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Abstract 28: Diagnostic Accuracy Of On-site FFRCT And The New Concept Of FFRangio: A Head To Head Comparison With Invasively Measured FFR

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Introduction: The new concept of "FFRangio" - simulating FFR based on coronary anatomy derived from the invasive angiogram - has shown high diagnostic accuracy to evaluate the hemodynamic significance of coronary lesions as compared to invasive FFR. So far, the diagnostic performance of non-invasive FFRangio in direct comparison to CT-derived FFR ("FFRCT") is unknown.

Methods: A total of 16 patients in whom coronary CT angiography was performed and who were further referred for invasive coronary angiography with invasive FFR measurement within 1 month of index CT were prospectively included in this analysis. All CT acquisitions were performed using a third generation dual source CT system (Somatom Force, Siemens Healthineers, Forchheim, Germany). CT data sets were rendered using a sharp (Bv49) reconstruction kernel. Iterative reconstruction (Admire® level 2) was used for all data sets. FFR_{CT} was calculated on-site using prototype software (cFFR version 3.1, Siemens Healthineers, Forchheim, Germany). Coronary angiography was performed with an image acquisition rate of 10-15 frames per second. FFRangio was calculated based on 2 to 3 angiographic frames in angulations at least 30° apart, using a dedicated workstation with proprietary software (CathWorks, Kfar-Saba, Israel). Invasive FFR was measured using a CERTUS® pressure wire (St. Jude Medical, Minnesota, USA) with intracoronary adenosine injection. Coronary stenoses with invasively measured FFR $\leq$ 0.80 were classified as hemodynamically significant. Diagnostic results of FFR_{CT} and FFR_{angio} were compared to invasive FFR.

Results: 25 vessels in 16 patients (mean age 64 ± 10 years) were analyzed. 9 lesions were classified as hemodynamically significant according to invasive FFR. The mean invasive FFR value across all 25 vessels was 0.84 ± 0.11 whereas the mean FFR value for FFR_{angio} was 0.84 ± 0.13 ($p = 0.69$) and for FFR_{CT} was 0.80 ± 0.13 ($p = 0.028$). Both FFRCT and FFRangio showed a significant correlation with invasive FFR ($r = 0.75$, $p < 0.001$, $r = 0.74$, $p < 0.001$ respectively). With a cut-off value of ≤ 0.8, FFRCT achieved a sensitivity of 100% and specificity of 87.5% to detect hemodynamically significant stenoses compared to invasive FFR, resulting in an accuracy of 92%. For FFR_{angio}, a cut off value of ≤ 0.8 resulted in a sensitivity of 88.9% and a specificity 93.8% with an equally high diagnostic accuracy of 92%. Bland-Altman analysis showed a comparable agreement of FFRangio and FFRCT with invasive FFR (mean difference of 0.002, 95% limits of agreement 0.17 to -0.17 compared to a mean difference of 0.04 and 95% limits of agreement 0.2 to -0.013 for FFRangio vs. FFRCT, respectively).

Conclusions: Simulated FFR based on coronary anatomy derived either from CT or invasive angiography achieved similar diagnostic accuracies when compared to the invasive gold standard.

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