Late stent thrombosis: a clinical case

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P. T.

Age: 60 years

Sex: female.

Cardiological risk factors: diabetes mellitus type II, dyslipidemia.

Cardiological History: chest pain on effort (CCS II), positive exercise stress test.

Coronary angiography: left main (65%), ostial ADA (70%), ostial Cx (70%).

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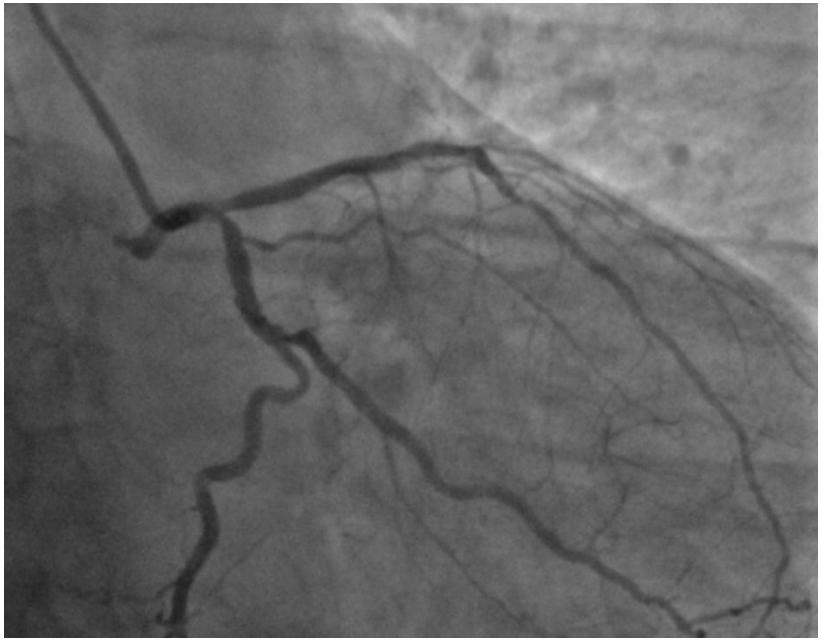

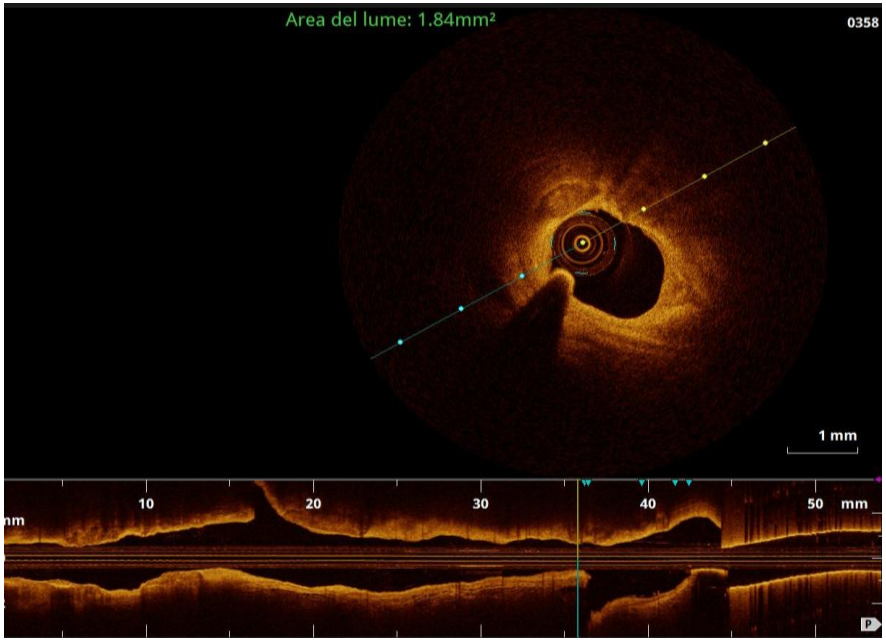

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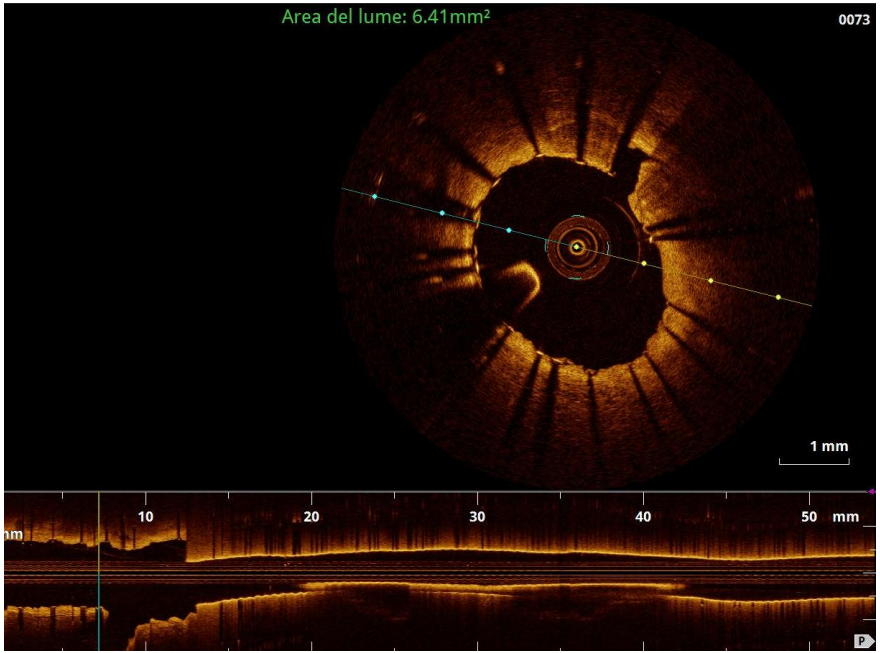
PTCA on Left Main-ADA-Cx with stent implantation (Resolute Onyx 3.5 x 22 mm on Left Main-Cx; Resolute Onyx 3.0 x 12 mm on IVA with final kissing balloon).



