



Session en collaboration avec les sociétés savantes : STCCCV et SAC

Angioplastie coronaire : Imagerie Endo-coronaire Systématique ?

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DÉCLARATION DE LIENS D'INTÉRÊT POTENTIELS

Intervenant : **Massima Amel TEBBAL** , Alger

Je n'ai pas de lien d'intérêt potentiel à déclarer

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Introduction :

- La coronarographie est l'examen de référence pour l'exploration de l'étendue et de la sévérité des lésions coronaires .
- Luminogramme : limites en ce qui concerne l'évaluation de la paroi vasculaire, de la composition de la plaque et de l'étendue de l'athérosclérose
- Les techniques d'imagerie intracoronaire, notamment l'échographie intravasculaire (IVUS) et la tomographie par cohérence optique (OCT), peuvent surmonter certaines de ces limites de l'angiographie coronaire et réduire par la suite les événements cardiovasculaires indésirables .

RENOVATE-COMPLEX-PCI: Intravascular imaging-guided versus angiography-guided procedural optimization in complex percutaneous coronary intervention

Reported from ACC 2023

Daniele Giacoppo report
Heart Vascular Stroke Institute
in a Late-Breaking Trial
New Orleans, LA, United States

Byong Hahn, from the
Department of Cardiology, Seoul, South Korea,
and the College of Cardiology (WCC),



Study population
Patients aged ≥19 years
undergoing PCI with contemporary
drug-eluting stents or drug-coated
balloons (only for in-stent restenosis)
for significant coronary artery lesions



Where?
South Korea

Primary endpoint
Composite of death from cardiac causes, target vessel myocardial infarction, or ischemia-driven target-lesion revascularization at 1 year, which was powered for noninferiority margin, 3.1 percentage point difference, -0.6 percentage point difference, 97.5% CI 0.97; p<0.001 for noninferiority

9 sites



Safety endpoints
Incidence of contrast-induced nephropathy was similar

1.4% = 1.5%

Incidence of major procedural complications was lower with OCT-guided PCI

2.2% vs. 3.7% p=0.048



THE NEW ENGLAND JOURNAL of MEDICINE

RESEARCH SUMMARY

OCT or Angiography Guidance for PCI in Complex Bifurcation Lesions

Holm NR et al. DOI: 10.1056/NEJMoa2307770

CLINICAL PROBLEM
In up to 20% of patients in whom coronary-artery revascularization is indicated, the lesion involves a branch point or bifurcation of the coronary artery. Percutaneous coronary intervention (PCI) of lesions at coronary-artery bifurcations is typically guided by angiography, but visualization of such lesions can be challenging. Whether PCI guided by optical coherence tomography (OCT) imaging could improve outcomes is unknown.

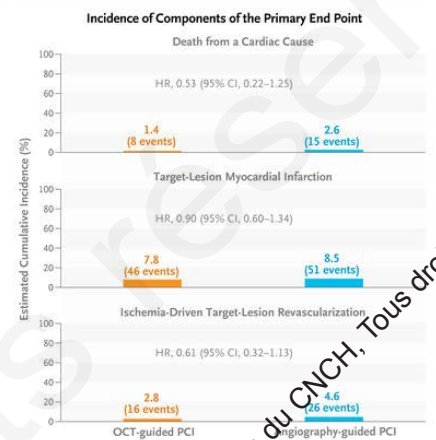
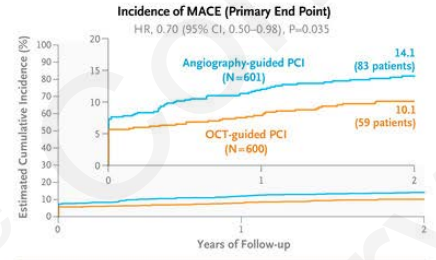
CLINICAL TRIAL
Design: A multicenter, open-label, randomized, controlled trial in Europe evaluated whether OCT-guided PCI would be superior to standard angiography-guided PCI in the revascularization of coronary-artery bifurcation lesions.
Intervention: 1201 adults with stable angina, unstable angina, or non-ST-segment elevation myocardial infarction; a clinical indication for PCI; and a complex coronary-artery bifurcation lesion identified on angiography were assigned to undergo either OCT-guided PCI or angiography-guided PCI. The primary end point was a composite of major adverse cardiac events (MACE), defined as death from a cardiac cause, target-lesion myocardial infarction, or ischemia-driven target-lesion revascularization at a median follow-up of 2 years.

RESULTS
Efficacy: The incidence of MACE was significantly lower among patients assigned to OCT-guided PCI than among those assigned to angiography-guided PCI.
Safety: The incidence of procedure-related complications appeared similar in the two groups.

LIMITATIONS AND REMAINING QUESTIONS

- Information on race and ethnic group was not collected.
- The subgroup of patients with lesions located at left main coronary-artery bifurcations was smaller than planned, which may have reduced the trial population's overall risk.
- The group assignments were not masked to treating physicians or patients.

Links: Full Article | NEJM Quick Take | Editorial



CONCLUSIONS
In patients with complex bifurcation lesions located at a coronary-artery bifurcation, OCT-guided PCI was superior to angiography-guided PCI with respect to the incidence of MACE at a median follow-up of 2 years.

Endpoint	HR (95% CI)
OCT-Related Complications at 2 Yr (Definite or Probable)	0.82 (0.67 to 1.01)
Stent Thrombosis at 2 Yr (Definite or Probable)	0.2 (0.05 to 0.81)
Procedure-Related Thrombotic Events at 2 Yr	0.1 (0.01 to 0.4)
Stent Thrombosis at 2 Yr (Definite or Probable)	0.2 (0.05 to 0.81)
OCT Guidance	0.5 (0.14 to 0.93)
Angiography Guidance	1.4 (0.77 to 2.54)

CONCLUSIONS
Among patients undergoing PCI, OCT guidance resulted in a larger minimum stent area than angiography guidance, but there was no between-group difference in target-vessel failure at 2 years.

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OCT vs. IVUS vs. angiography guidance

#ESCCongress

A real-time updated network meta-analysis

Conclusion



Intravascular imaging (IVI)-guided percutaneous coronary intervention (PCI) is associated with a lower rate of target lesion failure compared with angiography-guided PCI.

Impact on clinical practice



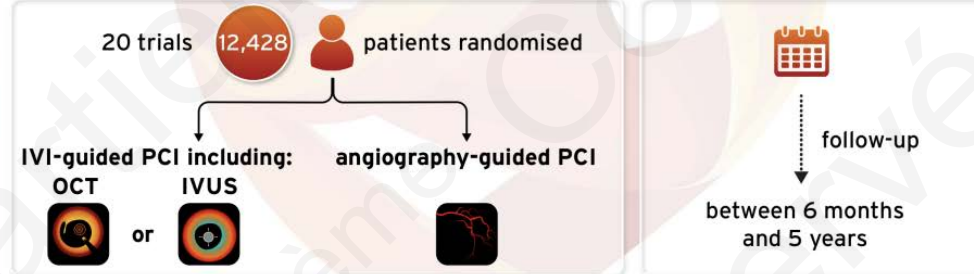
These results emphasise the importance of physicians using IVI with either optical coherence tomography (OCT) or intravascular ultrasound (IVUS) to optimise stent outcomes and improve the long-term prognosis of their patients.

