

Angina after percutaneous coronary intervention: patient and procedural predictors

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Supplemental Material

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Supplemental Methods

Patients in the TARGET-FFR trial received a comprehensive pre-PCI coronary physiology assessment including resting distal coronary to aortic pressure (Pd/Pa), fractional flow reserve (FFR), coronary flow reserve (CFR), the index of microcirculatory resistance (IMR) and a hyperemic pressure-wire pullback was encouraged (PressureWire X Guidewire, Abbott Laboratories, IL, USA and CoroFlow v3.0 software, Coroventis Research AB, Uppsala, Sweden). Randomization was performed prior to a mandatory, blinded post-PCI coronary physiology assessment as above. Results were only disclosed to operators for patients in the treatment arm who had a post-PCI FFR <0.90. The operator then followed the steps of the PIOS algorithm to optimize the final PCI result. A hyperemic trans-stent gradient (HTG) ≥ 0.05 was treated with additional stent post-dilation with a larger non-compliant balloon. A focal (abrupt) drop of ≥ 0.05 FFR units on pullback through an unstented segment represented a target for additional stenting. If the residual pressure gradient reflected diffuse atherosclerosis with no focal step-changes in pressure gradient, the result was accepted and no optimization attempted. Final coronary physiology results were not disclosed to patients.

Patient-Reported Outcome Measures

Seattle Angina Questionnaire (SAQ) scores range from 0 to 100, with higher scores indicating better health status. The EQ-5D-5L comprises 2 components: a descriptive profile and a single-index visual analog scale (VAS). The descriptive profile assesses 5 dimensions of general health (mobility, self-care, usual activities, pain/discomfort, and anxiety/depression) with a 5-level scale. Higher scores indicate more severe limitation within that dimension. When the descriptive system profile is linked to a 'value set', a single summary index value for health status is derived with scores that range from 0 to 1 (1 representing perfect health

and 0 representing the poorest health). A value set provides values (weights) for each health state description according to the preferences of the general population of a country/region. The VAS records the patient's personal perspective of their current health status on a vertical rating scale with scores ranging from 0 to 100, higher scores representing better quality-of-life.

Coronary Physiology Measurements

For the purposes of the primary and relevant secondary endpoints, coronary physiology data underwent post hoc adjudication by an independent core laboratory (CoreAalst BV, Aalst, Belgium). Each individual tracing was assessed for quality based on pre-specified criteria and received a binary decision regarding adequate quality for inclusion in the final analysis. The ratio of resting distal coronary to aortic pressure (Pd/Pa), fractional flow reserve (FFR), pullback pressure gradient (PPG), coronary flow reserve (CFR) and the index of microcirculatory resistance (IMR) were calculated independently from the corresponding recordings. Percentage change was defined as $([\text{Post-PCI Value} - \text{Pre-PCI Value}] / \text{Pre-PCI Value}) \times 100$.

Definition of Angina

The process of defining residual angina presents its own challenges and alternative definitions could have been applied in the present study with a resultant variation in the reported incidence. For example, when considering angina at baseline, 71.9% of patients (187/260) had angina as defined by a patient-reported SAQ-Angina Frequency score < 100; 82.7% (215/260) had angina as defined by physician-adjudicated CCS Class 1 and above; and 90.8% (236/260) had angina as defined by a patient-reported SAQ-Summary Score < 100. The rates of residual angina as defined by SAQ-AF score < 100 and SAQ-SS score < 100 were 38.3% (88/230) and 62.2% (143/230) respectively. CCS Class at follow-up was not available.

Figure S1. Change in FFR from pre- to post-PCI stratified by presence of angina 3 months post-PCI.

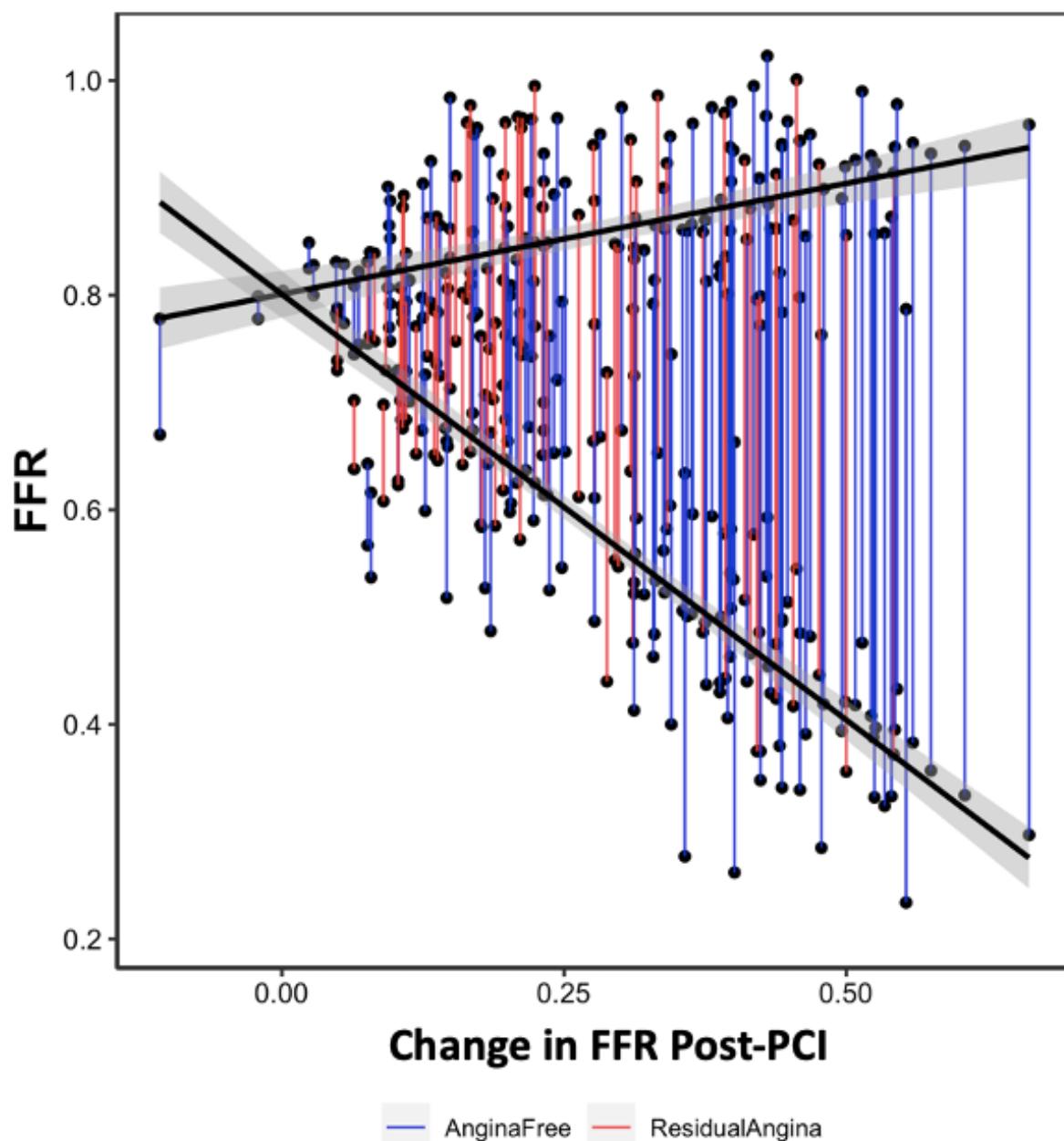


Table S1. Baseline clinical characteristics stratified by presence of baseline and post-PCI angina

