Revista Española de Cardiología

Lee JM, et al. Intravascular imaging-guided percutaneous coronary intervention in patients with acute myocardial infarction and cardiogenic shock

SUPPLEMENTARY DATA

Brief summarization of KAMIR-NIH and KAMIR-V registries protocol

In the KAMIR-NIH and KAMIR-V registries, acute myocardial infarction (MI) was diagnosed by detection of an increased level of cardiac biomarkers, preferably cardiac troponins, with at least 1 value above the 99th percentile of the upper reference limit, accompanied by at least 1 of the following: symptoms of myocardial ischemia, electrocardiogram changes (ST elevation, left bundle branch block, ST change without ST elevation), and imaging findings suggestive of myocardial infarction (loss of viable myocardium or new regional wall motion abnormality).[1] There was no exclusion criterion for either the KAMIR-NIH and KAMIR-V registries other than patient refusal to enroll.

Definitions of study outcomes

Procedural success was considered in patients with final residual stenosis less than 30% with Thrombolysis in Myocardial Infarction (TIMI) grade 3 flow. Death from unknown cause was assumed to be cardiac according to the definitions of the Academic Research Consortiums (ARC).[2] Spontaneous MI was defined as the recurrence of symptoms or the presence of electrocardiographic changes in association with a rise of cardiac biomarkers above the upper limit of normal. Procedure-related MI was not included as a clinical event in the current analysis. Clinically-driven revascularization that occurred after discharge from the index hospitalization was coded as a repeat revascularization event, according to the ARC definitions.[¡Error! Marcador no definido.] Clinically-driven revascularization was defined as revascularization of a lesion with ≥ 50% diameter stenosis and at least 1 of the following: *a)* recurrence of angina; *b)* positive noninvasive test; or *c)* positive invasive physiologic test; or *d)* the presence of diameter stenosis ≥ 70%, even in the absence of other criteria. Definite or probable stent thrombosis was defined according to the ARC definitions.[¡Error! Marcador no definido.]

Included covariables for propensity score matching

The matched covariables included age, sex, body mass index, left ventricular ejection fraction, systolic blood pressure, diastolic blood pressure, hypertension, diabetes mellitus, hyperlipidemia, current smoker, previous MI, previous angina pectoris, previous heart failure, previous stroke, clinical presentation, second degree or third degree atrioventricular block, left bundle branch block, hemoglobin, multivessel disease, left main disease, culprit vessel location, ACC/AHA B2C of culprit lesion, complete revascularization, transradial access, use of GP 2b3a inhibitor, pre-PCI TIMI grade < 3, use of drug-eluting stent (DES), and major bleeding.

Revista Española de Cardiología

Lee JM, et al. Intravascular imaging-guided percutaneous coronary intervention in patients with acute myocardial infarction and cardiogenic shock

Table 1 of the supplementary data

Balance measurements of baseline characteristics in original population and matched population

	Original population			Matched population		
	Imaging-guided PCI	Angiography-guided PCI	ASMD	Imaging-guided PCI	Angiography-guided PCI	ASMD
Patient characteristics	375 (20.5)	1458 (79.5)		330 (34.7)	621 (65.3)	
Demographics						
Age, y	64.0±12.2	67.4±12.4	0.277	64.2±12.1	64.1±12.7	0.004
Male sex	296 (78.9)	1071 (73.5)	0.129	260 (78.8)	489 (78.7)	0.001
LVEF, %	49.2 ± 12.7	48.1 ± 12.6	0.081	49.3 ± 12.4	49.5 ± 12.3	0.018
Body mass index, kg/m^2	24.0 ± 3.6	23.6 ± 3.3	0.119	24.0 ± 3.6	23.9 ± 3.3	0.027
Cardiovascular risk factors						
Hypertension	199 (53.1)	770 (52.8)	0.005	173 (52.4)	310 (49.89)	0.050

Revista Española de Cardiología

Lee JM, et al. Intravascular imaging-guided percutaneous coronary intervention in patients with acute myocardial infarction and cardiogenic shock

