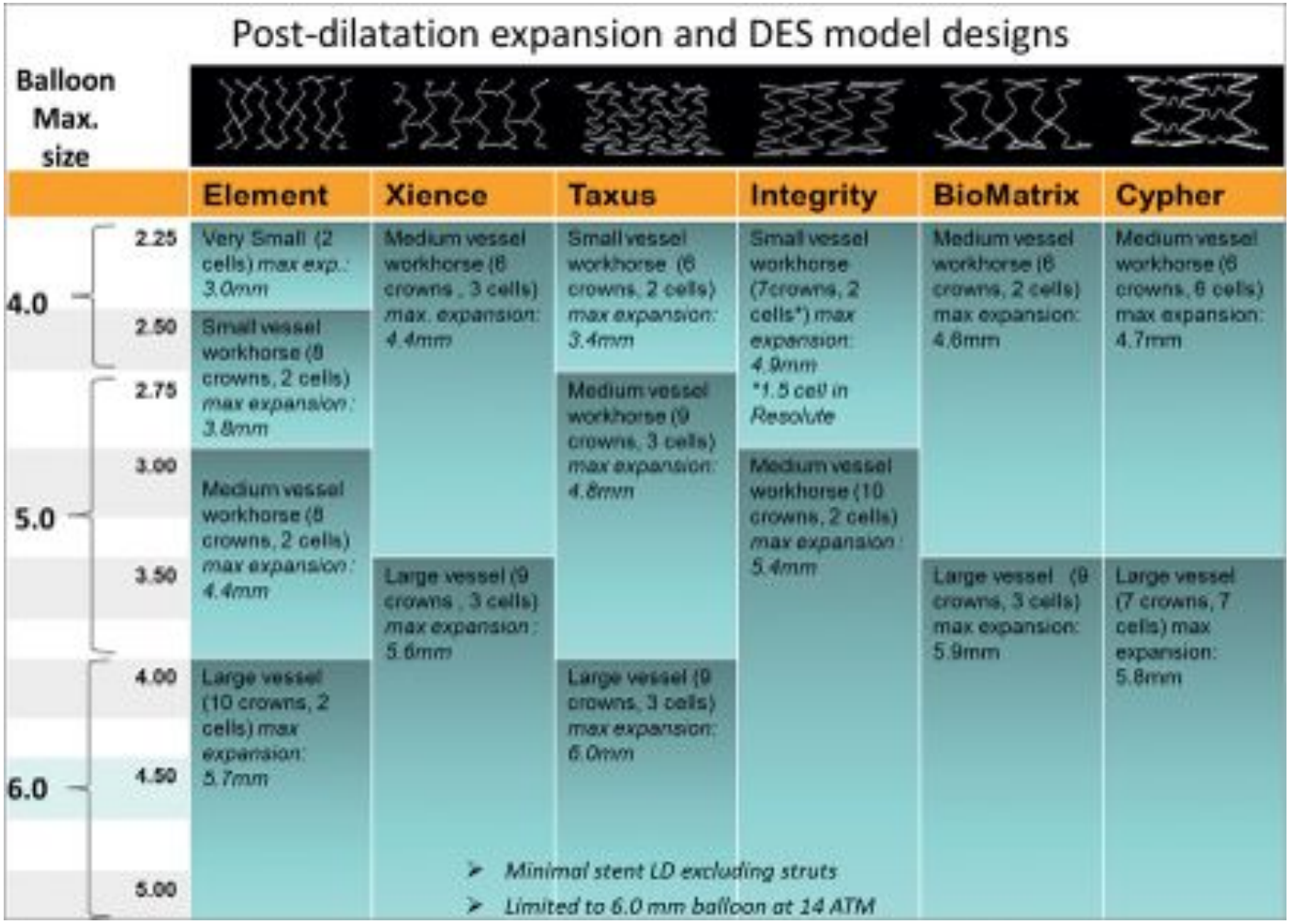
Stratégie thérapeutique

- Angioplastie TCG
- Provisional T stenting
- 1 Stent actif Resolute Integity 3 x 28 dans l'axe de l'IVA
- Final 2 steps KB

- Pas d'imagerie endocoronaire

EuroIntervention

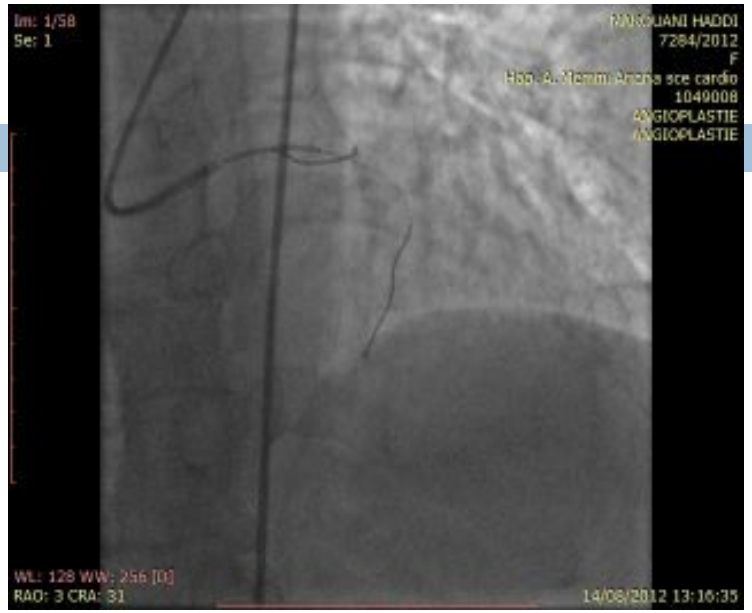
Bien connaitre son stent

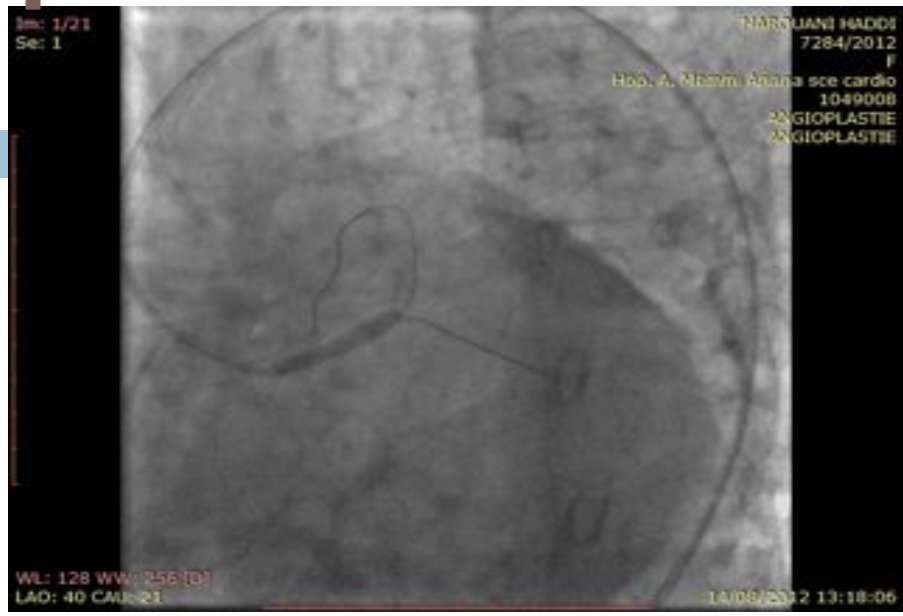


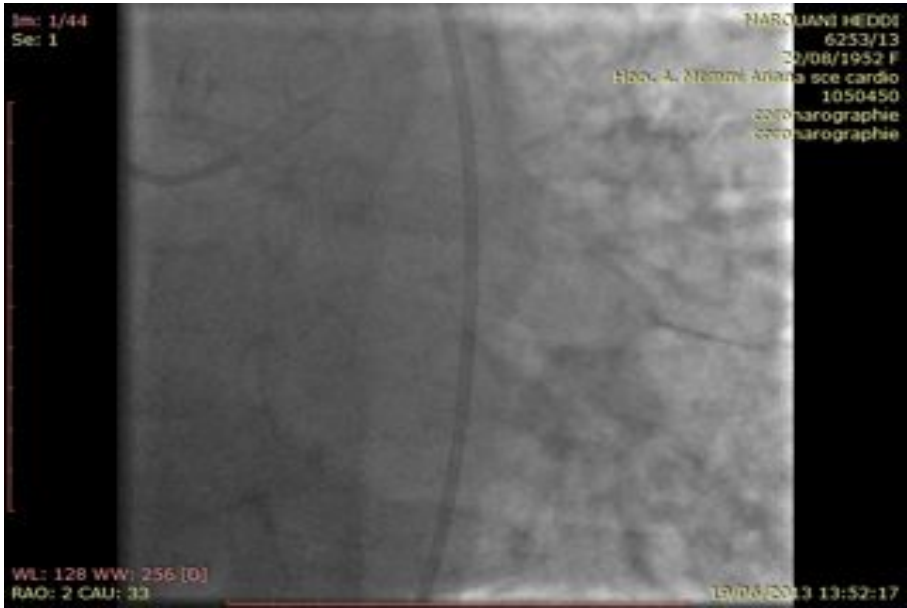
EuroIntervention 2013;8:1315-1325 published online ahead of print October 2012

Maximal expansion capacity with current DES platforms: a critical factor for stent selection in the treatment of left main bifurcations?

