Impact of coronary atherosclerotic plaque metrics and CT reader skills on inter-observer variation of repeated on-site CT-FFR

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Background and Purpose:

Little is known about the on-site CT-FFR inter-reader reproducibility and its variability in different atherosclerotic plaque scenarios. The aim of this study was to determine the variation of repeated CT-FFR analyses between two CCTA readers with different training skills across different atherosclerotic features.

Methods:

Patients referred for invasive coronary angiography who accepted to undergo a CCTA/CT-FFR study were prospectively included. Patients with contraindications for CCTA, atrial fibrillation, chronic total occlusions or previous coronary revascularization were excluded. Quantification of atherosclerotic plaque metrics and CT-FFR was performed for each coronary vessel by two different CT readers, one Level I and one Level III. Inter-reader agreement for CT-FFR was assessed using kappa index, Bland-Altman and Lin's concordance correlation agreement (LCCA). The impact of each atherosclerotic feature was assessed by dividing the dataset based on the corresponding median and assessing inter-reader variability for both the lower and upper half.

Results: 47 patients (137 vessels) were included. Mean age was 66 ± 10 years, 89% were males, 63% had hypertension, 76% dyslipidemia and 38% diabetes. Degree of stenosis was moderate (50-69%) in 29% and severe (≥70%) in 28% of vessels with a positive CT-FFR (≤0.80) in 39%. CT-FFR showed good correlation between the two readers based on a kappa index of 0.77 with a mean CT-FFR difference of -0.017 ± 0.12. The inter-reader agreement was good in the main epicardial vessels (LCCA of 0.70 for LAD, 0.74 for LCX and 0.76 for RCA, $p < 0.001$ for all) and better in proximal than in distal segments (LCCA of 0.83 vs 0.63, $p < 0.001$). Likewise, in different atherosclerotic plaque scenarios, the agreement was better in those vessels with lower plaque volume, less calcified and longer lesions (see table 1).

Conclusions:

In our cohort, on-site CT-FFR showed good inter-reader agreement without relevant impact by reader experience level and atherosclerotic plaque features.

Table 1

	Mean difference Bland-Altman	Lin's concordance correlation coefficient	p value
Plaque volume < median (556 mm^3)	-0.01 ± 0.12	0.85	<0.001
Plaque volume > median (556 mm^3)	-0.035 ± 0.13	0.64	<0.001
Calcified plaque burden < median (34%)	-0.03 ± 0.11	0.82	<0.001
Calcified plaque burden > median (34%)	-0.02 ± 0.14	0.75	<0.001
Lesion length < median (55 mm)	-0.005 ± 0.12	0.68	<0.001
Lesion length > median (55 mm)	-0.031 ± 0.12	0.83	<0.001

*p values indicate inter-reader agreement by two independent observers for each category