Study objectives



This real-time updated network meta-analysis, integrating data from the ILUMIEN IV and OCTOBER trials with prior studies, examined the effects of IVI-guided PCI versus angiography-guided PCI.

Who and what?



Primary endpoint

Target lesion failure, defined as a composite of cardiac death, target vessel myocardial infarction, or target lesion revascularisation.

Reduced by 31% with



Secondary endpoints

Cardiac death reduced by 46% with



Target vessel myocardial infarction reduced by 20% with



Target lesion revascularisation reduced by 29% with



Stent thrombosis reduced by 52% with



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Network Evidence: All Outcomes

OCT-guided PCI vs IVUS-guided PCI

Outcome	N trials	N pts	N events	Direct estimate	% evidence	Indirect estimate	% evidence	Network estimate
TLF	4	1316	48	0.89 [0.51, 1.57]	19	1.32 [1.00, 1.73]	81	1.22 [0.96, 1.56]
- Cardiac death	4	1316	3	1.32 [0.25, 6.98]	15	1.12 [0.56, 2.27]	85	1.15 [0.60, 2.20]
- TV-MI	4	1316	14	0.97 [0.34, 2.79]	14	1.06 [0.69, 1.64]	86	1.05 [0.70, 1.57]
- ID/CD TLR	4	1316	34	0.78 [0.39, 1.52]	25	1.51 [1.02, 2.22]	75	1.28 [0.91, 1.79]
Stent thrombosis	4	1316	4	0.93 [0.19, 4.51]	26	1.15 [0.45, 2.96]	74	1.09 [0.48, 2.45]
All-cause death	4	1316	12	1.26 [0.44, 3.62]	19	0.91 [0.55, 1.50]	81	0.97 [0.61, 1.52]
All MI	4	1316	21	1.26 [0.52, 3.02]	17	1.12 [0.75, 1.67]	83	1.14 [0.79, 1.64]
ID/CD TVR	4	1316	60	1.10 [0.67, 1.80]	34	1.52 [1.07, 2.17]	66	1.36 [1.02, 1.82]

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Est ce qu'elle est systématique ?

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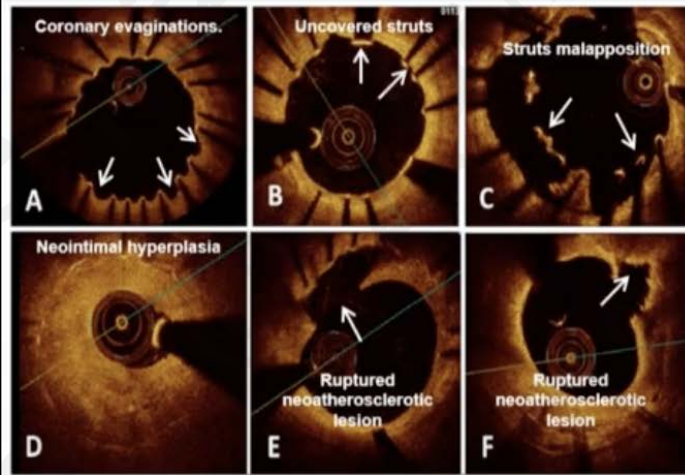


Management du stent failure :

Thrombose de stent :

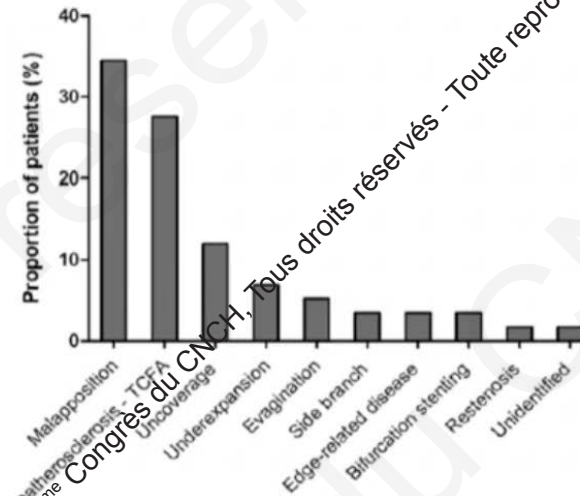
Mechanisms of stent thrombosis

PESTO french registry
OCT imaging identified an underlying abnormality in 95% of cases



Souteyrand G et al. Eur Heart J. 2016;37:1208-16.
Amabile N et al. Int J Cardiol 2017;227:161-165.

