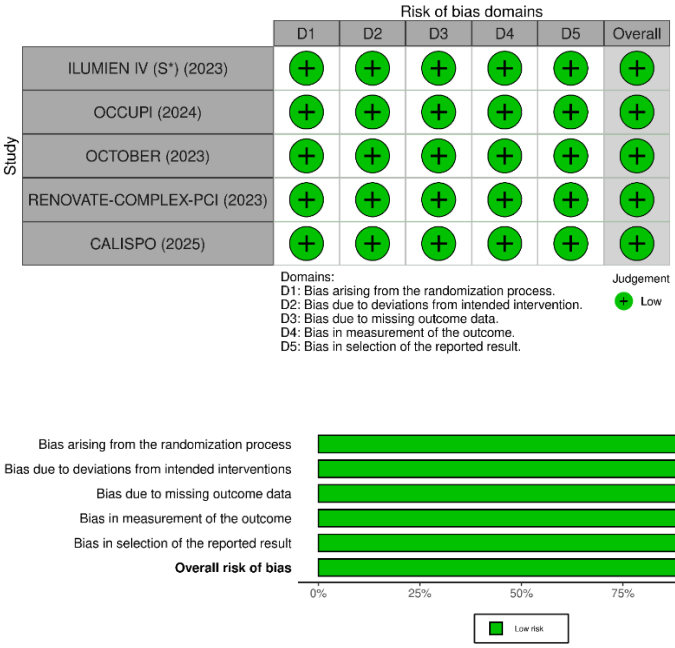
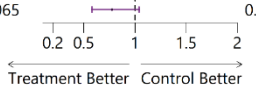
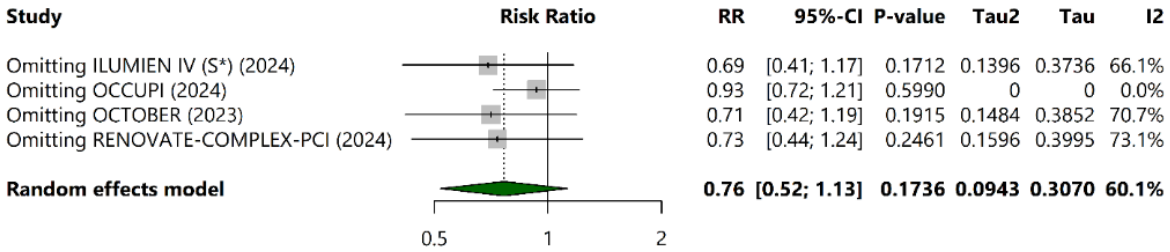


Supplementary Figure 1 Risk of bias assessment of randomized controlled trials using revised Cochrane Risk of Bias tool.

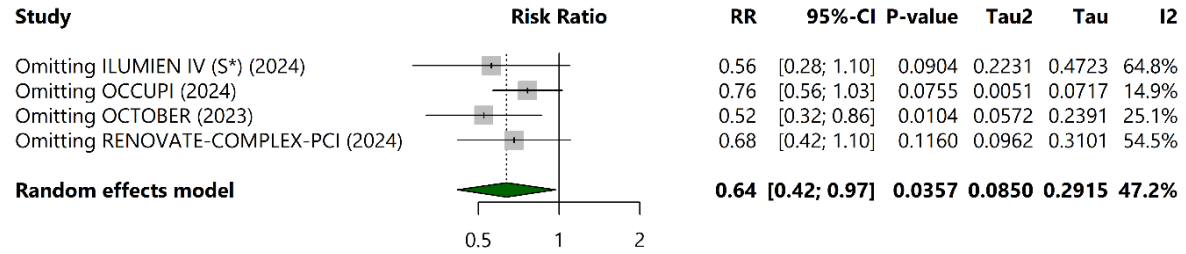
Subgroup	Treatment	Control	RR (95% CI)	P-value	P-interaction
Age					**0.79**
<65 years	58/1120	89/1104	0.64 (0.47 to 0.88)	0.007	
≥65 years	68/1275	100/1279	0.68 (0.51 to 0.92)	0.01	
Gender					**< 0.001**
Male	100/1911	143/1869	0.68 (0.53 to 0.88)	0.003	
Female	26/484	173/614	0.19 (0.13 to 0.28)	< 0.001	
Clinical presentation					**0.44**
ACS	60/998	80/970	0.73 (0.53 to 1.01)	0.05	
Non-ACS	66/1397	109/1413	0.61 (0.46 to 0.82)	0.001	
Diabetes					**0.79**
Yes	39/701	60/682	0.63 (0.43 to 0.93)	0.02	
No	86/1687	128/1694	0.67 (0.52 to 0.88)	0.004	
Bifurcation					**0.41**
Yes	69/828	96/837	0.73 (0.54 to 0.97)	0.03	
No	57/1567	93/1546	0.60 (0.44 to 0.83)	0.002	
In-stent restenosis					**0.99**
Yes	11/216	18/223	0.63 (0.31 to 1.30)	0.21	
No	56/1579	88/1559	0.63 (0.45 to 0.87)	0.005	
Calcification					**0.55**
Yes	34/403	45/409	0.77 (0.50 to 1.17)	0.22	
No	60/1254	91/1240	0.65 (0.48 to 0.89)	0.008	
Multivessel PCI					**0.09**
Yes	21/309	48/337	0.48 (0.29 to 0.78)	0.003	
No	75/1094	94/1065	0.78 (0.58 to 1.04)	0.09	