Variables	Total	Baseline Angina + No Post-PCI Angina	Baseline Angina + Post-PCI Angina	No Baseline Angina + No Post-PCI Angina	No Baseline Angina + Post-PCI Angina	p-value
Number of patients, n (%)	230	111 (48.3)	83 (36.1)	31 (13.5)	5 (2.2)	
Male, n (%)	202 (87.8)	97 (87.4)	70 (84.3)	30 (96.8)	5 (100)	0.26
Age years, mean (SD)	60.9 ± 8.6	61.4 ± 8.2	61.4 ± 9.4	59 ± 7.2	54.8 ± 8.8	0.20
BMI, mean (SD)	29.8 ± 5.5	29.4 ± 5.1	30.8 ± 6.4	27.5 ± 3.4	33.4 ± 5.6	0.01
Family history of CAD, n (%)	153 (66.5)	44 (66.7)	55 (66.3)	20 (64.5)	4 (80)	0.93
Smoking status, n (%)						0.06
Non-smoker	72 (31.3)	33 (29.7)	23 (27.7)	15 (48.4)	1 (20)	
Current Smoker	37 (16.1)	15 (13.5)	19 (22.9)	1 (3.2)	2 (40)	
Ex-smoker	121 (52.6)	63 (56.8)	41 (49.4)	15 (48.4)	2 (40)	
Hypertension, n (%)	103 (44.8)	49 (44.1)	44 (53)	8 (25.8)	2 (40)	0.08
Dyslipidemia, n (%)	128 (55.7)	70 (63.1)	43 (51.8)	14 (45.2)	1 (20)	0.07
Heart Failure, n (%)	53 (23)	23 (20.7)	19 (22.9)	8 (25.8)	3 (60)	0.23
Diabetes, n (%)	39 (17)	16 (14.4)	19 (22.9)	3 (9.7)	1 (20)	0.29
Atrial Fibrillation, n (%)	18 (7.8)	4 (3.6)	12 (14.5)	2 (6.5)	0 (0)	0.04
Chronic Kidney Disease, n (%)	4 (1.7)	1 (0.9)	2 (2.4)	1 (3.2)	0 (0)	0.76
Indication for PCI, n (%)						0.002
Stable Angina	67 (29.1)	36 (32.4)	27 (32.5)	4 (12.9)	0 (0)	
ACS – UA/NSTEMI	91 (39.6)	52 (46.8)	28 (33.7)	9 (29)	2 (40)	
Staged Completion of Revascularization	72 (31.3)	23 (20.7)	28 (33.7)	18 (58.1)	3 (60)	
Previous MI	83 (36.1)	25 (22.5)	37 (44.6)	18 (58.1)	3 (60)	<0.001
Previous PCI, n (%)	86 (37.4)	27 (24.3)	38 (45.8)	18 (58.1)	3 (60)	0.001
Baseline CCS Class, n (%)						<0.001
CCS 0	36 (15.7)	0 (0)	0 (0)	31 (100)	5 (100)	
CCS 1	56 (24.3)	45 (40.5)	11 (13.3)	0 (0)	0 (0)	
CCS 2	85 (37)	44 (39.6)	41 (49.4)	0 (0)	0 (0)	
CCS 3	52 (22.6)	21 (18.9)	31 (37.3)	0 (0)	0 (0)	
CCS 4	1 (0.4)	1 (0.9)	0 (0)	0 (0)	0 (0)	
Baseline SAQ-AF < 100	168 (73)	84 (75.7)	78 (94)	5 (16.1)	1 (20)	<0.001
Medications						
Any antiplatelet, n (%)	223 (97)	111 (100)	77 (92.8)	30 (96.8)	5 (100)	0.04
DAPT, n (%)	160 (69.6)	71 (64)	58 (69.9)	26 (83.9)	5 (100)	0.08
Oral anticoagulant, n (%)	16 (7)	3 (2.7)	13 (15.7)	0 (0)	0 (0)	0.001
Statins, n (%)	221 (96.1)	108 (97.3)	77 (92.8)	31 (100)	5 (100)	0.29

ACEI, n (%)	150 (65.2)	69 (62.2)	50 (60.2)	26 (83.9)	5 (100)	0.03
ARB, n (%)	23 (10)	8 (7.2)	13 (15.7)	2 (6.5)	0 (0)	0.18
Diuretics, n (%)	27 (11.7)	9 (8.1)	15 (18.1)	3 (9.7)	0 (0)	0.14
Number of Anti-anginal Agents, mean (SD)	1.73 ± 0.82	1.75 ± 0.76	2.02 ± 0.83	0.97 ± 0.55	1.00 ± 0.00	<0.001
Beta-blocker, n (%)	208 (90.4)	100 (90.1)	77 (92.8)	26 (83.9)	5 (100)	0.46
Calcium channel blocker, n (%)	45 (19.6)	25 (22.5)	19 (22.9)	1 (3.2)	0 (0)	0.05
Nicorandil, n (%)	17 (7.4)	8 (7.2)	9 (10.8)	0 (0)	0 (0)	0.23
Ivabradine, n (%)	4 (1.7)	2 (1.8)	2 (2.4)	0 (0)	0 (0)	0.84
Oral Nitrates, n (%)	66 (28.7)	31 (27.9)	33 (39.8)	2 (6.5)	0 (0)	0.002
Frequency of GTN spray use, n (%)						<0.001
None	115 (50)	59 (53.2)	21 (25.3)	30 (96.8)	5 (100)	
Daily	29 (12.6)	11 (9.9)	18 (21.7)	0 (0)	0 (0)	
Weekly	61 (26.5)	27 (24.3)	34 (41)	0 (0)	0 (0)	
Monthly	25 (10.9)	14 (12.6)	10 (12)	1 (3.2)	0 (0)	

ACEI=Angiotensin-Converting Enzyme Inhibitor; ACS-UA/NSTEMI=Acute Coronary Syndrome-Unstable Angina/Non-ST segment Elevation Myocardial Infarction; ARB=Angiotensin-Receptor Blocker; BMI=Body Mass Index; CCS=Canadian Cardiovascular Society; DAPT=Dual Anti-Platelet Therapy; GTN=Glyceryl Trinitrate; PCI=Percutaneous Coronary Intervention