Diabetes mellitus	106 (28.3)	475 (32.6)	0.094	93 (28.2)	169 (27.2)	0.022
Hyperlipidemia	43 (11.5)	160 (11.0)	0.016	40 (12.1)	65 (10.5)	0.052
Current smoker	161 (44.5)	535 (38.5)	0.121	148 (44.8)	285 (45.9)	0.021
Previous myocardial infarction	40 (10.7)	105 (7.2)	0.122	32 (9.7)	53 (8.5)	0.040
Previous angina pectoris	20 (5.3)	113 (7.8)	0.098	19 (5.8)	37 (6.0)	0.009
Previous heart failure	9 (2.4)	27 (1.9)	0.038	6 (1.8)	11 (1.8)	0.004
Previous stroke	21 (5.6)	127 (8.7)	0.120	17 (5.2)	39 (6.3)	0.049
Process-of-care index						
Door-to-balloon time, min	72 [50-147]	70 [53-119]	0.088	72 [50-157]	69 [51-134]	0.086
Symptom to door time, min	90 [41-233]	107 [47-272]	0.071	95 [44-254]	95 [41-268]	0.068
Clinical presentation			0.090			0.027
NSTEMI	88 (23.5)	288 (19.8)		82 (24.8)	147 (23.7)	

Lee JM, et al. Intravascular imaging-guided percutaneous coronary intervention in patients with acute myocardial infarction and cardiogenic shock

STEMI	287 (76.5)	1170 (80.2)		248 (75.2)	474 (76.3)	
Symptoms						
Chest pain			0.035			0.012
Typical	282 (75.2)	1074 (73.7)		248 (75.2)	470 (75.7)	
Atypical or painless	93 (24.8)	384 (26.3)		82 (24.8)	151 (24.3)	
Dyspnea	122 (32.5)	458 (31.4)	0.024	108 (32.7)	190 (30.6)	0.046
Initial hemodynamics						
Systolic blood pressure, mmHg	83 [70-100]	80 [70-90]	0.132	84 [70-100]	80 [70-100]	0.004
Diastolic blood pressure, mmHg	51 [41-65]	50 [40-60]	0.189	50 [40-63]	51 [40-66]	0.005
Heart rate, bpm	70 [48-91]	70 [50-90]	0.019	70 [48-92]	71 [52-93]	0.079
Initial 12-lead ECG						
Sinus rhythm	240 (64.2)	953 (65.9)	0.036	212 (64.2)	425 (68.4)	0.089
2nd or 3rd degree AV	28 (7.5)	74 (5.1)	0.098	26 (7.9)	45 (7.2)	0.024

Revista Española de Cardiología

Lee JM, et al. Intravascular imaging-guided percutaneous coronary intervention in patients with acute myocardial infarction and cardiogenic shock

block						
Atrial fibrillation	47 (12.6)	172 (11.9)	0.020	42 (12.7)	66 (10.6)	0.065
Wide QRS tachycardia	7 (1.9)	38 (2.6)	0.051	7 (2.1)	12 (1.9)	0.013
Paced rhythm	1 (0.3)	9 (0.6)	0.053	1 (0.3)	6 (1.0)	0.084
Left bundle branch block	8 (2.1)	33 (2.3)	0.010	8 (2.4)	9 (1.4)	0.071
Right bundle branch block	21 (5.6)	115 (8.0)	0.093	18 (5.5)	53 (8.5)	0.121
Initial bloodwork						
Hemoglobin, g/L	13.3 ± 2.1	13.0 ± 2.3	0.148	13.4 ± 2.1	13.4 ± 2.3	0.002
Platelet, 10^3/µL	228.8 ± 76.7	228.5 ± 75.4	0.004	231.0 ± 77.5	233.7 ± 76.1	0.035
Creatinine, mg/dL	1.5 ± 1.8	1.4 ± 1.0	0.076	1.5 ± 1.8	1.3 ± 0.9	0.143
Peak CK-MB, ng/mL	180.5 ± 187.3	178.1 ± 225.2	0.011	183.8 ± 192.2	181.3 ± 208.4	0.013
NT-proBNP, pg/mL	3301.131 ± 7420.7	4804.9 ± 8735.6	0.202	2555.6 ± 6324.5	2909.4 ± 6723.8	0.054