Procédure d'angioplastie



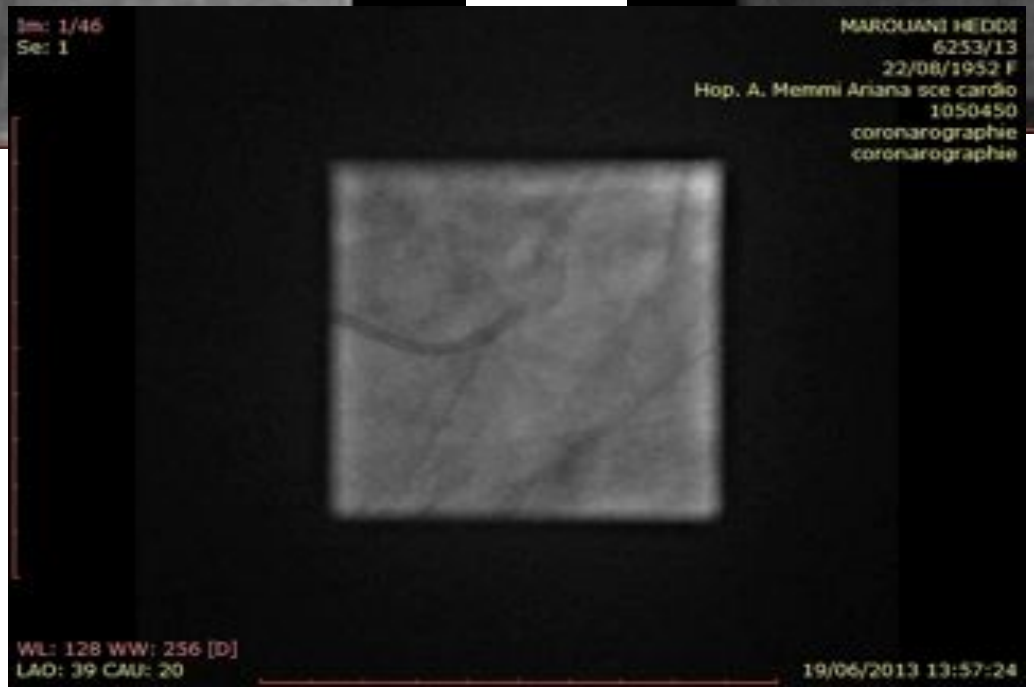




Présentation clinique : évolution

- 8 mois après
- Se présente pour un Angor d'effort
- Contrôle angiographique

Contrôle angiographique



8 mois

- Pas de RIS nette

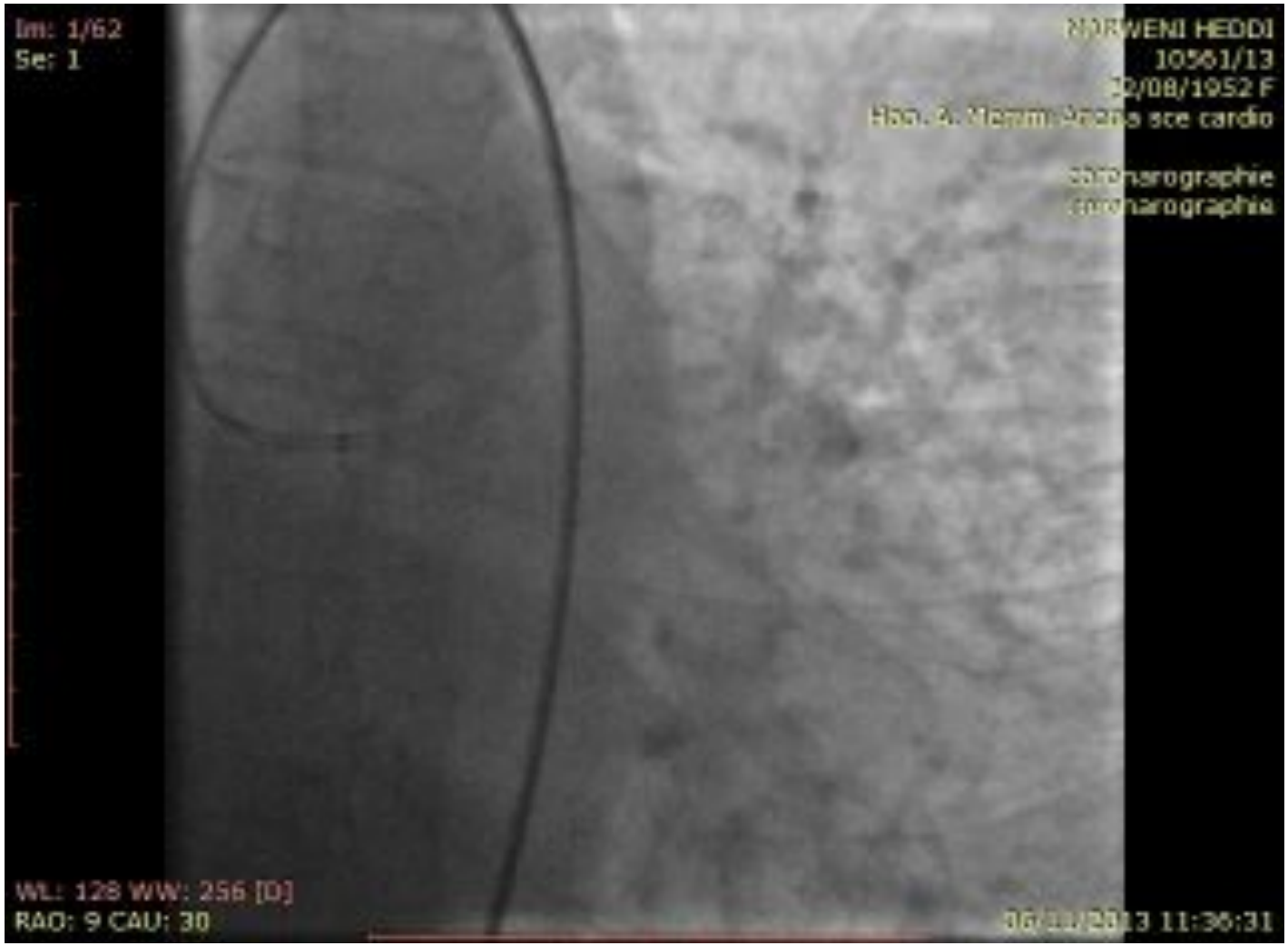
- Scintigraphie : pas d'ischémie

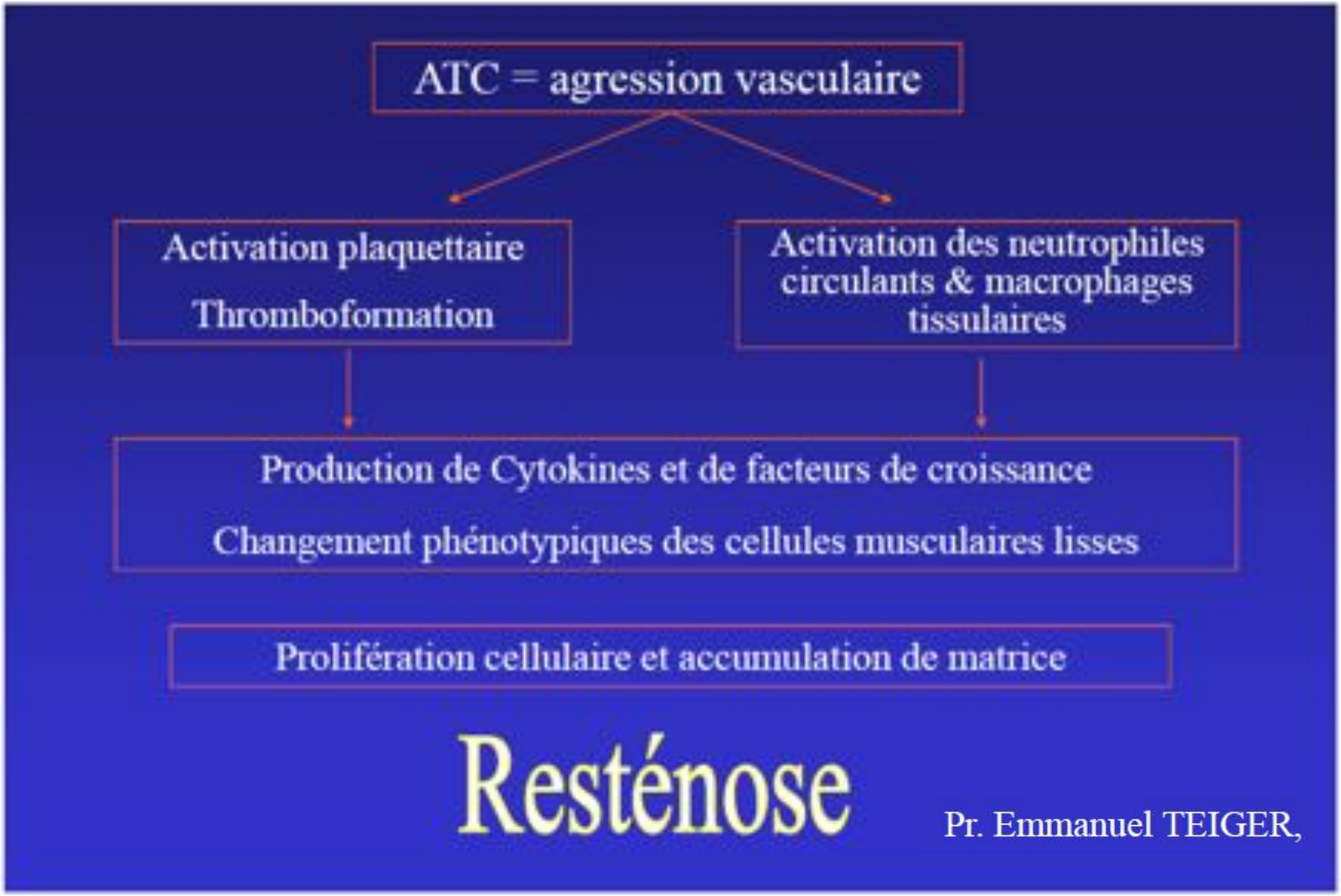
Présentation clinique : évolution

13 mois

- **SCA ST- tropo – compliqué d'IVG killip II**

Contrôle angiographique




ATC = agression vasculaire
Activation plaquettaire
Thromboformation
Activation des neutrophiles circulants & macrophages tissulaires
Production de Cytokines et de facteurs de croissance
Changement phénotypiques des cellules musculaires lisses
Prolifération cellulaire et accumulation de matrice
Resténose
Pr. Emmanuel TEIGER,

Study name	N. of centres	Countries	N. patients	Type of DES	Length of follow-up (yrs)	Angio follow-up (%)	Angiographic restenosis (%)	TLR (%)	TVR (%)
Valgimigli et al[5]	1	The Netherlands	110	50% PES, 50% SES	1.8	66	17.8		10
Park et al[6]	2	Korea/USA	102	100% SES	1	84.3	5.9	2	
Kim et al[5]	1	Korea	116	100% SES	1.5	84.5	13.8	5.2	
Migliorini et al[6]	1	Italy	101	SES/PES	0.5		16		13.8
Chieffo et al[7]	5	Italy, Netherlands, Korea	147	73% SES, 27% PES	2.5	72.1	0.9	0.7	4.7
DELFT[8]	7	USA/Italy	358	55% SES 45% PES	3.5	71.2		5.8	14.2
Gao et al[9]	1	China	220	SES/PES	1.3	46.4			5.9
Palmerini et al[10]	19	Italy	1,111	97% SES or PES	2			11.8	
MAIN COMPARE[11]	12	Korea	858	SES/PES	3				10.7
FAILS[12]	6	Italy, UK, USA	718	PES/SES/ZES	3	62.8	9.8		21.4
Tamburino et al[13]	19	Italy	334	SES/PES	3	69		7.9	
ASAN-MAIN[14]	1	Korea	176	SES PES	5			13.2	16.2
Lee et al[15]	1	Korea	509	97% SES or PES	3.4	80.1	17.7	10.0	
FRIEND[16]	23	France	151	PES	3	88		2.3	
LEMAX[17]	4	France	173	EES	1	47		2.9	7
PRECOMBAT-2[18]	21	Korea	334	EES	1.6	60.8	9.2		6.5
MITO[19]	2	Italy, Japan	565	89% SES 10% PES 1% ZES	0.6	80.1	17.5	16.1	
French Left Main TAXUS[20]	4	France	291	PES	5			10.3	11.0

DES: drug-eluting stent; EES: everolimus-eluting stent; PES: paclitaxel-eluting stent; SES: sirolimus-eluting stent; TLR: target lesion revascularisation; TVR: target vessel revascularisation; ZES: zotarolimus-eluting stent

Définition et incidence de la RS du TCG

Study name	N. of centres	Countries	N. patients	Type of DES	Length of follow-up (yrs)	Angio follow-up (%)	Angiographic restenosis (%)	TLR (%)	TVR (%)
ISAR-LEFT MAIN[21]	1	Germany	607	PES/SES	2	87.1	16-19%	7.2	
SYNTAX LM[22]	85	Europe, US	357	PES	1				11.8
Boudriot et al[23]	2	Germany	100	PES	1	95	9.0		14.0
PRECOMBAT[24]	13	Korea	300	EES	2	75.3			6.1

DES: drug-eluting stent; EES: everolimus-eluting stent; PES: paclitaxel-eluting stent; SES: sirolimus-eluting stent; TLR: target lesion revascularisation; TVR: target vessel revascularisation

Alberto R. De Caterina, EuroIntervention 2013;8:1326-1334

Clinical predictors of ULM restenosis

- Diabete IN
- IRn
- Localisation : TCG distal
- Strategie à deux stents

Alberto R. De Caterina, EuroIntervention 2013;8:1326-1334

Mechanisms of ULM restenosis

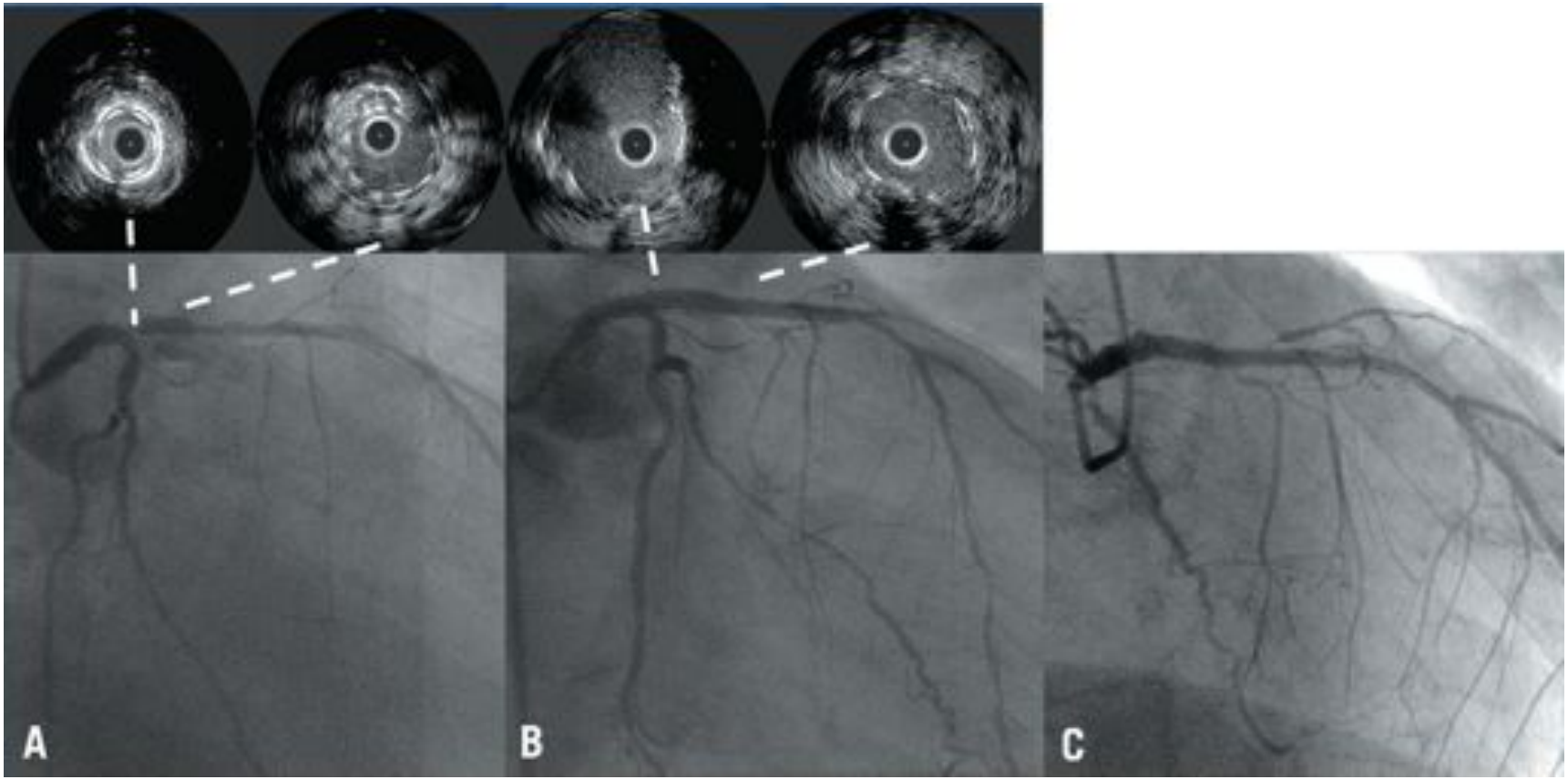
- **Deux phénomènes sont prépondérants dans le mécanisme de la resténose:**

  - **Mal apposition du stent : facteur prédictif independant de survenu de MACE**

  - **Proliferation néointimale : échec de la drogue**

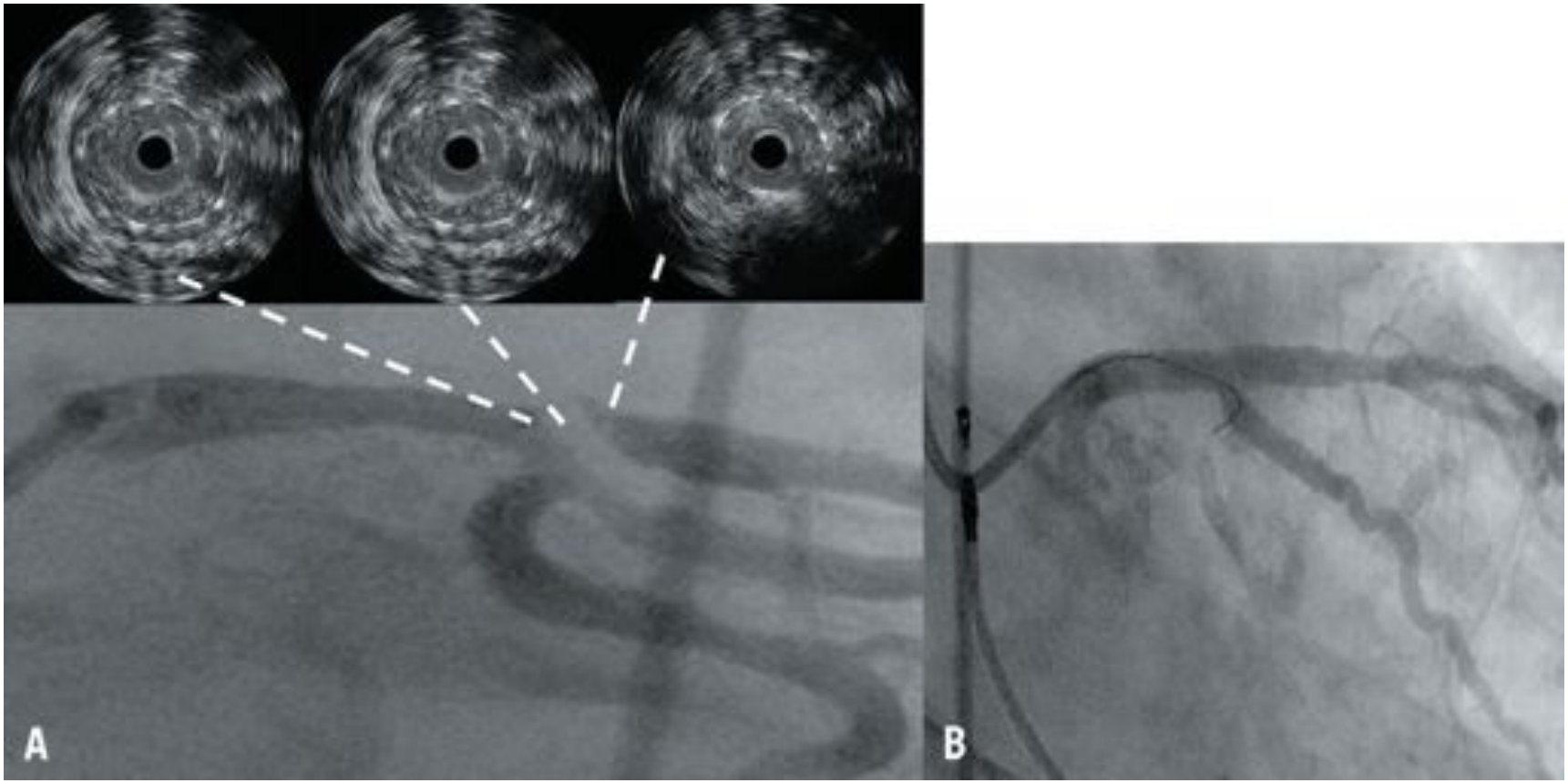
IVUS / OCT : mécanisme et guider la stratégie du traitement