Table S2. Procedural and coronary physiology characteristics stratified by presence of baseline and post-PCI angina

Variables	Overall	Baseline Angina + No Post-PCI Angina	Baseline Angina + Post-PCI Angina	No Baseline Angina + No Post-PCI Angina	No Baseline Angina + Post-PCI Angina	p-value
Number of patients, n (%)	230	111 (48.3)	83 (36.1)	31 (13.5)	5 (2.2)	
Target Vessel, n (%)						0.67
LAD	130 (56.5)	63 (56.8)	45 (54.2)	20 (64.5)	2 (40)	
Non-LAD	100 (43.5)	48 (43.2)	38 (45.8)	11 (35.5)	3 (60)	
Diameter stenosis (%), mean ± SD	65.9 ± 15.4	67.8 ± 15.3	63.8 ± 15.2	64.1 ± 15.0	69.4 ± 19.0	0.27
Lesion length, mean ± SD	12.2 ± 6.0	12.6 ± 6.5	12.1 ± 5.4	11.5 ± 5.9	11.6 ± 6.4	0.82
AHA/ACC Lesion type, n (%)						0.11
A	40 (17.4)	22 (19.8)	9 (10.8)	9 (29)	0 (0)	
B1	83 (36.1)	39 (35.1)	38 (45.8)	5 (16.1)	1 (20)	
B2	91 (39.6)	42 (37.8)	31 (37.3)	15 (48.4)	3 (60)	
C	16 (7)	8 (7.2)	5 (6)	2 (6.5)	1 (20)	
SYNTAX score, mean ± SD	11.2 ± 8.1	11.5 ± 8.3	10.5 ± 7.6	11.9 ± 8.8	8.8 ± 9.1	0.70
BCIS Jeopardy score, mean ± SD	5.0 ± 3.0	5.0 ± 3.2	5.1 ± 2.9	4.4 ± 2.7	4.0 ± 2.4	0.57
Pre-PCI Pd/Pa, mean ± SD	0.75 ± 0.18	0.71 ± 0.19	0.79 ± 0.15	0.80 ± 0.18	0.74 ± 0.12	0.004
Pre-PCI FFR, mean ± SD	0.58 ± 0.14	0.53 ± 0.15	0.62 ± 0.12	0.65 ± 0.14	0.53 ± 0.12	<0.001
Pre-PCI resting TT	1.13 ± 0.44	1.15 ± 0.41	1.07 ± 0.47	1.17 ± 0.48	1.21 ± 0.51	0.58
Pre-PCI hyperemic TT	0.69 ± 0.40	0.80 ± 0.44	0.58 ± 0.34	0.59 ± 0.27	0.85 ± 0.43	0.001
Pre-PCI CFR, mean ± SD	1.9 ± 0.9	1.7 ± 0.8	2.2 ± 1.0	2.1 ± 0.7	1.6 ± 0.6	0.004
Pre-PCI IMR, mean ± SD	28 ± 12	30 ± 12	26 ± 13	26 ± 10	32 ± 13	0.29
Pre-PCI IMRc, mean ± SD	21 ± 11	20 ± 10	21 ± 12	22 ± 10	20 ± 7	0.88
Pre-dilatation, n (%)	230 (100)	111 (100.0)	83 (100.0)	31 (100.0)	5 (100)	NA
Post-dilatation, n (%)	225 (97.8)	108 (97.3)	82 (98.8)	30 (96.8)	5 (100)	0.85
Intravascular imaging, n (%)	36 (15.7)	19 (17.1)	12 (14.5)	3 (9.7)	2 (40)	0.34
PIOS Applied, n (%)	33 (14.3)	19 (17.1)	9 (10.8)	5 (16.1)	0 (0)	0.49
Number of stents (per vessel), mean ± SD	1.46 ± 0.66	1.43 ± 0.64	1.46 ± 0.67	1.52 ± 0.77	1.60 ± 0.55	0.89
Stent diameter (mm), mean ± SD	3.22 ± 0.43	3.22 ± 0.41	3.23 ± 0.43	3.06 ± 0.43	3.70 ± 0.45	0.01
Total stent length (mm), mean ± SD	41.8 ± 20.1	41.6 ± 20.1	43.0 ± 21.2	39.5 ± 18.3	38.4 ± 11.8	0.84
Residual diameter stenosis, mean ± SD	14.2 ± 8.6	14.0 ± 8.8	14.9 ± 8.6	13.4 ± 9.0	9.8 ± 4.1	0.54

Residual SYNTAX score, mean ± SD	2.31 ± 4.38	2.31 ± 4.18	2.52 ± 4.83	1.97 ± 3.77	0 ± 0	0.61
Post-PCI Pd/Pa, mean ± SD	0.94 ± 0.05	0.94 ± 0.06	0.94 ± 0.05	0.93 ± 0.05	0.94 ± 0.05	0.89
Post-PCI FFR, mean ± SD	0.86 ± 0.08	0.86 ± 0.08	0.85 ± 0.08	0.84 ± 0.10	0.88 ± 0.07	0.45
Post-PCI resting TT	0.91 ± 0.42	0.92 ± 0.43	0.84 ± 0.37	1.06 ± 0.47	1.10 ± 0.43	0.06
Post-PCI hyperemic TT	0.32 ± 0.21	0.32 ± 0.23	0.32 ± 0.21	0.33 ± 0.16	0.26 ± 0.12	0.92
Post-PCI CFR, mean ± SD	3.4 ± 1.9	3.4 ± 1.8	3.3 ± 2.2	3.7 ± 1.7	4.6 ± 1.7	0.45
Post-PCI IMR	22 ± 17	22 ± 19	22 ± 16	20 ± 10	17 ± 8	0.86
Post-PCI IMRc	21 ± 16	21 ± 19	22 ± 16	19 ± 10	17 ± 8	0.85
Delta Pd/Pa	0.19 ± 0.18	0.24 ± 0.18	0.14 ± 0.15	0.13 ± 0.19	0.20 ± 0.08	0.001
% Delta Pd/Pa, mean ± SD	37.0 ± 57.4	47.3 ± 55	25.2 ± 45.6	32.6 ± 87.4	29.3 ± 13.9	0.09
Delta FFR, mean ± SD	0.28 ± 0.15	0.33 ± 0.16	0.22 ± 0.12	0.18 ± 0.14	0.36 ± 0.10	<0.001
% Delta FFR, mean ± SD	58.3 ± 46.5	74.9 ± 50.4	40.8 ± 32.6	35.1 ± 38.3	73.2 ± 34.7	<0.001
Delta resting TT	-0.22 ± 0.46	-0.23 ± 0.50	-0.22 ± 0.42	-0.13 ± 0.36	-0.27 ± 0.58	0.77
% Delta resting TT, mean ± SD	-11.8 ± 43.2	-12.1 ± 47.5	-12.9 ± 41.0	-8.0 ± 33.5	-10.9 ± 50.9	0.96
Delta hyperemic TT	-0.38 ± 0.41	-0.49 ± 0.44	-0.27 ± 0.37	-0.27 ± 0.28	-0.64 ± 0.39	0.001
% Delta hyperemic TT, mean ± SD	-43.3 ± 41.9	-52.2 ± 31	-33.0 ± 53.3	-36.5 ± 33.6	-69.6 ± 18.5	0.01
Delta CFR, mean ± SD	1.5 ± 1.8	1.8 ± 1.9	1.2 ± 1.8	1.4 ± 1.4	3.2 ± 1.5	0.06
% Delta CFR, mean ± SD	103.8 ± 131	136.4 ± 158.7	68.0 ± 90.8	75.4 ± 83.7	208.2 ± 100.9	0.001
Delta IMR	-7 ± 16	-9 ± 15	-4 ± 18	-7 ± 11	-18 ± 9	0.14
% Delta IMR, mean ± SD	-16.4 ± 66.5	-25.1 ± 47.2	-3.3 ± 89.1	-17 ± 50	-53.6 ± 13.2	0.14
Delta IMRc	-1 ± 15	-1 ± 16	0 ± 17	-3 ± 10	-6 ± 4	0.75
% Delta IMRc, mean ± SD	13.5 ± 125.5	14.3 ± 140.9	18.8 ± 125.0	3.6 ± 75	-30.1 ± 13.0	0.86
Periprocedural MI, n (%)	7 (3)	1 (1)	4 (5)	2 (6)	0 (0)	

