

Clinical outcome following percutaneous coronary intervention in stable coronary artery disease based on a novel index: computational pressure-flow dynamics derived fractional flow reserve

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Introduction

Computational pressure-flow dynamics derived fractional flow reserve (caFFR) is a novel index to assess myocardial ischaemia of coronary artery disease (CAD), without the need of invasive pressure wire and hyperaemic stimulus measured by conventional fractional flow reserve (FFR). Nonetheless, the clinical value of caFFR is uncertain.

This study evaluated the clinical outcomes of patients with and without percutaneous coronary intervention (PCI) in patients with ischaemia defined by caFFR.

Conventional FFR ^{1,2}

- Pressure-derived physiologic index, defined as the ratio of mean distal coronary pressure to mean aortic pressure
- Standard method to evaluate the functional significance of epicardial coronary artery stenosis as a Class IA recommendation, by incorporating stenosis severity, myocardial territory and viability, and collateral perfusion
- Utilizes a specialized guide wire to measure blood pressure within a coronary artery
- Low adoption rate of FFR guided PCI in real-world practice

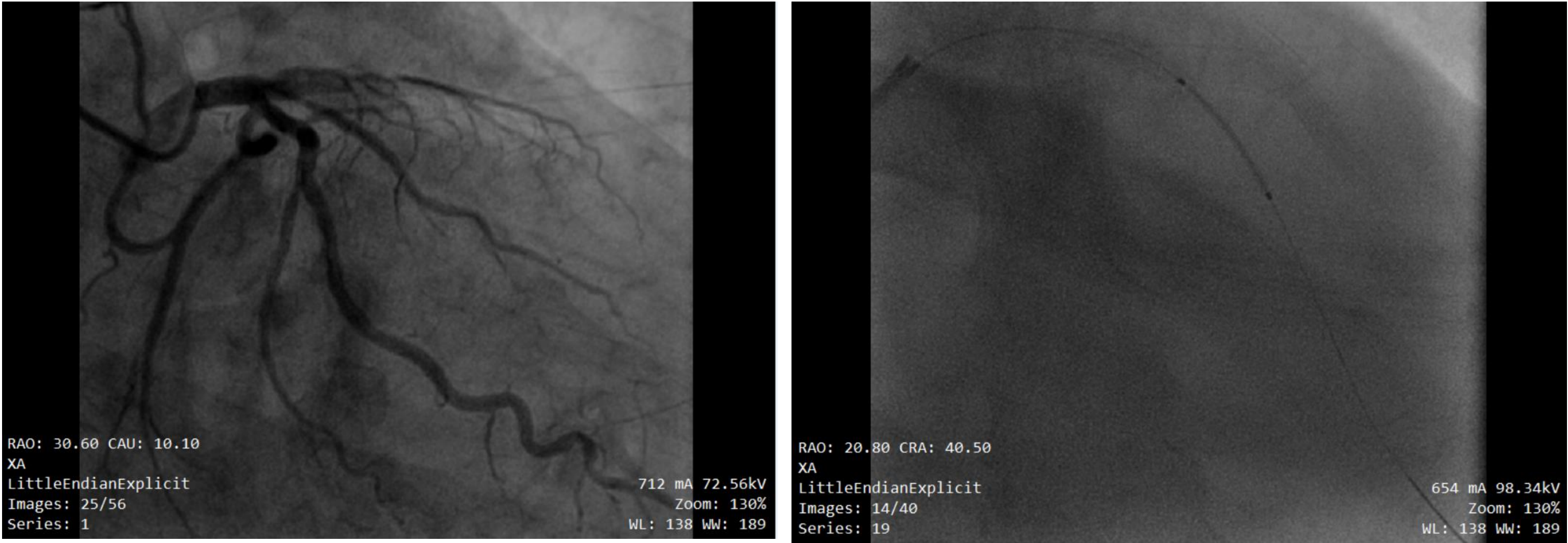
caFFR

- Angiography-based FFR generated by FLASH software using computational pressure-fluid dynamics
- Computational time < 1 minute, total operation time < 5 minutes
- Previously reported accuracy validation³

Methods

A total of 442 patients (mean age: 66.0 ± 10.7; 73.1% male) with stable CAD and functional ischaemia defined as caFFR ≤ 0.80 were identified. Patients were subsequently stratified into those with PCI (n=320) and without PCI (n=122).

The primary end point was defined as a composite of all-cause mortality, myocardial infarction or any repeat revascularization at 3 years.



Results

The number of obstructive lesions was 2.6 ± 1.5 in patients with PCI and 2.3 ± 1.4 in those without PCI (P=0.203) and the severity of CAD assessed by SYNTAX score was similar between the two groups (19.8 ± 10.6 vs 17.8 ± 9.5, P=0.072).

The rate of primary end point was significantly lower in those with PCI compared with those without PCI (8.1% vs 18.0%; adjusted hazard ratio [HR]=0.49; 95% confidence interval [CI]=0.28-0.88; P=0.016). Recurrent angina was also significantly less in patients with PCI compared with those without PCI (10.3% vs 20.5%; adjusted HR=0.54; 95% CI=0.32-0.92; P=0.005).

Table 2. Primary and Secondary End Points at 3 Years.

