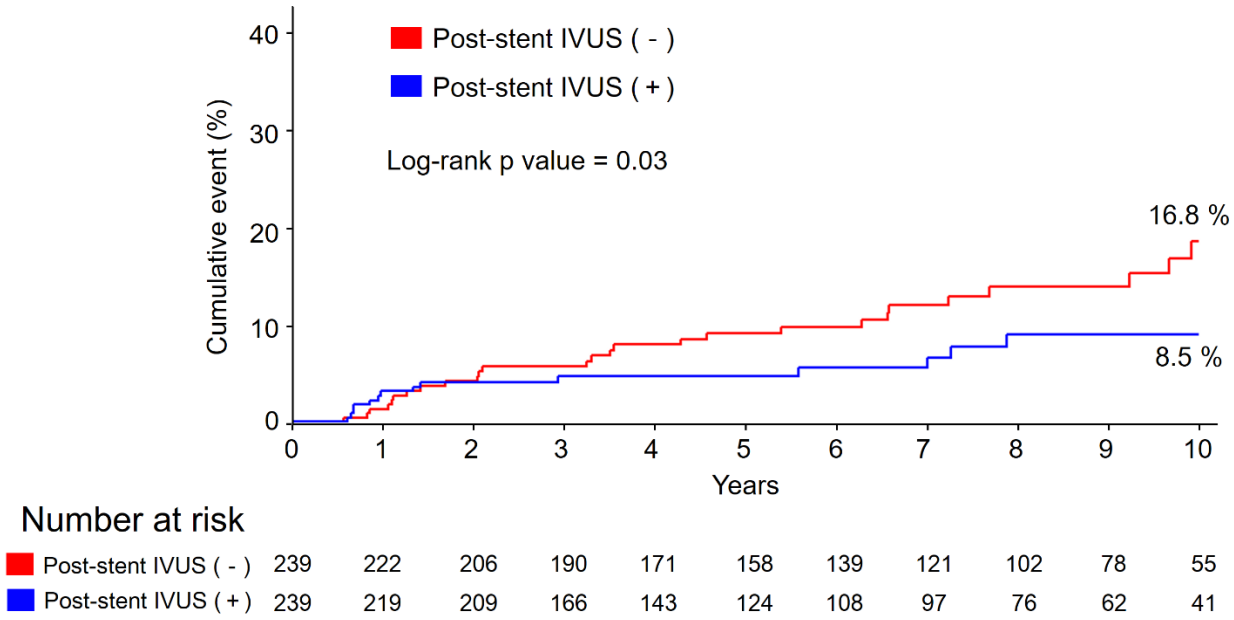
Supplementary data



Supplementary Figure 1. Kaplan-Meier curves for target lesion revascularisation/reocclusion in the propensity score-matched population.

IVUS: intravascular ultrasound

Supplementary Table 1. Standardised effect size of clinically relevant variables between the treatment groups before and after weighting.

Clinical variables	Unweighted	Weighted	**Lesion or procedural variables**	Unweighted	Weighted
Age	0.039	0.055	**Target CTO location**	0.339	0.017
Sex	0.077	0.042	**In-stent restenosis**	0.187	0.028
Body mass index, kg/m^2	0.024	0.091	**Multivessel disease**	0.038	0.032
Hypertension	0.119	0.049	**Japanese CTO score**	0.060	0.089
Diabetes mellitus	0.032	0.014	**Retrograde attempt**	0.096	0.104
Insulin use	0.060	0.105	**Total CTO length, mm**	0.123	0.097
Hyperlipidaemia	0.116	0.036	**Total lesion length, mm**	0.059	0.009
Current smoker	0.128	0.059	**Stent type generation**	0.417	0.031
History of myocardial infarction	0.024	0.058	**Number of stents per lesion**	0.104	0.038
Prior percutaneous coronary intervention	0.053	0.067	**Stent length per lesion, mm**	0.037	0.035

Prior coronary artery bypass grafting	0.165	0.005	**Average stent diameter, mm**	0.372	0.060
Renal dysfunction	0.133	0.019			
History of stroke	0.103	0.100			
Peripheral artery disease	0.011	0.053			
Atrial fibrillation	0.012	0.028			
Left ventricular ejection fraction, %	0.068	0.003			
Clinical diagnosis	0.029	0.039			

CTO: chronic total occlusion

Supplementary Table 2. Univariate Cox proportional hazards regression to identify predictors of target lesion revascularisation/reocclusion.