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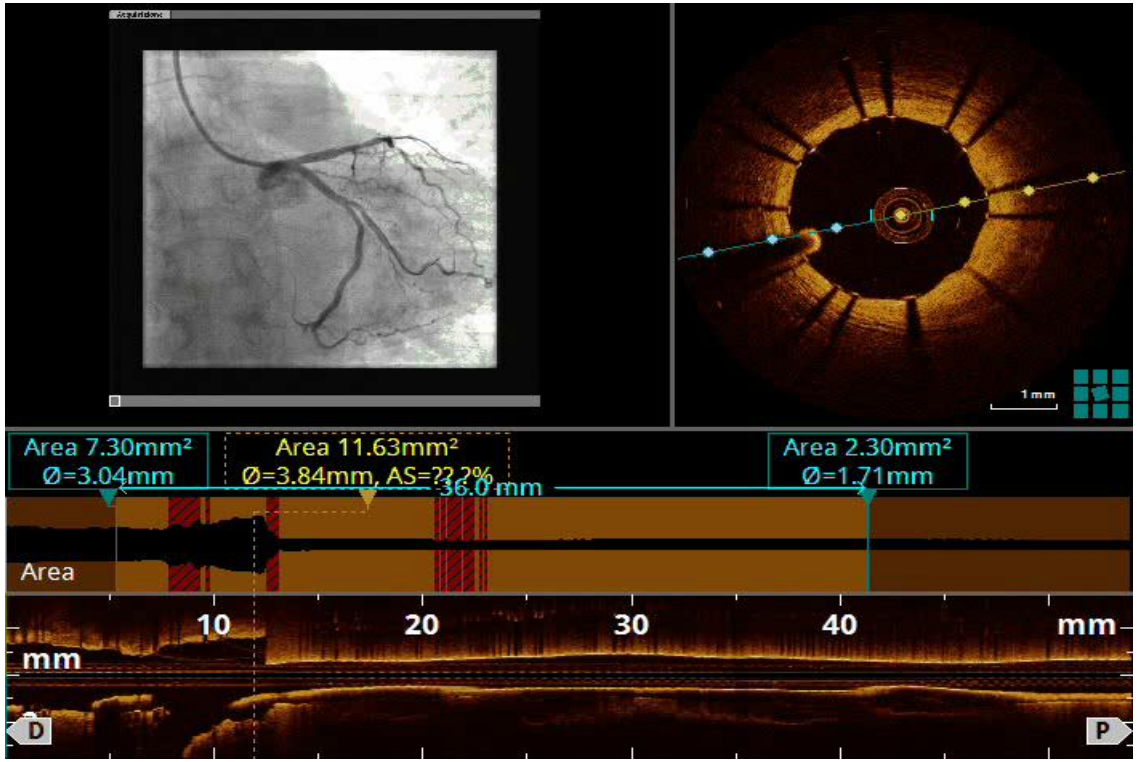
Final result



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- <u>Therapy on discharge</u>: Clopidogrel 75 mg/die, ASA 100 mg/die , Carvedilol 6,25 mg x 2, Tresiba 20 UI x 1, Novorapid x 3, Atorvastatin 20 mg/die.
- The patient became asymptomatic for chest pain after revascularization.
- At 1 year follow up, clopidogrel was interrupted without any changing of the of the remaining therapy.
- After about 1 year and half, the patient presented to our Emergency Department for typical chest pain at rest. At EKG: 2 mm ST-depression in lateral leads.
- Coronary angiography was performed.

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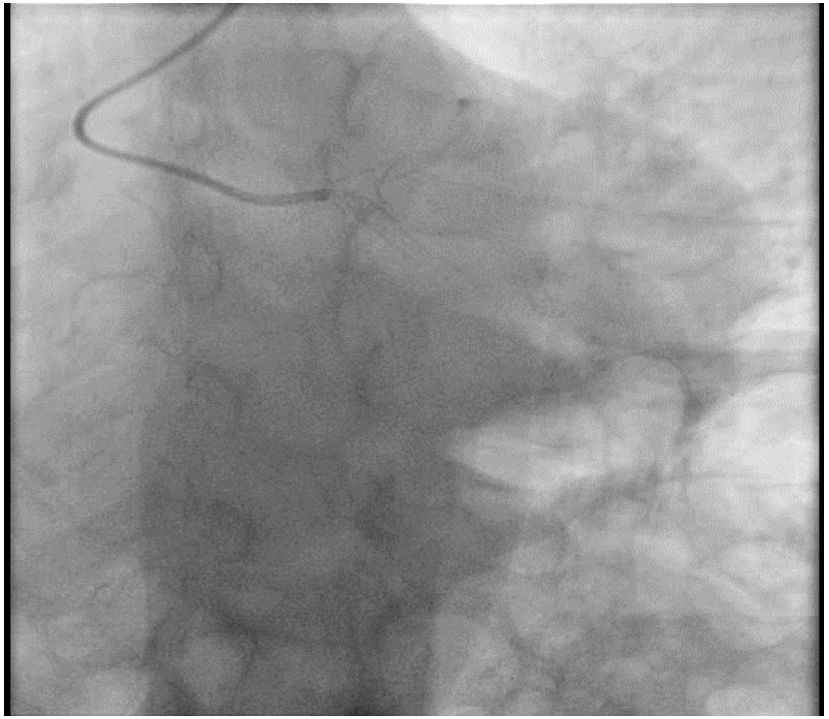
Angiography of ST