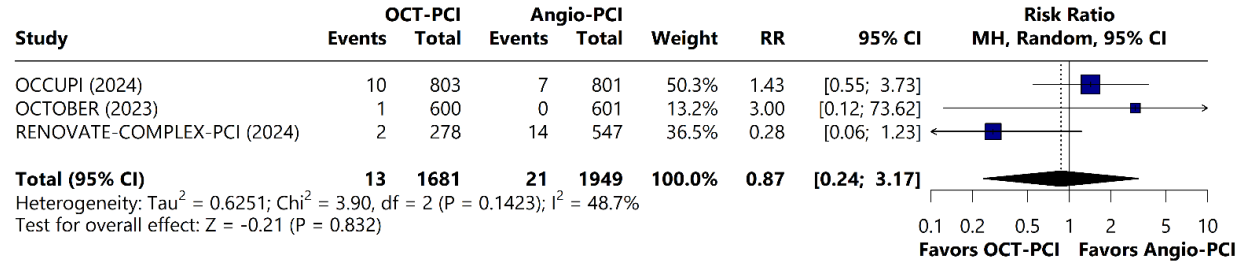
Supplementary Figure 2 Subgroup analysis for the outcome of major adverse cardiovascular events. ACS: Acute coronary syndrome; PCI: Percutaneous coronary intervention.



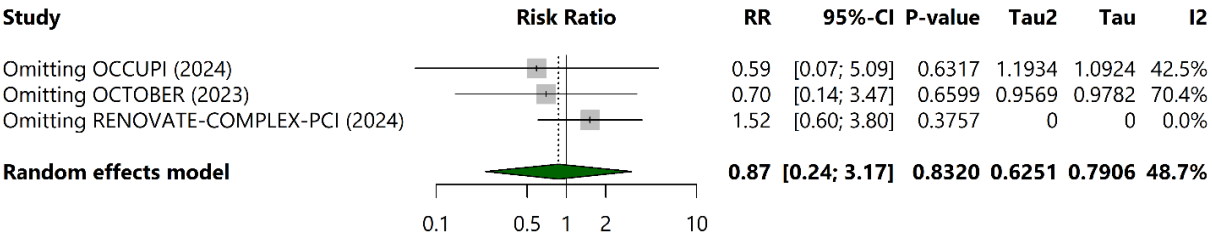
Supplementary Figure 3 Leave-one out sensitivity analysis for the outcome of target-vessel myocardial infarction. RR: Risk ratio.



Supplementary Figure 4 Leave-one out sensitivity analysis for the outcome of any revascularization. RR: Risk ratio.

