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Clinical outcomes among patients with acute coronary syndrome and concomitant multivessel disease based on a novel angiography-based index in non-culprit vessels

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Introduction

- **Fractional flow reserve** (FFR) is a physiological index which measures the degree of myocardial ischaemia caused by coronary artery stenoses, and FFR-guided revascularization has been shown to provide clinical benefits
- **Computational pressure-flow dynamics** derived fractional flow reserve (caFFR) is a novel index which estimates FFR values, and was shown to have high accuracy
- Compared to FFR, caFFR **does not require** the use of pressure guidewire as well as induction of hyperaemia, and it can be analzed retrospectively if suitable coronary angiograms are available
- In patients with acute coronary syndrome (ACS) and multivessel disease, significant ischaemia-producing lesions in **non-culprit vessels** may affect clinical outcomes
- This study aimed to evaluate the prognostic value of non-culprit vessel ischaemia, based on caFFR assessment, among ACS patients with multivessel disease

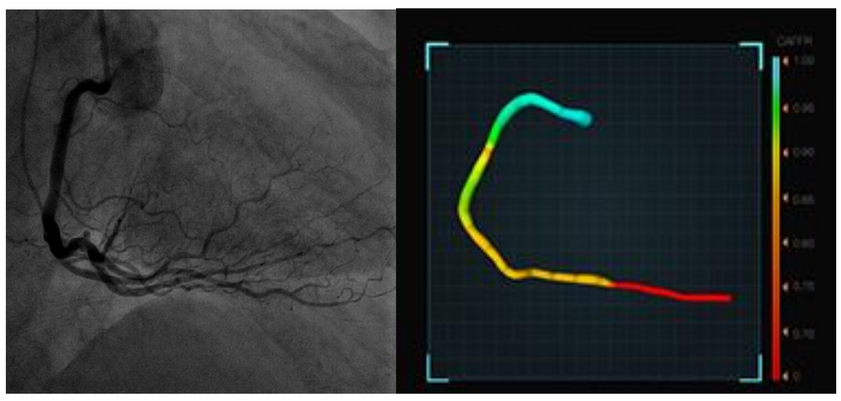

Figure 1: caFFR analysis
Coronary angiogram (left) and reconstruction of vessel contour (right)

Methods

- Patients presenting with ACS (including STEMI, NSTEMI and unstable angina) and multivessel disease (≥50% diameter stenosis in ≥2 major coronary arteries) between 2014-2016 in Queen Mary Hospital were retrospectively included
- Coronary angiograms and mean aortic pressure data were retrieved for caFFR analysis
- Based on FFR threshold of 0.8, patients were stratified into 2 groups according to caFFR values in non-culprit vessels:

1. **Ischaemic group:** ≥1 non-culprit vessel with caFFR≤0.8
2. **Non-ischaemic group:** no non-culprit vessel with caFFR≤0.8

- Primary endpoint was major adverse cardiovascular events (MACE), defined as a composite of all-cause mortality, non-fatal myocardial infarction and any repeat revascularization