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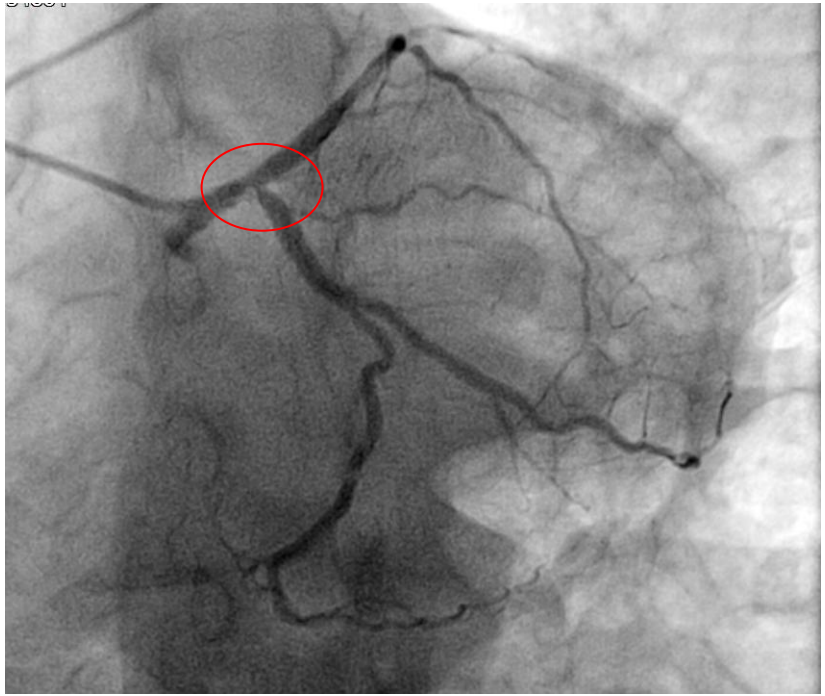

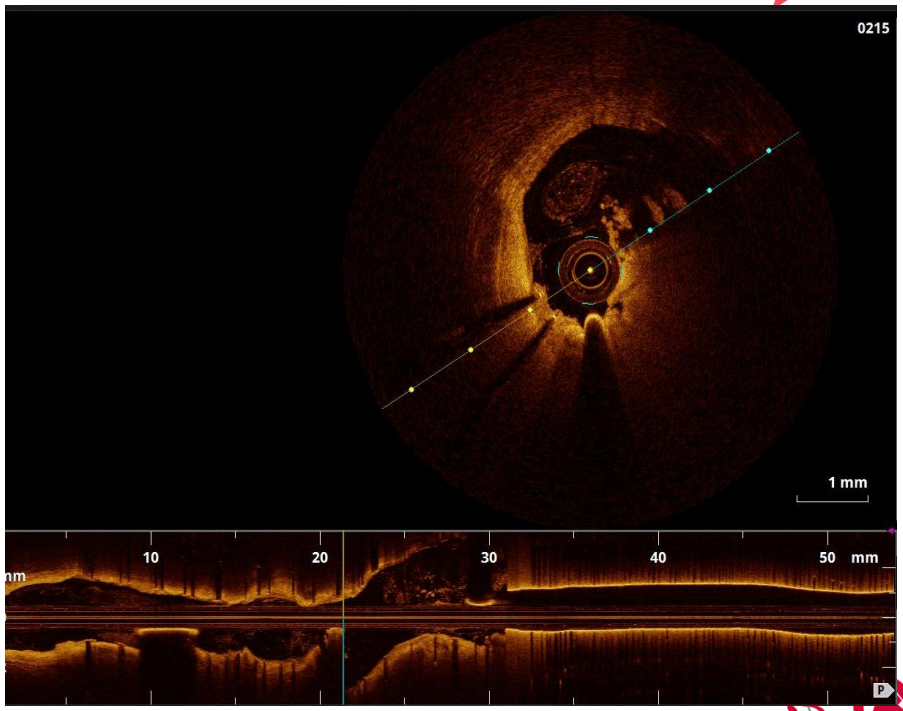

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- **PCI on Left main–ADA-Cx: intracoronary Reopro bolus, kissing dilatation with Trek NC 3.5x20 mm (Cx) and 3.25x15 mm (ADA) (14 atm) ; final "POT" finale with Trek 4.5x12 mm (10 atm).**

- **<u>Therapy on discharge</u>: Cardioaspirin 100 mg/die, Efient 10 mg/die, Carvedilol 6,25 mg x 2, Tresiba 20 UI x 1, Novorapid x 3, Atorvastatin 80 mg/die.**

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Guidelines on myocardial revascularization

	European guidelines[4,5,34]		US guidelines[6,35]	
	BMS	DES	BMS	DES
Stable coronary artery disease				
DAPT ($P2Y_{12}$ inhibitor plus aspirin)	≥1 month (class IA)	6 months (class IB) with new-generation DES Shorter DAPT duration (<6 months) in patients at high bleeding risk (class IIb, A)[4]	Clopidogrel 75 mg/day for ≥1 month and ideally up to 12 months in patients not at high risk of bleeding (class IB)[6]	Clopidogrel 75 mg/day for ≥12 months in patients not at high risk of bleeding (class IB)[6]
Aspirin	Lifelong single antiplatelet therapy (usually aspirin 75–100 mg/day) (class IA)		Aspirin 81–325 mg/day indefinitely (class IA)	