Mal expansion du stent



Alberto R. De Caterina, EuroIntervention 2013;8:1326-1334

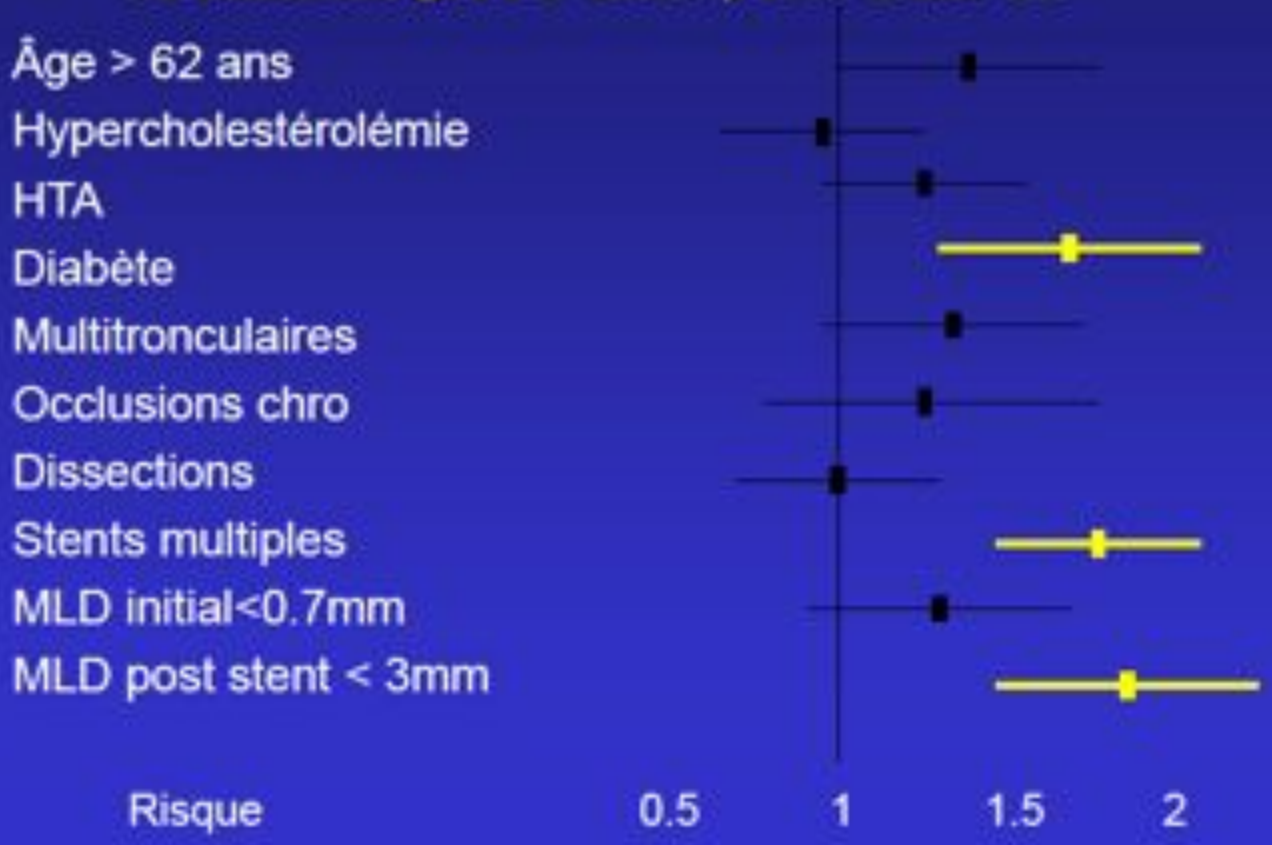
Prolifération neo intimale



Alberto R. De Caterina, EuroIntervention 2013;8:1326-1334

Predictive factors of restenosis after coronary stent placement.

A Kastrati. JACC 1997 ; 30 : 1428-36



Journal of the American College of Cardiology
© 2000 by the American College of Cardiology
Published by Elsevier Science Inc.

Vol. 35, No. 6, 2000
ISSN 0735-1097/00/$20.00
PII S0735-1097(00)00944-X

Interventional Cardiology

Unprotected Left Main Coronary Artery Stenting: Immediate and Medium-Term Outcomes of 140 Elective Procedures

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Marseille, France

OBJECTIVES We sought to evaluate immediate and late outcomes after stenting for left main coronary artery (LMCA) stenosis.

BACKGROUND Conventional percutaneous transluminal coronary angioplasty (PTCA), for which coronary artery bypass grafting (CABG) has been the gold standard therapy for years, has yielded poor results in unprotected LMCA lesions. The development of coronary stents, together with their dramatic potency improvement provided by new antiplatelet regimens and their validation against restenosis, warrants a reappraisal of angioplasty in LMCA stenosis.

METHODS From January 1993 to September 1998, 140 consecutive unselected patients with unprotected LMCA stenosis underwent elective stenting. Group I included 47 high-CABG-risk patients, and group II included 93 low-CABG-risk patients. Ticlopidine without aspirin was routinely started at least 72 h before the procedure and continued for one month. Patients were reevaluated monthly. A follow-up angiography was requested after six months.

RESULTS The procedure success rate was 100%. One-month mortality was 9% (4/47) in group I and 0% in group II. A follow-up angiography was obtained in 82% of cases, and target lesion revascularization was required in 17.4%. One-year actuarial survival was 89% in the first 29 group I patients and 97.5% in the first 63 group II patients.

CONCLUSIONS Stenting of unprotected LMCA stenosis provided excellent immediate results, particularly in good CABG candidates. Medium-term results were good, with a restenosis rate of 25%, similar to that seen after stenting at other coronary sites. Stenting deserves to be considered a safe and effective alternative to CABG in institutions performing large numbers of PTCAs.
(J Am Coll Cardiol 2000;35:1543–50) © 2000 by the American College of Cardiology

Immediate Results and Long-Term Clinical Outcome of Patients With Unprotected Distal Left Main Restenosis

The CORPAL Registry (Córdoba and Las Palmas)

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Francisco Manzelos, MD, PhD,* Javier Suárez de Lezo, MD, PhD,*
Miguel Romero, MD, PhD,* José Segura, MD, PhD,* Djordje Pavlovic, MD, PhD,*
Alfonso Medina, MD, PhD,† Jose Suárez de Lezo, MD, PhD*

Córdoba and Las Palmas de Gran Canaria, Spain

Objectives The goal of this study was to assess the immediate and long-term outcomes in patients undergoing percutaneous coronary intervention (PCI) for in-stent restenosis (ISR) in an unprotected distal left main coronary artery (UDLM).

Background PCI for UDLM-ISR can be complex. Limited information is available on procedural and clinical outcomes.

Methods Between May 2002 and February 2011, UDLM-ISR after drug-eluting stent implantation was observed in 79 of 1,102 patients (7%). Seventy-five were treated by repeat PCI using a simple approach (balloon/in-stent implantation) or a complex strategy (additional stent/double-stenting technique). A diagnosis of mild or severe restenosis was considered depending on the number of bifurcation segments affected (1 vs. >1). Major adverse cardiac events (MACE) were defined as cardiac death, target lesion revascularization, and myocardial infarction.

Results ISR treatment was performed using a simple approach in 44 (58%) patients, and using a complex strategy in 31 (42%). After 46 ± 26 months, the MACE rate was 22%. Patients treated with a simple approach had a lower incidence of MACE at follow-up compared with patients treated with a complex strategy, regardless of the restenosis extent (mild restenosis: 93% vs. 67%, $p < 0.05$; severe: 70% vs. 23%, $p < 0.01$). On Cox regression analysis, diabetes was the only predictor of MACE (hazard ratio [HR]: 4.94; 95% confidence interval [CI]: 1.03 to 23.70; $p < 0.05$), whereas a simple strategy for ISR treatment was associated with lower risk (HR: 0.25; 95% CI: 0.08 to 0.79; $p = 0.02$).

Conclusions PCI for UDLM-ISR is safe and feasible, with a high rate of procedural success and an acceptable long-term MACE rate. A simple strategy, when applicable, appears to be a good treatment option, associated with a lower event rate at follow-up. (J Am Coll Cardiol Intv 2014;7:212–21)

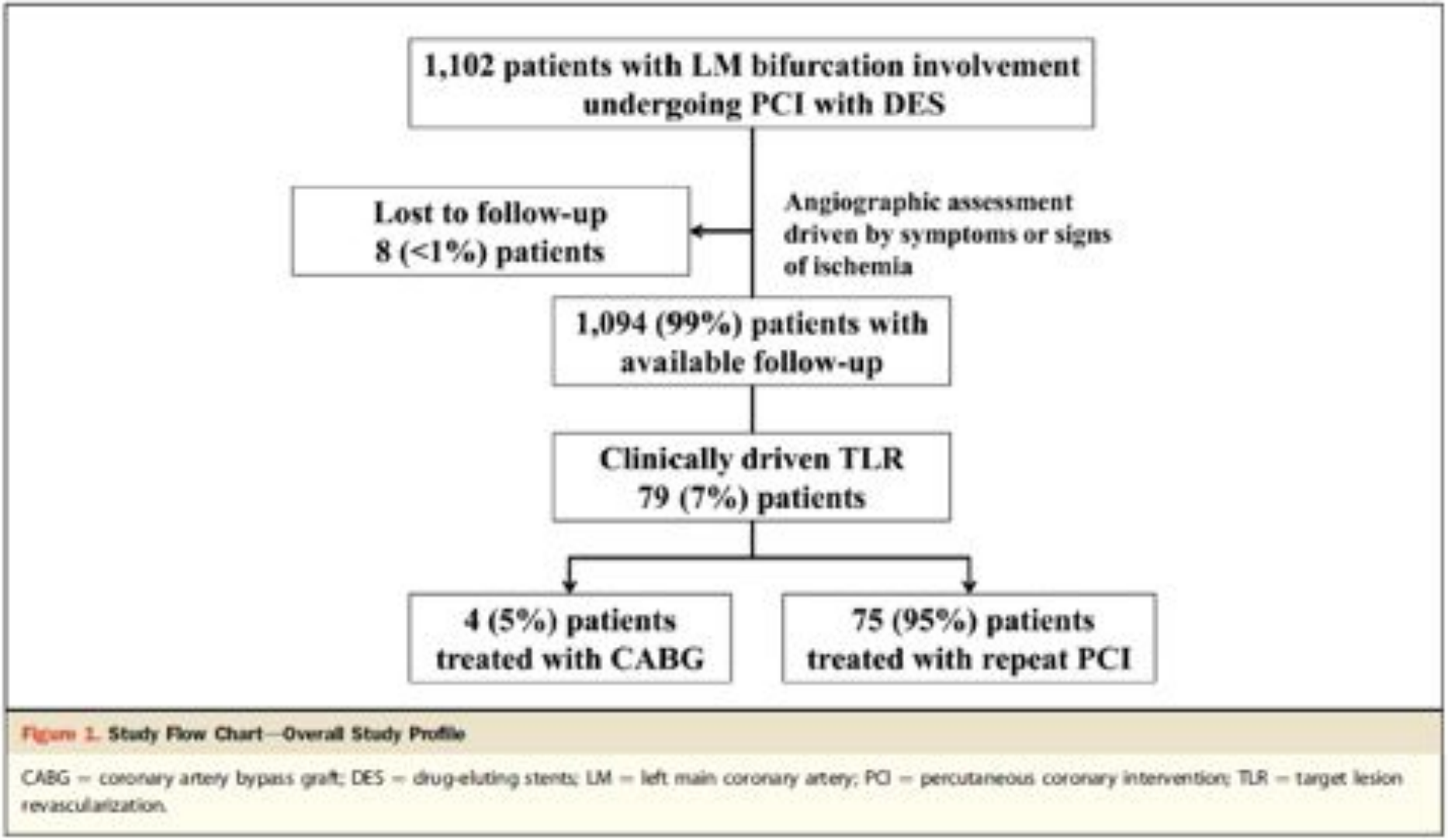
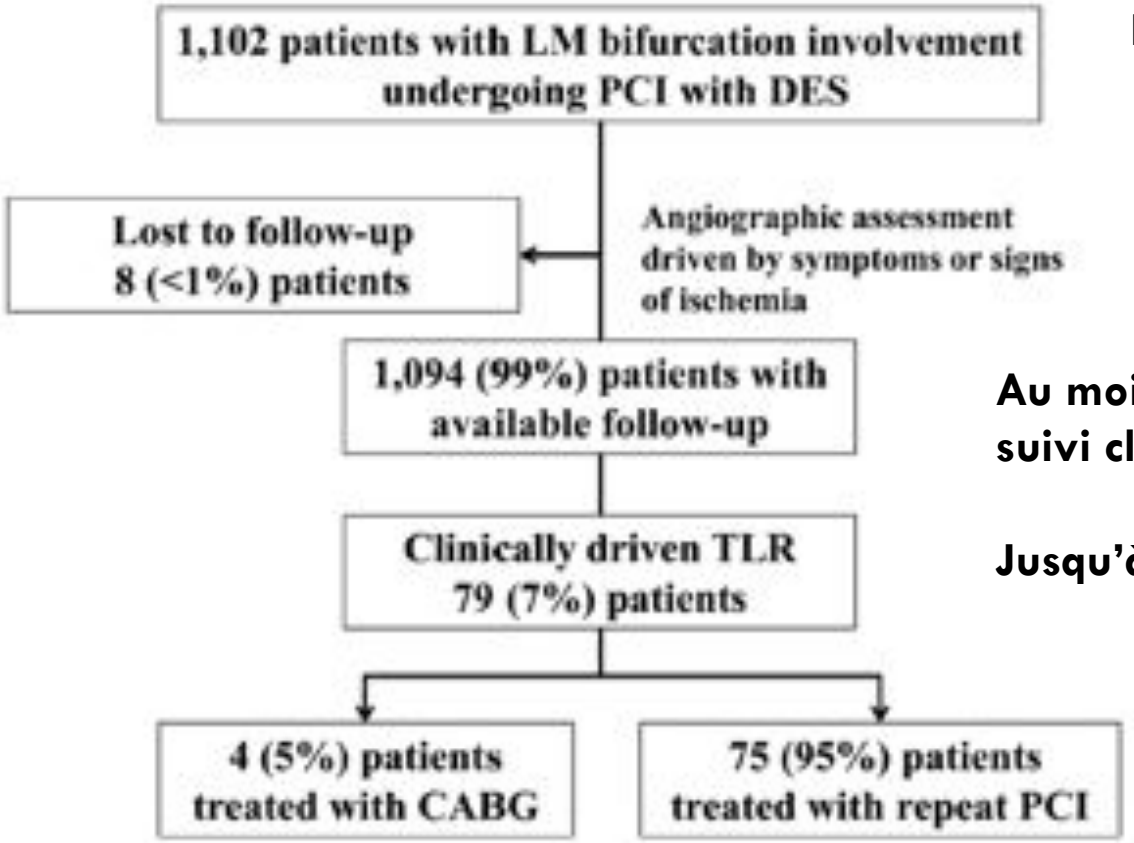


Figure 1. Study Flow Chart—Overall Study Profile

CABG = coronary artery bypass graft; DES = drug-eluting stents; LM = left main coronary artery; PCI = percutaneous coronary intervention; TLR = target lesion revascularization.

