The impact of coronary calcification on diagnostic performance of workstation CT derived fractional flow reserve - a multicentre experience

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Background: On-site workstation based computed tomography derived fractional flow reserve (CT-FFR) is an emerging method to assess the vessel specific ischaemia in coronary artery disease (CAD). The impact of coronary calcification on its diagnostic performance is unknown.

Purpose: To evaluate the impact of coronary calcification on the diagnostic performance of reduced-order CT-FFR at detecting vessel specific ischaemia.

Methods: This is a retrospective pooled analysis of 141 patients with suspected CAD enrolled from 3 global centres who underwent CT-coronary angiography (CTA), onsite CT-FFR and invasive FFR. Coronary calcification was assessed by Agatston score (AS). The diagnostic performance of CT-FFR (=0.8) and CTA (=50%) in evaluation of vessel specific ischaemia (FFR=0.8) was assessed across AS quartiles (Q1-4). A comparison of diagnostic performance of the low to mid AS (Q1 to Q3) versus high AS (Q4) was performed.

Results: Mean age and median AS was 65.8 ± 9.9 and 327.3 (interquartile range = 78.5 – 798.1). Diagnostic accuracy, sensitivity and specificity of CT-FFR for low-mid AS (0-798) and high AS (799-4019) were 77.4% vs 82.9%; 78.9% vs 94.7%; 68.8% vs 76.5% respectively with no statistical difference between the two groups. The AUC for ischaemia of CT-FFR in low to mid AS was comparable with AUC in the high AS (0.76 [95% CI: 0.66-0.86] vs 0.84 [0.69-0.99]; P=0.397). The AUC for ischemia for CT-FFR in both low to mid AS and high AS was significantly higher than for CTA (0.76 [0.66-0.86] vs 0.57 [0.50-0.64]; P=0.003 and 0.84 [0.69-0.99] vs 0.48 [0.38-0.57]; P<0.001 respectively).

Conclusion: On-site workstation CT-FFR demonstrated consistently high diagnostic performance in patients with high AS. Its diagnostic performance was superior when compared with significant stenosis assessment on CTA across all spectrum of Agatston scores.