Revista Española de Cardiología

Lee JM, et al. Intravascular imaging-guided percutaneous coronary intervention in patients with acute myocardial infarction and cardiogenic shock

Discharge medication						
Aspirin	374 (99.7)	1410 (96.7)	0.230	329 (99.7)	597 (96.1)	0.251
P2Y$_{12}$ Inhibitor	375 (100.0)	1411 (96.8)	0.258	330 (100.0)	600 (96.6)	0.264
Clopidogrel	174 (46.4)	811 (55.6)	0.188	159 (48.2)	318 (51.2)	0.033
Ticagrelor	169 (45.1)	482 (33.1)	0.248	145 (43.9)	224 (36.1)	0.177
Prasugrel	32 (8.5)	118 (8.1)	0.016	26 (7.9)	58 (9.3)	0.052
Beta-blocker	249 (66.4)	872 (59.8)	0.137	216 (65.5)	391 (63.0)	0.052
RAAS blockade	204 (54.4)	838 (57.5)	0.062	178 (53.9)	371 (59.7)	0.117
Statin	315 (84.0)	1079 (74.0)	0.247	275 (83.3)	476 (76.7)	0.167
Discharge medication (excluding in-hospital mortality)						
Aspirin	332 (100.0)	1130 (99.7)	0.073	289 (100.0)	492 (99.6)	0.090
P2Y$_{12}$ Inhibitor	332 (100.0)	1129 (99.6)	0.084	289 (100.0)	492 (99.6)	0.090
Clopidogrel	149 (44.9)	620 (54.7)		135 (48.2)	245 (49.6)	

Lee JM, et al. Intravascular imaging-guided percutaneous coronary intervention in patients with acute myocardial infarction and cardiogenic shock

Ticagrelor	153 (46.1)	400 (35.3)		130 (45.0)	192 (38.9)	
Prasugrel	30 (9.0)	109 (9.6)		24 (8.3)	55 (11.1)	
Beta-blocker	247 (74.4)	863 (76.2)	0.041	214 (74.0)	387 (78.3)	0.101
RAAS blockade	203 (61.1)	830 (73.3)	0.260	177 (61.2)	367 (74.3)	0.281
Statin	313 (94.3)	1040 (91.8)	0.098	273 (94.5)	458 (92.7)	0.071

ASMD, absolute standardized mean difference; AV, atrioventricular; CK-MB, creatine kinase-myoglobin band; LVEF, left ventricular ejection fraction; NSTEMI, non–ST-segment elevation myocardial infarction; NT-proBNP, N-terminal pro-B-type natriuretic peptide; RASS, renin-angiotensin-aldosterone system; STEMI, ST-segment elevation myocardial infarction.

Data are expressed as No. (%) or mean ± standard deviation, or median [quartile 1-quartile 3].

Revista Española de Cardiología

Lee JM, et al. Intravascular imaging-guided percutaneous coronary intervention in patients with acute myocardial infarction and cardiogenic shock

Table 2 of the supplementary data

Balance of measurements of lesion and procedural characteristics in the original and matched populations

	Original population			Matched population		
	Imaging-guided PCI	Angiography-guided PCI	ASMD	Imaging-guided PCI	Angiography-guided PCI	ASMD
Lesion characteristics						
Angiographic findings						
Extent of disease			0.144			0.028
1-vessel disease	132 (35.3)	628 (43.1)		118 (35.8)	238 (38.3)	
2-vessel disease	141 (37.7)	489 (33.5)		125 (37.9)	217 (34.9)	
3 vessel disease	101 (27.0)	341 (23.4)		87 (26.4)	166 (26.7)	
Multivessel disease	242 (64.7)	830 (56.9)	0.160	212 (64.2)	383 (61.7)	0.053
Left main disease	56 (15.0)	125 (8.6)	0.199	44 (13.3)	71 (11.4)	0.058
Culprit vessel location			0.010			0.002

Revista Española de Cardiología

Lee JM, et al. Intravascular imaging-guided percutaneous coronary intervention in patients with acute myocardial infarction and cardiogenic shock