European registry
Leading causes of very late stent thrombosis



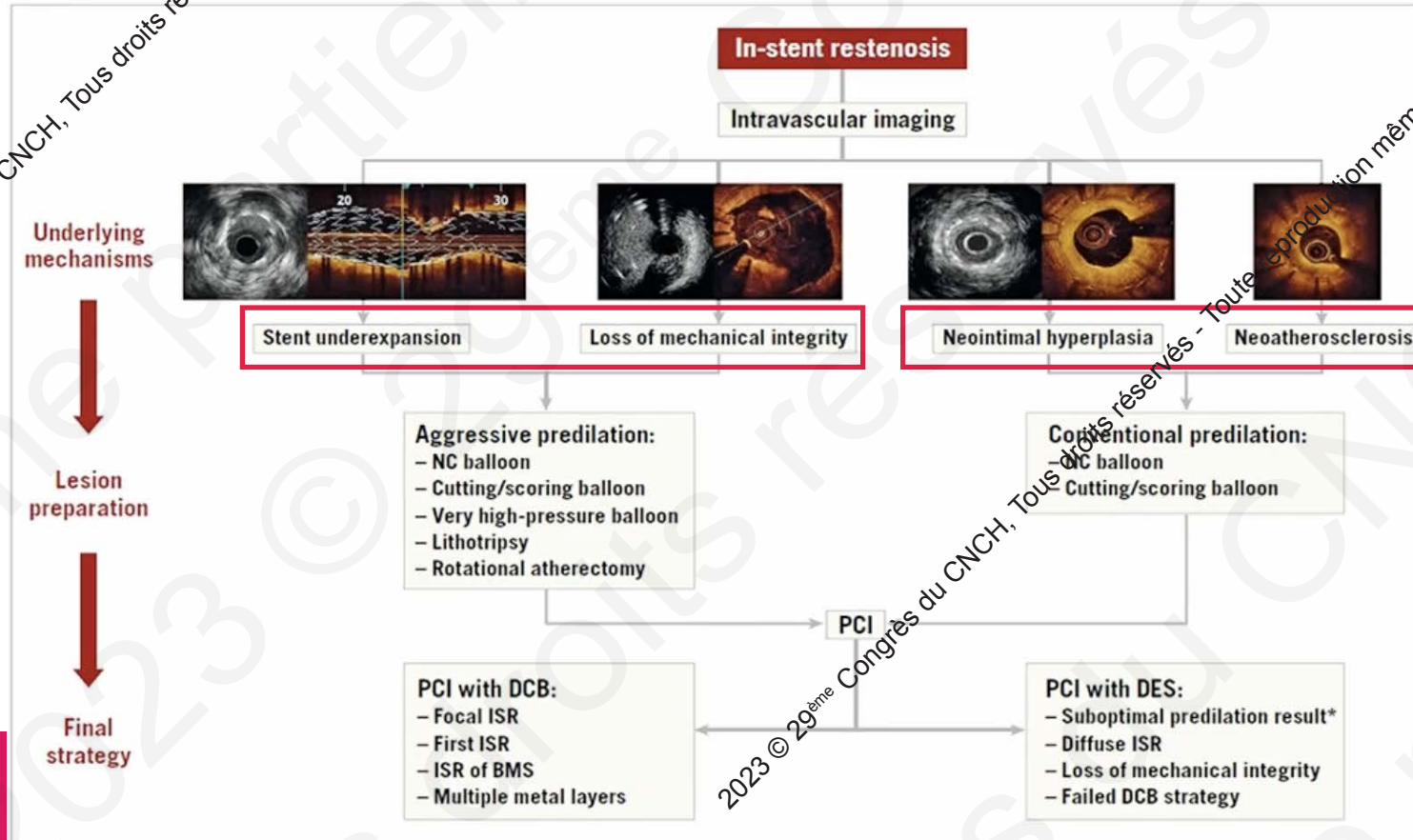
Taniwaki M et al. Circulation 2016;133:650-660.



Management du stent failure :

Resténose intra-stent :

Management of myocardial revascularisation failure :
an expert consensus document of the EAPCI



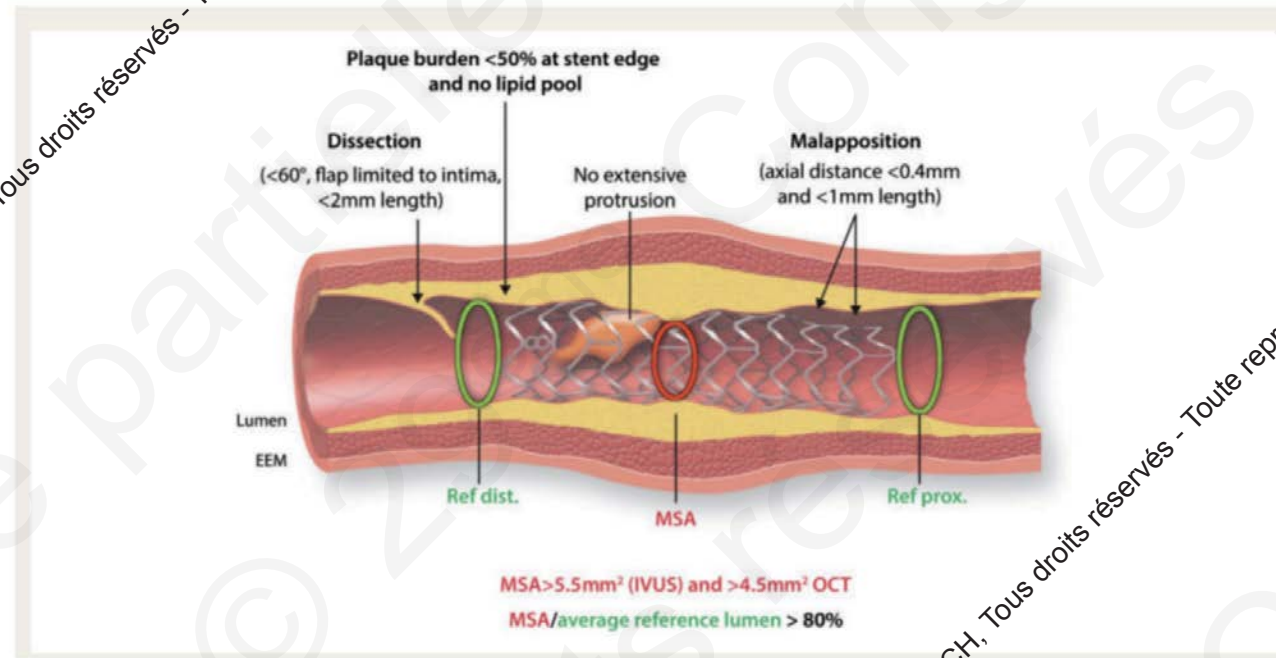
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Management du stent failure :

Post-PCI optimization targets in complex coronary stenting



- Déploiement optimal du stent (> 80% du diamètre de la lumière de référence)
- Couverture optimale de la lésion (éviter une zone d'atterrissage dans une plaque lipidique)
- Correction des malappositions significatives
- Corrections des dissections de bord étendues
- Éviter les protrusions tissulaires intrastent extensives (±)

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Les lésions complexes :

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RESEARCH SUMMARY

Intravascular Imaging-Guided or Angiography-Guided Complex PCI

Lee JM et al. DOI: 10.1056/NEJMoa2216607

CLINICAL PROBLEM

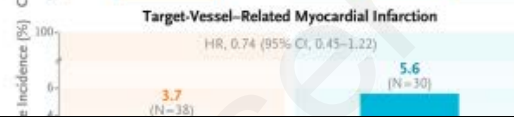
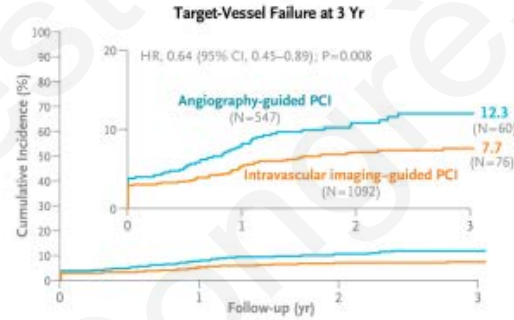
During percutaneous coronary intervention (PCI), guidance with intravascular imaging, with the use of intravascular ultrasonography or optical coherence tomography (OCT), can optimize stent implantation. However, for patients with complex coronary-artery lesions, data regarding clinical outcomes after intravascular imaging-guided PCI as compared with outcomes after angiography-guided PCI are limited.

CLINICAL TRIAL

Design: A prospective, multicenter, open-label, randomized trial in South Korea evaluated whether intravascular imaging-guided PCI would result in better clinical outcomes than angiography-guided PCI in adults with complex coronary-artery lesions.