ACC=American College of Cardiology; AHA=American Heart Association; BCIS=British Cardiovascular Intervention Society; CFR=Coronary Flow Reserve; FFR=Fractional Flow Reserve; IMR=Index of Microcirculatory Resistance; IMRc=Index of Microcirculatory Resistance corrected for epicardial stenosis (Yong's formula); MI=Myocardial Infarction; Pd/Pa=Ratio of resting distal coronary to aortic pressure; PIOS=Physiology-guided Optimization Protocol; PPG=Pullback Pressure Gradient; SD=Standard Deviation; TT=Transit Time;

Table S3. Baseline, Follow-Up and Change in SAQ-7 scores stratified by presence of baseline (CCS class ≥ 1) and post-PCI angina (SAQ-AF score < 100)

Variables	Overall	Baseline Angina + No Post-PCI Angina	Baseline Angina + Post-PCI Angina	No Baseline Angina + No Post-PCI Angina	No Baseline Angina + Post-PCI Angina	p-value
n (%)	230	111 (48.3)	83 (36.1)	31 (13.5)	5 (2.2)	
Baseline SAQ-7						
Physical Limitation score, mean ± SD	68.61 ± 26.66	69.72 ± 24.17	54.64 ± 23.86	99.69 ± 1.60	100 ± 0	<0.001
Physical Limitation categories						<0.001
Very Poor to Poor, n (%)	7/208 (3.4)	2/97 (2.1)	5/79 (6.3)	0/27 (0)	0/5 (0)	
Poor to Fair, n (%)	38/208 (18.3)	14/97 (14.4)	24/79 (30.4)	0/27 (0)	0/5 (0)	
Fair to Good, n (%)	58/208 (27.9)	31/97 (32)	27/79 (34.2)	0/27 (0)	0/5 (0)	
Good to Excellent, n (%)	105/208 (50.5)	50/97 (51.5)	23/79 (29.1)	27/27 (100)	5/5 (100)	
Angina Frequency score, mean ± SD	68.83 ± 28.73	70.27 ± 27.81	54.46 ± 26.05	97.74 ± 5.60	96.00 ± 8.94	<0.001
Angina Frequency categories						<0.001
Daily, n (%)	35 (15.2)	13 (11.7)	22 (26.5)	0 (0)	0 (0)	
Weekly, n (%)	63 (27.4)	30 (27)	33 (39.8)	0 (0)	0 (0)	
Monthly, n (%)	70 (30.4)	41 (36.9)	23 (27.7)	5 (16.1)	1 (20)	
None, n (%)	62 (27)	27 (24.3)	5 (6)	26 (83.9)	4 (80)	
Quality of Life score, mean ± SD	48.75 ± 30.54	47.64 ± 27.88	34.79 ± 25.08	86.29 ± 18.64	72.50 ± 28.50	<0.001
Quality of Life categories						<0.001
Very Poor to Poor, n (%)	46 (20)	18 (16.2)	28 (33.7)	0 (0)	0 (0)	
Poor to Fair, n (%)	69 (30)	38 (34.2)	30 (36.1)	0 (0)	1 (20)	
Fair to Good, n (%)	50 (21.7)	27 (24.3)	16 (19.3)	6 (19.4)	1 (20)	
Good to Excellent, n (%)	65 (28.3)	28 (25.2)	9 (10.8)	25 (80.6)	3 (60)	
Summary Score, mean ± SD	62.10 ± 25.30	62.57 ± 22.55	47.83 ± 20.86	94.20 ± 7.86	89.50 ± 11.75	<0.001
Summary Score categories						<0.001
Very Poor to Poor, n (%)	17 (7.4)	6 (5.4)	11 (13.3)	0 (0)	0 (0)	
Poor to Fair, n (%)	61 (26.5)	25 (22.5)	36 (43.4)	0 (0)	0 (0)	
Fair to Good, n (%)	69 (30)	41 (36.9)	27 (32.5)	0 (0)	1 (20)	