2 centres à haut Volumes.



Prov T : 90%

Au moins 2 ans de suivi clinique.

Jusqu'à 4 ans

Figure 1. **Study Flow Chart—Overall Study Profile**

CABG = coronary artery bypass graft; DES = drug-eluting stents; LM = left main coronary artery; PCI = percutaneous coronary intervention; TLR = target lesion revascularization.

Mécanisme de la RIS

- un IVUS a été réalisé chez 79% des patients.
- Stent underexpansion : 14% des patients.
- Drug failure : 83% des patients.

Traitement de la RIS

- A simple approach : 58% (POBA : 17% ; stent in-stent 41%).

- A complex strategy : 42% (1 additional stent 30% ; 2-stent implantation 12%).

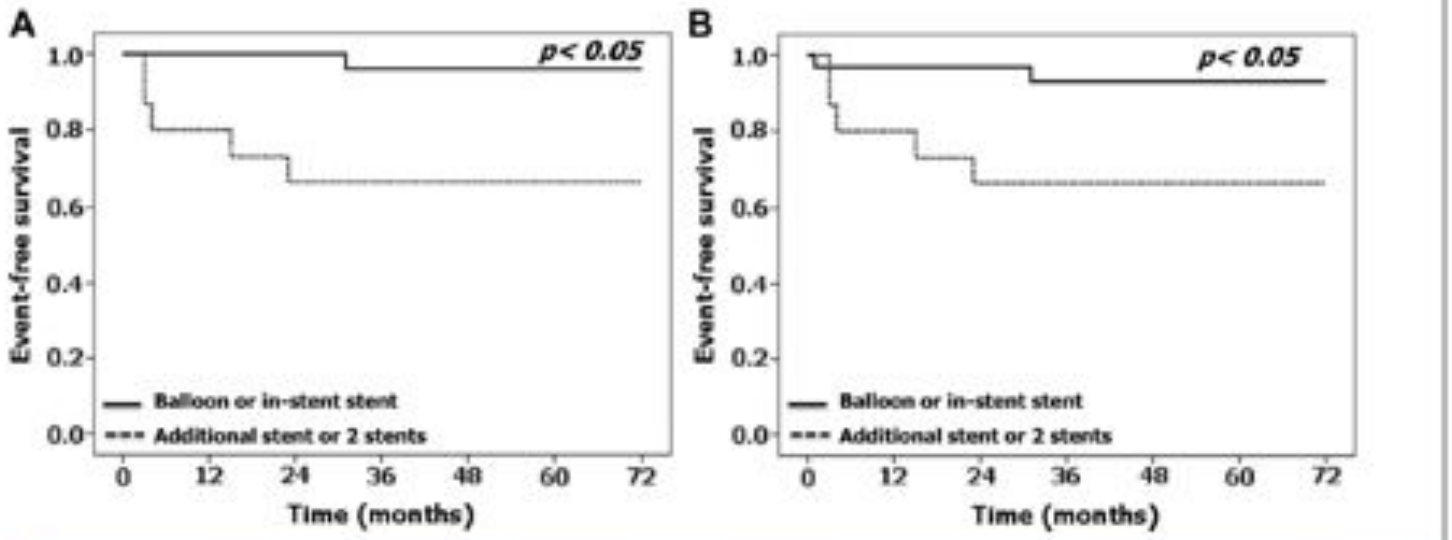


Figure 5. Event-Free Survival According to the Restenosis Treatment Modality in Patients With Restenosis Affecting Only 1 Bifurcation Segment

Medina classification of the bifurcation lesions (1, 0, 0), (0, 1, 0), and (0, 0, 1) are shown. **(A)** Target lesion revascularization. **(B)** Major adverse cardiac events.

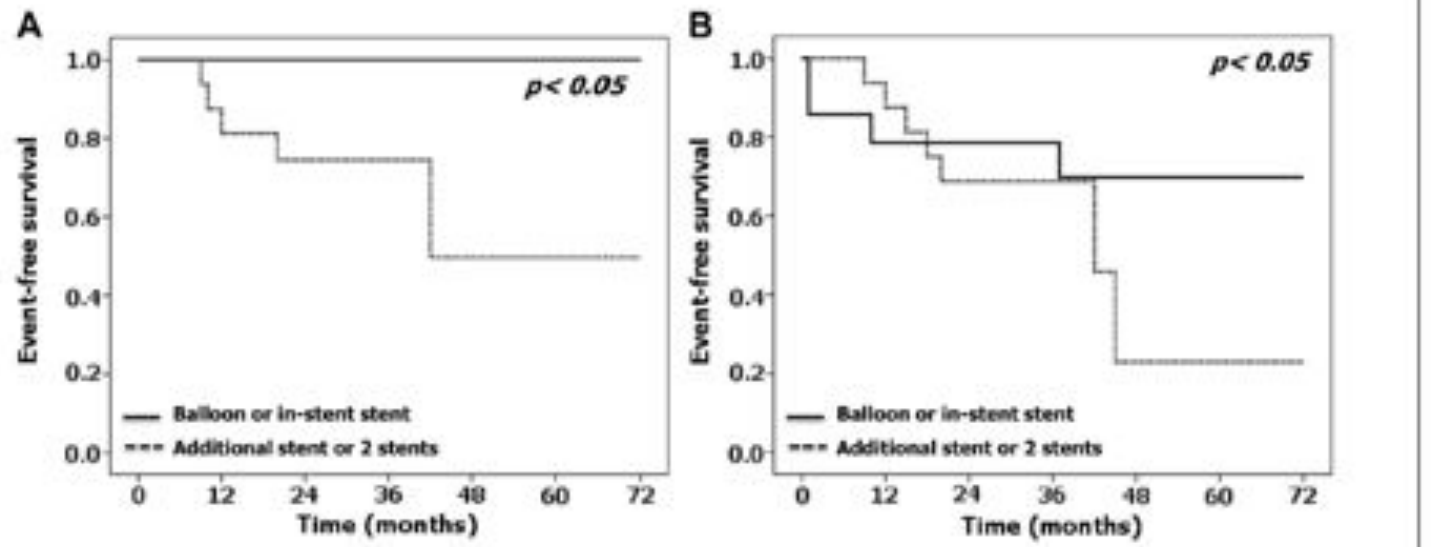


Figure 6. Event-Free Survival According to the Restenosis Treatment Modality in Patients With Restenosis Affecting More Than 1 Bifurcation Segment

Medina classification of the bifurcation lesions (1, 1, 0), (1, 0, 1), (0, 1, 1), and (1, 1, 1) are shown. **(A)** Target lesion revascularization. **(B)** Major adverse cardiac events.

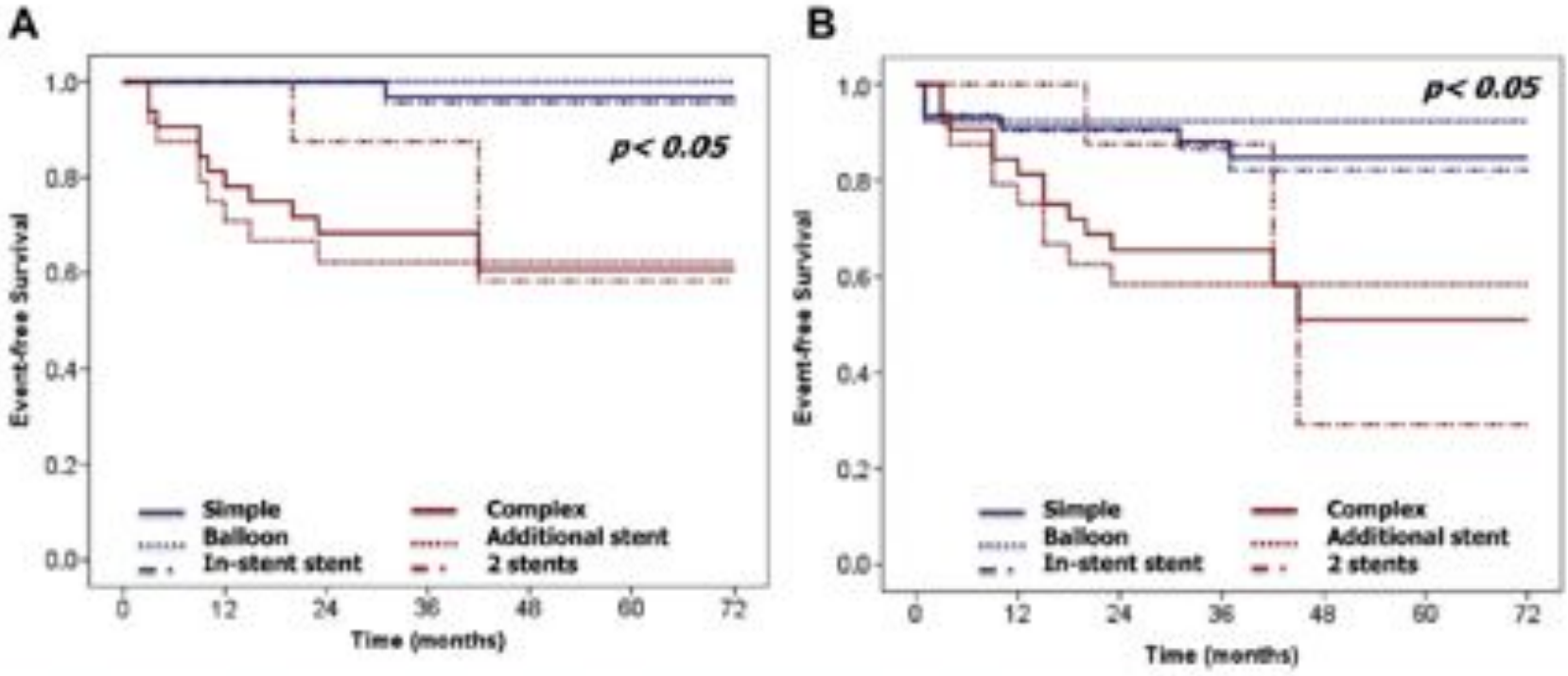


Figure 4. **Event-Free Survival According to the Restenosis Treatment Modality in the Global Series**

(A) Target lesion revascularization. **(B)** Major adverse cardiac events.

Table 3. Univariate and Multivariate Predictors of MACE at Follow-Up

	Univariable HR (95% CI)	p Value	Cox Regression Adjusted HR (95% CI)	p Value
Age ≥70 yrs	2.20 (0.89–5.49)	0.1		
EF <45%	3.63 (1.35–9.78)	0.01		
Diabetes mellitus	3.05 (1.00–9.28)	0.05	4.94 (1.03–23.70)	0.046
Restenosis extension: 1 bifurcation segment	0.31 (0.12–0.78)	0.014		
Treatment strategy: simple approach	0.30 (0.12–0.78)	0.013	0.25 (0.08–0.79)	0.02

CI = confidence interval; EF = ejection fraction; HR = hazard ratio; MACE = major adverse cardiac events.

Clinical and Procedural Predictors of Suboptimal Outcome After the Treatment of Drug-Eluting Stent Restenosis in the Unprotected Distal Left Main Stem

The Milan and New-Tokyo (MITO) Registry

Kensuke Takagi, MD; Alfonso Ielasi, MD; Joanne Shannon, MD; Azeem Latib, MD; Cosmo Godino, MD; Giedrius Davidavicius, MD; Marco Mussardo, MD; Santo Ferrarello, MD; Filippo Figini, MD; Mauro Carlino, MD; Matteo Montorfano, MD; Alaide Chieffo, MD; Sunao Nakamura, MD; Antonio Colombo, MD

Background—Few data are available regarding the optimal revascularization strategy for unprotected distal left main coronary artery (UDLM) in-stent restenosis (ISR).

Methods and Results—Between April 2002 and December 2008, UDLM-ISR following drug-eluting stent (DES) implantation occurred in 92 of 474 patients (19.4%). Of these, 8 (8.7%) who underwent a coronary artery bypass graft (CABG) were excluded, and the remaining 84 (91.3%) who underwent percutaneous coronary intervention (PCI) (43 plain old balloon angioplasty [POBA] and 41 DES) were analyzed to assess the feasibility of PCI for UDLM-ISR. The overall cardiac death, myocardial infarction (MI), and major adverse cardiac events during the follow-up period (median, 24 months) occurred in 4, 2, and 31 patients, respectively. Repeat target lesion revascularization (TLR) occurred in 28 patients. The incidence of repeat TLR was higher following PCI with POBA than with DES (hazard ratio [HR], 2.79; 95% CI, 1.23–6.34; P=0.014). On Cox regression analysis, the independent predictors of repeat TLR were treatment with POBA (HR, 3.29; 95% CI, 1.41–7.69; P=0.006) and EuroSCORE (European System for Cardiac Operative Risk Evaluation) >6 (HR, 2.53; 95% CI, 1.02–6.28; P=0.045). More complex lesions requiring a 2-stent strategy were associated with a higher occurrence of TLR for restenosis of the left circumflex coronary artery ostium (LCX-ISR) (HR, 2.51; 95% CI, 1.59–3.97; P=0.001) as well as repeat TLR for recurrent LCX-ISR (HR, 4.32; 95% CI, 0.97–19.20; P=0.05) compared to a 1-stent strategy. No cardiac death at 2 years occurred in patients with LCX-ISR.