	HR	95% CI	*p*-value
Clinical factors			
Age	0.98	0.96-1.01	0.13
Sex (male)	1.05	0.57-1.95	0.87
Hypertension	1.46	0.89-2.38	0.13
Diabetes mellitus	0.92	0.56-1.53	0.76
Hyperlipidaemia	1.02	0.62-1.68	0.95
Renal insufficiency	0.60	0.01-73.3	0.42
History of myocardial infarction	0.58	0.23-1.43	0.24
Clinical diagnosis (ACS)	1.13	0.67-1.92	0.65
Ejection fraction	1.00	0.97-1.03	0.95
Procedural factors			
In-stent restenosis	1.56	0.82-2.96	0.17
J-CTO score	1.26	1.02-1.55	0.03
Stent lengths	1.01	1.00-1.02	0.01
Stent numbers	1.53	1.18-1.98	0.001
First-generation stent	1.19	0.16-8.83	0.87
Adjunctive post-dilatation	1.02	0.64-1.62	0.94
Final balloon size, mm	0.88	0.54-1.42	0.59
Maximal inflation pressure, atm	0.98	0.93-1.03	0.41
IVUS parameters			
Proximal segments			
MLA	0.95	0.87-1.04	0.25
EEM area at MLA site	0.99	0.94-1.04	0.67
Maximal plaque burden	1.03	1.00-1.06	0.05
In-stent segments			

MSA	0.75	0.62-0.91	0.004
EEM at MSA	0.96	0.90-1.02	0.20
PB at MSA	1.00	0.98-1.03	0.87
Distal segments			
MLA	1.03	0.91-1.15	0.68
EEM area at MLA site	0.97	0.90-1.04	0.36
Maximal PB	0.99	0.97-1.01	0.17
Edge dissection	0.57	0.18-1.84	0.35
Malapposition	1.09	0.47-2.43	0.84
Haematoma	1.44	0.35-5.96	0.61
False lumen involvement	8.15	1.97-33.72	0.004
MSA greater than MLA at the distal reference segment	0.67	0.36-1.25	0.21
Degree of stent expansion*	1.26	0.61-2.57	0.53

* Degree of stent expansion was defined as the minimal stent area divided by the mean of the proximal and distal reference lumen areas.

ACS: acute coronary syndrome; EEM: external elastic membrane; HR: hazard ratio; IVUS: intravascular ultrasound; J-CTO: Japanese chronic total occlusion; MLA: minimal lumen area; MSA: minimal stent area; PB: plaque burden

Supplementary Table 3. In-hospital outcomes.

Total cases (N=1,077)	Post-IVUS not done (n=239)	Post-IVUS done (n=838)	*p*-value
In-hospital MACCE	6 (2.5)	18 (2.1)	0.80
Death	0 (0.0)	0 (0.0)	>0.99
Procedure-related myocardial infarction	6 (2.5)	16 (1.9)	0.60
Urgent repeat revascularisation	0 (0.0)	1 (0.1)	>0.99
Cardiac tamponade requiring intervention	0 (0.0)	1 (0.1)	>0.99
Stroke	0 (0.0)	1 (0.1)	>0.99
Contrast-induced nephropathy	2 (0.8)	3 (0.4)	0.32

Values are numbers (%).

Contrast-induced nephropathy is defined as an elevation of serum creatinine of more than 25% or ≥0.5 mg/dl from baseline within 48 hours.

IVUS: intravascular ultrasound; MACCE: major adverse cardiac and cerebrovascular events

Supplementary Table 4. Comparison of clinical outcomes between subjects with and those without post-stent intravascular ultrasound.

	Unweighted population						Weighted population					
	Event number (%)			Cox analysis			Event number (%)			Cox analysis		
	Post-stent IVUS (+) (n=838)	Post-stent IVUS (-) (n=239)	*p*-value	HR	95% CI	*p*-value	Post-stent IVUS (+) (n=840)	Post-stent IVUS (-) (n=241)	*p*-value	HR	95% CI	*p*-value
All-cause mortality	77 (14.9)	38 (21.1)	0.05	0.67	0.45-0.98	0.04	84.9 (16.8)	35.4 (21.1)	0.04	0.72	0.48-1.06	0.09
Non-CV death	24 (4.2)	5 (2.4)	0.43	1.47	0.56-3.86	0.43	26.7 (4.5)	9.8 (4.4)	0.43	0.78	0.38-1.63	0.51
CV death	53 (11.2)	33 (19.2)	0.01	0.55	0.35-0.85	0.01	56.0 (11.6)	24.5 (15.6)	0.01	0.69	0.43-1.11	0.13
Target vessel MI	25 (3.5)	12 (6.7)	0.17	0.62	0.31-1.24	0.18	24.4 (3.4)	9.0 (5.2)	0.17	0.79	0.37-1.69	0.54
Periprocedural MI	16 (1.9)	6 (2.5)	0.56	0.76	0.60-1.94	0.56	15.7 (1.9)	4.3 (1.8)	0.56	1.05	0.36-3.07	0.92
Spontaneous MI	9 (1.6)	6 (4.1)	0.16	0.49	0.17-1.37	0.17	8.7 (1.5)	4.7 (3.4)	0.16	0.55	0.18-1.69	0.30
TVR/reocclusion	53 (10.4)	28 (17.2)	0.03	0.60	0.38-0.96	0.03	54.1 (10.2)	28.1 (19.1)	0.03	0.56	0.36-0.89	0.01
TLR/reocclusion	49 (9.7)	27 (16.8)	0.02	0.58	0.36-0.93	0.02	50.6 (9.6)	27.4 (18.9)	0.02	0.54	0.34-0.86	0.01
Stent thrombosis, definite	10 (1.8)	5 (2.5)	0.37	0.62	0.21-1.80	0.38	11.1 (2.0)	5.3 (2.5)	0.37	0.60	0.21-1.71	0.34

Cumulative incidences of events are presented as Kaplan-Meier estimates.