Intervention: 1639 patients were assigned in a 2:1 ratio to undergo either intravascular imaging-guided PCI, with the use of ultrasonography or OCT, or angiography-guided PCI. The primary end point was target-vessel failure, which was defined as a composite of death from cardiac causes, target-vessel-related myocardial infarction, or clinically driven target-vessel revascularization.

RESULTS

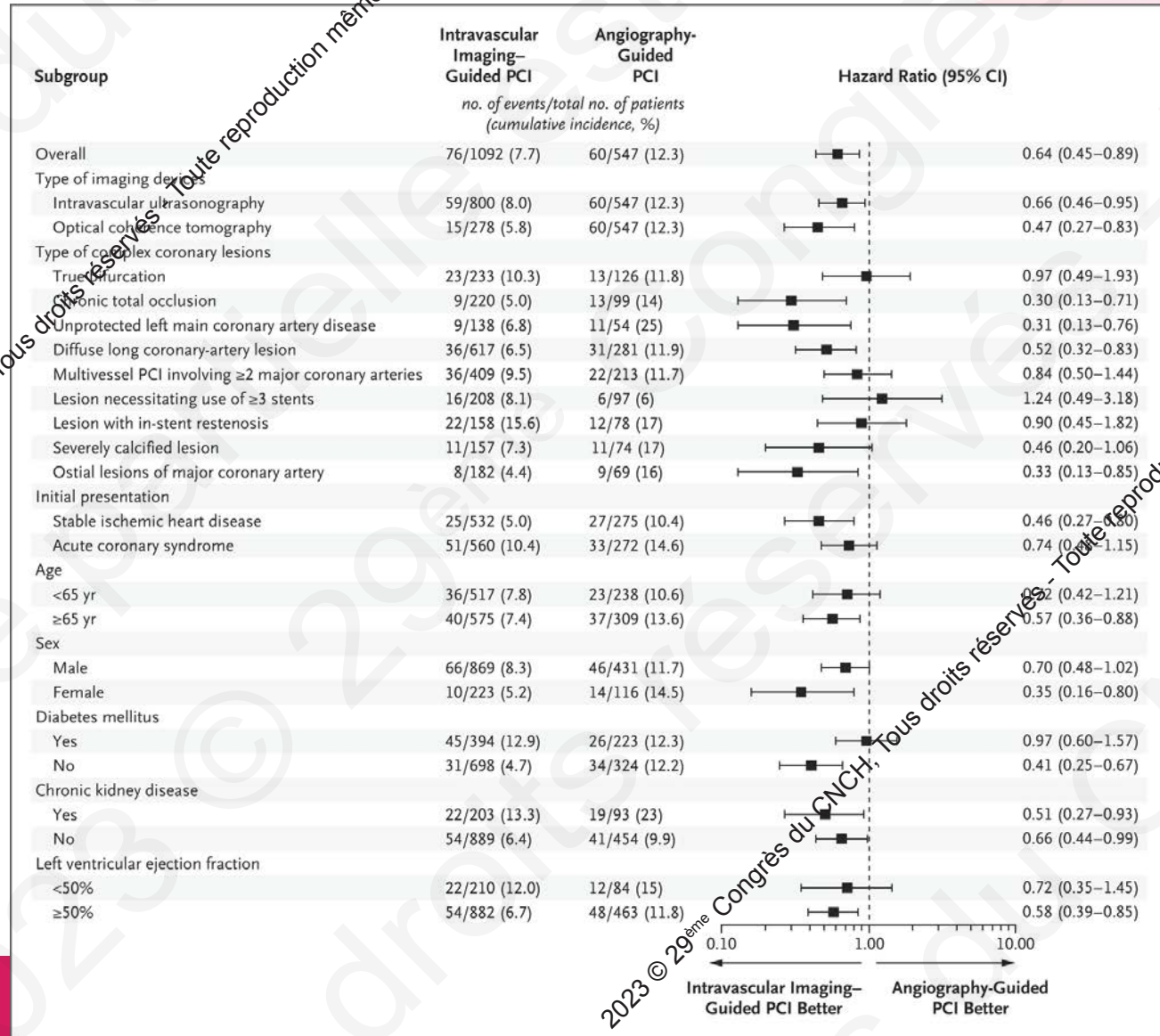


Pour être inclus dans l'étude, les patients devaient présenter des **lésions coronaires complexes** définies par :

1. Lésion de vraie bifurcation (1/1,0,1/0,1,1) avec une side-branche $\geq 2,5$ mm
2. Occlusion totale chronique depuis > 3 mois
3. Lésion d'un tronc commun non protégé
4. Lésion longue nécessitant l'implantation d'une longueur de stent > 8 mm
5. Lésions sur > 2 vaisseaux épicaudiques majeurs traités au cours d'une seule procédure
6. Lésion nécessitant l'implantation de > 3 stents
7. Lésion de resténose intra-stent
8. Lésions sévèrement calcifiées
9. Lésion ostiale de l'IVA, de la circonflexe ou de la coronaire droite.



Les lésions complexes :



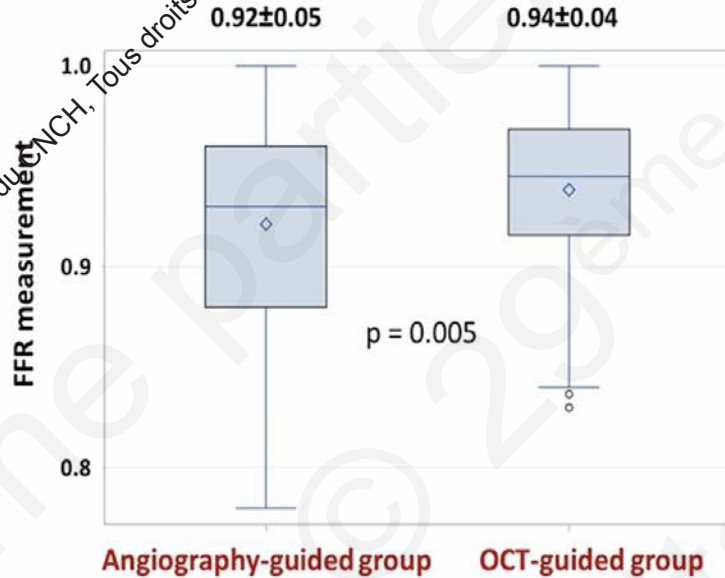
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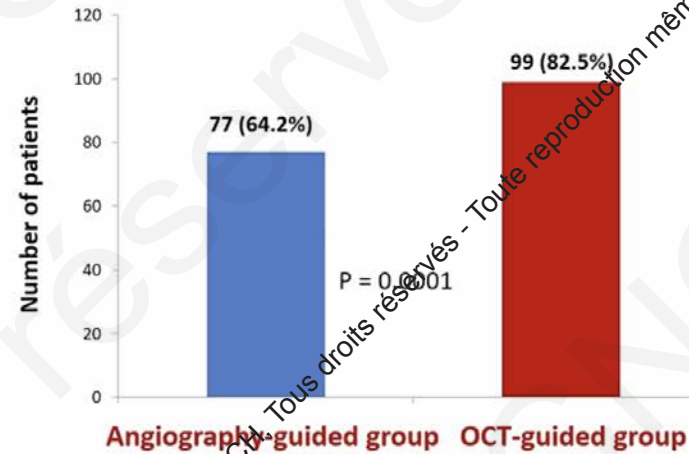