LM	32 (8.5)	84 (5.8)		26 (7.9)	44 (7.1)	
LAD	135 (36.0)	473 (32.5)		122 (37.0)	221 (35.6)	
LCX	35 (9.3)	184 (12.6)		32 (9.7)	74 (11.9)	
RCA	173 (46.1)	716 (49.1)		150 (45.5)	282 (45.4)	
ACC/AHA B2/C of culprit lesion	337 (90.8)	1245 (87.4)	0.111	302 (91.5)	562 (90.5)	0.035
Procedural characteristics						
In patients with nonculprit vessel disease	n = 242	n = 830		n = 212	n = 383	
Complete revascularization	117/242 (48.3)	394/830 (47.5)	0.018	104/212 (49.1)	184/383 (48.0)	0.020
Immediate nonculprit vessel PCI	90/242 (37.2)	257/830 (31.0)	0.129	81/212 (38.2)	138/383 (36.0)	0.045
Staged PCI for nonculprit vessel	30/242 (12.4)	142/830 (17.1)	0.134	27/212 (12.7)	67/383 (17.5)	0.133
Transradial access	100 (26.7)	275 (18.9)	0.187	90 (27.3)	157 (25.3)	0.045
Use of GP2b3a inhibitor	107 (28.5)	244 (16.7)	0.285	94 (28.5)	156 (25.1)	0.076

Revista Española de Cardiología

Lee JM, et al. Intravascular imaging-guided percutaneous coronary intervention in patients with acute myocardial infarction and cardiogenic shock

Thrombus aspiration	99 (26.4)	364 (25.0)	0.033	88 (26.7)	152 (24.5)	0.050
Pre-PCI TIMI grade < 3	292 (78.3)	1247 (86.1)	0.204	260 (78.8)	503 (81.0)	0.055
Use of DES	351 (93.9)	1298 (89.6)	0.155	314 (95.4)	588 (95.1)	0.014
Post-PCI TIMI grade 3	356 (94.9)	1347 (92.5)	0.102	311 (94.2)	575 (92.6)	0.066
Procedural success	367 (97.9)	1413 (97.0)	0.056	322 (97.6)	603 (97.1)	0.029
Total number of stents	1.6±1.0	1.3±0.8	0.338	1.6±1.0	1.4±0.8	0.270
Device characteristics used in culprit vessel						
Number of stents	1.3±0.6	1.1±0.5	0.325	1.3±0.6	1.1±0.4	0.318
Mean stent diameter, mm	3.30±0.52	3.16±0.44	0.303	3.30±0.52	3.18±0.42	0.260
Maximal stent diameter, mm	3.36±0.53	3.18±0.44	0.365	3.36±0.52	3.21±0.43	0.325
Total length of stents, mm	34.1±18.4	30.0±14.0	0.251	34.2±17.8	29.8±14.0	0.273
Complications during hospitalization						
Cardiopulmonary resuscitation	113 (30.1)	516 (35.4)	0.112	99 (30.0)	211 (34.0)	0.085

Lee JM, et al. Intravascular imaging-guided percutaneous coronary intervention in patients with acute myocardial infarction and cardiogenic shock

Defibrillation	72 (19.2)	298 (20.4)	0.031	64 (19.4)	121 (19.5)	0.002
Use of IABP	43 (11.5)	206 (14.1)	0.080	37 (11.2)	90 (14.5)	0.098
Use of PCPS	24 (6.4)	130 (8.9)	0.095	20 (6.1)	47 (7.6)	0.060
TPM	54 (14.4)	261 (17.9)	0.095	47 (14.2)	99 (15.9)	0.047
PPM	3 (0.8)	3 (0.2)	0.084	3 (0.9)	0 (0.0)	0.135
Major bleeding	8 (2.1)	76 (5.2)	0.164	6 (1.8)	11 (1.8)	0.004
Minor bleeding	20 (5.3)	67 (4.6)	0.034	19 (5.8)	20 (3.2)	0.123
Stroke	4 (1.1)	16 (1.1)	0.003	4 (1.2)	7 (1.1)	0.008
Multiple organ failure	13 (3.5)	47 (3.2)	0.014	12 (3.6)	20 (3.2)	0.023
Sepsis	5 (1.3)	29 (2.0)	0.051	4 (1.2)	10 (1.6)	0.034
Acute kidney injury	20 (5.3)	63 (4.3)	0.047	16 (4.8)	23 (3.7)	0.057
CABG	1 (0.3)	1 (0.1)	0.048	1 (0.3)	0 (0.0)	0.078