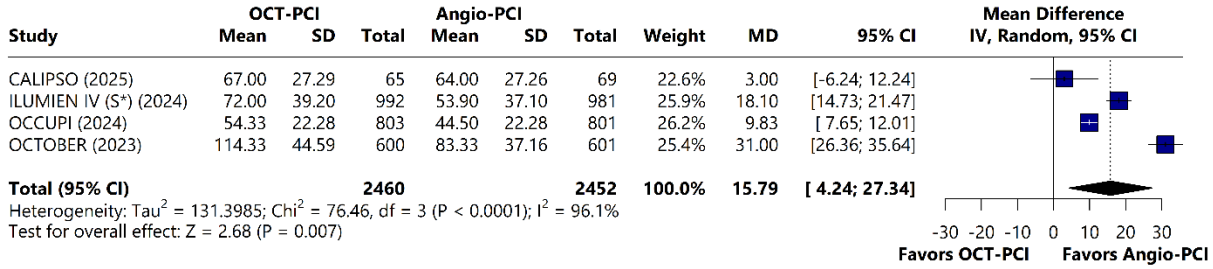


Supplementary Figure 5 Forest plot of studies comparing optical coherence tomography-guided percutaneous coronary intervention with angiography-guided percutaneous coronary intervention in terms of contrast induced acute kidney injury. OCT: Optical coherence tomography; PCI: Percutaneous coronary intervention; RR: Risk ratio.

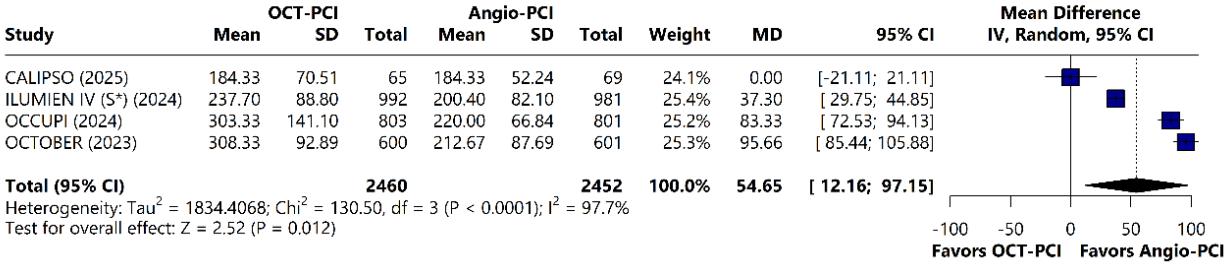


Supplementary Figure 6 Leave-one out sensitivity analysis of contrast-associated acute kidney injury. RR: Risk ratio.

A



B



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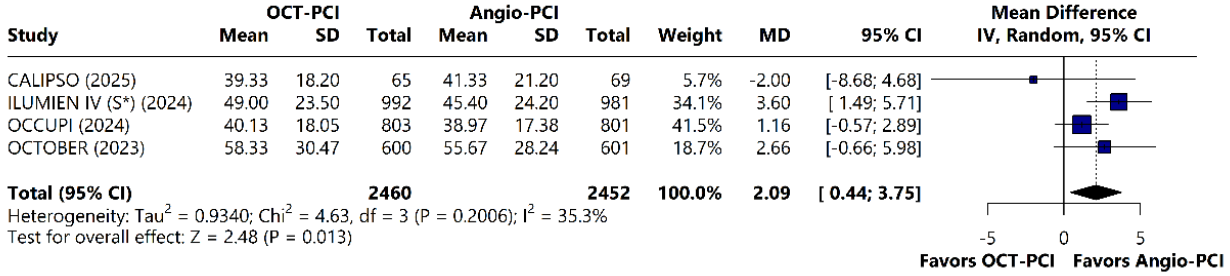
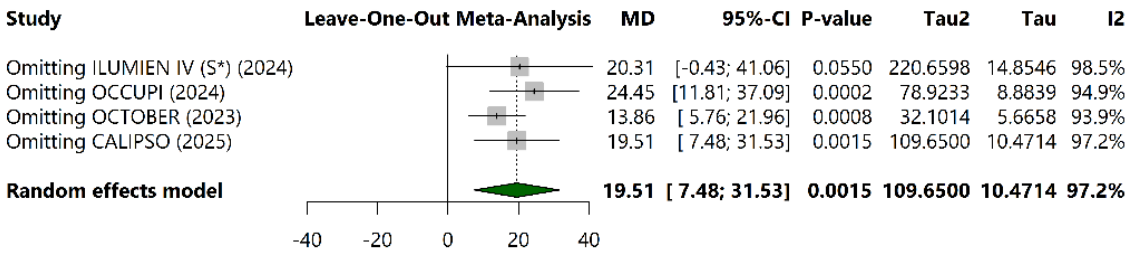
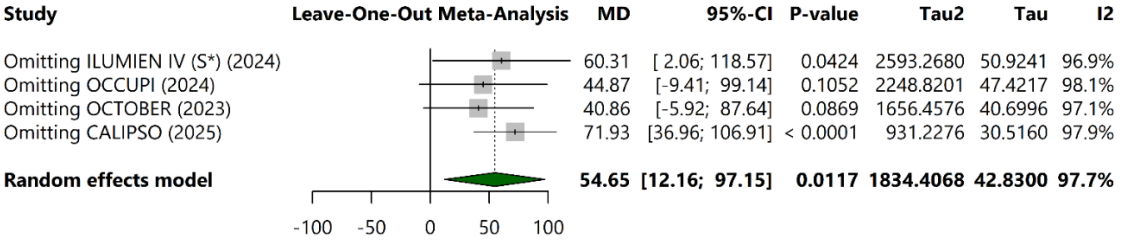