Syndromes coronaires Aigus :

Post-PCI optimisation targets DOCTORS study (ACS pts)



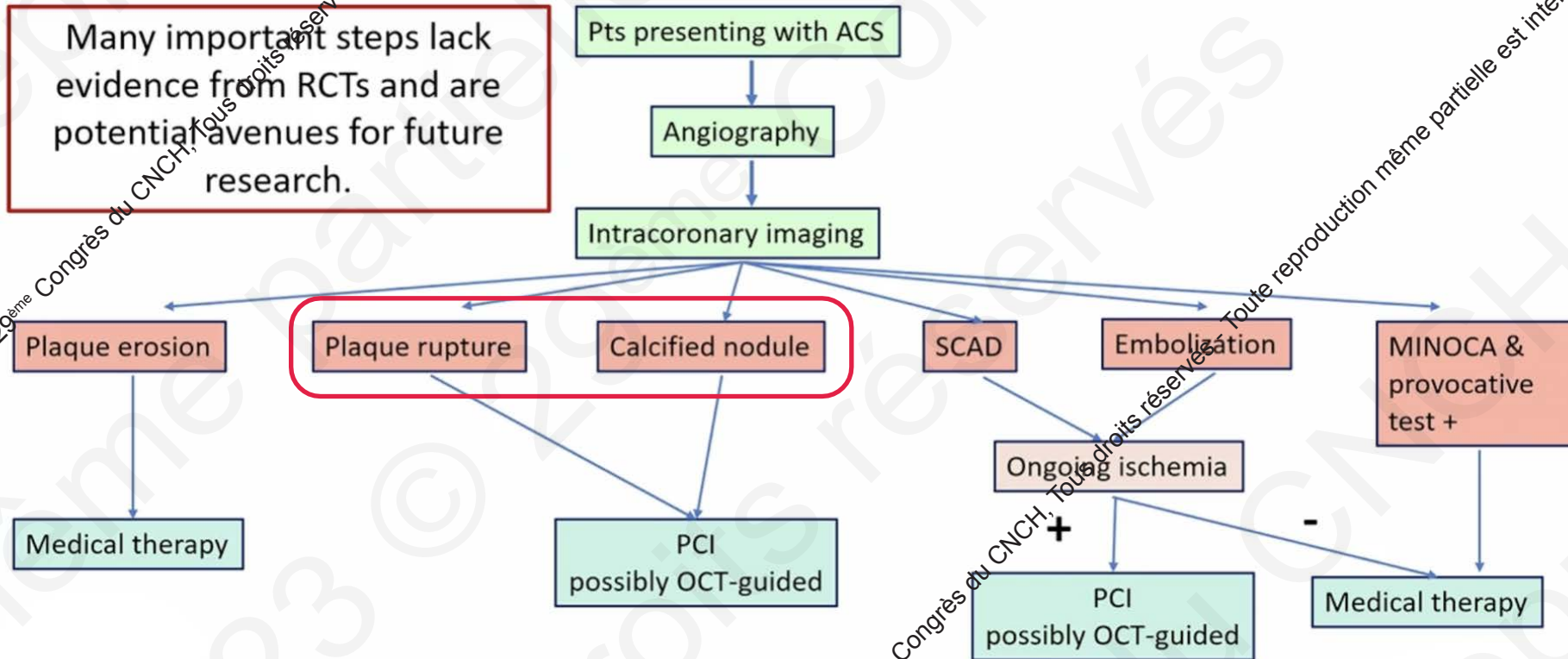
+ 22% de pts avec FFR post-PCI > 0.90





Syndromes coronaires Aigus :

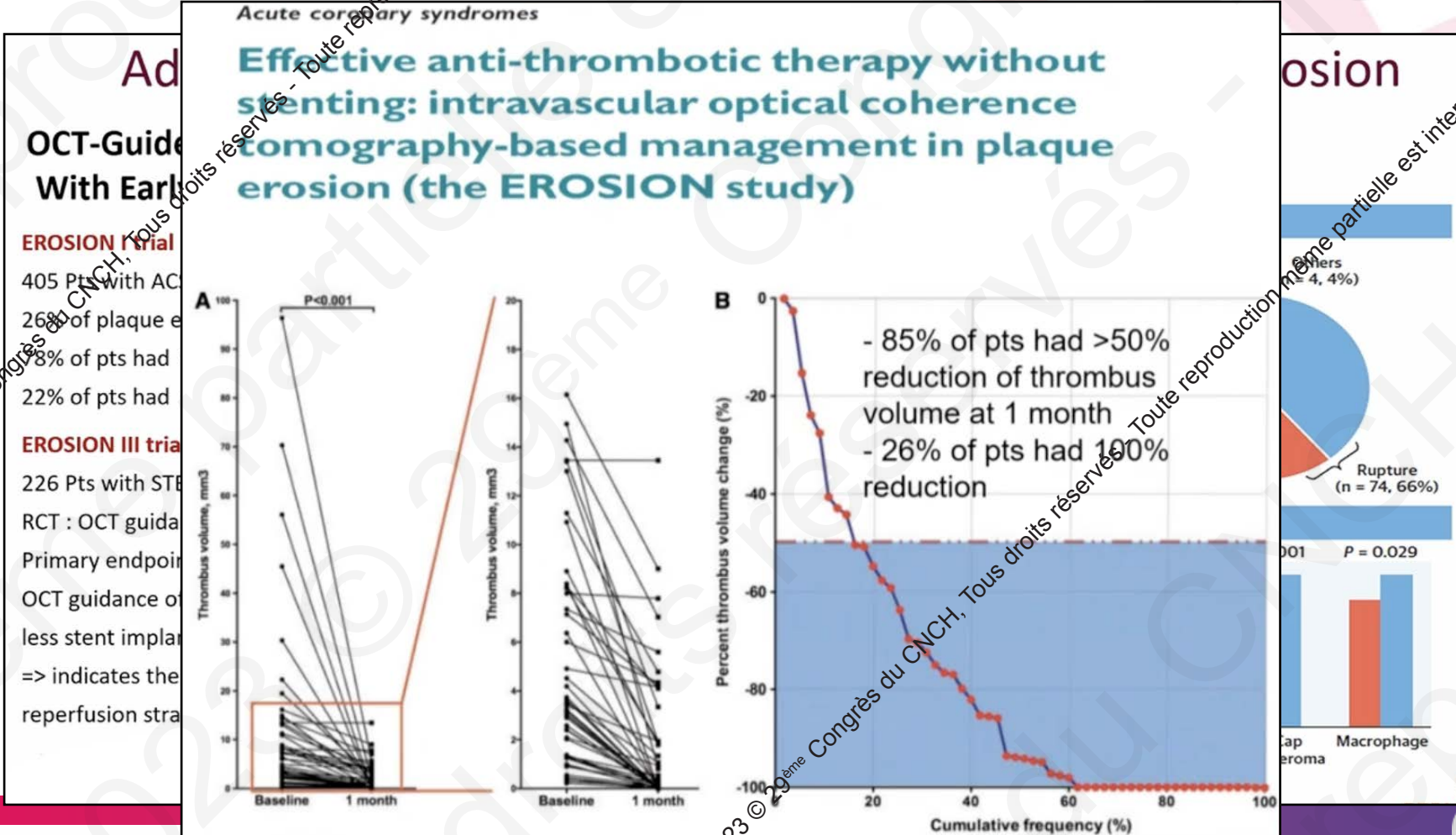
Possible treatment algorithm for ACS pts