Conclusions—UDLM restenosis is better treated with DES than with POBA. The rate of recurrent ISR following repeat PCI was high, whereas the rates of MI and death were relatively low. Complex lesions requiring a 2-stent strategy had a higher recurrence rate at the ostial LCX but without an associated increased risk of MI and death. (***Circ Cardiovasc Interv.* 2012;5:491-498.**)

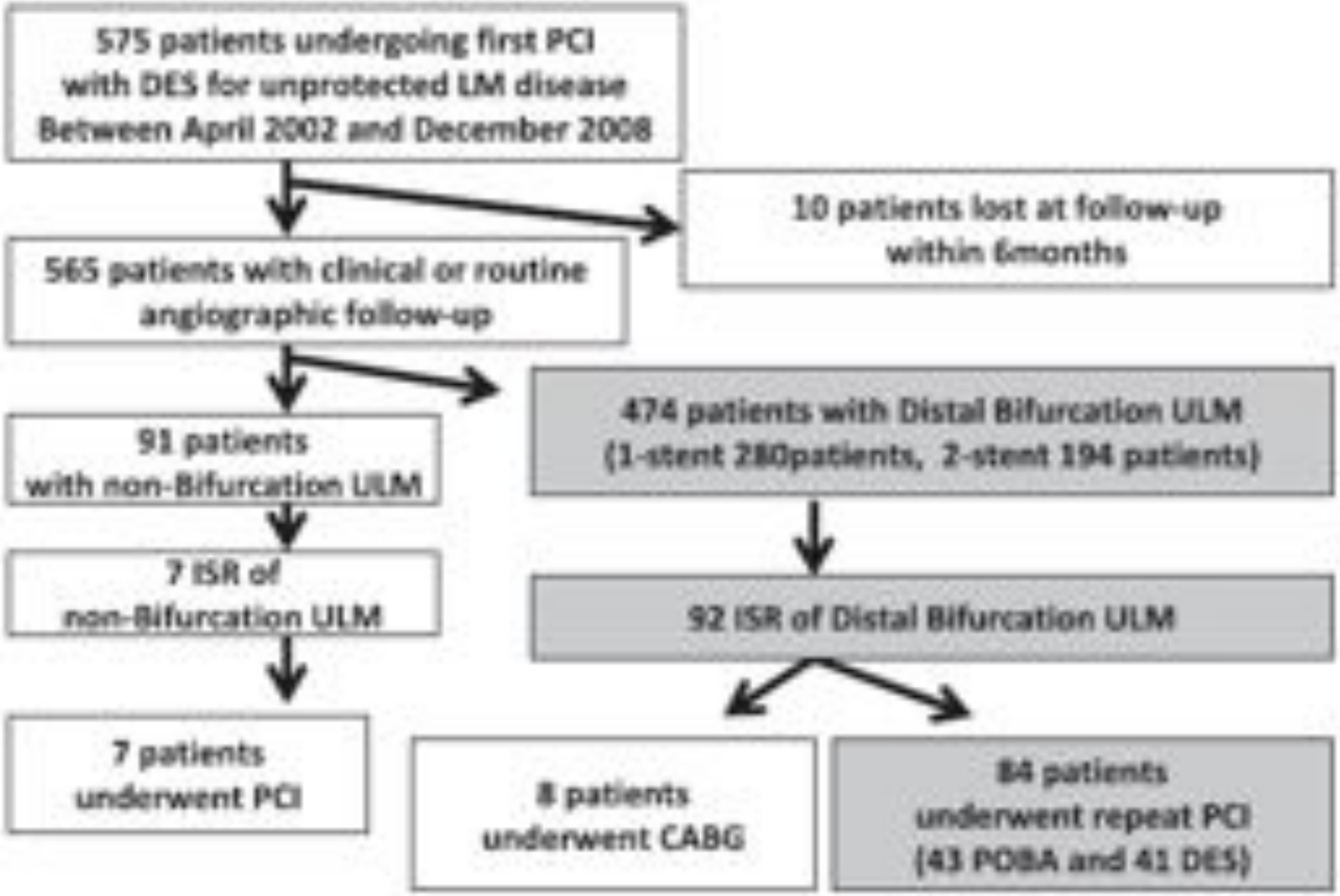
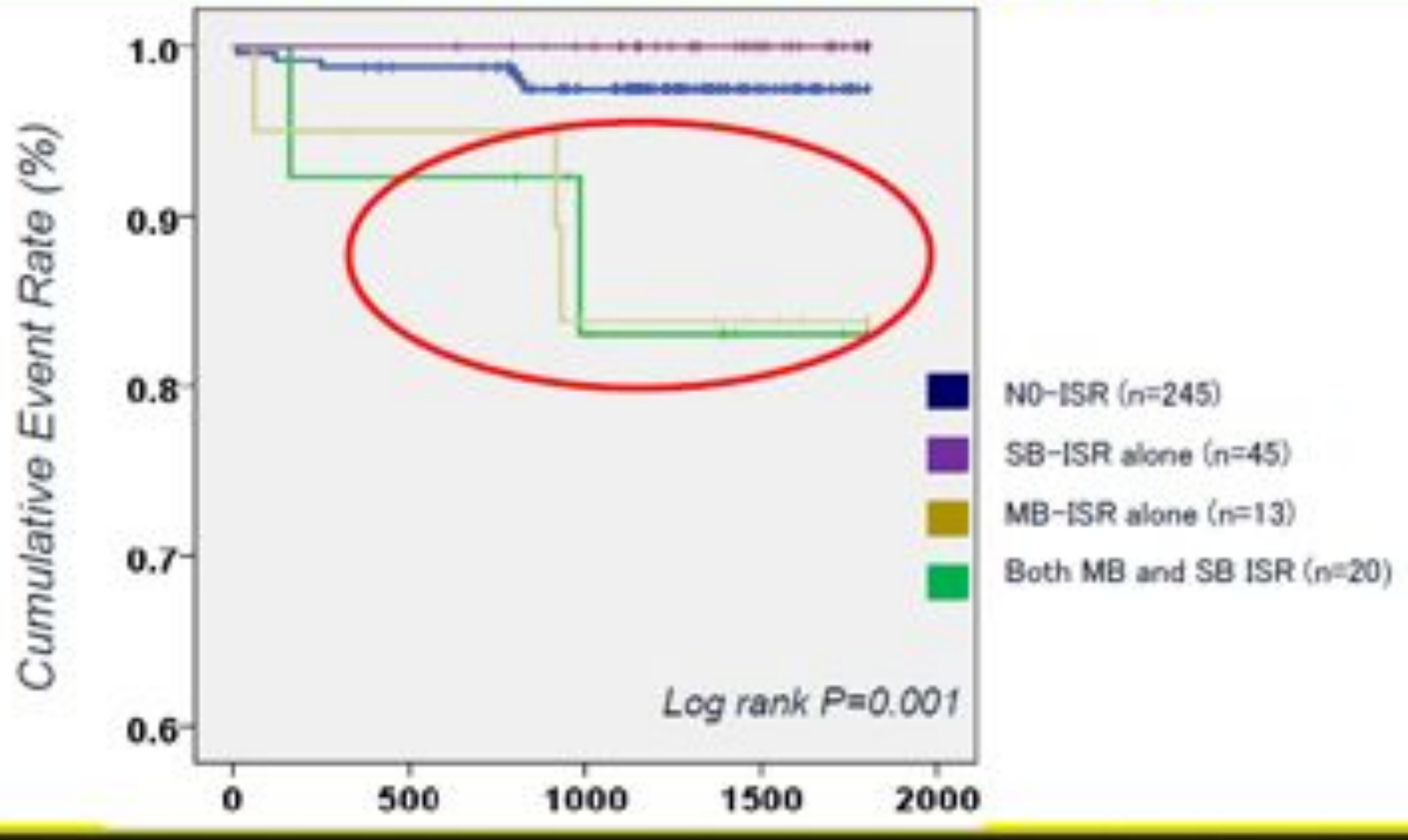


Figure 1. Study profile: Milan and New-Tokyo between April 2002 and December 2008. CABG indicates coronary artery bypass graft; DES, drug-eluting stents; LM, left main coronary artery; PCI, percutaneous coronary intervention; POBA, plain old balloon angioplasty; ULM, unprotected left main coronary artery.

The Milan and New-TOkyo (MITO) Registry

Cardiac-death according to ISR type in patients with f/u angiography



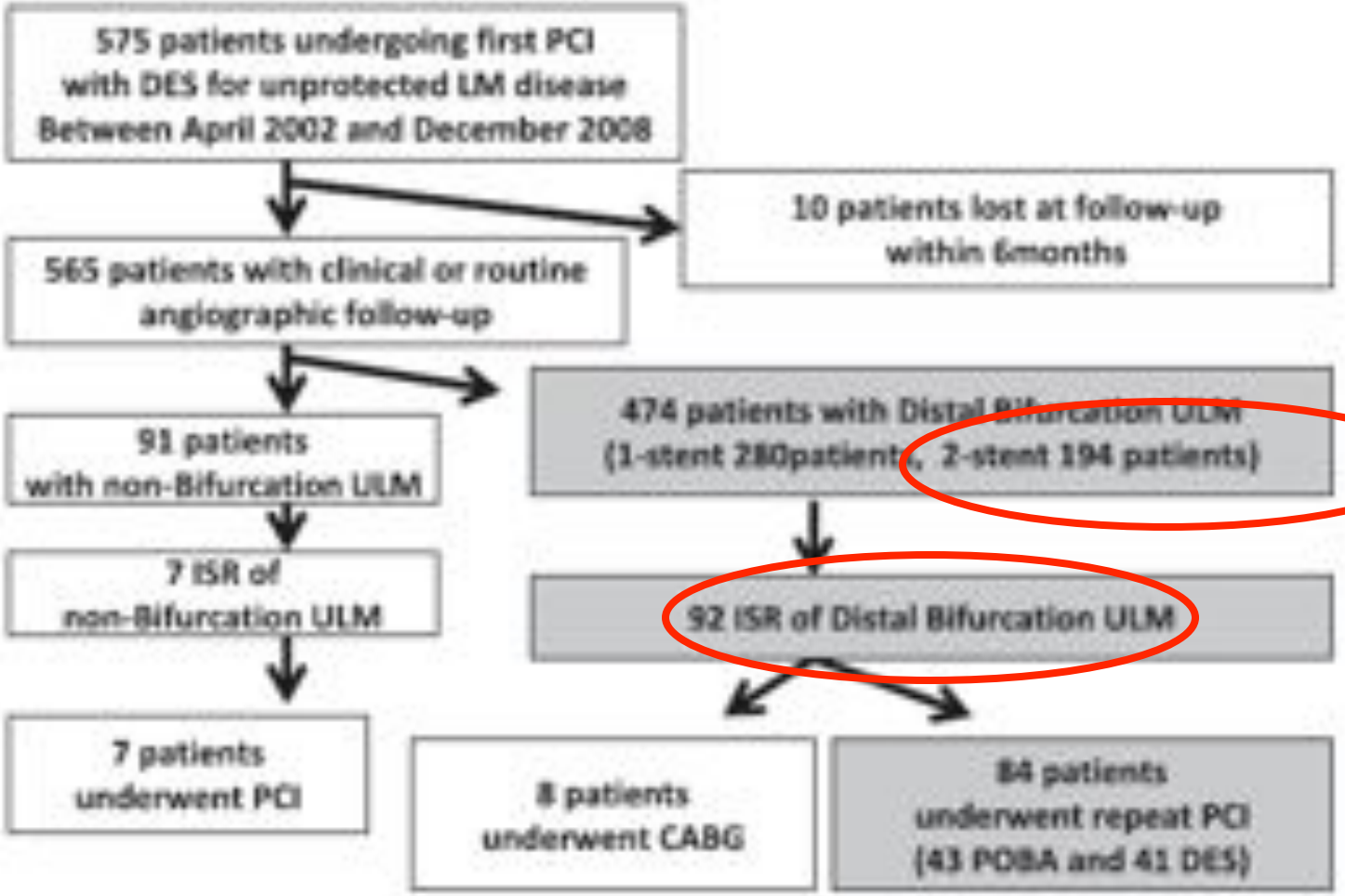
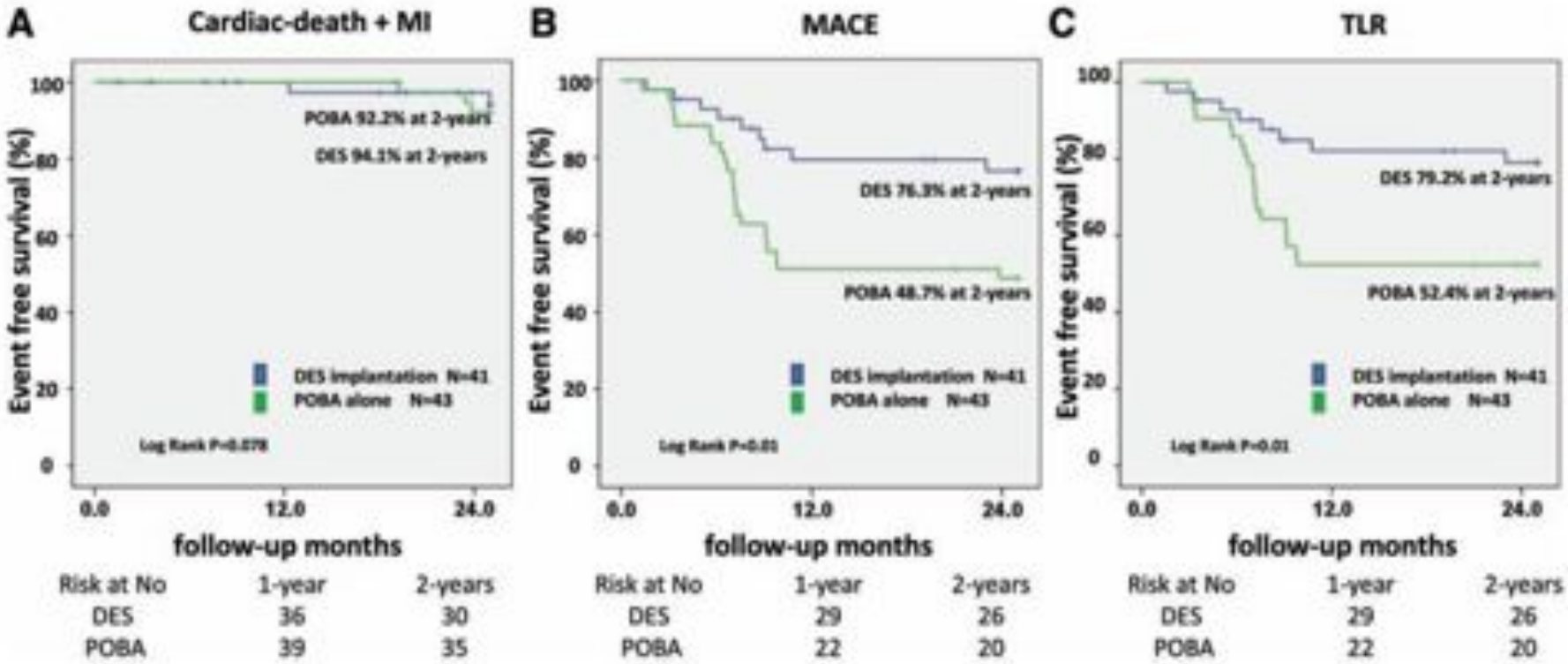


Figure 1. Study profile: Milan and New-Tokyo between April 2002 and December 2008. CABG indicates coronary artery bypass graft; DES, drug-eluting stents; LM, left main coronary artery; PCI, percutaneous coronary intervention; POBA, plain old balloon angioplasty; ULM, unprotected left main coronary artery.