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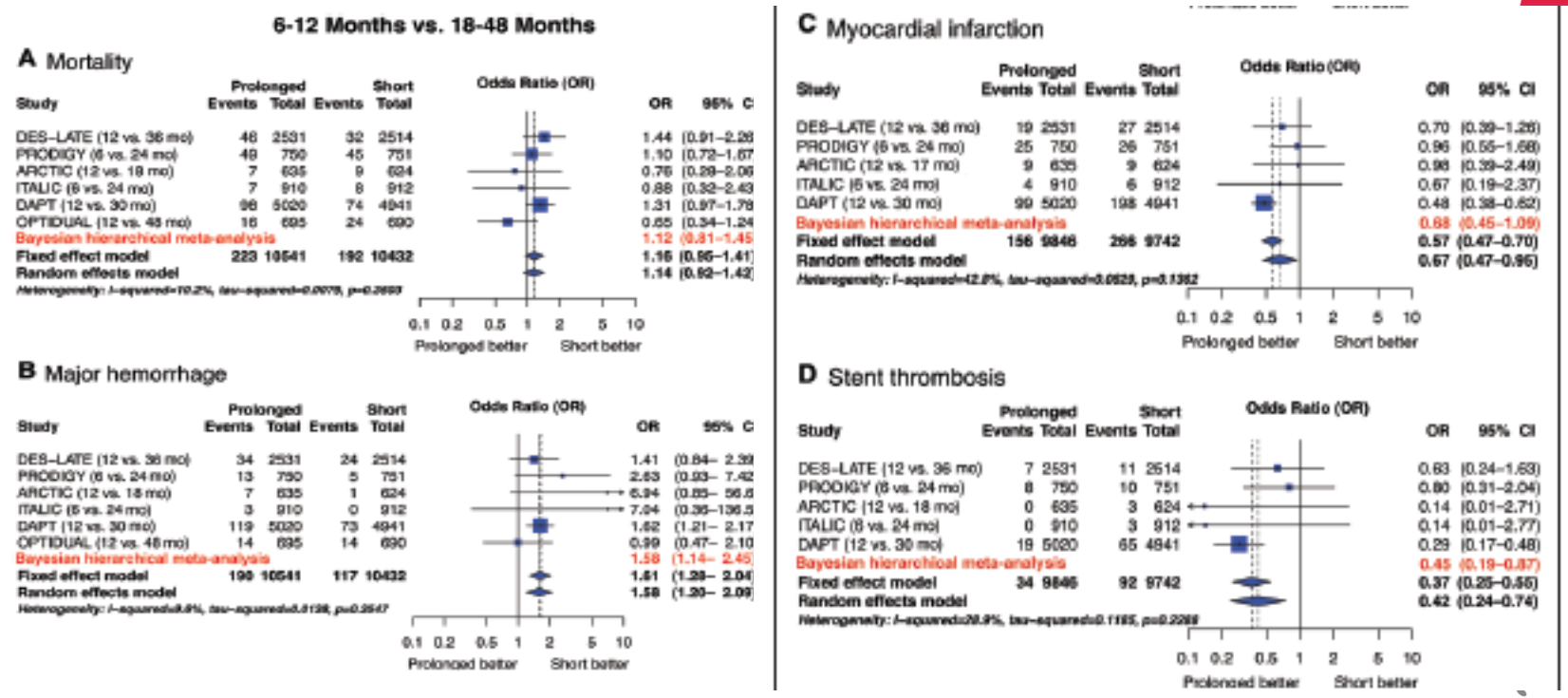
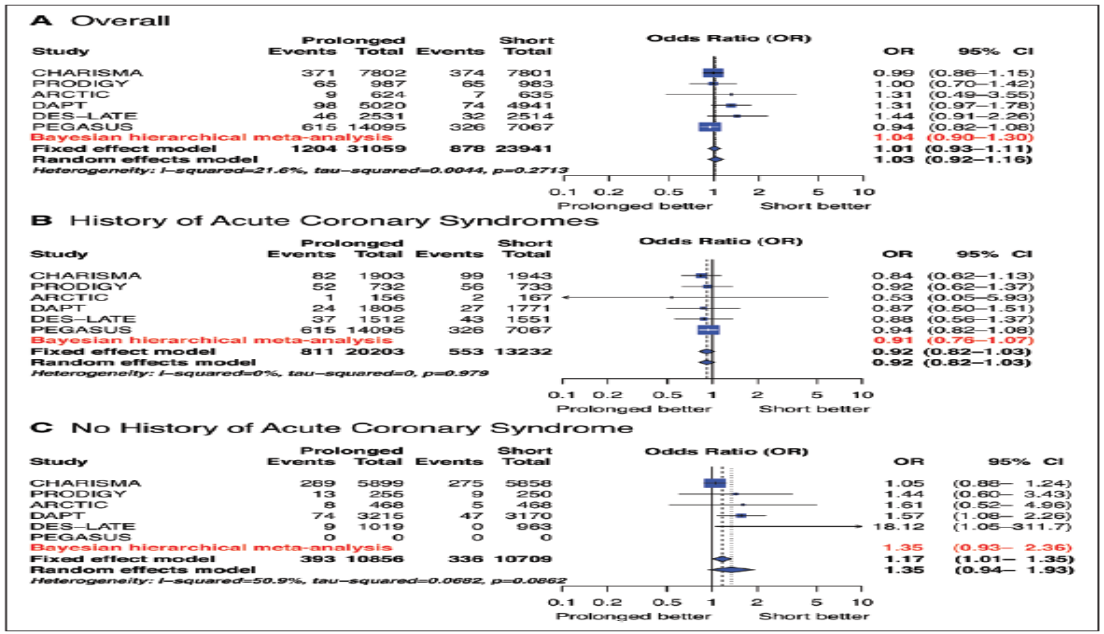
Short vs prolonged DAPT after DES



