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Correlation of Fractional Flow Reserve with non-invasive tests for the detection of ischaemia due to intermediate coronary artery stenosis

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Objectives

To compare ischaemia assessment by Fractional flow reserve (FFR) with non-invasive testing in patients with intermediate coronary artery stenosis.

Background

FFR was initially validated against SPECT, Dobutamine Stress Echo and Exercise Testing [1]. It is now frequently used to determine the management of intermediate coronary artery stenosis. A cut-off value of 0.75 is used in clinical practice to guide revascularisation supported by long-term outcome data [2], but a 'grey zone' of 0.75-0.8 with uncertain clinical significance exists [3]. Advances in non-invasive imaging tests (gated SPECT and CMR) warrant a re-evaluation of FFR at intermediate stenosis severity against non-invasive imaging.

Methods

Patients due for investigation of presumed cardiac chest pain were recruited and underwent SPECT (Discovery, GE Healthcare), perfusion-CMR (1.5T, Intera, Phillips) and coronary angiography. Any vessel that was angiographically determined as intermediate severity (40-70%) was assessed by QCA and pressure wire-derived FFR (RADI medical systems, Uppsala, Sweden).

Results

In 23 study patients (age 57±8, 78% male), 33 FFR measurements were performed (LAD 64%, Cx 18%, RCA 12%, LMS 6%). FFR was classified negative (>0.80) in n=20. Perfusion-CMR detected ischaemia in 3 vessels (2 with positive FFR and one with 'grey' FFR). SPECT also detected ischaemia in 3 vessels (2 negative FFR and one positive FFR), (Table 1). Coronary stenosis by QCA and FFR correlated poorly (r= -0.35, p=0.054) . Chi-squared analysis of FFR severity found no significant association between FFR positivity and perfusion-CMR (p=0.078) or SPECT (p=0.34).

Conclusion

Non-invasive imaging does not correlate well with FFR measurements in intermediate coronary lesions. Perfusion-CMR whilst not significantly discriminating between the groups had no false negatives and may thus be the more useful additional test to determine the significance of 'grey' lesions on FFR.

Table 1 Cross tabulation of Fractional Flow Research grading (negative ≥0.8, grey 0.75-0.79 and positive <0.75) and the qualitative result of (A) Perfusion cardiac magnetic resonance (CMR) and (B) SPECT

A		CMR		Total
		Non ischaemic	Ischaemic	
FFR	Negative	20	0	20
	Grey	7	2	9
	Positive	3	1	4
Total		30	3	33
B		SPECT		
		Non ischaemic	Ischaemic	Total
FFR	Negative	18	2	20
	Grey	9	0	9
	Positive	3	1	4
Total		30	3	33

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