Table 2. Baseline Angiographic and Procedural Characteristics of Patients Treated for UDLM DES-ISR

Patients	Overall UDLM DES-ISR That Underwent PCI (n=84)	UDLM DES-ISR Treated With POBA (n=43)	UDLM DES-ISR Treated With DES (n=41)	*P* Value
LM+3VD	33 (39.3)	10 (23.3)	23 (56.1)	0.01
True-bifurcation medina 1-1-1, 1-0-1, 0-1-1	64 (76.2)	30 (69.8)	34 (82.9)	0.20
SYNTAX score	31.30±9.82	30.39±9.62	32.36±10.09	0.39
SYNTAX >33	29 (34.5)	13 (30.2)	16 (39.0)	0.49
IABP	10 (11.9)	1 (2.3)	9 (22.0)	0.01
IVUS	41 (48.8)	25 (58.1)	16 (39.0)	0.09
Rotational atherectomy	8 (9.5)	5 (11.6)	3 (7.3)	0.71
Only SES	75 (89.3)	40 (93.0)	35 (85.4)	0.19
Only PES	8 (9.5)	2 (4.7)	6 (14.6)	
Only ZES	1 (1.2)	1 (2.3)	0	
Bif-2 stent	49 (58.3)	30 (69.8)	19 (46.3)	0.05
Provisional T stent	6 (7.1)	2 (4.7)	4 (9.8)	0.02
V stent	3 (3.6)	0	3 (7.3)	
Crush	14 (16.7)	10 (23.3)	4 (9.8)	
Mini-crush	19 (22.7)	15 (34.9)	4 (9.8)	
Culotte	6 (7.1)	2 (4.7)	4 (9.8)	
Simultaneous kissing stenting	1 (1.2)	1 (2.3)	0	
Final kissing balloon	74 (88.1)	41 (95.3)	33 (80.5)	0.05
No. stents/patient	1.49±0.50	1.60±0.50	1.37±0.49	0.03
Total stent length/patient, mm	30.55±12.70	31.84±11.90	29.20±13.51	0.34
Maximum stent diameter, mm	3.24±0.31	3.26±0.32	3.22±0.30	0.59
Maximum balloon diameter, mm	3.53±0.60	3.60±0.63	3.46±0.56	0.36
Maximum dilation pressure, atm	18.73±3.76	18.67±3.68	18.77±3.86	0.92



Risk at No	1-year	2-years
DES	36	30
POBA	39	35

Risk at No	1-year	2-years
DES	29	26
POBA	22	20

Risk at No	1-year	2-years
DES	29	26
POBA	22	20

Figure 2. Survival curves by TLR strategy (DES versus POBA). Cumulative survival rates were calculated by the Kaplan-Meier method and compared with the log-rank test. **A**, Freedom from cardiac death and MI by TLR strategy (DES versus POBA). **B**, Freedom from MACE (cardiac death+MI+TLR) by TLR strategy (DES versus POBA). **C**, Freedom from TLR by TLR strategy (DES versus POBA). DES indicates drug-eluting stents; MACE, major adverse cardiac events; MI, myocardial infarction; POBA, plain old balloon angioplasty; TLR, target lesion revascularization.

Angiographic and clinical outcome of percutaneous coronary intervention for in-stent restenosis of bifurcated lesions

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EuroIntervention 2012;8:701-707

Abstract

Aims: Restenosis and bifurcated lesions represent technically challenging lesions for percutaneous coronary interventions (PCI). Data regarding procedural and clinical outcome of re-PCI for restenosis of treated bifurcated lesions are lacking. Our aims were to evaluate angiographic and procedural results and one-year clinical outcome of PCI for restenosis of treated bifurcated lesions.

Methods and results: Consecutive patients undergoing PCI for restenosis of one bifurcated lesion previously treated by stent implantation at our centre entered the study. The primary endpoint was angiographic and procedural success, defined as final residual stenosis ≤30% in the main vessel with TIMI 3 flow in both MV and side branch, and stenosis ≤50% in the SB without death, myocardial infarction or target vessel revascularisation during hospitalisation. The secondary endpoint was the incidence of major adverse cardiac events at one-year clinical follow-up. The study population included 64 patients treated by PCI on a single restenotic bifurcated lesion. Angiographic and procedural success was achieved in 61 cases (95.3%) whereas the three cases of failure were due to SB residual stenosis >50%. At one year, MACE rate was 18.7% (12/64) with rates of cardiac death, MI and TVR of 1.6% (1/64), 6.2% (4/64) and 18.7% (12/64), respectively. No cases of stent thrombosis occurred. Patients treated by a single drug-eluting stent (DES) on main vessel (MV) had a significant lower rate of MACE at one year as compared to patients treated with balloon only PCI or by double-stenting technique or with a BMS, irrespective of the strategy adopted: 4/37 (10.8%) vs. 8/27 (29.6%); p=0.04.

Conclusions: PCI in restenotic bifurcated lesions can be a good treatment option with high rates of angiographic and procedural success and an acceptable rate of long-term MACE. The use of a single DES implantation may be a promising strategy as it is associated with lower rates of MACE in the long term.

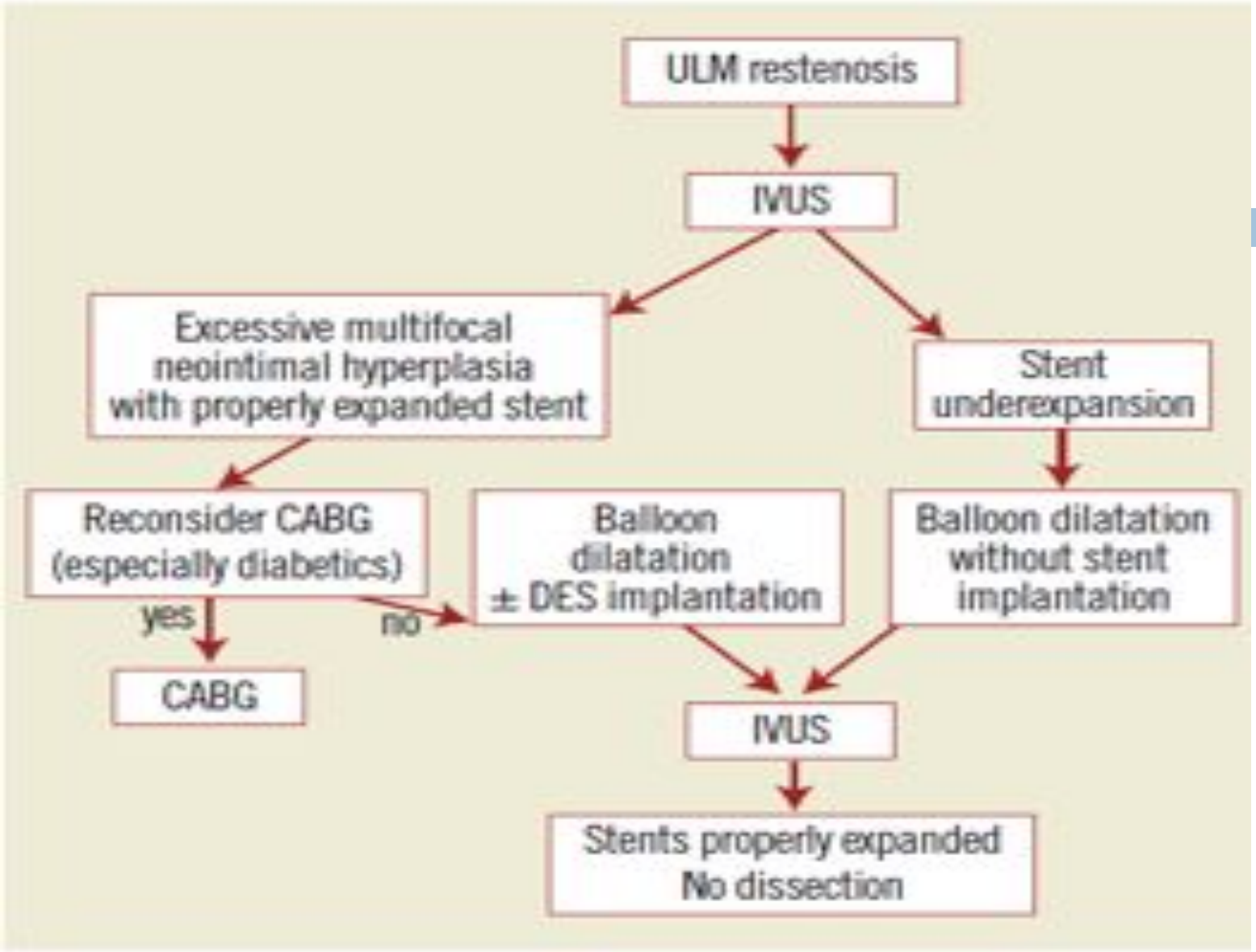
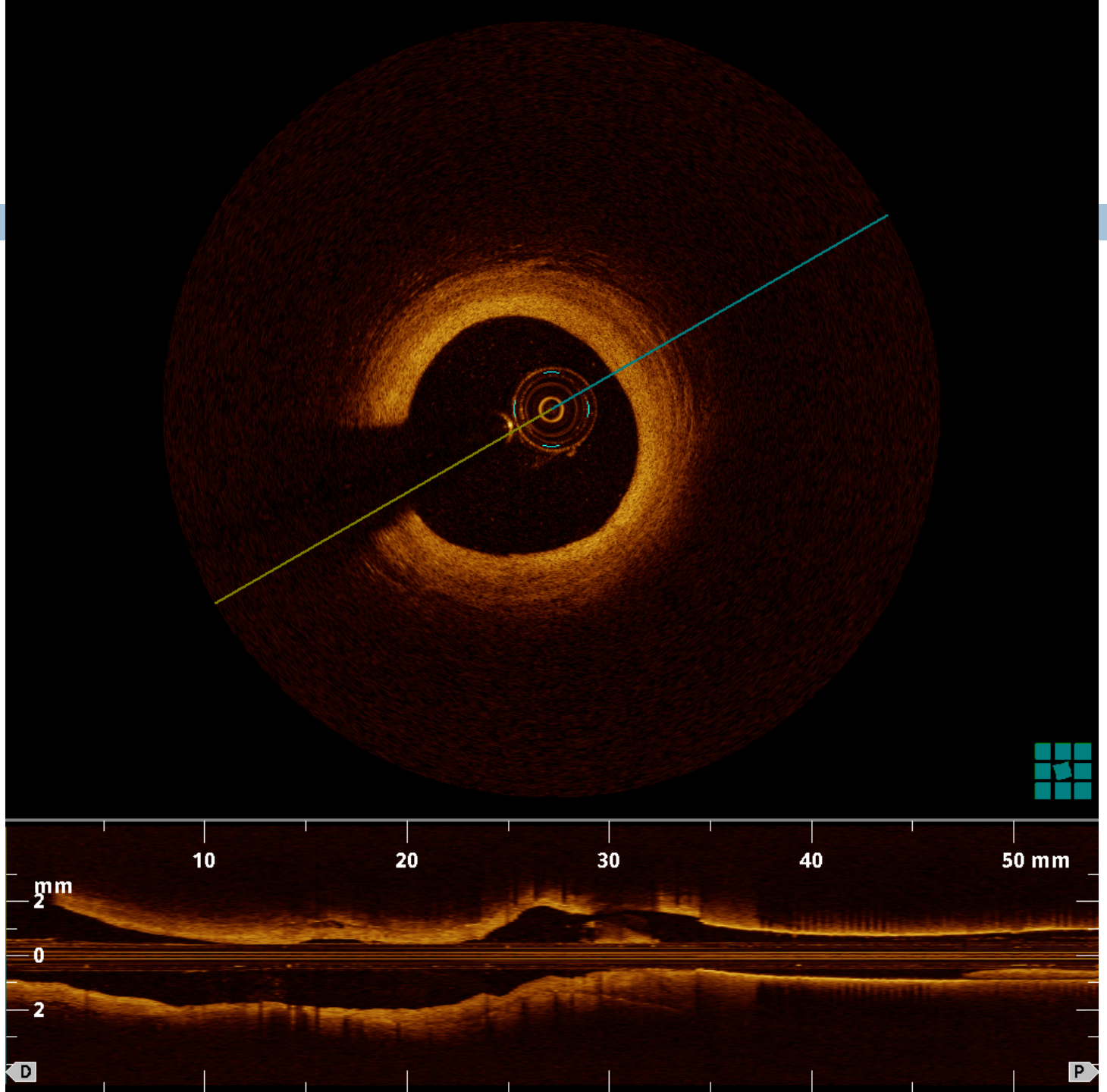