Supplementary Figure 7 Forest plots of studies comparing optical coherence tomography-guided percutaneous coronary intervention with angiography-guided percutaneous coronary intervention in terms of procedural outcomes. A: Procedure duration; B: Contrast volume; C: Total stent length. MD: Mean difference; OCT: Optical coherence tomography; PCI: Percutaneous coronary intervention.

A



B



Supplementary Figure 8 Leave-one out sensitivity analysis for procedural outcomes. A: Procedure duration; B: Contrast volume. MD: Mean difference

Supplementary Table 1 Search strings for all databases

Database	Search string	Results
PubMed	(((((((Tomography, Optical Coherence[Mesh]) OR (Coherence Tomography, Optical)) OR (Optical Coherence Tomography)) OR (OCT Tomography)) OR (Tomography, OCT)) AND ((((((Angiography[Mesh]) OR (Angiographies)) OR (Arteriography)) OR (Arteriographies)) OR (Angiogram)) OR (Angiograms))) AND ((((((((((Percutaneous Coronary Intervention[Mesh]) OR (Coronary Intervention, Percutaneous)) OR (Coronary Interventions, Percutaneous)) OR (Intervention, Percutaneous Coronary)) OR (Interventions, Percutaneous Coronary)) OR (Percutaneous Coronary Interventions)) OR (Percutaneous Coronary Revascularization)) OR (Coronary Revascularization, Percutaneous)) OR (Coronary Revascularizations, Percutaneous)) OR (Percutaneous Coronary	407

	Revascularizations)) OR (Revascularization, Percutaneous Coronary)) OR (Revascularizations, Percutaneous Coronary))) AND ((Randomized clinical trial OR Randomized controlled trial OR RCT OR clinical trial OR single blind OR double blind OR cross over OR trial))	
EMBASE	('percutaneous coronary intervention'/exp OR 'percutaneous coronary intervention') AND ('optical coherence tomography'/exp OR 'oct (optical coherence tomography)' OR 'optical coherence tomography' OR 'tomography, optical coherence') AND ('angiography'/exp OR 'angiographical method' OR 'angiography' OR 'angioradiology' OR 'blood vessel radiography' OR 'moving table angiography' OR 'peripheral angiography' OR 'peripheral vasculography' OR 'rheoacroangiography') AND ('randomized controlled trial'/exp OR 'controlled trial, randomized' OR 'randomised controlled study' OR 'randomised controlled trial' OR 'randomized controlled study' OR 'randomized controlled trial' OR 'trial, randomized controlled')	327
Cochrane	("Tomography, Optical Coherence" OR "Optical Coherence Tomography" OR "OCT Tomography" OR "Tomography, OCT") AND ("Angiography" OR "Angiographies" OR "Arteriography" OR "Angiogram" OR "Angiograms") AND ("Percutaneous Coronary Intervention" OR "Percutaneous Coronary Interventions" OR "Coronary Revascularization, Percutaneous" OR "Percutaneous Coronary Revascularizations" OR "Revascularization, Percutaneous Coronary")	262