Syndromes coronaires Aigus :

Erosion de plaque :



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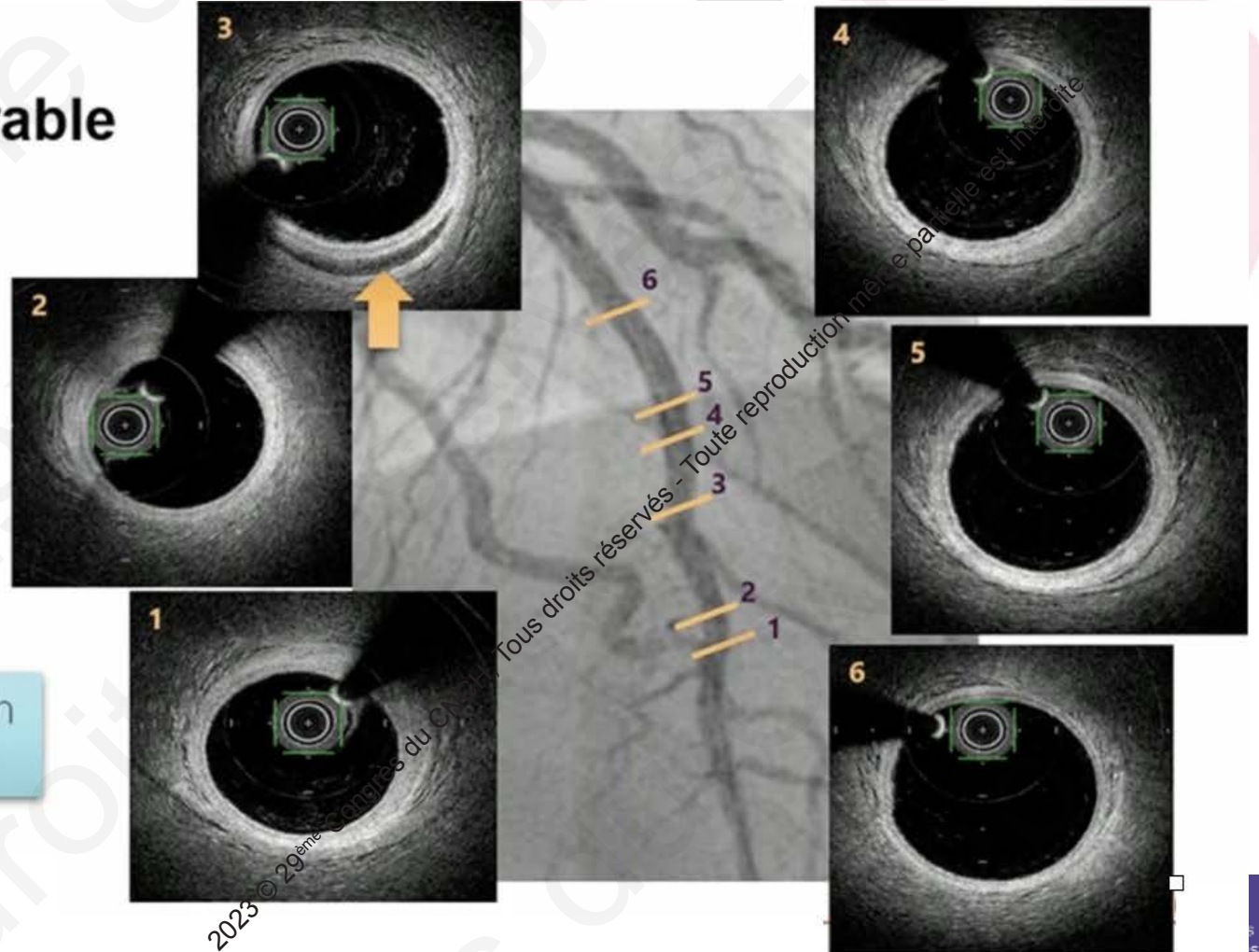
Syndromes coronaires Aigus :

Dissection spontanée(SCAD) / hématorne intra-mural :