Figure 3. *Proposed catheter-based management of ULM restenosis.*

Alberto R. De Caterina, EuroIntervention 2013;8:1326-1334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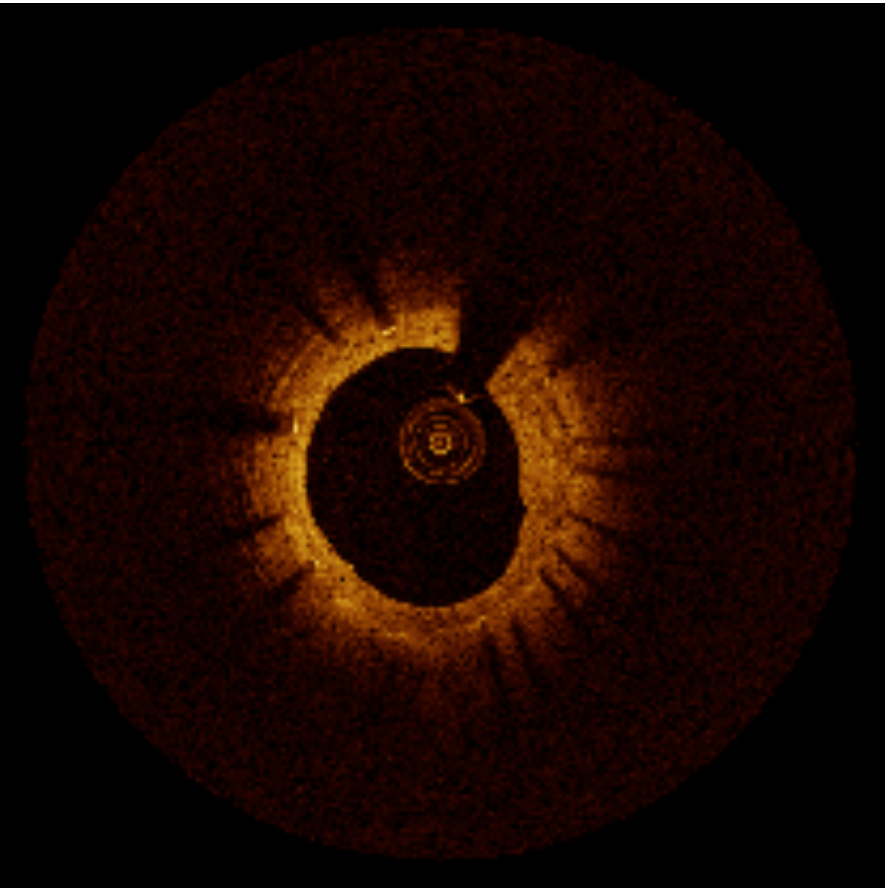
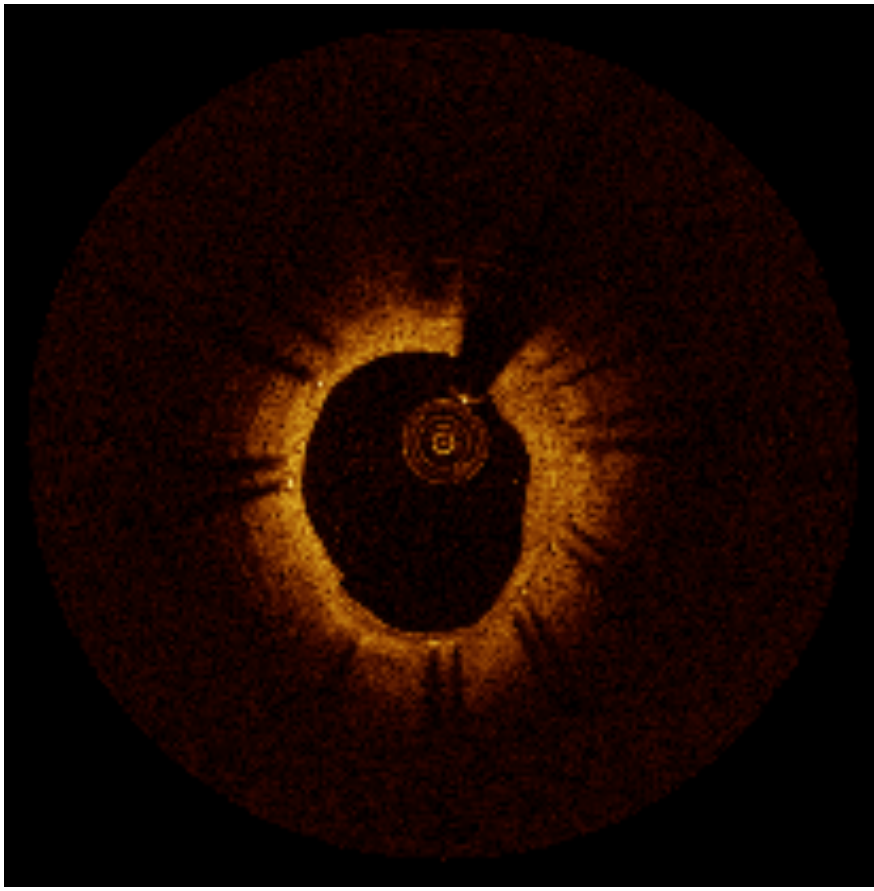
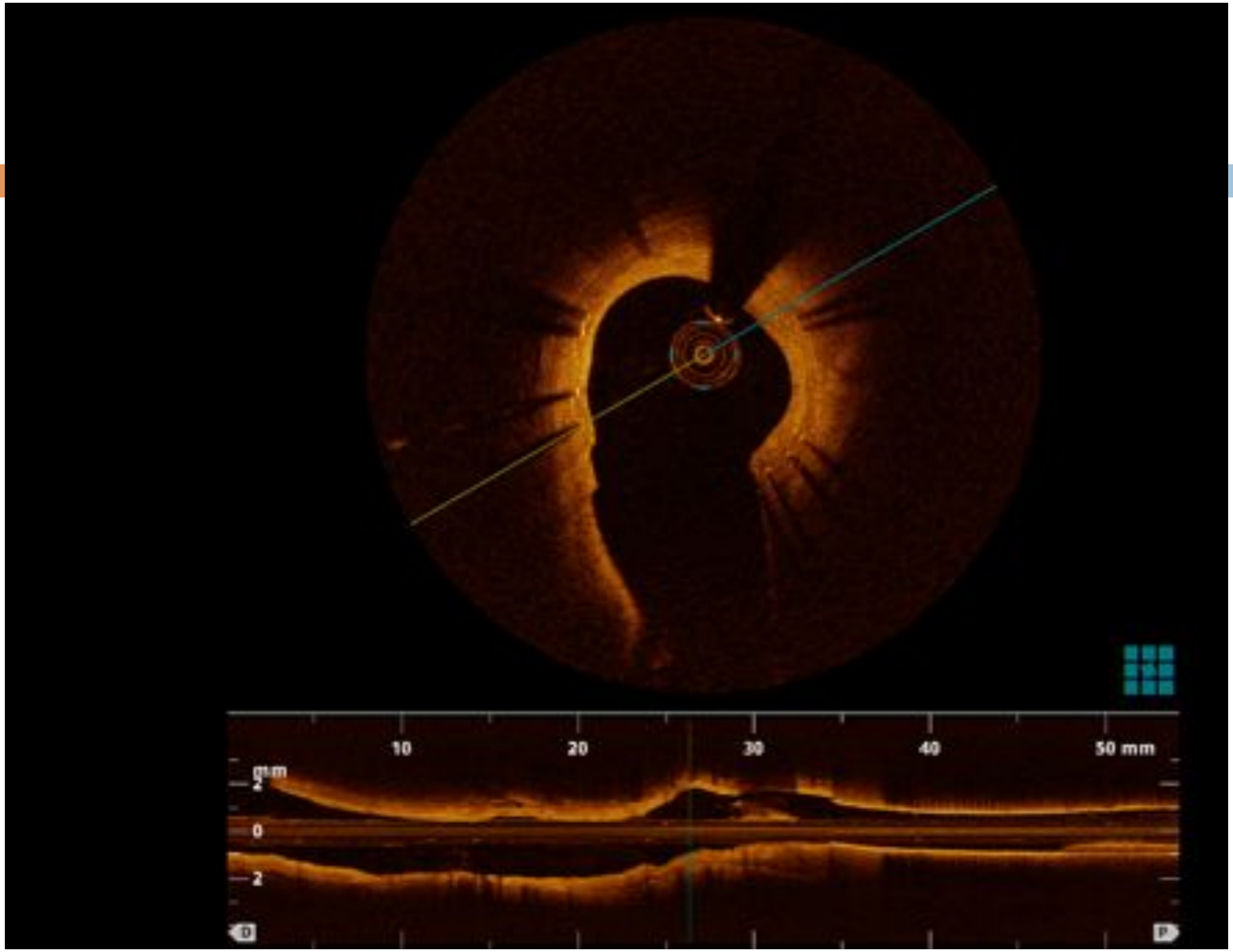
Présentation clinique : OCT





Présentation clinique : OCT

- **Mécanisme de la RIS : prolifération néo intimale**
- **→ATC avec un stent actif à Evrolimus**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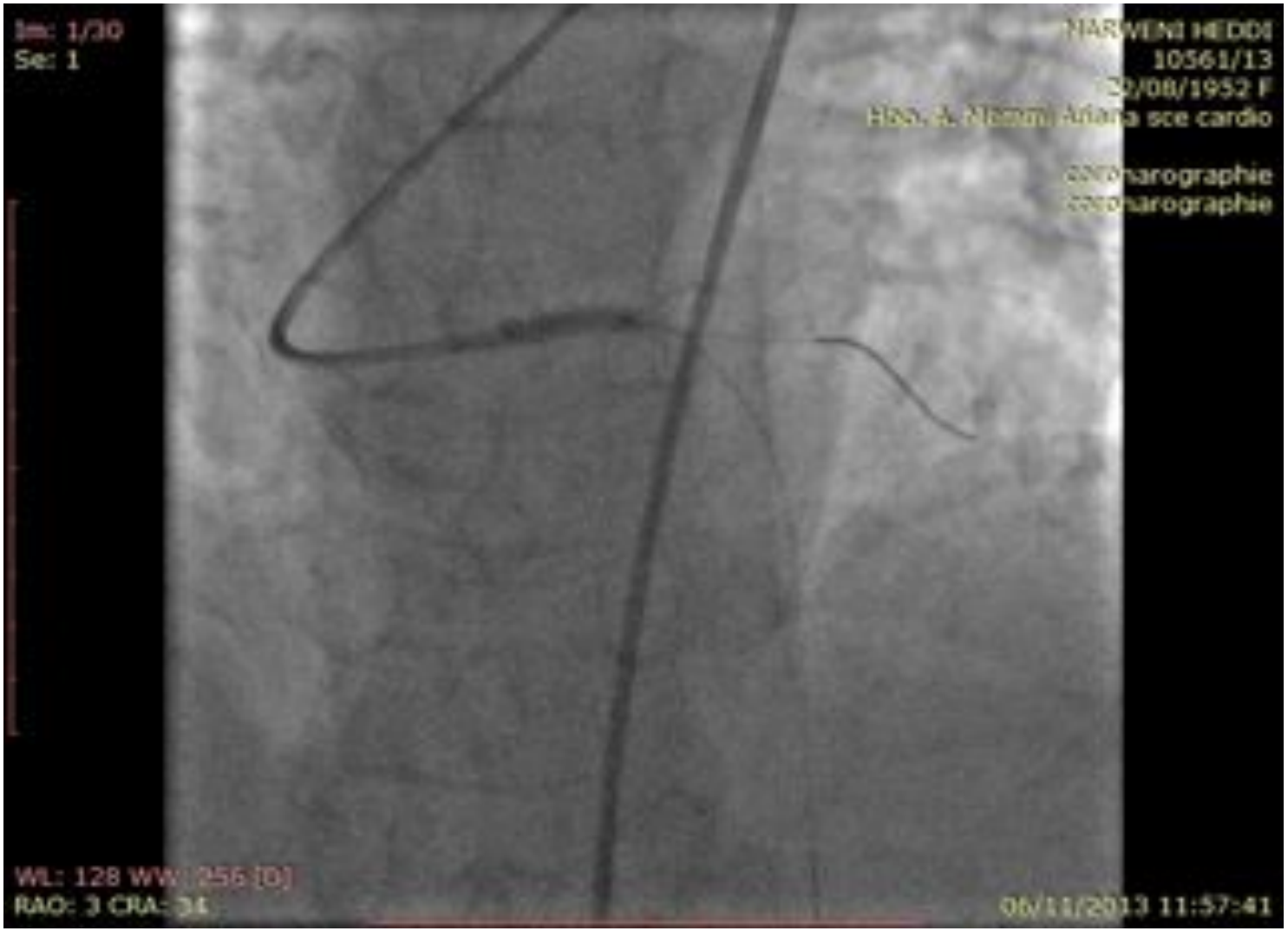
PROCEDURE ATC



PROCEDURE ATC

PROCEDURE ATC

PROCEDURE ATC

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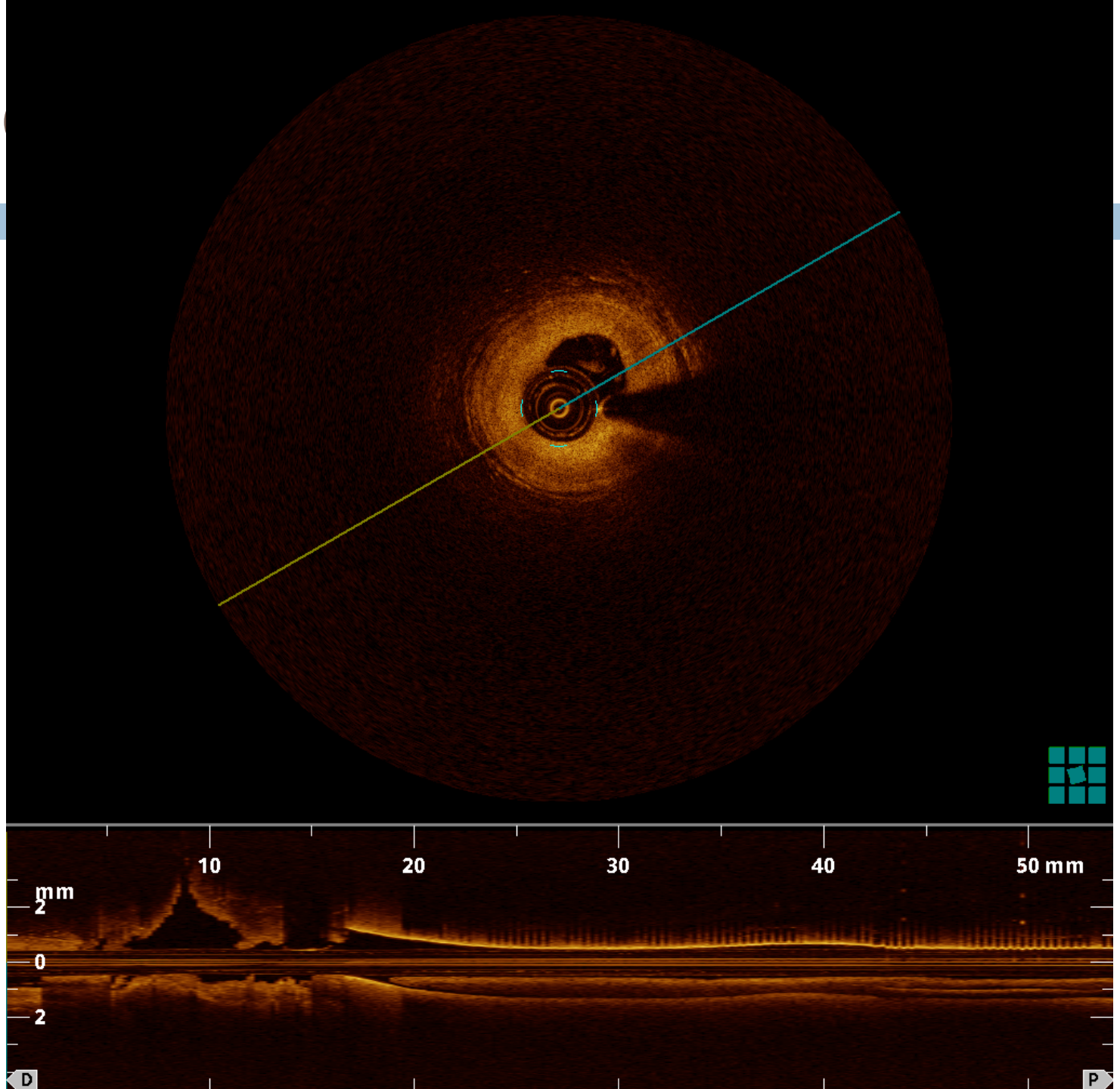