Supplementary Table 2 Definition of complex lesion

Criteria	Definition

Complex coronary lesions	Complex coronary lesions were defined as chronic total occlusion; long lesions; bifurcation lesions; left main disease or unprotected left main coronary artery; proximal left anterior descending artery; moderate to severe calcified lesions; ostial lesions of a major epicardial coronary artery; small vessels; requirement of ≥ 3 stents; in-stent restenosis; lesion responsible for a recent myocardial infarction; American Heart Association/American Congress of Cardiology classification lesions type B2 and C

Supplementary Table 3 Definition of complex lesion in each study

Trial name	Type of lesion
ILUMIEN IV	A high-risk coronary-artery lesion was defined as a lesion responsible for a recent myocardial infarction, long or multiple lesions warranting treatment with more than 28 mm of stent, a bifurcation lesion for which treatment would warrant the implantation of two stents, a severely calcified lesion, CTO, diffuse or multifocal in-stent restenosis
OCTOBER	Bifurcation lesions with a main branch reference diameter of at least 2.75 mm and stenosis of at least 50% by visual estimation. The side branch had to have a reference diameter of at least 2.5 mm and stenosis of at least 50% within 5 mm from the ostium of the side branch by visual estimation. The bifurcation lesion could involve the left main coronary artery
RENOVATE-COMPLEX- PCI	Complex coronary-artery lesions were defined as true bifurcation lesions according to the Medina classification system with a side-branch diameter of at least 2.5 mm; a chronic total occlusion; unprotected left main coronary artery disease; long coronary-artery lesions that would involve an

	expected stent length of ≥ 38 mm; multivessel PCI involving at least two major epicardial coronary arteries being treated at the same time; a lesion that would necessitate the use of multiple stents (at least three planned stents); a lesion involving in-stent restenosis; a severely calcified lesion; or ostial lesions of a major epicardial coronary artery
OCCUPI	Complex lesion was included: Acute myocardial infarction; CTO; long lesion; calcified lesion; bifurcation lesion; unprotected left main disease; small vessel disease; intracoronary thrombus; stent thrombosis; in-stent restenosis; bypass graft lesion
CALIPSO	Calcified lesion was defined as angiographically moderately to severely calcified target lesion (type B or C by Mintz classification)

CTO: Chronic total occlusion; PCI: Percutaneous coronary intervention.

Supplementary Table 4 Definition of primary outcomes in each study

Trial name	**Definition(s)**	
	Major adverse cardiovascular event	**Target-vessel failure**
ILUMIEN IV (S[1]) (2024)	Cardiac death target-vessel MI, stent thrombosis	Cardiac death, target-vessel MI, TVR
OCCUPI (2024)	Cardiac death, MI, stent thrombosis, ischemia-driven TVR	
OCTOBER (2023)	Cardiac death, target-lesion-related MI, target-lesion revascularization	
RENOVATE-COMPLEX-PCI (2024)[1]	Cardiac death, MI, stent thrombosis, ischemia-driven TVR	

CALIPSO (2025)	Cardiovascular death, any myocardial infarction, clinically driven reintervention on the target lesion	-

[1]Major adverse cardiovascular event calculated by summation of individual outcomes according to the latest trial *i.e.* OCCUPI,2024.

MI: Myocardial infarction; TVR: Target-vessel revascularization.

Supplementary Table 5 Definition of outcomes in each study

Trial name	Outcome definition
ILUMIEN IV	TVF: Defined as the composite of cardiac death, target-vessel-related MI, or ischemia-driven TVR Spontaneous MI: Defined according to the 4th Universal Definition of MI classification Periprocedural MI: Defined according to the Modified Academic Research Consortium-2 Definition Repeat revascularization: Ischemic-driven revascularization was considered as TVR if repeat revascularization happened in the target lesion, and non-TVR if it was in another vessel. As revascularization was performed in the target vessel, it could be considered as TLR if repeat revascularization of the target lesion, or non-TLR if it is not restricted to the lesion and includes other parts of the vessel. Stent thrombosis: Defined according to the Modified Academic Research Consortium-2 Definition Cardiovascular death: Death due to cardiovascular causes All-cause death: Included cardiac and non-cardiovascular mortality
OCTOBER	MACE: Defined as the composite of death from a cardiac cause, target-lesion MI, or ischemia-driven TLR MI: The definition of myocardial infarction used was based on the