Natural evolution usually favorable

3 MONTH FOLLOW-UP

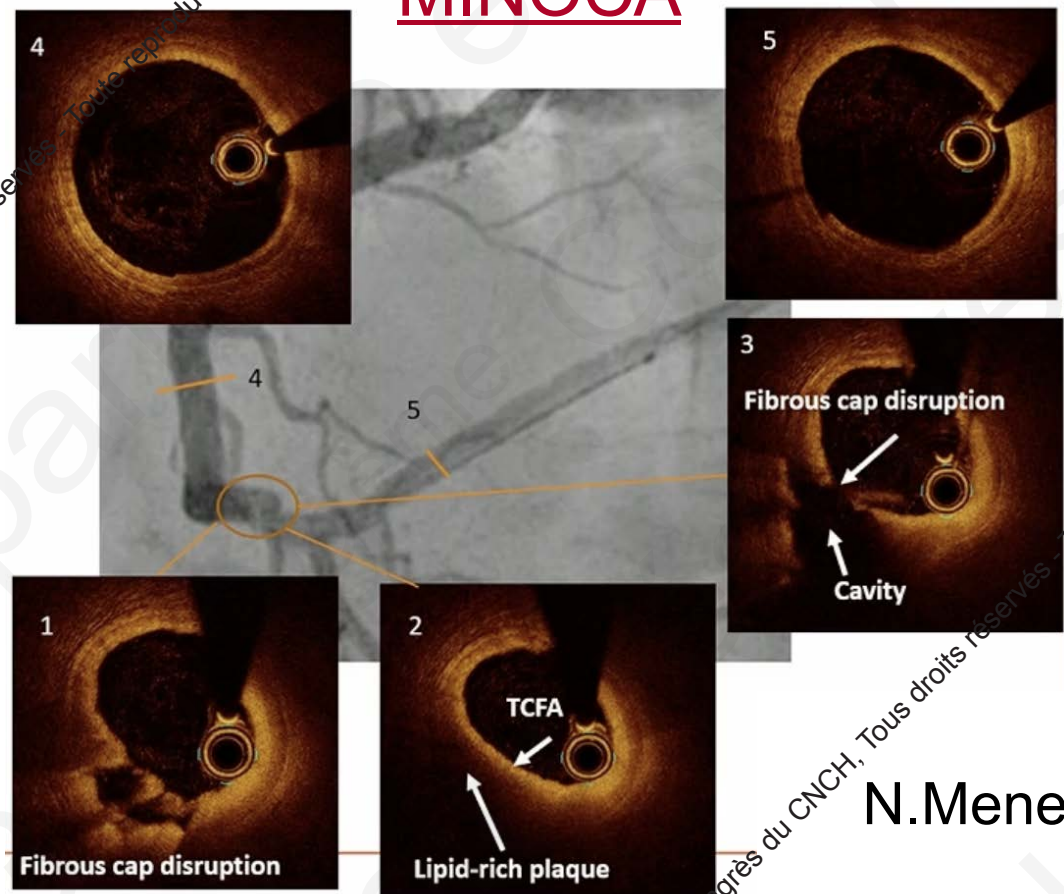
Almost complete recovery with
hematoma resorption





Syndromes coronaires Aigus :

MINOCA



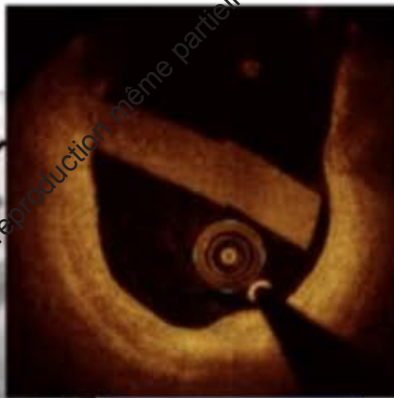
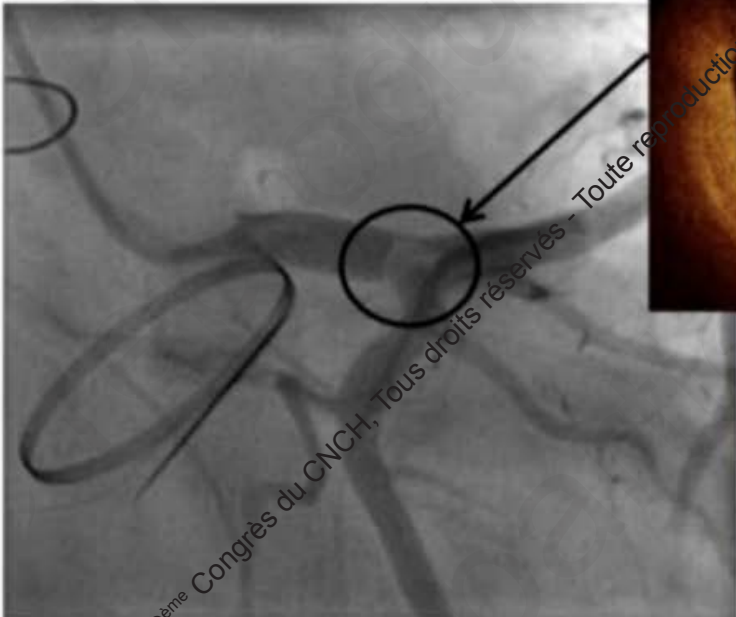
N.Meneveau

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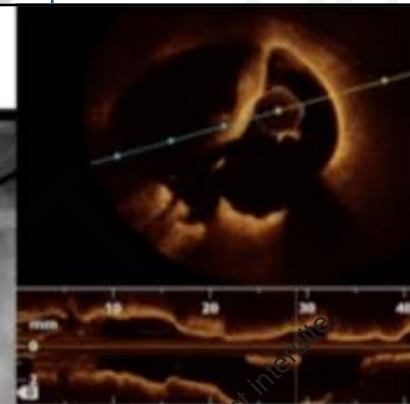
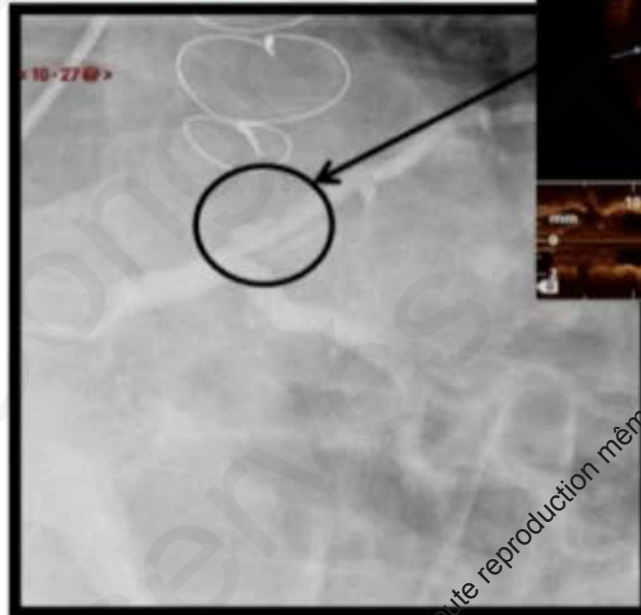
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Ambiguïtés morphologiques :

Corps étranger

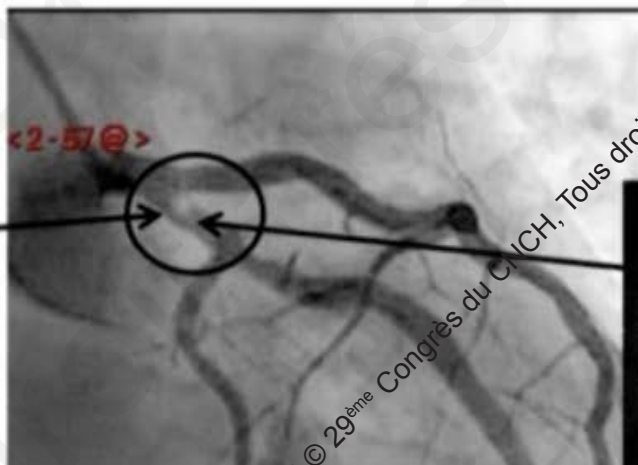
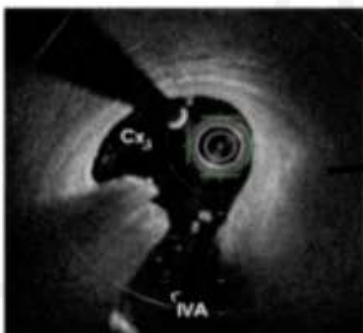


Vrai/faux chenal



Ca++/thrombus ?