CI: confidence interval; CV: cardiovascular; HR: hazard ratio; MI: myocardial infarction; TLR: target lesion revascularisation; TVR: target vessel revascularisation

Supplementary Table 5. Comparison of clinical outcomes between subjects with and those without post-stent intravascular ultrasound using propensity score-matching method.

	Cox analysis		
	HR	95% CI	*p*-value
All-cause mortality	0.67	0.45-0.98	0.04
Non-CV death	1.47	0.56-3.86	0.43
CV death	0.55	0.35-0.85	0.01
Target vessel MI	0.62	0.31-1.24	0.18
Periprocedural MI	0.76	0.60-1.94	0.56
Spontaneous MI	0.49	0.17-1.37	0.17
TVR/reocclusion	0.60	0.38-0.96	0.03
TLR/reocclusion	0.58	0.36-0.93	0.02
Stent thrombosis, definite	0.62	0.21-1.80	0.38

CI: confidence interval; CV: cardiovascular; HR: hazard ratio; MI: myocardial infarction; TLR: target lesion revascularisation; TVR: target vessel revascularisation

Supplementary Table 6. Post-stenting intravascular ultrasound findings.

	Total population (N=723)	TLR/reocclusion (-) (n=677)	TLR/reocclusion (+) (n=46)	*p*-value
Proximal reference segments				
MLA	9.5±3.6	9.5±3.6	8.7±3.2	0.11
EEM area at MLA site, mm^2	19.7±5.8	19.7±5.8	19.0±5.5	0.40
Maximum plaque burden	51.9±10.9	51.7±11.0	55.1±11.1	0.06
In-stent segments				
MSA		5.5±1.8	4.6±1.2	0.001
EEM area at MLA site, mm^2		11.8±4.9	10.7±4.7	0.13
Plaque burden at MSA		50.4±11.7	51.0±15.0	0.78
Distal reference segments				
MLA	4.5±2.5	4.5±2.4	4.7±3.3	0.78
EEM area at MLA site, mm^2	9.0±4.7	9.2±4.7	8.2±5.3	0.34
Maximum plaque burden	47.4±15.1	47.7±15.0	43.7±17.0	0.14
Edge dissection	78 (7.2)	75 (11.1)	3 (6.5)	0.34
Malapposition	105 (9.7)	98 (14.5)	7 (15.2)	0.89
Haematoma	21 (1.9)	19 (2.8)	2 (4.3)	0.64
False lumen involvement	5 (0.5)	3 (0.4)	2 (4.3)	0.04
MSA greater than MLA at the distal reference segment	568 (52.7)	536 (79.2)	32 (69.6)	0.12
Degree of stent expansion*	0.95±0.40	0.95±0.36	0.98±0.80	0.80

* Degree of stent expansion was defined as the minimal stent area divided by the mean of the proximal and distal reference lumen areas.

EEM: external elastic membrane; MLA: minimal lumen area; MSA: minimal stent area; TLR: target lesion revascularisation

Supplementary Table 7. Cox proportional hazards regression to identify predictors of target lesion revascularisation/reocclusion.

	Univariate			Multivariate		
	HR	95% CI	*p*-value	HR	95% CI	*p*-value
Clinical or procedural factors						
Age	0.98	0.96-1.01	0.13			
Hypertension	1.46	0.89-2.38	0.13			
In-stent restenosis	1.56	0.82-2.96	0.17			
J-CTO score	1.26	1.02-1.55	0.03			
Stent lengths	1.01	1.00-1.02	0.01			
Stent numbers	1.53	1.18-1.98	0.001			
IVUS parameters						
Maximal plaque burden at the proximal segment	1.03	1.00-1.06	0.05			
MSA	0.75	0.62-0.91	0.004	0.78	0.64-0.95	0.01
EEM at MSA	0.96	0.90-1.02	0.20			
Maximal plaque burden at the distal segment	0.99	0.97-1.01	0.17			
False lumen involvement	8.15	1.97-33.72	0.004			

Cox proportional hazards regression analysis was performed using conventional cardiovascular risk factors, and intravascular ultrasound parameters, with $p \leq 0.2$.

EEM: external elastic membrane; HR: hazard ratio; IVUS: intravascular ultrasound; J-CTO: Japanese chronic total occlusion; MSA: minimal stent area