ACC, American College of Cardiology; AHA, American Heart Association; ASMD, absolute standardized mean difference; CABG, coronary artery bypass graft; DES, drug-eluting stent; GP, glycoprotein; IABP, intra-aortic balloon pump; LAD, left anterior descending; LCX, left circumflex; LM, left main; PCI,

Lee JM, et al. Intravascular imaging-guided percutaneous coronary intervention in patients with acute myocardial infarction and cardiogenic shock

percutaneous coronary intervention; PCPS, percutaneous cardiopulmonary support; PPM, permanent pacemaker; RCA, right coronary artery; TIMI,

thrombolysis in myocardial infarction; TPM, temporary pacemaker.

Data are expressed as No. (%) or mean ± standard deviation.

Lee JM, et al. Intravascular imaging-guided percutaneous coronary intervention in patients with acute myocardial infarction and cardiogenic shock

Table 3 of the supplementary data

Sensitivity analysis of clinical outcomes according to treatment strategy

	Unadjusted HR (95%CI)	IPW adjusted HR (95%CI)	Bayesian OR (95% CrI)
Patient number	1833	1594	1833
MACE*	0.61 (0.47-0.79)	0.61 (0.45-0.83)	0.66 (0.49-0.88)
All-cause death	0.51 (0.39-0.68)	0.62 (0.45-0.86)	0.56 (0.41-0.75)
Cardiac death	0.53 (0.40-0.72)	0.61 (0.43-0.85)	0.57 (0.41-0.79)
Any myocardial infarction	1.24 (0.40-3.90)	0.77 (0.22-2.67)	1.31 (0.36-4.03)
Any vessel revascularization	1.11 (0.65-1.90)	0.67 (0.33-1.36)	1.25 (0.70-2.15)

95%CI, 95% confidence interval; CrI, credible interval; HR, hazard ratio; IPW, inverse probability weighting; MACE, major adverse cardiovascular events; OR, odds ratio.

* MACE was defined as a composite of cardiac death, any myocardial infarction, any revascularization by percutaneous or surgical methods, or definite or probable stent thrombosis at 1 year.

Lee JM, et al. Intravascular imaging-guided percutaneous coronary intervention in patients with acute myocardial infarction and cardiogenic shock

Table 4 of the supplementary data

Clinical outcomes among participating centers according to the rates of intravascular imaging device use

	Tertile distribution of participating centers according to the ratio of imaging use			
	Tertile 1 (≤ 4%) (N = 796)	Tertile 2 (5-25%) (N = 602)	Tertile 3 (39-100%) (N = 435)	*P*
MACE*	229 (29.5)	135 (23.4)	103 (24.3)	.010
All-cause death	234 (29.8)	127 (21.4)	92 (21.3)	< .001
Cardiac death	212 (27.0)	104 (17.6)	79 (18.3)	< .001

MACE, major adverse cardiovascular events.

[*]MACE was defined as a composite of cardiac death, any myocardial infarction, any revascularization by percutaneous or surgical methods, or definite or probable stent thrombosis at 1 year.
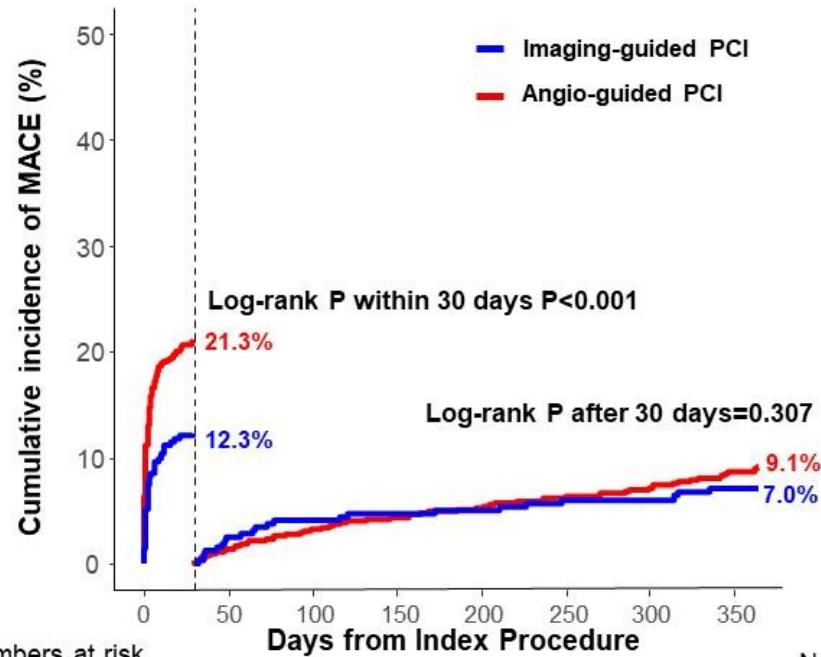
Revista Española de Cardiología