Good to Excellent, n (%)	83 (36.1)	39 (35.1)	9 (10.8)	31 (100)	4 (80)	
Follow-up SAQ						
Physical Limitation score, mean ± SD	81.69 ± 25.73	90.84 ± 19.13	66.17 ± 28.24	92.71 ± 18.11	79.17 ± 22.05	<0.001
Physical Limitation categories						<0.001
Very Poor to Poor, n (%)	10/205 (4.9)	2/101 (2)	7/76 (9.2)	1/24 (4.2)	0/4 (0)	
Poor to Fair, n (%)	15/205 (7.3)	3/101 (3)	12/76 (15.8)	0/24 (0)	0/4 (0)	
Fair to Good, n (%)	24/205 (11.7)	7/101 (6.9)	15/76 (19.7)	1/24 (4.2)	1/4 (25)	
Good to Excellent, n (%)	156/205 (76.1)	89/101 (88.8)	42/76 (55.3)	22/24 (91.7)	3/4 (75)	
Angina Frequency score, mean ± SD	87.65 ± 19.84	100 ± 0	66.99 ± 19.92	100 ± 0	80.00 ± 7.07	<0.001
Angina Frequency categories						<0.001
Daily, n (%)	5 (2.2)	0 (0)	5 (6)	0 (0)	0 (0)	
Weekly, n (%)	32 (13.9)	0 (0)	32 (38.6)	0 (0)	0 (0)	
Monthly, n (%)	51 (22.2)	0 (0)	46 (55.4)	0 (0)	5 (100)	
None, n (%)	142 (61.7)	111 (100)	0 (0)	31 (100)	0 (0)	
Quality of Life score, mean ± SD	80.11 ± 27.12	93.02 ± 14.66	56.48 ± 28.78	95.97 ± 10.89	87.50 ± 8.84	<0.001
Quality of Life categories						<0.001
Very Poor to Poor, n (%)	12 (5.2)	0 (0)	12 (14.5)	0 (0)	0 (0)	
Poor to Fair, n (%)	19 (8.3)	2 (1.8)	17 (20.5)	0 (0)	0 (0)	
Fair to Good, n (%)	28 (12.2)	7 (6.3)	20 (24.1)	1 (3.2)	0 (0)	
Good to Excellent, n (%)	171 (74.3)	102 (91.9)	34 (41)	30 (96.8)	5 (100)	
Summary Score, mean ± SD	83.24 ± 21.47	94.71 ± 9.02	62.87 ± 22.04	96.77 ± 7.45	82.94 ± 9.95	<0.001
Summary Score categories						<0.001
Very Poor to Poor, n (%)	3 (1.3)	0 (0)	3 (3.6)	0 (0)	0 (0)	
Poor to Fair, n (%)	22 (9.6)	0 (0)	22 (26.5)	0 (0)	0 (0)	
Fair to Good, n (%)	36 (15.7)	6 (5.4)	28 (33.7)	1 (3.2)	1 (20)	
Good to Excellent, n (%)	169 (73.5)	105 (94.6)	30 (36.1)	30 (96.8)	4 (80)	
Change in SAQ Scores						
Change in Physical Limitation score, mean ± SD	13.81 ± 27.64	22.55 ± 27.60	9.87 ± 26.86	-4.17 ± 9.17	-20.83 ± 22.05	<0.001

Change in Angina Frequency score, mean \pm SD	18.83 ± 28.13	29.73 ± 27.81	12.53 ± 27.84	2.26 ± 5.60	-16.00 ± 11.40	<0.001
Change in Quality of Life score, mean \pm SD	31.36 ± 30.75	45.38 ± 27.43	21.69 ± 30.99	9.68 ± 15.38	15.00 ± 24.04	<0.001
Change in Summary Score, mean \pm SD	21.14 ± 24.73	32.14 ± 23.30	15.04 ± 23.81	2.58 ± 8.18	-6.56 ± 14.23	<0.001

SAQ=Seattle Angina Questionnaire

Table S4. Baseline and follow-up EQ-5D-5L scores stratified by stratified by presence of baseline (CCS class ≥ 1) and post-PCI angina (SAQ-AF score < 100)

Variables	Total	Baseline Angina + No Post-PCI Angina	Baseline Angina + Post-PCI Angina	No Baseline Angina + No Post-PCI Angina	No Baseline Angina + Post-PCI Angina	p-value
Baseline EQ-5D-5L						
Mobility score, mean ± SD	1.8 ± 1.0	1.7 ± 0.9	2.3 ± 1.0	1.2 ± 0.8	1.0 ± 0.0	<0.001
Self-care score, mean ± SD	1.2 ± 0.5	1.1 ± 0.4	1.4 ± 0.6	1.0 ± 0.2	1.0 ± 0.0	<0.001
Usual activities score, mean ± SD	2.2 ± 1.2	2.2 ± 1.2	2.6 ± 1.1	1.5 ± 0.9	1.0 ± 0.0	<0.001
Pain score, mean ± SD	2.0 ± 1.0	1.9 ± 0.8	2.5 ± 1.0	1.3 ± 0.8	1.2 ± 0.4	<0.001
Anxiety and depression score, mean ± SD	1.8 ± 0.9	1.6 ± 0.7	2.2 ± 0.9	1.3 ± 0.8	1.8 ± 0.8	<0.001
Visual Analogue Scale, mean ± SD	69.8 ± 18.2	72.2 ± 16.5	62.7 ± 18.7	81.2 ± 15.0	67.2 ± 19.2	<0.001
EQ-5D-5L index, mean ± SD	0.78 ± 0.20	0.81 ± 0.15	0.68 ± 0.22	0.91 ± 0.15	0.94 ± 0.06	<0.001
Follow-Up EQ-5D-5L						
Mobility score, mean ± SD	1.6 ± 1.0	1.4 ± 0.8	2.1 ± 1.2	1.2 ± 0.6	1.6 ± 0.6	<0.001
Self-care score, mean ± SD	1.3 ± 0.7	1.1 ± 0.5	1.6 ± 0.9	1.1 ± 0.4	1.0 ± 0.0	<0.001
Usual activities score, mean ± SD	1.7 ± 1.0	1.4 ± 0.8	2.4 ± 1.1	1.3 ± 0.7	1.4 ± 0.6	<0.001
Pain score, mean ± SD	1.7 ± 0.9	1.4 ± 0.8	2.4 ± 0.9	1.3 ± 0.8	1.2 ± 0.4	<0.001
Anxiety and depression score, mean ± SD	1.7 ± 1.1	1.4 ± 0.8	2.3 ± 1.3	1.3 ± 0.5	1.8 ± 0.8	<0.001
Visual Analogue Scale, mean ± SD	76.9 ± 18.3	83.3 ± 12.4	65.3 ± 21.2	83.9 ± 12.4	79.6 ± 17.8	<0.001
EQ-5D-5L index, mean ± SD	0.82 ± 0.23	0.90 ± 0.17	0.68 ± 0.27	0.93 ± 0.14	0.88 ± 0.09	<0.001
Change in Weighted Health Index	0.04 ± 0.22	0.08 ± 0.20	0.00 ± 0.27	0.02 ± 0.09	-0.05 ± 0.10	0.045

EQ-5D-5L: European Quality-of-Life–5 Dimensions–5 Levels questionnaire

Table S5. Predictors of No Post-PCI Angina in Patients with Baseline Angina (n=194)

	Univariate HR (95% CI)	p value	Multivariate HR (95% CI)	p value
BMI	0.96 (0.91 to 1.01)	0.09	0.95 (0.89 to 1.02)	0.13
Current Smoker	0.55 (0.23 to 1.3)	0.17	0.72 (0.25 to 2.09)	0.55
Ex-smoker	1.07 (0.55 to 2.07)	0.84	1.31 (0.57 to 3.03)	0.52
Atrial Fibrillation	0.22 (0.06 to 0.66)	0.01	0.42 (0.1 to 1.6)	0.21
Previous PCI	0.38 (0.2 to 0.7)	0.002	0.5 (0.22 to 1.12)	0.09
Delta FFR (0.10 increments)	1.68 (1.34 to 2.16)	<0.001	1.53 (1.17 to 2.02)	0.002
Periprocedural MI	0.18 (0.01 to 1.24)	0.13	0.23 (0.01 to 1.82)	0.22
Cardiac Rehab Attendance	0.49 (0.23 to 1.01)	0.054	0.72 (0.3 to 1.74)	0.46