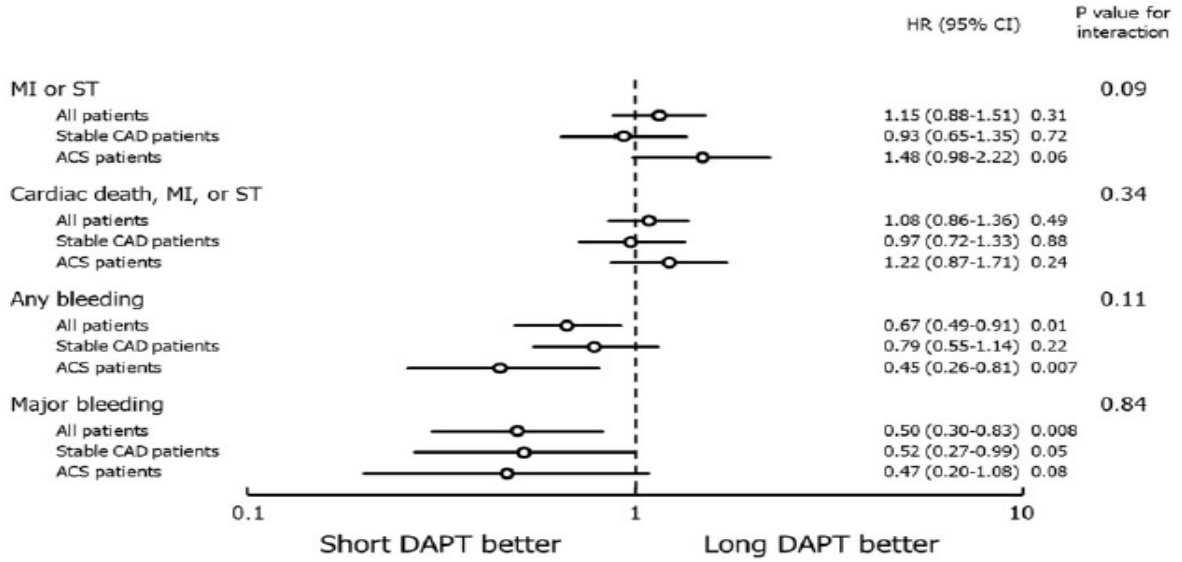
Bittl JA et al, Circulation, 2016

Short vs prolonged DAPT according to previous ACS



Bittl JA et al, Circulation, 2016

Short vs prolonged DAPT after DES according to previous ACS



Palmerini T et al, EHJ, 2017

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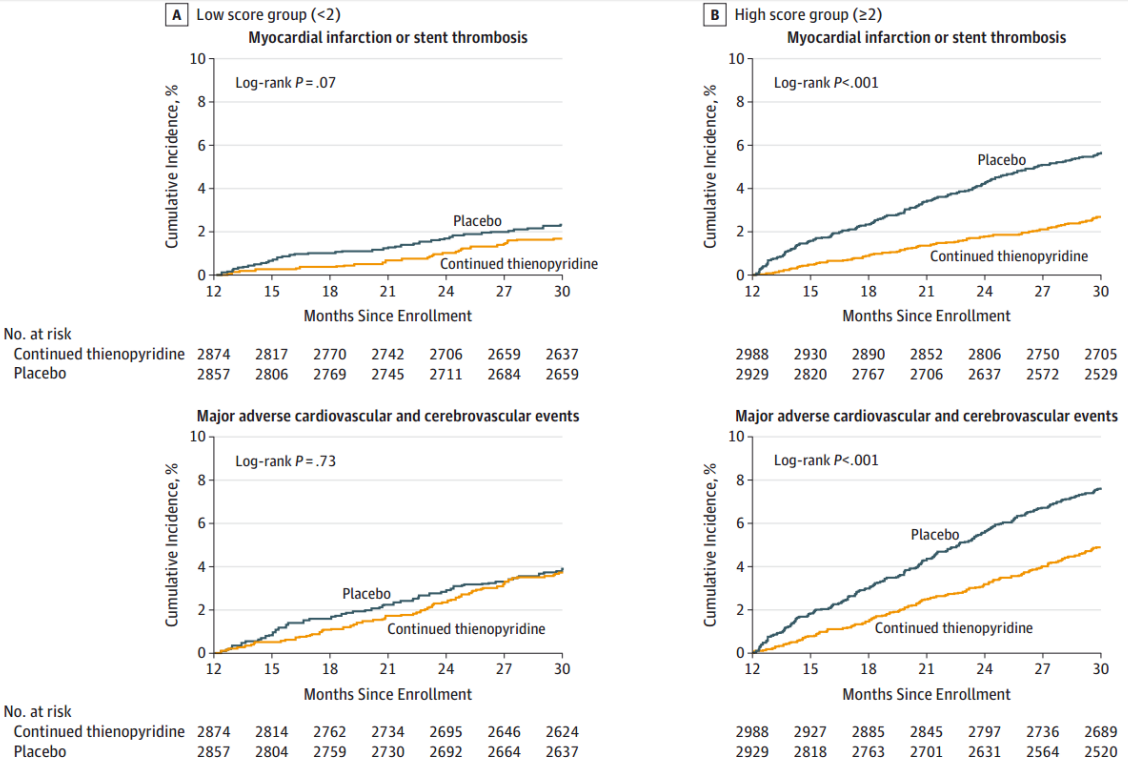
DAPT score

Clinical Prediction Score Variable	Points
Age, y	
≥75	-2
65-<75	-1
<65	0
Cigarette smoking	1
Diabetes mellitus	1
MI at presentation	1
Prior PCI or prior MI	1
Paclitaxel-eluting stent	1
Stent diameter <3 mm	1
CHF or LVEF <30%	2
Vein graft stent	2
Total score range: -2 to 10	



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Utility of the DAPT score

TABLE 4 Clinical Utility of MI Status Versus DAPT Score Stratification

	NNTB for MI/ST Before Stratification	NNTH for GUSTO Moderate or Severe Bleeding Before Stratification	→	NNTB After Stratification	NNTH After Stratification
No MI (n = 6,308)	84	103	DAPT score <2 (n = 4,098)	203	74
			DAPT score ≥2 (n = 2,210)	40	389
Any MI (n = 5,340)	39	106	DAPT score <2 (n = 1,633)	91	48
			DAPT score ≥2 (n = 3,707)	31	226