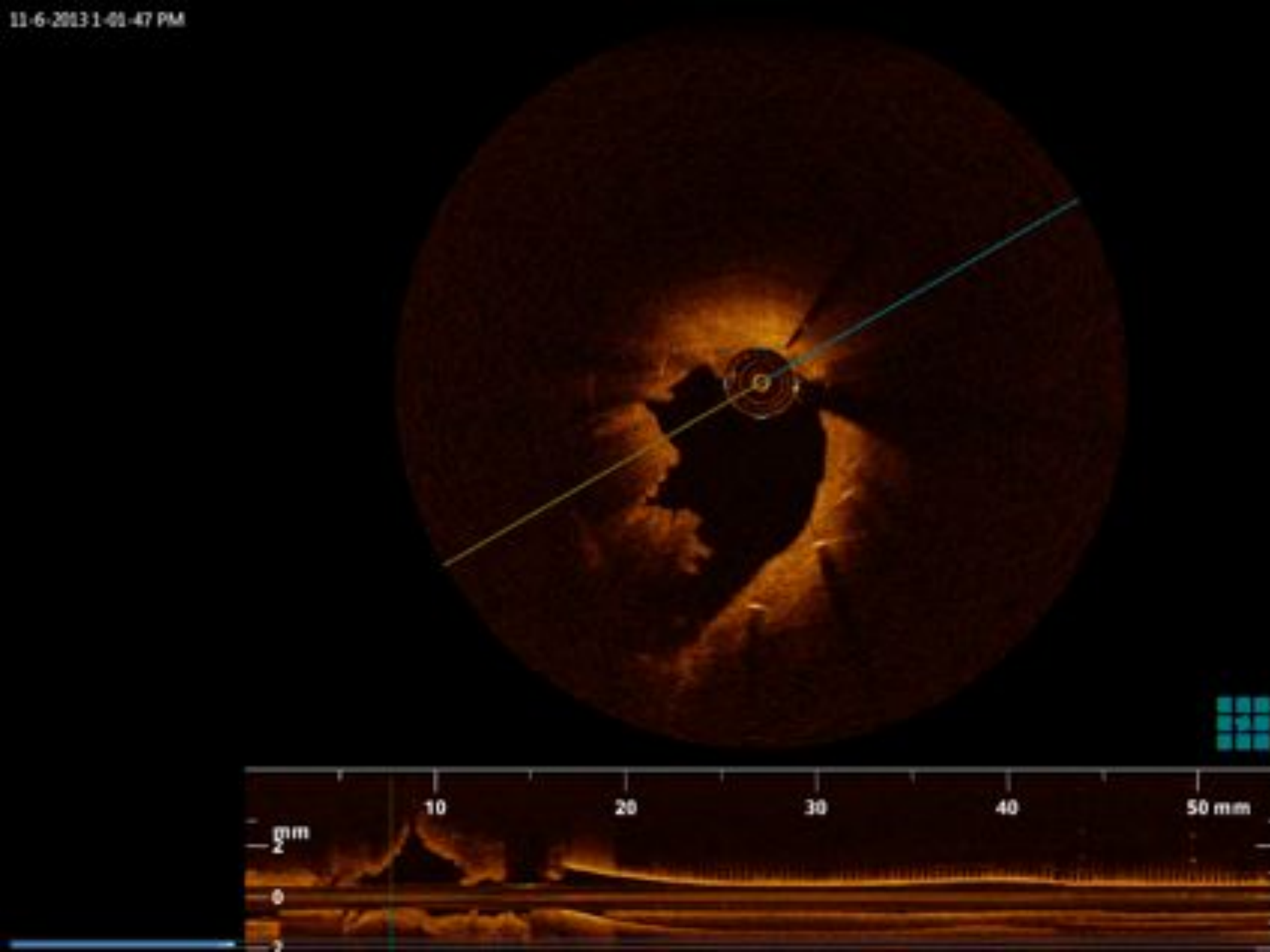
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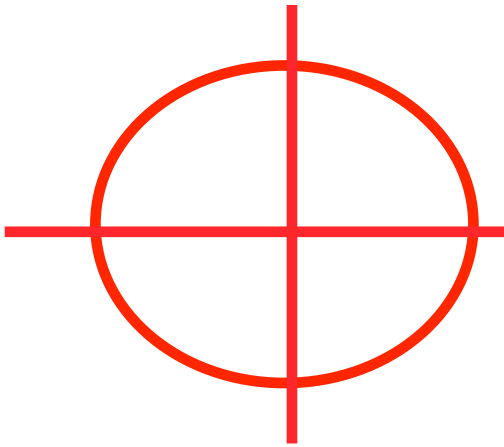
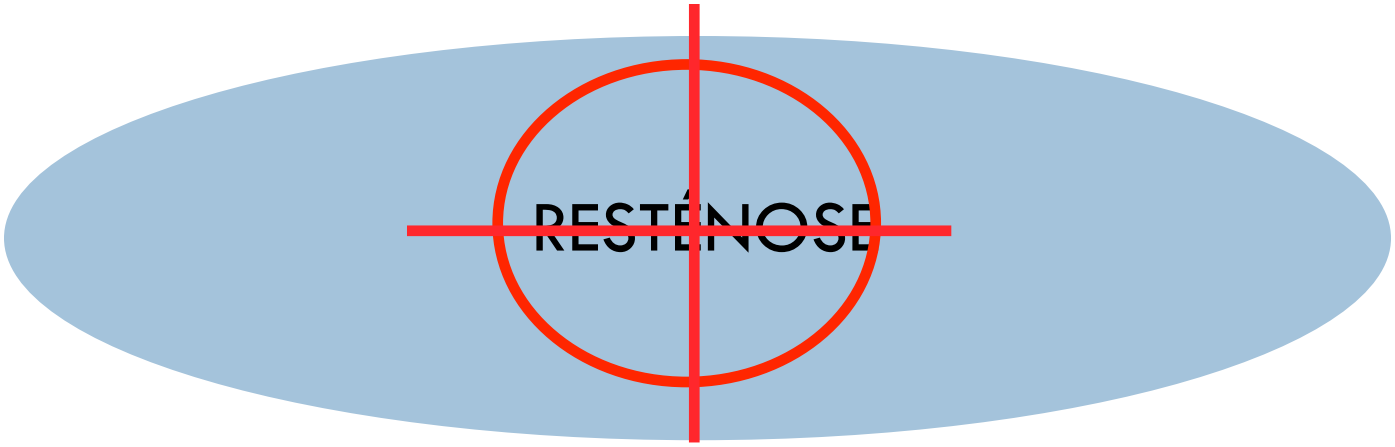
ATC du TCGD : Nos ennemis

Thrombus et la plaquette activée





PROCEDURE ATC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29/08/1952 F
Hôp. A. Mimni Ariana sce cardio
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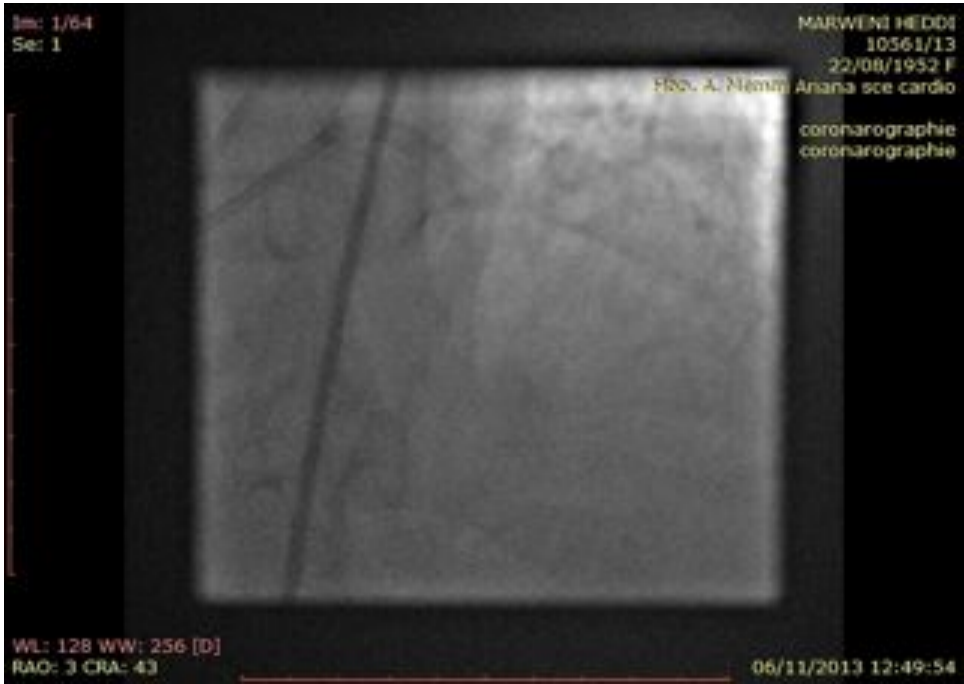
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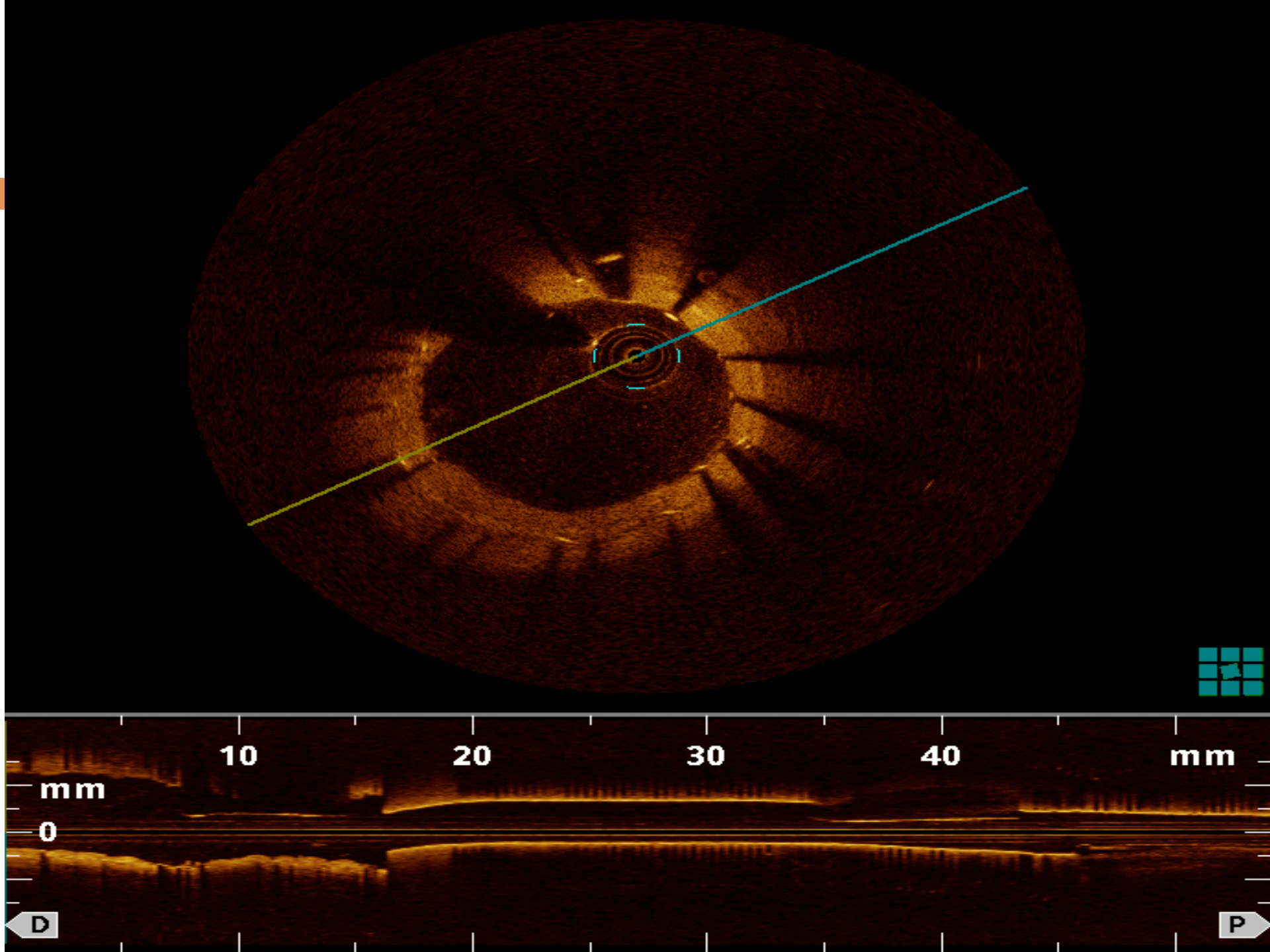
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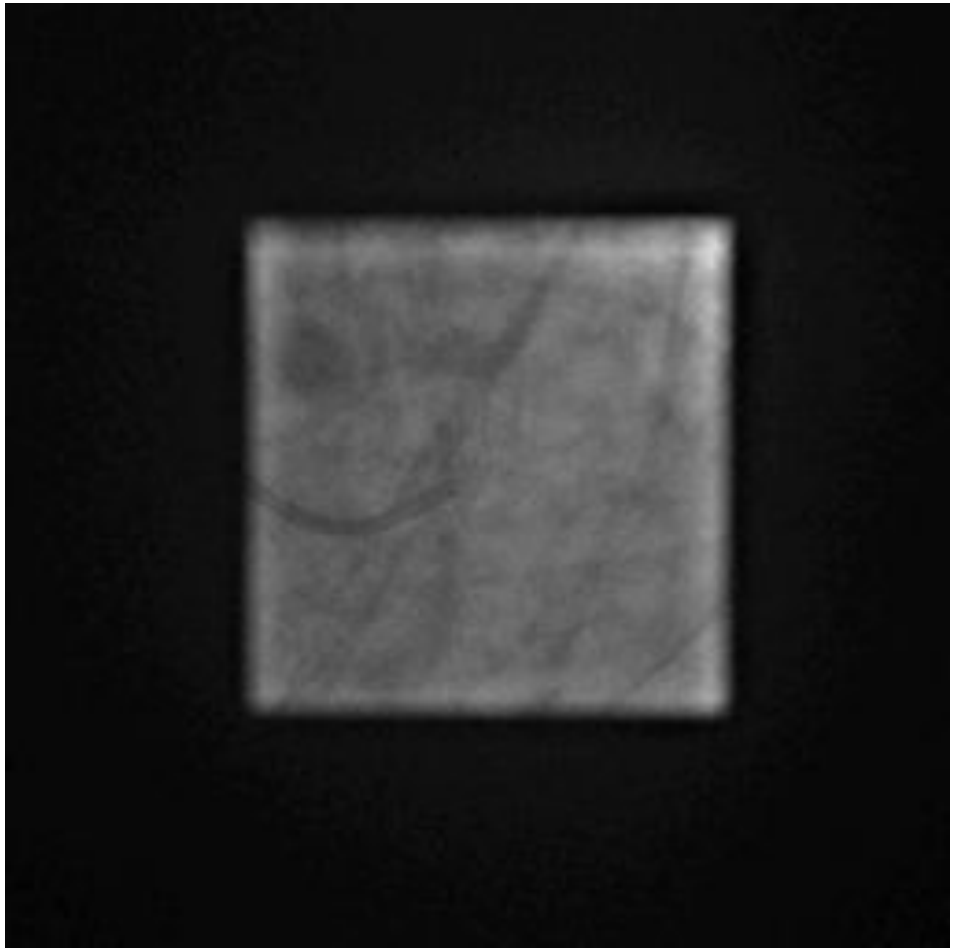
Follow up



- Coro systématique à 1 mois : disparition du thrombus.
- Appel téléphonique il y'a 3 semaine : 0 MACCE à 6 mois.

Conclusion

- **Angioplastie du TCG : pratique courante → gestion RIS ?**
- **Le choix de la stratégie du traitement de la RIS dépend du mécanisme: déterminé par IVUS et/ou OCT**
- **Une stratégie simple au départ associée à une stratégie simple pour traiter la RIS : meilleur approche**
- **« Il faut approcher la RIS du TCGD de la même façon qu'on approche une sténose native ».**

Merci de votre attention