	Ischemic, with PCI (n=320)	Ischemic, without PCI (n=122)	P value
Composite of death, MI, and any repeat revascularization - no. (%)	26 (8.1)	22 (18.0)	0.003
Recurrent Angina	33 (10.3)	25 (20.5)	0.005

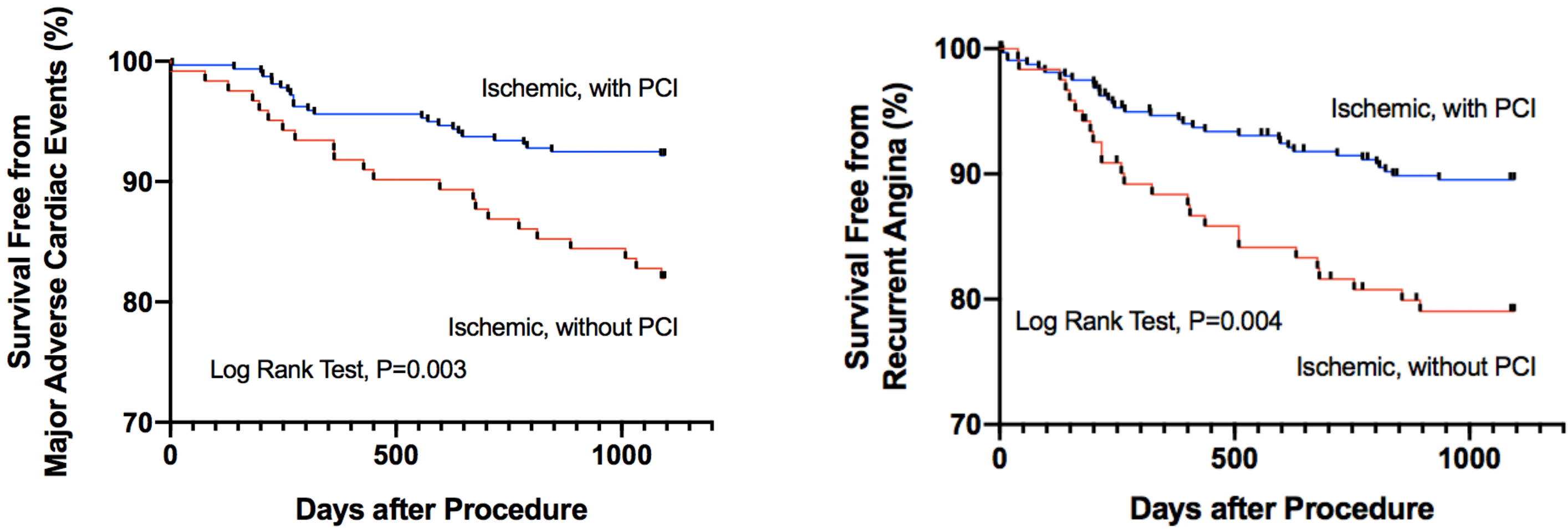


Table 3a. Univariate and multivariate cox regression models for MACE outcomes in patients with ischemic lesions at 3 years.

	Univariate analysis			Multivariate analysis		
	Hazard Ratio	95% Confidence Interval	P value	Hazard Ratio	95% Confidence Interval	P value
PCI	0.432	0.245-0.761	0.004	0.449	0.247-0.816	0.009
Age	0.999	0.973-1.026	0.937			
Sex	1.654	0.801-3.415	0.173			
History of MI	2.291	1.029-5.106	0.043	2.158	0.898-5.188	0.086
History of PCI	1.324	0.701-2.503	0.387			
Peripheral Vascular Disease	2.700	0.855-11.125	0.169			
ACEI	1.342	0.752-2.342	0.328			
Cerebrovascular disease	1.162	0.417-3.223	0.774			
Diabetes Mellitus	2.041	1.154-3.611	0.014	1.480	0.773-2.834	0.237
Hypertension	1.419	0.762-2.645	0.270			
Smoker	0.847	0.441-1.628	0.619			
Hyperlipidaemia	1.327	0.752-2.342	0.328			
Family history of CAD	0.830	0.115-6.019	0.854			
Renal disease	6.665	3.315-13.400	0.000	3.852	1.679-8.839	0.001
Beta blocker	0.903	0.513-1.592	0.725			
Calcium antagonist	0.760	0.413-1.400	0.379			
ARB	1.342	0.756-2.381	0.316			
Diuretics	1.220	0.548-2.720	0.626			
Digoxin	2.372	0.327-17.195	0.393			
Nitrate	0.531	0.281-1.003	0.051	0.537	0.263-1.096	0.088
Statin	0.436	0.243-0.783	0.005	0.354	0.171-0.734	0.005
Insulin injection	2.878	1.434-5.778	0.003	1.558	0.674-3.598	0.300
Anti-DM drugs	0.760	0.395-1.461	0.410			
Aspirin	0.549	0.306-0.984	0.044	1.058	0.522-2.144	0.876
Anti-ADP	1.111	0.578-2.135	0.752			
Anticoagulant	1.142	0.277-4.706	0.854			

Conclusion

In stable CAD patients with myocardial ischaemia defined by caFFR ≤ 0.80, PCI significantly reduces the rate of the composite end point and recurrent episode of angina compared with those without PCI.

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