Kereiakes DJ et al, JACC 2016

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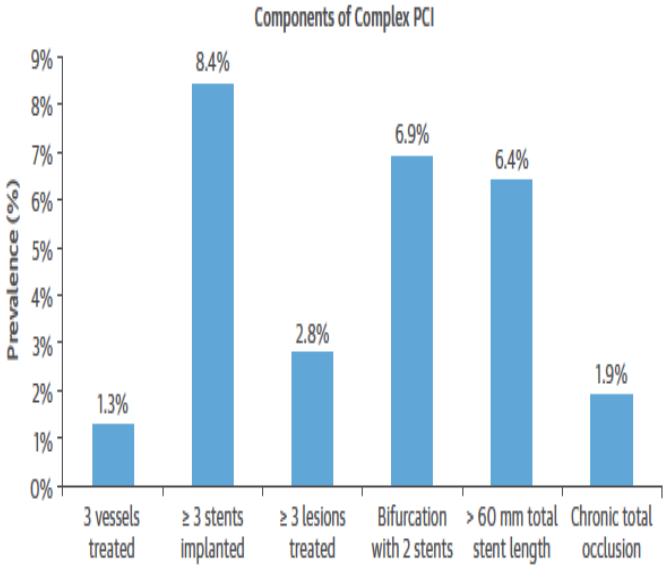
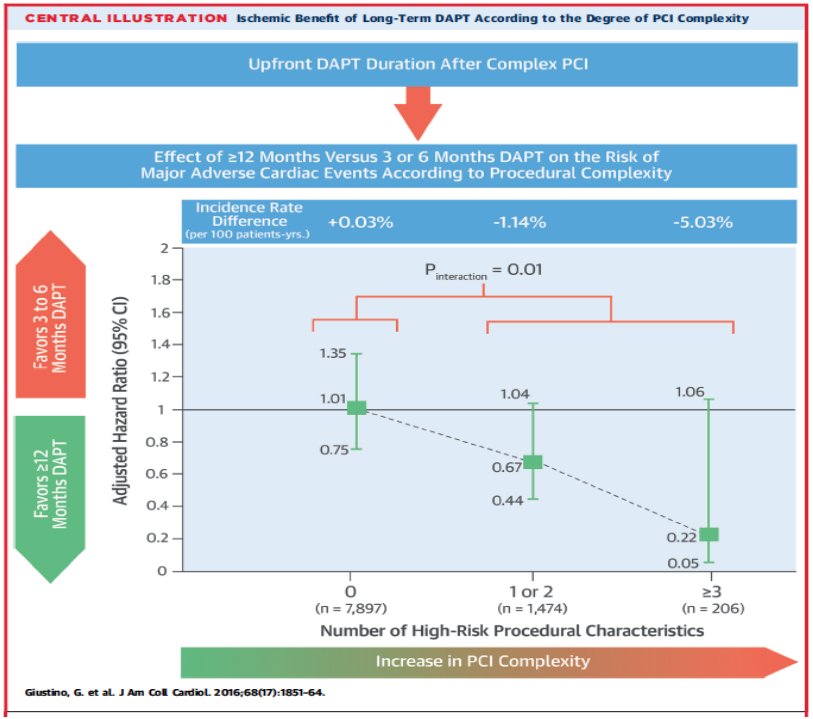
Something else to consider?

- **Angiographic variables**
  - Complexity of lesions
  - Proximal coronary segment involvement
  - Severe and diffuse Coronary Disease (Sullivan Score, Bogaty Score)
  - Stent number, length and overlap

- **Imaging Variables (IVUS or OCT).**
  - Stent underexpansion or malapposition
  - Edge dissections
  - Residual thrombus burden or plaque prolapse

Procedure complexity





Giustino G et al, JACC 2016

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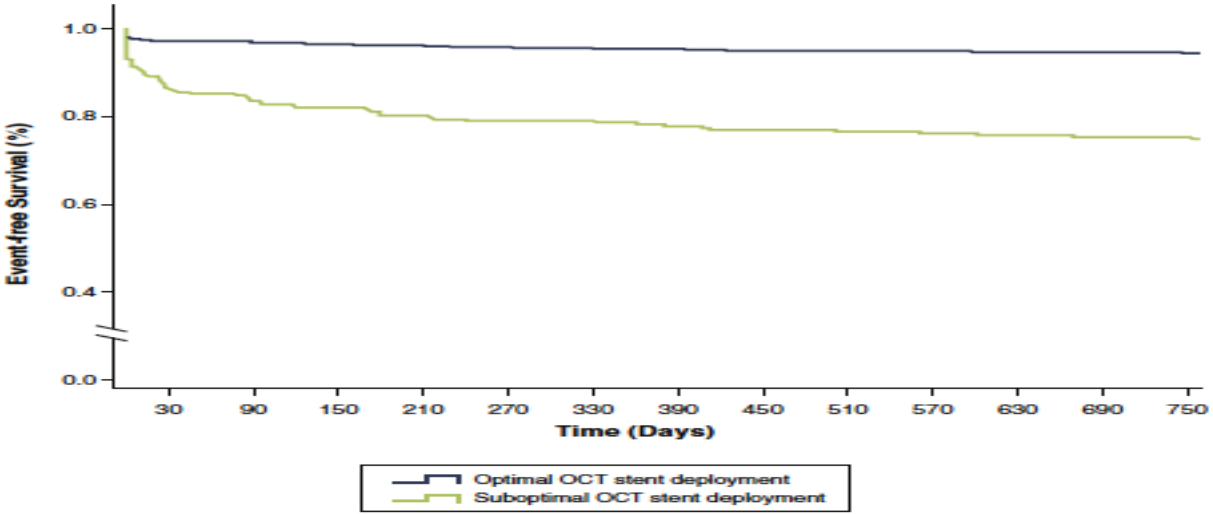
OCT guidance of PCI

FIGURE 2 Clinical Outcomes



Survival free of major adverse cardiac events according to optimal versus nonoptimal stent deployment assessed using optical coherence tomography (OCT).

Prati F et al, JACC imaging 2015

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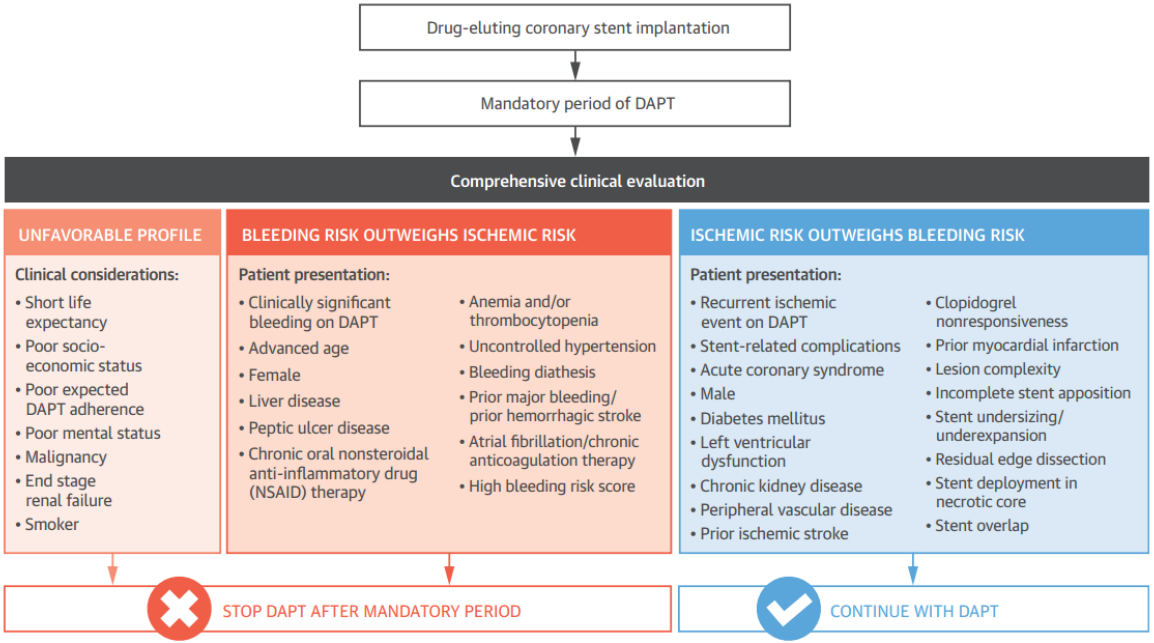
Decision making