Lee JM, et al. Intravascular imaging-guided percutaneous coronary intervention in patients with acute myocardial infarction and cardiogenic shock

Figure 1 of the supplementary data

Balance between imaging-guided and angio-guided PCI after IPW

Covariate balance
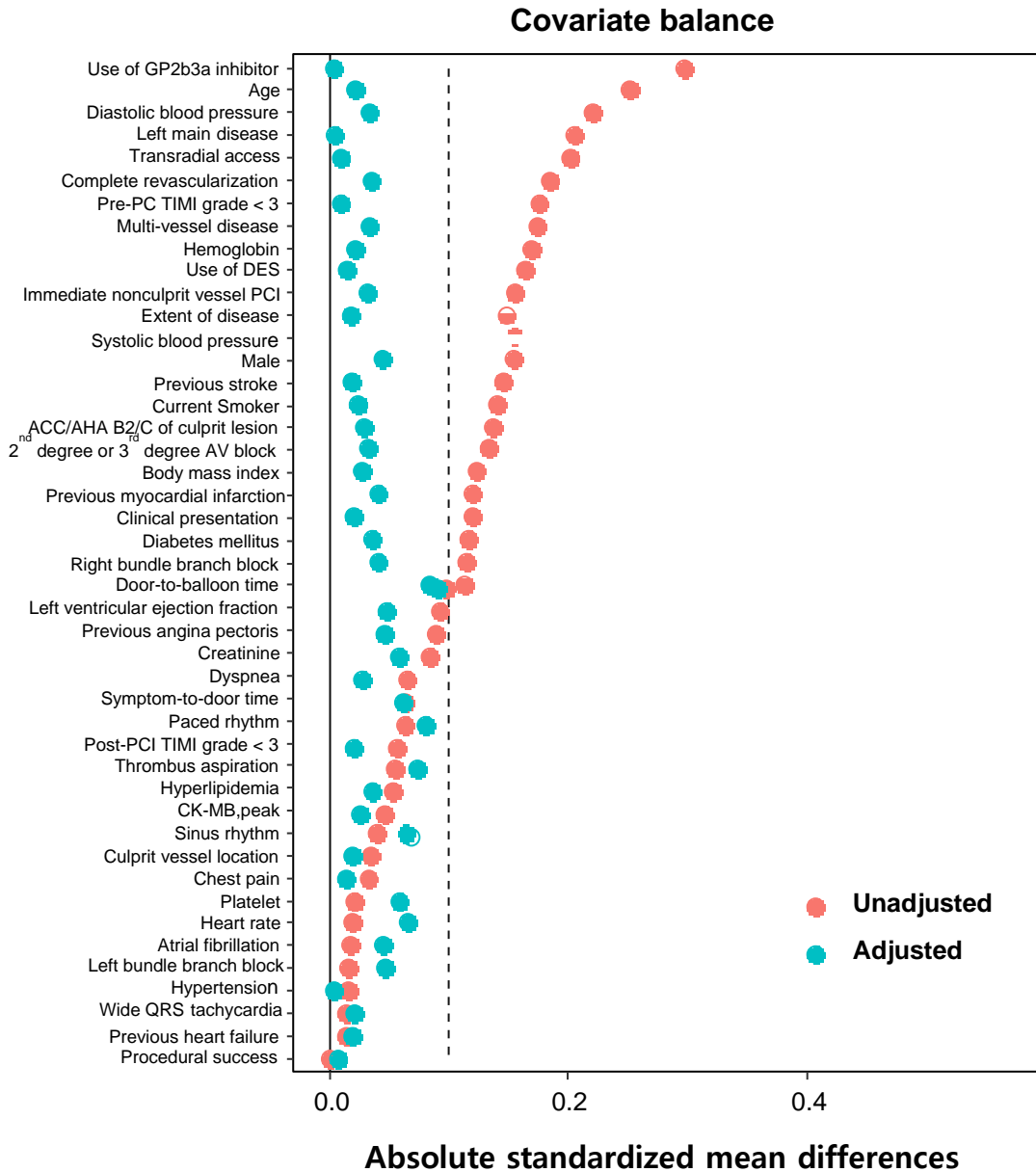
ACC, American College of Cardiology; AHA, American Heart Association; AV, atrioventricular; CK-MB, creatine kinase-myoglobin band; DES, drug-eluting stent; GP, glycoprotein; IPW, inverse probability weighting; PCI, percutaneous coronary intervention; TIMI, thrombolysis in myocardial infarction.