	Fourth Universal Definition of MI for spontaneous myocardial infarction, and the SCAI definition for procedure-related MI Repeat revascularization: TLR or TVR, defined as ischemia-driven revascularization with CABG or PCI of the index lesion or vessel respectively Stent thrombosis: Defined according to the Academic Research Consortium criteria Cardiac death: Encompasses death due to coronary heart disease including MI, sudden cardiac death including fatal arrhythmias and cardiac arrest without successful resuscitation, death from heart failure including cardiogenic shock, and death related to the cardiac procedure within 28 days from the procedure. If death was not clearly attributable to other non-cardiac causes it was adjudicated as cardiac death All-cause mortality: Included death by any cause, including cardiac deaths and non-natural causes of death
RENOVATE-COMPLEX-PCI	TVF: Defined as a composite of death from cardiac causes, target-vessel-related MI, or clinically driven TVR MI: Definition of MI was based on the Third Universal Definition of Myocardial Infarction for spontaneous MI, and the SCAI definition for procedure-related MI Revascularization: TVF and TLR may be either PCI or CABG. Revascularization was defined according to the Academic Research Consortium Stent thrombosis: Defined according to the Academic Research Consortium Cardiac death: Any death due to a proximate cardiac cause and all procedure-related deaths, including those related to concomitant treatment. All deaths were cardiac death unless an unequivocal noncardiac cause can be established Death from any cause: Included cardiac deaths and any death that

	were not covered by the definition of cardiac death
OCCUPI:	Cardiac death: Defined as death due to cardiac causes, including myocardial infarction, cardiac tamponade, arrhythmia, or stroke related to the procedure. Death due to complications of procedures or deaths where a cardiac cause cannot be ruled out is also included Spontaneous MI: Defined using the Third Universal Definition of MI, which includes symptoms, ECG changes, or abnormal imaging indicative of MI, along with an increase in cardiac biomarkers (CK-MB ≥ 3× ULN or troponin > 99th percentile ULN) Periprocedural MI: Occurs within 48 hours after PCI and is defined by biomarker elevation (CK-MB ≥ 10 × ULN or troponin ≥ 70 × ULN without new ECG changes, or CK-MB ≥ 5 × ULN/troponin ≥ 35 × ULN with ECG changes) Stent thrombosis: Defined according to the Academic Research Consortium criteria. It includes definite stent thrombosis (confirmed by angiography or pathology) and probable stent thrombosis (unexplained death within 30 days or MI related to the stented vessel) TVR: Defined as a repeat PCI or bypass of the target vessel, with angiographic stenosis ≥ 50% plus symptoms or ischemic test positivity, or stenosis ≥ 70% even without symptoms Contrast-induced nephropathy: Defined as a serum creatinine increase of > 25% or an absolute rise of ≥ 0.5 mg/dL within 72 hours post-procedure
CALIPSO (2025)	MSA: The crude minimal stent area (MSA) will be measured along the stent on the target lesion. Stent geometric expansion will be evaluated by the DOCTORS criteria for non-bifurcated segments and LEMON criteria for bifurcated segments MACE: MACE is defined as a composite of cardiovascular death, any myocardial infarction, or need for clinically driven reintervention on the target lesion, measured at 30 days and 1 year

	after the procedure Periprocedural MI: Periprocedural MI, particularly after PCI, is defined according to SCAI criteria: Elevation of CK-MB or troponin > 3 × ULN post-procedure (for patients with normal baseline biomarkers). For patients with stable or falling elevated biomarkers, a ≥ 20% increase post-procedure signals recurrent MI Coronary artery perforation: Coronary perforation was defined as evidence of extravasation of dye or blood from the coronary artery during or following the interventional procedure

CABG: Coronary artery bypass graft; CK-MB: Creatine kinase-myocardial band; ECG: Electrocardiogram; MACE: Major adverse cardiovascular events; MI: Myocardial infarction; MSA: Minimal stent area; PCI: Percutaneous coronary intervention; SCAI: Society for Cardiovascular Angiography and Interventions; TLR: target-lesion revascularization; TVF: Target-vessel failure; TVR: target-vessel revascularization; ULN: Upper limits of normal.