Montalescot, G. et al. J Am Coll Cardiol. 2015; 66(7):832-47.

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Conclusions

- The decision to prolong DAPT after DES is complex
- Clinical factors are not always of utility
- Pocedural data as well imaging informations may be of help
- Scores should include both clinical and procedural data

Thank you for your attention

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Ongoing Studies

Study (Ref. #)	Design	Size	Active (Months)	Control (Months)	Population	Primary EP
GLOBAL LEADERS (NCT01813435)	RCT (Biomatrix stent)	16,000	1	12	DES	Composite of all-cause mortality or nonfatal new Q-wave MI up to 2 yrs post-randomization
REDUCE (NCT02118870)	RCT (COMBO dual therapy stent)	1,500	3	12	ACS	Composite of all-cause mortality, MI, ST, stroke, or bleeding at 12 months
SMART-CHOICE (NCT02079194)	RCT	5,100	3	12	DES	Composite of death, MI, cerebrovascular events, or bleeding over 3-12 months after the index procedure
SMART-DATE (NCT01701453)	RCT	3,000	6	12	ACS	Composite of death, MI, CVA, ST, or major bleeding over 6-18 months post-hospitalization
DAPT-STEMI (NCT01459627)	RCT	1,100	6	12	STEMI	Composite of death, MI, revascularization, CVA, or bleeding at 18 months post-randomization
TWILIGHT (NCT02270242)	RCT	8,000	3	12	complex PCI with DES	Major bleeding at 15 months post-PCI

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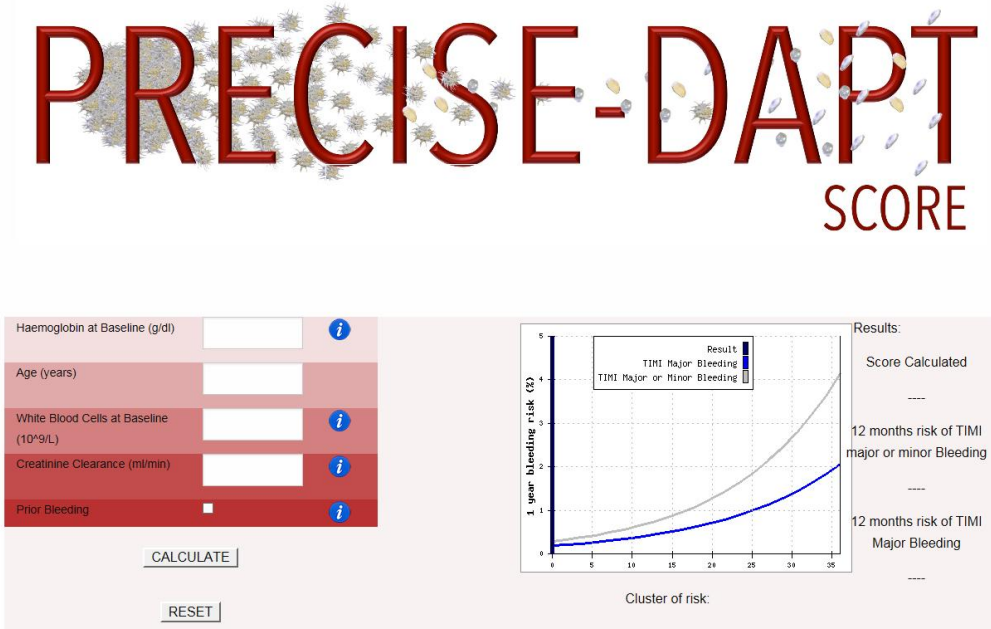
PRECISE DAPT-score



- To Predict the risk of bleeding in individual patients with coronary artery disease, treated coronary stenting and subsequent dual antiplatelet therapy
- Dataset including 14,963 patients from 8 randomized clinical trials, enrolled in more than 130 clinical sites and 12 countries worldwide.

The PRECISE-DAPT Risk Score has been externally validated in two independent datasets. Data analysis, derivation and validation of the PRECISE-DAPT score were performed at the Erasmus Medical Center public health department.