Nodule Ca++ : aspect « peigné », cône d'ombre postérieur, contours bien délimités





Ambiguïtés morphologiques :

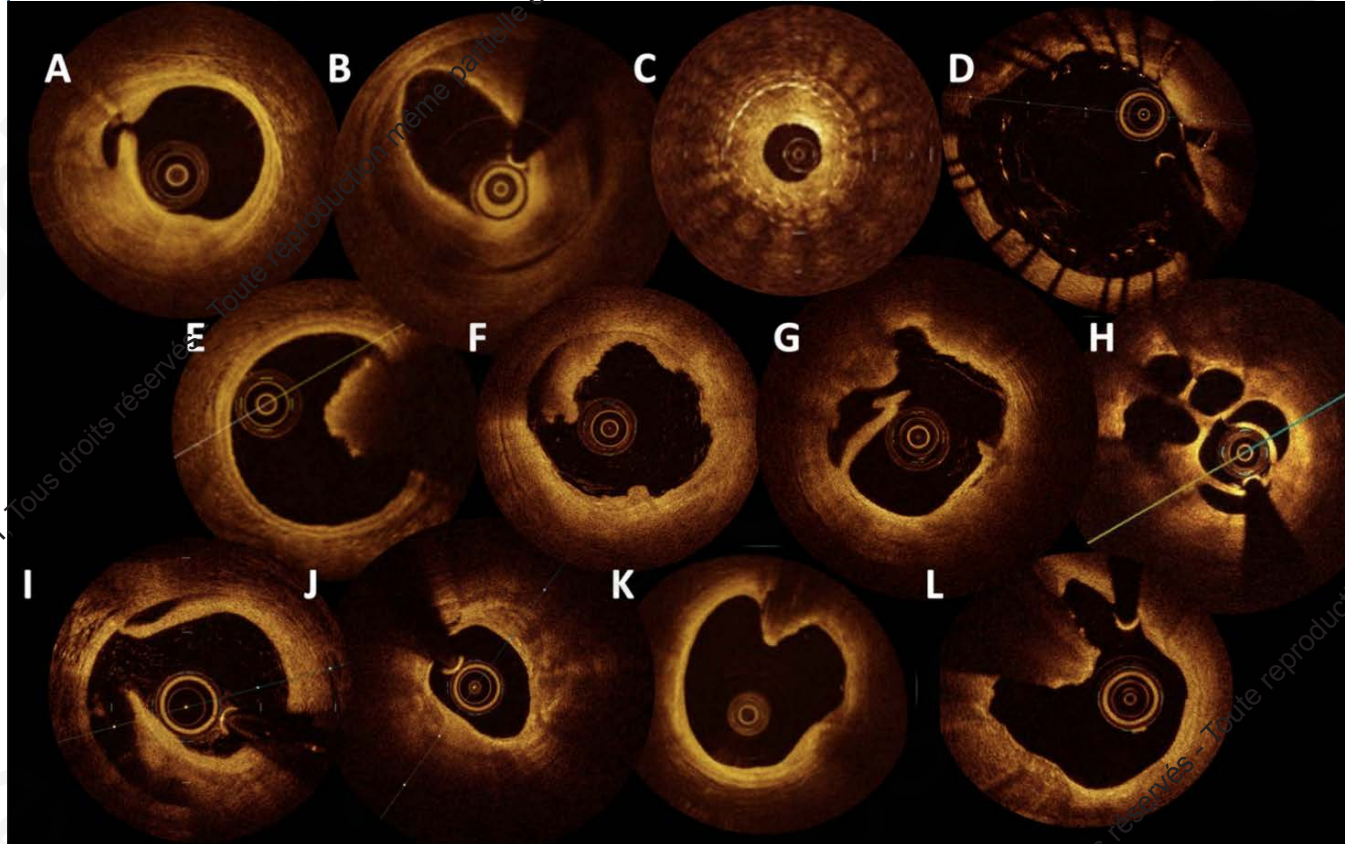


Figure 6 : Ambiguïtés angiographiques face à des anomalies fines et contribution de l'OCT
A. Rupture de plaque, B. Dissection coronaire, C. Resténose au sein d'un stent sous-déployé, D. Malapposition de stent, E. Thrombus endoluminal, F. Thrombus mural, G. Rupture de plaque et thrombus, H. Thrombus vieilli recanalisé, I. Dissection iatrogène en bord de stent, J. Calcification annulaire, K. Ergot calcaire, L. Calcification coralliforme

Recommendations on intravascular imaging for procedural optimization

Recommendations	Class ^a	Level ^b
IVUS or OCT should be considered in selected patients to optimize stent implantation. ^{603,612,651-653}	IIa	B
IVUS should be considered to optimize treatment of unprotected left main lesions. ³⁵	IIa	B

IVUS = intravascular ultrasound; OCT = optical coherence tomography.
^aClass of recommendation.
^bLevel of evidence.

IVUS should be considered to assess the severity of unprotected left main lesions.³⁵⁻³⁷

IIa

B

2018 ESC/EACTS Guidelines on Myocardial Revascularisation

Intracoronary imaging should be considered to diagnose SCAD if suspected.

IIa

C

2020 ESC Guidelines for NSTEMI

2021 ACC/AHA/SCAI Guideline for Coronary Artery Revascularization

COR	LOE	Recommendation
2a	B-NR	1. In patients with intermediate stenosis of the left main artery, intravascular ultrasound (IVUS) is reasonable to help define lesion severity (1-5). *
2a	B-R	1. In patients undergoing coronary stent implantation, IVUS can be useful for procedural guidance, particularly in cases of left main or complex coronary artery stenting, to reduce ischemic events (1-10).
2a	B-R	2. In patients undergoing coronary stent implantation, OCT is a reasonable alternative to IVUS for procedural guidance, except in ostial left main disease (11-13).
2a	C-LD	3. In patients with stent failure, IVUS or OCT is reasonable to determine the mechanism of stent failure (14-17).

Take Home Message :

- L'OCT et l'IVUS sont deux techniques utiles à l'arsenal du cardiologue interventionnel
- Problèmes logistiques, de disponibilité et de remboursement par l'Assurance
- Il n'est probablement pas nécessaire de l'utiliser dans chaque procédure, mais elles devraient potentiellement être utilisées dans la majorité des procédures.
- Quelques points restent à éclaircir :
 - Le type de lésion cible Le timing d'utilisation
 - Le timing d'utilisation /La technique optimale
 - Les perspectives de prise en charge par la Sécurité Sociale.

Est-il temps de changer de pratique ?

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