Supplementary Table 6 Distribution of types of complex lesions across the studies, *n* (%)

Ref.	Long or multiple lesions		Bifurcation		Severe calcification		Moderate calcification		Chronic total occlusion		In-stent restenosis		Acute MI		Small vessel disease		Left main artery disease		Intracoronary thrombus visible on the angiogram	
	OCT-PCI	Angio-PCI	OCT-PCI	Angio-PCI	OCT-PCI	Angio-PCI	OCT-PCI	Angio-PCI	OCT-PCI	Angio-PCI	OCT-PCI	Angio-PCI	OCT-PCI	Angio-PCI	OCT-PCI	Angio-PCI	OCT-PCI	Angio-PCI	OCT-PCI	Angio-PCI
LUMIEN IV Sub-study, 2024, Ali *et al*[11]	853 (86.0)	824 (84.0)	40 (4.0)	43 (4.4)	140 (14.1)	146 (14.9)	-	-	94 (9.5)	79 (8.1)	130 (13.1)	138 (14.1)	-	-	-	-	-	-	-	-
OCCUPI, 2024, Hong *et al*[14]	575 (72)	577 (72)	188 (23)	193 (24)	71 (9)	78 (10)	-	-	57 (7)	58 (7)	86 (11)	85 (11)	164 (20)	163 (20)	127 (16)	140 (17)	113 (14)	116 (14)	70 (9)	60 (7)
OCTOBER, 2023, Holm *et al*[12]	-	-	600 (100)	601 (100)	198 (33)	194 (32.2)	-	-	-	-	-	-	-	-	-	-	-	-	-	-
RENOVATE-COMPLEX-PCI, 2024, Lee *et al*[13]	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CALIPSO, 2025, Amabile *et al*[15]	-	-	-	-	36 (55)	39 (56)	29 (45)	30 (44)	-	-					4 (6)	5 (7)	-	-		

Angio-PCI: Angiography-guided percutaneous coronary intervention; OCT-PCI: Optical coherence tomography-guided percutaneous coronary intervention.

Supplementary Table 7 Grade assessment of major outcomes

Certainty assessment							*N* of patients		Effect		Certainty	Importance
***N* of studies**	**Study design**	**Risk of bias**	**Inconsistency**	**Indirectness**	**Imprecision**	**Other considerations**	**OCT-guided PCI**	**Angiography guided PCI**	**Relative (95%CI)**	**Absolute (95%CI)**		
Major adverse cardiovascular events												
5	Randomised trials	Not serious	Not serious	Not serious	Not serious	None	149/2738 (5.4%)	273/2999 (9.1%)	RR: 0.63 (0.52-0.77)	34 fewer per 1000 (from 44 fewer to 21 fewer)	High	Critical
Target-vessel Failure												
4	Randomised trials	Not serious	Not serious	Not serious	Not serious	None	177/2673 (6.6%)	285/2930 (9.7%)	RR: 0.68 (0.53-0.83)	31 fewer per 1000 (from 46 fewer to 17 fewer)	High	Critical
Mortality outcomes												

4	Randomised trials	Not serious	Not serious	Not serious	Not serious	None	33/2673 (1.2%)	71/2930 (2.4%)	RR: 0.58 (0.38-0.87)	10 fewer per 1000 (from 15 fewer to 3 fewer)	High	Critical
Myocardial Infarction												
5	Randomised trials	Not serious	Not serious	Not serious	Not serious	None	120/2738 (4.3%)	167/2999 (5.5%)	RR: 0.79 (0.62-1.01)	12 fewer per 1000 (from 21 fewer to 1 more)	High	Important
Revascularization												
4	Randomised trials	Not serious	Serious	Not serious	Not serious	None	118/2673 (4.4%)	167/2930 (5.7%)	RR: 0.76 (0.52-1.13)	14 fewer per 1000 (from 27 fewer to 7 more)	Moderate	Important
Stent thrombosis												

4	Randomised trials	Not serious	Not serious	Not serious	Not serious	None	22/2673 (0.8%)	46/2930 (1.6%)	RR: 0.52 (0.31-0.86)	8 fewer per 1000 (from 11 fewer to 2 fewer)	High	Important

OCT: Optical coherence tomography; PCI: Percutaneous coronary intervention; RR: Risk ratio.