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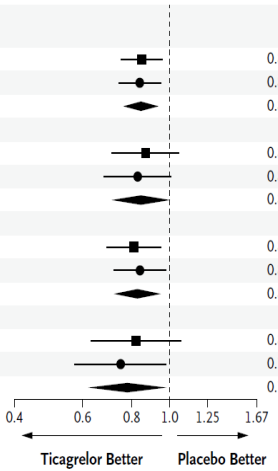
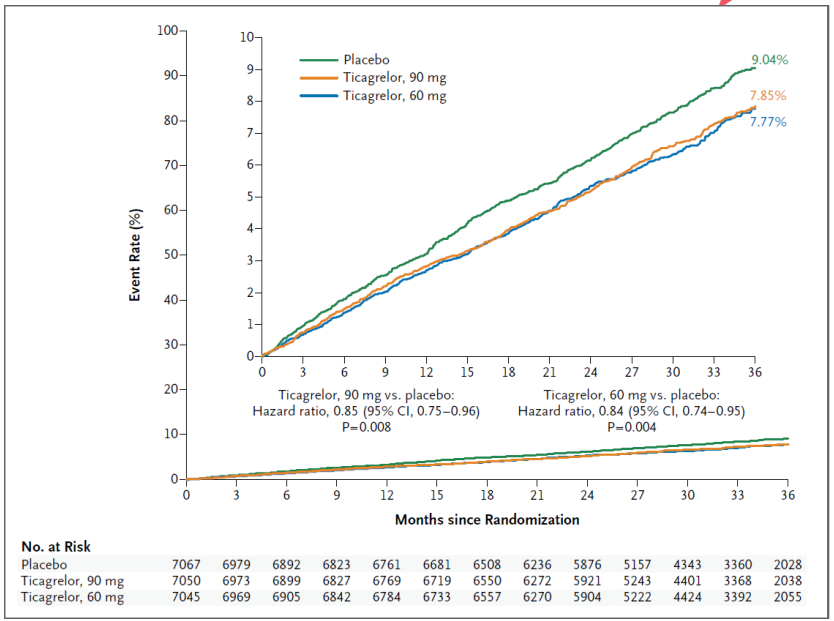
PEGASUS TIMI 54 study

End Point	Ticagrelor	Placebo	Hazard Ratio (95% CI)	P Value
	3-yr Kaplan–Meier event rate (%)			
Cardiovascular death, myocardial infarction, or stroke				
Ticagrelor, 90 mg	7.85	9.04	0.85 (0.75–0.96)	0.008
Ticagrelor, 60 mg	7.77	9.04	0.84 (0.74–0.95)	0.004
Ticagrelor pooled	7.81	9.04	0.84 (0.76–0.94)	0.001
Cardiovascular death				
Ticagrelor, 90 mg	2.94	3.39	0.87 (0.71–1.06)	0.15
Ticagrelor, 60 mg	2.86	3.39	0.83 (0.68–1.01)	0.07
Ticagrelor pooled	2.90	3.39	0.85 (0.71–1.00)	0.06
Myocardial infarction				
Ticagrelor, 90 mg	4.40	5.25	0.81 (0.69–0.95)	0.01
Ticagrelor, 60 mg	4.53	5.25	0.84 (0.72–0.98)	0.03
Ticagrelor pooled	4.47	5.25	0.83 (0.72–0.95)	0.005
Stroke				
Ticagrelor, 90 mg	1.61	1.94	0.82 (0.63–1.07)	0.14
Ticagrelor, 60 mg	1.47	1.94	0.75 (0.57–0.98)	0.03
Ticagrelor pooled	1.54	1.94	0.78 (0.62–0.98)	0.03





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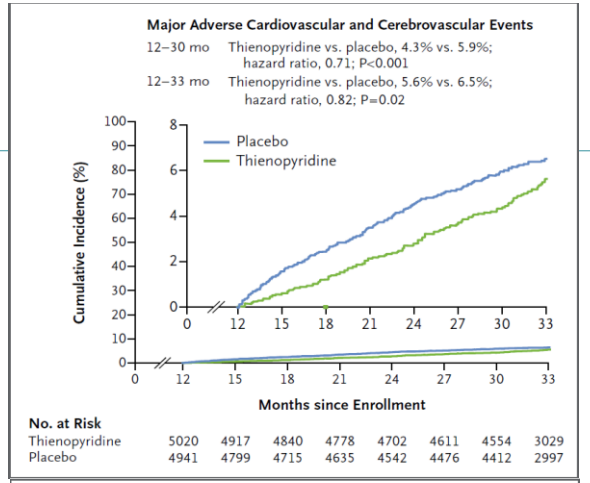
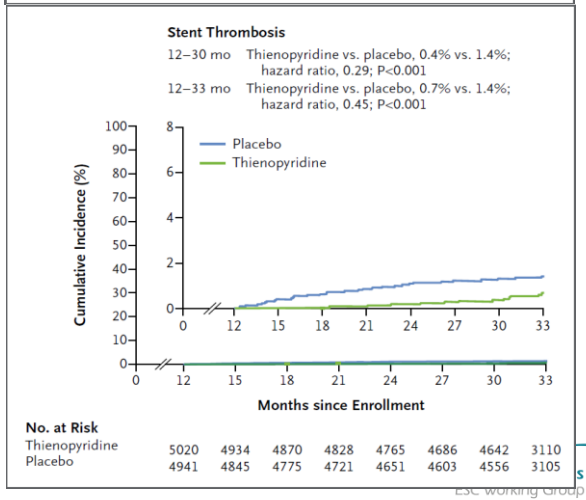
DAPT study

Outcome	Continued Thienopyridine (N=5020)	Placebo (N=4941)	Hazard Ratio, Thienopyridine vs. Placebo (95% CI)†	P Value†
	no. of patients (%)			
Stent thrombosis‡	19 (0.4)	65 (1.4)	0.29 (0.17–0.48)	<0.001
Definite	15 (0.3)	58 (1.2)	0.26 (0.14–0.45)	<0.001
Probable	5 (0.1)	7 (0.1)	0.71 (0.22–2.23)	0.55
Major adverse cardiovascular and cerebrovascular events§	211 (4.3)	285 (5.9)	0.71 (0.59–0.85)	<0.001
Death	98 (2.0)	74 (1.5)	1.36 (1.00–1.85)	0.05
Cardiac	45 (0.9)	47 (1.0)	1.00 (0.66–1.52)	0.98
Vascular	5 (0.1)	5 (0.1)	0.98 (0.28–3.39)	0.98
Noncardiovascular	48 (1.0)	22 (0.5)	2.23 (1.32–3.78)	0.002
Myocardial infarction	99 (2.1)	198 (4.1)	0.47 (0.37–0.61)	<0.001
Stroke	37 (0.8)	43 (0.9)	0.80 (0.51–1.25)	0.32
Ischemic	24 (0.5)	34 (0.7)	0.68 (0.40–1.17)	0.16
Hemorrhagic	13 (0.3)	9 (0.2)	1.20 (0.50–2.91)	0.68
Type uncertain	0	1 (<0.1)	—	0.32





Mauri L et al, NEJM, 2014

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