BMI=Body Mass Index; FFR=Fractional Flow Reserve; HR=Hazard Ratio; MI=Myocardial Infarction; PCI=Percutaneous Coronary Intervention

Table S6. Baseline, Follow-Up and Change in SAQ-7 scores stratified by presence of post-PCI angina (SAQ-AF score < 100 at follow-up)

Variables	Overall	No Post-PCI Angina	Post-PCI Angina	p-value
n	230	142	88	
Baseline SAQ-7				
Physical Limitation score, mean ± SD	68.61±26.66	76.24±24.71	57.34±25.53	<0.001
Physical Limitation categories				<0.001
Very Poor to Poor, n (%)	7/208 (3.4)	2/124 (1.6)	5/84 (6)	
Poor to Fair, n (%)	38/208 (18.3)	14/124 (11.3)	24/84 (28.6)	
Fair to Good, n (%)	58/208 (27.9)	31/124 (25)	27/84 (32.1)	
Good to Excellent, n (%)	105/208 (50.5)	77/124 (62.1)	28/84 (33.3)	
Angina Frequency score, mean ± SD	68.83±28.73	76.27±27.20	56.82± 7.15	<0.001
Angina Frequency categories				<0.001
Daily, n (%)	35 (15.2)	13 (9.2)	22 (25)	
Weekly, n (%)	63 (27.4)	30 (21.1)	33 (37.5)	
Monthly, n (%)	70 (30.4)	46 (32.4)	24 (27.3)	
None, n (%)	62 (27)	53 (37.3)	9 (10.2)	
Quality of Life score, mean ± SD	48.75±30.54	56.07±30.61	36.93±26.59	<0.001
Quality of Life categories				<0.001
Very Poor to Poor, n (%)	46 (20)	18 (12.7)	28 (31.8)	
Poor to Fair, n (%)	69 (30)	38 (26.8)	31 (35.2)	
Fair to Good, n (%)	50 (21.7)	33 (23.2)	17 (19.3)	
Good to Excellent, n (%)	65 (28.3)	53 (37.3)	12 (13.6)	
Summary Score, mean ± SD	62.10±25.30	69.48±24.12	50.20±22.59	<0.001
Summary Score categories				<0.001
Very Poor to Poor, n (%)	17 (7.4)	6 (4.2)	11 (12.5)	
Poor to Fair, n (%)	61 (26.5)	25 (17.6)	36 (40.9)	
Fair to Good, n (%)	69 (30)	41 (28.9)	28 (31.8)	
Good to Excellent, n (%)	83 (36.1)	70 (49.3)	13 (14.8)	

Follow-up SAQ				
Physical Limitation score, mean ± SD	81.69±25.73	91.20±18.88	66.82±27.99	<0.001
Physical Limitation categories				<0.001
Very Poor to Poor, n (%)	10/205 (4.9)	3/125 (2.4)	7/80 (8.8)	
Poor to Fair, n (%)	15/205 (7.3)	3/125 (2.4)	12/80 (15)	
Fair to Good, n (%)	24/205 (11.7)	8/125 (6.4)	16/80 (20)	
Good to Excellent, n (%)	156/205 (76.1)	111/125 (88.8)	45/80 (56.3)	
Angina Frequency score, mean ± SD	87.65±19.84	100±0	67.73±19.64	<0.001
Angina Frequency categories				<0.001
Daily, n (%)	5 (2.2)	0	5 (5.7)	
Weekly, n (%)	32 (13.9)	0	32 (36.4)	
Monthly, n (%)	51 (22.2)	0	51 (58)	
None, n (%)	142 (61.7)	142 (100)	0	
Quality-of-Life score, mean ± SD	80.11±27.16	93.66±13.95	58.24±28.92	<0.001
Quality-of-Life categories				<0.001
Very Poor to Poor, n (%)	12 (5.2)	0	12 (13.6)	
Poor to Fair, n (%)	19 (8.3)	2 (1.4)	17 (19.3)	
Fair to Good, n (%)	28 (12.2)	8 (5.6)	20 (22.7)	
Good to Excellent, n (%)	171 (74.3)	132 (93)	39 (44.3)	
Summary Score, mean ± SD	83.24±21.47	95.16±8.72	64.01±22	<0.001
Summary Score categories				<0.001
Very Poor to Poor, n (%)	3 (1.3)	0	3 (3.4)	
Poor to Fair, n (%)	22 (9.6)	0	22 (25)	
Fair to Good, n (%)	36 (15.7)	7 (4.9)	29 (33)	
Good to Excellent, n (%)	169 (73.5)	135 (95.1)	34 (38.6)	
Change in SAQ Scores				
Change in Physical Limitation score, mean ± SD	13.81±27.64	17.69±27.27	8.28±27.38	0.02
Change in Angina Frequency score, mean ± SD	18.83±28.13	23.73±27.20	10.91 ± 27.94	<0.001
Change in Quality-of-Life score, mean ± SD	31.36±30.75	37.59±29.27	21.31±30.57	<0.001

Change in Summary Score, mean \pm SD	21.14 \pm 24.73	25.68 \pm 24.25	13.81 \pm 23.85	<0.001
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SAQ=Seattle Angina Questionnaire

Table S7. Baseline and follow-up EQ-5D-5L scores stratified by presence of post-PCI angina (SAQ-AF score < 100 at follow-up)

Variables	Total	No Post-PCI Angina	Post-PCI Angina	p-value
Baseline EQ-5D-5L				
Mobility score, mean ± SD	1.8 ± 1.0	1.6 ± 0.9	2.2 ± 1.0	<0.001
Self-care score, mean ± SD	1.2 ± 0.5	1.1 ± 0.3	1.4 ± 0.6	<0.001
Usual activities score, mean ± SD	2.2 ± 1.2	2.0 ± 1.1	2.6 ± 1.1	<0.001
Pain score, mean ± SD	2.0 ± 1.0	1.7 ± 0.9	2.4 ± 1.0	<0.001
Anxiety and depression score, mean ± SD	1.8 ± 0.9	1.6 ± 0.8	2.2 ± 0.9	<0.001
Visual Analogue Scale, mean ± SD	69.8 ± 18.2	74.2 ± 16.6	62.9 ± 18.7	<0.001
EQ-5D-5L index, mean ± SD	0.78 ± 0.20	0.84 ± 0.15	0.69 ± 0.22	<0.001
Follow-Up EQ-5D-5L				
Mobility score, mean ± SD	1.6 ± 1.0	1.3 ± 0.8	2.1 ± 1.1	<0.001
Self-care score, mean ± SD	1.3 ± 0.7	1.1 ± 0.4	1.6 ± 0.9	<0.001
Usual activities score, mean ± SD	1.7 ± 1.0	1.4 ± 0.7	2.3 ± 1.1	<0.001
Pain score, mean ± SD	1.7 ± 0.9	1.4 ± 0.8	2.3 ± 0.9	<0.001
Anxiety and depression score, mean ± SD	1.7 ± 1.1	1.4 ± 0.7	2.3 ± 1.3	<0.001
Visual Analogue Scale, mean ± SD	76.9 ± 18.3	83.5 ± 12.4	66.2 ± 21.2	<0.001
EQ-5D-5L index, mean ± SD	0.82 ± 0.23	0.91 ± 0.17	0.69 ± 0.26	<0.001
Change in Weighted Health Index	0.04 ± 0.22	0.07 ± 0.18	-.001 ± 0.26	0.03