Absolute standard mean differences after IPW adjustment were within 10% among all adjusted

covariables, demonstrating successful balance between the comparison groups.

Lee JM, et al. Intravascular imaging-guided percutaneous coronary intervention in patients with acute myocardial infarction and cardiogenic shock

Figure 2 of the supplementary data

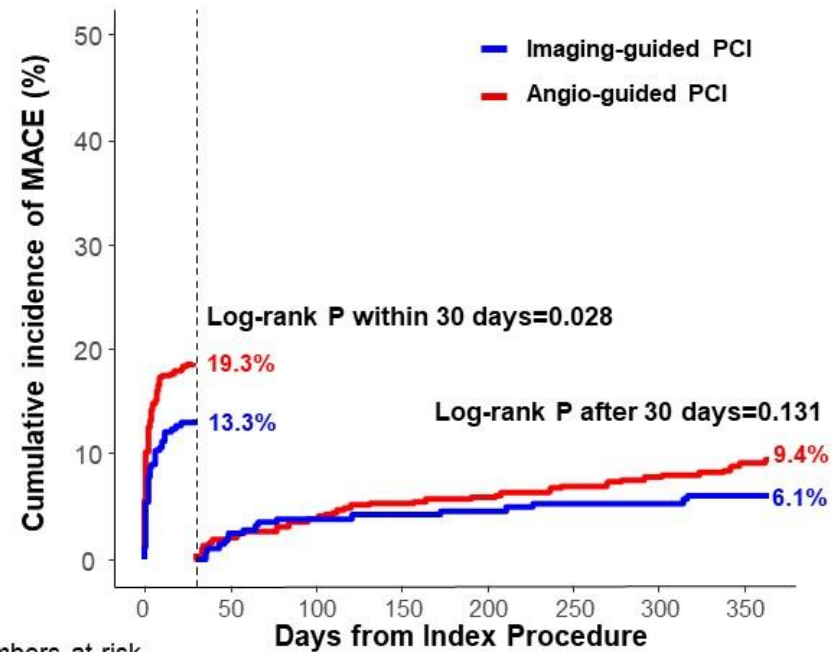Landmark analysis at 30 days between imaging-guided versus angio-guided PCI

Lee JM, et al. Intravascular imaging-guided percutaneous coronary intervention in patients with acute myocardial infarction and cardiogenic shock

Kaplan-Meier curve is presented for cumulative incidence of MACE at 1 year between the intravascular imaging-guided PCI group and the angiography-guided PCI group in (A) the original population and (B) the matched population. The dashed line corresponds to the 30-days time point for landmark analysis.

MACE, major adverse cardiovascular events; PCI, percutaneous coronary intervention.

REFERENCES OF THE SUPPLEMENTARY DATA

1. Thygesen K, Alpert JS, Jaffe AS, et al. Third universal definition of myocardial infarction. *Circulation*. 2012;126:2020-2035.

2. Cutlip DE, Windecker S, Mehran R, et al. Clinical end points in coronary stent trials: a case for standardized definitions. *Circulation.* 2007;11