Results

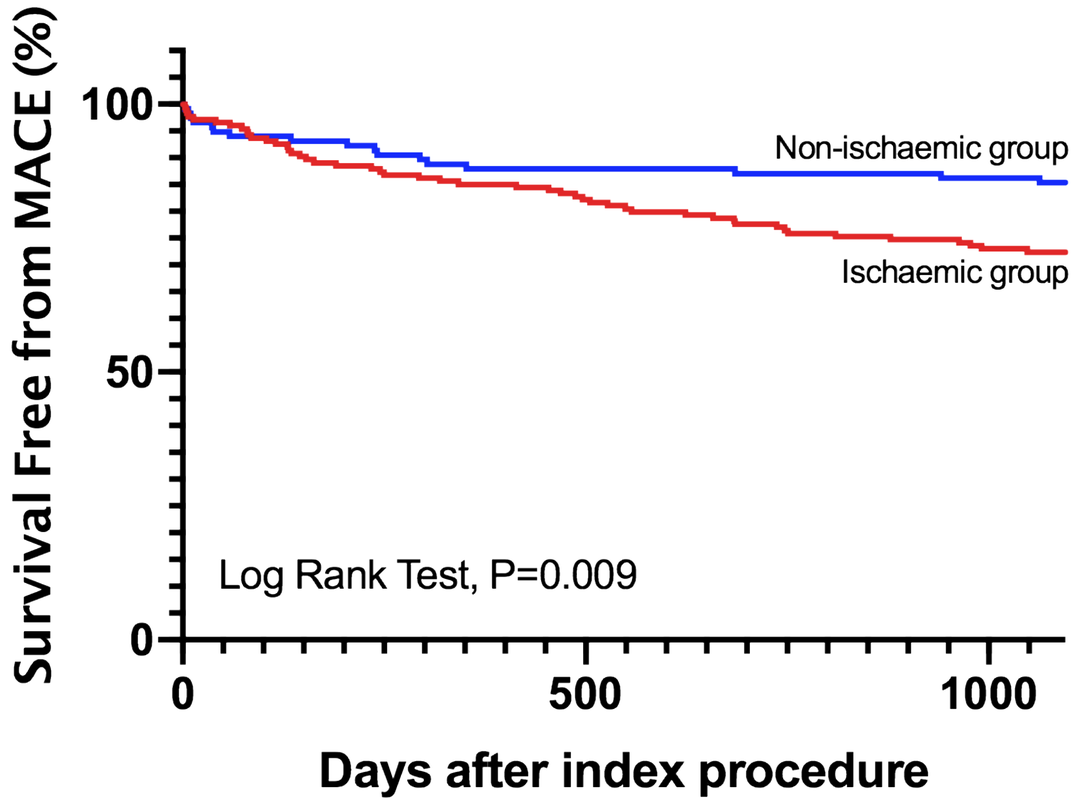

Figure 2: Kaplan-Meier Analysis for MACE

MACE at 3 years	Univariate analysis		Multivariate analysis	
	HR (95% CI)	P value	HR (95% CI)	P value
Age≥65	1.62 (0.99-2.64)	0.056	0.89 (0.49-1.62)	0.700
Male gender	0.64 (0.38-1.08)	0.098	0.74 (0.42-1.30)	0.294
Charlson Comorbidity Index≥3	2.15 (1.29-3.61)	0.004	1.73 (0.91-3.30)	0.097
History of PCI	2.78 (1.46-5.31)	0.002	**2.58** (1.30-5.13)	**0.007**
Hypertension	1.11 (0.69-1.79)	0.673		
Diabetes mellitus	1.48 (0.83-2.62)	0.184		
Hyperlipidaemia	0.76 (0.45-1.27)	0.292		
STEMI	0.91 (0.56-1.48)	0.703		
Complete PCI	0.49 (0.30-0.79)	0.003	**0.60** (0.37-0.98)	**0.043**
Ischaemic group	2.06 (1.19-3.57)	0.010	**1.79** (1.02-3.14)	**0.044**

Table 1: Univariate and Multivariate Cox Proportional Hazards Regression Models for MACE

- After multivariable adjustment, **history of PCI** and **non-culprit vessel ischaemia** were independent predictors of MACE at three years; **complete PCI** to all diseased vessels was a negative independent predictor
- The results are in line with the COMPLETE trial [1] that showed superior outcomes in STEMI and multivessel disease patients receiving complete PCI strategy compared to culprit-only PCI strategy, while our results show that non-culprit vessel ischaemia is also an important prognostic factor

Conclusion

- In patients with ACS and multivessel disease, non-culprit vessel ischaemia is associated with increased risk of MACE
- Physiological testing may have a role in managing ACS

Reference
1. Mehta SR, Wood DA, Storey RF, et al. Complete revascularization with multivessel PCI for myocardial infarction. *N Engl J Med*. 2019;381:1411-1421

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