EQ-5D-5L: European Quality-of-Life–5 Dimensions–5 Levels questionnaire

Table S8. Spearman correlation between FFR and follow-up Patient Reported Outcome Measure scores among patients with angina at baseline (CCS Class I and above)

Patient Reported Outcome Measure	FFR	Correlation Coefficient	P value
SAQ Physical Limitation Score (SAQ7-PL)	Baseline	-0.21	0.008
	Post-PCI	0.07	0.39
	Absolute Change	0.26	0.002
	Percentage Change	0.26	0.001
SAQ Angina Frequency Score (SAQ7-AF)	Baseline	-0.31	<0.0001
	Post-PCI	0.07	0.35
	Absolute Change	0.35	<0.0001
	Percentage Change	0.36	<0.0001
SAQ Quality of Life Score (SAQ7-QL)	Baseline	-0.17	0.02
	Post-PCI	0.03	0.70
	Absolute Change	0.21	0.008
	Percentage Change	0.22	0.006
SAQ Summary Score (SAQ7-SS)	Baseline	-0.26	0.0004
	Post-PCI	0.01	0.90
	Absolute Change	0.29	0.0002
	Percentage Change	0.30	<0.0001
EQ-5D-5L UK Weighted Health State	Baseline	-0.15	0.04
	Post-PCI	0.02	0.80
	Absolute Change	0.20	0.011
	Percentage Change	0.21	0.008

CCS=Canadian Cardiovascular Society; EQ-5D-5L= European Quality-of-Life-5 Dimension-5 Level questionnaire; FFR=Fractional Flow Reserve; PCI=Percutaneous Coronary Intervention; SAQ=Seattle Angina Questionnaire.

Table S9. Follow-Up PROM scores stratified by tertiles of FFR at baseline, post-PCI and percentage change among patients with angina at baseline (CCS class I and above)

FFR	Patient Reported Outcome	Low		Intermediate		High		p value
		N	Score	N	Score	N	Score	
Baseline	SAQ Physical Limitation Score	55	83.79±25.68	53	81.05±24.98	51	75.82±24.80	0.30
	SAQ Angina Frequency Score	61	93.77±13.31	59	82.71±23.48	54	80.74±23.14	0.001
	SAQ Quality of Life Score	61	84.02±23.62	59	75.64±29.94	54	74.31±28.98	0.12
	SAQ Summary Score	61	87.60±17.75	59	79.17±24.47	54	77.02±23.61	0.02
	EQ-5D-5L Health State (UK)	61	0.84±0.25	59	0.78±0.27	54	0.79±0.24	0.35
Post-PCI	SAQ Physical Limitation Score	51	81.54±23.94	57	77.92±26.70	54	80.86±28.94	0.75
	SAQ Angina Frequency Score	58	84.48±21.70	62	86.29±20.74	59	87.29±19.99	0.76
	SAQ Quality of Life Score	58	77.59±29.22	62	76.41±26.31	59	77.54±29.89	0.97
	SAQ Summary Score	58	81.62±22.46	62	80.25±20.72	59	81.17±24.12	0.94
	EQ-5D-5L Health State (UK)	58	0.82±0.24	62	0.81±0.21	59	0.79±0.29	0.87
Percentage Change	SAQ Physical Limitation Score	47	71.81±30.07	48	83.16±24.76	52	85.90±23.89	0.02
	SAQ Angina Frequency Score	50	78.60±23.56	55	85.09±21.33	57	94.39±13.89	<0.001

	SAQ Quality of Life Score	50	71.75±29.75	55	77.95±28.05	57	84.43±23.89	0.06
	SAQ Summary Score	50	74.51±24.20	55	81.45±22.38	57	88.23±18.29	0.006
	EQ-5D-5L Health State (UK)	50	0.76±0.26	55	0.81±0.24	57	0.84±0.26	0.29

FFR=Fractional Flow Reserve; PCI=Percutaneous Coronary Intervention; SAQ=Seattle Angina Questionnaire

Table S10. Spearman correlation between CFR and follow-up Patient Reported Outcome Measure scores among patients with angina at baseline (CCS Class I and above) (n=194)

Patient Reported Outcome Measure	CFR	Correlation Coefficient	P value
SAQ Physical Limitation Score (SAQ7-PL)	Baseline	-0.08	0.32
	Post-PCI	0.10	0.21
	Absolute Change	0.18	0.02
	Percentage Change	0.21	0.008
SAQ Angina Frequency Score (SAQ7-AF)	Baseline	-0.24	0.002
	Post-PCI	0.08	0.26
	Absolute Change	0.20	0.009
	Percentage Change	0.26	<0.001
SAQ Quality of Life Score (SAQ7-QL)	Baseline	-0.13	0.10
	Post-PCI	0.03	0.64
	Absolute Change	0.12	0.12
	Percentage Change	0.16	0.036
SAQ Summary Score (SAQ7-SS)	Baseline	-0.16	0.03
	Post-PCI	0.07	0.37
	Absolute Change	0.17	0.03
	Percentage Change	0.21	0.005
EQ-5D-5L UK Weighted Health Index	Baseline	-0.06	0.40
	Post-PCI	0.09	0.21
	Absolute Change	0.17	0.025
	Percentage Change	0.20	0.01

CCS=Canadian Cardiovascular Society; CFR=Coronary Flow Reserve; EQ-5D-5L=European Quality-of-Life-5 Dimension-5 Level questionnaire; PCI=Percutaneous Coronary Intervention; SAQ=Seattle Angina Questionnaire.

Table S11. PROM scores 3 months post-PCI stratified by tertiles of CFR at baseline, post-PCI and percentage change among patients with angina at baseline

CFR	Patient Reported Outcome	Low		Intermediate		High		p value
		N	Score	N	Score	N	Score	
Baseline	SAQ Physical Limitation Score	52	81.57±26.58	53	78.77±27.23	54	78.32±26.59	0.80
	SAQ Angina Frequency Score	61	91.31±16.48	56	83.04±22.96	57	80.53±23.18	0.015
	SAQ Quality of Life Score	61	81.56±25.88	56	75.67±31.21	57	74.12±28.14	0.32
	SAQ Summary Score	61	85.00±19.86	56	78.70±25.58	57	77.65±21.99	0.16
	EQ-5D-5L Health State (UK)	61	0.80±0.27	56	0.84±0.19	57	0.77±0.27	0.34
Post-PCI	SAQ Physical Limitation Score	56	75.52±26.83	51	83.99±23.62	63	81.22±27.80	0.23
	SAQ Angina Frequency Score	62	83.55±21.36	61	85.41±23.49	64	88.75±16.57	0.36
	SAQ Quality of Life Score	62	75.81±30.52	61	77.05±30.21	64	79.88±24.05	0.71
	SAQ Summary Score	62	77.93±23.95	61	82.09±23.16	64	83.38±20.10	0.37
	EQ-5D-5L Health State (UK)	62	0.80±0.23	61	0.80±0.23	64	0.82±0.27	0.86
Percentage Change	SAQ Physical Limitation Score	50	70.58±27.00	51	86.93±22.25	52	80.61±27.89	0.007
	SAQ Angina Frequency Score	55	76.18±25.35	55	90.00±15.87	58	89.14±18.28	<0.001

	SAQ Quality of Life Score	55	68.18±33.14	55	85.45±19.80	58	78.88±28.02	0.005
	SAQ Summary Score	55	71.90±25.71	55	87.38±16.11	58	82.58±22.47	0.006
	EQ-5D-5L Health State (UK)	55	0.72±0.25	55	0.88±0.17	58	0.81±0.27	<0.001

CFR=Coronary Flow Reserve ; EQ-5D-5L=European Quality-of-Life-5 Dimension-5 Level questionnaire; PCI=Percutaneous Coronary Intervention; PROM=Patient-Reported Outcome Measure; SAQ=Seattle Angina Questionnaire

Table S12. Spearman correlation between corrected IMR (IMRc) and Patient Reported Outcome Measure scores 3 months post-PCI among patients with angina at baseline (CCS Class I and above)

Patient Reported Outcome Measure	IMRc	Correlation Coefficient	P value
SAQ Physical Limitation Score (SAQ7-PL)	Baseline	-0.02	0.82
	Post-PCI	0.02	0.70
	Absolute Change	-0.02	0.85
	Percentage Change	0.04	0.64
SAQ Angina Frequency Score (SAQ7-AF)	Baseline	-0.04	0.62
	Post-PCI	-0.05	0.54
	Absolute Change	-0.03	0.67
	Percentage Change	-0.03	0.73
SAQ Quality of Life Score (SAQ7-QL)	Baseline	-0.04	0.59
	Post-PCI	-0.04	0.59
	Absolute Change	0.02	0.84
	Percentage Change	0.04	0.64
SAQ Summary Score (SAQ7-SS)	Baseline	-0.03	0.68
	Post-PCI	-0.04	0.56
	Absolute Change	-0.01	0.88
	Percentage Change	0.02	0.78
EQ-5D-5L UK Weighted Health Index	Baseline	-0.08	0.29
	Post-PCI	-0.08	0.26
	Absolute Change	-0.02	0.81
	Percentage Change	0.01	0.95

CCS=Canadian Cardiovascular Society; IMRc=Index of Microcirculatory Resistance corrected for epicardial stenosis (Yong's formula); EQ-5D-5L= European Quality-of-Life-5 Dimension-5 Level questionnaire; PCI=Percutaneous Coronary Intervention; SAQ=Seattle Angina Questionnaire.

Table S13. PROM scores 3 months post-PCI stratified by tertiles of IMRc at baseline, post-PCI and percentage change among patients with angina at baseline

IMRc	Patient Reported Outcome	Low		Intermediate		High		p value
		N	Score	N	Score	N	Score	
Baseline	SAQ Physical Limitation Score	53	83.73±25.32	47	78.37±26.28	50	76.83±29.66	0.40
	SAQ Angina Frequency Score	56	86.61±20.56	53	83.58±21.93	56	84.82±22.07	0.76
	SAQ Quality of Life Score	56	80.58±25.99	53	74.29±28.42	56	77.01±30.60	0.51
	SAQ Summary Score	56	83.59±20.09	53	79.12±22.84	56	79.42±25.14	0.51
	EQ-5D-5L Health State (UK)	56	0.84±0.24	53	0.79±0.23	56	0.78±0.27	0.39
Post-PCI	SAQ Physical Limitation Score	60	77.50±27.07	51	86.60±23.57	55	76.59±27.95	0.10
	SAQ Angina Frequency Score	63	85.08±21.01	60	88.67±18.91	60	83.83±22.33	0.42
	SAQ Quality of Life Score	63	76.98±27.42	60	80.83±27.47	60	74.79±30.14	0.50
	SAQ Summary Score	63	80.18±21.63	60	85.13±22.06	60	77.87±23.71	0.20
	EQ-5D-5L Health State (UK)	63	0.81±0.23	60	0.84±0.26	60	0.77±0.23	0.37
Absolute Change	SAQ Physical Limitation Score	47	79.61±27.68	50	80.67±25.22	46	78.17±28.75	0.90
	SAQ Angina Frequency Score	53	85.85±20.80	55	87.27±19.76	50	82.00±22.95	0.43

	SAQ Quality of Life Score	53	76.65±29.83	55	79.32±26.38	50	76.50±28.86	0.85
	SAQ Summary Score	53	80.46±24.03	55	82.81±21.01	50	78.84±23.48	0.67
	EQ-5D-5L Health State (UK)	53	0.80±0.28	55	0.83±0.19	50	0.78±0.26	0.54
Percentage Change	SAQ Physical Limitation Score	47	77.84±29.61	48	82.29±24.04	48	78.39±27.57	0.68
	SAQ Angina Frequency Score	54	85.19±21.61	53	88.30±18.99	51	81.76±22.60	0.29
	SAQ Quality of Life Score	54	75.69±29.78	53	81.37±26.47	51	75.49±28.39	0.48
	SAQ Summary Score	54	79.50±24.77	53	84.34±20.74	51	78.39±22.52	0.36
	EQ-5D-5L Health State (UK)	54	0.79±0.28	53	0.84±0.19	51	0.78±0.25	0.46

EQ-5D-5L= European Quality-of-Life-5 Dimension-5 Level questionnaire; IMRc=Index of Microcirculatory Resistance corrected for epicardial stenosis (Yong's formula); PCI=Percutaneous Coronary Intervention; PROM=Patient-Reported Outcome Measure; SAQ=Seattle Angina Questionnaire